NI PXIe-1435 Getting Started Guide

2025-03-20

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Overview

The NI PXIe-1435 is an image acquisition device with a PCIe 2.0 x8 host interface. It supports many Lite, Base, Medium, Full, 72-bit, and 80-bit configuration Camera Link-compatible cameras at up to 85 MHz. Power over Camera Link (PoCL) is supported for simplified system connectivity. A variety of auxiliary IO is provided for triggering and control via a digital I/O connector, an I/O extension connector, and RTSI. This document describes the NI PXIe-1435 features and capabilities.

Required Components

The following items are necessary to set up and use the NI PXIe-1435:

- NI PXIe-1435 image acquisition device

- Camera Link camera
- Camera Link cables
  - One SDRCamera Link cable for Base configuration cameras
  - Two SDRCamera Link cables of the same length for Medium, Full, or Extended Full configuration cameras

  National Instruments recommends that you use the following cables to connect your camera:
  - MDR to SDR Camera Link cable (part number 199745A-05)
  - SDR to SDR Camera Link cable (part number 199746A-05)

  > **Note** To ensure the high-speed signaling of the Camera Link interface, National Instruments recommends that you purchase a Camera Link cable rather than build a custom cable.

- One of the following system considerations:
  - PXI Express/CompactPCI Express chassis with a PXI Express/Compact PCI Express embedded controller
  - MXI kit and a development computer running Microsoft Windows. Refer to the

driver or application development software readme for specific Windows version compatibility

- NI-IMAQ 4.6 or later driver software, which is included with NI Vision Acquisition Software
- Optional software for developing machine vision applications:
  - NI Vision Builder for Automated Inspection
  - NI Vision Development Module, which requires one of the following application development environments:
    - LabVIEW
    - LabWindows™/CVI™

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 NI 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** NI 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

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.

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 the 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.

Installing Application Software and Driver

Before installing the NI PXIe-1435, you must install the application software and device driver. National Instruments provides two options for developing machine vision applications.

- NI Vision Builder for Automated Inspection (Vision Builder AI)—Interactive, menu-driven configuration software for developing, benchmarking, and deploying machine vision applications. You must also install NI-IMAQ.
- NI Vision Development Module—Programming library for developing machine vision and scientific imaging applications. The NI Vision Development Module requires an application development environment, such as LabVIEW or LabWindows/CVI, and NI-IMAQ.

Installing Vision Builder AI

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.

Install the following software to use Vision Builder AI to develop applications.

1. NI-IMAQ—Refer to the ***NI Vision Acquisition Software Release Notes*** on the NI Vision Acquisition Software installation media for system requirements and installation instructions for the NI-IMAQ driver.
   Documentation for the NI-IMAQ driver software is available by selecting **Start » All Programs » National Instruments » Vision » Documentation » NI-IMAQ**.
2. Vision Builder AI—Refer to the ***NI Vision Builder for Automated Inspection Readme*** for installation instructions.
   Documentation for Vision Builder AI is available by selecting **Start » All Programs » National Instruments » Vision Builder AI » Documentation**.

Installing the Vision Development Module

Install the following software to use the Vision Development Module to develop applications.

1. One of the following application development environments:
   - LabVIEW—Refer to the ***LabVIEW Installation Guide*** for installation instructions and system requirements for the LabVIEW software. Refer to the ***LabVIEW Upgrade Notes*** for additional information about upgrading to the most recent version of LabVIEW.
   - LabWindows/CVI—Refer to the ***LabWindows/CVI Release Notes*** for installation instructions and system requirements for the LabWindows/CVI software.

     Documentation for LabWindows/CVI is available by selecting **Start » All Programs » National Instruments » LabWindows CVI**.

2. NI-IMAQ—Refer to the ***NI Vision Acquisition Software Release Notes*** on the NI Vision Acquisition Software installation media for system requirements and installation instructions for the NI-IMAQ driver.
   Documentation for the NI-IMAQ driver software is available by selecting **Start » All Programs » National Instruments » Vision » Documentation » NI-IMAQ**.
3. NI Vision Development Module—Refer to the ***NI Vision Development Module Readme*** on the NI Vision Development Module installation media for system

requirements and installation instructions.
Documentation for the NI Vision Development Module is available by selecting **Start » All Programs » National Instruments » Vision » Documentation » NI Vision**.

Installing the Device, Accessories, and Cables

This section describes how to unpack and install the device. You must install the software before installing the hardware.

Note The NI PXIe-1435 is static sensitive. Always properly ground yourself and the equipment when handling or connecting the device.

1. Remove the device from the package and inspect it. Contact National Instruments if the device is damaged. Do not install a damaged device.
2. Power off and unplug the PXI Express chassis. Refer to the chassis manual for chassis installation and configuration instructions.

   Note Refer to the Read Me First: Safety and Electromagnetic Compatibility document packaged with your PXI Express chassis or device before removing equipment covers or connecting or disconnecting signal wires.

3. Identify a supported PXI Express slot in the chassis. The NI PXIe-1435 is compatible with PXI Express slots, PXI Express Hybrid slots, and PXIe System Timing slots. The following figure shows the symbols that indicate the slot types for a PXI Express chassis.
4. Remove the filler panel and touch any metal part of the chassis to discharge static electricity.
5. Place the module edges into the module guides at the top and bottom of the slot.
6. Slide the module along the guides until it reaches the rear connector, then seat the module by pushing the front panel until it is flush with the front panel of the chassis.
7. Secure the device front panel to the chassis front panel mounting rail using the front-panel mounting screws.
8. Connect the Camera Link cable(s) to the Camera Link camera. Refer to the camera manufacturer documentation for specific instructions about how to connect the

cable to your camera.
9. Connect the Camera Link cable to the Camera Link connector on the NI PXIe-1435 front panel.
10. Plug in and power on the PXI Express chassis.

Confirming the Device is Recognized

To confirm that the device is recognized, complete the following additional steps:

1. Select **Start** » **All Programs** » **National Instruments** » **Measurement & Automation** to open Measurement & Automation Explorer (MAX).
2. Expand **Devices and Interfaces**.
3. Verify that the device appears under **Devices and Interfaces** » **NI-IMAQ Devices**

Note You can use MAX to maintain trigger reservations for each of your PXI Express chassis. Refer to ***Configuring PXI Triggers in the Measurement & Automation Explorer Help*** for more information.