PCIe-PXIe-8638 Series

ADLINK PXIe Extension Kit

User's Manual



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Revision History

Revision	Release Date	Description of Change(s)
2.0	2014-12-29	Initial release
2.1	2020-12-19	Added PXIe-8638D/P models.

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Preface

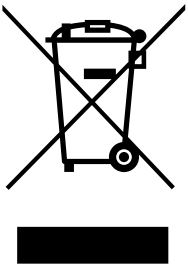
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Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.

NOTE: Additional information, aids, and tips that help users perform tasks.

CAUTION: Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

WARNING: Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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1 Introduction

The PCIe-PXIe-8638 PCI Express to PXI Express extension kit provides control of PXI Express modules installed in a PXIe chassis using high bandwidth PCI Express technology. The extension kit provides up to 4GB/s bandwidth using PCIe x8 Gen2 signaling. With comprehensive hardware and software transparency, the extension kit enables fast and convenient detection of any PXI modules installed in the system, requiring no additional drivers or software.

The host PC may be separated from the PXI Express chassis by up to five meters using high-quality shielded twisted copper cables. The robust and reliable PCIe to PXIe Extension Kit is suited for test and measurement applications with high-density I/O requirements and can be used in hazardous industrial control and automation environments.

The dual port PXIe-8638D provides the capability of multi-chassis control in a daisy chain configuration with the upper port connected to a PCIe-8638 installed in a host PC, or PXIe-8638D/PXIe-8638P in a PXI Express chassis, and the lower port connected to another PXIe-8638 or PXIe-8638D in subsequent chassis.

The PXIe-8638P supports multi-chassis expansion in a daisy or star chain configuration. A PXIe-8638P in a peripheral slot can connect to another chassis with a PXIe-8638 or PXIe-8638D to establish multi-chassis control.

1.1 Controlling a PXI Express System via PCI Express

Based on PCI Express technology, the PCIe to PXIe Extension Kit provides bus extension capability through a high-speed differential signal interface.

The PCIe-PXIe-8638 PCI Express-to-PXI Express expansion kit provides additional PXI instrument slots to the host computer by implementing PCI Express-based control of PXI modules. The technology consists of a PCIe-8638 host adapter installed in the host computer, a PCIe x8 cable, and a PXIe-8638 remote controller with the 3U (Eurocard) expansion module. The PCIe-8638 comes with a PCI Express x8 interface and a PCIe x8 cable connector.

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1.2 Specifications

	PCIe-8638	PXIe-8638	PXIe-8638D	PXIe-8638P
Format	Low Profile	Standard Profile		
Compliance	PCI Express Base Specifications Rev. 2.0	PXI-5 PXI Express Hardware Specification Rev. 2.0		
Dimensions	Low-profile PCI Express module 142(W) x 69(H) mm	PXI Express system module: 175 mm (W) x 107 mm (H)		PXIe Peripheral Module 175 mm (W) x 107 mm (H)
Up-Link Port	To Host PC PCIe: PCIe Gen2 x8	External Port: PCIe Gen2 x8		To PXIe chassis backplane: PCIe Gen2 x8
Down-Link Port	External Port: PCIe Gen2 x8	To PXIe chassis backplane: PCIe Gen2 Four-link configuration: x4 x4 x4 x4 Two-link configuration: x8 x16	To PXIe chassis backplane: PCIe Gen2 Four-link configuration: x4 x4 x4 x4 Two-link configuration: x8 x16 External Port: PCIe Gen2 x8	External Port: PCIe Gen2 x8
PXI Express Link Capability	N/A	Four-link configuration: x4 x4 x4 x4 Two-link configuration: x16 x8		
Data Bandwidth (max)	4GB/s (PCIe x8 Gen2)			
Power Consumption	4W (typical) 8W (max.)	Refer to Table 1.2		

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	PCIe-8638	PXIe-8638	PXIe-8638D	PXIe-8638P
Cable Length	Up to 5 meters for Gen2			
Operating Temperature	0°C to 55°C			
Storage Temperature	-20°C to 70°C			
Relative Humidity	10% to 90%, non-condensing			

Table 1-1: Model Specifications

Power Rail	12 V	3.3 V
Typical Current	0.85 A	1.3 A
Maximum Current	1.7 A	2.6 A

Table 1-2: PXIe-8638 Series Power Consumption



Insertion loss in sockets and accessory cable connectors may increase after frequent multiple insertions/removals, degrading signal integrity of high speed PCI Express transmission. For each PCIe-PXIe-8638 socket or accessory cable connector, more than 200 connections/disconnections can impede functionality and performance.

1.3 Features

- PXI-5 PXI Express hardware specification Rev. 2.0
- PCI Express® Base Specifications Rev. 2.0
- Maximum system throughput 4 GB/s
- PXI Express system slot link capability:
  - Four-link configuration: x4 x4 x4 x4
  - Two-link configuration: x16 x8
- Expansion up to 5m (expansion cables at 2 or 5m)
- Comprehensive hardware and software transparency

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1.4 Ordering Options

Product	Description
PCIe-PXIe-8638/2M	PXIe remote controller kit. PCIe-8638, PXIe-8638, and 2m cable.
PCIe-PXIe-8638/5M	PXIe remote controller kit. PCIe-8638, PXIe-8638, and 5m cable.
PCIe-PXIe-8638D/2M	PXIe remote controller kit. PCIe-8638, PXIe-8638D, and 2m cable.
PCIe-PXIe-8638D/5M	PXIe remote controller kit. PCIe-8638, PXIe-8638D, and 5m cable.
PCIe-8638	PCIe x8 host adapter for PCIe-to-PXIe cable extension.
PXIe-8638	PXIe remote controller for PCIe-to-PXIe cable extension.
PXIe-8638D	PXIe remote controller for PCIe-to-PXIe cable extension, dual ports.
PXIe-8638P	PXIe peripheral module for PCIe-to-PXIe cable extension.
2m Cable for PCIe/PXIe-8638 SAS 2*4 Cable Assembly	2m PCIe x8 cable
5m PCIe x8 Cable for PCIe/PXIe-8638	5m PCIe x8 cable

Table 1-3: Ordering Options

1.5 Applications

These extension kits are suitable for:

- Electronics manufacturing testing
- High-density I/O systems
- Industrial automation and control
- Military and aerospace
- Testing systems for remote and/or harsh environments
- Video capture

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1.6 PXI Platform Services Installation

It is recommended that ADLINK PXI Platform Services be downloaded and installed prior to operation. See the ADLINK **PXI Platform Services User's Manual** for more details.

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2 Getting Started


NOTE:

Diagrams and images of equipment are for reference only. The actual system appearance may vary.

2.1 PCIe-PXIe-8638 Kit Package Contents

- PCI-8638 (PCI Express x8 host adapter for extension kit)
- PXIe-8638 Series (PXI Express remote controller)
- PCI Express x8 cable assembly (2 or 5m)
- Quick Start Guide


NOTE:

If any of the items in the contents list are missing or damaged, contact your ADLINK dealer.

2.2 Installation Environment

Whenever unpacking and preparing to install any equipment described in this manual, refer to the ***Appendix B, Important Safety Instructions:***.

Install equipment in well lit areas on flat, sturdy surfaces with access to basic tools such as flat and cross-head screwdrivers.

The PCIe to PXIe Extension Kit contains several electrostatic sensitive components that can be easily damaged by static electricity. For this reason, the modules and chassis should be handled on a grounded anti-static mat and the operator should wear an anti-static wristband during the unpacking and installation procedure.

Inspect the components for any damage. Improper shipping and handling may cause damage to the components. Be sure there is no damage to the components before continuing with the installation.

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Do not apply power to damaged equipment.

2.3 Installing the PCIe-8638 on a Host Computer

1. Power-off the host computer.
2. Unscrew the housing of the host computer using a (cross-head or flat-head) screwdriver. Open the housing.
3. Locate the PCI Express® extension module (PCIe-8638) and remove it from its packaging. (Wear anti-static gloves and use an anti-static surface when handling the module).
4. Install the PCIe-8638 in an available x8 or x16 PCI Express slot in the host computer. Be sure to firmly attach the PCIe-8638's bracket to the backplane of the host PC.
5. Close the chassis and re-install the housing screws.

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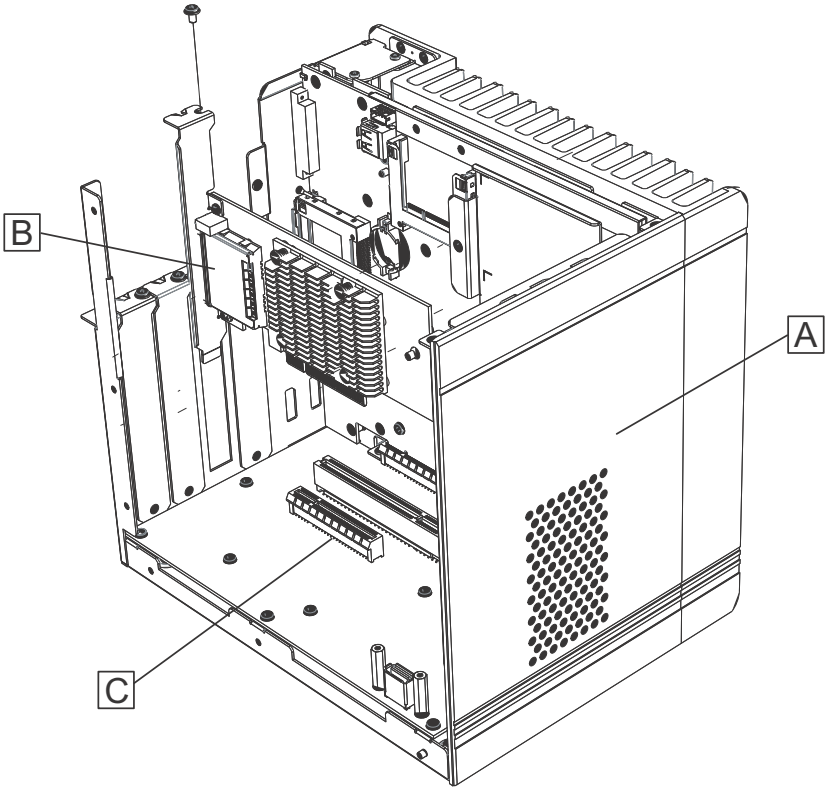


Figure 2-1: PCIe-8638 to Host PC Installation

Item	Description
A	Industrial or desktop PC with PCI Express x8 slot
B	PCIe-8638 (PCI Express host module)
C	PCI Express x8 slot

Table 2-1: PCIe-8638 to Host PC Installation Legend

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2.4 PXIe-8638 Series to PXIe Chassis Installation

2.4.1 PXIe-8638/D to PXIe Chassis Installation

1. Remove the cover panel of the system slot.
2. Locate the PXIe-8638/PXIe-8638D and remove it from its packaging. (Wear anti-static gloves and use an anti-static surface when handling the module).
3. Insert the PXIe-8638/PXIe-8638D into the system slot and tighten the bracket-retaining screws on the top and bottom of the panel to fasten the PXIe-8638/PXIe-8638D to the chassis.

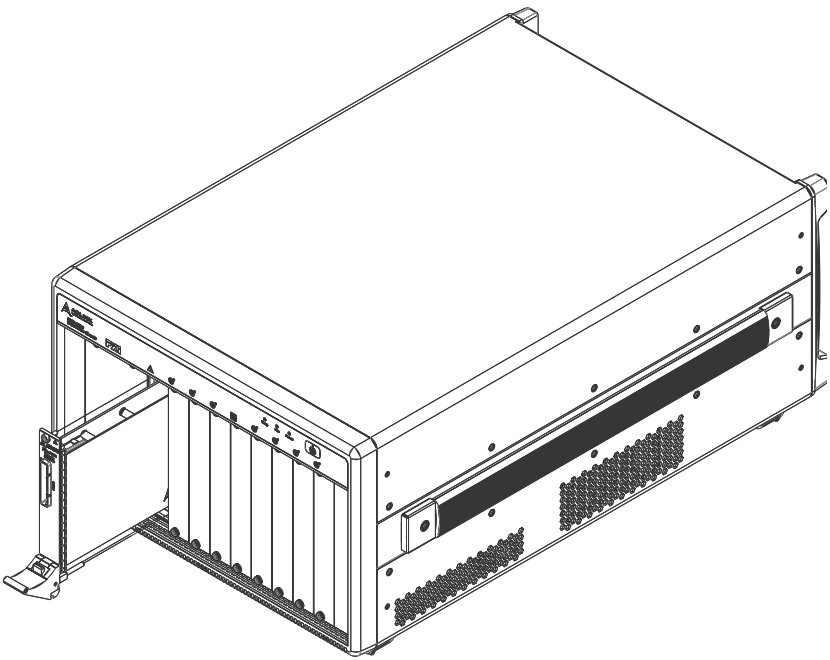


Figure 2-2: PXIe-8638(D) to PXI™ Chassis Installation Diagram

WARNING:

The PXIe-8638/PXIe-8638D must be installed into the PXI™ system slot. Peripheral slots must not be used.

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2.4.2 PXIe-8638P to PXIe Chassis Installation

1. Remove the cover panel of the peripheral slot assigned for connecting to an extension chassis based on application requirements.
2. Locate the PXIe-8638P and remove it from its packaging. (Wear anti-static gloves and use an anti-static surface when handling the module).
3. Insert the PXIe-8638P into the peripheral slot and tighten the bracket-retaining screws on the top and bottom of the panel to fasten the PXIe-8638P to the chassis.

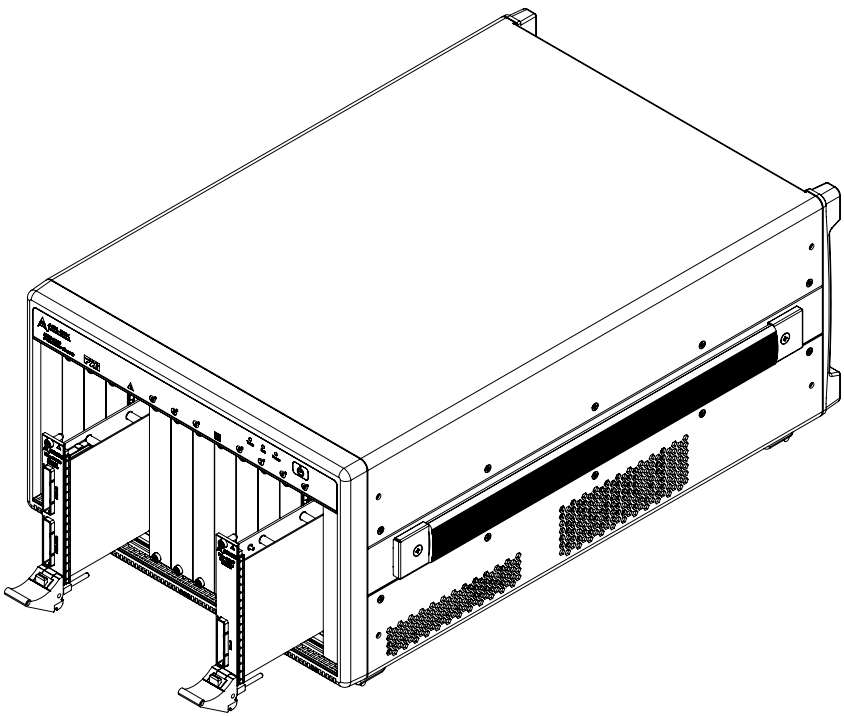


Figure 2-3: PXIe-8638D/P to PXI Chassis Installation Diagram

WARNING:

The PXIe-8638P must be installed into the PXI peripheral slot, System slots may not be used.

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2.5 Cabling the Host Computer to a PXI Chassis

Connect the PCIe cable assembly between the PCIe-8638, PXIe-8638, PXIe-8638D, and/or PXIe-8638P.

CAUTION:

Removing the PCIe cable assembly after the system is powered on may cause system errors or data loss. If the cable is unplugged improperly, reconnect it and reboot the host PC and PXI chassis.



Figure 2-4: PCIe x8 Cable Assembly

1. Connect the cable assembly to the external port on the bracket of the PCIe-8638 located in the host PC.
2. Connect the other end of the cable assembly to the external port of the PXIe-8638 or uplink port of the PXIe-8638D installed into the system slot of the PXI Express chassis.

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3. In a multiple PXI Express chassis configuration, connect another cable assembly to the downlink port of the PXIe-8638D or external port of the PXIe-8638P installed into the first PXI Express chassis. Then, connect the other end of cable assembly to the external port of the PXIe-8638 or uplink port of the PXIe-8638D installed into the system slot of the next PXI Express chassis.

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2.6 Configuration Block Diagrams

2.6.1 PC to PXIe Chassis

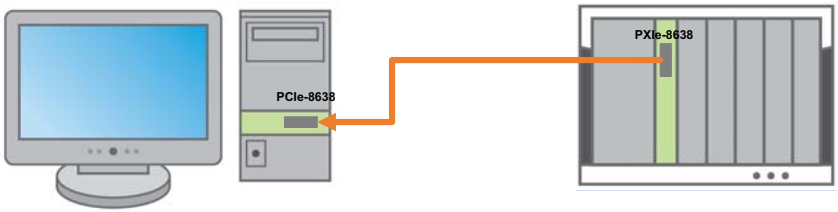


Figure 2-5: PC to PXIe Chassis

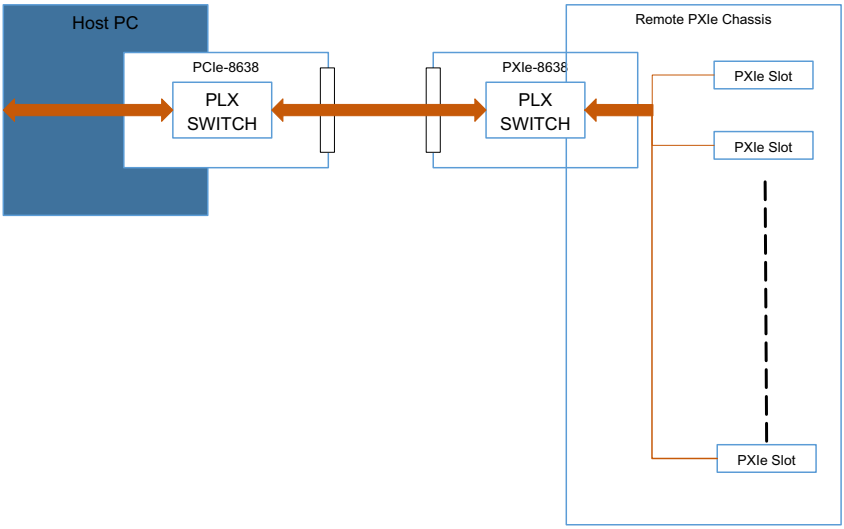


Figure 2-6: PC to PXIe Chassis Block Diagram

2.6.2 PC to PXIe Chassis (Star Topology)

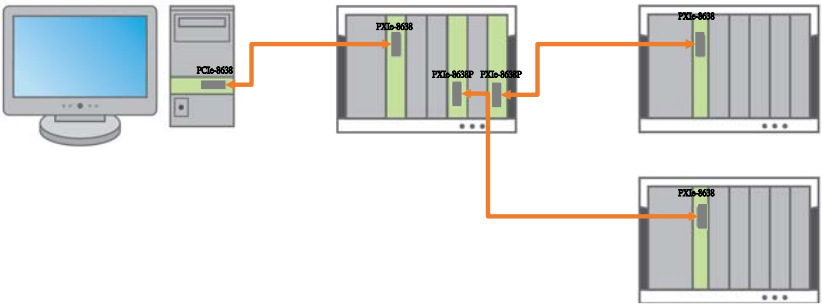


Figure 2-7: PC to PXIe Chassis (Star Topology)

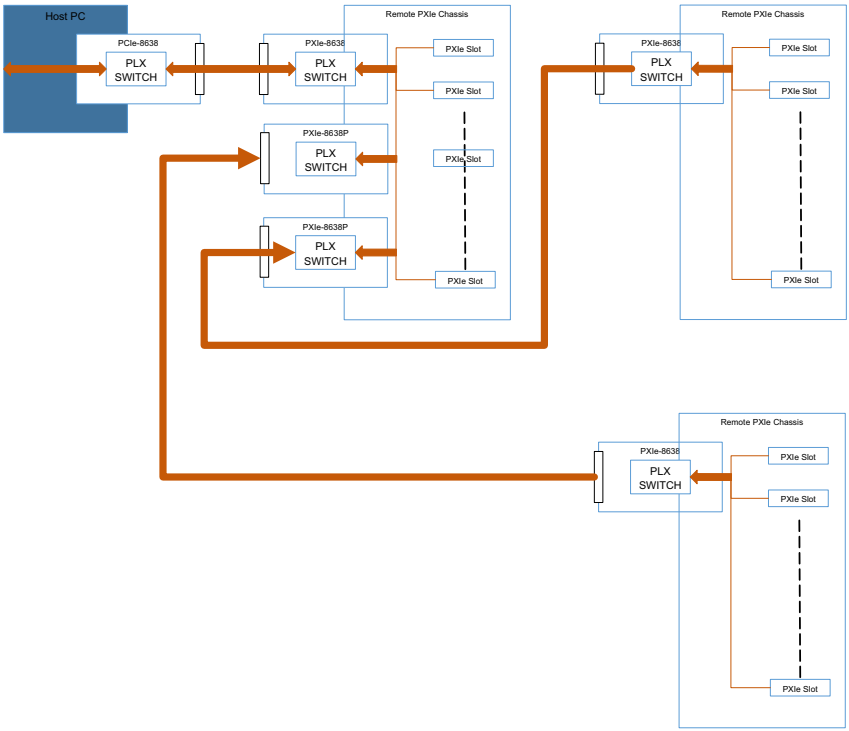


Figure 2-8: PC to PXIe Block Diagram (Star Topology)

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2.6.3 PC to PXIe Chassis (Daisy Chain Topology)

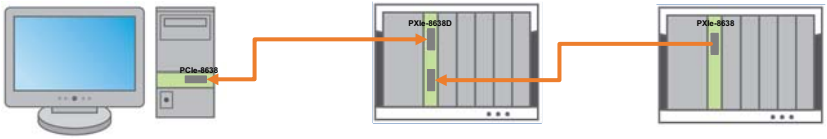


Figure 2-9: PC to PXIe Chassis (Daisy Chain Topology)

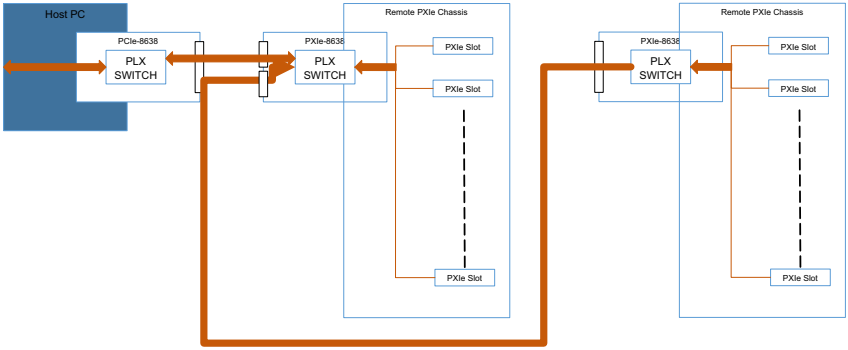


Figure 2-10: PC to PXIe Block Diagram (Daisy Chain Topology)

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2.6.4 PXIe to PXIe Chassis Connection



Figure 2-11: PXIe to PXIe Chassis Connection

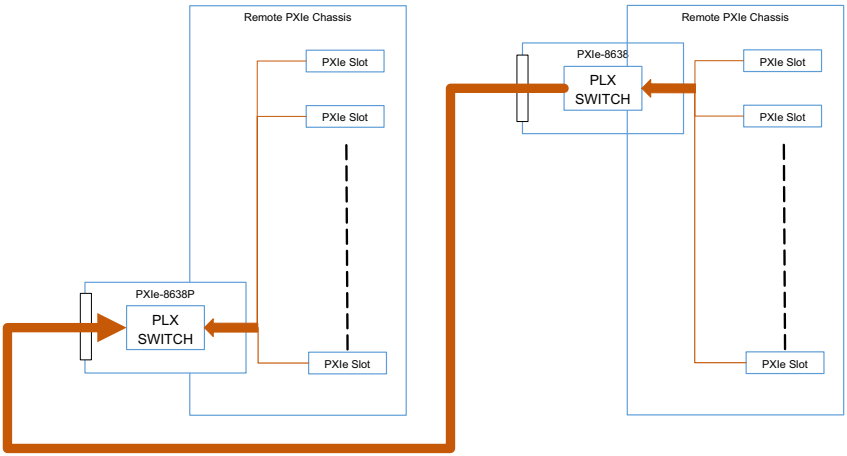


Figure 2-12: PXIe to PXIe Chassis Connection Block Diagram

2.7 Power On/Off Sequence

To power-on the PCIe to PXIe Extension Kit:

1. Ensure that the extension cable is properly connected to the host PC and PXIe chassis.
2. In a single chassis configuraiton, power on the PXIe chassis. In a multiple chassis configuration, power on the most subordinate chassis in the configuration first, then power on the uplink chassis. Continue until all chassis are powered on.
3. When the status LEDs of the PXI Express chassis and all installed modules indicate ready, power on the host PC.



DO NOT remove the cable after the system and PXIe chassis are powered on. Disconnecting the cable while the system is running may cause unpredictable system errors and/or a system crash.

As the PCIe to PXIe Extension Kit is equipped with a standard PCIe switch, the BIOS will identify each device behind the switch and assign resources to each during startup. Thus the PXI Express chassis must be powered up in order to acquire appropriate resources from the BIOS.

To power down the PCIe to PXIe Extension Kit:

1. Power down the host PC.
2. Power down the PXIe chassis.



DO NOT power down the PXIe chassis until the host PC is powered off. If the PXIe chassis is powered off while the host PC is on, the host PC may hang or crash.

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3 Hardware Information

3.1 PCIe-8638 Layout, Connectors and Jumpers

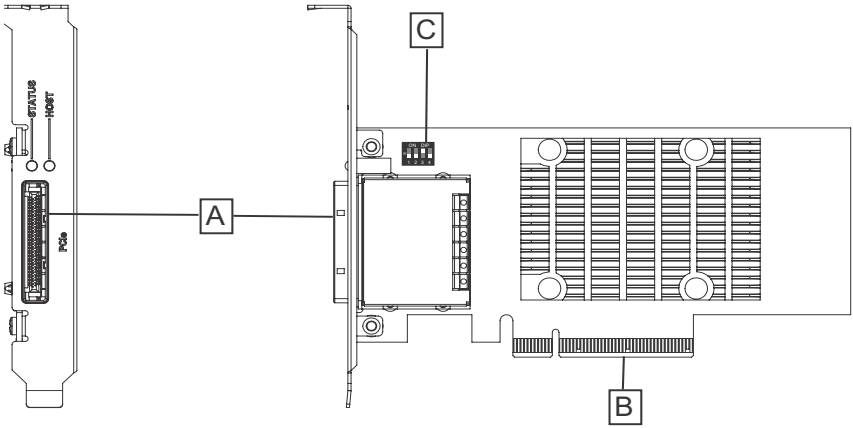


Figure 3-1: PCIe-8638 Mechanical Layout

A	PCIe x8 external downlink port
B	PCIe x8 edge finger
C	SW1

Table 3-1: PCIe-8638 Mechanical Layout Legend

Connector/Switch/LED	Description
STATUS LED	Off: No power
	Orange: Power OK
	Green: Device connected to downlink port is present
HOST (Link status between PCIe-8638 and PXIe-8638)	Off: No link
	0.5Hz Blinking: Link in PCIe Gen1 signaling
	1Hz Blinking: Link in PCIe Gen2 signaling
SW1	Default settings are: ON: Pin 3 OFF: Pins 1,2,4

Table 3-2: PCIe-8638 Connectors, Switches, and LEDs

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3.2 PXIe-8638(D/P) Layout, Connectors and Jumpers

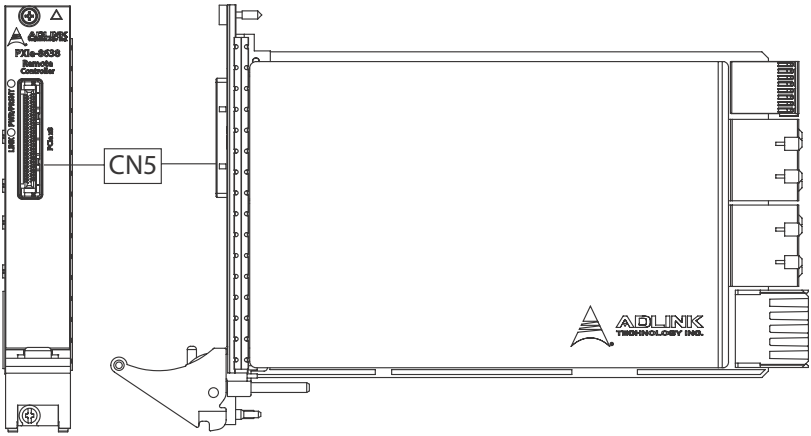


Figure 3-2: PXIe-8638 Mechanical Layout

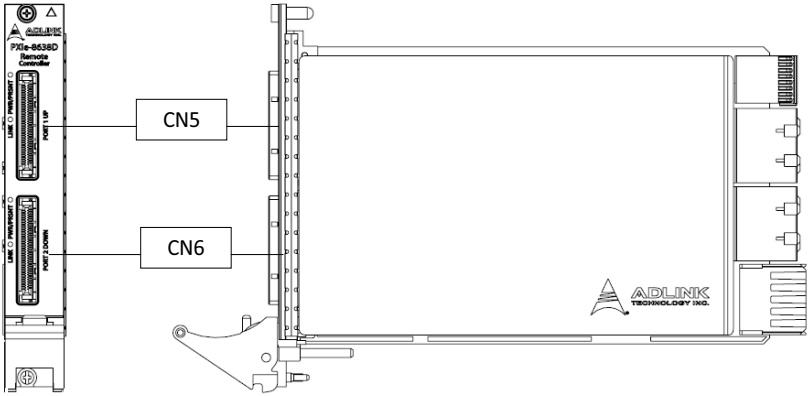


Figure 3-3: PXIe-8638D Mechanical Layout

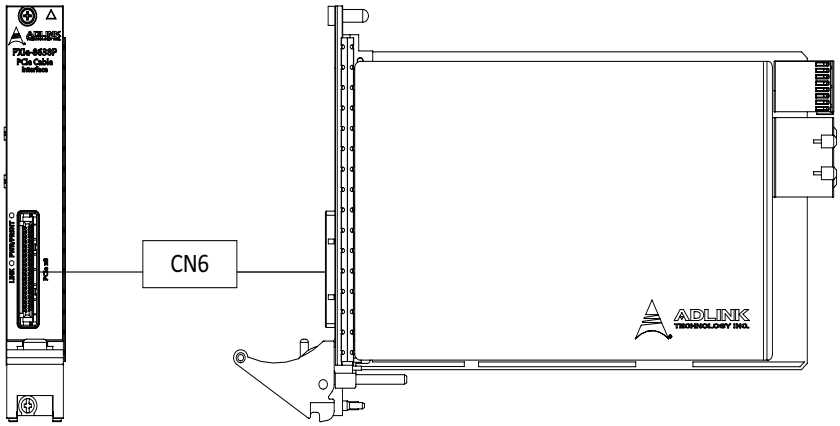


Figure 3-4: PXIe-8638P Mechanical Layout

Connector/Jumper/LED	Description
CN5	PCIe x8 external uplink port
CN6	PXIe x8 external downlink port
PWR/PRSNT LED	Off: No power
	Orange: Power OK
	Green: Device connected to uplink/downlink port is present
LINK LED (Link status between PCIe-8638 and PXIe-8638 Series)	Off: No link
	0.5Hz Blinking: Link in PCIe Gen1 signaling
	1Hz Blinking: Link in PCIe Gen2 signaling

Table 3-3: PXIe-8638 Series Connectors and LEDs

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Appendix A Troubleshooting (FAQ)

This chapter describes frequently asked questions to assist in solving problems that may be encountered.

Question: What is the maximum extension length of the PCIe-PXIe-8638?

Answer: ADLINK provides cable accessories for the PCIe-PXIe-8638 in 2 and 5 meter lengths, with a maximum cable length between systems at 5 meters.

Question: When using the PCIe-PXIe-8638, are there any additional drivers or software required to install?

Answer: Yes, ADLINK PXI Platform Services supports the -8638/PXIe-8638D including SMBus controller drivers and PXI software framework.

ADLINK PXI Platform Services can be downloaded from the PCIe-PXIe-8638 product page on the ADLINK website.

Question: Which link configuration of the PXI Express system slot does the PCIe-PXIe-8638 support, 4- or 2-link? How are the associated settings configured?

Answer: The PCIe-PXIe-8638 acts as a generic PXI Express system controller that supports both 4-link and 2-link PXI Express system slots. It detects the backplane and configures automatically without any settings required.

Question: Are there any compatibility concerns with the PCIe-PXIe-8638? How can a host PC be selected that will be most compatible with the PCIe-PXIe-8638? How many chassis can be connected together via PCIe-PXIe-8638?

Answer: Limited PCI bus availability is the major concern with compatibility. Available PCI bus numbers assigned by the system BIOS may exceed PCI bus numbers required by the

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PCIe-PXIe-8638 and PXI Express chassis. If PCI bus numbers are occupied, the system may not boot correctly, or devices will not be detected.

Theoretically, PC systems implementing PCI Express can support up to 256 bus numbers. However, the maximum PCI bus numbers of many PC systems are frequently limited by the system BIOS based on the system design or architecture. Conversely, the PXI Express chassis consumes many PCI bus numbers. Each PXI Express peripheral slot reserves a PCI bus number, and PCI Express switches on a PXI Express chassis also occupy several PCI bus numbers. Some peripheral modules may also consume PCI bus numbers. PCI bus number requirements for ADLINK PXI Express chassis are as shown.

Model	PCI Bus Number Requirement
PCIe-PXIe-8638 + PXES-2590	27
PCIe-PXIe-8638 + PXES-2780	44

Table A-1: PCI Bus Number Requirements

Third party utilities like System Information Viewer (http://rh-software.com/) are able to check available PCI bus numbers in the system BIOS (Run SIV>>PCI Bus>>ACPI Buses), as shown.



Figure A-1: Bus Number Information Result

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Question: One or more modules in the PXI Express chassis connected via PCIe-PXIe-8638 are missing from Windows Device Manager. What is the best solution for this or other compatibility problems (like no boot)?

Answer: Due to flexibility and the variety of systems with PCI Express expansion, most compatibility issues are related to abnormal device detection or resource assignment by the system BIOS. The following suggestions may help solve frequently encountered issues.

- Check that the PCIe-PXIe-8638 and cable are properly installed.
- Check any abnormal LED status on the PCIe-PXIe-8638. (See “PCIe-8638 Layout, Connectors and Jumpers” on page 19.)
- Check that the PCIe-PXIe-8638 cables are not broken, bent, or have dirty/broken connectors.
- Make sure there are sufficient PXI Express bus numbers available.
- Occasionally updated BIOS system fixes cause resource limitation issues.
- Try different installation sequences of modules in PXI Express chassis.
- Try a different PCI Express slot or different host PC (different system BIOS).
- Remove some modules to free resources.

Question: Does the PCIe-PXIe-8638 support Linux?

Answer: The PCIe-PXIe-8638 is designed as a standard PCIe-to-PCIe bridge and should support most modern Linux kernels without additional driver requirements. Since the PXI Express software specification is based on a Windows environment, however, the PXI software framework and SMBus controller of the PCIe-PXIe-8638 are not operable under Linux.

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Important Safety Instructions

For user safety, please read and follow all instructions, Warnings, Cautions, and Notes marked in this manual and on the associated device before handling/operating the device, to avoid injury or damage.

- Read these safety instructions carefully.
- Keep the User's Manual for future reference.
- Read the Specifications section of this manual for detailed information on the recommended operating environment.
- The device can be operated at an ambient temperature of 55ºC.
- When installing/mounting or uninstalling/removing device, or when removal of a chassis cover is required for user servicing (See "Getting Started" on page 7.):
  - Turn off power and unplug any power cords/cables.
  - Reinstall all chassis covers before restoring power.
- To avoid electrical shock and/or damage to device:
  - Keep device away from water or liquid sources.
  - Keep device away from high heat or humidity.
  - Keep device properly ventilated (do not block or cover ventilation openings).
  - Always use recommended voltage and power source settings.
  - Always install and operate device near an easily accessible electrical outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate device on stable surfaces and/or recommended mountings.
- If the device will not be used for long periods of time, turn off and unplug it from its power source
- Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools

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- A Lithium-type battery may be provided for uninterrupted backup or emergency power.



Risk of explosion if battery is replaced with one of an incorrect type; please dispose of used batteries appropriately.

- The device must be serviced by authorized technicians when:
  - The power cord or plug is damaged.
  - Liquid has entered the device interior.
  - The device has been exposed to high humidity and/or moisture.
  - The device is not functioning or does not function according to the User's Manual.
  - The device has been dropped and/or damaged and/or shows obvious signs of breakage.
- Disconnect the power supply cord before loosening the thumbscrews and always fasten the thumbscrews with a screwdriver before starting the system up.
- It is recommended that the device be installed only in a server room or computer room where access is:
  - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required.
  - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location.

	**BURN HAZARD** Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching.

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Getting Service

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