W-CDMA Programming Commands

Agilent Technologies E4406A VSA Series Transmitter Tester

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These commands are only available when the W-CDMA mode has been selected using INSTrument:SELect. If W-CDMA mode is selected, commands that are unique to another mode are not available.

SCPI Command Subsystems

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.

Code Domain Power Measurement Power Offset

:CALCulate:CDPower:PO1 <rel_power>

:CALCulate:CDPower:PO1?

Set the power offset value of the pilot bits.

:CALCulate:CDPower:PO2 <rel_power>

:CALCulate:CDPower:PO2?

Set the power offset value of the transmit control bits.

:CALCulate:CDPower:PO3 <rel_power>

:CALCulate:CDPower:PO3?

Set the power offset value of the transport format control indicator bits.

Factory Preset and *RST: 0 dB

Range: –20 to 50 dB

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Spread Code

:CALCulate:CDPower:SPRead <integer>

:CALCulate:CDPower:SPRead?

Set a spread code.

Factory Preset and *RST: 0

Range: 0 to 511, when **CALCulate:CDPower:SRATe** = 8

0 to 255, when **CALCulate:CDPower:SRATe** = 16

0 to 127, when **CALCulate:CDPower:SRATe** = 32

0 to 63, when **CALCulate:CDPower:SRATe** = 64

0 to 31, when **CALCulate:CDPower:SRATe** = 128

0 to 15, when **CALCulate:CDPower:SRATe** = 256

0 to 7, when **CALCulate:CDPower:SRATe** = 512

0 to 3, when **CALCulate:CDPower:SRATe** = 1024

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Symbol Rate

:CALCulate:CDPower:SRATe <integer>

:CALCulate:CDPower:SRATe?

Set a symbol rate.

Factory Preset and *RST: 16

Range: 8, 16, 32, 64, 128, 256, 512, 1024, when **[SENSe:]RADio:FORMat** = ARIB

16, 32, 64, 128, 256, 512, 1024, when **[SENSe:]RADio:FORMat** = Trial

Unit: ksps

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Sweep Offset (Measurement Offset)

:CALCulate:CDPower:SWEep:OFFSet <integer>

:CALCulate:CDPower:SWEep:OFFSet?

Set the timing offset of measurement interval in slots. (1 slot = 625 µs)

The sum of **CALCulate:CDPower:SWEep:TIME** and **CALCulate:CDPower:SWEep:OFFSet** must be equal to or less than 32, because data of 32 slots are acquired. If the sum becomes more than 32, **CALCulate:CDPower:SWEep:TIME** is adjusted automatically.

Factory Preset and *RST: 0

Range: 0 to 31

Unit: slots

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Sweep Time (Measurement Interval)

:CALCulate:CDPower:SWEep:TIME <integer>

:CALCulate:CDPower:SWEep:TIME?

Set the length of measurement interval in slots. (1 slot = 625 µs)

The sum of **CALCulate:CDPower:SWEep:TIME** and **CALCulate:CDPower:SWEep:OFFSet** must be equal to or less than 32, because data of 32 slots are acquired. If the sum becomes more than 32, **CALCulate:CDPower:SWEep:OFFSet** is adjusted automatically.

Factory Preset and *RST: 1

Range: 1 to 32

Unit: slots

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Query the Current Measurement Status

:CALCulate:CLIMits:FAIL?

Checks if the current measurement is outside its limits. It returns a 0 (zero) if it is passing or a 1 (one) if it is failing.

Front Panel Access: None

Data Query

:CALCulate:DATA[n]?

Returns the designated measurement data for the currently selected measurement and sub-opcode.

n = any valid sub-opcode for the current measurement. See the "MEASure Group of Commands" on page 27 for information on the data that can be returned for each measurement.

Calculate/Compress Trace Data Query

:CALCulate:DATA[n]:COMPress?
MAXimum|MEAN|MINimum|RMS|SAMPle|SDEViation|CFIT
{,<soffset>}{,<length>}{,<roffset>}

Returns the designated trace data for the currently selected measurement. The command can be used with sub-opcodes (*n*) for measurement results that are trace data. See the following table.

This command is used to compress/decimate a long trace to extract the desired data and only return to the computer the necessary data. A typical example would be to acquire N bursts of GSM data and return the mean power of each burst.

The command can also be used to identify the best curve fit for the data.

Curve Fit - applies curve fitting routines to the data. Where <soffset> and <length> are required, and <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in points) and the curve coefficients ((order + 1) values).

<Start offset> - is an optional integer. It specifies the amount of data, at the beginning of the trace, that will be ignored before the decimation process starts. It is an integer index (that starts counting at zero) for all the elements in the trace. The default value is zero.

<Length> - is an optional integer that defines how many trace elements will be compressed into one value. This parameter has a default value equal to the current trace length.

<Repeat offset> - is an optional real number. It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Select a number such that repeated additions will round to the correct starting index.

Example: To query the mean power of a set of GSM bursts:

1. Set the waveform measurement sweep time to acquire the required number of bursts.
2. Set the triggers such that acquisition happens at a known position relative to a burst.
3. Then query the mean burst levels using, **`CALC:DATA2:COMP? MEAN,62,1315,1442.3`** (These parameter values correspond to GSM signals.)

Remarks: The optional parameters must be entered in the specified order. If you want to specify <length>, you must also specify <soffset> or it's default. (e.g. **`CALC:DATA2:COMP? MEAN,62,1315`**

This command uses the data setting specified by the FORMat:DATA command and can return binary or ascii data.

History: Added in revision A.03.00 and later

Measurement	Available Traces	Markers Available?
ACP - adjacent channel power (Basic, cdmaOne, cdma2000, W-CDMA, iDEN, NADC, PDC modes)	no traces	no markers
CDPower - code domain power (W-CDMA mode)	CDPower (*n*=2)[a] EVM (*n*=4)[a] MERRor (*n*=5)[a] PERRor (*n*=6)[a] SPOWer (*n*=8)[a]	yes
CHPower - channel power (Basic, cdmaOne, cdma2000, W-CDMA mode)	SPECtrum (*n*=2)[a]	no markers
EVMQpsk - QPSK error vector magnitude (cdma2000, W-CDMA modes)	EVM (*n*=2)[a] MERRor (*n*=3)[a] PERRor (*n*=4)[a]	yes
PSTatistic - power statistics CCDF (cdma2000, W-CDMA modes)	MEASured (*n*=2)[a] GAUSsian (*n*=3)[a] REFerence (*n*=4)[a]	yes
RHO - modulation quality (cdmaOne, cdma2000, W-CDMA mode)	EVM (*n*=2)[a] MAGerror (*n*=3)[a] PHASe (*n*=4)[a]	yes
SPECtrum - (frequency domain) (all modes)	RFENvelope (*n*=2)[a] for Service mode IQ (*n*=3)[a] SPECtrum (*n*=4)[a] ASPectrum (*n*=7)[a]	yes
WAVEform - (time domain) (all modes)	RFENvelope (*n*=2)[a] IQ (*n*=8)[a]	yes

a. The *n* number indicates the sub-opcode that corresponds to this trace. Detailed descriptions of the trace data can be found in the MEASure subsystem documentation by looking up the sub-opcode for the appropriate measurement.

Calculate Peaks of Trace Data

:CALCulate:DATA[n]:PEAKs?
<threshold>,<excursion>[,AMPLitude|FREQuency|TIME]

Returns a list of peaks for the designated trace data *n* for the currently selected measurement. The peaks must meet the requirements of the peak threshold and excursion values.

The command can be used with sub-opcodes (*n*) for any measurement results that are trace data. See the table above. Subopcode *n*=0, raw trace data cannot be searched for peaks. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm.

Threshold - is the level below which trace data peaks are ignored

Excursion - To be defined as a peak, the signal must rise above the threshold by a minimum amplitude change. Excursion is measured from the lowest point above the threshold (of the rising edge of the peak), to the highest signal point that begins the falling edge.

Amplitude - lists the peaks in order of descending amplitude, so the highest peak is listed first. This is the default peak order listing if the optional parameter is not specified.

Frequency - lists the peaks in order of occurrence, left to right across the x-axis

Time - lists the peaks in order of occurrence, left to right across the x-axis

Example: Select the spectrum measurement.

Use **CALC:DATA4:PEAK? -40,10,FREQ** to identify the peaks above -40 dBm, with excursions of at least 10 dB, in order of increasing frequency.

Query Results: Returns a list of floating-point numbers. The first value in the list is the number of peak points that follow. A peak point consists of two values: a peak amplitude followed by the its corresponding frequency (or time).

If no peaks are found the peak list will consist of only the number of peaks, (0).

The peak list is limited to 100 peaks. Peaks in excess of 100 are ignored.

Remarks: This command uses the data setting specified by the FORMat:DATA command and can return real 32-bit, real 64-bit, or ASCII data. The default data format is ASCII.

History: Added in revision A.03.00 and later

CALCulate:MARKers Subsection

When using the marker commands you must specify the measurement in the SCPI command. We recommend that you use the marker commands only on the current measurement. Many marker commands will return invalid results, when used on a measurement that is not current. (This is true for commands that do more than simply setting or querying an instrument parameter.) No error is reported for these invalid results.

You must make sure that the measurement is completed before trying to query the marker value. Using the MEASure or READ command, before the marker command, forces the measurement to complete before allowing the next command to be executed.

Each measurement has its own instrument state for marker parameters. Therefore, if you exit the measurement, the marker settings in each measurement are saved and are then recalled when you change back to that measurement.

W-CDMA Mode - <measurement> key words

- ACP - no markers
- CDPower - markers available
- CHPower - no markers
- EVMQpsk - markers available
- PSTatistic - markers available
- RHO - markers available
- SPECtrum - markers available
- WAVeform - markers available

Example:

Suppose you are using the Spectrum measurement. To position marker 2 at the maximum peak value, of the trace that marker 2 is currently on, the command is:

```
:CALCulate:SPECtrum:MARKer2:MAXimum
```

You must make sure that the measurement is completed before trying to query the marker value. Using the MEASure or READ command, before the marker command, forces the measurement to complete before allowing the next command to be executed.

Markers All Off on All Traces

:CALCulate:<measurement>:MARKer:AOFF

Turns off all markers on all the traces.

Example: **CALC:SPEC:MARK:AOFF**

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, More, Marker All Off**

Marker Function

:CALCulate:<measurement>:MARKer[1]|2|3|4:FUNCtion BPOWer|NOISe|OFF

:CALCulate:<measurement>:MARKer[1]|2|3|4:FUNCtion?

Selects the type of marker for the specified marker. A particular measurement may not have all the types of markers that are commonly available.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

Band Power – is the integrated power between the two markers for traces in the frequency domain and is the mean power between the two markers for traces in the time domain.

Noise – is the noise power spectral density in a 1 Hz bandwidth. It is averaged over 32 horizontal trace points.

Off – turns off the marker functions

Example: **CALC:SPEC:MARK3:FUNC Noise**

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, Marker Function**

Marker Function Result

:CALCulate:<measurement>:MARKer[1]|2|3|4:FUNCtion:RESult?

Quires the result of the currently active marker function. The measurement must be completed before querying the marker.A particular measurement may not have all the types of markers available.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

Example: **CALC:SPEC:MARK:FUNC:RES?**

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, Marker Function**

Marker Peak (Maximum) Search

:CALCulate:<measurement>:MARKer[1]|2|3|4:MAXimum

Places the selected marker on the highest point on the trace that is assigned to that particular marker number.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

Example: **CALC:SPEC:MARK1:MAX**

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Search**

Marker Peak (Minimum) Search

:CALCulate:<measurement>:MARKer[1]|2|3|4:MINimum

Places the selected marker on the lowest point on the trace that is assigned to that particular marker number.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

Example: **CALC:SPEC:MARK2:MIN**

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: None

Marker Mode

:CALCulate:<measurement>:MARKer[1]|2|3|4:MODE POSition|DELTa

:CALCulate:<measurement>:MARKer[1]|2|3|4:MODE?

Selects the type of marker to be a normal position-type marker or a delta marker.A specific measurement may not have both types of markers. For example, several measurements only have position markers.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

Example: **CALC:SPEC:MARK:MODE DELTA**

Remarks: For the delta mode only markers 1 and 2 are valid.

The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, Marker [Delta]**

Marker On/Off

:CALCulate:<measurement>:MARKer[1]|2|3|4[:STATe] OFF|ON|0|1

:CALCulate:<measurement>:MARKer[1]|2|3|4[:STATe]?

Turns the selected marker on or off.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

Example: **CALC:SPEC:MARK2: on**

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, AREFerence, WAVeform)

The WAVeform measurement only has two markers available.

Front Panel Access: **Marker, Select** then **Marker Normal** or **Marker On Off**

Marker to Trace

:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe <trace_name>

:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe?

Assigns the specified marker to the designated trace. Not all types of measurement data can have markers assigned to them.

Example: With the WAVeform measurement selected, a valid command is **CALC:SPEC:MARK2:TRACE rfenvelope**.

Range: The names of valid traces are dependent upon the selected measurement. See the following table for the available trace names. The trace name assignment is independent of the marker number.

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, Marker Trace**

Measurement	Available Traces	Markers Available?
ACP - adjacent channel power (Basic, cdmaOne, cdma2000, W-CDMA, iDEN, NADC, PDC modes)	no traces	no markers
CDPower - code domain power (W-CDMA mode)	CDPower (*n*=2)[a] EVM (*n*=4)[a] MERRor (*n*=5)[a] PERRor (*n*=6)[a] SPOWer (*n*=8)[a]	yes
CHPower - channel power (Basic, cdmaOne, cdma2000, W-CDMA mode)	SPECtrum (*n*=2)[a]	no markers
EVMQpsk - QPSK error vector magnitude (cdma2000, W-CDMA modes)	EVM (*n*=2)[a] MERRor (*n*=3)[a] PERRor (*n*=4)[a]	yes
PSTatistic - power statistics CCDF (cdma2000, W-CDMA modes)	MEASured (*n*=2)[a] GAUSian (*n*=3)[a] REFerence (*n*=4)[a]	yes

Measurement	Available Traces	Markers Available?
RHO - modulation quality (cdmaOne, cdma2000, W-CDMA mode)	EVM (*n*=2)[a] MAGerror (*n*=3)[a] PHASe (*n*=4)[a]	yes
SPECtrum - (frequency domain) (all modes)	RFENvelope (*n*=2)[a] for Service mode IQ (*n*=3)[a] SPECtrum (*n*=4)[a] ASPectrum (*n*=7)[a]	yes
WAVEform - (time domain) (all modes)	RFENvelope (*n*=2)[a] IQ (*n*=8)[a]	yes

a. The *n* number indicates the sub-opcode that corresponds to this trace. Detailed descriptions of the trace data can be found in the MEASure subsystem documentation by looking up the sub-opcode for the appropriate measurement.

Marker X Value

:CALCulate:<measurement>:MARKer[1]|2|3|4:X <param>

:CALCulate:<measurement>:MARKer[1]|2|3|4:X?

Position the designated marker on its assigned trace at the specified X value. The parameter value is in X-axis units (which is often frequency or time).

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

The query returns the current X value of the designated marker. The measurement must be completed before querying the marker.

Example: **CALC:SPEC:MARK2:X 1.2e6 Hz**

Default Unit: Matches the units of the trace on which the marker is positioned

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, <active marker>, RPG**

Marker X Position

:CALCulate:<measurement>:MARKer[1]|2|3|4:X:POSition <integer>

:CALCulate:<measurement>:MARKer[1]|2|3|4:X:POSition?

Position the designated marker on its assigned trace at the specified X position. A trace is composed of a variable number of measurement points. This number changes depending on the current measurement conditions. The current number of points must be identified before using this command to place the marker at a specific location.

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

The query returns the current X position for the designated marker. The measurement must be completed before querying the marker.

Example: **CALC:SPEC:MARK:X:POS 500**

Range: 0 to a maximum of (3 to 920,000)

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

Front Panel Access: **Marker, <active marker>, RPG**

Marker Readout Y Value

:CALCulate:<measurement>:MARKer[1]|2|3|4:Y?

Readout the current Y value for the designated marker on its assigned trace. The value is in the Y-axis units for the trace (which is often dBm).

The marker must have already been assigned to a trace. Use **:CALCulate:<measurement>:MARKer[1]|2|3|4:TRACe** to assign a marker to a particular trace.

The measurement must be completed before querying the marker.

Example: **CALC:SPEC:MARK1:Y -20 dB**

Default Unit: Matches the units of the trace on which the marker is positioned

Remarks: The keyword for the current measurement must be specified in the command. (Some examples include: SPECtrum, WAVeform)

CONFigure Subsystem

:CONFigure:<measurement>

The CONFigure commands are used with several other commands and are documented in the section on the "MEASure Group of Commands" on page 27.

DISPlay Subsystem

The DISPlay controls the selection and presentation of textual, graphical, and TRACe information. Within a DISPlay, information may be separated into individual WINDows.

Adjacent Channel Power Measurement View Selection

:DISPlay:ACP:VIEW BGRaph|SPECtrum

:DISPlay:ACP:VIEW?

Select the adjacent channel power measurement display of bar graph or spectrum.

Factory Preset and *RST: BGRaph

Remarks: You must be in the cdma2000, W-CDMA, NADC or PDC mode to use this command. Use INSTrument:SELect to set the mode.

Spectrum Measurement Y-Axis Reference Level

:DISPlay:SPECtrum[n]:WINDow[m]:TRACe:Y[:SCALe]:RLEVel <power>

:DISPlay:SPECtrum[n]:WINDow[m]:TRACe:Y[:SCALe]:RLEVel?

Sets the amplitude reference level for the y-axis.

n – selects the view, the default is Spectrum.

— n=1, Spectrum

— n=2, I/Q Waveform

— n=3, numeric data (service mode)

— n=4, RF Envelope (service mode)

m – selects the window within the view. The default is 1.

Factory Preset and *RST: 0 dBm, for Spectrum

Range: –250 to 250 dBm, for Spectrum

Default Unit: dBm, for Spectrum

Remarks: May affect input attenuator setting.

To use this command, the appropriate mode should be selected with INSTrument:SELect.

Front Panel Access: When in Spectrum measurement: **Amplitude Y Scale, Ref Level**

Turn a Trace Display On/Off

`:DISPlay:TRACe[n][:STATe] OFF|ON|0|1`

`:DISPlay:TRACe[n][:STATe]?`

Controls whether the specified trace is visible or not.

n is a sub-opcode that is valid for the current measurement. See the "MEASure Group of Commands" on page 27 for more information about sub-opcodes.

Factory Preset and *RST: On

Range: The valid traces and their sub-opcodes are dependent upon the selected measurement. See the following table.

The trace name assignment is independent of the window number.

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Front Panel Access: **Display, Display Traces**

Measurement	Available Traces	Markers Available?
ACP - adjacent channel power (Basic, cdmaOne, cdma2000, W-CDMA, iDEN, NADC, PDC modes)	no traces	no markers
CDPower - code domain power (W-CDMA mode)	CDPower (*n*=2)[a] EVM (*n*=4)[a] MERRor (*n*=5)[a] PERRor (*n*=6)[a] SPOWer (*n*=8)[a]	yes
CHPower - channel power (Basic, cdmaOne, cdma2000, W-CDMA mode)	SPECtrum (*n*=2)[a]	no markers
EVMQpsk - QPSK error vector magnitude (cdma2000, W-CDMA modes)	EVM (*n*=2)[a] MERRor (*n*=3)[a] PERRor (*n*=4)[a]	yes
PSTatistic - power statistics CCDF (cdma2000, W-CDMA modes)	MEASured (*n*=2)[a] GAUSian (*n*=3)[a] REFerence (*n*=4)[a]	yes
RHO - modulation quality (cdmaOne, cdma2000, W-CDMA mode)	EVM (*n*=2)[a] MAGerror (*n*=3)[a] PHASe (*n*=4)[a]	yes
SPECtrum - (frequency domain) (all modes)	RFENvelope (*n*=2)[a] for Service mode IQ (*n*=3)[a] SPECtrum (*n*=4)[a] ASPectrum (*n*=7)[a]	yes
WAVEform - (time domain) (all modes)	RFENvelope (*n*=2)[a] IQ (*n*=8)[a]	yes

a. The *n* number indicates the sub-opcode that corresponds to this trace. Detailed descriptions of the trace data can be found in the MEASure subsystem documentation by looking up the sub-opcode for the appropriate measurement.

Waveform Measurement Y-Axis Reference Level

:DISPlay:WAVEform[n]:WINDow[m]:TRACe:Y[:SCALe]:RLEVel <power>

:DISPlay:WAVEform[n]:WINDow[m]:TRACe:Y[:SCALe]:RLEVel?

Sets the amplitude reference level for the y-axis.

n – selects the view, the default is RF envelope.

— n=1, RF Envelope

— n=2, I/Q Waveform

m – selects the window within the view. The default is 1.

Factory Preset and *RST:	0 dBm, for RF envelope
Range:	–250 to 250 dBm, for RF envelope
Default Unit:	dBm, for RF envelope
Remarks:	May affect input attenuator setting. To use this command, the appropriate mode should be selected with INSTrument:SELect.
Front Panel Access:	When in Waveform measurement: **Amplitude Y Scale, Ref Level**

FETCh Subsystem

:FETCh:<measurement>[n]?

The FETCh? commands are used with several other commands and are documented in the section on the "MEASure Group of Commands" on page 27.

MEASure Group of Commands

This group includes commands used to make measurements and return results. The different commands can be used to provide fine control of the overall measurement process. Most measurements should be done in single measurement mode, rather than doing the measurement continuously.

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:FREQuency, SENSe:POWer, SENSe:RADio, SENSe:SNYC
CALCulate:<measurement>, CALCulate:CLIMits/DATA
DISPlay:<measurement>
TRIGger

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 Standard.

- 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.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement.

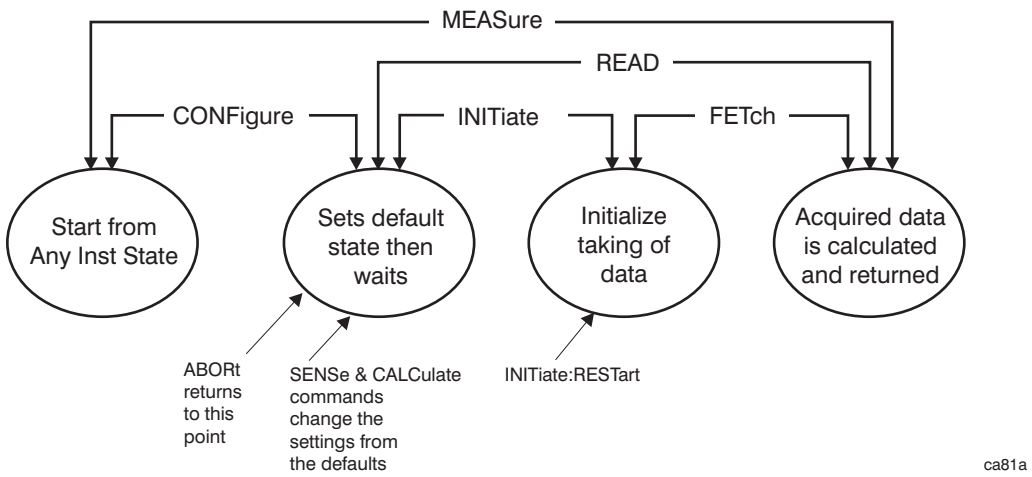
  If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.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

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 1-1.

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 1-1 Measurement Group of Commands



Configure Commands

:CONFigure:<measurement>

This command sets up the instrument for the specified measurement using the factory default instrument settings and stops the current measurement. It does not initiate the taking of measurement data.

The CONFigure? query returns the current measurement name.

Fetch Commands

:FETCh:<measurement>[n]?

This command puts valid data into the output buffer, but does not initiate data acquisition. 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. The binary data formats should be used for handling large blocks of data since they are smaller and faster then the ASCII format.

Read Commands

:READ:<measurement>[n]?

- Does not preset the measurement to the factory defaults. (The MEASure? command does preset.) It uses the settings from the last measurement.
- 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.
- 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.

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 Ratio (ACP) Measurement

This measures the total rms power in the specified channel and in 5 offset channels. You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN, NADC or PDC 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]?

For Basic mode, a channel frequency and power level can be defined in the command statement to override the default standard setting. A comma must precede the power value as a place holder for the frequency, when no frequency is sent.

History: Added to Basic mode, version A.03.00 or later

Front Panel Access: **Measure, ACPR**

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

Measurement Results Available

Measurement Type	n	Results Returned
	0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
Total power reference	not specified or n=1 cdmaOne, cdma2000, or W-CDMA mode	Returns 24 comma-separated scalar results, in the following order: Center freq - relative power (dB) Center freq - absolute power (dBm) Center freq - relative power (dB) Center freq - absolute power (dBm) Negative offset freq(1) - relative power (dB), Negative offset freq(1) - absolute power (dBm) Positive offset freq(1) - relative power (dB) Positive offset freq(1) - absolute power (dBm) . . . Positive offset freq(5) - relative power (dB) Positive offset freq(5) - absolute power (dBm)
Power spectral density reference	not specified or n=1 cdmaOne, cdma2000, or W-CDMA mode	Returns 24 comma-separated scalar results, in the following order: Center freq - relative power (dB) Center freq - absolute power (dBm/Hz) Center freq - relative power (dB) Center freq - absolute power (dBm/Hz) Negative offset freq(1) - relative power (dB) Negative offset freq(1) - absolute power (dBm/Hz) Positive offset freq(1) - relative power (dB) Positive offset freq(1) - absolute power (dBm/Hz) . . . Positive offset freq(5) - relative power (dB) Positive offset freq(5) - absolute power (dBm/Hz)

Measurement Type	n	Results Returned
Total power reference	2 cdmaOne, cdma2000, or W-CDMA mode	Returns 11 comma-separated scalar values (in dBm) corresponding to the total power histogram display. The values are returned in ascending frequency order: Negative offset frequency(5) Negative offset frequency(4) . . . Center frequency Positive Offset frequency(1) . . . Positive Offset frequency(5)
Power spectral density reference	3 cdmaOne, cdma2000, or W-CDMA mode	Returns 11 comma-separated scalar values (in dBm/Hz) corresponding to the power spectral density histogram display. The values are returned in ascending frequency order: Negative offset frequency(5) Negative offset frequency(4) . . . Center frequency Positive Offset frequency(1) . . . Positive Offset frequency(5)
(For cdma2000 and W-CDMA the data is only available with spectrum display selected)	4 cdmaOne, cdma2000, or W-CDMA mode	Returns the frequency-domain spectrum trace data for the entire frequency range being measured. With spectrum display selected (DISPlay:ACP:VIEW SPEC): • In FFT mode (SENSe:ACPR:SWEep:TYPE FFT) the number of trace points returned are 343 (cdma2000 SR1), 1029 (cdma2000 SR3) or 1715 (W-CDMA). This is with the default span of 5 MHz (cdma2000 SR1), 15 MHz (cdma2000 SR3), or 25 MHz (W-CDMA). The number of points also varies if another offset frequency is set. • In sweep mode (SENSe:ACPR:SWEep:TYPE SWEep), the number of trace points returned is 601 (for cdma2000 or W-CDMA) for any span. With bar graph display selected, one point of –999.0 will be returned.

Measurement Type	n	Results Returned
Total power reference	5 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values (in dBm) of the absolute power of the center and the offset frequencies: Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative Offset frequency(5) Positive Offset frequency(5)
Power spectral density reference	5 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values (in dBm/Hz) of the absolute power of the center and the offset frequencies: Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive offset frequency(5)
Total power reference	6 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values (total power in dB) of the power relative to the carrier at the center and the offset frequencies: Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive offset frequency(5)
Power spectral density reference	6 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values (power spectral density in dB) of the power relative to the carrier at the center and offset frequencies: Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive offset frequency(5)

Measurement Type	n	Results Returned
Total power reference	7 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values of the pass/fail (1=passed, or 0=failed) results determined by testing the absolute power limit of the center and offset frequencies (measured as total power in dB): Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive offset frequency(5)
Power spectral density reference	7 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values of the pass/fail (1=passed, or 0=failed) results determined by testing the absolute power limit of the center and offset frequencies (measured as power spectral density in dB): Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive Offset frequency(5)
Total power reference	8 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values of the pass/fail (1=passed, or 0=failed) results determined by testing the power limit relative to the center frequency (measured as total power spectral in dB): Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive Offset frequency(5)

Measurement Type	n	Results Returned
Power spectral density reference	8 cdmaOne, cdma2000, or W-CDMA mode	Returns 12 comma-separated scalar values of the pass/fail (1=passed, or 0=failed) results determined by testing the power limit relative to the center frequency (measured as power spectral density in dB): Center frequency Center frequency Negative offset frequency(1) Positive offset frequency(1) . . . Negative offset frequency(5) Positive Offset frequency(5)

Code Domain Power Measurement

This measures the power for each of the 64 Walsh codes/channels, relative to the total power in the pilot channel. You must be in the cdmaOne or W-CDMA 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:CDPower commands for more measurement related commands.

:CONFigure:CDPower

:FETCh:CDPower[n]?

:READ:CDPower[n]?

:MEASure:CDPower[n]?

Front Panel Access: **Measure, Code Domain Power**

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

Measurement Results Available

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.

n	Results Returned
not specified or n=1 W-CDMA mode	Returns the following14 comma-separated scalar results: 1. **RMS symbol EVM** is a floating point number (in percent) of the EVM over the entire measurement area. 2. **Peak symbol EVM** is a floating point number (in percent) of the peak EVM in the measurement area. 3. **Symbol magnitude error** is a floating point number (in percent) of the average magnitude error over the entire measurement area. 4. **Symbol phase error** is a floating point number (in degrees) of the average phase error over the entire measurement area. 5. **Total power** is a floating point number with units of dBm. It is the total RF power over the measurement interval. 6. **Average power** is a floating point number with units of dBm. It is the power in the entire slot, for the selected code, averaged over the measurement interval. 7. **Tslot** is an integer number (in symbols) of the frame timing offset within the slot. It is the measured offset of the start of the radio frame of the selected code. The code is determined by the current spread code and symbol rate. 8. **Tframe** is an integer number (in slots) of the frame timing offset within the frame. It is the measured offset of the start of the radio frame of the selected code. The code is determined by the current spread code and symbol rate. 9. **Total power in slot** is a floating point number in units of dBm. It is the total RF power in the first slot timing in the acquired data. The slot timing is determined by Perch. (The search code portion of Perch is excluded.) 10. **Perch power** is a floating point number (in dB) of the average power of the Perch code relative to the total slot power. The slot timing is determined by Perch. (The search code portion of Perch is excluded.) 11. **Maximum active traffic power** is a floating point number (in dB) of the maximum average power of the active traffic channels. If no active code is detected the value returned is –999. The slot timing is determined by Perch. (The search code portion of Perch is excluded.) 12. **Average active traffic power** is a floating point number (in dB) of the average power of all the active traffic channels. If no active code is detected the value returned is –999. The slot timing is determined by Perch. (The search code portion of Perch is excluded.) 13. **Maximum inactive traffic power** is a floating point number (in dB) of the maximum average power of the inactive traffic channels. The slot timing is determined by Perch. (The search code portion of Perch is excluded.) 14. **Average inactive traffic power** is a floating point number (in dB) of the average power of the inactive traffic channels. The slot timing is determined by Perch. (The search code portion of Perch is excluded.)

n	Results Returned
2 W-CDMA mode	With a radio format (or band) of ARIB: Returns a series of floating point numbers (in dB) with a multiplier of 8 ksymbols per second that represent all the code domain powers. 1st number = 1st code power relative to the total power over a slot 2nd number = 1st code symbol rate / 8 ksps . . . (2×N-1)th number = Nth code power relative to the total power over a slot (2×N)th number = Nth code symbol rate / 8 ksps N = the number of codes detected. The total number of codes varies because of the different symbol rates of each code.
2 W-CDMA mode	With a radio format (or band) of Trial: Returns a series of floating point numbers (in dB) with a multiplier of 16 ksymbols/second that represent all the code domain powers. 1st number = 1st code power relative to the total power over a slot 2nd number = 1st code symbol rate / 16 ksps . . . (2×N-1)th number = Nth code power relative to the total power over a slot (2×N)th number = Nth code symbol rate / 16 ksps N = the number of codes detected. The total number of codes varies because of the different symbol rates of each code.
3 W-CDMA mode	Returns a series of floating point numbers that show either active or inactive status for each of the code powers returned in n=2. (See above.) If a code is inactive, the value returned is 0.0, otherwise a value >0.0 is returned. 1st number = active or inactive flag of the 1st code . . . Nth number = active or inactive flag of the Nth code (where N= the number of codes identified)
4 W-CDMA mode	Returns a series of floating point numbers (in percent) that represent each sample in the *EVM* trace. The first number is the symbol 0 decision point and there are X points per symbol. Therefore, the decision points are at 0, 1×X, 2×X, 3×X. . . (where X = the number of points per chip)
5 W-CDMA mode	Returns a series of floating point numbers (in percent) that represent each sample in the *magnitude error* trace. The first number is the symbol 0 decision point and there are X points per symbol. Therefore, the decision points are at 0, 1×X, 2×X, 3×X. . . (where X = the number of points per chip)
6 W-CDMA mode	Returns a series of floating point numbers (in degrees) that represent each sample in the *phase error* trace. The first number is the symbol 0 decision point and there are X points per symbol. Therefore, the decision points are at 0, 1×X, 2×X, 3×X. . . (where X = the number of points per chip)

n	Results Returned
7 W-CDMA mode	Returns series of floating point numbers that alternately represent I and Q pairs of the *corrected measured* trace. The magnitude of each I and Q pair is normalized to 1.0. The first number is the in-phase (I) sample of symbol 0 decision point and the second is the quadrature-phase (Q) sample of symbol 0 decision point. As in the EVM, there are X points per symbol, so that: 1st number is I of the symbol 0 decision point 2nd number is Q of the symbol 0 decision point . . . (2×X)+1 number is I of the symbol 1 decision point (2×X)+2 number is Q of the symbol 1 decision point . . . (2×X)×N+1th number is I of the symbol N decision point (2×X)×N+2th number is Q of the symbol N decision point where X = the number of points per symbol, and N = the number of symbols
8 W-CDMA mode	Returns series of floating point numbers (in dBm) that represent the trace data of the symbol power vs. time.

Channel Power Measurement

This measures the total rms power in a specified integration bandwidth. You must be in the Basic, cdmaOne 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:CHPower commands for more measurement related commands.

:CONFigure:CHPower

:FETCh:CHPower[n]?

:READ:CHPower[n]?

:MEASure:CHPower[n]?

History: Added to Basic mode, version A.03.00 or later

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

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

Measurement Results Available

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
not specified or n=1	Returns 2 comma-separated scalar results: 1. **Channel power** is a floating point number representing the total channel power in the specified integration bandwidth. 2. **PSD** (Power Spectral Density) is the power (in dBm/Hz) in the specified integration bandwidth.
2	Returns comma-separated floating point numbers that are the captured trace data of the power (in dBm/resolution BW) of the signal. The frequency span of the captured trace data is specified by the **Span** key.

QPSK Error Vector Magnitude Measurement

This measures the QPSK error vector magnitude of each symbol. You must be in the cdma2000 or W-CDMA 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:EVM commands for more measurement related commands.

:CONFigure:EVMQpsk

:FETCh:EVMQpsk[n]?

:READ:EVMQpsk[n]?

:MEASure:EVMQpsk[n]?

History: Version A.03.00 or later

Front Panel Access: **Measure, QPSK EVM**

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

Measurement Results Available

n	Results Returned
0	Returns unprocessed I/Q trace data, as a data array of comma-separated trace points, in volts.

n	Results Returned
1 (default) cdma2000, W-CDMA mode	Returns 11 comma-separated scalar results, in the following order. 1. RMS EVM – a floating point number (in percent) of EVM over the entire measurement area 2. RMS EVM maximum – the maximum RMS EVM over the averaged counts 3. Peak EVM error – a floating point number (in percent) of peak EVM in the measurement area 4. Peak EVM maximum – the maximum peak EVM over the averaged counts 5. Magnitude error – a floating point number (in percent) of average magnitude error over the entire measurement area 6. Magnitude error maximum – the maximum magnitude error over the averaged counts 7. Phase error – a floating point number (in degree) of average phase error over the entire measurement area 8. Phase error maximum – the maximum phase error over the averaged counts 9. Frequency error – a floating point number (in Hz) of the frequency error in the measured signal 10. Frequency error maximum – the maximum frequency error over the averaged counts 11. I/Q origin offset – a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin
2 cdma2000, W-CDMA mode	EVM trace – returns series of floating point numbers (in percent) that represent each sample in the EVM trace. The first number is the symbol 0 decision point. There are X points per symbol (X = points/chip). Therefore, the decision points are at 0, $1 \times X$, $2 \times X$, $3 \times X$ . . .
3 cdma2000, W-CDMA mode	Magnitude error trace – returns series of floating point numbers (in percent) that represent each sample in the magnitude error trace. The first number is the symbol 0 decision point. There are X points per symbol (X = points/chip). Therefore, the decision points are at 0, $1 \times X$, $2 \times X$, $3 \times X$ . . .
4 cdma2000, W-CDMA mode	Phase error trace – returns series of floating point numbers (in degree) that represent each sample in the phase error trace. There are X points per symbol (X = points/ chip). Therefore, the decision points are at 0, $1 \times X$, $2 \times X$, $3 \times X$ . . .

n	Results Returned
5 cdma2000, W-CDMA mode	Corrected measured trace – returns series of floating point numbers that alternately represent I and Q pairs of the corrected measured trace. The magnitude of each I and Q pair are normalized to 1.0. The first number is the in-phase (I) sample of symbol 0 decision point and the second is the quadrature-phase (Q) sample of symbol 0 decision point. There are *X* points per symbol (*X* = points/chip), so the series of numbers is: 1st number = I of the symbol 0 decision point 2nd number = Q of the symbol 0 decision point . . . $(2 \times X) + 1$, number = I of the symbol 1 decision point $(2 \times X) + 2$, number = Q of the symbol 1 decision point . . . $(2 \times X) \times$ Nth + 1 number = I of the symbol N decision point $(2 \times X) \times$ Nth + 2 number = Q of the symbol N decision point

Power Statistics CCDF Measurement

This is a statistical power measurement of the complimentary cumulative distribution function (CCDF). You must be in the cdma2000 or W-CDMA 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:PSTat commands for more measurement related commands.

:CONFigure:PSTatistic

:FETCh:PSTatistic[n]?

:READ:PSTatastic[n]?

:MEASure:PSTatastic[n]?

History: Version A.03.00 or later

Front Panel Access: **Measure, Power Stat CCDF**

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

Measurement Results Available

n	
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values,
not specified or n=1	Returns 10 comma-separated scalar results: 1. Average input power (in dBm) 2. Probability at the average input power level (in %) 3. Power level that has 10% of the power 4. Power level that has 1% of the power 5. Power level that has 0.1% of the power 6. Power level that has 0.01% of the power 7. Power level that has 0.001% of the power 8. Power level that has 0.0001% of the power 9. Peak power (in dB) 10. Count

n	
2	Returns a series of 5001 floating point numbers (in percent) that represent the current measured power stat trace. This is the probability at particular power levels (average power), in the following order: Probability at 0 dB power Probability at 0.1 dB power Probability at 0.2 dB power . . . Probability at 49.9 dB power Probability at 50.0 dB power
3	Returns a series of 5001 floating point numbers (in percent) that represent the Gaussian trace. This is the probability at particular power levels (average power), in the following order: Probability at 0 dB power Probability at 0.1 dB power Probability at 0.2 dB power . . . Probability at 49.9 dB power Probability at 50.0 dB power
4	Returns a series of 5001 floating point numbers (in percent) that represent the user-definable reference trace. This is the probability at particular power levels (average power), in the following order: Probability at 0 dB power Probability at 0.1 dB power Probability at 0.2 dB power . . . Probability at 49.9 dB power Probability at 50.0 dB power

Rho (Waveform Quality) Measurement

This measures the modulation accuracy of the transmitter by checking the magnitude and phase error and the EVM (error vector magnitude). You must be in the cdma2000 or W-CDMA 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:RHO commands for more measurement related commands.

:CONFigure:RHO

:FETCh:RHO[n]?

:READ:RHO[n]?

:MEASure:RHO[n]?

Front Panel Access: **Measure, Mod Accuracy (Rho)**

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

Measurement Results Available

n	Results Returned
0	Returns unprocessed I/Q trace data, as a data array of comma-separated trace points, in volts.
1 (default) cdma2000, W-CDMA mode	Returns 7 comma-separated scalar results, in the following order. 1. RMS EVM – a floating point number (in percent) of EVM over the entire measurement area 2. Peak EVM error – a floating point number (in percent) of peak EVM in the measurement area 3. Magnitude error – a floating point number (in percent) of average magnitude error over the entire measurement area 4. Phase error – a floating point number (in degree) of average phase error over the entire measurement area 5. I/Q origin offset – a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin 6. Frequency error – a floating point number (in Hz) of the frequency error in the measured signal 7. Rho – a floating point number of Rho
2 cdma2000, W-CDMA mode	EVM trace – returns series of floating point numbers (in percent) that represent each sample in the EVM trace. The first number is the symbol 0 decision point. There are X points per symbol (X = points/chip). Therefore, the decision points are at 0, $1 \times X$, $2 \times X$, $3 \times X$ . . .

n	Results Returned
3 cdma2000, W-CDMA mode	Magnitude error trace – returns series of floating point numbers (in percent) that represent each sample in the magnitude error trace. The first number is the symbol 0 decision point. There are *X* points per symbol (*X* = points/chip). Therefore, the decision points are at 0, $1 \times X$, $2 \times X$, $3 \times X$ . . .
4 cdma2000, W-CDMA mode	Phase error trace – returns series of floating point numbers (in degree) that represent each sample in the phase error trace. There are *X* points per symbol (*X* = points/ chip). Therefore, the decision points are at 0, $1 \times X$, $2 \times X$, $3 \times X$ . . .
5 cdma2000, W-CDMA mode	Corrected measured trace – returns series of floating point numbers that alternately represent I and Q pairs of the corrected measured trace. The magnitude of each I and Q pair are normalized to 1.0. The first number is the in-phase (I) sample of symbol 0 decision point and the second is the quadrature-phase (Q) sample of symbol 0 decision point. There are *X* points per symbol (*X* = points/chip), so the series of numbers is: 1st number = I of the symbol 0 decision point 2nd number = Q of the symbol 0 decision point . . . $(2 \times X) + 1$, number = I of the symbol 1 decision point $(2 \times X) + 2$, number = Q of the symbol 1 decision point . . . $(2 \times X) \times$ Nth + 1 number = I of the symbol N decision point $(2 \times X) \times$ Nth + 2 number = Q of the symbol N decision point

Spectrum (Frequency Domain) Measurement

This measures the amplitude of your input signal with respect to the frequency. It provides spectrum analysis capability using FFT (fast Fourier transform) measurement techniques. You must select the appropriate mode using INSTrument:SELect, to use these commands.

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

:CONFigure:SPECtrum

:FETCh:SPECtrum[n]?

:READ:SPECtrum[n]?

:MEASure:SPECtrum[n]?

Front Panel Access: **Measure, Spectrum (Freq Domain)**

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

Measurement Results Available

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.

n	Results Returned
not specified or n=1	Returns the following comma-separated scalar results: 1. **FFT peak** is the FFT peak amplitude. 2. **FFT frequency** is the FFT frequency of the peak amplitude. 3. **FFT points** is the Number of points in the FFT spectrum. 4. **First FFT frequency** is the frequency of the first FFT point of the spectrum. 5. **FFT spacing** is the frequency spacing between the FFT points of the spectrum. 6. **Time domain points** is the number of points in the time domain trace used for the FFT. 7. **First time point** is the time of the first time domain point, where time zero is the trigger event. 8. **Time spacing** is the time spacing between the time domain points. 9. **Time domain** returns a 1, if time domain is complex (I/Q), or 0 if it is real. (raw ADC samples) 10. **Scan time** is the total scan time of the time domain trace used for the FFT. The total scantime = (time spacing) x (time domain points – 1) 11. **Current average count** is the current number of data measurements that have already been combined, in the averaging calculation.
2, **Service** mode only	Returns the trace data of the log-magnitude versus time. (That is, the RF envelope.)
3	Returns the I and Q trace data. It is represented by I and Q pairs (in volts) versus time.
4	Returns spectrum trace data. That is, the trace of log-magnitude versus frequency. (The trace is computed using a FFT.)
5, **Service** mode only	Returns the averaged trace data of log-magnitude versus time. (That is, the RF envelope.)
6	Not used.
7	Returns the averaged spectrum trace data. That is, the trace of the averaged log-magnitude versus frequency.
8	Not used.
9, **Service** mode only	Returns a trace containing the shape of the FFT window.
10, **Service** mode only	Returns trace data of the phase of the FFT versus frequency.

Waveform (Time Domain) Measurement

This measures the power in your input signal with respect to time and is equivalent to zero-span operation in a traditional spectrum analyzer. You must select the appropriate mode using INSTrument:SELect, to use these commands.

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

:CONFigure:WAVeform

:FETCh:WAVeform[n]?

:READ:WAVeform[n]?

:MEASure:WAVeform[n]?

Front Panel Access: **Measure, Waveform (Time Domain)**

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

Measurement Results Available

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.

n	Results Returned
not specified or n=1	Returns the following comma-separated scalar results: 1. **Sample time** is a floating point number representing the time between samples when using the trace queries (n=0,2,etc). 2. **Mean power** is the mean power (in dBm). This is either the power across the entire trace, or the power between markers if the markers are enabled. If averaging is on, the power is for the latest acquisition. 3. **Mean power averaged** is the power (in dBm) for N averages, if averaging is on. This is either the power across the entire trace, or the power between markers if the markers are enabled. If averaging is on, the power is for the latest acquisition. If averaging is off, the value of the mean power averaged is the same as the value of the mean power. 4. **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. **Peak-to-mean ratio** has units of dB. The peak is defined to be the maximum level of the signal (non-averaged). The mean is the mean power (non-averaged). If averaging is on, the peak-to-mean ratio is invalid. 6. **Maximum value** is the maximum of the most recently acquired data (in dBm). 7. **Minimum value** is the minimum of the most recently acquired data (in dBm).
2	Returns comma-separated trace points 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**.

READ Subsystem

:READ:<measurement>[n]?

The READ? commands are used with several other commands and are documented in the section on the “MEASure Group of Commands” on page 27.

SENSe Subsystem

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

Adjacent Channel Power Measurement

Commands for querying the adjacent channel power measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. 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 Measurement Average Count

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

[:SENSe]:ACP:AVERage:COUNt?

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

Factory Preset and *RST: 10, for cdma2000, W-CDMA mode

20, for Basic, cdmaOne, iDEN mode

Range: 1 to 10,000

Remarks: Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Averaging State

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

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

Turn average on or off.

Factory Preset and *RST: On

Off, for iDEN mode

Remarks: Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Averaging Termination Control

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

[:SENSe]:ACP:AVERage:TCONtrol?

Select the type of termination control used for averaging. 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: Repeat, for basic, cdmaOne, cdma2000, W-CDMA mode

Exponential, for NADC, PDC, iDEN mode

Remarks: Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Channel Integration BW

Basic, iDEN mode

[:SENSe]:ACP:BANDwidth|BWIDth:INTegration <freq>

[:SENSe]:ACP:BANDwidth|BWIDth:INTegration?

cdmaOne, cdma2000, W-CMDA mode

[:SENSe]:ACP:BANDwidth|BWIDth[n]:INTegration[n] <freq>

[:SENSe]:ACP:BANDwidth|BWIDth[n]:INTegration[n]?

Set the Integration bandwidth that will be used for the main (carrier) channel.

cdmaOne mode

Bandwidth [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

Integration [n] - Where 1 is cellular bands and 2 is pcs bands. The default is cellular (1).

cdma2000 mode

Bandwidth [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

Integration [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Bandwidth [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

Integration [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

Mode	**Format (Modulation Standard)**		
Basic	1.23 MHz		
cdmaOne	1.23 MHz		
iDEN	18 kHz		
cdma2000	SR1 (n=1) 1.23 MHz	SR3 DC (n=2) 3.69 MHz	SR3 MC (n=3) 3.69 MHz
W-CDMA	ARIB (n=1) 4.069 MHz	3GPP (n=2) 3.84 MHz	Trial (n=3) 4.096 MHz

Range: 300 Hz to 20 MHz for Basic, cdmaOne, cdma2000, W-CDMA mode

1 kHz to 5 MHz for iDEN

Default Unit: Hz

Remarks: With measurement type set at (TPR) total power reference, 1.40 MHz is sometimes used. Using 1.23 MHz will give a power that is very nearly identical to the 1.40 MHz value, and using 1.23 MHz will also yield the correct power spectral density with measurement type set at (PSD) reference. However, a setting of 1.40 MHz will not give the correct results with measurement type set at PSD reference.

You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Absolute Amplitude Limits

iDEN mode

[:SENSe]:ACP:OFFSet:ABSolute <power>

[:SENSe]:ACP:OFFSet:ABSolute?

Basic mode

[:SENSe]:ACP:OFFSet:LIST:ABSolute <power>{,<power>}

[:SENSe]:ACP:OFFSet:LIST:ABSolute?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n]:ABSolute <power>{,<power>}

[:SENSe]:ACP:OFFSet[n]:LIST[n]:ABSolute?

Sets the absolute amplitude levels to test against for each of the custom offsets. The list contains five (5) entries. If there is more than one offset, the offset closest to the carrier channel is the first one in the list. ACP:OFFS[n]:LIST[n]:TEST selects the type of testing to be done at each offset.

The query returns five (5) real numbers that are the current absolute amplitude test limits.

cdmaOne, Basic mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular bands and 2 is pcs bands. The default is cellular.

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

	Offset A	Offset B	Offset C	Offset D	Offset E
Basic					
	0 dBm	0 dBm	0 dBm	0 dBm	0 dBm
cdmaOne					
BS cellular	0 dBm	0 dBm	0 dBm	0 dBm	0 dBm
BS pcs	0 dBm	–13 dBm	–13 dBm	0 dBm	0 dBm
MS cellular	0 dBm	0 dBm	0 dBm	0 dBm	0 dBm
MS pcs	0 dBm	–13 dBm	–13 dBm	0 dBm	0 dBm
cdma2000					
	50 dBm	50 dBm	50 dBm	50 dBm	50 dBm
W-CDMA					
	50 dBm	50 dBm	50 dBm	50 dBm	50 dBm
iDEN					
	0 dBm	n/a	n/a	n/a	n/a

Range: –200 dBm to 50 dBm

Default Unit: dBm

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Define Resolution Bandwidth List

iDEN mode

[:SENSe]:ACP:OFFSet:BANDwidth|BWIDth <res_bw>

[:SENSe]:ACP:OFFSet:BANDwidth|BWIDth?

Basic mode

[:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth <res_bw>{,<res_bw>}

[:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n]:BANDwidth|BWIDth <res_bw>{,<res_bw>}

[:SENSe]:ACP:OFFSet[n]:LIST[n]:BANDwidth|BWIDth?

Define the custom resolution bandwidth(s) for the adjacent channel power testing. If there is more than one bandwidth, the list contains five (5) entries. Each resolution bandwidth in the list corresponds to an offset frequency in the list defined by ACP:OFFSet[n]:LIST[n][:FREQ.

cdmaOne mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular bands and 2 is pcs bands. The default is cellular.

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

	Offset A	Offset B	Offset C	Offset D	Offset E
iDEN					
	10 kHz	n/a	n/a	n/a	n/a
Basic					
	30 kHz	30 kHz	30 kHz	30 kHz	30 kHz
cdmaOne					
BS cellular	30 kHz	30 kHz	30 kHz	30 kHz	30 kHz
BS pcs	30 kHz	12.5 kHz	1 MHz	30 kHz	30 kHz
MS cellular	30 kHz	30 kHz	30 kHz	30 kHz	30 kHz
MS pcs	30 kHz	12.5 kHz	1 MHz	30 kHz	30 kHz
cdma2000					
	30 kHz	30 kHz	30 kHz	30 kHz	30 kHz
W-CDMA					
Trial and ARIB	4.096 MHz	4.096 MHz	4.096 MHz	4.096 MHz	4.096 MHz
3GPP	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz

Range: 300 Hz to 20 MHz for cdmaOne, Basic, cdma2000, W-CDMA mode

1 kHz to 5 MHz for iDEN mode

Default Unit: Hz

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Define Offset Frequency List

iDEN mode

[:SENSe]:ACP:OFFSet[:FREQuency] <offset_freq>

[:SENSe]:ACP:OFFSet[:FREQuency]?

Basic mode

[:SENSe]:ACP:OFFSet:LIST[:FREQuency] <offset_freq>{,<offset_freq>}

[:SENSe]:ACP:OFFSet:LIST[:FREQuency]?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n][:FREQuency] <offset_freq>{,<offset_freq>}

[:SENSe]:ACP:OFFSet[n]:LIST[n][:FREQuency]?

Define the custom set of offset frequencies at which the switching transient spectrum part of the ACP measurement will be made. The list contains five (5) entries for offset frequencies. Each offset frequency in the list corresponds to a resolution bandwidth in the bandwidth list. An offset frequency of zero turns “off” the measurement for that offset.

cdmaOne mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular frequency bands and 2 is pcs frequency bands. The default is cellular bands (1).

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

	Offset A	Offset B	Offset C	Offset D	Offset E
iDEN					
	25 kHz	n/a	n/a	n/a	n/a
Basic					
	750 kHz	1.98 MHz	0 Hz	0 Hz	0 Hz
cdmaOne					
BS cellular	750 kHz	1.98 MHz	0 Hz	0 Hz	0 Hz
BS pcs	885 kHz	1.25625 MHz	2.75 MHz	0 Hz	0 Hz
MS cellular	885 kHz	1.98 MHz	0 Hz	0 Hz	0 Hz
MS pcs	885 kHz	1.25625 MHz	2.75 MHz	0 Hz	0 Hz
cdma2000					
BTS SR1	750 kHz	1.98 MHz	0 Hz	0 Hz	0 Hz
BTS SR3 DS	2.655 MHz	3.75 MHz	0 Hz	0 Hz	0 Hz
BTS SR3 MC	2.135 kHz	2.5 MHz	0 Hz	0 Hz	0 Hz
MS SR1	885 kHz	1.98 MHz	0 Hz	0 Hz	0 Hz
MS SR3 DS	2.655 MHz	3.75 MHz	0 Hz	0 Hz	0 Hz
MS SR3 MC	2.655 kHz	3.75 MHz	0 Hz	0 Hz	0 Hz
W-CDMA					
	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz

Range: 0 Hz to 20 MHz for cdmaOne, iDEN, Basic mode

0 Hz to 100 MHz for cdma2000, W-CDMA mode

Default Unit: Hz

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Amplitude Limits Relative to the Carrier

iDEN mode

[:SENSe]:ACP:OFFSet:RCARrier <rel_power>

[:SENSe]:ACP:OFFSet:RCARrier?

Basic mode

[:SENSe]:ACP:OFFSet:LIST:RCARrier <rel_power>{,<rel_power>}

[:SENSe]:ACP:OFFSet:LIST:RCARrier?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n]:RCARrier <rel_power>{,<rel_power>}

[:SENSe]:ACP:OFFSet[n]:LIST[n]:RCARrier?

Sets the amplitude levels to test against for any custom offsets. This amplitude level is relative to the carrier amplitude. If multiple offsets are available, the list contains five (5) entries. The offset closest to the carrier channel is the first one in the list. ACP:OFFS[n]:LIST[n]:TEST selects the type of testing to be done at each offset.

The query returns five (5) real numbers that are the current amplitude test limits, relative to the carrier, for each offset.

cdmaOne, Basic mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular frequency bands and 2 is pcs frequency bands. The default is cellular bands (1).

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

	Offset A	Offset B	Offset C	Offset D	Offset E
iDEN					
	0 dBc	n/a	n/a	n/a	n/a
Basic					
	–45 dBc	–60 dBc	0 dBc	0 dBc	0 dBc
cdmaOne					
BS cellular	–45 dBc	–60 dBc	0 dBc	0 dBc	0 dBc
BS pcs	–45 dBc	0 dBc	0 dBc	0 dBc	0 dBc
MS cellular	–42 dBc	–54 dBc	0 dBc	0 dBc	0 dBc
MS pcs	–42 dBc	0 dBc	0 dBc	0 dBc	0 dBc
cdma2000					
	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc
W-CDMA					
	0 dBc	0 dBc	0 dBc	0 dBc	0 dBc

Range: –150 dB to 50 dB for cdmaOne, Basic mode

–200 dB to 50 dB for cdma2000, W-CDMA, iDEN mode

Default Unit: dB

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Amplitude Limits Relative to the Power Spectral Density

iDEN mode

[:SENSe]:ACP:OFFSet:RPSDensity <rel_power>

[:SENSe]:ACP:OFFSet:RPSDensity?

Basic mode

[:SENSe]:ACP:OFFSet:LIST:RPSDensity <rel_power>{,<rel_power>}

[:SENSe]:ACP:OFFSet:LIST:RPSDensity?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n]:RPSDensity <rel_power>{,<rel_power>}

[:SENSe]:ACP:OFFSet[n]:LIST[n]:RPSDensity?

Sets the amplitude levels to test against for any custom offsets. This amplitude level is relative to the power spectral density. If multiple offsets are available, the list contains five (5) entries. The offset closest to the carrier channel is the first one in the list. ACP:OFFS[n]:LIST[n]:TEST selects the type of testing to be done at each offset.

The query returns five (5) real numbers that are the current amplitude test limits, relative to the power spectral density, for each offset.

cdmaOne, Basic mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular frequency bands and 2 is pcs frequency bands. The default is cellular bands (1).

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

	Offset A	Offset B	Offset C	Offset D	Offset E
iDEN					
	0 dB	n/a	n/a	n/a	n/a
Basic					
	–28.87 dB	–43.87 dB	0 dB	0 dB	0 dB
cdmaOne					
BS cellular	–28.87 dB	–43.87 dB	0 dB	0 dB	0 dB
BS pcs	–28.87 dB	0 dB	0 dB	0 dB	0 dB
MS cellular	–25.87 dB	–37.87 dB	0 dB	0 dB	0 dB
MS pcs	–25.87 dB	0 dB	0 dB	0 dB	0 dB
cdma2000					
	0 dB	0 dB	0 dB	0 dB	0 dB
W-CDMA					
	0 dB	0 dB	0 dB	0 dB	0 dB

Range: –150 dB to 50 dB for cdmaOne, Basic, cdma2000, W-CDMA mode

–200 dB to 50 dB for iDEN mode

Default Unit: dB

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Control Offset Frequency List

iDEN mode

[:SENSe]:ACP:OFFSet:STATe OFF|ON|0|1

[:SENSe]:ACP:OFFSet:STATe?

Basic mode

[:SENSe]:ACP:OFFSet:LIST:STATe OFF|ON|0|1{, OFF|ON|0|1}

[:SENSe]:ACP:OFFSet:LIST:STATe?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n]:STATe OFF|ON|0|1 {, OFF|ON|0|1}

[:SENSe]:ACP:OFFSet[n]:LIST[n]:STATe?

Selects whether testing is to be done at the custom offset frequencies. The measured powers are tested against the absolute values defined with ACP:OFFS[n]:LIST[n]:ABS, or the relative values defined with ACP:OFFS[n]:LIST[n]:RPSD and ACP:OFFS[n]:LIST[n]:RCAR.

cdmaOne mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular frequency bands and 2 is pcs frequency bands. The default is cellular bands (1).

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

Factory Preset and *RST:

	Offset A	Offset B	Offset C	Offset D	Offset E
iDEN					
	On	n/a	n/a	n/a	n/a
Basic					
	On	On	On	On	On
cdmaOne					
BS cellular	On	On	On	On	On
BS pcs	On	On	On	On	On
MS cellular	On	On	On	On	On
MS pcs	On	On	On	On	On
cdma2000					
	On	On	Off	Off	Off
W-CDMA					
	On	On	Off	Off	Off

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Define Type of Offset Frequency List

iDEN mode

[:SENSe]:ACP:OFFSet:TEST ABSolute|AND|RELative|OR

[:SENSe]:ACP:OFFSet:TEST?

Basic mode

[:SENSe]:ACP:OFFSet:LIST:TEST ABSolute|AND|RELative|OR {, ABSolute|AND|RELative|OR}

[:SENSe]:ACP:OFFSet:LIST:TEST?

cdmaOne, cdma2000, W-CDMA mode

[:SENSe]:ACP:OFFSet[n]:LIST[n]:TEST ABSolute|AND|RELative|OR{, ABSolute|AND|RELative|OR}

[:SENSe]:ACP:OFFSet[n]:LIST[n]:TEST?

Defines the type of testing to be done at any custom offset frequencies. The measured powers are tested against the absolute values defined with ACP:OFFS[n]:LIST[n]:ABS, or the relative values defined with ACP:OFFS[n]:LIST[n]:RPSD and ACP:OFFS[n]:LIST[n]:RCAR.

cdmaOne, Basic mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is cellular frequency bands and 2 is pcs frequency bands. The default is cellular bands (1).

cdma2000 mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is SR1, 2 is SR3 DS, and 3 is SR3 MC. The default is SR1 (1).

W-CDMA mode

Offset [n] - Where 1 is base station and 2 is mobiles. The default is base station (1).

List [n] - Where 1 is ARIB, 2 is 3GPP, and 3 is Trial. The default is ARIB (1).

The types of testing that can be done for each offset include:

- And - Test both the absolute power measurement and the power relative to the carrier. If they both fail, then return a failure for the measurement at this offset.

- Absolute - Test the absolute power measurement. If it fails, then return a failure for the measurement at this offset.
- Or - Test both the absolute power measurement and the power relative to the carrier. If either one fails, then return a failure for the measurement at this offset.
- Relative - Test the power relative to the carrier. If it fails, then return a failure for the measurement at this offset.

Factory Preset and *RST:

	Offset A	**Offset B**	**Offset C**	**Offset D**	**Offset E**
iDEN					
	REL	n/a	n/a	n/a	n/a
Basic					
	REL	REL	REL	REL	REL
cdmaOne					
BS cellular	REL	REL	REL	REL	REL
BS pcs	REL	ABS	ABS	REL	REL
MS cellular	REL	REL	REL	REL	REL
MS pcs	REL	ABS	ABS	REL	REL
cdma2000					
	REL	REL	REL	REL	REL
W-CDMA					
	REL	REL	REL	REL	REL

Remarks: You must be in Basic, cdmaOne, cdma2000, W-CDMA, iDEN mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Sweep Mode Resolution Bandwidth

[:SENSe]:ACP:SWEep:BANDwidth|BWIDth[:RESolution] <freq>

[:SENSe]:ACP:SWEep:BANDwidth|BWIDth[:RESolution]?

Sets the resolution bandwidth when using the spectrum analyzer type sweep mode. See [:SENSe]:ACP:SWEep:TYPE.

Factory Preset and *RST: In the automatic mode, the resolution bandwidth is set based on the current span, which is determined by the furthest selected offset.

Range: 1.0 kHz to 1.0 MHz

Default Unit: Hz

Remarks: You must be in the cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Sweep Mode Resolution BW Control

[:SENSe]:ACP:SWEep:BANDwidth|BWIDth[:RESolution]:AUTO OFF|ON|0|1

[:SENSe]:ACP:SWEep:BANDwidth|BWIDth[:RESolution]:AUTO?

Sets the resolution bandwidth to automatic, when using the spectrum analyzer type sweep mode. See [:SENSe]:ACP:SWEep:TYPE.

Factory Preset and *RST: On

Remarks: You must be in the cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Sweep Mode Detection

[:SENSe]:ACP:SWEep:DETector[:FUNCtion] AAVerage|POSitive

[:SENSe]:ACP:SWEep:DETector[:FUNCtion]?

Selects the detector type when using the sweep mode. See [:SENSe]:ACP:SWEep:TYPE.

Absolute average - the absolute average power in each frequency is measured across the spectrum

Positive - the positive peak power in each frequency is measured across the spectrum

Factory Preset and *RST: Positive

Remarks: You must be in the cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Sweep Time

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

[:SENSe]:ACP:SWEep:TIME?

Sets the sweep time when using the sweep mode. See [:SENSe]:ACP:SWEep:TYPE.

Factory Preset and *RST: 625 µs (1 slot)

Range: 500 µs to 10 ms

Default Unit: seconds

Remarks: You must be in the cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Sweep Type

[:SENSe]:ACP:SWEep:TYPE FFT|SWEep

[:SENSe]:ACP:SWEep:TYPE?

Selects the type of sweeping. This can be either FFT or conventional spectrum analyzer sweeping.

FFT - makes fast ACP measurements

Sweep - is slower than FFT, but the results correlate with traditional spectrum analyzer measurements though the signals peak/average ratio is higher. See [SENSe:]ACP:SWEep:DETector[:FUNCtion]

Factory Preset and *RST: FFT

Remarks: You must be in the cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Adjacent Channel Power Measurement Power Reference

[:SENSe]:ACP:TYPE TPRef|PSDRef

[:SENSe]:ACP:TYPE?

Selects the measurement type. This allows you to make absolute and relative power measurements of either total power, or the power normalized to the measurement bandwidth.

Total Power Reference - the total power is used as the power reference

Power Spectral Density Reference - the power spectral density is used as the power reference

Factory Preset and *RST: Total power reference

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, NADC, PDC mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement

Commands for querying the code domain power measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Code Domain Power** measurement has been selected from the **MEASURE** key menu.

Code Domain Power Measurement Demod Alpha

[:SENSe]:CDPower:ALPHa <float>

[:SENSe]:CDPower:ALPHa?

Set alpha for the root nyquist filter.

Factory Preset and *RST: 0.22

Range: 0.01 to 0.5

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Chip Rate

[:SENSe]:CDPower:CRATe <freq>

[:SENSe]:CDPower:CRATe?

Set chip rate.

Factory Preset and *RST: 4.096 MHz

Range: 3.6864 to 4.5056 MHz

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Spectrum Normal/Invert

[:SENSe]:CDPower:SPECtrum NORMal|INVert

[:SENSe]:CDPower:SPECtrum?

Select normal or inverted spectrum for demodulation.

Normal - normal spectrum is used

Invert - inverted spectrum is used

Factory Preset and *RST: Normal

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

Code Domain Power Measurement Scramble Code

[:SENSe]:CDPower:SYNC:SCRamble <integer>

[:SENSe]:CDPower:SYNC:SCRamble?

Set the scramble code for synchronization.

Factory Preset and *RST: 1

Range: 0 to 262143 (0h to 3FFFFh) (0 is for no-scramble)

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Code Domain Power Measurement Trigger Source

[:SENSe]:CDPower:TRIGger:SOURce EXTernal[1]|External2|FRAMe|IF|IMMediate|IF|RFBurst

[:SENSe]:CDPower:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

External 1 – front panel external trigger input

External 2 – rear panel external trigger input

Frame – internal frame trigger from front panel input

IF – internal IF envelope trigger

Immediate – the next data acquisition is immediately taken, capturing the signal asynchronously (also called free run).

RF Burst – internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals.

Factory Preset and *RST: Immediate

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

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

Channel Power Measurement

Commands for querying the channel power measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Channel Power** measurement has been selected from the **MEASURE** key menu. CHPower used instead of the more std-compliant CPOWer, as that syntax was already used for Carrier Power measurement (but has since been renamed).

Channel Power Measurement Average Count

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

[:SENSe]:CHPower: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: 20

Range: 1 to 10,000

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Averaging State

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

[:SENSe]:CHPower:AVERage[:STATe]?

Turn averaging on or off.

Factory Preset and *RST: On

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Averaging Termination Control

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

[:SENSe]:CHPower:AVERage:TCONtrol?

Select the type of terminal control used for averaging. 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: Repeat

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Integration BW

[:SENSe]:CHPower:BANDwidth|BWIDth:INTegration <freq>

[:SENSe]:CHPower:BANDwidth|BWIDth:INTegration?

Set the Integration BW (IBW) that will be used.

Factory Preset and *RST: 1.23 MHz for Basic, cdmaOne, SR1 of cdma2000

3.69 MHz for SR3 of cdma2000

5 MHz for W-CDMA

Range: 1 kHz to 10 MHz

Default Unit: Hz

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Span

[:SENSe]:CHPower:FREQuency:SPAN <freq>

[:SENSe]:CHPower:FREQuency:SPAN?

Set the frequency span that will be used.

Factory Preset and *RST: 2 MHz for Basic, cdmaOne, SR1 of cdma2000

5 MHz for SR3 of cdma2000

6 MHz for W-CDMA

Range: 1 kHz to 10 MHz

Default Unit: Hz

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Data Points

[:SENSe]:CHPower:POINts <integer>

[:SENSe]:CHPower:POINts?

Set the number of data points that will be used. Changing this will change the time record length and resolution BW that are used.

Factory Preset and *RST: 512

Range: 64 to 32768, in a 2^n sequence

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Data Points Auto

[:SENSe]:CHPower:POINts:AUTO OFF|ON|0|1

[:SENSe]:CHPower:POINts:AUTO?

Select auto or manual control of the data points. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default, may cause invalid measurement results.

Auto - couples the Data Points to the Integration BW.

Manual - the Data Points is uncoupled from the Integration BW.

Factory Preset and *RST: Auto

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Channel Power Measurement Trigger Source

[:SENSe]:CHPower:TRIGger:SOURce EXTernal[1]|EXTernal 2|IMMediate

[:SENSe]:CHPower:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions. This is an Advanced control that normally does not need to be changed.

External 1 - front panel external trigger input

External 2 - rear panel external trigger input

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

Factory Preset and *RST: Immediate (Free Run)

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA, or Basic mode to use this command. Use INSTrument:SELect to set the mode.

Correction for BTS RF Port External Attenuation

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

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

Set equal to the external attenuation used when measuring base transmit stations.

Factory Preset and *RST: 0 dB

Range: 0 to 100 dB for GSM

–50 to 50 dB for cdma2000, W-CDMA

Default Unit: dB

Remarks: Global to the current mode.

You must be in the GSM, cdma2000, or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Correction for Mobile Station RF Port External Attenuation

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

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

Set the correction equal to the external attenuation used when measuring mobile stations.

Factory Preset and *RST:	0 dB
Range:	–50 to 50 dB for cdma2000, W-CDMA, iDEN, NADC or PDC
Default Unit:	dB
Remarks:	You must be in the cdma2000, W-CDMA, iDEN, NADC or PDC mode to use this command. Use INSTrument:SELect to set the mode. Value is global to the current mode.

QPSK Error Vector Magnitude Measurement

Commands for querying the QPSK error vector magnitude measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **EVM** measurement has been selected from the **MEASURE** key menu.

QPSK Error Vector Magnitude Measurement Demod Alpha

[:SENSe]:EVMQpsk:ALPHa <float>

[:SENSe]:EVMQpsk:ALPHa?

Set alpha for the root nyquist filter.

Factory Preset and *RST: 0.22

Range: 0.01 to 0.5

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

QPSK Error Vector Magnitude Measurement Average Count

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

[:SENSe]:EVMQpsk:AVERage:COUNt?

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

Factory Preset and *RST: 10

Range: 1 to 10,000

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

QPSK Error Vector Magnitude Measurement Averaging State

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

[:SENSe]:EVMQpsk:AVERage[:STATe]?

Turn average on or off.

Factory Preset and *RST: On

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

QPSK Error Vector Magnitude Measurement Averaging Termination Control

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

[:SENSe]:EVMQpsk:AVERage:TCONtrol?

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

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: Repeat

Remarks: You must be in the cdam2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

QPSK Error Vector Magnitude Measurement Chip Rate

[:SENSe]:EVMQpsk:CRATe <freq>

[:SENSe]:EVMQpsk:CRATe?

Set chip rate.

Factory Preset and *RST: 1.2288 MHz for SR1 and SR3 MC BTS of cdma2000

3.6864 MHz for SR3 MC MS and SR3 DS of cdma2000

3.84 MHz for 3GPP of W-CDMA

4.096 MHz for Trial and ARIB of W-CDMA

Range: 1.10592 to 1.35168 MHz for SR1 and SR3 MC BTS of cdma2000

3.31776 to 4.05504 MHz for SR3 MC MS and SR3 DS of cdma2000

3.456 to 4.224 MHz for 3GPP of W-CDMA

3.6864 to 4.5056 MHz for Trial and ARIB of W-CDMA

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

QPSK Error Vector Magnitude Measurement Length

[:SENSe]:EVMQpsk:SWEep:POINts <integer>

[:SENSe]:EVMQpsk:SWEep:POINts?

Set the number of data points that will be used.

Factory Preset and *RST: 256

Range: 128 to 1536 for cdma2000

128 to 512 for W-CDMA

Unit: chips

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

QPSK Error Vector Magnitude Measurement Trigger Source

[:SENSe]:EVMQpsk:TRIGger:SOURce EXTernal[1]|EXTernal2|FRAMe|IF|IMMediate|RFBurst

[:SENSe]:EVMQpsk:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

External 1 – front panel external trigger input

External 2 – rear panel external trigger input

IF – internal IF envelope (video) trigger

Immediate – the next data acquisition is immediately taken, capturing the signal asynchronously (also called free run)

Frame – internal frame trigger from front panel input

RF Burst – internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals

Factory Preset and *RST:	Immediate
Remarks:	You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Power Statistics CCDF Measurement

Commands for querying the statistical power measurement of the complimentary cumulative distribution function (CCDF) measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Power Stat CCDF** measurement has been selected from the **MEASURE** key menu.

Power Statistics CCDF Measurement Channel Bandwidth

[:SENSe]:PSTatistic:BANDwidth|BWIDth <freq>

[:SENSe]:PSTatistic:BANDwidth|BWIDth?

Set the bandwidth that will be used for acquiring the signal.

Factory Preset and *RST: 5.0 MHz

Range: 10.0 kHz to 6.7 MHz

Resolution: 0.1 kHz

Step: 1.0 kHz

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Power Statistics CCDF Measurement Sample Counts

[:SENSe]:PSTatistic:COUNts <integer>

[:SENSe]:PSTatistic:COUNts?

Set the counts. Measurement stops when the sample counts reach this value.

Factory Preset and *RST: 10,000,000

Range: 1,000 to 2,000,000,000

Unit: counts

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Power Statistics CCDF Measurement Sweep Time

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

[:SENSe]:PSTatistic:SWEep:TIME?

Set the length of measurement interval that will be used.

Factory Preset and *RST: 1.0 ms

Range: 0.1 ms to 10 ms

Resolution: 0.001 ms

Step: 0.001 ms

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Power Statistics CCDF Measurement Trigger Source

[:SENSe]:PSTatistic:TRIGger:SOURce EXTernal[1]|EXTernal2|FRAMe|IF|IMMediate|RF Burst

[:SENSe]:PSTatistic:TRIGger:SOURce?

Set the trigger source used to control the data acquisitions.

External 1 - front panel external trigger input

External 2 - rear panel external trigger input

Frame - uses the internal frame timer, which has been synchronized to the selected burst sync.

IF - internal IF envelope (video) trigger

Immediate - the next data acquisition is immediately taken, capturing the signal asynchronously (also called Free Run).

RF Burst - internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals.

Factory Preset and *RST: Immediate

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Radio Device Under Test

[:SENSe]:RADio:DEVice BTS|MS

[:SENSe]:RADio:DEVice?

Select the type of radio device to be tested.

BTS - Base station transmitter test

MS - Mobile station transmitter test

Factory Preset and *RST: BTS

Remarks: Global to the current mode.

You must be in cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

History: Version A.03.00 or later

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

Frequency Offset of MS to BTS

[:SENSe]:RADio:FOFFset <freq>

[:SENSe]:RADio:FOFFset?

Set the amount of frequency offset (MS freq – BTS freq).

Factory Preset and *RST: 190 MHz

Range: –500 MHz to 500 MHz

Remarks: Global to the current mode.

You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

History: Version A.03.00 or later

Front Panel Access: **Mode Setup, Radio, MS-BTS Offset**

Radio Format (Standard)

[:SENSe]:RADio:FORMat ARIB|TGPP|TRIal

[:SENSe]:RADio:FORMat?

Select the format that testing will be compliant with when measurements are made.

ARIB, is the standard format defined by the Association of Radio Industries and Business in Japan

TGPP, is the standard format defined by the Third Generation Partnership Projects (3GPP)

Trial, is a 1998 trial format being evaluated

Factory Preset and *RST: Trial

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

History: Version A.03.00 or later

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

Rho (Waveform Quality) Measurement

Commands for querying the rho measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Mod Accuracy (Rho)** measurement has been selected from the **MEASURE** key menu.

Rho Measurement Demod Alpha

[:SENSe]:RHO:ALPHa <float>

[:SENSe]:RHO:ALPHa?

Set alpha for the root nyquist filter.

Factory Preset and *RST: 0.22

Range: 0.01 to 0.5

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Rho Measurement Average Count

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

[:SENSe]:RHO:AVERage:COUNt?

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

Factory Preset and *RST: 10

Range: 1 to 10,000

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Rho Measurement Averaging State

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

[:SENSe]:RHO:AVERage[:STATe]?

Turn averaging on or off.

Factory Preset and *RST: On

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Rho Measurement Averaging Termination Control

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

[:SENSe]:RHO:AVERage:TCONtrol?

Select the type of terminal control used for averaging. This determines the averaging action after the specified number of frames (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

Repeat for cdma2000 and W-CDMA mode

Remarks: You must be in the cdmaOne, cdma2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Rho Measurement Spectrum Normal/Invert

[:SENSe]:RHO:SPECtrum NORMal|INVert

[:SENSe]:RHO:SPECtrum?

Select normal or inverted spectrum for demodulation.

Normal - normal spectrum is used

Invert - inverted spectrum is used

Factory Preset and *RST: Normal

Remarks You must be in the cdmaOne, cama2000, W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Rho Measurement Scramble Code

[:SENSe]:RHO:SYNC:SCRamble <integer>

[:SENSe]:RHO:SYNC:SCRamble?

Set the scramble code for synchronization.

Factory Preset and *RST: 1

Range: 0 to 262143 (0h to 3FFFFh) (0 is for no-scramble)

Remarks: You must be in the W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

Rho Measurement Trigger Source

[:SENSe]:RHO:TRIGger:SOURce EXTernal[1]|External2|FRAMe|IF|IMMediate|IF|RFBurst

[:SENSe]:RHO:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

External 1 – front panel external trigger input

External 2 – rear panel external trigger input

Frame – internal frame trigger from front panel input

IF – internal IF envelope trigger

Immediate – the next data acquisition is immediately taken, capturing the signal asynchronously (also called free run).

RF Burst – internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals.

Factory Preset and *RST: Immediate

Remarks: You must be in the cdma2000 or W-CDMA mode to use this command. Use INSTrument:SELect to set the mode.

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

Spectrum (Frequency-Domain) Measurement

Commands for querying the spectrum measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Spectrum (Freq Domain)** measurement has been selected from the **MEASURE** key menu.

Spectrum Measurement Data Acquisition Packing

[:SENSe]:SPECtrum:ACQuisition:PACKing AUTO|LONG|MEDium|SHORt

[:SENSe]:SPECtrum:ACQuisition:PACKing?

Select the amount of data acquisition packing. This is an advanced control that normally does not need to be changed.

Factory Preset and *RST: Auto

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement ADC Dither

[:SENSe]:SPECtrum:ADC:DITHer[:STATe] AUTO|ON|OFF|2|1|0

[:SENSe]:SPECtrum:ADC:DITHer[:STATe]?

Turn the ADC dither on or off. This is an advanced control that normally does not need to be changed.

Factory Preset and *RST: Auto

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement ADC Range

[:SENSe]:SPECtrum:ADC:RANGe AUTO|APEak|APLock|M6|P0|P6|P12|P18|P24|

[:SENSe]:SPECtrum:ADC:RANGe?

Select the range for the gain-ranging that is done in front of the ADC. This is an advanced control that normally does not need to be changed. Auto peak ranging is the default for this measurement. If you are measuring a CW signal please see the description below.

- Auto - automatic range

  For FFT spectrums - auto ranging should not be not be used. An exception to this would be if you know that your signal is “bursty”. Then you might use auto to maximize the time domain dynamic range as long as you are not very interested in the FFT data.

- Auto Peak - automatically peak the range

  For CW signals, the default of auto-peak ranging can be used, but a better FFT measurement of the signal can be made by selecting one of the manual ranges that are available: M6, P0 - P24. Auto peaking can cause the ADC range gain to move monotonically down during the data capture. This movement should have negligible effect on the FFT spectrum, but selecting a manual range removes this possibility. Note that if the CW signal being measured is close to the auto-ranging threshold, the noise floor may shift as much as 6 dB from sweep to sweep.

- Auto Peak Lock - automatically peak lock the range

  — For CW signals, auto-peak lock ranging may be used. It will find the best ADC measurement range for this particular signal and will not move the range as auto-peak can. Note that if the CW signal being measured is close to the auto-ranging threshold, the noise floor may shift as much as 6 dB from sweep to sweep.
  — For “bursty” signals, auto-peak lock ranging should not be used. The measurement will fail to operate, since the wrong (locked) ADC range will be chosen often and overloads will occur in the ADC.

- M6 - manually selects an ADC range that subtracts 6 dB of fixed gain across the range. Manual ranging is best for CW signals.

- P0 to 24 - manually selects ADC ranges that add 0 to 24 dB of fixed gain across the range. Manual ranging is best for CW signals.

Factory Preset and *RST: Auto peak

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Average Clear

[:SENSe]:SPECtrum:AVERage:CLEAr

The average data is cleared and the average counter is reset.

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Number of Averages

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

[:SENSe]:SPECtrum:AVERage:COUNt?

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

Factory Preset and *RST: 25

Range: 1 to 10,000

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Averaging State

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

[:SENSe]:SPECtrum:AVERage[:STATe]?

Turn averaging on or off.

Factory Preset and *RST: On

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Averaging Mode

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

[:SENSe]:SPECtrum:AVERage:TCONtrol?

Select the type of terminal control used for averaging. This determines the averaging action after the specified number of 'sweeps' (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: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Averaging Type

[:SENSe]:SPECtrum:AVERage:TYPE LOG|MAXimum|MINimum|RMS|SCALar

[:SENSe]:SPECtrum:AVERage:TYPE?

Select the type of averaging.

Log – The log of the power is averaged. (This is also known as video averaging.)

Maximum – The maximum values are retained.

Minimum – The minimum values are retained.

RMS – The power is averaged, providing the rms of the voltage.

Scalar – The voltage is averaged.

Factory Preset and *RST: Log

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement pre-ADC Bandpass Filter

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PADC OFF|ON|0|1

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PADC?

Turn the pre-ADC bandpass filter on or off. This is an advanced control that normally does not need to be changed.

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement pre-FFT BW Auto

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PFFT:AUTO OFF|ON|0|1

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PFFT:AUTO?

Select auto or manual control of the pre-FFT BW. This is an advanced control that normally does not need to be changed.

Auto - couples the pre-FFT BW to the frequency span.

Manual - the pre-FFT BW is uncoupled from the frequency span.

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement pre-FFT BW

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PFFT[:SIZE] <freq>

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PFFT[:SIZE]?

Set the pre-FFT bandwidth. This is an advanced control that normally does not need to be changed.

Frequency span, resolution bandwidth, and the pre-FFT bandwidth settings are normally coupled. If you are not auto-coupled, there can be combinations of these settings that are not valid.

Factory Preset and *RST: 1.55 MHz

1.25 MHz for cdmaOne

155 kHz, for iDEN mode

Range: 1 Hz to 10 MHz

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Pre-FFT BW Filter Type

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PFFT:TYPE FLAT|GAUSsian

[:SENSe]:SPECtrum:BANDwidth|BWIDth:PFFT:TYPE?

Select the type of pre-FFT filter that is used. This is an advanced control that normally does not need to be changed.

Flat top- a filter with a flat amplitude response, which provides the best amplitude accuracy.

Gaussian - a filter with Gaussian characteristics, which provides the best pulse response.

Factory Preset and *RST: Flat top

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Resolution BW

[:SENSe]:SPECtrum:BANDwidth|BWIDth[:RESolution] <freq>

[:SENSe]:SPECtrum:BANDwidth|BWIDth[:RESolution]?

Set the resolution bandwidth for the FFT. This is the bandwidth used for resolving the FFT measurement. It is not the pre-FFT bandwidth. This value is ignored if the function is auto-coupled.

Frequency span, resolution bandwidth, and the pre-FFT bandwidth settings are normally coupled. If you are not auto-coupled, there can be combinations of these settings that are not valid.

Factory Preset and *RST: 20 kHz

250 Hz, for iDEN mode

Range: 0.10 Hz to 3 MHz

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Resolution BW Auto

[:SENSe]:SPECtrum:BANDwidth|BWIDth[:RESolution]:AUTO OFF|ON|0|1

[:SENSe]:SPECtrum:BANDwidth|BWIDth[:RESolution]:AUTO?

Select auto or manual control of the resolution BW. The automatic mode couples the resolution bandwidth setting to the frequency span.

Factory Preset and *RST: On

Off, for iDEN mode

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Decimation of Spectrum Display

[:SENSe]:SPECtrum:DECimate[:FACTor] <integer>

[:SENSe]:SPECtrum:DECimate[:FACTor]?

Set the amount of data decimation done by the hardware and/or the software. Decimation by 3 keeps every third sample, throwing away the two in between. Similarly, decimation by 5 keeps every fifth sample, throwing away the four in between.

Using zero (0) decimation selects the automatic mode. The measurement will then automatically choose decimation by “1” or “2” as is appropriate for the bandwidth being used. This is an advanced control that normally does not need to be changed.

Factory Preset and *RST: 0

Range: 0 to 1000, where 0 sets the function to automatic

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

History: Version A.02.00 or later

Spectrum Measurement FFT Length

[:SENSe]:SPECtrum:FFT:LENGth <integer>

[:SENSe]:SPECtrum:FFT:LENGth?

Set the FFT length. This value is only used if length control is set to manual. The value must be greater than or equal to the window length value. Any amount greater than the window length is implemented by zero-padding. This is an advanced control that normally does not need to be changed.

Factory Preset and *RST: 4096

32768, for iDEN mode

Range: 8 to 1,048,576

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

History: Short form changed from LENgth to LENGth, A.03.00

Spectrum Measurement FFT Length Auto

[:SENSe]:SPECtrum:FFT:LENGth:AUTO OFF|ON|0|1

[:SENSe]:SPECtum:FFT:LENGth:AUTO?

Select auto or manual control of the FFT and window lengths.

This is an advanced control that normally does not need to be changed.

Auto - the window lengths are coupled to resolution bandwidth, window type (FFT), pre-FFT bandwidth (sample rate) and SENSe:SPECtrum:FFT:RBWPoints.

Manual - lets you set `SENSe:SPECtrum:FFT:LENGth` and `SENSe:SPECtrum:FFT:WINDow:LENGth`.

Factory Preset and *RST: Auto

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

History: Short form changed from LENgth to LENGth, A.03.00

Spectrum Measurement FFT Minimum Points in Resolution BW

[:SENSe]:SPECtrum:FFT:RBWPoints <real>

[:SENSe]:SPECtum:FFT:RBWPoints?

Set the minimum number of data points that will be used inside the resolution bandwidth. The value is ignored if length control is set to manual. This is an advanced control that normally does not need to be changed.

Factory Preset and *RST: 1.30

Range: 0.1 to 100

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Window Length

[:SENSe]:SPECtrum:FFT:WINDow:LENGth <integer>

[:SENSe]:SPECtrum:FFT:WINDow:LENGth?

Set the FFT window length. This value is only used if length control is set to manual. This is an advanced control that normally does not need to be changed.

Factory Preset and *RST: 706

5648, for iDEN mode

Range: 8 to 1,048,576

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

History: Short form changed from LENgth to LENGth, A.03.00

Spectrum Measurement FFT Window

[:SENSe]:SPECtrum:FFT:WINDow[:TYPE] BH4Tap|BLACkman|FLATtop|GAUSsian|HAMMing|HANNing|KB70|KB90 |KB110|UNIForm

[:SENSe]:SPECtrum:FFT:WINDow[:TYPE]?

Select the FFT window type.

BH4Tap - Blackman Harris with 4 taps

Blackman - Blackman

Flat Top - flat top, the default (for high amplitude accuracy)

Gaussian - Gaussian with alpha of 3.5

Hamming - Hamming

Hanning - Hanning

KB70, 90, and 110 - Kaiser Bessel with sidelobes at –70, –90, or –110 dBc

Uniform - no window is used. (This is the unity response.)

Factory Preset and *RST: Flat top

Remarks: This selection affects the acquisition point quantity and the FFT size, based on the resolution bandwidth selected.

To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Frequency Span

[:SENSe]:SPECtrum:FREQuency:SPAN <freq>

[:SENSe]:SPECtrum:FREQuency:SPAN?

Set the frequency span to be measured.

Factory Preset and *RST: 1 MHz

100 kHz for iDEN mode

Range: 10 Hz to 10 MHz (15 MHz when Service mode is selected)

Default Unit: Hz

Remarks: The actual measured span will generally be slightly wider due to the finite resolution of the FFT.

To use this command, the appropriate mode should be selected with INSTrument:SELect.

Spectrum Measurement Trigger Source

[:SENSe]:SPECtrum:TRIGger:SOURce EXTernal[1]|EXTernal 2|FRAMe|IF|LINE|IMMediate|RFBurst

[:SENSe]:SPECtrum:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

External 1 - front panel external trigger input

External 2 - rear panel external trigger input

Frame - internal frame timer from front panel input

IF - internal IF envelope (video) trigger

Line - internal line trigger

Immediate - the next data acquisition is immediately taken (also called free run)

RF Burst - internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals

Factory Preset and *RST: Immediate (free run)

RF burst, for GSM, iDEN mode

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform (Time-Domain) Measurement

Commands for querying the waveform measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 27. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Waveform (Time Domain)** measurement has been selected from the **MEASURE** key menu.

Waveform Measurement pre-ADC Bandpass Filter

[:SENSe]:WAVeform:ADC:FILTer:[:STATe] OFF|ON|0|1

[:SENSe]:WAVeform:ADC:FILTer:[:STATe]?

Turn the pre-ADC bandpass filter on or off. This is an Advanced control that normally does not need to be changed.

Preset: Off

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement ADC Range

[:SENSe]:WAVeform:ADC:RANGe AUTO|APEak|APLock|GROund|M6|P0|P6|P12|P18|P24|

[:SENSe]:WAVeform:ADC:RANGe?

Select the range for the gain-ranging that is done in front of the ADC. This is an Advanced control that normally does not need to be changed.

Auto - automatic range

Auto Peak - automatically peak the range

Auto Peak Lock - automatically peak lock the range

Ground - ground

M6 - subtracts 6 dB of fixed gain across the range

P0 to 24 - adds 0 to 24 dB of fixed gain across the range

Factory Preset and *RST: Auto

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Number of Averages

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

[:SENSe]:WAVeform:AVERage:COUNt?

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

Factory Preset and *RST: 10

Range: 1 to 10,000

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Averaging State

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

[:SENSe]:WAVeform:AVERage[:STATe]?

Turn averaging on or off.

Factory Preset and *RST: Off

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Averaging Mode

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

[:SENSe]:WAVeform:AVERage:TCONtrol?

Select the type of terminal control used for averaging. This determines the averaging action after the specified number of 'sweeps' (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: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Averaging Type

[:SENSe]:WAVeform:AVERage:TYPE LOG|MAXimum|MINimum|RMS|SCALar

[:SENSe]:WAVeform:AVERage:TYPE?

Select the type of averaging.

Log - The log of the power is averaged. (This is also known as video averaging.)

Maximum - The maximum values are retained.

Minimum - The minimum values are retained.

RMS - The power is averaged, providing the rms of the voltage.

Factory Preset and *RST: RMS

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Resolution BW

[:SENSe]:WAVeform:BANDwidth|BWIDth[:RESolution] <freq>

[:SENSe]:WAVeform:BANDwidth|BWIDth[:RESolution]?

Set the resolution bandwidth. This value is ignored if the function is auto-coupled.

Factory Preset and *RST: 100 kHz, for NADC, PDC, cdma2000, W-CDMA, basic, service mode

500 kHz, for GSM mode

2 MHz. for cdmaOne

Range: 1 kHz to 5 MHz

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Resolution BW Filter Type

[:SENSe]:WAVeform:BANDwidth|BWIDth[:RESolution]:TYPE FLATtop|GAUSsian

[:SENSe]:WAVeform:BANDwidth|BWIDth[:RESolution]:TYPE?

Select the type of Resolution BW filter that is used. This is an Advanced control that normally does not need to be changed.

Flat top - a filter with a flat amplitude response, which provides the best amplitude accuracy.

Gaussian - a filter with Gaussian characteristics, which provides the best pulse response.

Factory Preset and *RST: Gaussian

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Decimation of Waveform Display

[:SENSe]:WAVeform:DECimate[:FACTor] <integer>

[:SENSe]:WAVeform:DECimate[:FACTor]?

Set the amount of data decimation done by the hardware and/or the firmware. For example, if 4 is selected, three out of every four data points will be thrown away. So every 4th data point will be kept.

Factory Preset and *RST: 1

Range: 1 to 4

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Control Decimation of Waveform Display

[:SENSe]:WAVeform:DECimate:STATe OFF|ON|0|1

[:SENSe]:WAVeform:DECimate:STATe?

Set the amount of data decimation done by the hardware in order to decrease the number of acquired points in a long capture time. This is the amount of data that the measurement ignores.

Factory Preset and *RST: Off

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Sweep (Acquisition) Time

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

[:SENSe]:WAVeform:SWEep:TIME?

Set the measurement acquisition time. It is used to specify the length of the time capture record.

Factory Preset and *RST: 2.0 ms

10.0 ms, for NADC, PDC

15.0 ms, for iDEN mode

Range: 1 µs to 100 s

Default Unit: seconds

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.

Waveform Measurement Trigger Source

[:SENSe]:WAVeform:TRIGger:SOURce EXTernal[1]|EXTernal 2|FRAMe|IF|IMMediate|LINE|RFBurst

[:SENSe]:WAVeform:TRIGger:SOURce?

Select the trigger source used to control the data acquisitions.

External 1 - front panel external trigger input

External 2 - rear panel external trigger input

Frame - internal frame timer from front panel input

IF - internal IF envelope (video) trigger

Immediate - the next data acquisition is immediately taken (also called free run)

Line - internal line trigger

RF Burst - internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals

Factory Preset and *RST: Immediate (free run), for Basic, cdmaOne, NADC, PDC mode

RF burst, for GSM, iDEN mode

Remarks: To use this command, the appropriate mode should be selected with INSTrument:SELect.