NATIONAL INSTRUMENTS PXIe-4138 Precision System PXI Source Measure Unit User Guide

NATIONAL INSTRUMENTS PXIe-4138 Precision System PXI Source Measure Unit User Guide

Contents

GETTING STARTED GUIDE

This document explains how to install, configure, and test the PXIe-4138/4139. The PXIe-4138/4139 ships with NI-DCPower driver software, which you can use to program the module.

Note Before you begin, install and configure your chassis and controller.

Note In this document, the PXIe-4139 (40W) and PXIe-4139 (20W) are referred to inclusively as the PXIe-4139. The information in this document applies to all versions of the PXIe-4139 unless otherwise specified. To determine which version of the module you have, locate the device name in one of the following places:

- **In MAX**—The PXIe-4139 (40W) shows NI PXIe-4139 (40W), and the PXIe-4139 (20W) shows as NI PXIe-4139.
- **Device front panel**—The PXIe-4139 (40W) shows PXIe-4139 40W System SMU, and the PXIe-4139 (20W) shows NI PXIe-4139 Precision System SMU on the front panel.

Verifying the System Requirements

To use the NI-DCPower instrument driver, your system must meet certain requirements. Refer to the product readme, which is available on the driver software media or online at ni.com/manuals, for more information about minimum system requirements, recommended system, and supported application development environments (ADEs).

Unpacking the Kit

Notice To prevent electrostatic discharge (ESD) from damaging the module, 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 module from the package and inspect it for loose components or other signs of damage.

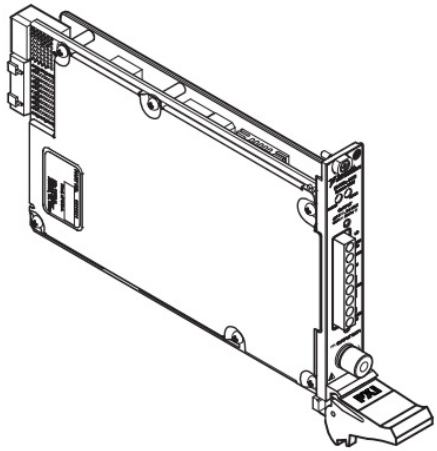
   Notice Never touch the exposed pins of connectors.

   Note Do not install a module if it appears damaged in any way.
3. Unpack any other items and documentation from the kit. Store the module in the antistatic package when the module is not in use.

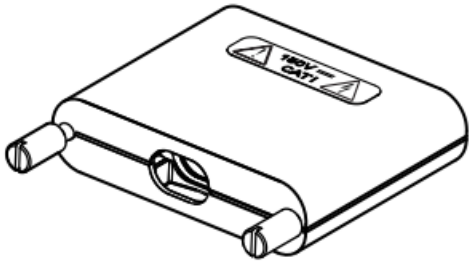
Kit Contents

Figure 1. NI 4138/4139 Kit Contents

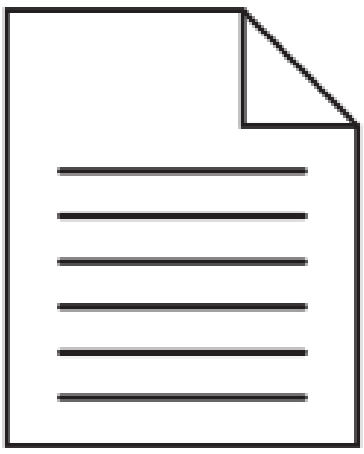
1. NI PXIe-4138/4139 System SMU Device



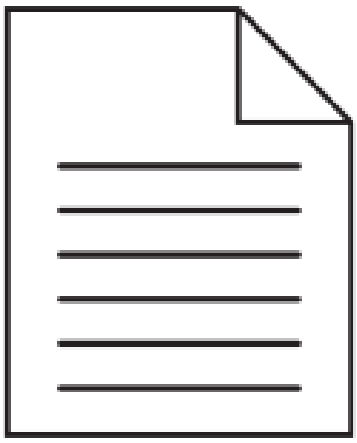
2. Output Connector Assembly



3. Safety, Environmental, and Regulatory Information



4. Product documentation



Other Equipment

There are several required items not included in your PXIe-4138/4139 kit that you need to operate the PXIe-4138/4139. Your application may require additional items not included in your kit to install or operate your PXIe-4138/4139.

Required Items

- A PXI Express chassis and chassis documentation. For more information about compatible chassis options, refer to ni.com.
- A PXI Express embedded controller or MXI controller system that meets the system requirements specified in this guide and chassis documentation.

Optional Items

- PXI Slot Blocker Kit (NI part number 199198-01)
- NI screwdriver (NI part number 781015-01)

Visit ni.com for more information about these additional items.

Preparing the Environment

Ensure that the environment you are using the PXIe-4138/4139 in meets the following specifications:

Temperature and Humidity

Temperature	
Operating	0 °C to 55 °C
Storage	-40 °C to 70 °C
Humidity	
Operating	10% to 90%, non condensing
Storage	5% to 95%, non condensing
Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)

Notice This model is intended for use in indoor applications only.

Installing the Software

You must be an Administrator to install NI software on your computer.

1. Install an ADE, such as LabVIEW or LabWindows™/CVI™.
2. Download the driver software installer from ni.com/downloads or install the driver software from the physical media included with your product.
   NI Package Manager downloads with the driver software to handle the installation. Refer to the NI Package Manager Manual for more information about installing, removing, and upgrading NI software using NI Package Manager.
3. Follow the instructions in the installation prompts.
   Note Windows users may see access and security messages during installation. Accept the prompts to complete the installation.
4. When the installer completes, select Restart in the dialog box that prompts you to restart, shut down, or restart later.

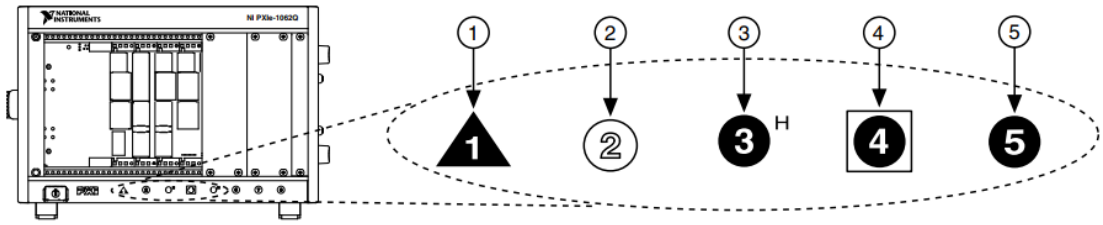
Installing the PXIe-4138/4139

Notice To prevent damage to the PXIe-4138/4139 caused by ESD or contamination, handle the module using the edges or the metal bracket.

1. Ensure the AC power source is connected to the chassis before installing the PXIe-4138/4139.
   The AC power cord grounds the chassis and protects it from electrical damage while you install the PXIe-4138/4139.
2. Power off the chassis.
3. Inspect the slot pins on the chassis backplane for any bends or damage prior to installation. Do not install a module if the backplane is damaged.
4. Position the chassis so that inlet and outlet vents are not obstructed. For more information about optimal chassis positioning, refer to the chassis documentation.

5. Remove the black plastic covers from all the captive screws on the module front panel.
6. Identify a supported slot in the chassis. The following figure shows the symbols that indicate the slot types.

Figure 2. Chassis Compatibility Symbols

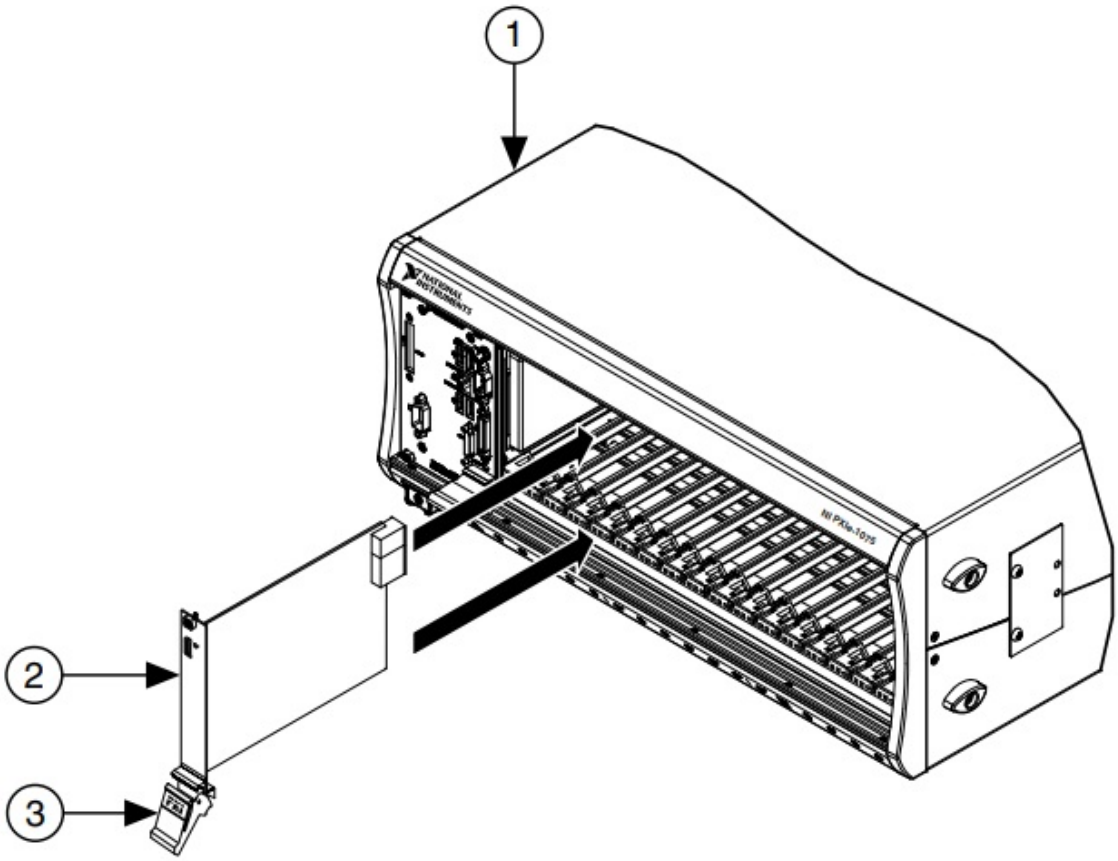


1. PXI Express System Controller Slot
2. PXI Peripheral Slot
3. PXI Express Hybrid Peripheral Slot
4. PXI Express System Timing Slot
5. PXI Express Peripheral Slot

PXIe-4138/4139 modules can be placed in PXI Express peripheral slots, PXI Express hybrid peripheral slots, or PXI Express system timing slots.

Touch any metal part of the chassis to discharge static electricity.
Ensure that the ejector handle is in the downward (unlatched) position.
Place the module edges into the module guides at the top and bottom of the chassis. Slide the module into the slot until it is fully inserted.

Figure 3. Module Installation



1. Chassis
2. Hardware Module
3. Ejector Handle in Downward (Unlatched) Position

Latch the module in place by pulling up on the ejector handle.
Secure the module front panel to the chassis using the front-panel mounting screws.

Note Tightening the top and bottom mounting screws increases mechanical stability and also electrically connects the front panel to the chassis, which can improve the signal quality and electromagnetic performance.
Cover all empty slots using either filler panels (standard or EMC) or slot blockers with filler panels, depending on your application.

Note For more information about installing slot blockers and filler panels, go to **ni.com/r/pxiblocker.**
Connect the output connector assembly to the device. Tighten any thumbscrews on the output connector assembly to hold it in place.
Power on the chassis.

Related Information
Why Is the ACCESS LED Off When the Chassis Is On? on page 14

PXIe-4138 Pinout

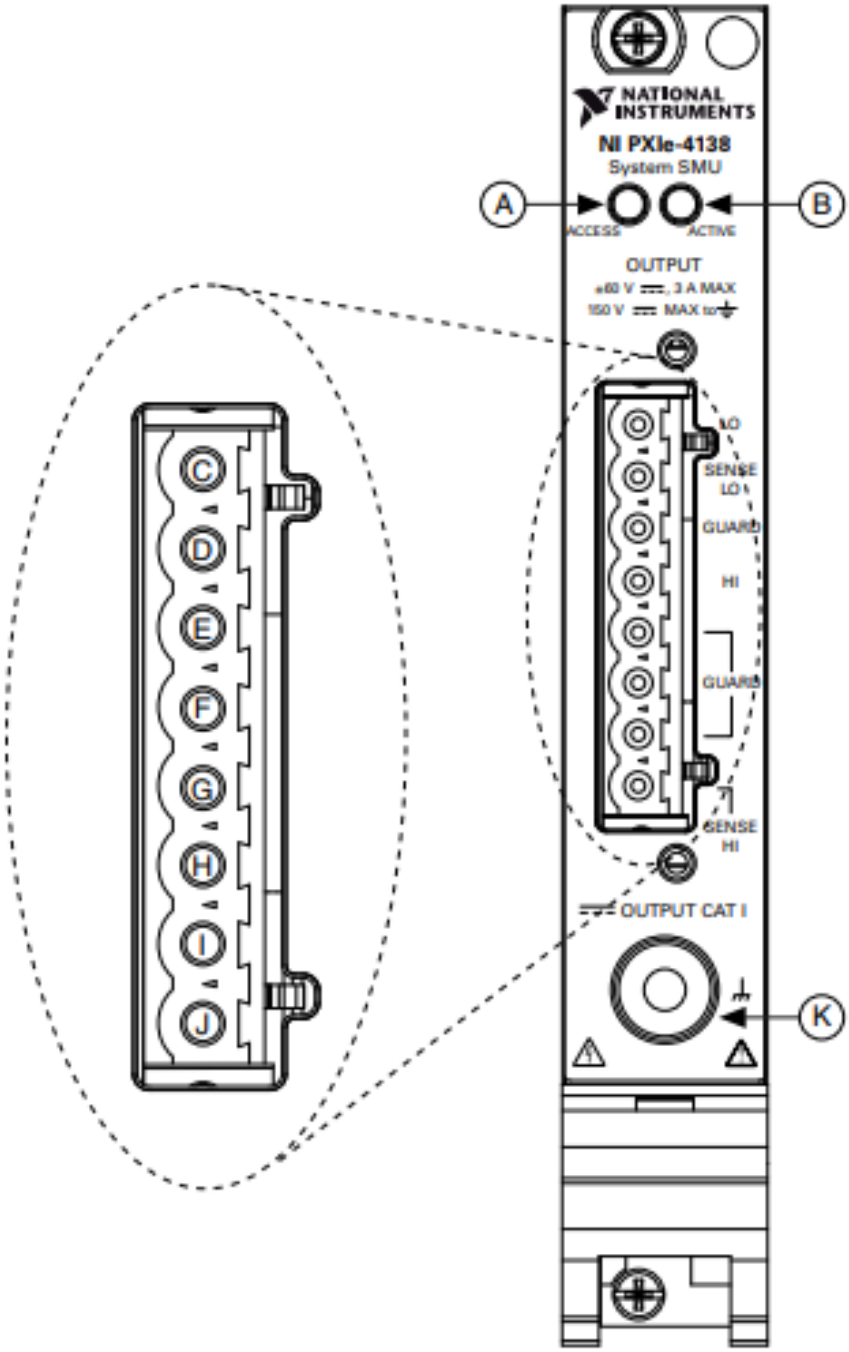


Table 1. Signal Descriptions

Item	Description
A	Access Status LED
B	Active Status LED
C	Output LO
D	Sense LO
E	Guard
F	Output HI

Table 1. Signal Descriptions (Continued)

Item	Description
G	Guard
H	Guard
I	Guard
J	Sense HI
K	Chassis Ground

Table 2. LED Access Status Indicator

Status Indicator	Device State
(Off)	Not Powered
Green	Powered
Amber	Device is being accessed

Table 3. LED Active Status Indicator

Status Indicator	Output Channel State
(Off)	Channel not operating in a programmed state
Green	Channel operating in a programmed state
Red	Channel disabled because of error, such as an overcurrent condition

PXIe-4139 Pinout

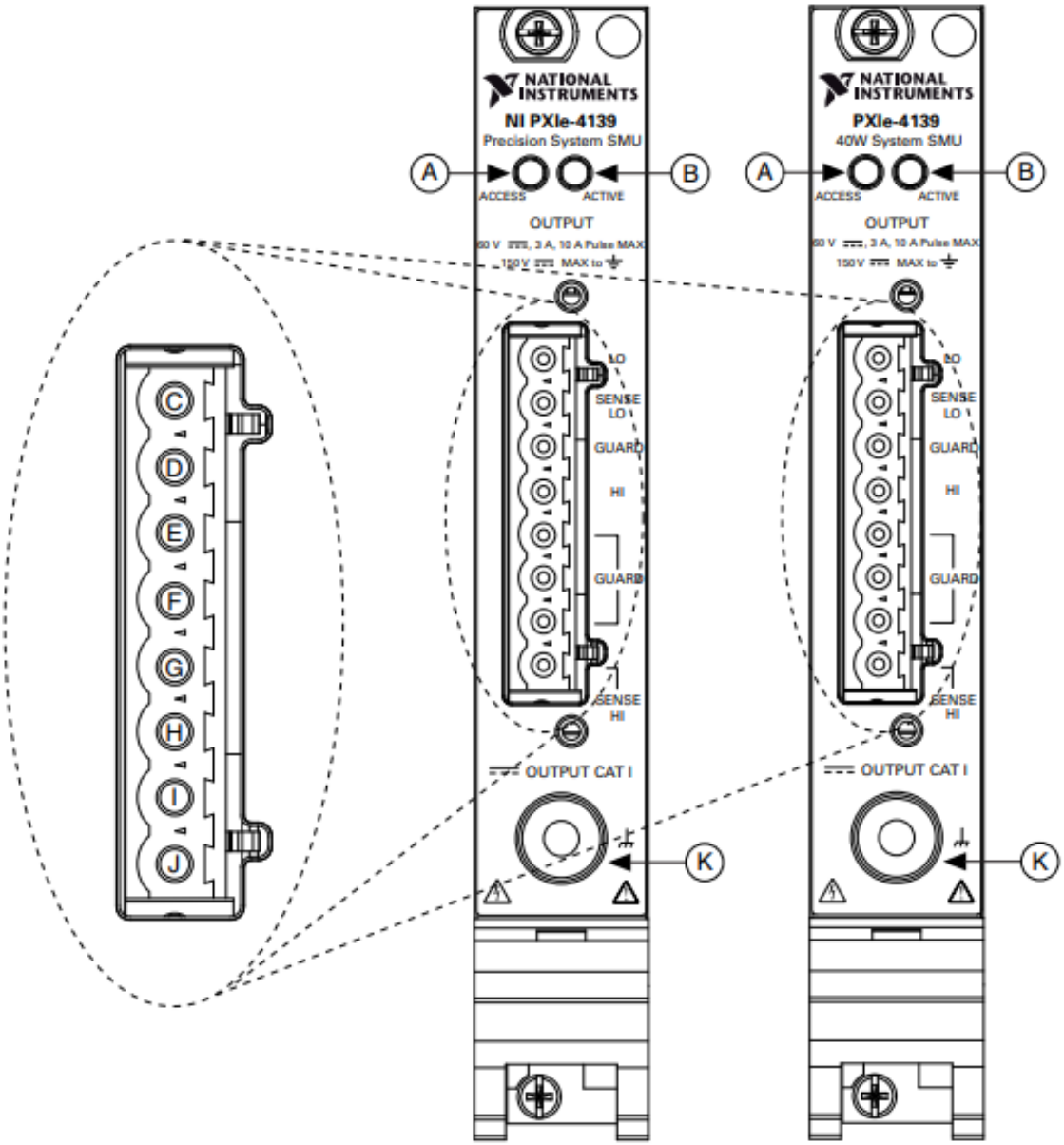


Table 4. Signal Descriptions

Item	Description
A	Access Status LED
B	Active Status LED
C	Output LO

Table 4. Signal Descriptions (Continued)

Item	Description
D	Sense LO
E	Guard
F	Output HI
G	Guard
H	Guard
I	Guard
J	Sense HI
K	Chassis Ground

Table 5. LED Access Status Indicator

Status Indicator	Device State
(Off)	Not Powered
Green	Powered
Amber	Device is being accessed

Table 6. LED Active Status Indicator

Status Indicator	Output Channel State
(Off)	Channel not operating in a programmed state
Green	Channel operating in a programmed state
Red	Channel disabled because of error, such as an overcurrent condition

Configuring the PXIe-4138/4139 in MAX

Use Measurement & Automation Explorer (MAX) to configure your NI hardware. MAX informs other programs about which NI hardware products are in the system and how they are configured. MAX is automatically installed with NI-DCPower.

1. Launch MAX.
2. In the configuration tree, expand Devices and Interfaces to see the list of installed NI hardware.
   Installed modules appear under the name of their associated chassis
3. .Expand your **Chassis** tree item.
   MAX lists all modules installed in the chassis. Your default names may vary.
   Note If you do not see your module listed, press to refresh the list of installed modules. If the module is still not listed, power off the system, ensure the module is correctly installed, and restart.

4. Record the identifier MAX assigns to the hardware. Use this identifier when programming the PXIe-4138/4139.
5. Self-test the hardware by selecting the item in the configuration tree and clicking Self **Test** in the **MAX** toolbar.

The MAX self-test performs a basic verification of hardware resources.

Related Information

What Should I Do if the PXIe-4138/4139 Doesn't Appear in MAX? on page 13

Self-Calibrating the PXIe-4138/4139

Self-calibration adjusts the PXIe-4138/4139 for variations in the module environment. Perform a complete self-calibration after the first time you install the PXIe-4138/4139.

1. Install the PXIe-4138/4139 and let it warm up for 30 minutes.
   Note Warm up begins when the PXI Express chassis has been powered on and the operating system has completely loaded.
2. Self-calibrate the PXIe-4138/4139 by clicking the Self-Calibrate button in MAX or calling niDCPower Cal Self Calibrate or niDCPower_CalSelfCalibrate.

The PXIe-4138/4139 modules are externally calibrated at the factory but you should perform a self-calibration in all of the following situations:

- After first installing the PXIe-4138/4139 in a chassis
- After any module that is in the same chassis as the PXIe-4138/4139 is installed, uninstalled, or moved
- When the PXIe-4138/4139 is in an environment where the ambient temperature varies or the PXIe-4138/4139 temperature has drifted more than ±5 °C from the temperature at the last self-calibration
- Within 24 hours of the previous self-calibration

Related Information
What Should I Do if the PXIe-4138/4139 Fails the Self-Test? on page 14

Programming the PXIe-4138/4139

You can generate signals interactively using Instrument Studio or you can use the NI-DC Power instrument driver to program your device in the supported ADE of your choice.

Software	Location	Description
InstrumentStudio	InstrumentStudio is automatically installed when you install the NI-DCPower driver on a 64-bit system. You can access InstrumentStudio in any of the following ways:• From the Windows start menu, select **National Instruments**»**[Driver] Soft Front Panel**. This launches InstrumentStudio and runs a soft front panel populated with NI-DCPower devices.• From the Windows start menu, select **National Instruments**» **InstrumentStudio [year]**. This launches InstrumentStudio and runs a soft front panel populated with devices detected on your system.	When you install NI- DCPower on a 64-bit system, you can monitor, control, and record measurements from supported devices using InstrumentStudio .InstrumentStudio is a software-based soft front panel application that allows you to perform interactive measurements on several different device types in a single program.
	• From Measurement & Automation Explorer (MAX), select a device and then click **Test Panels.**…. This launchesInstrumentStudio and runs a soft front panel for the device you selected.	

Software	Location	Description
NI-DCPower	LabVIEW—Available on the LabVIEW	The NI-DCPower API
Instrument Driver	Functions palette at **Measurement I/O** »	configures and operates
	NI-DCPower . Examples are available from	the module hardware and
	the **Start** menu in the **National**	performs basic acquisition
	Instruments folder.	and measurement
		functions.
	LabVIEW NXG—Available from the	
	diagram at **Hardware Interfaces** »	
	Electronic Test »**NI-DCPower** . Examples	
	are available from the **Learning** tab in the	
	Examples »**Hardware Input and Output**	
	folder.	
	LabWindows/CVI—Available at **Program**	
	Files »**IVI Foundation** »**IVI** »**Drivers** »	
	NI-DCPower . LabWindows/CVI examples	
	are available from the **Start** menu in the	
	National Instruments folder.	
	C/C++—Available at **Program Files** »**IVI**	
	Foundation »**IVI** . Refer to the *Creating an*	
	Application with NI-DCPower in Microsoft	
	Visual C and C++ topic of the *NI DC*	
	Power Supplies and SMUs Help (installed	
	with the NI-DCPower driver software) to	
	manually add all required include and	
	library files to your project. NI-DCPower	
	does not ship with installed C/C++	
	examples.	

Troubleshooting

If an issue persists after you complete a troubleshooting procedure, contact NI technical support or visit ni.com/support.

What Should I Do if the PXIe-4138/4139 Doesn't Appear in MAX?

1. In the MAX configuration tree, expand Devices and Interfaces.

2. Expand the Chassis tree to see the list of installed hardware, and press to refresh the list.
3. If the module is still not listed, power off the system, ensure that all hardware is correctly installed, and restart the system.
4. Navigate to the Device Manager.

Operating System	Description
Windows 10/8.1	Right-click the Start button, and select Device Manager
Windows 7	Select **Start»Control Panel»Device** Manager.

5. Verify the PXIe-4138/4139 appears in the Device Manager.
   a) Under an NI entry, confirm that a PXIe-4138/4139 entry appears.

   Note If you are using a PC with a device for PXI remote control system, under System Devices, also confirm that no error conditions appear for the **PCI-to-PCI Bridge.**

   b) If error conditions appear, reinstall NI-DCPower and the PXIe-4138/4139

Why Is the ACCESS LED Off When the Chassis Is On?

Before proceeding, verify that the PXIe-4138/4139 appears in MAX.

If the ACCESS LED fails to light after you power on the chassis, a problem may exist with the chassis power rails, a hardware module, or the LED.

Notice Apply external signals only while the PXIe-4138/4139 is powered on. Applying external signals while the module is powered off may cause damage.

1. Disconnect any signals from the module front panels.
2. Power off the chassis.
3. Remove the module from the chassis and inspect it for damage. Do not reinstall a damaged module.
4. Install the module in a different chassis slot from which you removed it.
5. Power on the chassis.

   Note If you are using a PC with a device for PXI remote control system, power on the chassis before powering on the computer.
6. Verify that the module appears in MAX.
7. Reset the module in MAX and perform a self-test.

What Should I Do if the PXIe-4138/4139 Fails the Self Test?

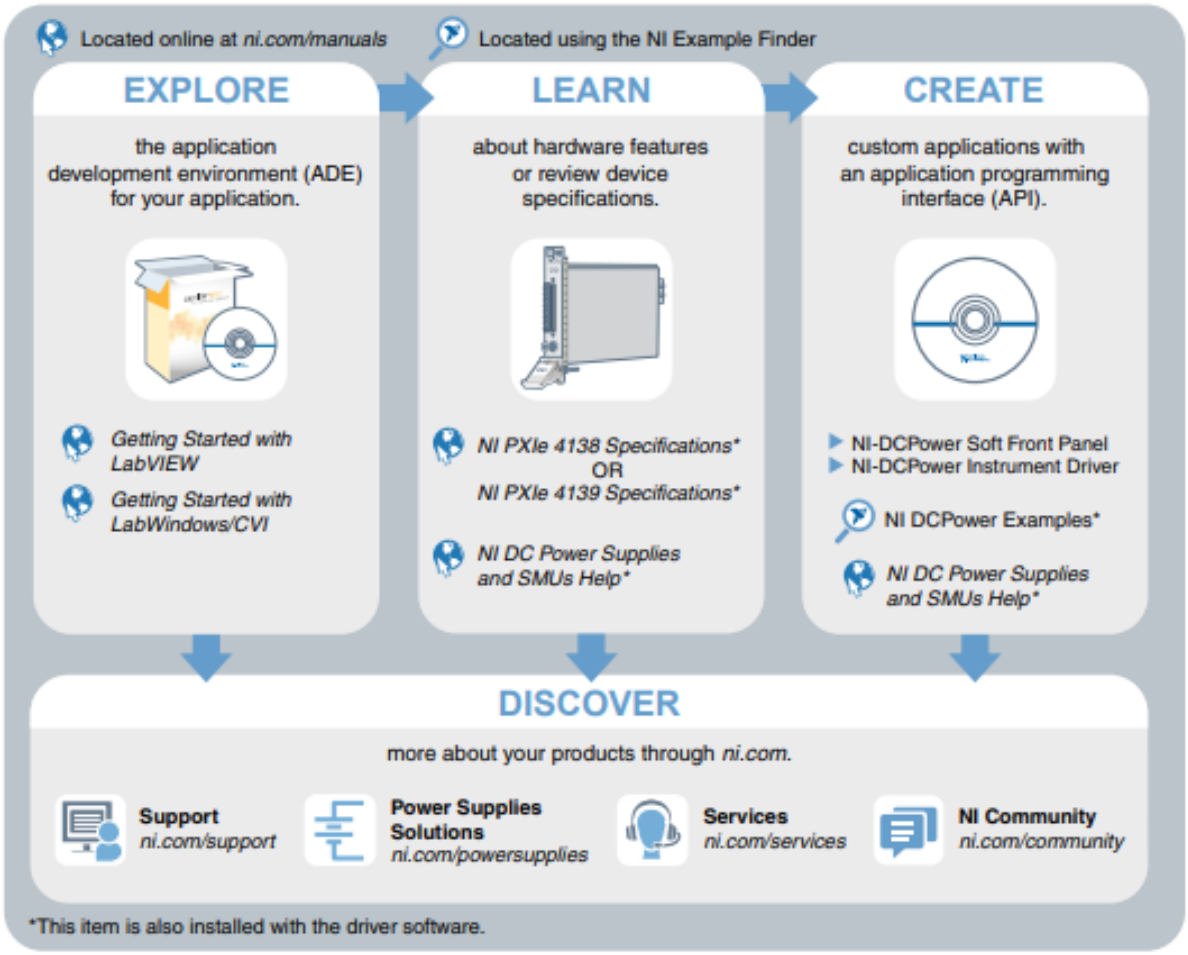
1. Restart the system.
2. Launch MAX.
   - Failed self-test
   - Perform self-calibration, then perform the self-test again. The PXIe-4138/4139 must be calibrated to pass

the self-test.

- Failed self-calibration
- Perform self-calibration again.

3. Power off the chassis.
4. Reinstall the failed module in a different slot.
5. Power on the chassis.
6. Perform the self-test again.

Where To Go Next



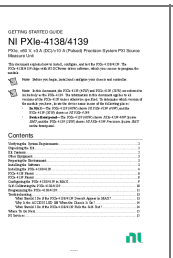
NI Services

Visit ni.com/support to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.
Visit ni.com/services to learn about NI service offerings such as calibration options, repair, and replacement.
Visit ni.com/register to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.
NI corporate headquarters is located at 11500 N Mopac Expwy, Austin, TX, 78759-3504, USA.

HTS codes, ECCNs, and other import/export data. NI MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO THE ACCURACY OF THE INFORMATION CONTAINED HEREIN AND SHALL NOT BE LIABLE FOR ANY ERRORS. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.

374671C-01 November 27, 2020

Documents / Resources

	NATIONAL INSTRUMENTS PXIe-4138 Precision System PXI Source Measure Unit [pdf] User Guide PXIe-4138, PXIe-4139, PXIe-4138 Precision System PXI Source Measure Unit, PXIe-4138, Precision System PXI Source Measure Unit, System PXI Source Measure Unit, PXI Source Measure Unit, Source Measure Unit, Measure Unit

References

- Test and Measurement Systems, a part of Emerson - NI
- NI Community - National Instruments
- Software and Driver Downloads - NI
- Trade Compliance - NI
- Product Documentation - NI
- National Instruments Patents - NI
- Product Documentation - NI
- Log In - National Instruments
- NI Services - NI
- Support - NI
- NI Trademarks and Logo Guidelines - NI
- Test and Measurement Systems, a part of Emerson - NI
- Product Documentation - NI
- Search Results - NI
- NI Services - NI
- Support - NI