Keysight Technologies
PXIe Optical Extenders for Instrumentation

Configuration Guide

KEYSIGHT TECHNOLOGIES

Overview

This configuration guide contains a step-by-step process to help you configure the family of PXI Optical Extenders including the use of the M9408A RF Reflectometer.

For more detailed product and specification information refer to Keysight Technologies, Inc. Optical Extensions for Instrumentation
literature:

- Keysight PXIe Optical Extenders for Instruments Datasheet (literature no. 5991-0383EN)
- Keysight PXIe Optical Extenders for Instruments
- Flyer (literature no. 5990-9069EN)

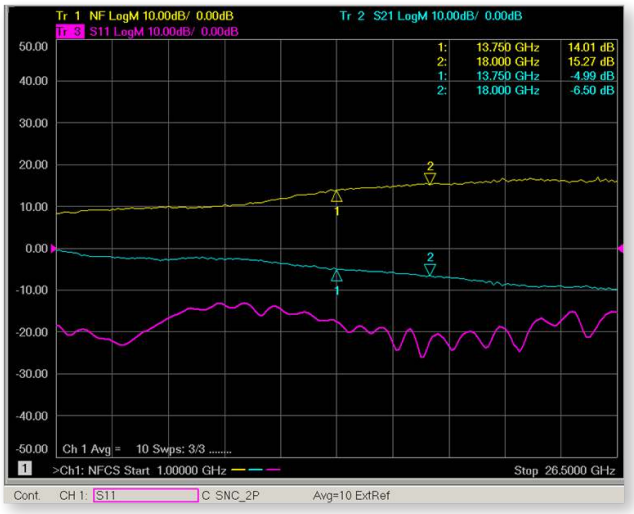

Figure 1. Link Efficiency (dB) M9405A, M9403A and M9404A.

Configuration Steps

- Select your modules
- Configure your modules
- Add the chassis
- Consider additional accessories

Figure 2. Keysight M9018A PXI Chassis with 18-slot capacity.

Select Your Modules

Description	Number of slots used	Additional information
PXIe Optical Transmitter		
M9403A: 300 kHz to 26.5 GHz or 50 GHz (requires the M9404A to complete the RF link)	2	Converts your RF signal into a 1550 nm single mode optical signal.
PXIe Optical Receiver		
M9404A: 300 kHz to 26.5 GHz or 50 GHz (requires the M9403A to complete the RF link)	1	Converts the modulated optical signal back to RF.
PXIe Amplifier		
M9405A: 300 kHz to 26.5 GHz or 50 GHz	1	30 dB amplifier, standalone single module.
PXIe Optical to USB		
M9406A: USB 2.0 (requires the M9407A to complete the USB port extension)	2	Optically extend the USB 2.0 ports for the use of remote devices such as a keyboard, mouse, or display.
PXIe Optical to 4 Port USB		
M9407A: USB 2.0 Hub (requires the M9406A to complete the USB port extension)	2	Optically extend the USB 2.0 ports for the use of remote devices such as a keyboard, mouse, or display.
PXIe Remote RF Reflectometer		
M9408A: 10 MHz to 50 GHz 300 kHz to 10 Mhz (coupling values will degrade performance)	2	Fully extends the port of a vector network analyzer equipped with a configurable test set.

The M9403A and M9404A complete an Optical Link. The optional M9405A can be added prior to or after the link, or included within the M9403A or M9404A. The M9406A and M9407A Optical to USB modules enables you to extend control devices to remote locations such as:

- USB mouse
- USB keyboard
- VGA display (using USB to VGA adapter)
- Keysight PNA series electronic calibration modules
- USB power sensor
- Other USB 1.1 and 2.0 compliant devices

The M9408A RF Reflectometer enables full port extension of a vector network analyzer with a configurable test set such as the PNA family of analyzers and can be used with the optical port extenders.

Configure Your Modules

Configuring a transmit and received link

A complete RF/ Optical/ RF link consists of 2 modules:

- M9403A PXIe Optical Transmit module
- M9404A PXIe Optical Receive module

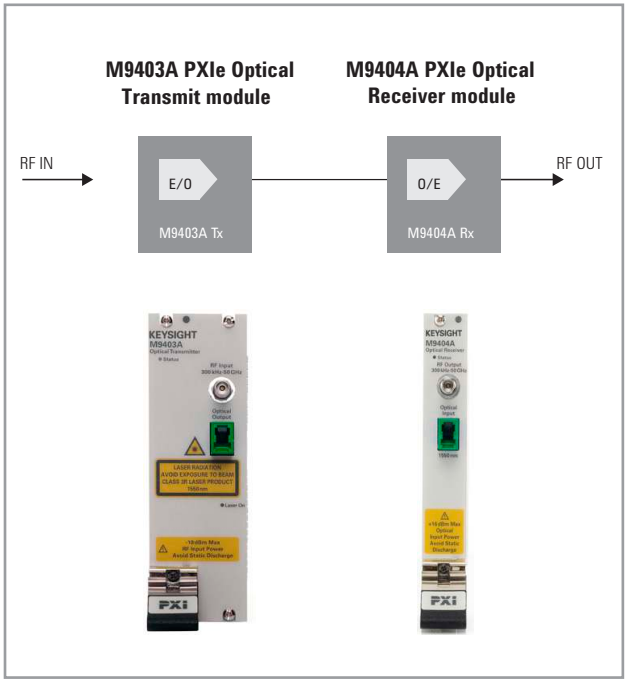

Figure 3. Transmit and receive link with the Keysight M9403A and M9404A optical modules.

Configuring the M9403A Optical Transmitter

The M9403A is a two slot PXI module that converts your RF signal into a 1550 nm single mode optical signal.

Step 1. Standard or Amplified?

Select one option:

- Standard Optical Transmitter module (M9403A_H01 E/O converter), or
- Internal 30 dB preamp option (M9403A-H02 E/O converter with Amplifier)[1]

Step 2. Frequency Range?

Select the desired frequency range for the M9403A Optical Transmitter module:

- 10 MHz to 26.5 GHz (M9403A-F26), or
- 10 MHz to 50 GHz (M9403A-F50)

Figure 4. M9403A Optical transmitter

1. The internal preamplifier can be used to improve the Noise Figure of the Link. The maximum RF input level of the link is +7 dBm. With the preamplifier the maximum input level is -23 dBm.

Configure Your Modules

Configuring the M9404A Optical Receiver

The M9404A is a single slot PXI module that converts the modulated optical signal back to RF. The conversion loss of the link with no amplification is ~30 dB. Refer to the technical support information for complete nominal performance information at **http://cp.literature.keysight.com/litweb/pdf/5991-0383EN.pdf**.

Step 3. Standard or Amplified?
Select one option:

- Standard M9404A Optical Receiver module M9404A-H01 E/O converter), or
- Internal 30 dB built in post amplifier (M9404A-H02 E/O converter)

Step 4. Frequency Range?

Select the desired frequency range for the M9404A Optical Transmitter module:

- 10 MHz to 26.5 GHz (M9404A-F26), or
- 10 MHz to 50 GHz (M9404A-F50)

This provides a complete end to end optical link with E2000 APC (Angled Polished Connector) connectors. Operating the link requires a PXI chassis, such as the Keysight Technologies M9018A at each end of the link. One chassis powers the M9403A and one chassis powers the M9404A. The optical link also requires a customer provided single mode fiber cable with E2000 APC connectors which completes the transmitter and receiver RF path.

Figure 5. M9404A Optical receiver

Configuring the optional M9405A 30 dB RF Amplifier Module

The M9405A 30 dB RF amplifier is a standalone, single module. A 30 dB amplifier can also be integrated directly into the M9403A Optical Transmitter and/or the M9404A Optical Receiver module by selecting option H02. When the M9405A is chosen, the amplifier is a standalone module providing the flexibility to be used on either end of the link as needed.

Step 5. What Frequency Range?

Choose the frequency range to match your Optical Link:

- 10 MHz to 26.5 GHz (M9405A-F26), or
- 10 MHz to 50 GHz (M9405A-F50)

Figure 6. M9405A 30 dB RF Amplifier

Configure Your Modules

Configuring the optional M9406A and M9407A USB modules

The M9406A and M9407A are 2-slot PXI USB modules that optically extend the USB 2.0 ports for the use of remote devices such as a keyboard, mouse or display. The USB ports can also support USB devices such as power sensors for remote power measurements.

Step 6. Add the USB 2.0 Extenders, both are required:

- M9406A-H01
- M9407A-H01

These provide a complete end to end Optical USB extension. A pair of customer furnished optical cables with SC connectors are required to complete the link.

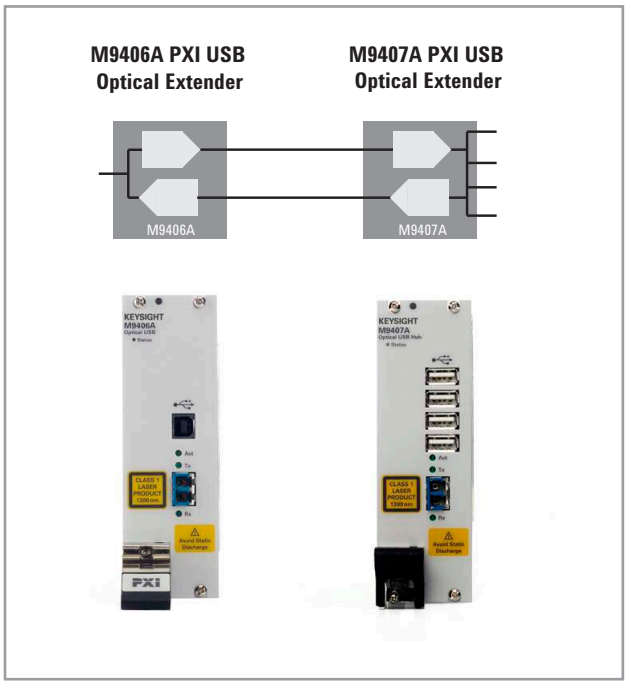

Figure 7. M9406A and M9407A USB Optical Extenders

Configuring the M9408A RF Reflectometer[2]

The M9408A fully extends the port of a vector network analyzer equipped with a configurable test set such as a PNA. It is designed to work with three of the optical link pairs to accommodate the test coupler arm or reflected path, the reference coupler arm, and the source RF or test signal. It operates over the 300 kHZ to 50 GHz frequency range.

Step 7. Extending the vector network analyzer port.

Select the RF Reflectometer select:

- M9408A

Figure 8. M9408A RF Reflectometer

2. Requires three each of the M9403A and M9404A pairs to fully extend the VNA port, one link for the Source RF in, one link for the Ref Coupler Arm, and one link for the Test Coupler Arm.

Add the Chassis

M9018A PXIe Chassis (requires two)	18-slot capacity	2 PXI chassis are required to power the modules: – one chassis at the transmit end – one chassis at the receive end of the link – embedded controller not required

Additional Accessories

Y1213A	PXI EMC Filler Panel Kit for 5 slots	There are 21 total slots in the M9018A Mainframe. To ensure proper cooling, please select the appropriate amount of blank panels to complete your system
Y1215A	Chassis rack mount kit for M9018A	

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