Getting Started with the NI PCIe-8235

The NI PCIe-8235 (NI 8235) is a quad port Gigabit Ethernet (GigE) interface device for PCI Express (PCIe) computers. This document describes how to install and configure the necessary hardware and software components to begin using the NI 8235.

What You Need to Get Started

You need the following items to set up and use the NI 8235.

- ❑ NI 8235 GigE interface device
- ❑ GigE Vision Camera
- ❑ Ethernet cable
- ❑ Computer running Microsoft Windows Vista/2000/XP with at least one available x4 PCIe slot

Note Visit `ni.com/info` and enter `rdvisionvista` for more information about National Instruments interface device compatibility with Windows Vista.

- ❑ NI Vision Acquisition Software 8.2.1 or later, which includes the NI-IMAQdx driver software
- ❑ Optional software for developing applications:
  - NI Vision Builder for Automated Inspection
  - NI Vision Development Module
  - LabVIEW
  - LabWindows™/CVI™
  - Microsoft Visual Basic

Related Documentation

The following documents contain additional information that you may find helpful:

- *NI Vision Acquisition Software Release Notes*—Outlines new functionality, system requirements, installation procedures, and descriptions of the documentation included with the NI-IMAQdx driver software.
- *Measurement & Automation Explorer Help for NI-IMAQdx*—Describes how to configure the NI-IMAQdx driver software, NI interface devices, and cameras using Measurement & Automation Explorer (MAX).
- *NI-IMAQdx Help*—Contains fundamental programming concepts for the NI-IMAQdx driver software

Safety Information

Caution The following paragraphs contain important safety information you *must* follow when installing and operating the device.

Do *not* operate the device in a manner not specified in the documentation. Misuse of the device may result in a hazard and may compromise the safety protection built into the device. If the device is damaged, turn it off and do *not* use it until service-trained personnel can check its safety. If necessary, return the device to National Instruments for repair.

Keep away from live circuits. Do *not* remove equipment covers or shields unless you are trained to do so. If signal wires are connected to the device, hazardous voltages can exist even when the equipment is turned off. To avoid a shock hazard, do *not* perform procedures involving cover or shield removal unless you are qualified to do so. Disconnect all field power prior to removing covers or shields.

If the device is rated for use with hazardous voltages (>30 V_{rms}, 42.4 V_{pk}, or 60 V_{dc}), it may require a safety earth-ground connection wire. Refer to the device specifications for maximum voltage ratings.

Because of the danger of introducing additional hazards, do *not* install unauthorized parts or modify the device. Use the device only with the chassis, modules, accessories, and cables specified in the installation instructions. All covers and filler panels *must* be installed while operating the device.

Do *not* operate the device in an explosive atmosphere or where flammable gases or fumes may be present. Operate the device only at or below the pollution degree stated in the specifications. Pollution consists of any foreign matter—solid, liquid, or gas—that may reduce dielectric strength or surface resistivity. The following is a description of pollution degrees.

- Pollution Degree 1—No pollution or only dry, nonconductive pollution occurs. The pollution has no effect.
- Pollution Degree 2—Normally only nonconductive pollution occurs. Occasionally, nonconductive pollution becomes conductive because of condensation.
- Pollution Degree 3—Conductive pollution or dry, nonconductive pollution occurs. Nonconductive pollution becomes conductive because of condensation.

Clean the device and accessories by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with a stiff, nonmetallic brush. The unit *must* be completely dry and free from contaminants before returning it to service.

You *must* insulate signal connections for the maximum voltage for which the device is rated. Do *not* exceed the maximum ratings for the device. Remove power from signal lines before connection to or disconnection from the device.

Caution National Instruments measurement products may be classified as either Measurement Category I or II. Operate products at or below the Measurement Category level specified in the hardware specifications.

Measurement Category[1]: Measurement circuits are subjected to working voltages[2] and transient stresses (overvoltage) from the circuit to which they are connected during measurement or test. Measurement Category establishes standardized impulse withstand voltage levels that commonly occur in electrical distribution systems. The following is a description of Measurement (Installation[3]) Categories:

- Measurement Category I is for measurements performed on circuits *not* directly connected to the electrical distribution system referred to as MAINS[4] voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.
- Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (e.g., 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar products.
- Measurement Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired equipment such as equipment in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.
- Measurement Category IV is for measurements performed at the primary electrical supply installation (<1,000 V). Examples include electricity meters and measurements on primary overcurrent protection devices and on ripple control units.

Unpacking

The NI 8235 ships in an antistatic package to prevent electrostatic discharge from damaging device components. To avoid such damage in handling the device, take the following precautions:

1. Ground yourself using a grounding strap or by touching a grounded object, such as the computer chassis.
2. Touch the antistatic package to a metal part of the computer chassis before removing the device from the package.

Caution *Never* touch the exposed pins of connectors.

3. Remove the device from the package and inspect it for loose components or any other signs of damage. Notify National Instruments if the device appears damaged in any way. Do *not* install a damaged device in the computer.

Store the NI 8235 in the antistatic package when not in use.

[1] Measurement Categories as defined in electrical safety standard IEC 61010-1.

[2] Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

[3] Measurement Category is also referred to as Installation Category.

[4] MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

Installation

The following instructions are for general installation. Refer to the documentation provided by your computer manufacturer for specific instructions and warnings. Refer to the *Specifications* section for a list of the typical power requirements for the NI 8235.

1. Install the NI Vision Acquisition Software before installing the NI 8235. Refer to the *NI Vision Acquisition Software Release Notes* for specific installation instructions.
2. Power off and unplug the computer.

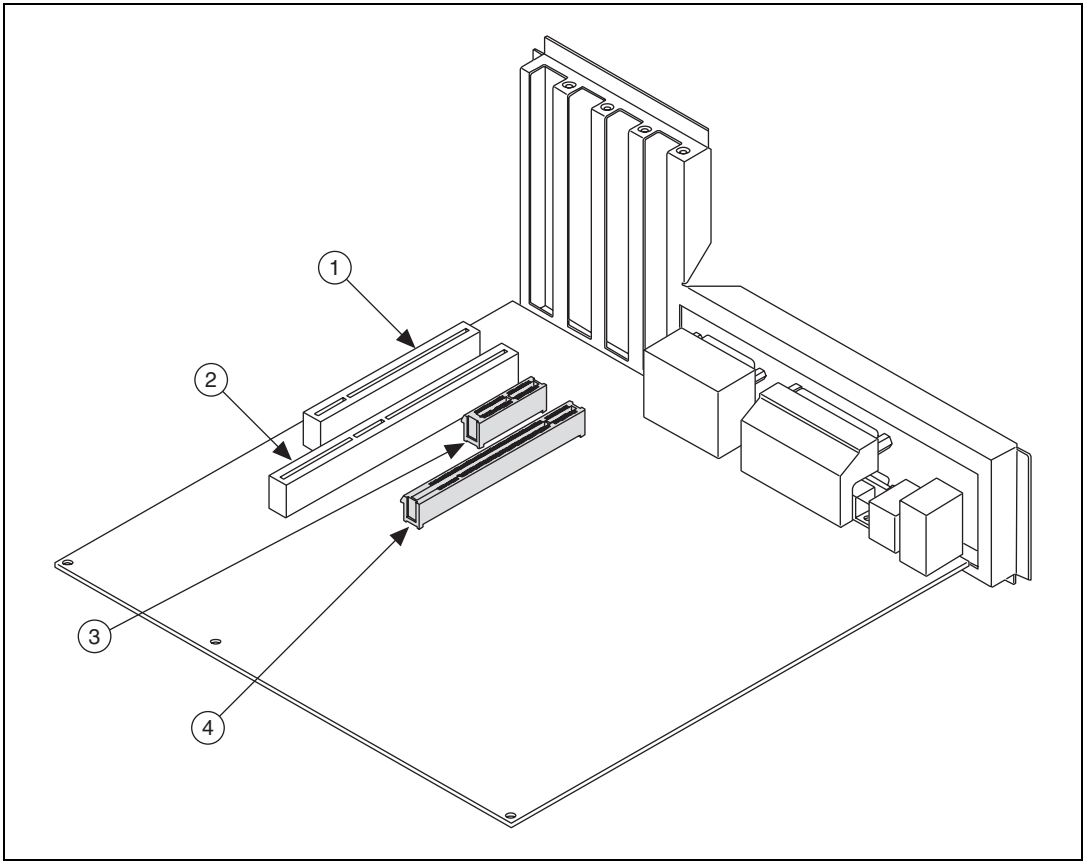
Caution To protect yourself and the computer from electrical hazards, the computer *must* remain unplugged until the installation is complete.

3. Remove the computer cover to expose the expansion slots.

Caution Installing a PCIe device into a PCI, PCI-X, AGP, or any non-PCIe slot can damage both the computer motherboard and the device. If you are unsure of the differences between the connector types, do *not* install the device. Refer to the documentation provided by your computer manufacturer to determine the correct slot in which to install the NI 8235.

4. Touch a metal part of the computer to discharge any static electricity that might be on your clothes or body. Static electricity can damage the device.
5. Choose an unused x4 or larger PCIe slot, and remove the corresponding expansion slot cover on the back panel of the computer. Figure 1 shows the different types of expansion slots available on most computers.

Note The NI 8235 is intended for a x4 PCIe slot. The NI 8235 will fit into, and can be used in, a x8 or x16 PCIe slot.



1	PCI 32-bit Connector	3	PCIe x4 Connector
2	PCI 64-bit and/or PCI-X Connector	4	PCIe x16 Connector

Figure 1. PC Expansion Slots

6. Remove your device from the antistatic package and gently rock the device into the slot. The connection may be tight, but do *not* force the device into place.

Note Check that the bracket of your device lines up with the hole in the back panel rail of the computer chassis.

7. Secure the device mounting bracket to the back panel rail of the computer.
8. Replace the computer cover.
9. Connect the Ethernet cable to your camera. Refer to your camera manufacturer documentation for specific instructions about how to connect the cable to your camera.
10. Connect the Ethernet cable to one of the RJ-45 connectors on the NI 8235 front panel.
11. Plug in and power on the computer.

The NI 8235 is now installed and the camera is connected.

Installing the High Performance GigE Vision Driver

To achieve maximum performance, you must install the High Performance GigE Vision Driver available with NI-IMAQdx. This will ensure optimized performance and minimal configuration. To associate the NI 8235 with the high performance driver, complete the following steps.

1. After you have installed the NI 8235 and restarted the computer, complete one of the following steps.
   a. If Windows does not prompt you to choose a driver, proceed to step 2.
   b. If Windows prompts you to choose a driver, proceed to step 3.
2. Right-click the NI 8235 in the Windows Device Manager, and select **Update Driver**.
3. Choose not to connect to the Windows Update Web site, and click **Next**.
4. Choose to **Install from a list or a specific location**, and click **Next**.
5. Choose **Don't Search. I will choose the driver to install**.
6. Click **Next**.
7. Select National Instruments GigE Vision driver from the list, and click **Next**.
8. Click **Finish**.

Note Windows may return a warning stating that the driver is unsigned. It is safe to ignore the warning.

Configuring Multiple Ports

Complete the following steps to configure the network ports on the NI 8235:

1. In the Windows Control Panel, double-click **Network Connections**.
2. Select all of the ports that cameras will be connected to by holding <Ctrl> while clicking each port.
3. Right-click one of the selected ports, and choose **Bridge Connections**.

Note If you are not using the High Performance Driver, you will be unable to use jumbo frames on bridged devices.

Configuring GigE Cameras

After you have installed the NI 8235 and powered on your computer, Windows will recognize the device and assign resources to it. Use Measurement & Automation Explorer (MAX), the National Instruments configuration utility, to configure a GigE Vision compliant camera, connected to the NI 8235, for acquisition. Refer to the *Measurement and Automation Explorer Help for NI-IMAOdx* for more information about how to configure the NI 8235.

Specifications

The following specifications apply to the NI 8235 interface device. These specifications are typical at 25 °C, unless otherwise stated.

Physical Characteristics

Dimensions ..... 12.9 cm × 12.0 cm (5.1 in. × 4.725 in.)

Camera Interface ..... Four RJ-45 connectors

Weight ..... 166.5 g (5.87 oz)

Signaling

Ethernet ..... 1000Base-T compliant on four pairs of Category 5 cable

Power Requirements

Typical ..... 1 A at 12 V = 12 W

PCI Express Interface

PCI Express compliance ..... Version 1.0a

Native link width x4

Up-plugging link width availability x8, x16

Operating Environment

The NI 8235 is intended for indoor use only.

Ambient temperature range ..... 0 °C to 55 °C

Operating relative humidity ..... 50% to 85%, noncondensing

Pollution Degree 2

Caution Do *not* use the NI 8235 for connection to signals within Measurement Categories II, III, or IV.

Approved at altitudes up to 2,000 m.

Storage Environment

Ambient temperature range ..... –40 °C to 70 °C

Relative humidity ..... 50% to 85%, noncondensing

Safety

This product is designed to meet the requirements of the following standards of safety:

- IEC 60950-1, EN 60950-01
- UL 60950-1, CSA 60950-1

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- FCC Part 15—Radiated and Conducted Emissions (USA)
- ICES-003—Radiated and Conducted Emissions (Canada)
- CISPR 22—Radiated and Conducted Emissions (International)
- EN55022—Radiated and Conducted Emissions (European Union)
- EN55024—(Immunity) (European Union)
- VCCI—Radiated and Conducted Emissions (Japan)
- CNS13438—Radiated and Conducted Emissions (Taiwan)
- AS/NZS3548—Radiated and Conducted Emissions (Australia/New Zealand)
- MIC notice 1997-41, EMI and MIC notice 1997-42—EMS (Korea)

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 73/23/EEC; Low-Voltage Directive (safety)
- 89/336/EEC; Electromagnetic Compatibility Directive (EMC)

FCC Class B User Information

This equipment has been tested and found to comply with the limits for the class B digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to television or radio reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following means:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution If the device is changed or modified, the user may void his or her authority to operate the equipment.

Note This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain 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

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* 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 their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

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.)

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At ni.com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

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 electronic 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.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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