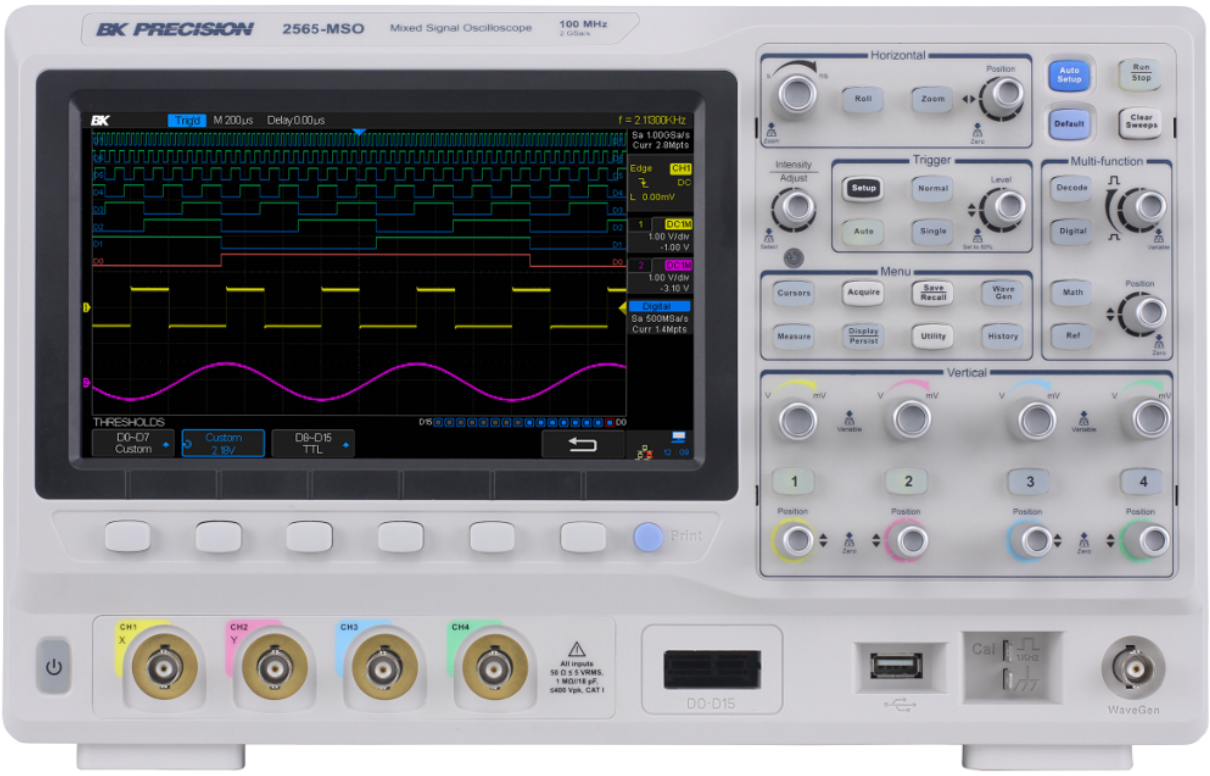
2560 Series

Oscilloscope



Programming Manual

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SCPI Commands

General syntax for SCPI commands or query is a ":" (colon) separated string with either a "?" or an argument following the command string separated by a SPACE character. Commands are terminated by the linefeed character (0x10). Arguments are listed using "<ARG ARG ... >" in the following descriptions. The "ARG" will be from **Table 1.1**.

Symbol	Format
<NR1>	Number with an implicit decimal point at the end. Ex. 100
<NR2>	Number with an explicit decimal point. Ex. 100.5
<Boolean>	Boolean value. Ex. 0 - OFF - 1 - ON
<STR>	String value. Ex. ON, MEASurement

Table 1.1 Number Formats

Most commands have a long and short format, the capitalized portion of the name is the short form, and the complete name is the long form. For example, the FETch can be sent as either "fet" or fetch. Short and long forms may be mixed in a command string. An optional portion of a command is shown within "[ ]".

1.1 Example query command – Read the serial number

```
``
XX.XX   SYStem
XX.XX.YY  SERial?
''
```

This command is in the SYStem section of the SCPI command set. The command is a "query" command and will return a string containing the serial number. As a "query" it must end with a "?".
Command string: "sys:ser? n" OR "system:serial? n" OR "sys:serial? n" etc...

1.2 Example value set command

```
``
XX.XX   SYStem
XX.XX.YY  SERial?
''
```

1.3 Example value query command

" XX.XX SYStem XX.XX.YY SERial? "

Acquisition

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2.1 ACQuire_Way, ACQW

Description The ACQUIRE_WAY command specifies the acquisition mode. The ACQUIRE_ WAY? Query returns the current acquisition mode.

Command Syntax ACQUIRE_WAY <mode>[,<time>]

Parameters

Parameter	Values
<mode>	SAMPLING ,PEAK_DETECT, AVERA GE, HIGH_RES
<time>	4, 16, 32, 64, 128, 256, 512, etc

Query Syntax ACQUIRE_WAY?

Response Format ACQUIRE_WAY <mode>[,<time>]

Example ACQW AVERAGE,16
Sets the acquisition mode to average mode,and also sets the average time to 16.

Related Commands AVGA, PDE, STATUS

Note

1. The [HIGH_RES] option of mode is applicable for **SPO** models.
2. The <time> parameter only can be set with the average acquisition mode. And its options varies with model.

2.2 Auto_SETup, ASET

Description The AUTO_SETUP command attempts to identify the waveform type and automatically adjusts controls to produce a usable display of the input signal.

Command Syntax AUTO_SETUP

Example The following command instructs the oscilloscope to perform an auto-setup: ASET

Related Commands AUTTS

2.3 AUTo_TypeSet, AUTTS

Description The AUTO_TYPESET command selects the specified type of automatically adjusting which is used to display.

Command Syntax AUTO_TYPESET <str>

Parameters

Parameter	Values
SP	only one period to be displayed
MP	multiple periods to be displayed
RS	waveform is triggered on the rise side
DRP	waveform is triggered on the drop side
RC	go back to the state before auto set

Query Syntax AUTO_TYPESET?

Response Format AUTO_TYPESET <str>
Same as above.

Example The following command sets the type of automatic adjustment to multiple periods: AUTTS MP

Related Commands ASET

2.4 AVeraGe_Acquire, AVGA

Description The AVERAGE_ACQUIRE command selects the average times of average acquisition. The response to the AVERAGE_ACQUIRE query indicates the times of average acquisition.

Command Syntax AVERAGE_ACQUIRE <time>

Query Syntax AVERAGE_ACQUIRE?

Response Format AVERAGE_ACQUIRE <time>

Example The following turns the average times of average acquisition 16: Command message: AVGA 16

Note The <time> parameter's options vary with model.

2.5 BandWidth_Limit, BWL

Description BANDWIDTH_LIMIT enables or disables the bandwidth-limiting low-pass filter. If the bandwidth filters are on, it will limit the bandwidth to reduce display noise. When you turn Bandwidth Limit ON, the Bandwidth Limit value is set to 20 MHz. It also filters the signal to reduce noise and other unwanted high frequency components. The response to the BANDWIDTH_LIMIT? Query indicates whether the bandwidth filters are on or off.

Command Syntax BandWidth_Limit <channel>, <mode> [, <channel>, <mode> [, <channel>, <mode> [, <channel>, <mode>]]]

Parameters <channel> = C1, C2, C3, C4
<mode> = ON, OFF

Query Syntax BandWidth_Limit?

Response Format BandWidth_Limit <channel>, <mode> [,<channel>,<mode> [, <channel>, <mode> [,<channel>,<mode>]]]

Example The following turns on the bandwidth filter for all channels, when Global_BWL is on (as it is by default)
The following turns the bandwidth filter on for Channel 1 only: BWL C1, ON

2.6 CouPLing, CPL

Description The COUPLING command selects the coupling mode of the specified input channel. The COUPLING? query returns the coupling mode of the specified channel.

Command Syntax <channel>: CouPLing <coupling>

Parameters

Parameter	Values
<channel>	C1, C2, C3, C4
<coupling>	A1M, A50, D1M, D50, GND

The A of the <coupling> is alternating current. The D of the <coupling> is direct current.1M and 50 is the impedance of input. Some series (CML) couldn't have the set of input impedance.

Query Syntax <channel>: CouPLing?

Response Format <channel>: CouPLing <coupling>

Example The following command sets the coupling of Channel 2 to 50 ΩDC: C2: CPL D50

Related Commands CURSOR

Note The options of <coupling> vary with models. If your oscilloscope is SPO model, the options are A1M, A50, D1M, D50, GND, otherwise the options are A1M, D1M, GND.

2.7 FoRce_TRigger, FRTR

Description Causes the instrument to make one acquisition.

Command Syntax FoRce_TRigger

Example Either of the following pairs of instruction make one acquisition:
message1: TRMD SINGLE;ARM;FRTR
message2: TRMD STOP;ARM;FRTR

Related Commands MASS STORAGE

2.8 InterLeaVeD, ILVD

Description The INTERLEAVED command enables or disables random interleaved sampling (RIS) for timebase settings where both single shot and RIS mode are available. The response to the INTERLEAVED? Query indicates whether the oscilloscope is in RIS mode.

Command Syntax InterLeaVeD <mode>

Parameters ON, OFF

Query Syntax InterLeaVeD?

Response Format InterLeaVeD <mode>

Example The following instructs the oscilloscope to use RIS mode: ILVD ON

Related Commands TIME_DIV, TRIG_MODE

Note This command is suitable for not SPO models.

2.9 MaTh_Vert_Pos, MTVP

Description The MATH_VERT_POS command controls the vertical position of the math waveform with specified source. The FFT waveform isn't included. But we have another command which called VPOS to control its vertical position. The response to the MATH_VERT_POS? query indicates the value of the vertical position of the math waveform.

Command Syntax MATH_VERT_POS <position>

Parameters <position>:= the position is related to the position of the screen center. For example, if we set the position of MTVP to 50. The math waveform will be displayed 1 grid up to the vertical center of the screen. Namely one grid is 50.

Query Syntax MATH_VERT_POS?

Response Format MATH_VERT_POS <position>

Example The following instruction changes the vertical position of the math waveform to 1 grid up to the screen vertical centre: MTVP 50

2.10 MaTh_Vert_Div, MTVD

Description The MATH_VERT_DIV command controls the vertical sensitivity of the math waveform of specified source. We can only set the value of existing The FFT waveform isn't included.
The response to the MATH_VERT_DIV? query indicates the specified scale of math waveform of specified source.

Command Syntax MATH_VERT_DIV <scale>

Parameters <scale> = 1PV/div - 100V/div.

Query Syntax MATH_VERT_DIV?

Response Format MATH_VERT_DIV <scale>

Example The following instruction changes the vertical sensitivity of the math waveform of specified source to 1V/div: MTVD 1V

2.11 MEAsure_Delay, MEAD

Description The MEASURE_DELY command selects the type of delay measure. The response to the MEASURE_DELY? query indicates the type of delay measure.

Command Syntax Format1: MEASURE_DELAY <source>,<type>
Format2: MEASURE_DELAY SOURCE,<source>,TYPE,<type>

Parameters <source>:= C1-C2, C1-C3, C1-C4, C2-C3, C2-C4, C3-C4
<type>:=PHA,FRR,FRF,FFR,FFF,LRR,LRF,LFR, LFF
The PHA is phase, the others are the same as the specified type of the instrument's delay measure.

Query Syntax MEAsure_Delay? <type>

Response Format MEASURE_DELY SOURCE,<mode>,TYPE,<type>

Example The following instruction sets the type of delay measure to phase between C1 and C2: MEAD SOURCE,C1-C2,TYPE,PHA

Note This command varies with series, so there are two formats. The format1 is suitable for SPO models, and format2 is suitable for not SPO models.

2.12 OFfSeT, OFST

Description The OFFSET command allows adjustment of the vertical offset of the specified input channel. The maximum ranges depend on the fixed sensitivity setting. If an out-of-range value is entered, the oscilloscope is set to the closest possible value and the VAB bit (bit 2) in the STB register is set. The OFFSET? query returns the offset value of the specified channel.

Command Syntax <channel>: OFfSeT <offset>

Parameters <channel> : = C1, C2, C3,C4
<offset> : = See the oscilloscope's specifications.

Query Syntax <channel>:OFfSeT?

Response Format <channel>:OFfSeT <offset>

Example The following command sets the offset of Channel 2 to -3 V: C2: OFST -3V

2.13 PEAK_DETECT, PDET

Description The PEAK_DETECT command switches ON or OFF the peak detector built into the acquisition system. The PEAK_DETECT? query returns the current status of the peak detector.

Command Syntax Peak_DETect <state>

Parameters <state> ON, OFF

Query Syntax Peak_DETect?

Response Format PDET <state>

Example The following instruction turns on the peak detector: PDET ON

2.14 STOP

Description The STOP command immediately stops the acquisition of a signal. If the trigger mode is AUTO or NORM.

Query Syntax STOP

Example The following stops the acquisition process: *STOP
Response message: *STB 0

Related Commands ARM_ACQUISITION, TRIG_MODE, WAIT

2.15 SAMPLE_STATUS,SAST

Description The SAST? query the acquisition status of the scope.

Query Syntax SAST?

Response Format SAST <status>

Example The following command reads the acquisition status of the scope: SAST?
Response message: SAST trig'd

2.16 SAMPLE_RATE,SARA

Description The SARA? query returns the sample rate of the scope.

Query Syntax SARA?

Response Format SARA<value>

Example The following command reads the sample rate of the scope: SARA?
Response message: SARA 500.0kSa

2.17 SAMPLE_RATE,SANU

Description The SANU? query returns the number of sampled points available from last acquisition and the trigger position.

Query Syntax SANU? <channel>

Response Format SANU <value>

Example The following command reads the number of sampled points available from last acquisition from the Channel 2. SANU? C2
Response message: SANU 6000

2.18 SKEW,SKEW

Description The SKEW command sets the skew value of the specified trace. The response to the SKEW? query indicates the skew value of the specified trace.

Command Syntax <trace>:SKEW <skew>

Parameters <trace> C1,C2,C3,C4
<skew>: = it is a value about time.

Query Syntax <trace>:SKEW?

Response Format <trace>:SKEW <skew>

Example The following command sets channel 1 skew value to 3ns C1:SKEW 3NS

2.19 SINXX_SAMPLE, SXSA

Description The SINXX_SAMPLE command sets the way of interpolation. The response to the SINXX_SAMPLE? query indicates the way of interpolation.

Command Syntax SINXX_SAMPLE, <state>

Parameters <state> ON,OFF
ON means sine interpolation, and OFF means linear interpolation

Query Syntax SINXX_SAMPLE?

Response Format SINXX_SAMPLE <state>

Example The following instruction sets the way of the interpolation to sine interpolation: SXSA ON

2.20 TIME_DIV,TDIV

Description The TIME_DIV command modifies the timebase setting. The new timebase setting may be specified with suffixes: NS for nanoseconds, US for microseconds, MS for milliseconds, S for seconds, or KS for kiloseconds. An out-of-range value causes the VAB bit (bit 2) in the STB register to be set. The TIME_DIV? query returns the current timebase setting.

Command Syntax Time_DIV <value>

Parameters <value> Seconds

Query Syntax Time_DIV?

Response Format Time_DIV <value>

Example The following sets the time base to 500 s /div: TDIV 500US

Related Commands TRIG_DELAY, TRIG_MODE

2.21 *TRG

Description The *TRG command executes an ARM command.

Command Syntax *TRG

Example The following command enables signal acquisition: *TRG

Related Commands ARM_ACQUISITION, STOP, WAIT

2.22 TRIG_COUPLING, TRCP

Description The TRIG_COUPLING command sets the coupling mode of the specified trigger source. The TRIG_COUPLING? query returns the trigger coupling of the selected source.

Command Syntax <trig_source>: TRig_CouPling <trig_coupling>

Parameters <trig_source> = C1, C2, C3, C4, EX, EX5, LINE
<trig_coupling> = AC,DC,HFREJ,LFREJ

Query Syntax <trig_source>: TRig_CouPling?

Response Format <trig_source>: TRig_CouPling <trig_coupling>

Example The following command sets the coupling mode of the trigger source Channel 2 to AC: C2: TRCP AC

Related Commands TRIG_COUPLING, TRIG_DELAY, TRIG_LEVEL, TRIG_MODE, TRIG_SELECT, TRIG_SLOPE

2.23 TRIG_DELAY, TRDL

Description The TRIG_DELAY command sets the time at which the trigger is to occur with respect to the first acquired data point. This mode is called pre-trigger acquisition, as data are acquired before the trigger occurs. Negative trigger delays must be given in seconds. This mode is called post-trigger acquisition, as the data are acquired after the trigger has occurred. If a value outside the range, the trigger time will be set to the nearest limit and the VAB bit (bit 2) will be set in the STB register. The response to the TRIG_DELAY? query indicates the trigger time with respect to the first acquired data point.

Command Syntax TRig_DeLay <value>

Parameters <value> = the range of value is related to the timebase.

Response Format TRig_DeLay <value>

Example The following command sets the trigger delay to -2ms (posttrigger): TRDL -2MS

Related Commands TIME_DIV, TRIG_COUPLING, TRIG_LEVEL, TRIG_MODE, TRIG_SELECT, TRIG_SLOPE

Query Syntax TRig_DeLay?

Note The suffix S is optional and assumed.

2.24 TRIG_LEVEL, TRLV

Description The TRIG_LEVEL command adjusts the trigger level of the specified trigger source. An out-ofrange value will be adjusted to the closest legal value and will cause the VAB bit (bit 2) in the STB register to be set. The TRIG_LEVEL? query returns the current trigger level.

Command Syntax <trig_source>: TRig_LeVel <trig_level>

Parameters <trig_source> = C1, C2, C3, C4, EX, EX5
<trig_level>: = -4.5DIV* volt/div to 4.5DIV * volt/div

Query Syntax <trig_source>: TRig_LeVel?

Response Format <trig_source>: TRig_LeVel <trig_level>

Example The following code adjusts the trigger level of Channel 3 to 52.00mv: C3:TRig_LeVel 52.00mv

Related Commands TRIG_COUPLING, TRIG_DELAY, TRIG_MODE, TRIG_SELECT, TRIG_SLOPE

Note The suffix V is optional and assumed.

2.25 TRIG_LEVEL2, TRLV2

Description The TRIG_LEVEL2 command adjusts the second trigger level of the specified trigger source. An out-of-range value will be adjusted to the closest legal value and will cause the VAB bit (bit 2) in the STB register to be set. The TRIG_LEVEL? query returns the current trigger level.

Command Syntax <trig_source>: TRig_LeVel2 <trig_level>

Parameters <trig_source> = C1, C2, C3, C4, EX, EX5
<trig_level>: = -4.5DIV* volt/div to 4.5DIV * volt/div

Query Syntax <trig_source>: TRig_LeVel2?

Response Format <trig_source>: TRig_LeVel <trig_level>

Example The following code adjusts the trigger level of Channel 3 to 52.00mv:
Command message:
C3:TRig_LeVel 52.00mv

Related Commands TRIG_COUPLING, TRIG_DELAY, TRIG_MODE, TRIG_SELECT, TRIG_SLOPE

Note The suffix V is optional and assumed.
This command is suitable for not SPO models.

2.26 TRIG_MODE, TRMD

Description The TRIG_MODE command specifies the trigger mode. The TRIG_MODE? query returns the current trigger mode.

Command Syntax TRig_MoDe <mode>

Parameters <mode> = AUTO, NORM, SINGLE,STOP

Query Syntax TRig_MoDe?

Response Format TRig_MoDe <mode>

Example The following selects the normal mode: TRMD NORM

Note The suffix V is optional and assumed.
STOP is a part of the option of this command, but is not a trigger mode of the instrument.

Related Commands ARM_ACQUISITION, STOP, TRIG_SELECT, TRIG_COUPLING, TRIG_LEVEL, TRIG_SLOP

2.27 TRIG_SELECT, TRSE

Description The TRIG_SELECT? query returns the current trigger condition.
The TRIG_SELECT command selects the condition that will trigger the acquisition of waveforms. Depending on the trigger type, additional parameters must be specified. These additional parameters are grouped in pairs. The first in the pair names the variable to be modified, while the second gives the new value to

be assigned. Pairs may be given in any order and restricted to those variables to be changed.

Parameter	Values
EDGE	Edge
GLIT	Glitch
HV	Hold Value
HT	Hold Type
IL	Interval Larger
INTV	Interval
IS	Interval Smaller
PL	Pulse Larger
PS	Pulse Smaller
SR	Source
TI	Time
TV	TV
CHAR	CHAR
LPIC	LPIC
LINE	Line

Command Syntax TRig_SElect <trig_type>,SR,<source>,HT,<hold_type>,HV,<hold_value>

Parameters

Parameter	Values
trig_type	EDGE, GLIT, SLEW, INTV
source	C1, C2, C3, C4, LINE, EX, EX5
hold_type	TI, PS, PS, PL, P2, IS, IL, I2, OFF, EV
hold_value	see the user manual for values

Command Syntax (TV) Format1 (SPO Models): TRig_SElect TV, SR, <source>, FLDC, <field_count>, FLD, <field>, CHAR, <characteristics>, IPIC, <ipic>, ILAC, <ilace>, LINE, <line>
Format2 (Non-SPO models): TRig_SelEct TV, SR, <source>, CHAR, <characteristicse>, POL, <polarity>, SYNC, <sync_type>, LINE, <line>

Parameters Format 1:

Parameter	Values
trig_type	TV
source	C1, C2, C3, C4
field_count	1, 2, 4, 8
field	1 to field count
characteristics	NTSC, PALSEC, 720P/50, 720P/60, 1080P/50, 1080P/60, 1080I/50, 1080I/60, CUSTOM
lpic	1 to 1500
ilace	1, 2, 4, 8
line	1 to 525 (PALSEC) 1 to 625(NTSC)

Format 2:

Parameter	Values
trig_type	TV
source	is used to set the trigger's channel. If you want to set the other option.You must set it. <source> = C1, C2, C3,C4,EX, EX5
polarity	is used to set polarity, If you want to set it. You must set <trig_type> to TV. <polarity>: = PO,NE PO means positive. NE means negative.
characteristics	is used to set the standard .if you want to set it, the <trig_type> must be set to TV. <characteristics> = NTSC, PALSEC
sync_type	is used to set sync. If you want to set it. You must set <trig_type> to TV <sync_type> = AL,LN,OF,EF AL means all lines; LN means line num; OF means odd field; EF means even field.
line	is used to set the line num. if you want to set it. The SYNC must be set to LINENUM
vertical	is used to set vertical. If you Want to set it. You must set <trig_type> SLEW <vertical> = UP,DOWN,BOTH

Query Syntax TRig_SElect?

Response Format TRig_Select <trig_type>, SR, <source>, HT, <hold_type>, HV, <hold_value>

Example The following selects the EDGE trigger with Channel 1 as trigger source. Hold type and holdvalue are chosen as "time" and 1.43US: TRSE EDGE, SR, C1, HT, TI, HV, 1.43US

Note The <hold type> varies with models. If your oscilloscope is SPO models, hold type's options are TI,PS,PL,P2,IS,IL, else ,hold type's options are TI, PS, PL,PE, IS, IL,IE.

Related Commands TRIG_COUPLING, TRIG_DELAY, TRIG_LEVEL, TRIG_MODE, TRIG_SLOPE

2.28 TRIG_SLOPE, TRSL

Description The TRIG_SLOPE command sets the trigger slope of the specified trigger source. The TRIG_SLOPE? query returns the trigger slope of the selected source.

Command Syntax <trig_source>: TRig_SLope <trig_slope>

Parameters <trig_source> = C1, C2, C3, C4, EX,EX5
<trig_slope> = NEG,POS,WINDOW

Query Syntax <trig_source>: TRig_Slope?

Response Format <trig_source>: TRig_Slope <trig_slope>

Example The following sets the trigger slope of Channel 2 to negative: C2: TRSL NEG

Related Commands TRIG_COUPLING,TRIG_DELAY,TRIG_LEV EL,TRIG_MODE,TRIG_SELECT, TRIG_SLOPE

2.29 TRIG_WINDOW, TRWI

Description The TRIG_WINDOW command sets the relative height of the two trigger line of the trigger window type. The TRIG_WINDOW? query returns relative height of the two trigger line of the trigger window type.

Command Syntax TRig_WIndow <value>

Parameters <value>: -4.5DIV* volt/div to 4.5DIV * volt/div

Query Syntax TRig_WIndow?

Response Format TRig_WIndow <value>

Example The following sets the relative height of the two trigger line of the trigger window type to 2V: TRWI 2V

Related Commands TRIG_LEVEL, TRIG_LEVEL2, TRIG_SE, TRIG_PATTERN, TRPA

2.30 TRIG_PATTERN

Description The TRIG_PATTERN command condition of the pattern trigger.
The TRIG_ PATTERN? query returns the condition of the pattern trigger.

Command Syntax TRig_Pattern <source>, <status>[, <source>, <status>][, <source>, <status>] [,<source>,<status>], STATE, <condition>

Parameters

Parameter	Values
source	C1, C2, C3, C4
status	X, L, H
condition	AND, OR, NAND, OR

Query Syntax TRig_PAttern?

Response Format TRig_Pattern <source>, <status>, <source>, <status>, <source>, <status>, <source>, <status>

Example The following sets the channel 2 and channel 3 to low and the condition to AND: TRPA C2,L,C3,L,STATE,AND

Related Commands TRIG_LEVEL, TRIG_LEVEL2,TRIG_SELECT

Note This command is suitable for SPO models.

2.31 UNIT, UNIT

Description The UNIT command sets the unit of the specified trace. The UNIT query returns the unit of the specified trace.

Command Syntax <channel>: UNIT <type>

Parameters <channel> = C1, C2, C3, C4
<type> = V,A

Query Syntax <channel> : UNIT?

Response Format <channel>: UNIT <type>

Example The following command sets the unit of the channel 1 to V: C1: UNIT V

2.32 VOLT_DIV, VDIV

Description The VOLT_DIV command sets the vertical sensitivity in Volts/div. The VAB bit (bit 2) in the STB register is set if an out-of-range value is entered.
The VOLT_DIV query returns the vertical sensitivity of the specified channel.

Command Syntax <channel>: Volt_DIV <v_gain>

Parameters <channel> = C1, C2, C3, C4
<v_gain> = 2mV to 10V

Query Syntax <channel>:Volt_DIV?

Response Format <channel>:Volt_DIV <v_gain>

Example The following command sets the vertical sensitivity of channel 1 to 50 mV/div: C1: VDIV 50MV

Note The suffix V is optional.

2.33 VERTICAL, VTCL

Description The VERTICAL command controls the vertical position of the slope trigger line. It is related to the TRSE command. The VERT option of the TRSE command changes the controlling type of the slopes trigger line. When the slope trigger lines are both controlled, the vertical position of the slope trigger line is the up one's position. The VERTICAL query returns the vertical position of the slope trigger line.

Command Syntax <channel>: VERTICAL <pos>

Parameters <channel> = C1, C2, C3, C4
<pos> = the position is related to the screen vertical center. For example, if we set the vertical position of the slope trigger line to 25, it will be displayed 1 grid up to the screen vertical center. Namely one grid is 25.

Query Syntax <channel>:VERTICAL?

Response Format <channel>:VERTICAL <pos>

Example The following command sets the vertical position of the slope trigger line to 25 that what is the distance from the up of centre about 1 grid : C1: VTCL 25

Related Commands TRSE

2.34 WAIT,WAIT

Description The WAIT command prevents the instrument from analyzing new commands until the oscilloscope has completed the current acquisition. The instrument will be waiting for trigger or the limit time over (if we set it) or the device time out when we sent this command

Command Syntax WAIT <time>

Example If we move the trigger level of the source to the position where the trace isn't triggered. Then we send an ARM command to set the trigger mode to single. Finally we send the WAIT command. The instrument will be waiting for triggering until the time over (if we set it) or time out. If we move the trigger level of the source, and the instrument is triggered. Then we send an ARM command to set the trigger mode to single. Finally we send the WAIT command. The WAIT command will be finished if we send a FRTR for triggering: WAIT

Note This command have two ways to use. One sets the limited time, another one doesn't set the limited time.

Waveform Transfer

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3.1 Get_CSV, GCSV

Description The response to the GET_CSV? Query indicates current waveform of CSV format. The GET_CSV? query have option to set. They are the same as the options of CSVS.

Query Syntax Format1: GET_CSV? SAVE,<state>
The option SAVE is that if the waveform data have parameters.
<state> = OFF,ON
Format2: GET_CSV? DD,<DD>,SAVE,<state>
The option DD is the data depth of the CSV format waveform. The option SAVE is that if the waveform data have parameters. <DD> = (MAX, DIS) the meaning of MAX is that the CSV waveform's depth is maximum. The meaning of DIS is that CSV waveform's depth is the data which is displayed on the screen.

Parameter	Values
STATE	OFF, ON
DD	MAX, DIS

Response Format the waveform data of CSV format

Example The following command transfers the waveform data of CSV format to the controller. It has parameters information.
Foramt1: GET_CSV? SAVE,ON
Foramt2: GET_CSV? DD,DIS,SAVE,ON

Note This command varies with models, so there are two formats. If you oscilloscope can set the data depth of CSV file which will be saved, you should use Format2, otherwise you should use Format1.

3.2 STOre, STO

Description The STORE command stores the contents of the specified trace into the current directory in a USB memory device.

Command Syntax STOre <trace>

Parameters

Parameter	Value(s)
trace	TA, TB, TC, TD, C1, C2, C3, C4,ALL_DISPLAYED
destination	UDSK

Example The following command stores the contents of Channel 1(C1) into USB memory device: STO C1, UDSK
The following command stores all currently displayed waveforms onto the USB memory device: STO ALL_DISPLAYED, UDSK The following command stores the contents of Channel 1(C1) into Memory 1 (M1): STO C1, M1

Note If the STORE command is sent without any argument, and the current trace isn't enabled, the current trace will be enabled and stored in the Store Setup. This setup can be modified using the STORE_SETUP command.
The <dest> parameter is vary with oscilloscope's models. If your oscilloscope is not SPO models , this parameter's options are (M1-M10 (or M20 in the CFL series), UDSK). If your oscilloscope is SPO model, this parameter's option is (UDSK).

Related Commands STORE_SETUP, RECALL

3.3 STore_SeTup, STST

Description The STORE_SETUP command controls the way in which traces will be stored. A single trace or all displayed traces may be enabled for storage.

Command Syntax STore_SeTup [<trace>, <dest>]

Parameters

Parameter	Values
trace	C1,C2,C3,C4,ALL_DISPLAYED
dest	UDSK

Query Syntax STore_SeTup?

Response Format STore_SeTup <trace>, <dest>

Example The following command selects Channel 1 to be stored: STST C1, UDSK

Related Commands STORE,INR

Note The <dest> parameter is vary with oscilloscope's models. If your oscilloscope is not SPO models, it's options are (M1-M10 (or M20 in the CFL series), UDSK). If your oscilloscope is SPO models, it's option is (UDSK).

3.4 TeMPLate, TMPL

Description The TEMPLATE? query produces a copy of the template that describes the various logical entities making up a complete waveform. In particular, the template describes in full detail the variables contained in the descriptor part of a waveform.

Query Syntax TeMPLate?

Response Format TeMPLate "<template>" <template>: = A variable length string detailing the structure of a waveform.

Related Commands WF

3.5 WAVEFORM,WF

Description A WAVEFORM? Query transfers a waveform from the oscilloscope to the controller. A waveform consists of several distinct entities:

1. the descriptor (DESC)
2. the auxiliary data (DAT1) block
3. the main data (DAT2) block

The WAVEFORM? Query instructs the oscilloscope to transmit a waveform to the controller. The entities may be queried independently. If the "ALL" parameter is specified,all four or five entities are transmitted in one block in the order enumerated above.

Query Syntax <trace>: WaveForm? [<section>]

Parameters

Parameter	Values
trace	C1,C2,C3,C4
section	DESC, DAT1, DAT2

Response Format <trace>: WaveForm <waveform_data_block>

Example The following command reads waveform data block of Channel 2: C2: WF?

Related Commands WAVEFORM_SETUP

Note The format of the waveform data depends on the current settings specified by the last WAVEFORM_SETUP command. The format of the waveform data can be seen by the TEMPLATE? Query.

3.6 WAVEFORM_SETUP, WFSU

Description The WAVEFORM_SETUP command specifies the amount of data in a waveform to be transmitted to the controller. The command controls the settings of the parameters listed below.

- FP

  First Point

- SP

  Sparsing (SP): The sparsing parameter defines the interval between data points. For example:
  SP = 0 sends all data points
  SP = 1 sends all data points
  SP = 4 sends every 4th data point

- NP

  Number of points (NP): The number of points parameter indicates how many points should be transmitted. For example:
  NP = 0 sends all data points
  NP = 1 sends 1 data point
  NP = 50 sends a maximum of 50 data points
  NP = 1001 sends a maximum of 1001 data points

Command Syntax Usage1: WaveForm_SetUp SP,<sparsing>,NP,<number>, FP, <point>
Usage2: WaveForm_SetUp TYPE,<len>

Parameters <len> = 0, 1

Query Syntax WaveForm_SetUp?
The WAVEFORM_SETUP? query returns the transfer parameters currently in use.

Response Format WaveForm_SetUp SP,<sparsing>,NP,<number>,FP,<point>

Example The following command specifies that every 3rd data point (SP=3) starting at address 200 should be transferred: WFSU SP, 3, FP, 200

Related Commands

Note For SPO models, you can use the usage2 to control the returned waveform data, 0 means all waveform data of screen, 1 means all waveform data of memory depth.
Parameters are grouped in pairs. The first of the pair names the variable to be modified, whilst the second gives the new value to be assigned. Pairs may be given in any order and may be restricted to those variables to be changed.
After power-on ,SP is set to 4,NP is set to 100,and FP is set to 0.

Function

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4.1 COUNTER,COUN

Description The COUNTER command enables or disables the cymometer display on the screen of instrument. The response to the COUNTER? query indicates whether the cymometer is displayed on the screen of instrument.

Command Syntax COUNTER <state>

Parameters <state> := ON, OFF

Query Syntax COUNTER?

Response Format COUNTER <state>

Example The following command enables the cymometer display: COUN ON

Note This command is suitable for not SPO models.

4.2 CYMOMETER, CYMT

Description The response to the CYMOMETER? query is the value of cymometer which displaying on the screen of the instrument. When the signal frequency is less than 10Hz, it returns 10Hz.

Query Syntax CYMOMETER?

Response Format CYMOMETER <option>

Example The following instruction returns the value of cymometer which displaying on the screen of the instrument: cymometer?
Response message: CYMT 10Hz

4.3 DATE

Description The DATE command changes the date/time of the oscilloscope's internal real-time clock. The command is only used in the CFL series instrument.

Command Syntax DATE <day>, <month>, <year>, <hour>, <minute>, <second>

Parameters

Parameter	Values
day	1-31
month	JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP,OCT, NOV, DEC
year	1990-2089
hour	0-23
minute	0-59
second	0-59

Query Syntax DATE?

Response Format DATE <day>, <month>, <year>, <hour>, <minute>, <second>

Example This instruction will change the date to NOV. 1, 2009 and the time to 14:38:16: DATE 1, NOV, 2009,14,38,16

4.4 DEFINE, DEF

Description The DEFINE command specifies the mathematical expression to be evaluated by a function.

Command Syntax DEFine EQN,''<equation>''

Equation	Name
<source1> + <source2>	Addition
<source1> - <source2>	Subtraction
<source1>*<source2>	Multiplication
<source1>/<source2>	Ratio
FFT(source x)	FFT
INTG(source x)	Integral
DIFF(source x)	Differentiator
SQRT(source x)	Square Root

Query Syntax DEFine?

Response Format DEFine EQN,'<equation>'

Example Command message: DEFine EQN,'C1*C2'

4.5 FFT_WINDOW,FFTW

Description The FFT_WINDOW command selects the window of FFT(Fast Fourier Transform algorithm). The response to the FFT_WINDOW? query indicates current window of FFT

Command Syntax FFT_WINDOW <window>

Parameters <window> := RECT,BLAC,HANN,HAMM
RECT is short for rectangle.

BLAC is short for Blackman.
HANN is short for hanning.
HAMM is short for hamming

Query Syntax FFT_WINDOW?

Response Format FFT_WINDOW,<window>

Example The following command sets the FFT window to hamming: FFTW HAMM

4.6 FFT_ZOOM,FFTZ

Description The FFT_ZOOM command selects the specified zoom of FFT. The response to the FFT_ZOOM? query indicates current zoom in/out times of FFT.

Command Syntax FFT_ZOOM <zoom>

Parameters < zoom > : = 1, 2, 5, 10

Query Syntax FFT_ZOOM?

Response Format FFT_ZOOM,<zoom>

Example The following command sets the zoom factor of FFT to 1X: FFTZ 1

4.7 FFT_SCALE,FFTS

Description The FFT_SCALE command selects the specified scale of FFT(Fast Fourier Transform algorithm). The response to the FFT_SCALE? query indicates current vertical scale of FFT waveform.

Command Syntax FFT_SCALE <scale>

Parameters < scale > : = VRMS,DBVRMS

Query Syntax FFT_SCALE?

Response Format FFT_SCALE,< scale >

Example The following command turns the vertical scale of FFT to dBVrms: FFTS DBVRMS

4.8 FFT_FULLSCREEN,FFTF

Description The FFT_FULLSCREEN command enables or disables to display the FFT waveform full screen. The response to the FFT_FULLSCREEN? query indicates whither the FFT waveform is full screen displayed.

Command Syntax FFT_FULLSCREEN <state>

Parameters < state > : = ON,OFF

Query Syntax FFT_FULLSCREEN?

Response Format FFT_FULLSCREEN < state >

Example The following command enables to display the FFT waveform full screen: FFTF ON

4.9 FILTER,FILT

Description The FILTER command enables or disables filter of the specified trace. The response to the FILTER? query indicates whether the filter of specified trace is enabled.

Command Syntax <channel>:FILTER <state>

Parameters <channel> : = C1,C2,C3,C4
<state> := ON,OFF

Query Syntax <channel>:FILTER?

Response Format <channel>:FILTER <state>

Example The following command enables the filter of channel 1: C1:FILT ON

Note This command is suitable for not SPO models.

Related Commands FILTS

4.10 FILT_SET,FILTS

Description The FILT_SET command selects the specified type of filter, and sets the limit value of filter. The response to the FILT_SET? query indicates current parameter of the filter.

Command Syntax <channel>:FILT_SET TYPE,<type>,<limit>,<limit_value>

Parameters <channel> : = C1,C2,C3,C4
<type> : = LP,HP,BP,BR
<limit> : = UPPLIMIT,LOWLIMIT

Query Syntax <channel>: FILT_SET?

Response Format <channel>:FILTER < value >

Example The following command changes the type of filter to band-pass, and sets the up-limit to 200 KHz and the low-limit to 100 KHz: TYPE,<type>,<limit>,<limit- C1:FILTS TYPE,BP, UPPLIMIT,200KHz,LOWLIMIT,100KH

Related Commands FILT

Note This command is suitable for not SPO models.
1. LP is low-pass, HP is high-pass, BP is band-pass, BR is band-reject.
2. If seted the <limit>, the <type> must be related.

4.11 MEMORY_SIZE, MSIZ

Description The MEMORY_SIZE command sets the maximal depth of memory. The response to the MEMORY_SIZE? query the maximal depth of memory.

Command Syntax MEMORY_SIZE <size>

Parameters <size> := 7K, 14K, 70K, 140K, 700K, 1.4M, 7M, 14M

Query Syntax MEMORY_SIZE?

Response Format MEMORY_SIZE <size>

Example The following instruction sets the maximal depth of memory to 14M: MSIZ 14M

Note This command is suitable for SPO models.

4.12 PF_DISPLAY,PFDS

Description The PF_DISPLAY command enables or disables to turn the test and display the message in the pass/fail option. The response to the PF_DISPLAY? query indicates whether the test is enabled and the message of pass/fail is displayed

Command Syntax PF_DISPLAY TEST,<state>,DISPLAY,<state>

Parameters <state> := ON, OFF

Query Syntax PF_DISPLAY TEST?

Response Format PF_DISPLAY TEST <state>,DISPLAY,<state>

Example The following instruction enables to turn on the test and display the message of pass/fail: PFDS TEST,ON,DISPLAY,ON

4.13 PF_SET,PFST

Description The PF_SET command sets the X mask and the Y mask of the mask setting in the pass/fail option. The response to the PF_ SET? query indicates the value of the X mask and the Y mask.

Command Syntax PF_ SET XMASK, ,YMASK,

Parameters : = 0.04div - 4.0div

Query Syntax PF_ SET?

Response Format PF_ SET XMASK, ,YMASK,

Example The following instruction sets the X mask to 0.4div and the Y mask to 0.5div of the mask setting in the pass/fail option:
PFST XMASK,0.4,YMASK,0.5

Related Commands PFSL PFST

4.14 PF_CONTROL,PFCT

Description The PF_CONTROL command controls the pass/fail controlling options: "operate", "output" and the "stop on output". See instrument's Operator Manual for these options The response to the PF_ CONTROL? query indicates the controlling options of the pass/fail.

Command Syntax PF_CONTROL TRACE,<trace>,CONTROL,<control>,OUTPUT,< output>,OUTPUTSTOP,<state>

Parameters <trace> : = C1,C2,C3,C4
<control> : = START,STOP
<output> : = FAIL,PASS
<state> : = ON,OFF

Query Syntax PF_ CONTROL?

Response Format PF_CONTROL TRACE,<trace>,CONTROL,<control>, OUTPUT,<output>,OUTPUTSTOP,<state>

Example The following instruction sets source to channel 1, "operate" to "start", "output" to "pass" and "stop on output" to "off": PFCT TRACE,C1,CONTROL,START, OUTPUT,PASS,OUTPUTSTOP,OFF

4.15 PF_CREATEM,PFCM

Description The PF_CREATEM command creates the mask of the pass/fail.

Command Syntax PF_ CREATEM

Example The following instruction creates the mask of the pass/fail: PFCM

Related Commands PFSL PFST

4.16 PF_DATADIS, PFDD

Description The PF_DATADIS? query returns the number of the fail ,pass and total number that the screen showing.

Command Syntax PF_ DATADIS?

Response Format PF_DATADIS FAIL,<num>,PASS,<num>,total,<num>

Example The following instruction returns the number of the message display of the pass/fail: PFDD FAIL,0,PASS,0,TOTAL,0

Related Commands PACL

4.17 REF_SET, REFS

Description The REF_SET command sets the reference waveform and its options. The response to the REF_ SET? query indicates whether the specified reference waveform is turned on.

Command Syntax REF _ SET TRACE,<trace>REF,<ref>,state, <state>,SAVE,DO

Parameters <trace> : = C1,C2,C3,C4,MATH
<ref> : = RA,RB,RC,RD
The Rx(x is A,B,C,D) is that which one can be stored or displayed
<state> := ON,OFF
The state enables or disables to display the specified reference waveform. If the command syntax have the option that SAVE,DO, means that the specified trace will be saved to the specified reference waveform.

Query Syntax REF _ SET? REF,<ref>

Response Format REF _ SET REF,<ref>,STATE,<state>

Example The following instruction saves the channel 1 waveform to the REFA, and turns on REFA: REFS TRACE,C1,REF,RA STATE,ON,SAVE,DO

4.18 SET50,SET50

Description The SET50 command sets the trigger level of the specified trigger source to the centre of the signal amplitude.

Command Syntax SET50

Example The following command sets the trigger level of the specified trigger source to the centre of the signal amplitude: SET50

Note This command is suitable for not SPO models.

Status

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5.1 ALL_STATUS? , ALST?

Desription The ALL_STATUS? Query reads and clears the contents of all status registers: STB, ESR, INR, DDR, CMR, EXR and URR except for the MAV bit (bit 6) of the STB register. For an interpretation of the contents of each register, refer to the appropriate status register. The ALL_STATUS? Query is useful in a complete overview of the state of the instrument.

Query Syntax ALl_STatus?

Response Format ALl_STatus STB,<value>,ESR,<value>,INR,<value>,DDR ,<value>,CMR,<value>, EXR,<value>,URR,<value>

<value> : = 0 to 65535

Example The following instruction reads the contents of all the status registers: ALST?
Response message: ALST STB, 0, ESR, 52, INR, 5, DDR, 0, CMR, 4, EXR, 24, URR, 0

Related Commands *CLS, CMR? , DDR? ,*ESR? , EXR? , *STB? , URR?

5.2 ARM_ACQUISITION, ARM

Description The ARM_ACQUISITION command enables the signal acquisition process by changing the acquisition state (trigger mode) from“stopped” to “single”.

Command Syntax ARM acquisition

Example The following command enables signal acquisition: ARM

Related Commands STOP, *TRG, TRIG_MODE, WAIT

5.3 ATTENUATION, ATTN

Description The ATTENUATION command selects the vertical attenuation factor of the probe. Values of 1, 5, 10, 50, 100, 500, and 1000 may be specified. The ATTENUATION? Query returns the attenuation factor of the specified channel.

Command Syntax <channel>: ATTeNuation <attenuation>

Parameters <channel> : = C1, C2, C3, C4
<attenuation> = 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000

Query Syntax <channel>: ATTeNuation?

Response Format <channel>: ATTeNuation <attenuation>

Example The following command sets to 100 the attenuation factor of Channel 1: C1:ATTN 100

5.4 *CLS

Description The *CLS command clears all the status data registers.

Command Syntax *CLS

Example The following command causes all the status data registers to be cleared: *CLS

Related Commands ALL_STATUS, CMR, DDR, *ESR, EXR, *STB, URR

5.5 CMR?

Description The CMR? Query reads and clears the contents of the Command error Register (CMR) see table next page—which specifies the last syntax error type detected by the instrument.

Query Syntax CMR?

Response Format CMR?
CMR <value>
<value> : = 0 to 14
Error Status Register Structure (CMR):

Value	Description
1	Unrecognized command/query header
2	Invalid character
3	Invalid separator
4	Missing parameter
5	Unrecognized keyword
6	String error
7	Parameter cannot allowed
8	Command String Too Long
9	Query cannot allowed
10	Missing Query mask
11	Invalid parameter
12	Parameter syntax error
13	Filename too long

Example The following instruction reads the contents of the CMR register: CMR?
Response message: CMR 0

Related Commands ALL_STATUS? ,*CLS

5.6 DDR?

Description The DDR? Query reads and clears the contents of the Device Dependent or device specific error Register (DDR). In the case of a hardware failure, the DDR register specifies the origin of the failure.

Query Syntax DDR?

Response Format DDR <value> <value> : = 0 to 65535

Example The following instruction reads the contents of the DDR register: DDR?
Response message: DDR 0

Related Commands ALL_STATUS? ,*CLS

5.7 *ESE

Description The *ESE command sets the Standard Event Status Enable register (ESE). This command allows one or more events in the ESR register to be reflected in the ESB summary message bit (bit 5) of the STB register.

Command Syntax *ESE <value>

Parameters <value> : = 0 to 255

Query Syntax *ESE?

Response Format *ESE <value>

Example The following instruction allows the ESB bit to be set if a user request (URQ bit 6, i.e. decimal 64) and/or a device dependent error (DDE bit 3, i.e. decimal 8) occurs. Summing these values yields the ESE register mask 64+8=72.
*ESE 72

Related Commands *ESR

5.8 *ESR?

Description The *ESR? query reads and clears the contents of the Event Status Register (ESR). The response represents the sum of the binary values of the register bits 0 to 7.

Query Syntax *ESR?

Response Format *ESER<value>
<value> : = 0 to 255

Example The following instruction reads and clears the contents of the ESR register: *ESR?
Response message: *ESR 0 ALL_STATUS, *CLS, *ESE

Bit	Name	Default	Description
8-15		0	Reserved by IEEE488.2
7	PON	1	Power OFF-to-ON transition has occured
6	URQ	1	User request issued
5	CME	1	Command parser error detected
4	EXE	1	Execution error
3	DDE	1	Device specific error
2	QYE	1	Query error
1	RQC	1	Instrument never requests bus control
0	OPC	1	Instrument never requests bus control

Related Commands

- **Bit 7: PON**

  The Power On (PON) bit is always turned on (1) when the unit is powered up.

- **Bit 6: URQ**

  The User Request (URQ) bit is set true (1) when a soft key is pressed. An associated register URR identifies which key was selected. For further details refer to the URR? query.

- **Bit 5: CME**

  The CoMmand parser Error bit (CME) is set true (1) whenever a command syntax error is detected. The CME bit has an associated CoMmand parser Register (CMR) which specifies the error code. Refer to the query CMR? for further details.

- **Bit 4: EXE**

  The EXecution Error bit (EXE) is set true (1) when a command cannot be executed due to some device condition (e.g. oscilloscope in local state) or a semantic error. The EXE bit has an associated Execution Error Register (EXR) which specifies the error code. Refer to query EXR? for further details.

- **Bit 3: DDE**

  The Device specific Error (DDE) is set true (1) whenever a hardware failure has occurred at power-up, or execution time, such as a channel overload condition, a trigger or a timebase circuit defect. The origin of the failure may be localized via the DDR? or the self test *TST? query.

- **Bit 2: QYE**

  The Query Error bit (QYE) is set true (1) whenever (a) an attempt is made to read data from the Output Queue when no output is either present or pending, (b) data in the Output Queue has been lost, (c) both output and input buffers are full (deadlock state), (d) an attempt is made by the controller to read before having sent an <END>, (e) a command is received before the response to the previous query was read (output buffer flushed).

- **Bit 1: RQC**

  The ReQuest Control bit (RQC) is always false (0), as the oscilloscope has no GPIB controlling capability.

- **Bit 0: OPC**

  The OPeration Complete bit (OPC) is set true (1) whenever *OPC has been received, since commands and queries are strictly executed in sequential order. The oscilloscope starts processing a command only when the previous command has been entirely executed.

5.9 EXR?

Description The EXR? query reads and clears the contents of the Execution error Register (EXR). The EXR register specifies the type of the last error detected during execution.

Query Syntax EXR?

Response Format EXR <value>
Execution Error Status Register Structure (EXR)

Value	Description
21	Permission error. The command cannot be executed in local mode.
22	Environment error. The instrument is not configured to correctly process a command. For instance, the oscilloscope cannot be set to RIS at a slow timebase.
23	Option error. The command applies to an option which has not been installed.
25	Parameter error. Too many parameters specified.
26	Non-implemented command.
32	Waveform descriptor error. An invalid waveform descriptor has been detected.
36	Panel setup error. An invalid panel setup data block has been detected.
50	No mass storage present when user attempted to access it.
53	Mass storage was write protected when user attempted to create, or a file, to delete a file, or to format the device.
58	Mass storage file not found.
59	Requested directory not found.
61	Mass storage filename not DOS compatible, or illegal filename.
62	Cannot write on mass storage because filename already exists.

Example The following instruction reads the contents of the EXR register: EXR?
Response message (if no fault): EXR 0

Related Commands ALL_STATUS, *CLS

5.10 *OPC

Description The *OPC (OPeration Complete) command sets to true the OPC bit (bit 0) in the standard Event Status Register (ESR). This command has no other effect on the operation of the oscilloscope because the instrument starts parsing a command or query only after it has completely processed the previous command or query. The *OPC? query always responds with the ASCII character “1” because the oscilloscope only responds to the query when the previous command has been entirely executed.

Command Syntax *OPC

Query Syntax *OPC?

Response Format *OPC 1

5.11 *SRE

Description The *SRE command sets the Service Request Enable register (SRE). This command allows the user to specify which summary message bit(s) in the STB register will generate a service request. A summary message bit is enabled by writing a „1 into the corresponding bit location. Conversely, writing a „0 into a given

bit location prevents the associated event from generating a service request (SRQ). Clearing the SRE register disables SRQ interrupts. The *SRE? query returns a value that, when converted to a binary number, represents the bit settings of the SRE register.

Command Syntax *SRE <value>

Parameters <value> : = 0 to 255

Query Syntax *SRE?

Response Format *SRE <value>

Example The following instruction allows an SRQ to be generated as soon as the MAV summary bit (bit 4, i.e. decimal 16) or the INB summary bit (bit 0, i.e. decimal 1) in the STB register, or both, are set. Summing these two values yields the SRE mask 16+1 = 17.
*SRE 17

Note That bit 6 (MSS) cannot be set and its returned value is always zero.

5.12 *STB?

Description The *STB? query reads the contents of the 488.1 defined status register (STB), and the Master Summary Status (MSS). The response represents the values of bits 0 to 5 and 7 of the Status Byte register and the MSS summary message. The response to a *STB? Query is identical to the response of a serial poll except that the MSS summary message appears in bit 6 in place of the RQS message.

Query Syntax *STB?

Response Format *STB <value>
<value> : = 0 to 255

Bit	Name	Default Value	Description
7	DIO7	0	Reserved
6	MSS/RQS	1	at least 1 bit in STB masked by SRE is 1 service is requested
5	ESB	1	an ESR enabled event has occured
4	MAV	1	output queue is not empty
3	DIO3	0	reserved
2	VAB	1	a command data value has been adapted
1	DIO1	0	reserved
0	INB	1	an enabled internal state change has occured

- **Bit 6**

  The Power On (PON) bit is always turned on (1) when the unit is powered up.
  The Master Summary Status (MSS) indicates that the instrument requests service, whilst the Service Request status — when set — specifies that the oscilloscope issued a service request. Bit position 6 depends on the polling method: Bit 6 = MSS if an *STB? Query is received = RQS if serial polling is conducted.
  Example: If SRE=10 and STB=10 then MSS=1. If SRE=010 and STB=100 then MSS=0.

- **Bit 5:**

  The Event Status Bit (ESB) indicates whether or not one or more of the enabled IEEE 488.2 events have occurred since the last reading or clearing of the Standard Event Status Register (ESR). ESB is set if an enabled event becomes true (1).

- **Bit 4:**

  The Message AVailable bit (MAV) indicates whether or not the Output queue is empty. The MAV summary bit is set true (1) whenever a data byte resides in the Output queue.

- **Bit 2:**

  The Value Adapted Bit (VAB) is set true (1) whenever a data value in a command has been adapted to the nearest legal value. For instance, the VAB bit would be set if the timebase is redefined as 2 s/div since the adapted value is 2.5 s/div.

- **Bit 0:**

  The INternal state Bit (INB) is set true (1) whenever certain enabled internal states are entered. For further information, refer to the INR query.

Example The following reads the status byte register: *STB?
Response message: *STB 0

Related Commands ALL_STATUS,*CLS,*SRE

Hardcopy

6.1 HARDCOPY_SETUP, HCSU 35
6.2 SCREEN_DUMP,SCDP 35

6.1 HARDCOPY_SETUP, HCSU

Description The HARDCOPY_SETUP command configures the instrument's hard-copy driver.

Command Syntax HCSU PSIZE, <page_size>, ISIZE, <image_size>, FORMAT, <format>, BCKG, <bckg>, PRTKEY, <printkey>

Parameters <page_size> = DEFAULT
<printkey> = SAVE,PRINT
<format> = PORTRAIT, LANDSCAPE
<bckg> = BLACK, WHITE
<image_size>:= DEFAULT,A4,LETTER

Query Syntax HCSU?

Response Format HCSU PSIZE, <page_size>, ISIZE, <image_size>, FORMAT, <format>, BCKG, <bckg>, PRTKEY, <printkey>

Example The following example selects PORTRAIT format, sets the size of the image to "6*8CM": HCSU ISIZE, 6*8CM, FORMAT, PORTRAIT

Related Commands SCDP

Note

6.2 SCREEN_DUMP,SCDP

Description The SCREEN_DUMP command is used to obtain the screen information of image format .

Command Syntax SCreen_DumP

Parameters

Example The following command transfers the screen information of image format to the controller: SCDP

Note

Cursor

7.1 CURSOR_AUTO,CRAU 36
7.2 CURSOR_MEASURE, CRMS 36
7.3 CURSOR_SET, CRST 36
7.4 CURSOR_VALUE?, CRVA? 37
7.5 PARAMETER_CLR, PACL 38
7.6 PARAMETER_CUSTOM, PACU 38
7.7 PARAMETER_VALUE?, PAVA? 38

7.1 CURSOR_AUTO,CRAU

Description The CURSOR_AUTO command changes the cursor mode to auto mode.

Command Syntax CRAU

Parameters

Example The following code changes the cursor mode to auto mode: CRAU

Note This command is suitable for not SPO models.

7.2 CURSOR_MEASURE, CRMS

Description The CURSOR_MEASURE command specifies the type of cursor or parameter measurement to be displayed The CURSOR_MEASURE? query indicates which cursors or parameter measurements are currently displayed.

Command Syntax CuRsor_MeaSure <mode>

Parameters format1: <mode>=:OFF, ON
format2: <mode>=:OFF, HREL, VREL, AUTO

Query Syntax CuRsor_MeaSure?

Response Format CuRsor_MeaSure <mode>

Example The following command determines cursor function is turned off: CRMS OFF

Related Commands CURSOR_VALUE, PARAMETER_VALUE

Note 1. If the oscilloscope doesn't have auto cursor, you should use the format1. OFF means manual mode, ON means track mode.
2. If the oscilloscope doesn't have auto cursor, you should use the format2, and HREL means track mode, VREL means manual mode, AUTO means auto mode.

7.3 CURSOR_SET, CRST

Description The CURSOR_SET command allows the user to position any one of the eight independent cursors at a given screen location. The positions of the cursors can be modified or queried even if the required cursor is not currently displayed on the screen. When setting a cursor position, a trace must be specified, relative to which the cursor will be positioned. The CURSOR_SET? Query indicates the current position of

the cursor(s). The values returned depend on the grid type selected.

Parameter	Description
VREF	The volt-value of curA manual cursor mode
VDIF	The volt -value of curB manual cursor mode
TREF	The time value of curA manual cursor mode
TDIF	The time value of curB manual cursor mode
HREF	The time value of curA under cursor mode
HDIF	The time value of curB under cursor mode

Command Syntax <trace>:CuRsor_SeT<cursor>,<position>[,<cursor >,<position>,<cursor> ,<position>] VDIF

Parameters

Parameter	Values
trace	C1, C2, C3, C4
cursor	VREF,VDIF,TREF,TDIF,HRDF,HDIF
position (horizontal)	0.02 to 13.98 DIV
position (vertical)	0.02 to 7.98 DIV

Query Syntax <trace>: CuRsor_SeT? [<cursor>, ...<cursor>]

Response Format <trace>:CuRsor_SeT <cursor>, <position>[, <cursor>, <position>, <cursor>, <position>]

Example The following command positions the VREF and VDIF cursors at +3 DIV and −1 DIV respectively, using C1 as a reference: C1: CRST VREF, 3DIV, VDIF, −1DIV

Related Commands CURSOR_MEASURE,CURSOR_VALUE, PARAMETER_VALUE

Note
1. The horizontal position's value is related to the size of screen. For SPO models, the position's value is in the range of 0.02 to 13.98. And in not SPO models it's in the range of -8 to 8. If the value is in the range of 0.02 to 13.98, you need add the unit (DIV) to the value.
2. The vertical position's value is related to the size of screen. For SPO models, the position's value is in the range of 0.02 to 7.98. And in not SPO models it's in the range of -4 to 4. If the value is in the range of 0.02 to 7.98, you need add the unit (DIV) to the value.

7.4 CURSOR_VALUE?, CRVA?

Description The CURSOR_VALUE? Query returns the values measured by the specified cursors for a given trace. (The PARAMETER_VALUE? query is used to obtain measured waveform parameter values.)

Parameter	Description
HREL	the cursor value under track cursor mode
VREL	the dalta volt-value, curA volt_value and curb volt_value under manual cursor mode

Query Syntax <trace>:CuRsor_Value? [<mode>,...<mode>]

Parameter	Values
trace	C1, C2, C3, C4
mode	HREL, VREL

Response Format <trace> : CuRsor_Value HREL, <delta_hori>,<delta_vert>,<A->T>, <A->V>,<(delta_vert)/(delta_hori)>
<trace> : CuRsor_Value VREL,<delta_vert>

Example The following query reads the dalta volt value under manual cursor mode (VREL) on Channel 2: C2:CRVA? VREL
Response message: C2:CuRsor_Value VREL 1.00V

Related Commands CURSOR_SET, PARAMETER_VALUE

Note For not SPO models , VREL is the dalta voltvalue under manual cursor mode.

7.5 PARAMETER_CLR, PACL

Description The PARAMETER_CLR command clears the P/F test counter and starts it again at 0.

Command Syntax PArameter_CLr

Parameters

Related Commands PARAMETER_VALUE PFDD

7.6 PARAMETER_CUSTOM, PACU

Description The PARAMETER_CUSTOM command controls the parameters that have customizable qualifiers.

Command Syntax PArameter_CUstom <line>,<parameter>,<qualifier>

Parameters

Parameter	Values
line	1 to 5
parameter	PKPK, MAX, MIN, AMPL, TOP, BASE, CMEAN, MEAN, RMS, CRMS, OVSN, FPRE, OVSP, RPRE, PER, FREQ, PWID, NWID, RISE,FALL,WID,DUTY,NDUTY,PHASE,FRR,F RF,FFR,FFF,LRR,LRF,LFR,LFF,ALL
qualifier	C1,C2,C3,C4,C1-C2,C1-C3,C1C4,C2-C3,C2-C4,C3-C4

Measurement qualifier specific to each (source option)

Query Syntax PArameter_CUstom? <line>

Example Command Example: PACU 2, PKPK, C1
Query/Response Examples PACU? 2 returns: PACU 2, PKPK, C1
PAVA? CUST2 returns: C2: PAVA CUST2, 160.00mV

Related Commands PARAMETER_CLR, PARAMETER_VALUE

Note The measured value of a parameter setup with PACU can be read by using PAVA?

7.7 PARAMETER_VALUE?, PAVA?

Description The PARAMETER_VALUE query returns the measurement values.

Query Syntax <trace>:PArameter_VAlue? [<parameter>, ... , <parameter>]

Parameter	Values
trace	C1, C2, C3, C4
parameter	See table of parameter names on previous table

Response Format <trace>: PArameter_VAlue <parameter>, <value> [,..., <parameter>,<value>]

Parameter	Description
ALL	All parameters
AMPL	Amplitude
BASE	Base
CMEAN	cyclic mean value
CRMS	cyclic RMS value
DUTY	Duty cycle
FALL	Fall time
FREQ	Frequency
FPRE	(Vmin-Vbase)/Vamp before the falling waveform transition
MAX	Maximum
MIN	Minimum
MEAN	Mean
NDUTY	Negative duty cycle
NWID	Negative width
OVSN	Negative overshoot
OVSP	Positive overshoot
PKPK	Peak to peak
PER	Period
RPRE	(Vmin-Vbase)/Vamp before the rising waveform transition
PWID	Positive width
RMS	Root Mean Square
RISE	Risetime
TOP	Top
WID	Width

Additionally, CUST1-5 are returned. These are defined using the PARAMETER_CUSTOM command.

Example The following query reads the rise time of Channel 2: C2: PAVA? RISE
Response message: C2: PAVA RISE, 3.6E-9S

Related Commands CURSOR_MEASURE, CURSOR_SET, PARAMETER_CUSTOM

Note

Miscellaneous

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8.4 *IDN? 41
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8.1 AUTO_CALIBRATE, ACAL

Description The AUTO_CALIBRATE command is used to enable or disable the quick calibration of the instrument. The quick calibration may be disabled by issuing the command ACAL OFF. Whenever it is convenient, a *CAL? Query may be issued to fully calibrate the oscilloscope. The response to the AUTO_CALIBRATE? Query indicates whether quick -calibration is enabled. The command is only used in the CFL series instrument.

Command Syntax Auto_CALibrate <state>

Parameters <state> : = ON, OFF

Query Syntax Auto_CALibrate?

Response Format Auto_CALibrate <state>

Example The following instruction disables quick calibration: ACAL OFF

Related Commands *CAL?

Note

8.2 BUZZER, BUZZ

Description The BUZZER command enables or disables sound switch. The response to the BUZZER? query indicates whether the sound switch is enabled.

Command Syntax BUZZer <state>

Parameters <state> = ON, OFF

Query Syntax BUZZER?

Response Format BUZZER <state>

Example Sending the following code will let the oscilloscope turn on the sound switch: BUZZ ON

Note

8.3 *CAL?

Example The *CAL? query cause the oscilloscope to perform an internal self-calibration and generates a response:
*CAL?
*CAL <diagnostics>

<diagnostics> : = 0
0 = Calibration successful
The following instruction forces a self-calibration: *CAL?
Response message: *CAL 0

Related Commands AUTO_CALIBRATE

Note

8.4 *IDN?

Description The *IDN? query is used for identification purposes. The response consists of four different fields providing information on the manufacturer, the scope model, the serial number and the firmware revision level.

Query Syntax *IDN?

Response Format *IDN <manufacturer>, <model>, <serial_number>, <firmware_level>
<model> : = A eleven characters model identifier
<serial_number> : = A 14-digit decimal code
<firmware_level> : = similar to k.xx.yy.zz

Note

8.5 LOCK, LOCK

Description The LOCK command enables or disables the panel keyboard of the instrument. When any command or query is executed in either local or remote state, the functions of the panel keys except "FORCE" are not available. When the panel keyboard of the instrument is locked , press "FORCE" key can enable the panel keyboard function. The LOCK? query returns the status of the panel keyboard of the instrument.

Command Syntax LOCK <state>

Parameters <state>:= ON,OFF

Query Syntax LOCK?

Response Format LOCK < state>

Example The following instruction enables the functions of the panel keys: LOCK ON

Note

8.6 *OPT?

Description The *OPT? query identifies oscilloscope options: installed software or hardware that is additional to the standard instrument configuration. The response consists of a series of response fields listing all the installed options.

Query Syntax *OPT?

Response Format *OPT <option>

Example The following instruction queries the installed options: *OPT?
Return: *OPT RS232,NET,USBTMC

Note If no option is present, the character 0 will be returned.

Display

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9.1 DOT_JOIN,DTJN

Description The DOT_JOIN command controls interpolation lines between data points.

Command Syntax DoT_JoiN <state>

Parameters <state> : = ON, OFF

Query Syntax DoT_JoiN?

Response Format DoT_JoiN <state>

Example The following instruction turns off the interpolation lines: DTJN OFF

9.2 GRID_DISPLAY,GRDS

Description The GRID_DISPLAY command selects the type of the grid which is used to display. The response to the GRID_DISPLAY? query indicates current type of the grid.

Command Syntax GRID_DISPLAY <type>

Parameters <type> : = FULL,HALF,OFF

Query Syntax GRID_DISPLAY?

Response Format GRID_DISPLAY <type>

Example The following command changes the type of grid to full grid: GRID_DISPLAY FULL

9.3 HOR_MAGNIFY, HMAG

Description The HOR_MAGNIFY command horizontally expands the selected expansion trace by a specified factor. Magnification factors not within the range of permissible values will be rounded off to the closest legal value. If the specified factor is too large for any of the expanded traces (depending on their current source), it

is reduced to an acceptable value and only then applied to the traces. The VAB bit (bit 2) in the STB register is set when a factor outside the legal range is specified. The HOR_MAGNIFY query returns the current magnification factor for the specified expansion function.

Command Syntax <exp_trace>: Hor_MAGnify <factor>

Parameters <exp_trace>: = TA, TB, TC, TD
<factor> : = 1 to 2,000,000 The range of <factor> is related to the current timebase and the range of the timebase.

Query Syntax <exp_trace> : Hor_MAGnify?

Response Format <exp_trace>: Hor_MAGnify <factor>

Example The following instruction horizontally magnifies Trace A (TA) by a factor of 5: TA: HMAG 5.00

Related Commands HPOS

9.4 HOR_POSITION, HPOS

Description The HOR_POSITION command horizontally positions the geometric center of the intensified zone on the source trace. Allowed positions range from division -7 to 7. If this would cause the horizontal position of any expanded trace to go outside the left or right screen boundaries, the difference of positions is adapted and then applied to the traces. The VAB bit (bit 2) in the STB register is set if a value outside the legal range is specified. The HOR_POSITION query returns the position of the geometric center of the intensified zone on the source trace.

Command Syntax <exp_trace>: Hor_POSition <hor_position>

Parameters <exp_trace>: = TA, TB, TC, TD
<hor_position>: = -7 to 7 DIV(The range of the value is related to the size of the screen). the range of the <hor_position> is related to the magnification factors of command HMAG. While the range after magnifying beyond the screen could display, it will be adjusted to the proper value.

Query Syntax <exp_trace>: Hor_POSition?

Response Format <exp_trace>: Hor_POSition <hor_position>

Example The following instruction positions the center of the intensified zone on the trace currently viewed by Trace A (TA) at division 3: TA: HPOS 3

Related Commands HMAG

9.5 INTENSITY,INTS

Description The INTENSITY command sets the intensity level of the grid or the trace. The intensity level is expressed as a percentage (PCT). A level of 100 PCT corresponds to the maximum intensity whilst a level of 0 PCT sets the intensity to its minimum value.(The minimum value of the trace is 30 PCT) The response to the INTENSITY? Query indicates the grid and trace intensity levels.

Command Syntax INTenSity GRID, <value>, TRACE, <value>

Parameters <value> : = 0(or 30) to 100%

Query Syntax INTenSity?

Response Format INTenSity TRACE, <value>, GRID, <value>

Example The following instruction enables remote control of the intensity, and changes the grid intensity level to 75%: INTS GRID, 75

Note Parameters are grouped in pairs. The first of the pair names the variable to be modified, whilst the second gives the new value to be assigned. Pairs may be given in any order and be restricted to those variables to be changed.
The suffix PCT is optional.

9.6 INVERTSET,INVS

Description The INVERTSET command inverts the specified traces or the waveform of math. The response to the INVERTSET? query indicates whether the specified waveform is invert.

Command Syntax <trace>:INVERTSET <state>

Parameters <trace> : = C1,C2,C3,C4,MATH
<state>:= ON,OFF

Query Syntax <trace>:INVERTSET?

Response Format <trace>:INVERTSET <state>

Example The following instruction inverts the trace of channel 1: C1:INVS ON

9.7 MENU, MENU

Description The MENU command enables or disables to display the menu. The response to the MENU? query indicates whether the menu is displayed.

Command Syntax MENU <state>

Parameters <state>:= ON,OFF

Query Syntax MENU?

Response Format MENU <state>

Example The following instruction enables the display of the menu: MENU ON

Note This command is suitable for not SPO models.

9.8 PERSIST, PERS

Description The PERSIST command enables or disables the persistence display mode.

Command Syntax PERSist <mode>

Parameters <mode> : = ON, OFF

Query Syntax PERSist?

Response Format PERSist <mode>

Example The following code turns the persistence display ON: PERS ON

Related Commands PERSIST_SETUP

9.9 PERSIST_SETUP, PESU

Description The PERSIST_SETUP command selects the persistence duration of the display, in seconds,in persistence mode. The PERSIST_SETUP? query indicates the current status of the persistence.

Command Syntax PErsist_SetUp <time>

Parameters <time> = 1, 5, 10, 30, Infinite

Query Syntax PErsist_SetUp?

Response Format PErsist_SetUp <time>

Example The following instruction sets the variable persistence at 5 Seconds: PESU 5

Related Commands PERSIST

Note The options of time are the same as your oscilloscope.

9.10 SCREEN_SAVE,SCSV

Description The SCREEN_SAVE command controls the automatic Screen Saver, which automatically shuts down the internal color monitor after a preset time. The response to the SCREEN_SAVE? query indicates whether the automatic screen saver feature is on or off.

Command Syntax SCreen_SaVe <enabled>

Parameters <enabled> : = YES, NO

Query Syntax SCreen_SaVe?

Response Format SCreen_SaVe <enabled>

Example The following enables the automatic screen saver: SCSV YES

Note When the screen save is in effect, the oscilloscope is still fully functional.

9.11 TRACE,TRA

Description The TRACE command enables or disables the display of a trace. An environment error is set if an attempt is made to display more than four waveforms. The TRACE? query indicates whether the specified trace is displayed or not.

Command Syntax <trace>: TRAce <mode>

Parameters <trace> : = C1, C2, C3, C4, TA, TB, TC, TD
<mode> := ON, OFF

Query Syntax <trace>: TRAce?

Response Format <trace>: TRAce <mode>

Example The following command displays Channel 1(C1): C1: TRA ON

9.12 VERT_POSITION,VPOS

Description The VERT_POSITION command adjusts the vertical position of the specified FFT trace on the screen. It does not affect the original offset value obtained at acquisition time. The VERT_POSITION? query returns the current vertical position of the specified FFT trace.

Command Syntax <trace>: Vert_POSITION <display_offset>

Parameters <trace>: = TA, TB, TC, TD
<display_offset> =-40 DIV to 40 DIV

Query Syntax <trace>: Vert_POSition?

Response Format <trace>: Vert_POSITION <display_offset>

Example The following shifts FFT Trace A (TA) upwards by +3 divisions relative to the position at the time of acquisition: TA: VPOS 3DIV

Note 1. The suffix DIV is optional.

9.13 XY_DISPLAY, XYDS

Description The XY_DISPLAY command enables or disables the display the XY format The response to the XY_DISPLAY? query indicates whether the XY format display is enabled.

Command Syntax XY_DISPLAY <state>

Parameters <state> = ON, OFF

Query Syntax XY_DISPLAY?

Response Format XY_DISPLAY <state>