PX Series SA Series

USER GUIDE

HAROGIC SCPI

Application Guide

V4.55.52
08/21/2026

HAROGIC

Contents

1. Version Management

Updated Description Sheet

Version Number	Content	Time
V4.55.52	1. Added: Preparation chapter 2. Added: EMI Pre-Compliance Measurements chapter	08/21/2026
V0.55.63.0	Version number update only, no content changes.	10/24/2025
V1.2	1. Added: HTRA_SCPI IQS INT,16 and INT,32 data transfer formats. 2. Added: HTRA_SCPI dynamic parsing of device switch configuration files. 3. Fixed: HTRA_SCPI high-speed data channel status information returning incorrectly. 4. Optimized: HTRA_SCPI SCPI configuration retrieval and transmission timing, and synchronization. 5. Optimized: HTRA_SCPI data acquisition to avoid conflicts between parameter setting and data transfer or prolonged waiting.	10/23/2025
V1.1	1. Added: Obtain frequency axis data in SWP mode. 2. Fixed: Precision errors in return values of certain commands. 3. Optimized: Data return precision. 4. Optimized: Program installation.	09/09/2025
V1.0	Initial version	08/08/2025

2. Overview

This manual describes the configuration and use of the SCPI functionality integrated into SAStudio4, enabling users to remotely control SA, NX, and PX Series instruments through SCPI commands. It covers an introduction to the SCPI functionality, communication and connection methods, control and data ports, SCPI command syntax, typical application examples, and the SCPI command reference. In the current version, the SCPI service is integrated directly into SAStudio4, eliminating the need for the standalone HTRA Server service.

3. Preparation

SCPI remote control is supported in GUI version 4.55.52 and later. In earlier versions, the SCPI remote control function relied on the standalone HTRA Server, which had to be installed and started separately. In newer versions, the SCPI service is integrated directly into the spectrum analyzer software, eliminating the need to install or run HTRA Server. **To avoid communication port conflicts, make sure that the previous version of HTRA Server has been completely uninstalled before using the built-in SCPI function. Otherwise, the previous service may occupy the default communication port, preventing the built-in SCPI service from starting properly or causing communication failures.**

Uninstallation: Navigate to the service directory (C:\HTRA_Server) and double-click uninstall.exe.

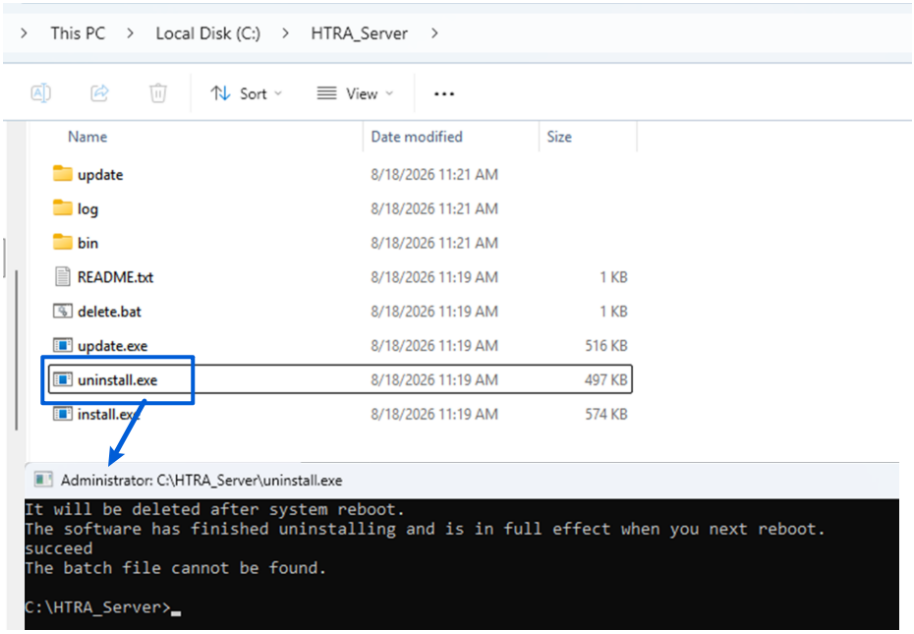

figure 1 Uninstalling HTRA Server

4. SCPI Communication

When the control program and the software are running on the same host, localhost (127.0.0.1) can be used for communication. When they are running on different hosts, use the IP address of the host on which the software is running.

SCPI remote control uses a combination of a control channel and a data channel. The control port (default: 5025) is used for SCPI command communication and responses, while the data port (default: 5125) is used for fast reception of continuous measurement data. The port numbers can be modified as required. For communication, use the port settings currently displayed in the software.

Remote control is supported via TCP Socket and VISA. Development environments such as LabVIEW and Python can be used to send SCPI commands (for example, *IDN?) to configure instrument parameters, query instrument status, and read measurement data.

5. SCPI Command Format

5.1 Command Format

SCPI commands have a tree structure, consisting of one or more hierarchical levels. Keywords are separated by ":", parameters are separated from commands by a "space", and multiple parameters are separated by ",". Adding "?" after a command keyword indicates a query for that command.

For example: Set the start frequency: SENSe:FREQuency:STARt <number>{unit}

In the command, SENSe is the root keyword, FREQuency is the second-level keyword, and STARt is the third-level keyword. The parameter "<number>" cannot be omitted, while "{unit}" is optional. Adding "?" after the command indicates a query for the parameter issued by that command.

5.2 Symbol Conventions

1. Angle brackets <>: Parameters enclosed in angle brackets must be replaced with a valid value.
   For example: SENSe:FREQuency:STARt <number>, the <number> parameter cannot be omitted; otherwise, the command is invalid.
2. Square brackets []: Keywords enclosed in square brackets are optional and can be omitted.
   For example: [SENSe:]BWIDth[:RESolution]:AUTO? can be abbreviated as: BWIDth:AUTO?
3. Vertical bar |: One parameter must be selected from the separated options.
   For example: BWIDth:AUTO <0 | 1 | OFF | ON> One of the values enclosed in angle brackets must be selected.
4. Braces {}: Braces indicate an optional parameter that can either be specified or omitted to use the default value.

For example: SENSe:FREQuency:STARt <number>{ Hz | kHz | MHz | GHz }, a numeric value must be entered, while the unit can be omitted.

5.3 Command Abbreviation

All SCPI commands can be abbreviated and are case-insensitive.
For example: FREQuency:STARt? can be abbreviated as FREQ:STAR?, Freq:Start? or freq:start?

6. SCPI Command Introduction

6.1 Common Commands

6.1.1 System Information

***IDN?**

Function	Queries basic information about the instrument.
Query	*IDN?
Setting	Not supported.
Example	Query: *IDN? Response:"HTRA,Hardware,57465013002b003a,A:0_55_89,F:0_55_103,M:0_55_103S0_55_103"
Remarks	The response consists of four fields separated by commas. The fields are defined as follows: manufacturer, model, serial number, and firmware version. The firmware version consists of the API version, FPGA version, MCU version, and Server version.

6.1.2 Error Query

***ERR?**

Function	Queries error information from the SCPI error queue.
Query	*ERR?
Setting	Not supported.
Example	Query: *ERR? Response:"0, No error"
Remarks	The response consists of an error code and an error description, separated by a comma.

6.1.3 Synchronization Command

***WAI**

Function	Wait for the previously issued command to complete.
Query	Not supported.
Setting	*WAI
Example	Setting: *WAI
Remarks	This command is used to synchronize command execution. After *WAI is executed, the instrument waits for all previously received commands to complete before executing subsequent commands.

6.1.4 Clear Error Queue

***CLS**

Function	Clears the error queue.
Query	Not supported.
Setting	*CLS
Example	Setting: *CLS
Remarks	After this command is executed, all SCPI error information currently stored in the error queue is cleared.

6.1.5 Restore Default Settings

***RST**

Function	Restores the default parameter settings for the current operating mode.
Query	Not supported.
Setting	*RST
Example	Setting: *RST
Remarks	After this command is executed, the instrument is restored to its default operating state.

6.1.6 Operating Mode

INST:MODE

Function	Sets or queries the current operating mode of the instrument.
Query	INSTrument:SELect?
Setting	INSTrument:SELect < mode>
Example	Query: INST:SEL? Response: "IQS" Setting: INST:SEL SWP
Remarks	The <mode> parameter can be set to: SWP | IQS | DET | RTA | EMC | DEMOD | MAPPING | HARMONIC | PHASENOISE. SWP indicates Standard Spectrum Analysis mode; IQS indicates IQ Streaming mode; DET indicates Detector Analysis mode; RTA indicates Real-Time Spectrum Analysis mode; EMC indicates Precompliance EMI Measurements mode; DEMOD indicates Digital Demodulation mode; MAPPING indicates Heatmap mode; HARMONIC indicates Harmonic Analysis mode; and PHASENOISE indicates Phase Noise Measurement mode.

6.1.7 Data Channel Control

FETCH

Function	Starts or stops the transmission of measurement data over the Data Channel.
Query	FETCH?
Setting	FETCH <action>
Example	Query: FETCH? Response: "STOP" Setting: FETCH START
Remarks	The <action> parameter can be set to: START | STOP. Before executing FETCH START, a Data Channel connection must be established. After transmission is started, measurement data is sent through the Data Channel port.

6.2 Standard Spectrum Analysis Mode

6.2.1 Center Frequency

FREQ:CENT

Function	Sets or queries the center frequency of the instrument.
Query	[SENSe:]FREQuency:CENTer?
Setting	[SENSe:]FREQuency:CENTer <Number>{Hz|kHz|MHz|GHz}
Example	Query: FREQ:CENT? Response: 2260004000 Setting: FREQ:CENT 100MHz
Remarks	The <Number> parameter is of type double, the default unit is Hz.

6.2.2 Span

FREQ:SPAN

Function	Sets or queries the span of the instrument.
Query	[SENSe:]FREQuency:SPAN?
Setting	[SENSe:]FREQuency:SPAN <(<Number>{ Hz|kHz|MHz|GHz}) | FULL>
Example	Query: FREQ:SPAN? Response: 500000000 Setting: FREQ:SPAN 1GHz
Remarks	The <Number> parameter is of type double, the default unit is Hz. Parameter range: 10 Hz to the maximum frequency of the instrument.

6.2.3 Start Frequency

FREQ:STAR

Function	Sets or queries the start frequency of the instrument.
Query	[SENSe:]FREQuency:STARt?
Setting	[SENSe:]FREQuency:STARt <Number>{Hz|kHz|MHz|GHz}
Example	Query: FREQ:STAR? Response: 9000 Setting: FREQuency:STARt 1GHz
Remarks	The <Number> parameter is of type double, the default unit is Hz.

6.2.4 Stop Frequency

FREQ:STOP

Function	Sets or queries the stop frequency of the instrument.
Query	[SENSe:]FREQuency:STOP?
Setting	[SENSe]:FREQuency:STOP <Number>{Hz|kHz|MHz|GHz}
Example	Query: FREQ:STOP? Response: 4520000000 Setting: FREQuency:STOP 1GHz
Remarks	The <Number> parameter is of type double, the default unit is Hz.

6.2.5 Frequency Step

FREQ:CENT:STEP?

Function	Queries the frequency step.
Query	[SENSe:]FREQuency:CENTer:STEP?
Setting	Not supported.
Example	Query: FREQ:CENT:STEP? Response: 10000000
Remarks	The response value is of type double and is expressed in Hz.

6.2.6 Resolution Bandwidth

BAND|BWID

Function	Sets or queries the resolution bandwidth (RBW) of the instrument.
Query	[SENSe:]BANDwidth|BWIDth[:RESolution]?
Setting	[SENSe:]BANDwidth|BWIDth[:RESolution] Number>{Hz|kHz|MHz|GHz}
Example	Query: BAND:RES? Response: 300000 Setting: BAND:RES 400kHz
Remarks	The <Number> parameter is of type double, the default unit is Hz. Range: 0.1 Hz to 10 MHz.

6.2.7 Resolution Bandwidth Mode

BAND:AUTO

Function	Sets or queries the RBW mode.
Query	[SENSe:]BANDwidth:AUTO?
Setting	[SENSe:]BANDwidth:AUTO <state>
Example	Query: BAND:AUTO? Response: "AUTO" Setting: BAND:AUTO MANU
Remarks	The <state> parameter can be set to: MANUal | AUTO | ONETHOUsandthSpan | ONEPERcentSpan. MANUal indicates manual, AUTO indicates automatic, ONETHOUsandthSpan: RBW=0.001*Span, ONEPERcentSpan: RBW=0.001*Span.

6.2.8 Video Bandwidth

BWID:VID

Function	Sets or queries the video bandwidth (VBW) of the instrument.
Query	[SENSe:]BWIDth:VIDeo?
Setting	[SENSe:]BWIDth:VIDeo <Number>{Hz|kHz|MHz|GHz}
Example	Query: BWID:VID? Response: 300000 Setting: BWID:VID 400kHz
Remarks	The <Number> parameter is of type double, the default unit is Hz. Range: 0.1 Hz to 10 MHz.

6.2.9 Video Bandwidth Mode

BWID:VID:AUTO

Function	Sets or queries the VBW mode.
Query	[SENSe:]BWIDth:VIDeo:AUTO?
Setting	[SENSe:]BWIDth:VIDeo:AUTO <state>
Example	Query: BWID:VID:AUTO? Response: "TENTIMEsRBW" Setting: BWID:VID:AUTO MANU
Remarks	The <state> parameter can be set to: MANUal | EQUALToRBW | TENPERcentRBW | ONEPERcentRBW | TENTIMEsRBW. MANUal: Manually enter the VBW value; EQUALToRBW:VBW=RBW; TENPERcentRBW: VBW=0.1×RBW; ONEPERcentRBW: VBW=0.01×RBW; TENTIMEsRBW: VBW=10×RBW.

6.2.10 Sweep Time

SWE:TIME?

Function	Sets or queries the sweep time.
Query	[SENSe:]SWEep:TIME?
Setting	[SENSe:]SWEep:TIME <Number>
Example	Query: SWE:TIME? Response: 0.100016 Setting: SWE:TIME 1
Remarks	The <Number> parameter is of type double and is expressed in seconds (s). This command is valid only when the sweep time is set to manual mode.

6.2.11 Sweep Time Mode

SWE:TIME:AUTO

Function	Sets or queries the sweep time mode.
Query	[SENSe:]SWEep:TIME:AUTO?
Setting	[SENSe:]SWEep:TIME:AUTO <mode>
Example	Query: SWE:TIME:AUTO? Response: "SWT" Setting: SWE:TIME:AUTO MANU
Remarks	The <mode> parameter can be set to: MANUal | SWT | SWT2 | SWT4 | SWT10 | SWT20 | SWT50 | SWTN.

	MANUal: Sweep with the specified sweep time. SWT: Sweep with the minimum sweep time. SWT2: Sweep with approximately 2× the minimum sweep time. SWT4: Sweep with approximately 4× the minimum sweep time. SWT10: Sweep with approximately 10× the minimum sweep time. SWT20: Sweep with approximately 20× the minimum sweep time. SWT50: Sweep with approximately 50× the minimum sweep time. SWTN: Sweep with approximately N× the minimum sweep time, where N is specified by SweepTimeMultiple.

6.2.12 Sweep Points

SWE:POIN

Function	Sets or queries the number of trace points.
Query	[SENSe:]SWEep:POINts?
Setting	[SENSe:]SWEep:POINts <Number>
Example	Query: SWE:POIN? Response: 4000 Setting: SWEep:POINts 5000
Remarks	The <Number> parameter is of type int and specifies the number of trace points.

6.2.13 Window Type

SWE:FFT:WIND:TYPE

Function	Sets or queries the FFT window function type.
Query	[SENSe:]SWEep:FFT:WINDow:TYPE?
Setting	[SENSe:]SWEep:FFT:WINDow:TYPE <type>
Example	Query: SWE:FFT:WIND:TYPE? Response: "NUTTall" Setting: SWE:FFT:WIND:TYPE FLAT
Remarks	The <type> parameter can be set to: FLATop | NUTTall | LOWSideLobe | RECT | KAISer

6.2.14 Trace Detector

TRAC:DET

Function	Sets or queries the trace detector type.
Query	[SENSe:]TRACe:DETector?
Setting	[SENSe:]TRACe:DETector <type >
Example	Query: TRAC:DET? Response: "AUTO" Setting: TRAC:DET POS
Remarks	The <type> parameter can be set to: AUTO | Sample | POSitive | NEGative | RMS | Bypass | Normal. AUTO indicates automatic sampling; Sample indicates sample detection; POSitive indicates positive peak detection; NEGative indicates negative peak detection; RMS indicates RMS detection; Bypass indicates no detection; and Normal indicates normal detection.

6.2.15 Trace Detector Mode

TRAC:DET:MODE

Function	Sets or queries the trace detector mode.
Query	[SENSe:]TRACe:DETector:MODE?
Setting	[SENSe:]TRACe:DETector:MODE <mode>
Example	Query: TRAC:DET:MODE? Response: "MANUal" Setting: TRAC:DET:MODE AUTO
Remarks	The <mode> parameter can be set to: AUTO | MANUal. AUTO indicates automatic mode, and MANUal indicates manual mode.

6.2.16 Reference Level

DISP:TRAC:Y:SCAL:RLEV?

Function	Sets or queries the reference level.
Query	[SENSe:]DISPlay:TRACe:Y:SCALe:RLEVel?
Setting	[SENSe:]DISPlay:TRACe:Y:SCALe:RLEVel <Number>
Example	Query: DISP:TRAC:Y:SCAL:RLEV? Response: 0 Setting: DISP:TRAC:Y:SCAL:RLEV 10
Remarks	The <Number> parameter is of type int and is expressed in dBm.

6.2.17 Spur Rejection

DISP:WIND:TRAC:SPUR:SUPP

Function	Sets or queries spur rejection.
Query	[SENSe:]DISPlay[:WINDow]:TRACe:SPURs:SUPPress?
Setting	[SENSe:]DISPlay[:WINDow]:TRACe:SPURs:SUPPress <level>
Example	Query: DISP:WIND:TRAC:SPUR:SUPP? Response: "ON" Setting: DISP:WIND:TRAC:SPUR:SUPP OFF
Remarks	The <level> parameter can be set to: OFF | ON | HIGH. OFF indicates no spur rejection, ON indicates standard spur rejection, and HIGH indicates enhanced spur rejection.

6.2.18 Power Array

TRAC:DATA?

Function	Queries the power array.
Query	[SENSe:]TRACe:DATA?
Setting	Not supported.
Example	Query: TRAC:DATA? Response: 9E+01;-8.672E+01;-8.3E+01;-8.139E+01;-8.611E+01, etc.
Remarks	Response Y-axis data of the current trace, expressed in dBm.

6.2.19 Frequency Array

TRAC:X:DATA?

Function	Queries the frequency array.
Query	[SENSe:]TRACe:X:DATA?
Setting	Not supported.
Example	Query: TRAC:X:DATA? Response: 9.000E+08;9.010E+08;9.020E+08;9.030E+08, etc.
Remarks	Response X-axis data of the current trace, expressed in Hz.

6.2.20 Trace Type

TRAC:TYPE?

Function	Sets or queries the trace type.
Query	[SENSe:]TRACe:TYPE?
Setting	[SENSe:]TRACe:TYPE <type>
Example	Query: TRAC:TYPE? Response: "WRIT" Setting: TRAC:TYPE MAXH
Remarks	The <type> parameter can be set to: WRIT | MAXH | MINH. WRIT indicates Clear/Write mode, in which new data from each sweep overwrites the previous data; MAXH indicates Max Hold mode, which retains the historical maximum value at each frequency point; MINH indicates Min Hold mode, which retains the historical minimum value at each frequency point.

6.2.21 Detector

DET

Function	Sets or queries the detector type.
Query	[SENSe:]DETector?
Setting	[SENSe:]DETector <type>
Example	Query: DET? Response: "POSitive" Setting: DET NORM
Remarks	The <type> parameter can be set to: NORMal | POSitive | AVERage | NEGAtive | MAXPower | RMS | RAW. NORMal indicates sample detection; POSitive indicates positive peak detection; AVERage indicates average detection; NEGAtive indicates negative peak detection; MAXPower indicates maximum power detection; RMS indicates RMS detection; and RAW indicates raw frame detection.

6.2.22 Attenuation

INP:ATT

Function	Sets or queries the attenuation.
Query	[SENSe:]INPut:ATTenuation?
Setting	[SENSe:]INPut:ATTenuation <Number>
Example	Query: INP:ATT? Response: -1 Setting: INP:ATT 10
Remarks	The default value is -1 (Auto). This parameter is linked to the reference level. For details, refer to the user guide of the corresponding instrument.

6.2.23 Trigger Source

TRIG:SOUR

Function	Sets or queries the trigger source.
Query	[SENSe:]TRIGger:[SEQuence:]SOURce?
Setting	[SENSe:]TRIGger:[SEQuence:]SOURce <source>
Example	Query: TRIG:SEQ:SOUR? Response: "FREE" Setting: TRIG:SEQ:SOUR HOP
Remarks	The <source> parameter can be set to: FREE | HOP | SWEep | GNSSHOP | GNSSSWEep | PROFile. FREE indicates internal trigger with free-running operation; HOP indicates external triggering, with each trigger advancing to the next frequency point; SWEep indicates external triggering, with each trigger refreshing one trace; PROFile indicates external triggering, with each trigger applying a new configuration; GNSSHOP indicates internal GNSS pulse-per-second (PPS) triggering, with each trigger advancing to the next frequency point; GNSSSWEep indicates internal GNSS PPS triggering, with each trigger refreshing one trace.

6.2.24 Trigger Slope

TRIG:SLOP

Function	Sets or queries the trigger slope.
Query	[SENSe:]TRIGger:[SEQuence:]SLOPe?
Setting	[SENSe:]TRIGger:[SEQuence:]SLOPe <slope>
Example	Query: TRIG:SEQ:SLOP? Response: "POSitive" Setting: TRIG:SEQ:SLOP NEG
Remarks	The <slope> parameter can be set to: POSitive | NEGative. POSitive indicates triggering on the rising edge, while NEGative indicates triggering on the falling edge.

6.2.25 Trigger Output Mode

TRIG:OUTP:MODE

Function	Sets or queries the trigger output mode.
Query	[SENSe:]TRIGger:OUTPut:MODE?
Setting	[SENSe:] TRIGger:OUTPut:MODE <Number>
Example	Query: TRIG:OUTP:MODE? Response: 0 Setting: TRIG:OUTP:MODE 1
Remarks	The <Number> parameter is of type int. 0 indicates no trigger output; 1 indicates frequency-hop trigger; 2 indicates sweep trigger; and 3 indicates configuration trigger.

6.2.26 FFT Execution Strategy

DISP:FFT:EXEC:STRA

Function	Sets or queries the FFT execution strategy.
Query	[SENSe:]DISPlay:FFT:EXECution:STRAtegy?
Setting	[SENSe:]DISPlay:FFT:EXECution:STRAtegy <strategy>
Example	Query: DISP:FFT:EXEC:STRA? Response: 0 Setting: DISP:FFT:EXEC:STRA 1
Remarks	The <Number> parameter is of type int. 0 indicates Auto; 1 indicates CPU Priority; 2 indicates FPGA Priority; 3 indicates CPU with low utilization; 4 indicates CPU with medium utilization; 5 indicates CPU with high utilization; and 6 indicates FPGA.

6.2.27 Preamplifier

INP:GAIN:STAT

Function	Sets or queries the preamplifier state.
Query	[SENSe:]INPut:GAIN:STATe?
Setting	[SENSe:] INPut:GAIN:STATe <state>
Example	Query: INP:GAIN:STAT? Response: "AUTO" Setting: INP:GAIN:STAT OFF
Remarks	The <state> parameter can be set to: AUTO | OFF. AUTO automatically controls the preamplifier state, while OFF disables the preamplifier.

6.2.28 Reference Clock Frequency

ROSC:EXT:FREQ

Function	Sets or queries the reference clock frequency.
Query	[SENSe:]ROSCillator:EXTernal:FREQuency?
Setting	[SENSe:]ROSCillator:EXTernal:FREQuency<Number>{Hz|kHz|MHz|GHz}
Example	Query: ROSC:EXT:FREQ? Response: 100000007.57 Setting: ROSC:EXT:FREQ 10000000
Remarks	The <Number> parameter is of type double and is expressed in Hz. It specifies the external reference clock frequency.

6.2.29 Peak Power

CALC:MARK:MAX?

Function	Queries the current peak power.
Query	[SENSe:]CALCulate:MARKer:MAXnum?
Setting	Not supported.
Example	Query: CALC:MARK:MAX? Response: "2564950698.934783,-78.657837"
Remarks	Returns the frequency and power corresponding to the peak in the current measurement results. The units are Hz and dBm, respectively.

6.3 IQS

6.3.1 Center Frequency

FREQ:CENT

Function	Sets or queries the center frequency of the instrument.
Query	[SENSe:]FREQuency:CENTer?
Setting	[SENSe:]FREQuency:CENTer <Number>{Hz|kHz|MHz|GHz}
Example	Query: FREQ:CENT? Response: 1000000000 Setting: FREQ:CENT 100MHz
Remarks	The <Number> parameter is of type double. The default unit is Hz. Hz, kHz, MHz, and GHz are supported as input units.

6.3.2 Reference Level

DISP:TRAC:Y:SCAL:RLEV

Function	Sets or queries the reference level.
Query	[SENSe:]DISPlay:TRACe:Y:SCALe:RLEVel?
Setting	[SENSe:]DISPlay:TRACe:Y:SCALe:RLEVel <Number>
Example	Query: DISP:TRAC:Y:SCAL:RLEV? Response: 0 Setting: DISP:TRAC:Y:SCAL:RLEV 10
Remarks	The <Number> parameter is of type int and is expressed in dBm.

6.3.3 Analysis Bandwidth

ANAL:BAND?

Function	Queries the current analysis bandwidth.
Query	[SENSe:]ANALysis:BANDwidth?
Setting	Not supported.
Example	Query: ANAL:BAND? Response: 50000000
Remarks	Returns the currently available analysis bandwidth, in Hz.

6.3.4 Decimation Factor

ACQ:DEC

Function	Sets or queries the time-domain decimation factor.
Query	[SENSe:]ACQuire:DECunation?
Setting	[SENSe:]ACQuire:DECunation <Number>
Example	Query: ACQ:DEC? Response: 1 Setting: ACQ:DEC 4
Remarks	The <Number> parameter is of type int. The setting must be a power of 2. Range: 1 to 4096.

6.3.5 Acquire IQ Data

TRAC:DATA

Function	Acquires IQ data (I/Q sample array).
Query	[SENSe:]TRACe:DATA?
Setting	Not supported.
Example	Query: TRACe:DATA? Response: 17291,14550,-10375,14592,-13833,14507,-13833,-18517, etc.
Remarks	Returns interleaved I/Q data.

6.3.6 Data Type

TRAC:DATA:TYPE

Function	Sets or queries the IQ data type.
Query	[SENSe:]TRACe:DATA:TYPE?
Setting	[SENSe:]TRACe:DATA:TYPE <type>
Example	Query: TRAC:DATA:TYPE? Response: "ASC8" Setting: TRAC:DATA:TYPE VITA49
Remarks	The <type> parameter can be set to: ASC8 | BIN8 | VITA49. ASC8 indicates ASCII-format data, BIN8 indicates binary-format data, and VITA49 indicates data in VITA 49 protocol format.

6.3.7 Data Format

TRAC:FORM

Function	Sets or queries the IQ data format.
Query	[SENSe:]TRACe: FORMat?
Setting	[SENSe:]TRACe: FORMat <format>
Example	Query: TRAC:FORM? Response: "INT16" Setting: TRAC:FORM INT8
Remarks	The <format> parameter can be set to: INT8 | INT16 | INT32. INT8, INT16, and INT32 indicate 8-bit, 16-bit, and 32-bit binary data per I/Q component, respectively.

6.3.8 IQ Sample Rate

TRAC:IQ:SRAT

Function	Sets or queries the IQ sample rate.
Query	[SENSe:] TRACe:IQ:SRATe?
Setting	[SENSe:] TRACe:IQ:SRATe <Number>{Hz|kHz|MHz|GHz}
Example	Query: TRAC:IQ:SRAT? Response: 62500000 Setting: TRAC:IQ:SRAT 55MHz
Remarks	The <Number> parameter is of type double. The default unit is Hz.

6.3.9 Preview Points

TRAC:IQ:POIN

Function	Queries the number of IQ sample points after triggering.
Query	[SENSe:]TRACe:IQ:POINts?
Setting	Not supported.
Example	Query: TRAC:IQ:POIN? Response: 55000
Remarks	The response value is of type int and indicates the current number of IQ sample points.

6.3.10 Reference Clock Source

ROSC:SOUR

Function	Sets or queries the reference clock source.
Query	[SENSe:]ROSCillator:SOURce?
Setting	[SENSe:]ROSCillator:SOURce <source>
Example	Query: ROSC:SOUR? Response: 0 Setting: ROSC:SOUR 3
Remarks	The <source> parameter can be set to: 0 | 1 | 2 |3. 0 indicates the internal clock source; 1 indicates the external clock source; 2 indicates internal clock source – high quality; and 3 indicates the forced external clock source, which does not switch to the internal reference even if the external clock loses lock.

6.3.11 Reference Clock Frequency

ROSC:EXT:FREQ

Function	Sets or queries the reference clock frequency.
Query	[SENSe:]ROSCillator:EXTernal:FREQuency?
Setting	[SENSe:] ROSCillator:EXTernal:FREQuency <Number>{Hz|kHz|MHz|GHz}
Example	Query: ROSC:EXT:FREQ? Response: 100000007.57 Setting: ROSC:EXT:FREQ 10MHz
Remarks	The <Number> parameter is of type double. The default unit is Hz.

6.3.12 Reference Clock Output

ROSC:OUTP:STAT

Function	Sets or queries the reference clock output state.
Query	[SENSe:]ROSCillator:OUTPut:STATe?
Setting	[SENSe:]ROSCillator:OUTPut:STATe <Number>
Example	Query: ROSC:OUTP:STAT? Response: 0 Setting: ROSC:OUTP:STAT 1
Remarks	The <Number> parameter can be set to: 0|1, 0 disables the reference clock output, while 1 enables the reference clock output.

6.3.13 LO Optimization

LO:STAT

Function	Sets or queries the LO optimization state.
Query	[SENSe:]LO:STATe?
Setting	[SENSe:] LO:STAT <Number>
Example	Quer: LO:STAT? Response: 0 Setting: LO:STAT 1
Remarks	The <Number> parameter can be set to: 0 | 1 | 2 |3, 0 indicates Auto; 1 optimizes sweep speed; 2 optimizes spurious performance; and 3 optimizes phase noise performance.

6.3.14 Gain Strategy

GAIN:STR

Function	Sets or queries the gain strategy.
Query	[SENSe:]GAIN:STRategy?
Setting	[SENSe:]GAIN:STRategy <number>
Example	Query: GAIN:STR? Response: 0 Setting: GAIN:STR 1
Remarks	The <Number> parameter can be set to: 0 | 1. 0 indicates low-noise mode, while 1 indicates high-linearity mode.

6.3.15 IF Gain Level

GAIN:IF

Function	Sets or queries the IF gain level.
Query	[SENSe:]GAIN:IF?
Setting	[SENSe:]GAIN:IF <Number>
Example	Query: GAIN:IF? Response: 0 Setting: GAIN:IF 1
Remarks	The <Number> parameter is of type int and specifies the IF gain level.

6.3.16 Trigger Source

TRIG:SEQ:SOUR

Function	Sets or queries the trigger source.
Query	[SENSe:]TRIGger:[SEQuence:]SOURce?
Setting	[SENSe:] TRIGger:[SEQuence:]SOURce <TriggerSource_TypeDef>
Example	Query: TRIG:SEQ:SOUR? Response: "BUS" Setting: TRIG:SEQ:SOUR TIM
Remarks	The <TriggerSource_TypeDef> parameter can be set to: EXTernal | BUS | LEVel | TIMer | MULTIExt | MULTIGNSS1PPS | GNSS1PPS. EXTernal indicates external triggering; BUS indicates bus triggering; LEVel indicates level triggering; TIMer indicates timer triggering; MULTIExt indicates external multi-instrument synchronization triggering; MULTIGNSS1PPS indicates GNSS 1PPS multi-instrument synchronization triggering; and GNSS1PPS indicates 1PPS triggering provided by GNSS.

6.3.17 Trigger Slope

TRIG:SEQ:SLOP

Function	Sets or queries the trigger slope.
Query	[SENSe:]TRIGger:[SEQuence:]SLOPe?
Setting	[SENSe:]TRIGger:[SEQuence:]SLOPe? <TriggerEdge_TypeDef>
Example	Query: TRIG:SEQ:SLOP? Response: "POSitive" Setting: TRIG:SEQ:SOUR NEG
Remarks	The <TriggerEdge_TypeDef> parameter can be set to: POSitive | NEGative. POSitive indicates triggering on the rising edge, while NEGative indicates triggering on the falling edge.

6.3.18 Level Trigger Threshold

TRIG:SEQ:LEV:THR

Function	Sets or queries the trigger level threshold.
Query	[SENSe:]TRIGger:[SEQuence]:LEVel:THReshold?
Setting	[SENSe:]TRIGger:[SEQuence]:LEVel:THReshold <Number>
Example	Query: TRIG:LEV:THR? Response: -10.0000003375759 Setting: TRIG:LEV:THR -70
Remarks	The <Number> parameter is of type double and is expressed in dBm.

6.3.19 Trigger Delay

TRIG:DELAY

Function	Sets or queries the trigger delay time.
Query	[SENSe:] TRIGger:DELAY?
Setting	[SENSe:] TRIGger:DELAY <Number>
Example	Query: TRIG:DELAY? Response: 0 Setting: TRIG:DELAY 0.1
Remarks	The default unit is seconds (s).

6.3.20 Pretrigger

TRIG:SEQ:LEV:PRET

Function	Sets or queries the pretrigger time.
Query	[SENSe:]TRIGger:[SEQuence]:LEVel:PRETime?
Setting	[SENSe:]TRIGger:[SEQuence]:LEVel:PRETime <Number>
Example	Query: TRIG:SEQ:LEV:PRET? Response: 0 Setting: TRIG:SEQ:LEV:PRET 0.00001
Remarks	The default unit is seconds (s).

6.3.21 Debounce Safety Time

TRIG:SEQ:LEV:PRET

Function	Sets or queries the debounce safety time for level triggering.
Query	[SENSe:]TRIGger:SEQuence:LEVel:SAFETime?
Setting	[SENSe:]TRIGger:SEQuence:LEVel:SAFETime <Number>
Example	Query: TRIG:SEQ:LEV:SAFET? Response: 1.016e-06 Setting: TRIG:SEQ:LEV:PRET 0.000001
Remarks	The default unit is seconds (s).

6.3.22 IF Automatic Gain Control

DISP:IF:AGC:STAT

Function	Sets or queries the IF automatic gain control state.
Query	[SENSe:]DISPlay:IF:AGC:STATe?
Setting	[SENSe:]DISPlay:IF:AGC:STATe <Number>
Example	Query: DISP:IF:AGC:STAT? Response: 0 Setting: DISP:IF:AGC:STAT 1
Remarks	The <Number> parameter can be set to: 0|1. 0 disables IF automatic gain control, while 1 enables IF automatic gain control.

6.3.23 DC Suppression

DISP:DDC:STAT

Function	Sets or queries DC suppression.
Query	[SENSe:]DISPlay:DDC:STATe?
Setting	[SENSe:]DISPlay:DDC:STATe <Number>
Example	Query: DISP:DDC:STAT? Response: 0 Setting: DISP:DDC:STAT 1
Remarks	The <Number> parameter can be set to: 0|1|3. 0 disables DC suppression; 1 enables the high-pass filter; and 3 enables automatic offset correction.

6.3.24 External Trigger Edge Synchronization

TRIG:TIM:SYNC

Function	Sets or queries the external trigger edge synchronization option.
Query	[SENSe:]TRIGger:TIMer:SYNC?
Setting	[SENSe:]TRIGger:TIMer:SYNC <mode>
Example	Query: TRIG:TIM:SYNC? Response: "EXTR" Setting: TRIG:TIM:SYNC NONE
Remarks	The <mode> parameter can be set to: NONE | EXTR | EXTF | EXTSR | EXTSF | GR | GF | GSR | GSF. NONE: Timer triggering is not synchronized with an external trigger. EXTR: Timer triggering is synchronized with the rising edge of the external trigger. EXTF: Timer triggering is synchronized with the falling edge of the external trigger. EXTSR: Timer triggering is synchronized once with the rising edge of the external trigger (a command function must be called to perform one-time synchronization). EXTSF: Timer triggering is synchronized once with the falling edge of the external trigger (a command function must be called to perform one-time synchronization). GR: Timer triggering is synchronized with the rising edge of GNSS 1PPS. GF: Timer triggering is synchronized with the falling edge of GNSS 1PPS. GSR: Timer triggering is synchronized once with the rising edge of GNSS 1PPS (a command function must be called to perform one-time synchronization). GSF: Timer triggering is synchronized once with the rising edge of GNSS 1PPS (a command function must be called to perform one-time synchronization).

6.3.25 Preamplifier

PREA:STAT

Function	Sets or queries the preamplifier state.
Query	[SENSe:]PREAmplifier:STATe?
Setting	[SENSe:]PREAmplifier:STATe <Number>
Example	Query: PREA:STAT? Response: 0 Setting: PREA:STAT 1
Remarks	The <Number> parameter can be set to: 0 | 1 | 2 | 3 | 4. 0 indicates automatic enable; 1 forces the preamplifier off; 2 indicates low gain; 3 indicates medium gain; and 4 indicates high gain.

6.4 EMI Pre-Compliance Measurements

6.4.1 Amplitude Unit

DISP:WIND:TRAC:Y:RLEV:UNIT

Function	Sets or queries the amplitude unit.
Query	[SENSe:]DISPlay:WINDow:TRACe:Y:RLEVel:UNIT?
Setting	[SENSe:]DISPlay:WINDow:TRACe:Y:RLEVel:UNIT <unit>
Example	Query: DISP:WIND:TRAC:Y:RLEV:UNIT Response: "DBUV" Setting: DISP:WIND:TRAC:Y:RLEV:UNIT dBm
Remarks	The <unit> parameter can be set to: DBM | DBMV | DBUV.

6.4.2 Search Mode

SEAR:MODE

Function	Sets or queries the search mode.
Query	[SENSe:]SEARch:MODE?
Setting	[SENSe:]SEARch:MODE <mode>
Example	Query: SEAR:MODE? Response: "SPUR" Setting: SEAR:MODE PEAK
Remarks	The <mode> parameter can be set to: SPUR | PEAK. SPUR indicates spur search, and PEAK indicates peak search.

6.4.3 Margin

SEAR:MARG

Function	Sets or queries the search margin.
Query	[SENSe:]SEARch:MARGin?
Setting	[SENSe:]SEARch:MARGin <value>
Example	Query: SEAR:MARG? Response: -10 Setting: SEAR:MARG 0
Remarks	The <value> parameter is of type double and is expressed in dB. Range: -20 dB to 20 dB.

6.4.4 Measurement Time

MEAS:TIME

Function	Sets or queries the measurement time.
Query	[SENSe:]MEASure:TIME?
Setting	[SENSe:]MEASure:TIME <value>
Example	Query: MEAS:TIME? Response: 2 Setting: MEAS:TIME 0.1
Remarks	The <value> parameter is of type double and is expressed in seconds (s). Range: 0.1 s to 10 s.

6.4.5 Execution Mode

MEAS:SEQ

Function	Sets or queries the execution sequence.
Query	[SENSe:]MEASure:SEQuence?
Setting	[SENSe:]MEASure:SEQuence <sequence>
Example	Query: MEAS:SEQ? Response: "SCAN" Setting: MEAS:SEQ MEAS
Remarks	The <sequence> parameter can be set to: SCAN | MEAS | ALL. SCAN indicates scan and search; MEAS indicates measurement; and ALL indicates scan, search, and measurement.

6.4.6 Measurement Frequency

MEAS:FREQ

Function	Sets or queries the measurement frequency.
Query	[SENSe:]MEASure:FREQuency?
Setting	[SENSe:]FREQuency <value>
Example	Query: MEAS:FREQ? Response: 1000000000 Setting: MEAS:FREQ 150000000
Remarks	The <value> parameter is of type double. The default unit is Hz.

6.4.7 Measurement Bandwidth

MEAS:BWID

Function	Sets or queries the measurement bandwidth.
Query	[SENSe:]MEASure:BWIDth?
Setting	[SENSe:]MEASure:BWIDth <Number>
Example	Query: MEAS:BWID? Response: "120kHz" Setting: MEAS:BWID 0
Remarks	The <Number> parameter can be set to: 0 | 1 | 2 | 3. 0 indicates 200 Hz; 1 indicates 9 kHz; 2 indicates 120 kHz; and 3 indicates 1 MHz.

7. Example

The following example demonstrates how to acquire spectrum data in Standard Spectrum Analysis mode using Python:

1. On the software menu bar, select "System" -> "SCPI", and then click Enable to enable SCPI remote control.
2. Use Python to establish a TCP Socket connection and send SCPI commands as required to configure instrument parameters, query instrument status, and read measurement data.

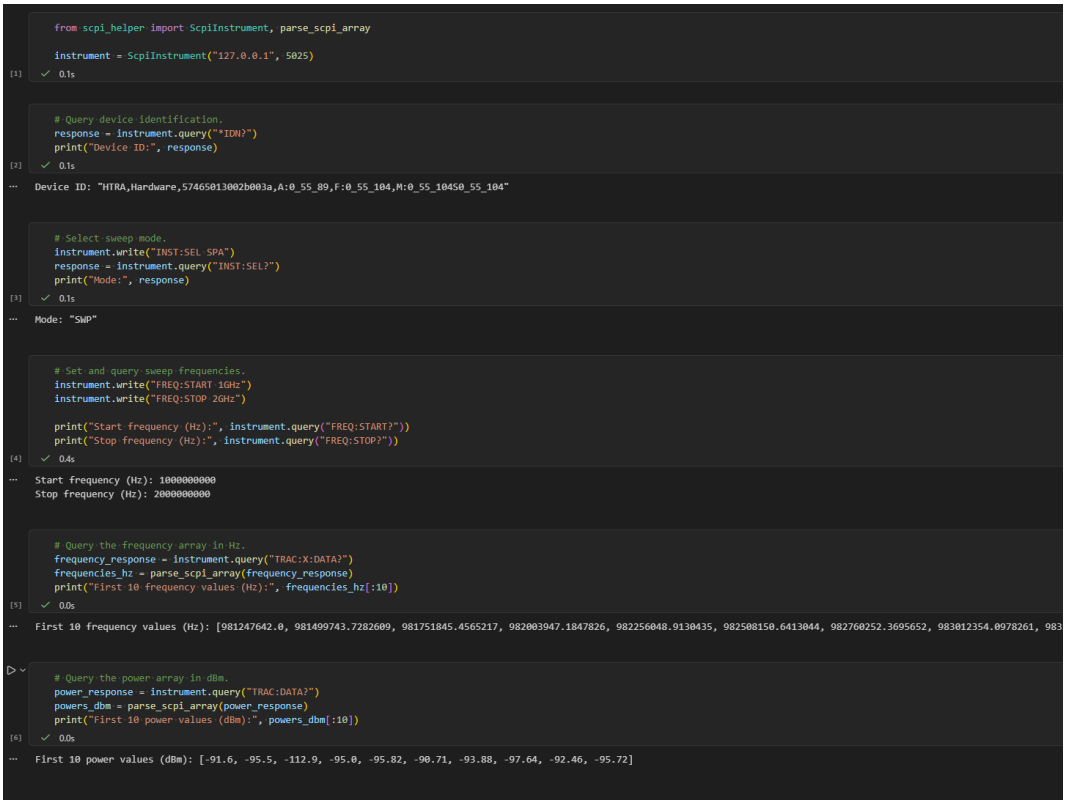

figure 2 Acquiring Spectrum Sweep Data Using Python

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