

LibreVNA SCPI Programming Guide

December 2, 2025

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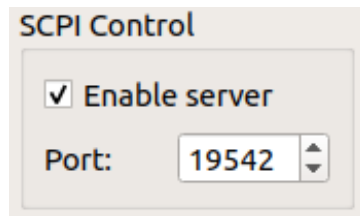
6 Streaming data 75

1 Introduction

The LibreVNA-GUI contains a TCP server that can be used to control the LibreVNA with SCPI commands.

2 SCPI Server Configuration

The server is configurable in the preferences: Window Preferences General



If enabled, it will accept any TCP connection at the configured port. Once the connection is established, it can be used to send SCPI commands and receive replies. Only one connection at a time is possible, if a second connection is created, the first one will be closed by the LibreVNA-GUI. Alternatively, a port can be manually configured by setting the “port” argument:

```
./LibreVNA-GUI --port 1234
```

This enables the SCPI server at the specified port, regardless of what is configured in the preferences (useful for starting multiple instances at different ports at the same time). If no graphical user interface is required, the LibreVNA-GUI can be hidden:

```
./LibreVNA-GUI --port 1234 --no-gui
```

3 General Syntax

The syntax follows the usual SCPI rules:

- All commands are case insensitive (implicitly converted to uppercase before evaluated)
- The command tree is organized in branches, separated by a colon:

```
VNA:TRACE:LIST?
```

- Multiple commands can be concatenated in one line using a semicolon:

```
DEVIce:CONNECT;;DEVIce:INFo:FWRRevision?
```

- If a subsequent command starts with a colon it is evaluated from the root branch, otherwise the last used branch is assumed:

```
VNA:FREQuency:START 1000000;STOP 2000000 #No colon, VNA:FREQuency  
branch was used before
```

- Branches and commands can be abbreviated by using only the uppercase part of their name, the following commands are identical:

```
DEVIce:INFo:LIMits:MINFrequency?  
DEV:INF:LIM:MINF?
```

- Every query generates a response, terminated with a newline character (exceptions exist for a few queries which return more than one line)

- Some commands require additional arguments that have to be passed after the command (separated by spaces):

```
DEV:REF:OUT 10
```

- Two types of commands are available:
 - **Events** change a setting or trigger an action. They have no response
 - **Queries** request information. They end with a question mark.
 Some commands are both events and queries, depending on whether the question mark is present:

```
VNA:FREQ:SPAN 50000000 # Set the span
VNA:FREQ:SPAN? # Read the current span
```

4 Commands

4.1 General Commands

4.1.1 *IDN

Query:

| | |
|----------------------|---|
| Effect: | Returns the identifications string |
| Syntax: | *IDN? |
| Parameters: | None |
| Return value: | LibreVNA,LibreVNA-GUI,<serial>,<software version> |

- The serial number is the serial number from the connected LibreVNA. If none is connected, it will be set to “Not connected”
- The software version is the version of the LibreVNA-GUI, not the firmware version of the connected LibreVNA

4.1.2 *RST

Event:

| | |
|--------------------|--|
| Effect: | Resets the GUI (and any connected device) to the default state |
| Syntax: | *RST |
| Parameters: | None |

4.1.3 *CLS

Event:

| | |
|--------------------|----------------------------------|
| Effect: | Clears the event status register |
| Syntax: | *CLI |
| Parameters: | None |

4.1.4 *ESE

Event:

| | |
|----------------|---|
| Effect: | Configures the event status enable register |
| Syntax: | *ESE |

| | |
|--------------------|------------------------|
| Parameters: | <enabled_bits_decimal> |
|--------------------|------------------------|

Query:

| | |
|----------------------|--|
| Effect: | Returns the event status enable register |
| Syntax: | *ESE? |
| Parameters: | None |
| Return value: | <enabled_bits_decimal> |

4.1.5 *ESR

Query:

| | |
|----------------------|-----------------------------------|
| Effect: | Returns the event status register |
| Syntax: | *ESR? |
| Parameters: | None |
| Return value: | <set_bits_decimal> |

The bits are used according to IEEE 488:

| Bitvalue | Name | Meaning |
|----------|------|-----------------------------------|
| 1 | OPC | Operation complete |
| 2 | RQC | Request control (not used) |
| 4 | QYE | Query error (not used) |
| 8 | DDE | Device dependent error (not used) |
| 16 | EXE | Execution error (not used) |
| 32 | CME | Command error |
| 64 | URQ | User request (not used) |
| 128 | PON | Power on (not used) |

4.1.6 *OPC

Event:

| | |
|--------------------|---|
| Effect: | Sets the OPC bit in the event status register after all operations are complete |
| Syntax: | *OPC |
| Parameters: | None |

Query:

| | |
|----------------------|--|
| Effect: | Returns a 1 after every active operation has completed |
| Syntax: | *OPC? |
| Parameters: | None |
| Return value: | 1 |

4.1.7 *WAI

Event:

| | |
|----------------|---|
| Effect: | Blocks further command parsing until all active operations are complete |
| Syntax: | *WAI |

| | |
|--------------------|------|
| Parameters: | None |
|--------------------|------|

4.1.8 *LST

Query:

| | |
|----------------------|--|
| Effect: | Lists all available commands |
| Syntax: | *LST? |
| Parameters: | None |
| Return value: | List of commands, separated by newline |

4.2 Device Commands

This section contains general device commands, available regardless of the current mode.

4.2.1 DEVIce:DISConnect

Event:

| | |
|--------------------|-----------------------------|
| Effect: | Disconnects from the device |
| Syntax: | DEVIce:DISConnect |
| Parameters: | None |

4.2.2 DEVIce:CONNect

Event:

| | |
|--------------------|---|
| Effect: | Connects to a device. If no serialnumber is specified, the connection is made with the first device found |
| Syntax: | DEVIce:CONNect [<serialnumber>] |
| Parameters: | <serialnumber> Serialnumber of the device that should be connected |

Example

```
:DEV:CONN 206039903350
```

Query:

| | |
|----------------------|---|
| Effect: | Queries the serial number of the connected device |
| Syntax: | DEVIce:CONNect? |
| Parameters: | None |
| Return value: | <serialnumber> or "Not connected" |

Example

```
:DEV:CONN?  
206039903350
```

4.2.3 DEVice:LIST

Query:

| | |
|----------------------|---|
| Effect: | Lists all available devices by their serial numbers |
| Syntax: | DEVice:LIST? |
| Parameters: | None |
| Return value: | List of serialnumbers |

Example

```
:DEV:LIST?  
206039903350,208939A23350
```

4.2.4 DEVice:PREferences

This command provides read/write access to the preferences. The recommended way is usually to change the preferences manually in the GUI. But if for some reason that is not an option, this is also possible through the SCPI server. There is no complete documentation for all available preferences, refer to the source code.

Event:

| | |
|--------------------|---|
| Effect: | Set a preferences entry |
| Syntax: | DEVice:PREferences <name> <value> |
| Parameters: | <name> Name of the preferences entry <value> New value for the preferences entry |

Example

```
:DEV:PREF Startup.ConnectToFirstDevice false
```

Most settings take effect immediately but some (such as changing the port for the SCPI server) are only applied when the preferences are saved. Also see command 4.2.5.

Query:

| | |
|----------------------|--|
| Effect: | Returns a preferences entry |
| Syntax: | DEVice:PREferences? <name> |
| Parameters: | <name> Name of the preferences entry |
| Return value: | Current value of the preferences entry |

4.2.5 DEVice:APPLYPREferences

Event:

| | |
|--------------------|---|
| Effect: | Permanently stores the preferences after a setting has been changed |
| Syntax: | DEVice:APPLYPREferences |
| Parameters: | None |

4.2.6 DEVice:MODE

Event:

| | |
|--------------------|--|
| Effect: | Switches the device to the specified mode |
| Syntax: | DEVIce:MODE <mode> |
| Parameters: | <mode>: VNA: set to vector analyzer GEN: set to signal generator SA: set to spectrum analyzer |

Example

```
: DEV : MODE VNA
```

Query:

| | |
|----------------------|--|
| Effect: | Queries the currently active mode |
| Syntax: | DEVIce:MODE? |
| Parameters: | None |
| Return value: | <mode>: VNA: set to vector analyzer GEN: set to signal generator SA: set to spectrum analyzer |

Example

```
: DEV : MODE ?  
VNA
```

4.2.7 DEVIce:SETUP:SAVE

Event:

| | |
|--------------------|-------------------------------|
| Effect: | Saves the GUI setup to a file |
| Syntax: | DEVIce:SETUP:SAVE |
| Parameters: | <filename> |

Important points when saving/loading setup files through SCPI commands:

- Filenames must be either absolute or relative to the location of the GUI application.
- If the LibreVNA-GUI (and thus also the SCPI server) is running on a different machine than the SCPI client, the setup files will be saved/loaded from the machine that runs the GUI.
- If no (or a wrong) file ending is specified, “.setup” is automatically added to the filename.

4.2.8 DEVIce:SETUP:LOAD

Query:

| | |
|----------------------|--------------------|
| Effect: | Loads a setup file |
| Syntax: | DEVIce:SETUP:LOAD? |
| Parameters: | <filename> |
| Return value: | TRUE or FALSE |

- Filenames must be either absolute or relative to the location of the GUI application.
- The filename must include the file ending “.setup”.

4.2.9 DEVIce:REFeRence:OUT

Event:

| | |
|--------------------|---|
| Effect: | Sets the reference output frequency |
| Syntax: | DEVIce:REFeRence:OUT <freq> |
| Parameters: | <freq> in MHz, either 0 (disabled), 10 or 100 |

Query:

| | |
|----------------------|--|
| Effect: | Queries the reference output frequency |
| Syntax: | DEVIce:REFeRence:OUT? |
| Parameters: | None |
| Return value: | Output frequency in MHz |

4.2.10 DEVIce:REFeRence:IN

Event:

| | |
|--------------------|--|
| Effect: | Set the reference input mode |
| Syntax: | DEVIce:REFeRence:IN <mode> |
| Parameters: | <mode>: INT: use internal reference EXT: use external reference AUTO: automatic reference switching |

Query:

| | |
|----------------------|------------------------------|
| Effect: | Queries the reference source |
| Syntax: | DEVIce:REFeRence:IN? |
| Parameters: | None |
| Return value: | INT or EXT |

4.2.11 DEVIce:STAtus:UNLOcked

Query:

| | |
|----------------------|---------------------------------|
| Effect: | Queries the PLL lock error flag |
| Syntax: | DEVIce:STAtus:UNLOcked? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.2.12 DEVIce:STAtus:ADCOVERload

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the ADC overload error flag |
| Syntax: | DEVIce:STAtus:ADCOVERload? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.2.13 DEVIce:STAtus:UNLEVel

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the output level error flag |
| Syntax: | DEVIce:STAtus:UNLEVel? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.2.14 DEVIce:INFo:FWREVision

Query:

| | |
|----------------------|---|
| Effect: | Returns the firmware revision of the connected device |
| Syntax: | DEVIce:INFo:FWREVision? |
| Parameters: | None |
| Return value: | <major>.<minor>.<patch> |

Example

```
:DEV:INF:FWREV?  
1.0.0
```

4.2.15 DEVIce:INFo:HWREVision

Query:

| | |
|----------------------|---|
| Effect: | Returns the hardware revision of the connected device |
| Syntax: | DEVIce:INFo:HWREVision? |
| Parameters: | None |
| Return value: | <revision>, single char |

Example

```
:DEV:INF:HWREV?  
B
```

4.2.16 DEVIce:INFo:LIMits:MINFrequency

Query:

| | |
|----------------------|---|
| Effect: | Queries the lowest frequency the device can measure |
| Syntax: | DEVIce:INFo:LIMits:MINFrequency? |
| Parameters: | None |
| Return value: | lowest frequency in Hz |

4.2.17 DEVIce:INFo:LIMits:MAXFrequency

Query:

| | |
|----------------|--|
| Effect: | Queries the highest frequency the device can measure |
|----------------|--|

| | |
|----------------------|----------------------------------|
| Syntax: | DEVIce:INFo:LIMits:MAXFrequency? |
| Parameters: | None |
| Return value: | highest frequency in Hz |

4.2.18 DEVIce:INFo:LIMits:MINIFBW

Query:

| | |
|----------------------|---|
| Effect: | Queries the lowest IF bandwidth setting |
| Syntax: | DEVIce:INFo:LIMits:MINIFBW? |
| Parameters: | None |
| Return value: | lowest possible IF bandwidth in Hz |

4.2.19 DEVIce:INFo:LIMits:MAXIFBW

Query:

| | |
|----------------------|--|
| Effect: | Queries the highest IF bandwidth setting |
| Syntax: | DEVIce:INFo:LIMits:MAXIFBW? |
| Parameters: | None |
| Return value: | highest possible IF bandwidth in Hz |

4.2.20 DEVIce:INFo:LIMits:MAXPoints

Query:

| | |
|----------------------|--|
| Effect: | Queries the maximum number of points per sweep |
| Syntax: | DEVIce:INFo:LIMits:MAXPoints? |
| Parameters: | None |
| Return value: | maximum number of points |

4.2.21 DEVIce:INFo:LIMits:MINPOWer

Query:

| | |
|----------------------|----------------------------------|
| Effect: | Queries the minimum output power |
| Syntax: | DEVIce:INFo:LIMits:MINPOWer? |
| Parameters: | None |
| Return value: | minimum output power in dBm |

4.2.22 DEVIce:INFo:LIMits:MAXPOWer

Query:

| | |
|----------------------|----------------------------------|
| Effect: | Queries the maximum output power |
| Syntax: | DEVIce:INFo:LIMits:MAXPOWer? |
| Parameters: | None |
| Return value: | maximum output power in dBm |

4.2.23 DEVice:INFo:LIMits:MINRBW

Query:

| | |
|----------------------|---|
| Effect: | Queries the lowest resolution bandwidth setting |
| Syntax: | DEVice:INFo:LIMits:MINRBW? |
| Parameters: | None |
| Return value: | lowest possible resolution bandwidth in Hz |

4.2.24 DEVice:INFo:LIMits:MAXRBW

Query:

| | |
|----------------------|--|
| Effect: | Queries the highest resolution bandwidth setting |
| Syntax: | DEVice:INFo:LIMits:MAXRBW? |
| Parameters: | None |
| Return value: | highest possible resolution bandwidth in Hz |

4.2.25 DEVice:INFo:LIMits:MAXHARMonicfrequency

Query:

| | |
|----------------------|--|
| Effect: | Queries the (theoretical) maximum frequency when using harmonic mixing in VNA mode |
| Syntax: | DEVice:INFo:LIMits:MAXHARMonicfrequency? |
| Parameters: | None |
| Return value: | maximum frequency in Hz |

4.3 VNA Commands

These commands change or query VNA settings. Although most of them are available regardless of the current device mode, they usually only have an effect once the VNA mode is active (e.g. it is possible to change the span while in signal generator mode but it does not effect the LibreVNA until the mode is switched to VNA). Certain commands (like taking a calibration measurement) are only available in VNA mode and will return an error if another mode is active.

4.3.1 VNA:SWEEP

Event:

| | |
|--------------------|-----------------------------------|
| Effect: | Sets the type of the sweep |
| Syntax: | VNA:SWEEP |
| Parameters: | <type>, either FREQUENCY or POWER |

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the currently selected type |
| Syntax: | VNA:SWEEP? |
| Parameters: | None |
| Return value: | <type>, either FREQUENCY or POWER |

4.3.2 VNA:FREQuency:SPAN

Event:

| | |
|--------------------|----------------------------|
| Effect: | Sets the span of the sweep |
| Syntax: | VNA:FREQuency:SPAN |
| Parameters: | , in Hz |

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the currently selected span |
| Syntax: | VNA:FREQuency:SPAN? |
| Parameters: | None |
| Return value: | span in Hz |

4.3.3 VNA:FREQuency:START

Event:

| | |
|--------------------|---------------------------------------|
| Effect: | Sets the start frequency of the sweep |
| Syntax: | VNA:FREQuency:START |
| Parameters: | <start frequency>, in Hz |

Query:

| | |
|----------------------|--|
| Effect: | Queries the currently selected start frequency |
| Syntax: | VNA:FREQuency:START? |
| Parameters: | None |
| Return value: | start frequency in Hz |

4.3.4 VNA:FREQuency:CENTer

Event:

| | |
|--------------------|--|
| Effect: | Sets the center frequency of the sweep |
| Syntax: | VNA:FREQuency:CENTer |
| Parameters: | <center frequency>, in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected center frequency |
| Syntax: | VNA:FREQuency:CENTer? |
| Parameters: | None |
| Return value: | center frequency in Hz |

4.3.5 VNA:FREQuency:STOP

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the stop frequency of the sweep |
| Syntax: | VNA:FREQuency:STOP |
| Parameters: | <stop frequency>, in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected stop frequency |
| Syntax: | VNA:FREQuency:STOP? |
| Parameters: | None |
| Return value: | stop frequency in Hz |

4.3.6 VNA:FREQuency:FULL

Event:

| | |
|--------------------|--|
| Effect: | Sets the device to the maximum span possible |
| Syntax: | VNA:FREQuency:FULL |
| Parameters: | None |

4.3.7 VNA:FREQuency:ZERO

Event:

| | |
|--------------------|-----------------------------------|
| Effect: | Sets the device to zero span mode |
| Syntax: | VNA:FREQuency:ZERO |
| Parameters: | None |

4.3.8 VNA:POWer:START

Event:

| | |
|--------------------|---|
| Effect: | Sets the start power of the power sweep |
| Syntax: | VNA:POWer:START |
| Parameters: | <start power>, in dBm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the currently selected start power |
| Syntax: | VNA:POWer:START? |
| Parameters: | None |
| Return value: | start power in dBm |

4.3.9 VNA:POWer:STOP

Event:

| | |
|--------------------|--|
| Effect: | Sets the stop power of the power sweep |
| Syntax: | VNA:POWer:STOP |
| Parameters: | <stop power>, in dBm |

Query:

| | |
|----------------|---|
| Effect: | Queries the currently selected stop power |
| Syntax: | VNA:POWer:STOP? |

| | |
|----------------------|-------------------|
| Parameters: | None |
| Return value: | stop power in dBm |

4.3.10 VNA:SWEEPTYPE

Event:

| | |
|--------------------|---|
| Effect: | Selects between linear and logarithmic sweeps |
| Syntax: | VNA:SWEEPTYPE |
| Parameters: | <type>, either “LIN” or “LOG” |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected sweep type |
| Syntax: | VNA:SWEEPTYPE? |
| Parameters: | None |
| Return value: | “LIN” or “LOG” |

4.3.11 VNA:ACQuisition:RUN

Event:

| | |
|--------------------|---|
| Effect: | Puts the VNA into run mode (sweep active) |
| Syntax: | VNA:ACQuisition:RUN |
| Parameters: | None |

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the VNA is in run mode |
| Syntax: | VNA:ACQuisition:RUN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.3.12 VNA:ACQuisition:STOP

Event:

| | |
|--------------------|--|
| Effect: | Puts the VNA into stop mode (sweep inactive) |
| Syntax: | VNA:ACQuisition:STOP |
| Parameters: | None |

4.3.13 VNA:ACQuisition:IFBW

Event:

| | |
|--------------------|-----------------------|
| Effect: | Sets the IF bandwidth |
| Syntax: | VNA:ACQuisition:IFBW |
| Parameters: | <IF bandwidth>, in Hz |

Query:

| | |
|--|--|
| | |
|--|--|

| | |
|----------------------|---|
| Effect: | Queries the currently selected IF bandwidth |
| Syntax: | VNA:ACQuisition:IFBW? |
| Parameters: | None |
| Return value: | IF bandwidth in Hz |

4.3.14 VNA:ACQuisition:POINTS

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the number of points per sweep |
| Syntax: | VNA:ACQuisition:POINTS |
| Parameters: | <points> |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected number of points |
| Syntax: | VNA:ACQuisition:POINTS? |
| Parameters: | None |
| Return value: | points |

4.3.15 VNA:ACQuisition:AVG

Event:

| | |
|--------------------|---|
| Effect: | Sets the number of sweeps over which a moving average is calculated |
| Syntax: | VNA:ACQuisition:AVG |
| Parameters: | <averaging sweeps> |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently configured number of sweeps |
| Syntax: | VNA:ACQuisition:AVG? |
| Parameters: | None |
| Return value: | <averaging sweeps> |

4.3.16 VNA:ACQuisition:AVGLEVel

Query:

| | |
|----------------------|---|
| Effect: | Queries the number of sweeps that have been acquired by the average function. |
| Syntax: | VNA:ACQuisition:AVGLEVel? |
| Parameters: | None |
| Return value: | <acquired sweeps> |

<acquired sweeps> resets to zero whenever a setting is changed. It is incremented at the end of each sweep, but will not go above the number of configured sweeps for the averaging.

Example (assuming <averaging sweep> = 3):

| | | |
|-------------------|--|-------------------|
| # of active sweep | | <acquired sweeps> |
|-------------------|--|-------------------|

| | |
|---|---|
| 1 | 0 |
| 2 | 1 |
| 3 | 2 |
| 4 | 3 |
| 5 | 3 |

4.3.17 VNA:ACQuisition:FINished

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the average filter has reached a steady state (that is <acquired sweeps> = <averaging sweeps>) |
| Syntax: | VNA:ACQuisition:FINished? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.3.18 VNA:ACQuisition:LIMit

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of limits that maybe set up on any graph |
| Syntax: | VNA:ACQuisition:LIMit? |
| Parameters: | None |
| Return value: | PASS or FAIL |

4.3.19 VNA:ACQuisition:SINGLE

Event:

| | |
|--------------------|---|
| Effect: | Configures the VNA for single or continuous sweep |
| Syntax: | VNA:ACQuisition:SINGLE |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the VNA is set up for single sweep |
| Syntax: | VNA:ACQuisition:SINGLE? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

If single sweep is enabled, the acquisition is stopped when the required number of averages have been reached. There are two ways to trigger a new sweep:

- Change any sweep setting (e.g. center frequency)
- Issue the command again (i.e. VNA:ACQ:SINGLE TRUE always triggers a new sweep)

4.3.20 VNA:ACQuisition:FREQuency

Query:

| | |
|----------------|--|
| Effect: | Returns the current frequency of the sweep |
| Syntax: | VNA:ACQuisition:FREQuency? |

| | |
|----------------------|-------------------|
| Parameters: | None |
| Return value: | <Frequency in Hz> |

This command only returns valid data when a sweep is running and the the sweep is a frequency sweep.

4.3.21 VNA:ACQuisition:POWer

Query:

| | |
|----------------------|--|
| Effect: | Returns the current power of the sweep |
| Syntax: | VNA:ACQuisition:POWer? |
| Parameters: | None |
| Return value: | <Power in dBm> |

This command only returns valid data when a sweep is running and the the sweep is a power sweep.

4.3.22 VNA:ACQuisition:TIME

Query:

| | |
|----------------------|---------------------------------------|
| Effect: | Returns the current time of the sweep |
| Syntax: | VNA:ACQuisition:TIME? |
| Parameters: | None |
| Return value: | <Time in seconds> |

This command only returns valid data when a sweep is running and the the sweep is a zero-span sweep.

4.3.23 VNA:STIMulus:LVL

Event:

| | |
|--------------------|---|
| Effect: | Sets the output power of the stimulus signal when sweep type is frequency |
| Syntax: | VNA:STIMulus:LVL |
| Parameters: | <power>, in dBm |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected output power |
| Syntax: | VNA:STIMulus:LVL? |
| Parameters: | None |
| Return value: | power in dBm |

4.3.24 VNA:STIMulus:FREQuency

Event:

| | |
|--------------------|--|
| Effect: | Sets the frequency of the stimulus signal when sweep type is power |
| Syntax: | VNA:STIMulus:FREQuency |
| Parameters: | <freq>, in Hz |

Query:

| | |
|----------------------|--|
| Effect: | Queries the currently selected frequency |
| Syntax: | VNA:STIMulus:FREQuency? |
| Parameters: | None |
| Return value: | frequency in Hz |

4.3.25 VNA:TRACe:LIST

Query:

| | |
|----------------------|---|
| Effect: | Lists the names of all available traces |
| Syntax: | VNA:TRACe:LIST? |
| Parameters: | None |
| Return value: | comma-separated list of trace name |

Example

```
VNA:TRAC:LIST?  
S11,S12,S21,S22
```

4.3.26 VNA:TRACe:DATA

Query:

| | |
|----------------------|--|
| Effect: | Returns the data of a trace |
| Syntax: | VNA:TRACe:DATA? |
| Parameters: | <trace>, either by name or by index |
| Return value: | comma-separated list of tuples [x, real(y), imag(y)] |

Depending on the sweep and possible configured math operations, x may be either frequency, power or time.

Example

```
:VNA:TRAC:DATA? S11  
[1e+6,0.400172,0.0377869],  
[6.67556e+8,-0.0922281,-0.00990373],  
[1.33411e+9,-0.0341439,-0.0331184],  
[2.00067e+9,0.00750893,0.0490847],  
[2.66722e+9,0.0472666,-0.175552],  
[3.33378e+9,-0.106545,-0.00952825],  
[4.00033e+9,-0.102039,0.0890605],  
[4.66689e+9,0.0464292,0.118183],  
[5.33344e+9,0.13223,-0.00780554],  
[6e+9,-0.0314859,-0.246024]
```

Note: actual response will not include newlines between data points, only at the end

4.3.27 VNA:TRACe:AT

Query:

| | |
|----------------------|--|
| Effect: | Returns the data at a specific frequency (possibly interpolated) |
| Syntax: | VNA:TRACe:AT? |
| Parameters: | <trace>, either by name or by index <frequency>, in Hz |
| Return value: | real,imag (or “NaN,NaN” if specified frequency is invalid) |

Example

```
:VNA:TRAC:AT? S11 1200000000
-0.0458452, -0.028729
```

4.3.28 VNA:TRACe:TOUCHSTONE

Query:

| | |
|----------------------|--|
| Effect: | Returns the content of multiple trace according to the touchstone format |
| Syntax: | VNA:TRACe:TOUCHSTONE? |
| Parameters: | <trace1>,<trace2>,<trace3>,... |
| Return value: | Touchstone file content in ASCII |

Some additional constraints apply:

- The number of specified traces must be a square number. The number of ports in the touchstone file is inferred from that.
- Only frequency domain traces are allowed.
- All traces must have the same number of points and the same start/stop frequency.
- The order in which the traces are specified matters and depending on its index and each trace must be a reflection or transmission measurement:
 - Assuming that n is the number of ports of the desired touchstone file, the $n * n$ number of traces must be specified in this order:

$$S_{11}...S_{1n}, S_{21}...S_{2n}, ..., S_{n1}...S_{nn}$$

- For every trace S_{ij} , the trace must contain a reflection measurement if $i = j$ and a transmission measurement if $i \neq j$.
- Traces can be specified either by name or by index.
- A deviation from any of these points (invalid number of traces, non-existing trace, wrong order, ...) will result in an error being returned.

Example

```
:VNA:TRACE:TOUCHSTONE? S11 S12 S21 S22
# GHZ S RI R 50
1.000000000000 1.000497817993 0.010679213330 0.000013886895
-0.000054684886 -0.000023392624 -0.000021111371
0.401717424393 0.702864229679
1.002000000000 1.000323534012 0.010577851906 -0.000011075452
-0.000013504875 0.000000477609 -0.000007789199
0.413144201040 0.696514129639
...
```


4.3.29 VNA:TRACe:MAXFrequency

Query:

| | |
|----------------------|--|
| Effect: | Returns the highest frequency contained in the trace |
| Syntax: | VNA:TRACe:MAXFrequency? |
| Parameters: | <trace>, either by name or by index |
| Return value: | maximum frequency in Hz |

4.3.30 VNA:TRACe:MINFrequency

Query:

| | |
|----------------------|---|
| Effect: | Returns the lowest frequency contained in the trace |
| Syntax: | VNA:TRACe:MINFrequency? |
| Parameters: | <trace>, either by name or by index |
| Return value: | maximum frequency in Hz |

4.3.31 VNA:TRACe:MAXAmplitude

Query:

| | |
|----------------------|---|
| Effect: | Returns the datapoint with the highest amplitude in the trace |
| Syntax: | VNA:TRACe:MAXAmplitude? |
| Parameters: | <trace>, either by name or by index |
| Return value: | <frequency>,<real>,<imag> of the highest amplitude point |

Example

```
:VNA:TRAC:MAXA? S21
5.66406e+9,-6.21766e-5,-0.000795846
```

4.3.32 VNA:TRACe:MINAmplitude

Query:

| | |
|----------------------|--|
| Effect: | Returns the datapoint with the lowest amplitude in the trace |
| Syntax: | VNA:TRACe:MINAmplitude? |
| Parameters: | <trace>, either by name or by index |
| Return value: | <frequency>,<real>,<imag> of the lowest amplitude point |

4.3.33 VNA:TRACe:NEW

Event:

| | |
|--------------------|---------------------|
| Effect: | Creates a new trace |
| Syntax: | VNA:TRACe:NEW |
| Parameters: | <trace name> |

4.3.34 VNA:TRACe:DELeTe

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Deletes a trace |
| Syntax: | VNA:TRACe:DELeTe |
| Parameters: | <trace>, either by name or by index |

4.3.35 VNA:TRACe:RENAME

Event:

| | |
|--------------------|---|
| Effect: | Changes the name of a trace |
| Syntax: | VNA:TRACe:RENAME |
| Parameters: | <trace>, either by name or by index <new name> |

4.3.36 VNA:TRACe:PAUSE

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Pauses (freezes) a trace |
| Syntax: | VNA:TRACe:PAUSE |
| Parameters: | <trace>, either by name or by index |

4.3.37 VNA:TRACe:RESUME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Resumes (unfreezes) a trace |
| Syntax: | VNA:TRACe:RESUME |
| Parameters: | <trace>, either by name or by index |

4.3.38 VNA:TRACe:PAUSED

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries whether a trace is paused |
| Syntax: | VNA:TRACe:PAUSED? |
| Parameters: | <trace>, either by name or by index |
| Return value: | TRUE or FALSE |

4.3.39 VNA:TRACe:DEEMBedding:ACTive

Event:

| | |
|--------------------|---|
| Effect: | Enables/disables de-embedding on a trace |
| Syntax: | VNA:TRACe:DEEMBedding:ACTive |
| Parameters: | <trace>, either by name or by index <enable>, either TRUE or FALSE |

If no de-embedding is configured for the selected trace, enabling the de-embedding will fail.
Query:

| | |
|----------------------|---|
| Effect: | Queries whether de-embedding is active for the selected trace |
| Syntax: | VNA:TRACe:DEEMBedding:ACTive? |
| Parameters: | <trace>, either by name or by index |
| Return value: | TRUE or FALSE |

4.3.40 VNA:TRACe:DEEMBedding:AVAILable

Query:

| | |
|----------------------|--|
| Effect: | Queries whether de-embedding is available for the selected trace |
| Syntax: | VNA:TRACe:DEEMBedding:AVAILable? |
| Parameters: | <trace>, either by name or by index |
| Return value: | TRUE or FALSE |

4.3.41 VNA:TRACe:PARAMeter

Event:

| | |
|--------------------|--|
| Effect: | Sets the measurement parameter that is stored in the trace |
| Syntax: | VNA:TRACe:PARAMeter |
| Parameters: | <trace>, either by name or by index <parameter>, options are S11, S12, S21 or S22 |

Query:

| | |
|----------------------|--|
| Effect: | Queries the measurement parameter of a trace |
| Syntax: | VNA:TRACe:PARAMeter? |
| Parameters: | <trace>, either by name or by index |
| Return value: | S11, S12, S21 or S22 |

4.3.42 VNA:TRACe:TYPE

Event:

| | |
|--------------------|--|
| Effect: | Sets the storage type of a trace |
| Syntax: | VNA:TRACe:TYPE |
| Parameters: | <trace>, either by name or by index <type>, options are OVERWRITE, MAXHOLD or MINHOLD |

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the storage type of a trace |
| Syntax: | VNA:TRACe:TYPE? |
| Parameters: | <trace>, either by name or by index |
| Return value: | OVERWRITE, MAXHOLD or MINHOLD |

4.3.43 VNA:CALibration:ACTivate

Event:

| | |
|--------------------|---|
| Effect: | Activates a specific calibration. This command fails if the required measurements have not been taken yet |
| Syntax: | VNA:CALibration:ACTivate |
| Parameters: | <type> |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently available calibration types |
| Syntax: | VNA:CALibration:ACTivate? |
| Parameters: | None |
| Return value: | comma-separated list of available calibration types |

4.3.44 VNA:CALibration:ACTIVE

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently active calibration type |
| Syntax: | VNA:CALibration:ACTIVE? |
| Parameters: | None |
| Return value: | Currently active calibration type |

4.3.45 VNA:CALibration:NUMber

Query:

| | |
|----------------------|--|
| Effect: | Queries the number of available calibration measurements |
| Syntax: | VNA:CALibration:NUMber? |
| Parameters: | None |
| Return value: | <number of configured measurements> |

4.3.46 VNA:CALibration:RESET

Event:

| | |
|--------------------|---|
| Effect: | Resets the calibration. Deactivates the calibration and deletes all measurements. |
| Syntax: | VNA:CALibration:RESET |
| Parameters: | None |

4.3.47 VNA:CALibration:ADD

Event:

| | |
|----------------|---|
| Effect: | Adds a new empty calibration measurement. |
| Syntax: | VNA:CALibration:ADD |

| | |
|--------------------|--|
| Parameters: | <type> Measurement type, one of: OPEN SHORT LOAD THROUGH ISOLATION SLIDINGLOAD REFLECT LINE [<standard>], calibration kit standard name, optional |
|--------------------|--|

4.3.48 VNA:CALibration:TYPE

Query:

| | |
|----------------------|--|
| Effect: | Returns the type of the specified measurement |
| Syntax: | VNA:CALibration:TYPE? |
| Parameters: | <measurement number> |
| Return value: | Measurement type, one of: OPEN SHORT LOAD THROUGH ISOLATION SLIDINGLOAD REFLECT LINE |

4.3.49 VNA:CALibration:PORT

Event:

| | |
|--------------------|---|
| Effect: | Sets the port for the specified measurement |
| Syntax: | VNA:CALibration:PORT |
| Parameters: | <measurement number> <port number> |

Query:

| | |
|----------------------|--|
| Effect: | Returns the port for the specified measurement |
| Syntax: | VNA:CALibration:PORT? |
| Parameters: | <measurement number> |
| Return value: | <port number> |

4.3.50 VNA:CALibration:STANDARD

Event:

| | |
|--------------------|--|
| Effect: | Sets the calibration standard which will be used for the specified measurement |
| Syntax: | VNA:CALibration:STANDARD |
| Parameters: | <measurement number> <standard name> |

Query:

| | |
|----------------------|--|
| Effect: | Returns the standard name for the specified measurement |
| Syntax: | VNA:CALibration:STANDARD? |
| Parameters: | <measurement number> |
| Return value: | Name of used calibration standard (from calibration kit) |

4.3.51 VNA:CALibration:MEASure

Event:

| | |
|--------------------|---|
| Effect: | Starts a calibration measurement. This command fails if no device is connected, the VNA mode is not active or a calibration measurement is already in progress. |
| Syntax: | VNA:CALibration:MEASure |
| Parameters: | <measurement 1>,<measurement 2>,... |

Any number of measurements can be specified (by their number). These measurements will be taken simultaneously. This only works if they are measuring different ports (e.g. measure SHORT on port 1 and OPEN on port 2). If colliding measurements are specified (e.g. SHORT on port 1 and LOAD on port 1), an error is returned and no measurements are started.

4.3.52 VNA:CALibration:BUSY

Query:

| | |
|----------------------|--|
| Effect: | Queries whether a calibration measurement is ongoing |
| Syntax: | VNA:CALibration:BUSY? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.3.53 VNA:CALibration:SAVE

Event:

| | |
|--------------------|--|
| Effect: | Saves the active calibration to a file |
| Syntax: | VNA:CALibration:SAVE |
| Parameters: | <filename> |

Important points when saving/loading calibration files through SCPI commands:

- Filenames must be either absolute or relative to the location of the GUI application.
- If the LibreVNA-GUI (and thus also the SCPI server) is running on a different machine than the SCPI client, the calibration files will be saved/loaded from the machine that runs the GUI.

4.3.54 VNA:CALibration:LOAD

Query:

| | |
|--------------------|--------------------------|
| Effect: | Loads a calibration file |
| Syntax: | VNA:CALibration:LOAD? |
| Parameters: | <filename> |

| | |
|----------------------|---------------|
| Return value: | TRUE or FALSE |
|----------------------|---------------|

4.3.55 VNA:CALibration:KIT:MANufacturer

Event:

| | |
|--------------------|---|
| Effect: | Sets the manufacturer name of the calibration kit |
| Syntax: | VNA:CALibration:KIT:MANufacturer |
| Parameters: | <manufacturer> |

Query:

| | |
|----------------------|--|
| Effect: | Returns the manufacturer name of the calibration kit |
| Syntax: | VNA:CALibration:KIT:MANufacturer? |
| Parameters: | None |
| Return value: | <manufacturer> |

4.3.56 VNA:CALibration:KIT:SERial

Event:

| | |
|--------------------|---|
| Effect: | Sets the serial number of the calibration kit |
| Syntax: | VNA:CALibration:KIT:SERial |
| Parameters: | <serial number> |

Query:

| | |
|----------------------|--|
| Effect: | Returns the serial number of the calibration kit |
| Syntax: | VNA:CALibration:KIT:SERial? |
| Parameters: | None |
| Return value: | <serial number> |

4.3.57 VNA:CALibration:KIT:DESCription

Event:

| | |
|--------------------|---|
| Effect: | Sets the description of the calibration kit |
| Syntax: | VNA:CALibration:KIT:DESCription |
| Parameters: | <description> |

Query:

| | |
|----------------------|--|
| Effect: | Returns the description of the calibration kit |
| Syntax: | VNA:CALibration:KIT:DESCription? |
| Parameters: | None |
| Return value: | <description> |

4.3.58 VNA:CALibration:KIT:FILENAME

Query:

| | |
|----------------------|---|
| Effect: | Returns the filename of the calibration kit |
| Syntax: | VNA:CALibration:KIT:FILENAME? |
| Parameters: | None |
| Return value: | <filename> |

The filename is only available if the calibration kit was loaded from a dedicated file. If it was loaded as part of a calibration file or has not been loaded since the GUI started, no filename will be returned.

4.3.59 VNA:CALibration:KIT:SAVE

Event:

| | |
|--------------------|--|
| Effect: | Saves the active calibration kit to a file |
| Syntax: | VNA:CALibration:KIT:SAVE |
| Parameters: | <filename> |

- Important points when saving/loading calibration kit files through SCPI commands:
- Filenames must be either absolute or relative to the location of the GUI application.
 - If the LibreVNA-GUI (and thus also the SCPI server) is running on a different machine than the SCPI client, the calibration kit files will be saved/loaded from the machine that runs the GUI.

4.3.60 VNA:CALibration:KIT:LOAD

Query:

| | |
|----------------------|------------------------------|
| Effect: | Loads a calibration kit file |
| Syntax: | VNA:CALibration:KIT:LOAD? |
| Parameters: | <filename> |
| Return value: | TRUE or FALSE |

4.3.61 Common calibration kit standards commands

The calibration kit supports an arbitrary amount of standards. This requires a flexible SCPI API which adjusts to the currently configured standards.

A few calibration kit standard commands are always available and they can be used to create and delete calibration standards. Every created calibration standard adds their own commands. They can be accessed by including the calibration standard number in the command (shown as “x” in the following commands).

4.3.61.1 VNA:CALibration:KIT:STANDARD:CLEAR

Event:

| | |
|--------------------|--|
| Effect: | Resets the calibration kit to default values (ideal standards) |
| Syntax: | VNA:CALibration:KIT:STANDARD:CLEAR |
| Parameters: | None |

4.3.61.2 VNA:CALibration:KIT:STANDARD:NUMBER

Query:

| | |
|----------------------|--|
| Effect: | Returns the number of configured calibration standards |
| Syntax: | VNA:CALibration:KIT:STANDARD:NUMBER? |
| Parameters: | None |
| Return value: | <number of calibration standards> |

4.3.61.3 VNA:CALibration:KIT:STANDARD:TYPE

Query:

| | |
|----------------------|--|
| Effect: | Returns the type of a created calibration standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:TYPE? |
| Parameters: | <x> Number of calibration standard |
| Return value: | Type of standard, one of: Open Short Load Reflect Through Line |

4.3.61.4 VNA:CALibration:KIT:STANDARD:NEW

Event:

| | |
|--------------------|--|
| Effect: | Adds a new calibration standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:NEW |
| Parameters: | <type> Type of calibration standard, one of: Open Short Load Reflect Through Line <name> User selectable name of new standard |

4.3.61.5 VNA:CALibration:KIT:STANDARD:DELETE

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Removes a calibration standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:DELETE |
| Parameters: | <x> Number of standard to delete |

4.3.62 OPEN standard commands

The following commands are only valid for a calibration standard of type “Open”. The “x” in the command names must be replaced with the calibration standard number.

4.3.62.1 VNA:CALibration:KIT:STANDARD:x:NAME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME |
| Parameters: | <name> User selectable name |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME? |
| Parameters: | None |
| Return value: | <name> User selectable name |

4.3.62.2 VNA:CALibration:KIT:STANDARD:x:Zo

Event:

| | |
|--------------------|---|
| Effect: | Sets the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo |
| Parameters: | <Z> Characteristic impedance in Ohm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo? |
| Parameters: | None |
| Return value: | <Z> Characteristic impedance in Ohm |

4.3.62.3 VNA:CALibration:KIT:STANDARD:x:DELAY

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY |
| Parameters: | <delay> Delay in ps |

Query:

| | |
|----------------------|---------------------------------------|
| Effect: | Queries the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY? |
| Parameters: | None |
| Return value: | <delay> Delay in ps |

4.3.62.4 VNA:CALibration:KIT:STANDARD:x:LOSS

Event:

| | |
|----------------|-------------------------------------|
| Effect: | Sets the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS |

| | |
|--------------------|---|
| Parameters: | <loss> Loss in $\text{G}\Omega\text{ s}^{-1}$ |
|--------------------|---|

Query:

| | |
|----------------------|---|
| Effect: | Queries the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:LOSS? |
| Parameters: | None |
| Return value: | <loss> Loss in $\text{G}\Omega\text{ s}^{-1}$ |

4.3.62.5 VNA:CALibration:KIT:STAndard:x:Co

Event:

| | |
|--------------------|--|
| Effect: | Sets the fringing capacitance polynom term 0 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:Co |
| Parameters: | <Co> in 10^{-15}F |

Query:

| | |
|----------------------|---|
| Effect: | Queries the fringing capacitance polynom term 0 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:Co? |
| Parameters: | None |
| Return value: | <Co> in 10^{-15}F |

4.3.62.6 VNA:CALibration:KIT:STAndard:x:C1

Event:

| | |
|--------------------|--|
| Effect: | Sets the fringing capacitance polynom term 1 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:C1 |
| Parameters: | <C1> in 10^{-27}F Hz^{-1} |

Query:

| | |
|----------------------|---|
| Effect: | Queries the fringing capacitance polynom term 1 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:C1? |
| Parameters: | None |
| Return value: | <C1> in 10^{-27}F Hz^{-1} |

4.3.62.7 VNA:CALibration:KIT:STAndard:x:C2

Event:

| | |
|--------------------|--|
| Effect: | Sets the fringing capacitance polynom term 2 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:C2 |
| Parameters: | <C2> in 10^{-36}F Hz^{-2} |

Query:

| | |
|----------------|---|
| Effect: | Queries the fringing capacitance polynom term 2 of the standard |
|----------------|---|

| | |
|----------------------|-------------------------------------|
| Syntax: | VNA:CALibration:KIT:STAndard:x:C2? |
| Parameters: | None |
| Return value: | <C2> in $10^{-36} \text{F Hz}^{-2}$ |

4.3.62.8 VNA:CALibration:KIT:STAndard:x:C3

Event:

| | |
|--------------------|--|
| Effect: | Sets the fringing capacitance polynom term 3 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:C3 |
| Parameters: | <C3> in $10^{-45} \text{F Hz}^{-3}$ |

Query:

| | |
|----------------------|---|
| Effect: | Queries the fringing capacitance polynom term 3 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:C3? |
| Parameters: | None |
| Return value: | <C3> in $10^{-45} \text{F Hz}^{-3}$ |

4.3.62.9 VNA:CALibration:KIT:STAndard:x:FILE

Event:

| | |
|--------------------|---|
| Effect: | Loads the coefficients for the calibration standard from a touchstone file |
| Syntax: | VNA:CALibration:KIT:STAndard:x:FILE |
| Parameters: | <filename> <port> sets the port from the file which is used to define the standard, optional |

4.3.63 SHORT standard commands

The following commands are only valid for a calibration standard of type “Short”. The “x” in the command names must be replaced with the calibration standard number.

4.3.63.1 VNA:CALibration:KIT:STAndard:x:NAME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the name of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:NAME |
| Parameters: | <name> User selectable name |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the name of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:NAME? |
| Parameters: | None |
| Return value: | <name> User selectable name |

4.3.63.2 VNA:CALibration:KIT:STANDARD:x:Zo

Event:

| | |
|--------------------|---|
| Effect: | Sets the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo |
| Parameters: | <Z> Characteristic impedance in Ohm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo? |
| Parameters: | None |
| Return value: | <Z> Characteristic impedance in Ohm |

4.3.63.3 VNA:CALibration:KIT:STANDARD:x:DELAY

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY |
| Parameters: | <delay> Delay in ps |

Query:

| | |
|----------------------|---------------------------------------|
| Effect: | Queries the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY? |
| Parameters: | None |
| Return value: | <delay> Delay in ps |

4.3.63.4 VNA:CALibration:KIT:STANDARD:x:LOSS

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS |
| Parameters: | <loss> Loss in $G\Omega s^{-1}$ |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS? |
| Parameters: | None |
| Return value: | <loss> Loss in $G\Omega s^{-1}$ |

4.3.63.5 VNA:CALibration:KIT:STANDARD:x:Lo

Event:

| | |
|----------------|--|
| Effect: | Sets the residual inductance polynomial term o of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Lo |

| | |
|--------------------|----------------------------|
| Parameters: | <Lo> in 10^{-12}H |
|--------------------|----------------------------|

Query:

| | |
|----------------------|--|
| Effect: | Queries the residual inductance polynom term 0 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:Lo? |
| Parameters: | None |
| Return value: | <Lo> in 10^{-12}H |

4.3.63.6 VNA:CALibration:KIT:STAndard:x:L1

Event:

| | |
|--------------------|---|
| Effect: | Sets the residual inductance polynom term 1 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:L1 |
| Parameters: | <L1> in 10^{-24}H Hz^{-1} |

Query:

| | |
|----------------------|--|
| Effect: | Queries the residual inductance polynom term 1 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:L1? |
| Parameters: | None |
| Return value: | <L1> in 10^{-24}H Hz^{-1} |

4.3.63.7 VNA:CALibration:KIT:STAndard:x:L2

Event:

| | |
|--------------------|---|
| Effect: | Sets the residual inductance polynom term 2 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:L2 |
| Parameters: | <L2> in 10^{-33}H Hz^{-2} |

Query:

| | |
|----------------------|--|
| Effect: | Queries the residual inductance polynom term 2 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:L2? |
| Parameters: | None |
| Return value: | <L2> in 10^{-33}H Hz^{-2} |

4.3.63.8 VNA:CALibration:KIT:STAndard:x:L3

Event:

| | |
|--------------------|---|
| Effect: | Sets the residual inductance polynom term 3 of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:L3 |
| Parameters: | <L3> in 10^{-42}H Hz^{-3} |

Query:

| | |
|----------------|--|
| Effect: | Queries the residual inductance polynom term 3 of the standard |
|----------------|--|

| | |
|----------------------|-------------------------------------|
| Syntax: | VNA:CALibration:KIT:STAndard:x:L3? |
| Parameters: | None |
| Return value: | <L3> in $10^{-42} \text{H Hz}^{-3}$ |

4.3.63.9 VNA:CALibration:KIT:STAndard:x:FILE

Event:

| | |
|--------------------|---|
| Effect: | Loads the coefficients for the calibration standard from a touchstone file |
| Syntax: | VNA:CALibration:KIT:STAndard:x:FILE |
| Parameters: | <filename> <port> sets the port from the file which is used to define the standard, optional |

4.3.64 LOAD standard commands

The following commands are only valid for a calibration standard of type “Load”. The “x” in the command names must be replaced with the calibration standard number.

4.3.64.1 VNA:CALibration:KIT:STAndard:x:NAME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the name of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:NAME |
| Parameters: | <name> User selectable name |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the name of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:NAME? |
| Parameters: | None |
| Return value: | <name> User selectable name |

4.3.64.2 VNA:CALibration:KIT:STAndard:x:RESistance

Event:

| | |
|--------------------|---|
| Effect: | Sets the resistance of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:RESistance |
| Parameters: | <R> in Ω |

Query:

| | |
|----------------------|--|
| Effect: | Queries the resistance of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:RESistance? |
| Parameters: | None |
| Return value: | <R> in Ω |

4.3.64.3 VNA:CALibration:KIT:STANDARD:x:Zo

Event:

| | |
|--------------------|---|
| Effect: | Sets the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo |
| Parameters: | <Z> Characteristic impedance in Ohm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo? |
| Parameters: | None |
| Return value: | <Z> Characteristic impedance in Ohm |

4.3.64.4 VNA:CALibration:KIT:STANDARD:x:DELAY

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY |
| Parameters: | <delay> Delay in ps |

Query:

| | |
|----------------------|---------------------------------------|
| Effect: | Queries the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY? |
| Parameters: | None |
| Return value: | <delay> Delay in ps |

4.3.64.5 VNA:CALibration:KIT:STANDARD:x:LOSS

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS |
| Parameters: | <loss> Loss in $G\Omega s^{-1}$ |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS? |
| Parameters: | None |
| Return value: | <loss> Loss in $G\Omega s^{-1}$ |

4.3.64.6 VNA:CALibration:KIT:STANDARD:x:CARallel

Event:

| | |
|----------------|---|
| Effect: | Sets the residual capacitance polynom of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:CARallel |

| | |
|--------------------|----------|
| Parameters: | <C> in F |
|--------------------|----------|

Query:

| | |
|----------------------|--|
| Effect: | Queries the residual capacitance of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:CARallel? |
| Parameters: | None |
| Return value: | <C> in F |

4.3.64.7 VNA:CALibration:KIT:STAndard:x:LSERies

Event:

| | |
|--------------------|--|
| Effect: | Sets the residual inductance of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:LSERies |
| Parameters: | <L> in H |

Query:

| | |
|----------------------|---|
| Effect: | Queries the residual inductance of the standard |
| Syntax: | VNA:CALibration:KIT:STAndard:x:LSERies? |
| Parameters: | None |
| Return value: | <L> in H |

4.3.64.8 VNA:CALibration:KIT:STAndard:x:CFIRST

Event:

| | |
|--------------------|---|
| Effect: | Sets the order of residual capacitance/inductance |
| Syntax: | VNA:CALibration:KIT:STAndard:x:CFIRST |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|--|
| Effect: | Queries the order of residual capacitance/inductance |
| Syntax: | VNA:CALibration:KIT:STAndard:x:CFIRST? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.3.64.9 VNA:CALibration:KIT:STAndard:x:FILE

Event:

| | |
|--------------------|---|
| Effect: | Loads the coefficients for the calibration standard from a touchstone file |
| Syntax: | VNA:CALibration:KIT:STAndard:x:FILE |
| Parameters: | <filename> <port> sets the port from the file which is used to define the standard, optional |

4.3.65 REFLECT standard commands

The following commands are only valid for a calibration standard of type “Reflect”. The “x” in the command names must be replaced with the calibration standard number.

4.3.65.1 VNA:CALibration:KIT:STANDARD:x:NAME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME |
| Parameters: | <name> User selectable name |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME? |
| Parameters: | None |
| Return value: | <name> User selectable name |

4.3.65.2 VNA:CALibration:KIT:STANDARD:x:SHORT

Event:

| | |
|--------------------|--|
| Effect: | Sets the type of reflection standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:SHORT |
| Parameters: | TRUE for short standard or FALSE for open standard |

Query:

| | |
|----------------------|--|
| Effect: | Queries the type of reflection standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:SHORT? |
| Parameters: | None |
| Return value: | TRUE for short standard or FALSE for open standard |

4.3.66 THROUGH standard commands

The following commands are only valid for a calibration standard of type “Through”. The “x” in the command names must be replaced with the calibration standard number.

4.3.66.1 VNA:CALibration:KIT:STANDARD:x:NAME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME |
| Parameters: | <name> User selectable name |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME? |
| Parameters: | None |
| Return value: | <name> User selectable name |

4.3.66.2 VNA:CALibration:KIT:STANDARD:x:Zo

Event:

| | |
|--------------------|---|
| Effect: | Sets the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo |
| Parameters: | <Z> Characteristic impedance in Ohm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo? |
| Parameters: | None |
| Return value: | <Z> Characteristic impedance in Ohm |

4.3.66.3 VNA:CALibration:KIT:STANDARD:x:DELAY

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY |
| Parameters: | <delay> Delay in ps |

Query:

| | |
|----------------------|---------------------------------------|
| Effect: | Queries the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY? |
| Parameters: | None |
| Return value: | <delay> Delay in ps |

4.3.66.4 VNA:CALibration:KIT:STANDARD:x:LOSS

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS |
| Parameters: | <loss> Loss in $G\Omega s^{-1}$ |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the loss of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:LOSS? |
| Parameters: | None |
| Return value: | <loss> Loss in $G\Omega s^{-1}$ |

4.3.66.5 VNA:CALibration:KIT:STANDARD:x:FILE

Event:

| | |
|----------------|--|
| Effect: | Loads the coefficients for the calibration standard from a touchstone file |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:FILE |

| | |
|--------------------|---|
| Parameters: | <filename> <port1> selects the first port from the file which is used to define the standard <port1> selects the second port from the file which is used to define the standard |
|--------------------|---|

4.3.67 LINE standard commands

The following commands are only valid for a calibration standard of type “Line”. The “x” in the command names must be replaced with the calibration standard number.

4.3.67.1 VNA:CALibration:KIT:STANDARD:x:NAME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Sets the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME |
| Parameters: | <name> User selectable name |

Query:

| | |
|----------------------|--------------------------------------|
| Effect: | Queries the name of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:NAME? |
| Parameters: | None |
| Return value: | <name> User selectable name |

4.3.67.2 VNA:CALibration:KIT:STANDARD:x:Zo

Event:

| | |
|--------------------|---|
| Effect: | Sets the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo |
| Parameters: | <Z> Characteristic impedance in Ohm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the characteristic impedance of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:Zo? |
| Parameters: | None |
| Return value: | <Z> Characteristic impedance in Ohm |

4.3.67.3 VNA:CALibration:KIT:STANDARD:x:DELAY

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the delay of the standard |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY |
| Parameters: | <delay> Delay in ps |

Query:

| | |
|----------------|-----------------------------------|
| Effect: | Queries the delay of the standard |
|----------------|-----------------------------------|

| | |
|----------------------|---------------------------------------|
| Syntax: | VNA:CALibration:KIT:STANDARD:x:DELAY? |
| Parameters: | None |
| Return value: | <delay> Delay in ps |

4.3.67.4 VNA:CALibration:KIT:STANDARD:x:FILE

Event:

| | |
|--------------------|---|
| Effect: | Loads the coefficients for the calibration standard from a touchstone file |
| Syntax: | VNA:CALibration:KIT:STANDARD:x:FILE |
| Parameters: | <filename> <port1> selects the first port from the file which is used to define the standard <port2> selects the second port from the file which is used to define the standard |

4.3.68 Common Deembedding Commands

The VNA supports various deembedding options which can also be configured through the SCPI API. Because the deembedding system is flexible and supports any number of deembedding options at the same time, the SCPI API is also flexible. Instead of fixed commands, the available commands change depending on the configured deembedding options.

A few deembedding commands are always available and they can be used to create, delete and swap deembedding options. Every created deembedding option adds their own commands. They can be accessed by including the option number in the command (shown as “x” in the following commands).

4.3.68.1 VNA:DEEMBedding:NUMBER

Query:

| | |
|----------------------|--|
| Effect: | Returns the number of configured deembedding options |
| Syntax: | VNA:DEEMBedding:NUMBER? |
| Parameters: | None |
| Return value: | <number of deembedding options> |

4.3.68.2 VNA:DEEMBedding:TYPE

Query:

| | |
|----------------------|--|
| Effect: | Returns the type of a configured deembedding option |
| Syntax: | VNA:DEEMBedding:TYPE? |
| Parameters: | <x> Number of deembedding option |
| Return value: | Type of option, one of: Port_Extension 2xThru Matching_Network Impedance_Renormalization |

4.3.68.3 VNA:DEEMBedding:NEW

Event:

| | |
|--------------------|---|
| Effect: | Adds a new deembedding option |
| Syntax: | VNA:DEEMBedding:NEW |
| Parameters: | <type> Type of option, one of: Port_Extension 2xThru Matching_Network Impedance_Renormalization |

4.3.68.4 VNA:DEEMBedding:DELeTe

Event:

| | |
|--------------------|--------------------------------|
| Effect: | Removes a deembedding option |
| Syntax: | VNA:DEEMBedding:DELeTe |
| Parameters: | <x> Number of option to delete |

4.3.68.5 VNA:DEEMBedding:SWAP

Event:

| | |
|--------------------|--|
| Effect: | Swaps the order of two deembedding options |
| Syntax: | VNA:DEEMBedding:SWAP |
| Parameters: | <x1> Number of option 1 to swap <x2> Number of option 2 to swap |

4.3.68.6 VNA:DEEMBedding:CLEAR

Event:

| | |
|--------------------|--------------------------------|
| Effect: | Delete all deembedding options |
| Syntax: | VNA:DEEMBedding:CLEAR |
| Parameters: | None |

4.3.69 Port Extension Deembedding Commands

The following commands are only valid for a deembedding option of type “Port_Extension”. The “x” in the command names must be replaced with the option number.

4.3.69.1 VNA:DEEMBedding:x:PORT

Event:

| | |
|--------------------|------------------------|
| Effect: | Sets the port |
| Syntax: | VNA:DEEMBedding:x:PORT |
| Parameters: | <port>, 1...n |

Query:

| | |
|----------------|---------------------------|
| Effect: | Queries the selected port |
|----------------|---------------------------|

| | |
|----------------------|-------------------------|
| Syntax: | VNA:DEEMBedding:x:PORT? |
| Parameters: | None |
| Return value: | <port>, 1...n |

4.3.69.2 VNA:DEEMBedding:x:DELAY

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the delay of the port extension |
| Syntax: | VNA:DEEMBedding:x:DELAY |
| Parameters: | <delay> Delay in seconds |

Query:

| | |
|----------------------|---|
| Effect: | Queries the delay of the port extension |
| Syntax: | VNA:DEEMBedding:x:DELAY? |
| Parameters: | None |
| Return value: | <delay> Delay in seconds |

4.3.69.3 VNA:DEEMBedding:x:DCLOSS

Event:

| | |
|--------------------|--|
| Effect: | Sets the DC loss of the port extension |
| Syntax: | VNA:DEEMBedding:x:DCLOSS |
| Parameters: | <loss> Loss at DC in dB |

Query:

| | |
|----------------------|---|
| Effect: | Queries the DC loss of the port extension |
| Syntax: | VNA:DEEMBedding:x:DCLOSS? |
| Parameters: | None |
| Return value: | <loss> Loss at DC in dB |

4.3.69.4 VNA:DEEMBedding:x:LOSS

Event:

| | |
|--------------------|---|
| Effect: | Sets the loss of the port extension at the configured frequency |
| Syntax: | VNA:DEEMBedding:x:LOSS |
| Parameters: | <loss> Loss at frequency in dB |

Query:

| | |
|----------------------|--|
| Effect: | Queries the loss of the port extension at the configured frequency |
| Syntax: | VNA:DEEMBedding:x:LOSS? |
| Parameters: | None |
| Return value: | <loss> Loss at frequency in dB |

4.3.69.5 VNA:DEEMBedding:x:FREQuency

Event:

| | |
|--------------------|---|
| Effect: | Sets the frequency for the specified loss of the port extension |
| Syntax: | VNA:DEEMBedding:x:FREQuency |
| Parameters: | <freq> Frequency for loss in Hz |

Query:

| | |
|----------------------|--|
| Effect: | Queries the frequency for the specified loss of the port extension |
| Syntax: | VNA:DEEMBedding:x:FREQuency? |
| Parameters: | None |
| Return value: | <freq> Frequency for loss in Hz |

4.3.70 2xThru Deembedding Commands

The 2xThru deembedding does not have a SCPI API so far because it requires the user to manually make specific connections and take additional measurements.

4.3.71 Matching Network Deembedding Commands

The following commands are only valid for a deembedding option of type “Matching_Network”. The “x” in the command names must be replaced with the option number.

Similarly to the deembedding options, the matching network itself is also flexible and requires a flexible API as well. A similar approach is used where components in the matching network are given a number. This number is shown as “y” in the following commands.

4.3.71.1 VNA:DEEMBedding:x:PORT

Event:

| | |
|--------------------|--|
| Effect: | Sets the port at which the matching network is added |
| Syntax: | VNA:DEEMBedding:x:PORT |
| Parameters: | <port>, 1...n |

Query:

| | |
|----------------------|---|
| Effect: | Queries the port at which the matching network is added |
| Syntax: | VNA:DEEMBedding:x:PORT? |
| Parameters: | None |
| Return value: | <port>, 1...n |

4.3.71.2 VNA:DEEMBedding:x:ADD

Event:

| | |
|--------------------|--|
| Effect: | Selects whether the network is added or removed during the deembedding |
| Syntax: | VNA:DEEMBedding:x:ADD |
| Parameters: | TRUE if the effect of the network should be added. FALSE if the effect of the network should be subtracted |

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the network is added or removed during the deembedding |
| Syntax: | VNA:DEEMBedding:x:ADD? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.3.71.3 VNA:DEEMBedding:x:NUMBER

Query:

| | |
|----------------------|--|
| Effect: | Returns the number of configured matching network components |
| Syntax: | VNA:DEEMBedding:x:NUMBER? |
| Parameters: | None |
| Return value: | <number of matching network components> |

4.3.71.4 VNA:DEEMBedding:x:TYPE

Query:

| | |
|----------------------|--|
| Effect: | Returns the type of a configured matching network component |
| Syntax: | VNA:DEEMBedding:x:TYPE? <y> |
| Parameters: | <y> Number of matching component |
| Return value: | Type of component, one of: SeriesR SeriesL SeriesC ParallelR ParallelL ParallelC Touchstone_Through Touchstone_Shunt |

4.3.71.5 VNA:DEEMBedding:x:NEW

Event:

| | |
|----------------|---------------------------------------|
| Effect: | Adds a new matching network component |
| Syntax: | VNA:DEEMBedding:x:NEW |

| | |
|--------------------|---|
| Parameters: | <p><type> Type of component, one of: SeriesR SeriesL SeriesC ParallelR ParallelL ParallelC Touchstone_Through Touchstone_Shunt</p> <p><pos> position at which the component will be added. A value of 0 adds the component closest to the port. This parameter is optional. If it is omitted, the component is added closest to the DUT</p> |
|--------------------|---|

4.3.71.6 VNA:DEEMBedding:x:DELeTe

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Removes a matching network component |
| Syntax: | VNA:DEEMBedding:x:DELeTe |
| Parameters: | <y> Number of component to delete |

4.3.71.7 VNA:DEEMBedding:x:CLAR

Event:

| | |
|--------------------|---|
| Effect: | Removes all matching network components |
| Syntax: | VNA:DEEMBedding:x:DELeTe |
| Parameters: | None |

4.3.72 Impedance Renormalization Deembedding Commands

The following commands are only valid for a deembedding option of type “Impedance_Renormalization”. The “x” in the command names must be replaced with the option number.

4.3.72.1 VNA:DEEMBedding:x:IMPedance

Event:

| | |
|--------------------|------------------------------|
| Effect: | Sets the target impedance |
| Syntax: | VNA:DEEMBedding:x:IMPedance |
| Parameters: | <impedance> Impedance in Ohm |

Query:

| | |
|----------------------|------------------------------|
| Effect: | Queries the target impedance |
| Syntax: | VNA:DEEMBedding:x:IMPedance? |
| Parameters: | None |
| Return value: | <impedance> Impedance in Ohm |

4.3.72.2 VNA:DEEMBedding:x:y:VALue

Event:

| | |
|--------------------|--|
| Effect: | Sets the value of a matching network component |
| Syntax: | VNA:DEEMBedding:x:y:VALue |
| Parameters: | <value>, either in Ohm, Farad or Henry |

Query:

| | |
|----------------------|---|
| Effect: | Queries the value of a matching network component |
| Syntax: | VNA:DEEMBedding:x:y:VALue? |
| Parameters: | None |
| Return value: | <port>, either in Ohm, Farad or Henry |

This command is only available for a component of these types:

- SeriesR
- SeriesL
- SeriesC
- ParallelR
- ParallelL
- ParallelC

4.3.72.3 VNA:DEEMBedding:x:y:FILE

Event:

| | |
|--------------------|--|
| Effect: | Loads a matching network component values from a Touchstone file |
| Syntax: | VNA:DEEMBedding:x:y:FILE |
| Parameters: | <filename> |

This command is only available for a component of these types:

- Touchstone_Through
- Touchstone_Shunt

4.4 Signal Generator Commands

These commands change or query signal generator settings. Although most of them are available regardless of the current device mode, they usually only have an effect once the generator mode is active.

4.4.1 GENerator:FREQuency

Event:

| | |
|--------------------|---------------------------|
| Effect: | Sets the output frequency |
| Syntax: | GENerator:FREQuency |
| Parameters: | <frequency>, in Hz |

Query:

| | |
|----------------|---------------------------------------|
| Effect: | Queries the selected output frequency |
|----------------|---------------------------------------|

| | |
|----------------------|----------------------|
| Syntax: | GENerator:FREQuency? |
| Parameters: | None |
| Return value: | frequency in Hz |

4.4.2 GENerator:LVL

Event:

| | |
|--------------------|------------------------|
| Effect: | Sets the output power |
| Syntax: | GENerator:LVL |
| Parameters: | <output level>, in dBm |

Query:

| | |
|----------------------|-----------------------------------|
| Effect: | Queries the selected output power |
| Syntax: | GENerator:LVL? |
| Parameters: | None |
| Return value: | output level in dBm |

4.4.3 GENerator:PORT

Event:

| | |
|--------------------|---|
| Effect: | Sets the active output port |
| Syntax: | GENerator:PORT |
| Parameters: | <output port> 0: output disabled 1: output signal at port 1 2: output signal at port 2 |

Query:

| | |
|----------------------|-----------------------------|
| Effect: | Queries the selected output |
| Syntax: | GENerator:PORT? |
| Parameters: | None |
| Return value: | output port |

4.5 Spectrum Analyzer Commands

These commands change or query spectrum analyzer settings. Although most of them are available regardless of the current device mode, they usually only have an effect once the spectrum analyzer mode is active.

4.5.1 SA:FREQuency:SPAN

Event:

| | |
|--------------------|----------------------------|
| Effect: | Sets the span of the sweep |
| Syntax: | SA:FREQuency:SPAN |
| Parameters: | , in Hz |

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the currently selected span |
| Syntax: | SA:FREQuency:SPAN? |
| Parameters: | None |
| Return value: | span in Hz |

4.5.2 SA:FREQuency:START

Event:

| | |
|--------------------|---------------------------------------|
| Effect: | Sets the start frequency of the sweep |
| Syntax: | SA:FREQuency:START |
| Parameters: | <start frequency>, in Hz |

Query:

| | |
|----------------------|--|
| Effect: | Queries the currently selected start frequency |
| Syntax: | SA:FREQuency:START? |
| Parameters: | None |
| Return value: | start frequency in Hz |

4.5.3 SA:FREQuency:CENTer

Event:

| | |
|--------------------|--|
| Effect: | Sets the center frequency of the sweep |
| Syntax: | SA:FREQuency:CENTer |
| Parameters: | <center frequency>, in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected center frequency |
| Syntax: | SA:FREQuency:CENTer? |
| Parameters: | None |
| Return value: | center frequency in Hz |

4.5.4 SA:FREQuency:STOP

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Sets the stop frequency of the sweep |
| Syntax: | SA:FREQuency:STOP |
| Parameters: | <stop frequency>, in Hz |

Query:

| | |
|--------------------|---|
| Effect: | Queries the currently selected stop frequency |
| Syntax: | SA:FREQuency:STOP? |
| Parameters: | None |

| | |
|----------------------|----------------------|
| Return value: | stop frequency in Hz |
|----------------------|----------------------|

4.5.5 SA:FREQuency:FULL

Event:

| | |
|--------------------|--|
| Effect: | Sets the device to the maximum span possible |
| Syntax: | SA:FREQuency:FULL |
| Parameters: | None |

4.5.6 SA:FREQuency:ZERO

Event:

| | |
|--------------------|-----------------------------------|
| Effect: | Sets the device to zero span mode |
| Syntax: | SA:FREQuency:ZERO |
| Parameters: | None |

4.5.7 SA:ACQuisition:RUN

Event:

| | |
|--------------------|---|
| Effect: | Puts the spectrum analyzer into run mode (sweep active) |
| Syntax: | SA:ACQuisition:RUN |
| Parameters: | None |

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the spectrum analyzer is in run mode |
| Syntax: | SA:ACQuisition:RUN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.5.8 SA:ACQuisition:STOP

Event:

| | |
|--------------------|--|
| Effect: | Puts the spectrum analyzer into stop mode (sweep inactive) |
| Syntax: | SA:ACQuisition:STOP |
| Parameters: | None |

4.5.9 SA:ACQuisition:RBW

Event:

| | |
|--------------------|-------------------------------|
| Effect: | Sets the resolution bandwidth |
| Syntax: | SA:ACQuisition:IFBW |
| Parameters: | <resolution bandwidth>, in Hz |

Query:

| | |
|----------------|---|
| Effect: | Queries the currently selected resolution bandwidth |
|----------------|---|

| | |
|----------------------|----------------------------|
| Syntax: | SA:ACQquisition:IFBW? |
| Parameters: | None |
| Return value: | resolution bandwidth in Hz |

4.5.10 SA:ACQquisition:WINDow

Event:

| | |
|--------------------|---|
| Effect: | Sets the type of window used in the acquisition |
| Syntax: | SA:ACQquisition:WINDow |
| Parameters: | <windowtype> NONE KAISER HANN FLATTOP |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently selected type of window |
| Syntax: | SA:ACQquisition:WINDow? |
| Parameters: | None |
| Return value: | NONE, KAISER, HANN or FLATTOP |

4.5.11 SA:ACQquisition:DETECTOR

Event:

| | |
|--------------------|---|
| Effect: | Sets the detector type |
| Syntax: | SA:ACQquisition:DETECTOR |
| Parameters: | <detector> +PEAK -PEAK NORMAL SAMPLE AVERAGE |

Query:

| | |
|----------------------|--|
| Effect: | Queries the currently selected detector type |
| Syntax: | SA:ACQquisition:DETECTOR? |
| Parameters: | None |
| Return value: | +PEAK, -PEAK, NORMAL, SAMPLE or AVERAGE |

4.5.12 SA:ACQquisition:AVG

Event:

| | |
|--------------------|---|
| Effect: | Sets the number of sweeps over which a moving average is calculated |
| Syntax: | SA:ACQquisition:AVG |
| Parameters: | <sweeps> |

Query:

| | |
|----------------------|---|
| Effect: | Queries the currently configured number of sweeps |
| Syntax: | SA:ACQuisition:AVG? |
| Parameters: | None |
| Return value: | sweeps |

4.5.13 SA:ACQuisition:AVGLEVel

Query:

| | |
|----------------------|---|
| Effect: | Queries the number of sweeps that have been acquired by the average function. |
| Syntax: | SA:ACQuisition:AVGLEVel? |
| Parameters: | None |
| Return value: | <acquired sweeps> |

<acquired sweeps> resets to zero whenever a setting is changed. It is incremented at the end of each sweep, but will not go above the number of configured sweeps for the averaging.

Example (assuming <averaging sweep> = 3):

| # of active sweep | <acquired sweeps> |
|-------------------|-------------------|
| 1 | 0 |
| 2 | 1 |
| 3 | 2 |
| 4 | 3 |
| 5 | 3 |

4.5.14 SA:ACQuisition:FINished

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the average filter has reached a steady state (that is <acquired sweeps> = <averaging sweeps>) |
| Syntax: | SA:ACQuisition:FINished? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.5.15 SA:ACQuisition:LIMit

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of limits that maybe set up on any graph |
| Syntax: | SA:ACQuisition:LIMit? |
| Parameters: | None |
| Return value: | PASS or FAIL |

4.5.16 SA:ACQuisition:SINGLE

Event:

| | |
|--------------------|---|
| Effect: | Configures the spectrum analyzer for single or continuous sweep |
| Syntax: | SA:ACQuisition:SINGLE |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|--|
| Effect: | Queries whether the spectrum analyzer is set up for single sweep |
| Syntax: | SA:ACQuisition:SINGLE? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

If single sweep is enabled, the acquisition is stopped when the required number of averages have been reached. There are two ways to trigger a new sweep:

- Change any sweep setting (e.g. center frequency)
- Issue the command again (i.e. SA:ACQ:SINGLE TRUE always triggers a new sweep)

4.5.17 SA:ACQuisition:SIGid

Event:

| | |
|--------------------|---|
| Effect: | Enables/disables signal identification |
| Syntax: | SA:ACQuisition:SIGid |
| Parameters: | <enabled>, option are TRUE, FALSE, 1 or 0 |

Query:

| | |
|----------------------|--|
| Effect: | Queries whether signal identification is enabled |
| Syntax: | SA:ACQuisition:SIGid? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.5.18 SA:ACQuisition:FREQuency

Query:

| | |
|----------------------|--|
| Effect: | Returns the current frequency of the sweep |
| Syntax: | SA:ACQuisition:FREQuency? |
| Parameters: | None |
| Return value: | <Frequency in Hz> |

This command only returns valid data when a sweep is running and the the sweep is a frequency sweep.

4.5.19 SA:ACQuisition:TIME

Query:

| | |
|----------------------|---------------------------------------|
| Effect: | Returns the current time of the sweep |
| Syntax: | SA:ACQuisition:TIME? |
| Parameters: | None |
| Return value: | <Time in seconds> |

This command only returns valid data when a sweep is running and the the sweep is a zero-span sweep.

4.5.20 SA:TRACKing:ENable

Event:

| | |
|--------------------|---|
| Effect: | Enables/disables the tracking generator |
| Syntax: | SA:TRACKing:ENable |
| Parameters: | <enabled>, option are TRUE, FALSE, 1 or 0 |

Query:

| | |
|----------------------|---|
| Effect: | Queries whether tracking generator is enabled |
| Syntax: | SA:TRACKing:ENable? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.5.21 SA:TRACKing:PORT

Event:

| | |
|--------------------|--|
| Effect: | Sets the output port of the tracking generator |
| Syntax: | SA:TRACKing:PORT |
| Parameters: | <port>, either 1 or 2 |

Query:

| | |
|----------------------|---|
| Effect: | Queries the output port of the tracking generator |
| Syntax: | SA:TRACKing:PORT? |
| Parameters: | None |
| Return value: | 1 or 2 |

4.5.22 SA:TRACKing:LVL

Event:

| | |
|--------------------|---|
| Effect: | Sets the output power of the tracking generator |
| Syntax: | SA:TRACKing:LVL |
| Parameters: | <output level>, in dBm |

Query:

| | |
|----------------------|---|
| Effect: | Queries the selected output power of the tracking generator |
| Syntax: | SA:TRACKing:LVL? |
| Parameters: | None |
| Return value: | output level in dBm |

4.5.23 SA:TRACKing:OFFset

Event:

| | |
|--------------------|---|
| Effect: | Sets the offset frequency of the tracking generator |
| Syntax: | SA:TRACKing:OFFset |
| Parameters: | <offset>, in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the selected offset frequency of the tracking generator |
| Syntax: | SA:TRACKing:OFFset? |
| Parameters: | None |
| Return value: | offset in Hz |

4.5.24 SA:TRACKing:NORMalize:ENable

Event:

| | |
|--------------------|---|
| Effect: | Enables/disables normalization. If the span has changed since the last active normalization, a normalization measurement is also started. |
| Syntax: | SA:TRACKing:NORMalize:ENable |
| Parameters: | <enabled>, option are TRUE, FALSE, 1 or 0 |

Query:

| | |
|----------------------|---|
| Effect: | Queries whether tracking generator normalization is enabled |
| Syntax: | SA:TRACKing:NORMalize:ENable? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

4.5.25 SA:TRACKing:NORMalize:MEASure

Event:

| | |
|--------------------|--|
| Effect: | Triggers a new normalization measurement |
| Syntax: | SA:TRACKing:NORMalize:MEASure |
| Parameters: | None |

4.5.26 SA:TRACKing:NORMalize:LVL

Event:

| | |
|--------------------|--|
| Effect: | Sets the reference level for the normalization |
| Syntax: | SA:TRACKing:NORMalize:LVL |
| Parameters: | <normalization level>, in dBm |

Query:

| | |
|----------------------|--|
| Effect: | Queries the selected reference level for the normalization |
| Syntax: | SA:TRACKing:NORMalize:LVL? |
| Parameters: | None |
| Return value: | normalization level in dBm |

4.5.27 SA:TRACe:LIST

Query:

| | |
|----------------------|---|
| Effect: | Lists the names of all available traces |
| Syntax: | SA:TRACe:LIST? |
| Parameters: | None |
| Return value: | comma-separated list of trace name |

Example

```
VNA:TRAC:LIST?
Port1,Port2
```

4.5.28 SA:TRACe:DATA

Query:

| | |
|----------------------|---|
| Effect: | Returns the data of a trace |
| Syntax: | SA:TRACe:DATA? |
| Parameters: | <trace>, either by name or by index |
| Return value: | comma-separated list of tuples [x, dBm] |

Example

```
:SA:TRACE:DATA? PORT1
[9.75e+8,-100.351],
[9.7505e+8,-95.7394],
[9.751e+8,-97.5749],
[9.7515e+8,-96.9667],
[9.752e+8,-96.2391],
[9.7525e+8,-94.8761],
[9.753e+8,-96.0805],
[9.7535e+8,-95.7997],
[9.754e+8,-95.2021],
[9.7545e+8,-96.3472]
```

Note: actual response will not include newlines between data points, only at the end

4.5.29 SA:TRACe:AT

Query:

| | |
|----------------------|--|
| Effect: | Returns the data at a specific frequency (possibly interpolated) |
| Syntax: | SA:TRACe:AT? |
| Parameters: | <trace>, either by name or by index <frequency>, in Hz |
| Return value: | <dBm> or “NaN” if specified frequency is invalid) |

Example

```
:SA:TRAC:AT? Port1 1000000000
-96.424
```

4.5.30 SA:TRACe:MAXFrequency

Query:

| | |
|----------------------|--|
| Effect: | Returns the highest frequency contained in the trace |
| Syntax: | SA:TRACe:MAXFrequency? |
| Parameters: | <trace>, either by name or by index |
| Return value: | maximum frequency in Hz |

4.5.31 SA:TRACe:MINFrequency

Query:

| | |
|----------------------|---|
| Effect: | Returns the lowest frequency contained in the trace |
| Syntax: | SA:TRACe:MINFrequency? |
| Parameters: | <trace>, either by name or by index |
| Return value: | maximum frequency in Hz |

4.5.32 SA:TRACe:MAXAmplitude

Query:

| | |
|----------------------|---|
| Effect: | Returns the datapoint with the highest amplitude in the trace |
| Syntax: | SA:TRACe:MAXAmplitude? |
| Parameters: | <trace>, either by name or by index |
| Return value: | <frequency>,<dBm> of the highest amplitude point |

Example

```
:SA:TRAC:MAXA? Port1
9.63e+8, -12.534
```

4.5.33 SA:TRACe:MINAmplitude

Query:

| | |
|----------------------|--|
| Effect: | Returns the datapoint with the lowest amplitude in the trace |
| Syntax: | SA:TRACe:MINAmplitude? |
| Parameters: | <trace>, either by name or by index |
| Return value: | <frequency>,<dBm> of the lowest amplitude point |

4.5.34 SA:TRACe:NEW

Event:

| | |
|--------------------|---------------------|
| Effect: | Creates a new trace |
| Syntax: | SA:TRACe:NEW |
| Parameters: | <trace name> |

4.5.35 SA:TRACe:DELeTe

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Deletes a trace |
| Syntax: | VNA:TRACe:DELeTe |
| Parameters: | <trace>, either by name or by index |

4.5.36 SA:TRACe:RENAME

Event:

| | |
|--------------------|---|
| Effect: | Changes the name of a trace |
| Syntax: | SA:TRACe:RENAME |
| Parameters: | <trace>, either by name or by index <new name> |

4.5.37 SA:TRACe:PAUSE

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Pauses (freezes) a trace |
| Syntax: | SA:TRACe:PAUSE |
| Parameters: | <trace>, either by name or by index |

4.5.38 SA:TRACe:RESUME

Event:

| | |
|--------------------|-------------------------------------|
| Effect: | Resumes (unfreezes) a trace |
| Syntax: | SA:TRACe:RESUME |
| Parameters: | <trace>, either by name or by index |

4.5.39 SA:TRACe:PAUSED

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries whether a trace is paused |
| Syntax: | SA:TRACe:PAUSED? |
| Parameters: | <trace>, either by name or by index |
| Return value: | TRUE or FALSE |

4.5.40 SA:TRACe:PARAMeter

Event:

| | |
|--------------------|---|
| Effect: | Sets the measurement parameter that is stored in the trace |
| Syntax: | SA:TRACe:PARAMeter |
| Parameters: | <trace>, either by name or by index <parameter>, options are PORT ₁ and PORT ₂ |

Query:

| | |
|----------------------|--|
| Effect: | Queries the measurement parameter of a trace |
| Syntax: | SA:TRACe:PARAMeter? |
| Parameters: | <trace>, either by name or by index |
| Return value: | PORT1 or PORT2 |

4.5.4I SA:TRACe:TYPE

Event:

| | |
|--------------------|--|
| Effect: | Sets the storage type of a trace |
| Syntax: | SA:TRACe:TYPE |
| Parameters: | <trace>, either by name or by index <type>, options are OVERWRITE, MAXHOLD or MINHOLD |

Query:

| | |
|----------------------|-------------------------------------|
| Effect: | Queries the storage type of a trace |
| Syntax: | SA:TRACe:TYPE? |
| Parameters: | <trace>, either by name or by index |
| Return value: | OVERWRITE, MAXHOLD or MINHOLD |

5 Custom Driver Commands

The LibreVNA-GUI is mainly intended to be used with the LibreVNA. However, the interface between the LibreVNA-GUI and the actual VNA is abstracting certain hardware features to allow the LibreVNA-GUI to interact with other devices as well. This is mainly intended for future extensions and only very few other devices are supported for testing and demonstration purposes.

Each device driver may implement additional SCPI commands that are too specific to be useful with every device. These commands are only available when the LibreVNA-GUI is connected to the device.

5.1 LibreVNA Version 1

The following commands are available when connected to a LibreVNA (hardware version 1):

5.1.1 DEViCe:UPDATE

Event:

| | |
|--------------------|--|
| Effect: | Updates the firmware of the connected device |
| Syntax: | DEViCe:UPDATE <fw_file> |
| Parameters: | <fw_file> Path to the firmware file |

Important points when saving/loading setup files through SCPI commands:

- The path must be either absolute or relative to the location of the GUI application.
- If the LibreVNA-GUI (and thus also the SCPI server) is running on a different machine than the SCPI client, the firmware file must be stored on the machine that runs the GUI.

5.1.2 DEVice:INFo:TEMPeratures

Query:

| | |
|----------------------|---|
| Effect: | Queries the temperatures of certain chips |
| Syntax: | DEVice:INFo:TEMPeratures? |
| Parameters: | None |
| Return value: | <source>/<I.LO>/<CPU> |

Example

```
: DEV : INF : TEMP ?  
45 / 51 / 31
```

5.1.3 MANual:STArt

Event:

| | |
|--------------------|---|
| Effect: | Starts the manual device control dialog |
| Syntax: | MANual:STArt |
| Parameters: | None |

The manual device control dialog allows the user to directly access all the hardware components. This can be considered as a forth mode (in addition to VNA, signal generator and spectrum analyzer). As long as it is active, it takes priority over any other mode. After starting the manual control dialog, all hardware components are disabled by default. While the manual control dialog is active, additional SCPI commands are available to configure the hardware and retrieve ADC readings.

5.1.4 MANual:STOp

Event:

| | |
|--------------------|--|
| Effect: | Stops the manual device control dialog |
| Syntax: | MANual:STOp |
| Parameters: | None |

5.1.5 MANual:HSRC_CE

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the chip enable for the highband source |
| Syntax: | MANual:HSRC_CE |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the chip enable for the highband source |
| Syntax: | MANual:HSRC_CE? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.6 MANual:HSRC_RFEN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the RF enable for the highband source |
| Syntax: | MANual:HSRC_RFEN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the RF enable for the highband source |
| Syntax: | MANual:HSRC_RFEN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.7 MANual:HSRC_LOCKed

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the lock status of the highband source |
| Syntax: | MANual:HSRC_LOCKed? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.8 MANual:HSRC_PWR

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Sets the output power of the highband source |
| Syntax: | MANual:HSRC_PWR |
| Parameters: | <power>, output power in dBm, allowed values are -4, -1, 2 and 5 |

Query:

| | |
|----------------------|---|
| Effect: | Queries the output power of the highband source |
| Syntax: | MANual:HSRC_PWR? |
| Parameters: | None |
| Return value: | <power>, output power in dBm |

5.1.9 MANual:HSRC_FREQ

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Sets the target frequency of the highband source |
| Syntax: | MANual:HSRC_FREQ |
| Parameters: | <freq>, frequency in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the target frequency of the highband source |
| Syntax: | MANual:HSRC_FREQ? |
| Parameters: | None |
| Return value: | <freq>, frequency in Hz |

5.1.10 MANual:HSRC_LPF

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|---|
| Effect: | Sets the lowpass filter of the highband source |
| Syntax: | MANual:HSRC_LPF |
| Parameters: | <cutoff>, Cutoff frequency in MHz, allowed values are 947, 1880, 3500 and 0 (no filter) |

Query:

| | |
|----------------------|---|
| Effect: | Queries the lowpass filter setting of the highband source |
| Syntax: | MANual:HSRC_LPF? |
| Parameters: | None |
| Return value: | <cutoff>, Cutoff frequency in MHz |

5.1.11 MANual:LSRC_EN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|---|
| Effect: | Controls the enable signal for the lowband source |
| Syntax: | MANual:LSRC_EN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|--|
| Effect: | Queries the status of the enable signal for the lowband source |
| Syntax: | MANual:LSRC_EN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.12 MANual:LSRC_PWR

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|---|
| Effect: | Sets the output power of the lowband source |
| Syntax: | MANual:LSRC_PWR |
| Parameters: | <power>, output power in mA, allowed values are 2, 4, 6 and 8 |

Query:

| | |
|----------------|--|
| Effect: | Queries the output power of the lowband source |
| Syntax: | MANual:LSRC_PWR? |

| | |
|----------------------|-----------------------------|
| Parameters: | None |
| Return value: | <power>, output power in mA |

5.1.13 MANual:LSRC_FREQ

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|---|
| Effect: | Sets the target frequency of the lowband source |
| Syntax: | MANual:LSRC_FREQ |
| Parameters: | <freq>, frequency in Hz |

Query:

| | |
|----------------------|--|
| Effect: | Queries the target frequency of the lowband source |
| Syntax: | MANual:LSRC_FREQ? |
| Parameters: | None |
| Return value: | <freq>, frequency in Hz |

5.1.14 MANual:BAND_SW

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--------------------------------------|
| Effect: | Controls the band selector switch |
| Syntax: | MANual:BAND_SW |
| Parameters: | TRUE for highband, FALSE for lowband |

Query:

| | |
|----------------------|--|
| Effect: | Queries the status of the band selector switch |
| Syntax: | MANual:BAND_SW? |
| Parameters: | None |
| Return value: | TRUE for highband, FALSE for lowband |

5.1.15 MANual:ATTenuator

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|---|
| Effect: | Sets the attenuator value |
| Syntax: | MANual:ATTenuator |
| Parameters: | <att>, Attenuation in dB, values between -31.75 and 0 |

Query:

| | |
|----------------------|------------------------------|
| Effect: | Queries the attenuator value |
| Syntax: | MANual:ATTenuator? |
| Parameters: | None |
| Return value: | <att>, Attenuation in dB |

5.1.16 MANual:AMP_EN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the enable signal for the amplifier |
| Syntax: | MANual:AMP_EN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the enable signal for the amplifier |
| Syntax: | MANual:AMP_EN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.17 MANual:PORT_SW

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|-----------------------------------|
| Effect: | Controls the port selector switch |
| Syntax: | MANual:PORT_SW |
| Parameters: | <port>, either 1 or 2 |

Query:

| | |
|----------------------|--|
| Effect: | Queries the status of the port selector switch |
| Syntax: | MANual:PORT_SW? |
| Parameters: | None |
| Return value: | <port> |

5.1.18 MANual:LOI_CE

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the chip enable for the LOI PLL |
| Syntax: | MANual:LOI_CE |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the chip enable for the LOI PLL |
| Syntax: | MANual:LOI_CE? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.19 MANual:LOI_RFEN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the RF enable for the LO _I PLL |
| Syntax: | MANual:LO _I _RFEN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the RF enable for the LO _I PLL |
| Syntax: | MANual:LO _I _RFEN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.20 MANual:LO_I_LOCKed

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the lock status of the LO _I PLL |
| Syntax: | MANual:LO _I _LOCKed? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.21 MANual:LO_I_FREQ

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Sets the target frequency of the LO _I PLL |
| Syntax: | MANual:LO _I _FREQ |
| Parameters: | <freq>, frequency in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the target frequency of the LO _I PLL |
| Syntax: | MANual:LO _I _FREQ? |
| Parameters: | None |
| Return value: | <freq>, frequency in Hz |

5.1.22 MANual:IF_I_FREQ

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|------------------------------------|
| Effect: | Sets the IF _I frequency |
| Syntax: | MANual:IF _I _FREQ |
| Parameters: | <freq>, frequency in Hz |

Query:

| | |
|--------------------|---------------------------------------|
| Effect: | Queries the IF _I frequency |
| Syntax: | MANual:IF _I _FREQ? |
| Parameters: | None |

| | |
|----------------------|-------------------------|
| Return value: | <freq>, frequency in Hz |
|----------------------|-------------------------|

5.1.23 MANual:LO2_EN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the enable signal for the LO2 PLL |
| Syntax: | MANual:LO2_EN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the enable signal for the LO2 PLL |
| Syntax: | MANual:LO2_EN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.24 MANual:LO2_FREQ

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Sets the target frequency of the LO2 PLL |
| Syntax: | MANual:LO2_FREQ |
| Parameters: | <freq>, frequency in Hz |

Query:

| | |
|----------------------|---|
| Effect: | Queries the target frequency of the LO2 PLL |
| Syntax: | MANual:LO2_FREQ? |
| Parameters: | None |
| Return value: | <freq>, frequency in Hz |

5.1.25 MANual:IF2_FREQ

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|-------------------------|
| Effect: | Sets the IF2 frequency |
| Syntax: | MANual:IF2_FREQ |
| Parameters: | <freq>, frequency in Hz |

Query:

| | |
|----------------------|---------------------------|
| Effect: | Queries the IF2 frequency |
| Syntax: | MANual:IF2_FREQ? |
| Parameters: | None |
| Return value: | <freq>, frequency in Hz |

5.1.26 MANual:PORT1_EN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the enable signal for the port 1 receiver |
| Syntax: | MANual:PORT1_EN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the enable signal for the port 1 receiver |
| Syntax: | MANual:PORT1_EN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.27 MANual:PORT2_EN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Controls the enable signal for the port 2 receiver |
| Syntax: | MANual:PORT2_EN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|---|
| Effect: | Queries the status of the enable signal for the port 2 receiver |
| Syntax: | MANual:PORT2_EN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.28 MANual:REF_EN

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|---|
| Effect: | Controls the enable signal for the reference receiver |
| Syntax: | MANual:REF_EN |
| Parameters: | TRUE or FALSE |

Query:

| | |
|----------------------|--|
| Effect: | Queries the status of the enable signal for the reference receiver |
| Syntax: | MANual:REF_EN? |
| Parameters: | None |
| Return value: | TRUE or FALSE |

5.1.29 MANual:SAMPLES

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Sets the number of ADC samples per reading |
| Syntax: | MANual:SAMPLES |
| Parameters: | <samples>, value between 16 and 131072 in increments of 16 |

Query:

| | |
|----------------------|---|
| Effect: | Queries the number of ADC samples per reading |
| Syntax: | MANual:SAMPLES? |
| Parameters: | None |
| Return value: | <samples> |

5.1.30 MANual:WINDow

Only available when the manual control dialog is active.

Event:

| | |
|--------------------|--|
| Effect: | Sets the window for the DFT calculation |
| Syntax: | MANual:WINDow |
| Parameters: | <window>, either NONE, KAISER, HANN or FLATTOP |

Query:

| | |
|----------------------|--|
| Effect: | Queries the window for the DFT calculation |
| Syntax: | MANual:WINDow? |
| Parameters: | None |
| Return value: | NONE, KAISER, HANN or FLATTOP |

5.1.31 MANual:PORTI_MIN

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|---|
| Effect: | Queries the minimum observed port 1 ADC value in the last sampling period |
| Syntax: | MANual:PORTI_MIN? |
| Parameters: | None |
| Return value: | minimum ADC value |

5.1.32 MANual:PORTI_MAX

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|---|
| Effect: | Queries the maximum observed port 1 ADC value in the last sampling period |
| Syntax: | MANual:PORTI_MAX? |
| Parameters: | None |
| Return value: | maximum ADC value |

5.1.33 MANual:PORT1_MAG

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the observed magnitude at port 1 in the last sampling period |
| Syntax: | MANual:PORT1_MAG? |
| Parameters: | None |
| Return value: | port 1 magnitude (linear unit, arbitrary scale) |

5.1.34 MANual:PORT1_PHASE

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the observed phase at port 1 in the last sampling period |
| Syntax: | MANual:PORT1_PHASE? |
| Parameters: | None |
| Return value: | phase in degree (random value because it is relativ to an internal sampling clock) |

5.1.35 MANual:PORT1_REFERenced

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|---|
| Effect: | Queries the observed signal at port 1 relative to the reference in the last sampling period |
| Syntax: | MANual:PORT1_REFERenced? |
| Parameters: | None |
| Return value: | <real>, <imag> |

5.1.36 MANual:PORT2_MIN

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|---|
| Effect: | Queries the minimum observed port 2 ADC value in the last sampling period |
| Syntax: | MANual:PORT2_MIN? |
| Parameters: | None |
| Return value: | minimum ADC value |

5.1.37 MANual:PORT2_MAX

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|---|
| Effect: | Queries the maximum observed port 2 ADC value in the last sampling period |
| Syntax: | MANual:PORT2_MAX? |
| Parameters: | None |
| Return value: | maximum ADC value |

5.1.38 MANual:PORT2_MAG

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the observed magnitude at port 2 in the last sampling period |
| Syntax: | MANual:PORT2_MAG? |
| Parameters: | None |
| Return value: | port 1 magnitude (linear unit, arbitrary scale) |

5.1.39 MANual:PORT2_PHASE

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the observed phase at port 2 in the last sampling period |
| Syntax: | MANual:PORT2_PHASE? |
| Parameters: | None |
| Return value: | phase in degree (random value because it is relativ to an internal sampling clock) |

5.1.40 MANual:PORT2_REFERENCED

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|---|
| Effect: | Queries the observed signal at port 2 relative to the reference in the last sampling period |
| Syntax: | MANual:PORT2_REFERENCED? |
| Parameters: | None |
| Return value: | <real>, <imag> |

5.1.41 MANual:REF_MIN

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the minimum observed reference ADC value in the last sampling period |
| Syntax: | MANual:REF_MIN? |
| Parameters: | None |
| Return value: | minimum ADC value |

5.1.42 MANual:REF_MAX

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the maximum observed reference ADC value in the last sampling period |
| Syntax: | MANual:REF_MAX? |
| Parameters: | None |
| Return value: | maximum ADC value |

5.1.43 MANual:REF_MAG

Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the observed magnitude at the reference receiver in the last sampling period |
| Syntax: | MANual:REF_MAG? |
| Parameters: | None |
| Return value: | port 1 magnitude (linear unit, arbitrary scale) |

5.1.44 MANual:REF_PHASE


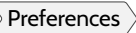
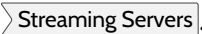
Only available when the manual control dialog is active.

Query:

| | |
|----------------------|--|
| Effect: | Queries the observed phase at the reference receiver in the last sampling period |
| Syntax: | MANual:REF_PHASE? |
| Parameters: | None |
| Return value: | phase in degree (random value because it is relativ to an internal sampling clock) |

6 Streaming data

The SCPI server works well for configuring the device and also for reading trace data once an acquisition is done. But it isn't very well suited for reading data while the device is capturing it. For some applications (e.g. when running continuous sweeps) it may be beneficial to process the data externally as it getting captured. For this purpose, the LibreVNA-GUI supports streaming the data over dedicated ports.

These streaming servers have to be enabled first. This can be done in   .

There are a total of 5 streaming servers available. They can all be enabled and used at the same time, although not all servers will output data all the time.

- **VNA raw data:** Outputs the raw S-parameters without any calibration applied. This output is always available, even when a calibration is enabled or de-embedding is active. Apart from averaging (if enabled) no processing is done on the data.
- **VNA calibrated data:** Outputs the calibrated S-parameters with the calibration applied. This output is only available when a calibration is enabled.
- **VNA de-embedded data:** Outputs the de-embedded S-parameters with the de-embedding and calibration (if enabled) applied. This output is only available when de-embedding is active.
- **SA raw data:** Outputs the raw (not normalized) power levels from the spectrum analyzer. This output is always available, even when normalizing is active.
- **SA normalized data:** Outputs the normalized power levels from the spectrum analyzer. This output is only available when normalizing is active.

All servers output a newline-terminated line of json formatted data for each measurement point in the sweep. The format of the output data changes depending on the configured sweep type.

- VNA frequency or power sweeps:

Example

```
{
  "Z0": 50.0, "dBm": -20.0, "frequency": 42993000.0, "measurements": {
    "S11_imag": -0.061379313997181856, "S11_real": 0.023033630841401063, "S12_imag": 0.3205479840477101, "S12_real": -0.5742283570681822, "S21_imag": -0.3746074656570865, "S21_real": 0.6126114195570408, "S22_imag": 0.06312766256272641, "S22_real": -0.018668561526968372}, "pointNum": 7}
}
```

- VNA zero span sweeps:

Example

```
{
  "Z0": 50.0, "measurements": {
    "S11_imag": 0.0697879786634009, "S11_real": 0.11959939538177566, "S12_imag": -0.2820494760489866, "S12_real": 0.4134518710922877, "S21_imag": 0.11201366122663228, "S21_real": -0.4258244924547545, "S22_imag": -0.004193267854043776, "S22_real": 0.028964823536021114}, "pointNum": 7, "time": 2.438674}
}
```

- Spectrum analyzer non zero span sweeps:

Example

```
{
  "frequency": 2182396.0, "measurements": {
    "PORT1": 7.343487141042715e-06, "PORT2": 6.78117066854611e-06}, "pointNum": 445}
}
```

- Spectrum analyzer zero span sweeps:

Example

```
{
  "measurements": {
    "PORT1": 2.595309979369631e-06, "PORT2": 1.4385256008608849e-06}, "pointNum": 7, "time": 0.344095}
}
```

For zero span sweeps, the time in seconds since the beginning of the sweep is given instead of a frequency of power level. The time is always relative to point 0 of the current sweep and point 0 will have a time of 0.