SPECIFICATIONS

PXIe-5171

PXIe, 8-Channel, 250 MHz Bandwidth, 14-Bit, Reconfigurable PXI Oscilloscope

Contents

NATIONAL INSTRUMENTS

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty. *Warranted* specifications account for measurement uncertainties, temperature drift, and aging. *Warranted* specifications are ensured by design, or verified during production and calibration.

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.
- *Measured (meas)* specifications describe the measured performance of a representative model.

Specifications are *Nominal* unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- All vertical ranges
- Sample rate set to 250 MS/s
- Onboard sample clock locked to onboard reference clock
- PXIe-5171 module warmed up for 15 minutes at ambient temperature.[1]
- PXI Express chassis fan speed set to HIGH, foam fan filters removed if present, and empty slots contain PXI chassis slot blockers and filler panels. For more information

[1] Warm-up begins after the chassis is powered, the device is recognized by the host, and the ADC clock is configured using either instrument design libraries or the NI-SCOPE device driver.

about cooling, refer to the *Maintain Forced-Air Cooling Note to Users* available at *http://www.ni.com/manuals*.
- Calibration IP used properly when using LabVIEW Instrument Design Libraries for Reconfigurable Oscilloscopes (instrument design libraries) to create FPGA bitfiles. Refer to the *NI Reconfigurable Oscilloscopes Help* for more information about the calibration API.

Warranted specifications are valid under the following conditions unless otherwise noted.
- Ambient temperature range of 0 °C to 45 °C
- External calibration cycle maintained
- External calibration performed at 23 °C ± 3 °C

Typical specifications are valid under the following conditions unless otherwise noted.
- Ambient temperature ranges of 0 °C to 45 °C

Nominal and Measured specifications are valid under the following conditions unless otherwise noted.
- Room temperature, approximately 23 °C

Vertical

Analog Input

Number of channels	8 (simultaneously sampled)
Input type	Referenced single-ended
Connectors	SMA

Impedance and Coupling

Input impedance	50 Ω ± 1.5%, typical
Input coupling	AC, DC

Figure 1. Voltage Standing Wave Ratio (VSWR)

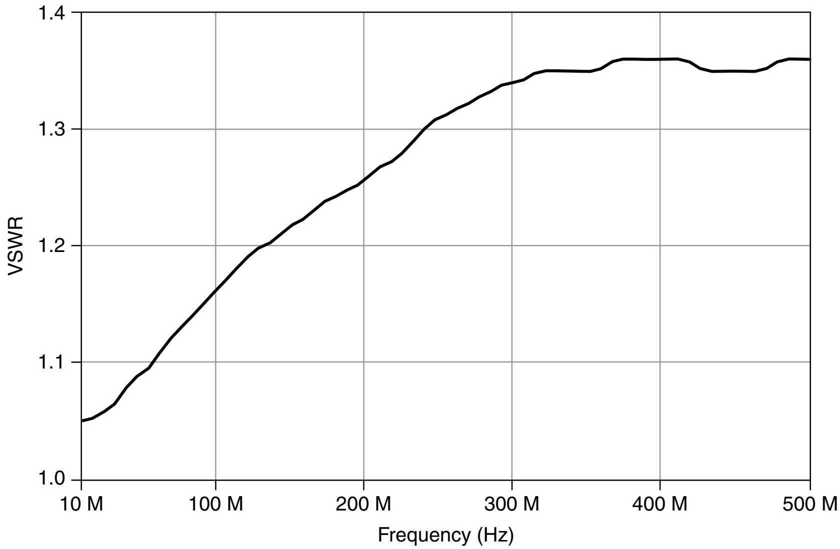
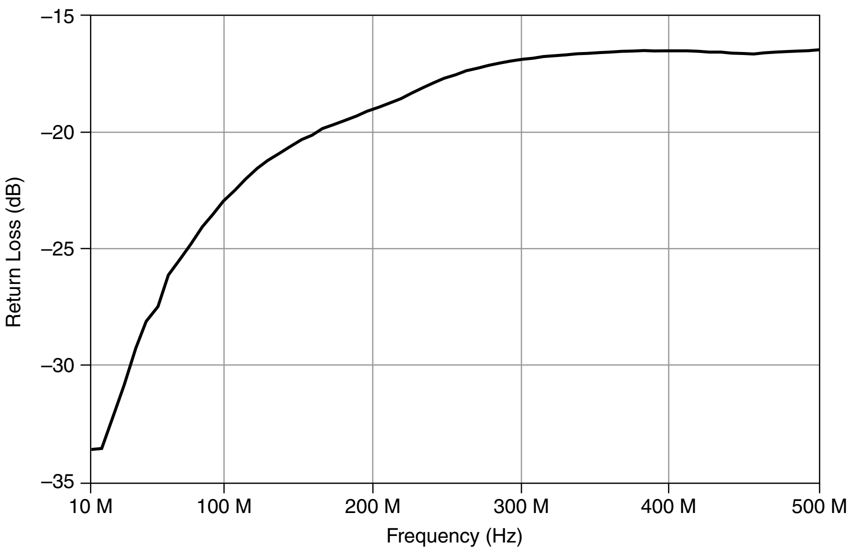


Figure 2. Input Return Loss



Voltage Levels

Full-scale (FS) input range (V_{pk-pk})	0.2 V 0.4 V 1 V 2 V 5 V
Maximum input overload[2]	|Peaks| ≤ 5 V

Accuracy

Notice Electromagnetic interference can adversely affect the measurement accuracy of this product. The coaxial channel inputs of this device (CH 0 to CH 7) are not protected for electromagnetic interference. As a result, this device may experience reduced measurement accuracy or other temporary performance degradation when connected cables are routed in an environment with radiated or conducted radio frequency electromagnetic interference. To limit radiated emissions and to ensure that this device functions within specifications in its operational electromagnetic environment, take precautions when designing, selecting, and installing measurement probes and cables.

Resolution	14 bits

[2] Signals exceeding the maximum input overload may cause damage to the device.

Table 1. DC Accuracy[3]

Input Range	Accuracy		Drift
	Typical[4]	Warranted[5]	Nominal[6]
V_{pk-pk}	±(% of |Reading| + % of FS + mV)	±(% of |Reading| + % of FS + mV)	±(% of |Reading| + % of FS + mV) per °C
0.2 V	±(0.45 + 0.6 + 0.2)	±(0.90 + 0.65 + 0.7)	±(0.015 + 0.002 + 0.004)
0.4 V	±(0.45 + 0.24 + 0.2)	±(0.80 + 0.25 + 0.7)	±(0.012 + 0.002 + 0.004)
1 V	±(0.45 + 0.2 + 0.2)	±(0.80 + 0.25 + 0.7)	±(0.010 + 0.002 + 0.004)
2 V	±(0.40 + 0.2 + 0.2)	±(0.60 + 0.25 + 0.7)	±(0.005 + 0.002 + 0.004)
5 V	±(0.40 + 0.2 + 0.2)	±(0.55 + 0.25 + 0.7)	±(0.005 + 0.002 + 0.004)

DC accuracy sampling drift, full bandwidth (±% of |Reading| per MHz from 250 MHz)[7]	±0.03, nominal
AC amplitude accuracy[3]	
Accuracy	±0.095 dB at 50 kHz, typical[4] ±0.15 dB at 50 kHz, warranted[5]
Drift[6]	±0.0013 dB per °C

3 Verification of these specifications requires the *DC Adjustment Device Temperature (°C)* value. If you are using version 14.0 of the software, visit *ni.com/info* and enter the Info Code `exxpmp` for information on how to read this value. Otherwise, use NI-SCOPE to read the value.

4 When the reading from the *Device Temperature* sensor is within ±10 °C of the *DC Adjustment Device Temperature (°C)* value.

5 When the reading from the *Device Temperature* sensor is within ±38 °C of the *DC Adjustment Device Temperature (°C)* value. This increased temperature span encompasses the majority of temperature differences between the last external calibration environment and the operating environment.

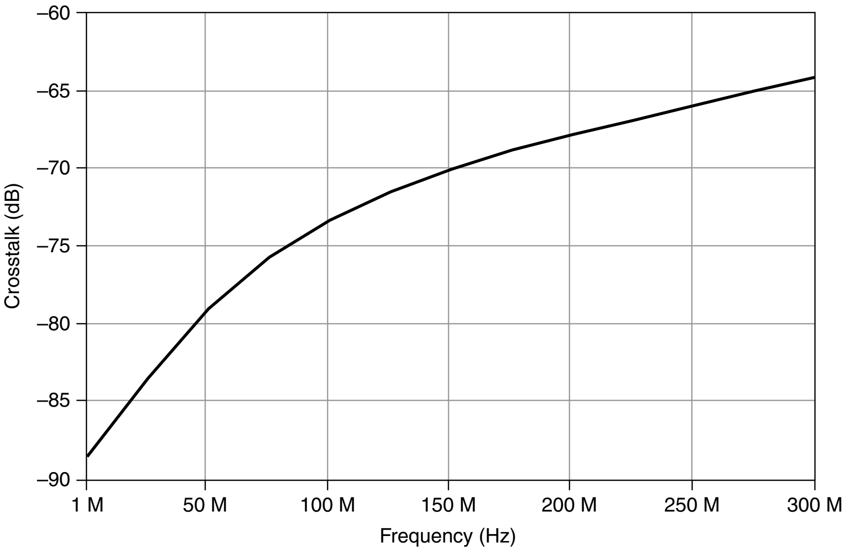
6 Used to calculate additional temperature error when the difference between the *Device Temperature* sensor and the *DC Adjustment Device Temperature (°C)* value is greater than ±10 °C (for typical specifications) or ±38 °C (for warranted specifications).

7 Used to calculate additional DC accuracy error when using an external sample clock of frequency <250 MHz. To calculate the additional error, solve the following for the analog path of interest:

$$\frac{250\text{MHz} - \text{frequency}}{1,000,000} \times \text{DC accuracy sampling drift}$$

Conversion error rate[8]	
250 MS/sec	$<1 \times 10^{-10}$
200 MS/sec	$<1 \times 10^{-15}$
150 MS/sec	$<1 \times 10^{-20}$

Figure 3. Channel-to-Channel Crosstalk[9]



Bandwidth and Transient Response

Bandwidth-limiting filter	100 MHz anti-alias filter
Bandwidth (-3 dB)[10]	
Anti-alias filter	100 MHz
Full bandwidth	
0.2 V_{pk-pk} input range	260 MHz
All other input ranges	270 MHz

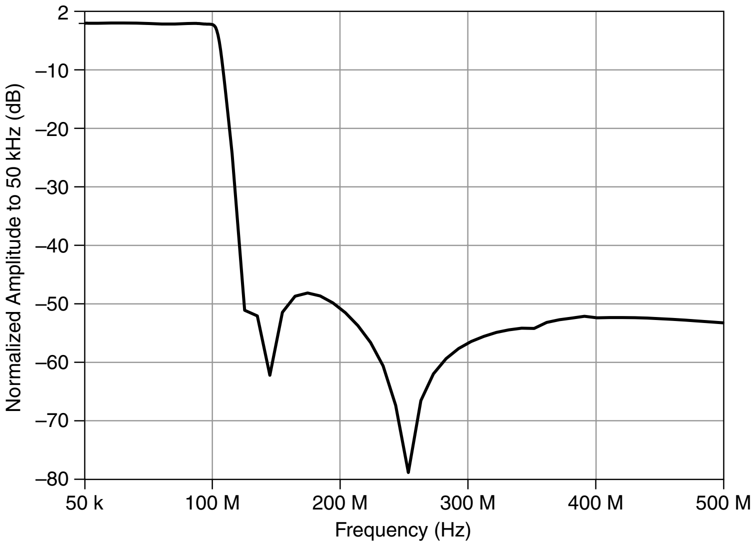
8 A *conversion error* is defined as deviation greater than 0.6% of full scale.
9 Measured on one channel with test signal applied to another channel, with the same range setting on both channels.

Table 2. Passband Amplitude Flatness, Warranted[10]

Input Frequency	Anti-Alias Filter Enabled	Full Bandwidth
<50 MHz	-0.5 dB to 0.5 dB	-0.5 dB to 0.5 dB
≥50 MHz to <90 MHz	-1.0 dB to 0.5 dB	-0.75 dB to 0.5 dB
≥90 MHz to <100 MHz	—	-0.75 dB to 0.5 dB
≥100 MHz to <150 MHz	—	-1 dB to 0.5 dB

AC-coupling cutoff (-3 dB)[11] 120 kHz

Figure 4. Frequency Response, Anti-Alias Filter Enabled, Measured



[10] Normalized to 50 kHz.
[11] With AC coupling enabled, the input impedance is 260 kΩ to ground. Verified using a 50 Ω source.

Figure 5. Frequency Response (Zoomed), Anti-Alias Filter Enabled, Measured

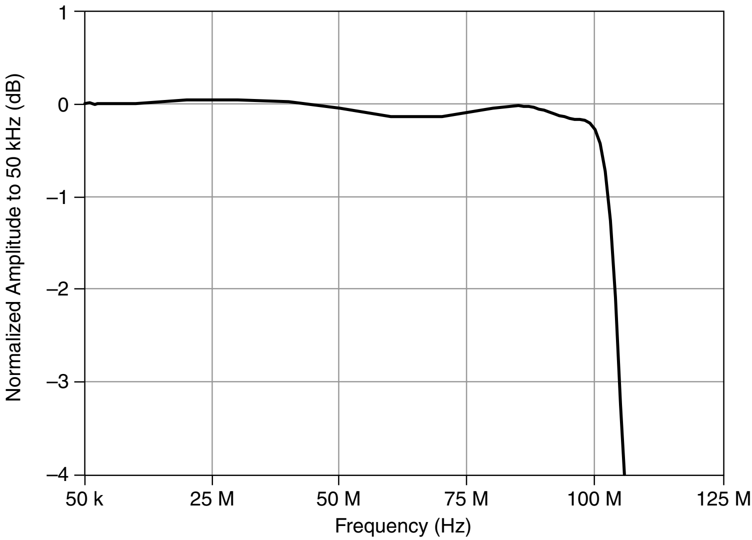


Figure 6. PXIe-5171 Frequency Response, Full Bandwidth, Measured

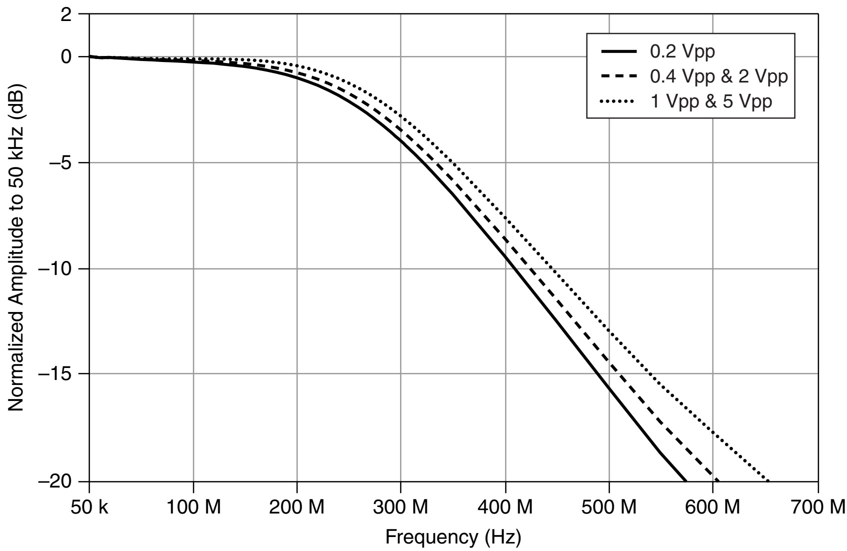
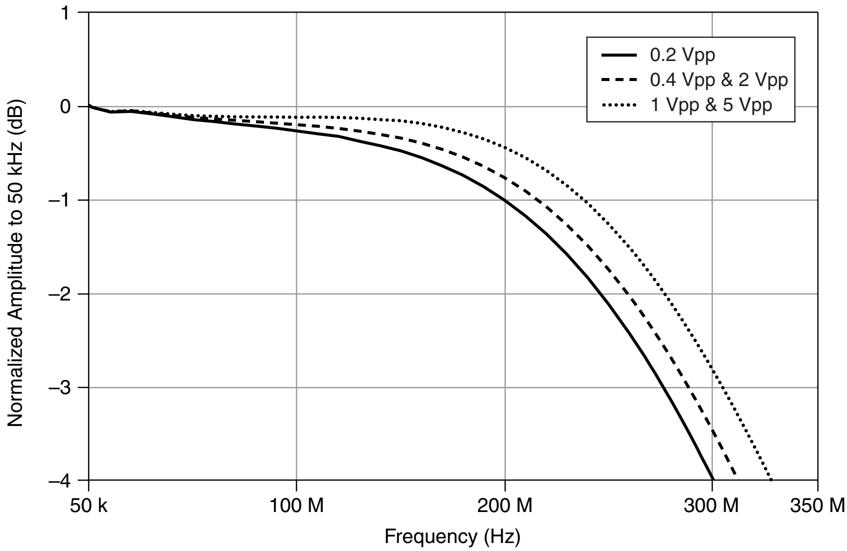


Figure 7. PXIe-5171 Frequency Response (Zoomed), Full Bandwidth, Measured



Spectral Characteristics

Table 3. Spurious-Free Dynamic Range (SFDR)[12]

Input Range (V_{pk-pk})	Input Frequency	Full Bandwidth
0.2 V to 2 V	<10 MHz	-80.0 dBc
	≥10 MHz to <30 MHz	-76.0 dBc
5 V	<10 MHz	-77.0 dBc
	≥10 MHz to <30 MHz	-73.0 dBc

Table 4. Total Harmonic Distortion (THD)[13]

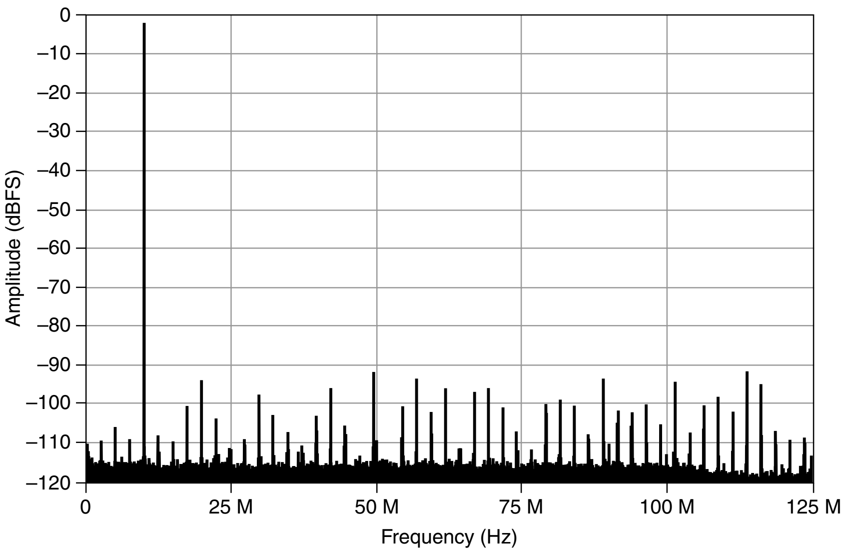
Input Frequency	Full Bandwidth
<10 MHz	-77.0
≥10 MHz to <30 MHz	-73.0

12 -1 dBFS input signal corrected to FS. 358 Hz resolution bandwidth (RBW).
13 Includes the second through the fifth harmonics. -1 dBFS input signal.

Table 5. Effective Number of Bits (ENOB)[12]

Input Range (V_{pk-pk})	Input Frequency	Full Bandwidth
0.2 V	<30 MHz	10.8
All other input ranges	<30 MHz	11.0

Figure 8. Single-Tone Spectrum, 2.98 dBm Input Signal at Connector, 1 V_{pk-pk} Input Range, 9.9 MHz Input Tone, Anti-Alias Filter Enabled, Measured



Noise

RMS noise[14]	
Anti-alias filter enabled	0.017% of FS, typical
Full bandwidth	
0.2 V_{pk-pk} input range	0.037% of FS, typical
0.4 V_{pk-pk} input range	0.025% of FS, typical
All other input ranges	0.024% of FS, typical

Table 6. Average Noise Density (dBm/Hz), Typical[14]

Input Range (V_{pk-pk})	Anti-Alias Filter Enabled (dBm/Hz)	Full Bandwidth (dBm/Hz)
0.2 V	-159.2 dBm/Hz	-153.6 dBm/Hz
0.4 V	-153.7 dBm/Hz	-150.4 dBm/Hz
1 V	-145.7 dBm/Hz	-142.4 dBm/Hz
2 V	-139.7 dBm/Hz	-136.4 dBm/Hz
5 V	-131.7 dBm/Hz	-128.4 dBm/Hz

Table 7. Average Noise Density (dBFS/Hz), Typical[14]

Input Range (V_{pk-pk})	Anti-Alias Filter Enabled (dBFS/Hz)	Full Bandwidth (dBFS/Hz)
0.2 V	149.2 dBFS/Hz	143.6 dBFS/Hz
All other input ranges	149.7 dBFS/Hz	146.4 dBFS/Hz

Table 8. Average Noise Density (nV/√Hz), Typical[14]

Input Range (V_{pk-pk})	Anti-Alias Filter Enabled (nV/√Hz)	Full Bandwidth (nV/√Hz)
0.2 V	3.5 nV/√Hz	6.6 nV/√Hz
0.4 V	6.5 nV/√Hz	9.6 nV/√Hz
1 V	16.4 nV/√Hz	23.9 nV/√Hz
2 V	32.7 nV/√Hz	47.9 nV/√Hz
5 V	81.8 nV/√Hz	119.7 nV/√Hz

Horizontal

Sample Clock

Sources	
Internal	Onboard clock (internal VCXO)
External	AUX I/O CLK IN (front panel MHDMR connector) PXIe_DStarA (backplane connector)

14 Verified using a 50 Ω terminator connected to input.

Sample rate range, real-time[15]	3.815 kS/s to 250 MS/s
Timebase frequency	
Internal	250 MHz
External	150 MHz – 250 MHz[16]
Timebase accuracy	
Phase-locked to onboard clock	±25.0 ppm, warranted
Phase-locked to external clock	Equal to the external clock accuracy
Duty cycle tolerance	45% to 55%

Phase-Locked Loop (PLL) Reference Clock

Sources	
Internal	Onboard clock (internal VCXO) PXI_Clk10 (backplane connector)
External (10 MHz)	AUX I/O CLK IN (front panel MHDMR connector)
Duty cycle tolerance	45% to 55%

External Sample Clock

Source	AUX I/O CLK IN (front panel MHDMR connector)
Impedance	50 Ω
Coupling	AC
Input voltage range	
As a 250 MHz sine wave	1 dBm through 18 dBm
As a fast slew rate input (square wave, $V_{pk\text{-}pk}$)	0.4 V to 5 V
Maximum input overload	
As a 250 MHz sine wave	20 dBm
As a fast slew rate input (square wave, $V_{pk\text{-}pk}$)	6 V

15 Divide by *n* decimation from 250 MS/s. For more information about the sample clock and decimation, refer to the *NI Reconfigurable Oscilloscopes Help* at *ni.com/manuals*.
16 Variable external sample clock support was added in NI-SCOPE 18.7.

External Reference Clock In

Source	AUX I/O CLK IN (front panel MHDMR connector)
Impedance	50 Ω
Coupling	AC
Frequency[17]	10 MHz
Input voltage range	
As a 250 MHz sine wave	1 dBm through 18 dBm
As a fast slew rate input (square wave, $V_{pk\text{-}pk}$)	6 V
Duty cycle tolerance	45% to 55%

Reference Clock Out

Source	PXI_Clk10 (backplane connector)
Destination	AUX I/O CLK OUT (front panel MHDMR connector)
Output impedance	50 Ω
Logic type	3.3 V LVCMOS
Maximum current drive	±8 mA

PXIe_DStarA

Source	System timing slot
Destinations	Onboard clock (internal VCXO) FPGA

PXI_Clk100

Source	PXI backplane
Destination	FPGA

[17] The PLL reference clock frequency must be accurate to ±25 ppm.

Trigger

Note The following characteristic behaviors are valid when using the device with the NI-SCOPE API. When using instrument design libraries, these characteristics may not be valid.

Supported trigger	Reference (Stop) Trigger
Trigger types	Edge Window Hysteresis Digital Immediate Software
Trigger sources	CH 0 to CH 7 PFI <0..7> PXI_Trig <0..6> Software
Time resolution	
Analog triggers[18]	
With interpolation	Sample Clock period / 1024
Without interpolation	Sample Clock period
Digital triggers	2x Sample Clock period
Minimum dead time[18]	
With interpolation	240 x Sample Clock period
Without interpolation	130 x Sample Clock period
Holdoff	From dead time to [(2^{64} - 1) × Sample Clock timebase period]
Trigger delay	From 0 to [(2^{51} - 1) × Sample Clock timebase period]
Trigger accuracy[19]	0.5% of full scale

18 Trigger interpolation is used when the Enable TDC NI-SCOPE attribute is set to `TRUE`. Otherwise, trigger interpolation is not used.

19 Analog triggers. For input frequencies less than 90 MHz.

Trigger jitter[19]	15 ps_{rms}
Minimum threshold duration[20]	Sample Clock period

Related Information

For information about when to self-calibrate the device, refer to the NI High-Speed Digitizers Help at ni.com/manuals.

For more information about triggers, refer to the NI High-Speed Digitizers Help at ni.com/manuals.

Programmable Function Interface (PFI 0..7, AUX I/O Front Panel Connector)

Connector	AUX I/O
Direction	Bidirectional per channel
Direction control latency	25 ns
As an Input (Trigger)	
Destination	FPGA diagram Start Trigger (Acquisition Arm) Reference (Stop) Trigger Arm Reference Trigger Advance Trigger
Input impedance	10 kΩ
V_{IH}	2 V
V_{IL}	0.8 V
Maximum input overload	0 V to 3.3 V, 5 V tolerant
Minimum pulse width	10 ns

[20] Data must exceed each corresponding trigger threshold for at least the minimum duration to ensure analog triggering.

As an Output (Event)

Sources	FPGA diagram Ready for Start Start Trigger (Acquisition Arm) Ready for Reference Reference (Stop) Trigger End of Record Ready for Advance Advance Trigger Done (End of Acquisition)
Output impedance	50 Ω
Logic type	3.3 V CMOS
Maximum current drive	12 mA
Minimum pulse width	10 ns

Power Output (+3.3 V)

Connector	AUX I/O/+3.3 V front panel connector
Voltage output	3.3 V ± 10%
Maximum current drive	200 mA
Output impedance	<1 Ω

Waveform Specifications

Onboard memory size[21]	1.5 GB
Minimum record length	1 sample
Number of pretrigger samples	Zero up to (record length - 1)
Number of posttrigger samples	Zero up to record length

Channels	Max Records per Channel	Record Length
1	1	805306192
1	10	80530432
1	1000	805120
1	100,000	7840

21 Onboard memory is shared among all enabled channels.

Channels	Max Records per Channel	Record Length
1	1M	592
2	1	402653096
2	10	40265216
2	1000	402560
2	100,000	3920
2	1M	296
4	1	201326548
4	10	20132608
4	1000	201280
4	100,000	1960
4	1M	148
8	1	100663274
8	10	10066304
8	1000	100640
8	100,000	980
8	1M	74

Memory Sanitization

For information about memory sanitization, refer to the letter of volatility for your device, which is available at *ni.com/manuals*.

FPGA

FPGA support	Xilinx Kintex-7 XC7K410T FPGA
Xilinx Kintex-7 XC7K410T FPGA Resources	
Slice registers	508,400
Slice look-up tables (LUT)	254,200

DSPs	1,540
18 Kb block RAMs	1,590

Note Note that some of these resources are consumed by the logic necessary to operate the device and integrate with software, and are thus out of the control of users.

Calibration

External Calibration

External calibration corrects for gain, offset, and timing errors at all input ranges.

All calibration constants are stored in nonvolatile memory.

Self-Calibration

Self-calibration is done on software command. The calibration corrects for intermodule synchronization errors.

Related Information

For information about when to self-calibrate the device, refer to the NI High-Speed Digitizers Help at ni.com/manuals.

Calibration Specifications

Interval for external calibration	2 years
Warm-up time[22]	15 minutes

Software

Driver Software

This device was first supported in LabVIEW Instrument Design Libraries for Reconfigurable Oscilloscopes 14.0 and NI-SCOPE 15.1. NI-SCOPE is an IVI-compliant driver that allows

[22] Warm-up begins after the chassis is powered, the device is recognized by the host, and the device is configured using the instrument design libraries or NI-SCOPE. Running an included sample project or running self-calibration using NI-MAX will configure the device and start warm-up.

you to configure, control, and calibrate the device. NI-SCOPE provides application programming interfaces for many development environments.

Related Information

For information about the available software options, refer to the PXIe-5170/5171 Getting Started Guide.

Application Software

NI-SCOPE provides programming interfaces, documentation, and examples for the following application development environments:

- LabVIEW
- LabWindows™/CVI™
- Measurement Studio
- Microsoft Visual C/C++
- .NET (C# and VB.NET)

Interactive Soft Front Panel and Configuration

When you install NI-SCOPE on a 64-bit system, you can monitor, control, and record measurements from the PXIe-5171 using InstrumentStudio.

InstrumentStudio is a software-based front panel application that allows you to perform interactive measurements on several different device types in a single program.

Note InstrumentStudio is supported only on 64-bit systems. If you are using a 32-bit system, use the NI-SCOPE–specific soft front panel instead of InstrumentStudio.

Interactive control of the PXIe-5171 was first available via InstrumentStudio in NI-SCOPE 18.1 and via the NI-SCOPE SFP in NI-SCOPE 15.1. InstrumentStudio and the NI-SCOPE SFP are included on the NI-SCOPE media.

NI Measurement & Automation Explorer (MAX) also provides interactive configuration and test tools for the PXIe-5171. MAX is included on the driver media.

Synchronization

Channel-to-channel skew	
Anti-alias filter enabled	<120 ps, nominal[23]
Full bandwidth	<120 ps, nominal

[23] For input frequencies less than 75 MHz.

Synchronization with the NI-TClk API[24]

NI-TClk is an API that enables system synchronization of supported PXI modules in one or more PXI chassis, which you can use with the PXIe-5171 and NI-SCOPE.

NI-TClk uses a shared Reference Clock and triggers to align the Sample Clocks of PXI modules and synchronize the distribution and reception of triggers. These signals are routed through the PXI chassis backplane without external cable connections between PXI modules in the same chassis.

Module-to-module skew, between PXIe-5171 modules using NI-TClk[25]	
NI-TClk synchronization without manual adjustment[26]	
Skew, Peak-to-Peak [27]	300 ps
NI-TClk synchronization with manual adjustment[26]	
Skew after manual adjustment	≤10 ps
Sample Clock delay/adjustment resolution	3.5 ps

Power

Note Power consumed depends on the FPGA image and driver software used. This specifications represents the maximum power for the NI-SCOPE use case or the typical value when using the Instrument Design Libraries (IDL).

[24] NI-TClk installs with NI-SCOPE.

[25] Although you can use NI-TClk to synchronize non-identical modules, these specifications apply only to synchronizing identical modules. Specifications are valid under the following conditions:

- All modules installed in the same PXI Express chasses.
- NI-TClk used to align the sample clocks of each module.
- All parameters set to identical values for each module.
- Self-calibration completed.
- Ambient temperature within ±1 °C of self-calibration.

For other configurations, including multi-chassis systems, contact NI Technical Support at *ni.com/support*.

[26] Manual adjustment is the process of minimizing synchronization jitter and skew by adjusting Trigger Clock (TClk) signals using the instrument driver.

[27] Caused by clock and analog delay differences. Tested with a PXIe-1082 chassis with maximum slot to slot skew of 100 ps. Valid within ±1 °C of self-calibration.

Table 9. PXIe-5171 Power Consumption

	Instrument Design Libraries	NI-SCOPE
+3.3 VDC	6.4 W	6.3 W
+12 VDC	16.2W	17.2W
Total power	22.6 W	23.5 W

Total maximum power allowed	38.25 W

Dimensions and Weight

Dimensions	18.5 cm × 2.0 cm × 13.0 cm (7.3 in. × 0.8 in. × 5.1 in.) 3U, 1 slot, PXI Express Gen 2 x8 Module
Weight	484 g (17.1 oz.)

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 45 °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 4 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} (Tested in accordance with IEC 60068-2-64.)
Nonoperating	5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC 60068-2-64. Test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

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 UL and other 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 61326-2-1 (IEC 61326-2-1): 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.

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)

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 *Commitment to the Environment* 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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