PCIe-5763
Getting Started

Contents

Getting Started with the PCIe-5763

This document explains how to install, configure, test, and use the PCIe-5763. You can program the PCIe-5763 with the following software options.

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

> ✎ **Note** Adapter modules are not installable or interchangeable on the PCIe-5763.

FlexRIO Documentation and Resources

Table 1. FlexRIO Documentation and Resources

Document/Resource	Location	Description
PCIe-5763 Getting Started Guide (this document)	Available at ni.com/manuals.	Contains installation instructions and basic programming instructions for your PCIe-5763.
PCIe-5763 Specifications	Available at ni.com/manuals.	Contains specifications for your PCIe-5763.
PCIe-5763 Safety, Environmental, and Regulatory Information	Available at ni.com/manuals.	Contains important safety, environmental, and regulatory information for your PCIe-5763.
LabVIEW FPGA Module Help	Embedded in **LabVIEW Help** and at ni.com/manuals.	Contains information about the basic functionality of the LabVIEW FPGA Module.
FlexRIO Help	Available at ni.com/manuals.	Contains information about the FPGA module front panel connectors and I/O, programming instructions, and I/O component-level IP (CLIP).

Document/Resource	Location	Description
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 PCIe-5763, 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 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.

> ✏ **Note** Store the device in the antistatic package when the device is not in use.

PCIe-5763 Kit Contents

The following items are included in the device kit:

- PCIe-5763
- Documentation:
    - *PCIe-5763 Getting Started Guide* (this document)
    - *PCIe-5763 Safety, Environmental, and Regulatory Information*

Preparing the Environment

Ensure the environment in which you are using the PCIe-5763 meets the following specifications.

Operating environment	
Ambient temperature range	0 °C to 45 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800FClass 3 low temperature limit and MIL-PRF-28800FClass 4 high temperature limit.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)
Pollution Degree	2

Indoor use only.

> **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 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.

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.

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.

Installing the PCIe-5763 Module into PCIe Chassis

1. Power off and unplug the computer.
2. Access the computer system expansion slots. This step might require you to remove one or more access panels on the computer case.
3. Locate a compatible slot and remove the corresponding slot cover on the computer back panel.
4. Touch any metal part of the computer to discharge any static electricity.
5. Insert the module into the slot you selected. Gently rock the module into place without forcing it.

Figure 1. Module Installation
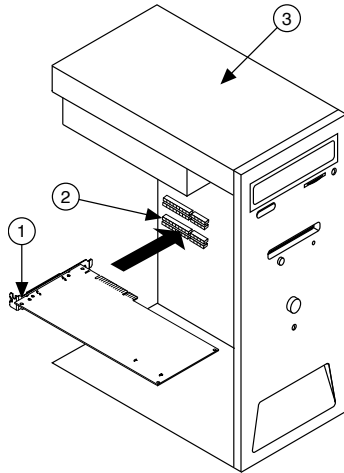
1. Module
2. System Expansion Slot
3. PC

6. Secure the PCI Express mounting bracket of the module to the computer chassis with two bracket screws.

> ✏️ **Note** Because of the high mass of the PCI Express FlexRIO devices, installing the bracket screws is recommended. Installing the bracket screws increases mechanical stability and electrically connects the front panel to the chassis, which can improve signal quality and electromagnetic performance.
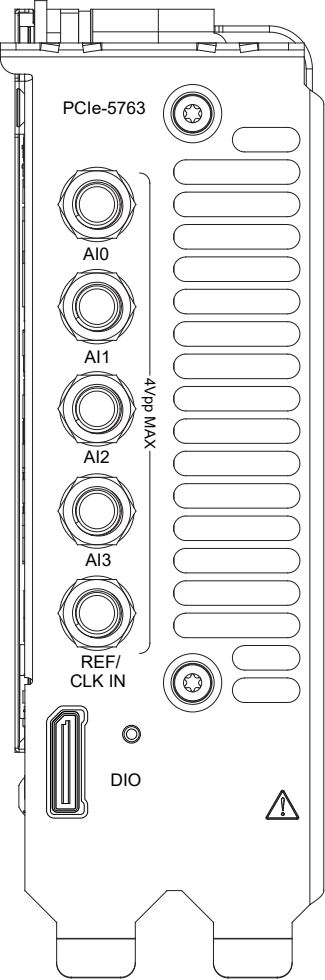
7. Connect the 6-pin PCI Express power connector from the power supply to the PCI Express FlexRIO device.
8. Reinstall any access panels on the computer case.
9. Power on your computer.

PCIe-5763 Front Panel and Pinout

Front Panel

The following figure shows the PCIe-5763 front panel.

Figure 1. PCIe-5763 Front Panel

The following table describes the signal connections for the PCIe-5763.

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.
AI <0..3>	Standard SMA female connector	Analog input connection.
REF/CLK IN	Standard SMA female connector	Input for an external Reference Clock or Sample Clock.

Digital I/O Pinout

The following figure shows the Digital I/O (DIO) connector pinout.

Figure 3. Digital I/O Connector

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>[1][1]	Xilinx UltraScale GTH	Output
MGT Rx± <0..3>[1]	Xilinx UltraScale GTH	Input
DIO <0..7>	Single-ended	Bidirectional
5.0 V	DC	Output
GND	Ground	—

> (!) **Notice** The maximum input signal levels are valid only when the module is powered on. To avoid permanent damage to the PCIe-5763, do not apply a signal to the device when the module is powered down.

1. MGTs are available only on devices with KU040 and KU060 FPGAs.

> (!) **Notice** Connections that exceed any of the maximum ratings of any connector on the PCIe-5763 can damage the device and the system. NI is not liable for any damage resulting from such connections.

Configuring the PCIe-5763 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.

   > ✎ **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.

3. Record the identifier MAX assigns to the hardware. Use this identifier when programming the PCIe-5763.
4. 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.

Block Diagram

The following figure shows a block diagram of the carrier portion of the PCIe-5763 (KU035 FPGA version).
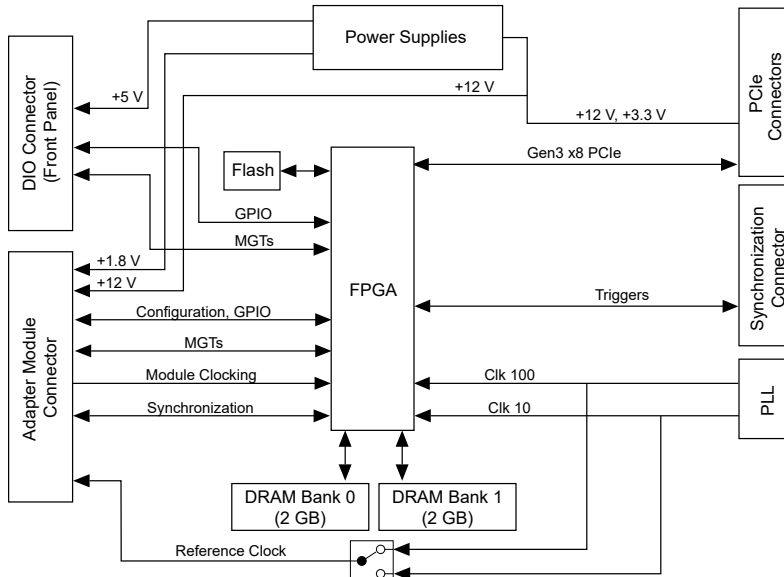
Figure 1. Carrier Block Diagram (KU035)
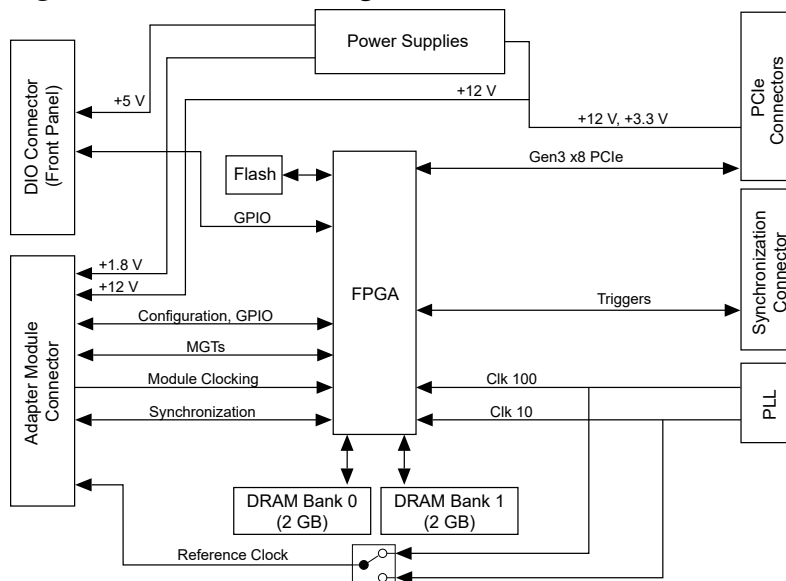
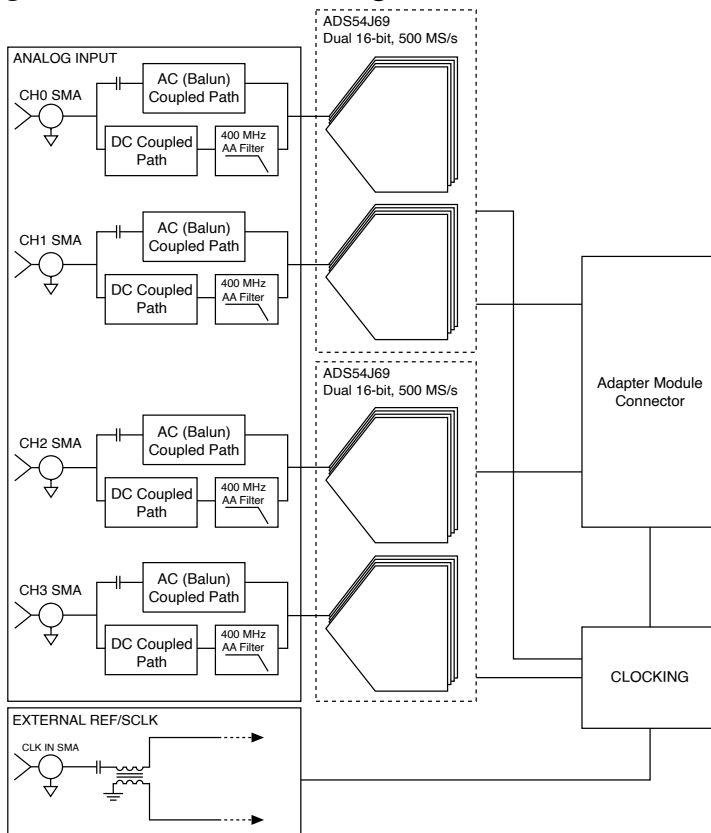The following figure shows a block diagram of the carrier portion of the PCIe-5763

(KU040 and KU060 FPGA versions).

Figure 1. Carrier Block Diagram (KU040 and KU060)

The following figure shows a block diagram of the I/O portion of the PCIe-5763.

Figure 1. PCIe-5763 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 PCIe-5763 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.

Making a Measurement with LabVIEW

1. Launch LabVIEW.
2. Select **Help » Find Example**.
3. Open the example VI that you want to use by selecting **Hardware Input and Output » FlexRIO**.
4. Follow any setup, configuration, and execution instructions in the VI.

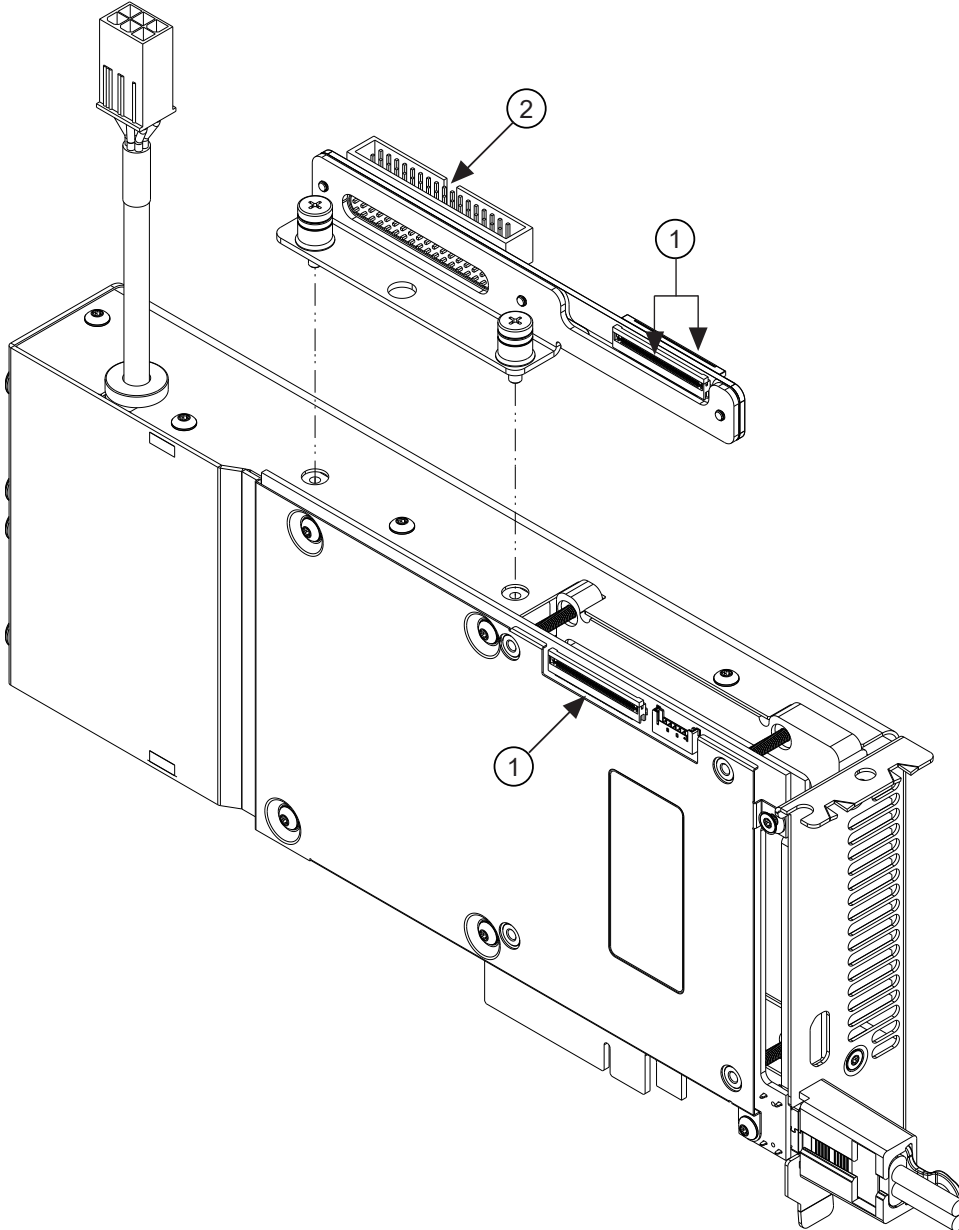# Synchronizing Reference Clocks and Triggers across PCI Express devices

To synchronize the PCIe-5763 with another PCI Express FlexRIO device, you need the following accessories:

- Compact Synchronization Interface Cable, NI part number 787213-01

To synchronize the PCIe-5763 with any PCI Express device that supports RTSI synchronization, you need the following accessories:

- Compact Synchronization Interface to RTSI Adapter, NI part number 787214-01
- RTSI cable, NI part number 776249-02

Figure 7. Synchronization Connectors on the PCIe-5763

1. Compact synchronization interface cable connector
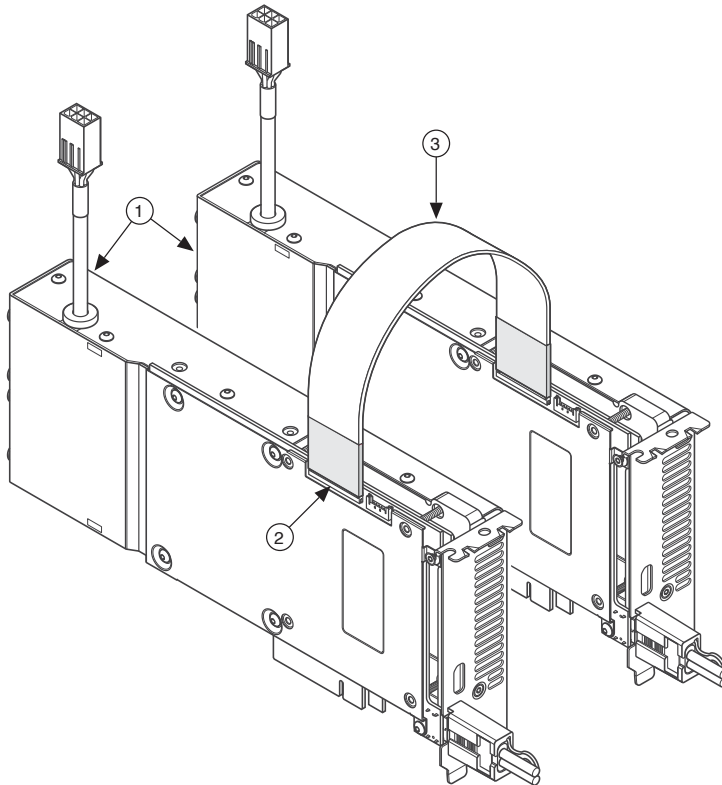2. Compact synchronization interface cable to RTSI adapter

Sharing Reference Clocks and Triggers with Another FlexRIO PCI Express Device

> ✏️ **Note** To synchronize the PCIe-5763 with another FlexRIO PCI Express device, you need the Compact Synchronization Interface Cable, NI part number 787213-01.

1. Install the PCIe-5763 and another PCI Express FlexRIO device into one PCI Express backplane.
2. Insert one end of the Compact Synchronization Interface Cable into the synchronization connector on each PCI Express FlexRIO device. Ensure the contacts on the cable are facing the FlexRIO device.

Figure 8. Connecting Two FlexRIO PCI Express Devices

1. FlexRIO PCI Express devices
2. Compact synchronization cable connector
3. Compact Synchronization Interface Cable

## Sharing Reference Clocks and Triggers with PCI Express Devices

Using RTSI

> ✎ **Note** To synchronize the PCIe-5763 with a RTSI-supported PCI Express device, you need the Compact Synchronization Interface to RTSI Adapter, NI part number 787214-01, and a RTSI cable, NI part number 776249-02.

1. Affix the RTSI adapter to the top of the PCIe-5763 using the attached mounting screws.
2. Install the PCIe-5763 and up to five additional PCI Express devices in one PCI Express backplane.
3. Insert one end of the compact synchronization interface cable into the synchronization connector on the PCIe-5763. Ensure the contacts on the cable are facing the PCIe-5763.
4. Insert the other end of the compact synchronization interface cable into the closest synchronization connector on the RTSI adapter.
5. Connect one RTSI female connector on the RTSI cable to the RTSI male connector on the compact synchronization interface to RTSI adapter on the PCIe-5763. Connect the remaining RTSI female connectors on the RTSI cable to the male RTSI connectors on the other PCI Express devices.

Figure 9. Connecting FlexRIO PCI Express Devices to RTSI-Supported PCI Express Devices
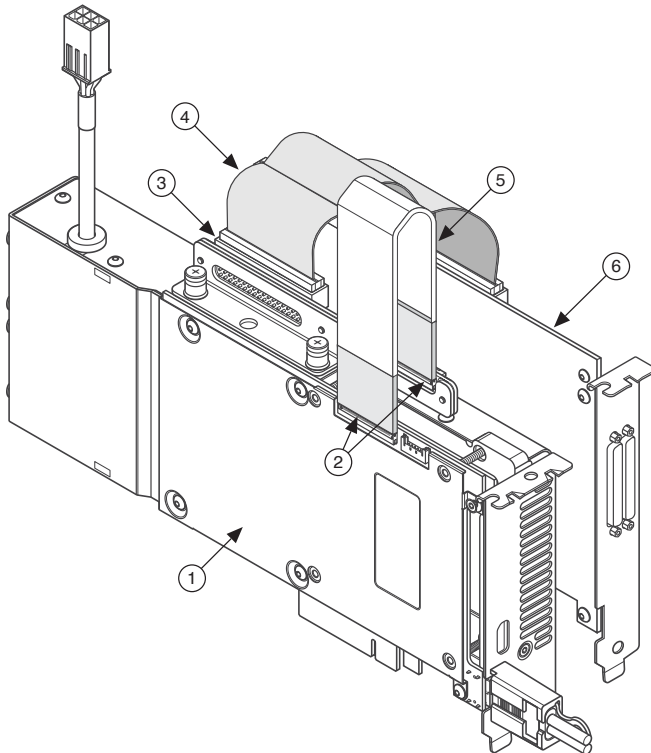
1. FlexRIO PCI Express device
2. Compact synchronization cable connector
3. Compact synchronization interface to RTSI adapter
4. RTSI cable
5. Compact synchronization interface cable
6. RTSI-supported PCI Express device

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 PCIe-5763 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 PCIe-5763 appears in the Device Manager.
   a. Under an NI entry, confirm that a PCIe-5763 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 FlexRIO.

What Should I Do if the PCIe-5763 Fails the Self-Test?

1. Restart the system.
2. Launch MAX.

- ◦ Failed self-test—Perform self-calibration, then perform the self-test again. The PCIe-5763 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

Refer to the following figure for information about other product tasks and associated resources for those tasks.
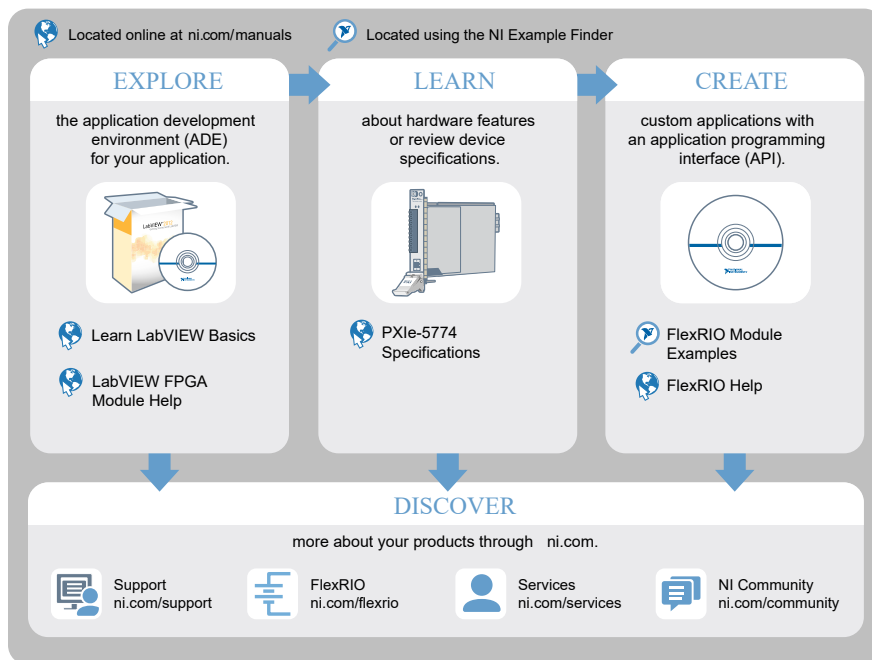
NI Services

Visit ni.com/support to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

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