250 MS/s, 125 MHz, 8-Bit Digitizers

NI 5114 *NEW!*

- 250 MS/s real-time sampling
- 5 GS/s random-interleaved sampling
- 8-bit resolution
- 125 MHz bandwidth
- 40 mV_{pp} to 40 V_{pp} input range
- 8, 64, or 256 MB memory per channel
- Edge, window, hysteresis, video, and digital triggering with 40 ps timestamping

Calibration

- Gain, offset, compensated 1 MΩ attenuator, and timing self-calibration
- 2-year external calibration interval

Operating Systems

- Windows Vista/XP/2000
- LabVIEW Real-Time

Recommended Software

- LabVIEW
- LabWindows™/CVI
- Measurement Studio for Visual Studio
- LabVIEW SignalExpress

Driver Software (included)

- NI-SCOPE Soft Front Panel and driver
- LabVIEW Express VIs

>> For complete specifications, see the *NI 5114 Specifications* manual at **ni.com/manuals**.

Overview

Applications
Aerospace/Defense
RADAR, SONAR, and LIDAR
Satellite
Signal intelligence
Biomedical and Scientific Research
Ultrasonic medical imaging
Mass spectrometry
Particle physics
Communications
xDSL
Wireless communications
Baseband I & Q

National Instruments PXI-5114 and PCI-5114 high-speed digitizers feature two 250 MS/s simultaneously sampled input channels with 8-bit resolution, 125 MHz bandwidth, and up to 256 MB of memory per channel in a compact, 3U PXI or PCI device. With the National Instruments Synchronization and Memory Core (SMC) architecture of an NI 5114, you can create mixed-signal systems using signal generators and digital waveform generator/analyzers or build a high-channel-count digitizer with subnanosecond synchronization between channels. An NI 5114 is ideal for a wide range of application areas including communications, scientific applications, military/aerospace, and consumer electronics.

Dual 250 MS/s, 8-Bit Input Channels

- 125 MHz input bandwidth with noise filters
- 5 GS/s equivalent-time sampling (ETS) for repetitive signals
- Independent channel-selectable 40 mV_{pp} to 40 V_{pp} input ranges
- Independent channel-selectable 50 Ω or 1 MΩ input impedance
- 2-year calibration interval and 0 to 55 °C operating temperature

Deep Onboard Memory

- 8, 64, or 256 MB of memory per channel
- Capture more than 1 million triggered waveforms in multiple record mode with hardware trigger rearming
- Stream data continuously from onboard memory to host memory or disk

Triggering, Clocking, and Synchronization

- Edge, window, hysteresis, and digital triggering with 40 ps timestamping
- Pretrigger and posttrigger acquisition in single- and multiple-record mode
- Internal 250 MHz clock or external clock from 50 to 250 MHz
- Phase lock to PXI 10 MHz reference or external reference from 1 to 20 MHz
- Timestamp-triggered events with 100 ps resolution

Software

- IVI-compliant NI-SCOPE driver for NI LabVIEW and LabWindows/CVI as well as Microsoft C++ and Visual Basic with more than 50 built-in measurements
- NI-SCOPE Soft Front Panel for interactive control

Ordering Information

NI PXI-5114 .....779466-0M[1]

NI PCI-5114 .....779745-0M[1]

[1]M (memory per channel): 1 (8 MB), 2 (64 MB), 3 (256 MB)

Includes NI-SCOPE Soft Front Panel and driver.

Recommended PXI Switch

NI PXI-2593 (500 MHz mux/matrix) 778793-01

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/digitizers**.

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Specifications

These specifications are valid for 0 to 55 °C, unless otherwise stated.

Acquisition System

Number of channels..... 2 simultaneously sampled
Vertical resolution..... 8 bits
Bandwidth (-3 dB)

Range (V_{pp})	Minimum Bandwidth
All except 0.04	125 MHz
0.04	100 MHz

Bandwidth limit filters
(software-selectable)..... 20 MHz noise filter
Maximum sampling rate..... 250 MS/s real-time sampling, 5 GS/s equivalent-time/ random-interleaved sampling
Onboard sample memory..... 8, 64, or 256 MB per channel (8, 64, or 256 million samples)

Multiple Record Acquisition (0 to 100% pretrigger and posttrigger data)	
Memory/Channel	Maximum Number of Records
8 MB	32,768
64 MB	100,000[1]
256 MB	100,000[1]

[1]Infinite in streaming configuration.

Input impedance ..... 50 Ω and 1 MΩ II 26 pF, software-selectable

Full-Scale Input Range and Programmable Vertical Offset			
50 Ω		1 MΩ	
Range (V_{pp})	Vertical Offset Range (V)	Range (V_{pp})	Vertical Offset Range (V)
0.04	±0.8	0.04	±0.8
0.1	±0.8	0.1	±0.8
0.2	±0.8	0.2	±0.8
0.4	±0.8	0.4	±0.8
1.0	±6.5	1.0	±8.0
2.0	±6.0	2.0	±8.0
4.0	±5.0	4.0	±8.0
10	±2.0	10	±30
–	–	20	±25
–	–	40	±15

Maximum input overload..... 50 Ω: 7 V_{rms} with I peaks I ≤10 V; 1 MΩ: I peaks I ≤35 V
Input coupling ..... AC, DC, GND – AC coupling available on 1 MΩ only
AC coupling cutoff frequency (-3 dB).. 12 Hz (1 MΩ)

Accuracy

DC accuracy (0 V offset setting)..... ±(1.5% of input +0.3% of FS + 200 µV) for PXI-5114
±(1.5% of input +0.3% of FS + 280 µV) for PCI-5114
Channel-to-channel crosstalk ..... -60 dB at 10 MHz

Spectral Characteristics (typical)

Dynamic performance (10 MHz, -1 dBFS input signal)

	Range (V_{pp})	
	All Ranges Except 0.04	0.04
SFDR	58 dBc	58 dBc
THD	-58 dBc	-58 dBc
ENOB	7.2	6.2
SINAD	44 dB	38 dB

RMS Noise

20 MHz filter enabled..... 0.28% of FS

Timebase System

Timebase options..... Internal, external (CLK IN)

Internal

Internal sample clock frequency ..... 250 MS/s sampling rate with decimation by n, 1 ≤ n ≤ 65,535
Timebase accuracy..... ±25 ppm (±0.0025%)

External

External clock sources ..... CLK IN (SMB connector)
External clock range..... 50 to 250 MHz with decimation by n where 1 ≤ n ≤ 65,535
External reference sources ..... CLK IN (SMB connector), PXI_CLK10 (PXI backplane 10 MHz)
External reference range ..... 1 to 20 MHz in 1 MHz increments
External clock/reference amplitude.... Sine wave: 0.65 to 2.8 V_{pp} (0 to 13 dBm)
Square wave: 0.2 to 2.8 V_{pp}
External clock/reference impedance .. 50 Ω, AC coupled

Trigger System

Modes ..... Edge, hysteresis, window, video, digital, immediate, software
Sources..... CH 0, CH 1, TRIG, PXI_Trig <0..6>, PXI star, software
Slope ..... Rising or falling
Hysteresis..... Fully programmable
High-frequency reject filter..... 50 kHz software-selectable
Low-frequency reject filter ..... 50 kHz software-selectable
Sensitivity
CH 0 and CH 1 ..... 5% FS
TRIG ..... 0.5 V_{pp}
Level accuracy
CH 0, CH 1 ..... ±5% FS up to 10 MHz
TRIG ..... ±0.5 V up to 10 MHz
Time resolution ..... 40 ps with time-to-digital converter enabled
Rearm time[1] ..... 2 µs
Holdoff[1] ..... From 2 µs to [(2^{35}-1) x (sample clock period)], software-selectable

[1]Time-to-digital converter disabled.

External Trigger Channel (TRIG)

Impedance	1 MΩ ll 22 pF
Vertical range	±5 V
Coupling	AC, DC

Intermodule SMC Synchronization Using NI-TClk (typical)

Skew	500 ps ≤20 ps after manual adjustment

Power Requirements (typical)

	+3.3 VDC	+5 VDC	+12 VDC	-12 VDC	Total Power
PXI	840 mA	1.1 A	250 mA	170 mA	13.32 W
PCI	1.6 A	1.7 A	45 mA	0 A	14.32 W

Environment

Operating temperature[2]	0 to 55 °C for PXI-5114, 0 to 45 °C for PCI-5114 (meets IEC-60068-2-1 and IEC-60068-2-2)
Storage temperature	-40 to 71 °C (meets IEC-60068-2-1 and IEC-60068-2-2)
Relative humidity	10 to 90%, noncondensing (meets IEC-60068-2-56)

[2] 0 to 45 °C in PXI-101x or PXI-1000/B chassis.

Calibration

Self-calibration	Gain, offset, compensated 1 MΩ attenuator, triggering, and timing for all input ranges
External calibration interval	2 years

Safety and Compliance

Safety

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 visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note: For EMC compliance, operate this device according to product documentation.

CE Compliance

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)

Note: Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain 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.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit **ni.com/environment/weee.htm**.

NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit **ni.com/services**.

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OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit **ni.com/oem**.

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We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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