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Find the *National Instruments PXIe-8238* at our website: *Click HERE*

USER MANUAL

PXIe-8238

Dual-Port 10 Gigabit Ethernet Peripheral Module

This document provides reference information for PXI Express and the PXIe-8238 module.

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Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

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Caution This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.

Caution The protection the PXIe-8238 provides can be impaired if it is used in a manner not described in the user documentation.

Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

Related Documentation

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

- Your chassis documentation
- *PXI Express Hardware Specification*, Revision 2.0
- *PXI-6 PXI Express Software Specification*
- *PICMG CompactPCI Express EXP.0 R1.0 Specification*
- *PCI Express Base Specification*, Revision 2.1, PCI Special Interest Group

PXI Express Features

Benefits of PXI Express

The PXI (PCI eXtensions for Instrumentation) industry standard, an open specification governed by the PXI Systems Alliance (PXISA), has quickly gained adoption and grown in prevalence in test, measurement, and control systems since its release in 1998. One of the key elements driving the rapid adoption of PXI is its use of PCI in the communication backplane. As the commercial PC industry has improved the available bus bandwidth by evolving PCI to PCI Express, PXI is now able to meet even more application needs by integrating PCI Express into the PXI standard. By taking advantage of PCI Express technology in the backplane, PXI Express increases the available PXI bandwidth from up to 132 MB/s to up to 8 GB/s for a more than 60x improvement in bandwidth.

PXI Express maximizes both hardware and software compatibility with PXI modules. PXI Express hybrid slots deliver both PCI and PCI Express signaling to accept devices that use PXI communication and triggering or the newer PXI Express standard. Software compatibility is maintained because PCI Express uses the same OS and driver model as PCI, resulting in complete software compatibility among PCI-based systems, for example PXI, and PCI Express-based systems such as PXI Express.

PXI Express, like PXI, leverages from the CompactPCI specification to define a rugged, modular form factor that offers superior mechanical integrity and easy installation and removal of hardware components. PXI Express products offer higher and more carefully defined levels of environmental performance required by the shock, vibration, temperature, and humidity extremes of industrial environments. Mandatory environmental testing and active cooling is

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added to the CompactPCI mechanical specification to ease system integration and ensure multivendor interoperability.

The demanding timing and synchronization requirements of instrumentation systems are met by the integrated features of PXI Express. Not only are the trigger bus, 10 MHz system reference clock, and star trigger bus available in PXI retained by PXI Express, but new timing and synchronization features that include a 100 MHz differential system reference clock for the synchronization of multiple modules and three differential star trigger buses for the distribution of precise clock and trigger signals have been added. Differential timing and synchronization signals provide PXI Express systems with increased noise immunity and the ability to transmit clock signals at higher frequencies.

PXIe-8238 Overview

Functional Overview

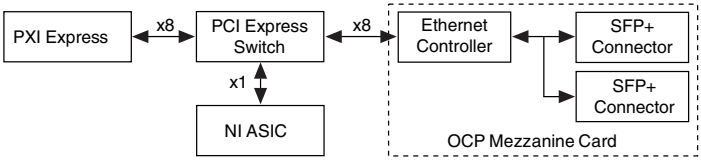
The PXIe-8238 is a peripheral module that provides up to 10 Gigabit Ethernet (GbE) connectivity on two SFP+ ports for a PXI Express system. It can attach to a PXI Express system via a high-bandwidth, low-latency PXI Express backplane Gen2 x8 link.

With the 10Gb Ethernet, it allows offloading data from a PXI Express system to an external storage solution or a server for further analysis. It also allows data exchange and aggregation across two or more PXI Express systems.

Functional Description

The PXIe-8238 is a peripheral module in a 1-slot 3U PXI Express form factor. The following figure is a functional block diagram of the PXIe-8238. Following the diagram is a description of each logic block shown.

Figure 1. PXIe-8238 Block Diagram



The PXIe-8238 consists of the following logic blocks on two circuit card assemblies (CCA):

- The *PXI Express Connectors* connect the PXIe-8238 to the PXI Express/CompactPCI Express backplane.
- The *PCI Express Switch* links the PXI Express backplane to the Ethernet controller on the OCP mezzanine card with PCI Express x8 links.
- The *OCP Mezzanine Card* block consists of the Ethernet controller and the SFP+ connectors that provide the 10 GbE connectivity.

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National Instruments Software

National Instruments has developed several software tools you can use with the PXIe-8238.

National Instruments' hardware and software work together to help you make the most of your PXI Express system. The LabVIEW, Measurement Studio, and LabWindows™/CVI™ application development environments combine with leading hardware drivers such as NI-DAQmx to provide exceptional control of NI hardware. Instrument drivers are available at `ni.com/idnet` to simplify communication with instruments over a variety of buses.

LabVIEW is a powerful and easy-to-use graphical programming environment you can use to acquire data from thousands of different instruments including USB, IEEE 488.2, VXI, serial, PLCs, and plug-in boards. LabVIEW helps you convert acquired data into meaningful results using powerful data analysis routines. Add-on tools provide additional specialized functionality. For more information, visit `ni.com/labview` and `ni.com/toolkits`.

If you prefer to use Microsoft's Visual Basic, Visual C++, and Visual Studio .NET for the core of your application, Measurement Studio adds tools for measurement and automation to each language. For more information, visit `ni.com/mstudio`.

LabWindows/CVI is an interactive ANSI C programming environment designed for building virtual instrument applications. LabWindows/CVI delivers a drag-and-drop editor for building user interfaces, a complete ANSI C environment for building your test program logic, and a collection of automated code generation tools, as well as utilities for building automated test systems, monitoring applications, or laboratory experiments. For more information, visit `ni.com/lwcvi`.

NI-DAQmx provides an extensive library of functions you can call from your application development environment or interactive environment such as NI Signal Express. These functions provide an intuitive API for National Instruments multifunction DAQ products. Features available include analog input (A/D conversion), buffered data acquisition (high-speed A/D conversion), analog output (D/A conversion), waveform generation, digital I/O, counter/timer operations, SCXI signal conditioning, RTSI or PXI Express synchronization, self-calibration, messaging, and acquiring data to extended memory. For more information, visit `ni.com/daq`.

National Instruments modular instruments use specialized drivers suited to each product's specialization. Express VIs provide customized, interactive programming of instruments in a single interface and soft front panels provide an interface for testing the functionality of each instrument with no programming required. NI Switches, DMMs, High-Speed DIO, High-Speed Digitizers, and Sources each have customized drivers for high-end modular instrumentation systems. RF applications leverage two drivers, NI-RFSG and NI-RFSA and Dynamic Signal Acquisition is available through NI-DAQmx. For more information, visit `ni.com/modularinstruments`.

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You can expand the timing and triggering functionality of your PXI Express system with PXI Express Timing and Synchronization products. These products provide precision clock sources, custom routing of triggers for multichassis synchronization, clock sharing, and more and are programmed with NI-Sync. For more information, visit `ni.com/pxi`.

NI-VISA is the National Instruments implementation of the VISA specification. VISA is a uniform API for communicating and controlling USB, Serial, GPIB, PXI, PXI Express, VXI, and various other types of instruments. This API aids in the creation of portable applications and instrument drivers. For information about writing your own PXI Express instrument driver with NI-VISA, refer to the *NI-VISA Getting Started Manual* and the `readme.txt` file in the NI-VISA directory. For more information, visit `ni.com/visa`.

With LabVIEW for Linux and support for more than two hundred devices on Linux with the NI-DAQmx driver, you now can create Virtual Instruments based on the Linux OS. The NI-VISA driver for Linux has improved instrument control in Linux, and NI Modular Instruments are partially supported. For more information, visit `ni.com/linux`.

Specifications

This document lists the electrical, mechanical, and environmental specifications of the PXIe-8238 dual-port 10 Gigabit Ethernet peripheral module.

Features

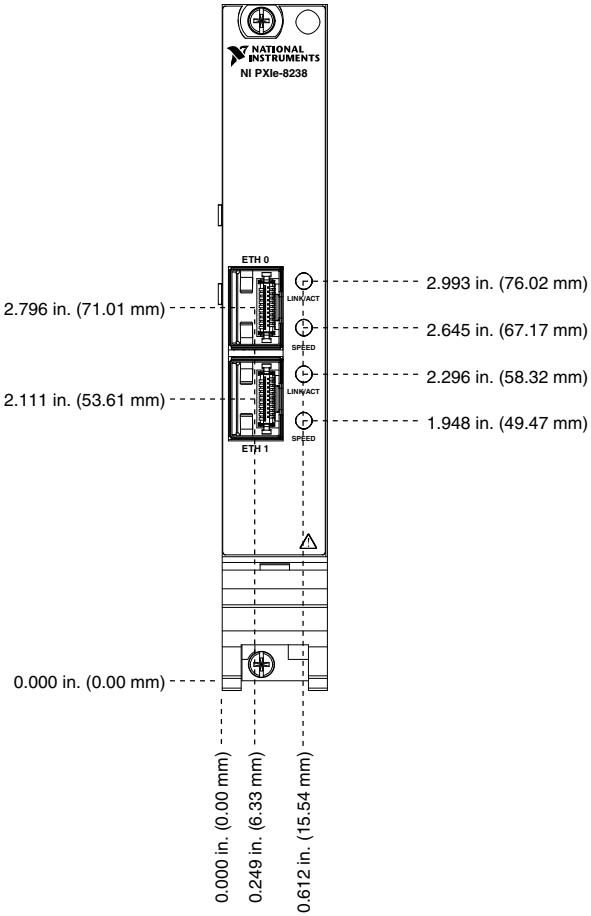
PXIe-8238	
Ethernet Connectivity	Two SFP+ ports support 10GBASE-SR optic and Copper Direct Attach physical media
Data rate supported per port	Up to 10 GbE
PXI Express Link Configuration	Gen2 x8 PCI Express connection (maximum throughput is achievable with PXI Express Gen2 x8)
Slot Requirement	One peripheral slot
LED Indicators	LINK (solid) and ACTIVITY (blinking) LINK SPEED (green = 10 Gbps; yellow = 1 Gbps)

Front Panel Dimensions

The following figure shows the front panel layout and dimensions of the PXIe-8238. Dimensions are in inches (millimeters).

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Figure 2. PXIe-8238 Front Panel Layout and Dimensions



Electrical

Power Rail	Typical Value	Max Value
+3.3 VDC	0.62 A	0.93 A
+12 VDC	1.02 A	1.68 A
Total Power	14.28 W	23.23 A

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Physical

Board dimensions	1-slot 3U PXI Express peripheral module
Compatibility	Fully compatible with *PXI Express Specification* 1.0
Weight	249 g (0.55 lb) typical

Caution Clean the hardware with a soft, nonmetallic brush. Make sure the hardware is completely dry and free from contaminants before returning it to service.

Environmental

Operating Environment

Ambient temperature range	0 °C to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Maximum altitude	2,000 m (800 mbar)
Pollution Degree	2

Indoor use only.

Storage Environment

Ambient temperature range	-40 °C to 71 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity range	5% to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

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Shock and Vibration

Operating shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)
Random vibration	
Operating	5 Hz to 500 Hz, 0.3 g_{rms}
Nonoperating	5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety

This product is designed to meet the requirements of the following standards of safety for information technology equipment:

- IEC 61010-1, EN 61010-1
- CAN/CSA-C22.2 No. 61010-1

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

Electromagnetic Compatibility

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

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

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

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

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

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

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

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

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

Battery Replacement and Disposal

Battery Directive This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit *ni.com/environment/batterydirective*.

电子信息产品污染控制管理办法（中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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SFP+ Connectors Pinout

The following figure shows the pinouts for the SFP+ connectors on the PXIe-8238. The following table lists and describes the SFP+ connector signals.

Figure 3. SFP+ Connector Pinout

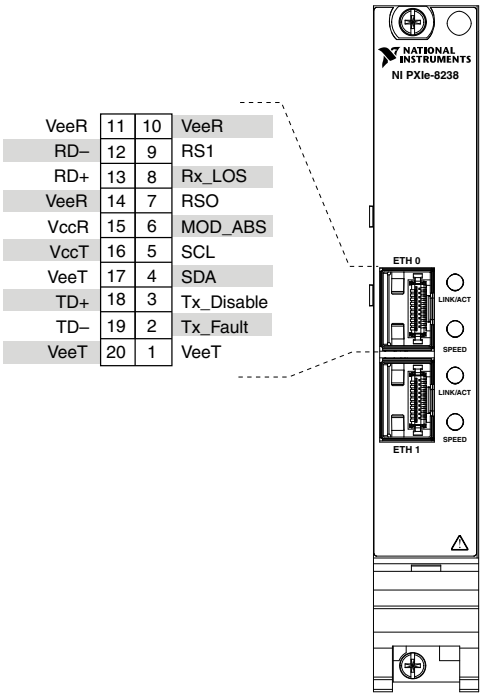


Table 1. SFP+ Connector Signals

Pin	Symbol	Name/Description
1	VeeT	Module Transmitter Ground
2	Tx_Fault	Module Transmitter Fault
3	Tx_Disable	Transmitter Disable; turns off transmitter laser output
4	SDA	2-Wire Serial Interface Data Line
5	SCL	2-Wire Serial Interface Clock
6	Mod_ABS	Module Absent; connected to VeeT or VeeR in the module

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Table 1. SFP+ Connector Signals (Continued)

Pin	Symbol	Name/Description
7	RS0	Rate Select 0; optionally controls SFP+ module receiver
8	Rx_LOS	Receiver Loss of Signal Indication
9	RS1	Rate Select 1; optionally controls SFP+ module transmitter
10	VeeR	Module Receiver Ground
11	VeeR	Module Receiver Ground
12	RD-	Receiver Inverted Data Output
13	RD+	Receiver Non-Inverted Data Output
14	VeeR	Module Receiver Ground
15	VccR	Module Receiver 3.3 V Supply
16	VccT	Module Transmitter 3.3 V Supply
17	VeeT	Module Transmitter Ground
18	TD+	Transmitter Non-Inverted Data Input
19	TD-	Transmitter Inverted Data Input
20	VeeT	Module Transmitter Ground

Note The PXIe-8238 can perform an automatic crossover, thus eliminating the need for crossover cables.

Table 2. Link/Activity and Speed Indicator LEDs

	Link/Activity LED	Speed LED
No Link	Off	Off
Linked—No Activity	Green	Yellow = 1 GbE Green = 10 GbE
Linked—Activity	Blinking Green	Yellow = 1 GbE Green = 10 GbE

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Visit *ni.com/register* to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting *ni.com/certification*. If your product supports calibration, you can obtain the calibration certificate for your product at *ni.com/calibration*.

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