SPECIFICATIONS

PXI-5124

150 MHz Bandwidth, 200 MS/s, 12-Bit PXI Oscilloscope

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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 *Typical* unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- All filter settings
- All impedance selections
- Sample clock set to 200 MS/s using onboard clock
- The PXI-5124 module is warmed up for 15 minutes at ambient temperature.
- Calibration cycle is maintained.
- The PXI chassis fan speed is set to HIGH, the foam fan filters are removed if present, and the empty slots contain PXI chassis slot blockers and filler panels. For more information about cooling, refer to the *Maintain Forced-Air Cooling Note to Users* available at *ni.com/manuals*.
- External calibration is performed at 23 °C ± 5 °C

Hot Surface If the PXI-5124 has been in use, it may exceed safe handling temperatures and cause burns. Allow the PXI-5124 to cool before removing it from the chassis.

Caution To ensure the specified EMC performance, operate this product only with double-shielded cables (for example, RG-233/U or equivalent) and shielded accessories.

Caution You can impair the protection provided by the PXI-5124 if you use it in a manner not described in this document.

Vertical

Analog Input

Number of channels	Two (simultaneously sampled)
Connectors	BNC

Impedance and Coupling

Input impedance (software-selectable)	50 Ω ± 2.0% 1 MΩ ± 0.75% in parallel with a nominal capacitance of 29 pF
Input coupling (software-selectable)	AC[1] DC GND

Voltage Levels

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

Range (V_{pk-pk})	Vertical Offset Range	
	50 Ω Input	1 MΩ Input
0.2 V	±0.1 V	
0.4 V	±0.2 V	
1 V	±0.5 V	
2 V	±1 V	
4 V	±2 V	

[1] AC coupling available on 1 MΩ input only.

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

Range (V_{pk-pk})	Vertical Offset Range	
	50 Ω Input	1 MΩ Input
10 V	—	±5 V
20 V (1 MΩ only)	—	—

Maximum input overload

50 Ω	7 V_{rms} with |Peaks| ≤10 V
1 MΩ	|Peaks| ≤42 V

Accuracy

Resolution 12 bits

Table 2. DC Accuracy[2], warranted

Range (V_{pk-pk})	Accuracy
0.2 V and 0.4 V	±(0.65% of input + 1.8 mV)
1 V and 2 V	±(0.65% of input + 2.1 mV)
4 V, 10 V, and 20 V[3]	±(0.65% of input + 10.0 mV)

Programmable vertical offset accuracy[4] ±0.4% of offset setting, warranted

Table 3. DC Drift, Nominal

Range (V_{pk-pk})	50 Ω and 1 MΩ
0.2 V, 0.4 V, 1 V, and 2 V	±(0.057% of input + 0.006% of FS + 100 µV) per °C
4 V, 10 V, and 20 V[3]	±(0.057% of input + 0.006% of FS + 900 µV) per °C

AC amplitude accuracy[4]

50 Ω	±0.06 dB (±0.7%) at 50 kHz
1 MΩ	±0.09 dB (±1.0%) at 50 kHz

Crosstalk[5] ≤-85 dB at 10 MHz

[2] Programmable vertical offset = 0 V. Within ±5 °C of self-calibration temperature.
[3] 1 MΩ input only.
[4] Within ±5 °C of self-calibration temperature.
[5] CH 0 to/from CH 1, External trigger to CH 0 or CH 1.

Sparkle code rate[6]	
Onboard clock	<300 ppt[7]
External clock	
200 MHz	<300 ppt[7]
150 MHz	<3 ppt[7]
100 MHz	0

Bandwidth and Transient Response

Table 4. Bandwidth (±3 dB), Warranted[8, 9]

Input Range (V_{pk-pk}) [8]	50 Ω	1 MΩ
0.2 V	85 MHz	75 MHz
All other input ranges	150 MHz	145 MHz up to 40 °C[10]

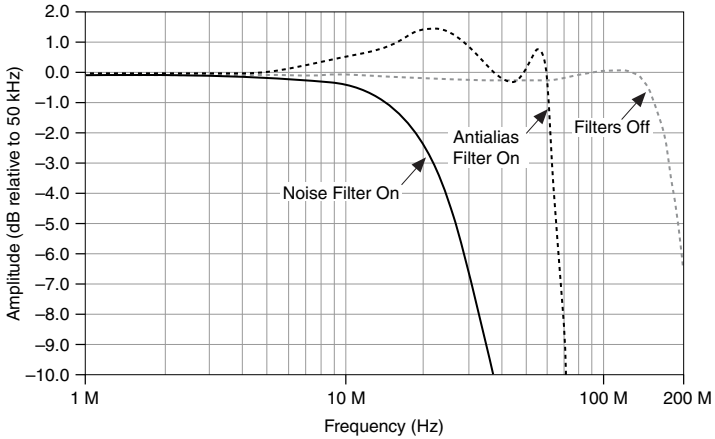
Rise/fall time[8]	
0.2 V_{pk-pk} input range	3.3 ns
All other input ranges	2.4 ns
Bandwidth limit filters[11]	
Noise filter	20 MHz 2-pole Bessel filter
Anti-alias filter	60 MHz 4-pole elliptical filter
AC coupling cutoff (-3 dB)[12]	12 Hz

6 Results based on 2×10^{12} samples.
7 ppt = parts per trillion (10^{12}).
8 Filters off.
9 Referenced to 50 kHz.
10 135 MHz above 40 °C.
11 Only one filter can be enabled at any given time. The anti-alias filter is enabled by default.
12 AC coupling available on 1 MΩ path only.

Table 5. Passband Flatness[9]

Filter Settings[9]	Input Range (V_{pk-pk})	50 Ω and 1 MΩ
Filters off	0.2 V	±0.6 dB (DC to 20 MHz) ±1.5 dB (20 MHz to 40 MHz)
	All input ranges except 0.2 V	±0.5 dB (DC to 20 MHz) ±1.0 dB (20 MHz to 50 MHz) ±1.7 dB (50 MHz to 100 MHz)
Anti-alias filter on	All ranges	-1.0 dB to +2.0 dB (DC to 55 MHz)

Figure 1. PXI-5124 Frequency Response (Measured)



Spectral Characteristics

Table 6. Spurious-Free Dynamic Range with Harmonics (SFDR)[13]

Input Range (V_{pk-pk})	50 Ω	1 MΩ
0.2 V	75 dBc	70 dBc
0.4 V	75 dBc	70 dBc
1 V	72 dBc	70 dBc

[13] Filters off or Anti-alias filter on. 10 MHz, -1 dBFS input signal. Includes the 2nd through the 5th harmonics. Measured from DC to 100 MHz.

Table 6. Spurious-Free Dynamic Range with Harmonics (SFDR)[13] (Continued)

Input Range (V_{pk-pk})	50 Ω	1 MΩ
2 V	72 dBc	70 dBc
4 V	65 dBc	67 dBc
10 V	65 dBc	60 dBc
20 V (1 MΩ only)	—	60 dBc

Table 7. Total Harmonic Distortion (THD)[14]

Input Range (V_{pk-pk})	50 Ω	1 MΩ
0.2 V	-74 dBc	-68 dBc
0.4 V	-74 dBc	-68 dBc
1 V	-72 dBc	-68 dBc
2 V	-72 dBc	-67 dBc
4 V	-63 dBc	-66 dBc
10 V	-63 dBc	-58 dBc
20 V (1 MΩ only)	—	-58 dBc

Intermodulation distortion (V_{pk-pk})[15] -75 dBc

Table 8. Signal-to-Noise Ratio (SNR)[16]

Input Range (V_{pk-pk})	50 Ω		1 MΩ	
	Filters Off	Anti-alias Filter On	Filters Off	Anti-alias Filter On
0.2 V	57 dB	56 dB	53 dB	55 dB
0.4 V	58 dB	57 dB	55 dB	57 dB
1 V	58 dB	58 dB	57 dB	57 dB

[13] Filters off or Anti-alias filter on. 10 MHz, -1 dBFS input signal. Includes the 2nd through the 5th harmonics. Measured from DC to 100 MHz.

[14] Filters off or Anti-alias filter on. 10 MHz, -1 dBFS input signal. Includes the 2nd through the 5th harmonics.

[15] 0.2 V to 2.0 V input ranges on 50 Ω input. Filters off or Anti-alias filter on. Two tones at 10.2 MHz and 11.2 MHz. Each tone is -7 dBFS.

[16] Excludes harmonics. 10 MHz, -1 dBFS input signal. Measured from DC to 100 MHz.

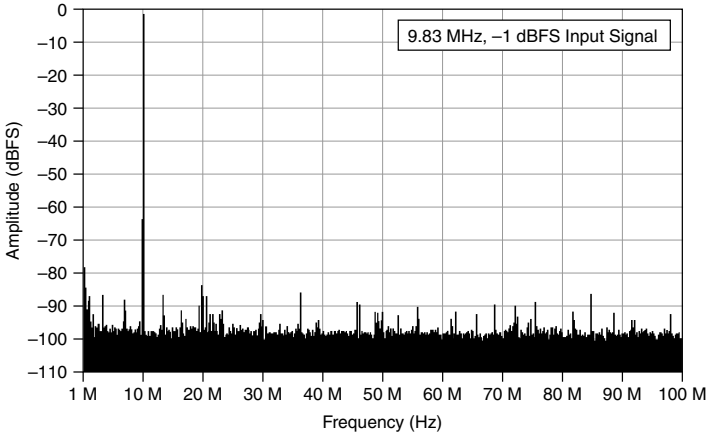
Table 8. Signal-to-Noise Ratio (SNR)[16] (Continued)

Input Range (V_{pk-pk})	50 Ω		1 MΩ	
	Filters Off	Anti-alias Filter On	Filters Off	Anti-alias Filter On
2 V	58 dB	58 dB	57 dB	57 dB
4 V	—	—	56 dB	58 dB

Table 9. Signal to Noise and Distortion (SINAD)[17]

Input Range (V_{pk-pk})	50 Ω		1 MΩ	
	Filters Off	Anti-alias Filter On	Filters Off	Anti-alias Filter On
0.2 V	57 dB	56 dB	53 dB	55 dB
0.4 V	58 dB	57 dB	55 dB	57 dB
1 V	58 dB	58 dB	57 dB	57 dB
2 V	58 dB	58 dB	57 dB	57 dB
4 V	—	—	56 dB	57 dB

Figure 2. PXI-5124 Dynamic Performance, 50 Ω, 1 V Input Range, 262,144-Point FFT, Measured



[16] Excludes harmonics. 10 MHz, -1 dBFS input signal. Measured from DC to 100 MHz.
[17] Includes harmonics. 10 MHz, -1 dBFS input signal. Measured from DC to 100 MHz.

Table 10. RMS Noise (Noise filter on; 50 Ω terminator connected to input)

Input Range (V_{pk-pk})	50 Ω	1 MΩ
0.2 V	94 μV_{rms} (0.047% FS)	104 μV_{rms} (0.052% FS)
0.4 V	188 μV_{rms} (0.047% FS)	192 μV_{rms} (0.048% FS)
1 V	470 μV_{rms} (0.047% FS)	480 μV_{rms} (0.048% FS)
2 V	940 μV_{rms} (0.047% FS)	960 μV_{rms} (0.048% FS)
4 V	1.88 mV_{rms} (0.047% FS)	1.92 mV_{rms} (0.048% FS)
10 V	4.7 mV_{rms} (0.047% FS)	4.8 mV_{rms} (0.048% FS)
20 V (1 MΩ only)	—	9.4 mV_{rms} (0.047% FS)

Table 11. RMS Noise (Anti-alias filter on; 50 Ω terminator connected to input)

Input Range (V_{pk-pk})	50 Ω	1 MΩ
0.2 V	112 μV_{rms} (0.056% FS)	130 μV_{rms} (0.065% FS)
0.4 V	200 μV_{rms} (0.05% FS)	216 μV_{rms} (0.054% FS)
1 V	500 μV_{rms} (0.05% FS)	510 μV_{rms} (0.051% FS)
2 V	1.0 mV_{rms} (0.05% FS)	1.02 mV_{rms} (0.051% FS)
4 V	2.04 mV_{rms} (0.051% FS)	2.16 mV_{rms} (0.054% FS)
10 V	5.1 mV_{rms} (0.051% FS)	5.2 mV_{rms} (0.052% FS)
20 V (1 MΩ only)	—	10.2 mV_{rms} (0.051% FS)

Table 12. RMS Noise (Filters off; 50 Ω terminator connected to input)

Input Range (V_{pk-pk})	50 Ω	1 MΩ
0.2 V	114 μV_{rms} (0.057% FS)	164 μV_{rms} (0.082% FS)
0.4 V	204 μV_{rms} (0.051% FS)	264 μV_{rms} (0.066% FS)
1 V	510 μV_{rms} (0.051% FS)	550 μV_{rms} (0.055% FS)
2 V	1.02 mV_{rms} (0.051% FS)	1.08 mV_{rms} (0.054% FS)
4 V	2.08 mV_{rms} (0.052% FS)	2.6 mV_{rms} (0.065% FS)

Table 12. RMS Noise (Filters off; 50 Ω terminator connected to input) (Continued)

Input Range (V_{pk-pk})	50 Ω	1 MΩ
10 V	5.2 mV_{rms} (0.052% FS)	5.5 mV_{rms} (0.055% FS)
20 V (1 MΩ only)	—	10.6 mV_{rms} (0.053% FS)

Figure 3. PXI-5124 Spectral Noise Density on 0.2 V Input Range, Noise Filter Enabled, 1 MΩ Input Impedance, Nominal

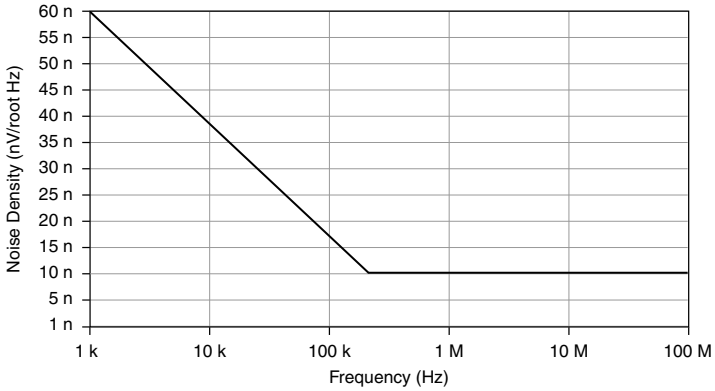
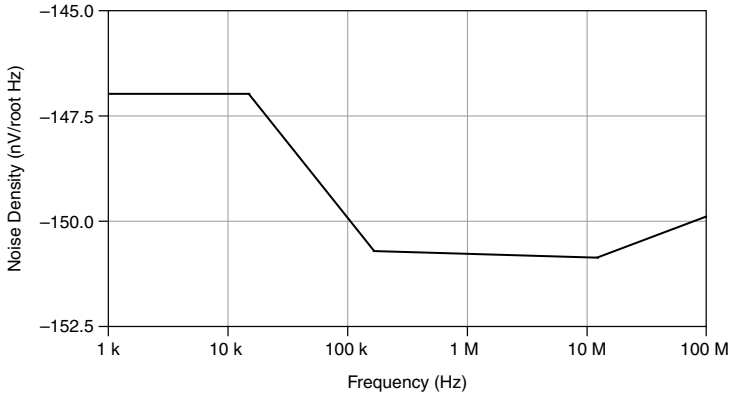


Figure 4. PXI-5124 Spectral Noise Density on 0.2 V Input Range, Full Bandwidth, 50 Ω Input Impedance, Nominal



Horizontal

Sample Clock

Sources	
Internal	Onboard clock (internal VCXO)[18]
External	CLK IN (front panel SMB connector) PXI Star Trigger (backplane connector)

Onboard Clock (Internal VCXO)

Sample rate range	
Real-time sampling (single shot)	3.052 kS/s to 200 MS/s[19]
Random interleaved sampling (RIS)	400 MS/s to 4 GS/s in multiples of 200 MS/s
Phase noise density[20]	<-100 dBc/Hz at 100 Hz <-120 dBc/Hz at 1 kHz <-130 dBc/Hz at 10 kHz
Sample clock jitter[21]	≤1 ps_{rms} (100 Hz to 100 kHz) ≤2 ps_{rms} (100 Hz to 1 MHz)
Timebase frequency	200 MHz
Timebase accuracy	
Not phase-locked to Reference clock	±25 ppm, Warranted
Phase-locked to Reference clock	Equal to the Reference clock accuracy
Sample clock delay range	±1 Sample clock period
Sample clock delay/adjustment resolution	≤5 ps

Related Information

For mor information about Sample clock and decimation, refer to the NI High-Speed Digitizers Help, available at ni.com/manuals.

[18] Internal Sample clock is locked to the Reference clock or derived from the onboard VCXO.
[19] Divide by *n* decimation used for all rates less than 200 MS/s.
[20] 10 MHz input signal.
[21] Includes the effects of the converter aperture uncertainty and the clock circuitry jitter. Excludes trigger jitter.

External Sample Clock

Sources	CLK IN (front panel SMB connector) PXI Star Trigger (backplane connector)
Frequency range[22]	
CLK IN	50 MHz to 210 MHz
PXI Star Trigger	50 MHz to 80 MHz
Duty cycle tolerance	45% to 55%
Exported Reference clock destinations	CLK OUT (front panel SMB connector) PFI <0..1> (front panel 9-pin mini-circular DIN connector) PXI_Trig <0..7> (backplane connector)

Related Information

For mor information about Sample clock and decimation, refer to the NI High-Speed Digitizers Help, available at ni.com/manuals.

Sample Clock Exporting

Table 13. Exported Sample Clock Destinations

Destination	Maximum Frequency
CLK OUT (front panel SMB connector)	210 MHz
PXI_Trig <0..6>[23]	20 MHz
PFI <0..1> (front panel 9-pin mini-circular DIN connector)[23]	25 MHz

Phase-Locked Loop (PLL) Reference Clock

Sources	PXI_CLK10 (backplane connector) CLK IN (front panel SMB connector)
Frequency range[24]	5 MHz to 20 MHz in 1 MHz increments
Duty cycle tolerance	45% to 55%
Exported reference clock destinations	CLK OUT (front panel SMB connector) PFI <0..1> (front panel 9-pin mini-circular DIN connector) PXI_Trig <0..7> (backplane connector)

[22] Divide by n decimation available where $1 \leq n \leq 65{,}535$.
[23] Decimated Sample clock only.
[24] Default of 10 MHz. The PLL Reference clock frequency must be accurate to ±50 ppm.

CLK IN (Sample Clock and Reference Clock Input)

Connector	SMB jack
Input voltage range	
Sine wave (V_{pk-pk})	0.65 V to 2.8 V (0 dBm to 13 dBm)
Square wave (V_{pk-pk})	0.2 V to 2.8 V
Maximum input overload	7 V_{rms} with |Peaks| ≤10 V
Impedance	50 Ω
Coupling	AC

CLK OUT (Sample Clock and Reference Clock Output)

Connector	SMB jack
Output impedance	50 Ω
Logic type	3.3 V CMOS
Maximum drive current	±48 mA

Trigger

Reference (Stop) Trigger

Note Refer to the following sections and the *NI High-Speed Digitizers Help* for more information about what sources are available for each trigger type.

Trigger types	Edge Window Hysteresis Video Digital Immediate Software
Trigger sources	CH 0 CH 1 TRIG PXI_Trig <0..6> PFI <0..1> PXI Star Trigger Software

Time resolution	
Time-to-digital conversion circuit (TDC) on	
Onboard clock	50 ps
External clock	N/A
TDC off	
Onboard clock	5 ns
External clock	External clock period
Minimum rearm time[25]	
TDC on	10 µs
TDC off	2 µs
Holdoff	
Onboard clock	
TDC on	10 µs to 85.899 s
TDC off	2 µs to 85.899 s
External clock (TDC off)	200 × *External clock period* to (2^{32} - 1) × *External clock period*

Analog Trigger

Trigger types	Edge Window Hysteresis
Sources	CH 0 (front panel BNC connector) CH 1 (front panel BNC connector) TRIG (front panel BNC connector)
Trigger level range	
CH 0, CH 1	100% of FS
TRIG (External Trigger)	±5 V
Trigger level resolution	10 bits (1 in 1,024)
Edge trigger sensitivity, warranted	
CH 0, CH 1	3.5% FS up to 50 MHz Increases to 10% FS at 150 MHz
TRIG (external trigger), V_{pk-pk}	0.25 V up to 100 MHz Increases to 1 V at 200 MHz

[25] Holdoff set to 0. Onboard Sample clock at maximum rate.

Level accuracy	
CH 0, CH 1	±4.7% FS up to 10 MHz
TRIG (External Trigger)	±0.35 V up to 10 MHz
Trigger jitter	≤80 ps_{rms}[26]
Trigger filters	
Low-frequency (LF) reject	50 kHz
High-frequency (HF) reject	50 kHz

Digital Trigger

Trigger type	Digital
Sources	PXI_Trig <0..6> (backplane connector) PFI <0..1> (front panel SMB connector) PXI Star Trigger (backplane connector)

Video Trigger

Trigger type	Video
Sources	CH 0 (front panel BNC connector) CH 1 (front panel BNC connector) TRIG (front panel BNC connector)
Video trigger types	Specific line Any line Specific field
Standards	Negative sync of NTSC, PAL, or SECAM signal

External Trigger

Connector	TRIG (front panel BNC connector)
Impedance	1 MΩ in parallel with 22 pF
Coupling	AC DC
AC-coupling cutoff (-3 dB)	12 Hz
Input voltage range	±5 V
Maximum input overload	|Peaks| ≤42 V

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

PFI 0 and PFI 1 (Programmable Function Interface, AUX Front Panel Connectors)

Connector	9-pin mini-circular DIN
Direction	Bidirectional
As an input (trigger)	
Destinations	Start trigger (acquisition arm) Reference (stop) trigger Arm Reference trigger Advance trigger
Input impedance	150 kΩ, nominal
V_{IH}	2.0 V
V_{IL}	0.8 V
Maximum input overload	-0.5 V to 5.5 V
Maximum frequency	25 MHz
As an output (event)	
Sources	Start trigger (acquisition arm) Reference (stop) trigger End of Record Done (end of acquisition) Probe Compensation[27]
Output impedance	50 Ω
Logic type	3.3 V CMOS
Maximum drive current	±24 mA
Maximum frequency	25 MHz

Waveform Specifications

Onboard memory sizes	8 MB per channel (4 MS per channel) 32 MB per channel (16 MS per channel) 256 MB per channel (128 MS per channel) 512 MB per channel (256 MS per channel)
Minimum record length	1 sample

[27] 1 kHz, 50% duty cycle square wave, PFI 1 only.

Number of pretrigger samples	Zero up to full record length[28]
Number of posttrigger samples	Zero up to full record length[28]
Maximum number of records in onboard memory	
8 MB per channel	21,845
32 MB per channel	87,381
256 MB per channel	100,000[29]
512 MB per channel	100,000[29]
Allocated onboard memory per record	(*Record Length* × 2 bytes/S) + 200 bytes, rounded up to next multiple of 128 bytes or 384 bytes, whichever is greater

Calibration

External Calibration

External calibration calibrates the VCXO and the voltage reference. All calibration constants are stored in nonvolatile memory.

Self-Calibration

Self-calibration is done on software command. The calibration corrects for gain, offset, frequency response, triggering, and timing adjustment errors for all input ranges.

Calibration Specifications

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

Software

Driver Software

Driver support for this device was first available in NI-SCOPE 2.7.

NI-SCOPE is an IVI-compliant driver that allows you to configure, control, and calibrate the PXI-5124. NI-SCOPE provides application programming interfaces for many development environments.

[28] Single-record mode and multiple-record mode.
[29] It is possible to exceed these numbers if you fetch records while acquiring data.

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 PXI-5124 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.

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 PXI-5124. MAX is included on the driver media.

Synchronization

Synchronization with the NI-TClk API[30]

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 PXI-5124 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

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

through the PXI chassis backplane without external cable connections between PXI modules in the same chassis.

Module-to-module skew, between PXI-5124 modules using NI-TClk[31]	
NI-TClk synchronization without manual adjustment[32]	
Skew, Peak-to-Peak [33]	500 ps
NI-TClk synchronization with manual adjustment[32]	
Skew after manual adjustment	<10 ps
Sample Clock delay/adjustment resolution	≤5 ps

Dimensions and Weight

Dimensions	3U, one-slot, PXI/cPCI module 21.6 cm × 2.0 cm × 13.0 cm (8.5 in × 0.8 in × 5.1 in)
Weight	383 g (13.5 oz)

Power

Current draw	
+3.3 VDC	1.3 A
+5 VDC	1.7 A
+12 VDC	130 mA
-12 VDC	270 mA
Total power	17.6 W

[31] 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 chassis.
- All filters are disabled.
- 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*.

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

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

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 45 °C when installed in an NI PXI-1000/B or PXI-101*x* chassis. 0 °C to 55 °C when installed in any other NI PXI chassis. (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 71 °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.)

Shock and Vibration

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.)
Storage shock	50 g peak, half-sine, 11 ms pulse (Meets IEC 60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)
Random vibration	
Operating	5 Hz to 500 Hz, 0.31 g_{rms} (Tested in accordance with IEC 60068-2-64.)
Nonoperating	5 Hz to 500 Hz, 2.46 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

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 *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`.)

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