NI-5793 Specifications

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Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

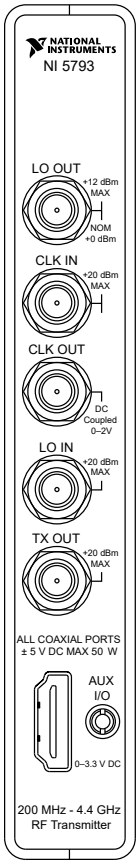
- ***Typical*** specifications describe the performance met by a majority of models.
- ***Nominal*** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are ***Typical*** unless otherwise noted.

NI-5793 Pinout

Use the pinout to connect to terminals on the NI-5793.

Figure 1. NI-5793 Front Panel Connector Pinout



Signal Name	Description
LO OUT	Local oscillator output, +12 dBm maximum, +0 dBm
CLK IN	Reference Clock input, 50 Ω single-ended, +20 dBm maximum
CLK OUT	Exported clock output, DC-coupled, 0V to 2V
LO IN	Local oscillator input, +20 dBm maximum
TX OUT	Transmit channel, +20 dBm maximum
AUX I/O	Digital I/O and PFI connector

Caution To avoid damaging the NI-5793, disconnect all connected signals before powering down. Connect signals after the adapter module powers on by the FlexRIO FPGA module or Controller for FlexRIO.

Caution Connections that exceed the maximum ratings of connectors on the NI-5793 might damage the device and the chassis. NI is not liable for any damage resulting from such connections.

AUX I/O Connector

Figure 1. AUX I/O Connector Pinout

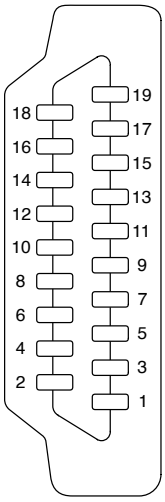


Table 1. Signal Descriptions

Pin	Signal	Signal Description
1	DIO Port 0 (0)	Bidirectional single-ended (SE) digital I/O (DIO) data channel.
2	GND	Ground reference for signals.
3	DIO Port 0 (1)	Bidirectional SE DIO data channel.
4	DIO Port 0 (2)	Bidirectional SE DIO data channel.
5	GND	Ground reference for signals.
6	DIO Port 0 (3)	Bidirectional SE DIO data channel.
7	DIO Port 1 (0)	Bidirectional SE DIO data channel.
8	GND	Ground reference for signals.
9	DIO Port 1 (1)	Bidirectional SE DIO data channel.
10	DIO Port 1 (2)	Bidirectional SE DIO data channel.
11	GND	Ground reference for signals.
12	DIO Port 1 (3)	Bidirectional SE DIO data channel.

Pin	Signal	Signal Description
13	PFI 0	Bidirectional SE DIO data channel.
14	NC	No connect.
15	PFI 1	Bidirectional SE DIO data channel.
16	PFI 2	Bidirectional SE DIO data channel.
17	GND	Ground reference for signals.
18	+5 V	+5 V power (10 mA maximum).
19	PFI 3	Bidirectional SE DIO data channel.

Caution The AUX I/O connector accepts a standard, third-party HDMI cable, but the AUX I/O port is not an HDMI interface. Do not connect the AUX I/O port on the NI-5793 to the HDMI port of another device. NI is not liable for any damage resulting from such signal connections.

TX OUT

Amplitude Characteristics

Power range	
Output	Noise floor to +8 dBm, nominal
Output resolution	0.25 dB, nominal
Amplitude settling time	<0.5 dB within 1 ms, nominal

Absolute Amplitude Accuracy

Note All values are typical.

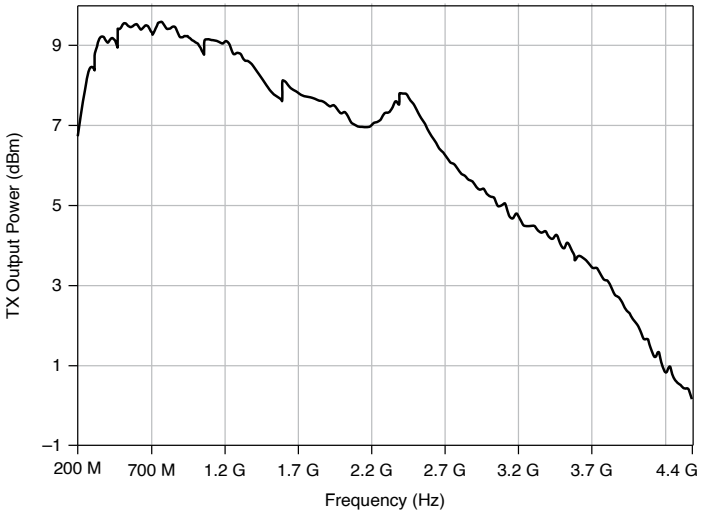
Note Absolute amplitude accuracy uses a correction coefficient in EEPROM

to improve performance. The TX amplitude accuracy applies to the output power level from -12 dBm to -4 dBm.

Table 2. Transmit Absolute Amplitude Accuracy

Frequency	Temperature 23 °C±5 °C (dB)
>200 MHz to 1 GHz	0.8
1 GHz to 2 GHz	1.3
2 GHz to 3 GHz	1.3
3 GHz to 4.4 GHz	1.8

Figure 1. TX Output Power



Noise Density

Note All values are typical.

Note Performance is measured with 0 dB of TX attenuation.

Frequency	Temperature 23 °C±5 °C(dBm/Hz)
>200 MHz to 1 GHz	-138
>1 GHz to 2 GHz	-138
>2 GHz to 4.4 GHz	-138

Output Voltage Standing Wave Ratio (VSWR)

<2.0 GHz	1.6:1
≥2.0 GHz and <3.0 GHz	1.4:1
≥3.0 GHz	1.7:1

Note The VSWR is measured with 10 dB of TX attenuation.

TX OUT Third Order Intermodulation (IP_3)

Note All values are typical.

Note Values are based on two input tones spaced 1.3 MHz apart with 5 dB of TX attenuation.

Table 3. TX IP_3

Frequency	Temperature 23 °C ± 5 °C (dBm)
>200 MHz to 1 GHz	19
>1 GHz to 2 GHz	17
>2 GHz to 3 GHz	13
>3 GHz to 3.9 GHz	11
>3.9 GHz to 4.4 GHz	8

Second Order Intermodulation (IP_2)

Note All values are typical.

Table 5. IP_2

Frequency	Temperature 23 °C ±5 °C (dBm)
>200 MHz to 1 GHz	25
>1 GHz to 2 GHz	25
>2 GHz to 3 GHz	25
>3 GHz to 4.4 GHz	35

Note Values are based on two input tones spaced 1.3 MHz MHz apart with 5 dB of TX attenuation.

TX Sideband Image Suppression

Note All values are nominal.

Table 5. Image Suppression

Frequency	Temperature 23 °C ±5 °C (dBc)
>200 MHz to 1 GHz	-50
>1 GHz to 2 GHz	-50
>2 GHz to 3 GHz	-50
>3 GHz to 4.4 GHz	-45

Note The image suppression specifications hold at the center frequency of the transmitted instantaneous bandwidth after the device performs a recent single point I/Q impairment self-correction.

TX LO Residual Power

Note All values are typical.

Table 6. TX LO Residual Power

Frequency	Temperature 23 °C ±5 °C (dBm)
>200 MHz to 1 GHz	-48

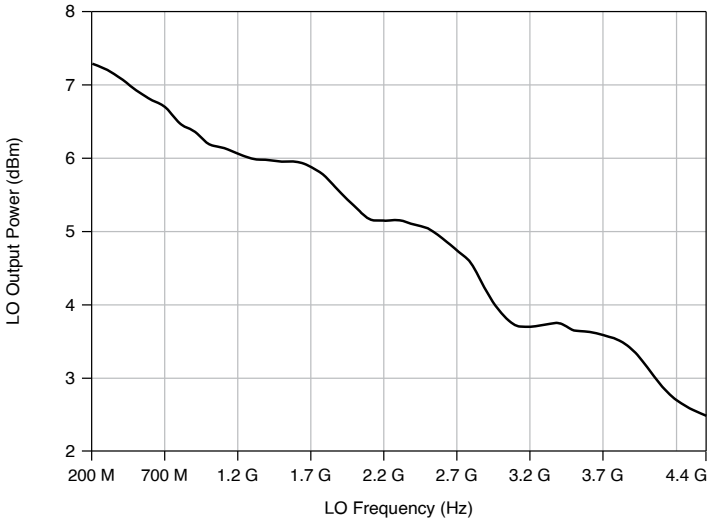
Frequency	Temperature 23 °C ±5 °C (dBm)
>1 GHz to 2 GHz	-48
>2 GHz to 3 GHz	-48
>3 GHz to 4.4 GHz	-45

Note This specification holds at the center frequency of the transmitted instantaneous bandwidth, 100 MHz maximum after the device performs a recent single point I/Q impairment self-correction. The measurement is performed with 0 dB of TX attenuation.

LO OUT Front Panel Connector

Frequency range	200 MHz to 4.4 GHz
Power	3 dBm, ±3 dB, nominal
Output power resolution	0.15 dB
Output impedance	50 Ω, nominal
Output VSWR	1.78:1
Amplitude settling time	< 0.25 dB in less than 10 ms, typical
Maximum DC voltage	±0.5 V_{DC}

Figure 1. LO Output Power vs. LO Frequency



LO IN Front Panel Connector

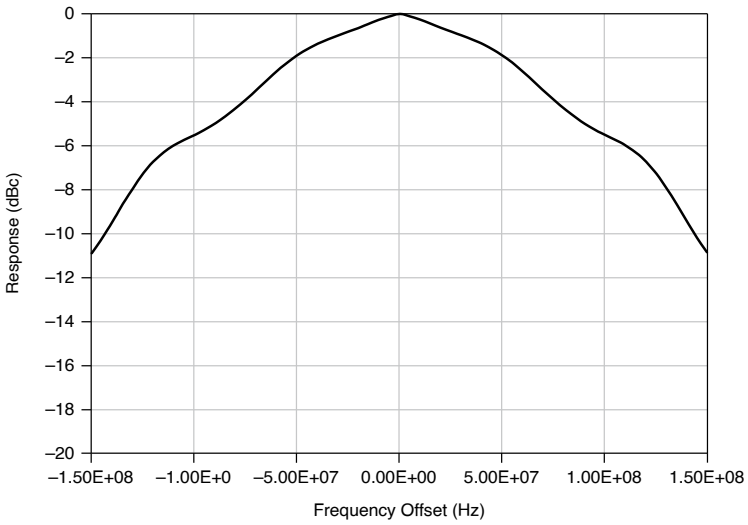
Frequency range	200 MHz to 4.4 GHz
Input power	3 dBm ±3 dB, nominal
Input impedance	50 Ω
Input VSWR	1.78:1
Absolute maximum power	+15 dBm
Maximum DC power	±0.5 V_{DC}

TX OUT Frequency Characteristics

Frequency range	200 MHz to 4.4 GHz

Instantaneous bandwidth (6 dB)	200 MHz[1]
Tuning resolution[2]	<250 kHz
LO step size[3]	
Integer mode	4 MHz, 6 MHz, 12 MHz, 24 MHz
Fractional mode	100 kHz step size

Figure 1. TX OUT Frequency Response



Frequency Settling Time

Settling time[4]	< 50 ms per 100 MHz step

1. Instantaneous bandwidth is 200 MHz at 6 dB. Instantaneous bandwidth is 130 MHz at 3 dB.
2. Tuning resolution combines LO step size capability and frequency shift DSP implemented on the FPGA.
3. All LO step size specifications are assumed to be with fractional mode enabled and a 100 kHz LO step size.
4. The settling time specification only includes frequency settling, and it excludes any residual amplitude settling that may occur as a result of large frequency changes. Driver and operating system timing can affect transition times. This specification reflects only hardware settling.

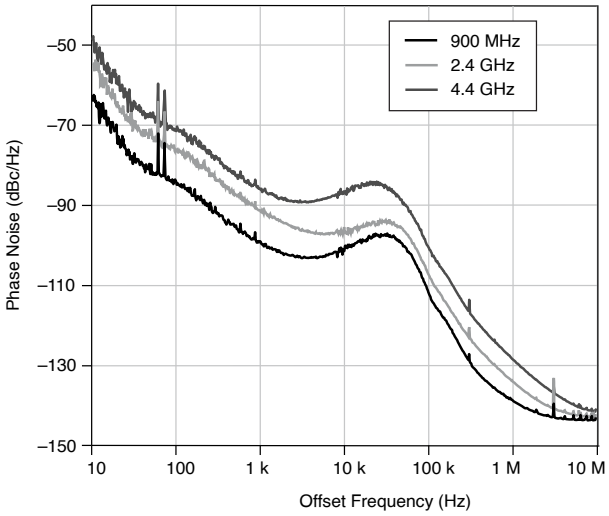
Phase Noise

Note All values are nominal.

Table 7. Phase Noise at 2.4 GHz

Offset Frequency	Loop Phase Noise (dBc/Hz)
1 kHz	-85
10 kHz	-95
100 kHz	-97
1 MHz	-100
10 MHz	-110

Figure 1. Phase Noise



Baseband Characteristics

Digital-to-Analog Converters (DAC)[5]	
Part number	TI DAC 3482
Resolution	16 bits

5. DACs are dual-channel components with each channel assigned to I and Q, respectively.

Data rate	250 MS/s
I/Q data rate	1.84 kS/s to 250 MS/s[6]

CLK IN Front Panel Connector

Frequency		
Reference Clock		10 MHz
Sample Clock		250 MHz
Amplitude		
Square	0.7 V_{pk-pk} to 5.0 V_{pk-pk} into 50 Ω, typical	
Sine	1.4 V_{pk-pk} to 5.0 V_{pk-pk} (1 V_{RMS} to 3.5 V_{RMS}) into 50 Ω, typical	
Input impedance		50 Ω, nominal
Coupling		AC

CLK OUT Front Panel Connector

Interface standard	3.3 V LVCMOS
Interface logic	

6. The NI 5793 interpolates the data rate using Fractional Interpolation DSP blocks implemented in the LabVIEW FPGA target. See <resource here> for information about how to use Frequency Shift DSP blocks.

Maximum V_{OL}	0.55 V
Minimum V_{OH}	2.7 V
Maximum V_{OH}	3.6 V
Output impedance	50 Ω ±20%
Coupling	DC
I_{out} (DC)	±32 mA

Dimensions and Weight

Dimensions	12.9 × 2.0 × 12.1 cm (5.1 × 0.8 × 4.7 in)
Weight	413 g (14.6 oz)
I/O	RX in, RX out, LO in, LO out, 10 MHz, 10 MHz out
Power	6 W, nominal, with one LO turned on

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	6.6 MHz
+5 V maximum power	10 mA
+5 V voltage tolerance	4.2 V to 5 V

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
Relative humidity range	10% to 90%, noncondensing

Storage Environment

Ambient temperature range	-40 °C to 70 °C
Relative humidity range	5% to 95%, noncondensing

Shock and Vibration

Operating shock	30 g peak, half-sine, 11 ms pulse
Random vibration	
Operating	5 Hz to 500 Hz, 0.3 g RMS
Nonoperating	5 Hz to 500 Hz, 2.4 g RMS

Compliance and Certifications

Safety Compliance Standards

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 safety certifications, refer to the product label or the Product Certifications and Declarations 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 Product Certifications and Declarations section.

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

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 ***Engineering a Healthy Planet*** 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.

EU and UK Customers

- **Waste Electrical and Electronic Equipment (WEEE)**—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RoHS**— NI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NI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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