
PXle-6594

Getting Started

2025-05-28



Contents

PXIe-6594 Getting Started	3
FlexRIO Documentation and Resources	3
Verifying the System Requirements.....	4
Unpacking the Kit	4
PXIe-6594 Kit Contents	5
Preparing the Environment.....	5
Installing the Software and Driver Using NI Package Manager	6
Installing the PXIe-6594	6
PXIe-6594 Front Panel and Pinout	8
Verifying the Installation in MAX.....	12
FlexRIO Examples.....	12
Accessing FlexRIO Examples	13
Block Diagrams.....	13
Component-Level Intellectual Property (CLIP)	15
Troubleshooting.....	15
What Should I Do if the PXIe-6594 Does Not Appear in MAX?.....	15
What Should I Do if the PXIe-6594 Fails the Self-Test?	16
NI Services	16

PXIe-6594 Getting Started

This document explains how to install, configure, test, and use the PXIe-6594. You can program the PXIe-6594 with the following software options.

- FlexRIO driver software
- NI LabVIEW Instrument Design Libraries for FlexRIO (instrument design libraries)



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



Note Adapter modules are not installable or interchangeable on the PXIe-6594.

FlexRIO Documentation and Resources

Table 1. FlexRIO Documentation and Resources

Document/Resource	Location	Description
<i>PXIe-6594 Getting Started Guide</i> (this document)	Available at ni.com/manuals .	Contains installation instructions and basic programming instructions for your PXIe-6594.
<i>PXIe-6594 Specifications</i>	Available at ni.com/manuals .	Contains specifications for your PXIe-6594.
<i>PXIe-6594 Safety, Environmental, and Regulatory Information</i>	Available at ni.com/manuals .	Contains important safety, environmental, and regulatory information for your PXIe-6594.
<i>LabVIEW FPGA Module Help</i>	Embedded in <i>LabVIEW Help</i> and at ni.com/manuals .	Contains information about the basic functionality of the LabVIEW FPGA Module.
<i>FlexRIO Help</i>	Available at ni.com/manuals .	Contains information about the FPGA module front panel

Document/Resource	Location	Description
		connectors and I/O, programming instructions, and I/O component-level IP (CLIP).
LabVIEW Examples	Available in NI Example Finder. In LabVIEW, click Help » Find Examples » Hardware Input and Output » FlexRIO .	Contains examples of how to run FPGA VIs and Host VIs on your FlexRIO devices.
FlexRIO product page	Located at ni.com/flexrio .	Contains product information and data sheets for FlexRIO hardware.

Verifying the System Requirements

To use the PXIe-6594, your system must meet certain requirements. For more information about minimum system requirements, recommended system, and supported application development environments (ADEs), refer to the readme, which is installed or available at ni.com/manuals.

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.

PXIe-6594 Kit Contents

The following items are included in the device kit:

- PXIe-6594
- Documentation:
 - **PXIe-6594 Getting Started Guide** (this document)
 - **PXIe-6594 Safety, Environmental, and Regulatory Information**

Preparing the Environment

Ensure the environment in which you are using the PXIe-6594 meets the following specifications.

Operating environment	
Ambient temperature range	0 °C to 55 °C ¹
Relative humidity range	10% to 90%, noncondensing
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Pollution Degree	2

Indoor use only.

1. The PXIe-6594 requires a chassis with slot cooling capacity ≥ 58 W. Not all chassis with slot cooling capacity ≥ 58 W can achieve this ambient temperature range. Refer to the [PXI Chassis Manual](#) for specifications to determine the ambient temperature ranges your chassis can achieve.



Note For complete specifications, refer to the specifications document for your device at ni.com/manuals.

Installing the Software and Driver Using NI Package Manager

Before you install your hardware, you must install the application software and driver using NI Package Manager. If you do not already have NI Package Manager installed, visit ni.com/r/nipmdownload to download.

Follow the prompts in NI Package Manager to install the software in the following order:

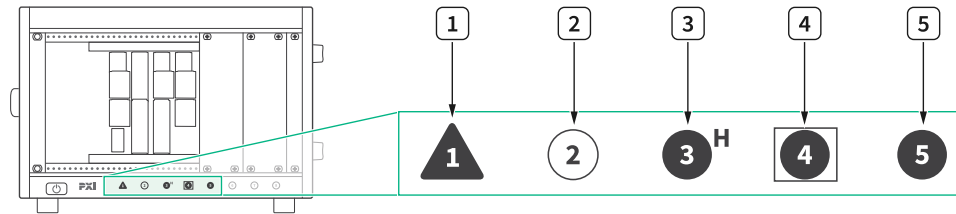
1. Install LabVIEW.
2. Install the LabVIEW FPGA Module.
3. (Optional) Install the LabVIEW Real-Time Module.
4. Install FlexRIO.

Installing the PXIe-6594



Notice To prevent damage to the PXIe-6594 caused by ESD or contamination, handle the module using the edges or the metal bracket.

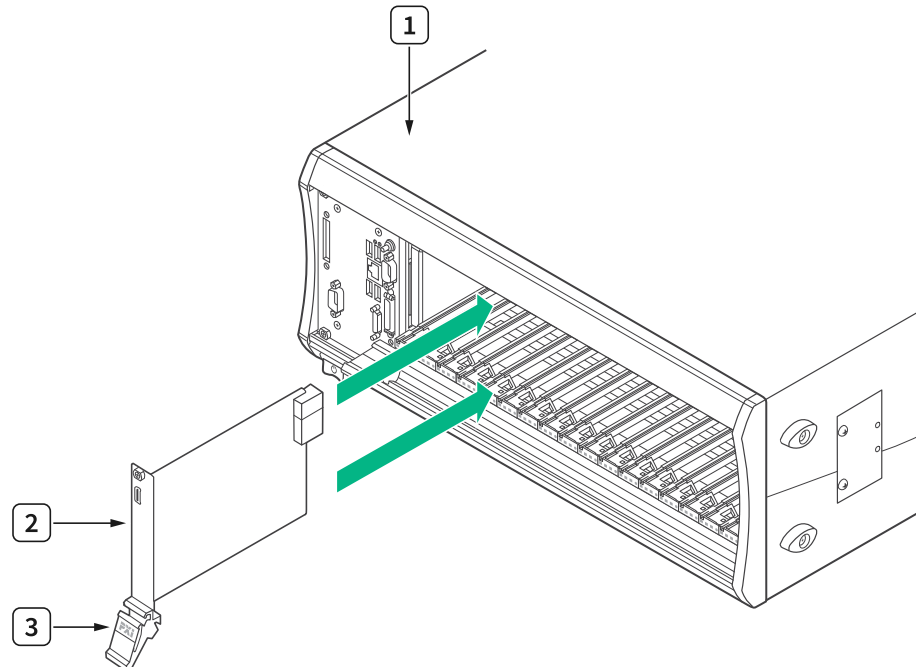
1. Ensure the AC power source is connected to the chassis before installing the module.
The AC power cord grounds the chassis and protects it from electrical damage while you install the module.
2. Power off the chassis.
3. Inspect the slot pins on the chassis backplane for any bends or damage prior to installation. Do not install a module if the backplane is damaged.
4. Remove the black plastic covers from all the captive screws on the module front panel.
5. Identify a supported slot in the chassis. The following figure shows the symbols that indicate the slot types.

Figure 1. 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-6594 modules can be placed in PXI Express peripheral slots, PXI Express hybrid peripheral slots, or PXI Express system timing slots.

6. Touch any metal part of the chassis to discharge static electricity.
7. Ensure that the ejector handle is in the downward (unlatched) position.
8. 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 1. Module Installation

1. Chassis
2. Hardware Module
3. Ejector Handle in Downward (Unlatched) Position
9. Latch the module in place by pulling up on the ejector handle.

10. 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.

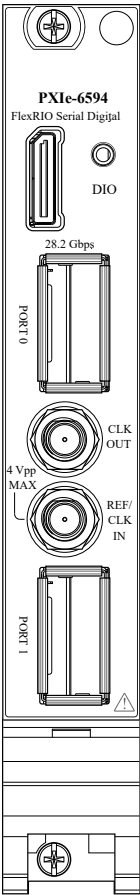
11. Cover all empty slots using either filler panels (standard or EMC) or slot blockers with filler panels, depending on your application.



Note For more information about installing slot blockers and filler panels, go to ni.com/r/pxiblocker.

12. Power on the chassis.

PXle-6594 Front Panel and Pinout



The following table describes the signal connections for the PXle-6594.

Connector	Description	Function
DIO	Molex Nano-Pitch DIO connector	Multi-signal DIO connector that provides access to FPGA multi-gigabit transceivers (MGTs) and general-purpose LVCMOS signals
PORT 0	QSFP, SFF-8436 compliant	High-speed serial interfacing ports
PORT 1		
CLK OUT	Standard SMA female connector	Output for exported clock
REF/CLK IN	Standard SMA female connector	Input for an external Reference Clock

Figure 3. Digital I/O Connector Pinout

Reserved	A1	B1	5 V
GND	A2	B2	GND
MGT Rx+ 0	A3	B3	MGT Tx+ 0
MGT Rx− 0	A4	B4	MGT Tx− 0
GND	A5	B5	GND
MGT Rx+ 1	A6	B6	MGT Tx+ 1
MGT Rx− 1	A7	B7	MGT Tx− 1
GND	A8	B8	GND
DIO 4	A9	B9	DIO 6
DIO 5	A10	B10	DIO 7
GND	A11	B11	GND
DIO 0	A12	B12	DIO 2
DIO 1	A13	B13	DIO 3
GND	A14	B14	GND
MGT Rx+ 2	A15	B15	MGT Tx+ 2
MGT Rx− 2	A16	B16	MGT Tx− 2
GND	A17	B17	GND
MGT Rx+ 3	A18	B18	MGT Tx+ 3
MGT Rx− 3	A19	B19	MGT Tx− 3
GND	A20	B20	GND
5.0 V	A21	B21	Reserved

The following table lists the available pins on the DIO connector.

Signal	Type	Direction
MGT Tx± <0..3>	Xilinx UltraScale+ GTY	Output
MGT Rx± <0..3>	Xilinx UltraScale+ GTY	Input
DIO <0..7>	Single-ended	Bidirectional
5.0 V	DC	Output
GND	Ground	—

Figure 4. QSFP+ Connector Pinout

GND	20	19	GND
Rx2n	21	18	Rx1n
Rx2p	22	17	Rx1p
GND	23	16	GND
Rx4n	24	15	Rx3n
Rx4p	25	14	Rx3p
GND	26	13	GND
ModPrsL	27	12	SDA
IntL	28	11	SCL
Vcc Tx	29	10	Vcc Rx
Vcc1	30	9	ResetL
LPMODE	31	8	ModSelL
GND	32	7	GND
Tx3p	33	6	Tx4p
Tx3n	34	5	Rx4n
GND	35	4	GND
Tx1p	36	3	Tx2p
Tx1n	37	2	Tx2n
GND	38	1	GND

The following table lists the available pins on the QSFP+ connectors.

Symbol	Signal Name
Txn	Transmitter Inverted Data Input
Txp	Transmitter Non-Inverted Data Input
Rxn	Receiver Inverted Data Output
Rxp	Receiver Non-Inverted Data Output
SCL	2-Wire Serial Interface Clock
SDA	2-Wire Serial Interface Data
ModPrsL	Module Present
ModSelL	Module Select
ResetL	Module Reset
IntL	Interrupt
LPMODE	Low Power Mode
Vcc Rx	+3.3 V Power Supply Receiver
Vcc Tx	+3.3 V Power Supply Transmitter
Vcc1	+3.3 V Power Supply

Symbol	Signal Name
GND	Ground

Verifying the Installation in MAX

You can 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 FlexRIO.



Note MAX is not available on Linux.

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 <F5> 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 name MAX assigns to the hardware. Use this identifier when programming the PXIe-6594.
5. Self-test the hardware by selecting the item in the configuration tree and clicking **Self-Test** in the MAX toolbar.
MAX self-test performs a basic verification of hardware resources.

FlexRIO Examples

FlexRIO includes several example applications for LabVIEW. These examples serve as interactive tools, programming models, and as building blocks in your own applications.

Accessing FlexRIO Examples

FlexRIO examples are available in LabVIEW's NI Example Finder. Complete the following steps to access the examples by task.

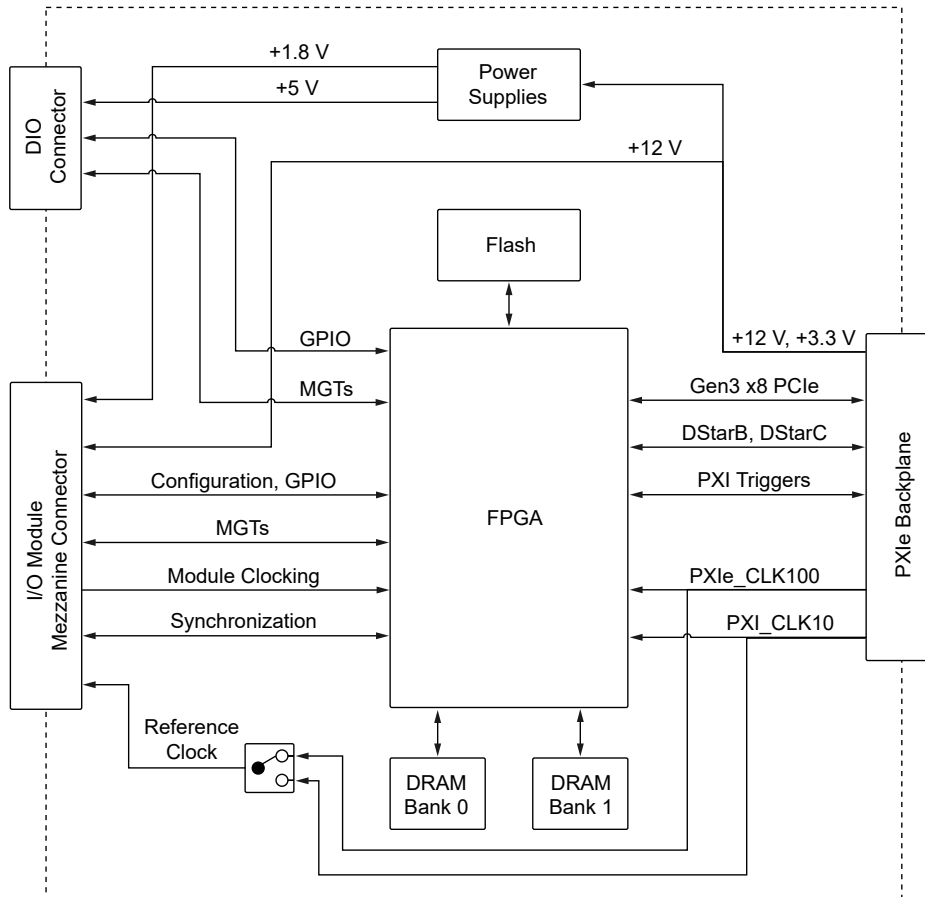
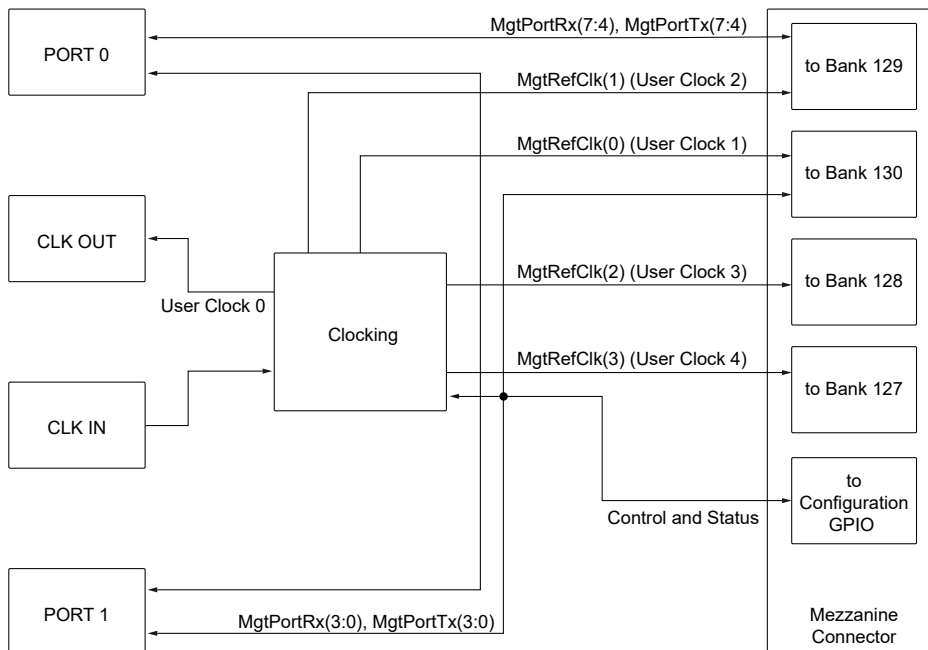
1. In LabVIEW, click **Help » Find Examples**.
2. In the NI Example Finder window that appears, click **Hardware Input and Output » FlexRIO**.

Click on an example and refer to the Information window for a description of the example. Refer the Requirements window for a list of hardware that can run the example.

You can also click the Search tab to search all installed examples by keyword. For example, search for `FlexRIO` to locate all FlexRIO examples.

Online examples are also available to demonstrate FlexRIO basics, such as using DRAM, acquiring data from adapter modules, and performing high throughput streaming. To access these examples, search `FlexRIO examples` in the **Search the community** field at ni.com/examples.

Block Diagrams

Figure 1. FPGA Carrier Block Diagram**Figure 1. PXle-6594 I/O Block Diagram**

Component-Level Intellectual Property (CLIP)

The LabVIEW FPGA Module includes component-level intellectual property (CLIP) for HDL IP integration. FlexRIO devices support two types of CLIP: user-defined and socketed.

- **User-defined CLIP** allows you to insert HDL IP into an FPGA target, enabling VHDL code to communicate directly with an FPGA VI.
- **Socketed CLIP** provides the same IP integration of the user-defined CLIP, but it also allows the CLIP to communicate directly with circuitry external to the FPGA. Adapter module socketed CLIP allows your IP to communicate directly with both the FPGA VI and the external adapter module connector interface.

The PXle-6594 ships with socketed CLIP items that add module I/O to the LabVIEW project.

Refer to **Configuring Your Adapter Module Using LabVIEW FPGA** in FlexRIO documentation for more information about CLIP.

Troubleshooting

If an issue persists after you complete a troubleshooting procedure, search our KnowledgeBase for additional information our technical support engineers create as they answer common user questions and resolve unexpected issues.

What Should I Do if the PXle-6594 Does Not 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 <F5> 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 PXle-6594 appears in the Device Manager.
 - a. Under the NI RIO Devices section, confirm that a PXle-6594 entry appears.



Note Device Manager identifies the PXle-6594 as NI FlexRIO PXle Module (KU15P).



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 the FlexRIO driver and the PXle-6594.

What Should I Do if the PXle-6594 Fails the Self-Test?

1. Restart the system.
2. Launch MAX.
 - Failed self-test—Perform self-calibration, then perform the self-test again. The PXle-6594 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.

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.