Return values:

<MaxLength> Range: 1 to 200
Increment: 1
*RST: 20
Default unit: UI

Usage: Query only

ADVJitter<m>:DCOMposition:RLEStimate

Runs an estimate of the step response for the advanced jitter analysis measurements.

Suffix:

<m> 1..2

Usage: Event
Asynchronous command

ADVJitter<m>:DCOMposition:POSStep <Position>

Sets the steps position.

Suffix:

<m> 1..2

Parameters:

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

ADVJitter<m>:DCOMposition:RESPlength <Length>

Set the step response length in unit intervals.

Suffix:

<m> 1..2

Parameters:

<Length> Range: 1 to 200
Increment: 1
*RST: 20
Default unit: UI

ADVJitter<m>:DCOMposition:ENP <State>

Enables the display of the periodic jitter components table.

Suffix:

<m> 1..2

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

ADVJitter<m>:DCOMposition:NHORizontal <MaxNumber>

Sets the maximum number of periodic components in the horizontal direction that are considered for the measurement. If the actual number of periodic components is higher than the set value, they are considered for the random jitter component.

Suffix:
<m> 1..2

Parameters:
<MaxNumber> Range: 0 to 10
Increment: 1
*RST: 5

ADVJitter<m>:DCOMposition:NVERtical <MaxNumber>

Sets the maximum number of periodic components in the vertical direction that are considered for the measurement. If the actual number of periodic components is higher than the set value, they are considered for the random jitter component.

Suffix:
<m> 1..2

Parameters:
<MaxNumber> Range: 0 to 10
Increment: 1
*RST: 5

ADVJitter<m>:DCOMposition:ENOBu <State>

Suffix:
<m> 1..2

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

23.22.3 Clock data recovery (software-based, option R&S RTO-K12)

CDR:SOFTware<m>:ALGorithm <Algorithm>

Sets the software algorithm that is used for clock data recovery.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<Algorithm> CFRequency | PLL | FF | PLLStart

CFRequency
Constant frequency. CDR uses the nominal bit rate to generate the clock signal. The method assumes that the frequency of the signal is constant during the complete acquisition.

PLL
Phase-locked loop control system. It can follow slow deviations in the frequency of the data stream.

FF
Feed forward algorithm, a mathematical optimization method. Feed forward is available if none of the listed serial standards is used ("Custom"). It is faster than PLL, i.e., the settling time is shorter. Feed forward is also more precise than PLL. To set up the algorithm, set the bandwidth and the relative bandwith.

*RST: PLLStart

Usage: Asynchronous command

CDR:SOFTware<m>:SERStandard <SerialStandard>

Sets the serial standard. The nominal bit rate and bandwidth settings are set according to the selected standard, no estimation is required. The serial standards are available only if the instrument is able to support its maximum nominal bit rate.

Set `CUSTOM` to adjust the bit rate and the bandwidth manually.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:

<SerialStandard> CUSTOM | USB20 | USB31GEN1 | USB31GEN2 | DISPPORT11 | DISPPORT12 | FIBCHAN1 | FIBCHAN2 | FIBCHAN4 | FIBCHAN8 | FIBCHAN16 | HDMI12 | HDMI14 | HDMI20 | PCIGEN1 | PCIGEN2 | PCIGEN3 | PCIGEN4 | SATAGEN1500 | SATAGEN11667 | SATAGEN1 | SATAGEN2500 | SATAGEN21667 | SATAGEN2 | SATAGEN3500 | SATAGEN31667 | SATAGEN3 | SASGEN1 | SASGEN2 | SASGEN3 | TB10G | XAUI | CUSTOM | USB20 | USB31GEN1 | DISPPORT11 | DISPPORT12 | FIBCHAN1 | FIBCHAN2 | FIBCHAN4 | HDMI12 | HDMI14 | HDMI20 | PCIGEN1 | PCIGEN2 | SATAGEN1500 | SATAGEN11667 | SATAGEN1 | SATAGEN2500 | SATAGEN21667 | SATAGEN2 | SATAGEN3500 | SATAGEN31667 | SATAGEN3 | SASGEN1 | SASGEN2 | XAUI

*RST: CUSTOM

Usage: Asynchronous command

CDR:SOFTware<m>:ESBRate:SOURce <BitrateSource>

Selects the source of the data stream, which is analized to recover the clock.

Suffix:

<m> 1..2
Number of the software CDR setup

Parameters:

<BitrateSource> C1W1 | C2W1 | C3W1 | C4W1 | R1 | R2 | R3 | R4

Usage: Asynchronous command

CDR:SOFTware<m>:ESBRate:BREStimate

Estimates the bit rate once, for the current acquisition.

Suffix:

<m> 1..2
Number of the software CDR setup

Usage: Event
Asynchronous command

CDR:SOFTware<m>:ESBRate:CONTinuous <BitrateEstimation>

Enables ongoing correction of the bit rate.

Suffix:

<m> 1..2
Number of the software CDR setup

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

Usage: Asynchronous command

CDR:SOFTware<m>:BITRate <Bitrate>

Sets the quiescent frequency of the PLL. It corresponds to the data rate of the data stream from which the clock is to be recovered.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<Bitrate> Range: 100 to max {5 Gbps, <available instrument bandwidth}
Increment: 10
*RST: 1E+9
Default unit: bps

Usage: Asynchronous command

CDR:SOFTware<m>:ESLope <Edge>

Selects the edges of the data stream that are used for the clock recovery.

- "Either": Both positive and negative edges are used
- "Positive / Negative": Only one edge direction is used. Use one of these settings if the other edge might deliver unreliable results.

Suffix:
<m> 1..2
Number of the software CDR setup

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

Usage: Asynchronous command

CDR:SOFTware<m>:SYNC <InitialSync>

Defines the phase reference for the first clock edge.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<InitialSync> SAMPle | DATaedge

SAMPle
The first clock edge matches the first sample of the waveform at the left border of the display.

DATaedge
The first clock edge matches the first edge of the data signal.

*RST: DATaedge

Usage: Asynchronous command

CDR:SOFTware<m>:RESults <Results>

The PLL requires some time to synchronize to the phase of the data stream. You can select when the CDR algorithm returns clock edges.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<Results> ALL | AISYnc

ALL
All clock edges are used.

AISYnc
The clock edges of the synchronization time are discarded; results are gathered after initial synchronization of the CDR. Thus, meaningful TIE measurement results can be obtained.

*RST: ALL

Usage: Asynchronous command

CDR:SOFTware<m>:PLL:ORDer <PLLOrder>

Sets the order of the PLL: first or second order. PLL of higher order can compensate for more complex jitter behavior.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<PLLOrder> FIRSt | SECond

*RST: SECond

Usage: Asynchronous command

CDR:SOFTware<m>:PLL:BWIDth <PLLBandwidth>

Sets the PLL bandwidth. It defines the part of the spectrum that the PLL can follow during synchronization. The PLL bandwidth is usually defined by the transmission standard.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<PLLBandwidth> Range: Nominal BITRate * Range of RELBwidth (dependent range)
Increment: 10
*RST: 599.88E+3
Default unit: Hz

Usage: Asynchronous command

CDR:SOFTware<m>:PLL:RELBwidth <PLLRelBw>

Sets the relative bandwidth, that is the ratio of the nominal bit rate to the PLL bandwidth.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<PLLRelBw> Range: 10 to 5000
Increment: 1
*RST: 1667

Usage: Asynchronous command

CDR:SOFTware<m>:PLL:DAMPing <DampingFactor>

Sets the damping factor, which is only relevant for second order PLL.

Suffix:
<m> 1..2
Number of the software CDR setup

Parameters:
<DampingFactor> Range: 0.5 to 1
Increment: 0.01
*RST: 0.7

Usage: Asynchronous command

CDR:SOFTware<m>:REVLockpll <ReverseLockPll>

Enables the reverese lock PLL algorithm. The signal is locked on the first edge.

Suffix:
<m> 1..2

Parameters:

<ReverseLockPll> ON | OFF

*RST: ON

Usage: Asynchronous command

CDR:SOFTware<m>:SAMTime <UntIntvlOffs>

Sets a sampling time for the clock signal, an offset for the clock edge in relation to the bit start. The clock edge sets the beginning of the unit interval. The sampling time is a number between 0 and 1. Value 0 sets the clock edge to the beginning of the bit period; value 0.5 sets the clock edge to the middle of the bit period.

Suffix:

<m> 1..2

Parameters:

<UntIntvlOffs>

Range: 0 to 1
Increment: 0.01
*RST: 0.5
Default unit: UI

Usage: Asynchronous command

23.22.4 Clock data recovery (hardware-based, option R&S RTO-K13)

CDR:HARDware:SOURce <Source>

Selects the channel signal that is used for clock recovery.

The source cannot be changed if the CDR trigger is selected in the trigger setup. In this case, the instrument triggers on the recovered clock; trigger source and CDR source are the same.

Parameters:

<Source> CHAN1 | C1 | CHAN2 | C2 | CHAN3 | C2 | CHAN4 | C4

*RST: CHAN1

Usage: Asynchronous command

CDR:HARDware:SERStandard <SerialStandard>

Sets the serial standard. Set `CUSTOM` to adjust the bit rate and the bandwidth manually.

Parameters:

<SerialStandard> CUSTOM | USB20 | DISPPORT11 | FIBCHAN1 | FIBCHAN2 | HDMI12 | PCIGEN1 | SATAGEN1500 | SATAGEN11667

*RST: CUSTOM

Usage: Asynchronous command

CDR:HARDware:BREStimate

Estimates the bite rate once, for the current acquisition.

Usage: Event
Asynchronous command

CDR:HARDware:BITRate <Bitrate>

Sets the quiescent frequency of the PLL. It corresponds to the data rate of the data stream from which the clock is to be recovered.

Parameters:

<Bitrate>
Range: 200E+3 to 2.5E+9 for 10 GSa/s; range depends on sample rate
Increment: 10
*RST: 1E+9
Default unit: bps

Usage: Asynchronous command

CDR:HARDware:ESLope <Edge>

Selects the edges of the data stream that are used for the clock recovery.

- "Either": Both positive and negative edges are used
- "Positive / Negative": Only one edge direction is used. Use one of these settings if the other edge might deliver unreliable results.

Parameters:

<Edge> POSitive | NEGative | EITHer

*RST: EITHer

Usage: Asynchronous command

CDR:HARDware:PLL:ORDer <PLLOrder>

Sets the order of the PLL: first or second order. PLL of higher order can compensate for more complex jitter behavior.

Parameters:

<PLLOrder> FIRSt | SECond

*RST: FIRSt

Usage: Asynchronous command

CDR:HARDware:PLL:BWIDth <PLLBandwidth>

Sets the PLL bandwidth. It defines the part of the spectrum that the PLL can follow during synchronization. The PLL bandwidth is usually defined by the transmission standard.

Parameters:

<PLLBandwidth> Range: Nominal BITRate * Range of RELBwidth (dependent range)
Increment: 10
*RST: 599.88E+3
Default unit: Hz

Usage: Asynchronous command

CDR:HARDware:PLL:RELBwidth <PLLRelBw>

Sets the relative bandwidth, that is the ratio of the nominal bit rate to the PLL bandwidth.

Parameters:

<PLLRelBw> Range: 500 to 3000
Increment: 1
*RST: 1667

Usage: Asynchronous command

CDR:HARDware:PLL:DAMPing <DampingFactor>

Sets the damping factor, which is only relevant for second order PLL.

Parameters:

<DampingFactor> Range: 0.5 to 1
Increment: 0.01
*RST: 0.7

Usage: Asynchronous command

CDR:HARDware:SAMTime <UntIntvlOffs>

Sets a sampling time for the clock signal, an offset for the clock edge in relation to the bit start. The clock edge sets the beginning of the unit interval. The sampling time is a number between 0 and 1. Value 0 sets the clock edge to the beginning of the bit period; value 0.5 sets the clock edge to the middle of the bit period.

Parameters:

<UntIntvlOffs>
Range: 0 to 1
Increment: 0.01
*RST: 0.5
Default unit: UI

Usage: Asynchronous command

TRIGger<m>:LEVel<n>[:VALue] <Level>

Sets the trigger level for the specified event and source.

If the trigger source is serial bus, the trigger level is set by the thresholds in the protocol configuration.

Suffix:

<m>
1..3
1 = A-trigger, 2 = B-trigger, 3 = R-trigger

<n>
1..31
Indicates the trigger source:
1...4 = channel 1 to 4
5 = external trigger input
6...11 = not available
12...27 = R&S RT-ZVC input channels
28...31 = differential signals Diff1, Diff2 and Common1, Common2

Parameters:

<Level>
Voltage for the trigger level.

Range: Depends on vertical scale, channel offset and other settings. The trigger level must be within the current display range.
Increment: 1E-3
*RST: 0
Default unit: V

Example: `TRIG:LEV5 0.01`
Sets the trigger level for the external trigger signal to 10 mV.
`TRIG2:LEV3 0.2`
Sets the trigger level for the B-event and B-trigger source channel 3 to 200 mV.

Usage: Asynchronous command

23.22.5 Serial pattern trigger using CDR

TRIGger<m>:SPATtern:CDR <CdrInUse>

Disables the clock source and enables the recovered clock signal generated by hardware CDR.

Suffix:
<m> 1..3
Only 1 = A-trigger, 2 | 3 = not available. Can be omitted.

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

Usage: Asynchronous command

CDR:HARDware:SAMTime <UntIntvlOffs>

Sets a sampling time for the clock signal, an offset for the clock edge in relation to the bit start. The clock edge sets the beginning of the unit interval. The sampling time is a number between 0 and 1. Value 0 sets the clock edge to the beginning of the bit period; value 0.5 sets the clock edge to the middle of the bit period.

Parameters:
<UntIntvlOffs> Range: 0 to 1
Increment: 0.01
*RST: 0.5
Default unit: UI

Usage: Asynchronous command

23.22.6 Eye mask testing

The eye mask testing is available if the option R&S RTO-K12 is activated on the instrument.

The commands for eye mask testing are described in Chapter 23.14.6, "Eye mask testing", on page 1597.

23.23 Power analysis (option R&S RTO-K31)

23.23.1 General

POWer:ENABle

Activates the power mode and initializes the power measurements. If the power mode is disabled, the instrument does not accept any `POWer` command.

Use `POWer:ENABle` after each `*RST`.

Example: See Chapter 23.3.7.1, "Auto deskew", on page 1278

Usage: Event

POWer:SOURce:CURRent<1..2> <CurrentSource>

Sets the channel for the current source.

Parameters:

<CurrentSource> CHAN1 | CHANnel1 | CHAN2 | CHANnel2 | CHAN3 | CHANnel3 | CHAN4 | CHANnel4

CHAN1 = CHANnel1, CHAN2 = CHANnel2, CHAN3 = CHANnel3, CHAN4 = CHANnel4

*RST: CURRent1: CHAN2, CURRent2: CHAN4,

Usage: Asynchronous command

POWer:SOURce:VOLTage<1..4> <VoltageSource>

Sets the channel for the voltage source input.

Parameters:

<VoltageSource> CHAN1 | CHANnel1 | CHAN2 | CHANnel2 | CHAN3 | CHANnel3 | CHAN4 | CHANnel4

CHAN1 = CHANnel1, CHAN2 = CHANnel2, CHAN3 = CHANnel3, CHAN4 = CHANnel4

*RST: VOLTage1: CHAN1, VOLTage2: CHAN3, VOLTage3: CHAN3, VOLTage4: CHAN4

Usage: Asynchronous command

23.23.2 Deskew

Programming example: Chapter 23.3.7.1, "Auto deskew", on page 1278

POWer:DESKew:CURRent

Applies the result of the auto deskew to the "Skew offset" value.

Usage: Event

POWer:DESKew:EXECute

Starts the auto deskew.

Usage: Event

POWer:DESKew:RESet <OverwriteCurrSkew>

Overwrites the present skew setup.

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

POWer:DESKew:TIME?

Queries the result of the auto deskew.

Return values:
<AutoDeskewOffs> Range: -100E-9 to 100E-9
*RST: 0
Default unit: s

Usage: Query only

POWer:DESKew:UDPReset <UsrDefinedPreset>

Activates or deactivates a user defined setup. If ON, the instrument setup including probe setup and the deskew values are written to a user defined preset file (saveset) that can be loaded using `MMEMory:RCL` on page 1644.

The default path is:

C:\Users\Public\Documents\Rohde-Schwarz\RTO\SaveSets\

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

23.23.3 Report

POWer:REPort:CONTent:HSETup <ContentHorizSet>
POWer:REPort:CONTent:MSETup <ContentMeasSet>
POWer:REPort:CONTent:MSIGnal <ContentMeasuredSigns>
POWer:REPort:CONTent:RESU <ContentResults>
POWer:REPort:CONTent:SETTings <ContentSettings>

POWer:REPort:CONTent:TSETup <ContentTrigSet>
POWer:REPort:CONTent:VSETup <ContentVertSet>

Sets how often the respective content is shown in the final report.

Parameters:
<ContentVertSet> ALWAYS | NEVER | ONCE
*RST: ONCE

POWer:REPort:CONTent:TITLe <ContentTitle>

Includes the title page in the report.

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

POWer:REPort:DESCription <String>
POWer:REPort:DUT <String>
POWer:REPort:SITE <String>
POWer:REPort:TEMPerature <String>
POWer:REPort:USER <String>

The content of the strings is shown at the title page of a report if the title page is included in the report.

Parameters:
<String>

POWer:REPort:FONT:COLO <FontColor>

Sets the font color.

Parameters:
<FontColor> Range: 0 to 4294967295
Increment: 1
*RST: 0

POWer:REPort:FONT:FAMI <FontFamily>

Selects the font family. You can choose between Arial and Helvetica.

Parameters:
<FontFamily> ARIAL | HELV
*RST: ARIAL

POWer:REPort:FONT:SIZE <FontSize>

Sets the font size.

Parameters:

<FontSize>	Range:	10 to 30
	Increment:	1
	*RST:	12

POWer:REPort:LOGO <LogoFile>

Selects a path to a logo picture file.

Parameters:
<LogoFile>

POWer:REPort:PAPersize <PaperSize>

Set the layout of your report.

Parameters:

<PaperSize>	A4 | USL	
	*RST:	A4

POWer:REPort:FILE:NAME <Path>

Defines the path and file name of the report file that is to be created, saved, or deleted.

Parameters:

<Path>	String containing path and file name

POWer:REPort:FILE:DELete

Deletes the selected report file.

Usage: Event

POWer:REPort:FILE:NEW

Creates a new report file.

Usage: Event

POWer:REPort:FILE:SAVE

Saves the report file.

Usage: Event

POWer:REPort:TEST:ADD <MeasType>
POWer:REPort:TEST:INSert <MeasType>, <Index>
POWer:REPort:TEST:REMove <MeasType>, <Index>

Manage reports.

Setting parameters:

<MeasType> QUAL | RUSH | HARM | MODU | DONR | SLEW | SOA | TURN | SWIT | EFF | RIPP | TRANS | SPEC

QUAL
Power Quality

RUSH
Inrush Current

HARM
Current Harmonic

MODU
Modulation Analysis

DONR
Dynamic ON Resistance

SLEW
Slew Rate

SOA
Safe Operating Area (S.O.A.)

TURN
Turn On/Off

SWIT
Switching Loss

EFF
Power Efficiency

RIPP
Ripple

TRANS
Transient Response

SPEC
Spectrum

<Index>

Usage: Setting only

POWer:REPort:INVert <InvertScreenshotClr>
POWer:REPort:TEST:DSEA <MeasType>
POWer:REPort:TEST:ISE <MeasType>

POWer:REPort:TEST:SEA <MeasType>
POWer:REPort:TEST:RSE <MeasType>

Manage the selection of reports.

Parameters:

<MeasType> QUAL | RUSH | HARM | MODU | DONR | SLEW | SOA | TURN | SWIT | EFF | RIPP | TRANS | SPEC

QUAL
Power Quality

RUSH
Inrush Current

HARM
Current Harmonic

MODU
Modulation Analysis

DONR
Dynamic ON Resistance

SLEW
Slew Rate

SOA
Safe Operating Area (S.O.A.)

TURN
Turn On/Off

SWIT
Switching Loss

EFF
Power Efficiency

RIPP
Ripple

TRANS
Transient Response

SPEC
Spectrum

POWer:REPort:TEST:DIRectory <MeasType>, <DirectoryPath>
POWer:REPort:TEST:DIRectory? <MeasType>

Selects the directory, in which the reports are saved.

Setting parameters:

<DirectoryPath>

Parameters for setting and query:

<MeasType> QUAL | RUSH | HARM | MODU | DONR | SLEW | SOA | TURN | SWIT | EFF | RIPP | TRANS | SPEC

POWer:REPort:TEST:COMMent <MeasType>, <Comment>
POWer:REPort:TEST:COMMent? <MeasType>

Sets a comment for the report.

Setting parameters:
<Comment>

Parameters for setting and query:
<MeasType> QUAL | RUSH | HARM | MODU | DONR | SLEW | SOA | TURN | SWIT | EFF | RIPP | TRANS | SPEC

POWer:REPort:TEST:COUNt <MeasType>

Parameters:
<MeasType> QUAL | RUSH | HARM | MODU | DONR | SLEW | SOA | TURN | SWIT | EFF | RIPP | TRANS | SPEC

Return values:
<Count>

POWer:REPort:TEST:LSENd? <MeasType>

Query parameters:
<MeasType> QUAL | RUSH | HARM | MODU | DONR | SLEW | SOA | TURN | SWIT | EFF | RIPP | TRANS | SPEC

Usage: Query only

23.23.4 Power quality

POWer:QUALity:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL
*RST: MANUAL

POWer:QUALity:EXECute

Starts the power quality measurement.

Usage: Event

POWer:QUALity:FREQ <Frequency>

Sets the input frequency of the source signal in Hz.

Parameters:

<Frequency> F50 | F60 | F360 | F400 | F650 | F800 | NFF650 | WFF800 | FCUS
NFF650: 360 to 650 Hz
WFF800: 360 to 800 Hz
FCUS: user-defined frequency to be set using `POWer:QUALity:FCUS`.
*RST: F50

POWer:QUALity:FCUS <CustomFrequency>

Sets the user-defined frequency if `POWer:QUALity:FREQ` is set to `FCUS`.

Parameters:

<CustomFrequency> Range: 1 to 5000
Increment: 1
*RST: 16.666
Default unit: Hz

Firmware/software: Version 2.70

POWer:QUALity:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:QUALity:RESult:CURRent:CRESTfactor?
POWer:QUALity:RESult:CURRent:FREQuency?
POWer:QUALity:RESult:CURRent:PEAK?
POWer:QUALity:RESult:CURRent:RMS?

POWer:QUALity:RESult:POWer:APParent?
POWer:QUALity:RESult:POWer:PFACtor?
POWer:QUALity:RESult:POWer:PHASe?
POWer:QUALity:RESult:POWer:REACtive?
POWer:QUALity:RESult:POWer:REALpower?
POWer:QUALity:RESult:VOLTage:CRESt factor?
POWer:QUALity:RESult:VOLTage:FREQuency?
POWer:QUALity:RESult:VOLTage:PEAK?
POWer:QUALity:RESult:VOLTage:RMS?

Returns the value of the respective result.

Return values:

<Value> Range: Depends on the measured quantity.
Default unit: Depends on the measured quantity.

Usage: Query only

23.23.5 Inrush current

This measurement is a single shot measurement. To start the measurement, use the `RUNS` command.

POWer:INRush:ADD

Adds a gate.

Usage: Event

POWer:INRush:INSert <GateIndex>

Inserts a gate.

Setting parameters:

<GateIndex>

Usage: Setting only

POWer:INRush:REMove <GateIndex>

Removes a gate

Setting parameters:
<GateIndex>

Usage: Setting only

POWer:INRush:COUNt?

Queiries the number of inrush current gates.

Return values:
<Count>

Usage: Query only

POWer:INRush:EXECute

Starts the inrush current measurement.

Usage: Event

POWer:INRush:GATE<m>:STARt <StartTime>
POWer:INRush:GATE<m>:STOP <StopTime>

Sets the measuring time for the selected gate.

Suffix:
<m> *

Parameters:
<StopTime>
Range: 0 to 10
Increment: 0
*RST: 100E-6
Default unit: s

POWer:INRush:GATE<m>:VALue <Value>

Returns the value of the inrush current.

Suffix:
<m> *

Parameters:
<Value>
Range: -1000 to 1000
Increment: 0
*RST: 0
Default unit: A

POWer:INRush:MAXCurrent <MaxExpCurr>

Sets the maximum expected current for the vertical scale.

Parameters:

<MaxExpCurr>
Range: -1000 to 1000
Increment: 0
*RST: 10
Default unit: A

POWer:INRush:TRIGger <CurrentValue>

Sets the current value for the trigger.

Parameters:

<CurrentValue>
Range: -1000 to 1000
Increment: 0
*RST: 1
Default unit: A

POWer:INRush:REPort:ADD

Adds the result to the report list.

Usage: Event

23.23.6 Current harmonic

POWer:HARMonics:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale>
AUTO | MANUAL
*RST: MANUAL

POWer:HARMonics:DOFR <FrequencyDOA160>

Selects the frequency of the input signal.

Parameters:
<FrequencyDOA160> F360 | F400 | F650 | F800
*RST: F400

POWer:HARMonics:ENFR <FreqEN61000>

Selects the frequency of the input signal.

Parameters:
<FreqEN61000> F50 | F60
*RST: F50

POWer:HARMonics:MIFR <FreqMIL1399>

Selects the frequency of the input signal.

Parameters:
<FreqMIL1399> F400 | F60
*RST: F400

POWer:HARMonics:EVAL <AnalysisRevised>

Sets the evaluation of the results for "Standard" > "RTCA DO-160".

Parameters:
<AnalysisRevised> REVISED | NOREVISED
*RST: NOREVISED

POWer:HARMonics:EXECute

Starts the current harmonic measurement.

Usage: Event

POWer:HARMonics:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:HARMonics:RESult<m>:STDinuse?

Returns the used standard.

Suffix:
<m> 1..2

Return values:
<StandardInUse> ENA | ENB | ENC | END | MIL | RTC
*RST: ENA

Usage: Query only

POWer:HARMonics:RESult<m>:FREQuency<n>:VALue?
POWer:HARMonics:RESult<m>:MAXValue<n>:VALue?
POWer:HARMonics:RESult<m>:STDValue<n>:VALue?
POWer:HARMonics:RESult<m>:VALue<n>:VALue?

Returns the value of the respective result.

Suffix:
<m> 1..2

<n> *

Return values:
<Value> Range: -1000 to 1000
*RST: 0
Default unit: A

Usage: Query only

POWer:HARMonics:STAN <StandardInUse>

Sets a standard for the current harmonic measurement.

Parameters:
<StandardInUse> ENA | ENB | ENC | END | MIL | RTC
*RST: ENA

POWer:HARMonics:VOLT <DOADisplayResult>

Selects if the voltage results are displayed or not for "Standard" > "RTCA DO-160" and enabled "Evaluation with voltage source and revised current law".

Parameters:
<DOADisplayResult> VOLTDISP | NOVOLTDISP
*RST: NOVOLTDISP

Example:
```
POW:HARM:STAN RTC
POW:HARM:EVAL REVISED
POW:HARM:VOLT NOVOLTDISP
```
Selects an evaluation with the revised current law and no voltage display.

23.23.7 Modulation analysis

This measurement is a single shot measurement. To start the measurement, use the RUNS command.

POWer:MODulation:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL

*RST: MANUAL

POWer:MODulation:DHIStogram <DispHistg>

Activates or deactivates the display of a histogram.

Parameters:

<DispHistg> ON | OFF

*RST: ON

POWer:MODulation:EXECute

Starts the modulation analysis measurement.

Usage: Event
Asynchronous command

POWer:MODulation:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:MODulation:RESult:ACTual? <MeasType>
POWer:MODulation:RESult:AVG? <MeasType>
POWer:MODulation:RESult:EVTCount? <MeasType>
POWer:MODulation:RESult:NPEak? <MeasType>
POWer:MODulation:RESult:PPEak? <MeasType>
POWer:MODulation:RESult:RMS? <MeasType>
POWer:MODulation:RESult:STDDev? <MeasType>
POWer:MODulation:RESult:WFMCount? <MeasType>

Return the specified statistic result of the specified measurement type.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:
<MeasType> FREQ | DUTY

Usage: Query only

POWer:MODulation:SOURce <Source>

Selects the source for the measurement.

Parameters:
<Source> CURRENT | VOLTAGE
*RST: VOLTAGE

POWer:MODulation:TYPE <AnalysisType>

Sets the type of measurement.

Parameters:
<AnalysisType> TURNON | CONT
*RST: CONT

23.23.8 Dynamic ON resistance

POWer:DONRes:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:
<Autoscale> AUTO | MANUAL
*RST: MANUAL

POWer:DONRes:AVG <Average>

Enables/disables averaging.

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

POWer:DONRes:EXECute

Starts the dynamic on resistance measurement.

Usage: Event
Asynchronous command

POWer:DONRes:GATE<m>:STARt <Start>
POWer:DONRes:GATE<m>:STOP <Stop>

Sets the value for the cursor.

Suffix:
<m> 1..2

Parameters:
<Stop>

POWer:DONRes:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:DONRes:RESult:RESistance?

Returns the the dynamic on resistance value.

Return values:
<Resistance> Range: -100E+24 to 100E+24
*RST: 0
Default unit: \x2126

Usage: Query only

23.23.9 Slew rate

POWer:SLEWrate:SOURce <Source>

Selects the source for the slew rate measurement.

Parameters:

<Source> CURRENT | VOLTAGE
*RST: VOLTAGE

POWer:SLEWrate:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL
*RST: MANUAL

POWer:SLEWrate:AVGDeriv <AvgDerivative>

Activates or deactivates average.

Parameters:

<AvgDerivative> ON | OFF
*RST: ON

POWer:SLEWrate:EXECute

Starts the slew rate measurement.

Usage: Event

ACQuire:ARESet:MODE <ArtmRst>

Defines when the envelope and average evaluation restarts.

Parameters:

<ArtmRst> NONE | TIME | WFMS

TIME
Restarts the envelope and average calculation after the time defined with `ACQuire:ARESet:TIME`.

WFMS
Restarts the envelope and average calculation after a number of acquired waveforms defined with `ACQuire:ARESet:COUNt` on page 1337.

*RST: NONE

Usage: Asynchronous command

ACQuire:ARESet:TIME <EnvelopeTimeout>

Defines the time after which the envelope and average evaluation restarts.

The setting is relevant if `ACQuire:ARESet:MODE` is set to `TIME`.

Parameters:

<EnvelopeTimeout>
Range: 0.1 to 10000
Increment: 0.01
*RST: 0.1
Default unit: s

Usage: Asynchronous command

ACQuire:ARESet:COUNt <NofWaveforms>

Defines the number of acquired waveforms after which the envelope and average evaluation restarts.

The setting is relevant if `ACQuire:ARESet:MODE` is set to `WFMS`.

Parameters:

<NofWaveforms>
Range: 2 to 16777215
Increment: 10
*RST: 1000

Usage: Asynchronous command

POWer:SLEWrate:GATE:STARt <T0>
POWer:SLEWrate:GATE:STOP <T1>

Sets the value for the cursor.

Parameters:

<T1>

POWer:SLEWrate:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:SLEWrate:RESult:ACTual? <MeasType>
POWer:SLEWrate:RESult:AVG? <MeasType>
POWer:SLEWrate:RESult:EVTCount? <MeasType>
POWer:SLEWrate:RESult:NPEak? <MeasType>
POWer:SLEWrate:RESult:PPEak? <MeasType>
POWer:SLEWrate:RESult:RMS? <MeasType>
POWer:SLEWrate:RESult:STDDev? <MeasType>
POWer:SLEWrate:RESult:WFMCount? <MeasType>

Return the specified statistic result of the specified measurement type.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:
<MeasType> MIN | MAX

Usage: Query only

23.23.10 S.O.A

POWer:SOA:EXECute

Starts the safe operating area measurement.

Usage: Event

POWer:SOA:LINear:ADD
POWer:SOA:LOGarithmic:ADD

Adds a point.

Usage: Event

POWer:SOA:LINear:COUNt?
POWer:SOA:LOGarithmic:COUNt?

Queries the number of points.

Return values:
<Count>

Usage: Query only

POWer:SOA:LINear:REMove <GateIndex>
POWer:SOA:LOGarithmic:REMove <GateIndex>

Removes a point.

Setting parameters:
<GateIndex>

Usage: Setting only

POWer:SOA:LINear:INSert <GateIndex>
POWer:SOA:LOGarithmic:INSert <GateIndex>

Inserts a point.

Setting parameters:
<GateIndex>

Usage: Setting only

POWer:SOA:LINear:POINt<m>:CURRent <Amp>
POWer:SOA:LOGarithmic:POINt<m>:CURRent <Amp>

Sets the current value for the respective point.

Suffix:
<m> *

Parameters:

<Amp>
Range: 0.01 to 1000
Increment: 0
*RST: 0.01
Default unit: A

POWer:SOA:LINear:POINt<m>:VOLTage <Volt>
POWer:SOA:LOGarithmic:POINt<m>:VOLTage <Volt>

Sets the voltage value for the respective point.

Suffix:

<m> *

Parameters:

<Volt>
Range: 1E-3 to 1000
Increment: 0
*RST: 1E-3
Default unit: V

POWer:SOA:MASK <EnableMaskTest>

Activates or deactivates a mask.

Parameters:

<EnableMaskTest> ON | OFF
*RST: OFF

POWer:SOA:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:SOA:SCALe <Scale>

Sets the scale for the measurement.

Parameters:

<Scale> LOG | LINEAR
*RST: LOG

POWer:SOA:SWITch <Switch>

Switches between linear and logarithmic scale.

Parameters:

<Switch> LOGLINEAR | LINEARLOG
*RST: LOGLINEAR

23.23.11 Turn on/off

This measurement is a single shot measurement. To start the measurement, use the RUNS command.

POWer:ONOFf:ATOFf <ACTrigLevOff>
POWer:ONOFf:ATON <ACTrigLevOn>

Triggers the beginning of the measurements at the moment the AC input voltage reaches the set value.

Parameters:

<ACTrigLevOn>
Range: -1E+6 to 1E+6
Increment: 1E-3
*RST: 10
Default unit: V

POWer:ONOFf:DTOFf <ACTrigLevOff>
POWer:ONOFf:DTON <ACTrigLevOn>
POWer:ONOFf:DSOFf <StateLevelOff>
POWer:ONOFf:DSON <StateLevelOn>

Sets the percentage of the steady state level of the DC output that has to be reached.

Parameters:

<StateLevelOn>
Range: 0 to 100
Increment: 1
*RST: 90
Default unit: %

POWer:ONOFf:EXECute

Starts the turn on/off measurement.

Usage: Event

POWer:ONOFf:INPut <InputType>

Sets the input type.

Parameters:

<InputType> AC | DC
*RST: AC

POWer:ONOFf:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:ONOFf:RESult:TOFF?
POWer:ONOFf:RESult:TON?

Returns the result time.

Return values:

<TurnOnTime> Range: -100E+24 to 100E+24
Increment: 100E-12
*RST: 0
Default unit: s

Usage: Query only

POWer:ONOFf:TIME <Time>

Sets the time, the start of the measurement of the turn off time is delay with, after the trigger point.

Parameters:

<Time> Range: 100E-12 to 10000
Increment: 100E-9
*RST: 0.1
Default unit: s

POWer:ONOFf:TYPE <MeasType>

Selects the measurement type.

Parameters:

<MeasType> TON | TOFF
TON - "Turn on" measurement
TOFF - "Turn off" measurement
*RST: TON

23.23.12 Switching loss

POWer:SWITching:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL

*RST: MANUAL

POWer:SWITching:EXECute

Starts the switching loss measurement.

Usage: Event
Asynchronous command

POWer:SWITching:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:SWITching:SWIFrequency <SwitchingFreq>

Sets the switching frequency.

Parameters:
<SwitchingFreq> Range: 1 to 500E+9
Increment: 1000
*RST: 10E+6
Default unit: Hz

POWer:SWITching:SWIT <MeasSwitchingFreq>

Activates or deactivates the measurements of the switching frequency.

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

POWer:SWITching:COND <MeasureConduction>
POWer:SWITching:NCON <MeasureNonConduction>
POWer:SWITching:TON <MeasureTurnOn>
POWer:SWITching:TOFF <MeasureTurnOff>
POWer:SWITching:TOTal <MeasureTotal>

Enables the measurement during the respective period.

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

POWer:SWITching:GATE:COND:STARt <T1>
POWer:SWITching:GATE:COND:STOP <T2>
POWer:SWITching:GATE:NCON:STARt <T3>
POWer:SWITching:GATE:TOFF:STARt <T2>
POWer:SWITching:GATE:TOFF:STOP <T3>
POWer:SWITching:GATE:TON:STARt <T0>
POWer:SWITching:GATE:TON:STOP <T1>

Sets the value for the respective cursor.

Parameters:
<T1>

POWer:SWITching:RESult:ENERgy:ACTual? <MeasType>
POWer:SWITching:RESult:ENERgy:AVG? <MeasType>
POWer:SWITching:RESult:ENERgy:EVTCount? <MeasType>
POWer:SWITching:RESult:ENERgy:NPEak? <MeasType>
POWer:SWITching:RESult:ENERgy:PPEak? <MeasType>
POWer:SWITching:RESult:ENERgy:RMS? <MeasType>
POWer:SWITching:RESult:ENERgy:STDDev? <MeasType>
POWer:SWITching:RESult:ENERgy:WFMCount? <MeasType>

Return the specified statistic result of the specified measurement type.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<MeasType> SWF | TON | TOF | CON | NCO | TOT

Usage: Query only

POWer:SWITching:RESult:POWer:ACTual? <MeasType>
POWer:SWITching:RESult:POWer:AVG? <MeasType>
POWer:SWITching:RESult:POWer:EVTCount? <MeasType>
POWer:SWITching:RESult:POWer:NPEak? <MeasType>
POWer:SWITching:RESult:POWer:PPEak? <MeasType>
POWer:SWITching:RESult:POWer:RMS? <MeasType>
POWer:SWITching:RESult:POWer:STDDev? <MeasType>
POWer:SWITching:RESult:POWer:WFMCount? <MeasType>

Return the specified statistic result of the specified measurement type.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<MeasType> SWF | TON | TOF | CON | NCO | TOT

Usage: Query only

23.23.13 Power efficiency

POWer:EFFiciency:AUTO <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL
*RST: MANUAL

POWer:EFFiciency:EXECute

Starts the power efficiency measurement.

Usage: Event

POWer:EFFiciency:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:EFFiciency:RESult<m>:ACTual?
POWer:EFFiciency:RESult<m>:AVG?
POWer:EFFiciency:RESult<m>:EVTCount?
POWer:EFFiciency:RESult<m>:NPEak?
POWer:EFFiciency:RESult<m>:PPEak?
POWer:EFFiciency:RESult<m>:RMS?
POWer:EFFiciency:RESult<m>:STDDev?
POWer:EFFiciency:RESult<m>:WFMCount?

Return the specified statistic result of the specified measurement type.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results

- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Suffix:
<m> 1..3

Return values:
<WaveformsCount> Range: 0 to 4E+9
*RST: 0

Usage: Query only

23.23.14 Ripple

POWer:RIPPle:AUToscale <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL

*RST: MANUAL

POWer:RIPPle:CURRent <TwoChMeas>

Activates or deactivates the input current.

Parameters:

<TwoChMeas> ON | OFF

*RST: ON

POWer:RIPPle:EXECute

Starts the ripple measurement.

Usage: Event

POWer:RIPPle:FREQuency <SmpsFrequency>

Sets the SMPS switching frequency.

Parameters:

<SmpsFrequency> Range: 1 to 100E+9
Increment: 1
*RST: 1E+6
Default unit: Hz

POWer:RIPPle:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:RIPPle:RESult:FREQuency[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:FREQuency:WFMCount? [<VoltageMeasType>]

Return the specified statistic result of the frequency of the signal. The result is based on the period measurement.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:

<Result> Statistic result of the frequency

Usage: Query only

POWer:RIPPle:RESult:MAXimum[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:MAXimum:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the maximum value of the waveform.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:

<Result> Statistic result

Usage: Query only

POWer:RIPPle:RESult:MINimum[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:MINimum:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the minimum value of the waveform.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:
<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:
<Result> Statistic result

Usage: Query only

POWer:RIPPle:RESult:NDCYcle[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:NDCYcle:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the negative duty cycle. The measurement requires at least one complete period of a triggered signal.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:
<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:
<Result> Statistic result

Usage: Query only

POWer:RIPPle:RESult:PDCYcle[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDCYcle:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the positive duty cycle. The measurement requires at least one complete period of a triggered signal.

- [:ACTual]: current measurement result

- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:

<Result> Statistic result

Usage: Query only

POWer:RIPPle:RESult:PDEL[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:PDEL:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the peak to peak measurement.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:

<Result> Statistic result

Usage: Query only

POWer:RIPPle:RESult:PERiod[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:PERiod:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:PERiod:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:PERiod:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:PERiod:PPEak? [<VoltageMeasType>]

POWer:RIPPle:RESult:PERiod:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:PERiod:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:PERiod:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the period, the length of the left-most signal period of the waveform.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:

<Result> Statistic result

Usage: Query only

POWer:RIPPle:RESult:STDDev[:ACTual]? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:AVG? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:EVTCount? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:NPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:PPEak? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:RMS? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:STDDev? [<VoltageMeasType>]
POWer:RIPPle:RESult:STDDev:WFMCount? [<VoltageMeasType>]

Return the specified statistic result for the standard deviation of the long-term measurement results.

- [:ACTual]: current measurement result
- AVG: average of the long-term measurement results
- EVTCount: number of measurement results in the long-term measurement
- NPEak: negative peak value of the long-term measurement results
- PPEak: positive peak value of the long-term measurement results
- RMS: RMS value of the long-term measurement results
- STDDev: standard deviation of the long-term measurement results

Query parameters:

<VoltageMeasType> VOLTage | CURRent
*RST: VOLTage

Return values:

<Result> Statistic result

Usage: Query only

23.23.15 Transient response

This measurement is a single shot measurement. To start the measurement, use the `RUNS` command.

Programgramming example: Chapter 23.3.7.2, "Transient response measurement", on page 1279

POWer:TRANsient:AUToscale <Autoscale>

Selects the scaling for the display of the results.

Parameters:
<Autoscale> AUTO | MANUAL
*RST: MANUAL

POWer:TRANsient:EXECute

Starts the transient response measurement.

Usage: Event

POWer:TRANsient:FREQuency <SmpsFrequency>

Sets the SMPS switching frequency.

Parameters:
<SmpsFrequency> Range: 1 to 100E+6
Increment: 1
*RST: 1E+6
Default unit: Hz

POWer:TRANsient:HYSTeresis <ToleranceTube>

Specifies a tolerated error band for the signal level.

Parameters:

<ToleranceTube>
Range: 0 to 50
Increment: 1
*RST: 10
Default unit: %

POWer:TRANsient:INPut <ThreeChMeas>

Activates or deactivates the input voltage.

Parameters:

<ThreeChMeas>
ON | OFF
*RST: OFF

POWer:TRANsient:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:TRANsient:RESult[:ACTual]? <MeasType>

Returns the results of the transient response measurement.

Query parameters:

<MeasType>
OVERshoot | RTIMe | DELay | PEAKtime | SETTling

Usage: Query only

POWer:TRANsient:SIGHigh <ExpHighOutputSignLev>

Sets the expected signal high voltage value.

Parameters:

<ExpHighOutputSignLev>
Range: -1000 to 1000
Increment: 1E-3
*RST: 1
Default unit: V

POWer:TRANsient:SIGLow <ExpLowOutputSignLev>

Sets the expected signal low voltage value.

Parameters:

<ExpLowOutputSignLev>
Range: -1000 to 1000
Increment: 1E-3
*RST: 0
Default unit: V

POWer:TRANsient:TRGChannel <TriggerSource>

Sets the source channel of the trigger.

Parameters:

<TriggerSource> CHAN1 | CHANnel1 | CHAN2 | CHANnel2 | CHAN3 | CHANnel3 | CHAN4 | CHANnel4

CHAN1 = CHANnel1, CHAN2 = CHANnel2, CHAN3 = CHANnel3, CHAN4 = CHANnel4
Only the measurement source channels can be used as trigger source.

*RST: CHAN1

POWer:TRANsient:TRGLevel <TriggerLevel>

Parameters:

<TriggerLevel> Range: -1000 to 1000
Increment: 1E-3
*RST: 0
Default unit: V

POWer:TRANsient:TRGSlope <TriggerSlope>

Sets the edge type for the trigger event.

Parameters:

<TriggerSlope> POSitive | NEGative | EITHer

*RST: POSitive

23.23.16 Spectrum

POWer:SPECtrum:AUToscale <Autoscale>

Selects the scaling for the display of the results.

Parameters:

<Autoscale> AUTO | MANUAL

*RST: MANUAL

POWer:SPECtrum:EXECute

Starts the spectrum measurement.

Usage: Event

POWer:SPECtrum:FREQuency <SmpsFrequency>

Sets the SMPS switching frequency.

Parameters:
<SmpsFrequency> Range: 1 to 100E+6
Increment: 1
*RST: 1E+6
Default unit: Hz

POWer:SPECtrum:REPort:ADD

Adds the result to the report list.

Usage: Event

POWer:SPECtrum:RCOunt?

Returns the total number of harmonics.

Return values:
<ResultCount>

Usage: Query only

POWer:SPECtrum:RESult<m>:FREQuency?

Returns the result frequency of the m-th result value.

Suffix:
<m> 1..*

Return values:
<Frequency>

Usage: Query only

POWer:SPECtrum:RESult<m>:LEVel?

Returns the result level of the m-th result value.

Suffix:
<m> 1..*

Return values:
<Level>

Usage: Query only

23.24 Deembedding (Option R&S RTO-K121)

Some of the commands in the following chapter 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-scpi, chapter "Command Sequence and Synchronization"
- Chapter 23.3, "Programming examples", on page 1261

23.24.1 Measurement setup

DEEMbedding<m>[:STATe] <State>

Activates the deembedding - the correction of parasitic effects of the measurement setup on the measured signal.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

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

Usage: Asynchronous command

DEEMbedding<m>:ADD <Index>, [<Type>]

Adds a component to the measurement setup.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Setting parameters:
<Index> Defines the place of the component in the measurement path. The DUT is always the first component (index = 1), the probe or input is the last component.

<Type> PROBe | FIXTure | CABLe | DUT | ADAPter | INPut | OTHer | RTZA10 | RTZA16 | RTZA17 | PP | PC | COPRobes

RTZA10 | RTZA16 | RTZA17
SMA adapters and cable offered by Rohde & Schwarz

PP | PC
Proven probe, proven cable

Usage: Setting only
Asynchronous command

DEEMbedding<m>:REMove <Index>

Deletes the component with the indicated index from the measurement setup.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Setting parameters:
<Index> Defines the place of the component in the measurement path. The DUT is always the first component (index = 1), the probe or input is the last component.

Usage: Setting only
Asynchronous command

DEEMbedding<m>:CCOunt?

Returns the total number of components in the measurement setup, including disabled components.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Return values:
<Value> Integer value, number of components

Usage: Query only

DEEMbedding<m>:BANDwidth <Bandwidth>

Sets the maximum bandwidth until which the signal is corrected. This maximum value is the minimum bandwidth value of probe, probe tip and oscilloscope bandwidth, and can not be higher than the highest frequency in a used S-parameter file.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Parameters:
<Bandwidth> Bandwidth limit for correction.

Range: 1E+9 to 16E+9
Increment: 10
*RST: 4E+9
Default unit: Hz

Usage: Asynchronous command

DEEMbedding<m>:CMPDelay <DelayCompens>

Enables the compensation for the group delay of the complete measurement setup. If enabled, the calibration time reference point is the start point of the measurement setup. If disabled, the calibration time reference point is the oscilloscope's channel input.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Parameters:
<DelayCompens> ON | OFF

*RST: ON

Usage: Asynchronous command

DEEMbedding<m>:PRESet

Sets the complete deembedding configuration to the default values.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Usage: Event
Asynchronous command

23.24.2 Save and load the deembedding setup

DEEMbedding<m>:NAME <Path>

Sets the file name, file format and path of the deembedding setup file. The file format is always `.xml`.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Parameters:
<Path> String with path and file name with extension `.xml`

Usage: Asynchronous command

DEEMbedding<m>:SAVE

Saves the deembedding configuration to the file specified with `DEEMbedding<m>:NAME`.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Usage: Event

DEEMbedding<m>:OPEN

Opens and loads the deembedding configuration from the file specified with `DEEMbedding<m>:NAME`.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Usage: Event

DEEMbedding<m>:DELete

Deletes the deembedding configuration file specified with `DEEMbedding<m>:NAME`.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Usage: Event

23.24.3 Components

23.24.3.1 General settings

DEEMbedding<m>:COMPonent<n>[:STATe] <IsEnabled>

Enables or disables the indicated component for deembedding.

The first and the last component are always enabled and cannot be disabled.

Suffix:

<m> 1..4
Selects the channel that is configured for deembedding.

<n> 2..n-1
Index of the component in the measurement setup. The DUT has index 1, the probe has index n.

Parameters:

<IsEnabled> ON | OFF

*RST: OFF

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:TYPE <Type>

Sets the type of the indicated component. The first component is always DUT, the last component is PROBe or INPut.

Suffix:

<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1..n
Index of the component in the measurement setup. The DUT has index 1, the probe has index n.

Parameters:

<Type> PROBe | FIXTure | CABLe | DUT | ADAPter | INPut | OTHer | RTZA10 | RTZA16 | RTZA17 | PP | PC

RTZA10 | RTZA16 | RTZA17
SMA adapters and cable offered by Rohde & Schwarz

PP | PC
Proven probe, proven cable

*RST: CABLe

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:NAME <Name>

Sets a name for the indicated component that helps you identifying it.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1..n
Index of the component in the measurement setup. The DUT has index 1, the probe has index n.

Parameters:
<Name> String parameter, name of the component

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:PCOunt?

Returns the number of all ports of the selected component (input ports and output ports).

The number of ports depends on the attached probe. If a modular probe R&S RT-ZM or differential probe R&S RT-ZD is used, the number of ports is 4. Otherwise, 2 ports are available.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1..n
Index of the component in the measurement setup. The DUT has index 1, the probe has index n.

Return values:
<TotalPorts> ONE | TWO | THRee | FOUR
*RST: TWO

Usage: Query only
Asynchronous command

23.24.3.2 DUT settings

DEEMbedding<m>:COMPonent<n>:MODE <Mode>

Sets the probing mode.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1, only for available DUT

Parameters:

<Mode> PROBing | TERMinating

PROBing
For measurements with a high-ohmic probe and measure on an existing line in parallel to the load.

TERMinating
For measurements if the measuring equipment is the load of the line.

*RST: PROBing

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:LOAD:REMProbeload <Value>

Removes the loading of the probe if `DEEMbedding<m>:COMPonent<n>:MODE` is set to `PROBing`.

If the probe loading is removed, you see the signal that would be at the measurement point if the probe's input impedance is ideal (infinite impedance).

Without removing the loading, you see the real signal at the measurement point, including the probe loading.

Suffix:

<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1, only for available DUT

Parameters:

<Value> OFF | ON

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:LOAD:IMPedance? <Value>

Shows the source impedance of the DUT. If an R&S RT-ZM probe is connected, the value depends on the selected probe mode: common mode, differential, or single-ended measurement.

Suffix:

<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1, only for available DUT

Return values:

<Value> Numeric value

Usage: Query only
Asynchronous command

23.24.3.3 R&S RT-ZM probe settings

This chapter lists the commands that correspond to the "Deembedding" > "RT-ZMxx" dialog box. More commands are provided in Chapter 23.8.7.6, "Modular probes, deembedding", on page 1360.

PROBe<m>:DEEMbedding:TIPModule[:SELect] <ProbeTip>

Selects the tip module that is used for measurement.

Suffix:
<m> 1..4
Selects the channel to which the probe is connected.

Parameters:
<ProbeTip> NONE | ZMA10 | ZMA12 | ZMA14 | ZMA15 | ZMA30 | ZMA40 | ZMA50 | CUST

*RST: ZMA10

Usage: Asynchronous command

PROBe<m>:DEEMbedding:TIPModule:ZMA<n>:SUBModule <Value>

Defines additional settings for some tip modules:

For the browser module R&S RT-ZMA30, measure the space between the pins, and select the appropriate value.

If R&S RT-ZMA40 is selected, choose the used submodule: semi-rigid cables or none.

Suffix:
<m> 1..4
Selects the channel to which the probe is connected.

<n> 30 (R&S RT-ZMA30) or 40 (R&S RT-ZMA40)

Parameters:
<Value> D16 | D25 | D45 | D75 | NONE | SRCS

For R&S RT-ZMA30:
D16 = 1.6 mm
D25 = 2.5 mm
D45 = 4.5 mm
D75 = 7.5 mm
For R&S RT-ZMA40:
NONE = no submodule
SRCS = semi-rigid cables

Usage: Asynchronous command

PROBe<m>:DEEMbedding:BANDwidth <ProbeBandwidth>

Sets the maximum bandwidth until which the signal is corrected. This maximum value is the minimum bandwidth value of probe, probe tip and oscilloscope bandwidth, and can not be higher than the highest frequency in a used S-parameter file. Consider that most tip modules support the full bandwidth of the probe amplifier, but some tip modules have limited bandwidth.

Suffix:
<m> 1..4
Selects the channel to which the probe is connected.

Parameters:
<ProbeBandwidth> Range: 1E+9 to 16E+9
Increment: 10
*RST: 4E+9
Default unit: Hz

Usage: Asynchronous command

23.24.3.4 Cable, adapter, fixture and custom settings

DEEMbedding<m>:COMPonent<n>:IDENtical <MatchedPaths>

The setting is relevant if the measurement setup is a 4-port, and the component is a 2-port. Usually, these components are cables and adapters, which are described by *.s2p files. In case of a 4-port setup, 2 cables or 2 adapters are used. If they are identical, for example, when a matched-pair cable is used, they can be described by the same file. In this case, set the command to ON.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1..*
Selects the component. The DUT has suffix 1.

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

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:IPONe <InputPort1>
DEEMbedding<m>:COMPonent<n>:IPTWo <InputPort2>
DEEMbedding<m>:COMPonent<n>:OPONe <OutputPort1>
DEEMbedding<m>:COMPonent<n>:OPTWo <OutputPort2>

Assign the ports to the input and output of the component according to the data in the Touchstone file. This information is not directly written in the file. You need background information how the S-parameters were determined, i.e. which port was input and which port was output.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1..*
Selects the component. The DUT has suffix 1.

Parameters:
<InputPort1>
<InputPort2>
<OutputPort1>
<OutputPort2>
ONE | TWO | THRee | FOUR
Port number that is assigned to the input or output.
*RST: ONE for input 1, TWO for output 1, THRee for input 2, FOUR for output 4

Usage: Asynchronous command

DEEMbedding<m>:COMPonent<n>:SPONe <SParamFilePath>
DEEMbedding<m>:COMPonent<n>:SPTWo <SParamFilePath>

Set the file name, file format and path of the S-parameter file, and load the S-parameters.

See also: "S-Parameters, Filetype" on page 1206.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

<n> 1..*
Selects the component. The DUT has suffix 1.

Parameters:
<SParamFilePath> String with path and file name with extension `s2p` (2-port component) or `s4p` (4-port component).

Usage: Asynchronous command

23.24.4 Responses

DEEMbedding<m>:CADC?

Maximum attenuation or gain of the measurement setup before deembedding at DC. This value is the expected basic attenuation or gain, which is corrected by deembedding.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Return values:
ValueAtDC Range: -1E+9 to 1E+9
Increment: 0.01
*RST: 0
Default unit: dB

Usage: Query only

DEEMbedding<m>:MATTenuation?

Maximum attenuation of the measurement setup before deembedding, with reference to a frequency response normalized at DC to 0 dB. The deembedding filter must amplify the amplitude response by the "Att_{max}" value, and thus also increases the noise by this value. The value also helps to decide whether deembedding is useful for the defined effective bandwidth.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Return values:
<MaxFilterAtt> Range: -1E+9 to 1E+9
Increment: 0.01
*RST: 0
Default unit: dB

Usage: Query only

DEEMbedding<m>:MGAin?

Maximum gain of the measurement setup before deembedding, with reference to a frequency response normalized at DC to 0 dB. The deembedding filter must attenuate the amplitude response by this value. The value helps also to avoid an overload of the ADC.

Suffix:
<m> 1..4
Selects the channel that is configured for deembedding.

Return values:
<MaxFilterGn> Range: -1E+9 to 1E+9
Increment: 0.01
*RST: 0
Default unit: dB

Usage: Query only

23.25 Maintenance

Some of the commands in the following chapter 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-scpi, chapter "Command Sequence and Synchronization"
- Chapter 23.3, "Programming examples", on page 1261

DIAGnostic:SERVice:WFAModel?

Returns the model name of the oscilloscope.

Return values:
<WFAModel> Product type

Usage: Query only

DIAGnostic:SERVice:WFASeries?

Returns the model series of the oscilloscope.

Return values:
<WFASeries> RTO | RTE | RTP
*RST: RTO

Usage: Query only

DIAGnostic:SERVice:WFAType?

Returns the instrument family of the oscilloscope.

Return values:
<WFAType> RTO | RTO2000 | RTEM | RTE | RTP
*RST: RTO2000

Usage: Query only

CALibration:DATE?

Returns the date of the last selfalignment.

Return values:
<Date>

Usage: Query only
Asynchronous command

CALibration:TIME?

Returns the time of the last selfalignment.

Return values:
<Time>

Usage: Query only
Asynchronous command

CALibration:RESult?

Returns the result of the last selfalignment 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

DIAGnostic:SERVice:STST:EXECute

Starts the selftest.

Usage: Event
Asynchronous command

DIAGnostic:SERVice:STST:STATe?

Returns the summary result of the selftest.

Return values:
<State> PSSD | FAILed | UNDefined
*RST: UNDefined

Usage: Query only
Asynchronous command

DIAGnostic:SERVice:PWD <Password>

Sets the password to enter the service mode.

Setting parameters:
<Password> Password string

Usage: Setting only

23.26 Status reporting

This chapter describes the remote commands that are used to read the status registers.

For information on structure, hierarchy, and contents of the status registers, see Chapter 22.5.4, "Remote control - status reporting system", on page 1243.

23.26.1 STATus:OPERation register

`STATus:OPERation` commands provide information on the activity of the instrument.

See also: "STATus:OPERation register" on page 1244

STATus:OPERation:CONDition?
STATus:OPERation[:EVENt]?

The CONDition command returns information on actions the instrument is currently executing. The contents of the register is retained.

The EVENt command returns information on actions the instrument has executed since the last reading. Reading the EVENt register deletes its contents.

Bits:

- 0 = ALIGnment
- 2 = AUToset
- 3= WTRIgger (wait for trigger)
- 4= MEASuring

Usage: Query only

STATus:OPERation:ENABle <Enable>

Controls the ENABle part of the STATus:OPERation register. The ENABle defines which events in the EVENt part of the status register are forwarded to the OPERation summary bit (bit 7) of the status byte. The status byte can be used to create a service request.

Parameters:

<Enable> Range: 1 to 65535
Increment: 1

Example: `STATus:OPERation:ENABle 5`
The ALIGnment event (bit 0) and AUToset event (bit 2) are forwarded to the OPERation summary bit of the status byte.

23.26.2 STATus:QUEStionable registers

The commands of the `STATus:QUEStionable` subsystem control the status reporting structures of the STATus:QUEStionable registers.

See also: "STATus:QUEStionable register" on page 1245

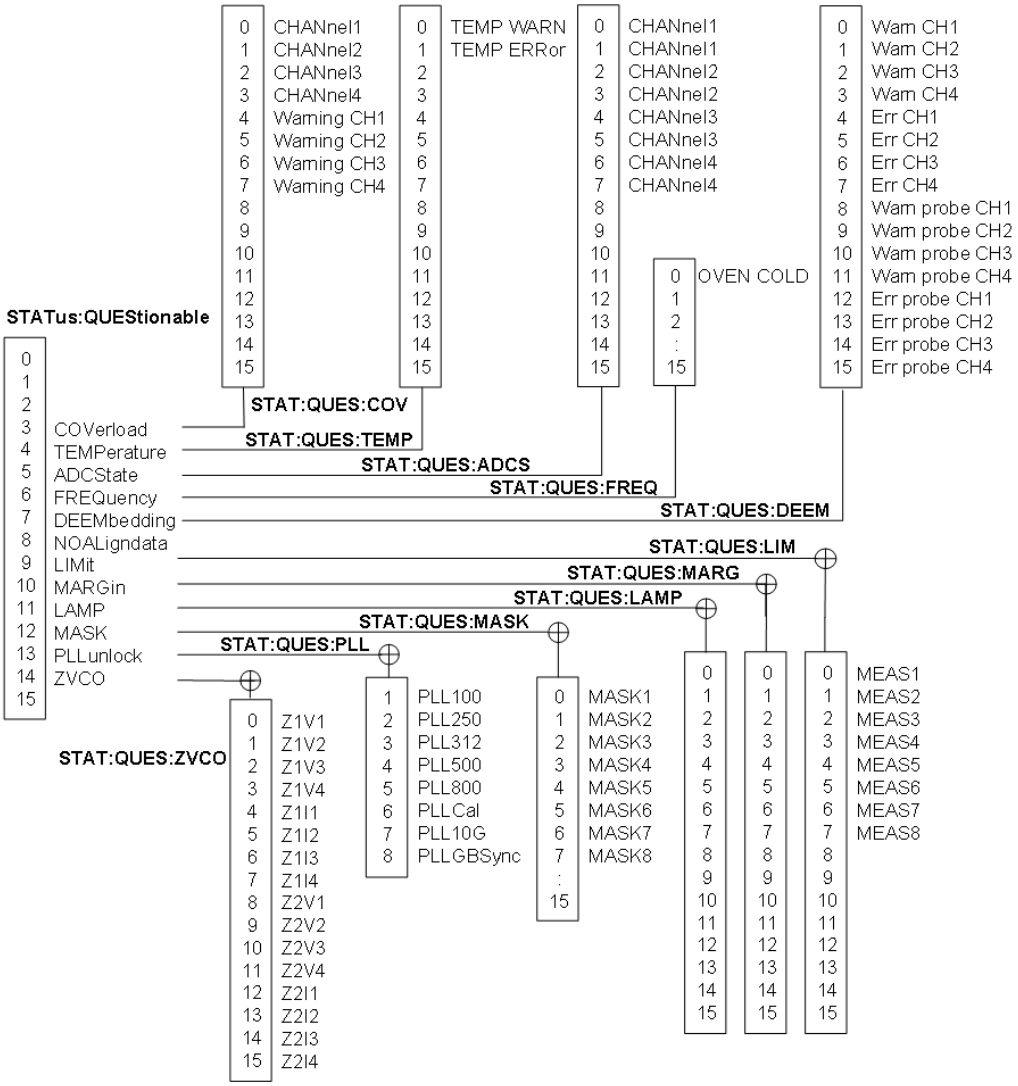

Figure 23-1: Overview of the STATus:QUEStionable register

The `STATus:QUEStionable:PLL...` commands are only relevant if option R&S RTO-K13 is installed.

The following commands are available:

STATus:QUEStionable:COVerload:CONDition?
STATus:QUEStionable:TEMPerature:CONDition?
STATus:QUEStionable:ADCState:CONDition?

STATus:QUEStionable:LIMit:CONDition?
STATus:QUEStionable:MARGin:CONDition?
STATus:QUEStionable:FREQuency:CONDition?
STATus:QUEStionable:PLL:CONDition?
STATus:QUEStionable:DEEMbedding:CONDition?
STATus:QUEStionable:LAMPlitude:CONDition?
STATus:QUEStionable:ZVCoverload:CONDition?
STATus:QUEStionable:MASK:CONDition?

Returns the contents of the CONDition part of the status register to check for questionable instrument or measurement states. Reading the CONDition registers does not delete the contents.

Usage: Query only

STATus:QUEStionable:COVerload:ENABle <Value>
STATus:QUEStionable:TEMPerature:ENABle <Value>
STATus:QUEStionable:ADCState:ENABle <Value>
STATus:QUEStionable:LIMit:ENABle <Value>
STATus:QUEStionable:MARGin:ENABle <Value>
STATus:QUEStionable:FREQuency:ENABle <Value>
STATus:QUEStionable:PLL:ENABle <Value>
STATus:QUEStionable:DEEMbedding:ENABle <Value>
STATus:QUEStionable:LAMPlitude:ENABle <Value>
STATus:QUEStionable:ZVCoverload:ENABle <Value>
STATus:QUEStionable:MASK:ENABle <Value>

Sets the ENABle part that allows true conditions in the EVENt part to be reported in the summary bit. If a bit is set to 1 in the enable part and its associated event bit transitions to true, a positive transition occurs in the summary bit and is reported to the next higher level.

Parameters:

<Value> Bit mask in decimal representation

Example: `STATus:QUEStionable:MASK:ENABle 24`
Set bits no. 3 and 4 of the STATus:QUEStionable:MASK:ENABle register part: *24 = 8 + 16 =* $2^3 + 2^4$

STATus:QUEStionable:COVerload[:EVENt]?
STATus:QUEStionable:TEMPerature[:EVENt]?
STATus:QUEStionable:ADCState[:EVENt]?
STATus:QUEStionable:LIMit[:EVENt]?
STATus:QUEStionable:MARGin[:EVENt]?
STATus:QUEStionable:FREQuency:EVENt?
STATus:QUEStionable:PLL[:EVENt]?
STATus:QUEStionable:DEEMbedding[:EVENt]?
STATus:QUEStionable:LAMPlitude[:EVENt]?

STATus:QUEStionable:ZVCoverload[:EVENt]?
STATus:QUEStionable:MASK[:EVENt]?

Returns the contents of the EVENt part of the status register to check whether an event has occurred since the last reading. Reading an EVENt register deletes its contents.

Usage: Query only

STATus:QUEStionable:COVerload:NTRansition <Value>
STATus:QUEStionable:TEMPerature:NTRansition <Value>
STATus:QUEStionable:ADCState:NTRansition <Value>
STATus:QUEStionable:LIMit:NTRansition <Value>
STATus:QUEStionable:MARGin:NTRansition <Value>
STATus:QUEStionable:FREQuency:NTRansition <Value>
STATus:QUEStionable:PLL:NTRansition <Value>
STATus:QUEStionable:DEEMbedding:NTRansition <Value>
STATus:QUEStionable:LAMPlitude:NTRansition <Value>
STATus:QUEStionable:ZVCoverload:NTRansition <Value>
STATus:QUEStionable:MASK:NTRansition <Value>

Sets the negative transition filter. If a bit is set, a 1 to 0 transition in the corresponding bit of the condition register causes a 1 to be written in the corresponding bit of the event register.

Parameters:
<Value> Bit mask in decimal representation

Example: `STATus:QUEStionable:MASK:NTRansition 24`
Set bits no. 3 and 4 of the STATus:QUEStionable:MASK:NTRansition register part: $24 = 8 + 16 = 2^3 + 2^4$

STATus:QUEStionable:COVerload:PTRansition <Value>
STATus:QUEStionable:TEMPerature:PTRansition <Value>
STATus:QUEStionable:ADCState:PTRansition <Value>
STATus:QUEStionable:LIMit:PTRansition <Value>
STATus:QUEStionable:MARGin:PTRansition <Value>
STATus:QUEStionable:FREQuency:PTRansition <Value>
STATus:QUEStionable:PLL:PTRansition <Value>
STATus:QUEStionable:DEEMbedding:PTRansition <Value>
STATus:QUEStionable:LAMPlitude:PTRansition <Value>
STATus:QUEStionable:ZVCoverload:PTRansition <Value>
STATus:QUEStionable:MASK:PTRansition <Value>

Sets the positive transition filter. If a bit is set, a 0 to 1 transition in the corresponding bit of the condition register causes a 1 to be written in the corresponding bit of the event register.

Parameters:
<Value> Bit mask in decimal representation

Example: `STATus:QUEStionable:MASK:PTRansition 24`
Set bits no. 3 and 4 of the STATus:QUEStionable:MASK:PTRansition register part: *24 = 8 + 16 = $2^3 + 2^4$*

MTESt:SBITnumber? <MaskTestName>

Returns the number of the status bit that belongs to the indicated mask test in the `STATus:QUEStionable:MASK` register. The status bits are assigned in the order of mask creation.

Query parameters:

<MaskTestName> String with the name of the mask test

Return values:

<StatusBitNumber> Bit number, see "STATus:QUEStionable:MASK register" on page 1250.

Range: 0 to 7
Increment: 1
*RST: 0

Example:

```
:MTESt:SBITnumber? 'MT1'
<--0
:MTESt:SBITnumber? 'MT2'
<--1
:MTESt:SBITnumber? 'MT3'
<--2
```

Usage: Query only
Asynchronous command

23.27 Remote trace

The commands in this section configure tracing of the remote control interface and of events. They also configure the display of the SCPI remote trace.

Before you start tracing, configure all settings as desired. Modifying settings while tracing is active may result in loss of already traced data. Useful exception: Selecting a new target file while tracing is allowed. For start mode `EXPLicit` a restart of the instrument resets the settings to the documented default values.

If you want to start tracing already during startup of the instrument, configure all settings (including start mode `AUTO`). Then restart your instrument. Tracing will be started automatically during the restart, using the already configured settings.

If you use an XML file as trace file, ensure that tracing is stopped properly. If tracing is aborted instead of stopped, for example by shutting down the instrument for stop mode `EXPLicit`, the XML file will be invalid, because some tags are not closed.

When the maximum file size is reached (except for stop mode `BUFFerfull`) or if tracing is started with an already existing trace file, a backup of the trace file is created and the file itself is reset and overwritten. When the file is full for the second time or when

tracing is started the next time, the first backup file is lost because it is overwritten by the next backup. In order to prevent loss of data, set a sufficient file size, select an appropriate stop mode and archive/copy completed trace files if you want to keep them.

23.27.1 Standard commands

TRACe:REMote:MODE:FILE:NAME <FilePath>

Sets the directory and file name where the remote trace file is stored.

Parameters:
<FilePath> String parameter

TRACe:REMote:MODE:FILE:FORMat <Format>

Sets the file format of the remote trace file.

Parameters:
<Format> ASCii | XML

TRACe:REMote:MODE:FILE:SIZE <FileSize>

Sets the maximum size of the remote trace file.

Parameters:
<FileSize> Integer value

TRACe:REMote:MODE:FILE:STARtmode <StartMode>

Defines how the remote trace is started.

Parameters:
<StartMode> AUTO | EXPLicit

AUTO
Starts the remote trace immediately.

EXPLicit
Starts remote trace with `TRACe:REMote:MODE:FILE:ENABle ON`

TRACe:REMote:MODE:FILE:STOPmode <StopMode>

Defines when the remote trace is stopped.

Parameters:

<StopMode> AUTO | EXPLicit | ERRor | BUFFerfull

AUTO
Ends the remote trace on device shutdown.

EXPLicit
Ends remote trace with `TRACe:REMote:MODE:FILE:ENABle OFF`

ERRor
Ends remote trace when a SCPI error occurs.

BUFFerfull
Ends remote trace when the maximum file size is reached.

TRACe:REMote:MODE:FILE:ENABle <Enable>

Enables and disables the remote trace to file.

Parameters:

<Enable> ON | OFF

TRACe:REMote:MODE:FILE:FILTer <Input>, <Output>, <Error>, <Trigger>, <DeviceClear>, <StatusRegister>, <Connection>, <RemoteLocalEvents>, <Locking>

Defines the content of the remote trace file.

Parameters:

<Input> ON | OFF
Input data

<Output> ON | OFF
Output data

<Error> ON | OFF
New SCPI error queue entries

<Trigger> ON | OFF
Trigger events

<DeviceClear> ON | OFF
Device clear events

<StatusRegister> ON | OFF
Status register conditions

<Connection> ON | OFF
Open/close connection events

<RemoteLocalEvents> ON | OFF
Local/remote transition events

<Locking> ON | OFF
Remote locking events

23.27.2 Diagnostic remote trace commands

TRACe:REMote:MODE:FILE:DEXecution:DURation <Enable>

Traces the device execution time of a command

Parameters:
<Enable> ON | OFF

TRACe:REMote:MODE:FILE:RPC <Enable>

Enables and disables output of rpc calls to remote trace.

Parameters:
<Enable> ON | OFF

TRACe:REMote:MODE:FILE:PARSer <Enable>

Enables and disables output of parser transitions to remote trace.

Parameters:
<Enable> ON | OFF

TRACe:REMote:MODE:FILE:FUNCtions <Enable>

Enables and disables output of function names to remote trace.

Parameters:
<Enable> ON | OFF

23.28 Deprecated commands

The following commands are provided for compatibility to previous oscilloscope versions only. For new remote control programs, use the specified alternative commands.

23.28.1 Base instrument

Legacy command	Replaced by	Comment
ACQuire:ARESet:WFMCount	ACQuire:ARESet:COUNt on page 1337	Replaced since FW 2.70
BUSFormat	For parallel buses: BUS<m>:PARallel:DATA:FORMat on page 2420 For serial buses: BUS<m>:FORMat on page 1671	Replaced since FW 4.70
MEASurement<m>:SPECtrum:NREJect		Functionality is not supported.
MEASurement<m>:SPECtrum:THReshold	MEASurement<m>:SPECtrum:ATHReshold on page 1515	Replaced since FW 3.30
SEARch:TRIGger:DATatoclock[:STATe] SEARch:TRIGger:DATatoclock:ACOPy SEARch:TRIGger:DATatoclock:CEDGe SEARch:TRIGger:DATatoclock:CLEVel SEARch:TRIGger:DATatoclock:CSOurce SEARch:TRIGger:DATatoclock:HTIMe SEARch:TRIGger:DATatoclock:STIMe	SEARch:TRIGger:SETHold[:STATe] on page 1604 SEARch:TRIGger:SETHold:ACOPy on page 1605 SEARch:TRIGger:SETHold:CEDGe on page 1619 SEARch:TRIGger:SETHold:CLEVel on page 1620 SEARch:TRIGger:SETHold:CSOurce on page 1620 SEARch:TRIGger:SETHold:HTIMe on page 1620 SEARch:TRIGger:SETHold:STIMe on page 1621	Replaced since FW 5.00
SEARch:TRIGger:INTerval:POLarity	SEARch:TRIGger:INTerval:SLOPe on page 1607	Replaced since FW 2.70
SYSTem:RESet	*RST on page 1291	Replaced since FW 4.60
TRIGger<m>:DATatoclock:CSOurce[:VALue] TRIGger<m>:DATatoclock:CSOurce:EDGE TRIGger<m>:DATatoclock:CSOurce:LEVel TRIGger<m>:DATatoclock:HTIMe TRIGger<m>:DATatoclock:STIMe	TRIGger<m>:SETHold:CSOurce[:VALue] on page 1411 TRIGger<m>:SETHold:CSOurce:EDGE on page 1410 TRIGger<m>:SETHold:CSOurce:LEVel on page 1410 TRIGger<m>:SETHold:HTIMe on page 1411 TRIGger<m>:SETHold:STIMe on page 1411	Replaced since FW 5.00
TRIGger<m>:INTerval:POLarity	TRIGger<m>:INTerval:SLOPe on page 1406	Replaced since FW 2.70
TRIGger<m>:OUT:STATe	TRIGger<m>:OUT:ACTion on page 1438	Replaced since FW 5.00

Legacy command	Replaced by	Comment
TRIGger<m>:PARallel:DATato-clock:CSOurce[:VALue] TRIGger<m>:PARallel:DATato-clock:CSOurce:EDGE TRIGger<m>:PARallel:DATatoclock:STIMe TRIGger<m>:PARallel:DATatoclock:HTIMe	TRIGger<m>:PARallel:SETHold:CSOurce[:VALue] on page 2426 TRIGger<m>:PARallel:SETHold:CSOurce:EDGE on page 2429 TRIGger<m>:PARallel:SETHold:HTIMe on page 2429 TRIGger<m>:PARallel:SETHold:STIMe on page 2430	Replaced since FW 5.00
TRIGger<m>:SEQuence:MODE	TRIGger<m>:SEQuence:TYPE on page 1432	Replaced since FW 5.10
TRIGger<m>:ROBust		Functionality is not supported.

23.28.2 Options

Legacy command	Replaced by	Comment
CAN, CAN FD		
SEARch:TRIGger:CAN[:STATe]	SEARch:TRIGger:CAN[:SSOFrame] on page 1758 SEARch:TRIGger:CAN:SFTYpe on page 1759 SEARch:TRIGger:CAN:SFIDentifier on page 1759 SEARch:TRIGger:CAN:SIDData on page 1759 SEARch:TRIGger:CAN:SERRor on page 1759 SEARch:TRIGger:CAN:SSYMbolic on page 1775	Replaced since FW 2.25
DPHY		
SEARch:TRIGger:DPHY:ERRor:CHKSum		Functionality is not supported.
SEARch:TRIGger:DPHY:ERRor:ECC		Functionality is not supported.
Ethernet 100BASE-T1		
TRIGger<m>:HBTO:RSTatus		Functionality is not supported.
SEARch:TRIGger:HBTO:RSTatus		Functionality is not supported.
FlexRay		
SEARch:TRIGger:FLXRay[:STATe]		Functionality is not supported.
Manchester and NRZ		
SEARch:TRIGger:CMSB:TYPE		Functionality is not supported.

Legacy command	Replaced by	Comment
SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:BIT SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:DMAX SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:DMIN SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:DOPerator SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:ENABle SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:IMAX SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:IMIN SEARch:TRIGger:CMSB:FRAMe<m>:FIELd<n>:IOPerator	SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:BIT on page 2164 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:DMAX on page 2165 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:DMIN on page 2165 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:DOPerator on page 2166 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:ENABle on page 2166 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:IMAX on page 2167 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:IMIN on page 2167 SEARch:TRIGger:CMSB:FRAMe<m>:FLD<n>:IOPerator on page 2167	Replaced since FW 4.15
MDIO		
BUS<m>:MDIO:MAXGap		Functionality is not supported.
RFFE		
TRIGger<m>:RFFE:MINGap:SELect	Same as BUS<m>:RFFE:MINGap:SELect on page 2015	Duplicate command since FW 3.20
TRIGger<m>:RFFE:MINGap:TIME	Same as BUS<m>:RFFE:MINGap:TIME on page 2015	Duplicate command since FW 3.20
SEARch:TRIGger:RFFE:ERRor:BP SEARch:TRIGger:RFFE:ERRor:NOResponse SEARch:TRIGger:RFFE:ERRor:USEQuence		Functionality is no longer supported since FW 4.50.
SENT		
SEARch:TRIGger:SENT:TYPE		Functionality is not supported.
TRIGger<m>:SENT:SCONdition	TRIGger<m>:SENT:SDCN on page 1989	Replaced since FW 4.15
SpaceWire		
BUS<m>:SWIRe:MINGap	BUS<m>:SWIRe:MGAP on page 2302	
BUS<m>:SWIRe:THRCoupling	BUS<m>:SWIRe:COUPling on page 2303	Replaced since FW 3.30
BUS<m>:SWIRe:THRPreset	BUS<m>:SWIRe:PRESet on page 2303	Replaced since FW 3.30
USBPD		
SEARch:TRIGger:USBPd:TYPE TRIGger<m>:USBPd:TYPE		Functionality is not supported.
SEARch:TRIGger:USBPd:FRAMe:SELect TRIGger<m>:USBPd:FRAMe:SELect		Functionality is not supported.

Legacy command	Replaced by	Comment
SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:BIT SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:DMAX SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:DMIN SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:DOPerator SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:ENABle SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:IMAX SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:IMIN SEARch:TRIGger:USBPd:FRAMe<m>:FIELd<n>:IOPerator	SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:BIT on page 2292 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:DMAX on page 2292 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:DMIN on page 2293 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:DOPerator on page 2293 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:ENABle on page 2291 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:IMAX on page 2294 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:IMIN on page 2294 SEARch:TRIGger:USBPd:FRAMe<m>:FLD<n>:IOPerator on page 2294	Replaced since FW 4.15
TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:BIT TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:DMAX TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:DMIN TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:DOPerator TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:ENABle TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:IMAX TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:IMIN TRIGger<m>:USBPd:FRAMe<n>:FIELd<o>:IOPerator	TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:BIT on page 2282 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:DMAX on page 2282 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:DMIN on page 2282 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:DOPerator on page 2283 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:ENABle on page 2281 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:IMAX on page 2283 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:IMIN on page 2284 TRIGger<m>:USBPd:FRAMe<n>:FLD<o>:IOPerator on page 2284	Replaced since FW 4.15
USB 3.1 Generation 1		
SEARch:TRIGger:USBThree:TYPE TRIGger<m>:USBThree:TYPE		Functionality is not supported.
SEARch:TRIGger:USBThree:FRAMe:SELect TRIGger<m>:USBThree:FRAMe:SELect		Functionality is not supported.

Legacy command	Replaced by	Comment
SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:BIT SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:DMAX SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:DMIN SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:DOPerator SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:ENABle SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:IMAX SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:IMIN SEARch:TRIGger:USB-Three:FRAMe<m>:FIELd<n>:IOPerator	`SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:BIT` on page 2269 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:DMAX` on page 2269 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:DMIN` on page 2269 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:DOPerator` on page 2268 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:ENABle` on page 2267 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:IMAX` on page 2271 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:IMIN` on page 2271 `SEARch:TRIGger:USBThree:FRAMe<m>:FLD<n>:IOPerator` on page 2270	Replaced since FW 4.15
TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:BIT TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:DMAX TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:DMIN TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:DOPerator TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:ENABle TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:IMAX TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:IMIN TRIGger<m>:USB-Three:FRAMe<n>:FIELd<o>:IOPerator	`TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:BIT` on page 2260 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:DMAX` on page 2259 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:DMIN` on page 2259 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:DOPerator` on page 2258 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:ENABle` on page 2258 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:IMAX` on page 2261 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:IMIN` on page 2261 `TRIGger<m>:USBThree:FRAMe<n>:FLD<o>:IOPerator` on page 2260	Replaced since FW 4.15
Advanced Jitter Analysis		
ADVJitter<m>::RESult:TYPBathtub ADVJitter<m>::RESult:TYPSynteye		Functionality is not supported.
ADVJitter<m>:SIGNal:UIOFfset	`ADVJitter<m>:SIGNal:SAMTime` on page 2481	Replaced since FW 5.10

24 Maintenance and support

The instrument does not need periodic maintenance. Only the cleaning of the instrument is essential.

To protect the front panel and to transport the instrument to another workplace safely and easily, various accessories are provided. Refer to the data sheet for available covers and cases and their order numbers.

The adjustment of the OCXO oscillator is described in the service manual.

24.1 Cleaning

How to clean the product is described in "Cleaning the product" on page 15.

Do not use any liquids for cleaning. Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

24.2 Contacting customer support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:

Figure 24-1: QR code to the Rohde & Schwarz support page

24.3 Information for technical support

If you encounter problems that you cannot solve yourself, contact your Rohde & Schwarz support center, see Contacting customer support.

The support center finds solutions more quickly and efficiently, if you provide them with information on the instrument and an error description. To create, collect and save the required information you can use the RTxServiceReporter. The RTxServiceReporter creates a ZIP file with a complete bug report, all relevant setup information, reporting and log files, and the instrument configuration (device footprint).

1. Press the app key in the [Analysis] section of the frontpanel.
2. On the "R&S Apps" tab, tap "Servie Reporter".

   The RTxServiceReporter creates the report and saves it as ZIP file directly on the Windows desktop.
3. Attach the report file to an email in which you describe the problem. Send the email to the customer support address for your region as listed in the internet.

On the instrument, you can find log files, the device footprint and report files, and other information in the "AppData" folder on the Windows desktop (`C:\ProgramData\Rohde-Schwarz\RTx`).

The "Maintenance" dialog box also provides information on your instrument configuration which can be helpful in case you need support.

24.4 Data security

If you have to send the instrument to the service, or if the instrument is used in a secured environment, consider the document "Instrument Security Procedures" that is delivered on the R&S RTO web page.

Instrument configuration data and user data are stored on a removable hard disk only. Thus it is sufficient to remove the hard disk before the instrument leaves a secured environment. Details are given in the document mentioned above.

24.5 Transporting

Lifting and carrying

See: "Lifting and carrying the instrument" on page 12

Packing

Use the original packaging material. It consists of antistatic wrap for electrostatic protection and packing material designed for the product.

If you do not have the original packaging, use similar materials that provide the same level of protection.

Securing

When moving the R&S RTO in a vehicle or using transporting equipment, make sure that the R&S RTO is properly secured. Only use items intended for securing objects.

Transport altitude

Refer to the the data sheet, the maximum transport altitude without pressure compensation.

24.6 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the data sheet.

24.7 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

Disposing electrical and electronic equipment

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its service life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Figure 24-2: Labeling in line with EU directive WEEE

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

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