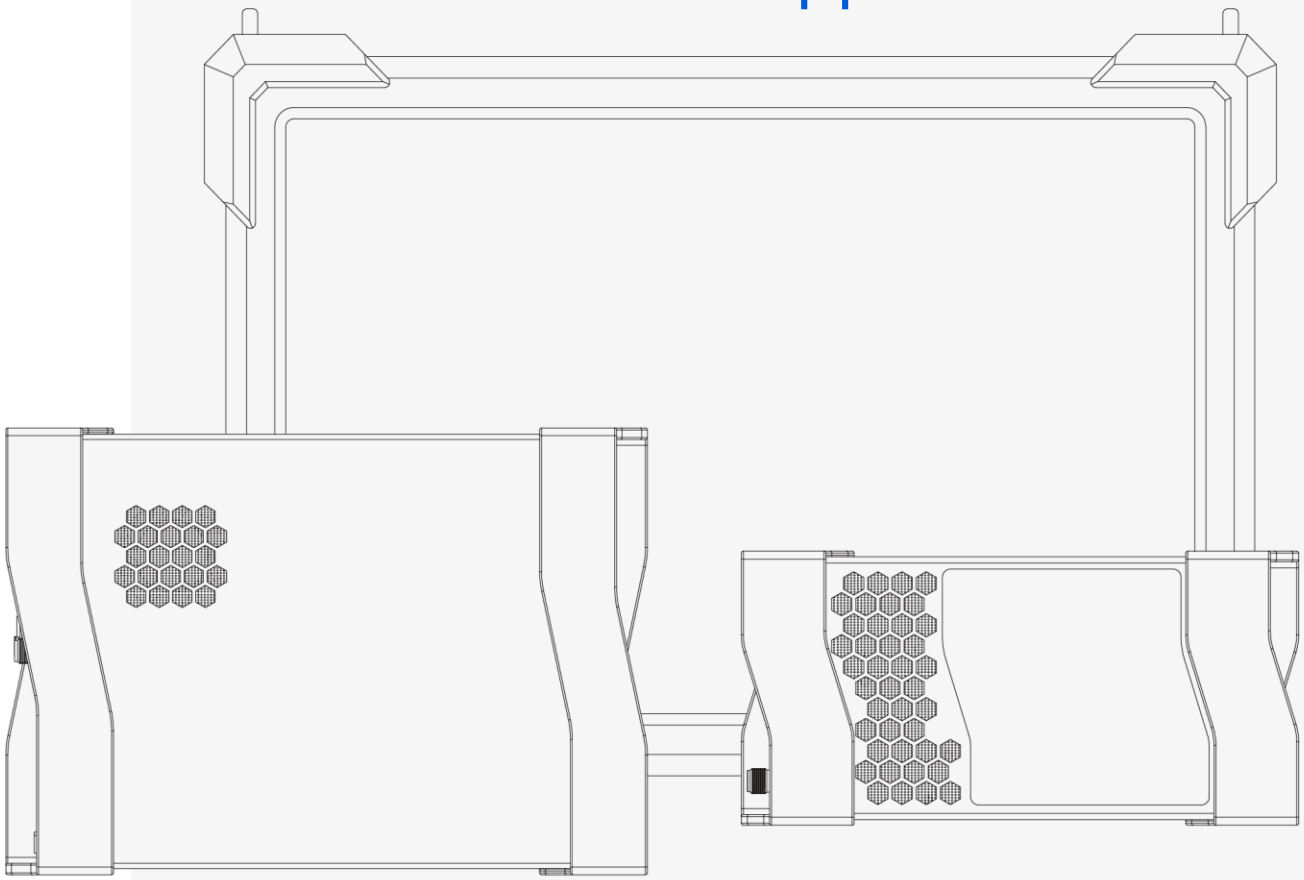
APPLICATION GUIDE

HAROGIC SCPI

Application Guide



PX Series

SA Series

NX Series

V0.55.63.3

12/5/2025

HAROGIC

Contents

Version Management

Updated Description Sheet

Version Number	Content	Time
V0.55.63.3	1. Added: Query Peak Power Section	12/5/2025
V0.55.63.1	1. Added: Added a Note in the device connection section. 2. Modified: Modify the "Device Connection" section to "Preparation" section, and add the detailed steps for connecting the device.	11/20/2025
V0.55.63.0	1. Version number update only, no content changes.	10/24/2025
V1.18	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
V1.17	1. Added: Obtain frequency axis data in SWP mode. 2. Optimized: Data return precision. 3. Optimized: Program installation. 4. Fixed: Precision errors in return values of certain commands.	9/9/2025
V1.16	1. Initial version	8/8/2025

1. SCPI Application Guide

This manual provides instructions on the installation, configuration, and usage of the HTRA_Server service, helping users achieve remote control of instruments such as SA, NX, PX, etc., through SCPI commands. The content includes SCPI application guidelines, device connection methods, command formats, and control examples, as well as detailed parameter settings and version update records for SWP and IQS modes. It is intended for use by developers and testers.

2. HTRA_Server

System Requirements:

Operating System: recommended Windows 10/11, Windows 7/8 (minimum)

Dependencies: Visual Studio 2019 C++ Redistributables (x86)

2.1 Acquisition

Obtain from HAROGIC official website > Download Center > Software (Website).

2.2 Installation

1. Unzip HTRA_Server.zip;

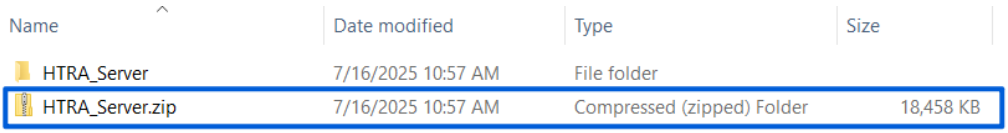


Figure 1 Extract the HTRA_Server folder

2. Enter the HTRA_Server directory;

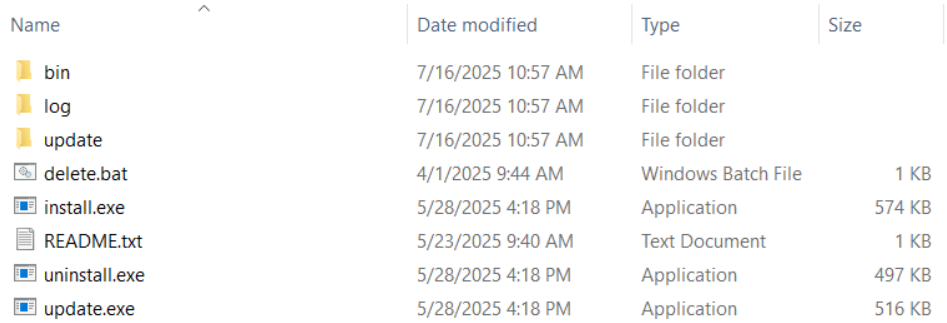
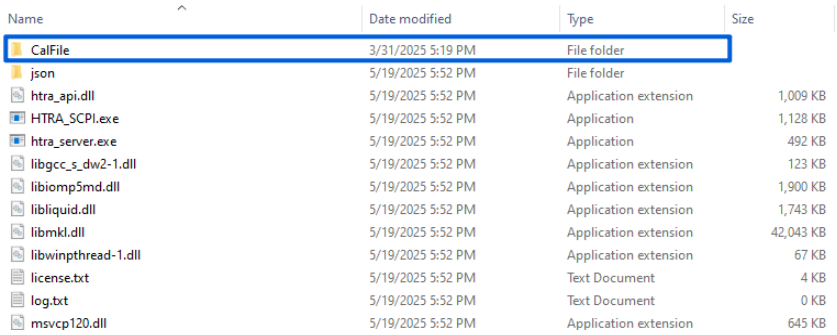


Figure 2 Enter the HTRA_Server folder

3. Copy the calibration files to HTRA_Server/bin/CalFile;



Name	Date modified	Type	Size
CalFile	3/31/2025 5:19 PM	File folder	
json	5/19/2025 5:52 PM	File folder	
htra_api.dll	5/19/2025 5:52 PM	Application extension	1,009 KB
HTRA_SCPI.exe	5/19/2025 5:52 PM	Application	1,128 KB
htra_server.exe	5/19/2025 5:52 PM	Application	492 KB
libgcc_s_dw2-1.dll	5/19/2025 5:52 PM	Application extension	123 KB
libiomp5md.dll	5/19/2025 5:52 PM	Application extension	1,900 KB
libliquid.dll	5/19/2025 5:52 PM	Application extension	1,743 KB
libmkl.dll	5/19/2025 5:52 PM	Application extension	42,043 KB
libwinpthread-1.dll	5/19/2025 5:52 PM	Application extension	67 KB
license.txt	5/19/2025 5:52 PM	Text Document	4 KB
log.txt	5/19/2025 5:52 PM	Text Document	0 KB
msvcp120.dll	5/19/2025 5:52 PM	Application extension	645 KB

Figure 3 Copy the calibration files

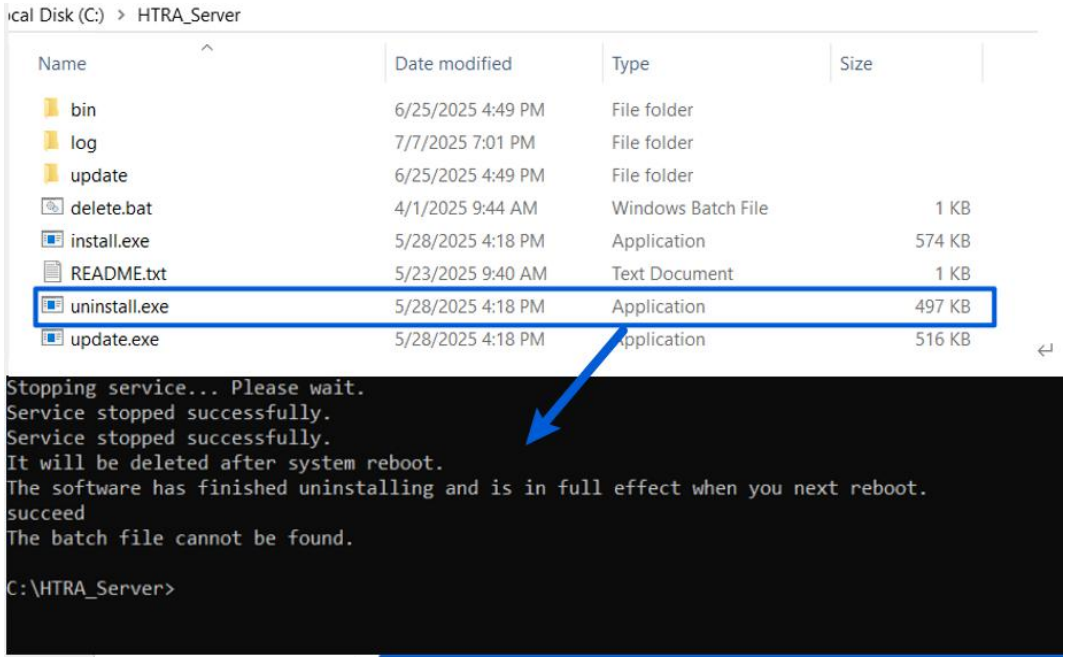
4. Enter HTRA_Server / click install.exe

```
C:\Users\ \Desktop\1\HTRA_Server0.55.0.15_v25\HTRA_Server0.55.0.15_v25>.\install.exe
current catalog :C:\Users\ \Desktop\1\HTRA_Server0.55.0.15_v25\HTRA_Server0.55.0.15_v25
Service does not exist. Creating new service...
Service installed successfully.
Service failure actions configured successfully.
HTRA_PortMap
Service started successfully!
Service does not exist. Creating new service...
Service installed successfully.
Service failure actions configured successfully.
HTRA_SCPI
```

Figure 4 Click the install.exe

2.3 Uninstall

Enter the service directory (C:\HTRA_Server), and double-click uninstall.exe in the program directory.



ical Disk (C:) > HTRA_Server

Name	Date modified	Type	Size
bin	6/25/2025 4:49 PM	File folder	
log	7/7/2025 7:01 PM	File folder	
update	6/25/2025 4:49 PM	File folder	
delete.bat	4/1/2025 9:44 AM	Windows Batch File	1 KB
install.exe	5/28/2025 4:18 PM	Application	574 KB
README.txt	5/23/2025 9:40 AM	Text Document	1 KB
uninstall.exe	5/28/2025 4:18 PM	Application	497 KB
update.exe	5/28/2025 4:18 PM	Application	516 KB

```
Stopping service... Please wait.
Service stopped successfully.
Service stopped successfully.
It will be deleted after system reboot.
The software has finished uninstalling and is in full effect when you next reboot.
succeed
The batch file cannot be found.

C:\HTRA_Server>
```

Figure 5 Uninstall HTRA_Server

2.4 Adding Other Devices

If you need to use other devices, you can place the corresponding device's calibration files into C:\HTRA_Server\bin\CalFile.

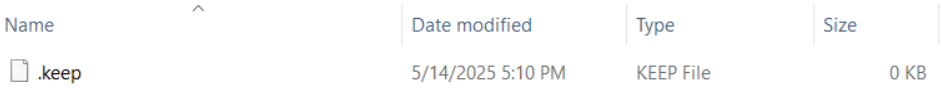


Figure 6 Adding other devices

2.5 Restart Service

1. Open the Task Manager;
2. Go to Services and search for HTRA;
3. Select HTRA_SCPI and click Restart.

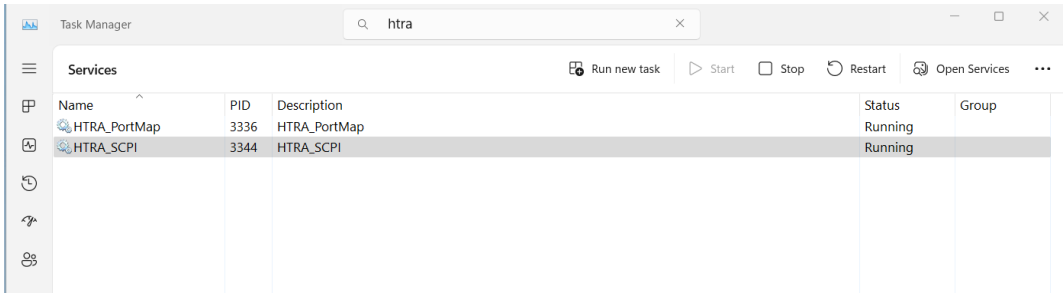


Figure 7 Restart service

3. Preparations

Before using SCPI commands, ensure that the equipment of each series has been correctly connected to the host computer according to the steps below.

Note: Make sure that SAStudio4 is closed when using SCPI control.

3.1 SA Series

1. Install the corresponding driver according to your computer's information;
2. Connect the device to the host computer correctly.

Tips: SA series instruments require approximately 3 seconds after power-on to function normally. Please wait patiently.

3.2 NX Series

1. Configure an IP address on the host computer that is in the same network segment as the instrument, according to the fixed IP address of the NX series instrument: 192.168.1.100.
2. Correctly connect the power supply and the Gigabit Ethernet port.

Tips: NX series instruments require approximately 40 seconds after power-on to complete the self-startup process. Please wait patiently.

3.3 PX Series

1. Connect the instrument's USB 3.0 port to the PC's Ethernet port via a driver-free expansion dock with an Ethernet port;
2. Click "File" -> "Exit" in the software to close the software on the PX series device;
3. Configure an IP address on the host computer that is in the same network segment as 192.168.1.100, and ensure the network connection is successful.

4. SCPI Control

By default, the system performs remote control via localhost **(127.0.0.1).** If using a TCP socket, the port number is 5025.

Remote control is supported through LabVIEW, Python, and TCP sockets. In LabVIEW, SCPI commands (e.g., *IDN?) are sent via VISA nodes to communicate with the instrument, enabling remote control and data acquisition. For other control methods, please refer to the Example section.

5. SCPI Command Introduction

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 Explanation

1. Angle brackets <>: The parameter inside angle brackets must be replaced by a valid value. For example: SENSe:FREQuency:STARt <number>, where the number cannot be empty; otherwise, it is an invalid command.
2. Square brackets []: The function of square brackets is to indicate that the keyword can be omitted.
   [SENSe:]BWIDth[:RESolution]:AUTO? can be omitted as: BWIDth:AUTO?
3. Vertical bar |: The vertical bar represents selecting one from multiple separated parameters. For example: BWIDth:AUTO <0 | 1 | OFF | ON>, you need to choose one from the angle brackets.
4. Curly braces {}: The function of curly braces is to indicate optional parameters, which can be set or use the default setting.
   For example: SENSe:FREQuency:STARt <number>{ Hz | kHz | MHz | GHz }, need to enter a number, but the unit can be omitted.

5.3 Command Simplification

All SCPI commands support simplification and are case-insensitive.

For example: FREQuency:STARt? can be simplified to FREQ:STAR?, Freq:Start?, or freq:start?. In FREQuency, FREQ is the key character and cannot be omitted; of course, the key character can also be in lowercase form as freq.

6. System Commands

6.1 System Information

Query device information

Remote Commands	*IDN?
Example	*IDN? Remote command response: HTRA,M80_R5,4248500b001e003a,A0_55_58F0_55_22M0_55_53S0_55_15
Note	This command does not have a settable form. The response consists of four comma-separated fields. If the UID is 0, it indicates that the device is not opened. The fields are defined as follows: Manufacturer, Model, Serial Number, Firmware Version. The Firmware Version is composed of API/FPGA/MCU/Server version.

6.2 Error Query

Retrieve the currently cached error information.

Remote Commands	*ERR
Example	*ERR?
Note	The maximum storage capacity of the error queue is1000entries. When exceeded, the data at the top of the queue will be discarded. This command does not have a settable form.

6.3 Mode Function

Switch or query device mode

Remote Commands	INSTrument:SELect <String> INSTrument:SELect?
Example	INST:SEL SWP INST:SEL?
Range	SPA | IQS
Note	SPA: Sweep Mode IQS: IQ Data Acquisition Mode

6.4 Synchronization Command

Wait for previous operations to complete

Remote Commands	*WAI
Example	*WAI
Note	This command does not have a query form.

6.5 Clear Error Cache

Clear the error cache

Remote Commands	*CLS
Example	*CLS
Note	This command does not have a query form. In the current version, using this command will clear the error queue.

6.6 Data Channel Control

Control the high-speed channel to start or stop data transmission

Remote Commands	FETCH FETCH?
Example	FETCH STARt
Range	STOP | STARt
Note	Ensure that the client TCP connection has been established and the device is operating properly.

7. SWP Mode

7.1 Start Frequency

Set or query start frequency

Remote Commands	[SENSe:]FREQuency:STARt <number>{Hz|kHz|MHz|GHz} [SENSe:]FREQuency:STARt?
Example	FREQ:STAR 1e6 FREQ:STAR?
Max	Depends on the maximum frequency of the instrument, and its value is the maximum frequency minus 100 Hz.
Min	9 kHz
Note	Default Unit Hz

7.2 Stop Frequency

Set or query stop frequency

Remote Commands	[SENSe]:FREQuency:STOP <Number>{Hz|kHz|MHz|GHz} FREQuency:STOP?
Example	FREQuency:STOP 1000MHz FREQuency:STOP?
Max	Depends on the maximum frequency of the instrument
Min	9.1 kHz
Note	Default Unit Hz

7.3 Center Frequency

Set or query center frequency

Remote Commands	[SENSe]:FREQuency:CENTer <number>{Hz|kHz|MHz|GHz} [SENSe]:FREQuency:CENTer?
Example	FREQ:CENT 100MHz FREQ:CENT?
Max	Depends on the maximum frequency of the instrument, and its value is the maximum frequency minus 100 Hz.
Min	9.05 kHz
Note	Default Unit Hz

7.4 Span

Set or query span

Remote Commands	[SENSe]:FREQuency:SPAN <(<Number>{ Hz|kHz|MHz|GHz}) | FULL> [SENSe]:FREQuency:SPAN?
Example	FREQ:SPAN FULL FREQ:SPAN?
Max	Depends on the maximum frequency of the instrument
Min	100 Hz
Note	Default Unit Hz

7.5 Reference Level

Set or query reference level

Remote Commands	[SENSe]:DISPlay:TRACe:Y:SCALe:RLEVel <Number>{dBm} [SENSe]:DISPlay:TRACe:Y:SCALe:RLEVel?
Example	DSIP:TRAC:Y:SCAL:RLEV 10 DSIP:TRAC:Y:SCAL:RLEV?
Max	23 dBm
Min	-50 dBm
Note	Default Unit dBm. There are differences between models. Please refer to the product manual of the respective instrument for the specific range.

7.6 Resolution Bandwidth

Set or query resolution bandwidth

Remote Commands	[:SENSe]:BANDwidth|BWIDth[:RESolution] <Number>{Hz|kHz|MHz|GHz} [:SENSe]:BANDwidth|BWIDth[:RESolution]?
Example	BAND:RES 1e7 BAND:RES?
Max	10 MHz
Min	0.1 Hz
Note	Default Unit Hz

7.7 Resolution Bandwidth Mode

Set or query resolution bandwidth mode

Remote Commands	[SENSe:]BWIDth:[RESolution:]AUTO <String> [SENSe:]BWIDth[:RESolution]:AUTO?
Example	BWID:AUTO?
Range	OFF| ON
Note	Automatically switch to ON when setting the resolution bandwidth.

7.8 Video Bandwidth

Set or query video bandwidth

Remote Commands	[SENSe:]BWIDth:VIDeo <Number>{Hz|kHz|MHz|GHz} [SENSe:]BWIDth:VIDeo?
Example	BWID:VID 1e5 BWID:VID?
Max	10 MHz
Min	0.1 Hz
Note	Default Unit Hz

7.9 Video Bandwidth Mode

Set or query video bandwidth mode

Remote Commands	[SENSe:]BWIDth:VIDeo:AUTO <String> [SENSe:]BWIDth:VIDeo:AUTO?
Example	BWID:VID:AUTO OFF BWID:VID:AUTO?
Range	OFF | ON
Note	Automatically switch to ON when setting the video bandwidth.

7.10 Analog Intermediate Frequency Bandwidth Grade

Set or query analog intermediate frequency bandwidth grade

Remote Commands	[SENSe:]BWIDth:IF <Number> [SENSe:]BWIDth:IF?
Example	BWID:IF? BWID:IF 2
Max	SAN-45/SAN-60/SAM-60/SAM-80: 11 SAE-90/SAE-200/SAN-400 R2: 3 SAN-400 R1: 7
Min	SAN-45/SAN-60/SAM-60/SAM-80: 0 SAE-90/SAE-200/SAN-400 R2: 0 SAN-400 R1: 0

7.11 Sweep Time

Set or query Sweep Time

Remote Commands	[SENSe:]SWEep:TIME <number> [SENSe:]SWEep:TIME?
Example	SWE:TIME 300 SWE:TIME?
Note	Default Unit ms

7.12 Sweep Time Mode

Set or query scan time mode

Remote Commands	[SENSe:]SWEep:TIME:AUTO <String> [SENSe:]SWEep:TIME:AUTO?
Example	SWE:TIME:AUTO MANUal SWE:TIME:AUTO?
Range	MANUal | AUTO

7.13 FFT Window

Set or query FFT window

Remote Commands	[SENSe]:SWEep:FFT:WINDow:TYPE <String> [SENSe]:SWEep:FFT:WINDow:TYPE?
Example	SWE:FFT:WIND:TYPE FLAT SWE:FFT:WIND:TYPE?
Range	FLATop | NUTTall | LOWSideobe
Note	The parameters can be simplified as follows: FLATop : FLAT NUTTall : NUTT LOWSideobe : LOWS

7.14 Detector

Set or query detector in sweep mode

Remote Commands	[SENSe:]DETector <String> [SENSe:]DETector?
Example	DET NORM DET?
Description	The query command will return a string, such as: POSpeak.
Range	NORMal | POSitive | AVERage | NEGative | MAXPower | RMS
Note	The parameters can be simplified as follows: NORMal : NORM POSitive : POS AVERage : AVER NEGative : NEG MAXPower : MAXP

7.15 Trace Points

Set or query trace points

Remote Commands	[SENSe:]SWEep:POINts <Number> [SENSe:]SWEep:POINts?
Example	SWE:POINt 40000 SWE:POINt?
Note	An integer type number is required.
Max	5000000
Min	1

7.16 Trace Type

Set or query trace type

Remote Commands	[SENSe:]TRACe:TYPE <String> [SENSe:]TRACe:TYPE?
Example	TRAC:TYPE WRIT TRAC:TYPE?
Range	WRIT | MAXH | MINH

7.17 Attenuation

Set or query the spectrum analyzer channel attenuation

Remote Commands	[SENSe:]INPut:ATTenuation <Number> [SENSe:]INPut:ATTenuation?
Example	INP:ATT 10 INP:ATT?
Max	33
Min	-1
Note	The default is -1 (automatic). This parameter is linked with the reference level. For more details, please refer to the user manual of the respective instrument.

7.18 Spurious Rejection

Set or query spurious rejection

Remote Commands	[SENSe:]DISPlay[:WINDow]:TRACe:SPURs:SUPPress <String> [SENSe:]DISPlay[:WINDow]:TRACe:SPURs:SUPPress?
Example	DISP:WIND:TRAC:SPUR:SUPP OFF DISP:WIND:TRAC:SPUR:SUPP?
Range	OFF | ON

7.19 Get Data

Set or query get data

Remote Commands	[SENSe:]TRACe:DATA? {TRACE1}
Example	TRAC:DATA?
Note	This command does not support the setting format. Default Unit dBm

7.20 Get Frequency Axis Data

Get frequency axis data

Remote Commands	[SENSe:]TRACe:X:DATA? {TRACE1}
Example	TRAC:X:DATA?
Note	This command does not support the setting format. Default Unit dBm

7.21 Data Format

Set or query data format

Remote Commands	[SENSe:]TRACe:DATA:TYPE <String> [SENSe:]TRACe:DATA:TYPE?
Example	FORMAT:DATA REAL,8 FORMAT:DATA?
Range	ASC,8 | REAL,32
Note	Default ASC,8

7.22 Trace Detector Mode

Set or query trace detector mode

Remote Commands	TRACe:DETector:MODE <String> TRACe:DETector:MODE?
Example	TRAC:DET:MODE AUTO TRAC:DET:MODE?
Range	AUTO | MANUal
Note	The instrument detector can only be modified when the detector mode is set to Manual.

7.23 Trace Detector

Set or query trace detector

Remote Commands	[SENSe:]TRACe:DETector <String> [SENSe:]TRACe:DETector?
Example	TRAC:DET AUTO TRAC:DET?
Range	Sample | POSitive | NEGative | RMS | Bypass
Note	The parameters can be simplified as follows: POSitive : POS NEGative : NEG

7.24 Trigger Source

Set or query trigger source

Remote Commands	[SENSe:]TRIGger:[SEQuence:]SOURce <String> [SENSe:]TRIGger:[SEQuence:]SOURce?
Example	TRIG:SOUR FREE TRIG:SOUR?
Range	FREE | HOP | SWEep
Note	The parameters can be simplified as follows: SWEep : SWE
Parameter Description	FREE: Free Run HOP: Jump to a new frequency point with each trigger SWEep: Refresh a trace with each trigger

7.25 Trigger Edge

Set or query trigger edge

Remote Commands	[SENSe:]TRIGger:[SEQuence:]SLOPe <String> [SENSe:]TRIGger:[SEQuence:]SLOPe?
Example	TRIG:SLOP POS TRIG:SLOP?
Range	POSitive | NEGative
Note	The parameters can be simplified as follows: POSitive : POS NEGative : NEG

7.26 Preamplifier

Set or query preamplifier

Remote Commands	[SENSe:]INPut:GAIN:STATe <String> [SENSe:]INPut:GAIN:STATe?
Example	INP:GAIN:STAT AUTO INP:GAIN:STAT?
Range	AUTO | OFF

7.27 Reference Clock Frequency

Set or query reference clock frequency

Remote Commands	[SENSe:]ROSCillator:EXTernal:FREQuency <Number>{Hz|kHz|MHz|GHz} [SENSe:]ROSCillator:EXTernal:FREQuency?
Example	ROSC:EXT:FREQ 10000000 ROSC:EXT:FREQ?
Note	Default Unit Hz. The reference clock frequency is supported only at 10 MHz.

7.28 Query Peak Power

Query peak power

Remote Commands	CALCulate:MARKer:MAXnum?
Example	CALCulate:MARKer:MAXnum?
Note	Return parameters: Frequency (Hz), Power (dBm)

8. IQS Mode

8.1 Center Frequency

Set or query center frequency

Remote Commands	[SENSe]:FREQuency:CENTer <number>{Hz|kHz|MHz|GHz} [SENSe]:FREQuency:CENTer?
Example	FREQ:CENT 100MHz FREQ:CENT?
Max	Depending on the maximum frequency of the instrument, its value is the maximum frequency minus 100 Hz.
Min	9.05 kHz
Note	Default Unit Hz

8.2 Reference Level

Set or query reference level

Remote Commands	[SENSe]:DISPlay:TRACe:Y:SCALe:RLEVel <Number>{dBm} [SENSe]:DISPlay:TRACe:Y:SCALe:RLEVel?
Example	DSIP:TRAC:Y:SCAL:RLEV10 DSIP:TRACY:SCALRLEV?
Max	23 dBm
Min	-50 dBm
Note	The default Unit is dBm. There are differences between models, so please refer to the product manual of the respective instrument for the specific range.

8.3 Decimation Factor

Set or query decimation factor

Remote Commands	[SENSe:]ACQuire:DECunation <Number> [SENSe:]ACQuire:DECunation?
Example	ACQ:DEC 4 ACQ:DEC?
Max	4096
Min	1
Note	The value of Number must be a power of 2.

8.4 Preamplifier

Set or query preamplifier

Remote Commands	[SENSe:]INPut:GAIN:STATe <String> [SENSe:]INPut:GAIN:STATe?
Example	INP:GAIN:STAT AUTO INP:GAIN:STAT?
Range	AUTO | OFF

8.5 Reference Clock Frequency

Set or query reference clock frequency

Remote Commands	[SENSe:]ROSCillator:EXTernal:FREQuency <Number>{Hz|kHz|MHz|GHz} [SENSe:]ROSCillator:EXTernal:FREQuency?
Example	ROSC:EXT:FREQ?
Note	Default Unit Hz. The reference clock frequency is supported only at 10 MHz.

8.6 Attenuation

Set or query the spectrum analyzer channel attenuation

Remote Commands	[SENSe:]INPut:ATTenuation <Number> [SENSe:]INPut:ATTenuation?
Example	INP:ATT 10 INP:ATT?
Max	33
Min	-1
Note	The default is -1 (automatic). This parameter is linked with the reference level. For more details, please refer to the user manual of the respective instrument.

8.7 Trigger Source

Set or query trigger source

Remote Commands	[SENSe:]TRIGger:[SEQuence:]SOURce <String> [SENSe:]TRIGger:[SEQuence:]SOURce?
Example	TRIG:SOUR SWE TRIG:SOUR?
Range	FREE | EXTernal | BUS
Note	The parameters can be simplified as follows: EXTernal : EXT

8.8 Trigger Edge

Set or query trigger edge

Remote Commands	[SENSe:]TRIGger:[SEQuence:]SLOPe <String> [SENSe:]TRIGger:[SEQuence:]SLOPe?
Example	TRIG:SLOP NEG TRIG:SLOP?
Range	POSitive | NEGative
Note	The parameters can be simplified as follows: POSitive : POS NEGative : NEG

8.9 Number of Samples After Trigger

Set or query the number of samples after input trigger

Remote Commands	[SENSe:]TRIGger:IQ:POINts <Number> [SENSe:]TRIGger:IQ:POINts?
Example	TRIG:IQ:POIN 17000 TRIG:IQ:POIN?
Max	uint64_Max / 6
Min	32

8.10 Trigger Level Threshold

Set or query trigger level threshold

Remote Commands	[SENSe:]TRIGger:[SEQuence]:LEVel:THReshold <number> [SENSe:]TRIGger:[SEQuence]:LEVel:THReshold?
Example	TRIG:SEQ:LEV:THR 2 TRIG:SEQ:LEV:THR?
Note	Default Unit dBm

8.11 Trigger Delay

Set or query trigger delay

Remote Commands	[SENSe:]TRIGger: DELAY <number> [SENSe:]TRIGger:DELAY?
Example	TRIG:DELAY 100 TRIG:DELAY?
Note	Default Unit ms

8.12 Pre-Trigger Time

Set or query the pre-trigger time

Remote Commands	[SENSe:]TRIGger:[SEQuence]:LEVel:PRETime <Number> [SENSe:]TRIGger:[SEQuence]:LEVel:PRETime?
Example	TRIG:SEQ:LEV:PRET 0.001 TRIG:SEQ:LEV:PRET?
Note	Default Unit s

8.13 Trigger Timer Synchronization

Set or query trigger timer synchronization

Remote Commands	[SENSe:]TRIGger:TIMer:SYNC <String> [SENSe:]TRIGger:TIMer:SYNC?
Example	TRIG:TIM:SYNC 3 TRIG:TIM:SYNC?
Max	NONE | EXTR | EXTF | EXTSR | EXTSF | GR | GF | GSR | GSF
Min	NONE: NoneSync, Timer trigger is not synchronized with external trigger EXTR: SyncToExt_RisingEdge, Timer trigger is synchronized with the rising edge of the external trigger EXTF: SyncToExt_FallingEdge, Timer trigger is synchronized with the falling edge of the external trigger EXTSR: SyncToExt_SingleRisingEdge, Timer trigger is synchronized once with the rising edge of the external trigger (requires calling the instruction function to execute a single synchronization) EXTSF: SyncToExt_SingleFallingEdge, Timer trigger is synchronized once with the falling edge of the external trigger (requires calling the instruction function to execute a single synchronization) GR: SyncToGNSS1PPS_RisingEdge, Timer trigger is synchronized with the rising edge of GNSS-1PPS GF: SyncToGNSS1PPS_FallingEdge = 0x06, Timer trigger is synchronized with the falling edge of GNSS-1PPS GSR: SyncToGNSS1PPS_SingleRisingEdge, Timer trigger is synchronized once with the rising edge of GNSS-1PPS (requires calling the instruction function to execute a single synchronization) GSF: SyncToGNSS1PPS_SingleFallingEdge, Timer trigger is synchronized once with the falling edge of GNSS-1PPS (requires calling the instruction function to execute a single synchronization)

8.14 Get Data

Get IQ data

Remote Commands	[SENSe:]TRACe:DATA? {TRACE1}
Example	TRAC:DATA?
Note	This command does not have a settable form.

8.15 IQ Data Format

Set or query IQ data format

Remote Commands	[SENSe:]TRACe:DATA:TYPE <String> [SENSe:]TRACe:DATA:TYPE?
Example	TRAC:DATA:TYPE ASC,8 TRAC:DATA:TYPE?
Range	ASC,8 | INT,16 | VITA,49
Parameter Description	ASC, 8: Output string type data INT, 16: Output binary type data VITA, 49: Output VITA 49.2 format type data

8.16 Stream Data Format

Set or query Stream Data format

Remote Commands	[SENSe:]TRACe:FORMat <String > [SENSe:]TRACe: FORMat
Example	TRAC:FORMat INT,8 TRAC:FORMat?
Range	INT,8 | INT,16 | INT,32
Parameter Description	INT, 8: 8-bit single-channel binary data INT, 16: 16-bit single-channel binary data INT, 32: 32-bit single-channel binary data
Note	The stream data format affects the bit width of single-channel binary data.

9. Example

9.1 Get Spectrum Data in SWP Mode in Python

```
import pyvisa

rm = pyvisa.ResourceManager()

# Connecting to the SCPI Server
instrument = rm.open_resource('TCPIP0::127.0.0.1::inst0::INSTR')

# Query current device information
response = instrument.query('*IDN?')
print('',response)
```

```
 HTRA,M80_R5,4248500b001e003a,A0_55_58F0_55_22M0_55_53S0_55_15
```

```
# Set the start frequency to 1GHz
instrument.write('FREQ:START 1e9')

# Set the stop frequency to 2GHz
instrument.write('FREQ:STOP 2e9')

# Query the start frequency
response = instrument.query('FREQ:START?')
print('start frequency : ',response)

# Query the stop frequency
response = instrument.query('FREQ:STOP?')
print('stop frequency : ',response)
```

```
start frequency :  1.000E+09
stop frequency :  2.000E+09
```

```
# Retrieve Y-axis spectrum data
response = instrument.query('TRACe:DATA?')
print('',response)
```

```
 -8.833E+01;-1.010E+02;-8.629E+01;-8.295E+01;-8.605E+01;-8.804E+01;-8.815E+01;-9.177E+01;-8.768E+01;-8.794E+01;-9.065E+01;-8.769E+01;-8.742E+01;-9.573E
+01;-8.480E+01;-8.697E+01;-8.597E+01;-8.186E+01;-9.952E+01;-8.890E+01;-8.280E+01;-8.612E+01;-8.707E+01;-8.729E+01;-8.960E+01;-8.484E+01;-9.109E+01;-9.3
09E+01;-8.944E+01;-8.887E+01;-8.952E+01;-9.431E+01;-9.972E+01;-9.233E+01;-8.717E+01;-9.331E+01;-9.303E+01;-8.547E+01;-9.739E+01;-8.884E+01;-9.673E+01;-
8.642E+01;-9.385E+01;-8.574E+01;-8.781E+01;-8.454E+01;-8.831E+01;-9.038E+01;-8.900E+01;-8.727E+01;-8.632E+01;-9.226E+01;-8.851E+01;-9.008E+01;-9.478E+0
1;-9.319E+01;-8.985E+01;-9.219E+01;-9.325E+01;-9.234E+01;-9.203E+01;-1.030E+02;-8.976E+01;-9.920E+01;-9.012E+01;-8.566E+01;-8.668E+01;-9.504E+01;-8.737
E+01;-8.994E+01;-9.225E+01;-8.419E+01;-9.017E+01;-9.198E+01;-9.052E+01;-8.598E+01;-8.722E+01;-1.016E+02;-8.655E+01;-8.638E+01;-8.585E+01;-8.519E+01;-9.
138E+01;-9.534E+01;-9.375E+01;-8.861E+01;-8.992E+01;-9.653E+01;-8.620E+01;-9.052E+01;-8.583E+01;-8.818E+01;-8.980E+01;-8.981E+01;-8.465E+01;-8.263E+01;
-8.798E+01;-9.059E+01;-8.841E+01;-8.892E+01;-9.008E+01;-8.365E+01;-8.458E+01;-8.877E+01;-9.603E+01;-8.265E+01;-8.429E+01;-9.662E+01;-1.001E+02;-8.789E+
01;-9.137E+01;-1.013E+02;-9.872E+01;-9.243E+01;-9.700E+01;-9.087E+01;-9.023E+01;-9.023E+01;-8.856E+01;-8.856E+01;-9.246E+01;-8.688E+01;-1.001E+02;-9.22
```

Figure 8 Get spectrum Data in Python

9.2 Get IQ Data in Python

```
import pyvisa

rm = pyvisa.ResourceManager()

# Connecting to the SCPI Server
instrument = rm.open_resource('TCPIP0::127.0.0.1::inst0::INSTR')

# Query current device information
response = instrument.query('*IDN?')
print('',response)
```

```
 HTRA,M80_R5,4248500b001e003a,A0_55_58F0_55_22M0_55_53S0_55_15
```

```
# Set mode to IQS
instrument.write('INST:MODE IQS')

# Query current mode
response = instrument.query('INST:MODE?')
print('Mode : ',response)
```

```
Mode :  IQS
```

```
# Set the center frequency to 1GHz
instrument.write('FREQ:CENTer 1e9')

# Query the center frequency
response = instrument.query('FREQ:CENTer?')
print('center frequency : ',response)

# Query data format
response = instrument.query('TRACe:DATA:TYPE?')
print('data format : ',response)
```

```
center frequency :  1.000E+09
data format :  ASC,8
```

```
# Retrieve IQ data
response = instrument.query('TRACe:DATA?')
print('',response)
```

```
 2,0,2,-1,-4,-5,0,2,3,3,-5,-3,-3,-1,1,7,-3,0,3,-3,-5,3,5,-5,3,2,-3,4,-4,0,-2,-4,2,-2,2,-1,1,1,2,1,-1,1,0,1,3,7,3,-1,3,4,5,3,1,-1,4,-1,5,-3,-1,0,-2,-3,-
2,-1,-2,1,0,2,-2,-2,-2,2,0,3,3,1,-2,0,4,6,1,8,5,-4,5,0,0,2,7,-2,-1,0,-1,-2,1,0,-2,1,-2,0,2,-1,4,3,-4,-1,5,2,-2,-1,-5,-3,2,4,-1,-2,5,-3,1,1,4,3,5,4,1,-
3,-4,2,-7,0,-3,-3,-3,1,5,0,-1,1,0,-4,1,-2,-2,3,1,1,-4,0,-6,3,-4,0,-7,2,0,-5,1,1,1,-6,7,-5,-3,1,-6,-3,0,-2,-2,-3,5,-5,-2,2,-9,7,-4,-1,-6,0,-4,1,3,0,3,-
1,0,2,2,0,4,1,-5,6,-6,0,0,-3,1,1,1,3,-7,2,-2,-5,0,-5,-4,1,1,0,0,3,-7,-3,3,1,-2,1,1,-5,-1,1,-8,7,3,-2,5,10,3,6,0,1,-4,2,-5,4,3,-4,4,-6,-2,0,1,-5,2,-3,-
3,-3,1,-3,0,0,1,-1,3,1,-1,-4,-4,0,3,1,3,7,0,0,0,-8,2,-1,5,1,4,-3,4,0,2,2,-1,1,1,-4,0,-1,-5,0,7,-1,3,4,0,-4,2,0,-3,2,4,-1,2,1,4,2,5,-2,0,0,-2,1,-2,0,2,
```

Figure 9 Get IQ Data in Python

9.3 Python to Get VITA 49.2 Data

Note: The example should only be executed after a successful TCP connection.

Command Sending Process:

```
import pyvisa
rm = pyvisa.ResourceManager()

#connecting to the SCPI server

instrument = rm.open_resource('TcPIPe::127.0.0.1::inst0::INSTR')
# Query current device information
response = instrument.query('*IDN?')
print('',response)
```

```
 HTRA,M80_R5,4248500b001e003a,A0_55_58F0_55_22M0_55_53S0_55_15
```

```
# Set mode to Ios
instrument.write('INST:MODE IQS')

# Query current mode
response = instrument.query('INST:MODE?')
print('Mode :',response)
```

```
Mode : IQS
```

```
#Set the data format to VITA,49.
instrument.write('TRACE:DATA:TYPE VITA,49')
response = instrument.query('TRACE:DATA:TYPE?')
print('Mode :',response)
```

```
Mode : VITA,49
```

```
instrument.write('FETCH START')
```

Figure 10 Send Command to get VITA 49.2 Data

Verify the received VITA 49.2 Data through WireShark:

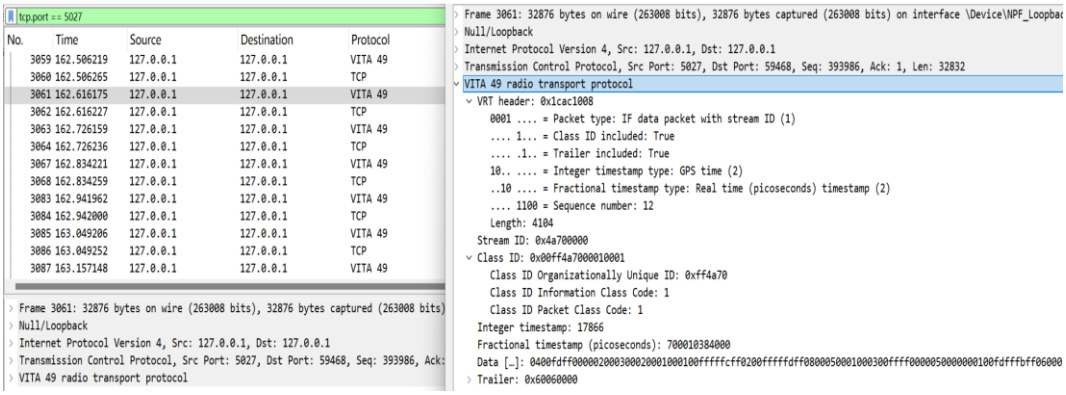


Figure 11 Parse VITA 49.2 Data

9.4 TCP Socket to Get Data

Below is the Python TCP Socket for remote control:

```python
import socket

# Define server address and port
server_address = ('localhost', 5025)  # Modify with actual server address and port
BUFFER_SIZE = 1024  # Size of the buffer to receive data

# Create a TCP/IP socket
client_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

try:
    # Connect the socket to the server's address
    client_socket.connect(server_address)
    print(f"Connected to {server_address}")

    # Send the *IDN? command to request identification info
    message = '*IDN?\n'
    client_socket.sendall(message.encode())  # Send the command as bytes
    print(f"Sent: {message}")

    # Receive the response from the server
    data = client_socket.recv(BUFFER_SIZE)  # Receive data up to BUFFER_SIZE
    print(f"Received: {data.decode()}")  # Decode and print the response

finally:
    # Close the socket after communication is done
    client_socket.close()
    print("Connection closed")
```

```
Connected to ('localhost', 5025)
Sent: *IDN?

Received: HTRA,M80_R5,4248500b001e003a,A0_55_58F0_55_22M0_55_53S0_55_15
```

Figure 12 Remote Control via TCP Socket in Python

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