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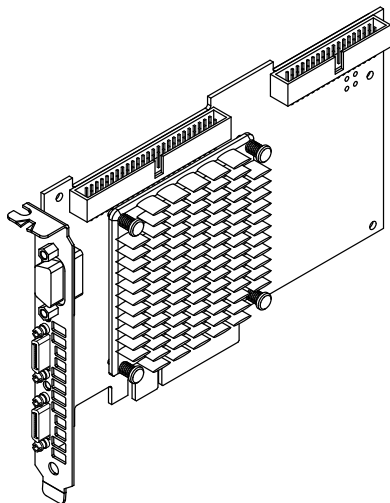
PCIe-1437

GETTING STARTED GUIDE

NI PCIe-1437

Base, Medium, Full, and Extended Configuration Camera Link Frame Grabber

This document describes how to begin using the NI PCIe-1437.



Safety



Caution Observe all instructions and cautions in the user documentation. Using the model in a manner not specified can damage the model and compromise the built-in safety protection. Return damaged models to NI for repair.



Attention Suivez toutes les instructions et respectez toutes les mises en garde de la documentation utilisateur. L'utilisation d'un modèle de toute autre façon que celle spécifiée risque de l'endommager et de compromettre la protection de sécurité intégrée. Renvoyez les modèles endommagés à NI pour réparation.

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



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

Preparing the Environment

Ensure that the environment in which you are using the NI PCIe-1437 meets the following specifications.

Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Pollution degree	2

Indoor use only.



Note Refer to the device specifications on ni.com/manuals for complete specifications.

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

Operating Environment

Operating temperature, local ¹	0 °C to 55 °C (IEC 60068-2-1 and IEC 60068-2-2)
Operating humidity	10% to 90% RH, noncondensing (IEC 60068-2-78)
System slot airflow	0.4 m/s (80 LFM)

Storage Environment

Ambient temperature range	-20 °C to 70 °C (IEC 60068-2-1 and IEC 60068-2-2)
Relative humidity range	5% to 95% RH, noncondensing (IEC 60068-2-78)

Unpacking the Kit



Notice To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.



Notice Never touch the exposed pins of connectors.



Note Do not install a device if it appears damaged in any way.

3. Unpack any other items and documentation from the kit.

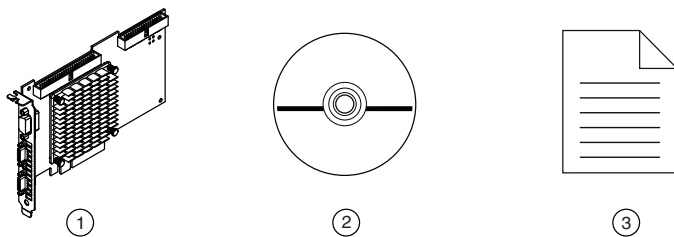
Store the device in the antistatic package when the device is not in use.

Verifying the Kit Contents

Verify that the following items are included in the NI PCIe-1437 kit.

¹ For PCI Express adapter cards with integrated air movers, NI defines the local operational ambient environment to be at the fan inlet. For cards without integrated air movers, NI defines the local operational ambient environment to be 25 mm (1 in.) upstream of the leading edge of the card. For more information about the local operational ambient environment definition for PCI Express adapter cards, visit ni.com/info and enter the Info Code `pcielocalambient`.

Figure 1. NI PCIe-1437 Kit Contents



1. Hardware
2. NI Vision Acquisition Software
3. Getting Started Guide

Installing the Software

Close any applications before upgrading your software. You must be an Administrator to install NI software on your computer.

1. If applicable, install an application development environment (ADE), such as LabVIEW 2015 or later, LabVIEW NXG 2.1 or later, Microsoft Visual Studio®, or LabWindows™/CVI™.
2. Install the NI Vision Acquisition Software 18.0.



Note NI-IMAQdx API is required when programming the NI PCIe-1437 in LabVIEW NXG.

Installing the NI PCIe-1437

The following instructions are for general installation. Refer to the documentation provided by your computer manufacturer for specific instructions and warnings.

What to Use

- NI PCIe-1437
- Camera Link-compatible camera
- One (base) or two (medium/full/extended) Camera Link cables with a 26-pin SDR connector on the end for the NI PCIe-1437
- Computer running Microsoft Windows 7 SP1 (32- or 64-bit) or later with at least one available x8 or larger PCIe slot
- Tools for PCIe card installation (refer to the documentation provided by your computer manufacturer)
- NI Vision Acquisition Software

What to Do

1. Install NI Vision Acquisition Software before installing the NI PCIe-1437. 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.



Attention Pour vous protéger et protéger l'ordinateur des risques électriques, l'ordinateur doit rester débranché jusqu'à ce que l'installation soit terminée.

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



Notice Installing a PCIe device into any non-PCIe slot can damage both the computer motherboard and the device. Refer to the documentation provided by your computer manufacturer to determine the correct slot in which to install the NI PCIe-1437.

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 x8 or larger PCIe slot, and remove the corresponding expansion slot cover on the back panel of the computer.



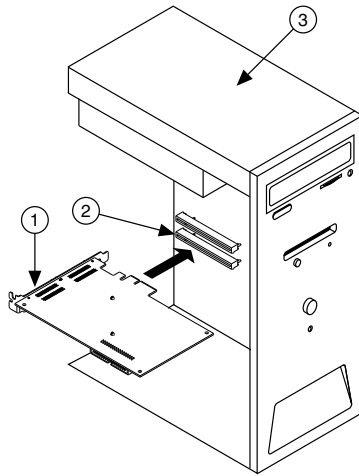
Note The NI PCIe-1437 is intended for a x8 PCIe slot. The NI PCIe-1437 will fit into, and can be used in, a x8 or x16 PCIe slot. Refer to the [Verifying the Installation](#) section to check the connected PCIe lane width and speed in Measurement & Automation Explorer (MAX) to ensure that the NI PCIe-1437 is plugged into a slot that is providing maximum performance. If the NI PCIe-1437 is plugged into a slot that cannot provide a x8 5.0 GT/s connection, you will not be able to achieve full bandwidth and you may experience timeouts and/or FIFO overflows.

6. Insert the device into the applicable PCIe slot 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 aligns up with the hole in the back panel rail of the computer chassis.

Figure 2. Installing a PCI Express Device



1. PCI Express Device
2. PCI Express System Slot
3. PC with PCI Express Slot

7. Secure the device mounting bracket to the back panel rail of the computer.



Note If you will be using the NI Camera Link I/O Extension Board (PCIe), refer to the *NI Camera Link I/O Extension Board (PCIe) User Guide* for installation instructions.

8. Replace the computer cover.
9. Connect the Camera Link cable(s) to a Camera Link-compatible camera. Refer to the camera manufacturer documentation for specific instructions about how to connect the cable to your camera.
10. Connect the other end of the Camera Link cable(s) to the 26-pin SDR Camera Link connector(s) on the front panel. Tighten the retention screws to secure the cable(s) to the connector(s).



Note If connecting two cables, ensure that one cable connects the Base connector of the camera to the Base connector of the NI PCIe-1437 and one cable connects the Med/Full/Ext connector of the camera to the Med/Full/Ext connector of the NI PCIe-1437. Crossing the cables will lead to the NI PCIe-1437 being unable to communicate with the camera.

11. Plug in and power on the computer.

The NI PCIe-1437 is now installed and the camera is connected.

Verifying the Installation

After you have installed the device and powered on your computer, Windows will recognize the device and assign resources to it. You can verify that the system recognizes the NI PCIe-1437 by using Measurement & Automation Explorer (MAX).

1. Launch MAX by navigating to **Start»All Programs»National Instruments»MAX** or by clicking the MAX desktop icon.
2. Expand **Devices and Interfaces**.
3. Verify that the NI PCIe-1437 device appears under **Devices and Interfaces**.

If the device does not appear, press <F5> to refresh the view in MAX. If the device does not appear after refreshing the view, visit ni.com/support for troubleshooting information.

4. Click on **NI PCIe-1437** and verify that the device is plugged into a slot that can provide the maximum performance with the following **Settings**:
 - a) **Negotiated PCIe Lane Width** — X8
 - b) **Negotiated PCIe Link Speed** — 5.0 GT/s

Configuring the NI PCIe-1437

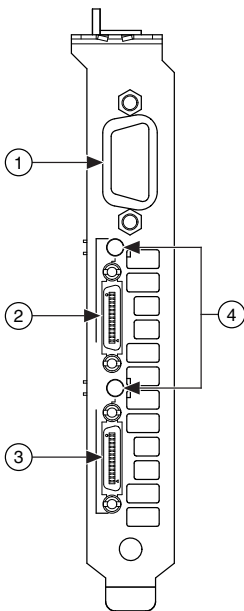
Use Measurement & Automation Explorer (MAX), to configure the NI PCIe-1437 for acquisition. In NI Vision Acquisition Software 18.0, the NI PCIe-1437 will use the NI-IMAQdx MAX configuration panels if NI-IMAQdx is also installed. If NI-IMAQdx is not installed, it will use the NI-IMAQ panels to configure the device. Refer to the *Measurement & Automation Explorer Help for NI-IMAQ* for additional information about configuring the device.



Note Before configuring the device in MAX, ensure that you installed the NI-IMAQdx and/or NI-IMAQ driver software, included with the NI Vision Acquisition Software.

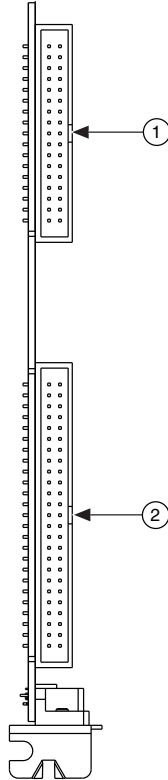
Connectors and Interfaces

Figure 3. Front Panel Interface



-
- | | |
|-----------------------------------|---|
| 1. Digital I/O Connector | 3. Medium/Full/Extended Camera Link SDR Connector |
| 2. Base Camera Link SDR Connector | 4. Power over Camera Link LEDs |
-

Figure 4. Top Connectors



- 1. RTSI Connector
- 2. I/O Extension Connector

Pinout

Digital I/O Connector

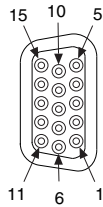


Table 1. Pin Assignments and Signal Descriptions

Pin	Signal Name	Description
1	TTL I/O 0	TTL-compatible Digital I/O or external trigger
2	Iso Input 0+	24 V-compatible isolated current sinking digital input
3	Phase A+	Quadrature encoder phase A positive connection for single-ended or differential signal
4	Phase B-	Quadrature encoder Phase B negative connection for differential signal
5	TTL I/O 4	TTL-compatible Digital I/O or external trigger
6	TTL I/O 1	TTL-compatible Digital I/O or external trigger
7	TTL I/O 2	TTL-compatible Digital I/O or external trigger
8	Iso Input 1+	24 V-compatible isolated current sinking digital input
9	Phase B+	Quadrature encoder Phase B positive connection for single-ended or differential signal
10	TTL I/O 3	TTL-compatible Digital I/O or external trigger
11	Digital Ground	Digital Ground reference for quadrature encoder inputs and TTL I/O
12	Iso Input 0- Iso Input 1-	Common Ground reference for isolated digital inputs
13	Phase A-	Quadrature encoder Phase A negative connection for differential signal
14	Digital Ground	Digital Ground reference for quadrature encoder inputs and TTL I/O
15	TTL I/O 5	TTL-compatible Digital I/O or external trigger

Base Camera Link SDR Connector

DGND/12 V	26	13	DGND
X(0)-	25	12	X(0)+
X(1)-	24	11	X(1)+
X(2)-	23	10	X(2)+
XCLK-	22	9	XCLK+
X(3)-	21	8	X(3)+
SerTC+	20	7	SerTC-
SerTFG-	19	6	SerTFG+
CC(1)-	18	5	CC(1)+
CC(2)+	17	4	CC(2)-
CC(3)-	16	3	CC(3)+
CC(4)+	15	2	CC(4)-
DGND	14	1	DGND/12 V

Table 2. Signal Descriptions

Signal Name	Description
X<3..0>±	Base configuration data and enable signals from the camera to the NI PCIe-1437
XCLK±	Transmission clock on the Base configuration chip for Camera Link communication between the NI PCIe-1437 and the camera
SerTC±	Serial transmission to the camera from the NI PCIe-1437
SerTFG±	Serial transmission to the NI PCIe-1437 from the camera
CC<4..1>±	Four LVDS pairs, defined as camera inputs and NI PCIe-1437 outputs, reserved for camera control. On some cameras, the camera controls allow the NI PCIe-1437 to control exposure time and frame rate
DGND/12 V	Digital Ground when connected to non-PoCL cameras and 12 V power supply when connected to PoCL cameras
DGND	Digital Ground

Medium/Full/Extended Camera Link SDR Connector

DGND/12 V	26	13	DGND
Y(0)-	25	12	Y(0)+
Y(1)-	24	11	Y(1)+
Y(2)-	23	10	Y(2)+
YCLK-	22	9	YCLK+
Y(3)-	21	8	Y(3)+
100 Ω differential termination with pin 7	20	7	100 Ω differential termination with pin 20
Z(0)-	19	6	Z(0)+
Z(1)-	18	5	Z(1)+
Z(2)-	17	4	Z(2)+
ZCLK-	16	3	ZCLK+
Z(3)-	15	2	Z(3)+
DGND	14	1	DGND/12 V

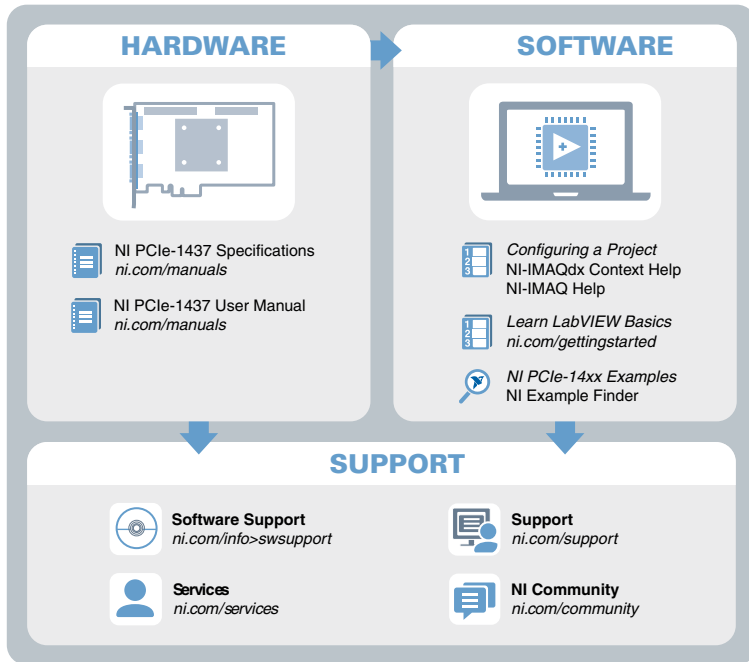
Table 3. Signal Descriptions

Signal Name	Description
Y<3..0>±	Medium configuration data and enable signals from the camera to the NI PCIe-1437
YCLK±	Transmission clock on the Medium configuration chip for Camera Link communication between the NI PCIe-1437 and the camera
Z<3..0>±	Full/Extended configuration data and enable signals from the camera to the NI PCIe-1437
ZCLK±	Transmission clock on the Full/Extended configuration chip for Camera Link communication between the NI PCIe-1437 and the camera
DGND/12 V	Digital Ground when connected to non-PoCL cameras and 12 V power supply when connected to PoCL cameras
DGND	Digital Ground



Note Refer to the device specifications, available at ni.com/manuals for more information.

Where to Go Next



Worldwide Support and Services

The NI website 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.

Visit ni.com/services for information about the services NI offers.

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

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378047A-01 April 10, 2018