QUANTIFI PHOTONICS™

OSA

1000 SERIES
OPTICAL SPECTRUM ANALYZER

USER MANUAL

quantifiphotonics.com

Copyright © 2022 Quantifi Photonics Ltd. All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form, be it electronically, mechanically, or by any other means such as photocopying, recording or otherwise, without the prior written permission of Quantifi Photonics Ltd. (Quantifi Photonics).

Information provided by Quantifi Photonics is believed to be accurate and reliable.
However, no responsibility is assumed by Quantifi Photonics for its use nor for any infringements of patents or other rights of third parties that may result from its use. No license is granted by implication or otherwise under any patent rights of Quantifi Photonics.

The information contained in this publication is subject to change without notice.

Trademarks

Quantifi Photonics' trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

LabVIEW™, MATLAB® and Python® are trademarks of National Instruments, The MathWorks Inc., and the Python Software Foundation, respectively. Neither Quantifi Photonics nor any software programs or other goods or services offered by Quantifi Photonics are affiliated with, endorsed by, or sponsored by National Instruments, The MathWorks Inc., and the Python Software Foundation.

Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

EU Authorized Representative

Certification Company
Veluwezoom 42
1327 AH ALMERE
The Netherlands
+31 (0)36 202 40 37
info@certification-company.com

Version: 2.06

Contents

1 Conventions 6

2 Safety information 7

2.1 Optical laser radiation precautions 7

2.2 Electrostatic discharge precautions 7

2.3 Electromagnetic compatibility 7

3 Introducing the OSA 1000 Series – Optical spectrum analyzer 8

3.1 OSA 1000 PXIe module overview & features 8

3.2 OSA 1000 MATRIQ instrument overview & features 8

3.3 Status LEDs 9

4 Connecting optical fibers 10

4.1 Cleaning and connecting optical fibers 10

5 Handling the OSA 1000 Series products 11

5.1 OSA 1000 PXIe module installation 11

5.2 OSA 1000 PXIe module uninstallation 12

5.3 OSA 1000 MATRIQ Instrument Installation 13

6 Software installation information for OSA 1000 Series 14

6.1 Cohesion Installer information for PXIe modules 14

6.1.1 Installation overview 14

6.1.2 Installation process 14

6.2 Quantifi Photonics PXIe system utility applications 16

6.2.1 Cohesion Manager utility 17

6.2.2 Cohesion Firmware Updater utility 18

6.3 Installing software for MATRIQ instruments 19

6.3.1 Installing Cohesion Operator on client computer(s) 19

6.3.2 Checking MATRIQ firmware versions and other product information 21

6.3.3 Upgrading a MATRIQ instrument with the latest firmware 22

6.3.4 Restoring factory settings on a MATRIQ instrument 23

7 CohesionUI 24

7.1 Accessing CohesionUI for PXIe modules 24

7.2 Accessing CohesionUI for MATRIQ instruments 24

7.3 Home page 25

7.4 Modules list 27
7.4.1 Set and Actual values 27
7.5 Settings page 28
7.5.1 System controls for PXIe modules 29
7.5.2 Network and Update settings controls for MATRIQ instruments 30
7.5.3 Configuring the Network Interface settings for MATRIQ instruments 30
7.5.4 Setting the USB IP address for MATRIQ instruments 31
7.5.5 Setting the Ethernet IP address for MATRIQ instruments 31
7.6 SCPI Command Console (available on PXIe modules) 32
7.7 Info panel 35

8 OSA 1000 Series control with CohesionUI 36
8.1 OSA sweep settings 37
8.2 OSA analysis settings 40
8.2.1 OSNR 40
8.2.2 SMSR 42
8.2.3 Spectral width 46
8.2.4 Find Peaks 47

9 Programming guide 48
9.1 Programming conventions 48
9.1.1 Index addressing of modules (slot, source) and units (channel) 48
9.2 Common system command summary 50
9.3 Common system command descriptions 50
9.4 Specific command summary 52
9.5 Specific command descriptions 53
9.5.1 Slot commands 53
9.5.2 Configuration commands 54
9.6 OSA 1000 PXIe Multi Chassis mode operation 60
9.6.1 NI-MAX application Multi Chassis mode 60
9.6.2 SCPI Multi Chassis commands 60
9.7 SCPI Command Console (available on MATRIQ instruments) 62

10 Example: Control of an OSA 1000 Series with SCPI 65
10.1 NI-MAX application 66
10.2 NI-VISA application 67
10.3 Python® 2.7 code example 68
10.4 MATLAB® code example 69
10.5 LabVIEW™ application 70
10.5.1 Soft Panels 70

10.5.2 LabVIEW™ Virtual Instruments (VIs) 71

11 Maintenance 72

11.1 Annual calibration schedule 72

12 Technical support 73

12.1 Contacting the Technical Support Group 73

12.2 Transportation 73

13 Warranty 74

13.1 General information 74

13.2 Liability 74

13.3 Exclusions 74

13.4 Certification 75

13.5 Service and repairs 75

1 Conventions

Before using the instrument described in this manual, take note of the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in **death or serious injury**. Do not proceed unless the required conditions are met and understood.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in **minor or moderate injury**. Do not proceed unless the required conditions are met and understood.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in **component damage**. Do not proceed unless the required conditions are met and understood.

IMPORTANT

Refers to information about this product that you should not overlook.

NOTE

Indicates some information that requires your attention or some extra information for the current topic.

2 Safety information

Before using the OSA 1000 Series product, ensure that the following safety information has been read and understood.

2.1 Optical laser radiation precautions

WARNING

Do not install or terminate fibers while the light source is active. Care must be taken to ensure that the instrument has been **turned OFF before inspecting the end face(s) of the instrument, or any optical patch cords** connected to this instrument. Never look directly into a live fiber; ensure that your eyes are protected at all times.

CAUTION

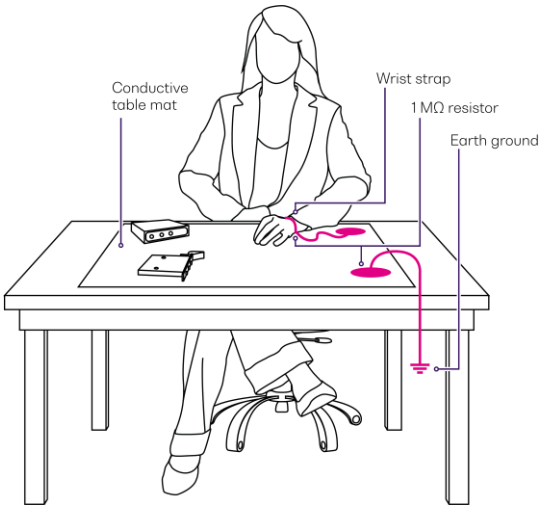
The use of controls, adjustments, and procedures other than those specified herein may result in exposure to hazardous situations involving optical radiation.

2.2 Electrostatic discharge precautions

CAUTION

The OSA 1000 Series products are sensitive to electrostatic discharge (ESD). Store the unused products in the original protective electrostatic packaging that the product was shipped in.

Ensure that a wrist strap and grounding table mat is used when unpacking or handling the OSA 1000 Series product. Proper grounding and ESD management practices should always be followed to ensure that no ESD damage is caused to the OSA 1000 Series product.



2.3 Electromagnetic compatibility

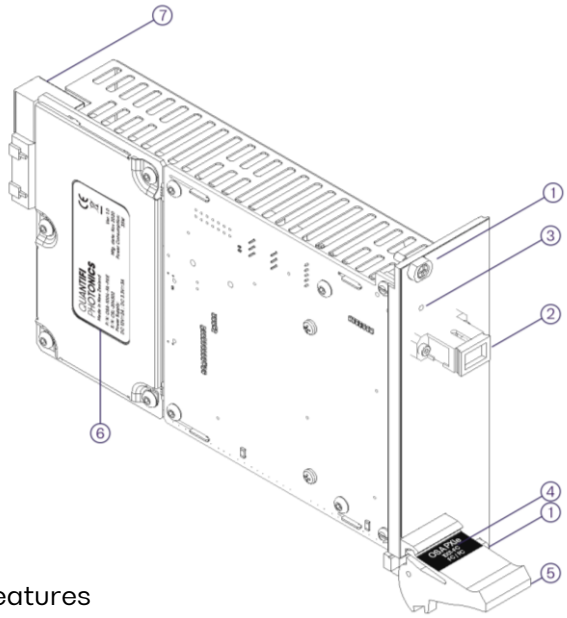
CAUTION

- For electromagnetic compatibility, this instrument is a **Class A** product. It is intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.
- Wherever the ⚠ symbol is printed on the unit, refer to the instructions provided in the device documentation for related safety information Ensure that the required conditions are met and understood before using the product.

3 Introducing the OSA 1000 Series – Optical spectrum analyzer

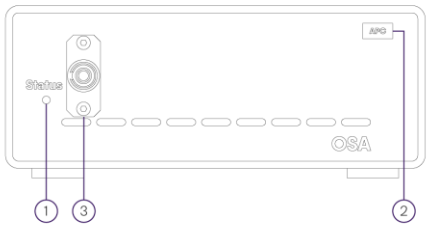
The OSA 1000 Series enables cost-effective spectral test and measurement in a compact form factor. The OSA is grating-based and is designed for efficient, space saving performance where space and time are critical. It is an excellent fit for fully automated production testing of optical sources, amplifiers, transceivers, and passive optical components.

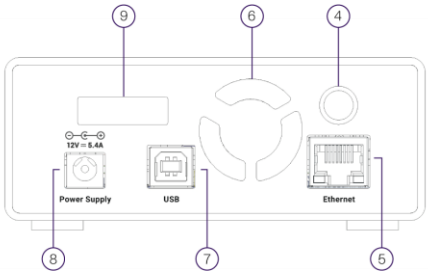
3.1 OSA 1000 PXIe module overview & features



1 Fastening screws
2 Optical Input
3 Status LEDs
4 Optical connector information
5 Fastening clip
6 OSA PXIe module information
7 PXIe headers

3.2 OSA 1000 MATRIQ instrument overview & features





1 Status LEDs
2 Optical connector type
3 Input optical port
4 On / Off push button
5 Ethernet port
6 Ventilation fan (DO NOT OBSTRUCT)
7 USB type B port
8 Power supply port
9 IP address LCD screen

⚠ IMPORTANT

- You must use the external power supply that has been supplied by Quantifi Photonics with the unit. Any attempt to use a different external power supply may cause product damage and will void your warranty.
- The external power supply that has been used with the unit can only be used with that unit. Do not use it with any other product.

3.3 Status LEDs

The Status LEDs are used to denote the operation state of the OSA 1000 Series products.

- Off - Indicates that the OSA is turned OFF.
- Green - Indicates that the OSA is turned ON.

⚠ IMPORTANT

After powering on the OSA, allow at least 30 seconds before attempting to communicate with the module, to enable the product to initialize itself.

If a query is sent to the OSA before initialization has successfully completed, it will return an array of zeroes (0).

4 Connecting optical fibers

CAUTION

To ensure maximum power and to avoid erroneous readings always inspect fiber end faces. Make sure they are cleaned as detailed below before inserting into any port. **Quantifi Photonics is not responsible for damage or errors caused by bad fiber cleaning or handling**.

IMPORTANT

The type of optical connectors on the OSA 1000 Series product can be found printed on the front plate of the product. **Joining mismatched connectors will damage the ferrules and fibre faces**.

To keep connectors clean and in good condition, Quantifi Photonics strongly recommends inspecting them with a fiber inspection probe before connecting them. Failure to do so will result in permanent damage to the connectors and degradation of future measurements.

Quantifi Photonics uses high quality connectors in compliance with EIA-455-21A standards.

4.1 Cleaning and connecting optical fibers

To connect the fiber-optic cable to the port:

1. Inspect the fiber using a fiber inspection microscope. If the fiber is clean, proceed to connect it to the desired port. If the fiber is dirty, clean it as detailed below.
2. Clean fiber ends as follows:
   a. Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.
   b. Use compressed air to dry completely.
   c. Visually inspect the fiber end to ensure its cleanliness.
3. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces. If the connector features a key, ensure that it is correctly mated into the corresponding notch of the port bulkhead.
4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact. If your connector features a screw sleeve, tighten the connector enough to firmly maintain the fiber in place. **Do not over tighten, as this will damage the fiber and the port bulkhead.**

NOTE

If your fiber-optic cable is not properly aligned and/or connected, you will notice large signal loss and reflection.

5 Handling the OSA 1000 Series products

CAUTION

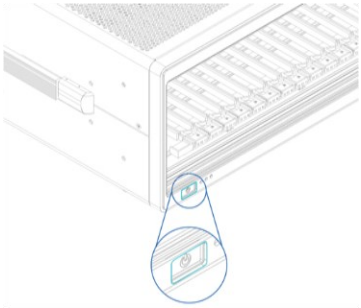
- Do not remove the OSA 1000 Series product from the antistatic packaging until instructed during the following installation procedure.
- **The OSA 1000 Series product is sensitive to ESD. Ensure you are wearing a grounded wrist strap at all times when handling the OSA product to prevent such damage.**
- Take care not to handle the connectors on the OSA product, as once they are exposed to skin contact this may leave corrosive residue which can damage the connector.

5.1 OSA 1000 PXIe module installation

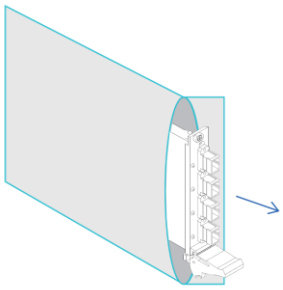
WARNING

DO NOT attempt to remove or adjust any component of the PXIe chassis while the power is on. **Ensure the chassis is powered OFF, and that the correct handling procedure detailed herein is followed when removing or installing any modules**.

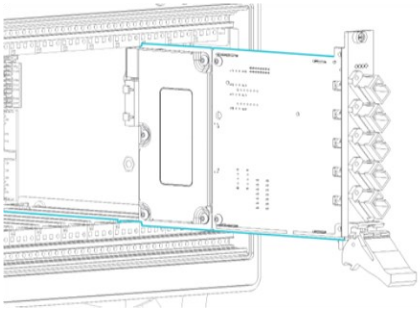
STEP 1: Power OFF the Chassis



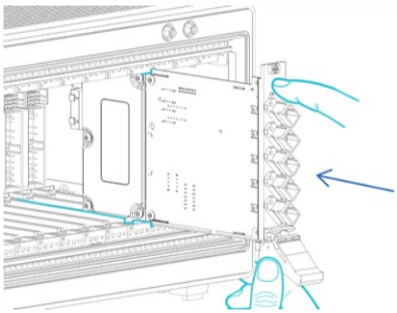
STEP 2: Remove the module from the antistatic bag. Retain bag



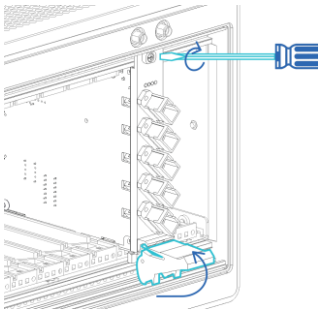
STEP 3: Align module with slot guide rails



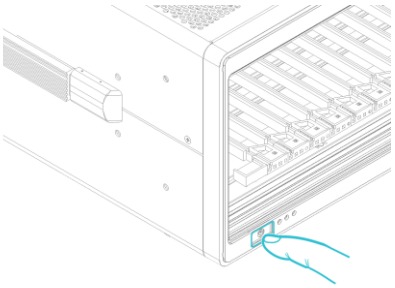
STEP 4: Push module into slot until resistance is felt from the backplane connection



STEP 5: Engage the fastening clip. Secure all fastening screws



STEP 6: Power ON the chassis

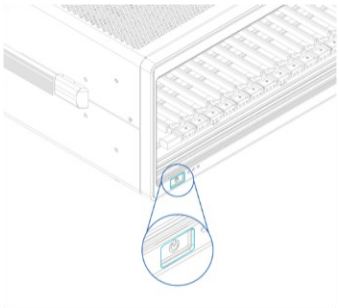


IMPORTANT

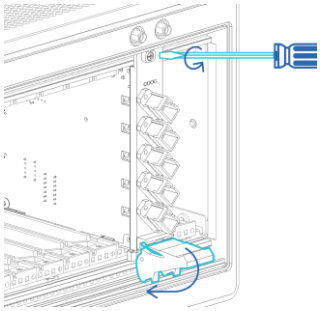
After powering on the PXIe chassis, please wait at least **2 minutes** before attempting to communicate with the instrument. This will allow the chassis enough time to finish boot procedures and initialize the communication server.

5.2 OSA 1000 PXIe module uninstallation

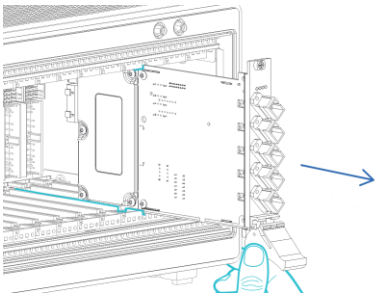
STEP 1: Power OFF the chassis



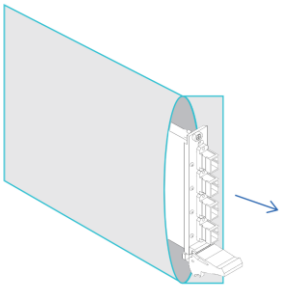
STEP 2: Unsecure the fastening screws and fastening clip



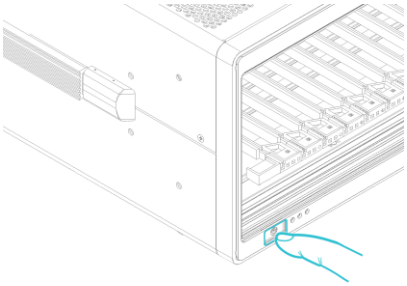
STEP 3: Pull out the module. USE THE FASTENING CLIP TO PULL. DO NOT PULL ON THE CONNECTORS



STEP 4: Store module in antistatic bag



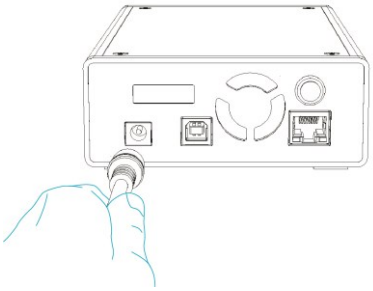
STEP 5: Power ON the chassis



5.3 OSA 1000 MATRIQ Instrument Installation

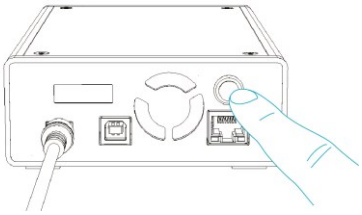
STEP 1:

Insert power cord



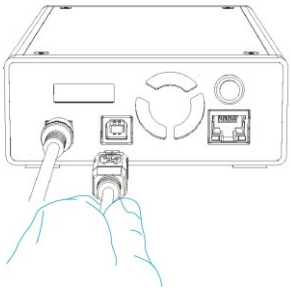
STEP 2:

Power ON the instrument



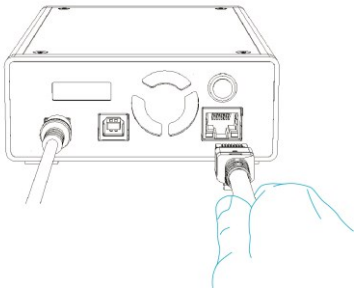
STEP 3:

via USB – Connect USB cable



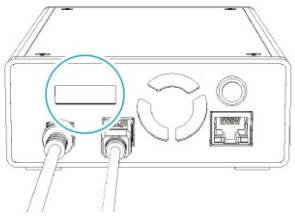
STEP 3:

via Ethernet – Connect Ethernet cable

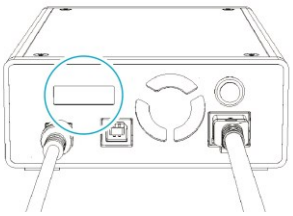


STEP 4:

IP address will appear on the LCD screen



via USB



via Ethernet

⚠ IMPORTANT

- You must use the external power supply that has been supplied by Quantifi Photonics with the unit. Any attempt to use a different external power supply may cause product damage and will void your warranty.
- The external power supply that has been used with the unit can only be used with that unit. Do not use it with any other product.

6 Software installation information for OSA 1000 Series

⚠ IMPORTANT

The installation process varies between the PXIe Modules (6.1) and the MATRIQ Instrument (6.3). Refer to the relevant section according to the product type.

6.1 Cohesion Installer information for PXIe modules

⚠ IMPORTANT

The software must be installed on the PXIe Controller for the PXIe Chassis in which the Quantifi Photonics modules will be installed, or the controller PC in the case of a MXI setup.

Minimum System Requirements: 64bit OS, Windows 7 or above.
Recommended System Requirements: 64bit Windows 10.

The Cohesion Installer is a **single installation package** that contains all the required drivers and software, to support and control Quantifi Photonics modules on the PXIe Platform.

6.1.1 Installation overview

For the PXIe Controller to communicate with the OSA 1000 Series installed in the chassis, software and driver installations are necessary. This software is contained in the **Cohesion Installer** single installer package.

- CohesionDriver: Drivers for Quantifi Photonics PXIe Modules
- CohesionSCPI: VXI11 compliant server for remote SCPI communication
- CohesionUI: Web-based Graphical User Interface

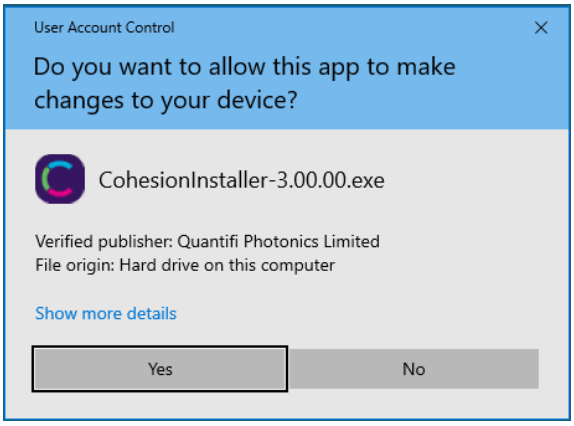
⚠ IMPORTANT

It recommended that you **save all work and close any open programs** before attempting to install the required software packages above.

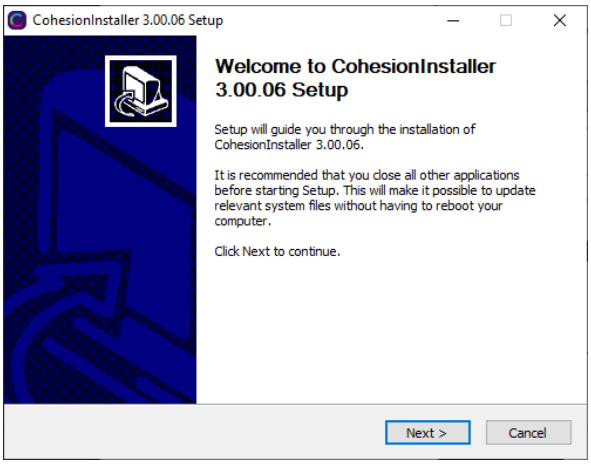
6.1.2 Installation process

Windows 10 64bit:

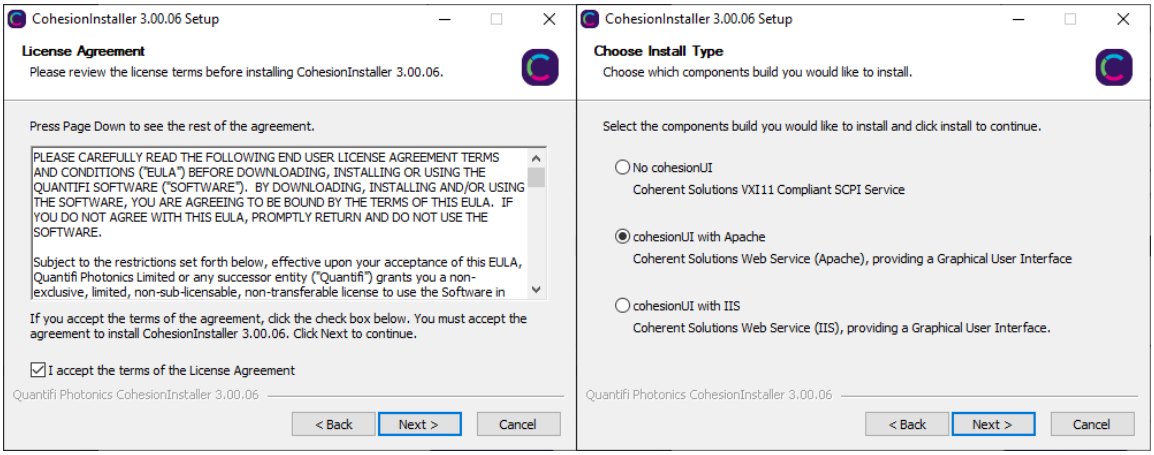
1. Locate and run the installer **CohesionInstaller-3.XX.XX.exe** from the provided USB media device (or download from the Quantifi Photonics website).



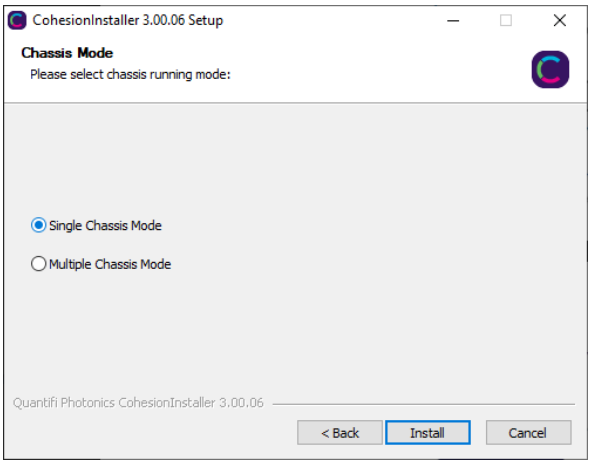
2. Follow the on-screen installation prompts.



3. Continue with the installation by following the on-screen installation prompts. Choose the default installation type – CohesionUI with Apache.



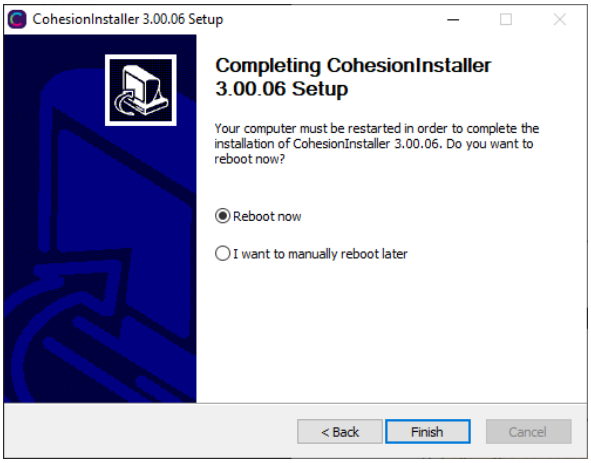
4. Installation will continue with the **Chassis Mode** selection. The default setting is **Single Chassis Mode**. If unsure, proceed with the default mode setting.



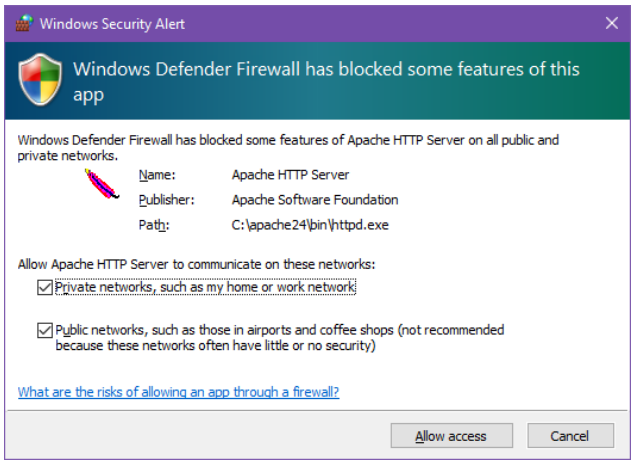
⚠ IMPORTANT

To operate in Multiple Chassis Mode, additional hardware modules are required. The Chassis Mode can be changed at any time, so it is recommended to select **Single Mode** until all other configuration requirements have been met.

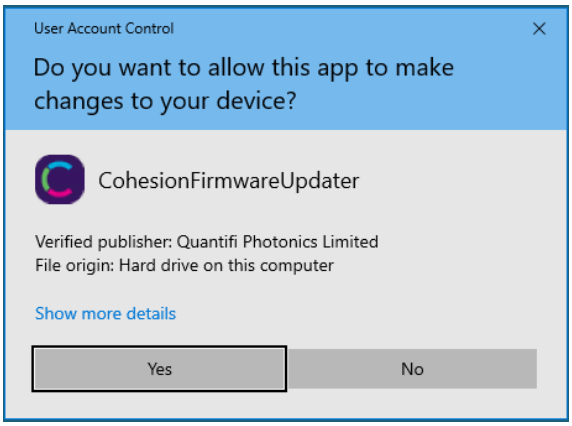
5. At the end of the installation, **it is recommended to select the Reboot now** option, and click **Finish** to complete the installation process.



6. Windows Security Alert may prompt the user for network access. It is **recommended that both options be ticked**, to allow any network configuration.



7. After rebooting the system, on startup a User Account Control prompt will be displayed to run the Cohesion Firmware Updater Utility. Click **Yes** and proceed with the application.



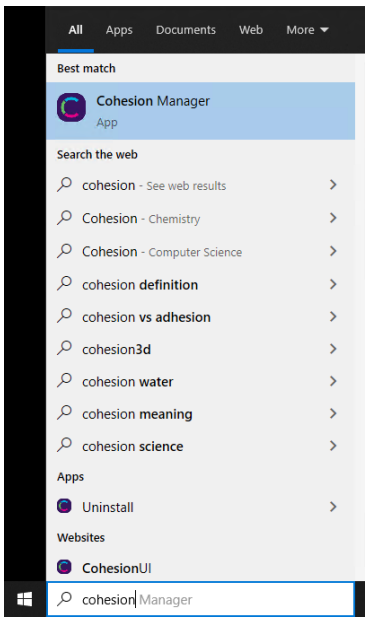
6.2 Quantifi Photonics PXIe system utility applications

Contained within the CohesionInstaller 3.XX.XX are two utility applications:

- Cohesion Manager
- Cohesion Firmware Updater

6.2.1 Cohesion Manager utility

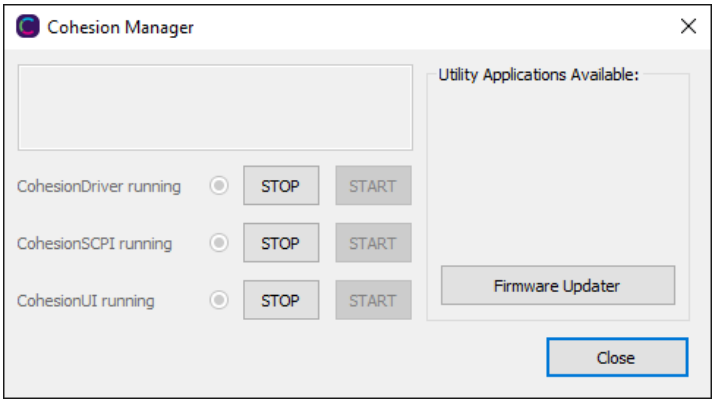
The Cohesion Manager utility serves as a single window application to give the user an overview of the status of all the Cohesion Software Services running on the system. The Cohesion Manager can be accessed via the Windows Start Menu.



Cohesion Manager is designed as a single reference source to check the status of all the running services in one contained window. The utility also allows the user to start or stop the **CohesionDriver service, CohesionSCPI service**, or **CohesionUI service** independently.

By default, all these Cohesion Software Services will start automatically on startup of the Windows OS and need to be running to facilitate proper communication with the Quantifi Photonics PXIe modules. If there is an issue in detecting or communicating with the modules, run the Cohesion Manager to check the status of the software services.

- **(Required) CohesionDriver** – The CohesionDriver service which directly manages the installed Quantifi Photonics modules.
- **(Required) CohesionSCPI** – The CohesionSCPI service which is the VXI11 compliant SCPI interface for TCP communication with the installed Quantifi Photonics modules.
- **(Optional) CohesionUI** – An optional web service providing a graphical interface for simplified operation of the installed Quantifi Photonics modules.



⚠ IMPORTANT

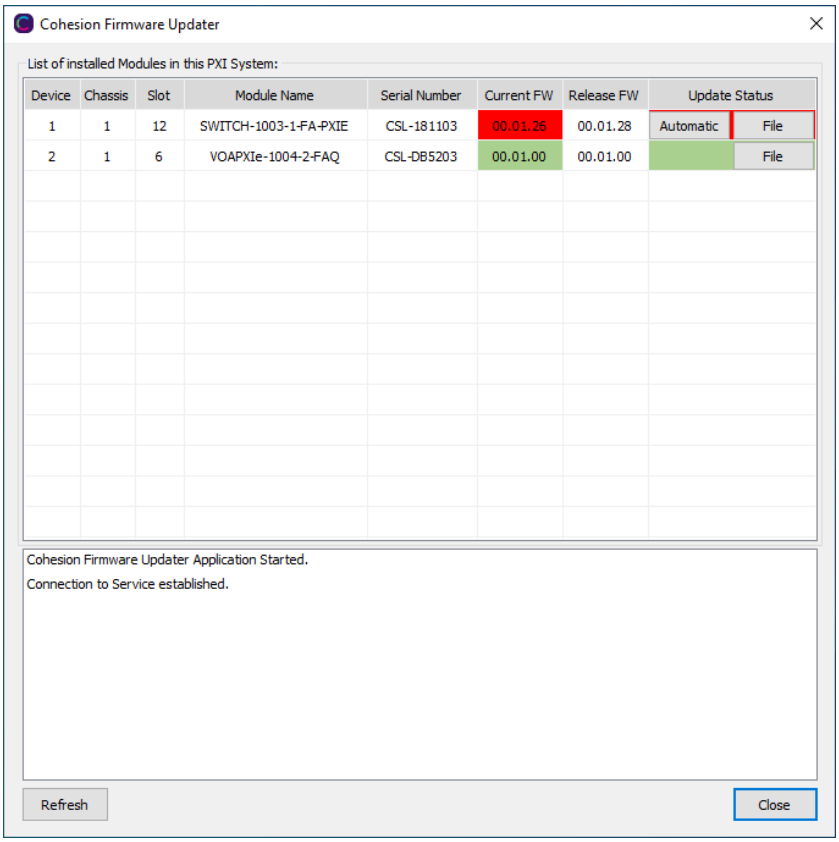
The **Driver and SCPI services** need to be running to facilitate communication with any installed Quantifi Photonics module, **therefore they are listed as REQUIRED**.

On the right side of the Cohesion Manager window a list of all the installed Quantifi Photonics system utilities is displayed.

6.2.2 Cohesion Firmware Updater utility

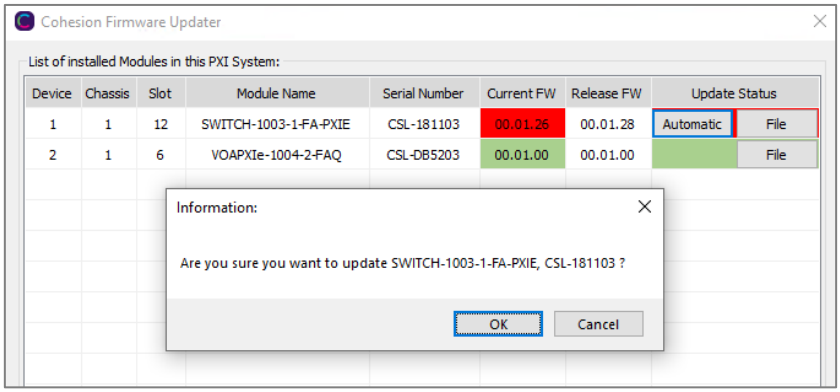
The Cohesion Firmware Updater utility serves as a single window summary application to display the current firmware status of all the Quantifi Photonics PXIe modules installed in the chassis.

The Cohesion Firmware Updater utility can be accessed via the Cohesion Manager application (see Section for more 6.2.1 information).

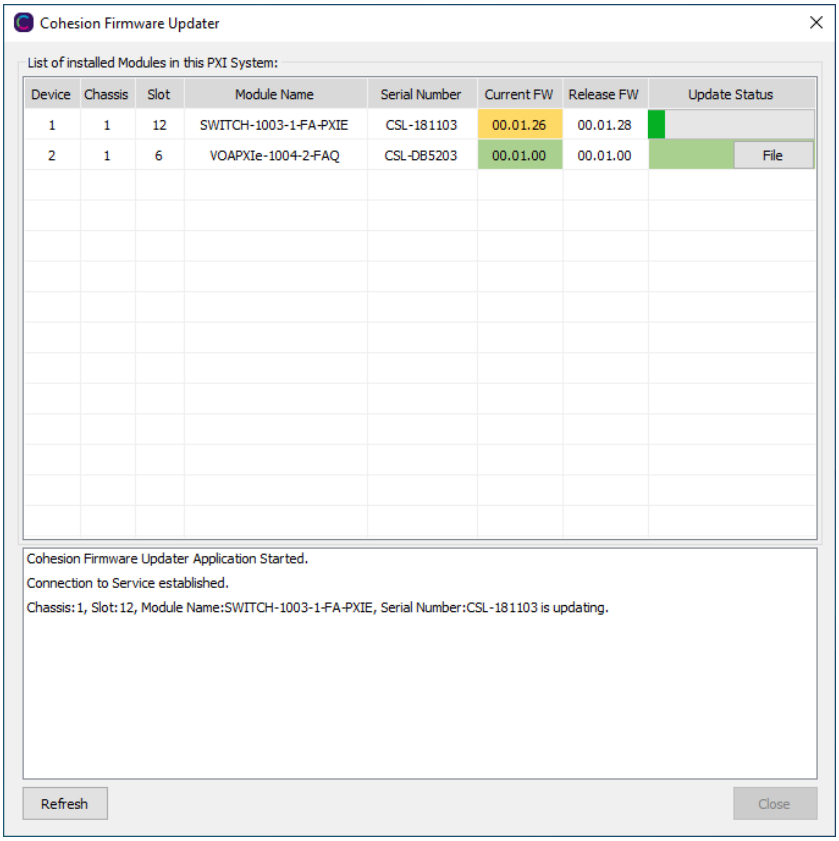


Whenever a new version of the CohesionInstaller is installed on the system, the Cohesion Firmware Updater utility will automatically launch after the system is rebooted. It will show the user the firmware status of all installed Quantifi Photonics modules and allow the user to update the firmware to a new version if applicable.

If a module's firmware is out of date, it is highly recommended to update the firmware to the new available version. Clicking the **Automatic** button will update the module(s) to the latest supported firmware for the installed packages on the system.



After clicking **OK**, the firmware update progress will be shown in the **Update Status** column.
The **File** button is reserved for updating a module to a specific firmware version if required.



6.3 Installing software for MATRIQ instruments

6.3.1 Installing Cohesion Operator on client computer(s)

Set up any computer you use to connect with the instrument by installing the latest Cohesion Operator software package. Cohesion Operator enables you to connect with Quantifi Photonics instruments on your network and manage firmware upgrades.

The package is included on the USB media device that we provide with your instrument, or you can download it from quantifiphotonics.com (go to **Resources** > **Drivers, software and manuals** > **MATRIQ Series**).

> **⚠ IMPORTANT**
> If **another MATRIQ instrument is already connected** to the client computer **over USB**, consult the **Network and Update settings** (7.5.4) section below on configuring the Ethernet / USB IP address for multi instrument control.

To install the software package on a client computer:

- (recommended) Save your work and close all programs.
- If using the USB media device, insert it on the computer.
- Double-click **CohesionOperator-<version>.exe** and follow the prompts.

NOTE: A Windows Security Alert may prompt you to allow network access. We recommend that you allow access to both, private and public networks, to enable any network configuration.

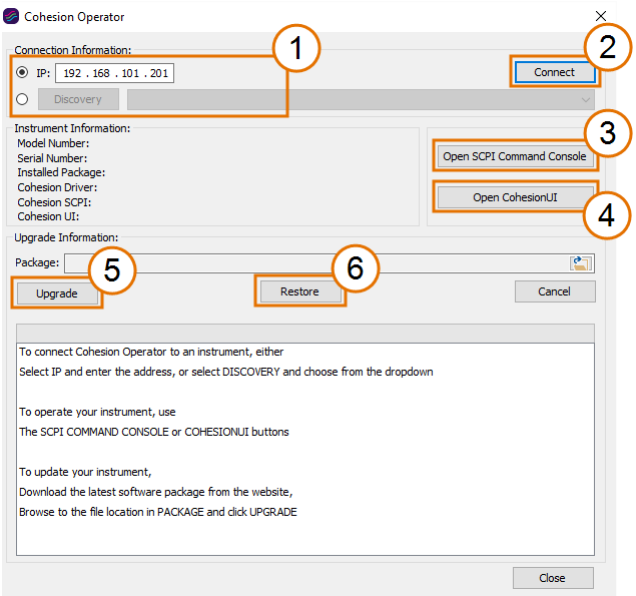
The installation wizard will install required drivers, applications, and desktop icons on the computer.

To open the Cohesion Operator application:

- Double-click the Cohesion Operator desktop icon or open Cohesion Operator from the Start menu.

From Cohesion Operator you can:

1. Select a Quantifi Photonics instrument that is available on your network.
2. Validate the IP address of the instrument and retrieve instrument information (refer 6.3.2).
3. Communicate with the instrument through the SCPI Command Console (refer 0).
4. Access the instrument through CohesionUI, a web-based graphical user interface (refer 7.2).
5. Upgrade instrument firmware (refer 6.3.3).
6. Restore the instrument to factory settings (refer 6.3.4).

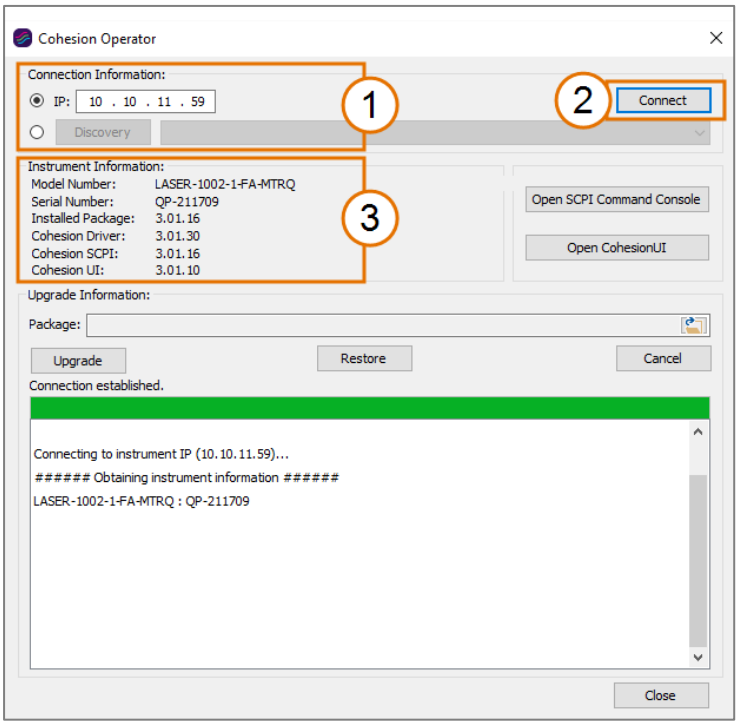


6.3.2 Checking MATRIQ firmware versions and other product information

You can check the details of a MATRIQ instrument, for example by doing one of the following:

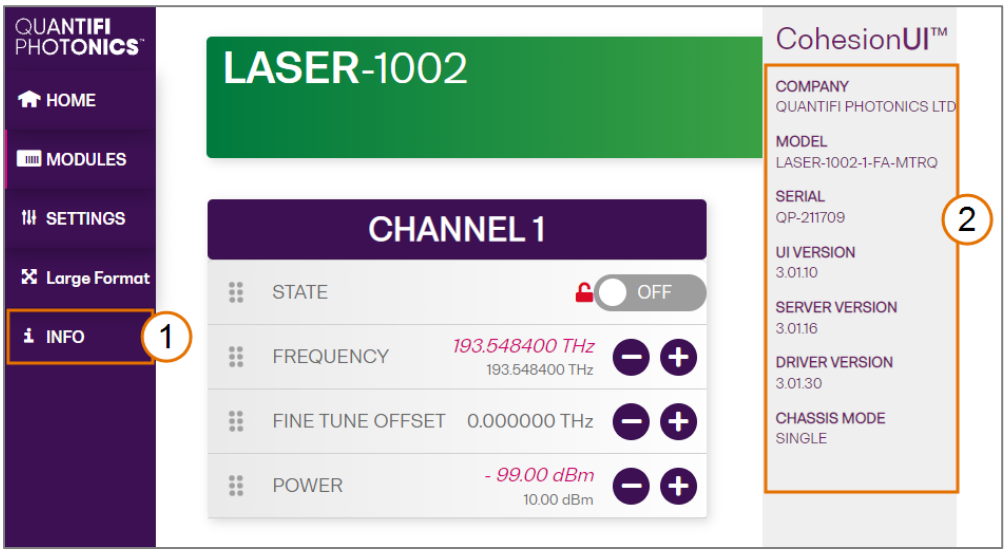
In the Cohesion Operator:

1. Select the instrument.
2. Click **Connect**.
3. Current instrument information will be displayed.



In CohesionUI:

1. Select **INFO** on the menu.
2. Instrument information will be displayed in the info panel.



6.3.3 Upgrading a MATRIQ instrument with the latest firmware

NOTE

The Cohesion Operator can upgrade MATRIQ instruments that currently use firmware package version 2.08.24 or greater. To upgrade MATRIQ instruments that use older software packages, refer to the user manual that came with your instrument.

To upgrade a MATRIQ instrument:

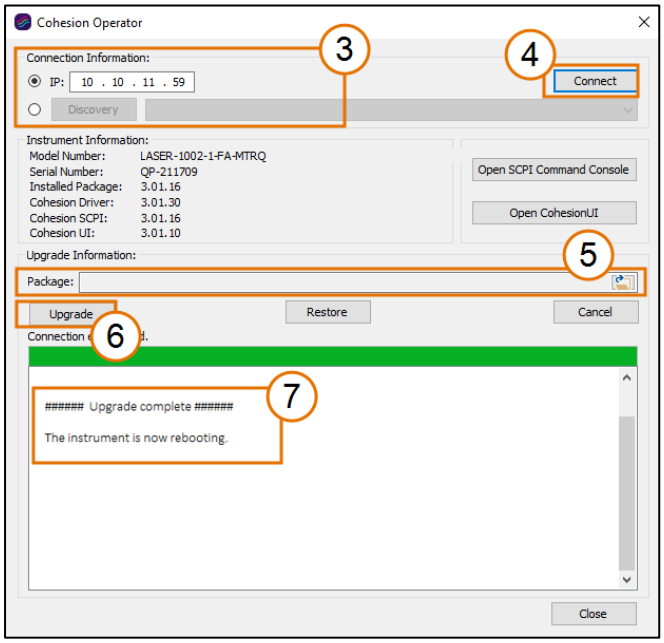
1. Get the latest MATRIQ firmware package **CohesionMTRQ-<version>.tgz**, for example by downloading it from quantifiphotonics.com (go to **Resources > Drivers, software and manuals > MATRIQ Series**), and save it to your network.
2. Open the Cohesion Operator, for example by double-clicking the **Cohesion Operator** desktop icon.
3. Select the instrument by entering its **IP address** or by selecting it from the **Discovery** drop down list.
4. To confirm that you have selected the correct instrument, click **Connect**.
   This will retrieve instrument information, with **Installed Package** showing the current firmware version.
5. In **Package**, click the Browse button, navigate to the previously downloaded firmware package and select it.
6. Click **Upgrade**.
   The instrument will be upgraded to the selected firmware package. This can take a few minutes and the instrument might reboot several times in the process.
7. A message shows when the upgrade is complete.

NOTE

To confirm the new firmware version, click **Connect** to retrieve the latest instrument information.

NOTE

If an upgrade attempt is unsuccessful, the Cohesion Operator will stop the upgrade process and restore the MATRIQ instrument to its previous firmware version. Messages will be displayed accordingly.



6.3.4 Restoring factory settings on a MATRIQ instrument

NOTE

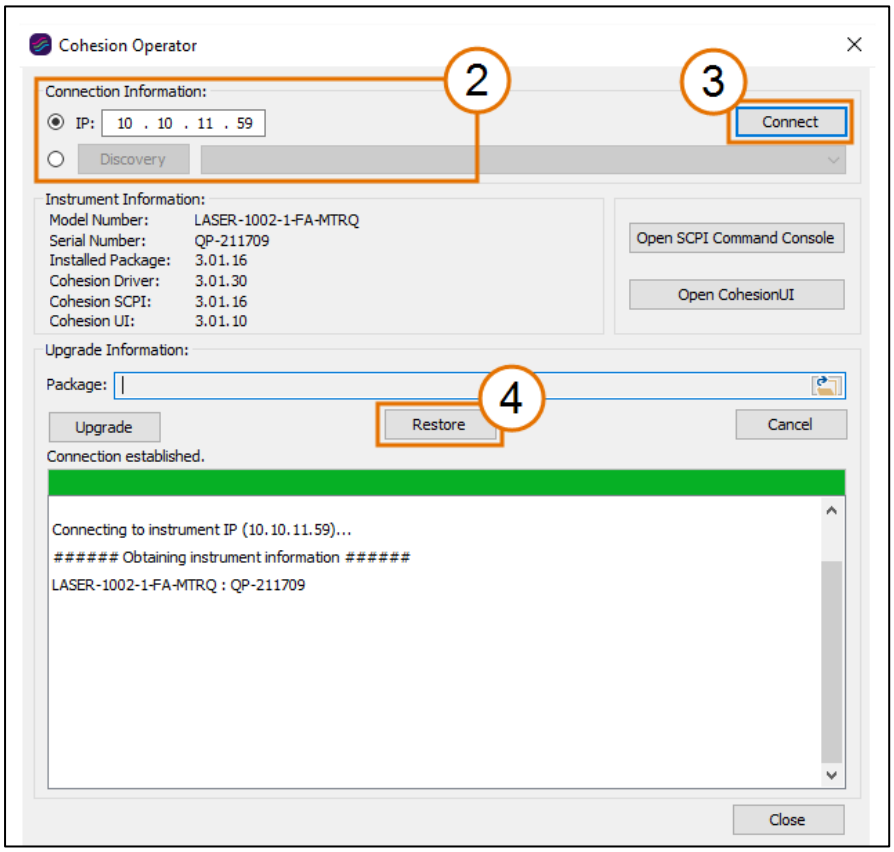
The Cohesion Operator can restore MATRIQ instruments that currently use firmware package version 2.08.24 or greater. To restore MATRIQ instruments that use older software packages, refer to the user manual that came with your instrument.

To restore factory settings:

1. Open the Cohesion Operator, for example by double-clicking the **Cohesion Operator** desktop icon.
2. Select the instrument by entering its **IP address** or by selecting it from the **Discovery** drop down list.
3. (optional) Retrieve instrument information, including current firmware versions, by clicking **Connect**.
4. Click **Restore**.

NOTE

IP address settings will also revert to factory settings.



7 CohesionUI

CohesionUI is a web-based application that you can use to control any OSA 1000 Series product from Quantifi Photonics. Its cutting-edge design offers a sleek modern interface, cross-device compatibility, multi-instrument control, customizable views, and remote access.

7.1 Accessing CohesionUI for PXIe modules

To use CohesionUI, you need the IP address of the host chassis, with which you can access the chassis either locally or remotely. For local access, use the embedded PXIe controller operating system, and for remote access, use any compatible device that is connected to the PXIe chassis via an ethernet connection.

To obtain the IP address, open the **Command Prompt** window on the chassis controller and then run the `ipconfig` command. Note down the IPv4 address that is displayed. For the local IP address, you can use `127.0.0.1` instead.

To access CohesionUI locally or remotely, open a compatible browser (Google Chrome or Microsoft Edge) and use the IP address `127.0.0.1` as the URL. Alternatively, you can double-click the desktop icon for CohesionUI or select it from the **Start** menu.

7.2 Accessing CohesionUI for MATRIQ instruments

You can open CohesionUI:

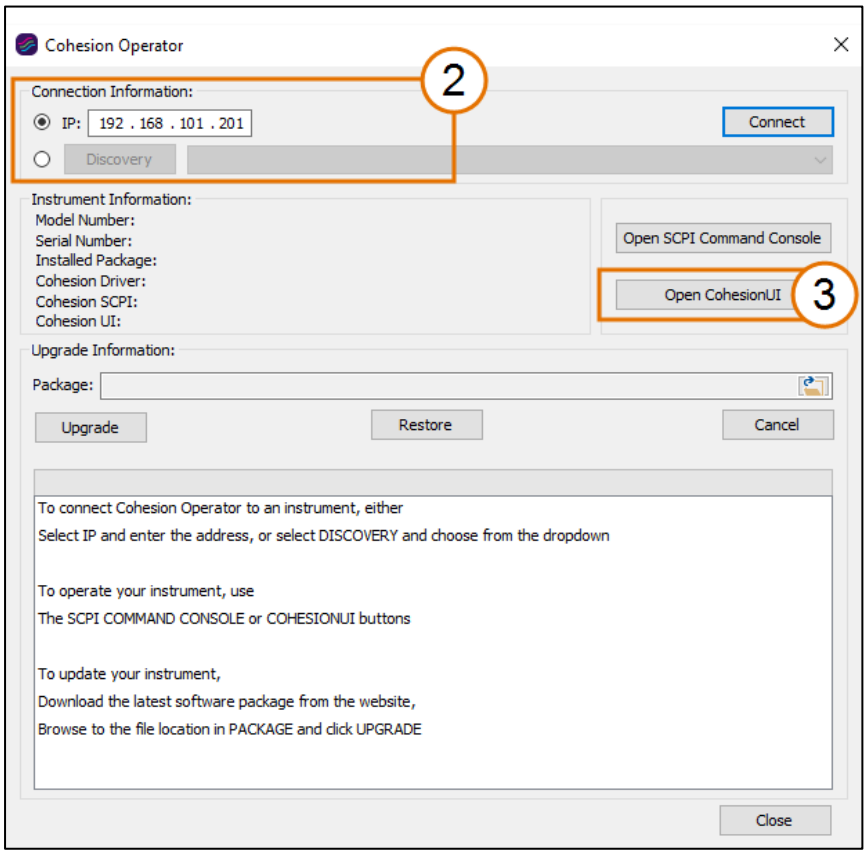
- from the Cohesion Operator application, or
- from your browser.

NOTE: The IP address of the MATRIQ instrument is displayed on the LCD screen on the back of the instrument. When the instrument is connected via both, Ethernet and USB cables, the displayed IP address will alternate between the USB and Ethernet IP address.

NOTE: If required, the IP address can be statically assigned to the Ethernet or USB connection.

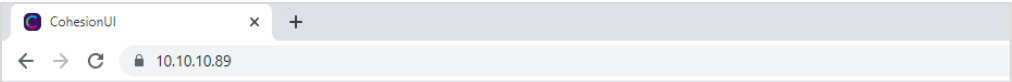
To open CohesionUI from Cohesion Operator:

1. Open Cohesion Operator on a client computer, for example by double-clicking the **Cohesion Operator** desktop icon.
2. Select the instrument by entering its **IP address** or by selecting it from the **Discovery** drop down list.
3. Click **Open CohesionUI**.



To open CohesionUI from a browser:

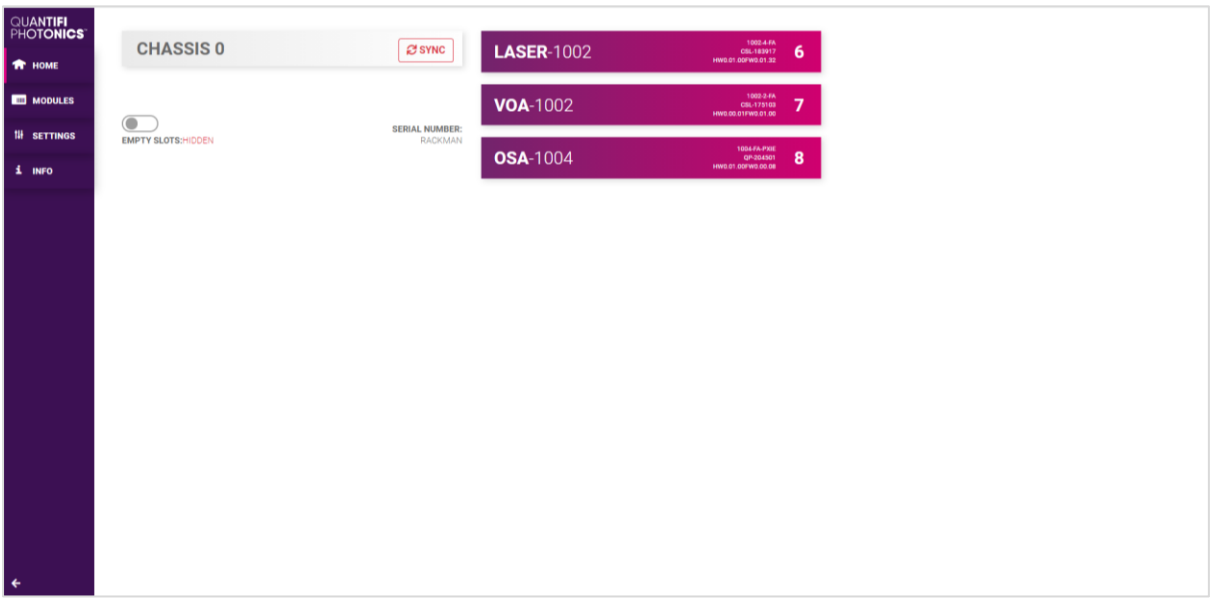
1. Launch Google Chrome or Microsoft Edge on a client computer.
2. Type in the MATRIQ instrument IP address into the address bar of the browser, e.g. **10.10.10.89**.

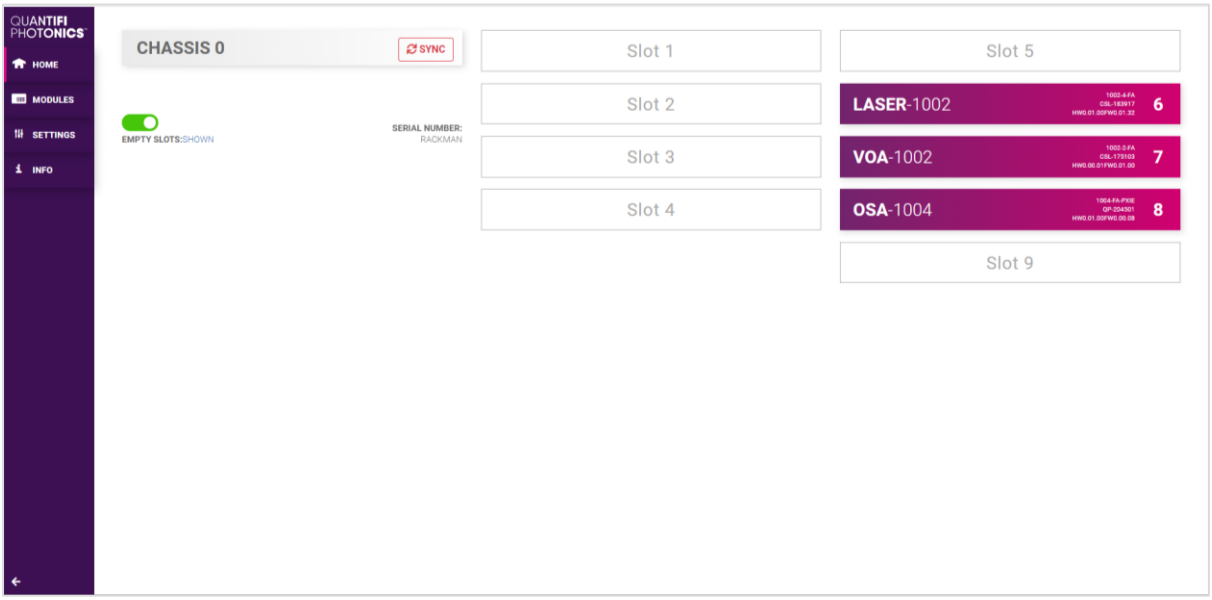


7.3 Home page

The main landing page in CohesionUI is called the **HOME** page. It displays a graphical representation of the module arrangement in the PXIe chassis or the MATRIQ instrument channels.

For PXIe modules, white numbers are displayed beside each module corresponding the slot in which they are installed. The EMPTY SLOTS button will toggle the page view to hide (HIDDEN), or to show (SHOWN) the empty slots in the PXIe chassis. The default setting is HIDDEN.

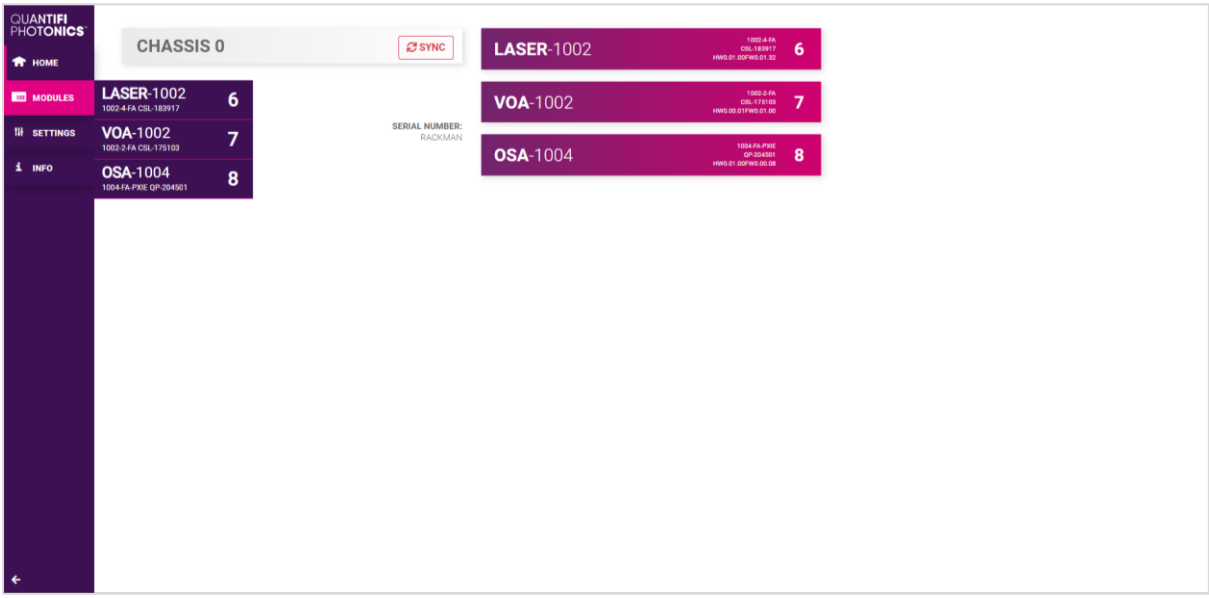




For MATRIQ instruments, all the information relating to the instrument such as the model number, serial number and firmware versions are displayed in the top right corner of the window.

7.4 Modules list

All the installed modules are displayed on the HOME page. To access the controls for a module, click the corresponding module name, or hover over the MODULES button and select a module from the displayed list. Controls for a specific module, or a channel in a module are then displayed.



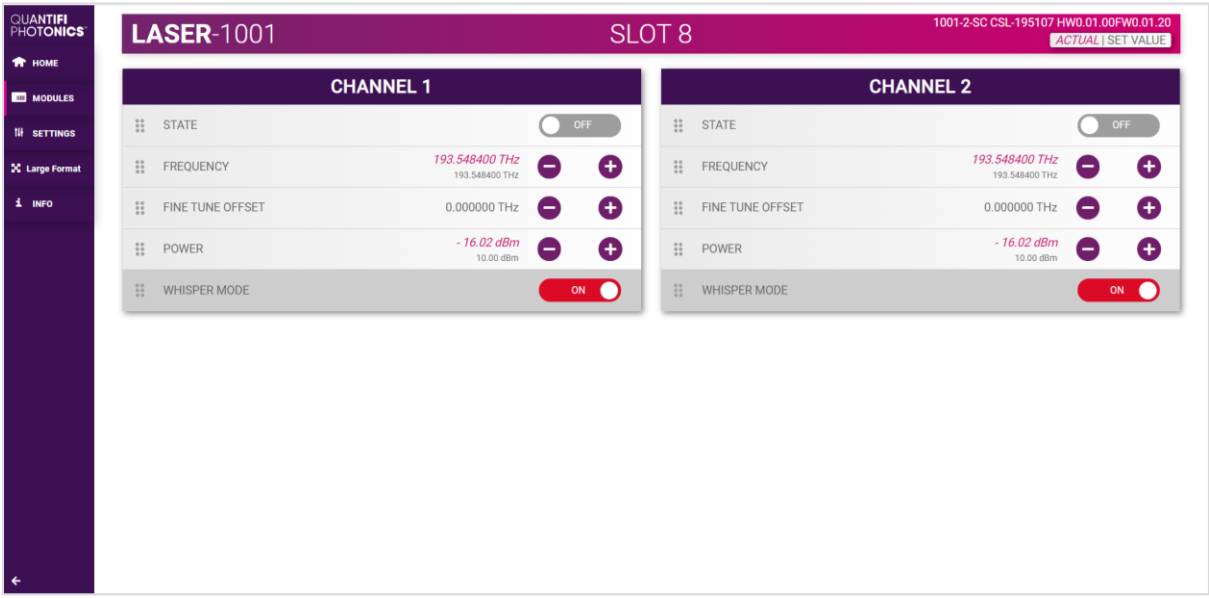
7.4.1 Set and Actual values

Some Quantifi Photonics products will allow the user to set a given parameter's value and then read that parameter (eg. Laser, VOA, O2E, etc). In order to help the user to distinguish between a set value and an actual read value, CohesionUI will format these values differently according to the legend in the top right corner of the window.

- *ACTUAL*: the actual value of the parameter, defined by querying the module
- SET: the intended value of a given parameter, defined by user input

In the following example, the POWER is SET to 10.00 dBm, but the *ACTUAL* value is *-16.02 dBm*. Thus, the user can see both the current and user defined value of a given parameter.

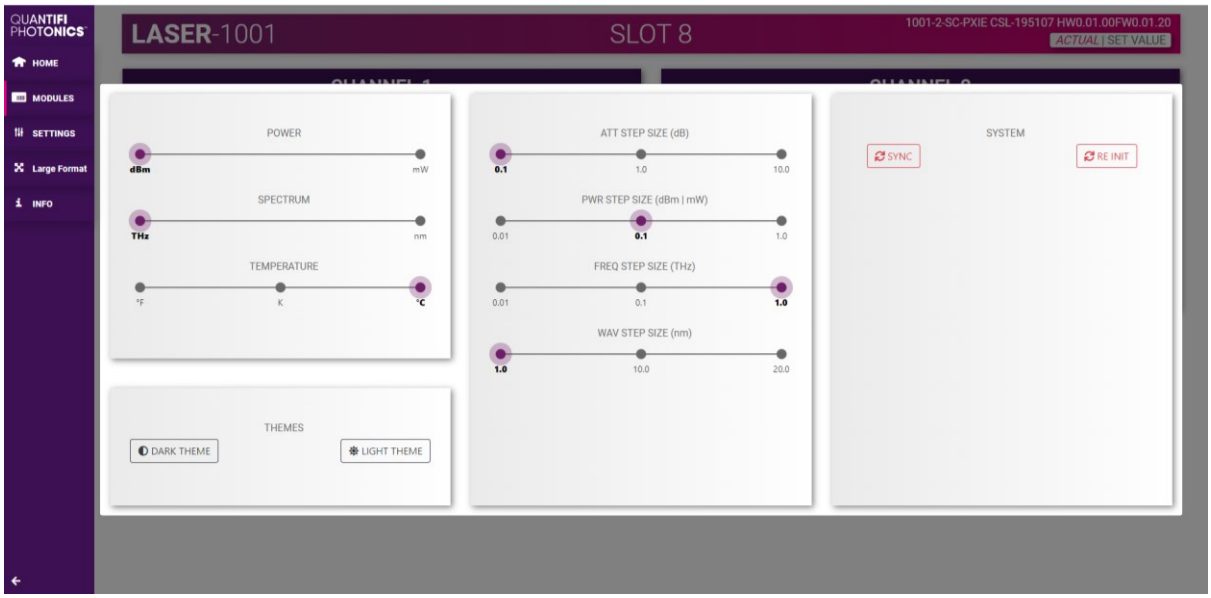
The SET and *ACTUAL* values are only displayed for appropriate parameters which require user input. For parameters that report a value and do not depend on user input, only an *ACTUAL* value is displayed.

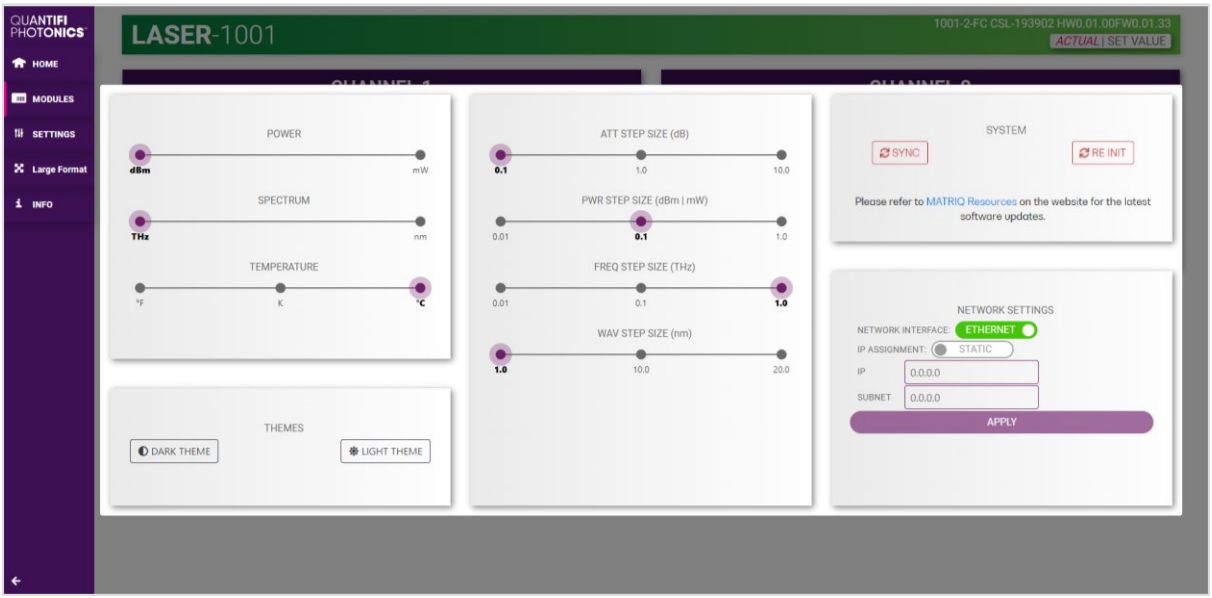


7.5 Settings page

The **SETTINGS** page is used to configure the CohesionUI settings and unit preferences or to synchronize / reinitialize the system. These controls can be accessed by clicking the **SETTINGS** button.

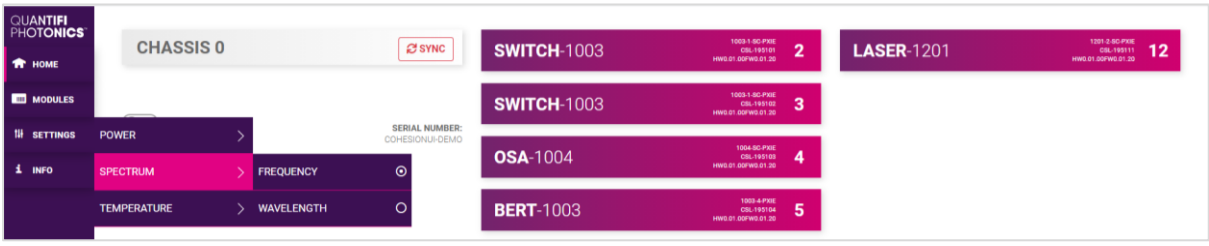
Step size refers to the amount by which the attenuation, frequency, or power increments / decrements when the **+** or **-** button is clicked.





NOTE

- The unit preferences and settings can be set by hovering over the **SETTINGS** button in the left side menu. This will bring up a dropdown menu that lists all settings for a quick access.
- Whenever the chassis is power cycled, CohesionUI reverts to default settings.



7.5.1 System controls for PXIe modules

On the SETTINGS window there is a SYSTEM controls section. These controls are to facilitate re-discovery of any Quantifi Photonics PXIe modules there may have been installed after initial startup, or if no modules are displayed in the CohesionUI window. This is useful for users who are operating in a multi-chassis MXI setup, instead of the standard PXIe embedded controller setup.

There are two actions in the SYSTEM controls section:

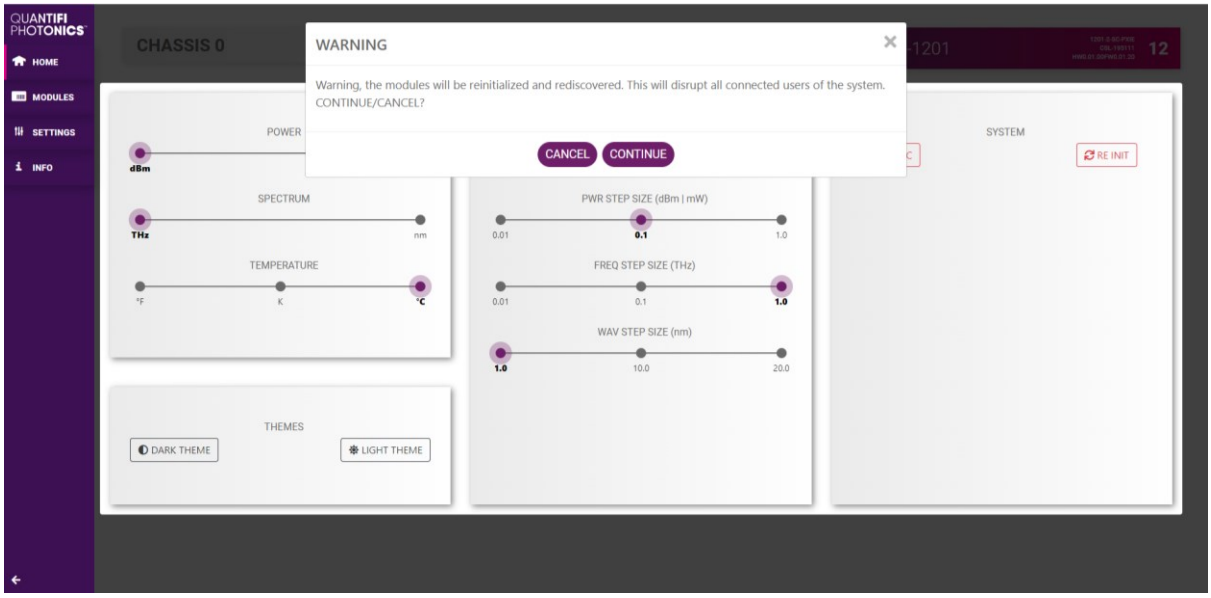
- SYNC: Synchronize CohesionUI with the latest information from the CohesionSCPI service.
- RE-INIT: Re-initialize CohesionUI by synchronizing the CohesionSCPI service with the CohesionDriver service.

The SYNC button is also displayed on the HOME page beside every chassis in the setup. This allows any chassis to be synchronized independently. After clicking the SYNC button, CohesionUI will disable the page while it is synchronizing with the CohesionSCPI service. Once it is complete, the page will be functional again.

Clicking the RE-INIT button will bring up a prompt to continue, since this action will temporarily disconnect all modules while the re-initialization with the CohesionDriver service is in progress. Once it is complete, the page will be functional again.

NOTE

The RE-INIT action will disconnect any connected users to the PXIe system while the action is being completed. All modules will be disabled during this time.



7.5.2 Network and Update settings controls for MATRIQ instruments

The network configuration control panel enables the user to set the preferred communication interface (Ethernet or USB).

NOTE

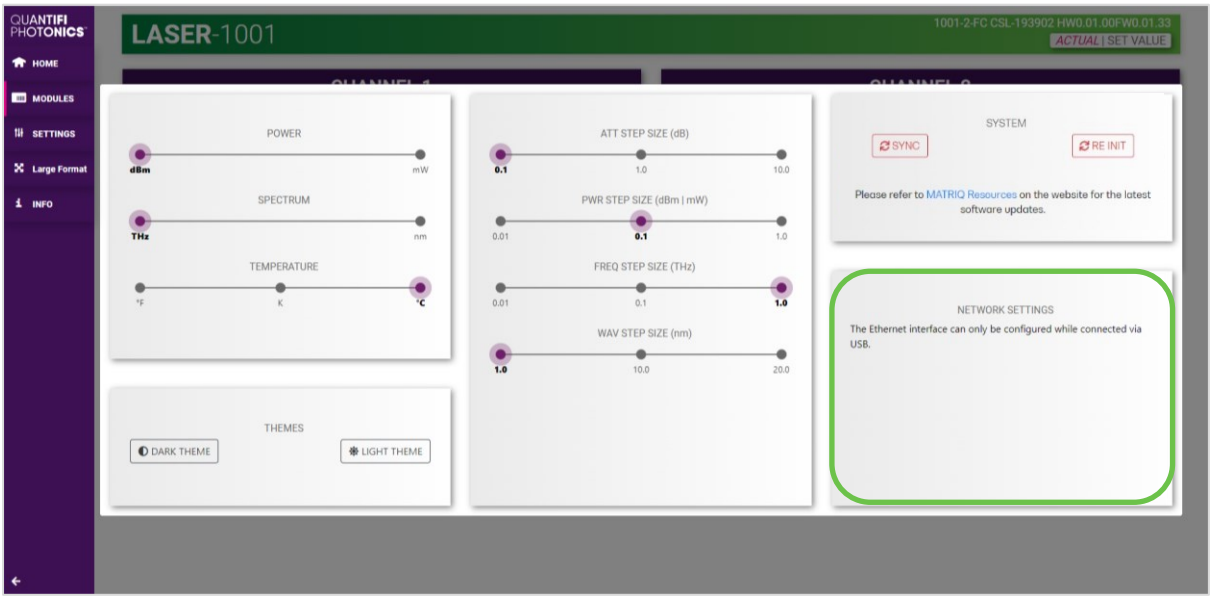
The Network interface controls are only available when connected over USB.

7.5.3 Configuring the Network Interface settings for MATRIQ instruments

The MATRIQ instruments can operate over either an Ethernet or USB connection. To communicate with the instrument, the IP address is required.

NOTE

The Network interface controls are **only available when connected over USB**. When connected over Ethernet the settings will be locked, as highlighted as follows.



7.5.4 Setting the USB IP address for MATRIQ instruments

When connected via USB, the default IP address is **192.168.101.201**. This is a static address set during instrument calibration. If necessary, this address can be changed. Typing the default IP address in a supported web browser will open the CohesionUI page for the instrument. The Network Interface configuration controls are available in the **SETTINGS** page.

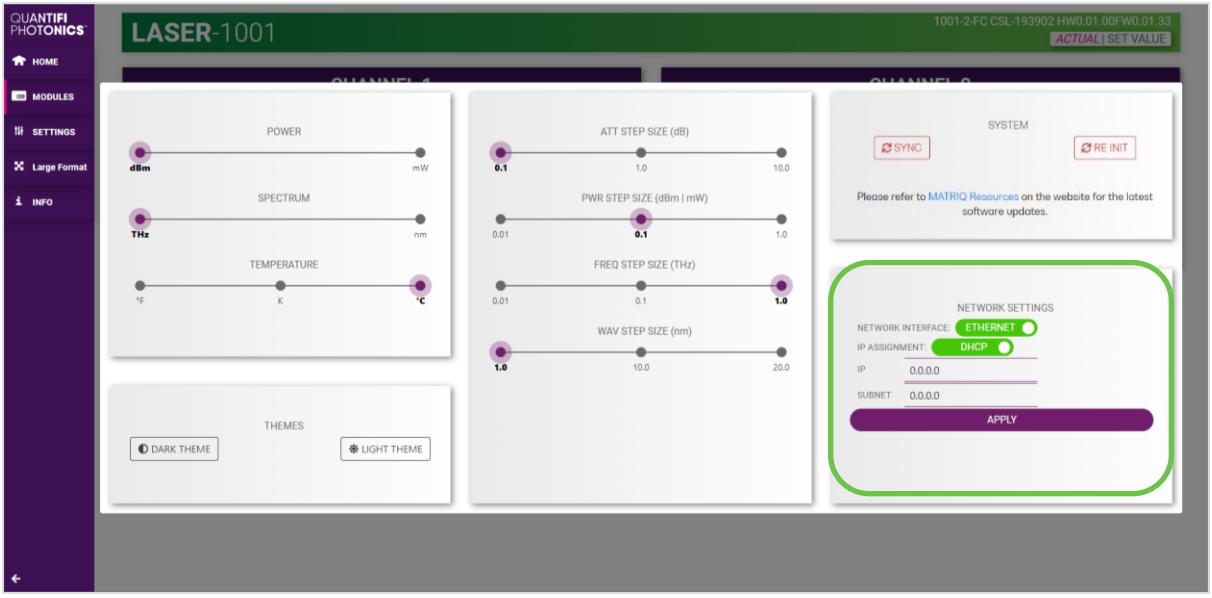
The **value in the 3rd octet of the IP address can be changed** to any available value. It is important to make sure that any other instruments connected to the computer do not share this new IP address, as there will be an addressing conflict.

Clicking **APPLY** will write the new IP address to the instrument settings. Once set, the new IP address will be displayed on the LCD screen on the back of the instrument.

7.5.5 Setting the Ethernet IP address for MATRIQ instruments

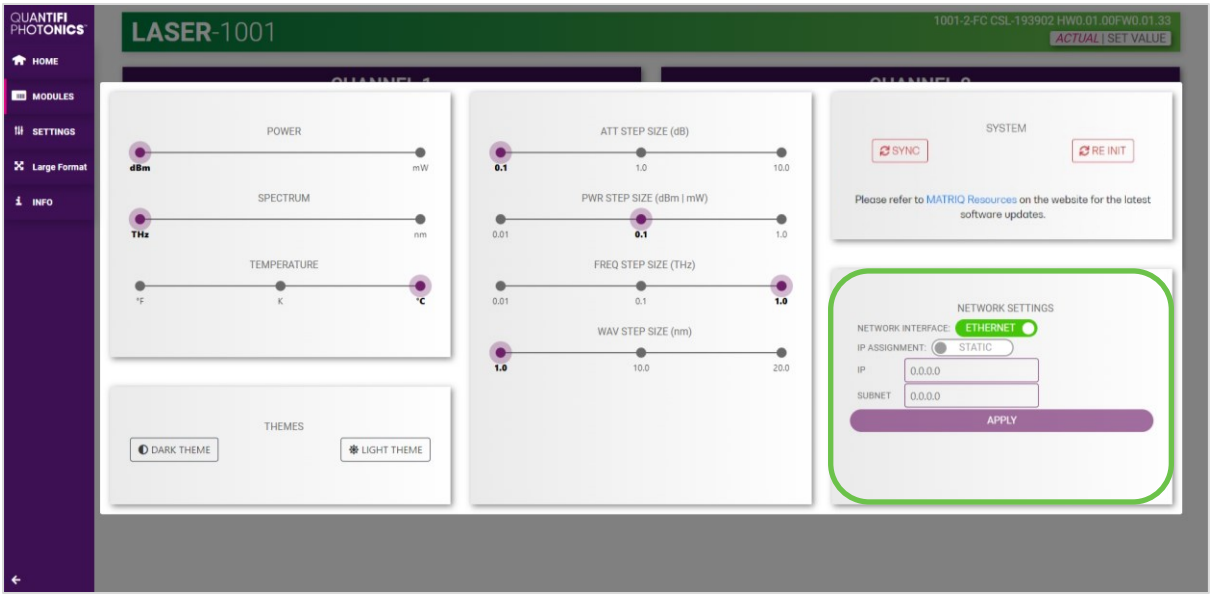
The default Ethernet IP addressing method is dynamic, as the DHCP will automatically assign the instrument an IP address. This address can be found on the back of the instrument on the LCD screen.

While connected over USB, typing in the assigned IP address in a supported web browser will open the CohesionUI page for the instrument.



The addressing method can be changed to a static method, where the MATRIQ instrument will always have the same IP address over Ethernet. Typing in a **valid IP address and Subnet mask**, and then clicking **APPLY** will save the IP address into the settings of the instrument.

To test if the IP addressing has worked, power **OFF** the instrument, and disconnect the USB cable. Turn the unit back **ON**, and once it has finished booting, check the IP address shown on the LCD screen.



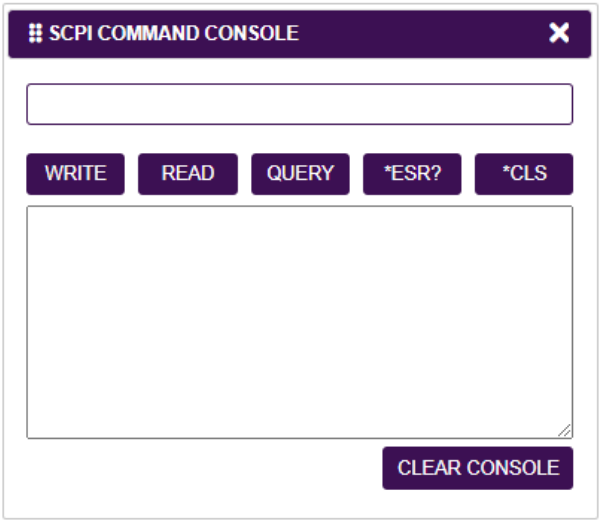
7.6 SCPI Command Console (available on PXIe modules)

The CohesionUI SCPI Command Console enables you to communicate with Quantifi Photonics PXI modules via SCPI commands. It enables you to test commands and verify their syntax.

For details on available SCPI commands, refer 9.

To open the SCPI Command Console:

- On the CohesionUI menu, click **CONSOLE**.
  The console will appear in the bottom right corner.

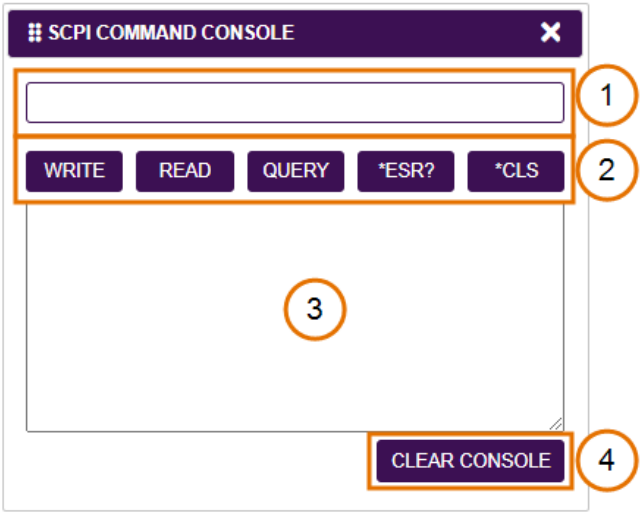


You can move the console by clicking on the title bar and dragging it to any position on the screen. On closing and re-opening, the console will re-appear at its last position.

The console remains open when navigating between different modules. It floats on top of the UI so that you can observe the effect of SCPI commands on a module in real-time.

To communicate with a module via the SCPI Command Console:

1. Enter a command.
2. Select action(s).
3. Review the action response in the output area.
4. (optional) Clear the output area.

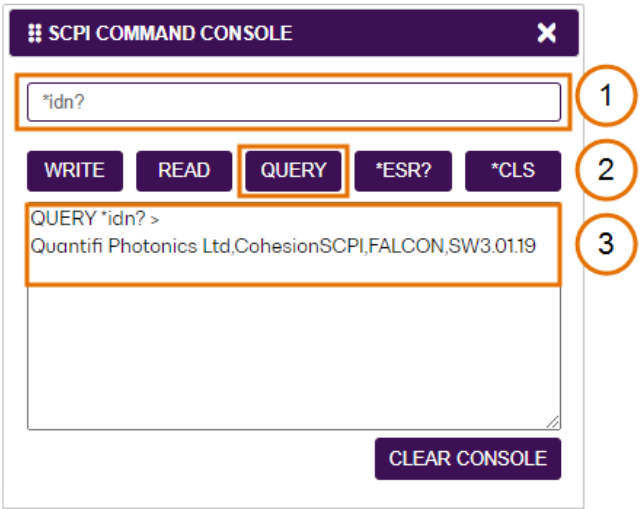


You can choose from these SCPI command actions:

Action	Meaning	FAILED response
WRITE	Send the command to the instrument	The command is invalid. Please check the command and syntax.
READ	(after WRITE) Request the response from the instrument	Response buffer is empty.
QUERY	WRITE and READ	
*ESR?	Query the status event status register (ESR) – this will give you more details and specific information about command failures. For details on error codes, please refer to 9.	
*CLS	Clear the response buffer and start fresh – useful when getting out of sync with WRITE and READ actions	

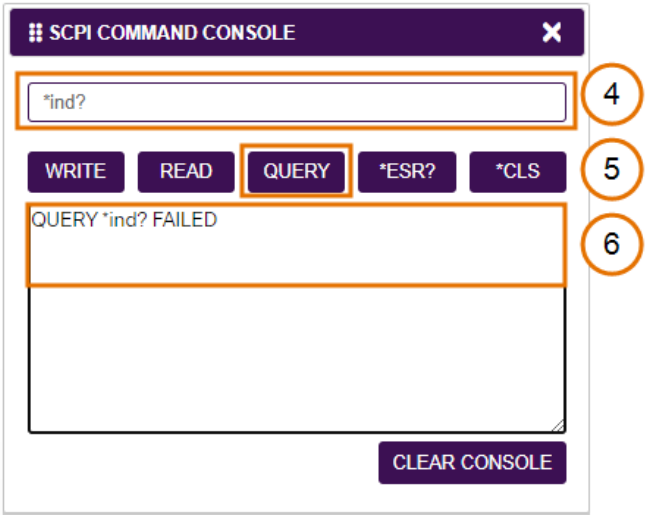
Example 1: Send instrument identification query `*idn?`

1. Enter the command: **`*idn?`**
2. Click **QUERY.**
3. The module returns the requested information.



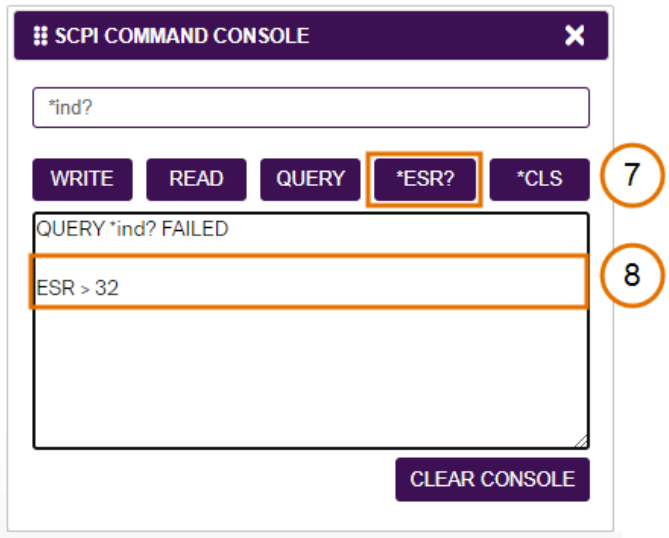
Example 2: What happens when you send an incorrect command?

4. Enter an incorrect command, for example: **`*ind?`**
5. Click **QUERY.**
6. The module returns FAILED.



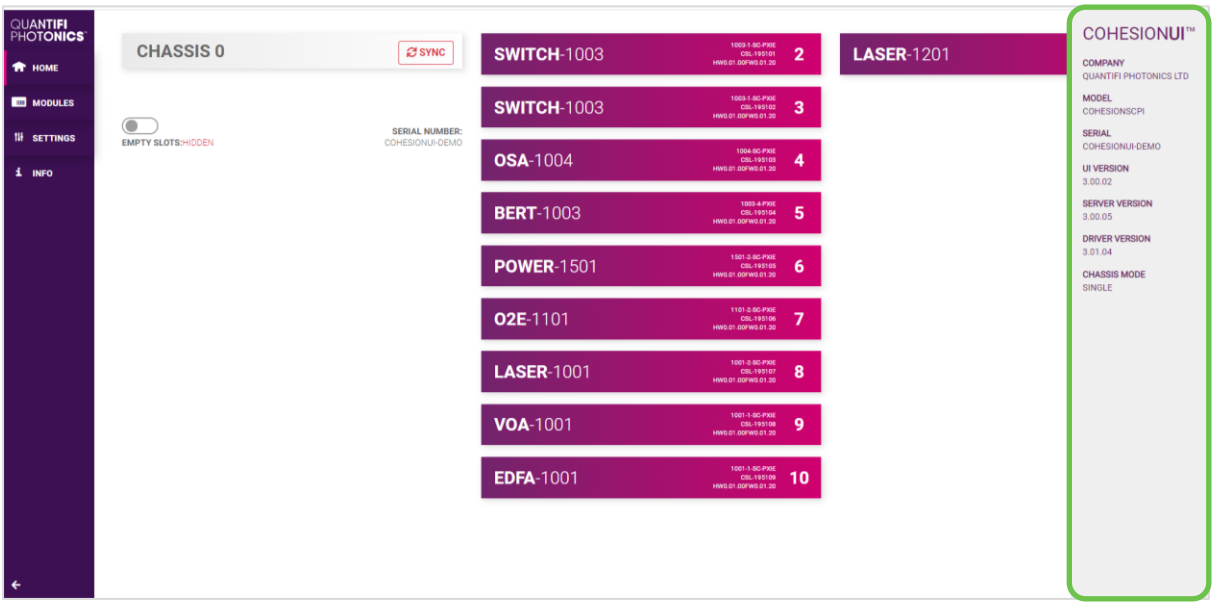
Example 3: Investigate a command failure

7. Click ***ESR?** to query the event status register and request information about the command failure.
8. The instrument returns the error code, for example 32.
   For details on error codes, please refer to the `*ESR?` command.



7.7 Info panel

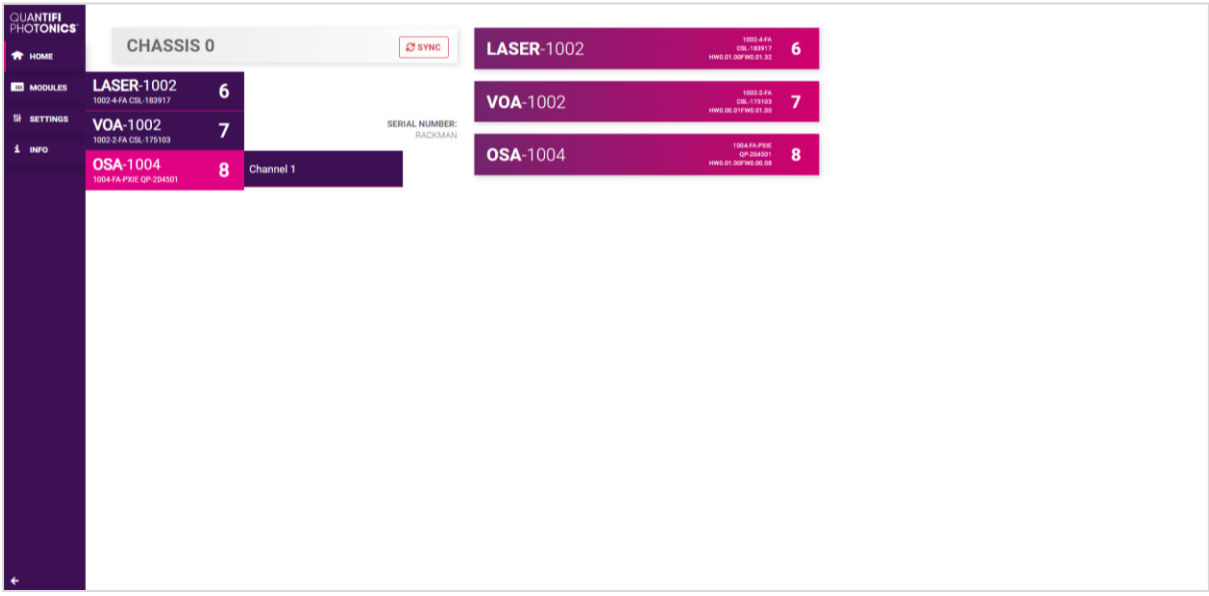
Clicking the **INFO** button will display an information panel on the right side of the page. Information such as the chassis operation mode, manufacturer, model, and serial number of the chassis, CohesionUI version number, and the version of CohesionSCPI service running on the chassis is displayed in this panel.



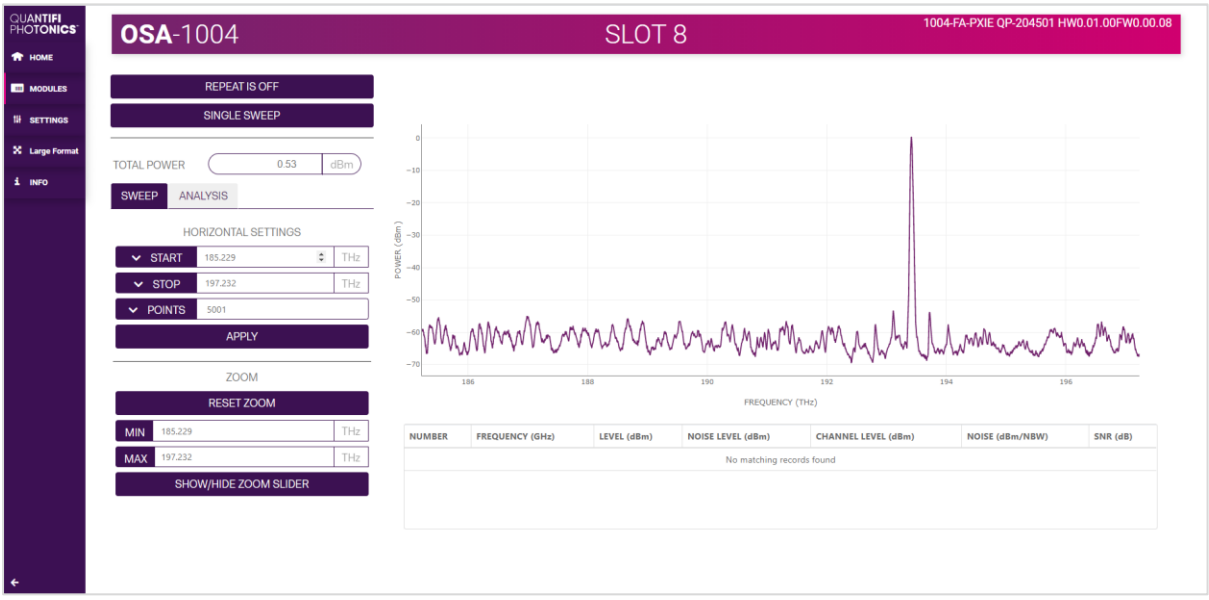
8 OSA 1000 Series control with CohesionUI

To control the OSA PXIe module through CohesionUI, click the desired module installed in the chassis or the desired channel. Alternatively, hovering over the **MODULES** menu button on the left will bring up a dropdown menu that the OSA module can also be selected from.

To control the OSA MATRIQ instrument, click **HOME** to display controls for all channels.



After clicking the desired OSA module, its control page is displayed. All information relating to the module such as model number, serial number and firmware versions are displayed in the top right corner of the window.



8.1 OSA sweep settings

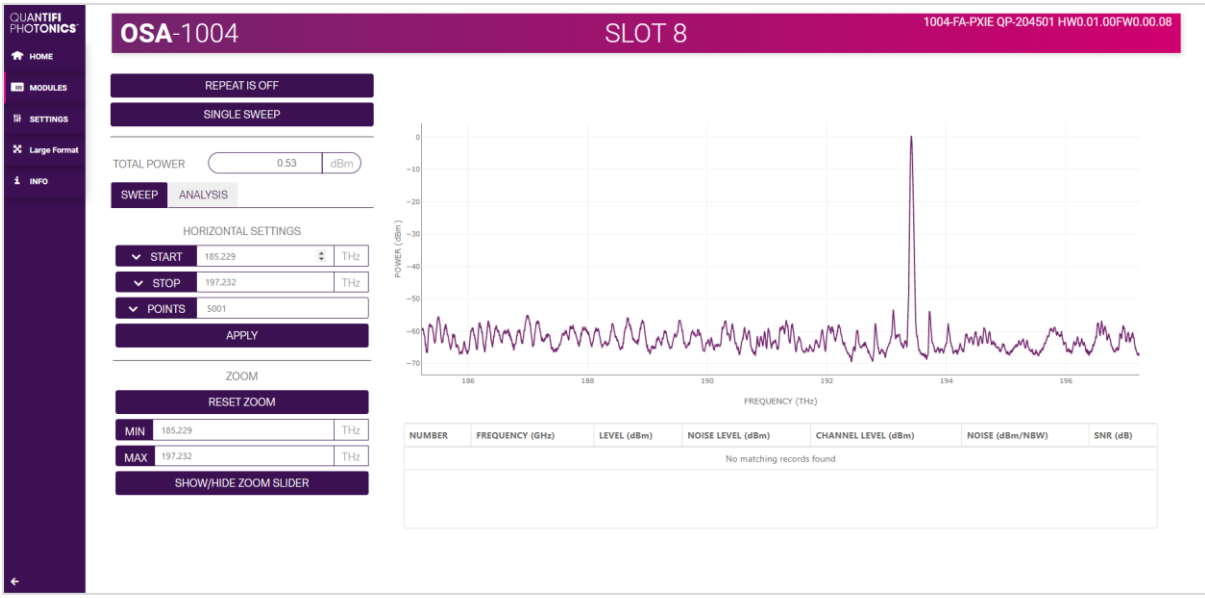
Parameters and settings in the **SWEEP** tab control the start and stop values, between which the spectrum of the optical input will be recorded. The spectrum can also be zoomed to show a specific section of the recorded spectrum, by clicking and dragging the desired area with the cursor.

The sweep settings for an OSA can be entered manually into any parameter field, or by clicking the up and down arrow buttons in the value field, to increment or decrement the value by a set amount. This step size is set in the **SETTINGS** menu. Alternatively, the parameter can also be set to the MIN, MAX or DEFAULT values by clicking the dropdown menu in the name of the parameter.

This applies to the following parameters:

- **START**: The frequency (wavelength) value that the OSA should begin scanning from.
- **STOP**: The frequency (wavelength) value that the OSA should stop scanning at.
- **POINTS**: The number of data points that the OSA will gather between the START and STOP frequencies (wavelengths).

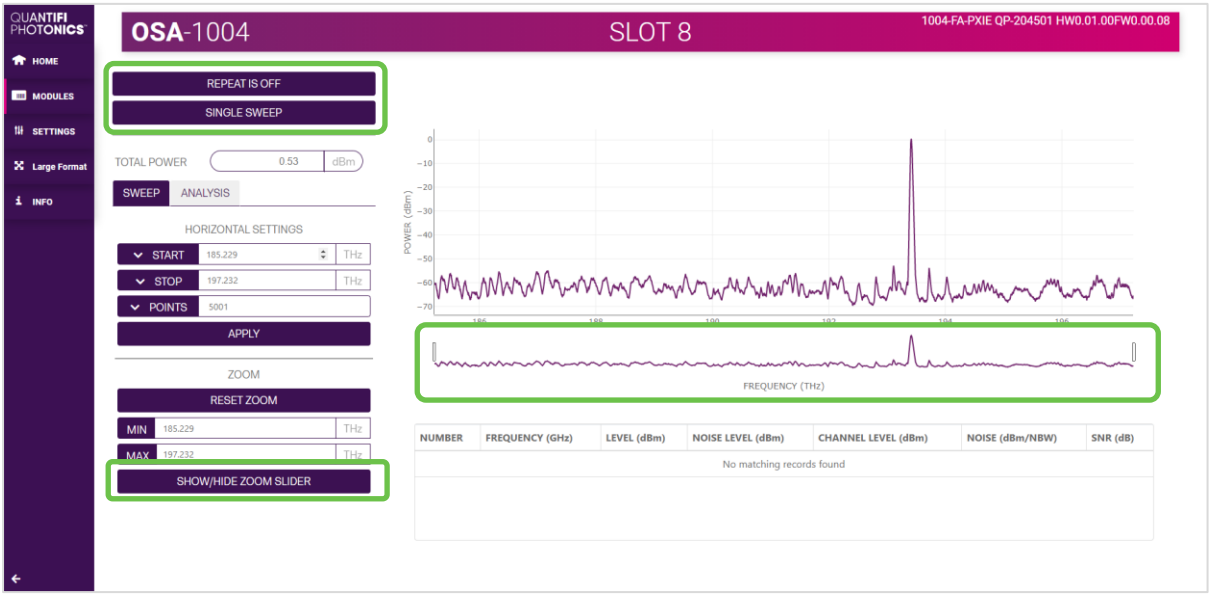
The integrated power across the START / STOP bandwidth is displayed as the **TOTAL POWER**.



After setting the START and STOP frequency / wavelength values and the number of sweep POINTS, clicking **APPLY** will save the parameter values into memory and update the sweep settings of the OSA.

Clicking the **SINGLE SWEEP** button will conduct a single scan over the set frequency / wavelength span. If a continuously repeating scan is desired, then clicking the **REPEAT IS OFF** toggle button will conduct repeated sweeps of the frequency / wavelength range, and the button will display **REPEAT IS ON** text.

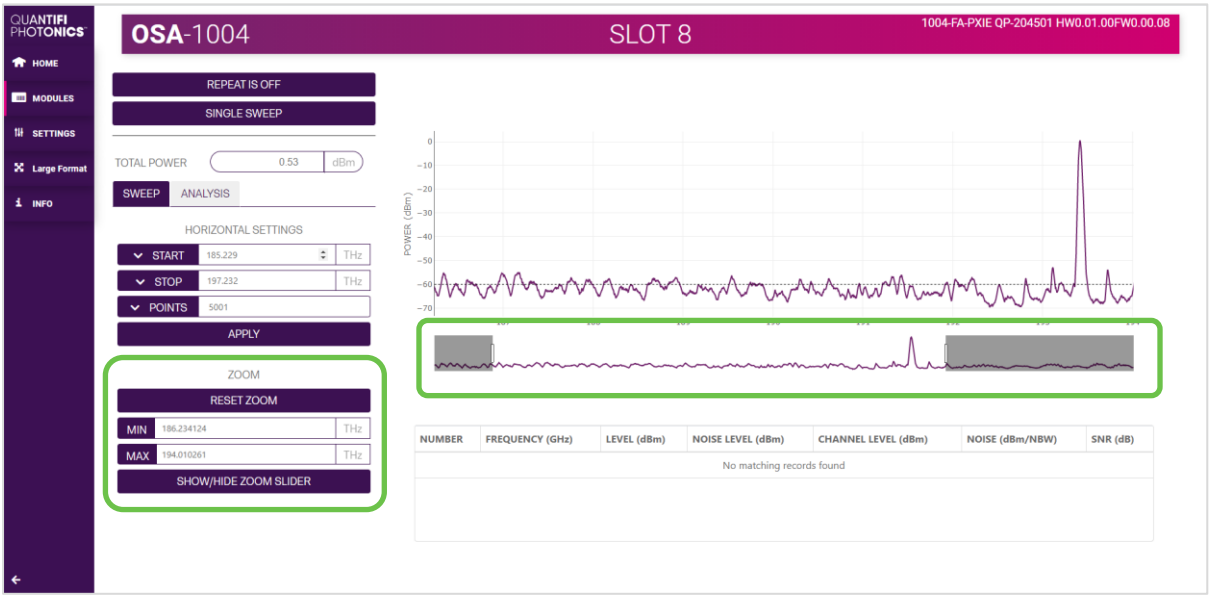
By clicking **SHOW / HIDE ZOOM SLIDER** an interactive OSA trace is displayed below the main trace. This second panel has two draggable bars at either end of the frequency / wavelength span, which can be moved to zoom the main trace view to a specific range.



⚠ IMPORTANT

Zooming does not change the actual START and STOP frequency / wavelength sweep values; it only changes the displayed trace.

The zoomed trace will show the zoom window by rendering a mask over the second OSA trace to illustrate the position of the zoom window.



When the interactive zoom bars are dragged around, their corresponding values are automatically populated into the MIN and MAX fields. These values denote the minimum and maximum frequency / wavelength values that form the zoom window. The values can be set to their minimum or maximum by clicking the parameter name. This will automatically change the display window to reflect the MIN / MAX values.

Clicking RESET ZOOM will revert the zoom window to the full frequency / wavelength span as defined in the SWEEP settings. Alternatively, clicking and dragging over the main trace window will also zoom the trace. Double clicking anywhere in the trace window will reset the zoom to the default view.

NOTE

The MIN and MAX values are limited by the START and STOP values that were set in the SWEEP settings. The OSA cannot zoom the display to a value outside the START / STOP range.

8.2 OSA analysis settings

Parameters and controls in the ANALYSIS tab allow the user to perform some processing on the OSA traces. These functions provide the user with analysis ability for the most common actions that are performed on OSA traces. Clicking the dropdown menu will display the following options:

- OSNR – Optical Signal to Noise Ratio
- SMSR – Side Mode Suppression Ratio
- SPECTRAL WIDTH
- FIND PEAKS

8.2.1 OSNR

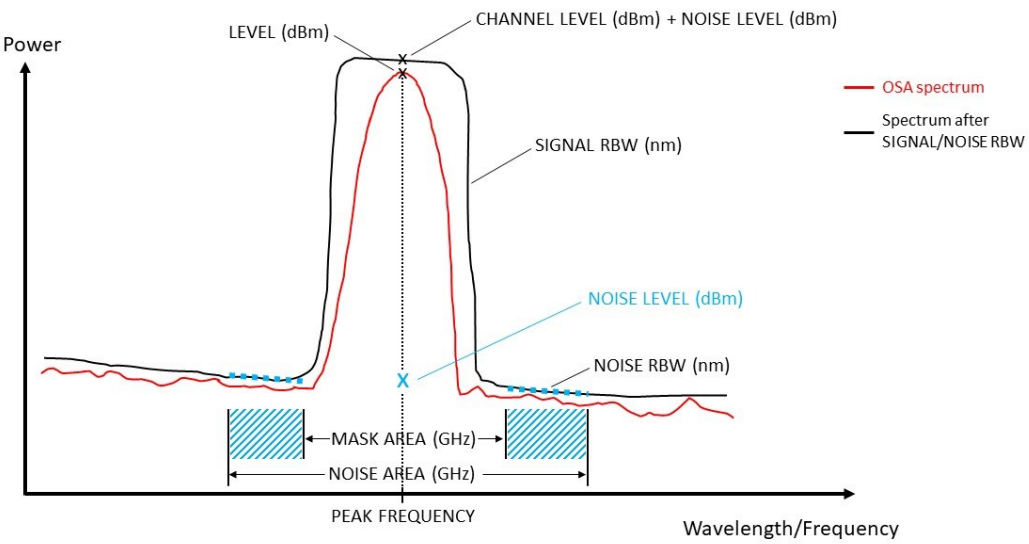
The OSNR (Optical Signal to Noise Ratio) can be computed between all detected peaks and the average noise level of the OSA trace.

Parameters:

PEAK FIND THRESHOLD (dBm)	Power level above which the OSA will detect peaks. NOTE: If set close to the noise floor of the OSA, more peaks will be detected. If the threshold value is lower than the noise floor (so that the ratio of peak power to noise power is negative), an error will be returned, and no peaks will be detected at all. In this instance it is advisable to increase the threshold value.
NOISE AREA (GHz)	The NOISE AREA (GHz) is centered at the peak. By default, or if you enter a zero value, this value represents the full channel bandwidth (if only one peak is found), or the distance between adjacent peaks (if there are multiple peaks). The OSA rejects any side peaks in the NOISE AREA (GHz). NOISE AREA (GHz) excluding MASK AREA (GHz) defines the part of the OSA trace that is used for calculating noise values.
MASK AREA (GHz)	The MASK AREA (GHz) is centered at the peak and defines the part of the OSA trace that is excluded from the NOISE AREA (GHz) for noise calcualations. By default, or if you enter a zero value, this value represents half of the noise area. If MASK AREA (GHz) = NOISE AREA (GHz), the OSA will use the entire NOISE AREA (GHz) for noise calculations. If set MASK AREA (GHz) > NOISE AREA (GHz), the OSA will decrease the MASK AREA (GHz) to equal the NOISE AREA (GHz).
SIGNAL RBW (nm)	Signal resolution bandwidth. The bandwidth of the signal as measured 3dB below the peak value of the OSA filter response.
NOISE RBW (nm)	Noise resolution bandwidth. Determined by the width of the rectangle that represents the same area as the spectrum area of the OSA filter response at the SIGNAL RBW (nm).

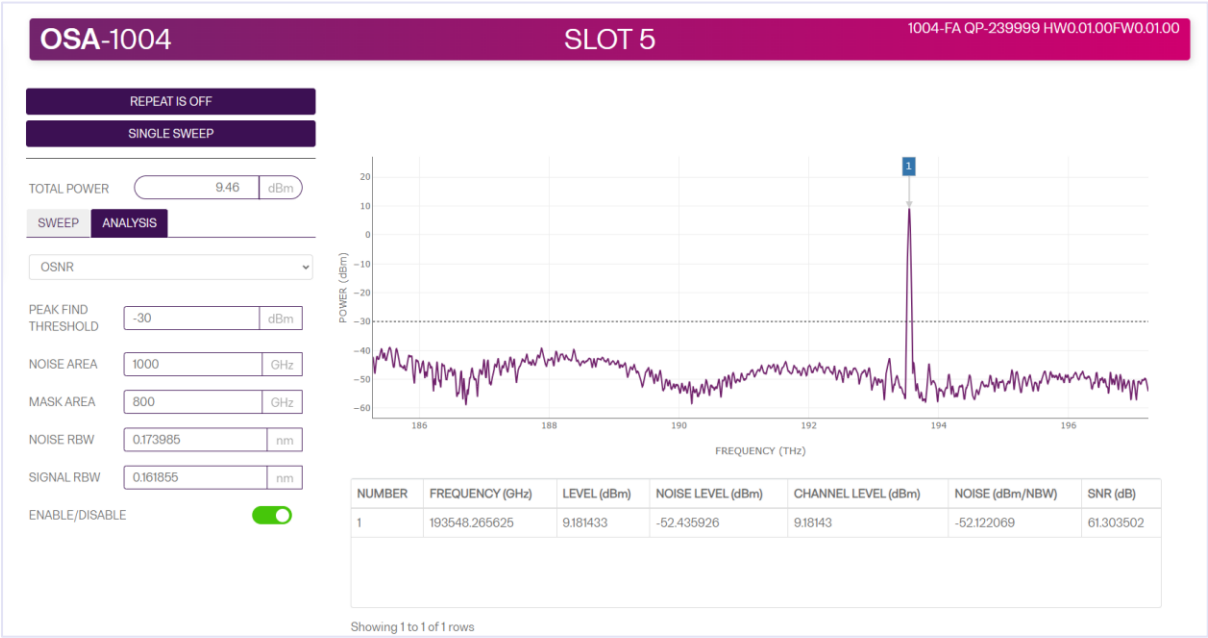
Measuremens:

NUMBER	Refers to a detected peak
FREQUENCY (GHz)	Peak frequency
LEVEL (dBm)	Peak signal power, adjusted by set SIGNAL RBW (nm) for an integrated power value.
NOISE LEVEL (dBm)	Average noise power, calculated based on the noise power values within the set NOISE AREA (GHz) of the peak (excluding MASK AREA (GHz)).
NOISE (dBm/NBW)	Normalized noise power, adjusted for NOISE RBW (nm) ≠ SIGNAL RBW (nm): $$\mathbf{NOISE}\ (\boldsymbol{dBm/NBW}) = \mathbf{NOISE\ LEVEL}\ (\mathbf{dBm}) + 10 \times \log_{10}\left(\frac{\mathbf{NOISE\ RBW\ (nm)}}{\mathbf{SIGNAL\ RBW\ (nm)}}\right)$$
CHANNEL LEVEL (dBm)	Channel power at SIGNAL RBW (nm). $$\mathbf{CHANNEL\ LEVEL\ (dBm) = LEVEL\ (dBm) - NOISE\ (dBm/NBW)}$$
SNR (dB)	Optical signal to noise ratio $$\mathbf{SNR} = \mathbf{CHANNEL\ LEVEL}\ (\mathbf{dBm}) - \mathbf{NOISE}\ (\mathbf{dBm/NBW})$$



To analyze a scan:

- Set parameters: PEAK FIND THRESHOLD, NOISE AREA and MASK AREA.
- Apply the parameters by toggling the ENABLE/DISABLE button to ENABLE.
- Detected peaks will be highlighted in the trace, measurements will be displayed in the table below the trace.


OSA-1004
SLOT 5
1004-FA QP-239999 HW0.01.00FW0.01.00
REPEAT IS OFF
SINGLE SWEEP
TOTAL POWER
9.46
dBm
SWEEP
ANALYSIS
OSNR
PEAK FIND THRESHOLD
-30
dBm
NOISE AREA
1000
GHz
MASK AREA
800
GHz
NOISE RBW
0.173985
nm
SIGNAL RBW
0.161855
nm
ENABLE/DISABLE
POWER (dBm)
FREQUENCY (THz)
NUMBER | FREQUENCY (GHz) | LEVEL (dBm) | NOISE LEVEL (dBm) | CHANNEL LEVEL (dBm) | NOISE (dBm/NBW) | SNR (dB)
1 | 193548.265625 | 9.181433 | -52.435926 | 9.18143 | -52.122069 | 61.303502
Showing 1 to 1 of 1 rows

8.2.2 SMSR

The SMSR (Side Mode Suppression Ratio) can be computed between the primary peak and adjacent peaks of lower optical power in the OSA trace.

The following adjacent peak detection methods are available for calculating SMSR:

- Highest peak outside mask
- Highest adjacent peak
- Highest peaks on either side of mask
- Highest adjacent peaks on either side

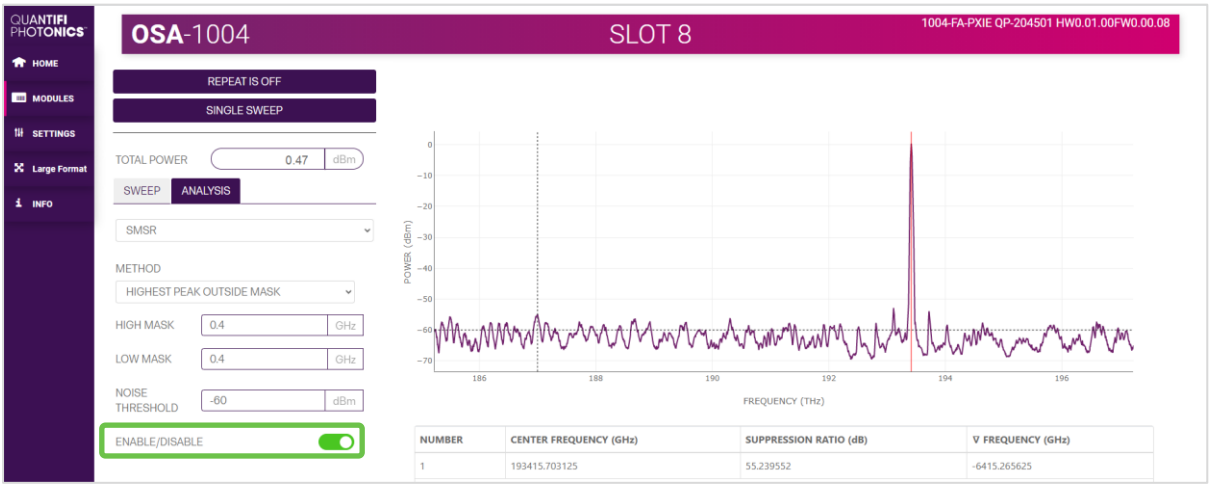
For all the SMSR functions, there are options to set a LOW MASK, HIGH MASK or NOISE THRESHOLD. Each of these parameters can either be set by manually entering a valid number or by using the arrows to increment or decrement to the desired value.

⚠ IMPORTANT

It is important to note that the LOW MASK and HIGH MASK values must be **positive**.

The different SMSR calculation methods are included to allow control over the peak detection constraints. Instances when these methods are beneficial are illustrated in the HIGHEST ADJACENT PEAK and HIGHEST PEAKS ON EITHER SIDE OF MASK methods.

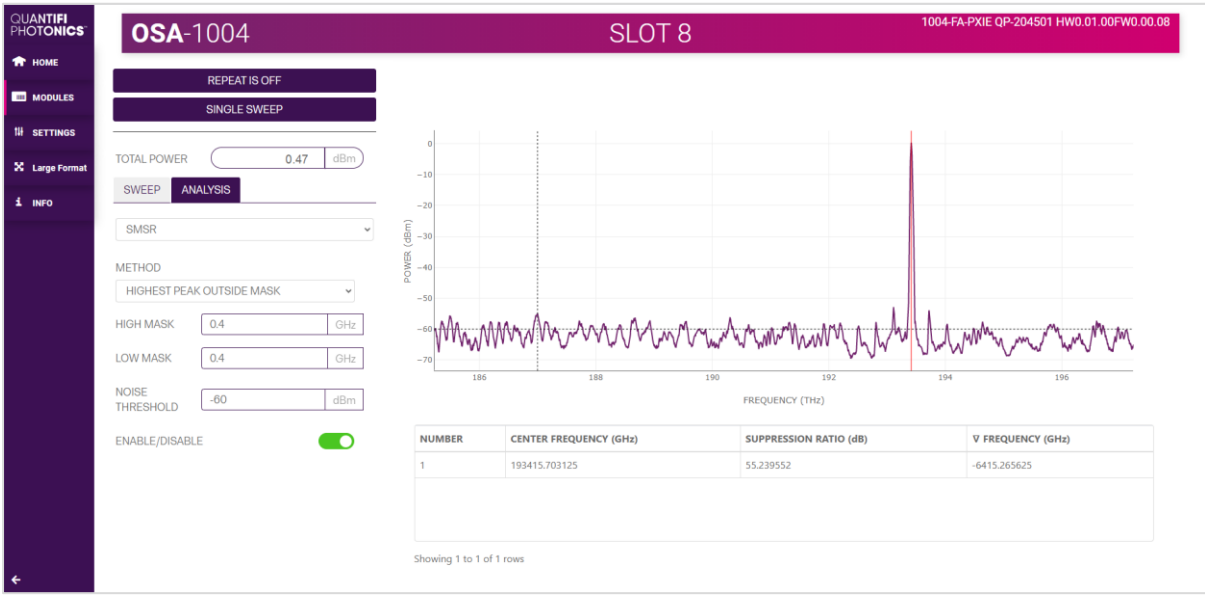
After all parameters have been set, toggle the **ENABLE / DISABLE** button to apply the changes.



8.2.2.1 Highest peak outside mask

This detection mode for SMSR calculation will find the primary peak of highest power. It will then apply a mask either side of this peak, and only detect the highest peak that is outside this mask and above the set NOISE THRESHOLD.

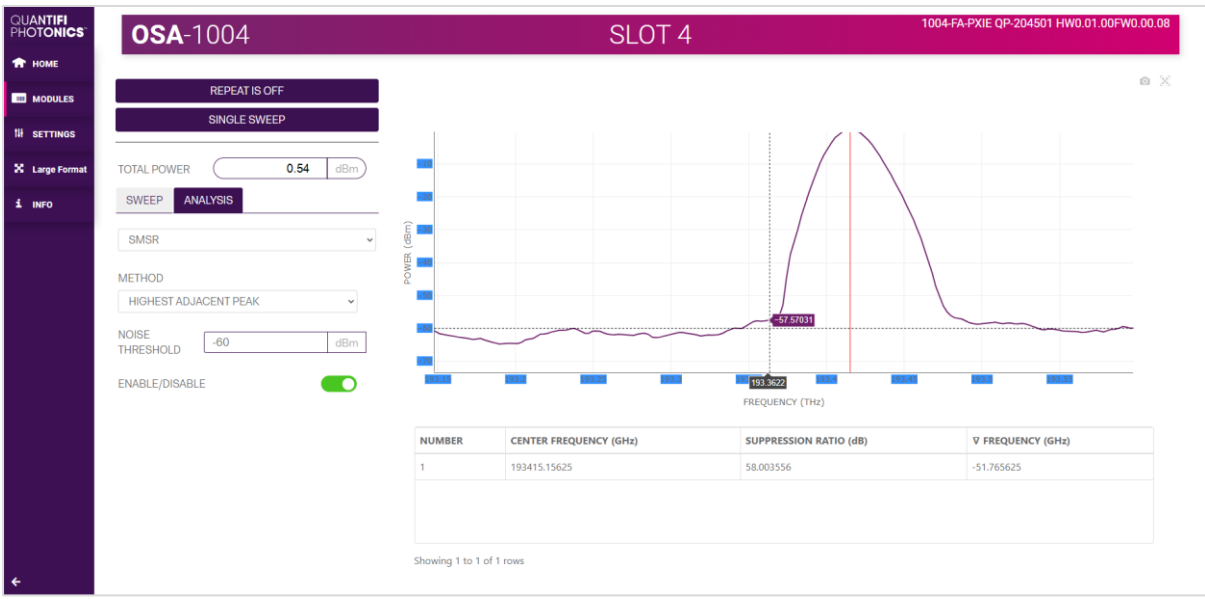
In the example below, the mask has been set to be 400 GHz either side of the primary peak at approximately 193.415 THz (as shown in the CENTER FREQUENCY). The NOISE THRESHOLD has also been moved down to -60 dBm, to facilitate valid peak detection.



8.2.2.2 Highest adjacent peak

This detection mode for SMSR calculation will find the primary peak of highest power. It will then scan and find the closest peak of highest power that is above the set NOISE THRESHOLD.

In the example below, the laser has a secondary peak within the primary mode, at approximately 193.362 THz. This could be a valid side mode that exists very close to the primary mode but could have been missed with a masking method.

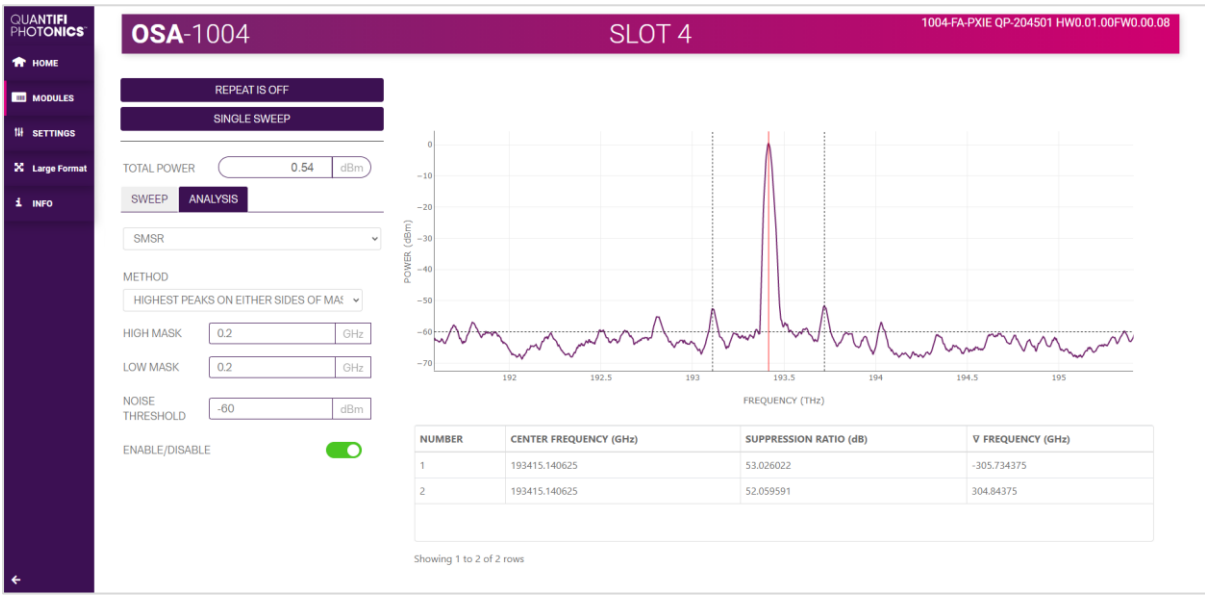


8.2.2.3 Highest peaks on either side of mask

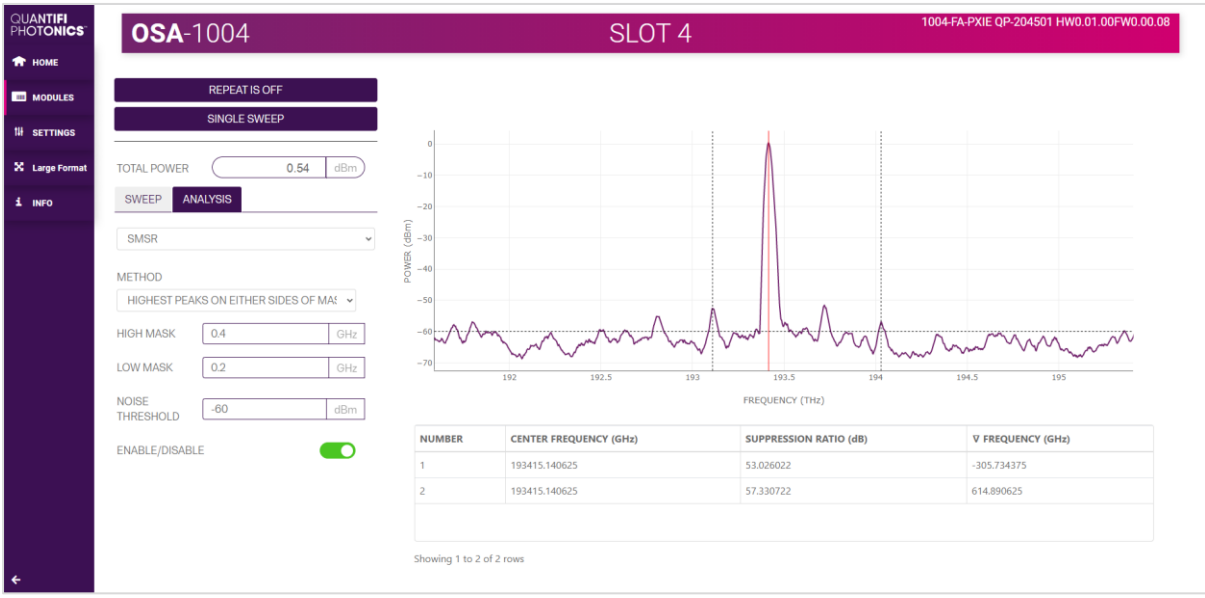
This detection mode for SMSR calculation will find the primary peak of highest power. It will then apply a mask either side of the primary peak and detect the highest peaks on either side of this mask that are also above the set NOISE THRESHOLD.

The benefit of this detection method is the ability to mask out the secondary peak that exists in the primary mode.

In the example below, it detects and calculates the SMSR between the primary peak and the two detected peaks at approximately 193.109 THz and 193.719 THz.

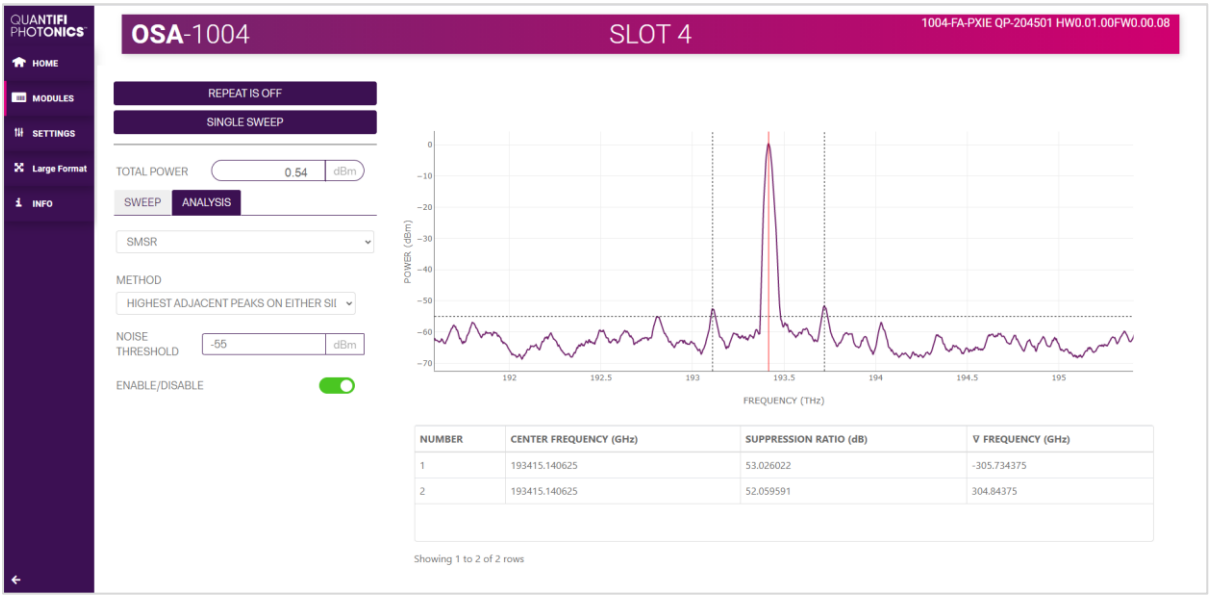


A non-symmetric mask can also be applied with this SMSR method, to facilitate SMSR calculation between other side modes. In the example below, the SMSR is calculated between the peaks at approximately 193.109 THz and 194.030 THz.



8.2.2.4 Highest adjacent peaks on either side

This detection mode for SMSR calculation will find the primary peak of highest power. It will then detect the highest peaks on either side of this primary peak that are also above the set NOISE THRESHOLD.



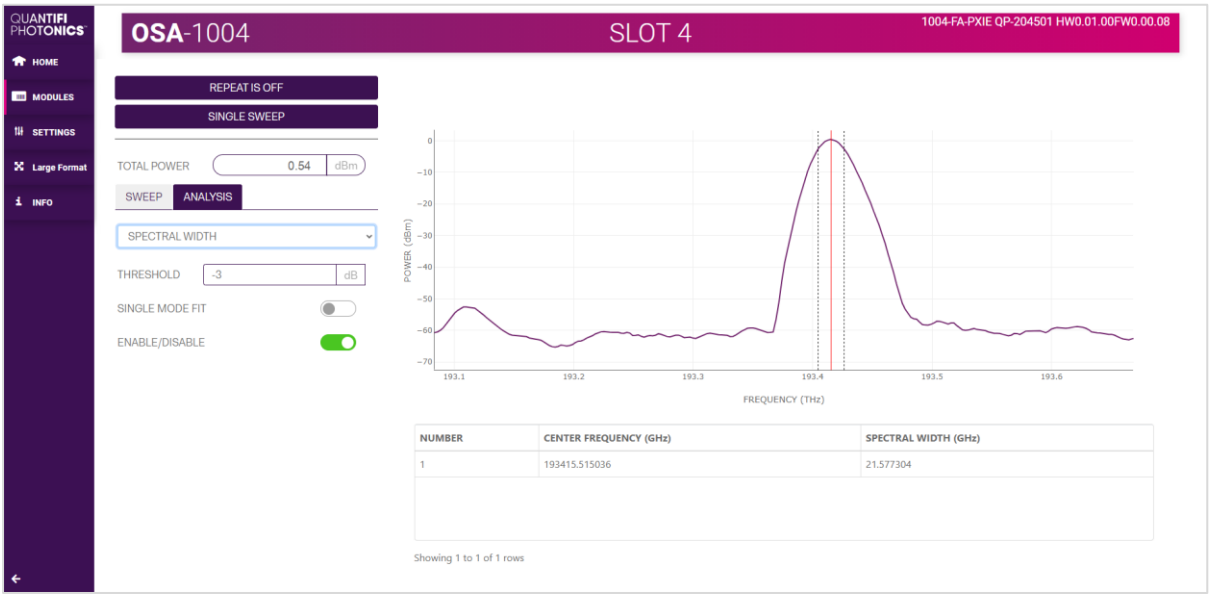
8.2.3 Spectral width

The **SPECTRAL WIDTH** function allows the user to calculate the width of a given peak in the OSA trace.

The **THRESHOLD** value sets how far below the peak power to calculate the spectral width between. This parameter can be entered manually or by using the arrows to increment or decrement the value. **This value must be a negative number.**

In the example below, the THRESHOLD has been set to 30 dB below the peak power value. The spectral width is then calculated as the frequency difference between the two points that are closest to the threshold on either side of the peak power value.

To calculate the SPECTRAL WIDTH, toggle the **ENABLE / DISABLE** button.

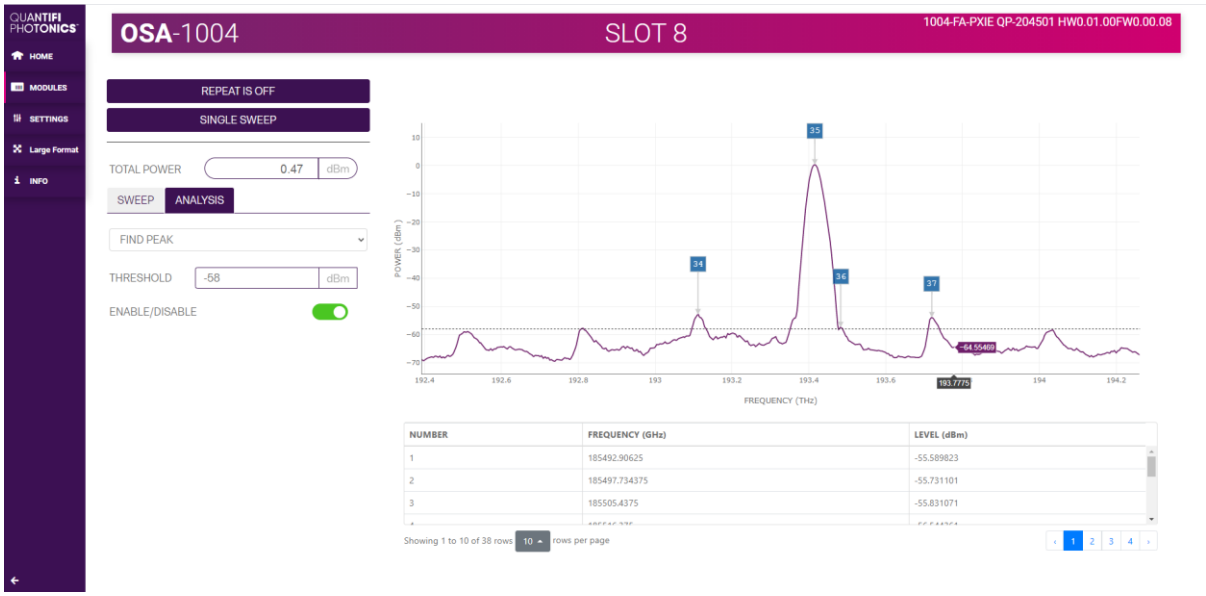


8.2.4 Find Peaks

The **FIND PEAKS** function will detect all valid peaks above a given THRESHOLD level in an OSA trace.

The **THRESHOLD** value is the power level above which all valid peaks will be detected and displayed. This parameter can be entered manually or by using the arrows to increment or decrement the value. If the THRESHOLD is set close to the noise floor of the OSA, more peaks will be detected and displayed.

To calculate and display the peaks, toggle the **ENABLE / DISABLE** button.



9 Programming guide

Introduction

Remote communication with the CohesionSCPI service is achieved through the Standard Commands for Programmable Instruments (SCPI). Support for VISA I/O API over TCP/IP is provided by the VXI-11 compliant CohesionSCPI service. With VISA communication drivers installed on the client, the implementation of VISA programming within environments such as MATLAB becomes available.

This guide provides general information on the commands available to communicate with the CohesionSCPI service remotely using the VISA I/O.

On PXIe modules you can use the SCPI Command Console in CohesionUI (refer 7.6 SCPI Command Console (available on PXIe modules)).

On MATRIQ instruments you can use the SCPI Command Console that you can access from the Cohesion Operator.

> ⚠ **IMPORTANT**
> In NI-MAX a RIO interface will show up, however there are no communication methods available or implemented on this interface. Quantifi Photonics products are **ONLY** accessible through the **VISA TCPIP INSTR** interface provided by the CohesionSCPI service installed on the system.

9.1 Programming conventions

This section details the programming and measurement conventions to follow while executing the commands for the CohesionSCPI service.

Parameter	Default Unit	Alternative Units
Power	DBM	DBM
Frequency	HZ	THZ, GHZ, MHZ, KHZ
Frequency Fine	HZ	THZ, GHZ, MHZ, KHZ
Wavelength	M	NM, PM

Argument	Data Format
`<wsp>`	Specifies whitespace character (01_{16} – 09_{16}, $0B_{16}$ – 20_{16}).
`<value>`	Is numerical data, an integer, a decimal, exponential (10e-9 or 5.8e6) or string
`[VALUE1|VALUE2]`	A parameter choice. The '`|`' separates the unique parameters available, only one of the choices can be used. In the example, either the input parameter `[VALUE1]` or `[VALUE2]` can be used, but not both. Some commands may have more than two choices available. This parameter can be omitted where the command has a default defined in the command description.

9.1.1 Index addressing of modules (slot, source) and units (channel)

When executing commands, it is almost always necessary to provide the index of a specific OSA module or an index of a specific installed unit.

For the commands that require index values:

- <c>: is the chassis index in which the specific blade module is installed; this is an integer, inclusive of 0.
- <n>: is the slot (or source) index of the specific blade module, this is an integer, <1 to 18>
- <m>: is the channel index of a specific unit in the module, this is an integer, <1 to 4>.

Message queues

Information is exchanged in the form of messages. These messages are held in input and output queues. The output queue stores responses to query commands. The CohesionSCPI service transmits any data in the output queue when a read request is received. Unless explicitly specified otherwise in the command description, all output response data is transmitted in ASCII format.

9.2 Common system command summary

Common Commands	Description
`*CLS`	-Clear Status command
`*IDN?`	-Query the chassis identification
`*OPC?`	-Query the Operation Complete Status
`*OPT?`	-Query the modules managed by the CohesionSCPI service
`*ESR?`	-Query the Standard Event Status Register

9.3 Common system command descriptions

Command	`*CLS`
Syntax	`*CLS`
Description	Clear Status command
Parameters	No parameters
Response	No response
Example	`*CLS`

Command	`*ESR?`
Syntax	`*ESR?`
Description	Query the Standard Event Status Register
Parameters	No parameters
Response	Unsigned integer 8 bit value for the register <0 to 255>, as a string. Bit — Description — Decimal Value 7 (MSB) — Not used — 0 6 — Not used — 0 5 — Command Error — 32 4 — Execution Error — 16 3 — Device dependent Error — 8 2 — Not used — 0 1 — Not used — 0 0 (LSB) — Not used — 0
Example	`*ESR? -> 8` `*ESR? -> 32`

⚠ IMPORTANT

It is recommended to use the `*ESR?` command query after every command that is sent to the device. The `*ESR?` query will be able to catch:

- **Device dependent Error** – the device is reporting an error in operation
- **Execution Error** – SCPI was unable to execute the given command
- **Command Error** – SCPI was unable to parse the given command, likely due to an incorrect command

Command	`*IDN?`
Syntax	`*IDN?`
Description	Query the chassis identification
Parameters	No parameters
Response	Comma separated string with the `<manufacturer>,<server name>,<chassis controller name>,<server version>`
Example	`*IDN? -> Quantifi Photonics, CohesionSCPI service,PXIE-8133,FW2.0.15`

Command	`*OPC?`
Syntax	`*OPC?`
Description	Query the Operation Complete Status
Parameters	No parameters
Response	`1` is returned if all the modules installed in the chassis are ready to execute commands `0` is returned if any module installed in the chassis still has a command to execute in the input queue
Example	`*OPC? -> 1`

Command	`*OPT?`
Syntax	`*OPT?`
Description	Query the modules managed by the CohesionSCPI service
Parameters	No parameters
Response	Response will be a comma separated string of the installed modules in the chassis
Example	`*OPT? -> ,LaserPXIe-1002-2-FA,SwitchPXIe-1003-1-FC,,VOAPXIe-1001-2-FA,,,,O2EPXIe-1001-1-FC,,,,,,,,,`

9.4 Specific command summary

Slot commands	Description
:SLOT<n>	
:OPC?	- Query the status of the Operation Complete bit
:TeST?	- Perform a self-test of the module
:ReSeT	- Perform a reset on the device, restoring the module to default values
:OPTions?	- Query the modules installed on the slot
:IDN?	- Query the Identifier for the slot; returns the manufacturer, part number, serial number, hardware and firmware versions
:CHANnel<m>	
:TEMPerature?	- Query the temperature of the installed module
Configuration commands	**Description**
:INITiate<n>	
:CHANnel<m>	
:SWEep	-Initiate the Sweep to populate the data buffer
:SMODe/?	-Set or query the Sweep mode
:SENSe<n>	
:CHANnel<m>	
:WAVelength	
:STARt/?	-Set or query the start wavelength for the wavelength sweep
:STOP/?	-Set or query the stop wavelength for the wavelength sweep
:FREQuency	
:STARt/?	-Set or query the start frequency for the frequency sweep
:STOP/?	-Set or query the stop frequency for the frequency sweep
:SWEep	
:WAVelength?	-Query the wavelength sweep (Y data)
:FREQuency?	-Query the frequency sweep (Y data)
:POINts/?	-Set or query the number of sweep points
:CALCulate<n>	
:CATegory<m>	
:OSNR?	-Query the OSNR measurement of a sweep
:POWer?	-Query the Total Power of a sweep
:SMSR?	-Query the SMSR measurement of a sweep
:SWTHresh?	-Query the Spectral Width of a peak in a sweep
:MARKer<m>	
:MSEarch?	-Query the peak locations of a sweep

9.5 Specific command descriptions

9.5.1 Slot commands

Command	`:SLOT<n>:OPC?`
Syntax	`:SLOT<n>:OPC?`
Description	Query the status of the Operation Complete bit
Parameters	No parameters
Response	`1` is returned if the module is ready to execute a new operation `0` is returned if the module is busy
Example	`:SLOT2:OPC? -> 1`

Command	`:SLOT<n>:TeST?`
Syntax	`:SLOT<n>:TeST?`
Description	Perform a self-test of the module
Parameters	No parameters
Response	1 is returned if self-test reports an error with the module 0 is returned if self-test passed for the module
Example	`:SLOT1:TST? -> 0`

Command	`:SLOT<n>:ReSeT`
Syntax	`:SLOT<n>:ReSeT`
Description	Perform a reset on the device, restoring the module to default values
Parameters	No parameters
Response	No response
Example	`:SLOT1:RST`

Command	`:SLOT<n>:OPTions?`
Syntax	`:SLOT<n>:OPTions?`
Description	Query the modules installed on the slot
Parameters	No parameters
Response	The response will be a comma separated string of detectors installed in the OSAPXIe. If a module is not installed in a channel, it will not return any identification string
Example	`:SLOT2:OPT? -> 1,1,,`

Command	`:SLOT<n>:IDN?`
Syntax	`:SLOT<n>:IDN?`
Description	Query the Identifier for the slot; returns the manufacturer, part number, serial number, hardware and firmware versions
Parameters	No parameters
Response	Comma separated string containing the `<manufacturer>, <part number>, <serial number>,<hardware version><firmware version>`
Example	`:SLOT2:IDN? -> Quantifi Photonics,LaserPXIe-1002-2-FA,QuantifiPhotonics-192001,HW1.0FW1.02` Hardware and firmware versions are not separated by a comma

Command	`:SLOT<n>:CHANnel<m>:TEMPerature?`
Syntax	`:SLOT<n>:CHANnel<m>:TEMPerature?<wsp>[MIN|MAX|ACT|ALL]`
Description	Query the OSA temperature
Parameters	MIN: Returns the minimum temperature of the module MAX: Returns the maximum temperature of the module ACT: Returns the actual temperature of the module ALL: Returns all the above values in a comma separated string
Response	Depending on the parameters, the response will be a string, or a comma separated string of values
Example	`:SLOT1:CHANnel1:TEMP? ALL -> 5.0,60.0,17.1`

9.5.2 Configuration commands

Command	`:INITiate<n>:CHANnel<m>:SWEep`
Syntax	`:INITiate<n>:CHANnel<m>:SWEep`
Description	Initiate the Sweep to populate the data buffer
Parameters	No parameters
Response	No response
Example	`:CONT1:CHANnel1:SWE`

Command	`:INITiate<n>:CHANnel<m>:SMODe`
Syntax	`:INITiate<n>:CHANnel<m>:SMODe<wsp>[DEF|REPeat|SINGLe]`
Description	Set the Sweep mode
Parameters	DEF: sets the sweep mode to the default (SINGLE) REPeat: sets the sweep mode to a REPEAT sweep SINGLe: sets the sweep mode to a SINGLE sweep
Response	No response
Example	`:INIT1:CHANnel1:SMOD REP`

Command	`:INITiate<n>:CHANnel<m>:SMODe?`
Syntax	`:INITiate<n>:CHANnel<m>:SMODe?<wsp>[DEF|LIST|SET|ALL]`
Description	Query the Sweep mode
Parameters	DEF: Returns the default sweep mode LIST: Returns a comma separated list of the supported sweep modes SET: Returns the set sweep mode ALL: Returns all the above values in a comma separated list
Response	Depending on the parameters, the response will be a string, or a comma separated string of values.
Example	`:INIT1:CHANnel1:SMOD? -> REPEAT`

Command	`:SENSe<n>:CHANnel<m>:WAVelength:STARt`
Syntax	`:SENSe<n>:CHANnel<m>:WAVelength:STARt<wsp>[MIN|MAX|DEF|<value>]`
Description	Set the start wavelength for the wavelength sweep
Parameters	MIN: Sets the start wavelength to the minimum wavelength value MAX: Sets the start wavelength to the maximum wavelength value DEF: Sets the start wavelength to the default wavelength value <value>: Sets the start wavelength to the user defined value (default units of nm)
Response	No response
Example	`:SENS1:CHANnel1:WAV:STAR 1520`

Command	`:SENSe<n>:CHANnel<m>:WAVelength:STARt?`
Syntax	`:SENSe<n>:CHANnel<m>:WAVelength:STARt?<wsp>[MIN|MAX|DEF|SET]`
Description	Query the start wavelength for the wavelength sweep
Parameters	MIN: Returns the minimum start wavelength value MAX: Returns the maximum start wavelength value DEF: Returns the default start wavelength value SET: Returns the set start wavelength value (default units of nm)
Response	Depending on the parameters, the response will be a string, or a comma separated string of values.
Example	`:SENS1:CHANnel1:WAV:STAR? SET -> 1520.006784`

Command	`:SENSe<n>:CHANnel<m>:WAVelength:STOP`
Syntax	`:SENSe<n>:CHANnel<m>:WAVelength:STOP<wsp>[MIN|MAX|DEF|<value>]`
Description	Set the stop wavelength for the wavelength sweep
Parameters	MIN: Sets the stop wavelength to the minimum wavelength value MAX: Sets the stop wavelength to the maximum wavelength value DEF: Sets the stop wavelength to the default wavelength value <value>: Sets the stop wavelength to the user defined value (default units of nm)
Response	No response
Example	`:SENS1:CHANnel1:WAV:STOP 1600`

Command	`:SENSe<n>:CHANnel<m>:WAVelength:STOP?`
Syntax	`:SENSe<n>:CHANnel<m>:WAVelength:STOP?<wsp>[MIN|MAX|DEF|SET]`
Description	Query the stop wavelength for the wavelength sweep
Parameters	MIN: Returns the minimum stop wavelength value MAX: Returns the maximum stop wavelength value DEF: Returns the default stop wavelength value SET: Returns the set stop wavelength value (default units of nm)
Response	Depending on the parameters, the response will be a string, or a comma separated string of values.
Example	`:SENS1:CHANnel1:WAV:STOP? SET -> 1600.002444`

Command	`:SENSe<n>:CHANnel<m>:FREQuency:STARt`
Syntax	`:SENSe<n>:CHANnel<m>:FREQuency:STARt<wsp>[MIN|MAX|DEF|<value>]`
Description	Set the start frequency for the frequency sweep
Parameters	MIN: Sets the start frequency to the minimum frequency value MAX: Sets the start frequency to the maximum frequency value DEF: Sets the start frequency to the default frequency value <value>: Sets the start frequency to the user defined value (default units of GHz)
Response	No response
Example	`:SENS1:CHANnel1:FREQ:STAR 186000`

Command	`:SENSe<n>:CHANnel<m>:FREQuency:STARt?`
Syntax	`:SENSe<n>:CHANnel<m>:FREQuency:STARt?<wsp>[MIN|MAX|DEF|SET]`
Description	Query the start frequency for the frequency sweep
Parameters	MIN: Returns the minimum start frequency value MAX: Returns the maximum start frequency value DEF: Returns the default start frequency value SET: Returns the set start frequency value (default units of GHz)
Response	Depending on the parameters, the response will be a string, or a comma separated string of values.
Example	`:SENS1:CHANnel1:FREQ:STAR? SET -> 186000`

Command	`:SENSe<n>:CHANnel<m>:FREQuency:STOP`
Syntax	`:SENSe<n>:CHANnel<m>:FREQuency:STOP<wsp>[MIN|MAX|DEF|<value>]`
Description	Set the stop frequency for the frequency sweep
Parameters	MIN: Sets the stop frequency to the minimum frequency value MAX: Sets the stop frequency to the maximum frequency value DEF: Sets the stop frequency to the default frequency value <value>: Sets the stop frequency to the user defined value (default units of GHz)
Response	No response
Example	`:SENS1:CHANnel1:FREQ:STOP 191000`

Command	`:SENSe<n>:CHANnel<m>:FREQuency:STOP?`
Syntax	`:SENSe<n>:CHANnel<m>:FREQuency:STOP?<wsp>[MIN|MAX|DEF|SET]`
Description	Query the stop frequency for the frequency sweep
Parameters	MIN: Returns the minimum stop frequency value MAX: Returns the maximum stop frequency value DEF: Returns the default stop frequency value SET: Returns the set stop frequency value (default units of GHz)
Response	Depending on the parameters, the response will be a string, or a comma separated string of values.
Example	`:SENS1:CHANnel1:FREQ:STOP? SET -> 191000`

Command	`:SENSe<n>:CHANnel<m>:SWEep:WAVelength?`
Syntax	`:SENSe<n>:CHANnel<m>:SWEep:WAVelength?[<wsp><X|Y|FULL>]`
Description	Query the wavelength sweep (Y data)
Parameters	X Returns the array of wavelength data Y Returns the array of power FULL Returns both arrays of wavelength data and power
Response	A comma separated string with the <wavelength data>, <power>, <number of points>, <sweep data>.

Example	`:SENS1:CHANnel1:SWE:WAV? ->`
	`1520.006784, 1600.002444, 10, -67.304688,-67.007813,-67.910156,-68.132813,-67.324219,-66.691406,-67.230469,`
	`-67.277344,-67.230469,-67.265625`
	`:SENSE12:CHANnel12:SWEEP:WAV? X ->`
	`10,1522.051816,1530.335876,1538.710604,1547.177498,1555.738087,1564.393935,1573.146642,1581.997841,1590.949205,1600.002444'In`
	`:SENSE12:CHANnel12:SWEEP:WAV? Y ->`
	`10,-62.019531,-52.089844,-50.312500,-55.757813,-51.796875,-47.878906,-48.628906,-55.117188,-45.941406,-44.242188`
	`:SENSE12:CHANnel12:SWEEP:WAV? FULL ->`
	`10,X,1522.051816,1530.335876,1538.710604,1547.177498,1555.738087,1564.393935,1573.146642,1581.997841,1590.949205,1600.002444,Y,-62.019531,-52.089844,-50.312500,-55.757813,-51.796875,-47.878906,-48.628906,-55.117188,-45.941406,-44.242188'`

Command	`:SENSe<n>:CHANnel<m>:SWEep:FREQuency?`
Syntax	`:SENSe<n>:CHANnel<m>:SWEep:FREQuency?[<wsp><X|Y|FULL>]`
Description	Query the frequency sweep (Y data)
Parameters	X Returns the array of frequency data Y Returns the array of power FULL Returns both arrays of frequency data and power
Response	A comma separated string with the <frequency data>, <power>, <number of points>, <sweep data>.

Example	`:SENS1:CHANnel1:SWE:FREQ? -> 186000, 191000, 10, -76.867188,-76.878906,-76.300781,-75.781250,-75.949219,-75.800781,-75.914063,-75.953125,-75.617188,-75.007813,-74.457031`
	`:SENSE12:CHANnel12:SWEEP:FREQ? X -> 10,187370.000000,188436.222222,189502.444444,190568.666667,191634.888889,192701.111111,193767.333333,194833.555556,195899.777778,196966.000000`
	`:SENSE12:CHANnel12:SWEEP:FREQ? Y -> 10,-44.242188,-45.941406,-55.117188,-48.628906,-47.878906,-51.796875,-55.757813,-50.312500,-52.089844,-62.019531`
	`:SENSE12:CHANnel12:SWEEP:FREQ? FULL -> 10,X,187370.000000,188436.222222,189502.444444,190568.666667,191634.888889,192701.111111,193767.333333,194833.555556,195899.777778,196966.000000,Y,-44.242188,-45.941406,-55.117188,-48.628906,-47.878906,-51.796875,-55.757813,-50.312500,-52.089844,-62.019531'`

Command	`:SENSe<n>:CHANnel<m>:SWEep:POINts`
Syntax	`:SENSe<n>:CHANnel<m>:SWEep:POINts<wsp>[MIN|MAX|DEF|<value>]`
Description	Set the number of sweep points
Parameters	MIN: Sets the minimum number of sweep points MAX: Sets the maximum number of sweep points DEF: Sets the default number of sweep points <value>: Sets the number of sweep points to the user defined value
Response	No response
Example	`:SENS1:CHANnel1:SWE:POIN 1000`

Command	`:SENSe<n>:CHANnel<m>:SWEep:POINts?`
Syntax	`:SENSe<n>:CHANnel<m>:SWEep:POINts?<wsp>[MIN|MAX|DEF|SET]`
Description	Set the number of sweep points
Parameters	MIN: Returns the minimum number of sweep points MAX: Returns the maximum number of sweep points DEF: Returns the default number of sweep points SET: Returns the number of sweep points to the user defined value
Response	Depending on the parameters, the response will be a string, or a comma separated string of values.
Example	`:SENS1:CHANnel1:SWE:POIN? -> 1000`

Command	`:CALCulate<n>:CATegory<m>:OSNR?`
Syntax	`:CALCulate<n>:CATegory<m>:OSNR?<wsp><PTH>,<IBW>,<NOISE>,<MASK>,<NBW>,<SBW>`
Description	Query the OSNR measurement of a sweep
Parameters	PTH: The power threshold above which peaks should be detected (units of dBm) IBW: The integration bandwidth for power calculation of each detected peak (units of GHz) NOISE: The noise area, centered at the peak. The OSA rejects any side peaks in this area. (units of GHz) MASK: The mask area, centered at the peak. The OSA will exclude this area from OSNR callculations (units of GHz) NBW: Noise resolution bandwidth (units of nm) SBW: Signal resolution bandwidth (units of nm)
Response	A comma separated string containing <peak number>,<peak frequency>, <peak power>,<noise power>,<channel power>,<noise power per NBW>,<SNR>. <peak frequency> in units of GHz <peak power> in units of dBm <noise power> in units of dBm <channel power> in units of dBm <noise power per NBW> in units of dBm/NBW <SNR> in units of dB
Example	`:CALC2:CAT1:OSNR? -30,0.5,0,0,0,0 -> 1,193542.578125,-12.710617,-66.198472,-12.710636,-66.198472,53.487855`

Command	`:CALCulate<n>:CATegory<m>:POWer?`
Syntax	`:CALCulate<n>:CATegory<m>:POWer?`
Description	Query the Total Power of a sweep
Parameters	No parameters
Response	A string of the value representing total calculated optical power in units of dBm.
Example	`:CALC2:CAT1:POW? -> -5.3265`

Command	`:CALCulate<n>:CATegory<m>:SMSR?`
Syntax	`:CALCulate<n>:CATegory<m>:SMSR?<wsp><MTH>,<MSH>,<MSL>,<PTH>` `:CALCulate<n>:CATegory<m>:SMSR?<wsp><MTH>,<PTH>`
Description	Query the SMSR measurement of a sweep
Parameters	<MTH>: The SMSR method to base the calculation on. Valid options are: 1. Highest peak outside mask 2. Highest adjacent peak 3. Highest peaks on either sides of mask 4. Highest adjacent peaks on either sides of mask <MSH>: The maximum frequency location of the mask in THz <MSL>: The minimum frequency location of the mask in THz <PTH>: The power threshold above which peaks should be detected (units of dBm)
Response	A comma separated string containing the <peaks>,<center freq GHz>,<suppression ratio dB>,<delta freq GHz>

Example	`:CALC12:CAT1:SMSR? 1,0,0,-50 ->`
	`1,193409.171875,50.379475,-304.25`
	`:CALC12:CAT1:SMSR? 2,-50 ->`
	`1,193409.171875,50.379475,-304.25`
	`:CALC12:CAT1:SMSR? 3,0,0,-50 ->`
	`1,193409.171875,50.379475,-304.25`
	`2,193409.171875,52.401028,303.875`
	`:CALC12:CAT1:SMSR? 4,-50 ->`
	`1,193409.171875,50.379475,-304.25`
	`2,193409.171875,52.401028,303.875`

Command	`:CALCulate<n>:CATegory<m>:SWTHresh?`
Syntax	`:CALCulate<n>:CATegory<m>:SWTHresh?<wsp><FIT>,<PTH>[DBM]`
Description	Query the Spectral Width of a peak in a sweep
Parameters	<FIT>: Enable (1) or disable (0) single mode fit. <PTH> The power threshold below the peak power at which the spectral width should be calculated (units of dB).
Response	A comma separated string containing the <peak frequency>,<spectral width>. <peak frequency> in units of GHz <spectral width> in units of GHz
Example	`:CALC2:CAT1:SWTH? 0,-3 -> 193542.664143,20.940859`

Command	`:CALCulate<n>:MARKer<m>:MSEarch?`
Syntax	`:CALCulate<n>:MARKer<m>:MSEarch? <PTH>`
Description	Query the peak locations of a sweep
Parameters	<PTH>: The power threshold above which to register a peak (units of dBm)
Response	A comma separated string containing the <number of peaks>,<peak frequency locations>,<peak powers>. <peak frequency locations> a comma separated string of all peaks above the specified power threshold in ascending value order. <peak powers> a comma separated string of each recorded peak's corresponding optical power in units of dBm.
Example	`:CALC2:MARK1:MSE? -58 -> 3,185641.921875,185648.765625,193542.796875,-57.020798,-56.928300,-11.050784`

9.6 OSA 1000 PXIe Multi Chassis mode operation

Multiple chassis can be connected to operate in **Multi Chassis Mode.** To operate in Multi Chassis Mode, **CohesionSCPI service must be version 1.02.06** or later.

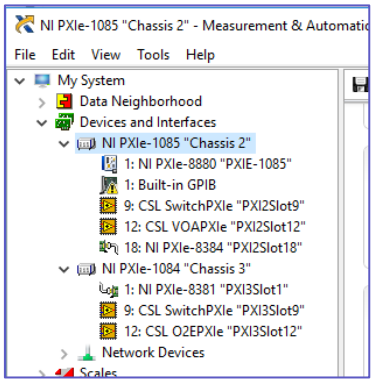
9.6.1 NI-MAX application Multi Chassis mode

⚠ IMPORTANT

The CohesionSCPI service does not manage the chassis numbers. These are controlled by the NI Platform Services (and through NI-MAX).

Even if the CohesionSCPI service is in Multi Chassis mode, if a chassis is connected but has no installed modules, it will not show up when **`*OPT?`** is run.

In the example shown below, there are two chassis connected via the PXIe-8384 to PXIe-8381 connection. Chassis #2 has the controller running CohesionSCPI service, and Chassis #3 is the 'extended' chassis.



9.6.2 SCPI Multi Chassis commands

⚠ IMPORTANT

Changing the CohesionSCPI service Chassis Mode will rediscover all Chassis and installed modules.

Command	`:SYSTEM:CHASSIS?`
Syntax	`:SYSTEM:CHASSIS?<wsp>[LIST|MODE]`
Description	Query the Chassis Mode configuration
Parameters	No parameters
Response	**`LIST`**: Returns a comma separated list of valid chassis index numbers discovered by the CohesionSCPI service. These are chassis that have modules installed **`MODE`**: Returns the current Chassis Mode the CohesionSCPI service is operating in (`SINGLE` or `MULTI`) **`None`**: Returns the number of chassis managed by the CohesionSCPI service. If operating in SINGLE mode, this will always return `1`

Example	In Single chassis mode:
	`:SYSTEM:CHASSIS? -> 1`
	`:SYSTEM:CHASSIS? LIST -> 0`
	`:SYSTEM:CHASSIS? MODE -> SINGLE`
	In Multi chassis mode:
	`:SYSTEM:CHASSIS? -> 2`
	`:SYSTEM:CHASSIS? LIST -> 2,3`
	`:SYSTEM:CHASSIS? MODE -> MULTI`

Command	`:SYSTEM:CHASSIS`
Syntax	`:SYSTEM:CHASSIS<wsp>[SINGLE|MULTI]`
Description	Set the Chassis Mode configuration
Parameters	**SINGLE**: Set CohesionSCPI service to operate in SINGLE Chassis Mode **MULTI**: Set CohesionSCPI service to operate in MULTI Chassis Mode
Response	No response
Example	`:SYSTEM:CHASSIS SINGLE`

In Multi chassis mode, all the commands given above in the Specific Command Summary will still work, but they must be prefixed with `:CHASSIS<c>`.

Common command example:

Single Chassis Mode	`:SLOT2:IDN?`
Multi Chassis Mode	`:CHASSIS1:SLOT2:IDN?`

Specific command example:

Single Chassis Mode	`:SOUR2:CHAN2:POW? MAX`
Multi Chassis Mode	`:CHASSIS1 SOUR2:CHAN2:POW? MAX`

9.7 SCPI Command Console (available on MATRIQ instruments)

The SCPI Command Console enables you to communicate with Quantifi Photonics devices via SCPI commands. You can easily test commands and verify their syntax.

NOTE

For available SCPI commands, refer to the user manual of the Quantifi Photonics device you are communicating with.

NOTE

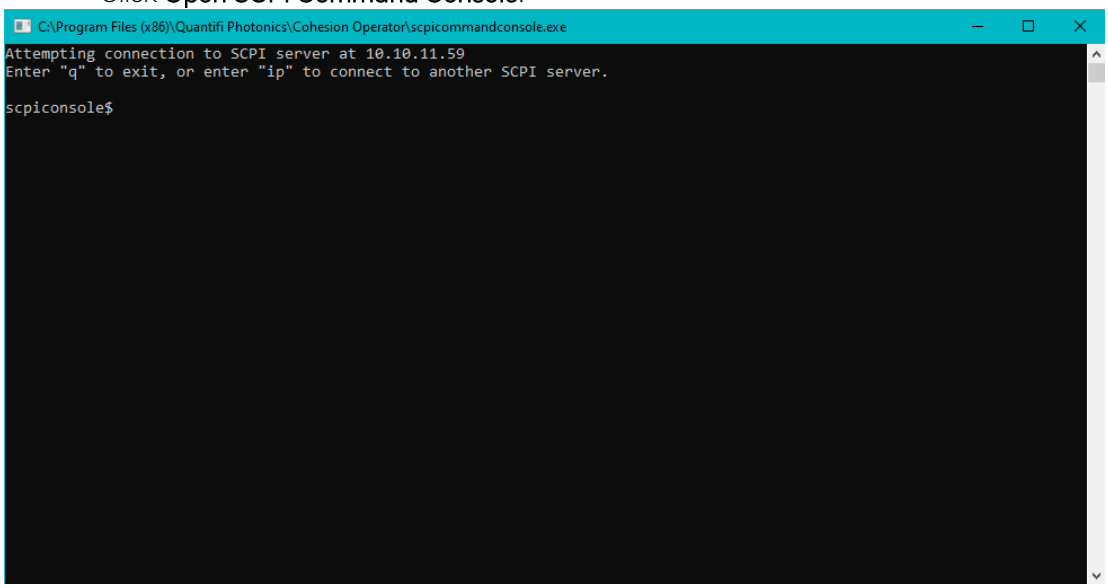
The two most common error codes are:

17: IO write error: the command was invalid or not accepted by the instrument.

15: IO timeout: there was no response available before expiry of the reading wait time.

To open the SCPI Command Console:

- Open the Cohesion Operator, for example by double-clicking the **Cohesion Operator** desktop icon.
- Select the instrument by entering its **IP address** or by selecting it from the **Discovery** drop down list.
- Click **Open SCPI Command Console**.



1. To verify that you are communicating with the right device:

- Enter **`*idn?`** and press <ENTER>.
- The device will return identification details.

2. To switch to another Quantifi Photonics device:

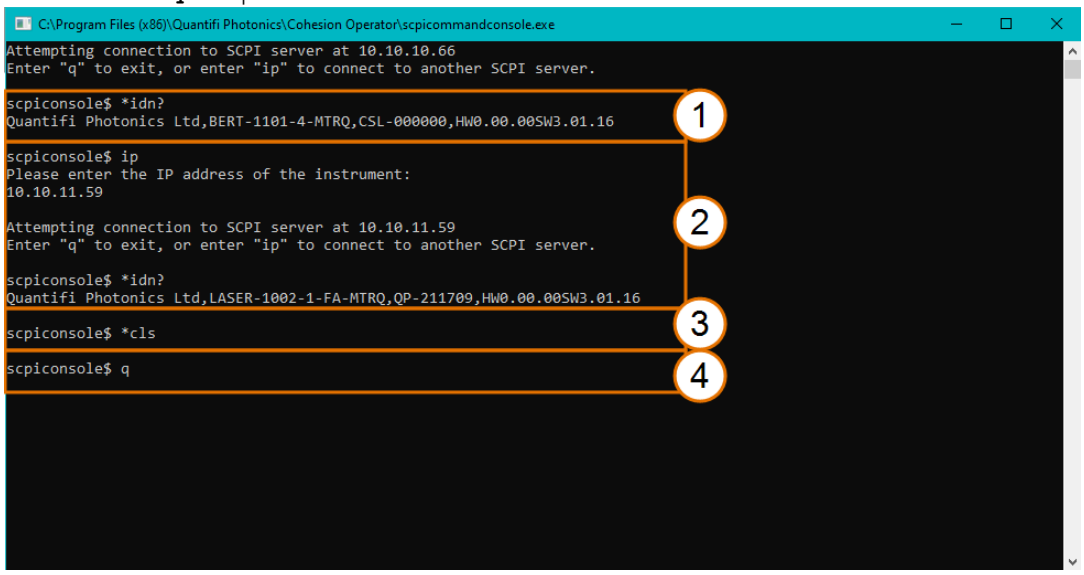
- Enter **`ip`** and press <ENTER>.
- Enter the IP address of the Quantifi Photonics product you would like to switch to and press <ENTER>.
- Confirm you are communicating with the right product: Enter **`*idn?`** and press <ENTER>.
  The device will return identification details.

3. To send a command or query to a Quantifi Photonics device:

- Enter a command and press <ENTER>.
- The device will execute the command and return an action response to the console if applicable.

4. To exit the SCPI Command Console:

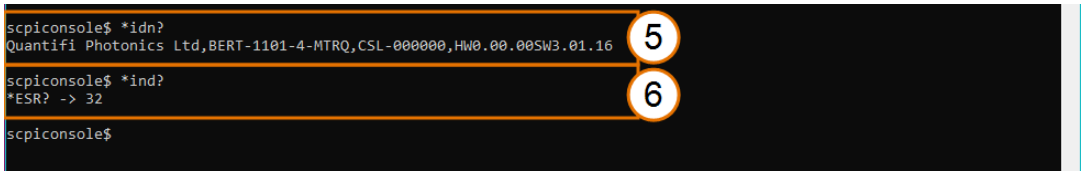
- Enter **`q`** and press <ENTER>.



Example: Send instrument identification query **`*idn?`**

5. Enter the command: **`*idn?`**
   The instrument returns the requested information.

6. If you enter the command incorrectly, for example: **`*ind?`**
   The instrument returns error code 32.
   For details on error codes, please refer to the `*ESR?` Command.



Example: Send a WRITE only command

7. Enter a command correctly, for example: **`*cls`**
   The instrument executes the command, there will be no action response.

8. Enter the command incorrectly: **`*csl`**
   The instrument returns error code 17: IO write error.

10 Example: Control of an OSA 1000 Series with SCPI

The following is a simple example of how to control the OSA 1000 Series using SCPI commands. See the previous section for specific details and extra parameters that the listed commands accept.

After any command, it is recommended to query the `*ESR?` command. This will allow debugging of unreceived or incorrect commands that were sent to the product.

Identifying the OSA product:

1. Query to confirm the correct instrument/PXIe chassis is setup
   `:*IDN?`
2. Query the available instrument module configuration
   `:*OPT?`
3. Query the identification information for a specific slot module
   `:SLOT3:IDN?`

Configuring the OSA product:

1. Set the start and stop frequency sweep values to MINIMUM and 195.0 THz
   `:SENSe3:CHANnel1:FREQuency:STARt MIN`
   `:SENSe3:CHANnel1:FREQuency:STOP 195THZ`
2. Set the number of sweep points
   `:SENSe3:CHANnel1:SWEep:POINts 4000`
3. Set the sweep mode to single, so that a single spectrum is captured once SWEep is executed
   `:INITiate3:CHANnel1:SMODe SINGLe`

Querying the OSA product configuration values:

1. Query the set start and stop frequency sweep values
   `:SENSe3:CHANnel1:FREQuency:STARt?`
   `:SENSe3:CHANnel1:FREQuency:STOP?`
2. Query the set number of sweep points
   `:SENSe3:CHANnel1:SWEep:POINts?`
3. Query the set sweep mode
   `:INITiate3:CHANnel1:SMODe?`

Initiating an OSA sweep and querying the sweep data:

1. Initiate the sweep to populate the data buffer
   `:INITiate3:CHAN1:SWEep`
2. Query the sweep data, with the x values as frequencies
   `:SENSe3:CHAN1:SWEep:FREQuency?`

Using the analysis functions on an OSA trace

1. Query the total optical power in the OSA trace
   `:CALCulate3:CATegory1:POWer?`
2. Find all peaks in the OSA trace above -35 dBm in power
   `:CALCulate3:MARKer1:MSEarch? -35DBM`

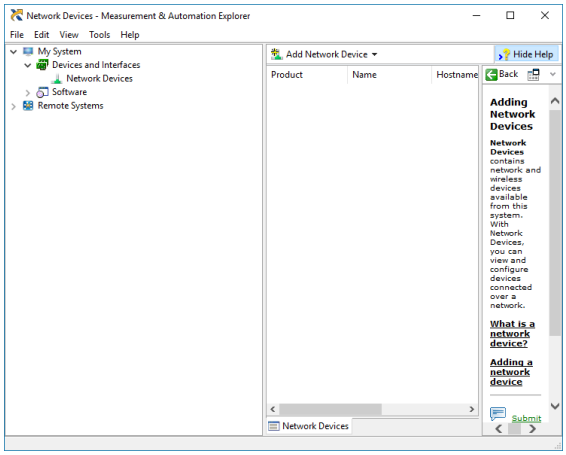
⚠ IMPORTANT

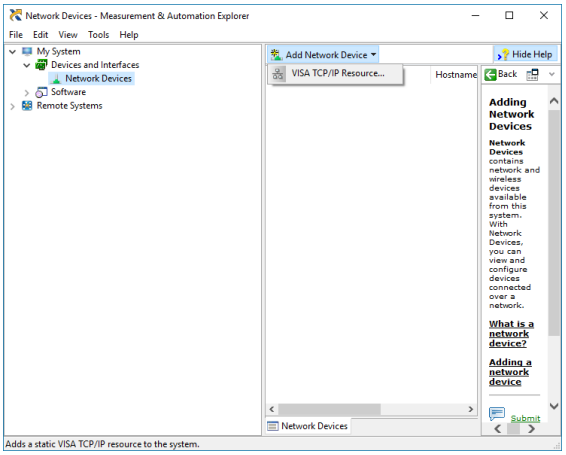
The following section details the various methods that a user may send these commands to an OSA 1000 Series product via **SCPI** commands.

10.1 NI-MAX application

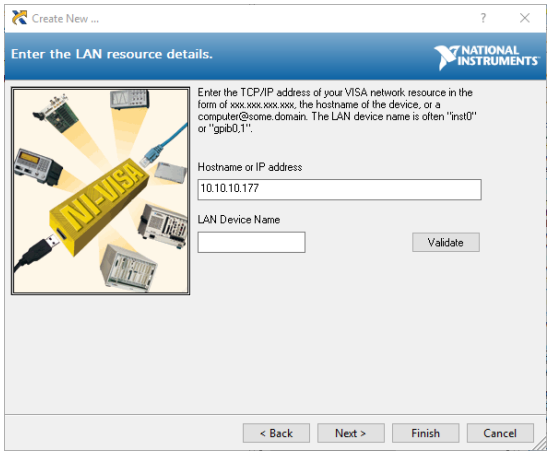
To communicate with any Quantifi Photonics PXIe or MATRIQ product, the chassis / instrument must first be setup as a TCP/IP instrument.

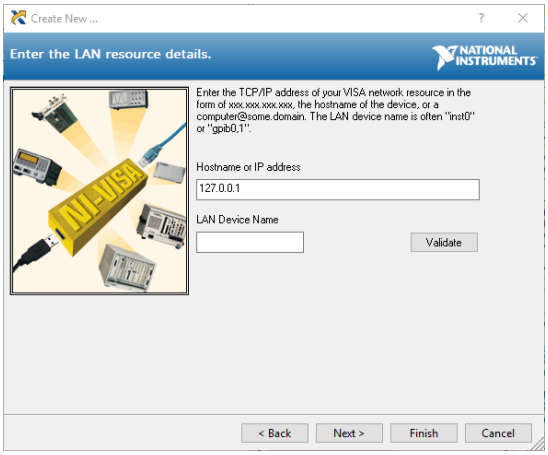
1. After installing NI-MAX, launch the application. In the left side panel of the window, click the **Devices and Interfaces** option. A drop down of available instruments detected will show up.
2. Click on **Network Devices**, then click **Add Network Devices** and select **VISA TCP/IP Resource**.





3. Select **Manual Entry of LAN Instrument**. Enter in the Hostname or IP Address. The top image is an example of operating remotely, the bottom image is an example of operating locally. Note when operating locally, enter in the localhost IP address of **127.0.0.1**. Click **Finish** to end the setup process.

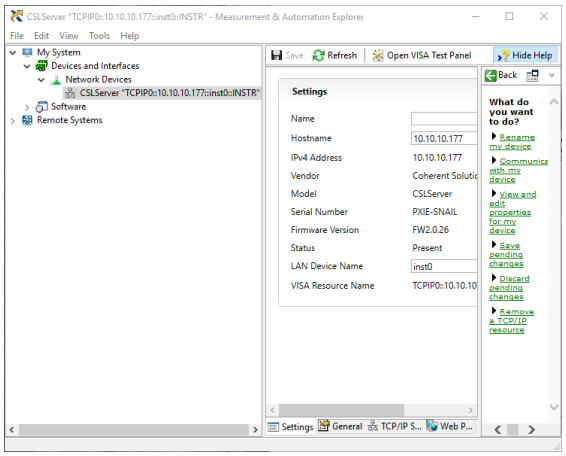




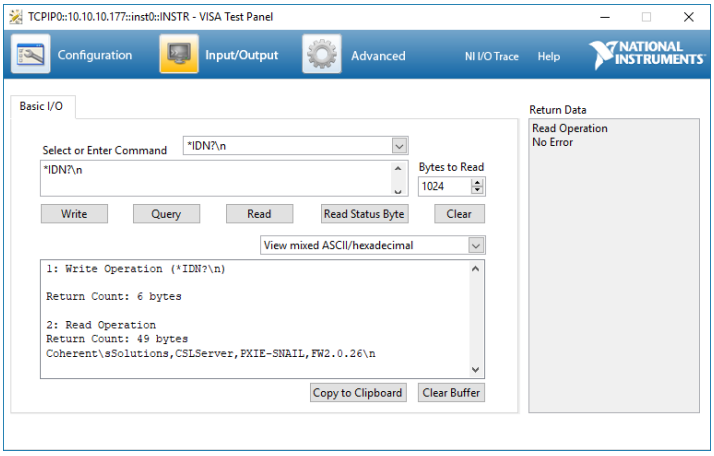
10.2 NI-VISA application

NI-VISA is used to communicate with the PXIe chassis or installed modules / instruments. The above steps must be completed before attempting to communicate using NI-VISA.

1. Launch NI-MAX. In the left-hand side menu, select an Instrument from the **Network Devices** list.



2. On the righthand side panel, select **Open VISA Test Panel**. A new window will popup. Click the **Input / Output** button from the window menu.
   Valid chassis and module commands can be entered in, and their returns queried.



10.3 Python® 2.7 code example

The following example shows how to communicate with an OSA product using Python code. For a list of supported and valid SCPI commands, refer to the **Programming Guide**.

```
# You can get VXI11 from pip:
# pip install python-vxi11==0.9
import vxi11
from vxi11.vxi11 import Vxi11Exception
# replace this with the IP of your device
ip = "127.0.0.1"
try:
        print("connecting to " + ip + " ... ")
        instrument = vxi11.Instrument(ip)
        print("connected")
        print("checking IDN...")
        command = "*IDN?"
        data = instrument.ask(command)
        print("IDN: " + data)
        print("checking OPT...")
        command = "*OPT?"
        data = instrument.ask(command)
        print("OPT: " + data)
        # replace this with a valid command for your device (read # the
        programming guide section for examples)
        command = ""
        print("writing a specific command")
        instrument.write(command)
        print("checking ESR")
        command = "*ESR?"
        data = instrument.ask(command)
        print("*ESR?: " + data)
except Vxi11Exception as e:
        # pass
        print("ERROR" + str(e) + ", command: " + str(command))
```

10.4 MATLAB® code example

To communicate with an OSA product in MATLAB® the installation of a VISA IO driver is required. These drivers enable the creation of the Interface Object for instrument communication.

If developing locally on the OSA Platform, then these will already be installed. However, if development is on a remotely connected system the VISA Libraries, e.g. National Instruments NI-VISA will have to be installed.

> ⚠ **IMPORTANT**
> MATLAB 2010x or later with the Instrument Control Toolbox is required to execute the code detailed in this section.

The following example shows how to communicate with an OSA product using MATLAB code. For a list of supported and valid SCPI commands, refer to the **Programming Guide**.

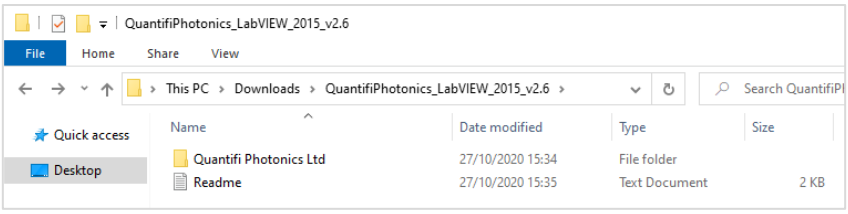
```
% Find a VISA-TCPIP object. This is if the VISA object has already been
% created with tmtool or has been removed from the workspace without
% first being closed (cleanly disconnected).
PXIE_Chassis = instrfind('Type', 'visa-tcpip', ...
       'RsrcName', 'TCPIP0::10.10.10.89::inst0::INSTR', 'Tag', '');
% Create the 'agilent' VISA-TCPIP object if it does not exist
% otherwise use the object that was found.
if isempty(PXIE_Chassis)
       PXIE_Chassis = visa('agilent', 'TCPIP0::10.10.10.89::inst0::INSTR');
else
       fclose(PXIE_Chassis);
       PXIE_Chassis = PXIE_Chassis (1);
end
% Open the connection to the VISA object.
fopen(PXIE_Chassis);
% Query the PXIE_Chassis.
response = query(PXIE_Chassis, '*IDN?');
disp('The *IDN query response:');
disp(response);
response = query(PXIE_Chassis, '*OPT?');
disp('The *OPT query response:');
disp(response);
% Replace this with a valid command for your device (read the programming
% guide section for examples)
command = ''
% Close the connection to the object.
fclose(PXIE_Chassis);
% Clean up all objects.
delete(PXIE_Chassis);
```

10.5 LabVIEW™ application

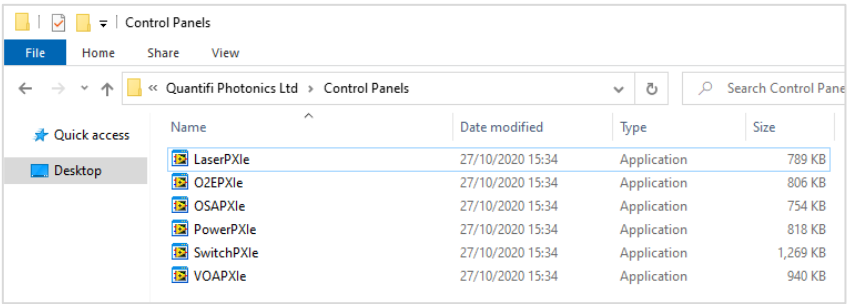
10.5.1 Soft Panels

To control the OSA product with a LabVIEW™ Soft Panel, you will need to have setup the chassis / instrument as a TCP/IP Resource as shown in Section 10.1.

1. Download the LabVIEW zip file from the Quantifi Photonics website. This contains all the Soft Panels and Virtual Instruments (VIs) for Quantifi Photonics PXIe modules.



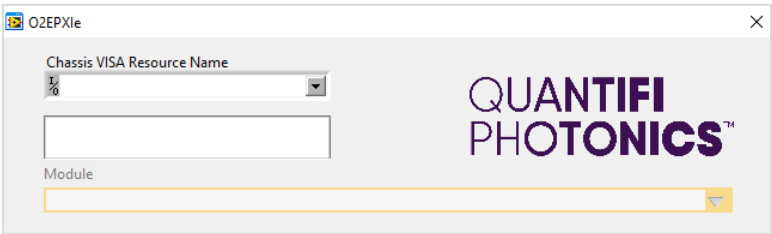
2. Open the Control Panels folder and select the corresponding Soft Panel for the desired PXIe module / MATRIQ instrument. Because these are executables, they will need LabVIEW Runtime Engine 2015 to run.



⚠ IMPORTANT

If LabVIEW Runtime Engine 2015 is not present, a system dialog will pop up. To proceed download the Runtime Engine (more information on LabVIEW website).

3. Once the desired executable has been run, select the VISA Resource corresponding to the intended instrument.



Note this step depends on the setup process shown in Section 10.1. If the instrument has not been setup, then the Soft Panel cannot be used.

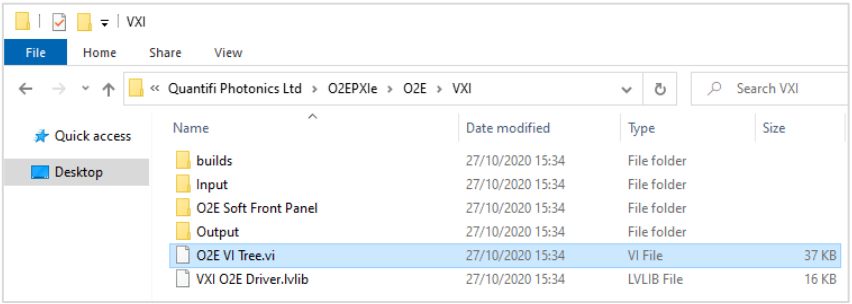
10.5.2 LabVIEW™ Virtual Instruments (VIs)

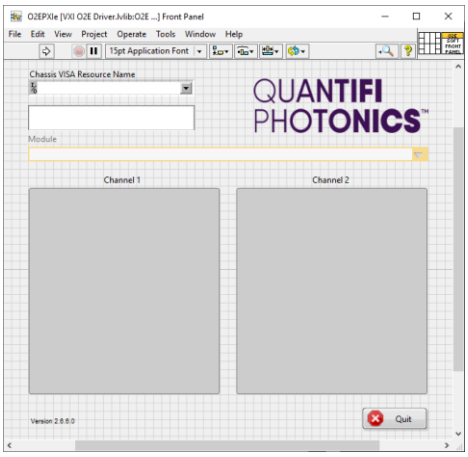
Instead of using the Soft Panels, the Virtual Instruments can also be used to control the OSA product from within LabVIEW. These VIs are provided for customers who want to develop custom applications using the PXIe modules / MATRIQ instruments.

1. Copy the QuantifiPhotonics_LabVIEW_2015_v2.6 > **Quantifi Photonics Ltd** folder to the following path:
   C:\Program Files\National Instruments\LabVIEW 20XX\instr.lib\

2. Within the Quantifi Photonics Ltd folder, navigate to the intended module's sub folder.
   e.g. Quantifi Photonics Ltd > O2E > O2E > VXI

This VI Tree can then be added into the desired development project, therefor the Soft Panel can be rebuilt and used by other LabVIEW Runtime Engine.





11 Maintenance

To help ensure long, trouble-free operation:

- Always inspect fiber-optic connectors before using them and clean them if necessary.
- Keep the product free of dust.
- Store product at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.
- If any liquids are spilled on or into the product, power off the chassis or the MATRIQ instrument immediately. Remove the product and allow to dry completely.

WARNING

The use of controls, adjustments, and procedures other than those specified herein may result in exposure to hazardous situations or impair the protection provided by this unit.

11.1 Annual calibration schedule

To ensure that the OSA product is performing as expected, it is recommended that the product be sent in for annual re-calibration. As an optical product will naturally degrade over time, it is important to periodically re-test the product, to confirm that it is working as expected.

All Quantifi Photonics products are calibrated during manufacture, and each product is shipped to the customer with a Calibration Certificate. On this certificate, the calibration date, as well as the next calibration due date are mentioned.

We recommend your product is returned for re-calibration before the listed due date, to ensure continued performance of the product. For re-calibration service information, or to send in a product for re-calibration service, email service@quantifiphotonics.com.

If the Calibration Certificate has been misplaced, or the calibration due date is not known, email service@quantifiphotonics.com.

12 Technical support

12.1 Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact Quantifi Photonics. The Technical Support Group is available to take your calls from Monday to Friday, 9:00 a.m. to 5:00 p.m. (New Zealand Time).

Technical Support Group

Tel.: +64 9 478 4849

Fax: +64 9 478 4851

support@quantifiphotonics.com

To accelerate the process, please have information such as the name and the serial number (see the product identification label), as well as a description of your problem, close at hand.

12.2 Transportation

Maintain a temperature range within specifications when transporting the unit. **Transportation damage can occur from improper handling.** The following steps are recommended to minimize the possibility of damage:

- Pack the product in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the product out of direct sunlight.
- Avoid unnecessary shocks and vibrations.

13 Warranty

13.1 General information

Quantifi Photonics Ltd. (Quantifi Photonics) warrants from the date of the original shipment (the Warranty Period) that this product will conform to specifications and will be free from defects in material and workmanship for the applicable Warranty Period. Quantifi Photonics also warrants that the equipment will meet applicable specifications under normal use.

⚠ IMPORTANT

The warranty can become null and void if:

- The unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-Quantifi Photonics personnel.
- The warranty sticker has been removed.
- The unit has been opened, other than as explained in this guide.
- The unit serial number has been altered, erased, or removed.
- The unit has been misused, neglected, or damaged by accident.
- The unit has been used with an external power supply not supplied by Quantifi Photonics with the unit.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL QUANTIFI PHOTONICS BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.
For full warranty terms and conditions, please visit www.quantifiphotonics.com.

13.2 Liability

Quantifi Photonics shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

Quantifi Photonics shall not be liable for damages resulting from improper usage, transportation or unauthorized modification of the product, its accompanying accessories and software.

The external power supply that has been supplied by Quantifi Photonics with the unit can only be used with that unit, do not use it with any other product.

13.3 Exclusions

Quantifi Photonics reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with Quantifi Photonics products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond the control of Quantifi Photonics.

13.4 Certification

Quantifi Photonics certifies that this equipment met its published specifications at the time of shipment from the factory.

13.5 Service and repairs

To send any equipment for service, repair or calibration please contact the Technical Support Group.

Test. Measure. Solve.

Quantifi Photonics is transforming the world of photonics test and measurement. Our portfolio of optical and electrical test instruments is rapidly expanding to meet the needs of engineers and scientists around the globe. From enabling ground-breaking experiments to driving highly efficient production testing, you'll find us working with customers to solve complex problems with optimal solutions.

To find out more, get in touch with us today.

General Enquiries sales@quantifiphotonics.com
Technical Support support@quantifiphotonics.com
Phone +64 9 478 4849
North America +1-800-803-8872

quantifiphotonics.com

QUANTIFI PHOTONICS™

©2022 Quantifi Photonics Ltd. All rights reserved. No part of this publication may be reproduced, adapted, or translated in any form or by any means without the prior permission from Quantifi Photonics Ltd. All specifications are subject to change without notice. Please contact Quantifi Photonics for the latest information.