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NI-5751B

DEVICE SPECIFICATIONS

NI 5751/5751B

50 MS/s Digitizer Adapter Module

This document lists specifications for the NI 5751/5751B adapter module. Pair these specifications with the specifications listed in your FlexRIO FPGA specifications document or your controller for FlexRIO specifications document.

Maximum and *minimum* specifications are warranted not to exceed these values within certain operating conditions and include the effects of temperature and uncertainty unless otherwise noted.

Characteristic specifications are unwarranted values that are representative of an average unit operating at room temperature

Typical specifications are unwarranted values that are representative of a majority (90%) of units within certain operating conditions and include the effects of temperature and uncertainty unless otherwise noted.



Note Using the NI 5751/5751B in a manner not described in this document may impair the protection that the NI 5751/5751B provides.



Caution To avoid permanent damage to the NI 5751/5751B, disconnect all signals connected to the NI 5751/5751B before powering down the module, and only connect signals after the module has been powered on by the FlexRIO FPGA module or the controller for FlexRIO.



Note These specifications are characteristic at 25 °C unless otherwise noted.

Specifications are subject to change without notice. For the most recent device specifications, visit ni.com/manuals.

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FlexRIO Documentation

Table 1. FlexRIO Documentation Locations and Descriptions

| Document | Location | Description |
|--|---|--|
| Getting started guide for your FlexRIO FPGA module or controller for FlexRIO | Available from the Start menu and at ni.com/manuals . | Contains installation instructions for your FlexRIO system. |
| Specifications document for your FlexRIO FPGA module or controller for FlexRIO | Available from the Start menu and at ni.com/manuals . | Contains specifications for your FlexRIO FPGA module or controller for FlexRIO. |
| 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. |
| <i>LabVIEW FPGA Module Help</i> | Embedded in <i>LabVIEW Help</i> and at ni.com/manuals . | Contains information about the basic functionality of the LabVIEW FPGA Module. |

Table 1. FlexRIO Documentation Locations and Descriptions (Continued)

| Document | Location | Description |
|---|--|--|
| <i>Real-Time Module Help</i> | Embedded in <i>LabVIEW Help</i> and at ni.com/manuals . | Contains information about real-time programming concepts, step-by-step instructions for using LabVIEW with the Real-Time Module, reference information about Real-Time Module VIs and functions, and information about LabVIEW features on real-time operating systems. |
| <i>FlexRIO Help</i> | Available from the Start menu and at ni.com/manuals . | Contains information about the FPGA module front panel connectors and I/O, controller for FlexRIO front panel connectors and I/O, programming instructions, and adapter module component-level IP (CLIP). |
| <i>FlexRIO Adapter Module Development Kit User Manual</i> | Available from the Start menu at Start»All Programs»National Instruments»NI FlexRIO»NI FlexRIO Adapter Module Development Kit»Documentation . | Contains information about how to create custom adapter modules for use with FlexRIO FPGA modules. |
| 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 | Located at ni.com/ipnet . | Contains LabVIEW FPGA functions and intellectual property to share. |
| FlexRIO product page | Located at ni.com/flexrio . | Contains product information and data sheets for FlexRIO devices. |

Absolute Maximum Ratings



Caution Stresses beyond those listed in this section may cause permanent damage to the adapter module. Avoid swapping the analog and digital cables because doing so will short the digital output terminals to ground.

| | |
|------------------------|-----------------|
| (AI+, AI-) | ± 2 V |
| External clock input | -0.5 V to 3.5 V |
| Digital input | -0.5 V to 3.5 V |
| Digital output current | 2 mA |

Analog Input (AI 0 to AI 15)

General Characteristics

| | |
|------------------------------|--|
| Connector type | VHDCI |
| Number of channels | 16 single-ended |
| Max input voltage swing | $2 V_{pp}$ |
| Input impedance | $50 \Omega \pm 2\%$ |
| Coupling | DC coupled |
| ADC manufacturer part number | AD9252, 14-bit pipelined analog-to-digital converter |



Note For additional information on the AD9252, refer to the device datasheet at www.analog.com.

Specific Characteristics

Figure 1. NI 5751 Characteristic Frequency Response

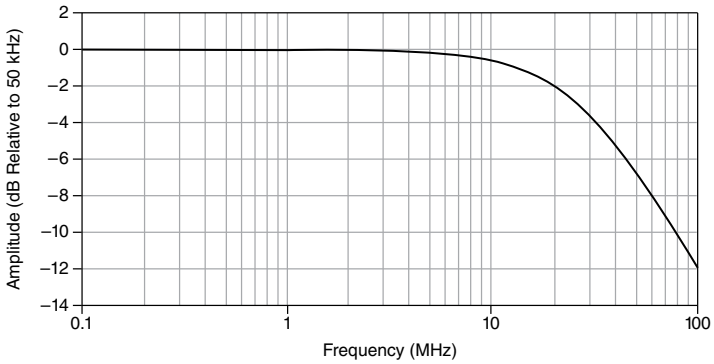
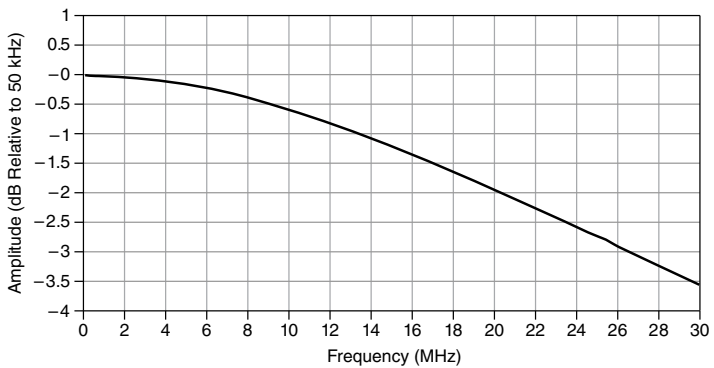


Figure 2. NI 5751 Characteristic Frequency Response



| | |
|------------------------|--------------|
| Bandwidth (-3 dB) | 26 MHz |
| DC gain error | ±2% of input |
| DC offset error | ±2% of FS |
| Crosstalk ¹ | |
| 1 MHz | 75 dB |
| 5 MHz | -65 dB |
| Average noise density | -147 dBFS/Hz |

¹ Measured on one channel with test signal applied to another channel.

Table 2. Signal Integrity

| Name | Value | Input Signal | f_{in} |
|------------------------------------|-------|--------------|----------|
| Signal-to-noise ratio (SNR) | 71 dB | -1 dBFS | 5 MHz |
| Spurious-free dynamic range (SFDR) | 73 dB | -1 dBFS | 5 MHz |
| Total harmonic distortion (THD) | 73 dB | -1 dBFS | 5 MHz |

Figure 3. NI 5751 Characteristic Dynamic Performance, Spectrum-64 k Samples, 5.3 MHz, -1 dBFS Input Signal

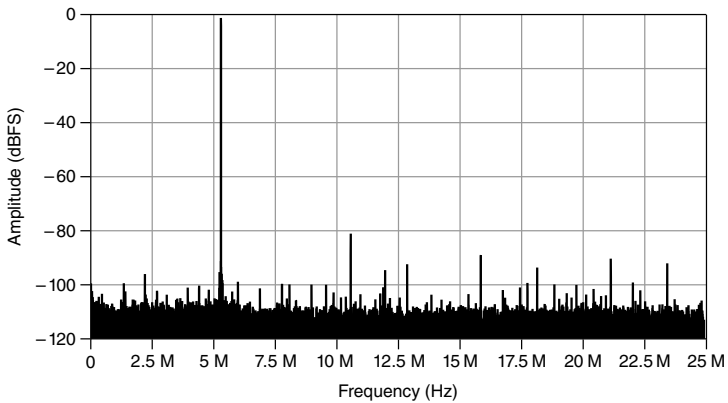
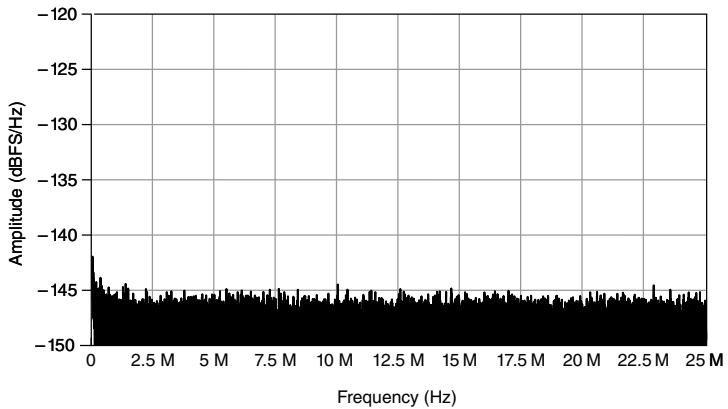


Figure 4. NI 5751 Characteristic Noise Density, Spectrum-64 k Samples



Sample Clock

| | |
|------------------------------|--|
| Sample Clock sources | 50 MHz onboard clock, Sync Clock (PXIe_DSTARA) ^{2,3} , or CLK IN ⁴ (front panel SMB) |
| Sample Clock frequency range | 30 MHz to 50 MHz ⁵ |

CLK IN

| | |
|---|-----------------|
| Connector | SMB |
| Logic level | 3.3 V CMOS |
| Minimum high-level input voltage (V_{IH}) | 2.2 V |
| Maximum low-level input voltage (V_{IL}) | 0.6 V |
| Input impedance | > 50 k Ω |
| Input coupling | DC |
| Duty cycle | 45% to 55% |

General Characteristics

| | |
|-----------------|-----------------|
| Connector | SMB |
| Logic Level | 3.3 V CMOS |
| V_{IH} | 2.2 V |
| V_{IL} | 0.6 V |
| Input impedance | > 50 k Ω |
| Input coupling | DC |
| Duty cycle | 45% to 55% |

² Sync Clock (PXIe_DSTARA) is only available on NI PXI Express FlexRIO FPGA modules, such as the NI PXIe-796xR. On PXI Express modules, Sync Clock is driven by the PXIe_DSTARA signal from the PXI/PXI Express backplane. For NI PXI modules, such as the NI PXI-795xR, and controllers for FlexRIO, such as the NI-793xR, Sync Clock (PXIe_DSTARA) is not available.

³ If you change the frequency of Sync Clock (PXIe_DSTARA) or CLK IN (when used as the Sample Clock), you must assert ForceInit.

⁴ If you change the frequency of Sync Clock (PXIe_DSTARA) or CLK IN (when used as the Sample Clock), you must assert ForceInit.

⁵ If you change the frequency of Sync Clock (PXIe_DSTARA) or CLK IN (when used as the Sample Clock), you must assert ForceInit.

Digital Input Terminals

General Characteristics

| | |
|---|-------|
| Number of channels | 8 |
| Connector | VHDCI |
| Minimum high-level input voltage ($V_{IH}(\min)$) | 2.0 V |
| Maximum low-level input voltage ($V_{IL}(\max)$) | 0.8 V |

Digital Output Terminals

General Characteristics

| | |
|--|-----------------------------|
| Number of channels | 8 |
| Connector | VHDCI |
| Minimum high-level output voltage ($V_{OH}(\min)$) | 2.4 V |
| Maximum low-level output voltage ($V_{OL}(\max)$) | 0.55 V |
| Maximum output current | 1 mA |
| Minimum pulse width | 10 ns |
| Maximum toggle frequency | 1 MHz, all outputs toggling |

Power

Power requirements from the NI FlexRIO FPGA module

| | |
|-------------|--------------------|
| +12 V | 200 mA, 2.4 W max |
| +3.3 V | 900 mA, 2.97 W max |
| Total power | 5.37 W |

Physical

| | |
|------------------------|---|
| Dimensions | 12.9 × 2.0 × 12.1 cm (5.1 × 0.8 × 4.7 in.) |
| Weight | 284 g (10 oz) |
| Front panel connectors | One SMB connector and three 68-pin VHDCI connectors |

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 71 °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

| | |
|-----------------|--|
| 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
- 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:

- 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 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）



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374705A-01 Oct15