

# **IDA-3106 Series**

# **NRA-320X Series**

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**Interference and Direction Analyzer**  
**Remote Analyzer**

**Command Reference Guide V 3.1.1**

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# 1 General Information

## Backus-Naur format

| Symbol | Meaning                                 |
|--------|-----------------------------------------|
| < >    | Defined element                         |
| :=     | Is defined as                           |
|        | Exclusive OR                            |
| { }    | Group, at least one element is required |
| [ ]    | Optional field, can be omitted          |
| ...    | Previous element(s) may be repeated     |
| ( )    | Comment                                 |

## Get commands

Get commands are used above all to query measurement values and settings. They always include '?' in the body of the command. Commas separate the parameters.

Syntax: <COMMAND> <?> [PARA1] , [PARA2] , [PARAn] ;

## Set commands

Set commands are used to configure and control the device and are characterized by the fact that there is no question mark in the body of the command. Commas separate the parameters.

Syntax: <COMMAND> [PARA1] , [PARA2] , [PARAn] ;

## Responses

Set or Get commands are always answered with a response from the device. The response includes a return code and, optionally, the requested data. A return code of 0 indicates success. A return code of 200 - 399 indicates a warning while a number of 400 or higher indicates an error. An error means the command was not accepted by the device.

Syntax [DATA1] , [DATA2] , [DATAn] , <ReturnCode> ;

## Remote ON operation

Almost all the commands can only be processed by the device when it is in Remote ON mode. The REMOTE ON; command activates remote operation. Once activated, remote operation can be deactivated by the REMOTE OFF; command. The actual remote state can be checked by the help of the REMOTE?; command.

## Termination and separation characters

All command parameters are separated by an ASCII comma Char <,> (decimal number: <44>). All commands are terminated with the ASCII semicolon char <;> (decimal number: <59>). Therefore the semicolon char <59> is not allowed to send within a command. The comma Char <44> can be included in an ASCII string marked with quotes: "SAMPLE,ASCII,STRING". In this case, the comma char does not act as a parameter separator.

## USB interface parameters (USB for configuration only)

Before using the USB connection, you will have to install the USB driver. The driver makes a virtual COM port available on the target computer. Communication with the device is via this COM port, as with a normal serial interface. The default USB interface settings cannot be changed by the user.

| Parameter       | Setting |
|-----------------|---------|
| Bits per second | 115200  |
| Start bits      | 1       |
| Data bits       | 8       |
| Stop bits       | 1       |
| Parity          | None    |
| Flow control    | None    |

## Network interface parameters



*Applies only for devices with an Ethernet connector*

Most network parameters are user configurable. Use the “Narda Configurator” utility program for easy setup of the device network interface. The table below shows the default settings.

| Parameter   | Default Setting                       | Description             |
|-------------|---------------------------------------|-------------------------|
| DHCP        | OFF                                   |                         |
| IP Address  | 192.168.128.128                       |                         |
| Subnet Mask | 255.255.255.0                         |                         |
| Gateway     | No default gateway                    |                         |
| Hostname    | NRA+<DeviceName>+<DeviceSerialNumber> |                         |
| TCP port    | 55555                                 | Remote communication    |
| TCP port    | 80                                    | Webserver communication |
| UDP port    | 4444                                  | Narda device finder     |

## Power-On self test



*Applies for rackmount devices only*

If an error occurs during the self test of the device, the LED will flash red. The number of flashes indicates the type of error. The sequence of flashes is repeated three times at intervals of three seconds.

| Number | Description      |
|--------|------------------|
| 1      | Operating System |
| 2      | Hardware         |
| 3      | Memory           |
| 4      | Data Logger      |
| 5      | Flash            |

## 2 Return Codes

### Information

| Code | Description        |
|------|--------------------|
| 0    | command successful |

### Warnings

| Code | Description                          |
|------|--------------------------------------|
| 201  | command parameter has been corrected |
| 202  | PLL not locked Warning               |

### Error Codes

| Code | Description                                                          |
|------|----------------------------------------------------------------------|
| 401  | remote command is not implemented in the remote module               |
| 402  | invalid parameter                                                    |
| 403  | invalid count of parameters                                          |
| 404  | invalid parameter range                                              |
| 405  | last command is not completed                                        |
| 406  | answer time between remote module and application module is too high |
| 407  | invalid or corrupt data                                              |
| 408  | error while accessing the hardware                                   |
| 409  | command is not supported in this version of the application module   |
| 410  | remote is not activated, please send REMOTE ON first                 |
| 411  | command is not supported in the selected mode                        |
| 412  | memory of data logger is full                                        |
| 413  | option code is invalid                                               |
| 414  | incompatible version                                                 |
| 415  | subindex full                                                        |
| 416  | file counter full                                                    |
| 417  | data lost                                                            |
| 418  | checksum error                                                       |
| 419  | FPGA programming error                                               |
| 420  | path not found                                                       |
| 421  | break detected                                                       |
| 422  | low battery                                                          |
| 423  | file open error                                                      |
| 424  | data verify error                                                    |
| 425  | error while writing voice comment                                    |
| 426  | no data available                                                    |
| 427  | program parameter error                                              |
| 428  | frequencies of equipment do not match                                |
| 429  | connected equipment and device frequencies do not match              |
| 430  | self test error was detected                                         |
| 431  | datalogger reorganization required                                   |
| 432  | mode not available                                                   |

## 3 ASCII and BINARY Communication Details

### Newline characters in ASCII communication

In ASCII communication newline characters can be sent by the device within the remote response. The newline character can be set to CR (0x0D), LF (0x0A), CR+LF (0x0D + 0x0A) or NONE. The newline character can be changed by the REMOTE\_NEWLINE command.

The device starts up with newline character CR set by default.

Newline characters are useful if the device is accessed with applications like Telnet or Matlab.

If newline characters are set and not used by the host, these characters should be ignored.

#### Note

Users of Linux and Terminal programs should use the CR+LF setting.

#### Examples

##### Newline character: NONE

|                 |                                                  |
|-----------------|--------------------------------------------------|
| <i>Command</i>  | UNIT_LIST?;                                      |
| <i>Response</i> | 4,"dBm",dBm,"dBV",dBV,"dBmV",dBmV,"dBμV",dBuV,0; |

##### Newline character: CR (default)

|                 |                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------|
| <i>Command</i>  | UNIT_LIST?;                                                                                  |
| <i>Response</i> | 4,<CR><br>"dBm",dBm,<CR><br>"dBV",dBV,<CR><br>"dBmV",dBmV,<CR><br>"dBμV",dBuV,<CR><br>0,<CR> |

##### Newline character: CR+LF

|                 |                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | UNIT_LIST?;                                                                                                          |
| <i>Response</i> | 4,<CR><LF><br>"dBm",dBm,<CR><LF><br>"dBV",dBV,<CR><LF><br>"dBmV",dBmV,<CR><LF><br>"dBμV",dBuV,<CR><LF><br>0,<CR><LF> |

##### Newline character: LF

|                 |                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------|
| <i>Command</i>  | UNIT_LIST?;                                                                                  |
| <i>Response</i> | 4,<LF><br>"dBm",dBm,<LF><br>"dBV",dBV,<LF><br>"dBmV",dBmV,<LF><br>"dBμV",dBuV,<LF><br>0,<LF> |

### Data types for ASCII communication

| Abbreviation  | Description                              | Example                               |
|---------------|------------------------------------------|---------------------------------------|
| String        | ASCII character string                   | "Narda"                               |
| Enum          | Enumerator, defined texts                | ON, on, OFF, off, ACT, act            |
| Float         | 32 bit floating point number             | -1.234e6, -100.1, 0, 100.1, 1.234e6   |
| Double        | 64 bit floating point number             | -1.234e6, -100.1, 0, 100.1, 1.234e6   |
| Byte          | 8 bit whole number without sign          | 0, 100, 255                           |
| Word          | 16 bit whole number without sign         | 0, 100, 65535                         |
| DWord         | 32 bit whole number without sign         | 0, 100, 4294967295                    |
| Short         | 16 bit whole number with sign            | -32768, -100, 0, 100, 32767           |
| Long          | 32 bit whole number with sign            | -2147483648, -100, 0, 100, 2147483647 |
| Date          | ASCII character string, format: dd.mm.yy | 21.04.81                              |
| Time          | ASCII character string, format: hh:mm:ss | 10:08:59                              |
| VersionString | V[d]d.[d]d.[d]d[blankxxx]                | "V0.0.0", "V99.99.99", "V1.0.1 beta1" |
| HEXDump       | ASCII character hexadecimal dump         | 7F, 7f, 7FE5CCD200FF                  |

### Block Data Transfer for BINARY communication

Block transfer is suitable for large amounts of data. Each data block begins with an ASCII Header such as #42204. The first digit represents the number of valid digits of the ASCII Header. The remainder of the header indicates the number of bytes transmitted with the telegram.

The commands ending with \_BINARY?; (expect FORMAT\_BINARY?;) will respond with a BINARY block data response. This document describes the format of the block data transfer for each single command. The terminating character ";" is not valid for block data transfer.

#### Example

#42204xxxxxxxxx

| Data      | Description                                             |
|-----------|---------------------------------------------------------|
| #         | This character introduces the block data transfer       |
| 4         | Number of valid digits describing the data block length |
| 2204      | Number of bytes transmitted with this telegram          |
| xxxxxxxxx | Example of BINARY data                                  |



## 4 Command Groups

### General

|                                                                               |
|-------------------------------------------------------------------------------|
| <b>BATTERY?</b>                                                               |
| Queries the remaining battery capacity during battery powered operation.      |
| <b>CHECKSUM</b>                                                               |
| Sets the checksum mode for the remote communication.                          |
| <b>CHECKSUM?</b>                                                              |
| Queries the checksum mode for the remote communication.                       |
| <b>DATE</b>                                                                   |
| Sets the current date setting for the device                                  |
| <b>DATE?</b>                                                                  |
| Queries the current date setting for the device                               |
| <b>DEV_ID?</b>                                                                |
| Queries the device identification number.                                     |
| <b>DEV_INFO?</b>                                                              |
| Queries all device information that describes the individual device.          |
| <b>DEV_OPTION?</b>                                                            |
| Queries the options installed on the device.                                  |
| <b>DEV_RESET</b>                                                              |
| Resets the device with different reset modes                                  |
| <b>ERROR?</b>                                                                 |
| Queries the last return code.                                                 |
| <b>FORMAT_ASCII</b>                                                           |
| Sets the output format of the measurement data for the remote interface.      |
| <b>FORMAT_ASCII?</b>                                                          |
| Queries the output format of the measurement data for the remote interface.   |
| <b>FORMAT_BINARY</b>                                                          |
| Sets the output format of the measurement data for BINARY communication.      |
| <b>FORMAT_BINARY?</b>                                                         |
| Queries the output format of the measurement data for BINARY communication.   |
| <b>POWER_MODE?</b>                                                            |
| Queries the way the device is being powered.                                  |
| <b>POWER_OFF</b>                                                              |
| Initiates a controlled shutdown of the device.                                |
| <b>REMOTE</b>                                                                 |
| Enables/Disables remote communication with the NRA.                           |
| <b>REMOTE?</b>                                                                |
| Checks communication with the NRA and queries readiness for remote operation. |
| <b>REMOTE_NEWLINE</b>                                                         |
| Sets the newline character(s) for the remote communication.                   |
| <b>REMOTE_NEWLINE?</b>                                                        |
| Queries the newline character(s) for the remote communication.                |
| <b>RETURN_CODE?</b>                                                           |
| Queries the type and description of a specific return code.                   |
| <b>RETURN_CODE_LIST?</b>                                                      |
| Queries a list with type and description of all return codes.                 |
| <b>SELFTEST?</b>                                                              |
| Queries the selftest number of the power-on self tests returning error codes. |
| <b>SELFTEST_DETAIL?</b>                                                       |
| Queries the detailed results of all power-on self tests.                      |
| <b>SU_STARTUP_CONFIG</b>                                                      |
| Sets the startup behavior of the device.                                      |

## Command Reference Guide

### Command Groups

---

|                                                       |
|-------------------------------------------------------|
| <b>SU_STARTUP_CONFIG?</b>                             |
| Queries the current startup behavior of the device.   |
| <b>TIME</b>                                           |
| Sets the current system time of the device.           |
| <b>TIME?</b>                                          |
| Queries the current system time of the device.        |
| <b>VERSION?</b>                                       |
| Queries the versions of the current firmware modules. |

## Antenna and Cable

|                                                                                              |
|----------------------------------------------------------------------------------------------|
| <b>ANT_HANDLE_PREAMP</b>                                                                     |
| Switches the preamplifier in the antenna handle on or off.                                   |
| <b>ANT_HANDLE_PREAMP?</b>                                                                    |
| Queries the current state of the antenna handle preamplifier.                                |
| <b>ANT_HANDLE_SEL?</b>                                                                       |
| Queries the information of the currently connected antenna handle.                           |
| <b>ANT_HANDLE_COMPASS?</b>                                                                   |
| Queries the current compass data of the antenna handle.                                      |
| <b>ANT_HANDLE_BUTTON?</b>                                                                    |
| Queries the current state of the antenna handle push button.                                 |
| <b>ANT_LIST?</b>                                                                             |
| Queries a list of all currently available user defined antennas.                             |
| <b>ANT_SEL</b>                                                                               |
| Selects a user defined antenna.                                                              |
| <b>ANT_SEL?</b>                                                                              |
| Queries the information of the currently selected or connected user defined or auto antenna. |
| <b>ANT_SEL_NO</b>                                                                            |
| Disables a selected user defined antenna.                                                    |
| <b>ANT_DS</b>                                                                                |
| Creates a new user defined antenna and stores it in the nonvolatile memory of the device.    |
| <b>ANT_DS?</b>                                                                               |
| Queries a user defined antenna.                                                              |
| <b>ANT_CLR</b>                                                                               |
| Deletes a user defined antenna.                                                              |
| <b>ANT_CLR_ALL</b>                                                                           |
| Deletes all user defined antennas.                                                           |
| <b>CBL_LIST?</b>                                                                             |
| Queries a list of all currently available user defined cables.                               |
| <b>CBL_SEL</b>                                                                               |
| Selects a user defined cable.                                                                |
| <b>CBL_SEL?</b>                                                                              |
| Queries the information of the currently selected or connected user defined or auto cable.   |
| <b>CBL_SEL_NO</b>                                                                            |
| Disables a selected user defined cable.                                                      |
| <b>CBL_DS</b>                                                                                |
| Creates a new user defined cable and stores it in the nonvolatile memory of the device.      |
| <b>CBL_DS?</b>                                                                               |
| Queries a user defined cable.                                                                |
| <b>CBL_CLR</b>                                                                               |
| Deletes a user defined cable.                                                                |
| <b>CBL_CLR_ALL</b>                                                                           |
| Deletes all user defined cables.                                                             |
| <b>GPS_DATA?</b>                                                                             |
| Queries the GPS data.                                                                        |

## Audio demodulation –Optional (Audio streaming see p.241)

|                                                                                      |
|--------------------------------------------------------------------------------------|
| <b>AUDIO_MUTE</b>                                                                    |
| Switches audio mute on or off in Level Meter mode.                                   |
| <b>AUDIO_MUTE?</b>                                                                   |
| Queries the state of audio mute in Level Meter mode.                                 |
| <b>AUDIO_VOLUME</b>                                                                  |
| Sets the current audio demodulation volume in Level Meter mode.                      |
| <b>AUDIO_VOLUME?</b>                                                                 |
| Queries the current audio demodulation volume in Level Meter mode.                   |
| <b>AUDIO_VOLUME_LIST?</b>                                                            |
| Queries the audio demodulation volume-list in Level Meter mode.                      |
| <b>DEMOD_MODE</b>                                                                    |
| Sets the audio demodulation type in Level Meter mode.                                |
| <b>DEMOD_MODE?</b>                                                                   |
| Queries the current audio demodulation type in Level Meter mode.                     |
| <b>DEMOD_MODE_LIST?</b>                                                              |
| Queries the currently available audio demodulation types in Level Meter mode.        |
| <b>DEMOD_SQUELCH</b>                                                                 |
| Sets the audio squelch threshold (noise suppression) in Level Meter mode.            |
| <b>DEMOD_SQUELCH?</b>                                                                |
| Queries the current audio squelch threshold (noise suppression) in level meter mode. |
| <b>DEMOD_SQUELCH_LIST?</b>                                                           |
| Queries an audio squelch threshold-list (noise suppression) in level meter mode      |
| <b>DEMOD_BFO</b>                                                                     |
| Sets the BFO value (beat frequency oscillator) in level meter mode.                  |
| <b>DEMOD_BFO?</b>                                                                    |
| Queries the current BFO value (beat frequency oscillator) in level meter mode.       |

## Axis Commands

|                                                                                         |
|-----------------------------------------------------------------------------------------|
| <b>AXIS</b>                                                                             |
| Capability to measure each individual axis (X,Y,Z) or to measure in automatic mode RSS. |
| <b>AXIS?</b>                                                                            |
| Queries the currently measured axis.                                                    |

## External Device

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| <b>EXT_DEV_LIST?</b>                                                                              |
| Queries a list of all currently available user defined external devices.                          |
| <b>EXT_DEV_SEL_NO</b>                                                                             |
| Disables a selected user defined external device.                                                 |
| <b>EXT_DEV_SEL</b>                                                                                |
| Selects a user defined external device.                                                           |
| <b>EXT_DEV_SEL?</b>                                                                               |
| Queries the information of the currently selected user defined external device.                   |
| <b>EXT_DEV_DS</b>                                                                                 |
| Creates a new user defined external device and stores it in the nonvolatile memory of the device. |
| <b>EXT_DEV_DS?</b>                                                                                |
| Queries a user defined external device.                                                           |
| <b>EXT_DEV_SWITCH</b>                                                                             |
| Switches the calibration set of the external device.                                              |
| <b>EXT_DEV_SWITCH?</b>                                                                            |
| Queries the current switch state.                                                                 |
| <b>EXT_DEV_CLR</b>                                                                                |
| Deletes a user defined external device.                                                           |

## Command Reference Guide

### Command Groups

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#### **EXT\_DEV\_CLR\_ALL**

Deletes all user defined external devices.

## Livescreen

#### **DISPLAY\_REMOTE**

Activates or deactivates the GUI remote operation mode.

#### **DISPLAY\_REMOTE?**

Queries the status of the GUI remote operation mode

#### **DISPLAY\_VIEWER\_INTERVAL**

Sets the update interval time (refresh rate) of the Webserver's Live Display Viewer.

#### **DISPLAY\_VIEWER\_INTERVAL?**

Queries the update interval time (refresh rate) of the Webserver's Live Display Viewer.

#### **LIVE\_SCREEN?**

Queries the current device display as a screenshot in PNG format.

#### **LIVE\_SCREEN\_BINARY?**

Queries the current device display as a screenshot in 16 bit BMP format.

#### **LIVE\_SEND\_KEY**

Activates an operating panel key by remote communication.

#### **LIVE\_SEND\_ROT\_KNOB**

Activates the operating panel rotary control by remote communication.

## LNB control – NRA-LNB versions only

#### **LNB\_CTRL**

Switches the LNB control unit on or off.

#### **LNB\_CTRL?**

Queries the state of the LNB control unit.

#### **LNB\_CTRL\_BAND**

Selects the low band (22kHz off) or the high band (22kHz on) for the LNB control unit.

#### **LNB\_CTRL\_BAND?**

Queries the band setting for the LNB control unit.

#### **LNB\_CTRL\_DIAG?**

Queries diagnostic information from the LNB control unit.

#### **LNB\_CTRL\_POL**

Selects the polarization setting for the LNB control unit.

#### **LNB\_CTRL\_POL?**

Queries the polarization setting for the LNB control unit.

#### **LNB\_CTRL\_RESET**

Resets the LNB control unit to the default settings.

#### **LNB\_CTRL\_VOLTAGE\_CORRECTION**

Activates or deactivates the cable compensation for the LNB control unit.

#### **LNB\_CTRL\_VOLTAGE\_CORRECTION?**

Queries the setting for the cable compensation for the LNB control unit.

## Measurement

#### **MEAS\_START**

(Re)starts cyclic measurement in the current operating mode.

#### **MEAS\_STOP**

Stop cyclic measurement in the current operating mode.

#### **MODE**

Sets the current operating mode.

#### **MODE?**

Queries the current operating mode.

#### **RBW\_LIST?**

Queries a list of the current possible RBW settings.

|                                                                                                                |
|----------------------------------------------------------------------------------------------------------------|
| <b>RESULTTYPE_RESET</b>                                                                                        |
| Resets all measurement runs (traces) to default values as is done at the start of the measurement.             |
| <b>RESULTTYPE_RESET_MIN_MAX</b>                                                                                |
| Resets the Min and Max measurement runs (traces) to default values as is done at the start of the measurement. |
| <b>RL_ATT_LIST?</b>                                                                                            |
| Queries a list of the current possible reference level and attenuator settings (measurement range).            |
| <b>RL_LIST?</b>                                                                                                |
| Queries a list of the current possible reference level settings (measurement range).                           |
| <b>SWEEP_STATE?</b>                                                                                            |
| Queries the status and progress of the current measurement.                                                    |
| <b>UNIT</b>                                                                                                    |
| Sets the current unit setting.                                                                                 |
| <b>UNIT?</b>                                                                                                   |
| Queries the current unit setting.                                                                              |
| <b>UNIT_LIST?</b>                                                                                              |
| Queries a list of current possible unit settings (Unit).                                                       |
| <b>VBW_LIST?</b>                                                                                               |
| Queries the current possible VBW settings.                                                                     |

## Spectrum

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| <b>SPECTRUM?</b>                                                                                  |
| Queries one or more measurement runs (traces) in SPECTRUM mode.                                   |
| <b>SPECTRUM_AVG_CONFIG</b>                                                                        |
| Sets the current averaging method.                                                                |
| <b>SPECTRUM_AVG_CONFIG?</b>                                                                       |
| Queries the current averaging method.                                                             |
| <b>SPECTRUM_AVG_LIST?</b>                                                                         |
| Queries a list of the current possible averaging settings for SPECTRUM mode.                      |
| <b>SPECTRUM_BI_VALUE?</b>                                                                         |
| Band Integration over Frequency.                                                                  |
| <b>SPECTRUM_BINARY?</b>                                                                           |
| Queries measurement data in SPECTRUM mode and BINARY format.                                      |
| <b>SPECTRUM_CONFIG</b>                                                                            |
| Sets the current measurement parameters for SPECTRUM mode.                                        |
| <b>SPECTRUM_CONFIG?</b>                                                                           |
| Queries the current measurement parameters for SPECTRUM mode.                                     |
| <b>SPECTRUM_DETECTOR?</b>                                                                         |
| Queries trace data with fixed user defined number of values in SPECTRUM mode.                     |
| <b>SPECTRUM_DETECTOR_BINARY?</b>                                                                  |
| Queries BINARY trace data with fixed user defined number of values in SPECTRUM mode.              |
| <b>SPECTRUM_DETECTOR_LIST?</b>                                                                    |
| Queries the detector list for spectrum data.                                                      |
| <b>SPECTRUM_FULLSPAN</b>                                                                          |
| Sets the frequency parameters Fcent and Fspan to select the entire frequency range of the device. |
| <b>SPECTRUM_HEADER?</b>                                                                           |
| Queries the header information for the measured values in SPECTRUM mode.                          |
| <b>SPECTRUM_MAX_VALUES?</b>                                                                       |
| Queries the maximum number of measurement points in Spectrum mode                                 |
| <b>SPECTRUM_MODE</b>                                                                              |
| Sets the sub mode, in Spectrum mode                                                               |
| <b>SPECTRUM_MODE?</b>                                                                             |
| Queries the sub mode, in Spectrum mode                                                            |
| <b>SPECTRUM_MRK_HIGHEST?</b>                                                                      |
| Queries the marker values for the highest measurement value.                                      |
| <b>SPECTRUM_MRK_IDX_VALUE?</b>                                                                    |
| Queries the marker values for a selected marker.                                                  |

## Command Reference Guide

### Command Groups

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|                                                                                                               |
|---------------------------------------------------------------------------------------------------------------|
| <b>SPECTRUM_MRK_VALUE?</b>                                                                                    |
| Queries the marker values for a specified frequency point.                                                    |
| <b>SPECTRUM_PEAK_TABLE?</b>                                                                                   |
| Queries a configurable peak table.                                                                            |
| <b>SPECTRUM_PEAK_TABLE_EXC?</b>                                                                               |
| Queries a configurable peak table with excursion.                                                             |
| <b>SPECTRUM_RAW?</b>                                                                                          |
| Queries one or more measurement runs (traces) in Spectrum mode using the RAW format and BINARY data transfer. |
| <b>SPECTRUM_TRACE?</b>                                                                                        |
| Queries one or more traces in SPECTRUM mode.                                                                  |
| <b>SPECTRUM_TRACE_BINARY?</b>                                                                                 |
| Queries one or more BINARY traces in SPECTRUM mode.                                                           |
| <b>SPECTRUM_TRACE_LIST?</b>                                                                                   |
| Queries the current possible trace list in SPECTRUM mode.                                                     |

## Multi-Channel Power (MCP) –Optional

|                                                                               |
|-------------------------------------------------------------------------------|
| <b>MCP?</b>                                                                   |
| Queries one or more measurement runs (traces) in Multi-Channel Power mode.    |
| <b>MCP_AVG_CONFIG</b>                                                         |
| Sets the current averaging method.                                            |
| <b>MCP_AVG_CONFIG?</b>                                                        |
| Queries the current averaging method.                                         |
| <b>MCP_AVG_LIST?</b>                                                          |
| Queries the current possible averaging settings for Multi-Channel Power mode. |
| <b>MCP_CONFIG</b>                                                             |
| Sets the current measurement parameters for Multi-Channel Power mode.         |
| <b>MCP_CONFIG?</b>                                                            |
| Queries the current measurement parameters for Multi-Channel Power mode.      |
| <b>MCP_MODE</b>                                                               |
| Sets the sub mode in Multi-Channel Power mode                                 |
| <b>MCP_MODE?</b>                                                              |
| Queries the sub mode in Multi-Channel Power mode                              |

## Time Domain (Scope) and I/Q –Optional

|                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SCOPE?</b>                                                                                                                                                        |
| Queries time domain measurement results in Scope mode for the previously defined Result Type and measurement parameters (see "SCOPE_RESULTTYPE" and "SCOPE_CONFIG"). |
| <b>SCOPE_BINARY?</b>                                                                                                                                                 |
| Queries one or more measurement runs (traces) in Scope mode using the BINARY format.                                                                                 |
| <b>SCOPE_CONFIG</b>                                                                                                                                                  |
| Sets the current measurement parameters for Scope mode. Select Scope mode first.                                                                                     |
| <b>SCOPE_CONFIG?</b>                                                                                                                                                 |
| Queries the current measurement parameters in Scope mode                                                                                                             |
| <b>SCOPE_HEADER?</b>                                                                                                                                                 |
| Queries the Header Data of measurement values in Scope mode.                                                                                                         |
| <b>SCOPE_MAX_VALUES?</b>                                                                                                                                             |
| Queries the maximum number of measurement points in Scope mode                                                                                                       |
| <b>SCOPE_RAW?</b>                                                                                                                                                    |
| Queries one or more measurement runs (traces) in Scope mode using the RAW format and BINARY data transfer.                                                           |
| <b>SCOPE_RESULTTYPE</b>                                                                                                                                              |
| Sets the desired Result Type in Scope mode. When Result Type CONDENSED is selected, measurements are expressed as intervals with Max, Avg, Min values.               |
| <b>SCOPE_RESULTTYPE?</b>                                                                                                                                             |
| Queries the current Result Type in Scope mode.                                                                                                                       |

|                                                                                                |
|------------------------------------------------------------------------------------------------|
| <b>SCOPE_STATE?</b>                                                                            |
| Queries the current State in Scope mode.                                                       |
| <b>SCOPE_TRIGGER_ARM</b>                                                                       |
| Sets the Trigger State to ARMED for activating the selected Trigger Mode.                      |
| <b>SCOPE_TRIGGER_BREAK</b>                                                                     |
| Deactivates the selected Trigger Mode by changing the Trigger State from ARMED to WAIT_ARMING. |
| <b>SCOPE_TRIGGER_CONFIG</b>                                                                    |
| Sets the Trigger parameters in Scope mode.                                                     |
| <b>SCOPE_TRIGGER_CONFIG?</b>                                                                   |
| Queries the Trigger parameters in Scope mode.                                                  |
| <b>SCOPE_TRIGGER_DELAY_LIST?</b>                                                               |
| Queries the current possible Trigger Delay settings in Scope mode.                             |
| <b>SCOPE_TRIGGER_LEVEL_LIST?</b>                                                               |
| Queries the current possible Trigger Level settings in Scope mode.                             |

## Level Meter –Optional

|                                                                                         |
|-----------------------------------------------------------------------------------------|
| <b>LEVEL?</b>                                                                           |
| Queries the different measurement runs (traces) that are available in Level Meter mode. |
| <b>LEVEL_AVG_CONFIG</b>                                                                 |
| Sets the current averaging method.                                                      |
| <b>LEVEL_AVG_CONFIG?</b>                                                                |
| Queries the current averaging method.                                                   |
| <b>LEVEL_AVG_LIST?</b>                                                                  |
| Queries the current possible averaging time settings for Level Meter mode.              |
| <b>LEVEL_CONFIG</b>                                                                     |
| Sets the current measurement parameters for Level Meter mode.                           |
| <b>LEVEL_CONFIG?</b>                                                                    |
| Queries the current measurement parameters for Level Meter mode.                        |

## Network configuration

|                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------|
| <b>IP_CONFIG</b>                                                                                                           |
| Sets the IP configuration of the device. Use IP_Config_Renew to apply the new settings.                                    |
| <b>IP_CONFIG?</b>                                                                                                          |
| Queries the simple IP configuration of the device.                                                                         |
| <b>IP_CONFIG_ALL?</b>                                                                                                      |
| Queries the expanded IP configuration of the device.                                                                       |
| <b>IP_CONFIG_RENEW</b>                                                                                                     |
| Renews the IP address of the device and restarts the server with the actual settings.<br>This closes all open connections. |
| <b>IP_SERVER</b>                                                                                                           |
| Sets the new server configuration of the device. Use IP_Config_Renew to apply the new settings.                            |
| <b>IP_SERVER?</b>                                                                                                          |
| Queries the current server configuration of the device.                                                                    |

## Reference Input 10 MHz

|                                                                       |
|-----------------------------------------------------------------------|
| <b>RF_EXT_REF</b>                                                     |
| Switches the 10 MHz reference input on or off.                        |
| <b>RF_EXT_REF?</b>                                                    |
| Queries the current state of the 10 MHz reference input.              |
| <b>RF_EXT_REF_LOCKED?</b>                                             |
| Queries whether an external 10 MHz signal is connected to the device. |

### Service Tables (channel tables)

|                                                                                |
|--------------------------------------------------------------------------------|
| <b>SRV_CLR</b>                                                                 |
| Deletes a service table.                                                       |
| <b>SRV_CLR_ALL</b>                                                             |
| Deletes all service tables.                                                    |
| <b>SRV_DS</b>                                                                  |
| Creates a service table and stores it in the nonvolatile memory of the device. |
| <b>SRV_DS?</b>                                                                 |
| Queries a service table.                                                       |
| <b>SRV_LIST?</b>                                                               |
| Queries all service tables without details.                                    |
| <b>SRV_SEL</b>                                                                 |
| Sets the current active service table.                                         |
| <b>SRV_SEL?</b>                                                                |
| Queries the current active service table.                                      |

### Stream communication general settings

|                                                                          |
|--------------------------------------------------------------------------|
| <b>STREAM_SETUP</b>                                                      |
| Sets the protocol and connection settings for the Stream data output.    |
| <b>STREAM_SETUP?</b>                                                     |
| Queries the connection and protocol settings for the Stream data output. |
| <b>STREAM_STATE</b>                                                      |
| Starts or stops the Stream data output.                                  |
| <b>STREAM_STATE?</b>                                                     |
| Queries the current Stream status.                                       |

### IQ stream communication –Optional

|                                                                      |
|----------------------------------------------------------------------|
| <b>IQSTREAM_ATT</b>                                                  |
| Sets the Attenuator value mode without interrupting the measurement. |
| <b>IQSTREAM_ATT?</b>                                                 |
| Queries the current Attenuator value.                                |
| <b>IQSTREAM_CONFIG</b>                                               |
| Sets the Fcent, RBW and RL settings.                                 |
| <b>IQSTREAM_CONFIG?</b>                                              |
| Queries the current settings.                                        |
| <b>IQSTREAM_FCEN</b>                                                 |
| Sets Fcent without interrupting the measurement.                     |
| <b>IQSTREAM_FCEN?</b>                                                |
| Queries the current Fcent setting.                                   |
| <b>IQSTREAM_RBW</b>                                                  |
| Sets the RBW setting.                                                |
| <b>IQSTREAM_RBW?</b>                                                 |
| Queries the current RBW setting.                                     |
| <b>IQSTREAM_RBW_LIST?</b>                                            |
| Queries the RBW List.                                                |
| <b>IQSTREAM_RL</b>                                                   |
| Sets the Reference Level without interrupting the measurement.       |
| <b>IQSTREAM_RL?</b>                                                  |
| Queries the current Reference Level.                                 |

### Audio stream communication –Optional

|                                                                 |
|-----------------------------------------------------------------|
| <b>AUDIOSTREAM_ATT</b>                                          |
| Sets the Attenuator value without interrupting the measurement. |



|                                                                  |
|------------------------------------------------------------------|
| <b>AUDIOSTREAM_ATT?</b>                                          |
| Queries the current Attenuator value.                            |
| <b>AUDIOSTREAM_BFO</b>                                           |
| Sets the BFO value (beat frequency oscillator).                  |
| <b>AUDIOSTREAM_BFO?</b>                                          |
| Queries the current BFO value (beat frequency oscillator).       |
| <b>AUDIOSTREAM_DEMOD</b>                                         |
| Sets the demodulation type.                                      |
| <b>AUDIOSTREAM_DEMOD?</b>                                        |
| Queries the current audio demodulation type.                     |
| <b>AUDIOSTREAM_DEMOD_LIST?</b>                                   |
| Queries the currently available audio demodulation types.        |
| <b>AUDIOSTREAM_FCEN</b>                                          |
| Sets Fcent without interrupting the measurement.                 |
| <b>AUDIOSTREAM_FCEN?</b>                                         |
| Queries the current Fcent setting.                               |
| <b>AUDIOSTREAM_FORMAT</b>                                        |
| Sets the Audio stream resolution per sample.                     |
| <b>AUDIOSTREAM_FORMAT?</b>                                       |
| Queries the current Audio stream resolution per sample.          |
| <b>AUDIOSTREAM_RBW?</b>                                          |
| Queries the current RBW setting.                                 |
| <b>AUDIOSTREAM_RBW</b>                                           |
| Sets the RBW setting.                                            |
| <b>AUDIOSTREAM_RBW_LIST?</b>                                     |
| Queries the RBW List of potential RBW settings.                  |
| <b>AUDIOSTREAM_RL</b>                                            |
| Sets the Reference Level without interrupting the measurement.   |
| <b>AUDIOSTREAM_RL?</b>                                           |
| Queries the current Reference Level.                             |
| <b>AUDIOSTREAM_SAMPLERATE</b>                                    |
| Sets the audio signal Samplerate.                                |
| <b>AUDIOSTREAM_SAMPLERATE?</b>                                   |
| Queries the current audio stream Samplerate.                     |
| <b>AUDIOSTREAM_SQUELCH</b>                                       |
| Sets the audio stream squelch threshold (noise suppression).     |
| <b>AUDIOSTREAM_SQUELCH?</b>                                      |
| Queries the current audio squelch threshold (noise suppression). |
| <b>AUDIOSTREAM_SQUELCH_LIST?</b>                                 |
| Queries an audio squelch threshold-list (noise suppression).     |



## 5 Command Descriptions

### General

### BATTERY?



*Command only available for hand-held devices*

#### Description

Queries the remaining battery capacity during battery powered operation.

#### Note

The command does not provide valid responses while charging. The battery mode can be checked by using the "POWER\_MODE?" command.

#### Command

BATTERY?;

#### Response

<BatState>,<ReturnCode>;

#### Parameter List

| Parameter    | Type  | Description                                                                                               |
|--------------|-------|-----------------------------------------------------------------------------------------------------------|
| <BatState>   | Short | Value in the range of 0 to 100 indicates the current battery capacity in percent (0 = empty, 100 = full). |
| <ReturnCode> | Word  | Warning or error code                                                                                     |

#### Example

|                 |           |
|-----------------|-----------|
| <i>Command</i>  | BATTERY?; |
| <i>Response</i> | 100,0;    |

## CHECKSUM

### Description

Sets the checksum mode for the remote communication.

### Note

If a checksum is activated, the last parameter of each response from the device will be the checksum in hexadecimal format. Checksum calculation includes all characters before the last comma.

The CRC-CCITT is used for calculation.

The CRC polynomial for the calculation is:  $x^{16} + x^{12} + x^5 + 1$

The starting value for the calculation is: 0xFFFF

By default the checksum calculation is not activated for the remote communication.

### Command

CHECKSUM <ChecksumMode>;

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type | Description                                                                                                                                                               |
|----------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ChecksumMode> | Enum | <div>OFF</div> <div>CHECKSUM</div> <div>TRANSMIT</div> <div>Checksum calculation not active.</div> <div>Checksum calculation for data send from device to the host.</div> |
| <ReturnCode>   | Word | Warning or error code                                                                                                                                                     |

### Examples

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | CHECKSUM TRANSMIT; |
| <i>Response</i> | 0,D7A3;            |
| <i>Command</i>  | CHECKSUM OFF;      |
| <i>Response</i> | 0;                 |

## CHECKSUM?

### Description

Queries the checksum mode for the remote communication.

### Note

If a checksum is activated, the last parameter of each response from the device will be the checksum in hexadecimal format. Checksum calculation includes all characters before the last comma.

The CRC-CCITT (X.25, V.41, HDLC, XMODEM, Bluetooth, SD,...) is used for calculation.

The CRC polynomial for the calculation is:  $x^{16} + x^{12} + x^5 + 1$

By default the checksum calculation is not activated for the remote communication.

### Command

CHECKSUM?;

### Response

<ChecksumMode>,<ReturnCode>;

### Parameter List

| Parameter      | Type | Description                                                                                                            |
|----------------|------|------------------------------------------------------------------------------------------------------------------------|
| <ChecksumMode> | Enum | OFF      Checksum calculation not active.<br>TRANSMIT      Checksum calculation for data send from device to the host. |
| <ReturnCode>   | Word | Warning or error code                                                                                                  |

### Examples

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | CHECKSUM?;       |
| <i>Response</i> | TRANSMIT,0,DAFC; |
| <i>Command</i>  | CHECKSUM?;       |
| <i>Response</i> | OFF,0;           |

# DATE

### Description

Sets the current date setting for the device

### Command

DATE <Date>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <Date>       | Date | dd.mm.yy              |
| <ReturnCode> | Word | Warning or error code |

### Example

---

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | DATE 06.07.12; |
| <i>Response</i> | 0;             |

---

## DATE?

### Description

Queries the current date setting for the device

### Command

DATE?;

### Response

<Date>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <Date>       | Date | dd.mm.yy              |
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | DATE?;      |
| <i>Response</i> | 06.07.12,0; |

### DEV\_ID?

#### Description

Queries the device identification number.

#### Command

DEV\_ID?;

#### Response

<DeviceID>,<ReturnCode>;

#### Parameter List

| Parameter    | Type   | Description                  |
|--------------|--------|------------------------------|
| <DeviceID>   | String | Device identification number |
| <ReturnCode> | Word   | Warning or error code        |

#### Example

---

|                 |                       |
|-----------------|-----------------------|
| <i>Command</i>  | DEV_ID?;              |
| <i>Response</i> | "A86CECE3BB98C957",0; |

---



## DEV\_INFO?

### Description

Queries all device information that describes the individual device.

### Note

Command also useable in "Remote OFF" mode

### Command

DEV\_INFO?;

### Response

<ProductName>,<ProductID>,<SerialNo>,<DeviceID>,  
<FirmwareVersion>,<FirmwareDate>,  
<CalDate>,<NextCalDate>,<ReturnCode>;

### Parameter List

| Parameter         | Type          | Description                        |
|-------------------|---------------|------------------------------------|
| <ProductName>     | String        | Product name (e.g. "NRA-3000")     |
| <ProductID>       | String        | Production identification number   |
| <SerialNo>        | String        | Serial number                      |
| <DeviceID>        | String        | Device identification number       |
| <FirmwareVersion> | VersionString | Firmware version                   |
| <FirmwareDate>    | Date          | Firmware date                      |
| <CalDate>         | Date          | Date of the calibration            |
| <NextCalDate>     | Date          | Recommended date for recalibration |
| <ReturnCode>      | Word          | Warning or error code              |

### Example NRA Device

|                 |                                                                                                |
|-----------------|------------------------------------------------------------------------------------------------|
| <i>Command</i>  | DEV_INFO?;                                                                                     |
| <i>Response</i> | "NRA-6000","123456789","PT-0001",<br>"A86CECE3BB98C957","V1.0.4",19.01.11,01.01.01,01.01.03,0; |

### Example IDA Device

|                 |                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------|
| <i>Command</i>  | DEV_INFO?;                                                                                 |
| <i>Response</i> | "IDA-3106","RF-309","A-0009","CAA73ABB2E601226",<br>"V1.1.0",06.08.12,16.09.09,16.09.10,0; |

## DEV\_OPTION?

### Description

Queries the options installed on the device.

### Note

Options are additional measurement modes that the device is prepared for. Each device needs a separate activation code for each option, which can be purchased. The current device firmware determines whether an option is prepared and can be activated.

To check Name and State of all possible options, use Index 0 and increment the index value until the response returns UNKNOWN.

### Command

DEV\_OPTION? <Index>;

### Response

<State>, <Name>, <ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                  |
|--------------|--------|----------------------------------------------|
| <Index>      | Word   | Option index, valid values: 0 to 63          |
| <State>      | Enum   | FREE (=enabled); CLOSED (=disabled); UNKNOWN |
| <Name>       | String | Option name                                  |
| <ReturnCode> | Word   | Warning or error code                        |

### Example

---

|                 |                                 |
|-----------------|---------------------------------|
| <i>Command</i>  | DEV_OPTION? 0;                  |
| <i>Response</i> | FREE, "Multi Channel Power", 0; |

---

## DEV\_RESET

### Description

Resets the device with different reset modes

### Command

DEV\_RESET <ResetMode>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ResetMode>  | Enum | <p>MEAS</p> <ul style="list-style-type: none"><li>- Resets measurement settings to factory default.</li></ul> <p>APP</p> <ul style="list-style-type: none"><li>- Restarts the measurement application.</li><li>- Resets the measurement settings to startup configuration.</li><li>- Resets the temporary settings of the device to default.</li><li>- Closes all open TCP connections.</li></ul> <p>FACTORY</p> <ul style="list-style-type: none"><li>- Restarts the measurement application.</li><li>- Resets the startup configuration to factory default.</li><li>- Resets the network settings to factory default.</li><li>- Resets the temporary settings of the device to default.</li><li>- Closes all open TCP connections.</li></ul> <p>REMOTE</p> <ul style="list-style-type: none"><li>- Resets the settings of the following commands to their default values:</li></ul> <p>CHECKSUM; REMOTE_NEWLINE;<br/>FORMAT_ASCII; FORMAT_BINARY;</p> |
| <ReturnCode> | Word | Warning or error code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Example

|          |                |
|----------|----------------|
| Command  | DEV_RESET APP; |
| Response | 0;             |

# ERROR?

### Description

Queries the last return code.

### Command

ERROR?;

### Response

<LastReturnCode>,<ReturnCode>;

### Parameter List

| Parameter        | Type | Description                            |
|------------------|------|----------------------------------------|
| <LastReturnCode> | Enum | Last return code                       |
| <ReturnCode>     | Word | Warning or error code for this command |

### Example

---

|                 |         |
|-----------------|---------|
| <i>Command</i>  | ERROR?; |
| <i>Response</i> | 401,0;  |

---

## FORMAT\_ASCII

### Description

Sets the output format of the measurement data for the remote interface.

### Note

The output format will not be stored by the device.  
After restart, the Device is set to UNIT output format.

Example output strings and corresponding device internal format strings:

| Parameter      | Number of Digits   | Format | Output string                        |
|----------------|--------------------|--------|--------------------------------------|
| UNIT (default) | 2 for dB values    | %.2f   | -44.80, -9.19, 0.00                  |
| UNIT (default) | 7 for IQ values    | %.7G   | -0.0004326085, -7.302459E-007        |
| UNIT (default) | 3 for other values | %.3E   | -4.480E+001, -9.193E+000, 4.967E-008 |
| SCIENTIFIC     | 2                  | %.2e   | -4.48e+001, -9.19e+000, 4.97e-008    |
| FIXED          | 3                  | %.3f   | -44.801, -9.193, 0.000               |
| ENGINEERING    | 2                  | %.2g   | -45, -9.2, 5.0e-008                  |

### Command

FORMAT\_ASCII <OutputFormat>, <Digits>;

### Response

<ReturnCode>;

## Command Reference Guide

### General

#### Parameter List

| Parameter      | Type | Description                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <OutputFormat> | Enum | UNIT<br>Sets the output format to the default ASCII format:<br>2 digits in decimal notation for dB Values<br>3 digits in scientific notation for other values.<br>SCIENTIFIC<br>Sets the output format to scientific notation.<br>FIXED<br>Sets the output format to fixed decimal notation.<br>ENGINEERING<br>Sets the output format to a fixed number of significant digits<br>in scientific or decimal notation. |
| <Digits>       | Word | Range: 0 to 12<br>UNIT mode<br>Parameter not used<br>SCIENTIFIC mode<br>Number of digits after decimal point in scientific notation<br>FIXED mode<br>Number of digits after decimal point in decimal notation.<br>ENGINEERING mode<br>Number of significant digits.                                                                                                                                                 |
| <ReturnCode>   | Word | Warning or error code                                                                                                                                                                                                                                                                                                                                                                                               |

#### Example

|                 |                      |
|-----------------|----------------------|
| <i>Command</i>  | FORMAT_ASCII UNIT,0; |
| <i>Response</i> | 0;                   |

## FORMAT\_ASCII?

### Description

Queries the output format of the measurement data for the remote interface.

### Note

The output format will not be stored by the device.  
After restart, the Device is set to UNIT output format.

### Command

FORMAT\_ASCII?;

### Response

<OutputFormat>, <Digits>, <ReturnCode>;

### Parameter List

| Parameter      | Type | Description                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <OutputFormat> | Enum | UNIT<br>Sets the output format to the default ASCII format:<br>2 digits in decimal notation for dB Values<br>3 digits in scientific notation for other values.<br>SCIENTIFIC<br>Sets the output format to scientific notation.<br>FIXED<br>Sets the output format to fixed decimal notation.<br>ENGINEERING<br>Sets the output format to a fixed number of significant digits in scientific or decimal notation. |
| <Digits>       | Word | Range: 0 to 12<br>UNIT mode<br>Parameter not used<br>SCIENTIFIC mode<br>Number of digits after decimal point in scientific notation<br>FIXED mode<br>Number of digits after decimal point in decimal notation.<br>ENGINEERING mode<br>Number of significant digits.                                                                                                                                              |
| <ReturnCode>   | Word | Warning or error code                                                                                                                                                                                                                                                                                                                                                                                            |

### Examples

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | FORMAT_ASCII?;  |
| <i>Response</i> | UNIT,0,0;       |
| <i>Command</i>  | FORMAT_ASCII?;  |
| <i>Response</i> | SCIENTIFIC,4,0; |
| <i>Command</i>  | FORMAT_ASCII?;  |
| <i>Response</i> | FIXED,6,0;      |

# FORMAT\_BINARY

## Description

Sets the output format of the measurement data for BINARY communication.

## Note

In NORMAL mode the BINARY data is sent with most significant byte first (big endian).  
In SWAPPED mode the BINARY data is sent with last significant byte first (little endian)

The output format will not be stored by the device.  
After restart, the Device is set to NORMAL output format.

## Command

FORMAT\_BINARY <OutputFormat>;

## Response

<ReturnCode>;

## Parameter List

| Parameter      | Type | Description                                                                       |
|----------------|------|-----------------------------------------------------------------------------------|
| <OutputFormat> | Enum | NORMAL<br>Most significant byte first.<br>SWAPPED<br>Last significant byte first. |
| <ReturnCode>   | Word | Warning or error code                                                             |

## Examples

|                 |                        |
|-----------------|------------------------|
| <i>Command</i>  | FORMAT_BINARY NORMAL;  |
| <i>Response</i> | 0;                     |
| <i>Command</i>  | FORMAT_BINARY SWAPPED; |
| <i>Response</i> | 0;                     |



## FORMAT\_BINARY?

### Description

Queries the output format of the measurement data for BINARY communication.

### Note

In NORMAL mode the BINARY data is sent with most significant byte first (big endian).  
In SWAPPED mode the BINARY data is sent with last significant byte first (little endian)

The output format will not be stored by the device.  
After restart, the Device is set to NORMAL output format.

### Command

FORMAT\_BINARY?;

### Response

<OutputFormat>,<ReturnCode>;

### Parameter List

| Parameter      | Type | Description                                                                       |
|----------------|------|-----------------------------------------------------------------------------------|
| <OutputFormat> | Enum | NORMAL<br>Most significant byte first.<br>SWAPPED<br>Last significant byte first. |
| <ReturnCode>   | Word | Warning or error code                                                             |

### Examples

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | FORMAT_BINARY?; |
| <i>Response</i> | NORMAL,0;       |
| <i>Command</i>  | FORMAT_BINARY?; |
| <i>Response</i> | SWAPPED,0;      |

# POWER\_MODE?



*Command only available for hand-held devices*

### Description

Queries the way the device is being powered.

### Note

In case of battery powered operation the remaining capacity can be indicated by using the "BATTERY?" command.

### Command

POWER\_MODE?;

### Response

<PowerMode>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                   |
|--------------|------|---------------------------------------------------------------|
| <PowerMode>  | Enum | BATTERY      The device is powered by rechargeable batteries. |
|              |      | PWR_LINE     The device is powered by external power supply.  |
| <ReturnCode> | Word | Warning or error code                                         |

### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | POWER_MODE?; |
| <i>Response</i> | BATTERY,0;   |

### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | POWER_MODE?; |
| <i>Response</i> | PWR_LINE,0;  |

## POWER\_OFF

### Description

Initiates a controlled shutdown of the device.

### Note

The hardware remains powered on after shutdown.

The actual settings of the device will be lost after the POWER\_OFF command.

The device has to be turned on locally using the power switch after it has been shutdown by the POWER\_OFF command. There is no way to boot up remotely!

### Command

POWER\_OFF;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |            |
|-----------------|------------|
| <i>Command</i>  | POWER_OFF; |
| <i>Response</i> | 0;         |

# REMOTE

### Description

Enables/Disables remote communication with the NRA.

### Note

“REMOTE ON” is the condition required for utilizing remote access through all device interfaces.

If the response to the REMOTE command includes an error code, there may be a system error which can be analyzed by the SELFTEST command.

By default, the device is in REMOTE ON mode after start-up.

### Command

REMOTE <Status>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                |
|--------------|------|----------------------------------------------------------------------------|
| <Status>     | Enum | ON = Enables remote operation mode<br>OFF = Disables remote operation mode |
| <ReturnCode> | Word | Warning or error code                                                      |

### Example

---

|                 |            |
|-----------------|------------|
| <i>Command</i>  | REMOTE ON; |
| <i>Response</i> | 0;         |

---

## REMOTE?

### Description

Checks communication with the NRA and queries readiness for remote operation.

### Note

“REMOTE ON” is the condition required for utilizing remote access through all device interfaces.

If the response to the REMOTE command includes an error code, there may be a system error which can be analyzed by the SELFTEST command.

By default, the device is in REMOTE ON mode after start-up.

### Command

REMOTE?;

### Response

<Status>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                      |
|--------------|------|----------------------------------------------------------------------------------|
| <Status>     | Enum | ON = Remote operation mode is enabled<br>OFF = Remote operation mode is disabled |
| <ReturnCode> | Word | Warning or error code                                                            |

### Example

|                 |          |
|-----------------|----------|
| <i>Command</i>  | REMOTE?; |
| <i>Response</i> | ON,0;    |

# REMOTE\_NEWLINE

### Description

Sets the newline character(s) for the remote communication.

### Note

After restart the newline characters are set to <CR>

Command also useable in “Remote OFF” mode

### Command

REMOTE\_NEWLINE <Type>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                              |
|--------------|-------|----------------------------------------------------------|
| <Type>       | Enum  | CR Sends carriage return ( 0x0D ) as a newline character |
|              |       | LF Sends line feed ( 0x0A ) as a newline character       |
|              |       | CRLF Sends carriage return and line feed ( 0x0D + 0x0A ) |
|              |       | NONE No newline characters will be sent                  |
| <ReturnCode> | DWord | Warning or error code                                    |

### Example

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | REMOTE_NEWLINE CR; |
| <i>Response</i> | 0;                 |

## REMOTE\_NEWLINE?

### Description

Queries the newline character(s) for the remote communication.

### Note

After restart the newline characters are set to <CR>

Command also useable in "Remote OFF" mode

### Command

REMOTE\_NEWLINE?;

### Response

<Type>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                              |
|--------------|-------|----------------------------------------------------------|
| <Type>       | Enum  | CR Sends carriage return ( 0x0D ) as a newline character |
|              |       | LF Sends line feed ( 0x0A ) as a newline character       |
|              |       | CRLF Sends carriage return and line feed ( 0x0D + 0x0A ) |
|              |       | NONE No newline characters will be sent                  |
| <ReturnCode> | DWord | Warning or error code                                    |

### Example

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | REMOTE_NEWLINE?; |
| <i>Response</i> | CR,0;            |

# RETURN\_CODE?

## Description

Queries the type and description of a specific return code.

## Note

This command can be used to implement text messages in the remote application.

## Command

RETURN\_CODE? <Code>;

## Response

<Code>,<Type>,<Description>,<ReturnCode>;

## Parameter List

| Parameter     | Type   | Description                                                                                                                                                 |
|---------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Code>        | Word   | Warning or error code to be described                                                                                                                       |
| <Type>        | Enum   | INFO           The return type is an information code<br>WARNING       The return type is a warning code<br>ERROR          The return type is an error code |
| <Description> | String | Textual description of the return code                                                                                                                      |
| <ReturnCode>  | Word   | Warning or error code                                                                                                                                       |

## Examples

|                 |                                                                        |
|-----------------|------------------------------------------------------------------------|
| <i>Command</i>  | RETURN_CODE? 0;                                                        |
| <i>Response</i> | 0,INFO,"Command successful.",0;                                        |
| <i>Command</i>  | RETURN_CODE? 201;                                                      |
| <i>Response</i> | 201,WARNING,"Command parameter has been corrected.",0;                 |
| <i>Command</i>  | RETURN_CODE? 401;                                                      |
| <i>Response</i> | 401,ERROR,"Remote command is not implemented in the remote module.",0; |



## RETURN\_CODE\_LIST?

### Description

Queries a list with type and description of all return codes.

### Note

This command can be used to implement text messages in the remote application.

### Command

RETURN\_CODE\_LIST?;

### Response

<NoOfElements>, [ <Code>, <Type>,<Description>, ] <ReturnCode>;

### Parameter List

| Parameter      | Type   | Description                                                                                                                                                 |
|----------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NoOfElements> | Word   | Number of list elements                                                                                                                                     |
| <Code>         | Word   | Warning or error code to be described                                                                                                                       |
| <Type>         | Enum   | INFO           The return type is an information code<br>WARNING       The return type is a warning code<br>ERROR          The return type is an error code |
| <Description>  | String | Textual description of the return code                                                                                                                      |
| <ReturnCode>   | Word   | Warning or error code                                                                                                                                       |

### Example

|                 |                                                                                                                                                                                                                                                                                                              |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | RETURN_CODE_LIST?;                                                                                                                                                                                                                                                                                           |
| <i>Response</i> | 34,<br>0,INFO,"Command successful.",<br>201,WARNING,"Command parameter has been corrected.",<br>401,ERROR,"Remote command is not implemented in the remote module.",<br>402,ERROR,"Invalid parameter.",<br>...<br>431,ERROR,"Datalogger reorganization required.",<br>432,ERROR,"Mode not available.",<br>0; |

# SELFTEST?

### Description

Queries the selftest number of the power-on self tests returning error codes.

### Note

Command also useable in “Remote OFF” mode

### Command

SELFTEST?;

### Response

<NumberOfTests>, [ <SelftestNumber>, ] <ReturnCode>;

### Parameter List

| Parameter        | Type | Description              |
|------------------|------|--------------------------|
| <NumberOfTests>  | Word | Number of test(s) passed |
| <SelftestNumber> | Word | Selftest Number          |
| <ReturnCode>     | Word | Warning or error code    |

### Examples

|                 |            |
|-----------------|------------|
| <i>Command</i>  | SELFTEST?; |
| <i>Response</i> | 0,0;       |
|                 |            |
| <i>Command</i>  | SELFTEST?; |
| <i>Response</i> | 1,2,0;     |

## SELFTEST\_DETAIL?

### Description

Queries the detailed results of all power-on self tests.

### Note

Command also useable in "Remote OFF" mode

### Command

SELFTEST\_DETAIL?;

### Response

<NumberOfTests>, [ <SelftestNumber>,<NameOfTest>,<StepOfTest>,<StateOfTest>,<CommentOfTest>,<ErrorOfTest>, ] <ReturnCode>;

### Parameter List

| Parameter        | Type   | Description              |
|------------------|--------|--------------------------|
| <NumberOfTests>  | Word   | Number of test(s) passed |
| <SelftestNumber> | Word   | Selftest Number          |
| <NameOfTest>     | String | Name of the test         |
| <StepOfTest>     | String | Step of the test         |
| <StateOfTest>    | String | State of the test        |
| <CommentOfTest>  | String | Comment of the test      |
| <ErrorOfTest>    | Word   | Error code of the test   |
| <ReturnCode>     | Word   | Warning or error code    |

### Example NRA

|                 |                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SELFTEST_DETAIL?;                                                                                                                                                                             |
| <i>Response</i> | 4,<br>1,"Operating System:","Ready","OK","V1.6.3",0,<br>2,"Hardware Check:","Ready","OK","",0,<br>3,"Memory Check:","Ready","OK","",0,<br>5,"Flash Check:","Ready","OK","Free: 98 %",0,<br>0; |

### Example IDA

|                 |                                                                                                                                                                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SELFTEST_DETAIL?;                                                                                                                                                                                                                                                                     |
| <i>Response</i> | 6,<br>1,"Operating System:","Ready","OK","V1.8.1",0,<br>2,"Hardware Check:","Ready","OK","",0,<br>3,"Memory Check:","Ready","OK","",0,<br>4,"Data Logger:","Ready","OK","",0,<br>5,"Flash Check:","Ready","OK","Free: 75 %",0,<br>6,"Battery:","Ready","OK","External Power",0,<br>0; |

## SU\_STARTUP\_CONFIG

**Description**

Sets the startup behavior of the device.

**Note**

The configuration includes the measurement mode and the particular set parameters.

**Command**

SU\_STARTUP\_CONFIG <StartupMode>;

**Response**

<ReturnCode>;

**Parameter List**

| Parameter     | Type | Description                                                                                                                                      |
|---------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <StartupMode> | Enum | USER: Stores and uses the current settings as startup configuration.<br><br>FACTORY: Uses the standard factory settings as startup configuration |
| <ReturnCode>  | Word | Warning or error code                                                                                                                            |

**Example**

|                 |                            |
|-----------------|----------------------------|
| <i>Command</i>  | SU_STARTUP_CONFIG USER;    |
| <i>Response</i> | 0;                         |
| <i>Command</i>  | SU_STARTUP_CONFIG FACTORY; |
| <i>Response</i> | 0;                         |

## SU\_STARTUP\_CONFIG?

### Description

Queries the current startup behavior of the device.

### Command

SU\_STARTUP\_CONFIG?;

### Response

<StartupMode>,<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                          |
|---------------|------|--------------------------------------|
| <StartupMode> | Enum | USER: User defined startup settings. |
|               |      | FACTORY: Factory settings.           |
| <ReturnCode>  | Word | Warning or error code                |

### Example

---

*Command* SU\_STARTUP\_CONFIG?;

---

*Response* USER,0;

---

---

*Command* SU\_STARTUP\_CONFIG?;

---

*Response* FACTORY,0;

---

## TIME

### Description

Sets the current system time of the device.

### Command

TIME <Time>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <Time>       | Time | hh:mm:ss              |
| <ReturnCode> | Word | Warning or error code |

### Example

---

*Command*    TIME 15:16:16;

---

*Response*    0;

---

## TIME?

### Description

Queries the current system time of the device.

### Command

TIME?;

### Response

<Time>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <Time>       | Time | hh:mm:ss              |
| <ReturnCode> | Word | Warning or error code |

### Example

---

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | TIME?;      |
| <i>Response</i> | 15:16:16,0; |

---

## VERSION?

### Description

Queries the versions of the current firmware modules.

### Note

You can query the current RF-Board version by using the parameter “RF” (VERSION? RF ). If you are using a device with an older firmware version, the response will be error code “404”. This is also an indicator for the RF-Board 1.

### Command

VERSION? <ModuleType>;

### Response

<FW Version>,<ReturnCode>;

### Parameter List

| Parameter    | Type          | Description                                                                                                       |
|--------------|---------------|-------------------------------------------------------------------------------------------------------------------|
| <ModuleType> | Enum          | APP      Application Firmware<br>BL        Bootloader<br>OS        Operating System<br>RF        RF-Board Version |
| <FW Version> | VersionString | “V0.0.0” to “V99.99.99”                                                                                           |

### Examples

|                 |               |
|-----------------|---------------|
| <i>Command</i>  | VERSION? APP; |
| <i>Response</i> | "V1.0.4",0;   |
| <i>Command</i>  | VERSION? BL;  |
| <i>Response</i> | "V1.0.7",0;   |
| <i>Command</i>  | VERSION? OS;  |
| <i>Response</i> | "V1.6.3",0;   |
| <i>Command</i>  | VERSION? RF;  |
| <i>Response</i> | "1",0;        |



## Antenna and Cable

### ANT\_HANDLE\_PREAMP



*Command only available for devices with an antenna connector*

#### Description

Switches the preamplifier in the antenna handle on or off.

#### Note

Switching the preamplifier on or off could affect the current Reference Level (Attenuator).

#### Command

ANT\_HANDLE\_PREAMP <SwitchState>;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter     | Type | Description                                                                                                                                            |
|---------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <SwitchState> | Enum | ON: Switches on the preamplifier in the antenna handle<br>OFF: Switches off the preamplifier in the antenna handle<br>(default state after connecting) |
| <ReturnCode>  | Word | Warning or error code                                                                                                                                  |

#### Example

*Command* ANT\_HANDLE\_PREAMP ON;

*Response* 0;

# ANT\_HANDLE\_PREAMP?



*Command only available for devices with an antenna connector*

### Description

Queries the current state of the antenna handle preamplifier.

### Command

ANT\_HANDLE\_PREAMP?;

### Response

<SwitchState>,<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                                                                                                                                                  |
|---------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <SwitchState> | Enum | ON: The preamplifier in the antenna handle is switched on<br>OFF: The preamplifier in the antenna handle is switched off<br>(default state after connecting) |
| <ReturnCode>  | Word | Warning or error code                                                                                                                                        |

### Example

|                 |                     |
|-----------------|---------------------|
| <i>Command</i>  | ANT_HANDLE_PREAMP?; |
| <i>Response</i> | ON,0;               |

## ANT\_HANDLE\_SEL?



*Command only available for devices with an antenna connector*

### Description

Queries the information of the currently connected antenna handle.

### Command

ANT\_HANDLE\_SEL?;

### Response

<DataSource>,  
[ <LongName>,<ShortName>,<FminOn>,<FmaxOn>,<FminOff>,<FmaxOff>,<AntennaID>,  
<AntennaPol>, ] <ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                |
|--------------|--------|----------------------------------------------------------------------------|
| <DataSource> | Enum   | AUTO: An antenna handle is connected<br>NO: No antenna handle is connected |
| <LongName>   | String | Long Name of the antenna handle, up to 35 characters                       |
| <ShortName>  | String | Short Name of the antenna handle, up to 10 characters                      |
| <FminOn>     | String | Start frequency of the antenna handle (Preamp = ON)                        |
| <FmaxOn>     | String | Stop frequency of the antenna handle (Preamp = ON)                         |
| <FminOff>    | String | Start frequency of the antenna handle (Preamp = OFF)                       |
| <FmaxOff>    | String | Stop frequency of the antenna handle (Preamp = OFF)                        |
| <AntennaID>  | Short  | 0=None, 3=Antenna Adapter, all others=Narda Antennas                       |
| <AntennaPol> | Enum   | HORIZONTAL, VERTICAL                                                       |
| <ReturnCode> | Word   | Warning or error code                                                      |

### Example: Antenna Handle

|                 |                                                                                          |
|-----------------|------------------------------------------------------------------------------------------|
| <i>Command</i>  | ANT_HANDLE_SEL?;                                                                         |
| <i>Response</i> | AUTO,"Active Antenna Handle","AntHandle","9 kHz","6 GHz","9 kHz","6 GHz",3,HORIZONTAL,0; |

### Example: No Antenna Handle

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | ANT_HANDLE_SEL?; |
| <i>Response</i> | NO,0;            |

# ANT\_HANDLE\_COMPASS?



*Command only available for devices with an antenna connector*

### Description

Queries the current compass data of the antenna handle.

### Command

ANT\_HANDLE\_COMPASS?;

### Response

<Azimuth>,<Elevation>,<Roll>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                                                                            |
|--------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Azimuth>    | Float | Angle of the azimuth. From 0°... 360°                                                                                                                                  |
| <Elevation>  | Float | Angle of the elevation. Right angle = 0°.<br>Moving up the handle, positive values from 0°... +90°<br>Moving down the handle, negative values from 0°...-90°           |
| <Roll>       | Float | Angle of the roll factor. Right angle = 0°.<br>Turning right the handle, positive values from 0°... +180°<br>Turning left the handle, negative values from 0°... -180° |
| <ReturnCode> | Word  | Warning or error code                                                                                                                                                  |

### Example: Antenna Handle Compass

|                 |                      |
|-----------------|----------------------|
| <i>Command</i>  | ANT_HANDLE_COMPASS?; |
| <i>Response</i> | 344.3,30.3,-28.5,0;  |

## ANT\_HANDLE\_BUTTON?



*Command only available for devices with an antenna connector*

### Description

Queries the current state of the antenna handle push button.

### Command

ANT\_HANDLE\_BUTTON?;

### Response

<ButtonPressed>,<ReturnCode>;

### Parameter List

| Parameter       | Type | Description                                                  |
|-----------------|------|--------------------------------------------------------------|
| <ButtonPressed> | Enum | TRUE or FALSE; True if push button is pressed, false if not. |
| <ReturnCode>    | Word | Warning or error code                                        |

### Example: Antenna Handle

*Command* ANT\_HANDLE\_BUTTON?;

*Response* TRUE,0;

*Command* ANT\_HANDLE\_BUTTON?;

*Response* FALSE,0;

# ANT\_LIST?

### Description

Queries a list of all currently available user defined antennas.

### Command

ANT\_LIST?;

### Response

<NumberOfElements>,[ <LongName>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                                     |
|--------------------|--------|---------------------------------------------------------------------------------|
| <NumberOfElements> | Short  | Number of subsequent items                                                      |
| <LongName>         | String | Long Name of each currently available user defined antenna, up to 35 characters |
| <ReturnCode>       | Word   | Warning or error code                                                           |

### Example

|                 |                                                                                                                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | ANT_LIST?;                                                                                                                                                                                              |
| <i>Response</i> | 5,<br>"Double-Ridged Horn Antenna 3106",<br>"Conical Dipole Antenna PCD8250",<br>"Double-Ridged Horn Antenna 3115",<br>"LogPER_Antenna_LP-03_0.8-6GHz",<br>"LogPER_Schwarzbeck-Antenna_USL_9143",<br>0; |

## ANT\_SEL

### Description

Selects a user defined antenna.

### Note

Narda auto (directional) antennas are detected automatically and cannot be manually selected.

The selection of a user antenna is always possible when no antenna handle is connected or when the antenna adapter is connected to the antenna handle.

The selection of a user antenna might lead to an adjustment of the frequency range of the device.

### Command

ANT\_SEL <LongName>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                |
|--------------|--------|------------------------------------------------------------|
| <LongName>   | String | Long Name of the user defined antenna, up to 35 characters |
| <ReturnCode> | Word   | Warning or error code                                      |

### Example

|                 |                                            |
|-----------------|--------------------------------------------|
| <i>Command</i>  | ANT_SEL "Double-Ridged Horn Antenna 3106"; |
| <i>Response</i> | 0;                                         |

# ANT\_SEL?

### Description

Queries the information of the currently selected or connected user defined or auto antenna.

### Command

ANT\_SEL?;

### Response

<DataSource>, [ <LongName>,<ShortName>,<Fmin>,<Fmax>,<Property>, ] <ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                                                            |
|--------------|--------|------------------------------------------------------------------------------------------------------------------------|
| <DataSource> | Enum   | AUTO: A Narda auto (directional) antenna is selected<br>USER: A user antenna is selected<br>NO: No antenna is selected |
| <LongName>   | String | Long Name of the selected antenna, up to 35 characters                                                                 |
| <ShortName>  | String | Short Name of the antenna, up to 10 characters                                                                         |
| <Fmin>       | String | Start frequency of the antenna                                                                                         |
| <Fmax>       | String | Stop frequency of the antenna                                                                                          |
| <Property>   | Enum   | E-FIELD, H-FIELD, CURRENT, E&H-FIELD, UNKNOWN                                                                          |
| <ReturnCode> | Word   | Warning or error code                                                                                                  |

### Example: Narda Auto-Antenna

---

*Command* ANT\_SEL?;

---

*Response* AUTO,"Dir. Antenna 20 - 250 MHz","DirAnt 1","20 MHz","250 MHz",E&H-FIELD,0;

---

### Example: No Antenna

---

*Command* ANT\_SEL?;

---

*Response* NO,0;

---



## ANT\_SEL\_NO

### Description

Disables a selected user defined antenna.

### Note

Narda auto (directional) antennas are detected automatically and cannot be manually deselected.

### Command

ANT\_SEL\_NO;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | ANT_SEL_NO; |
| <i>Response</i> | 0;          |

## ANT\_DS

### Description

Creates a new user defined antenna and stores it in the nonvolatile memory of the device.

### Command

ANT\_DS < ShortName>,<LongName>,<Manufacturer>,<DeviceName>,<Model>,<SerialNo>,<CalDate>,<Fmin>,<Fmax>,<Property>,<MNOL>,<Channels>,<nCal>,[<CalFreq>,<CalValue>];

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type   | Description                                                                                                                                                                                                                     |
|----------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ShortName>    | String | Abbreviated name for the antenna, up to 10 chr                                                                                                                                                                                  |
| <LongName>     | String | Long Name of the antenna and used for selection, up to 35 chr                                                                                                                                                                   |
| <Manufacturer> | String | Manufacturer's name, up to 15 chr                                                                                                                                                                                               |
| <DeviceName>   | String | Antenna name, up to 15 chr                                                                                                                                                                                                      |
| <Model>        | String | Model, up to 15 chr                                                                                                                                                                                                             |
| <SerialNo>     | String | Serial number of the antenna, up to 15 chr                                                                                                                                                                                      |
| <CalDate>      | Date   | Calibration date of the antenna, DD.MM.YY                                                                                                                                                                                       |
| <Fmin>         | String | Lower frequency limit of the antenna, up to 15 chr [Hz]                                                                                                                                                                         |
| <Fmax>         | String | Upper frequency limit of the antenna, up to 15 chr [Hz]                                                                                                                                                                         |
| <Property>     | Enum   | Antenna measurement property: [E-FIELD, H-FIELD, CURRENT, E&H-FIELD]                                                                                                                                                            |
| <MNOL>         | Float  | Maximum nominal output level of the antenna. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Reference Level selection accordingly. [dBm] |
| <Channels>     | Enum   | CH1 (single axis, for user defined antennas), CH3 (three axis antenna, reserved for Narda Antennas )                                                                                                                            |
| <nCal>         | Short  | Number of calibration points from 2 to 200                                                                                                                                                                                      |
| <CalFreq>      | Double | List of antenna calibration points, must be ascending order [Hz]                                                                                                                                                                |
| <CalValue>     | Float  | Calibration value [dB/m or dBA/V]; dBA/V if Property = CURRENT                                                                                                                                                                  |
| <ReturnCode>   | Word   | Warning or error code                                                                                                                                                                                                           |

**Example**

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Command  | ant_ds<br>"LP-03",<br>"LogPER_Antenna_LP-03_0.8-6GHz",<br>"Narda - PMM",<br>"Log Per LP-03",<br>"LP-03",<br>"000WE90602",<br>15.09.09,<br>"800 MHz",<br>"6 GHz",<br>E-FIELD,20,1CH,<br>15,<br>7000000000,26.5,<br>8000000000,23.75,<br>14000000000,27.5,<br>20000000000,30,<br>21000000000,30.6,<br>22000000000,32.5,<br>24000000000,33.4,<br>38000000000,36.2,<br>40000000000,36.3,<br>52000000000,39.7,<br>54000000000,39.6,<br>56000000000,40,<br>58000000000,41.2,<br>60000000000,41.7,<br>61000000000,41.3,; |
| Response | 0;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

# ANT\_DS?

### Description

Queries a user defined antenna.

### Note

Long name of the antenna is for selection.

### Command

ANT\_DS? <LongName>;

### Response

< ShortName>,<LongName>,<Manufacturer>,<DeviceName>,<Model>,<SerialNo>,  
<CalDate>,<Fmin>,<Fmax>,<Property>,<MNOL>,<Channels>,<nCal>,[<CalFreq>,<CalValue>],  
<ReturnCode>;

### Parameter List

| Parameter      | Type   | Description                                                                                                                                                                                                                     |
|----------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ShortName>    | String | Abbreviated name for the antenna, up to 10 chr                                                                                                                                                                                  |
| <LongName>     | String | Long Name of the antenna and used for selection, up to 35 chr                                                                                                                                                                   |
| <Manufacturer> | String | Manufacturer's name, up to 15 chr                                                                                                                                                                                               |
| <DeviceName>   | String | Antenna name, up to 15 chr                                                                                                                                                                                                      |
| <Model>        | String | Model, up to 15 chr                                                                                                                                                                                                             |
| <SerialNo>     | String | Serial number of the antenna, up to 15 chr                                                                                                                                                                                      |
| <CalDate>      | Date   | Calibration date of the antenna                                                                                                                                                                                                 |
| <Fmin>         | String | Lower frequency limit of the antenna, up to 15 chr [Hz]                                                                                                                                                                         |
| <Fmax>         | String | Upper frequency limit of the antenna, up to 15 chr [Hz]                                                                                                                                                                         |
| <Property>     | Enum   | Antenna measurement property: [E-FIELD, H-FIELD, CURRENT, E&H-FIELD]                                                                                                                                                            |
| <MNOL>         | Float  | Maximum nominal output level of the antenna. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Reference Level selection accordingly. [dBm] |
| <Channels>     | Enum   | CH1 (single axis), CH3 (three axis antenna)                                                                                                                                                                                     |
| <nCal>         | Short  | Number of calibration points from 2 to 200                                                                                                                                                                                      |
| <CalFreq>      | Double | List of antenna calibration points, must be ascending order [Hz]                                                                                                                                                                |
| <CalValue>     | Float  | Calibration value [dB/m or dBA/V]; dBA/V if Property = CURRENT                                                                                                                                                                  |
| <ReturnCode>   | Word   | Warning or error code                                                                                                                                                                                                           |

**Example**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | Ant_ds? "LogPER_Antenna_LP-03_0.8-6GHz";                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>Response</i> | "LP-03","LogPER_Antenna_LP-03_0.8-6GHz",<br>"Narda - PMM","Log Per LP-03","LP-03",<br>"000WE90602",15.09.09,"800 MHz","6 GHz",E-FIELD,20,1CH,<br>15,<br>7000000000,26.5,<br>8000000000,23.75,<br>14000000000,27.5,<br>20000000000,30,<br>21000000000,30.6,<br>22000000000,32.5,<br>24000000000,33.4,<br>38000000000,36.2,<br>40000000000,36.3,<br>52000000000,39.7,<br>54000000000,39.6,<br>56000000000,40,<br>58000000000,41.2,<br>60000000000,41.7,<br>61000000000,41.3,<br>0; |

# ANT\_CLR

### Description

Deletes a user defined antenna.

### Command

ANT\_CLR <LongName>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                   |
|--------------|--------|-----------------------------------------------|
| <LongName>   | String | Long Name of a specific antenna, up to 35 chr |
| <ReturnCode> | Word   | Warning or error code                         |

### Example

---

*Command* ANT\_CLR "my\_longname";

---

*Response* 0;

---

## ANT\_CLR\_ALL

### Description

Deletes all user defined antennas.

### Command

ANT\_CLR\_ALL;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | ANT_CLR_ALL; |
| <i>Response</i> | 0;           |

# CBL\_LIST?

### Description

Queries a list of all currently available user defined cables.

### Command

CBL\_LIST?;

### Response

<NumberOfElements>,[ <LongName>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                                   |
|--------------------|--------|-------------------------------------------------------------------------------|
| <NumberOfElements> | Short  | Number of subsequent items                                                    |
| <LongName>         | String | Long Name of each currently available user defined cable, up to 35 characters |
| <ReturnCode>       | Word   | Warning or error code                                                         |

### Example

|                 |                                                                            |
|-----------------|----------------------------------------------------------------------------|
| <i>Command</i>  | CBL_LIST?;                                                                 |
| <i>Response</i> | 2,<br>"ENVIRONFLEX 400 Length 1.5m",<br>"ENVIRONFLEX 400 Length 5m",<br>0; |



## CBL\_SEL

### Description

Selects a user defined cable.

### Note

Narda auto cables are detected automatically and cannot be manually selected.  
The selection of a user cable might lead to an adjustment of the frequency range of the device.

### Command

CBL\_SEL <LongName>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                          |
|--------------|--------|------------------------------------------------------|
| <LongName>   | String | Long Name of user defined cable, up to 35 characters |
| <ReturnCode> | Word   | Warning or error code                                |

### Example

|                 |                                        |
|-----------------|----------------------------------------|
| <i>Command</i>  | CBL_SEL "ENVIRONFLEX 400 Length 1.5m"; |
| <i>Response</i> | 0;                                     |

### CBL\_SEL?

#### Description

Queries the information of the currently selected or connected user defined or auto cable.

#### Command

CBL\_SEL?;

#### Response

<DataSource>, [ <LongName>,<ShortName>,<Fmin>,<Fmax>, ] <ReturnCode>;

#### Parameter List

| Parameter    | Type   | Description                                                                                        |
|--------------|--------|----------------------------------------------------------------------------------------------------|
| <DataSource> | Enum   | AUTO: A Narda auto cable is selected<br>USER: A user cable is selected<br>NO: No cable is selected |
| <LongName>   | String | Long Name of the cable, up to 35 characters                                                        |
| <ShortName>  | String | Short Name of the cable, up to 10 characters                                                       |
| <Fmin>       | String | Start frequency of the cable                                                                       |
| <Fmax>       | String | Stop frequency of the cable                                                                        |
| <ReturnCode> | Word   | Warning or error code                                                                              |

#### Example: Narda Auto-Cable

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <i>Command</i>  | CBL_SEL?;                                                               |
| <i>Response</i> | AUTO," RF-cable SRM - N 50 Ohms - 1.5 m","SRM 1.5 m","9 kHz","6 GHz",0; |

#### Example: No Cable

|                 |           |
|-----------------|-----------|
| <i>Command</i>  | CBL_SEL?; |
| <i>Response</i> | NO,0;     |

## CBL\_SEL\_NO

### Description

Disables a selected user defined cable.

### Note

Narda auto cables are detected automatically and cannot be manually deselected.

### Command

CBL\_SEL\_NO;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | CBL_SEL_NO; |
| <i>Response</i> | 0;          |

### CBL\_DS

#### Description

Creates a new user defined cable and stores it in the nonvolatile memory of the device.

#### Command

CBL\_DS < ShortName>,<LongName>,<Manufacturer>,<DeviceName>,<Model>,<SerialNo>,<CalDate>,<Fmin>,<Fmax>,<nCal>,[<CalFreq>,<CalValue>];

#### Response

<ReturnCode>;

#### Parameter List

| Parameter      | Type   | Description                                                    |
|----------------|--------|----------------------------------------------------------------|
| <ShortName>    | String | Abbreviated name for the cable, up to 10 chr                   |
| <LongName>     | String | Long Name of the cable and used for selection, up to 35 chr    |
| <Manufacturer> | String | Manufacturer's name, up to 15 chr                              |
| <DeviceName>   | String | Cable name, up to 15 chr                                       |
| <Model>        | String | Model, up to 15 chr                                            |
| <SerialNo>     | String | Serial number of the cable, up to 15 chr                       |
| <CalDate>      | Date   | Calibration date of the cable                                  |
| <Fmin>         | String | Lower frequency limit of the cable, up to 15 chr [Hz]          |
| <Fmax>         | String | Upper frequency limit of the cable, up to 15 chr [Hz]          |
| <nCal>         | Short  | Number of calibration points from 2 to 200                     |
| <CalFreq>      | Double | List of cable calibration points, must be ascending order [Hz] |
| <CalValue>     | Float  | Calibration value [dB]                                         |
| <ReturnCode>   | Word   | Warning or error code                                          |

# Example

---

*Command*    cbl\_ds  
                   "EF400 5m", "ENVIRONFLEX 400 Length 5m",  
                   "H+S", "EF", "EF400",  
                   "", 03.05.04, "100 kHz", "3 GHz",  
                   41,  
                   100000,0.03,  
                   1000000,0.09,  
                   10000000,0.27,  
                   20000000,0.38,  
                   30000000,0.47,  
                   50000000,0.61,  
                   80000000,0.77,  
                   100000000,0.86,  
                   150000000,1.06,  
                   200000000,1.22,  
                   250000000,1.37,  
                   300000000,1.5,  
                   350000000,1.63,  
                   400000000,1.74,  
                   433000000,1.82,  
                   500000000,1.96,  
                   600000000,2.15,  
                   700000000,2.33,  
                   800000000,2.49,  
                   900000000,2.65,  
                   1000000000,2.8,  
                   1100000000,2.95,  
                   1200000000,3.08,  
                   1300000000,3.22,  
                   1400000000,3.34,  
                   1500000000,3.47,  
                   1600000000,3.59,  
                   1700000000,3.7,  
                   1800000000,3.82,  
                   1900000000,3.93,  
                   2000000000,4.04,  
                   2100000000,4.14,  
                   2200000000,4.25,  
                   2300000000,4.35,  
                   2400000000,4.45,  
                   2500000000,4.55,  
                   2600000000,4.64,  
                   2700000000,4.74,  
                   2800000000,4.83,  
                   2900000000,4.92,  
                   3000000000,5.01,;

---

*Response*    0;

---

### CBL\_DS?

#### Description

Queries a user defined cable.

#### Note

Long name of the cable is used for selection.

#### Command

CBL\_DS? <LongName>;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter      | Type   | Description                                                    |
|----------------|--------|----------------------------------------------------------------|
| <ShortName>    | String | Abbreviated name for the cable, up to 10 chr                   |
| <LongName>     | String | Long Name of the cable and used for selection, up to 35 chr    |
| <Manufacturer> | String | Manufacturer's name, up to 15 chr                              |
| <DeviceName>   | String | Cable name, up to 15 chr                                       |
| <Model>        | String | Model, up to 15 chr                                            |
| <SerialNo>     | String | Serial number of the cable, up to 15 chr                       |
| <CalDate>      | Date   | Calibration date of the cable                                  |
| <Fmin>         | String | Lower frequency limit of the cable, up to 15 chr [Hz]          |
| <Fmax>         | String | Upper frequency limit of the cable, up to 15 chr [Hz]          |
| <nCal>         | Short  | Number of calibration points from 2 to 200                     |
| <CalFreq>      | Double | List of cable calibration points, must be ascending order [Hz] |
| <CalValue>     | Float  | Calibration value [dB]                                         |
| <ReturnCode>   | Word   | Warning or error code                                          |

**Example**

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | cbl_ds? "ENVIRONFLEX 400 Length 5m";                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Response</i> | "EF400 5m", "ENVIRONFLEX 400 Length 5m",<br>"H+S", "EF", "EF400",<br>"", "03.05.04", "100 kHz", "3 GHz",<br>41,<br>100000,0.03,<br>1000000,0.09,<br>10000000,0.27,<br>20000000,0.38,<br>30000000,0.47,<br>50000000,0.61,<br>80000000,0.77,<br>100000000,0.86,<br>150000000,1.06,<br>200000000,1.22,<br>250000000,1.37,<br>300000000,1.5,<br>350000000,1.63,<br>400000000,1.74,<br>433000000,1.82,<br>500000000,1.96,<br>600000000,2.15,<br>700000000,2.33,<br>800000000,2.49,<br>900000000,2.65,<br>1000000000,2.8,<br>1100000000,2.95,<br>1200000000,3.08,<br>1300000000,3.22,<br>1400000000,3.34,<br>1500000000,3.47,<br>1600000000,3.59,<br>1700000000,3.7,<br>1800000000,3.82,<br>1900000000,3.93,<br>2000000000,4.04,<br>2100000000,4.14,<br>2200000000,4.25,<br>2300000000,4.35,<br>2400000000,4.45,<br>2500000000,4.55,<br>2600000000,4.64,<br>2700000000,4.74,<br>2800000000,4.83,<br>2900000000,4.92,<br>3000000000,5.01,<br>0; |

# CBL\_CLR

### Description

Deletes a user defined cable.

### Command

CBL\_CLR <LongName>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                     |
|--------------|--------|-------------------------------------------------|
| <LongName>   | String | Long Name of a user defined cable, up to 35 chr |
| <ReturnCode> | Word   | Warning or error code                           |

### Example

---

*Command* CBL\_CLR "my\_longname";

---

*Response* 0;

---



## CBL\_CLR\_ALL

### Description

Deletes all user defined cables.

### Command

CBL\_CLR\_ALL;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | CBL_CLR_ALL; |
| <i>Response</i> | 0;           |

# GPS\_DATA?



Command only applicable for devices with a GPS

### Description

Queries the GPS data.

### Command

GPS\_DATA?;

### Response

<GPSFlag>;<NumberOfGPSSatellites>;<Latitude>;<Longitude>;<Altitude>;<HDOP>;<VDOP>;<UTC-TimeOfGPSTimeMessage>;<ReturnCode>;

### Parameter List

| Parameter                  | Type   | Description                                                    |
|----------------------------|--------|----------------------------------------------------------------|
| <GPSFlag>                  | string | "VALID", "FROZEN", "INVALID", "DIFFERENTIAL"                   |
| <NumberOfGPSSatellites>    | byte   | 0..255                                                         |
| <Latitude>                 | double | GPS coordinates                                                |
| <Longitude>                | double | GPS coordinates                                                |
| <Altitude>                 | float  | GPS coordinates                                                |
| <HDOP>                     | float  | Horizontal Dilution Of Precision; the smaller the more precise |
| <VDOP>                     | float  | Vertical Dilution Of Precision; the smaller the more precise   |
| <UTC-TimeOfGPSTimeMessage> | string | "00:00:00" ... "23:59:59"                                      |
| <ReturnCode>               | Word   | Warning or error code                                          |

### Example: No reception

Command GPS\_DATA?;

Response "INVALID",0,0,0,0,0,0,"13:26:35",0;

### Example: Reception

Command GPS\_DATA?;

Response "VALID",4,48.458465,9.23053166667,447.8,2.1,3.5,"13:36:17",0;

## Audio demodulation –Optional (Audio streaming see p.252)

### Note

To use the Audio demodulation commands:

- › IDA only: The “Demodulation” 3100/95.07 option is required.

## AUDIO\_MUTE



*Command only available for devices with speaker / headphone jack*

### Description

Switches audio mute on or off in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Command

AUDIO\_MUTE <MuteValue>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <MuteValue>  | Enum | ON, OFF               |
| <ReturnCode> | Word | Warning or error code |

### Example

*Command* AUDIO\_MUTE ON;

*Response* 0;

# AUDIO\_MUTE?



*Command only available for devices with speaker / headphone jack*

### Description

Queries the state of audio mute in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Command

AUDIO\_MUTE?;

### Response

<MuteValue>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <MuteValue>  | Enum | ON, OFF               |
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | AUDIO_MUTE?; |
| <i>Response</i> | ON,0;        |

## AUDIO\_VOLUME



*Command only available for devices with speaker / headphone jack*

### Description

Sets the current audio demodulation volume in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Command

AUDIO\_VOLUME <VolumeValue>;

### Response

<ReturnCode>;

### Parameter List

| Parameter     | Type  | Description                                         |
|---------------|-------|-----------------------------------------------------|
| <VolumeValue> | DWord | -33,-30,-27,-24,-21,-18,-15,-12,-9,-6,-3,0,3,6 [dB] |
| <ReturnCode>  | Word  | Warning or error code                               |

### Example

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | AUDIO_VOLUME 0; |
| <i>Response</i> | 0;              |

# AUDIO\_VOLUME?



*Command only available for devices with speaker / headphone jack*

### Description

Queries the current audio demodulation volume in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Command

AUDIO\_VOLUME?;

### Response

<VolumeValue>,<ReturnCode>;

### Parameter List

| Parameter     | Type  | Description                                         |
|---------------|-------|-----------------------------------------------------|
| <VolumeValue> | DWord | -33,-30,-27,-24,-21,-18,-15,-12,-9,-6,-3,0,3,6 [dB] |
| <ReturnCode>  | Word  | Warning or error code                               |

### Example

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | AUDIO_VOLUME?; |
| <i>Response</i> | 0,0;           |

## AUDIO\_VOLUME\_LIST?



*Command only available for devices with speaker / headphone jack*

### Description

Queries the audio demodulation volume-list in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Command

AUDIO\_VOLUME\_LIST?;

### Response

<NumberOfElements>, [ <DisplayStringPercent>, <VolumeValue>, ] <ReturnCode>;

### Parameter List

| Parameter              | Type   | Description                      |
|------------------------|--------|----------------------------------|
| <NumberOfElements>     | Word   | Number of subsequent items       |
| <DisplayStringPercent> | String | Audio volume in Percent          |
| <VolumeValue>          | DWord  | Relative audio volume value [dB] |
| <ReturnCode>           | Word   | Warning or error code            |

### Example

|                 |                                                                                                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | AUDIO_VOLUME_LIST?;                                                                                                                                                                                                         |
| <i>Response</i> | 14,<br>"100 %",6,<br>"71 %",3,<br>"50 %",0,<br>"36 %",-3,<br>"25 %",-6,<br>"18 %",-9,<br>"12.5 %",-12,<br>"9 %",-15,<br>"6.3 %",-18,<br>"4.5 %",-21,<br>"3.2 %",-24,<br>"2.25 %",-27,<br>"1.6 %",-30,<br>"1.1 %",-33,<br>0; |

# DEMOD\_MODE



*Command only available for devices with speaker / headphone jack*

## Description

Sets the audio demodulation type in Level Meter mode.

## Note

Level Meter mode must be selected as the current operating mode.  
Available demodulation types depends on the RBW (CBW for IDA2) setting in Level Meter mode.  
Demodulation while using axis mode RSS (automatic mode) is not provided.  
The command DEMOD\_MODE\_LIST? queries a list of currently available demodulation types.

## Command

DEMOD\_MODE <DemodMode>;

## Response

<ReturnCode>;

## Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <DemodMode>  | Enum | OFF,FM,AM,USB,LSB,CW  |
| <ReturnCode> | Word | Warning or error code |

## Example

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | DEMOD_MODE FM; |
| <i>Response</i> | 0;             |



## DEMOD\_MODE?



*Command only available for devices with speaker / headphone jack*

### Description

Queries the current audio demodulation type in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

Available demodulation types depends on the RBW (CBW for IDA2) setting in Level Meter mode.

Demodulation while using axis mode RSS (automatic mode) is not provided.

The command DEMOD\_MODE\_LIST? queries a list of currently available demodulation types.

### Command

DEMOD\_MODE?;

### Response

<DemodMode>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <DemodMode>  | Enum | OFF,FM,AM,USB,LSB,CW  |
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | DEMOD_MODE?; |
| <i>Response</i> | FM,0;        |

# DEMOD\_MODE\_LIST?



*Command only available for devices with speaker / headphone jack*

## Description

Queries the currently available audio demodulation types in Level Meter mode.

## Note

Level Meter mode must be selected as the current operating mode.  
Available demodulation types depends on the RBW (CBW for IDA2) setting in Level Meter mode.  
Demodulation while using axis mode RSS (automatic mode) is not provided.

## Command

DEMOD\_MODE\_LIST?;

## Response

<NumberOfElements>,[ <DemodMode>, ] <ReturnCode>;

## Parameter List

| Parameter          | Type  | Description                |
|--------------------|-------|----------------------------|
| <NumberOfElements> | Short | Number of subsequent items |
| <DemodMode>        | Enum  | OFF,FM,AM,USB,LSB,CW       |
| <ReturnCode>       | Word  | Warning or error code      |

## Example

|          |                                                       |
|----------|-------------------------------------------------------|
| Command  | DEMOD_MODE_LIST?;                                     |
| Response | 6,<br>OFF,<br>FM,<br>AM,<br>CW,<br>LSB,<br>USB,<br>0; |

## DEMOD\_SQUELCH



*Command only available for devices with speaker / headphone jack*

### Description

Sets the audio squelch threshold (noise suppression) in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

You can set a squelch threshold when one of the following demodulation types is selected:

AM, CW, LSB, USB. Setting squelch in FM mode has no impacts.

The squelch value is given relatively to the input reference level in “dB”.

Absolute squelch value [Unit] = RL [Unit] + squelch [dB].

### Command

DEMOD\_SQUELCH <SquelchValue>;

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type  | Description                                                      |
|----------------|-------|------------------------------------------------------------------|
| <SquelchValue> | Short | 0 = Squelch OFF<br>Squelch level relative to RL, -40...-120 [dB] |
| <ReturnCode>   | Word  | Warning or error code                                            |

### Example

*Command* DEMOD\_SQUELCH -40;

*Response* 0;

# DEMOD\_SQUELCH?



*Command only available for devices with speaker / headphone jack*

## Description

Queries the current audio squelch threshold (noise suppression) in level meter mode.

## Note

Level Meter mode must be selected as the current operating mode.

You can set a squelch threshold when one of the following demodulation types is selected: AM, CW, LSB, USB.

The squelch value is given relatively to the input reference level in “dB”.

Absolute squelch value [Unit] = RL [Unit] + squelch [dB].

## Command

DEMOD\_SQUELCH?;

## Response

<SquelchValue>,<ReturnCode>;

## Parameter List

| Parameter      | Type  | Description                                                      |
|----------------|-------|------------------------------------------------------------------|
| <SquelchValue> | Short | 0 = Squelch OFF<br>Squelch level relative to RL, -40...-120 [dB] |
| <ReturnCode>   | Word  | Warning or error code                                            |

## Example

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | DEMOD_SQUELCH?; |
| <i>Response</i> | -40,0;          |

## DEMOD\_SQUELCH\_LIST?



*Command only available for devices with speaker / headphone jack*

### Description

Queries an audio squelch threshold-list (noise suppression) in level meter mode

### Note

Level Meter mode must be selected as the current operating mode.

### Command

DEMOD\_SQUELCH\_LIST?;

### Response

<NumberOfElements>, [ <DisplayStringRel>, <DisplayStringAbs>, <ValueRel>, <ValueAbs>, ]  
<ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                 |
|--------------------|--------|-------------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                                  |
| <DisplayStringRel> | String | Relative value [dB] of the squelch level and unit as string |
| <DisplayStringAbs> | String | Absolute value of the squelch level and unit as string      |
| <ValueRel>         | Short  | Relative squelch level value [dB]                           |
| <ValueAbs>,        | Double | Absolute squelch level value [Unit]                         |
| <ReturnCode>       | Word   | Warning or error code                                       |

### Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | DEMOD_SQUELCH_LIST?;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>Response</i> | 82,<br>"OFF","OFF",0,0,<br>"RL-40 dB","-70 dBm",-40,-69.96,<br>"RL-41 dB","-71 dBm",-41,-70.96,<br>"RL-42 dB","-72 dBm",-42,-71.96,<br>"RL-43 dB","-73 dBm",-43,-72.96,<br>"RL-44 dB","-74 dBm",-44,-73.96,<br>...<br>"RL-114 dB","-144 dBm",-114,-143.96,<br>"RL-115 dB","-145 dBm",-115,-144.96,<br>"RL-116 dB","-146 dBm",-116,-145.96,<br>"RL-117 dB","-147 dBm",-117,-146.96,<br>"RL-118 dB","-148 dBm",-118,-147.96,<br>"RL-119 dB","-149 dBm",-119,-148.96,<br>"RL-120 dB","-150 dBm",-120,-149.96,<br>0; |

# DEMOD\_BFO



*Command only available for devices with speaker / headphone jack*

### Description

Sets the BFO value (beat frequency oscillator) in level meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

You can set the BFO when one of the following demodulation types is selected: LSB, USB. Setting BFO in other modes (AM, FM, CW) has no impacts.

### Command

DEMOD\_BFO <BfoValue>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <BfoValue>   | Double | -20.0 ... +20.0 [Hz]  |
| <ReturnCode> | Word   | Warning or error code |

### Example

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | DEMOD_BFO 10.0; |
| <i>Response</i> | 0;              |

## DEMOD\_BFO?



*Command only available for devices with speaker / headphone jack*

### Description

Queries the current BFO value (beat frequency oscillator) in level meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

You can set the BFO when one of the following demodulation types is selected: LSB, USB.

### Command

DEMOD\_BFO?;

### Response

<BfoValue>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <BfoValue>   | Double | -20.0 ... +20.0 [Hz]  |
| <ReturnCode> | Word   | Warning or error code |

### Example

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | DEMOD_BFO?; |
| <i>Response</i> | 10,0;       |

## Axis Commands

### AXIS



*Command only available for NRA in combination with “Ant-Ctrl” option*

*Command only applicable for single axis measurements for IDA*

#### Description

Capability to measure each individual axis (X,Y,Z) or to measure in automatic mode RSS.

#### Note

RSS mode switches automatically between X,Y,Z to measure independent of direction and polarization. Single mode is for single axis antennas. Audio demodulation and I/Q stream are not provided in RSS mode as well as using ACT in Scope and I/Q mode. In this case device will switchover from RSS mode to X,Y or Z. RSS mode will lead to sweeptime changes because of sequential measuring of each axis. For setting X,Y, Z or RSS a 3-axis Narda antenna is required.

#### Command

AXIS <AxisPara>;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter    | Type | Description                                                                                                                                           |
|--------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AxisPara>   | Enum | X<br>Y<br>Z<br>SINGLE (standard startup setting for single axis antenna)<br>RSS (automatic mode – standard startup setting for 3-axis Narda antennas) |
| <ReturnCode> | Word | Warning or error code                                                                                                                                 |

#### Example

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | AXIS X;      |
| <i>Response</i> | 0;           |
| <i>Command</i>  | AXIS Y;      |
| <i>Response</i> | 0;           |
| <i>Command</i>  | AXIS Z;      |
| <i>Response</i> | 0;           |
| <i>Command</i>  | AXIS SINGLE; |
| <i>Response</i> | 0;           |



---

|                 |           |
|-----------------|-----------|
| <i>Command</i>  | AXIS RSS; |
| <i>Response</i> | 0;        |

---

### AXIS?



*Command only available for NRA in combination with “Ant-Ctrl” option*

*Command only applicable for single axis measurements for IDA*

#### Description

Queries the currently measured axis.

#### Command

AXIS?;

#### Response

<AxisPara>,<ReturnCode>;

#### Parameter List

| Parameter    | Type | Description                                                                                                                                           |
|--------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AxisPara>   | Enum | X<br>Y<br>Z<br>SINGLE (standard startup setting for single axis antenna)<br>RSS (automatic mode – standard startup setting for 3-axis Narda antennas) |
| <ReturnCode> | Word | Warning or error code                                                                                                                                 |

#### Example

|                 |            |
|-----------------|------------|
| <i>Command</i>  | AXIS?      |
| <i>Response</i> | X, 0;      |
| <i>Command</i>  | AXIS?      |
| <i>Response</i> | Y, 0;      |
| <i>Command</i>  | AXIS?      |
| <i>Response</i> | Z, 0;      |
| <i>Command</i>  | AXIS?      |
| <i>Response</i> | SINGLE, 0; |
| <i>Command</i>  | AXIS?      |
| <i>Response</i> | RSS, 0;    |

## External Device

### EXT\_DEV\_LIST?

#### Description

Queries a list of all currently available user defined external devices.

#### Command

EXT\_DEV\_LIST?;

#### Response

<NumberOfElements>,[ <LongName>, ] <ReturnCode>;

#### Parameter List

| Parameter          | Type   | Description                                                                |
|--------------------|--------|----------------------------------------------------------------------------|
| <NumberOfElements> | Short  | Number of subsequent items                                                 |
| <LongName>         | String | Long Name of each currently available external device, up to 35 characters |
| <ReturnCode>       | Word   | Warning or error code                                                      |

#### Example

---

*Command* EXT\_DEV\_LIST?;

---

*Response* 1,  
"Fixed Coaxial Attenuator (N) 10dB",  
0;

---

# EXT\_DEV\_SEL\_NO

### Description

Disables a selected user defined external device.

### Command

EXT\_DEV\_SEL\_NO;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

---

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | EXT_DEV_SEL_NO; |
| <i>Response</i> | 0               |

---

## EXT\_DEV\_SEL

### Description

Selects a user defined external device.

### Command

EXT\_DEV\_SEL <LongName>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                        |
|--------------|--------|--------------------------------------------------------------------|
| <LongName>   | String | Long Name of the user defined external device, up to 35 characters |
| <ReturnCode> | Word   | Warning or error code                                              |

### Example

|                 |                         |
|-----------------|-------------------------|
| <i>Command</i>  | EXT_DEV_SEL " LongName" |
| <i>Response</i> | 0;                      |

## EXT\_DEV\_SEL?

### Description

Queries the information of the currently selected user defined external device.

### Command

EXT\_DEV\_SEL?;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                            |
|--------------|--------|----------------------------------------------------------------------------------------|
| <DataSource> | Enum   | USER: A user defined external device is selected<br>NO: No external device is selected |
| <LongName>   | String | Long Name of the external device, up to 35 characters                                  |
| <ShortName>  | String | Short Name of the external device, up to 10 characters                                 |
| <ReturnCode> | Word   | Warning or error code                                                                  |

### Example

|                 |                                                        |
|-----------------|--------------------------------------------------------|
| <i>Command</i>  | EXT_DEV_SEL?                                           |
| <i>Response</i> | USER,"Fixed Coaxial Attenuator (N) 10dB","Att.10dB",0; |

### Example: No ext. device

|                 |               |
|-----------------|---------------|
| <i>Command</i>  | EXT_DEV_SEL?; |
| <i>Response</i> | NO,0;         |

## EXT\_DEV\_DS

### Description

Creates a new user defined external device and stores it in the nonvolatile memory of the device.

### Command

EXT\_DEV\_DS < ShortName>,<LongName>,<Manufacturer>,<DeviceName>,<Model>,<SerialNo>,<CalDate>,<ExtDeviceType>,<Switchable>,<Fmin\_ON>,<Fmax\_ON>,<MNOL\_ON>,<nCal\_ON>,[<CalFreq\_ON>,<CalValue\_ON>];

### Response

<ReturnCode>;

### Parameter List

| Parameter       | Type   | Description                                                                                                                                                                                                                         |
|-----------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ShortName>     | String | Abbreviated name for the external device, up to 10 chr                                                                                                                                                                              |
| <LongName>      | String | Long Name of the external device and used for selection, up to 35 chr                                                                                                                                                               |
| <Manufacturer>  | String | Manufacturer's name, up to 15 chr                                                                                                                                                                                                   |
| <DeviceName>    | String | External device name, up to 15 chr                                                                                                                                                                                                  |
| <Model>         | String | Model, up to 15 chr                                                                                                                                                                                                                 |
| <SerialNo>      | String | Serial number of the external device, up to 15 chr                                                                                                                                                                                  |
| <CalDate>       | Date   | Calibration date of the external device                                                                                                                                                                                             |
| <ExtDeviceType> | Enum   | ANT_HANDLE, FILTER, ATTENUATOR, PREAMP                                                                                                                                                                                              |
| <Switchable>    | Enum   | YES or NO, designed for external devices with two different states. Able to switch between two different calibration sets.                                                                                                          |
| <Fmin_ON>       | String | Lower frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <Fmax_ON>       | String | Upper frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <MNOL_ON>       | Float  | Maximum nominal output level of the ext. device. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Reference Level selection accordingly. [dBm] |
| <nCal_ON>       | Short  | Number of calibration points from 2 to 100                                                                                                                                                                                          |
| <CalFreq_ON>    | Double | List of external device calibration points, must be in ascending order [Hz]                                                                                                                                                         |
| <CalValue_ON>   | Float  | Calibration value [dB]                                                                                                                                                                                                              |
| <ReturnCode>    | Word   | Warning or error code                                                                                                                                                                                                               |

## Command Reference Guide

### External Device

#### Optional parameters if Switchable = YES

| Parameter      | Type   | Description                                                                                                                                                                                                                         |
|----------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Fmin_OFF>     | String | Lower frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <Fmax_OFF>     | String | Upper frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <MNOL_OFF>     | Float  | Maximum nominal output level of the ext. device. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Reference Level selection accordingly. [dBm] |
| <nCal_OFF>     | Short  | Number of calibration points from 2 to 100                                                                                                                                                                                          |
| <CalFreq_OFF>  | Double | List of external device calibration points, must be in ascending order [Hz]                                                                                                                                                         |
| <CalValue_OFF> | Float  | Calibration value [dB]                                                                                                                                                                                                              |

#### Example

*Command* EXT\_DEV\_DS  
"Att.10dB",  
"Fixed Coaxial Attenuator (N) 10dB",  
"Narda",  
"Attenuator 10dB",  
"Dummy",  
"0001",  
28.09.11,  
ATTENUATOR,  
NO,  
"9 kHz",  
"6 GHz",  
33,4,  
9000,10.01,  
1000000000,10.05,  
3000000000,10.12,  
6000000000,10.25,

*Response* 0;



## EXT\_DEV\_DS?

### Description

Queries a user defined external device.

### Note

Long name of the external device is for selection.

### Command

EXT\_DEV\_DS? <LongName>;

### Response

EXT\_DEV\_DS? < ShortName>,<LongName>,<Manufacturer>,<DeviceName>,<Model>,<SerialNo>,<CalDate>,<ExtDeviceType>,<Switchable>,<Fmin\_ON/OFF>,<Fmax\_ON/OFF>,<MNOL\_ON/OFF>,<nCa\_ON/OFF>,[<CalFreq\_ON/OFF>,<CalValue\_ON/OFF>];<ReturnCode>;

### Parameter List

| Parameter       | Type   | Description                                                                                                                                                                                                                         |
|-----------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ShortName>     | String | Abbreviated name for the external device, up to 10 chr                                                                                                                                                                              |
| <LongName>      | String | Long Name of the external device and used for selection, up to 35 chr                                                                                                                                                               |
| <Manufacturer>  | String | Manufacturer's name, up to 15 chr                                                                                                                                                                                                   |
| <DeviceName>    | String | External device name, up to 15 chr                                                                                                                                                                                                  |
| <Model>         | String | Model, up to 15 chr                                                                                                                                                                                                                 |
| <SerialNo>      | String | Serial number of the external device, up to 15 chr                                                                                                                                                                                  |
| <CalDate>       | Date   | Calibration date of the external device                                                                                                                                                                                             |
| <ExtDeviceType> | Enum   | ANT_HANDLE, FILTER, ATTENUATOR, PREAMP                                                                                                                                                                                              |
| <Switchable>    | Enum   | YES or NO, designed for external devices with two different states. Able to switch between two different calibration sets.                                                                                                          |
| <Fmin_ON>       | String | Lower frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <Fmax_ON>       | String | Upper frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <MNOL_ON>       | Float  | Maximum nominal output level of the ext. device. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Reference Level selection accordingly. [dBm] |
| <nCal_ON>       | Short  | Number of calibration points from 2 to 100                                                                                                                                                                                          |
| <CalFreq_ON>    | Double | List of external device calibration points, must be in ascending order [Hz]                                                                                                                                                         |
| <CalValue_ON>   | Float  | Calibration value [dB]                                                                                                                                                                                                              |
| <ReturnCode>    | Word   | Warning or error code                                                                                                                                                                                                               |

## Command Reference Guide

### External Device

| Optional parameters if Switchable = YES |        |                                                                                                                                                                                                                                     |
|-----------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameter                               | Type   | Description                                                                                                                                                                                                                         |
| <Fmin_OFF>                              | String | Lower frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <Fmax_OFF>                              | String | Upper frequency limit of the external device, up to 15 chr [Hz]                                                                                                                                                                     |
| <MNOL_OFF>                              | Float  | Maximum nominal output level of the ext. device. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Reference Level selection accordingly. [dBm] |
| <nCal_OFF>                              | Short  | Number of calibration points from 2 to 100                                                                                                                                                                                          |
| <CalFreq_OFF>                           | Double | List of external device calibration points, must be in ascending order [Hz]                                                                                                                                                         |
| <CalValue_OFF>                          | Float  | Calibration value [dB]                                                                                                                                                                                                              |

| Additional parameters if Switchable = YES |        |                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameter                                 | Type   | Description                                                                                                                                                                                                                                                                                                   |
| <Fmin_OFF>                                | String | Lower frequency limit of the antenna, up to 15 chr [Hz]                                                                                                                                                                                                                                                       |
| <Fmax_OFF>                                | String | Upper frequency limit of the antenna, up to 15 chr [Hz]                                                                                                                                                                                                                                                       |
| <MNOL_OFF>                                | Float  | Maximum nominal output level of the ext. device. Entering this parameter prevents the device from being overdriven, avoiding the resulting measurement error. The device restricts the Measurement Range selection accordingly. If you do not enter a value in this field, a default value will be set. [dBm] |
| <nCal_OFF>                                | Short  | Number of calibration points from 2 to 100                                                                                                                                                                                                                                                                    |
| <CalFreq_OFF>                             | Double | List of antenna calibration points, must be in ascending order [Hz]                                                                                                                                                                                                                                           |
| <CalValue_OFF>                            | Float  | Calibration value [dB]                                                                                                                                                                                                                                                                                        |

### Example

|                 |                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | EXT_DEV_DS? "Fixed Coaxial Attenuator (N) 10dB";                                                                                                                                                                                                                 |
| <i>Response</i> | "Att.10dB",<br>"Fixed Coaxial Attenuator (N) 10dB",<br>"Narda","Attenuator 10dB",<br>"Dummy",<br>"0001",<br>28.09.11,<br>ATTENUATOR,<br>NO,<br>"9 kHz",<br>"6 GHz",<br>33,4,<br>9000,10.01,<br>1000000000,10.05,<br>3000000000,10.12,<br>6000000000,10.25,<br>0; |

# EXT\_DEV\_SWITCH

### Description

Switches the calibration set of the external device.

### Note

Designed for external devices with two different states. Able to switch between two different calibration sets accordingly to the state (active/passive) of the external device.

### Command

EXT\_DEV\_SWITCH <SwitchState>;

### Response

<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                               |
|---------------|------|-------------------------------------------|
| <SwitchState> | Enum | ON<br>OFF (default state after selecting) |
| <ReturnCode>  | Word | Warning or error code                     |

### Example

|                 |                     |
|-----------------|---------------------|
| <i>Command</i>  | EXT_DEV_SWITCH ON;  |
| <i>Response</i> | 0;                  |
| <i>Command</i>  | EXT_DEV_SWITCH OFF; |
| <i>Response</i> | 0;                  |

## EXT\_DEV\_SWITCH?

### Description

Queries the current switch state.

### Command

EXT\_DEV\_SWITCH?;

### Response

<SwitchState>

### Parameter List

| Parameter     | Type | Description           |
|---------------|------|-----------------------|
| <SwitchState> | Enum | ON or OFF             |
| <ReturnCode>  | Word | Warning or error code |

### Example

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | EXT_DEV_SWITCH?; |
| <i>Response</i> | ON,0;            |

# EXT\_DEV\_CLR

### Description

Deletes a user defined external device.

### Command

EXT\_DEV\_CLR <LongName>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                     |
|--------------|--------|-------------------------------------------------|
| <LongName>   | String | Long Name of the external device, up to 35 chr. |
| <ReturnCode> | Word   | Warning or error code                           |

### Example

---

*Command* EXT\_DEV\_CLR "my\_longname";

---

*Response* 0;

---

## EXT\_DEV\_CLR\_ALL

### Description

Deletes all user defined external devices.

### Command

EXT\_DV\_CLR\_ALL;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | EXT_DEV_CLR_ALL; |
| <i>Response</i> | 0;               |

## Livescreen

### DISPLAY\_REMOTE

**Description**

Activates or deactivates the GUI remote operation mode.

**Note**

This mode provides additional graphical representation of the current settings and results even in “Remote OFF” state.

**Command**

DISPLAY\_REMOTE <Status>;

**Response**

<ReturnCode>;

**Parameter List**

| Parameter    | Type | Description                                                                        |
|--------------|------|------------------------------------------------------------------------------------|
| <Status>     | Enum | ON = Enables GUI remote operation mode<br>OFF = Disables GUI remote operation mode |
| <ReturnCode> | Word | Warning or error code                                                              |

**Example**

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | DISPLAY_REMOTE ON; |
| <i>Response</i> | 0;                 |



## DISPLAY\_REMOTE?

### Description

Queries the status of the GUI remote operation mode

### Command

DISPLAY\_REMOTE?;

### Response

<Status>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                        |
|--------------|------|------------------------------------------------------------------------------------|
| <Status>     | Enum | ON = GUI remote operation mode enabled<br>OFF = GUI remote operation mode disabled |
| <ReturnCode> | Word | Warning or error code                                                              |

### Example

---

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | DISPLAY_REMOTE?; |
| <i>Response</i> | ON,0;            |

---

## DISPLAY\_VIEWER\_INTERVAL



*Command only available for devices with an Ethernet connector*

### Description

Sets the update interval time (refresh rate) of the Webserver's Live Display Viewer.

### Note

This command can also be used to disable the Viewer. The default interval value after power-up is "0 ms". The update interval time setting is volatile, and must be re-established each time the device is switched on.

The HTML Display Viewer reduces the measurement speed of the device and should be turned off if not needed.

### Command

DISPLAY\_VIEWER\_INTERVAL <Interval>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                           |
|--------------|------|---------------------------------------------------------------------------------------|
| <Interval>   | Word | Time interval in ms,<br>0 ms to disable remote GUI or >=1000 ms to enable remote GUI. |
| <ReturnCode> | Word | Warning or error code                                                                 |

### Example

---

*Command*    DISPLAY\_VIEWER\_INTERVAL 2000;

---

*Response*    0;

---

## DISPLAY\_VIEWER\_INTERVAL?



*Command only available for devices with an Ethernet connector*

### Description

Queries the update interval time (refresh rate) of the Webserver's Live Display Viewer.

### Command

DISPLAY\_VIEWER\_INTERVAL?;

### Response

<Interval>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <Interval>   | Word | Time interval in ms   |
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                           |
|-----------------|---------------------------|
| <i>Command</i>  | DISPLAY_VIEWER_INTERVAL?; |
| <i>Response</i> | 2000,0;                   |

## LIVE\_SCREEN?

### Description

Queries the current device display as a screenshot in PNG format.

### Note

Individual values are themselves represented by binary numbers in the range 0-255 (0x00 – 0xFF). The values are transmitted in ASCII-HEX-Dump.

Example: the value 0x89 is transmitted as '8' '9', and the associated HEX representation is 0x38 0x39.

The complete and consistent quantity of all values can be converted back into binary data so that the device display can be shown straightaway on a monitor as a PNG file.

Command also useable in "Remote OFF" mode

### Command

LIVE\_SCREEN? <Blocksize>;

### Response

<NumberOfBytes>, [ <BinaryValue>, ] <ReturnCode>;

### Parameter List

| Parameter       | Type    | Description                                                                                                        |
|-----------------|---------|--------------------------------------------------------------------------------------------------------------------|
| <Blocksize>     | DWord   | Number of binary bytes per line (block-wise transfer)<br>0 no vertical format<br>up to 65533 binary bytes per line |
| <NumberOfBytes> | DWord   | Number of binary bytes (before conversion to HEX)                                                                  |
| <BinaryValue>   | HEXDump | Binary bytes as HEX strings                                                                                        |
| <ReturnCode>    | Word    | Warning or error code                                                                                              |

### Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | LIVE_SCREEN? 32;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>Response</i> | 15325,<br>89504E470D0A1A0A0000000D4948445200000320000001E00802000000D2659E<br>A2000000017352474200AECE1CE90000000467414D410000B18F0BFC61050000<br>00206348524D00007A26000080840000FA00000080E8000075300000EA600000<br>3A98000017709CBA513C00003B5B49444154785EEDDD5D92AC38B268E13C733F<br>A3E96B751ECA6C4FA3EFE319C21DC6BED146354D01925C801480BEB47CA88A14<br>...<br>...<br>F65601E43E043A8C3278BAF89B607DFEC7573B027FFCE38FDFBF7FB7EB5FCFF3<br>6686A2290191DC14EFD439C8207720D06188C123F9B3FC7F6D66DF0820800002<br>08208000021712F8FFB8E0519A6C7BCEB70000000049454E44AE426082<br>,0; |

## LIVE\_SCREEN\_BINARY?

### Description

Queries the current device display as a screenshot in 16 bit BMP format.

### Note

The values are represented by binary bytes with a range 0-255 (0x00 – 0xFF).  
The values are transmitted as BINARY block data.

The complete and consistent quantity of all values can be converted back into binary data so that the device display can be shown straightaway on a monitor as a BMP file.

Command also useable in “Remote OFF” mode

### Command

LIVE\_SCREEN\_BINARY? <Typ>;

### Response

<AsciiHeader> [ BinaryValue ]

### Parameter List

| Parameter       | Description                                                                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader>   | ASCII header for block data transfer.                                                                                                                                                                          |
| <Typ>           | ALL = Complete device screen of the device<br>AUTO = Complete screen or the measurement screen<br>MEAS_ONLY = Measurement screen of the device<br>MEAS_PARAM = Measurement screen including status information |
| [ BinaryValue ] | Array of binary bytes representing screenshot data.                                                                                                                                                            |

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                                                                                                                                                                                                                                                                                                                                             |                          |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Command</b>  | 4c 49 56 45 5f 53 43 52 45 45 4e 5f 42 49 4e 41<br>52 59 3f 20 41 4c 4c 3b                                                                                                                                                                                                                                                                                                  | LIVE_SCREEN_BINARY? ALL; |
| <b>Response</b> | 23 36 37 36 38 30 36 36 42 4d 42 94 11 00 00 00<br>00 00 42 00 00 00 28 00 00 00 20 03 00 00 e0 01<br>00 00 01 00 10 00 03 00 00 00 00 00 b8 0b 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 f8<br>00 00 e0 07 00 00 1f 00 00 00 18 c6 18 c6 18 c6<br>18 c6 18 c6 18 c6 18 c6 18 c6 18 c6 18 c6 18 c6<br>18 c6 18 c6 18 c6 18 c6 18 c6 18 c6 18 c6 18 c6<br>... | #6768066 ...             |

## LIVE\_SEND\_KEY

### Description

Activates an operating panel key by remote communication.

### Note

Command also useable in “Remote OFF” mode

### Command

LIVE\_SEND\_KEY <Key>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Key>        | Enum | HSK1    horizontal soft key 1, (HSK1 ... HSK6, from left to right)<br>VSK1    vertical soft key 1, (VSK1 ... VSK6, top down)<br>0        number key 0, (keys 0 ...9)<br>DOT     decimal point<br>MENU    function key MENU<br>OK      function key OK<br>ESC     function key ESC<br>SAVE    function key SAVE<br>HOLD    function key HOLD<br>LEFT    arrow key <<br>RIGHT   arrow key ><br>ON_OFF  function key ON/OFF |
| <ReturnCode> | Word | Warning or error code                                                                                                                                                                                                                                                                                                                                                                                                    |

### Example

|                 |                     |
|-----------------|---------------------|
| <i>Command</i>  | LIVE_SEND_KEY HSK1; |
| <i>Response</i> | 0;                  |

## LIVE\_SEND\_ROT\_KNOB

### Description

Activates the operating panel rotary control by remote communication.

### Note

Command also useable in “Remote OFF” mode

### Command

LIVE\_SEND\_ROT\_KNOB <Steps>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                     |
|--------------|-------|-------------------------------------------------------------------------------------------------|
| <Steps>      | Short | Counter-clockwise rotation decrements (-1 to -20)<br>or clockwise rotation increments (1 to 20) |
| <ReturnCode> | Word  | Warning or error code                                                                           |

### Example

---

|                 |                        |
|-----------------|------------------------|
| <i>Command</i>  | LIVE_SEND_ROT_KNOB -5; |
| <i>Response</i> | 0;                     |

---

### LNB control – NRA-LNB versions only



*All LNB commands are obsolete (the NRA-LNB Remote Analyzer is discontinued)*

## LNB\_CTRL



*Command only available for devices with an LNB control unit*

### Description

Switches the LNB control unit on or off.

### Command

LNB\_CTRL <Power>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                      |
|--------------|-------|----------------------------------------------------------------------------------|
| <Power>      | Enum  | ON = Switches on the LNB control unit<br>OFF = Switches off the LNB control unit |
| <ReturnCode> | DWord | Warning or error code                                                            |

### Examples

---

*Command* LNB\_CTRL ON;

*Response* 0;

---

*Command* LNB\_CTRL OFF;

*Response* 0;

---



## LNB\_CTRL?



*Command only available for devices with an LNB control unit*

### Description

Queries the state of the LNB control unit.

### Command

LNB\_CTRL?;

### Response

<Power>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                  |
|--------------|-------|------------------------------------------------------------------------------|
| <Power>      | Enum  | ON = The LNB control is switched on<br>OFF = The LNB control is switched off |
| <ReturnCode> | DWord | Warning or error code                                                        |

### Example

|                 |            |
|-----------------|------------|
| <i>Command</i>  | LNB_CTRL?; |
| <i>Response</i> | ON,0;      |

# LNB\_CTRL\_BAND



*Command only available for devices with an LNB control unit*

### Description

Selects the low band (22kHz off) or the high band (22kHz on) for the LNB control unit.

### Command

LNB\_CTRL\_BAND <Band>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                       |
|--------------|-------|-----------------------------------------------------------------------------------|
| <Band>       | Enum  | LOW = Selects LNB low band (22kHz off)<br>HIGH = Selects LNB high band (22kHz on) |
| <ReturnCode> | DWord | Warning or error code                                                             |

### Examples

|                 |                     |
|-----------------|---------------------|
| <i>Command</i>  | LNB_CTRL_BAND LOW;  |
| <i>Response</i> | 0;                  |
| <i>Command</i>  | LNB_CTRL_BAND HIGH; |
| <i>Response</i> | 0;                  |

## LNB\_CTRL\_BAND?



*Command only available for devices with an LNB control unit*

### Description

Queries the band setting for the LNB control unit.

### Command

LNB\_CTRL\_BAND?;

### Response

<Band>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                         |
|--------------|-------|-------------------------------------------------------------------------------------|
| <Band>       | Enum  | LOW = LNB low band selected (22kHz off)<br>HIGH = LNB high band selected (22kHz on) |
| <ReturnCode> | DWord | Warning or error code                                                               |

### Example

|          |                 |
|----------|-----------------|
| Command  | LNB_CTRL_BAND?; |
| Response | LOW,0;          |

### LNB\_CTRL\_DIAG?



*Command only available for devices with an LNB control unit*

#### Description

Queries diagnostic information from the LNB control unit.

#### Note

The current overload flag is set if a current limit is exceeded or a short-circuit is detected.

The thermal overload flag is set after the inner temperature of the LNB control unit exceeds approximately 150 °C. The flag is set low, after the inner temperature of the LNB control unit is below approximately 135 °C.

It is recommended, that the diagnostic information is queried periodically. After an overload event, it is recommended to do a reset of the LNB control unit.

#### Command

LNB\_CTRL\_DIAG?;

#### Response

<CurrentOVL>,<ThermalOVL>,<ReturnCode>;

#### Parameter List

| Parameter    | Type  | Description                                                                 |
|--------------|-------|-----------------------------------------------------------------------------|
| <CurrentOVL> | Enum  | NO = Current overload Flag is not set<br>YES = Current overload Flag is set |
| <ThermalOVL> | Enum  | NO = Thermal overload Flag is not set<br>YES = Thermal overload Flag is set |
| <ReturnCode> | DWord | Warning or error code                                                       |

#### Example

---

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | LNB_CTRL_DIAG?; |
| <i>Response</i> | NO,NO,0;        |

---

## LNB\_CTRL\_POL



*Command only available for devices with an LNB control unit*

### Description

Selects the polarization setting for the LNB control unit.

### Note

With polarization = vertical, the output voltage of the LNB control unit is set to 13.4 volts.  
With polarization = horizontal, the output voltage of the LNB control unit is set to 18.5 volts.

### Command

LNB\_CTRL\_POL <Polarization>;

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type  | Description                                                                                      |
|----------------|-------|--------------------------------------------------------------------------------------------------|
| <Polarization> | Enum  | HORIZONTAL = Selects LNB horizontal polarization<br>VERTICAL = Selects LNB vertical polarization |
| <ReturnCode>   | DWord | Warning or error code                                                                            |

### Examples

*Command* LNB\_CTRL\_POL HORIZONTAL;

*Response* 0;

*Command* LNB\_CTRL\_POL VERTICAL;

*Response* 0;

### LNB\_CTRL\_POL?



*Command only available for devices with an LNB control unit*

#### Description

Queries the polarization setting for the LNB control unit.

#### Note

With polarization = vertical, the output voltage of the LNB control unit is set to 13.4 volts.

With polarization = horizontal, the output voltage of the LNB control unit is set to 18.5 volts.

#### Command

LNB\_CTRL\_POL?;

#### Response

<Polarization>,<ReturnCode>;

#### Parameter List

| Parameter      | Type  | Description                                                                                        |
|----------------|-------|----------------------------------------------------------------------------------------------------|
| <Polarization> | Enum  | HORIZONTAL = LNB horizontal polarization selected<br>VERTICAL = LNB vertical polarization selected |
| <ReturnCode>   | DWord | Warning or error code                                                                              |

#### Example

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | LNB_CTRL_POL?; |
| <i>Response</i> | HORIZONTAL,0;  |

## LNB\_CTRL\_RESET



*Command only available for devices with an LNB control unit*

### Description

Resets the LNB control unit to the default settings.

### Note

The LNB Reset Settings are as follows:

Power = OFF

Band = High

Polarization = Vertical

Cable Compensation = OFF

### Command

LNB\_CTRL\_RESET;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description           |
|--------------|-------|-----------------------|
| <ReturnCode> | DWord | Warning or error code |

### Example

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | LNB_CTRL_RESET; |
| <i>Response</i> | 0;              |

# LNB\_CTRL\_VOLTAGE\_CORRECTION



*Command only available for devices with an LNB control unit*

## Description

Activates or deactivates the cable compensation for the LNB control unit.

## Note

This command can be used to compensate a voltage drop caused by a long coaxial cable between the LNB control unit and the LNB.

If LNB\_CTRL\_VOLTAGE\_CORRECTION is activated, the output voltages of the LNB control unit are as follows:

With polarization = vertical, the output voltage of the LNB control unit is set to 14.4 volts.

With polarization = horizontal, the output voltage of the LNB control unit is set to 19.5 volts.

## Command

LNB\_CTRL\_VOLTAGE\_CORRECTION <Correction>;

## Response

<ReturnCode>;

## Parameter List

| Parameter    | Type  | Description                                                                       |
|--------------|-------|-----------------------------------------------------------------------------------|
| <Correction> | Enum  | ON = Activates the cable compensation<br>OFF = Deactivates the cable compensation |
| <ReturnCode> | DWord | Warning or error code                                                             |

## Examples

*Command* LNB\_CTRL\_VOLTAGE\_CORRECTION ON;

*Response* 0;

*Command* LNB\_CTRL\_VOLTAGE\_CORRECTION OFF;

*Response* 0;



## LNB\_CTRL\_VOLTAGE\_CORRECTION?



*Command only available for devices with an LNB control unit*

### Description

Queries the setting for the cable compensation for the LNB control unit.

### Note

If LNB\_CTRL\_VOLTAGE\_CORRECTION is activated, the output voltages of the LNB control unit are as follows:

With polarization = vertical, the output voltage of the LNB control unit is set to 14.4 volts.  
With polarization = horizontal, the output voltage of the LNB control unit is set to 19.5 volts.

### Command

LNB\_CTRL\_VOLTAGE\_CORRECTION?;

### Response

<Correction>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                               |
|--------------|-------|---------------------------------------------------------------------------|
| <Correction> | Enum  | ON = Cable compensation activated<br>OFF = Cable compensation deactivated |
| <ReturnCode> | DWord | Warning or error code                                                     |

### Example

|                 |                               |
|-----------------|-------------------------------|
| <i>Command</i>  | LNB_CTRL_VOLTAGE_CORRECTION?; |
| <i>Response</i> | OFF,0;                        |



## Measurement

### MEAS\_START

#### Description

(Re)starts cyclic measurement in the current operating mode.

#### Note

This command is not necessary for normal operation. It can be used to restart the measurement process.

By default, cyclic measurement is performed after device start-up and measurement configuration. This command resets all measurement runs (traces) as done at the start of the measurement. (see RESULTTYPE\_RESET).

#### Command

MEAS\_START;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

#### Example

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | MEAS_START; |
| <i>Response</i> | 0;          |

# MEAS\_STOP

### Description

Stop cyclic measurement in the current operating mode.

### Note

This command is not necessary for normal operation. It can be used to stop the measurement process.

By default, cyclic measurement is performed after device start-up and measurement configuration.

### Command

MEAS\_STOP;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

---

|                 |            |
|-----------------|------------|
| <i>Command</i>  | MEAS_STOP; |
| <i>Response</i> | 0;         |

---

## MODE

### Description

Sets the current operating mode.

### Note

The standard mode is SPECTRUM.

Some modes are optional and can be selected only if they are enabled on the device. Otherwise the code 432 ("mode not available") will be returned.

Options can be subsequently ordered and enabled by activation code.

### Command

MODE <Mode>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                            |
|--------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Mode>       | Enum | SPECTRUM<br>MCP (Option required for IDA / NRA)<br>LEVEL (Option required for IDA / NRA)<br>SCOPE (Option required for IDA / NRA)<br>IQSTREAM (Option required for IDA / NRA)<br>AUDIOSTREAM (Option required for IDA) |
| <ReturnCode> | Word | Warning or error code                                                                                                                                                                                                  |

### Examples

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | MODE SPECTRUM; |
| <i>Response</i> | 0;             |
| <i>Command</i>  | MODE MCP;      |
| <i>Response</i> | 0;             |
| <i>Command</i>  | MODE LEVEL;    |
| <i>Response</i> | 0;             |
| <i>Command</i>  | MODE SCOPE;    |
| <i>Response</i> | 0;             |
| <i>Command</i>  | MODE IQSTREAM; |
| <i>Response</i> | 0;             |

## MODE?

### Description

Queries the current operating mode.

### Command

MODE?;

### Response

<Mode>,<ReturnCode>,

### Parameter List

| Parameter    | Type | Description                                                                                                                |
|--------------|------|----------------------------------------------------------------------------------------------------------------------------|
| <Mode>       | Enum | SPECTRUM<br>MCP<br>LEVEL<br>SCOPE<br>IQSTREAM<br>AUDIOSTREAM<br>IQ_ANALYZER (IDA, read only)<br>DIRECTION (IDA, read only) |
| <ReturnCode> | Word | Warning or error code                                                                                                      |

### Example

---

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | MODE?;      |
| <i>Response</i> | SPECTRUM,0; |

---

## RBW\_LIST?

### Description

Queries a list of the current possible RBW settings.

### Note

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Note for IDA

In Remote operation there's no differentiation between RBW and CBW. All commands are using the term "RBW". For manual operation you'll find the term "CBW" for the steep channel filters used in Level Meter and Scope Mode. Both terms have the same meaning in remote operation.

### Command

RBW\_LIST?

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                 |
|--------------------|--------|---------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                  |
| <DisplayString>    | String | Resolution bandwidth RBW and unit as string |
| <Value>            | Double | Resolution bandwidth RBW as value [Hz]      |
| <ReturnCode>       | Word   | Warning or error code                       |

### Example

|                 |                                                                                                                                                           |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | RBW_LIST?;                                                                                                                                                |
| <i>Response</i> | 7,<br>"20 MHz",20000000,<br>"10 MHz",10000000,<br>"5 MHz",5000000,<br>"3 MHz",3000000,<br>"2 MHz",2000000,<br>"1 MHz",1000000,<br>"500 kHz",500000,<br>0; |

## RESULTTYPE\_RESET

**Description**

Resets all measurement runs (traces) to default values as is done at the start of the measurement.

**Command**

RESULTTYPE\_RESET;

**Response**

<ReturnCode>;

**Parameter List**

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

**Example**

---

|                 |                   |
|-----------------|-------------------|
| <i>Command</i>  | RESULTTYPE_RESET; |
| <i>Response</i> | 0;                |

---



## RESULTTYPE\_RESET\_MIN\_MAX

### Description

Resets the Min and Max measurement runs (traces) to default values as is done at the start of the measurement.

### Command

RESULTTYPE\_RESET\_MIN\_MAX;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                           |
|-----------------|---------------------------|
| <i>Command</i>  | RESULTTYPE_RESET_MIN_MAX; |
| <i>Response</i> | 0;                        |

## RL\_ATT\_LIST?

### Description

Queries a list of the current possible reference level and attenuator settings (measurement range).

### Note

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

RL\_ATT\_LIST?;

### Response

<NumberOfElements>, [ <DisplayStringRL>, <DisplayStringAtt>, <ValueRL>,<ValueAtt>, ]  
<ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                            |
|--------------------|--------|--------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                             |
| <DisplayStringRL>  | String | Reference level (measurement range) and unit as string |
| <DisplayStringAtt> | String | Attenuator and unit as string                          |
| <ValueRL>          | Float  | Reference level as value [Unit]                        |
| <ValueAtt>         | Float  | Attenuator as value [Unit]                             |
| <ReturnCode>       | Word   | Warning or error code                                  |

### Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | RL_ATT_LIST?;                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Response</i> | 51,<br>"20 dBm","50 dB",20,50,<br>"19 dBm","49 dB",19,49,<br>"18 dBm","48 dB",18,48,<br>"17 dBm","47 dB",17,47,<br>"16 dBm","46 dB",16,46,<br>"15 dBm","45 dB",15,45,<br>"14 dBm","44 dB",14,44,<br>...<br>...<br>"-24 dBm","6 dB",-24,6,<br>"-25 dBm","5 dB",-25,5,<br>"-26 dBm","4 dB",-26,4,<br>"-27 dBm","3 dB",-27,3,<br>"-28 dBm","2 dB",-28,2,<br>"-29 dBm","1 dB",-29,1,<br>"-30 dBm","0 dB",-30,0,<br>0; |

## RL\_LIST?

### Description

Queries a list of the current possible reference level settings (measurement range).

### Note

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

RL\_LIST?;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                            |
|--------------------|--------|--------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                             |
| <DisplayString>    | String | Reference level (measurement range) and unit as string |
| <Value>            | Float  | Reference level as value [Unit]                        |
| <ReturnCode>       | Word   | Warning or error code                                  |

### Example

|                 |                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | RL_LIST?;                                                                                                                                                                                                                         |
| <i>Response</i> | 51,<br>"20 dBm",20,<br>"19 dBm",19,<br>"18 dBm",18,<br>"17 dBm",17,<br>"16 dBm",16,<br>"15 dBm",15,<br>"14 dBm",14,<br>...<br>...<br>"-26 dBm",-26,<br>"-27 dBm",-27,<br>"-28 dBm",-28,<br>"-29 dBm",-29,<br>"-30 dBm",-30,<br>0; |

## SWEEP\_STATE?

### Description

Queries the status and progress of the current measurement.

### Note

The parameter <SweepCounter> can be used to detect the start of a new measurement so that the measured values can be requested only when required.

The parameter <SweepProgress> should only be used for graphical purposes and not for synchronizing the request of measurement values.

### Command

SWEEP\_STATE?;

### Response

<SweepCounter>,<SweepTime>,<SweepProgress>,<AVGProgress>,<ReturnCode>;

### Parameter List

| Parameter       | Type  | Description                                  |
|-----------------|-------|----------------------------------------------|
| <SweepCounter>  | DWord | Number of sweeps performed                   |
| <SweepTime>     | DWord | Sweep Time [ms]                              |
| <SweepProgress> | Word  | 0 – 100 [%]<br>Progress of the current sweep |
| <AVGProgress>   | Word  | 0 – 100 [%]<br>Progress of averaging         |
| <ReturnCode>    | Word  | Warning or error code                        |

### Example

---

|                 |                   |
|-----------------|-------------------|
| <i>Command</i>  | SWEEP_STATE?;     |
| <i>Response</i> | 2576,38,100,54,0; |

---

## UNIT

### Description

Sets the current unit setting.

### Command

UNIT <Unit>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Unit>       | Enum | Measurement results can be displayed in one of the following units:<br>-With no antenna connected: dBm, dBV, dBmV, dBuV<br>-With antenna connected (additional): dBV/m, dBmV/m, dBuV/m, dBA/m, V/m, A/m, W/m <sup>2</sup> , W/cm <sup>2</sup><br><br>Units for Scope (I/Q)<br>-With no antenna connected: V<br>-With antenna connected (additional): V/m, A/m |
| <ReturnCode> | Word |                                                                                                                                                                                                                                                                                                                                                               |

### Example

---

*Command*    UNIT dBm;

---

*Response*    0;

---

# UNIT?

### Description

Queries the current unit setting.

### Command

UNIT?;

### Response

<Unit>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Unit>       | Enum | Measurement results can be displayed in one of the following units:<br>-With no antenna connected: dBm, dBV, dBmV, dBuV<br>-With antenna connected (additional): dBV/m, dBmV/m, dBuV/m, dBA/m, V/m, A/m, W/m <sup>2</sup> , W/cm <sup>2</sup><br><br>Units for Scope (I/Q)<br>-With no antenna connected: V<br>-With antenna connected (additional): V/m, A/m |
| <ReturnCode> | Word | Warning or error code                                                                                                                                                                                                                                                                                                                                         |

### Example

---

|                 |        |
|-----------------|--------|
| <i>Command</i>  | UNIT?; |
| <i>Response</i> | dBm,0; |

---

## UNIT\_LIST?

### Description

Queries a list of current possible unit settings (Unit).

### Note

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

UNIT\_LIST?;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                                                                                                                                                                                                                                            |
|--------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                                                                                                                                                                                                                                                             |
| <DisplayString>    | String | Unit as a string                                                                                                                                                                                                                                                                       |
| <Value>            | Enum   | -With no antenna connected: dBm, dBV, dBmV, dBuV<br>-With antenna connected (additional): dBV/m, dBmV/m, dBuV/m, dBA/m, V/m, A/m, W/m <sup>2</sup> , W/cm <sup>2</sup><br><br>Units for Scope (I/Q)<br>-With no antenna connected: V<br>-With antenna connected (additional): V/m, A/m |
| <ReturnCode>       | Word   | Warning or error code                                                                                                                                                                                                                                                                  |

## Command Reference Guide

### Measurement

---

#### Example without antenna connected

---

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| <i>Command</i>  | UNIT_LIST?;                                                          |
| <i>Response</i> | 4,<br>"dBm",dBm,<br>"dBV",dBV,<br>"dBmV",dBmV,<br>"dBμV",dBuV,<br>0; |

---

#### Example with antenna connected

---

|                 |                                                                                                                                                                                                                                                                     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | UNIT_LIST?;                                                                                                                                                                                                                                                         |
| <i>Response</i> | 12,<br>"dBm",dBm,<br>"dBV",dBV,<br>"dBmV",dBmV,<br>"dBμV",dBuV,<br>"dBV/m",dBV/m,<br>"dBmV/m",dBmV/m,<br>"dBμV/m",dBuV/m,<br>"dBA/m",dBA/m,<br>"V/m",V/m,<br>"A/m",A/m,<br>"W/m <sup>2</sup> ",W/m <sup>2</sup> ,<br>"W/cm <sup>2</sup> ",W/cm <sup>2</sup> ,<br>0; |

---



## VBW\_LIST?

### Description

Queries the current possible VBW settings.

### Note

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

VBW\_LIST?;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                        |
|--------------------|--------|------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items         |
| <DisplayString>    | String | Video bandwidth and unit as string |
| <Value>            | Double | Video bandwidth as value [Hz]      |
| <ReturnCode>       | Word   | Warning or error code              |

### Example

|          |                                                                                                                                                                                              |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Command  | VBW_LIST?;                                                                                                                                                                                   |
| Response | 9,<br>"1 MHz",1000000,<br>"500 kHz",500000,<br>"300 kHz",300000,<br>"200 kHz",200000,<br>"100 kHz",100000,<br>"50 kHz",50000,<br>"30 kHz",30000,<br>"20 kHz",20000,<br>"10 kHz",10000,<br>0; |

## Spectrum

## SPECTRUM?



*The SPECTRUM? command is obsolete, it is recommended to instead use the command SPECTRUM\_TRACE?*

#### Description

Queries one or more measurement runs (traces) in SPECTRUM mode.

#### Note

Spectrum mode must be selected as the current operating mode.

A measurement run is the number of all the measurement values determined during a measurement cycle (sweep).

#### Command

SPECTRUM? <Trace>;

#### Response

<SweepCounter>,<SweepTime>,<AVGProgress>,<NoOfSpatialAVG>,<Fmin>,<df>,<NoOfTraces>,  
[ <ActTrace>,<Overdriven>,<NoOfValues>,[ <Value>,[ ] ] <ReturnCode>;

## Parameter List

| Parameter        | Type   | Description                                                                                                                                                                                                                                                                                             |
|------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Trace>          | Enum   | Sets the desired traces:<br>ACT           Actual value<br>AVG           Averaged value<br>MAX           Maximum value<br>MAX_AVG      Maximum of the averaged values<br>MIN           Minimum value<br>MIN_AVG      Minimum of the averaged values<br>ALL           All traces in the order noted above |
| <SweepCounter>   | DWord  | Number of sweeps performed                                                                                                                                                                                                                                                                              |
| <SweepTime>      | DWord  | Sweep Time [ms]                                                                                                                                                                                                                                                                                         |
| <AVGProgress>    | Word   | 0 – 100 [%]<br>Progress of averaging                                                                                                                                                                                                                                                                    |
| <NoOfSpatialAVG> | DWord  | 0 – 999 999<br>Number of sweeps used for spatial averaging                                                                                                                                                                                                                                              |
| <Fmin>           | Double | Lower limit of the frequency range $F_{min}$ [Hz]                                                                                                                                                                                                                                                       |
| <df>             | Double | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                                                                                                            |
| <NoOfTraces>     | Word   | Number of traces, 1 - 6                                                                                                                                                                                                                                                                                 |
| <ActTrace>       | Enum   | Actual trace<br>ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG                                                                                                                                                                                                                                                    |
| <Overdriven>     | Enum   | YES, NO;<br>Yes, if at least one trace exceeded the range limit.<br>Overdriven results may have a very high uncertainty.                                                                                                                                                                                |
| <NoOfValues>     | DWord  | Number of measurement values per trace.<br>21...632891 values are possible. (NRA)<br>21...27517 values are possible. (IDA)                                                                                                                                                                              |
| <Value>          | Float  | Measurement result [Unit]. Very low results in logarithmic units are represented by “-999” (negative infinity).                                                                                                                                                                                         |
| <ReturnCode>     | Word   | Warning or error code                                                                                                                                                                                                                                                                                   |

## Examples

|                 |                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SPECTRUM? ACT;                                                                                                                                                                                                     |
| <i>Response</i> | 2946,37,100,0,1500000000,5000000,1,<br>ACT,NO,21,<br>-39.15,-42.65,-38.01,-50.29,-40.12,-39.91,-37.98,-32.33,-37.17,-36.31,-40.04,-43.39,-<br>36.40,-35.99,-51.26,-36.75,-35.99,-40.29,-35.68,-33.77,-38.14,<br>0; |

## Command Reference Guide

### Spectrum

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SPECTRUM? ALL;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Response</i> | 8058,36,100,0,1500000000,5000000,6,<br>ACT,NO,21,<br>-36.77,-30.52,-43.30,-41.15,-35.68,-42.16,-34.77,-34.81,-39.91,-51.26,-43.05,-41.96,-<br>37.74,-37.17,-43.39,-37.62,-37.98,-39.22,-36.63,-44.73,-37.03,<br>AVG,NO,21,<br>-37.05,-33.94,-37.64,-37.18,-38.44,-36.16,-37.08,-34.53,-39.58,-38.15,-37.61,-36.56,-<br>37.02,-37.42,-38.41,-36.63,-38.04,-35.27,-37.85,-37.07,-36.65,<br>MAX,NO,21,<br>-25.43,-24.80,-26.48,-27.38,-26.06,-26.78,-27.03,-26.51,-26.56,-25.84,-25.48,-25.62,-<br>25.32,-26.66,-25.28,-25.97,-26.53,-26.96,-26.62,-27.06,-26.73,<br>MAX_AVG,NO,21,<br>-30.63,-29.67,-30.72,-31.29,-30.81,-30.85,-31.24,-30.14,-30.65,-30.98,-30.04,-30.67,-<br>30.27,-30.93,-30.64,-31.11,-30.88,-31.12,-31.14,-31.24,-30.91,<br>MIN,NO,21,<br>-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-<br>999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-999.00,-<br>999.00,<br>MIN_AVG,NO,21,<br>-42.62,-42.29,-43.21,-42.54,-42.28,-42.62,-42.17,-45.02,-42.37,-43.46,-42.56,-42.36,-<br>42.68,-42.93,-42.32,-43.27,-42.81,-42.46,-42.14,-43.23,-42.60,<br>0; |

## SPECTRUM\_AVG\_CONFIG

### Description

Sets the current averaging method.

### Note

SPECTRUM mode has 2 averaging methods:

- › Average over a number of individual measurements (Number)
- › Average over a time period (Time)

There is one setting parameter for each method, which is selected from a basic set of values.

### Command

SPECTRUM\_AVG\_CONFIG <AvgMode>,<AvgNumber>,<AvgTime>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                                                                                          |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AvgMode>    | Enum  | NUMBER: Average over a number of individual measurements<br>TIME: Average over a time period (in seconds)                                                                            |
| <AvgNumber>  | DWord | Number of averaging samples: 4, 8, 16, 32, 64, 128, 256                                                                                                                              |
| <AvgTime>    | DWord | Time [s]:<br>60, 120, 180, 240, 300, 360, 420, 480, 540, 600, 660, 720, 780, 840,<br>900, 960, 1020, 1080, 1140, 1200, 1260, 1320, 1380, 1440, 1500,<br>1560, 1620, 1680, 1740, 1800 |
| <ReturnCode> | Word  | Warning or error code                                                                                                                                                                |

### Examples

|                 |                                    |
|-----------------|------------------------------------|
| <i>Command</i>  | SPECTRUM_AVG_CONFIG NUMBER,64,240; |
| <i>Response</i> | 0;                                 |
| <i>Command</i>  | SPECTRUM_AVG_CONFIG TIME,4,180;    |
| <i>Response</i> | 0;                                 |

## SPECTRUM\_AVG\_CONFIG?

### Description

Queries the current averaging method.

### Note

SPECTRUM mode has 2 averaging methods:

- › Average over a number of individual measurements (Number)
- › Average over a time period (Time)

There is one setting parameter for each method, which is selected from a basic set of values.

### Command

SPECTRUM\_AVG\_CONFIG?;

### Response

<AvgMode>,<AvgNumber>,<AvgTime>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                                                                                          |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AvgMode>    | Enum  | NUMBER: Average over a number of individual measurements<br>TIME: Average over a time period (in seconds)                                                                            |
| <AvgNumber>  | DWord | Number of averaging samples: 4, 8, 16, 32, 64, 128, 256                                                                                                                              |
| <AvgTime>    | DWord | Time [s]:<br>60, 120, 180, 240, 300, 360, 420, 480, 540, 600, 660, 720, 780, 840,<br>900, 960, 1020, 1080, 1140, 1200, 1260, 1320, 1380, 1440, 1500,<br>1560, 1620, 1680, 1740, 1800 |
| <ReturnCode> | Word  | Warning or error code                                                                                                                                                                |

### Examples

|                 |                       |
|-----------------|-----------------------|
| <i>Command</i>  | SPECTRUM_AVG_CONFIG?; |
| <i>Response</i> | NUMBER,64,240,0;      |
| <i>Command</i>  | SPECTRUM_AVG_CONFIG?; |
| <i>Response</i> | TIME,4,180,0;         |

## SPECTRUM\_AVG\_LIST?

### Description

Queries a list of the current possible averaging settings for SPECTRUM mode.

### Note

SPECTRUM mode has 2 averaging methods:

- › Average over a number of individual measurements (Number)
- › Average over a time period (Time)

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

SPECTRUM\_AVG\_LIST? <AvgMode>;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                                                               |
|--------------------|--------|-----------------------------------------------------------------------------------------------------------|
| <AvgMode>          | Enum   | NUMBER: Average over a number of individual measurements<br>TIME: Average over a time period (in seconds) |
| <NumberOfElements> | Word   | Number of subsequent items                                                                                |
| <DisplayString>    | String | Averaging parameter as string including the unit                                                          |
| <Value>            | Float  | Averaging parameter as a numerical value                                                                  |
| <ReturnCode>       | Word   | Warning or error code                                                                                     |

### Example

|          |                                                                                              |
|----------|----------------------------------------------------------------------------------------------|
| Command  | SPECTRUM_AVG_LIST? NUMBER;                                                                   |
| Response | 7,<br>"4",4,<br>"8",8,<br>"16",16,<br>"32",32,<br>"64",64,<br>"128",128,<br>"256",256,<br>0; |

## SPECTRUM\_BI\_VALUE?

### Description

Band Integration over Frequency.

### Note

Spectrum mode must be selected as the current operating mode.  
The spectral power level is integrated over a selected frequency band.

The following conditions apply:

- › The band limits must lie within the range Fmin to Fmax of the current measurement setting
- › Bandwidth  $\Delta f \geq 4 \cdot \text{RBW}$ ,  $\Delta f = F_{\text{high}} - F_{\text{low}}$ , RBW according to the current measurement setting

### Command

SPECTRUM\_BI\_VALUE? <FLow>,<FHigh>,<Trace>;

### Response

<SumValue>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                            |
|--------------|--------|------------------------------------------------------------------------|
| <FLow>       | Double | Lower limit of the frequency band [Hz]                                 |
| <FHigh>      | Double | Upper limit of the frequency band [Hz]                                 |
| <Trace>      | Enum   | Trace selected for integration<br>ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG |
| <SumValue>   | Float  | Total power within the frequency band                                  |
| <ReturnCode> | Word   | Warning or error code                                                  |

### Example

|                 |                                               |
|-----------------|-----------------------------------------------|
| <i>Command</i>  | SPECTRUM_BI_VALUE? 1500000000,1600000000,ACT; |
| <i>Response</i> | -29.37981,0;                                  |



## SPECTRUM\_BINARY?



*The SPECTRUM\_BINARY? command is obsolete, it is recommended to instead use the command SPECTRUM\_TRACE\_BINARY?*

### Description

Queries measurement data in SPECTRUM mode and BINARY format.

### Note

Number of trace calculation: SizeOfBlock / sizeof(float) with sizeof(float) = 4

### Command

SPECTRUM\_BINARY? <Trace>;

### Response

<AsciiHeader>

<Endian> <DataID> <DataVersion> <Reserved> <NumberOfBlock> <SizeOfBlock> <Reserved>

<Fmin> <df> <Unit> <Flags> <SweepCounter> <SweepTime> <AVGProgress> <NoOfSpatialAVG>

<FillBytes> [ACT] [AVG] [MIN] [MIN\_AVG] [MAX] [MAX\_AVG] [ALL]

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                 |                  |
|-----------------|-------------------------------------------------|------------------|
| <b>Command</b>  | 73 70 65 63 74 72 75 6d 5f 62 69 6e 61 72 79 3f | spectrum_binary? |
|                 | 20 61 63 74 3b                                  | act;             |
| <b>Response</b> | 23 33 32 31 32 4d 53 42 46 01 02 00 01 00 00 00 | #3212 ...        |
|                 | 00 00 00 00 15 00 00 00 04 00 00 00 00 41 cc 50 |                  |
|                 | ce 88 00 00 00 40 59 6e 6a aa aa ab 00 02 00    |                  |
|                 | 00 00 00 6a d1 00 00 00 16 00 64 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 c2 b5 50 ea c2 b1 f4 e5 c2 af ce |                  |
|                 | 9a c2 ad bf 5c c2 ac c8 b4 c2 ad 48 30 c2 af cc |                  |
|                 | 0e c2 b3 8c 3c c2 b7 71 94 c2 ba 60 4c c2 bc 80 |                  |
|                 | 2a c2 bd 27 3a c2 bb 7e b7 c2 ba ff 22 c2 bb 9f |                  |
|                 | 8a c2 be 88 7a c2 c2 1f e7 c2 c4 d9 82 c2 c3 b3 |                  |
|                 | 16 c2 c0 da ac c2 bc 06 25                      |                  |

### Parameter List

| Parameter | Type | Description                                                                                                                                                                                                                                                                                                    |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Trace>   | Enum | Sets the desired traces:<br>ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG       Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG       Minimum of the averaged values<br>ALL            All traces in the order noted above |

## Parameter List (Response)

| Parameter        | Type   | Bytes | Description                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|--------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader>    | ---    | ---   | ASCII header for block data transfer                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <Endian>         | DWord  | 4     | Identification if the byte order is swapped or not<br>0x4D534246 = Most Significant Byte First<br>0x4C534246 = Last Significant Byte First                                                                                                                                                                                                                                                                                                           |
| <DataID>         | Word   | 2     | Identification of the telegram data type<br>0x0101 = ALL, 0x0102 = ACT<br>0x0103 = AVG, 0x0104 = MIN<br>0x0105 = MIN_AVG, 0x0106 = MAX<br>0x0107 = MAX_AVG                                                                                                                                                                                                                                                                                           |
| <DataVersion>    | Word   | 2     | BINARY protocol version<br>Actual Version of Spectrum protocol = 0x0001                                                                                                                                                                                                                                                                                                                                                                              |
| <Reserved>       | ---    | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <NumberOfBlock>  | DWord  | 4     | Number of records (values)                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <SizeOfBlock>    | DWord  | 4     | Size of a single record                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <Reserved>       | ---    | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <Fmin>           | Double | 8     | Lower limit of the frequency range $F_{\min}$ [Hz]                                                                                                                                                                                                                                                                                                                                                                                                   |
| <df>             | Double | 8     | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                                                                                                                                                                                                                                                         |
| <Unit>           | Word   | 2     | Units of measurement data<br>0x0002 = dBm,<br>0x0003 = dBV,<br>0x0004 = dBmV,<br>0x0005 = dB $\mu$ V<br>Units with antenna connected<br>0x0006 = dBV/m,      0x0007 = dBmV/m,<br>0x0008 = dB $\mu$ V/m,      0x0009 = dBA/m,<br>0x000A = V/m,      0x000B = A/m,<br>0x000C = W/m <sup>2</sup> ,      0x000D = mW/cm <sup>2</sup> ,<br>Units reserved for future use<br>0x0001 = dB,      0x000E = %,<br>0x000F = dBA,      0x0010 = A,<br>0x0011 = V |
| <Flags>          | Word   | 2     | Flags representing the device status<br>0x0001 = Overdriven Flag                                                                                                                                                                                                                                                                                                                                                                                     |
| <SweepCounter>   | DWord  | 4     | Number of sweeps performed                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <SweepTime>      | DWord  | 4     | Sweep Time [ms]                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <AVGProgress>    | DWord  | 4     | 0 – 100 [%] Progress of averaging                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <NoOfSpatialAVG> | DWord  | 4     | 0 – 999 999 Number of sweeps used for spatial averaging                                                                                                                                                                                                                                                                                                                                                                                              |
| <FillBytes>      | ---    | 68    | Fill bytes to get a fixed BINARY header size.<br>The total header size is 128 bytes without the leading ASCII Header. Reserved for later use.                                                                                                                                                                                                                                                                                                        |

| Parameter | Type  | Description                                                                                                                                                                                                                                               |
|-----------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [ACT]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: ACT ACT ACT ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [AVG]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: AVG AVG AVG ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [MIN]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN MIN MIN ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [MIN_AVG] | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN_AVG MIN_AVG MIN_AVG ...<br>Very low results in logarithmic units are represented by "-999".                      |
| [MAX]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MAX MAX MAX ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [MAX_AVG] | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MAX_AVG MAX_AVG MAX_AVG ...<br>Very low results in logarithmic units are represented by "-999".                      |
| [ALL]     | Float | Array of binary floating point data with [n] = 21...632891 (NRA)<br>Array of binary floating point data with [n] = 21...27517 (IDA)<br>Alignment: ACT AVG MIN MIN_AVG MAX MAX_AVG ...<br>Very low results in logarithmic units are represented by "-999". |

## SPECTRUM\_CONFIG

### Description

Sets the current measurement parameters for SPECTRUM mode.

### Note

Spectrum mode must be selected as the current operating mode.

### Command

SPECTRUM\_CONFIG <Fcent>,<Fspan>,<RBW>,<VBWMode>,<VBW>,<RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <Fspan>      | Double | Frequency span [Hz]                        |
| <RBW>        | Double | Resolution bandwidth [Hz]                  |
| <VBWMode>    | Enum   | Video filter: ON, OFF;                     |
| <VBW>        | Double | Video filter bandwidth [Hz]                |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example (Unit=dBm)

|                 |                                                           |
|-----------------|-----------------------------------------------------------|
| <i>Command</i>  | SPECTRUM_CONFIG 1550000000,100000000,1000000,OFF,20000,0; |
| <i>Response</i> | 0;                                                        |

## SPECTRUM\_CONFIG?

### Description

Queries the current measurement parameters for SPECTRUM mode.

### Note

Spectrum mode must be selected as the current operating mode.

### Command

SPECTRUM\_CONFIG?;

### Response

<Fcent>,<Fspan>,<RBW>,<VBWMode>,<VBW>,<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <Fspan>      | Double | Frequency span [Hz]                        |
| <RBW>        | Double | Resolution bandwidth [Hz]                  |
| <VBWMode>    | Enum   | Video filter: ON, OFF;                     |
| <VBW>        | Double | Video filter bandwidth [Hz]                |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example

|                 |                                             |
|-----------------|---------------------------------------------|
| <i>Command</i>  | SPECTRUM_CONFIG?;                           |
| <i>Response</i> | 1550000000,100000000,1000000,OFF,20000,0,0; |

## SPECTRUM\_DETECTOR?

### Description

Queries trace data with fixed user defined number of values in SPECTRUM mode.

### Note

Spectrum must be selected as the current operating mode.  
The detector calculation is done just before the data output.

This command is helpful if there is a slow remote connection or fixed number of values is necessary.

Number of maximal Detector Traces (Number of Traces \* Number of Detector) is limited to 16

### Command

SPECTRUM\_DETECTOR? <NoOfTraces>,[Trace],<NoOfDetectors>,[Detector,] <NoOfValues>;

### Response

<SweepCounter>,<SweepTime>,<AVGProgress>,<NoOfSpatialAVG>,<Fmin>,<df>,<NoOfDetectorTraces>,[ <DetectorTrace>,<Overdriven>,<NoOfValues>,[Value,] ] <ReturnCode>;

### Parameter List:

| Parameter       | Type  | Description                                                                                                                                                                                                                                             |
|-----------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NoOfTraces>    | Word  | Number of traces, 1 – 6                                                                                                                                                                                                                                 |
| [Trace]         | Enum  | Sets the selected traces:<br>ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG      Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG      Minimum of the averaged values |
| <NoOfDetectors> | Word  | Number of selected detectors, 1 - 3                                                                                                                                                                                                                     |
| [Detector]      | Enum  | Sets the selected detectors:<br><br>RMS            RMS detector result<br>PLUS_PEAK    +Peak detector result<br>MINUS_PEAK   -Peak detector result                                                                                                      |
| <NoOfValues>    | DWord | User defined number of measurement values per detector trace.<br>21...27517 values are possible.                                                                                                                                                        |

| Parameter            | Type   | Description                                                                                                                                                                                                                                                                                                       |
|----------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <SweepCounter>       | DWord  | Number of sweeps performed                                                                                                                                                                                                                                                                                        |
| <SweepTime>          | DWord  | Sweep Time [ms]                                                                                                                                                                                                                                                                                                   |
| <AVGProgress>        | Word   | 0 – 100 [%]<br>Progress of averaging                                                                                                                                                                                                                                                                              |
| <NoOfSpatialAVG>     | DWord  | 0 – 999 999<br>Number of sweeps used for spatial averaging                                                                                                                                                                                                                                                        |
| <Fmin>               | Double | Lower limit of the frequency range $F_{min}$ [Hz]                                                                                                                                                                                                                                                                 |
| <df>                 | Double | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                                                                                                                      |
| <NoOfDetectorTraces> | Word   | Number traces of multiplied with number of detectors, 1 - 16                                                                                                                                                                                                                                                      |
| <DetectorTrace>      | Enum   | Detector Trace:<br>ACT_RMS, AVG_RMS, MIN_RMS,<br>MIN_AVG_RMS, MAX_RMS,<br>MAX_AVG_RMS, ACT_MINUS_PEAK,<br>AVG_MINUS_PEAK, MIN_MINUS_PEAK,<br>MIN_AVG_MINUS_PEAK, MAX_MINUS_PEAK,<br>MAX_AVG_MINUS_PEAK, ACT_PLUS_PEAK,<br>AVG_PLUS_PEAK, MIN_PLUS_PEAK,<br>MIN_AVG_PLUS_PEAK, MAX_PLUS_PEAK,<br>MAX_AVG_PLUS_PEAK |
| <Overdriven>         | Enum   | YES, NO;<br>Yes, if at least one trace exceeded the range limit.<br>Overdriven results may have a very high uncertainty.                                                                                                                                                                                          |
| <NoOfValues>         | DWord  | User defined number of measurement values per detector trace.<br>21...27517 values are possible.                                                                                                                                                                                                                  |
| [Value]              | Float  | Measurement result [Unit]. Very low results in logarithmic units are represented by “-999” (negative infinity).                                                                                                                                                                                                   |
| <ReturnCode>         | Word   | Warning or error code                                                                                                                                                                                                                                                                                             |

### Example

|                 |                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SPECTRUM_DETECTOR? 1,ACT,1,RMS,33;                                                                                                                                                                                                                                                                         |
| <i>Response</i> | 841,10,100,0,85000000,937500,1,<br>ACT_RMS,NO,33,<br>-56.36,-51.47,-51.91,-53.93,-58.43,-55.29,-52.51,-57.29,-58.11,-55.72,-54.97,-53.68,-<br>57.35,-56.81,-53.85,-57.19,-57.12,-55.81,-55.42,-55.20,-53.50,-53.51,-56.40,-57.31,-<br>56.28,-55.95,-59.22,-57.60,-53.09,-57.67,-54.40,-56.73,-54.83,<br>0; |

## SPECTRUM\_DETECTOR\_BINARY?

### Description

Queries BINARY trace data with fixed user defined number of values in SPECTRUM mode.

### Note

Spectrum mode must be selected as the current operating mode.

The detector calculation is done just before the data output.

This command is helpful if there is a slow remote connection or fixed number of values is necessary.

Number of maximal Detector Traces (Number of Traces \* Number of Detector) is limited to 16

Number of Traces Calculation:  $\text{SizeOfBlock} / \text{sizeof(float)}$  with  $\text{sizeof(float)} = 4$

### Command

SPECTRUM\_DETECTOR\_BINARY?

<NoOfTraces>,[Trace],<NoOfDetectors>,[Detector],<NoOfValues>;

### Response

<AsciiHeader>

<Endian> <DataID> <DataVersion> <Reserved> <NumberOfBlock> <SizeOfBlock> <Reserved>

<Fmin> <df> <Unit> <Flags> <SweepCounter> <SweepTime> <AVGProgress> <NoOfSpatialAVG>

[DetectorTraceOrderList] <FillBytes> [ACT\_RMS] [ACT\_PLUS\_PEAK] [ACT\_MINUS\_PEAK] [..]

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| <i>Command</i>  | 53 50 45 43 54 52 55 4d 5f 44 45 54 45 43 54 4f<br>52 5f 42 49 4e 41 52 59 3f 20 31 2c 41 43 54 2c<br>31 2c 52 4d 53 2c 32 31 3b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SPECTRUM_DETECTO<br>R_BINARY? 1,ACT,<br>1,RMS,21; |
| <i>Response</i> | 23 33 32 31 32 4d 53 42 46 04 00 00 02 00 00 00<br>00 00 00 00 15 00 00 00 04 00 00 00 00 41 de 97<br>e8 9d 00 00 00 40 49 00 00 00 00 00 00 00 02 00<br>00 00 02 39 11 00 00 00 1b 00 00 00 64 00 00 00<br>00 04 02 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 c2 c0 57 6c c2 c2 d3 fa c2 b5 3d<br>d2 c2 b0 fc 68 c2 b3 54 e9 c2 b8 1f e0 c2 bc d3<br>0f c2 ce bd 98 c2 bb e2 fa c2 bb 67 4e c2 bc b1<br>2c c2 b3 88 62 c2 ac fe a0 c2 aa dc 31 c2 aa e4<br>82 c2 ac f1 48 c2 b3 c8 f7 c2 bd 29 8e c2 b9 3e<br>c2 c2 b7 2a fa c2 b9 d8 9b | #3212 ...                                         |



## Parameter List

| Parameter       | Type  | Description                                                                                                                                                                                                                                             |
|-----------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NoOfTraces>    | Word  | Number of traces, 1 – 6                                                                                                                                                                                                                                 |
| [Trace]         | Enum  | Sets the selected traces:<br>ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG      Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG      Minimum of the averaged values |
| <NoOfDetectors> | Word  | Number of selected detectors, 1 - 3                                                                                                                                                                                                                     |
| [Detector]      | Enum  | Sets the selected detectors:<br>RMS            RMS detector result<br>PLUS_PEAK    +Peak detector result<br>MINUS_PEAK   -Peak detector result                                                                                                          |
| <NoOfValues>    | DWord | User defined number of measurement values per detector trace.<br>21...27517 values are possible.                                                                                                                                                        |

## Parameter List (Response)

| Parameter       | Type   | Bytes | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|--------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader>   | ---    | ---   | ASCII header for block data transfer                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <Endian>        | DWord  | 4     | Identification if the byte order is swapped or not<br>0x4D534246 = Most Significant Byte First<br>0x4C534246 = Last Significant Byte First                                                                                                                                                                                                                                                                                                                                           |
| <DataID>        | Word   | 2     | Identification of the telegram data type<br>0x0400 = Spectrum Detector                                                                                                                                                                                                                                                                                                                                                                                                               |
| <DataVersion>   | Word   | 2     | BINARY protocol version<br>Actual Version of Spectrum trace protocol = 0x0002                                                                                                                                                                                                                                                                                                                                                                                                        |
| <Reserved>      | ---    | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <NumberOfBlock> | DWord  | 4     | Number of records (values)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <SizeOfBlock>   | DWord  | 4     | Size of a single record                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <Reserved>      | ---    | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <Fmin>          | Double | 8     | Lower limit of the frequency range $F_{min}$ [Hz]                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <df>            | Double | 8     | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <Unit>          | Word   | 2     | Units of measurement data<br>0x0002 = dBm,<br>0x0003 = dBV,<br>0x0004 = dBmV,<br>0x0005 = dB $\mu$ V<br>Units with antenna connected<br>0x0006 = dBV/m,            0x0007 = dBmV/m,<br>0x0008 = dB $\mu$ V/m,        0x0009 = dBA/m,<br>0x000A = V/m,            0x000B = A/m,<br>0x000C = W/m <sup>2</sup> ,            0x000D = mW/cm <sup>2</sup> ,<br>Units reserved for future use<br>0x0001 = dB,            0x000E = %,<br>0x000F = dBA,            0x0010 = A,<br>0x0011 = V |

## Command Reference Guide

Spectrum

|                          |          |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|----------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Flags>                  | Word     | 2  | Flags representing the device status<br>0x0001 = Overdriven Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <SweepCounter>           | DWord    | 4  | Number of sweeps performed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <SweepTime>              | DWord    | 4  | Sweep Time [ms]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <AVGProgress>            | DWord    | 4  | 0 – 100 [%] Progress of averaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <NoOfSpatialAVG>         | DWord    | 4  | 0 – 999 999 Number of sweeps used for spatial averaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| [DetectorTraceOrderList] | 16x Word | 32 | This Array of IDs represents the order of the following binary detector traces. Possible IDs are:<br>0x0402 = ACT_RMS,<br>0x0403 = AVG_RMS,<br>0x0404 = MIN_RMS,<br>0x0405 = MIN_AVG_RMS,<br>0x0406 = MAX_RMS,<br>0x0407 = MAX_AVG_RMS,<br>0x0408 = ACT_MINUS_PEAK,<br>0x0409 = AVG_MINUS_PEAK,<br>0x040A = MIN_MINUS_PEAK,<br>0x040B = MIN_AVG_MINUS_PEAK,<br>0x040C = MAX_MINUS_PEAK,<br>0x040D = MAX_AVG_MINUS_PEAK,<br>0x040E = ACT_PLUS_PEAK,<br>0x040F = AVG_PLUS_PEAK,<br>0x0410 = MIN_PLUS_PEAK,<br>0x0411 = MIN_AVG_PLUS_PEAK,<br>0x0412 = MAX_PLUS_PEAK,<br>0x0413 = MAX_AVG_PLUS_PEAK,<br>0x0000 = End of List Marker |
| <FillBytes>              | ---      | 36 | Fill bytes to get a fixed BINARY header size.<br>The total header size is 128 bytes without the leading ASCII Header. Reserved for later use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

### Single detector selection

| Parameter        | Type  | Description                                                                                                                                                                                  |
|------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [ACT_RMS]        | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...27517<br>Alignment: ACT_RMS ACT_RMS ACT_RMS ...<br>Very low results in logarithmic units are represented by "-999".       |
| [ACT_PLUS_PEAK]  | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...27517<br>Alignment: ACT_PLUS_PEAK ACT_PLUS_PEAK ...<br>Very low results in logarithmic units are represented by "-999".   |
| [ACT_MINUS_PEAK] | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...27517<br>Alignment: ACT_MINUS_PEAK ACT_MINUS_PEAK ...<br>Very low results in logarithmic units are represented by "-999". |

### Multi detector selection

| Parameter                                        | Type  | Description                                                                                                                                                                                         |
|--------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [ACT_RMS]<br>[ACT_PLUS_PEAK]<br>[ACT_MINUS_PEAK] | Float | Array of 3x 4 byte floating point data.<br>Number of records: 21...27517<br>Alignment: ACT_RMS ACT_PLUS_PEAK ACT_MINUS_PEAK ...<br>Very low results in logarithmic units are represented by "-999". |

## SPECTRUM\_DETECTOR\_LIST?

### Description

Queries the detector list for spectrum data.

### Note

The detectors in this list can be used as selection for the SPECTRUM\_DETECTOR?; and SPECTRUM\_DETECTOR\_BINARY?; commands.

### Command

SPECTRUM\_DETECTOR\_LIST?;

### Response

<NoOfDetectors>, [ Detector,] <ReturnCode>;

### Parameter List

| Parameter       | Type | Description                                                                           |
|-----------------|------|---------------------------------------------------------------------------------------|
| <NoOfDetectors> | Word | Number of selectable detectors                                                        |
| [Detector]      | Enum | RMS           RMS detector<br>PLUS_PEAK   +Peak detector<br>MINUS_PEAK -Peak detector |
| <ReturnCode>    | Word | Warning or error code                                                                 |

### Example

|                 |                               |
|-----------------|-------------------------------|
| <i>Command</i>  | SPECTRUM_DETECTOR_LIST?;      |
| <i>Response</i> | 3,RMS,PLUS_PEAK,MINUS_PEAK,0; |

## SPECTRUM\_FULLSPAN

### Description

Sets the frequency parameters Fcent and Fspan to select the entire frequency range of the device.

### Note

RBW and VBW settings will be adjusted to the next valid value if the current setting does not match.

### Command

SPECTRUM\_FULLSPAN;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | SPECTRUM_FULLSPAN; |
| <i>Response</i> | 0;                 |

## SPECTRUM\_HEADER?

### Description

Queries the header information for the measured values in SPECTRUM mode.

### Note

This command provides additional information useful for result evaluation and presentation.

### Command

SPECTRUM\_HEADER? <Trace>;

### Response

<SweepCounter>,<SweepTime>,<AVGProgress>,<NoOfSpatialAVG>,<Fmin>,<df>,<NoOfTraces>,<ReturnCode>;

### Parameter List

| Parameter        | Type   | Description                                                                                                                                                                                                                                                                                                  |
|------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Trace>          | Enum   | Sets the desired traces:<br>ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG      Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG      Minimum of the averaged values<br>ALL            All traces in the order noted above |
| <SweepCounter>   | DWord  | Number of sweeps performed                                                                                                                                                                                                                                                                                   |
| <SweepTime>      | DWord  | Sweep Time [ms]                                                                                                                                                                                                                                                                                              |
| <AVGProgress>    | Word   | 0 – 100 [%]<br>Progress of averaging                                                                                                                                                                                                                                                                         |
| <NoOfSpatialAVG> | DWord  | 0 – 999 999<br>Number of sweeps used for spatial averaging                                                                                                                                                                                                                                                   |
| <Fmin>           | Double | Lower limit of the frequency range $F_{min}$ [Hz]                                                                                                                                                                                                                                                            |
| <df>             | Double | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                                                                                                                 |
| <NoOfTraces>     | Word   | Number of traces, 1 - 6                                                                                                                                                                                                                                                                                      |
| <ReturnCode>     | Word   | Warning or error code                                                                                                                                                                                                                                                                                        |

### Examples

|                 |                               |
|-----------------|-------------------------------|
| <i>Command</i>  | SPECTRUM_HEADER? ACT;         |
| <i>Response</i> | 46,437,5,0,9000,250000,1,0;   |
| <i>Command</i>  | SPECTRUM_HEADER? ALL;         |
| <i>Response</i> | 301,435,36,0,9000,250000,6,0; |

## SPECTRUM\_MAX\_VALUES?

### Description

Queries the maximum number of measurement points in Spectrum mode

### Command

SPECTRUM\_MAX\_VALUES?;

### Response

<NoOfValues>, <ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                    |
|--------------|-------|--------------------------------------------------------------------------------|
| <NoOfValues> | DWord | Maximal Number of measurement values per trace.<br>632891 (NRA)<br>27517 (IDA) |
| <ReturnCode> | Word  | Warning or error code                                                          |

### Examples

---

*Command* SPECTRUM\_MAX\_VALUES?;

---

*Response* 27517,0;

---

## SPECTRUM\_MODE

### Description

Sets the sub mode, in Spectrum mode

### Note

The measurement time can be significantly longer in the SPECTROGRAM sub mode

### Command

SPECTRUM\_MODE <MeasMode>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <MeasMode>   | Enum | SPECTRUM_ONLY         |
| <ReturnCode> | Word | Warning or error code |

### Examples

|                 |                              |
|-----------------|------------------------------|
| <i>Command</i>  | SPECTRUM_MODE SPECTRUM_ONLY; |
| <i>Response</i> | 0;                           |



## SPECTRUM\_MODE?

### Description

Queries the sub mode, in Spectrum mode

### Note

The measurement time can be significantly longer in the SPECTROGRAM sub mode.

### Command

SPECTRUM\_MODE?;

### Response

<MeasMode>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                    |
|--------------|------|------------------------------------------------|
| <MeasMode>   | Enum | SPECTRUM_ONLY,<br>SPECTROGRAM (IDA, read only) |
| <ReturnCode> | Word | Warning or error code                          |

### Examples

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | SPECTRUM_MODE?;  |
| <i>Response</i> | SPECTRUM_ONLY,0; |

## SPECTRUM\_MRK\_HIGHEST?

### Description

Queries the marker values for the highest measurement value.

### Note

This command is only available in SPECTRUM mode.

### Command

SPECTRUM\_MRK\_HIGHEST? <Trace>;

### Response

<Frequency>,<Value>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                          |
|--------------|--------|--------------------------------------|
| <Trace>      | Enum   | ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG |
| <Frequency>  | Double | Marker frequency [Hz]                |
| <Value>      | Float  | Marker value [Unit]                  |
| <ReturnCode> | Word   | Warning or error code                |

### Example

|                 |                            |
|-----------------|----------------------------|
| <i>Command</i>  | SPECTRUM_MRK_HIGHEST? ACT; |
| <i>Response</i> | 1580000000,-33.68924,0;    |

## SPECTRUM\_MRK\_IDX\_VALUE?

### Description

Queries the marker values for a selected marker.

### Note

This command is only available in Spectrum mode.

The marker is selected by means of an index starting with 0.

The index describes a BIN (single measured value) in the spectrum.

21 to 632981 BINs may be present depending on the current measurement settings.

The actual number of BINs can be determined using the <NoOfValues> parameter in the SPECTRUM? query.

The relation between marker frequency and index is defined in the following formula (use the SPECTRUM? query to determine <Fmin> and <df>):

$$\text{<Frequency>} = \text{<Fmin>} + ( \text{<Index>} * \text{<df>} )$$

### Command

SPECTRUM\_MRK\_IDX\_VALUE? <Index>,<Trace>;

### Response

<Frequency>,<Value>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                          |
|--------------|--------|--------------------------------------|
| <Index>      | DWord  | Index of the marker                  |
| <Trace>      | Enum   | ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG |
| <Frequency>  | Double | Marker frequency [Hz]                |
| <Value>      | Float  | Marker value [Unit]                  |
| <ReturnCode> | Word   | Warning or error code                |

### Example

|                 |                                |
|-----------------|--------------------------------|
| <i>Command</i>  | SPECTRUM_MRK_IDX_VALUE? 3,ACT; |
| <i>Response</i> | 1515000000,-48.2472,0;         |

## SPECTRUM\_MRK\_VALUE?

### Description

Queries the marker values for a specified frequency point.

### Note

This command is only available in Spectrum mode.

The discrete resolution of the spectrum means that the marker closest to the specified frequency point will be selected.

### Command

SPECTRUM\_MRK\_VALUE? <FrequencySet>,<Trace>;

### Response

<FrequencyGet>,<Value>,<ReturnCode>;

### Parameter List

| Parameter      | Type   | Description                          |
|----------------|--------|--------------------------------------|
| <FrequencySet> | Double | Desired frequency [Hz]               |
| <Trace>        | Enum   | ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG |
| <FrequencyGet> | Double | Real marker frequency [Hz]           |
| <Value>        | Float  | Marker value [Unit]                  |
| <ReturnCode>   | Word   | Warning or error code                |

### Example

|                 |                                     |
|-----------------|-------------------------------------|
| <i>Command</i>  | SPECTRUM_MRK_VALUE? 1550000000,ACT; |
| <i>Response</i> | 1550000000,-47.98391,0;             |

## SPECTRUM\_PEAK\_TABLE?

### Description

Queries a configurable peak table.

### Note

This command is only available in Spectrum mode.

### Command

SPECTRUM\_PEAK\_TABLE?

<NoOfPeaksSet>,<Trace>,<EvaluatePeakThreshold>,<PeakThreshold>;

### Response

<NoOfPeaksGet>, [ <Frequency>,<Value>, ] <ReturnCode>;

### Parameter List

| Parameter               | Type   | Description                                                                                                               |
|-------------------------|--------|---------------------------------------------------------------------------------------------------------------------------|
| <NoOfPeaksSet>          | Word   | Sets the maximum number of peaks for the peak table.<br>1 - 50 peaks                                                      |
| <Trace>                 | Enum   | ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG                                                                                      |
| <EvaluatePeakThreshold> | Enum   | ON, OFF                                                                                                                   |
| <PeakThreshold>         | Float  | Signal threshold for peak recognition<br>default: 0 [Unit] for linear units<br>default: -200 [Unit] for logarithmic units |
| <NoOfPeaksGet>          | Word   | Number of recognized peaks                                                                                                |
| <Frequency>             | Double | Frequency of a peak [Hz]                                                                                                  |
| <Value>                 | Float  | Level of a peak [Unit]                                                                                                    |
| <ReturnCode>            | Word   | Warning or error code                                                                                                     |

### Example

|                 |                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SPECTRUM_PEAK_TABLE? 8,ACT,ON,-60;                                                                                                                                                                                             |
| <i>Response</i> | 8,<br>1595231749.51,-36.83402,<br>1525000000,-37.7842,<br>1583047423.02,-38.64394,<br>1512402178.71,-38.69695,<br>1553851190.77,-38.85493,<br>1535000000,-40.37614,<br>1545000000,-40.79449,<br>1563396306.54,-46.03093,<br>0; |

## SPECTRUM\_PEAK\_TABLE\_EXC?

### Description

Queries a configurable peak table with excursion.

### Note

This command is only available in Spectrum mode.

### Command

SPECTRUM\_PEAK\_TABLE\_EXC?

<NoOfPeaksSet>,<Trace>,<EvaluatePeakThreshold>,<PeakThreshold>,<EvaluatePeakContrast>,<PeakContrast>;

### Response

<NoOfPeaksGet>, [ <Frequency>,<Value>, ] <ReturnCode>;

### Parameter List

| Parameter               | Type   | Description                                                                                                               |
|-------------------------|--------|---------------------------------------------------------------------------------------------------------------------------|
| <NoOfPeaksSet>          | Word   | Sets the maximum number of peaks for the peak table.<br>1 - 50 peaks                                                      |
| <Trace>                 | Enum   | ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG                                                                                      |
| <EvaluatePeakThreshold> | Enum   | ON, OFF                                                                                                                   |
| <PeakThreshold>         | Float  | Signal threshold for peak recognition<br>default: 0 [Unit] for linear units<br>default: -200 [Unit] for logarithmic units |
| <EvaluatePeakContrast>  | Enum   | ON, OFF                                                                                                                   |
| <PeakContrast>          | Float  | Signal contrast for peak recognition<br>0...20 dB                                                                         |
| <NoOfPeaksGet>          | Word   | Number of recognized peaks                                                                                                |
| <Frequency>             | Double | Frequency of a peak [Hz]                                                                                                  |
| <Value>                 | Float  | Level of a peak [Unit]                                                                                                    |
| <ReturnCode>            | Word   | Warning or error code                                                                                                     |

### Example

|                 |                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SPECTRUM_PEAK_TABLE_EXC? 8,ACT,OFF,0,ON,10;                                                                                                                                                                                          |
| <i>Response</i> | 8,<br>97705916.2862,-52.4374,<br>104808206.952,-55.192,<br>105699118.482,-57.82082,<br>102305756.951,-61.69502,<br>94704779.465,-62.47497,<br>92224158.5006,-64.32042,<br>103095044.165,-65.63362,<br>101300636.441,-66.63588,<br>0; |

## SPECTRUM\_RAW?

### Description

Queries one or more measurement runs (traces) in Spectrum mode using the RAW format and BINARY data transfer.

### Command

SPECTRUM\_RAW? <Trace>;

### Response

<AsciiHeader> [ACT] [AVG] [MIN] [MIN\_AVG] [MAX] [MAX\_AVG] [ALL]

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                                                                                                                                                                                                                                                        |                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <b>Command</b>  | 73 70 65 63 74 72 75 6d 5f 72 61 77 3f 20 61 63<br>74 3b                                                                                                                                                                                                                               | spectrum_raw? Ac<br>t; |
| <b>Response</b> | 23 32 38 34 c2 cf 64 52 c2 d9 bb e6 c2 c6 da b2<br>c2 ca 1c 9e c2 cb 70 d2 c2 c0 22 84 c2 cd 75 84<br>c2 cb 16 d2 c2 c7 66 78 c2 d0 93 9e c2 ce 17 4c<br>c2 d2 f5 3c c2 c1 96 43 c2 c2 12 95 c2 d2 eb 70<br>c2 bb cb 38 c2 bf 67 c4 c2 ce de ec c2 be 31 f0<br>c2 c6 a7 42 c2 b9 6a 85 | #284 ...               |

### Parameter List

| Parameter | Type | Description                                                                                                                                                                                                                                                                                                      |
|-----------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Trace>   | Enum | Sets the desired traces:<br>ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG        Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG        Minimum of the averaged values<br>ALL            All traces in the order noted above |

## Command Reference Guide

Spectrum

| Parameter     | Type  | Description                                                                                                                                                                                                                                               |
|---------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader> | ---   | ASCII header for block data transfer                                                                                                                                                                                                                      |
| [ACT]         | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: ACT ACT ACT ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [AVG]         | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: AVG AVG AVG ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [MIN]         | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN MIN MIN ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [MIN_AVG]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN_AVG MIN_AVG MIN_AVG ...<br>Very low results in logarithmic units are represented by "-999".                      |
| [MAX]         | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MAX MAX MAX ...<br>Very low results in logarithmic units are represented by "-999".                                  |
| [MIN_AVG]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MAX_AVG MAX_AVG MAX_AVG ...<br>Very low results in logarithmic units are represented by "-999".                      |
| [ALL]         | Float | Array of binary floating point data with [n] = 21...632891 (NRA)<br>Array of binary floating point data with [n] = 21...27517 (IDA)<br>Alignment: ACT AVG MIN MIN_AVG MAX MAX_AVG ...<br>Very low results in logarithmic units are represented by "-999". |



## SPECTRUM\_TRACE?

### Description

Queries one or more traces in SPECTRUM mode.

### Note

Spectrum mode must be selected as the current operating mode.

A trace is the number of all the measurement values determined during a measurement cycle (sweep).

### Command

SPECTRUM\_TRACE? <NoOfTraces>,[Trace,];

### Response

<SweepCounter>,<SweepTime>,<AVGProgress>,<NoOfSpatialAVG>,<Fmin>,<df>,<NoOfTraces>,  
[ <Trace>,<Overdriven>,<NoOfValues> , [Value,] ] <ReturnCode>;

### Parameter List

| Parameter        | Type   | Description                                                                                                                                                                                                   |
|------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NoOfTraces>     | Word   | Number of traces, 1 - 6                                                                                                                                                                                       |
| [Trace]          | Enum   | Sets the selected traces:<br>ACT Actual value<br>AVG Averaged value<br>MAX Maximum value<br>MAX_AVG Maximum of the averaged values (NRA)<br>MIN Minimum value<br>MIN_AVG Minimum of the averaged values (NRA) |
| <SweepCounter>   | DWord  | Number of sweeps performed                                                                                                                                                                                    |
| <SweepTime>      | DWord  | Sweep Time [ms]                                                                                                                                                                                               |
| <AVGProgress>    | Word   | 0 – 100 [%]<br>Progress of averaging                                                                                                                                                                          |
| <NoOfSpatialAVG> | DWord  | 0 – 999 999<br>Number of sweeps used for spatial averaging                                                                                                                                                    |
| <Fmin>           | Double | Lower limit of the frequency range $F_{min}$ [Hz]                                                                                                                                                             |
| <df>             | Double | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                  |
| <Overdriven>     | Enum   | YES, NO;<br>Yes, if at least one trace exceeded the range limit.<br>Overdriven results may have a very high uncertainty.                                                                                      |
| <NoOfValues>     | DWord  | Number of measurement values per trace.<br>21...632891 values are possible. (NRA)<br>21...27517 values are possible. (IDA)                                                                                    |
| [Value]          | Float  | Measurement result [Unit]. Very low results in logarithmic units are represented by “-999” (negative infinity).                                                                                               |
| <ReturnCode>     | Word   | Warning or error code                                                                                                                                                                                         |

## Examples

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SPECTRUM TRACE? 1,ACT;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>Response</i> | 810,133,100,0,9000,10000000,1,<br>ACT,NO,101,<br>-70.89,-68.48,-67.57,-65.77,-65.39,-69.80,-76.23,-65.90,-55.35,-54.76,-56.86,-50.91,-<br>57.82,-75.17,-86.14,-70.86,-75.13,-71.41,-82.23,-62.27,-62.49,-58.52,-62.08,-71.08,-<br>68.70,-57.67,-66.21,-59.53,-55.90,-63.22,-63.08,-64.02,-54.52,-61.63,-70.68,-74.98,-<br>64.33,-59.97,-61.31,-60.95,-68.20,-61.85,-62.27,-61.81,-75.30,-80.79,-75.02,-79.60,-<br>76.51,-84.33,-83.80,-74.92,-83.47,-79.90,-79.81,-90.25,-76.96,-84.57,-77.54,-70.47,-<br>78.67,-75.35,-83.50,-68.22,-68.39,-70.29,-80.17,-66.51,-76.77,-80.63,-74.80,-72.07,-<br>71.60,-79.23,-76.20,-70.01,-69.95,-70.12,-73.02,-77.72,-73.71,-77.54,-84.52,-81.69,-<br>84.00,-82.62,-74.92,-70.75,-70.50,-83.26,-77.54,-77.72,-60.51,-72.45,-58.64,-50.41,-<br>65.88,-61.50,-86.06,-87.11,-84.17,<br>0;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>Command</i>  | SPECTRUM TRACE? 2,MIN,MAX;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>Response</i> | 197,149,100,0,9000,10000000,2,<br>MIN,NO,101,<br>-86.06,-79.66,-86.61,-83.77,-85.00,-97.98,-88.64,-90.38,-80.82,-71.66,-75.84,-79.81,-<br>84.52,-89.91,-96.14,-95.24,-100.29,-90.25,-93.39,-81.99,-80.06,-87.71,-85.69,-85.94,-<br>103.30,-87.37,-89.61,-85.80,-91.26,-78.69,-91.72,-84.01,-71.82,-85.24,-88.44,-87.62,-<br>84.16,-84.16,-84.30,-84.16,-88.33,-88.56,-83.44,-78.75,-94.97,-97.74,-110.29,-103.30,-<br>93.30,-94.61,-103.30,-107.28,-999.00,-107.28,-103.30,-110.29,-100.29,-110.29,-104.27,-<br>96.31,-100.75,-110.29,-103.30,-78.08,-80.35,-81.47,-94.61,-93.76,-97.98,-101.26,-<br>92.44,-93.30,-88.56,-97.98,-104.27,-110.29,-97.28,-97.98,-100.75,-101.26,-101.26,-<br>100.29,-107.28,-107.28,-95.66,-104.27,-100.29,-103.30,-98.25,-94.61,-100.75,-96.31,-<br>91.96,-74.00,-89.91,-78.18,-80.35,-104.27,-104.27,-999.00,-103.30,<br>MAX,NO,101,<br>-49.75,-50.46,-48.21,-47.73,-49.80,-53.19,-54.85,-49.41,-48.34,-45.26,-44.30,-41.97,-<br>43.41,-43.11,-42.44,-47.93,-48.90,-44.90,-52.50,-49.94,-47.44,-49.16,-51.28,-50.72,-<br>45.34,-46.54,-48.83,-43.45,-44.37,-50.14,-50.49,-54.16,-55.61,-53.96,-52.33,-49.27,-<br>50.67,-54.74,-51.33,-50.99,-51.52,-52.42,-56.63,-58.99,-64.54,-68.23,-69.48,-66.90,-<br>66.09,-68.55,-70.38,-66.90,-69.86,-71.70,-71.91,-72.70,-72.22,-72.79,-72.25,-67.80,-<br>66.01,-68.51,-69.27,-65.11,-62.35,-63.93,-62.74,-63.91,-64.91,-62.51,-67.94,-64.34,-<br>64.01,-65.04,-67.88,-64.98,-63.71,-66.20,-69.95,-69.31,-68.93,-70.69,-73.13,-72.43,-<br>73.34,-69.93,-68.67,-66.78,-65.16,-57.73,-41.47,-38.52,-47.90,-44.07,-45.36,-47.20,-<br>49.13,-54.98,-68.66,-73.83,-72.72,<br>0; |

## SPECTRUM\_TRACE\_BINARY?

### Description

Queries one or more BINARY traces in SPECTRUM mode.

### Note

Number of Traces Calculation:  $\text{SizeOfBlock} / \text{sizeof(float)}$  with  $\text{sizeof(float)} = 4$

### Command

SPECTRUM\_TRACE\_BINARY? <NoOfTraces>,[Trace,];

### Response

<AsciiHeader>  
<Endian> <DataID> <DataVersion> <Reserved> <NumberOfBlock> <SizeOfBlock> <Reserved>  
<Fmin> <df> <Unit> <Flags> <SweepCounter> <SweepTime> <AVGProgress> <NoOfSpatialAVG>  
[TraceOrderList] <FillBytes> [ACT] [AVG] [MAX] [MAX\_AVG] [MIN] [MIN\_AVG]

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                 |                  |
|-----------------|-------------------------------------------------|------------------|
| <i>Command</i>  | 53 50 45 43 54 52 55 4d 5f 54 52 41 43 45 5f 42 | SPECTRUM_TRACE_B |
|                 | 49 4e 41 52 59 3f 20 31 2c 41 43 54 3b          | INARY? 1,ACT;    |
| <i>Response</i> | 23 33 32 31 32 4d 53 42 46 03 00 00 02 00 00 00 | #3212 ...        |
|                 | 00 00 00 00 15 00 00 00 04 00 00 00 00 41 de 97 |                  |
|                 | e8 9d 00 00 00 40 49 6e 6a aa aa ab 00 02 00    |                  |
|                 | 00 00 02 70 62 00 00 00 1b 00 00 00 64 00 00 00 |                  |
|                 | 00 03 02 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |                  |
|                 | 00 00 00 00 00 c2 ae 5e a7 c2 a8 d1 1c c2 aa 59 |                  |
|                 | 91 c2 b3 ec 8c c2 b5 75 5b c2 b6 e5 76 c2 cd 2c |                  |
|                 | e0 c2 b3 43 c6 c2 b4 1d 4b c2 b8 0d 2e c2 b3 9c |                  |
|                 | a2 c2 b1 f7 ae c2 ac 78 1e c2 a9 20 32 c2 a9 89 |                  |
|                 | 04 c2 ac 68 32 c2 b3 98 d6 c2 bf 21 ca c2 b6 0b |                  |
|                 | f4 c2 b0 d7 b4 c2 b4 5a ec                      |                  |

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                                                               |
|--------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NoOfTraces> | Word | Number of traces, 1 - 6                                                                                                                                                                                                                                   |
| [Trace]      | Enum | Sets the selected traces:<br>ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG       Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG       Minimum of the averaged values |

## Parameter List (Response)

| Parameter        | Type    | Bytes | Description                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|---------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader>    | ---     | ---   | ASCII header for block data transfer                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <Endian>         | DWord   | 4     | Identification if the byte order is swapped or not<br>0x4D534246 = Most Significant Byte First<br>0x4C534246 = Last Significant Byte First                                                                                                                                                                                                                                                                                                           |
| <DataID>         | Word    | 2     | Identification of the telegram data type<br>0x0300 = Spectrum Trace                                                                                                                                                                                                                                                                                                                                                                                  |
| <DataVersion>    | Word    | 2     | BINARY protocol version<br>Actual Version of Spectrum trace protocol = 0x0002                                                                                                                                                                                                                                                                                                                                                                        |
| <Reserved>       | ---     | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <NumberOfBlock>  | DWord   | 4     | Number of records (values)                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <SizeOfBlock>    | DWord   | 4     | Size of a single record                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <Reserved>       | ---     | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <Fmin>           | Double  | 8     | Lower limit of the frequency range $F_{min}$ [Hz]                                                                                                                                                                                                                                                                                                                                                                                                    |
| <df>             | Double  | 8     | Frequency steps (resolution) of the FFT [Hz]                                                                                                                                                                                                                                                                                                                                                                                                         |
| <Unit>           | Word    | 2     | Units of measurement data<br>0x0002 = dBm,<br>0x0003 = dBV,<br>0x0004 = dBmV,<br>0x0005 = dB $\mu$ V<br>Units with antenna connected<br>0x0006 = dBV/m,      0x0007 = dBmV/m,<br>0x0008 = dB $\mu$ V/m,      0x0009 = dBA/m,<br>0x000A = V/m,      0x000B = A/m,<br>0x000C = W/m <sup>2</sup> ,      0x000D = mW/cm <sup>2</sup> ,<br>Units reserved for future use<br>0x0001 = dB,      0x000E = %,<br>0x000F = dBA,      0x0010 = A,<br>0x0011 = V |
| <Flags>          | Word    | 2     | Flags representing the device status<br>0x0001 = Overdriven Flag                                                                                                                                                                                                                                                                                                                                                                                     |
| <SweepCounter>   | DWord   | 4     | Number of sweeps performed                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <SweepTime>      | DWord   | 4     | Sweep Time [ms]                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <AVGProgress>    | DWord   | 4     | 0 – 100 [%] Progress of averaging                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <NoOfSpatialAVG> | DWord   | 4     | 0 – 999 999 Number of sweeps used for spatial averaging                                                                                                                                                                                                                                                                                                                                                                                              |
| [TraceOrderList] | 16xWord | 32    | This Array of Trace IDs represents the order of the following binary traces. Possible Trace IDs are:<br>0x0302 = ACT,      0x0303 = AVG,<br>0x0304 = MIN,      0x0305 = MIN_AVG,<br>0x0306 = MAX,      0x0307 = MAX_AVG,<br>0x0000 = End of List Marker                                                                                                                                                                                              |
| <FillBytes>      | ---     | 36    | Fill bytes to get a fixed BINARY header size.<br>The total header size is 128 bytes without the leading ASCII Header. Reserved for later use.                                                                                                                                                                                                                                                                                                        |

### Single trace selection

| Parameter | Type  | Description                                                                                                                                                                                                                          |
|-----------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [ACT]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: ACT ACT ACT ...<br>Very low results in logarithmic units are represented by "-999".             |
| [AVG]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: AVG AVG AVG ...<br>Very low results in logarithmic units are represented by "-999".             |
| [MAX]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MAX MAX MAX ...<br>Very low results in logarithmic units are represented by "-999".             |
| [MAX_AVG] | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MAX_AVG MAX_AVG MAX_AVG ...<br>Very low results in logarithmic units are represented by "-999". |
| [MIN]     | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN MIN MIN ...<br>Very low results in logarithmic units are represented by "-999".             |
| [MIN_AVG] | Float | Array of 1x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN_AVG MIN_AVG MIN_AVG ...<br>Very low results in logarithmic units are represented by "-999". |

### Multi trace selection

| Parameter                  | Type  | Description                                                                                                                                                                                                                          |
|----------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [MIN] [MAX]                | Float | Array of 2x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: MIN MAX MIN MAX MIN MAX ...<br>Very low results in logarithmic units are represented by "-999". |
| [ACT] [AVG]<br>[MIN] [MAX] | Float | Array of 4x 4 byte floating point data.<br>Number of records: 21...632891 (NRA)<br>Number of records: 21...27517 (IDA)<br>Alignment: ACT AVG MIN MAX ...<br>Very low results in logarithmic units are represented by "-999".         |

## SPECTRUM\_TRACE\_LIST?

### Description

Queries the current possible trace list in SPECTRUM mode.

### Note

The traces in this list can be used as selection for the SPECTRUM\_TRACE?; and SPECTRUM\_TRACE\_BINARY?; commands.

### Command

SPECTRUM\_TRACE\_LIST?;

### Response

<NoOfTraces>, [Trace,] <ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                                                                                                                                                  |
|--------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <NoOfTraces> | Word | Number of selectable traces                                                                                                                                                                                                  |
| [Trace]      | Enum | ACT            Actual value<br>AVG            Averaged value<br>MAX            Maximum value<br>MAX_AVG       Maximum of the averaged values<br>MIN            Minimum value<br>MIN_AVG       Minimum of the averaged values |
| <ReturnCode> | Word | Warning or error code                                                                                                                                                                                                        |

### Example

|                 |                                      |
|-----------------|--------------------------------------|
| <i>Command</i>  | SPECTRUM_TRACE_LIST?;                |
| <i>Response</i> | 6,ACT,AVG,MAX,MAX_AVG,MIN,MIN_AVG,0; |

## Multi-Channel Power (MCP) –Optional

### Note

To use the Multi-Channel Power commands:

- › IDA: The “Multi-Channel Power” 3100/95.08 option is required
- › NRA: The “Multi Channel Power” 3200/95.01 option is required.

## MCP?

### Description

Queries one or more measurement runs (traces) in Multi-Channel Power mode.

### Note

Multi-Channel Power must be selected as the current operating mode.

Traces can only be queried when the device is in “Detailed” table view mode. “Condensed” table view mode is not supported in remote operation.

All measurements in MCP mode are related to the currently selected Service Table (see SRV\_SEL?). The selection of a Service Table is mandatory because it contains the necessary parameters of the up to 500 different channels which can be defined in a single Service Table. Each channel is named by its Service Name <ServName>.

### Command

MCP? <Trace>;

### Response

<SweepCounter>,<SweepTime>,<AVGProgress>,<NoOfSpatialAVG>,  
<Others>,<RBWMode>,<NoOfTraces>,  
[ <ActTrace>,<Overdriven>,<TotalValue>,<TotalNoiseFlag>,<OthersValue>,<OthersNoiseFlag>,  
<NoOfValues>,[ <Value>,<NoiseFlag>,<ServName>,<RBW>,<Fmin>,<Fmax>,[ ] ] <ReturnCode>;

### Parameter List

| Parameter        | Type  | Description                                                                                                                                                                                                        |
|------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Trace>          | Enum  | Sets the desired traces:<br>ACT Actual value<br>AVG Averaged value<br>MAX Maximum value<br>MAX_AVG Maximum of the averaged values<br>MIN Minimum value<br>MIN_AVG Minimum of the averaged values<br>ALL All traces |
| <SweepCounter>   | DWord | Number of sweeps performed, 0 – 999 999<br>Device setting changes will reset the counter to „0“.                                                                                                                   |
| <SweepTime>      | DWord | Current sweep time [ms]                                                                                                                                                                                            |
| <AVGProgress>    | Word  | 0 – 100 [%]<br>Progress of averaging                                                                                                                                                                               |
| <NoOfSpatialAVG> | DWord | 0 – 999 999<br>Number of sweeps used for spatial averaging                                                                                                                                                         |

## Command Reference Guide

Multi-Channel Power (MCP) –Optional

|                   |        |                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Others>          | Enum   | ON The power level of gaps between the channels is measured<br>OFF The power level of gaps between the channels is ignored                                                                                                                                                                                                                                     |
| <RBWMode>         | Enum   | Channel (Service) dependent RBW settings:<br><br>MANUAL<br>All channels will be measured using the same RBW.<br><br>AUTO<br>Each channel will be measured using a dedicated and automatically determined RBW setting.<br><br>INDIVIDUAL<br>Each channel will be measured using a dedicated and manually defined RBW setting. Only available for <Others> = OFF |
| <NoOfTraces>      | Word   | Number of traces, 1 - 6                                                                                                                                                                                                                                                                                                                                        |
| <ActTrace>        | Enum   | Actual trace<br>ACT, AVG, MAX, MAX_AVG, MIN, MIN_AVG                                                                                                                                                                                                                                                                                                           |
| <Overdriven>      | Enum   | YES, NO;<br>Yes, if at least one trace exceeded the range limit.<br>Overdriven results may have a very high uncertainty.                                                                                                                                                                                                                                       |
| <TotalValue>      | Float  | Total power level [Unit] for the frequency bands of all channels (services)                                                                                                                                                                                                                                                                                    |
| <TotalNoiseFlag>  | Enum   | Noise flag related to the total power of all channels:<br>UNCHECKED When Noise Suppression is OFF<br>LOW Result is below the reference noise level<br>OK Result is equal or above the reference noise level                                                                                                                                                    |
| <OthersValue>     | Float  | Power level [Unit] of the frequency gaps between the channels                                                                                                                                                                                                                                                                                                  |
| <OthersNoiseFlag> | Enum   | Nose flag related to the power level of the gaps (Others):<br>UNCHECKED, LOW, OK see above <TotalNoiseFlag>                                                                                                                                                                                                                                                    |
| <NoOfValues>      | DWord  | Number of measurement values per trace                                                                                                                                                                                                                                                                                                                         |
| <Value>           | Float  | Power level [Unit] of the channel (service).<br>Very low results in logarithmic units are represented by “-999” (negative infinity).                                                                                                                                                                                                                           |
| <NoiseFlag>       | Enum   | Noise flag related to a specific channel (service):<br>UNCHECKED When Noise Suppression is OFF<br>LOW Result is below the reference noise level<br>OK Result is equal or above the reference noise level                                                                                                                                                       |
| <ServName>        | String | Name of the channel (service)                                                                                                                                                                                                                                                                                                                                  |
| <RBW>             | Double | Resolution bandwidth [Hz] being used for this channel (service)                                                                                                                                                                                                                                                                                                |
| <Fmin>            | Double | Lower frequency of the channel (service) [Hz]                                                                                                                                                                                                                                                                                                                  |
| <Fmax>            | Double | Upper frequency of the channel (service) [Hz]                                                                                                                                                                                                                                                                                                                  |
| <ReturnCode>      | Word   | Warning or error code                                                                                                                                                                                                                                                                                                                                          |



**Example**

---

|                 |                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | MCP? ACT;                                                                                                                                                                                 |
| <i>Response</i> | 62,115,100,0,ON,AUTO,1,<br>ACT,NO,-47.54,UNCHECKED,-50.59,UNCHECKED,2,<br>-63.66,UNCHECKED,"SrvA",2000000,10000000,20000000,<br>-50.72,UNCHECKED,"SrvB",2000000,10000000,200000000,<br>0; |

---

## MCP\_AVG\_CONFIG

### Description

Sets the current averaging method.

### Note

Multi-Channel Power mode has two averaging methods:

- › Average over a number of individual measurements (Number)
- › Average over a time period (Time)

There is one setting parameter for each method, which is selected from a basic set of values.

### Command

MCP\_AVG\_CONFIG <AvgMode>,<AvgNumber>,<AvgTime>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                                                                                          |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AvgMode>    | Enum  | NUMBER<br>TIME                                                                                                                                                                       |
| <AvgNumber>  | DWord | Number of averaging samples: 4, 8, 16, 32, 64, 128, 256                                                                                                                              |
| <AvgTime>    | DWord | Time [s]:<br>60, 120, 180, 240, 300, 360, 420, 480, 540, 600, 660, 720, 780,<br>840, 900, 960, 1020, 1080, 1140, 1200, 1260, 1320, 1380,<br>1440, 1500, 1560, 1620, 1680, 1740, 1800 |
| <ReturnCode> | Word  | Warning or error code                                                                                                                                                                |

### Examples

|                 |                               |
|-----------------|-------------------------------|
| <i>Command</i>  | MCP_AVG_CONFIG NUMBER,64,240; |
| <i>Response</i> | 0;                            |
| <hr/>           |                               |
| <i>Command</i>  | MCP_AVG_CONFIG TIME,4,180;    |
| <i>Response</i> | 0;                            |

## MCP\_AVG\_CONFIG?

### Description

Queries the current averaging method.

### Note

Multi-Channel Power mode has two averaging methods:

- › Average over a number of individual measurements (Number)
- › Average over a time period (Time)

There is one setting parameter for each method, which is selected from a basic set of values.

### Command

MCP\_AVG\_CONFIG?;

### Response

<AvgMode>,<AvgNumber>,<AvgTime>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                                                                                          |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AvgMode>    | Enum  | NUMBER<br>TIME                                                                                                                                                                       |
| <AvgNumber>  | DWord | Number of averaging samples: 4, 8, 16, 32, 64, 128, 256                                                                                                                              |
| <AvgTime>    | DWord | Time [s]:<br>60, 120, 180, 240, 300, 360, 420, 480, 540, 600, 660, 720,<br>780, 840, 900, 960, 1020, 1080, 1140, 1200, 1260, 1320,<br>1380, 1440, 1500, 1560, 1620, 1680, 1740, 1800 |
| <ReturnCode> | Word  | Warning or error code                                                                                                                                                                |

### Examples

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | MCP_AVG_CONFIG?; |
| <i>Response</i> | TIME,4,180,0;    |
| <i>Command</i>  | MCP_AVG_CONFIG?; |
| <i>Response</i> | NUMBER,64,240,0; |

## MCP\_AVG\_LIST?

### Description

Queries the current possible averaging settings for Multi-Channel Power mode.

### Note

Multi-Channel Power mode has two averaging methods:

- › Average over a number of individual measurements (Number)
- › Average over a time period (Time)

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

MCP\_AVG\_LIST? <AvgMode>;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                                                               |
|--------------------|--------|-----------------------------------------------------------------------------------------------------------|
| <AvgMode>          | Enum   | NUMBER: Average over a number of individual measurements<br>TIME: Average over a time period (in seconds) |
| <NumberOfElements> | Word   | Number of subsequent items                                                                                |
| <DisplayString>    | String | Averaging parameter as string including the unit                                                          |
| <Value>            | Float  | Averaging parameter as a numerical value                                                                  |
| <ReturnCode>       | Word   | Warning or error code                                                                                     |

### Example

|                 |                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------|
| <i>Command</i>  | MCP_AVG_LIST? NUMBER;                                                                        |
| <i>Response</i> | 7,<br>"4",4,<br>"8",8,<br>"16",16,<br>"32",32,<br>"64",64,<br>"128",128,<br>"256",256,<br>0; |

---

## MCP\_CONFIG

### Description

Sets the current measurement parameters for Multi-Channel Power mode.

### Note

Multi-Channel Power must be selected as the current operating mode.

### Command

MCP\_CONFIG <Others>,<RBWMode>,<RBW>,<RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                                                                                                                                                                                                                                                                                                    |
|--------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Others>     | Enum   | ON The power level of gaps between the channels is measured<br>OFF The power level of gaps between the channels is ignored                                                                                                                                                                                                                                     |
| <RBWMode>    | Enum   | Channel (Service) dependent RBW settings:<br><br>MANUAL<br>All channels will be measured using the same RBW.<br><br>AUTO<br>Each channel will be measured using a dedicated and automatically determined RBW setting.<br><br>INDIVIDUAL<br>Each channel will be measured using a dedicated and manually defined RBW setting. Only available for <Others> = OFF |
| <RBW>        | Double | Resolution bandwidth [Hz]                                                                                                                                                                                                                                                                                                                                      |
| <RL>         | Float  | Reference level (Measurement Range) [Unit]                                                                                                                                                                                                                                                                                                                     |
| <ReturnCode> | Word   | Warning or error code                                                                                                                                                                                                                                                                                                                                          |

### Example (Unit=dBm)

|                 |                                        |
|-----------------|----------------------------------------|
| <i>Command</i>  | MCP_CONFIG OFF,INDIVIDUAL,1000000,-30; |
| <i>Response</i> | 0;                                     |

## MCP\_CONFIG?

### Description

Queries the current measurement parameters for Multi-Channel Power mode.

### Note

Multi-Channel Power must be selected as the current operating mode.

### Command

MCP\_CONFIG?;

### Response

<Others>,<RBWMode>,<RBW>,<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                                                                                                                                                                                                                                                                                                    |
|--------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <Others>     | Enum   | ON The power level of gaps between the channels is measured<br>OFF The power level of gaps between the channels is ignored                                                                                                                                                                                                                                     |
| <RBWMode>    | Enum   | Channel (Service) dependent RBW settings:<br><br>MANUAL<br>All channels will be measured using the same RBW.<br><br>AUTO<br>Each channel will be measured using a dedicated and automatically determined RBW setting.<br><br>INDIVIDUAL<br>Each channel will be measured using a dedicated and manually defined RBW setting. Only available for <Others> = OFF |
| <RBW>        | Double | Resolution bandwidth [Hz]                                                                                                                                                                                                                                                                                                                                      |
| <RL>         | Float  | Reference level (Measurement Range) [Unit]                                                                                                                                                                                                                                                                                                                     |
| <ReturnCode> | Word   | Warning or error code                                                                                                                                                                                                                                                                                                                                          |

### Example

|                 |                               |
|-----------------|-------------------------------|
| <i>Command</i>  | MCP_CONFIG?;                  |
| <i>Response</i> | OFF,INDIVIDUAL,1000000,-30,0; |

## MCP\_MODE

### Description

Sets the sub mode in Multi-Channel Power mode

### Note

Querying of measurement data is not possible in sub mode CONDENSED

### Command

MCP\_MODE <MeasMode>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <MeasMode>   | Enum | DETAILED              |
| <ReturnCode> | Word | Warning or error code |

### Examples

---

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | MCP_MODE DETAILED; |
| <i>Response</i> | 0;                 |

---

## MCP\_MODE?

### Description

Queries the sub mode in Multi-Channel Power mode

### Note

Querying of measurement data is not possible in sub mode CONDENSED

### Command

MCP\_MODE?;

### Response

<MeasMode>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                       |
|--------------|------|-----------------------------------|
| <MeasMode>   | Enum | DETAILED<br>CONDENSED (read only) |
| <ReturnCode> | Word | Warning or error code             |

### Examples

---

|                 |             |
|-----------------|-------------|
| <i>Command</i>  | MCP_MODE?;  |
| <i>Response</i> | DETAILED,0; |

---



## Time Domain (Scope) and I/Q –Optional

### Note

To use the Scope commands:

- › IDA: The “Time Domain (Scope)” 3100/95.04 and “I/Q Analyzer” 3100/95.05 options are required
- › NRA: The “Scope and I/Q Data” 3200/95.03 option is required.

## SCOPE?

### Description

Queries time domain measurement results in Scope mode for the previously defined Result Type and measurement parameters (see “SCOPE\_RESULTTYPE” and “SCOPE\_CONFIG”).

### Note for IDA

When Result Type CONDENSED is selected, measurements are expressed as intervals with Max, Avg, Min values. This corresponds to the +Peak, RMS, -Peak detectors in Long-Time Scope when IDA is operated manually.

In Remote operation there's no differentiation between RBW and CBW. All commands are using the term “RBW”. For manual operation you'll find the term “CBW” for the steep channel filters used in Level Meter and Scope Mode. Both terms have the same meaning in remote operation.

| Result Type     | ACTUAL<br>(High Resolution) | CONDENSED<br>(Long Time) | IQ, I, Q            |
|-----------------|-----------------------------|--------------------------|---------------------|
| Time Resolution | = 1/RBW                     | >= 8/RBW                 | =1/RBW              |
| Sweep Time      | 16/RBW...16000/RBW          | 16...4000*TimeRes        | 16/RBW...250000/RBW |
| Traces          | 16/RBW...250000/RBW         | 16 ...62500*TimeRes      | 16/RBW...250000/RBW |
|                 | ACT                         | MAX, AVG, MIN            | I, Q                |

### Command

SCOPE?;

### Response

```
<CurrentValues>,<MaxValues>,<CompletedRuns>,<TriggerCounter>,  
<TriggerMode>,<TriggerState>,<GaplessMode>,<TimeRes>,<NoOfTraces>,  
[ <Trace>,<Overdriven>,<NoOfValues>,[ <Value> , ] ] <ReturnCode>;
```

## Command Reference Guide

Time Domain (Scope) and I/Q –Optional

### Parameter List

| Parameter        | Type   | Description                                                                                                                                                                                                       |
|------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <CurrentValues>  | DWord  | Counter of values in current sweep                                                                                                                                                                                |
| <MaxValues>      | DWord  | Counter of values available if sweep is completed.                                                                                                                                                                |
| <CompletedRuns>  | DWord  | Counter of completed sweeps                                                                                                                                                                                       |
| <TriggerCounter> | DWord  | Counter of trigger events                                                                                                                                                                                         |
| <TriggerMode>    | Enum   | FREE_RUN No trigger function<br>USER Trigger to be started by user<br>TIME Trigger is timer controlled<br>SINGLE Frozen display after the first valid event<br>MULTI The display is frozen after each valid event |
| <TriggerState>   | Enum   | NO, WAIT_ARMING, ARMED, TRIGGERED,<br>WAIT_NEXT_TRIGGER, STOPPED                                                                                                                                                  |
| <GaplessMode>    | Enum   | ON = Gapless data acquisition<br>OFF = Interrupted data acquisition                                                                                                                                               |
| <TimeRes>        | Double | Time resolution [s]                                                                                                                                                                                               |
| <NoOfTraces>     | Word   | Number of traces, 1 - 3                                                                                                                                                                                           |
| <Trace>          | Enum   | Trace identification: ACT, MAX, AVG, MIN, I, Q                                                                                                                                                                    |
| <Overdriven>     | Enum   | YES, NO<br>Yes, if at least one trace exceeded the range limit.<br>Overdriven results may have a very high uncertainty.                                                                                           |
| <NoOfValues>     | DWord  | Number of measurement values per trace                                                                                                                                                                            |
| <Value>          | Float  | Measurement value [Unit]. Very low results in logarithmic units<br>are represented by "-999" (negative infinity).                                                                                                 |
| <ReturnCode>     | Word   | Warning or error code                                                                                                                                                                                             |

### Examples

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SCOPE?;                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>Response</i> | 10,17,3734,0,FREE_RUN,NO,ON,1E-005,1,<br>ACT,NO,17,<br>-61.51,-61.45,-61.36,-61.48,-61.68,-61.29,-61.32,-61.48,-61.25,-61.63,-61.41,-61.28,-<br>61.41,-61.33,-61.53,-61.40,-61.38,<br>0;                                                                                                                                                                                                                                                                                           |
| <i>Command</i>  | SCOPE?;                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>Response</i> | 14,17,1746,0,FREE_RUN,NO,ON,8E-005,3,<br>MAX,NO,17,<br>-68.77,-62.65,-60.73,-60.71,-60.97,-60.98,-61.11,-61.11,-61.10,-61.06,-61.22,-61.07,-<br>61.19,-61.21,-61.19,-60.85,-60.86,<br>AVG,NO,17,<br>-74.46,-64.08,-61.25,-60.90,-61.11,-61.18,-61.23,-61.28,-61.28,-61.18,-61.36,-61.28,-<br>61.40,-61.35,-61.27,-61.10,-60.90,<br>MIN,NO,17,<br>-88.67,-66.80,-62.04,-61.04,-61.25,-61.31,-61.40,-61.44,-61.62,-61.27,-61.56,-61.45,-<br>61.60,-61.54,-61.38,-61.27,-60.98,<br>0; |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SCOPE?;                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Response</i> | 70,129,4794,0,FREE_RUN,NO,ON,2.5E-005,2,<br>I,NO,17,<br>1.978E-003,1.958E-003,1.931E-003,1.903E-003,1.872E-003,1.840E-003,1.812E-<br>003,1.772E-003,1.734E-003,1.698E-003,1.660E-003,1.619E-003,1.581E-003,1.536E-<br>003,1.492E-003,1.445E-003,1.400E-003,<br>Q,NO,17,<br>8.420E-004,8.967E-004,9.528E-004,1.003E-003,1.061E-003,1.112E-003,1.165E-<br>003,1.221E-003,1.270E-003,1.321E-003,1.369E-003,1.416E-003,1.460E-003,1.506E-<br>003,1.548E-003,1.594E-003,1.633E-003,<br>0; |

## SCOPE\_BINARY?

### Description

Queries one or more measurement runs (traces) in Scope mode using the BINARY format.

### Note

Number of trace calculation:  $\text{SizeOfBlock} / \text{sizeof(float)}$  with  $\text{sizeof(float)} = 4$

### Command

SCOPE\_BINARY?;

### Response

<AsciiHeader>

<Endian> <DataID> <DataVersion> <Reserved> <NumberOfBlock> <SizeOfBlock> <Reserved>

<TimeRes> <Unit> <Flags> <CurrentValues> <MaxValues> <CompletedRuns> <TriggerCounter>

<TriggerMode>,<TriggerState> <FillBytes> [ACTUAL] [CONDENSED] [IQ] [I] [Q]

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <i>Command</i>  | 53 43 4f 50 45 5f 42 49 4e 41 52 59 3f 3b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SCOPE_BINARY?; |
| <i>Response</i> | 23 33 31 39 36 4d 53 42 46 02 01 00 01 00 00 00<br>00 00 00 00 11 00 00 00 04 00 00 00 00 3e fa 36<br>e2 eb 1c 43 2d 00 02 00 02 00 00 00 09 00 00 00<br>11 00 01 d7 87 00 00 00 00 00 05 00 01 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00<br>00 00 00 00 00 c4 79 c0 00 c2 bc 89 1d c2 d0 89<br>1c c2 ce 98 f0 c2 c8 93 aa c2 c0 9e 34 c2 dc 93<br>aa c2 ca 83 d6 c2 ce 98 f0 c2 ce 98 f0 c2 d0 89<br>1c c2 ce 98 f0 c2 d0 89 1c c2 ce 98 f0 c2 c8 93<br>aa c2 d6 8e 64 c2 bc 89 1d | #3196 ...      |

### Parameter List (Response)

| Parameter        | Type   | Bytes | Description                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------|--------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader>    | ---    | ---   | ASCII header for block data transfer                                                                                                                                                                                                                                                                                                                                                                                               |
| <Endian>         | DWord  | 4     | Identification if the byte order is swapped or not<br>0x4D534246 = Most Significant Byte First<br>0x4C534246 = Last Significant Byte First                                                                                                                                                                                                                                                                                         |
| <DataID>         | Word   | 2     | Identification of the telegram data type<br>0x0201 = Scope Actual, 0x0202 = Scope Condensed<br>0x0203 = Scope IQ, 0x0204 = Scope I, 0x0205 = Scope Q                                                                                                                                                                                                                                                                               |
| <DataVersion>    | Word   | 2     | BINARY protocol version<br>Actual version of Scope protocol = 0x0001                                                                                                                                                                                                                                                                                                                                                               |
| <Reserved>       | ---    | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                             |
| <NumberOfBlock>  | DWord  | 4     | Number of records (values)                                                                                                                                                                                                                                                                                                                                                                                                         |
| <SizeOfBlock>    | DWord  | 4     | Size of a single record                                                                                                                                                                                                                                                                                                                                                                                                            |
| <Reserved>       | ---    | 4     | Reserved for later use                                                                                                                                                                                                                                                                                                                                                                                                             |
| <TimeRes>        | Double | 8     | Time resolution [s]                                                                                                                                                                                                                                                                                                                                                                                                                |
| <Unit>           | Word   | 2     | Units of measurement data<br>0x0002 = dBm,<br>0x0003 = dBV,<br>0x0004 = dBmV,<br>0x0005 = dBμV<br>0x0011 = V<br>Units with antenna connected<br>0x0006 = dBV/m,           0x0007 = dBmV/m<br>0x0008 = dBμV/m,       0x0009 = dBA/m,<br>0x000A = V/m,           0x000B = A/m,<br>0x000C = W/m²,         0x000D = mW/cm²<br>Units reserved for future use<br>0x0001 = dB,            0x000E = %,<br>0x000F = dBA,         0x0010 = A |
| <Flags>          | Word   | 2     | Flags representing the device status<br>0x0001 = Overdriven Flag<br>0x0002 = Gapless Measurement Flag                                                                                                                                                                                                                                                                                                                              |
| <CurrentValues>  | DWord  | 4     | Counter of values in current sweep                                                                                                                                                                                                                                                                                                                                                                                                 |
| <MaxValues>      | DWord  | 4     | Counter of values available if sweep is completed.                                                                                                                                                                                                                                                                                                                                                                                 |
| <CompletedRuns>  | DWord  | 4     | Counter of completed sweeps                                                                                                                                                                                                                                                                                                                                                                                                        |
| <TriggerCounter> | DWord  | 4     | Counter of trigger events                                                                                                                                                                                                                                                                                                                                                                                                          |
| <TriggerMode>    | Word   | 2     | Number representing the trigger mode<br>0x0000 = No, 0x0001 = Free Run,<br>0x0002 = User Trigger, 0x0003 = Time Trigger,<br>0x0004 = Single Trigger, 0x0005 = Multi Run                                                                                                                                                                                                                                                            |
| <TriggerState>   | Word   | 2     | Number representing the trigger state<br>0x0000 = No, 0x0001 = Wait Arming,<br>0x0002 = Armed, 0x0003 = Triggered,<br>0x0004 = Stopped, 0x0005 = Wait next Trigger                                                                                                                                                                                                                                                                 |
| <FillBytes>      | ---    | 72    | Fill bytes to get a fixed BINARY header size.<br>The total header size is 128 bytes without the leading ASCII Header. Reserved for later use.                                                                                                                                                                                                                                                                                      |

## Command Reference Guide

Time Domain (Scope) and I/Q –Optional

---

| Parameter   | Type  | Description                                                                                                                                                                              |
|-------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [ACTUAL]    | Float | Array of 1x 4 byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: ACT ACT ACT ...<br>Very low results in logarithmic units are represented by “-999”.            |
| [CONDENSED] | Float | Array of 3x 4 byte floating point data.<br>Number of records: 17 ... 62502<br>Alignment: MAX AVG MIN MAX AVG MIN ...<br>Very low results in logarithmic units are represented by “-999”. |
| [IQ]        | Float | Array of 2x 4byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: I Q I Q I Q ...<br>Very low results in logarithmic units are represented by “-999”.             |
| [I]         | Float | Array of 1x 4 byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: I I I ...<br>Very low results in logarithmic units are represented by “-999”.                  |
| [Q]         | Float | Array of 1x 4 byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: Q Q Q ...<br>Very low results in logarithmic units are represented by “-999”.                  |

## SCOPE\_CONFIG

### Description

Sets the current measurement parameters for Scope mode. Select Scope mode first.

### Note

Scope mode must be selected as the current operating mode.

### IDA

In Remote operation there's no differentiation between RBW and CBW. All commands are using the term "RBW". For manual operation you'll find the term "CBW" for the steep channel filters used in Level Meter and Scope Mode. Both terms have the same meaning in remote operation.

### Command

SCOPE\_CONFIG <Fcent>,<RBW>,<VBWMode>,<VBW>,<SweepTime>,<TimeRes>,<RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <RBW>        | Double | Resolution bandwidth [Hz]                  |
| <VBWMode>    | Enum   | Video filter: ON, OFF;                     |
| <VBW>        | Double | Video bandwidth [Hz]                       |
| <SweepTime>  | Double | Sweep time [s]                             |
| <TimeRes>    | Double | Time resolution [s]                        |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example: SCOPE\_RESULTTYPE ACTUAL (Unit=dBm)

|                 |                                                     |
|-----------------|-----------------------------------------------------|
| <i>Command</i>  | SCOPE_CONFIG 26995000,40000,OFF,400,0.1,2.5E-005,0; |
| <i>Response</i> | 0;                                                  |

## SCOPE\_CONFIG?

### Description

Queries the current measurement parameters in Scope mode

### Note for IDA

In Remote operation there's no differentiation between RBW and CBW. All commands are using the term "RBW". For manual operation you'll find the term "CBW" for the steep channel filters used in Level Meter and Scope Mode. Both terms have the same meaning in remote operation

### Command

SCOPE\_CONFIG?;

### Response

<Fcent>,<RBW>,<VBWMode>,<VBW>,<SweepTime>,<TimeRes>,<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <RBW>        | Double | Resolution bandwidth [Hz]                  |
| <VBWMode>    | Enum   | Video filter: ON, OFF;                     |
| <VBW>        | Double | Video bandwidth [Hz]                       |
| <SweepTime>  | Double | Sweep time [s]                             |
| <TimeRes>    | Double | Time resolution [s]                        |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example: SCOPE\_RESULTTYPE ACTUAL

---

|                 |                                          |
|-----------------|------------------------------------------|
| <i>Command</i>  | SCOPE_CONFIG?;                           |
| <i>Response</i> | 26995000,40000,OFF,400,0.1,2.5E-005,0,0; |

---



## SCOPE\_HEADER?

### Description

Queries the Header Data of measurement values in Scope mode.

### Note

This command provides additional information useful for result evaluation and presentation.

### Command

SCOPE\_HEADER?;

### Response

<CurrentValues>,<MaxValues>,<CompletedRuns>,<TriggerCounter>,  
<TriggerMode>,<TriggerState>,<GaplessMode>,<TimeRes>,<NoOfTraces>,  
<ReturnCode>;

### Parameter List

| Parameter        | Type   | Description                                                                                                                                                                                                                                            |
|------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <CurrentValues>  | DWord  | Counter of values in current sweep                                                                                                                                                                                                                     |
| <MaxValues>      | DWord  | Counter of values available if sweep is completed.                                                                                                                                                                                                     |
| <CompletedRuns>  | DWord  | Counter of completed sweeps                                                                                                                                                                                                                            |
| <TriggerCounter> | DWord  | Counter of trigger events                                                                                                                                                                                                                              |
| <TriggerMode>    | Enum   | FREE_RUN      No trigger function<br>USER          Trigger to be started by user<br>TIME          Trigger is timer controlled<br>SINGLE        Frozen display after the first valid event<br>MULTI        The display is frozen after each valid event |
| <TriggerState>   | Enum   | NO, WAIT_ARMING, ARMED, TRIGGERED,<br>WAIT_NEXT_TRIGGER, STOPPED                                                                                                                                                                                       |
| <GaplessMode>    | Enum   | ON = Gapless data acquisition<br>OFF = Interrupted data acquisition                                                                                                                                                                                    |
| <TimeRes>        | Double | Time resolution [s]                                                                                                                                                                                                                                    |
| <NoOfTraces>     | Word   | Number of traces, 1 - 3                                                                                                                                                                                                                                |
| <ReturnCode>     | Word   | Warning or error code                                                                                                                                                                                                                                  |

### Example

|                 |                                             |
|-----------------|---------------------------------------------|
| <i>Command</i>  | SCOPE_HEADER?;                              |
| <i>Response</i> | 11857,16001,47,0,FREE_RUN,NO,ON,1E-005,1,0; |

## SCOPE\_MAX\_VALUES?

### Description

Queries the maximum number of measurement points in Scope mode

### Command

SCOPE\_MAX\_VALUES? <Trace>;

### Response

<NoOfValues>, <ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                               |
|--------------|-------|-----------------------------------------------------------------------------------------------------------|
| <Trace>      | Enum  | ACTUAL, CONDENSED, IQ, I, Q                                                                               |
| <NoOfValues> | DWord | Maximal Number of measurement values per trace.<br>ACTUAL: 250002<br>CONDENSED: 62502<br>IQ, I, Q: 250002 |
| <ReturnCode> | Word  | Warning or error code                                                                                     |

### Examples

---

|                 |                       |
|-----------------|-----------------------|
| <i>Command</i>  | SCOPE_MAX_VALUES? IQ; |
| <i>Response</i> | 250002,0;             |

---

## SCOPE\_RAW?

### Description

Queries one or more measurement runs (traces) in Scope mode using the RAW format and BINARY data transfer.

### Note

Very low results in logarithmic units are represented by “-999” (negative infinity).

### Command

SCOPE\_RAW?;

### Response

<AsciiHeader> [ACTUAL] [CONDENSED] [IQ] [I] [Q]

### Parameter List

| Parameter     | Type  | Description                                                                                                          |
|---------------|-------|----------------------------------------------------------------------------------------------------------------------|
| <AsciiHeader> | -     | ASCII header for block data transfer.                                                                                |
| [ACTUAL]      | Float | Array of 1x 4 byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: ACT ACT ACT ...            |
| [CONDENSED]   | Float | Array of 3x 4 byte floating point data.<br>Number of records: 17 ... 62502<br>Alignment: MAX AVG MIN MAX AVG MIN ... |
| [IQ]          | Float | Array of 2x 4byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: I Q I Q I Q ...             |
| [I]           | Float | Array of 1x 4 byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: I I I ...                  |
| [Q]           | Float | Array of 1x 4 byte floating point data.<br>Number of records: 17 ... 250002<br>Alignment: Q Q Q ...                  |

### Hexdump: FORMAT\_BINARY NORMAL

|                 |                                                                                                                                                                                                                                     |             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Command</b>  | 73 63 6f 70 65 5f 72 61 77 3f 3b                                                                                                                                                                                                    | scope_raw?; |
| <b>Response</b> | 23 32 36 38 c2 d6 8e 64 c2 c8 93 aa c2 d0 89 1c<br>c2 dc 93 aa c2 d0 89 1c c2 c8 93 aa c2 dc 93 aa<br>c4 79 c0 00 c2 dc 93 aa c2 c2 8e 63 c2 dc 93 aa<br>c2 ce 98 f0 c2 c2 8e 63 c2 dc 93 aa c2 c6 4c 44<br>c2 d6 8e 64 c2 d0 89 1c | #268 ...    |

## SCOPE\_RESULTTYPE

### Description

Sets the desired Result Type in Scope mode. When Result Type CONDENSED is selected, measurements are expressed as intervals with Max, Avg, Min values.

### Note for IDA

This corresponds to the +Peak, RMS, -Peak detectors in Long-Time Scope when IDA is operated manually.

| Result Type     | ACTUAL<br>(High Resolution) | CONDENSED<br>(Long Time) | IQ, I, Q            |
|-----------------|-----------------------------|--------------------------|---------------------|
| Time Resolution | = 1/RBW                     | >= 8/RBW                 | =1/RBW              |
| Sweep Time      | 16/RBW...250000/RBW         | 16 ...62500*TimeRes      | 16/RBW...250000/RBW |
| Traces          | ACT                         | MAX, AVG, MIN            | I, Q                |

### Command

SCOPE\_RESULTTYPE <Trace>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                 |
|--------------|------|-----------------------------|
| <Trace>      | Enum | ACTUAL, CONDENSED, IQ, I, Q |
| <ReturnCode> | Word | Warning or error code       |

### Examples

|                 |                          |
|-----------------|--------------------------|
| <i>Command</i>  | SCOPE_RESULTTYPE IQ;     |
| <i>Response</i> | 0;                       |
| <hr/>           |                          |
| <i>Command</i>  | SCOPE_RESULTTYPE ACTUAL; |
| <i>Response</i> | 0;                       |

## SCOPE\_RESULTTYPE?

### Description

Queries the current Result Type in Scope mode.

### Command

SCOPE\_RESULTTYPE?;

### Response

<Trace>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                 |
|--------------|------|-----------------------------|
| <Trace>      | Enum | ACTUAL, CONDENSED, IQ, I, Q |
| <ReturnCode> | Word | Warning or error code       |

### Example

---

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | SCOPE_RESULTTYPE?; |
| <i>Response</i> | ACTUAL, 0;         |

---

## SCOPE\_STATE?

### Description

Queries the current State in Scope mode.

### Command

SCOPE\_STATE?;

### Response

<CurrentValues>,<MaxValues>,<CompletedRuns>,<TriggerCounter>,  
<TriggerMode>,<TriggerState>,<GaplessMode>,<ReturnCode>;

### Parameter List

| Parameter        | Type  | Description                                                                                                                                                                                                       |
|------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <CurrentValues>  | DWord | Counter of values in current sweep                                                                                                                                                                                |
| <MaxValues>      | DWord | Counter of values available if sweep is completed.                                                                                                                                                                |
| <CompletedRuns>  | DWord | Counter of completed sweeps                                                                                                                                                                                       |
| <TriggerCounter> | DWord | Counter of trigger events                                                                                                                                                                                         |
| <TriggerMode>    | Enum  | FREE_RUN No trigger function<br>USER Trigger to be started by user<br>TIME Trigger is timer controlled<br>SINGLE Frozen display after the first valid event<br>MULTI The display is frozen after each valid event |
| <TriggerState>   | Enum  | NO, WAIT_ARMING, ARMED, TRIGGERED,<br>WAIT_NEXT_TRIGGER, STOPPED                                                                                                                                                  |
| <GaplessMode>    | Enum  | ON = Gapless data acquisition<br>OFF = Interrupted data acquisition                                                                                                                                               |
| <ReturnCode>     | Word  | Warning or error code                                                                                                                                                                                             |

### Examples

|                 |                                             |
|-----------------|---------------------------------------------|
| <i>Command</i>  | SCOPE_STATE?;                               |
| <i>Response</i> | 70,129,4794,0,FREE_RUN,NO,ON,0;             |
| <i>Command</i>  | SCOPE_STATE?;                               |
| <i>Response</i> | 0,12502,12,1,SINGLE,STOPPED,OFF,0;          |
| <i>Command</i>  | SCOPE_STATE?;                               |
| <i>Response</i> | 0,12502,24,6,MULTI,WAIT_NEXT_TRIGGER,OFF,0; |
| <i>Command</i>  | SCOPE_STATE?;                               |
| <i>Response</i> | 0,12502,1,1,USER,STOPPED,OFF,0;             |
| <i>Command</i>  | SCOPE_STATE?;                               |
| <i>Response</i> | 0,12502,26,1,TIME,STOPPED,OFF,0;            |

## SCOPE\_TRIGGER\_ARM

### Description

Sets the Trigger State to ARMED for activating the selected Trigger Mode.

### Command

SCOPE\_TRIGGER\_ARM;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | SCOPE_TRIGGER_ARM; |
| <i>Response</i> | 0;                 |

## SCOPE\_TRIGGER\_BREAK

**Description**

Deactivates the selected Trigger Mode by changing the Trigger State from ARMED to WAIT\_ARMING.

**Command**

SCOPE\_TRIGGER\_BREAK;

**Response**

<ReturnCode>;

**Parameter List**

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

**Example**

---

|                 |                      |
|-----------------|----------------------|
| <i>Command</i>  | SCOPE_TRIGGER_BREAK; |
| <i>Response</i> | 0;                   |

---



## SCOPE\_TRIGGER\_CONFIG

### Description

Sets the Trigger parameters in Scope mode.

### Note

The Trigger Level is given relatively to the input Reference Level.in “dB”

Absolute Trigger Level [Unit] = RL [Unit] + TriggerLevel [dB]

The Trigger Delay is given relatively to the Sweep Time in “%”.

Absolute Delay [s] = Sweep Time [s] · Delay [%]

Use the commands SCOPE\_CONFIG? or SCOPE\_TRIGGER\_LEVEL\_LIST? to get the current RL value.

Changing the Reference Level will also change the absolute value of the Trigger Level.

Changing the Sweep Time will also change the absolute value of the Delay.

### Command

SCOPE\_TRIGGER\_CONFIG <TriggerMode>,<TriggerLevel>,<Slope>,<Delay>,<Date>,<Time>;

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type  | Description                                                                                                                                                                                                                                                                                       |
|----------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <TriggerMode>  | Enum  | <div>FREE_RUN      No trigger function</div> <div>USER          Trigger to be started by user</div> <div>TIME          Trigger is timer controlled</div> <div>SINGLE        Frozen display after the first valid event</div> <div>MULTI        The display is frozen after each valid event</div> |
| <TriggerLevel> | Float | Trigger level relative to RL, 0 to -120 [dB]                                                                                                                                                                                                                                                      |
| <Slope>        | Enum  | <div>Trigger slope:</div> <div>POSITIV      Rising edge</div> <div>NEGATIV      Falling edge</div>                                                                                                                                                                                                |
| <Delay>        | Float | Trigger delay, -90 to +200 [%] in steps of 10 [%]                                                                                                                                                                                                                                                 |
| <Date>         | Date  | dd.mm.yy                                                                                                                                                                                                                                                                                          |
| <Time>         | Time  | hh:mm:ss                                                                                                                                                                                                                                                                                          |
| <ReturnCode>   | Word  | Warning or error code                                                                                                                                                                                                                                                                             |

### Examples

|                 |                                                                |
|-----------------|----------------------------------------------------------------|
| <i>Command</i>  | SCOPE_TRIGGER_CONFIG FREE_RUN,0,POSITIV,-10,01.01.01,00:00:00; |
| <i>Response</i> | 0;                                                             |
| <i>Command</i>  | SCOPE_TRIGGER_CONFIG SINGLE,-49,POSITIV,-10,01.01.01,00:00:00; |
| <i>Response</i> | 0;                                                             |

## SCOPE\_TRIGGER\_CONFIG?

### Description

Queries the Trigger parameters in Scope mode.

### Note

The Trigger Level is given relatively to the input Reference Level.in “dB”

Absolute Trigger Level [Unit] = RL [Unit] + TriggerLevel [dB]

The Trigger Delay is given relatively to the Sweep Time in “%”.

Absolute Delay [s] = Sweep Time [s] · Delay [%]

Use the commands SCOPE\_CONFIG? or SCOPE\_TRIGGER\_LEVEL\_LIST? to get the current RL value.

Changing the Reference Level will also change the absolute value of the Trigger Level.

Changing the Sweep Time will also change the absolute value of the Delay.

### Command

SCOPE\_TRIGGER\_CONFIG?;

### Response

<TriggerMode>,<TriggerLevel>,<Slope>,<Delay>,<Date>,<Time>,<ReturnCode>;

### Parameter List

| Parameter      | Type  | Description                                                                                                                                                                                                                                    |
|----------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <TriggerMode>  | Enum  | FREE_RUN    No trigger function<br>USER        Trigger to be started by user<br>TIME        Trigger is timer controlled<br>SINGLE       Frozen display after the first valid event<br>MULTI       The display is frozen after each valid event |
| <TriggerLevel> | Float | Trigger level relative to RL, 0 to -120 [dB]                                                                                                                                                                                                   |
| <Slope>        | Enum  | Trigger slope:<br>POSITIV     Rising edge<br>NEGATIV     Falling edge                                                                                                                                                                          |
| <Delay>        | Float | Trigger delay, -90 to +200 [%] in steps of 10 [%]                                                                                                                                                                                              |
| <Date>         | Date  | dd.mm.yy                                                                                                                                                                                                                                       |
| <Time>         | Time  | hh:mm:ss                                                                                                                                                                                                                                       |
| <ReturnCode>   | Word  | Warning or error code                                                                                                                                                                                                                          |

### Example

|                 |                                             |
|-----------------|---------------------------------------------|
| <i>Command</i>  | SCOPE_TRIGGER_CONFIG?;                      |
| <i>Response</i> | SINGLE,-49,POSITIV,-10,01.01.01,00:00:00,0; |

## SCOPE\_TRIGGER\_DELAY\_LIST?

### Description

Queries the current possible Trigger Delay settings in Scope mode.

### Command

SCOPE\_TRIGGER\_DELAY\_LIST?;

### Response

<NumberOfElements>, [ <DisplayStringRel>, <DisplayStringAbs>, <ValueRel>, <ValueAbs>, ]  
<ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                             |
|--------------------|--------|---------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                              |
| <DisplayStringRel> | String | Relative value [%] of the delay time and unit as string |
| <DisplayStringAbs> | String | Absolute value of the delay time and unit as string     |
| <ValueRel>         | Double | Relative delay value [%]                                |
| <ValueAbs>         | Double | Absolute delay value in current time unit               |
| <ReturnCode>       | Word   | Warning or error code                                   |

### Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SCOPE_TRIGGER_DELAY_LIST?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>Response</i> | 30,<br>"-90 %", "90.000 ms", -90, 0.09,<br>"-80 %", "80.000 ms", -80, 0.08,<br>"-70 %", "70.000 ms", -70, 0.07,<br>"-60 %", "60.000 ms", -60, 0.06,<br>"-50 %", "50.000 ms", -50, 0.05,<br>"-40 %", "40.000 ms", -40, 0.04,<br>"-30 %", "30.000 ms", -30, 0.03,<br>"-20 %", "20.000 ms", -20, 0.02,<br>"-10 %", "10.000 ms", -10, 0.01,<br>"0 %", "0 s", 0, -0,<br>"10 %", "-10.000 ms", 10, -0.01,<br>"20 %", "-20.000 ms", 20, -0.02,<br>...<br>"190 %", "-190.000 ms", 190, -0.19,<br>"200 %", "-200.000 ms", 200, -0.2,<br>0; |

## SCOPE\_TRIGGER\_LEVEL\_LIST?

### Description

Queries the current possible Trigger Level settings in Scope mode.

### Command

SCOPE\_TRIGGER\_LEVEL\_LIST?;

### Response

<NumberOfElements>, [ <DisplayStringRel>, <DisplayStringAbs>, <ValueRel>, <ValueAbs>, ]  
<ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                                 |
|--------------------|--------|-------------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                                  |
| <DisplayStringRel> | String | Relative value [dB] of the trigger level and unit as string |
| <DisplayStringAbs> | String | Absolute value of the trigger level and unit as string      |
| <ValueRel>         | Double | Relative trigger level value [dB]                           |
| <ValueAbs> ,       | Double | Absolute trigger level value in current unit                |
| <ReturnCode>       | Word   | Warning or error code                                       |

### Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SCOPE_TRIGGER_LEVEL_LIST?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Response</i> | 121,<br>"RL+0 dB","-30 dBm",0,-30,<br>"RL-1 dB","-31 dBm",-1,-31,<br>"RL-2 dB","-32 dBm",-2,-32,<br>"RL-3 dB","-33 dBm",-3,-33,<br>"RL-4 dB","-34 dBm",-4,-34,<br>"RL-5 dB","-35 dBm",-5,-35,<br>"RL-6 dB","-36 dBm",-6,-36,<br>"RL-7 dB","-37 dBm",-7,-37,<br>"RL-8 dB","-38 dBm",-8,-38,<br>"RL-9 dB","-39 dBm",-9,-39,<br>"RL-10 dB","-40 dBm",-10,-40,<br>"RL-11 dB","-41 dBm",-11,-41,<br>"RL-12 dB","-42 dBm",-12,-42,<br>...<br>"RL-117 dB","-147 dBm",-117,-147,<br>"RL-118 dB","-148 dBm",-118,-148,<br>"RL-119 dB","-149 dBm",-119,-149,<br>"RL-120 dB","-150 dBm",-120,-150,<br>0; |

---

## Level Meter –Optional

### Note

To use the Level Meter commands:

- › IDA: The “Level Meter” 3100/95.06 option is required
- › NRA: The “Level Meter” 3200/95.02 option is required.

## LEVEL?

### Description

Queries the different measurement runs (traces) that are available in Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Command

LEVEL? <Trace>;

### Response

<SweepCounter>,<AVGProgress>,<NoOfSpatialAVG>,<NoOfTraces>,  
[ <Trace>,<Overdriven>,<NoiseFlag>,<Value>, ] <ReturnCode>;

### Parameter List

| Parameter        | Type  | Description                                                                                                                                   |
|------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <Trace>          | Enum  | RMS, MAX_RMS, PEAK, MAX_PEAK, ALL                                                                                                             |
| <SweepCounter>   | DWord | Number of sweeps performed                                                                                                                    |
| <AVGProgress>    | Word  | 0 – 100 [%]<br>Progress of averaging                                                                                                          |
| <NoOfSpatialAVG> | DWord | 0 – 999 999<br>Number of sweeps used for spatial averaging                                                                                    |
| <NoOfTraces>     | Word  | Number of traces                                                                                                                              |
| <Overdriven>     | Enum  | YES, NO;<br>Yes, if at least one trace exceeded the range limit.<br>Overdriven results may have a very high uncertainty.                      |
| <NoiseFlag>      | Enum  | UNCHECKED Result has not been compared with noise level<br>LOW Result is below the noise level<br>OK Result is equal or above the noise level |
| <Value>          | Float | Measurement result [Unit]. Very low results in logarithmic units are represented by “-999” (negative infinity).                               |
| <ReturnCode>     | Word  | Warning or error code                                                                                                                         |

### Examples

|                 |                                                  |
|-----------------|--------------------------------------------------|
| <i>Command</i>  | LEVEL? RMS;                                      |
| <i>Response</i> | 60,100,0,1,<br>RMS,NO,UNCHECKED,-62.99961,<br>0; |

## Command Reference Guide

Level Meter –Optional

---

|                 |                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | LEVEL? ALL;                                                                                                                                  |
| <i>Response</i> | 473,100,0,4,<br>RMS,NO,UNCHECKED,-62.99,<br>MAX_RMS,NO,UNCHECKED,-62.96,<br>PEAK,NO,UNCHECKED,-51.69,<br>MAX_PEAK,NO,UNCHECKED,-50.46,<br>0; |

---

## LEVEL\_AVG\_CONFIG

### Description

Sets the current averaging method.

### Note

Level Meter mode has 1 averaging method:

- › Average over a time period (Time)

### Command

LEVEL\_AVG\_CONFIG <AvgTime>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                        |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------|
| <AvgTime>    | Float | Time [s]:<br>0.12, 0.24, 0.48, 0.96, 1.2, 2.4, 3.6, 6, 12, 18, 30, 60, 120, 180,<br>300, 360, 600, 900, 1200, 1800 |
| <ReturnCode> | Word  | Warning or error code                                                                                              |

### Example

---

*Command*    LEVEL\_AVG\_CONFIG 2.4;

---

*Response*    0;

---

## LEVEL\_AVG\_CONFIG?

### Description

Queries the current averaging method.

### Note

Level Meter mode has 1 averaging method:

- › Average over a time period (Time)

### Command

LEVEL\_AVG\_CONFIG?;

### Response

<AvgTime>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                                                                                        |
|--------------|-------|--------------------------------------------------------------------------------------------------------------------|
| <AvgTime>    | Float | Time [s]:<br>0.12, 0.24, 0.48, 0.96, 1.2, 2.4, 3.6, 6, 12, 18, 30 ,60, 120,<br>180, 300, 360, 600, 900, 1200, 1800 |
| <ReturnCode> | Word  | Warning or error code                                                                                              |

### Example

---

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | LEVEL_AVG_CONFIG?; |
| <i>Response</i> | 2.4,0;             |

---



## LEVEL\_AVG\_LIST?

### Description

Queries the current possible averaging time settings for Level Meter mode.

### Note

Level Meter mode has 1 averaging method:

- › Average over a time period (Time)

The requested list reflects all the possible settings and guarantees consistency with the other device settings. The <DisplayString> parameter can be used in the application to ensure the same appearance as in the device (e.g. in List boxes). The <Value> parameter is a numerical value, which can be transmitted to the device in order to apply the corresponding setting.

### Command

LEVEL\_AVG\_LIST?;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                                             |
|--------------------|--------|---------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                              |
| <DisplayString>    | String | Averaging time and its unit as string (in „s“ or „min“) |
| <Value>            | Float  | Averaging time as value [s]                             |
| <ReturnCode>       | Word   | Warning or error code                                   |

### Example

|                 |                                                                                                                                                                                                                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | LEVEL_AVG_LIST?;                                                                                                                                                                                                                                                                                         |
| <i>Response</i> | 18,<br>"0.48 s",0.48,<br>"0.96 s",0.96,<br>"1.2 s",1.2,<br>"2.4 s",2.4,<br>"3.6 s",3.6,<br>"6 s",6,<br>"12 s",12,<br>"18 s",18,<br>"30 s",30,<br>"1 min",60,<br>"2 min",120,<br>"3 min",180,<br>"5 min",300,<br>"6 min",360,<br>"10 min",600,<br>"15 min",900,<br>"20 min",1200,<br>"30 min",1800,<br>0; |

## LEVEL\_CONFIG

### Description

Sets the current measurement parameters for Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Note for IDA

In Remote operation there's no differentiation between RBW and CBW. All commands are using the term "RBW". For manual operation you'll find the term "CBW" for the steep channel filters used in Level Meter and Scope Mode. Both terms have the same meaning in remote operation.

### Command

LEVEL\_CONFIG <Fcent>,<RBW>,<VBWMode>,<VBW>,<RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <RBW>        | Double | Resolution bandwidth [Hz]                  |
| <VBWMode>    | Enum   | Video filter: ON, OFF;)                    |
| <VBW>        | Double | Video filter bandwidth [Hz]                |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example (Unit=dBm)

---

|                 |                                           |
|-----------------|-------------------------------------------|
| <i>Command</i>  | LEVEL_CONFIG 10000000,250000,OFF,50000,0; |
| <i>Response</i> | 0;                                        |

---

## LEVEL\_CONFIG?

### Description

Queries the current measurement parameters for Level Meter mode.

### Note

Level Meter mode must be selected as the current operating mode.

### Note for IDA

In Remote operation there's no differentiation between RBW and CBW. All commands are using the term "RBW". For manual operation you'll find the term "CBW" for the steep channel filters used in Level Meter and Scope Mode. Both terms have the same meaning in remote operation.

### Command

LEVEL\_CONFIG?;

### Response

<Fcent>,<RBW>,<VBWMode>,<VBW>,<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <RBW>        | Double | Resolution bandwidth [Hz]                  |
| <VBWMode>    | Enum   | Video filter: ON, OFF;                     |
| <VBW>        | Double | Video filter bandwidth [Hz]                |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example

|                 |                               |
|-----------------|-------------------------------|
| <i>Command</i>  | LEVEL_CONFIG?;                |
| <i>Response</i> | 1000000,250000,OFF,50000,0,0; |

# Network configuration

## IP\_CONFIG



*Command only available for devices with an Ethernet connector*

### Description

Sets the IP configuration of the device. Use IP\_Config\_Renew to apply the new settings.

### Command

IP\_CONFIG <DHCP>,<IPAddress>,<SubnetMask>,<Gateway>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                                               |
|--------------|--------|-----------------------------------------------------------------------------------------------------------|
| <DHCP>       | Enum   | ON = DHCP is active (Dynamic Host Configuration Protocol)<br>OFF = DHCP is not active (static IP address) |
| <IPAddress>  | String | IP-Address of the device; Format: ###.###.###.###                                                         |
| <SubnetMask> | String | Subnet mask of the device; Format: ###.###.###.###                                                        |
| <Gateway>    | String | Gateway; Format: ###.###.###.###<br>Empty String: "" = No default gateway                                 |
| <ReturnCode> | Word   | Warning or error code                                                                                     |

### Examples

#### Dynamic IP Address (DHCP)

|                 |                           |
|-----------------|---------------------------|
| <i>Command</i>  | IP_CONFIG ON, "", "", ""; |
| <i>Response</i> | 0;                        |

#### Static IP Address

|                 |                                                     |
|-----------------|-----------------------------------------------------|
| <i>Command</i>  | IP_CONFIG OFF,"192.168.128.128","255.255.255.0",""; |
| <i>Response</i> | 0;                                                  |

## IP\_CONFIG?



*Command only available for devices with an Ethernet connector*

### Description

Queries the simple IP configuration of the device.

### Command

IP\_CONFIG?;

### Response

<DHCP>,<IPAddress>,<SubnetMask>,<Gateway>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                           |
|--------------|--------|---------------------------------------------------------------------------------------|
| <DHCP>       | Enum   | ON = DHCP is active (Dynamic Host Configuration Protocol)<br>OFF = DHCP is not active |
| <IPAddress>  | String | IP-Address of the device; Format: ###.###.###.###                                     |
| <SubnetMask> | String | Subnet mask of the device; Format: ###.###.###.###                                    |
| <Gateway>    | String | Gateway; Format: ###.###.###.###<br>Empty String: "" = No default gateway             |
| <ReturnCode> | Word   | Warning or error code                                                                 |

### Example

*Command* IP\_CONFIG?;

*Response* OFF,"192.168.128.128","255.255.255.0","",0;

## IP\_CONFIG\_ALL?



*Command only available for devices with an Ethernet connector*

### Description

Queries the expanded IP configuration of the device.

### Command

IP\_CONFIG\_ALL?;

### Response

<Hostname>,<Adapter>,<MacAddress>,<DHCP>,<IPAddress>,<SubnetMask>,<Gateway>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                                                           |
|--------------|--------|---------------------------------------------------------------------------------------|
| <Hostname>   | String | Network alias name of the device                                                      |
| <Adapter>    | String | Name of the network adapter                                                           |
| <MacAddress> | String | MAC address of the device                                                             |
| <DHCP>       | Enum   | ON = DHCP is active (Dynamic Host Configuration Protocol)<br>OFF = DHCP is not active |
| <IPAddress>  | String | IP-Address of the device; Format: ###.###.###.###                                     |
| <SubnetMask> | String | Subnet mask of the device; Format: ###.###.###.###                                    |
| <Gateway>    | String | Gateway; Format: ###.###.###.###<br>Empty String: "" = No default gateway             |
| <ReturnCode> | Word   | Warning or error code                                                                 |

### Example

|          |                                                                                                   |
|----------|---------------------------------------------------------------------------------------------------|
| Command  | IP_CONFIG_ALL?;                                                                                   |
| Response | "NRA320301PT0001","SMSC91181","00-50-C2-AD-1D-E7",<br>OFF,"192.168.128.128","255.255.255.0","",0; |

## IP\_CONFIG\_RENEW



*Command only available for devices with an Ethernet connector*

### Description

Renews the IP address of the device and restarts the server with the actual settings. This closes all open connections.

### Command

IP\_CONFIG\_RENEW;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                  |
|-----------------|------------------|
| <i>Command</i>  | IP_CONFIG_RENEW; |
| <i>Response</i> | 0;               |

# IP\_SERVER



*Command only available for devices with an Ethernet connector*

### Description

Sets the new server configuration of the device. Use IP\_Config\_Renew to apply the new settings.

### Note

To avoid synchronization problems with client applications, only one client (the master) is allowed to change device settings. The use of a Socket timeout is recommended.

### Command

IP\_SERVER <Type>,<Port>,<Clients>,<SocketMode>,<SocketTimeout>;

### Response

<ReturnCode>;

### Parameter List

| Parameter       | Type | Description                                                                                                                                  |
|-----------------|------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <Type>          | Enum | REMOTE = remote channel                                                                                                                      |
| <Port>          | Word | Listening port of the server                                                                                                                 |
| <Clients>       | Word | Maximum number of allowed clients (see note above)<br>The maximum number of allowed clients is limited to 4                                  |
| <SocketMode>    | Enum | Server behavior for new clients:<br>DYN = Existing socket will be closed by a new client<br>STAT = New client denied when socket is occupied |
| <SocketTimeout> | Word | Socket timeout<br>0 = Socket without timeout<br>1 - 60 = Socket timeout [s] (The use of a Socket timeout is recommended)                     |
| <ReturnCode>    | Word | Warning or error code                                                                                                                        |

### Example

**Command** IP\_SERVER REMOTE,55555,1,DYN,30;

**Response** 0;



## IP\_SERVER?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current server configuration of the device.

### Note

To avoid synchronization problems with client applications, only one client (the master) is allowed to change device settings.

### Command

IP\_SERVER? <Type>;

### Response

<Type>,<Port>,<Clients>,<SocketMode>,<SocketTimeout>,<ReturnCode>;

### Parameter List

| Parameter       | Type | Description                                                                                                                                  |
|-----------------|------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <Type>          | Enum | REMOTE = remote channel                                                                                                                      |
| <Port>          | Word | Listening port of the server                                                                                                                 |
| <Clients>       | Word | Maximum number of allowed clients (see note above)<br>The maximum number of allowed clients is limited to 4                                  |
| <SocketMode>    | Enum | Server behavior for new clients:<br>DYN = Existing socket will be closed by a new client<br>STAT = New client denied when socket is occupied |
| <SocketTimeout> | Word | Socket timeout<br>0 = Socket without timeout<br>1 - 60 = Socket timeout [s]                                                                  |
| <ReturnCode>    | Word | Warning or error code                                                                                                                        |

### Example

|                 |                         |
|-----------------|-------------------------|
| <i>Command</i>  | IP_SERVER? REMOTE;      |
| <i>Response</i> | REMOTE,55555,1,DYN,0,0; |

## Reference Input 10 MHz



*Command only available for devices with 10 MHz reference input*

### RF\_EXT\_REF

#### Description

Switches the 10 MHz reference input on or off.

#### Note

If the 10 MHz input is on, ensure that an external 10 MHz signal is connected to avoid measurement errors.

#### Command

RF\_EXT\_REF <EnableState>;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter     | Type | Description                                                         |
|---------------|------|---------------------------------------------------------------------|
| <EnableState> | Enum | ON<br>OFF (standard startup setting)                                |
| <ReturnCode>  | Word | Warning or error code (Warning 202 if ext. Ref = ON and not locked) |

#### Example

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | RF_EXT_REF ON;  |
| <i>Response</i> | 0;              |
| <hr/>           |                 |
| <i>Command</i>  | RF_EXT_REF OFF; |
| <i>Response</i> | 0;              |

## RF\_EXT\_REF?



*Command only available for devices with 10 MHz reference input*

### Description

Queries the current state of the 10 MHz reference input.

### Command

RF\_EXT\_REF?;

### Response

<EnableState>,<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                                                         |
|---------------|------|---------------------------------------------------------------------|
| <EnableState> | Enum | ON,OFF                                                              |
| <ReturnCode>  | Word | Warning or error code (Warning 202 if ext. Ref = ON and not locked) |

### Example

*Command* RF\_EXT\_REF?;

*Response* ON,0;

*Command* RF\_EXT\_REF?;

*Response* OFF,0;

# RF\_EXT\_REF\_LOCKED?



*Command only available for devices with 10 MHz reference input*

### Description

Queries whether an external 10 MHz signal is connected to the device.

### Command

RF\_EXT\_REF\_LOCKED?;

### Response

<LockedState>,<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                                                                                     |
|---------------|------|-------------------------------------------------------------------------------------------------|
| <LockedState> | Enum | TRUE (10 MHz signal is connected)<br>FALSE (10 MHz signal is not connected or RF_EXT_REF = OFF) |
| <ReturnCode>  | Word | Warning or error code                                                                           |

### Example

|                 |                     |
|-----------------|---------------------|
| <i>Command</i>  | RF_EXT_REF_LOCKED?; |
| <i>Response</i> | TRUE,0;             |
| <i>Command</i>  | RF_EXT_REF_LOCKED?; |
| <i>Response</i> | FALSE,0;            |

## Service Tables (channel tables)

### SRV\_CLR

#### Description

Deletes a service table.

#### Command

SRV\_CLR <ServTabLong>;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter     | Type   | Description                                            |
|---------------|--------|--------------------------------------------------------|
| <ServTabLong> | String | Long Name of the channel (service) table, up to 35 chr |
| <ReturnCode>  | Word   | Warning or error code                                  |

#### Example

|                 |                        |
|-----------------|------------------------|
| <i>Command</i>  | SRV_CLR "my_longname"; |
| <i>Response</i> | 0;                     |

# SRV\_CLR\_ALL

### Description

Deletes all service tables.

### Command

SRV\_CLR\_ALL;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <ReturnCode> | Word | Warning or error code |

### Example

---

|                 |              |
|-----------------|--------------|
| <i>Command</i>  | SRV_CLR_ALL; |
| <i>Response</i> | 0;           |

---

## SRV\_DS

### Description

Creates a service table and stores it in the nonvolatile memory of the device.

### Note

A Service Table is mandatory for using the Multi-Channel Power mode as all MCP measurements are related to the currently selected Service Table (see SRV\_SEL?).

It contains the necessary parameters of the up to 500 different channels which can be defined in a single Service Table. Each channel is named by its Service Name (ServName).

The following rules apply for creating a Service Table:

$F_{high} - F_{low} \geq 40 \text{ Hz}$  (minimum channel width of 40 Hz)

$F_{low[n+1]} \geq F_{high[n]}$  (channels must be sorted from low to high without overlapping)

$RBW_{max} < ((F_{high} - F_{low}) / 4)$  (RBW to be less than a quarter of the channel width)

To simplify the creation of Service Tables, Narda provides a suitable configuration program.

### Command

SRV\_DS <ServTabShort>,<ServTabLong>,  
<NoOfServices>, [ <Flow>,<Fhigh>,<RBW>,<ServName>, ];

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type   | Description                                             |
|----------------|--------|---------------------------------------------------------|
| <ServTabShort> | String | Short Name of the channel (service) table, up to 15 chr |
| <ServTabLong>  | String | Long Name of the channel (service) table, up to 35 chr  |
| <NoOfServices> | Word   | Number of channels (services), 1 - 500                  |
| <Flow>         | Double | Lower frequency limit of the channel (service), [Hz]    |
| <Fhigh>        | Double | Upper frequency limit of the channel (service), [Hz]    |
| <RBW>          | Double | Resolution bandwidth [Hz]                               |
| <ServName>     | String | Name of the channel (service) , up to 15 chr            |
| <ReturnCode>   | Word   | Warning or error code                                   |

## Command Reference Guide

Service Tables (channel tables)

---

### Examples

|                 |                                                                                                                     |
|-----------------|---------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SRV_DS "my_shortname","my_longname",2,<br>10000000,20000000,2000000,"SrvA",<br>100000000,200000000,20000000,"SrvB"; |
| <i>Response</i> | 0;                                                                                                                  |

---

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SRV_DS "EU Full Band","Europe Full Band",17,<br>47000000,68000000,5000000,"TV Band I",<br>87500000,108000000,200000,"FM-Radio",<br>137000000,165000000,3000000,"Mid Wave",<br>165000000,174000000,2000000,"Paging",<br>174000000,230000000,5000000,"BandIII (DVB-T)",<br>467450000,468300000,200000,"Trains",<br>470000000,790000000,10000000,"BandIV (DVB-T)",<br>790000000,862000000,5000000,"BandV (DAB)",<br>876000000,880000000,500000,"GSM-R",<br>890000000,960000000,500000,"GSM 900",<br>1452000000,1492000000,5000000,"L-Band (DAB)",<br>1710000000,1880000000,500000,"GSM 1800",<br>1880000000,1900000000,3000000,"DECT",<br>1900000000,2025000000,5000000,"UMTS-TDD",<br>2110000000,2170000000,5000000,"UMTS DL",<br>2400000000,2483500000,20000000,"W-LAN",<br>2483500000,2500000000,3000000,"ISM"; |
| <i>Response</i> | 0;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



## SRV\_DS?

### Description

Queries a service table.

### Command

SRV\_DS? <ServTabLongReq>;

### Response

<ServTabShort>,<ServTabLong>,  
<NoOfServices>, [ <Flow>,<Fhigh>,<RBW>,<ServName>, ] <ReturnCode>;

### Parameter List

| Parameter        | Type   | Description                                                      |
|------------------|--------|------------------------------------------------------------------|
| <ServTabLongReq> | String | Requested Long Name of the channel (service) table, up to 35 chr |
| <ServTabShort>   | String | Short Name of the channel (service) table, up to 15 chr          |
| <ServTabLong>    | String | Long Name of the channel (service) table, up to 35 chr           |
| <NoOfServices>   | Word   | Number of channels (services), 1 - 500                           |
| <Flow>           | Double | Lower frequency limit of the channel (service), [Hz]             |
| <Fhigh>          | Double | Upper frequency limit of the channel (service), [Hz]             |
| <RBW>            | Double | Resolution bandwidth [Hz]                                        |
| <ServName>       | String | Name of the channel (service) , up to 15 chr                     |
| <ReturnCode>     | Word   | Warning or error code                                            |

### Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SRV_DS? "Europe Full Band";                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>Response</i> | "EU Full Band","Europe Full Band",<br>17,<br>47000000,68000000,5000000,"TV Band I",<br>87500000,108000000,200000,"FM-Radio",<br>137000000,165000000,3000000,"Mid Wave",<br>165000000,174000000,2000000,"Paging",<br>174000000,230000000,5000000,"BandIII (DVB-T)",<br>467450000,468300000,200000,"Trains",<br>470000000,790000000,10000000,"BandIV (DVB-T)",<br>790000000,862000000,5000000,"BandV (DAB)",<br>876000000,880000000,500000,"GSM-R",<br>890000000,960000000,500000,"GSM 900",<br>1452000000,1492000000,5000000,"L-Band (DAB)",<br>1710000000,1880000000,500000,"GSM 1800",<br>1880000000,1900000000,3000000,"DECT",<br>1900000000,2025000000,5000000,"UMTS-TDD",<br>2110000000,2170000000,5000000,"UMTS DL",<br>2400000000,2483500000,20000000,"W-LAN",<br>2483500000,2500000000,3000000,"ISM",<br>0; |

# SRV\_LIST?

## Description

Queries all service tables without details.

## Command

SRV\_LIST?;

## Response

<NumberOfElements>, [ <ServTabLong>, ] <ReturnCode>;

## Parameter List

| Parameter          | Type   | Description                                            |
|--------------------|--------|--------------------------------------------------------|
| <NumberOfElements> | Word   | Total number of channel (service) tables available     |
| <ServTabLong>      | String | Long Name of the channel (service) table, up to 35 chr |
| <ReturnCode>       | Word   | Warning or error code                                  |

## Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | SRV_LIST?;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <i>Response</i> | 26,<br>"Ex. Airport Radar",<br>"China_Overview",<br>"EN50492:2008_Annex_A_no_PMR+A.Radio",<br>"Europe Full Band",<br>"Europe GSM 900+1800+UMTS",<br>"Europe UMTS W-CDMA 3GPP/FDD",<br>"Ex.Cellular GSM 850+1900",<br>"Ex.DECT Channels",<br>"Ex.Digital Cordless Phones Overview",<br>"Ex.ISM Band 2.4 GHz",<br>"Ex.TETRA",<br>"Ex.WLAN 2.4 GHz",<br>"Germany alle Funkdienste",<br>"Germany Broadcast Overview",<br>"Germany Channels GSM-900 Downlink",<br>"Germany Ex. FM Radio Narda Pful.",<br>"Germany GSM1800",<br>"Germany Mobilfunkbetreiber",<br>"Germany UMTS",<br>"Japan+Korea Mobile Phone Services ",<br>"Österreich Funkdienste",<br>"Österreich GSM-1800",<br>"Österreich GSM-900",<br>"Österreich UMTS",<br>"Swisscom",<br>"USA FCC Frequencies",<br>0; |

---

## SRV\_SEL

### Description

Sets the current active service table.

### Command

SRV\_SEL <ServTabLong>;

### Response

<ReturnCode>;

### Parameter List

| Parameter     | Type   | Description                                            |
|---------------|--------|--------------------------------------------------------|
| <ServTabLong> | String | Long Name of the channel (service) table, up to 35 chr |
| <ReturnCode>  | Word   | Warning or error code                                  |

### Example

|                 |                             |
|-----------------|-----------------------------|
| <i>Command</i>  | SRV_SEL "Europe Full Band"; |
| <i>Response</i> | 0;                          |

### SRV\_SEL?

#### Description

Queries the current active service table.

#### Command

SRV\_SEL?;

#### Response

<ServTabLong>,<ServTabShort>,<ReturnCode>;

#### Parameter List

| Parameter      | Type   | Description                                             |
|----------------|--------|---------------------------------------------------------|
| <ServTabLong>  | String | Long Name of the channel (service) table, up to 35 chr  |
| <ServTabShort> | String | Short Name of the channel (service) table, up to 15 chr |
| <ReturnCode>   | Word   | Warning or error code                                   |

#### Example

---

|                 |                                      |
|-----------------|--------------------------------------|
| <i>Command</i>  | SRV_SEL?;                            |
| <i>Response</i> | "Europe Full Band","EU Full Band",0; |

---

## Stream communication general settings

### STREAM\_SETUP



*Command only available for devices with an Ethernet connector*

#### Description

Sets the protocol and connection settings for the Stream data output.

#### Note

This command stops an active Stream data output.

More information about the Stream data is given in the Stream Communication section.

#### Command

STREAM\_SETUP <Protocol>,<IPAddress>,<Port>;

#### Response

<ReturnCode>;

#### Parameter List

| Parameter    | Type   | Description                                                                                    |
|--------------|--------|------------------------------------------------------------------------------------------------|
| <Protocol>   | Enum   | UDP = User Datagram Protocol<br>TCP = Transmission Control Protocol                            |
| <IPAddress>  | String | IP-Address of the receiving device.<br>Used only for UDP streaming.<br>Format: ###.###.###.### |
| <Port>       | Word   | Listening port of the TCP stream server or<br>destination port of the UDP stream datagrams.    |
| <ReturnCode> | Word   | Warning or error code                                                                          |

#### Examples

*Command* STREAM\_SETUP TCP,"",60001;

*Response* 0;

*Command* STREAM\_SETUP UDP,"192.168.128.200",60001;

*Response* 0;

# STREAM\_SETUP?



*Command only available for devices with an Ethernet connector*

## Description

Queries the connection and protocol settings for the Stream data output.

## Note

More information about the Stream data is given in the Stream Communication section.

## Command

STREAM\_SETUP?;

## Response

<Protocol>,<IPAddress>,<Port>,<ReturnCode>;

## Parameter List

| Parameter    | Type   | Description                                                                                    |
|--------------|--------|------------------------------------------------------------------------------------------------|
| <Protocol>   | Enum   | UDP = User Datagram Protocol<br>TCP = Transmission Control Protocol                            |
| <IPAddress>  | String | IP-Address of the receiving device.<br>Used only for UDP streaming.<br>Format: ###.###.###.### |
| <Port>       | Word   | Listening port of the TCP stream server or<br>destination port of the UDP stream datagrams.    |
| <ReturnCode> | Word   | Warning or error code                                                                          |

## Examples

|                 |                                |
|-----------------|--------------------------------|
| <i>Command</i>  | STREAM_SETUP?;                 |
| <i>Response</i> | TCP,"",60001,0;                |
| <i>Command</i>  | STREAM_SETUP?;                 |
| <i>Response</i> | UDP,"192.168.128.200",60001,0; |

## STREAM\_STATE



*Command only available for devices with an Ethernet connector*

### Description

Starts or stops the Stream data output.

### Note

More information about the Stream data is given in the Stream Communication section.

### Command

STREAM\_STATE <StreamState>;

### Response

<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                                                                     |
|---------------|------|---------------------------------------------------------------------------------|
| <StreamState> | Enum | ON = Stream data output is activated<br>OFF = Stream data output is deactivated |
| <ReturnCode>  | Word | Warning or error code                                                           |

### Example

*Command* STREAM\_STATE ON;

*Response* 0;

# STREAM\_STATE?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Stream status.

### Note

More information about the Stream data is given in the Stream Communication section.

### Command

STREAM\_STATE?;

### Response

<StreamState>,<ReturnCode>;

### Parameter List

| Parameter     | Type | Description                                                                     |
|---------------|------|---------------------------------------------------------------------------------|
| <StreamState> | Enum | ON = Stream data output is activated<br>OFF = Stream data output is deactivated |
| <ReturnCode>  | Word | Warning or error code                                                           |

### Example

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | STREAM_STATE?; |
| <i>Response</i> | ON,0;          |



## IQ stream communication –Optional

### Note

To use the IQ stream communication commands:

- › IDA: “I/Q Streaming” 3100/95.10 option is required
- › NRA: The “Scope and I/Q Data” 3200/95.03 option is required.

## IQSTREAM\_ATT



*Command only available for devices with an Ethernet connector*

### Description

Sets the Attenuator value mode without interrupting the measurement.

### Note

The Attenuator value is coupled to the Reference Level.

An active Stream data output is not stopped by this command.

### Command

IQSTREAM\_ATT <Attenuator>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                 |
|--------------|-------|-----------------------------|
| <Attenuator> | Float | Attenuator value 0dB...50dB |
| <ReturnCode> | Word  | Warning or error code       |

### Example

*Command* IQSTREAM\_ATT 50;

*Response* 0;

## IQSTREAM\_ATT?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Attenuator value.

### Note

The Attenuator value is coupled to the Reference Level.

### Command

IQSTREAM\_ATT?;

### Response

<Attenuator>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                 |
|--------------|-------|-----------------------------|
| <Attenuator> | Float | Attenuator value 0dB...50dB |
| <ReturnCode> | Word  | Warning or error code       |

### Example

---

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | IQSTREAM_ATT?; |
| <i>Response</i> | 50,0;          |

---

## IQSTREAM\_CONFIG



*Command only available for devices with an Ethernet connector*

### Description

Sets the Fcent, RBW and RL settings.

### Note

This command restarts the measurement and resynchronizes the timestamp.

An active Stream data output is not stopped by this command.

### Command

STREAM\_CONFIG <Fcent>,<RBW>,<RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <RBW>        | Double | Channel bandwidth [Hz]                     |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example (Unit=V)

|                 |                                        |
|-----------------|----------------------------------------|
| <i>Command</i>  | IQSTREAM_CONFIG 97700000,100000,0.008; |
| <i>Response</i> | 0;                                     |

## IQSTREAM\_CONFIG?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current settings.

### Command

STREAM\_CONFIG?;

### Response

<Fcent>,<RBW>,<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                                |
|--------------|--------|--------------------------------------------|
| <Fcent>      | Double | Center frequency [Hz]                      |
| <RBW>        | Double | Channel bandwidth [Hz]                     |
| <RL>         | Float  | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word   | Warning or error code                      |

### Example

|                 |                          |
|-----------------|--------------------------|
| <i>Command</i>  | IQSTREAM_CONFIG?;        |
| <i>Response</i> | 97700000,100000,0.008,0; |

## IQSTREAM\_FCEN



*Command only available for devices with an Ethernet connector*

### Description

Sets Fcent without interrupting the measurement.

### Note

An active Stream data output is not stopped by this command.

### Command

IQSTREAM\_FCEN <Fcent>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <Fcent>      | Double | Center frequency [Hz] |
| <ReturnCode> | Word   | Warning or error code |

### Example

*Command* IQSTREAM\_FCEN 97700000;

*Response* 0;

### IQSTREAM\_FCEN?



*Command only available for devices with an Ethernet connector*

#### Description

Queries the current Fcent setting.

#### Command

IQSTREAM\_FCEN?;

#### Response

<Fcent>,<ReturnCode>;

#### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <Fcent>      | Double | Center frequency [Hz] |
| <ReturnCode> | Word   | Warning or error code |

#### Example

|                 |                 |
|-----------------|-----------------|
| <i>Command</i>  | IQSTREAM_FCEN?; |
| <i>Response</i> | 97700000,0;     |

## IQSTREAM\_RBW



*Command only available for devices with an Ethernet connector*

### Description

Sets the RBW setting.

### Note

This command restarts the measurement and resynchronizes the timestamp.  
An active Stream data output is not stopped by this command.

### Command

IQSTREAM\_RBW <RBW>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description            |
|--------------|--------|------------------------|
| <RBW>        | Double | Channel bandwidth [Hz] |
| <ReturnCode> | Word   | Warning or error code  |

### Example

*Command* IQSTREAM\_RBW 100000;

*Response* 0;

### IQSTREAM\_RBW?



*Command only available for devices with an Ethernet connector*

#### Description

Queries the current RBW setting.

#### Command

IQSTREAM\_RBW?;

#### Response

<RBW>,<ReturnCode>;

#### Parameter List

| Parameter    | Type   | Description            |
|--------------|--------|------------------------|
| <RBW>        | Double | Channel bandwidth [Hz] |
| <ReturnCode> | Word   | Warning or error code  |

#### Example

|                 |                |
|-----------------|----------------|
| <i>Command</i>  | IQSTREAM_RBW?; |
| <i>Response</i> | 100000,0;      |



## IQSTREAM\_RBW\_LIST?



*Command only available for devices with an Ethernet connector*

### Description

Queries the RBW List.

### Command

IQSTREAM\_RBW\_LIST?;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                |
|--------------------|--------|----------------------------|
| <NumberOfElements> | Word   | Number of subsequent items |
| <DisplayString>    | String | RBW and unit as string     |
| <Value>            | Float  | RBW as value [Hz]          |
| <ReturnCode>       | Word   | Warning or error code      |

### Example

---

|         |                     |
|---------|---------------------|
| Command | IQSTREAM_RBW_LIST?; |
|---------|---------------------|

|          |                                                                                                                                                                                                                                                                                                                                                                |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Response | 37,<br>"400 kHz",400000,<br>"320 kHz",320000,<br>"250 kHz",250000,<br>"200 kHz",200000,<br>"160 kHz",160000,<br>"125 kHz",125000,<br>"100 kHz",100000,<br>...<br>"1 kHz",1000,<br>"800 Hz",800,<br>"640 Hz",640,<br>"500 Hz",500,<br>"400 Hz",400,<br>"320 Hz",320,<br>"250 Hz",250,<br>"200 Hz",200,<br>"160 Hz",160,<br>"125 Hz",125,<br>"100 Hz",100,<br>0; |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

---

## IQSTREAM\_RL



*Command only available for devices with an Ethernet connector*

### Description

Sets the Reference Level without interrupting the measurement.

### Note

The Attenuator value is coupled to the Reference Level.  
An active Stream data output is not stopped by this command.

### Command

IQSTREAM\_RL <RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                |
|--------------|-------|--------------------------------------------|
| <RL>         | Float | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word  | Warning or error code                      |

### Example (Unit=V)

|                 |                   |
|-----------------|-------------------|
| <i>Command</i>  | IQSTREAM_RL 2.25; |
| <i>Response</i> | 0;                |

## IQSTREAM\_RL?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Reference Level.

### Note

The attenuator value is coupled to the Reference Level.

### Command

IQSTREAM\_RL?;

### Response

<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                |
|--------------|-------|--------------------------------------------|
| <RL>         | Float | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word  | Warning or error code                      |

### Example

|                 |               |
|-----------------|---------------|
| <i>Command</i>  | IQSTREAM_RL?; |
| <i>Response</i> | 2.25,0;       |

## Audio stream communication –Optional

### Note

To use the Audio Stream Communication commands:

- › IDA only: The “Audio Streaming” 3100/95.11 option is required.

## AUDIOSTREAM\_ATT



*Command only available for devices with an Ethernet connector*

### Description

Sets the Attenuator value without interrupting the measurement.

### Note

The Attenuator value is coupled to the Reference Level.

An active Stream data output is not stopped by this command.

### Command

AUDIOSTREAM\_ATT <Attenuator>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                 |
|--------------|-------|-----------------------------|
| <Attenuator> | Float | Attenuator value 0dB...50dB |
| <ReturnCode> | Word  | Warning or error code       |

### Example

|                 |                     |
|-----------------|---------------------|
| <i>Command</i>  | AUDIOSTREAM_ATT 50; |
| <i>Response</i> | 0;                  |

## AUDIOSTREAM\_ATT?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Attenuator value.

### Note

The Attenuator value is coupled to the Reference Level.

### Command

AUDIOSTREAM\_ATT?;

### Response

<Attenuator>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                 |
|--------------|-------|-----------------------------|
| <Attenuator> | Float | Attenuator value 0dB...50dB |
| <ReturnCode> | Word  | Warning or error code       |

### Example

*Command* AUDIOSTREAM\_ATT?;

*Response* 50,0;

# AUDIOSTREAM\_BFO



*Command only available for devices with an Ethernet connector*

## Description

Sets the BFO value (beat frequency oscillator).

## Note

Audio Streaming must be selected as current operating mode.

You can set the BFO when one of the following demodulation types is selected: LSB, USB. Setting BFO in other modes (AM, FM, CW) has no impacts.

## Command

AUDIOSTREAM\_BFO <BfoValue>;

## Response

<ReturnCode>;

## Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <BfoValue>   | Double | -20.0 ... +20.0 [Hz]  |
| <ReturnCode> | Word   | Warning or error code |

## Example

|                 |                       |
|-----------------|-----------------------|
| <i>Command</i>  | AUDIOSTREAM_BFO 10.0; |
| <i>Response</i> | 0;                    |

## AUDIOSTREAM\_BFO?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current BFO value (beat frequency oscillator).

### Note

Audio stream mode must be selected as the current operating mode.

You can set the BFO when one of the following demodulation types is selected: LSB, USB.

### Command

AUDIOSTREAM\_BFO?;

### Response

<BfoValue>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <BfoValue>   | Double | -20.0 ... +20.0 [Hz]  |
| <ReturnCode> | Word   | Warning or error code |

### Example

|                 |                   |
|-----------------|-------------------|
| <i>Command</i>  | AUDIOSTREAM_BFO?; |
| <i>Response</i> | 10,0;             |

## AUDIOSTREAM\_DEMOD



*Command only available for devices with an Ethernet connector*

### Description

Sets the demodulation type.

### Note

Audio Stream mode must be selected as current operating mode.

Available demodulation types depend on the RBW (CBW for IDA2) setting.

Demodulation while using axis mode RSS (automatic mode) is not provided.

Command AUDIOSTREAM\_DEMOD\_LIST? queries list of currently available demodulation types.

### Command

AUDIOSTREAM\_DEMOD<DemodMode>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <DemodMode>  | Enum | OFF,FM,AM,USB,LSB,CW  |
| <ReturnCode> | Word | Warning or error code |

### Example

---

*Command* AUDIOSTREAM\_DEMOD\_FM;

---

*Response* 0;

---



## AUDIOSTREAM\_DEMOD?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current audio demodulation type.

### Note

Audio Stream mode must be selected as current operating mode.

Available demodulation types depend on the RBW (CBW for IDA2) setting.

Demodulation while using axis mode RSS (automatic mode) is not provided.

The command AUDIOSTREAM\_DEMOD\_LIST? queries list of currently available demodulation types.

### Command

AUDIOSTREAM\_DEMOD?;

### Response

<DemodMode>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description           |
|--------------|------|-----------------------|
| <DemodMode>  | Enum | OFF,FM,AM,USB,LSB,CW  |
| <ReturnCode> | Word | Warning or error code |

### Example

|                 |                   |
|-----------------|-------------------|
| <i>Command</i>  | AUDIOSTREAM_DEMOD |
| <i>Response</i> | FM,0;             |

### AUDIOSTREAM\_DEMOD\_LIST?



*Command only available for devices with an Ethernet connector*

#### Description

Queries the currently available audio demodulation types.

#### Note

Audio Streaming mode must be selected as the current operating mode.  
Available demodulation types depend on the RBW (CBW for IDA2).  
Demodulation while using axis mode RSS (automatic mode) is not provided.

#### Command

AUDIOSTREAM\_DEMOD\_LIST?

#### Response

<NumberOfElements>,[ <DemodMode>, ] <ReturnCode>;

#### Parameter List

| Parameter          | Type  | Description                |
|--------------------|-------|----------------------------|
| <NumberOfElements> | Short | Number of subsequent items |
| <DemodMode>        | Enum  | OFF,FM,AM,USB,LSB,CW       |
| <ReturnCode>       | Word  | Warning or error code      |

#### Example

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| <i>Command</i>  | AUDIOSTREAM_DEMOD_LIST?;                              |
| <i>Response</i> | 6,<br>OFF,<br>FM,<br>AM,<br>CW,<br>LSB,<br>USB,<br>0; |

## AUDIOSTREAM\_FCEN



*Command only available for devices with an Ethernet connector*

### Description

Sets Fcent without interrupting the measurement.

### Note

An active Stream data output is not stopped by this command.

### Command

AUDIOSTREAM\_FCEN <Fcent>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <Fcent>      | Double | Center frequency [Hz] |
| <ReturnCode> | Word   | Warning or error code |

### Example

*Command*    AUDIOSTREAM\_FCEN 97700000;

*Response*    0;

# AUDIOSTREAM\_FCEN?T?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Fcent setting.

### Command

AUDIOSTREAM\_FCEN?;

### Response

<FCent>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description           |
|--------------|--------|-----------------------|
| <Fcent>      | Double | Center frequency [Hz] |
| <ReturnCode> | Word   | Warning or error code |

### Example

|                 |                    |
|-----------------|--------------------|
| <i>Command</i>  | AUDIOSTREAM_FCEN?; |
| <i>Response</i> | 97700000,0;        |

## AUDIOSTREAM\_FORMAT



*Command only available for devices with an Ethernet connector*

### Description

Sets the Audio stream resolution per sample.

### Note

The higher the resolution the better the quality. High quality causes high data rate.

### Command

AUDIOSTREAM\_FORMAT <Format>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                           |
|--------------|------|-------------------------------------------------------------------------------------------------------|
| <Format>     | Enum | PCM_INT8 (PCM_INT8 stands for 8 Bit resolution)<br>PCM_INT16 (PCM_INT16 stands for 16 Bit resolution) |
| <ReturnCode> | Word | Warning or error code                                                                                 |

### Example

---

*Command*    AUDIOSTREAM\_FORMAT PCM\_INT16;

---

*Response*    0;

---

## AUDIOSTREAM\_FORMAT?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Audio stream resolution per sample.

### Command

AUDIOSTREAM\_FORMAT?;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                         |
|--------------|------|-------------------------------------------------------------------------------------|
| <Format>     | Enum | PCM_INT8 (PCM_INT16 = 16 Bit resolution)<br>PCM_INT16 (PCM_INT8 = 8 Bit resolution) |
| <ReturnCode> | Word | Warning or error code                                                               |

### Example

|                 |                      |
|-----------------|----------------------|
| <i>Command</i>  | AUDIOSTREAM_FORMAT?; |
| <i>Response</i> | PCM_INT16;           |

## AUDIOSTREAM\_RBW?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current RBW setting.

### Command

AUDIOSTREAM\_RBW?;

### Response

<RBW>,<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description            |
|--------------|--------|------------------------|
| <RBW>        | Double | Channel bandwidth [Hz] |
| <ReturnCode> | Word   | Warning or error code  |

### Example

|                 |                   |
|-----------------|-------------------|
| <i>Command</i>  | AUDIOSTREAM_RBW?; |
| <i>Response</i> | 100000,0;         |

## AUDIOSTREAM\_RBW



*Command only available for devices with an Ethernet connector*

### Description

Sets the RBW setting.

### Note

This command restarts the measurement and resynchronizes the timestamp.  
An active Stream data output is not stopped by this command.

### Command

AUDIOSTREAM\_RBW <RBW>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type   | Description                         |
|--------------|--------|-------------------------------------|
| <RBW>        | Double | Channel bandwidth (100..200E3 [Hz]) |
| <ReturnCode> | Word   | Warning or error code               |

### Example

|                 |                         |
|-----------------|-------------------------|
| <i>Command</i>  | AUDIOSTREAM_RBW 100000; |
| <i>Response</i> | 0;                      |



## AUDIOSTREAM\_RBW\_LIST?



*Command only available for devices with an Ethernet connector*

### Description

Queries the RBW List of potential RBW settings.

### Command

AUDIOSTREAM\_RBW\_LIST?;

### Response

<NumberOfElements>, [ <DisplayString>, <Value>, ] <ReturnCode>;

### Parameter List

| Parameter          | Type   | Description                |
|--------------------|--------|----------------------------|
| <NumberOfElements> | Word   | Number of subsequent items |
| <DisplayString>    | String | RBW and unit as string     |
| <Value>            | Float  | RBW as value [Hz]          |
| <ReturnCode>       | Word   | Warning or error code      |

### Example

|                 |                                                                                                                                                                                                                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | AUDIOSTREAM_RBW_LIST?;                                                                                                                                                                                                                                                                          |
| <i>Response</i> | 34,<br>"200 kHz",200000,<br>"160 kHz",160000,<br>"125 kHz",125000,<br>"100 kHz",100000,<br>...<br>"1 kHz",1000,<br>"800 Hz",800,<br>"640 Hz",640,<br>"500 Hz",500,<br>"400 Hz",400,<br>"320 Hz",320,<br>"250 Hz",250,<br>"200 Hz",200,<br>"160 Hz",160,<br>"125 Hz",125,<br>"100 Hz",100,<br>0; |

## AUDIOSTREAM\_RL



*Command only available for devices with an Ethernet connector*

### Description

Sets the Reference Level without interrupting the measurement.

### Note

The Attenuator value is coupled to the Reference Level.  
An active Stream data output is not stopped by this command.

### Command

AUDIOSTREAM\_RL <RL>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                |
|--------------|-------|--------------------------------------------|
| <RL>         | Float | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word  | Warning or error code                      |

### Example (Unit=V)

|                 |                      |
|-----------------|----------------------|
| <i>Command</i>  | AUDIOSTREAM_RL 2.25; |
| <i>Response</i> | 0;                   |

## AUDIOSTREAM\_RL?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current Reference Level.

### Note

The attenuator value is coupled to the Reference Level.

### Command

AUDIOSTREAM\_RL?;

### Response

<RL>,<ReturnCode>;

### Parameter List

| Parameter    | Type  | Description                                |
|--------------|-------|--------------------------------------------|
| <RL>         | Float | Reference level (Measurement Range) [Unit] |
| <ReturnCode> | Word  | Warning or error code                      |

### Example

---

*Command* AUDIOSTREAM\_RL?;

---

*Response* 2.25,0;

---

## AUDIOSTREAM\_SAMPLERATE



*Command only available for devices with an Ethernet connector*

### Description

Sets the audio signal Samplerate.

### Command

AUDIOSTREAM\_SAMPLERATE <Samplerate>;

### Response

<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                |
|--------------|------|--------------------------------------------------------------------------------------------|
| <Samplerate> | Word | 8000 = Samplerate of 8 kHz<br>16000 = Samplerate of 16 kHz<br>32000 = Samplerate of 32 kHz |
| <ReturnCode> | Word | Warning or error code                                                                      |

### Example

|                 |                         |
|-----------------|-------------------------|
| <i>Command</i>  | AUDIOSTREAM_SAMPLERATE; |
| <i>Response</i> | 0;                      |

## AUDIOSTREAM\_SAMPLERATE?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current audio stream Samplerate.

### Command

AUDIOSTREAM\_SAMPLERATE?;

### Response

<StreamState>,<ReturnCode>;

### Parameter List

| Parameter    | Type | Description                                                                                |
|--------------|------|--------------------------------------------------------------------------------------------|
| <Samplerate> | Word | 8000 = Samplerate of 8 kHz<br>16000 = Samplerate of 16 kHz<br>32000 = Samplerate of 32 kHz |
| <ReturnCode> | Word | Warning or error code                                                                      |

### Example

*Command* AUDIOSTREAM\_SAMPLERATE?;

*Response* 16000,0;

# AUDIOSTREAM\_SQUELCH



*Command only available for devices with an Ethernet connector*

### Description

Sets the audio stream squelch threshold (noise suppression).

### Note

Audio stream mode must be selected as current operating mode.

You can set a squelch threshold when one of the following demodulation types is selected:

AM, CW, LSB, USB. Setting squelch in FM mode has no impacts.

The squelch value is given relatively to the input reference level in “dB”.

Absolute squelch value [Unit] = RL [Unit] + squelch [dB].

### Command

AUDIOSTREAM\_SQUELCH <SquelchValue>;

### Response

<ReturnCode>;

### Parameter List

| Parameter      | Type  | Description                                                      |
|----------------|-------|------------------------------------------------------------------|
| <SquelchValue> | Short | 0 = Squelch OFF<br>Squelch level relative to RL, -40...-120 [dB] |
| <ReturnCode>   | Word  | Warning or error code                                            |

### Example

---

*Command*    AUDIOSTREAM\_SQUELCH -40;

---

*Response*    0;

---

## AUDIOSTREAM\_SQUELCH?



*Command only available for devices with an Ethernet connector*

### Description

Queries the current audio squelch threshold (noise suppression).

### Note

Audio stream mode must be selected as current operating mode.

You can set a squelch threshold when one of the following demodulation types is selected: AM, CW, LSB, USB.

The squelch value is given relatively to the input reference level in “dB”.

Absolute squelch value [Unit] = RL [Unit] + squelch [dB].

### Command

AUDIOSTREAM\_SQUELCH?;

### Response

<SquelchValue>,<ReturnCode>;

### Parameter List

| Parameter      | Type  | Description                                                      |
|----------------|-------|------------------------------------------------------------------|
| <SquelchValue> | Short | 0 = Squelch OFF<br>Squelch level relative to RL, -40...-120 [dB] |
| <ReturnCode>   | Word  | Warning or error code                                            |

### Example

|                 |                       |
|-----------------|-----------------------|
| <i>Command</i>  | AUDIOSTREAM_SQUELCH?; |
| <i>Response</i> | -40,0;                |

# AUDIOSTREAM\_SQUELCH\_LIST?



*Command only available for devices with speaker / headphone jack*

## Description

Queries an audio squelch threshold-list (noise suppression).

## Note

Audio stream mode must be selected as the current operating mode.

## Command

AUDIOSTREAM\_SQUELCH\_LIST?;

## Response

<NumberOfElements>, [ <DisplayStringRel>, <DisplayStringAbs>, <ValueRel>, <ValueAbs>, ]  
<ReturnCode>;

## Parameter List

| Parameter          | Type   | Description                                                 |
|--------------------|--------|-------------------------------------------------------------|
| <NumberOfElements> | Word   | Number of subsequent items                                  |
| <DisplayStringRel> | String | Relative value [dB] of the squelch level and unit as string |
| <DisplayStringAbs> | String | Absolute value of the squelch level and unit as string      |
| <ValueRel>         | Short  | Relative squelch level value [dB]                           |
| <ValueAbs>,        | Double | Absolute squelch level value [Unit]                         |
| <ReturnCode>       | Word   | Warning or error code                                       |

## Example

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Command</i>  | AUDIOSTREAM_SQUELCH_LIST?;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Response</i> | 82,<br>"OFF","OFF",0,0,<br>"RL-40 dB","-70 dBm",-40,-69.96,<br>"RL-41 dB","-71 dBm",-41,-70.96,<br>"RL-42 dB","-72 dBm",-42,-71.96,<br>"RL-43 dB","-73 dBm",-43,-72.96,<br>"RL-44 dB","-74 dBm",-44,-73.96,<br>...<br>"RL-114 dB","-144 dBm",-114,-143.96,<br>"RL-115 dB","-145 dBm",-115,-144.96,<br>"RL-116 dB","-146 dBm",-116,-145.96,<br>"RL-117 dB","-147 dBm",-117,-146.96,<br>"RL-118 dB","-148 dBm",-118,-147.96,<br>"RL-119 dB","-149 dBm",-119,-148.96,<br>"RL-120 dB","-150 dBm",-120,-149.96,<br>0; |





## 6 Stream Communication



*Applies only for devices with an Ethernet connector*

### Definitions

The following terms are used to describe the streaming communication.

| Term                   | Explanation                                                                                                                                                                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stream                 | A Stream consists of one or more data packets transmitted automatically one after the other.                                                                                                                                                                                                                               |
| Stream Identifier (ID) | The Stream ID determines which data packets belong to a particular Stream. Several Streams transmitted in parallel can each be uniquely identified using the Stream ID in the Header.                                                                                                                                      |
| Data packet            | A data packet is transmitted as an entity and consists of Header, Context and Data items. The Context or Data items may be empty in some cases.                                                                                                                                                                            |
| Header                 | The Header is a defined data structure at the start of each data packet and has the same format for all Streams that are being transmitted.                                                                                                                                                                                |
| Context                | The Context differs from Stream to Stream and contains additional information about the data items.<br><br>Example Context data:<br>The Context of an IQ Stream contains: Sample rate, RBW, Fcent                                                                                                                          |
| Data item              | Data items are the actual payload data in a data packet and differ in structure and number from Stream to Stream.<br>An individual data item consists of a single value or a structure containing various values, depending on the Stream.<br><br>Example data item:<br>An IQ data item consists of the two values I and Q |
| Data item format       | The data item format determines the basic data types (e.g. INT16, FLOAT32) that make up a data element.                                                                                                                                                                                                                    |
| Packet Counter         | The Packet Counter numbers the individual data packets consecutively. This enables the receiver to determine whether all the data packets were received.                                                                                                                                                                   |
| Endianness             | Endianness describes the way that the bytes in the basic data types (e.g. INT16, FLOAT32) are arranged in memory.<br>The byte arrangement for Microsoft Windows based systems is little endian.                                                                                                                            |
| Streamlink             | The Streamlink is a data connection for transmitting a Stream.                                                                                                                                                                                                                                                             |
| Remotelink             | The Remotelink is used to configure and control the device settings and the Stream transmitted by the device.                                                                                                                                                                                                              |

## General information

A Stream consists of one or more data packets transmitted automatically one after the other. A data packet is transmitted as an entity and consists of Header, Context and Data items. The Context or Data items may be empty in some cases.

### Example: Structure of a data packet

|        |         |            |
|--------|---------|------------|
| Header | Context | Data items |
|--------|---------|------------|

The Header is identical for all data packets in a Stream.

The Stream ID in the Header determines the size and structure of the Context and the Data items.

The Header, Context and data items are always transmitted together as a packet.

### Note

Unknown packets have to be filtered out and ignored using the Header information.

### Example: IQ Data packets in a Stream

|    |  |  |    |  |  |    |  |  |    |  |  |  |    |  |  |    |  |  |
|----|--|--|----|--|--|----|--|--|----|--|--|--|----|--|--|----|--|--|
| IQ |  |  | IQ |  |  | ?? |  |  | IQ |  |  |  | IQ |  |  | ?? |  |  |
|----|--|--|----|--|--|----|--|--|----|--|--|--|----|--|--|----|--|--|

## Streamlink and Remotelink

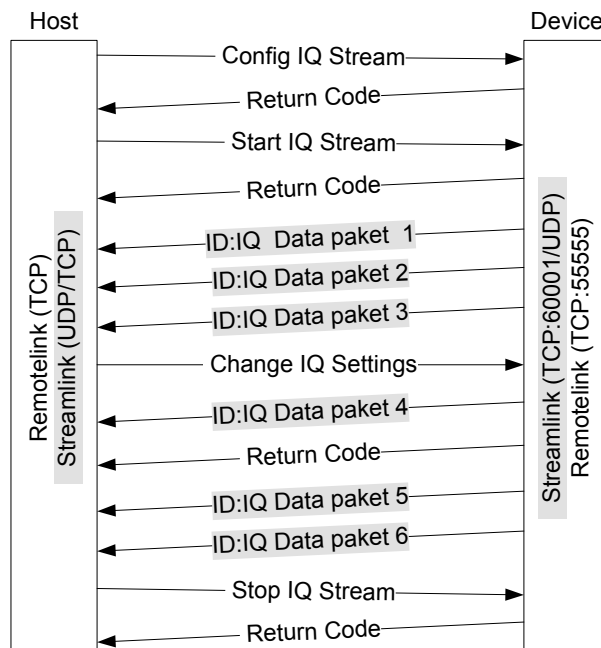
A Remotelink and a Streamlink are used for Stream communication.

The Remotelink consists of the ASCII remote commands described in this document.

The Streamlink consists of the binary data packets for one or more Streams.

The Streamlink is configured and controlled by the Remotelink.

### Example: Remotelink and Streamlink between host and device



## General Stream Header

### Description

The Header is a defined data structure at the start of each individual data packet and has the same format for all the Streams that are being transmitted.

Together with the Stream Version, the Stream ID is used to uniquely identify the data contents. This makes it possible to implement a receiver routine that distinguishes between different Stream IDs and Stream Versions so they can be processed.

The packet counter is used to verify the transmitted data. Each data packet transmitted is numbered consecutively before it is sent. This enables the receiver to detect whether data packets have been lost or is out of sequence.

### Header format

| Parameter     | Type  | Bytes | Description                                                                  |
|---------------|-------|-------|------------------------------------------------------------------------------|
| ByteOrder     | Word  | 2     | 0x55AA = little endian<br>0xAA55 = big endian (not supported)                |
| HeaderVersion | Word  | 2     | Header version<br>0x0001 = Stream Header Version 1                           |
| StreamID      | Word  | 2     | Stream identifier<br>0x0001 = Stream IQ<br>0x0002 = Stream Audio             |
| StreamVersion | Word  | 2     | Version for context and data items<br>0x0001 = Version 1 (of e.g. Stream IQ) |
| Reserved      | Word  | 2     | Reserved for later use                                                       |
| Reserved      | Word  | 2     | Reserved for later use                                                       |
| PacketCounter | DWord | 4     | Packet counter for lost packet detection                                     |
| SizeOfContext | DWord | 4     | Number of bytes for the context data                                         |
| NumberOfItems | DWord | 4     | Number of data items                                                         |
| SizeOfItem    | DWord | 4     | Size of a single data item                                                   |
| Reserved      | DWord | 4     | Reserved for later use                                                       |

## IQ Stream Context

### Description

The IQ Stream Context is a defined data structure which is transmitted in an IQ data packet after the Header. The size of the Context structure is specified by the SizeOfContext data field in the Header.

The timestamp consists of the two data fields IntegerSeconds and FractionalSeconds. The time is based on the device RTC (real time clock). The RTC must be set anew after every device start using remote commands (DATE; TIME;). The timestamp is synchronized with the RTC once when the IQ Stream is started and is then computed with sample accuracy for each transmitted data packet until the IQ Stream is stopped.

The EventFlags 0x00000001, 0x00000002, 0x00000004 and 0x00000008 are important for the assessment of measurement result quality. The EventFlags bit 0x00000004 is set after every parameter change and remains set until the measurement data capture function is stable again.

## IQ context format

| Parameter         | Type   | Bytes | Description                                                                                                                                                                                                                                                                                                               |
|-------------------|--------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IntegerSeconds    | DWord  | 4     | Integer second part of the timestamp in UTC seconds since January 1, 1970 (without leap seconds).                                                                                                                                                                                                                         |
| FractionalSeconds | DWord  | 4     | Nanosecond part of the timestamp to add to the second part.                                                                                                                                                                                                                                                               |
| EventFlags        | DWord  | 4     | 0x00000001 = Indicates a ADC input Overrange<br>0x00000002 = Samples lost indicator<br>0x00000004 = Indicates measurement hardware is not settled<br>0x00000008 = Indicates a measurement hardware error<br>0x40000000 = Indicates the first packet of the stream<br>0x80000000 = Indicates the last packet of the stream |
| ChangeFlags       | DWord  | 4     | The ChangeFlags are automatically reset when measurement hardware is settled.<br>0x00000001 = Fcent changed<br>0x00000002 = RL, Attenuator changed<br>0x00000004 = Scale to Unit value changed                                                                                                                            |
| DataltemFormat    | Word   | 2     | 0x0002 = INT16<br>0x0009 = FLOAT32                                                                                                                                                                                                                                                                                        |
| Unit              | Word   | 2     | Units for data elements multiplied with ScaleToUnit<br>0x0011 = V<br>Units for later use only<br>0x000A = V/m<br>0x000B = A/m                                                                                                                                                                                             |
| ScaleToUnit       | Float  | 4     | Multiply data elements with this value to convert to unit                                                                                                                                                                                                                                                                 |
| SampleRate        | Float  | 4     | IF sample rate [Hz]                                                                                                                                                                                                                                                                                                       |
| RBW               | Float  | 4     | IF bandwidth [Hz]                                                                                                                                                                                                                                                                                                         |
| Fcent             | Double | 8     | Center frequency [Hz]                                                                                                                                                                                                                                                                                                     |
| RL                | Float  | 4     | Reference level (Measurement Range) [Unit]                                                                                                                                                                                                                                                                                |
| Attenuator        | Float  | 4     | Attenuator 0...50 dB                                                                                                                                                                                                                                                                                                      |
| Temperature       | Float  | 4     | Degrees °C measured on RF Hardware                                                                                                                                                                                                                                                                                        |

## IQ Stream Data Items

The IQ Stream data items are a definite data structure which is transmitted in an IQ data packet after the Context.

The size of the data items' structure is defined by the NumberOfItems and SizeOfItems data fields in the header.

Depending on the RBW setting, the IQ data items are transmitted as contiguous pairs of values either in INT16 (word) format or in FLOAT32 (float) format. The number of data items in a data packet depends on the RBW and is a maximum of 2048 IQ value pairs in the particular data format.

### Note

The data items are transmitted in a RAW format.

Each RAW value must be multiplied by the ScaleToUnit factor to convert the RAW value to the selected units:

## Command Reference Guide

### Stream Communication

---

Example:  $I/Q_{\text{Unit}}[n] = I/Q_{\text{RAW}}[n] * \text{ScaleToUnit}$

#### IQ data item format: INT16 (RBW $\geq$ 40kHz)

| Parameter        | Type | Bytes | Description                 |
|------------------|------|-------|-----------------------------|
| I[1]             | Word | 2     | First in-phase data item    |
| Q[1]             | Word | 2     | First quadrature data item  |
| I[2]             | Word | 2     | Second in-phase data item   |
| Q[2]             | Word | 2     | Second quadrature data item |
| ...              | -    | -     | -                           |
| ...              | -    | -     | -                           |
| I[NumberOfItems] | Word | 2     | Last in-phase data item     |
| Q[NumberOfItems] | Word | 2     | Last quadrature data item   |

#### IQ data item format: FLOAT32 (RBW $<$ 40kHz)

| Parameter        | Type  | Bytes | Description                 |
|------------------|-------|-------|-----------------------------|
| I[1]             | Float | 4     | First in-phase data item    |
| Q[1]             | Float | 4     | First quadrature data item  |
| I[2]             | Float | 4     | Second in-phase data item   |
| Q[2]             | Float | 4     | Second quadrature data item |
| ...              | -     | -     | -                           |
| ...              | -     | -     | -                           |
| I[NumberOfItems] | Float | 4     | Last in-phase data item     |
| Q[NumberOfItems] | Float | 4     | Last quadrature data item   |

## **Narda Audio Stream Context**

### **Description**

The Audio Stream Context is a defined data structure which is transmitted in an Audio data packet after the Header. The size of the Context structure is specified by the SizeOfContext data field in the Header.

The timestamp consists of the two data fields IntegerSeconds and FractionalSeconds. The time is based on the device RTC (real time clock). The RTC must be set anew after every device start using remote commands (DATE; TIME;). The timestamp is synchronized with the RTC once when the Audio Stream is started and is then computed with sample accuracy for each transmitted data packet until the Audio Stream is stopped.

The EventFlags 0x00000001, 0x00000002, 0x00000004 and 0x00000008 are important for the assessment of measurement result quality. The EventFlags bit 0x00000004 is set after every parameter change and remains set until the measurement data capture function is stable again.

## Command Reference Guide

### Stream Communication

#### Audio stream context format

| Parameter         | Type   | Bytes | Description                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|--------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IntegerSeconds    | DWord  | 4     | Integer second part of the timestamp in UTC seconds since January 1, 1970 (without leap seconds).                                                                                                                                                                                                                                                                |
| FractionalSeconds | DWord  | 4     | Nanosecond part of the timestamp to add to the second part.                                                                                                                                                                                                                                                                                                      |
| EventFlags        | DWord  | 4     | 0x00000001 = Indicates a ADC input Overage<br>0x00000002 = Samples lost indicator<br>0x00000004 = Indicates measurement hardware is not settled<br>0x00000008 = Indicates a measurement hardware error<br>0x00000010 = Indicates a stream error<br>0x40000000 = Indicates the first packet of the stream<br>0x80000000 = Indicates the last packet of the stream |
| ChangeFlags       | DWord  | 4     | The ChangeFlags are automatically reset when measurement hardware is settled.<br>0x00000001 = Fcent changed<br>0x00000002 = Attenuator, RL changed<br>0x00000004 = reserved<br>0x00000008 = Squelch changed<br>0x00000010 = BFO changed                                                                                                                          |
| DataItemFormat    | Word   | 2     | 0x0001 = INT8 (8 Bit Audio)<br>0x0002 = INT16 (16 Bit Audio)                                                                                                                                                                                                                                                                                                     |
| DemodMode         | Word   | 2     | 0x0001 = FM<br>0x0002 = AM<br>0x0003 = CW<br>0x0004 = LSB<br>0x0005 = USB                                                                                                                                                                                                                                                                                        |
| Channels          | Word   | 2     | Number of audio channels                                                                                                                                                                                                                                                                                                                                         |
| BFO               | Float  | 4     | Beat Frequency [Hz] (only for LSB and USB Demodulation)                                                                                                                                                                                                                                                                                                          |
| CW Frequency      | Float  | 4     | CW Frequency [Hz] (only for CW Demodulation)                                                                                                                                                                                                                                                                                                                     |
| Squelch Value     | Float  | 4     | Squelch Threshold Value (not for FM Demodulation)                                                                                                                                                                                                                                                                                                                |
| SampleRate        | Float  | 4     | Audio sample rate [Hz]                                                                                                                                                                                                                                                                                                                                           |
| RBW               | Float  | 4     | Audio bandwidth [Hz]                                                                                                                                                                                                                                                                                                                                             |
| Fcent             | Double | 8     | Center frequency [Hz]                                                                                                                                                                                                                                                                                                                                            |
| Attenuator        | Float  | 4     | Attenuator 0...50 dB                                                                                                                                                                                                                                                                                                                                             |

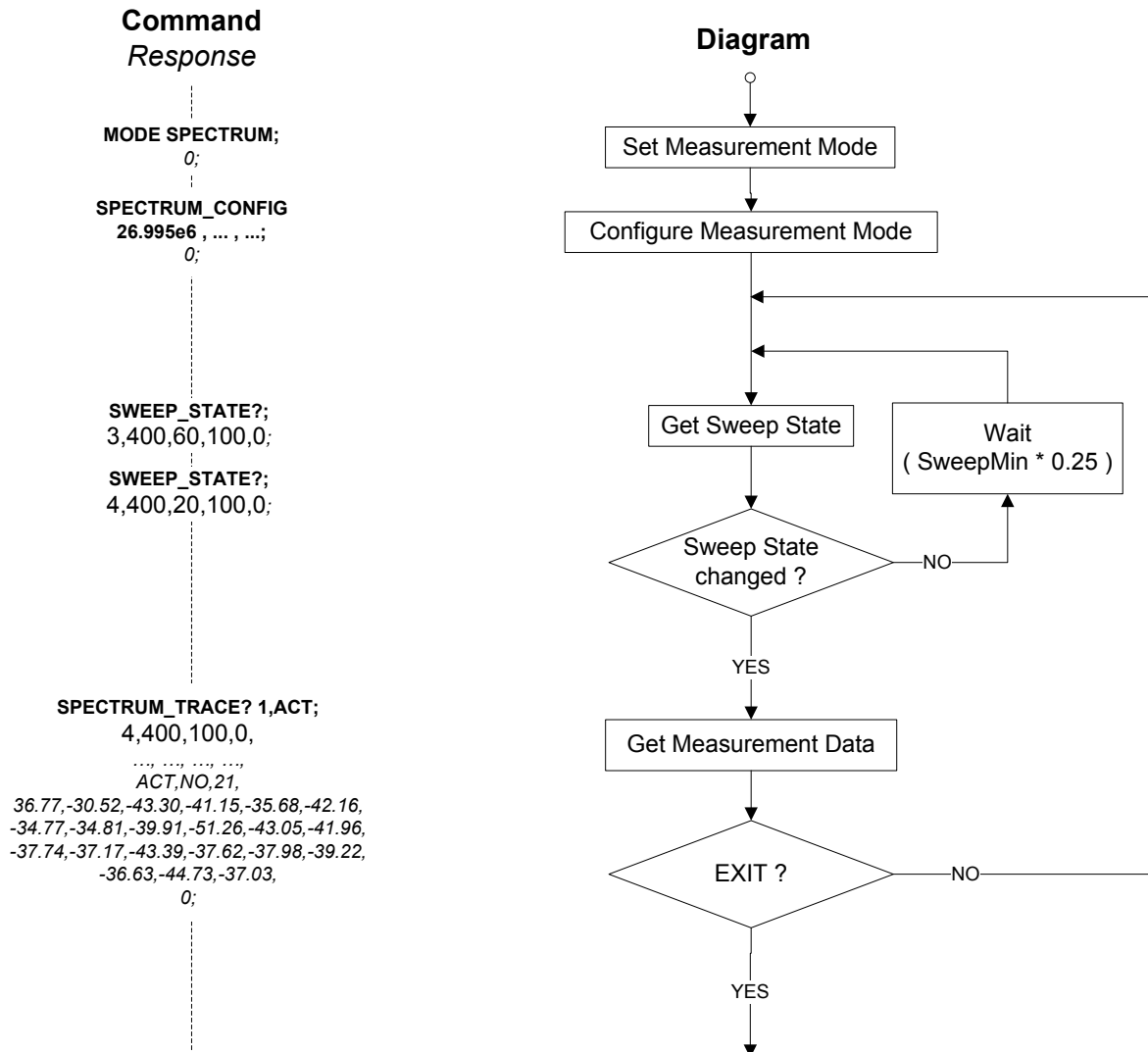


## 7 Programming Examples



To put the device back into default state and to avoid incomprehensible issues we highly recommend using following commands: `DEV_RESET MEAS;` and `DEV_RESET REMOTE;` before implementing those programming examples.

### Spectrum operating mode



#### Calculation of SweepMin:

SweepMin is the smallest sweep time of all measurement runs since last parameter change.

SweepMin should be limited between 15ms ... 5000ms after each calculation.

Sweep time = 0 values must be ignored for calculation.

### Multi-Channel Power operating mode

#### Command Response

```

MODE MCP;
0;

MCP_CONFIG
ON,AUTO,200000,20;
0;

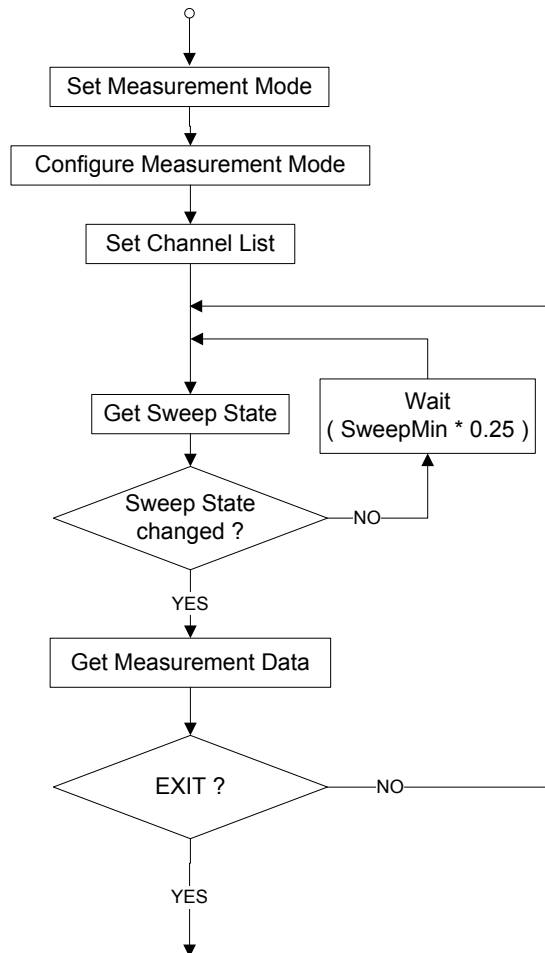
SRV_SEL "MyTable"
0;

SWEEP_STATE?;
3,400,100,100,0;

SWEEP_STATE?;
4,400,100,100,0;

MCP? ACT;
4,400,100,0,ON,AUTO,1,
ACT,NO,-42.15,UNCHECKED,-999.00,UNCHECKED,2,
-44.23,UNCHECKED,"Srv_0000",200000,99500000,100500000,
-46.34,UNCHECKED,"Srv_0001",200000,100500000,101500000,
0;
    
```

#### Diagram



#### Calculation of SweepMin:

SweepMin is the smallest sweep time of all measurement runs since last parameter change.

SweepMin should be limited between 15ms ... 5000ms after each calculation.

Sweep time = 0 values must be ignored for calculation.

## Level Meter operating mode

### Command Response

```

MODE LEVEL;
0;

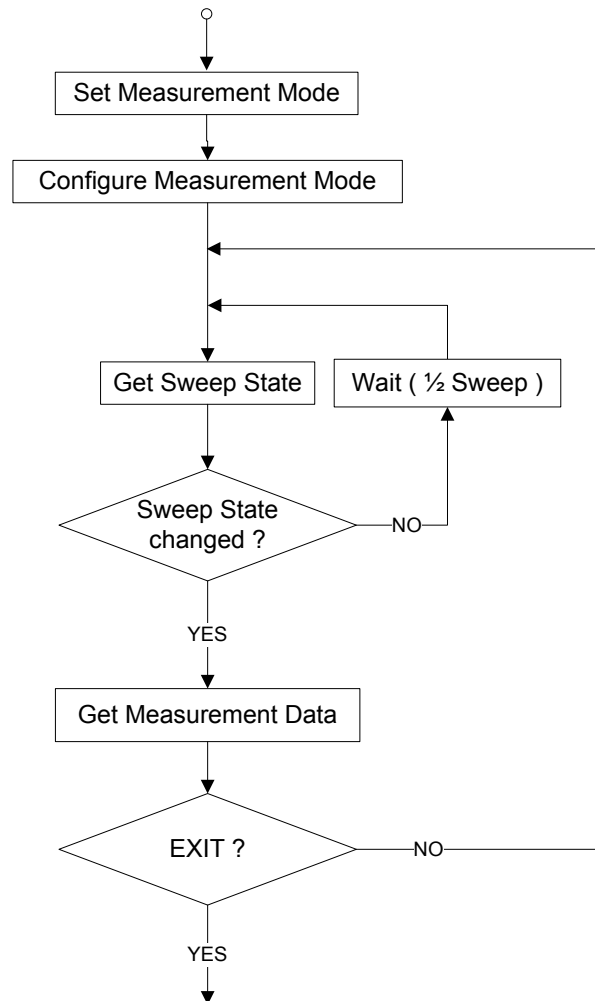
LEVEL_CONFIG
26.995e6,40000,OFF,400,20
0;

SWEEP_STATE?;
3,120,0,100,0;

SWEEP_STATE?;
4,120,0,100,0;

LEVEL? ALL;
4,100,0,4,
RMS,NO,UNCHECKED,-999.00,
MAX_RMS,NO,UNCHECKED,-999.00,
PEAK,NO,UNCHECKED,-54.27,
MAX_PEAK,NO,UNCHECKED,-53.30,
0;
    
```

### Diagram



### Scope Freerun mode

#### Command Response

```

MODE SCOPE;
0;

SCOPE_RESULTTYPE ACTUAL;
0;

SCOPE_CONFIG
26.995e6 , ... , ...;
0;

SCOPE_TRIGGER_CONFIG
FREE_RUN , ... , ...;
0;

SCOPE_STATE?;
30,40,12,0,FREE_RUN,NO,ON,0;

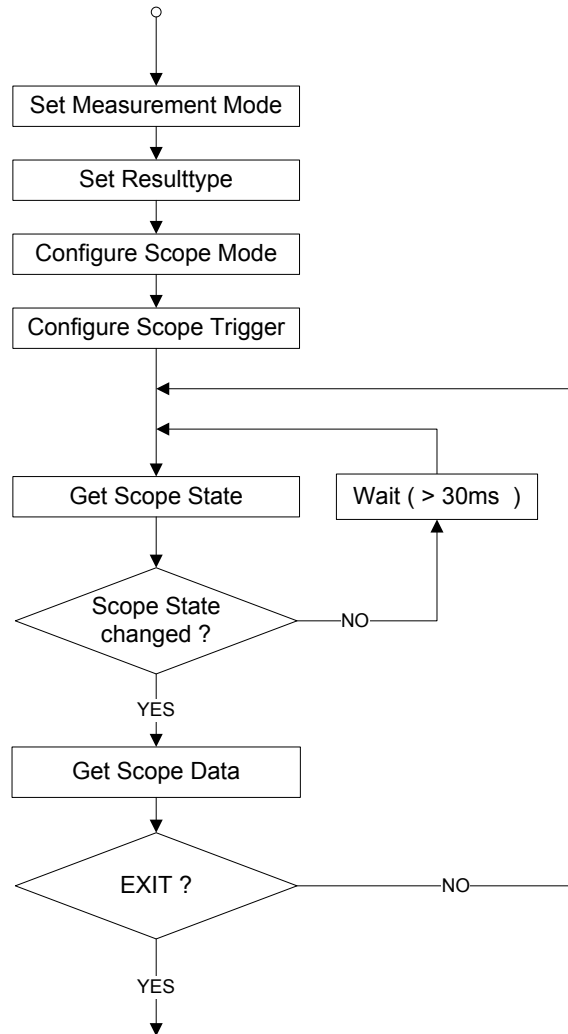
SCOPE_STATE?;
33,40,12,0,FREE_RUN,NO,ON,0;

SCOPE_STATE?;
36,40,12,0,FREE_RUN,NO,ON,0;

SCOPE_STATE?;
2,40,13,0,FREE_RUN,NO,ON,0;

SCOPE?;
6,40,13,0,FREE_RUN,NO,ON,
2.5E-005,1,
ACT,NO,1001,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
0;
    
```

#### Diagram



## Scope Single Trigger mode

### Command Response

```

MODE SCOPE;
0;

SCOPE_RESULTTYPE ACTUAL;
0;

SCOPE_CONFIG
26.995e6 , ... , ...;
0;

SCOPE_TRIGGER_CONFIG
SINGLE , -30 , POSITIV , ...;
0;

SCOPE_TRIGGER_ARM;
0;

SCOPE_STATE?;
30,40,0,0,SINGLE,ARMED,ON,0;

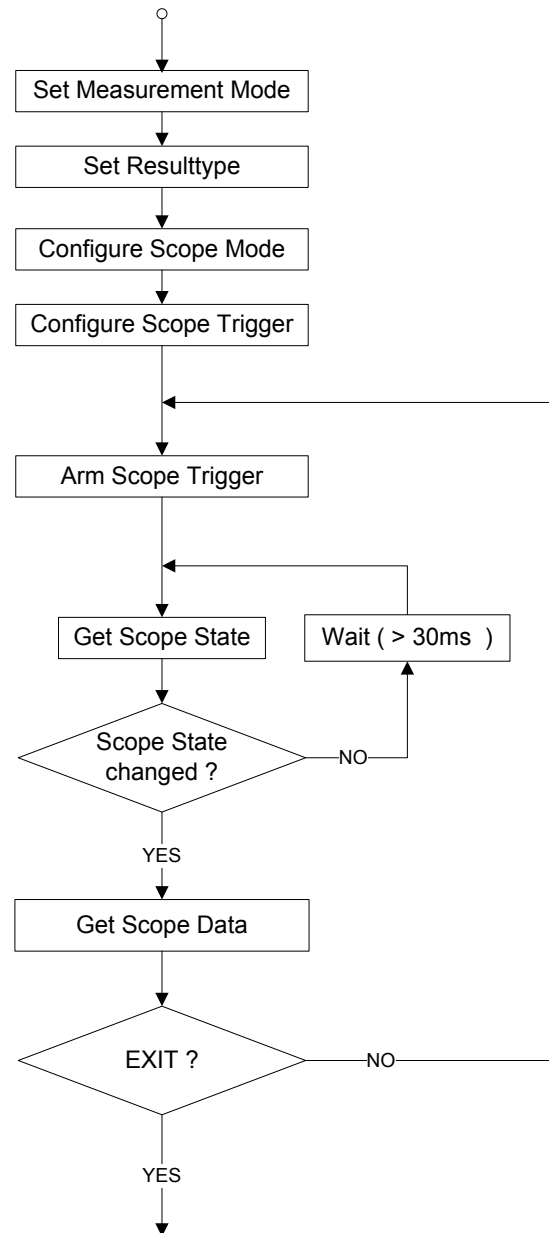
SCOPE_STATE?;
33,40,0,0,SINGLE,ARMED,ON,0;

SCOPE_STATE?;
36,40,0,0,SINGLE,TRIGGERED,ON,0;

SCOPE_STATE?;
3,40,1,1,SINGLE,STOPPED,ON,0;

SCOPE?;
8,40,1,1,SINGLE,STOPPED,ON,
2.5E-005,1,
ACT,NO,1001,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
... ..
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
0;
    
```

### Diagram



### Scope Multi Trigger mode

**Command Response**

```

MODE SCOPE;
0;

SCOPE_RESULTTYPE ACTUAL;
0;

SCOPE_CONFIG
26.995e6 , ... , ...;
0;

SCOPE_TRIGGER_CONFIG
MULTI , -30 , POSITIV , ...;
0;

SCOPE_TRIGGER_ARM;
0;

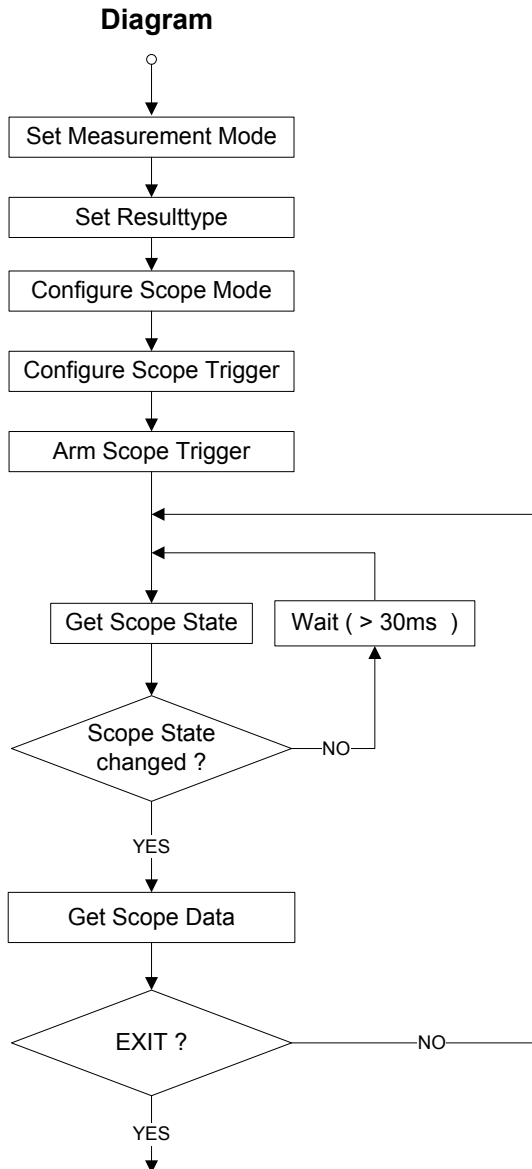
SCOPE_STATE?;
0,40,0,0,MULTI,ARMED,ON,0;

SCOPE_STATE?;
0,40,0,0,MULTI,ARMED,ON,0;

SCOPE_STATE?;
0,40,0,0,MULTI,TRIGGERED,ON,0;

SCOPE_STATE?;
0,40,1,1,MULTI,WAIT_NEXT_TRIGGER,ON,0;

SCOPE?;
0,40,1,1,MULTI,WAIT_NEXT_TRIGGER,ON,
2.5E-005,1,
ACT,NO,1001,
-110,-113,-113, -110,
-110,-113,-113, -110,
-110,-113,-113, -110,
... ..
-110,-113,-113, -110,
-110,-113,-113, -110,
-110,-113,-113, -110,
0;
    
```



## Scope User Trigger mode

### Command Response

```

MODE SCOPE;
0;

SCOPE_RESULTTYPE ACTUAL;
0;

SCOPE_CONFIG
26.995e6 , ... , ...;
0;

SCOPE_TRIGGER_CONFIG
USER , -30 , POSITIV , ...;
0;

SCOPE_TRIGGER_ARM;
0;

SCOPE_STATE?;
30,40,0,0,USER,TRIGGERED,ON,0;

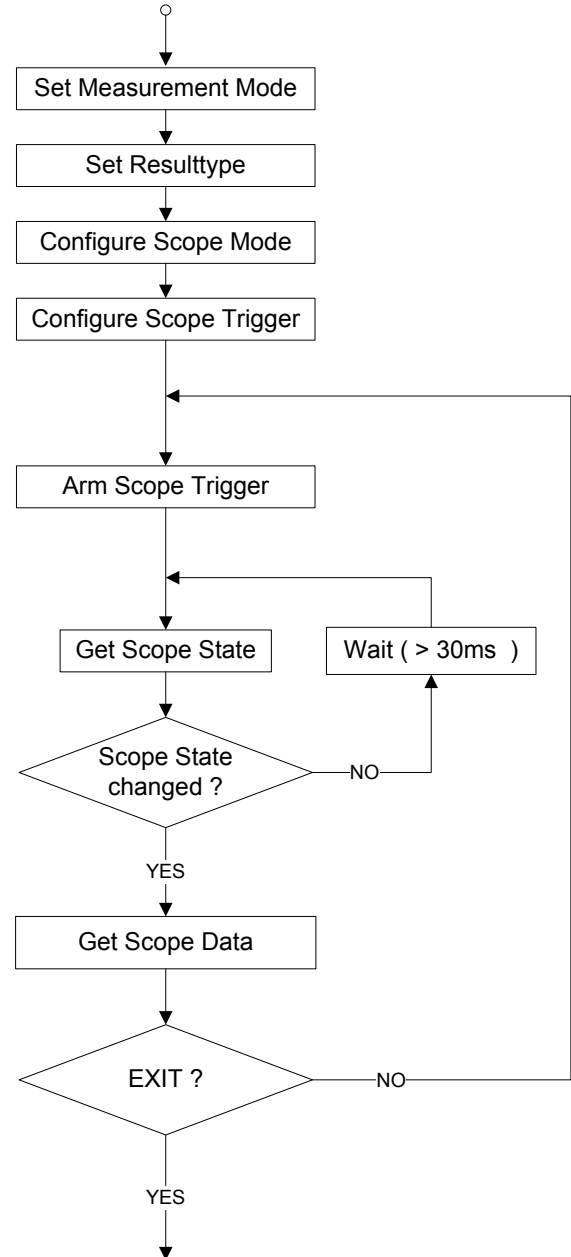
SCOPE_STATE?;
33,40,0,0,USER,TRIGGERED,ON,0;

SCOPE_STATE?;
36,40,0,0,USER,TRIGGERED,ON,0;

SCOPE_STATE?;
3,40,1,1,USER,STOPPED,ON,0;

SCOPE?;
6,40,1,1,USER,STOPPED,ON,
2.5E-005,1,
ACT,NO,1001,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
..., ..., ...,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
0;
    
```

### Diagram



### Scope Time Trigger mode

#### Command Response

```

MODE SCOPE;
0;

SCOPE_RESULTTYPE ACTUAL;
0;

SCOPE_CONFIG
26.995e6 , ... , ...;
0;

SCOPE_TRIGGER_CONFIG
TIME , -30 , POSITIV , -10 ,
21.04.11 , 12:30:59 ;
0;

SCOPE_TRIGGER_ARM;
0;

SCOPE_STATE?;
30,40,0,0,TIME,ARMED,ON,0;

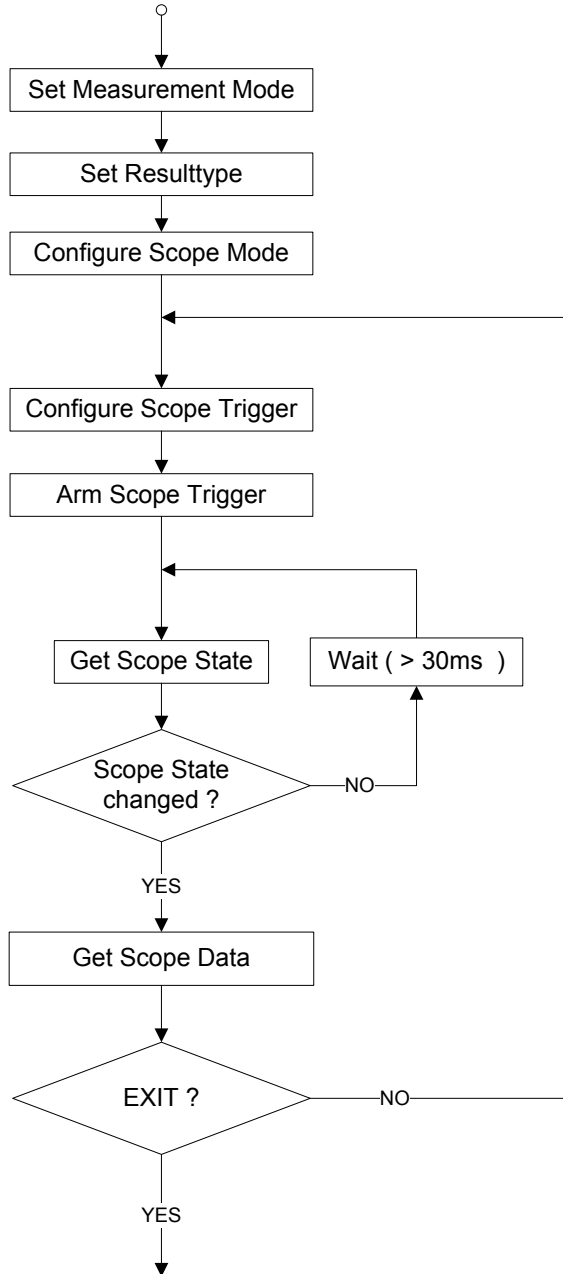
SCOPE_STATE?;
33,40,0,0,TIME,ARMED,ON,0;

SCOPE_STATE?;
36,40,0,0,TIME,TRIGGERED,ON,0;

SCOPE_STATE?;
4,40,1,1,TIME,STOPPED,ON,0;

SCOPE?;
6,40,1,1,TIME,STOPPED,ON,
2.5E-005,1,
ACT,NO,1001,
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
... , ... , ... , ...
-110,-113,-113,-110,
-110,-113,-113,-110,
-110,-113,-113,-110,
0;
    
```

#### Diagram





## Using the LNB control feature

**Command Response**

```

LNB_CTRL ON;
0;

LNB_CTRL Reset;
0;

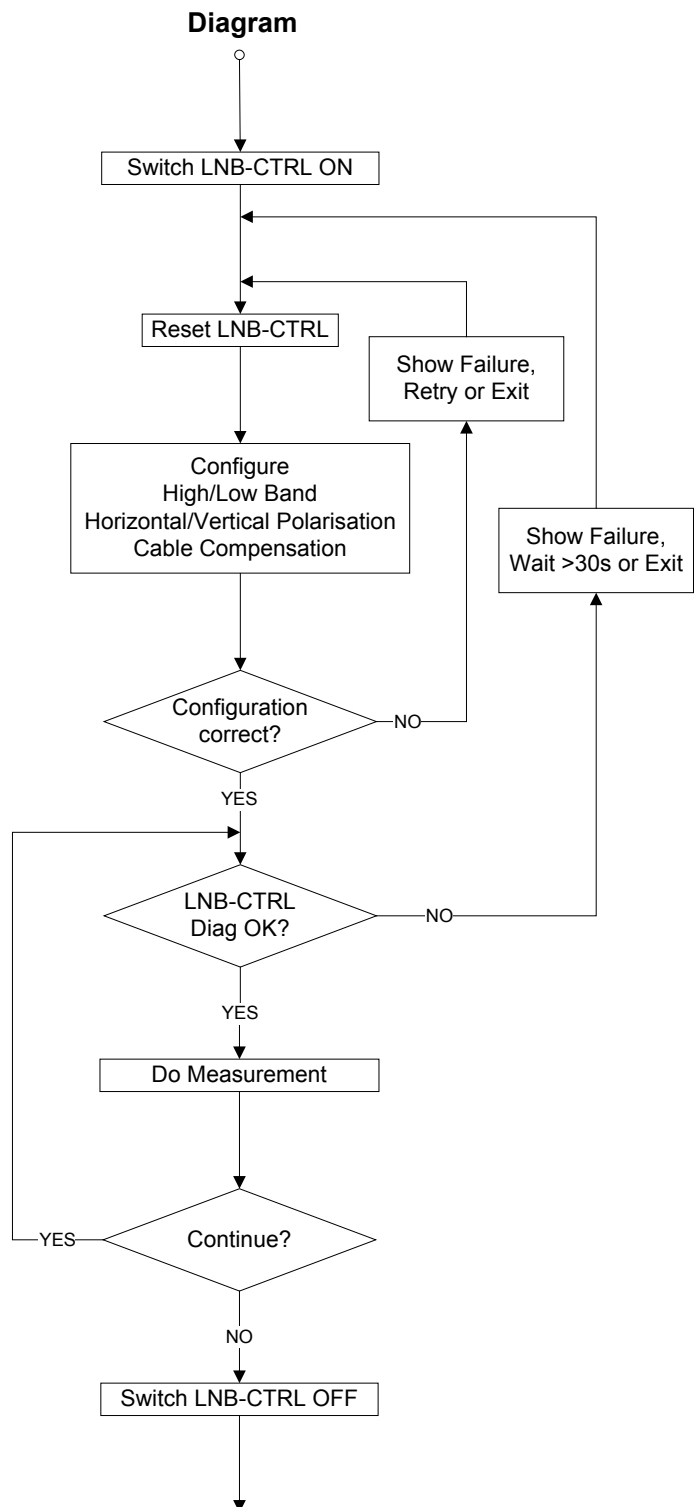
LNB_CTRL_BAND HIGH;
0;
LNB_CTRL_POL VERTICAL;
0;
LNB_CTRL_VOLTAGE_CORRECTION OFF;
0;

LNB_CTRL_BAND?;
HIGH,0;
LNB_CTRL_POL?;
VERTICAL,0;
LNB_CTRL_VOLTAGE_CORRECTION?;
OFF,0;

LNB_CTRL_DIAG?;
NO,NO,0;

SPECTRUM? ACT;
4,400,100,0,
..., ..., ...,
ACT,NO,21,
36.77,-30.52,-43.30,-41.15,-35.68,-42.16,
-34.77,-34.81,-39.91,-51.26,-43.05,-41.96,
-37.74,-37.17,-43.39,-37.62,-37.98,-39.22,
-36.63,-44.73,-37.03,
0;

LNB_CTRL OFF;
0;
    
```



### Time and date synchronization

The device system time can differ from the local time. In such cases, the device time should be synchronized with the PC clock to ensure that the measurements are time stamped correctly.

The following routine checks the date and time of the device and corrects the settings if necessary.

#### Command Response

```

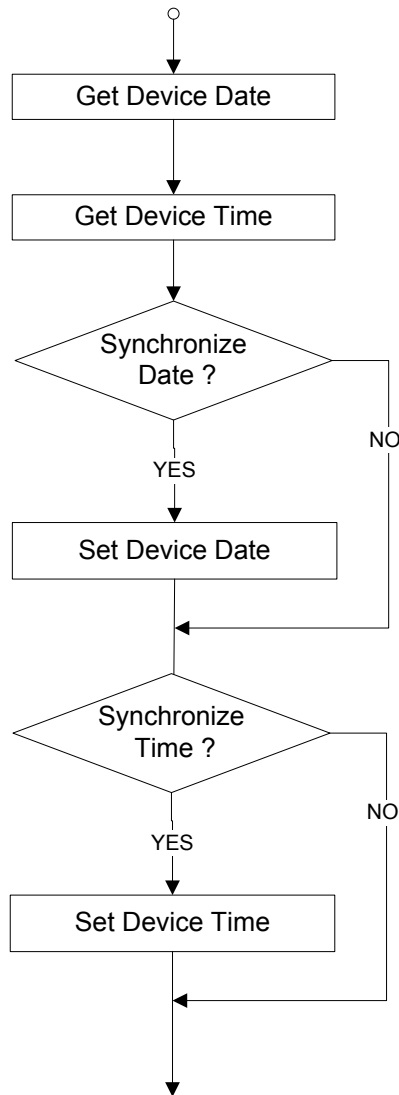
DATE?;
01.01.10,0;

TIME?;
12:00:00,0;

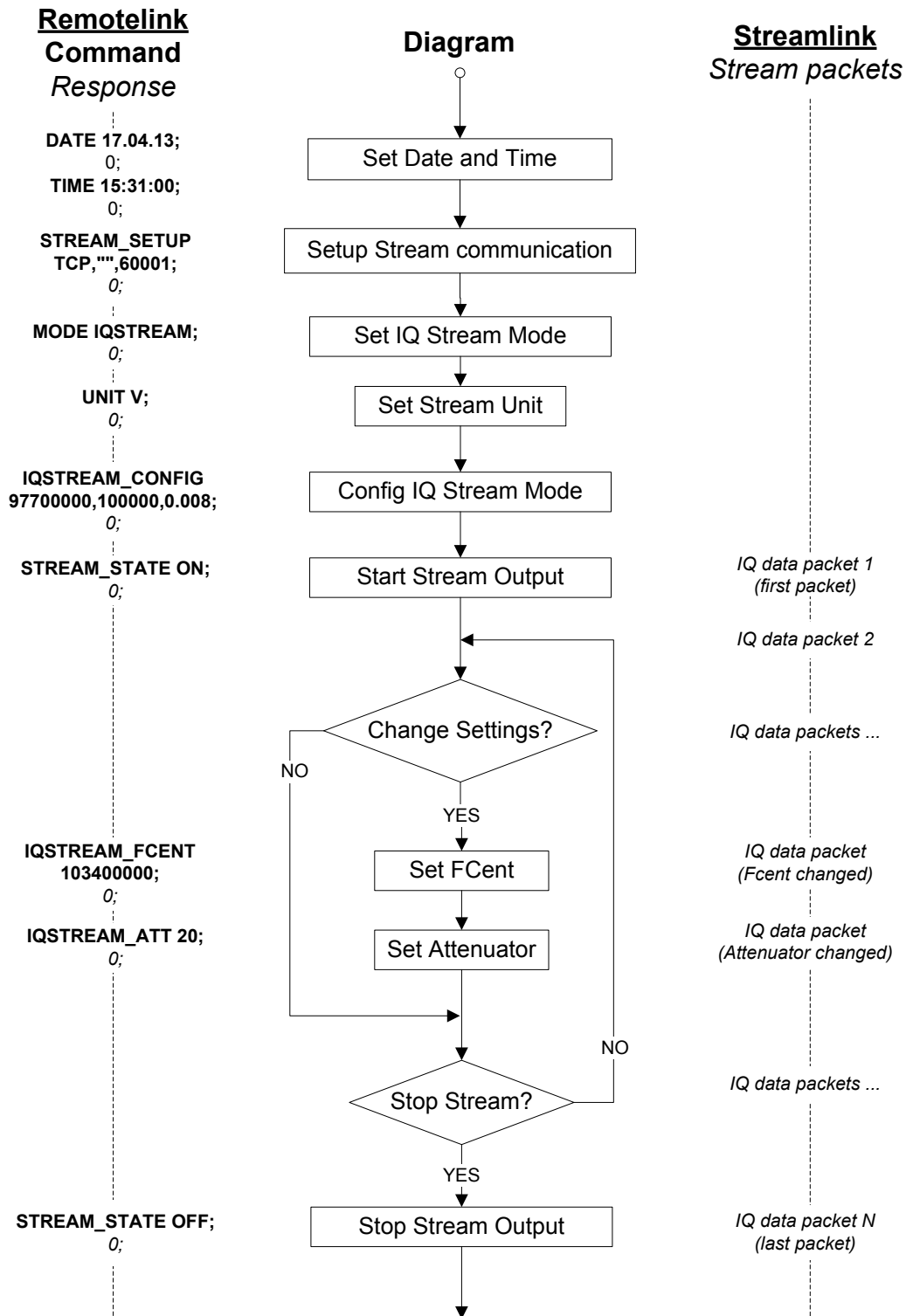
DATE 21.04.10;
0;

TIME 15:31:00;
0;
    
```

#### Diagram



## IQ Stream operating mode



## 8 Appendix

### Synchronizing measured values with the device status

A large number of measured values can occur for certain device settings when e.g. a spectrum is queried. Synchronization with the device status (sweep state or scope state) is necessary to avoid reading the same measurement result several times.

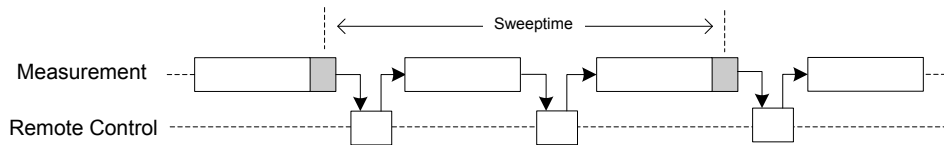
The cycle time (how often the device status should be queried) depends on the measurement parameters and what the user wants to do with the measurement results.

The following diagrams show how the sweep time increases if the sweep state is queried with different cycle times.

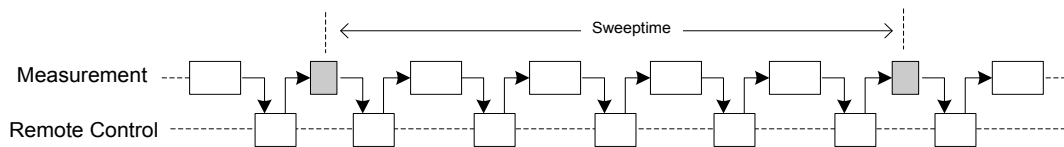
#### Measurement as fast as possible without remote control



#### Measurement with remote control > SweepMin \* 0.25



#### Measurement with remote control < SweepMin \* 0.25



#### Calculation of SweepMin:

**SweepMin** is the smallest sweep time of all measurement runs since last parameter change.

**SweepMin** should be limited between 15ms ... 5000ms after each calculation.

Sweep time = 0 values must be ignored for calculation.

## Relationship of Spectrum mode parameters

### Note

You can check the RF-board version by using the command "VERSION? RF;".

|                             |                                                                                                   |
|-----------------------------|---------------------------------------------------------------------------------------------------|
| Number of BINs:<br>(values) | $\text{BINs} = 1 + \text{ceil} ( F_{\text{Span}} / dF ) \approx 2 * F_{\text{Span}} / \text{RBW}$ |
| Bin limits:                 | 21 ... 632891 (NRA)<br>21 ... 27517 (IDA)                                                         |

| RBW     | SpanMax<br>Single FFT<br>RF-Board 1 | Span Max<br>Single FFT<br>RF-Board 2 | Span Max<br>NRA-6000 RX<br>Multi FFT | Span Max<br>IDA<br>Multi FFT | dF $\approx$ RBW/2<br>[Hz] |
|---------|-------------------------------------|--------------------------------------|--------------------------------------|------------------------------|----------------------------|
| 10 Hz   | 134.2 kHz                           | 134.2 kHz                            | 3.090282 MHz                         | 134.2 kHz                    | 4.8828125                  |
| 20 Hz   | 268.6 kHz                           | 268.6 kHz                            | 6.180566 MHz                         | 268.6 kHz                    | 9.765625                   |
| 30 Hz   | 419.8 kHz                           | 419.8 kHz                            | 9.657134 MHz                         | 419.8 kHz                    | 15.2587890625              |
| 50 Hz   | 699.6 kHz                           | 699.6 kHz                            | 16.095224 MHz                        | 699.6 kHz                    | 25.4313151042              |
| 100 Hz  | 1.399 4 MHz                         | 1.399 4 MHz                          | 32.190450 MHz                        | 1.399 4 MHz                  | 50.8626302083              |
| 200 Hz  | 2.799 0 MHz                         | 2.799 0 MHz                          | 64.380900 MHz                        | 2.799 0 MHz                  | 101.725260417              |
| 300 Hz  | 4.198 6 MHz                         | 4.198 6 MHz                          | 96.571350 MHz                        | 4.198 6 MHz                  | 152.587890625              |
| 500 Hz  | 6.717 6 MHz                         | 6.717 6 MHz                          | 154.514160 MHz                       | 6.717 6 MHz                  | 244.140625                 |
| 1 kHz   | 13.435 4 MHz                        | 13.435 4 MHz                         | 309.028320 MHz                       | 13.435 4 MHz                 | 488.28125                  |
| 2 kHz   | 26.871 0 MHz                        | 22.658 2 MHz                         | 618.056640 MHz                       | 26.871 0 MHz                 | 976.5625                   |
| 3 kHz   | 19.185 2 MHz                        | 19.185 2 MHz                         | 882.938058 MHz                       | 38.387 2 MHz                 | 1395.08928571              |
| 5 kHz   | 16.777 2 MHz                        | 16.777 2 MHz                         | 1.545141600 GHz                      | 67.177 6 MHz                 | 2441.40625                 |
| 10 kHz  | 16.757 8 MHz                        | 16.757 8 MHz                         | 3.090283202 GHz                      | 134.355 4 MHz                | 4882.8125                  |
| 20 kHz  | 16.699 2 MHz                        | 16.699 2 MHz                         | 5.999991 GHz                         | 268.710 8 MHz                | 9765.625                   |
| 30 kHz  | 26.750 0 MHz                        | 22.531 2 MHz                         | 5.999991 GHz                         | 429.937 4 MHz                | 15625                      |
| 50 kHz  | 22.187 4 MHz                        | 22.187 4 MHz                         | 5.999991 GHz                         | 716.562 4 MHz                | 26041.6666667              |
| 100 kHz | 21.979 0 MHz                        | 21.979 0 MHz                         | 5.999991 GHz                         | 1.433 125 GHz                | 52083.3333333              |
| 200 kHz | 21.458 2 MHz                        | 21.458 2 MHz                         | 5.999991 GHz                         | 2.866 250 GHz                | 104166.666667              |
| 300 kHz | 15.312 4 MHz                        | 15.312 4 MHz                         | 5.999991 GHz                         | 4.299 375 GHz                | 156250                     |
| 500 kHz | 24.500 0 MHz                        | 21.500 0 MHz                         | 5.999991 GHz                         | 5.999991 GHz                 | 250000                     |
| 1 MHz   | 22.000 0 MHz                        | 20.000 0 MHz                         | 5.999991 GHz                         | 5.999991 GHz                 | 500000                     |
| 2 MHz   | -                                   | -                                    | 5.999991 GHz                         | 5.999991 GHz                 | 1000000                    |
| 3 MHz   | -                                   | -                                    | 5.999991 GHz                         | 5.999991 GHz                 | 1428571.42857              |
| 5 MHz   | -                                   | -                                    | 5.999991 GHz                         | 5.999991 GHz                 | 2500000                    |
| 10 MHz  | -                                   | -                                    | 5.999991 GHz                         | 5.999991 GHz                 | 5000000                    |
| 20 MHz  | -                                   | -                                    | 5.999991 GHz                         | 5.999991 GHz                 | 10000000                   |

dF is the frequency spacing between two BINs (values) of a dataset.

## Device parameter list

The device can be queried for a list of the possible settings for the RBW, VBW and RL parameters using the following command:

RBW\_LIST?; IQSTREAM\_RBW\_LIST?; VBW\_LIST?; RL\_LIST?; RL\_ATT\_LIST?;

### Note

Information about the various device models can be found in the corresponding data sheet.

## Spectrum Detector Commands

The NRA measures internally using a number of measurement points (BINs) ranging from 21 up to 632891 BINs. The number of internal BINs depends on the frequency range and the selected RBW.

The Detector command adjusts the number of points (N) to a fixed value set by the user. The adjustment of the number of points is exactly to the frequency range ( $F_{\text{Span}}$ ) set by the user with the SPECTRUM\_CONFIG command.

The Spectrum Detector commands are:

```
SPECTRUM_DETECTOR?;  
SPECTRUM_DETECTOR_BINARY?;  
SPECTRUM_DETECTOR_LIST?;
```

The result is a frequency grid with point spacing  $dF_{(N)}$ :

$$dF_{(N)} = F_{\text{Span}} / (N-1)$$

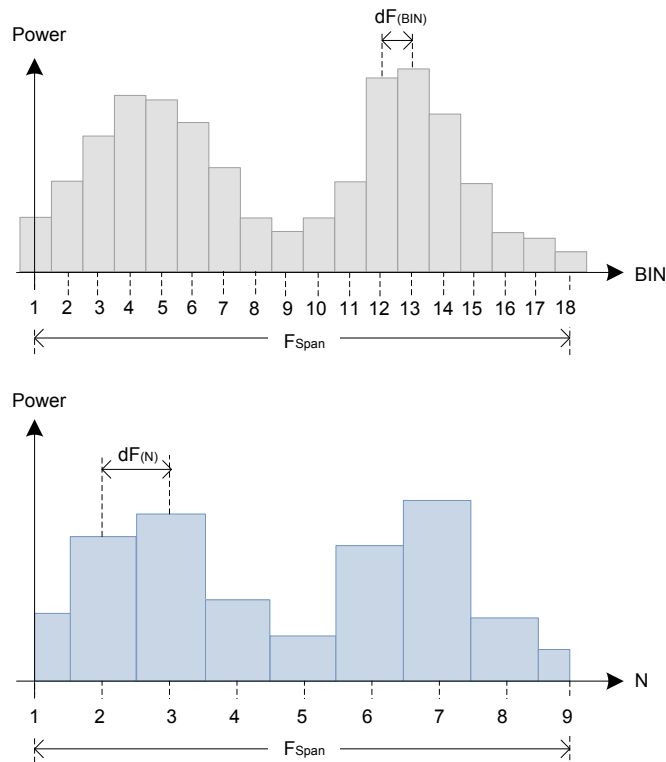
Computation of the desired frequency grid is done either by reducing or spreading the internal BINs to the number of points N set.

Reduction occurs if  $\text{BIN} > N$  or  $dF_{(\text{BIN})} < dF_{(N)}$

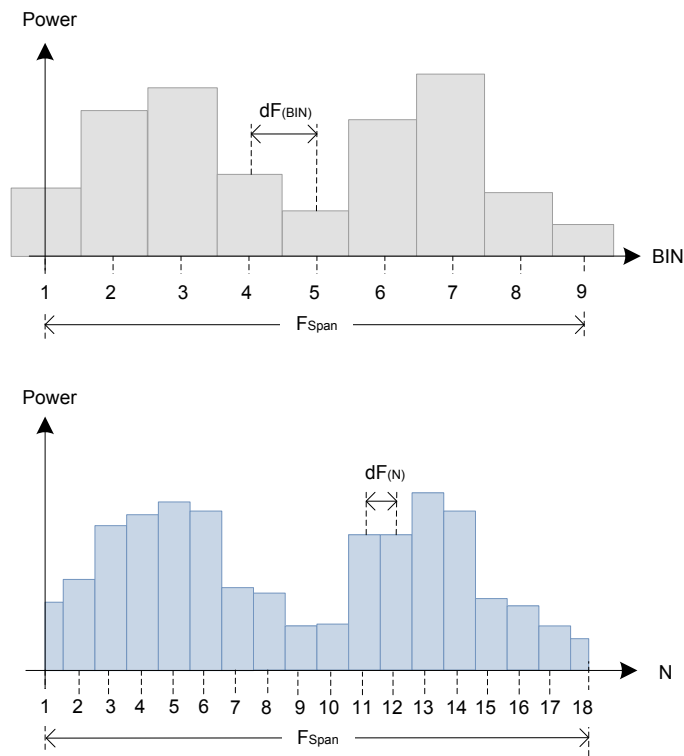
Spreading occurs if  $\text{BIN} < N$  or  $dF_{(\text{BIN})} > dF_{(N)}$

Where  $dF_{(\text{BIN})} = dF_{(N)}$ , the corresponding measurement points are copied one to one.

Example: Reduction with BINs = 18 and N = 9:



Example: Spreading with BINs = 9 and N = 18:





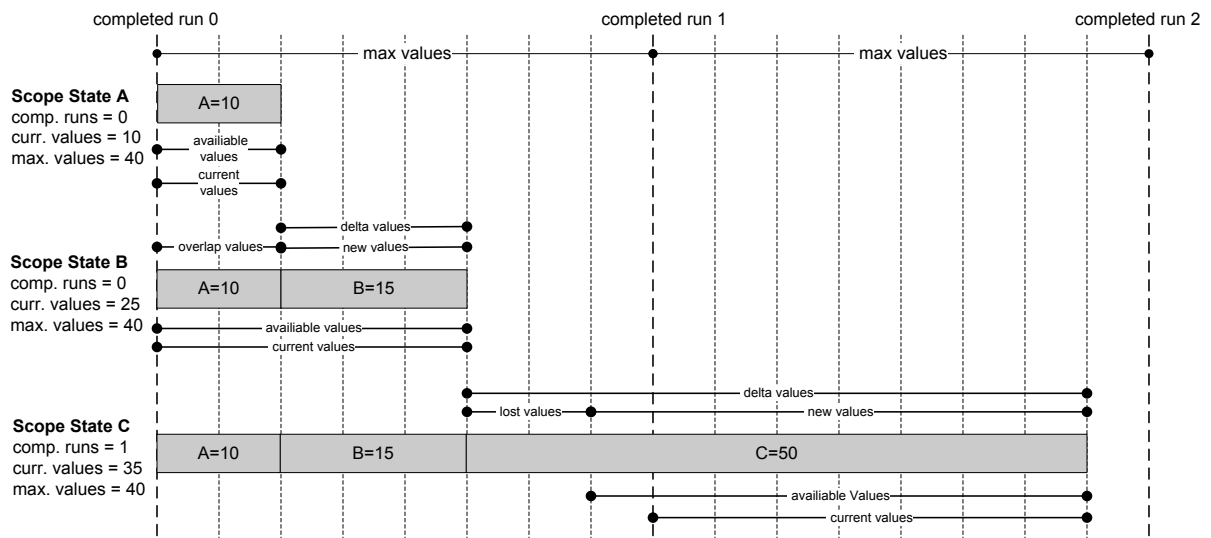
## Scope State calculation

The command `Scope_State?` is useful to check the number of new measurement values since last query. It also provides information about consecutive results to analyze whether the available measurements are gapless, overlapping or data is lost.

The following parameters are required for this type of assessment:

| Parameter       | Type  | Description                                       |
|-----------------|-------|---------------------------------------------------|
| <CurrentValues> | DWord | Counter of values in current sweep                |
| <MaxValues>     | DWord | Counter of values available if sweep is completed |
| <CompletedRuns> | DWord | Counter of completed sweeps                       |

### Template for the calculations



## Calculation Formula

```
DeltaValues = MaxValues * ( CompletedRunsNew - CompletedRunsOld )
              + (CurrentValuesNew - CurrentValuesOld )

if ( CompletedRunsNew == 0 )
{
    NewValues = DeltaValues
    AvailableValues = CurrentValuesNew
    OverlapValues = CurrentValuesOld
    LostValues = 0
}
else
{
    AvailableValues = MaxValues

    if ( DeltaValues > MaxValues )
    {
        NewValues = MaxValues
        OverlapValues = 0
        LostValues = DeltaValues - MaxValues
    }
    else
    {
        NewValues = DeltaValues
        OverlapValues = MaxValues - DeltaValues
        LostValues = 0
    }
}
```

## Scope Trigger States

The trigger function in Scope mode allows you to synchronize the measurement cycle with the signal. The device will provide new measurement data continuously, at a certain signal level or at a certain time, depending on the selected trigger mode. The command `SCOPE_STATE?` returns information about the current state of the measurement. Hereby it is possible to get only specifically requested measurement data from the device. The status evaluation depends on the type of trigger mode being used.

### Scope Freerun

The query provides the latest available measurement values within the actual sweep time.

### Scope Single Trigger

Initially the measurement is in „Freerun“ mode until triggering is activated by sending the command `SCOPE_TRIGGER_ARM`. When activated the measurement data output stops after the first trigger event when the sweep is completed.

### Scope Multi Trigger

Initially the measurement is in „Freerun“ mode until triggering is activated by sending the command `SCOPE_TRIGGER_ARM`. When activated the measurement data output stops after the first trigger event when the sweep is completed. Each subsequent trigger event will refresh the measurement data.

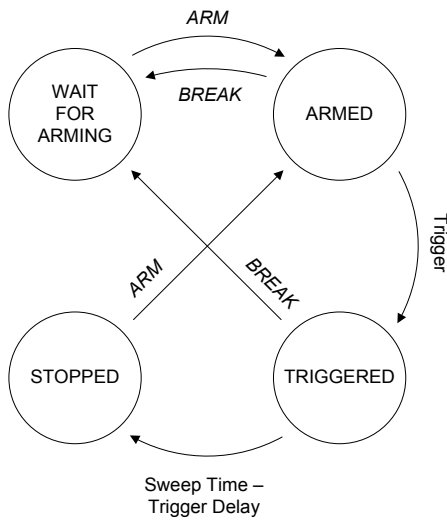
## Scope User Trigger

Initially the measurement is in „Freerun“ mode until triggering is activated and executed once by sending the command SCOPE\_TRIGGER\_ARM. Afterwards the measurement data output stops when the sweep is completed.

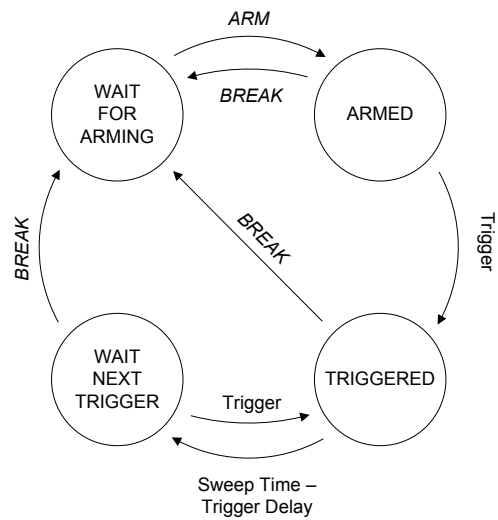
## Scope Time Trigger

Initially the measurement is in „Freerun“ mode until triggering is activated by sending the command SCOPE\_TRIGGER\_ARM. When activated the measurement data output stops after the specified trigger time has been reached and the sweep is completed.

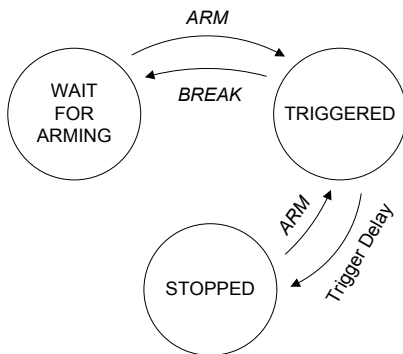
Scope Single Trigger



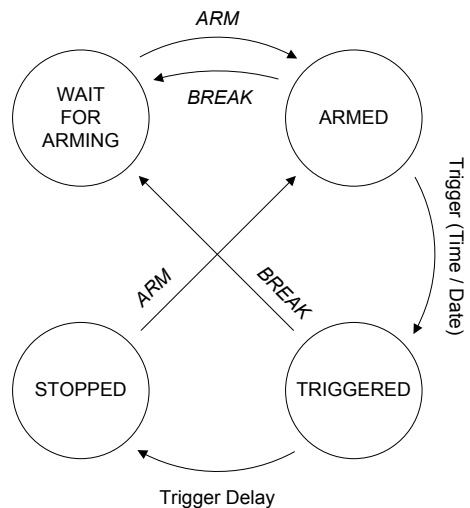
Scope Multi Trigger



Scope User Trigger



Scope Time Trigger



## 9 Glossary / Acronyms

| Term                              | Description                                                                                                                                                                                                                                                                         |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CBW:                              | Channel bandwidth                                                                                                                                                                                                                                                                   |
| HTML                              | HTML stands for HyperText Markup Language and represents a language for describing Internet pages or their elements. Internet browsers are able to interpret this language and thus display the contents of the Internet pages formatted accordingly.                               |
| HTTP                              | HyperText Transfer Protocol is a standard, which describes the transfer of data over a network. It is mainly used to load / transfer web pages from the World Wide Web (WWW) into a web browser.                                                                                    |
| IP address                        | An IP address is a unique computer network address based on the Internet protocol (IP), which is assigned to each device connected to the network (e.g. the Internet) enabling the device to be addressed and therefore accessed (similar to the house number in a postal address). |
| Measurement mode (sub mode):      | A second level of modes/a submenu of modes                                                                                                                                                                                                                                          |
| Narda auto (directional) antenna: | A Narda directional antenna; which is always automatically detected by the device                                                                                                                                                                                                   |
| Narda auto cable:                 | A Narda cable; which is always automatically detected by the device                                                                                                                                                                                                                 |
| NRA                               | Narda Remote Analyzer                                                                                                                                                                                                                                                               |
| NRA Series                        | Series includes: NRA and NRA-RX devices                                                                                                                                                                                                                                             |
| Option:                           | An additional measurement mode that can be enabled on the device by buying an (unlock-) code                                                                                                                                                                                        |
| RBW:                              | Resolution bandwidth                                                                                                                                                                                                                                                                |
| TCP port                          | The TCP port number is part of the device network address. It indicates the application for which the data are intended. The TCP port number is thus comparable to the name of the recipient (addressee) in the analogy of a postal address.                                        |
| User antenna:                     | An external antenna (non-Narda antenna)                                                                                                                                                                                                                                             |
| User cable:                       | An external cable (non-Narda antenna)                                                                                                                                                                                                                                               |
| VBW:                              | Video bandwidth                                                                                                                                                                                                                                                                     |
| Web application                   | A web application is an application that uses a web browser as its user interface, whereby the actual processing is done on the server.                                                                                                                                             |
|                                   |                                                                                                                                                                                                                                                                                     |

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