DEVICE SPECIFICATIONS

NI PXIe-5185

12.5 GS/s, 8-Bit Digitizer

This document lists the specifications for the National Instruments PXIe-5185, 3 GHz digitizer. The NI 5185 digitizer was developed jointly between Tektronix and National Instruments. The device uses Tektronix, Enabling Technology™ to deliver wide analog bandwidth and high-speed sampling on the National Instruments Synchronization and Memory Core (SMC) technology with TClk synchronization.

Unless otherwise noted, the following conditions were used for each specification:

- For 50 Ω input channel, vertical range (V_{pk-pk}) set to 0.11, 0.2, 0.5, or 1
- For 1 MΩ input channel[1], vertical range (V_{pk-pk}) set to 0.11, 0.2, 0.5, 1, 2, 5, or 10
- 1 MΩ input channel disconnected for 50 Ω input channel specifications, and 50 Ω input channel disconnected for 1 MΩ input channel specifications
- Sample clock set to 6.25 GS/s or 12.5 GS/s
- Onboard Sample clock locked to PXIe_CLK100 Reference clock
- 0 °C to 50 °C ambient temperature

Warranted (*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. Specifications are warranted under the following conditions:

- The NI 5185 module is warmed up for 25 minutes at ambient temperature
- Self-calibration is completed after warm-up period or when switching from an external Sample and/or Reference clock to the Onboard clock
- Calibration cycle is maintained
- The PXI Express chassis fan speed is set to HIGH, the fan filters are clean if present, and the empty slots contain PXI chassis slot blockers and filler panels. For more information

[1] Early versions of the NI 5185 only support 50 Ω input impedance. Later versions support both 50 Ω and 1 MΩ input impedance. To verify input impedances supported by your device, compare your device front panel with the diagrams at the end of this document. You can also check the device part number:

- NI 5185 module part numbers 199363*x*-0*z*L (where *x* is any letter and *z* is any number) only support 50 Ω input impedance.
- NI 5185 module part numbers 152962*x*-0*z*L (where *x* is any letter and *z* is any number) support both 50 Ω and 1 MΩ input impedance.

NATIONAL INSTRUMENTS

about cooling, refer to the *Maintain Forced-Air Cooling Note to Users* document available at *ni.com/manuals*.

- NI-SCOPE 3.9.6 or later instrument driver is used
- External calibration is performed at 23 °C ± 3 °C

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.

Nominal specifications describe additional information about the product that may be useful, including expected performance that is not covered under *Warranted*,*Characteristic*, or *Typical* specifications. Nominal values are not covered by warranty.

Specifications are subject to change without notice. For the most recent NI 5185 specifications, visit *ni.com/manuals*.

To access the NI 5185 documentation, including the *NI High-Speed Digitizers Getting Started Guide*, go to **Start»All Programs»National Instruments»NI-SCOPE»Documentation**.

Hot Surface If the NI 5185 has been in use, it may exceed safe handling temperatures and cause burns. Allow the NI 5185 to cool before removing it from the chassis. Refer to the *Environment* section for operating temperatures of this device.

Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit *ni.com/manuals*, and search for the document title.

Caution To ensure the specified EMC performance, operate this product only with double-shielded cables (for example, RG-223/U) and accessories.

Caution The protection provided by the NI 5185 can be impaired if it is used in a manner not described in this document.

Contents

Vertical

Analog Input (Channel 0 and Channel 1)

Number of channels....Two (simultaneously sampled)

Input type....Reference single-ended

Connectors

- CH 0, 50 Ω....SMA
- CH 1, 50 Ω....SMA
- CH 0, 1 MΩ....BNC
- CH 1, 1 MΩ....BNC

Impedance and Coupling

Input impedance, typical

- 50 Ω....50 Ω ± 1.5%
- 1 MΩ....1 MΩ ± 1.0% in parallel with a characteristic capacitance of 10 pF

Input coupling

50 Ω.....DC

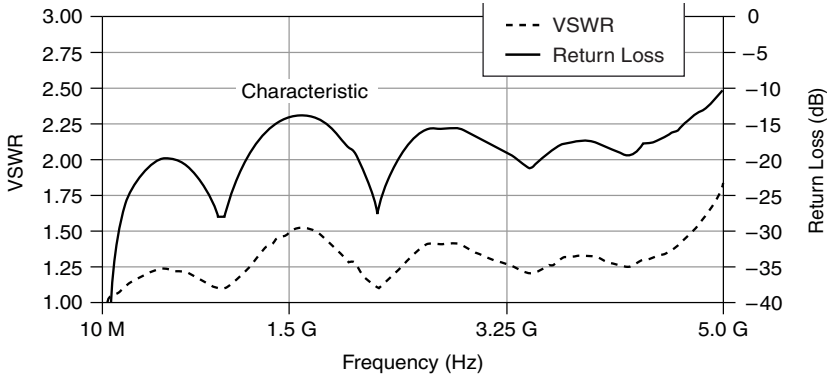
1 MΩ.....AC, DC; software-selectable

Voltage standing wave ratio (VSWR), characteristic[2]

≥DC to ≤1 GHz.....1.25:1

>1 GHz to ≤5 GHz.....1.8:1

Figure 1. 50 Ω Input VSWR and Input Return Loss



Voltage Levels

Table 1. Full Scale (FS) Input Range and Programmable Vertical Offset

Input	Input range (V_{pk-pk})	Vertical offset range (V)
50 Ω and 1 MΩ inputs	0.11 to 1 in >0.3 mV steps	±0.25
1 MΩ input only	>1 to 10 in >3 mV steps	±2.5

Maximum input overload, characteristic[3]

50 Ω.....|Peaks| ≤ 1 V

1 MΩ.....|Peaks| ≤ 42 V

[2] 50 Ω input only.

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

Accuracy

Resolution.....8 bits

DC accuracy (programmable vertical offset = 0 Volts), warranted[4]

- 50 Ω.....±(2% of input + 0.35% of FS + 0.7 mV)
- 1 MΩ.....±(2% of input + 0.9% of FS + 1.3 mV)

Programmable vertical offset accuracy, warranted[4].....±1.2% of offset setting

DC drift, characteristic[5]

- 50 Ω.....±(0.23% of input + 0.03% of FS) per °C
- 1 MΩ.....±(0.23% of input + 0.1% FS + 0.2 mV) per °C

Programmable vertical offset drift, characteristic[5].....±0.02% of offset setting per ºC

AC amplitude accuracy, warranted[4]

- 50 Ω.....±0.35 dB at 50 kHz
- 1 MΩ.....±0.5 dB at 50 kHz

AC amplitude drift, characteristic[5].....±0.014 dB per ºC at 50 kHz

Crosstalk (CH 0 to/from CH 1), characteristic[6]

- 50 Ω
  - ≥DC to ≤1 GHz.....–68 dB
  - >1 GHz to ≤2.5 GHz.....–60 dB
  - >2.5 GHz to ≤5 GHz.....–47 dB
- 1 MΩ: ≥DC to ≤300 MHz.....–62 dB

Bandwidth and Transient Response

Bandwidth (-3 dB)

- 50 Ω, warranted.....3 GHz, warranted
- 1 MΩ[7].....500 MHz, characteristic; 425 MHz, warranted

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4 Within ±3 °C of self-calibration temperature.

5 Used to calculate errors when temperature changes more than ±3 °C since the last self-calibration.

6 Measured on one channel with test signal applied to other channel. Same range settings used on both channels.

7 Bandwidth decreases as ambient temperature increases. 1 MΩ input tested using Fluke 9500B with Fluke 9530 test head.

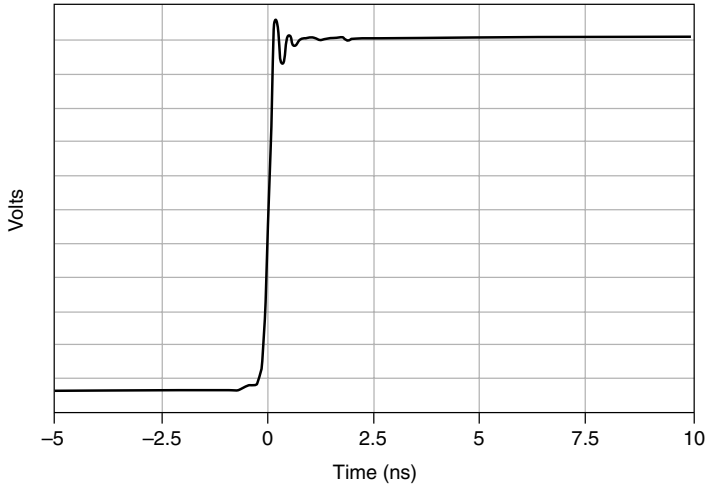
Rise/fall time, typical[8]

50 Ω.....170 ps

1 MΩ.....750 ps

AC-coupling cutoff (-3 dB), typical[9].....10 Hz

Figure 2. NI 5185 Step Response, 50 Ω, -0.25 V Programmable Offset, 150 ps Rising Edge, Characteristic



[8] 50% FS input pulse, 23°C ± 10°C.

[9] AC coupling available on 1 MΩ only.

Figure 3. NI 5185 Step Response, 1 MΩ, -0.25 V Programmable Offset, 500 ps Rising Edge, Characteristic

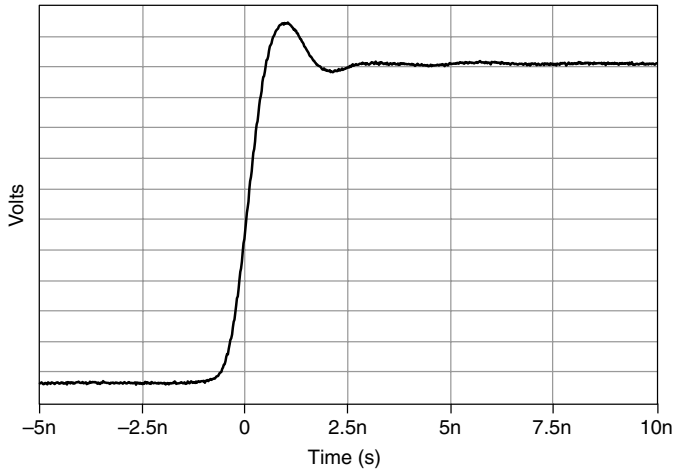


Figure 4. NI 5185 50 Ω Frequency Response, Characteristic

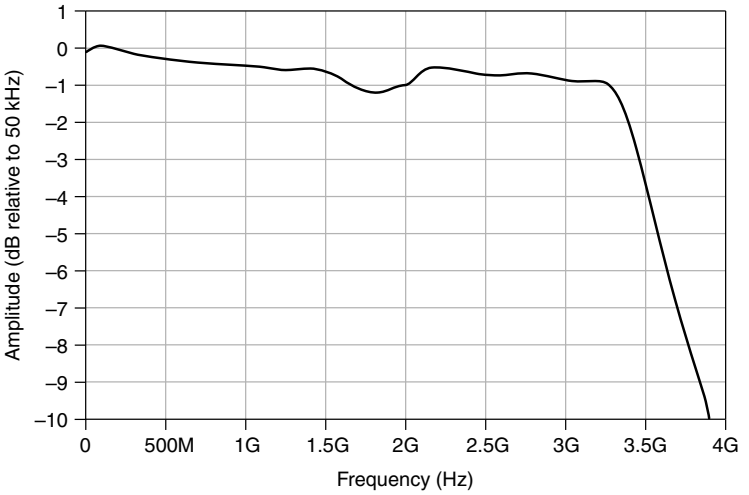
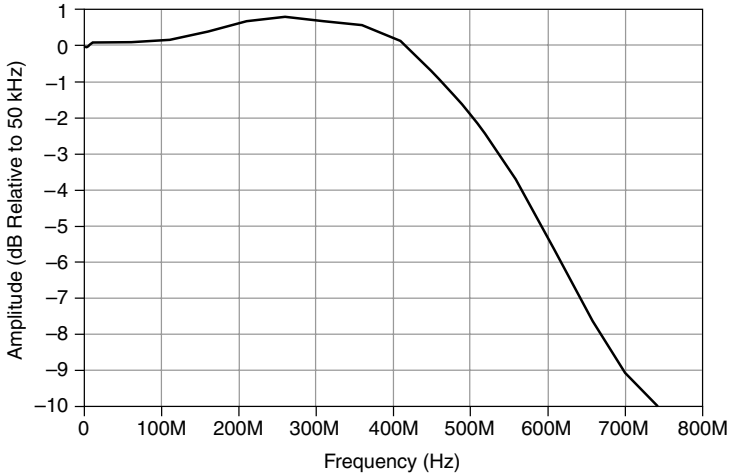


Figure 5. NI 5185 1 MΩ Frequency Response, Characteristic[10]



Spectral Characteristics

NI 5185 50 Ω Spectral Characteristics

Spurious-Free Dynamic Range (SFDR), characteristic[11]

0.11 V_{pk-pk}, 0.2 V_{pk-pk}, or 0.5 V_{pk-pk} range

≤10 MHz.....-51 dBc

>10 MHz to ≤1 GHz.....-50 dBc

>1 GHz to ≤3 GHz.....-46 dBc

1 V_{pk-pk} range

≤10 MHz.....-50 dBc

>10 MHz to ≤1 GHz.....-47 dBc

>1 GHz to ≤3 GHz.....-46 dBc

Total Harmonic Distortion (THD), characteristic[12]

0.11 V_{pk-pk}, 0.2 V_{pk-pk}, or 0.5 V_{pk-pk} range

≤ 10 MHz.....-54 dBc

>10 MHz to ≤1 GHz.....-49 dBc

>1 GHz to ≤3 GHz.....-52 dBc

[10] Tested using Fluke 9500B with Fluke 9530 test head.

[11] -1 dBFS input signal. Includes the 2nd through the 5th harmonics.

[12] -1 dBFS input signal. Includes the 2nd through the 5th harmonics.

1 V_{pk-pk} range

≤ 10 MHz.....-50 dBc

>10 MHz to ≤1 GHz.....-46 dBc

>1 GHz to ≤3 GHz.....-46 dBc

Effective Number of Bits (ENOB), characteristic[13]

10 MHz.....6.5

1 GHz.....6.3

3 GHz.....6.0

Signal to Noise and Distortion (SINAD), characteristic[14]

10 MHz.....40.9 dB

1 GHz.....39.7 dB

3 GHz.....37.9 dB

NI 5185 1 MΩ Spectral Characteristics

SFDR, characteristic[15]

0.11 V_{pk-pk}, 0.2 V_{pk-pk}, or 0.5 V_{pk-pk} range

≤10 MHz.....-51 dBc

>10 MHz to ≤300 MHz.....-45 dBc

1 V_{pk-pk}, 2 V_{pk-pk}, 5 V_{pk-pk}, or 10 V_{pk-pk} range

≤10 MHz.....-50 dBc

>10 MHz to ≤300 MHz.....-41 dBc

Total Harmonic Distortion (THD), characteristic[16]

0.11 V_{pk-pk}, 0.2 V_{pk-pk}, or 0.5 V_{pk-pk} range

≤10 MHz.....-54 dBc

>10 MHz to ≤300 MHz.....-44 dBc

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13 -1 dBFS input signal corrected to FS. Includes the 2nd through the 5th harmonics. 18 kHz resolution bandwidth (RBW).

14 -1 dBFS input signal corrected to FS. Includes the 2nd through the 5th harmonics. 18 kHz resolution bandwidth (RBW).

15 For ≤100 MHz, -1 dBFS input signal corrected to FS. For >100 MHz, -2 dBFS input signal corrected to FS.

16 For ≤100 MHz, -1 dBFS input signal corrected to FS. For >100 MHz, -2 dBFS input signal corrected to FS.

1 V_{pk-pk}, 2 V_{pk-pk}, 5 V_{pk-pk}, or 10 V_{pk-pk} range

≤10 MHz.....-50 dBc

>10 MHz to ≤300 MHz.....-40 dBc

ENOB, characteristic[17]

0.11 V_{pk-pk} range

10 MHz.....5.9

300 MHz.....5.9

0.2 V_{pk-pk}, 0.5 V_{pk-pk}, 1 V_{pk-pk}, 2 V_{pk-pk}, 5 V_{pk-pk}, or 10 V_{pk-pk} range

10 MHz.....6.3

300 MHz.....6.3

SINAD, characteristic[18]

0.11 V_{pk-pk} range

10 MHz.....37.3 dB

300 MHz.....37.3 dB

0.2 V_{pk-pk}, 0.5 V_{pk-pk}, 1 V_{pk-pk}, 2 V_{pk-pk}, 5 V_{pk-pk}, or 10 V_{pk-pk} range

10 MHz.....39.7 dB

300 MHz.....39.7 dB

Noise

RMS noise, typical[19]

50 Ω.....0.35% of FS

1 MΩ.....0.5% of FS

Average noise density, typical[20]

50 Ω.....-137 dBFS/Hz

1 MΩ.....-134 dBFS/Hz

[17] For 10 MHz, -1 dBFS input signal corrected to FS. For 300 MHz, -2 dBFS input signal corrected to FS. Includes the 2nd through the 5th harmonics. 18 kHz resolution bandwidth (RBW).

[18] For 10 MHz, -1 dBFS input signal corrected to FS. For 300 MHz, -2 dBFS input signal corrected to FS. Includes the 2nd through the 5th harmonics. 18 kHz resolution bandwidth (RBW).

[19] 50 Ω terminator connected to input. 23°C ± 10°C.

[20] 50 Ω terminator connected to input. 23°C ± 10°C.

Skew

Channel-to-channel skew, characteristic

50 Ω to 50 Ω.....< 10 ps

1 MΩ to 1 MΩ.....< 45 ps

50 Ω to 1 MΩ.....< 1.5 ns

Horizontal

Sample Clock

Sources

Internal.....Onboard clock (internal VCO)[21]

External.....Front panel SMA connector

Onboard Clock (Internal VCO)

Real-time sample rate range

One channel enabled.....190.740 kS/s to 12.5 GS/s[22]

Two channels enabled.....190.740 kS/s to 6.25 GS/s[22]

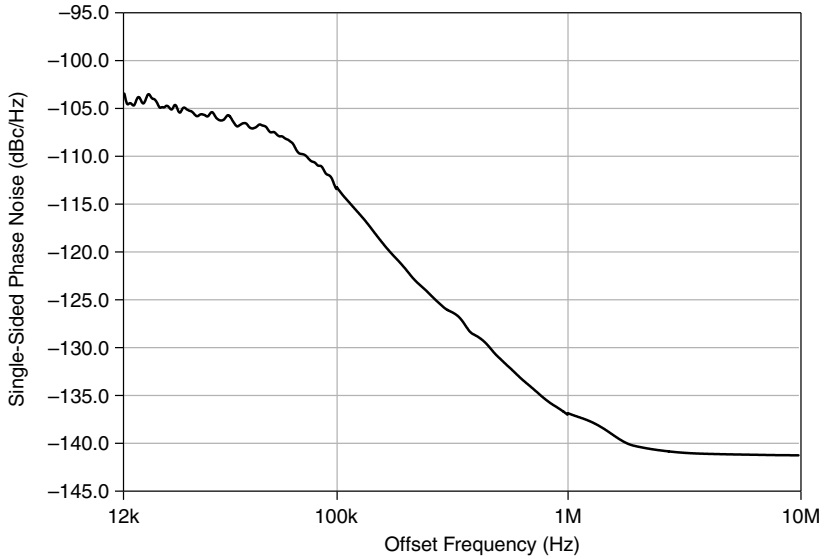
Random Interleaved Sampling (RIS).....Up to 250 GS/s[23]
range

[21] Internal Sample clock is locked to the PXIe_CLK100 Reference clock.

[22] Divide by n decimation from 6.25 GS/s used for all rates less than maximum sample rate. For more information about Sample clock and decimation, refer to the *NI High-Speed Digitizers Help*.

[23] With one channel enabled, stepped in multiples of 12.5 GS/s. With two channels enabled, stepped in multiples of 6.25 GS/s.

Figure 6. NI 5185 Phase Noise (Plotted without Spurs) at 1 GHz, 3 dBm Input Signal, Locked to 100 MHz PXI Express Backplane (Characteristic)



Sample clock jitter, characteristic[24].....500 fs rms (12 kHz to 10 MHz)

Timebase frequency.....3.125 GHz

Timebase accuracy[25].....Accuracy equal to the backplane or user-provided Reference clock

External Sample Clock

Sources.....CLK IN (front panel SMA connector)

Frequency range[26].....1.6 GHz to 3.125 GHz

Duty cycle tolerance, typical.....45% to 55%

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[24] Includes the effects of the converter aperture uncertainty and the clock circuitry jitter. Excludes trigger jitter.

[25] Phase-locked to Reference clock. The chassis clock or external Reference clock must be accurate to 25 parts per million (ppm), or (1×10^{-6}).

[26] Divide by n decimation available where $1 \leq n \leq 65535$. For more information about Sample clock and decimation, refer to the *NI High-Speed Digitizers Help*. The effective sample rate can be 1 × Input Frequency or 2 × Input Frequency when acquiring on two channels, or 1 × Input Frequency, 2 × Input Frequency or 4 × Input Frequency when acquiring on one channel; use the Sample Clock Timebase Multiplier property or the NISCOPE_ATTR_SAMP_CLK_TIMEBASE_MULT attribute to specify.

Phase-Locked Loop (PLL) Reference Clock

Sources

Internal.....PXIe_CLK100 (backplane connector)

External.....REF CLK (front panel SMB connector)

Frequency[27].....10 MHz or 100 MHz

Duty cycle tolerance, characteristic.....45% to 55%

CLK IN (Sample Clock Input, Front Panel Connector)

Input voltage range, characteristic.....Sine wave: 0.45 V_{pk-pk} to 1.78 V_{pk-pk} (–3 dBm to 9 dBm)

Maximum input overload, characteristic.....3 V_{rms}, |Peaks| ≤ 4.25 V

Impedance, nominal.....50 Ω

Coupling.....AC

REF CLK (Reference Clock In, Front Panel Connector)

Input voltage range, characteristic.....Sine wave: -2 dBm to 16 dBm

Maximum input overload, typical.....1.6 V_{rms}, |Peaks| ≤ 10 V (1 ms peak)

Impedance, nominal.....50 Ω

Coupling.....AC

Frequency[28].....10 MHz or 100 MHz

Trigger

Supported trigger.....Reference (stop) trigger

Trigger types.....Edge, Digital, Immediate, and Software

Trigger sources.....CH 0, CH 1, TRIG, PXI_Trig <0..6>, and Software

[27] The PLL Reference clock frequency must be accurate to ±25 ppm.

[28] The PLL Reference clock frequency must be accurate to ±25 ppm.

Time resolution

Onboard Clock

TDC (Time to Digital Conversion Circuit) on ..... 2.56 ps

TDC off ..... 2.56 ns

External clock, TDC off ..... External clock period × 8

Rearm time[29]

TDC on ..... 10 µs

TDC off ..... 2 µs

Holdoff ..... Rearm time to 10.99 s

Trigger delay ..... From 0 to 1,450,000 seconds (15 days)

Analog Trigger (Edge Trigger Type)

Sources ..... CH 0, CH 1, or TRIG

Trigger level range

CH 0, CH 1 ..... 100% of FS

TRIG (external trigger) ..... ±5 V

Voltage resolution

CH 0, CH 1 ..... 8 bits (1 in 256)

TRIG (external trigger), characteristic ..... 10 bits (1 in 1,024)

Edge trigger sensitivity

CH 0, CH 1, typical ..... 3% of FS at ≤1 GHz

TRIG (external trigger), characteristic ..... 2% of FS at ≤100 MHz

Trigger level accuracy

CH 0, CH 1, typical ..... ±5% of FS at ≤100 MHz[30]

TRIG (external trigger), characteristic ..... ±5% at ≤100 MHz[31]

[29] Holdoff set to 0.

[30] Within ±5 °C of self-calibration temperature.

[31] When same impedance settings used on both input channels. For more information about functionality when using mixed impedances between the input channels, visit *ni.com/kb* and enter `5W8CFE8P`.

Trigger jitter

CH 0, CH 1, typical.....≤16 ps rms

TRIG (external trigger), characteristic.....≤16 ps rms

Digital Trigger (Digital Trigger Type)

Sources.....PXIe_TRIG <0..6> (backplane connector)

TRIG (External Trigger, Front Panel Connector)

Connector.....SMA

Impedance, nominal.....50 Ω

Coupling.....DC

Input voltage range, nominal.....±5 V

Maximum input overload, characteristic.....|Peaks| ≤ 6 V

TClk Specifications

You can use the National Instruments TClk synchronization method and the NI-TClk driver to align the Sample clocks on any number of SMC-based modules in a chassis. Specifications are valid for any number of NI 5185 or NI 5186 modules installed in one PXI Express chassis, with all parameters set to identical values for each SMC-based module. For more information about TClk synchronization, refer to the *NI-TClk Synchronization Help*, which is located within the *NI High-Speed Digitizers Help*. For other configurations, including multichassis systems, contact NI Technical Support at *ni.com/support*.

Note You can only use NI-TClk to synchronize NI 5185 or NI 5186 devices to other NI 5185 or NI 5186 devices. These specifications apply only to synchronizing identical modules without using an external Sample clock.

Intermodule SMC synchronization using NI-TClk for identical modules, characteristic

Skew[32].....500 ps

Skew after manual adjustment.....160 ps

[32] Caused by clock and analog path delay differences. No manual adjustment performed.

Sample clock delay/adjustment resolution.....80 ps

Triggers that can be TClk synchronized[33].....Reference trigger

Waveform Specifications

Onboard memory sizes[34].....32 MB or 1 GB

Minimum record length, characteristic.....1 sample

Number of pretrigger samples, characteristic[35].....Zero up to full record length

Number of posttrigger samples, characteristic[35].....Zero up to full record length

Maximum number of records in onboard memory, characteristic

- 16 MB per channel.....4,096[36]
- 512 MB per channel.....100,000[36]

Allocated onboard memory per record, characteristic.....[(Record length × 1 byte/sample) + 1,500], rounded up to: 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or an integer multiple of 128 KB

Memory Sanitization

For information about memory sanitization, refer to the *NI PXIe-5185/5186 Letter of Volatility*, which is available for download from *ni.com/manuals*.

[33] Synchronized triggers are synchronized to ±1 Sample clock timebase.

[34] Onboard memory is shared between all enabled channels.

[35] Single-record and multirecord acquisitions.

[36] You can exceed these numbers if you fetch records while acquiring data. For more information, refer to the *NI High-Speed Digitizers Help*.

Calibration

Power-up calibration	Automatically performed by the device at power-on to calibrate the gain, offset, and phase of the ADCs on the device. Typically takes 5 to 10 minutes to complete.
Self-calibration	Self-calibration is done on software command. The calibration corrects for gain, offset, triggering, and timing errors for all input ranges, excluding the External Trigger input channel (TRIG). Refer to the *NI High-Speed Digitizers Help* for information about when to self-calibrate the device.
External calibration	The external calibration calibrates the onboard references used in self-calibration, the input overload levels, and the external trigger levels. All calibration constants are stored in nonvolatile memory.
Interval for external calibration	1 year
Warm-up time	25 minutes

Power

+3.3 VDC	5.1 A
+12 VDC	6.1 A
+5 V_{aux}	12 mA
Total power	90 W

Software

Driver Software

This device is supported in NI-SCOPE 3.9.6 or later. NI-SCOPE is an IVI-compliant driver that allows you to configure, control, and calibrate the NI 5185. NI-SCOPE provides application programming interfaces for many development environments.

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++
- Microsoft Visual Basic

Interactive Soft Front Panel and Configuration

The NI-SCOPE Soft Front Panel version 3.9.6 or later supports interactive control of the NI 5185. The NI-SCOPE Soft Front Panel is included on the NI-SCOPE DVD.

National Instruments Measurement & Automation Explorer (MAX) also provides interactive configuration and test tools for the NI 5185. MAX is included on the NI-SCOPE DVD.

Physical

Front Panel Connectors

Table 2. Front Panel Connectors

Label	Function	Connector Type
CH 0, 50 Ω	Analog input	SMA female
CH 0, 1 MΩ	Analog input	BNC female
CH 1, 50 Ω	Analog input	SMA female
CH 1, 1 MΩ	Analog input	BNC female
TRIG	External analog trigger	SMA female
REF CLK	Imports an external Reference clock to the digitizer.	SMB jack
CLK IN	Imports an external Sample clock to the digitizer.	SMA female

Dimensions and Weight

Dimensions.....3U, 3 slot, PXI Express Module, 21.6 × 6.2 × 13.0 cm (8.5 × 2.4 × 5.1 in.)

Weight

50 Ω.....1,208 g (42.61 oz.)

1 MΩ.....1,222 g (43.10 oz.)

Figure 7. NI 5185 (50 Ω)

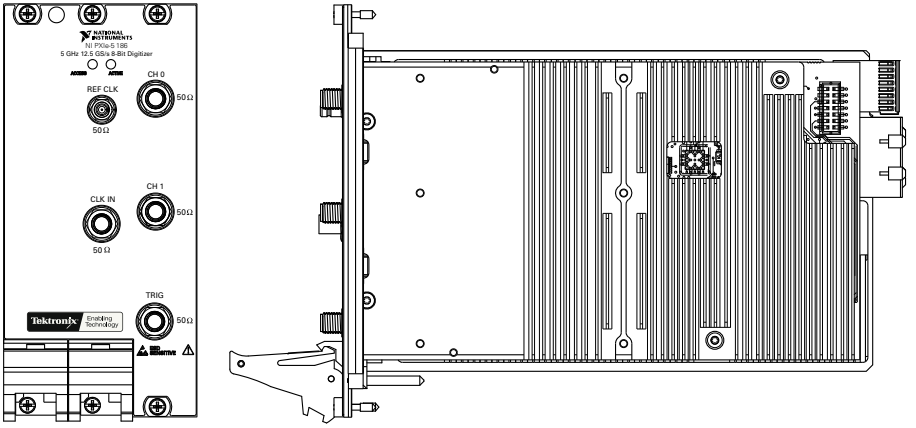
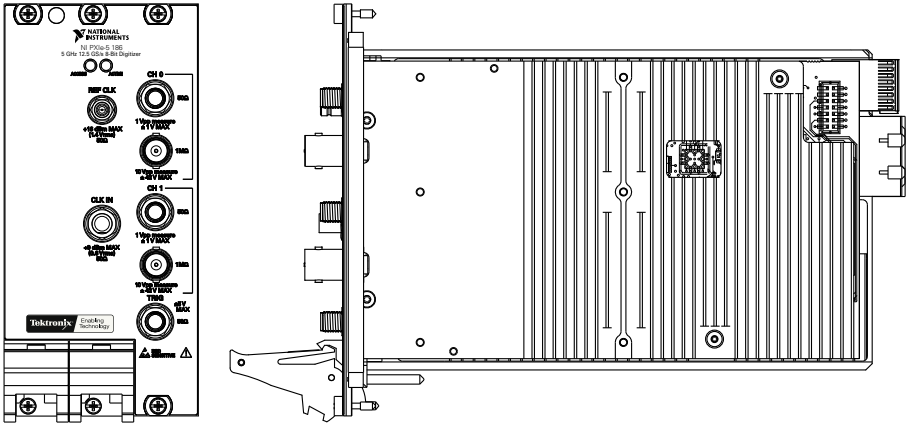


Figure 8. NI 5185 (1 MΩ)



Environment

Maximum altitude.....2,000 m (at 25 °C ambient temperature)

Pollution Degree.....2

Indoor use only.

Operating Environment

Ambient temperature range.....0 °C to 50 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Relative humidity range.....10% to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Storage Environment

Ambient temperature range.....-40 °C to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Relative humidity range.....5% to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Operational shock.....30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Test profile developed in accordance with MIL-PRF-28800F)

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 treament of material or inspection/analysis purposes.

Note For EMC declarations and certifications, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as amended for CE marking, 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*, 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 not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and 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 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*.

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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