LibreVNA SCPI Programming Guide

April 16, 2025

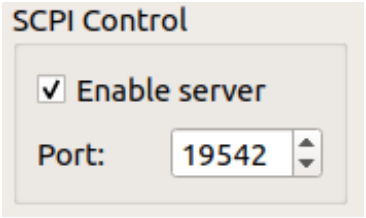
Contents

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:FWRevision?
```

- 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:	<mayor>.<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: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

4.3.21 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

4.3.22 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
```

4.3.23 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 confiigured 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

4.3.24 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 frequeny is invalid)

Example

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

4.3.25 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
...
```

4.3.26 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

4.3.27 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

4.3.28 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
```

4.3.29 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

4.3.30 VNA:TRACe:NEW

Event:

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

4.3.31 VNA:TRACe:DELete

Event:

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

4.3.32 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>

4.3.33 VNA:TRACe:PAUSE

Event:

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

4.3.34 VNA:TRACe:RESUME

Event:

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

4.3.35 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

4.3.36 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

4.3.37 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

4.3.38 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

4.3.39 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

4.3.40 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

4.3.41 VNA:CALibration:ACTIVE

Query:

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

4.3.42 VNA:CALibration:NUMber

Query:

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

4.3.43 VNA:CALibration:RESET

Event:

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

4.3.44 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 [<standard>], calibration kit standard name, optional

4.3.45 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

4.3.46 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>

4.3.47 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)

4.3.48 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.

4.3.49 VNA:CALibration:BUSY

Query:

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

4.3.50 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.

4.3.51 VNA:CALibration:LOAD

Query:

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

Return value:	TRUE or FALSE

4.3.52 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.

4.3.53 VNA:CALibration:KIT:LOAD

Query:

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

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 frequeny
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:ACQuisition:IFBW?
Parameters:	None
Return value:	resolution bandwidth in Hz

4.5.10 SA:ACQuisition:WINDow

Event:

Effect:	Sets the type of window used in the acquisition
Syntax:	SA:ACQuisition:WINDow

Parameters:	<windowtype> NONE KAISER HANN FLATTOP

Query:

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

4.5.11 SA:ACQuisition:DETector

Event:

Effect:	Sets the detector type
Syntax:	SA:ACQuisition:DETector
Parameters:	<detector> +PEAK -PEAK NORMAL SAMPLE AVERAGE

Query:

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

4.5.12 SA:ACQuisition:AVG

Event:

Effect:	Sets the number of sweeps over which a moving average is calculated
Syntax:	SA:ACQuisition: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: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

4.5.19 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

4.5.20 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

4.5.21 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

4.5.22 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

4.5.23 SA:TRACKing:NORMalize:MEASure

Event:

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

4.5.24 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

4.5.25 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
```

4.5.26 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

4.5.27 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 frequeny is invalid)

Example

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

4.5.28 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

4.5.29 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

4.5.30 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
```

4.5.31 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

4.5.32 SA:TRACe:NEW

Event:

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

4.5.33 SA:TRACe:DELete

Event:

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

4.5.34 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>

4.5.35 SA:TRACe:PAUSE

Event:

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

4.5.36 SA:TRACe:RESUME

Event:

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

4.5.37 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

4.5.38 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 PORT1 and PORT2

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

4.5.39 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>/<1.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:LO1_CE

Only available when the manual control dialog is active.
Event:

Effect:	Controls the chip enable for the LO1 PLL
Syntax:	MANual:LO1_CE
Parameters:	TRUE or FALSE

Query:

Effect:	Queries the status of the chip enable for the LO1 PLL
Syntax:	MANual:LO1_CE?
Parameters:	None
Return value:	TRUE or FALSE

5.1.19 MANual:LO1_RFEN

Only available when the manual control dialog is active.
Event:

Effect:	Controls the RF enable for the LO1 PLL
Syntax:	MANual:LO1_RFEN
Parameters:	TRUE or FALSE

Query:

Effect:	Queries the status of the RF enable for the LO1 PLL
Syntax:	MANual:LO1_RFEN?
Parameters:	None
Return value:	TRUE or FALSE

5.1.20 MANual:LO1_LOCKed

Only available when the manual control dialog is active.
Query:

Effect:	Queries the lock status of the LO1 PLL
Syntax:	MANual:LO1_LOCKed?
Parameters:	None
Return value:	TRUE or FALSE

5.1.21 MANual:LO1_FREQ

Only available when the manual control dialog is active.
Event:

Effect:	Sets the target frequency of the LO1 PLL
Syntax:	MANual:LO1_FREQ
Parameters:	<freq>, frequency in Hz

Query:

Effect:	Queries the target frequency of the LO1 PLL
Syntax:	MANual:LO1_FREQ?
Parameters:	None

Return value:	<freq>, frequency in Hz

5.1.22 MANual:IF1_FREQ

Only available when the manual control dialog is active.
Event:

Effect:	Sets the IF1 frequency
Syntax:	MANual:IF1_FREQ
Parameters:	<freq>, frequency in Hz

Query:

Effect:	Queries the IF1 frequency
Syntax:	MANual:IF1_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 calculatio
Syntax:	MANual:WINdow?
Parameters:	None
Return value:	NONE, KAISER, HANN or FLATTOP

5.1.31 MANual:PORT1_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:PORT1_MIN?
Parameters:	None

Return value:	minimum ADC value

5.1.32 MANual:PORT1_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:PORT1_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 observerd 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 observerd 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 observerd 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 acquition 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 enbled first. This can be done in Window > Preferences > Streaming Servers.

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 it 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-embbeding 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.