TD-SCDMA Guide

Agilent Technologies PSA Series

Option 211

This manual provides documentation for the following instruments:
Spectrum Analyzers:
E4440A (3 Hz – 26.5 GHz)
E4443A (3 Hz – 6.7 GHz)
E4445A (3 Hz – 13.2 GHz)
E4446A (3 Hz – 44.0 GHz)
E4448A (3 Hz – 50.0 GHz)

Manufacturing Part Number: E4440-90231
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1 Introduction

This chapter provides overall information on the TD-SCDMA communications system and describes TD-SCDMA measurements made by the analyzer. For further information, a list of associated documents is also provided.

What Does the Agilent PSA Series and Option 211 Do?

The PSA series spectrum analyzer offers comprehensive RF measurement capabilities. The TD-SCDMA (Time Division Synchronous Code Domain Multiple Access) measurement personality provides a suite of standard-based measurements, including one-button power measurements, to provide the most comprehensive and easy-to-use TD-SCDMA measurement solution in one analyzer, and to help you evaluate margins and trade-offs in your design performance, efficiency, and cost.

TD-SCDMA is a wireless multiple access technology, which combines aspects of code division multiple access (CDMA) and time division multiple access (TDMA). Making standard-based measurements presents unique challenges and requirements. The PSA series TD-SCDMA measurement personality provides a one-analyzer solution to perform essential power measurements on complex TD-SCDMA signals so that you can:

- ✓ Facilitate the design, development, and deployment of TD-SCDMA systems
- ✓ Expand design possibilities with powerful measurement capability and flexibility
- ✓ Expedite troubleshooting and design verification with numerous features and an intuitive user interface
- ✓ Simplify test systems with RF power measurements, spur searches, and general high-performance spectrum analysis in one analyzer

You can test a TD-SCDMA transmitter manufactured according to CWTS TSM standards documents. These documents define complex, multi-part measurements used to create and maintain an interference-free environment. For example, the documents include standardized test methods for the measurement of power in a carrier, a spectrum emission mask, and other critical measurements.

You can use the PSA with Option 211 to automatically make these measurements using the measurement methods and limits defined in the CWTS TSM standards documents. You may perform measurements on both uplink and downlink signals. The measurements display detailed results that allow you to analyze TD-SCDMA system performance. You may alter the measurement parameters for specialized analysis.

For infrastructure test, the instrument will test transmitters of base stations in a non-interfering manner by means of a coupler or power splitter. For subscriber unit test, mobiles may be measured by way of a splitter or coupler when the mobile is actively linked to a base station or base station simulator. An alternate method of mobile measurement

requires that the mobile be placed in a special test mode.

Using the PSA and Option 211, you can make the following measurements of TD-SCDMA signals:

- "Transmit Power Measurement" on page 36
- "Power Versus Time Measurement" on page 43
- "ACP (ACLR) Measurement" on page 49
- "Multi-Carrier Power Measurement" on page 54
- "Spurious Emissions Measurement" on page 58
- "Spectrum Emission Mask (SEM) Measurement" on page 61

Installing Optional Measurement Personalities

When you install a measurement personality, you need to follow a three step process:

1. Determine whether your memory capacity is sufficient to contain all the options you want to load. If not, decide which options you want to install now, and consider upgrading your memory. Details follow in "Do You Have Enough Memory to Load All Your Personality Options?" on page 25.
2. Install the measurement personality firmware into the instrument memory. Details follow in "Loading an Optional Measurement Personality" on page 28.
3. Enter a license key number that activates the measurement personality. Details follow in "Obtaining and Installing a License Key" on page 28.

NOTE PSA Series Spectrum Analyzers must have Option B7J in order to use most of the measurement personality options, including cdmaOne, cdma2000, 1xEV-DO, W-CDMA, GSM, EDGE, NADC, and PDC.

Adding additional measurement personalities requires purchasing a retrofit kit for the desired option. The retrofit kit contains the measurement personality firmware and an entitlement certificate that is used to generate a license key from the internet website. A separate license key is required for each option on a specific instrument serial number and host ID.

Do You Have Enough Memory to Load All Your Personality Options?

If you want to operate the instrument with only 4 or less options installed, you can skip ahead to the next section, "Loading an Optional Measurement Personality" on page 28. If, after installing your options, you get error messages relating to memory issues, you can return to this section to learn more about how to optimize your configuration.

If you want to install your 5th or 6th option, you should check to see how much memory you have installed.

If you have 64 MB of memory installed in your instrument, you should have ample memory to install 6 optional personalities, with plenty of memory to spare for data and states.

If you have less than 64 MB of installed memory, depending how much data you save, you are unlikely to have any memory issues until you want to install your 4th or 5th option. If this is the case, you can either swap the applications in/out of memory as needed, or you can upgrade your hardware to 64MB of memory.

To see the size of your installed memory for PSA Series Spectrum Analyzers:

1. Ensure that the spectrum analyzer is in spectrum analyzer mode because this can affect the screen size.
2. Press the **System** key, **MORE (1 of 3)**, and **Show Hdwr** keys.
3. Read `Flash Memory` size on the last line of the table.

If you have 48 MB of memory, and you want to install more than 4 optional personalities, you may need to manage your memory resources. The following section, "How to Predict Your Memory Requirements" on page 26, will help you decide how to configure your installed options to provide optimal operation.

How to Predict Your Memory Requirements

You should review your memory requirements, so you can decide whether you have enough memory to operate efficiently.

You can approximate your total memory requirements by adding up the following allocations:

NOTE After loading all your optional measurement personalities, you must have a reserve of ~2 MB memory to facilitate mode switching. Less memory will increase mode switching time. For example, if you use up most of your free memory by saving files of state and/or data, your mode switching times can increase to more then a minute.

1. Program memory - Select option requirements from the table "Measurement Personality Options and Memory Required" on page 27.
2. PSA shared libraries - 3.5 MB
3. PSA mode swap space- 0.5 MB
4. State memory - State file sizes range from 21 kB for SA mode to 40 kB for W-CDMA. The state of every mode accessed since power-on will be saved in the state file. File sizes can exceed 150 kB each when several modes are accessed, for each state file saved.
5. Screens - .gif files need 20-25 kB each

TIP State memory retains settings for all states accessed before the **Save State** command. To reduce this usage to a minimum, reduce the modes accessed before the **Save State** is executed. You can set the PSA to boot into a selected mode by assessing the desired mode, then pressing the **System**, **Power On/Preset**, **Power On** keys and toggle the setting to **Last**.

Measurement Personality Options and Memory Required

Personality Options [a] **(for PSA series)**	**Option**	**File Size (PSA Rev: A.05)**
cdmaOne measurement personality	**BAC**	1,900,000 Bytes[b]
NADC and PDC measurement personalities (not available separately)	**BAE**	2,400,000 Bytes[b]
W-CDMA (only) measurement personality	**BAF**	4,700,000 Bytes [b]
W-CDMA w/ HSDPA measurement personality	**210**	5,000,000 Bytes [b]
cdma2000 (only) measurement personality	**B78**	4,000,000 Bytes [b]
cdma2000 w/ 1xEV-DV measurement personality	**214**	4,300,000 Bytes [b]
1xEV-DO measurement personality	**204**	4,800,000 Bytes [b]
Shared measurement library[b]	n/a	4,300,000 Bytes
PSA only Options:		
Phase noise measurement personality	**226**	2,800,000 Bytes[c]
Noise Figure measurement personality	**219**	4,800,000 Bytes[c]
Basic measurement personality with digital demod hardware	**B7J**	Cannot be deleted
GSM (with EDGE) measurement personality	**202**	3,400,000 Bytes[b]
HP8566B/HP8568B Programming Code Compatibility [d]	**266**	650,000 Bytes[c]
TD-SCDMA	**211**	5,210,000 Bytes[c]
Shared measurement library[b]	n/a	4,300,000 Bytes

a. Available as of the print date of this guide.
b. PSA Series personality options use a 4,300,000 Byte shared measurement library. If you are loading multiple personalities that use this library, you only need to add this memory allocation once.
c. Shared measurement library allocation not required
d. This is a no charge option that does not require a license key.

Memory Upgrade Kits

The PSA 64 MB Memory Upgrade kit p/n is E4440AU Option ANE.

For more information about memory upgrade kits contact your local sales/service office, or see:

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

Loading an Optional Measurement Personality

You must use a PC to load the desired personality option into the instrument memory. Loading can be done from a firmware CD-ROM or an internet location. An automatic loading program comes with the files and runs from your PC.

To check the Agilent website for firmware versions available for downloading, see: www.agilent.com/find/psa, and refer to the link for “Firmware Upgrades”.

NOTE When you add a new option, or update an existing option, you will get the updated versions of all your current options as they are all reloaded simultaneously. This process may also require you to update the instrument core firmware so that it is compatible with the new option.

Depending on your installed hardware memory, you may not be able to fit all of the available measurement personalities in instrument memory at the same time. You may need to delete an existing option file from memory and load the one you want. Use the automatic update program that is provided with the files. Refer to the table showing “Measurement Personality Options and Memory Required” on page 27.

The approximate memory requirements for the options are listed above. These numbers are worst case examples. Some options share components and libraries, therefore the total memory usage of multiple options may not be exactly equal to the combined total.

Obtaining and Installing a License Key

If you purchase an optional personality that requires installation, you will receive an “Entitlement Certificate” which may be redeemed for a license key specific to one instrument. Follow the instructions that accompany the certificate to obtain your license key.

To install a license key number for the selected personality option, use the following procedure:

NOTE You can also use this procedure to reinstall a license key number that has been deleted during an uninstall process, or lost due to a memory failure.

1. Press **System**, **More**, **More**, **Licensing**, **Option** to accesses the alpha editor. Use this alpha editor to enter letters (upper-case), and the front-panel numeric keys to enter numbers for the option designation. You will validate your option entry in the active function area of the display. Then, press the **Enter** key.

2. Press **License Key** to enter the letters and digits of your license key. You will validate your license key entry in the active function area of the display. Then, press the **Enter** key.
3. Press the **Activate License** key.

Viewing a License Key

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

Use the following procedure to display the license key number unique to your personality option that is already installed in your instrument:

Press **System**, **More**, **More**, **Licensing**, **Show License.** The **System**, **Personality** key displays the personalities loaded, version information, and whether the personality are licensed.

NOTE *You will want to keep a copy of your license key number in a secure location. Press **System**, **More**, then **Licensing**, **Show License**, and print out a copy of the display that shows the license numbers. If you should lose your license key number, call your nearest Agilent Technologies service or sales office for assistance.*

Using the Delete License Key

This key will make the option unavailable for use, but will not delete it from memory. Write down the 12-digit license key number for the option before you delete it. If you want to use that measurement personality later, you will need the license key number to reactivate the personality firmware.

NOTE Using the **Delete License** key does not remove the personality from the instrument memory, and does not free memory to be available to install another option. If you need to free memory to install another option, refer to the instructions for loading firmware updates located at the URL: **http://www.agilent.com/find/psa/**

1. Press **System**, **More**, **More**, **Licensing**, **Option**. Pressing the **Option** key will activate the alpha editor menu. Use the alpha editor to enter the letters (upper-case) and the front-panel numeric keyboard to enter the digits (if required) for the option, then press the **Enter** key. As you enter the option, you will see your entry in the active function area of the display.
2. Press **Delete License** to remove the license key from memory.

Performing a Security Erase on PSA Series Spectrum Analyzers

A Security Erase of a PSA can perform the following functions:

- Blank the display
- Erase user files
- Erase all memory including the operating system

To perform a security erase of your instrument memory you will need to have PSA Option HS7, a free firmware option, installed. For more information see:

`http://www.agilent.com/find/security`

Instructions for security erase procedures and the PSA Option HS7 firmware upgrade are available for downloading.

CAUTION Security Erase procedures can leave your instrument in an inoperative state. Be sure to follow the instructions carefully.

Ordering Optional Measurement Personalities

To order a measurement personality option you need to supply the instrument model number, the host ID and the serial number.

Required Information:	**Front Panel Key Path:**
Model #: (Ex. E4440A)	
Host ID: _____	**System**, **Show System**
Instrument Serial Number: _____	**System**, **Show System**

2 Making Measurements

This chapter introduces the basic features of the analyzer, including the front panel keys, and provides simplified procedures for making measurements on TD-SCDMA BTS or MS.

TD-SCDMA Measurements

This chapter begins with instructions common to all measurements, and then details all TD-SCDMA measurements available by pressing the **MEASURE** key. For more information on front panel keys specific to this measurement personality refer to "Key and SCPI Reference" on page 67 and for keys not described in this manual, refer to the PSA *User's and Programmer's Reference* manual. For information specific to individual measurements refer to "Concepts" on page 221 or the sections at the page numbers below.

The measurements described in this chapter are referred to as one-button measurements. When you press the key to select one measurement, it becomes the active measurement, using settings and a display unique to that measurement. Data acquisition automatically begins when trigger requirements, if any, are met.

Setting up and Making a Measurement

Making the Initial Signal Connection

CAUTION Before connecting a signal to the instrument, make sure the instrument can safely accept the signal level provided. The signal level limits are marked next to the connectors on the front panel.

See the menu map, "Input/Output Key (See page 77)" on page 242, and key descriptions, "Input/Output" on page 77, for details on selecting input ports and setting internal attenuation to prevent overloading the instrument

Using Instrument Mode and Measurement Presets

If you want to set your current measurement personality to a known, factory default state, press **Preset**. This initializes the instrument by returning the mode setup and all of the measurement setups in the mode to the factory default parameters.

NOTE Pressing the **Preset** key may switch instrument modes if you have set the Power On/Preset function Preset Type to User or Factory.

To preset only the parameters that are specific to an active, selected measurement, press **Meas Setup**, then **Restore Meas Defaults**. Restore Meas Defaults will return all the measurement setup parameters to the factory defaults, but only for the currently selected measurement. This key may not appear on the first page of the Meas Setup menu. If it is not visible on the first page of the menu, press **More** until the key is available.

The 3 Steps to Set Up and Make Measurements

All measurements need to be set up in 3 steps: first at the Mode level, second at the Measurement level, then finally the result display may be adjusted.

1. Select and Set Up the Mode

   Press **MODE** - All licensed, installed Modes available are shown. Press **TD-SCDMA**, or to make measurements of signals with non-standard formats, select **Basic** mode.

   Press **Mode Setup** - Make any required adjustments to the mode settings. These settings apply to all measurement in the mode.

2. Select and Set Up the Measurement

   Press **MEASURE** - Select a specific measurement to be performed (e.g. **ACP**, **Transmit Power**, or **Spectrum Emissions Mask**). The measurement begins as soon as any required trigger conditions are met. The resulting data is shown on the display or is available for export.

   Press **Meas Setup -** Make any adjustments as required to the selected measurement settings. The settings only apply to this measurement.

3. Select and Set Up a View of the Results

   Press **Trace/View** - Select a display format for the current measurement data. Depending on the mode and measurement selected, other graphical and tabular data presentations may be available. **Y-Scale** adjustments may also be made now.

NOTE A setting may be reset at any time, and will be in effect on the next measurement cycle or View.

Step	Primary Key	Setup Keys	Related Keys
1. Select & set up a Mode	**MODE**	**Mode Setup**, **Input/Output**, **FREQUENCY Channel**	**System**
2. Select & set up a Measurement	**MEASURE**	**Meas Setup**	**Meas Control**, **Restart**
3. Select & set up a View of the Results	**Trace/View**	**AMPLITUDE Y Scale**, **Display**, **Next Window**, **Zoom**	**File**, **Save**, **Print**, **Print Setup**, **Marker**

Preparing for Measurements

If you want to set your current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**. This will initialize the instrument by setting the mode setup and all of the measurements to the factory default parameters. Often, you should be able to make a measurement using these defaults.

NOTE Pressing the **Preset** key may switch instrument modes if you have set the Power On/Preset function Preset Type to User or Factory.

To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not appear on the first page of the menu. If not, press **More** until the key is available.) This will reset the measurement setup parameters, only for the currently selected measurement, to the factory defaults.

Initial Setup

Before activating a measurement, make sure the mode setup and frequency channel parameters are set to the desired settings. Refer to the sections "Mode Setup" on page 109 and "FREQUENCY / Channel" on page 72.

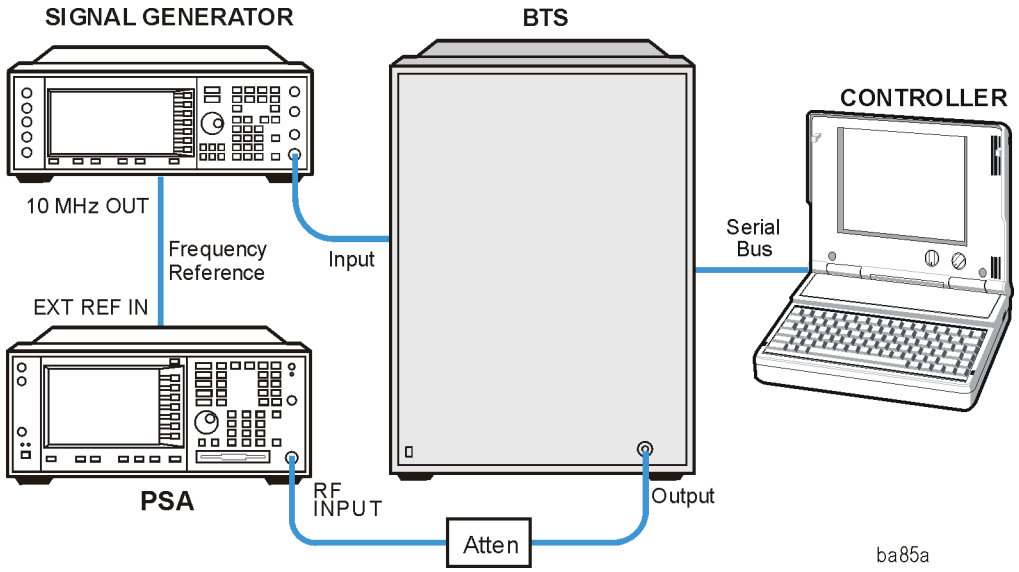
Transmit Power Measurement

One-Button BTS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The base transmission station (BTS) under test has to be set to transmit the one RF carrier remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-1 Base Station Equipment Measurement System Setup



a. Using the appropriate cables and adapters, connect the modulated signal, using the proper radio standard, from the signal generator to the amplifier input connector of the BTS.

b. Connect the output signal of the BTS to the RF input port of the instrument, through the attenuator.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the BTS through the serial bus cable.

Step 2. From the system controller, perform all of the call acquisition functions required for the BTS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE** and **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **BTS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the number pad, enter the frequency of interest.

Step 7. Select the measurement by pressing **MEASURE** and the **Transmit Power** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 37

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on use of the available keys and customizing your measurement, refer to "Transmit Power Measurement" on page 123. For additional information on the measurement concepts, refer to "Transmit Power Measurement Concepts" on page 225.

Measurement Results

Figure 2-2 shows an example of Transmit Power measurement result with the measurement method set to measured burst width. The transmit power graph is shown in the graph window. The measured mean transmit power, current data minimum and maximum power points, full burst width, along with the amplitude threshold level used are shown in the text window.

Figure 2-2 Transmit Power—Measured Burst Width

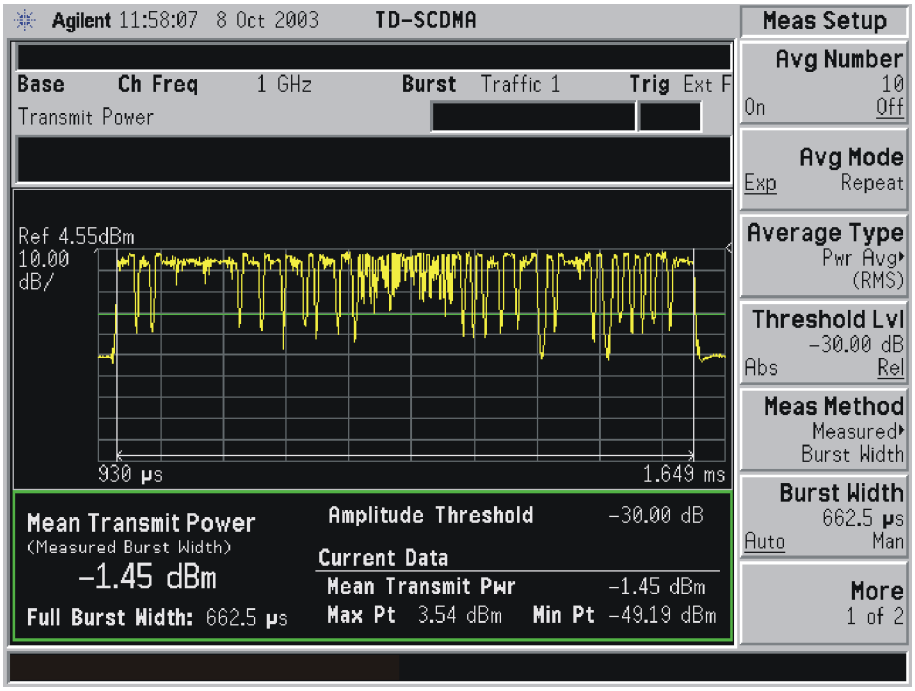


Figure 2-3 shows an example of Transmit Power measurement result with the measurement method set to above threshold level. The transmit power graph is shown in the graph window. The measured mean transmit power, current data minimum and maximum power points, along with the amplitude threshold level used are shown in the text window.

- **Mean Transmit Power** - The mean transmit power result can be calculated using one of two methods:

  — When the Measure Method parameter is set to Above Threshold Level, all trace data points above the Threshold Lvl parameter value are averaged according to the selected Average Type parameter.

  — When the Measure Method parameter is set to Measured Burst Width, the trace data points that fall within the Burst Width are averaged according to the selected Average Type parameter. These data points are indicated on screen as the region between the two white vertical lines displayed when the Measured Burst Width method is selected.

  The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

- **Max Pt.** - The max pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the maximum trace point detected over the entire trace.

- **Min Pt.** - The min pt is current data, and therefore is based on the

current trace, and not the averaged data. It gives the minimum trace point detected over the entire trace.

- **Full Burst Width** - The full burst width result is the time between the detected –3 dB start and stop points relative to the mean transmit power of the first detected “active” timeslot. This result metric is only available when the Measure Method parameter is set to Measured Burst Width.

  If no signal timeslots are determined to be “active”, all the screen results are unavailable (four dashed lines are shown) and SCPI NaN is returned when measurement results are queried remotely.

NOTE It may be necessary to adjust the Threshold Lvl parameter located under the Meas Setup menu, in order to achieve reliable detection of the input signal active timeslots. Use of an inappropriate value of Threshold Lvl parameter may result in all the screen results are unavailable (four dashed lines are shown).

- **Amplitude Threshold** - The relative or absolute value of Threshold Lvl setup parameter is displayed on the screen, and represents the level of the green horizontal amplitude threshold line displayed in the graph window.

  In Above Threshold Level measure method the Amplitude Threshold determines the level above which trace points will be included in the Mean Transmit Power result calculation.

  In Measured Burst Width measure method the Amplitude Threshold determines the burst search threshold level to be used by the Transmit Power measurement in determining whether or not a signal timeslot is active or not.

Figure 2-3 Transmit Power—Above Threshold Level

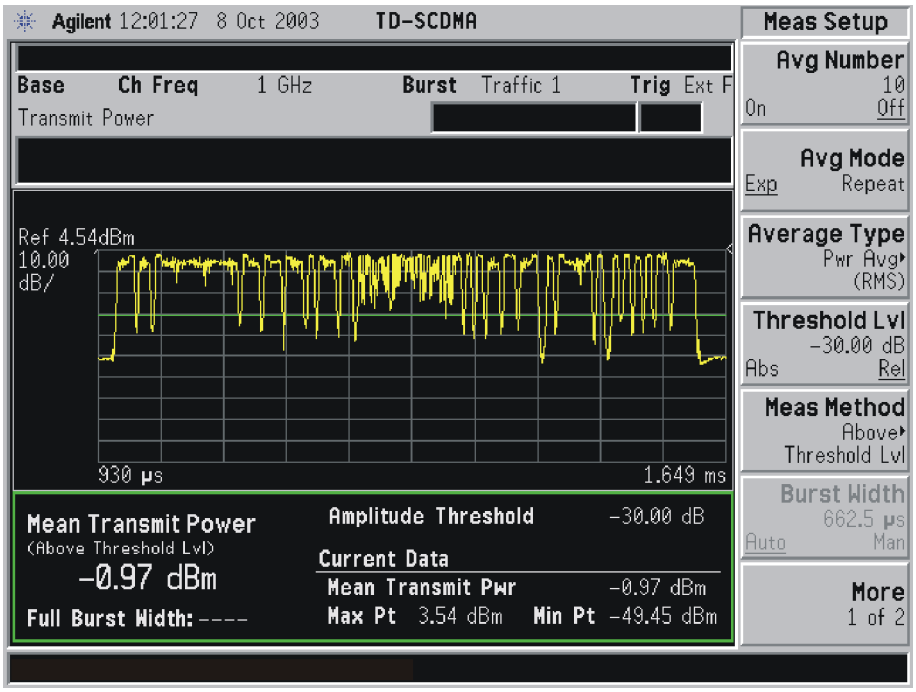


Figure 2-4 **Transmit Power—Meas Time = 1**

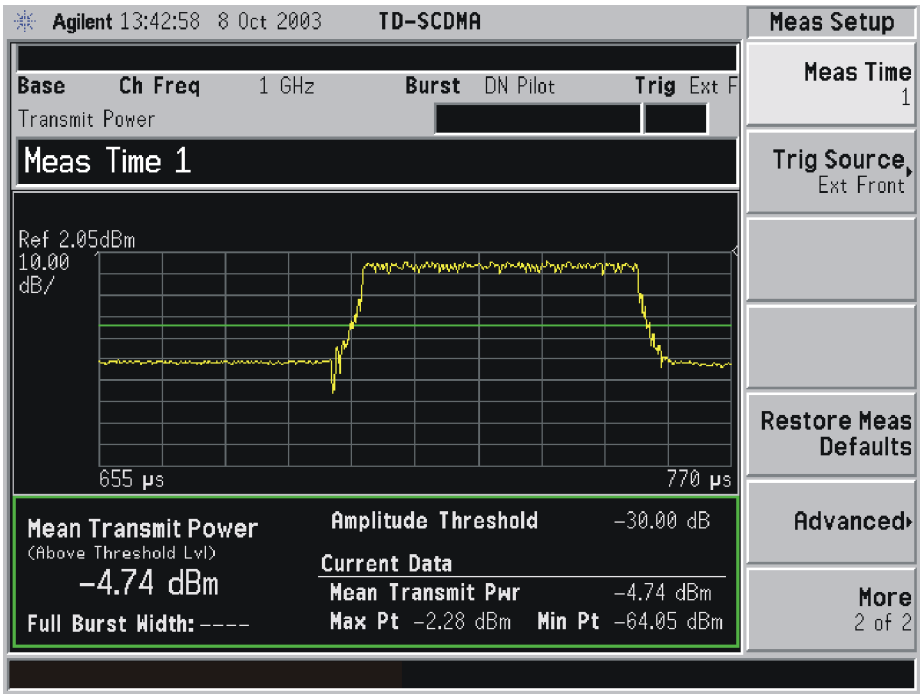
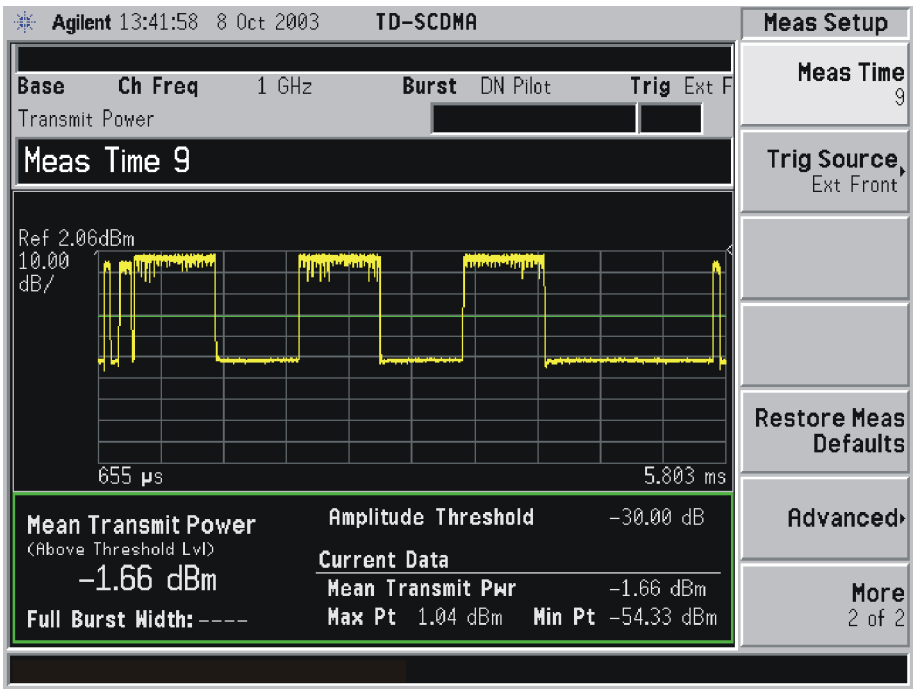


Figure 2-5 **Transmit Power—Meas Time = 9 Full Frame**



If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

Low output power can lead to poor coverage and intermittent service for phone users. Out of specification power measurements indicate a fault usually in the power amplifier circuitry. They can also provide early indication of a fault with the power supply, i.e. the battery in the case of mobile stations.

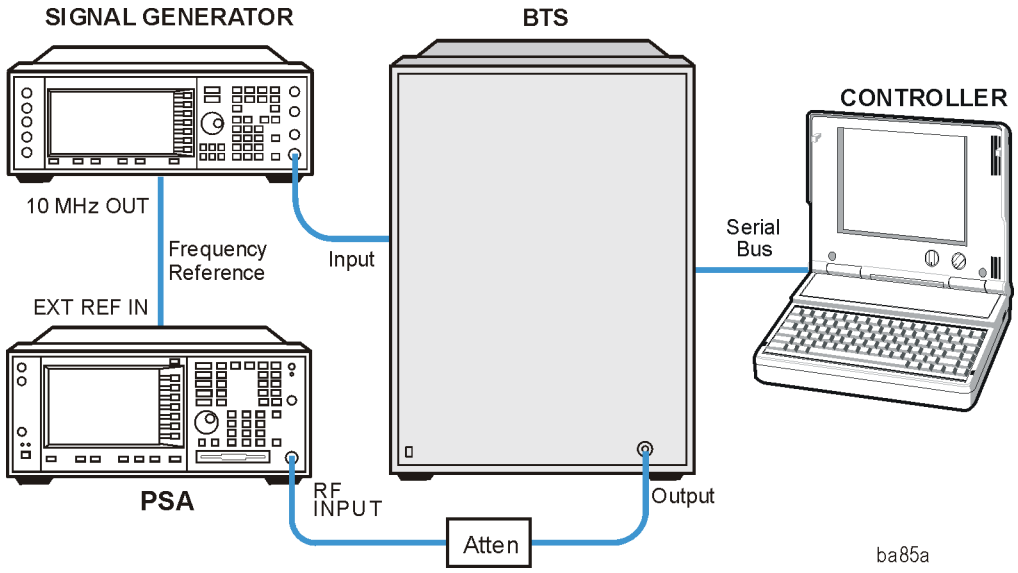
Power Versus Time Measurement

One-Button BTS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The base transmission station (BTS) under test has to be set to transmit the one RF carrier remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-6 Base Station Equipment Measurement System Setup



a. Using the appropriate cables and adapters, connect the modulated signal, using the proper radio standard, from the signal generator to the amplifier input connector of the BTS.

b. Connect the output signal of the BTS to the RF input port of the instrument, through the attenuator.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the BTS through the serial bus cable.

Step 2. From the system controller, perform all of the call acquisition functions required for the BTS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE** and **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **BTS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the number pad, enter the frequency of interest.

Step 7. Select the measurement by pressing **MEASURE** and the **Pwr vs Time** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 45

Step 8. It may be necessary to adjust the external trigger Delay parameter located under the Trigger menu, in order to achieve reliable detection of the input signal active timeslots.

Proper adjustment of the external trigger delay can be achieved by ensuring the rise and fall edges of the input signal active timeslot align with the location of the two white vertical Burst Lines displayed in the graph window. These Burst Lines represent the theoretical expected location of the selected Burst Type and Traffic Slot parameters, when the external trigger event occurs at the start of each 5 msec frame.

Use of an inappropriate value of external trigger Delay parameter may result in both the Full Burst Width result being made unavailable (four dashed lines are shown) as well as an inappropriate Power vs Time limit mask being automatically created and applied resulting in a potential limit test FAIL.

Step 9. It may be necessary to adjust the Burst Search Threshold parameter located under the Trigger menu, in order to achieve reliable detection of the input signal active timeslots.

Use of an inappropriate value of Burst Search Threshold parameter may result in both the Full Burst Width result being made unavailable (four dashed lines are shown) as well as an inappropriate Power vs Time limit mask being automatically created and applied resulting in a potential limit test FAIL.

Step 10. You may need to change some of the display settings. These changes

should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

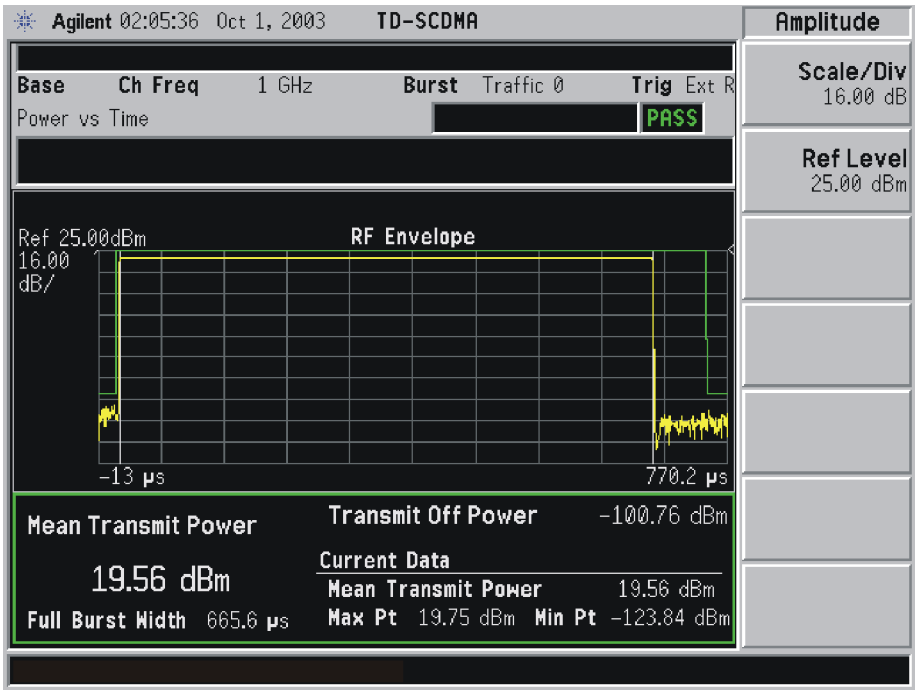
The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 11. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on use of the available keys and customizing your measurement, refer to "Pwr vs Time (Power vs Time/ Time Mask) Measurement" on page 135. For additional information on the measurement concepts, refer to "Power Versus Time Measurement Concepts" on page 228.

Measurement Results

The following figure shows an example result of `Power vs Time` measurement in the graph window. The measured mean transmit power, transmit off power, current data minimum and maximum power points, and full burst width are shown in the text window.

Figure 2-7 Power vs Time Measurement



Information shown in the data window of the displays include:

- **Mean Transmit Power** - The Mean Transmit Pwr result is measured over the transmission period of the selected Burst Type, which is indicated on screen as the region between the two white vertical lines displayed when the Burst Lines display parameter is enabled.

The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

- **Transmit Off Power** - The transmit off power result is measured in accordance with the TSM specification. It is a measure the average power of the BTS or MS output signal over the transmit off power period region starting 11 chips before the start of any “inactive” time slot, and ending 8 chips before any following “active” time slot. Also if there are more than one “inactive” region, then the average power measurement is made over all “inactive” regions.

  The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

  If all signal timeslots are determined to be “active”, the screen result is unavailable (four dashed lines are shown) and SCPI NaN is returned for this result when measurement results are queried remotely.

- **Max Pt.** - The max pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the maximum trace point detected over the entire trace.

- **Min Pt.** - The min pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the minimum trace point detected over the entire trace.

- **Burst Width** - The full burst width result is the time between the detected –3 dB start and stop points relative to the mean transmit power of the selected Burst Type timeslot.

  If the selected Burst Type signal timeslot is determined to be “inactive”, the screen result is unavailable (four dashed lines are shown) and SCPI NaN is returned for this result when measurement results are queried remotely.

NOTE

NOTE: It may be necessary to adjust the Burst Search Threshold parameter located under the Trigger menu, in order to achieve reliable detection of the input signal active timeslots. Use of an inappropriate value of Burst Search Threshold parameter may result in both the Full Burst Width result being made unavailable (four dashed lines are shown) as well as an inappropriate Power vs Time limit mask being automatically created and applied resulting in a potential limit test FAIL.

Figure 2-8 **Power vs Time—Meas Time = 1**

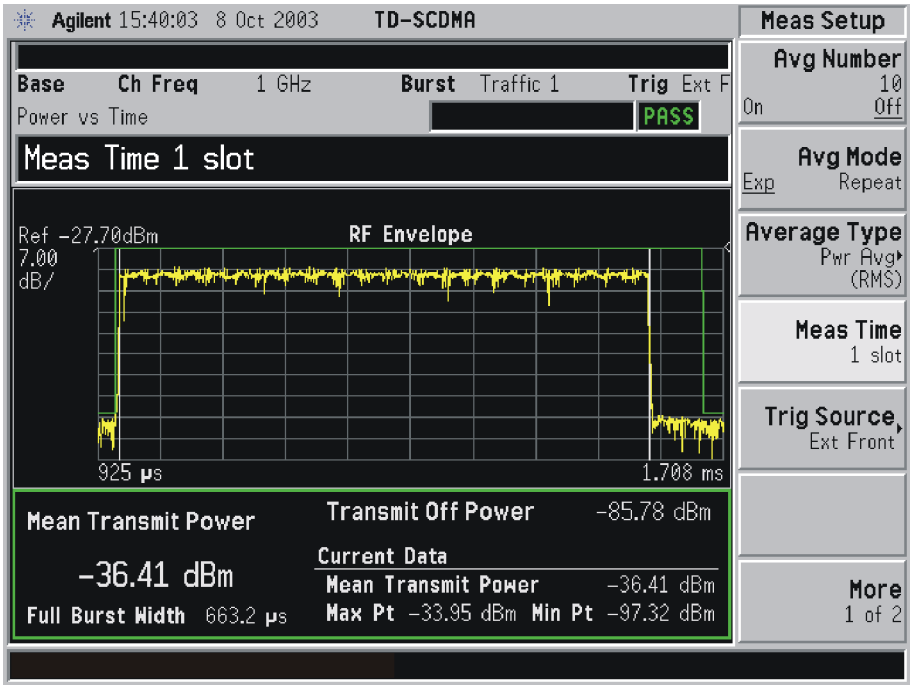
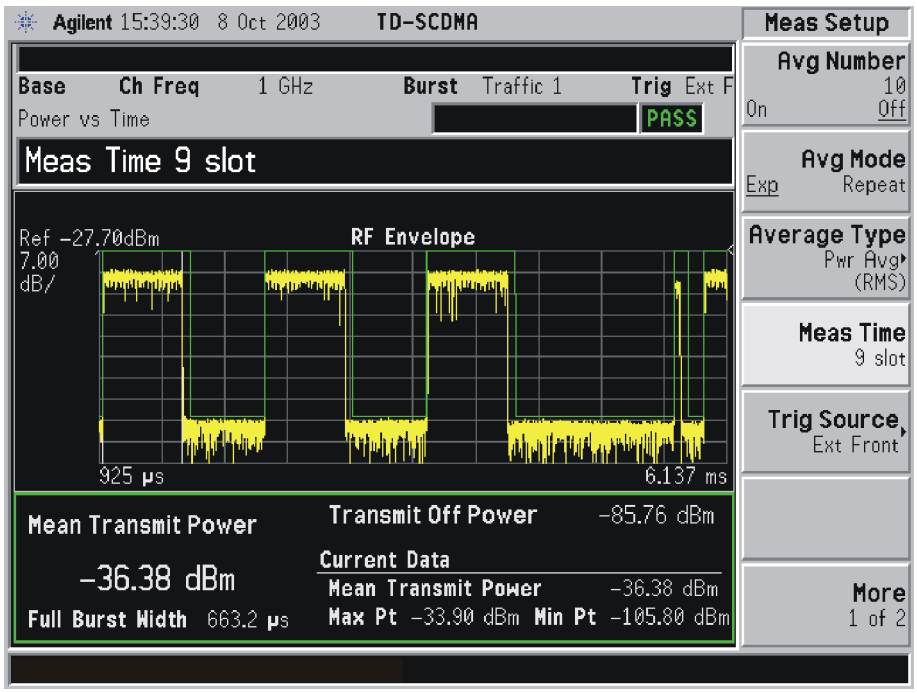


Figure 2-9 **Power vs Time—Meas Time = 9 Full Frame**



If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

If a transmitter fails the Power vs. Time measurement this usually indicates a problem with the units output amplifier or leveling loop.

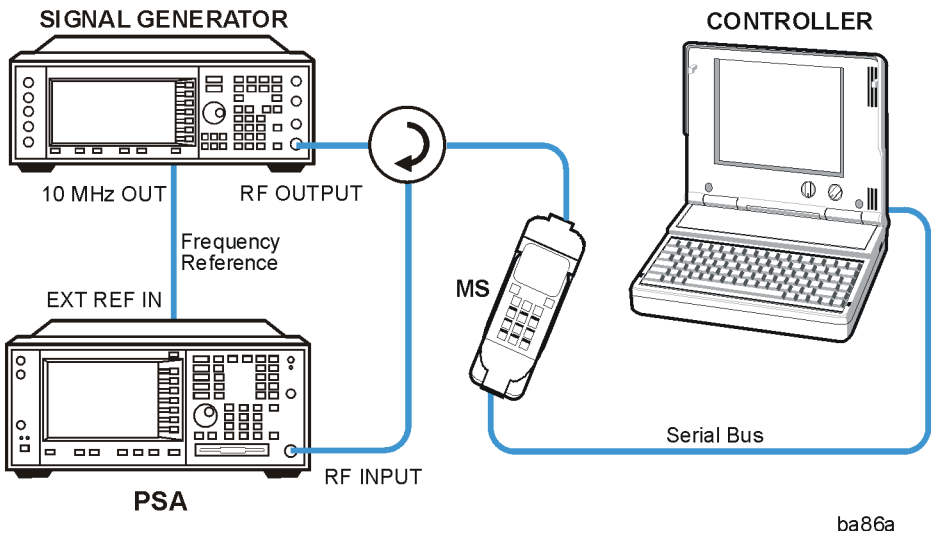
ACP (ACLR) Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-10 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE** and **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the number pad, enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **ACP** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 50

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. Depending on the mode and measurement you have selected, various graphical and tabular presentations are available. To set the display presentation you need, press **Trace/View** and select the desired presentation from the menu list displayed.

Step 10. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on use of the available keys and customizing your measurement, refer to "ACP—Adjacent Channel Power Measurement" on page 153. For additional information on the measurement concepts, refer to "Adjacent Channel Power (ACP) Measurement Concepts" on page 230.

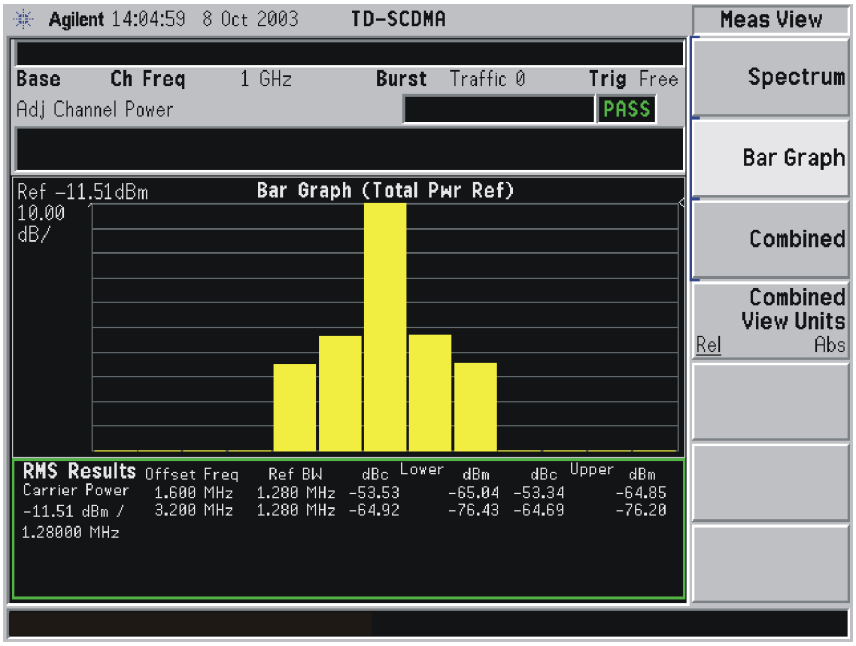
Step 11. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on use of the available keys, refer to "Sweep" on page 112.

Measurement Results

Figure 2-11 shows an example result of ACP (Total Pwr Ref)

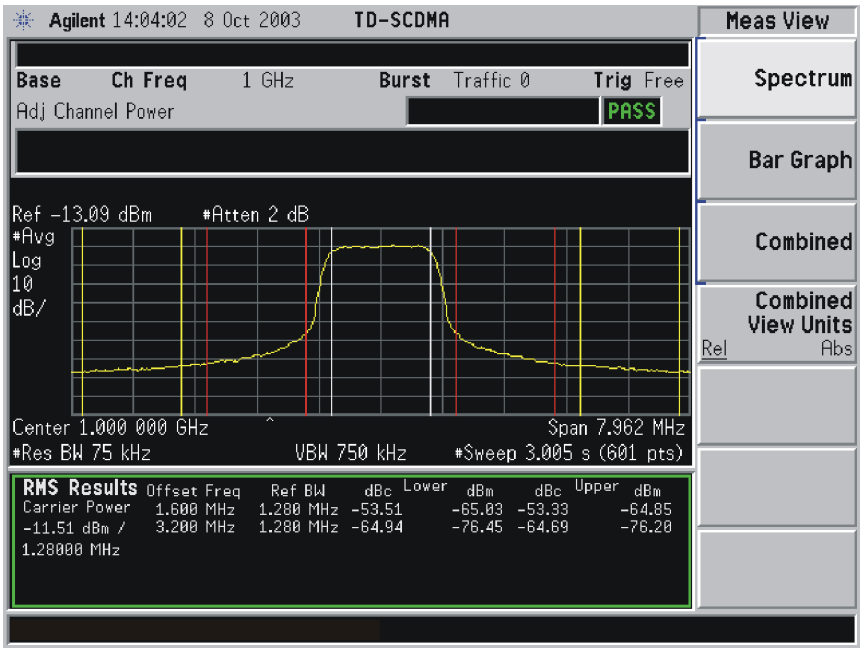
measurement in the bar graph window when you have selected the measurement mode indicated. The absolute and relative power levels on both sides of the carrier frequency are displayed in the graphic window and text window. The text window shows the absolute total power reference, while the lower and upper offset channel power levels are displayed in both absolute and relative readings.

Figure 2-11 ACP Measurement - Bar Graph View



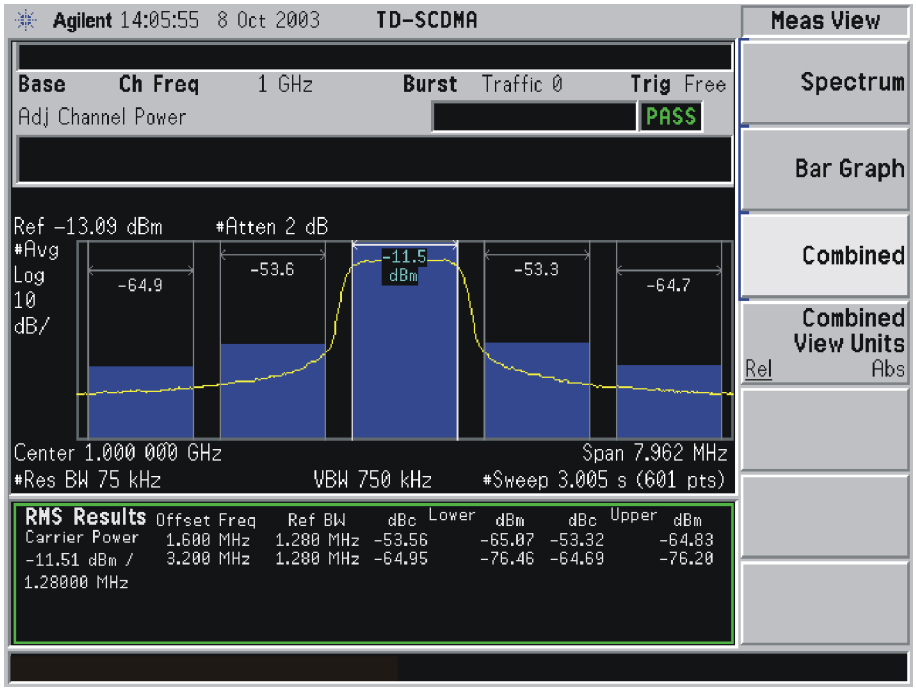
You can press the **View/Trace**, **Spectrum** keys to see the ACP Spectrum graph with the bandwidth marker lines in the graph window. The corresponding measured data is also shown in the text window. (See Figure 2-12.)

Figure 2-12 ACP Measurement - Spectrum View



You can press the **View/Trace**, **Combined** keys to see the ACP Bar graph combined with the Spectrum graph. The corresponding measured data is also shown in the text window. (See Figure 2-12.)

Figure 2-13 ACP Measurement - Combined View



You can press the **View/Trace**, **Combined View Units** keys to set the units used, for the data displayed in the graphic window, to relative or absolute values.

If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

This adjacent channel power ratio measurement can reveal degraded or defective parts in the transmitter section of the UUT. The following examples are those areas to be checked further.

- Some faults in the DC power supply control of the transmitter power amplifier, RF power controller of the pre-power amplifier stage, or I/Q control of the baseband stage
- Some degradation in the gain and output power level of the amplifier due to the degraded gain control and/or increased distortion
- Some degradation of the amplifier linearity and other performance characteristics

Power amplifiers are one of the final stage elements of a base or mobile transmitter and are a critical part of meeting the important power and spectral efficiency specifications. Since ACP measures the spectral response of the amplifier to a complex wideband signal, it is a key measurement linking amplifier linearity and other performance characteristics to the stringent system specifications.

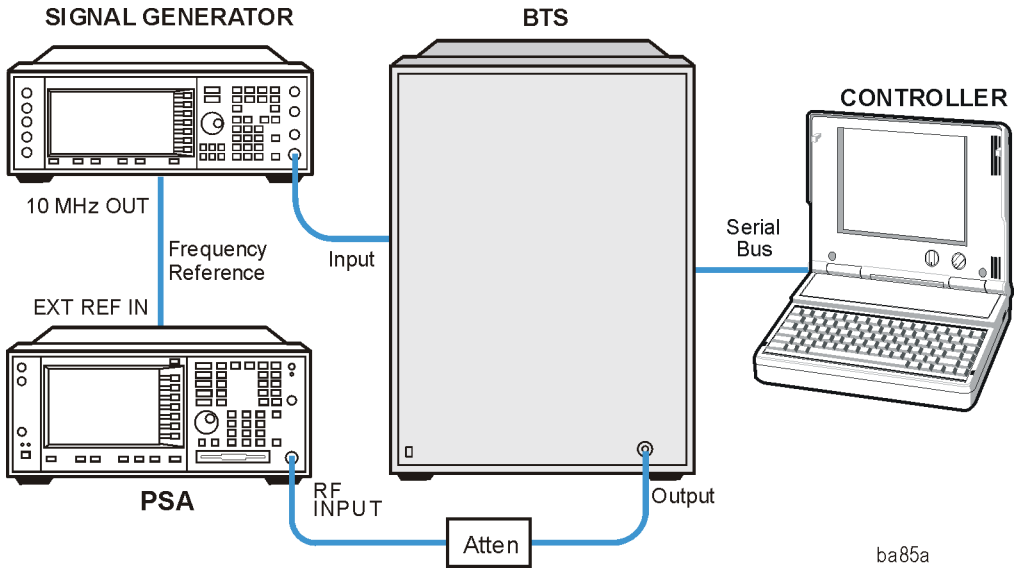
Multi-Carrier Power Measurement

One-Button BTS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The base transmission station (BTS) under test has to be set to transmit the one RF carrier remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-14 Base Station Equipment Measurement System Setup



a. Using the appropriate cables and adapters, connect the modulated signal, using the proper radio standard, from the signal generator to the amplifier input connector of the BTS.

b. Connect the output signal of the BTS to the RF input port of the instrument, through the attenuator.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the BTS through the serial bus cable.

Step 2. From the system controller, perform all of the call acquisition functions required for the BTS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE** and **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **BTS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the number pad, enter the frequency of interest.

Step 7. Select the measurement by pressing **MEASURE** and the **Multi Carrier Power** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 55

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on use of the available keys and customizing your measurement, refer to "Multi-Carrier Power—MCP Measurement" on page 169. For additional information on the measurement concepts, refer to "Multi-carrier Power Measurement Concepts" on page 231.

Step 10. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on use of the available keys, refer to "Sweep" on page 112.

Measurement Results

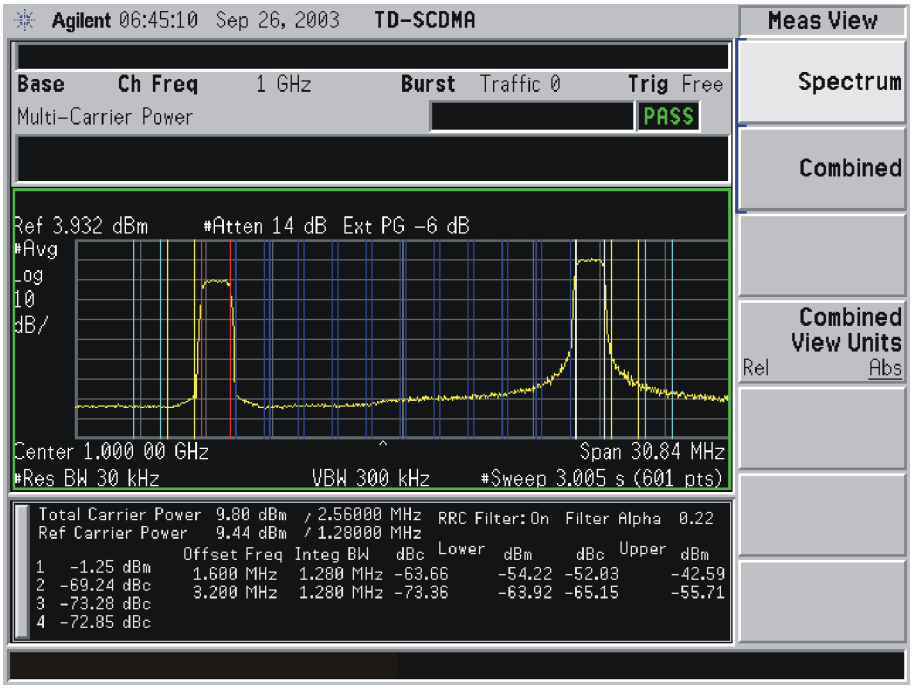
The following figure (Figure 2-15) shows an example result of the Spectrum View for the multi-carrier power measurement with the bandwidth marker lines in the graph window. The relative and absolute power levels for the center and second carriers, the lower and upper offset channels, and other parameters are shown in the text window.

The example shows a 12 Carrier TD-SCDMA signal with the Carrier 1 Frequency at 991.2 MHz (1000-0.8-5 x 1.6 = 991.2 MHz) set with 0 dBm power and Carrier 12 Frequency at 1008.8 MHz (1000 + 0.8 + 5 x 1.6 = 1008.8 MHz) set with 10 dBm power. The remaining carriers, Carrier 2 to Carrier 11 are shown with no power.

The colored vertical bars n the spectrum view indicate the following:

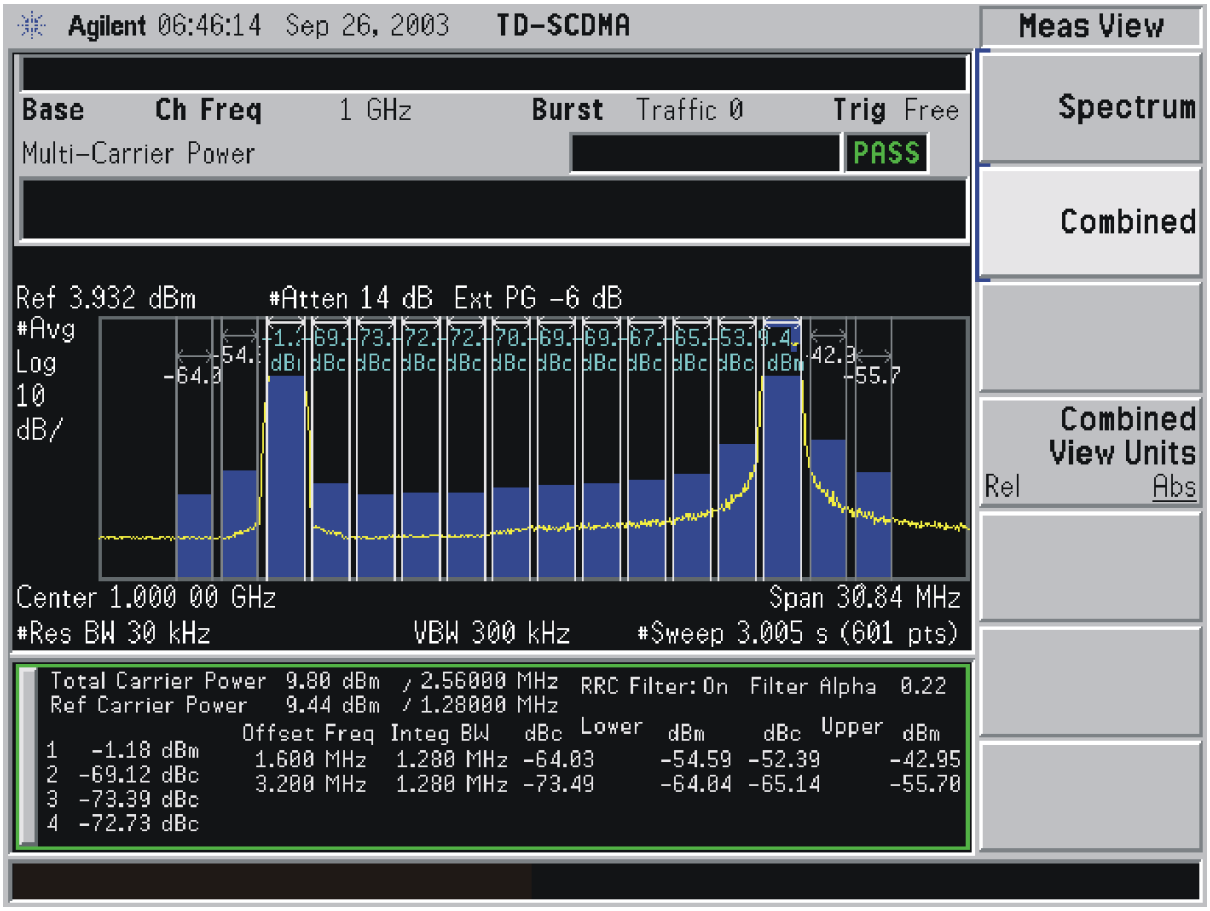
— Dark Blue lines: represent the carriers with no power (Carriers from 2 to 11)
— Red lines: represent the carriers with power that are not the reference carrier (Carrier 1)
— White lines: represent the reference carrier (Carrier 12))
— Yellow lines: represent the Upper & Lower 1.6 MHz offset
— Light Blue lines: represent the Upper & Lower 3.2 MHz offset

Figure 2-15 MCP Measurement - Spectrum View



You can press the **View/Trace**, **Combined** keys to see the MCP Bar graph combined with the Spectrum graph. The corresponding measured data is also shown in the text window. (See Figure 2-16.)

Figure 2-16 MCP Measurement - Combined View



You can press the **View/Trace**, **Combined View Units** keys to set the units used, for the data displayed in the graphic window, to relative or absolute values.

Troubleshooting Hints

If there is a frequency channel dependency in the operating characteristics of a multi-carrier power amplifier, it might have channel balance problems due to spurious response, distortion, and/or intermodulation products.

If you have a problem and get an error message, refer to the “Instrument Messages and Functional Tests” manual.

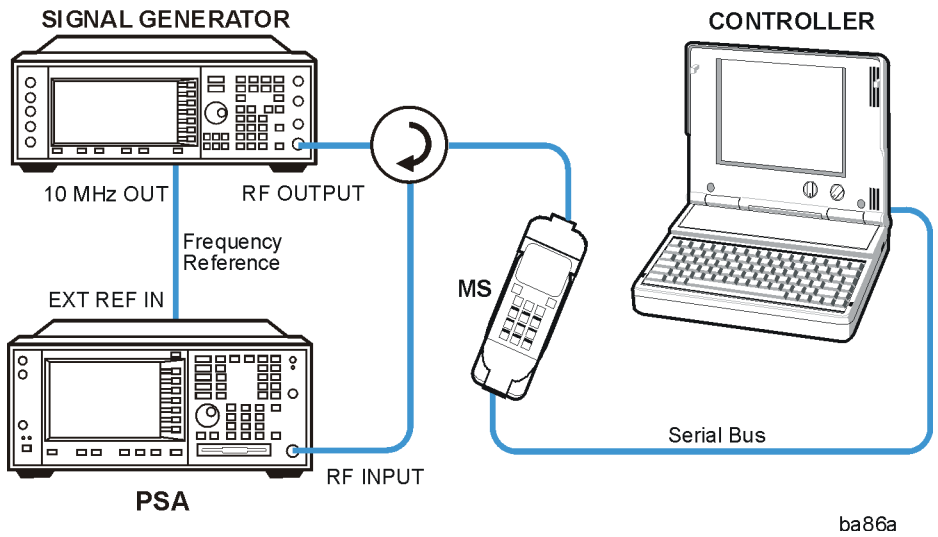
Spurious Emissions Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-17 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF power as required.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE** and **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the number pad, enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **Spurious Emissions** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 60

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

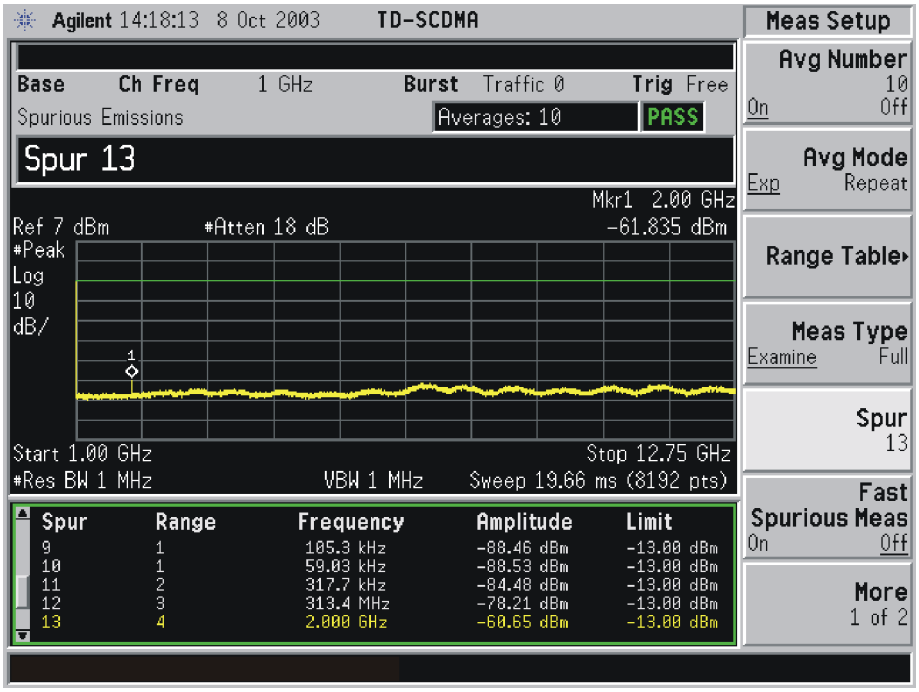
Step 9. Depending on the mode and measurement you have selected, various graphical and tabular presentations are available. To set the display presentation you need, press **Trace/View** and select the desired presentation from the menu list displayed.

Step 10. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on use of the available keys and customizing your measurement, refer to "Spurious Emissions—Spurs Measurement" on page 187. For additional information on the measurement concepts, refer to "Spurious Emissions Measurement Concepts" on page 234.

Measurement Results

The Spurious Emissions measurement results should look like the next figure. The spectrum window and the text window show the Spurs that are within the current value of the Marker Peak Excursion setting of the absolute limit. Any spur that has failed the absolute limit will have the red 'F' beside it.

Figure 2-18 Spurious Emissions Measurement



If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

If there is a frequency channel dependency in the operating characteristics of a multi-carrier power amplifier, it might have channel balance problems due to spurious response, distortion, and/or intermodulation products.

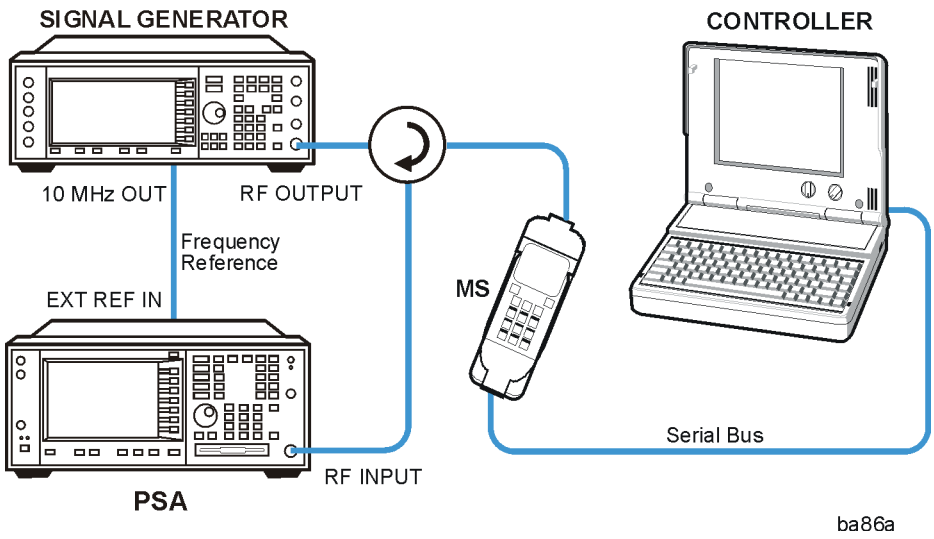
Spectrum Emission Mask (SEM) Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-19 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF power as required.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE** and **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the number pad, enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **Spectrum Emission Mask** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 63

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. Depending on the mode and measurement you have selected, various graphical and tabular presentations are available. To set the display presentation you need, press **Trace/View** and select the desired presentation from the menu list displayed.

Step 10. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on use of the available keys and customizing your measurement, refer to "Spectrum Emission Mask—SEM Measurement" on page 200. For additional information on the measurement concepts, refer to "Specrtum Emissions Mask (SEM) Measurement Concepts" on page 236.

Step 11. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on use of the available keys, refer to "Sweep" on page 112.

Measurement Results

The following figures show examples of Integrated Power View, Rel Peak Pwr & Freq View, and Abs Peak Pwr & Freq View result metrics.

The relative and absolute integrated power levels for each offset frequency range on both sides of the reference channel are displayed in the Integrated Power View.

The relative peak power levels along with frequency of peak in each offset frequency range on both sides of the reference channel are displayed in the Rel Peak Pwr & Freq View.

The absolute peak power levels along with frequency of peak in each offset frequency range on both sides of the reference channel are displayed in the Abs Peak Pwr & Freq View.

Figure 2-20 SEM Measurement—Integrated Power View

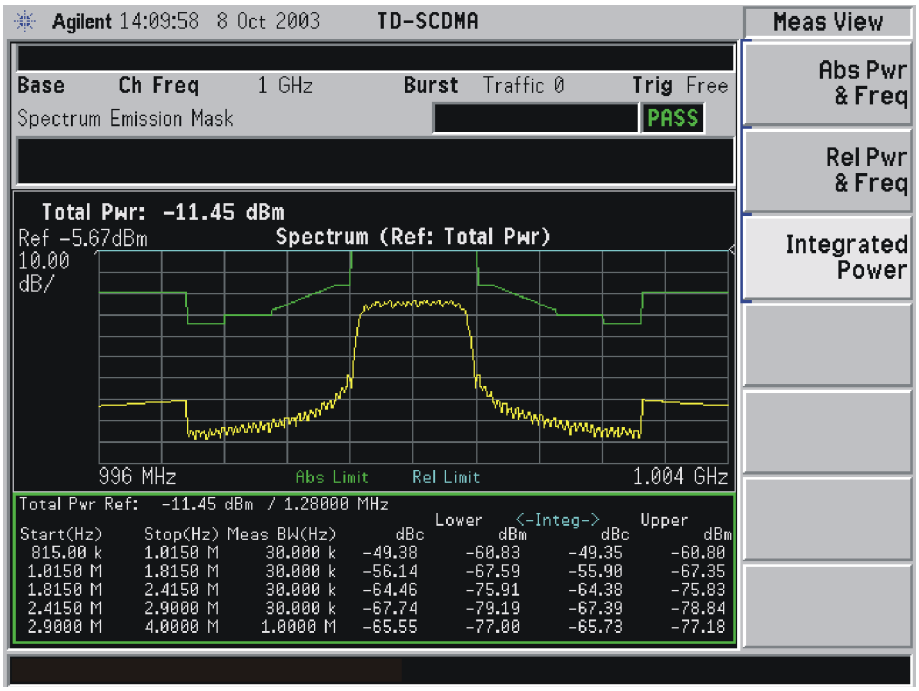


Figure 2-21 Standard Results Screen—Rel Peak Pwr & Freq View

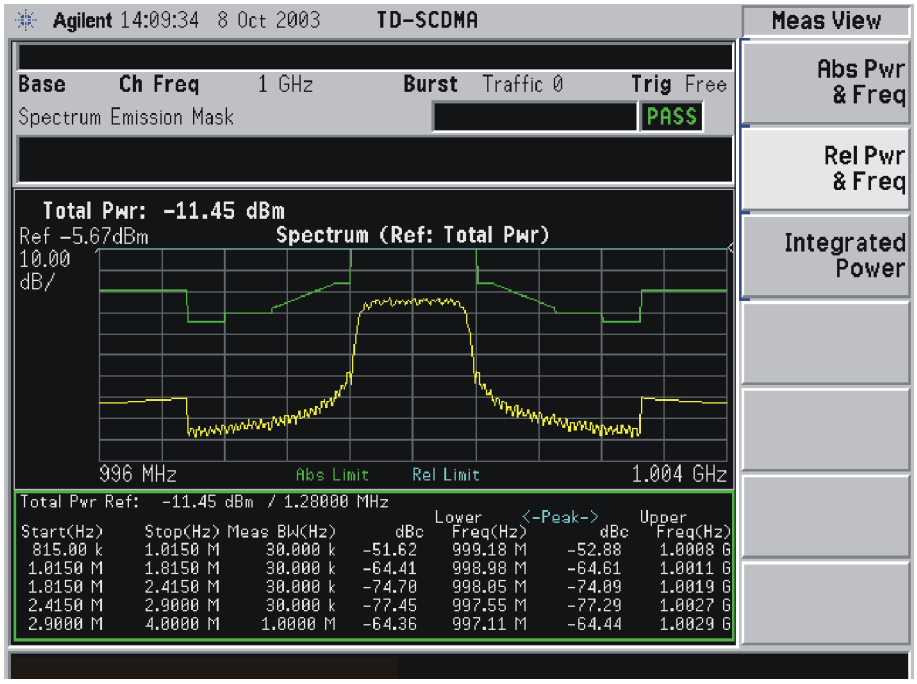
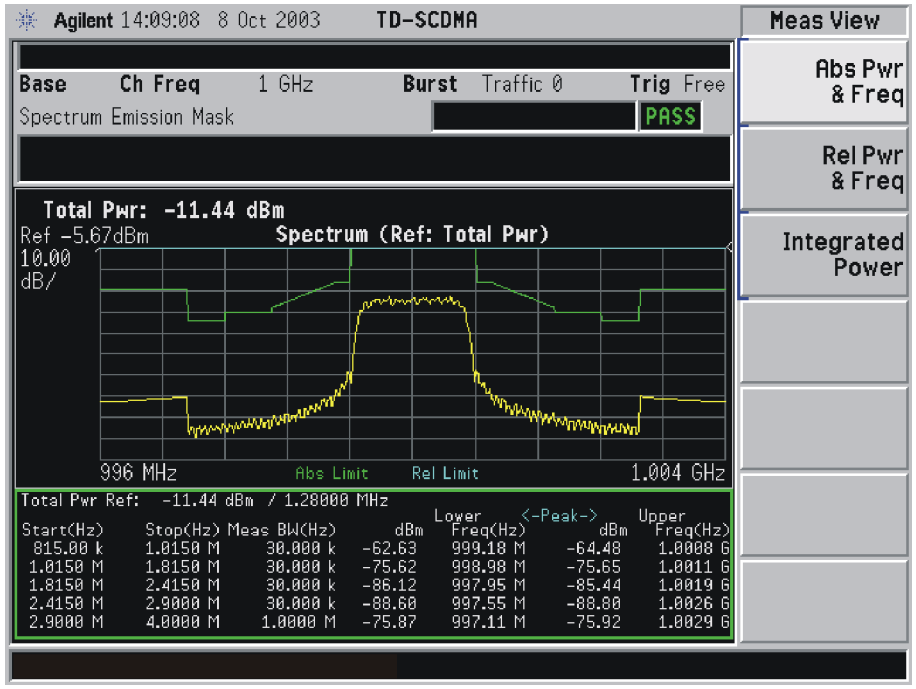


Figure 2-22 Standard Results Screen—Abs Peak Pwr & Freq View



If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

This spectrum emission mask measurement can reveal degraded or

defective parts in the transmitter section of the UUT. The following examples are those areas to be checked further.

- Faulty DC power supply control of the transmitter power amplifier.
- RF power controller of the pre-power amplifier stage.
- I/Q control of the baseband stage.
- Some degradation in the gain and output power level of the amplifier due to the degraded gain control and/or increased distortion.
- Some degradation of the amplifier linearity or other performance characteristics.

Power amplifiers are one of the final stage elements of a base or mobile transmitter and are a critical part of meeting the important power and spectral efficiency specifications. Since spectrum emission mask measures the spectral response of the amplifier to a complex wideband signal, it is a key measurement linking amplifier linearity and other performance characteristics to the stringent system specifications.

Using Basic Mode

Basic mode is part of Option B7J for the PSA Series Spectrum Analyzers. Basic mode is *not* related to a particular communications standard. That is, it does not default to measurement settings that are for any specific standard. You may want to use Basic Mode if you are making measurements on a signal that is not based on a specific digital communications standard.

Basic Mode in PSA Series Spectrum Analyzers

There are two generic measurements available under the **MEASURE** key in Basic mode:

- Spectrum measurement (frequency domain).
- Waveform measurement (time domain)

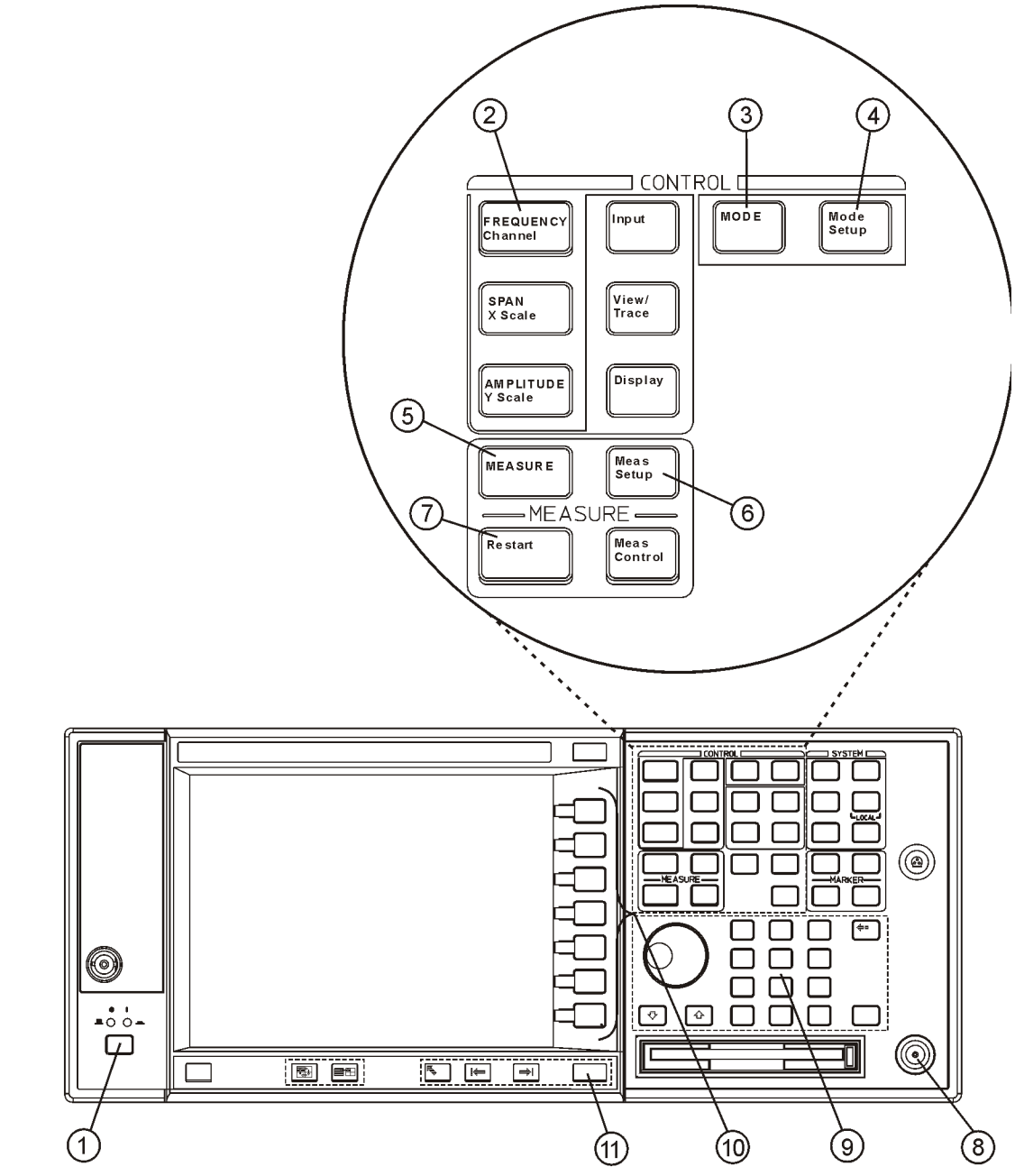
These Spectrum and Waveform measurements are also available in this mode, with the same functionality, so you can refer to the sections included in this chapter for information about using them.

3 Key and SCPI Reference

3.1 Instrument Front Panel Highlights

The major functional keys on the front panel are located as illustrated below, and each of these operation is explained on the next page.

Figure 3-1 Front Panel Major Key Locations - PSA Series



ar84a

1. The **On/Off** switch toggles the power between on and off. A green LED will be on once the instrument has been turned on. When in the standby mode a yellow LED is on above the **On/Off** switch.
2. **FREQUENCY Channel** accesses the menu key that controls the center frequency or channel number. These parameters apply to all measurements in the current mode.
3. **MODE** accesses the menu key menu to select one of the radio systems measurement modes loaded in the instrument. Each mode is independent from all other modes.
4. **Mode Setup** accesses menu keys that affect parameters that are specific to the current mode and affect all measurements within that mode.
5. **MEASURE** accesses the menus to initiate one of the various measurements that are specific to the current mode.
6. **Meas Setup** accesses the menus of test parameters that are specific to the current measurement.
7. **Restart** causes the measurement, for which the process is currently halted, to start again from the beginning of the measurement according to the current measurement setup parameters.
8. The **RF INPUT** port allows you to apply an external RF signal.
9. The **Data Entry** keypad is used to enter numeric values for parameters. A value from this entry will be displayed in the active function area of the screen. The value will become valid after pressing the **Enter** key, or selecting a unit of measurement, depending on the current parameter.
10. The **menu keys** allow you either to activate a feature or to access a further menu key menu. An arrow on the right side of a menu key label indicates that the key has a further selection menu. The active menu key is highlighted. Grayed-out keys are currently unavailable for use or are only to show information. If a menu key menu has multiple pages, access them by pressing the **More** key at the bottom of a menu.
11. **Return** allows you to exit from the current menu and display the previous menu. If you are on the first page of a multiple-page menu (the menu with **More (1 of 3)** for example), the **Return** key will exit from that menu. When you activate a different measurement, the return list is cleared. The **Return** key will not return you to a previously activated mode, nor will it alter any values you have entered on previous menus.

3.2 AMPLITUDE / Y Scale

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.2.1 Scale/Div

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 12 dB for Power vs Time

10 dB for all other measurements

Terminators: dB

Default Terminator: dB

Range: 0.1 dB to 20 dB

Remote Command:

```
:DISPlay:<measurement>:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>
```

```
:DISPlay:<measurement>:WINDow:TRACe:Y:[SCALe]:PDIVision?
```

Remote Command Notes:

The keyword for the current measurement must be specified in the command. (Some examples include: TXPower or PVTime)

.

Example: `DISP:ACP:WIND:TRAC:Y:PDIV 0.5 DB`

3.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad.

Key Path: **AMPLITUDE / Y Scale**

Dependencies/ Couplings: If you reduce the Input Atten setting, the analyzer may have to lower the Ref Level to maintain the proper level at the top of the screen. If you then increase Input Atten, the Ref Level does not increase to its previous value.

Ref Level is affected by: Input Atten, Int Preamp, Ext RF Atten.

State Saved: Saved in Instrument State

Factory Preset: 10 dBm

Range: –200 dBm to 200 dBm

Remote Command:

```
:DISPlay:<measurement>:WINDow:TRACe:Y:[SCALe]:RLEVel <power>
```

```
:DISPlay:<measurement>:WINDow:TRACe:Y:[SCALe]:RLEVel?
```

Remote Command Notes:

The keyword for the current measurement must be specified in the command. (Some examples include: TXPower or PVTime)

Example: `DISP:ACP:WIND:TRAC:Y:RLEV 20 dbm` sets the ACP measurement display reference level to 20 dBm

3.3 FREQUENCY / Channel

Displays the menu of frequency functions. The **Center Frequency** and **Span** appears below the graticule on the display.

NOTE Although the analyzer allows entry of frequencies greater than its specified range, analyzer performance will be degraded if it is used beyond the specified frequency range.

3.3.1 Center Freq

Allows you to set the center frequency to you frequency of interest and activates the function that sets the center of the displayed frequency range to that specified frequency.

Key Path: **FREQUENCY**

State Saved: Saved in instrument state.

Factory Preset: 1.00000 GHz

Range:

Model	Frequency Range (with Frequency Offset = 0 Hz)		
E4440A	–100.0 MHz	to	26.0 GHz
E4443A	–100.0 MHz	to	7.2 GHz
E4445A	–100.0 MHz	to	13.7 GHz
E4446A	–100.0 MHz	to	44.5 GHz
E4448A	–100.0 MHz	to	51.0 GHz

Remote Command:

`[:SENSe]:FREQuency:CENTer <frequency>|UP|DOWN`

`[:SENSe]:FREQuency:CENTer?`

Example: `FREQ:CENT 5 GHZ` sets the center frequency to 5 GHz

`FREQ:CENT UP` changes the center frequency to 5.1 GHz if you use `FREQ:CENT:STEP 100 MHz` to set the center frequency step size to 100 MHz

`FREQ:CENT?`

3.3.2 Tx Band Start

Allows you to specify the start frequency for the transmit band. This value is used for determining the spectrum that should be skipped in order to meet the specification requirements for spurious emissions for base station measurements and when the measured spectrum should be extended in order to meet the spectrum emission mask measurement requirements.

Key Path: **FREQUENCY**

State Saved: Saved in Instrument State

Terminators: Hz | kHz | MHz | GHz

Factory Preset and *RST: 1785 MHz

Range: –100 MHz to upper limit of your analyzer

Remote Command:

```
[:SENSe]:FREQuency:BAND:STARt <freq>
[:SENSe]:FREQuency:BAND:STARt?
```

Example:
```
FREQ:BAND:STAR 1805 MHz
FREQ:BAND:STAR?
```

3.3.3 Tx Band Stop

Allows you to specify the stop frequency for the transmit band. This value is used for determining the spectrum that should be skipped in order to meet the specification requirements for spurious emissions for base station measurements and when the measured spectrum should be extended in order to meet the spectrum emission mask measurement requirements.

Key Path: **FREQUENCY**

State Saved: Saved in Instrument State

Terminators: Hz | kHz | MHz | GHz

Factory Preset and *RST: 1805 MHz

Range: –100 MHz to upper limit of your analyzer

Remote Command:

```
[:SENSe]:FREQuency:BAND:STOP <freq>
[:SENSe]:FREQuency:BAND:STOP?
```

Example:
```
FREQ:BAND:STOP 1825 MHz
```

FREQ:BAND:STOP?

3.3.4 CF Step

Allows you to set the step size for the center frequency function. Once you select step size and activate the center frequency function, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer. When set to auto, the center frequency step size will be set to the channel spacing. The center frequency step size will be 1.6 MHz since the Chip rate is 1.28 Mcps.

Key Path: **FREQUENCY**

State Saved: Saved in Instrument State

Factory Preset: On and 1.6 MHz since the Chip rate is 1.28 Mcps

Range: 1 kHz to 1 GHz

Remote Command:

[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq>

[:SENSe]:FREQuency:CENTer:STEP[:INCRement]?

[:SENSe]:FREQuency:CENTer:STEP:AUTO OFF|ON|0|1

[:SENSe]:FREQuency:CENTer:STEP:AUTO?

Example: FREQ:CENT:STEP:AUTO ON sets the automatic and the step size is set to the channel spacing.

FREQ:CENT:STEP 500 MHz sets the step size to 500 MHz.

FREQ:CENT UP increases the current center frequency value by 500 MHz

FREQ:CENT:STEP?

FREQ:CENT:STEP:AUTO?

3.3.5 Burst Type

Allows you to set the type of burst to be measured. You can select between Traffic (TRAFfic), Downlink Pilot (DWPTS), and Uplink Pilot (UPPTS). In addition, internal hardware trigger delays will be automatically set to the appropriate value (675 µs for downlink pilot, 825 µs for uplink pilot; refer below to ""Traffic Slot" parameter for internal hardware trigger delays for traffic timeslots) so that the specified timeslot is the leftmost on the analyzer display for the Transmit Power and Power vs. Time measurements. This automatically set trigger delay is not be displayed under the Trigger, ExT Front or Ext Rear, Delay menu

This parameter in conjunction with Traffic Slot parameter allows you to define which traffic slot you want to analyze in the frame. When multiple slots are viewed using a Meas Time value greater than 1, the specified Burst will be assumed to be the first (leftmost) of the slots to be viewed. Time masks and sweep times will computed based on this specified burst, the number of slots to be viewed, and the known configuration of the TD-SCDMA burst. The **Traffic Slot** parameter can be found under the **Frequency** menu and is only available when an External Trigger is used and when the Burst Type is set to Traffic. The "Traffic Slot" menu key should be grayed out when RF Burst Trigger is used or when the Burst Type is set to DwPTS/UpPTS.

Key Path: **FREQUENCY**

State Saved: Saved in Instrument State

Factory Preset: Traffic

Remote Command:

`[:SENSe]:CHANnel:BURSt DWPTS|TRAFfic|UPPTS`

`[:SENSe]:CHANnel:BURSt?`

Example: `FREQ:CHAN:BURS DWPTS` sets the burst type to Downlink Pilot.

`FREQ:CHAN:BURS?`

3.3.6 Traffic Slot

Allows you to set the number for the traffic timeslot used for measurements when the burst type is set to Traffic. The number you set will appear at the top right of the display under the heading "Burst". This parameter is unavailable when Burst Type is set to Uplink or Downlink Carrier or if you have selected **RF Burst** under the **Trigger** menu.

Depending on the Traffic slot value you have set, the "Hardware Trigger" delay will be automatically set with the proper delay time so that the specified traffic timeslot is leftmost on the analyzer display for the Transmit Power and Power vs. Time measurements. This automatically set trigger delay is not be displayed under the **Trigger**, **ExT Front** or **Ext Rear**, **Delay** menu.

Key Path: **FREQUENCY**

State Saved: Saved in Instrument State

Factory Preset: 0

Range: 0 to 6

Remote Command:

`[:SENSe]:CHANnel:SLOT` <integer>

`[:SENSe]:CHANnel:SLOT?`

Example: `FREQ:CHAN:SLOT 2` sets the traffic timeslot to slot 2.

FREQ:CHAN:SLOT?

3.4 Input/Output

Displays the keys that control some of the signal inputs and outputs of the analyzer.

3.4.1 Input Port

Allows you to set the source of the input. The two options are **RF** and **Amptd Ref**.

RF Selects the front panel RF Input port to be the analyzer signal input.

Amptd Ref Selects the 50 MHz, –25 dBm internal amplitude reference as the input signal.

Key Path: **Mode Setup**, **Input** or **Input/Output**

State Saved: Saved in Instrument State

Factory Preset: RF

Remote Command:

```
[:SENSe]:FEED RF|AREFerence
[:SENSe]:FEED?
```

Example: `FEED AREF` selects the 50 MHz amplitude reference as the signal input.

3.4.2 RF Input Range

Turns the Auto reference level and attenuation feature on (Auto) or off (Man). When set to On, the input will be measured and the attenuator and reference level set when any measurement is entered or restarted with the Restart key. When set to Off, the attenuator and reference level are set to the values you enter under the **Input Atten** and **Amplitude**, **Ref Value** keys respectively.

Key Path: **Mode Setup**, **Input** or **Input/Output**

State Saved: Saved in Instrument State

Factory Default: On or 1

Remote Command:

```
[:SENSe]:POWer[:RF]:RANGe:AUTO ON | OFF | 1 | 0
```

Example: `POW:RANG:AUTO 0`

3.4.3 Max Total Power

Allows you to enter the maximum expected total power level at the radio unit under test. This value is ignored if RF port power range is set to auto.

Key Path: **Mode Setup**, **Input** or **Input/Output**

State Saved: Saved in Instrument State

Factory Default: –15.00 dBm

Knob Increment: 1 dBm

Step Key Increment: 10 dBm

Range: –200 dBm to 100 dBm

Remote Command:

`[:SENSe]:POWer[:RF]:RANGe[:Upper]`

`[:SENSe]:POWer[:RF]:RANGe[:Upper]?`

Example: `POW:RANG 10`

3.4.4 Input Atten

Set the RF attenuator level. This value is set automatically if RF Input Range parameter is set to On.

Key Path: **Mode Setup**, **Input** or **Input/Output**

State Saved: Saved in Instrument State

Factory Preset: 10 dB

Range: 0.0 dB to 70 dB

Remote Command:

`[:SENSe]:POWer[:RF]:RANGe:ATTenuation <rel_power>`

`[:SENSe]:POWer[:RF]:RANGe:ATTenuation?`

Example: `POW:RANG:ATT 20` sets the input attenuator level to 20 dB.

3.4.5 External RF Atten

Displays the keys that allow you to set the amount of base station or mobile station attenuation that needs to corrected for in the measurement results.

Key Path: **Mode Setup**, **Input** or **Input/Output**

Remote Command:

There is no remote command for this key.

3.4.5.1 MS

Allows you to set the amount of mobile station attenuation that needs to corrected for in the measurement results.

Key Path: **Input/Output**

State Saved: Saved in Instrument State

Factory Preset: 0 dB

Range: –100 dB to 100 dB

Remote Command:

`[:SENSe]:CORRection:MS[:RF]:LOSS <rel_power>`

`[:SENSe]:CORRection:MS[:RF]:LOSS?`

Example: `CORR:MS:LOSS 20` sets the external attenuation level at 20 dB for a mobile station measurement.

3.4.5.2 BTS

Allows you to set the amount of base station attenuation that needs to be corrected for in the measurement results.

Key Path: **Input/Output**

State Saved: Saved in Instrument State

Factory Preset: 0 dB

Range: –100 dB to 100 dB

Remote Command:

`[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_power>`

`[:SENSe]:CORRection:BTS[:RF]:LOSS?`

Example: `CORR:BTS:LOSS 20` sets the external attenuation level at 20 dB for a base station measurement.

3.4.6 Int Preamp

Turns the internal preamplifier on or off. Option 1DS is required for this function to be available.

Key Path: **Input/Output**

State Saved: Saved in Instrument State

Factory Preset: Off

Remote Command:

`[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1`

`[:SENSe]:POWer[:RF]:GAIN[:STATe]?`

Example: `POW:RANG:GAIN 1` sets the input internal preamp to on.

3.5 Meas Control

These functions allows you to pause and resume the currently selected measurement and to select between continuous or single measurements.

Key Path: Front-panel key

3.5.1 Restart

This function restarts a previously paused measurement at the beginning. If the current measurement is still in process, it will stop it as soon as possible and restart it from the beginning. This does not change any parameter values but resets the following:

Key Path: Front-panel key. It can also be found under **Meas Control**.

Remote Command:

`:INITiate:RESTart`

Remote Command Notes: This command is equivalent to sending an `:ABORt` command followed by an `:INITiate[:IMMediate]` command. See "Abort the Sweep or Measurement (Remote Command Only)" on page 83. for more information.

Example: `INIT:REST`

3.5.2 Measure

Switches the analyzer between triggering the current measurement/sweep continuously or triggering a single measurement. The front panel **Single** key also puts the analyzer in single-measurement mode.

Key Path: **Meas Control**

State Saved: Save

Factory Preset: Continuous

Remote Command:

Use `:INITiate:CONTinuous OFF|ON`

Remote Command Notes: This command affects measurements when a measurement has been selected from the MEASure command subsystem.

- When ON, at the completion of each trigger cycle, the trigger system immediately initiates another trigger cycle.
- When OFF, the trigger system remains in an "idle" state until CONTinuous is set to ON or an :INITiate[:IMMediate] command is received. On receiving the :INITiate[:IMMediate] command, it will go

through a single trigger cycle, and then return to the “idle” state.

- The query `INIT:CONT?` returns 1 or 0. 1 is returned when the instrument is continuous triggering. 0 is returned when it is single triggering.

Example: `INIT:CONT OFF`

3.5.3 Pause or Resume

This function pauses the currently running measurement. Pressing **Pause** will toggle between pausing and resuming your measurement. The key label will toggle between **Pause** and **Resume**. If an averaged measurement was in progress, the average counter is frozen when the measurement is halted

Key Path: **Meas Control**

Remote Command:

`:INITiate:PAUSe` to pause the measurement

`:INITiate:RESume` to resume the measurement.

Remote Command Notes: See “Abort the Sweep or Measurement (Remote Command Only)” on page 83.for more information.

Example: `INIT:PAUS`

3.5.4 Trigger a Measurement (Remote Command Only)

The command is ignored if the instrument is in a measurement (selected under the MEASURE key), but the measurement is currently running, (`INITiate:CONTinuous ON`).

If a measurement is selected but it is in the idle state (i.e. it’s not running, `INITiate:CONT OFF`), this command triggers the instrument, when trigger conditions are met. The trigger system is initiated, it completes one full trigger cycle and returns to the “waiting” state. Depending on the measurement selected and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. The instrument must have external triggering selected, or the command will be ignored. Use the `TRIGer[:SEQuence]:SOURce EXT` command to select the external trigger.

Remote Command:

`:INITiate[:IMMediate]`

Remote Command Notes: See also the `*TRG` command and the TRIGger subsystem.

Use the `[:SENSe]:<meas>:TRIGger:SOURce` command to select the desired trigger. The instrument must be in the single measurement mode. If `:INITiate:CONTinuous` is ON then the command is ignored.

Use `:FETCh?` to transfer a measurement result from memory to the output buffer. Refer to individual commands in the MEASure subsystem for more

information.

Example: `INIT:IMM`

3.5.5 Abort the Sweep or Measurement (Remote Command Only)

Stops any sweep or measurement in progress and resets the sweep or trigger system. A measurement refers to any of the measurements found in the **MEASURE** menu. If the trigger conditions are met, another sweep is initiated immediately.

If `:INITiate:CONTinuous` is off (single measure), then `:INITiate:IMMediate` will start a new single measurement.

If `:INITiate:CONTinuous` is on (continuous measure), a new continuous measurement begins immediately.

The INITiate and/or TRIGger subsystems contain additional related commands.

Remote Command:

`:ABORt`

Remote Command Notes: In the continuous measurement mode, the **Restart** key is equivalent to `ABORt`.

Example: `ABOR`

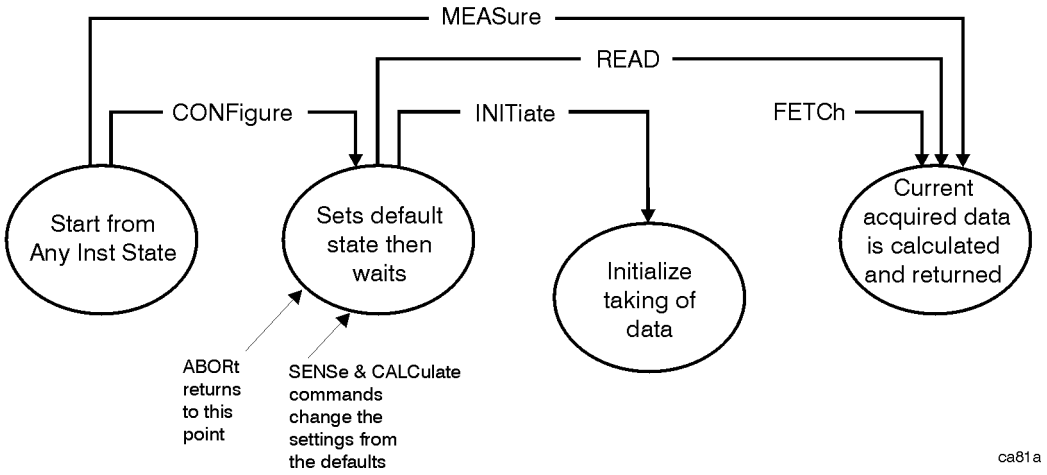
3.6 MEASURE (TD-SCDMA)

This key displays a menu that allows you to make the following TD-SCDMA measurements: Transmit Power, Power vs. Time, ACP (ACPR, ACLR), Multi-carrier Power, Spurious Emissions and Spectrum Emissions Mask. Some common settings can be made for these measurements using the function under the **Mode Setup** key. For example, you may select one of several trigger sources available by pressing **Mode Setup**, **Trigger**.

Remote Command Info:

3.6.1 Command Interactions: MEASure, CONFigure, FETCh, INITiate and READ

Figure 3-2 Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.

  The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.

  ASCII is the default format for the data output. The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results. See Figure 3-2.

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

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

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory default instrument settings. It sets the instrument to single measurement mode but should not initiate the taking of measurement data unless INIT:CONTinuous is ON. After you change any measurement settings, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

The CONFigure? query returns the current measurement name.

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, e.g. both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement.

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

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster then the ASCII format. (FORMat:DATA)

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

INITiate Commands:

:INITiate:<measurement>

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

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

  For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.

- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.

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

READ Commands:

:READ:<measurement>[n]?

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

  For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
- Blocks other SCPI communication, waiting until the measurement is complete before returning the results

  If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster then the ASCII format. (FORMat:DATA)

3.6.2 Transmit Power

The transmit power measurement is an accurate method of determining the average power for the specified burst. The analyzer is set into zero-span mode, with a sweep time that captures at least one burst. Use INSTrument:SELect to set the mode. The measurement settings may be configured by pressing **Meas Setup** after **Transmit Power** has been selected. For more information, see "Transmit Power Measurement" on page 123 and "Transmit Power Measurement Concepts" on page 225. Pressing **Meas Control** allows you to pause or restart your measurement, or toggle between continuous and single measurement mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:MCPower commands for more measurement related commands.

:CONFigure:TXPower

:INITiate:TXPower

:FETCh:TXPower[n]?

:READ:TXPower[n]?

:MEASure:TXPower[n]?

Front Panel Access: **MEASURE**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Remote Command:

Measurement Results Available		
Command	**n**	**Results Returned**
:CONFigure:TXPower :INITiate:TXPower	N/A	Not Applicable
:FETCh:TXPower[n]? :MEASure:TXPower[n]? :READ:TXPower[n]?	n=1 (or not specified)	Returns 8 comma-separated scalar results, in the following order. 1. Sample time is a floating point number representing the time between samples when using the trace queries (n = 0, 2, etc). 2. Power (RMS of carrier power) is the mean power (in dBm) of the power above the threshold value. If averaging is on, the power is for the latest acquisition. 3. Power averaged is the threshold power (in dBm) for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of power averaged is the same as the power value. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n = 0, 2, etc.). 5. Amplitude threshold (relative) is the threshold (in dBm) above which the power is calculated. 6. Amplitude threshold points is the number of points that were above the threshold and were used for the power calculation. 7. Maximum trace point value is the maximum of the most recently acquired data (in dBm). 8. Minimum trace point value is the minimum of the most recently acquired data (in dBm).
	n=2	Returns trace point values of the entire captured 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 number of samples. The period between the samples is defined by the sample time.

Example: FETC:TXP? or MEAS:TXP? or READ:TXP?

3.6.3 Pwr vs Time (Power vs Time / Time Mask) Measurement

This measures the average power during the “useful part” of the burst comparing the power ramp to required timing mask. You must be in TD-SCDMA mode to use these commands. Use INSTrument:SELect to set the mode. The measurement settings may be configured by pressing **Meas Setup** after **Pwr vs Time** has been selected. For more information, see “Pwr vs Time (Power vs Time/ Time Mask) Measurement” on page 135 and “Power Versus Time Measurement Concepts” on page 228. Pressing **Meas Control** allows you to pause or restart your measurement, or toggle between continuous and single measurement mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:PVTime commands for more measurement related commands.

:CONFigure:PVTime

:INITiate:PVTime

:FETCh:PVTime[n]?

:READ:PVTime[n]?

:MEASure:PVTime[n]?

Front Panel Access: **Measure, Pwr vs Time**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

3.6.3.1 Measurement Results Available

n	Results Returned
n=1 (or not specified)	Returns 12 comma-separated scalar results, in the following order: 1. Sample time is a floating point number that represents the time (in seconds) between each trace point returned when using the trace result queries (n = 2,3,4). 2. Power of single burst is the floating point number that represents the Mean Transmit Pwr (in dBm) measured over the transmission period of the selected Burst Type, in the most recently acquired data, or in the last data acquired at the end of a set averages. If averaging is on, the power returned is for the last burst only. 3. Power averaged is the floating point number that represents the Mean Transmit Pwr (in dBm) measured over the transmission period of the selected Burst Type. The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings. If averaging is off, the power returned is the same as the Power of single burst. 4. Number of samples is the integer number that represents the number of trace data points (N) that will be returned when using the trace result queries (n = 2,3,4). 5. Start point of the transmission period is the integer number that represents the trace index of the theoretical start location of selected Burst Type transmission period. 6. Stop point of the transmission period is the integer number that represents the trace index of the theoretical stop location of selected Burst Type transmission period. 7. Center point of the transmission period is the integer number that represents the trace index of the theoretical center location of selected Burst Type transmission period. 8. Burst width is the floating point number that represents the Burst Width (in seconds) measured as the time between the detected –3 dB start and stop points of the selected Burst Type timeslot. If the selected Burst Type signal timeslot is determined to be “inactive”, SCPI_NaN is returned for this result. 9. Maximum value is the floating point number that represents the maximum trace point (in dBm) detected over the entire trace. Max Pt is current data, and therefore is based on the current trace, and not the averaged data. 10. Minimum value is the floating point number that represents the minimum trace point (in dBm) detected over the entire trace. Min Pt is current data, and therefore is based on the current trace, and not the averaged data. 11. Burst search threshold is the floating point number that represents the burst active power threshold (in dBm), derived from the measured signals peak power and the Burst Search Threshold parameter setting. This burst active power threshold is used to determine which timeslots are considered active for the purpose of power versus time limit mask creation. 12. Transmit Off Power is the floating point number that represents the measured Tx Off Power. The result is averaged according to the Average Number Average Mode and Average Type. If all signal timeslots are determined to be “active”, SCPI NaN is returned for this result
n=2	Returns trace point values of the entire waveform 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 number of samples. The period between the samples is defined by the sample time.
n=3	Returns data points representing the upper mask (in dBm).

n	Results Returned
n=4	Returns data points representing the lower mask (in dBm).

Example: FETC:PVT? or MEAS:PVT? or READ:PVT?

3.6.4 Adjacent Channel Power Ratio—ACP Measurement

This measures the total rms power in the specified channel and in 6 offset channels. You must be in TD-SCDMA mode to use these commands. Use INSTrument:SELect to set the mode. The measurement settings may be configured by pressing **Meas Setup** after **ACP** has been selected. For more information, see "ACP—Adjacent Channel Power Measurement" on page 153 and "Adjacent Channel Power (ACP) Measurement Concepts" on page 230. Pressing **Meas Control** allows you to pause or restart your measurement, or toggle between continuous and single measurement mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:ACP commands for more measurement related commands.

:CONFigure:ACP

:INITiate:ACP

:FETCh:ACP[n]?

:READ:ACP[n]?

:MEASure:ACP[n]?

Front Panel Access: **Measure, ACP**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

3.6.4.1 Measurement Results Available

Measurement Type	n	Results Returned
Total power reference	n=1 (or not specified)	Returns 28 comma-separated scalar results, in the following order: 1. Center frequency - relative power (dB) 2. Center frequency - absolute power (dBm) 3. Center frequency - relative power (dB) (same as value 1) 4. Center frequency - absolute power (dBm) (same as value 2) 5. Negative offset frequency (1) - relative power (dB), 6. Negative offset frequency (1) - absolute power (dBm) 7. Positive offset frequency (1) - relative power (dB) 8. Positive offset frequency (1) - absolute power (dBm) . . . 1. Positive offset frequency (6) - relative power (dB) 2. Positive offset frequency (6) - absolute power (dBm) **NOTE** Center frequency relative power is relative to the center frequency absolute power and therefore, is always equal to 0.00 dB.
Power spectral density reference	n=1 (or not specified)	Returns 28 comma-separated scalar results, in the following order: 1. Center frequency - relative power (dB) 2. Center frequency - absolute power (dBm/Hz) 3. Center frequency - relative power (dB) (same as value 1) 4. Center frequency - absolute power (dBm/Hz) (same as value 2) 5. Negative offset frequency (1) - relative power (dB) 6. Negative offset frequency (1) - absolute power (dBm/Hz) 7. Positive offset frequency (1) - relative power (dB) 8. Positive offset frequency (1) - absolute power (dBm/Hz) . . . 1. Positive offset frequency (6) - relative power (dB) 2. Positive offset frequency (6) - absolute power (dBm/Hz) **NOTE** Center frequency relative power is relative to the center frequency absolute power and therefore, is always equal to 0.00 dB.

Remote Command Notes: The main channel power is returned in the current amplitude units, and the lower and upper channel results are always returned in dB.

Example: FETC:ACP? or MEAS:ACP? or READ:ACP? commands return the scalar results of main channel power, lower channel power (relative), and upper

channel power (relative) if only one offset is set to on and the Radio Standard is set to None. Otherwise, 28 values are returned. If **Meas Type** is **Total Power Ref**, these are the main channel power in dBm and in dBc from the carrier (0 dBc) each repeated, followed by the absolute and relative power levels for each lower and upper offset if Meas Type is Total Power Ref. Otherwise they are the main channel power spectral density and relative power spectral density (0 dB) each repeated, followed by the absolute and relative spectral density values for each lower and upper offset.

3.6.5 Multi-Carrier Power—MCP Measurement

This measures the power levels of up to 12 carriers, out-of-channels from them, and the channels between them. You must be in TD-SCDMA mode to use these commands. Use INSTrument:SELect to set the mode. The measurement settings may be configured by pressing Meas Setup after ACP has been selected. For more information, see "Multi-Carrier Power—MCP Measurement" on page 169 and "Multi-carrier Power Measurement Concepts" on page 231. Pressing Meas Control allows you to pause or restart your measurement, or toggle between continuous and single measurement mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:MCPower commands for more measurement related commands.

:CONFigure:MCPower

:INITiate:MCPower

:FETCh:MCPower[n]?

:READ:MCPower[n]?

:MEASure:MCPower[n]?

Front Panel Access: **Measure, Multi-carrier Power**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

3.6.5.1 Measurement Results Available

n	Results Returned
n=1 (or not specified)	Returns 36 comma-separated scalar results, in the following order. 1 to 24. All carriers absolute and relative values 25. lower offset A – relative power (dBc) 26. lower offset A – absolute power (dBm) 27. upper offset A – relative power (dBc) 28. upper offset A -- absolute power (dBm) 29. lower offset B – relative power (dBc) 30. lower offset B– absolute power (dBm) 31. upper offset B– relative power (dBc) 32. upper offset B-- absolute power (dBm) 33. lower offset C– relative power (dBc) 34. lower offset C– absolute power (dBm) 35. upper offset C– relative power (dBc) 36. upper offset C- absolute power (dBm) If the results are not available, –999.0 is returned for the power results and 0.0 for the frequency results.
n=2	Returns 18 comma-separated scalar values of the pass/fail (0 for pass, and 1 for fail) results of all of the offsets and those carriers with power present as determined by testing the power based on the limit setting. 1 to 12: pass/fail status for the 12 carriers. If power present is set to YES, 0 (Pass) is returned. 13 pass/fail status for lower offset A 14 pass/fail status for upper offset A 15 pass/fail status for lower offset B 16 pass/fail status for upper offset B 17 pass/fail status for lower offset C 18 pass/fail status for upper offset C If the results are not available, 0.0 is returned.

Example: `FETC:MCP?` or `MEA:MCP?` or `READ:MCP?`

3.6.6 Spurious Emissions—Spurs Measurement

The spurious emissions measurement identifies and determines the power level of spurious emissions in certain frequency bands. You must be in TD-SCDMA mode to use these commands. Use INSTrument:SELect to set the mode. The measurement settings may be configured by pressing **Meas Setup** after **Spurious Emissions** has been selected. For more information, see "Spurious Emissions—Spurs Measurement" on page 187 and "Spurious Emissions Measurement Concepts" on page 234. Pressing **Meas Control** allows you to pause or restart your measurement, or toggle between continuous and single measurement mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:ACP commands for more measurement related commands.

Key Path: **MEASURE**

Remote Command:

```
:CONFigure:SPURious
:INITiate:SPURious
:FETCh:SPURious[n]?
:MEASure:SPURious[n]?
:READ:SPURious[n]?
```

n	Results Returned
n=1 (or not specified)	Returns a variable-length list of values containing detailed spur information. The total number of data values returned is (1 + 6x spurs – up to 1201 entries), where x is the number of spurs identified. You can have up to 121 data entries if you have the maximum 20 spurs identified. The values returned are in the following order: 1. Number of spurs in items 2 through 6 in this list [Repeat the following for each spur] 2. Spur number 3. Range number in which spur was located (integer) 4. Frequency of spur (Hz) 5. Amplitude of spur (dBm) 6. Absolute limit (dBm) 7. Pass or Fail (1 | 0)
n=2 through 21	Returns a comma separated list of the trace data values for the selected frequency range (where range number = n – 1). If the selected range is not active, then 9.91E37 is returned for each non-active trace data element.
n=22	Returns the number of spurs found.

Example: MEAS:SPUR?

3.6.7 Spectrum Emission Mask—SEM Measurement

Spectrum Emission Mask measurement includes the in-band and out-of-band spurious emissions. As it applies to TD-SCDMA, this is the power contained in a specified frequency bandwidth at certain offsets relative to the total carrier power.

Offsets that are turned off (inactive) will return –999.0 when their results are queried over SCPI.

You must be in TD-SCDMA mode to use these commands. Use INSTrument:SELect to set the mode. The measurement settings may be configured by pressing **Meas Setup** after **Spectrum Emissions Mask** has been selected. For more information, see "Spectrum Emission Mask—SEM Measurement" on page 200 and "Specrtum Emissions Mask (SEM) Measurement Concepts" on page 236. Pressing **Meas Control** allows you to pause or restart your measurement, or toggle between continuous and single measurement mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:ACP commands for more measurement related commands.

Key Path: **MEASURE**

Remote Command:

Measurement Results Available		
Command / Condition	**n**	**Results Returned**
:CONFigure:SEMask :INITiate:SEMask	N/A	Not Applicable
:FETCh:SEMask[n]? :MEASure:SEMask[n]? :READ:SEMask[n]?	n=1 (or not specified)	Returns 60 comma-separated scalar results, in the following order: 1. Reserved for the future use, returns –999.0 2. Absolute power at the center frequency (reference) area (dBm) 3. Reserved for the future use, returns –999.0 4. Reserved for the future use, returns –999.0 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns –999.0 7. Reserved for the future use, returns –999.0 8. Reserved for the future use, returns –999.0 9. Reserved for the future use, returns –999.0 10. Reserved for the future use, returns -999.0. 11. Relative power on the negative offset A (dBc) 12. Absolute power on the negative offset A (dBm) 13. Relative peak power on the negative offset A (dBc) 14. Absolute peak power on the negative offset A (dBm) 15. Peak frequency in the negative offset A (Hz) 16. Relative power on the positive offset A (dBc) 17. Absolute power on the positive offset A (dBm) 18. Relative peak power on the positive offset A (dBc) 19. Absolute peak power on the positive offset A (dBm) 20. Peak frequency in the positive offset A (Hz) 21. Relative power on the negative offset B (dBc) … 59. Absolute peak power on the positive offset E (dBm) 60. Peak frequency in the positive offset E (Hz)
	n=2	Returns the displayed frequency domain spectrum trace data separated by comma. The number of data points is determined by the setting of the trace points parameter.

Measurement Results Available (Continued)		
Command / Condition	**n**	**Results Returned**
	n=3	Returns the displayed frequency domain absolute limit trace data separated by comma. The number of data points is determined by the setting of the trace points parameter.
	n=4	Returns the displayed frequency domain relative limit trace data separated by comma. The number of data points is determined by the setting of the trace points parameter.
	n=5	Returns 12 comma-separated scalar values (in dBm) of the absolute power of the segment frequencies: 1. Total power reference (dBm) 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).
	n=6	Returns 12 comma-separated scalar values (in dBc) of the power relative to the carrier at the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).
	n=7	Returns 12 comma-separated pass/fail test results (0 = passed, or 1 = failed) determined by testing the absolute power in each offset against the specified offset's absolute power limits: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).

Measurement Results Available (Continued)		
Command / Condition	**n**	**Results Returned**
	n=8	Returns 12 comma-separated scalar values of the pass/fail (0 = passed, or 1 = failed) results determined by testing the relative power in each offset against the specified offset's relative power limits: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).
	n=9	Returns 12 comma-separated scalar values of frequency (in Hz) that have peak power in each offset: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).
	n=10	Returns 12 comma-separated scalar values (in dBm) of the absolute peak power of the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).
	n=11	Returns 12 comma-separated scalar values (in dBc) of the peak power relative to the carrier at the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) … 11. Negative offset frequency (E) 12. Positive offset frequency (E).

Example: `FETC:SEM?` or `MEA:SEM?` or `READ:SEM?`

3.6.8 Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command:

```
:CONFigure?
```

Example: `CONF?`

3.7 MODE

Allows you to select the measurement mode of your analyzer. Spectrum Analysis mode is for general purpose measurement use. The instrument comes with the Spectrum Analysis mode. Additional measurement modes can be added to your instrument memory. Refer to the individual measurement personality mode manuals for instructions on how to install the software.

Dependencies/
Couplings: Other modes, besides Spectrum Analysis, must be installed/licensed in your instrument before they will appear in the **Mode** menu. Some modes also require the presence of specific hardware.

Saved State: Saved in instrument state.

SCPI Status Bits/
OPC Dependencies: If you are using the status bits and the analyzer mode is changed, the status bits should be read, and any errors resolved, prior to switching modes. Error conditions that exist prior to switching modes cannot be detected using the condition registers after the mode change. This is true unless they recur after the mode change, although transitions of these conditions can be detected using the event registers.

Changing modes resets all SCPI status registers and mask registers to their power-on defaults. Hence, any event or condition register masks must be re-established after a mode change. Also note that the power up status bit is set by any mode change, since that is the default state after power up.

Factory Preset: Spectrum Analysis

If **Preset Type Mode** is selected, then the analyzer settings are preset but it stays in that selected mode.

Remote Command:

```
:INSTrument[:SELect]
BASIC|CDMA|CDMA1XEV|CDMA2K|EDGEGSM|LINK|NADC|NFIGURE|PDC|PNOISE|SA|WCDMA|TDSCDMA
```

```
:INSTrument[:SELect]?
```

Remote Command Notes: The actual available choices depend upon which modes (measurement applications) are installed in the instrument. A list of the valid choices is returned with the INST:CAT? query.

Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

BASIC
CDMA1XEV (1xEV-DO)
CDMA2K (cdma2000)

EDGEGSM (GSM with EDGE)
LINK (89600 VSA Link software)
NADC
NFIGURE (noise figure)
PDC
PNOISE (phase noise)
SA
TDSCDMA
WCDMA

Example: `INST TDSCDMA`

`INST?`

3.7.1 Spectrum Analysis

Selects the spectrum analysis measurement mode for your analyzer.

Key Path: **Mode**

Remote Command:

:INSTrument[:SELect] SA

Example: `INST SA`

`INST?`

3.7.2 Application Mode Number Selection (Remote command only)

Allows you to select the measurement mode by its mode number. The actual available choices depend upon which applications are installed in your instrument.

Dependencies/
Couplings: Other modes, besides Spectrum Analysis, must be installed/licensed in your instrument before they will appear in the **Mode** menu. Some modes also require the presence of specific hardware.

SCPI Status Bits/
OPC Dependencies: If you are using the status bits and the analyzer mode is changed, the status bits should be read, and any errors resolved, prior to switching modes. Error conditions that exist prior to switching modes cannot be detected using the condition registers after the mode change. This is true unless they recur after the mode change, although transitions of these conditions can be detected using the event registers.

Changing modes resets all SCPI status registers and mask registers to their power-on defaults. Hence, any event or condition register masks must be re-established after a mode change. Also note that the power up status bit is set by any mode change, since that is the default state after

power up.

Factory Preset: 1 (Spectrum Analysis)

If **Preset Type Mode** is selected, then the analyzer settings are preset but it stays in that selected mode.

Remote Command:

`:INSTrument:NSELect <integer>`

`:INSTrument:NSELect?`

Remote Command Notes: Enter one of the following integers in the command to set the analyzer mode.

Mode	NSELect Number	Mode Keyword
Basic	8	BASIC
cdmaOne	4	CDMA
CDMA1xEV-DO	15	CDMA1XEV
cdma2000	10	CDMA2K
EDGE with GSM	13	EDGEGSM
89600 VSA Link Software	231	LINK
NADC	5	NADC
Noise Figure	219	NFIGURE
PDC	6	PDC
Phase Noise	14	PNOISE
Spectrum Analysis	1	SA
TD-SCDMA	211	TDSCDMA
W-CDMA for 3GPP	9	WCDMA

Example: `INST:NSEL 211` sets the mode to TD-SCDMA.

3.7.3 Application Mode Catalog Query (Remote command only)

Returns a comma separated list of strings that contain the names of all the installed applications/modes. These names can only be used with the **`INST:SELECT`** command.

Remote Command:

`:INSTrument:CATalog?`

Example: `INST:CAT?`

Query response: `“SA”,“CDMA”,“PNOISE”,“TDSCDMA”`

3.8 Mode Setup

Allows you to change measurement settings common to *all* measurements in the **MEASURE** menu. In Spectrum Analysis mode, there are several built-in power measurements. Parameters that you set in the Mode Setup menu affect all of these measurements.

Key Path: Front-panel key

3.8.1 Radio

Accesses the key menu for selecting the device signal to be measured.

Key Path: **Mode Setup**

Remote Command:

There is no equivalent remote command.

3.8.1.1 Device BTS/MS

This function allows you to select either the base transmitter station (BTS) setup defaults or the mobile station (MS) defaults.

Key Path: **Mode Setup, Std Setup**

Factory Preset: BTS

Remote Command:

`[:SENSe]:RADio:DEVice BTS|MS`

`[:SENSe]:RADio:DEVice?`

Example: `RAD:DEV MS` sets the device measurement parameters to mobile station defaults.

3.8.2 Input

Displays the keys that control some of the signal inputs and outputs of the analyzer. The menu items accessed by this menu key on the Mode Setup menu are duplicates of the menu items under the **Input/Output** front panel key. Refer to "Input/Output" on page 77

3.8.2.1 Input Port

See "Input/Output" on page 77

3.8.2.1.1 RF

See “Input/Output” on page 77

3.8.2.1.2 Amptd Ref

See “Input/Output” on page 77

3.8.2.2 RF Input Range

See “Input/Output” on page 77

3.8.2.3 Max Total Pwr

See “Input/Output” on page 77

3.8.2.4 External RF Atten

See “Input/Output” on page 77

3.8.2.4.1 MS

See “Input/Output” on page 77

3.8.2.4.2 BTS

See “Input/Output” on page 77

3.8.2.5 Int Preamp

See “Input/Output” on page 77

3.8.3 Trigger

Displays the keys that enable you to configure the trigger parameters associated with each the supported trigger types. The menu items accessed by this menu key on the Mode Setup menu are duplicates of the menu items under the **Trig** front panel key. Refer to “Trig” on page 117

3.8.3.1 RF Burst

See “RF Burst” on page 117

3.8.3.1.1 Delay

See “Delay” on page 117

3.8.3.1.2 Slope

See “Slope” on page 118

3.8.3.2 Ext Front

See “Ext Front” on page 118

3.8.3.2.1 Delay

See “Delay” on page 118

3.8.3.2.2 Slope

See “Slope” on page 119

3.8.3.3 Ext Rear

See “Ext Rear” on page 119

3.8.3.3.1 Delay

See “Delay” on page 120

3.8.3.3.2 Slope

See “Slope” on page 120

3.8.3.4 Burst Search Threshold

See “Burst Search Threshold” on page 120

3.9 Sweep

Displays menu keys that enable you to set the LO Sweep Gated mode of a measurement. Sweep gating is disabled when the currently selected measurement is Transmit Power, Power vs Time, or Spurious Emissions.

Even though the Gate state parameter is disabled for Transmit Power, PvT and Spurious Emissions; Transmit Power and Power vs. Time provide a gate view which the you can use for configuring the gate. To use Gating in ACP, MCP or SEM; you must first configure the Gate Source, Gate Delay and Gate Length parameters as follows:

1. Select one of the time domain measurement (PvT or Transmit Power). With either of these measurements selected, adjust the Meas Time parameter located under the Meas Setup menu in order to see the burst you want to measure.
2. Select **Marker**, which activates Marker 1 as a normal marker.
3. Position Normal Marker 1 to the start of the desired burst.
4. Enter the displayed Normal Marker 1 time value as the Gate Delay parameter value, located under the Gate Setup menu.
5. Change Marker 1 mode to Delta, which also activates Marker 2 as the Reference Maker.
6. Position Delta Marker 1 to the end of the desired burst.
7. Enter the displayed Delta Marker 1 time value as the Gate Length parameter value, located under the Gate Setup menu.
8. Select the desired Gate Source, located under the Gate Setup menu.
9. Select the desired swept measurement: ACP, MCP or SEM. (Note that upon entering one of these three swept measurements, the Gate state key, located under the Sweep menu, will be enabled.)
10. Set the Gate state to On and the gating function will use the Gate Setup parameters you have just entered in the previous steps.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command.

3.9.1 Gate

Allows you to turn the gate function on and off. When set to **Gate** (On), the LO sweeps whenever the gate conditions are satisfied by the signal at the Gate Source selected under **Gate Setup**. Refer to the steps listed above to set the gate parameters.

This parameter is disabled when the currently selected measurement is Transmit Power, Power vs Time, or Spurious Emissions.

Key Path: **Sweep**

State Saved: Saved in instrument state.

Factory Preset: Off/0

Remote Command:

`[:SENSe]:SWEep:EGATe[:STATe] 1|0|ON|OFF`

Example: `SWEep:EGATe 1` sets gating on.

3.9.2 Gate Setup

Displays the menu that allows you to set various sweep gate parameters. Refer to the steps listed above to set the gate parameters.

Key Path: **Sweep**

State Saved: Saved in instrument state.

Remote Command:

There is no equivalent remote command.

3.9.2.1 Gate Polarity

Allows you to set the polarity for the gate signal. When **Positive** (Pos) is selected, a positive going edge will satisfy the gate condition, after the delay set with the **Gate Delay** key. When **Negative** (Neg) is selected, a negative-going edge will satisfy the gate condition after the delay.

Key Path: **Sweep, Gate Setup**

State Saved: Saved in instrument state.

Factory Preset: Pos/0

Remote Command:

`[:SENSe]:SWEep:EGATe:POLarity NEGative | POSitive`

Example: `SWE:EGAT:POL NEG` to set the sweep gate polarity to negative.

3.9.2.2 Gate Delay

Allows you to set a time delay from the time the gate condition goes True until the gate is turned on.

Key Path: **Sweep, Gate Setup**

State Saved: Saved in instrument state.

Factory Preset: 57.70 µs

Range: 0 s to 1 s

Remote Command:

`[:SENSe]:SWEep:EGATe:DELay <time>`

`[:SENSe]:SWEep:EGATe:DELay?`

Example: `SWEep:EGATe:DEL 100 µs` sets the sweep gate delay to 100 microseconds.

3.9.2.3 Length

Allows you to set the length of time that the sweep gate is on after it opens.

Key Path: **Sweep**, **Gate Setup**

State Saved: Saved in instrument state.

Factory Preset: 461.6 µs

Terminators: ns | µs | ms | s | ks

Default Terminator µs

Range: 10 µs to 500 ms

Remote Command:

`[:SENSe]:SWEep:EGATe:LENGth <time>`

`[:SENSe]:SWEep:EGATe:LENGth?`

Example: `SWE:EGAT:LENG 900 µs` sets the sweep gate length to 900 microseconds.

3.9.2.4 Gate Source

Displays the menu that allows you to select the input to which the gate signal will be applied.

Key Path: **Sweep**, **Gate Setup**

State Saved: Saved in instrument state.

Factory Preset: External 1 (front)

Remote Command:

`[:SENSe]:SWEep:EGATe:SOURce EXTernal[1]|EXTernal2|RFBurst`

`[:SENSe]:SWEep:EGATe:SOURce?`

RFB = RFBurst–triggers on the RF burst envelope signal
EXT1 = External Front–allows you to trigger on an externally connected trigger source
EXT2 = External Rear–allows you to trigger on an externally connected trigger source

Example: SWEep:EGATe:SOUR EXT2 sets the sweep gate to act on the signal applied to the external rear trigger input.

3.9.2.4.1 Ext Front (Ext Trig In)

Allows you to set the gate input to be the EXT TRIGGER INPUT on the front panel, and defines the transition point for that input to be the value set on the key.

.

Key Path: **Sweep, Gate Setup, Gate Source**

State Saved: Saved in instrument state.

Factory Preset: 1.50 V

Terminators: mV | V

Default Terminator V

Range: –5.0 V to 5.0 V

Remote Command:

[:SENSe]:SWEep:EGATe:EXTernal[1]:LEVel <voltage>

[:SENSe]:SWEep:EGATe:EXTernal[1]:LEVel?

EXT1 = External Front–allows you to trigger on an externally connected trigger source

Example: SWEep:EGATe:EXT:LEV 2 sets the sweep gate trigger level for the external front trigger input to 2.0 volts.

3.9.2.4.2 Ext Rear (Trigger In)

Allows you to set the gate input to be the TRIGGER INPUT on the rear panel, and defines the transition point for that input to be the value set on the key.

.

Key Path: **Sweep, Gate Setup, Gate Source**

State Saved: Saved in instrument state.

Factory Preset: 1.50 V

Terminators: mV | V

Default Terminator V

Range: –5.0 V to 5.0 V

Remote Command:

[:SENSe]:SWEep:EGATe:EXTernal2:LEVel <voltage>

[:SENSe]:SWEep:EGATe:EXTernal2:LEVel?

EXT1 = External Front–allows you to trigger on an externally connected trigger source

Example: SWEep:EGATe:EXT2:LEV 2 sets the sweep gate trigger level for the external rear trigger input to 2.0 volts.

3.9.2.4.3 RF Burst

Allows you to set the gate input to be the RF Burst (wideband) trigger.

Key Path: **Sweep**, **Gate Setup**, **Gate Source**

State Saved: Saved in instrument state.

Remote Command:

[:SENSe]:SWEep:EGATe:SOURce EXTernal[1]|EXTernal2|RFBurst

[:SENSe]:SWEep:EGATe:SOURce?

RFB = RFBurst–triggers on the RF burst envelope signal
EXT1 = External Front–allows you to trigger on an externally connected trigger source
EXT2 = External Rear–allows you to trigger on an externally connected trigger source

Example: SWEep:EGATe:SOUR RFB sets the sweep gate to act on the RF burst envelope signal.

3.10 Trig

Displays the keys that allow you to configure the trigger parameters associated with each the supported trigger types. The menu items accessed by this front panel key are duplicates of the menu items under the Mode Setup menu **Trigger** key.

Key Path: Front-panel key

State Saved: Saved in Instrument State

Factory Preset: Free Run

Remote Command:

`:TRIGger[:SEQuence]:SOURce EXTernal[1]|EXTernal2|RFBurst`

`:TRIGger[:SEQuence]:SOURce?`

RFB = RFBurst–triggers on the RF burst envelope signal
EXT1 = External Front–allows you to trigger on an externally connected trigger source
EXT2 = External Rear–allows you to trigger on an externally connected trigger source

Remote Command Notes: For the trigger parameter keys and commands for the Power vs Time and Transmit Power measurements, refer to "Meas Setup (Transmit Power)" on page 123 and "Meas Setup (Pwr vs Time/Power vs Time/ Time Mask) Measurement" on page 135.

Other trigger-related commands are found in the INITiate and ABORt subsystems.

Example: `TRIG:SOUR RFB`

3.10.1 RF Burst

Displays the keys that allow you to configure the trigger delay and slope, to be used when trigger source is set to RF Burst

Key Path: **Trig**

Remote Command:

See "Trig" on page 117

Example: `TRIG:SOUR RFB` to select RF Burst triggering.

3.10.1.1 Delay

Allows you to set a time delay during which the analyzer will wait to begin a sweep after receiving a trigger signal when using the RF Burst (wideband) trigger. You can use negative delay to pre-trigger the instrument.

Key Path: **Trig, RF Burst**

State Saved: Saved in instrument state.

Factory Preset: 0.0 s

Range: –100 ms to 500 ms

Remote Command:

`:TRIGger[:SEQuence]:RFBurst:DELay <time>`

`:TRIGger[:SEQuence]:RFBurst:DELay?`

Example: `TRIG:RFB:DEL 0.3 s` sets the trigger delay to 30 milliseconds.

3.10.1.2 Slope

Allows you to set the trigger polarity when using the RF Burst (wideband) trigger. It is set to positive to trigger on a rising edge and to negative to trigger on a falling edge.

Key Path: **Trig, RF Burst**

State Saved: Saved in instrument state.

Factory Preset: Positive (rising edge)

Remote Command:

`:TRIGger[:SEQuence]:RFBurst:SLOPe POSitive|NEGative`

`:TRIGger[:SEQuence]:RFBurst:SLOPe?`

Example: `TRIG:RFB:SLOP NEG`

3.10.2 Ext Front

Displays the keys that allow you to configure the trigger delay and slope, to be used when trigger source is set to Ext Front.

Key Path: **Trig**

SCPI Status Bits/
OPC Dependencies: Line trigger is not available when operating from a dc power source.

Remote Command:

See "Trig" on page 117

3.10.2.1 Delay

Allows you to set a time delay during which the analyzer will wait to begin a sweep after receiving a trigger signal when using the front panel external trigger. You can use negative delay to pre-trigger the instrument.

Key Path: **Trig, Ext Front**

State Saved: Saved in instrument state.

Factory Preset: 0.0 s

Range: –100 ms to 500 ms

Remote Command:

`:TRIGger[:SEQuence]:EXTernal[1]|2:DELay <time>`

`:TRIGger[:SEQuence]:EXTernal[1]|2:DELay?`

Example: `TRIG:EXT:DEL 0.3 s` sets the trigger delay to 30 milliseconds when using the front external trigger source.

3.10.2.2 Slope

Allows you to set the trigger polarity when using the front panel external trigger. It is set to positive to trigger on a rising edge and to negative to trigger on a falling edge.

Key Path: **Trig, Ext Front**

State Saved: Saved in instrument state.

Factory Preset: Positive (rising edge)

Remote Command:

`:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe POSitive|NEGative`

`:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe?`

Example: `TRIG:EXT:SLOP NEG` sets the trigger polarity to negative when using the front external trigger source.

3.10.3 Ext Rear

Displays the keys that allow you to configure the trigger delay and slope, to be used when trigger source is set to Ext Rear.

Key Path: **Trig**

Remote Command:

See "Trig" on page 117

3.10.3.1 Delay

Allows you to set a time delay during which the analyzer will wait to begin a sweep after receiving a trigger signal when using the front panel external trigger. You can use negative delay to pre-trigger the instrument.

Key Path: **Trig, Ext Rear**

State Saved: Saved in instrument state.

Factory Preset: 0.0 s

Range: –100 ms to 500 ms

Remote Command:

`:TRIGger[:SEQuence]:EXTernal[1]|2:DELay <time>`

`:TRIGger[:SEQuence]:EXTernal[1]|2:DELay?`

Example: `TRIG:EXT2:DEL 0.3 s` sets the trigger delay to 30 milliseconds when using the rear external trigger source.

3.10.3.2 Slope

Allows you to set the trigger polarity when using the front panel external trigger. It is set to positive to trigger on a rising edge and to negative to trigger on a falling edge.

Key Path: **Trig, Ext Rear**

State Saved: Saved in instrument state.

Factory Preset: Positive (rising edge)

Remote Command:

`:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe POSitive|NEGative`

`:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe?`

Example: `TRIG:EXT2:SLOP NEG` sets the trigger polarity to negative when using the rear external trigger source.

3.10.4 Burst Search Threshold

Set the relative power threshold, which is used to determine the timeslots that will be included in the search for TD-SCDMA bursts. The threshold power is relative to the peak power of the highest power timeslot. This is useful when measuring a BTS with different power levels in different timeslots, and you want to exclude bursts with lower power levels.

This parameter only effects the Power v Time measurement.

Key Path: **Trig**

State Saved: Saved in instrument state.

Factory Preset: –30.0 dB

Range: –200 dB to –0.01 dB

Remote Command:

```
:[:SENSe]:SYNC:BURSt:STHReshold <integer>
:[:SENSe]:SYNC:BURSt:STHReshold?
```

Example: `SYNC:BURS:STHR –35`

3.11 TD-SCDMA Measurement Keys

3.12 Transmit Power Measurement

3.12.1 Meas Setup (Transmit Power)

When **Transmit Power** has been selected in the **Measure** menu, this key displays the appropriate measurement setup menu.

The Transmit power measurement is an accurate method of determining the average power for the specified burst.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command.

3.12.1.1 Avg Number

Press **Avg Number (On)** to specify the number of measurement averages used when calculating the measurement result. The average is displayed at the end of each sweep.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 10 averages / Off

Range: 1 to 1000

Remote Command:

```
[:SENSe]:TXPower:AVERage:COUNt <integer>
[:SENSe]:TXPower:AVERage:COUNt?

[:SENSe]:TXPower:AVERage[:STATe] OFF|ON|0|1
[:SENSe]:TXPower:AVERage[:STATe]?
```

Example:
```
TXP:AVER:COUN 100
TXP:AVER ON
```

3.12.1.2 Avg Mode

Press **Avg Mode** to select the type of termination control used for the averaging function to either **Exp** or **Repeat**. This determines the averaging action after the specified number of measurements (average count) is reached.

- **EXP** (Exponential Averaging mode)—When you set **Avg Mode** to **Exp**, each successive data acquisition after the average count is reached is exponentially weighted and combined with the existing average. Exponential averaging weights new data more than old data, which facilitates tracking of slow-changing signals. The average will be displayed at the end of each sweep.
- **Repeat**—When you set **Avg Mode** to **Repeat**, after reaching the average count, all previous result data is cleared and the average count is set back to 1.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: EXPonential

Range: EXPonential|REPeat

Remote Command:

`[:SENSe]:TXPower:AVERage:TCONrol EXPonential|REPeat`

`[:SENSe]:TXPower:AVERage:TCONrol?`

Example:
```
TXP:AVG:TCON REP
TXP:AVG:TCON?
```

3.12.1.3 Average Type

Allows you to specify the type of result averaging to be performed.

- **Log** — Selects averaging that sums the trace data and divides by the number of data points. This average does not effect the trace and is only applied to the matrix information.
- **RMS** — Selects averaging that converts trace data from dB to power units, then averages the power trace data. This average does not effect the trace and is only applied to the matrix information.

Key Path: **Meas Setup**

Factory Preset: RMS

Remote Command:

`[:SENSe]:TXPower:AVERage:TYPE LOG|RMS`

`[:SENSe]:TXPower:AVERage:TYPE?`

Example:
```
TXP:AVG:TYPE Log to select Log type.
TXP:AVG:TYPE?
```

3.12.1.4 Threshold Lvl

Allows you to set the threshold level which is used by both the supported Meas Method

parameter settings. The threshold level can be described in dB (**Rel**) or dBm (**Abs**). The resulting threshold level in use is also represented graphically by a green horizontal Amplitude Threshold line displayed in the graph window.

In Above Threshold Level measure method the Amplitude Threshold determines the level above which trace points will be included in the Mean Transmit Power result calculation.

In Measured Burst Width measure method the Amplitude Threshold determines the burst search threshold level to be used by the Transmit Power measurement in determining whether or not a signal timeslot is active or not.

Key Path: **Meas Setup**

Factory Preset: –30 dB and RELative

Terminators: dB or dBm

Default Terminator dB

Knob Increment: 0.1 dB/dBm

Step Key Increment: 6 dB/dBm

Range: –60 dBm to 60 dBm (in absolute mode)

–60 dB to 0 dB (in relative mode)

Remote Command:

```
[:SENSe]:TXPower:THReshold <number>
[:SENSe]:TXPower:THReshold?
[:SENSe]:TXPower:THReshold:TYPE ABSolute|RELative
[:SENSe]:TXPower:THReshold:TYPE?
```

Example:
```
TXP:THR –20
TXP:THR:TYPE ABS
```

3.12.1.5 Meas Method

Allows you to select the measurement method.

- **Above Threshold Lvl** — Uses the Threshold Lvl parameter as the criteria in making the measurement. A time record is captured and only those points in the time record that exceed the threshold level are averaged. No attempt is made to position the burst or to calculate and display burst widths. This method can be used to measure continuous signals or burst signals where the Measured Burst Width method is too restrictive.
- **Measured Burst Width** — Uses the Threshold Lvl parameter to determine the active burst rise and fall edges, and consequently the determines the location of burst center. Then averages those points that lie within either an auto calculated or user-specified Burst Width centered upon the burst. For more information on the burst width parameter see

"Burst Width" on page 126

Key Path: **Meas Setup**

Factory Preset: Above Threshold Lvl (THReshold)

Remote Command:

[:SENSe]:TXPower:METHod THReshold|BWIDth

[:SENSe]:TXPower:METHod?

Example: TXP:METH BWID to select burst width as the measurement method.

3.12.1.6 Burst Width

Allows you to enter a burst width value and to set the burst width parameter to automatic (**Auto**) or manual (**Man**) mode.

- **Auto** — The burst width is updated automatically to be the measured Full Burst Width result value. The Full Burst Width result is the time between the detected –3 dB start and stop points relative to the mean transmit power of the first detected "active" timeslot. This will update after each sweep, but before any power results are calculated. Since the measurement only measures Mean Transmit Power over the burst width, this will force a measurement between the –3 dB points.
- **Man** — The burst width used for computing the burst power is controlled by entering a burst width value directly in seconds. The burst width is centered on the observed burst in each measurement.

NOTE This key will be greyed out if **Meas Method** is set to **Above Threshold Lvl.**

Key Path: **Meas Setup**

Factory Preset: 675.0 µs and Auto/On

Terminators: s, ms, µs, ns

Default Terminator: seconds (s)

Knob Increment: 0.1 µs

Step Key Increment: 10 µs

Range: 0.1 µs to 1 s

Remote Command:

[:SENSe]:TXPower:BURSt:WIDTh <time>

[:SENSe]:TXPower:BURSt:WIDTh?

[:SENSe]:TXPower:BURSt:AUTO OFF|ON|0|1

[:SENSe]:TXPower:BURSt:AUTO?

Example: TXP:BURST:WIDT 1.2 ms

TXP:BURST:AUTO ON

3.12.1.7 Meas Time

Allows you to set the number of slots to be captured for each measurement. Uplink and downlink pilots each count as one slot, therefore setting the Meas Time parameter to 9 will display one full subframe.

Key Path: **Meas Setup**

Factory Preset: 1

Range: 1 to 18

Remote Command:

[:SENSe]:TXPower:SWEep:TIME <time>

[:SENSe]:TXPower:SWEep:TIME?

Example: TXP:SWE:TIME 4

3.12.1.8 Trig Source

Displays menu keys that enable you to select the trigger mode of a sweep or measurement. The analyzer will begin a sweep only with the proper trigger condition.

Key Path: **Meas Setup**

State Saved: Saved in Instrument State

Factory Preset: RFBurst

Remote Command:

[:SENSe]:TXPower:TRIGger:SOURce EXTernal[1]|EXTernal2|RFBurst

[:SENSe]:TXPower:TRIGger:SOURce?

RFB = RFBurst–triggers on the RF burst envelope signal
Ext1 = External Front–Allows you to trigger on an externally connected trigger source
Ext2 = External Rear–Allows you to trigger on an externally connected trigger source

Remote Command Notes: Other trigger-related commands are found in the INITiate and ABORt subsystems.

Example: TXP:TRIG:SOUR RFB

3.12.1.8.1 Free Run

Sets the trigger to start a new sweep/measurement as soon as the last one has ended (continuous sweep mode) or immediately (single sweep mode).

Key Path: **Meas Setup**, **Trig Source**

Dependencies/ Couplings: Trigger Slope and Delay adjustments are not available with Free Run triggering.

Remote Command:

See "Trig Source" on page 127

Example: `TXP:TRIG:SOUR IMM`

3.12.1.8.2 RF Burst (Wideband)

Allows the analyzer to be triggered by an RF burst envelope signal.

Key Path: **Meas Setup**, **Trig Source**

Remote Command:

See "Trig Source" on page 127

Example: `TRIG:SOUR RFB` to select RF Burst triggering.

3.12.1.8.3 Ext Front

Sets the trigger to start a new sweep/measurement whenever the external voltage (connected to EXT TRIGGER INPUT on the front panel) passes through approximately 1.5 volts. The external trigger signal must be a TTL-type signal.

Key Path: **Meas Setup**, **Trig Source**

Remote Command:

See "Trig Source" on page 127

Example: `TRIG:SOUR EXT` to select front panel external triggering.

3.12.1.8.4 Ext Rear

Sets the trigger to start a new sweep/measurement whenever the external voltage (connected to TRIGGER IN on the rear panel) passes through approximately 1.5 volts. The external trigger signal must be a TTL-type signal.

Key Path: **Meas Setup**, **Trig Source**

Remote Command:

See "Trig Source" on page 127

Example: `TRIG:SOUR EXT2` selects rear panel external triggering.

3.12.1.9 Advanced

Access the menu that allows you to set the advanced measurement parameters.

Key Path: **Meas Setup**

Remote Command:

There is no remote command for this key.

3.12.1.9.1 Res BW

Allows you to specify the resolution bandwidth used in making the measurement sweeps.

Key Path: **Meas Setup, Advanced**

State Saved: Saved in instrument state.

Factory Preset: 2.0 MHz

Default Terminator: Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: 1 Hz to 8 MHz

Remote Command:

`[:SENSe]:TXPower:BANDwidth|BWIDth:RESolution <freq>`

`[:SENSe]:TXPower:BANDwidth|BWIDth:RESolution?`

Example: `TXP:BAND:RES 5 MHz`

`TXP:BAND:RES?`

3.12.2 AMPLITUDE / Y Scale (Transmit Power)

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.12.2.1 Scale/Div

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 10 dB

Terminators: dB

Default Terminator: dB

Range: 0.1 dB to 20 dB

Remote Command:

```
:DISPlay:TXPower:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>
:DISPlay:TXPower:WINDow:TRACe:Y:[SCALe]:PDIVision?
```

Example: `DISP:TXP:WIND:TRAC:Y:PDIV 0.5 DB`

3.12.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad.

Key Path: **AMPLITUDE / Y Scale**

Dependencies/ Couplings: If you reduce the **Input Atten** setting, the analyzer may have to lower the Reference Level to maintain the proper level at the top of the screen. If you then increase **Input Atten**, the Reference Level does *not* increase to its previous value.

State Saved: Saved in Instrument State

Factory Preset: 0 dBm

Range: –170 dBm to 30 dBm

Remote Command:

```
:DISPlay:TXPower:WINDow:TRACe:Y:[SCALe]:RLEVel <power>
:DISPlay:TXPower:WINDow:TRACe:Y:[SCALe]:RLEVel?
```

Example: `DISP:TXP:WIND:TRAC:Y:RLEV 20 dbm`

3.12.3 Marker (Transmit Power)

Displays the Marker control menu for the Transmit Power measurement. If no markers are active, **Marker** selects marker 1, sets it to **Normal** and places it to the right of the display. There are two control modes for the markers:

- **Normal (POSition) -** A single marker that can be moved to any point on the trace.
- **Delta -** Turns on a second marker and readouts the level difference between the marker pair.
- **Off (Off) -** Turns off the active marker or marker pair.
- **Marker All Off -** Turns off all of the displayed markers.

Key Path: Front-panel key

State Saved: The control mode for each marker, as well as the position of each marker, is saved in instrument state.

Factory Preset: All Off.

Remote Command:

There is no equivalent remote command.

`:CALCulate:TXPower:MARKer[1]|2|3|4:STATe OFF|ON|0|1`

`:CALCulate:TXPower:MARKer[1]|2|3|4:STATe?`

`:CALCulate:TXPower:MARKer[1]|2|3|4:MODE POSition|DELTa|OFF`

`:CALCulate:TXPower:MARKer[1]|2|3|4:MODE?`

The following commands do not have an equivalent menu key:

`:CALCulate:TXPower:MARKer[1]|2|3|4:X <number>`

`:CALCulate:TXPower:MARKer[1]|2|3|4:X?`

Factory Preset: 2.5 ms

Terminators: ns, µs, ms, s, ks

Default Terminator: s

Range: –1.0 s to 5 ms

`:CALCulate:TXPower:MARKer[1]|2|3|4:Y?`

Remote Command Notes:

`CALC:TXP:MARK[1]|2|3|4:X` sets the marker X position to a specified point on the x-axis in the current X-axis unit (frequency or time). If the frequency or time chosen would place the marker off screen, the marker will be placed at the left or right side of the display, on the trace. The marker must already be ON.

`CALC:TXP:MARK[1]|2|3|4:Y?` returns the marker Y value or delta value

in the current y-axis unit.

Example: `CALC:TXP:MARK2:X 0.001s` selects marker 2 and moves it to 0.001 second.

`CALC:TXP:MARK2:X?` returns the marker 2 X position in Hz.

`CALC:TXP:MARK2:Y:POS?` returns the marker 2 Y value or delta value.

3.12.3.1 Select Marker

Selects one of the four possible markers. Once a marker is selected, it can be set to any of the control modes **Normal**, **Delta**, or **Off**.

Key Path: **Marker**

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

Factory Preset: Marker 1

Remote Command:

See "Marker (Transmit Power)" on page 131 for the mode command.

Remote Command Notes: Sets or queries the state of a marker. Setting a marker to state ON or 1 selects that marker. Setting a marker which is OFF to state ON or 1 puts it in **Normal** mode and places it on the screen to the right of the displayed measurement graph. Setting a marker to state OFF or 0 selects that marker and turns it off. The response to the query will be 0 if OFF, 1 if ON.

Example: `CALC:TXP:MARK2:STAT ON` selects marker 2.

`CALC:TXP:MARK:STAT ON` will not modify a marker that is already on.

3.12.3.2 Normal

Sets the control mode for the selected marker to **Normal**. If the marker is off, a single marker is activated and placed on the screen to the right of the measurement graph. You can then adjust the trace point of the marker using the knob, numeric keypad, or ⇑ ⇓ keys.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Marker (Transmit Power)" on page 131 for the mode command.

Example: `CALC:TXP:MARK2:MODE POS` selects marker 2 and sets it to Normal.

3.12.3.3 Delta

Sets the control mode for the selected marker to **Delta** and turns on a second, sequentially numbered

marker as the reference marker. The newly activated reference marker is placed on the screen to the right of the measurement graph (the delta of 0 dB) is displayed. The control mode of the second marker is set to Normal. If marker 4 is set to **Delta**, the second marker turned on as the reference marker will be marker 1. You can adjust the position of either marker by selecting the marker and using the knob, numeric keypad, or ⇑ ⇓ keys.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Select Marker" on page 132 for the mode command.

Example: `CALC:TXP:MARK2:MODE DELT` selects marker 2, sets it to Delta, turns on marker 3 (if not already active) as the reference marker, and sets marker 3 to normal.

3.12.3.4 Off

Turns off the selected marker. In addition, **Off** also turns off functions related to the selected marker.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Marker (Transmit Power)" on page 131 for the command to select the control mode.

Example: `CALC:TXP:MARK3:MODE OFF` selects marker 3 and sets it to **Off**.

3.12.3.5 Marker All Off [ESA] [PSA]

Turns off all markers, including markers used for signal track.

Key Type: Immediate Action

Key Path: **Marker**

Key Notes: Marker annotation is also removed from the display.

Remote Command:

`:CALCulate:TXPower:MARKer[1]|2|3|4:AOFF`

Remote Command Notes: n/a

Example: `CALC:TXP:MARK:AOFF` turns off all markers.

3.12.4 Trace/View (Transmit Power)

Displays menu keys that enable you to set how trace information is stored and displayed.

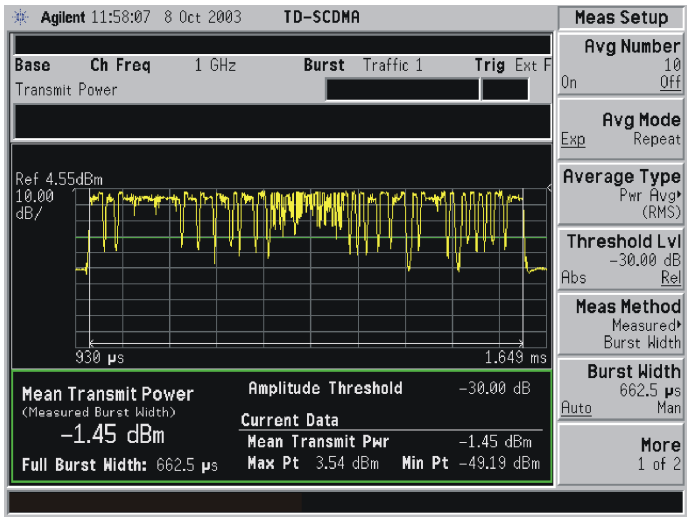
Key Path: Front-panel key

Remote Command:

There is no remote command for this key.

3.12.4.1 RF Envelope

Press **RF Envelope** to view the measurement results as shown in the following figure. The results are updated after each sweep.



Key Path: **Trace/View**

3.13 Pwr vs Time (Power vs Time/ Time Mask) Measurement

3.13.1 Meas Setup (Pwr vs Time/Power vs Time/ Time Mask) Measurement

If the **Pwr vs Time** measurement has been selected in the **Measure** menu, this key displays the Power vs Time measurement setup menu.

The Power vs Time measurement is an analysis of the amplitude profile and timing of the burst signal and provides a time mask for the signal.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command.

3.13.1.1 Avg Number

Pressing **Avg Number** to **On** allows you to specify the number of measurements that will be averaged when calculating the measurement result. The average will be displayed at the end of each sweep. Setting **Avg Number** to **Off** disables the measurement averaging.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 10 / Off

Range: 1 through 1000

Remote Commands:

```
[:SENSe]:PVTime:AVERage:COUNt <integer>
[:SENSe]:PVTime:AVERage:COUNt?
[:SENSe]:PVTime:AVERage[:STATe] OFF|ON|0|1
[:SENSe]:PVTime:AVERage[:STATe]?
```

Example:
```
PVT:AVER:COUN 25
PVT:AVER:COUN?
PVT:AVER ON
PVT:AVER?
```

3.13.1.2 Avg Mode

Press **Avg Mode** to select the type of termination control used for the averaging function as either **Exp** or **Repeat**. This determines the averaging action after the specified number of measurements (average count) is reached.

- **EXP** (Exponential Averaging mode)—When you set **Avg Mode** to **Exp**, each successive data acquisition after the average count is reached is exponentially weighted and combined with the existing average. Exponential averaging weights new data more than old data, which facilitates tracking of slow-changing signals. The average will be displayed at the end of each sweep.
- **Repeat**—When you set **Avg Mode** to **Repeat**, after reaching the average count, all previous result data is cleared and the average count is set back to 1.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Exponential

Remote Command:

`[:SENSe]:PVTime:AVERage:TCONrol EXPonential|REPeat`

`[:SENSe]:PVTime:AVERage:TCONrol?`

Example: `PVT:AVG:TCON REP`

`PVT:AVG:TCON?`

3.13.1.3 Average Type

Allows you to specify the type of result averaging to be performed.

- **Log** — Selects averaging that sums the trace data and divides by the number of data points. This average does not effect the trace and is only applied to the matrix information.
- **RMS** — Selects averaging that converts trace data from dB to power units, then averages the power trace data. This average does not effect the trace and is only applied to the matrix information.

Key Path: **Meas Setup**

Factory Preset: RMS

Remote Command:

`[:SENSe]:PVTime:AVERage:TYPE LOG|RMS`

`[:SENSe]:PVTime:AVERage:TYPE?`

Example: `PVT:AVG:TYPE Log` to select Log type.
`PVT:AVG:TYPE?`

3.13.1.4 Meas Time

Allows you to set the number of slots to be captured for each measurement. Uplink and downlink pilots each count as one slot, therefore setting the Meas Time parameter to 9 will display one full subframe (5 ms).

Key Path: **Meas Setup**

State Saved: Saved in Instrument State

Factory Preset: 1

Range: 1 to 9

Remote Command:

`[:SENSe]:PVTime:SWEep:TIME <time>`

`[:SENSe]:PVTime:SWEep:TIME?`

Example: `PVT:SWE:TIME 4`

3.13.1.5 Trig Source

Displays menu keys that enable you to select the trigger mode of a sweep or measurement. The analyzer will begin a sweep only with the proper trigger condition.

Key Path: **Meas Setup**

State Saved: Saved in Instrument State

Factory Preset: EXT1

Remote Command:

`[:SENSe]:PVTime:TRIGger:SOURce EXTernal[1]|EXTernal2`

`[:SENSe]:PVTime:TRIGger:SOURce?`

Ext1 = External Front–allows you to trigger on an externally connected trigger source
Ext2 = External Rear–allows you to trigger on an externally connected trigger source

Remote Command Notes: Other trigger-related commands are found in the INITiate and ABORt subsystems.

Example: `PVT:TRIG:SOUR EXT` to select front panel external triggering.

3.13.1.5.1 Ext Front

Sets the trigger to start a new sweep/measurement whenever the external voltage (connected to EXT TRIGGER INPUT on the front panel) passes through approximately 1.5 volts. The external trigger signal must be a TTL-type signal.

Key Path: **Meas Setup**, **Trig Source** or Trig

Remote Command:

See "Trig Source" on page 137

Example: `PVT:TRIG:SOUR EXT2`

3.13.1.5.2 Ext Rear

Sets the trigger to start a new sweep/measurement whenever the external voltage (connected to TRIGGER IN on the rear panel) passes through approximately 1.5 volts. The external trigger signal must be a TTL-type signal.

Key Path: **Meas Setup**, **Trig Source** or Trig

Remote Command:

See "Trig Source" on page 137

Example: `PVT:TRIG:SOUR EXT` to select front panel external triggering.

3.13.1.6 Mask Delay

Allows you to set the PVT mask delay. This allows you to make post-capture adjustment of the PVT mask for fine adjustment of mask relative to captured trace data, for comparison purposes.

Key Path: **Meas Setup**

State Saved: Saved in Instrument State

Factory Preset: 0.0 s

Range: –5 ms to 5 ms

Remote Command:

`[:SENSe]:PVTime:LIMit:MASK:DELay <time>`

`[:SENSe]:PVTime:LIMit:MASK:DELay?`

Remote Command Notes: This command effects all mask segments.

Example: `PVT:LIMit:MASK:DELay 0.003s`

`PVT:LIMit:MASK:DELay?`

3.13.1.7 Advanced

Access the menu that allows you to set the advances measurement parameters.

Key Path: **Meas Setup**

Remote Command:

There is no remote command for this key.

3.13.1.7.1 Res BW

Allows you to specify the resolution bandwidth used in making the measurement sweeps.

Key Path: **Meas Setup, Advanced**

State Saved: Saved in instrument state.

Factory Preset: 2 MHz

Default Terminator: Hz

Range: 1 Hz to 8 MHz

Remote Command:

`[:SENSe]:PVTime:BANDwidth|BWIDth:RESolution <freq>`

`[:SENSe]:PVTime:BANDwidth|BWIDth:RESolution?`

Example: `PVT:BAND:RES 5 MHz`

`PVT:BAND:RES?`

3.13.1.8 Limit Mask Controls (Remote Commands Only)

The following remote SCPI commands enable you to set the parameters for the Limit Mask. When Limit Mask Selection is set to CUSTom, the mask used will be the one described by these programming commands

Key Path: None

3.13.1.8.1 Limit Mask Selection (Remote Commands Only)

Sets whether the limit masks used will be the default, standard-compliant values or the user defined values.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: STANdard

Remote Command:

`[:SENSe]:PVTime:MASK:SELect CUSTom|STANdard`

`[:SENSe]:PVTime:MASK:SELect?`

When set to CUSTom, the mask used will be the one described by the following

programming commands.

```
[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute <power>
[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute?
[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute <power>
[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute?
[:SENSe]:PVTime:MASK:LIST:LOWer:RELative <rel_power>
[:SENSe]:PVTime:MASK:LIST:LOWer:RELative?
[:SENSe]:PVTime:MASK:LIST:UPPer:RELative <rel_power>
[:SENSe]:PVTime:MASK:LIST:UPPer:RELative?
[:SENSe]:PVTime:MASK:LIST:LOWer:TIME <seconds>
[:SENSe]:PVTime:MASK:LIST:LOWer:TIME?
[:SENSe]:PVTime:MASK:LIST:UPPer:TIME <seconds>
[:SENSe]:PVTime:MASK:LIST:UPPer:TIME?
```

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same setting as the last mask segments that you sent.

Example:

```
PVT:MASK:SEL CUST
PVT:MASK:SEL?
```

3.13.1.8.2 Lower Mask Absolute Amplitude Levels (Remote Commands Only)

Sets the power level for any mask line segments that require an absolute minimum power limit in addition to a relative limit. Each time a measurement is made the Ref Level is determined. (This is the power level of the useful part of the burst, or midway between the upper/lower masks). As the power of the Ref Level changes, all of the relative mask power levels will change by the same amount. Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to

the specified absolute limit for each line segment. If this calculated relative limit is lower than the absolute limit specified, the value of the absolute limit is used for this segment. If the absolute limit is set to a very low value (–200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit will always be used for that segment. Every time point defined with PVT:MASK:LOW:TIME must have a power value defined in the same order. A comma may be used in the SCPI command as a place holder for any points where an absolute power is not specified. The default value will then be used for that segment. When set to CUSTom, the mask used will be the one described by these programming commands:.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: –200 dBm, –200 dBm, –200 dBm, –200 dBm

Terminators: dBm

Default Terminator: dBm

Range: –200 dBm to 100 dBm

Remote Command:

`[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute <power>`

`[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute?`

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same setting as the last mask segments that you sent.

Example: `PVT:MASK:LIST:LOW:ABS –130 dBm, –130 dBm, –130 dBm, –130 dBm`

`PVT:MASK:LIST:LOW:ABS?`

3.13.1.8.3 Lower Mask Time Points (Remote Commands Only)

Query the number of elements in the lower mask. This value is determined by the number of time points entered using [:SENSe]:PVTime:MASK:LIST:LOWer:TIME.

Key Path: None

Remote Command:

[:SENSe]:PVTime:MASK:LIST:LOWer:POINts

Remote Command Notes: Query command only.

Example: PVT:MASK:LIST:LOW:POIN?

3.13.1.8.4 Lower Mask Relative Amplitude Levels (Remote Commands Only)

Sets the relative power level for each horizontal line segment in the lower limit mask. There should be a power level for each time point entered using :PVTime:MASK:LIST:LOWer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When set to CUSTom, the mask used will be the one described by these programming commands.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: 100 dB, 100 dB, 100 dB, 100 dB

Terminators: dB

Default Terminator: dB

Range: 100 dB to 200 dB

Remote Command:

[:SENSe]:PVTime:MASK:LIST:LOWer:RELative <rel_power>

[:SENSe]:PVTime:MASK:LIST:LOWer:RELative?

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same setting as the last mask segments that you sent.

Example: PVT:MASK:LIST:LOW:REL 130 dB, 130 dB, 130 dB, 130 dB

PVT:MASK:LIST:LOW:REL?

3.13.1.8.5 Lower Mask Time Points (Remote Commands Only)

Sets the time points that define the horizontal line segments of the lower limit. You can set the value on the x-axis at which the next segment of the mask begins. The leftmost value on the x-axis is the value of the trigger delay (which may be positive or negative), and is shown on the display as an annotation on the x-axis. selecting a large time value for the first and last mask points (e.g. –1 and +1 second) guarantees a limit is defined for all measured data. When set to custom, the mask used will be the one described by these programming commands.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: 0, 0, 0, 0

Terminators: ns, µs, ms, s, ks

Default Terminator: s

Range: –1 s to 1 s

Remote Command:

```
[:SENSe]:PVTime:MASK:LIST:LOWer:TIME <seconds>
```

```
[:SENSe]:PVTime:MASK:LIST:LOWer:TIME?
```

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same setting as the last mask segments that you sent.

Example:
```
PVT:MASK:LIST:LOW:TIME –1.0, –5.0, 0.5, 1.0
```

```
PVT:MASK:LIST:LOW:TIME?
```

3.13.1.8.6 Upper Mask Absolute Amplitude Levels (Remote Commands Only)

Sets the power level for any mask line segments that require an absolute minimum power limit in addition to a relative limit. Each time a measurement is made the Ref Level is

determined. (This is the power level of the useful part of the burst, or midway between the upper/lower masks). As the power of the Ref Level changes, all of the relative mask power levels will change by the same amount. Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the absolute limit specified, the value of the absolute limit is used for this segment. If the absolute limit is set to a very low value (–200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit will always be used for that segment. Every time point defined with PVT:MASK:LOW:TIME must have a power value defined in the same order. A comma may be used in the SCPI command as a place holder for any points where an absolute power is not specified. The default value will then be used for that segment. When set to CUSTom, the mask used will be the one described by these programming commands:.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: –200 dBm, –200 dBm, –200 dBm, –200 dBm

Terminators: dBm

Default Terminator: dBm

Range: –200 dBm to 100 dBm

Remote Command:

`[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute <power>`

`[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute?`

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same setting as the last mask segments that you sent.

Example: `PVT:MASK:LIST:UPP:ABS –130 dBm, –130 dBm, –130 dBm, –130 dBm`

`PVT:MASK:LIST:UPP:ABS?`

3.13.1.8.7 Upper Mask Time Points (Remote Commands Only)

Query the number of elements in the upper mask. This value is determined by the number of time points entered using [:SENSe]:PVTime:MASK:LIST:UPPer:TIME.

Key Path: None

Remote Command:

`[:SENSe]:PVTime:MASK:LIST:UPPer:POINts`

Remote Command Notes: Query command only.

Example: `PVT:MASK:LIST:UPP:POIN?`

3.13.1.8.8 Upper Mask Relative Amplitude Levels (Remote Commands Only)

Sets the relative power level for each horizontal line segment in the upper limit mask. There should be a power level for each time point entered using :PVTime:MASK:LIST:UPPer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When set to CUSTom, the mask used will be the one described by these programming commands.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: 100 dB, 100 dB, 100 dB, 100 dB

Terminators: dB

Default Terminator: dB

Range: –200 dB to 100 dB

Remote Command:

`[:SENSe]:PVTime:MASK:LIST:UPPer:RELative <rel_power>`

`[:SENSe]:PVTime:MASK:LIST:UPPer:RELative?`

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same

setting as the last mask segments that you sent.

Example: `PVT:MASK:LIST:UPP:REL 130 dB, 130 dB, 130 dB, 130 dB`

`PVT:MASK:LIST:UPP:REL?`

3.13.1.8.9 Upper Mask Time Points (Remote Commands Only)

Sets the time points that define the horizontal line segments of the upper limit. You can set the value on the x-axis at which the next segment of the mask begins. The leftmost value on the x-axis is the value of the trigger delay (which may be positive or negative), and is shown on the display as an annotation on the x-axis. selecting a large time value for the first and last mask points (e.g. –1 and +1 second) guarantees a limit is defined for all measured data. When set to custom, the mask used will be the one described by these programming commands.

Key Path: None

State Saved: Saved in instrument state.

Factory Preset: 0, 0, 0, 0

Terminators: ns, µs, ms, s, ks

Default Terminator: s

Range: –1 s to 1 s

Remote Command:

`[:SENSe]:PVTime:MASK:LIST:UPPer:TIME <seconds>`

`[:SENSe]:PVTime:MASK:LIST:UPPer:TIME?`

Remote Command Notes: These commands are used to set the parameters for all of the mask segments.

When setting these values remotely, the position in the list sent corresponds to the mask segment. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of allowed mask segments, then subsequent values will be ignored.

Sending fewer than 4 parameters to one of these commands will leave the values of the unspecified mask segments unchanged. If you don't send settings for all 4 mask segments, it will set all the mask segments that you specified, then it will set any remaining mask segments to the same setting as the last mask segments that you sent.

Example: `PVT:MASK:LIST:UPP:TIME –1.0, –5.0, 0.5, 1.0`

`PVT:MASK:LIST:UPP:TIME?`

3.13.2 AMPLITUDE / Y Scale (Power vs Time)

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.13.2.1 Scale/Div

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 12 dB

Terminators: dB

Default Terminator: dB

Range: 0.10 dB to 20 dB

Remote Command:

```
:DISPlay:PVTime:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>
:DISPlay:PVTime:WINDow:TRACe:Y:[SCALe]:PDIVision?
```

Example: `DISP:PVT:WIND:TRAC:Y:PDIV 0.5 DB`

3.13.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad. Min and Max dependant on Input Atten settings.

When RF Input Range (under the Input/Output key) is set to Auto, the reference level and attenuation is set automatically each time a measurement is entered or is restarted with the Restart hardkey. When RF Input Range (under the Input/Output key) is set to Man, the reference level and attenuation is set according to the values you have entered for Max Total Pwr, Input Atten, and Ref Level.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 0 dBm

Range: –200 dBm to 200 dBm

Remote Command:

`:DISPlay:PVTime:WINDow:TRACe:Y:[SCALe]:RLEVel <power>`

`:DISPlay:PVTime:WINDow:TRACe:Y:[SCALe]:RLEVel?`

Remote Command Notes:

The Min and Max values are dependant on Input Atten and Int Preamp settings.

Example: `DISP:PVT:WIND:TRAC:Y:RLEV 20 dbm`

3.13.3 Display (Power vs Time)

If **Pwr vs Time** has been selected in the **Measure** menu, this key displays the appropriate display menu for the power versus time measurement and displays menu keys that enable you to control certain items on the display of the analyzer.

Key Path: Front-panel key

3.13.3.1 Limit Mask State

This key allows you to display or hide the limit mask lines. The state of this parameter also enables/disables the mask limit checking.

Key Path: **Display**

State Saved: Saved in Instrument State

Factory Default: On.

Remote Command:

`:DISPlay:PVTime:LIMit:MASK ON|OFF|1|0`

`:DISPlay:PVTime:LIMit:MASK?`

Example: `DISP:PVT:LIM:MASK 0`

3.13.3.2 Burst Lines State

This key allows you to display or hide a pair of “white vertical” transmission period burst annotation lines for the timeslot specified by the current Burst Type and Traffic Slot settings. It is useful to display the transmission period burst annotation lines while adjusting the trigger delay parameter, to ensure signal timeslots are properly aligned to PVT mask. The state of this parameter does not affect the pass/fail calculation for limit tests.

Key Path: **Display**

State Saved: Saved in Instrument State

Factory Default: On.

Remote Command:

```
:DISPlay:PVTime:BLINes[:STATe] ON|OFF|1|0
```

```
:DISPlay:PVTime:BLINes[:STATe]?
```

Example: `DISP:PVT:BLIN 0`

3.13.4 Marker (Power vs Time)

Displays the Marker control menu for the Power vs Time measurement. If no markers are active, **Marker** selects marker 1, sets it to **Normal** and places it to the right of the display. There are two control modes for the markers:

- **Normal (POSition) -** A single marker that can be moved to any point on the trace.
- **Delta -** Turns on a second marker and readouts the level difference between the marker pair.
- **Off (Off) -** Turns off the active marker or marker pair.
- **Marker All Off -** Turns off all of the displayed markers.

Key Path: Front-panel key

State Saved: The control mode for each marker, as well as the position of each marker, is saved in instrument state.

Factory Preset: All Off.

Remote Command:

There is no equivalent remote command.

```
:CALCulate:PVTime:MARKer[1]|2|3|4:STATe OFF|ON|0|1
```

```
:CALCulate:PVTime:MARKer[1]|2|3|4:STATe?
```

```
:CALCulate:PVTime:MARKer[1]|2|3|4:MODE POSition|DELTa|OFF
```

```
:CALCulate:PVTime:MARKer[1]|2|3|4:MODE?
```

The following commands do not have an equivalent menu key:

```
:CALCulate:PVTime:MARKer[1]|2|3|4:X <number>
```

```
:CALCulate:PVTime:MARKer[1]|2|3|4:X?
```

Factory Preset: 2.5 ms

Terminators: ns, µs, ms, s, ks

Default Terminator: s

Range: 0 s to 5 ms

`:CALCulate:PVTime:MARKer[1]|2|3|4:X:POSition <number>`

`:CALCulate:PVTime:MARKer[1]|2|3|4:X:POSition?`

Factory Preset: 300

Range: 0 to 8192

`:CALCulate:PVTime:MARKer[1]|2|3|4:Y?`

Remote Command Notes:

`CALC:PVT:MARK[1]|2|3|4:X` sets the marker X position to a specified point on the x-axis in the current X-axis unit (frequency or time). If the frequency or time chosen would place the marker off screen, the marker will be placed at the left or right side of the display, on the trace. The marker must already be ON.

`CALC:PVT:MARK[1]|2|3|4:X:POS` sets the marker X position to a specified point on the x-axis in trace points (values of 0 to 8192, or the current number of points in the sweep). The marker must already be ON. If you are querying a delta marker, it returns the number of trace points between the two markers. If the delta marker has been manually moved off the display, even though the marker stays on the edge of the display, the value returned will reflect it's actual off-screen location.

`CALC:PVT:MARK[1]|2|3|4:Y?` returns the marker Y value or delta value in the current y-axis unit.

Example: `CALC:PVT:MARK2:X 0.001s` selects marker 2 and moves it to 0.001 seconds.

`CALC:PVT:MARK2:X?` returns the marker 2 X position in Hz.

`CALC:PVT:MARK2:X:POS 1000` selects marker 2 and moves it to trace point 1000.

`CALC:PVT:MARK2:Y:POS?` returns the marker 2 Y value or delta value.

3.13.4.1 Select Marker

Selects one of the four possible markers. Once a marker is selected, it can be set to any of the control modes **Normal**, **Delta**, or **Off**.

Key Path: **Marker**

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

Factory Preset: Marker 1

Remote Command:

See "Marker (Power vs Time)" on page 149 for the select command.

Remote Command Notes: Sets or queries the state of a marker. Setting a marker to state ON or 1 selects that marker. Setting a marker which is OFF to state ON or 1 puts it in **Normal** mode and places it on the screen to the right of the displayed measurement graph. Setting a marker to state OFF or 0 selects that marker and turns it off. The response to the query will be 0 if OFF, 1 if ON.

Example: `CALC:PVT:MARK2:STAT ON` selects marker 2.

`CALC:PVT:MARK:STAT ON` will not modify a marker that is already on.

3.13.4.2 Normal

Sets the control mode for the selected marker to **Normal**. If the marker is off, a single marker is activated and placed on the screen to the right of the measurement graph. You can then adjust the trace point of the marker using the knob, numeric keypad, or ⇑ ⇓ keys.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Marker (Power vs Time)" on page 149 for the mode command.

Example: `CALC:PVT:MARK2:MODE POS` selects marker 2 and sets it to Normal.

3.13.4.3 Delta

Sets the control mode for the selected marker to **Delta** and turns on a second, sequentially numbered marker as the reference marker. The newly activated reference marker is placed on the screen to the right of the measurement graph (the delta of 0 dB) is displayed. The control mode of the second marker is set to Normal. If marker 4 is set to **Delta**, the second marker turned on as the reference marker will be marker 1. You can adjust the position of either marker by selecting the marker and using the knob, numeric keypad, or ⇑ ⇓ keys.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Marker (Power vs Time)" on page 149 for the mode command.

Example: `CALC:PVT:MARK2:MODE DELT` selects marker 2, sets it to Delta, turns on marker 3 (if not already active) as the reference marker, and sets marker 3 to normal.

3.13.4.4 Off

Turns off the selected marker. In addition, **Off** also turns off functions related to the selected marker.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Marker (Power vs Time)" on page 149 for the command to select the control mode.

Example: `CALC:PVT:MARK3:STAT OFF` selects marker 3 and sets it to **Off**.

3.13.4.5 Marker All Off

Turns off all markers, including markers used for signal track.

Key Path: **Marker**

Remote Command:

`:CALCulate:PVTime:MARKer:AOFF`

Example: `CALC:PVT:MARK:AOFF` turns off all markers.

3.13.5 Trace/View (Power vs Time)

If **Power vs Time** has been selected in the **Measure** menu, this key displays the appropriate **Trace/View** menu for the Power vs Time measurement that allows you to set how trace information is stored and displayed.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command for this function.

3.13.5.1 Burst

Pressing **Burst** selects the burst display of the measurement. This will display the measured burst or if you increase the measurement time to 9, the entire frame will be displayed.

Key Path: **Trace/View**

Factory Preset: Burst

Remote Command:

There is no remote command for this function.

3.14 ACP—Adjacent Channel Power Measurement

Insert the key file(s) for this measurement, like Meas Setup, Trace/View, Display, Markers, etc.

3.14.1 Meas Setup (Adjacent Channel Power—ACP)

If the adjacent channel power (ACP) measurement has been selected, this key displays the ACP measurement setup menu. The adjacent channel power measurement measures the power that leaks into adjacent transmit channels.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command.

3.14.1.1 Avg Number

Pressing **Avg Number** to **On** allows you to specify the number of measurements that will be averaged when calculating the measurement result. The average will be displayed at the end of each sweep. Setting **Avg Number** to **Off** disables the measurement averaging.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 10 / Off

Range: 1 to 1000

Remote Command:

`[:SENSe]:ACP:AVERage:COUNt <integer>`

`[:SENSe]:ACP:AVERage:COUNt?`

`[:SENSe]:ACP:AVERage[:STATe] OFF|ON|0|1` turns the averaging on or off.

`[:SENSe]:ACP:AVERage[:STATe]?`

Example:
```
ACP:AVER:COUN 25
ACP:AVER:COUN?
ACP:AVER 1
ACP:AVER?
```

3.14.1.2 Avg Mode

Press **Avg Mode** to select the type of termination control used for the averaging function as

either **Exp** or **Repeat**. This determines the averaging action after the specified number of measurements (average count) is reached.

- **EXP** (Exponential Averaging mode)—When you set **Avg Mode** to **Exp**, each successive data acquisition after the average count is reached is exponentially weighted and combined with the existing average. Exponential averaging weights new data more than old data, which facilitates tracking of slow-changing signals. The average will be displayed at the end of each sweep.
- **Repeat**—When you set **Avg Mode** to **Repeat**, after reaching the average count, all previous result data is cleared and the average count is set back to 1.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: EXPonential

Remote Command:

`[:SENSe]:ACP:AVERage:TCONrol EXPonential|REPeat`

`[:SENSe]:ACP:AVERage:TCONrol?`

Example: `ACP:AVG:TCON REP`

`ACP:AVG:TCON?`

3.14.1.3 Chan Integ BW

Press **Chan Integ BW** to specify the range of integration used in calculating the power in the carrier/main channel.

Key Path: **Meas Setup**

Key Notes: If **RRC Filter** is on, the actual integration bandwidth used is the displayed integration bandwidth multiplied by (1 + Filter Alpha).

State Saved: Saved in instrument state.

Factory Preset: 1.28 MHz

Default Terminator: Hz

Knob Increment: Span/50

RBW/100 if zero span.

Step Key Increment: Span/10 if **CF Step** is set to **Auto**.

CF Step if **CF Step** is set to **Manual**.

Range: 100 Hz - 200 MHz

Remote Command:

```
[:SENSe]:ACP:BANDwidth|BWIDth:INTegration <freq>
[:SENSe]:ACP:BANDwidth|BWIDth:INTegration?
```

Example: `ACP:BWID:INT 5E6`
`ACP:BWID:INT?`

3.14.1.4 Offset/Limits

Accesses menu keys that allow you to configure the offsets for the ACP measurement.

Key Path: **Meas Setup**

3.14.1.4.1 Offset

Selects the offset the menu keys will affect. Press **Offset** until the letter (A, B, C, D, E, or F) of the desired offset is underlined.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: A

Remote Command:

There is no remote command for this function.

3.14.1.4.2 Offset Freq

Allows you to set the frequency difference from the center of the main channel to the center of the offset for a maximum of 6 offsets (labeled A-F). It also allows you to turn on or off the offsets that you want to measure.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 1.6 MHz, 3.2 MHz, 0 Hz 0 Hz, 0 Hz, 0 Hz

Default Terminator: Hz

Knob Increment: Span/50

Step Key Increment: Span/10 if **CF Step** is set to **Auto**.
CF Step if **CF Step** is set to **Manual**.

Range: 0 Hz to 45 MHz

Remote Command:

```
[:SENSe]:ACP:OFFSet:LIST[:FREQuency]
<f_offset>,<f_offset>,<f_offset>,<f_offset>,<f_offset>,<f_offset>
```

```
[:SENSe]:ACP:OFFSet:LIST[:FREQuency]?
```

```
[:SENSe]:ACP:OFFSet:LIST:STATE
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1
```

```
[:SENSe]:ACP:OFFSet:LIST:STATE?
```

Remote Command Notes: This command, along with commands [:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth[:INTegration] and [:SENSe]:ACP:OFFSet:LIST:STATe, are used to set the parameters for all of the offsets, up to six.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Sending fewer than six parameters to one of these commands will leave the values of the unspecified offsets unchanged. If you don't send settings for all 6 offsets, it will set all the offsets that you specified, then it will set any remaining offsets to the same setting as the last offset that you sent.

In the example below, after the command is sent, sending the command with only four parameters (`ACP:OFFS:LIST:STAT ON,ON,ON,OFF`) will result in the fifth and sixth offset remaining the same as previously set (OFF).

Example:

```
ACP:OFFS:LIST 50 Hz,75 Hz,100 Hz,125 Hz,150 Hz,175 Hz
```

```
ACP:OFFS:LIST:STAT ON,ON,ON,OFF,OFF,OFF
```

3.14.1.4.3 Ref BW

Allows you to set the reference bandwidth (integration bandwidth) for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI. This is the bandwidth over which the power is integrated for the selected offset. If the RRC filter is on, the actual reference bandwidth used will be the displayed integration bandwidth multiplied by (1 + filter alpha).

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz

Default Terminator: Hz

Knob Increment: Span/50

Step Key Increment: Span/10 if **CF Step** is set to **Auto** with non-zero span.

CF Step if **CF Step** is set to **Manual**.

Range: 100 Hz to 20 MHz

Remote Command:

`[:SENSe]:ACP:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:INTegration] <bw>,<bw>,<bw>,<bw>,<bw>,<bw>`

`[:SENSe]:ACP:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:INTegration]?`

Remote Command Notes: OFFSet1 for BTS, OFFSet2 for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `ACP:OFFS2:LIST:BAND 50,50,50,50,50,50` sets the mobile station offset bandwidths to 50 Hz.

`ACP:OFFS2:LIST:BAND?`

3.14.1.4.4 Absolute Limit

Allows you to set the upper absolute limit for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Base (BTS)

–55 dBm, –55 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Mobile (MS)

Default Terminator: dBm

Range: –200 dB to 200 dB

Remote Command:

`:CALCulate:ACP:OFFSet[1]|2:LIST:LIMit:ABSolute <rel_power>,<rel_power>,<rel_power>,<rel_power>,<rel_power>,<rel_power>`

`:CALCulate:ACP:OFFSet[1]|2:LIST:LIMit:ABSolute?`

Remote Command Notes: OFFSet1 for BTS, OFFSet2 for MS. BTS is the default.

When setting these values remotely, the position in the list sent

corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `CALC:ACP:OFFS2:LIST:LIM:POS:DATA 10,10,10,10,10,10` sets the mobile station relative limits to 10 dB.

`CALC:ACP:OFFS2:LIST:LIM:POS:DATA?`

3.14.1.4.5 Offset Limit Fail Mask

When you press **Mask Fail** a menu is displayed with **Absolute**, **Relative**, **Abs AND Rel**, and **Abs OR Rel** keys. This menu allows you to select one of the logic keys for determining the conditions for which the measurement fails: Absolute and Relative both check the results against the respective limit, while OR checks against both limits, failing if either of the limits is broken. AND will result in a failure reported only if both the absolute and relative limits fail.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: AND,AND,AND,AND,AND if Device is Mobile (MS)

REL,REL,REL,REL,REL if Device is Base (BTS)

Remote Command:

`:CALCulate:ACP:OFFSet[1]|2:LIST:LIST:TEST ABSolute | RELative | AND | OR`

`:CALCulate:ACP:OFFSet[1]|2:LIST:TEST?`

Remote Command Notes: OFFSet1 is for BTS, OFFSet2 is for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `CALC:ACP:OFFS2:LIST:TEST ABS,REL,ABS,AND,OR` sets the mobile station offset limit logic keys.

`CALC:ACP:OFFS2:LIST:TEST?`

3.14.1.4.6 Rel Lim (Car) (Relative Limit (to Carrier))

Allows you to set the upper limit relative to the Total Pwr Reference value for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: –40 dB, –45 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Base (BTS default)

–33 dB, –43 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Mobile (MS)

Coupling: Coupled to the Rel Limit (Car) parameter. When the Rel Limit (PSD) value is changed, the Rel Limit (Car) parameter value will be recalculated to the equivalent dB value for the new Rel (PSD) value given the current RBW setting. Similarly, when the Rel Limit (Car) parameter value is changed, the Rel Limit (PSD) value will be recomputed.
Rel Limit (PSD) = Rel Limit (Car) – 10(log(offsetIntegBW))

Default Terminator: dB

Range: –200 dB to 200 dB

Remote Command:

`:CALCulate:ACP:OFFSet[1]|2:LIST:RCARrier <dB>, <dB>,<dB>,<dB>,<dB>,<dB>`

`:CALCulate:ACP:OFFSet[1]|2:LIST:RCARrier?`

Remote Command Notes: OFFSet1 for BTS, OFFSet2 for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `CALC:ACP:OFFS2:LIST:RCAR 10,10,10,10,10,10` sets the mobile station relative limits to 10 dB.

`CALC:ACP:OFFS2:LIST:RCAR?`

3.14.1.4.7 Rel Limit (PSD) Limit

Allows you to set the upper limit relative to the PDS Reference value for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: –40 dB, –45 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Base (BTS default)

–33 dB, –43 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Mobile (MS)

Coupling: Coupled to the Rel Limit (Car) parameter. When the Rel Limit (PSD) value is changed, the Rel Limit (Car) parameter value will be recalculated to the equivalent dB value for the new Rel (PSD) value given the current RBW setting. Similarly, when the Rel Limit (Car) parameter value is changed,

the Rel Limit (PSD) value will be recomputed.
Rel Limit (PSD) = Rel Limit (Car) – 10(log(offsetIntegBW))

Default Terminator: dB

Range: –200 dB to 200 dB

Remote Command:

`:CALCulate:ACP:OFFSet[1]|2:LIST:RPSDensity <dB>, <dB>,<dB>,<dB>,<dB>,<dB>`

`:CALCulate:ACP:OFFSet[1]|2:LIST:RPSDensity?`

Remote Command Notes: OFFSet1 for BTS, OFFSet2 for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `CALC:ACP:OFFS2:LIST:RPSD 10,10,10,10,10,10` sets the mobile station relative limits to 10 dB.

`CALC:ACP:OFFS2:LIST:RPDSD?`

3.14.1.4.8 Pass/Fail State Query (Remote Command Only)

Allows you to query the Pass/Fail state of the measurement. Returns True (1) if one or more of the limits for the measurement have failed.

Key Path: None

Remote Command:

`:CALCulate:ACP:CLIMits:FAIL?`

Example: `CALC:ACP:OFFS2:LIST:RPSD 10,10,10,10,10,10` sets the mobile station relative limits to 10 dB.

`CALC:ACP:OFFS2:LIST:RPDSD?`

3.14.1.5 Meas Type

Allows you to specify the reference for the measurement, either **Total Pwr Ref** or **PSD Ref**. Relative values can be displayed referenced to either the total carrier power (**Total Pwr Ref**) or the power spectral density (**PSD Ref**) of the carrier measured in the main channel.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Total Pwr Ref

Remote Command:

`[:SENSe]:ACP:TYPE PSDRef|TPRef`

`[:SENSe]:ACP:TYPE?`

Example: `ACP:TYPE PSDR`

`ACP:TYPE?`

3.14.1.6 Total Pwr Ref (Total Power Reference)

Allows you to set the mode of the carrier power result. When set to auto, the carrier power result reflects the measured power value in the reference carrier. When set to manual, the result takes on the last measured value, or may be entered by you. This key is only available when Meas Type is set to Total Pwr Ref.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: The default value is the measured Total Power Spectral Reference of the first measurement.

Default Terminator: dBm

Knob Increment: 1

Step Key Increment: 5

Range: –200 dBm to 200

Remote Command:

`[:SENSe]:ACP:CARRier:[POWer] <dBm>`

`[:SENSe]:ACP:CARRier:[POWer]?`

Example: `ACP:CARR –10 dBm`

`ACP:CARR?`

3.14.1.7 PSD Ref (Power Spectral Density Reference)

Allows you to set the mode of the carrier power result. When set to auto, the carrier power result reflects the measured power value in the reference carrier. When set to manual, the result takes on the last measured value, or may be entered by you. This key is only available when Meas Type is set to PSD Ref.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: The default value is the measured Total Power Spectral Reference of the

first measurement.

Default Terminator: dBm

Knob Increment: 1

Step Key Increment: 5

Range: –999 dBm to 999

Remote Command:

`[:SENSe]:ACP:CARRier:CPSD <dBm>`

`[:SENSe]:ACP:CARRier:CPSD?`

Example: `ACP:CARR:CPSD –10 dBm`

`ACP:CARR:CPSD?`

3.14.1.8 Total Pwr Ref

Allows you to set the adjacent channel power reference to automatic or manual. When set to automatic, the carrier power result reflects the measured power value in the carrier. When set to manual, the last measured value is captured and held, or may be entered by the user. Relative values are displayed, referenced to the total power measured in the main channel.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Auto, Measured carrier power value

Remote Command:

`[:SENSe]:ACP:CARRier[:POWer]`

`[:SENSe]:ACP:CARRier:AUTO[:STATe] OFF|ON|0|1`

`[:SENSe]:ACP:CARRier:AUTO[:STATe]?`

Example: `ACP:CARR:AUTO 0`

`ACP:CARR:AUTO?`

3.14.1.9 PSD Ref

Allows you to set the power spectral density in the carrier (main channel) that will be used to compute the relative power spectral density values for the offsets. When the PSD Ref state is set to Auto, this will be set to the measured carrier power spectral density.

Factory Preset: 0 dBm

Terminators: dBm

Default Terminator: dBm

Step Key Increment: 1, 1.5, 2...

Range: –999 dBm to +999 dBm

Remote Command:

`[:SENSe]:ACP:CARRier:CPSD <dBm>`

`[:SENSe]:ACP:CARRier:CPSD?`

Remote Command Notes: This function is only available when measurement type is set to PSD Ref, use the command [:SENSe]:ACP:TYPE PSDRef to select the measurement type.

Example: `ACP:CARR:CPSD 5`

3.14.1.10 Limit Test

Pressing **Limit Test** turns the testing of the limit line on or off. When **Limit Test** is set to **On**, each offset is compared to its upper and lower offset limit. In those cases where the power exceeds the limit, a red "F" is placed next to the dBc result to indicate a failure. If there are any failures, the pass/fail indicator area show "FAIL" in red (in the combined view, the bar turns red); if there are none, it shows "PASS" in green. Any offsets that are in the off state (see "Offset Freq" on page 155) are not measured and their results will not be displayed on screen.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

`[:SENSe]:ACP:LIMit[:STATe] OFF|ON|0|1`

`[:SENSe]:ACP:LIMit[:STATe]?`

Example: `ACP:LIM 1`

`ACP:LIM?`

3.14.1.11 RRC Filter

Pressing **Filter** turns the Root Raised Cosine filter on or off. The rolloff value (alpha-α) for the filter will be set to value of the Filter Alpha parameter.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

`[:SENSe]:ACP:FILTer[:RRC][:STATe] OFF|ON|0|1`

[:SENSe]:ACP:FILTer[:RRC][:STATe]?

Example: `ACP:FILT 0`

`ACP:FILT?`

3.14.1.12 Filter Alpha

Allows you to enter the alpha value for the RRC Filter.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 0.22

Knob Increment: 0.01

Step Key Increment: 0.1

Range: 0.01 to 1.0

Remote Command:

`[:SENSe]:ACP:FILTer[:RRC]:ALPHA <number>`

[:SENSe]:ACP:FILTer[:RRC]:ALPHA?

Example: `ACP:FILT:ALPH 0.22`

`ACP:FILT:ALPH?`

3.14.1.13 Noise Correction

Pressing **Noise Correction** turns noise correction **on** or **off**. When you measured power in the reference channel or any offset close to the noise floor of the analyzer and you set **Noise Corr** to **On**, a calibration of the noise floor is performed and used to correct for analyzer noise floor contribution to measurement levels, increasing dynamic range.

Noise Correction is unavailable if signal tracking is on. If noise correction is on and signal tracking is turned on, the signal tracking state is forced back to off and an advisory message is displayed.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

`[:SENSe]:ACP:CORRection:NOISe[:AUTO] OFF|ON|0|1`

`[:SENSe]:ACP:CORRection:NOISe[:AUTO]?`

Example: `ACP:CORR:NOIS 1`

`ACP:CORR:NOIS?`

3.14.2 AMPLITUDE / Y Scale (ACP—Adjacent Channel Power)

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.14.2.1 Scale/Div

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 10 dB

Terminators: dB

Default Terminator: dB

Range: 0.1 dB to 20 dB

Remote Command:

`:DISPlay:ACP:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>`

`:DISPlay:ACP:WINDow:TRACe:Y:[SCALe]:PDIVision?`

Example: `DISP:ACP:WIND:TRAC:Y:PDIV 0.5 DB`

3.14.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad.

Key Path: **AMPLITUDE / Y Scale**

Dependencies/ Couplings: If you reduce the Input Atten setting, the analyzer may have to lower the Reference Level to maintain the proper level at the top of the screen. If you then increase Input Atten, the Reference Level does *not* increase to its

previous value.

When the input attenuator is auto-coupled, **RF Input Range** (On), its setting may be affected by changes in the reference level setting. See "Input Atten" on page 78.

Reference level is affected by: Input Atten, Preamp, Ext Amp Gain, Reference level offset, Y-Axis Units.

State Saved: Saved in Instrument State

Factory Preset: 10 dBm

Range: 0.01 dBm to 20 dBm

Remote Command:

`:DISPlay:ACP:WINDow:TRACe:Y:[SCALe]:RLEVel <power>`

`:DISPlay:ACP:WINDow:TRACe:Y:[SCALe]:RLEVel?`

Example: `DISP:ACP:WIND:TRAC:Y:RLEV 20 dbm`

3.14.3 Trace/View (ACP—Adjacent Channel Power)

If **ACP** has been selected in the **Measure** menu of the Spectrum Analysis mode, this key displays the appropriate **Trace/View** menu for the adjacent channel power (ACP) measurement.

Displays menu keys that enable you to set how trace information is stored and displayed.

Key Path: Front-panel key

Factory Preset: Spectrum

Remote Command:

There is no equivalent remote command for this function.

3.14.3.1 Spectrum

Pressing **Spectrum** selects the spectral display of the measurement.

Key Path: **Trace/View**

Factory Preset: Spectrum

Remote Command:

There is no remote command for this function.

3.14.3.2 Bar Graph

Pressing **Bars** turns the graphic bar display on or off.

Key Path: **Trace/View**

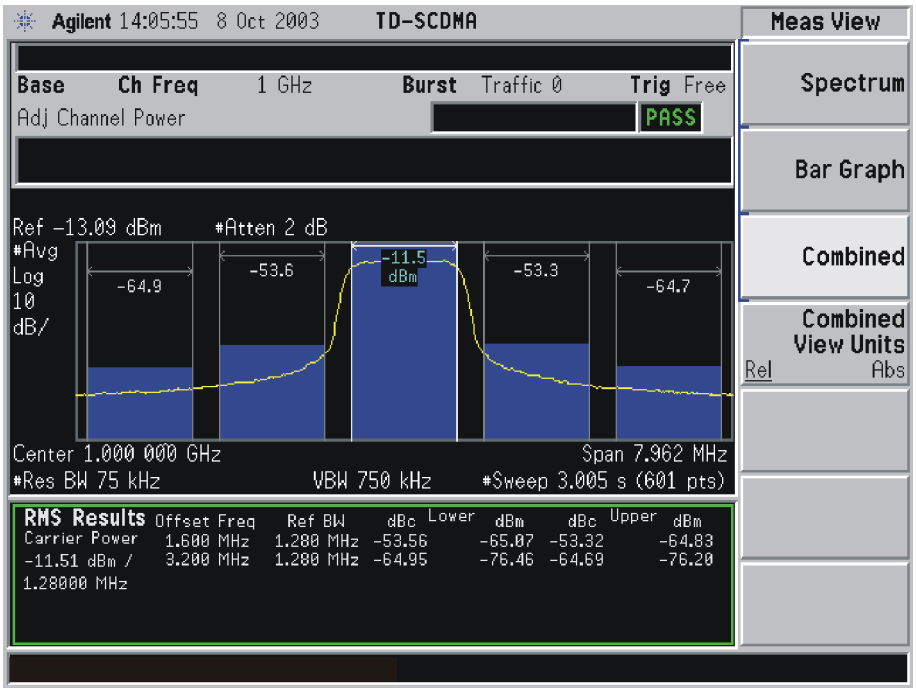
Factory Preset: Spectrum

Remote Command:

There is no remote command for this function.

3.14.3.3 Combined

Pressing **Combined** selects the measurement to be displayed as a bar graph and spectrum as shown below.



Key Path: **Trace/View**

Factory Preset: Spectrum

Remote Command:

There is no remote command for this function.

3.14.3.4 Combined View Units

Pressing **Combined View Units** selects the units (**dBc** or **dBm**) for the floating numeric displays when **Combined** is selected.

Key Path: **Trace/View**

Factory Preset: dBc

Remote Command:

There is no remote command for this function.

3.15 Multi-Carrier Power—MCP Measurement

3.15.1 Meas Setup (Multi-Carrier Power—MCP)

If the MCP measurement has been selected in the **Measure** menu, this key displays the MCP measurement setup menu.

The Multi-Carrier Power measurement is a measure of the power in two or more transmit channels and of the power that leaks into their adjacent transmit channels. The results reported are similar to the adjacent channel power measurement, but the setup is different to allow for two or more carriers present.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command.

3.15.1.1 Avg Number

Pressing **Avg Number** to **On** allows you to specify the number of measurements that will be averaged when calculating the measurement result. The average will be displayed at the end of each sweep. Setting **Avg Number** to **Off** disables the measurement averaging.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 10 / Off

Range: 1 through 1000

Remote Commands:

```
[:SENSe]:MCPower:AVERage:COUNt <integer>
[:SENSe]:MCPower:AVERage:COUNt?
[:SENSe]:MCPower:AVERage[:STATe] OFF|ON|0|1
[:SENSe]:MCPower:AVERage[:STATe]?
```

Example:
```
MCP:AVER:COUN 100
MCP:AVER:COUN?
MCP:AVER OFF
MCP:AVER?
```

3.15.1.2 Avg Mode

Press **Avg Mode** to select the type of termination control used for the averaging function as either **Exp** or **Repeat**. This determines the averaging action after the specified number of measurements (average count) is reached.

- **EXP** (Exponential Averaging mode)—When you set **Avg Mode** to **Exp**, each successive data acquisition after the average count is reached is exponentially weighted and combined with the existing average. Exponential averaging weights new data more than old data, which facilitates tracking of slow-changing signals. The average will be displayed at the end of each sweep.
- **Repeat**—When you set **Avg Mode** to **Repeat**, after reaching the average count, all previous result data is cleared and the average count is set back to 1.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Exponential

Remote Command:

`[:SENSe]:MCPower:AVERage:TCONrol EXPonential|REPeat`

`[:SENSe]:MCPower:AVERage:TCONrol?`

Example: `MCP:AVG:TCON EXP`

`MCP:AVG:TCON?`

3.15.1.3 Carrier Setup

Accesses the Carrier Setup and Configure Carriers menus that enable you to define the various parameters for each carrier.

Key Path: **Meas Setup**

Remote Command:

There is no equivalent remote command.

3.15.1.3.1 Carriers

Press **Carriers** to specify the number of carriers to be measured.

Key Path: **Meas Setup**, **Carrier Setup**

Factory Preset: 4

Step Key Increment: 1

Range: 2 to 12

Remote Command:

```
[:SENSe]:MCPower:CARRier:COUNt<integer>
[:SENSe]:MCPower:CARRier:COUNt?
```

Example: `MCP:CARR:COUN 10`

`MCP:CARR:COUN?`

3.15.1.3.2 Ref Carrier

Press **Ref Carrier** (Man) to specify the carrier (identified by a numeric position) from which all relative power measurements will be made. When **Ref Carrier** is set to **Auto**, the analyzer selects the carrier with the highest power as the reference. **Ref Carrier Frequency Mode** cannot be set to Man when **Ref Carrier Mode** is set to Auto. If **Ref Carrier Frequency Mode** is set to Man and **Ref Carrier Mode** is changed to Auto, **Ref Carrier Frequency Mode** will be reset to Auto.

Key Path: **Meas Setup**, **Carrier Setup**

Key Notes:

- If you enter a value when Ref Carrier Mode is set to Auto it will be changed to Man.
- The carrier must have power present in order to be assigned as a reference carrier. If you enter a carrier value that is currently configured as having no power present that carrier will be changed to having power present.
- If you change the reference carrier's power present value from automatic (yes) to manual (no), the next carrier to the left (or to the right, if there are none to the left) will be assigned as the reference carrier. If the newly designated reference carrier currently has power present set to No, this will change to Yes.
- This is also true when there are only two carriers with a "yes" value. Refer to the "Carrier Pwr Present" key description for more information on setting the carrier power present value.

Factory Preset: Auto

Range: Auto/Man
1 to 12 or current number of carriers, which ever is greater

Remote Command:

```
[:SENSe]:MCPower:RCARrier:AUTO OFF|ON|0|1
[:SENSe]:MCPower:RCARrier:AUTO?
[:SENSe]:MCPower:RCARrier<integer>
[:SENSe]:MCPower:RCARrier?
```

Remote Command Notes: Refer to "Key Notes:" above.

Example: `MCP:RCAR:AUTO OFF`

`MCP:RCAR 3`

MCP:RCAR?

3.15.1.3.3 Ref Carrier Freq

Press **Ref Carrier Freq** (Man) to select the reference carrier frequency for this measurement. The center frequency is then calculated using the following algorithm:

1. Cntr Freq 1 = Ref Freq – [0.5 (Carrier Width of Ref Carrier)]
2. Cntr Freq 2 = Cntr Freq 1– (Total of all Carrier Widths excluding the Ref Carrier Width)
3. Cntr Freq = Cntr Freq 2 + [(Total of all Carrier Widths)/2]

Pressing **Ref Carrier Freq** (Auto) distributes the carriers evenly around the current center frequency. The reference carrier frequency is then calculated using the following algorithm:

1. Ref Freq 1 = Cntr Freq – [(Total of all Carrier Widths)/2]
2. Ref Freq 2 = Ref Freq 1+ (Total of all Carrier Widths excluding the Ref Carrier Width)
3. Ref Freq = Ref Freq 2 + [0.5 (Carrier Width of Ref Carrier)]

The above procedure ensures carrier visibility on the analyzer display.

Key Path: **Meas Setup**, **Carrier Setup**

Dependencies/ Couplings: The reference carrier can be re-assigned by implementing changes to carrier power present values.

Ref Carrier Mode cannot be set to Auto when Ref Carrier Frequency Mode is set to Man. If Ref Carrier Mode is set to Auto and Ref Carrier Frequency Mode is changed to Man, Ref Carrier Frequency Mode is forced to Man.

State Saved: Saved in instrument state.

Factory Preset: Auto/Calculated based on current center frequency. Refer to the algorithm above **Ref Carrier Freq**(Auto).

Terminators: Hz, kHz, MHz, GHz

Default Terminator GHz

Resolution: 1 Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10.
If **CF Step** (Man) is selected: CF Step

Range: Analyzer minimum to analyzer maximum

Remote Command:

[:SENSe]:MCPower:RCFRequency<Freq>

[:SENSe]:MCPower:RCFRequency?

[:SENSe]:MCPower:RCFRequency:AUTO OFF|ON|0|1

[:SENSe]:MCPower:RCFRequency:AUTO?

Example: MCP:RCFR 2GHz

MCP:RCFR?

3.15.1.3.4 Configure Carriers

Accesses the Config Carriers menu that allows you to further define each carrier.

Key Path: **Meas Setup**, **Carrier Setup**

Remote Command:

There is no equivalent remote command.

3.15.1.3.4.1 Carrier

Allows you to select the carrier number you wish to configure.

Key Path: **Meas Setup**, **Carrier Setup**, **Configure Carriers**

Dependencies/ Couplings: All keys available on the Configure Carrier key menu are coupled to this key.

State Saved: Saved in instrument state.

Factory Preset: 1

Knob Increment: 1

Step Key Increment: 1

Range: 2 to 12

Remote Command:

There is no equivalent remote command.

3.15.1.3.4.2 Carrier Pwr Present

You can use carrier power present parameter to configure the carriers for this measurement. It allows spaces to be inserted between carriers. Carriers with the power present parameter set to yes are carriers and those with power present parameter set to no are spaces. The total number of carrier power present values will be coupled to the number of carriers. The maximum number of entries that can be set is 12. Press **Carrier Pwr Present** (Yes) to specify carriers which have power present. First, press the **Carrier** key and select the carrier number you wish to define, using the Step Keys (⇓ ⇑), the knob, or the numeric keypad. (The carrier number selected is shown on the **Carrier** key.) Then toggle the **Carrier Pwr Present** key to indicate either yes or no.

If you change the carrier power present to no and that carrier is currently configured as the reference carrier, the next carrier to the left (or the right if there are no carriers to the left) will be assigned as the reference carrier. This also applies when there are only two carriers configured as having power present and you change one to have no power present.

If there are only two carriers this key will be greyed out as they both need to have power present.

If a carrier is defined as having power present, the absolute power will be displayed. If a carrier is defined as having no power present, the power displayed will be relative to the reference carrier.

Key Path: **Meas Setup**, **Carrier Setup**, **Configure Carriers**

Dependencies/ Couplings: This key assigns a value (yes or no) to the carrier number displayed on the **Carrier** key.

State Saved: Saved in instrument state.

Factory Preset: YES, YES, YES, YES

Range: Yes or No

Remote Command:

`[:SENSe]:MCPower:CARRier:LIST:PPResent YES|NO`

`[:SENSe]:MCPower:CARRier:LIST:PPResent?`

Remote Command Notes:

- The position number in the list sent corresponds to the carrier number you are designating. For example: “YES, YES, NO, YES, YES, NO” defines six carriers. Carriers 1, 2, 4, and 5 are defined as having power present whereas carriers 3 and 6 do not have power present. If you need to change carrier 5, you must send all carriers up to 5. Carrier 6 will remain unchanged. If you send more values than the number of carriers specified using the **Carriers** key, they will be ignored.
- The query for this parameter returns the current value for all carriers (with and without power present). If a carrier is defined as having no power present, the power displayed will be relative to the reference carrier, else the absolute power will be displayed.

Example: `MCP:CARR:PPR YES,NO,YES,NO,YES`

`MCP:CARR:PPR?`

3.15.1.3.4.3 Carrier Width

Allows you to set the width of the carriers. This will be the value applied to all the current slots, whether they are carriers or spaces. There is a corresponding one-to-one relationship between each carrier width value and the specified number of carriers. number of carriers. The maximum number of entries that can be set is 12. Press **Carrier Width** to specify the width of each carrier including carriers with no power present. First, press the **Carrier** key and select the carrier number you wish to define, using the Step Keys (⇓ ⇑), the knob, or the numeric keypad. (The carrier number selected is shown on the **Carrier** key.) Then press the **Carrier Width** key and enter the width using the numeric keypad.

Key Path: **Meas Setup**, **Carrier Setup**, **Configure Carriers**

Key Notes: The **Carrier** key determines which carrier width you are defining.

State Saved: Saved in instrument state.

Factory Preset: 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz

Terminators: Hz, kHz, MHz, GHz

Default Terminator: Hz

Resolution: 1 Hz

Step Key

Increment: If **CF Step** (Auto) is selected: span/10.
If **CF Step** (Man) is selected: CF Step

Range: 0 Hz to 45 MHz

Remote Command:

```
[:SENSe]:MCPower:CARRier:LIST:WIDTh <Hz>
```

```
[:SENSe]:MCPower:CARRier:LIST:WIDTh?
```

Remote Command Notes:

- The position number of the each carrier width in the list sent corresponds to the carrier number you are defining. Missing values are not permitted. For example: “5 MHz, 10 MHz, 0 MHz, 5 MHz” defines four carriers. If you need to change carrier 5, you must send all carriers up to 5. Carrier 6 will remain unchanged. If you send more values than the number of carriers specified using the **Carriers** key, they will be ignored.
- The query for this parameter returns the current value for all carriers (with and without power present).

Example:
```
MCP:CARR:LIST:WIDT 5 MHz,10 MHz,4 MHz,15 MHz,5 MHz,10 MHz
```
```
MCP:CARR:LIST:WIDT?
```

3.15.1.3.4.4 Carrier IntegBW

When you press **Carrier IntegBW** you may enter the integration bandwidth used to calculate the power in the carriers. If the RRC Filter is on, the actual integration bandwidth used will be the displayed integration bandwidth multiplied by (1 + filter alpha).

The total number of carrier integration bandwidth values will be coupled to the number of carriers. The maximum number of entries that can be set is 12. Press **Carrier IntegBW** to specify the integration bandwidth of each carrier including carriers with no power present. First, press the **Carrier** key and select the carrier number you wish to define, using the Step Keys (⇓ ⇑), the knob, or the numeric keypad. (The carrier number selected is shown on the **Carrier** key.) Then press the **Carrier IntegBW** key and enter the width using the numeric keypad.

Key Path: **Meas Setup**, **Carrier Setup**, **Configure Carriers**

State Saved: Saved in instrument state.

Factory Preset: 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz

Terminators: Hz, kHz, MHz, GHz

Default Terminator Hz

Resolution: 1 Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10.
If **CF Step** (Man) is selected: CF Step

Range: 100 Hz to 20 MHz

Remote Command:

```
[:SENSe]:MCPower:CARRier:LIST:BANDwidth|BWIDth:[INTegration]<Hz>
```

```
[:SENSe]:MCPower:CARRier:LIST:BANDwidth|BWIDth:[INTegration]?
```

Example: `MCP:CARR:BAND 3.5MHz,2.85MHz,3.84MHz`

Remote Command Notes:

- The position number of the each carrier width in the list sent corresponds to the carrier number you are defining. Missing values are not permitted. For example: “4 MHz, 4 MHz, 0 MHz, 4 MHz” defines six carriers. If you need to change carrier 5, you must send all carriers up to 5. Carrier 6 will remain unchanged. If you send more values than the number of carriers specified using the **Carriers** key, they will be ignored.
- The query for this parameter returns the current value for all carriers (with and without power present).

3.15.1.3.4.5 Carrier Limit

Allows you to specify the upper limit for the power measured in the carrier if the Carrier Power Present parameter is set to No. If the Carrier Power Present parameter is set to Yes for the carrier, the value is ignored. If it is set to No, the measured power will be compared to the power measured in the reference carrier. If the carrier does not pass the limit, the carrier power result will appear in red and the measurement query CALCulate:CLIMits:FAIL? will return TRUE.

Key Path: **Meas Setup**, **Carrier Setup**, **Configure Carriers**

State Saved: Saved in instrument state.

Factory Preset: –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc, –40 dBc if Device is Base (BTS default)

–30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc, –30 dBc if Device is Mobile (MS)

Terminators: dBc

Default Terminator dBc

Resolution: 1

Knob Increment: 1

Step Key Increment: 5

Range: –200 dBc to 200 dBc

Remote Command:

`:CALCulate:MCPower:CARRier[1]|2:LIST:RCARrier <dBc>`

`:CALCulate:MCPower:CARRier[1]|2:LIST:RCARrier?`

Remote Command Notes:

- CARR1 for BTS, CARR2 for MS. BTS is the default.
- The position number of the each carrier width in the list sent corresponds to the carrier number you are defining. Missing values are not permitted. For example: “–60 dBc, –65 dBc, –70 dBc, –60 dBc” defines six carriers. If you need to change carrier 5, you must send all carriers up to 5. Carrier 6 will remain unchanged. If you send more values than the number of carriers specified using the **Carriers** key, they will be ignored.
- The query for this parameter returns the current value for all carriers (with and without power present).

Example: `:CALC:MCP:CARR:LIST:LIM:DATA 0,0,0,0`

3.15.1.4 Offsets/Limits

Displays menu keys that enable you to configure the offsets and limits for the MCP measurement.

Key Path: **Meas Setup**

Remote Command:

There is no equivalent remote command.

3.15.1.4.1 Offset

Allows you to select the offset the menu keys will affect. Press **Offset** until the letter of the desired offset (A, B, or C) is underlined.

Key Path: **Meas Setup**, **Offset/Limits**

Factory Preset: A

Remote Command:

There is no equivalent remote command.

3.15.1.4.2 Offset Freq

Sets the frequency difference between the center of the uppermost carrier and the center of the upper element of the offset pair, as well as the frequency difference between the center of the lower element of the offset pair and the center of the lowermost carrier. If you set the frequency of any offset to 0 Hz, the offset is turned off and not included in the displayed results.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 1.6 MHz, 3.2 MHz, 0 MHz

Terminators: Hz, kHz, MHz, GHz

Default Terminator: Hz

Range: 0 MHz to 45 MHz

Remote Command:

`[:SENSe]:MCPower:OFFSet:LIST:[FREQuency]<Hz>,<Hz>,<Hz>`

`[:SENSe]:MCPower:OFFSet:LIST:[FREQuency]?`

Remote Command Notes: When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if

you want to change values 1 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `MCP:OFFS:LIST:5MHz,7.5MHz,15MHz`

`MCP:OFFS:LIST:?`

3.15.1.4.3 Offset Integ BW

Allows you to set the integration bandwidth for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI. This is the bandwidth over which the power is integrated for the selected offset. If the RRC filter is on, the actual integration bandwidth used will be the displayed integration bandwidth multiplied by (1 + filter alpha).

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 1.28 MHz, 1.28 MHz, 1.28 MHz

Terminators: Hz, kHz, MHz, GHz

Default Terminator: Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: 100 Hz to 20 MHz

Remote Command:

`[:SENSe]:MCPower:OFFSet:LIST:BANDwidth|BWIDth:[INTegration]<Hz>,<Hz>,<Hz>`

`[:SENSe]:MCPower:OFFSet:LIST:BANDwidth|BWIDth:[INTegration]<Hz>,<Hz>,<Hz>`

Remote Command Notes: When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `MCP:OFFS:LIST:BWID 3.84MHz,3.84MHz,3.84MHz`

`MCP:OFFS:LIST:BWID?`

3.15.1.4.4 Absolute Limit

Allows you to set the upper absolute limit for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 0 dBm, 0 dBm, 0 dBm if Device is Base (BTS)

–55 dBm, –55 dBm, 0 dBm if Device is Mobile (MS)

Default Terminator: dBm

Range: –200 dB to 200 dB

Remote Command:

```
:CALCulate:MCPower:OFFSet[1]|2:LIST:LIMit:ABSolute <dBm>,<dBm>,<dBm>
```

```
:CALCulate:MCPower:OFFSet[1]|2:LIST:LIMit:ABSolute?
```

Remote Command Notes: OFFSet1 for BTS, OFFSet2 for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `CALC:MCP:OFFS2:LIST:LIM:ABS 10,10,10,10,10,10` sets the mobile station relative limits to 10 dB.

`CALC:MCP:OFFS2:LIST:LIM:ABS?`

3.15.1.4.5 Offset Limit Fail Mask

When you press **Mask Fail** a menu is displayed with **Absolute**, **Relative**, **Abs AND Rel**, and **Abs OR Rel** keys. This menu allows you to select one of the logic keys for determining the conditions for which the measurement fails: Absolute and Relative both check the results against the respective limit, while OR checks against both limits, failing if either of the limits is broken. AND will result in a failure reported only if both the absolute and relative limits fail.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: ABS,ABS,ABS if Device is Mobile (MS)

REL,REL,REL if Device is Base (BTS)

Remote Command:

```
[:SENSe]:MCPower:OFFSet[1]|2:LIST:TEST ABSolute | RELative | AND | OR
```

:CALCulate:MCPower:OFFSet[1]|2:LIST:TEST?

Remote Command Notes: OFFSet1 is 1 for BTS, OFFSet2 is for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: CALC:MCP:OFFS2:LIST:TEST ABS,REL,OR sets the mobile station offset limit logic keys.

CALC:MCP:OFFS2:LIST:TEST?

3.15.1.4.6 Rel Lim (Car) (Relative Limit (to Carrier))

Allows you to set the upper limit relative to the Total Pwr Reference value for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: –40 dB, –45 dB, 0 dB if Device is Base (BTS default)

–33 dB, –43 dB, 0 dB if Device is Mobile (MS)

Coupling: Coupled to the Rel Limit (Car) parameter. When the Rel Limit (PSD) value is changed, the Rel Limit (Car) parameter value will be recalculated to the equivalent dB value for the new Rel (PSD) value given the current RBW setting. Similarly, when the Rel Limit (Car) parameter value is changed, the Rel Limit (PSD) value will be recomputed.
Rel Limit (PSD) = Rel Limit (Car) – 10(log(offsetIntegBW))

Default Terminator: dB

Range: –200 dB to 200 dB

Remote Command:

:CALCulate:MCPower:OFFSet[1]|2:LIST:RCARrier <dB>, <dB>,<dB>

:CALCulate:MCPower:OFFSet[1]|2:LIST:RCARrier?

Remote Command Notes: OFFSet1 for BTS, OFFSet2 for MS. BTS is the default.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `CALC:MCP:OFFS2:LIST:RCAR 10,10,10,10,10,10` sets the mobile station relative limits to 10 dB.

`CALC:MCP:OFFS2:LIST:RCAR?`

3.15.1.5 Carrier Result

Press **Carrier Result** to select the result you wish to display on the last line of the carrier power results list except when:

- the carrier result number ≤ 4 (the first 4 carrier power results are displayed)
- the carrier result number ≥ 9 (the last 4 carrier power results are displayed)

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 1

Step Key Increment: 1

Range: 1 to number of carriers.

Remote Command:

There is no equivalent remote command.

3.15.1.6 Power Ref

Allows you to set the multi-carrier power reference to automatic or manual. When set to automatic, the carrier power result reflects the measured power value in the selected reference carrier (**Meas Setup**, **Carrier Setup**, **Ref Carrier**). When set to manual, the result is referenced to the last measured value, or you may specify the reference for the multi-carrier power measurement. Relative values are displayed, referenced to the “Power Reference” value.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Off/Measured power in the reference carrier.

Terminators: dBm

Default Terminator: dBm

Range: –200 dB to 200 dB

Remote Command:

`[:SENSe]:MCPower:CARRier:AUTO[:STATe] OFF|ON|0|1`

[:SENSe]:MCPower:CARRier:AUTO[:STATe]?

[:SENSe]:MCPower:CARRier[:POWer]<dBm>

[:SENSe]:MCPower:CARRier[:POWer]?

Example: MCP:CARR:AUTO 1

MCP:CARR:AUTO?

MCP:CARR -100

MCP:CARR?

3.15.1.7 Limit Test

Pressing **Limit Test** turns the testing of the limit line on or off. When **Limit Test** is set to **On**, each offset is compared to its upper and lower offset limit. In those cases where the power exceeds the limit, a red "F" is placed next to the dBc result to indicate a failure. If there are any failures, the pass/fail indicator area show "FAIL" in red (in the combined view, the bar turns red); if there are none, it shows "PASS" in green. Any offsets that are in the off state (see "Offset Freq" on page 177) are not measured and their results will not be displayed on screen.

Key Path: **Meas Setup**, **More**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

[:SENSe]:MCPower:LIMit[:STATe] OFF|ON|0|1

[:SENSe]:MCPower:LIMit[:STATe]?

Example: MCP:LIM ON

MCP:LIM?

3.15.1.8 RRC Filter

Pressing **Filter** turns the Root Raised Cosine filter on or off. The rolloff value (alpha-α) for the filter will be set to value of the Filter Alpha parameter.

Key Path: **Meas Setup**, **More**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

[:SENSe]:MCPower:FILTer[:RRC][:STATe] OFF|ON|0|1

[:SENSe]:MCPower:FILTer[:RRC][:STATe]?

Example: MCP:FILT 1

MCP:FILT?

3.15.1.9 Filter Alpha

Press **Filter** to input the alpha value for the RRC Filter.

Key Path: **Meas Setup, More**

State Saved: Saved in instrument state.

Factory Preset: 0.22

Range: 0.01 to 1.0

Remote Command:

[:SENSe]:MCPower:FILTer[:RRC]:ALPHA <number>

[:SENSe]:MCPower:FILTer[:RRC]:ALPHA?

Example: MCP:FILT:ALPHA .33

MCP:FILT:ALPHA?

3.15.1.10 Noise Correction

Pressing **Noise Correction** turns noise correction **on** or **off**. When you measured power in the reference channel or any offset close to the noise floor of the analyzer and you set **Noise Corr** to **On**, a calibration of the noise floor is performed and used to correct for analyzer noise floor contribution to measurement levels, increasing dynamic range.

Key Path: **Meas Setup**, **More**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

[:SENSe]:MCPower:CORRection:NOISe[:AUTO] OFF|ON|0|1

[:SENSe]:MCPower:CORRection:NOISe[:AUTO]?

Remote Command Notes: The noise correction feature is not available when the measurement method is RBW (**Meas Setup**, **Method** (RBW) or when signal tracking is on.

Example: MCP:CORR:NOIS 1

MCP:CORR:NOIS?

3.15.2 AMPLITUDE / Y Scale (Multi-Carrier Power—MCP)

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.15.2.1 Scale/Div

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 10 dB

Terminators: dB

Default Terminator: dB

Range: 0.1 dB to 20 dB

Remote Command:

```
:DISPlay:MCPower:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>
:DISPlay:MCPower:WINDow:TRACe:Y:[SCALe]:PDIVision?
```

Example: `DISP:MCP:WIND:TRAC:Y:PDIV 0.5 DB`

3.15.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad.

Key Path: **AMPLITUDE / Y Scale**

Dependencies/ Couplings: If you reduce the Input Atten setting, the analyzer may have to lower the Reference Level to maintain the proper level at the top of the screen. If you then increase Input Atten, the Reference Level does *not* increase to its previous value.

State Saved: Saved in Instrument State

Factory Preset: 10 dBm

Range: 0.01 dBm to 20 dBm

Remote Command:

```
:DISPlay:MCPower:WINDow:TRACe:Y:[SCALe]:RLEVel <power>
```

`:DISPlay:MCPower:WINDow:TRACe:Y:[SCALe]:RLEVel?`

Example: `DISP:MCP:WIND:TRAC:Y:RLEV 20 dbm`

Sets the reference level to 20 dBm.

3.15.3 Trace/View (Multi-Carrier Power—MCP)

If **Multi-Carrier Power** has been selected in the **Measure** menu, this key displays the appropriate **Trace/View** menu for the multi-carrier power measurement.

Displays menu keys that enable you to set how trace information is stored and displayed.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command for this function.

3.15.3.1 Spectrum

Pressing **Spectrum** selects the spectral display of the measurement.

Key Path: **Trace/View**

Factory Preset: Spectrum

Remote Command:

There is no remote command for this function.

3.15.3.2 Combined

Pressing **Combined** selects the measurement to be displayed as a bar graph and spectrum.

Key Path: **Trace/View**

Factory Preset: Spectrum

Remote Command:

There is no remote command for this function.

3.15.3.3 Combined View Units

Pressing **Combined View Units** selects the units (**dBc** or **dBm**) for the floating numeric displays when **Combined** is selected.

Key Path: **Trace/View**

Factory Preset: dBc

Remote Command:

There is no remote command for this function.

3.16 Spurious Emissions—Spurs Measurement

Insert the key file(s) for this measurement, like Meas Setup, Trace/View, Display, Markers, etc.

3.16.1 Meas Setup (Spurious Emissions)

When the spurious emissions measurement has been selected in the **Measure** menu, this key displays the appropriate measurement setup menu.

The spurious emissions measurement identifies and determines the power level of spurious emissions in certain frequency bands.

Key Path: Front-panel key

Remote Command:

There is no equivalent remote command.

3.16.1.1 Avg Number

Press **Avg Number** to **On** to specify the number of measurements that will be averaged when calculating the measurement result. The average will be displayed at the end of each sweep. **Off** disables the measurement averaging.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 10 averages / Off

Range: 1 to 1000

Remote Command:

`[:SENSe]:SPURious:AVERage:COUNt <integer>`

`[:SENSe]:SPURious:AVERage:COUNt?`

`[:SENSe]:SPURious:AVERage[:STATe] OFF|ON|0|1` turns the averaging on or off.

`[:SENSe]:SPURious:AVERage[:STATe]?`

Example:
```
SPUR:AVER:COUN 100
SPUR:AVER OFF
```

3.16.1.2 Avg Mode

Selects the type of termination control used for the averaging function (**Exp** or **Repeat**). This

determines the averaging action after the specified number of measurements (average count) is reached.

- **EXP** (Exponential Averaging mode)—When you set **Avg Mode** to **Exp**, each successive data acquisition after the average count is reached is exponentially weighted and combined with the existing average. Exponential averaging weights new data more than old data, which facilitates tracking of slow-changing signals. The average will be displayed at the end of each sweep.
- **Repeat**—When you set **Avg Mode** to **Repeat**, after reaching the average count, all previous result data is cleared and the average count is set back to 1.

If you set Meas Type to **Examine**, the measurement sets **Avg Mode** to **Exp**. If you set Meas Type to Full, the measurement sets **Avg Mode** to **Rep**.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: EXPonential

Remote Command:

`[:SENSe]:SPURious:AVERage:TCONrol EXPonential|REPeat`

`[:SENSe]:SPURious:AVERage:TCONrol?`

Example: `SPUR:AVG:TCON REP`

`SPUR:AVG:TCON?`

3.16.1.3 Range Table

Allows you to enter the settings for up to 20 ranges, either using the instrument front panel keys or remotely. Upon entering the range table, the measurement stops, then the analyzer is set to a constantly sweeping idle state. The analyzer is then set to the current values for range 1 (whether range 1 is on or off). If a range is currently off, the values in the range table for that range are replaced with dashes (----) to indicate this range is currently inactive.

Key Path: **Meas Setup**

Saved State: All values for all ranges are saved in instrument state.

Remote Command:

There is no equivalent remote command.

3.16.1.3.1 Range

Allows you to select a range and sets the other Range Table keys to display the values for the selected range. If **Range** is set to **On** it is used as part of the measurement; when set to **Off**, it is excluded.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF if Device is Base (BTS)

ON, ON, ON, ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF if Device is Mobile (MS)

Remote Command:

`[:SENSe]:SPURious[:RANGe][:LIST]:STATe OFF|ON|0|1`

`[:SENSe]:SPURious[:RANGe][:LIST]:STATe?`

Remote Command Notes: This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. For example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values remain as they were.

The query for this parameter will always return 20 values.

Example: `SPUR:STAT 0,1,1,0,1,1` lists values 1 through 6

3.16.1.3.2 Start Freq

Allows you to set the start frequency of the analyzer for the selected range.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: 9 kHz, 150 kHz, 30 MHz, 1.0 GHz, 925 MHz, 935 MHz, 1805 MHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz if Device is either Base (BTS) or Mobile (MS)

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: Frequency range of your analyzer.

Remote Command:

`[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt <integer>`

`[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt?`

Remote Command Notes: This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. For example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values remain as they were.

The query for this parameter will always return 20 values.

Example: `SPUR:FREQ:STAR 5 MHz,10 MHz,15 MHz` lists values 1 through 3

3.16.1.3.3 Stop Freq

Stop Freq is used to set the stop frequency of the analyzer.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: 150 kHz, 30 MHz, 1.0 GHz, 12.75 GHz, 935 MHz, 960 MHz, 1880 MHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz if Device is either Base (BTS) or Mobile (MS)

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: Frequency range of your analyzer.

Remote Command:

`[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP <integer>`

`[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP?`

Remote Command Notes: This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. For example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values remain as they were.

The query for this parameter will always return 20 values.

Example: `SPUR:FREQ:STOP`
`2.715 MHz,3.515 MHz,4.0 MHz,7.5 MHz,12.5 MHz` lists values 1 through 5

3.16.1.3.4 Res BW

Res BW allows you to set the resolution bandwidth of the analyzer. When **Auto** is selected the analyzer determines the optimum setting, while **Man** allows you to enter the Res BW value.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: 1 kHz, 10 kHz, 100 kHz, 1 MHz, 100 kHz, 100 kHz, 100 kHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz if Device is either Base (BTS) or Mobile (MS)

Knob Increment: Steps through the available resolution bandwidth filters.

Step Key Increment: Steps through the available resolution bandwidth filters.

Range: Resolution bandwidth range of your analyzer.

Remote Command:

`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]:AUTO OFF|ON|0|1` selects the mode.

`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] <integer>`

`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]:AUTO?`

`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]?`

Remote Command Notes: This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. For example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values remain as they were.

The query for this parameter will always return 20 values.

Example: `SPUR:BAND:AUTO 1,1,0,1,1` sets the resolution bandwidth for ranges 1, 2, 4, and 5 to auto and range 3 to manual.

`SPUR:BAND 50 kHz, 50 kHz, 50 kHz, 10 MHz, 10 MHz, 10 MHz` sets all 6 ranges to manual with the indicated values.

3.16.1.3.5 Video BW

Video BW allows you to set the video bandwidth of the analyzer. When **Auto** is selected the analyzer determines the optimum setting, while **Man** allows you to enter the Video BW value.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: 1 kHz, 10 kHz, 100 kHz, 1 MHz, 100 kHz, 100 kHz, 100 kHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz if Device is either Base (BTS) or Mobile (MS)

Knob Increment: Steps through the available video bandwidth filters.

Step Key Increment: Steps through the available video bandwidth filters.

Range: Video bandwidth range of your analyzer.

Remote Command:

`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo:AUTO OFF|ON|0|1` selects the mode.

`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo <integer>`

[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo:AUTO?

[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo?

Remote Command Notes: This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. For example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values remain as they were.

The query for this parameter will always return 20 values.

Example: SPUR:BAND:VIDO:AUTO 1,1,0,1,1 sets the video bandwidth for ranges 1, 2, 4, and 5 to auto and range 3 to manual.

SPUR:BAND:VIDO 50 kHz, 50 kHz, 50 kHz, 10 MHz, 10 MHz, 10 MHz sets all 6 ranges to manual with the indicated values.

3.16.1.3.6 Sweep Time

Sweep Time allows you to set the sweep time of the analyzer. When **Auto** is selected the analyzer determines the optimum setting, while **Man** allows you to you to enter the Sweep time value.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: 170 ms, 359.9 ms, 117 ms, 19.60 ms, 1.240 ms, 3.040 ms, 9.080 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms, 1.680 ms

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Remote Command:

[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO OFF|ON|0|1 selects the mode.

[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME <integer>

[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO?

[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME?

Remote Command Notes: This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. For example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values remain as they were.

The query for this parameter will always return 20 values.

Example: SPUR:SWE:TIME:AUTO 1,1,0,1,1 sets the sweep times for range 1, 2, 4,

and 5 to auto and range 4 to manual.

```
SPUR:SWE:TIME 5 ms, 5 ms, 5 ms, 5 ms, 5 ms, 5 ms
```

3.16.1.3.7 Abs Start Limit

Allows you to set the absolute start limit to the set value, the limit above which spur levels will report “fail”. If the Limit Line Test parameter is off, any spurs which are found to be above the current ‘Peak Excursion’ value will be added to the results table (see “Peak Excursn (Excursion)” on page 195). From these spurs, the amplitude will be checked using the abs limit start and abs limit stop parameters to calculate the limit. A red ‘F’ will be appended to the amplitude value of the spur if the measured amplitude is above the limit. If the Limit Line Test is on, only spurs whose amplitudes exceed the limit will be reported.

Key Path: **Meas Setup, Range Table**

Dependencies/ Couplings: If Abs Stop Limit Mode is set to Auto, this value is coupled to Abs Stop Limit to make a flat limit line. If set to Man, you may enter different values for the Abs Start Limit and Abs Stop Limit to make a sloped limit line.

Factory Preset: –13 dBm, –13 dBm, –13 dBm, –13 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Base (BTS)

–36 dBm, –36 dBm, –36 dBm, –30 dBm, –67 dBm, –79 dBm, –71 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Mobile (MS)

Knob Increment: 0.1 dBm

Step Key Increment: 1 dBm

Range: –200 dBm to 50 dBm

Remote Command:

```
:CALCulate:SPURious:RANGe[1]|2[:LIST]:LIMit:ABSolute[:UPPER]:DATA[:STARt]
<integer>
```

```
:CALCulate:SPURious:RANGe[1]|2[:LIST]:LIMit:ABSolute[:UPPER]:DATA[:STARt]?
```

Remote Command Notes: RANGe1 for BTS and RANGe2 for MS. Default is BTS (1).

This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, for example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were.

The query for this parameter will always return 20 values.

Related commands are
`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO?`

`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME?`

Example: `:CALC:SPUR:RANG2:LIM:ABS:DATA –20 dBm, –20 dBm, –20 dBm, –30 dBm, 76 dBm, 97 dBm, 77 dBm`

`:CALC:SPUR:RANG2:LIM:ABS:DATA?`

3.16.1.3.8 Abs Stop Limit

Allows you to set the absolute stop limit to the set value, the limit above which spur levels will report “fail” and to set the Abs Stop Limit Mode to Auto or Manual. If Abs Stop Limit Mode is set to Auto, this value is coupled to Abs Start Limit to make a flat limit line. If set to Man, you may enter different values for the Abs Start Limit and Abs Stop Limit to make a sloped limit line.

If the Limit Line Test parameter is off, any spurs which are found to be above the current ‘Peak Excursion’ value will be added to the results table (see “Peak Excursn (Excursion)” on page 195). From these spurs, the amplitude will be checked using the abs limit start and abs limit stop parameters to calculate the limit. A red ‘F’ will be appended to the amplitude value of the spur if the measured amplitude is above the limit. If the Limit Line Test is on, only spurs whose amplitudes exceed the limit will be reported.

Key Path: **Meas Setup**, **Range Table**

Dependencies/ Couplings: If Abs Stop Limit Mode is set to Auto, this value is coupled to Abs Start Limit to make a flat limit line. If set to Man, you may enter different values for the Abs Start Limit and Abs Stop Limit to make a sloped limit line.

Factory Preset: –13 dBm, –13 dBm, –13 dBm, –13 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm if Device is Base (BTS)

–36 dBm, –36 dBm, –36 dBm, –30 dBm, –67 dBm, –79 dBm, –71 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Mobile (MS)

Knob Increment: 0.1 dBm

Step Key Increment: 1 dBm

Range: –200 dBm to 50 dBm

Remote Command:

`:CALCulate:SPURious:RANGe[1]|2[:LIST]:LIMit:ABSolute[:UPPER]:DATA:STOP <integer>`

`:CALCulate:SPURious:RANGe[1]|2[:LIST]:LIMit:ABSolute[:UPPER]:DATA:STOP?`

`:CALCulate:SPURious:RANGe[1]|2[:LIST]:LIMit:ABSolute[:UPPER]:DATA:STOP:AUTO OFF|ON|0|1`

`:CALCulate:SPURious:RANGe[1]|2[:LIST]:LIMit:ABSolute[:UPPER]:DATA:STOP:AUTO?`

Remote Command Notes: RANGe1 for BTS and RANGe2 for MS. Default is BTS (1).

This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, for example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were.

The query for this parameter will always return 20 values.

Related commands are
`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO?`

`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME?`

Example:
```
:CALC:SPUR:RANGe2:LIM:ABS:DATA:STOP –20 dBm, –20 dBm,
–20 dBm, –30 dBm, –76 dBm, –97 dBm, –77 dBm

:CALC:SPUR:RANG2:LIM:ABS:DATA:STOP?

:CALC:SPUR:RANG2:LIM:ABS:DATA:STOP:AUTO 0,0,0,0,0,0

:CALC:SPUR:RANG2:LIM:ABS:DATA:STOP:AUTO?
```

3.16.1.3.9 Peak Excursn (Excursion)

Peak Excursn allows you to set the minimum amplitude variation of signals that can be identified as peaks. For example, if a value of 6 dB is selected, peaks that rise and fall more than the 6 dB above the peak threshold value are identified.

Key Path: **Meas Setup**, **Range Table**

State Saved: Saved in instrument state.

Factory Preset: 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB

Knob Increment: 0.1 dB

Step Key Increment: 10 dB

Range: 0.0 dB to 100.0 dB

Remote Command:

`[:SENSe]:SPURious:RANGe[1]|2[:LIST]:PEAK:EXCursion <integer>`

`[:SENSe]:SPURious:RANGe[1]|2[:LIST]:PEAK:EXCursion?`

Remote Command Notes: RANGe1 for BTS and RANGe2 for MS. Default is BTS (1).

This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, for example, if you want to change values 2 and 6, you must

send all values up to 6. Subsequent values will remain as they were.

The query for this parameter will always return 20 values.

Example: `:SPUR:RANGe2:PEAK:EXC 10, 10, 10, 10, 10, 10`

`:SPUR:RANGe|2:PEAK:EXC?`

3.16.1.3.10 Pk Threshold

Pk Threshold allows you to set the minimum amplitude of signals that can be identified as peaks. For example, if a value of –90 dBm is selected, only peaks that rise and fall more than the peak excursion value above –90 dBm are identified.

Key Path: **Meas Setup**, **Range Table**

Factory Preset: –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm

Knob Increment: 1 dBm

Step Key Increment: 1 dBm

Range: Current Ref Level Setting – (10 * Trace/Div) to Current Ref Level Setting

Remote Command:

`[:SENSe]:SPURious:RANGe[1]|2[:LIST]:PEAK:THReshold <integer>`

`[:SENSe]:SPURious:RANGe[1]|2[:LIST]:PEAK:THReshold?`

Remote Command Notes: RANGe1 for BTS and RANGe2 for MS. Default is BTS (1).

This parameter can receive up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, for example, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were.

The query for this parameter will always return 20 values.

Example: `:SPUR:RANG2:PEAK:THR –60, –60, –60, –60, –60, –60`

`:SPUR:RANG|2:PEAK:THR?`

3.16.1.4 Meas Type

Allows you to specify the measurement type (**Examine** or **Full**). This parameter is coupled to the average mode. If you select **Examine**, the measurement sets **Avg Mode** to **Exp**. If you select Full, the measurement sets **Avg Mode** to **Rep**. The behavior of each measurement type is

described below.

	Single		Continuous	
	No Spurs	**Spurs**	**No Spurs**	**Spurs**
Examine	All active ranges are measured. Upon completion, the measurement is set to the idle state. The message `No Spurs` is displayed.	All active ranges are measured and the found spurs are reported. Upon completion, the measurement is set to the idle state. The trace containing the worst spur is restored. **Spur** is enabled (no longer greyed out). A marker is added, set to the frequency of the worst spur.	All active ranges are measured. Upon completion, the analyzer remains set to the last range checked with an active trace. The message `No Spurs` is displayed.	All active ranges are measured and the found spurs are reported. Upon completion the analyzer is set to the range containing the worst spur found and continually sweeps this range. **Spur** is enabled (no longer greyed out). A marker added, set to the frequency of the worst spur.
Full	All active ranges are measured. Upon completion, the measurement is set to the idle state. The message `No Spurs` is displayed.	All active ranges are measured and the found spurs are reported. Upon completion, the measurement is set to the idle state. The trace of the last active range is displayed.	Measurement continually cycles through all active ranges.	All active ranges are measured and the found spurs are reported. On each cycle of the active ranges, the report on spurs found is reset. This ensures that remote queries retrieve the trace data that matches the currently displayed results.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Examine

Remote Command:

`[:SENSe]:SPURious:TYPE EXAMine|FULL`

`[:SENSe]:SPURious:TYPE?`

Example: `SPUR:TYPE FULL`

3.16.1.5 Spur

Allows you to view any spurs that have been found. The measurement sets the analyzer to

the range in which the currently selected spur was found. The range settings changes only if the selected spur is in the range that is different from the current range settings. A marker identifies the currently selected spur on the trace.

NOTE This key is enabled only when **Meas Type** is set to **Examine**, and only upon completion of a measurement.

Key Path: **Meas Setup**

Saved State: No values are saved to state.

Factory Preset: 1

Knob Increment: 1

Step Key Increment: 1

Range: 1 to 100

Remote Command:

There is no equivalent remote command.

3.16.1.6 Fast Spurious Meas

Pressing **Fast Spurious Meas** turns the fast spurious measurement test on or off. Pressing **Fast Spurious Meas** to **On** provides a faster method of execution because with fast spurious testing only spurs above the limit line are reported. Any spurs reported outside the limit will cause the measurement to fail. See "Abs Start Limit" on page 193 for more information.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: Off

Remote Command:

`[:SENSe]:SPURious:FSMeas OFF|ON|0|1`

`[:SENSe]:SPURious:FSMeas?`

Example: `SPUR:FSM ON`

3.16.2 AMPLITUDE / Y Scale (Spurious Emissions—Spurs)

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.16.2.1 Scale/Div

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 10 dB

Terminators: dB

Default Terminator: dB

Range: 0.1 dB to 20 dB

Remote Command:

`:DISPlay:SPURious:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>`

`:DISPlay:SPURious:WINDow:TRACe:Y:[SCALe]:PDIVision?`

Example: `DISP:SPUR:WIND:TRAC:Y:PDIV 0.5 DB`

3.16.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad.

Key Path: **AMPLITUDE / Y Scale**

Dependencies/ Couplings: If you reduce the Input Atten setting, the analyzer may have to lower the Reference Level to maintain the proper level at the top of the screen. If you then increase Input Atten, the Reference Level does *not* increase to its previous value.

State Saved: Saved in Instrument State

Factory Preset: 10 dBm

Range: 0.01 dBm to 20 dBm

Remote Command:

`:DISPlay:SPURious:WINDow:TRACe:Y:[SCALe]:RLEVel <power>`

`:DISPlay:SPURious:WINDow:TRACe:Y:[SCALe]:RLEVel?`

Example: `DISP:SPUR:WIND:TRAC:Y:RLEV 20 dbm`

3.17 Spectrum Emission Mask—SEM Measurement

Insert the key file(s) for this measurement, like Meas Setup, Trace/View, Display, Markers, etc.

3.17.1 Meas Setup (Spectrum Emissions Mask—SEM)

When the spectrum emissions mask measurement has been selected in the **Measure** menu, this key displays the appropriate measurement setup menu.

Spectrum Emissions Mask (SEM) measurement includes the in-band and out-of-band spurious emissions. As it applies to TD-SCDMA, this is the power contained in a specified frequency bandwidth at certain offsets relative to the total carrier power.

Key Path: Front-panel key

3.17.1.1 Avg Number

Press **Avg Number (On)** to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep.

Key Path: **Meas Setup**

State Saved: Saved in instrument state.

Factory Preset: 10 averages / Off

Range: 1 through 1000

Remote Command:

```
[:SENSe]:SEMask:AVERage:COUNt <integer>
[:SENSe]:SEMask:AVERage:COUNt?

[:SENSe]:SEMask:AVERage[:STATe] OFF|ON|0|1
[:SENSe]:SEMask:AVERage[:STATe]?
```

Example:
```
SEM:AVER:COUN 15
SEM:AVER 1
```

3.17.1.2 Ref Channel

Accesses the menu of keys that enable you to change the reference channel settings.

Key Path: **Meas Setup**

Remote Command:

There is no remote command for this function.

3.17.1.2.1 Chan Integ BW

Allows you to specify the integration bandwidth used in calculating the power in the main channel.

Key Path: **Meas Setup**, **Ref Channel**

Factory Preset: 1.28 MHz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: 10% to 100% of the setting of Chan Span

Remote Command:

```
[:SENSe]:SEMask:BANDwidth|BWIDth:INTegration <number>
```

```
[:SENSe]:SEMask:BANDwidth|BWIDth:INTegration?
```

Example:
```
SEM:BAND:INT 4 MHz
SEM:BWID:INT 4 MHz
SEM:BAND:INT?
SEM:BWID:INT?
```

3.17.1.2.2 Chan Span

Allows you to specify the span used in measuring the power in the main channel.

Key Path: **Meas Setup**, **Ref Channel**

Factory Preset: 1.6 MHz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: 1 kHz to 50 MHz

Remote Command:

```
[:SENSe]:SEMask:FREQuency:SPAN <number>
```

```
[:SENSe]:SEMask:FREQuency:SPAN?
```

Example: SEM:FREQ:SPAN 4 MHz

SEM:FREQ:SPAN?

3.17.1.2.3 Sweep Time

Allows you to specify the sweep time used in measuring the power in the main channel.

Key Path: **Meas Setup**, **Ref Channel**

Factory Preset: 1.120 ms and Auto/On

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: 1 ms through 4 ks

Remote Command:

[:SENSe]:SEMask:SWEeptime <number>

[:SENSe]:SEMask:SWEeptime?

[:SENSe]:SEMask:SWEeptime:AUTO OFF|ON|0|1

[:SENSe]:SEMask:SWEeptime:AUTO?

Example:
```
SEM:SWE 4 s
SEM:SWE?
SEM:SWE:AUTO 0
SEM:SWE:AUTO?
```

3.17.1.2.4 Res BW

Allows you to specify the resolution bandwidth used in measuring and the power in the main channel.

Key Path: **Meas Setup**, **Ref Channel**

Factory Preset: 15 kHz and Auto/On

Range: Full Range provided by Base Instrument Hardware.

Remote Command:

[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution] <freq>

[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]?

[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]:AUTO OFF|ON|0|1

[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]:AUTO?

Remote Command Notes: If an unavailable bandwidth is entered, the closest available bandwidth is used.

Example:
```
SEM:BAND 4 MHz
SEM:BWID 4 MHz
SEM:BAND?
SEM:BWID?

SEM:BAND:AUTO 1
SEM:BWID:AUTO 1
SEM:BAND:AUTO?
SEM:BWID:AUTO?
```

3.17.1.2.5 Total Pwr Ref

Allows you to set the mode of the carrier power result and to manually enter a value for the total power of the reference channel. When set to auto, the carrier power result reflects the measured power value in the reference carrier. When set to manual, the result takes on the last measured value or the value entered by you.

Total Pwr Ref is the power in the carrier that is used as the reference in computing the relative power values for the offsets.

Key Path: **Meas Setup**, **Ref Channel**

State Saved: Saved in instrument state.

Factory Preset: Auto/On

Knob Increment: 1

Step Key Increment: 5

Default Terminator: dBm

Range: –200.0 dBm to 200.0 dBm.

Remote Command:

[:SENSe]:SEMask:CARRier[:POWer] <ampl>

[:SENSe]:SEMask:CARRier[:POWer]?

[:SENSe]:SEMask:CARRier:AUTO[:STATe] OFF|ON|0|1

[:SENSe]:SEMask:CARRier:AUTO[:STATe]?

Example:
```
SEM:CARR –10 dBm
SEM:CARR?
```

```
SEM:CARR:AUTO 0

SEM:CARR:AUTO?
```

3.17.1.3 Offset/Limits

Displays the menus where you can change the following parameters for offset frequency settings and pass/fail tests: **Offset**, **Start Freq**, **Stop Freq**, **Sweep Time**, **Res BW**, **Meas BW**, **Meas BW**, **Abs Start**, **Abs Stop**, **Rel Start**, **Rel Stop** and **Fail Mask**.

3.17.1.3.1 Offset

Allows you to select the offset pairs (upper and lower) that the menu keys affect, and displays the memory selection menu from **A** to **E** (where you can store up to 5 sets of values for **Start Freq**, **Stop Freq**, **Sweep Time**, **Res BW**, **Meas BW**, **Meas BW**, **Abs Start**, **Abs Stop**, **Rel Start**, **Rel Stop** and **Fail Mask**). Press **Offset** until the letter of the desired offset (A, B, C, D, or E) is underlined. Only one selection at a time is shown on this key label.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: A

Remote Command:

There is no remote command for this function.

3.17.1.3.2 Start Freq

Allows you to specify the inner limit (frequency closest to the carrier) for both segments of the specified offset pair and to turn the function On and Off. When **Start Freq** (Off) is selected, the offset pair is not measured and has the same effect as setting the frequency of the offset to 0 Hz.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 815 kHz, 1.015 MHz, 1.815 MHz, 2.415 MHz, 2.9 MHz and ON, ON, ON, ON, OFF
if Device is Base

815 kHz, 1.815 MHz, 2.9 MHz, 0.0 Hz, 0.0 Hz and ON, ON, ON, OFF, OFF
if Device is Mobile

Default Terminator: Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10

If **CF Step** (Man) is selected: CF Step

Range: 0 Hz to the Stop Freq minus 100 Hz for each offset

Remote Command:

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STARt <freq>, ... [<freq>]` (up to five values)

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STARt?`

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STATe OFF|ON|0|`

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STATe?`

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS.

Offsets that are turned off, for the currently selected offset will return a –999.0 when queried.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `SEM:OFFS2:LIST:FREQ:STAR 5 MHz`, 10 MHz, 15 MHz

`SEM:OFFS2:LIST:FREQ:STAR?`

`SEM:OFFS2:LIST:STAT 0`

`SEM:OFFS2:LIST:STAT?`

3.17.1.3.3 Stop Freq

Allows you to specify the outer limit (frequency furthest from the carrier) for both segments of the specified offset pair. The lower range is limited to the setting of the Start Freq.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 1.015 MHz, 1.815 MHz, 2.415 MHz, 2.9 MHz, 4.0 MHz and ON, ON, ON, ON, OFF
if Device is Base

1.815 MHz, 2.415 MHz, 4.5 MHz, 0.0 Hz, 0.0 Hz and ON, ON, ON, OFF, OFF
if Device is Mobile

Default Terminator: Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: The Start Freq (for that offset) plus 10 Hz to 100 MHz

Remote Command:

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STOP <freq> ... [<freq>]` (up to five values)

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STOP?`

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:
```
SEM:OFFS:LIST:FREQ:STOP 2.715 MHz, 3.515 MHz, 4.0 MHz,
7.5 MHz, 12.5 MHz

SEM:OFFS:LIST:FREQ:STOP?
```

3.17.1.3.4 Sweep Time

Allows you to specify the sweep time for the currently selected offset and toggles this function between **Auto** and **Manual** for each offset.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 1.6 s, 1.6 s, 1.6 s, 1.6 s, 1.045 s and ON, ON, ON, ON, ON if Device is Base

1.8 s, 1.8 s, 1.295 s, 1 ms, 1 ms and ON, ON, ON, ON, ON if Device is Mobile

Default Terminator: s (seconds)

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: 1 ms to 4 ks

Remote Command:

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime <time> ... [<time>]` (up to five values)

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime?`

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime:AUTO OFF|ON|0|1`

`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime:AUTO?`

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:
```
SEM:OFFS:LIST:SWE:AUTO 0
SEM:OFFS:LIST:SWE:AUTO?
SEM:OFFS:LIST:SWE 1 ms, 1 ms, 50 ms, 1 s
SEM:OFFS:LIST:SWE?
```

3.17.1.3.5 Res BW

Allows you to specify the resolution bandwidth used in measuring the offset pair and toggles this function between **Auto** and **Manual** for each offset. When set to Man, the range of settings is the range of available Res BWs of the analyzer, except the maximum is further limited to not exceed (Stop Freq - Start Freq). en using the front panel, only the currently selected offset is affected. All the offsets are affected when using the remote command.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 51 kHz and OFF, OFF, OFF, OFF, OFF if Device is Base

30 kHz, 30 kHz, 51 kHz, 1 MHz, 1 MHz and OFF, OFF, OFF, ON, ON if Device is Mobile

Default Terminator: Hz

Knob Increment: Span ÷ 50

Step Key Increment: If **CF Step** (Auto) is selected: span/10
If **CF Step** (Man) is selected: CF Step

Range: Resolution bandwidth range of your analyzer.

Remote Command:

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]
<freq>...[<freq>] (up to five values)
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]?
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO
OFF|ON|0|1
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO?
```

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (1).

You may only enter valid Res BW filter frequencies.

This parameter must adhere to the rule (N x Res BW) <= (Stop freq of the offset - Start freq of the offset), where N is the multiplier. If the multiplier is changed, the Res BW will be changed to ensure this.

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:

```
SEM:OFFS2:LIST:BAND 1 MHz, 1 MHz, 1 MHz, 5 MHz
```

```
SEM:OFFS2:LIST:BAND?
```

```
SEM:OFFS2:LIST:BAND:AUTO 0, 0, 0, 0, 0
```

```
SEM:OFFS2:LIST:BAND:AUTO?
```

3.17.1.3.6 Meas BW

Allows you to specify the bandwidth to use when measuring the offset. When using the front panel, only the currently selected offset is affected. All the offsets are affected when using the remote command. This is the multiplier applied to the resolution bandwidth to determine the bandwidth to integrate when calculating the power.

Key Path: **Meas Setup**, **Offset/Limits**

Key Notes: When setting Meas BW > 1, dynamic range is increased, however measurement time is also increased since an increased number of sweep

points are required to make the measurement. For Meas BW > 1, consider this equation for trace points:

Trace points = (Offset Stop Freq - Offset Start Freq)/ (Meas BW/100)

When Meas BW = 1, the number of trace points are set at the value specified upon entering the measurement.

Dependencies/ Couplings: This parameter must adhere to the rule: (N x Res BW) ≤ (Stop Freq of the offset - Start freq of the offset), where N is Meas BW value. If the Res BW is changed, Meas BW will change to ensure this rule.

n/a

State Saved: Saved in instrument state.

Factory Preset: 1, 1, 1, 1, 20 if Device is Base

1, 1, 20, 1, 1 if Device is Mobile

Default Terminator: x Res BW

Knob Increment: 1

Step Key Increment: 1

Range: 1 to 1000

Remote Command:

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth:IMULti <integer>
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth:IMULti?
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO
OFF|ON|0|1
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO?
```

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (1).

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example: `SEM:OFFS:LIST:BAND:IMUL 40` or `SEM:OFFS:LIST:BWID:IMUL 40`

`SEM:OFFS:LIST:BAND:IMUL?` or `SEM:OFFS:LIST:BWID:IMUL?`

SEM:OFFS:LIST:BAND:AUTO 0 or SEM:OFFS:LIST:BWID:AUTO 0

SEM:OFFS:LIST:BAND:AUTO? or SEM:OFFS:LIST:BWID:AUTO?

3.17.1.3.7 Abs Start

Allows you to enter an absolute level limit at **Start Freq** for the currently selected offset ranging from –200.00 to +50.00 dBm with 0.01 dB resolution.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: –22 dBm, –22 dBm, –36 dBm, –40 dBm, –25 dBm and if Device is Base

0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Mobile

Default Terminator: dBm

Knob Increment: 0.1 dBm

Step Key Increment: 10 dBm

Range: –200 dBm to 50 dBm

Remote Command:

[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:ABSolute <ampl>,...[<ampl>] (up to five values)

[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:ABSolute?

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (OFFSet1).

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.-

Example: SEM:OFFS2:LIST:STAR:ABS –80 dBm, –80 dBm, –80 dBm, –80 dBm, –80 dBm

SEM:OFFS2:LIST:STAR:ABS?

3.17.1.3.8 Abs Stop

Allows you to enter an absolute level limit at **Stop Freq** for the currently selected offset ranging from –200.00 to +50.00 dBm with 0.01 dB resolution, and toggle this function between **Couple** and **Man**. If set to Couple, Abs Stop is coupled to Abs Start to make a flat limit line. If set to Man, you may enter different values for Abs Start and Abs Stop to make

a sloped limit line.

Key Path: **Meas Setup, Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: –22 dBm, –37 dBm, –36 dBm, –40 dBm, –25 dBm and ON, OFF, ON, ON, ON if Device is Base

0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm and ON, ON, ON, ON, ON if Device is Mobile

Default Terminator: dBm

Knob Increment: 0.1 dBm

Step Key Increment: 10 dBm

Range: –200 dBm to 50 dBm

Remote Command:

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute <ampl>,...[<ampl>] (up to five values)
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute?
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute:COUPle OFF|ON|0|1
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute:COUPle?
```

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (OFFSet1).

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:

```
SEM:OFFS2:LIST:STOP:ABS –80 dBm, –80 dBm, –80 dBm, –80 dBm, –80 dBm and ON
```

```
SEM:OFFS2:LIST:STOP:ABS
```

```
SEM:OFFS2:LIST:STOP:ABS:COUP 0, 0, 0, 0, 0
```

```
SEM:OFFS2:LIST:STOP:ABS:COUP?
```

3.17.1.3.9 Rel Start

Allows you to enter a relative level limit at **Start Freq** ranging from –150.00 to +50.00 dBc with 0.01 dB resolution.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 0 dBc, 0 dBc, 0 dBc, 0 dBc, 0 dBc if Device is Base

–35 dBc, –49 dBc, –49 dBc, –49 dBc, –49 dBc if Device is Mobile

Default Terminator: dBc

Knob Increment: 0.1 dBc

Step Key Increment: 10 dBc

Default Terminator: dBc

Range: –200 dBc to 50 dBc

Remote Command:

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:RCARrier <rel_ampl>,...
[<rel_ampl>] (up to five values)
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:RCARrier?
```

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (OFFSet1).

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:
```
SEM:OFFS2:LIST:STAR:RCAR –80 dBc, –80 dBc, –80 dBc, –80 dBc,
–80 dBc

SEM:OFFS2:LIST:STAR:RCAR
```

3.17.1.3.10 Rel Stop

Allows you to enter a relative level limit at **Stop Freq** ranging from –150.00 to +50.00 dBc with 0.01 dB resolution, and to toggle this function between **Couple** and **Man**. If set to Couple, Rel Stop is coupled to Rel Start to make a flat limit line. If set to Man, you may enter different values for Rel Start and Rel Stop to make a sloped limit line.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: 0 dBc, 0 dBc, 0 dBc, 0 dBc, 0 dBc if Device is Base

–49 dBc, –74 dBc, –49 dBc, –49 dBc, –49 dBc if Device is Mobile

Default Terminator: dBc

Range: –200 dBc to 50 dBc

Remote Command:

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier <real number>,[<real number>]...
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier?

[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier:COUPle OFF|ON|0|1
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier:COUPle?
```

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (OFFSet1).

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:

```
SEM:OFFS2:LIST:STOP:AR –80 dBc, –80 dBc, –80 dBc, –80 dBc, –80 dBc
SEM:OFFS2:LIST:STOP:RCAR

SEM:OFFS2:LIST:STOP:RCAR:COUP 0, 0, 0, 0, 0
SEM:OFFS2:LIST:STOP:RCAR:COUP?
```

3.17.1.3.11 Fail Mask

When you press **Mask Fail** a menu is displayed with **Absolute**, **Relative**, **Abs AND Rel**, and **Abs OR Rel** keys. This menu allows you to select one of the logic keys for determining the conditions for which the measurement fails

Absolute - Fail is shown if one of the absolute spectrum emission mask measurement results is larger than the limit between **Abs Start** and **Abs Stop**, inclusive. This is the default selection for each offset for BTS measurements.

Relative - Fail is shown if one of the relative spectrum emission mask measurement results is larger than the limit between **Rel Start** and **Rel Stop**, inclusive.

Abs AND Rel - Fail is shown if one of the absolute spectrum emission mask measurement results is larger than the limit between **Abs Start** and **Abs Stop, inclusive** AND one of the relative spectrum emission mask measurement results is larger than the limit for **Rel Start** and **Rel Stop**. This is the default for MS measurements.

Abs OR Rel - Fail is shown if one of the absolute spectrum emission mask measurement

results is larger than the limit between **Abs Start** and **Abs Stop**, inclusive OR one of the relative spectrum emission mask measurement results is larger than the limit for **Rel Start** and **Rel Stop**.

Key Path: **Meas Setup**, **Offset/Limits**

State Saved: Saved in instrument state.

Factory Preset: ABS, ABS, ABS, ABS, ABS if Device is Base

AND, AND, AND, AND, AND if Device is Mobile

Remote Command:

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:TEST
ABSolute|AND|OR|RELative,ABSolute|AND|OR|RELative,ABSolute|AND|OR|RELative
,ABSolute|AND|OR|RELative
```

```
[:SENSe]:SEMask:OFFSet[1]|2:LIST:TEST?
```

Remote Command Notes: Comma separated list of up to 5 values. OFFSet1 for BTS and OFFSet2 for MS. Default is BTS (OFFSet1).

When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted. For example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

Example:
```
SEM:OFFS2:LIST:TEST ABS, REL, Abs, AND, OR REL
SEM:OFFS2:LIST:TEST?
```

3.17.2 AMPLITUDE / Y Scale (Spectrum Emissions Mask—SEM)

Activates the Reference Level function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and corrected, and control instrument settings that affect the vertical axis.

3.17.2.1 Scale/Div]

Sets the logarithmic units per vertical graticule division on the display.

Key Path: **AMPLITUDE / Y Scale**

State Saved: Saved in Instrument State

Factory Preset: 10 dB

Terminators: dB

Default Terminator: dB

Range: 0.1 dB to 20 dB

Remote Command:

`:DISPlay:SEMask:WINDow:TRACe:Y:[SCALe]:PDIVision <rel_power>`

`:DISPlay:SEMask:WINDow:TRACe:Y:[SCALe]:PDIVision?`

Example: `DISP:SEM:WIND:TRAC:Y:PDIV 0.5 DB`

3.17.2.2 Ref Level

Allows you to adjust the absolute amplitude represented by the top graticule line on the display (the reference level). `Ref` in the upper left corner of the display, indicates the current value. To change the reference level, use the front-panel step keys, knob, or numeric keypad.

Key Path: **AMPLITUDE / Y Scale**

Dependencies/ Couplings: If you reduce the Input Atten setting, the analyzer may have to lower the Reference Level to maintain the proper level at the top of the screen. If you then increase Input Atten, the Reference Level does *not* increase to its previous value.

State Saved: Saved in Instrument State

Factory Preset: 10 dBm

Range: 0.01 dBm to 20 dBm

Remote Command:

`:DISPlay:SEMask:WINDow:TRACe:Y:[SCALe]:RLEVel <power>`

`:DISPlay:SEMask:WINDow:TRACe:Y:[SCALe]:RLEVel?`

Example: `DISP:SEM:WIND:TRAC:Y:RLEV 20 dbm`

3.17.3 Marker (Spectrum Emissions Mask—SEM)

Displays the Marker control menu for the SEM measurement. If no markers are active, **Marker** selects marker 1, sets it to **Normal** and places it to the right of the display. There are two control modes for the markers:

- **Normal (`POSition`) -** A single marker that can be moved to any point on the trace.
- **Delta -** Turns on a second marker and readouts the level difference between the marker pair.
- **Off (`Off`) -** Turns off the active marker or marker pair.

Key Path: Front-panel key

State Saved: The control mode for each marker, as well as the position of each marker, is

saved in instrument state.

Factory Preset: All Off.

Remote Command:

There is no equivalent remote command.

`:CALCulate:SEMask:MARKer[1]|2|3|4:STATe OFF|ON|0|1`

`:CALCulate:SEMask:MARKer[1]|2|3|4:STATe?`

`:CALCulate:SEMask:MARKer[1]|2|3|4:MODE POSition|DELTa|OFF`

`:CALCulate:SEMask:MARKer[1]|2|3|4:MODE?`

The following commands do not have an equivalent menu key:

`:CALCulate:SEMask:MARKer[1]|2|3|4:X <number>`

`:CALCulate:SEMask:MARKer[1]|2|3|4:X?`

Factory Preset: 1 GHz

Terminators: Hz, kHz, MHz, GHz

Default Terminator: GHz

Range: 100 Hz to 27 GHz

`:CALCulate:SEMask:MARKer[1]|2|3|4:Y:POSition?`

Remote Command Notes:

`CALC:SEM:MARK[1]|2|3|4:X` sets the marker X position to a specified point on the x-axis in the current X-axis unit (frequency or time). If the frequency or time chosen would place the marker off screen, the marker will be placed at the left or right side of the display, on the trace. The marker must already be ON.

`CALC:SEM:MARK[1]|2|3|4:Y:POS?` returns the marker Y value or delta value in the current y-axis unit.

Example: `CALC:SEM:MARK2:X 20 GHZ` selects marker 2 and moves it to 20 GHz.

`CALC:SEM:MARK2:X?` returns the marker 2 X position in Hz.

`CALC:SEM:MARK2:Y:POS?` returns the marker 2 Y value or delta value.

3.17.3.1 Select Marker

Selects one of the four possible markers. Once a marker is selected, it can be set to any of the control modes **Normal**, **Delta**, or **Off**.

Key Path: **Marker**

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

Factory Preset: Marker 1

Remote Command:

See "Select Marker" on page 216 for the mode command.

Remote Command Notes: Sets or queries the state of a marker. Setting a marker to state ON or 1 selects that marker. Setting a marker which is OFF to state ON or 1 puts it in **Normal** mode and places it on the screen to the right of the displayed measurement graph. Setting a marker to state OFF or 0 selects that marker and turns it off. The response to the query will be 0 if OFF, 1 if ON.

Example: `CALC:SEM:MARK2:STAT ON` selects marker 2.

`CALC:SEM:MARK:STAT ON` will not modify a marker that is already on.

3.17.3.2 Normal

Sets the control mode for the selected marker to **Normal**. If the marker is off, a single marker is activated and placed on the screen to the right of the measurement graph. You can then adjust the trace point of the marker using the knob, numeric keypad, or ⇑ ⇓ keys.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Select Marker" on page 216 for the mode command.

Example: `CALC:SEM:MARK2:MODE POS` selects marker 2 and sets it to Normal.

3.17.3.3 Delta

Sets the control mode for the selected marker to **Delta** and turns on a second, sequentially numbered marker as the reference marker. The newly activated reference marker is placed on the screen to the right of the measurement graph (the delta of 0 dB) is displayed. The control mode of the second marker is set to Normal. If marker 4 is set to **Delta**, the second marker turned on as the reference marker will be marker 1. You can adjust the position of either marker by selecting the marker and using the knob, numeric keypad, or ⇑ ⇓ keys.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Select Marker" on page 216 for the mode command.

Example: `CALC:SEM:MARK2:MODE DELT` selects marker 2, sets it to Delta, turns on marker 3 (if not already active) as the reference marker, and sets marker 3 to normal.

3.17.3.4 Off

Turns off the selected marker. In addition, **Off** also turns off functions related to the selected marker.

Key Path: **Marker**

Factory Preset: Off

Remote Command:

See "Select Marker" on page 216 for the command to select the control mode.

Example: `CALC:SEM:MARK3:MODE OFF` selects marker 3 and sets it to **Off**.

3.17.3.5 Marker All Off

Turns off all markers, including markers used for signal track.

Key Path: **Marker**

Remote Command:

`:CALCulate:SEMask:MARKer[1]|2|3|4:AOFF`

Example: `CALC:SEM:MARK:AOFF` turns off all markers.

3.17.4 Trace/View (Spectrum Emission Mask—SEM)

If **Spectrum Emission Mask** has been selected in the **Measure** menu, this key displays the appropriate **Trace/View** menu for the spectrum emission mask (SEM).

Displays menu keys that enable you to set how trace information is stored and displayed.

Key Path: Front-panel key

Remote Command:

There is no remote command for this function.

3.17.4.1 Abs Pwr & Freq

Press **Abs Pwr & Freq** to view the measurement results of Spectrum (Ref: Total Pwr) measurements in the graph window as absolute peak power and frequency. The absolute peak power levels, in dBm and those corresponding offset frequency ranges on both sides of the reference channel are displayed in the text window.

Key Path: **Trace/View**

Saved State: Saved in instrument state.

Factory Preset: On

Remote Command:

There is no remote command for this function.

3.17.4.2 Rel Pwr & Freq

Press **Rel Pwr & Freq** to view the measurement results of Spectrum (Ref: Total Pwr) measurements in the graph window as power relative to the carrier power and frequency. The relative power levels in dBc and those corresponding offset frequency ranges on both sides of the reference channel are displayed in the text window.

Key Path: **Trace/View**

Saved State: Saved in instrument state.

Remote Command:

There is no remote command for this function.

3.17.4.3 Integrated Power

Press **Integrated Power** to view the measurement results of Spectrum (Ref: Total Pwr) measurements in the graph window as integrated absolute and relative peak power and frequency. The absolute and relative peak power levels integrated throughout the bandwidths between the start and stop frequencies and those corresponding offset frequency ranges on both sides of the reference channel are displayed in the text window.

Key Path: **Trace/View**

Saved State: Saved in instrument state.

Remote Command:

There is no remote command for this function.

4 Concepts

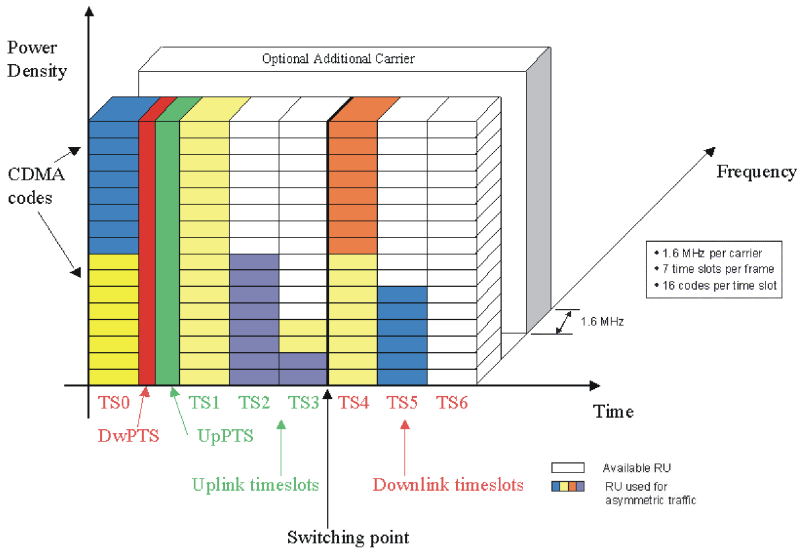
This chapter provides overall information on the TD-SCDMA communications system and describes TD-SCDMA measurements made by the analyzer. For further information, a list of associated documents is also provided.

What Is the TD-SCDMA Communications System?

TD-SCDMA (Time Division-Synchronous Code Division Multiple Access) is a mobile radio format developed by the China Academy of Telecommunication and Technology (CATT). TD-SCDMA combines a TDMA component with a CDMA component to provide an efficient use of resources and dynamically adapt to both symmetric and asymmetric traffic loads. There are seven time slots (numbered 0 through 6) in a single 5 ms long frame, and within each time slot there are up to 16 code channels that are available to allocate to a single user or to distribute among multiple users. Time division duplexing is used to separate uplink and downlink periods in a given time frame. Therefore, a Resource Unit (RU) is defined by a frequency, time slot, and code channel with spreading factor. The basic resource unit uses a spreading factor of 16. In TD-SCDMA, the chip rate is 1.28 Mcps and each carrier signal occupies 1.6 MHz bandwidth.

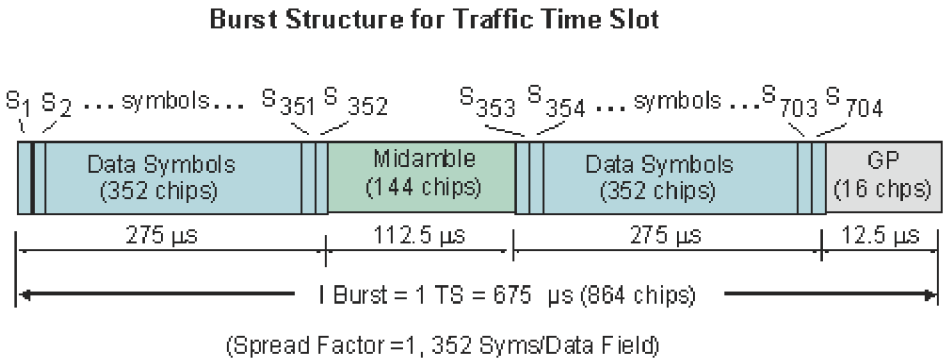
The first time slot in a frame, time slot 0, is always allocated to downlink traffic. Also included in each 5 ms frame are two additional time slots, the downlink pilot timeslot (DwPTS) and the uplink pilot timeslot (UpPTS), which are separated by a 75 µs guard period. The DwPTS and UpPTS are separated from the traffic time-slot 0 by a switching point. The next time slots, beginning with time slot 1, are allocated to uplink traffic, until the second switching point in the frame occurs, at which point traffic time slots switch from uplink to downlink traffic slots. TD-SCDMA adapts to symmetric and asymmetric traffic loads by adjusting the number of downlink and uplink time slots per frame.

Figure 4-1 **TD-SCDMA Resource Unit Structure**



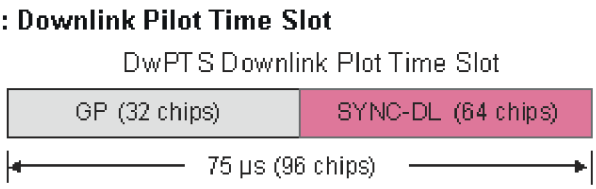
In TD-SCDMA, a traffic time slot burst consists of two data symbol fields, a midamble field, and a guard period. Each traffic burst is 675 µs in length, including the 12.5 µs long guard period at the end of the burst, which is used to avoid time slot multi-path interference. The midamble is used as a training sequence for channel estimation, power measurements, and synchronization.

Figure 4-2 Burst Structure for Traffic Time Slot



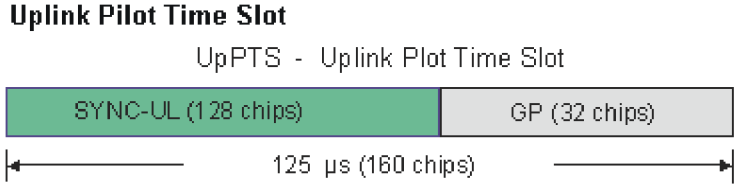
The downlink pilot time slot is used for downlink synchronization and cell initial search. There are 32 different downlink synchronization codes used to distinguish base stations. The DwPTS is 75 µs long.

Figure 4-3 Downlink Pilot Time Slot



The uplink pilot timeslot is used for initial synchronization, random access, and adjacent cell handoff measurements. There are 256 synchronization codes, which can be divided into 32 groups of 8 codes. The base station receives initial beam forming parameters from this signal. This time slot is 125 µs long.

Figure 4-4 Uplink Pilot Time Slot



TD-SCDMA benefits from several key technological features that enable its efficiency in handling symmetric and asymmetric traffic loads and optimize system performance and capacity. These include the following:

Smart antennas permit cell sectorization through the use of multiple, dynamic, focused base station antenna beam patterns. These multiple-element antenna arrays receive and transmit signals to specific areas within a cell, in order to target specific mobile users individually and simultaneously. They also enable the base station to track the user as it moves within a cell. Additionally, smart antennas help minimize multiple access interference, and increase the capacity of the TD-SCDMA network.

Joint detection is used to combat multiple access interference and increase system capacity. Efficient implementation of joint detection is made possible through the limited use of CDMA codes per timeslot (a maximum of 16), thus avoiding the high computational complexity of joint detection as implemented in other systems. The capacity improvement through the use of joint detection is enhanced by the synchronization of nodes in the network.

Synchronization also reduces the search time for handover searching and reduces the time for position location calculations. It enables the use of hard handoffs instead of soft handoffs, thus reducing system overhead.

Optimal utilization of spectrum is achieved through the use of unpaired frequency bands. Assigning separate frequency bands for uplink and downlink signals is inefficient for use with applications that have asymmetric traffic loads. Applications that have a heavy downlink requirement do not efficiently use frequency bands allocated to uplink signals. TD-SCDMA uses the same frequency band for both uplink and downlink, and can dynamically allocate resources for either uplink or downlink as needed.

Transmit Power Measurement Concepts

Purpose

Transmit Power is the measure of in-channel power for TD-SCDMA systems. Mobile stations and base transceiver stations must transmit enough power, with sufficient modulation accuracy, to maintain a call of acceptable quality without leaking into frequency channels or timeslots allocated for others. TD-SCDMA systems use dynamic power control to ensure that each link is maintained with minimum power. This gives two fundamental benefits: overall system interference is kept to a minimum and, in the case of mobile stations, battery life is maximized.

The Transmit Power measurement determines the average power for an RF signal burst at or above a specified threshold value. The threshold value may be absolute, or relative to the peak value of the signal.

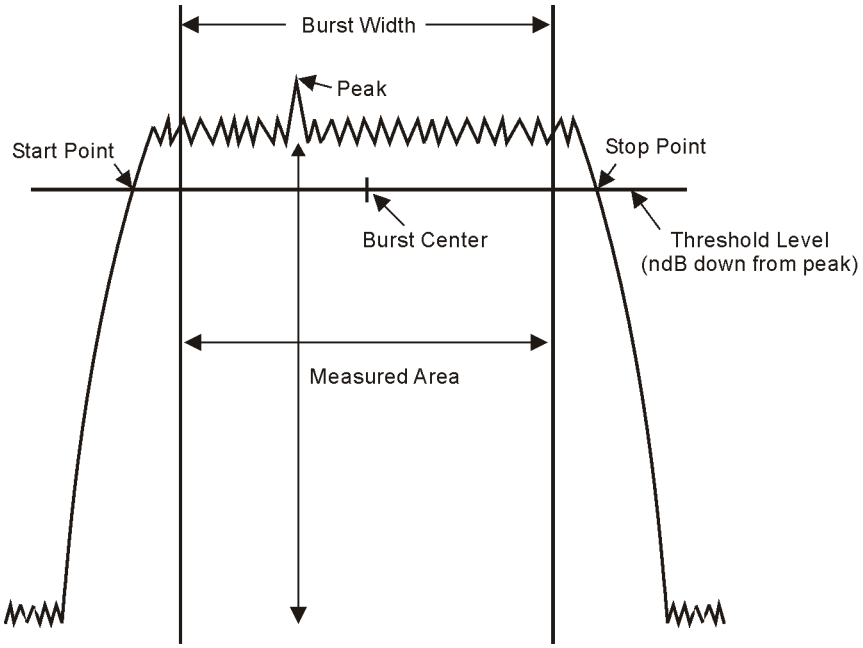
At the base transceiver station, the purpose of the Transmit Power measurement is to determine the power delivered to the antenna system on the radio-frequency channel under test. The Transmit Power measurement verifies the accuracy of the mean transmitted RF carrier power. This can be done across the frequency range and at each power step.

Measurement Method

The instrument acquires a TD-SCDMA signal in the time domain. The average power level above the threshold is then computed and displayed. This measurement uses the “power-above-threshold” method instead of the “useful part of the burst” method defined in the TD-SCDMA standards. The measured Transmit Carrier Power will be very nearly the same for these two methods. The power-above-threshold method has the advantages of being faster and allows power measurements to be made at somewhat lower power levels. It also has the advantage of not requiring the carrier to have a valid TSC (Training Sequence Code).

Note that this measurement does not provide a way to specify which timeslot is to be measured. Therefore if multiple timeslots are on, they should all be set at the same power level, or the levels of those timeslots to be excluded need to be kept below the threshold level. If you want to measure Transmit Carrier Power using the TD-SCDMA specified useful part of the burst method, use the Power vs. Time measurement, which also measures the power ramping of the burst.

The transmit power measurement is an accurate method of determining the average power for the specified burst. The analyzer is set into zero-span mode, with a sweep time that captures at least one burst.



The transmit power measurement acquires data from the “Measured Area” above when a radio standard is chosen and when **Meas Setup**, **Meas Method**, **Measured Burst Width** is selected. When **Meas Setup**, **Meas Method**, **Above Threshold Lvl** is selected, the “Measured Area” extends the burst width delimiter lines to the start and stop points.

The mean carrier power is calculated by:

1. converting each trace point amplitude from dBm into linear power
2. Adding the above amplitudes together and dividing by the number of points included in the average.
3. This value is then displayed in logarithmic form (dBm).

$$(P_{avg}) = 10\log 10\left\{\frac{\left(\sum_{n}^{m}\left(10^{\frac{p}{10}}\right)\right)}{m-n}\right\}$$

where P_{avg} = average power, n is the start trace point, m = the stop trace point, and p = the trace point amplitude power in dBm.

NOTE

The analyzer defaults to zero-span mode and the sweep time is set to capture at least one burst. The sweep time can be changed by pressing **Meas Setup**, **Meas Time**.

Pressing **Meas Setup** after **Transmit Power** has been selected displays the transmit power measurement setup menu. Pressing **Meas Control** after **Transmit Power** has been selected displays the transmit power control menu, where you can pause or restart a measurement, or toggle between continuous and single measurement.

Power Versus Time Measurement Concepts

Purpose

The Power vs. Time (PvT) measurement analyzes the amplitude profile and timing of the burst signal and provides a time mask for the signal. It measures the mean transmit power during the “useful part” of TD-SCDMA bursts and verifies that the power ramp fits within the defined mask.

TD-SCDMA is a Time Division Multiple Access (TDMA) scheme with seven time slots, or bursts, per RF channel. If the burst does not occur at exactly the right time, or if the burst is irregular, then other adjacent timeslots can experience interference. Because of this, the industry standards specify a tight mask for the fit of the TD-SCDMA burst. The measurement allows adjustment of Meas Time to capture from 1 to 9 timeslots (up to one complete subframe).

This measurement supports the three types of TD-SCDMA timeslots Traffic, Uplink Pilot, and Downlink Pilot.

The Power vs. Time measurement provides masks for both BTS (Base Transceiver Station) and MS (mobile station).

Measurement Method

The instrument acquires a TD-SCDMA signal by capturing two time records for each Power vs Time measurement using a 2 MHz RBW.

The first time record capture is made with the internal preamp (Option 1DS) enabled and with internal attenuation set to off to support the required Base Station transmit off level of –82 dBm.

The second time capture is made using the user defined settings of internal preamp (Option 1DS) and internal attenuation as defined under the Input/Output menu to ensure accurate measurement of the burst transmit on power level. The data from the two sweeps will be combined to create one trace. This combined trace is displayed (with the limit mask, if it has not been turned off) and is used to calculate results data.

This two sweep method allows the measurement to reach the high dynamic range requirement of greater than 112 dB for the Transmit ON/OFF Time Mask defined by the TD-SCDMA Specs for Base Station when measuring a maximum input signal power of +30 dBm.

CAUTION It is imperative that there be no more than +35 dBm present at the analyzer input, in order to prevent damage to the internal attenuator.

NOTE

- PvT requires Option 1DS (Preamplifier Option). The measurement will still work without this option present, but you will not be able to reach the dynamic range required by the TD-SCDMA specifications.
- PvT is set in the single sweep mode. Because of the switching of the Preamp state from on to off, making PvT measurements in the continuous sweep mode is not recommended.
- PvT will only support the measurement of Base Stations with a Maximum Power of 30 dBm. The following Base Station Power Ranges are not be supported:

  — BS maximum output power P 43 dBm
  — BS maximum output power 39 P < 43 dBm
  — BS maximum output power 31 P < 39 dBm.

Adjacent Channel Power (ACP) Measurement Concepts

Purpose

Adjacent Channel Power (ACP) is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

As a composite measurement of out-of-channel emissions, ACP combines both in-band and out-of-band specifications to provide useful figures-of-merit for spectral regrowth and emissions produced by components and circuit blocks without the rigor of performing a full spectrum emissions mask measurement.

To maintain a quality call by avoiding channel interference, it is important to measure and reduce any adjacent channel leakage power transmitted from a mobile phone. The characteristics of adjacent channel leakage power are mainly determined by the transmitter design, particularly the low-pass filter.

Measurement Method

This ACP measurement analyzes the total power levels within the defined carrier bandwidth and at given frequency offsets on both sides of the carrier frequency. This measurement requires the user to specify measurement bandwidths of the carrier channel and each of the offset frequency pairs up to 6. Each pair may be defined with unique measurement bandwidths.

It uses an integration bandwidth (IBW) method that performs a swept trace data acquisition in the frequency domain. In this process, the channel integration bandwidth is analyzed using the automatically defined resolution bandwidth (RBW), which is much narrower than the channel bandwidth. The measurement computes an average power of the carrier channel and each of the offset channels, automatically compensating for resolution bandwidth and noise bandwidth.

If **Total Pwr Ref** is selected as the measurement type, the results are displayed as relative power in dBc and as absolute power in dBm. If **PSD Ref** (Power Spectral Density Reference) is selected, the results are displayed as relative power in dB, and as absolute power in dBm/Hz.

Multi-carrier Power Measurement Concepts

Purpose

This measurement is for adjusting multi-carrier power amplifiers to transmit well balanced multiple carriers. In this measurement, two carrier inputs are required to make measurements of the in-channel and out-of-channel powers. Up to 12 carrier inputs can be measured. If a power amplifier accepts multiple carriers, the intermodulation products caused by these carriers will act to decrease the performance of the amplifier.

Measurement Method

Multi-carrier Power is a measure of the power in two or more transmit channels and of the power that leaks into their adjacent transmit channels. The results reported are identical to the adjacent channel power measurement, but the setup is different to allow for two or more carriers present.

When you choose the MCP measurement from the Measurement menu, the center frequency of the analyzer is maintained. If you have set Ref Freq Mode to auto, the slot with the highest power will be used as the reference. However, you also may enter a value for Ref Freq, and this will set the Ref Freq Mode to man. To ensure that the carriers are always centered on the screen, the following algorithm is used to calculate the Ref Freq:

CtrFreq = Ref Freq + (((0.5*Carriers) – Ref Carrier Pos + 0.5) * Carrier Span)

This algorithm is identical to the algorithm used for the ACP measurement, except the appropriate number of carriers will be included in the sequence of bursts measured before the spectrum view is constructed.

If the RRC filter is turned on, this will be noted in the results area. All carriers and offsets will have the filter mathematically applied before the power results are reported. The value (rolloff) for the filter will be set to the value of the Filter Alpha parameter and T will be 1/Integ BW (where the default Integration BW parameters are set to 1.28 MHz, equal to the chip rate).

There is no change in algorithm when the view is changed to either Spectrum or Combined.

Results

The results shown in the results view are described below.

Result	Units	Min	Max
Total Carrier Power	dBm	-200	200
Ref Carrier Power	dBm	-200	200
Carrier Power (Carrier Pwr Present set to Yes | No)	dBm | dB	-200	200
Offset Relative Power	dB	-200	200
Offset Absolute Power	dBm	-200	200

Total Carrier Power result gives the total power in all the carriers with carrier power present set to yes. The power is calculated by integrating across the bandwidth declared by the Carrier IntegBW parameter for each carrier then totalling. The total integration bandwidth is shown as part of the result. This will be the total of the Carrier Integ BW parameters of the carriers used in calculating the total carrier power.

Ref Carrier Power result gives the power in the reference carrier. The power is calculated by integrating across the multi-carrier power bandwidth declared by the Carrier IntegBW parameter for that carrier. The integration bandwidth is shown as part of the result.

On the graph display the carrier representing the reference carrier will be identified using white. In Spectrum view the vertical lines used to identify the carrier will be white and in combined view the width arrow will be white.

Carrier Power result is the power in all the currently defined carriers. If the carrier has carrier power present the power will be absolute. If it is defined as not having power present the power will be relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier IntegBW parameter. The integration bandwidth is shown as part of the result. As there may be more results than can be easily viewed on the display a scrollable list is used to display the results. The currently selected Carrier Result will be displayed on the last line of the carrier power result list unless:

- the selected Carrier Result is 4 or less in normal multi-carrier power results view. In this case the first 4 carrier power results will be displayed.
- the selected Carrier Result is 9 or greater in normal multi-carrier power results view. In this case the last 4 carrier power results will be displayed.
- the zoom mode is selected. In this case all carrier power ranges can

be displayed.

On the graph display, the carrier(s) representing the carriers with power present (with the exception of the reference carrier) are identified using red. The carrier(s) representing carriers with no power present are identified using pale blue. In the Spectrum view, the vertical lines used to identify the carrier(s) with power present are red and the vertical lines used to identify the carrier(s) with no power present are pale blue. In combined view, the width arrow for carrier(s) with power present are red and the width arrow for carrier(s) with no power present are pale blue.

Offset Relative Power result gives the power in the offsets relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Offset IntegBW parameter. The offset integration bandwidth is shown as part of the result.

On the graph display, the offsets A, B and C are identified using yellow, blue and purple respectively. In the Spectrum view, the appropriate color is applied to the vertical lines to identify the offset.

Offset Absolute Power result gives the absolute power in the offsets. The power is calculated by integrating across the bandwidth declared by the Offset IntegBW parameter. The offset integration bandwidth is shown as part of the result. On the graph display, the offset A, B and C are identified using yellow, blue and purple respectively. In the Spectrum view, the appropriate color is applied to the vertical lines to identify the offset.

Spurious Emissions Measurement Concepts

Purpose

This measurement identifies and determines the (absolute) power level of spurious emissions in certain frequency bands. This energy may cause interference for other users of the TD-SCDMA system. You may use the range table to specify the parameters of the ranges to be swept.

Making the Measurement

NOTE The factory default settings provide a measurement that complies with pre-established standards for TD-SCDMA. For special requirements, you may need to change some of the settings. To return all parameters for the current measurement to their default settings press **Meas Setup**, **More**, **Restore Meas Defaults** at any time.

The Spurious Emissions measurement begins executing when the **Spurious Emissions** menu key in the Measure menu is pressed. The measurement sets up the analyzer using the data from the first active range. If no ranges are active, the “No ranges are defined” message is displayed and the measurement is put in the idle state. Once the measurement is started you can edit the current table or load the table with new data using the File System (i. e., ISTATE save/recall).

The state machine cycles through each active range table entry one at a time averaging to N as necessary. This test uses the multiple setpoint state machine model. Once all set points are measured the completion behavior is determined by the Meas Type and Measure settings. This is shown in the table under the description for the Meas Type parameter late in this chapter.

For each range that you specify and activate, the analyzer scans the band using the specified Res BW, Video BW, Span and Sweep Time settings. As each band is swept, any signal which is above the Peak Threshold value and has a peak excursion of greater than the Peak Excursion value will be added to a list of spurs displayed in the lower (data) results window. A total of 200 spurs can be recorded for one measurement, with a limit of 10 spurs per frequency range.

Those spurs in the list with a peak amplitude greater than the Absolute Limit for that range will be logged as a measurement failure and indicated by a red ‘F’ in the ‘Amplitude’ column of the table.

The China Wireless Telecommunication Standard document CWTS TSM 05.05 V3.1 requires different default measurement ranges for mobile devices (UE or MS) and base stations (BTS). The spurious emissions measurement takes these differences into account, according

to the Device parameter value you enter under the **Mode Setup**, **Radio** menu.

When the radio device is set to Mobile (MS), the measurement will not report any spurs that are within 4 MHz of the expected MS carrier frequency that you enter as the Center Freq value on the frequency menu. When the radio device is set to Base (BTS),", the measurement will not report any spurs for the spectrum 4 MHz below the beginning of the transmission band nor the spectrum 4 MHz above the end of the transmission band. The beginning and ending of the transmission band are set by you using the Tx Band Start and Tx Band Stop menu keys (or SCPI commands). Any spectrum falling within either "skipped' spectrum will indeed not be swept so that an optimal reference level can be used.

Specrtum Emissions Mask (SEM) Measurement Concepts

Purpose

The Spectrum Emission Mask measurement includes the in-band and out-of-band spurious emissions. As it applies to TD-SCDMA, this is the power contained in a specified frequency bandwidth at certain offsets relative to the total carrier power.

This spectrum emission mask measurement is a composite measurement of out-of-channel emissions, combining both in-band and out-of-band specifications. It provides useful figures-of-merit for the spectral regrowth and emissions produced by components and circuit blocks, without the rigor of performing a full spectrum emissions mask measurement.

Measurement Method

The spectrum emission mask measurement measures spurious signal levels in up to five pairs of offset/region frequencies and relates them to the carrier power. The reference channel integration bandwidth method is used to measure the carrier channel power and offset/region powers. Spectrum emission mask measurements are made, relative to the carrier channel frequency bandwidth.

This integration bandwidth method is used to perform a data acquisition. In this process, the reference channel integration bandwidth (Meas BW) is analyzed using the automatically defined resolution bandwidth (Res BW), which is much narrower than the channel bandwidth. The measurement computes an average power of the channel or offset/region over a specified number of data acquisitions, automatically compensating for resolution bandwidth and noise bandwidth.

This measurement requires you to specify the measurement bandwidths of carrier channel and each of the offset/region frequency pairs up to 5. You may define each pair with unique measurement bandwidths. The results are displayed either as relative power (to the measured output power of the signal) in dBc, or as absolute power in dBm. In addition to the reference power a “Total Pwr” result is displayed at the top of the trace window. This value is a duplicate of the top left hand value in the results window. This allows you to zoom into this trace window and have all the relevant results, while adjusting your DUT power parameters.

Other Sources of Measurement Information

Additional measurement application information is available through your local Agilent Technologies sales and service office. The following application notes treat digital communications measurements in much greater detail than discussed in this measurement guide.

- Application Note 1298

  Digital Modulation in Communications Systems - An Introduction
  Agilent part number 5965-7160E

- Application Note 1311

  Understanding CDMA Measurements for Base Stations and Their Components
  Agilent part number 5968-0953E

- Application Note 1355

  Designing and Testing TD-SCDMA User Equipment
  Agilent part number 5980-1239E

- Application Note 1356

  Designing and Testing 3GPP TD-SCDMA Base Stations
  Agilent part number 5980-1238E

- Application Note

  Characterizing Digitally Modulated Signals with CCDF Curves
  Agilent part number 5968-5858E

Instrument Updates at www.agilent.com

These web locations can be used to access the latest information about the instrument, including the latest firmware version.

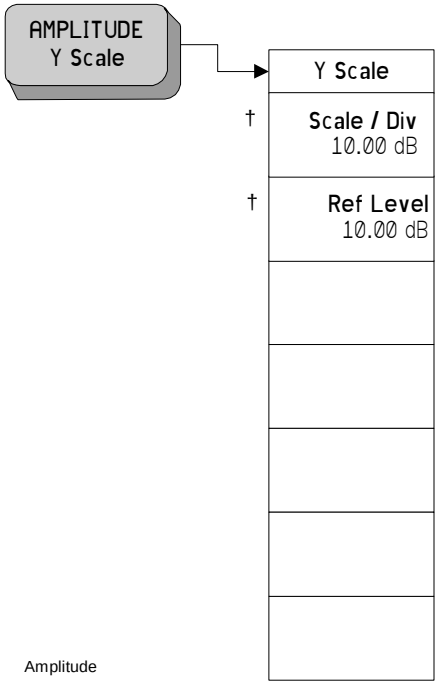
http://www.agilent.com/find/vsa

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

5 Menu Maps

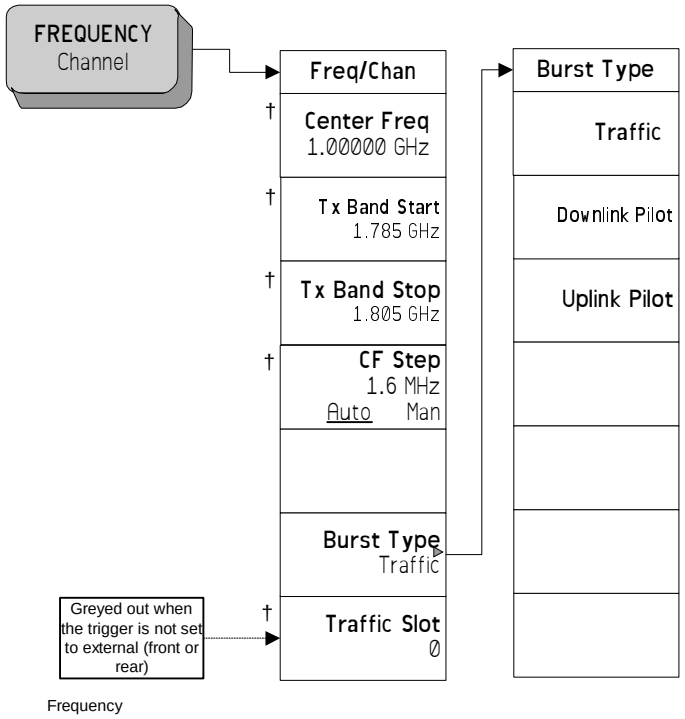
These menu maps are in alphabetical order by the front-panel key label or oval cross-reference label. You can locate detailed information about each key/function at the page number listed in the figure title for each menu.

5.1 Amplitude Y Scale Key (See page 70)



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

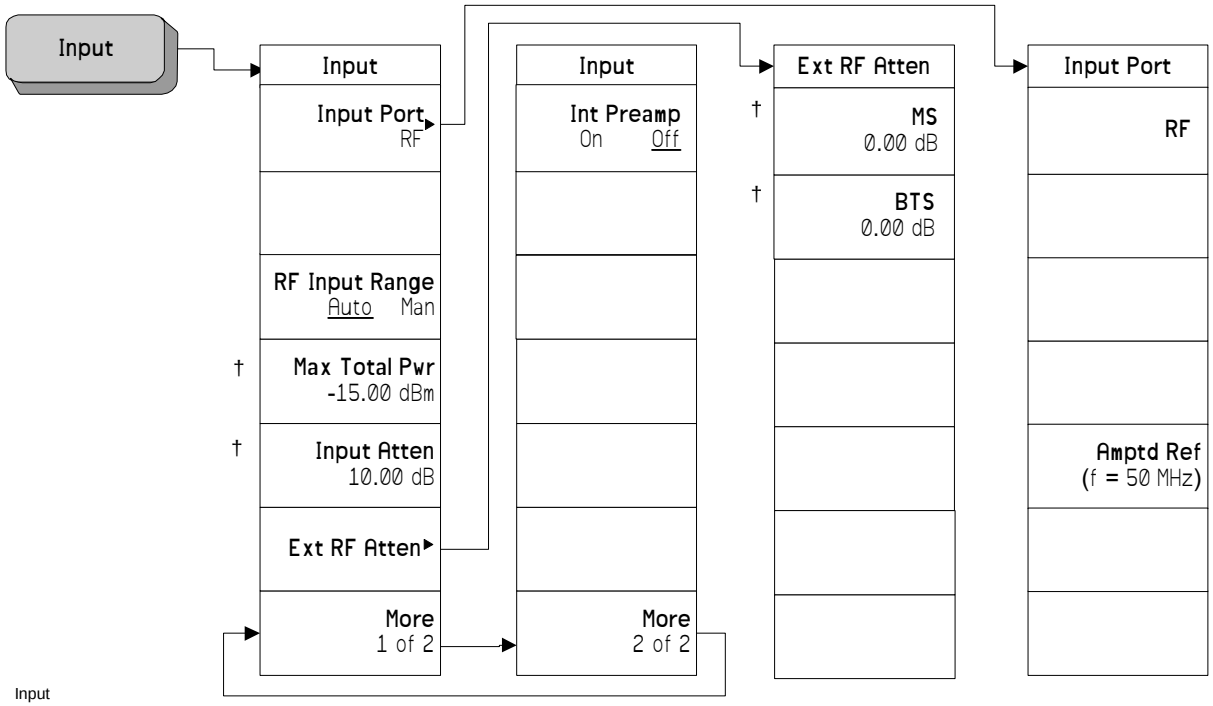
5.2 Frequency Channel Key (See page 72)



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

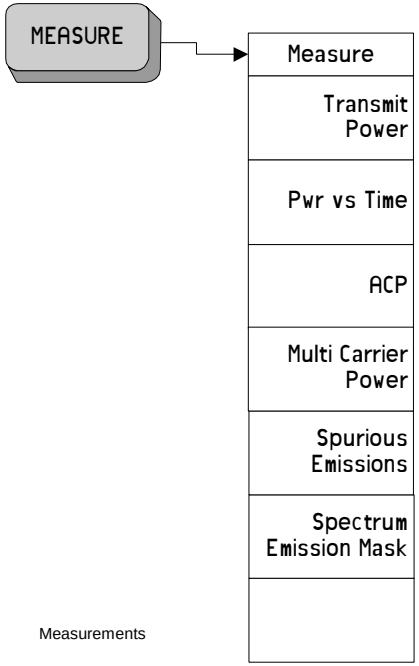
Menu Maps

5.3 Input/Output Key (See page 77)



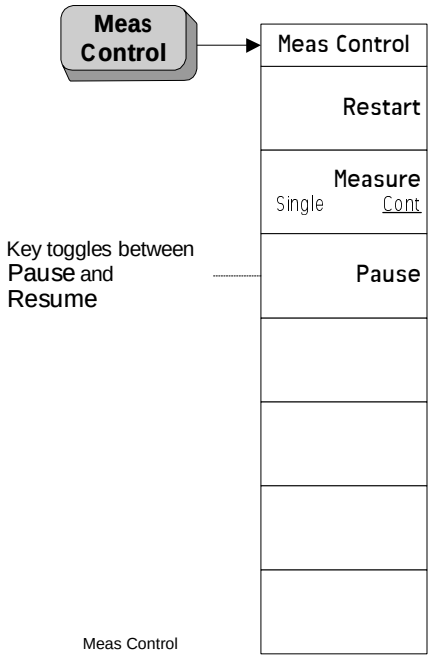
† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.4 MEASURE Key (See page 84)



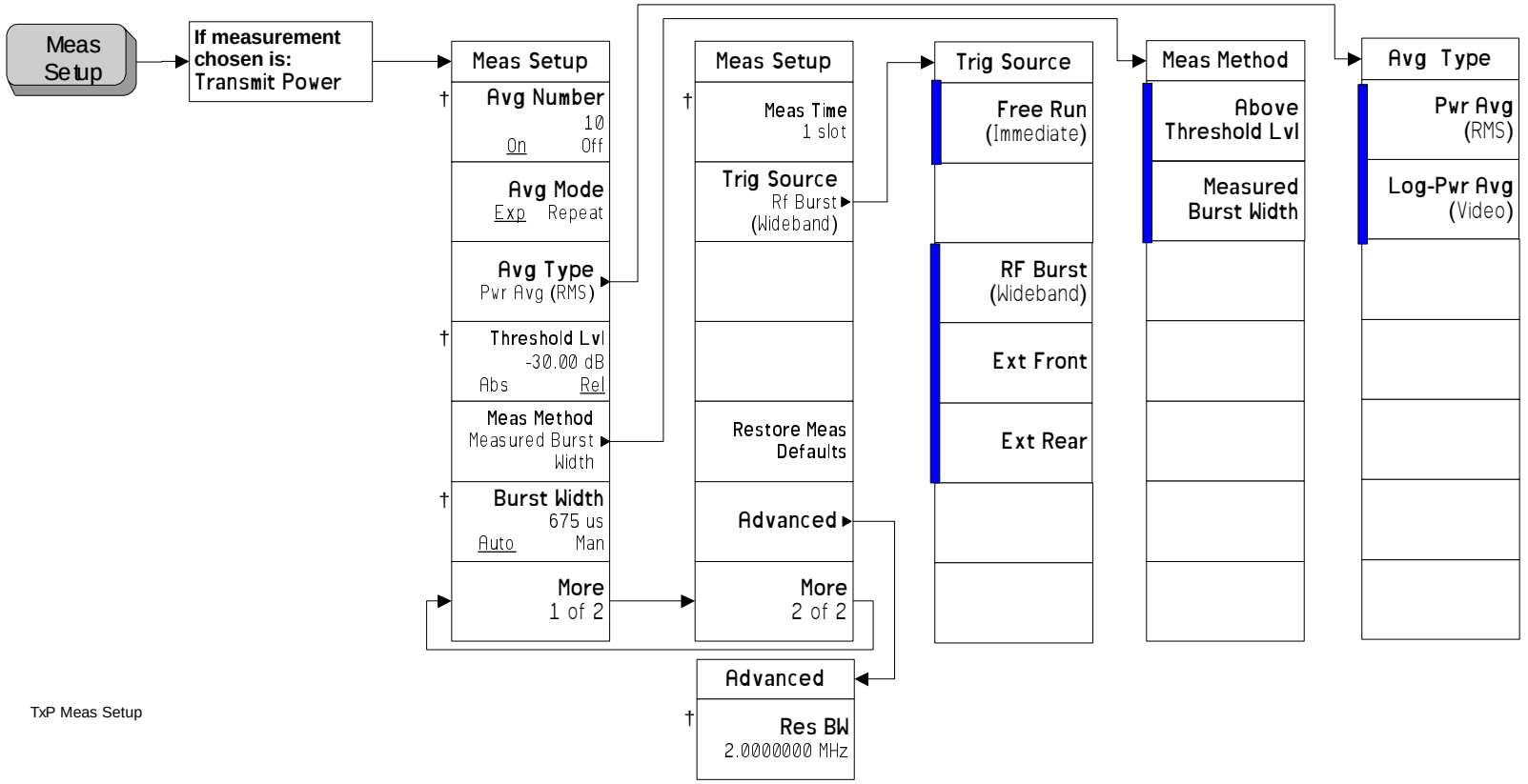
Menu Maps

5.5 Meas Control Key (See page 81)



5.6 Menus for Setting Up Measurements

5.6.1 Transmit Power Measurement Meas Setup Key (See page 122)



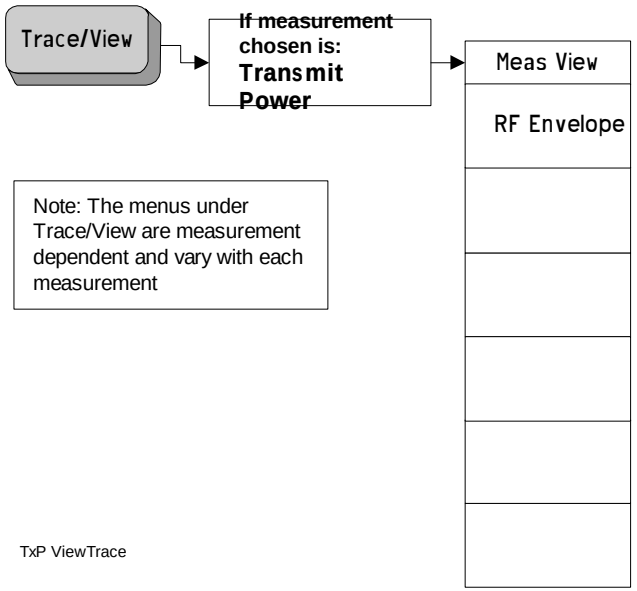
TxP Meas Setup

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

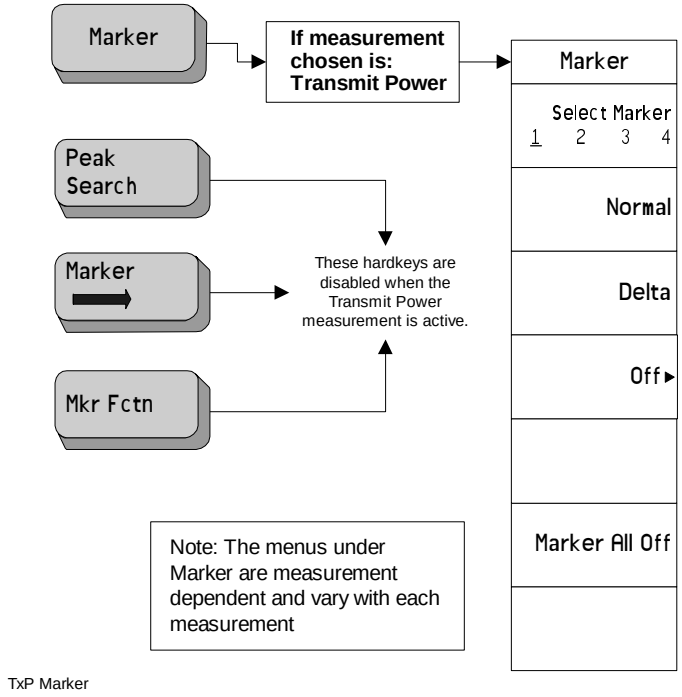
† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

5.6.2 Transmit Power Measurement Trace/View Key (See page 133)



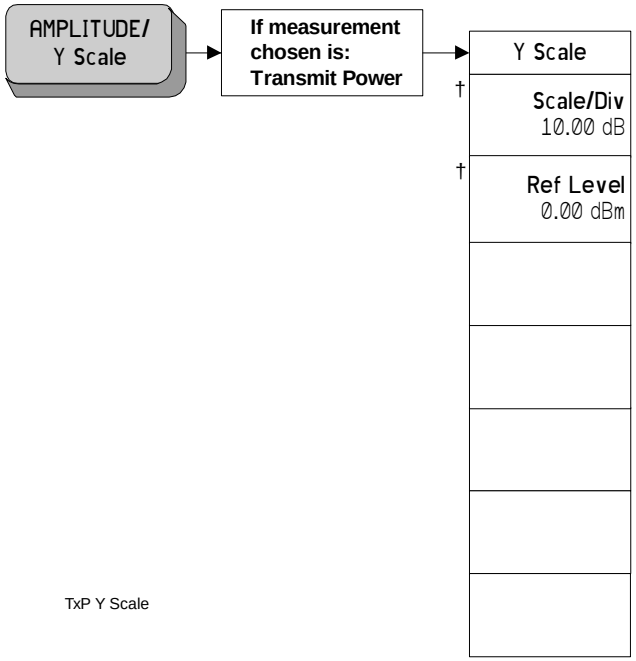
5.6.3 Transmit Power Measurement Marker Key (See page 130)



TxP Marker

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

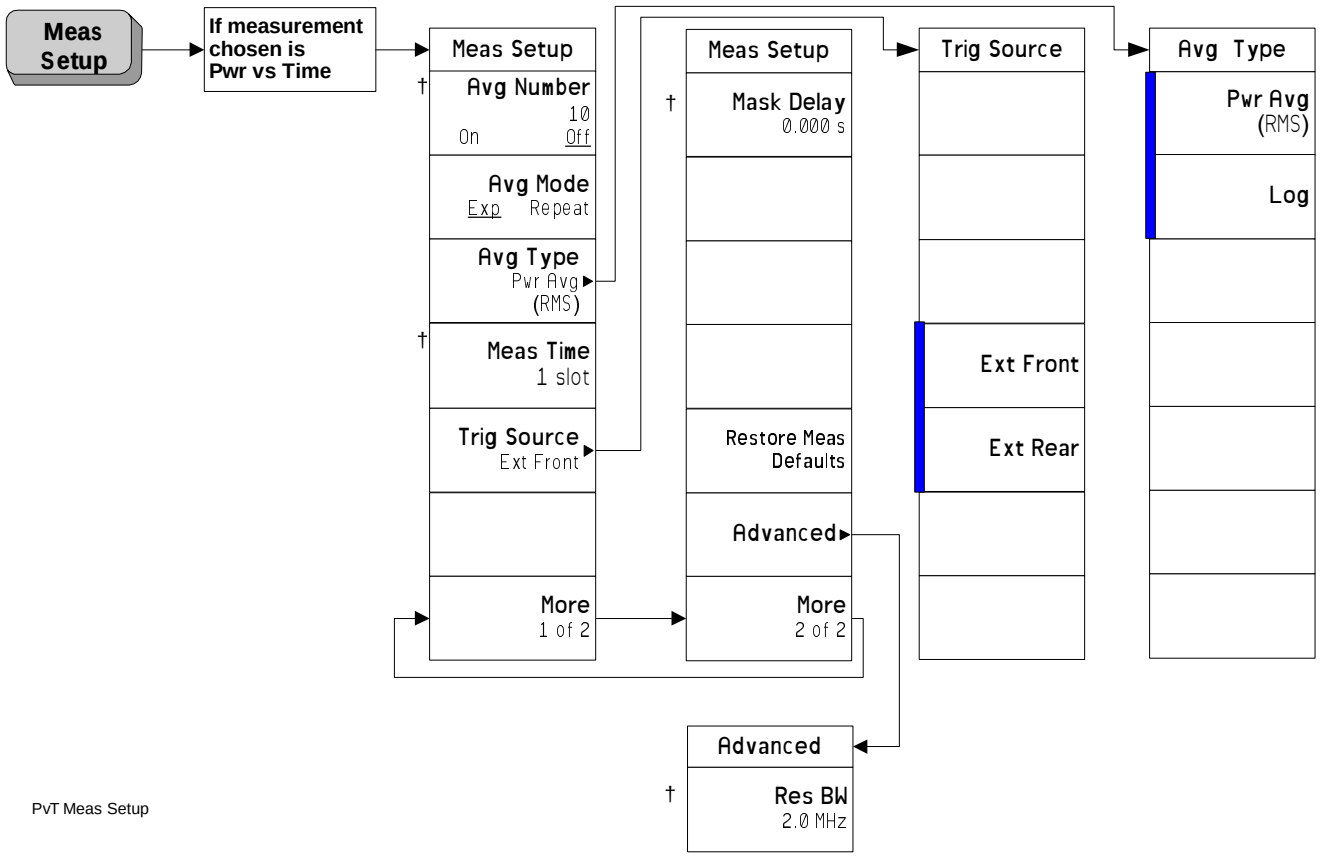
5.6.4 Transmit Power Measurement Amplitude Y Scale (See page 128)



TxP Y Scale

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.6.5 Power vs Time Measurement Meas Setup Key (See page 134)



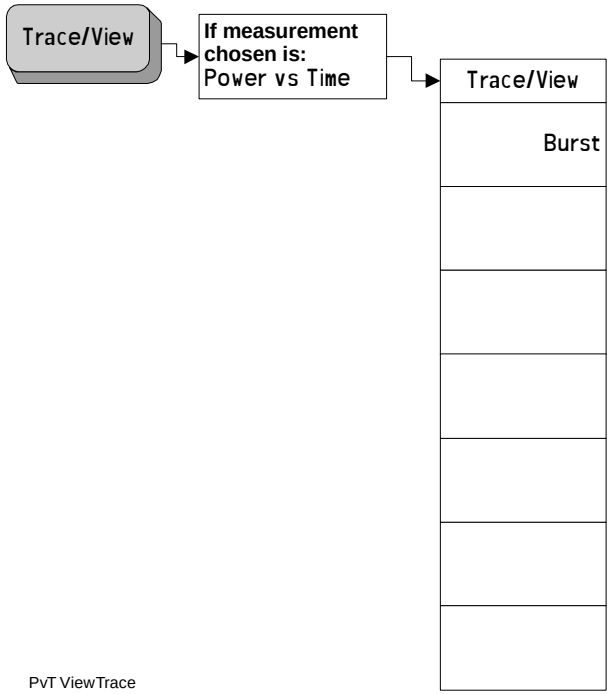
PvT Meas Setup

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

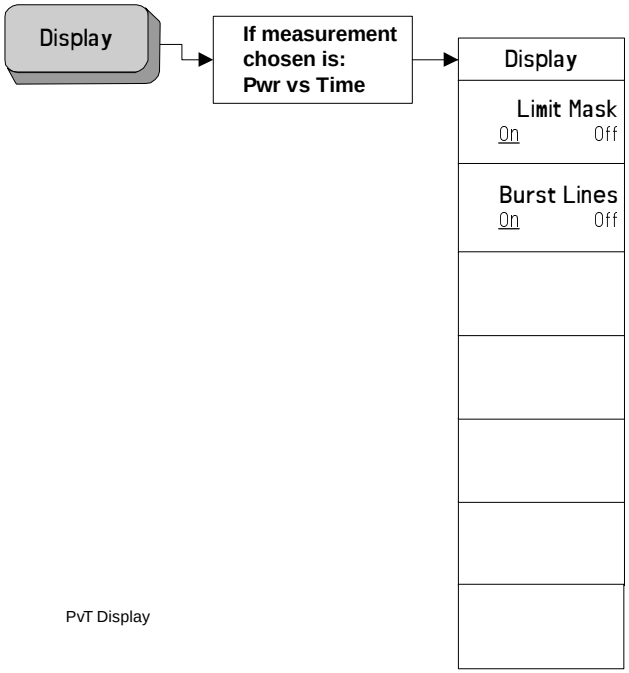
Menu Maps

5.6.6 Power vs Time Measurement Trace/View Key (See page 151)



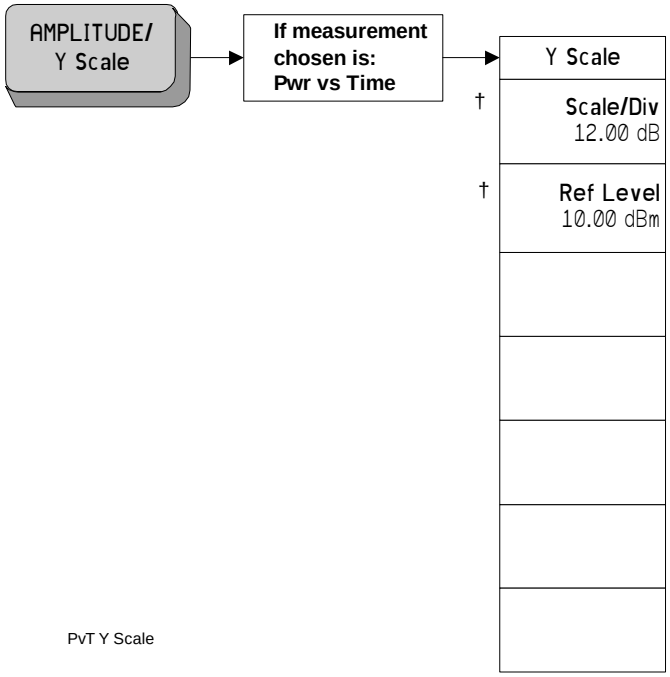
PvT ViewTrace

5.6.7 Power vs Time Measurement Display Key (See page 147)



Menu Maps

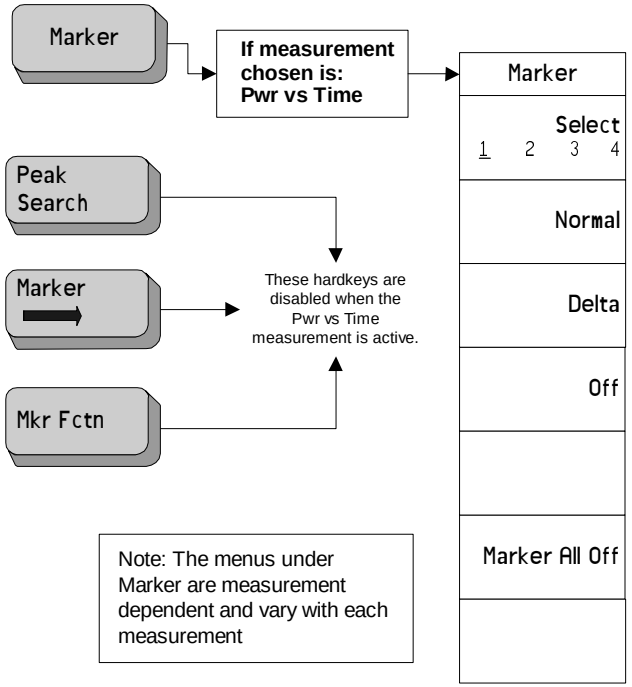
5.6.8 Power vs Time Measurement Amplitude Y Scale Key (See page 146)



PvT Y Scale

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.6.9 Power vs Time Measurement Marker Key (See page 148)



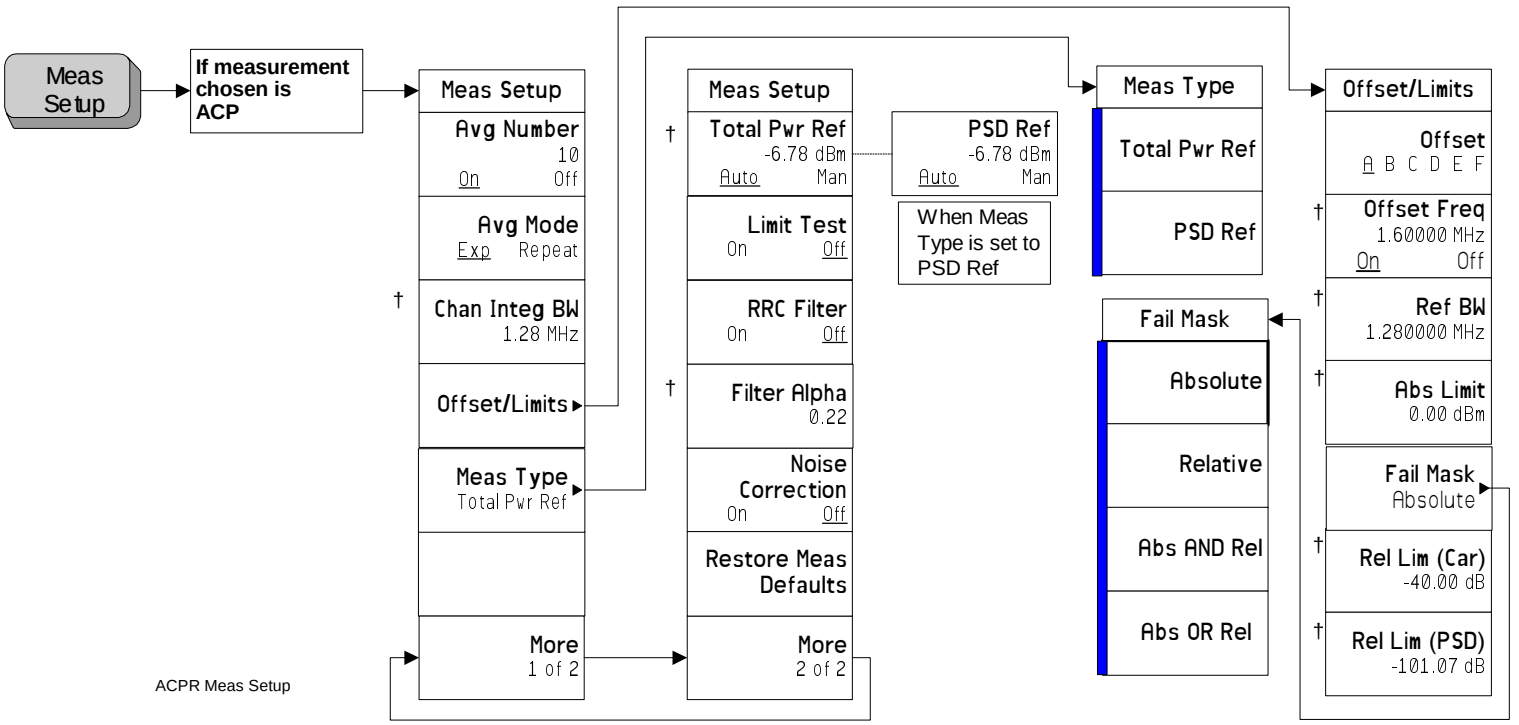
PvT Marker

▌ A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

5.6.10 Adjacent Channel Power—ACP Measurement Meas Setup Key (See page 152)

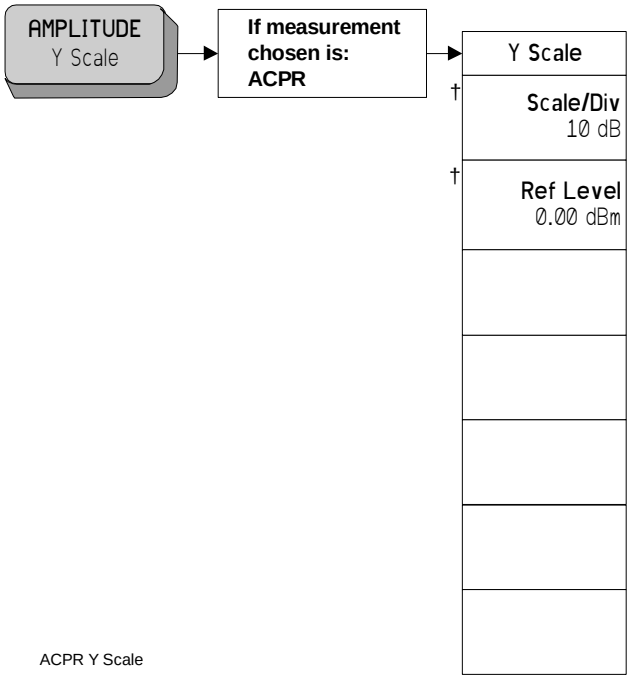


ACPR Meas Setup

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.6.11 Adjacent Channel Power—ACP Measurement Amplitude Y Scale Key (See page 164)

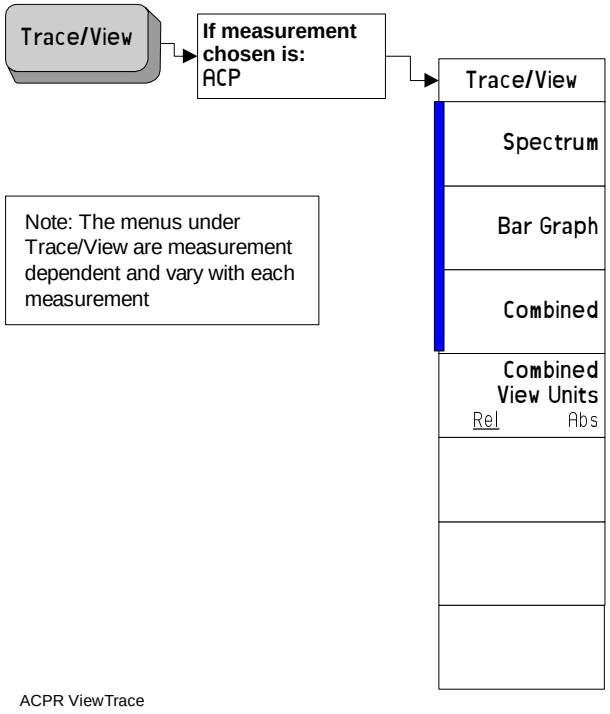


ACPR Y Scale

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

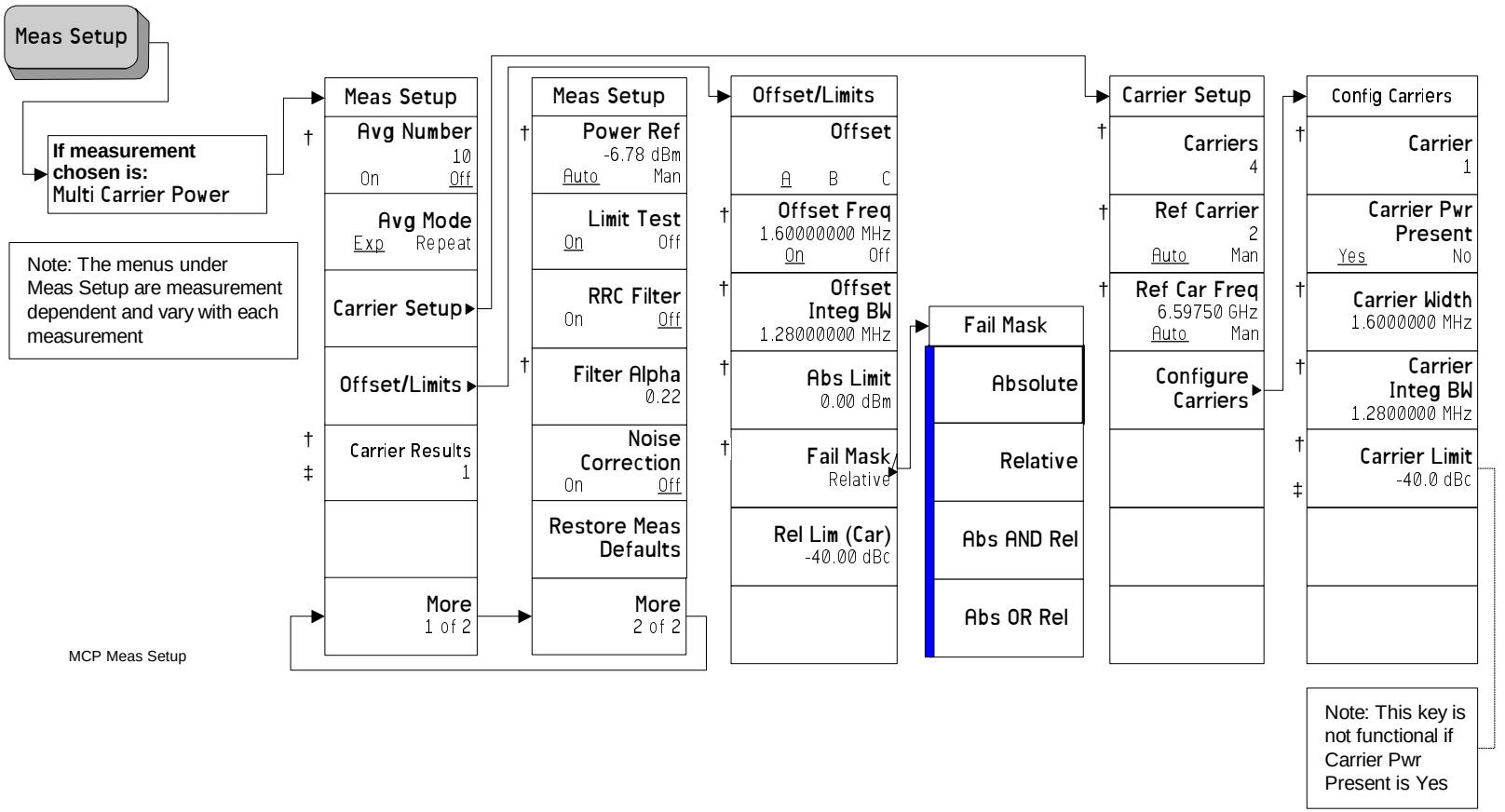
5.6.12 Adjacent Channel Power—ACP Measurement Trace/View Key (See page 165)



ACPR ViewTrace

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

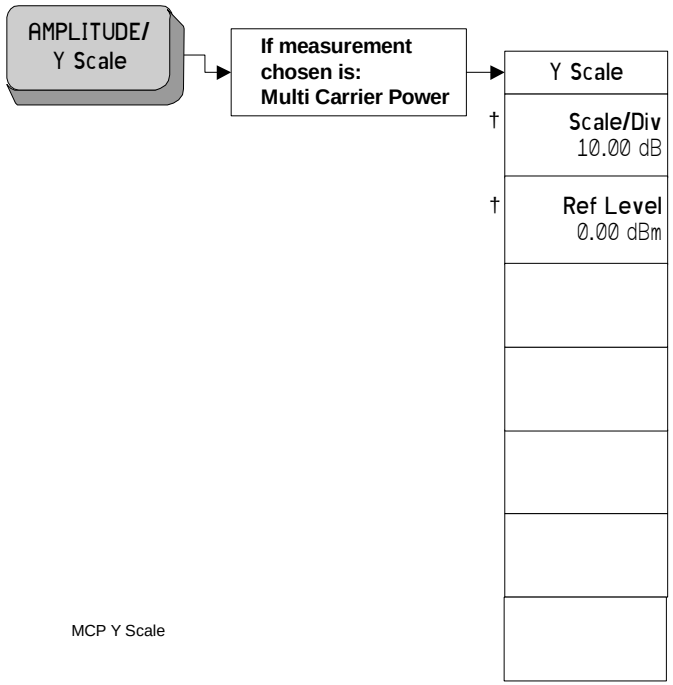
5.6.13 Multi-Carrier Power—MCP Measurement Meas Setup Key (See page 168)



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.
‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

Menu Maps

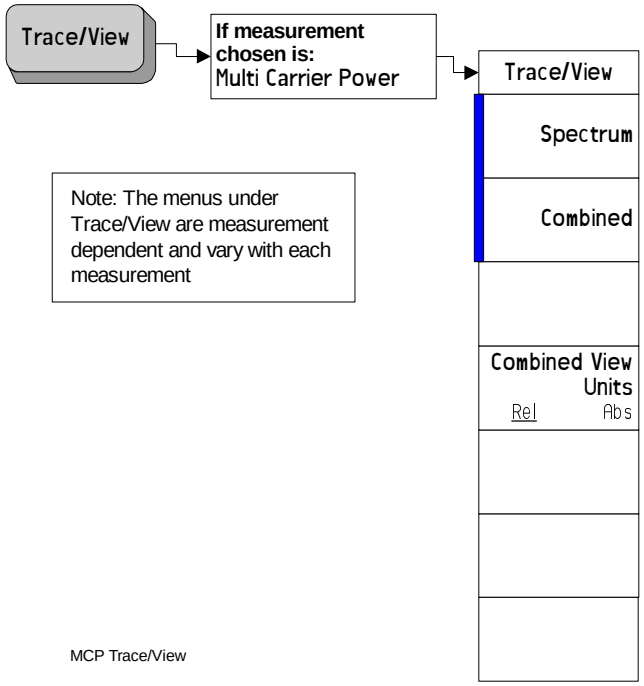
5.6.14 Multi-Carrier Power—MCP Measurement Amplitude Y Scale Key (See page 183)



MCP Y Scale

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.6.15 Multi-Carrier Power—MCP Measurement Trace/View Key (See page 184)

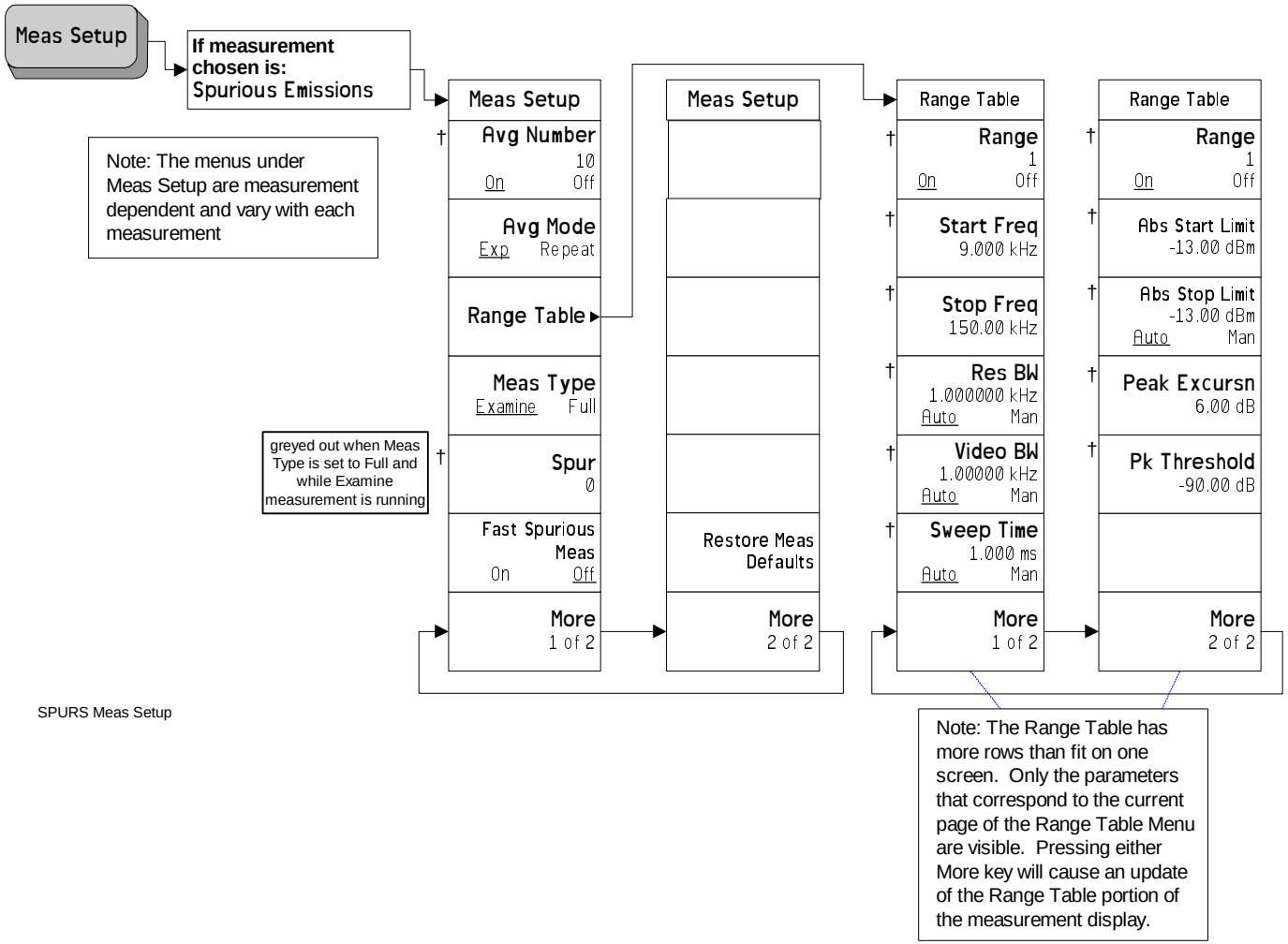


MCP Trace/View

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

Menu Maps

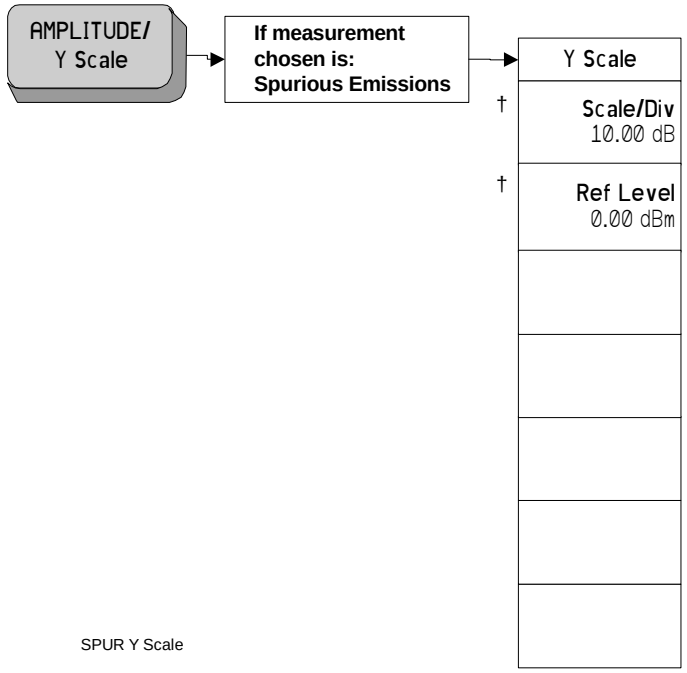
5.6.16 Spurious Emissions—Spurs Measurement Meas Setup Key (See page 186)



SPURS Meas Setup

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

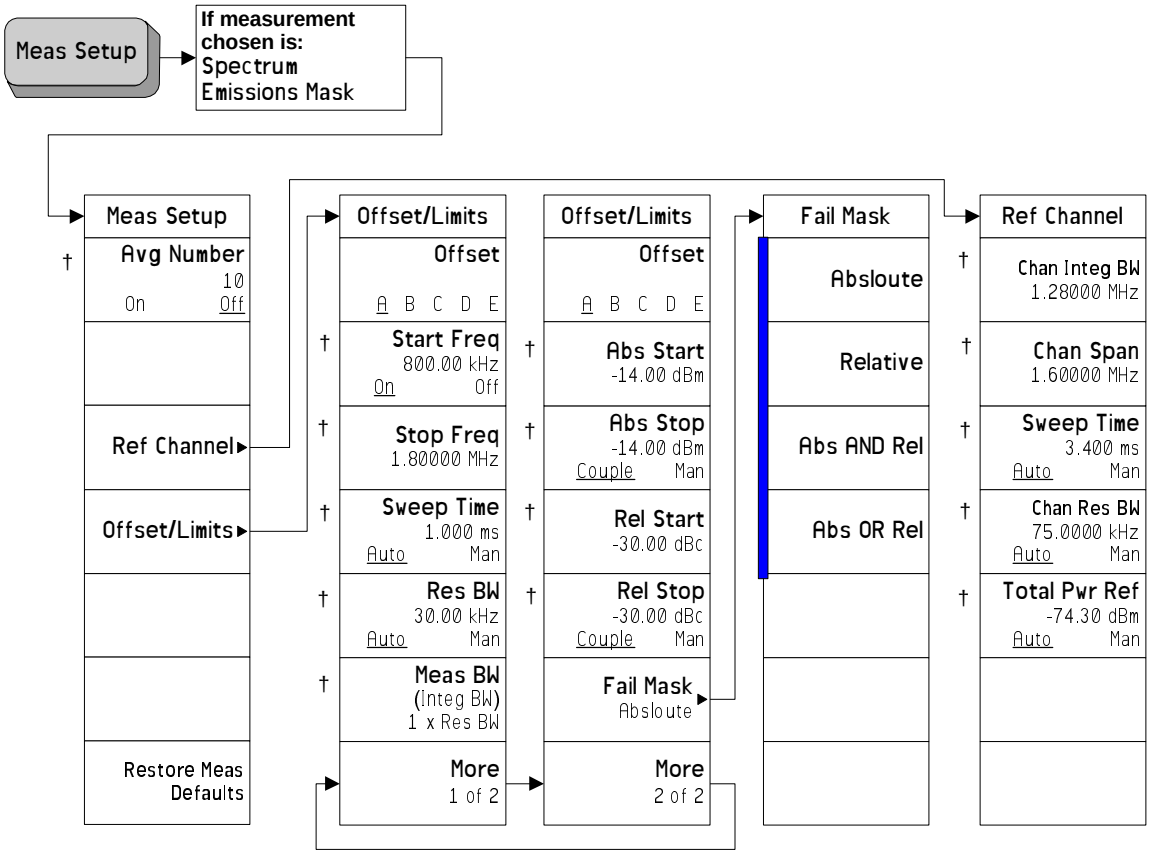
5.6.17 Spurious Emissions—Spurs Measurement Amplitude Y Scale Key (See page 197)



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

5.6.18 Spectrum Emission Mask—SEM Measurement Meas Setup Key (See page 199)

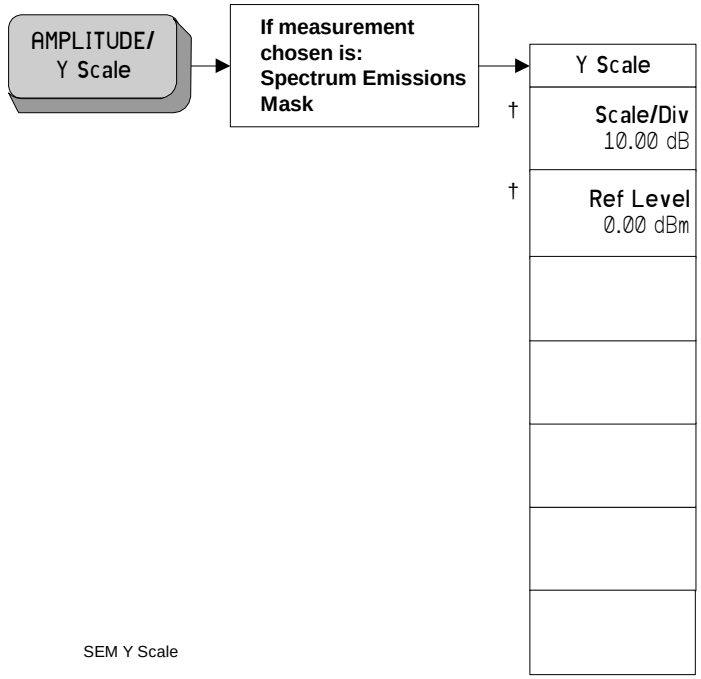


SEM Meas Setup

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

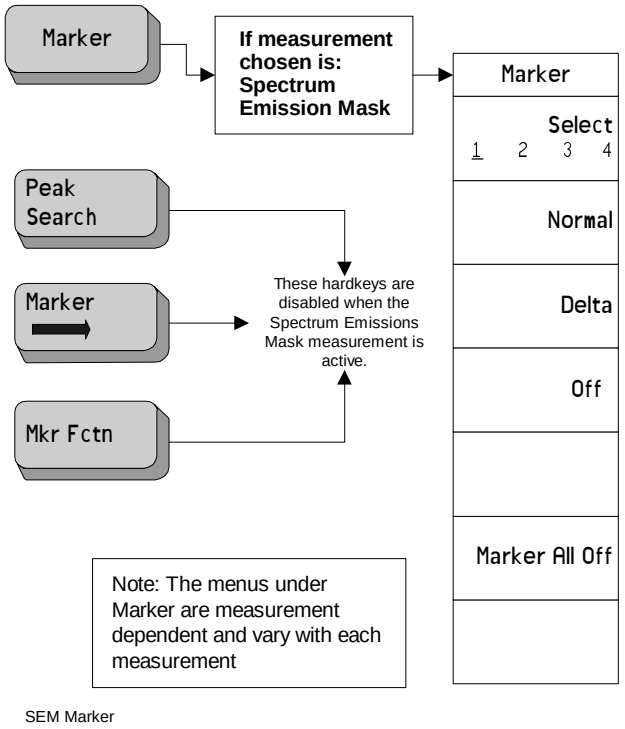
5.6.19 Spectrum Emission Mask—SEM Measurement Amplitude Y Scale Key (See page 213)



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

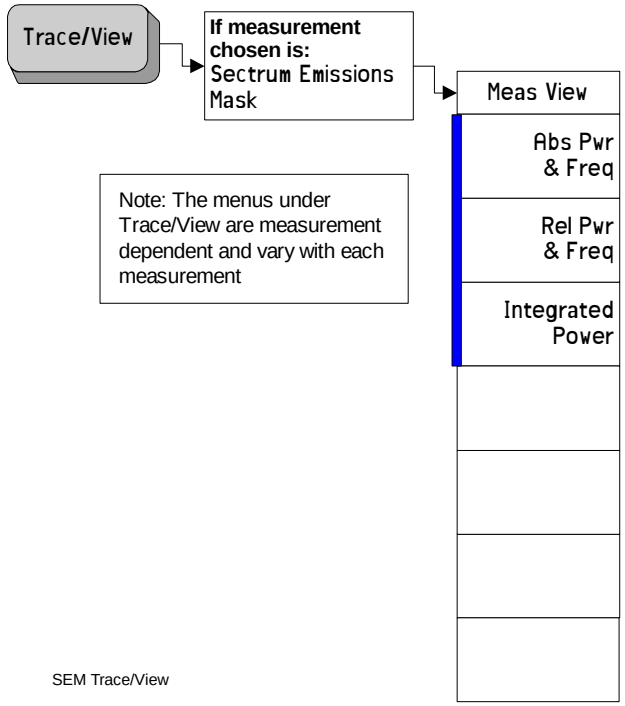
5.6.20 Spectrum Emission Mask—SEM Measurement Marker Key (See page 214)



SEM Marker

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

5.6.21 Spectrum Emission Mask—SEM Measurement Trace/View Key (See page 217)

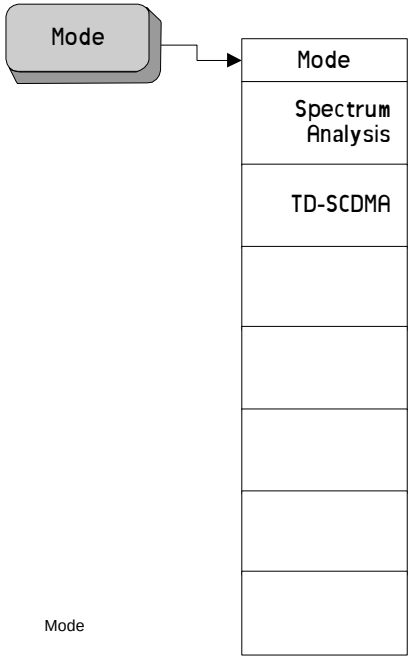


SEM Trace/View

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

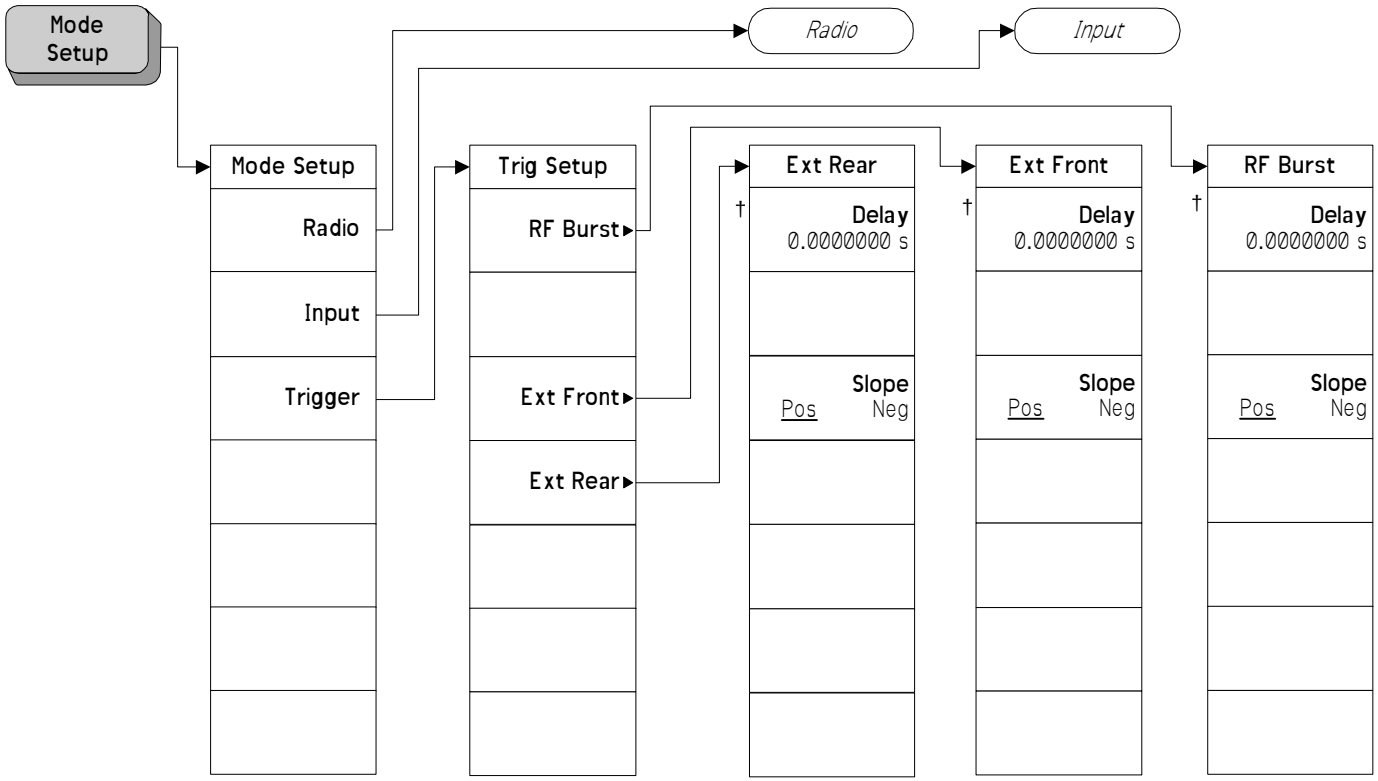
Menu Maps

5.7 Mode Key (See page 104)



Mode

5.8 Mode Setup Key (Sheet 1 of 2) (See page 108)

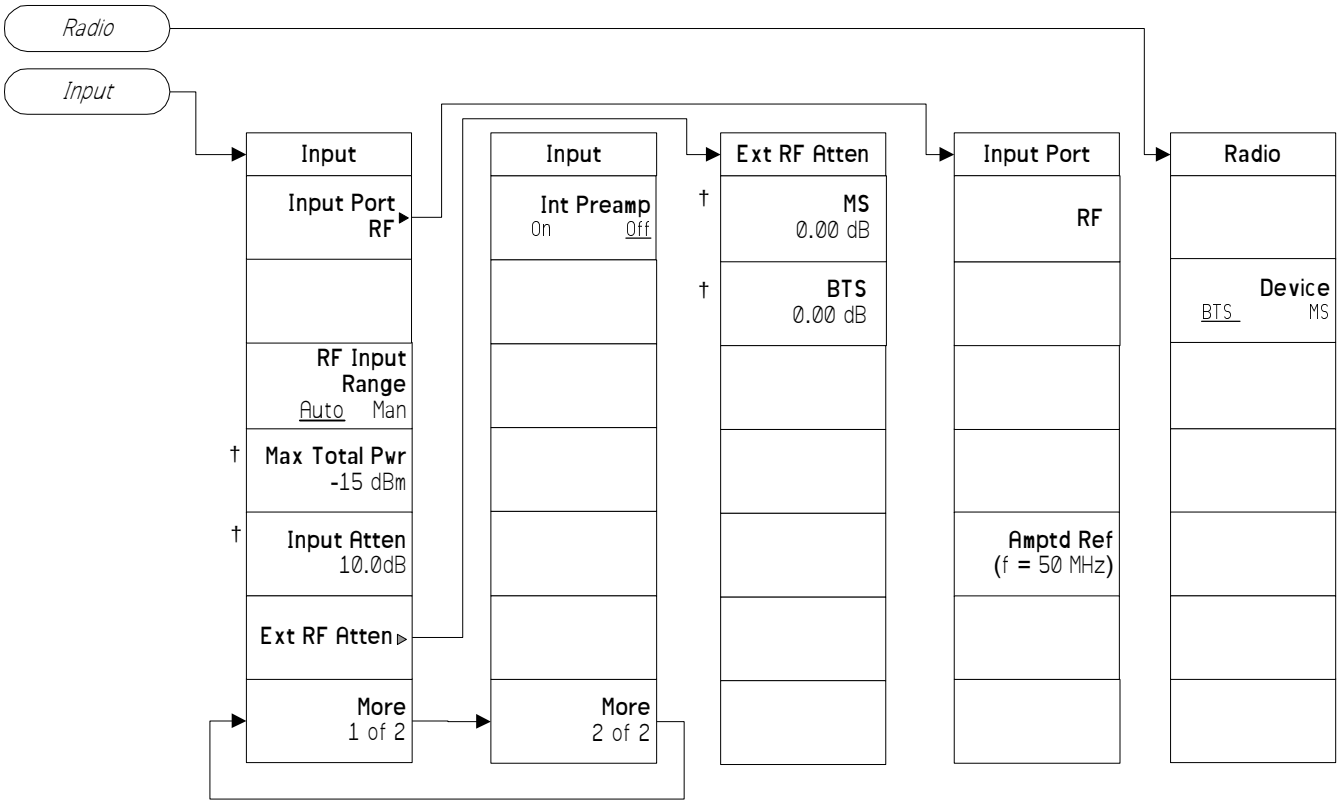


Mode Setup (Sheet 1)

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

5.9 Mode Setup Key (Sheet 2 of 2) (See page 108)

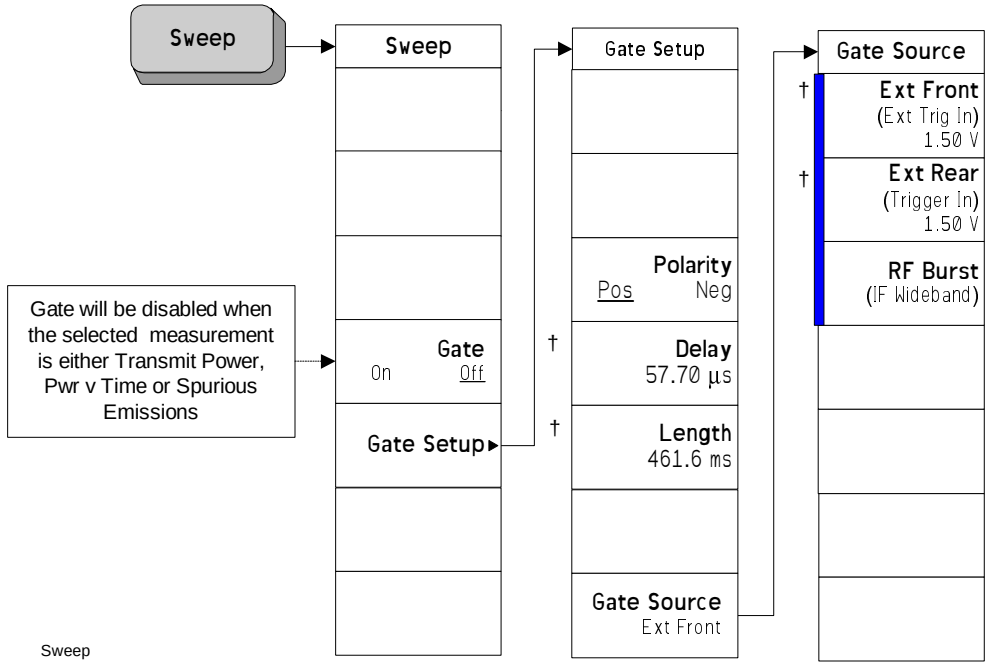


Mode Setup (Sheet 2)

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.10 Sweep Key (See page 111)

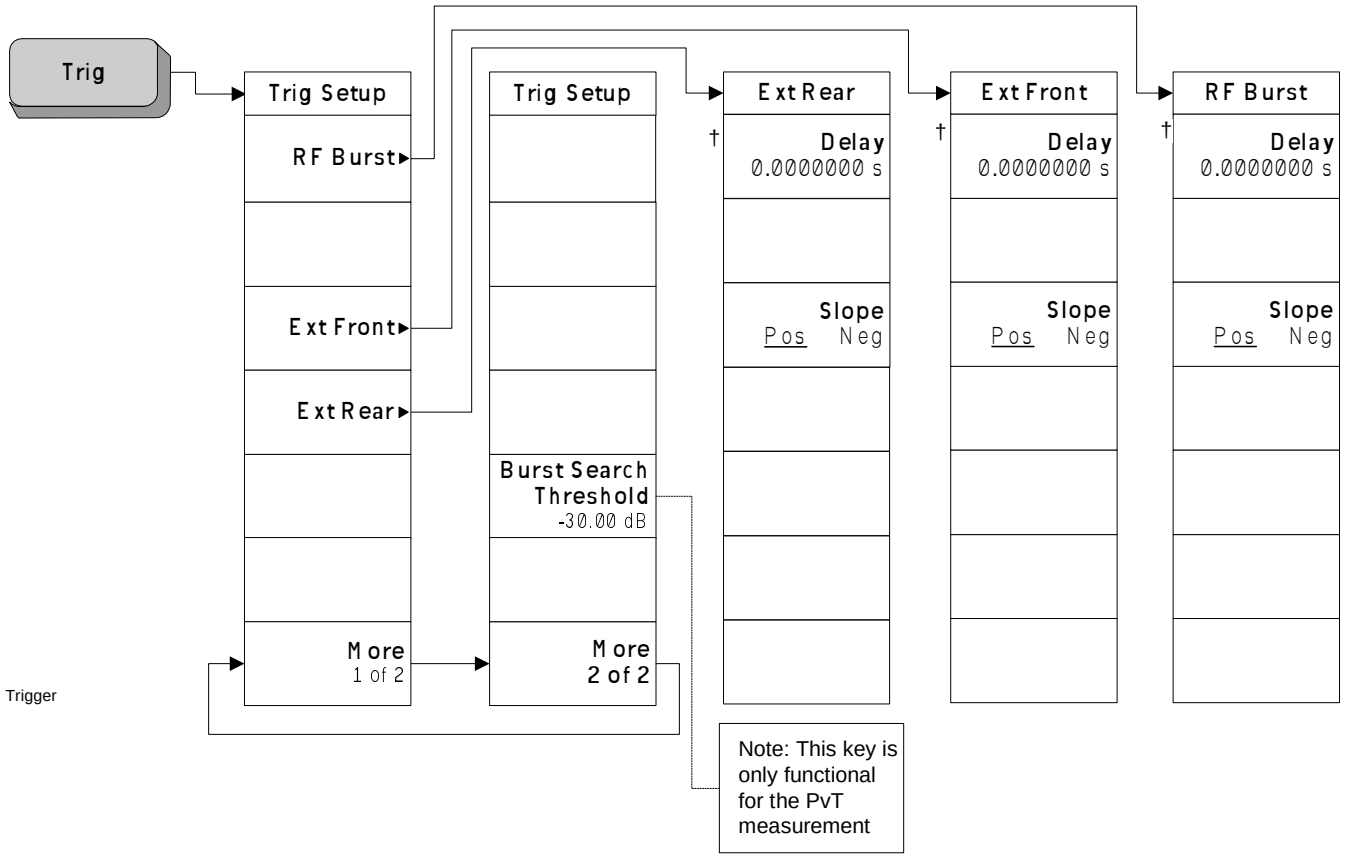


A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

5.11 Trigger Key (See page 116)



A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

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