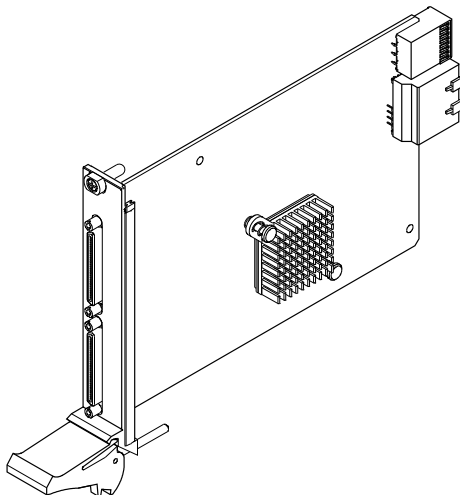# NI PXIe-7856R

R Series Reconfigurable I/O Module (AI, AO, DIO) for PXI Express, 8 AI, 8 AO, 48 DIO, 1 MS/s AI, Kintex-7 160T FPGA

This document describes how to begin using the NI PXIe-7856R.

Safety Guidelines

⚠️ **Caution** Do not operate the NI PXIe-7856R in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

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.

NATIONAL INSTRUMENTS

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.

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

⚠ **Caution** To ensure the specified EMC performance, the length of all I/O cables must be no longer than 3 m (10 ft).

Preparing the Environment

Ensure that the environment in which you are using the NI PXIe-7856R meets the following specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	0 °C to 55 °C
Operating humidity (IEC 60068-2-56)	10% RH to 90% RH, noncondensing
Pollution degree	2
Maximum altitude	2,000 m

Indoor use only.

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

Unpacking the Kit

⚠ **Caution** 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.

⚠ **Caution** Never touch the exposed pins of connectors.

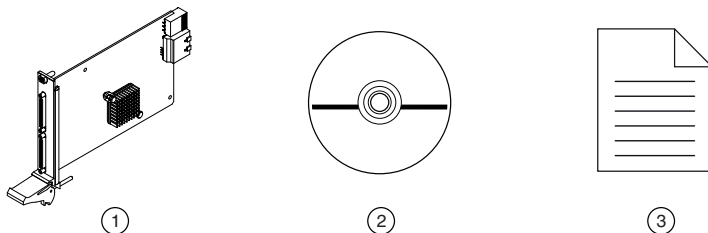📝 **Note** Do not install a device if it appears damaged in any way.

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 PXIe-7856R kit.

Figure 1. NI PXIe-7856R Kit Contents

1. Hardware
2. NI-RIO Media
3. Getting Started Guide

Installing Software on the Host Computer

Before using the NI PXIe-7856R, you must install the following application software and device drivers on the host computer.
1. LabVIEW 2016 or later
2. LabVIEW Real-Time Module 2016 or later[1]
3. LabVIEW FPGA Module 2016 or later
4. NI R Series Multifunction RIO Device Drivers August 2016 or later

Visit *ni.com/info* and enter the Info Code softwareversion for minimum software support information.

Installing the NI PXIe-7856R

⚠ **Caution** To prevent damage to the device caused by ESD or contamination, handle the device using the edges or the metal bracket.

1. Ensure the AC power source is connected to the chassis before installing the modules.

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

---

[1] LabVIEW Real Time Module is only required when the R Series board is used in a chassis where the PXIe Controller is running a real-time operating system.

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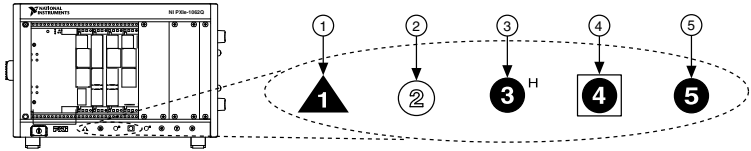
1. PXI Express System Controller Slot	4. PXI Express System Timing Slot
2. PXI Peripheral Slot	5. PXI Express Peripheral Slot
3. PXI Express Hybrid Peripheral Slot	

NI PXIe-7856R 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. Place the module edges into the module guides at the top and bottom of the chassis. Slide the device into the slot until it is fully inserted.

Figure 3. Module Installation
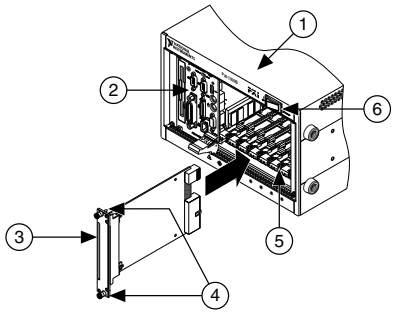
1. Chassis	4. Front-Panel Mounting Screws
2. System Controller	5. Module Guides
3. Hardware Module	6. Power Switch

8. Secure the device 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.

9. Cover all empty slots with filler panels or use slot blockers to maximize cooling air flow.

10. Power on the chassis.

Verifying Hardware Installation for Host Targets

You can verify that the system recognizes the NI PXIe-7856R 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 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.

Verifying Hardware Installation for Remote Targets

You can verify that the system recognizes the NI PXIe-7856R by using Measurement & Automation Explorer (MAX).

1. Launch MAX on the host computer.

2. Expand **Remote Targets** in the configuration tree and locate your system.

3. Install LabVIEW Real-Time Module 2016 and NI RIO Device Drivers August 2016 or later on your **Remote Target**.
    a) Refer to the *Installing Software on the Host Computer* section for information about installing software on the host.
    b) Refer to the *PXI Express Controllers User Manual* at *ni.com/manuals* for information on installing software on the target.

4. Under **Remote Targets**, find and expand **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.
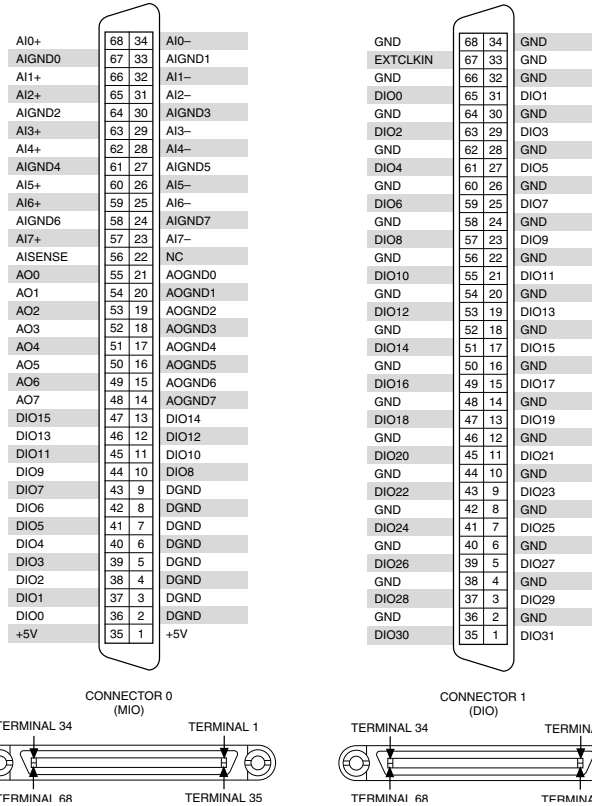
Pinout

CONNECTOR 0 (MIO)			
AI0+	68	34	AI0–
AIGND0	67	33	AIGND1
AI1+	66	32	AI1–
AI2+	65	31	AI2–
AIGND2	64	30	AIGND3
AI3+	63	29	AI3–
AI4+	62	28	AI4–
AIGND4	61	27	AIGND5
AI5+	60	26	AI5–
AI6+	59	25	AI6–
AIGND6	58	24	AIGND7
AI7+	57	23	AI7–
AISENSE	56	22	NC
AO0	55	21	AOGND0
AO1	54	20	AOGND1
AO2	53	19	AOGND2
AO3	52	18	AOGND3
AO4	51	17	AOGND4
AO5	50	16	AOGND5
AO6	49	15	AOGND6
AO7	48	14	AOGND7
DIO15	47	13	DIO14
DIO13	46	12	DIO12
DIO11	45	11	DIO10
DIO9	44	10	DIO8
DIO7	43	9	DGND
DIO6	42	8	DGND
DIO5	41	7	DGND
DIO4	40	6	DGND
DIO3	39	5	DGND
DIO2	38	4	DGND
DIO1	37	3	DGND
DIO0	36	2	DGND
+5V	35	1	+5V

CONNECTOR 1 (DIO)			
GND	68	34	GND
EXTCLKIN	67	33	GND
GND	66	32	GND
DIO0	65	31	DIO1
GND	64	30	GND
DIO2	63	29	DIO3
GND	62	28	GND
DIO4	61	27	DIO5
GND	60	26	GND
DIO6	59	25	DIO7
GND	58	24	GND
DIO8	57	23	DIO9
GND	56	22	GND
DIO10	55	21	DIO11
GND	54	20	GND
DIO12	53	19	DIO13
GND	52	18	GND
DIO14	51	17	DIO15
GND	50	16	GND
DIO16	49	15	DIO17
GND	48	14	GND
DIO18	47	13	DIO19
GND	46	12	GND
DIO20	45	11	DIO21
GND	44	10	GND
DIO22	43	9	DIO23
GND	42	8	GND
DIO24	41	7	DIO25
GND	40	6	GND
DIO26	39	5	DIO27
GND	38	4	GND
DIO28	37	3	DIO29
GND	36	2	GND
DIO30	35	1	DIO31

CONNECTOR 0 (MIO)

TERMINAL 34 TERMINAL 1

TERMINAL 68 TERMINAL 35

CONNECTOR 1 (DIO)

TERMINAL 34 TERMINAL 1

TERMINAL 68 TERMINAL 35

Table 1. NI PXIe-7856R Signal Descriptions

Signal	Description
AI+	Positive analog input signal connection
AI-	Negative analog input signal connection
AISENSE	Reference connection for NRSE measurements
AIGND	Ground reference for the analog input signal
AO	Analog output signal connection
AOGND	Ground reference for the analog output signal

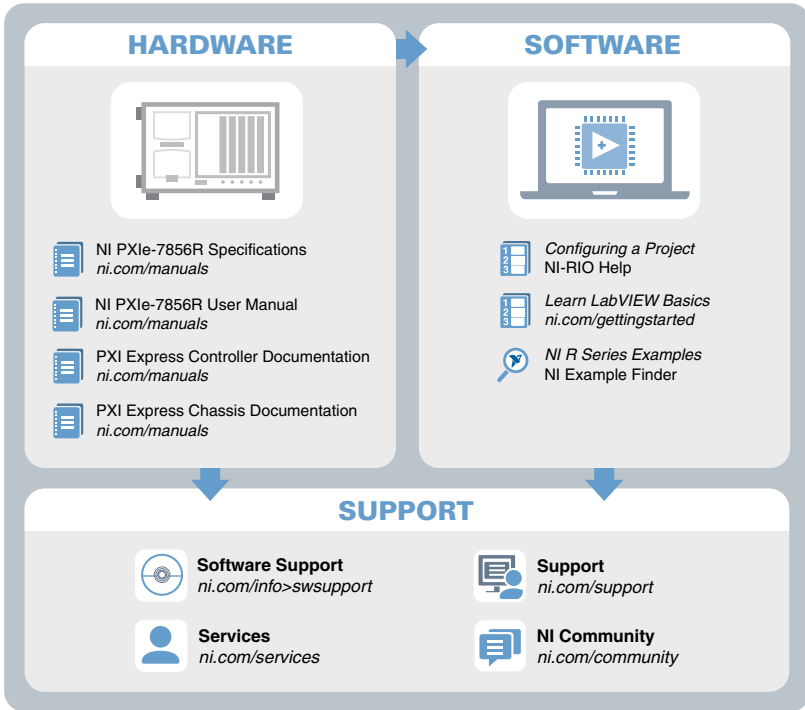**Table 1.** NI PXIe-7856R Signal Descriptions (Continued)

Signal	Description
DIO	Digital input/output signal connection
DGND	Ground reference for the digital signal
EXTCLKIN	External clock input source that can be used for source synchronous acquisitions. The provided clock source must be stable and glitch-free.
GND	Ground connection
Supply (+5 Vout)	5 V power output connection for external devices
NC	No connection

The NI PXIe-7856R is protected from overvoltage and overcurrent conditions.

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

Where to Go Next

HARDWARE

📑 NI PXIe-7856R Specifications
ni.com/manuals

📑 NI PXIe-7856R User Manual
ni.com/manuals

📑 PXI Express Controller Documentation
ni.com/manuals

📑 PXI Express Chassis Documentation
ni.com/manuals

SOFTWARE

📑 *Configuring a Project*
NI-RIO Help

📑 *Learn LabVIEW Basics*
ni.com/gettingstarted

🔍 *NI R Series Examples*
NI Example Finder

SUPPORT

💿 **Software Support**
ni.com/info>swsupport

👤 **Services**
ni.com/services

🖥 **Support**
ni.com/support

💬 **NI Community**
ni.com/community

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 NI Factory Installation Services, repairs, extended warranty, and other services.

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

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting *ni.com/certification*. If your product supports calibration, you can obtain the calibration certificate for your product at *ni.com/calibration*.

NI corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. NI also has offices located around the world. For telephone support in the United States, create your service request at *ni.com/support* or dial 1 866 ASK MYNI (275 6964). For telephone support outside the United States, visit the *Worldwide Offices* section of *ni.com/niglobal* to access the branch office websites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.