

Programming Manual

Anritsu

Bit Master

MP1026A Eye Pattern Analyzer



Bit Master MP1026A Programming Manual

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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.

MP1026A Bit Master User's Guide (document #10580-00169). Anritsu Company, Morgan Hill, CA, 2007.

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 1.61. They are available in your application beginning with the following firmware revisions:

Application	Firmware Revision
Bit Master	1.23

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 subbranches. The final node is called the “leaf”. The entire sequence of branches, plus the leaf, make up the command. For example, part of the “DISPlay” branch looks like this:

```
:DISPlay
  :WINDow
    :Y
      [ :SCALe ]
        :UNIT
        :BITs
        :DIVision
          :CH1
```

Although they are at different levels in the tree, “UNIT” and “CH1” 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 a “CH1” leaf at the tip of both of these branches:

```
:DISPlay          :DISPlay
  :WINDow          :WINDow
    :Y              :Y
      [ :SCALe ]    [ :SCALe ]
        :DIVision    :OFFSetS
          :CH1        :CH1
```

Subsystems

A colon (':') separates each subsystem. For example, the command `:CALCulate:MARKer:CH1:AOff` turns all markers off for Channel 1. The turn marker off is part of the `:MARKer` subsystem which is part of the `:CALCulate` subsystem. Center marker is also part of the `:CALCulate:MARKer` subsystem. It is specified by `:CALCulate:MARKer:CH1:CENTer`.

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]:TIME:CLKRate` the `:SENSe` subsystem is optional. So, both `:SENSe:TIME:CLKRate` and `:TIME:CLKRate` 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 input clock rate command can be specified by `:SENSe:TIME:CLKRate` or `:SENS:TIME:CLKR`. 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:TIME:CLKRate` is not an acceptable form of the command.

Case Sensitivity

Commands are not case sensitive. For example, `:SENS:TIME:CLKR 10 GHZ` and `:sens:time:clkr 10 ghz` 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:TIME:CLKR 10 GHZ` sets the input clock rate to 10 GHz.

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:TIME:CLKR?` will return the current value of the clock rate.

Combining Multiple Commands

Multiple commands can be sent together if separated by a semi-colon (;). For example, `:SENS:DISP:MODE EYE; :CONF:MEAS:TYPE AMPL` would set the display mode to EYE and then set the measurement type to Amplitude.

Creating Valid Commands

Command Specification	Valid Forms
<code>[:SENSE] :TIME:CLKRate <freq></code>	The following all produce equivalent results: <code>:SENSe:TIME:CLKRate 1 GHZ</code> <code>:SENS:TIME:CLKR 1000 MHZ</code> <code>:sens:time:clkr 1000000000</code> <code>:TIME:CLKR 1000000 KHZ</code>
<code>:CALCulate:MARKer:LOCatio n:CH1 2:Y1 2 <amplitude></code>	The first 2 commands set the location of marker for Channel 1. The last 2 commands set the location of marker for Channel 2. <code>:CALC:MARK:LOC:CH1:Y1 100 MV</code> <code>:CALC:MARK:LOC:CH1:Y2 100 MV</code> <code>:CALC:MARK:LOC:CH2:Y1 100 MV</code> <code>:CALC:MARK:LOC:CH2:Y2 100 MV</code>
<code>:CALCulate:MARKer:CH1 2:X 1 2 ON OFF 1 0</code>	The following commands are identical: <code>:CALCulate:MARKer:CH1:X1 OFF</code> <code>:CALCulate:MARKer:CH1:X1 0</code>
<code>[:SENSE] :TIME:DATRate <bit rate></code>	The following all produce equivalent results: <code>:SENSe:TIME:DATRate 5 GBPS</code> <code>:SENS:TIME:DATR 5000 MBPS</code> <code>:sense:time:datr 5000000 Kbps</code> <code>:TIME:DATR 5000000000 BPS</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><identifier></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.
<time>	Time value. Unit is not specified with the command. It is added by the instrument based on current unit setting.
<bit rate>	Bit rate. Unit specified with the command.

3 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,MP1026A/3/2,62011032,1.23"
```

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

4 Bit Master Specific Commands

NOTE: The Bit Master must have a clock present and must have the correct clock settings before making any measurements or retrieving any data. Otherwise, any data retrieved from the Bit Master may not be valid or may not have the correct format, and messages sent to the Bit Master will take longer to process.

:CALCulate Subsystem

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

The following commands are used to manipulate data markers.

All Markers Off

:CALCulate:MARKer:CH1 | 2:AOFF

Turns all markers off.

Front Panel Access:	Marker, All Markers OFF
See Also:	:CONFigure:MEASure:CHANnel 1 2

Center Markers

:CALCulate:MARKer:CH1 | 2:CENTER

Enables all markers and centers them in the middle of the current display screen. From this default location, it should be much easier to adjust the X and Y values as needed for extracting results.

Front Panel Access:	Marker, Center Markers
See Also:	:CONFigure:MEASure:CHANnel 1 2

X Marker

:CALCulate:MARKer:CH1 | 2:X1 | 2 ON|OFF | 1 | 0

:CALCulate:MARKer:CH1 | 2:X1 | 2?

Enables or disables X1 or X2 marker of active channel.

The query returns current status of X marker.

ON/1: Enable marker

OFF/0: Disable marker

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, X1/X2
See Also:	:CONFigure:MEASure:CHANnel 1 2

Y Marker

:CALCulate:MARKer:CH1|2:Y1|2 ON|OFF|1|0

:CALCulate:MARKer:CH1|2:Y1|2?

Enables or disables Y1 or Y2 marker of active channel.

The query returns current status of Y marker.

ON/1: Enable marker

OFF/0: Disable marker

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, Y1/Y2
See Also:	:CONFigure:MEASure:CHANnel 1 2

X Marker Location

:CALCulate:MARKer:LOCation:CH1|2:X1|2 <time>

:CALCulate:MARKer:LOCation:CH1|2:X1|2?

Sets X1 or X2 marker value. It will turn on marker if marker status is OFF.

The query returns current X marker value. "Marker Off" will be returned if queried marker is disabled.

Factory Preset / *RST:	X1: 0.250, X2: 0.750
Default Unit:	Current time axis unit
Range:	PS: 0 to 4294967295 UI: 0 to 4294967
Front Panel Access:	Marker, X1/X2
See Also:	:CONFigure:MEASure:CHANnel 1 2

Delta X Marker Location

:CALCulate:MARKer:LOCation:CH1|2:XDELta?

Returns current delta value of X marker. "Marker Off" will be returned if one of queried markers is disabled. The result is always a positive value.

Default Unit:	Current time-axis unit
Front Panel Access:	Marker, X1/X2
See Also:	:CONFigure:MEASure:CHANnel 1 2

Y Marker Location

:CALCulate:MARKer:LOCation:CH1|2:Y1|2 <amplitude>

:CALCulate:MARKer:LOCation:CH1|2:Y1|2?

Sets Y1 or Y2 marker value. It will turn on marker if marker status is OFF.

The query returns current Y marker value. "Marker Off" will be returned if queried marker is disabled. The marker location uses mV for Electrical channel and μ W for

Optical channel. For optical channels, the marker location range value depends on the conversion gain value (specified by :CALibrate:CGain <number>).

Factory Preset / *RST:	Y1: 250 mV, Y2: -250 mV
Default Unit:	Current y-axis unit
Range:	Electrical: -1.00V to 1.00V Optical: range equals electrical range divide by Conversion Gain(V/W)
Front Panel Access:	Marker, Y1/Y2
See Also:	:CONFigure:MEASure:CHANnel 1 2

Delta Y Marker Location

:CALCulate:MARKer:LOCation:CH1 | 2:YDELta?

Returns current delta value of Y marker. “Marker Off” will be returned if one of queried markers is disabled. The result is always a positive value.

Default Unit:	Current y-axis unit
Front Panel Access:	Marker, Y1/Y2
See Also:	:CONFigure:MEASure:CHANnel 1 2

:CALibration Subsystem

This subsystem controls the system calibration.

Calibrate Amplitude

:CALibrate:AMPLitude

Initiates an amplitude calibration for both Channel 1 and Channel 2. The calibration could take more than 30 seconds. The calibration result is returned after the command is completed.

Front Panel Access:	shift-2(calibrate), Calibrate Amplitude
---------------------	---

Calibrate Conversion Gain (V/W)

:CALibrate:CGain <number>

:CALibrate:CGain?

Sets transimpedance gain value of O/E module.

The query returns current value for conversion gain.

Range:	1 to 9999
Front Panel Access:	shift-2(calibrate), Conversion Gain(V/W)

Calibrate O/E Power

:CALibrate:OEPower

Executes a calibration of the O/E module power meter measurement. The calibration result is returned after the command is completed.

Front Panel Access:	shift-2(calibrate), Calibrate O/E Power
---------------------	---

Calibrate Responsivity (A/W)

:CALibrate:RESPonsivity <number>

:CALibrate:RESPonsivity?

Sets responsivity value for O/E module. The value is used for average optical power measurement.

The query returns current value for responsivity.

Range:	0.001 to 9999
Front Panel Access:	shift-2(calibrate), Responsivity(A/W)

:Display Subsystem

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

Clear Display

:DISPlay:WINDow:GRAPhics:CLEar

Clears graphic display on screen.

Front Panel Access:	Setup, Clear Display
---------------------	----------------------

Autoscale

:DISPlay:WINDow[:SCALE] :AUTOscale

Rescales the eye pattern display to the proper amplitude and time scale so that the eye pattern is centered on the screen.

This command is only valid for Eye pattern display mode.

Front Panel Access:	Setup, Autoscale
---------------------	------------------

Bits

:DISPlay:WINDow:X[:SCALE]:BITs <integer>

:DISPlay:WINDow:X[:SCALE]:BITs?

Sets the number of bits displayed on the screen.

The query returns current bits setting.

Factory Preset / *RST:	2
Range:	1 to 65535
Front Panel Access:	Time, Bits

X Offset

:DISPlay:WINDow:X[:SCALE]:OFFSet <number>

:DISPlay:WINDow:X[:SCALE]:OFFSet?

Sets the amount of horizontal (time) shift that is applied to the display.

The query returns current X offset.

Factory Preset / *RST:	0
Range:	0 to 65536
Front Panel Access:	Time, Offset

Time Axis Unit

:DISPlay:WINDow:X[:SCALE]:UNIT UI | PS

:DISPlay:WINDow:X[:SCALE]:UNIT?

Sets time axis unit.

The query returns current time units.

UI: unit interval. A “unit interval” is bit period.

PS: units of picoseconds

Factory Preset / *RST:	UI
Front Panel Access:	Time, Unit

Y Scale

:DISPlay:WINDow:Y[:SCALE]:DIVision:CH1 | 2? <amplitude>

:DISPlay:WINDow:Y[:SCALE]:DIVision:CH1 | 2?

Sets value of Y-axis scale for Channel 1 or Channel 2.

The query returns current Y-axis scale.

The unit that must follow the amplitude value depends on the current setting of the active channel (specified by [:SENSE]:INPut:CH1 | 2 ELECTRical | OPTical | OFF).

The setting can be Electrical or Optical. The scale uses mV for Electrical channel and μ W for Optical channel. Maximum scale value depends on the attenuation setting for

each channel (specified by [:SENSE] : INPut : ATTenuation : CH1 | 2 <rel ampl>). Optical scale value depends on conversion gain value (specified by :CALibrate:CGain <number>).

Factory Preset / *RST:	125 mV
Default Unit:	Current amplitude unit
Range:	Electrical: 1.0mV to 250.0 x [10^(attenuation/20)] mV Optical: range equals electrical range divided by Conversion Gain (V/W)
Front Panel Access:	Amplitude, Scale
See Also:	[:SENSE] : INPut : CH1 2 ELEctrical OPTical OFF

Y Offset

:DISPlay:WINDow:Y[:SCALE]:OFFsets:CH1|2 <amplitude>

:DISPlay:WINDow:Y[:SCALE]:OFFsets:CH1|2?

Sets Y-axis offset value for Channel 1 or Channel 2.

The query returns current y-axis offset.

The unit that must follow the amplitude value depends on the current setting of the active channel (specified by [:SENSE] : INPut : CH1 | 2 ELEctrical | OPTical | OFF). The setting can be Electrical or Optical. The offset uses mV for Electrical channel and μ W for Optical channel. The optical scale value depends on the conversion gain value (specified by :CALibrate:CGain <number>).

Factory Preset / *RST:	0
Default Unit:	Current amplitude unit
Range:	Electrical: -500.0 mV to +500.0 mV Optical: offset equals electrical offset divided by Conversion Gain (V/W)
Front Panel Access:	Amplitude, Offset
See Also:	[:SENSE] : INPut : CH1 2 ELEctrical OPTical OFF

: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: "SCOPE"17

Front Panel Access:	Shift-9 (Mode)
---------------------	----------------

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:	17
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:	“SCOPE”
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 ".scope" for measurement.

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

Format Storage Device

:MMEMory:INITialize [CFLash]

Formats the compact flash. Issuing this command will erase all files on an installed Compact Flash module and create the /usr directory for storage of measurements, setups and jpg files.

Front Panel Access:	Shift-7 (File), Directory Management, Format Compact Flash
---------------------	--

Recall Measurement Data

:MMEMory:LOAD:MData <integer>, <file name>

Recalls the measurement data from the file specified by <file name>.

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

The <integer> parameter is not currently used, but it must be sent. Send a 1.

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

Recall Setup

:MMEMory:LOAD:STATe <integer>,<file name>

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

<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 value of 1.

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

Storage Location

:MMEMory:MSIS INTernal | CFLash | USB

:MMEMory:MSIS?

Sets the storage location.

Setting the storage location to INTernal will set the current storage location to be the internal memory.

Setting the storage location to CFLash will set the current storage location to be the Compact Flash memory.

Setting the storage location to USB will set the current storage location to be the USB Flash drive memory, if supported by the instrument hardware.

Note that changing the current location causes the "Copy To Destination" on the front panel to be automatically changed if the "Copy To Destination" location is the same as the selected current storage location.

Note that the storage location must be available in order for it to be set.

Front Panel Access:	Shift-7 (File), Directory Management, Current Location
See Also:	:MMEMory:MSIS:DESTination

Copy From Current Location To Destination

:MMEMory:MSIS:COPIY

Copies all measurements, setups and jpg files stored in the current storage location to the "copy to destination" location.

Front Panel Access:	Shift-7 (File), Directory Management, Copy From Current Location To Destination
See Also:	:MMEMory:MSIS :MMEMory:MSIS:DESTination

Copy to Destination

:MMEMory:MSIS:DESTination INTERNAL|CFLash|USB
:MMEMory:MSIS:DESTination?

Sets the destination to where measurements and setups in the current storage location will be copied.

Setting the location to INTERNAL will result in copying the files that are stored at the current storage location to the internal memory when the command **:MMEMory:MSIS:COPY** is sent.

Setting the location to CFLash will result in copying the files that are stored at the current storage location to the Compact Flash memory when the command **:MMEMory:MSIS:COPY** is sent.

Setting the storage location to USB will result in copying the files that are stored at the current storage location to the USB flash drive memory (if supported by the instrument hardware) when the command **:MMEMory:MSIS:COPY** is sent.

Note that changing the destination to which the instrument will copy files, will automatically change the “Current Location” on the front panel if the current location is the same as the selected copy to destination.

Front Panel Access:	Shift-7 (File), Directory Management, Copy To Destination
See Also:	:MMEMory:MSIS :MMEMory:MSIS:COPY

Save Measurement

:MMEMory:STORe:MData <integer>, <file name>

Stores the current measurement data 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 value of 1.

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

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 value of 0.

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

:SENSe Subsystem

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

Display Mode

[:SENSe] :DISPlay:MODE EYE | PULSe

[:SENSe] :DISPlay:MODE?

Sets the display mode. System defines two display modes, Eye pattern and Pulse pattern.

Command: **CONFigure:MEASure:TYPE AMPLitude | TIME** could change the setting.

The query returns current display mode.

Factory Preset / *RST:	Eye
Front Panel Access:	Setup, Display Mode
See Also:	:CONFigure:MEASure:TYPE AMPLitude TIME HISTogram MASK OFF

:SENSe:ACCUmulation Subsystem

Commands in this subsystem relate to the setup of parameters related to the sampling and accumulation of data.

Accumulation Limit

[:SENSe] :ACCUmulation:LIMit TIME | SAMPLe, <number>

[:SENSe] :ACCUmulation:LIMit?

Sets limit type and number of the limit for Limited Accumulation.

The query returns current accumulation limit type and its value.

TIME: Accumulation is limited by time.

SAMPLe: Accumulation is limited by sample.

Number: Integer value of time in seconds for TIME limit or real number of samples in millions for SAMPLES limit.

The unit of number (second or million) does not need to be specified with the command. The command will treat it as seconds for Time limit and as million samples for Sample limit.

This command will clear data and restart an accumulation if current Sampling Status is set to RUN. Once the limit selected is reached, accumulation will stop.

The query returns current accumulation limit type and its value.

Factory Preset / *RST:	TIME, 60
Default Units:	Second(s)
Range:	1 to 99999
Front Panel Access:	Setup, Sampling & Accumulation, Limit Type, Time Limit(sec)/Sample Limit(million)
See Also:	: [SENSE]:Accumulation:TYPE : [SENSE:]SAMPLing:STATus

Sampling Status

[:SENSE] :SAMPLing:STATus RUN | HOLD

[:SENSE] :SAMPLing:STATus?

The query returns current sampling status.

RUN: Start sampling and update data.

HOLD: Stop sampling and keep last data.

FETCH commands can query measurement data at HOLD state. But a MEASURE command may lose data at HOLD.

The data will be lost if any parameter is changed at HOLD state. New setting will be not available until RUN is selected. However, HOLD will switch to RUN and stay on RUN if Autoscale command is received.

Factory Preset / *RST:	RUN
Front Panel Access:	Setup, Sampling & Accumulation, Sampling Status
See Also:	[:SENSE] :Accumulation:Limit [:SENSE] :ACCUmulation:TYPE

Accumulation Type

[:SENSE] :ACCUmulation:TYPE NONE | INFinite | LIMited

[:SENSE] :ACCUmulation:TYPE?

Sets accumulation type to one of three below:

NONE: data are not accumulated on the screen but are refreshed with every new set of samples.

INFinite: Data are accumulated infinitely on the screen.

LIMited: Data are accumulated on the screen until a limit is reached.

The query returns current accumulation type.

This command will clear data and restart with the current accumulation type, limit type and limit value that are set by Accumulation Limit command

: [SENSE]:ACCUmulation:LIMit if current Sampling Status is on RUN. Sampling Status will switch from RUN to HOLD once the limit is reached.

The query returns current accumulation type.

Factory Preset / *RST:	NONE
Front Panel Access:	Setup, Sampling & Accumulation, No Accumulation / Infinite Accumulation / Limited Accumulation
See Also:	: [SENSE]:Accumulation:Limit : [SENSE:]SAMPLing:STATus

:SENSe:HISTogram Subsystem

Commands in this subsystem relate to the setup of values for the histogram window and to histogram measurements.

Center Histogram

[:SENSe] :HISTogram:CENTer

Centers a histogram in the middle of the current display screen. From this default location, it should be much easier to adjust the X and Y values of the histogram window as needed for extracting results.

Front Panel Access:	Measurement, Histogram, Center Histogram
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Histogram X Marker

[:SENSe] :HISTogram:X1 | 2 <time>

[:SENSe] :HISTogram:X1 | 2?

Sets the position of the first or second horizontal side of the histogram window.

The query returns marker value.

Default Unit:	Current time axis unit
Range:	PS: 0 to 4294967295 UI: 0 to 4294967
Front Panel Access:	Measurement, Histogram, X1/X2
See Also:	:DISPlay:WINDow:X[:SCALE] :UNIT UI PS :DISPlay:WINDow:X[:SCALE] :UNIT?

Histogram Y Marker

`[:SENSe]:HISTogram:Y1 | 2 <amplitude>`

`[:SENSe]:HISTogram:Y1 | 2?`

Sets the position of the first or second vertical side of the histogram window.

The query returns marker value. The marker location uses mV for Electrical channel and uW for Optical channel. For Optical channels, the marker location range value depends on the conversion gain value (specified by `:CALibrate:CGain <number>`).

Default Unit:	Current y-axis unit
Range:	Electrical: -1V to 1V Optical: range equals electrical range divided by Conversion Gain (V/W)
Front Panel Access:	Measurement, Histogram, Y1/Y2
See Also:	<code>[:SENSe]:INPut:CH1 2</code> <code>ELEctrical OPTical OFF</code> <code>[:SENSe]:INPut: CH1 2?</code>

:SENSe:INPut Subsystem

Commands in this subsystem relate to the setup of input parameters.

Channel Attenuation

`[:SENSe]:INPut:ATTenuation:CH1 | 2 <rel ampl>`

`[:SENSe]:INPut:ATTenuation:CH1 | 2?`

Sets input attenuation factor which adjusts the Y-axis (amplitude) scale of Channel 1 or Channel 2.

The query returns current channel attenuation value.

Factory Preset / *RST:	0 dB
Range:	0 to 80 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Attenuation

Channel Input Type

`[:SENSe]:INPut:CH1 | 2 ELEctrical | OPTical | OFF`

`[:SENSe]:INPut:CH1 | 2?`

Sets input type for Channel 1 or Channel 2. Switching input signals between Electrical and Optical will affect amplitude measurement results.

The query returns current channel input type.

Factory Preset / *RST:	Electrical
Front Panel Access:	Setup, Channel 1/Channel 2 Amplitude, Channel 1/Channel 2

Clock Recovery

[:SENSe] : INPut : CLKRecovery OFF | LESS27 | 98

[:SENSe] : INPut : CLKRecovery?

Turns clock recovery on and selects the clock recovery band.

The query returns current setting for clock recovery.

OFF: clock recovery off

LESS27: clock recovery on and set to <2.7 GHz band

98: clock recovery on and set to >9.8 GHz band

Factory Preset / *RST:	Off
Front Panel Access:	Setup, Recovery Clock

Wavelength

[:SENSe] : INPut : WAVLength 850 | 1310 | 1550

[:SENSe] : INPut : WAVLength?

Sets wavelength of input signal into O/E module.

The query returns current wavelength used.

Factory Preset / *RST:	1550 nm
Default Unit:	Nm
Front Panel Access:	Setup, Wavelength Calibrate, Wavelength

:SENSe:TIME Subsystem

Commands in this subsystem relate to the setup of parameters related to the time axis.

Acquire Clock Rate

[:SENSe] : TIME : ACQClock?

Initiates the acquisition of the input clock rate and sets the Clock Rate parameter to this new detected value.

The query returns the new Clock Rate parameter value.

Default Unit:	Hz
Front Panel Access:	Time, Acquire Clock Rate

Clock Rate

[:SENSE] : TIME : CLKRate <freq>

[:SENSE] : TIME : CLKRate?

Sets the rate of the input clock used to trigger the Bit Master. When the clock rate is changed, the data rate value will change accordingly, depending on the divide ratio setting.

The query returns current clock rate setting.

Factory Preset / *RST:	100 MHz
Range:	100 MHz to 12.5 GHz
Front Panel Access:	Time, Clock Rate

Data Rate

[:SENSE] : TIME : DATRate <bit rate>

[:SENSE] : TIME : DATRate?

Sets data rate of the input bit pattern. When the data rate is changed, the clock rate value will change accordingly, depending on the divide ratio setting.

The query returns current data rate.

Factory Preset / *RST:	100 Mbps
Range:	100 Mbps to 12.5 Gbps
Front Panel Access:	Time, Data Rate

Divide Ratio

[:SENSE] : TIME : DIVRatio <integer>, DATR | CLKR

[:SENSE] : TIME : DIVRatio?

Sets integer value of the clock divide ratio (Clock Rate = Data Rate / Divide Ratio). When the divide ratio is changed, either the data rate or clock rate must change, as identified by the following parameter:

DATR: Recalculate data rate based on new divide ratio and existing clock rate.

CLKR: Recalculate clock rate based on new divide ratio and existing data rate.

The query returns current divide ratio.

Factory Preset / *RST:	1
Range:	1 to 64
Front Panel Access:	Time, Divide Ratio

Pattern Length

[:SENSE] : TIME : PATLength <integer>

[:SENSE] : TIME : PATLength?

Sets the length of the repeating data pattern (for pulse pattern display mode).

The query returns current pattern length.

Factory Preset / *RST:	32
Range:	1 to 65536
Front Panel Access:	Time, Pattern Length

: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

:SYSTEM:FILE Subsystem

This subsystem provides commands that modify how file lists should be displayed on the instrument. They do not modify the way in which data is returned to the controller.

File Lists Sort Method

:SYSTEM:FILE:SORT:METHOD NAME | TYPE | DATE

:SYSTEM:FILE:SORT:METHOD?

Sets the file lists sort method.

Setting the sort method to NAME will result in file lists sorted by the name of the file.

Setting the sort method to TYPE will result in the file lists sorted by the type of file.

Setting the sort method to DATE will result in the file lists sorted by the date that the file was saved.

Front Panel Access:	Shift-7 (File), Directory Management, Sort Method
See Also:	:SYSTEM:FILE:SORT:ORDER

File Lists Sort Order

:SYSTem:FILE:SORT:ORDER ASCend | DESCend

:SYSTem:FILE:SORT:ORDER?

Sets the file lists sort order.

Setting the sort order to ASCend will result in file lists sorted from lowest to highest.

Setting the sort order to DESCend will result in the file lists sorted from highest to lowest.

When sorting by name, the sort will place file names that start with numbers before file names that start with letters.

Front Panel Access:	Shift-7 (File), Directory Management, Sort Order
See Also:	:SYSTem:FILE:SORT:METHOD

:Trace Subsystem

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

Trace Header Transfer

:TRACe:PREAmble?

Returns current setup information for instrument.

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	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

Parameter Name	Description
MEAS_MODE	Display mode
CLOCK_RECOVERY	Clock Recovery
OPTICAL_RECEIVER	Optical receiver
LOW_FREQ_CLOCK	Low frequency clock
PERSISTENCE	Accumulation type
DATA_RATE	Clock Rate
X_UNIT	Unit for X axis
BITS	Number of Bits
OFFSET	Waveform offset
PATTERN_LEN	Pulse pattern length
CHANNEL_1	Channel 1
SCALE_1	Scale of Channel 1
OFFSET_1	Offset of Channel 1
ATTENUATION_1	Attenuation of Channel 1
CHANNEL_2	Channel 2
SCALE_2	Scale of Channel 2
OFFSET_2	Offset of Channel 2
ATTENUATION_2	Attenuation of Channel 2
CURRENT_MEASUREMENT	Measurement type
HISTOGRAM_X1	Histogram X1 marker
HISTOGRAM_X2	Histogram X2 marker
HISTOGRAM_Y1	Histogram Y1 marker
HISTOGRAM_Y2	Histogram Y2 marker
STARTING_DATA_POINT	Start point of new data in each buffer
DATA_POINTS	Number of points remained for a data transfer command
CRU_STATUS	Clock recover unit status
ACTIVE_CHANNEL	Active channel
X_SCALE_START	Scale start point on X axis
X_SCALE_STOP	Scale stop point on X axis
MARKER_X1_CH1	Marker X1 of Channel 1

MARKER_X2_CH1	Marker X2 of Channel 1
MARKER_Y1_CH1	Marker Y1 of Channel 1
MARKER_Y2_CH1	Marker Y2 of Channel 1
MARKER_X1_CH1_LOCATION	Marker X1 location of Channel 1
MARKER_X2_CH1_LOCATION	Marker X2 location of Channel 1
MARKER_Y1_CH1_LOCATION	Marker Y1 location of Channel 1
MARKER_Y2_CH1_LOCATION	Marker Y2 location of Channel 1
MARKER_X1_CH2	Marker X1 of Channel 2
MARKER_X2_CH2	Marker X2 of Channel 2
MARKER_Y1_CH2	Marker Y1 of Channel 2
MARKER_Y2_CH2	Marker Y2 of Channel 2
MARKER_X1_CH2_LOCATION	Marker X1 location of Channel 2
MARKER_X2_CH2_LOCATION	Marker X2 location of Channel 2
MARKER_Y1_CH2_LOCATION	Marker Y1 location of Channel 2
MARKER_Y2_CH2_LOCATION	Marker Y2 location of Channel 2
ONE_LEVEL	One Level
ZERO_LEVEL	Zero Level
EYE_AMPLITUDE	Eye amplitude
EYE_HEIGHT	Eye Height
CROSSING_PERCENT	Eye Crossing Percentage
SNR	Signal Noise Ratio
AVERAGE_POWER	Average Power
EXTINCTION_RATIO	Extinction Ratio
JITTER_P_P	Peak to peak jitter
JITTER_RMS	RMS jitter
RISE_TIME	Rise time
FALL_TIME	Fall time
EYE_WIDTH	Eye width
DCD	Duty cycle distortion
MEAN	Mean
STD_DEV	Standard deviation

P_P	Time peak to peak
HITS	Hits
TOTAL_SAMPLES	Total samples
FAILED_SAMPLES	Failed samples
DIVIDE_RATIO	Clock divide ratio
HISTOGRAM_TYPE	Histogram type
CURRENT_MASK	Current mask
OE_A_W	OE Responsivity
OE_V_W	OE Conversion gain
NUM_OF_SWEEPS	For Internal Use Only
SAMPLES_PER_SWEEP	Samples per sweep
DEBUG_OPTICAL_POWER	For Internal Use Only
DEBUG_RESPONSIVITY	For Internal Use Only
DEBUG_CONVERSION_GAIN	For Internal Use Only
REPORTED_CURRENT	For Internal Use Only
WAVELENGTH	Wavelength
OE_A_W_BACKUP	For Internal Use Only
OE_V_W_BACKUP	For Internal Use Only
CAL_TEMP	Calibration temperature
CAL_DATE	Calibration date
DATA_RATE_BPS	Data Rate
SCALE_1_BACKUP	For Internal Use Only
OFFSET_1_BACKUP	For Internal Use Only
SCALE_2_BACKUP	For Internal Use Only
OFFSET_2_BACKUP	For Internal Use Only
SAMPLING_STATUS	Sampling status
LIMIT_TYPE	Accumulation limit type
TIME_LIMIT	Accumulation time limit
SAMPLE_LIMIT	Accumulation sample limit
ACCUMULATION	Accumulation percentage of completion
CFDR1	For Internal Use Only

CFDR2	For Internal Use Only
CFDR3	For Internal Use Only
CFDR4	For Internal Use Only
CFDR5	For Internal Use Only
OFFSET_1_ACTUAL	For Internal Use Only
OFFSET_2_ACTUAL	For Internal Use Only
OFFSET_1_ACTUAL_BACKUP	For Internal Use Only
OFFSET_2_ACTUAL_BACKUP	For Internal Use Only
OPTIONS	For Internal Use Only
MAX_NUM_OF_SAMPLES	Parameter of Maximum Number of Samples

:CONFigure Subsystem

This set of commands prepares the instrument for the selected measurement. It disables any currently-enabled measurements and activates the specified measurement. Depending on the setup, Bit Master may start taking measurements after these configuration setting commands.

CONFigure commands may affect the value of any other setting in the instrument. 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 Histogram Axis

:CONFigure:HISTogram:AXIS TIME|AMPLitude

:CONFigure:HISTogram:AXIS?

Sets the histogram measurement axis to either time or amplitude.

Query command returns current selected histogram axis.

Factory Preset / *RST:	AMPLitude
Front Panel Access:	Measurement , Histogram, Axis

Configure Mask Type

:CONFigure:MASK:TYPE <integer>

:CONFigure:MASK:TYPE?

Selects the mask type based on its location in the list of masks available in the instrument (with index 0 referring to the 1st mask listed). The mask list can be customized and new masks can be added by using Master Software Tool.

The query returns the index of the current mask selected.

Factory Preset / *RST:	0 (first listed mask in the installed mask list file)
Front Panel Access:	Measurement, Mask

Configure Measure Channel

:CONFigure:MEASure:CHANnel 1 | 2

:CONFigure:MEASure:CHANnel?

Sets active channel to Channel 1 or Channel 2. The active channel is the one on which the measurements are made and the one to which markers are applied.

Query commands returns current active channel.

Factory Preset / *RST:	1 (Channel 1)
Front Panel Access:	Measurement , Active Channel Marker, Active Channel

Configure Measurement Type

:CONFigure:MEASure:TYPE AMPLitude | TIME | HISTogram | MASK | OFF

:CONFigure:MEASure:TYPE?

Sets measurement type to be performed.

The query returns current measurement type.

AMPLitude: Sets measurement type to Amplitude. Sets display mode to Eye Pattern.

One Level, Zero Level, Eye Amplitude, Eye Height, Crossing, SNR, Average Power and Extinction Ratio are updated after a :MEASure:AMPLitude command execution.

TIME: Sets measurement type to Time. Sets display mode to Eye Pattern.

Jitter p-p, Jitter RMS, Rise Time, Fall Time, Eye Width and DCD are updated after a :MEASure:TIME command execution.

HISTogram: sets measurement type to Histogram.

Mean value, standard Deviation, Peak-to-Peak, and Hits of Time or Amplitude are updated after a :MEASure:HISTogram command execution.

MASK: sets measurement type to Mask.

Total Samples and Failed Samples will be updated after a :MEASure:MASK command execution.

OFF: All above measurements are disabled.

Histogram and mask measurement settings can be modified by using the [:SENSe]:DISPlay:MODE commands before initiating a measurement.

Factory Preset / *RST:	Amplitude
Front Panel Access:	Measurement, Amplitude, Time, Histogram, Mask, OFF
See Also:	[:SENSe]:DISPlay:MODE

:FETCh:AMPLitude Subsystem

This set of commands return the most recent measurement data of the active measurement. These commands are used for repeating query measurement data following a MEASure command or a CONFIgure command (if the Bit Master is set up to continuously take measurements). They will not switch to another measurement. If the instrument is collecting data, it will not return until the data collection is complete. This could occur if there was a *RST immediately before the :FETCh?

To get new measurement data, use the MEASure command.

Commands in this subsystem return most recent measurement data for amplitude measurements. The command :FETCh:AMPLitude? returns eight measurement results. There are eight more commands that can return the eight results individually.

The units of a result depend on the current setting of the active channel (specified by [:SENSe]INPut:CH1|2 ELECTrical|OPTical|OFF). The setting can be Electrical (mV units) or Optical (µW unit). These data are only valid for Eye Pattern display mode. They are not valid for Pulse Pattern mode. See command [:SENSe]:DISPlay:MODE EYE|PULSE

Fetch Amplitude Measurement Result

:FETCh:AMPLitude:MEASurement?

Returns the most recent results for all the amplitude measurements.

Data are returned as 8 comma-separated values: level one, level zero, eye amplitude, eye height, crossing, SNR, average power and extinction ratio.

Average Power and Extinction Ratio are only valid for an optical channel. "N/A" will be returned if the channel is set to Electrical.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch Average Power

:FETCh:AMPLitude:AVEPower?

Returns the most recent value of the average optical power that is derived from the O/E module. This measurement is only available for an optical channel.

Default Units:	μ W
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch Eye Crossing Percentage

:FETCh:AMPLitude:CROSSing?

Returns the most recent eye crossing point that represents a percentage of eye height.

Default Units:	%
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch Extinction Ratio

:FETCh:AMPLitude:EXTRatio?

Returns the most recent extinction ratio that measures the ratio of the average power levels for the logic High to the logic Low of an optical waveform. This measurement is only available for an optical channel.

Default Units:	dB
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch Eye Amplitude

:FETCh:AMPLitude:EYEAmplitude?

Returns the most recent eye amplitude value.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch Eye Height

:FETCh:AMPLitude:EYEHeight?

Returns the most recent value of vertical opening of an eye pattern.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch One Level

:FETCh:AMPLitude:LEVel:ONE?

Returns the most recent one level value that is the mean value of the top histogram distribution of an eye pattern.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch Zero Level

:FETCh:AMPLitude:LEVel:ZERO?

Returns the most recent zero level value that is the mean value of the bottom histogram distribution of an eye pattern.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

Fetch SNR

:FETCh:AMPLitude:SNR?

Returns the most recent signal-to-noise ratio measurement.

Default Units:	None
Front Panel Access:	Measurement, Amplitude
See Also:	:MEASure:AMPLitude?

:FETCh:HISTogram Subsystem

This set of commands return the most recent measurement data of the active measurement. These commands are used for repeating query measurement data following a MEASure command or a CONFigure command (if the Bit Master is set up to continuously take measurements). They will not switch to another measurement. If the instrument is collecting data, it will not return until the data collection is complete. This could occur if there was a *RST immediately before the :FETCh?

To get new measurement data, use the MEASure command.

Commands in this subsystem return the most recent measurement data for two histogram measurements, histogram time and histogram amplitude (specified by :CONFigure:HISTogram:AXIS TIME|AMPLitude). Four measurement results will be returned by :FETCh:HISTogram:TIME:MEASurement? or :FETCh:HISTogram:AMPLitude:MEASurement? They also can be queried by other lower level histogram commands individually. The measurement results are derived from the current histogram window settings.

The units of a result depend on the current setting of the active channel (specified by [:SENSE]INPUT:CH1|2 ELECTRICAL|OPTICAL|OFF). The setting can be Electrical (mV units) or Optical (μ W unit).

Fetch Histogram Time Measurement Result

:FETCh:HISTogram:TIME:MEASurement?

Returns the most recent time histogram measurement results.

Data are returned as 4 comma-separated values: mean, std dev, peak-to-peak, and hits.

Default Units:	ps
Front Panel Access:	Measurement, Histogram, Time
See Also:	:MEASure:HISTogram:TIME?

Fetch Histogram Amplitude Measurement Result

:FETCh:HISTogram:AMPLitude:MEASurement?

Returns the most recent amplitude histogram measurement results.

Data are returned as 4 comma-separated values: mean, std dev, peak-to-peak, and hits.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Histogram, Amplitude
See Also:	:MEASure:HISTogram:AMPLitude?

Fetch Histogram Amplitude Hits

:FETCh:HISTogram:AMPLitude:HITS?

Returns the most recent measurement result for the number of hits, which is the number of samples inside the histogram window.

Front Panel Access:	Measurement, Histogram, Amplitude
See Also:	:MEASure:HISTogram:AMPLitude?

Fetch Histogram Amplitude Mean

:FETCh:HISTogram:AMPLitude:MEAN?

Returns the most recent measurement result of the amplitude mean value of the samples inside the histogram window.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Histogram, Amplitude
See Also:	:MEASure:HISTogram:AMPLitude?

Fetch Histogram Amplitude Peak to Peak Value

:FETCh:HISTogram:AMPLitude:PPEak?

Returns the most recent measurement result of the amplitude peak-to-peak value of the samples inside the histogram window.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Histogram, Amplitude
See Also:	:MEASure:HISTogram:AMPLitude?

Fetch Histogram Amplitude Standard Deviation

:FETCh:HISTogram:AMPLitude:STDDeviation?

Returns the most recent measurement result of the amplitude standard deviation value of the samples inside the histogram window.

Default Units:	Current amplitude units
Front Panel Access:	Measurement, Histogram, Amplitude
See Also:	:MEASure:HISTogram:AMPLitude?

Fetch Histogram Time Hits

:FETCh:HISTogram:TIME:HITS?

Returns the most recent measurement result for the number of hits, which is the number of samples inside the histogram window.

Front Panel Access:	Measurement, Histogram, Time
See Also:	:MEASure:HISTogram:TIME?

Fetch Histogram Time Mean

:FETCh:HISTogram:TIME:MEAN?

Returns the most recent measurement result of the time mean value of the samples inside the histogram window.

Default Units:	ps
Front Panel Access:	Measurement, Histogram, Time
See Also:	:MEASure:HISTogram:TIME?

Fetch Histogram Time Peak to Peak Value

:FETCh:HISTogram:TIME:PPEak?

Returns the most recent measurement result of the time peak-to-peak value of the samples inside the histogram window.

Default Units:	ps
Front Panel Access:	Measurement, Histogram, Time
See Also:	:MEASure:HISTogram:TIME?

Fetch Histogram Time Standard Deviation

:FETCh:HISTogram:TIME:STDDeviation?

Returns the most recent measurement result of the time standard deviation value of the samples inside the histogram window.

Default Units:	ps
Front Panel Access:	Measurement, Histogram, Time
See Also:	:MEASure:HISTogram:TIME?

:FETCh:MASK Subsystem

This set of commands return the most recent measurement data of the active measurement. These commands are used for repeating query measurement data following a MEASure command or a CONFigure command (if the Bit Master is set up to continuously take measurements). They will not switch to another measurement. If the instrument is collecting data, it will not return until the data collection is complete. This could occur if there was a *RST immediately before the :FETCh?

To get new measurement data, use the MEASure command.

Commands in this subsystem calculate the most recent total samples and failed samples for a mask measurement. The results are based on the current mask type selected (specified by CONFigure:MASK:TYPE <index>). The results are returned collectively by one command or individually using two commands.

Fetch Mask Measurement Result

:FETCh:MASK:MEASurement?

Returns the most recent results for the mask measurement.

Data are returned as 2 comma-separated values: total samples, failed samples.

Front Panel Access:	Measurement, Mask
See Also:	:MEASure:MASK?

Fetch Failed Samples

:FETCh:MASK:SAMPles:FAILED?

Returns the most recent failed samples for the mask measurement.

Front Panel Access:	Measurement, Mask
See Also:	:MEASure:MASK?

Fetch Total Samples

:FETCh:MASK:SAMPles:TOTal?

Returns the most recent total samples for the mask measurement.

Front Panel Access:	Measurement, Mask
See Also:	:MEASure:MASK?

:FETCh:TIME Subsystem

This set of commands return the most recent measurement data of the active measurement. These commands are used for repeating query measurement data following a MEASure command or a CONFigure command (if the Bit Master is set up to continuously take measurements). They will not switch to another measurement. If the instrument is collecting data, it will not return until the data collection is complete. This could occur if there was a *RST immediately before the :FETCh?

To get new measurement data, use the MEASure command.

Commands in this subsystem return the most recent measurement data for time related measurements. The command :FETCh:TIME:MEASurement? returns six measurement results. There are six more commands that return the six results individually.

These data are only valid for Eye Pattern display mode. They are not valid for Pulse Pattern. See command [:SENSe]:DISPlay:MODE EYE|PULSe

Fetch Time Measurement Result

:FETCh:TIME:MEASurement?

Returns the most recent result for all the time measurements.

Data are returned as 6 comma-separated values: jitter p-p, jitter RMS, rise time, fall time eye width and DCD.

Default Units:	ps
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

Fetch Duty Cycle Distortion

:FETCh:TIME:DCD?

Returns the most recent Duty Cycle Distortion result as a percentage.

Default Units:	%
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

Fetch Eye Width

:FETCh:TIME:EYEWidth?

Returns the most recent the eye width result of the current measurement.

Default Units:	ps
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

Fetch Fall Time

:FETCh:TIME:FTIME?

Returns the most recent fall time result of the current measurement.

Default Units:	ps
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

Fetch Rise Time

:FETCh:TIME:TRISe?

Returns the most recent rise time result of the current measurement.

Default Units:	ps
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

Fetch Jitter Peak to Peak

:FETCh:TIME:JITTer:PPeak?

Returns the most recent peak- to- peak jitter result of the current measurement.

Default Units:	ps
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

Fetch Jitter RMS

:FETCh:TIME:JITTer:RMS?

Returns the most recent RMS jitter result of the current measurement.

Default Units:	ps
Front Panel Access:	Measurement, Time
See Also:	:MEASure:TIME?

:MEASure Subsystem

These commands take the instrument from its current state and enable the specified measurement. They correct any parameters that are invalid given the new measurement state such that a valid measurement can take place. They are taken on the active channel with some default settings; those default settings are not specified in a MEASue command and may be changed by CONFIgure command and other relative commands. They then initiate the measurement. When the measurement is complete, they return the result. If these MEASure commands are used to change measurement modes, the Bit Master may take longer to return the results than if the measurement mode is unchanged by the command.

The message “Active channel is OFF” is returned if default setting for the active channel is OFF.

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

Amplitude Measurement

:MEASure:AMPLitude?

Sets the active measurement to Amplitude.

Sets display mode to Eye.

Triggers a new amplitude measurement and returns the results as 8 comma-separated values: Level One, Level Zero, Eye Amplitude, Eye Height, Crossing, SNR, AveragePower and Extinction Ratio.

If the measurement is set to OFF, it may take longer to receive the results. Average Power and Extinction Ratio are only valid for an optical channel. “N/A” will be returned if the active channel is Electrical.

Units depend on current setting of active channel. The units will be mV for an Electricalchannel or μ W for an Optical channel.

Results also can be queried by :FETCh:AMPLitude:MEASurement?. To queryspecific data, see command :FETCh:AMPLitude:xxxx?.

The current measurement can be queried using :CONFIgure?.

See Also:	:CONFIgure:MEASure:CHANnel 1 2 [:SENSe]:INPUt:CH1 2 ELECTrical OPTical OFF
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Time Measurement

:MEASure:TIME?

Sets the active measurement to Time. Sets display mode to Eye.

Triggers a new time measurement and returns the results as 6 comma-separated values: Jitter p-p, Jitter RMS, Rise Time, Fall Time EYE Width and DCD. If the measurement is set to OFF, it may take longer to receive the results.

Results also can be queried by :FETCh:TIME? To query specific data, see command :FETCh:TIME:xxxx?

The current measurement can be queried using :CONFIgure?

See Also:	:CONFIgure:MEASure:CHANnel 1 2 [:SENSE]:INPut:CH1 2 ELECTrical OPTical OFF
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Histogram Time Measurement

:MEASure:HISTogram:TIME?

Sets the active measurement to histogram time. Triggers a new histogram time measurement and returns the results as 4 comma-separated values: Mean, std Deviation, Peak-to-Peak, and Hits.

Results also can be queried by :FETCh:HISTogram:TIME?. To query specific data, see command :FETCh:HISTogram:TIME:xxxx?.

The current measurement can be queried using :CONFIgure:HISTogram:AXIS?.

See Also:	:CONFIgure:MEASure:CHANnel 1 2 [:SENSE]:INPut:CH1 2 ELECTrical OPTical OFF [:SENSE]:HISTogram:X1 2 <time> [:SENSE]:HISTogram:Y1 2 <amplitude>
-----------	--

Histogram Amplitude Measurement

:MEASure:HISTogram:AMPLitude?

Sets the active measurement to histogram amplitude. Triggers a new histogram amplitude measurement and returns the results as 4 comma-separated values: Mean, Std Deviation, Peak-to-Peak, and Hits.

Results also can be queried by :FETCh:HISTogram:AMPLitude?. To query specific data, see command :FETCh:HISTogram:AMPLitude:xxxx?.

The current measurement can be queried using :CONFIgure:HISTogram:AXIS?.

See Also:	:CONFIgure:MEASure:CHANnel 1 2 [:SENSE]:INPut:CH1 2 ELECTrical OPTical OFF
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Mask Measurement

:MEASure:MASK?

Sets the active measurement to MASK. Triggers a new mask measurement and returns the results as 2 comma-separated values: Total Samples, Failed Samples.

Results also can be queried by :FETCh:MASK:MEASUREMENT?. To query specific data, see command :FETCh:MASK:SAMPLES:xxxx?.

The mask measurement must specified by :CONFIgure:MASK:TYPE. The current measurement can be queried using :CONFIgure:MASK:TYPE?.

See Also:	:CONFIgure:MASK:TYPE <index> :CONFIgure:MEASure:CHANnel 1 2 [:SENSe]:INPut:CH1 2 ELEctrical OPTical OFF
-----------	---

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
```


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01/17/07	10580-00170 Revision A	Initial release
02/22/08	10580-00170 Revision B	Updated to support firmware V1.23