Programming Commands

Agilent Technologies
ESA-E Series Spectrum Analyzers
Bluetooth™ Measurement Personality

This manual provides documentation for the following instruments:

ESA-E Series

E4402B (9 kHz - 3.0 GHz)
E4404B (9 kHz - 6.7 GHz)
E4405B (9 kHz - 13.2 GHz)
E4407B (9 kHz - 26.5 GHz)

Manufacturing Part Number: E4402-90083
Supersedes: E4402-90055

Printed in USA

August 2002

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WARNING **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

WARNING **This is a Safety Class 1 Product (provided with a protective earth ground incorporated in the power cord). The mains plug shall be inserted only in a socket outlet provided with a protected earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.**

WARNING **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.**

CAUTION Always use the three-prong AC power cord supplied with this product. Failure to ensure adequate grounding may cause product damage.

Contents

Contents

1 Programming Command Cross-References

Functional Index to SCPI Subsection

The following table lists the SCPI subsystems or subsections associated with the instrument Bluetooth function categories. The commands listed are for Bluetooth specific functions. These commands are documented in Chapter 2 , "Language Reference." If you require information on the commands for the Agilent ESA Spectrum Analyzers, refer to the *Agilent ESA Spectrum Analyzers Programmer's Guide*.

Function Category	SCPI Subsection or Subsystem
AMPLITUDE	:CALCulate:CFDrift :CALCulate:ICFTol :CALCulate:MCHar :CALCulate:OPOWer :CONFigure :FETCh :MEASure :READ
ATTENUATION	[SENSe]:POWer
AVERAGING	[:SENSe]:CFDRift [:SENSe]:ICFTol [:SENSe]:MCHar [:SENSe]:MONitor [:SENSe]:MOVerview [:SENSe]:OPOWer [:SENSe]:OSBWidth
BAND, BANDWIDTH	[:SENSe]:MCHar [:SENSe]:MONitor [:SENSe]:OSBWidth :CONFigure :FETCh :MEASure :READ
BURST	TRIGger [:SENSe]:CFDRift [:SENSe]:ICFTol [:SENSe]:MCHar [:SENSe]:MOVerview [:SENSe]:OPOWer [:SENSe]:SYNC
Corrections	[:SENSe]:CORRection
DETECTOR	[:SENSe]:MONitor

Function Category	SCPI Subsection or Subsystem
DISPLAY	[:SENSe]:CFDRift [:SENSe]:MONitor [:SENSe]:MOVerview
FREQUENCY	:CALCulate:CFDRift :CALCulate:ICFTol :CALCulate:MCHar [:SENSe]:CFDRift [:SENSe]:CHANnel [:SENSe]:CHANnel:FHOPping [:SENSe]:DEViation [:SENSe]:FREQuency [:SENSe]:ICFTol :CONFigure :FETCh :MEASure :READ
FREQUENCY SPAN	:CONFigure :FETCh :MEASure :READ
LIMITS	:CALCulate:ACP :CALCulate:CFDrift :CALCulate:ICFTol :CALCulate:MCHar :CALCulate:OPOWer [:SENSe]:ACP [:SENSe]:CFDRift [:SENSe]:ICFTol [:SENSe]:MCHar [:SENSe]:OPOWer [:SENSe]:OSBWidth
MARKER	[:SENSe]:OPOWer
MEASURE	:CONFigure :FETCh :MEASure :READ [:SENSe]:MONitor

Function Category	SCPI Subsection or Subsystem
TRIGGER	TRIGger [:SENSe]:CFDRift [:SENSe]:ICFTol [:SENSe]:MCHar [:SENSe]:MOVerview [:SENSe]:OPOWer :CONFigure :FETCh :MEASure :READ

2 Language Reference

These commands are only available when the Bluetooth™ mode has been selected using INSTrument:SELect or INSTrument:NSELect. If the Bluetooth™ mode is selected, commands that are unique to another mode are not available.

ABORt Subsystem

Abort Command

:ABORt

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 **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.

Front Panel Access: For the continuous measurement mode, the **Restart** key is equivalent to **ABORt**.

CALCulate Subsystem

This subsystem is used to perform post-acquisition data processing. In effect, the collection of new data triggers the CALCulate subsystem. In this instrument, the primary functions in this subsystem are markers and limits.

ACP - Limits

Adjacent Channel Power—Far Limit Test

:CALCulate:ACP:LIMit:FAR:UPPer[:DATA] <real number>

:CALCulate:ACP:LIMit:FAR:UPPer[:DATA]?

Set the far limit, in dBm for adjacent channel power testing. The sum of the peak power of the adjacent channel power measurement results are tested against this value.

Factory Preset and *RST: –40 dBm

Range: –90 to 0 dBm

Default Unit: dBm

Remarks: You must be in Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **More**, **Limits**

Adjacent Channel Power—Near Limit Test

:CALCulate:ACP:LIMit:NEAR:UPPer[:DATA] <real number>

:CALCulate:ACP:LIMit:NEAR:UPPer[:DATA]?

Set the near limit, in dBm for adjacent channel power testing. The sum of the peak power of the adjacent channel power measurement results are tested against this value.

Factory Preset and *RST: –20 dBm

Range: –90 to 0 dBm

Default Unit: dBm

Remarks: You must be in Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **More**, **Limits**

Carrier Frequency Drift Limit Commands

Carrier Frequency Drift—Upper Limit

:CALCulate:CFDRift:LIMit:DH1|DH3|DH5[:UPPer][:DATA]<freq>

:CALCulate:CFDRift:LIMit:DH1|DH3|DH5[:UPPer][:DATA]?

Set the upper frequency limit for carrier frequency drift. This limit is set depending on the selected Packet Type.

Factory Preset and *RST:
- DH1 Packet 25 kHz
- DH3 Packet 40 kHz
- DH5 Packet 40 kHz

Range: –500 kHz to 500 kHz

Remarks: If the Freq Drift is greater than this limit, the measurement display will append a red “F” to the value.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Carrier Frequency Drift—Lower Limit

:CALCulate:CFDRift:LIMit:DH1|DH3|DH5:LOWer[:DATA]<freq>

:CALCulate:CFDRift:LIMit:DH1|DH3|DH5:LOWer[:DATA]?

Set the lower frequency limit for carrier frequency drift. This limit is set depending on the selected Packet Type.

Factory Preset and *RST:
- DH1 Packet –25 kHz
- DH3 Packet –40 kHz
- DH5 Packet –40 kHz

Range: –500 kHz to 500 kHz

Remarks: If the Freq Drift is less than this limit, the measurement display will append a red “F” to the value.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Carrier Frequency Drift—Maximum Drift Rate Upper Limit

`:CALCulate:CFDRift:LIMit:MDRate[:UPPer][:DATA]<freq>`

`:CALCulate:CFDRift:LIMit:MDRate[:UPPer][:DATA]?`

Set the maximum drift rate upper limit.

Factory Preset and *RST: 20 kHz

Range: –500 kHz to 500 kHz

Remarks: If the Max Drift Rate is greater than this limit, the measurement display will append a red “F” to the value.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Carrier Frequency Drift—Maximum Drift Rate Lower Limit

`:CALCulate:CFDRift:LIMit:MDRate:LOWer[:DATA]<freq>`

`:CALCulate:CFDRift:LIMit:MDRate:LOWer[:DATA]?`

Set the maximum drift rate lower limit.

Factory Preset and *RST: –20 kHz

Range: –500 kHz to 500 kHz

Remarks: If the Max Drift Rate is less than this limit, the measurement display will append a red “F” to the value.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Test Current Results Against all Limits

`:CALCulate:CLIMits:FAIL?`

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Initial Carrier Frequency Tolerance (ICFT) Limit Commands

ICFT—Upper Limit

:CALCulate:ICFTol:LIMit[:UPPer][:DATA]<freq>

:CALCulate:ICFTol:LIMit[:UPPer][:DATA]?

Set the upper frequency limit for ICFT.

Factory Preset and *RST: 75 kHz

Range: 0 Hz to 500 kHz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits**

ICFT—Lower Limit

:CALCulate:ICFTol:LIMit:LOWer[:DATA]<freq>

:CALCulate:ICFTol:LIMit:LOWer[:DATA]?

Set the lower frequency limit for ICFT.

Factory Preset and *RST: –75 kHz

Range: –500 kHz to 0 Hz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits**

Modulation Characteristics Limit Commands

Modulation Characteristics—Average Lower Limit

:CALCulate:MCHar:LIMit:DF1avg:LOWer[:DATA]<freq>

:CALCulate:MCHar:LIMit:DF1avg:LOWer[:DATA]?

Set the lower frequency limit for Δf1avg.

Factory Preset and *RST: Δf1 140 kHz

Range: 0 to 500 kHz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits**

Modulation Characteristics—Average Upper Limit

:CALCulate:MCHar:LIMit:DF1avg[:UPPer][:DATA]<freq>

:CALCulate:MCHar:LIMit:DF1avg[:UPPer][:DATA]?

Set the upper frequency limit for Δf1avg.

Factory Preset and *RST: Δf1 175 kHz

Range: 0 to 500 kHz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits**

Modulation Characteristics—Max Lower Limit

:CALCulate:MCHar:LIMit:RATio:LOWer[:DATA]<real number, %>

:CALCulate:MCHar:LIMit:RATio:LOWer[:DATA]?

All values of Δf2 max measured over the entire packet must be at least 115 kHz. Use this parameter to change the lower limit from the default value of 115 kHz.

Factory Preset and *RST: Δf2/Δf1 80%

Range: 0 to 100%

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits**

Modulation Characteristics—Ratio Lower Limit

:CALCulate:MCHar:LIMit:RATio:LOWer[:DATA]<real number, %>

:CALCulate:MCHar:LIMit:RATio:LOWer[:DATA]?

Set the lower limit of the deviation ratio. This is the ratio of Δf2 avg to Δf1 avg expressed as a percentage.

Factory Preset and *RST: 80.000%

Range: 0 to 100%

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits**

Output Power Limit Commands

Output Power—Average Power Upper Limit

:CALCulate:OPOWer:LIMit:PC1|PC2|PC3:AVERage [:UPPer][:DATA]<dBm>

:CALCulate:OPOWer:LIMit:PC1|PC2|PC3:AVERage[:UPPer][:DATA]?

Set the average power upper limit. The limit is set depending on the selected Power Class.

Factory Preset and *RST:

Power Class 1	20.00 dBm
Power Class 2	4.00 dBm
Power Class 3	0.00 dBm

Range: –100.00 to 30.00 dBm

Remarks: If the average power is greater than this limit, the measurement display will append a red “F” to the value.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Output Power—Average Power Lower Limit

:CALCulate:OPOWer:LIMit:PC1|PC2|PC3:AVERage:LOWer[:DATA]<dBm>

:CALCulate:OPOWer:LIMit:PC1|PC2|PC3:AVERage:LOWer[:DATA]?

Set the average power lower limit. The limit is set depending on the selected Power Class.

Factory Preset and *RST:
- Power Class 1: 0.00 dBm
- Power Class 2: –6.00 dBm
- Power Class 3: N/A

Range: –100.00 to 30.00 dBm

Remarks: If the average power is less than this limit, the measurement display will append a red “F” to the value. If Power Class 3 is selected, this parameter is not required.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Output Power—Peak Power Upper Limit

:CALCulate:OPOWer:LIMit:PEAK[:UPPer][:DATA]<dBm>

:CALCulate:OPOWer:LIMit:PEAK[:UPPer][:DATA]?

Set the peak power upper limit. The limit is set depending on the selected Power Class.

Factory Preset and *RST: 23.00 dBm

Range: –100.00 to 30.00 dBm

Remarks: If the peak power is greater than this limit, the measurement display will append a red “F” to the value.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limits...**

Output Spectrum Bandwidth Limit Commands

Output Spectrum Bandwidth—Upper Limit

`:CALCulate:OSBWidth:LIMit[:UPPer][:DATA]<freq>`

`:CALCulate:OSBWidth:LIMit[:UPPer][:DATA]?`

Set the upper bandwidth limit for output spectrum bandwidth.

Factory Preset and *RST:	1 MHz
Range:	-5 MHz to 5 MHz
Default Unit:	Hz
Remarks:	You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup**, **Limits**

CONFigure Subsystem

CONFigure subsystem commands apply only to measurements found in the MEASURE menu. These commands stop the current measurement and set up the instrument for the specified measurement using the factory default instrument settings.

:CONFigure:<measurement> will always set :INITiate:CONTinuous OFF (single mode), and also places the measurement in the idle state.

:CONFigure:SANalyzer causes the present measurement to exit (functionally the same as pressing MODE, SA), and places the analyzer in base instrument spectrum analyzer state.

The query :CONFigure? returns the current measurement name in quotes.

Each measurement sets the instrument state that is appropriate for that measurement. Other commands are available for each **Mode** to allow changing settings, view, limits, etc. Refer to:

SENSe:<measurement>, SENSe:CHANnel, SENSe:CORRection, SENSe:DEFaults, SENSe:DEViation, SENSe:FREQuency, SENSe:PACKet, SENSe:POWer, SENSe:RADio, SENSe:SYNC, CALCulate:<measurement>, CALCulate:CLIMits, TRIGger

FETCh Subsystem

FETCh subsystem commands apply only to measurements found in the MEASURE menu. FETCh commands can only be used as queries.

FETCh commands put valid data into the output buffer, but do not initiate data acquisition. Use the :INITiate[:IMMediate] command to acquire data. You can only fetch results from the measurement that is selected, and when current measurement results are valid.

:FETCh <meas>? will return valid data only when the measurement is in one of the following states:

idle
initiated
paused

INITiate Subsystem

The INITiate subsystem is used to control the initiation of the trigger. Refer to the TRIGger and ABORt subsystems for related commands.

Continuous or Single Measurements

`:INITiate:CONTinuous OFF|ON|0|1`

`:INITiate:CONTinuous?`

Factory Preset: On

*RST:

Front Panel Access: **Sweep, Sweep Cont Single** (SA mode)

Single

Meas Control, Measure Cont Single

Take New Data Acquisitions

`:INITiate[:IMMediate]`

This command is used to place the measurement in an awaiting trigger state. When a valid trigger is received, the measurement will begin. If the measurement is currently running, this will cause a restart. A “measurement” refers to any function under the MEASURE key.

Remarks: See also the *TRG command and the TRIGger subsystem.

Use the [:SENSe]:<meas>:TRIGger:SOURce command to select the desired trigger.

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

Front Panel Access: **Sweep, Sweep Cont Single** (SA mode)

Single

Meas Control, Measure Cont Single

Pause the Measurement

:INITiate:PAUSe

Pauses the current measurement by changing the current measurement state from the “wait for trigger” state to the “paused” state. If the measurement is not in the “wait for trigger” state, when the command is issued, the transition will be made the next time that state is entered as part of the trigger cycle. When in the paused state, the spectrum analyzer auto-align process stops. If the analyzer is paused for a long period of time, measurement accuracy may degrade.

Front Panel Access: **Meas Control, Pause**

Restart the Measurement

:INITiate:RESTart

This command applies to measurements found in the MEASURE menu.

It restarts the current measurement from the “idle” state regardless of its current operating state. It is equivalent to:

INITiate[:IMMediate]

ABORt (for continuous measurement mode)

Front Panel Access: **Restart**

or

Meas Control, Restart

Resume the Measurement

:INITiate:RESume

Resumes the current measurement by changing the current measurement state from the “paused state” back to the “wait for trigger” state. If the measurement is not in the “paused” state, when the command is issued, an error is reported. Only include if INIT:IMM is implemented as an overlapping command. Note: INITiate:PAUSE was TEST:RESume.

Front Panel Access: **Meas Control, Resume**

INSTrument Subsystem

This subsystem includes commands for querying and selecting instrument measurement (personality option) modes.

Select Application by Number

`:INSTrument:NSELect <integer>`

`:INSTrument:NSELect?`

Select the measurement application by its instrument number. The actual available choices depends upon which applications are installed in the instrument.

1 = SA

228 = BLUETOOTH

NOTE

If you are using the SCPI status registers 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 and *RST: Persistent state with factory default of 1

Range: 1 to x, where x depends upon which applications are installed.

Front Panel Access: **Mode**

Select Application

:INSTrument[:SELect]
'SA'|'GSM'|'CDMA'|'PNOISE'|'BLUETOOTH'

:INSTrument[:SELect]?

Select the measurement application mode. The actual available choices depend upon which applications (modes) are installed in the instrument. See the manual for your installed options for the mode designator.

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

NOTE

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 and *RST: Persistent state with factory default of Spectrum Analyzer

Front Panel Access: **Mode**

MEASure Group of Commands

This group includes the CONFigure, FETCH, MEASure, and READ commands that are used to make measurements and return results. The different commands can be used to provide fine control of the overall measurement process, like altering measurement parameters from their default settings. Most measurements should be done in single measurement mode, rather than doing the measurement continuously.

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 Radio Standard that is currently selected.

- Stops the current measurement and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- Turns the averaging function on and sets the number of averages to 10 for all measurements.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement.

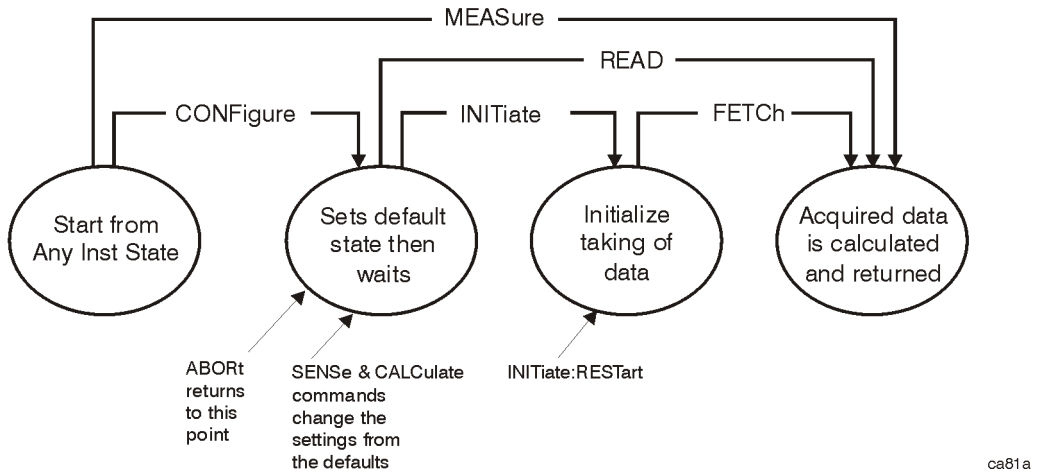
  If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.

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, or the INITiate and FETCh? commands, to initiate the measurement and query the results. See Figure 2-1.

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 or INITiate and FETCh? commands, 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>?.

Figure 2-1 Measurement Group of Commands



Configure Commands

:CONFigure:<measurement>

This command stops the current measurement and sets up the instrument for the specified measurement using the factory default instrument settings. It does not initiate the taking of measurement data. This command also turns the averaging function on and sets the number of averages to 10 for all measurements.

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 (data acquisition is not initiated, however). Use the INITiate[:IMMediate] command to acquire data before you use the FETCh command. You can only fetch results from the measurement that is currently selected.

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.

FETCh may be used to return results other than those specified with the READ or MEASure commands.

Read Commands

:READ:<measurement>[n]?

- Does not preset the measurement to the factory defaults. (The MEASure? and CONFigure? commands reset the parameters to the default values.) READ uses the settings from the last measurement.
- Initiates the measurement which puts new 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.
- 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.

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>?.

Adjacent Channel Power (ACP) Measurement

This measures and sums the maximum power in all the channels EXCEPT the Transmit Channel and the immediately adjacent. You must be in Bluetooth™ mode to use these commands. Use INSTrument:SELect to set the 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

: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.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 79 scalar values (comma separated) of the PTX per channel. The transmit channel and adjacent channels will contain NaN.

Carrier Frequency Drift Measurement

This measures the performance of the modulator circuitry and the stability of the Voltage Controlled Oscillator (VCO). You must be in the Bluetooth™ mode to use these commands. Use INSTrument:SELect to set the mode.

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

:CONFigure:CFDRift

:FETCh:CFDRift[n]?

:READ:CFDRift[n]?

:MEASure:CFDRift[n]?

Front Panel Access: **Measure**, **Carrier Freq Drift**

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

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 3 scalar values (comma separated): 1. ICFT 2. Frequency Drift 3. Maximum Drift Rate
2	Returns an N-point trace representing FM deviation samples (specified in kHz) 100 ns apart. The number of trace points returned can be accessed using FETCh:CFDR4?
3	Returns the trace point (from FETCh:CFDR2?) which most closely corresponds to bit p0 (if Burst Sync set to 'None', 0 will always be returned)
4	Returns the number of points that will be returned from FETCh:CFDR2?

Initial Carrier Frequency Tolerance Measurement

This measures the accuracy of the transmitter's center frequency. You must be in the Bluetooth™ mode to use these commands. Use INSTrument:SELect to set the mode.

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

:CONFigure:ICFTol

:FETCh:ICFTol[n]?

:READ:ICFTol[n]?

:MEASure:ICFTol[n]?

Front Panel Access: **Measure**, **Init Carrier Freq Tol**

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

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 1 scalar value: Initial carrier frequency tolerance specified in Hz
2	Returns an N-point trace representing FM deviation samples (specified in kHz) 25 ns apart (if option B7D installed, otherwise 50 ns apart for option AYX). The number of trace points returned can be accessed using FETCh:ICFT4?
3	Returns the trace point (from FETCh:ICFT2?) which most closely corresponds to bit p0 (if Burst Sync set to 'None', 0 will always be returned)
4	Returns the number of points that will be returned from FETCh:ICFT2?

Modulation Characteristics Measurement

This measures the modulator performance and the accuracy of the pre-modulation 0.5BT Gaussian filter. You must be in the Bluetooth™ mode to use these commands. Use INSTrument:SELect to set the mode.

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

:CONFigure:MCHar

:FETCh:MCHar[n]?

:READ:MCHar[n]?

:MEASure:MCHar[n]?

Front Panel Access: **Measure**, **Modulation Chars**

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

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 7 scalar values (comma separated): 1. Δf1avg 2. Min Δf1max 3. Max Δf1max 4. Δf2avg 5. Min Δf2max 6. Max Δf2max 7. Δf2avg/Δf1avg
2	Returns an N-point trace representing FM deviation samples for the full packet (specified in kHz) 100 ns apart. The number of trace points returned can be accessed using FETCh:MCH4?
3	Returns the trace point (from FETCh:MCH2?) which most closely corresponds to bit p0 (if Burst Sync set to 'None', 0 will always be returned)
4	Returns the number of points that will be returned from FETCh:MCH2?

Monitor Band/Channel Measurement

This measurement has two measurement methods: monitor band and monitor channel. In monitor band, the frequency band is viewed. In monitor channel, the spectrum of a selected channel is viewed.

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

:CONFigure:MONitor

:FETCh:MONitor[n]?

:READ:MONitor[n]?

:MEASure:MONitor[n]?

Front Panel Access: **Measure, Monitor Band/Channel**

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

Measurement Results Available

n	Results Returned
not specified or n=1	No return value
2	Returns the RF Envelope Trace (data array). This trace contains 401 data points in dBm.
3	Returns the Max Hold Trace (data array). This trace contains 401 data points in dBm.

Modulation Overview Measurement

This measures and reports several modulation metrics on a burst of any type.

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

:CONFigure:MOVerview

:FETCh:MOVerview[n]?

:READ:MOVerview[n]?

:MEASure:MOVerview[n]?

Front Panel Access: **Measure**, **Modulation Overview**

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

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 7 scalar values (comma separated): 1. Payload Bits 2. ICFT 3. Hi/Low Ratio 4. Low –Dev 5. Low +Dev 6. High –Dev 7. High +Dev
2	Returns an N-point trace representing FM deviation samples for the full packet (specified in kHz) 100 ns apart. The number of trace points returned can be accessed using FETCh:MOV4?
3	Returns the trace point (from FETCh:MOV2?) which most closely corresponds to bit p0 (if Burst Sync set to 'None', 0 will always be returned)
4	Returns the number of points that will be returned from FETCh:MOV2?

Output Power Measurement

This measures the output power of a specified channel or center frequency. You must be in the Bluetooth™ mode to use these commands. Use INSTrument:SELect to set the mode.

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

:CONFigure:OPOWer

:FETCh:OPOWer[n]?

:READ:OPOWer[n]?

:MEASure:OPOWer[n]?

Front Panel Access: **Measure, Output Power**

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

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 2 scalar values (comma separated): Average Power Peak Power
2	Returns the RF Envelope Trace Data (data array). This trace contains 401 data points in dBm.

Output Spectrum Bandwidth Measurement

Verify if the emissions inside the operating frequency are within limits. You must be in the Bluetooth™ mode to use these commands. Use INSTrument:SELect to set the mode.

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

:CONFigure:OSBWidth

:FETCh:OSBWidth[n]?

:READ:OSBWidth[n]?

:MEASure:OSBWidth[n]?

Front Panel Access: **Measure**, **Output Spectrum BW**

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

Measurement Results Available

n	Results Returned
not specified or n=1	Returns Output Spectrum –20 dB Bandwidth result
2	Returns the RF Envelope Trace Data (data array). This trace contains 401 data points in mdBm.

MMEMory Subsystem

The purpose of the MMEMory subsystem is to provide access to mass storage devices such as internal or external disk drives. Any part of memory that is treated as a device will be in the MMEMory subsystem.

The purpose of the MMEMory subsystem is to provide access to mass storage devices such as internal or external disk drives.

NOTE Refer also to :CALCulate and :TRACe subsystems for more trace and limit line commands.

Agilent ESA analyzers use two types of mass storage devices:

- 3.5 inch disk drive (high density, 1.44 MBytes formatted) designated “A:”
- Part of flash memory and treated as a device designated “C:”

The MMEMory command syntax term <file_name> is a specifier having the form: drive:name.ext, where the following rules apply:

- “drive” is “A:” or “C:”
- “name” is a DOS file name of up to eight characters, letters (A-Z, a-z) and numbers (0-9) only (lower case letters are read as uppercase)
- “ext” is an optional file extension using the same rules as “name,” but consists of up to three characters total. (The default file extension will be added if it is not specified.)

Store a Measurement Results in a File

`:MMEMory:STORe:RESults filename.csv`

Saves the measurement results to a file in memory. The file name must have a file extension of .csv and will be in the CSV (comma-separated values) format.

Example: MMEM:STOR:RES ‘C:mymeas.csv’

Front Panel Access: **File**, **Save**, **Type, Measurement Results**

READ Subsystem

The READ? commands are used with several other commands and are documented in the section on the “MEASure Group of Commands” on page 37.

SENSe Subsystem

Sets the instrument state parameters so that you can measure the input signal.

SENSe subsystem commands used for measurements in the MEASURE and Meas Setup menus may only be used to set parameters of a specific measurement when the measurement is active. Otherwise, an error will occur. You must first select the appropriate measurement using the :CONFigure:<measurement> command. If a :SENSe command is used to change a parameter during a measurement (while not in its idle state), the measurement will be restarted.

Adjacent Channel Power (ACP) Measurement

Commands for querying the ACP measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **ACP** measurement has been selected from the **MEASURE** key menu.

Adjacent Channel Power—Average Count

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

`[:SENSe]:ACPower:COUNt?`

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Adjacent Channel Power—State

`[:SENSe]:ACPower[:STATe] OFF|ON|0|1`

`[:SENSe]:ACPower[:STATe]?`

Turn Fast ACP measurement on or off.

Factory Preset and *RST: off

Remarks: You must be in the Bluetooth™ mode to use this command. Use

INSTrument:SELect to set the mode.

Adjacent Channel Power—Averaging Termination Control

[:SENSe]:ACPower:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:ACPower:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Factory Preset and *RST: Repeat

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Adjacent Channel Power—Fast Measurement Mode

[:SENSe]:ACPower:FAST OFF|ON|0|1

[:SENSe]:ACPower:FAST?

Turn Fast ACP measurements on and off.

Factory Preset and *RST: OFF

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Adjacent Channel Power—Limit Test

[:SENSe]:ACPower:LIMit:TEST OFF|ON|0|1

[:SENSe]:ACPower:LIMit:TEST?

Turn limit checking on and off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Carrier Frequency Drift Measurement

Commands for querying the carrier frequency drift measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Carrier Freq Drift** measurement has been selected from the **MEASURE** key menu.

Carrier Frequency Drift—Average Count

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

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

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Carrier Frequency Drift—Averaging State

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

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

Turn averaging on or off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Carrier Frequency Drift—Averaging Termination Control

[:SENSe]:CFDRift:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:CFDRift:AVERage:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Mode**

Carrier Frequency Drift—Burst Sync Source

[:SENSe]:CFDRift:BSYNc:SOURce PREamble|NONE

[:SENSe]:CFDRift:BSYNc:SOURce?

Selects how the measurement will synchronize with the correct part of the burst.

PREamble - uses p0 to define the start of the burst and defines the duration as the packet length of the currently selected packet type.

Factory Preset and *RST: PREamble

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Burst Sync**

Carrier Frequency Drift—Limit Test

[:SENSe]:CFDRift:LIMit:TEST OFF|ON|0|1

[:SENSe]:CFDRift:LIMit:TEST?

Turn limit checking on and off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Carrier Frequency Drift—Trigger Source

[:SENSe]:CFDRift:TRIGger:SOURce IMMediate|EXTernal|RFBurst

[:SENSe]:CFDRift:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

IMMediate - the next data acquisition is immediately taken (also called Free Run).

EXTernal - rear panel external trigger input.

RFBurst – RF burst envelope trigger that has automatic level control for periodic burst signals (Option B7E required).

Factory Preset and *RST: RFBurst

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Trig Source**

Carrier Frequency Drift—View Offset

[:SENSe]:CFDRift:VOFFset <real number>

[:SENSe]:CFDRift:VOFFset?

Offset the trace displayed on the screen.

Factory Preset and *RST: 0.00 s

Range –4.00 to 4.00 s

Remarks: Although a restart is witnessed on changing this parameter it is not a full restart and only changes the trace position on the screen, not the results being calculated.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Channel Commands

Channel Auto

[:SENSe]:CHANnel:AUTO OFF|ON|0|1

[:SENSe]:CHANnel:AUTO?

When activated the channel will be set to the channel nearest to the strongest signal within the Bluetooth™ operating frequencies. No validation of the signal is conducted.

Factory Preset and *RST: OFF

Remarks: Global to the current mode.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **FREQUENCY/Channel**, **Auto Channel**

Frequency Hopping

[:SENSe]:CHANnel:FHOPping OFF|ON|0|1

[:SENSe]:CHANnel:FHOPping?

Turns frequency hopping off or on.

Factory Preset and *RST: OFF

Remarks: Global to the current mode.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup**, **Radio**

Channel Number

[:SENSe]:CHANnel[:NUMBer] <integer>

[:SENSe]:CHANnel[:NUMBer]?

Set the analyzer to a frequency that corresponds to the channel number.

Factory Preset and *RST: 0

Range: 0 to 78

Remarks: Global to the current mode.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **FREQUENCY Channel, Channel**

Channel Software Enhanced Triggering

[:SENSe]:CHANnel:SETRiggering On|Off|1|0

[:SENSe]:CHANnel:SETRiggering?

Set the analyzer to set software enhanced triggering On or Off. When switched to "on" traces acquired using external or RF burst trigger will be verified for correctness before any processing upon them is carried out. A trace would be considered incorrect if the trace had been acquired either:

1. During a hardware mis-trigger (perhaps due to a noisy signal or out of spec conditions)
2. From an incorrect external trigger signal if the carrier were on another hopping channel.

In these cases the most recently acquired trace would be automatically rejected and another trace would be taken. The same process would be repeated until a valid trace was acquired.

Factory Preset and *RST: Off

Remarks: Global to the current mode.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Radio**…

Signal Corrections Commands

Correction For External Gain

[:SENSe]:CORRection:GAIN <dB>

[:SENSe]:CORRection:GAIN?

Set equal to the gain of an external amplifier.

Factory Preset and *RST: 0.00 dB

Range: 0 to 65.00 dB

Default Unit: dB

Remarks: Global to the current mode.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Input....**

Correction For External Loss

[:SENSe]:CORRection:LOSS <dB>

[:SENSe]:CORRection:LOSS?

Set equal to the external attenuation.

Factory Preset and *RST: 0.00 dB

Range: 0 to 65.00 dB

Default Unit: dB

Remarks: Global to the current mode.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Input....**

Default Reset

[:SENSe]:DEFaults

Restores personality Mode Setup defaults.

Front Panel Access: **Mode Setup**

Remarks: This command sets all the SENSe defaults but has no effect on the MEASure default settings. Use the CONFigure:<measurement> command to set measurement defaults

Maximum Deviation

[:SENSe]:DEViation <freq>

[:SENSe]:DEViation?

Sets the expected maximum deviation of the Bluetooth™ modulation.

Default Unit: Hz

Front Panel Access: **Mode Setup**, **Demod...**

Frequency Commands

Center Frequency

[:SENSe]:FREQuency:CENTer <freq>

[:SENSe]:FREQuency:CENTer?

Set the center frequency.

Factory Preset and *RST:
ESA E4402B, E4403B: 1.5 GHz for SA

ESA E4404B: 3.35 GHz for SA

ESA E4405B: 6.6 GHz for SA

ESA E4407B, E4408B: 13.25 GHz for SA

942.6 MHz for GSM

The first channel in the current tuning plan, for cdmaOne.

2.40200 GHz for Bluetooth™

Range:
ESA E4402B, E4403B: –80 MHz to 3.10 GHz for SA

ESA E4404B: –80 MHz to 6.78 GHz for SA

ESA E4405B: –80 MHz to 13.3 GHz for SA

ESA E4407B, E4408B: –80 MHz to 27.0 GHz for SA

942.6 MHz for GSM

The same as the SA range for cdmaOne

2.400 to 2.4835 GHz for Bluetooth™

Default Unit: Hz

Remarks: Global to the current mode.

Front Panel Access:
For ESA SA, GSM, and Bluetooth™

FREQUENCY/Channel, Center Freq

For ESA cdmaOne

FREQUENCY/Channel, Channel Freq

Initial Carrier Frequency Tolerance Measurement

Commands for querying the initial carrier frequency tolerance measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Init Carrier Freq Tol** measurement has been selected from the **MEASURE** key menu.

Initial Carrier Frequency Tolerance—Average Count

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

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

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Initial Carrier Frequency Tolerance—Averaging State

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

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

Turn averaging on or off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Initial Carrier Frequency Tolerance—Averaging Termination Control

[:SENSe]:ICFTol:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:ICFTol:AVERage:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Mode**

Initial Carrier Frequency Tolerance—Burst Sync Source

[:SENSe]:ICFTol:BSYNc:SOURce PREamble|NONE

[:SENSe]:ICFTol:BSYNc:SOURce?

Select how the measurement will synchronize with the correct part of the burst.

PREamble - uses p0 to define the start of the burst and defines the duration as the packet length of the currently selected packet type.

Factory Preset and *RST: PREamble

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Burst Sync**

Initial Carrier Frequency Tolerance—Limit Test

[:SENSe]:ICFTol:LIMit:TEST OFF|ON|0|1

[:SENSe]:ICFTol:LIMit:TEST?

Turn limit checking on and off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Initial Carrier Frequency Tolerance—Trigger Source

[:SENSe]:ICFTol:TRIGger:SOURce IMMediate|EXTernal|RFBurst

[:SENSe]:ICFTol:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

IMMediate - the next data acquisition is immediately taken (also called Free Run).

EXTernal - rear panel external trigger input

RFBurst – RF burst envelope trigger that has automatic level control for periodic burst signals

Factory Preset and *RST: RFBurst

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Trig Source**

Modulation Characteristics Measurement

Commands for querying the modulation characteristics measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Modulation Chars** measurement has been selected from the **MEASURE** key menu.

Modulation Characteristics—Average Count

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

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

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Modulation Characteristics—Averaging State

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

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

Turn averaging on or off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Modulation Characteristics—Averaging Termination Control

[:SENSe]:MCHar:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:MCHar:AVERage:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Mode**

Modulation Characteristics—Resolution Bandwidth

[:SENSe]:MCHar:BANDwidth|BWIDth[:RESolution]: DFONe|DFTWo <freq>

[:SENSe]:MCHar:BANDwidth|BWIDth[:RESolution]: DFONe|DFTWo?

Change the resolution bandwidth filter used when calculating Δ f1 or Δ f2.

Factory Preset and *RST: 3 MHz for Δf1 and Δf2

Range 10 Hz to 5 MHz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Advanced**

Modulation Characteristics—Burst Sync Source

[:SENSe]:MCHar:BSYNc:SOURce PREamble|NONE

[:SENSe]:MCHar:BSYNc:SOURce?

Select how the measurement will synchronize with the correct part of the burst.

PREamble - uses p0 to define the start of the burst and defines the duration as the packet length of the currently selected packet type.

Factory Preset and *RST: PREamble

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Burst Sync**

Modulation Characteristics—Hold Result

[:SENSe]:MCHar:HRESult OFF|DF1|DF2

[:SENSe]:MCHar:HRESult?

Store the measurement result for either Δf1 Avg or Δf2 Avg depending on which result has been measured.

Factory Preset and *RST: OFF

Remarks: **Hold Result** may not be used when:

the measurement has not completed the full number of averages, or

the measurement is in the idle state and the result data is or has become invalid.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Hold Result**

Modulation Characteristics—Limit Test

[:SENSe]:MCHar:LIMit:TEST OFF|ON|0|1

[:SENSe]:MCHar:LIMit:TEST?

Turn limit checking on and off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Modulation Characteristics—Payload Data

[:SENSe]:MCHar:PDATa AUTO|LFPattern|HFPattern

[:SENSe]:MCHar:PDATa?

Choose the expected payload data pattern (**11110000** or **10101010**), or to let the measurement auto-detect the pattern.

AUTO - the measurement will auto-detect the pattern.

LFPattern - selects the 11110000 pattern.

HFPattern - selects the 10101010 pattern.

Factory Preset and *RST: AUTO

Remarks: If you select **Auto**, then the measurement will complete successfully only if one of the two expected patterns is received. If the pattern is not received, the measurement will abort to the idle state, although it will not invalidate any previously attained results that have been held using SENSe:MCHar:HRESult.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Payload Data**

Modulation Characteristics—Trigger Source

`[:SENSe]:MCHar:TRIGger:SOURce IMMediate|EXTernal|RFBurst`

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

Select the trigger source used to control the data acquisitions.

IMMediate - the next data acquisition is immediately taken (also called Free Run).

EXTernal - rear panel external trigger input.

RFBurst - RF burst envelope trigger that has automatic level control for periodic burst signals (Option B7E required).

Factory Preset and *RST: RFBurst

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Trig Source**

Monitor Band/Channel Measurement

Commands for querying the monitor band/channel measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Monitor Band/Channel** measurement has been selected from the **MEASURE** key menu.

Monitor Band/Channel—Average Count

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

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

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Avg Number**

Monitor Band/Channel—Averaging State

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

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

Turn averaging on or off.

Factory Preset and *RST: ON for GSM, Bluetooth™

OFF for cdmaOne

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Avg Number**

Monitor Band/Channel—Averaging Termination Control

`[:SENSe]:MONitor:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:MONitor:AVERage:TCONtrol?`

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Avg Mode**

Monitor Band/Channel—Band Method Resolution Bandwidth

[:SENSe]:MONitor:BAND:BANDwidth|BWIDth[:RESolution] <freq>

[:SENSe]:MONitor:BAND:BANDwidth|BWIDth[:RESolution]?

Set the value of the resolution bandwidth for the band method of the monitor band/channel measurement. If span is set to a value greater than 5 MHz, minimum resolution bandwidth is limited to 1 kHz.

Factory Preset and *RST:	100 kHz
Range:	Option 1DR — 10 Hz to 5 MHz non-Option 1DR — 1 kHz to 5 MHz
Default Unit:	Hz
Remarks:	You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup, Band Setup, Res BW**

Monitor Band/Channel—Band Method Video Bandwidth

[:SENSe]:MONitor:BAND:BANDwidth|BWIDth:VIDeo <freq>

[:SENSe]:MONitor:BAND:BANDwidth|BWIDth:VIDeo?

Set the video bandwidth for the band method of the monitor band/channel measurement.

Factory Preset and *RST:	100 kHz
Range:	30 Hz to 3 MHz
Default Unit:	Hz
Remarks:	You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup, Band Setup, Video BW**

Monitor Band/Channel—Band Method Detector Mode

[:SENSe]:MONitor:BAND:DETector POSitive|SAMPle|NEGative

[:SENSe]:MONitor:BAND:DETector?

Set the detector mode type for the band method of the monitor band/channel measurement.

POSitive - positive peak detection displays the highest sample taken during the interval being displayed.

SAMPle - sample detection displays the first sample taken during the interval being displayed.

NEGative - negative peak detection displays the lowest sample taken during the interval being displayed.

Factory Preset and *RST: POSitive

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Band Setup, Detector**

Monitor Band/Channel—Band Method Maximum Hold Trace Average State

[:SENSe]:MONitor:BAND:MAXHold[:STATe] OFF|ON|0|1

[:SENSe]:MONitor:BAND:MAXHold[:STATe]?

Turn maximum hold trace average feature on or off for the band method of the monitor band/channel measurement.

Factory Preset and *RST: OFF

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Band Setup, Max Hold**

Monitor Band/Channel—Band Method Frequency Span

[:SENSe]:MONitor:BAND:SPAN <freq>

[:SENSe]:MONitor:BAND:SPAN?

Set the frequency span of the monitor band measurement. If resolution bandwidth is set to a value less than 1 kHz, maximum span is limited to 5 MHz.

Factory Preset and *RST: Full (Uses the full span of the selected standard.) for cdmaOne

103.5 MHz for Bluetooth™

Range: ESA range

Default Unit: Hz

Remarks: You must be in the Bluetooth™ or cdmaOne mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Edit Table** for cdmaOne

Span for Bluetooth™

Monitor Band/Channel—Band Sweep Time

[:SENSe]:MONitor:BAND:SWEep:TIME <real number>

[:SENSe]:MONitor:BAND:SWEep:TIME?

Set the sweep time.

Factory Preset and *RST: 2 s

Range: 5 ms to 2 ks

Default Unit: Seconds

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Band Setup**, **Sweep Time**

Monitor Band/Channel—Band Sweep Time Auto

[:SENSe]:MONitor:BAND:SWEep:TIME:AUTO OFF|ON|0|1

[:SENSe]:MONitor:BAND:SWEep:TIME:AUTO?

Select auto or manual control of the sweep (acquisition) time. This is an advanced control that normally does not need to be changed.

AUTO - couples the Sweep Time to the Frequency Span and Resolution BW

Manual - the Sweep Time is uncoupled from the Frequency Span and Resolution BW.

Factory Preset and *RST: AUTO

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Band Setup**, **Sweep Time**

Monitor Band/Channel—Channel Span

[:SENSe]:MONitor:CHANnel SINGle|TRIPle

[:SENSe]:MONitor:CHANnel?

Switch view between a single or triple channel display.

Factory Preset and *RST: SINGle

Remarks: You must be in Bluetooth™ or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Channel Span**

Monitor Band/Channel—Channel Method Resolution Bandwidth

[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth[:RESolution] <freq>

[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth[:RESolution]?

Set the resolution bandwidth for the channel method of the monitor band/channel measurement. If span is set to a value greater than 5 MHz, minimum resolution bandwidth is limited to 1 kHz.

Factory Preset and *RST:	10 kHz for GSM 30 kHz for cdmaOne 100 kHz for Bluetooth™
Range:	Option 1DR—10 Hz to 5 MHz non-Option 1DR—1 kHz to 5 MHz
Default Unit:	Hz
Remarks:	You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup, Chan Setup, Res BW**

Monitor Band/Channel—Channel Method Video Bandwidth

[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth:VIDeo <freq>

[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth:VIDeo?

Set the video bandwidth for the channel method of the monitor band/channel measurement.

Factory Preset and *RST:	10 kHz for GSM 30 kHz for cdmaOne 100 kHz for Bluetooth™
Range:	Option 1DR—30 Hz to 3 MHz non- Option 1DR—1 kHz to 3 MHz
Default Unit:	Hz
Remarks:	You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup, Chan Setup, Video BW**

Monitor Band/Channel—Channel Method Detector Mode

[:SENSe]:MONitor:CHANnel:DETector POSitive|SAMPle|NEGative

[:SENSe]:MONitor:CHANnel:DETector?

Set the detector mode type for the channel method of the monitor band/channel measurement.

POSitive - positive peak detection displays the highest sample taken during the interval being displayed.

SAMPle - sample detection displays the first sample taken during the interval being displayed.

NEGative - negative peak detection displays the lowest sample taken during the interval being displayed.

Factory Preset and *RST: POSitive

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Chan Setup, Detector**

Monitor Band/Channel—Channel Method Maximum Hold Trace Average State

[:SENSe]:MONitor:CHANnel:MAXHold[:STATe] OFF|ON|0|1

[:SENSe]:MONitor:CHANnel:MAXHold[:STATe]?

Turn maximum hold trace average feature on or off for the channel method of the monitor band/channel measurement. When max hold is turned on, trace averaging is turned off.

Factory Preset and *RST: OFF

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Chan Setup, Max Hold**

Monitor Band/Channel—Channel Sweep Time

[:SENSe]:MONitor:CHANnel:SWEep:TIME <real number>

[:SENSe]:MONitor:CHANnel:SWEep:TIME?

Set the sweep time.

Factory Preset and *RST: 2 s

Range: 5 ms to 2 ks

Default Unit: Seconds

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Channel Setup**, **Sweep Time**

Monitor Band/Channel—Channel Sweep Time Auto

[:SENSe]:MONitor:CHANnel:SWEep:TIME:AUTO OFF|ON|0|1

[:SENSe]:MONitor:CHANnel:SWEep:TIME:AUTO?

Select auto or manual control of the sweep (acquisition) time. This is an advanced control that normally does not need to be changed.

AUTO - couples the Sweep Time to the Frequency Span and Resolution BW

Manual - the Sweep Time is uncoupled from the Frequency Span and Resolution BW.

Factory Preset and *RST: AUTO

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Channel Setup**, **Sweep Time**

Monitor Band/Channel—Method Selection

[:SENSe]:MONitor:METHod CHANnel|BAND

[:SENSe]:MONitor:METHod?

Sets the monitor measurement method to either channel or band.

Factory Preset and *RST: BAND

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Method**

Modulation Overview Measurement

Commands for querying the modulation overview measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Modulation Overview** measurement has been selected from the **MEASURE** key menu.

Modulation Overview—Average Count

[:SENSe]:MOVerview:AVERage:COUNt <integer>

[:SENSe]:MOVerview:AVERage:COUNt?

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Modulation Overview—Averaging State

[:SENSe]:MOVerview:AVERage[:STATe] OFF|ON|0|1

[:SENSe]:MOVerview:AVERage[:STATe]?

Turn averaging on or off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Modulation Characteristics—Averaging Termination Control

[:SENSe]:MOVerview:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:MOVerview:AVERage:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Mode**

Modulation Overview—Burst Sync Source

[:SENSe]:MOVerview:BSYNc:SOURce PREamble|NONE

[:SENSe]:MOVerview:BSYNc:SOURce?

Select how the measurement will synchronize with the correct part of the burst.

PREamble - uses p0 to define the start of the burst and defines the duration as the packet length of the currently selected packet type.

Factory Preset and *RST: PREamble

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Burst Sync**

Modulation Overview—Trigger Source

[:SENSe]:MOVerview:TRIGger:SOURce IMMediate|EXTernal|RFBurst

[:SENSe]:MOVerview:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

IMMediate - the next data acquisition is immediately taken (also called Free Run).

EXTernal - rear panel external trigger input

RFBurst - RF burst envelope trigger that has automatic level control for periodic burst signals

Factory Preset and *RST: RFBurst (or EXTernal if option B7E is not present)

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Trig Source**

Modulation Overview—View Offset

`[:SENSe]:MOVerview:VOFFset <real number>`

`[:SENSe]:MOVerview:VOFFset?`

Offset the trace displayed on the screen.

Factory Preset and *RST: 0.00 s

Range –4.00 to 4.00 s

Remarks: Although a restart is witnessed on changing this parameter it is not a full restart and only changes the trace position on the screen, not the results being calculated.

You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Output Power Measurement

Commands for querying the output power measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Output Power** measurement has been selected from the **MEASURE** key menu.

Output Power—Average Count

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

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

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Output Power—Averaging State

[:SENSe]:OPOWer:AVERage[:STATe] OFF|ON|0|1

[:SENSe]:OPOWer:AVERage[:STATe]?

Turn averaging on or off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Output Power—Averaging Termination Control

[:SENSe]:OPOWer:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:OPOWer:AVERage:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Mode**

Output Power—Average Type

[:SENSe]:OPOWer:AVERage:TYPE LPOWer|POWer

[:SENSe]:OPOWer:AVERage:TYPE?

Successive measurements of data can be combined together to average out measurement variations.

LPOWer - linear power, also called video. Selects a digital averaging routine that averages on a point-by-point basis over a number of successive sweeps.

POWer - selects power averaging which is performed by converting the trace data from dB to power units, and then averaging the power trace data.

Factory Preset and *RST: POWer

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Type**

Output Power—Burst Sync Source

[:SENSe]:OPOWer:BSYNc:SOURce PREamble|RFAMplitude|NONE

[:SENSe]:OPOWer:BSYNc:SOURce?

Select how the measurement will synchronize with the correct part of the burst.

PREamble - uses p0 to define the start of the burst and defines the duration as the packet length of the currently selected packet type.

RFAMplitude - defines the duration of the burst as the time between the leading and trailing 3 dB points compared to the average power.

Factory Preset and *RST: PREamble

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Burst Sync**

Output Power—Limit Test

[:SENSe]:OPOWer:LIMit:TEST OFF|ON|0|1

[:SENSe]:OPOWer:LIMit:TEST?

Turns limit checking on and off. This is not the same as limit lines – the numeric peak and average power results are checked against the Peak Upper Limit, Avg Upper Limit and Avg Lower Limit parameters to see if they meet the limit requirements.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Limit Test**

Output Power—Start Marker

[:SENSe]:OPOWer:STARt <real number>

[:SENSe]:OPOWer:STARt?

Set the point at which averaging of the power should begin. It is defined as a percentage of the burst length. The difference between the stop and start marker must be at least 1%.

Factory Preset and *RST: 20.00%

Range 0.00 to 99.00%

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Start Marker**

Output Power—Stop Marker

[:SENSe]:OPOWer:STOP <real number>

[:SENSe]:OPOWer:STOP?

Set the point at which averaging of the power should stop. It is defined as a percentage of the burst length. The difference between the stop and start marker must be at least 1%.

Factory Preset and *RST: 80.00%

Range 1.00 to 100.00%

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Stop Marker**

Output Power—Trigger Source

[:SENSe]:OPOWer:TRIGger:SOURce IMMediate|EXTernal|RFBurst|VIDeo

[:SENSe]:OPOWer:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

IMMediate - the next data acquisition is immediately taken (also called Free Run).

EXTernal - rear panel external trigger input.

RFBurst – RF burst envelope trigger that has automatic level control for periodic burst signals (Option B7E required).

VIDeo – Activates the trigger condition that allows the next sweep to start if the detected RF envelope voltage rises to a level set by the video trigger level.The analyzer triggers when the input signal exceeds the trigger level at the left edge of the display.

Factory Preset and *RST: RFBurst

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Trig Source**

Output Spectrum Bandwidth Measurement

Commands for querying the output spectrum bandwidth measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Output Spectrum BW** measurement has been selected from the **MEASURE** key menu.

Output Spectrum Bandwidth—Average Count

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

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

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset and *RST: 10

Range: 1 to 1000

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Output Spectrum Bandwidth—Averaging State

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

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

Turn averaging on or off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Number**

Output Spectrum Bandwidth—Averaging Termination Control

[:SENSe]:OSBWidth:AVERage:TCONtrol EXPonential|REPeat

[:SENSe]:OSBWidth:AVERage:TCONtrol?

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

EXPonential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

REPeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset and *RST: EXPonential

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Avg Mode**

Output Spectrum Bandwidth—Bandwidth Resolution

[:SENSe]:OSBWidth:BAND[RESolution] <freq>

[:SENSe]:OSBWidth:BAND[RESolution]?

Set the resolution bandwidth that will be used.

Factory Preset and *RST: 10 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Advanced**, **Res Bw**

Output Spectrum Bandwidth—Span

[:SENSe]:OSBWidth:BAND:SPAN <freq>

[:SENSe]:OSBWidth:BAND:SPAN?

Set the instrument span.

Factory Preset and *RST: 2 MHz

Range: ESA model dependent.

Remarks: You must be in the Bluetooth™, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Advanced**, **Span**

Output Spectrum Bandwidth—Video Bandwidth

[:SENSe]:OSBWidth:BAND:VIDeo <freq>

[:SENSe]:OSBWidth:BAND:VIDeo?

Set the video bandwidth that will be used.

Factory Preset and *RST: 30 kHz

Range: 30 Hz to 3 MHz

Default Unit: Hz

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Advanced**, **Video BW**

Output Spectrum Bandwidth—Limit Test

[:SENSe]:OSBWidth:LIMit:TEST OFF|ON|0|1

[:SENSe]:OSBWidth:LIMit:TEST?

Turn limit checking on and off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**

Output Spectrum Bandwidth—Maximum Hold Trace Average State

[:SENSe]:OSBWidth:MAXHold[:STATe] OFF|ON|0|1

[:SENSe]:OSBWidth:MAXHold[:STATe]?

Turn maximum hold trace feature on or off. When max hold is turned on, trace averaging is turned off.

Factory Preset and *RST: ON

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup, Advanced**, **Max Hold**

Output Spectrum Bandwidth—Sweep Time

[:SENSe]:OSBWidth:SWEep:TIME <real number>

[:SENSe]:OSBWidth:SWEep:TIME?

Set the sweep time.

Factory Preset and *RST: 1 s

Range: 5 ms to 4 ks

Default Unit: Seconds

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Advanced**, **Sweep Time**

Output Spectrum Bandwidth—Sweep Time Auto

[:SENSe]:OSBWidth:SWEep:TIME:AUTO OFF|ON|0|1

[:SENSe]:OSBWidth:SWEep:TIME:AUTO?

Select auto or manual control of the sweep (acquisition) time. This is an advanced control that normally does not need to be changed.

AUTO - couples the Sweep Time to the Frequency Span and Resolution BW

Manual - the Sweep Time is uncoupled from the Frequency Span and Resolution BW.

Factory Preset and *RST: AUTO

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Output Spectrum Bandwidth—Bandwidth

[:SENSe]:OSBWidth:XDB <dB>

[:SENSe]:OSBWidth:XDB?

Set the level of the markers that will determine the measured output spectrum bandwidth.

Factory Preset and *RST: –20 dB

Range: –50 dB to –5 dB

Default Unit: dB

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Meas Setup**, **Bandwidth**

Packet Commands

Packet Access Code and Header

[:SENSe]:PACKet:ACHeader

[:SENSe]:PACKet:ACHeader?

Set the number of bits which total the Bluetooth™ packet Access Code and Header.

Factory Preset and *RST: 126

Range: 0 to 126

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup**, **Packet Data...**

Packet Payload CRC Length

[:SENSe]:PACKet:DH1|DH3|DH5Crc <bits>

[:SENSe]:PACKet:DH1|DH3|DH5Crc?

Set the number of bits which make up the DH1, DH3, or DH5 payload CRC length. The default value is 16 bits.

Factory Preset and *RST:	DH1	16
	DH3	16
	DH5	16
Range:	DH1	0 to 16
	DH3	0 to 16
	DH5	0 to 16

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup**, **Packet Data...**

Packet Payload Header

[:SENSe]:PACKet:DH1|DH3|DH5Header <bits>

[:SENSe]:PACKet:DH1|DH3|DH5Header?

Set the number of bits which make up the DH1, DH3, or DH5 Packet Payload Header.

Factory Preset and *RST:	DH1	8
	DH3	16
	DH5	16
Range:	DH1	0 to 8
	DH3	0 to 16
	DH5	0 to 16

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup**, **Packet Data...**

Packet Payload Data Length

[:SENSe]:PACKet:DH1|DH3|DH5Length <bits>

[:SENSe]:PACKet:DH1|DH3|DH5Length?

Set the number of data bits which make up the DH1, DH3, or DH5 Payload Data. The default value does not include the 16 CRC bits.

Factory Preset and *RST:	DH1	216
	DH3	1464
	DH5	2712
Range:	DH1	0 to 232
	DH3	0 to 1480
	DH5	0 to 2728

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup**, **Packet Data...**

Packet Type

[:SENSe]:PTYPe DH1|DH3|DH5

[:SENSe]:PTYPe?

Select the type of packet to measure

Factory Preset and *RST: DH1

Remarks: You must be in the Bluetooth™ mode to use this command. Use :INSTrument:SELect to set the mode.

Front Panel Access: **Frequency Channel**, **Packet Type**

RF Power Commands

RF Port Input Attenuation

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

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

Set the RF input attenuator. This value is set at its auto value if RF input is set to auto.

Factory Preset and *RST: 10 dB for SA

5 dB for Bluetooth™, cdmaOne, GSM

Range: ESA E4402B, E4403B: 0 to 75 dB for SA

ESA E4404B: 0 to 75 dB for SA

ESA E4405B: 0 to 75 dB for SA

ESA E4407B, E4408B: 0 to 65dB for SA

0 to 75 dB in 5 dB steps for cdmaOne, GSM

Same range as SA mode, but in 5 dB steps for Bluetooth™

Default Unit: dB

Front Panel Access: **Input, Input Atten** for Bluetooth™, cdmaOne, GSM

or

Mode Setup, Input, Tab⇒, **Input Attenuation** for Bluetooth™, cdmaOne, GSM

or

AMPLITUDE/Y Scale, Attenuation for SA, cdmaOne, GSM

RF Input Port Power Gain

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

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

Turns the internal preamp on or off for the currently selected measurement.

Factory Preset and *RST: OFF

Remarks: You must be in GSM or Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **AMPLITUDE/Y Scale, Int Preamp for SA**

or

Mode Setup, Input... for GSM, Bluetooth

or

Input, Int Preamp for GSM, Bluetooth

RF Port Power Range

[:SENSe]:POWer[:RF]:RANGe <dBm>

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

Set the maximum total power to be applied at the RF input. There are two modes of operation as follows:

When RF Port Power Range Auto = AUTO, Max Total Pwr displays the actual measured power level.

When RF Port Power Range Auto = MANual, the input power range is determined by the manually entered Max Total Pwr value.

Range: -100 to +80

Default Unit: dBm

Remarks: You must be in GSM or Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Input....**

or

Input, Max Total Pwr

RF Port Power Range Auto

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

[:SENSe]:POWer[:RF]:RANGe:AUTO?

Select the RF port power range to be set either automatically or manually.

ON - power range is automatically set as determined by the actual measured power level at the start of a measurement, as displayed by the Max Total Pwr value.

OFF - power range is manually set by either the manually entered Max Total Pwr or Input Atten value.

Factory Preset and *RST: ON

Remarks: You must be in GSM or Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Input....**

or

Input, Max Total Pwr

Radio Standards Commands

Radio Device Under Test

[:SENSe]:RADio:DEVice PC1|PC2|PC3

[:SENSe]:RADio:DEVice?

Select the power class of the Bluetooth™ device to be measured. Choices are Power Class 1, 2, or 3.

Factory Preset and *RST: PC1

Remarks: You must be in Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Global to current mode.

Front Panel Access: **Mode Setup, Radio, Device**

Synchronization Commands

Burst Search Pre-Trigger

[:SENSe]:SYNC:BURSt:SPRetrig <seconds>

[:SENSe]:SYNC:BURSt:SPRetrig?

Enter the value, relative to the trigger, that will determine the point where the trace data will start to be collected. Default is –100us.

Factory Preset and *RST: –100 υs

Range: –4.000 ms to 4.000 ms

Remarks: You must be in the Bluetooth™ mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Demod....**

or

Det/Demod, Burst Search Pre-Trigger

Burst Search Threshold

[:SENSe]:SYNC:BURSt:STHReshold <rel_power>

[:SENSe]:SYNC:BURSt:STHReshold?

Set the power threshold, relative to the peak power, that is used to determine the burst rising edge and falling edge.

Factory Preset and *RST: –10 dB

–3.00 dB for Bluetooth™

Range: –200 to –0.01 dB

–50.00 to –0.01 dB for Bluetooth™

Default Unit: dB

Remarks: You must be in the Bluetooth™ or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup, Demod....**

or

Det/Demod, Burst Search Threshold

TRIGger Subsystem

The Trigger Subsystem is used to set the controls and parameters associated with triggering the data acquisitions. Other trigger-related commands are found in the INITiate and ABORt subsystems.

External Trigger Delay

:TRIGger[:SEQuence]:EXTernal:DELay <time>

:TRIGger[:SEQuence]:EXTernal:DELay?

Set the trigger delay when using an external trigger. Set the trigger value to zero (0) seconds to turn off the delay.

Factory Preset and *RST: 0.0 s

Range: -5 ms to +5 ms, for GSM, Bluetooth™

Default Unit: seconds

Front Panel Access: **Mode Setup, Trigger....**

or

Trig, External, Delay

External Trigger Slope

:TRIGger[:SEQuence]:EXTernal:SLOPe NEGative|POSitive

:TRIGger[:SEQuence]:EXTernal:SLOPe?

Sets the trigger slope when using an external trigger input.

In SA mode this command activates the trigger condition that allows the next sweep to start when the external voltage (connected to GATE TRIG/EXT TRIG IN on the rear panel) passes through approximately 1.5 volts. The external trigger signal must be a 0 V to +5 V TTL signal. This function only controls the trigger polarity (for positive or negative-going signals).

Factory Preset and *RST: Positive

Front Panel Access: **Mode Setup, Trigger....**

or

Trig, External, Slope

RF Burst Trigger Delay

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

:TRIGger[:SEQuence]:RFBurst:DELay?

Set the trigger delay when using the RF burst trigger.

Factory Preset and *RST: 0.0 µs

Range: –5ms to 5ms

Default Unit: seconds

Front Panel Access: **Mode Setup, Trigger, Tab⇒, RF Burst Delay**

or

Trig

RF Burst Trigger Level

:TRIGger[:SEQuence]:RFBurst:LEVel <rel_power>

:TRIGger:RFBurst:LEVel <dB> for GSM mode

:TRIGger[:SEQuence]:RFBurst:LEVel?

Set the trigger level when using the RF Burst trigger. The value is relative to the peak of the signal. RF Burst is also known as RF Envelope.

Factory Preset and *RST: –6.0 dB

Range: –25.0 to 0.0 dB

Default Unit: dB

Front Panel Access: **Mode Setup, Trigger, Tab⇒, RF Burst Level**

or

Trig, RF Burst, Peak Level

Video Trigger Delay

:TRIGger[:SEQuence]:VIDeo:DELay <time>

:TRIGger[:SEQuence]:VIDeo:DELay?

Set the trigger delay when using the video trigger.

Factory Preset and *RST: 0.000 s

Range: –5.000 to 5.000 ms

Default Unit: seconds

Remarks: You must be in the Bluetooth™ mode to use this command. Use :INSTrument:SELect to set the mode.

Front Panel Access: **Mode Setup**, **Trigger...**, **Tab⇒**, **Video Delay**

Trig, **Video**

Video Trigger Level Amplitude

:TRIGger[:SEQuence]:VIDeo:LEVel <ampl>

:TRIGger[:SEQuence]:VIDeo:LEVel?

Specifies the level at which a video trigger will occur.

Factory Preset and *RST: –3.5 dB

Range: -25.00 to 0.00 dB

Default Unit: current amplitude units

Remarks: Video is adjusted using this command, but must also be selected using the command:

:TRIGger[:SEQuence]:SOURce VIDeo

You must be in the Bluetooth™ mode to use this command. Use :INSTrument:SELect to set the mode.

Front Panel Access: **Trig, Video**

Mode Setup, **Trigger...**, **Tab⇒**, **Video Level**

Index

Index

Index