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# PXle-6593

# Getting Started

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# Getting Started Guide

This document explains how to install, configure, test, and use the PXIe-6593. You can program the PXIe-6593 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-6593.

## FlexRIO Documentation and Resources

Document/Resource	Location	Description
<b>PXIe-6593 Getting Started Guide</b> (this document)	Available at <a href="http://ni.com/manuals">ni.com/manuals</a> .	Contains installation instructions and basic programming instructions for your PXIe-6593.
<b>PXIe-6593 Specifications</b>	Available at <a href="http://ni.com/manuals">ni.com/manuals</a> .	Contains specifications for your PXIe-6593.
<b>PXIe-6593 Safety, Environmental, and Regulatory Information</b>	Available at <a href="http://ni.com/manuals">ni.com/manuals</a> .	Contains important safety, environmental, and regulatory information for your PXIe-6593.
<b>LabVIEW FPGA Module Help</b>	Embedded in <b>LabVIEW Help</b> and at <a href="http://ni.com/manuals">ni.com/manuals</a> .	Contains information about the basic functionality of the LabVIEW FPGA Module.
<b>FlexRIO Help</b>	Available at <a href="http://ni.com/manuals">ni.com/manuals</a> .	Contains information about the FPGA module front panel 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 »	Contains examples of how to run FPGA VIs and Host VIs on your FlexRIO devices.

Document/Resource	Location	Description
	Hardware Input and Output » FlexRIO.	
FlexRIO product page	Located at <a href="http://ni.com/flexrio">ni.com/flexrio</a> .	Contains product information and data sheets for FlexRIO hardware.

Table 1. FlexRIO Documentation and Resources

## Verifying the System Requirements

To use the PXIe-6593, 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](http://ni.com/manuals).

## 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.

## PXIe-6593 Kit Contents

The following items are included in the device kit:

- PXIe-6593
- Documentation:
  - **PXIe-6593 Getting Started Guide** (this document)
  - **PXIe-6593 Safety, Environmental, and Regulatory Information**

## Preparing the Environment

Ensure the environment in which you are using the PXIe-6593 meets the following specifications.

<b>Operating environment</b>	
Ambient temperature range	0 °C to 55 °C <sup>[1]</sup>
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.



**Note** For complete specifications, refer to the specifications document for your device at [ni.com/manuals](https://ni.com/manuals).

<sup>1</sup> The PXIe-6593 requires a chassis with slot cooling capacity  $\geq 58$  W. Not all chassis with slot cooling capacity  $\geq 58$  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.

## Installing the Software and Driver Using NI Package Manager

Before installing your hardware, you must install the application software and instrument driver. Install the software in the following order:

1. Install LabVIEW.

Refer to the **LabVIEW Installation Guide** for installation instructions for LabVIEW 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 for Windows. Documentation for LabVIEW is available at [ni.com/manuals](http://ni.com/manuals).

2. Install the LabVIEW FPGA Module.

Refer to the **LabVIEW FPGA Module Release and Upgrade Notes** for installation instructions and information about getting started with the LabVIEW FPGA Module. Documentation for the LabVIEW FPGA Module is available at [ni.com/manuals](http://ni.com/manuals).

3. (Optional) Install the LabVIEW Real-Time Module.

Refer to the **LabVIEW Real-Time Module Release and Upgrade Notes** for system requirements, installation instructions, and additional information about using the LabVIEW Real-Time Module.

4. Install FlexRIO.

Refer to the **FlexRIO Readme** for system requirements and installation instructions for FlexRIO. Documentation for FlexRIO is available at [ni.com/manuals](http://ni.com/manuals).

## Installing the PXIe-6593



**Notice** To prevent damage to the PXIe-6593 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.

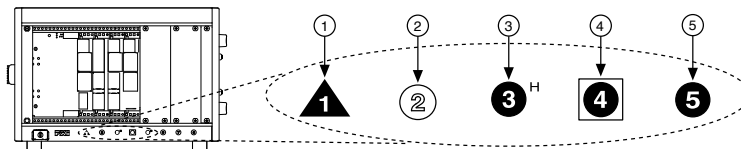
The AC power cord grounds the chassis and protects it from electrical damage while you install the module.

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
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.
  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.

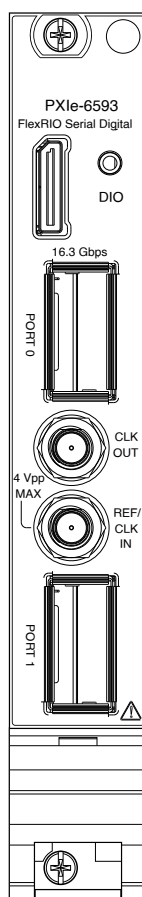


**Note** For more information about installing slot blockers and filler panels, go to [ni.com/r/pxiblocker](https://ni.com/r/pxiblocker).

## 12. Power on the chassis.

### PXle-6593 Front Panel and Pinouts

Figure 1. PXle-6593 Front Panel



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 PORT 1	QSFP, SFF-8436 compliant	High-speed serial interfacing ports
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

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

Table 2. Available Pins on the DIO connector.

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

Pin	Symbol	Name/Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3V Power Supply Receiver
11	SCL	2-Wire Serial Interface Clock
12	SDA	2-Wire Serial Interface Data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground

Pin	Symbol	Name/Description
21	Rx2n	Receiver Inverted Data Output
22	Rx2p	Receiver Non-Inverted Data Output
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output
25	Rx4p	Receiver Non-Inverted Data Output
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3V Power Supply Transmitter
30	Vcc1	+3.3V Power Supply
31	LPMODE	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

Table 3. Available Pins on the QSFP+ Connectors

## Configuring the PXIe-6593 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 FlexRIO.

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 identifier MAX assigns to the hardware. Use this identifier when programming the PXIe-6593.
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.

## 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](https://ni.com/examples).

# Block Diagrams

Figure 1. FPGA Carrier Block Diagram

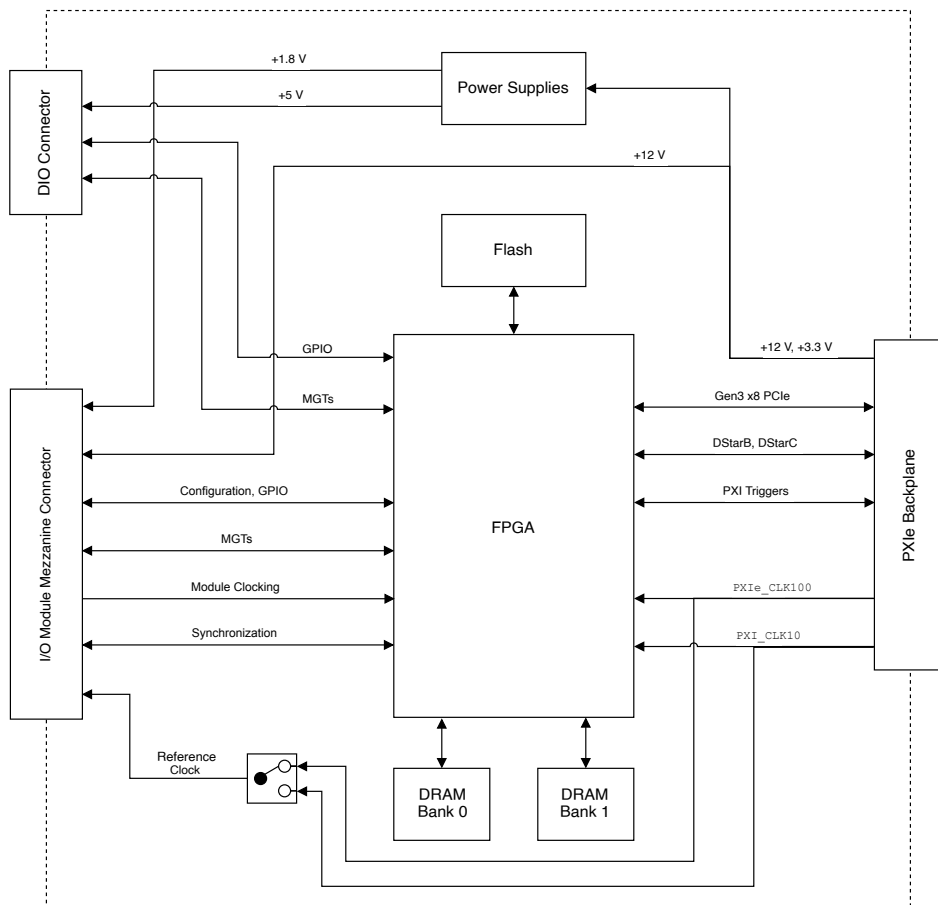
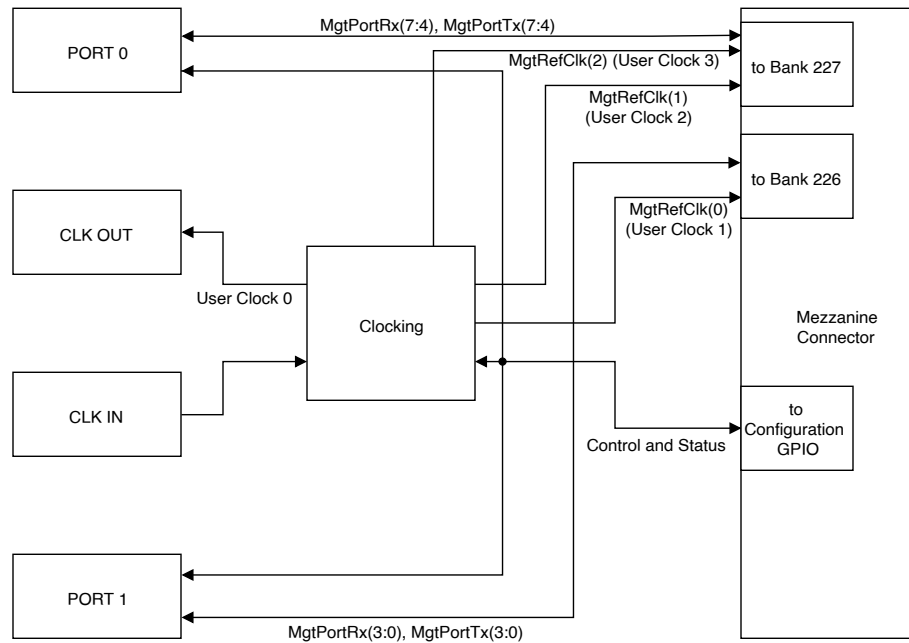


Figure 1. PXle-6593 Block Diagram



## 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-6593 ships with socketed CLIP items that add module I/O to the LabVIEW project.

## 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 PXIe-6593 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** by right-clicking the **Start** button, and selecting **Device Manager**.
5. Verify the PXIe-6593 appears in the **Device Manager**.

1. Under an NI entry, confirm that a PXIe-6593 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**.

2. If error conditions appear, reinstall the FlexRIO driver.

### What Should I Do if the PXIe-6593 Fails the Self-Test?

1. Restart the system.
2. Launch MAX, and perform the self-test 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](https://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](https://ni.com/services) to learn about NI service offerings such as calibration options, repair, and replacement.

Visit [ni.com/register](https://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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