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MXI™-Express Gen 2 x8

MXI-Express Gen 2 x8 Series User Manual

PCIe-8381
PCIe-8382
PXIe-8381
PXIe-8384

March 2022
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This hardware has been tested and found to comply with the applicable regulatory requirements and limits for electromagnetic compatibility (EMC) as indicated in the hardware's Declaration of Conformity (DoC)[1]. These requirements and limits are designed to provide reasonable protection against harmful interference when the hardware is operated in the intended electromagnetic environment. In special cases, for example when either highly sensitive or noisy hardware is being used in close proximity, additional mitigation measures may have to be employed to minimize the potential for electromagnetic interference.

While this hardware is compliant with the applicable regulatory EMC requirements, there is no guarantee that interference will not occur in a particular installation. To minimize the potential for the hardware to cause interference to radio and television reception or to experience unacceptable performance degradation, install and use this hardware in strict accordance with the instructions in the hardware documentation and the DoC[1].

If this hardware does cause interference with licensed radio communications services or other nearby electronics, which can be determined by turning the hardware off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the antenna of the receiver (the device suffering interference).
- Relocate the transmitter (the device generating interference) with respect to the receiver.
- Plug the transmitter into a different outlet so that the transmitter and the receiver are on different branch circuits.

Some hardware may require the use of a metal, shielded enclosure (windowless version) to meet the EMC requirements for special EMC environments such as, for marine use or in heavy industrial areas. Refer to the hardware's user documentation and the DoC[1] for product installation requirements.

When the hardware is connected to a test object or to test leads, the system may become more sensitive to disturbances or may cause interference in the local electromagnetic environment.

Operation of this hardware in a residential area is likely to cause harmful interference. Users are required to correct the interference at their own expense or cease operation of the hardware.

Changes or modifications not expressly approved by National Instruments could void the user's right to operate the hardware under the local regulatory rules.

[1] The Declaration of Conformity (DoC) contains important EMC compliance information and instructions for the user or installer. To obtain the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

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About This Manual

This manual describes the features, functions, and operation of the PCIe-8381, PCIe-8382, PXIe-8381, and PXIe-8384 MXI-Express Gen 2 x8 series of products.

Products Covered

The model numbers listed below are followed by their specific NI assembly numbers in parentheses. Ensure the specifications of interest match the NI assembly number that is printed on either the front or back side of the board.

- PCIe-8381 (153094A-01L)
- PCIe-8382 (153094B-01L)
- PXIe-8381 (153097x-01L)
- PXIe-8384 (153100x-01L)

Note *x* denotes all letter revisions of the assembly.

Related Documentation

The following documents contain information that you might find helpful as you read this manual:

- Your computer or chassis documentation
- *PXI Express Hardware Specification*, Revision 2.0
- *PXI-6 PXI Express Software Specification*
- *PICMG CompactPCI Express EXP.0 R1.0 Specification*
- *PCI Express Specification*, Revision 2.0
- *PCI Express External Cabling 2.0 Specification*

Conventions

The following conventions appear in this manual:

- **CompactPCI Express/CPCIe**—The terms *CompactPCI Express* and *CPCIe* are interchangeable.
- **MXI-Express Gen 2 x8 product** —A PCIe-8381, PCIe-8382, PXIe-8381, or PXIe-8384.
- **PCI Express/PCIe**—The terms *PCI Express* and *PCIe* are interchangeable.
- **PXI Express chassis**—Whenever a PXI Express chassis is referenced, a CompactPCI Express chassis could be used instead.
- **PXI Express/PXIe**—The terms *PXI Express* and *PXIe* are interchangeable.

1 Introduction

Description and Features

MXI-Express Gen 2 x8 extends PCI Express communication over a cable of up to 5 m. With MXI-Express Gen 2 x8, you can do the following:

- Control a PXI Express or CompactPCI Express backplane with a PCI Express-based PC
- Physically separate the measurement or automation system from a host PC
- Control multiple PXI Express or CompactPCI Express chassis with a single PCI Express-based PC or PXI Express embedded controller.

Table 1-1lists the products and lists their features for comparison.

Table 1-1. Feature Comparison of Available MXI-Express Gen 2 x8 Interfaces

Model	Slot Type	Number of Ports	Cable Support
PCIe-8381 PCIe-8382	PCI Express Gen 2 x8 or wider	1	MXI-Express x8 Copper
PXIe-8381	PXI Express Controller	1	MXI-Express x8 Copper
PXIe-8384	PXI Express Peripheral	1	MXI-Express x8 Copper

Tip For optimum link widths and performance, use the PXIe-8381 and PXIe-8384 in chassis that support a Gen 2 x8 backplane link.

Functional Overview

MXI-Express Gen 2 x8 is based on PCI Express technology. A MXI-Express Gen 2 x8 kit uses PCI Express switches to enable control of a PXI Express or CompactPCI Express chassis from a PC with an available PCI Express slot, or from a PXI Express chassis with an available PXI Express slot. The switch architecture is transparent to device drivers, so no additional software is needed for CompactPCI Express level support for PXI Express devices in connected chassis.

Note For full PXI/PXI Express functionality such as chassis and controller identification, trigger routing, and slot detection, install the PXI Platform Services software included with your kit. This software also can be found at `ni.com/updates` by searching for **PXI Platform Services**.

The link between the PC and the chassis is a Gen 2 x8 cabled PCI Express link. This link is a dual-simplex communication channel comprised of eight low-voltage, differentially driven signal pairs. The link can transmit at a rate of 40 Gbps in each direction simultaneously.

Note This link is compatible with the cabled PCI Express specification developed by the PCI-SIG.

Functional Block Diagrams

Figure 1-1. PCIe-8381 (153094A-01L) Block Diagram

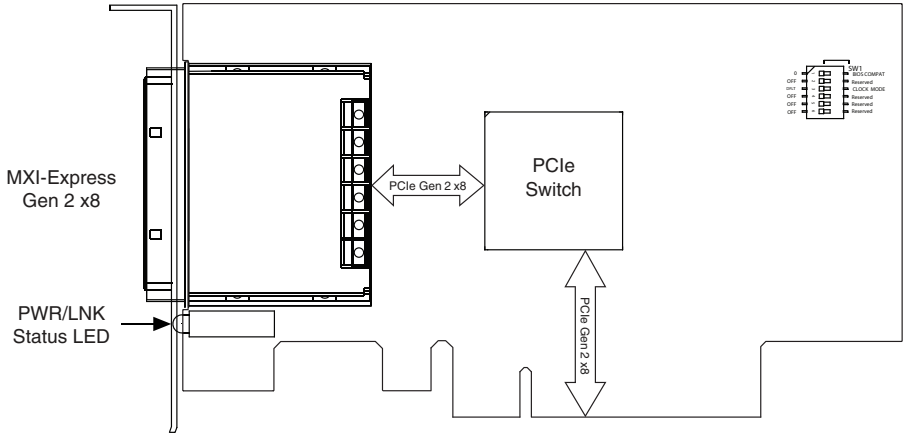


Figure 1-2. PCIe-8382 (153094B-01L) Block Diagram

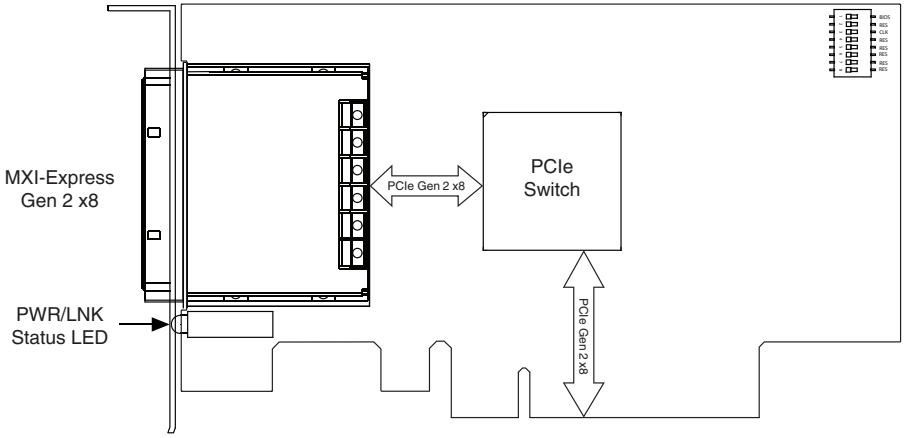
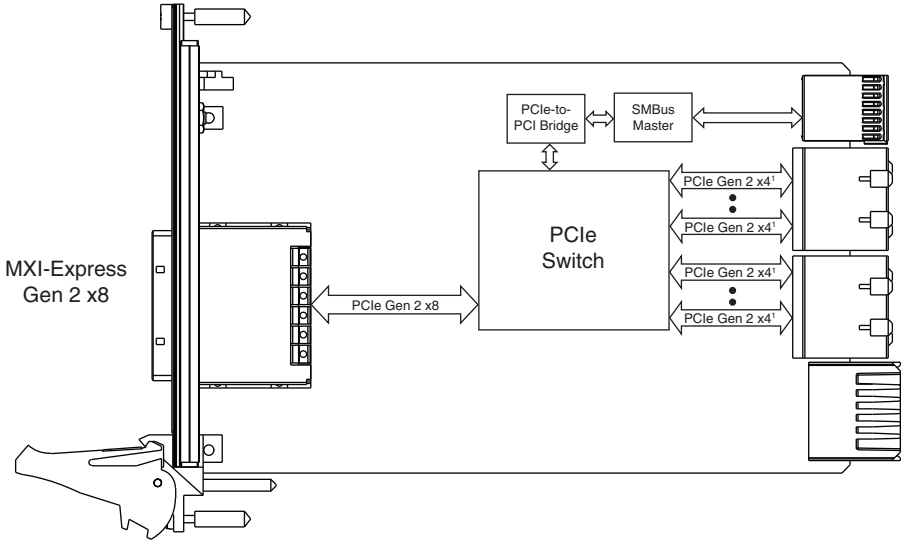


Figure 1-3. PXIe-8381 (153097x-01L) Block Diagram[1]

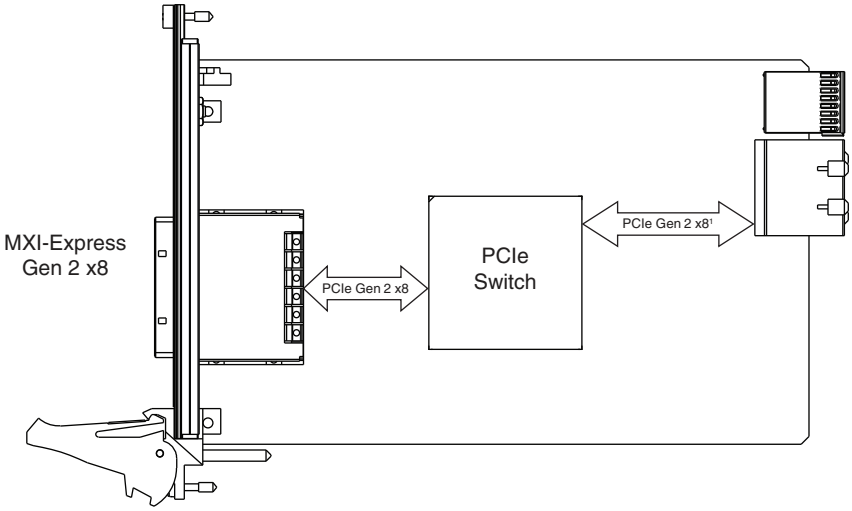


The PXIe-8381 supports dual link mode, which will merge the four x4 links to the chassis backplane into two x8 links if the chassis supports it.

[1] The width and speed of the backplane links are chassis dependent.

NI offers Gen 2 PXI Express chassis that allow the PXIe-8381 to establish Gen 2 backplane links.

Figure 1-4. PXIe-8384 (153100x-01L) Block Diagram[1]

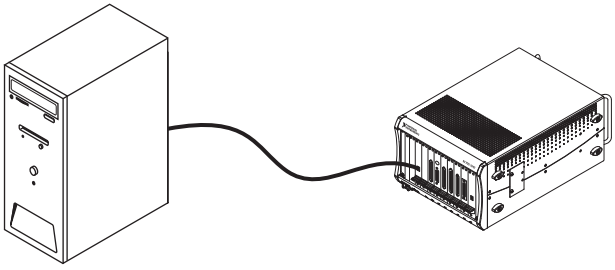


NI offers Gen 2 PXI Express chassis that allow the PXIe-8384 to establish Gen 2 backplane links.

Basic MXI-Express Gen 2 x8 Systems

The simplest MXI-Express Gen 2 x8 system consists of a PCIe-8381 or PCIe-8382 in a PC connected to a PXIe-8381 in the controller slot of a PXI Express chassis, as shown in Figure 1-5.

Figure 1-5. Example of a Basic MXI-Express Gen 2 x8 Link Topology



Host PC to Target PXI Express Chassis

[1] The width and speed of the backplane links are chassis dependent.

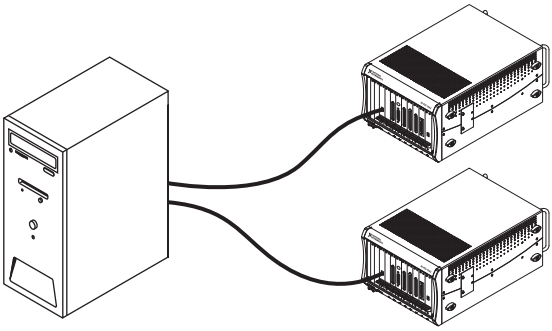
Note In this manual, whenever a PXI Express chassis is referenced, a CompactPCI Express chassis could be used instead.

Larger MXI-Express Gen 2 x8 Systems

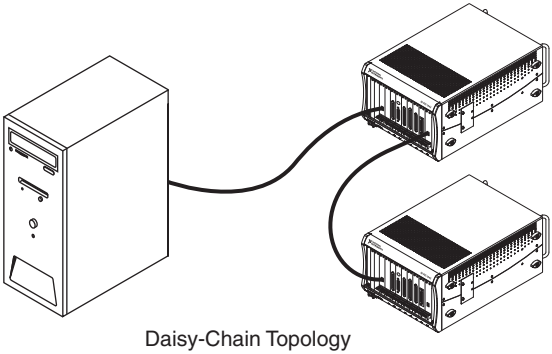
If multiple PCI Express slots are available in the host PC, additional PXI Express chassis can be connected by installing an additional PCIe-8381 or PCIe-8382 in any available Gen 2 x8 or wider PCI Express slot.

You can also daisy-chain from a PXI Express chassis that is already controlled by an embedded controller, host PC, or laptop to additional PXI Express chassis using MXI-Express Gen 2 x8 products. Figure 1-6 shows how you can use MXI-Express Gen 2 x8 cards to connect multiple PXI Express expansion chassis to a PC in a star or daisy-chain topology.

Figure 1-6. Example of MXI-Express Gen 2 x8 System Expansion Topologies



Star Topology



Daisy-Chain Topology

Compatibility with Host PCs

The BIOS of some host machines may not support the extension of the PCI-Express fabric. Since this is the primary function of MXI-Express Gen 2 x8 products, those systems may not boot or

function correctly. To address this issue, NI offers *NI MXI-Express BIOS Compatibility Software.* This software can be found at `ni.com` by searching for **MXI-Express BIOS Compatibility Software**. Review the documentation for information about using this software.

In the cases where this software is required, there may be a dip switch on the board that needs to be toggled as instructed by the documentation for the software. The functional block diagrams in this chapter illustrate the locations and availability of the dip switch package. Only the first dip switch in the package is used for this purpose. The other switches should be left in their default position.

Note Unless NI MXI-Express BIOS Compatibility Software is installed on the host machine for use, the BIOS Compat Mode dip switch (switch 1) should remain in the off position. If this mode is enabled on a MXI-Express Gen 2 x8 product in a host machine that does not have the software installed, the connected devices will not be detected by the operating system.

For more information on host system compatibility with MXI-Express Gen 2 x8 products, refer to the NI Developer Zone document *Tips to Help You Successfully Use MXI-Express Controllers* at `ni.com/zone`.

2

Installation and Configuration

This chapter explains how to unpack, install, and configure the MXI-Express Gen 2 x8 hardware and software.

Equipment Needed

Connecting a PC to an Expansion Chassis

- Host PC with an available PCI Express Gen 2 x8 slot or wider
- Expansion PXI Express or CompactPCI Express chassis
- MXI-Express x8 cable
- One PCIe-8381 or PCIe-8382
- One PXIe-8381

Connecting Additional Expansion Chassis to a System

- Chassis to daisy-chain from
- Expansion chassis to daisy-chain to
- MXI-Express x8 cable
- One PXIe-8381
- One PXIe-8384

Note Using a PCI Express slot wider than x8 may result in negotiation down to x1 width, and therefore limiting bandwidth. This is uncommon in newer PCs.

Note The BIOS or motherboard may not support the PCIe-8381 or PCIe-8382 in a slot intended for a graphics card.

Note Not all PCI Express expansion slots that have x8 or wider physical connectors are electrically capable of x8 PCI Express operation. Check with the motherboard manufacturer to verify that the slot is capable of x8 PCI Express operation.

Unpacking

Your MXI-Express Gen 2 x8 products are shipped in antistatic packages to prevent electrostatic discharge (ESD) to the devices. ESD can damage several components on the device.

Caution *Never* touch the exposed pins of connectors. Doing so may damage the device.

To avoid such damage in handling the device, take the following precautions:

- Ground yourself using a grounding strap or by holding a grounded object.
- Touch the antistatic package to a metal part of the computer chassis before removing the device from the package.

Remove the device from the package and inspect the device for loose components or any sign of damage. Notify NI if the device appears damaged in any way. Do *not* install a damaged device into the computer or into a PXI Express or CompactPCI Express chassis.

Store the device in the antistatic envelope when not in use.

Hardware Installation

The following are general instructions for installing the MXI-Express Gen 2 x8 products. Consult your computer user manual or technical reference manual for further instructions and warnings.

Caution The protection provided by the MXI-Express Gen 2 x8 products can be impaired if it is used in a manner not described in this document.

Installing a PCIe-8381 or PCIe-8382

Complete the following steps to install a PCIe-8381 or PCIe-8382 in your computer.

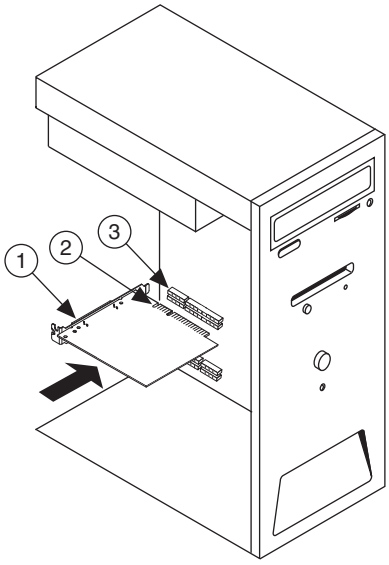
1. Power off your computer.

Caution To protect both yourself and the computer from electrical hazards, your computer should remain off until you finish installing all hardware as instructed.

2. Remove the top cover or access port to the PCI Express expansion slots.
3. Touch the metal part of the power supply case inside the computer to discharge any static electricity that might be on your clothes or body.
4. Unplug the computer and wait 30 seconds to allow the energy stored in the computer's power supply to fully dissipate.
5. Select any available PCI Express expansion slot (Gen 2 x8 or wider).
6. Locate the metal bracket that covers the cut-out in the back panel of the computer for the slot you have selected. Remove and save the bracket-retaining screw and the bracket cover.
7. Line up the PCIe card with the slot on the back panel. Slowly lower the PCIe card until its card-edge connector is resting on the expansion slot receptacle. Using slow, evenly distributed pressure, press the PCIe card straight down until it seats in the expansion slot, as shown in Figure 2-1

8. Secure the PCIe card to the back panel rail using a bracket retaining screw.
9. Replace the computer cover.
10. Plug the computer back in.

Figure 2-1. Installing a PCIe-8381 or PCIe-8382



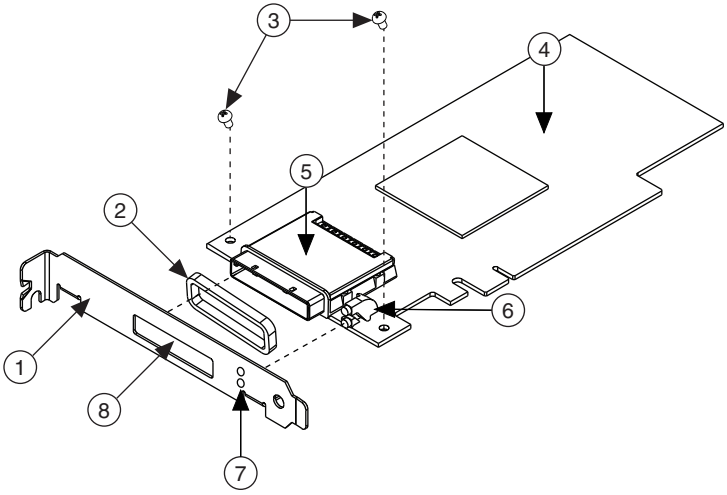
1	PCIe-8381 or PCIe-8382	3	PCI Express Slot (x8 or wider)
2	PCI Express x8 Card-Edge Connector		

Installing the Low-Profile Bracket on the PCIe-8381 or PCIe-8382 (Optional)

To install the PCIe-8381 or PCIe-8382 in a host computer that requires a low-profile height card, the front bracket must be replaced with the low-profile bracket included with your kit. Complete the following steps to replace the bracket.

1. Remove the standard height front bracket already installed on the PCIe-8381 or PCIe-8382 card by removing the two 4-40 × 3/16 in. Phillips head screws that attach the bracket to the card. Note that the two mounting tabs for the standard height bracket rest against the *back* side of the card. Set the two screws aside to re-use when installing the low-profile bracket.

Figure 2-2. Removing the Standard Bracket from the PCIe-8381 or PCIe-8382



1	Standard Height Bracket	5	Connector Shield
2	EMI Gasket	6	LEDs
3	4-40 × 3/16 in. Phillips Head Screws (x2)	7	Bracket Holes for LEDs
4	Front Side of Card	8	Bracket Hole for Connector Shield

Caution When removing the bracket, be careful not to remove or lose the EMI gasket on the cable receptacle connector housing.

2. Fit the low-profile bracket onto the PCIe-8381 or PCIe-8382. Note that the two mounting tabs that the screws thread into rest against the *back* side of the card for the low-profile bracket. Ensure that the front bracket LED bulbs are situated in the display hole correctly.
3. Align the mounting holes on the card with the threaded holes on the mounting tabs of the bracket, and insert the screws from the *front* side.
4. Tighten each screw to a maximum torque of 3.6 lb · in. (0.407 N · m).

Installing a PXIe-8381 or PXIe-8384

Table 2-1 provides information on which PXI Express MXI-Express Gen 2 x8 boards are compatible with which chassis slot types.

Table 2-1. NI MXI-Express Gen 2 x8 PXI Express Board Slot Type Compatibility

NI PXI Express Board	PXI Express Chassis		
	Controller ▲	Peripheral ●	Hybrid ●H
PXIe-8381	Yes	No	No
PXIe-8384	No	Yes	Yes

Note For this section, all of the above products will be referred to as an "NI PXI Express board".

Complete the following steps to install the NI PXI Express board in your PXI Express or CompactPCI Express chassis.

1. Power off your PXI Express or CompactPCI Express chassis, but leave it plugged in while installing the NI PXI Express board. The power cord grounds the chassis and protects it from electrical damage while you install the module.

Caution To protect both yourself and the chassis from electrical hazards, leave the chassis off until you finish installing the NI PXI Express board.

2. Remove or open any doors or covers blocking access to the slot in which you intend to install the NI PXI Express board.
3. Touch a metal part of the chassis to discharge any static electricity that might be on your clothes or body.
4. Make sure the injector/ejector handle is in its downward position. Be sure to remove all connector packaging and protective caps from retaining screws on the module. Align the NI PXI Express board with the card guides on the top and bottom of the system controller slot.

Caution Do *not* raise the injector/ejector handle as you insert the NI PXI Express board. It will not insert properly unless the handle is in its downward position so that it does not interfere with the injector/ejector rail on the chassis, as shown in Figure 2-3.

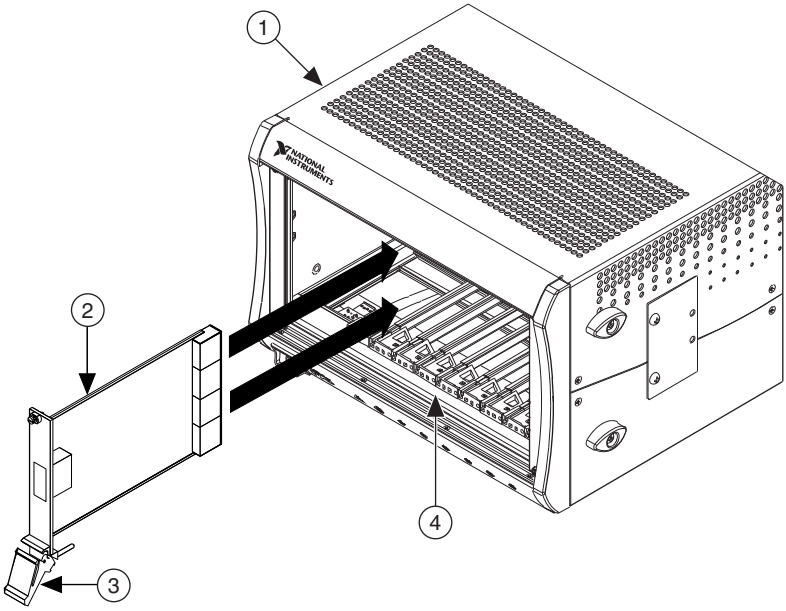
5. Hold the handle as you slowly slide the module into the chassis until the handle catches on the injector/ejector rail.
6. Raise the injector/ejector handle until the module firmly seats into the backplane receptacle connectors. The front panel of the NI PXI Express board should be even with the front panel of the chassis.

Note LEDs on the back side of the PXIe-8381 will light, indicating the presence of 5 V auxiliary power. Refer to the *LED Indicators* section for details.

7. Tighten the bracket-retaining screws on the top and bottom of the front panel to secure the NI PXI Express board to the chassis.
8. Replace or close any doors or covers to the chassis.

Figure 2-3 shows an NI PXI Express board just before installation in the system controller slot of a PXI Express chassis.

Figure 2-3. Example NI PXI Express Board Installation Into a PXI Express Chassis



1	PXI Express/CompactPCI Express Chassis	3	Ejector Handle in Down Position
2	NI PXI Express board	4	Injector/Ejector Rail

Cabling

Table 2-2 shows the various MXI-Express x8 copper cables available from NI.

Table 2-2. NI MXI-Express x8 Copper Cables

Cable Length (Meters)	Description	Part Number
3 m	MXI-Express x8 copper cable	782317-03
5 m	MXI-Express x8 copper cable	782317-05

Connect the MXI-Express x8 cable to both MXI-Express Gen 2 x8 cards. The cables have no polarity, so either end may be connected to either card.

Caution Do *not* remove the cable after the system is powered on. Doing so can hang or cause errors in applications communicating with devices behind MXI-Express Gen 2 x8. If a cable becomes unplugged, plug it back into the system. You will need to restart your computer.

Powering On the MXI-Express Gen 2 x8 System

1. Power on all of the expansion chassis in any order you choose.
2. Power on the host.

   Connected chassis that are controlled by a PXIe-8381 will automatically power on.

   The PXIe-8381 has a built in feature that powers on/off the chassis that it is controlling when the host system is powered on/off. This feature can be avoided by manually powering on the downstream chassis prior to the host system.

Note There are no requirements for how expansion chassis are powered up relative to each other, as long as they are all on before the computer is powered on.

Observe the LED status on the PCIe-8381, PCIe-8382, PXIe-8381, and PXIe-8384 where applicable. A properly connected and powered up system should report a valid link and power status on *all* of these boards once the host PC is powered on. Refer to the *LED Indicators* section for more information.

Typical PCI Express switches are used to add PCI devices to a PCI hierarchy in which all the bridges and devices are contained within a single chassis. Because of this, BIOSes and operating systems make the assumption that all PCI devices in the entire hierarchy will be available as soon as code execution begins at power-up time. This assumption means that all of the expansion chassis must be turned on before the host PC for the BIOS and OS to correctly configure a MXI-Express Gen 2 x8 system.

Powering Off the MXI-Express Gen 2 x8 System

Because operating systems and drivers commonly make the assumption that PCI devices will be present in the system from power-up to power-down, it is important to not power off the expansion chassis until after the host PC is powered off. Powering off the expansion chassis while the host is still on can cause crashes or hangs. However, once the host PC is powered off, the order that the expansion chassis are powered off is not important.

Note To power off the chassis while the host computer or host chassis is on, you may need to hold the power button for at least four seconds. However, this behavior cannot be guaranteed.

LED Indicators

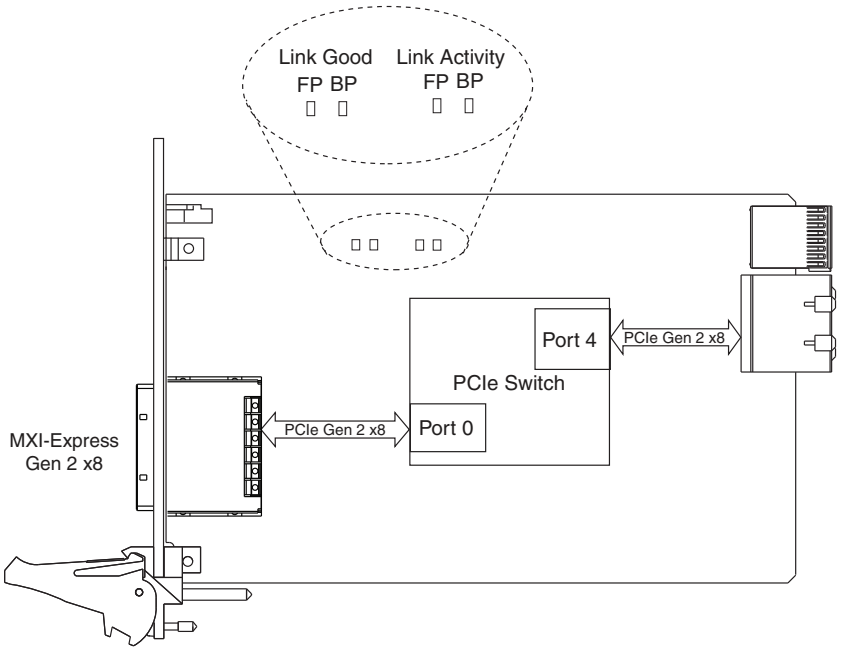
The LEDs on MXI-Express Gen 2 x8 cards give status information about power supplies and link state. The PCIe-8381, PCIe-8382, PXIe-8381 and PXIe-8384 have one tri-color LED on the panel, indicating power and link status.

Table 2-3. LED Status Descriptions of MXI-Express Gen 2 x8 Products

Board	LED	Color	Meaning
PCIe-8381 (153094A-01L) PCIe-8382 (153094B-01L) PXIe-8381 (153097x-01L) PXIe-8384 (153100x-01L)	PWR/LINK	Off	Power is off
		Blinking Red	Power is out of spec
		Solid Amber	Power is within spec; no link to chassis
		Solid Green	Power is within spec; link established

Refer to Figure 2-4 and 2-5 for onboard LED locations.

Figure 2-4. PXIe-8384 (153100x-01L) Onboard LED Locations

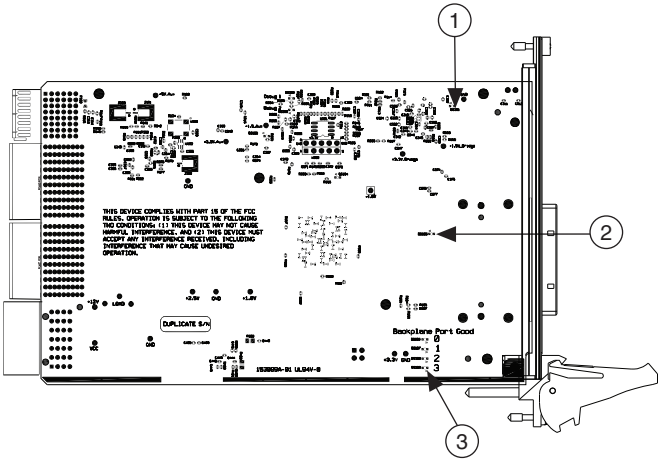


Link Good LEDs—LEDs that indicate a successful cable link (LED FP) and backplane link (LED BP).

Link Activity LEDs—LEDs that indicate link activity on the cable link (LED FP) and the backplane link (LED BP).

The PXIe-8381 also has a vertical column of 6 LEDs on the back side of the card near the front connector, as shown in Figure 2-5. These LEDs provide additional information about the link status of the PCI Express lanes on the module. The lower four correspond to links to the backplane, the middle LED corresponds to the cable port, and the top-most LED corresponds to the SMBus controller.

Figure 2-5. PXIe-8381 Back Side LED Locations



1	SMBus Controller Link Status LED	3	Backplane Link Status LED
2	Cable Port Link Status LED		

The SMBus Controller Link Status LED reports if the PCIe switch of the PXIe-8381 has successfully linked to the onboard PCIe-to-PCI bridge responsible for the SMBus controller. During normal operation, the SMBus Controller Link Status LED should blink green with a 25% active duty cycle.

The Cable Port Link Status LED reports a solid green status if the PXIe-8381 has successfully established a Gen 2 x8 cable link.

The Backplane Link Status LEDs report the status of the PCIe links established between any PCIe switches that reside on the backplane of the chassis that the PXIe-8381 is controlling, and in some cases the peripheral boards that are installed in any passive slots of the chassis. These LEDs are useful for determining the width of the PCIe links between the PXIe-8381 and the PCIe switches on the chassis backplane.

The backplane architecture of the chassis determines the link configuration of the PXIe-8381. Refer to the chassis documentation for more information about its backplane PCIe link topology to the controller slot, as well as identifying any PXI Express slots that are passive. A “passive slot” has a direct copper path to the controller slot instead of being routed through a backplane PCIe switch. Peripheral products installed in these slots determine the actual link established to the PXIe-8381, and set the corresponding Backplane Link Status LED appropriately. Table 2-4 shows example scenarios of how the Backplane Link Status LEDs behave in different chassis configurations.

Table 2-4. Backplane Link Status LED Behavior for Example Chassis Controlled by a PXIe-8381

Chassis	BP Port Good 0	BP Port Good 1	BP Port Good 2	BP Port Good 3	Description
PXIe-1075	Blink 75% Green	Blink 75% Green	Blink 75% Green	Blink 75% Green	Four Gen 1 x4 links have been established to the four backplane PCIe switches for all slots
PXIe-1082	Depends on Slot 2 peripheral	Solid Green	Solid Green	Solid Green	The first backplane link is passive to slot 2. Three Gen 2 x4 links have been established to the three backplane PCIe switches for the remaining slots
PXIe-1085	Off	Off	Solid Green	Solid Green	Two Gen 2 x8 links have been established to the two backplane PCIe switches for all slots

Note The LED behavior and correlation between each BP Port Good LED and the actual backplane link varies by chassis due to the port configuration and capability of the PCIe switches involved.

Software Installation and Configuration

Installation

MXI-Express Gen 2 x8 is based on PCI Express technology, using PCI Express switches and/or bridges to enable control of a PXI Express chassis from a PC or another PXI Express chassis with an available PCI Express or PXI Express slot. This technology will be recognized as a collection of PCI-to-PCI bridges to the operating system, and should automatically have CompactPCI Express level support without any additional software.

Note For full PXI/PXI Express functionality such as chassis and controller identification, trigger routing, and slot detection, install the PXI Platform Services software included with your kit. This software also can be found at `ni.com/updates` by searching for **PXI Platform Services**.

For operating system support, refer to *PXI Platform Services Operating System Support* at `ni.com/r/fm2grc`.

Configuring Your System



Note The following requires the PXI Platform Services software and Measurement & Automation Explorer (MAX).

For information on configuring your system in MAX, open MAX and navigate to **Help»Help Topics»PXI**.

A

Specifications

This appendix lists the system specifications for the following products only:

- PCIe-8381 (153094A-01L)
- PCIe-8382 (153094B-01L)
- PXIe-8381 (153097x-01L)
- PXIe-8384 (153100x-01L)

Note The model numbers listed are followed by their specific NI assembly numbers in parentheses. Ensure the specifications of interest match the NI assembly number that is printed on either the front or back side of the board.

Note *x* denotes all letter revisions of the assembly.

PCIe-8381 (153094A-01L)

Note These specifications are typical at 25 °C, unless otherwise stated, and are subject to change without notice.

Physical

Dimensions	6.89 × 12.70 cm (2.71 × 5.00 in.)
Maximum cable length	5 m
Slot requirements	One slot (PCI Express, x8 or wider)
Compatibility	Fully compatible with the *PCI Express Specification*, Revision 1.0a, 1.1, and 2.0
Weight	0.06 kg (0.14 lb) typical

Power Requirements

Power Rail	Typical Current	Maximum Current
+3.3 V	500 mA	800 mA
+3.3 V_{Aux}	0 A	0 A
+12 V	350 mA	500 mA

Environment

Maximum altitude	2,000 m
Pollution Degree	2
Indoor use only.	

Operating Environment

Ambient temperature range	0 to 55 °C IEC-60068-2-1 and IEC-60068-2-2
Relative humidity range	10 to 90%, noncondensing IEC-60068-2-56

Storage Environment

Ambient temperature range	–20 to 70 °C IEC-60068-2-1 and IEC-60068-2-2
Relative humidity range	5 to 95%, noncondensing IEC-60068-2-56

Caution Clean the PCIe-8381 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- ICES-001: Class A emissions



Note In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.



Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generates radio frequency energy for the treatment of material or inspection/analysis purposes..



Note For EMC declarations and certifications, and additional information, refer to the *Online Product Certification* section.

Online Product Certification

To obtain product certifications and the Declaration of Conformity (DoC) for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

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For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

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PCIe-8382 (153094B-01L)

Note These specifications are typical at 25 °C, unless otherwise stated, and are subject to change without notice.

Physical

Dimensions	6.89 × 12.70 cm (2.71 × 5.00 in.)
Maximum cable length	5 m
Slot requirements	One slot (PCI Express, x8 or wider)
Compatibility	Fully compatible with the *PCI Express Specification*, Revision 1.0a, 1.1, and 2.0
Weight	0.06 kg (0.14 lb) typical

Power Requirements

Power Rail	Typical Current	Maximum Current
+3.3 V	0 mA	0 mA
+3.3 V_{Aux}	15 mA	30 mA
+12 V	0.7 A	1 A

Environment

Maximum altitude	2,000 m
Pollution Degree	2
Indoor use only.	

Operating Environment

Ambient temperature range	0 to 55 °C IEC-60068-2-1 and IEC-60068-2-2
Relative humidity range	10 to 90%, noncondensing IEC-60068-2-56

Storage Environment

Ambient temperature range	–20 to 70 °C IEC-60068-2-1 and IEC-60068-2-2
Relative humidity range	5 to 95%, noncondensing IEC-60068-2-56

Caution Clean the PCIe-8382 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

Electromagnetic Compatibility

Note For EMC declarations and certifications, and additional information, refer to the *Online Product Certification* section.

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PXIe-8381 (153097*x*-01L)

Note These specifications are typical at 25 °C, unless otherwise stated, and are subject to change without notice.

Physical

Dimensions	10.7 × 17.5 cm (4.4 × 6.9 in.)
Maximum cable length	5 m
Slot requirements	One system slot (PXI Express, or CompactPCI Express)
Compatibility	Fully compatible with the *PXI Express Hardware Specification*, Revision 2.0, *PICMG CompactPCI Express EXP.0 R2.0 Specification*, and the *PCIe External Cable Specification*
Weight	0.19 kg (0.42 lb) typical

Power Requirements

Power Rail	Typical Current	Maximum Current
+3.3 V*	750 mA	1.2 A
+5 V	1 mA	25 mA
+12 V	300 mA	500 mA
+5 V_{Aux}	110 mA	300 mA

* Not including the power consumed by an active cable. NI copper cables (782317-0x) are passive.

Environment

Maximum altitude	2,000 m
Pollution Degree	2
Indoor use only.	

Operating Environment

Ambient temperature range	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)
Relative humidity range	10 to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Storage Environment

Ambient temperature range	–40 to 71 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)
Relative humidity range	5 to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Shock and Vibration

Operational shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)

Random Vibration

Operating	5 to 500 Hz, 0.3 g_{rms}
Nonoperating	5 to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Caution Clean the PXIe-8381 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- ICES-001: Class A emissions

Note In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generates radio frequency energy for the treatment of material or inspection/analysis purposes..

Note For EMC declarations and certifications, and additional information, refer to the *Online Product Certification* section.

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PXIe-8384 (153100*x*-01L)



Note These specifications are typical at 25 °C, unless otherwise stated, and are subject to change without notice.

Physical

Dimensions	10.0 × 16.0 cm (3.9 × 6.3 in.)
Maximum cable length	5 m
Slot requirements	One peripheral slot (PXI Express or CompactPCI Express)
Compatibility	Fully compatible with the *PXI Express Hardware Specification*, Revision 2.0, *PICMG CompactPCI Express EXP.0 R2.0 Specification*, and the *PCIe External Cable Specification*
Weight	0.17 kg (0.37 lb) typical

Power Requirements

Power Rail	Typical Current	Maximum Current
+3.3 V	500 mA	800 mA
+12 V	450 mA	750 mA
+5 V_{Aux}	5 mA	20 mA
* Not including the power consumed by an active cable. NI copper cables (782317-0x) are passive.		

Environment

Maximum altitude	2,000 m
Pollution Degree	2
Indoor use only.	

Operating Environment

Ambient temperature range	0 to 55 °C
Relative humidity range	10 to 90%, noncondensing

Storage Environment

Ambient temperature range	–40 to 71 °C
Relative humidity range	5 to 95%, noncondensing

Shock and Vibration

Operational shock	30 g peak, half-sine, 11 ms pulse

Random Vibration

Operating	5 to 500 Hz, 0.3 g_{rms}
Nonoperating	5 to 500 Hz, 2.4 g_{rms}

Caution Clean the PXIe-8384 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- ICES-001: Class A emissions

Note In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

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B

Common Questions

This appendix lists common questions related to the use of the MXI-Express Gen 2 x8 controllers.

General Hardware

What connectors do the NI MXI-Express x8 copper cables use?

The NI MXI-Express x8 copper cables use Molex x8 PCIe connectors. For more information about these connectors visit Molex at `www.molex.com` and search for **x8 PCIe iPass**.

How many PXI bus segments can I connect together with MXI-Express Gen 2 x8?

The PCI specification allows up to 255 bus segments. MXI-Express Gen 2 x8 does not limit this number, but the maximum number of bus segments allowed can be BIOS or operating system dependent. Also, a computer may already have several PCI bus segments internally, and the MXI-Express Gen 2 x8 link also has multiple PCI buses internally. Every PCI Express device has at least 1 bus segment, though it will have more if it includes a bridge or switch.

Will my PC work with MXI-Express Gen 2 x8 products?

It will depend on the robustness of the BIOS in your PC. In most cases, the BIOS should be able to enumerate the bridge resources that the MXI products require for operation, especially for smaller MXI system configurations. For more information, refer to the NI Developer Zone article, *Tips to Help You Successfully Use NI MXI-Express Controllers*, at `ni.com/zone`.

What is the maximum length of a MXI-Express x8 copper cable?

The maximum length for a MXI-Express x8 copper cable is 5 m. NI offers 3 m and 5 m copper cables. Refer to the *Cabling* section of Chapter 2, *Installation and Configuration*, for more information.

MXI-4 to MXI-Express Gen 2 x8 Upgrade Questions

What are some of the improvements from MXI-4 to MXI-Express Gen 2 x8?

MXI-Express Gen 2 x8 incorporates the latest technology to include:

- Support for PCI Express slots.
- Support for PXI Express and CompactPCI Express chassis.

- Improved error correction and handling for noisy or harsh environments.
- Improved mechanical connectivity.
- Improved performance.

Can I use a MXI-4, and MXI-Express Gen 2 x8 kit in the same multichassis PXI system?

Yes. Different MXI kits can be intermixed to connect multiple PXI and PXI Express chassis together.

MXI-4 systems required the use of a specific boot ordering. Is this a requirement with MXI-Express Gen 2 x8?

Yes. The requirements of the PCI bus still mandate that you must power on secondary PXI/PXI Express chassis before powering on the host PC when using MXI-Express Gen 2 x8. However, a MXI-Express Gen 2 x8 controlled chassis will power on with the host.

Now with MXI-Express Gen 2 x8, multiple chassis are connected in parallel and can be powered on in any order, except that you need to ensure that the last component powered on is the host PC.

For more details, refer to the *Powering On the MXI-Express Gen 2 x8 System* section of Chapter 2, *Installation and Configuration*.

General Software

Under which operating systems will MXI-Express Gen 2 x8 products work?

MXI-Express Gen 2 x8 will be recognized as a collection of PCI-to-PCI bridges to the majority of operating systems. It should automatically have CompactPCI Express support with most systems like Windows, Macintosh OS X, Linux, and Solaris. For full PXI Express functionality, PXI Platform Services software is required. Refer to the *Software Installation and Configuration* section of Chapter 2, *Installation and Configuration*, for more information.

What software is required to use my MXI-Express Gen 2 x8 kit?

For Windows and LabVIEW RT, the required software is included as part of the latest version of NI PXI Platform Services included with your kit. The software for your MXI-Express Gen 2 x8 controller enhances the product, allowing you to view information about the organization of your PXI Express system, gain access to the trigger routing capabilities of the PXI Express chassis, and programmatically retrieve data about the chassis and modules you have installed.

Refer to *PXI Platform Services Operating System Support* at `ni.com/r/fm2grc` for the current supported operating systems for NI PXI Platform Services:

If your operating system is not supported by PXI Platform Services, you can still use MXI-Express Gen 2 x8 as a PCI Express expansion solution. However, access to features such as chassis and controller identification, trigger routing, and slot detection will be lost.

C

NI Services

NI provides global services and support as part of our commitment to your success. Take advantage of product services in addition to training and certification programs that meet your needs during each phase of the application life cycle; from planning and development through deployment and ongoing maintenance.

To get started, register your product at `ni.com/myproducts`.

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For information about other technical support options in your area, visit ni.com/services, or contact your local office at ni.com/contact.

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