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DEVICE SPECIFICATIONS

NI PXIe-7976R

NI FlexRIO™ FPGA Module for PXI Express

This document lists the specifications for the NI PXIe-7976R (NI 7976R) FPGA module. Specifications are subject to change without notice. For the most recent device specifications, refer to *ni.com/manuals*. Refer to your adapter module documentation for the adapter module specifications.

Note Typical values are representative of an average unit operating at room temperature. These specifications are typical at 25 °C unless otherwise noted.

Contents

NATIONAL INSTRUMENTS

How to Use Your NI FlexRIO Documentation Set

Figure 1. How to Use Your NI FlexRIO Documentation Set

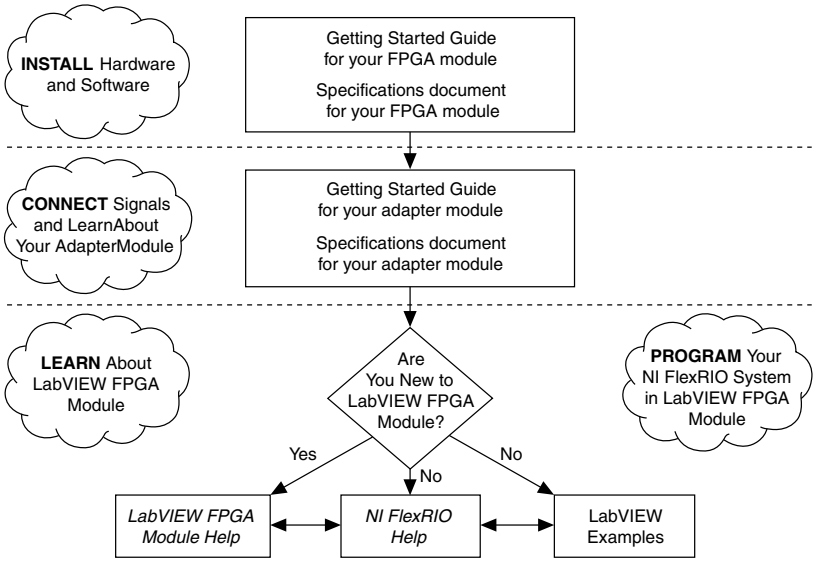


Table 1. NI FlexRIO Documentation Locations and Descriptions

Document	Location	Description
Getting started guide for your FPGA module	Available from the Start menu and at *ni.com/manuals*.	Contains installation instructions for your NI FlexRIO system.
Specifications document for your FPGA module	Available from the Start menu and at *ni.com/manuals*.	Contains specifications for your NI 7976R module.
Getting started guide for your adapter module	Available from the Start menu and at *ni.com/manuals*.	Contains signal information, examples, and CLIP details for your adapter module.
Specifications document for your adapter module	Available from the Start menu and at *ni.com/manuals*.	Contains specifications for your adapter module.
LabVIEW FPGA Module Help	Embedded in *LabVIEW Help* and at *ni.com/manuals*.	Contains information about the basic functionality of the LabVIEW FPGA Module.

Table 1. NI FlexRIO Documentation Locations and Descriptions (Continued)

Document	Location	Description
NI FlexRIO Help	Available from the Start menu and at *ni.com/manuals*.	Contains information about the FPGA module, adapter module, and CLIP configuration information.
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 device.
IPNet	*ni.com/ipnet*	Contains LabVIEW FPGA functions and intellectual property to share.
NI FlexRIO product page	*ni.com/flexrio*	Contains product information and data sheets for NI FlexRIO devices.

Reconfigurable FPGA

FPGA.....Kintex-7 XC7K410T

LUTs.....254,200

DSP48 Slices (25 × 18 Multiplier).....1,540

Embedded Block RAM (kbits).....28,620

Default timebase.....40 MHz

Timebase reference sources.....PXI Express 100 MHz (PXIe_CLK100)

Timebase accuracy.....±100 ppm, 250 ps peak-to-peak jitter

Data transfers.....DMA, interrupts, programmed I/O

Number of DMA channels.....32

FPGA Digital Input/Output

Number of general-purpose channels.....136, configurable as 136 single-ended, 68 differential, or a combination of both[1]

Channels per bank

- Bank 0/Bank 1.....48
- Bank 2.....40

Compatibility.....Configured through the FPGA and based on the attached adapter module; 1.2 V, 1.5 V, 1.8 V, 2.5 V, and 3.3 V I/O standards (refer to *xilinx.com*).

Protection.....Refer to *xilinx.com*.

Current.....Refer to *xilinx.com*.

Maximum I/O data rates

- Single-ended.....400 Mb/s
- Differential.....1 Gb/s for LVDS

Multi-region clock inputs.....6

Single-region clock inputs.....5

Connection resources.....PXI triggers, PXI_CLK10, PXI star trigger, PXIe_DStarA, PXIe_DStarB, PXIe_DStarC, and PXIe_Sync100

Onboard DRAM

Memory size.....2 GB single bank

Maximum theoretical data rate.....10.5 GB/s

Bus Interface

Form factor.....x8 PXI Express, specification v2.1 compliant

Slot compatibility.....x4, x8, and x16 PXI Express or PXI Express hybrid slots

[1] The 136 channels span across three FPGA banks.

Maximum Power Requirements

Note Power requirements are dependent on the adapter module and contents of the LabVIEW FPGA VI used in your application.

+3.3 VDC (±5%).....3 A

+12 V.....3 A

Physical

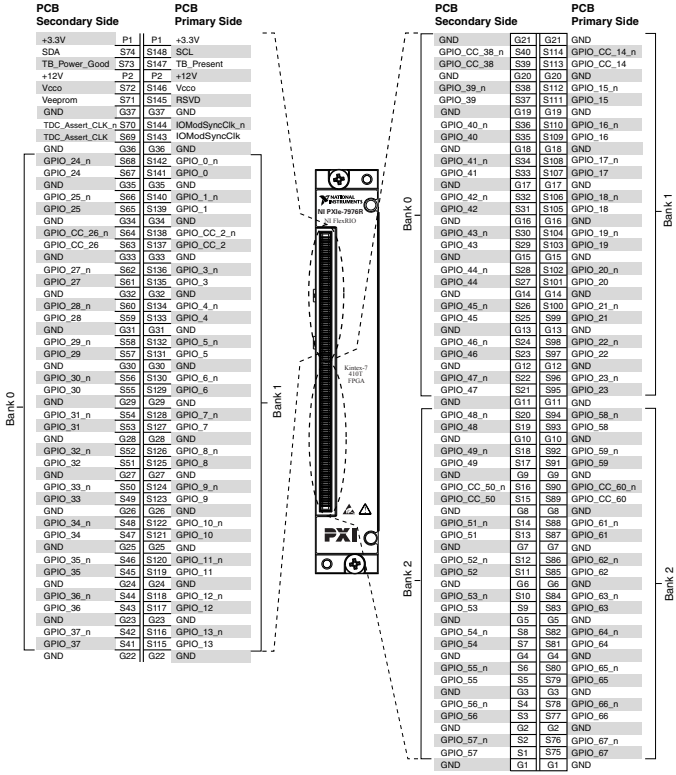
Dimensions (not including connectors).....18.8 cm × 12.9 cm (7.4 in. × 5.1 in.)

Weight.....190 g (6.7 oz)

NI FlexRIO FPGA Module Signals

The following figure shows the available signals on the NI FlexRIO FPGA module. Refer to your adapter module specifications for your adapter module pinout.

Figure 2. NI FlexRIO FPGA Module Front Connector Pin Assignments and Locations



Bank 0					Bank 1			
+3.3V	P1	P1	+3.3V		GND	G21	G21	GND
SDA	S74	S148	SCL		GPIO_CC_38_n	S40	S114	GPIO_CC_14_n
TB_Power_Good	S73	S147	TB_Present		GPIO_CC_38	S39	S113	GPIO_CC_14
+12V	P2	P2	+12V		GND	G20	G20	GND
Vcco	S72	S146	Vcco		GPIO_39_n	S38	S112	GPIO_15_n
Veeprom	S71	S145	RSVD		GPIO_39	S37	S111	GPIO_15
GND	G37	G37	GND		GND	G19	G19	GND
TDC_Assert_CLK_n	S70	S144	IOModSyncClk_n		GPIO_40_n	S36	S110	GPIO_16_n
TDC_Assert_CLK	S69	S143	IOModSyncClk		GPIO_40	S35	S109	GPIO_16
GND	G36	G36	GND		GND	G18	G18	GND
GPIO_24_n	S68	S142	GPIO_0_n		GPIO_41_n	S34	S108	GPIO_17_n
GPIO_24	S67	S141	GPIO_0		GPIO_41	S33	S107	GPIO_17
GND	G35	G35	GND		GND	G17	G17	GND
GPIO_25_n	S66	S140	GPIO_1_n		GPIO_42_n	S32	S106	GPIO_18_n
GPIO_25	S65	S139	GPIO_1		GPIO_42	S31	S105	GPIO_18
GND	G34	G34	GND		GND	G16	G16	GND
GPIO_CC_26_n	S64	S138	GPIO_CC_2_n		GPIO_43_n	S30	S104	GPIO_19_n
GPIO_CC_26	S63	S137	GPIO_CC_2		GPIO_43	S29	S103	GPIO_19
GND	G33	G33	GND		GND	G15	G15	GND
GPIO_27_n	S62	S136	GPIO_3_n		GPIO_44_n	S28	S102	GPIO_20_n
GPIO_27	S61	S135	GPIO_3		GPIO_44	S27	S101	GPIO_20
GND	G32	G32	GND		GND	G14	G14	GND
GPIO_28_n	S60	S134	GPIO_4_n		GPIO_45_n	S26	S100	GPIO_21_n
GPIO_28	S59	S133	GPIO_4		GPIO_45	S25	S99	GPIO_21
GND	G31	G31	GND		GND	G13	G13	GND
GPIO_29_n	S58	S132	GPIO_5_n		GPIO_46_n	S24	S98	GPIO_22_n
GPIO_29	S57	S131	GPIO_5		GPIO_46	S23	S97	GPIO_22
GND	G30	G30	GND		GND	G12	G12	GND
GPIO_30_n	S56	S130	GPIO_6_n		GPIO_47_n	S22	S96	GPIO_23_n
GPIO_30	S55	S129	GPIO_6		GPIO_47	S21	S95	GPIO_23
GND	G29	G29	GND		GND	G11	G11	GND
GPIO_31_n	S54	S128	GPIO_7_n	Bank 2	GPIO_48_n	S20	S94	GPIO_58_n
GPIO_31	S53	S127	GPIO_7		GPIO_48	S19	S93	GPIO_58
GND	G28	G28	GND		GND	G10	G10	GND
GPIO_32_n	S52	S126	GPIO_8_n		GPIO_49_n	S18	S92	GPIO_59_n
GPIO_32	S51	S125	GPIO_8		GPIO_49	S17	S91	GPIO_59
GND	G27	G27	GND		GND	G9	G9	GND
GPIO_33_n	S50	S124	GPIO_9_n		GPIO_CC_50_n	S16	S90	GPIO_CC_60_n
GPIO_33	S49	S123	GPIO_9		GPIO_CC_50	S15	S89	GPIO_CC_60
GND	G26	G26	GND		GND	G8	G8	GND
GPIO_34_n	S48	S122	GPIO_10_n		GPIO_51_n	S14	S88	GPIO_61_n
GPIO_34	S47	S121	GPIO_10		GPIO_51	S13	S87	GPIO_61
GND	G25	G25	GND		GND	G7	G7	GND
GPIO_35_n	S46	S120	GPIO_11_n		GPIO_52_n	S12	S86	GPIO_62_n
GPIO_35	S45	S119	GPIO_11		GPIO_52	S11	S85	GPIO_62
GND	G24	G24	GND		GND	G6	G6	GND
GPIO_36_n	S44	S118	GPIO_12_n		GPIO_53_n	S10	S84	GPIO_63_n
GPIO_36	S43	S117	GPIO_12		GPIO_53	S9	S83	GPIO_63
GND	G23	G23	GND		GND	G5	G5	GND
GPIO_37_n	S42	S116	GPIO_13_n		GPIO_54_n	S8	S82	GPIO_64_n
GPIO_37	S41	S115	GPIO_13		GPIO_54	S7	S81	GPIO_64
GND	G22	G22	GND		GND	G4	G4	GND
					GPIO_55_n	S6	S80	GPIO_65_n
					GPIO_55	S5	S79	GPIO_65
					GND	G3	G3	GND
					GPIO_56_n	S4	S78	GPIO_66_n
					GPIO_56	S3	S77	GPIO_66
					GND	G2	G2	GND
					GPIO_57_n	S2	S76	GPIO_67_n
					GPIO_57	S1	S75	GPIO_67
					GND	G1	G1	GND

Note Pins S72 and S146 are shorted together on the NI 7976R.

Maximum Working Voltage

Note Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth.....0 V to 3.3 V, Measurement Category I

Channel-to-channel.....0 V to 3.3 V, Measurement Category I

Caution Do not use this device for connecting to signals in Measurement Categories II, III, or IV.

Environment

Maximum altitude.....2,000 m (800 mbar) (at 25 °C ambient temperature)

Pollution Degree.....2

Indoor use only.

Operating Environment

Ambient temperature range.....0 °C to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)

Relative humidity range.....10% to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Storage Environment

Ambient temperature range.....-20 °C to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Relative humidity range.....5% to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Shock and Vibration

Operating shock.....30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)

Random vibration

- Operating.....5 Hz to 500 Hz, 0.3 g_{rms}
- Nonoperating.....5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Compliance and Certifications

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations, certifications, and additional information, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

To obtain product certifications and the DoC for this product, visit *ni.com/certification*, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at *ni.com/environment*. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit *ni.com/environment/weee*.

电子信息产品污染控制管理办法（中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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