
PCIe-8383 Manual

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PCIe-8383 Overview

The PCIe-8383 is an MXI-Express remote controller for devices or systems cabled over PCI from a computer with a PCI Express slot. The remote controller provides a x8 PCI Express link over a copper cable to the PXIe-8381 PXI Remote Control Module when used for remote PXI system control. This link is transparent to software applications and drivers, helping you use industry - standard desktop computers and servers to control connected devices with no additional programming. With the PCIe-8383, compatible PXI modules can be used as if they are PCI devices directly installed in the computer.

MXI-Express Gen 2 x8 Overview

The PCIe-8383 is part of the MXI-Express Gen 2 x8 series of products. 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.

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.

MXI-Express Gen 2 x8 Products

The following table lists the products and their features for comparison.

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

Model	Slot Type	Number of Ports
PCIe-8381, PCIe-8382, PCIe-8383	PCI Express Gen 2 x8 or wider	1
PXIe-8381	PXI Express Controller	1
PXIe-8384	PXI Express Peripheral	1

You will need one PXIe-8381 for basic systems. To connect additional expansion chassis, you will need one PXIe-8381 and one PXIe-8384.

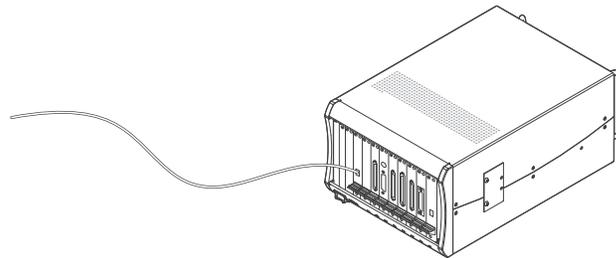
Basic MXI-Express Gen 2 x8 Systems

The simplest MXI-Express Gen 2 x8 system consists of a PCIe-8383 in a PC connected to a PXIe-8381 in the controller slot of a PXI Express chassis, as shown in the following figure.



Note A CompactPCI Express chassis could be used instead of a PXI Express chassis.

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



1. Host PC
2. PCIe-8383
3. PXIe-8381
4. PXI Express Chassis

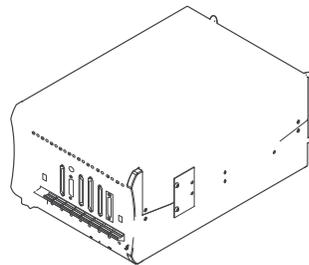
Larger MXI-Express Gen 2 x8 Systems

If multiple PCI Express slots are available in the host PC, additional PXI Express chassis can be connected by installing an additional PCIe-8383 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. The figures below show 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.

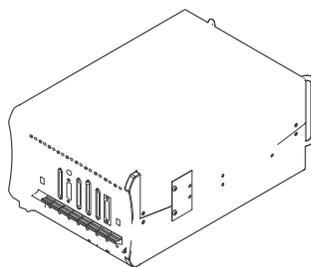
The PCI specification allows up to 256 bus segments. MXI-Express Gen 2 x8 does not limit this number, but the maximum number of bus segments allowed can be BIOS or operating system dependent. Also, a computer may already have several PCI bus segments internally, and the MXI-Express Gen 2 x8 link also has multiple PCI buses internally. Every PCI Express device has at least one bus segment, though it will have more if it includes a bridge or switch.

Figure 2. Example of MXI-Express Gen 2 x8 System Expansion Star Topology



1. Host PC
2. PCIe-8383
3. PXIe-8381
4. PXI Express Expansion Chassis

Figure 3. Example of MXI-Express Gen 2 x8 System Expansion Daisy-Chain Topology



1. Host PC
2. PCIe-8383
3. PXIe-8381
4. PXIe-8384
5. PXI Express Expansion Chassis

Components of a MXI-Express Gen 2 x8 System

The following list defines the minimum required hardware and software for a system that includes a PCIe-8383.



Note Refer to the **NI Hardware and Software Operating System Compatibility** page linked below for driver, desktop operating system, and real-time operating system support for individual hardware devices.

Table 2. System Components

Component	Description and Recommendations
Host PC	<p>The computer that houses the PCIe-8383.</p> <div style="border-left: 2px solid green; padding-left: 10px; margin-top: 10px;">  <p>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.</p> </div>
Expansion PXI Express or CompactPCI Express Chassis	A chassis that houses and powers the PXIe-8381.
Cables	Connect the PXI Express board in the chassis to the PCIe-8383 in your computer.
PXI Remote Control Module	Your PCIe-8383.
PXI Express Controller	The PXIe-8381, which allows you to control PXI and CompactPCI systems from your computer using a fully transparent MXI-Express link.
PXI Platform Services Driver	Provides support for NI PXI chassis and controllers, implements PXI software specifications, and supplies system services to other NI products.

Component	Description and Recommendations
	 Note You will need to install this driver for full PXI/PXI Express functionality such as chassis and controller identification, trigger routing, and slot detection.
NI Applications	PXI Platform Services offers driver support for the following applications: <ul style="list-style-type: none"> ▪ LabVIEW ▪ LabWindows/CVI

Related information:

- [PXI Platform Services Download](#)
- [NI Hardware and Software Operating System Compatibility](#)

Compatibility with Host PCs

The BIOS of some host PCs 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 help address this issue, NI offers MXI-Express BIOS Compatibility software. If you need to use this software, you must toggle the BIOS DIP switch on the board to enable BIOS compatibility.



Note Unless MXI-Express BIOS Compatibility software is installed on the host PC, the BIOS DIP switch should remain in the disabled (default) position. If this mode is enabled on a MXI-Express Gen 2 x8 product in a host PC that does not have the software installed, the connected devices will not be detected by the operating system.

Related concepts:

- [BIOS Switch](#)

Related information:

- [MXI-Express BIOS Compatibility Software Download](#)
- [MXI-Express Products and MXI-Express BIOS Compatibility Software Compatibility](#)

PXI Express Board and Chassis Compatibility

Refer to the following table for which PXI Express MXI-Express Gen 2 x8 boards are compatible with which chassis slot types.

Table 3. MXI-Express Gen 2 x8 PXI Express Board Slot Type Compatibility

PXI Express Board	PXI Express Chassis		
	Controller	Peripheral	Hybrid
PXIe-8381	Yes	No	No
PXIe-8384	No	Yes	Yes

Cables

Refer to the following table for the various MXI-Express x8 copper cables available from NI.

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.

Table 4. MXI-Express x8 Copper Cables

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

Related tasks:

- [Connecting the PCIe-8383 to the Chassis](#)

PCIe-8383 Theory of Operation

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.



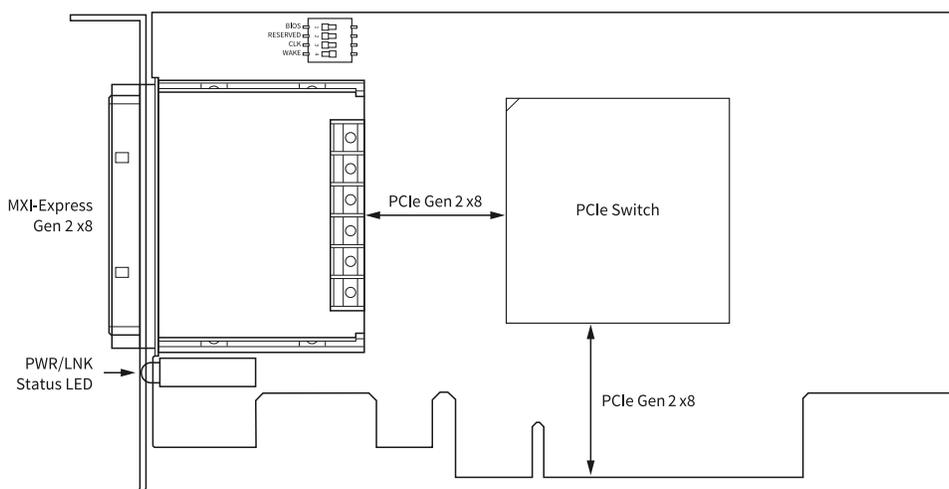
Note For full PXI/PXI Express functionality such as chassis and controller identification, trigger routing, and slot detection, download and install the PXI Platform Services driver from ni.com/downloads.

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 Gb/s in each direction simultaneously.



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

Figure 4. PCIe-8383 Block Diagram



Related concepts:

- DIP Switch

PCIe-8383 LED Indicators

The PCIe-8383 has one LED on the panel that indicates link status.

Table 5. LED Status Descriptions

Color	Meaning
Solid Amber	No link to chassis
Solid Green	Link to chassis established

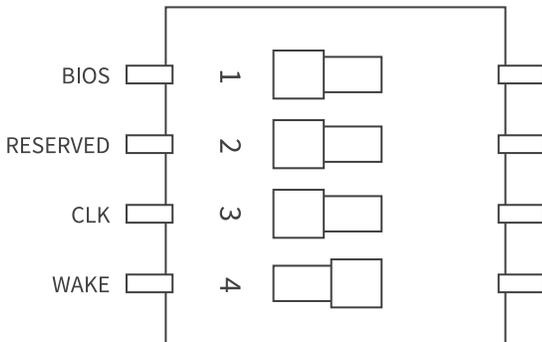
Related tasks:

- [Powering On the MXI-Express Gen 2 x8 System](#)

DIP Switch

The PCIe-8383 has a DIP switch with four switches, which can be found on the top-left corner of the board as shown in the PCIe-8383 block diagram. Refer to the **PCIe-8383 Theory of Operation** page linked below to view the block diagram.

Figure 5. PCIe-8383 DIP Switch



Related concepts:

- [PCIe-8383 Theory of Operation](#)

BIOS Switch

The BIOS switch enables the BIOS compatibility feature. The BIOS switch is disabled by default.

Enabling BIOS compatibility requires the installation of MXI-Express BIOS Compatibility software on the host PC. Refer to the **Compatibility with Host PCs** page linked below for more information on BIOS compatibility.

Table 6. BIOS Switch Functions

Position	Function
Left (default)	Disabled
Right	Enabled

Related concepts:

- [Compatibility with Host PCs](#)

RESERVED Switch

The RESERVED DIP switch has no function and should be kept in its default position (left).

CLK Switch

The CLK sets the clocking mode. The PCIe-8383 supports two clocking modes: spread spectrum clocking (SSC) and constant frequency clocking (CFC). SSC can reduce radiated emissions and some types of electrical noise in the system. The CLK switch is set to SSC mode by default.

Table 7. CLK Switch Functions

Position	Function
Left (default)	SSC mode
Right	CFC mode

WAKE Switch

The WAKE DIP switch enables the target PXI chassis to wake up the host PC when you press the chassis power button. The WAKE switch is enabled by default.

Table 8. WAKE Switch Functions

Position	Function
Left	Disabled
Right (default)	Enabled

Installing the PCIe-8383

Complete the following steps to install the PCIe-8383 and prepare it for use.

1. [Unpacking the Kit](#)
2. [Installing the Software](#)
3. [Installing the PCIe-8383 in a Computer](#)
4. [Installing the Low-Profile Bracket on the PCIe-8383 \(Optional\)](#)
5. [Connecting the PCIe-8383 to the Chassis](#)
6. [Powering On the MXI-Express Gen 2 x8 System](#)
7. [Powering Off the MXI-Express Gen 2 x8 System](#)
8. [Configuring Your System](#)

Unpacking the Kit



Notice To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.



Notice Never touch the exposed pins of connectors.



Note Do not install a device if it appears damaged in any way.

3. Unpack any other items and documentation from the kit.

Store the device in the antistatic package when the device is not in use.

Installing the Software

1. Install an ADE, such as LabVIEW or LabWindows™/CVI™.
2. Download the PXI Platform Services installer from ni.com/downloads.



Note Refer to the **NI Hardware and Software Operating System Compatibility** page linked below to confirm which version you need.

3. Follow the instructions in the installation prompts.



Note Windows users may see access and security messages during installation. Accept the prompts to complete the installation.

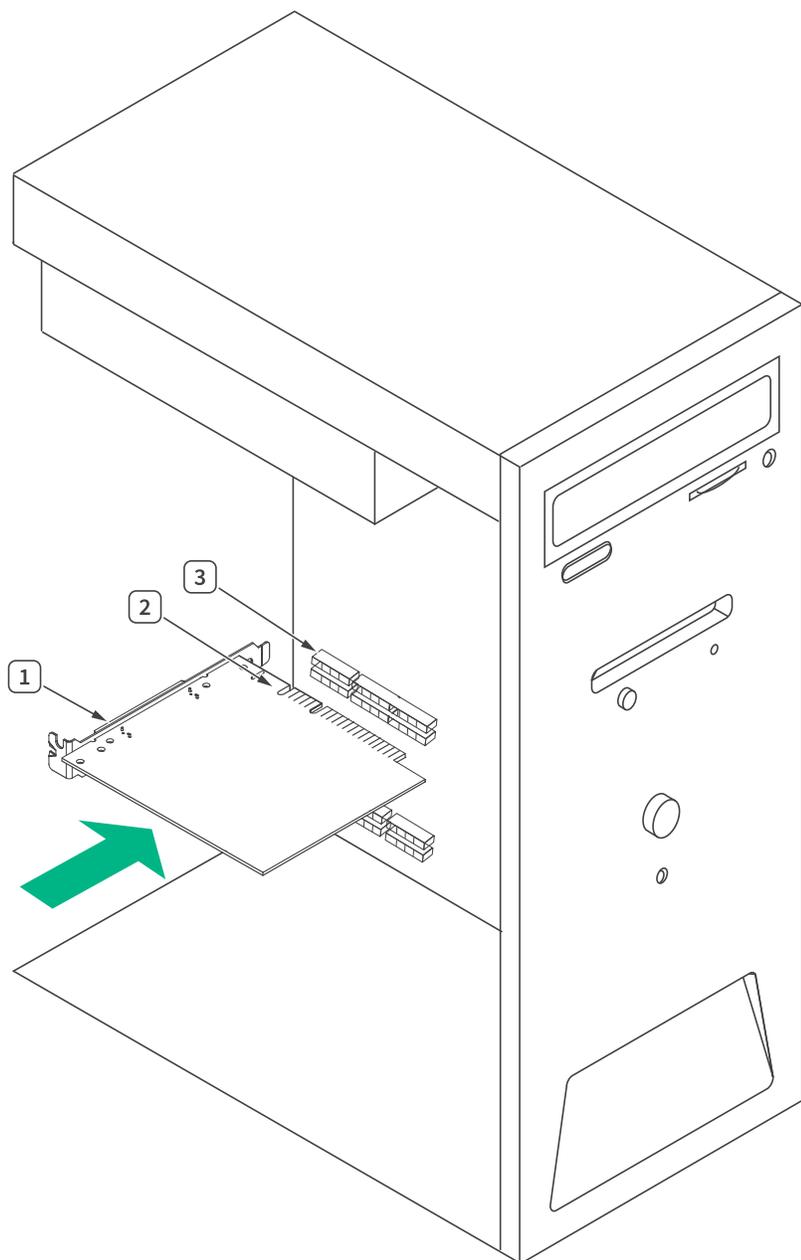
4. When the installer completes, select **Restart** in the dialog box that prompts you to restart, shut down, or restart later.

Related information:

- [PXI Platform Services Download](#)
- [NI Hardware and Software Operating System Compatibility](#)

Installing the PCIe-8383 in a Computer

Figure 6. Installing a PCIe-8383 in a Computer



1. PCIe-8383
2. PCI Express x8 Card-Edge Connector
3. PCI Express Slot (x8 or wider)



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-8383 in a slot intended for a graphics card.

1. Power off your computer

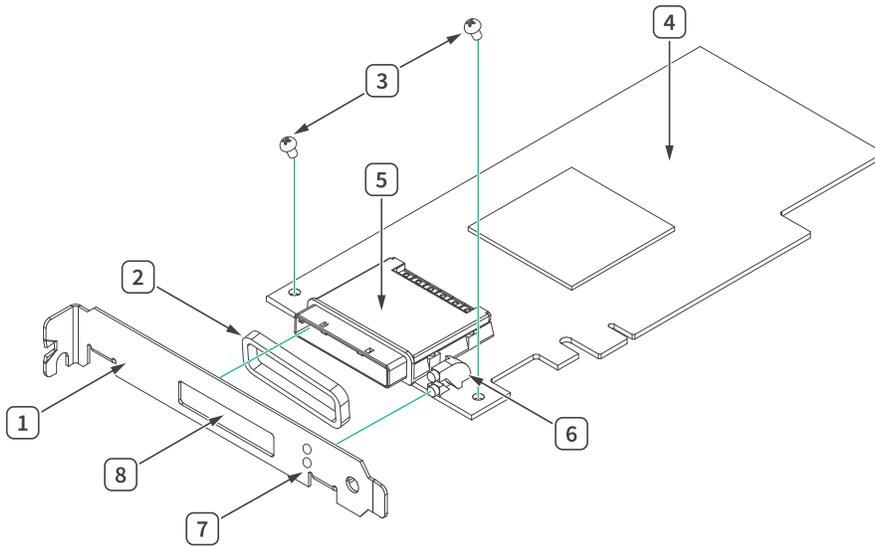


Caution To protect yourself and the computer from electrical hazards, your computer should remain off until you finish installing all hardware as instructed.

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 below.
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.

Installing the Low-Profile Bracket on the PCIe-8383 (Optional)

Figure 7. Removing the Standard Bracket from the PCIe-8383



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

To install the PCIe-8383 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.

1. Remove the standard height front bracket already installed on the PCIe-8383 card by removing the two 4-40 × 3/16 in. Phillips head screws that attach the bracket to the card.
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. 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-8383.
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).

Connecting the PCIe-8383 to the Chassis

Refer to the **Cables** page linked below for MXI-Express x8 copper cables available from NI.



Notice 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.



Note The cables have no polarity, so either end may be connected to either card.

1. Connect one end of the MXI-Express x8 cable to the PCIe-8383.
2. Connect the other end of the cable to the PXIe-8381 board installed in the chassis.

Related reference:

- [Cables](#)

Powering On the MXI-Express Gen 2 x8 System

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 assume that all PCI devices in the entire hierarchy will be available as soon as code execution begins at power-up time. Therefore, you

must turn on all of the expansion chassis before turning on the host PC for the BIOS and OS to correctly configure a MXI-Express Gen 2 x8 system.

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



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.

2. Power on the host PC.

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.

3. Check the LED status on the PCIe-8383 and PXI Express board(s). 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 **PCIe-8383 LED Indicators** page linked below for more information.

Related reference:

- [PCIe-8383 LED Indicators](#)

Powering Off the MXI-Express Gen 2 x8 System

Because operating systems and drivers commonly assume that PCI devices will be present in the system from power-up to power-down, it is important that you power off the host PC before powering off the expansion chassis. 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, powering off the chassis while the host is on is not recommended.

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

Configuring Your System

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

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