Parameters:
<WhiteBackground> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "White background" on page 436

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

18.13 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.

18.13.1 General settings

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 | ... | C8 | D0 | D1 | D2 | ... | D14 | D15 | M1 | M2 | ... | M8 | TRK1 | TRK2 | TRK3 | ... | TRK24 | PA1QPOWER | PA2QPOWER | ... | PA6QPOWER | PA1HPOWER1 | PA2HPOWER1 | ... | PA6HPOWER1| | PA1SPOWER | PA2SPOWER | ... | PA6SPOWER | PA1SOA | PA2SOA | ... | PA6SOA | PA1IPOWER | PA2IPOWER | ... | PA6IPOWER | PA1OPOWER1 | PA2OPOWER1 | ... | PA6OPOWER1 | PA1OPOWER2 | PA2OPOWER2 | ... | PA6OPOWER2 | PA1OPOWER3 | PA2OPOWER3 | ... | PA6OPOWER3 | PA1TOPOWER | PA2TOPOWER | ... | PA6TOPOWER | O<n>C1 | O<n>C2 | ... | O<n>C8 (<n> = 2 to 8)

<SignalSource2> Same as <SignalSource>

Usage: Asynchronous command

Manual operation: See "Source" on page 272

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> See `MEASurement<mg>:SOURce` on page 1046.

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> See `MEASurement<mg>:SOURce` on page 1046.

Usage: Asynchronous command

Manual operation: See "Source 2, Clock source" on page 283

MEASurement<mg>:MAIN <MeasType>

Defines the measurement type to be performed. To query the result, use `MEASurement<mg>:RESult[:ACTual]?` on page 1058.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<MeasType>

Amplitude/time measurements
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

Jitter measurements
CCJitter | NCJitter | CCWidth | CCDutycycle | TIE | UINTerval | DRATe | SKWDelay | SKWPhase
Require option R&S MXO5-K12.

Measurements for serial protocols
F2F | T2F | F2T | FLDValue | MBITrate | SBITrate | BIDLe | GAP | FCNT | FEC | FER | CFER
Require option R&S MXO5-K500.

Usage: Asynchronous command

Manual operation: See "Specific type" on page 273

MEASurement<mg>:DISPlay:RESults <ResultLines>

Enables the measurement annotations for the selected measurement. These annotations are, for example, periods, maximum and minimum values, relevant reference levels, and more.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<ResultLines> OFF | ON
*RST: OFF

Usage: Asynchronous command

Manual operation: See "Display result lines" on page 281

MEASurement<mg>:DISPlay:REFLevel<rl>:LEVels <DisplayLevels>

Displays the reference levels of the indicated measurement.

Suffix:
<mg> 1 to 24, index of the measurement

<rl> Irrelevant, omit the suffix.
Reference level set is assigned to the measurement.

Parameters:
<DisplayLevels> OFF | ON
*RST: OFF

Usage: Asynchronous command

MEASurement<mg>:ENVSelect <EnvelopeCurve>

Relevant only for measurements on envelope waveforms. It selects the envelope to be used for measurement.

Prerequisites:

- `ACQuire:TYPE` 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 281

18.13.2 Settings for amplitude/time measurements

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 283

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 282

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 282

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 282

MEASurement<mg>:AMPTime:DELay<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 284

MEASurement<mg>:AMPTime:DTOTrigger<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 284

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 282

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 "Gate" on page 274

MEASurement<mg>:REFLevel<rl>:REFerence <RefLevelSet>

Selects the set of reference levels that is used for the measurement and for the indicated measurement source. Each source of the measurement can have its own reference level set.

Suffix:
<mg> 1 to 24, index of the measurement

<rl> 1..2
Measurement source, to which the reference level set is applied. For most measurements, one source is needed. For delay measurements, for example, two measurement sources are required, and each source can have its own reference levels.

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 274

18.13.3 Settings for jitter measurements

MEASurement<mg>:JITTer:NCYCles <NumberCycles>

Sets the number of periods (cycles) that are accumulated to measure the N-cycle jitter.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<NumberCycles>
Range: 1 to 4294967295
Increment: 1
*RST: 2

Usage: Asynchronous command

Manual operation: See "Number of cycles" on page 288

MEASurement<mg>:JITTer:POLarity <Polarity>

For cycle-cycle width and the cycle-cycle duty cycle measurements, the command sets the polarity of pulses for which the pulse width is measured: POSitive or NEGative. `MEASurement<mg>:MAIN` is set to measurements CCWidth | CCDutycycle.

For skew delay and skew phase measurements, the command sets the edge of the first waveform from which the measurements starts: POSitive, NEGative or EITHer. `MEASurement<mg>:MAIN` is set to measurements SKWDelay | SKWPhase.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<Polarity> POSitive | NEGative | EITHer
*RST: POSitive

Usage: Asynchronous command

Manual operation: See "Pulse polarity" on page 288

MEASurement<mg>:JITTer:REFLevel<rl> <ReferenceLevel>

Selects the reference level that is used for the measurement and for the indicated measurement source. Each source of the measurement can have its own reference level .

Suffix:
<mg> 1 to 24, index of the measurement

<rl> 1..2
Measurement source, to which the reference level set is applied. For most measurements, one source is needed. For delay measurements, for example, two measurement sources are required, and each source can have its own reference levels.

Parameters:
<ReferenceLevel> UPPer | MIDDle | LOWer
*RST: MIDDle

Example:
```
MEASurement1:MAIN SKWDelay
MEASurement1:SOURce C1,C2
MEASurement1:JITTer:REFLevel1 MIDDle
MEASurement1:JITTer:REFLevel2 UPPer
```

Measurement 1 is a skew delay measurement on channel 1 and channel 2. C1 is the first source and uses the middle reference level. C2 is the second source and uses the upper reference level.

Usage: Asynchronous command

Manual operation: See "Reference level" on page 288

MEASurement<mg>:JITTer:RELPolarity <RelPolarity>

Sets the edge of the second waveform relative to the first waveform.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<RelPolarity> MATChing | INVerse

MATChing
Measures from positive to positive edge or from negative to negative edge.

INVerse
Measures from positive to negative edge or from negative to positive edge.

*RST: MATChing

Usage: Asynchronous command

Manual operation: See "Relative polarity" on page 288

MEASurement<mg>:JITTer:SLOPe <Slope>

For cycle-cycle jitter, N-cycle jitter, and cycle-cycle duty cycle measurements, the setting selects the slope at which the periods and thus the jitter is measured: FIRSt, POSitive, NEGative or EITHer. `MEASurement<mg>:MAIN` is set to measurements CCJitter | NCJitter | CCDutycycle.

For time-interval error measurements, the command sets the edges of the data signal that are used for measurements: POSitive, NEGative or EITHer. `MEASurement<mg>:MAIN` is set to TIE.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<Slope> FIRSt | POSitive | NEGative | EITHer

*RST: FIRSt

<Slope> FIRSt | POSitive | NEGative | EITHer

FIRSt
Measures the period from the first edge that is found, no matter of its direction.

POSitive
Measures the period at positive going edges.

NEGative
Measures the period at negative going edges.

EITHer
Measures the period at both positive and negative going edges. This option is useful, for example, to check the clock stability of a double data rate clock.

*RST: FIRSt

Usage: Asynchronous command

Manual operation: See "Cycle begin, Slope" on page 287

MEASurement<mg>:JITTer:TREF <TimingReference>

Selects the timing reference, which is one of the available clock configurations. The timing reference must be defined before it can be used.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<TimingReference> Range: 1 to 4

Usage: Asynchronous command

Manual operation: See "Timing reference" on page 290

MEASurement<mg>:JITTer:UNIT <Unit>

Sets the unit for data rate measurements.

Suffix:
<mg> 1 to 24, index of the measurement

Parameters:
<Unit> BIT_S | HZ

*RST: BIT_S

Usage: Asynchronous command

Manual operation: See "Unit" on page 290

18.13.4 Settings for protocol measurements

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 293

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 293

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 293

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 293

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 293

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 294

18.13.5 Results

MEASurement<mg>:CLEar

Deletes the results of all measurements.

Suffix:
<mg> Irrelevant, omit the suffix.

Usage: Setting only
Asynchronous command

Manual operation: See "Clear results" on page 296

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: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

18.13.6 Statistics

MEASurement<mg>:STATistics:RESet
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 296

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 296

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 297

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 297

18.13.7 Tracks