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**NI-6587**

## DEVICE SPECIFICATIONS

# NI 6587

## High-Speed Digital I/O Adapter Module

This document lists specifications for the NI 6587 adapter module. Pair these specifications with the specifications listed in your NI FlexRIO FPGA specifications document. For more information about safety and electromagnetic compatibility, refer to the *Read Me First: Safety and Electromagnetic Compatibility* document included in your hardware kit or available at [ni.com/manuals](http://ni.com/manuals).



**Caution** To avoid permanent damage to the NI 6587, disconnect all signals connected to the NI 6587 before powering down the module, and only connect signals after the module has been powered on by the NI FlexRIO FPGA module.



**Note** All numeric specifications are typical unless otherwise noted. All graphs illustrate the performance of a representative module.



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

Specifications are subject to change without notice. For the most recent device specifications, visit [ni.com/manuals](http://ni.com/manuals).

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# Channel Specifications

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Number of connectors.....2 SMA (PFI 0 and CLOCK IN) and  
1 InfiniBand (Digital Data & Control, or DDC)

Number of digital I/O channels.....23 total on DDC (16 LVDS data, 4 LVDS PFI,  
and 3 single-ended PFI)

Direction control of digital I/O.....Per channel  
channels

Number of clock input terminals.....2, CLOCK IN (SMA) and STROBE (DDC)

Number of clock output terminals.....1, DDC CLK OUT

## Single-Ended Channel (PFI, CLOCK IN)

Maximum data rate.....100 Mb/s

Minimum required time to tristate.....6 ns

## Generation (PFI, CLOCK IN)

**Table 1.** Generation Voltage Levels (100  $\mu$ A load)

| Generation Voltage Levels | Low Voltage Levels |         | High Voltage Levels |         |
|---------------------------|--------------------|---------|---------------------|---------|
|                           | Characteristic     | Maximum | Characteristic      | Minimum |
| 3.3 V                     | 0 V                | 200 mV  | 3.3 V               | 3.1 V   |

Output impedance.....50  $\Omega$ , nominal

Maximum per channel DC drive..... $\pm$ 18 mA  
strength

Output protection.....Single-ended I/O can indefinitely sustain a  
short to any voltage between -0.5 V and 3.8 V  
with a current not exceeding 30 mA.

## Acquisition (PFI, CLOCK IN)

| Acquisition Voltage Levels | Low Voltage Threshold | High Voltage Theshold |
|----------------------------|-----------------------|-----------------------|
|                            | Minimum               | Maximum               |
| 3.3 V                      | 0.8 V                 | 2.0 V                 |

Input impedance.....50 k $\Omega$ , nominal

Input protection.....-0.5 V to 4.6 V



**Note** Internal diode clamps may begin conducting outside the 0 V to 3.3 V range.

## LVDS Channels (DDC)

Part number of LVDS buffers.....SN65LVDT100 (Texas Instruments)

Power-up state.....Data direction set to input, 110  $\Omega$  differential impedance with 1.62 k $\Omega$  to 3.3 V on the inverted pins, and 1.62 k $\Omega$  on the noninverted pins.

Maximum data rate.....1 Gb/s (per channel)

Minimum required direction change.....500  $\mu$ s latency



**Note** For more information about using 16 channels in parallel, refer to the Xilinx application note available at the following website: [www.xilinx.com/support/documentation/application\\_notes/xapp860.pdf](http://www.xilinx.com/support/documentation/application_notes/xapp860.pdf).

## Generation (Data, DDC Clock Out)

**Table 2.** Generation Voltage Levels (100  $\Omega$  total load)

| Offset Voltage |         |         | Differential Voltage |         |         |
|----------------|---------|---------|----------------------|---------|---------|
| Minimum        | Typical | Maximum | Minimum              | Typical | Maximum |
| 1.125 V        | 1.2 V   | 1.375 V | 247 mV               | 340 mV  | 454 mV  |

Output protection.....Each channel can indefinitely sustain a short to any voltage between 0 V and 4.3 V.



**Note** Internal diode clamps may begin conducting outside the 0 V and 3.3 V range.

# Acquisition (Data, STROBE)

**Table 3.** Acquisition Voltage Levels

| Magnitude of Differential Input Voltage |         | Input Voltage |         |
|---|---------|---------------|---------|
| Minimum                                 | Maximum | Minimum       | Maximum |
| 0.1 V                                   | 0.8 V   | 0 V           | 4 V     |



**Note** Input Voltage values apply to any combination of common-mode or input signals.

Input impedance.....110 Ω differential, nominal

Input protection.....Each channel can indefinitely sustain a short to any voltage between 0 V and 4.3 V.



**Note** Internal diode clamps may begin conducting outside the 0 V to 3.3 V range.

## Clocking

Part number of crosspoint switch.....DS90CP04 (National Semiconductor)

Part number of adapter module.....Si570, Grade B (Silicon Labs)  
onboard clock

Frequency range of adapter module.....10 MHz to 810 MHz  
onboard clock

Resolution of adapter onboard clock.....0.1 Hz, maximum by design

Duty cycle of adapter module.....45% to 55%  
onboard clock



**Note** For more specifications and information about the Si570 clock chip, refer to the Si570 datasheet available at the Silicon Labs website, [www.silabs.com](http://www.silabs.com).

## EEPROM Map

| Byte Address | Size (Bytes) | Field Name |
|--------------|--------------|------------|
| 0x0          | 2            | Vendor ID  |
| 0x2          | 2            | Product ID |

| Byte Address | Size (Bytes) | Field Name    |
|--------------|--------------|---------------|
| 0x4          | 4            | Serial Number |
| 0x8          | 116          | Reserved      |
| 0x7C         | 132          | User Space    |



**Caution** Only write to **User Space**. Writing to any other byte address may cause the NI 6587 to stop functioning.

## Power

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|                         |                         |
|-------------------------|-------------------------|
| +12 V.....              | 210 mA, 2.51 W, typical |
| +3.3 V.....             | 770 mA, 2.53 W, typical |
| V <sub>ccoA</sub> ..... | 290 mA, 710 mW, typical |
| V <sub>ccoB</sub> ..... | 0 mA                    |

## Physical

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**Note** Clean the device with a soft, non-metallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

|                             |  |
|-----------------------------|--|
| Dimensions.....             | 12.9 × 2.0 × 12.5 cm (5.1 × 0.8 × 4.9 in.) |
| Weight.....                 | 302 g (10.6 oz)                            |
| Front Panel Connectors..... | 2 SMA and one 73-pin InfiniBand connector  |

## Environment

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|                       |   |
|-----------------------|---|
| 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 <sup>1</sup> (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. Meets MIL-PRF-28800F Class 3 limits.) |
| Relative humidity range.....   | 5% to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)  |

# Shock and Vibration

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|                      |   |
|----------------------|---|
| 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 <sub>rms</sub>  |
| Nonoperating.....    | 5 Hz to 500 Hz, 2.4 g <sub>rms</sub> (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.) |

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<sup>1</sup> For PXI/PXI Express chassis configurations that group NI FlexRIO adapter modules in three or more contiguous slots, National Instruments recommends limiting the ambient temperature to less than 50 °C.

# Compliance and Certifications

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## 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
- AS/NZS CISPR 11: Group 1, 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

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](https://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](http://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.htm](http://ni.com/environment/weee.htm).

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