

17 Remote control commands

This section describes all remote commands available for MXO 5 and provides examples and information on how to use the commands.

For general information on remote control of Rohde & Schwarz products via SCPI, refer to www.rohde-schwarz.com/rc-via-scp.

See also [Section 16.4, "Remote control"](#), on page 674 and [Section 16.5, "Remote control - status reporting system"](#), on page 677 for further information on remote control.



The descriptions of the remote commands assume a MXO 5 with the highest available bandwidth and number of channels. Depending on your model, some of the available command ranges can differ from the values stated in the following sections.

17.1 Conventions used in remote command description

The basics of SCPI command structure, syntax and command parameters are explained in www.rohde-schwarz.com/rc-via-scp.

The following conventions are used in the remote command descriptions:

- **Command usage**
If not specified otherwise, commands can be used both for setting and for querying parameters.
If a command can be used for setting or querying only, or if it initiates an event, the usage is stated explicitly.
- **Parameter usage**
If not specified otherwise, a parameter can be used to set a value, and it is the result of a query.
Parameters required only for setting are indicated as "Setting parameters".
Parameters required only to refine a query are indicated as "Query parameters".
Parameters that are only returned as the result of a query are indicated as "Return values".
- **Conformity**
Commands that are taken from the SCPI standard are indicated as "SCPI confirmed". All commands used by the MXO 5 follow the SCPI syntax rules.
- **Asynchronous commands**
A command which does not automatically finish executing before the next command starts executing (overlapping command) is indicated as an "Asynchronous command".
- **Reset values (*RST)**
Default parameter values that are used directly after resetting the instrument (*RST command) are indicated as "*RST" values, if available.
- **Default unit**
The default unit is used for numeric values if no other unit is provided with the parameter.

17.2 Finding the appropriate command

In the following chapters, the commands are sorted according to the menu and dialog structure.

A list of all commands in alphabetical order is given in the "List of Commands" at the end of this documentation.

To find the appropriate command for a setting easily, you can use the context help:

1. Enable the "Help" icon on the toolbar.
2. Tap the parameter for which you need information.

The "Help" window opens and displays the comprehensive description and the corresponding remote command.

3. Tap the remote command link to open the command description.

17.3 Frequently used parameters and suffixes

This chapter describes in general those parameters and suffixes that are used in several subsystems.

17.3.1 Waveform parameter

Many commands require one of the waveforms to be specified as source. The following table lists all waveforms. For each command using a waveform parameter, the available waveforms are specified in the command description.

Waveform	Description
C1 C2 C3 C4 C5 C6 C7 C8 D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 M1 M2 M3 M4 M5 M6 M7 M8 R1 R2 R3 R4 R5 R6 R7 R8 CHAN1 = C1, CHAN2 = C2, CHAN3 = C3, CHAN4 = C4 , CHAN5 = C5, CHAN6 = C6, CHAN7 = C7, CHAN8 = C8	Channel waveforms
M1 M2 M3 M4 M5 M6 M7 M8	Math waveforms
R1 R2 R3 R4 R5 R6 R7 R8	Reference waveforms
SBUS1 SBUS2 SBUS3 SBUS4	Serial buses
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15	Digital channels (option R&S MXO5-B1)

Waveform	Description
PBUS1 PBUS2 PBUS3 PBUS4	Digital buses (option R&S MXO5-B1)
SPECMAXH1 SPECMINH1 SPECNORM1 SPECAPER1	Spectrum traces: SPECMAXH1 : Spectrum1 maxhold SPECMINH1: Spectrum1 minhold SPECNORM1: Spectrum1 normal SPECAPER1: Spectrum1 average

17.3.2 Slope parameter

The slope parameter is used with several trigger and search condition commands.

Slope	Description
POSitive	Rising edge, which is a positive voltage change.
NEGative	Falling edge, which is a negative voltage change.
EITHER	Rising as well as the falling edge.

17.3.3 Polarity parameter

The polarity parameter is used with several trigger and search condition commands.

Polarity	Description
POSitive	Positive going pulses.
NEGative	Negative going pulses.
EITHER	Both positive and negative going pulses.

17.4 Programming examples

17.4.1 SmartGrid layout with zoom

The following example uses 3 sine waves, all with frequency 20 MHz and an amplitude of ± 0.4 V. The vertical scale is 100 mV/div, the time scale is 20 ns/div.

In the example, 2 layouts are created, waveforms are assigned, and zoom and spectrum are added.

For a description of the commands, see:

- [Section 17.7.2, "SmartGrid", on page 704](#)

- [Section 17.10.1, "Zoom", on page 818](#)
- [Section 17.14.1, "Spectrum setup", on page 897](#)

```
//Prepare: 3 channel signals.
```

```
//Enable C1, C2 and C3.
```

```
CHAN1:STAT 1
```

```
CHAN2:STAT 1
```

```
CHAN3:STAT 1
```



```
//Create new diagrams for C2 and C3.
```

```
//Assign sources C2 and C3 to these diagrams.
```

```
LAY:DIAG2:ENAB 1
```

```
LAY:DIAG2:SOUR C2
```

```
LAY:DIAG3:ENAB 1
```

```
LAY:DIAG3:SOUR C3
```

```
//Create new node (node 2) and assign new diagrams to that node
```

```
//Place C2 on top, C3 at bottom
```

```
LAY:NODE2:ENAB 1
```

```
LAY:NODE2:CHIL1:CONT:TYPE DIAG
```

```
LAY:NODE2:CHIL1:CONT:ID 2
```

```
LAY:NODE2:CHIL2:CONT:TYPE DIAG
```

```
LAY:NODE2:CHIL2:CONT:ID 3
```

```
LAY:NODE2:STYP VERT
```

```
//Insert node 2 into the base node (initial node)
```

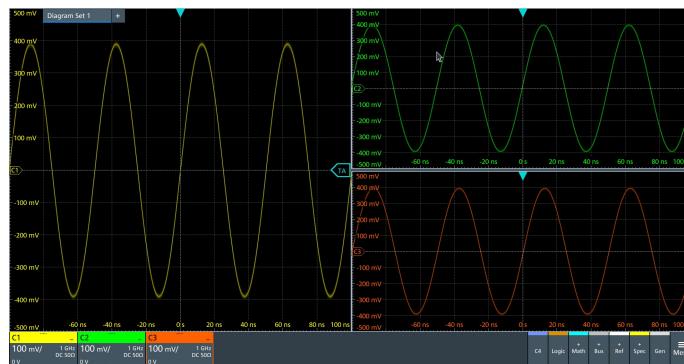
```
//Diagram1 is initially located at child 1
```

```
LAY:NODE1:CHIL2:CONT:TYPE NODE
```

```
LAY:NODE1:CHIL2:CONT:ID 2
```

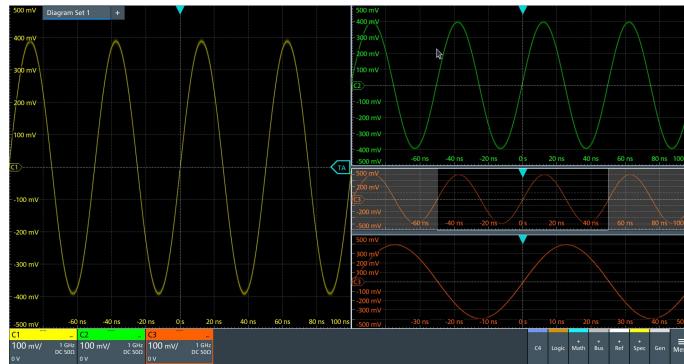
```
//Place both nodes side by side
```

```
LAY:NODE1:STYP HOR
```



//Add zoom to C3. The zoom is located in diagram 3.

```
LAY:ZOOM:ENAB 1
LAY:ZOOM:SOUR 3
```



//Add a second layout with C1 and spectrum of C1.

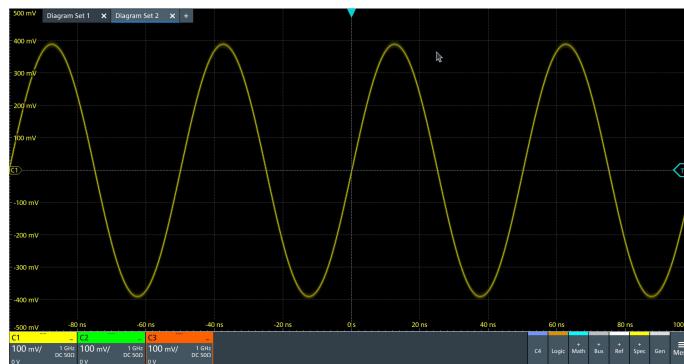
//By default, the new layout is empty.

```
LAY2:ENAB 1
```

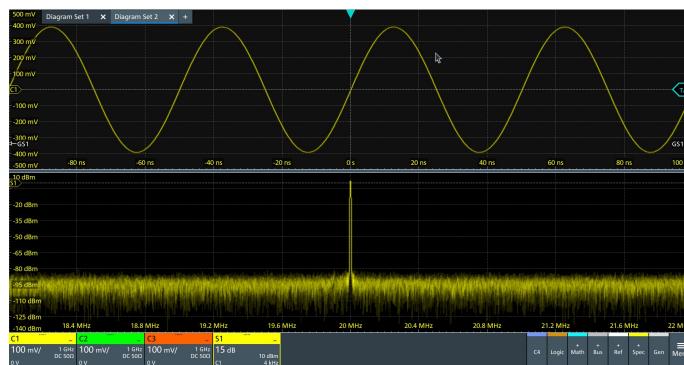


//Assign C1 to layout 2.

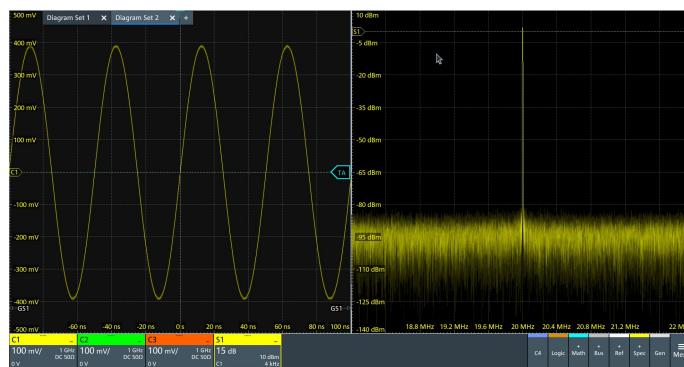
```
LAY2:DIAG1:SOUR C1
```



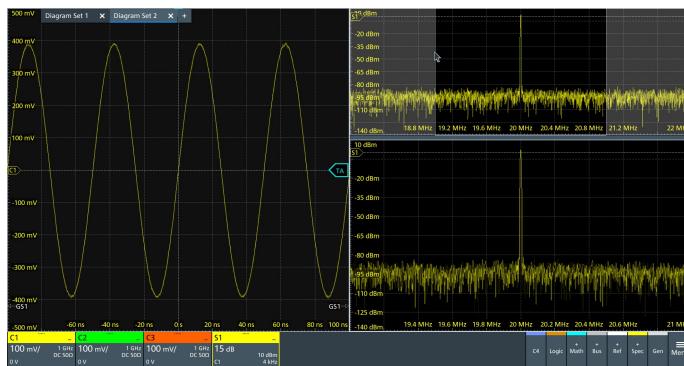
```
//Turn on spectrum of C1.  
//By default, the spectrum is set below its analog source, and into the next  
//free diagram (here diagram 2).  
CALC:SPEC:STAT 1  
CALC:SPEC:FREQ:CENT 20e6  
CALC:SPEC:FREQ:SPAN 4e6  
CALC:SPEC:FREQ:SCAL 15
```



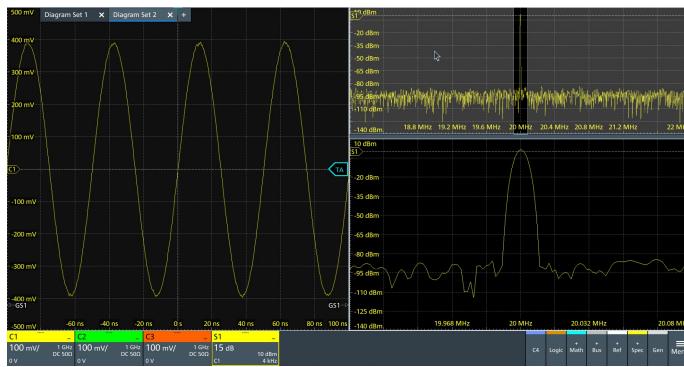
```
//Set C1 and spectrum side by side by changing the split type.  
LAY2:NODE1:STYP HOR
```



```
//Add zoom to spectrum. The zoom is located in layout 2, in diagram 2.  
LAY2:ZOOM:ENAB 1  
LAY2:ZOOM:SOUR 2
```



```
//Change zoom area.
LAY2:ZOOM:HOR:MODE REL
LAY2:ZOOM:HOR:REL:START 48
LAY2:ZOOM:HOR:REL:STOP 52
```



```
//Switch back to first layout (Tab 1).
LAY1:SACT
```



17.4.2 Creating a mask

The example creates a segment in mask 1 and defines the positions of the corner points.

```

:MTEST:ADD          //Create mask 1
:MTEST:SEGMENT:ADD //Create segment 1 in mask 1
:MTEST:SEGMENT:POINT:ADD //Add 4 points at coordinate 0;0
:MTEST:SEGMENT:POINT:ADD
:MTEST:SEGMENT:POINT:ADD
:MTEST:SEGMENT:POINT:ADD
:MTEST:SEGMENT:POINT:COUNT? //Query the number of points
-->4
:MTEST:SEGMENT:POINT:X -60NS //Set the coordinates of point 1
:MTEST:SEGMENT:POINT:Y 50 MV
:MTEST:SEGMENT:POINT2:X -40NS //Set the coordinates of point 2
:MTEST:SEGMENT:POINT2:Y -50 MV
:MTEST:SEGMENT:POINT3:X -20NS //Set the coordinates of point 3
:MTEST:SEGMENT:POINT4:Y 100 MV //Set the coordinates of point 4, X = 0

```

17.4.3 Saving screenshots to file

The example saves three display images in png format to the files `Print.png`, `Print_001.png`, and `Print_002.png` on USB flash drive in the directory `/run/media/usb/<MyDriveName>`. For `<MyDriveName>`, use the name that was defined when formatting of the USB flash drive. To get a correct screenshot, turn on the display first.

Command description in: [Section 17.11.8, "Screenshots", on page 859](#).

In the following example `*OPC` prevents overlapping execution of asynchronous commands.

- Connect a USB flash drive.

```

SYST:DISP:UPD ON
HCOP:DEST MMEM
HCOP:DEV:LANG PNG
*OPC?
MMEM:NAME '/run/media/usb/<MyDriveName>/Print.png'
HCOP:IMMEDIATE; *OPC?
HCOP:IMM:NEXT; *OPC?
HCOP:IMM:NEXT; *OPC?

```

17.4.4 Data transfer in roll mode

The example shows the effects of `EXPORT:WAVEFORM:SCOPE` and `ACQUIRE:ROLLmode:OSCCapture` in roll mode.

Sample rate mode and record length mode are set to AUTO, and the record length is 10 M points.

```

ACQUIRE:SRATE:MODE AUTO
ACQUIRE:POINTS:MODE AUTO

```

```

ACQuire:POINts?
--> 10000000
ACQuire:ROLLmode:OSCapture OFF
CHANnel1:DATA:HEADer?
--> -5,4.999999,10000000,1      //10 M points of data are transferred
ACQuire:ROLLmode:OSCapture ON
EXPoRt:WAVEform:SCOPe DISP      //Export of the displayed data
CHANnel1:DATA:HEADer?
--> -5,4.999999,10000000,1      //10 M points of data are transferred
EXPoRt:WAVEform:SCOPe ALL       //Export of all data
CHANnel1:DATA:HEADer?
--> -31.702346,4.9999999,36702346,1   //36.7 M points of data are transferred

```

17.5 Common commands

Common commands are described in the IEEE 488.2 (IEC 625-2) standard. These commands have the same effect and are employed in the same way on different devices. The headers of these commands consist of "*" followed by three letters. Many common commands are related to the Status Reporting System.

Available common commands:

*CAL?	695
*CLS	696
*IDN?	696
*OPC	696
*OPT?	696
*RCL	696
*RST	697
*SAV	697
*SRE	697
*STB?	697
*TRG	698
*TST?	698
*WAI	698

*CAL?

Starts a self-alignment of the instrument, and then queries a status response. Return values ≠ 0 indicate an error.

Return values:

<State>	0: no error 1: alignment failed 2: not aligned, e.g. init 3: device needs longer warmup time before selfalignment can start 4: input signal connected during selfalignment
---------	--

Usage:	Query only
--------	------------

***CLS**

Clear status

Sets the status byte (STB), the standard event register (ESR) and the EVENT part of the QUESTIONable and the OPERATION registers to zero. The command does not alter the mask and transition parts of the registers. It clears the output buffer.

Usage: Setting only

***IDN?**

Identification

Returns the instrument identification.

Return values:

<ID> "Rohde&Schwarz,<device type>,<part number>/<serial number>,<firmware version>"

Example: Rohde&Schwarz,MX05,1802.1008k08/100222,2.00.0.2
Model assignment:

Usage: Query only

Manual operation: See "[Instrument](#)" on page 83

***OPC**

Operation complete

Sets bit 0 in the event status register when all preceding commands have been executed. This bit can be used to initiate a service request. The query writes a "1" into the output buffer when all preceding commands have been executed, which is useful for command synchronization.

***OPT?**

Option identification query

Queries the options included in the instrument. For a list of all available options and their description, refer to the specifications document.

Return values:

<Options> The query returns a list of options. The options are returned at fixed positions in a comma-separated string. A zero is returned for options that are not installed.

Usage: Query only

***RCL <Number>**

Recall

Loads the instrument settings from an intermediate memory identified by the specified number. The instrument settings can be stored to this memory using the command [*SAV](#) with the associated number.

The stored instrument settings do not include waveform generator settings.

It also activates the instrument settings which are stored in a file and loaded using [MMEMory:LOAD:STATE](#).

***RST**

Reset

Sets the instrument to a default status. The default settings are indicated in the description of commands. Default settings are fixed, they are *not* changed by user-defined preset.

The command does not affect the waveform generator settings. To reset the generator, use [WGENerator<wg>:PRESet](#).

Usage: Setting only

***SAV <Number>**

Save

Stores the current instrument settings under the specified number in an intermediate memory. The settings can be recalled using the command [*RCL](#) with the associated number.

Waveform generator settings are not included.

To transfer the stored instrument settings in a file, use the command [:MMEM:STOR:STAT](#).

***SRE <Contents>**

Service request enable

Sets the service request enable register to the indicated value. This command determines under which conditions a service request is triggered.

Parameters:

<Contents> Contents of the service request enable register in decimal form.
 Bit 6 (MSS mask bit) is always 0.

Range: 0 to 255

***STB?**

Status byte query

Reads the contents of the status byte in decimal form.

Usage: Query only

***TRG**

Trigger

Triggers all actions waiting for a trigger event. In particular, *TRG generates a manual trigger signal. This common command complements the commands of the TRIGger subsystem.

*TRG corresponds to the INITiate:IMMEDIATE command.

Usage: Event

***TST?**

Self-test query

Initiates self-tests of the instrument and returns an error code.

Return values:

<ErrorCode> **integer > 0 (in decimal format)**
An error occurred.

0
No errors occurred.

Usage: Query only

Manual operation: See "Run tests" on page 110

***WAI**

Wait to continue

Prevents servicing of the subsequent commands until all preceding commands have been executed and all signals have settled (see also command synchronization and *OPC).

Usage: Event

17.6 General remote settings

This section describes commands that affect many other remote commands in different applications of the MXO 5.

FORMAT[:DATA].....	699
FORMAT:BORDer.....	700
FORMAT:BPATtern.....	700
SYSTem:DISPlay:UPDate.....	700
SYSTem:DISPlay:MESSAge:STATE.....	701
SYSTem:DISPlay:MESSAge[:TEXT].....	701

FORMAT[:DATA] [<Format>],[<Length>]

Selects the data type that is used for transmission of data from analog channels, math and reference waveforms, and some measurement results from the instrument to the controlling computer.

For INT and REAL formats, use **FORMAT:BORDER** to set the byte order.

If you need physical data (e.g. in Volt or Ampere) for further analysis, use the floating point formats (REAL) for export. No data conversion is needed.

Parameters:

<Format>,<Length> ASCii | REAL,32 | REAL,64 | INT,8 | INT,16 | INT,32

ASCii

Data values are returned in ASCII format as a list of comma-separated values in floating point format. The length can be omitted. It is 0 which means that the instrument selects the number of digits to be returned. The query returns both values (ASC, 0).

REAL,32

"FLOAT", physical data in floating point format. The data is stored as binary data (Definite Length Block Data according to IEEE 488.2). Each waveform value is formatted in the 32-Bit IEEE 754 floating point format.

The schema of the result string is as follows:

#41024<value1><value2>...<value n> with:

#4 = number of digits (= 4 in the example) of the following number

1024 = number of following data bytes (= 1024 in the example)

<value> = 4-byte floating point values

For large data (\geq 1 GB), the result string starts with "#(data length)". The number inside the parentheses indicates the real data length in bytes.

REAL,64

"DOUBLE" format, 64 bit floating point format.

INT,8 | INT,16 | INT,32

Signed integer data with length 8 bit, 16 bit, or 32 bit.

The result string has the same schema as the REAL format.

For INT,16, you can set the byte order using the command.

For digital channel data, math and histogram data, INT formats are not available.

*RST: ASCii

Example:

FORMAT:DATA REAL, 32

FORMAT:DATA?

REAL, 32

Usage:

SCPI confirmed

Asynchronous command

Manual operation:

See "[Transfer data format](#)" on page 87

FORMAT:BORDer <ByteOrder>

Sets the endianness.

The command is only relevant for data in integer and float format.

Parameters:

<ByteOrder> LSBFirst | MSBFirst

LSB first: little endian, least significant byte first
MSB first: big endian, most significant byte first

*RST: LSBFirst

Example:

A number in INT32 format is 439041101, which is hex 1A2B3C4D.

With LSBFirst (default), 4D 3C 2B 1A is returned.

With MSBFirst, 1A 2B 3C 4D is returned.

Usage:

Asynchronous command

FORMAT:BPATtern <BtPattFmt>

Sets the number format for remote bit pattern queries on serial protocols.

Parameters:

<BtPattFmt> DEC | HEX | OCT | BIN | ASCII | ASCii | STRG

*RST: HEX

Usage:

Asynchronous command

Manual operation: See "[Bit pattern format](#)" on page 87

SYSTem:DISPlay:UPDate <DisplayUpdate>

Defines whether the display is updated while the instrument is in the remote state. If the display is switched off, the normal GUI is replaced by a static image while the instrument is in the remote state. Switching off the display can speed up the measurement. OFF is the recommended state.

Parameters:

<DisplayUpdate> OFF | ON

ON | 1: The display is shown and updated during remote control.

OFF | 0: The display shows a static image during remote control.

*RST: OFF

Example:

SYSTem:DISPlay:UPDate 1

Switch on the display update.

Usage:

Asynchronous command

SYSTem:DISPlay:MESSAge:STATe <DispMessSt>

Enables and disables the display of an additional text in remote control.

To define the text, use [SYSTem:DISPlay:MESSAge\[:TEXT\]](#).

Parameters:

<DispMessSt> OFF | ON

*RST: OFF

Usage:

Asynchronous command

SYSTem:DISPlay:MESSAge[:TEXT] <DisplayMessage>

Defines an additional text that is displayed during remote control operation.

To enable the text display, use [SYSTem:DISPlay:MESSAge:STATe](#).

Parameters:

<DisplayMessage>

Usage:

Asynchronous command

17.7 Instrument setup

● System	701
● SmartGrid	704
● Toolbar	709
● Annotations	709
● Appearance	721
● Display	726
● Save/Recall	729
● Preset	731
● Maintenance	732

17.7.1 System

SYSTem:COMMunicate:NET[:HOSTname]	702
SYSTem:DATE	702
SYSTem:EXIT	702
SYSTem:FW:FILEpath	702
SYSTem:PRESet	703
SYSTem:SHUTdown	703
SYSTem:FW:START	703
SYSTem:TIME	703

SYSTem:COMMUnicatE:NET[:HOSTname] <Hostname>

Sets the host name of the instrument, which is required when configuring a network. After changing the host name, you have to reboot the instrument.

The query SYSTem:COMMUnicatE:NET:HOSTname? returns the currently defined host name.

Parameters:

<Hostname> String parameter

Usage: Asynchronous command

Manual operation: See "[Host name](#)" on page 84

SYSTem:DATE <Year>,<Month>,<Day>

Sets the date of the internal calendar.

Parameters:

<Year> Year, to be entered as a four-digit number (including the century and millennium information)

Range: 2012 to 2099

Increment: 1

*RST: 2012

<Month> Month, 1 (January) to 12 (December)

Range: 1 to 12

Increment: 1

*RST: 1

<Day> Day, 1 to the maximum number of days in the specified month

Range: 1 to 31

Increment: 1

*RST: 1

Example: SYSTem:DATE?

Returned value: 2022,09,28

Usage: Asynchronous command

SYSTem:EXIT

Starts the shutdown of the firmware.

Usage:

Setting only

Asynchronous command

SYSTem:FW:FILEpath <FilePath>

Sets the path and the filename of the firmware installation file.

Parameters:

<FilePath> String with path and filename

Usage:

SCPI confirmed

Asynchronous command

SYSTem:PRESet

Resets the instrument to the default state, has the same effect as *RST.

Usage:

Setting only

SCPI confirmed

Asynchronous command

Manual operation: See "[Factory preset](#)" on page 105

SYSTem:SHUTdown

Starts the shutdown of the instrument (firmware and operating system).

Usage:

Setting only

Asynchronous command

SYSTem:FW:STARt

Starts the firmware update. Before starting, make sure that the correct path is set with [SYSTem:FW:FILEpath](#).

Usage:

Event

SCPI confirmed

Asynchronous command

SYSTem:TIME <Hours>,<Minutes>,<Seconds>

Returns the current time of the clock.

Parameters:

<Hours> Range: 0 to 24

Increment: 1

*RST: 1

<Minutes> Range: 0 to 59

Increment: 1

*RST: 1

<Seconds> Range: 0 to 59

Increment: 1

*RST: 1

Usage:

Asynchronous command

17.7.2 SmartGrid

The following LAYout commands configure the SmartGrid. In manual operation, you configure the SmartGrid by drag and drop. See [Section 4.5, "Rohde & Schwarz SmartGrid"](#), on page 64.

Table 17-1: Terms and definitions of SmartGrid configuration

Term	Definition
Layout	A layout is a SmartGrid configuration. Several layouts can exist but only one layout is active. By default, layouts are named "Tab <n>" on the display.
Children	A child is an area where data (data table, result table) or waveforms (diagram) are displayed. A node can also be a child. A child can be empty.
Node	A node consists of one or two children. A node is created by default with one child that has content.
Diagram	A diagram displays waveforms, the graphical visualization of data.

LAYout<ly>:COUNT?	704
LAYout<ly>[:ENABLE]	704
LAYout<ly>:ACTive	705
LAYout<ly>:SACtive	705
LAYout<ly>:LABel	705
LAYout<ly>:DIAGram<da>:COUNT?	705
LAYout<ly>:DIAGram<da>[:ENABLE]	706
LAYout<ly>:DIAGram<da>:SOURCE	706
LAYout<ly>:DIAGram<da>:LABel	706
LAYout<ly>:NODE<no>:COUNT?	707
LAYout<ly>:NODE<no>[:ENABLE]	707
LAYout<ly>:NODE<no>:CHILDren<o>:CONTent<p>:ID	707
LAYout<ly>:NODE<no>:CHILDren<o>:CONTent<p>:TYPE	708
LAYout<ly>:NODE<no>:RATio	708
LAYout<ly>:NODE<no>:STYPE	708

LAYout<ly>:COUNT?

Returns the number of available layouts, i.e. SmartGrid configurations. By default, they are named "Diagram Set" on the display.

Suffix:

<ly> Irrelevant, omit the suffix.

Return values:

<Count> Number of SmartGrid configurations

Usage:

Query only

Asynchronous command

LAYout<ly>[:ENABLE] <State>

Creates a new SmartGrid configuration and sets it active.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

Parameters:

<State> OFF | ON

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

LAYout<ly>:ACTive <ActiveKey>

Sets the active SmartGrid configuration. The query returns the index of the active layout.

Suffix:

<ly> Irrelevant, omit the suffix.

Parameters:

<ActiveKey> Index of the active layout

Usage: Asynchronous command

LAYout<ly>:SACTive

Activates the specified SmartGrid configuration. The command has the same effect as [LAYout<ly>:ACTive](#) but it has no query, and the active layout is specified by the suffix.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Setting only
Asynchronous command

LAYout<ly>:LABel <Label>

Defines a name for the specified layout (SmartGrid configuration).

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

Parameters:

<Label> String with the layout name

Usage: Asynchronous command

LAYout<ly>:DIAGram<da>:COUNT?

Returns the number of diagrams in a specified layout.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<da> Irrelevant, omit the suffix.

Return values:

<Count> Number of diagrams

Usage:

Query only

Asynchronous command

LAYOUT<ly>:DIAGRAM<da>[:ENABLE] <State>

Creates and displays a specified diagram in a specified layout. OFF deletes the diagram.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<da> 1 to 8, index of the diagram

Parameters:

<State> OFF | ON

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

LAYOUT<ly>:DIAGRAM<da>:SOURCE <SignalKeys>

Assigns the waveforms to a diagram.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<da> 1 to 8, index of the diagram

Parameters:

<SignalKeys> String with a comma-separated list of waveforms, e.g. "C1,
C2, M1"

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

LAYOUT<ly>:DIAGRAM<da>:LABEL <Label>

Defines a name for the specified diagram in a specified layout.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<da> 1 to 8, index of the diagram

Parameters:

<Label> String with the diagram name

Usage: Asynchronous command

LAYOut<ly>:NODE<no>:COUNT?

Returns the maximum number of nodes that can be defined. This number is the maximum value for the node suffix.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<no> Irrelevant, omit the suffix.

Return values:

<Count> Maximum value for the node suffix

Usage: Query only
Asynchronous command

LAYOut<ly>:NODE<no>[:ENABLE] <State>

Creates the specified node in the specified layout. OFF deletes the node and its children.

The query returns whether the specified node exists (1) or not (0).

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<no> Index of the node

Parameters:

<State> OFF | ON

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

LAYOut<ly>:NODE<no>:CHILDren<o>:CONTENT<p>:ID <ID>

Sets the content ID, the number of the specified content type.

For example, the "Diagram5" has Type=DIAGRAM and ID=5.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<no> Index of the node
<o> 1 | 2, child index
<p> Irrelevant, omit the suffix.

Parameters:

<ID> Numeric value

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

LAYOut<ly>:NODE<no>:CHILdren<o>:CONTent<p>:TYPE <Type>

Sets the content type for a specified child in a specified node: diagram, result table, another node, or empty.

For example, the "Diagram5" has Type=DIAGRAM and ID=5.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<no> Index of the node

<o> 1 | 2, child index

<p> Irrelevant, omit the suffix.

Parameters:

<Type> NONE | DIAG | DIAGRAM | RES | RESULT | NODE

DIAG = DIAGRAM, RES = RESULT

*RST: NONE

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

LAYOut<ly>:NODE<no>:RATio <SplitRatio>

Sets the size ratio of the two children in the specified node.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<no> Index of the node

Parameters:

<SplitRatio> Size ratio of the children. 0.5 assigns 50% of the node size to each child. 0.3 assigns 30% to child 1% and 70% to child 2.

Range: 0 to 1

Increment: 0.0001

*RST: 0.5

Usage: Asynchronous command

LAYOut<ly>:NODE<no>:STYPe <SplitType>

Creates a second child (e.g. diagram) in the node if only one child exists, and sets the splitting of the node. If two children exist, only the splitting is set.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<no> Index of the node

Parameters:

<SplitType> HOR | HOrizontal | VERT | VERTical
HOR = HOrizontal, VERT = VERTical
*RST: NONE

Example:

See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage:

Asynchronous command

17.7.3 Toolbar

DISPlay:TOOLbar:COUNt?	709
DISPlay:TOOLbar:DESelect	709
DISPlay:TOOLbar:RESTore	709

DISPlay:TOOLbar:COUNt?

Returns the number of tools that are currently assigned to the toolbar.

Return values:

<ToolCount> Range: 0 to 100
Increment: 1
*RST: 8

Usage:

Query only
Asynchronous command

DISPlay:TOOLbar:DESelect

Removes all tools from the toolbar.

Usage:

Setting only
SCPI confirmed
Asynchronous command

DISPlay:TOOLbar:RESTore

Resets the toolbar to the factory configuration.

Usage:

Setting only
SCPI confirmed
Asynchronous command

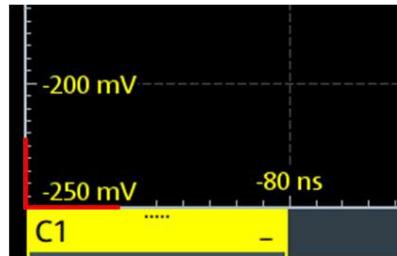
17.7.4 Annotations

The following `DISPlay:ANNotation` commands configure the annotations. With these commands you can select the type of annotation you want to add, define its value, position and color.

Defining the position of the annotation

With some of the following commands, you can define the position of the annotation on the screen. When defining the position, consider the following:

- A position is defined with two elements. The first element refers to the X dimension and the second to the Y dimension.
- The minimum position (0,0) is the lower left corner of the SmartGrid.



- The maximum position (100,100) is the upper right corner of the SmartGrid.



- The position is defined in percent with a range from 0 to 100. The minimum increment is 0.01.
- An annotation element cannot be moved outside the SmartGrid, the position is limited depending on the size of the annotation element.

Color catalog

When using annotations, you can select their color from a list of predefined colors. The following table gives an overview on the available colors and their command parameter name.

Table 17-2: Color catalog for annotations

Color	Color command parameter	Description
	WHITE	White
	LGRAY	Light gray
	MGRAY	Middle gray
	GRAY	Gray

Color	Color command parameter	Description
	DGRay	Dark gray
	RED	Red
	DORange	Dark orange
	ORANGE	Orange
	LORange	Light orange
	YELLOW	Yellow
	DGreen	Dark green
	GREEN	Green
	LGREEN	Light green
	LBLue	Light blue
	BLUE	Blue
	PINK	Pink
	LPINK	Light pink
	TURQuoise	Turquoise
	LPURple	Light purple
	PURple	Purple

17.7.4.1 General settings

DISPlay:ANNotation:CLEar.....	712
DISPlay:ANNotation:COLor<m>:CATalog?.....	712
DISPlay:ANNotation:TRANsparency.....	712

DISPlay:ANNAnnotation:CLEar

Removes all existing annotations.

Usage: Setting only
Asynchronous command

DISPlay:ANNAnnotation:COLor<m>:CATalog?

Returns the list of possible colors, see [Color catalog for annotations](#).

Suffix:
<m> Irrelevant, omit the suffix.

Return values:
<ColorCatalog> String parameter, comma-separated values

Usage: Query only
Asynchronous command

DISPlay:ANNAnnotation:TRANsparency <Transparency>

Sets a transparency of all annotations. For high transparency values, you can see the waveform display in the background. For lower transparency values, readability of the annotation improves.

Parameters:
<Transparency> Range: 0 to 90
Increment: 1
*RST: 0

Usage: Asynchronous command

17.7.4.2 Rectangle

DISPlay:ANNAnnotation:RECTangle<m>:CLEar.....	712
DISPlay:ANNAnnotation:RECTangle<m>:COLor.....	713
DISPlay:ANNAnnotation:RECTangle<m>:HEIGHT.....	713
DISPlay:ANNAnnotation:RECTangle<m>:HORizontal:POSIon.....	713
DISPlay:ANNAnnotation:RECTangle<m>:REMove.....	713
DISPlay:ANNAnnotation:RECTangle<m>:VERTical:POSIon.....	714
DISPlay:ANNAnnotation:RECTangle<m>:WIDTh.....	714
DISPlay:ANNAnnotation:RECTangle<m>[:VALue].....	714

DISPlay:ANNAnnotation:RECTangle<m>:CLEar

Deletes all rectangle annotations.

Suffix:
<m> Irrelevant, omit the suffix.

Usage: Setting only
Asynchronous command

DISPlay:ANNotation:RECTangle<m>:COLor <Type>

Sets the color of the indicated rectangle annotation.

Suffix:

<m> 1 to <number of rectangle annotations>
Index of the rectangle annotation

Parameters:

<Type> WHITe | LGRay | MGRay | GRAY | DGRay | RED | DORange |
ORANge | LORange | YELLow | DAGreen | GREEn | LIGreen |
LBLue | BLUE | PINK | LPINK | TURQuoise | LPURple | PURPle
See [Color catalog for annotations](#).

Usage:

Asynchronous command

DISPlay:ANNotation:RECTangle<m>:HEIGht <Height>

Sets the height (vertical size) of the rectangle annotation.

Suffix:

<m> 1 to <number of rectangle annotations>
Index of the rectangle annotation

Parameters:

<Height> In % of the screen.
Range: 0 to 100
Increment: 1
0 results in an invisible rectangle, 100 takes the complete height
of the screen.

Usage:

Asynchronous command

DISPlay:ANNotation:RECTangle<m>:HORIZONTAL:POSITION <HorizontalPos>

Sets the horizontal position of the left edge of the rectangle annotation. See also [Defining the position of the annotation](#).

Suffix:

<m> 1 to <number of rectangle annotations>
Index of the rectangle annotation

Parameters:

<HorizontalPos> In % of the screen
Range: 0 to 99

Usage:

Asynchronous command

DISPlay:ANNotation:RECTangle<m>:REMove

Removes the specified rectangle annotation from the screen.

Suffix:

<m> 1 to <number of rectangle annotations>
Index of the rectangle annotation

Usage:

Setting only
Asynchronous command

DISPlay:ANNotation:RECTangle<m>:VERTical:POStion <VerticalPos>

Sets the vertical position of the lower edge of the rectangle annotation. See also [Defining the position of the annotation](#).

Suffix:

<m> 1 to <number of rectangle annotations>
Index of the rectangle annotation

Parameters:

<VerticalPos> In % of the screen
Range: 0 to 99

Usage:

Asynchronous command

DISPlay:ANNotation:RECTangle<m>:WIDTh <Width>

Sets the width (horizontal size) of the rectangle annotation.

Suffix:

<m> 1 to <number of rectangle annotations>
Index of the rectangle annotation

Parameters:

<Width> In % of the screen
Range: 0 to 100
Increment: 1
0 results in an invisible rectangle, 100 takes the complete width of the screen.

Usage:

Asynchronous command

DISPlay:ANNotation:RECTangle<m>[:VALue] [<HorizontalPos>],[<VerticalPos>], [<Width>],[<Height>]

Adds a new rectangle annotation, or replaces the annotation if it already exists. If no parameters are defined, the default values are used.

All parameters are given in % of the screen.

Suffix:

<m> *
Index of the created rectangle annotation

Parameters:

<HorizontalPos> Range: 0 to 99

<VerticalPos>	Range:	0 to 99
<Width>	Range:	0 to 100
<Height>	Range:	0 to 100
Usage:	Asynchronous command	

17.7.4.3 Arrow

DISPlay:ANNAnnotation:ARRow<m>:CLEar.....	715
DISPlay:ANNAnnotation:ARRow<m>:COLor.....	715
DISPlay:ANNAnnotation:ARRow<m>:DIRection.....	715
DISPlay:ANNAnnotation:ARRow<m>:HEIGHT.....	716
DISPlay:ANNAnnotation:ARRow<m>:HORizontal:POSITION.....	716
DISPlay:ANNAnnotation:ARRow<m>:REMove.....	716
DISPlay:ANNAnnotation:ARRow<m>:VERTical:POSITION.....	717
DISPlay:ANNAnnotation:ARRow<m>:WIDTh.....	717
DISPlay:ANNAnnotation:ARRow<m>[:VALue].....	717

DISPlay:ANNAnnotation:ARRow<m>:CLEar

Deletes all arrow annotations.

Suffix:

<m> Irrelevant, omit the suffix.

Usage:

Setting only
Asynchronous command

DISPlay:ANNAnnotation:ARRow<m>:COLor <Type>

Sets the color of the indicated arrow annotation.

Suffix:

<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Parameters:

<Type> WHITe | LGRay | MGRay | GRAY | DGRay | RED | DORange | ORANge | LORange | YELLOW | DAGreen | GREEn | LIGreen |LBLue | BLUE | PINK | LPINK | TURQuoise | LPURple | PURPle
See [Color catalog for annotations](#).

Usage:

Asynchronous command

DISPlay:ANNAnnotation:ARRow<m>:DIRection <Type>

Sets the direction of the indicated arrow annotation from strating point to arrow tip.

Suffix:
<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Parameters:
<Type> TLEFT | TRIGHT | BLEFT | BRIGHt
TLEFT: to top left
TRIGHT: to top right
BLEFT: to bottom left
BRIGHt: to bottom right

Usage: Asynchronous command

DISPlay:ANNotation:ARRow<m>:HEIGht <Height>

Sets the height (vertical size) of the arrow annotation.

Suffix:
<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Parameters:
<Height> In % of the screen.
Range: 0 to 100
Increment: 1
0 results in an invisible rectangle, 100 takes the complete height of the screen.

Usage: Asynchronous command

DISPlay:ANNotation:ARRow<m>:HORizontal:POStion <HorizontalPos>

Sets the horizontal position of the left point of the arrow annotation. See also [Defining the position of the annotation](#).

Suffix:
<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Parameters:
<HorizontalPos> In % of the screen
Range: 0 to 99

Usage: Asynchronous command

DISPlay:ANNotation:ARRow<m>:REMove

Removes the specified arrow annotation from the screen.

Suffix:
<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Usage: Setting only
Asynchronous command

DISPlay:ANNotation:ARRow<m>:VERTical:POStion <VerticalPos>

Sets the vertical position of the lower point of the arrow annotation. See also [Defining the position of the annotation](#).

Suffix:
<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Parameters:
<VerticalPos> In % of the screen
Range: 0 to 99

Usage: Asynchronous command

DISPlay:ANNotation:ARRow<m>:WIDth <Width>

Sets the width (horizontal size) of the arrow annotation.

Suffix:
<m> 1 to <number of arrow annotations>
Index of the arrow annotation

Parameters:
<Width> In % of the screen
Range: 0 to 100
Increment: 1
0 results in an invisible rectangle, 100 takes the complete width of the screen.

Usage: Asynchronous command

**DISPlay:ANNotation:ARRow<m>[:VALue] [<HorizontalPos>],[<VerticalPos>],
[<Width>],[<Height>]**

Adds a new arrow annotation, or replaces the annotation if it already exists. If no parameters are defined, the default values are used.

All parameters are given in % of the screen.

Suffix:
<m> *
Index of the created arrow annotation

Parameters:
<HorizontalPos> Range: 0 to 99
<VerticalPos> Range: 0 to 99
<Width> Range: 0 to 100

<Height> Range: 0 to 100
Usage: Asynchronous command

17.7.4.4 Text

DISPlay:ANNAnnotation:TEXT<m>:CLEar.....	718
DISPlay:ANNAnnotation:TEXT<m>:COLor.....	718
DISPlay:ANNAnnotation:TEXT<m>:FONTsize.....	718
DISPlay:ANNAnnotation:TEXT<m>:HORIZONTAL:POStion.....	719
DISPlay:ANNAnnotation:TEXT<m>:REMove.....	719
DISPlay:ANNAnnotation:TEXT<m>:VERTICAL:POStion.....	719
DISPlay:ANNAnnotation:TEXT<m>[:VALue].....	719

DISPlay:ANNAnnotation:TEXT<m>:CLEar

Deletes all text annotations.

Suffix:
 <m> Irrelevant, omit the suffix.
Usage: Setting only
 Asynchronous command

DISPlay:ANNAnnotation:TEXT<m>:COLor <Type>

Sets the color of the indicated text annotation.

Suffix:
 <m> 1 to <number of text annotations>
 Index of the text annotation
Parameters:
 <Type> WHITe | LGRay | MGRay | GRAY | DGRay | RED | DORange |
 ORANge | LORange | YELLOW | DAGReen | GREen | LIGReen |
 LBLue | BLUE | PINK | LPINK | TURQuoise | LPURple | PURPle
 See [Color catalog for annotations](#).
Usage: Asynchronous command

DISPlay:ANNAnnotation:TEXT<m>:FONTsize <Fontsize>

Sets the font size of the text.

Suffix:
 <m> 1 to <number of text annotations>
 Index of the text annotation
Parameters:
 <Fontsize> Range: 12 to 30
 Default unit: px
Usage: Asynchronous command

DISPlay:ANNotation:TEXT<m>:HORizontal:POSition <HorizontalPos>

Sets the horizontal position of the left edge of the text annotation. See also [Defining the position of the annotation](#).

Suffix:

<m> 1 to <number of text annotations>
Index of the text annotation

Parameters:

<HorizontalPos> In % of the screen
Range: 0 to 99

Usage: Asynchronous command

DISPlay:ANNotation:TEXT<m>:REMove

Removes the specified text annotation from the screen.

Suffix:

<m> 1 to <number of text annotations>
Index of the text annotation

Usage:

Setting only
Asynchronous command

DISPlay:ANNotation:TEXT<m>:VERTical:POSition <VerticalPos>

Sets the vertical position of the lower edge of the text annotation. See also [Defining the position of the annotation](#).

Suffix:

<m> 1 to <number of text annotations>
Index of the text annotation

Parameters:

<VerticalPos> In % of the screen
Range: 0 to 99

Usage:

Asynchronous command

DISPlay:ANNotation:TEXT<m>[:VALue] [<Text>]

Adds a new text annotation or replaces the text value of an already existing text annotation.

Suffix:

<m> *
Index of the created text annotation

Parameters:

<Text> String with the annotation text

Usage:

Asynchronous command

17.7.4.5 Draw

DISPlay:ANNAnnotation:PLINe<m>:CLEar	720
DISPlay:ANNAnnotation:PLINe<m>:COLor	720
DISPlay:ANNAnnotation:PLINe<m>:EXTend	720
DISPlay:ANNAnnotation:PLINe<m>:REMove	721
DISPlay:ANNAnnotation:PLINe<m>[:VALue]	721

DISPlay:ANNAnnotation:PLINe<m>:CLEar

Deletes all draw annotations.

Suffix:

<m> Irrelevant, omit the suffix.

Usage:

Setting only
Asynchronous command

DISPlay:ANNAnnotation:PLINe<m>:COLor <Type>

Sets the color of the indicated draw annotation.

Suffix:

<m> 1 to <number of draw annotations>
Index of the drawn annotation.

Parameters:

<Type> WHITe | LGRay | MGRay | GRAY | DGRay | RED | DORange | ORANge | LORange | YELLOW | DAGreen | GREen | LIGreen | LBLue | BLUE | PINK | LPINK | TURQuoise | LPURple | PURPle
See [Color catalog for annotations](#).

Usage:

Asynchronous command

DISPlay:ANNAnnotation:PLINe<m>:EXTend [<x>],[<y>]

Expands the draw item with a segment. The x and y position of the existing end point is the start point of the new segment. The segments are always a straight lines.

Suffix:

<m> 1 to <number of draw annotations>
Index of the draw annotation

Setting parameters:

<x> Horizontal position of the end point of the new segment
<y> Vertical position of the end point of the new segment

Usage:

Setting only
Asynchronous command

DISPlay:ANNotation:PLINe<m>:REMove

Removes the specified draw annotation from the screen.

Suffix:

<m> 1 to <number of draw annotations>
Index of the draw annotation

Usage:

Setting only
Asynchronous command

DISPlay:ANNotation:PLINe<m>[:VALue] <x1>,<y1>,<x2>,<y2>,[<xn>]

Adds a new draw annotation, or replaces the annotation if it already exists. If no parameters are defined, the default values are used.

All parameters are given in % of the screen.

Suffix:

<m> *
Index of the created draw annotation

Parameters:

<x1> Horizontal position of the start point of the new line
 <y1> Vertical position of the start point of the new line
 <x2> Horizontal position of the endpoint of the new line
 <y2> Vertical position of the endpoint of the new line
 <xn> Vertical or horizontal position of extension points. For each point, you need two values, first the horizontal and second the vertical value. All values are separated by commas.

Usage:

Asynchronous command

17.7.5 Appearance

- [Waveform colors](#)..... 721
- [Grid appearance](#)..... 723
- [Dialog appearance](#)..... 725
- [Peak list appearance](#)..... 725

17.7.5.1 Waveform colors

DISPlay:COLor:SIGNaL:CATalog?	722
DISPlay:COLor:SIGNaL:COLor	722
DISPlay:COLor:SIGNaL:ASSign	722
DISPlay:COLor:SIGNaL:USE	723

DISPlay:COLor:SIGNal:CATalog?

Returns a list of valid signal names. The signal names are needed in other DISPlay:COLor commands to set the <Signal> parameter.

Return values:

<Signals> Comma-separated list of signal names

Usage:

Query only

Asynchronous command

DISPlay:COLor:SIGNal:COLor <Signal>,<Value>**DISPlay:COLor:SIGNal:COLor? <Signal>**

Sets the color of the selected waveform.

Parameters:

<Value> Decimal value of the ARGB color. Use the color dialog box on the instrument to get the hex value of the color, and convert the hex value to a decimal value.
0 is fully transparent black.
4278190080 (dec) = FF000000 (hex) is opaque black.
4294967295 (dec) = FFFFFFFF (hex) is opaque white.
To reset the color to its default, use
DISPlay:COLor:SIGNal:COLor <Signal>,DEF.

Parameters for setting and query:

<Signal> Signal name as returned by [DISPlay:COLor:SIGNal:CATalog?](#).

Usage: Asynchronous command

Manual operation: See "[Color](#)" on page 93

DISPlay:COLor:SIGNal:ASSign <Signal>,<ColorTable>**DISPlay:COLor:SIGNal:ASSign? <Signal>**

Assigns a color table to the source waveform instead of a dedicated color.

Parameters:

<ColorTable> String with the name of the color table.
Valid values are: "FalseColors", "Spectrum",
"SingleEvent" and "Temperature".

Setting parameters:

<Signal> Signal name as returned by [DISPlay:COLor:SIGNal:CATalog?](#).

Usage: Asynchronous command

Manual operation: See "[Assigned color table](#)" on page 93

DISPlay:COLor:SIGNal:USE <Signal>,<State>

If enabled, the selected waveform is displayed according to its assigned color table.

If disabled, the selected color is displayed, and the intensity of the signal color varies according to the cumulative occurrence of the values.

Parameters:

<State> OFF | ON

Parameters for setting and query:

<Signal> Signal name as returned by [DISPlay:COLor:SIGNal:CATalog?](#).

Usage: Asynchronous command

Manual operation: See "[Use color table](#)" on page 92

17.7.5.2 Grid appearance

DISPlay:DIAGram:CROShair	723
DISPlay:DIAGram:FINgrid	723
DISPlay:DIAGram:GRID	724
DISPlay:DIAGram:LABels	724
DISPlay:DIAGram:XFIXed	724
DISPlay:DIAGram:YFIXed	724

DISPlay:DIAGram:CROShair <Crosshair>

If selected, a crosshair is displayed in the diagram area. A crosshair allows you to select a specific data point by its coordinates.

Parameters:

<Crosshair> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Show crosshair](#)" on page 96

DISPlay:DIAGram:FINgrid <ShowFineScale>

If selected, the crosshair is displayed as a ruler with scale markers. If disabled, the crosshair is shown as dashed lines.

Parameters:

<ShowFineScale> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Show fine grid scale](#)" on page 96

DISPlay:DIAGram:GRID <Show>

If selected, a grid is displayed in the diagram area. A grid helps you associate a specific data point to its exact value on the x- or y-axis.

Parameters:

<Show> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Show grid](#)" on page 96

DISPlay:DIAGram:LABels <ShowLabels>

If selected, labels mark values on the x- and y-axes in specified intervals in the diagram.

Parameters:

<ShowLabels> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Show labels](#)" on page 96

DISPlay:DIAGram:XFIXed <XGridFixed>

If enabled, the vertical grid lines remain in their position when the horizontal position is changed. Only the values at the grid lines are adapted.

Parameters:

<XGridFixed> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[Keep X-grid fixed](#)" on page 97

DISPlay:DIAGram:YFIXed <YGridFixed>

If enabled, the horizontal grid lines remain in their position when the position of the curve is changed. Only the values at the grid lines are adapted.

Fixed horizontal grid lines correspond to the behavior of traditional oscilloscopes.

Parameters:

<YGridFixed> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Keep Y-grid fixed](#)" on page 97

17.7.5.3 Dialog appearance

DISPlay:DIALog:FONTsize.....	725
DISPlay:DIALog:TRANsparency.....	725
DISPlay:RESUlt:FONTsize.....	725

DISPlay:DIALog:FONTsize <DialogFontSize>

Sets the font size of the text in dialog boxes.

Parameters:

<DialogFontSize> Range: 16 to 25
 Increment: 1
 *RST: 21

Usage: Asynchronous command

Manual operation: See "[Font size \(Dialog\)](#)" on page 97

DISPlay:DIALog:TRANsparency <DialogTransp>

Sets the transparency of the dialog box background. For high transparency values, you can see the waveform display in the background, and possibly check the effect of the changed setting. For lower transparency values, readability in the dialog box improves.

Parameters:

<DialogTransp> Range: 0 to 70
 Increment: 1
 *RST: 0

Usage: Asynchronous command

Manual operation: See "[Transparency \(Dialog\)](#)" on page 98

DISPlay:RESUlt:FONTsize <ResultFontSize>

Sets the font size of the text in result tables.

Parameters:

<ResultFontSize> Range: 16 to 25
 Increment: 1
 *RST: 21

Usage: Asynchronous command

Manual operation: See "[Font size \(Result dialog\)](#)" on page 98

17.7.5.4 Peak list appearance

CALCulate:SPECtrum<sp>:PLISt:LABel:BORDer.....	726
--	-----

CALCulate:SPECTrum<sp>:PLISt:LABEL:BORDer <LabelBorder>

Defines the layout of the labels, full border or none.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<LabelBorder> NOBorder | FULL

FULL: Full border

*RST: FULL

Usage: Asynchronous command

Manual operation: See "[Frame type](#)" on page 98

17.7.6 Display

- [Persistence](#)..... 726
- [Signal](#)..... 727
- [Backlight](#)..... 728
- [Clear results](#)..... 729

17.7.6.1 Persistence

- [DISPLAY:PERSistence:INFinite](#)..... 726
- [DISPLAY:PERSistence:RESET](#)..... 726
- [DISPLAY:PERSistence:TIME](#)..... 727
- [DISPLAY:PERSistence\[:STATe\]](#)..... 727

DISPLAY:PERSistence:INFinite <State>

If infinite persistence is enabled, each new waveform point remains on the screen until this option is disabled. Use infinite persistence to display rare events in the signal.

Parameters:

<State> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Infinite persistence](#)" on page 100

DISPLAY:PERSistence:RESET

Resets the display, removing persistent all waveform points.

Usage: Setting only
Asynchronous command

Manual operation: See "[Reset](#)" on page 100

DISPlay:PERSistence:TIME <Time>

Sets a time factor that controls how long the waveforms points fade away from the display. Thus, the MXO 5 emulates the persistence of analog phosphor screens.

Parameters:

<Time> Range: 0.05 to 50
 Increment: 0.05
 *RST: 0.05
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Time](#)" on page 100

DISPlay:PERSistence[:STATe] <State>

If enabled, each new data point in the diagram area remains on the screen for the duration defined using [DISPlay:PERSistence:TIME](#), or as long as [DISPlay:PERSistence:INFinite](#) is enabled.

If disabled, the signal value is only displayed as long as it actually occurs.

Parameters:

<State> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Enable](#)" on page 100

17.7.6.2 Signal

DISPlay:INTensity	727
DISPlay:DIAGram:STYLE	728

DISPlay:INTensity <Intensity>

The intensity determines the strength of the waveform line in the diagram. Enter a percentage between 0 (not visible) and 100% (strong). The default value is 50%.

Parameters:

<Intensity> Range: 0 to 100
 Increment: 1
 *RST: 50
 Default unit: %

Usage: Asynchronous command

Manual operation: See "[Intensity](#)" on page 101

DISPlay:DIAGram:STYLE <Style>

Selects the style in which the waveform is displayed.

Parameters:

<Style> VECTors | DOTS

VECTors

The individual data points are connected by a line.

DOTS

Only the individual data points are displayed.

*RST: VECTors

Usage: Asynchronous command

Manual operation: See "[Waveform style](#)" on page 101

17.7.6.3 Backlight

| | |
|------------------------------------|-----|
| DISPlay:BACKLight[:BRIGtness]..... | 728 |
| DISPlay:BACKLight:DIMMing..... | 728 |

DISPlay:BACKLight[:BRIGtness] <LCDIntensity>

Sets the background luminosity of the touchscreen.

Parameters:

<LCDIntensity> Range: 5 to 100
Increment: 1
*RST: 90
Default unit: %

Usage: Asynchronous command

Manual operation: See "[Brightness](#)" on page 102

DISPlay:BACKLight:DIMMing <InactiveTime>

Selects a time, after which the monitor brightness is reduced, if the instrument was inactive. Remote control of the instrument is also considered as an activity.

Parameters:

<InactiveTime> OFF | T1Minute | T2Minutes | T3Minutes | T5Minutes |
T10Minutes | T15Minutes | T20Minutes | T25Minutes |
T30Minutes | T45Minutes | T1Hour | T2Hours | T3Hours |
T4Hours

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Dimm on user inactivity](#)" on page 102

17.7.6.4 Clear results

DISPlay:CLR

Deletes all measurement results including all waveforms and statistics.

Usage: Setting only
Asynchronous command

Manual operation: See "Clear" on page 69

17.7.7 Save/Recall

17.7.7.1 Autonaming

| | |
|-------------------------------------|-----|
| MMEMory:AUTOnaming:PREFix..... | 729 |
| MMEMory:AUTOnaming:TIME..... | 729 |
| MMEMory:AUTOnaming:INDex..... | 729 |
| MMEMory:AUSave:ENABLE..... | 729 |
| MMEMory:AUSave:INTerval..... | 730 |
| MMEMory:AUTOnaming:USERtext..... | 730 |
| MMEMory:AUTOnaming:DEFaultpath..... | 730 |
| MMEMory:AUTOnaming:RESall..... | 730 |
| MMEMory:AUTOnaming:RESPath..... | 731 |
| MMEMory:AUTOnaming:TEXT..... | 731 |

MMEMory:AUTOnaming:PREFix <MainNmeStemSt>

MMEMory:AUTOnaming:TIME <DateTime>

MMEMory:AUTOnaming:INDex <NameIndex>

Includes or excludes the prefix/ date/time /index in the filename pattern for automatic filename generation. This name is used as the default filename.

The prefix indicates the type of data that is saved, for example, RefCurve, Settings.

Parameters:

<NameIndex> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "Index" on page 112

MMEMory:AUSave:ENABLE <EnableAutosave>

Enables the automatic saving of the waveform. You can set the autosave interval with [MMEMory:AUSave:INTerval](#).

Parameters:

<EnableAutosave> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Enable autosave](#)" on page 112

MMEMemory:AUSave:INTerval <AutosaveIntvl>

Defines the time interval for the automatic saving of the waveform, if [MMEMemory:AUSave:ENABLE](#) is set to ON.

Parameters:

<AutosaveIntvl> Range: 1 to 360000
Increment: 1
*RST: 300
Default unit: s

Usage: Asynchronous command

Manual operation: See "[Enable autosave](#)" on page 112

MMEMemory:AUTonaming:USERtext <State>

If enabled, inserts the specified user text after the prefix.

You can define the text with [MMEMemory:AUTonaming:TEXT](#).

Parameters:

<State> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[User text](#)" on page 111

MMEMemory:AUTonaming:DEFaultpath <Path>

Sets the path where data and settings files are stored. On the instrument, all user data is written to /home/storage/userData. You can create subfolders in this folder.

Parameters:

<Path> String parameter

Usage: Asynchronous command

Manual operation: See "[Default path for all file operations](#)" on page 112

MMEMemory:AUTonaming:RESall

Resets all autonaming settings to the default value, including the path.

Usage: Setting only
Asynchronous command

Manual operation: See "[Reset path](#)" on page 112

MMEMory:AUTonaming:RESPath

Resets the path for file operations to the factory default path.

Usage: Setting only
Asynchronous command

Manual operation: See "[Reset path](#)" on page 112

MMEMory:AUTonaming:TEXT <NameString>

Defines a text that can be included in the autonaming pattern.

Parameters:

<NameString> String parameter

Usage: Asynchronous command

Manual operation: See "[User text](#)" on page 111

17.7.7.2 CSV export

EXPort:RESUlt:DELimiter <Delimiter>

Selects the list separator symbol from a list. Available are semicolon, comma, space, tab and colon.

Parameters:

<Delimiter> SEMICOLON | COMMA | SPACE | TAB | COLON
*RST: COMMA

Manual operation: See "[CSV delimiter](#)" on page 114

17.7.8 Preset

| | |
|----------------------------------|-----|
| USERdefined:PRESet:NAME..... | 731 |
| USERdefined:PRESet:OPEN..... | 732 |
| USERdefined:PRESet:SAVE..... | 732 |
| USERdefined:PRESet[:ENABLE]..... | 732 |

USERdefined:PRESet:NAME <Name>

Sets the path, the filename and the file format of the preset file.

Parameters:

<Name> String with path and file name with extension .set.

Example: USERdefined:PRESet:NAME '/home/storage/userData/settings/Preset_SPI.set'

Manual operation: See "Preset file selection" on page 104

USERdefined:PRESet:OPEN

Opens and loads the preset file that is defined with `USERdefined:PRESet:NAME`.

Usage: Event

Manual operation: See "Preset file selection" on page 104

USERdefined:PRESet:SAVE

Saves the current settings as a preset file. You define the storage location and filename with `USERdefined:PRESet:NAME`.

Usage: Event

Manual operation: See "Select, Save" on page 105

USERdefined:PRESet[:ENABLE] <Name>

If enabled, the settings from the selected saveset are restored when the [Preset] key is pressed.

If disabled, [Preset] sets the instrument to the factory defaults.

The saveset to be used as preset file is defined with `USERdefined:PRESet:NAME`.

Parameters:

<Name> OFF | ON

*RST: OFF

Manual operation: See "Enable user-defined preset" on page 104

17.7.9 Maintenance

| | |
|---------------------|-----|
| *CAL? | 733 |
| CALibration[:ALL] | 733 |
| CALibration:DATE? | 733 |
| CALibration:TIME? | 733 |
| CALibration:RESUlt? | 734 |
| SERvice:REPort | 734 |
| SYSTem:APUP | 734 |

***CAL?**

Starts a self-alignment of the instrument, and then queries a status response. Return values ≠ 0 indicate an error.

Return values:

| | |
|---------|--|
| <State> | 0: no error
1: alignment failed
2: not aligned, e.g. init
3: device needs longer warmup time before selfalignment can start
4: input signal connected during selfalignment |
|---------|--|

| | |
|---------------|------------|
| Usage: | Query only |
|---------------|------------|

CALibration[:ALL]

Calibration:ALL starts the self-alignment process without returning status information. To get the status, use the commands of the operation status register.

Calibration:ALL? starts the self-alignment process and returns information on the state of the self-alignment. (Same as *CAL?).

The process can take several minutes. Consider your timeout settings.

Return values:

| | |
|----------|--|
| <Result> | Numeric status indicator. Return values ≠ 0 indicate an error. |
|----------|--|

| | |
|---------------|----------------------|
| Usage: | Asynchronous command |
|---------------|----------------------|

CALibration:DATE?

Returns the date of the last self-alignment.

Return values:

| |
|--------|
| <Date> |
|--------|

| | |
|---------------|------------------------------------|
| Usage: | Query only
Asynchronous command |
|---------------|------------------------------------|

| | |
|--------------------------|---|
| Manual operation: | See " Date, Time, Overall alignment state " on page 107 |
|--------------------------|---|

CALibration:TIME?

Returns the time of the last self-alignment.

Return values:

| |
|--------|
| <Time> |
|--------|

| | |
|---------------|------------------------------------|
| Usage: | Query only
Asynchronous command |
|---------------|------------------------------------|

| | |
|--------------------------|---|
| Manual operation: | See " Date, Time, Overall alignment state " on page 107 |
|--------------------------|---|

CALibration:RESUlt?

Returns the result of the last self-alignment and the current alignment status. In remote mode, *CAL? provides more detailed information.

Return values:

<ResultState> PASSED | FAILed | NOALignData
 *RST: FAILed

Usage:

Query only
Asynchronous command

Manual operation: See "[Date, Time, Overall alignment state](#)" on page 107

SERvice:REPort

Creates a service report.

The service report is a ZIP file with a complete bug report, all relevant setup information, reporting and log files, alignment files, and the instrument configuration.

If a USB flash drive is connected, the report is saved on the USB flash drive. Otherwise, the report is saved in the user data folder /home/storage/userData.

Usage:

Event
Asynchronous command

Manual operation: See "[Create report](#)" on page 110

SYSTem:APUP <AutoPowerUp>

If enabled, the instrument powers up automatically when it is connected to the mains voltage.

Parameters:

<AutoPowerUp> OFF | ON
 *RST: ON

Usage:

Asynchronous command

Manual operation: See "[Auto power up](#)" on page 109

17.8 Acquisition and waveform setup

17.8.1 Starting and stopping acquisition

| | |
|--------------|-----|
| RUNCont..... | 735 |
| RUN..... | 735 |

| | |
|----------------|-----|
| RUNSingle..... | 735 |
| SINGle..... | 735 |
| STOP..... | 735 |

RUNCont**RUN**

Starts the continuous acquisition.

Usage: Setting only
Asynchronous command

Manual operation: See "[Run / Stop]" on page 45

RUNSingle**SINGle**

Starts a defined number of acquisition cycles. The number of cycles is set with [ACQuire:COUNT](#).

Usage: Setting only
Asynchronous command

Manual operation: See "[Single]" on page 45

STOP

Stops the running acquisition.

Usage: Event
Asynchronous command

Manual operation: See "[Run / Stop]" on page 45

17.8.2 Horizontal setup

| | |
|----------------------------------|-----|
| AUToscale..... | 735 |
| TIMebase:SCALE..... | 736 |
| TIMebase:RANGE..... | 736 |
| TIMebase:DIVisions?..... | 736 |
| TIMebase:HORizontal:POStion..... | 736 |
| TIMebase:REFerence..... | 737 |

AUToscale

Performs an autoset process: analyzes the enabled channel signals, and obtains appropriate horizontal, vertical, and trigger settings to display stable waveforms.

Rohde & Schwarz does not recommend using the autoset in remote control. To adjust the oscilloscope remotely, especially for automated testing applications, use the remote commands that adjust the horizontal, vertical and trigger settings.

| | |
|---------------|-------------------------------|
| Usage: | Event
Asynchronous command |
|---------------|-------------------------------|

TIMebase:SCALe <TimebaseScale>

Sets the horizontal scale, the time per division, for all waveforms in the time domain, for example, channel and math waveforms.

Parameters:

<TimebaseScale> Range: 200E-12 to 10E+3
 Increment: 1E-12
 *RST: 20E-9
 Default unit: s/div

| | |
|---------------|----------------------|
| Usage: | Asynchronous command |
|---------------|----------------------|

| | |
|--------------------------|--|
| Manual operation: | See " [Scale] " on page 46 |
|--------------------------|--|

TIMebase:RANGe <TimebaseRange>

Sets the time of one acquisition, which is the time across the 10 divisions of the diagram: *Acquisition time = Time scale * 10 divisions.*

Parameters:

<TimebaseRange> Range: 2E-9 to 100E+3
 Increment: 1E-12
 *RST: 200E-9
 Default unit: s

| | |
|---------------|----------------------|
| Usage: | Asynchronous command |
|---------------|----------------------|

| | |
|--------------------------|--|
| Manual operation: | See " Timebase range " on page 116 |
|--------------------------|--|

TIMebase:DIVisions?

Returns the number of horizontal divisions on the screen. The number cannot be changed.

Return values:

<HorizDivCnt> *RST: 10

| | |
|---------------|------------------------------------|
| Usage: | Query only
Asynchronous command |
|---------------|------------------------------------|

TIMebase:HORIZONTAL:POSITION <Position>

Defines the time distance between the reference point and the trigger point, which is the zero point of the diagram. The horizontal position is also known as trigger offset.

Parameters:

<Position> Range: -9.95E+6 to 1E+26
 Increment: 1E-12
 *RST: 0
 Default unit: s

Usage:

Asynchronous command

Manual operation: See "[Position]" on page 46**TIMebase:REFerence <RescaleCtrPos>**

Sets the position of the reference point in % of the screen. It defines which part of the waveform is shown.

Parameters:

<RescaleCtrPos> Range: 0 to 100
 Increment: 1
 *RST: 50
 Default unit: %

Usage:

Asynchronous command

Manual operation: See "Reference point" on page 117

17.8.3 Roll mode

| | |
|---------------------------------|-----|
| TIMebase:ROLL:ENABLE..... | 737 |
| TIMebase:ROLL:MTIME..... | 737 |
| ACQuire:ROLLmode:OSCapture..... | 738 |
| ACQuire:ROLLmode:POINTS?..... | 738 |
| TIMebase:ROLL:STATe..... | 738 |

TIMebase:ROLL:ENABLE <Mode>

Selects, if the roll mode is set automatically by the instrument or if it is turned off.

Parameters:

<Mode> AUTO | OFF
 *RST: AUTO

Usage:

Asynchronous command

Manual operation: See "Mode" on page 118**TIMebase:ROLL:MTIME <MinAcquTime>**

Sets the minimum acquisition time for automatic start of the roll mode.

Parameters:

<MinAcqTime> Range: 0.5 to 100000
Increment: 1
*RST: 2
Default unit: s

Usage:

Asynchronous command

Manual operation: See "Start roll time" on page 118

ACQuire:ROLLmode:OSCCapture <OffScreenCapture>

If enabled, the analyzable waveform in roll mode is extended. You can run the roll mode, stop the acquisition after some time, and analyze the data that is on the display and in the unvisible area on the left.

Parameters:

<OffScreenCapture> OFF | ON
*RST: OFF

Example: See [Section 17.4.4, "Data transfer in roll mode", on page 694](#).

Usage: Asynchronous command

Manual operation: See "[Off screen capture](#)" on page 119

ACQuire:ROLLmode:POINts?

Returns the record length of the roll mode. In roll mode, the complete record is always captured, independently of the displayed waveform. To process and analyze the complete roll waveform, enable [ACQquire:ROLLmode:OSCCapture](#).

Return values:

<RecordLength> Range: 0 to 18446744073709551615
Increment: 1
*RST: 0
Default unit: pts

Usage:

Query only
Asynchronous command

Manual operation: See "[Off screen capture](#)" on page 119

TIMebase:ROLL:STATE?

Returns the status of the roll mode.

Return values:

<State> OFF | ON
*RST: OFF

Usage:

Query only
Asynchronous command

Manual operation: See "[Mode](#)" on page 118

17.8.4 Vertical setup

The channel suffix <ch> selects the input channel that is affected by the command.

| | |
|-------------------------------|-----|
| CHANnel<ch>:STATe..... | 739 |
| CHANnel<ch>:SCALe..... | 739 |
| CHANnel<ch>:RANGE..... | 740 |
| CHANnel<ch>:OFFSet..... | 740 |
| CHANnel<ch>:POSIon..... | 740 |
| CHANnel<ch>:COUpling..... | 741 |
| CHANnel<ch>:INVert..... | 741 |
| DISPlay:SIGNAl:LABel..... | 742 |
| CHANnel<ch>:SKEW:TIME..... | 742 |
| CHANnel<ch>:BANDwidth..... | 742 |
| CHANnel<ch>:EATScale..... | 743 |
| CHANnel<ch>:EATTenuation..... | 743 |
| CHANnel<ch>:IMPedance..... | 744 |

CHANnel<ch>:STATe <State>

Switches the selected channel signal on or off.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

| | |
|---------|----------|
| <State> | OFF ON |
| *RST: | OFF |

Usage: Asynchronous command

Manual operation: See "[\[C<n>\]](#)" on page 48

CHANnel<ch>:SCALe <Scale>

Sets the vertical scale, which defines the displayed amplitude of the selected waveform.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

| | |
|---------|---|
| <Scale> | Range: 0.001 to 1
Increment: 0.001
*RST: 0.05
Default unit: Depends on the connected probe |
|---------|---|

Usage: Asynchronous command

Manual operation: See "[\[Scale\]](#)" on page 49

CHANnel<ch>:RANGe <Range>

Sets the voltage range across the 10 vertical divisions of the diagram. The command is an alternative to [CHANnel<ch>:SCALe](#).

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Range> Range: 0.01 to 10
Increment: 0.01
*RST: 0.5
Default unit: V/div

Usage: Asynchronous command

CHANnel<ch>:OFFSet <Offset>

Sets the offset voltage, which corrects an offset-affected signal. The vertical center of the selected channel is shifted by the offset value and the signal is repositioned within the diagram.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Offset> Range: -1 to 1
Increment: 0.01
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[\[Position\]](#)" on page 48

CHANnel<ch>:POSItion <Position>

Moves the selected signal up or down in the diagram. While the offset sets a voltage, position is a graphical setting given in divisions. The visual effect is the same as for offset.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Position> Positive values move up the waveform, negative values move it down.

Range: -5 to 5

Increment: 0.02

*RST: 0

Default unit: div

Usage: Asynchronous command

Manual operation: See "[\[Position\]](#)" on page 48

CHANnel<ch>:COUPling <Value>

Sets the connection of the channel signal, i.e. the input impedance (termination) and a filter (coupling). The command determines what part of the signal is used for waveform analysis and triggering.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Value> DC | DCLimit | AC

DC

Connection with 50 Ω termination, passes both DC and AC components of the signal.

DCLimit

Connection with 1 MΩ termination, passes both DC and AC components of the signal.

AC

Connection with 1 MΩ termination through DC capacitor, removes DC and very low-frequency components. The waveform is centered on zero volts.

Usage: Asynchronous command

Manual operation: See "[Coupling](#)" on page 133

CHANnel<ch>:INVert <InvertChannel>

Turns the inversion of the signal amplitude on or off. To invert means to reflect the voltage values of all signal components against the ground level.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<InvertChannel> OFF | ON
 ON: inverted waveform
 OFF: normal waveform
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[Invert channel](#)" on page 133

DISPlay:SIGNAl:LABEL <Signal>,<Label>**DISPlay:SIGNAl:LABEL? <Signal>**

Defines and assigns a label to the specified channel waveform.

Parameters:

<Label> String with the waveform label

Parameters for setting and query:

<Signal> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8

Usage: Asynchronous command

Manual operation: See "[Label](#)" on page 133

CHANnel<ch>:SKEW:TIME <Offset>

Sets a skew value to compensate for the delay of the measurement setup or from the circuit specifics that the instrument cannot compensate automatically. It affects only the selected input channel.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Offset> Range: -100E-9 to 100E-9
 Increment: 1E-12
 *RST: 0
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Skew](#)" on page 133

CHANnel<ch>:BANDwidth <BandwidthLimit>

Sets the bandwidth limit. The specified bandwidth indicates the range of frequencies that the instrument can acquire and display accurately with less than 3 dB attenuation. Frequencies above the limit are removed from the signal, and noise is reduced.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Setting parameters:

<BandwidthLimit> FULL | B2G | B1G5 | B1G | B700 | B500 | B350 | B200 | B100 | B50 | B20

FULL

Sets the bandwidth to the maximum bandwidth of the instrument. Bandwidth extension options are considered.

B700 | B500 | B350 | B200 | B100 | B50 | B20

Sets a bandwidth limit lower than the maximum. The number indicates the bandwidth limit in MHz.

B1G5 | B1G

Sets the bandwidth limit to 1500 MHz or 1000 MHz if these values are lower than the maximum.

Return values:

<Result> B2G | B1G5 | B1G | B700 | B500 | B350 | B200 | B100 | B50 | B20

Possible results, availability depends on the maximum bandwidth of the instrument and bandwidth extension options.

Usage:

Asynchronous command

Manual operation: See "[Bandwidth](#)" on page 134

CHANnel<ch>:EATScale <ExtAttScl>

Sets the attenuation scale for an external divider: linear or logarithmic.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<ExtAttScl> LIN | LOG

*RST: LIN

Usage:

Asynchronous command

Manual operation: See "[External Attenuation: Scale, Attenuation](#)" on page 135

CHANnel<ch>:EATTenuation <ExtAtt>

Consider a voltage divider that is part of the DUT before the measuring point. The external attenuation is included in the measurement, and the instrument shows the results that would be measured before the divider. External attenuation can be used with all probes.

| | |
|--------------------------|---|
| Suffix: | |
| <ch> | 1 to 8, depending on instrument model. Index of the analog channel. |
| Parameters: | |
| <ExtAtt> | Values depend on the selected scale (CHANnel<ch>:EATScale on page 743) and the unit of the waveform. See "External Attenuation: Scale, Attenuation" on page 135. Limits below are for linear scale.
Range: 0.005 to 1000000
Increment: 0.01
*RST: 1 |
| Usage: | Asynchronous command |
| Manual operation: | See "External Attenuation: Scale, Attenuation" on page 135 |

CHANnel<ch>:IMPedance <Impedance>

Sets the impedance of the connected probe for power calculations and measurements.

| | |
|--------------------------|---|
| Suffix: | |
| <ch> | 1 to 8, depending on instrument model. Index of the analog channel. |
| Parameters: | |
| <Impedance> | Range: 0.1 to 100000
Increment: 1
*RST: 50
Default unit: Ω |
| Usage: | Asynchronous command |
| Manual operation: | See "Impedance" on page 135 |

17.8.5 Probes

This section describes all remote commands for probes.

- [Common probe settings](#).....744
- [Settings for active voltage probes](#).....749
- [Settings for modular probes](#).....755
- [Settings for current probes](#).....759
- [Optical isolated probes](#).....761
- [Probe adapter R&S RT-Z2T](#).....763
- [Probe attributes](#).....764

17.8.5.1 Common probe settings

The probe suffix <ch> selects the input channel to which the probe is connected.

| | |
|--------------------------------------|-----|
| PROBe<ch>:SETup:ATTenuation[:AUTO]? | 745 |
| PROBe<ch>:SETup:ATTenuation:MANual | 745 |
| PROBe<ch>:SETup:ATTenuation:DEFProbe | 745 |
| PROBe<ch>:SETup:ATTenuation:UNIT | 746 |
| PROBe<ch>:SETup:BANDwidth? | 746 |
| PROBe<ch>:SETup:OFFSet:TOMean | 747 |
| PROBe<ch>:SETup:OFFSet:AZERO | 747 |
| PROBe<ch>:SETup:OFFSet:USEautozero | 747 |
| PROBe<ch>:SETup:NAME? | 748 |
| PROBe<ch>:SETup:STATe? | 748 |
| PROBe<ch>:SETup:TYPE? | 748 |

PROBe<ch>:SETup:ATTenuation[:AUTO]?

Returns the attenuation of a detected or predefined probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Attenuation> Range: 0.001 to 1000
Increment: 0.1
*RST: 1
Default unit: V/V

Usage: Query only
Asynchronous command

Manual operation: See "Attenuation" on page 138

PROBe<ch>:SETup:ATTenuation:MANual <Attenuation>

Sets the attenuation for an unknown probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Attenuation> Range: 0.0001 to 10000
Increment: 0.1
*RST: 1
Default unit: V/V

Usage: Asynchronous command

Manual operation: See "Attenuation" on page 138

PROBe<ch>:SETup:ATTenuation:DEFProbe <PredefinedProbe>

Selects one of the predefined probes, or a user-defined probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<PredefinedProbe> NONE | USER | ZC10 | ZC20 | ZC30 | ZD01A100 | ZD01A1000 | ZZ80 | ZS10L | ZD02 | ZD08 | ZC02100 | ZC021000 | ZC03 | ZD002A10 | ZD002A100 | ZD003A20 | ZD003A200 | ZC3110 | ZC311 | ZC3101 | ZH03 | ZP1X

USER

Probe is not detected and not known to the instrument. Set unit and attenuation manually.

ZC10 | ZC20 | ZC30 | ZC03

Current probes

ZD01A100 | ZD01A1000

High voltage differential probes, attenuation ratio according to the setting on the probe.

A100 = 100:1

A1000 = 1000:1

ZC02100 | ZC021000

Current probes 100 A/V or 1000 A/V according to the setting on the probe.

*RST: NONE

Usage:

Asynchronous command

Manual operation:

See "[Predefined probe, name and type of the probe](#)" on page 137

PROBe<ch>:SETup:ATTenuation:UNIT <Unit>

Returns the unit of the connected probe if the probe is detected or predefined. For unknown probes, you can select the required unit.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Unit> V | A | W

Voltage probe (V), current probe (A), power probe (W)

*RST: V

Usage:

Asynchronous command

Manual operation:

See "[Vertical unit](#)" on page 138

PROBe<ch>:SETup:BANDwidth?

Returns the bandwidth of the connected probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Bandwidth> Range: 10000 to 20000000000
Increment: 10
*RST: 15000000000
Default unit: Hz

Usage:

Query only
Asynchronous command

Manual operation: See "[Probe bandwidth](#)" on page 138

PROBe<ch>:SETUp:OFFSet:TOMean

Compensates automatically for a DC component of the input signal using the result of a background mean measurement.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

Manual operation: See "[Set offset to mean](#)" on page 138

PROBe<ch>:SETUp:OFFSet:AZERo

Measures the zero error of the probe. Short the signal pin and the ground pin together, then send the command.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

Manual operation: See "[AutoZero, Use AutoZero](#)" on page 138

PROBe<ch>:SETUp:OFFSet:USEautozero <UseAutoZeroOffset>

Corrects the zero error of the probe. The zero error is detected with [PROBe<ch>:SETUp:OFFSet:AZERo](#).

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<UseAutoZeroOffset> OFF | ON

*RST: OFF

Example:

PROB2:SET:OFFS:AZER

PROB2:SET:OFFS:USE ON

Detects the zero error and uses it for correction.

Usage:

Asynchronous command

Manual operation: See "[AutoZero, Use AutoZero](#)" on page 138

PROBe<ch>:SETup:NAME?

Queries the name of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Name> Name string

Usage: Query only
Asynchronous command**Manual operation:** See "[Predefined probe, name and type of the probe](#)" on page 137

PROBe<ch>:SETup:STATE?Queries if the probe at the specified input channel is active (detected) or not active (not detected). To switch the probe on, use [CHANnel<ch>:STATE](#).**Suffix:**

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<State> DETected | NDETected

*RST: NDETected

Usage: Query only
Asynchronous command**Manual operation:** See "[Predefined probe, name and type of the probe](#)" on page 137

PROBe<ch>:SETup:TYPE?

Queries the class of the probe.

| | |
|--------------------------|--|
| Suffix: | |
| <ch> | 1 to 8, depending on instrument model. Index of the analog channel. |
| Return values: | |
| <Type> | String containing the probe class, e.g. None (no probe detected), passive, current, active diff., active single-ended. |
| Usage: | Query only
Asynchronous command |
| Manual operation: | See " Predefined probe, name and type of the probe " on page 137 |

17.8.5.2 Settings for active voltage probes

The probe suffix <ch> selects the input channel to which the probe is connected.

| | |
|---|-----|
| PROBe<ch>:SETUp:MODE..... | 749 |
| PROBe<ch>:SETUp:ACCoupling..... | 750 |
| PROBe<ch>:SETUp:CMOFFset..... | 751 |
| PROBe<ch>:SETUp:DISPLAYdiff..... | 751 |
| PROBe<ch>:SETUp:ZAXV..... | 751 |
| PROBe<ch>:PMETer:STATE..... | 752 |
| PROBe<ch>:PMETer:RESULTS:SINGle?..... | 752 |
| PROBe<ch>:PMETer:RESULTS:COMMON?..... | 752 |
| PROBe<ch>:PMETer:RESULTS:DIFFerential?..... | 753 |
| PROBe<ch>:PMETer:RESULTS:NEGative?..... | 753 |
| PROBe<ch>:PMETer:RESULTS:POSitive?..... | 754 |
| PROBe<ch>:SETUp:ADVanced:AUDIOverload..... | 754 |
| PROBe<ch>:SETUp:ADVanced:FILTer..... | 754 |
| PROBe<ch>:SETUp:ADVanced:RANGE..... | 755 |
| PROBe<ch>:SETUp:ADVanced:PMToffset..... | 755 |

PROBe<ch>:SETUp:MODE <Mode>

The micro button is located on the probe head. Pressing this button, you initiate an action on the instrument directly from the probe. The button is disabled during internal automatic processes, for example, during self-alignment, autoset, and level detection.

Select the action that you want to start from the probe.

| | |
|--------------------|--|
| Suffix: | |
| <ch> | 1 to 8, depending on instrument model. Index of the analog channel. |
| Parameters: | |
| <Mode> | RCONTinuous RSINGle AUToset AZERo OTMean SITFile NOACtion FTRiglevel PRSetup |
| RCONTinuous | Run continuous: the acquisition is running as long as the probe button is pressed. |

RSINgle

Run single: starts a defined number of acquisitions (same as [Single] key).

AUToset

Starts the autoset procedure.

AZERo

AutoZero: performs an automatic correction of the zero error.

OTMean

Set offset to mean: performs an automatic compensation for a DC component of the input signal.

SITFile

Save image to file: saves the display image in a file.

NOACtion

Nothing is started on pressing the micro button.

FTRiglevel

Sets the trigger level automatically to $0.5 * (MaxPeak - MinPeak)$. The function is not available for an external trigger source.

PRSetup

Opens the "Probes Setup" dialog box.

*RST: RCONtinuous

Usage: Asynchronous command

Manual operation: See "[MicroButton](#)" on page 140

PROBe<ch>:SETup:ACCoupling <ProbeCouplingAC>

Enables AC coupling in R&S RT-ZPR power rail probes, which removes DC and very low-frequency components. The R&S RT-ZPR probe requires 50 Ω input termination, for which the channel AC coupling is not available. The probe setting allows AC coupling also at 50 Ω inputs.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<ProbeCouplingAC> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[AC Coupling](#)" on page 144

PROBe<ch>:SETUp:CMOffset <CMOffset>

Sets the common-mode offset to compensate for a common DC voltage that is applied to both input sockets (referenced to the ground socket). The setting is available for Rohde & Schwarz differential probes and for modular probes in CM measurement mode.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<CMOffset> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[CM offset](#)" on page 143

PROBe<ch>:SETUp:DISPLAYdiff <DisplayDiff>

Selects the voltage to be measured by the R&S ProbeMeter of differential active probes:

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<DisplayDiff> DIFFerential | SINGleended
DIFFerential
Measures differential and common mode voltages
SINGleended
Measures the voltage between the positive/negative signal socket and the ground.
*RST: DIFFerential

Usage: Asynchronous command

Manual operation: See "[Display](#)" on page 143

PROBe<ch>:SETUp:ZAXV <AttenuationZA15>

If you use the external attenuator R&S RT-ZA15 together with one of the differential active probes R&S RT-ZD10/20/30, enable "RT-ZA15 attenuator" to include the external attenuation in the measurements.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<AttenuationZA15> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[RT-ZA15 attenuator](#)" on page 143

PROBe<ch>:PMETer:STATe <State>

Activates the integrated R&S ProbeMeter on probes with Rohde & Schwarz probe interface.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<State> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[ProbeMeter](#)" on page 141

PROBe<ch>:PMETer:RESUlt:SINGle?

Returns the R&S ProbeMeter measurement result of single-ended active Rohde & Schwarz probes, the voltage measured between the probe tip and the ground.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Result> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

Manual operation: See "[ProbeMeter](#)" on page 141

PROBe<ch>:PMETer:RESUlt:COMMON?

Returns the R&S ProbeMeter measurement result of differential active R&S probes: the common mode voltage, which is the mean voltage between the signal sockets and the ground socket.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Result> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage:

Query only
Asynchronous command

Manual operation: See "[ProbeMeter](#)" on page 141

PROBe<ch>:PMETer:RESUlt:DIFFerential?

Returns the R&S ProbeMeter measurement result of differential active Rohde & Schwarz probes, the differential voltage - the voltage between the positive and negative signal sockets.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Result> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage:

Query only
Asynchronous command

Manual operation: See "[ProbeMeter](#)" on page 141

PROBe<ch>:PMETer:RESUlt:NEGative?

Returns the R&S ProbeMeter measurement result of differential active R&S probes, the voltage that is measured between the negative signal socket and the ground.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Result> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage:

Query only
Asynchronous command

Manual operation: See "[ProbeMeter](#)" on page 141

PROBe<ch>:PMETer:RESults:POSitive?

Returns the R&S ProbeMeter measurement result of differential active R&S probes: the voltage that is measured between the positive signal socket and the ground.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Result> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage:

Query only
Asynchronous command

Manual operation: See "[ProbeMeter](#)" on page 141

PROBe<ch>:SETup:ADVanced:AUDioverload <Sound>

Activates the acoustic overrange warning in the probe control box. The command is relevant for R&S RT-ZHD probes.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Sound> OFF | ON
*RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Audible overrange](#)" on page 146

PROBe<ch>:SETup:ADVanced:FILTer <State>

Activates the lowpass filter in the probe control box. The filter frequency depends on the probe type and is indicated on the probe control box.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<State> OFF | ON
*RST: OFF

Usage:

Asynchronous command

Manual operation: See "Bandwidth limit" on page 146

PROBe<ch>:SETup:ADVanced:RANGE <ProbeRange>

Sets the voltage range of an R&S RT-ZHD probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<ProbeRange> AUTO | MHIGH | MLOW

AUTO

The voltage range is set with CHANnel<ch>:SCALE.

MHIGH

Sets the higher voltage range of the connected probe. To query the value, use PROBe<ch>:SETup:ATTenuation[:AUTO] ?.

MLOW

Sets the lower voltage range of the connected probe. To query the value, use PROBe<ch>:SETup:ATTenuation[:AUTO] ?.

*RST: AUTO

Usage: Asynchronous command

Manual operation: See "Range" on page 146

PROBe<ch>:SETup:ADVanced:PMToffset

Sets the measured ProbeMeter value as offset. Thus, the value is considered in measurements.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Setting only

Asynchronous command

Manual operation: See "Set offset to ProbeMeter value" on page 153

17.8.5.3 Settings for modular probes

| | |
|------------------------------------|-----|
| PROBe<ch>:SETup:PRMode..... | 756 |
| PROBe<ch>:SETup:CMOFset..... | 756 |
| PROBe<ch>:SETup:DMOFset..... | 757 |
| PROBe<ch>:SETup:NOFFset..... | 757 |
| PROBe<ch>:SETup:POFFset..... | 757 |
| PROBe<ch>:SETup:TERM:ADJust..... | 758 |
| PROBe<ch>:SETup:TERM:MEASure?..... | 758 |
| PROBe<ch>:SETup:TERM:MODE..... | 758 |
| PROBe<ch>:SETup:TERM:STATE..... | 759 |

PROBe<ch>:SETup:PRMode <MeasMode>

Sets the measurement mode of modular probes.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<PrbMeasMd> DMODe | CMODe | PMODe | NMODe

DMODe

Differential mode input voltage (V_{dm}), the voltage between the positive and negative input terminal.

CMODe

Common mode input voltage (V_{cm}), the mean voltage between the positive and negative input terminal vs. ground.

PMODe

Positive single-ended input voltage (V_p). the voltage between the positive input terminal and ground.

NMODOe

Negative single-ended input voltage (V_N). the voltage between the negative input terminal and ground.

*RST: DMODe

Usage: Asynchronous command

Manual operation: See "[Probe mode](#)" on page 150

PROBe<ch>:SETup:CMOffset <CMOffset>

Sets the common-mode offset to compensate for a common DC voltage that is applied to both input sockets (referenced to the ground socket). The setting is available for Rohde & Schwarz differential probes and for modular probes in CM measurement mode.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<CMOffset> Range: -1E+26 to 1E+26

Increment: 0.001

*RST: 0

Default unit: V

Usage: Asynchronous command

Manual operation: See "[CM offset](#)" on page 143

PROBe<ch>:SETUp:DMOffset <DMOffset>

Sets the differential offset to compensate a DC voltage applied between the positive (V_p) and the negative (V_n) input terminal at the probe tip.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<DMOffset> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "DM Offset, CM Offset, P Offset, N Offset" on page 150

PROBe<ch>:SETUp:NOFFset <NOffset>

Sets the negative offset to compensate a DC voltage applied to the negative input terminal (V_n) referenced to ground.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<NOffset> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "DM Offset, CM Offset, P Offset, N Offset" on page 150

PROBe<ch>:SETUp:POFFset <POffset>

Sets the positive offset to compensate a DC voltage applied to the positive input terminal (V_p) referenced to ground.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<POffset> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[DM Offset, CM Offset, P Offset, N Offset](#)" on page 150

PROBe<ch>:SETup:TERM:ADJust <VoltageAdj>

Activates control of the termination voltage.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<VoltageAdj> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Adjustment](#)" on page 152

PROBe<ch>:SETup:TERM:MEASure?

Returns the measured common mode voltage.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<VoltageMeas> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

Manual operation: See "[Measurement](#)" on page 152

PROBe<ch>:SETup:TERM:MODE <Mode>

Selects the voltage that is used for termination.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Mode> AUTO | MANUAL
 AUTO: the instrument uses the measured common mode voltage for termination.
 MANUAL: enter the voltage to be used for termination with **PROBe<ch>:SETup:TERM:ADJust**.
***RST:** AUTO

Usage: Asynchronous command

Manual operation: See "Mode" on page 151

PROBe<ch>:SETup:TERM:STATe <VoltageState>

Activates control of the termination voltage.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<VoltageState> OFF | ON
***RST:** OFF

Usage: Asynchronous command

Manual operation: See "State" on page 151

17.8.5.4 Settings for current probes

The probe suffix **<ch>** selects the input channel to which the probe is connected.

| | |
|---------------------------------|-----|
| PROBe<ch>:SETup:GAIN:AUTO? | 759 |
| PROBe<ch>:SETup:GAIN:MANUAL | 760 |
| PROBe<ch>:SETup:DEGauss | 760 |
| PROBe<ch>:SETup:OFFSet:ZADJust | 760 |
| PROBe<ch>:SETup:OFFSet:STPProbe | 761 |

PROBe<ch>:SETup:GAIN:AUTO?

Returns the gain of a detected or predefined current probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Gain> Range: 0.001 to 1000
 Increment: 0.1
***RST:** 1
 Default unit: A/V

Usage: Query only
Asynchronous command

Manual operation: See "[Gain, Manual gain](#)" on page 147

PROBe<ch>:SETup:GAIN:MANual <Gain>

Sets the gain for an unknown current probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Gain> Range: 0.0001 to 10000
Increment: 0.0001
*RST: 1
Default unit: V/V

Usage: Asynchronous command

Manual operation: See "[Gain, Manual gain](#)" on page 147

PROBe<ch>:SETup:DEGauss

Demagnetizes the core if it has been magnetized by switching the power on and off, or by an excessive input. Always carry out demagnetizing before measurement.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

Manual operation: See "[DeGauss](#)" on page 148

PROBe<ch>:SETup:OFFSet:ZADJust <ZeroAdjustValue>

Set the waveform to zero position. It corrects the effect of a voltage offset or temperature drift. To set the value by the instrument, use [PROBe<ch>:SETup:OFFSet:AZERO](#).

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<ZroAdjVal> Range: -100 to 100
Increment: 0.1
*RST: 0
Default unit: %

Usage: Asynchronous command

Manual operation: See "[Zero adjust](#)" on page 148

PROBe<ch>:SETUp:OFFSet:STPProbe

Saves the zero adjust value in the probe box. If you connect the probe to another channel or to another Rohde & Schwarz oscilloscope, the value is read out again, and you can use the probe without further adjustment.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

Manual operation: See "[Save to probe](#)" on page 148

17.8.5.5 Optical isolated probes

The commands of this section are relevant for optical isolated probes. The commands are available in firmware version 2.2 and higher.

| | |
|--|-----|
| PROBe<ch>:SETUp:ADVanced:UNIT | 761 |
| PROBe<ch>:SETUp:OFFSet:TOPMeter | 761 |
| PROBe<ch>:SETUp:LASer:STATE? | 762 |
| PROBe<ch>:SETUp:ALIGNment:GAIN:EXECute | 762 |
| PROBe<ch>:SETUp:ALIGNment:ZERO:EXECUTE | 762 |
| PROBe<ch>:SETUp:ALIGNment:WRITe | 763 |
| PROBe<ch>:SETUp:ADVanced:RDEFaults | 763 |
| PROBe<ch>:SETUp:TIPModel:NAME? | 763 |

PROBe<ch>:SETUp:ADVanced:UNIT <SelectUnit>

Sets the unit of the R&S RT-ZISO signal.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<SelectUnit> V | A | W

*RST: V

Usage: Asynchronous command

Manual operation: See "[Select input unit](#)" on page 153

PROBe<ch>:SETUp:OFFSet:TOPMeter

Sets the measured R&S ProbeMeter value as offset. Thus, the value is considered in measurements.

Suffix:

<ch> 1..8

Usage:

Event

Asynchronous command

Manual operation: See "[ProbeMeter to offset](#)" on page 145

PROBe<ch>:SETUp:LASer:STATe?

Returns the current status of the laser.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<LaserState> 1 | 2 | 3

1

The laser is working.

2

The laser needs service, but is still working.

3

Defective laser, send to your Rohde & Schwarz service center.

*RST: 1

Usage:

Query only

Asynchronous command

Manual operation: See "[Laser state](#)" on page 153

PROBe<ch>:SETUp:ALIGNment:GAIN:EXECute

Corrects the zero point error and the gain error of the R&S RT-ZISO probe.

To write the alignment result to the non-volatile flash of the probe, use [PROBe<ch>:SETUp:ALIGNment:WRITE](#).

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event

Asynchronous command

Manual operation: See "[Gain/Zero-error alignment](#)" on page 154

PROBe<ch>:SETUp:ALIGNment:ZERO:EXECute

Performs a self-alignment and corrects the zero point error of the R&S RT-ZISO probe.

To write the alignment result to the non-volatile flash of the probe, use [PROBe<ch>:SETUp:ALIGNment:WRITE](#).

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

Manual operation: See "[Zero-error alignment](#)" on page 154

PROBe<ch>:SETUp:ALIGnment:WRITe

The command writes the alignment result to the non-volatile flash of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

PROBe<ch>:SETUp:ADVanced:RDEFaults

Resets the zero point and gain error correction to the factory default values.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Usage:

Event
Asynchronous command

Manual operation: See "[Restore default values](#)" on page 154

PROBe<ch>:SETUp:TIPModel:NAME?

Returns the name of the tip module that is connected to the R&S RT-ZISO probe at the specified channel.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<ProbeTipModel> UNKNOWN | Z101 | Z201 | Z202 | Z203 | Z301 | Z302 | NONE
*RST: NONE

Usage:

Query only
Asynchronous command

17.8.5.6 Probe adapter R&S RT-Z2T

| | |
|---------------------------------------|-----|
| PROBe<ch>:SETUp:ADAPter? | 764 |
| PROBe<ch>:SETUp:ATTenuation:TDEFprobe | 764 |

PROBe<ch>:SETUp:ADAPter?

Queries the adapter status, whether the instrument identified the adapter.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

| | |
|--------|------------|
| <Type> | NONE Z2T |
| | *RST: NONE |

Usage:

Query only
Asynchronous command

PROBe<ch>:SETUp:ATTenuation:TDEFprobe <TekPredefProbe>

Selects the Tektronix probe that is connected to the R&S RT-Z2T adapter.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

| | |
|------------------|--|
| <TekPredefProbe> | NONE P5205A50 P5205A500 P5210A100 P5210A1000
P6205 P6241 P6243 P6245 P6246A1 P6246A10
P6247A1 P6247A10 P6248A1 P6248A10 P6249
P6250A5 P6250A50 P6251A5 P6251A50 P6701B
P6703B P6711 P6713 TCP202 |
|------------------|--|

*RST: NONE

Example:

```
PROBe2:SETUp:ADAPter
<-- Z2T
PROBe2:SETUp:ATTenuation:TDEFprobe P5205A50
```

Checks the adapter state on channel 2, and selects the probe P5205A50.

Usage:

Asynchronous command

17.8.5.7 Probe attributes

| | |
|------------------------------|-----|
| PROBe<ch>:ID:PARTnumber? | 765 |
| PROBe<ch>:ID:PRDate? | 765 |
| PROBe<ch>:ID:SRNumber? | 765 |
| PROBe<ch>:ID:SWVersion? | 765 |
| PROBe<ch>:SETUp:CAPacitance? | 766 |
| PROBe<ch>:SETUp:DCRange:MAX? | 766 |
| PROBe<ch>:SETUp:DCRange:MIN? | 766 |
| PROBe<ch>:SETUp:IMPedance? | 767 |

PROBe<ch>:ID:PARTnumber?

Queries the Rohde & Schwarz part number of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<PartNumber> Part number in a string.

Usage:

Query only
Asynchronous command

PROBe<ch>:ID:PRDate?

Queries the production date of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<ProductionDate> Date in a string.

Usage:

Query only
Asynchronous command

PROBe<ch>:ID:SRNumber?

Queries the serial number of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<SerialNo> Serial number in a string.

Usage:

Query only
Asynchronous command

PROBe<ch>:ID:SWVersion?

Queries the version of the probe firmware.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Softwareversion> Version number in a string.

Usage: Query only
Asynchronous command

PROBe<ch>:SETup:CAPacitance?

Queries the input capacitance of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<InputCapacity> Range: 1E-13 to 1E-07
Default unit: F

Usage: Query only
Asynchronous command

PROBe<ch>:SETup:DCRange:MAX?

Returns the maximum value of the dynamic DC range.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<DynDCrangeMax> Range: -1E+26 to 1E+26
Increment: 1E-12
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

PROBe<ch>:SETup:DCRange:MIN?

Returns the minimum value of the dynamic DC range.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<DynDCrangeMin> Range: -1E+26 to 1E+26
Increment: 1E-12
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

PROBe<ch>:SETup:IMPedance?

Queries the termination of the probe.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<InputImpedance> Range: 0 to 1E+9
Default unit: Ω

Usage:

Query only
Asynchronous command

17.8.6 Acquisition setup

This section describes all remote commands for acquisition.

| | |
|------------------------|-----|
| ACQuire:AVAvailble? | 767 |
| ACQuire:AVErage? | 768 |
| ACQuire:COUNt? | 768 |
| ACQuire:CURRent? | 768 |
| ACQuire:INTerpolate? | 768 |
| ACQuire:POINts[:VALue] | 769 |
| ACQuire:POINts:ARATe? | 769 |
| ACQuire:POINts:MAXimum | 769 |
| ACQuire:POINts:MODE | 769 |
| ACQuire:RESolution | 770 |
| ACQuire:RLReal? | 770 |
| ACQuire:SRATE[:VALue] | 771 |
| ACQuire:SRATE:MINimum | 771 |
| ACQuire:SRATE:MODE | 771 |
| ACQuire:SRReal | 772 |
| ACQuire:TYPE | 772 |

ACQuire:AVAvailble?

Number of acquisitions that is saved in the memory and available for history viewing. It is also the number of acquisitions in a fast segmentation acquisition series.

Return values:

<AcquisitionCount> Range: 0 to 4294967295
Increment: 1
*RST: 0

Usage:

Query only
Asynchronous command

Manual operation: See "Available acqs" on page 227

ACQuire:AVERage?

Returns the current number of acquired waveforms that contribute to the average.

Return values:

<CurrAverageCount> Range: 0 to 4294967295
Increment: 1
*RST: 0

Usage: Query only
Asynchronous command

Manual operation: See "[Current Average count](#)" on page 126

ACQuire:COUNt <MaxAcqCnt>

Sets the acquisition and average count, which has a double effect:

- It sets the number of waveforms acquired with RUNSingle.
- It defines the number of waveforms used to calculate the average waveform.

Parameters:

<MaxAcqCnt> Range: 1 to 16777215
Increment: 1
*RST: 1

Usage: Asynchronous command

Manual operation: See "[N-single/Avg count](#)" on page 124

ACQuire:CURRent?

Returns the current number of acquisitions that have been acquired.

Return values:

<CurrAcqCnt> Range: 0 to 18446744073709551615
Increment: 1
*RST: 0

Usage: Query only
Asynchronous command

ACQuire:INTerpolate <IntpolMd>

Selects the interpolation method.

Parameters:

<IntpolMd> SINX | LINear | SMHD

LINear

Linear interpolation between two adjacent sample points

SINX

Interpolation with a sin(x)/x function.

SMHD

Sample/Hold causes a histogram-like interpolation.

*RST: SINX

Usage: Asynchronous command

Manual operation: See "[Interpolation](#)" on page 126

ACQuire:POINts[:VALue] <RecordLength>

Sets the record length, if [ACQuire:POINTS:MODE](#) is set to `MANual`.

Parameters:

<RecordLength> Range: 1000 to 87.5E+6
Increment: 2
*RST: 1000
Default unit: pts

Usage: Asynchronous command

Manual operation: See "[Record length](#)" on page 124

ACQuire:POINts:ARATe?

Returns the sample rate of the ADC, before waveform processing. The result is the interleaved sample rate or the non-interleaved one, depending on the channel usage.

Return values:

<ADCSampleRate> Range: 5 Gsample/s (interleaved), 2,5 Gsample/s (non-interleaved)
Default unit: Hz

Usage: Query only
Asynchronous command

ACQuire:POINts:MAXimum <RecLengthLimit>

Sets the maximum record length, if [ACQuire:POINTS:MODE](#) is set to `AUTO`.

Parameters:

<RecLengthLimit> Range: 1000 to 800E+6
Increment: 2
*RST: 10E+6
Default unit: pts

Usage: Asynchronous command

Manual operation: See "[Record length limit](#)" on page 124

ACQuire:POINts:MODE <RecLengthMode>

Selects the mode of the waveform record length adjustment.

The record length is the number of waveform samples that are stored in one waveform record after processing, including interpolation. It determines the length of the displayed waveform.

Parameters:

<RecLengthMode> AUTO | MANual

AUTO

Record length is determined automatically and changes due to instrument internal adjustments.

MANual

The waveform record length is defined with [ACQuire:](#)

[POINts\[:VALue\]](#).

*RST: AUTO

Usage: Asynchronous command

Manual operation: See "[RL mode](#)" on page 124

ACQuire:RESolution <Resolution>

Defines the time between two waveform samples in the waveform record. It considers the processing of the captured samples including interpolation. A fine resolution with low values produces a more precise waveform record.

The resolution is the reciprocal value of [ACQuire:SRATE\[:VALue\]](#).

Parameters:

<Resolution> Range: 1E-15 to 100

Increment: 1E-11

*RST: 200E-12

Default unit: s

Usage: Asynchronous command

Manual operation: See "[Resolution](#)" on page 125

ACQuire:RLReal?

Returns the internal record length used by the acquisition system.

Return values:

<HWRecordLength> Range: 2 to 4294967295

Increment: 1

*RST: 1000

Default unit: pts

Usage: Query only

Asynchronous command

ACQuire:SRATe[:VALue] <SampleRate>

Sets the number of waveform points per second if [ACQuire:SRATE:MODE](#) is set to **MANual**.

Parameters:

<SampleRate> Range: 2 to 5E+12
 Increment: 1
 *RST: 5E+9
 Default unit: Sa/s

Usage: Asynchronous command

Manual operation: See "[Sample rate](#)" on page 124

ACQuire:SRATe:MINimum <SampleRateMin>

Sets the minimum sample rate if [ACQuire:SRATE:MODE](#) is set to **AUTO**.

Parameters:

<SampleRateMin> Range: 2 to 5E+12
 Increment: 1
 *RST: 2
 Default unit: Sa/s

Usage: Asynchronous command

Manual operation: See "[Min. sample rate](#)" on page 124

ACQuire:SRATe:MODE <SampleRateMode>

Defines how the sample rate is set.

The sample rate considers the samples of the ADC, and the processing of the captured samples including interpolation.

Parameters:

<SampleRateMode> AUTO | MANual

AUTO

Sample rate is determined automatically and changes due to instrument internal adjustments. You can set a minimum sample rate with [ACQuire:SRATE:MINimum](#).

MANual

The sample rate is defined with [ACQuire:SRATE\[:VALue\]](#).

*RST: AUTO

Usage: Asynchronous command

Manual operation: See "[SR mode](#)" on page 123

ACQuire:SRReal <HWSampleRate>

Returns the sample rate of the waveform after HW processing. Interpolation is not considered.

Parameters:

<HWSampleRate> Range: 2 to ADC sample rate
 Increment: 1
 *RST: 5E+9
 Default unit: Sa/s

Usage: Asynchronous command

ACQuire:TYPE <AcquMode>

Sets how the waveform is built from the captured samples.

Parameters:

<AcquMode> SAMPlE | PDETect | ENVelope | AVERage
 *RST: SAMPlE

Usage: Asynchronous command

Manual operation: See "[Acquisition mode](#)" on page 125

17.8.7 Fast segmentation

ACQuire:SEGmented:STATe <State>

If fast segmentation is enabled, the acquisitions are performed as fast as possible, without processing and displaying the waveforms. When acquisition has been stopped, the data is processed and the latest waveform is displayed. Older waveforms are stored in segments. You can display and analyze the segments using the history.

Parameters:

<State> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[Fast segmentation](#)" on page 127

ACQuire:SEGmented:MAX <MaxAcqs>

If ON, the instrument acquires the maximum number of segments that can be stored in the memory. The maximum number depends on the current sample rate and record length settings.

If OFF, define the number of segments in a fast segmentation cycle with [ACQuire:COUNT](#).

Parameters:

<MaxAcqs> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "Acquire maximum" on page 127

17.8.8 High definition mode

| | |
|------------------------------|-----|
| HDEFinition:BWIDth..... | 773 |
| HDEFinition:RESolution?..... | 773 |
| HDEFinition:STATe..... | 773 |

HDEFinition:BWIDth <Bandwidth>

Sets the filter bandwidth for the high definition mode.

Parameters:

<Bandwidth> Range: 1000 to 500E+6
Increment: 1000
*RST: 100E+6
Default unit: Hz

Usage: Asynchronous command

Manual operation: See "Bandwidth" on page 129

HDEFinition:RESolution?

Displays the resulting vertical resolution in high definition mode. The higher the filter bandwidth, the lower the resolution.

Return values:

<Resolution> Range: 0 to 18
Increment: 0.1
*RST: 0
Default unit: bit

Usage: Query only
Asynchronous command

Manual operation: See "Resolution in bits" on page 129

HDEFinition:STATe <State>

Enables high definition mode, which increases the numeric resolution of the waveform signal.

Parameters:

<State> OFF | ON
 ON: high definition mode
 OFF: normal oscilloscope mode
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "State" on page 128

17.8.9 Waveform data export

To set the export data format, see [FORMat \[:DATA\]](#).

For fast export of several waveforms at once, use [EXPort:WAVeform:DATA\[:VALues\]?](#) on page 856.

| | |
|--|-----|
| CHANnel<ch>:DATA:HEADer? | 774 |
| CHANnel<ch>:DATA[:VALues]? | 774 |

CHANnel<ch>:DATA:HEADer?

Returns the header of channel waveform data, the attributes of the waveform.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

| | |
|-------------------|--|
| <XStart> | 1. header value: start time XStart in s |
| <XStop> | 2. header value: end time XStop in s |
| <RecordLength> | 3. header value: record length of the waveform in samples |
| <ValuesPerSample> | 4. header value: number of values per sample interval. For most waveforms, the result is 1. For peak detect and envelope waveforms, it is 2. If the number is 2, the number of returned values is twice the number of samples (record length). |

Example:

`CHAN1:WAV1:DATA:HEAD?`

`-9.477E-008, 9.477E-008, 20000, 1`

Start time of the data is $-9.477E-008 = -94,77 \text{ ns}$, and stop time of the data is $9.477E-008 = 94,77 \text{ ns}$. The data stream has 20000 values with one value per sample interval.

Usage:

Query only
 Asynchronous command

CHANnel<ch>:DATA[:VALues]? [<Offset>[,<Length>]]

Returns the data of the channel waveform points for transmission from the instrument to the controlling computer. The data can be used in MATLAB, for example.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

To set the export format, use [FORMat \[:DATA\]](#) on page 699.

Suffix:

<ch> 1 to 8, depending on instrument model. Index of the analog channel.

Query parameters:

<Offset> Number of offset waveform samples to be skipped.
Range: 0 to m. Limit: n + m <= record length

<Length> Number of waveform points to be retrieved.
Range: 1 to n. Limit: n + m <= record length

Return values:

<Data> List of values according to the format and content settings.

Example: Retrieve the complete channel 1 waveform, only Y-values:

```
FORM ASC
CHAN1:WAV:DATA?
<-- -0.125000,-0.123016,-0.123016,-0.123016,-0.123016,...
```

Example:

Retrieve the first 10 values of the waveform:

```
CHANnel:WAVEform:DATA:VALues? 0,10
<-- -0.10079051554203,-0.098814234137535,-0.098814234137535,
      -0.096837945282459,-0.094861663877964,-0.094861663877964,
      -0.092885382473469,-0.090909093618393,-0.090909093618393,
      -0.088932812213898
```

Example:

Skip 5 samples and retrieve the next 5 samples:

```
CHANnel:WAVEform:DATA:VALues? 5,5
<-- -0.094861663877964,-0.092885382473469,-0.090909093618393,
      -0.090909093618393,-0.088932812213898
```

Usage:

Query only
Asynchronous command

17.8.10 Reference clock

SENSe[:ROSCillator]:OUTPut[:ENABLE] <ReferenceOutput>

Sends the internal reference clock signal to the Ref Out 10MHz connector.

Parameters:

<ReferenceOutput> OFF | ON
*RST: OFF

Usage:

SCPI confirmed
Asynchronous command

Manual operation: See "[Output 10 MHz ref. signal](#)" on page 119

SENSe[:ROSCillator]:SOURce <RefSource>

Enables the use of an external 10 MHz reference signal instead of the internal reference clock.

Parameters:

<RefSource> INTernal | EXTernal
*RST: INTernal

Usage: Asynchronous command

Manual operation: See "[Use external ref. clock](#)" on page 119

17.9 Trigger

Trigger commands use several suffixes.

LEVel<n>, NOISe<m>

The suffix indicates the analog channel for which the command takes effect. C1 has suffix 1, C2 has suffix 2, and so on.

Event<ev>

The suffix indicates the sequence step, for which the command takes effect when you trigger on a sequence. If you trigger on a single event, the suffix = 1 and can be omitted.

- 1 = A-trigger
- 2 = B-trigger
- 3 = R-trigger (reset event)

Asynchronous commands

Some of the commands in the following section are asynchronous. An overlapping or asynchronous command does not automatically finish executing before the next command starts executing. If overlapping commands must be executed in a defined order, e.g. to avoid wrong measurement results, they must be serviced sequentially.

To prevent an overlapping execution of commands, one of the commands *OPC, *OPC? or *WAI can be used after the command or a command set.

For more information, see:

- www.rohde-schwarz.com/rc-via-scp, section "Command sequence and synchronization"

17.9.1 Common trigger settings

| | |
|---|-----|
| TRIGger:MEVents:MODE..... | 777 |
| TRIGger:EVENt<ev>:TYPE..... | 777 |
| TRIGger:EVENt<ev>:LEVel<n>[:VALue]..... | 777 |
| TRIGger:FINDlevel..... | 778 |
| TRIGger:EVENt<ev>:SOURce..... | 778 |

TRIGger:MEVents:MODE <Class>

Selects, if you want to trigger on a single event, or on a series of events.

Parameters:

<Class> SINGle | SEQuence
 *RST: SINGle

Usage: Asynchronous command

Manual operation: See "[Trigger on](#)" on page 161

TRIGger:EVENt<ev>:TYPE <Type>

Selects the trigger type. In a trigger sequence the trigger type is set for each condition.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Type> EDGE | GLITch | WIDTh | RUNT | WINDOW | TIMeout | INTerval |
 SLEWrate | ANEDge | SETHold | STATe | PATTern

ANEDge = analog edge trigger is the only trigger type if the
extern trigger source is used.

For SETHold, also DATatoclock can be used.

*RST: EDGE

Usage: Asynchronous command

Manual operation: See "[Type](#)" on page 162

TRIGger:EVENt<ev>:LEVel<n>[:VALue] <Level>

Sets the trigger level for the specified event and source (channel).

If the trigger source is serial bus, the trigger level is set by the thresholds in the proto-
col configuration.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event
<n> 1 to 8, depending on instrument model. Index of the analog
 channel.

Parameters:

<Level> Range: -10 to 10
 Increment: 0.001
 *RST: 0
 Default unit: V

Usage: Asynchronous command

Manual operation: See "[\[Level\]](#)" on page 45

TRIGger:FINDlevel

Sets the trigger level automatically to $0.5 * (\text{MaxPeak} - \text{MinPeak})$.

In a trigger sequence, "Find level" affects all active events of the sequence (A, B, and R event).

Usage: Event
 Asynchronous command

Manual operation: See "[Find level](#)" on page 163

TRIGger:EVENt<ev>:SOURce <SourceDetailed>

Selects the source of the trigger signal for the selected trigger event. The trigger source works even if it is not displayed in a diagram.

Available sources depend on the trigger sequence setting. If you trigger on a single event, all inputs can be used as trigger source. If you trigger on a sequence, only analog channels can be set as trigger source.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<SourceDetailed> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | EXternanalog | LINE | D0
 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 |
 D13 | D14 | D15 | SBUS1 | SBUS2 | SBUS3 | SBUS4

C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8

Available for single event and all events in a trigger sequence

**EXTERNanalog | LINE | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
 D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | SBUS1 | SBUS2 |
 SBUS3 | SBUS4**

Available for single event (EVENT1)

*RST: C1

Usage: Asynchronous command

Manual operation: See "[\[Source\]](#)" on page 46

17.9.2 Trigger sequence

| | |
|--|-----|
| TRIGger:MEVents:AEVents..... | 779 |
| TRIGger:MEVents:SEQUence<se>:COUNT..... | 779 |
| TRIGger:MEVents:SEQUence<se>:DELay..... | 779 |
| TRIGger:MEVents:SEQUence<se>:RESet:EVENt..... | 780 |
| TRIGger:MEVents:SEQUence<se>:RESet:TIMEout:TIME..... | 780 |
| TRIGger:MEVents:SEQUence<se>:RESet:TIMEout[:ENABLE]..... | 780 |

TRIGger:MEVents:AEVents <Type>

Selects the type of the trigger sequence.

Parameters:

| | |
|--------|---|
| <Type> | AONLy ABR AZ ASB
AONLy = single event, same as TRIGger:MEVents:MODE SINGLE
ABR = sequence A → B → R
AZ = sequence A → Zone trigger
ASB = sequence A → Serial bus
*RST: AONLY |
|--------|---|

Usage: Asynchronous command

Manual operation: See "[Trigger sequence](#)" on page 164

TRIGger:MEVents:SEQUence<se>:COUNt <Events>

Sets the number of B-trigger conditions to be fulfilled after an A-trigger. The last B-trigger causes the trigger event. The waiting time for B-triggers can be restricted with a reset condition: timeout or reset event.

Suffix:

| | |
|------|-----------|
| <se> | 1..3
2 |
|------|-----------|

Parameters:

| | |
|----------|---|
| <Events> | Range: 1 to 2147483647
Increment: 1
*RST: 1 |
|----------|---|

Usage: Asynchronous command

Manual operation: See "[B event count](#)" on page 165

TRIGger:MEVents:SEQUence<se>:DELay <Delay>

Sets the time that the instrument waits after an A-trigger until it recognizes B-triggers.

Suffix:

| | |
|------|---|
| <se> | 1 |
|------|---|

Parameters:

<Delay> Range: 0 to 50
 Increment: 1E-12
 *RST: 0
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Delay](#)" on page 165

TRIGger:MEVents:SEQUence<se>:RESET:EVENT <State>

If enabled, the trigger sequence is restarted by the R-trigger condition if the specified number of B-triggers does not occur before the R-trigger conditions are fulfilled.

Suffix:

<se> 3

Parameters:

<State> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[Enable reset event](#)" on page 165

TRIGger:MEVents:SEQUence<se>:RESET:TIMEout:TIME <ResetTimeout>

The time the instrument waits for the number of B-events specified using [TRIGger:MEVents:SEQUence<se>:COUNT](#), before the sequence is restarted with the A-trigger.

Suffix:

<se> Irrelevant, omit the suffix.

Parameters:

<ResetTimeout> Range: 0 to 50
 Increment: 1E-12
 *RST: 0
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Enable reset by time, Reset timeout](#)" on page 165

TRIGger:MEVents:SEQUence<se>:RESET:TIMEout[:ENABLE] <State>

If set to ON, the instrument waits for the time defined using [TRIGger:MEVents:SEQUence<se>:RESET:TIMEout:TIME](#) for the specified number of B-events. If no trigger occurs during that time, the sequence is restarted with the A-event.

Suffix:

<se> Irrelevant, omit the suffix.

Parameters:

<State> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "Enable reset by time, Reset timeout" on page 165

17.9.3 Edge trigger

| | |
|-------------------------------------|-----|
| TRIGger:EVENT<ev>:EDGE:SLOPe..... | 781 |
| TRIGger:ANEDge:LEVel..... | 781 |
| TRIGger:ANEDge:COUPLing..... | 781 |
| TRIGger:ANEDge:FILTer..... | 782 |
| TRIGger:ANEDge:CUToff:HIGHpass..... | 782 |
| TRIGger:ANEDge:CUToff:LOWPass..... | 782 |
| TRIGger:ANEDge:NREject..... | 783 |

TRIGger:EVENT<ev>:EDGE:SLOPe <Slope>

Sets the edge direction for the trigger.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Slope> POSitive | NEGative | EITHer
 *RST: POSitive

Usage: Asynchronous command

Manual operation: See "Slope" on page 166

TRIGger:ANEDge:LEVel <ExtTrigLev>

Sets the trigger level for the external trigger source.

Parameters:

<ExtTrigLev> Range: - 5 to 5
 Default unit: V

Usage: Asynchronous command

Manual operation: See "Level" on page 162

TRIGger:ANEDge:COUPLing <Coupling>

Sets the connection of the external trigger signal, i.e. the input impedance and a termination. The coupling determines what part of the signal is used for triggering.

Parameters:

<Coupling> DC | DCLimit | AC

DC

Connection with 50 Ω termination, passes both DC and AC components of the signal.

DCLimit

Connection with 1 MΩ termination, passes both DC and AC components of the signal.

AC

Connection with 1 MΩ termination through DC capacitor, removes DC and very low-frequency components. The waveform is centered on zero volts.

*RST: DCLimit

Usage: Asynchronous command

Manual operation: See "[Coupling](#)" on page 167

TRIGger:ANEDge:FILTer <Filter>

Selects the filter mode for the external trigger signal.

Parameters:

<Filter> OFF | LFReject | RFReject

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Filter, Cut-off](#)" on page 168

TRIGger:ANEDge:CUTOFF:HIGHpass <CutOffFreq>

Frequencies below the cutoff frequency are rejected, higher frequencies pass the filter.

Parameters:

<CutOffFreq> KHZ5 | KHZ50

KHZ5 = 5 kHz

KHZ50 = 50 kHz

*RST: KHZ50

Usage: Asynchronous command

Manual operation: See "[Filter, Cut-off](#)" on page 168

TRIGger:ANEDge:CUTOFF:LOWPass <CutOffFreq>

Frequencies higher than the cutoff frequency are rejected, lower frequencies pass the filter.

Parameters:

<CutOffFreq> KHZ50 | MHZ50
 KHZ50 = 50 kHz
 MHZ50 = 50 MHz
 *RST: KHZ50

Usage:

Asynchronous command

Manual operation: See "[Filter, Cut-off](#)" on page 168

TRIGger:ANEDge:NREject <NoiseReject>

Enables an automatic hysteresis on the trigger level to avoid unwanted trigger events caused by noise.

Parameters:

<NoiseReject> OFF | ON
 *RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Trigger noise reject](#)" on page 168

17.9.4 Glitch trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:GLITch:POLarity..... | 783 |
| TRIGger:EVENT<ev>:GLITch:RANGE..... | 783 |
| TRIGger:EVENT<ev>:GLITch:WIDTH..... | 784 |

TRIGger:EVENT<ev>:GLITch:POLarity <Polarity>

Sets the polarity of a pulse, which is the direction of the first pulse slope.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Polarity> POSitive | NEGative | EITHer
 *RST: POSitive

Usage:

Asynchronous command

Manual operation: See "[Polarity](#)" on page 169

TRIGger:EVENT<ev>:GLITch:RANGE <RangeMode>

Selects which glitches are identified: shorter or longer than the width specified using [TRIGger:EVENT<ev>:GLITch:WIDTH](#).

| | |
|--------------------------|---|
| Suffix: | |
| <ev> | 1 = A-trigger, 2 = B-trigger, 3 = reset event |
| Parameters: | |
| <RangeMode> | SHORter LONGer |
| SHORter | Glitches shorter than the specified width are identified. |
| LONGer | Glitches longer than the specified width are identified. |
| *RST: | SHORter |
| Usage: | Asynchronous command |
| Manual operation: | See " Range " on page 169 |

TRIGger:EVENT<ev>:GLITch:WIDTh <Width>

Sets the length of a glitch. The instrument triggers on pulses shorter or longer than this value, depending on the value set with [TRIGger:EVENT<ev>:GLITch:RANGE](#).

| | |
|--------------------------|--|
| Suffix: | |
| <ev> | 1 = A-trigger, 2 = B-trigger, 3 = reset event |
| Parameters: | |
| <Width> | Range: 1E-10 to 10000
Increment: 0.0001
*RST: 1E-09
Default unit: s |
| Usage: | Asynchronous command |
| Manual operation: | See " Width " on page 169 |

17.9.5 Width trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:WIDTh:DELTa | 784 |
| TRIGger:EVENT<ev>:WIDTh:POLarity | 785 |
| TRIGger:EVENT<ev>:WIDTh:RANGE | 785 |
| TRIGger:EVENT<ev>:WIDTh:WIDTh | 785 |

TRIGger:EVENT<ev>:WIDTh:DELTa <WidthDelta>

Defines a range around the width value.

| | |
|--------------------|---|
| Suffix: | |
| <ev> | 1 = A-trigger, 2 = B-trigger, 3 = reset event |
| Parameters: | |
| <WidthDelta> | Range: 0 to 432
Increment: 5E-10
*RST: 0
Default unit: s |

Usage: Asynchronous command

Manual operation: See "[±Delta](#)" on page 171

TRIGger:EVENT<ev>:WIDTh:POLarity <Polarity>

Sets the polarity of a pulse, which is the direction of the first pulse slope.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Polarity> POSitive | NEGative | EITHer
*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Polarity](#)" on page 171

TRIGger:EVENT<ev>:WIDTh:RANGE <RangeMode>

Selects how the range of a pulse width is defined.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<RangeMode> WITHin | OUTSide | SHORter | LONGer
*RST: WITHin

Usage: Asynchronous command

Manual operation: See "[Range](#)" on page 171

TRIGger:EVENT<ev>:WIDTh:WIDTh <Width>

Depending on the values of **TRIGger:EVENT<ev>:WIDTh:RANGE** the width sets:

- For the ranges `Within` and `Outside`, the width defines the center of a time range which is defined by the limits "`±Delta`" (see [TRIGger:EVENT<ev>:WIDTh:DELta](#)).
- For the ranges `Shorter` and `Longer`, it defines the maximum and minimum time lapse, respectively.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Width> Range: 1E-10 to 10000
Increment: 1E-07
*RST: 5E-09
Default unit: s

Usage: Asynchronous command

Manual operation: See "[Width](#)" on page 171

17.9.6 Runt trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:LEVel<n>:RUNT:LOWER..... | 786 |
| TRIGger:EVENT<ev>:LEVel<n>:RUNT:UPPer..... | 786 |
| TRIGger:EVENT<ev>:RUNT:DELTa..... | 787 |
| TRIGger:EVENT<ev>:RUNT:POLarity..... | 787 |
| TRIGger:EVENT<ev>:RUNT:RANGE..... | 787 |
| TRIGger:EVENT<ev>:RUNT:WIDTH..... | 788 |

TRIGger:EVENT<ev>:LEVel<n>:RUNT:LOWER <Level>

Sets the lower voltage limit.

Suffix:

- <ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event
<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

- <Level> Range: -10 to 10
Increment: 0.001
*RST: -0.1
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Lower level](#)" on page 173

TRIGger:EVENT<ev>:LEVel<n>:RUNT:UPPer <Level>

Sets the upper voltage limit.

Suffix:

- <ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event
<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

- <Level> Range: -10 to 10
Increment: 0.001
*RST: 0.1
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Upper level](#)" on page 172

TRIGger:EVENT<ev>:RUNT:DELTa <WidthDelta>

Defines a range around the runt width specified using [TRIGger:EVENT<ev>:RUNT:WIDTh](#).

Available if [TRIGger:EVENT<ev>:RUNT:RANGE](#) is set to WITHin or OUTSide.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<WidthDelta> Range: 1E-10 to 864
Increment: 1E-07
*RST: 1E-10
Default unit: s

Usage: Asynchronous command

Manual operation: See "[±Delta](#)" on page 173

TRIGger:EVENT<ev>:RUNT:POLarity <Polarity>

Sets the polarity of a pulse, which is the direction of the first pulse slope.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Polarity> POSitive | NEGative | EITHer
*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Polarity](#)" on page 169

TRIGger:EVENT<ev>:RUNT:RANGE <Mode>

Defines the time limit of the runt pulse in relation to the [TRIGger:EVENT<ev>:RUNT:WIDTh](#) and [TRIGger:EVENT<ev>:RUNT:DELTa](#) settings.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Mode> ANY | LONGer | SHORter | WITHin | OUTSide
ANY
Triggers on all runts fulfilling the level condition, without time limitation.
LONGer
Triggers on runts longer than the given runt width.
SHORter
Triggers on runts shorter than the given runt width.

WITHin

Triggers if the runt length is inside a given time range. The range is defined by runt width and \pm Delta.

OUTSide

Triggers if the runt length is outside a given time range. The range is defined by runt width and \pm Delta.

*RST: ANY

Usage: Asynchronous command

Manual operation: See "Range" on page 173

TRIGger:EVENT<ev>:RUNT:WIDTh <Width>

Defines the upper or lower voltage threshold.

It is not available if **TRIGger:EVENT<ev>:RUNT:RANGE** is set to ANY.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

| | |
|---------|-----------------------|
| <Width> | Range: 1E-10 to 10000 |
| | Increment: 1E-07 |
| | *RST: 5E-09 |
| | Default unit: s |

Usage: Asynchronous command

Manual operation: See "Runt width" on page 173

17.9.7 Window trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:LEVel<n>:WINDOW:LOWER..... | 788 |
| TRIGger:EVENT<ev>:LEVel<n>:WINDOW:UPPER..... | 789 |
| TRIGger:EVENT<ev>:WINDOW:DELTa..... | 789 |
| TRIGger:EVENT<ev>:WINDOW:RANGE..... | 789 |
| TRIGger:EVENT<ev>:WINDOW:TIME..... | 790 |
| TRIGger:EVENT<ev>:WINDOW:WIDTh..... | 791 |

TRIGger:EVENT<ev>:LEVel<n>:WINDOW:LOWER <Level>

Sets the lower voltage limit.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Level> Range: -10 to 10
Increment: 0.001
*RST: -0.1
Default unit: V

Usage:

Asynchronous command

Manual operation: See "[Lower level](#)" on page 175

TRIGger:EVENt<ev>:LEVel<n>:WINDOW:UPPer <Level>

Sets the upper voltage limit.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event
<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Level> Range: 0 to 1000
Increment: 1E-06
*RST: 0.1
Default unit: V

Usage:

Asynchronous command

Manual operation: See "[Upper level](#)" on page 174

TRIGger:EVENt<ev>:WINDOW:DELTa <WidthDelta>

Defines a range around the width value.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<WidthDelta> Range: 0 to 432
Increment: 5E-10
*RST: 0
Default unit: s

Usage:

Asynchronous command

Manual operation: See "[±Delta](#)" on page 175

TRIGger:EVENt<ev>:WINDOW:RANGe <RangeMode>

Selects how the signal run is compared with the window.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<RangeMode> ENTer | EXIT | WITHin | OUTSide

ENTER

Triggers when the signal crosses the upper or lower level and thus enters the window made up of these two levels.

EXIT

Triggers when the signal leaves the window.

WITHin

Triggers if the signal stays between the upper and lower level for a specified time. The time is defined with [TRIGger:EVENT<ev>:WINDOW:TIME](#).

[TRIGger:EVENT<ev>:WINDOW:TIME](#).

OUTSide

Triggers if the signal stays above the upper level or below the lower level for a specified time. The time is defined with [TRIGger:EVENT<ev>:WINDOW:TIME](#).

[TRIGger:EVENT<ev>:WINDOW:TIME](#).

*RST: ENTer

Usage: Asynchronous command

Manual operation: See "[Vertical condition](#)" on page 174

TRIGger:EVENT<ev>:WINDOW:TIME <TimeRangeMode>

Available for [TRIGger:EVENT<ev>:WINDOW:RANGE](#) = WITHin and OUTSide.

Selects how the time limit of the window is defined.

You can specify the width with [TRIGger:EVENT<ev>:WINDOW:WIDTh](#) and the delta with [TRIGger:EVENT<ev>:WINDOW:DELTa](#).

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<TimeRangeMode> WITHin | OUTSide | SHORter | LONGer

WITHin

Triggers if the signal stays inside or outside the vertical window limits at least for the time *Width - Delta* and for *Width + Delta* at the most.

OUTSide

"Outside" is the opposite definition of "Within". The instrument triggers if the signal stays inside or outside the vertical window limits for a time shorter than *Width - Delta* or longer than *Width + Delta*.

SHORter

Triggers if the signal crosses vertical limits before the specified width time is reached.

LONGer

Triggers if the signal crosses vertical limits before the specified width time is reached.

*RST: WITHin

Usage: Asynchronous command

Manual operation: See "Time condition" on page 175

TRIGger:EVENT<ev>:WINDOW:WIDTH <Width>

Depending on the values of `TRIGger:EVENT<ev>:WINDOW:RANGE` the width sets:

- For the ranges `Within` and `Outside`, the width defines the center of a time range. The range is defined by the limits "`±Delta`", see `TRIGger:EVENT<ev>:WINDOW:DELTA`.
- For the ranges `Shorter` and `Longer`, it defines the maximum and minimum time lapse, respectively.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

| | |
|---------|-----------------------|
| <Width> | Range: 1E-10 to 10000 |
| | Increment: 1E-07 |
| | *RST: 5E-09 |
| | Default unit: s |

Usage: Asynchronous command

Manual operation: See "Width" on page 175

17.9.8 Timeout trigger

| | |
|--|-----|
| <code>TRIGger:EVENT<ev>:TIMEout:RANGE</code> | 791 |
| <code>TRIGger:EVENT<ev>:TIMEout:TIME</code> | 792 |

TRIGger:EVENT<ev>:TIMEout:RANGE <TimeoutMode>

Sets the relation of the signal level to the trigger level for the timeout trigger.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

| | |
|---------------|--|
| <TimeoutMode> | HIGH LOW EITHer |
| | HIGH = stays high, the signal level stays above the trigger level. |
| | LOW = stays low, the signal level stays below the trigger level. |
| | EITHer = stays high or low. |

*RST: HIGH

Usage: Asynchronous command

Manual operation: See "[Range](#)" on page 176

TRIGger:EVENT<ev>:TIMEout:TIME <Time>

Sets the time limit for the timeout at which the instrument triggers.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Time> Range: 1E-10 to 10000
Increment: 1E-07
*RST: 1E-07
Default unit: s

Usage: Asynchronous command

Manual operation: See "[Time](#)" on page 176

17.9.9 Interval trigger

| | |
|---------------------------------------|-----|
| TRIGger:EVENT<ev>:INTerval:DELTa..... | 792 |
| TRIGger:EVENT<ev>:INTerval:RANGE..... | 792 |
| TRIGger:EVENT<ev>:INTerval:SLOPe..... | 793 |
| TRIGger:EVENT<ev>:INTerval:WIDTh..... | 793 |

TRIGger:EVENT<ev>:INTerval:DELTa <WidthDelta>

Sets a range around the interval width value specified with [TRIGger:EVENT<ev>:INTerval:WIDTh](#).

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<WidthDelta> Range: 0 to 10
Increment: 1E-07
*RST: 0
Default unit: s

Usage: Asynchronous command

Manual operation: See "[±Delta](#)" on page 178

TRIGger:EVENT<ev>:INTerval:RANGE <RangeMode>

Defines the range of an interval in relation to the interval width specified using [TRIGger:EVENT<ev>:INTerval:WIDTh](#) and [TRIGger:EVENT<ev>:INTerval:DELTa](#).

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<RangeMode> WITHin | OUTSide | SHORter | LONGer

WITHin

Triggers on pulses inside a given range. The range is defined by the interval width \pm delta.

OUTSide

Triggers on pulses outside a given range. The range is defined by the interval width \pm delta.

SHORter

Triggers on pulses shorter than the given interval width.

LONGer

Triggers on pulses longer than the given interval width.

*RST: OUTSide

Usage:

Asynchronous command

Manual operation: See "[Range](#)" on page 177

TRIGger:EVENT<ev>:INTerval:SLOPe <Slope>

Sets the edge for the trigger. You can analyze the interval between positive edges or between negative edges.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Slope> POSitive | NEGative | EITHer

*RST: POSitive

Usage:

Asynchronous command

Manual operation: See "[Slope](#)" on page 177

TRIGger:EVENT<ev>:INTerval:WIDTh <Width>

Sets the time between two pulses for the interval trigger.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Width> Range: 1E-10 to 10000

Increment: 1E-07

*RST: 5E-09

Default unit: s

Usage:

Asynchronous command

Manual operation: See "[Interv. width](#)" on page 178

17.9.10 Slew rate trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:LEVel<n>:SLEW:LOWER..... | 794 |
| TRIGger:EVENT<ev>:LEVel<n>:SLEW:UPPer..... | 794 |
| TRIGger:EVENT<ev>:SLEW:DELTa..... | 794 |
| TRIGger:EVENT<ev>:SLEW:RANGE..... | 795 |
| TRIGger:EVENT<ev>:SLEW:RATE..... | 795 |
| TRIGger:EVENT<ev>:SLEW:SLOPe..... | 796 |

TRIGger:EVENT<ev>:LEVel<n>:SLEW:LOWER <Level>

Sets the lower voltage threshold. When the signal crosses this level, the slew rate measurement starts or stops depending on the selected slope.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Level> Range: -10 to 10
Increment: 0.001
*RST: -0.1
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Lower level](#)" on page 179

TRIGger:EVENT<ev>:LEVel<n>:SLEW:UPPer <Level>

Sets the upper voltage threshold. When the signal crosses this level, the slew rate measurement starts or stops depending on the selected slope.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Level> Range: -10 to 10
Increment: 0.001
*RST: 0.1
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Upper level](#)" on page 179

TRIGger:EVENT<ev>:SLEW:DELTa <TimeDelta>

Defines a time range around the given slew rate.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<TimeDelta> Range: 0 to 10
 Increment: 1E-07
 *RST: 0
 Default unit: s

Usage:

Asynchronous command

Manual operation: See "[±Delta](#)" on page 180

TRIGger:EVENT<ev>:SLEW:RANGE <RangeMode>

Selects how the time limit for the slew rate is defined. The time measurement starts when the signal crosses the first trigger level - the upper or lower limit depending on the selected slope. The measurement stops when the signal crosses the second level.

You can select the rate with [TRIGger:EVENT<ev>:SLEW:RATE](#) and set the delta with [TRIGger:EVENT<ev>:SLEW:DELta](#).

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<RangeMode> INSRange | OUTRange | LTHan | GTHan

INSRange

Triggers on pulses inside a given range. The range is defined by the slew rate \pm delta.

OUTRange

Triggers on pulses outside a given range. The range is defined by the slew rate \pm delta.

LTHan

Triggers on pulses shorter than the given slew rate.

GTHan

Triggers on pulses longer than the given slew rate.

*RST: GTHan

Usage:

Asynchronous command

Manual operation: See "[Range](#)" on page 180

TRIGger:EVENT<ev>:SLEW:RATE <Time>

For [TRIGger:EVENT<ev>:SLEW:RANGE](#) = INSRange and OUTRange, the slew rate defines the center of a range which is defined by the limits "[±Delta](#)".

For [TRIGger:EVENT<ev>:SLEW:RANGE](#) = LTHan and GTHan, the slew rate defines the maximum and minimum slew rate limits, respectively. When the signal crosses this level, the slew rate measurement starts or stops depending on the selected slope (see [TRIGger:EVENT<ev>:SLEW:SLOPe](#)).

Suffix:
<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:
<Time> Range: 1E-10 to 10000
 Increment: 1E-07
 *RST: 1E-10
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Slew rate](#)" on page 180

TRIGger:EVENT<ev>:SLEW:SLOPe <Slope>

Sets the edge direction for the trigger.

Suffix:
<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:
<Slope> POSitive | NEGative | EITHer
 *RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Slope](#)" on page 179

17.9.11 Setup & Hold

| | |
|--|-----|
| TRIGger:EVENT<ev>:SETHold:CSOURCE:EDGE..... | 796 |
| TRIGger:EVENT<ev>:SETHold:CSOURCE:LEVEL..... | 797 |
| TRIGger:EVENT<ev>:SETHold:CSOURCE[:VALUE]..... | 797 |
| TRIGger:EVENT<ev>:SETHold:HTIME..... | 797 |
| TRIGger:EVENT<ev>:SETHold:STIME..... | 798 |

TRIGger:EVENT<ev>:SETHold:CSOURCE:EDGE <ClockEdge>

Sets the edge of the clock signal. Edge and level define the time reference point.

Suffix:
<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:
<ClockEdge> POSitive | NEGative | EITHer
 *RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Clock edge](#)" on page 181

TRIGger:EVENT<ev>:SETHold:CSOURCE:LEVel <ClockLevel>

Sets the voltage level for the clock signal.

Both the clock level and the clock edge define the starting point for calculation of the setup and hold time.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<ClockLevel> Range: -10 to 10
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Clock level](#)" on page 182

TRIGger:EVENT<ev>:SETHold:CSOURCE[:VALue] <ClockSource>

Selects the input channel of the clock signal.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<ClockSource> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8
The following values are also accepted:
C1 = CHAN1 = CHANNEL1, C2 = CHAN2 = CHANNEL2,
C3 = CHAN3 = CHANNEL3, C4 = CHAN4 = CHANNEL4
*RST: C1

Usage: Asynchronous command

Manual operation: See "[Clock source](#)" on page 181

TRIGger:EVENT<ev>:SETHold:HTIME <HoldTime>

Sets the minimum time **after** the clock edge while the data signal must stay steady above or below the data level.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<HoldTime> Range: -9.9999E-08 to 1E-07
Increment: 1E-09
*RST: 0
Default unit: s

Usage: Asynchronous command

Manual operation: See "[Hold time](#)" on page 182

TRIGger:EVENT<ev>:SETHold:STIMe <SetupTime>

Sets the minimum time **before** the clock edge while the data signal must stay steady above or below the data level.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

| | |
|-------------|-----------------------------|
| <SetupTime> | Range: -9.9999E-08 to 1E-07 |
| | Increment: 1E-09 |
| | *RST: 0 |
| | Default unit: s |

Usage: Asynchronous command

Manual operation: See "[Setup time](#)" on page 182

17.9.12 State trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:STATe:QUALify:ANALog:CHAN<n>:HLX..... | 798 |
| TRIGger:EVENT<ev>:STATe:QUALify:LOGic..... | 799 |
| TRIGger:EVENT<ev>:STATe:SLOPe..... | 799 |
| TRIGger:EVENT<ev>:STATe:QUALify:DIGital:LOGic..... | 799 |
| TRIGger:EVENT<ev>:STATe:QUALify:DIGital:CHAN<n>:HLX..... | 799 |

TRIGger:EVENT<ev>:STATe:QUALify:ANALog:CHAN<n>:HLX <HLX>

Set the state for each channel. For the state trigger, the clock source is indicated and does not get a state.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

<n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

| | |
|-------|----------------------------------|
| <HLX> | HIGH LOW DONTcare |
| | State of the individual channels |
| | *RST: DONTcare |

Example:

```
TRIG:EVEN1:SOUR C1
TRIG:EVEN1:SLOP POS
TRIG:EVEN1:STAT:QUAL:ANAL:CHAN2:HLX HIGH
TRIG:EVEN1:STAT:QUAL:ANAL:CHAN3:HLX LOW
TRIG:EVEN1:STAT:QUAL:ANAL:CHAN4:HLX HIGH
TRIG:EVEN1:STAT:QUAL:LOG AND
```

Usage: Asynchronous command

Manual operation: See "[Source: channel states](#)" on page 186

TRIGger:EVENT<ev>:STATe:QUALify:LOGic <StateOperator>

Defines the logic combination of the channels and their states.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<StateOperator> AND | OR

*RST: AND

Usage: Asynchronous command

Manual operation: See "[Logic Operator](#)" on page 186

TRIGger:EVENT<ev>:STATe:SLOPe <Slope>

Sets the edge direction for the trigger.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Slope> POSitive | NEGative | EITHer

*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Slope](#)" on page 183

TRIGger:EVENT<ev>:STATe:QUALify:DIGItal:LOGic <Logic>

Defines the logic combination of the channels and their states.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<Logic> AND | OR

*RST: AND

Usage: Asynchronous command

Manual operation: See "[Logic Operator](#)" on page 186

TRIGger:EVENT<ev>:STATe:QUALify:DIGItal:CHAN<n>:HLX <HLX>

Sets the required state for each digital channel that is used for triggering.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

<n> 0 to 15, index of the logic channel

Parameters:

<HLX> HIGH | LOW | DONTcare
 *RST: DONTcare

Usage: Asynchronous command

Manual operation: See "Source: channel states" on page 187

17.9.13 Pattern trigger

| | |
|--|-----|
| TRIGger:EVENT<ev>:PATTern:QUALify:ANALog:CHAN<n>:HLX..... | 800 |
| TRIGger:EVENT<ev>:PATTern:QUALify:DIGItal:CHAN<n>:HLX..... | 800 |
| TRIGger:EVENT<ev>:PATTern:QUALify:LOGic..... | 801 |
| TRIGger:EVENT<ev>:PATTern:QUALify:DIGItal:LOGic..... | 801 |
| TRIGger:EVENT<ev>:PATTern:QUALify:SOURces..... | 801 |

TRIGger:EVENT<ev>:PATTern:QUALify:ANALog:CHAN<n>:HLX <HLX>

Set the state for each channel. For the state trigger, the clock source is indicated and does not get a state.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event
 <n> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<HLX> HIGH | LOW | DONTcare
 State of the individual channels
 *RST: DONTcare

Example:

```
TRIG:EVEN1:PATT:QUAL:ANAL:CHAN1:HLX LOW
TRIG:EVEN1:PATT:QUAL:ANAL:CHAN2:HLX HIGH
TRIG:EVEN1:PATT:QUAL:ANAL:CHAN3:HLX LOW
TRIG:EVEN1:PATT:QUAL:ANAL:CHAN4:HLX HIGH
TRIG:EVEN1:PATT:QUAL:LOG AND
```

Usage: Asynchronous command

Manual operation: See "Source: channel states" on page 186

TRIGger:EVENT<ev>:PATTern:QUALify:DIGItal:CHAN<n>:HLX <HLX>

Sets the required state for each digital channel that is used for triggering.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event
 <n> 0 to 15, index of the logic channel

Parameters:

<HLX> HIGH | LOW | DONTcare
*RST: DONTcare

Usage: Asynchronous command

Manual operation: See "[Source: channel states](#)" on page 187

TRIGger:EVENT<ev>:PATTERn:QUALify:LOGic <StateOperator>

Defines the logic combination of the channels and their states.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<StateOperator> AND | OR
*RST: AND

Usage: Asynchronous command

Manual operation: See "[Logic Operator](#)" on page 186

TRIGger:EVENT<ev>:PATTERn:QUALify:DIGItal:LOGic <Logic>

Defines the logic combination of the channels and their states.

Suffix:

<ev> 1..3

Parameters:

<Logic> AND | OR
*RST: AND

Usage: Asynchronous command

Manual operation: See "[Logic Operator](#)" on page 186

TRIGger:EVENT<ev>:PATTERn:QUALify:SOURces <StateSources>

Selects if the source of the trigger for the pattern type is an analog or digital channel.

Suffix:

<ev> 1 = A-trigger, 2 = B-trigger, 3 = reset event

Parameters:

<StateSources> ANALog | DIGital
*RST: ANALog

Usage: Asynchronous command

Manual operation: See "[State sources](#)" on page 184

17.9.14 Trigger mode, holdoff

| | |
|--------------------------------|-----|
| TRIGger:MODE..... | 802 |
| TRIGger:FORCe..... | 802 |
| TRIGger:HOLDoff:MODE..... | 802 |
| TRIGger:HOLDoff:AUTotime?..... | 803 |
| TRIGger:HOLDoff:SCALing..... | 804 |
| TRIGger:HOLDoff:EVENTs..... | 804 |
| TRIGger:HOLDoff:MAX..... | 804 |
| TRIGger:HOLDoff:MIN..... | 804 |
| TRIGger:HOLDoff:TIME..... | 805 |

TRIGger:MODE <TriggerMode>

Sets the trigger mode which determines the behavior of the instrument with and without a trigger event.

Parameters:

<TriggerMode> AUTO | NORMAl | FREQerun

AUTO

The instrument triggers repeatedly after a time interval if the trigger conditions are not fulfilled. If a real trigger occurs, it takes precedence. The time interval depends on the time base.

NORMAl

The instrument acquires a waveform only if a trigger occurs.

FREQerun

The instrument triggers after a very short time interval - faster than in AUTO mode. Real triggers are ignored.

*RST: AUTO

Usage: Asynchronous command

Manual operation: See "[\[Auto Norm\]](#)" on page 45

TRIGger:FORCe

Provokes an immediate single acquisition. Force the trigger if the acquisition is running in normal mode and no valid trigger occurs. Thus, you can confirm that a signal is available and use the waveform display to determine how to trigger on it.

Usage:

Setting only

Asynchronous command

Manual operation: See "[Force trigger](#)" on page 189

TRIGger:HOLDoff:MODE <Mode>

Selects the method to define the holdoff condition.

The trigger holdoff defines when the next trigger after the current will be recognized. Thus, it affects the next trigger to occur after the current one. Holdoff helps to obtain stable triggering when the oscilloscope is triggering on undesired events.

Holdoff settings are not available if the trigger source is an external trigger input or serial bus, and if you trigger on a sequence of events.

Parameters:

<Mode> TIME | EVENTs | RANDOM | AUTO | OFF

TIME

Defines the holdoff directly as a time period. The next trigger occurs only after the holdoff time has passed, which is defined using [TRIGger:HOLDoff:TIME](#).

EVENTs

Defines the holdoff as a number of trigger events. The next trigger occurs only when this number of events is reached. The number of triggers to be skipped is defined with [TRIGger:HOLDoff:EVENTs](#).

RANDOM

Defines the holdoff as a random time limited by [TRIGger:HOLDoff:MIN](#) and [TRIGger:HOLDoff:MAX](#). For each acquisition cycle, the instrument selects a new random holdoff time from the specified range.

AUTO

The holdoff time is calculated automatically based on the current horizontal scale.

OFF

No holdoff

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

TRIGger:HOLDoff:AUTotime?

Returns the resulting holdoff time, if [TRIGger:HOLDoff:MODE](#) is set to AUTO: *Auto time = Auto time scaling * Horizontal scale*. The auto time scaling factor is defined with [TRIGger:HOLDoff:SCALing](#).

Return values:

<AutoTime> Range: 1E-07 to 10
Increment: 0.0002
*RST: 0.001
Default unit: s

Usage: Query only
Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

TRIGger:HOLDoff:SCALing <AutoTimeScl>

Sets the auto time scaling factor that the horizontal scale is multiplied with, if [TRIGger:HOLDoff:MODETRIGger:HOLDoff:MODETRIGger:HOLDoff:MODE](#) is set to AUTO.

*Auto time = Auto time scaling * Horizontal scale*

The next trigger occurs only after this time has passed.

Parameters:

<AutoTimeScl> Range: 0.001 to 1000
 Increment: 1
 *RST: 0.5

Usage: Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

TRIGger:HOLDoff:EVENTs <Events>

Defines the number of triggers to be skipped, if [TRIGger:HOLDoff:MODETRIGger:HOLDoff:MODETRIGger:HOLDoff:MODE](#) is set to EVENTS. The next trigger only occurs when this number of events is reached.

Parameters:

<Events> Range: 1 to 2147483647
 Increment: 10
 *RST: 1

Usage: Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

TRIGger:HOLDoff:MAX <RandomMaxTime>

Defines the upper limit for the random time holdoff, if [TRIGger:HOLDoff:MODETRIGger:HOLDoff:MODETRIGger:HOLDoff:MODE](#) is set to RANDOM.

Parameters:

<RandomMaxTime> Range: 1E-07 to 10
 Increment: 0.0002
 *RST: 0.002
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

TRIGger:HOLDoff:MIN <RandomMinTime>

Defines the lower limit for the random time holdoff, if [TRIGger:HOLDoff:MODETRIGger:HOLDoff:MODETRIGger:HOLDoff:MODE](#) is set to RANDOM.

Parameters:

<RandomMinTime> Range: 1E-07 to 5
 Increment: 0.0002
 *RST: 0.001
 Default unit: s

Usage:

Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

TRIGger:HOLDOff:TIME <Time>

Defines the holdoff time period, if `TRIGger:HOLDOff:MODE` is set to `TIME`. The next trigger occurs only after this time has passed.

Parameters:

<Time> Range: 1E-07 to 10
 Increment: 0.0002
 *RST: 0.001
 Default unit: s

Usage:

Asynchronous command

Manual operation: See "[Holdoff mode](#)" on page 189

17.9.15 Hysteresis

| | |
|---|-----|
| <code>TRIGger:NOISe<m>:ABSolute</code> | 805 |
| <code>TRIGger:NOISe<m>:EFFective?</code> | 806 |
| <code>TRIGger:NOISe<m>:MODE</code> | 806 |
| <code>TRIGger:NOISe<m>:PERDivision</code> | 806 |
| <code>TRIGger:NOISe<m>:RELative</code> | 806 |
| <code>TRIGger:NOISe<m>[:STATe]</code> | 807 |

TRIGger:NOISe<m>:ABSolute <Absolute>

Defines a range in absolute values around the trigger level. If the signal oscillates inside this range and thus crosses the trigger level, no trigger event occurs.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Absolute>

Usage: Asynchronous command

Manual operation: See "[Absolute hysteresis](#)" on page 191

TRIGger:NOISe<m>:EFFective?

Returns the hysteresis that is set by the instrument in automatic hysteresis mode.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Effective> numeric value

Usage:

Query only
Asynchronous command

Manual operation: See "[HW hysteresis](#)" on page 191

TRIGger:NOISe<m>:MODE <Mode>

Selects whether the hysteresis is defined in absolute or relative values. The setting is available only in manual hysteresis mode.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Mode> ABS | REL

Usage: Asynchronous command

Manual operation: See "[Hysteresis mode](#)" on page 191

TRIGger:NOISe<m>:PERDivision <InDivision>

Defines a range in divisions around the trigger level in division units. If the signal oscillates inside this range and crosses the trigger level thereby, no trigger event occurs.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<InDivision> Range: 0 to 5
Increment: 0.01
*RST: 0
Default unit: div

Usage: Asynchronous command

Manual operation: See "[Relative hysteresis](#)" on page 192

TRIGger:NOISe<m>:RELative <Relative>

Defines a range in divisions around the trigger level as percentage. If the signal oscillates inside this range and crosses the trigger level thereby, no trigger event occurs.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Relative> Range: 0 to 50
 Increment: 1
 *RST: 0
 Default unit: %

Usage: Asynchronous command

Manual operation: See "Relative hysteresis" on page 192

TRIGger:NOISe<m>[:STATe] <Mode>

Selects how the hysteresis is set.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<Mode> AUTO | MANual

AUTO

Automatic mode is the recommended mode. The hysteresis is set by the instrument to reject the internal noise of the instrument.

MANual

The hysteresis is defined with [TRIGger:NOISe<m>:ABSolute](#) or [TRIGger:NOISe<m>:RELative](#).

Usage: Asynchronous command

17.9.16 Channel filter

| | |
|--|-----|
| TRIGger:FILTermode | 807 |
| TRIGger:LFReject | 808 |
| TRIGger:RFReject | 808 |

TRIGger:FILTermode <Mode>

Selects the filter mode for the trigger channel.

Parameters:

<Mode> OFF | LFReject | RFReject
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "Trigger filter mode" on page 192

TRIGger:LFReject <Bandwidth>

Sets the limit frequency limit for the highpass filter of the trigger signal. Frequencies lower than this value are rejected, higher frequencies pass the filter.

Parameters:

<Bandwidth> Range: 50 kHz
 *RST: 50 kHz
 Default unit: Hz

Usage: Asynchronous command

Manual operation: See "[LF reject BW](#)" on page 192

TRIGger:RFReject <Bandwidth>

Sets the limit frequency limit for the lowpass filter of the trigger signal. Frequencies higher than this value are rejected, lower frequencies pass the filter.

Parameters:

<Bandwidth> Range: 1E+3 to 500E+6
 Increment: 1000
 *RST: 1E+6
 Default unit: Hz

Usage: Asynchronous command

Manual operation: See "[RF reject BW](#)" on page 193

17.9.17 Actions on trigger

| | |
|------------------------------------|-----|
| TRIGger:ACTions:BEEP | 808 |
| TRIGger:ACTions:OUT:STATe | 809 |
| TRIGger:ACTions:OUT:SOURce | 809 |
| TRIGger:ACTions:OUT:DELay | 809 |
| TRIGger:ACTions:OUT:PLENgh | 809 |
| TRIGger:ACTions:OUT:POLarity | 810 |
| TRIGger:ACTions:SCReenshot | 810 |
| TRIGger:ACTions:STOP | 810 |
| TRIGger:ACTions:WFMSave | 810 |

TRIGger:ACTions:BEEP <Beep>

Generates a beep sound if the command is set to TRIGger.

Parameters:

<Beep> NOACtion | TRIGger
 *RST: NOACtion

Usage: Asynchronous command

Manual operation: See "[Beep](#)" on page 193

TRIGger:ACTions:OUT:STATe <State>

Activates the outgoing pulse on the [Trigger Out] connector on the rear panel.

If ON, a pulse is sent out each time when a trigger occurs.

Parameters:

<State> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Trigger out pulse](#)" on page 194

TRIGger:ACTions:OUT:SOURce <SignalSource>

Defines when the trigger out signal is initiated: at the trigger point, when waiting for the trigger, or when the post-trigger time is finished.

Parameters:

<SignalSource> TRIG | TRIGGER | POST | POSTTRIGGER | WAIT | WAITTRIGGER

TRIG = TRIGGER, POST = POSTTRIGGER, WAIT = WAIT-TRIGGER

*RST: TRIG

Usage: Asynchronous command

Manual operation: See "[Signal source](#)" on page 194

TRIGger:ACTions:OUT:DELay <Delay>

Defines the delay of the first pulse edge to the trigger point. The minimum delay is 600 ns.

Parameters:

<Delay> Range: 8E-07 to 1

Increment: 4E-09

*RST: 8E-07

Default unit: s

Usage: Asynchronous command

Manual operation: See "[Delay](#)" on page 195

TRIGger:ACTions:OUT:PLENgh <PulseLength>

Sets the length of the trigger out pulse.

Parameters:

<PulseLength> Range: 1.6E-08 to 0.05
 Increment: 1.6E-08
 *RST: 9.6E-08
 Default unit: s

Usage:

Asynchronous command

Manual operation: See "[Pulse length](#)" on page 195

TRIGger:ACTions:OUT:POLarity <Polarity>

Sets the polarity of the trigger out pulse, which is the direction of the first pulse edge.

Parameters:

<Polarity> POSitive | NEGative
 *RST: POSitive

Usage:

Asynchronous command

Manual operation: See "[Polarity](#)" on page 195

TRIGger:ACTions:SCReenshot <SaveScreenshot>

Saves a screenshot at each trigger if the command is set to TRIGger.

To configure the screenshot settings, use the commands described in [Section 17.11.8, "Screenshots"](#), on page 859.

Parameters:

<SaveScreenshot> NOACtion | TRIGger
 *RST: NOACtion

Usage:

Asynchronous command

Manual operation: See "[Screenshot](#)" on page 194

TRIGger:ACTions:STOP <StopAcq>

Stops the running acquisition if the command is set to TRIGger.

Parameters:

<StopAcq> NOACtion | TRIGger
 *RST: NOACtion

Usage:

Asynchronous command

Manual operation: See "[Stop acq](#)" on page 193

TRIGger:ACTions:WFMSave <SaveWfm>

Saves the waveform data to file at each trigger if the command is set to TRIGger.

To define the path and file names, use the EXPOrt:WAVeform:AUTOnaming:* commands:

- [EXPOrt:WAVeform:AUTOnaming:NAME](#) on page 852
- [EXPOrt:WAVeform:AUTOnaming:PATH](#) on page 853
- [EXPOrt:WAVeform:AUTOnaming:TYPE](#) on page 853

Parameters:

<SaveWfm> NOACtion | TRIGger
*RST: NOACtion

Usage: Asynchronous command

Manual operation: See "Save wfm" on page 194

17.9.18 Zone trigger

Zone trigger commands are available since FW version 2.2.x.x.

| | |
|---|-----|
| ZONE<m>;ADD | 811 |
| TRIGger:ZONE:EXPRession[:DEFInE] | 812 |
| ZONE<m>;ACOMbination | 812 |
| ZONE<m>;AREA<n>;ADD | 812 |
| ZONE<m>;AREA<n>;COUNT? | 812 |
| ZONE<m>;AREA<n>;INTersect | 813 |
| ZONE<m>;AREA<n>;LABEL | 813 |
| ZONE<m>;AREA<n>;VALid? | 813 |
| ZONE<m>;AREA<n>;POINT<o>;ADD | 814 |
| ZONE<m>;AREA<n>;POINT<o>;COUNT? | 814 |
| ZONE<m>;AREA<n>;POINT<o>;REMove | 814 |
| ZONE<m>;AREA<n>;POINT<o>;X | 815 |
| ZONE<m>;AREA<n>;POINT<o>;Y | 815 |
| ZONE<m>;AREA<n>;POINT<o>;VALid? | 815 |
| ZONE<m>;AREA<n>;REMove | 816 |
| ZONE<m>;AREA<n>;STATe | 816 |
| ZONE<m>;COUNT? | 816 |
| ZONE<m>;DIAGram | 816 |
| TRIGger:ZONE:HISTory | 817 |
| ZONE<m>;REMove | 817 |
| ZONE<m>;SOURce | 817 |
| ZONE<m>[:VISible] | 818 |

ZONE<m>;ADD

Adds a new trigger zone.

Suffix:

<m> 1 to 4, index of the zone

Usage:

Setting only
Asynchronous command

Manual operation: See "[Add zone, !\[\]\(d390011039d885f15592e144932457dc_img.jpg\)](#)" on page 203

TRIGger:ZONE:EXPRESSION[:DEFine] <LogicExpression>

Defines the zone trigger. The available operators for the combination between the zones are AND | NOT | OR | XOR.

Parameters:

<LogicExpression> String with the logical expression

Example: Prerequisite: Zone1 and Zone2 are defined.

TRIGger:ZONE:EXPRESSION 'Zone1 and Zone2'

TRIGger:ZONE:EXPRESSION?

<-- Zone1 and Zone2

Usage: Asynchronous command

Manual operation: See "[\[Zone\]](#)" on page 46

ZONE<m>:ACOMBination <AreaCombination>

Sets the logic combination that applies to all areas in the indicated zone.

Suffix:

<m> 1 to 4, index of the zone

Parameters:

<AreaCombination> AND | OR

*RST: AND

Usage: Asynchronous command

Manual operation: See "[Area](#)" on page 203

ZONE<m>:AREA<n>:ADD

Adds a new area to the trigger zone.

Suffix:

<m> 1 to 4, index of the zone

<n> 1 to 8, index of the zone area

Usage:

Setting only
Asynchronous command

Manual operation: See "[Area](#)" on page 203

ZONE<m>:AREA<n>:COUNT?

Returns the number of the defined areas in the zone.

ZONE<m>:AREA:COUNT? MAX returns the maximum number of areas that can be created.

Suffix:

- <m> 1 to 4, index of the zone
<n> Irrelevant, omit the suffix.

Return values:

- <Count> Number of defined zone areas

Usage:

Query only
Asynchronous command

Manual operation: See "Area" on page 203

ZONE<m>:AREA<n>:INTersect <Intersection>

Defines if the signal must intersect the zone to allow the instrument to trigger, or if it must not intersect the zone.

Suffix:

- <m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area

Parameters:

- <Intersection> MUST | NOT
*RST: MUST

Usage: Asynchronous command

Manual operation: See "Area" on page 203

ZONE<m>:AREA<n>:LABEL <Label>

Defines a label for the selected area.

Suffix:

- <m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area

Parameters:

<Label>

Usage: Asynchronous command

Manual operation: See "Area" on page 203

ZONE<m>:AREA<n>:VALid?

Checks the validity of the indicated zone area. The area is invalid if one of its points is invalid. See [Figure 7-13](#).

Suffix:

- <m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area

Return values:

<Valid> OFF | ON

*RST: ON

Usage:Query only
Asynchronous command

ZONE<m>:AREA<n>:POINT<o>:ADD

Adds a new point to the area at the indicated point index.

To define the coordinates of the point, use [ZONE<m>:AREA<n>:POINT<o>:X](#) and [ZONE<m>:AREA<n>:POINT<o>:Y](#).

Suffix:

<m> 1 to 4, index of the zone

<n> 1 to 8, index of the zone area

<o> 1 to 16, index of the zone area point

Usage:Setting only
Asynchronous command

ZONE<m>:AREA<n>:POINT<o>:COUNT?

Queries the number of the defined points in the area.

`ZONE<m>:AREA<n>:POINT:COUNT? MAX` returns the maximum number of points that can be created.

Suffix:

<m> 1 to 4, index of the zone

<n> 1 to 8, index of the zone area

<o> Irrelevant, omit the suffix.

Return values:

<Count> Range: 0 to 16

Usage: Query only
Asynchronous command

ZONE<m>:AREA<n>:POINT<o>:REMove

Removes the selected point from the area.

Suffix:

<m> 1 to 4, index of the zone

<n> 1 to 8, index of the zone area

<o> 1 to 16, index of the zone area point

Usage: Setting only
Asynchronous command

ZONE<m>:AREA<n>:POInt<o>:X <X>

Sets the horizontal X coordinates for the selected point of the area.

Suffix:

<m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area
<o> 1 to 16, index of the zone area point

Parameters:

<X> Range: -1E+26 to 1E+26
Increment: 1E-06
*RST: 0
Default unit: s

Usage: Asynchronous command

ZONE<m>:AREA<n>:POInt<o>:Y <Y>

Sets the vertical Y coordinates for the selected point of the area.

Suffix:

<m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area
<o> 1 to 16, index of the zone area point

Parameters:

<Y> Range: -1E+26 to 1E+26
Increment: 1E-06
*RST: 0
Default unit: V

Usage: Asynchronous command

ZONE<m>:AREA<n>:POInt<o>:VALid?

Checks the validity of the selected point. See [Figure 7-13](#).

Suffix:

<m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area
<o> 1 to 16, index of the zone area point

Return values:

<Valid> OFF | ON
*RST: ON

Usage: Query only
Asynchronous command

ZONE<m>:AREA<n>:REMove

Removes the selected area from the trigger zone.

Suffix:

<m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area

Usage: Setting only
Asynchronous command

Manual operation: See "[Delete icon](#)" on page 204

ZONE<m>:AREA<n>:STATe <State>

Enables the selected area.

Suffix:

<m> 1 to 4, index of the zone
<n> 1 to 8, index of the zone area

Parameters:

<State> OFF | ON
*RST: ON

Usage: Asynchronous command

ZONE<m>:COUNT? <Count>

Returns the number of zones.

ZONE:COUNT? MAX returns the maximum number of zones that can be created.

Suffix:

<m> Irrelevant, omit the suffix.

Return values:

<Count> Number of defined zones

Usage: Query only
Asynchronous command

ZONE<m>:DIAGram <SignDiagKey>

Selects the diagram on which the zone trigger is applied, for example layoutset1 diagram1 (L1_D1).

For more information about the SmartGrid definition, see [Section 17.7.2, "SmartGrid"](#), on page 704.

Suffix:

<m> 1 to 4, index of the zone

Parameters:

<SignDiagKey> String that indicates the layout set and the diagram, e.g. "L1_D1".

Usage:

Asynchronous command

TRIGger:ZONE:HISTory <ApplyToHistory>

Applies the zone trigger condition to the acquisitions that are stored in the history memory. Thus, you can filter the history of waveforms on zone conditions.

Parameters:

<ApplyToHistory> OFF | ON

*RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Apply zone trigger to history](#)" on page 206

ZONE<m>:REMove

Removes the selected trigger zone.

Suffix:

<m> 1 to 4, index of the zone

Usage:

Setting only
Asynchronous command

Manual operation: See "[Delete icon](#)" on page 204

ZONE<m>:SOURce <Source>

Sets the source of the zone trigger.

Suffix:

<m> 1 to 4, index of the zone

Parameters:

<Source> NONE | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | XY1 | XY2 | XY3 | XY4 | SPECNORM1 | SPECNORM2 | SPECNORM3 | SPECNORM4 | PA1QPOWER1 | PA2QPOWER | PA3QPOWER | PA4QPOWER4 | PA5QPOWER5 | PA6QPOWER6

Usage:

Asynchronous command

Manual operation: See "[Source](#)" on page 203

ZONE<m>[:VISIBLE] <DisplayState>

Enables the display of the zone on the screen.

Suffix:

<m> 1 to 4, index of the zone

Parameters:

<DisplayState> OFF | ON

*RST: ON

Usage: Asynchronous command

Manual operation: See "Display" on page 203

17.10 Waveform analysis

Some of the commands in the following section are asynchronous. An overlapping or asynchronous command does not automatically finish executing before the next command starts executing. If overlapping commands must be executed in a defined order, e.g. to avoid wrong measurement results, they must be serviced sequentially.

To prevent an overlapping execution of commands, one of the commands *OPC, *OPC? or *WAI can be used after the command or a command set.

For more information, see:

- www.rohde-schwarz.com/rc-via-scp, section "Command sequence and synchronization"
- [Zoom](#).....818
- [Mathematics](#).....827
- [History](#).....832
- [Reference waveforms](#).....835

17.10.1 Zoom

| | |
|--|-----|
| LAYOut<ly>:ZOOM<zo>[:ENABLE] | 819 |
| LAYOut<ly>:ZOOM<zo>:COUNT? | 819 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:POSition | 819 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:SPAN | 820 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:STARt | 820 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:STOP | 820 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:WIDTH | 821 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:MODE | 821 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:RELative:POSition | 821 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:RELative:SPAN | 822 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:RELative:STARt | 822 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:RELative:STOP | 823 |
| LAYOut<ly>:ZOOM<zo>:HORizontal:RELative:WIDTH | 823 |
| LAYOut<ly>:ZOOM<zo>:SOURce | 823 |

| | |
|---|-----|
| LAYOut<ly>:ZOOM<zo>:VERTical:ABSolute:POSition..... | 824 |
| LAYOut<ly>:ZOOM<zo>:VERTical:ABSolute:RANGE..... | 824 |
| LAYOut<ly>:ZOOM<zo>:VERTical:ABSolute:SPAN..... | 824 |
| LAYOut<ly>:ZOOM<zo>:VERTical:ABSolute:START..... | 824 |
| LAYOut<ly>:ZOOM<zo>:VERTical:ABSolute:STOP..... | 825 |
| LAYOut<ly>:ZOOM<zo>:VERTical:MODE..... | 825 |
| LAYOut<ly>:ZOOM<zo>:VERTical:RELative:POSition..... | 825 |
| LAYOut<ly>:ZOOM<zo>:VERTical:RELative:START..... | 826 |
| LAYOut<ly>:ZOOM<zo>:VERTical:RELative:STOP..... | 826 |
| LAYOut<ly>:ZOOM<zo>:VERTical:RELative:WIDTh..... | 826 |
| LAYOut<ly>:ZOOM<zo>:VERTical:RELative:SPAN..... | 826 |
| LAYOut<ly>:ZOOM<zo>:SSCREEN..... | 827 |

LAYOut<ly>:ZOOM<zo>[:ENABLE] <State>

Enables the zoom.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
 <zo> 1 to 8, index of the zoom

Parameters:

- <State> OFF | ON

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

Manual operation: See "[State](#)" on page 208

LAYOut<ly>:ZOOM<zo>:COUNT?

Returns the max number of available zooms.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
 <zo> 1 to 8, index of the zoom

Return values:

<Count>

Usage: Query only
 Asynchronous command

LAYOut<ly>:ZOOM<zo>:HORIZONTAL:ABSolute:POSition <Center>

Defines the x-value of the centerpoint of the zoom area in absolute values.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
 <zo> 1 to 8, index of the zoom

Parameters:

<Center> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0
Default unit: Depends on the underlying waveform

Usage:

Asynchronous command

Manual operation: See "[Position range](#)" on page 209

**LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:SPAN **

Defines the width of the zoom area in absolute values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

 Range: 0 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: Depends on the underlying waveform

Usage:

Asynchronous command

Manual operation: See "[Position range](#)" on page 209

LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:STARt <Start>

Defines the lower limit of the zoom area on the x-axis in absolute values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

<Start> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: Depends on the underlying waveform

Usage:

Asynchronous command

Manual operation: See "[Start Stop](#)" on page 209

LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:STOP <Stop>

Defines the upper limit of the zoom area on the x-axis in absolute values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Parameters:

<Stop> Range: -1E+26 to 1E+26

Increment: 0.01

*RST: 0.01

Default unit: Depends on the underlying waveform

Usage: Asynchronous command

Manual operation: See "[Start Stop](#)" on page 209

**LAYOut<ly>:ZOOM<zo>:HORizontal:ABSolute:WIDTh **

Defines the width of the zoom area in absolute values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Parameters:

 Range: 0 to 1E+26

Increment: 0.01

*RST: 0.01

Default unit: Depends on the underlying waveform

Usage: Asynchronous command

LAYOut<ly>:ZOOM<zo>:HORizontal:MODE <Mode>

Defines if absolute or relative values are used to specify the x-axis values. Since the zoom area refers to the active signal, relative values ensure that the zoom area remains the same.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Parameters:

<Mode> ABS | REL

*RST: ABS

Example: See [Section 17.4.1, "SmartGrid layout with zoom"](#), on page 689.

Usage: Asynchronous command

Manual operation: See "[Mode](#)" on page 210

LAYOut<ly>:ZOOM<zo>:HORizontal:RELative:POSItion <RelativeCenter>

Defines the x-value of the centerpoint of the zoom area in relative values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Parameters:

<RelativeCenter> Relative position of the centerpoint (x-value)

Range: 0 to 100

Increment: 0.1

*RST: 50

Default unit: %

Usage: Asynchronous command

Manual operation: See "[Position range](#)" on page 209

LAYout<ly>:ZOOM<zo>:HORizontal:RELative:SPAN <RelativeSpan>

Defines the width of the zoom area in relative values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Parameters:

<RelativeSpan> Range: 1E-15 to 100

Increment: 0.1

*RST: 1

Default unit: %

Usage: Asynchronous command

Manual operation: See "[Position range](#)" on page 209

LAYout<ly>:ZOOM<zo>:HORizontal:RELative:STARt <RelativeStart>

Defines the lower limit of the zoom area on the x-axis in relative values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Parameters:

<RelativeStart> Range: 0 to 100

Increment: 0.1

*RST: 0

Default unit: %

Example: See [Section 17.4.1, "SmartGrid layout with zoom"](#), on page 689.

Usage: Asynchronous command

Manual operation: See "[Start Stop](#)" on page 209

LAYout<ly>:ZOOM<zo>:HORizontal:RELative:STOP <RelativeStop>

Defines the upper limit of the zoom area on the x-axis in relative values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

<RelativeStop> Range: 0 to 100
Increment: 0.1
*RST: 100
Default unit: %

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

Manual operation: See "[Start Stop](#)" on page 209

LAYout<ly>:ZOOM<zo>:HORizontal:RELative:WIDTh <RelativeSpan>

Defines the width of the zoom area in relative values.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

<RelativeSpan> Range: 1E-15 to 100
Increment: 0.1
*RST: 1
Default unit: %

Usage: Asynchronous command

LAYout<ly>:ZOOM<zo>:SOURce <Diagram>

Indicates which of the waveform diagrams is selected for zooming. The number is displayed on the screen in the middle of each diagram.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

<Diagram> Index of the diagram, which is zoomed.

Example: See [Section 17.4.1, "SmartGrid layout with zoom", on page 689](#).

Usage: Asynchronous command

Manual operation: See "[Diagram](#)" on page 208

LAYOUT<ly>:ZOOM<zo>:VERTical:ABSolute:POsition <Center>

Defines the y-value of the centerpoint of the zoom area in absolute values.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

- <Center> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01

Usage: Asynchronous command

Manual operation: See "[Position range](#)" on page 209

LAYOUT<ly>:ZOOM<zo>:VERTical:ABSolute:RANGE **LAYOUT<ly>:ZOOM<zo>:VERTical:ABSolute:SPAN **

Defines the height of the zoom area in absolute values.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

- Range: 0 to 1E+26
Increment: 0.01
*RST: 0.01

Usage: Asynchronous command

Manual operation: See "[Position range](#)" on page 209

LAYOUT<ly>:ZOOM<zo>:VERTical:ABSolute:STARt <Start>

Defines the lower limit of the zoom area on the y-axis in absolute values.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

- <Start> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01

Usage: Asynchronous command

Manual operation: See "[Start Stop](#)" on page 209

LAYout<ly>:ZOOM<zo>:VERTical:ABSolute:STOP <Stop>

Defines the upper limit of the zoom area on the y-axis in absolute values.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

- <Stop> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01

Usage: Asynchronous command

Manual operation: See "[Start Stop](#)" on page 209

LAYout<ly>:ZOOM<zo>:VERTical:MODE <Mode>

Defines if absolute or relative values are used to specify the y-axis values. Since the zoom area refers to the active signal, relative values ensure that the zoom area remains the same.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

- <Mode> ABS | REL
*RST: REL

Usage: Asynchronous command

Manual operation: See "[Mode](#)" on page 210

LAYout<ly>:ZOOM<zo>:VERTical:RELative:POSITION <RelativeCenter>

Defines the y-value of the centerpoint of the zoom area in relative values.

Suffix:

- <ly> 1 to 8, index of the SmartGrid layout
<zo> 1 to 8, index of the zoom

Parameters:

- <RelativeCenter> Range: 0 to 100
Increment: 0.1
*RST: 50
Default unit: %

Usage: Asynchronous command

Manual operation: See "[Position range](#)" on page 209

LAYout<ly>:ZOOM<zo>:VERTical:RELative:STARt <RelativeStart>

Defines the lower limit of the zoom area on the y-axis in relative values.

Suffix:

| | |
|------|---------------------------------------|
| <ly> | 1 to 8, index of the SmartGrid layout |
| <zo> | 1 to 8, index of the zoom |

Parameters:

| | |
|-----------------|---|
| <RelativeStart> | Range: 0 to 100
Increment: 0.1
*RST: 0
Default unit: % |
|-----------------|---|

Usage: Asynchronous command**Manual operation:** See "[Start Stop](#)" on page 209

LAYout<ly>:ZOOM<zo>:VERTical:RELative:STOP <RelativeStop>

Defines the upper limit of the zoom area on the x-axis, in relative values.

Suffix:

| | |
|------|---------------------------------------|
| <ly> | 1 to 8, index of the SmartGrid layout |
| <zo> | 1 to 8, index of the zoom |

Parameters:

| | |
|----------------|---|
| <RelativeStop> | Range: 0 to 100
Increment: 0.1
*RST: 100
Default unit: % |
|----------------|---|

Usage: Asynchronous command**Manual operation:** See "[Start Stop](#)" on page 209

LAYout<ly>:ZOOM<zo>:VERTical:RELative:WIDTh <RelativeSpan>**LAYout<ly>:ZOOM<zo>:VERTical:RELative:SPAN <RelativeSpan>**

Defines the height of the zoom area in relative values.

Suffix:

| | |
|------|---------------------------------------|
| <ly> | 1 to 8, index of the SmartGrid layout |
| <zo> | 1 to 8, index of the zoom |

Parameters:

| | |
|----------------|---|
| <RelativeSpan> | Range: 1E-15 to 100
Increment: 0.1
*RST: 100
Default unit: % |
|----------------|---|

Usage: Asynchronous command**Manual operation:** See "[Position range](#)" on page 209

LAYout<ly>:ZOOM<zo>:SSCREEN

Sets the zoom area to the whole screen.

Suffix:

<ly> 1 to 8, index of the SmartGrid layout

<zo> 1 to 8, index of the zoom

Usage:

Setting only

Asynchronous command

Manual operation: See "[Set to screen](#)" on page 209

17.10.2 Mathematics

For fast export of several waveforms at once, use [EXPORT:WAVEFORM:DATA\[:VALUES\]?](#) on page 856.

| | |
|---|-----|
| CALCulate:MATH<m>:STATe..... | 827 |
| CALCulate:MATH<m>[:EXPReSSion][:DEFInE]..... | 827 |
| CALCulate:MATH<m>:LABel..... | 829 |
| CALCulate:MATH<m>:VERTical:SCALE[:VALue]..... | 829 |
| CALCulate:MATH<m>:UNIT..... | 829 |
| CALCulate:MATH<m>:VERTical:OFFSet..... | 829 |
| CALCulate:MATH<m>:ENVSelection..... | 830 |
| CALCulate:MATH<m>:VERTical:SCALE:MODE..... | 830 |
| CALCulate:MATH<m>:DATA:HEADER?..... | 830 |
| CALCulate:MATH<m>:DATA:STYPe?..... | 831 |
| CALCulate:MATH<m>:DATA[:VALues]?..... | 831 |

CALCulate:MATH<m>:STATe <First>

Activates the selected Math channel and displays the defined math waveforms.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<First> OFF | ON

Usage: Asynchronous command

Manual operation: See "[Display](#)" on page 213

CALCulate:MATH<m>[:EXPReSSion][:DEFInE] <Expression>

Defines the math expression to be calculated for the specified math channel.

| Operation | <Expression> | Comment |
|-------------|--------------|---------|
| Addition | "C1+C2" | |
| Subtraction | "C1-C2" | |

| Operation | <Expression> | Comment |
|--------------------------------|---|---|
| Multiplication | "C1*C2" | |
| Division | "C1/C2" | 0/0 = 0
+1 / 0 = Clip+
-1 / 0 = Clip- |
| Inverting | "-C1" | |
| Absolute value | "Abs(C1)" | |
| Derivation | "Derivation(C1,NoiseReject)" | NoiseReject can get any value between 1 and 5000 points
Default = 50 |
| Integral | "Integral(C1)" | |
| Logarithm (based on 10) | "Log(C1)" | Uses the absolute value of the source in calculation.
Log(0) = Clip - |
| Natural logarithm (based on e) | "Ln(C1)" | Uses the absolute value of the source in calculation.
Log(0) = Clip - |
| Binary logarithm (based on 2) | "Ld(C1)" | Uses the absolute value of the source in calculation.
Log(0) = Clip - |
| Square | "Pow(C1)" | |
| Square root | "Sqrt(C1)" | Uses the absolute value of the source in calculation. |
| Rescale | "Rescale(C1,a,b)" | a = scale, default = 1
b = offset, default = 0 |
| FIR | "FIR(Type,C1,Cut-Off,Characteristics)"

Examples:
"FIR(highpass,C1,10000000,Gaussian)"
"FIR(lowpass,C1,10000000,rectangle)" | Type = lowpass, highpass
Cut-Off = limit frequency
Characteristics = Gaussian, rectangle
Cut-Off can get any value between 4 GHz and 1 kHz |

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<Expression> String with regular expression for calculation

Example:

CALC:MATH 'C1*C2'

Defines the multiplication of waveforms channel 1 and channel 2.

Usage:

Asynchronous command

Manual operation: See "[Operator](#)" on page 214

CALCulate:MATH<m>:LABel <Label>

Defines a label for the selected math waveform.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<Label> String with the label

Example:

CALCulate:MATH3:LABel 'M3AddC1C2'

Usage: Asynchronous command**Manual operation:** See "[Label](#)" on page 213

CALCulate:MATH<m>:VERTical:SCALe[:VALue] <VerticalScale>

Sets the scale of the y-axis in the math function diagram. The value is defined as "<unit> per division", e.g. 50 mV/div. In this case, the horizontal grid lines are displayed in intervals of 50 mV.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<VerticalScale> Range: 1E-12 to 100E+12
Increment: 1E-05
*RST: 0.5
Default unit: V

Usage: Asynchronous command**Manual operation:** See "[\[Scale\]](#)" on page 49

CALCulate:MATH<m>:UNIT <UserUnit>

Sets a user-defined unit for the math operation.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<UserUnit> String with the base unit

Example:

CALCulate:MATH:UNIT 'A'

Usage: Asynchronous command**Manual operation:** See "[Unit](#)" on page 223

CALCulate:MATH<m>:VERTical:OFFSet <VerticalOffset>

Sets a voltage offset to adjust the vertical position of the math function on the screen. Negative values move the waveform up, positive values move it down.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<VerticalOffset> Range: -100E12 to 100E12
Increment: 0.01
*RST: 0
Default unit: div

Usage:

Asynchronous command

Manual operation: See "[Vertical offset](#)" on page 223

CALCulate:MATH<m>:ENVSelection <EnvelopeCurve>

Selects the upper or lower part of the input waveform for mathematic calculation, or a combination of both.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<EnvelopeCurve> MIN | MAX | BOTH
*RST: BOTH

Usage:

Asynchronous command

Manual operation: See "[Envelope wfm selection](#)" on page 215

CALCulate:MATH<m>:VERTical:SCALe:MODE <VertSclMd>

Sets how the vertical scale is adapted to the current measurement results. By default, scaling is done automatically to provide an optimal display. However, if necessary, you can define scaling values manually to suit your requirements.

Suffix:

<m> 1 to 8, index of the math waveform

Parameters:

<VertSclMd> MANual | AUTO
*RST: AUTO

Usage:

Asynchronous command

Manual operation: See "[Scale mode](#)" on page 223

CALCulate:MATH<m>:DATA:HEADer?

Returns the header of math waveform data, the attributes of the waveform.

Suffix:

<m> 1 to 8, index of the math waveform

Return values:

- <XStart> 1. header value: start time XStart in s
 <XStop> 2. header value: end time XStop in s
 <RecordLength> 3. header value: record length of the waveform in samples
 <ValuesPerSample> 4. header value: number of values per sample interval. For most waveforms, the result is 1. For envelope waveforms, it is 2. If the number is 2, the number of returned values is twice the number of samples (record length).

Example:

```
CALC:MATH1:DATA:HEAD?
```

```
-9.477E-008, 9.477E-008, 20000, 1
```

Start time of the data is -9.477E-008 = - 94,77 ns, and stop time of the data is 9.477E-008 = 94,77 ns. The data stream has 20000 values with one value per sample interval.

Usage:

Query only
 Asynchronous command

CALCulate:MATH<m>:DATA:STYPe?

Returns the signal type of the source of the math waveform.

Suffix:

- <m> 1 to 8, index of the math waveform

Return values:

- <SignalType> SOUR | CORR | MEAS | NONE
 SOURce = normal signal
 CORReation = correlated signal, specific math signal
 MEAsurement = result of a measurement
 NONE = undefined

Usage:

Query only
 Asynchronous command

CALCulate:MATH<m>:DATA[:VALues]? [<Offset>[,<Length>]]

Returns the data of the math waveform points for transmission from the instrument to the controlling computer. The data can be used in MATLAB, for example.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

To set the export format, use [FORMat \[:DATA\]](#).

Suffix:

- <m> 1 to 8, index of the math waveform

Query parameters:

- <Offset> Number of offset waveform points to be skipped.

<Length> Number of waveform points to be retrieved.

Return values:

<Data> List of values according to the format and content settings.

Example:

:CALC:MATH1:DATA:VAL? 100,10

Returns 10 points from the start index 100.

Usage:

Query only

Asynchronous command

17.10.3 History

| | |
|------------------------------------|-----|
| ACQuire:HISTory:CURREnt..... | 832 |
| ACQuire:HISTory:PLAY..... | 832 |
| ACQuire:HISTory:REPLay..... | 832 |
| ACQuire:HISTory:START..... | 833 |
| ACQuire:HISTory:STOP..... | 833 |
| ACQuire:HISTory:TPACq..... | 833 |
| ACQuire:HISTory:TSABSolute?..... | 834 |
| ACQuire:HISTory:TSDate?..... | 834 |
| ACQuire:HISTory:TSRelative?..... | 834 |
| ACQuire:HISTory:TSRReference?..... | 834 |
| ACQuire:HISTory[:STATe]..... | 835 |

ACQuire:HISTory:CURREnt <CurrentAcqIndex>

Accesses a particular acquisition in the memory to display it, or to save it. The newest acquisition always has the index "0". Older acquisitions have a negative index.

Parameters:

<CurrentAcqIndex> Range: -2147483648 to 0
Increment: 1
*RST: 0

Usage: Asynchronous command

Manual operation: See "[Current acq](#)" on page 226

ACQuire:HISTory:PLAY

Starts and stops the replay of the history waveforms.

Usage: Event
Asynchronous command

Manual operation: See "[Player](#)" on page 225

ACQuire:HISTory:REPLay <AutoRepeat>

If enabled, the replay of the history waveform sequence repeats automatically.

Otherwise, the replay stops at the stop index set with [ACQuire:HISTory:STOP](#) on page 833.

Parameters:

<AutoRepeat> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[Auto repeat](#)" on page 228

ACQuire:HISTory:STARt <StartAcqIndex>

Sets the index of the first (oldest) acquisition to be displayed or exported. The index is always negative.

Parameters:

<StartAcqIndex> Range: -2147483648 to 0
 Increment: 1
 *RST: 0

Usage: Asynchronous command

Manual operation: See "[Start acq](#)" on page 226

ACQuire:HISTory:STOP <StopAcqIndex>

Sets the index of the last (newest) acquisition to be displayed or exported. The newest acquisition of the complete acquisition series always has the index "0".

Parameters:

<StopAcqIndex> Range: -2147483648 to 0
 Increment: 1
 *RST: 0

Usage: Asynchronous command

Manual operation: See "[Stop acq](#)" on page 226

ACQuire:HISTory:TPACq <TimePerAcq>

Sets the display time for one acquisition. The shorter the time, the faster the replay is.

Parameters:

<TimePerAcq> Range: 4E-05 to 10
 Increment: 1
 *RST: 0.05
 Default unit: s

Usage: Asynchronous command

Manual operation: See "[Display time](#)" on page 226

ACQuire:HISTory:TSABsolute?

Returns the absolute daytime of the current acquisition ([ACQuire:HISTory:CURRent](#)).

Return values:

<TimeAbsString> String containing the time and unit

Usage:

Query only

Asynchronous command

Manual operation: See "[Time stamp](#)" on page 226

ACQuire:HISTory:TSDate?

Returns the date of the current acquisition ([ACQuire:HISTory:CURRent](#)).

Return values:

<DateAbsString> String parameter with acquisition date

Usage:

Query only

Asynchronous command

Manual operation: See "[Time stamp](#)" on page 226

ACQuire:HISTory:TSRelative?

Returns the relative time of the current acquisition - the time difference to the newest acquisition (index = 0).

See also: [ACQuire:HISTory:CURRent](#).

Return values:

<TimeRelativ> Range: -1E+26 to 1E+26

Increment: 1

*RST: 0

Default unit: s

Usage:

Query only

Asynchronous command

Manual operation: See "[Time stamp](#)" on page 226

ACQuire:HISTory:TSRReference?

Returns the relative time of the currently selected acquisition and the internal reference time (horizontal alignment) in history view in relation to the acquisition with index 0.

Return values:

<TimeRelIntRef> Range: -1E+26 to 1E+26

Increment: 1

*RST: 0

Default unit: s

Usage: Query only
Asynchronous command

Manual operation: See "Time stamp" on page 226

ACQuire:HISTory[:STATe] <State>

Enables the history mode and allows you to save history waveforms to file.

Parameters:

| | |
|---------|----------|
| <State> | OFF ON |
| *RST: | OFF |

Usage: Asynchronous command

Manual operation: See "Show history" on page 225

17.10.4 Reference waveforms

- [Setup](#).....835
- [Scaling](#).....838
- [Reference waveform data export](#).....842

17.10.4.1 Setup

| | |
|--|-----|
| REFCurve<rc>:ABORT | 835 |
| REFCurve<rc>:CLEar | 836 |
| REFCurve<rc>:NAME | 836 |
| REFCurve<rc>:OFFSet | 836 |
| REFCurve<rc>:OPEN | 836 |
| REFCurve<rc>:RESTore | 837 |
| REFCurve<rc>:SAVE | 837 |
| REFCurve<rc>:SOURce | 837 |
| REFCurve<rc>:STATe | 837 |
| REFCurve<rc>:UPDate | 838 |

REFCurve<rc>:ABORT

Aborts a running reference waveform export, which was started with [REFCurve<rc>:SAVE](#), or a running reference waveform update, which was started with [REFCurve<rc>:UPDate](#) on page 838.

Suffix:

<rc>.....1 to 8, index of the reference waveform

Usage: Event
Asynchronous command

Manual operation: See "Save" on page 233

REFCurve<rc>:CLEar

The selected reference waveform disappears, its memory is deleted.

Suffix:

<rc> 1 to 8, index of the reference waveform

Usage:

Setting only
Asynchronous command

Manual operation: See "[Clear](#)" on page 233

REFCurve<rc>:NAME <Name>

Defines the name of the reference waveform file to be loaded, saved or deleted.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<Name>

Usage:

Asynchronous command

REFCurve<rc>:OFFSet <VerticalOffset>

The vertical offset moves the reference waveform vertically. Enter a value with the unit of the waveform.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<VerticalOffset> Range: -1E+26 to 1E+26
Increment: 1E-06
*RST: 0
Default unit: V

Usage:

Asynchronous command

Manual operation: See "[Vertical offset](#)" on page 236

REFCurve<rc>:OPEN

Loads the reference waveform file selected by [REFCurve<rc>:NAME](#) on page 836.
Note that reference waveforms can be loaded only from .ref files.

Suffix:

<rc> 1 to 8, index of the reference waveform

Usage:

Event
Asynchronous command

Manual operation: See "[Recall](#)" on page 233

REFCurve<rc>:RESTore

Applies the original settings of the reference waveform to the horizontal and vertical settings of the selected waveform.

Suffix:

<rc> 1 to 8, index of the reference waveform

Usage:

Setting only

Asynchronous command

Manual operation: See "[Restore settings](#)" on page 235

REFCurve<rc>:SAVE

Saves the reference waveform to the file selected by [REFCurve<rc>:NAME](#).

Suffix:

<rc> 1 to 8, index of the reference waveform

Usage:

Event

Asynchronous command

Manual operation: See "[Save](#)" on page 233

REFCurve<rc>:SOURce <Source>

Selects the source waveform from the active waveforms, e.g. input channels, math waveforms, or spectrum.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<Source> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | M1 | M2 | M3 | M4 | M5 |
M6 | M7 | M8 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | SPEC-
MAXH1 | SPECMINH1 | SPECNORM1 | SPECAVER1 | SPEC-
MAXH2 | SPECMINH2 | SPECNORM2 | SPECAVER2 | SPEC-
MAXH3 | SPECMINH3 | SPECNORM3 | SPECAVER3 | SPEC-
MAXH4 | SPECMINH4 | SPECNORM4 | SPECAVER4

Source of the reference waveform.

Usage: Asynchronous command

Manual operation: See "[Source](#)" on page 232

REFCurve<rc>:STATe <State>

Enables the display of the reference waveform in the diagram.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<State> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "Show" on page 232

REFCurve<rc>:UPDate

Copies the selected source waveform with all its settings to the memory of the reference waveform. If there is a previously defined reference waveform in this memory, it is updated by the current source waveform. If the acquisition is running, the reference waveform is a snapshot.

Suffix:

<rc> 1 to 8, index of the reference waveform

Usage: Event
 Asynchronous command

Manual operation: See "Create/update" on page 233

17.10.4.2 Scaling

| | |
|---|-----|
| REFCurve<rc>:AXIS[:XMODE]..... | 838 |
| REFCurve<rc>:SCALE..... | 839 |
| REFCurve<rc>:POStion..... | 839 |
| REFCurve<rc>:HMODe..... | 839 |
| REFCurve<rc>:RESCale:HORizontal:FACTOr..... | 840 |
| REFCurve<rc>:RESCale:HORizontal:OFFSet..... | 840 |
| REFCurve<rc>:RESCale:HORizontal:STATe..... | 840 |
| REFCurve<rc>:RESCale:VERTical:FACTOr..... | 841 |
| REFCurve<rc>:RESCale:VERTical:OFFSet..... | 841 |
| REFCurve<rc>:RESCale:VERTical:STATe..... | 841 |
| REFCurve<rc>:TOORiginal..... | 842 |
| REFCurve<rc>:VMODe..... | 842 |

REFCurve<rc>:AXIS[:XMODE] <XAxisMode>

Defines the scaling method for the frequency (x-axis) of the reference curve.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<XAxisMode> LIN | LOG
 LIN: Linear scaling
 LOG: Logarithmic scaling
 *RST: LIN

Usage: Asynchronous command

REFCurve<rc>:SCALE <VerticalScale>

Sets the vertical scale, which defines the displayed amplitude of the selected waveform.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<VerticalScale> Range: 1E-15 to 1E+26
Increment: 1E-05
*RST: 0.5
Default unit: Unit of the source waveform

Usage: Asynchronous command

Manual operation: See "[\[Scale\]](#)" on page 49

REFCurve<rc>:POSItion <VertPosi>

Available, if [REFCurve<rc>:VMODE](#) is set to INDependent.

Moves the reference waveform up or down in the diagram.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<VertPosi> Range: -1E+26 to 1E+26
Increment: 0.02
*RST: 0
Default unit: div

Usage: Asynchronous command

Manual operation: See "[Vertical position](#)" on page 236

REFCurve<rc>:HMODe <HorizontalMode>

Selects the coupling of horizontal settings.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<HorizontalMode> ORIGinal | COUPled

ORIGinal

Horizontal scaling and reference point of the source waveform are used.

COUPled

The current horizontal settings of the diagram are used.

*RST: ORIGinal

Usage: Asynchronous command

Manual operation: See "[Mode](#)" on page 237

REFCurve<rc>:RESCale:HORizontal:FACTOr <ScaleFactor>

Sets the horizontal scale factor. A factor greater than 1 stretches the waveform horizontally, a factor lower than 1 compresses the curve.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<ScaleFactor> Range: 1E-14 to 1000000000000000
Increment: 0.1
*RST: 1

Usage: Asynchronous command

Manual operation: See "[Scale factor](#)" on page 237

REFCurve<rc>:RESCale:HORizontal:OFFSet <Offset>

Moves the waveform horizontally. Enter a value with a time unit suitable for the time scale of the diagram.

Positive values shift the waveform to the right, negative values shift it to the left.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<Offset> Range: -5000000 to 5000000
Increment: 0.01
*RST: 0
Default unit: s

Usage: Asynchronous command

Manual operation: See "[Horizontal offset](#)" on page 238

REFCurve<rc>:RESCale:HORizontal:STATe <State>

If enabled, the horizontal offset and factor are applied to the reference waveform.

Stretching and offset change the display of the waveform independent of the horizontal settings of the source waveform and of the horizontal diagram settings.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<State> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Enable](#)" on page 237

REFCurve<rc>:RESCale:VERTical:FACTOr <ScaleFactor>

Sets the vertical scale factor. A factor greater than 1 stretches the waveform vertically, a factor lower than 1 compresses the curve.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<ScaleFactor> Range: -100000000 to 100000000
Increment: 0.1
*RST: 1

Usage: Asynchronous command

Manual operation: See "[Scale factor](#)" on page 237

REFCurve<rc>:RESCale:VERTical:OFFSet <Offset>

The vertical offset moves the reference waveform vertically. Enter a value with the unit of the waveform.

Like vertical offset of a channel waveform, the offset of a reference waveform is subtracted from the measured value. Negative values shift the waveform up, positive values shift it down.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<Offset> Range: -100000000 to 100000000
Increment: 1E-06
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Vertical offset](#)" on page 237

REFCurve<rc>:RESCale:VERTical:STATe <State>

If enabled, the vertical offset and factor are applied to the reference waveform.

Stretching and offset change the display of the waveform independent of the vertical scale and position.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<State> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Enable](#)" on page 237

REFCurve<rc>:TOORiginal

Available, if `REFCurve<rc>:VMODE` is set to INDependent.

Restores the original vertical settings of the reference waveform (vertical scale, position, and offset).

Suffix:

<rc> 1 to 8, index of the reference waveform

Usage: Setting only

Asynchronous command

Manual operation: See "[Set to original](#)" on page 235

REFCurve<rc>:VMODe <VerticalMode>

Selects the coupling of vertical settings.

Suffix:

<rc> 1 to 8, index of the reference waveform

Parameters:

<VerticalMode> COUPled | INDependent

COUPled

Vertical position and scale of the source are used.

INDependent

Scaling and position can be set specific to the reference waveform.

*RST: INDependent

Usage: Asynchronous command

Manual operation: See "[Mode](#)" on page 235

17.10.4.3 Reference waveform data export

Commands to transmit the data of reference waveforms are listed below. Commands for saving waveform data to a file are described in [Section 17.11.4, "Waveform export to file"](#), on page 852.

`REFCurve<rc>:DATA:STYPe?`.....842

`REFCurve<rc>:DATA:HEADER?`.....843

`REFCurve<rc>:DATA[:VALUES]?`.....843

REFCurve<rc>:DATA:STYPe?

Returns the signal type of the source of the reference waveform.

Suffix:

<rc> 1 to 8, index of the reference waveform

Return values:

<SignalType> SOURce | SPECtrum | NONE

Usage:

Query only
Asynchronous command

REFCurve<rc>:DATA:HEADer?

Returns header information on the reference waveform, the attributes of the waveform.

Suffix:

<rc> 1 to 8, index of the reference waveform

Return values:

<XStart> 1. header value: start time XStart in s
 <XStop> 2. header value: end time XStop in s
 <RecordLength> 3. header value: record length of the waveform in samples
 <ValuesPerSample> 4. header value: number of values per sample interval. Depends on the source waveform from which the reference waveform was created.

Example:

REFC:DATA:HEAD?
 -9.477E-008, 9.477E-008, 20000, 1
 Start time of the data is -9.477E-008 = - 94,77 ns, and stop time of the data is 9.477E-008 = 94,77 ns. The data stream has 20000 values with one value per sample interval.

Usage:

Query only
Asynchronous command

REFCurve<rc>:DATA[:VALues]? [<Offset>[,<Length>]]

Returns the data of the channel waveform points for transmission from the instrument to the controlling computer. The data can be used in MATLAB, for example.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

To set the export format, use [FORMAT \[:DATA\]](#) on page 699.

Suffix:

<rc> 1 to 8, index of the reference waveform

Query parameters:

<Offset> Number of offset waveform points to be skipped.
 Range: 0 to m. Limit: n + m <= record length

<Length> Number of waveform points to be retrieved.
 Range: 1 to n. Limit: n + m <= record length

Return values:

<Data> List of values according to the format and content settings.

Usage:

Query only
 Asynchronous command

17.11 Data management

Some of the commands in the following section are asynchronous. An overlapping or asynchronous command does not automatically finish executing before the next command starts executing. If overlapping commands must be executed in a defined order, e.g. to avoid wrong measurement results, they must be serviced sequentially.

To prevent an overlapping execution of commands, one of the commands *OPC, *OPC? or *WAI can be used after the command or a command set.

For more information, see:

- www.rohde-schwarz.com/rc-via-scp, section "Command sequence and synchronization"

17.11.1 Instrument settings

The Mass MEMory subsystem provides commands to access the storage media and to save and reload instrument settings.

File and directory names

The <file_name> and <directory_name> parameters are strings. Some commands use a fixed directory; for others the <file_name> can contain the complete path including the drive name and all subdirectories. If no complete path is specified, the file location is relative to the current directory, queried with `MMEMemory:CDIRectory?`. The filename itself may contain the period as a separator for extensions.

File and directory names can be chosen according to Windows™ conventions. All letters and numbers are allowed, as well as the special characters "_", "^", "\$", "~", "!", "#", "%", "&", "-", "{", "}", "(", ")", "@" and "\". Reserved filenames are CON, AUX, COM1, ..., COM4, LPT1, ..., LPT3, NUL and PRN.

The use of wildcards ? and * is not allowed.

| | |
|---|-----|
| <code>MMEMemory:DRIVeS?</code> | 845 |
| <code>MMEMemory:DCATalog?</code> | 845 |
| <code>MMEMemory:DCATalog:LENGth?</code> | 846 |
| <code>MMEMemory:CDIRectory</code> | 846 |
| <code>MMEMemory:MDIRectory</code> | 846 |
| <code>MMEMemory:RDIRectory</code> | 846 |
| <code>MMEMemory:CATalog?</code> | 847 |

| | |
|-------------------------|-----|
| MMEMory:CATalog:LENGth? | 847 |
| MMEMory:COPY | 848 |
| MMEMory:MOVE | 848 |
| MMEMory:DElete | 848 |
| MMEMory:DATA | 849 |
| MMEMory:ATTRibute | 849 |
| MMEMory:SAV | 849 |
| MMEMory:RCL | 850 |
| MMEMory:STORe:STATe | 850 |
| MMEMory:LOAD:STATe | 850 |
| MMEMory:GENerator:RCL | 850 |
| MMEMory:GENerator:SAV | 851 |

MMEMory:DRIves?

Returns the path list of available drives.

Return values:

| | |
|---------|--|
| <Drive> | List of strings, for example:
Instrument only: "/home/storage/userData"
Instrument with connected USB flash drive:
"/home/storage/userData", "/run/media/usb/<MyDriveName>/MYD".
. MYDATA is the partition name, which is also shown in the file explorer.
Instrument with connected USB flash drive:
"/home/storage/userData", "/run/media/usb/<MyDriveName>/8AF".
. 8AF8-3EBA is an example ID. ID is used if the partition does not have a name, or the name cannot be read. |
|---------|--|

| | |
|---------------|------------|
| Usage: | Query only |
|---------------|------------|

MMEMory:DCATalog? [<PathName>]

Returns the subdirectories of the current or of a specified directory.

Query parameters:

| | |
|------------|--|
| <PathName> | String parameter to specify the directory. If the directory is omitted, the command queries the contents of the current directory, to be set and queried with MMEMory:CDIRectory . |
|------------|--|

Return values:

| | |
|-------------|---|
| <FileEntry> | Names of the subdirectories separated by colons. The first two strings are related to the parent directory. |
|-------------|---|

| | |
|-----------------|-------------|
| Example: | MMEM: DCAT? |
|-----------------|-------------|

| | |
|---------------|------------|
| Usage: | Query only |
|---------------|------------|

MMEMory:DCATalog:LENGth? [<PathName>]

Returns the number of subdirectories of the current or of a specified directory. The number includes the parent directory strings "." and ".." and corresponds to the number of strings returned by the [MMEMory:DCATalog?](#) command.

Query parameters:

<PathName> String parameter to specify the directory. If the directory is omitted, the command queries the contents of the current directory, to be set and queried with [MMEMory:CDIRectory](#).

Return values:

<FileEntryCount> Number of parent directories and subdirectories.

Example:

```
MMEM:DCAT:LENG?  
5
```

Usage:

Query only

MMEMory:CDIRectory [<DirectoryName>]

Changes the default directory for file access.

Parameters:

<DirectoryName> String parameter to specify the directory.
*RST: "\\"

Example:

```
MMEM:CDIR '/home/storage/userData/Waveforms'
```

Usage:

SCPI confirmed

MMEMory:MDIRectory <DirectoryName>

Creates a new directory with the specified name.

Setting parameters:

<DirectoryName> String parameter to specify the new directory. If the path consists of several subdirectories, the complete tree is created if necessary.

Example:

```
MMEM:MDIR '/home/storage/userData/Waveforms'
```

Usage:

Setting only

MMEMory:RDIRectory <DirectoryName>

Deletes the specified directory.

Setting parameters:

<DirectoryName> String parameter to specify the directory to be deleted.
This directory must be empty, otherwise it is not deleted.

Example:

```
MMEM:RDIR '/home/storage/userData/Test'
```

Usage:

Setting only

MMEMory:CATalog? [<PathName>][, <Format>]

Returns a list of files contained in the specified directory. The result corresponds to the number of files returned by the MMEMory:CATalog:LENgth command.

Query parameters:

<PathName> String parameter to specify the directory. If the directory is omitted, the command queries directory specified with [MMEMory:CDIRectory](#).

<Format> ALL | WTIME
ALL: Extended result including file, date, time and attributes
WTIME: Extended result including file, date, time

Return values:

<UsedMemory> Total amount of storage currently used in the directory, in bytes.

<FreeMemory> Total amount of storage available in the directory, in bytes.

<FileEntry> All files and subdirectories of the directory are listed with their filename, format and size in bytes. The first two strings are related to the parent directory.

Example:

```
MMEM:CAT? '/home/storage/userData'
529479,1831777894400,".",DIR,0,"..",DIR,0",
"Backup,DIR,0","CSS,DIR,0","DATEN,DIR,0",
"Commands.jar,BIN,529479","FAVORITES,DIR,0",
"LOG,DIR,0","DATA,DIR,0","test,DIR,0",
"TotalCMD,DIR,0"
```

Usage:

Query only
SCPI confirmed

MMEMory:CATalog:LENgth? [<PathName>]

Returns the number of files and subdirectories of the current or specified directory. The number includes the parent directory strings "." and ".." and it corresponds to the number of <FileEntry> strings returned by the [MMEMory:CATalog?](#) command.

Query parameters:

<PathName> String parameter, directory to be queried. If the directory is omitted, the current directory is queried, specified with [MMEMory:CDIRectory](#).

Return values:

<Count> Number of files and subdirectories including parent directory entries.

Example:

```
MMEM:CDIR '/home/storage/userData'
MMEM:CAT:LENG?
11
```

Usage:

Query only

MMEMory:COPY <FileSource>[, <FileDestination>]

Copies an existing file to a new file.

Setting parameters:

<FileSource> String parameter. Contains name and path of the file to be copied. Wildcards (*) and (?) are allowed.

<FileDestination> String parameter. Contains name and path of the new file. If the file already exists, it is overwritten without notice. If no file destination is specified, the source file is written to the current directory specified with [MMEMory:CDIRectory](#).

Usage:

Setting only

SCPI confirmed

MMEMory:MOVE <FileSource>, <FileDestination>

Moves the specified file to a new location on the same drive and renames it.

Setting parameters:

<FileSource> String parameter, contains name and path of the file to be copied.

Wildcards (*) and (?) are allowed. Therefore, specify a directory for <FileDestination>. Renaming is not possible.

<FileDestination> String parameter. Contains name and path of the new file. If no path is specified, the <FileSource> directory is used - the file is renamed.

Usage:

Setting only

SCPI confirmed

MMEMory:DELete <FileName>

Removes the specified file/files. To delete directories, use [MMEMory:RDIRectory](#).

Setting parameters:

<FileName> String parameter to specify the name and directory of the file to be removed. Wildcards (*) and (?) are allowed.

If no path is defined, the current directory is used, specified with [MMEMory:CDIRectory](#).

Example:

MMEM:DEL '* .CFG'

Deletes all CFG files from the current directory.

Usage:

Setting only

SCPI confirmed

MMEMory:DATA <FileName>, <Data>
MMEMory:DATA? <FileName>

Stores data in the specified file to the storage location specified using [MMEMory:CDIRectory](#).

Parameters:

<Data> **<block>**
488.2 block data format. The delimiter EOI must be selected to achieve correct data transfer.
The block begins with character '#'. The next digit is the length of the length information, followed by this given number of digits providing the number of bytes in the following binary data.

Parameters for setting and query:

<FileName> String parameter, the name of the file the data is stored to.

Example: MMEM:DATA 'abc.txt', #216This is the file
#2: the length information has two digits.
16: the binary data has 16 bytes.

Example: MMEM:DATA? 'abc.txt'
Returns the data from file abc.txt.

MMEMory:ATTRibute <FileName>, <Attributes>
MMEMory:ATTRibute? <FileName>

Sets file attributes for the specified file/files. The command can be used for files only.

Setting parameters:

<Attributes> String with attributes and setting information.
'+' before the attribute: sets the attribute
'-' before the attribute: deletes the attribute
'R': read only
'H': hidden file

Parameters for setting and query:

<FileName> String parameter, contains name and path of the file. Wildcards (*) and (?) are allowed.

Return values:

<FileEntry> String containing: "<file_name>,<file_attributes>"

MMEMory:SAV <FileDestination>

Stores the current instrument settings to the specified file.

Waveform generator settings are not included.

This command has the same effect as the combination of *SAV and [MMEMory:STORe:STATE](#).

Parameters:

<FileDestination> String parameter specifying path and filename of the target file. Wildcards are not allowed.

Usage: Event

MMEMemory:RCL <FileSource>

Restores the instrument settings from the specified file.

The stored instrument settings do not include waveform generator settings.

This command has the same effect as the combination of **MMEMemory:LOAD:STATE** and ***RCL**.

Parameters:

'<FileSource>' String parameter specifying the path and filename of the source file. Wildcards are not allowed.

Usage: Event

MMEMemory:STORe:STATe <MemoryNumber>, <FileName>

Stores the instrument settings from the specified internal memory to the specified file. To store the current instrument settings to the internal memory, use ***SAV** first.

Setting parameters:

<MemoryNumber> Number of the internal memory
Range: 1 to 99

<FileName> String parameter specifying the complete path and filename of the source file.

Usage: Setting only

MMEMemory:LOAD:STATe <MemoryNumber>, <FileName>

Loads the instrument settings from the specified file to the specified internal memory. After the file has been loaded, the settings must be activated using a ***RCL** command.

Setting parameters:

<MemoryNumber> Number of the internal memory
Range: 1 to 99

<FileName> String parameter specifying the complete path and filename of the source file.

Usage: Setting only

MMEMemory:GENerator:RCL <FilePath>

Restores the waveform generator settings from the specified file.

Parameters:

<FilePath> String parameter specifying the path and filename of the settings file.

Usage:

Asynchronous command

MMEMory:GENerator:SAV <FilePath>

Stores the current waveform generator settings to the specified file.

Parameters:

<FilePath> String parameter specifying path and filename of the settings file.

Usage:

Asynchronous command

17.11.2 Saveset

SAVeset:CONFIG:PREView <IncludePreview>

If set to OFF, the saveset is stored without the preview image to reduce the file size.

Use the command each time before you save a saveset.

Parameters:

<IncludePreview> OFF | ON

*RST: ON

Usage:

Asynchronous command

SAVeset:CONFIG:UPReferences <UserSettings>

If ON, the user-specific display settings for the toolbar, waveform colors and diagram presentation are included in the saveset file. The setting affects the saving and the recall actions.

Parameters:

<UserSettings> OFF | ON

*RST: OFF

Usage:

Asynchronous command

17.11.3 Generator saveset

GENerator:RCL <filePath>

Restores the waveform generator from the specified file.

Parameters:

<filePath> String parameter specifying the path and filename of the source file.

Usage: Asynchronous command

GENerator:SAV <filePath>

Stores the current waveform generator settings to the specified file.

Parameters:

<filePath> String parameter specifying path and filename of the target file.

Usage: Asynchronous command

17.11.4 Waveform export to file

| | |
|--------------------------------------|-----|
| EXPort:WAVeform:ABORT..... | 852 |
| EXPort:WAVeform:AUTonaming:NAME..... | 852 |
| EXPort:WAVeform:AUTonaming:PATH..... | 853 |
| EXPort:WAVeform:AUTonaming:TYPE..... | 853 |
| EXPort:WAVeform:CURSorset..... | 853 |
| EXPort:WAVeform:GATE..... | 853 |
| EXPort:WAVeform:NAME..... | 854 |
| EXPort:WAVeform:SAVE..... | 854 |
| EXPort:WAVeform:SCOPE..... | 854 |
| EXPort:WAVeform:SOURce..... | 855 |
| EXPort:WAVeform:START..... | 855 |
| EXPort:WAVeform:STOP..... | 856 |

EXPort:WAVeform:ABORT

Aborts a running waveform export, which was started with [EXPort:WAVeform:SAVE](#).

Usage: Event
Asynchronous command

EXPort:WAVeform:AUTonaming:NAME <FileName>

Sets a name for the waveform file, without extension. The name is extended with a time stamp when the file is saved.

The setting is used for automatic saving actions, for example, saving on trigger or mask violation. It has **no** effect on [EXPort:WAVeform:SAVE](#).

Parameters:

<FileName> String with the filename.

Usage: Asynchronous command

Manual operation: See "[File name](#)" on page 361

EXPort:WAVeform:AUTOnaming:PATH <FolderPath>

Sets the directory where the waveform file is saved. For local storage, the path is always /home/storage/userData.

The setting is used for automatic saving actions, for example, saving on trigger or mask violation. It has **no** effect on EXPort:WAVeform:SAVE.

Parameters:

<FolderPath> String with the path.

Usage: Asynchronous command

Manual operation: See "[<FolderPath>](#)" on page 361

EXPort:WAVeform:AUTOnaming:TYPE <FileExtension>

Sets the file type of the waveform file.

The setting is used for automatic saving actions, for example, saving on trigger or mask violation. It has **no** effect on EXPort:WAVeform:SAVE.

Parameters:

<FileExtension> CSV | REF | ZIP | H5

*RST: REF

Usage: Asynchronous command

Manual operation: See "[File extension](#)" on page 361

EXPort:WAVeform:CURSorset <Cursorset>

Sets the cursor set to be used for limited data export if EXPort:WAVeform:SCOPE is set to CURSOR.

Parameters:

<Cursorset> CURSOR1 | CURSOR1 | CURSOR2 | CURSOR2 | CURSOR3 |
CURSOR3 | CURSOR4 | CURSOR4

Usage: Asynchronous command

Manual operation: See "[Export mode](#)" on page 360

EXPort:WAVeform:GATE

Selects the gate to be used for limited data export if EXPort:WAVeform:SCOPE is set to GATE.

Usage: Asynchronous command

Manual operation: See "[Export mode](#)" on page 360

EXPort:WAVeform:NAME <name>

Sets the path, the filename and the file format of the export file. The setting is used for save-as operations that do not use the autonaming settings.

Parameters:

<name> String with path and filename with extension .ref, .csv, .zip, or .h5. Extensions .ref, .csv are provided for single waveform export, while .zip is for export of multiple waveforms.
For local storage, the path is always /home/storage/userData.

Example:

```
EXP:WAV:NAME  
'/home/storage/userData/Export_C1.csv'  
EXP:WAV:SCOP DISP  
EXP:WAV:SAVE  
Saves the visible waveform data of channel 1 in xml format  
to /home/storage/userData/Export_C1.csv.
```

Usage:

Asynchronous command

Manual operation: See "Save as" on page 361

EXPort:WAVeform:SAVE

Saves the waveform to the file specified with [EXPort:WAVeform:NAME](#).

Usage:

Event
Asynchronous command

Manual operation: See "Save as" on page 361

EXPort:WAVeform:SCOPE <Scope>

Defines the part of the waveform record that has to be stored.

Parameters:

<Scope> DISPlay | ALL | CURSor | GATE | MANual

DISPlay
Waveform data that is displayed in the diagram.

ALL
Complete waveform, which is usually longer than the displayed waveform.

CURSor
Data between the cursor lines if a cursor measurement is defined for the source waveform.

GATE
Data included in the measurement gate if a gated measurement is defined for the source waveform.

MANual

Saves the data between user-defined start and stop values to be set with `EXPort:WAVeform:START` and `EXPort:WAVeform:STOP`.

`*RST: DISPlay`

Example: See [Section 17.4.4, "Data transfer in roll mode"](#), on page 694.

Usage: Asynchronous command

Manual operation: See ["Export mode"](#) on page 360

EXPort:WAVeform:SOURce <Sources>

Selects the waveform or waveforms to be exported to file.

Parameters:

<Sources> Comma-separated list of waveforms

Possible waveform sources are:

Analog signals: C1,C2,C3,C4,C5,C6,C7,C8

Digital signals:

D0,D1,D2,D3,D4,D5,D6,D7,D8,D9,D10,D11,D12,D13,D14,D15

Math waveforms: M1,M2,M3,M4,M5

Reference waveforms: R1,R2,R3,R4

Spectrum traces: SPECMAXH1,SPECMINH1,SPEC-

NORM1,SPECAVER1,SPECMAXH2,SPECMINH2,SPEC-

NORM2,SPECAVER2,SPECMAXH3,SPECMINH3,SPEC-

NORM3,SPECAVER3,SPECMAXH4,SPECMINH4,SPEC-

NORM4,SPECAVER4

Example:

```
EXP:WAV:NAME '/home/storage/userData/Export_C2.csv'
EXPort:WAVeform:SOURce C2
EXP:WAV:SCOP DISP
EXP:WAV:SAVE
```

Exports the data of channel 2 to a CSV file.

Example:

```
EXP:WAV:NAME '/home/storage/userData/Export_multi.zip'
EXPort:WAVeform:SOURce C1,C2,SPECNORM1,SPECAVER1
EXP:WAV:SCOP DISP
EXP:WAV:SAVE
```

Exports the data of channel 1, channel 2, normal and average spectrum traces to a zip file.

Usage:

Asynchronous command

Manual operation: See ["Source"](#) on page 359

EXPort:WAVeform:STARt <Start>

Sets the start time value of the waveform section for export, if `EXPort:WAVeform:SCOPe` on page 854 is set to Manual.

Parameters:

<Start> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: s

Usage: Asynchronous command

Manual operation: See "Export mode" on page 360

EXPort:WAVeform:STOP <Stop>

Sets the end time value of the waveform section for export, if [EXPort:WAVeform:SCOPE](#) on page 854 is set to Manual.

Parameters:

<Stop> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: s

Usage: Asynchronous command

Manual operation: See "Export mode" on page 360

17.11.5 Fast data export

EXPort:WAVeform:DATA[:VALUes]?

Starts a fast export of the selected waveforms for use in automated analysis systems. There is no corresponding . . . :DATA:HEAdEr command. Offset and length parameters are not available.

Select the waveforms for export with [EXPort:WAVeform:SOURce](#), and the data scope with [EXPort:WAVeform:SCOPe](#).

The data stream contains the pure data of the exported sources. The order of the sources can be read with [EXPort:WAVeform:SOURce?](#). The order is predefined and independent of the setting order to ensure the same order for the same selection of waveforms.

Fast export is possible at low record length, depending on the instrument and active functionality. If fast export is not possible, you can export the single signals.

Parameters:

<Values> Binary format: stream of bytes, without delimiter
ASCII: comma-separated value list

Example: The following waveforms are active and acquired: C1, C2 and SPECNORM1.

Determine the number of values per waveform:

```
CHANnel1:WAVeform:DATA:HEADER? --> 1000 values
CHANnel2:WAVeform:DATA:HEADER? --> 1000 values
CALCulate:SPECtrum1:WAVeform:NORMAL:DATA:HEADER? --> 2867 values
```

Fast export of all waveforms at once as float values:

```
FORMat:DATA REAL, 32
EXPort:WAVeform:SOURce C2,C1,SPECNORM1
EXPort:WAVeform:SOURce? --> C1,C2,SPECNORM1
EXPort:WAVeform:DATA:VALues?
--> data stream of 1000 values C1, then 1000 values C2, then 2867 values
```

If the fast export fails, use the export of single waveforms:

```
CHANnel1:WAVeform:DATA:VALues?
CHANnel2:WAVeform:DATA:VALues?
CALCulate:SPECtrum1:WAVeform:NORMAL:DATA:VALues?
```

Usage: Query only
Asynchronous command

17.11.6 Sessions

| | |
|-----------------------------|-----|
| SESSION:SAVE:ABORT..... | 857 |
| SESSION:SAVE:CHANnel..... | 857 |
| SESSION:SAVE:REFerence..... | 858 |
| SESSION:SAVE[:EXECute]..... | 858 |
| SESSION:USERpref..... | 858 |

SESSION:SAVE:ABORT

Stops the saving process of a session file.

Usage: Setting only
Asynchronous command

Manual operation: See "[Save to file](#)" on page 376

SESSION:SAVE:CHANnel <ChWfms>

Includes the channel waveform data in the session file.

Parameters:

| | |
|----------|----------|
| <ChWfms> | OFF ON |
| | *RST: ON |

Usage: Asynchronous command

Manual operation: See "[Channel Waveforms](#)" on page 375

SESSION:SAVE:REFERENCE <RefWfms>

Includes the reference waveform data in the session file.

Parameters:

| | |
|-----------|-----------|
| <RefWfms> | OFF ON |
| | *RST: OFF |

Usage: Asynchronous command

Manual operation: See "[Reference Waveforms](#)" on page 375

SESSION:SAVE[:EXECUTE] <Filepath>

Saves the current session with selected content to the specified file.

Setting parameters:

| | |
|------------|---|
| <Filepath> | String parameter specifying path and filename of the target file. |
|------------|---|

Usage: Setting only
Asynchronous command

Manual operation: See "[Save to file](#)" on page 376

SESSION:USERpref <UserSettings>

If ON, the user-specific display settings for the toolbar, waveform colors and diagram presentation are included in the session file. The setting affects the saving and the recall actions.

Parameters:

| | |
|----------------|-----------|
| <UserSettings> | OFF ON |
| | *RST: OFF |

Usage: Asynchronous command

Manual operation: See "[Toolbar, color and diagram settings](#)" on page 375

17.11.7 Results

| | |
|---------------------------------------|-----|
| EXPORT:RESULT:NAME..... | 858 |
| EXPORT:RESULT:SAVE..... | 859 |
| EXPORT:RESULT:SELect:CURSor..... | 859 |
| EXPORT:RESULT:SELect:MEASurement..... | 859 |

EXPORT:RESULT:NAME <FilePath>

Sets the path, the filename and the file format of the export file.

Parameters:

| | |
|------------|---|
| <FilePath> | String with path and file name with extension .csv. |
|------------|---|

Usage: Asynchronous command

EXPort:RESUlt:SAVE

Saves the results to file. The target file is set using [EXPort:RESUlt:NAME](#). To select the results to be exported, use [EXPort:RESUlt:SElect:CURSor](#) and [EXPort:RESUlt:SElect:MEASurement](#).

Usage: Event
Asynchronous command

EXPort:RESUlt:SElect:CURSor <CursorResult>

Includes the current cursor results in the export file.

Parameters:
<CursorResult> OFF | ON
*RST: OFF

Usage: Asynchronous command

EXPort:RESUlt:SElect:MEASurement <MeasResult>

Includes the current automatic measurement results in the export file.

Parameters:
<MeasResult> OFF | ON
*RST: OFF

Usage: Asynchronous command

17.11.8 Screenshots

The HCOPy subsystem and some other commands control the output of display information for documentation purposes. The instrument allows two independent output configurations which can be set separately with the suffix.

Note that the remote mode is intended for maximum performance. Therefore, the display does not follow the remote commands constantly. To get a correct screenshot, turn the display on using [SYSTem:DISPlay:UPDate](#).

| | |
|-------------------------------|-----|
| HCOPy:DESTination<m>..... | 860 |
| MMEMory:NAME..... | 860 |
| HCOPy:DEvice<m>:LANGue..... | 860 |
| HCOPy:DEvice<m>:INVerse..... | 860 |
| HCOPy:IMMEDIATE<m>:NEXT..... | 861 |
| HCOPy:IMMEDIATE<m>[:DUM]..... | 861 |
| HCOPy:ISBA..... | 861 |
| HCOPy:SSD..... | 862 |
| HCOPy:WBKG..... | 862 |
| HCOPy:DATA?..... | 862 |

HCOPy:DESTination<m> <medium>

Selects the output medium: file or clipboard.

Suffix:

<m> 1..2
Selects the output configuration.

Parameters:

<medium> MMEM | CLIPBOARD
MMEM: saves image to a file.
CLIPBOARD: directs the image to the clipboard.

*RST: MMEM

Usage: Asynchronous command

Manual operation: See "[<Folder>](#)" on page 380

MMEMory:NAME <FileName>

Defines the filename for a screenshot that is stored to a file.

Parameters:

<FileName> String parameter specifying path and filename of the screenshot.

Example: See [Section 17.4.3, "Saving screenshots to file", on page 694](#).

Usage: SCPI confirmed
Asynchronous command

HCOPy:DEVice<m>:LANGuage <FileFormat>

Defines the file format for output of the screenshot to file.

To set the output to file, use [HCOPy:DESTination<m>](#) with parameter MMEM.

Suffix:

<m> 1..2
Selects the output configuration.

Parameters:

<FileFormat> PNG | JPG
*RST: PNG

Usage: Asynchronous command

HCOPy:DEVice<m>:INVerse <InverseColor>

Inverts the colors of the output, i.e. a dark waveform is shown on a white background.

See also [HCOPy:WBKG](#) and [White background](#).

Suffix:

<m> 1..2
Selects the output configuration.

Parameters:

<InverseColor> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Inverse color](#)" on page 380

HCOPy:IMMEDIATE<m>:NEXT

Starts the output of the next display image, depending on the [HCOPy: DESTINATION<m>](#) destination setting.

If the screenshot is saved to a file, the file name used in the last saving process is automatically counted up to the next unused name. To define the file name, use [MMEMORY:NAME](#).

Suffix:

<m> 1..2
Selects the output configuration.

Example: See [Section 17.4.3, "Saving screenshots to file"](#), on page 694.

Usage: Asynchronous command

HCOPy:IMMEDIATE<m>[:DUM]

Starts the immediate output of the display image, depending on the [HCOPy: DESTINATION<m>](#) destination setting.

To define the file name, use [MMEMORY:NAME](#). Existing files are overwritten by the HCOP : IMM command.

To get a correct screenshot of the diagrams, results, and dialog boxes, turn on the display using [SYSTEm:DISPLAY:UPDATE](#).

Suffix:

<m> 1..2
Selects the output configuration.

Example: See [Section 17.4.3, "Saving screenshots to file"](#), on page 694.

Usage: Event
Asynchronous command

HCOPy:ISBA <IncludeSignInBarScpi>

If enabled, the screenshot shows the signal bar below the diagram area.

Parameters:

<IncludeSignBarScpi>OFF | ON

*RST: ON

Usage:

Asynchronous command

Manual operation: See "[Include signal bar](#)" on page 380

HCOPy:SSD <ShowSetupDialog>

If enabled, the currently open dialog box is included in the screenshot.

Parameters:

<ShowSetupDialog> OFF | ON

*RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Show setup dialog](#)" on page 380

HCOPy:WBKG <WhiteBackground>

Inverts the background color, so you can picture waveforms with normal waveform colors on white background.

If both `HCOPy:WBKG` and `HCOPY:DEvice<m>:INVerse` are ON, the instrument inverts the background twice, and it appears black.

Parameters:

<WhiteBackground> OFF | ON

*RST: OFF

Usage:

Asynchronous command

Manual operation: See "[White background](#)" on page 380

HCOPy:DATA?

Creates a PNG screenshot and returns the data of the image file in a binary data stream. When receiving the data, write them into a PNG file which you can open later.

Usage:

Query only

Asynchronous command

17.12 Automatic measurements

This section contains all remote commands to set up automatic measurements and to analyze the measurement results.

Measurement suffix <mg>

The suffix <mg> indicates the number of the measurement for which the command takes effect.

17.12.1 General settings

| | |
|---------------------------|-----|
| MEASurement<mg>:COUNT? | 863 |
| MEASurement<mg>[:ENABLE] | 863 |
| MEASurement<mg>:SOURce | 863 |
| MEASurement<mg>:FSRC | 864 |
| MEASurement<mg>:SSRC | 864 |
| MEASurement<mg>:MAIN | 864 |
| MEASurement<mg>:ENVSelect | 865 |

MEASurement<mg>:COUNt?

Returns the maximum number of measurements, which is the maximum value for the <mg> suffix.

Suffix:

<mg> Irrelevant, omit the suffix.

Return values:

<Count> Maximum number of measurements

Usage:

Query only
Asynchronous command

MEASurement<mg>[:ENABLE] <First>

Switches the indicated measurement on or off.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<First> OFF | ON

Usage:

Asynchronous command

MEASurement<mg>:SOURce <SignalSource>,[<SignalSource2>]

Sets the source of the measurement.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<SignalSource> NONE | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D0 | D1 | D2 | D3 |
D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 |
M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8

<SignalSource2> NONE | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D0 | D1 | D2 | D3 |
 D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 |
 M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8

Usage: Asynchronous command

Manual operation: See "[Source](#)" on page 254

MEASurement<mg>:FSRC <Source>

Defines the first measurement source.

The command is an alternative to [MEASurement<mg>: SOURCE](#).

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<Source> NONE | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D0 | D1 | D2 | D3 |
 D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 |
 M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8

Usage: Asynchronous command

MEASurement<mg>:SSRC <Source2>

Defines the second measurement source.

The command is an alternative to [MEASurement<mg>: SOURCE](#).

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<Source2> NONE | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D0 | D1 | D2 | D3 |
 D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 |
 M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8

Usage: Asynchronous command

Manual operation: See "[Clock source](#)" on page 268

MEASurement<mg>:MAIN <MeasType>

Defines the measurement type to be performed. To query the result, use

[MEASurement<mg>: RESult\[:ACTual\]?](#) on page 871.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<MeasType>

HIGH | LOW | AMPLitude | MAXimum | MINimum | PDELta |
 MEAN | RMS | STDDev | CREST | POvershoot | NOVershoot |
 AREA | RTIMe | FTIMe | PPULse | NPULse | PERiod |
 FREquency | PDCYcle | NDCYcle | CYCarea | CYCMean |
 CYCRms | CYCStddev | CYCCrest | CAMplitude | CMAXimum |
 CMINimum | CPDelta | PULCnt | DELay | PHASe | BWIDth |
 EDGecount | SETup | HOLD | SHT | SHR | DTOTrigger |
 SLERising | SLEFalling

**F2F | T2F | F2T | FLDValue | MBITrate | SBITrate | BIDLe |
 GAP | FCNT | FEC | FER | CFER**

Measurements for the serial protocols

Usage:

Asynchronous command

Manual operation: See "[Specific type](#)" on page 272

MEASurement<mg>:ENVSelect <EnvelopeCurve>

Relevant only for measurements on envelope waveforms. It selects the envelope to be used for measurement.

Prerequisites:

- [ACQuire:TYPE](#) on page 772 is set to ENVELOpe.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<EnvelopeCurve> MIN | MAX | BOTH

MIN

Measures on the lower envelope.

MAX

Measures on the upper envelope.

BOTH

The envelope is ignored, and the waveform is measured as usual.

*RST: BOTH

Usage: Asynchronous command

Manual operation: See "[Envelope](#)" on page 266

17.12.2 Settings for amplitude/time measurements

| | |
|---|-----|
| MEASurement<mg>:AMPTime:CSlope..... | 866 |
| MEASurement<mg>:AMPTime:ESlope..... | 866 |
| MEASurement<mg>:AMPTime:PTCount..... | 866 |
| MEASurement<mg>:AMPTime:PSlope..... | 867 |
| MEASurement<mg>:AMPTime:DElay<n>:DIRection..... | 867 |

| | |
|--|-----|
| MEASurement<mg>:AMPTime:DTOTrigger<n>:SLOPe..... | 867 |
| MEASurement<mg>:AMPTime:DElay<n>:SLOPe..... | 868 |
| MEASurement<mg>:GATE..... | 868 |
| MEASurement<mg>:REFLevel<sc>:REFERENCE..... | 868 |

MEASurement<mg>:AMPTime:CSlope <SetHoldClkSlp>

Sets the edge of the clock from which the setup and hold times are measured.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<SetHoldClkSlp> POSitive | NEGative | EITHer
*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Clock slope](#)" on page 268

MEASurement<mg>:AMPTime:ESlope <EdgesSlope>

Sets the edge direction to be counted: rising edges, falling edges, or both. The setting is only relevant for edge count measurement [MEASurement<mg>:MAIN](#) is set to EDGecount.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<EdgesSlope> POSitive | NEGative | EITHer
*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Edges slope](#)" on page 267

MEASurement<mg>:AMPTime:PTCount <PulseCount>

Sets the number of positive pulses for the pulse train measurement. It measures the duration of N positive pulses from the rising edge of the first pulse to the falling edge of the N-th pulse.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<PulseCount> Range: 1 to 2147483647
Increment: 1
*RST: 1

Usage: Asynchronous command

Manual operation: See "[Pulse count](#)" on page 266

MEASurement<mg>:AMPTime:PSlope <PulsesSlope>

Sets the first slope of the pulses to be counted. The setting is only relevant for pulse count measurement (**MEASurement<mg>:MAIN** is set to PULCnt).

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<PulsesSlope> POSitive | NEGative | EITHer

*RST: POSitive

Usage: Asynchronous command**Manual operation:** See "[Pulse slope](#)" on page 267

MEASurement<mg>:AMPTime:DELy<n>:DIRection <EdgeCountDir>

Selects the direction for counting slopes for each source: from the beginning of the waveform, or from the end.

Suffix:

<mg> 1 to 24, index of the measurement

<n> 1..2

Selects the source number.

Parameters:

<EdgeCountDir> FRFI | FRLA

FRFI - FRom FIrst, counting starts with the first edge of the waveform.

FRLA - FRom LAst, counting starts with the last edge of the waveform.

*RST: FRFI

Usage: Asynchronous command**Manual operation:** See "[Direction](#)" on page 269

MEASurement<mg>:AMPTime:DTONTrigger<n>:SLOPe <DlyTrigSlp>

Sets the edge direction to be used for delay measurement.

Suffix:

<mg> 1 to 24, index of the measurement

<n> 1..2

Selects the source number.

Parameters:

<DlyTrigSlp> POSitive | NEGative | EITHer

*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Delay to trigger measurement settings](#)" on page 269

MEASurement<mg>:AMPTime:DELay<n>:SLOPe <Slope>

Sets the edge of each source, between which the delay is measured.

Suffix:

<mg> 1 to 24, index of the measurement

<n> 1..2

Selects the source number.

Parameters:

<Slope> POSitive | NEGative | EITHer

*RST: POSitive

Usage: Asynchronous command

Manual operation: See "[Edges slope](#)" on page 267

MEASurement<mg>:GATE <Gate>

Sets the gate of the indicated measurement. Enable a gate before you assign a measurement to it ([GATE<g>:ENABLE =ON](#)).

The query returns 0, if no gate is assigned.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<Gate> Number of the gate to be used

Usage: Asynchronous command

Manual operation: See "[Measurements gated by G<x>](#)" on page 257

MEASurement<mg>:REFLevel<sc>:REFERENCE <RefLevelSet>

Selects the set of reference levels that is used for the measurement and for the indicated source. Each source of the measurement can have its own reference level set.

Suffix:

<mg> 1 to 24, index of the measurement

<sc> 1...3

Source waveform, to which the reference level set is applied.

Parameters:

<RefLevelSet> Number of the reference level set. Define the reference level set before you use it.

Example:

```
MEASurement1:MAIN DELay
MEASurement1:SOURce C1,C2
MEASurement1:REFLevel1:REFerence 1
MEASurement1:REFLevel2:REFerence 2
```

Measurement 1 is a delay measurement on channel 1 and channel 2. C1 is the first source and uses reference level set 1 (RL1). C2 is the second source and uses reference level set 2 (RL2).

Usage:

Asynchronous command

Manual operation: See "[Reference levels](#)" on page 266

17.12.3 Settings for protocol measurements

| | |
|--|-----|
| MEASurement<mg>:PROTocol:FNAME..... | 869 |
| MEASurement<mg>:PROTocol:FDName..... | 869 |
| MEASurement<mg>:PROTocol:FDValue..... | 870 |
| MEASurement<mg>:PROTocol:F2Name..... | 870 |
| MEASurement<mg>:PROTocol:FD2Name..... | 870 |
| MEASurement<mg>:PROTocol:FD2Value..... | 870 |

MEASurement<mg>:PROTocol:FNAME <FrameName>

Sets or queries the name of the frame or the frame type, at which the oscilloscope executes or starts the measurement.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<FrameName>

Usage: Asynchronous command

Manual operation: See "[Frame Type](#)" on page 273

MEASurement<mg>:PROTocol:FDName <FieldName>

Sets or queries the name of the field or the field type, at which the oscilloscope executes or starts the measurement.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<FieldName>

Usage: Asynchronous command

Manual operation: See "[Field Type](#)" on page 273

MEASurement<mg>:PROTocol:FDValue <FieldValue>

Sets or queries the one or more values of the field, at which the oscilloscope executes or starts the measurement.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<FieldValue> List of comma separated values

Usage: Asynchronous command

Manual operation: See "[Field Value](#)" on page 273

MEASurement<mg>:PROTocol:F2Name <Frame2Name>

Sets or queries the name of the frame or the frame type, at which the oscilloscope ends the measurement in a "From" - "To" condition.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<Frame2Name>

Usage: Asynchronous command

Manual operation: See "[Frame Type](#)" on page 273

MEASurement<mg>:PROTocol:FD2Name <Field2Name>

Sets or queries the name of the field or the field type, at which the oscilloscope ends the measurement in a "From" - "To" condition.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<Field2Name>

Usage: Asynchronous command

Manual operation: See "[Field Type](#)" on page 274

MEASurement<mg>:PROTocol:FD2Value <Field2Value>

Sets or queries the one or more values of the field, at which the oscilloscope ends the measurement in a "From" - "To" condition.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<Field2Value> List of comma separated values

Usage: Asynchronous command

Manual operation: See "Field Value" on page 274

17.12.4 Results

| | |
|--------------------------------------|-----|
| MEASurement<mg>:RESUlt[:ACTual]? | 871 |
| MEASurement<mg>:RESUlt:AVG? | 871 |
| MEASurement<mg>:RESUlt:NPEak? | 871 |
| MEASurement<mg>:RESUlt:PPEak? | 871 |
| MEASurement<mg>:RESUlt:RMS? | 871 |
| MEASurement<mg>:RESUlt:WFMCount? | 871 |
| MEASurement<mg>:RESUlt:EVTCount? | 871 |
| MEASurement<mg>:RESUlt:STDDev? | 871 |
| MEASurement<mg>:RESUlt:RELiability? | 872 |
| MEASurement<mg>:RESUlt:START? | 872 |
| MEASurement<mg>:RESUlt:STOP? | 872 |
| MEASurement<mg>:RESUlt:EVENTs:COUNT? | 872 |
| MEASurement<mg>:RESUlt:EVENTs:START? | 872 |
| MEASurement<mg>:RESUlt:EVENTs:STOP? | 873 |
| MEASurement<mg>:RESUlt:EVENTs:VALue? | 873 |

MEASurement<mg>:RESUlt[:ACTual]?

MEASurement<mg>:RESUlt:AVG?
MEASurement<mg>:RESUlt:NPEak?
MEASurement<mg>:RESUlt:PPEak?
MEASurement<mg>:RESUlt:RMS?
MEASurement<mg>:RESUlt:WFMCount?
MEASurement<mg>:RESUlt:EVTCount?
MEASurement<mg>:RESUlt:STDDev?

Return the statistic results of the specified measurement. The measurement type is defined with [MEASurement<mg>:MAIN](#).

- [:ACTual]: current measurement result
- AVG: average of the measurement results
- EVTCount: number of measurement results in the measurement
- NPEak: negative peak value of the measurement results
- PPEak: positive peak value of the measurement results
- RMS: RMS value of the measurement results
- STDDev: standard deviation of the measurement results

Suffix:

<mg> 1 to 24, index of the measurement

Return values:

<Result> Numeric result value

Usage:

Query only
Asynchronous command

MEASurement<mg>:RESUlt:RELiability? [<MeasType>]

Returns the reliability of the measurement result of the specified measurement.

If no parameter is given, the command returns the reliability of the measurement defined with [MEASurement<mg>:MAIN](#).

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

<MeasType> See [MEASurement<mg>:MAIN](#).

Usage:

Query only

Asynchronous command

MEASurement<mg>:RESUlt:STARt?**MEASurement<mg>:RESUlt:STOP?**

Return the start and stop times of the specified measurement. The parameter defines the measurement. If no parameter is specified, the result of the main measurement is returned. The main measurement is defined using [MEASurement<mg>:MAIN](#).

Suffix:

<mg> 1 to 24, index of the measurement

Return values:

<Stop> Range: -1E+26 to 1E+26
Increment: 0
*RST: 0

Usage:

Query only

Asynchronous command

MEASurement<mg>:RESUlt:EVENTs:COUNt?

Returns the number of measured events in one acquisition.

The command is relevant for measurements of all events, see [MEASurement<mg>:MULTiple](#).

Suffix:

<mg> 1 to 24, index of the measurement

Return values:

<Count> Number of events

Usage:

Query only

Asynchronous command

MEASurement<mg>:RESUlt:EVENTs:STARt? <EventIndex>

Returns the start time of the indicated measured event.

The command is relevant for measurements of all events, see [MEASurement<mg>: MULTiple](#).

Suffix:

<mg> 1 to 24, index of the measurement

Setting parameters:

<EventIndex> Index number of the measured event.

Return values:

<EventStart> Range: -1E+26 to 1E+26
Increment: 0
*RST: 0

Usage:

Query only
Asynchronous command

MEASurement<mg>:RESUlt:EVENTs:STOP? <EventIndex>

Returns the end time of the indicated measured event.

The command is relevant for measurements of all events, see [MEASurement<mg>: MULTiple](#).

Suffix:

<mg> 1 to 24, index of the measurement

Setting parameters:

<EventIndex> Index number of the measured event.

Return values:

<EventStop> Range: -1E+26 to 1E+26
Increment: 0
*RST: 0

Usage:

Query only
Asynchronous command

MEASurement<mg>:RESUlt:EVENTs:VALue? <MeasResEvtIdx>

Returns the measured value of the indicated measured event.

The command is relevant for measurements of all events, see [MEASurement<mg>: MULTiple](#).

Suffix:

<mg> 1 to 24, index of the measurement

Setting parameters:

<EventIndex> Index number of the measured event.

Return values:

<EventValue> Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0

Usage: Query only
Asynchronous command

17.12.5 Statistics

| | |
|--|-----|
| MEASurement<mg>:STATistics:ARESet..... | 874 |
| MEASurement<mg>:STATistics[:ENABLE]..... | 874 |
| MEASurement<mg>:MULTiple..... | 874 |
| MEASurement<mg>:MNOMeas..... | 875 |

MEASurement<mg>:STATistics:ARESet

Resets the statistics for all measurements.

Suffix:

<mg> Irrelevant, omit the suffix.

Usage:

Setting only
Asynchronous command

Manual operation: See "[Clear results](#)" on page 275

MEASurement<mg>:STATistics[:ENABLE] <GlobalEnable>

Enables statistics calculation for all measurements.

Suffix:

<mg> Irrelevant, omit the suffix.

Parameters:

| | |
|----------------|----------|
| <GlobalEnable> | OFF ON |
| *RST: | OFF |

Usage: Asynchronous command

Manual operation: See "[Statistics](#)" on page 274

MEASurement<mg>:MULTiple <GlobalMeassAll>

If ON, the measurement is performed repeatedly if the measured parameter occurs several times inside the acquisition or defined gate. All results are included in evaluation, e.g. in statistics. To set the number of results to be considered, use [MEASurement<mg> : MNOMeas](#).

Suffix:

<mg> Irrelevant, omit the suffix.

Parameters:

| | |
|------------------|----------|
| <GlobalMeassAll> | OFF ON |
| *RST: | OFF |

Usage: Asynchronous command

Manual operation: See "Measure all events" on page 275

MEASurement<mg>:MNOMeas <MaxMeasPerAcq>

Sets the maximum number of measurements per acquisition if [MEASurement<mg>:MULTiple](#) is on. The setting affects all measurements.

Suffix:

<mg> Irrelevant, omit the suffix.

Parameters:

| | |
|-----------------|-----------------|
| <MaxMeasPerAcq> | Range: 2 to 1E6 |
| | Increment: 1 |
| | *RST: 1E6 |

Usage: Asynchronous command

Manual operation: See "Max. No. of events" on page 275

17.12.6 Gate

| | |
|-----------------------------|-----|
| GATE<g>:ENABLE..... | 875 |
| GATE<g>:GCOupling..... | 875 |
| GATE<g>:CURSor..... | 876 |
| GATE<g>:ZDlagram..... | 876 |
| GATE<g>:MODE..... | 877 |
| GATE<g>:ABSolute:STARt..... | 877 |
| GATE<g>:ABSolute:STOP..... | 877 |
| GATE<g>:RELative:STARt..... | 877 |
| GATE<g>:RELative:STOP..... | 877 |
| GATE<g>:SHOW..... | 878 |

GATE<g>:ENABLE <First>

Enables the gate.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<First> OFF | ON

Usage: Asynchronous command

Manual operation: See " Add" on page 256

GATE<g>:GCOupling <CouplingMode>

The gate coupling mode selects how the gate area is defined.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<CouplingMode> MANual | CURSor | ZOOM | SPECtrum

MANual

Manually define the gate with a user-defined start and stop values.

CURSor

Cursor coupling is available if a cursor is defined. The gate area is defined by the cursor lines of an active cursor measurement.

ZOOM

Zoom coupling is available if a zoom is defined. The gate area is defined identically to the zoom area - if you change the zoom, the gate changes as well.

SPECtrum

Spectrum coupling is available if a spectrum is enabled.

*RST: MANual

Usage: Asynchronous command

Manual operation: See "[Coupling mode](#)" on page 256

GATE<g>:CURSor <Cursor>

Available for [GATE<g>:GCOupling](#) = CURSor.

Selects the cursor set to be used for measurement gating. The gate area is defined by the cursor lines.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<Cursor> CURSOR1 | CURSor1 | CURSOR2 | CURSor2 | CURSOR3 | CURSor3 | CURSOR4 | CURSor4

Usage: Asynchronous command

Manual operation: See "[Coupling mode](#)" on page 256

GATE<g>:ZDiagram <SignalSource>,[<SignalSource2>]

Available for [GATE<g>:GCOupling](#) = ZOOM.

The gate area is defined identically to the zoom area for the selected zoom diagram.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<SignalSource>
<SignalSource2>

Usage: Asynchronous command

Manual operation: See "[Coupling mode](#)" on page 256

GATE<g>:MODE <Mode>

Selects if the gate settings are configured using absolute or relative values.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<Mode> ABS | REL

*RST: ABS

Usage: Asynchronous command

Manual operation: See "[Mode, Start, Stop](#)" on page 257

GATE<g>:ABSolute:STARt <Start>**GATE<g>:ABSolute:STOP <Stop>**

Define the absolute start and end values for the gate, respectively.

Available, if `GATE<g>:GCOupling` = MANUAL and `GATE<g>:MODE` = ABS.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<Stop> Range: -1E+26 to 1E+26

Increment: 0.01

*RST: 0.01

Default unit: Depends on the underlying waveform

Usage: Asynchronous command

Manual operation: See "[Mode, Start, Stop](#)" on page 257

GATE<g>:RELative:STARt <RelativeStart>**GATE<g>:RELative:STOP <RelativeStop>**

Define the relative start and end values for the gate, respectively.

Available, if `GATE<g>:GCOupling` = MANUAL and `GATE<g>:MODE` = REL.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<RelativeStop> Range: 0 to 100

Increment: 0.1

*RST: 100

Default unit: %

Usage: Asynchronous command

Manual operation: See "[Mode, Start, Stop](#)" on page 257

GATE<g>:SHOW <DisplayState>

If enabled, the gate area is indicated in the source diagram.

Suffix:

<g> 1 to 8, index of the gate

Parameters:

<DisplayState> OFF | ON

*RST: ON

Usage: Asynchronous command

17.12.7 Reference levels

| | |
|--|-----|
| REFLevel<rl>:ENABLE | 878 |
| REFLevel<rl>:LMODe | 878 |
| REFLevel<rl>:ABSolute:HYSTeresis | 879 |
| REFLevel<rl>:ABSolute:LLEVel | 879 |
| REFLevel<rl>:ABSolute:MLEVel | 879 |
| REFLevel<rl>:ABSolute:ULEVel | 880 |
| REFLevel<rl>:RELative:HYSTeresis | 880 |
| REFLevel<rl>:RELative:LOWER | 880 |
| REFLevel<rl>:RELative:MIDDLE | 881 |
| REFLevel<rl>:RELative:MODE | 881 |
| REFLevel<rl>:RELative:UPPER | 882 |

REFLevel<rl>:ENABLE <First>

Enables the specified reference level.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<First> OFF | ON

Usage: Asynchronous command

Manual operation: See "[RLx](#)" on page 259

REFLevel<rl>:LMODe <LevelMode>

Defines if the reference level is set in absolute or relative values.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<LevelMode> ABS | REL
*RST: REL

Usage: Asynchronous command

Manual operation: See "[Level mode](#)" on page 260

REFLevel<rl>:ABSolute:HYSTeresis <HystAbs>

Defines a hysteresis for the middle reference level. A rise or fall from the middle reference value that does not exceed the hysteresis is rejected as noise.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<HystAbs> Range: 0 to 1E+26
Increment: 0.001
*RST: 0.005
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Hysteresis](#)" on page 260

REFLevel<rl>:ABSolute:LLEVel <LowerLevel>

Sets the lower reference level in absolute values. This is required, e.g., to determine a fall.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<LowerLevel> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 260

REFLevel<rl>:ABSolute:MLEVel <MiddleLevel>

Sets the middle reference level in absolute values.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<MiddleLevel> Range: -1E+26 to 1E+26
 Increment: 0.001
 *RST: 0
 Default unit: V

Usage:

Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 260

REFLevel<r1>:ABSolute:ULEVel <UpperLevel>

Sets the upper reference level in absolute values. This is required to determine a rise.

Suffix:

<r1> 1 to 8, index of the reference level set

Parameters:

<UpperLevel> Range: -1E+26 to 1E+26
 Increment: 0.001
 *RST: 0
 Default unit: V

Usage:

Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 260

REFLevel<r1>:RELative:HYSTeresis <HystRel>

Defines a hysteresis for the middle reference level. A rise or fall from the middle reference value that does not exceed the hysteresis is rejected as noise.

Suffix:

<r1> 1 to 8, index of the reference level set

Parameters:

<HystRel> Range: 0 to 50
 Increment: 1
 *RST: 10
 Default unit: %

Usage:

Asynchronous command

Manual operation: See "[Hysteresis](#)" on page 260

REFLevel<r1>:RELative:LOWer <LowRefLevRel>

Sets the lower relative reference level if [REFLevel<r1>:RELATIVE:MODE](#) is set to USER.

Suffix:

<r1> 1 to 8, index of the reference level set

Parameters:

<LowRefLevRel> Range: -100 to 200
 Increment: 1
 *RST: 10
 Default unit: %

Usage:

Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 260

REFLevel<rl>:RELative:MIDDLE <MidRefLevRel>

Sets the middle relative reference level if [REFLevel<rl>:RELative:MODE](#) is set to USER.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<MidRefLevRel> Range: -100 to 200
 Increment: 1
 *RST: 50
 Default unit: %

Usage:

Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 260

REFLevel<rl>:RELative:MODE <RelativeLevels>

The lower, middle and upper reference levels, defined as percentages of the high signal level.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

<RelativeLevels> FIVE | TEN | TWENTy | USER
FIVE
 5/50/95
TEN
 10/50/90
TWENTy
 20/50/80
USER
 Set the reference levels to individual values with
[REFLevel<rl>:RELative:LOWER](#), [REFLevel<rl>:RELATIVE:MIDDLE](#), and [REFLevel<rl>:RELATIVE:UPPER](#).
 *RST: TEN

Usage:

Asynchronous command

Manual operation: See "Relative levels" on page 260

REFLevel<rl>:RELative:UPPer <UppRefLevRel>

Sets the upper relative reference level if [REFLevel<rl>:RELATIVE:MODE](#) is set to USER.

Suffix:

<rl> 1 to 8, index of the reference level set

Parameters:

| | |
|----------------|--------------------|
| <UppRefLevRel> | Range: -100 to 200 |
| | Increment: 1 |
| | *RST: 90 |
| | Default unit: % |

Usage: Asynchronous command

Manual operation: See "Upper level, Middle level, Lower level" on page 260

17.12.8 Tracks

| | |
|---|-----|
| MEASurement<mg>:TRACk[:STATe]..... | 882 |
| MEASurement<mg>:TRACk:AUTO..... | 882 |
| MEASurement<mg>:TRACk:CONTinuous..... | 883 |
| MEASurement<mg>:TRACk:OFFSET..... | 883 |
| MEASurement<mg>:TRACk:SCALE..... | 883 |
| MEASurement<mg>:TRACk:DATA:HEADER?..... | 884 |
| MEASurement<mg>:TRACk:DATA[:VALues]?..... | 884 |

MEASurement<mg>:TRACk[:STATe] <State>

Enables or disables the track for the selected measurement.

Suffix:

<mg> 1 to 24, index of the measurement

Parameters:

| | |
|---------|-----------|
| <State> | OFF ON |
| | *RST: OFF |

Usage: Asynchronous command

Manual operation: See "State" on page 277

MEASurement<mg>:TRACk:AUTO

Sets the vertical scale and the offset of the track, so that the complete height of the diagram is used.

Suffix:

<mg> 1 to 24, index of the measurement

Usage: Event
Asynchronous command

Manual operation: See "[Fit to screen](#)" on page 277

MEASurement<mg>:TRACk:CONTinuous <AutoScale>

Performs an automatic scaling whenever the track does not fit in the diagram during the measurement period.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<AutoScale> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Auto Scale](#)" on page 277

MEASurement<mg>:TRACk:OFFSet <VerticalOffset>

Sets or queries the offset of the track waveform.

If [MEASurement<mg>:TRACk:CONTinuous](#) is ON, use the command to query the current value.

If [MEASurement<mg>:TRACk:CONTinuous](#) is OFF, the command sets the offset.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<VerticalOffset> Range: -1E+26 to 1E+26
Increment: 1E-06
*RST: 0
Default unit: div

Usage: Asynchronous command

Manual operation: See "[Meas offset](#)" on page 278

MEASurement<mg>:TRACk:SCALe <VerticalScale>

Sets or queries the vertical scale of the track diagram.

If [MEASurement<mg>:TRACk:CONTinuous](#) is ON, use the command to query the current value.

If [MEASurement<mg>:TRACk:CONTinuous](#) is OFF, the command sets the scale.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:

<VerticalScale> Range: 1E-26 to 1E+26
 Increment: 1E-05
 *RST: 0.5
 Default unit: V/div

Usage:

Asynchronous command

Manual operation: See "Meas scale" on page 277**MEASurement<mg>:TRACk:DATA:HEADer?**

Returns the header of track data, the attributes of the waveform.

Suffix:

<mg> 1 to 24, index of the measurement

Return values:

<XStart> 1. header value: start time XStart, acquisition time before trigger, in s
 <XStop> 2. header value: end time XStop, acquisition time after trigger, in s
 <RecordLength> 3. header value: number of measured events = number of points in the track waveform
 <ValuesPerSample> 4. header value: number of values per sample interval. For tracks, the result is always 1.

Example:

MEAS1:TRAC:DATA:HEAD?

-5E-008,5E-008,1000,1

Start time of the data is -5E-008 = - 50 ns, and stop time of the data is 5E-008 = 50 ns. There are 1000 points in the track waveform.

Usage:

Query only

Asynchronous command

MEASurement<mg>:TRACk:DATA[:VALues]? [<Offset>[,<Length>]]

Returns the data of the indicated track waveform for transmission from the instrument to the controlling computer. The data can be used in MATLAB, for example.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

Suffix:

<mg> 1 to 24, index of the measurement

Query parameters:

<Offset> Number of offset track points, which are ignored in the data transfer.

| | |
|-----------------------|--|
| [<Length>] | Number of track points to be retrieved. |
| Return values: | |
| <Data> | List of values according to the format and content settings. |
| Usage: | Query only
Asynchronous command |

17.13 Cursor measurements

Some of the commands in the following section are asynchronous. An overlapping or asynchronous command does not automatically finish executing before the next command starts executing. If overlapping commands must be executed in a defined order, e.g. to avoid wrong measurement results, they must be serviced sequentially.

To prevent an overlapping execution of commands, one of the commands *OPC, *OPC? or *WAI can be used after the command or a command set.

For more information, see:

- [www.rohde-schwarz.com/rc-via-scp1](#), section "Command sequence and synchronization"
- [Cursor setup](#).....885
- [Cursor results](#).....893
- [Peak search using cursors](#).....894
- [Cursor appearance](#).....896

17.13.1 Cursor setup

| | |
|--|-----|
| CURSor<cu>:AOFF | 886 |
| CURSor<cu>:COUNT? | 886 |
| CURSor<cu>:STATe | 886 |
| CURSor<cu>:FUNCTION | 886 |
| CURSor<cu>:SOURce | 887 |
| CURSor<cu>:USSource | 887 |
| CURSor<cu>:SSOource | 887 |
| CURSor<cu>:X1Position | 888 |
| CURSor<cu>:X2Position | 888 |
| CURSor<cu>:Y1Position | 889 |
| CURSor<cu>:Y2Position | 889 |
| CURSor<cu>:SSCREen | 889 |
| CURSor<cu>:TRACKing[:STATe] | 889 |
| CURSor<cu>:LABel | 890 |
| CURSor<cu>:HORizontal<n>:LABel | 890 |
| CURSor<cu>:VERTical<n>:LABel | 890 |
| CURSor<cu>:DISPLAY:VALues | 891 |
| CURSor<cu>:SIAD | 891 |
| CURSor<cu>:XCOupling | 891 |
| CURSor<cu>:YCOupling | 892 |

| | |
|----------------------------|-----|
| CURSOr<cu>:X1ENvelope..... | 892 |
| CURSOr<cu>:X2ENvelope..... | 892 |

CURSOr<cu>:AOFF

Switches all cursors off.

Suffix:

<cu> Irrelevant, omit the suffix.

Usage:

Setting only
Asynchronous command

CURSOr<cu>:COUNT?

Returns the maximum number of cursor sets, which is the maximum value for the cursor suffix.

Suffix:

<cu> Irrelevant, omit the suffix.

Return values:

<Count> Number of cursor sets

Usage:

Query only
Asynchronous command

CURSOr<cu>:STATe <State>

Enables the selected cursor measurement.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<State> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Show cursor](#)" on page 243

CURSOr<cu>:FUNCTION <Type>

Defines the cursor type to be used for the measurement.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Type> VERTical | HORizontal | PAIRed

HORizontal

A pair of horizontal cursor lines.

VERTical

A pair of vertical cursor lines.

PAIRed

Both vertical and horizontal cursor line pairs.

*RST: PAIRed

Usage: Asynchronous command

Manual operation: See "[Type](#)" on page 243

CURSor<cu>:SOURce <Source>

Selects the cursor source.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Source> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D0 | D1 | D2 | D3 | D4 | D5
| D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | SBUS1 |
SBUS2 | SBUS3 | SBUS4 | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
M8 | XY1 | XY2 | XY3 | XY4 | SPECMAXH1 | SPECMINH1 |
SPECNORM1 | SPECAYER1 | SPECMAXH2 | SPECMINH2 |
SPECNORM2 | SPECAYER2 | SPECMAXH3 | SPECMINH3 |
SPECNORM3 | SPECAYER3 | SPECMAXH4 | SPECMINH4 |
SPECNORM4 | SPECAYER4

Usage: Asynchronous command

Manual operation: See "[Source](#)" on page 244

CURSor<cu>:USSource <UseSource2>

Enables the second cursor source. To select the second source, use [CURSor<cu>:SSource](#).

If enabled, the second cursor lines Cx.2 measure on the second source. Using a second source, you can measure differences between two channels with cursors.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<UseSource2> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Second source, Source 2](#)" on page 243

CURSor<cu>:SSource <Source2>

Selects the second cursor source.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Source2> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D0 | D1 | D2 | D3 | D4 | D5
| D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | SBUS1 |
SBUS2 | SBUS3 | SBUS4 | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
M8 | SPECMAXH1 | SPECMINH1 | SPECNORM1 | SPECA-
VER1 | SPECMAXH2 | SPECMINH2 | SPECNORM2 | SPECA-
VER2 | SPECMAXH3 | SPECMINH3 | SPECNORM3 | SPECA-
VER3 | SPECMAXH4 | SPECMINH4 | SPECNORM4 | SPECA-
VER4

Second source of the cursor measurement.

Usage: Asynchronous command

Manual operation: See "[Second source, Source 2](#)" on page 243

CURSor<cu>:X1Position <X1Position>

Defines the position of the left vertical cursor line.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<X1Position> Range: 0 to 500
Increment: 0.1
*RST: depends on time scale, at 25% of the time axis
Default unit: s

Usage: Asynchronous command

Manual operation: See "[X1 position, X2 position](#)" on page 244

CURSor<cu>:X2Position <X2Position>

Defines the position of the right vertical cursor line.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<X2Position> Range: 0 to 500
Increment: 0.1
*RST: depends on time scale, at 75% of the time axis
Default unit: s

Usage: Asynchronous command

Manual operation: See "[X1 position, X2 position](#)" on page 244

CURSor<cu>:Y1Position <YPosition1>

Defines the position of the lower horizontal cursor line.

If CURSor<cu>:TRACKing[:STATE] is enabled, the y-positions are set automatically. The query returns the measurement result - the lower vertical value of the waveform.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<YPosition1> Range: -50 to 50
Increment: 0.01
*RST: 0

Usage: Asynchronous command

Manual operation: See "Y1 position, Y2 position" on page 244

CURSor<cu>:Y2Position <YPosition2>

Defines the position of the upper horizontal cursor line.

If CURSor<cu>:TRACKing[:STATE] is enabled, the y-positions are set automatically. The query returns the measurement result - the upper vertical value of the waveform.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<YPosition2> Range: -50 to 50
Increment: 0.01
*RST: 0

Usage: Asynchronous command

Manual operation: See "Y1 position, Y2 position" on page 244

CURSor<cu>:SSCREEN

Resets the cursors to their initial positions. Reset is helpful if the cursors have disappeared from the display or need to be moved for a larger distance.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage: Setting only
Asynchronous command

Manual operation: See "Place on display" on page 245

CURSor<cu>:TRACKing[:STATE] <TrackCurve>

If enabled, the horizontal cursor lines follow the waveform.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<TrackCurve> OFF | ON

*RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Track waveform](#)" on page 244

CURSor<cu>:LABel <ShowLabel>

Shows the cursor labels in the diagram.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<ShowLabel> OFF | ON

*RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Show label](#)" on page 246

CURSor<cu>:HORizontal<n>:LABel <Label>

Defines the label to be displayed with the horizontal cursor lines. By default, the cursors are labeled as Cu1.1, Cu1.2, Cu2.1, ...

Suffix:

<cu> 1 to 4, index of the cursor set

<n> 1..2

Number of the cursor line

Parameters:

<Label> String with the cursor label

Example:

CURSor1:HORizontal1:LABel 'Cu1H1'

CURSor1:HORizontal2:LABel "Cu1H2"

Usage:

Asynchronous command

Manual operation: See "[Horizontal cursor 1, Horizontal cursor 2](#)" on page 246

CURSor<cu>:VERTical<n>:LABel <Label>

Defines the label to be displayed with the vertical cursor lines. By default, the cursors are labeled as Cu1.1, Cu1.2, Cu2.1, ...

Suffix:

<cu> 1 to 4, index of the cursor set

<n> 1..2
Number of the cursor line

Parameters:

<Label> String with the cursor label

Example:

```
CURSor2:VERTical1:LABEL 'Cu2V1'  
CURSor2:VERTical2:LABEL "Cu2V2"
```

Usage: Asynchronous command

Manual operation: See "[Vertical cursor 1, Vertical cursor 2](#)" on page 246

CURSor<cu>:DISPlay:VALues <AddValuesLabel>

Shows the measured values in the cursor labels.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<AddValuesLabel> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Show values](#)" on page 246

CURSor<cu>:SIAD <ShwInAllDiags>

Shows the enabled cursor measurements in all active diagrams of the time domain.

In the spectrum domain, the setting is disabled. The cursors are shown only on the source spectrum of the measurement.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<ShwInAllDiags> OFF | ON

*RST: ON

Usage: Asynchronous command

Manual operation: See "[Show in all diagrams](#)" on page 246

CURSor<cu>:XCOupling <Coupling>

Defines the positioning mode of the vertical cursor.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Coupling> OFF | ON

ON

Moving one cursor line moves the other cursor line too. The cursor lines always remain a fixed distance.

OFF

Each cursor line is positioned independently.

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[X, Y](#)" on page 245

CURSor<cu>:YCOupling <Coupling>

Defines the positioning mode of the horizontal cursor. If the horizontal cursor lines track the waveform, the y coupling is irrelevant ([CURSor<cu>:TRACKing\[:STATE\]](#) is ON).

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Coupling> OFF | ON

ON

Moving one cursor line moves the other cursor line too. The cursor lines always remain a fixed distance.

OFF

Each cursor line is positioned independently.

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[X, Y](#)" on page 245

CURSor<cu>:X1ENvelope <EnvelopeSelect>**CURSor<cu>:X2ENvelope <EnvelopeSelect>**

Define which horizontal cursor is positioned to the maximum and which to the minimum envelope values.

Prerequisites:

- [ACQuire:TYPE](#) on page 772 is set to ENVELOpe.
- [CURSor<cu>:TRACKing\[:STATE\]](#) is set to ON.
- [CURSor<cu>:FUNCTION](#) is set to PAIRed.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<EnvelopeSelect> MIN | MAX

MIN

The horizontal cursor is set to the crossing point of the vertical cursor with the minimum waveform envelope.

MAX

The horizontal cursor is set to the crossing point of the vertical cursor with the maximum waveform envelope.

*RST: MAX

Usage: Asynchronous command

Manual operation: See "[Envelope 1, Envelope 2](#)" on page 244

17.13.2 Cursor results

| | |
|----------------------------|-----|
| CURSOr<cu>:XDELta[:VALue]? | 893 |
| CURSOr<cu>:XDELta:INVerse? | 893 |
| CURSOr<cu>:YDELta[:VALue]? | 893 |
| CURSOr<cu>:YDELta:SLOPe | 894 |

CURSOr<cu>:XDELta[:VALue]?

Queries the delta value (distance) of two vertical cursor lines.

Suffix:

<cu> 1 to 4, index of the cursor set

Return values:

<Delta> Range: -1E+26 to 1E+26
 Increment: 0.1
 *RST: 0
 Default unit: s

Usage: Query only
 Asynchronous command

CURSOr<cu>:XDELta:INVerse?

Queries the inverse value of the delta value (distance) of the two vertical cursor lines.

Suffix:

<cu> 1 to 4, index of the cursor set

Return values:

<DeltaInverse> Range: -1E+26 to 1E+26
 Increment: 0.1
 *RST: 0
 Default unit: Hz

Usage: Query only
 Asynchronous command

CURSOr<cu>:YDELta[:VALue]?

Queries the delta value (distance) of the two horizontal cursor lines.

Suffix:

<cu> 1 to 4, index of the cursor set

Return values:

<Delta> Range: -1E+26 to 1E+26
 Increment: 0
 *RST: 0

Usage:

Query only
 Asynchronous command

CURSor<cu>:YDELta:SLOPe <DeltaSlope>

Returns the inverse value of the voltage difference - the reciprocal of the vertical distance of two horizontal cursor lines: $1/\Delta V$.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<DeltaSlope> Range: -1E+26 to 1E+26
 Increment: 0
 *RST: 0

Usage:

Asynchronous command

17.13.3 Peak search using cursors

| | |
|--------------------------------|-----|
| CURSor<cu>:FFT:SETCenter..... | 894 |
| CURSor<cu>:FFT:TOCenter..... | 894 |
| CURSor<cu>:MAXimum[:PEAK]..... | 895 |
| CURSor<cu>:MAXimum:LEFT..... | 895 |
| CURSor<cu>:MAXimum:RIGHT..... | 895 |
| CURSor<cu>:MAXimum:NEXT..... | 895 |
| CURSor<cu>:PEXCursion..... | 896 |
| CURSor<cu>:THRehold..... | 896 |

CURSor<cu>:FFT:SETCenter

Sets the center frequency to the frequency value that is measured at cursor line Cu1.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage:

Setting only
 Asynchronous command

Manual operation: See "Set center frequency to" on page 247

CURSor<cu>:FFT:TOCenter

Sets the vertical cursor line Cu1 to the center frequency.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage:

Setting only
Asynchronous command

Manual operation: See "[Center frequency](#)" on page 247

CURSor<cu>:MAXimum[:PEAK]

Sets both cursors to the absolute peak value.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage:

Event
Asynchronous command

Manual operation: See "[Absolute peak](#)" on page 247

CURSor<cu>:MAXimum:LEFT

Cursor 2 is set to the next peak to the left of the current position.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage:

Event
Asynchronous command

Manual operation: See "[Next peak left](#)" on page 247

CURSor<cu>:MAXimum:RIGHT

Cursor 2 is set to the next peak to the right of the current position.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage:

Event
Asynchronous command

Manual operation: See "[Next peak right](#)" on page 247

CURSor<cu>:MAXimum:NEXT

Cursor 2 is set to the next smaller absolute peak from the current position.

Suffix:

<cu> 1 to 4, index of the cursor set

Usage:

Event
Asynchronous command

Manual operation: See "[Next peak](#)" on page 247

CURSor<cu>:PEXCursion <Value>

Sets the minimum level by which the waveform must rise or fall so that it will be identified as a maximum or a minimum by the search functions.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Value>

Usage: Asynchronous command

Manual operation: See "[Peak excursion](#)" on page 248

CURSor<cu>:THReShold <Value>

Sets an absolute threshold as an additional condition for the peak search. Only peaks that exceed the threshold are detected.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Value>

Usage: Asynchronous command

Manual operation: See "[Threshold](#)" on page 248

17.13.4 Cursor appearance

CURSor<cu>:STYLe <Style>

Defines how the cursor is displayed in the diagram.

Suffix:

<cu> 1 to 4, index of the cursor set

Parameters:

<Style> LINes | LRHombus | VLRHombus | RHOMbus

LINes

The cursors are displayed as lines.

LRHombus

The cursors are displayed as lines. The intersections of the cursors with the waveforms are displayed by rhombus-shaped points.

VLRHombus

The cursors are displayed only as vertical lines. The intersections of the cursors with the waveforms are displayed by rhombus-shaped points.

RHOMbus

The intersections of the cursors with the waveforms are displayed by rhombus-shaped points.

*RST: LINes

Usage: Asynchronous command

Manual operation: See "Cursor style" on page 243

17.14 Spectrum analysis

17.14.1 Spectrum setup

| | |
|--|-----|
| CALCulate:SPECtrum<sp>:FREQuency:BANDwidth[:RESolution]:AUTO..... | 897 |
| CALCulate:SPECtrum<sp>:FREQuency:BANDwidth[:RESolution]:RATio..... | 898 |
| CALCulate:SPECtrum<sp>:FREQuency:BANDwidth[:RESolution][:VALue]..... | 898 |
| CALCulate:SPECtrum<sp>:FREQuency:CENTer..... | 898 |
| CALCulate:SPECtrum<sp>:FREQuency:SCALE..... | 899 |
| CALCulate:SPECtrum<sp>:FREQuency:SPAN..... | 899 |
| CALCulate:SPECtrum<sp>:FREQuency:STARt..... | 899 |
| CALCulate:SPECtrum<sp>:FREQuency:STOP..... | 900 |
| CALCulate:SPECtrum<sp>:FREQuency:WINDow:TYPE..... | 900 |
| CALCulate:SPECtrum<sp>:MAGNitude:LEVel..... | 901 |
| CALCulate:SPECtrum<sp>:MAGNitude:RANGE..... | 901 |
| CALCulate:SPECtrum<sp>:MAGNitude:SCALE..... | 902 |
| CALCulate:SPECtrum<sp>:PRESet..... | 902 |
| CALCulate:SPECtrum<sp>:SOURce..... | 902 |
| CALCulate:SPECtrum<sp>:STATe..... | 903 |
| CALCulate:SPECtrum<sp>:THRESHold..... | 903 |
| CALCulate:SPECtrum<sp>:PEXCursion..... | 903 |
| CALCulate:SPECtrum<sp>:WAveform:AVERage:COUNT..... | 904 |
| CALCulate:SPECtrum<sp>:WAveform:AVERage:ENABLE..... | 904 |
| CALCulate:SPECtrum<sp>:WAveform:MAXimum:ENABLE..... | 904 |
| CALCulate:SPECtrum<sp>:WAveform:MINimum:ENABLE..... | 904 |
| CALCulate:SPECtrum<sp>:WAveform:NORMal[:ENABLE]..... | 905 |

CALCulate:SPECtrum<sp>:FREQuency:BANDwidth[:RESolution]:AUTO <AutoRBW>

Couples the frequency span to the "RBW" setting.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<AutoRBW> OFF | ON

*RST: ON

Usage: Asynchronous command

Manual operation: See "[Auto RBW](#)" on page 286

CALCulate:SPECTrum<sp>:FREQuency:BANDwidth[:RESolution]:RATio
<SpanRBWRatio>

Defines the coupling ratio for Span/RBW.

Available, if [CALCulate:SPECTrum<sp>:FREQuency:BANDwidth\[:RESolution\]](#) :AUTO is set to ON.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<SpanRBWRatio> Range: 10 to 10000
Increment: 1
*RST: 1000

Usage: Asynchronous command

Manual operation: See "[Span/RBW](#)" on page 286

CALCulate:SPECTrum<sp>:FREQuency:BANDwidth[:RESolution][:VALue]
<RBW>

Queries or defines the used resolution bandwidth.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<RBW> Range: 0.0002 to 2000000
Increment: 0.01
*RST: 2000000
Default unit: Hz

Usage: Asynchronous command

Manual operation: See "[RBW](#)" on page 287

CALCulate:SPECTrum<sp>:FREQuency:CENTER <Center>

Defines the position of the displayed frequency range, which is (Center - Span/2) to (Center + Span/2). The width of the range is defined using the frequency span setting.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Center> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0
Default unit: HZ

Usage:

Asynchronous command

Manual operation: See "[\[Position\]](#)" on page 46

CALCulate:SPECTrum<sp>:FREQuency:SCALe <XAxisMode>

Defines the scaling method for the frequency axis (x-axis) of the spectrogram.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<XAxisMode> LIN | LOG
LIN: linear scaling
LOG: logarithmic scaling
*RST: LIN

Usage:

Asynchronous command

Manual operation: See "[Frequency axis](#)" on page 289

**CALCulate:SPECTrum<sp>:FREQuency:SPAN **

The span is specified in Hertz and defines the width of the displayed frequency range, which is (Center - Span/2) to (Center + Span/2). The position of the span is defined using the "Center" setting.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

 Range: 0 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: HZ

Usage:

Asynchronous command

Manual operation: See "[\[Scale\]](#)" on page 46

CALCulate:SPECTrum<sp>:FREQuency:STARt <Start>

Defines the start frequency of the displayed frequency span.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Start> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: HZ

Usage:

Asynchronous command

Manual operation: See "[Start](#)" on page 286

CALCulate:SPECTrum<sp>:FREQuency:STOP <Stop>

Sets the stop frequency of the displayed frequency span.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Stop> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: HZ

Usage: Asynchronous command

Manual operation: See "[Stop](#)" on page 286

CALCulate:SPECTrum<sp>:FREQuency:WINDOW:TYPE <WindowFunction>

Selects the window type. Windowing helps minimize the discontinuities at the end of the measured signal interval and thus reduces the effect of spectral leakage, increasing the frequency resolution.

Various different window functions are provided in the MXO 5 to suit different input signals. Each of the window functions has specific characteristics, including some advantages and some trade-offs. Consider these characteristics carefully to find the optimum solution for the measurement task.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<WindowFunction> RECTangular | HAMMING | HANN | BLACKharris | GAUSSian | FLATTOP2 | FLATtop2 | KAISerbessel

RECTangular

The rectangular window has the best frequency resolution, but a poor amplitude accuracy and is recommended for separating two tones with almost equal amplitudes and a small frequency distance.

HAMMing

The Hamming window is bell shaped and has a good frequency resolution and fair amplitude accuracy. It is recommended for frequency response measurements and sine waves, periodic signals and narrowband noise.

HANN

The Hann window is bell shaped and has a slightly worse frequency resolution but smaller sidelobe level than the Hamming window. The applications are the same.

BLACKharris

The Blackman window is bell shaped and has a poor frequency resolution, but very good amplitude accuracy. It is recommended mainly for signals with single frequencies to detect harmonics.

GAUSSian

Good frequency resolution and best magnitude resolution, recommended for weak signals and short duration

FLATtop2 | FLATTOP2

The flat top window has a poor frequency resolution, but the best amplitude accuracy and the sharpest sidelobe. It is recommended for accurate single tone amplitude measurements.

KAISeerbessel

The kaiser-bessel window has a fair frequency resolution and good amplitude accuracy, and a very high sidelobe level. It is recommended for separating two tones with differing amplitudes and a small frequency distance.

*RST: BLACKharris

Usage: Asynchronous command

Manual operation: See "[Window type](#)" on page 287

CALCulate:SPECTrum<sp>:MAGNitude:LEVel <VerticalMax>

Sets the maximum displayed value on the vertical scale.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<VerticalMax> Range: -1E+26 to 1000000000000000
Increment: 1
*RST: 10

Usage: Asynchronous command

Manual operation: See "[Vertical maximum](#)" on page 289

CALCulate:SPECTrum<sp>:MAGNitude:RANGE <VerticalRange>

Sets the range of the spectrum values to be displayed.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<VerticalRange> Range: 0 to 1000000000000000
Increment: 0.01
*RST: 100

Usage: Asynchronous command

Manual operation: See "[Vertical range](#)" on page 289

CALCulate:SPECtrum<sp>:MAGNitude:SCALe <Unit>

Sets the unit for the y-axis.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Unit> LINear | DB | DBM | DBV | DBUV | DBS | DBHZ
*RST: DBM

Usage: Asynchronous command

Manual operation: See "[Magnitude unit](#)" on page 289

CALCulate:SPECtrum<sp>:PRESet

Presets the spectrum measurement.

Suffix:

<sp> 1 to 4, index of the spectrum

Usage:

Setting only
Asynchronous command

Manual operation: See "[Spectrum preset](#)" on page 288

CALCulate:SPECtrum<sp>:SOURce <Source>

Selects the source for the spectrum.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Source> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | M1 | M2 | M3 | M4 | M5 |
M6 | M7 | M8 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8

Usage: Asynchronous command

Manual operation: See "[Source](#)" on page 285

CALCulate:SPECtrum<sp>:STATe <State>

Enables the spectrum.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<State> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Display](#)" on page 285

CALCulate:SPECtrum<sp>:THreshold <Threshold>

Sets an absolute threshold as an additional condition for the peak search. Only peaks that exceed the threshold are detected.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Threshold> Range: -500 to 500

Increment: 1

*RST: -70

Default unit: dBm

Usage: Asynchronous command

Manual operation: See "[Threshold](#)" on page 248

CALCulate:SPECtrum<sp>:PEXCursion <PeakExcursion>

Defines a minimum level value by which the waveform must drop left and right of the local maximum to be listed as a peak. Enter a peak excursion value to omit close by peaks and list just the highest peak.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<PeakExcursion> Range: 0 to 100

Increment: 1

*RST: 5

Default unit: dB

Usage: Asynchronous command

Manual operation: See "[Peak excursion](#)" on page 248

CALCulate:SPECTrum<sp>:WAveform:AVERage:COUNt <AverageCount>

Sets the number of segments used for the averaging of the spectrum.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<AverageCount> Range: 2 to 65534
Increment: 1
*RST: 1000

Usage: Asynchronous command

Manual operation: See "[Traces](#)" on page 287

CALCulate:SPECTrum<sp>:WAveform:AVERage:ENABLE <Enable>

Enables the average trace.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Enable> OFF | ON

Usage: Asynchronous command

Manual operation: See "[Traces](#)" on page 287

CALCulate:SPECTrum<sp>:WAveform:MAXimum:ENABLE <Enable>

Enables the maximum trace.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Enable> OFF | ON

Usage: Asynchronous command

Manual operation: See "[Traces](#)" on page 287

CALCulate:SPECTrum<sp>:WAveform:MINimum:ENABLE <Enable>

Enables the minimum trace.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Enable> OFF | ON

Usage: Asynchronous command

Manual operation: See "[Traces](#)" on page 287

CALCulate:SPECTrum<sp>:WAVeform:NORMal[:ENABLE] <Enable>

Enables the normal spectrum trace.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Enable> OFF | ON

Usage: Asynchronous command

Manual operation: See "[Traces](#)" on page 287

17.14.2 Spectrum gate

| | |
|---|-----|
| CALCulate:SPECTrum<sp>:GATE:POSITION..... | 905 |
| CALCulate:SPECTrum<sp>:GATE:START..... | 905 |
| CALCulate:SPECTrum<sp>:GATE:STOP..... | 906 |
| CALCulate:SPECTrum<sp>:GATE:WIDTH..... | 906 |

CALCulate:SPECTrum<sp>:GATE:POSITION <Center>

Sets the position of the displayed frequency range.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Center> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0
Default unit: HZ

Usage: Asynchronous command

Manual operation: See "[Position](#)" on page 290

CALCulate:SPECTrum<sp>:GATE:STARt <Start>

Sets the starting value for the gate.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Start> Range: -1E+26 to 1E+26
Increment: 0.01
*RST: 0.01
Default unit: HZ

Usage: Asynchronous command

Manual operation: See "[Start](#)" on page 290

CALCulate:SPECTrum<sp>:GATE:STOP <Stop>

Sets the end value for the gate.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

| | |
|--------|------------------------|
| <Stop> | Range: -1E+26 to 1E+26 |
| | Increment: 0.01 |
| | *RST: 0.01 |
| | Default unit: HZ |

Usage: Asynchronous command

Manual operation: See "[Stop](#)" on page 290

**CALCulate:SPECTrum<sp>:GATE:WIDTH **

Defines the width of the displayed gate.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

| | |
|--------|-------------------|
| | Range: 0 to 1E+26 |
| | Increment: 0.01 |
| | *RST: 0.01 |
| | Default unit: HZ |

Usage: Asynchronous command

Manual operation: See "[Width](#)" on page 290

17.14.3 Peak list

| | |
|--|-----|
| CALCulate:SPECTrum<sp>:PLISt:COUNT? | 907 |
| CALCulate:SPECTrum<sp>:PLISt[:STATe] | 907 |
| CALCulate:SPECTrum<sp>:PLISt:MAXCount | 907 |
| CALCulate:SPECTrum<sp>:PLISt:MODE | 907 |
| CALCulate:SPECTrum<sp>:PLISt:SOURce | 908 |
| CALCulate:SPECTrum<sp>:PLISt:SPOW | 908 |
| CALCulate:SPECTrum<sp>:PLISt:RESult[:VALue]? | 908 |
| CALCulate:SPECTrum<sp>:PLISt:SORt:COLumn | 909 |
| CALCulate:SPECTrum<sp>:PLISt:SORt:ORDer | 909 |
| CALCulate:SPECTrum<sp>:PLISt:LAbel:FREQuency[:STATe] | 909 |
| CALCulate:SPECTrum<sp>:PLISt:LAbel:MAXCount | 909 |

| | |
|--|-----|
| CALCulate:SPECtrum<sp>:PLISt:LAbEl:INVert..... | 910 |
| CALCulate:SPECtrum<sp>:PLISt:LAbEl:MAXCount..... | 910 |
| CALCulate:SPECtrum<sp>:PLISt:LAbEl[:STATe]..... | 910 |

CALCulate:SPECtrum<sp>:PLISt:COUNt?

Returns the current number of peak list results.

Suffix:

<sp> 1 to 4, index of the spectrum

Return values:

<Count>

Usage: Query only

Asynchronous command

CALCulate:SPECtrum<sp>:PLISt[:STATe] <ShowTable>

Enables the display of the peak table.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<ShowTable> OFF | ON

*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Peak table](#)" on page 292

CALCulate:SPECtrum<sp>:PLISt:MAXCount <MaxNoRess>

Sets the maximum number of measurement results that are listed in the result table.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<MaxNoRess> Range: 1 to 1000

Increment: 1

*RST: 10

Usage: Asynchronous command

Manual operation: See "[Max results](#)" on page 293

CALCulate:SPECtrum<sp>:PLISt:MODE <ResultMode>

Selects how the measurement results are displayed.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<ResultMode> ABS | REL
*RST: ABS

Usage: Asynchronous command

Manual operation: See "[Result mode](#)" on page 293

CALCulate:SPECTrum<sp>:PLISt:SOURce <Source>

Selects the source of the peak table. You can select one of the traces that is enabled with [Traces](#).

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Source> SPECMAXH1 | SPECMINH1 | SPECNORM1 | SPECVER1 |
SPECMAXH2 | SPECMINH2 | SPECNORM2 | SPECVER2 |
SPECMAXH3 | SPECMINH3 | SPECNORM3 | SPECVER3 |
SPECMAXH4 | SPECMINH4 | SPECNORM4 | SPECVER4

Usage: Asynchronous command

Manual operation: See "[Source](#)" on page 294

CALCulate:SPECTrum<sp>:PLISt:SPOW <ShowPeaks>

Displays a box with a description for each detected peak in the spectrum, including the magnitude.

If [CALCulate:SPECTrum<sp>:PLIST:LABEL:FREQuency\[:STATe\]](#) is ON, the frequency values are also displayed.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<ShowPeaks> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Peak on waveform](#)" on page 292

CALCulate:SPECTrum<sp>:PLISt:RESUlt[:VALue]?

Returns the current peak list measurement results.

Suffix:

<sp> 1 to 4, index of the spectrum

Return values:

<Value> Comma-separated list of results

Usage: Query only
Asynchronous command

CALCulate:SPECTrum<sp>:PLISt:SORt:COLumn <ResultColumn>

Sorts the results in the spectrum peak list table either according to the frequency or according to the value.

Suffix:
<sp> 1 to 4, index of the spectrum

Parameters:
<ResultColumn> FREQ | VAL
*RST: FREQ

Usage: Asynchronous command

CALCulate:SPECTrum<sp>:PLISt:SORt:ORDer <ResultOrder>

Defines if the spectrum peak list results are sorted in an ascending (increasing) or descending (decreasing) order.

Suffix:
<sp> 1 to 4, index of the spectrum

Parameters:
<ResultOrder> ASC | DESC
ASC: ascending
DESC: descending
*RST: ASC

Usage: Asynchronous command

CALCulate:SPECTrum<sp>:PLISt:LAbel:FREQuency[:STATe] <ShowFrequency>

Includes the frequency of the detected peak in the diagram labels.

Suffix:
<sp> 1 to 4, index of the spectrum

Parameters:
<ShowFrequency> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Show frequency](#)" on page 294

CALCulate:SPECTrum<sp>:PLISt:LAbel:MAXCount <MaxNumberPeaks>

Sets the maximum number of measurement results that are listed in the result table.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<MaxNumberPeaks> Range: 1 to 100
Increment: 1
*RST: 10

Usage:

Asynchronous command

CALCulate:SPECTrum<sp>:PLISt:LABel:INVert <Inverse>

Inverts the colors of the peak list labels, the peak boxes are shown with a white background.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<Inverse> OFF | ON
*RST: OFF

Usage:

Asynchronous command

CALCulate:SPECTrum<sp>:PLISt:LABel:MAXCount <MaxNumberPeaks>

Sets the maximum number of measurement results that are listed in the result table.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<MaxNumberPeaks> Range: 1 to 100
Increment: 1
*RST: 10

Usage:

Asynchronous command

CALCulate:SPECTrum<sp>:PLISt:LABel[:STATe] <ShowLabels>

Displays the labels in the peak list diagram.

Suffix:

<sp> 1 to 4, index of the spectrum

Parameters:

<ShowLabels> OFF | ON
*RST: ON

Usage:

Asynchronous command

17.14.4 Data export of spectrum waveforms

For each of the spectrum traces, a dedicated command is available. For a description of the traces, see "Traces" on page 287.

For fast export of several waveforms at once, use `EXPORT:WAVEFORM:DATA[:VALUES]?` on page 856.

```
CALCulate:SPECtrum<sp>:WAVEform:AVerage:DATA:HEADer?
CALCulate:SPECtrum<sp>:WAVEform:MAXimum:DATA:HEADer?
CALCulate:SPECtrum<sp>:WAVEform:MINimum:DATA:HEADer?
CALCulate:SPECtrum<sp>:WAVEform:NORMal:DATA:HEADer?
```

Returns the header of spectrum data, the attributes of the waveform.

Suffix:

<sp> 1 to 4, index of the spectrum

Return values:

| | |
|-------------------|--|
| <XStart> | 1. header value: start time XStart in s |
| <XStop> | 2. header value: end time XStop in s |
| <RecordLength> | 3. header value: record length of the waveform in samples |
| <ValuesPerSample> | 4. header value: the number of values per sample interval is always = 1. |

Example:

```
CALC:SPEC1:WAV:NORM:DATA:HEAD?
-9.477E-008, 9.477E-008, 20000, 1
Start time of the data is -9.477E-008 = - 94,77 ns, and stop time of the data is 9.477E-008 = 94,77 ns. The data stream has 20000 values with one value per sample interval.
```

Usage:

Query only
Asynchronous command

```
CALCulate:SPECtrum<sp>:WAVEform:AVerage:DATA[:VALUES]?
[<Offset>[,<Length>]]
CALCulate:SPECtrum<sp>:WAVEform:MAXimum:DATA[:VALUES]?
[<Offset>[,<Length>]]
CALCulate:SPECtrum<sp>:WAVEform:MINimum:DATA[:VALUES]?
[<Offset>[,<Length>]]
CALCulate:SPECtrum<sp>:WAVEform:NORMal:DATA[:VALUES]?
[<Offset>[,<Length>]]
```

Returns the data of the spectrum points for transmission from the instrument to the controlling computer. The data can be used in MATLAB, for example.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

To set the export format, use `FORMAT [:DATA]` on page 699.

Suffix:

<sp> 1 to 4, index of the spectrum

Query parameters:

<Offset> Number of offset waveform points to be skipped.

Range: 0 to m. Limit: n + m <= record length

<Length> Number of waveform points to be retrieved.

Range: 1 to n. Limit: n + m <= record length

Return values:

<Data> List of values according to the format and content settings.

Usage:

Query only

Asynchronous command

17.15 Applications

17.15.1 Mask testing

Some of the commands in the following section are asynchronous. An overlapping or asynchronous command does not automatically finish executing before the next command starts executing. If overlapping commands must be executed in a defined order, e.g. to avoid wrong measurement results, they must be serviced sequentially.

To prevent an overlapping execution of commands, one of the commands *OPC, *OPC? or *WAI can be used after the command or a command set.

For more information, see:

- www.rohde-schwarz.com/rc-via-scp, section "Command sequence and synchronization"
- [Mask test definition](#)..... 912
- [Segment definition](#)..... 915
- [Actions](#)..... 919
- [Results](#)..... 921

17.15.1.1 Mask test definition

| | |
|--|-----|
| MTEST<m>:ADD | 913 |
| MTEST<m>:COUNT? | 913 |
| MTEST<m>:DIAGram | 913 |
| MTEST<m>:IMEXport:NAME | 913 |
| MTEST<m>:IMEXport:OPEN | 914 |
| MTEST<m>:IMEXport:SAVE | 914 |
| MTEST<m>:REMove | 914 |

| | |
|-----------------------|-----|
| MTEST<m>:SOURce..... | 914 |
| MTEST<m>:STATe..... | 915 |
| MTEST<m>:VISible..... | 915 |

MTEST<m>:ADD

Creates a mask test with the indicated index.

Suffix:

<m> 1 to 8, index of the mask

Example: See [Section 17.4.2, "Creating a mask", on page 693](#).

Usage: Setting only
Asynchronous command

Manual operation: See "[+ Add mask](#)" on page 298

MTEST<m>:COUNT?

Returns the number of masks.

MTEST :COUNT? MAX returns the maximum number of masks that can be created.

Suffix:

<m> Irrelevant, omit the suffix.

Return values:

<Count> Number of defined masks

Usage: Query only
Asynchronous command

MTEST<m>:DIAGram <DiagramKey>

Sets the layout and the diagram where the mask is located and the test runs.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<DiagramKey> String with the layout-diagram key.

Example: :MTEST :DIAGram?
-->"L1_D1"

Usage: Asynchronous command

MTEST<m>:IMEXport:NAME <Name>

Sets the path, the filename and the file format of the mask file.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<Name> String with path and file name with extension .xml.

Example:

MTES2:IMEX:NAME
'/home/storage/userData/Masks/MyMask2.xml'
File and path definition for mask test 2.

Usage:

Asynchronous command

Manual operation: See "[Save mask](#)" on page 299

MTESt<m>:IMEXport:OPEN

Opens and loads the mask selected by [MTESt<m>: IMEXport : NAME](#).

Suffix:

<m> 1 to 8, index of the mask

Usage:

Event
Asynchronous command

Manual operation: See "[Load mask](#)" on page 299

MTESt<m>:IMEXport:SAVE

Saves the mask test to the file selected by [MTESt<m>: IMEXport : NAME](#).

Suffix:

<m> 1 to 8, index of the mask

Usage:

Event
Asynchronous command

Manual operation: See "[Save mask](#)" on page 299

MTESt<m>:REMove

Deletes the selected mask.

Suffix:

<m> 1 to 8, index of the mask

Usage:

Setting only
Asynchronous command

MTESt<m>:SOURce <Source>

Selects the waveform to be tested against the mask.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<Source> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | M1 | M2 | M3 | M4 | M5 |
 M6 | M7 | M8 | XY1 | XY2 | XY3 | XY4 | SPECNORM1 | SPEC-
 NORM2 | SPECNORM3 | SPECNORM4

Usage: Asynchronous command

Manual operation: See "[Source](#)" on page 298

MTEST<m>:STATe <State>

Activates or deactivates the mask test.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<State> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Enable test](#)" on page 298

MTEST<m>:VISible <DisplayState>

Displays all mask segments of the selected mask in the diagrams, or hides them.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<DisplayState> OFF | ON
 *RST: ON

Usage: Asynchronous command

Manual operation: See "[Display](#)" on page 298

17.15.1.2 Segment definition

| | |
|--|-----|
| MTEST<m>:SEGMENT<n>:ADD..... | 916 |
| MTEST<m>:SEGMENT<n>:COUNT?..... | 916 |
| MTEST<m>:SEGMENT<n>:POINT<o>:ADD..... | 916 |
| MTEST<m>:SEGMENT<n>:POINT<o>:COUNT?..... | 917 |
| MTEST<m>:SEGMENT<n>:POINT<o>:REMOVE..... | 917 |
| MTEST<m>:SEGMENT<n>:POINT<o>:VALID?..... | 917 |
| MTEST<m>:SEGMENT<n>:POINT<o>:X..... | 918 |
| MTEST<m>:SEGMENT<n>:POINT<o>:Y..... | 918 |
| MTEST<m>:SEGMENT<n>:REMOVE..... | 918 |
| MTEST<m>:SEGMENT<n>:VALID?..... | 919 |

MTEST<m>:SEGMENT<n>:ADD

Adds a new segment to the selected mask. The segment has no points, use **MTEST<m>:SEGMENT<n>:POINT<o>:ADD** to add the points.

Suffix:

- | | |
|-----|--|
| <m> | 1 to 8, index of the mask |
| <n> | 1 to 8, index of the segment
Omit the suffix to use the next free suffix. |

Example:

See [Section 17.4.2, "Creating a mask", on page 693](#).

Usage:

Setting only
Asynchronous command

Manual operation: See "[Add segment](#)" on page 300

MTEST<m>:SEGMENT<n>:COUNT?

Returns the number of segments that belong to the indicated mask.

MTEST<m>:SEGMENT:COUNT ? MAX returns the maximum number of segments that can be created.

Suffix:

- | | |
|-----|------------------------------|
| <m> | 1 to 8, index of the mask |
| <n> | Irrelevant, omit the suffix. |

Return values:

- | | |
|---------|-------------------------|
| <Count> | Number of defined masks |
|---------|-------------------------|

Usage:

Query only
Asynchronous command

MTEST<m>:SEGMENT<n>:POINT<o>:ADD

Adds a corner point to the selected mask segment at the next free suffix. The new point has the coordinates 0;0.

Suffix:

- | | |
|-----|------------------------------------|
| <m> | 1 to 8, index of the mask |
| <n> | 1 to 8, index of the segment |
| <o> | 1 to *, index of the segment point |

Example:

See [Section 17.4.2, "Creating a mask", on page 693](#).

Usage:

Setting only
Asynchronous command

Manual operation: See "[Add +](#)" on page 301

MTESt<m>:SEGMenT<n>:POInT<o>:COUNt?

Returns the number of points that was added to the indicated mask segment.

MTEST<m> : SEGMenT<n> : POInT : COUNt? MAX returns the maximum number of points that can be created.

Suffix:

- | | |
|-----|------------------------------|
| <m> | 1 to 8, index of the mask |
| <n> | 1 to 8, index of the segment |
| <o> | Irrelevant, omit the suffix. |

Parameters:

- | | |
|---------|-------------------------|
| <Count> | Number of defined masks |
|---------|-------------------------|

Example: See [Section 17.4.2, "Creating a mask", on page 693](#).

Usage: Query only
Asynchronous command

Manual operation: See "[Add +](#)" on page 301

MTESt<m>:SEGMenT<n>:POInT<o>:REMove

Deletes the indicated corner point of the mask segment.

Suffix:

- | | |
|-----|------------------------------------|
| <m> | 1 to 8, index of the mask |
| <n> | 1 to 8, index of the segment |
| <o> | 1 to *, index of the segment point |

Usage: Setting only
Asynchronous command

Manual operation: See "[Delete, Delete all](#)" on page 301

MTESt<m>:SEGMenT<n>:POInT<o>:VALId?

Checks the validity of the selected point. See "[Mask Definition](#)" on page 296.

Suffix:

- | | |
|-----|------------------------------------|
| <m> | 1 to 8, index of the mask |
| <n> | 1 to 8, index of the segment |
| <o> | 1 to *, index of the segment point |

Return values:

- | | |
|---------|----------|
| <Valid> | OFF ON |
|---------|----------|

ON = valid

OFF = invalid

*RST: ON

Usage: Query only
Asynchronous command

MTESt<m>:SEGMenT<n>:POInT<o>:X <X>

Sets the horizontal position of the selected corner point.

Suffix:

<m> 1 to 8, index of the mask
<n> 1 to 8, index of the segment
<o> 1 to *, index of the segment point

Parameters:

<X> Range: -1E+26 to 1E+26
Increment: 1E-06
*RST: 0
Default unit: s

Example: See [Section 17.4.2, "Creating a mask", on page 693](#).

Usage: Asynchronous command

Manual operation: See "[Point, X, Y](#)" on page 301

MTESt<m>:SEGMenT<n>:POInT<o>:Y <Y>

Sets the vertical position of the selected corner point.

Suffix:

<m> 1 to 8, index of the mask
<n> 1 to 8, index of the segment
<o> 1 to *, index of the segment point

Parameters:

<Y> Range: -1E+26 to 1E+26
Increment: 1E-06
*RST: 0
Default unit: V

Example: See [Section 17.4.2, "Creating a mask", on page 693](#).

Usage: Asynchronous command

Manual operation: See "[Point, X, Y](#)" on page 301

MTESt<m>:SEGMenT<n>:REMove**Suffix:**

<m> 1 to 8, index of the mask
<n> 1 to 8, index of the segment

Usage: Setting only
Asynchronous command

Manual operation: See "[Delete, Delete all](#)" on page 301

MTESt<m>:SEGMenT<n>:VALId?

Checks the validity of the indicated segment. The segment is invalid if one of its points is invalid. See "[Mask Definition](#)" on page 296.

Suffix:

<m> 1 to 8, index of the mask
<n> 1 to 8, index of the segment

Return values:

| | |
|---------|---------------|
| <Valid> | OFF ON |
| | ON = valid |
| | OFF = invalid |
| | *RST: ON |

Usage: Query only
Asynchronous command

17.15.1.3 Actions

| | |
|--------------------------------------|-----|
| MTEST<m>:ONViolation:BEEP..... | 919 |
| MTEST<m>:ONViolation:SCReenshot..... | 919 |
| MTEST<m>:ONViolation:STOP..... | 920 |
| MTEST<m>:ONViolation:TRIGgerout..... | 920 |
| MTEST<m>:ONViolation:WFMSave..... | 920 |

MTEST<m>:ONViolation:BEEP <Beep>

Generates a beep sound if the command is set to `SUCCESS` or `VIOLATION`.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

| | |
|--------|--------------------------------|
| <Beep> | NOACtion SUCCesS VIOLation |
| | *RST: NOACtion |

Usage: Asynchronous command

Manual operation: See "[Beep](#)" on page 302

MTEST<m>:ONViolation:SCReenshot <SaveScreenshot>

Saves the waveform data to file if the command is set to `SUCCESS` or `VIOLATION`.

To configure the screenshot settings, use the commands described in [Section 17.11.8, "Screenshots"](#), on page 859.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<SaveScreenshot> NOACtion | SUCCess | VIOLation

*RST: NOACtion

Usage:

Asynchronous command

Manual operation: See "[Screenshot](#)" on page 303

MTESt<m>:ONViolation:STOP <StopAcq>

Stops the running acquisition if the command is set to SUCCess or VIOLation.

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<StopAcq> NOACtion | SUCCess | VIOLation

*RST: NOACtion

Usage:

Asynchronous command

Manual operation: See "[Stop acq](#)" on page 302

MTESt<m>:ONViolation:TRIGgerout <TrigOutPls>

Sends an outgoing pulse to the [Trigger Out] connector if the command is set to SUCCess or VIOLation.

To configure the pulse, user the following commands:

- [TRIGGER:ACTions:OUT:SOURce](#) on page 809
- [TRIGGER:ACTions:OUT:POLarity](#) on page 810
- [TRIGGER:ACTions:OUT:DELay](#) on page 809
- [TRIGGER:ACTions:OUT:PLENgh](#) on page 809

Suffix:

<m> 1 to 8, index of the mask

Parameters:

<TrigOutPls> NOACtion | SUCCess | VIOLation

*RST: NOACtion

Usage:

Asynchronous command

Manual operation: See "[Trigger out pulse](#)" on page 303

MTESt<m>:ONViolation:WFMSave <SaveWfm>

Saves the waveform data to file if the command is set to SUCCess or VIOLation.

To define the path and file names, use the EXPOrt:WAVeform:AUTOnaming:* commands:

- [EXPOrt:WAVeform:AUTOnaming:NAME](#) on page 852
- [EXPOrt:WAVeform:AUTOnaming:PATH](#) on page 853
- [EXPOrt:WAVeform:AUTOnaming:TYPE](#) on page 853

Suffix:

<m> 1 to 8, index of the mask

Parameters:

| | |
|-----------|--------------------------------|
| <SaveWfm> | NOACtion SUCCess VIOLation |
| | *RST: NOACtion |

Usage: Asynchronous command

Manual operation: See "[Save wfm](#)" on page 303

17.15.1.4 Results

| | |
|-----------------------------------|-----|
| MTEST<m>:RESUlt:COUNT:FWAVeforms? | 921 |
| MTEST<m>:RESUlt:COUNT:PWAveforms? | 921 |
| MTEST<m>:RESUlt:COUNT:WAVEforms? | 922 |
| MTEST<m>:RESUlt:FRATe? | 922 |
| MTEST<m>:RESUlt[:RESUlt]? | 922 |

MTEST<m>:RESUlt:COUNT:FWAVeforms?

Returns the number of failed acquisitions.

Suffix:

<m> 1 to 8, index of the mask

Return values:

| | |
|--------------|------------------------------|
| <AcqsFailed> | Range: 0 to 1000000000000000 |
| | Increment: 1 |
| | *RST: 0 |

Usage: Query only
Asynchronous command

Manual operation: See "[Failed Acq.](#)" on page 297

MTEST<m>:RESUlt:COUNT:PWAveforms?

Returns the number of acquisitions that passed the test successfully.

Suffix:

<m> 1 to 8, index of the mask

Return values:

| | |
|--------------|------------------------------|
| <AcqsPassed> | Range: 0 to 1000000000000000 |
| | Increment: 1 |
| | *RST: 0 |

Usage: Query only
Asynchronous command

Manual operation: See "[Passed Acq.](#)" on page 297

MTESt<m>:RESUlt:COUNT:WAVeforms?

Returns the number of tested acquisitions.

Suffix:

<m> 1 to 8, index of the mask

Return values:

<AcqsCompleted> Range: 0 to 1000000000000000
Increment: 1
*RST: 0

Usage: Query only
Asynchronous command

Manual operation: See "[Total Acq.](#)" on page 297

MTESt<m>:RESUlt:FRATe?

Returns the fail rate, the ratio of failed acquisitions to the number of tested acquisitions.

Suffix:

<m> 1 to 8, index of the mask

Return values:

<FailRate> Range: -1E+26 to 1E+26
Increment: 0
*RST: 0
Default unit: %

Usage: Query only
Asynchronous command

Manual operation: See "[Fail rate](#)" on page 297

MTESt<m>:RESUlt[:RESUlt]?

Returns the overall test result.

Suffix:

<m> 1 to 8, index of the mask

Return values:

<TestResult> PASS | FAIL
*RST: PASS

Usage: Query only
Asynchronous command

Manual operation: See "[Result](#)" on page 297

17.15.2 Frequency response analysis (option R&S MXO5-K36)

| | |
|---|-----|
| ● Frequency response analysis settings..... | 923 |
| ● Frequency response analysis amplitude profile..... | 929 |
| ● Frequency response analysis calibration settings..... | 930 |
| ● Frequency response analysis diagram settings..... | 931 |
| ● Frequency response analysis results..... | 935 |
| ● Frequency response analysis export..... | 938 |

17.15.2.1 Frequency response analysis settings

| | |
|---|-----|
| FRANalysis:STATE..... | 923 |
| FRANalysis:ENABLE..... | 923 |
| FRANalysis:AUToscale..... | 924 |
| FRANalysis:AMPLitude:MODE..... | 924 |
| FRANalysis:FREQuency:START..... | 924 |
| FRANalysis:FREQuency:STOP..... | 924 |
| FRANalysis:GENERator:AMPLitude..... | 925 |
| FRANalysis:GENERator:LOAD..... | 925 |
| FRANalysis:GENERator[:CHANnel]..... | 925 |
| FRANalysis:INPut[:SOURce]..... | 925 |
| FRANalysis:MEASurement:DELay:STATE..... | 926 |
| FRANalysis:MEASurement:DELay[:TIME]..... | 926 |
| FRANalysis:MEASurement:POINT[:DISPLAY]..... | 926 |
| FRANalysis:MEASurement:RBW..... | 927 |
| FRANalysis:OUTPut[:SOURce]..... | 927 |
| FRANalysis:POINTs:LOGarithmic..... | 927 |
| FRANalysis:POINTs:MODE..... | 927 |
| FRANalysis:POINTs:TOTal..... | 928 |
| FRANalysis:REPeat..... | 928 |
| FRANalysis:RESET..... | 928 |
| FRANalysis:PHASE:MAXimum..... | 928 |

FRANalysis:STATE <Value>

Starts the frequency response analysis.

Parameters:

<Value> RUN | STOP | OFF

Usage: Asynchronous command

Manual operation: See "Run" on page 313

FRANalysis:ENABLE <State>

Enables the frequency response analysis application.

If the frequency response analysis is disabled, the instrument does not accept any FRANalysis command.

You can start the analysis with [FRANalysis:STATE](#).

Parameters:

<State> OFF | ON

Usage: Asynchronous command

FRANalysis:AUToscale <AutoScale>

Enables the auto scaling function for each measurement.

Parameters:

<AutoScale> OFF | ON

*RST: ON

Usage: Asynchronous command

Manual operation: See "Auto scale" on page 316

FRANalysis:AMPLitude:MODE <AmplitudeMode>

Selects, if the amplitude is a constant value ([FRANalysis:GENerator:AMPLitude](#)) or is defined as an amplitude profile.

Parameters:

<AmplitudeMode> CONSTant | PROfile

*RST: CONSTant

Usage: Asynchronous command

Manual operation: See "Amplitude profile" on page 313

FRANalysis:FREQuency:STARt <StartFrequency>

Sets the start frequency of the sweep.

Parameters:

<StartFrequency> Range: 0.01 to 100000000

Increment: 1

*RST: 100

Default unit: Hz

Usage: Asynchronous command

Manual operation: See "Start, Stop" on page 312

FRANalysis:FREQuency:STOP <StopFrequency>

Sets the stop frequency of the sweep.

Parameters:

<StopFrequency> Range: 0.01 to 100000000
Increment: 1
*RST: 10000
Default unit: Hz

Usage:

Asynchronous command

Manual operation: See "[Start, Stop](#)" on page 312

FRANalysis:GENerator:AMPLitude <GenAmplitude>

Sets a fixed amplitude for the frequency response analysis.

Parameters:

<GenAmplitude> Range: 0.01 to 12
Increment: 0.1
*RST: 1
Default unit: Vpp

Usage:

Asynchronous command

Manual operation: See "[Amplitude](#)" on page 312

FRANalysis:GENerator:LOAD <GenLoad>

Selects the generator voltage display for 50Ω or high impedance load.

Parameters:

<GenLoad> FIFTy | HIZ
HIZ: high input impedance
*RST: FIFTy

Usage:

Asynchronous command

Manual operation: See "[User load](#)" on page 312

FRANalysis:GENerator[:CHANnel] <GenCh>

Selects the built-in generator to start a frequency sweep for a defined frequency range.

Parameters:

<GenCh> GEN1 | GEN2
*RST: GEN1

Usage:

Asynchronous command

Manual operation: See "[Generator](#)" on page 312

FRANalysis:INPut[:SOURce] <InputChannel>

Sets the channel for the input signal of the DUT.

Parameters:

<InputChannel> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8
*RST: C1

Usage: Asynchronous command

Manual operation: See "[Input](#)" on page 312

FRANalysis:MEASurement:DELay:STATe <MeasDelay>

Enables the measurement delay. Set a measurement delay time with [FRANalysis:MEASurement:DELay\[:TIME\]](#).

Parameters:

<MeasDelay> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Measurement delay, Delay time](#)" on page 316

FRANalysis:MEASurement:DELay[:TIME] <MeasDelayTime>

Sets a time delay, that the system waits before measuring the next point of the plot. This is helpful in systems that need more time to adapt to the new frequency, for example if filters with significant time group delays are present.

Available, if [FRANalysis:MEASurement:DELay:STATe](#) = ON.

Parameters:

<MeasDelayTime> Range: 0 to 10
Increment: 0.001
*RST: 0
Default unit: s

Usage: Asynchronous command

Manual operation: See "[Measurement delay, Delay time](#)" on page 316

FRANalysis:MEASurement:POINt[:DISPlay] <Points>

Enables the display of the measurement points for the frequency response analysis.

Parameters:

<Points> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Display points](#)" on page 317

FRANalysis:MEASurement:RBW <RBW>

Sets the resolution bandwidth, which determines the number of measurements that are used for creating the plot.

Parameters:

<RBW> HIGH | MID | LOW
 *RST: MID

Usage: Asynchronous command

Manual operation: See "[RBW](#)" on page 316

FRANalysis:OUTPut[:SOURce] <OutputChannel>

Sets the channel for the output signal of the DUT.

Parameters:

<OutputChannel> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8
 *RST: C2

Usage: Asynchronous command

Manual operation: See "[Output](#)" on page 312

FRANalysis:POINts:LOGarithmic <PtsPerDecade>

Selects the number of points that are measured per decade, if [FRANalysis:POINTS:MODE](#) is set to DECade.

Parameters:

<PtsPerDecade> Range: 10 to 500
 Increment: 1
 *RST: 10

Usage: Asynchronous command

Manual operation: See "[Points](#)" on page 312

FRANalysis:POINts:MODE <PointsMode>

Selects, if the number of points for the FRA are measured as total or per decade.

You can set the number of points with [FRANalysis:POINTS:TOTal](#)/ [FRANalysis:POINTS:LOGarithmic](#).

Parameters:

<PointsMode> TOTal | DECade
 *RST: DECade

Usage: Asynchronous command

Manual operation: See "[Points](#)" on page 312

FRANalysis:POINts:TOTal <TotalPoints>

Set the total number of points for the FRA analysis, if [FRANalysis:POINTS:MODE](#) on page 927 is set to TOTal.

Parameters:

<TotalPoints> Range: 10 to 5000
 Increment: 1
 *RST: 100

Usage:

Asynchronous command

Manual operation: See "[Points](#)" on page 312

FRANalysis:REPeat <Repeat>

Repeats the measurement, using the same parameters.

Parameters:

<Repeat> OFF | ON
 *RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Repeat](#)" on page 313

FRANalysis:RESET

Resets the frequency response analysis.

Usage:

Setting only
Asynchronous command

FRANalysis:PHASE:MAXimum <MaxPhase>

Sets the upper boundary of the vertical phase window.

The lower boundary is given by "Maximum phase" - 360°.

By default, the "Maximum phase" is set to 180° for a phase window ranging from -180° to 180° accordingly.

Parameters:

<MaxPhase> Range: 0 to 360
 Increment: 1
 *RST: 180
 Default unit: °

Usage:

Asynchronous command

Manual operation: See "[Maximum phase](#)" on page 315

17.15.2.2 Frequency response analysis amplitude profile

| | |
|--|-----|
| FRANalysis:AMPLitude:PROFile:COUNT..... | 929 |
| FRANalysis:AMPLitude:PROFile:APoint..... | 929 |
| FRANalysis:AMPLitude:PROFile:POINT<m>:REMove..... | 929 |
| FRANalysis:AMPLitude:PROFile:SORT..... | 929 |
| FRANalysis:AMPLitude:PROFile:MODE..... | 930 |
| FRANalysis:AMPLitude:PROFile:POINT<m>:FREQuency..... | 930 |
| FRANalysis:AMPLitude:PROFile:POINT<m>:AMPLitude..... | 930 |

FRANalysis:AMPLitude:PROFile:COUNT <Value>

Returns the number of defined points for the amplitude profile.

Parameters:

<Value>

Usage: Asynchronous command

Manual operation: See "[Step start freq, Amplitude](#)" on page 314

FRANalysis:AMPLitude:PROFile:APoint

Adds a new point to the amplitude profile.

Usage: Setting only
Asynchronous command

Manual operation: See "[Add](#)" on page 314

FRANalysis:AMPLitude:PROFile:POINT<m>:REMove

Removes the selected amplitude point from the list.

Suffix:
<m> Index of the amplitude profile point

Usage: Setting only
Asynchronous command

Manual operation: See "[Delete](#)" on page 314

FRANalysis:AMPLitude:PROFile:SORT

Sorts the points in the amplitude table by frequency, starting with the lowest frequency.

Usage: Setting only
Asynchronous command

Manual operation: See "[Sort](#)" on page 314

FRANalysis:AMPLitude:PROFile:MODE <VoltageChange>

Selects if the voltage change is done as a single step or as a ramp.

Parameters:

<VoltageChange> SINGLE | RAMP

*RST: SINGLE

Usage: Asynchronous command

Manual operation: See "["Voltage change"](#) on page 314

FRANalysis:AMPLitude:PROFile:POINt<m>:FREQuency <Frequency>

Sets the start frequency for the selected point.

Suffix:

<m> Index of the amplitude profile point

Parameters:

<Frequency> Range: 0.01 to 100E6
Increment: 1
*RST: 100
Default unit: Hz

Usage: Asynchronous command

Manual operation: See "["Step start freq, Amplitude"](#) on page 314

FRANalysis:AMPLitude:PROFile:POINt<m>:AMPLitude <Amplitude>

Sets the amplitude for the selected point.

Suffix:

<m> Index of the amplitude profile point

Parameters:

<Amplitude> Range: 0 to 5.995
Increment: 0.1
*RST: 1
Default unit: Vpp

Usage: Asynchronous command

Manual operation: See "["Step start freq, Amplitude"](#) on page 314

17.15.2.3 Frequency response analysis calibration settings

| | |
|---|-----|
| FRANalysis:CALibration:CALibration..... | 931 |
| FRANalysis:CALibration:RESult?..... | 931 |
| FRANalysis:CALibration:STATe..... | 931 |

FRANalysis:CALibration:CALibration

Runs a calibration sequence.

Usage: Event

Manual operation: See "[Start calibration](#)" on page 321

FRANalysis:CALibration:RESUlt?

Returns the result of the calibration.

Return values:

<States> PASS | FAIL | RUN | NOAL
PASS: the calibration is successful.
FAIL: the calibration failed.
RUN: a calibration cycle is running.
NOAL: no active calibration.

*RST: NOAL

Usage: Query only

Manual operation: See "[Start calibration](#)" on page 321

FRANalysis:CALibration:STATe <UseCalData>

If ON, the user calibration data is used for the frequency response analysis.

Parameters:

<UseCalData> OFF | ON
*RST: OFF

Manual operation: See "[Use calibration data](#)" on page 321

17.15.2.4 Frequency response analysis diagram settings

| | |
|----------------------------------|-----|
| FRANalysis:PHASe:ENABLE..... | 932 |
| FRANalysis:PHASe:OFFSet..... | 932 |
| FRANalysis:PHASe:SCALE..... | 932 |
| FRANalysis:GAIN:ENABLE..... | 932 |
| FRANalysis:GAIN:OFFSet..... | 932 |
| FRANalysis:GAIN:SCALE..... | 933 |
| FRANalysis:AMPLitude:SCALE..... | 933 |
| FRANalysis:AMPLitude:ENABLE..... | 933 |
| FRANalysis:AMPLitude:OFFSET..... | 933 |
| FRANalysis:PHASe:DATA?..... | 934 |
| FRANalysis:FREQuency:DATA?..... | 934 |
| FRANalysis:GAIN:DATA?..... | 934 |

FRANalysis:PHASE:ENABLE <State>

Enables the phase waveform for the frequency response analysis.

Parameters:

<State> OFF | ON

*RST: OFF

Usage: Asynchronous command

FRANalysis:PHASE:OFFSET <VerticalOffset>

Sets a vertical offset of the phase waveform.

Parameters:

<VerticalOffset> Range: -10000 to 10000

Increment: 1

*RST: 0

Default unit: °

Usage: Asynchronous command

FRANalysis:PHASE:SCALE <VerticalScale>

Sets the vertical scale for the phase waveform.

Parameters:

<VerticalScale> Range: 1 to 180

Increment: 1

*RST: 36

Default unit: °/div

Usage: Asynchronous command

FRANalysis:GAIN:ENABLE <State>

Enables the gain waveform for the frequency response analysis.

Parameters:

<State> OFF | ON

*RST: OFF

Usage: Asynchronous command

FRANalysis:GAIN:OFFSET <VerticalOffset>

Sets a vertical offset of the gain waveform.

Parameters:

<VerticalOffset> Range: -2000 to 2000
 Increment: 1
 *RST: 10
 Default unit: dB

Usage:

Asynchronous command

FRANalysis:GAIN:SCALE <VerticalScale>

Sets the vertical scale for the gain waveform.

Parameters:

<VerticalScale> Range: 0.1 to 20
 Increment: 1
 *RST: 10
 Default unit: dB/div

Usage:

Asynchronous command

FRANalysis:AMPLitude:SCALE <VerticalScale>

Sets the vertical scale for the amplitude waveform.

Parameters:

<VerticalScale> Range: 0.01 to 10
 Increment: 0.01
 *RST: 0.5
 Default unit: Vpp/div

Usage:

Asynchronous command

FRANalysis:AMPLitude:ENABLE <State>

Enables the amplitude signal for the frequency response analysis. You can then define the amplitude profile of the signal.

Parameters:

<State> OFF | ON
 *RST: OFF

Usage:

Asynchronous command

Manual operation: See "[Amplitude profile](#)" on page 313

FRANalysis:AMPLitude:OFFSET <VerticalOffset>

Sets a vertical offset of the amplitude waveform.

Parameters:

<VerticalOffset> Range: -100 to 100
 Increment: 0.01
 *RST: 5
 Default unit: Vpp

Usage:

Asynchronous command

FRANalysis:PHASe:DATA?

Returns the data of the phase as a list of comma-separated values in degree.

Return values:

<Data> Comma-separated list of values

Example:

FRAN: PHAS: DATA?

Result:

-0.07463742650985239, -0.09417628145200041,
-0.1457021392091207, -0.1914790795969807,
-0.2494368612845221, -0.3415108478964939,
-0.4350150706042513, -0.5673151547214843,
-0.7363486980048108, -0.9055923620805615,
-1.0829557075417

Usage:

Query only

Asynchronous command

FRANalysis:FREQuency:DATA?

Returns the data of the frequency points for which gain and phase have been calculated as a list of comma-separated values in Hz.

Return values:

<Data> Comma-separated list of values

Example:

FRAN: FREQ: DATA?

Result:

-0.07463742650985239, -0.09417628145200041,
-0.1457021392091207, -0.1914790795969807,
-0.2494368612845221, -0.3415108478964939,
-0.4350150706042513, -0.5673151547214843,
-0.7363486980048108, -0.9055923620805615,
-1.0829557075417

Usage:

Query only

Asynchronous command

FRANalysis:GAIN:DATA?

Returns the data of the gain as a list of comma-separated values in dB.

Return values:

<Data> Comma-separated list of values

Example:

FRAN:GAIN:DATA?

Result:

```
0.4381956630254851,0.4593246383252179,
0.461895233375762,0.4570717993766185,
0.4623802509651942,0.4533450898899926,
0.4408194360143725,0.4221600784741697,
0.4483342212879299,0.4473558449908476,
0.4915016244058707
```

Usage:

Query only
Asynchronous command

17.15.2.5 Frequency response analysis results

| | |
|---|-----|
| FRANalysis:RESUlt:STATe..... | 935 |
| FRANalysis:MARGin:STATe..... | 935 |
| FRANalysis:MARGin:GAIN:FREQuency..... | 936 |
| FRANalysis:MARGin:GAIN:VALue?..... | 936 |
| FRANalysis:MARGin:PHASe:FREQuency?..... | 936 |
| FRANalysis:MARGin:PHASe:VALue?..... | 936 |
| FRANalysis:MARKer<m>:STATe..... | 936 |
| FRANalysis:MARKer<m>:FREQuency..... | 937 |
| FRANalysis:MARKer<m>:GAIN?..... | 937 |
| FRANalysis:MARKer<m>:PHASe?..... | 937 |
| FRANalysis:MARKer<m>:SSCreen..... | 937 |

FRANalysis:RESUlt:STATe <Table>

Enables the display of the result table for the FRA.

Parameters:

<Table> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Result table](#)" on page 317

FRANalysis:MARGin:STATe <Margins>

Enables the display of the margin table for the FRA.

Parameters:

<Margins> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Margin](#)" on page 317

FRANalysis:MARGin:GAIN:FREQuency?

Returns the frequency of the gain margin.

Return values:

<Frequency>

Usage:

Query only
Asynchronous command

FRANalysis:MARGin:GAIN:VALUe?

Returns the value of the gain margin.

Return values:

<Phase>

Usage:

Query only
Asynchronous command

FRANalysis:MARGin:PHASe:FREQuency?

Returns the frequency of the phase margin.

Return values:

<Frequency>

Usage:

Query only
Asynchronous command

FRANalysis:MARGin:PHASe:VALUe?

Returns the value of the phase margin.

Return values:

<Phase>

Usage:

Query only
Asynchronous command

FRANalysis:MARKer<m>:STATe <Markers>

Enables the display of the marker table for the FRA.

Suffix:

<m> Irrelevant, omit the suffix.

Parameters:

<Markers> OFF | ON

*RST: ON

Usage:

Asynchronous command

Manual operation: See "[Markers](#)" on page 317

FRANalysis:MARKer<m>:FREQuency <Frequency>

Returns the frequency for the specified marker.

Suffix:

<m> 1..2
Selects the marker number.

Parameters:

<Frequency> Range: 0.01 to 1000000000
Increment: 1E-05
*RST: 1000
Default unit: Hz

Usage: Asynchronous command

FRANalysis:MARKer<m>:GAIN?

Returns the gain for the specified marker.

Suffix:

<m> 1..2
Selects the marker number.

Usage: Query only
Asynchronous command

FRANalysis:MARKer<m>:PHASe?

Returns the phase value for the specified marker.

Suffix:

<m> 1..2
Selects the marker number.

Usage: Query only
Asynchronous command

FRANalysis:MARKer<m>:SSCReen

Resets the marker to their initial positions. Reset is helpful if the markers have disappeared from the display or need to be moved for a larger distance.

Suffix:

<m> 1..2
Selects the marker number.

Usage: Setting only
Asynchronous command

17.15.2.6 Frequency response analysis export

| | |
|--------------------------------------|-----|
| EXPort:RESULT:SElect:FRA:MARgin..... | 938 |
| EXPort:RESULT:SElect:FRA:MARKer..... | 938 |
| EXPort:RESULT:SElect:FRA:RESUlt..... | 938 |

EXPort:RESULT:SElect:FRA:MARgin <MarginResult>

If enabled, includes the margin results in the results export file of the FRA.

Parameters:

<MarginResult> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[FRA results](#)" on page 322

EXPort:RESULT:SElect:FRA:MARKer <MarkerResult>

If enabled, includes the marker results in the results export file of the FRA.

Parameters:

<MarkerResult> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[FRA results](#)" on page 322

EXPort:RESULT:SElect:FRA:RESUlt <Result>

If enabled, includes the frequency response analysis results, including the frequency, gain, phase and amplitude, in the results export file of the FRA.

Parameters:

<Result> OFF | ON
 *RST: OFF

Usage: Asynchronous command

Manual operation: See "[FRA results](#)" on page 322

17.15.3 Power analysis (option R&S MXO5-K31)

Some of the commands in the following section are asynchronous. An overlapping or asynchronous command does not automatically finish executing before the next command starts executing. If overlapping commands must be executed in a defined order, e.g. to avoid wrong measurement results, they must be serviced sequentially.

To prevent an overlapping execution of commands, one of the commands *OPC, *OPC? or *WAI can be used after the command or a command set.

For more information, see:

- www.rohde-schwarz.com/rc-via-scp, section "Command sequence and synchronization"

Overview of statistic commands

The remote commands for the power analysis measurements can include statistic results. In the following the abbreviations after the commands have the following meaning:

| Command | Description |
|-----------------------------------|--|
| POWer<m>:xxx:RESUlt:nnn[:ACTual]? | Current measurement result |
| POWer<m>:xxx:RESUlt:nnn::AVERage? | Average of the measurement results |
| POWer<m>:xxx:RESUlt:nnn:RMS? | RMS value of the measurement results |
| POWer<m>:xxx:RESUlt:nnn::PPEak? | Positive peak value of the measurement results |
| POWer<m>:xxx:RESUlt:nnn::NPEak? | Negative peak value of the measurement results |
| POWer<m>:xxx:RESUlt:xxx::STDDev? | Standard deviation of the measurement results |

- [General settings](#).....939
- [Power quality](#).....940
- [Power harmonics](#).....954
- [Reference level](#).....964
- [Power analysis data](#).....969

17.15.3.1 General settings

| | |
|---|-----|
| POWer<m>[:ENABLE] | 939 |
| POWer<m>.TYPE | 939 |
| POWer<m>:ASKew[:EXECute] | 940 |
| EXPort:RESULT:SElect:POWer<m> | 940 |

POWer<m>[:ENABLE] <State>

Enables the power measurement instance.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<State> OFF | ON

Usage: Asynchronous command

Manual operation: See "[Add](#)" on page 325

POWer<m>:TYPE <Type>

Sets the type for the respective power analysis measurement.

Suffix:
 <m> 1 to 6, index of the power analysis measurement

Parameters:
 <Type> QUALity | HARMonics

Example: POW1:TYPE QUAL
 Sets the 1st power analysis measurement to quality.

Usage: Asynchronous command

Manual operation: See "Add" on page 325

POWer<m>:ASKew[:EXECute]

Performs auto deskew adjustment.

Suffix:
 <m> Irrelevant, omit the suffix.

Usage: Event
 Asynchronous command

Manual operation: See "Auto Deskew" on page 345

EXPort:RESUlt:SELect:POWer<m> <ExportResults>

If enabled, includes the results of selected power analysis measurement in the results export file.

Suffix:
 <m> 1 to 6, index of the power analysis measurement

Parameters:
 <ExportResults> OFF | ON
 *RST: OFF

Usage: Asynchronous command

17.15.3.2 Power quality**Power quality setup**

| | |
|--|-----|
| POWer<m>:QUALity:SOURce:CURREnt..... | 941 |
| POWer<m>:QUALity:SOURce[:VOLTage]..... | 941 |
| POWer<m>:QUALity:GATE..... | 941 |
| POWer<m>:QUALity:FREQuency[:VALue]..... | 941 |
| POWer<m>:QUALity:FREQuency:USER..... | 942 |
| POWer<m>:QUALity:STATistics[:ENABLE]..... | 942 |
| POWer<m>:QUALity:STATistics:RESet..... | 942 |
| POWer<m>:QUALity:STATistics:WFMCount?..... | 943 |

POWer<m>:QUALity:SOURce:CURRent <CurrentSource>

Selects the current source waveform. Active analog channels and math waveforms can be used.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<CurrentSource> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8

Usage: Asynchronous command

Manual operation: See "["Current"](#) on page 329

POWer<m>:QUALity:SOURce[:VOLTage] <VoltageSource>

Selects the voltage source waveform. Active analog channels and math waveforms can be used.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<VoltageSource> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8

Usage: Asynchronous command

Manual operation: See "["Voltage"](#) on page 328

POWer<m>:QUALity:GATE <Gate>

Selects the gate that is used for limiting the range of the power quality measurement.

Enable the gate before you assign a measurement to it ([GATE<g>:ENABLE =ON](#)).

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<Gate> Number of the gate to be used

Usage: Asynchronous command

Manual operation: See "["Gate"](#) on page 329

POWer<m>:QUALity:FREQuency[:VALue] <FundamFreq>

Sets the input frequency of the source signal in Hz.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<FundamFreq> F50 | F60 | F400 | USER | AUTO
*RST: F50

Usage: Asynchronous command

Manual operation: See "[Fund. Freq](#)" on page 329

POWer<m>:QUALity:FREQuency:USER <FundamentalFreq>

Sets the user-defined frequency, if [POWer<m>:QUALity:FREQuency\[:VALue\]](#) on page 941 is set to USER.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<FundamentalFreq> Range: 10 to 1000000
Increment: 1
*RST: 50
Default unit: Hz

Usage: Asynchronous command

Manual operation: See "[Fund. Freq](#)" on page 329

POWer<m>:QUALity:STATistics[:ENABLE] <State>

Enables statistical calculation for all power quality measurements.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<State> OFF | ON
*RST: ON

Usage: Asynchronous command

Manual operation: See "[Statistics](#)" on page 329

POWer<m>:QUALity:STATistics:RESET

Resets the statistic calculation for all power quality measurements.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Usage: Setting only
Asynchronous command

Manual operation: See "[Resets the statistics](#)" on page 329

POWer<m>:QUALity:STATistics:WFMCOUNT?

Returns the number of waveforms included in the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<WaveformCount> Number of analyzed waveforms

Usage:

Query only
Asynchronous command

Manual operation: See "[Statistics](#)" on page 329

Power quality measurement display

POWer<m>:QUALity:DISPlay:CURREnt:CREStfactor <ShwCurrCrest>

Enables the current crest factor measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwCurrCrest> OFF | ON
*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:CURREnt:PEAK <ShwCurrPeak>

Enables the current peak measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwCurrPeak> OFF | ON
*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:CURREnt:RMS <ShowCurrentRMS>

Enables the current RMS measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShowCurrentRMS> OFF | ON
*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:POWer:APPARENT <ShwApparentPow>

Enables the apparent power measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwApparentPow> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:POWer:PFACtor <ShwPowFact>

Enables the power factor measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwPowFact> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:POWer:PHASe <ShowPhase>

Enables the power phase measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShowPhase> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:POWer:REACTIVE <ShwReactivePow>

Enables the reactive power measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwReactivePow> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:POWER:REALpower <ShwActPow>

Enables the real power measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwActPow> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:VOLTage:CREStfactor <ShwVoltageCrest>

Enables the voltage crest factor measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwVoltageCrest> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:VOLTage:FREQuency <ShwVoltageFreq>

Enables the voltage frequency measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwVoltageFreq> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:VOLTage:PEAK <ShwVoltagePeak>

Enables the voltage peak value measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShwVoltagePeak> OFF | ON

*RST: ON

Usage:

Asynchronous command

POWer<m>:QUALity:DISPlay:VOLTage:RMS <ShowVoltageRMS>

Enables the voltage RMS measurement for the power quality analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ShowVoltageRMS> OFF | ON

*RST: ON

Usage: Asynchronous command

Power quality results

The following power quality measurements are available. All measurements except for the actual value require enabled statistics.

| | |
|----------|--|
| ACTual | Actual value |
| AVERage | Average value |
| EVTCount | Number of calculated waveforms |
| RMS | RMS value |
| PPEak | Positive peak value (maximum) |
| NPEak | Negative peak value (minimum) |
| WFMCount | Number of calculated measurement results (periods) |
| STDDev | Standard deviation |

| | |
|---|-----|
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor[:ACTual]? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:AVERage? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:EVTCount? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:NPEak? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:PPEak? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:RMS? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:WFMCount? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:STDDev? | 948 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK[:ACTual]? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:AVERage? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:EVTCount? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:NPEak? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:PPEak? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:RMS? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:WFMCount? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:PEAK:STDDev? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS[:ACTual]? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:AVERage? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:EVTCount? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:NPEak? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:PPEak? | 949 |

| | |
|---|-----|
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:RMS? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:WFMCount? | 949 |
| POWer<m>:QUALity:RESUlt:CURREnt:RMS:STDDev? | 949 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT[:ACTUAL]? | 949 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:AVERage? | 949 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:EVTCount? | 949 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:NPEak? | 949 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:PPEak? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:RMS? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:WFMCount? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:APPARENT:STDDev? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor[:ACTUAL]? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:AVERage? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:EVTCount? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:NPEak? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:PPEak? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:RMS? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:WFMCount? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PFACtor:STDDev? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE[:ACTUAL]? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:AVERage? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:EVTCount? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:NPEak? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:PPEak? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:RMS? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:WFMCount? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:PHASE:STDDev? | 950 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE[:ACTUAL]? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:AVERage? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:EVTCount? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:NPEak? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:PPEak? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:RMS? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:WFMCount? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REACTIVE:STDDev? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower[:ACTUAL]? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:AVERage? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:EVTCount? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:NPEak? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:PPEak? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:RMS? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:WFMCount? | 951 |
| POWer<m>:QUALity:RESUlt:POWer:REALpower:STDDev? | 951 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor[:ACTUAL]? | 952 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:AVERage? | 952 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:EVTCount? | 952 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:NPEak? | 952 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:PPEak? | 952 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:RMS? | 952 |
| POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:WFMCount? | 952 |

| | |
|---|-----|
| POWer<m>:QUALity:RESULT:VOLTage:CREStfactor:STDDev? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency[:ACTual]? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:AVERage? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:EVTCount? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:NPEak? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:PPEak? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:RMS? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:WFMCount? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:FREQuency:STDDev? | 952 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK[:ACTual]? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:AVERage? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:EVTCount? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:NPEak? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:PPEak? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:RMS? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:WFMCount? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:PEAK:STDDev? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS[:ACTual]? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:AVERage? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:EVTCount? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:NPEak? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:PPEak? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:RMS? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:WFMCount? | 953 |
| POWer<m>:QUALity:RESULT:VOLTage:RMS:STDDev? | 953 |

POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor[:ACTual]?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:AVERage?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:EVTCount?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:NPEak?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:PPEak?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:RMS?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:WFMCount?
POWer<m>:QUALity:RESUlt:CURREnt:CREStfactor:STDDev?

Returns the current crest factor, the *Peak value / RMS value* for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

| | |
|----------|------------------------|
| <StdDev> | Range: -1E+26 to 1E+26 |
| | Increment: 1E-10 |
| | *RST: 0 |

Usage:

Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:CURREnt:PEAK[:ACTual]?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:AVERage?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:EVTCount?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:NPEak?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:PPEak?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:RMS?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:WFMCount?
POWer<m>:QUALity:RESUlt:CURREnt:PEAK:STDDev?

Returns the current peak value, the highest measured magnitude value for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

| | |
|----------|------------------------|
| <StdDev> | Range: -1E+26 to 1E+26 |
| | Increment: 1E-10 |
| | *RST: 0 |

Usage:

| |
|----------------------|
| Query only |
| Asynchronous command |

POWer<m>:QUALity:RESUlt:CURREnt:RMS[:ACTual]?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:AVERage?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:EVTCount?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:NPEak?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:PPEak?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:RMS?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:WFMCount?
POWer<m>:QUALity:RESUlt:CURREnt:RMS:STDDev?

Returns the root mean square of the current for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

| | |
|----------|------------------------|
| <StdDev> | Range: -1E+26 to 1E+26 |
| | Increment: 1E-10 |
| | *RST: 0 |

Usage:

| |
|----------------------|
| Query only |
| Asynchronous command |

POWer<m>:QUALity:RESUlt:POWER:APPARENT[:ACTual]?
POWer<m>:QUALity:RESUlt:POWER:APPARENT:AVERage?
POWer<m>:QUALity:RESUlt:POWER:APPARENT:EVTCount?
POWer<m>:QUALity:RESUlt:POWER:APPARENT:NPEak?

POWer<m>:QUALity:RESUlt:POWer:APPARENT:PPEak?
POWer<m>:QUALity:RESUlt:POWer:APPARENT:RMS?
POWer<m>:QUALity:RESUlt:POWer:APPARENT:WFMCount?
POWer<m>:QUALity:RESUlt:POWer:APPARENT:STDDev?

Returns the apparent power for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

| | |
|----------|------------------------|
| <StdDev> | Range: -1E+26 to 1E+26 |
| | Increment: 1E-10 |
| | *RST: 0 |

Usage:

Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:POWer:PFACtor[:ACTual]?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:AVERage?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:EVTCount?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:NPEak?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:PPEak?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:RMS?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:WFMCount?
POWer<m>:QUALity:RESUlt:POWer:PFACtor:STDDev?

Returns the power factor for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

| | |
|----------|------------------------|
| <StdDev> | Range: -1E+26 to 1E+26 |
| | Increment: 1E-10 |
| | *RST: 0 |

Usage:

Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:POWer:PHASE[:ACTual]?
POWer<m>:QUALity:RESUlt:POWer:PHASE:AVERage?
POWer<m>:QUALity:RESUlt:POWer:PHASE:EVTCount?
POWer<m>:QUALity:RESUlt:POWer:PHASE:NPEak?
POWer<m>:QUALity:RESUlt:POWer:PHASE:PPEak?
POWer<m>:QUALity:RESUlt:POWer:PHASE:RMS?
POWer<m>:QUALity:RESUlt:POWer:PHASE:WFMCount?
POWer<m>:QUALity:RESUlt:POWer:PHASE:STDDev?

Returns the phase for the power quality analysis.

For details on the statistics, see "Overview of statistic commands" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0

Usage:

Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:POWer:REACTive[:ACTual]?

POWer<m>:QUALity:RESUlt:POWer:REACTive:AVERage?

POWer<m>:QUALity:RESUlt:POWer:REACTive:EVTCount?

POWer<m>:QUALity:RESUlt:POWer:REACTive:NPEak?

POWer<m>:QUALity:RESUlt:POWer:REACTive:PPEak?

POWer<m>:QUALity:RESUlt:POWer:REACTive:RMS?

POWer<m>:QUALity:RESUlt:POWer:REACTive:WFMCount?

POWer<m>:QUALity:RESUlt:POWer:REACTive:STDDev?

Returns the reactive power for the power quality analysis.

For details on the statistics, see "Overview of statistic commands" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0

Usage:

Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:POWer:REALpower[:ACTual]?

POWer<m>:QUALity:RESUlt:POWer:REALpower:AVERage?

POWer<m>:QUALity:RESUlt:POWer:REALpower:EVTCount?

POWer<m>:QUALity:RESUlt:POWer:REALpower:NPEak?

POWer<m>:QUALity:RESUlt:POWer:REALpower:PPEak?

POWer<m>:QUALity:RESUlt:POWer:REALpower:RMS?

POWer<m>:QUALity:RESUlt:POWer:REALpower:WFMCount?

POWer<m>:QUALity:RESUlt:POWer:REALpower:STDDev?

Returns the active power for the power quality analysis.

For details on the statistics, see "Overview of statistic commands" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
 Increment: 1E-10
 *RST: 0

Usage:

Query only
 Asynchronous command

POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor[:ACTual]?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:AVERage?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:EVTCount?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:NPEak?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:PPEak?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:RMS?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:WFMCOUNT?
POWer<m>:QUALity:RESUlt:VOLTage:CREStfactor:STDDev?

Returns the voltage crest factor, the *Peak value / RMS value* for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
 Increment: 1E-10
 *RST: 0

Usage:

Query only
 Asynchronous command

POWer<m>:QUALity:RESUlt:VOLTage:FREQuency[:ACTual]?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:AVERage?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:EVTCount?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:NPEak?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:PPEak?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:RMS?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:WFMCOUNT?
POWer<m>:QUALity:RESUlt:VOLTage:FREQuency:STDDev?

Returns the voltage frequency value for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
 Increment: 1E-10
 *RST: 0

Usage: Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:VOLTage:PEAK[:ACTual]?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:AVERage?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:EVTCount?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:NPEak?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:PPEak?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:RMS?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:WFMCount?
POWer<m>:QUALity:RESUlt:VOLTage:PEAK:STDDev?

Returns the voltage peak value, the highest measured magnitude value for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
 Increment: 1E-10
 *RST: 0

Usage: Query only
Asynchronous command

POWer<m>:QUALity:RESUlt:VOLTage:RMS[:ACTual]?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:AVERage?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:EVTCount?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:NPEak?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:PPEak?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:RMS?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:WFMCount?
POWer<m>:QUALity:RESUlt:VOLTage:RMS:STDDev?

Returns the root mean square of the voltage for the power quality analysis.

For details on the statistics, see "[Overview of statistic commands](#)" on page 939.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<StdDev> Range: -1E+26 to 1E+26
 Increment: 1E-10
 *RST: 0

Usage: Query only
Asynchronous command

17.15.3.3 Power harmonics

Power harmonics setup

| | |
|--|-----|
| POWer<m>:HARMonics:SOURce:CURREnt..... | 954 |
| POWer<m>:HARMonics:SOURce[:VOLTage]..... | 954 |
| POWer<m>:HARMonics:STANDARD..... | 955 |
| POWer<m>:HARMonics:REVision..... | 955 |
| POWer<m>:HARMonics:FREQuency:EN..... | 955 |
| POWer<m>:HARMonics:FREQuency:ML..... | 956 |
| POWer<m>:HARMonics:FREQuency:RTCA..... | 956 |
| POWer<m>:HARMonics:STATistics:ENABLE..... | 956 |
| POWer<m>:HARMonics:STATistics:RESET..... | 957 |
| POWer<m>:HARMonics:DISPlay:HARMonics..... | 957 |
| POWer<m>:HARMonics:DISPlay:FREQuency:START[:VALue]..... | 957 |
| POWer<m>:HARMonics:DISPlay:FREQuency:STOP[:VALue]..... | 957 |
| POWer<m>:HARMonics:DISPlay:BARGraph:VERTical:SCALE:TYPE..... | 958 |
| POWer<m>:HARMonics:RPOWER[:MODE]..... | 958 |
| POWer<m>:HARMonics:RPOWER:USER..... | 958 |
| POWer<m>:HARMonics:PFACtor:USER..... | 959 |
| POWer<m>:HARMonics:PFACtor[:MODE]..... | 959 |

POWer<m>:HARMonics:SOURce:CURREnt <CurrentSource>

Sets the channel for the current source input of the power harmonics analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<CurrentSource> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8

Usage: Asynchronous command

Manual operation: See "Current" on page 338

POWer<m>:HARMonics:SOURce[:VOLTage] <VoltageSource>

Sets the channel for the voltage source input of the power harmonics analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<VoltageSource> C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8

Usage: Asynchronous command

Manual operation: See "Voltage" on page 338

POWer<m>:HARMonics:STANdard <Standard>

Sets a standard for the current harmonic measurement.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<Standard> ENA | ENB | ENC | END | MIL | RTCA

ENA: EN 61000-3-2 Class A

ENB: EN 61000-3-2 Class B

ENC: EN 61000-3-2 Class C

END: EN 61000-3-2 Class D

MIL: MIL-STD-1399

RTCA: RTCA DO-160

*RST: ENA

Usage: Asynchronous command

Manual operation: See "Standard" on page 339

POWer<m>:HARMonics:REVision <Revision>

Selects the revision of the EN61000 standard, if [POWer<m>:HARMonics:STANdard](#) is set to ENA / ENB / ENC / END.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<Revision> REV2011 | REV2019

*RST: REV2019

Usage: Asynchronous command

Manual operation: See "Standard" on page 339

POWer<m>:HARMonics:FREQuency:EN <FundFreqEN61000>

Sets the fundamental frequency of the input signal for the EN61000 standard, if [POWer<m>:HARMonics:STANdard](#) is set to ENA / ENB / ENC / END.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<FundFreqEN61000> F50 | F60 | AUTO

F50: 50 Hz

F60: 60 Hz

AUTO: automatically set

*RST: AUTO

Usage: Asynchronous command

Manual operation: See "Fund. Freq" on page 338

POWer<m>:HARMonics:FREQuency:MIL <FundFreqMIL>

Sets the fundamental frequency of the input signal for the MIL standard, if **POWer<m>:HARMonics:STANDARD** is set to MIL.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<FundFreqMIL> F60 | F400

F60: 60 Hz

F400: 400 Hz

*RST: F60

Usage: Asynchronous command

Manual operation: See "Fund. Freq" on page 338

POWer<m>:HARMonics:FREQuency:RTCA <FundamFreqRTCA>

Sets the fundamental frequency of the input signal for the RTCA standard, if **POWer<m>:HARMonics:STANDARD** is set to RTCA.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<FundFreqRTCA> F400 | NVF | WVF

F400: 400 Hz

NVF

WVF

*RST: F400

Usage: Asynchronous command

Manual operation: See "Fund. Freq" on page 338

POWer<m>:HARMonics:STATistics:ENABLE <EnabStatistics>

Enables statistical calculation for the power harmonics analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<EnabStatistics> OFF | ON

*RST: ON

Usage: Asynchronous command

POWer<m>:HARMonics:STATistics:RESet

Resets the statistics for the power harmonics analysis.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Usage:

Setting only

Asynchronous command

Manual operation: See "[Clear Results](#)" on page 340

POWer<m>:HARMonics:DISPlay:HARMonics <DispedHarmonics>

Selects which harmonics are displayed in the bargraph: all, odd even or depending on the standard definition.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<DispedHarmonics> ALL | EVEN | ODD | STANDard

*RST: STANDard

Usage:

Asynchronous command

Manual operation: See "[Displ. Harm.](#)" on page 339

POWer<m>:HARMonics:DISPlay:FREQuency:STARt[:VALue] <Frequency>

Sets the start frequency of a bar graph display. At least three bars are displayed.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<Frequency> Range: 0 to 100000000

Increment: 1

*RST: 50

Default unit: Hz

Usage:

Asynchronous command

Manual operation: See "[Min X Frequency](#)" on page 342

POWer<m>:HARMonics:DISPlay:FREQuency:STOP[:VALue] <Frequency>

Sets the stop frequency of the bar graph display. The maximum value is defined by standard and fundamental frequency.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<Frequency> Range: 0 to 100000000
Increment: 1
*RST: 1000
Default unit: Hz

Usage:

Asynchronous command

Manual operation: See "[Max X Frequency](#)" on page 342

POWer<m>:HARMonics:DISPlay:BARGraph:VERTical:SCALe:TYPE <Scaling>

Selects a logarithmic or linear scale for the display for the harmonics bargraph.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<Scaling> LIN | LOG
*RST: LIN

Usage:

Asynchronous command

Manual operation: See "[Scale bar graph](#)" on page 339

POWer<m>:HARMonics:RPOWer[:MODE] <ActPowMd>

Available if [POWer<m>:HARMonics:STANDARD](#) is set to END.

Selects if the power factor is defined automatically, or a user-defined value is used ([POWer<m>:HARMonics:RPOWer:USER](#)).

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<ActPowMd> AUTO | USER
*RST: AUTO

Usage:

Asynchronous command

Manual operation: See "[Real power, Power](#)" on page 340

POWer<m>:HARMonics:RPOWer:USER <UsrActPow>

Selects the revision of the EN61000 standard, if [POWer<m>:HARMonics:STANDARD](#) is set to END and [POWer<m>:HARMonics:RPOWer:USER](#) is set to USER.

Sets a user-defined power value.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<UsrActPow> Range: 0 to 10000
 Increment: 1
 *RST: 100
 Default unit: W

Usage:

Asynchronous command

Manual operation: See "Real power, Power" on page 340

POWer<m>:HARMonics:PFACtor:USER <UsrPowFact>

Available if `POWer<m>:HARMonics:STANDARD` is set to ENC and `POWer<m>:HARMonics:PFACtor[:MODE]` is set to USER.

Sets a user-defined power factor.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<UsrPowFact> Range: 0 to 100
 Increment: 1
 *RST: 100
 Default unit: %

Usage:

Asynchronous command

Manual operation: See "Power factor" on page 339

POWer<m>:HARMonics:PFACtor[:MODE] <PowFactMd>

Available if `POWer<m>:HARMonics:STANDARD` is set to ENC.

Selects if the power factor is defined automatically, or a user-defined value is used (`POWer<m>:HARMonics:PFACtor:USER`).

Suffix:

<m> 1 to 6, index of the power analysis measurement

Parameters:

<PowFactMd> AUTO | USER
 *RST: AUTO

Usage:

Asynchronous command

Manual operation: See "Power factor" on page 339

Power harmonics results

| | |
|--|-----|
| <code>POWer<m>:HARMonics:AVAilable?</code> | 960 |
| <code>POWer<m>:HARMonics:MEASurement:THDFundament[:ACTual]?</code> | 960 |
| <code>POWer<m>:HARMonics:MEASurement:THDRms[:ACTual]?</code> | 960 |
| <code>POWer<m>:HARMonics:RESUlt<n>:VIOLation?</code> | 960 |

| | |
|--|-----|
| POWer<m>:HARMonics:RESUlt<n>[:FREQuency]? | 961 |
| POWer<m>:HARMonics:MEASurement:FREQuency[:ACTual]? | 961 |
| POWer<m>:HARMonics:MEASurement:REALpower[:ACTual]? | 961 |
| POWer<m>:HARMonics:RESUlt<n>:MAGNitude:PERCent:MAXimum? | 962 |
| POWer<m>:HARMonics:RESUlt<n>:MAGNitude:PERCent:MINimum? | 962 |
| POWer<m>:HARMonics:RESUlt<n>:MAGNitude:PERCent[:ACTual]? | 962 |
| POWer<m>:HARMonics:RESUlt<n>:MAGNitude:RMS:MAXimum? | 962 |
| POWer<m>:HARMonics:RESUlt<n>:MAGNitude:RMS:MINimum? | 963 |
| POWer<m>:HARMonics:RESUlt<n>:MAGNitude:RMS[:ACTual]? | 963 |
| POWer<m>:HARMonics:MEASurement:FREQuency[:ACTual]? | 963 |
| POWer<m>:HARMonics:MEASurement:REALpower[:ACTual]? | 963 |

POWer<m>:HARMonics:AVAilable?

Returns the number of measured harmonics.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<Count>

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:MEASurement:THDFundament[:ACTual]?

Returns the total harmonic distortion relative to fundamental (THDF).

Suffix:

<m> 1 to 6, index of the power analysis measurement

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:MEASurement:THDRms[:ACTual]?

Returns the total harmonic distortion relative to the RMS amplitude (THD RMS).

Suffix:

<m> 1 to 6, index of the power analysis measurement

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:VIOLation?

Queries if the value of n-th harmonic is within the defined limit for the current measurement.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:RESUlt<n>[:FREQuency]?

Returns the frequency of the n-th harmonic.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:MEASurement:FREQuency[:ACTual]?

Returns the frequency of measured harmonics.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<Actual> Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:MEASurement:REALpower[:ACTual]?

Returns the real power. Only available, if [POWer<m>:HARMonics:STANDARD](#) on page 955 is set to ENC / END.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<Actual> Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:MAGNitude:PERCent:MAXimum?

Returns the maximum magnitude of the n-th harmonic in percent.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:MAGNitude:PERCent:MINimum?

Returns the minimum magnitude of the n-th harmonic in percent.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:MAGNitude:PERCent[:ACTual]?

Returns the magnitude of the n-th harmonic in percent.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:MAGNitude:RMS:MAXimum?

Returns the maximum magnitude of the n-th harmonic in RMS.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:MAGNitude:RMS:MINimum?

Returns the minimum magnitude of the n-th harmonic in RMS.

Suffix:

<m> 1 to 6, index of the power analysis measurement
<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:RESUlt<n>:MAGNitude:RMS[:ACTual]?

Returns the magnitude of the n-th harmonic in RMS.

Suffix:

<m> 1 to 6, index of the power analysis measurement
<n> 1...n, index of the harmonics

Return values:

<Harmonic>

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:MEASurement:FREQuency[:ACTual]?

Returns the frequency of measured harmonics.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<Actual> Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0

Usage: Query only
Asynchronous command

POWer<m>:HARMonics:MEASurement:REALpower[:ACTual]?

Returns the real power. Only available, if [POWer<m>:HARMonics:STANDARD](#) on page 955 is set to ENC / END.

| | |
|-----------------------|---|
| Suffix: | |
| <m> | 1 to 6, index of the power analysis measurement |
| Return values: | |
| <Actual> | Range: -1E+26 to 1E+26
Increment: 1E-10
*RST: 0 |
| Usage: | Query only
Asynchronous command |

17.15.3.4 Reference level

| | |
|--|-----|
| POWer<m>:HARMonics:REFLevel<rI>:ABSolute:HYSTeresis..... | 964 |
| POWer<m>:QUALity:REFLevel<rI>:ABSolute:HYSTeresis..... | 964 |
| POWer<m>:HARMonics:REFLevel<rI>:ABSolute:LLEVel..... | 965 |
| POWer<m>:QUALity:REFLevel<rI>:ABSolute:LLEVel..... | 965 |
| POWer<m>:HARMonics:REFLevel<rI>:ABSolute:MLEVel..... | 965 |
| POWer<m>:QUALity:REFLevel<rI>:ABSolute:MLEVel..... | 965 |
| POWer<m>:HARMonics:REFLevel<rI>:ABSolute:ULEVel..... | 965 |
| POWer<m>:QUALity:REFLevel<rI>:ABSolute:ULEVel..... | 965 |
| POWer<m>:HARMonics:REFLevel<rI>:LMODE..... | 966 |
| POWer<m>:QUALity:REFLevel<rI>:LMODE..... | 966 |
| POWer<m>:HARMonics:REFLevel<rI>:RELative:HYSTeresis..... | 966 |
| POWer<m>:QUALity:REFLevel<rI>:RELative:HYSTeresis..... | 966 |
| POWer<m>:HARMonics:REFLevel<rI>:RELative:LOWER..... | 966 |
| POWer<m>:QUALity:REFLevel<rI>:RELative:LOWER..... | 966 |
| POWer<m>:HARMonics:REFLevel<rI>:RELative:MIDDLE..... | 967 |
| POWer<m>:QUALity:REFLevel<rI>:RELative:MIDDLE..... | 967 |
| POWer<m>:HARMonics:REFLevel<rI>:RELative:MODE..... | 967 |
| POWer<m>:QUALity:REFLevel<rI>:RELative:MODE..... | 967 |
| POWer<m>:HARMonics:REFLevel<rI>:RELative:UPPer..... | 968 |
| POWer<m>:QUALity:REFLevel<rI>:RELative:UPPer..... | 968 |
| POWer<m>:HARMonics:REFLevel<rI>:ABSolute:HIGH..... | 968 |
| POWer<m>:QUALity:REFLevel<rI>:ABSolute:HIGH?..... | 968 |

POWer<m>:HARMonics:REFLevel<rI>:ABSolute:HYSTeresis <HystAbs>

POWer<m>:QUALity:REFLevel<rI>:ABSolute:HYSTeresis <HystAbs>

Defines a hysteresis for the middle reference level. A rise or fall from the middle reference value that does not exceed the hysteresis is rejected as noise.

Suffix:

| | |
|------|---|
| <m> | 1 to 6, index of the power analysis measurement |
| <rI> | 1 to 8, index of the reference level set |

Parameters:

| | |
|-----------|---|
| <HystAbs> | Range: 0 to 1E+26
Increment: 0.001
*RST: 0.005
Default unit: V |
|-----------|---|

Usage: Asynchronous command

Manual operation: See "[Hysteresis](#)" on page 344

POWer<m>:HARMonics:REFLevel<rl>:ABSolute:LLEVel <LowerLevel>
POWer<m>:QUALity:REFLevel<rl>:ABSolute:LLEVel <LowerLevel>

Sets the lower reference level in absolute values. This is required, e.g., to determine a fall.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<LowerLevel> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 343

POWer<m>:HARMonics:REFLevel<rl>:ABSolute:MLEVel <MiddleLevel>
POWer<m>:QUALity:REFLevel<rl>:ABSolute:MLEVel <MiddleLevel>

Sets the middle reference level in absolute values.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<MiddleLevel> Range: -1E+26 to 1E+26
Increment: 0.001
*RST: 0
Default unit: V

Usage: Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 343

POWer<m>:HARMonics:REFLevel<rl>:ABSolute:ULEVel <UpperLevel>
POWer<m>:QUALity:REFLevel<rl>:ABSolute:ULEVel <UpperLevel>

Sets the upper reference level in absolute values. This is required to determine a rise.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<UpperLevel> Range: -1E+26 to 1E+26
 Increment: 0.001
 *RST: 0
 Default unit: V

Usage:

Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 343

POWer<m>:HARMonics:REFLevel<r1>:LMODe <LevelMode>

POWer<m>:QUALity:REFLevel<r1>:LMODe <LevelMode>

Defines if the reference level is set in absolute or relative values.

Suffix:

<m> 1 to 6, index of the power analysis measurement
 <r1> 1 to 8, index of the reference level set

Parameters:

<LevelMode> ABS | REL
 *RST: REL

Usage:

Asynchronous command

Manual operation: See "[Level mode](#)" on page 343

POWer<m>:HARMonics:REFLevel<r1>:RELative:HYSTeresis <HystRel>

POWer<m>:QUALity:REFLevel<r1>:RELATIVE:HYSTeresis <HystRel>

Defines a hysteresis for the middle reference level. A rise or fall from the middle reference value that does not exceed the hysteresis is rejected as noise.

Suffix:

<m> 1 to 6, index of the power analysis measurement
 <r1> 1 to 8, index of the reference level set

Parameters:

<HystRel> Range: 0 to 50
 Increment: 1
 *RST: 10
 Default unit: %

Usage:

Asynchronous command

Manual operation: See "[Hysteresis](#)" on page 344

POWer<m>:HARMonics:REFLevel<r1>:RELative:LOWer <LowRefLevRel>

POWer<m>:QUALity:REFLevel<r1>:RELATIVE:LOWer <LowRefLevRel>

Sets the lower relative reference level if [POWer<m>:QUALity:REFLevel<r1>:RELATIVE:MODE](#) is set to USER.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<LowRefLevRel> Range: -100 to 200
 Increment: 1
 *RST: 10
 Default unit: %

Usage: Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 344

POWer<m>:HARMonics:REFLevel<rl>:RELative:MIDDLE <MidRefLevRel>

POWer<m>:QUALity:REFLevel<rl>:RELative:MIDDLE <MidRefLevRel>

Sets the middle relative reference level if **POWer<m>:QUALity:REFLevel<rl>:RELative:MODE** is set to **USER**.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<MidRefLevRel> Range: -100 to 200
 Increment: 1
 *RST: 50
 Default unit: %

Usage: Asynchronous command

Manual operation: See "[Upper level, Middle level, Lower level](#)" on page 344

POWer<m>:HARMonics:REFLevel<rl>:RELative:MODE <RelativeLevels>

POWer<m>:QUALity:REFLevel<rl>:RELative:MODE <RelativeLevels>

The lower, middle and upper reference levels, defined as percentages of the high signal level.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<RelativeLevels> FIVE | TEN | TWENTy | USER

FIVE

5/50/95

TEN

10/50/90

TWENty

20/50/80

USERSet the reference levels to individual values with `POWer<m>:QUALity:REFLevel<rl>:RELative:LOWER`, `POWer<m>:QUALity:REFLevel<rl>:RELative:MIDDLE`, and`POWer<m>:QUALity:REFLevel<rl>:RELative:UPPer`.

*RST: TEN

Usage: Asynchronous command**Manual operation:** See "Relative levels" on page 343**POWer<m>:HARMonics:REFLevel<rl>:RELative:UPPer <UppRefLevRel>****POWer<m>:QUALity:REFLevel<rl>:RELative:UPPer <UppRefLevRel>**Sets the upper relative reference level if `POWer<m>:QUALity:REFLevel<rl>:RELative:MODE` on page 967 is set to USER.**Suffix:**

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<UppRefLevRel> Range: -100 to 200

Increment: 1

*RST: 90

Default unit: %

Usage: Asynchronous command**Manual operation:** See "Upper level, Middle level, Lower level" on page 344**POWer<m>:HARMonics:REFLevel<rl>:ABSolute:HIGH?****POWer<m>:QUALity:REFLevel<rl>:ABSolute:HIGH? <SignalHigh>**

Returns the high signal value, which is the 100% value of the signal.

Suffix:

<m> 1 to 6, index of the power analysis measurement

<rl> 1 to 8, index of the reference level set

Parameters:

<SignalHigh> Range: -1E+26 to 1E+26

Increment: 0.001

*RST: 0

Default unit: V

Usage: Query only

Asynchronous command

17.15.3.5 Power analysis data

This section describes the commands for exporting and loading power analysis measurement data.

| | |
|--|-----|
| <code>POWer<m>:HARMonics:POWer:DATA:HEADer?</code> | 969 |
| <code>POWer<m>:HARMonics:POWer:DATA[:VALues]?</code> | 969 |
| <code>POWer<m>:QUALity:POWer:DATA:HEADer?</code> | 970 |
| <code>POWer<m>:QUALity:POWer:DATA[:VALues]?</code> | 970 |

POWer<m>:HARMonics:POWer:DATA:HEADer?

Only available, if `Power<m>:HARMonics:STANDARD` is set to ENC / END.

Returns the header of the power analysis waveform data. The header contains the attributes of the waveform.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

| | |
|-------------------|--|
| <XStart> | 1. header value: start time XStart in s |
| <XStop> | 2. header value: end time XStop in s |
| <RecordLength> | 3. header value: record length of the waveform in samples |
| <ValuesPerSample> | 4. header value: number of values per sample interval. For power quality measurements, the value is 1. |

Usage:

Query only

Asynchronous command

POWer<m>:HARMonics:POWer:DATA[:VALues]? [<Offset>[,<Length>]]

Returns the data of the power analysis waveform points for transmission from the instrument to the controlling computer.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Query parameters:

<Offset> Number of offset waveform points to be skipped.

<Length> Number of waveform points to be retrieved.

Return values:

<Data> List of values according to the format and content settings.

Usage:

Query only

Asynchronous command

POWer<m>:QUALity:POWer:DATA:HEADer?

Returns the header of the power analysis waveform data. The header contains the attributes of the waveform.

Suffix:

<m> 1 to 6, index of the power analysis measurement

Return values:

<XStart> 1. header value: start time XStart in s

<XStop> 2. header value: end time XStop in s

<RecordLength> 3. header value: record length of the waveform in samples

<ValuesPerSample> 4. header value: number of values per sample interval. For power quality measurements, the value is 1.

Usage:

Query only

Asynchronous command

POWer<m>:QUALity:POWer:DATA[:VALUes]? [<Offset>[,<Length>]]

Returns the data of the power analysis waveform points for transmission from the instrument to the controlling computer.

Without parameters, the complete waveform is retrieved. Using the offset and length parameters, data can be retrieved in smaller portions, which makes the command faster. If you send only one parameter, it is interpreted as offset, and the data is retrieved from offset to the end of the waveform.

To set the export format, use [FORMAT \[:DATA\]](#).

Suffix:

<m> 1 to 6, index of the power analysis measurement

Query parameters:

<Offset> Number of offset waveform points to be skipped.

<Length> Number of waveform points to be retrieved.

Return values:

<Data> List of values according to the format and content settings.

Usage:

Query only

Asynchronous command

17.15.4 Digital voltmeter

This section describes the commands for setting up and querying the results of the digital voltmeter.

| | |
|---|-----|
| METer:DVMeter<m>:ENABLE? | 971 |
| METer:BANDwidth | 971 |
| METer:DVMeter<m>:ACRMs:ENABLE | 971 |

| | |
|-------------------------------------|-----|
| METer:DVMeter<m>:ACRMs:RESUlt? | 972 |
| METer:DVMeter<m>:DC:ENABLE..... | 972 |
| METer:DVMeter<m>:DC:RESUlt?..... | 972 |
| METer:DVMeter<m>:DCRMs:ENABLE..... | 973 |
| METer:DVMeter<m>:DCRMs:RESUlt?..... | 973 |

METer:DVMeter<m>:ENABLE?

Queries the state of the voltmeter for the respective channel.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<State> OFF | ON
*RST: OFF

Usage:

Query only
Asynchronous command

METer:BANDwidth <Bandwidth>

Sets the filter bandwidth.

Parameters:

<Bandwidth> B20M | B10M | B5M | B2M | B1M | B500 | B200
B20M: 20 MHz
B10M: 10 MHz
B5M: 5 MHz
B2M: 2 MHz
B1M: 1 MHz
B500: 500 kHz
B200: 200 kHz
*RST: B20M

Usage: Asynchronous command

Manual operation: See "[Filter bandwidth](#)" on page 348

METer:DVMeter<m>:ACRMs:ENABLE <ACRMSResults_St>

Enables the AC RMS voltmeter measurement for the respective channel.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<ACRMSResults_St> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Measurements](#)" on page 348

METer:DVMeter<m>:ACRMs:RESUlt?

Returns the result of the AC RMS voltmeter measurement.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Results_ACRMS> Range: -1E+26 to 1E+26
Increment: 0.1
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

Manual operation: See "[Measurements](#)" on page 348

METer:DVMeter<m>:DC:ENABLE <DCResults_St>

Enables the DC voltmeter measurement for the respective channel.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<DCResults_St> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "[Measurements](#)" on page 348

METer:DVMeter<m>:DC:RESUlt?

Returns the result of the DC voltmeter measurement.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Results_DC> Range: -1E+26 to 1E+26
Increment: 0.1
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

Manual operation: See "Measurements" on page 348

METer:DVMeter<m>:DCRMs:ENABLE <DCRMSResults_St>

Enables the DC RMS voltmeter measurement for the respective channel.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Parameters:

<DCRMSResults_St> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "Measurements" on page 348

METer:DVMeter<m>:DCRMs:RESUlt?

Returns the result of the DC RMS voltmeter measurement.

Suffix:

<m> 1 to 8, depending on instrument model. Index of the analog channel.

Return values:

<Results_DCRMS> Range: -1E+26 to 1E+26
Increment: 0.1
*RST: 0
Default unit: V

Usage: Query only
Asynchronous command

Manual operation: See "Measurements" on page 348

17.15.5 XY-plot

| | |
|--------------------|-----|
| XY<m>:SWAP..... | 973 |
| XY<m>[:STATe]..... | 974 |
| XY<m>:YSOURCE..... | 974 |
| XY<m>:XSOURCE..... | 974 |

XY<m>:SWAP

Replaces the source of the x-axis with the source of the y-axis and vice versa.

Suffix:

<m> 1 to 4, index of the XY-plot