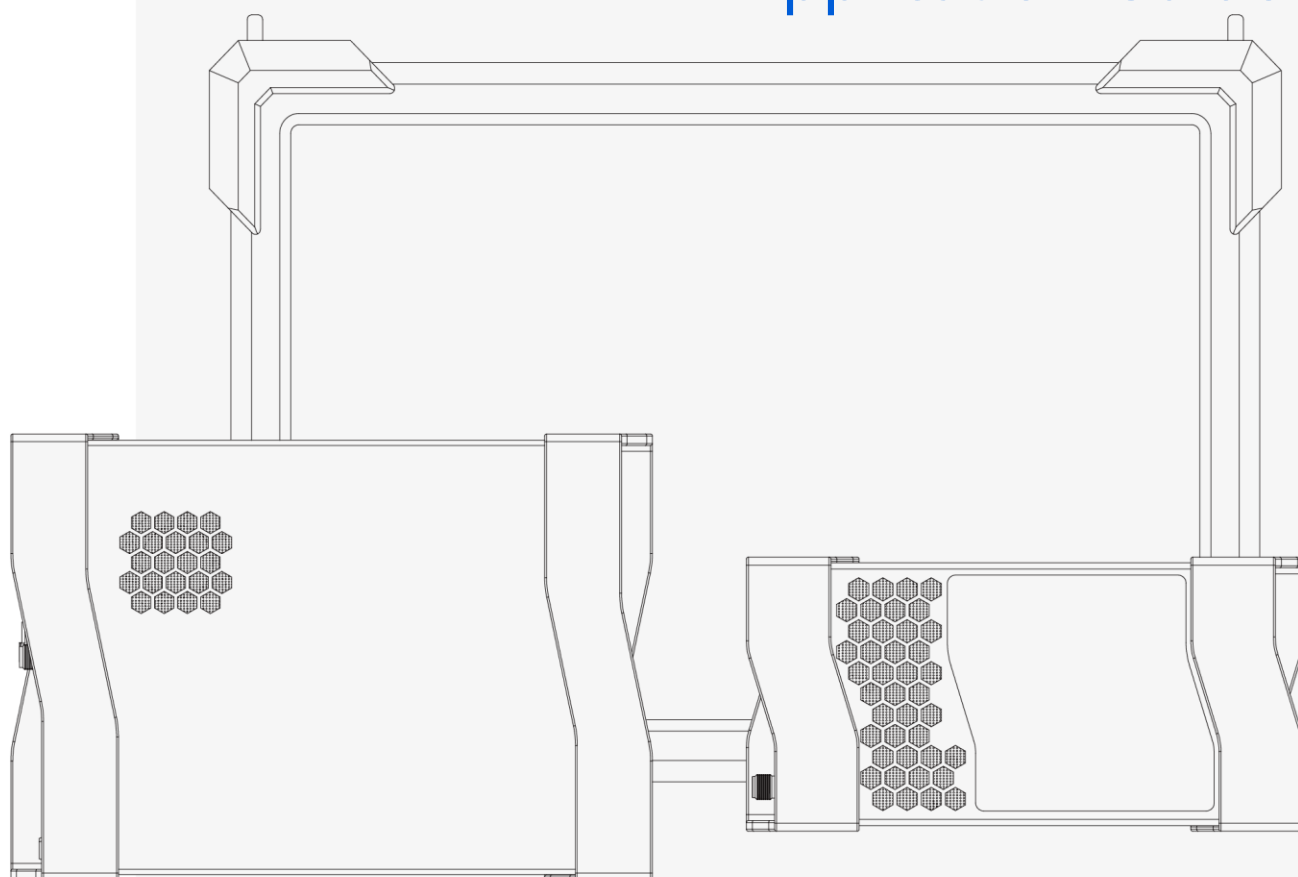




# HAROGIC SCPI

## Application Guide



# Contents

|                                                    |           |
|----------------------------------------------------|-----------|
| <b>1. Version Management</b>                       | <b>3</b>  |
| <b>2. SCPI Application Guide</b>                   | <b>4</b>  |
| <b>3. HTRA_Server</b>                              | <b>4</b>  |
| 3.1 Acquisition                                    | 4         |
| 3.2 Installation                                   | 4         |
| 3.3 Uninstall                                      | 5         |
| 3.4 Adding Other Devices                           | 6         |
| 3.5 Restart Service                                | 6         |
| <b>4. Preparations</b>                             | <b>6</b>  |
| 4.1 SA Series                                      | 6         |
| 4.2 NX Series                                      | 6         |
| 4.3 PX Series                                      | 7         |
| <b>5. SCPI Control</b>                             | <b>7</b>  |
| <b>6. SCPI Command Introduction</b>                | <b>8</b>  |
| 6.1 Command Format                                 | 8         |
| 6.2 Symbol Explanation                             | 8         |
| 6.3 Command Simplification                         | 8         |
| <b>7. System Commands</b>                          | <b>9</b>  |
| 7.1 System Information                             | 9         |
| 7.2 Error Query                                    | 9         |
| 7.3 Mode Function                                  | 9         |
| 7.4 Synchronization Command                        | 9         |
| 7.5 Clear Error Cache                              | 10        |
| 7.6 Data Channel Control                           | 10        |
| <b>8. SWP Mode</b>                                 | <b>11</b> |
| 8.1 Start Frequency                                | 11        |
| 8.2 Stop Frequency                                 | 11        |
| 8.3 Center Frequency                               | 11        |
| 8.4 Span                                           | 12        |
| 8.5 Reference Level                                | 12        |
| 8.6 Resolution Bandwidth                           | 12        |
| 8.7 Resolution Bandwidth Mode                      | 12        |
| 8.8 Video Bandwidth                                | 13        |
| 8.9 Video Bandwidth Mode                           | 13        |
| 8.10 Analog Intermediate Frequency Bandwidth Grade | 13        |

|            |                                                           |           |
|------------|-----------------------------------------------------------|-----------|
| 8.11       | Sweep Time .....                                          | 13        |
| 8.12       | Sweep Time Mode .....                                     | 14        |
| 8.13       | FFT Window .....                                          | 14        |
| 8.14       | Detector .....                                            | 14        |
| 8.15       | Trace Points .....                                        | 15        |
| 8.16       | Trace Type .....                                          | 15        |
| 8.17       | Attenuation .....                                         | 15        |
| 8.18       | Spurious Rejection .....                                  | 15        |
| 8.19       | Get Data .....                                            | 16        |
| 8.20       | Get Frequency Axis Data .....                             | 16        |
| 8.21       | Data Format .....                                         | 16        |
| 8.22       | Trace Detector Mode .....                                 | 16        |
| 8.23       | Trace Detector .....                                      | 17        |
| 8.24       | Trigger Source .....                                      | 17        |
| 8.25       | Trigger Edge .....                                        | 17        |
| 8.26       | Preamplifier .....                                        | 17        |
| 8.27       | Reference Clock Frequency .....                           | 18        |
| <b>9.</b>  | <b>IQS Mode .....</b>                                     | <b>19</b> |
| 9.1        | Center Frequency .....                                    | 19        |
| 9.2        | Reference Level .....                                     | 19        |
| 9.3        | Decimation Factor .....                                   | 19        |
| 9.4        | Preamplifier .....                                        | 20        |
| 9.5        | Reference Clock Frequency .....                           | 20        |
| 9.6        | Attenuation .....                                         | 20        |
| 9.7        | Trigger Source .....                                      | 20        |
| 9.8        | Trigger Edge .....                                        | 21        |
| 9.9        | Number of Samples After Trigger .....                     | 21        |
| 9.10       | Trigger Level Threshold .....                             | 21        |
| 9.11       | Trigger Delay .....                                       | 21        |
| 9.12       | Pre-Trigger Time .....                                    | 22        |
| 9.13       | Trigger Timer Synchronization .....                       | 22        |
| 9.14       | Get Data .....                                            | 22        |
| 9.15       | IQ Data Format .....                                      | 23        |
| 9.16       | Stream Data Format .....                                  | 23        |
| <b>10.</b> | <b>Example .....</b>                                      | <b>24</b> |
| 10.1       | Python to Obtain Frequency Data in SWP Working Mode ..... | 24        |
| 10.2       | Python to Get IQ Data .....                               | 24        |
| 10.3       | Python to Get VITA 49.2 Data .....                        | 25        |
| 10.4       | TCP Socket to Get Data .....                              | 25        |

# 1. Version Management

## Updated Description Sheet

| Version Number | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Time       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| V0.55.63.1     | <ol style="list-style-type: none"><li>1. Added: Added a Note in the device connection section.</li><li>2. Modified: Optimized the version management layout.</li><li>3. Modified: Modify the "Device Connection" section to "Preparation" section, and add the detailed steps for connecting the device.</li></ol>                                                                                                                                                                                                                                | 11/20/2025 |
| V0.55.63.0     | <ol style="list-style-type: none"><li>1. Version number update only, no content changes.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10/24/2025 |
| V1.18          | <ol style="list-style-type: none"><li>1. Added: HTRA_SCPI IQS INT,16 and INT,32 data transfer formats.</li><li>2. Added: HTRA_SCPI dynamic parsing of device switch configuration files.</li><li>3. Fixed: HTRA_SCPI high-speed data channel status information returning incorrectly.</li><li>4. Optimized: HTRA_SCPI SCPI configuration retrieval and transmission timing, and synchronization.</li><li>5. Optimized: HTRA_SCPI data acquisition to avoid conflicts between parameter setting and data transfer or prolonged waiting.</li></ol> | 10/23/2025 |
| V1.17          | <ol style="list-style-type: none"><li>1. Added: Obtain frequency axis data in SWP mode.</li><li>2. Optimized: Data return precision.</li><li>3. Optimized: Program installation.</li><li>4. Fixed: Precision errors in return values of certain commands.</li></ol>                                                                                                                                                                                                                                                                               | 9/9/2025   |
| V1.16          | <ol style="list-style-type: none"><li>1. Initial version</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 8/8/2025   |

## 2. 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.

## 3. HTRA\_Server

System Requirements:

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

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

### 3.1 Acquisition

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

### 3.2 Installation

1. Unzip HTRA\_Server.zip;

| Name            | Date modified      | Type                       | Size      |
|-----------------|--------------------|----------------------------|-----------|
| HTRA_Server     | 7/16/2025 10:57 AM | File folder                |           |
| HTRA_Server.zip | 7/16/2025 10:57 AM | Compressed (zipped) Folder | 18,458 KB |

2. Enter the HTRA\_Server directory;

| Name          | Date modified      | Type               | Size   |
|---------------|--------------------|--------------------|--------|
| bin           | 7/16/2025 10:57 AM | File folder        |        |
| log           | 7/16/2025 10:57 AM | File folder        |        |
| update        | 7/16/2025 10:57 AM | 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 |

- 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    |

- 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
```

### 3.3 Uninstall

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

| Local 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.
```

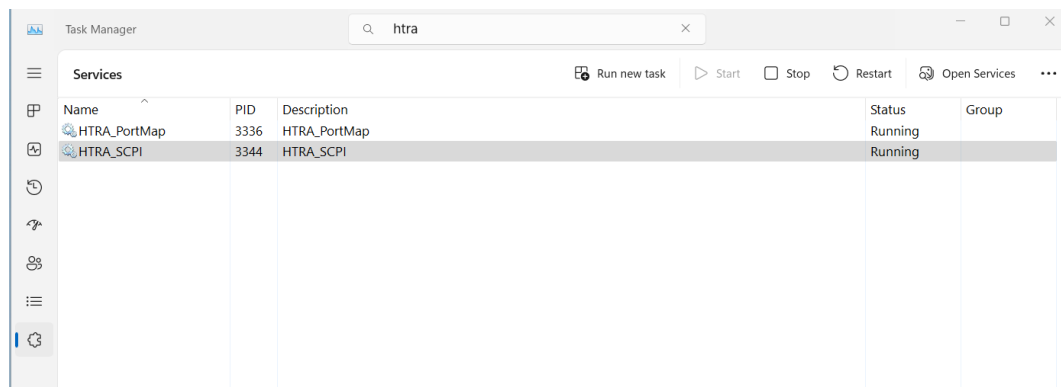
## 3.4 Adding Other Devices

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

| Name                                                                                    | Date modified     | Type      | Size |
|-----------------------------------------------------------------------------------------|-------------------|-----------|------|
|  .keep | 5/14/2025 5:10 PM | KEEP File | 0 KB |

## 3.5 Restart Service

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



## 4. 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 SASudio4 is closed when using SCPI control.**

### 4.1 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.

### 4.2 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.

## 4.3 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.

## 5. 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.

## 6. SCPI Command Introduction

### 6.1 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.

### 6.2 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.

### 6.3 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.

## 7. System Commands

### 7.1 System Information

---

#### Query device information

---

**Remote Commands**      \*IDN?

**Example**      \*IDN?  
Remote command response:  
  
HTRA,M80\_R5,4248500b001e003a,A0\_55\_58F0\_55\_22M0\_5  
5\_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.

### 7.2 Error Query

---

#### Retrieve the currently cached error information.

---

**Remote Commands**      \*ERR

**Example**      \*ERR?

**Note**      The maximum storage capacity of the error queue is 1000 entries. When exceeded, the data at the top of the queue will be discarded. This command does not have a settable form.

### 7.3 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

### 7.4 Synchronization Command

---

#### Wait for previous operations to complete

---

**Remote Commands**      \*WAI

**Example**      \*WAI

**Note**      This command does not have a query form.

## 7.5 Clear Error Cache

---

### Clear the error cache

---

|                        |      |
|------------------------|------|
| <b>Remote Commands</b> | *CLS |
|------------------------|------|

|                |      |
|----------------|------|
| <b>Example</b> | *CLS |
|----------------|------|

|             |                                                                                                                 |
|-------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Note</b> | This command does not have a query form. In the current version, using this command will clear the error queue. |
|-------------|-----------------------------------------------------------------------------------------------------------------|

## 7.6 Data Channel Control

---

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

---

|                        |                 |
|------------------------|-----------------|
| <b>Remote Commands</b> | FETCH<br>FETCH? |
|------------------------|-----------------|

|                |             |
|----------------|-------------|
| <b>Example</b> | FETCH START |
|----------------|-------------|

|              |              |
|--------------|--------------|
| <b>Range</b> | STOP   START |
|--------------|--------------|

|             |                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------|
| <b>Note</b> | Ensure that the client TCP connection has been established and the device is operating properly. |
|-------------|--------------------------------------------------------------------------------------------------|

## 8. SWP Mode

### 8.1 Start Frequency

---

#### Set or query start frequency

---

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

### 8.2 Stop Frequency

---

#### Set or query stop frequency

---

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

### 8.3 Center Frequency

---

#### Set or query center frequency

---

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

## 8.4 Span

### Set or query span

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

## 8.5 Reference Level

### Set or query reference level

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

## 8.6 Resolution Bandwidth

### Set or query resolution bandwidth

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

## 8.7 Resolution Bandwidth Mode

### Set or query resolution bandwidth mode

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

## 8.8 Video Bandwidth

### Set or query video bandwidth

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

## 8.9 Video Bandwidth Mode

### Set or query video bandwidth mode

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

## 8.10 Analog Intermediate Frequency Bandwidth Grade

### Set or query analog intermediate frequency bandwidth grade

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

## 8.11 Sweep Time

### Set or query Sweep Time

|                        |                                                    |
|------------------------|----------------------------------------------------|
| <b>Remote Commands</b> | [SENSe:]SWEep:TIME <number><br>[SENSe:]SWEep:TIME? |
| <b>Example</b>         | SWE:TIME 300<br>SWE:TIME?                          |
| <b>Note</b>            | Default Unit ms                                    |

## 8.12 Sweep Time Mode

---

### Set or query scan time mode

---

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

## 8.13 FFT Window

---

### Set or query FFT window

---

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

## 8.14 Detector

---

### Set or query detector in sweep mode

---

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

## 8.15 Trace Points

### Set or query trace points

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

## 8.16 Trace Type

### Set or query trace type

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

## 8.17 Attenuation

### Set or query the spectrum analyzer channel attenuation

|                        |                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remote Commands</b> | [SENSe:]INPut:ATTenuation <Number><br>[SENSe:]INPut:ATTenuation?                                                                                                  |
| <b>Example</b>         | INP:ATT 10<br>INP:ATT?                                                                                                                                            |
| <b>Max</b>             | 33                                                                                                                                                                |
| <b>Min</b>             | -1                                                                                                                                                                |
| <b>Note</b>            | 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. |

## 8.18 Spurious Rejection

### Set or query spurious rejection

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

## 8.19 Get Data

### Set or query get data

|                        |                                                                       |
|------------------------|-----------------------------------------------------------------------|
| <b>Remote Commands</b> | [SENSe:]TRACe:DATA? {TRACE1}                                          |
| <b>Example</b>         | TRAC:DATA?                                                            |
| <b>Note</b>            | This command does not support the setting format.<br>Default Unit dBm |

## 8.20 Get Frequency Axis Data

### Get frequency axis data

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

## 8.21 Data Format

### Set or query data format

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

## 8.22 Trace Detector Mode

### Set or query trace detector mode

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

## 8.23 Trace Detector

### Set or query trace detector

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

## 8.24 Trigger Source

### Set or query trigger source

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

## 8.25 Trigger Edge

### Set or query trigger edge

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

## 8.26 Preamplifier

### Set or query preamplifier

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

## 8.27 Reference Clock Frequency

---

### Set or query reference clock frequency

---

|                        |                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Remote Commands</b> | [SENSe:]ROSCillator:EXternal:FREQuency <Number>{Hz kHz MHz GHz}<br>[SENSe:]ROSCillator:EXternal:FREQuency? |
|------------------------|------------------------------------------------------------------------------------------------------------|

|                |                                          |
|----------------|------------------------------------------|
| <b>Example</b> | ROSC:EXT:FREQ 10000000<br>ROSC:EXT:FREQ? |
|----------------|------------------------------------------|

|             |                                                                             |
|-------------|-----------------------------------------------------------------------------|
| <b>Note</b> | Default Unit Hz. The reference clock frequency is supported only at 10 MHz. |
|-------------|-----------------------------------------------------------------------------|

## 9. IQS Mode

### 9.1 Center Frequency

---

#### Set or query center frequency

---

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

### 9.2 Reference Level

---

#### Set or query reference level

---

|                        |                                                                                                                                                           |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remote Commands</b> | [SENSe]:DISPlay:TRACe:Y:SCALe:RLEVel <Number>{dBm}<br>[SENSe]:DISPlay:TRACe:Y:SCALe:RLEVel?                                                               |
| <b>Example</b>         | DSIP:TRAC:Y:SCAL:RLEV10<br>DSIP:TRACY:SCALRLEV?                                                                                                           |
| <b>Max</b>             | 23 dBm                                                                                                                                                    |
| <b>Min</b>             | -50 dBm                                                                                                                                                   |
| <b>Note</b>            | 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. |

### 9.3 Decimation Factor

---

#### Set or query decimation factor

---

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

## 9.4 Preamplifier

### Set or query preamplifier

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

## 9.5 Reference Clock Frequency

### Set or query reference clock frequency

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

## 9.6 Attenuation

### Set or query the spectrum analyzer channel attenuation

|                        |                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remote Commands</b> | [SENSe:]INPut:ATTenuation <Number><br>[SENSe:]INPut:ATTenuation?                                                                                                  |
| <b>Example</b>         | INP:ATT 10<br>INP:ATT?                                                                                                                                            |
| <b>Max</b>             | 33                                                                                                                                                                |
| <b>Min</b>             | -1                                                                                                                                                                |
| <b>Note</b>            | 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. |

## 9.7 Trigger Source

### Set or query trigger source

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

## 9.8 Trigger Edge

---

### Set or query trigger edge

---

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

## 9.9 Number of Samples After Trigger

---

### Set or query the number of samples after input trigger

---

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

## 9.10 Trigger Level Threshold

---

### Set or query trigger level threshold

---

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

## 9.11 Trigger Delay

---

### Set or query trigger delay

---

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

## 9.12 Pre-Trigger Time

### Set or query the pre-trigger time

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

## 9.13 Trigger Timer Synchronization

### Set or query trigger timer synchronization

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remote Commands</b> | [SENSe:]TRIGger:TIMer:SYNC <String><br>[SENSe:]TRIGger:TIMer:SYNC?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Example</b>         | TRIG:TIM:SYNC 3<br>TRIG:TIM:SYNC?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Max</b>             | NONE   EXTR   EXTF   EXTSR   EXTSE   GR   GF   GSR   GSF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Min</b>             | NONE: NoneSync, Timer trigger is not synchronized with external trigger<br>EXTR: SyncToExt_RisingEdge, Timer trigger is synchronized with the rising edge of the external trigger<br>EXTF: SyncToExt_FallingEdge, Timer trigger is synchronized with the falling edge of the external trigger<br>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)<br>EXTSE: 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)<br>GR: SyncToGNSS1PPS_RisingEdge, Timer trigger is synchronized with the rising edge of GNSS-1PPS<br>GF: SyncToGNSS1PPS_FallingEdge = 0x06, Timer trigger is synchronized with the falling edge of GNSS-1PPS<br>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)<br>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) |

## 9.14 Get Data

### Get IQ data

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

## 9.15 IQ Data Format

---

### Set or query IQ data format

---

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

## 9.16 Stream Data Format

---

### Set or query Stream Data format

---

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

# 10. Example

## 10.1 Python to Obtain Frequency Data in SWP Working Mode

```
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_5350_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;-9.309E+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+01;-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;-8.737E+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
```

## 10.2 Python to Get IQ Data

```
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_5350_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,-2,0,3,3,1,-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,-3,1,5,0,-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,
```

## 10.3 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('TCPIP::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')
```

Verify the received VITA 49.2 Data through WireShark:

| No.  | Time       | Source    | Destination | Protocol |
|------|------------|-----------|-------------|----------|
| 3059 | 162.506219 | 127.0.0.1 | 127.0.0.1   | VITA 49  |
| 3060 | 162.506265 | 127.0.0.1 | 127.0.0.1   | TCP      |
| 3061 | 162.616175 | 127.0.0.1 | 127.0.0.1   | VITA 49  |
| 3062 | 162.616227 | 127.0.0.1 | 127.0.0.1   | TCP      |
| 3063 | 162.726159 | 127.0.0.1 | 127.0.0.1   | VITA 49  |
| 3064 | 162.726236 | 127.0.0.1 | 127.0.0.1   | TCP      |
| 3067 | 162.834221 | 127.0.0.1 | 127.0.0.1   | VITA 49  |
| 3068 | 162.834259 | 127.0.0.1 | 127.0.0.1   | TCP      |
| 3083 | 162.941962 | 127.0.0.1 | 127.0.0.1   | VITA 49  |
| 3084 | 162.942000 | 127.0.0.1 | 127.0.0.1   | TCP      |
| 3085 | 163.049206 | 127.0.0.1 | 127.0.0.1   | VITA 49  |
| 3086 | 163.049252 | 127.0.0.1 | 127.0.0.1   | TCP      |
| 3087 | 163.157148 | 127.0.0.1 | 127.0.0.1   | VITA 49  |

Frame 3061: 32876 bytes on wire (263008 bits), 32876 bytes captured (263008 bits) on interface \Device\NPF\_{...}

Null/Loopback

Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1

Transmission Control Protocol, Src Port: 5027, Dst Port: 59468, Seq: 393986, Ack: 1, Len: 32832

VITA 49 radio transport protocol

VRT header: 0x1ca1008

0001 .... = Packet type: IF data packet with stream ID (1)

.... 1... = Class ID included: True

.... .1.. = Trailer included: True

10.. .... = Integer timestamp type: GPS time (2)

..10 .... = Fractional timestamp type: Real time (picoseconds) timestamp (2)

.... 1100 = Sequence number: 12

Length: 4184

Stream ID: 0x4a700000

Class ID: 0x00ffa7000010001

Class ID Organizationally Unique ID: 0xff4a70

Class ID Information Class Code: 1

Class ID Packet Class Code: 1

Integer timestamp: 17866

Fractional timestamp (picoseconds): 700010384000

Data [-]: 0400fdff000002000300020001000100ffffcfff0200ffffdf0800050001000300ffff00000500000000100fdffbf060000

Trailer: 0x60060000

## 10.4 TCP Socket to Get Data

Below is the Python TCP Socket for remote control:

```
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
```

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