

SPECIFICATIONS

NI PCIe-7821R

R Series Digital I/O Module for PCI Express, 128 DIO, 512 MB DRAM, Kintex-7 160T FPGA

This document contains the specifications for the PCIe-7821R. Specifications are typical at 25 °C unless otherwise noted.



Caution Using the PCIe-7821R in a manner not described in this document may impair the protection the PCIe-7821R provides.

Digital I/O

Number of connectors	4
Number of channels per connector	32
Maximum frequency	80 MHz
Compatibility	LVTTL, LVCMOS
Logic family	Software-selectable
Default software setting	3.3 V

Table 1. Digital Input Logic Levels

Logic Family	Input Low Voltage (V_{IL})		Input High Voltage (V_{IH})	
	Minimum	Maximum	Minimum	Maximum
1.2 V	-0.3 V	0.40 V	0.84 V	1.5 V
1.5 V	-0.3 V	0.50 V	1.05 V	1.8 V
1.8 V	-0.3 V	0.60 V	1.25 V	2.1 V
2.5 V	-0.3 V	0.70 V	1.70 V	2.8 V
3.3 V	-0.3 V	0.80 V	2.00 V	3.6 V

Input leakage current	±15 μ A maximum
Input impedance	50 k Ω typical, pull-down

Table 2. Digital Output Logic Levels

Logic Family	Current	Output Low Voltage (V _{OL}) Maximum	Output High Voltage (V _{OH}) Minimum
1.2 V	100 μ A	0.20 V	1.00 V
1.5 V	100 μ A	0.20 V	1.25 V
1.8 V	100 μ A	0.20 V	1.54 V
2.5 V	100 μ A	0.20 V	2.22 V
3.3 V	100 μ A	0.20 V	3.00 V
	4 mA	0.40 V	2.40 V

Maximum DC output current per channel

Source	4.0 mA
Sink	4.0 mA
Output impedance	50 Ω
Power-on state ¹	Programmable, by line
Protection ²	\pm 20 V, single line
Digital I/O voltage selection	Programmable, per connector, and defined at compilation (not run-time configurable)
Direction control of digital I/O channels	Per channel
Minimum I/O pulse width	6.25 ns
Minimum sampling period	5 ns

External Clock

Direction	Input into device
Maximum input leakage	\pm 15 μ A
Characteristic impedance	50 Ω
Power-on state	Tristated

¹ Tristate by default

² NI recommends minimizing long-term over/under-voltage exposure to the Digital I/O. Prolonged DC voltage stresses that violate the maximum and minimum digital input voltage ratings may reduce device longevity. Over/under-voltage stresses are considered prolonged if the cumulative time in the abnormal condition exceeds 1 year.

Minimum input	Inherited from programmed digital voltage selection per connector
Maximum input	Inherited from programmed digital voltage selection per connector
Logic level	Inherited from programmed digital voltage selection per connector
Maximum input frequency	80 MHz

Reconfigurable FPGA

FPGA type	Kintex-7 160T
Number of flip-flops	202,800
Number of LUTs	101,400
Embedded Block RAM	11,700 kbits
Number of DSP48 slices	600
Timebase	40 MHz, 80 MHz, 120 MHz, 160 MHz, or 200 MHz
Default timebase	40 MHz
Timebase accuracy	±100 ppm, 250 ps peak-to-peak jitter
Data transfers	DMA, interrupts, programmed I/O

Onboard DRAM

Memory size	1 Bank; 512 MB
Maximum theoretical data rate	800 MB/s streaming

Synchronization Resources

Input/output source	RTSI<0..7>
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Bus Interface

Form factor	x4 PCI Express, specification v1.0 compliant
Slot compatibility	x4, x8, and x16 PCI Express slots
Data transfers	DMA, interrupts, programmed I/O
Number of DMA channels	16

Maximum Power Requirements

Power requirements are dependent on the digital output loads and configuration of the LabVIEW FPGA VI used in your application.

+3.3 V	3 A
+12 V	2 A

Physical Characteristics



Note If you need to clean the device, wipe it with a dry, clean towel.

Dimensions	18.1 cm × 12.6 cm × 2.2 cm (7.1 in. × 5.0 in. × 0.9 in.)
Weight	158 g (5.57 oz)
I/O connectors	4 × 68-pin VHDCI

Maximum Working Voltage

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

Channel-to-earth	±12 V, Measurement Category I
Channel-to-channel	±24 V, Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



Caution Do not use the PCIe-7821R for connection to signals in Measurement Categories II, III, or IV.



Note Measurement Categories CAT I and CAT O (Other) are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

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 C22.2 No. 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 and certifications, and additional information, refer to the [Online Product Certification](#) section.

CE Compliance

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

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. 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

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	0 °C to 40 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	- 20 °C to 70 °C
Operating humidity (IEC 60068-2-56)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-56)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, 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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