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15 MHz, 20 MS/s 8-Bit Digitizers

NI 5102

- 2 channels simultaneously sampled at 8-bit resolution
- 20 MS/s real-time and 1 GS/s random interleaved sampling
- 15 MHz bandwidth
- ±50 mV to ±5 V input range
- Memory for 663,000 samples
- Up to 16 million samples to host RAM via PCI/PXI bus mastering

Models

- NI PCI-5102
- NI PXI-5102
- NI PCMCIA-5102
- NI AT-5102
- NI USB-5102

Operating Systems

- Windows 2000/NT/XP

Recommended Software

- LabVIEW
- LabWindows/CVI
- Measurement Studio

Other Compatible Software

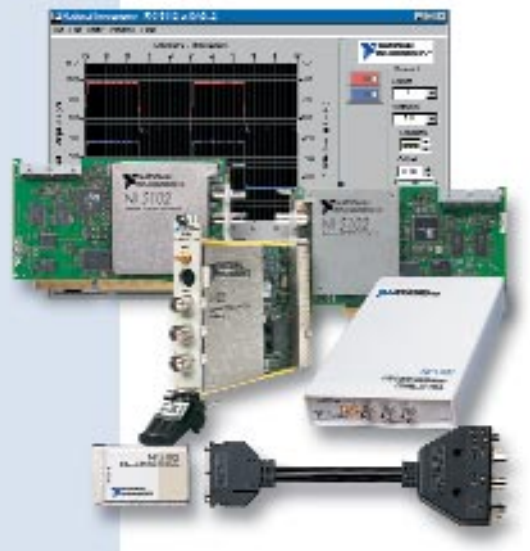
- Visual Basic
- C/C++

Driver Software (included)

- NI-SCOPE

Calibration Certificate Included

See page 21.



Product	Bus	Channels	Sampling Rate	Bandwidth	Memory Total	Resolution
NI 5102	PCI, PXI, PCMCIA, USB, ISA	2	20 MS/s	15 MHz	663 kS to 16 MS	8 bits for PCI/PXI

Overview

NI 5102 devices are dual-channel 20 MS/s digitizers for PCI, PXI, USB, PCMCIA, and ISA. Using an NI 5102 digitizer, you can build faster performance automated test systems at low cost. NI 5102 is also suited for use in a high-speed data acquisition system.

Hardware

Analog Input

An NI 5102 features two analog input channels with extensive functionality. Each channel has 15 MHz of analog input bandwidth. With software selectable attenuation, you can achieve an input voltage range of ±50 mV to ±5 V. Attenuating probes can extend the voltage range to ±50 V. Software-selectable AC or DC coupling further increases the signal measurement capability.

Acquisition System

NI 5102 devices use a pair of 20 MS/s, 8-bit flash ADCs to digitize the input signals. The real-time sampling rate ranges from 20 MS/s down to 1 kS/s. For repetitive signals, you can use random-interleaved sampling (RIS) to extend the effective sampling rate to 1 GS/s.

Acquisition Memory

An NI 5102 has 663,000 samples of onboard acquisition memory. Data is acquired into the onboard memory before being transferred to the host PC memory.

Both the PCI-5102 and PXI-5102 can transfer acquisition samples to host memory in real time. These devices can acquire a maximum 16 million samples if your system has at least 48 MB free. On the AT-5102, PCMCIA-5102, and USB-5102, data transfer of up to 663,000 samples takes place after the acquisition ends.

Triggering

The NI 5102 devices are equipped with sophisticated triggering options, such as programmable trigger thresholds, hysteresis values, trigger holdoff, and bilevel triggering on input channels as well as on a dedicated trigger channel. An NI 5102 also has two TTL/CMOS digital triggers for synchronizing multiple devices.

NI 5102 digitizers can acquire both pretrigger and posttrigger points in an acquisition. You specify in software the number of samples to acquire before and after a trigger event occurs. All NI 5102 digitizers also have two multipurpose digital input/output lines that you can program for external timing and triggering or generating various signals, such as the probe compensation signal or TTL-level pulse trains. The direction on these lines is individually selectable as input or output.

Multiple-Instrument Synchronization

For the PCI-5102, PXI-5102, and AT-5102, a synchronization bus (RTSI bus for PCI and ISA, and PXI trigger bus for PXI) routes timing and trigger signals between one or more NI 5102 devices and other National Instruments data acquisition and instrument products. The benefits of multiple-instrument synchronization include triggering multiple measurement devices with a single trigger and timing the acquisition of multiple devices with the same sample clock.

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15 MHz, 20 MS/s 8-Bit Digitizers

Calibration

Every NI 5102 is factory calibrated and is shipped with a calibration certificate verifying that it meets NIST-traceable standards. You can perform self-calibration (or internal calibration) to ensure that your board is within specifications. To externally calibrate your device, return your NI 5102 to National Instruments or ship it to a qualified metrology lab for recalibration.

Please see page 21 or visit ni.com/calibration for more information about calibration services.

I/O Connector

NI 5102 digitizers have two standard BNC female connectors for CH0 and CH1 analog input connections, one standard BNC female connector for the TRIG channel, and two standard SMB jack connectors for the multipurpose digital timing and triggering signals. On the PXI-5102, there is one SMB male and one AUX connector (9-pin DIN) for the digital triggers. The Aux100 cable is used to access the trigger lines from the BNC connectors.

Software

Every National Instruments high-speed digitizer comes with the NI-SCOPE instrument driver, which is optimized for use with NI LabVIEW, LabWindows/CVI, and Measurement Studio, as well as Microsoft Visual C++, and Visual Basic. With more than 50 built-in measurement and analysis functions including time and frequency-domain measurements, digital filters, windows, histograms, and waveform math, you can build automated test solutions in minimal time. Further customize your waveform analysis using LabVIEW, LabWindows/CVI, DIAdem, and TestStand. NI high-speed digitizers also include the interactive SCOPE Soft Front Panel to help you get started quickly and troubleshoot throughout the development process.

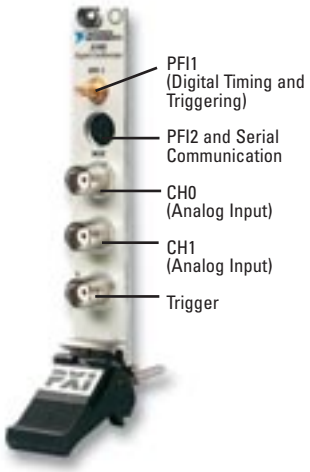


Figure 1. I/O Connector for the PXI-5102

Ordering Information

NI PCI-5102 777304-01
NI PXI-5102 777556-01
NI PCMCIA-5102 777251-03
NI AT-5102 777252-01
Includes the NI 5102 hardware, NI-SCOPE, probe compensation cable, and SCOPE Soft Front Panel.
NI USB-5102 with a power supply for
- U.S. 120 VAC 777650-01
- Universal Euro 240 VAC 777650-04
- United Kingdom 240 VAC.....777650-06
- Japanese 100 VAC.....777650-07

Includes the NI 5102 hardware, NI-SCOPE, probe compensation cable, SCOPE Soft Front Panel, and one USB cable.

Accessories

BNC connecting for 9-pin DIN AUX connector
- Aux100 .....185259-R3

Switchable 1/10x probe
- SP200B 763391-01

BNC-terminated PCMCIA cable for PCMCIA-5102
- PSH32-C5.....189303-09

For information on extended warranty and value added services, see page 20.

See page 474 for accessory and cable information.

BUY ONLINE!

Visit ni.com/products and enter pci5102, pxi5102, pcmcia5102, AT5102, or usb5102.

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15 MHz, 20 MS/s 8-Bit Digitizers

Specifications

Typical for 25 °C unless otherwise noted.

Acquisition System

Resolution	8 bits
Bandwidth	15 MHz
Number of channels	2 simultaneously sampled
Maximum sample rate	1 GS/s repetitive, 20 MS/s single shot
Onboard sample memory	663,000 samples
Max waveform buffer	Up to 16 million samples/channel for only PCI and PXI, with PCI bus mastering, (depends on available host memory); 663,000 samples for USB, AT, PCMCIA
Vertical ranges	±50 mV to ±5 V
DC accuracy	±2.5% of full scale at all gains
Input coupling	DC or AC, software selectable
Input impedance	1 MΩ ±1% in parallel with 25 pF ±10 pF
Input protection	±42 V (DC + peak AC < 10 kHz, ch0, ch1, and TRIG only without external attenuation)

Possible Number of Samples for Posttrigger and Pretrigger Acquisitions

Acquisition Mode	Channels	PCI, PXI	PCMCIA, USB, ISA
Posttrigger samples only	One	16,777,088[1]	663,000
	Two	16,777,088[1]	331,500
Pretrigger and posttrigger samples	One	663,000	663,000 minus the number of posttrigger samples
	Two	331,500	331,500 minus the number of posttrigger samples

[1]With PCI bus mastering and dependent on available system memory

Acquisition Modes

RIS	1 GS/s down to 40 MS/s effective sample rate, repetitive signals only
Single shot	20 MS/s down to 1 kS/s sample rate, for transient and repetitive signals

Timebase System

Timebase options

Internal 20 MHz timebase	RTSI 20 MHz timebase or direct Scan clock (can export via RTSI bus)	External 20 MHz timebase or direct Scan clock (PFI 1 or PFI 2)

Sample rate range	Internal: 20 MS/s to 1 kS/s with 20,000 intermediate rates
Clock accuracy	100 ppm
Interpolator resolution	1 ns
External clock	RTSI TRIG <0..6> or PFI<1..2>
Frequency	≤ 20 MHz with a 50% duty cycle; RTSI<0..6> and PFI<1..2> are CMOS/TTL inputs only

Triggering System

Modes	Edge, hysteresis, digital, software
Source	Ch0, Ch1, TRIG, PFI<1..2>, RTSI<0..6>
Slope	Rising/falling
Hysteresis	Full-scale voltage/n, where n is between 1 and 256; Full-scale voltage on TRIG is fixed to ±5 V (without external attenuation)
Coupling	AC/DC on Ch0, Ch1, TRIG
Pretrigger depth	1 sample up to 663,000 samples divided by number of channels
Posttrigger depth	1 sample up to 16 million samples (PCI and PXI); 1 sample up to 663,000 minus pretrigger depth divided by number of channels (AT, USB, PCMCIA)
Holdoff by time	800 ns to 6.71 s
Trigger sensitivity	8 bits, 256 steps in full-scale voltage range for Ch0, Ch1; ±5 V for TRIG
TRIG input range	±5 V (without external attenuation)
TRIG input impedance	1 MΩ ±1% in parallel with 30 ±15 pF
TRIG input protection	±42 V [(DC + peak AC) < 10 kHz, without external attenuation]

Calibration

Internal Internal calibration is done on software command. The calibration involves timing adjustment for RIS.

External	Internal reference requires external recalibration
Interval	1 year
Warm-up time	15 minutes

Power Requirements

Bus	+5 VDC (± .5%)
PCI	500 mA
PXI	550 mA
PCMCIA (active)	260 mA
(power down)	60 mA
ISA	300 mA
USB	External Power Supply (4W max)

Physical

Dimensions

PCI, ISA	10.7 by 17.5 cm (4.2 by 6.87 in.)
PXI	10 by 16 cm (3.9 by 6.3 in.)
PCMCIA	Type II PC Card
USB	14.6 by 21.3 by 3.8 cm (5.8 by 8.4 by 1.5 in.)

I/O Connectors

Analog inputs CH0,CH1	BNC female
Analog trigger TRIG	BNC female
Digital triggers PFI1, PFI2	SMB female (AUX for PFI2 on PXI)

Environment

Operating temperature	0 to 55 °C
Storage temperature	-20 to 70 °C
Relative humidity	5 to 95%, noncondensing

Certifications and Compliances

CE Mark Compliance CE

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