

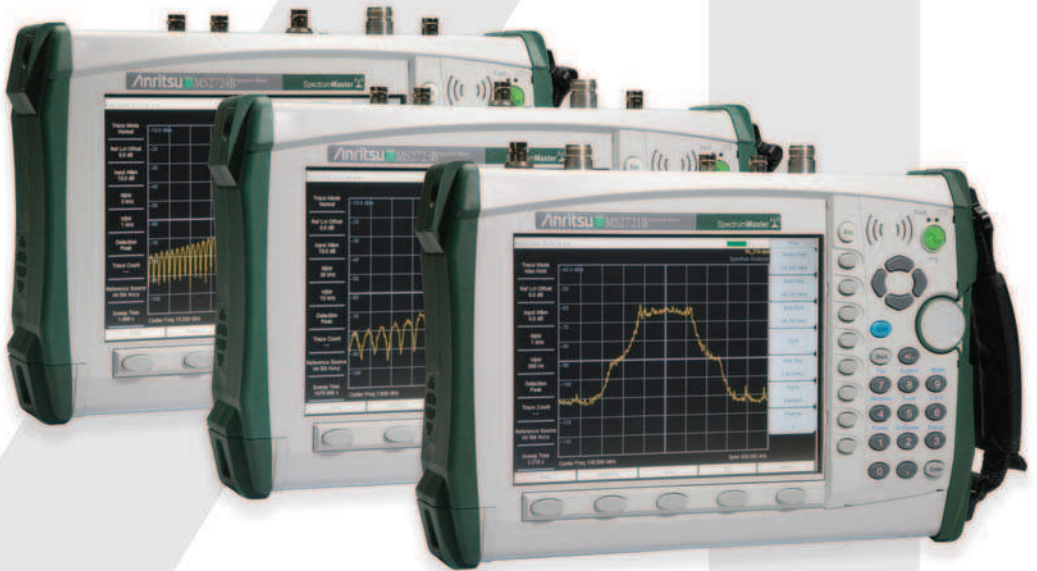
Anritsu

# Spectrum Master™

MS2721B, MS2723B, and MS2724B

A High Performance Handheld Spectrum Analyzer and Base Station Analyzer

## Programming Manual



SpectrumMaster 

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# 1 Introduction

## ***Scope of this Manual***

This manual contains descriptions of the remote commands available for Anritsu's line of Master™ products.

While it does reference the equivalent front-panel interface for each command, it does not provide a complete front panel reference. Please see the appropriate product's User's Guide for that information.

## ***References***

IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. IEEE, New York, NY, 1992.

SCPI Standard-1999, *Standard Commands for Programmable Instruments Volume 1: Syntax and Style*. SCPI Consortium, San Diego, CA, 1999.

*MS2721A Spectrum Analyzer User's Guide* (document #10580-00103). Anritsu Company, Morgan Hill, CA, 2004.

*NI-VISA User Manual* (document #370423A-01). National Instruments Corporation, Austin, TX, 2001.

## ***Trademark Acknowledgments***

NI-VISA and LabVIEW are trademarks of National Instruments Corporation. Spectrum Master is a trademark of Anritsu Company.

## ***Firmware Revisions***

To check your current firmware revision, press Shift-8 (System), Status.

Remote commands are available beginning with Base Version 1.13. They are available in the applications beginning with the following firmware revisions:

<b>Application</b>	<b>Firmware Revision</b>
Spectrum Analyzer	1.58
WCDMA	1.16

## 2 Programming Overview

### **Controller Interface**

The physical interface is the RJ-45 connection on the instrument for 10BASE-T.

Data transfer takes place over Ethernet using TCP/IP and the VXI-11 protocol. In order to communicate with the instrument the PC must have a VXI-11 client implementation either as part of the controller program or using a third party software package on the controlling PC. The examples in Appendix A of this manual are written using National Instruments' NI-VISA™ product.

### **Command Structure**

#### **Format**

The Master™ product line implements a remote interface based on the 1999 SCPI Standard. This is an ASCII-based command set.

Some basic details are described below. For a more detailed description see the SCPI Standard, available for download on the SCPI Consortium website.

#### **Command Tree**

SCPI commands are organized in a “tree” structure. The base of the tree is called the “root”. The “branches” are the functional subsystems. Each “branch” can have sub-branches. The final node is called the “leaf”. The entire sequence of branches, plus the leaf, make up the command. For example, part of the “SENSe” branch looks like this:

```
[ :SENSE]
  :FREQuency
    :CENTer
    :START
    :STOP
    :SPAN
      :FULL
      :PREVIOUS
```

Although they are at different levels in the tree, “CENTer” and “FULL” are both leaves on the tree.

There can be branches and leaves in the tree with the same name as long as they appear at different levels. For example, there is an “AUTO” leaf at the tip of both of these branches:

```
[ :SENSe]          [ :SENSe]
  :BANDwidth       :BANDwidth
    :RESolution    :VIDeo
      :AUTO        :AUTO
```

## Subsystems

A colon (':') separates each subsystem. For example, the command `:SENSe:FREQuency:STARt <freq>` sets the start frequency. The start frequency is part of the `:FREQuency` subsystem which is part of the `:SENSe` subsystem. Stop frequency is also part of the `:SENSe:FREQuency` subsystem. It is specified by `:SENSe:FREQuency:STOP`.

## Optional Subsystems

One subsystem at each “tree” level can be specified as optional. That is, the optional subsystem does not need to be specified to create a valid command. For example, if the specification is written as `[ :SENSe ] :FREQuency:STARt`, the `:SENSe` subsystem is optional. So, both `:SENS:FREQ:STAR` and `:FREQ:STARt` are valid commands and will have the same result.

## Long Format vs. Short Format

Each keyword has a long format and a short format. The start frequency can be specified by `:SENSe:FREQuency:STARt` or `:SENS:FREQ:STAR`. The capital letters in the command specification indicate the short form of the command.

Only the short form and the long form are acceptable. For example, `:SENS:FREQuen:STA` is not an acceptable form of the command.

## Case Sensitivity

Commands are not case sensitive. For example, `:SENS:FREQ:STAR 1 MHZ` and `:sens:freq:star 1 mhz` will have the same result.

## Parameters

The command and its parameters are separated by a space. Parameters may be specified with optional units, depending on the command.

For example, `:SENS:FREQ:STAR 1 MHZ` sets the start frequency to 1 MHz.

Multiple parameters are separated by a comma (“,”).

## Query Format

Many commands have a query format that will return a parameter value or other data.

For example, `:SENS:FREQ:STAR?` will return the current value of the start frequency.

## Combining Multiple Commands

Multiple commands can be sent together if separated by a semi-colon (;). For example, `:SENSe:FREQ:STAR 1MHZ ; :SENSe:FREQ:STOP 2 MHZ` would set the start frequency to 1 MHz and then set the stop frequency to 2 MHz.

## Creating Valid Commands

Command Specification	Valid Forms
<code>[ :SENSE ] :FREQUENCY:START &lt;freq&gt;</code>	The following all produce equivalent results:  <code>:SENSE:FREQUENCY:START 1 MHZ</code>  <code>:SENS:FREQ:STAR 1 MHZ</code>  <code>:sense:frequency:start 1000000</code>  <code>:FREQ:STAR 1000 KHZ</code>
<code>:CALCulate:MARKer [1]   2   3   4   5   6 :X &lt;x-parameter&gt;</code>	The first 2 commands set the location of marker 1. The third command sets the location of marker 2.  <code>:CALC:MARK:X 1 GHZ</code>  <code>:CALC:MARK1:X 1 GHZ</code>  <code>:CALC:MARK2:X 2 GHZ</code>
<code>:UNIT:POWer DBM   DBV   DBMV   DBUV   V   W</code>	The following commands are identical:  <code>:UNIT:POWer DBM</code>  <code>:unit:pow dbm</code>
<code>:INITiate:CONTinuous OFF   ON   0   1</code>	The following commands are identical:  <code>:INITiate:CONTinuous OFF</code>  <code>:init:cont 0</code>

## Command Terminators

The <new line> character (ASCII 10) in the last data byte of a command string is used as a command terminator. Use of a command terminator will reset the command path to the root of the tree.

## Conventions

The following conventions have been used throughout the document.

### Notational Conventions

This document uses several notational conventions. They are listed below.

<code>:COMMANds:WILL:LOOK:LIKE:THIS</code>	Commands will be formatted to differentiate them from text descriptions.
<code>:COMMANd:QUERies:LOOK:LIKE:THIS?</code>	The query form of the command will be followed by a “?”
Front-panel key sequences use this formatting	Front-panel keypresses will be formatted to differentiate them from text descriptions.  Key presses are separated by a comma (“,”).
<code>&lt;identifier&gt;</code>	Identifiers will be enclosed in “<>”. They indicate that some type of data must be provided.
	The “ ” indicates that a choice must be made.
<code>[optional input]</code>	Optional input will be enclosed in “[ ]”.

## Identifiers

The following identifiers have been used throughout the remote command definitions. Descriptions are provided here. In most cases, units will be specified with the individual command.

Identifier	Description
<amplitude>	Amplitude value. Units specified with the command.
<freq>	Frequency. Units specified with the command.
<integer>	Integer value, no units. Range specified with the command.
<number>	Numeric value, integer or real.
<percentage>	Percentage value from 0-100. Units are always “%”.
<rel ampl>	Relative amplitude. Units are always dB.
<x-parameter>	Parameter value in the units of the x-axis. Units are specified with the command.
<string>	The string should be enclosed in either single quotes ( ‘ ’ ) or double quotes ( “ ” ).
<file name>	The name should be enclosed in either single quotes ( ‘ ’ ) or double quotes ( “ ” ). The need for an extension will be documented with applicable commands.
<voltage>	Voltage. Units specified with the command.
<current>	Current. Units specified with the command.

## 3 Remote Commands

### 3.1 IEEE Common Commands

These commands are specified in IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. IEEE, New York, NY, 1992.

#### Identity Query

##### \*IDN?

This command returns the following information in `<string>` format separated by commas: manufacturer name (“Anritsu”), model number/options, serial number, firmware package number.

Note that the model number and options will be separated by a “/” and each option will be separated by a “/”.

For example, the return string might look like:

```
"Anritsu,MS2721A,1234567890,1.00"
```

#### Reset

##### \*RST

This command restores parameters in the current application as well as system settings to their factory default values.

System settings affected by this command are Ethernet configuration, language, volume and brightness.

Note that the unit will power-cycle after this command is executed.

Front Panel Access:	Shift-8 (System), System Options, Reset, Factory Defaults
See Also:	:SYSTem:PRESet

### 3.2 System

#### ***SENSe Subsystem***

The commands in this subsystem relate to device-specific parameters, not signal-oriented parameters.

#### ***[[:SENSe]:GPS Subsystem***

This subsystem includes commands that affect the optional GPS (Global Positioning System) on the instrument.



## GPS On/Off

`[ :SENSe ] :GPS OFF | ON | 0 | 1`

`[ :SENSe ] :GPS?`

Enables/disables optional GPS capability.

Factory Preset / *RST:	Off
Front Panel Access:	Shift-8(System), GPS, GPS On/Off
Required Options:	Option 31

## GPS Reset

`[ :SENSe ] :GPS :RESet`

Resets optional GPS receiver.

Front Panel Access:	Shift-8(System), GPS, Reset
Required Options:	Option 31

## 3.3 Spectrum Analyzer

### ***Abort Subsystem***

The abort subsystem includes commands that allow the user to stop current measurement activities on the instrument.

#### **Abort**

`:ABORt`

Restarts the current sweep and/or measurement. Resets the trigger system.

If `:INITiate:CONTinuous` is OFF (i.e. the instrument is in single sweep mode), send the command `:INITiate[:IMMediate]` to trigger the next sweep.

If `:INITiate:CONTinuous` is ON (i.e. the instrument is in continuous sweep mode) a new sweep will start immediately.

Front Panel Access:	Shift-3 (Sweep), Reset Sweep
See Also:	<code>:INITiate:CONTinuous</code> <code>:INITiate[:IMMediate]</code>

### ***CALCulate Subsystem***

The commands in this subsystem process data that has been collected via the `SENSe` subsystem.

#### ***:CALCulate:LIMit Subsystem***

This subsystem defines the limit lines and controls the limit check.

## Limit Alarm

**:CALCulate:LIMit:ALARm OFF | ON | 0 | 1**

**:CALCulate:LIMit:ALARm?**

Enables/disables the currently active limit line alarm.

Setting the value to ON or 1 will turn on the limit alarm.

Setting the value to OFF or 0 will turn off the limit alarm.

The query version of the command returns a 1 if the currently selected limit line alarm is set to ON and returns 0 if OFF.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:TYPE

## Lower Limit Alarm

**:CALCulate:LIMit:LOWer:ALARm OFF | ON | 0 | 1**

**:CALCulate:LIMit:LOWer:ALARm?**

Enables/disables the lower limit alarm.

It is a combination of the commands `:CALCulate:LIMit:TYPE 1;`

`:CALCulate:LIMit:ALARm ON | OFF.`

Setting the value to ON or 1 will turn on the lower limit alarm.

Setting the value to OFF or 0 will turn off the lower limit alarm.

The query version of the command returns a 1 if the lower limit line alarm is ON and returns 0 if OFF.

Note that using this command set the lower limit line active for editing.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:ALARm

## Number of Lower Limit Points

**:CALCulate:LIMit:LOWer:POINT?**

Returns the number of points currently in the lower limit line.

Note that issuing this command will set the lower limit line active for editing

(`:CALCulate:LIMit:TYPE 1`).

## Lower Limit State

**:CALCulate:LIMit:LOWer[:STATE] OFF | ON | 0 | 1**

**:CALCulate:LIMit:LOWer[:STATE] ?**

Turns the lower limit line ON or OFF.

It is a combination of the commands `:CALCulate:LIMit:TYPE 1;`  
`:CALCulate:LIMit:STATE ON|OFF.`

The query version of the command returns a 1 if the lower limit line is ON and returns a 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
See Also:	:CALCulate:LIMit[:STATE]

## Number of Limit Points

**:CALCulate:LIMit:POINT?**

Returns the number of points currently in the active limit line.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

See Also:	:CALCulate:LIMit:TYPE
-----------	-----------------------

## Add Limit Point

**:CALCulate:LIMit:POINT:ADD**

Adds a new limit point to the currently active limit line.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Add Point
See Also:	:CALCulate:LIMit:TYPE

## Limit Point X Value

**:CALCulate:LIMit:POINT:X <x-parameter>**

**:CALCulate:LIMit:POINT:X?**

Sets the location of the active limit point on the x-axis at the specified location. `<x-parameter>` is defined in the current x-axis.

The query version of the command returns the location of the active limit point on the x-axis.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Frequency
Default Unit:	Current x-axis unit.
See Also:	:CALCulate:LIMit:TYPE

## Limit Point Y Value

**:CALCulate:LIMit:POINT:Y <y-parameter>**

**:CALCulate:LIMit:POINT:Y?**

Sets the location of the active limit point on the y-axis at the specified location. `<y-parameter>` is defined in the current y-axis.

The query version of the command returns the location of the active limit point on the y-axis.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Amplitude
Default Unit:	Current y-axis unit.
See Also:	:CALCulate:LIMit:TYPE

## Limit State

`:CALCulate:LIMit[:STATE] OFF|ON|0|1`

`:CALCulate:LIMit[:STATE]?`

Turns the currently selected limit line (upper or lower) ON or OFF.

If the value is set to ON or 1, the currently selected limit line is ON.

If the value is set to OFF or 0, the currently selected limit line is OFF.

The query version of the command returns a 1 if the currently selected limit line is ON and returns a 0 if OFF.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
See Also:	:CALCulate:LIMit:TYPE

## Limit Type

`:CALCulate:LIMit:TYPE 0|1`

`:CALCulate:LIMit:TYPE?`

Sets the limit line segment type (upper or lower) to be edited.

Set the value to 1 for Lower limit segment and 0 for Upper limit line segment.

The query version of the command returns a 1 if the lower limit line is currently active for editing and returns 0 if the upper limit line is currently active for editing.

Front Panel Access:	Shift-6(Limit), Limit
---------------------	-----------------------

## Upper Limit Alarm

`:CALCulate:LIMit:UPPer:ALARm OFF|ON|0|1`

`:CALCulate:LIMit:UPPer:ALARm?`

Enables/disables the alarm for the upper limit.

It is a combination of the commands `:CALCulate:LIMit:TYPE 0;`  
`:CALCulate:LIMit:ALARm ON|OFF.`

Setting the value to ON or 1 will turn on the upper limit alarm.

Setting the value to OFF or 0 will turn off the upper limit alarm.

The query version of the command returns a 1 if the upper limit line alarm is ON and returns 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:ALARm

## Number of Upper Limit Points

**:CALCulate:LIMit:UPPer:POINt?**

Returns the number of points currently in the upper limit line.

Note that issuing this command will set the upper limit line active for editing (:CALCulate:LIMit:TYPe 0).

## Upper Limit State

**:CALCulate:LIMit:UPPer[:STATe] OFF|ON|0|1**

**:CALCulate:LIMit:UPPer[:STATe]?**

Turns the upper limit line ON or OFF.

It is a combination of the commands :CALCulate:LIMit:TYPe 0;  
:CALCulate:LIMit:STATe ON|OFF.

The query version of the command returns a 1 if the upper limit line is ON and returns a 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
See Also:	:CALCulate:LIMit[:STATe]

## Move Limit

**:CALCulate:LIMit:VALue <value>**

Sets the currently active limit line value. This command moves an entire single or multi-segment limit line up or down by the given <value>.

Use :CALCulate:LIMit:TYPe to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Move Limit
Default Unit:	Current active value unit.
See Also:	:CALCulate:LIMit:TYPe

## **:CALCulate:MARKer Subsystem**

This subsystem contains commands to manipulate data markers.

## Turn All Markers Off

**:CALCulate:MARKer:AOff**

Turns off all markers.

Front Panel Access:	VNA: Marker, All Markers Off SPA: Marker, More, All Markers Off WCDMA: Marker, All Markers Off
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## Delta Marker State

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA[:STATE] OFF | ON | 0 | 1**

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA[:STATE] ?**

Sets the specified delta marker on/off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, Delta

## Delta Marker X Value

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA:X <x-parameter>**

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA:X?**

Sets the location of the delta marker on the x-axis at the specified location <x-parameter> + the reference marker x-axis. <x-parameter> is defined in the current x-axis units.

The query version of the command returns the location of the delta marker on the x-axis.

Default Unit:	Current x-axis unit
Front Panel Access:	Marker, Delta
See Also:	:CALCulate:MARKer [1]   2   3   4   5   6:X

## Delta Marker Read Y Value

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA:Y?**

Reads the current Y value for the specified delta marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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## Marker (Maximum) Peak Search

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:MAXimum**

Puts the specified marker at the maximum amplitude in the trace.

Front Panel Access:	Marker, [Marker 1/2/3/4/5/6,] Peak Search Marker, More Peak Options, Peak Search
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## Marker (Maximum) Peak Search Left

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 :MAXimum:LEFT**

Puts the specified marker on the next highest peak to the left of the current peak.

The next highest peak must be above the peak threshold. If no point meets that criterion, the marker is set to the first point on the trace. Note that this command is valid only if the specified marker is on.

Front Panel Access:	Marker, More Peak Options, Next Peak Left
See Also:	:CALCulate:MARKer:PEAK:THReshold

## Marker (Maximum) Peak Search Right

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 :MAXimum:RIGHT**

Puts the specified marker on the next highest peak to the right of the current peak.

The next highest peak must be above the peak threshold. If no point meets that criterion, the marker is set to the last point on the trace. Note that this command is valid only if the specified marker is on.

Front Panel Access:	Marker, More Peak Options, Next Peak Right
See Also:	:CALCulate:MARKer:PEAK:THReshold

## Peak Threshold

**:CALCulate:MARKer:PEAK:THReshold <percentage>**

**:CALCulate:MARKer:PEAK:THReshold?**

Sets the peak/valley threshold as a percentage of the display.

:CALCulate:MARKer:MAXimum:LEFT and

:CALCulate:MARKer:MAXimum:RIGHT use this value to determine whether a particular display point qualifies as a peak.

Factory Preset / *RST:	10%
Range:	0% to 100%
Default Unit:	%
Front Panel Access:	Marker, More Peak Options, Peak Threshold

## Marker Frequency to Center

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 [:SET] :CENTer**

Sets the center frequency equal to the frequency of the specified marker.

Note that this will result in a change to the start and stop frequencies and may also result in a change to the span.

Front Panel Access:	Marker, Marker Freq to Center
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### Marker to Reference Level

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 [:SET] :RLEVel**

Sets the reference level equal to the measured amplitude of the specified marker.

Note that this may result in a change to the input attenuation.

Front Panel Access:	Marker, Marker to Ref Lvl
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### Marker State

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 [:STATE] OFF | ON | 0 | 1**

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 [:STATE] ?**

Sets the specified marker on/off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, On/Off

### Marker X Value

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 :X <x-parameter>**

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 :X?**

Sets the location of the marker on the x-axis at the specified location. <x-parameter> is defined in the current x-axis units.

The query version of the command returns the location of the marker on the x-axis.

Default Unit:	Current x-axis unit
Front Panel Access:	Marker, [Marker 1/2/3/4/5/6]

### Marker Read Y Value

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 :Y?**

Reads the current Y value for the specified marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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## Display Subsystem

This subsystem provides commands that modify the display of data for the user. They do not modify the way in which data is returned to the controller.

### Scale

**:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision <rel ampl>**

**:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision?**

Sets the scale (dB/division) for the y-axis.



Factory Preset / *RST:	10 dB/div
Range:	1 dB to 15 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Scale

### Reference Level

**:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel <amplitude>**

**:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel?**

Sets the reference level amplitude value for the y-axis.

Note that this may cause a change in attenuation if the automatic input attenuation coupling is enabled.

Factory Preset / *RST:	10 dBm
Range:	With reference level offset = 0 dB: 30 dBm to -130 dBm
Default Unit:	Current active amplitude unit
Front Panel Access:	Amplitude, Reference Level
See Also:	:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel:OFFset <rel ampl> :UNIT:POWER

### Reference Level Offset

**:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel:OFFSet <rel ampl>**

**:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel:OFFSet?**

Sets the reference level offset value for the y-axis.

Factory Preset / *RST:	0 dB
Range:	-100 dB to 100 dB
Default Unit:	dB
Front Panel Access:	Amplitude, RL Offset

### ***Format Subsystem***

This subsystem contains commands that determine the formatting of numeric data when it is transferred.

The format setting affects data in specific commands only. If a command is affected, it will be noted in the command description.

### **Numeric Data Format**

**:FORMat[:READings][:DATA] ASCii | INTeger, 32 | REAL, 32**

**:FORMat [:READings] [:DATA] ?**

This command specifies the format in which data is returned in certain commands.

ASCIi format returns the data in comma-separated ASCII format. The units are the current instrument units. This format requires many more bytes so it will be the slowest format.

INTeger,32 values are signed 32-bit integers in little-endian byte order. This format returns the data in 4-byte blocks. The units are always mdBm. For example, if the measured result was -12.345 dBm, that value would be sent as -12345.

REAL,32 values are 32-bit floating point numbers conforming to the IEEE 754 standard in little-endian byte order. This format returns the data in 4-byte binary format. The units are the current instrument units.

Both INTeger,32 and REAL,32 formats return a definite block length. Each transfer begins with an ASCII header such as #42204. The first digit represents the number of following digits in the header (in this example, 4). The remainder of the header indicates the number of bytes that follow the header (in this example, 2204). You then divide the number of following bytes by the number of bytes in the data format you've chosen (4 for both INTeger,32 and REAL,32...so 2204/4) to get the number of data points (in this example, 551).

Factory Preset / *RST:	ASCIi
See Also:	:TRACe [:DATA]

**INITiate Subsystem**

This subsystem works with the ABORt and TRIGger subsystems to control the triggering of measurements.

**Continuous/Single Sweep**

**:INITiate:CONTInuous OFF | ON | 0 | 1**  
**:INITiate:CONTInuous?**

Specifies whether the sweep/measurement is triggered continuously.

If the value is set to ON or 1, another sweep/measurement is triggered as soon as the current one completes.

If continuous is set to OFF or 0, the instrument enters the "idle" state and waits for the :INITiate[:IMMediate] command or for :INITiate:CONTInuous ON.

The default value is ON. That is, sending :INIT:CONT is equivalent to sending :INIT:CONT ON

The query version of the command returns a 1 if the instrument is continuously sweeping/measuring and returns a 0 if the instrument is in single sweep/measurement mode.

Factory Preset / *RST:	ON
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Front Panel Access:	SPA/WCDMA: Shift-3 (Sweep), Sweep (Single/Continuous) VNA: Shift-3 (Sweep), Sweep Type
See Also:	:INITiate[:IMMediate]

## Trigger Sweep/Measurement

**:INITiate[:IMMediate]**

Initiates a sweep/measurement.

If :INITiate:CONTinuous is set to ON, this command is ignored.

Use this command in combination with :STATus:OPERation? to synchronize the capture of one complete set of data. When this command is sent, the “sweep complete” bit of :STATus:OPERation? is set to 0, indicating that the measurement has not completed. The data collection is then triggered. The controlling program can poll :STATus:OPERation? to determine the status. When the “sweep complete” bit is set to 1, data is ready to be retrieved.

Front Panel Access:	SPA: Shift-3 (Sweep), Manual Trigger WCDMA: Shift-3 (Sweep), Trigger Sweep
See Also:	:INITiate:CONTinuous :STATus:OPERation?

## Tracking Generator On/Off

**:INITiate:TGENerator OFF|ON|0|1**

**:INITiate:TGENerator?**

Specifies whether the tracking generator is on or off.

If the value is set to ON or 1, the tracking generator is turned on.

If the value is set to OFF or 0, the tracking generator is turned off.

The default value is OFF. That is, sending :INIT:TGEN is equivalent to sending :INIT:TGEN OFF

The query version of the command returns a 1 if the tracking generator is on and returns a 0 if the tracking generator is off.

Factory Preset / *RST:	OFF
Front Panel Access:	SPA: Shift-4 (Measurements), Tracking Generator (Off/On)
See Also:	:INITiate[:TGENerator]

## INSTRUMENT Subsystem

One instrument may contain many logical instruments (“modes”). This subsystem controls the selection of the current instrument mode.

## Query Available Modes

**:INSTrument:CATalog:FULL?**

Returns a comma-separated list of available modes. Mode names are enclosed in double quotes (“”). Immediately following the string name is the application number.

For example: “SPA” 1, “WCDMA” 5, “VNA” 2

Front Panel Access:	Shift-9 (Mode)
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## Select Mode by Number

**:INSTrument:NSElect <integer>**

**:INSTrument:NSElect?**

Sets the instrument mode based on the value of <integer>.

The query version returns the number associated with the current mode.

Use **:INSTrument:CATalog:FULL?** to get a list of available mode names and their integer representations.

Factory Preset / *RST:	MS2721A: 1 MS2717A: 1 MT8220A: 1 MS2012A: 2 MS2024A: 2 MS2026A: 2 MS2034A: 2 MS2036A: 2
Front Panel Access:	Shift-9 (Mode)
See Also:	:INSTrument:CATalog:FULL? :INSTrument[:SElect]

## Select Mode by Name

**:INSTrument[:SElect] <string>**

**:INSTrument[:SElect]?**

Sets the instrument mode based on the mode name specified by <string>.

The query version returns the name of the current mode.

Use **:INSTrument:CATalog:FULL?** to get a list of available modes.

Factory Preset / *RST:	MS2721A: “SPA” MS2717A: “SPA” MT8220A: “SPA” MS2012A: “VNA” MS2024A: “VNA” MS2026A: “VNA” MS2034A: “VNA” MS2036A: “VNA”
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Front Panel Access:	Shift-9 (Mode)
See Also:	:INSTRument:CATalog:FULL? :INSTRument:NSElect

## **MMEMory Subsystem**

The Mass MEMory subsystem contains functions that provide access to the instrument's setup and data storage.

### **Delete Setup/Measurement**

**:MMEMory:DELEte <file name>**

Deletes the measurement or setup file specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".stp" for setup and ".spa" for measurement.

Front Panel Access:	Shift-7 (File), Delete, Delete Selected File
See Also:	:MMEMory:STORE:STATE, :MMEMory:STORE:TRACe

### **Recall Setup**

**:MMEMory:LOAD:STATE <integer>,<file name>**

Loads the current setup from the file specified by <file name>.

The instrument must be in the mode of the saved setup in order to recall that setup. Use :INSTRument:SELEct or :INSTRument:NSElect to set the mode.

<file name> should be enclosed in either single quotes (') or double quotes (") and should include the extension ".stp".

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Recall, Recall Setup
See Also:	:MMEMory:STORE:STATE

### **Recall Measurement**

**:MMEMory:LOAD:TRACe <integer>,<file name>**

Recalls the trace specified by <file name> into the trace specified by <integer>.

The instrument must be in the mode of the saved trace in order to recall that trace. Use :INSTRument:SELEct or :INSTRument:NSElect to set the mode.

Valid <integer> values are 1, 2 and 3. They correspond to traces A, B and C, respectively.

<file name> should be enclosed in either single quotes (') or double quotes (") and should include a file extension.

File Extensions:	“.spa”
Front Panel Access:	Shift-7 (File), Recall, Recall Measurement
See Also:	:MMEMory:STORe:TRACe

## Save Setup

**:MMEMory:STORe:STATe <integer>,<file name>**

Stores the current setup into the file specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’) and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Setup
See Also:	:MMEMory:LOAD:STATe

## Save Measurement

**:MMEMory:STORe:TRACe <integer>,<file name>**

Stores the trace in trace A into the file specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’) and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Measurement
See Also:	:MMEMory:LOAD:TRACe

## SENSe Subsystem

The commands in this subsystem relate to device-specific parameters, not signal-oriented parameters.

### [[:SENSe]:AVERage Subsystem

This subsystem contains commands related to the combination of the data from consecutive sweeps. Use commands in this subsystem to control sweep-to-sweep averaging and max hold functionality.

### Number of Traces to Average

**[[:SENSe]:AVERage:COUNT <integer>**

**[[:SENSe]:AVERage:COUNT?**

Sets the number of traces to average.

Factory Preset / *RST:	10
Range:	2-65535
Front Panel Access:	Shift-5 (Trace), Trace A Operations, # of Averages

## Trace Mode (Normal/Average/Max Hold/Min Hold)

`[ :SENSE ] :AVERAge:TYPE NONE | SCALAr | MAXimum | MINimum`

`[ :SENSe ] :AVERAge:TYPE?`

Specifies how successive traces are combined to produce the resulting display value.

Setting the TYPE to NONE is the equivalent of setting the Trace Mode to “Norm” on the front panel. The displayed value for a point will be the current measured value for that point.

Setting the TYPE to SCALAr is the equivalent of setting the Trace Mode to “Avg” on the front panel. The displayed value for a point will be the average of the last `<integer>` measured values where `<integer>` is set by

`[ :SENSe ] :AVERAge:COUNT.`

Setting the TYPE to MAXimum is the equivalent of setting the Trace Mode to “Max” on the front panel (Max Hold). The displayed value for a point will be the maximum measured value for that point over sweeps.

Setting the TYPE to MINimum is the equivalent of setting the Trace Mode to “Min” on the front panel (Min Hold). The displayed value for a point will be the minimum measured value for that point over sweeps.

Factory Preset / *RST:	NONE
Front Panel Access:	Shift-5 (Trace), Trace Mode
See Also:	<code>[ :SENSe ] :AVERAge:COUNT</code>

## ***[ :SENSe ] :BANDwidth | BWIDth Subsystem***

This subsystem contains commands related to the filter bandwidth of the instrument.

### Resolution Bandwidth

`[ :SENSE ] :BANDwidth | BWIDth [ :RESolution ] <freq>`

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

Sets the resolution bandwidth.

Note that using this command turns the automatic resolution bandwidth setting OFF.

Factory Preset / *RST:	3 MHz
Range:	10 Hz to 3 MHz in a 1:3 sequence
Default Unit:	Hz
Front Panel Access:	BW, RBW
See Also:	<code>[ :SENSE ] :BANDwidth   BWIDth [ :RESolution ] :AUTO</code>

### Resolution Bandwidth Coupling

`[ :SENSE ] :BANDwidth | BWIDth [ :RESolution ] :AUTO OFF | ON | 0 | 1`

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

Sets the state of the coupling of the resolution bandwidth to the frequency span.

Setting the value to ON or 1 will result in the resolution bandwidth being coupled to the span. That is, when the span changes, the resolution bandwidth changes.

Setting the value to OFF or 0 will result in the resolution bandwidth being un-coupled from the span. That is, changing the span will not change the resolution bandwidth. When this command is issued, the resolution bandwidth setting itself will not change.

The default value is ON. That is, sending `:SENS:BAND:RES:AUTO` is equivalent to sending `:SENS:BAND:RES:AUTO ON`.

Factory Preset / *RST:	ON
Front Panel Access:	BW, Auto RBW
See Also:	<code>[ :SENSE ] :BANDwidth   BWIDth [ :RESolution ] :RATio</code>

### Resolution Bandwidth to Span Ratio

`[ :SENSE ] :BANDwidth | BWIDth [ :RESolution ] :RATio <number>`

`[ :SENSE ] :BANDwidth | BWIDth [ :RESolution ] :RATio?`

Sets the ratio of the resolution bandwidth to the span for use when the resolution bandwidth to span coupling is enabled.

Note that the front panel interface sets the inverse ratio: the span to the resolution bandwidth.

Factory Preset / *RST:	0.0033
Range:	0.00001 to 1
Front Panel Access:	BW, Span/RBW (note that this is the inverse ratio)
See Also:	<code>[ :SENSE ] :BANDwidth   BWIDth [ :RESolution ] :AUTO</code>

### Video Bandwidth

`[ :SENSE ] :BANDwidth | BWIDth:VIDeo <freq>`

`[ :SENSE ] :BANDwidth | BWIDth:VIDeo?`

Sets the video bandwidth.

Note that using this command turns the automatic video bandwidth setting OFF.

Factory Preset / *RST:	1 MHz
Range:	1 Hz to 3 MHz in a 1:3 sequence
Default Unit:	Hz
Front Panel Access:	BW, VBW
See Also:	<code>[ :SENSE ] :BANDwidth   BWIDth:VIDeo:AUTO</code>

### Video Bandwidth Coupling

`[ :SENSE ] :BANDwidth | BWIDth:VIDeo:AUTO OFF | ON | 0 | 1`

`[ :SENSE ] :BANDwidth | BWIDth:VIDeo:AUTO?`



Sets the state of the coupling of the video bandwidth to the resolution bandwidth.

Setting the value to ON or 1 will result in the video bandwidth being coupled to the resolution bandwidth. That is, when the resolution bandwidth changes, the video bandwidth changes.

Setting the value to OFF or 0 will result in the video bandwidth being un-coupled from the resolution bandwidth. That is, changing the resolution bandwidth will not change the video bandwidth. When this command is issued, the video bandwidth setting itself will not change.

The default value is ON. That is, sending `:SENS:BAND:VID:AUTO` is equivalent to sending `:SENS:BAND:VID:AUTO ON`.

Factory Preset / *RST:	ON
Front Panel Access:	BW, Auto VBW
See Also:	<code>[ :SENSe ] :BANDwidth   BWIDth:VIDeo:RATio</code>

### Video Bandwidth to Resolution Bandwidth Ratio

`[ :SENSe ] :BANDwidth | BWIDth:VIDeo:RATio <number>`

`[ :SENSe ] :BANDwidth | BWIDth:VIDeo:RATio?`

Sets the ratio of the video bandwidth to the resolution bandwidth for use when the video to resolution bandwidth coupling is enabled.

Note that the front panel interface sets the inverse ratio: the resolution bandwidth to the video bandwidth.

Factory Preset / *RST:	0.33
Range:	0.00001 to 1
Front Panel Access:	BW, RBW/VBW (note that this is the inverse ratio)
See Also:	<code>[ :SENSe ] :BANDwidth   BWIDth:VIDeo:AUTO</code>

### ***CORRection Subsystem***

This subsystem provides commands for losses or gains external to the instrument.

#### **Input Impedance**

`[ :SENSe ] :CORRection:IMPedance [ :INPut ] [ :MAGNitude ] <integer>`

`[ :SENSe ] :CORRection:IMPedance [ :INPut ] [ :MAGNitude ] ?`

Sets the input impedance that will be used for amplitude correction and conversion between units (dBm vs. dBV vs. Volts, etc.).

If the value of `<integer>` is 50 no correction will be performed.

If the value of `<integer>` is 75 correction will be done based on Anritsu adapter 12N50-75B.

If the value of <integer> is anything else it will look to the value set by  
`[ :SENSe] :CORRection:IMPedance [:INPut] :OFFSet` for the amplitude  
 correction value. Unit conversion will be done as if the impedance is 75Ω.

If a value other than 50 or 75 is set, it will be returned as 2 by the query form of this  
 command.

Factory Preset / *RST:	50
Range:	50, 75 all other values will be treated as described above
Front Panel Access:	Shift-8 (System), Application Options, Impedance
See Also:	[ :SENSe] :CORRection:IMPedance [:INPut] :OFFSet

### “Other” Input Impedance Loss

`[ :SENSe] :CORRection:IMPedance [:INPut] :OFFSet <rel ampl>`  
`[ :SENSe] :CORRection:IMPedance [:INPut] :OFFSet?`

Sets the value that will be used for amplitude correction when the value set by  
`[ :SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude]` is something  
 other than 50 or 75. This value is not applied if the impedance is set to either 50 or 75.

Factory Preset / *RST:	0
Range:	0 dB to 100 dB
Default Unit:	dB
Front Panel Access:	Shift-8 (System), Application Options, Impedance
See Also:	[ :SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude]

### ***[ :SENSe]:DETECTOR Subsystem***

This subsystem includes commands that affect acquisition data points on the instrument.

#### **Detection Type**

`[ :SENSe] :DETECTOR [:FUNCTION] POSitive | RMS | NEGative | SAMPlE`  
`[ :SENSe] :DETECTOR [:FUNCTION] ?`

Sets the detection method for calculating each display point.

Each display point represents several measurements. The detection type determines how  
 the display point is derived from its associated measurements.

POSitive Peak detection displays the maximum value of the associated measurements.

RMS detection displays the average power of the associated measurements.

NEGative Peak detection displays the minimum value of the associated measurements.

SAMPLE detection displays the “middle” point of those measurements associated with a display point. For example, if there are 3 measurement frequencies associated with a given display point, sample detection will display the value at the frequency of the second measurement point.

Factory Preset / *RST:	(Positive) Peak
Front Panel Access:	Shift-3(Sweep), Detection, Peak RMS Negative Sample

## ***[ :SENSE ] :FREQUENCY Subsystem***

Commands in this subsystem pertain to the frequency settings of the instrument.

### **Center Frequency**

**[ :SENSE ] :FREQUENCY:CENTER <freq>**

**[ :SENSE ] :FREQUENCY:CENTER?**

Sets the center frequency.

Note that changing the value of the center frequency will change the value of the coupled parameters Start Frequency and Stop Frequency. It may also change the value of the span.

Factory Preset / *RST:	3.55 GHz
Range:	10 Hz – 7.099999995 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Center Freq

### **Frequency Span**

**[ :SENSE ] :FREQUENCY:SPAN <freq>**

**[ :SENSE ] :FREQUENCY:SPAN?**

Sets the frequency span. Setting the value of <freq> to 0 Hz is the equivalent of setting the span mode to zero span.

Note that changing the value of the frequency span will change the value of the coupled parameters Start Frequency and Stop Frequency and may change the Center Frequency.

Factory Preset / *RST:	7.1 GHz
Range:	0 Hz, 10 Hz – 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Span Span Span, Zero Span

### **Frequency Span - Full**

**[ :SENSE ] :FREQUENCY:SPAN:FULL**

Sets the frequency span to full span.

Note that changing the value of the frequency span will change the value of the coupled parameters, Start Frequency and Stop Frequency and may change the Center Frequency.

Factory Preset / *RST:	7.1 GHz
Front Panel Access:	Span, Full Span

### Frequency Span - Last

**[ :SENSe] :FREQuency:SPAN:PREVious**

Sets the frequency span to the previous span value.

Note that changing the value of the frequency span will change the value of the coupled parameters, Start Frequency and Stop Frequency and may change the Center Frequency.

Front Panel Access:	Freq, Span, Last Span
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### Start Frequency

**[ :SENSe] :FREQuency:START <freq>**

**[ :SENSe] :FREQuency:START?**

Sets the start frequency.

Note that in the spectrum analyzer, changing the value of the start frequency will change the value of the coupled parameters, Center Frequency and Span.

Note that in the VNA, changing the value of the start frequency may affect the DTF distance range.

Factory Preset / *RST:	SPA: 0 Hz VNA, MS2012A: 2 MHz VNA, MS2024A: 2 MHz VNA, MS2026A: 2 MHz
Range:	SPA: 0 Hz – 7.099999990 GHz VNA, MS2012A: 2 MHz – 2.5 GHz VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A, 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Start Freq

### Stop Frequency

**[ :SENSe] :FREQuency:STOP <freq>**

**[ :SENSe] :FREQuency:STOP?**

Sets the stop frequency.

Note that in the spectrum analyzer, changing the value of the stop frequency will change the value of the coupled parameters, Center Frequency and Span.

Note that in the VNA, changing the value of the start frequency may affect the DTF distance range.

Factory Preset / *RST:	SPA: 7.1 GHz VNA, MS2012A: 2.5 GHz VNA, MS2024A: 4.0 GHz VNA, MS2026A: 6.0 GHz
Range:	SPA: 10 Hz – 7.1 GHz VNA, MS2012A: 2 MHz – 2.5 GHz VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A, 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Stop Freq

## ***[[:SENSE]:POWER Subsystem***

This subsection relates to the power amplitude parameters of the instrument.

### **Input Attenuation**

```
[[:SENSE]:POWER[:RF]:ATTenuation <rel ampl>
[:SENSE]:POWER[:RF]:ATTenuation?
```

Sets the input attenuation.

Note that issuing this command will set the automatic input attenuation OFF.

Factory Preset / *RST:	30 dB
Range:	0 dB to 65 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Atten Lvl
See Also:	[[:SENSE]:POWER[:RF]:ATTenuation:AUTO

### **Input Attenuation Coupling**

```
[[:SENSE]:POWER[:RF]:ATTenuation:AUTO OFF|ON|0|1
[:SENSE]:POWER[:RF]:ATTenuation:AUTO?
```

Sets the input attenuation coupling.

Setting the value to ON or 1 will result in the input attenuation being coupled to the reference level.

Setting the value to OFF or 0 will result in the input attenuation being un-coupled from the reference level. That is, changing the reference level will not change the input attenuation. When this command is issued, the input attenuator setting itself will not change.

The default value is ON. That is, sending :SENS:POW:ATT:AUTO is equivalent to sending :SENS:POW:ATT:AUTO ON.

Factory Preset / *RST:	ON
Front Panel Access:	Amplitude, Auto Atten
See Also:	[[:SENSE]:POWER[:RF]:ATTenuation

## Preamp State

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

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

Sets the state of the preamp.

Note that this may cause a change in the reference level and/or attenuation.

Factory Preset / *RST:	OFF
Front Panel Access:	Amplitude, Pre Amp

## **[ :SENSe] :SWEep Subsystem**

This subsystem includes commands that affect the sweep generator of the instrument.

### Minimum Sweep Time

**[ :SENSe] :SWEep :TIME**

**[ :SENSe] :SWEep :TIME?**

Sets the value of the minimum sweep time parameter. The sweep will complete in the shortest time possible greater than the specified time.

To sweep as fast as possible, enter the minimum value allowed for the sweep time.

Factory Preset / *RST:	50 $\mu$ s
Range:	10 $\mu$ s to 600000000 $\mu$ s
Default Unit:	seconds
Front Panel Access:	Shift-3 (Sweep), Min Sweep Time

## **STATus Subsystem**

The commands in this subsystem relate to the current operating state of the instrument.

### Query Operation Status

**:STATus:OPERation?**

This command requests information about the current status of the instrument. Each bit of the return value represents some operation. Only a subset of the bits will be implemented for each application.

The number returned will be the decimal representation of the bit-wise OR of the enabled bits.

Bit	Decimal Value	Description
0	1	Not implemented
1	2	Not implemented
2	4	Not implemented

3	8	Not implemented
4	16	Not implemented
5	32	Not implemented
6	64	Not implemented
7	128	Not implemented
8	256	Sweep Complete – This bit will be set to 0 when the command <code>:INITiate[:IMMediate]</code> is sent to trigger a sweep. It will have a value of 1 when the sweep has completed.
9	512	Not implemented
10	1024	Not implemented
11	2048	Not implemented
12	4096	Not implemented
13	8192	Not implemented
14	16384	Not implemented
15	0	Will always be 0

## ***SYSTEM Subsystem***

This subsystem contains commands that affect instrument functionality that does not directly relate to data collection, display or transfer.

### **Query Installed Options**

**:SYSTEM:OPTions?**

Returns a string of the installed options. Options will be separated by a “/”.

The string will return “NONE” if no options are installed.

See Also:	*IDN?
-----------	-------

### **Preset**

**:SYSTEM:PRESet**

This command restores all application parameters to their factory preset values. This does not modify system parameters such as Ethernet configuration, language, volume or brightness.

Front Panel Access:	Shift-1 (Preset), Preset
See Also:	*RST

## ***TGENERator Subsystem***

This subsystem contains commands related to the tracking generator.

### **Tracking Generator Output Power**

**:TGENERator:OUTput:POWER <amplitude>**

**:TGENERator:OUTput:POWER?**

Sets the output power for the Tracking Generator.

Factory Preset / *RST:	-40 dBm
Range:	0 dBm to -40 dBm
Default Unit:	Current active amplitude unit
Front Panel Access:	SPA: Shift-4 (Measurements), Tracking Generator, Output Power
See Also:	:INITiate[:TGENERator]

**Trace Subsystem**

This subsystem contains commands related to the transfer of trace data to and from the instrument.

**Trace Data Transfer**

**:TRACe[:DATA] 1|2|3, (<header><block>)**

**:TRACe[:DATA]? [1]|2|3**

This command transfers data from the controlling program to the instrument. The query form transfers trace data from the instrument to the controller. Data is transferred to the instrument enclosed in parentheses as (<header><block>) and from the instrument as <header><block>.

The ASCII header specifies the number of data bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes in the <block>.

The format of the block data in the query form is specified by :FORMat:DATA. The block data in the command form is always sent in ASCII format.

Data can be transferred to and from the 3 available display traces. Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

The command form does not support setting all trace points to a single value. To do this, send the same value to each point.

Trace setup information can be acquired using :TRACe[:DATA]:PREamble?.

To acquire the data from trace A in the instrument send :TRACe[:DATA]? 1. A 551 point trace will be returned as #42204<block data>. <block> data could be in either INTeger,32 or REAL,32 format. In both cases, there will be 4 bytes per data point. So, 4 bytes per point \* 551 data points gives 2204 bytes in <block> data. This example assumes that :FORMat:DATA INTeger,32 or :FORMat:DATA REAL,32 has been sent to the instrument before the query command is sent.

See Also:	:FORMat:DATA :TRACe[:DATA]:PREamble?
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## Trace Header Transfer

**:TRACe:PREamble? [1] | 2 | 3**

Returns trace header information for the specified trace.

Data can be transferred to and from the 3 available display traces. Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

The response begins with an ASCII header. The header specifies the number of following bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes that follow the header.

Parameters are returned in comma-delimited ASCII format. Each parameter will be returned as "NAME=VALUE[ UNITS]."

Valid parameter names are:

Parameter Name	Description
SN	Instrument serial #
UNIT_NAME	Instrument name
DESCR	Trace name
DATE	Trace date/time
BASE_VER	Base FW version
APP_NAME	Application name
APP_VER	Application FW version

Parameter Name	Description
UNITS	Amplitude units
CENTER_FREQ	Center freq
SPAN	Frequency span
FREQ_STEP	Frequency step size
RBW	Resolution bw
RBW_TYPE	RBW coupling auto/manual
VBW	Video bw
VBW_TYPE	VBW coupling auto/manual
RBW_VBW_RATIO	RBW/VBW ratio
SPAN_RBW_RATIO	Span/RBW ratio
INPUT_ATTEN	Input attenuation
ATTEN_TYPE	Attenuation coupling auto/manual

REFERENCE_LEVEL	Reference level
SCALE	Y-axis scale
PREAMP_SET	Preamp state
REF_LEVEL_OFFSET	Reference level offset
DETECTION	Detection type
TRACE_AVERAGE	Number of traces to average
SWEEP_TYPE	Single/continuous
CURRENT_SIGNAL	Current signal index
CURRENT_CHANNEL	Current signal channel
TRACE_MODE	Normal/Avg/Max
TRACE_STATUS	TRACE_A_VIEW_NOT_BLANK 0x0000000000000001 TRACE_A_WRITE_NOT_HOLD 0x0000000000000002 TRACE_A_DATA_VALID 0x0000000000000004 TRACE_B_VIEW_NOT_BLANK 0x0000000000010000 TRACE_B_WRITE_NOT_HOLD 0x0000000000020000 TRACE_B_DATA_VALID 0x0000000000040000 TRACE_C_VIEW_NOT_BLANK 0x0000000100000000 TRACE_C_WRITE_NOT_HOLD 0x0000000200000000 TRACE_C_DATA_VALID 0x0000000400000000 TRACE_C_IS_B_MINUS_A_ON 0x0000001000000000 TRACE_C_IS_A_MINUS_B_ON 0x0000002000000000
TRACE_COUNT	Number of traces averaged
UI_DATA_POINTS	Number of display points
IMPEDANCE	Input impedance
REFERENCE_FREQUENCY	Reference freq
SET_SWEEP_TIME	Minimum sweep time setting
TRIGGER_TYPE	Trigger type
VIDEO_TRIGGER_LEVEL	Video trigger level
TRIGGER_POSITION	Trigger position as a percent of the display
PEAK_THRESHOLD	Marker peak search threshold
MARKER_TABLE	Marker table status

Parameter Name	Description
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ACTIVE_MEASUREMENT	Current measurement
ANTENNA	Antenna index
OCC_BW_METHOD	Occupied bandwidth method
OCC_BW_PERCENT	Occupied bandwidth % of power setting
OCC_BW_DBC	Occupied bandwidth dBc setting
OCC_BW_MEASURED_DB	Occupied bandwidth measured dBc value
OCC_BW_MEASURED_PERCENT	Occupied bandwidth measured % value
OCC_BW_VALUE	Measured occupied bandwidth
OCC_BW_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 3 OBW display indicators
CH_PWR_WIDTH	Channel power integration bandwidth
CH_PWR_VALUE	Measured channel power
CH_PWR_DENSITY	Measured channel power density
CH_PWR_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 channel power display indicators
ACPR_MAIN_CH_BW	ACPR main channel bw
ACPR_ADJC_CH_BW	ACPR adjacent channel bw
ACPR_CHANNEL_SPACING	ACPR channel spacing
ACPR_MAIN_CH_PWR	ACPR measured main channel power
ACPR_UPPER_CH_PWR	ACPR measured upper channel power
ACPR_LOWER_CH_PWR	ACPR measured lower channel power
ACPR_LOWER_CH_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 ACPR lower channel display indicators
ACPR_MAIN_CH_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 ACPR main channel display indicators
ACPR_UPPER_CH_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 ACPR upper channel display indicators
AM_FM_DEMOD_VOL	AM/FM demod volume
AM_FM_DEMOD_FREQUENCY	AM/FM demod freq

AM_FM_DEMOD_TYPE	AM/FM demod type
AM_FM_DEMOD_TIME	AM/FM demod time
AM_FM_LINE_MARKER	Display point location of the demodulation frequency
BEAT_FREQUENCY_OSC_FREQUENCY	BFO oscillator freq
CI_C_TYPE	C/I measurement carrier type
CI_C_VALUE	C/I measurement measured carrier power
CI_I_BB_VALUE	C/I measurement measured broadband interference power
CI_I_NB_VALUE	C/I measurement measured narrowband interference power
CI_I_WB_VALUE	C/I measurement measured wideband interference power
CI_BB_VALUE	C/I measurement with broadband interference
CI_NB_VALUE	C/I measurement with narrowband interference
CI_WB_VALUE	C/I measurement with wideband interference

Parameter Name	Description
MKR_REF_FREQNx	Reference marker x frequency (where x is the marker number 0-5)
MKR_REF_POINTx	Reference marker x display point
MKR_REF_MAGNTx	Reference marker x magnitude
MKR_REF_PRCNTx	Reference marker x display percentage
MKR_REF_FLAGSx	Reference marker x flags: MKR_FLAG_ON_OFF                    0x00000001 MKR_FLAG_NOISE                    0x00000002 MKR_FLAG_PHASE_NOISE            0x00000004 MKR_FLAG_AMP_TRACK              0x00000008 MKR_FLAG_DELTA_MKR              0x00000020 MKR_FLAG_DATA_INVALID          0x00000040 MKR_FLAG_DATA_STALE            0x00000080 MKR_FLAG_SELECTED               0x00000100 MKR_FLAG_COUNTER                0x00000200 MKR_FLAG_DELT_DISPL_PER_HZ    0x00000800 MKR_FLAG_TRACE_A                0x00001000 MKR_FLAG_TRACE_B                0x00002000 MKR_FLAG_TRACE_C                0x00004000 MKR_FLAG_TRACE_MASK            0x00007000
MKR_DLT_FREQNx	Delta marker x frequency (where x is the marker number 0-

	5)
MKR_DLT_POINTx	Delta marker x display point
MKR_DLT_MAGNTx	Delta marker x magnitude
MKR_DLT_PRCNTx	Delta marker x display percentage
MKR_DLT_FLAGSx	Delta marker x flags:

Parameter Name	Description
LIM_LFLAGS_UP-1	Upper limit flags: LIMIT_FLAG_UPPER 0x00000001 LIMIT_FLAG_ON 0x00000004 LIMIT_FLAG_ALARM_ON 0x00000002 LIMIT_FLAG_SEGMENTED 0x00000020 LIMIT_FLAG_ALARM_EVENT 0x00000040 LIMIT_FLAG_LEFT_OF_START_FREQ 0x00000080 LIMIT_FLAG_RIGHT_OF_STOP_FREQ 0x00000100 LIMIT_FLAG_MASK 0x000007FF
LIM_NUMPTS_UP-1	Number of upper limit points
LIM_FREQNC_UPx	Upper limit point x freq (where x is the limit point number starting with 0)
LIM_MAGNTD_UPx	Upper limit point x amplitude
LIM_LFLAGS_LO-1	Lower limit flags: LIMIT_FLAG_UPPER 0x00000001 LIMIT_FLAG_ON 0x00000004 LIMIT_FLAG_ALARM_ON 0x00000002 LIMIT_FLAG_SEGMENTED 0x00000020 LIMIT_FLAG_ALARM_EVENT 0x00000040 LIMIT_FLAG_LEFT_OF_START_FREQ 0x00000080 LIMIT_FLAG_RIGHT_OF_STOP_FREQ 0x00000100 LIMIT_FLAG_MASK 0x000007FF
LIM_NUMPTS_LO-1	Number of lower limit points
LIM_FREQNC_LOx	Lower limit point x freq (where x is the limit point number starting with 0)
LIM_MAGNTD_LOx	Lower limit point x amplitude

See Also:	: TRACe : DATA
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<b>Tracking Generator Option Only:</b>	
<b>Parameter Name</b>	<b>Description</b>
TG_SET_ON_OFF	Set tracking generator power; On/Off
TG_SET_OUTPUT_POWER	Set tracking generator output power; 0dBm to -40dBm
TG_REFERENCE_LEVEL	Tracking generator S21 normalized reference level; On/Off
TG_SCALE	Tracking generator specific scale for S21 normalized display only; +100 to -120 dBm
TG_UNITS	Tracking generator log / linear scale units. Currently defaulted to Log scale only; 0x00
TG_TRACE_STATUS	Tracking generator S21 normalized trace status; S21 OFF:           0x00 Normalizing Sweep: 0x11 Valid Sweep:       0x12
TG_REF_LEVEL_OFFSET	Tracking Generator S21 Normalized reference level offset; +100 to -100dBm
See Also:	: TRACe : DATA

## ***Trigger Subsystem***

This subsystem contains commands related to the triggering of instrument functions for the purposes of synchronization. Related commands appear in the ABORt and INITiate subsystems.

### **Trigger Source**

**:TRIGger[:SEquence]:SOURce IMMEDIATE | EXTERNAL | VIDEO**  
**:TRIGger[:SEquence]:SOURCE?**

This command defines the trigger source.

IMMEDIATE triggering is the equivalent of free-run triggering.

EXTERNAL triggering is triggered when a TTL signal is applied to the External Trigger input connector. EXTERNAL triggering is always done on the rising edge of the signal. It is available only in zero span mode.

VIDEO triggering is triggered based on the measured signal level. It is available only in zero span mode.

Factory Preset / *RST:	Immediate
Front Panel Access:	Shift-3 (Sweep), Trigger Type, Free Run External Video
See Also:	:TRIGger[:SEquence]:VIDeo:LEVel :TRIGger[:SEquence]:VIDeo:POSition

### Video Trigger Level

**:TRIGger[:SEquence]:VIDeo:LEVel <amplitude>**

**:TRIGger[:SEquence]:VIDeo:LEVel?**

This command sets the video triggering level.

Factory Preset / *RST:	-65.0 dBm
Range:	20 dBm to -300 dBm
Default Unit:	Current amplitude unit
Front Panel Access:	Shift-3 (Sweep), Trigger Type, Video

### Video Trigger Position

**:TRIGger[:SEquence]:VIDeo:POSition <percentage>**

**:TRIGger[:SEquence]:VIDeo:POSition?**

This command sets the video triggering position as a percentage of the display.

When the sweep is triggered, the trigger point will be drawn at the location defined by the position. The graph appearing to the left of the trigger position is data acquired before the trigger. The graph appearing to the right of the trigger position is data acquired after the trigger.

Factory Preset / *RST:	1.00%
Range:	0% to 100%
Default Unit:	%
Front Panel Access:	Shift-3 (Sweep), Trigger Type, Change Trigger Position

### Unit Subsystem

The unit subsystem is used to modify the default units used for related parameters. These changes affect parameters in both commands and responses.

### Measurement Units

**:UNIT:POWer DBM|DBV|DBMV|DBUV|V|W**

#### **:UNIT:POWER?**

Sets the default amplitude units for input, output and display.

Factory Preset / *RST:	dBm
Front Panel Access:	Amplitude, Units, dBm dBV dBmV dBuV Volt Watt

## 3.4 WCDMA

### **Abort Subsystem**

The abort subsystem includes commands that allow the user to stop current measurement activities on the instrument.

#### **Abort**

##### **:ABORT**

Restarts the current sweep and/or measurement. Resets the trigger system.

If :INITiate:CONTinuous is OFF (i.e. the instrument is in single sweep mode), send the command :INITiate[:IMMEDIATE] to trigger the next sweep.

If :INITiate:CONTinuous is ON (i.e. the instrument is in continuous sweep mode) a new sweep will start immediately.

Front Panel Access:	Shift-3 (Sweep), Reset Sweep
See Also:	:INITiate:CONTinuous :INITiate[:IMMEDIATE]

### **CALCulate Subsystem**

The commands in this subsystem process data that has been collected via the SENSE subsystem.

#### **Turn All Markers Off**

##### **:CALCulate:MARKer:AOff**

Turns off all markers.

Front Panel Access:	VNA: Marker, All Markers Off SPA: Marker, More, All Markers Off WCDMA: Marker, All Markers Off
---------------------	--

#### **Marker State**

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 [:STATe] OFF | ON | 0 | 1**

**:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 [:STATe] ?**

Sets the specified marker on/off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, On/Off



## Marker X Value

`:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:X <x-parameter>`

`:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:X?`

Sets the location of the marker on the x-axis at the specified location. `<x-parameter>` is defined in the current x-axis units.

The query version of the command returns the location of the marker on the x-axis.

Default Unit:	Current x-axis unit
Front Panel Access:	Marker, [Marker 1/2/3/4/5/6]

## Marker Read Y Value

`:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:Y?`

Reads the current Y value for the specified marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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## Display Subsystem

This subsystem provides commands that modify the display of data for the user. They do not modify the way in which data is returned to the controller.

### Power Offset

`:DISPlay:WINDow:TRACe:Y[:SCALE]:OFFSet <rel ampl>`

`:DISPlay:WINDow:TRACe:Y[:SCALE]:OFFSet?`

Sets the power offset value for the y-axis.

Factory Preset / *RST:	0 dB
Range:	0 dB to 100 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Power Offset

### Scale

`:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision <rel ampl>`

`:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision?`

Sets the scale (dB/division) for the y-axis.

Factory Preset / *RST:	10 dB/div
Range:	1 dB to 15 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Scale

## ***Format Subsystem***

This subsystem contains commands that determine the formatting of numeric data when it is transferred.

The format setting affects data in specific commands only. If a command is affected, it will be noted in the command description.

### **Numeric Data Format**

**:FORMat[:READings][:DATA] ASCii|INTeger,32|REAL,32**

**:FORMat[:READings][:DATA]?**

This command specifies the format in which data is returned in certain commands.

ASCii format returns the data in comma-separated ASCII format. The units are the current instrument units. This format requires many more bytes so it will be the slowest format.

INTeger 32 values are signed 32-bit integers in little-endian byte order. This format returns the data in 4-byte blocks. The units are always mdBm. For example, if the measured result was -12.345 dBm, that value would be sent as -12345.

REAL,32 values are 32-bit floating point numbers conforming to the IEEE 754 standard in little-endian byte order. This format returns the data in 4-byte binary format. The units are the current instrument units.

Both INTeger,32 and REAL,32 formats return a definite block length. Each transfer begins with an ASCII header such as #42204. The first digit represents the number of following digits in the header (in this example, 4). The remainder of the header indicates the number of bytes that follow the header (in this example, 2204). You then divide the number of following bytes by the number of bytes in the data format you've chosen (4 for both INTeger,32 and REAL,32...so 2204/4) to get the number of data points (in this example, 551).

Factory Preset / *RST:	ASCii
See Also:	:TRACe[:DATA]

## ***INITiate Subsystem***

This subsystem works with the ABORt subsystem to control the triggering of measurements.

### **Continuous/Single Sweep**

**:INITiate:CONTInuous OFF|ON|0|1**

**:INITiate:CONTInuous?**

Specifies whether the sweep/measurement is triggered continuously.

If the value is set to ON or 1, another sweep/measurement is triggered as soon as the current one completes.

If continuous is set to OFF or 0, the instrument enters the “idle” state and waits for the :INITiate[:IMMediate] command or for :INITiate:CONTinuous ON.

The default value is ON. That is, sending :INIT:CONT is equivalent to sending :INIT:CONT ON

The query version of the command returns a 1 if the instrument is continuously sweeping/measuring and returns a 0 if the instrument is in single sweep/measurement mode.

Factory Preset / *RST:	ON
Front Panel Access:	SPA/WCDMA: Shift-3 (Sweep), Sweep (Single/Continuous) VNA: Shift-3 (Sweep), Sweep Type
See Also:	:INITiate[:IMMediate]

## Trigger Sweep/Measurement

**:INITiate[:IMMediate]**

Initiates a sweep/measurement.

If :INITiate:CONTinuous is set to ON, this command is ignored.

Use this command in combination with :STATus:OPERation? to synchronize the capture of one complete set of data. When this command is sent, the “sweep complete” bit of :STATus:OPERation? is set to 0, indicating that the measurement has not completed. The data collection is then triggered. The controlling program can poll :STATus:OPERation? to determine the status. When the “sweep complete” bit is set to 1, data is ready to be retrieved.

Front Panel Access:	SPA: Shift-3 (Sweep), Manual Trigger WCDMA: Shift-3 (Sweep), Trigger Sweep
See Also:	:INITiate:CONTinuous :STATus:OPERation?

## INSTrument Subsystem

One instrument may contain many logical instruments (“modes”). This subsystem controls the selection of the current instrument mode.

### Query Available Modes

**:INSTrument:CATalog:FULL?**

Returns a comma-separated list of available modes. Mode names are enclosed in double quotes (“ ”). Immediately following the string name is the application number.

For example: “SPA” 1 , “WCDMA” 5 , “VNA” 2

Front Panel Access:	Shift-9 (Mode)
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## Select Mode by Number

`:INSTRument:NSElect <integer>`  
`:INSTRument:NSElect?`

Sets the instrument mode based on the value of `<integer>`.

The query version returns the number associated with the current mode.

Use `:INSTRument:CATalog:FULL?` to get a list of available mode names and their integer representations.

Factory Preset / *RST:	MS2721A: 1 MS2717A: 1 MT8220A: 1 MS2012A: 2 MS2024A: 2 MS2026A: 2 MS2034A: 2 MS2036A: 2
Front Panel Access:	Shift-9 (Mode)
See Also:	<code>:INSTRument:CATalog:FULL?</code> <code>:INSTRument[:SElect]</code>

## Select Mode by Name

`:INSTRument[:SElect] <string>`  
`:INSTRument[:SElect]?`

Sets the instrument mode based on the mode name specified by `<string>`.

The query version returns the name of the current mode.

Use `:INSTRument:CATalog:FULL?` to get a list of available modes.

Factory Preset / *RST:	MS2721A: "SPA" MS2717A: "SPA" MT8220A: "SPA" MS2012A: "VNA" MS2024A: "VNA" MS2026A: "VNA" MS2034A: "VNA" MS2036A: "VNA"
Front Panel Access:	Shift-9 (Mode)
See Also:	<code>:INSTRument:CATalog:FULL?</code> <code>:INSTRument:NSElect</code>

## MMEMory Subsystem

The Mass MEMory subsystem contains functions that provide access to the instrument's setup and data storage.

## Delete Setup/Measurement

**:MMEMory:DELEte <file name>**

Deletes the measurement or setup file specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".stp" for setup and ".wcd" for measurement.

Front Panel Access:	Shift-7 (File), Delete, Delete Selected File
See Also:	:MMEMory:STORE:STATE, :MMEMory:STORE:TRACe

## Recall Setup

**:MMEMory:LOAD:STATE <integer>,<file name>**

Loads the current setup from the file specified by <file name>.

The instrument must be in the mode of the saved setup in order to recall that setup. Use :INSTRument:SELEct or :INSTRument:NSELEct to set the mode.

<file name> should be enclosed in either single quotes (') or double quotes (") and should include the extension ".stp".

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Recall, Recall Setup
See Also:	:MMEMory:STORE:STATE

## Recall Measurement

**:MMEMory:LOAD:TRACe <integer>,<file name>**

Recalls the trace specified by <file name> into the trace specified by <integer>.

The instrument must be in the mode of the saved trace in order to recall that trace. Use :INSTRument:SELEct or :INSTRument:NSELEct to set the mode.

<file name> should be enclosed in either single quotes (') or double quotes (") and should include a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

File Extensions:	".wcd"
Front Panel Access:	Shift-7 (File), Recall, Recall Measurement
See Also:	:MMEMory:STORE:TRACe

## Save Setup

**:MMEMory:STORE:STATE <integer>,<file name>**

Stores the current setup into the file specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Setup
See Also:	:MMEMory:LOAD:STATe

## Save Measurement

**:MMEMory:STORe:TRACe <integer>,<file name>**

Stores the trace in trace A into the file specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Measurement
See Also:	:MMEMory:LOAD:TRACe

## SENSe Subsystem

The commands in this subsystem relate to device-specific parameters, not signal-oriented parameters.

### [[:SENSe]:FREQuency Subsystem

Commands in this subsystem pertain to the frequency settings of the instrument.

#### Center Frequency

**[[:SENSe]:FREQuency:CENTer <freq>**

**[[:SENSe]:FREQuency:CENTer?**

Sets the center frequency.

Factory Preset / *RST:	1 GHz
Range:	824 MHz – 2.7 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Center Freq

### [[:SENSe]:POWer Subsystem

This subsection relates to the power amplitude parameters of the instrument.

#### Automatic Amplitude Range

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

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

Sets the automatic amplitude range.

Setting the value to ON or 1 will result in the amplitude range being coupled to the detected input signal level.

Setting the value to OFF or 0 will result in the input attenuation being un-coupled from the input signal level. That is, changing the input signal level will not change the amplitude range. When this command is issued, the amplitude range itself will not change.

The default value is ON. That is, sending `:SENS:POW:RANG:AUTO` is equivalent to sending `:SENS:POW:RANG:AUTO ON`.

Factory Preset / *RST:	ON
Front Panel Access:	Amplitude, Auto Range
See Also:	<code>[ :SENSe ] :POWer [ :RF ] :RANGe</code>

## Amplitude Range

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

Re-calculates amplitude range.

Note that issuing this command will set the automatic dynamic range OFF.

Front Panel Access:	Amplitude, Adjust Range
See Also:	<code>[ :SENSe ] :POWer [ :RF ] :RANGe :AUTO</code>

## STATus Subsystem

The commands in this subsystem relate to the current operating state of the instrument.

### Query Operation Status

`:STATus:OPERation?`

This command requests information about the current status of the instrument. Each bit of the return value represents some operation. Only a subset of the bits will be implemented for each application.

The number returned will be the decimal representation of the bit-wise OR of the enabled bits.

Bit	Decimal Value	Description
0	1	Not implemented
1	2	Not implemented
2	4	Not implemented
3	8	Not implemented
4	16	Not implemented
5	32	Not implemented
6	64	Not implemented
7	128	Not implemented
8	256	Sweep Complete – This bit will be set to 0 when the command <code>:INITiate[:IMMediate]</code> is sent to trigger a sweep. It will have a value of 1 when the sweep

		has completed.
9	512	Not implemented
10	1024	Not implemented
11	2048	Not implemented
12	4096	Not implemented
13	8192	Not implemented
14	16384	Not implemented
15	0	Will always be 0

## ***SYSTEM Subsystem***

This subsystem contains commands that affect instrument functionality that does not directly relate to data collection, display or transfer.

### **Query Installed Options**

**:SYSTEM:OPTions?**

Returns a string of the installed options. Options will be separated by a “/”.

The string will return “NONE” if no options are installed.

See Also:	*IDN?
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### **Preset**

**:SYSTEM:PRESet**

This command restores all application parameters to their factory preset values. This does not modify system parameters such as Ethernet configuration, language, volume or brightness.

Front Panel Access:	Shift-1 (Preset), Preset
See Also:	*RST

## ***Trace Subsystem***

This subsystem contains commands related to the transfer of trace data to and from the instrument.

### **Trace Data Transfer**

**:TRACe[:DATA] ACLR|SPECTrum|EMISSion|DEMod,  
(<header><block>)**

**:TRACe[:DATA]? ACLR|SPECTrum|EMISSion|DEMod**

This command transfers data from the controlling program to the instrument. The query form transfers trace data from the instrument to the controller.

The ASCII header specifies the number of data bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes in the <block>. The number of bytes in the block is calculated by multiplying the number of data points by the number



of bytes used to transfer each data point. Also note that the second argument must be enclosed in parentheses.

The format of the block data in the query form is specified by `:FORMat:DATA`. The block data in the command form is always sent in ASCII format.

Trace setup information can be acquired using `:TRACe[:DATA]:PREamble?`.

Data can be transferred to and from the 4 available display types. Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

This command does not support setting all trace points to a single value. To do this, send the same value to each point.

For RF traces (ACLR, Spectrum and EMISsion), there is only one value per data point.

For example, to transfer a 501 point trace from the controlling program to the ACLR trace in the instrument the command `:TRACe:DATA ACLR, (#42004<block>)` would be sent. `<block>` data could be in either `INTeger,32` or `REAL,32` format. In both cases, there would be 4 bytes per data point. So, 4 bytes per point \* 501 data points gives 2004 bytes in `<block>` data.

For the demodulated code domain power trace, each data point is represented by 6 values of 4 bytes each: code number (no units), absolute power (dBm), relative power (dB), spreading factor (no units), symbol EVM (%), code state( 0 = Inactive, 1 = Active). If Option 65 is installed code state will indicate the modulation type (0 = Noise, 1 = QPSK, 2 = 16\_QAM).

Note that the instrument must be set in the selected view. Use the `CONFIgure` command to set the unit to the selected view.

See Also:	<code>:FORMat:DATA</code> <code>:TRACe[:DATA]:PREamble?</code>
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## Trace Header Transfer

**`:TRACe:PREamble? ACLR | SPECTrum | EMISsion | DEMod`**

Returns trace header information for the specified trace.

Data can be transferred to and from the 4 available display trace types. Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

The response begins with an ASCII header. The header specifies the number of following bytes. It looks like `#AX`, where A is the number of digits in X and X is the number of bytes that follow the header.

Parameters are returned in comma-delimited ASCII format. Each parameter will be returned as "NAME=VALUE[ UNITS],"

Valid parameter names are:

Parameter Name	Description
SN	Instrument serial #
UNIT_NAME	Instrument name
TYPE	The data type (Setup or Data)
DESCR	Trace name
DATE	Trace date/time
BASE_VER	Base FW version
APP_NAME	Application name
APP_VER	Application FW version
APP_MODE	Application Mode

Parameter Name	Description
CENTER_FREQ	Center frequency
AUTO_SCRAMBLING_CODE	Auto scrambling code detection on/off
SCRAMBLING_CODE	Selected manual scrambling code
MAX_SPREADING_FACTOR	Maximum spreading factor
REFERENCE_LEVEL	Reference Level
THRESHOLD	Active channel threshold
CURRENT_MEASUREMENTS	Currently active measurements
SCALE	Display scale (dB/division)
POWER_OFFSET	Applied power offset
SCCPCH_CODE	Selected S-CCPCH channelization code
PICH_CODE	Selected PICH channelization code
CURRENT_VIEW	Current view
CDP_ZOOM	Zoom range for code domain power
CDP_ZOOM_START	Start code for zoom window
REFERENCE_FREQUENCY	Reference Frequency
SCCPCH_SPREAD_FCT	Selected S-CCPCH spreading factor
RUN_HOLD	Run/hold state
EXT_REF_FREQ	Selected external reference frequency
DYNAMIC_ATTENUATION	Dynamic range on/off

ACLR_DISPLAY_GRAPH	Display ACLR trace on/off
MARKER_TABLE	Marker table on/off
OTA_AUTO_SC	OTA auto scrambling code on/off
OTA_CODE_LOCK	OTA code lock on/off
OTA_DISPLAY_VALUE	Selected OTA display value
OTA_SORT_PARAM	Selected OTA sort parameter
OTA_MANUAL_SC_1	Selected manual scrambling code 1
OTA_MANUAL_SC_2	Selected manual scrambling code 2
OTA_MANUAL_SC_3	Selected manual scrambling code 3
OTA_MANUAL_SC_4	Selected manual scrambling code 4
OTA_MANUAL_SC_5	Selected manual scrambling code 5
OTA_MANUAL_SC_6	Selected manual scrambling code 6
CODOGRAM_SINGLE_SWEEP_TIME	Single sweep time for codogram
TEST_MODEL	Current pass fail model being tested
CONSTELLATION_CODE	Code number for which IQ data is being displayed
CONSTELLATION_SPREAD	Spreading factor of code for which IQ data is being displayed
NUM_OF_ACLR_MAIN_CHANNELS	Number of main channels
NUM_OF_ACLR_MAIN_CHANNELS	Number of adjacent channels
BAND_SPECTRUM_START_FREQ	Band spectrum start frequency
BAND_SPECTRUM_STOP_FREQ	Band spectrum stop frequency
DL_CHANNEL_NUMBER	Currently selected band spectrum channel
AUTO_THRESHOLD	Auto threshold value
HSDPA_DEMOD_SINGLE_SWEEP_TIME	Single sweep time for hsdpa
BAND_SPECTRUM_REFERENCE_LEVEL	Reference level for band spectrum
CONSTELLATION_PERSISTENCE	Persistence level for IQ data
SIGNAL_STANDARD	Current Signal standard
CHANNEL	Current channel
CONSTELLATION_MARKER	Display location of the IQ marker

Parameter Name	Description
RF_MKR_POINT_[1] 2 3 4 5 6	RF marker point number

RF_MKR_STATE_[1] 2 3 4 5 6	RF marker on/off
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Parameter Name	Description
DEMOM_MKR_POINT_[1] 2 3 4 5 6	Code domain marker point number
DEMOM_MKR_STATE_[1] 2 3 4 5 6	Code domain marker on/off

Parameter Name	Description
CODOGRAM_MKR_POINT_1	Codogram marker point number
CODOGRAM_MKR_STATE_1	Codogram marker on/off
CODOGRAM_MKR_TIME_1	Codogram marker time offset

See Also:	: TRACe : DATA
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## 4 Measurement Commands

### 4.1 System

#### ***FETCh Commands***

This set of commands returns the most recent measured data.

#### **Fetch GPS Fix Data**

**:FETCh:GPS?**

Returns the most recent GPS fix information from the optional GPS receiver.

The results are returned as a set of comma-delimited values in this format: <fix status>, <date/time>, <latitude>, <longitude>. The <fix status> field will be either “GOOD FIX” or “NO FIX” depending on whether or not the GPS receiver is currently calculating position data. If “NO FIX” is the value of the <fix status> field then no data follows.

Both <latitude> and <longitude> fields are expressed in radians. A negative latitude corresponds to a “south” reading. A negative longitude value corresponds to a “west” reading.

Default Units:	Radians
Required Options:	Option 31

### 4.2 Spectrum Analyzer

#### ***CONFigure Commands***

This set of commands prepares the instrument for the selected measurement. It disables any currently-enabled measurements and activates the specified measurement. It sets the instrument to single sweep mode, waiting for an :INITiate command. It will not initiate the taking of a measurement.

Current instrument settings may be changed to default values. These changes will be identified with their respective measurement commands.

The CONFigure? query returns the name of the current measurement.

#### **Configure Adjacent Channel Power Ratio**

**:CONFigure:ACPower**

Configures the default adjacent channel power ratio measurement.

Disables any other active one-button measurements, including channel power, occupied bandwidth, AM/FM demodulation and C/I.

Sets the main channel bandwidth equal to the span.

Sets the adjacent channel bandwidth and channel spacing equal to the main channel bandwidth.

Sets the detection method to RMS.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:ACPower commands before initiating a sweep.

See Also:	<code>[:SENSe]:ACPower:STATE</code> <code>[:SENSe]:ACPower:BANDwidth BWIDth:MAIN</code> <code>[:SENSe]:ACPower:BANDwidth BWIDth:ADJacent</code> <code>[:SENSe]:ACPower:BANDwidth BWIDth:SPACing</code>
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## Configure Channel Power

### :CONFigure:CHPower

Configures the default channel power measurement.

Disables any other active one-button measurements, including ACPR, occupied bandwidth, AM/FM demodulation and C/I.

Sets the integration bandwidth equal to the span.

Sets the detection method to RMS.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:CHPower commands before initiating a sweep.

See Also:	<code>:SENSe:CHPower:STATE</code> <code>:SENSe:CHPower:BANDwidth BWIDth:INTEgration</code>
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## Configure Field Strength

### :CONFigure:FSTrength

Configures the default field strength measurement.

Disables any other active one-button measurements, including channel power, adjacent channel power, occupied bandwidth, AM/FM demodulation and C/I.

Sets the antenna to the first antenna in the instrument's antenna list.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:FSTrength commands before initiating a sweep.

See Also:	<code>[:SENSe]:FSTrength:ANTenna</code>
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## Configure Occupied Bandwidth

### :CONFigure:OBWidth

Configures the default occupied bandwidth measurement.

Disables any other active one-button measurements, including channel power, ACPR, AM/FM demodulation and C/I.

Sets the method to %.

Sets the % of power to 99%.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:OBWidth commands before initiating a sweep.

See Also:	<pre>[:SENSe]:OBWidth:STATE [:SENSe]:OBWidth:METHOD [:SENSe]:OBWidth:PERCent [:SENSe]:OBWidth:XDB</pre>
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## Configure Tracking Generator Measurement

**:CONFigure:TGENERator ABSStats | RELStats**

This command configures the selected tracking generator statistic measurement. It disables any other active one-button measurements, including channel power, occupied bandwidth, AM/FM demodulation and C/I.

Sets the tracking generator measurement state to ON.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:TGENERator commands before initiating a sweep.

When the ABSStats option is selected, the measurement results are equivalent to the results that are displayed by choosing Shift-4(Measure), then Tracking Generator, then Abs Max, Min, Avg from the front panel.

When the RELStats option is selected, the Normalize state is set to ON and the measurement results are equivalent to the results that are displayed by choosing Shift-4(Measure), then Tracking Generator, then S21 Insertion Loss, then S21 Max, Min, Avg from the front panel.

Required Options:	20
See Also:	<pre>TGENERator:OUTput:POWER [:SENSe:]TGENERator:S21[:SCALE]:RLEVEL [:SENSe:]TGENERator:S21[:SCALE]:RLEVEL:OFFSet [:SENSe:]TGENERator:S21[:SCALE]:PDIVision</pre>

## FETCH Commands

This set of commands returns the most recent measurement data of the active measurement. They will not switch to another measurement.

To get new measurement data, use the READ command.

## Fetch Adjacent Channel Power Ratio

**:FETCh:ACPower?**

Returns the most recent adjacent channel power ratio measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 3 comma-separated values: main channel power, lower adjacent channel power, upper adjacent channel power.

Default Units:	Current amplitude units
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## Fetch Channel Power/Density

**:FETCh:CHPower?**

Returns the most recent channel power measurement results: channel power and channel power density.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 2 comma-separated values: channel power, channel power density.

Default Units:	Current amplitude units
See Also:	:FETCh:CHPower:CHPower? :FETCh:CHPower:DENSity?

## Fetch Channel Power

**:FETCh:CHPower:CHPower?**

Returns the most recent channel power measurement result. It returns only the channel power, not the channel power density. Use :FETCh:CHPower? to get both channel power and channel power density.

Default Units:	Current amplitude units
See Also:	:FETCh:CHPower? :FETCh:CHPower:DENSity?

## Fetch Channel Power Density

**:FETCh:CHPower:DENSity?**



Returns the most recent channel power density measurement result. It returns only the channel power density, not the channel power. Use `:FETCh:CHPower?` to get both channel power and channel power density.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a `*RST` immediately before the `:FETCh?` or if a measurement parameter was changed without an `:INITiate`.

Default Units:	Current amplitude units
See Also:	<code>:FETCh:CHPower?</code> <code>:FETCh:CHPower:CHPower?</code>

## Fetch Occupied Bandwidth

**`:FETCh:OBWidth?`**

Returns the most recent occupied bandwidth measurement results: occupied bandwidth, percent of power and dB down.

One of either percent of power or dB down will be measured and the other will be set. That will be determined by the value set using `[ :SENSe ] :OBWidth:METhod`.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a `*RST` immediately before the `:FETCh?` or if a measurement parameter was changed without an `:INITiate`.

Data is returned as 3 comma-separated values: occupied bandwidth, percent of power, dB down.

Default Units:	For OBW: Hz For Percent of Power: % For dB Down: dB
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## Fetch Tracking Generator Absolute Statistics

**`:FETCh:TGENerator:ABSStats?`**

Returns the most recent tracking generator absolute statistic measurement results.

Data is returned as 3 comma-separated values: Absolute Max Power, Absolute Min Power, and Absolute Average Power. “---“ is returned for each data that is not valid at that instance.

Default Units:	Current amplitude units
Required Options:	20

## Fetch Tracking Generator Relative Statistics

**`:FETCh:TGENerator:RELStats?`**

Returns the most recent tracking generator relative statistic measurement results.

Data is returned as 3 comma-separated values: Insertion Loss Relative Max Power, Insertion Loss Relative Min Power, and Insertion Loss Relative Average Power. “---“ is returned for each data that is not valid at that instance.

Default Units:	Current amplitude units
Required Options:	20

## **MEASure Commands**

These command take the instrument from its current state, enable the specified measurement and put the instrument into single sweep mode. They correct any parameters that are invalid given the new measurement state such that a valid measurement can take place. Other settings may be changed; see the documentation of CONFigure for each measurement. They then initiate the measurement. When the measurement is complete, they return the result.

To make a measurement with settings other than the “default” measurement settings applied by CONFigure, do the following:

- Send the appropriate CONFigure command to set the desired measurement.
- Modify the settings as required.
- Send the appropriate READ command to measure and return the result.

To get the current measurement data, use the appropriate FETCh command.

## **Measure Adjacent Channel Power Ratio**

### **:MEASure:ACPower?**

Sets the active measurement to adjacent channel power ratio, sets the default measurement parameters, triggers a new measurement and returns the main channel power lower adjacent and upper adjacent channel power results.

It is a combination of the commands :CONFigure:ACPower;:READ:ACPower?

For a description of the default adjacent channel power ratio measurement parameters see :CONFigure:ACPower.

To make an adjacent channel power ratio measurement with settings other than the default values send

- :CONFigure:ACPower
- Commands to set desired settings
- :READ:ACPower?

Data is returned as 3 comma-separated values: main channel power, lower adjacent channel power, upper adjacent channel power.

Default Units:	Current amplitude units
See Also:	:CONFigure:ACPower

## **Measure Channel Power/Density**

### **:MEASure:CHPower?**

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power and channel power density results.

It is a combination of the commands `:CONFigure:CHPower;:READ:CHPower?`

For a description of the default channel power measurement parameters see `:CONFigure:CHPower`.

To make a channel power measurement with settings other than the default values send

- `:CONFigure:CHPower`
- Commands to set desired settings
- `:READ:CHPower?`

Data is returned as 2 comma-separated values: channel power, channel power density.

Default Units:	Current amplitude units
See Also:	<code>:MEASure:CHPower:CHPower?</code> <code>:MEASure:CHPower:DENSity?</code> <code>:CONFigure:CHPower</code>

## Measure Channel Power

**`:MEASure:CHPower:CHPower?`**

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power result. To measure both channel power and channel power density use `:MEASure:CHPower?`

It is a combination of the commands

`:CONFigure:CHPower;:READ:CHPower:CHPower?`

For a description of the default channel power measurement parameters see `:CONFigure:CHPower`.

To make a channel power measurement with settings other than the default values send

- `:CONFigure:CHPower`
- Commands to set desired settings
- `:READ:CHPower:CHPower?`

Default Units:	Current amplitude units
See Also:	<code>:MEASure:CHPower?</code> <code>:MEASure:CHPower:DENSity?</code> <code>:CONFigure:CHPower</code>

## Measure Channel Power Density

**`:MEASure:CHPower:DENSity?`**

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power density result. To measure both channel power and channel power density use `:MEASure:CHPower?`

It is a combination of the commands

`:CONFigure:CHPower;:READ:CHPower:DENSity?`

For a description of the default channel power measurement parameters see

`:CONFigure:CHPower`.

To make a channel power measurement with settings other than the default values send

- `:CONFigure:CHPower`
- Commands to set desired settings
- `:READ:CHPower:DENSity?`

Default Units:	Current amplitude units
See Also:	<code>:MEASure:CHPower?</code> <code>:MEASure:CHPower:CHPower?</code> <code>:CONFigure:CHPower</code>

## Measure Occupied Bandwidth

**`:MEASure:OBWidth?`**

Sets the active measurement to occupied bandwidth, sets the default measurement parameters, triggers a new measurement and returns the occupied bandwidth, percent of power and dB down results.

It is a combination of the commands `:CONFigure:OBWidth;:READ:OBWidth?`

For a description of the default occupied bandwidth measurement parameters see

`:CONFigure:OBWidth`.

To make an occupied bandwidth measurement with settings other than the default values send

- `:CONFigure:OBWidth`
- Commands to set desired settings
- `:READ:OBWidth?`

Data is returned as 3 comma-separated values: occupied bandwidth, percent of power, dB down.

Default Units:	For OBW: Hz For Percent of Power: % For dB Down: dB
See Also:	<code>:CONFigure:OBWidth</code>

## Measure Tracking Generator Absolute Statistics

**`:MEASure:TGENerator:ABSStats?`**

Sets the active measurement to tracking generator with absolute statistics on, sets the default measurement parameters, triggers a new measurement and returns the results.

It is a combination of the commands `:CONFigure:TGENerator`

`ABSStats;:READ:TGENerator:ABSStats?`

For a description of the default tracking generator absolute statistics measurement parameters see `:CONFigure:TGENerator ABSStats`.

To make an tracking generator absolute statistics measurement with settings other than the default values send

- `:CONFigure:TGENerator ABSStats`
- Commands to set desired settings
- `:READ:TGENerator:ABSStats?`

Data is returned as 3 comma-separated values: absolute max power, absolute min power, absolute average power.

Default Units:	Current amplitude units
See Also:	<code>:CONFigure:TGENerator</code>
Required Options:	20

## ***READ Commands***

This set of commands combines the `ABORT`, `INITiate` and `FETCh` commands. It aborts any current triggering sequence and sets the trigger state to idle. It then initiates a new active measurement (i.e. begins the collection of new data). When the measurement is complete, it returns the result. These commands will not switch to another measurement.

To get the current measurement data, use the `FETCh` command.

### **Read Adjacent Channel Power Ratio**

**`:READ:ACPower?`**

Triggers a new adjacent channel power ratio measurement and returns the results: main channel power, lower adjacent and upper adjacent channel power. It is a combination of the commands `:ABORT`; `:INITiate`; `:FETCh:ACPower?`

The channel power measurement must be the active measurement (specified by `:CONFigure:ACPower`). The current measurement can be queried using `:CONFigure?`

Data is returned as 3 comma-separated values: main channel power, lower adjacent channel power, upper adjacent channel power.

See Also:	<code>:READ:ACPower?</code> <code>:CONFigure</code>
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### **Read Channel Power/Density**

**`:READ:CHPower?`**

Triggers a new channel power measurement and returns the results: channel power and channel power density. It is a combination of the commands `:ABORT`; `:INITiate`; `:FETCh:CHPower?`

The channel power measurement must be the active measurement (specified by :CONFigure:CHPower). The current measurement can be queried using :CONFigure?

Data is returned as 2 comma-separated values: channel power, channel power density.

See Also:	:READ:CHPower:CHPower? :READ:CHPower:DENSity? :CONFigure
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## Read Channel Power

**:READ:CHPower:CHPower?**

Triggers a new channel power measurement and returns the channel power result.

It is a combination of the commands

:ABORT;:INITiate;:FETCh:CHPower:CHPower?

It returns only the channel power, not the channel power density. Use

:READ:CHPower? to get both channel power and channel power density.

The channel power measurement must be the active measurement (specified by :CONFigure:CHPower). The current measurement can be queried using :CONFigure?

Default Units:	Current amplitude units
See Also:	:READ:CHPower? :READ:CHPower:DENSity? :CONFigure

## Read Channel Power Density

**:READ:CHPower:DENSity?**

Triggers a new channel power measurement and returns the channel power density result.

It is a combination of the commands

:ABORT;:INITiate;:FETCh:CHPower:DENSity?

It returns only the channel power density, not the channel power. Use

:READ:CHPower? to get both channel power and channel power density.

The channel power measurement must be the active measurement (specified by :CONFigure:CHPower). The current measurement can be queried using :CONFigure?

Default Units:	Current amplitude units
See Also:	:READ:CHPower? :READ:CHPower:CHPower? :CONFigure

## Read Occupied Bandwidth

**:READ:OBWidth?**

Triggers a new occupied bandwidth measurement and returns the results: occupied bandwidth, percent of power and dB down. It is a combination of the commands :ABORT; :INITiate; :FETCh:OBWidth?

The occupied bandwidth measurement must be the active measurement (specified by :CONFIgure:OBWidth). The current measurement can be queried using :CONFIgure?

Data is returned as 3 comma-separated values: occupied bandwidth, percent of power, dB down.

Default Units:	For OBW: Hz For Percent of Power: % For dB Down: dB
See Also:	:CONFIgure

## Read Tracking Generator Absolute Statistics

**:READ:TGENerator:ABSStats?**

Triggers a new tracking generator absolute statistic measurement and returns the results. It is a combination of the commands :ABORT; :INITiate; :FETCh:TGENerator:ABSStats?

The tracking generator absolute statistic measurement must be the active measurement (specified by :CONFIgure:TGENerator ABSStats). The current measurement can be queried using :CONFIgure?

Data is returned as 3 comma-separated values: absolute max power, absolute min power, absolute average power.

Required Options:	20
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## Read Tracking Generator Relative Statistics

**:READ:TGENerator:RELStats?**

Triggers a new tracking generator relative statistics measurement and returns the results. It is a combination of the commands :ABORT; :INITiate; :FETCh:TGENerator:RELStats?

The tracking generator S21 Insertion Loss relative statistic measurement must be the active measurement (specified by :CONFIgure:TGENerator RELStats). The current measurement can be queried using :CONFIgure?

Data is returned as 3 comma-separated values: relative max power, relative min power, relative average power.

Required Options:	20
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## ***SENSe (Measurement Command) Subsystem***

This subsystem contains commands related to preparing the instrument to make a particular measurement. These measurements are not defined in the SCPI standard so they are maintained separately here.

### ***[:SENSe]:ACPower Subsystem***

This subsystem includes commands related to configuring the adjacent channel power ratio measurement.

#### **ACPR Adjacent Channel Bandwidth**

`[:SENSe]:ACPower:BANDwidth|BWIDth:ADJacent <freq>`

`[:SENSe]:ACPower:BANDwidth|BWIDth:ADJacent?`

Sets the adjacent channel bandwidth for the ACPR measurement.

Factory Preset / *RST:	10.35 MHz
Range:	10 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), ACPR, Adj Ch BW

#### **ACPR Main Channel Bandwidth**

`[:SENSe]:ACPower:BANDwidth|BWIDth:MAIN <freq>`

`[:SENSe]:ACPower:BANDwidth|BWIDth:MAIN?`

Sets the main channel bandwidth for the ACPR measurement.

Factory Preset / *RST:	10.35 MHz
Range:	10 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), ACPR, Main Ch BW

#### **ACPR Channel Spacing**

`[:SENSe]:ACPower:BANDwidth|BWIDth:SPACing <freq>`

`[:SENSe]:ACPower:BANDwidth|BWIDth:SPACing?`

Sets the channel spacing for the ACPR measurement.

Factory Preset / *RST:	10.35 MHz
Range:	1 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), ACPR, Ch Spacing

#### **ACPR Measurement State**

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

`[:SENSe]:ACPower:STATe?`

Sets the state of the adjacent channel power ratio measurement, ON or OFF.



When using :CONFIgure:ACPoweR, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), ACPR, On/Off
See Also:	:CONFIgure:ACPoweR

### ***[[:SENSE]:CHPower Subsystem***

This subsystem includes commands related to configuring the channel power measurement.

#### **Channel Power Integration Bandwidth**

**[[:SENSE]:CHPower:BANDwidth | BWIDth:INTEgration <freq>**

**[[:SENSE]:CHPower:BANDwidth | BWIDth:INTEgration?**

Sets the integration bandwidth for the channel power measurement.

Integration bandwidth must be less than or equal to the frequency span.

Factory Preset / *RST:	10.35 MHz
Range:	10 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), Channel Power, Ch Pwr Width
See Also:	[[:SENSE]:FREQuency:SPAN

#### **Channel Power Measurement State**

**[[:SENSE]:CHPower:STATE OFF | ON | 0 | 1**

**[[:SENSE]:CHPower:STATE?**

Sets the state of the channel power measurement, ON or OFF.

When using :CONFIgure:CHPower, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Channel Power, On/Off
See Also:	:CONFIgure:CHPower

### ***[[:SENSE]:FSTRength Subsystem***

This subsystem includes commands related to configuring the field strength measurement.

#### **Field Strength Antenna**

**[[:SENSE]:FSTRength:ANTenna <antenna>**

**[[:SENSE]:FSTRength:ANTenna?**

Selects an antenna from the antenna list to use for field strength measurement result calculations.

The **<antenna>** argument is a 1-based index of the position of the desired antenna in the instrument's current antenna list. The list can be seen on the instrument by choosing the "Antenna" soft-key button in the "F Strength" menu. For example, if the desired antenna were the 3<sup>rd</sup> item on the antenna listing then the value of the **<antenna>** argument would be 3.

The query form of this command will return the index of the currently-selected antenna.

Factory Preset / *RST:	1
Front Panel Access:	Shift-4(Measure), Field Strength, Antenna
See Also:	:CONFIgure:FSTRength

### Field Strength Measurement State

**[ :SENSe ] :FSTRength:STATe OFF | ON | 0 | 1**

**[ :SENSe ] :FSTRength:STATe?**

Sets the state of the field strength measurement, ON or OFF.

When using :CONFIgure:FSTRength, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Field Strength, On/Off
See Also:	:CONFIgure:FSTRength

### **[ :SENSe ] :OBWidth Subsystem**

This subsystem includes commands related to configuring the occupied bandwidth measurement.

#### Occupied Bandwidth Measurement Method

**[ :SENSe ] :OBWidth:METHod XDB | PERCent**

**[ :SENSe ] :OBWidth:METHod?**

Sets the method for calculating occupied bandwidth.

XDB calculates the occupied bandwidth based on points a specified number of dB below the carrier. Issue command [ :SENSe ] :OBWidth:XDB to set the number of dB to be used.

PERCent calculates the occupied bandwidth based on points a specified percentage of the carrier power below the carrier. Issue command [ :SENSe ] :OBWidth:PERCent to set the percentage to be used.

Factory Preset / *RST:	PERCent
Front Panel Access:	Shift-4(Measure), OCC BW, % Down dBc Down
See Also:	[ :SENSe ] :OBWidth:XDB [ :SENSe ] :OBWidth:PERCent

## Occupied Bandwidth Percent of Power

**[ :SENSE ] :OBWidth:PERCent <percentage>**

**[ :SENSE ] :OBWidth:PERCent?**

This command sets the percentage of carrier power used to measure the occupied bandwidth.

This value is used in the measurement if **:SENSE:OBWidth:METHOD** is set to **PERCent**.

Factory Preset / *RST:	99.00%
Range:	0% to 100%
Default Unit:	%
Front Panel Access:	Shift-4 (Measure), OCC BW, %
See Also:	<b>:SENSE:OBWidth:METHOD</b>

## Occupied Bandwidth Measurement State

**[ :SENSE ] :OBWidth:STATE OFF | ON | 0 | 1**

**[ :SENSE ] :OBWidth:STATE?**

Sets the state of the occupied bandwidth measurement, ON or OFF.

When using **:CONFIGure:OBWidth**, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), OCC BW, On/Off
See Also:	<b>:CONFIGure:OBWidth</b>

## Occupied Bandwidth dB Down

**[ :SENSE ] :OBWidth:XDB <rel ampl>**

**[ :SENSE ] :OBWidth:XDB?**

This command sets the number of dB below the carrier used to measure the occupied bandwidth.

This value is used in the measurement if **:SENSE:OBWidth:METHOD** is set to **XDB**.

Factory Preset / *RST:	3 dBc
Range:	0 to 100 dBc
Default Unit:	dBc
Front Panel Access:	Shift-4 (Measure), OCC BW, dBc
See Also:	<b>:SENSE:OBWidth:METHOD</b>

## **[ :SENSE ] :TGENerator Subsystem**

This subsystem includes commands used to set up parameters associated with the tracking generator measurement.

## Tracking Generator Absolute Statistic State

`[ :SENSE ] :TGENerator:ABSStats [:STATE] OFF | ON | 0 | 1`  
`[ :SENSE ] :TGENerator:ABSStats [:STATE] ?`

Specifies whether the tracking generator absolute statistic is ON or OFF.

If the value is set to ON or 1, the tracking generator absolute statistic is turned on.

If the value is set to OFF or 0, the tracking generator absolute statistic is turned off.

The query version of the command returns a 1 if the tracking generator absolute statistic is on and returns a 0 if the tracking generator is off.

Note that this command is ignored if the tracking generator state is off.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Tracking Generator, Abs Max, Min, Avg(On/Off)
Required Option:	20

## Tracking Generator Normalize State

`[ :SENSE ] :TGENerator:S21:NORMALize [:STATE] OFF | ON | 0 | 1`  
`[ :SENSE ] :TGENerator:S21:NORMALize [:STATE] ?`

Specifies whether the tracking generator normalization is ON or OFF.

If the value is set to ON or 1, the tracking generator normalization is turned on.

If the value is set to OFF or 0, the tracking generator normalization is turned off.

The query version of the command returns a 1 if the tracking generator normalization is on and returns a 0 if the tracking generator normalization is off.

Note that this command is ignored if the tracking generator state is off.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Tracking Generator, S21 Insertion Loss, Normalize(On/Off)
Required Option:	20

## Tracking Generator Relative Statistic State

`[ :SENSE ] :TGENerator:S21:RELStats [:STATE] OFF | ON | 0 | 1`  
`[ :SENSE ] :TGENerator:S21:RELStats [:STATE] ?`

Specifies whether the tracking generator relative statistic is ON or OFF.

If the value is set to ON or 1, the tracking generator relative statistic is turned on.

If the value is set to OFF or 0, the tracking generator relative statistic is turned off.

The query version of the command returns a 1 if the tracking generator relative statistic is on and returns a 0 if the tracking generator is off.

Note that this command is ignored if the tracking generator normalization is off.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Tracking Generator, S21 Insertion Loss, S21 Max,Min,Avg (On/Off)
Required Option:	20
See Also:	INITiate:TGENERator [:SENSe]:TGENERator:S21:NORMALize[:STATe]

### Tracking Generator Scale

**[:SENSe]:TGENERator:S21[:SCALE]:PDIVision <rel ampl>**

**[:SENSe]:TGENERator:S21[:SCALE]:PDIVision?**

Sets the tracking generator scale (dB/division).

Factory Preset / *RST:	10 dB/div
Range:	1 dB to 15 dB
Default Unit:	dB
Front Panel Access:	Shift-4(Measure), Tracking Generator, S21 Insertion Loss,S21 Scale.
Required Options:	20
See Also:	:INITiate:TGENERator

### Tracking Generator Reference Level

**[:SENSe]:TGENERator:S21[:SCALE]:RLEVEL <amplitude>**

**[:SENSe]:TGENERator:S21[:SCALE]:RLEVEL?**

Sets the tracking generator reference level amplitude value for the y-axis.

Factory Preset / *RST:	0 dB
Range:	With reference level offset = 0 dB: -200 dB to 20 dB
Default Unit:	Current active amplitude unit
Front Panel Access:	Shift-4(Measure),Tracking Generator,S21 Insertion Loss, S21 Ref Level
Required Options:	20
See Also:	[:SENSe]:TGENERator:S21[:SCALE]:RLEVEL:OFFSet <rel ampl> :UNIT:POWER

### Tracking Generator Reference Level Offset

**[:SENSe]:TGENERator:S21[:SCALE]:RLEVEL:OFFSet <rel ampl>**

**[:SENSe]:TGENERator:S21[:SCALE]:RLEVEL:OFFSet?**

Sets the tracking generator reference level offset value for the y-axis.

Factory Preset / *RST:	0 dB
Range:	-100 dB to 100 dB
Default Unit:	dB
Front Panel Access:	Shift-4(Measure), Tracking Generator, S21 Insertion Loss, S21 RL Offset
Required Options:	20
See Also:	INITiate:TGENERator [:SENSE]:TGENERator:S21[:SCALE]:RLEVEL <amplitude>

## 4.3 WCDMA

### **CONFigure Commands**

This set of commands prepares the instrument for the selected measurement. It disables any currently-enabled measurements and activates the specified measurement. All measurement activity is stopped pending an INITiate command.

Current instrument settings may be changed to default values. These changes will be identified with their respective measurement commands.

The :CONFigure? query returns the name of the current measurement.

### **Configure Demodulation Measurement**

**:CONFigure:DEMod SUMMary | CDPower | CODogram | HSDPa**

The HSDPa measurement is only available if option 65 is installed.

This command configures the selected demodulation measurement. It disables any other active measurements.

None of the instrument parameters are changed by the execution of this command.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSE]:DEMod commands before initiating a measurement.

When the SUMMARY option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then Demod, then Summary from the front panel.

When the CDP option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then Demod, then CDP from the front panel.

When the CODOGRAM option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then Demod, then Codogram from the front panel.

When the HSDPa option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then Demod, then Hsdpa from the front panel.

See Also:	<pre>[ :SENSe] :DEMod:SCODE [ :SENSe] :DEMod:SFACTOR [ :SENSe] :DEMod:THRShold [ :SENSe] :DEMod:PICH [ :SENSe] :DEMod:SCCPch</pre>
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## Configure Over-The-Air Measurement

### :CONFigure:OTA

This command configures the over-the-air measurement. It disables any other active measurements.

None of the instrument parameters are changed by the execution of this command.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:OTA commands before initiating a measurement.

The measurement results are equivalent to the results that are displayed by choosing Measurements, then OTA from the front panel.

See Also:	<pre>[ :SENSe] :OTA:RESet [ :SENSe] :OTA:SCODE [ :SENSe] :OTA:SORT</pre>
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## Configure PASS/FAIL Measurement

### :CONFigure PFail

This command configures the PASS/FAIL measurement. It disables any other active measurements.

None of the instrument parameters are changed by the execution of this command.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe] commands before initiating a measurement.

The measurement results are equivalent to the results that are displayed by choosing Measurements, then PASS/FAIL from the front panel.

See Also:	<pre>:FETCh:PFail? :MEASure:PFail? :READ:PFail?</pre>
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## Configure RF Measurement

**:CONFigure:RF SUMMary | SPECTrum | ACLR | EMISsion | BANDspectrum**

This command configures the selected RF measurement. It disables any other active measurements.

None of the instrument parameters are changed by the execution of this command.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:RF commands before initiating a measurement.

When the SUMMary option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then RF, then Summary from the front panel.

When the SPECTrum option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then RF, then Channel Spectrum from the front panel.

When the ACLR option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then RF, then ACLR from the front panel.

When the EMISsion option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then RF, then Spectral Emission Mask from the front panel.

When the BANDspectrum option is selected, the measurement results are equivalent to the results that are displayed by choosing Measurements, then RF, then Band Spectrum from the front panel.

See Also:	<code>[:SENSe]:FREQuency</code> <code>[:SENSe]:RF:ACLR:MAINchannelcount</code> <code>[:SENSe]:RF:ACLR:ADJCchannelcount</code> <code>[:SENSe]:BANDspectrum:SIGNAstandard</code>
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## Configure Summary Measurement

**:CONFigure SUMMARY | PFail**

This command configures the UMTS Summary or PASS/FAIL measurement. It disables any other active measurements.

None of the instrument parameters are changed by the execution of this command.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe] commands before initiating a measurement.

In SUMMARY mode, the measurement results are equivalent to the results that are displayed by choosing Measurements, then WCDMA Summary from the front panel. In



PFail mode, the results are equivalent to those that are displayed by choosing Measurements, then Pass Fail Mode from the front panel.

## ***FETCh Commands***

This set of commands returns the most recent measurement data of the active measurement. They will not switch to another measurement.

To get new measurement data, use the READ command.

### **Fetch Adjacent Channel Leakage Ratio**

**:FETCh:ACLR?**

Returns the most recent adjacent channel leakage ratio measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 12 comma-separated values: -20 MHz channel power, -15 MHz channel power, -10 MHz channel power, -5 MHz channel power, Main channel power 1, Main channel power 2, Main channel power 3, Main channel power 4, +5 MHz channel power, +10 MHz channel power, +15 MHz channel power, +20 MHz channel power.

Default Units:	dBm
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### **Fetch Channel Power**

**:FETCh:CHPower?**

Returns the most recent channel power measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Default Units:	dBm
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### **Fetch Active Channel Count**

**:FETCh:DEMod:ACTChannels?**

Returns the active channel count from the most recent measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the total number of active channels.

Default Units:	No units
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## Fetch Demodulated Channel Power

**:FETCh:DEMod:CDPower?**

Returns the most recent absolute power measurement results for the requested logical channel.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 4 comma-delimited values: CPICH power, PCCPCH power, PICH power, SCCPCH power.

Default Units:	dBm
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## Fetch Carrier Feed Through

**:FETCh:DEMod:CFTHrough?**

Returns the most recent carrier feed through measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the carrier feed through.

Default Units:	dB
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## Fetch Error Vector Magnitude (EVM)

**:FETCh:DEMod:EVM?**

Returns the most recent EVM measurement result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the RMS error vector magnitude.

Default Units:	Percent
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## Fetch Frequency Error

**:FETCh:DEMod:FERRor?**

Returns the most recent frequency error measurement result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the frequency error.

Default Units:	Hertz
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## Fetch Code Domain Noise Floor

**:FETCh:DEMod:NFLoor?**

Returns the most recent code domain noise floor measurement result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the noise floor power level.

Default Units:	dB
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## Fetch Total Channel Count

**:FETCh:DEMod:NUMChannels?**

Returns the total channel count from the most recent measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the total number of channels.

Default Units:	No units
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## Fetch Synch Channel Power

**:FETCh:DEMod:SPOWer?**

Returns the most recent absolute power measurement results for the requested synch channel.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 3 comma-delimited values: SCH power, PSCH power, SSCH power.

Default Units:	dBm
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## Fetch Transmitter Frequency

**:FETCh:DEMod:TXFRequency?**

Returns the most recent transmitter frequency measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the carrier frequency.

Default Units:	Hertz
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## Fetch Spectral Emission Mask Results

**:FETCh:EMISsion?**

Returns the most recent spectral emission mask pass/fail and template measurement results.

Any violation of the spectral emission mask template will cause a FAIL result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 2 comma-delimited values: PASS/FAIL status (PASS = 0, FAIL = 1), template number. See :FETCh:EMISsion:TEMPlate command for valid template numbers.

Default Units:	No units
See Also	:FETCh:EMISsion:FAIL? :FETCh:EMISsion:TEMPlate?

## Fetch Spectral Emission Mask Pass/Fail

**:FETCh:EMISsion:FAIL?**

Returns the most recent spectral emission mask pass/fail measurement result.

Any violation of the spectral emission mask template will cause a FAIL result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value indicating the PASS/FAIL status of the spectral emission mask measurement (PASS = 0, FAIL = 1).

Default Units:	No units
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## Fetch Spectral Emission Mask Template

**:FETCh:EMISsion:TEMPlate?**

Returns the spectral emission mask template used for the most recent spectral emission mask measurement.

Any violation of the spectral emission mask template will cause a FAIL result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as a single value representing the template used for the current spectral emission mask measurement results.

Default Units:	No units	
Templates	0	Power >= 43 dBm
	1	43 dBm > Power >= 39 dBm
	2	39 dBm > Power >= 31 dBm
	3	Power < 31 dBm

## Fetch Occupied Bandwidth

**:FETCh:OBWidth?**

Returns the most recent occupied bandwidth measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Default Units:	Hz
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## Fetch Over The Air

**:FETCh:OTA [1] | 2 | 3 | 4 | 5 | 6?**

Returns the most recent over-the-air measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

The measurement results are returned as 5 comma delimited values: scrambling code, CPICH power, chip energy, Ec/I0 ratio, pilot dominance.

If valid results are not available in the requested position (1-6), the returned string will contain a series of 3 dashes “---“ instead of the numeric results.

Default Units:	Scrambling Code: No units CPICH power: dBm Chip Energy: dBm EC/I0: dB Pilot dominance: No units
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## Fetch PASS/FAIL

**:FETCh:PFail?**

Returns the most recent PASS/FAIL measurement results.

If the instrument is actively measuring, it will not return until the measurement is complete. If the instrument is not actively measuring and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Measurement results are returned in a block of ASCII text in the format of <header><block>. The ASCII header specifies the number of data bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes in the <block>.

The block consists of a set of records which indicate individual test results. Records are comma-separated. Each record follows the format <test ID>: <input1> <input2> <min> <max> <value1> <value2> <PASS/FAIL/OPTION NOT INSTALLED>. The <test ID> field indicates which test was performed to retrieve these results. The <input1> and <input2> fields indicate the test setup. The <min> and <max> fields indicate the minimum and maximum values against which <value1> and <value2> were compared to arrive at the final PASS/FAIL result.

If the specified test is not available in the instrument, the <PASS/FAIL> field will indicate “option not available” instead of “pass” or “fail”.

All unused fields for a given test will be represented by a double dash (“--“).

## Fetch Peak to Average Power Ratio

**:FETCh:PTAPower?**

Returns the most recent peak to average power ratio measurement result.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a \*RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Default Units:	dB
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## MEASure Commands

These command take the instrument from its current state, enable the specified measurement and put the instrument into single sweep mode. They correct any parameters that are invalid given the new measurement state such that a valid measurement can take place. Other settings may be changed; see the documentation of CONFigure for each measurement. They then initiate the measurement. When the measurement is complete, they return the result.

To make a measurement with settings other than the “default” measurement settings applied by CONFigure, do the following:

- Send the appropriate CONFigure command to set the desired measurement.
- Modify the settings as required.
- Send the appropriate READ command to measure and return the result.

To get the current measurement data, use the appropriate FETCh command.

### Measure Adjacent Channel Leakage Ratio

**:MEASure:ACLR?**

Sets the active measurement to adjacent channel power ratio, sets the default measurement parameters, triggers a new measurement and returns the main channel(s) power, and adjacent channel(s) power.

It is a combination of the commands :CONFigure:ACLR; :READ:ACLR?

For a description of the default adjacent channel power ratio measurement parameters see : CONFigure:RF ACLR.

To make an adjacent channel power ratio measurement with settings other than the default values send

- :CONFigure:RF ACLR
- Commands to set desired settings
- :READ:ACLR?

Data is returned as 12 comma-separated values: -20 MHz channel power, -15 MHz channel power, -10 MHz channel power, -5 MHz channel power, Main channel power 1, Main channel power 2, Main channel power 3, Main channel power 4, +5 MHz channel power, +10 MHz channel power, +15 MHz channel power, +20 MHz channel power.

Default Units:	dBm
See Also:	: CONFigure:RF ACLR

### Measure Channel Power

**:MEASure:CHPower?**

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power results.

It is a combination of the commands :CONFigure:CHPower; :READ:CHPower?

For a description of the default channel power measurement parameters see  
:CONFigure:CHPower.

To make a channel power measurement with settings other than the default values send

- :CONFigure:CHPower
- Commands to set desired settings
- :READ:CHPower?

Default Units:	dBm
See Also:	:CONFigure:CHPower

## Measure Active Code Domain Channels

### :MEASure:DEMod:ACTChannels?

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the number of active traffic channels.

It is a combination of the  
commands: CONFigure:DEMod:CDP; :READ:DEMod:ACTChannels?

For a description of the default code domain power measurement parameters see  
:CONFigure:DEMod:CDP.

To make an active channel measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:ACTChannels?

Default Units:	dB
See Also:	:CONFigure:DEMod CDP

## Measure Code Domain Power

### :MEASure:DEMod:CDPower?

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the channel power results.

It is a combination of the commands  
:CONFigure:CDPower; :READ:DEMod:CDPower?

For a description of the default channel power measurement parameters see  
:CONFigure:DEMod:CDP.

To make a code domain power measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:CDPower?



Results are returned as 4 comma-delimited values: CPICH power, PCCPCH power, PICH power, SCCPCH power.

Default Units:	dBm
See Also:	:CONFigure:DEMod CDP

## Measure Carrier Feed Through

### :MEASure:DEMod:CFTHrough?

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the carrier feed through results.

It is a combination of the commands

:CONFigure:DEMod:CDP; :READ:DEMod:CFTHrough?

For a description of the default code domain power measurement parameters see

:CONFigure:DEMod:CDP.

To make a carrier feed through measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:CFTHrough?

Default Units:	dB
See Also:	:CONFigure:DEMod CDP

## Measure Error Vector Magnitude

### :MEASure:DEMod:EVM?

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the EVM results.

It is a combination of the commands

:CONFigure:DEMod:CDP; :READ:DEMod:EVM?

For a description of the default code domain power measurement parameters see

:CONFigure:DEMod:CDP.

To make a carrier feed through measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:EVM?

Default Units:	Percent
See Also:	:CONFigure:DEMod CDP

## Measure Frequency Error

### **:MEASure:DEMod:FERRor?**

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the frequency error results.

It is a combination of the

commands: `CONFigure:DEMod:CDP`; `:READ:DEMod:FERRor?`

For a description of the default code domain power measurement parameters see `:CONFigure:DEMod:CDP`.

To make a frequency error measurement with settings other than the default values send

- `:CONFigure:DEMod CDP`
- Commands to set desired settings
- `:READ:DEMod:FERRor?`

Default Units:	Hertz
See Also:	<code>:CONFigure:DEMod CDP</code>

## Measure Code Domain Noise Floor

### **:MEASure:DEMod:NFLoor?**

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the noise floor results.

It is a combination of the

commands: `CONFigure:DEMod:CDP`; `:READ:DEMod:NFLoor?`

For a description of the default code domain power measurement parameters see `:CONFigure:DEMod:CDP`.

To make a noise floor measurement with settings other than the default values send

- `:CONFigure:DEMod CDP`
- Commands to set desired settings
- `:READ:DEMod:NFLoor?`

Default Units:	dB
See Also:	<code>:CONFigure:DEMod CDP</code>

## Measure Code Domain Channel Count

### **:MEASure:DEMod:NUMChannels?**

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the number of channels.

It is a combination of the

commands: `CONFigure:DEMod:CDP`; `:READ:DEMod:NUMChannels?`

For a description of the default code domain power measurement parameters see `:CONFigure:DEMod:CDP`.

To make an channel count measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:NUMChannels?

Default Units:	dB
See Also:	:CONFigure:DEMod CDP

## Measure Synch Channel Power

### :MEASure:DEMod:SPOWer?

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the synch channel power results.

It is a combination of the

commands: CONFigure:DEMod:CDP; :READ:DEMod:SPOWer?

For a description of the default code domain power measurement parameters see

:CONFigure:DEMod:CDP.

To make a synch channel power measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:SPOWer?

Results are returned as 3 comma-delimited values: SCH power, PSCH power, SSCH power.

Default Units:	dBm
See Also:	:CONFigure:DEMod CDP

## Measure Transmitter Frequency

### :MEASure:DEMod:TXFREquency?

Sets the active measurement to code domain power, sets the default measurement parameters, triggers a new measurement and returns the transmitter frequency results.

It is a combination of the

commands: CONFigure:DEMod:CDP; :READ:DEMod:TXFREquency?

For a description of the default code domain power measurement parameters see

:CONFigure:DEMod:CDP.

To make a transmitter frequency measurement with settings other than the default values send

- :CONFigure:DEMod CDP
- Commands to set desired settings
- :READ:DEMod:TXFREquency?

Default Units:	Hertz
See Also:	:CONFigure:DEMod CDP

## Measure Spectral Emission Mask

### :MEASure:EMISsion?

Sets the active measurement to spectral emission mask, sets the default measurement parameters, triggers a new measurement and returns the spectral emission mask measurement results.

It is a combination of the commands :CONFigure:RF EMISSion; :READ:EMISSion?

For a description of the default spectral emission mask measurement parameters see :CONFigure:RF EMISSion.

To make a spectral emission mask measurement with settings other than the default values send

- :CONFigure:RF EMISSion
- Commands to set desired settings
- :READ:EMISSion?

Results are returned as 2 comma-delimited values: pass/fail status, and template number.

See Also:	:MEASure:EMISSion:FAIL? :MEASure:EMISSion:TEMPlate?
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## Measure Spectral Emission Mask Pass/Fail status

### :MEASure:EMISSion:FAIL?

Sets the active measurement to spectral emission mask, sets the default measurement parameters, triggers a new measurement and returns the spectral emission mask pass/fail results.

It is a combination of the commands :CONFigure:RF SPECMASK; :READ:EMISSion:FAIL?

For a description of the default spectral emission mask measurement parameters see :CONFigure:RF EMISSion.

To make a spectral emission mask pass/fail status measurement with settings other than the default values send

- :CONFigure:RF EMISSion
- Commands to set desired settings
- :READ:EMISSion:FAIL?

See Also:	:MEASure:EMISSion :MEASure:EMISSion:TEMPlate? :CONFigure:RF EMISSion
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## Measure Spectral Emission Mask Template

### **:MEASure:EMISsion:TEMPlate?**

Sets the active measurement to spectral emission mask, sets the default measurement parameters, triggers a new measurement and returns the spectral emission mask template results.

It is a combination of the commands :CONFIgure:RF EMISsion; :READ:EMISsion:TEMPlate?

For a description of the default spectral emission mask measurement parameters see :CONFIgure:RF EMISsion.

To make a spectral emission mask template measurement with settings other than the default values send

- :CONFIgure:RF EMISsion
- Commands to set desired settings
- :READ:EMISsion:TEMPlate?

See Also:	:MEASure:EMISsion? :MEASure:EMISsion:FAIL? :CONFIgure:RF EMISsion
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## Measure Occupied Bandwidth

### **:MEASure:OBWidth?**

Sets the active measurement to RF spectrum, sets the default measurement parameters, triggers a new measurement and returns the occupied bandwidth results.

It is a combination of the commands :CONFIgure:RF SPECTRUM; :READ:OBWidth?

For a description of the default occupied bandwidth measurement parameters see :CONFIgure:RF SPECTRUM.

To make an occupied bandwidth measurement with settings other than the default values send

- :CONFIgure:RF SPECTRUM
- Commands to set desired settings
- :READ:OBWidth?

Default Units:	Hz
See Also:	:CONFIgure:RF SPECTRUM

## Measure Over The Air

### **:MEASure:OTA [1] | 2 | 3 | 4 | 5 | 6?**

Sets the active measurement to over-the-air, sets the default measurement parameters, triggers a new measurement and returns the OTA measurement results.

It is a combination of the commands :CONFIgure:OTA; :READ:OBWidth?

For a description of the default occupied bandwidth measurement parameters see :CONFIgure:RF SPECTRUM.

To make an OTA measurement with settings other than the default values send

- :CONFIgure:OTA
- Commands to set desired settings
- :READ:OTA?

The measurement results are returned as 5 comma delimited values: scrambling code, CPICH power, chip energy, Ec/I0 ratio, pilot dominance.

Default Units:	Scrambling Code: No units CPICH power: dBm Chip Energy: dBm EC/I0: dB Pilot dominance: No units
See Also:	:CONFIgure:OTA

## Measure PASS/FAIL

### :MEASure:PFail?

Sets the active measurement to PASS/FAIL, sets the default measurement parameters, triggers a new measurement and returns the PASS/FAIL results.

It is a combination of the commands :CONFIgure:PFail;:READ:PFail?

To make a channel power measurement with settings other than the default values send

- :CONFIgure:PFail
- Commands to set desired settings
- :READ:PFail?

See Also:	:CONFIgure:PFail
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## Measure Peak to Average Power

### :MEASure:PTAPower?

Sets the active measurement to RF spectrum, sets the default measurement parameters, triggers a new measurement and returns the PTAP measurement results.

It is a combination of the commands :CONFIgure:RF SPECTRUM;  
:READ:PTAPower?

For a description of the default occupied bandwidth measurement parameters see :CONFIgure:RF SPECTRUM.

To make a peak to average power measurement with settings other than the default values send

- :CONFIgure:RF SPECTRUM
- Commands to set desired settings
- :READ:PTAPower?

Default Units	dB
See Also:	:CONFigure:RF SPECTRUM

## **READ Commands**

This set of commands combines the ABORt, INITiate and FETCh commands. It aborts any current triggering sequence and sets the trigger state to idle. It then initiates a new active measurement (i.e. begins the collection of new data). When the measurement is complete, it returns the result. These commands will not switch to another measurement.

To get the current measurement data, use the FETCh command.

### **Read Adjacent Channel Leakage Ratio (ACLR)**

**:READ:ACLR?**

Triggers a new adjacent channel power ratio measurement and returns the results: main channel power, lower adjacent and upper adjacent channel power, and lower alternate and upper alternate channel power. It is a combination of the commands

:ABORT;:INITiate;:FETCh:ACLR?

The ACLR measurement must be the active measurement (specified by

:CONFigure:RF ACLR). The current measurement can be queried using

:CONFigure?

Data is returned as 12 comma-separated values: -20 MHz channel power, -15 MHz channel power, -10 MHz channel power, -5 MHz channel power, Main channel power 1, Main channel power 2, Main channel power 3, Main channel power 4, +5 MHz channel power, +10 MHz channel power, +15 MHz channel power, +20 MHz channel power.

See Also:	:CONFigure:RF ACLR
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### **Read Channel Power**

**:READ:CHPower?**

Triggers a new channel power measurement and returns the results. It is a combination of the commands :ABORT;:INITiate;:FETCh:CHPower?

The channel power measurement must be active. The current measurement can be queried using :CONFigure?

See Also:	:CONFigure:RF ACLR
Default Units	dBm

### **Read Active Code Domain Channel Count**

**:READ:DEMod:ACTChannels?**

Triggers a new measurement and returns the active channel count. It is a combination of the commands :ABORT;:INITiate;:FETCh:DEMod:ACTChannels?

A demodulation measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	dB
See Also:	:CONFigure:DEMod

## Read Code Domain Power

**:READ:DEMod:CDPower?**

Triggers a new code domain power measurement and returns the results. It is a combination of the commands :ABORT; :INITiate; :FETCh:DEMod:CDPower?

The code domain power measurement must be active. The current measurement can be queried using :CONFigure?

Results are returned as 4 comma-delimited values: CPICH power, PCCPCH power, PICH power, SCCPCH power.

Default Units	dBm
See Also:	:CONFigure:DEMod CDP

## Read Carrier Feed Through

**:READ:DEMod:CFThrougH?**

Triggers a new measurement and returns the carrier feed through results. It is a combination of the commands

:ABORT; :INITiate; :FETCh:DEMod:CFThrougH?

The carrier feed through measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	dB
See Also:	:CONFigure:DEMod

## Read Error Vector Magnitude (EVM)

**:READ:DEMod:EVM?**

Triggers a new measurement and returns the EVM results. It is a combination of the commands :ABORT; :INITiate; :FETCh:DEMod:EVM?

The EVM measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	Percent
See Also:	:CONFigure:DEMod

## Read Frequency Error

**:READ:DEMod:FERRor?**



Triggers a new measurement and returns the frequency error results. It is a combination of the commands :ABORT;:INITiate;:FETCh:DEMod:FERRor?

The frequency error measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	Hertz
See Also:	:CONFigure:DEMod

## Read Noise Floor

**:READ:DEMod:NFLoor?**

Triggers a new measurement and returns the noise floor results. It is a combination of the commands :ABORT;:INITiate;:FETCh:DEMod:NFLoor?

The noise floor measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	dB
See Also:	:CONFigure:DEMod

## Read Code Domain Channel Count

**:READ:DEMod:NUMChannels?**

Triggers a new measurement and returns the channel count. It is a combination of the commands :ABORT;:INITiate;:FETCh:DEMod:NUMChannels?

A demodulation measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	dB
See Also:	:CONFigure:DEMod

## Read Synch Channel Power

**:READ:DEMod:SPOWer?**

Triggers a new measurement and returns the synch channel power results. It is a combination of the commands :ABORT;:INITiate;:FETCh:DEMod:SPOWer?

The synch channel power measurement must be active. The current measurement can be queried using :CONFigure?

Results are returned as 3 comma-delimited values: SCH power, PSCH power, SSCH power.

Default Units	dBm
See Also:	:CONFigure:DEMod

## Read Transmitter Frequency

**:READ:DEMod:TXFrequency?**

Triggers a new measurement and returns transmitter frequency results. It is a combination of the commands

:ABORT; :INITiate; :FETCh:DEMod:TXFrequency?

The carrier frequency measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	Hertz
See Also:	:CONFigure:DEMod

## Read Spectral Emission Mask

**:READ:EMISsion?**

Triggers a new spectral emission mask measurement and returns the results: pass/fail status and template number. It is a combination of the commands

:ABORT; :INITiate; :FETCh:EMISsion?

The spectral emission mask measurement must be active. The current measurement can be queried using :CONFigure?

Results are returned as 2 comma-delimited values: pass/fail status, and template number.

Default Units	No units
See Also:	:CONFigure:RF EMISsion

## Read Spectral Emission Mask Pass/Fail Status

**:READ:EMISsion:FAIL?**

Triggers a new spectral emission mask measurement and returns the pass/fail results. It is a combination of the commands :ABORT; :INITiate;

:FETCh:EMISsion:FAIL?

The spectral emission mask measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	No units
See Also:	:CONFigure:RF EMISsion

## Read Spectral Emission Mask Template

**:READ:EMISsion:TEMPlate?**

Triggers a new spectral emission mask measurement and returns the template number result. It is a combination of the commands :ABORT; :INITiate;

:FETCh:EMISsion:TEMPlate?

The spectral emission mask measurement must be active. The current measurement can be queried using :CONFigure?

Default Units	No units
See Also:	:CONFigure:RF EMISSION

## Read Occupied Bandwidth

**:READ:OBWidth?**

Triggers a new occupied bandwidth measurement and returns the result. It is a combination of the commands :ABORT; :INITiate; :FETCh:OBWidth?

The occupied bandwidth measurement must be active. The current measurement can be queried using :CONFigure?

Default Units:	Hz
See Also:	:CONFigure:RF

## Read Over The Air

**:READ:OTA [1] | 2 | 3 | 5 | 6?**

Triggers a new over-the-air measurement and returns the result. It is a combination of the commands :ABORT; :INITiate; :FETCh:OTA?

The over-the-air measurement must be active. The current measurement can be queried using :CONFigure?

The measurement results are returned as 5 comma delimited values: scrambling code, CPICH power, chip energy, Ec/I0 ratio, pilot dominance.

Default Units:	Scrambling Code: No units CPICH power: dBm Chip Energy: dBm EC/I0: dB Pilot dominance: No units
See Also:	:CONFigure:OTA

## Read PASS/FAIL

**:READ:PFail?**

Triggers a new PASS/FAIL measurement and returns the results. It is a combination of the commands :ABORT; :INITiate; :FETCh:PFail?

The PASS/FAIL measurement must be active. The current measurement can be queried using :CONFigure?

See Also:	:CONFigure PFail
Result Format	See :FETCh:PFail?

## Read Peak to Average Power Ratio

**:READ:PTAPower?**

Triggers a new measurement and returns the peak to average power ratio result. It is a combination of the commands `:ABORT`; `:INITiate`; `:FETCh:PTAPower?`

The peak to average power measurement must be active. The current measurement can be queried using `:CONFigure?`

Default Units:	dB
See Also:	<code>:CONFigure:RF</code>

## ***SENSe (Measurement Command) Subsystem***

This subsystem contains commands related to preparing the instrument to make a particular measurement. These measurements are not defined in the SCPI standard so they are maintained separately here.

### ***[[:SENSe]:DEMod] Subsystem***

This subsystem includes commands used to set up parameters associated with measurements that are performed on modulated signals.

#### **Codogram Measurement Time**

`[[:SENSe]:DEMod:CODogram:TIME <seconds>`

`[[:SENSe]:DEMod:CODogram:TIME?`

This command refers to the minimum elapsed time between successive codogram measurements.

Factory Preset / *RST:	5 seconds
Range:	5 seconds - 6000 seconds
Front Panel Access:	Measurements, Demodulator, Codogram, Single Sweep Time

#### **Control Channels Display Units**

`[[:SENSe]:DEMod:CTRLchannels:UNIT RELative | ABSolute | DELTa`

`[[:SENSe]:DEMod:CTRLchannels:UNIT?`

This command refers to the display units for the control channels in the HSDPA and CDP view.

Setting the value to `RELative` will result in displaying P-CCPCH, S-CCPCH, PICH, P-SCH and S-SCH in relative powers.

Setting the value to `ABSolute` will result in displaying P-CCPCH, S-CCPCH, PICH, P-SCH and S-SCH in absolute powers.

Setting the value to `DELTA` will result in displaying P-CCPCH, S-CCPCH, PICH, P-SCH and S-SCH in delta powers.

Factory Preset / *RST:	RELative
Front Panel Access:	Shift-4(Measure),Demodulator, HSDPA,Control Channels; Shift-4(Measure),Demodulator,CDP, Control Channels

### HSDPA IQ Persistence

**[ :SENSE ] :DEMod:HSDPa:IQPersistence <integer>**

**[ :SENSE ] :DEMod:HSDPa:IQPersistence?**

Sets the number of samples before displaying the screen.

Factory Preset / *RST:	1
Range:	1-48
Front Panel Access:	Measurements, Demodulator, HSDPA, IQ Persistence

### HSDPA Measurement Time

**[ :SENSE ] :DEMod:HSDPa:TIME <seconds>**

**[ :SENSE ] :DEMod:HSDPa:TIME?**

This command refers to the minimum elapsed time between successive codogram measurements.

Factory Preset / *RST:	MT8220A: 5 seconds
Range:	MT8220A: 6000 seconds
Front Panel Access:	Measurements, Demodulator, HSDPA Demod, Single Sweep Time

### PICH Code Number

**[ :SENSE ] :DEMod:PICH:CODE <code number>**

**[ :SENSE ] :DEMod:PICH:CODE?**

This command refers to the channelization code number of the PICH channel for W-CDMA code domain demodulation measurements.

Factory Preset / *RST:	MT8220A: 16 MS2717A: 16
Range:	MT8220A: 0 – 255 MS2717A: 0 – 255
Front Panel Access:	Setup, PICH Code

### S-CCPCH Code Number

**[ :SENSE ] :DEMod:SCCPch:CODE <code number>**

**[ :SENSE ] :DEMod:SCCPch:CODE?**

This command refers to the channelization code number of the S-CCPCH channel for W-CDMA code domain demodulation measurements.

Factory Preset / *RST:	MT8220A: 3 MS2717A: 3
Range:	MT8220A: 0 – 255 MS2717A: 0 – 255
Front Panel Access:	Setup, S-CCPCH Code

### S-CCPCH Spreading Factor

**[ :SENSe ] :DEMod :SCCPch :SFACTOR 4 | 8 | 16 | 32 | 64 | 128 | 256**  
**[ :SENSe ] :DEMod :SCCPch :SFACTOR?**

This command refers to the spreading factor of the S-CCPCH channel for W-CDMA code domain demodulation measurements.

Factory Preset / *RST:	MT8220A: 256 MS2717A: 256
Front Panel Access:	Setup, S-CCPCH Spread

### Scrambling Code

**[ :SENSe ] :DEMod :SCODE <scrambling code>**  
**[ :SENSe ] :DEMod :SCODE?**

This command refers to the primary scrambling code used for W-CDMA code domain demodulation measurements. When the auto scrambling code feature is turned on, setting this value has no direct effect on measurement results.

Factory Preset / *RST:	MT8220A: 0 MS2717A: 0
Valid Values:	MT8220A: 0 to 262143 MS2717A: 0 to 262143
Front Panel Access:	Setup, Scrambling Code

### Automatic Scrambling Code Detection

**[ :SENSe ] :DEMod :SCODE :AUTO OFF | ON | 0 | 1**  
**[ :SENSe ] :DEMod :SCODE :AUTO?**

Sets the state of the automatic scrambling code detection feature.

Setting the value to ON or 1 will result in the scrambling code being set to the code of the strongest detected signal. That is, the instrument will detect the strongest signal present and use the scrambling code of that signal for demodulation.

Setting the value to OFF or 0 will force the instrument to base all demodulation on the user-selected scrambling code value.

The default value is ON. That is, sending `:SENS :DEM :SCOD :AUTO` is equivalent to sending `:SENS :DEM :SCOD :AUTO ON`.

Factory Preset / *RST:	MT8220A: ON MS2717A: ON
Front Panel Access:	Setup, Scrambling Code
See Also:	[ :SENSE ] :DEMod :SCODE

### Maximum Spreading Factor

[ :SENSE ] :DEMod :SFACtor 256 | 512

[ :SENSE ] :DEMod :SFACtor?

This command refers to the maximum spreading factor used when demodulating a UMTS/W-CDMA signal.

Factory Preset / *RST:	MT8220A: 512 MS2717A: 512
Front Panel Access:	Setup, Max Spreading

### Active Code Threshold

[ :SENSE ] :DEMod :THRShold <rel ampl>

[ :SENSE ] :DEMod :THRShold?

This command refers to the threshold used for detecting active vs. inactive traffic channels in W-CDMA code domain demodulation measurements.

Factory Preset / *RST:	MT8220A: -30 dB MS2717A: -30 dB
Valid Values:	MT8220A: -50 to -10 dB MS2717A: -50 to -10 dB

### Automatic Threshold

[ :SENSE ] :DEMod :THRShold :AUTO OFF | ON | 0 | 1

[ :SENSE ] :DEMod :THRShold :AUTO?

Sets the state of the automatic threshold feature.

Setting the value to ON or 1 will enable the automatic threshold feature.

Setting the value to OFF or 0 will disable the automatic threshold feature.

The default value is ON. That is, sending :SENS :DEM :THRS :AUTO is equivalent to sending :SENS :DEM :THRS :AUTO ON.

Factory Preset / *RST:	ON
Front Panel Access:	Setup, Threshold
See Also:	[ :SENSE ] :DEMod :THRShold

## ***[[:SENSE]:OTA Subsystem***

This subsystem includes commands used to set up parameters associated with Over the Air measurements.

### **OTA Reset**

**[[:SENSE]:OTA:RESet**

This command forces the instrument to reset the over-the-air measurement and start fresh without any history.

When the auto scrambling code feature is ON the RESet command will clear the list of scrambling codes and attempt to detect new codes.

When the auto scrambling code feature is OFF the RESet command will force the instrument to take new measurements for all of the user-selected scrambling codes.

Front Panel Access:	Measurements, OTA, Reset
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### **OTA Scrambling Code**

**[[:SENSE]:OTA:SCODE[1] | 2 | 3 | 4 | 5 | 6 <scrambling code>**

**[[:SENSE]:OTA:SCODE[1] | 2 | 3 | 4 | 5 | 6?**

This command refers to the primary scrambling codes used for W-CDMA over-the-air measurements. To disable the specified code use a scrambling code value of '-1'.

When the auto scrambling code feature is turned on, setting this value has no direct effect on measurement results.

Factory Preset / *RST:	MT8220A: -1
Valid Values:	MT8220A: -1 to 511
Front Panel Access:	Measurements, OTA, Manual Scrambling Code

### **Automatic OTA Scrambling Code Detection**

**[[:SENSE]:OTA:SCODE:AUTO OFF | ON | 0 | 1**

**[[:SENSE]:OTA:SCODE:AUTO?**

Sets the state of the automatic scrambling code detection feature.

Setting the value to ON or 1 will result in the scrambling codes being set to the codes of the strongest detected signals. That is, the instrument will detect the strongest signals present.

Setting the value to OFF or 0 will force the instrument to base all over-the-air measurements on the user-selected scrambling code values.

The default value is ON. That is, sending :SENS:DEM:OTA:SCOD:AUTO is equivalent to sending :SENS:DEM:OTA:SCOD:AUTO ON.

Factory Preset / *RST:	MT8220A: ON
Front Panel Access:	Measurements, OTA, Auto Scrambling
See Also:	[[:SENSE]:DEMod:OTA:SCODE



## OTA Scrambling Code Lock

**[ :SENSe ] :OTA:SCODE:LOCK OFF | ON | 0 | 1**

**[ :SENSe ] :OTA:SCODE:LOCK?**

This command refers to the primary scrambling codes used for W-CDMA over-the-air measurements.

When scrambling code lock is ON, the instrument will not search for any new scrambling codes and will only measure the codes that have already been detected.

When scrambling code lock is OFF, the instrument will dynamically update the list of scrambling codes that are to be included in the current measurements.

This feature has no effect when scrambling code auto detection is OFF for over-the-air measurements.

The default value for this command is ON. That is, sending SENS :DEM:OTA:LOCK is equivalent to SENS :DEM:OTA:LOCK ON.

Factory Preset / *RST:	MT8220A: OFF
Front Panel Access:	Measurements, OTA, Code Lock

## OTA Sort Parameter

**[ :SENSe ] :OTA:SORT CODE | POWER**

**[ :SENSe ] :OTA:SORT?**

This command refers to the parameter that is used to sort the over-the-air measurement results.

Factory Preset / *RST:	MT8220A: CODE
Front Panel Access:	Measurements, OTA, Sort By

## PASS/FAIL Test Selection

**[ :SENSe ] :PFail <test set>**

**[ :SENSe ] :PFail?**

Selects the active test set to be used in subsequent PASS/FAIL measurements. The <test set> value must correspond to a test set that is defined in the test set list. For more information on loading test sets to the instrument, refer to the Anritsu Master Software Tools documentation. NOTE: The first test set in the list would be test set 0, the next test set would be 1, etc.

When using the query form of the command, the return value will be the currently selected test set number. If there is not a valid test set selected, the return value will be “-1” (negative 1).

Front Panel Access:	Measurement, Pass Fail Mode, Select Pass/Fail Test
See Also:	:CONFigure PFail

### ***[[:SENSe]:RF Subsystem***

This subsystem includes commands used to set up parameters associated with RF measurements.

### ***[[:SENSe]:ACLR Subsystem***

This subsystem includes commands related to configuring the ACLR measurement.

#### **ACLR ADJC Channel Count**

**[[:SENSe]:RF:ACLR:ADJCchannelcount <num of Adjacent channels>**

**[[:SENSe]:RF:ACLR:ADJCchannelcount?**

This command refers to the number of Adjacent channels in the ACLR view.

Factory Preset / *RST:	MT8220A: 2 Adjacent Channel MS2717A: 2 Adjacent Channel
Range:	MT8220A: 1 Adjacent Channel – 4 Adjacent Channels MS2717A: 1 Adjacent Channel – 4 Adjacent Channels
Front Panel Access:	Measurements, RF Measurement, ACLR, Select # of Adjacent Channels

#### **ACLR MAIN Channel Count**

**[[:SENSe]:RF:ACLR:MAINchannelcount <num of main channels>**

**[[:SENSe]:RF:ACLR:MAINchannelcount?**

This command refers to the number of main channels in the ACLR view.

Factory Preset / *RST:	MT8220A: 1 Main Channel MS2717A: 1 Main Channel
Range:	MT8220A: 1 Main Channel – 4 Main Channels MS2717A: 1 Main Channel – 4 Main Channels
Front Panel Access:	Measurements, RF Measurement, ACLR, Select # of Main Channels

# A Examples

## C/C++

This example is run on the command line. It sends the \*IDN? query to the instrument and prints the response to the console.

```
// IdnExample.cpp : Microsoft Visual Studio-Generated Example
//      Based on Example 2-1 in the NI-VISA User Manual
//      Usage : IdnExample "TCPIP::xxx.xxx.xxx.xxx::inst0::INSTR"
//      where xxx.xxx.xxx.xxx is the IP address of the
//      instrument.
//      Output : The string identity string returned from the
//      instrument.
//      VISA Header : visa.h (must be included)
//      VISA Library : visa32.lib (must be linked with)

#include "stdafx.h"
#include "stdio.h"
#include "string.h"
#include "visa.h"

#define BUFFER_SIZE 255

int main(int argc, char* argv[])
{
    ViStatus status; /* For checking errors */
    ViSession defaultRM, instr; /* Communication channels */
    ViUInt32 retCount; /* Return count from string I/O */
    ViChar buffer[BUFFER_SIZE]; /* Buffer for string I/O */
    char tempDisplay[BUFFER_SIZE]; /* Display buffer for example */
    char *pAddress;

    /* Make sure we got our address. */
    if ( argc < 2 )
    {
        printf("Usage: IdnExample
\\TCPIP::xxx.xxx.xxx.xxx::inst0::INSTR\\\"\\n");
        printf("\\t where xxx.xxx.xxx.xxx is the IP address of your
instrument.\\n");
        return -1;
    }

    /* Store the address. */
    pAddress = argv[1];

    /* Begin by initializing the system*/
    status = viOpenDefaultRM(&defaultRM);

    if (status < VI_SUCCESS)
    {
        /* Error Initializing VISA...exiting*/
        printf("Can't initialize VISA\\n");
        return -1;
    }
}
```

```

/* Open communication with TCP/IP device at xxx.xxx.xxx.xxx*/
/* NOTE: For simplicity, we will not show error checking*/
/* TODO: Add error handling. */
status = viOpen(defaultRM, pAddress, VI_NULL, VI_NULL, &instr);

/* Set the timeout for message-based communication*/
/* TODO: Add error handling. */
status = viSetAttribute(instr, VI_ATTR_TMO_VALUE, 5000);

/* Ask the device for identification */
sprintf(buffer, "*IDN?\n");
status = viWrite(instr, (unsigned char *)&buffer[0], 6,
&retCount);
status = viRead(instr, (unsigned char *)buffer, BUFFER_SIZE,
&retCount);

/* TODO: Add code to process data. */
strncpy(tempDisplay, buffer, retCount);
tempDisplay[retCount] = 0; /* Null-terminate display string. */
printf("*IDN? Returned %d bytes: %s\n", retCount, tempDisplay);

/* Close down the system */
/* TODO: Add error handling. */
status = viClose(instr);
status = viClose(defaultRM);

return 0;
}

```

## Visual Basic

This function can be called in a Visual Basic program. It sends the \*IDN? query to the instrument and returns the byte count and ASCII response string.

Rem This example is based on Example 2-1 from the NI-VISA User Manual.

```
Public Sub IdnMain(ByVal address As String, ByRef byteCount As String,
ByRef returnBytes As String)
    Const BUFFER_SIZE = 200
    Dim stat As ViStatus
    Dim dfltRM As ViSession
    Dim sesn As ViSession
    Dim retCount As Long
    Dim buffer As String * BUFFER_SIZE

    Rem ***Include visa32.dll as a reference in your project.***

    Rem Begin by initializing the system
    stat = viOpenDefaultRM(dfltRM)
    If (stat < VI_SUCCESS) Then
        Rem Error initializing VISA...exiting
        MsgBox "Can't initialize VISA"
        Exit Sub
    End If

    Rem Open communication with Device
    Rem NOTE: For simplicity, we will not show error checking
    Rem TODO: Add error handling.
    stat = viOpen(dfltRM, address, VI_NULL, VI_NULL, sesn)

    Rem Set the timeout for message-based communication
    Rem TODO: Add error handling.
    stat = viSetAttribute(sesn, VI_ATTR_TMO_VALUE, 5000)

    Rem Ask the device for identification
    Rem TODO: Add error handling.
    stat = viWrite(sesn, "*IDN?", 5, retCount)
    stat = viRead(sesn, buffer, BUFFER_SIZE, retCount)

    Rem TODO: Add code to process the data.
    byteCount = retCount
    returnBytes = Left(buffer, retCount)

    Rem Close down the system
    Rem TODO: Add error handling.
    stat = viClose(sesn)
    stat = viClose(dfltRM)
End Sub
```

## LabVIEW™

This example shows how to read the trace data from the instrument in 32-bit integer format. The output is an array of data point magnitudes. Figure 1 shows the data capture and conversion to 32-bit integers in the format used by LabVIEW. Figure 2 shows the details of the conversion.

Note that your instrument must first be defined to the VISA resource manager using NI-MAX. The VISA resource for your instrument serves as the VISA resource input to the vi.

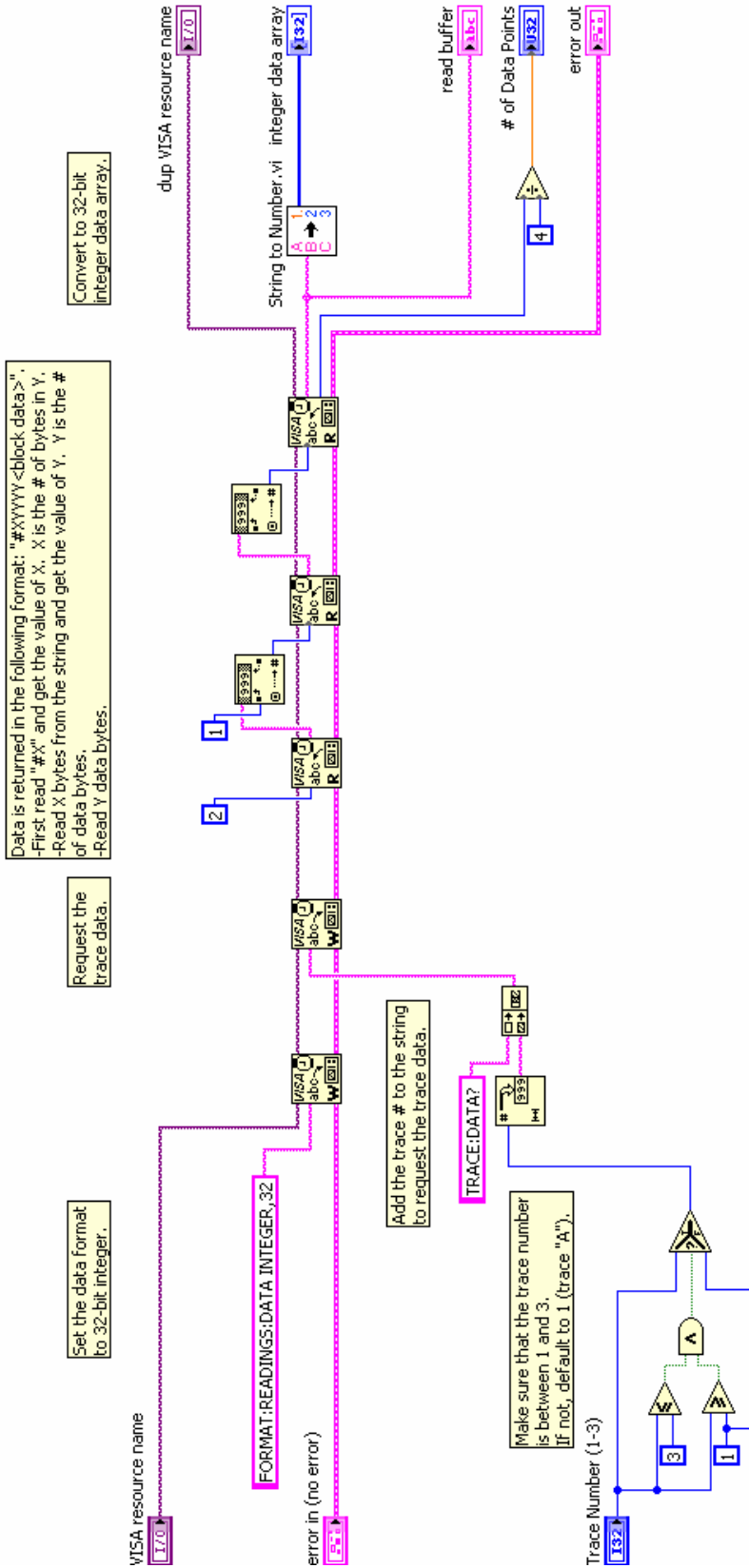


Figure 1: Data Capture

String To Number.vi

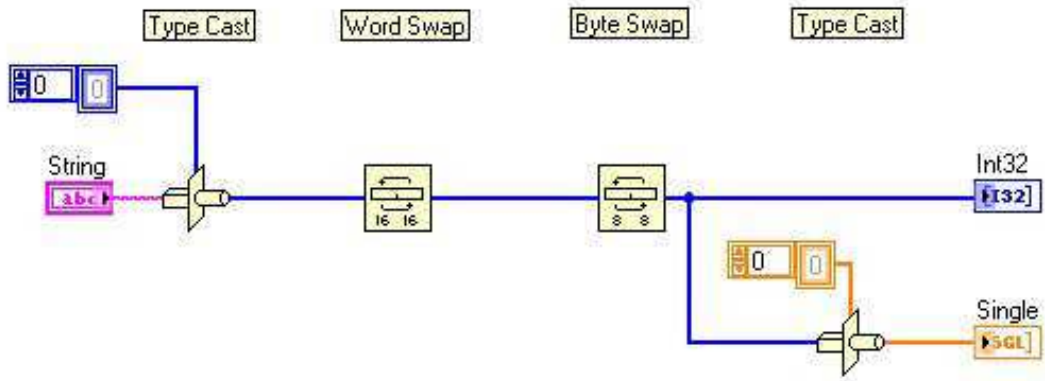


Figure 2: Data Conversion



## Master Programming Manual Revision History

<b>Date</b>	<b>Manual Section Name /Command Name</b>	<b>Change Description</b>
1/19/07	Manual Revision A (10580-00167A.pdf) Released	Initial release