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PCI-8570/PXI-8570

PCI-to-PXI, PXI-to-PXI Extension

User's Manual



Recycled Paper

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Chapter Outline

This manual is designed to help the user to understand and configure the PCI/PXI-8570. It is divided into three chapters:

Chapter 1 **Introduction**

Gives an overview of the product features, applications, and specifications.

Chapter 2 **Installation**

Describes how to install the PCI/PXI-8570, its jumper settings, and cabling for PCI/PXI-8570 extension module.

Chapter 3 **Hardware Overview**

Describes the basic architecture of the PCI/PXI extension module and its bus architecture.

1

Introduction

The ADLINK PCI/PXI-8570 is a PCI to PXI or PXI to PXI extension module that functions as a transparent PCI-PCI bridge register set. With coupling master and slave extension modules, users will have direct control of PXI/CompactPCI chassis from another PC or multi-chassis PXI/CompactPCI systems. All devices on this system appear as local devices in a single PCI system. One master extension card (PCI-8570 or PXI-8570) can expand up to 2 slave extension modules (PXI-8570) at the same time.

ADLINK PCI/PXI-8570 employs the StarFabric architecture, a well-known physical layer technology, with a serial interconnection at 622Mbps low voltage differential signaling (LVDS). Four transmit and receive differential pairs are used to provide 2.5Gbps full duplex link bandwidth. Using shielding twisted pair copper cable can extend the transmission distance to 10m. The PCI interface supports 64-bit or 32-bit PCI buses operating at 66MHz or 33MHz. A bundled link can support the full bandwidth of 64-bit/66MHz PCI bus.

All interrupts asserted by add-in cards in the extension system are passed through the extension set to the host system. PCI/PXI-8570 is built in a transparent architecture, and function independently of the operating system. A PCI-to-PCI bridge function in the system extension set provides 100% capability with PCI drivers, application software, BIOS, O/Ss, configuration codes, etc. With the PCI/PXI-8570, users can combine PCI, CompactPCI, and PXI devices in the same system, increase the available number of PXI/CompactPCI slots for high density I/O applications, and could separate the control system from the harsh environment with the extension chassis.

1.1 Features

The PCI/PXI-8570, PCI to PCI and PXI to PXI Extension Card, provides the following advanced features:

- Direct PC control of PXI/CompactPCI systems
- Multi-chassis configurations for PXI/CompactPCI
- Up to 2 PCI segments from signal 8570
- PCI local bus specifications Rev. 2.2 compliant
- PCI to PCI bridge architecture specifications Rev. 1.1 compliant
- PXI specifications Rev. 2.0 compliant
- Up to 64-bit, 66MHz PCI bus extension
- StarFabric link performance
    - 528Mbytes/s peak (64-bit, 66MHz PCI)
    - 132Mbytes/s peak (32-bit, 33MHz PCI)
- Shielded copper cabling
- 10m maximum distance
- Completely hardware and software transparent
- Independent of operating systems
- Seamless PCI interrupt extension

1.2 Applications

- High Density I/O System
- Test System in Harsh Environment
- Electronic Manufacturing Test System
- Automation System with Existed PC

1.3 Specifications

Architecture

- Functions as a PCI-to-PCI bridge
- PCI-to-PCI bridge architecture specifications Rev. 1.1 compliant
- PCI local bus specifications Rev. 2.2

- PXI specifications Rev. 2.0 compliant
- 64-bit, 66MHz PCI bus extension
- Maximum data throughput
    - 132Mbytes/s (32-bit, 33MHz PCI)
    - 528Mbytes/s (64-bit, 66MHz PCI)

Certificates

- EMC/EMI: CE, FCC Class A

General Specifications

- I/O Connector: RJ-45 connector x 4
- Maximum cable length: 10m
- Operating temperature: 0 to 55ºC
- Storage temperature: -20 to 80ºC
- Relative humidity: 10 to 90%, non-condensing
- Power requirements

Device	+5V	+3.3V
PCI-8570	190mA	250mA
PXI-8570	-	540mA

- Dimensions (not including connectors)

Device	Dimension
PCI-8570	175mm x 107mm
PXI-8570	160mm x 100mm

2

Installation

This chapter outlines the contents of package, describes unpacking information, and describes how to install the PCI/PXI-8570 software and hardware.

2.1 Contents of Package

The package includes the following items:

- PCI-8570 or PXI-8570
- ADLINK All-in-one Compact Disc (PXI-8570 only)
- This User's Manual

If any of these items are missing or damaged, contact your ADLINK dealer. Save the shipping materials and carton in to ship or store the product in the future.

2.2 Unpacking

PCI/PXI-8570 contains electro-static sensitive components that can be easily be damaged by static electricity.

Therefore, the module should be handled on a grounded anti-static mat. The operator should be wearing an anti-static wristband, grounded at the same point as the anti-static mat.

Inspect the module for obvious damage. Shipping and handling may cause damage to the module. Be sure there is no shipping and handling damage on the module before continuing.

You are now ready to install your PCI/PXI-8570.

Note: DO NOT APPLY POWER TO THE CARD IF IT HAS BEEN DAMAGED.

2.3 Getting Started

To set up and use the PCI bus extension module, you need the following:

- A PCI-8570 card and a PXI-8570 module or two PXI-8570 modules
- Two RJ-45 Copper cables (ADLINK provides three different lengths of shielded copper cable to eliminate the EMI issues: ACL-PXIES-2, ACL-PXIES-5, and ACL-PXIES-10. Please contact your local sales or dealer for more information)
- Primary bus – A computer with a PCI backplane, or a PXI controller embedded in a PXI/CompactPCI chassis
- Secondary bus – A PXI/CompactPCI chassis

2.4 Software Installation

Once Windows 98/2000/XP has started, the Plug and Play function of the Windows system will find the new PCI/PXI-8570. If this is the first time installing the PCI/PXI-8570 in your Windows system, you will be informed to input the device information source. Please follow these steps to install PCI/PXI-8570.

For Windows 98 users:

1. Insert the ADLINK ALL-In-One CD. Under `X:\PXI_Platform\PXI Extension\Win98\`, you can find `starfab 1.inf` (`X` is the drive letter of your CDROM). Copy this file to system information folder (`C:\Windows\inf`)
2. When you complete the hardware installation, turn on your system.
3. You will be informed to input the device information source, please point the source directory at `C:\Windows\inf`. The Hardware Install Wizard will find `MACHINE2.inf` and install this device automatically.

For Windows 2000/XP users:

1. Insert the ADLINK ALL-In-One CD.
2. Execute 8570install.exe to start the setup. The path is:
   `X:\PXI_Platform\PXI Extension\NT\8570install.exe`. (`X`

is the drive letter of your CDROM)

3. This setup program will copy the necessary files to your hard drive automatically. When the hardware installation process is complete, reboot the computer for the changes to take effect.

2.5 Hardware Installation

2.5.1 Jumper Setting (only for PXI-8570)

Spread Spectrum Jumper Setting

When PXI-8570 plugged into the system slot, it provides a discrete clock signal to each of the peripheral slot defined as a PCI clock (CLK0, CLK1, CLK2, CLK3, CLK4, CLK5, and CLK6).

An important feature of the PCI/PXI-8570 extension modules is that they support 33MHz/66MHz clock operating environment. As system clock increase, electromagnetic interference (EMI) becomes a challenge for the system designers. PXI-8570 adopts a spread-spectrum clock generator to help user to deal with this difficult task.

Spread spectrum clocking speeds up and slows down the clock within a few percent of its fundamental frequency. By reducing the peak amplitudes, the system will more likely meet EMI emission compliance standards. In other words, spread spectrum clocking distributes the energy that was originally concentrated on one frequency over a wider band. This method dramatically reduces the amount of EMI.

You can follow Figure 2.1 to turn on the spread spectrum clock generator.

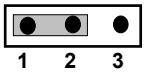
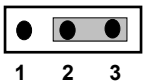
Spread Spectrum Control	JP1
OFF (default)	
ON	

Figure 2.1 Spread Spectrum Jumper Settings

M66EN Jumper Setting

PXI-8570 supports 64-bit or 32-bit PCI buses operating at 66MHz or 33MHz. A bundled link can support the full bandwidth of 64-bit/66MHz PCI bus. You can

utilize the following configuration to set the operation frequency of your system.

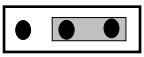
JP2	Setting
 (default)	66 MHz PCI enable. If the backplane or any devices in the system do not support 66MHz PCI bus operations, PCI/PXI-8570 will detect the configuration and operate at 33 MHz automatically.
	66MHz PCI disable. PCI bus is forced to operate at 33 MHz.

Figure 2.2 M66EN Jumper Settings

PCI/PXI-8570 supports the following primary and secondary bus frequency combinations:

- 66MHz primary bus, 66MHz secondary bus
- 66MHz primary bus, 33MHz secondary bus
- 33MHz primary bus, 33MHz secondary bus

PCI/PXI-8570 doesn't support 33MHz primary/66MHz secondary bus operation.

2.5.2 Installing PCI-8570

Follow these steps to install PCI-8570.

1. Turn off your computer, leave it plugged in while installing PCI-8570. The power code grounds the chassis and protects it from electrical damage while you install this module.
2. Remove the top cover and the access port to the PCI bus.
3. Select any available PCI slot and remove the bracket-retaining screw.
4. Plug in the PCI-8570 and reinstall the bracket-retaining screw.
5. Replace the computer cover.

2.5.3 Installing PXI-8570

Follow these steps to install PXI-8570 in your PXI or CompactPCI chassis.

1. Turn off your PXI/CompactPCI system, leave it plugged in while installing PXI-8570. The power code grounds the chassis and protects it from electrical damage while you install this module.
2. Select a slot for PXI-8570:
   a. For use in secondary PXI bus – Must choose the system slot (slot 1) of

your chassis.

b. For use in primary PXI bus – Choose any unused PXI or CompactPCI peripheral slot except slot 1 (Slot 1 is reserved for the system controller.)

3. Remove any covers blocking access to the slot in which you intend to install PXI-8570.
4. Make sure the injector/ejector handle is in its downward position.
5. Hold the handle as you 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 PXI-8570 should be even with the front panel of chassis.
7. Tighten the bracket-retaining screws.

2.5.4 Configuration & Cabling

Because PCI/PXI-8570 extension module functions as standard PCI-to-PCI bridge, it can take advantage of a variety of extension configurations. Figure 2.3 & 2.4 show the most basic PCI extension configuration. Each primary extension module can connect to two secondary extension modules at most in order to extend two PCI segments. Figure 2.5 & 2.6 show the Star and Daisy-chain configurations to extend more than two PXI chassis.

Each PCI/PXI-8570 extension module has two link ports (Link 0 and Link 1), and each link is divided into transmit (Tx) and receive (Rx). Please follow these steps to link the primary and secondary extension modules:

1. Connect the cooper cables to both primary and secondary extension modules. Two cables are needed while linking the primary and secondary modules. One cable is used for connecting transmit (Tx – black if ADLINK cables are used) of primary module with receive (Rx) of secondary module. The other is used for connecting receive (Rx – red if ADLINK cables are used) of primary module with transmit (Tx) of secondary module. Please refer to Figure 2.3 and 2.4 for the connection. Turn on the system with the secondary extension module first.
2. And then turn on the system with the primary extension module.

Notes:

- If your operation is correct, the indicated LED of primary extension module is dark and the LED of secondary extension module is bright.

- If you turn on the system with primary extension module first and then secondary extension module, the indicated LED of both modules will keep twinkling.
- If the communication between primary and secondary extension modules is broken, the indicated LED of primary moudle is bright and the LED of secondary module is dark.
- If Star or Daisy-chain configurations are implemented, please always turn on the secondary system first.

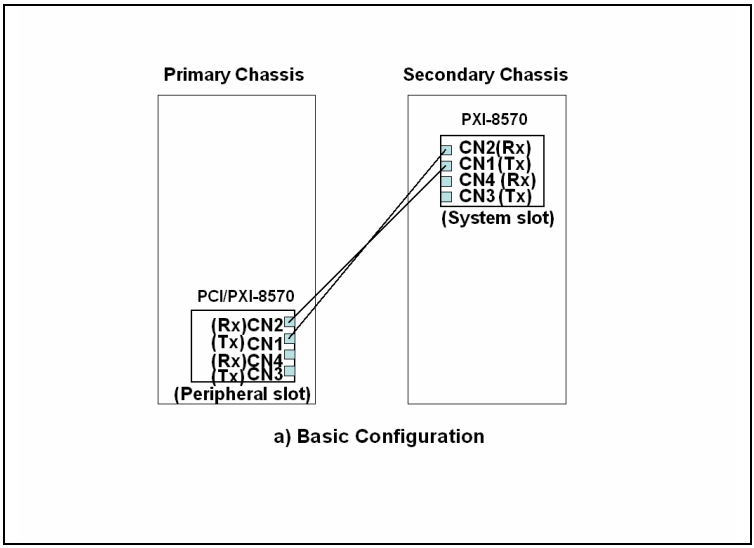


Figure 2.3 Basic PCI extension configuration – extend one PCI segment

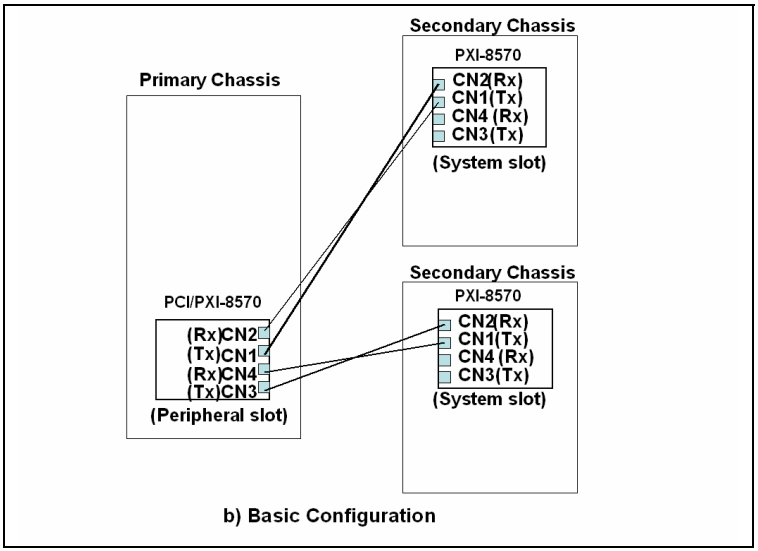


Figure 2.4 Basic PCI extension configuration – extend two PCI segments

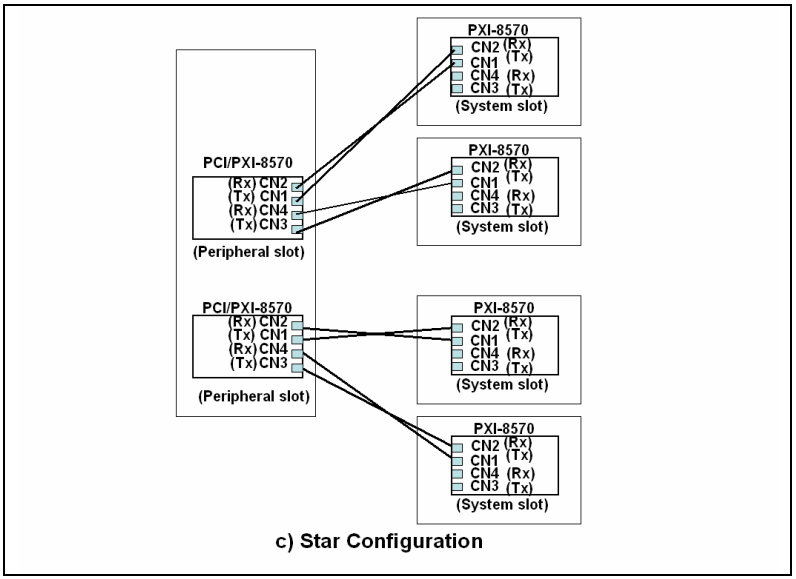


Figure 2.5 Star configuration

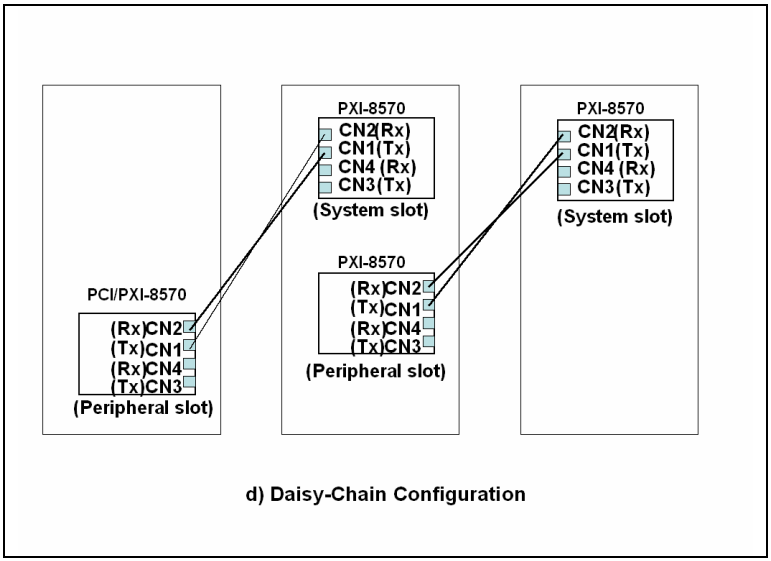


Figure 2.6 Daisy-Chain configuration

3

Hardware Overview

This chapter describes the basic architecture of the PCI extension module and its bus architecture.

3.1 Basic Architecture of PCI Extension Module

The PCI/PXI-8570 extension module is basically a PCI-to-PCI bridge. The PCI-to-PCI bridge function in the PCI/PXI-8570 supports legacy address routed traffic, which provides 100% capability with PCI drivers, application software, BIOS, O/Ss, etc. These functions allow users to transfer their designs without extra effort. The functional block diagram of PCI/PXI-8570 is shown in Figure 3.1.

The PCI/PXI-8570 employs a serial interconnect technology, 622Mbps low voltage differential signaling (LVDS). Each PCI/PXI-8570 extension module has two link ports, named as Link 0 & Link 1. Each link is divided into transmit (TX) and receive (RX). Four TX and RX differential pairs in each link are used to provide 2.5Gbps full duplex link bandwidth or 5Gbps of total bandwidth. Incorporated with the high speed serial LVDS, it is easy to extend the transmission up to 10 meters through shielded twisted pair copper cables.

Inside the PCI-to-PCI bridge, a PCI-to-StarFabric/StarFabric-to-PCI converter is used to translate PCI transactions into StarFabric frames and StarFabric frames into PCI transactions. The PCI interface of the PCI/PXI-8570 is capable of 64-bit/66MHz. Thus the maximum data throughput can up to 528Mbytes/s. The PCI interface in PCI/PXI-8570 acts like the primary side of a PCI-to-PCI bridge if PCI/PXI-8570 is plugged into the peripheral slot. The PCI interface in PXI-8570 acts like the secondary side of a PCI-to-PCI bridge if PXI-8570 is plugged into the system slot. The secondary side PCI interface of PCI-to-PCI bridge is responsible to the central resources and system clocks generation.

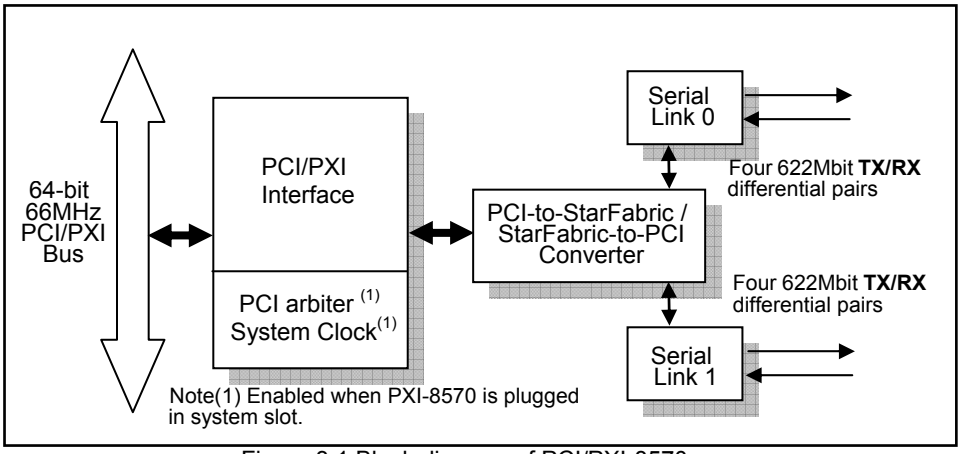


Figure 3.1 Block diagram of PCI/PXI-8570

3.2 Bus Architecture

Each PCI/PXI-8570 extension module has two link ports. Users can use one of them to extend PCI bus to a PXI chassis or both of them to extend PCI bus to two PXI chassis.

The following figure represents an example of the PCI extension architecture. The desktop PC or PXI system extends the PCI bus to two PXI chassis via PCI/PXI-8570 modules. From the system view, the three PCI/PXI-8570 modules act as three PCI-to-PCI bridges. Thus the serial interconnection between these bridges is also a bus, i.e. bus 1 in this example, although it's not PCI architecture.

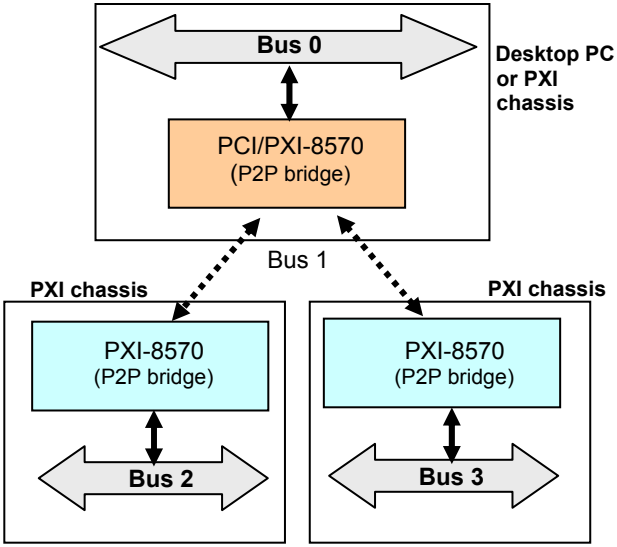


Figure 3.2 Bus architecture of the
basic configuration which is shown in Fig 2.4

Warranty Policy

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1. Before using ADLINK's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: http://rma.adlinktech.com/policy/.
2. All ADLINK products come with a limited two-year warranty, one year for products bought in China.
    - The warranty period starts on the day the product is shipped from ADLINK's factory.
    - Peripherals and third-party products not manufactured by ADLINK will be covered by the original manufacturers' warranty.
    - For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ADLINK is not responsible for any loss of data.
    - Please ensure the use of properly licensed software with our systems. ADLINK does not condone the use of pirated software and will not service systems using such software. ADLINK will not be held legally responsible for products shipped with unlicensed software installed by the user.
    - For general repairs, please do not include peripheral accessories. If peripherals need to be included, be certain to specify which items you sent on the RMA Request & Confirmation Form. ADLINK is not responsible for items not listed on the RMA Request & Confirmation Form.
3. Our repair service is not covered by ADLINK's guarantee in the following situations:
    - Damage caused by not following instructions in the User's Manual.
    - Damage caused by carelessness on the user's part during product transportation.
    - Damage caused by fire, earthquakes, floods, lightening, pollution, other acts of God, and/or incorrect usage of voltage transformers.
    - Damage caused by inappropriate storage environments such as with high temperatures, high humidity, or volatile chemicals.
    - Damage caused by leakage of battery fluid during or after change of batteries by customer/user.

- Damage from improper repair by unauthorized ADLINK technicians.
- Products with altered and/or damaged serial numbers are not entitled to our service.
- This warranty is not transferable or extendible.
- Other categories not protected under our warranty.

4. Customers are responsible for all fees necessary to transport damaged products to ADLINK.

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