PCIe-8364 User Manual

2025-03-26

Contents

PCIe-8364 User Manual

The PCIe-8364 User Manual provides detailed descriptions of the product functionality and the step by step processes for use.

Looking for Something Else?

For information not found in the User Manual for your product, such as specifications and API reference, browse ***Related Information***.

Related information:

- PCIe-8364 Specifications
- Software and Driver Downloads
- Release Notes
- License Setup and Activation
- Dimensional Drawings
- Product Certifications
- Letter of Volatility
- Discussion Forums
- NI Learning Center

PCIe-8364 Overview

The PCIe-8364 MXI-Express x1 functions as a two-port cabled PCI Express x1 link that enables control of devices installed in a PXI, PXI Express, VXI, or CompactRIO chassis through the use of desktop computers, workstations, laptops or any other host controller with a PCI, PCI Express, or ExpressCard slot.

The PCIe-8364 provides the following functionalities:

- Control a PXI/PXI Express/CompactPCI/CompactPCI Express, CompactRIO, or VXI backplane with a PCI, PCI Express, or ExpressCard-based PC or laptop/mobile host adapter.
- Physically separate the measurement or automation system from a host PC or laptop.
- Combine PCI Express, CompactPCI, CompactPCI Express, PXI, PXI Express, and CompactRIO devices into the same system.

PCIe-8364 Driver Support

Determine the earliest driver version supported for your product.

Tip To optimize product performance, update to the most recent driver version.

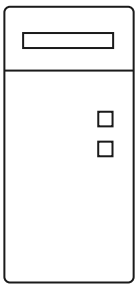
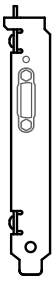
Table 3. PCIe-8364 Earliest Driver Version Support

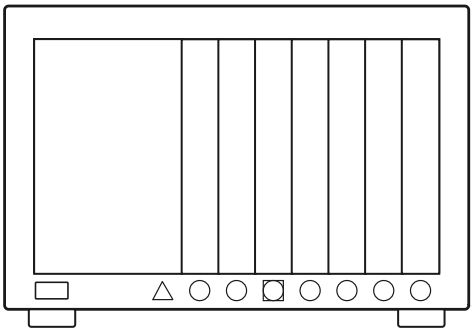
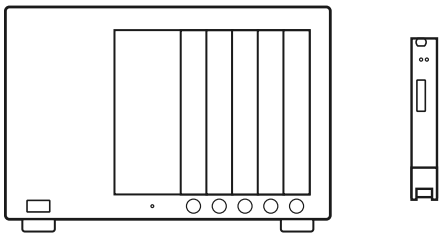
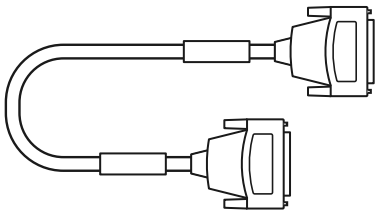
Driver Name	Earliest Version Support
PXI Platform Services	2025 Q1

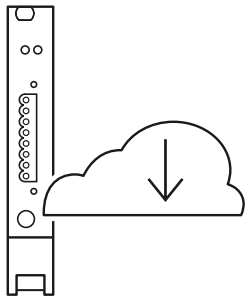
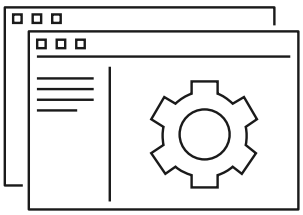
Components of a PCIe-8364 System

PCIe-8364 is designed for use in a system that might require hardware, drivers, and software to optimize PCIe-8364 for your application. Use the minimum required PCIe-8364 system components as a starting point for building your system.

Table 4. Minimum Required PCIe-8364 System Components

Component	Description and Recommendations
Host Computer 	A laptop or PC with a PCI Express expansion slot houses the PCIe-8364 and supplies power for PCIe-8364 functions.
PXI Remote Control Device 	Your PCIe-8364 MXI-Express x1 target board installs in the host computer. The PCIe-8364 connects to the host board with an x1 copper cable.
Expansion PXI Express or CompactPCI Express Chassis	The PXIe chassis houses the PXI remote control target board and application instruments to interface with the PCIe-8364. **Note** If your system uses a MXI Express chassis, an expansion PXI Express or CompactPCI Express chassis is not required to use the PCIe-8364.

Component	Description and Recommendations
	
MXI-Express Chassis or Target Controller 	A MXI Express chassis or MXI Express target controller installed in the PXI chassis, which allows you to control PXI and CompactPCI systems from your computer using a fully transparent MXI-Express link.
Cables and accessories 	Connect the PCIe-8364 in your computer to the PXI Express module in the chassis. Refer to ***Cables and Accessories*** for recommended cables and accessories and guidance.
PXI Platform Services driver	Instrument driver software that provides support for PXI chassis and controllers, implements PXI software specifications, and supplies system services to other NI products. **Note** For optimal performance, use the most current version of PXI Platform Services driver

Component	Description and Recommendations
	with the PCIe-8364. You can find the PXI Platform Services driver requirements in the ***PXI Platform Services Release Notes***.
NI Applications 	NI-DCPower offers driver support for the following applications: • InstrumentStudio • LabVIEW • LabWindows/CVI • C/C++ • .NET • Python

Related reference:

- Part Numbers for Recommended Cables and Accessories

PCIe-8364 Compatibility with Host PCs

The BIOS of some host PCs might not support the essential MXI-Express functionality. NI provides a combination of supplemental software and onboard PCIe-8364 features to address this issue.

The BIOS of some host PCs might not support the extension of the PCI-Express fabric. Since this extension is the primary function of MXI-Express products, those systems might not boot or function correctly. To address this issue, NI offers MXI-Express BIOS Compatibility software, available at ni.com/downloads. If you use MXI-Express BIOS Compatibility software, you must toggle the BIOS DIP switch on the PCIe-8364 to enable BIOS compatibility.

Note

Unless MXI-Express BIOS Compatibility software is installed on the host PC, the BIOS DIP switch must remain in the disabled (default) position. If the BIOS mode is enabled on the PCIe-8364 without the MXI-Express BIOS Compatibility Software installed on the host PC, the connected devices will not be detected by the operating system.

Refer to ***DIP Switches*** for more information. Refer to ***Block Diagram*** for the location of the DIP switch.

Related concepts:

- PCIe-8364 DIP Switch

Related reference:

- PCIe-8364 Block Diagram

Part Numbers for Recommended Cables and Accessories

Use part numbers to purchase the cables and the accessories for optimizing the performance of PCIe-8364.

Table 5. Part numbers for recommended cables and accessories

Accessory or cable	Description	Part number
MXI-Express Cable, Gen 1 x1, Copper	MXI-Express Cable, Gen 1 x1, Copper	779500-01 (1 m) 779500-03 (3 m) 779500-07 (7 m)

Supported Targets with the PCIe-8364

This section provides information on compatible targets for the PCIe-8364.

Refer to ni.com to find the latest available PXI Remote Control Modules and supported chassis.

Table 6. Supported Targets with the PCIe-8364

Target	Description
PXIe-8360	PXI Express remote control module. This module is no longer available on ni.com.
PXIe-8361	PXI Express remote control module.
PXIe-1073	PXI Express chassis with an integrated MXI-Express controller.
PXI-8360	PXI remote control module. This module is no longer available on ni.com.
PXI-1033	PXI chassis with an integrated MXI-Express controller. This chassis is no longer available on ni.com.
VXI-8360T	VXI-MXI-Express trigger board
NI-9157	MXI-Express CompactRIO chassis. This chassis is no longer available on ni.com.
NI-9159	MXI-Express CompactRIO chassis. This chassis is no longer available on ni.com.

Note For installation instructions and other information concerning the modules and chassis listed, refer to their respective user manuals.

PCIe-8364 Theory of Operation

The PCIe-8364 remote controller has two ports that each provide a x1 PCI Express link over a copper cable to a PXI Express remote control module, used for PXI system control.

MXI-Express x1 is based on PCI Express technology. An MXI-Express x1 kit might use a combination of PCI Express switches or PCI Express-to-PCI bridges. These PCIe interconnects enable control of a PXI or PXI Express chassis from a PC with an available PCI, PCI Express, or ExpressCard slot. The bridge architecture is transparent to device drivers. No additional software is required for CompactPCI level support for PXI or PXI Express devices in connected chassis.

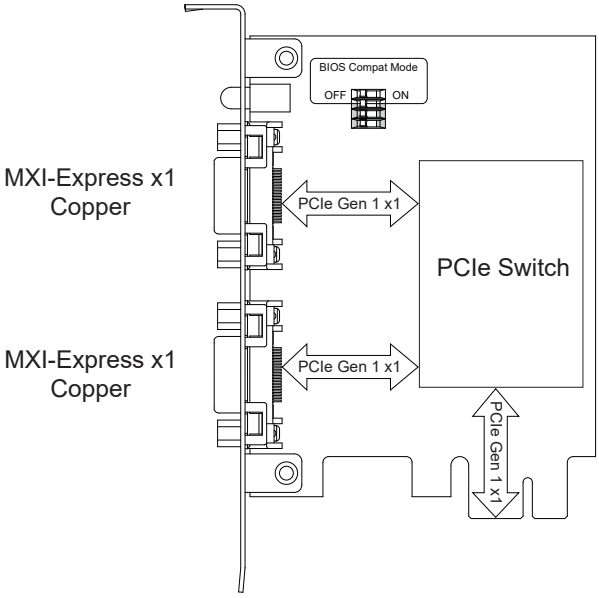
Note For full PXI/PXI Express functionality such as chassis and controller identification, trigger routing, and slot detection, install the PXI Platform Services software from ni.com/downloads.

The link between a PC and chassis is a x1 cabled PCI Express link. This link is a dual-simplex communication channel containing a low-voltage, differentially driven signal pair. The link can transmit at a rate of 2.5 Gb/s in each direction simultaneously. This port is not compatible with the cabled PCI Express specification developed by the PCI-SIG.

PCIe-8364 Block Diagram

Block diagrams describe the hardware architecture of your instrument and the paths that signals take through components of the instrument.

Figure 1. PCIe-8364 Block Diagram

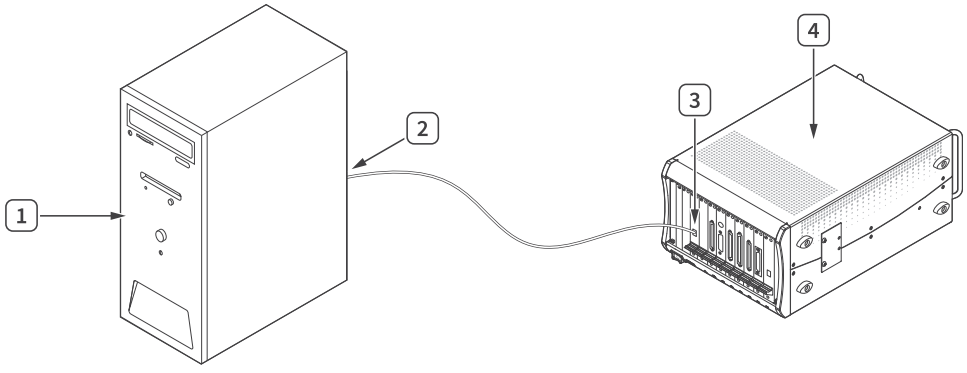


Connecting the PCIe-8364 in Basic MXI-Express x1 System Topologies

The simplest MXI-Express x1 system can consist of a host board connected to a target board installed in the controller slot of a chassis or integrated port of a chassis.

The following figure shows an example configuration.

Figure 2. Example of a Basic MXI-Express x1 Line Topologies



1. Host PC
2. PCIe-8364
3. PXI Remote Control Target Module
4. PXI Express Expansion Chassis

Note You can use a CompactPCI Express chassis instead of a PXI Express chassis.

Note For installation instructions and other information concerning the target chassis or other MXI Express modules, refer to their respective user manuals on ni.com/docs.

Note PCI Express host slots will give better throughput and latency performance than PCI slots.

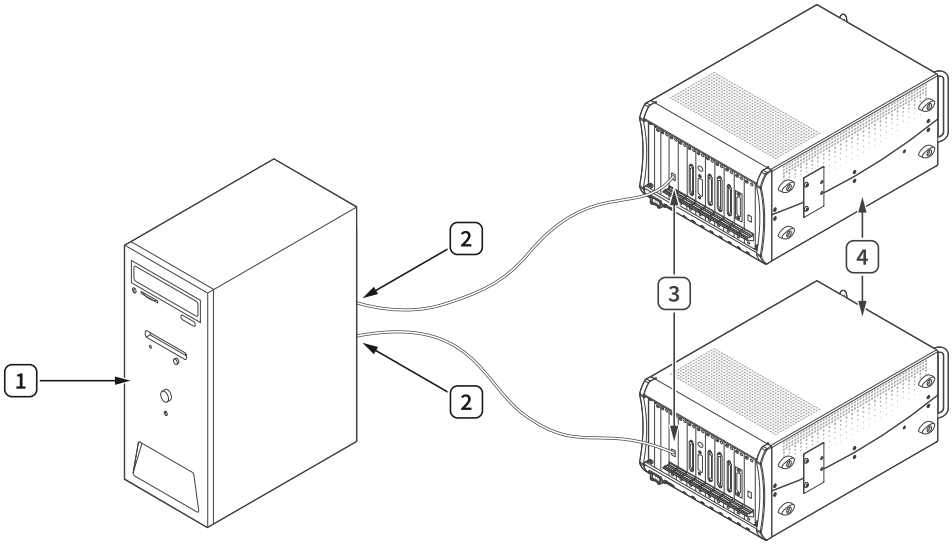
Connecting the PCIe-8364 in Larger MXI-Express x1 System Topologies

By leveraging the PCI Express technology used in MXI-Express x1 products, you can connect more than a single chassis to a host controller.

The PCIe-8364 has two MXI-Express x1 ports. This allows for connecting two targets simultaneously, also known as a star configuration or star topology. Also, if multiple PCI or PCI Express slots are available in the host PC, you can connect additional PXI or PXI Express chassis by installing additional NI MXI Express x1 host boards to achieve the same star topology.

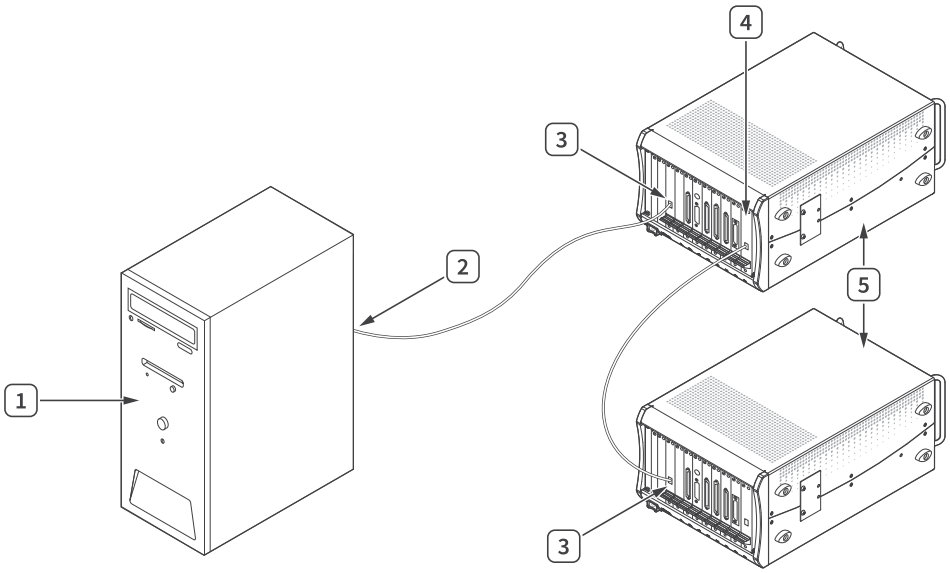
You can also daisy-chain from a chassis that is already controlled by an embedded controller or host computer to additional chassis using MXI-Express x1 products.

Figure 3. Example of MXI-Express x1 System Expansion Star Topology



1. Host PC
2. PCIe-8364
3. PXI Remote Control Target Module
4. PXI Express Expansion Chassis

Figure 4. Example of MXI-Express x1 System Expansion Daisy-Chain Topology

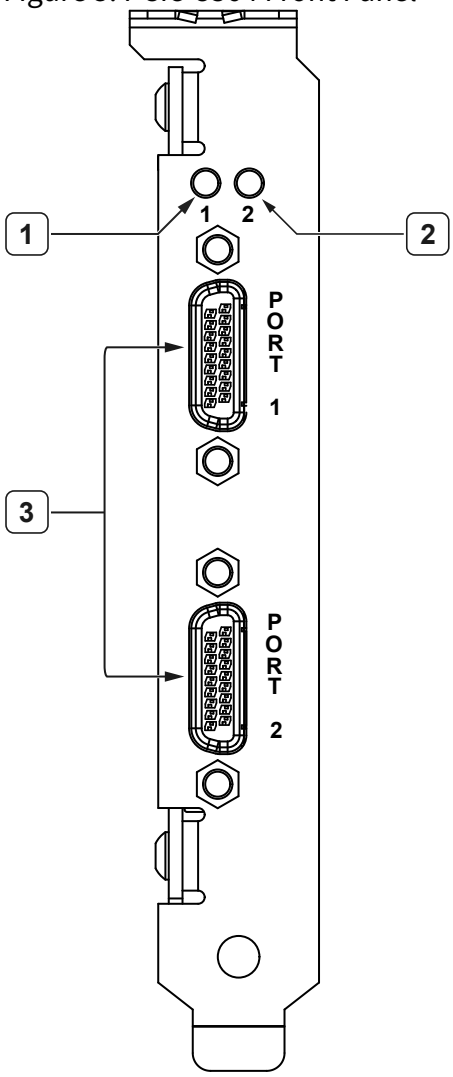


1. Host PC
2. PCIe-8364
3. PXI Remote Control Target Module
4. PXI Bus Extension Module
5. PXI Express Expansion Chassis

Note For installation instructions and other information concerning the target chassis or other MXI Express modules, refer to their respective user manuals on ni.com/docs.

PCIe-8364 Front Panel

Figure 5. PCIe-8364 Front Panel



1. Port 1 POWER/LINK LED
2. Port 2 POWER/LINK LED
3. MXI-Express Ports

PCIe-8364 Pinout

Use the pinout to identify terminals on the PCIe-8364.

Figure 6. PCIe-8364 connector pinout

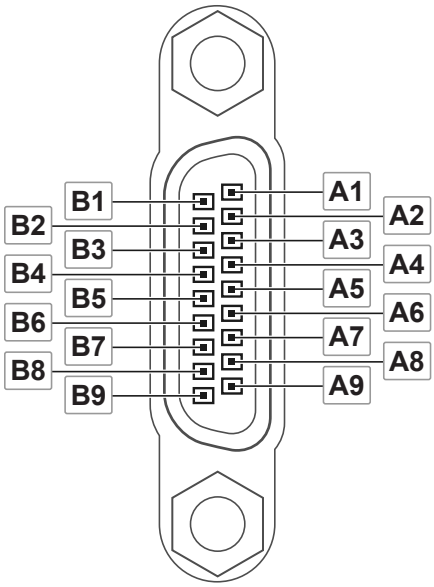


Table 7. Signal descriptions

Pin Number	Signal	Description
A1	PERn0	Differential PCI Express receiver lane
A2	PERp0	Differential PCI Express receiver lane
A3	NC	No connect
A4	GND	Ground reference for PCI Express receiver lane
A5	CREFCLKn	Differential 100 MHz cable reference clock
A6	CREFCLKp	Differential 100 MHz cable reference clock
A7	GND	Ground reference for cable reference clock
A8	CPERST#	Cable PERST#
A9	GND	Ground reference for PCI Express transmitter lane
B1	GND	Ground reference for PCI Express receiver lane
B2	NC	No connect

Pin Number	Signal	Description
B3	CWAKE#	Power management signal for ***Wakeup*** events (optional)
B4	CPRSNT#	Detects the following: • whether a cable is installed • whether the downstream subsystem is powered
B5	GND	Ground reference for cable reference clock
B6	NC	No connect
B7	CPWRON	Upstream subsystem ***Power Valid*** notification
B8	PETn0	Differential PCI Express transmitter lane
B9	PETp0	Differential PCI Express transmitter lane

PCIe-8364 LED Indicators

The LEDs, located on the device front panel and PCB, indicate status of the device power and communication.

POWER/LINK LEDs

The POWER/LINK LEDs, labeled **1** and **2** on the device front panel, indicate device power and expansion chassis link status for each corresponding port (Port 1 and Port 2).

Table 8. POWER/LINK LED Indicator Status

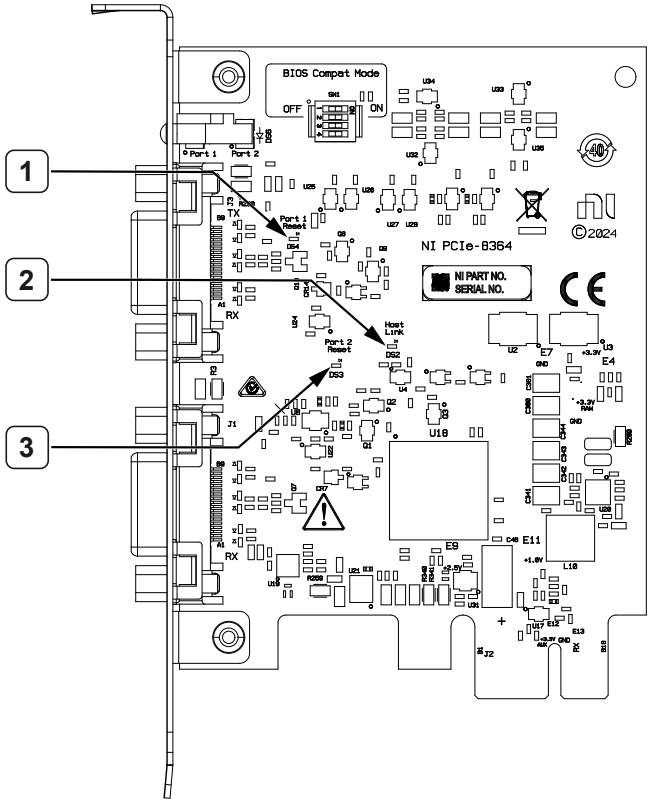
Status Indicator	Device State
(Off)	Not powered.
Blinking red	Power is outside of device specifications.
Solid amber	Power is within specifications, but no link to the chassis is established.
Solid green	Power is within specifications and the link to the chassis is established.

Note When powering on the host PC, there is an approximate one second delay before the actual link status displays. During this delay, the LED indicator is green. An invalid status lasting less than one second is not visible through the LED Indicators.

Cable and Host Link Status LEDs

Onboard LEDs on the bottom of the board indicate the link status of the MXI-Express cable ports and host link.

Figure 7. Onboard LED Locations



1. Port 1 Cable Status LED
2. Host Link LED
3. Port 2 Cable Status LED

Table 9. Host Link LED Indicator Status

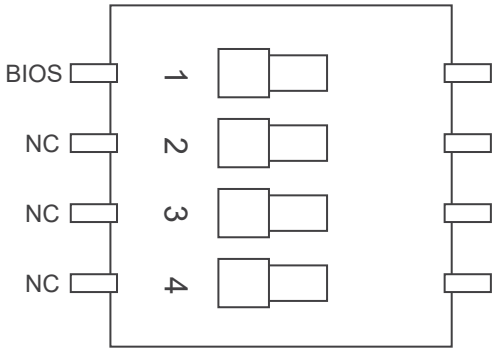
Status Indicator	Device State
Off	A link is not established between the chassis and the host computer.
Blinking green	A link is established between the chassis and the host computer.

Note Port 1/Port 2 Cable Status LEDs are internal signals that light when the PCIe-8364 asserts the cable port(s) PCIe Reset.

PCIe-8364 DIP Switch

The PCIe-8364 has a DIP switch with four switches, located on the top-left corner of the board as shown in the PCIe-8364 block diagram. Refer to the ***PCIe-8364 Block Diagram*** to view the location of the DIP switch.

Figure 8. PCIe-8364 DIP Switch



1. BIOS Switch
2. NC = No connect
3. NC = No connect
4. NC = No connect

Related reference:

- PCIe-8364 Block Diagram

PCIe-8364 BIOS Switch

The BIOS switch (DIP switch 1) 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*** section linked below for more information on BIOS compatibility.

Table 10. BIOS Switch Functions

Position	Function
Left (default)	Disabled (show downstream devices)
Right	Enabled (hide downstream devices)

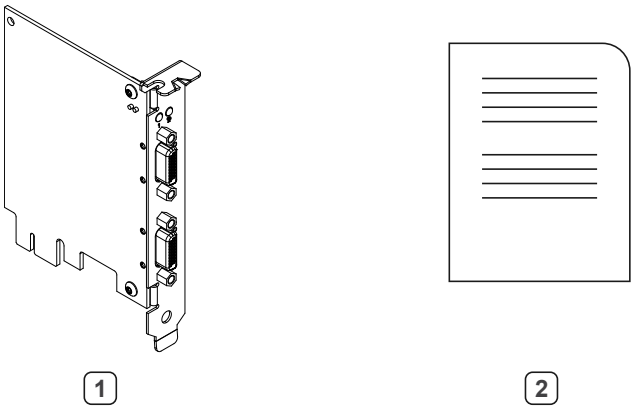
Related concepts:

- PCIe-8364 Compatibility with Host PCs

PCIe-8364 Kit Contents

Identify the contents of the PCIe-8364 kit.

Figure 9. PCIe-8364 Kit Contents



1. PCIe-8364 Device
2. Documentation

PCIe-8364 Safety Guidelines

Follow these guidelines to use the PCIe-8364 safely.

Guidelines apply to all PCIe-8364 instruments unless otherwise noted.

Notice For comprehensive safety information, refer to the safety, environmental, and regulatory information document that shipped with your hardware.

Caution Observe all instructions and cautions in the user documentation. Using the product in a manner not specified can damage the product and compromise the built-in safety protection.

Notice This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Notice Operate this product only with shielded cables and accessories.

Notice The length of MXI-Express cables must be no longer than 7 m (23 ft).

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit `ni.com/product-certifications`, search by model number, and click the appropriate link.

Related information:

- Product Certifications

Setting up the PCIe-8364

Install the PCIe-8364 into a host PC and prepare it for use.

1. Unpacking the Kit
   Take precautions to prevent electrostatic discharge when unpacking and inspecting your hardware.
2. Installing the Software
   To use the PCIe-8364, install PXI Platform Services software.
3. Installing the PCIe-8364
   Install the PCIe-8364 in your host computer.
4. Verifying the Installation
   Before using the PCIe-8364, verify that it is installed correctly through Hardware Configuration Utility or Measurement & Automation Explorer (MAX).

Unpacking the Kit

Take precautions to prevent electrostatic discharge when unpacking and inspecting your hardware.

> **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.

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

Installing the Software

To use the PCIe-8364, install PXI Platform Services software.

You must be an Administrator to install NI software on your computer.

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

Note For operating system support information, refer to ni.com/r/hw-support.

Installing the PCIe-8364

Install the PCIe-8364 in your host computer.

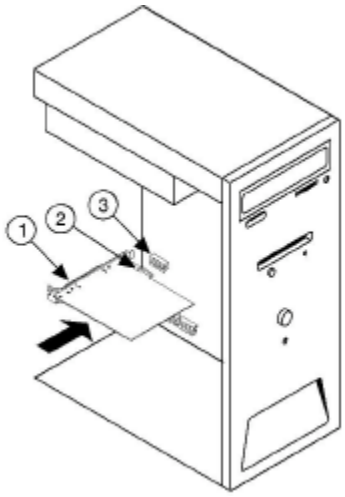
Caution To protect the user and the computer from electrical hazards, ensure the host computer remains powered off during installation.

1. Power off and unplug your host computer.

   Note To allow any stored energy in the power supply to dissipate fully, wait 30 seconds before proceeding.

2. Access the computer system expansion slots. This step might require you to remove one or more access panels on the computer case.

3. Select any available PCI Express (x1 or wider) expansion slot and remove the corresponding slot cover.
4. Touch a metal part of computer to discharge any static electricity.
5. Insert the PCIe-8364 into the applicable PCI Express system slot. Gently rock the device into place. Do not force the device into place.



   1. PCIe-8364
   2. PCI Express x1 System Slot
   3. PCI Express Slot
6. Secure the device mounting bracket to the computer back panel rail.

> **Note** Tightening the top and bottom mounting screws increases mechanical stability and also electrically connects the front panel to the chassis. Doing this can improve the signal quality and electromagnetic performance.

7. Replace any access panels on the computer case.
8. Plug in and power on the computer.

Verifying the Installation

Before using the PCIe-8364, verify that it is installed correctly through Hardware Configuration Utility or Measurement & Automation Explorer (MAX).

Verifying the Installation Using Hardware Configuration Utility

Before using the PCIe-8364, verify that it is installed correctly through Hardware

Configuration Utility.

1. Verifying the Installation in Hardware Configuration Utility
   NI recommends using Hardware Configuration Utility to perform and to validate initial hardware configuration.

Verifying the Installation in Hardware Configuration Utility

NI recommends using Hardware Configuration Utility to perform and to validate initial hardware configuration.

1. Open Hardware Configuration Utility.
   The PCIe-8364 appears in the system pane automatically.
2. Record the name that Hardware Configuration Utility assigns to the PCIe-8364 or provide a custom name.
   Use this name when programming the PCIe-8364.
3. Validate that your instrument is installed correctly: select the PCIe-8364 module in the system pane, expand the **Troubleshooting** area of the configuration pane, and click **Self-test**.
   Hardware Configuration Utility reports when it has validated the hardware setup.

What Should I Do If the PCIe-8364 Does Not Appear in Hardware Configuration Utility?

Check if you must refresh the connection between the hardware and the software in Hardware Configuration Utility.

1. Click the refresh button ().
2. If the PCIe-8364 is still not listed, complete the following steps.
   a. Power off the system.
   b. Ensure that all hardware is correctly installed.
   c. Restart the system.
3. Right-click the **Start** button and select **Device Manager**.
   a. Verify that a **National Instruments** entry appears in the system device list.
   b. If error conditions appear in the list, right-click the module you are using in the **Device Manager** and select **Update Driver**.

   If error conditions persist, reinstall the driver.

4. Restart your computer.
5. If the PCIe-8364 is still not listed, install the device in a different PCI Express expansion slot. Refer to ***Installing the PCIe-8364*** for the complete installation procedure.

Related tasks:

- Installing the PCIe-8364

What Should I Do If the PCIe-8364 Fails the Self-Test in Hardware Configuration Utility?

1. Reset the PCIe-8364 through Hardware Configuration Utility and then perform the self-test again.
2. Power off the entire system, wait 10 s, and then perform the self-test again.

> **Note** If the module fails the self-test again, contact NI or visit ni.com/support for further troubleshooting information.

Verifying the Installation Using Measurement & Automation Explorer (MAX)

Before using the PCIe-8364, verify that it is installed correctly through MAX.

1. Verifying the Installation in MAX
   To configure your NI hardware, use Measurement & Automation Explorer (MAX).

Verifying the Installation in MAX

To configure your NI hardware, use Measurement & Automation Explorer (MAX).

MAX informs other programs about the NI hardware products in the system and their hardware configuration. MAX is automatically installed with the driver.

> **Note** MAX is not available on Linux.

1. Launch MAX.
2. In the configuration tree, expand **Devices and Interfaces** to see the list of installed NI hardware.

   > **Note** If you do not see the device in the list, press **<F5>** to refresh the list of installed devices. If the device is still not listed, power off the system, ensure that the device is correctly installed, and restart.

3. Record the name MAX assigns to the hardware. Use this identifier when programming the PCIe-8364.
4. Self-test the hardware by selecting the item in the configuration tree and clicking **Self-Test** in the MAX toolbar.
   MAX self-test performs a basic verification of hardware resources.

What Should I Do If the PCIe-8364 Does Not Appear in MAX?

Check if you must refresh the connection between the hardware and the software in MAX.

1. In the MAX configuration tree, expand **Devices and Interfaces**. Press **<F5>** to refresh the list.
2. If the PCIe-8364 is still not listed, complete the following steps.
   a. Power off the system.
   b. Ensure that all hardware is correctly installed.
   c. Restart the system.
3. Right-click the **Start** button and select **Device Manager**.
   a. Verify that a **National Instruments** entry appears in the system device list.
   b. If error conditions appear in the list, right-click the module you are using in the **Device Manager** and select **Update Driver**.

   If error conditions persist, reinstall the driver.
4. Restart your computer.
5. If the PCIe-8364 is still not listed, install the device in a different PCI Express expansion slot. Refer to ***Installing the PCIe-8364*** for the complete installation procedure.

Related tasks:

- Installing the PCIe-8364

What Should I Do If the PCIe-8364 Fails the Self-Test in MAX?

1. Reset the PCIe-8364 through MAX and then perform the self-test again.
2. Power off the entire system, wait 10 s, and then perform the self-test again.

Note If the module fails the self-test again, contact NI or visit ni.com/support for further troubleshooting information.

Powering On and Off

Powering the PCIe-8364 On

Use the following method to safely power on the PCIe-8364.

Before powering on the system, ensure the following:

- The host device is installed.
- The MXI-Express cable is connected to target module.

1. Power on all of the expansion chassis in the order your application requires.
2. Power on the host PC.
   The PCIe-8364 displays a valid link/power status the device after the host PC is powered on. Refer to ***LED Indicators*** for more information.

> **Note** In some cases where there is an invalid MXI-Express x1 connection, some boards may report a valid link while others do not. When the host is powered on, ensure a valid link status across all connected MXI-Express x1 devices to ensure a valid configuration.

Powering the PCIe-8364 Off

Use the following method to safely power off the PCIe-8364.

1. Power off the host PC.
2. Power off the expansion chassis.

> **Note** Powering off the expansion chassis while the host PC is powered on can cause crashes or hangs. After the host PC is powered off, power off the expansion chassis in the order required for your application.

Cleaning and Maintaining the PCIe-8364

NI recommends the following to clean and maintain your device.

- Clean exterior surfaces with a dry, lint-free cloth or soft-bristle brush.
- Do not use abrasive compounds on any part of the product.
- Do not disassemble or remove any part of the enclosure of the product when cleaning.
- Contact NI Services (ni.com/support) for more information.

Caution Disconnect power and electrical connections before performing any cleaning of the product.

Caution Débranchez l’alimentation et les connexions électriques avant de nettoyer le produit.