Hantek

Tablet1000 series

Tablet oscilloscope

SCPI Manual

2022.05

Warranties and Declarations

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Hantek certified Tablet1000 series oscilloscope to meet China's national industry standards and has passed the CE certification.

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1 Document overview

This document is intended to guide users to quickly learn how to use SCPI commands to control Tablet1000 series digital oscilloscopes through remote interface programming. Tablet1000 series can communicate with a computer via a USB port.

Tip:

The latest version of this manual can be downloaded at http://www.hantek.com.

Document number:

202205

Software version:

Software upgrade may change or increase product functionalities, please pay attention to Hantek website for the latest version.

Document format conventions:

1   Virtual keys and main interface icons

Use **[name]** to represent virtual keys and main interface icons. For example, **[HOME]** is for , **[OSC]** is for .

2   Menu

Use "menu text (bold) + color" to represent a label or a menu option. For example, **Basic Settings** means to click the "Basic Settings" option on the current operation interface to enter the function configuration menu of "Basic Settings".

3   Operation steps

Use ">" to represent the next step. For example, **Utility**> **Acquire** means click **Utility** label before clicking **Acquire** menu.

Document content conventions:

Tablet1000 series tablet oscilloscope consists of the following models. Unless otherwise specified, this manual uses TO1254D as an example to describe the Tablet1000 series and basic operations.

Model	Channel	Bandwidth	Sampling rate	Signal source	Multimeter
TO1112	2	110MHz	250MSa/S	-	-
TO1112C	2	110MHz	250MSa/S	-	Yes

Model	Channel	Bandwidth	Sampling rate	Signal source	Multimeter
TO1112D	2	110MHz	250MSa/S	25MHz	Yes
TO1152	2	150MHz	1GSa/S	-	-
TO1202	2	200MHz	1GSa/S	-	-
TO1252	2	250MHz	1GSa/S	-	-
TO1152C	2	150MHz	1GSa/S	-	Yes
TO1202C	2	200MHz	1GSa/S	-	Yes
TO1252C	2	250MHz	1GSa/S	-	Yes
TO1152D	2	150MHz	1GSa/S	25MHz	Yes
TO1202D	2	200MHz	1GSa/S	25MHz	Yes
TO1252D	2	250MHz	1GSa/S	25MHz	Yes
TO1154	4	150MHz	1GSa/S	-	-
TO1204	4	200MHz	1GSa/S	-	-
TO1254	4	250MHz	1GSa/S	-	-
TO1154C	4	150MHz	1GSa/S	-	Yes
TO1204C	4	200MHz	1GSa/S	-	Yes
TO1254C	4	250MHz	1GSa/S	-	Yes
TO1154D	4	150MHz	1GSa/S	25MHz	Yes
TO1204D	4	200MHz	1GSa/S	25MHz	Yes
TO1254D	4	250MHz	1GSa/S	25MHz	Yes
TO1154AUTO	4	150MHz	1GSa/S	25MHz	Yes
TO1204AUTO	4	200MHz	1GSa/S	25MHz	Yes

Model	Channel	Bandwidth	Sampling rate	Signal source	Multimeter
TO1254AUTO	4	250MHz	1GSa/S	25MHz	Yes

Table 1.1 Model

2 SCPI introduction

SCPI (Standard Commands for Programmable Instruments) is a standardized instrument programming language based on the existing standards IEEE 488.1 and IEEE 488.2, following the floating-point operation rules in IEEE 754 standard, ISO 646 information exchange 7-bit coding symbol (equivalent to ASCII programming) and many other standards. The SCPI command is of tree hierarchy, consisting of multiple subsystems. Each subsystem consists of a root keyword and one or more level keywords.

Command format

Commands usually start with a colon ":". Keywords are separated by colons ":", and optional parameter settings are followed by keywords. Add a question mark "?" after the command line to indicate to query the function. The command keyword is separated by a space from the first parameter.
For example:
:ACQuire:TYPE <type>
:ACQuire:TYPE?
ACQuire is the root keyword of the command,
TYPE is the second-level keyword.
The command line starts with a colon ":" and separates each level of keywords with a colon ":".
<type> indicates the parameter that can be set.
"?" indicates a query.
Command keyword :ACQuire:TYPE and parameter <type> are separated by a space.
In some commands that take parameters, multiple parameters are usually separated by commas ",".
For example:
[:TRACe[<n>]]:DATA:VALue volatile,<points>,<data>

Marks description

The following marks are not sent with the command.

1. Curly braces {}

The contents in braces are parameter options. Usually, parameters are separated by a vertical bar "|". When using a command, you must select one of the parameters.

2. Vertical bar |

A vertical bar is used to separate multiple parameter options. You must select one parameter when running a command.

3. Square brackets []

The contents in square brackets can be ignored.

4. Triangle brackets <>

The parameter in triangle brackets must be replaced with a valid value.

Parameter types

1. Bool

The value can be ON, OFF, 1, or 0.
For example:
:MEASure:ADISplay <bool>
:MEASure:ADISplay?
<bool> can be set to: {{1|ON}|{0|OFF}}.
The query returns 1 or 0.

2. Discrete

The value can be options listed.
For example:
:ACQuire:TYPE <type>
:ACQuire:TYPE?
<type> can be set to: NORMal|AVERages|PEAK|HRESolution.
The query returns the abbreviated form: NORM, AVER, PEAK, or HRES.

3. Integer

Parameters can be any integer within the valid value range (NR1 format) unless
otherwise specified.
Note:
Do not set the parameter in decimal format. Otherwise, exceptions will occur.
For example:
:DISPlay:GBRightness <brightness>
:DISPlay:GBRightness?
<brightness> can be set to an integer between 0 and 100. The query returns an integer
between 0 and 100.

4. Real

Parameters can be any real number up to the valid value range. This command accepts
parameters in decimal (NR2 format) and scientific notation (NR3 format) formats.
For example:
:TRIGger:TIMeout:TIMe <NR3>
:TRIGger:TIMeout:TIMe?
Parameter <NR3> can be set to a real number between 1.6e-08 (16ns) and 1e +01 (10s).
The query returns a real number in scientific notation format.

5. ASCII String

The value can be a combination of ASCII characters.
For example:

:SYSTem:OPTion:INSTall <license>

<license> can be set to: PDUY9N9QTS9PQSWPLAETRD3UJHYA

Command abbreviations

All commands are case-insensitive, so either uppercase or lowercase can be used.
However, to abbreviate, you must enter all uppercase letters in the command.
For example:
:MEASure:ADISplay? can be abbreviated to MEAS:ADIS?

3 Command system

This chapter describes the formats, functions, parameters, and usage instructions of each command in Tablet1000 command set.

Note:

1. Unless otherwise specified, this manual uses the TO1254D model as an example.
2. For parameter setting commands (such as frequency, amplitude, etc.), oscilloscope can not recognize the unit sent with the parameter, only can recognize the number, and set the parameter in the default unit. For details about the default unit of each parameter, see the function description of the specific command below.

3.1 General command

Common commands are used to query basic device information and perform common operations. These commands usually start with "*". The length of the command keywords is three characters.

3.1.1 *IDN?

Command format

*IDN?

Functional description

Query the instrument ID string.

Parameter

None

Instructions

None

Return format

Query returns HANTEK,<model>,< serial number >,<software version >.
<model> : instrument model.
<serial number> : instrument serial number;
<software version> : instrument software version.

Example

IDN?   / HANTEK, TO1254D, CN2142000000035, 2.0.0.0(220329.0) */

3.1.2 *RST

Command format

*RST

Functional description

Restore the instrument to factory default.

Parameter

None

Instructions

None

Return format

None

Example

RST   / Restore the instrument to factory default */

3.2 :AUToscale

Command format

:AUToscale

Functional description

Enable the waveform automatic setting function. Oscilloscope will automatically adjust the vertical gear, horizontal time base and trigger mode according to the input signal to make the waveform display to the best.

Parameter

None

Instructions

When the waveform automatic setting function is applied, for sinusoidal signals, the theoretical frequency shall not be less than 10Hz. For square-wave signals, the theoretical value is related to the duty cycle, which should be greater than 1% and the amplitude should be at least 10mVpp (when the probe ratio is 1X).

Return format

None

Example

:AUToscale   /* The oscilloscope performs AUTO function */

3.3   :RUN

Command format

:RUN

Functional description

Command to run the oscilloscope.

Parameter

None

Instructions

None

Return format

None

Example

:RUN   /* The oscilloscope starts running */

3.4   :STOP

Command format

:STOP

Functional description

Command to stop the oscilloscope.

Parameter

None

Instructions

None

Return format

None

Example

:STOP   /* The oscilloscope stops running */

3.5   :SINGle

Command format

:SINGle

Functional description

Set the oscilloscope to single trigger mode.

Parameter

None

Instructions

Under single trigger mode, the oscilloscope will trigger once when the trigger condition is met, and then stop.

Return format

None

Example

:SINGle   /* Oscilloscope performs a single collection */

3.6   :TFORCe

Command format

*TFORCe

Functional description

Force a trigger signal to be generated. Applicable to common and single trigger mode.

Parameter

None

Instructions

Under single trigger mode, the oscilloscope will be triggered once when the trigger condition is met, and then stop.

Return format

None

Example

:TFORce   /* Oscilloscope is forced to be triggered */

3.7   Sampling command subsystem

The :ACQuire command is used to set and query the storage depth, the sampling method and average number of samples, and query the current sampling rate.

3.7.1   :ACQuire:AVERages

Command format

:ACQuire:AVERages <Vaule>
:ACQuire:AVERages?

Functional description

Set or query the average number of times under the average collecting mode.

Parameter

Name	Type	Range	Default value
<Vaule>	Integer	2^n (n is an integer ranging from 1 to 10)	4

Instructions

- You can run the :ACQuire:TYPE command to set the collecting mode.
- Under the average collecting mode, the more the number of times taking the average is, the smaller the noise of the collected waveform is and the higher the vertical resolution is, but the response of the displayed waveform to waveform changes is also slower.

Return format

The query returns an integer between 2 and 256.

Example

:ACQuire:AVERages 64   /* Set the number of times taking the average to 64*/
:ACQuire:AVERages?   /* Query returns 64*/

3.7.2   :ACQuire: MDEPth

Command format

:ACQuire:MDEPth <mdep>

:ACQuire:MDEPth?

Functional description

Set or query the storage depth of an oscilloscope (the number of waveform points that can be stored in a triggered collection), in pts (points) by default.

Parameter

Name	Type	Range	Default value
<mdep>	Discrete	Refer to the Instructions	32000

Instructions

The storage depth can be 4K, 20K, 200K, 2M, 4M, or 8M.

Return format

The query returns the actual points (integer).

Example

:ACQuire:MDEPth 4000   /* Set the storage depth to 4Kpts*/

:ACQuire:MDEPth?   /* Query returns 4000*/

3.7.3   :ACQuire:TYPE

Command format

:ACQuire:TYPE <Value>

:ACQuire:TYPE?

Functional description

Set and query the acquisition method of the samples.

Parameter

Name	Type	The scope of	Default value
<Vaule>	Discrete	{NORMal|AVERage|PEAK|HRESolution}	NORMal

Instructions

● NORMal: In this mode, the oscilloscope samples the signal at equal intervals to reconstruct the waveform. This mode produces the best display for most waveforms.

● AVERage: In this mode, the oscilloscope averages multiple sampled waveforms to reduce random noise on the input signal and improve vertical resolution. The number of times taking the average can be set by the :ACQuire:AVERages command. The more the times, the smaller the noise and the higher the vertical

resolution, but the slower the response of the displayed waveform to waveform changes.

● PEAK: In this mode, the oscilloscope collects the maximum and minimum values of sampling interval signals to obtain the envelope of the signal or narrow pulses that may be missing. Using this mode can avoid the aliasing of the signal, but the noise is relatively large.

● HRESolution: This mode uses a hypersampling technique that averages the adjacent points of the sampled waveform to reduce random noise on the input signal and produce a smoother waveform on the screen. Usually used when the sampling rate of the digital converter is higher than the storage rate of the acquisition memory.

Return format

The query returns a NORM, AVERage, PEAK, or HRESolution.

Example

:ACQuire:TYPE AVERage   /* Set the acquisition method to average */
:ACQuire:TYPE?   /* The query returns AVERage*/

3.7.4 :ACQuire:SRATe?

Command format

:ACQuire:SRATe?

Functional description

Query the current sampling rate. The default unit is Sa/s.

Parameter

None

Instructions

● Sampling rate refers to the frequency of signal sampled by oscilloscope, that is, the number of waveform points sampled per second.
● The relationship between sampling rate, storage depth and waveform length is as follows: Storage depth = sampling rate x waveform length.

Return format

The query returns the sample rate in scientific notation.

Example

:ACQuire:SRATe?   /* Query return 1.250e+06*/

3.8   Channel command subsystem

The :CHANnel<n> command is used to set or query the bandwidth limit, coupling, vertical gear and vertical system parameters such as the vertical offset of an analog channel.

3.8.1   :CHANnel<n>:BWLimit

Command format

:CHANnel<n>:BWLimit <type>
:CHANnel<n>:BWLimit?

Functional description

To set or query the bandwidth limit parameters of a specified channel.

Parameter

Name	Type	Range	Default value
<n>	Channel	{1	2	3	4}	-
<type>	Discrete	{{1|ON}|{0|OFF}}	OFF

Instructions

- OFF: Turn off the bandwidth limit. The high frequency component of the measured signal can pass through.
- ON: Turn on the bandwidth limit. The high frequency component larger than 20MHz in the measured signal is attenuated.

Enable bandwidth limit can reduce waveform noise, but also attenuate the high frequency components.

Return format

The query returns ON or OFF.

Example

:CHANnel1:BWLimit 1   /* Enable the 20MHz bandwidth limit */
:CHANnel1:BWLimit?   /* Query returns 1*/

3.8.2   :CHANnel<n>:COUPling

Command format

:CHANnel<n>:COUPling<coupling>
:CHANnel<n>:COUPling?

Functional description

Set or query how the specified channel is coupled.

Parameter

Name	Type	Range	Default value
<n>	Channel	{1 | 2 | 3 | 4}	-
< coupling >	Discrete	{AC|DC|GND}	DC

Instructions

- AC: The DC component of the measured signal is blocked.
- DC: Both the DC and AC components of the measured signal can pass through.
- GND: Both the DC and AC components contained in the measured signal are blocked.

Return format

The query returns AC, DC, or GND.

Example

:CHANnel1:COUPling AC   /* Select AC coupling */
:CHANnel1:COUPling?   /* Query returns AC*/

3.8.3   :CHANnel<n>: DISPlay

Command format

:CHANnel<n>:DISPlay <bool>
:CHANnel<n>:DISPlay?

Functional description

Enable or disable the specified channel or query the status of the specified channel.

Parameter

Name	type	Range	Default value
<n>	Channel	{1|2|3|4}	-
<bool>	Boolean	{{1|ON}|{0|OFF}}	CH1: 1|ON CH2 to CH4: 0|OFF

Instructions

- AC: The DC component of the measured signal is blocked.
- DC: Both the DC and AC components of the measured signal can pass through.
- GND: Both the DC and AC components contained in the measured signal are blocked.

Return format

The query returns 1 or 0.

Example

:CHANnel1:DISPlay ON   / *Enable CH1 * /
:CHANnel1:DISPlay?   /* Query returns 1*/

3.8.4   :CHANnel\<n>: INVert

Command format

:CHANnel\<n>:INVert \<bool>
:CHANnel\<n>:INVert?

Functional description

Enable or disable the waveform inverse of the specified channel or query the state of the waveform inverse of the specified channel.

Parameter

Name	Type	Range	Default value
\<n>	Channel	{1	2	3	4}	-
\<bool>	Boolean	{{1|ON}|{0|OFF}}	0|OFF

Instructions

When the waveform inverse is disabled, the waveform is displayed normally. When waveform inverse is enabled, the waveform voltage value is inverted.

Return format

The query returns 1 or 0.

Example

:CHANnel1:INVert ON   /* Enable the waveform inverse of CH1 */
:CHANnel1:INVert?   /* Query returns 1*/

3.8.5   :CHANnel\<n>: OFFSet

Command format

:CHANnel\<n>:OFFSet \<offset>
:CHANnel\<n>:OFFSet?

Functional description

Set or query the vertical displacement of the specified channel, default unit: V.

Parameter

Name	Type	Range	Default value
<n>	Channel	{1 | 2 | 3 | 4}	-
<offset>	Boolean	It has to do with the vertical gear and probe ratio. When the probe ratio is 1X, Vertical gear >1.28V/div: -50V to +50V Vertical gear <1.28V/div: -10V to +10V Vertical gear <128mV/div: -1V to +1V	0V (probe ratio 1X)

Instructions

The set vertical displacement value is affected by the vertical gear and probe ratio. The range of legal values varies with the vertical gear and probe ratio set. If you set the offset value outside the range of legal values, the offset value will be automatically set to the nearest legal value.

Return format

The query returns the vertical displacement value in scientific notation.

Example

:CHANnel1:OFFSet 1V   /* Set the vertical offset of CH1 to 1V*/
:CHANnel1:OFFSet?   /* Query returns 1.000e+00*/

3.8.6   :CHANnel<n>: TCAL

Command format

:CHANnel<n>:TCAL <val>
:CHANnel<n>:TCAL?

Functional description

Set or query the delay calibration time of a specified channel, which is used to calibrate the zero offset of the channel. The default unit is s.

Parameter

Name	Type	Range	Default value
<n>	Channel	{1 | 2 | 3 | 4}	-
<val>	Real	-100 to 100 ns	0.00 s

Instructions

If the sent parameter is not a configurable value, the nearest value is automatically taken.

Return format

The query returns the delay calibration time in scientific notation.

Example

:CHANnel1: TCAL 0.00000002   /* Set the delay calibration time to 20ns*/
:CHANnel1:TCAL?   /* Query returns 2.000000e-08 */

3.8.7   :CHANnel<n>: SCALe

Command format

:CHANnel<n>:SCALe <scale>
:CHANnel<n>:SCALe?

Functional description

Set or query the vertical gear of a specified channel. The default unit is V.

Parameter

Name	Type	Range	Default value
<n>	Channel	{1 | 2 | 3 | 4}	-
<scale>	Real	It has to do with the probe ratio. The probe ratio is 1X: 500uV to 10V	1V (probe ratio 10X)

Instructions

● The settable range of the vertical gear depends on the probe ratio currently set (set by the :CHANnel<n>:PROBe command).

● You can use the :CHANnel<n>:VERNier command to turn on or off the fine-tune function for a specified channel vertical gear. The fine-tune function is disabled by default. At this time, you can only set the vertical gear according to 1-2-5 step size, for example, 500uV,1mV, 2mV, 5mV, 10mV...10V (probe ratio is 1X). When the fine-tune function is turned on, you can further adjust the vertical gear in a small range to improve vertical resolution. If the amplitude of the input waveform is slightly larger than the full scale in the current gear and the amplitude of the waveform displayed using the next gear is slightly lower, the fine-tune function can be used to improve the amplitude of the waveform display to facilitate the observation of signal details.

Return format

The query returns the vertical gear in scientific notation.

Example

:CHANnel1:SCALe 1   /* Set CH1 vertical gear to 1V*/
:CHANnel1:SCALe?   /* Query returns 1.000e+00*/

3.8.8   :CHANnel<n>: PROBe

Command format

:CHANnel<n>:PROBe <atten>
:CHANnel<n>:PROBe?

Functional description

Set or query the probe ratio for a specified channel.

Parameter

Name	Type	Range	Default value
<n>	Channel	{1|2|3|4}	-
<atten>	Discrete	{0.01X-10000X}	1

Instructions

- Set the probe ratio, that is, multiply the collected signal by the specified multiple before display (does not affect the actual signal amplitude).
- Setting the probe ratio affects the settable range of the current vertical gear.

Return format

Query returns probe attenuation ratio in scientific notation.

Example

:CHANnel1:PROBe 10   /* Set the probe attenuation ratio of CH1 to 10X*/
:CHANnel1:PROBe?   /* Query returns 1.000000e+01*/

3.8.9   :CHANnel<n>: VERNier

Command format

:CHANnel<n>:VERNier <bool>
:CHANnel<n>:VERNier?

Functional description

Enable or disable the fine-tune function of a specified channel vertical gear, or query the fine-tune function status of a specified channel vertical gear.

Parameter

Name	Type	Range	Default value
<n>	channel	{1	2	3	4}	-

Name	Type	Range	Default value
<bool>	Boolean	{{1|ON}|{0|OFF}}	0|OFF

Instructions

The fine-tune function is disabled by default. At this time, you can only set the vertical gear according to 1-2-5 step size, for example, 500uV,1mV, 2mV, 5mV, 10mV...10V (probe ratio is 1X). When the fine-tune function is turned on, you can further adjust the vertical gear in a small range to improve vertical resolution. If the amplitude of the input waveform is slightly larger than the full scale in the current gear and the amplitude of the waveform displayed using the next gear is slightly lower, the fine-tune function can be used to improve the amplitude of the waveform display to facilitate the observation of signal details.

Return format

The query returns 1 or 0.

Example

:CHANnel1:VERNier ON   /* Turn on the fine-tune function of CH1 vertical gear */
:CHANnel1:VERNier?   /* Query returns 1*/

3.9   Cursor command subsystem

The :CURSor command is used to measure the X-axis values (such as time) and Y-axis values (such as voltage) of the waveform.

3.9.1   :CURSor:MODE

Command format

:CURSor:MODE <mode>
:CURSor:MODE?

Functional description

Set or query the cursor measurement mode.

Parameter

Name	Type	Range	Default value
<mode>	Discrete	{OFF|MANual}	OFF

Instructions

- OFF: Disable the cursor measurement function.
- "MANual" : Enable the manual cursor measurement mode.

Return format

The query returns OFF or MANual.

Example

:CURSor:MODE MANual   /* Enable manual cursor measurement mode */
:CURSor:MODE?   /* Query returns MANual */

3.9.2   :CURSor: MANual:TYPE

Command format

:CURSor:MANual:TYPE <type>
:CURSor:MANual:TYPE?

Functional description

Set and query the cursor type of the manual cursor measurement.

Parameter

Name	Type	Range	Default value
<type>	Discrete	{X|Y}	X

Instructions

- X: Select the X cursor. The X cursor is a vertical solid line (cursor A) and A vertical dashed line (cursor B) and is usually used to measure time parameters.
- Y: Select the Y cursor. The Y cursor is a solid horizontal line (cursor A) and a dashed horizontal line (cursor B) and is usually used to measure voltage parameters.

Return format

The query returns X or Y.

Example

:CURSor:MANual:TYPE X   /* Select the X cursor */
:CURSor:MANual:TYPE?   /* Query returns X*/

3.9.3   :CURSor: MANual: SOURce

Command format

:CURSor:MANual:SOURce <source>
:CURSor:MANual:SOURce?

Functional description

Set or query the channel source of the manual cursor measurement.

Parameter

Name	Type	Range	Default value
<source>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4|MATH }	CHANnel1

Instructions

Only the currently enabled channel can be selected as the channel source.

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, CHANnel4, MATH.

Example

:CURSor:MANual:SOURce CHANnel2   /* Set the channel source to CH2*/
:CURSor:MANual:SOURce?   /* Query returns CHANnel2*/

3.9.4   :CURSor: MANual:AX

Command format

:CURSor:MANual:AX <x>
:CURSor:MANual:AX?

Functional description

Horizontal position of cursor X1 when cursor measurement is turned on.

Parameter

Name	Type	Range	Default value
<x>	Integer	0 to 770	250

Instructions

The horizontal and vertical positions of the cursor are defined by grid coordinates. The pixel coordinates of the grid range from (0,0) to (770,400). (0,0) is the upper-left corner of the grid, and (770,400) is the lower-right corner of the grid. Horizontal pixels range from 0 to 770 and vertical pixels range from 0 to 400.

Return format

The query returns an integer between 0 and 770.

Example

:CURSor:MANual:AX 200   /* Set the horizontal position of cursor X1 to 200*/

:CURSor:MANual:AX?   /* Query returns 200*/

3.9.5   :CURSor: MANual:BX

Command format

:CURSor:MANual:BX <x>

:CURSor:MANual:BX?

Functional description

Set and query the horizontal position of cursor X2 when manual cursor measurement is performed.

Parameter

Name	Type	Range	Default value
<x>	Integer	0 to 770	515

Instructions

The horizontal and vertical positions of the cursor are defined by grid coordinates. The pixel coordinates of the grid range from (0,0) to (770,400). (0,0) is the upper-left corner of the grid, and (770,400) is the lower-right corner of the grid. Horizontal pixels range from 0 to 770 and vertical pixels range from 0 to 400.

Return format

The query returns an integer between 0 and 770.

Example

:CURSor:MANual:BX 200   /* Set the horizontal position of cursor X2 to 200*/

:CURSor:MANual:BX?   /* Query returns 200*/

3.9.6   :CURSor: MANual:AY

Command format

:CURSor:MANual:AY <y>

:CURSor:MANual:AY?

Functional description

Set or query the vertical position of cursor Y1 during manual cursor measurement.

Parameter

Name	Type	Range	Default value
<y>	Integer	0 to 400	100

Instructions

The horizontal and vertical positions of the cursor are defined by grid coordinates. The pixel coordinates of the grid range from (0,0) to (770,400). (0,0) is the upper-left corner of the grid, and (770,400) is the lower-right corner of the grid. Horizontal pixels range from 0 to 770 and vertical pixels range from 0 to 400.

Return format

The query returns an integer between 0 and 400.

Example

:CURSor:MANual:AY 200   /* Set the vertical position of cursor Y1 to 200*/
:CURSor:MANual:AY?   /* Query returns 200*/

3.9.7   :CURSor: MANual:BY

Command format

:CURSor:MANual:BY <y>
:CURSor:MANual:BY?

Functional description

Set or query the vertical position of cursor Y2 during manual cursor measurement.

Parameter

Name	Type	Range	Default value
<y>	Integer	0 to 400	300

Instructions

The horizontal and vertical positions of the cursor are defined by grid coordinates. The pixel coordinates of the grid range from (0,0) to (770,400). (0,0) is the upper-left corner of the grid, and (770,400) is the lower-right corner of the grid. Horizontal pixels range from 0 to 770 and vertical pixels range from 0 to 400.

Return format

The query returns an integer between 0 and 400.

Example

:CURSor:MANual:BY 200   /* Set the vertical position of cursor Y2 to 200*/
:CURSor:MANual:BY?   /* Query returns 200*/

3.9.8   :CURSor: MANual: AXValue?

Command format

:CURSor:MANual:AXValue?

Functional description

Query the value of X at cursor X1 when cursor measurement is performed. The unit is determined by the currently selected horizontal unit.

Parameter

None

Instructions

None

Return format

The query returns the X value at the current cursor X1 in scientific notation.

Example

:CURSor:MANual:AXValue?   /* Query returns -4.000000e-06 */

3.9.9   :CURSor: MANual: BXValue?

Command format

:CURSor:MANual:BXValue?

Functional description

Query the value of X at cursor X2 when cursor measurement is performed. The unit is determined by the currently selected horizontal unit.

Parameter

None

Instructions

None

Return format

The query returns the X value at the current cursor X2 in scientific notation.

Example

:CURSor:MANual:BXValue?   /* Query returns 4.000000e-06 */

3.9.10   :CURSor: MANual: AYValue?

Command format

:CURSor:MANual:AYValue?

Functional description

Query the value of Y at cursor Y1 when cursor measurement is performed. The unit is determined by the currently selected vertical unit.

Parameter

None

Instructions

None

Return format

The query returns the Y value at the current cursor Y1 in scientific notation.

Example

:CURSor:MANual:AYValue?   /* Query returns 2.000000e+00*/

3.9.11   :CURSor: MANual: BYValue?

Command format

:CURSor:MANual:BYValue?

Functional description

Query the value of Y at cursor Y2 when cursor measurement is performed. The unit is determined by the currently selected vertical unit.

Parameter

None

Instructions

None

Return format

The query returns the Y value at the current cursor Y2 in scientific notation.

Example

:CURSor:MANual:BYValue?   /* Query returns -2.000000e+00*/

3.9.12   :CURSor: MANual: XDELta?

Command format

:CURSor:MANual:XDELta?

Functional description

Query the difference BX-AX between the X values at cursor X1 and cursor X2 during manual cursor measurement. The unit is determined by the currently selected horizontal unit.

Parameter

None

Instructions

None

Return format

The query returns the current difference in scientific notation.

Example

:CURSor:MANual:XDELta?   /* 8.000000E-06 */ is returned

3.9.13   :CURSor: MANual: IXDELta?

Command format

:CURSor:MANual:IXDELta?

Functional description

Query the reciprocal of the absolute value of the difference between the X values at cursor X1 and cursor X2 1/|dX| during manual cursor measurement. The unit is determined by the currently selected horizontal unit.

Parameter

None

Instructions

None

Return format

Query returns 1 / | dX | in scientific notation.

Example

:CURSor:MANual:IXDELta?   /* Query returns 1.250000e+05*/

3.9.14   :CURSor: MANual: YDELta?

Command format

:CURSor:MANual:YDELta?

Functional description

Query the difference BY-AY between the Y values at cursor Y1 and cursor Y2 during manual cursor measurement. The unit is determined by the currently selected vertical unit.

Parameter

None

Instructions

None

Return format

The query returns the current difference in scientific notation.

Example

:CURSor:MANual:YDELta?   /* Query returns -4.000000e+00*/

3.10   Display command subsystem

The :DISPlay command can set the waveform display type, afterglow time, waveform brightness, grid type, and grid brightness.

3.10.1   :DISPlay:TYPE

Command format

:DISPlay:TYPE <type>
:DISPlay:TYPE?

Functional description

Set or query the waveform display type.

Parameter

Name	Type	Range	Default value
<type>	Discrete	{VECTors|DOTS}	VECTors

Instructions

- VECTors: Show lines between sample points. This mode provides the most realistic waveform in most cases. It is convenient to view the steep edge of a waveform (such as a square wave).
- DOTS: Display sample points directly. You can visually see each sample point and use the cursor to measure the X and Y values of that point.

Return format

The query returns VECT or DOTS.

Example

:DISPlay:TYPE DOTS   /* Select the dot display mode */
:DISPlay:TYPE?   /* Query returns DOTS*/

3.10.2   :DISPlay: GRADing:TIME

Command format

:DISPlay:GRADing:TIME <time>
:DISPlay:GRADing:TIME?

Functional description

Set or query the duration of the afterglow. The default unit is s.

Parameter

Name	Type	Range	Default value
<time>	Discrete	{MIN||1|5|10|30|INFinite}	MIN

Instructions

- MIN: Set the afterglow time to the minimum to observe the waveform changing with high refresh rate.
- Specified value: Set the afterglow time to one of the above specified values to observe the burr with slow change or low probability of occurrence.
- INFinite: If the infinite afterglow is selected, when the oscilloscope displays a new waveform, the previously collected waveform will not be cleared. The noise and jitter can be measured, and accidental events can be captured.

Return format

The query returns MIN, 1, 5, 10, 30 or INFinite.

Example

:DISPlay:GRADing:TIME 1   /* Set the afterglow duration to 1s*/

:DISPlay:GRADing:TIME?   /* Query returns 1*/

3.10.3   :DISPlay: WBRightness

Command format

:DISPlay:WBRightness <time>

:DISPlay:WBRightness?

Functional description

Set or query the brightness of the waveform on the screen.

Parameter

Name	Type	Range	Default value
<time>	Integer	0 to 100	80

Instructions

None

Return format

The query returns an integer between 0 and 100.

Example

:DISPlay:WBRightness 50   /* Set the waveform brightness to 50%*/

:DISPlay:WBRightness?   /* Query returns 50*/

3.10.4   :DISPlay: GRID

Command format

:DISPlay:GRID <grid>

:DISPlay:GRID?

Functional description

Set and query the type of grid displayed on the screen.

Parameter

Name	Type	Range	Default value
<grid>	Discrete	{FULL|HALF|NONE}	FULL

Instructions

- FULL: Enable the background grid, solid line.
- HALF: The grid is dotted line.
- NONE: Turns off the background grid.

Return format

The query returns FULL, HALF, or NONE.

Example

:DISPlay:GRID NONE   /* Close the background grid and coordinates */
:DISPlay:GRID?   /* The query returns NONE*/

3.10.5   :DISPlay: GBRightness

Command format

:DISPlay:GBRightness <brightness>
:DISPlay:GBRightness?

Functional description

Set and query the brightness of the grid.

Parameter

Name	Type	Range	Default value
<brightness>	Integer	0 to 100	50

Instructions

None

Return format

The query returns an integer between 0 and 100.

Example

:DISPlay:GBRightness 60   /* Set grid brightness to 60%*/
:DISPlay:GBRightness?   /* Query returns 60*/

3.11   Mathematical operation subsystem

The :MATH command is used to set various calculation functions of inter-channel waveforms.

3.11.1 :MATH:DISPlaY

Command format

:MATH:DISPlay <bool>
:MATH:DISPlay?

Functional description

Enable or disable the mathematical operation function or query the status of the mathematical operation function.

Parameter

Name	Type	Range	Default value
<bool>	Boolean	{{1|ON}|{0|OFF}}	0|OFF

Instructions

None

Return format

The query returns ON or OFF.

Example

:MATH:DISPlay ON   /* Enable the math operation function */
:MATH:DISPlay?   /* Query returns ON*/

3.11.2 :MATH: OPERator

Command format

:MATH:OPERator <opt>
:MATH:OPERator?

Functional description

Set and query the operators of a mathematical operation.

Parameter

Name	Type	Range	Default value
<opt>	Discrete	{ADD|SUBTract|MULTiply|DIVision|FFT}	ADD

Instructions

When commands :MATH: SOURce1 and/or :MATH: SOURce2 choosing FX as the parameter, the command is used to set the outer operation operator of the combinational operation. <opt> is optional within {ADD|SUBTract|MULTiply|

DIVision|FFT}.

Return format

The query returns ADD, SUBTract, MULTiply, DIVision, or FFT.

Example

:MATH:OPERator ADD   /* Sets the math operator to the integral operator */
:MATH:OPERator?   /* Query returns ADD*/

3.11.3 :MATH: SOURce1

Command format

:MATH:SOURce1 <src>
:MATH:SOURce1?

Functional description

Set or query the source 1 of algebraic operations.

Parameter

Name	Type	Range	Default value
<src>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

- For algebraic operations, this command is used to set source 1.
- For combinational operation, when the outer operation is algebraic operation, the command is used to set the source A of the outer operation. <src> is optional within {CHANnel1| CHANnel2|CHANnel3|CHANnel4}.

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, or CHANnel4.

Example

:MATH:SOURce1 CHANnel3   /* Set the source A of the algebra operation to CH3*/
:MATH:SOURce1?   /* Query returns CHANnel3*/

3.11.4 :MATH: SOURce2

Command format

:MATH:SOURce2 <src>

:MATH:SOURce2?

Functional description

Set and query the source 2 of the algebraic operations/outer operations of combinational operations.

Parameter

Name	Type	Range	Default value
<src>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

This command is only applicable to algebraic operations (containing two sources) and combinational operations whose outer operations are algebraic operations.

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, or CHANnel4.

Example

:MATH:SOURce2 CHANnel3   /* Set the algebraic operation source B to CH3*/
:MATH:SOURce2?   /* Query returns CHANnel3*/

3.11.5   :MATH: SCALe

Command format

:MATH:SCALe <scale>
:MATH:SCALe?

Functional description

Set and query the vertical gear of the operation result, in unit related to the currently selected operator and the unit selected by the source.

Parameter

Name	Type	Range	Default value
<scale>	Real	Maximum range: 1p to 5T (step size: 1-2-5)	1.00 V

Instructions

The settable range of the vertical gear is related to the currently selected operator and the gear of the source channel. For integral and differential operations, it is also related to the current horizontal time base.

Return format

The query returns the vertical gear of the current operation result in scientific notation.

Example

:MATH:SCALe 2   /* Set the vertical gear to 2V*/

:MATH:SCALe?   /* return 2.000e+00*/

3.11.6   :MATH: OFFSet

Command format

:MATH:OFFSet <offs>

:MATH:OFFSet?

Functional description

Set and query the vertical offset of the operation result, in unit related to the currently selected operator and the unit selected by the source.

Parameter

Name	Type	Range	Default value
<offs>	Real	Related to the vertical gear of the operation result (-1000 $\times$ MathVerticalScale) to (1000 $\times$ MathVerticalScale). The step size is MathVerticalScale/50	0.00 V

Instructions

MathVerticalScale is the vertical gear of the result, which can be set by the :MATH:SCALe command.

Return format

The query returns the vertical offset of the current operation result in scientific notation.

Example

:MATH:OFFSet 2   /* Set the vertical offset to 2V*/

:MATH:OFFSet?   /* query returns 2.000000e+00*/

3.11.7   :MATH: FFT:SOURce

Command format

:MATH:FFT:SOURce <src>

:MATH:FFT:SOURce?

Functional description

Set and query the source of FFT operations/filters.

Parameter

Name	Type	Range	Default value
<src>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

None

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, or CHANnel4.

Example

:MATH:FFT:SOURce CHANnel1   /* Sets the source of FFT operations to CH1*/
:MATH:FFT:SOURce?   /* Query returns CHAnel1*/

3.11.8   :MATH: FFT: UNIT

Command format

:MATH:FFT:UNIT <unit>
:MATH:FFT:UNIT?

Functional description

Set and query the vertical unit of FFT results.

Parameter

Name	Type	Range	Default value
<unit>	Discrete	{VRMS|DB}	DB

Instructions

None

Return format

The query returns VRMS or DB.

Example

:MATH:FFT:UNIT VRMS   /* Set the vertical unit of FFT to VRMS*/
:MATH:FFT:UNIT?   /* Query returns VRMS*/

3.11.9 :MATH: FFT: HCENter

Command format

:MATH:FFT:HCENter <cent>
:MATH:FFT:HCENter?

Functional description

Set or query the center frequency of the FFT result, that is, the frequency corresponding to the horizontal center of the screen. The default unit is Hz.

Parameter

Name	Type	Range	Default value
<cent>	Real	Refer to Instructions	312.50 KHz

Instructions

- In TRACe mode, the range of <cent> is 0 to ($0.4 \times$ FFT sampling rate), where the FFT sampling rate is the screen sampling rate (i.e. 100/ horizontal base). In MEMory mode, the range of <cent> is 0 to ($0.5 \times$ FFT sampling rate), where the FFT sampling rate is memory sampling rate (:ACQuire:SRATe?).
- The step size is (the horizontal gear of the current FFT operation result)/50.

Return format

The query returns the current center frequency in scientific notation.

Example

:MATH:FFT:HCENter 200000   /* Set the center frequency of FFT result to 200KHz*/
:MATH:FFT:HCENter?   /* Query returns 2.000e+05*/

3.12 Measurement command subsystem

3.12.1 :MEASure:SOURce

Command format

:MEASure:SOURce <sour>
:MEASure:SOURce?

Functional description

Set and query the source of the parameter currently measured.

Parameter

Name	Type	Range	Default value
<sour>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

Only the currently open channels are available.

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, or CHANnel4.

Example

:MEASure:SOURce CHANnel2   /* Set the source of the parameter measurement to CH2*/
:MEASure:SOURce?   /* Query returns CHANnel2*/

3.12.2 :MEASure: CLEar

Command format

:MEASure:CLEar <item>

Functional description

Clear the first item, second item, and so on in the measurement.

Parameter

Name	Type	Range	Default value
<item>	Discrete	{ITEM1|ITEM2|ITEM3|ITEM4 |ALL}	–

Instructions

The :MEASure:ITEM command can be used to open the parameters required measuring among the 42 parameters. The last four parameters are determined by the order in which you open them and do not change if you remove one or more of the measurement items.
After one or all measurement items are cleared, you can run the :MEASure:RECover command to recover.

Return format

None

Example

:MEASure:CLEar ITEM1   /* Clear the measurement items ITEM1*/

3.12.3   :MEASure: AMSource

Command format

:MEASure:AMSource <src>
:MEASure:AMSource?

Functional description

Set and query the source for all measurement functions.

Parameter

Name	Type	Range	Default value
<src>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

None

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, or CHANnel4.

Example

:MEASure:AMSource CHANnel1   /* Set the source of all measurement functions to CH1 */
:MEASure:AMSource?   /* Query returns CHANnel1*/

3.12.4   :MEASure: ITEM

Command format

:MEASure:ITEM CHANnel<n>，<item>
:MEASure:ITEM CHANnel<n>? <item>

Functional description

Measure any waveform parameters of a specified source, or query the measurement results of any waveform parameters of a specified source.

Parameter

Name	Type	Range	Default value

Name	Type	Range	Default value
<item>	Discrete	<FREQuency|VPP|VAVG|VMAX|VMIN|PERiod| VTOP| VMID|VBASE|VAMP|VRMS|OVERshoot|PRESh oot|PERIodrms| PERIodmean|RTIMe|FTIMe|PPULses|NPULses| PDUTy|NDUTy| FRR|FFF|FOVshoot|RPREshoot|BWIDth|FRF|F FR| LRR|LRF|LFR|LFF|MaxTime|MinTime|PPhaseTi me| NPhaseTime|Variance|PPulseCount|NPulseCou nt| PEdgeCount|PEdgeCount|TrigerCount>	–

Instructions

None

Return format

The query returns the current measurement in scientific notation.

Example

:MEASure:ITEM CHANnel1, VPP /* Turn on CH1 double peak measurement */
:MEASure:ITEM? OVERshoot,CHANnel2 /* Query returns 8.888889e-03 */

3.13 Auxiliary command subsystem

The :SYSTem command is used to set system settings such as sound and language.

3.13.1 :SYSTem:GAM?

Command format

:SYSTem:GAM?

Functional description

Query the number of horizontal grids on the screen.

Parameter

None

Instructions

None

Return format

The query returns 16 fixedly.

Example

None

3.13.2   :SYSTem: LANGuage

Command format

:SYSTem:LANGuage <lang>
:SYSTem:LANGuage?

Functional description

Set and query the language of the system.

Parameter

Name	Type	Range	Default value
<lang>	Discrete	{SCHinese|ENGLish}	–

Instructions

Language settings are not affected by restoring factory defaults (sending *RST).

Return format

The query returns SCHinese or ENGLish.

Example

:SYSTem:LANGuage SCHinese   /* Set the system language to Simplified Chinese */
:SYSTem:LANGuage?   /* Query returns SCHinese*/

3.13.3   :SYSTem:RAM?

Command format

:SYSTem:RAM?

Functional description

Query the number of analog channels of the instrument.

Parameter

None

Instructions

None

Return format

The query returns 4 fixedly.

Example

None

3.14 Horizontal system command subsystem

The :TIMebase command is used to set the horizontal system and horizontal timebase mode.

3.14.1 :TIMebase[:MAIN]:OFFSet

Command format

:TIMebase[:MAIN]:OFFSet <offset>
:TIMebase[:MAIN]:OFFSet?

Functional description

Set and query the primary time base offset. The default unit is s.

Parameter

Name	Type	Range	Default value
<offset>	Real	Refer to the Instructions	0

Instructions

The range of <offset> is related to the current horizontal timebase mode
(see :TIMebase:MODE) and operating state of the oscilloscope.
- YT mode
- RUN: (-0.5 × MemDepth/SampleRate) to1s（When the horizontal timebase is less than 200ms/div） (-0.5 × MemDepth/SampleRate) to (10 × MainScale)（When the horizontal timebase is equal to or greater than 200ms/div，i.e., slow scan mode）
- STOP：(-MemDepth/SampleRate) to (1s + 0.5 × MemDepth/SampleRate)
- Roll mode
- RUN: This command is unavailable.

- STOP: (-12 x MainScale) to 0. MemDepth is the current storage depth, SampleRate is the current sampling rate, and MainScale is the current gear of the primary time base.
- When the horizontal base mode is YT and the horizontal base is 200ms/div or greater (i.e., slow scan mode), this command is not available during the stop of the oscilloscope.

Return format

The query returns the primary time base offset in scientific notation.

Example

0.0002: TIMebase: MAIN: OFFSet   /* Set the primary time base offset to 20ms*/
:TIMebase:MAIN:OFFSet?   /* Query returns 2.0000000e-04 */

3.14.2   :TIMebase[:MAIN]:SCALe

Command format

:TIMebase[:MAIN]:SCALe <scale>
:TIMebase[:MAIN]:SCALe?

Functional description

Set and query the primary base gear. The default unit is s/div.

Parameter

Name	Type	Range	Default value
<scale>	Real	YT mode: 5ns/div to 50s/div, 1-2-5 step size Roll mode: 200ms/div to 50s/div, 1-2-5 step size	1 µs/div

Instructions

When the horizontal base mode is YT and the horizontal base is 200ms/div or greater (i.e., slow scan mode), this command is not available during the stop of the oscilloscope.

Return format

The query returns primary time base gear in scientific count form.

Example

: TIMebase: MAIN: SCALe (0.0002)   /* Set the primary base gear to 200µs/div*/
:TIMebase:MAIN:SCALe?   /* Query returns 2.0000000e-04 */

3.14.3　:TIMebase:MODE

Command format

:TIMebase:MODE <mode>
:TIMebase:MODE?

Functional description

Set or query the horizontal timebase mode.

Parameter

Name	Type	Range	Default value
<mode>	Discrete	{MAIN|XY|ROLL}	MAIN

Instructions

MAIN: YT mode
XY: XY mode
ROLL: Roll mode

Return format

The query returns MAIN, XY, or ROLL.

Example

:TIMebase:MODE XY　　　/* Set the horizontal base mode to XY */
:TIMebase:MODE?　　　　/* Query returns XY*/

3.15　Trigger command subsystem

The :TRIGger command is used to set the trigger system.

3.15.1　:TRIGger:MODE

Command format

:TRIGger:MODE <mode>
:TRIGger:MODE?

Functional description

Select or query the trigger mode.

Parameter

Name	Type	Range	Default value
<mode>	Discrete	<EDGe|PULSe|VIDeo|SLOPe|TIMeout>	EDGE

Instructions

None

Return format

The query returns EDGe, PULSe, VIDeo, SLOPe or TIMeout.

Example

:TRIGger:MODE   SLOPe   /* Set the trigger mode to slope trigger */
:TRIGger:MODE?   /* Query returns SLOPe*/

3.15.2   :TRIGger:STATus?

Command format

:TRIGger:STATus?

Functional description

Query the current trigger status.

Parameter

None

Instructions

- TD: The oscilloscope waveform data trigger effectively.
- WAIT: The oscilloscope is waiting to trigger.
- AUTO: The oscilloscope runs automatically.
- STOP: The oscilloscope is stopped running.

Return format

Query returns TD, WAIT, AUTO, or STOP.

Example

:TRIGger:STATus?   /* Query returns STOP*/

3.15.3   :TRIGger:SWEep

Command format

:TRIGger:SWEep <sweep>
:TRIGger:SWEep?

Functional description

Set and query the trigger type.

Parameter

Name	Type	Range	Default value
<sweep>	Discrete	{AUTO|NORMal|SINGle}	AUTO

Instructions

● AUTO: The waveform is displayed automatically regardless of whether the trigger conditions are met.
● NORMal: If the trigger conditions are met, the new waveform will be displayed. If the trigger conditions are not met, the original waveform will stay on the screen and wait for the next trigger.
● SINGle: The oscilloscope waits for the trigger and displays the waveform when the trigger condition is met, and then stops.

Return format

The query returns AUTO, NORMal, or SINGle.

Example

:TRIGger:SWEep SINGle   /* Select the single trigger type*/
:TRIGger:SWEep?   /* Query returns SINGle*/

3.15.4   :TRIGger:HOLDoff

Command format

:TRIGger:HOLDoff <value>
:TRIGger:HOLDoff?

Functional description

Set or query the hold-off time. The default unit is s.

Parameter

Name	Type	Range	Default value
<value>	Real	8ns to 10s	20ns

Instructions

Trigger hold-off stably triggers complex waveforms (e.g., pulse series). Hold-off time refers to the time for the oscilloscope to restart the trigger circuit, the oscilloscope will not trigger before the end of the hold-off time.
This item is unavailable when the trigger mode is video trigger or timeout trigger.

Return format

The query returns the hold-off time in scientific notation.

Example

: the TRIGger HOLDoff 0.0000002   /* Set the hold-off time to 200ns*/
:TRIGger:HOLDoff?   /* Query returns 2.000e-07 */

3.15.5   :TRIGger:EDGe:SOURce

Command format

:TRIGger:EDGe:SOURce <source>
:TRIGger:EDGe:SOURce?

Functional description

Set and query the trigger source for edge triggers.

Parameter

Name	Type	Range	Default value
<source>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

The digital probe must be connected to oscilloscope when a digital channel is used as a trigger source channel.

Return format

Query returns CHANnel1, CHANnel2, CHANnel3, CHANnel4.

Example

:TRIGger:EDGe:SOURce CHANnel1   /* Set the trigger source to CHANnel1*/
:TRIGger:EDGe:SOURce?   /* Query returns CHANnel1*/

3.15.6 :TRIGger:EDGe:SLOPe

Command format

:TRIGger:EDGe:SLOPe <slope>
:TRIGger:EDGe:SLOPe?

Functional description

Set or query the edge type for edge triggers.

Parameter

Name	Type	Range	Default value
<slope>	Discrete	{RISIng|FALLing|EITHer}	RISIng

Instructions

RISIng: Rising edge
FALLing: Falling edge
EITHer: Rising edge or falling edge

Return format

The query returns RISIng, FALLing, EITHer.

Example

:TRIGger:EDGe:SLOPe FALLing   /* Set the edge type to falling edge */
:TRIGger:EDGe:SLOPe?   /* Query returns FALLing*/

3.15.7 :TRIGger:EDGe:LEVel

Command format

:TRIGger:EDGe:LEVel <level>
:TRIGger:EDGe:LEVel?

Functional description

Set or query the trigger level for edge trigger, in units consistent with the current amplitude of the selected source.

Parameter

Name	Type	Range	Default value
<level>	Real	(-5×VerticalScale-OFFSet) to (5× VerticalScale-OFFSet)	0

Instructions

This command is valid only when the selected source is an analog channel.

Return format

The query returns the trigger level value in scientific notation.

Example

: the TRIGger: EDGe: LEVel 0.16   /* Set the trigger level to 160mV*/

:TRIGger:EDGe:LEVel?   /* 1.60000001 */ is returned

3.15.8   :TRIGger:PULSe:SOURce

Command format

:TRIGger:PULSe:SOURce <source>

:TRIGger:PULSe:SOURce?

Functional description

Set or query the trigger source of pulse-width triggers.

Parameter

Name	Type	Range	Default value
<source>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

The digital probe must be connected to oscilloscope when the digital channel is used as a trigger source channel.

Return format

The query returns CHAN1, CHAN2, CHAN3, and CHAN4.

Example

:TRIGger:PULSe:SOURce CHANnel1   /* Set the trigger source to CH1*/

:TRIGger:PULSe:SOURce?   /* Query returns CHANnel1*/

3.15.9   :TRIGger:PULSe:POLarity

Command format

:TRIGger:PULSe:POLarity <polarity>
:TRIGger:PULSe:POLarity?

Functional description

Set or query the trigger polarity of pulse width triggers.

Parameter

Name	Type	Range	Default value
<polarity>	Discrete	{POSItive	NEGAtive}	POSItive

Instructions

POSItive: positive pulse trigger
NEGAtive: negative pulse trigger

Return format

The query returns POSItive or NEGAtive.

Example

:TRIGger:PULSe:POLarity POSItive   /* Set positive pulse trigger */
:TRIGger:PULSe:POLarity?   /* Query returns POSItive*/

3.15.10 :TRIGger:PULSe:WHEN

Command format

:TRIGger:PULSe:WHEN <when>
:TRIGger:PULSe:WHEN?

Functional description

Set or query the trigger condition for pulse width trigger.

Parameter

Name	Type	Range	Default value
<when>	Discrete	{ EQUAl| NEQUal| GREAt| LESS }	GREAt

Instructions

- EQUAl = (equal to the time value) : Trigger when the positive or negative pulse width of the input signal equals the set pulse width. [Pulse width error is 5%]
- NEQUal!= (not equal to the time value) : Trigger when the positive pulse width or negative pulse width of the input signal is not equal to the set pulse width. [Pulse width error is 5%].

- GREAt > (greater than the time value) : Trigger when the positive or negative pulse width of the input signal is greater than the set pulse width. [Pulse width error is 5%].
- LESS < (less than the time value) : Trigger when the positive or negative pulse width of the input signal is less than the set pulse width. [Pulse width error is 5%].

Return format

The query returns EQUAI, NEQUaI, GREAt, LESS.

Example

:TRIGger:PULSe:WHEN LESs   /* Set the trigger condition to LESs*/
:TRIGger:PULSe:WHEN?   /* Query returns LESS*/

3.15.11   :TRIGger:PULSe:WIDTh

Command format

:TRIGger:PULSe:WIDTh <width>
:TRIGger:PULSe:WIDTh?

Functional description

Set or query the value of pulse width when pulse width trigger occurs. The default unit is s.

Parameter

Name	Type	Range	Default value
<width>	Real	8ns to 10s	20ns

Instructions

This command applies to trigger conditions.

Return format

The query returns the pulse width value in scientific notation.

Example

: the TRIGger PULSe, WIDTh of 0.000003   /* Set the pulse width to 3µs*/
:TRIGger:PULSe:WIDTh?   /* Query returns 3.000000e-06 */

3.15.12   :TRIGger:PULSe:LEVel1

Command format

:TRIGger:PULSe:LEVel <level>
:TRIGger:PULSe:LEVel?

Functional description

Set or query the trigger level when pulse width trigger occurs, in unit consistent with the current amplitude.

Parameter

Name	Type	Range	Default value
<level>	Real	(-5 $\times$ Verticalscale-offset) to (5 $\times$ Verticalscale-offset)	0

Instructions

This command is valid only when the selected source is an analog channel.

Return format

The query returns the trigger level value in scientific notation.

Example

: the TRIGger PULSe: LEVel 0.16   /* Set the trigger level to 160mV*/
:TRIGger:PULSe:LEVel?   /* Query returns 1.600000e-01 */

3.15.13 :TRIGger:SLOPe:SOURce

Command format

:TRIGger:SLOPe:SOURce <source>
:TRIGger:SLOPe:SOURce?

Functional description

Set or query the trigger source of slope trigger.

Parameter

Name	Type	Range	Default value
<source>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

Can only be analog channel trigger.

Return format

CHAN1, CHAN2, CHAN3, or CHAN4 are displayed.

Example

:TRIGger:SLOPe:SOURce CHANnel2   /* Sets the trigger source to CH2*/
:TRIGger:SLOPe:SOURce?   /* Query returns CHAN2*/

3.15.14   :TRIGger:SLOPe:POLarity

Command format

:TRIGger:SLOPe:POLarity <polarity>
:TRIGger:SLOPe:POLarity?

Functional description

Set and query the trigger slope of slope trigger.

Parameter

Name	Type	Range	Default value
<polarity>	Discrete	{POSItive	NEGAtive}	POSItive

Instructions

POSItive: Rising
NEGAtive: Falling

Return format

The query returns POSItive or NEGAtive.

Example

:TRIGger:SLOPe:POLarity POSItive   /* Set the rising slope */
:TRIGger:SLOPe:POLarity?   /* Query returns POSItive*/

3.15.15   :TRIGger:SLOPe:WHEN

Command format

:TRIGger:SLOPe:WHEN <when>
:TRIGger:SLOPe:WHEN?

Functional description

Set or query the trigger condition of slope trigger.

Parameter

Name	Type	Range	Default value
<when>	Discrete	{ EQUAl| NEQUal| GREAt| LESS }	GREAt

Instructions

- EQUAl = (equal to the time value) : Trigger when the positive or negative pulse width of the input signal equals the set pulse width. [Pulse width error is 5%]
- NEQUal != (not equal to the time value) : Trigger when the positive pulse width or negative pulse width of the input signal is not equal to the set pulse width. [Pulse width error is 5%].
- GREAt > (greater than the time value) : Trigger when the positive or negative pulse width of the input signal is greater than the set pulse width. [Pulse width error is 5%].
- LESS < (less than the time value) : Trigger when the positive or negative pulse width of the input signal is less than the set pulse width. [Pulse width error is 5%].

Return format

The query returns EQUAl, NEQUal, GREAt, LESS.

Example

:TRIGger:SLOPe:WHEN LESs   /* Set the trigger condition to LESs*/
:TRIGger:SLOPe:WHEN?   /* Query returns LESS*/

3.15.16   :TRIGger:SLOPe:TIME0

Command format

:TRIGger:SLOPe:TIME <time>
:TRIGger:SLOPe:TIME?

Functional description

Set or query the time value when the slope trigger occurs. The default unit is s.

Parameter

Name	Type	Range	Default value
<time>	Real	8ns to 10s	20ns

Instructions

This command applies to trigger conditions.

Return format

The query returns the time value in scientific notation.

Example

: the TRIGger: SLOPe: TIME of 0.000003   /* Set time to 3μs*/

:TRIGger:SLOPe:TIME?   /* Query returns 3.000000e-06 */

3.15.17   :TRIGger:SLOPe:ALEVel

Command format

:TRIGger:SLOPe:ALEVel <level>

:TRIGger:SLOPe:ALEVel?

Functional description

Set or query the upper level for slope trigger, in unit consistent with the current amplitude.

Parameter

Name	Type	Range	Default value
<level>	Real	(-5 $\times$ Verticalscale-offset) to (5 $\times$ Verticalscale-offset)	2V

Instructions

This command is valid only when the selected source is an analog channel.

Return format

The query returns the trigger level in scientific notation.

Example

: the TRIGger: SLOPe: ALEVel 0.16   /* Set the trigger level to 160mV*/

:TRIGger:SLOPe:ALEVel?   /*Query returns 1.600000e-01*/

3.15.18   :TRIGger:VIDeo:SOURce

Command format

:TRIGger:VIDeo:SOURce <source>

:TRIGger:VIDeo:SOURce?

Functional description

Select or query the trigger source of video trigger.

Parameter

Name	Type	Range	Default value
<source>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

None

Return format

The query returns CHAN1, CHAN2, CHAN3, or CHAN4.

Example

:TRIGger:VIDeo:SOURce CHANnel2   /* Set the trigger source to CH2*/
:TRIGger:VIDeo:SOURce?   /* Query returns CHAN2*/

3.15.19   :TRIGger:VIDeo:POLarity

Command format

:TRIGger:VIDeo:POLarity <polarity>
:TRIGger:VIDeo:POLarity?

Functional description

Select or query the video polarity when the video trigger occurs.

Parameter

Name	Type	Range	Default value
<polarity>	Discrete	{POSitive|NEGative}	POSitive

Instructions

None

Return format

The query returns POS or NEG.

Example

:TRIGger:VIDeo:POLarity POSitive   /* Set the video polarity to positive */
:TRIGger:VIDeo:POLarity?   /* Query returns POS*/

3.15.20 :TRIGger:VIDeo:MODE

Command format

:TRIGger:VIDeo:MODE <mode>
:TRIGger:VIDeo:MODE?

Functional description

Set or query the synchronization type when the video trigger occurs.

Parameter

Name	Type	Range	Default value
<mode>	Discrete	{SCAN_LINE|LINE_NUM|ODD_FIELD|EVEN_FIELD|ALL_FIELD}	SCAN_LINE

Instructions

- ODD_FIELD: Triggered at the rising edge of the first sawtooth wave in an odd field.
- EVEN_FIELD: Triggered at the rising edge of the first sawtooth wave in an even field.
- LINE: For NTSC and PAL video standards, triggered on specified lines of odd or even fields.
- ALL_LINE: Triggered on all horizontal sync pulses.

Return format

The query returns SCAN_LINE, LINE_NUM, ODD_FIELD, EVEN_FIELD or ALL_FIELD.

Example

:TRIGger:VIDeo:MODE ODD_FIELD   /* Set synchronization type to odd fields */
:TRIGger:VIDeo:MODE?   /* Query returns ODD_FIELD */

3.15.21 :TRIGger:VIDeo:LINE

Command format

:TRIGger:VIDeo:LINE <line>
:TRIGger:VIDeo:LINE?

Functional description

Set or query the number of lines when the video trigger occurs and the synchronization type is LINE.

Parameter

Name	Type	Range	Default value
<line>	Integer	Refer to the Instructions	1

Instructions

1 to 525 (NTSC)
1 to 625 (PAL)
1 to 750 (720P)
1 to 1125 (1080P/1080i).

Return format

The query returns an integer.

Example

:TRIGger:VIDeo:LINE 100   /* Set the number of lines to 100*/
:TRIGger:VIDeo:LINE?   /* Query returns 100*/

3.15.22   :TRIGger:VIDeo:STANdard

Command format

:TRIGger:VIDeo:STANdard <standard>
:TRIGger:VIDeo:STANdard?

Functional description

Set or query the video standards of the video trigger.

Parameter

Name	Type	Range	Default value
<standard>	Discrete	{PAL|NTSC|720P|1080P|1080I}	NTSC

Instructions

PAL: frame frequency is 25 frames per second, TV scan line is 625 lines, odd field is in the front, even field is behind. SECAM: Frame rate is 25 frames per second, TV scan line is 625 lines, interlaced scanning.
NTSC: The field frequency is 60 fields per second and the frame rate is 30 frames per second. The TV scan line is 525 lines, even field is in the front, odd field is behind.
720P: The frame rate is 60 frames per second, the TV scan line is 625 lines, scanning line by line.
1080P: The frame rate is 60 frames per second, and the TV scan line is 625 lines,

scanning line by line.

1080i: The frame rate is 60 frames per second, and the TV scan line is 625 lines, scanning line by line.

Return format

The query returns PALS, NTSC, 720P, 1080P, or 1080i.

Example

:TRIGger:VIDeo:STANdard NTSC   /* Select video standard NTSC */
:TRIGger:VIDeo:STANdard?   /* Query returns NTSC*/

3.15.23   :TRIGger:VIDeo:LEVel

Command format

:TRIGger:VIDeo:LEVel <level>
:TRIGger:VIDeo:LEVel?

Functional description

Set or query the trigger level of video trigger, in unit consistent with the current amplitude.

Parameter

Name	Type	Range	Default value
<level>	Real	(-5 × Verticalscale-offset) to (5 × Verticalscale-offset)	0

Instructions

This command is valid only when the selected source is an analog channel.

Return format

The query returns the trigger level in scientific notation.

Example

: the TRIGger: VIDeo: LEVel 0.16   /* Set the trigger level to 160mV*/
:TRIGger:VIDeo:LEVel?   /*Query returns 1.600000e-01*/

3.15.24   :TRIGger:TIMeout:SOURce

Command format

:TRIGger:TIMeout:SOURce <source>

:TRIGger:TIMeout:SOURce?

Functional description

Set or query the trigger source of timeout trigger.

Parameter

Name	Type	Range	Default value
<source>	Discrete	{CHANnel1|CHANnel2|CHANnel3|CHANnel4}	CHANnel1

Instructions

The digital probe must be connected to oscilloscope when a digital channel is used as a trigger source channel.

Return format

The query returns CHANnel1, CHANnel2, CHANnel3, or CHANnel4.

Example

:TRIGger:TIMeout:SOURce CHANnel2   /* Set the trigger source to CH2*/
:TRIGger:TIMeout:SOURce?   /* Query returns CHANnel2*/

3.15.25   :TRIGger:TIMeout:TIMe

Command format

:TRIGger:TIMeout:TIMe <NR3>
:TRIGger:TIMeout:TIMe?

Functional description

Set or query the timeout period of timeout trigger. The default unit is s.

Parameter

Name	Type	Range	Default value
<NR3>	Real	20ns to 10s	20ns

Instructions

None

Return format

The query returns the timeout period in scientific notation.

Example

: the TRIGger: TIMeout: TIMe of 0.002   /* Set the timeout to 2ms*/

:TRIGger:TIMeout:TIMe?   /* Query returns 2.000000e-03 */

3.15.26   :TRIGger:TIMeout:LEVel

Command format

:TRIGger:TIMeout:LEVel <level>

:TRIGger:TIMeout:LEVel?

Functional description

Set and query the trigger level of timeout trigger.

Parameter

Name	Type	Range	Default value
<level>	Real	(-5 × VerticalScale - OFFSet) to (5 × VerticalScale - OFFSet)	0

Instructions

This command is valid only when the selected source is an analog channel.

Return format

The query returns the trigger level value in scientific notation.

Example

:TRIGger:TIMeout:LEVel   0.16   /* Set the trigger level to 160mV*/

:TRIGger:TIMeout:LEVel?   /* Query returns 1.600000e-01*/

3.16   Waveform reading command subsystem

The :WAVeform command is used to read waveform data and related settings.

3.16.1   :WAVeform:DATA:ALL?

Command format

:WAVeform:DATA:ALL?

Functional description

Read waveform data.

Parameter

None

Instructions

Process for reading waveform data

1: WAV: DATA: ALL? Read the acquisition parameters of the oscilloscope.

2: WAV: DATA: ALL? Read valid waveform data.

Note: The total data length must be read.

: The first time this command is sent,

data [x] is parsed as follows

data [0]-data[1] (2 digits): #9

data [2]-data[10](9 digits): indicates the length of the current packet in bytes

data [11]-data[19](9 digits): indicates the total length of data in bytes.

data [20]-data[28](9 digits): indicates the length of uploaded data.

data [29](1 digit): indicates the current operating status

data [30](1 digit) : indicates the trigger state

data [31]- data [34] (4 digits) : indicates the offset of channel 1

data [35]-data[38] (4 digits) : indicates the offset of channel 2

data [39]- data [42] (4 digits) : indicates the offset of channel 3

data [43]- data [46] (4 digits) : indicates the offset of channel 4

data [47]- data [53] (7 digits) : indicates the voltage of channel 1

data [54]- data [60] (7 digits) : indicates the voltage of channel 2

data [61]- data [67] (7 digits) : indicates the voltage of channel 3

data [68]- data [74] (7 digits) : indicates the voltage of channel 4

data [75]- data [78] (4 digits) : indicates the channel status

data[75]

0 indicates oscilloscope channel 1 and oscilloscope channel 2 closed.

1 indicates oscilloscope channel 2 open.

2 indicates oscilloscope channel 1 open.

3 indicates oscilloscope channel 1 and oscilloscope channel 2 open.

data[76]

0 indicates oscilloscope channel 3 and oscilloscope channel 4 closed.

1 indicates oscilloscope channel 4 open.

2 indicates oscilloscope channel 3 open.

3 indicates oscilloscope channel 3 and oscilloscope channel 4 open.

data[77]

0 indicates digital channel 1 and digital channel 2 closed.

1 indicates digital channel 2 open.

2 indicates digital channel 1 open.

3 indicates digital channel 1 and digital channel 2 open.

data[78]

0 indicates digital channel 3 and digital channel 4 closed.

1 indicates digital channel 4 open.

2 indicates digital channel 3 open.

3 indicates digital channel 3 and digital channel 4 open.

data [79]- data [87] (9 digits) : indicates the sampling rate

data [88]- data [93] (6 digits) : indicates the sampling multiple

data [94]- data [102] (9 digits) : indicates the trigger time of the current frame

data [103]-data[111] (9 digits) : indicates the start time of data collection of the current frame

data [112]- data [127] (16 digits) : reserved bits

Before finishing reading data, run this command again,

the waveform data[x] is parsed as follows

data [0]-data[1] (2 digits) : #9

data [2]-data[10](9 digits): indicates the length of the current packet in bytes

data [11]-data[19](9 digits): indicates the total length of data in bytes

data [20]-data[28](9 digits): indicates the length of the uploaded data in bytes

data [29]-data[x]: indicates the waveform data corresponding to the current data header

Return format

Return a waveform package containing a data header as a string.

Example

None

3.17   [:SOURce[<n>]] command subsystem

The [:SOURce[<n>]] command is used to set parameters related to the built-in signal source. When <n> is 1, it indicates the corresponding built-in signal source channel. When <n> or :SOURce[<n>] is omitted, the operation is performed on signal source1 by default.

It can be set only for the machine with the signal source function.

3.17.1   [:SOURce[<n>]]:OUTPut[<n>][:STATe]

Command format

[:SOURce[<n>]]:OUTPut[<n>][:STATe] <bool> [:SOURce[<n>]]:OUTPut[<n>][:STATe]?

Functional description

Enables or disables the output of the a specified signal channel, or queries the output status of a specified signal channel.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by

Name	Type	Range	Default value
			default.
<bool>	Boolean	{1, ON | 0, OFF}	0

Instructions

This command requires hardware to support the signal source. Without the signal source, the command is invalid.

Return format

The query returns OFF or ON.

Example

:SOURce1:OUTPut 1   /* Enable the output of source 1 */
:SOURce1:OUTPut?   /* Query returns ON*/

3.17.2   [:SOURce[<n>]]:OUTPut[<n>]:IMPedance

Command format

[:SOURce[<n>]]:OUTPut[<n>]:IMPedance <impedance>
[:SOURce[<n>]]:OUTPut[<n>]:IMPedance?

Functional description

Set or query the impedance of the specified source channel.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<impedance>	Discrete	{OMEG|FIFTy}	OMEG

Instructions

OMEG: high resistance;
Looking: 50Ω;

Return format

The query returns OMEG or FIFT.

Example

:SOURce1:OUTPut:IMPedance FIFTy   /* Set the output impedance of source 1 to 50Ω*/

:SOURce1:OUTPut:IMPedance?   /* Query returns FIFT*/

3.17.3 [:SOURce[<n>]]:FREQuency

Command format

[:SOURce[<n>]]:FREQuency[:FIXed] <frequency>
[:SOURce[<n>]]:FREQuency[:FIXed]?

Functional description

If the modulation of a specified signal channel is not enabled, this command is used to set or query the output frequency of the specified signal channel. If the modulation is enabled, this command is used to set or query the carrier frequency of the specified signal channel. The default unit is Hz.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<frequency>	Real	Maximum: 0.1Hz to 25MHz. The maximum frequencies of different waveform outputs are different.	1kHz

Instructions

This command requires hardware to support the signal source. Without the signal source, the command is invalid.

Return format

The query returns a frequency value in scientific notation, such as 2.0000000e+05.

Example

:SOURce1:FREQuency 1000   /* Set the output frequency of source 1 to 1kHz*/
:SOURce1:FREQuency?   /*Query returns 1.0000000e+03*/

3.17.4 [:SOURce[<n>]]:FUNCtion

Command format

[:SOURce[<n>]]:FUNCtion[:SHAPe] <wave>
[:SOURce[<n>]]:FUNCtion[:SHAPe]?

Functional description

This command is used to select or query the output signal waveform.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<wave>	Discrete	{SIN|SQU|RAMP|NOIS|DC|ARB1|ARB2|ARB3|ARB4 }	SIN

Instructions

To use ARB waveforms, the arbitrary waveforms must be edited and downloaded into internal storage space first.

Return format

The query returns SIN, SQU, RAMP, NOIS, DC, ARB1, ARB2, ARB3, ARB4.

Example

:SOURce1:FUNCtion SQU   /* Set the output waveform of source 1 to square wave */
:SOURce1:FUNCtion?   /* Query returns SQU*/

3.17.5   [:SOURce[<n>]]:FUNCtion:RAMP:SYMMetry

Command format

[:SOURce[<n>]]:FUNCtion:RAMP:SYMMetry <val>
[:SOURce[<n>]]:FUNCtion:RAMP:SYMMetry?

Functional description

Set and query the symmetry of the square wave output from a specified source channel, that is, the percentage of the period in which the square wave is rising.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<val>	Real	0 to 100	50

Instructions

None

Return format

The query returns the current symmetry in scientific notation, such as 5.000000e+01.

Example

:SOURce1:FUNCtion:RAMP:SYMMetry 50 /* Set the symmetry of source 1 square wave to 50%*/
:SOURce1:FUNCtion:RAMP:SYMMetry?   /* return 5.000000e+01*/

3.17.6   [:SOURce[<n>]]:VOLTage

Command format

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude] <Amplitude>
[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]?

Functional description

Set or query the amplitude of the output signal from a specified signal channel. The default unit is Vpp.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<Ampliude>	Real	Related to the current output impedance High resistance: 0Vpp to 6Vpp 50Ω: 0Vpp to 3Vpp	0.2 Vpp

Instructions

Send [:SOURce[<n>]]:OUTPut[<n>]:IMPedance command to set the output impedance.

Return format

The query returns an amplitude value in scientific notation, such as 1.0000000e+00.

Example

:SOURce1:VOLTage 2   /* Set the output amplitude of source 1 to 2V*/

:SOURce1:VOLTage?   /* query returns 2.0000000e+00*/

3.17.7   [:SOURce[<n>]]:OFFSet

Command format

[:SOURce[<n>]]:VOLTage[:LEVel] [:IMMediate]:OFFSet <offset>
[:SOURce[<n>]]:VOLTage[:LEVel] [:IMMediate]:OFFSet?

Functional description

Set or query the DC offset of the output signal from a specified signal channel. The default unit is VDC.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<offset>	Real	Related to the current output impedance and amplitude High resistance :(-3V+ current amplitude /2) to (3V - current amplitude /2) 50Ω:(-1.5V+current amplitude/2) to (1.5V- current amplitude/2)	0μVDC

Instructions

Send [:SOURce[<n>]]:OUTPut[<n>]:IMPedance command to set the impedance.
Send [:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude] command to set the amplitude.

Return format

The query returns a DC offset in scientific notation, such as 1.0000000e+00.

Example

:SOURce1:VOLTage:OFFSet 0.5   /*set the DC offset of source 1 to 500mVDC*/
:SOURce1:VOLTage:OFFSet?   /*Query returns 5.0000000e-01*/

3.17.8   [:SOURce[<n>]]:PULSe:DCYCle

Command format

[:SOURce[<n>]]:PULSe:DCYCle <percent>
[:SOURce[<n>]]:PULSe:DCYCle?

Functional description

Set or query the duty cycle of the pulse output from a specified source channel, i.e., the percentage of the high level in a pulse cycle.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<percent>	Real	0 to 100	50

Instructions

None

Return format

The query returns the current duty cycle in scientific notation, such as 5.000000e+01.

Example

:SOURce1:PULSe:DCYCle 50   /* Set the duty cycle of source 1 pulse to 50%*/
:SOURce1:PULSe:DCYCle?   /* Query returns 5.000000e+01*/

3.17.9   [:SOURce[<n>]]:MOD[:STATe]

Command format

[:SOURce[<n>]]:MOD[:STATe] <bool>
[:SOURce[<n>]]:MOD[:STATe]?

Functional description

Enable or disable the modulation of a specified signal channel, or query the modulation status of a specified signal channel.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<bool>	Boolean	{{1|ON}|{0|OFF}}	0|OFF

Instructions

DPO6000/MPO signal source support AM,FM.PM,PWM.

Sine wave, square wave, sawtooth wave, built - in wave, or arbitrary wave of non-DC signal can be used as carrier wave.

Return format

The query returns OFF or ON.

Example

:SOURce1:MOD ON   /* Enable source 1 modulation */

:SOURce1:MOD?   /* Query returns ON*/

3.17.10 [:SOURce[<n>]]:MOD:TYPe

Command format

[:SOURce[<n>]]:MOD:TYPe <type>

[:SOURce[<n>]]:MOD:TYPe?

Functional description

Set or query the modulation type of a specified signal source channel.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<type>	Discrete	{AM|FM}	AM

Instructions

AM: Amplitude modulation, that is, the amplitude of the carrier wave changes with the amplitude of the modulated wave. FM: Frequency modulation, that is, the frequency of the carrier wave changes with the amplitude of the modulated wave.

Sine wave, square wave, sawtooth wave, built - in wave, or arbitrary wave of non-DC signal can be used as carrier wave.

Sine wave, square wave, triangle wave and noise can be selected as the modulation waveform.

Return format

The query returns AM or FM.

Example

:SOURce1:MOD:TYPe AM   /* Set the modulation type of source 1 to AM*/

:SOURce1:MOD:TYPe?   /* Query returns AM*/

3.17.11 [: SOURce [< n >]] : MOD: AM: INTernal: FREQuency (FM)

Command format

[:SOURce[<n>]]:MOD:AM:INTernal:FREQuency <frequency>
[:SOURce[<n>]]:MOD:AM:INTernal:FREQuency?
[:SOURce[<n>]]:MOD:FM:INTernal:FREQuency <frequency>
[:SOURce[<n>]]:MOD:FM:INTernal:FREQuency?

Functional description

Set and query the AM or FM modulated frequency of a specified source channel. The default unit is Hz.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<frequency>	Real	1 Hz to 50KHz	1kHz

Instructions

The [:SOURce[<n>]]:MOD:TYPe command can be used to set the modulation type.
AM: Amplitude modulation, that is, the amplitude of the carrier wave changes with the amplitude of the modulated wave. FM: Frequency modulation, that is, the frequency of the carrier wave changes with the amplitude of the modulated wave.
Sine wave, square wave, triangle wave and noise can be selected as the modulation wave. Send the command [:SOURce[<n>]]:MOD:AM:INTernal:FUNCtion or [:SOURce[<n>]]:MOD:FM:INTernal:FUNCtion to select.

Return format

The query returns an integer.

Example

:SOURce1:MOD:AM:INTernal:FREQuency 100   /* Set the AM modulated wave frequency of source 1 to 100Hz*/
:SOURce1:MOD:AM:INTernal:FREQuency?   /* Query returns 100*/

3.17.12 [:SOURce[<n>]]:MOD:AM:INTernal:FUNCtion (FM)

Command format

[:SOURce[<n>]]:MOD:AM:INTernal:FUNCtion <wave>
[:SOURce[<n>]]:MOD:AM:INTernal:FUNCtion?
[:SOURce[<n>]]:MOD:FM:INTernal:FUNCtion <wave>
[:SOURce[<n>]]:MOD:FM:INTernal:FUNCtion?

Functional description

Set or query the AM and FM modulated waves of a specified source channel.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<wave>	Discrete	{SIN|SQUAre|RAMP}	SIN

Instructions

Sine wave (SIN), square wave (SQUAre) and triangle wave (RAMP) can be selected as modulation wave. Send the command[:SOURce[<n>]]:MOD:AM:INTernal:FREQuency or
[:SOURce[<n>]]:MOD:FM:INTernal:FREQuency to set the frequency of the selected modulation wave.
Send the command [:SOURce[<n>]]:MOD:TYPe to set the modulation type.
AM: Amplitude modulation, that is, the amplitude of the carrier wave changes with the amplitude of the modulated wave.
FM: Frequency modulation, that is, the frequency of the carrier wave changes with the amplitude of the modulated wave.

Return format

The query returns SIN, SQUAre, RAMP.

Example

:SOURce1:MOD:AM:INTernal:FUNCtion SQUare   /* Set the AM modulation waveform of source 1 to square wave */
:SOURce1:MOD:AM:INTernal:FUNCtion?   /* Query returns SQUAre*/

3.17.13 [:SOURce[<n>]]:MOD:AM[:DEPTh]

Command format

[:SOURce[<n>]]:MOD:AM[:DEPTh] <depth>

[:SOURce[<n>]]:MOD:AM[:DEPTh]?

Functional description

Set or query the AM modulation depth of a specified signal channel. Modulation depth indicates the intensity of amplitude modulation, expressed as a percentage.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<depth>	Real	0 to 100	100

Instructions

When the modulation depth is 0%, the output amplitude is half that of the carrier signal. When the modulation depth is 100%, the output amplitude is equal to the carrier signal amplitude. When the modulation depth is greater than 100%, envelope distortion will occur, which must be avoided in the actual circuit. At this moment, the output of the instrument will not exceed 5 Vpp (load is 50Ω).

Return format

The query returns an integer.

Example

:SOURce1:MOD:AM 80   /* Set the AM modulation depth of source 1 to 80%*/

:SOURce1:MOD:AM?   /* Query returns 80*/

3.17.14   [:SOURce[<n>]]:MOD:FM[:DEVIation]

Command format

[:SOURce[<n>]]:MOD:FM[:DEVIation] <dev> [:SOURce[<n>]]:MOD:FM[:DEVIation]?

Functional description

Set or query the FM frequency offset of a specified source channel. The default unit is Hz.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1

Name	Type	Range	Default value
			by default.
<dev>	Real	0.1Hz to the currently set carrier frequency	1kHz

Instructions

Send the command [:SOURce[<n>]]:FREQuency[:FIXed] to set the carrier frequency.
Send the command [:SOURce[<n>]]:MOD:FM:INTernal:FREQuenc to set FM frequency.
When the amplitude of the modulated wave reaches its maximum value, the frequency of the carrier increases by "frequency offset", and when the amplitude of the modulated wave reaches its minimum value, the frequency of the carrier decreases by "frequency offset".
The FM frequency offset can be set only when the FM modulation type is currently selected for the specified source channel.

Return format

The query returns an integer.

Example

:SOURce1:MOD:FM 100   /* Set the FM frequency offset of the source 1 to 100Hz*/
:SOURce1:MOD:FM?   /* Query returns 100*/

3.17.15 [:SOURce[<n>]]:BURSt

Command format

[:SOURce[<n>]]:BURSt <cnt>
[:SOURce[<n>]]:BURSt?

Functional description

Set or query the number of burst output cycles of a signal source.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<cnt>	Real	0 to 2^19	1

Instructions

None

Return format

The query returns the current duty cycle in scientific notation, such as 5.000000e+01.

Example

:SOURce1:BURSt:CNT 50   /* The number of trigger output of source 1 is set to 50*/

:SOURce1:BURSt:CNT?   /* Query returns 50*/

3.17.16   [:SOURce[<n>]]:BURSt:SRC

Command format

[:SOURce[<n>]]:BURSt:SRC <soruce>

[:SOURce[<n>]]:BURSt:SRC?

Functional description

Set or query the trigger source of a specified signal source channel.

Parameter

Name	Type	Range	Default value
<n>	Discrete	{1}	When omitted, operations are performed on source 1 by default.
<soruce>	Discrete	{DSO}	DSO

Instructions

None

Return format

The query returns DSO, MANU.

Example

:SOURce1:BURSt:SRC DSO   /* Set the signal source trigger to oscilloscope trigger */

:SOURce1:BURSt:SRC?   /* Query returns DSO*/

3.18   CONFigure: command subsystem

The CONFigure command enables you to set and query a multimeter on the multimeter interface.

Only for the machines with the multimeter function.

3.18.1 CONFigure:<FUNC>

Command format

CONFigure:<FUNC>
CONFigure: FUNC?

Functional description

Set or query the multimeter gear.

Parameter

Name	Range
<FUNC>	{DCV|DCMV|ACV|DCA|DCMA|ACA|ACMA|CAPAcitance |CONTinuity|DIODe|RESIstance}

Instructions

None

Return format

Returned by the query
{DMM_TYPE_DC_V|DMM_TYPE_DC_MV|DMM_TYPE_AC_V|DMM_TYPE_DC_A|
DMM_TYPE_DC_MA|DMM_TYPE_AC_A|DMM_TYPE_AC_MA|DMM_TYPE_RESI|
DMM_TYPE_CAPA|
DMM_TYPE_DIODE | DMM_TYPE_BEEP}.

Example

CONFigure:CAPAcitance   /* Set the multimeter to capacitance */
CONFigure: FUNC?   /* Query returns DMM_TYPE_CAPA*/

3.18.2 CONFigure:DATA?

Command format

CONFigure:DATA?

Functional description

Read the measured value from the multimeter.

Parameter

None

Instructions

None

Return format

The query is returned.

Example

CONFigure:DATA?   /* Query is returned*/