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Find the *National Instruments USB-5102* at our website: ***Click HERE***

# 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

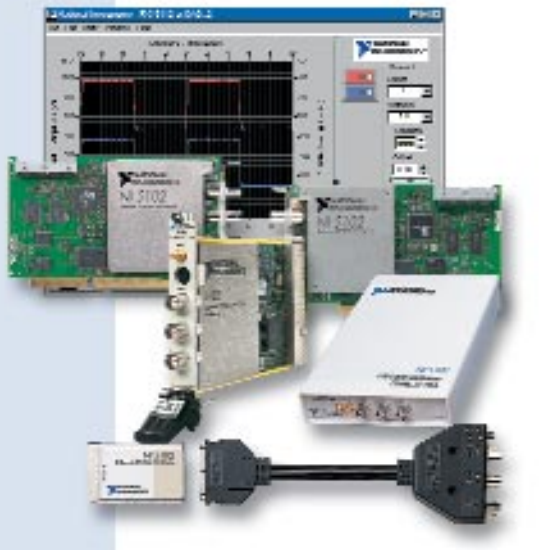
### Recommended Software
- LabVIEW
- LabWindows/CVI
- Measurement Studio

### 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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## 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.

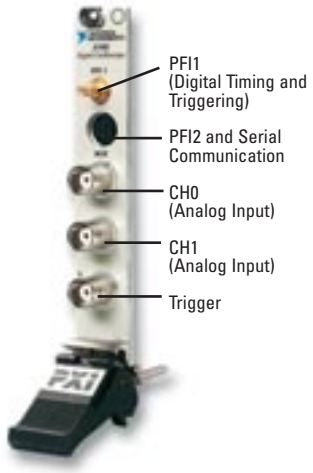



*Figure 1. I/O Connector for the PXI-5102*

## 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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