Technical Sales

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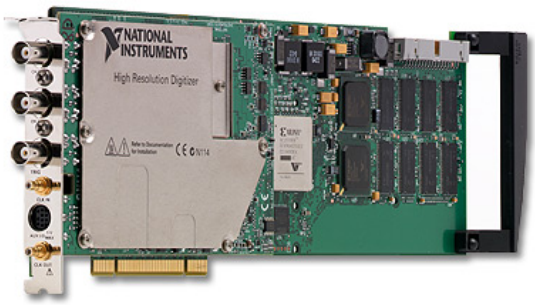
Last Revised: 2014-11-06 07:14:07.0

150 MHz, 200 MS/s, 12-Bit Digitizers

NI PXI-5124, NI PCI-5124



- 2 channels simultaneously sampled with 12-bit resolution
- 200 MS/s real-time sample rate and 4.0 GS/s random interleaved sampling
- 150 MHz bandwidth
- 200 mVpp to 20 Vpp input ranges
- >75 dBc SFDR
- 8, 32, 256, or 512 MB of memory per channel
- Edge, window, hysteresis, video, and digital triggering with 50 ps timestamping

Overview

NI 5124 high-resolution digitizers feature two 200 MS/s simultaneously sampled input channels with 12-bit resolution, 150 MHz bandwidth, and up to 512 MB of memory per channel in a 3U PXI or PCI device. NI 5124 devices use the high-speed PCI bus and the scatter-gather bus mastering of the NI MITE ASIC to move data to the computer at speeds up to 100 times faster than traditional instrument interfaces, thereby dramatically decreasing overall test time. With the NI Synchronization and Memory Core (SMC) architecture of an NI 5124, you can create mixed-signal systems using signal generators and digital waveform generators/analyzers or build a high-channel-count digitizer system with subnanosecond synchronization between channels.

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Application and Technology

Dual 200 MS/s, 12-Bit Input Channels for Time and Frequency Analysis
• 150 MHz input bandwidth with antialias and noise filters
• >75 dBc spurious-free dynamic range (SFDR)
• 4.0 GS/s equivalent time sampling for repetitive signals
• Independent channel-selectable 200 mVpp to 20 Vpp input ranges
• Independent channel-selectable 50 Ω or 1 MΩ input impedance
• 2-year calibration cycle and 0 to 55 °C operating temperature

Deep Onboard Memory
• 8, 32, 256, or 512 MB of memory per channel
• Capture more than 1 million triggered waveforms with multiple-record hardware rearm
• Stream data continuously from onboard memory to host memory or disk

Triggering, Clocking, and Synchronization
• Edge, window, hysteresis, video, digital, triggering with 50 ps timestamping
• Pretrigger and posttrigger acquisition in single and multiple-record mode
• Internal 200 MHz clock or external clock from 50 to 210 MHz
• Phase lock to PXI 10 MHz reference or external reference from 1 to 20 MHz

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Ordering Information

For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
NI PXI-5124/32MB			
NI PXI-5124/32MB Requires: 1 Cables ;	778757-02	**Cables:** Unshielded - SMB112, Double Shielded SMB to BNC Male Coax Cable, 50 Ohm, 1m ***Also Available: [Shielded]*	778827-01
NI PCI-5124_32			
NI PCI-5124 32MB/ch Requires: 1 Cables ;	779171-02	**Cables:** Unshielded - SMB112, Double Shielded SMB to BNC Male Coax Cable, 50 Ohm, 1m ***Also Available: [Shielded]*	778827-01

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Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Calibration

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Detailed Specifications

12-Bit 200 MS/s Digitizer

This topic lists the specifications for the NI PXI/PCI-5124 (NI 5124) high-speed digitizer. Unless otherwise noted, these specifications are valid for the following conditions:

- All filter settings
- All impedance selections
- Sample clock set to 200 MS/s using onboard clock

Typical values are representative of an average unit operating at room temperature. Specifications are subject to change without notice. For the most recent NI 5124 specifications, visit ni.com/manuals.

To access the NI 5124 documentation, including the *NI High-Speed Digitizers Getting Started Guide*, which contains functional descriptions of the NI 5124 signals, navigate to **Start»All Programs»National Instruments»NI-SCOPE»Documentation**.

Hot Surface If the NI 5124 has been in use, it may exceed safe handling temperatures and cause burns. Allow the NI 5124 to cool before removing it from the PXI chassis or PC. Refer to the Environment section for operating temperatures of this device.

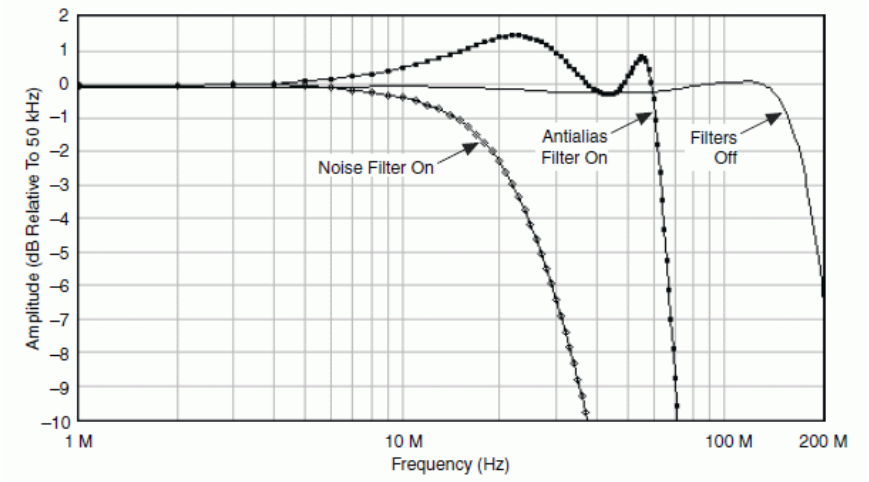
Vertical

Analog Input (Channel 0 and Channel 1)

Specification	Value				Comments
Number of Channels	Two (simultaneously sampled)				—
Connector	BNC				—
Impedance and Coupling					
Input Impedance	50 Ω ±2.0%		1 MΩ ±0.75% in parallel with a typical capacitance of 29 pF		Software selectable
Input Coupling	AC, DC, GND				AC coupling available on 1 MΩ only
Voltage Levels					
Full Scale (FS) Input Range and Programmable Vertical Offset	50 Ω		1 MΩ		—
	Range (V_{pk-pk})	Vertical Offset Range (V)	Range (V_{pk-pk})	Vertical Offset Range (V)	
	0.2	±0.1	0.2	±0.1	
	0.4	±0.2	0.4	±0.2	
	1	±0.5	1	±0.5	
	2	±1	2	±1	
	4	±2	4	±2	
	10	0	10	±5	
			20	0	
Maximum Input Overload	50 Ω		1 MΩ		—
	7 V_{rms} with |Peaks| ≤10 V		|Peaks| ≤42 V		
Accuracy					
Resolution	12 bits				—
DC Accuracy (Programmable Vertical Offset = 0 V)	Range (V_{pk-pk})	NI PXI-5124	NI PCI-5124		Within ±5 °C of self-calibration temperature
	0.2 and 0.4	±(0.65% of Input + 1.3 mV)	±(0.65% of Input + 1.8 mV)		
	1 and 2	±(0.65% of Input + 1.5 mV)	±(0.65% of Input + 2.1 mV)		
	4, 10, and 20 (1 MΩ only)	±(0.65% of Input + 10.0 mV)	±(0.65% of Input + 10.0 mV)		
Programmable Vertical Offset Accuracy	±0.4% of offset setting				Within ±5 °C of self-calibration temperature
DC Drift	Range (V_{pk-pk})	50 Ω and 1 MΩ			—
	0.2, 0.4, 1, and 2	±(0.057% of Input + 0.006% of FS + 100 µV) per °C			
	4, 10, and 20 (1 MΩ only)	±(0.057% of Input + 0.006% of FS + 900 µV) per °C			
AC Amplitude Accuracy	50 Ω		1 MΩ		Within ±5 °C of self-calibration temperature
	±0.06 dB (±0.7%) at 50 kHz		±0.09 dB (±1.0%) at 50 kHz		
Crosstalk, Typical	≤–85 dB at 10 MHz				CH 0 to/from CH 1, External Trigger to CH 0 or CH 1
Sparkle Code Rate, Typical	<300 ppt* with onboard clock or 200 MHz external clock				Results based on 2 × 10^{12} samples

Specification	Value			Comments
	<3 ppt* with 150 MHz external clock 0 with 100 MHz external clock			* ppt = parts per trillion (10^{12})
Bandwidth and Transient Response				
Bandwidth (–3 dB)	Range (V_{pk-pk})	50 Ω	1 MΩ	Filters off † 135 MHz above 40 °C
	All ranges except 0.2	150 MHz	145 MHz up to 40 °C†	
	0.2	85 MHz	75 MHz	
Rise/Fall Time, Typical	Range (V_{pk-pk})	50 Ω and 1 MΩ		Filters off
	All ranges except 0.2	2.4 ns		
	0.2	3.3 ns		
Bandwidth Limit Filters	Noise Filter		Antialias Filter	Only one filter can be enabled at any given time. The antialias filter is enabled by default.
	20 MHz, typical 2-pole Bessel filter		60 MHz, typical 4-pole elliptical filter	
AC Coupling Cutoff (–3 dB)	12 Hz			AC coupling available on 1 MΩ only
Passband Flatness	Filter Settings	Range (V_{pk-pk})	50 Ω and 1 MΩ	Referenced to 50 kHz
	Filters Off	All ranges except 0.2	±0.5 dB DC to 20 MHz ±1.0 dB 20 MHz to 50 MHz ±1.7 dB 50 MHz to 100 MHz	
		0.2	±0.6 dB DC to 20 MHz ±1.5 dB 20 MHz to 40 MHz	
	Antialias Filter On	All ranges	–1.0 dB to +2.0 dB DC to 55 MHz	

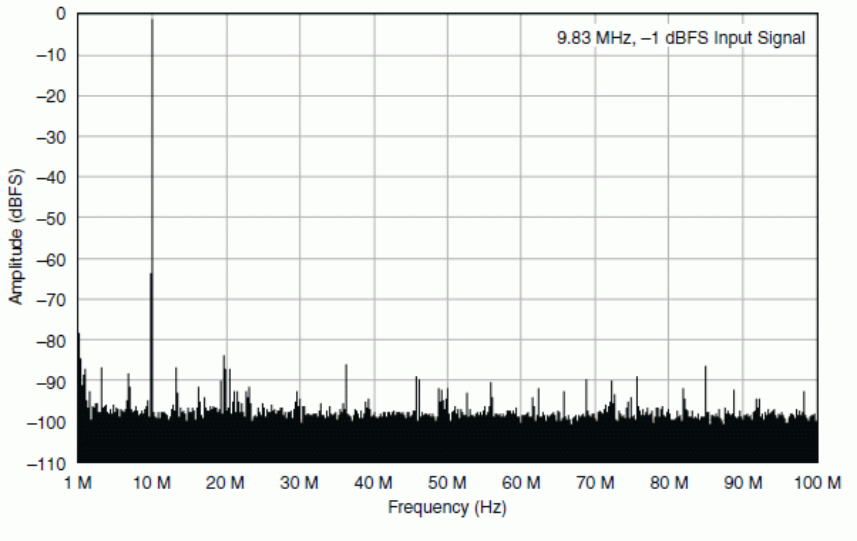
NI 5124 Frequency Response (Typical)



Specification	Value			Comments
Spectral Characteristics				
Spurious-Free Dynamic Range with Harmonics (SFDR), (Physical), Typical	Range (V_{pk-pk})	50 Ω	1 MΩ	Filters off or antialias filter on 10 MHz, –1 dBFS input signal Includes the 2nd through the 5th harmonics Measured from DC to 100 MHz on NI PXI-5124 Measured from 5 kHz to 100 MHz on NI PCI-5124
	0.2	75 dBc	70 dBc	
	0.4	75 dBc	70 dBc	
	1	72 dBc	70 dBc	
	2	72 dBc	70 dBc	
	4	65 dBc	67 dBc	
	10	65 dBc	60 dBc	
	20 (1 MΩ only)	—	60 dBc	

Specification	Value				Comments
Total Harmonic Distortion (THD), Typical	Range (V_{pk-pk})	50 Ω		1 MΩ	Filters off or antialias filter on 10 MHz, –1 dBFS input signal Includes the 2nd through the 5th harmonics
	0.2	–74 dBc		–68 dBc	
	0.4	–74 dBc		–68 dBc	
	1	–72 dBc		–68 dBc	
	2	–72 dBc		–67 dBc	
	4	–63 dBc		–66 dBc	
	10	–63 dBc		–58 dBc	
	20 (1 MΩ only)	—		–58 dBc	
Intermodulation Distortion, Typical	0.2 V_{pk-pk} to 2.0 V_{pk-pk} Ranges on 50 Ω Input				Filters off or antialias filter on Two tones at 10.2 MHz and 11.2 MHz Each tone is –7 dBFS
	–75 dBc				
Signal-to-Noise Ratio (SNR), Typical	Range (V_{pk-pk})	50 Ω		1 MΩ	Excludes harmonics 10 MHz, –1 dBFS input signal Measured from DC to 100 MHz
		Filters Off	Antialias Filter On	Filters Off	Antialias Filter On
	0.2	57 dB	56 dB	53 dB	55 dB
	0.4	58 dB	57 dB	55 dB	57 dB
	1	58 dB	58 dB	57 dB	57 dB
	2	58 dB	58 dB	57 dB	57 dB
	4	—	—	56 dB	58 dB
Signal to Noise and Distortion (SINAD), Typical	Range (V_{pk-pk})	50 Ω		1 MΩ	Includes harmonics 10 MHz, –1 dBFS input signal Measured from DC to 100 MHz
		Filters Off	Antialias Filter On	Filters Off	Antialias Filter On
	0.2	57 dB	56 dB	53 dB	55 dB
	0.4	58 dB	57 dB	55 dB	57 dB
	1	58 dB	58 dB	57 dB	57 dB
	2	58 dB	58 dB	57 dB	57 dB
	4	—	—	56 dB	57 dB

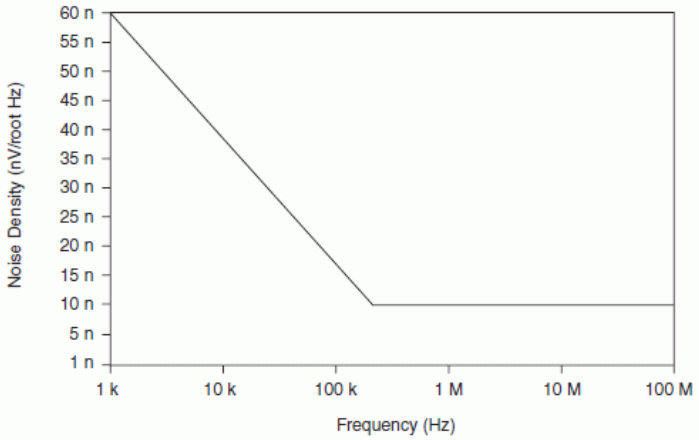
NI 5124 Dynamic Performance, 50 Ω, 1 V_{pk-pk} Range, 262,144 Point FFT (Typical)



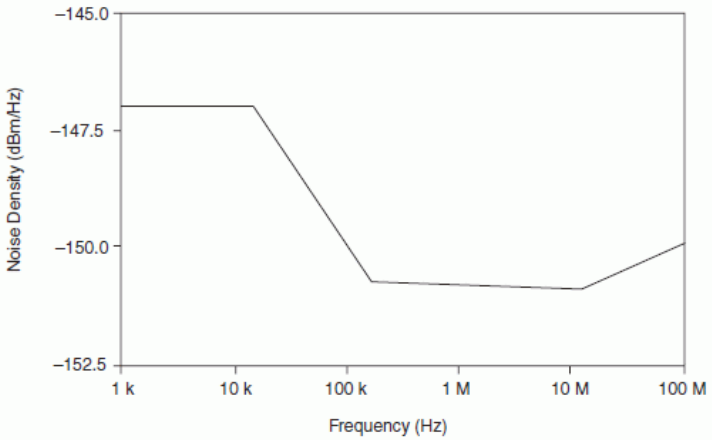
Specification	Value			Comments
RMS Noise	Range (V_{pk-pk})	50 Ω	1 MΩ	Noise filter on 50 Ω terminator connected to input
	0.2	NI PXI-5124: 94 μV_{rms} (0.047% FS)	NI PXI-5124: 104 μV_{rms} (0.052% FS)	
		NI PCI-5124: 106 μV_{rms} (0.053% FS)	NI PCI-5124: 116 μV_{rms} (0.058% FS)	

Specification	Value			Comments
	0.4	188 μV_{rms} (0.047% FS)	192 μV_{rms} (0.048% FS)	
	1	470 μV_{rms} (0.047% FS)	480 μV_{rms} (0.048% FS)	
	2	940 μV_{rms} (0.047% FS)	960 μV_{rms} (0.048% FS)	
	4	1.88 mV_{rms} (0.047% FS)	1.92 mV_{rms} (0.048% FS)	
	10	4.7 mV_{rms} (0.047% FS)	4.8 mV_{rms} (0.048% FS)	
	20 (1 MΩ only)	—	9.4 mV_{rms} (0.047% FS)	
RMS Noise	Range (V_{pk-pk})	50 Ω	1 MΩ	Antialias filter on 50 Ω terminator connected to input
	0.2	NI PXI-5124: 112 μV_{rms} (0.056% FS) NI PCI-5124: 126 μV_{rms} (0.063% FS)	NI PXI-5124: 130 μV_{rms} (0.065% FS) NI PCI-5124: 146 μV_{rms} (0.073% FS)	
	0.4	200 μV_{rms} (0.05% FS)	216 μV_{rms} (0.054% FS)	
	1	500 μV_{rms} (0.05% FS)	510 μV_{rms} (0.051% FS)	
	2	1.0 mV_{rms} (0.05% FS)	1.02 mV_{rms} (0.051% FS)	
	4	2.04 mV_{rms} (0.051% FS)	2.16 mV_{rms} (0.054% FS)	
	10	5.1 mV_{rms} (0.051% FS)	5.2 mV_{rms} (0.052% FS)	
	20 (1 MΩ only)	N/A	10.2 mV_{rms} (0.051% FS)	
RMS Noise	Range (V_{pk-pk})	50 Ω	1 MΩ	Filters off 50 Ω terminator connected to input
	0.2	NI PXI-5124: 114 μV_{rms} (0.057% FS) NI PCI-5124: 128 μV_{rms} (0.064% FS)	NI PXI-5124: 164 μV_{rms} (0.082% FS) NI PCI-5124: 184 μV_{rms} (0.092% FS)	
	0.4	204 μV_{rms} (0.051% FS)	264 μV_{rms} (0.066% FS)	
	1	510 μV_{rms} (0.051% FS)	550 μV_{rms} (0.055% FS)	
	2	1.02 mV_{rms} (0.051% FS)	1.08 mV_{rms} (0.054% FS)	
	4	2.08 mV_{rms} (0.052% FS)	2.6 mV_{rms} (0.065% FS)	
	10	5.2 mV_{rms} (0.052% FS)	5.5 mV_{rms} (0.055% FS)	
	20	—	10.6 mV_{rms} (0.053% FS)	

Representation of NI 5124 Spectral Noise Density on 0.2 V Range, Noise Filter Enabled, 1 MΩ Input Impedance



Representation of NI 5124 Spectral Noise Density on 0.2 V Range, Full Bandwidth, 50 Ω Input Impedance



Horizontal

Sample Clock

Specification	Value		Comments
Sources	NI PXI-5124	NI PCI-5124	* Internal Sample Clock is locked to the Reference Clock or derived from the onboard VCXO
	Internal, Onboard Clock (internal VCXO)* External, CLK IN (front panel SMB connector) External, PXI Star Trigger (backplane connector)	Internal, Onboard Clock (internal VCXO)* External, CLK IN (front panel SMB connector)	
Onboard Clock (Internal VCXO)			
Sample Rate Range	Real-Time Sampling (Single Shot)	Random Interleaved Sampling (RIS)	† Divide by *n* decimation used for all rates less than 200 MS/s For more information about Sample Clock and decimation, refer to the *NI High-Speed Digitizers Help*.
	3.052 kS/s to 200 MS/s†	400 MS/s to 4 GS/s in multiples of 200 MS/s	
Phase Noise Density, Typical	<–100 dBc/Hz at 100 Hz <–120 dBc/Hz at 1 kHz <–130 dBc/Hz at 10 kHz		10 MHz input signal
Sample Clock Jitter, Typical	≤1 ps rms (100 Hz to 100 kHz) ≤2 ps rms (100 Hz to 1 MHz)		Includes the effects of the converter aperture uncertainty and the clock circuitry jitter Excludes trigger jitter
Timebase Frequency	200 MHz		—
Timebase Accuracy	Not Phase-Locked to Reference Clock	Phase-Locked to Reference Clock	ppm = parts per million (1×10^{-6})
	±25 ppm	Equal to the Reference Clock accuracy	
Sample Clock Delay Range	±1 Sample Clock period		—
Sample Clock Delay/Adjustment Resolution	≤5 ps		—
External Sample Clock			
Sources	NI PXI-5124	NI PCI-5124	—
	CLK IN (front panel SMB connector) PXI Star Trigger (backplane connector)	CLK IN (front panel SMB connector)	
Frequency Range	50 MHz to 210 MHz (CLK IN) 50 MHz to 80 MHz (PXI Star Trigger)		Divide by *n* decimation available where $1 \le n \le 65{,}535$ For more information about Sample Clock and decimation, refer to the *NI High-Speed Digitizers Help*.

Specification	Value		Comments
Duty Cycle Tolerance	45% to 55%		—
Exported Reference Clock Destinations	NI PXI-5124	NI PCI-5124	—
	CLK OUT (front panel SMB connector) PFI<0..1> (front panel 9-pin mini-circular DIN connector) PXI_Trig<0..7> (backplane connector)	CLK OUT (front panel SMB connector) PFI<0..1> (front panel 9-pin mini-circular DIN connector) RTSI<0..7>	
Sample Clock Exporting			
Exported Sample Clock Destinations	Destination	Maximum Frequency	* Decimated Sample Clock only
	CLK OUT (front panel SMB connector)	210 MHz	
	PXI_Trig<0..6> (backplane connector)*	20 MHz	
	PFI<0..1> (front panel 9-pin mini-circular DIN connector)*	25 MHz	
	RTSI<0..6>*	20 MHz	

Phase-Locked Loop (PLL) Reference Clock

Specification	Value		Comments
Sources	NI PXI-5124	NI PCI-5124	—
	PXI_CLK10 (backplane connector) CLK IN (front panel SMB connector)	RTSI 7 CLK IN (front panel SMB connector)	
Frequency Range	1 MHz to 20 MHz in 1 MHz increments. Default of 10 MHz. The PLL Reference Clock frequency must be accurate to ±50 ppm.		—
Duty Cycle Tolerance	45% to 55%		—
Exported Reference Clock Destinations	NI PXI-5124	NI PCI-5124	—
	CLK OUT (front panel SMB connector) PFI<0..1> (front panel 9-pin mini-circular DIN connector) PXI_Trig<0..6> (backplane connector)	CLK OUT (front panel SMB connector) PFI<0..1> (front panel 9-pin mini-circular DIN connector) RTSI<0..7>	

CLK IN (Sample Clock and Reference Clock Input, Front Panel Connector)

Specification	Value	Comments
Input Voltage Range	Sine wave: 0.65 V_{pk-pk} to 2.8 V_{pk-pk} (0 dBm to 13 dBm) Square wave: 0.2 V_{pk-pk} to 2.8 V_{pk-pk}	—
Maximum Input Overload	7 V_{rms} with |Peaks| ≤10 V	—
Impedance	50 Ω	—
Coupling	AC	—

CLK OUT (Sample Clock and Reference Clock Output, Front Panel Connector)

Specification	Value	Comments
Output Impedance	50 Ω	—
Logic Type	3.3 V CMOS	—
Maximum Drive Current	±48 mA	—

Trigger

Reference (Stop) Trigger

Specification	Value		Comments
Trigger Types and Sources	Types	Sources	Refer to the following sections and the *NI High-Speed Digitizers Help* for more information about what sources are available for each trigger type.
	Edge, Window, Hysteresis, Video,	CH 0, CH 1, TRIG, PXI_Trig<0..6>, PFI<0..1>,	

Specification	Value			Comments
	Digital, Immediate, and Software		PXI Star Trigger, Software, and RTSI<0..6>	
Time Resolution	TDC	Onboard Clock	External Clock	TDC = Time to Digital Conversion Circuit
	On	50 ps	N/A	
	Off	5 ns	External Clock Period	
Minimum Rearm Time	TDC		Rearm Time	Holdoff set to 0. Onboard sample clock at maximum rate.
	On		10 µs	
	Off		2 µs	
Holdoff	TDC	Onboard Clock	External Clock	—
	On	10 µs to 85.899 s	N/A	
	Off	2 µs to 85.899 s	200 × (External Clock Period) to (2^{32} – 1) × (External Clock Period)	
Analog Trigger (Edge, Window, and Hysteresis Trigger Types)				
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		TRIG (External Trigger)	—
	100% FS		±5 V	
Trigger Level Resolution	10 bits (1 in 1,024)			—
Edge Trigger Sensitivity	CH 0, CH 1		TRIG (External Trigger)	—
	3.5% FS up to 50 MHz, increasing to 10% FS at 150 MHz		0.25 V_{pk-pk} up to 100 MHz, increasing to 1 V_{pk-pk} at 200 MHz	
Level Accuracy, Typical	CH 0, CH 1		TRIG (External Trigger)	—
	±4.7% FS up to 10 MHz		±0.35 V up to 10 MHz	
Trigger Jitter	≤80 ps rms			Within ±5 °C of self-calibration temperature
Trigger Filters	Low-Frequency (LF) Reject		High-Frequency (HF) Reject	—
	50 kHz		50 kHz	
Digital Trigger (Digital Trigger Type)				
Sources	NI PXI-5124		NI PCI-5124	—
	PXI_Trig<0..6> (backplane connector) PFI<0..1> (front panel SMB connector) PXI Star Trigger (backplane connector)		RTSI<0..6> PFI<0..1> (front panel SMB connector)	
Video Trigger (Video Trigger Type)				
Sources	CH 0 (front panel BNC connector) CH 1 (front panel BNC connector) TRIG (front panel BNC connector)			—
Types	Specific Line Any Line Specific Field			—
Standard	Negative sync of NTSC, PAL, or SECAM signal			—

TRIG (External Trigger, Front Panel Connector)

Specification	Value	Comments
Connector	BNC	—
Impedance	1 MΩ in parallel with 22 pF	—
Coupling	AC, DC	—
AC-Coupling Cutoff (–3 dB)	12 Hz	—

Specification	Value	Comments
Input Voltage Range	±5 V	—
Maximum Input Overload	|Peaks| ≤42 V	—

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

Specification	Value	Comments
Connector	9-pin mini-circular DIN	—
Direction	Bi-directional	—
As an Input (Trigger)		
Destinations	Start Trigger (Acquisition Arm) Reference (Stop) Trigger Arm Reference Trigger Advance Trigger	—
Input Impedance	150 kΩ	—
V_{IH}	2.0 V	—
V_{IL}	0.8 V	—
Maximum Input Overload	–0.5 V, 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 (1 kHz, 50% duty cycle square wave, PFI 1 only)	—
Output Impedance	50 Ω	—
Logic Type	3.3 V CMOS	—
Maximum Drive Current	±24 mA	—
Maximum Frequency	25 MHz	—

TClk Specifications

National Instruments TClk synchronization method and the NI-TClk driver are used to align the sample clocks on any number of SMC-based modules in a chassis. For more information about TClk synchronization, refer to the *NI-TClk Synchronization Help*, which is located within the *NI High-Speed Digitizers Help*.

- Specifications are valid for any number of modules installed in one NI PXI-1042 chassis.
- All parameters set to identical values for each SMC-based module.
- Sample Clock set to200 MS/s and all filters are disabled.
- For other configurations, including multichassis systems, contact NI Technical Support at ni.com/support.

Note Although you can use NI-TClk to synchronize nonidentical modules, these specifications apply only to synchronizing identical modules.

Specification	Value	Comments
Intermodule SMC Synchronization Using NI-TClk for Identical Modules (Typical)		
Skew	500 ps	Caused by clock and analog path delay differences No manual adjustment performed
Average Skew After Manual Adjustment	<10 ps	For information about manual adjustment, refer to the *Synchronization Repeatability Optimization* topic in the *NI-TClk Synchronization Help*. For additional help with the adjustment process, contact NI Technical Support at ni.com/support.
Sample Clock Delay/Adjustment Resolution	≤5 ps	—

Waveform Specifications

Specification	Value	Comments
Onboard Memory Size	8 MB per channel standard (4 megasamples per channel)	* NI PXI-5124 only

Specification	Value		Comments
	32 MB per channel option (16 megasamples per channel)		
	256 MB per channel option (128 megasamples per channel)		
	512 MB per channel option (256 megasamples per channel)*		
Minimum Record Length	1 Sample		—
Number of Pretrigger Samples	Zero up to full Record Length		Single-record mode and multiple-record mode
Number of Posttrigger Samples	Zero up to full Record Length		Single-record mode and multiple-record mode
Maximum Number of Records in Onboard Memory	8 MB/channel	21,845	* NI PXI-5124 only † It is possible to exceed these numbers if you fetch records while acquiring data. For more information, refer to the *NI High-Speed Digitizers Help*.
	32 MB/channel	87,381	
	256 MB/channel	100,000†	
	512 MB/channel*	100,000†	
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

Specification	Value	Comments
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.	—
External Calibration (Factory Calibration)	The external calibration calibrates the VCXO and the voltage reference. Appropriate constants are stored in nonvolatile memory.	—
Interval for External Calibration	2 years	—
Warm-Up Time	15 minutes	—

Power

Specification	Typical Value		Comments
	NI PXI-5124	NI PCI-5124	—
+3.3 VDC	1.3 A	1.3 A	
+5 VDC	1.7 A	2.7 A	
+12 VDC	130 mA	130 mA	
–12 VDC	270 mA	0 A	
Total Power	17.6 W	19.4 W	

Software

Specification	Value	Comments
Driver Software	NI-SCOPE 2.7 or later NI-SCOPE is an IVI-compliant driver that allows you to configure, control, and calibrate the NI 5124. 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 Scope Soft Front Panel supports interactive control of the NI 5124. The Scope Soft Front Panel is included on the NI-SCOPE CD. National Instruments Measurement & Automation Explorer (MAX) also provides interactive configuration and test tools for the NI 5124. MAX is included on the NI-SCOPE CD.	—

Environment

NI PXI-5124

Note To ensure that the NI PXI-5124 cools effectively, follow the guidelines in the *Maintain Forced Air Cooling Note to Users* included in the NI PXI-5124 kit. The NI PXI-5124 is intended for indoor use only.

Specification	Value	Comments
Operating Temperature	0 ºC to +55 ºC in all NI PXI chassis except the following: 0 ºC to +45 ºC when installed in an NI PXI-1000/B or PXI-101*x* chassis Meets IEC-60068-2-1 and IEC-60068-2-2	—
Storage Temperature	–40 ºC to +71 ºC Meets IEC-60068-2-1 and IEC-60068-2-2	—
Operating Relative Humidity	10% to 90%, noncondensing Meets IEC-60068-2-56	—
Storage Relative Humidity	5% to 95%, noncondensing Meets IEC-60068-2-56	—
Operating Shock	30 g, half-sine, 11 ms pulse Meets IEC-60068-2-27 Test profile developed in accordance with MIL-PRF-28800F	—
Storage Shock	50 g, half-sine, 11 ms pulse Meets IEC-60068-2-27 Test profile developed in accordance with MIL-PRF-28800F	—
Operating Vibration	5 Hz to 500 Hz, 0.31 g_{rms} Meets IEC-60068-2-64	—
Storage Vibration	5 Hz to 500 Hz, 2.46 g_{rms} Meets IEC-60068-2-64 Test profile exceeds requirements of MIL-PRF-28800F, Class 3	—
Altitude	2,000 m maximum (at 25 °C ambient temperature)	—
Pollution Degree	2	—

NI PCI-5124

Note To ensure that the NI PCI-5124 cools effectively, make sure that the chassis in which it is used has active cooling that provides at least some airflow across the PCI card cage. To maximize airflow and extend the life of the device, leave any adjacent PCI slots empty. Refer to the *Maintain Forced Air Cooling Note to Users* included in the NI PCI-5124 kit for important cooling information. The NI PCI-5124 is intended for indoor use only.

Specification	Value	Comments
Operating Temperature	0 ºC to +45 ºC Meets IEC-60068-2-1 and IEC-60068-2-2	—
Storage Temperature	–40 ºC to +71 ºC Meets IEC-60068-2-1 and IEC-60068-2-2	—
Operating Relative Humidity	10% to 90%, noncondensing Meets IEC-60068-2-56	—
Storage Relative Humidity	5% to 95%, noncondensing Meets IEC-60068-2-56	—
Storage Shock	50 g, half-sine, 11 ms pulse Meets IEC-60068-2-27 Test profile developed in accordance with MIL-PRF-28800F	—
Storage Vibration	5 Hz to 500 Hz, 2.46 g_{rms} Meets IEC-60068-2-64 Test profile exceeds requirements of MIL-PRF-28800F, Class 3	—

Specification	Value	Comments
Altitude	2,000 m maximum (at 25 °C ambient temperature)	—
Pollution Degree	2	—

Safety, Electromagnetic Compatibility, and CE Compliance

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment 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 (IEC 61326): 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 For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Note For EMC compliance, operate this device with RG223/U or equivalent shielded cable. Operate according to product documentation.

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

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 module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments 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.)

Physical

Front Panel Connectors

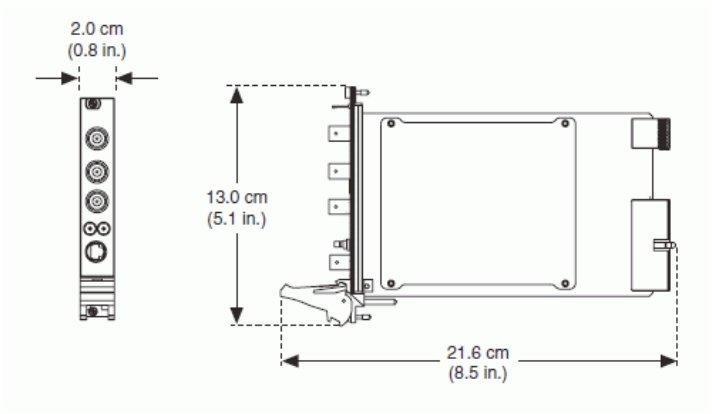
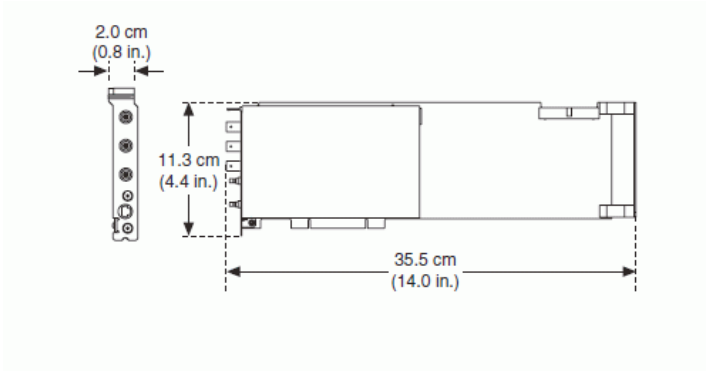
Label	Function	Connector Type
CH 0	Analog Input	BNC female
CH 1	Analog Input	BNC female
TRIG	External Trigger	BNC female
CLK IN	Sample Clock Input and Reference Clock Input	SMB jack
CLK OUT	Sample Clock Output and Reference Clock Output	SMB jack
AUX I/O	PFI 0, PFI 1	9-pin mini-circular DIN

NI PXI-5124 Front Panel Indicators

Label	Function	For more information, refer to the *NI High-Speed Digitizers Help*.
ACCESS	The ACCESS LED indicates the status of the PCI bus and the interface from the NI PXI-5124 to	

	the controller.	
ACTIVE	The ACTIVE LED indicates the status of the onboard acquisition hardware of the NI PXI-5124.	

Dimensions and Weight

NI PXI-5124	
Dimensions	3U, One slot, PXI/cPCI Module 21.6 × 2.0 × 13.0 cm (8.5 × 0.8 × 5.1 in.) 
Weight	383 g (13.5 oz)
NI PCI-5124	
Dimensions	35.5 × 2.0 × 11.3 cm (14.0 × 0.8 × 4.4 in.) 
Weight	455 g (16 oz)

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