NI-5753

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NI 5753 Specifications

This document lists specifications for the NI 5753 adapter module. Pair these specifications with the specifications listed in your FlexRIO FPGA module specifications document or your Controller for FlexRIO specifications document.

Caution The protection provided by the NI 5753 can be impaired if it is used in a manner not described in this document.

Caution To avoid permanent damage to the NI 5753, disconnect all signals connected to the NI 5753 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 All numeric specifications are typical unless otherwise noted. All graphs illustrate the performance of a representative module.

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

FlexRIO Documentation

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.

Document	Location	Description
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.
Real-Time Module Help	Embedded in **LabVIEW Help** 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.
FlexRIO Help	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).
FlexRIO Adapter Module Development Kit User Manual	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.

Document	Location	Description
FlexRIO product page	Located at ni.com/flexrio.	Contains product information and data sheets for FlexRIO devices.

Table 1. FlexRIO Documentation Locations and Descriptions

General Characteristics

Number of channels	
DC-coupled	12 analog input
AC-coupled	16 analog input
Input impedance	50 Ω
Sample rate	120 MS/s
Frequency range	
DC-coupled	DC to 250 MHz
AC-coupled	0.1 MHz to 250 MHz
ADC type	AD9653[1]

Related information

- http://www.analog.com/en/index.html

Typical Specifications

Analog Input Levels

ADC offset error (2 V_{pp} input)[2]	-6 mV

Uncalibrated DC coupling offset error[3]	±10 mV
ADC gain error	-5% full scale

DC offset control (DC-coupled option)

Range (at input)	-0.5 V to 0.5 V
Resolution	500 µV/step

Full-scale input (0 dBFS, 50 Ω, 20.1 MHz)

AC-coupled build

Number of channels	16
Input voltage	1.8 V_{pp}
Input power	+9.1 dBm

DC-coupled build

Number of channels	12
Input voltage	0.9 V_{pp}
Input power	+3.2 dBm

AC-Coupled Performance

Bandwidth

-3 dB	1 MHz to 176 MHz

-1 dB	1 MHz to 85 MHz

SNR[4]	
20.17 MHz input	75.86 dBFS
70.17 MHz input	70.75 dBFS
124.17 MHz input	66.09 dBFS

SINAD[4]	
20.17 MHz input	75.8 dBFS
70.17 MHz input	70.56 dBFS
124.17 MHz input	65.95 dBFS

SFDR[4]	
20.17 MHz input	-94.03 dBc
70.17 MHz input	-84.84 dBc
124.17 MHz input	-79.52 dBc

RX channel to RX channel isolation[5]	
1 MHz	86 dB
50 MHz	77 dB
100 MHz	71 dB

150 MHz	68 dB
200 MHz	64 dB

Figure 1. AC-Coupled Passband

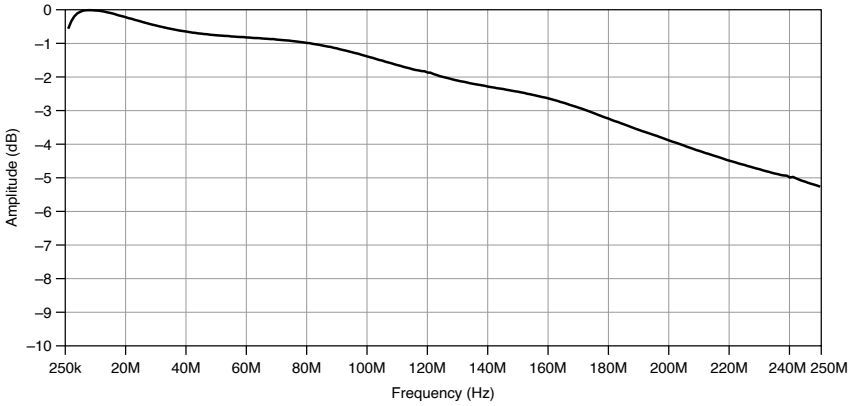
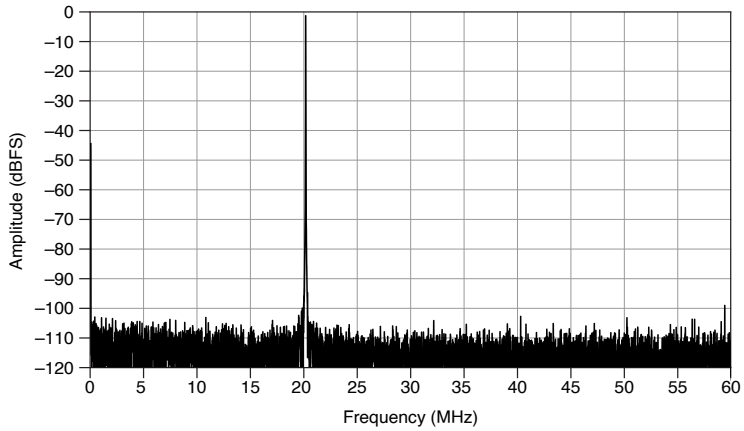


Figure 2. Analog Input One-Tone Spectral Measurement (20.17 MHz, -1 dBFS)



DC-Coupled Performance

Bandwidth	
-3 dB	1 MHz to 117 MHz
-1 dB	1 MHz to 64 MHz

SNR[]	
20.17 MHz	69.82 dBFS
70.17 MHz	66.95 dBFS
124.17 MHz	63.27 dBFS

SINAD[]	
20.17 MHz	69.66 dBFS
70.17 MHz	64.67 dBFS
124.17 MHz	54.64 dBFS

SFDR[]	
20.17 MHz	85.66 dBc
70.17 MHz	69.19 dBc
122.17 MHz	56.38 dBc

RX channel to RX channel isolation[6]	
1 MHz	99 dB
50 MHz	78 dB
100 MHz	72 dB
150 MHz	68 dB

200 MHz	66 dB

Figure 3. DC-Coupled Passband

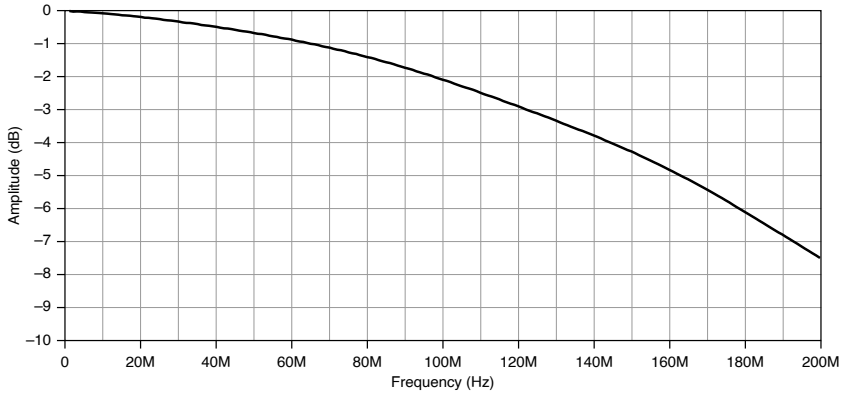
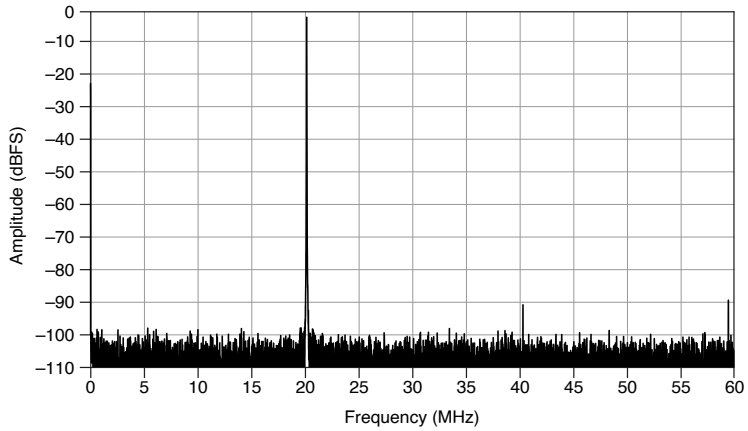


Figure 4. Analog Input One-Tone Spectral Measurement (20.17 MHz, -1 dBFS)



DC Power Requirements

Current Requirements

V_{EEPROM}	2 mA
AC-coupled build	
V_{ccoA}	<1 mA

V_{ccoB}	<1 mA
P_{33V}	870 mA
P_{12V}	211 mA
DC-coupled build	
V_{ccoA}	<1 mA
V_{ccoB}	<1 mA
P_{33V}	866 mA
P_{12V}	231 mA

Voltage Requirements

V_{ccoA}, V_{ccoB}	2.50 V
V_{EEPROM}	3.30 V
P_{33V}	3.3 V
P_{12V}	12 V

CLK IN

The CLK IN connector provides access to the external Reference Clock and the external Sample Clock.

External Reference Clock (CLK IN)	
Input impedance	50 Ω
Coupling	AC
Input voltage (50 Ω)	1.4 V_{pp} to 4.4 V_{pp}
Input power (50 Ω)	+7 dBm to +16.8 dBm
Frequency	10 MHz

External Sample Clock (CLK IN)	
Input impedance	50 Ω
Coupling	AC
Input voltage (50 Ω)	1.4 V_{pp} to 2.5 V_{pp}
Input power (50 Ω)	+7 dBm to +12 dBm
Frequency	120 MHz

Internal Clock

Internal Sample Clock	
Frequency (default)	120 MHz
Reference spurs	60 dBc

Phase Noise

10 kHz offset	-95 dBc/Hz
100 kHz offset	-115 dBc/Hz

Internal Reference

Frequency (default)	10 MHz
Stability	±1.0 ppm

Phase Noise

1 kHz offset	-137 dBc/Hz
10 kHz offset	-150 dBc/Hz
100 kHz offset	-155 dBc/Hz

AUX I/O (Port 0 DIO <0..3>, Port 1 DIO <0..3>, and PFI <0..3>

Number of channels	12 bidirectional (8 DIO and 4 PFI)
Connector type	HDMI
Interface standard	3.3 V LVCMOS

Interface logic

Maximum V_{IL}	0.8 V
Minimum V_{IH}	2.0 V
Maximum V_{OL}	0.4 V

Minimum V_{OH}	2.7 V
Maximum V_{OH}	3.6 V
Z_{out}	50 Ω ± 20%
I_{out} (DC)	±2 mA

Pull-down resistor	150 kΩ
Recommended operating voltage	-0.3 V to 3.6 V
Overvoltage protection	±10 V
Maximum toggle frequency	100 MHz
+5 V maximum power	10 mA
+5 V voltage tolerance	4.2 V to 5 V

Power Draw

AC-coupled build	5.40 W
DC-coupled build	5.62 W

Physical

Dimensions	11.7 x 2.00 x 10.2 cm (4.6 x 0.8 x 4.0 in.)
Weight	317.5 g (11.2 oz)

Front panel connectors	One ganged MCX connector, one SMB connector, and one HDMI connector

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	-40 °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
- 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:

- 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）

> **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.)

[1] The AC-coupled version uses four AD9653 to implement 16 channels. The DC-coupled version uses three AD9653 to implement 12 channels.

[2] ADC offset dominates when AC-coupled, does not include offset compensation.

[3] Typical DC offset due to component tolerance, does not include system DC variation.

[4] Measured with a 120 MHz onboard Sample Clock and a -1 dBFS input signal.

[5] Worst adjacent channel with -1 dBFS input.

[6] Worst adjacent channel with -1 dBFS input.