



Product Flyer

# Digital Multimeters

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# PXI Digital Multimeters

PXI-4065, PXIe-4080, PXIe-4081, and PXIe-4082



FIGURE 1

PXI-4065, PXIe-4081, and PXIe-4082 Digital Multimeters

- Software: Includes interactive soft front panel in InstrumentStudio™ software, API support for LabVIEW and text-based languages, shipping examples, and detailed help files
- Voltage measurements up to 1,000 VDC (700 VAC)
- Current measurements up to 3 A
- Resistance measurements up to 5 G $\Omega$
- Up to  $\pm 500$  VDC/VRMS common-mode isolation
- Up to 1.8 MS/s isolated, 1,000 V waveform acquisition

## Built for Automated Test and Measurement

PXI Digital Multimeters (DMMs) range from low-cost 6½-digit devices to high-performance 7½-digit models. Some models include specialized features such as extended measurement ranges, an isolated digitizer mode with sample rates up to 1.8 MS/s, extended calibration cycles, and basic inductance and capacitance measurements. Combined in a single instrument, these features provide a solution to the measurement challenges inherent in traditional precision instruments: limited measurement throughput and flexibility. These DMMs deliver a smarter way to tackle difficult applications in industries ranging from consumer electronics to aerospace and defense.

NI's DMM portfolio is highlighted by the PXIe-4081, the high-performance 7½-digit DMM. It provides 26 bits of resolution and high-stability, metrology-class voltage measurements that range from 10 nV to 1,000 V, current measurements that range from 1 pA to 3 A, and resistance measurements that range from 10  $\mu\Omega$  to 5 G $\Omega$ .

Table 1. NI offers PXI DMMs ranging from low-cost 6½-digit options to the high-performance 7½-digit DMM.

|                                 | PXI-4065            | PXIe-4080                     | PXIe-4081                     | PXIe-4082                     |
|---------------------------------|---------------------|-------------------------------|-------------------------------|-------------------------------|
| Description                     | Basic 6½-Digit DMM  | High-Performance 6½-Digit DMM | High-Performance 7½-Digit DMM | High-Performance 6½-Digit DMM |
| Maximum Voltage (V)             | 300                 | 300                           | 1,000                         | 300                           |
| Maximum Current (A)             | 3                   | 1                             | 3                             | 1                             |
| Maximum Sample Rate             | 3 kS/s              | 1.8 MS/s                      | 1.8 MS/s                      | 1.8 MS/s                      |
| Basic Accuracy (10 VDC, 2-Year) | 90 ppm <sup>1</sup> | 25 ppm                        | 12 ppm                        | 25 ppm                        |
| Maximum Calibration Cycle       | 1-year              | 2-year                        | 2-year                        | 2-year                        |
| DC and AC Voltage               | •                   | •                             | •                             | •                             |
| DC and AC Current               | •                   | •                             | •                             | •                             |
| 2-Wire and 4-Wire Resistance    | •                   | •                             | •                             | •                             |
| Frequency/Period                | -                   | •                             | •                             | •                             |
| Basic Inductance/Capacitance    | -                   | -                             | -                             | •                             |

<sup>1</sup>One-year calibration specifications are shown for the PXI-4065 because it does not include a two-year calibration option.

## Detailed View Of PXIe-4081 7½ Digit DMM

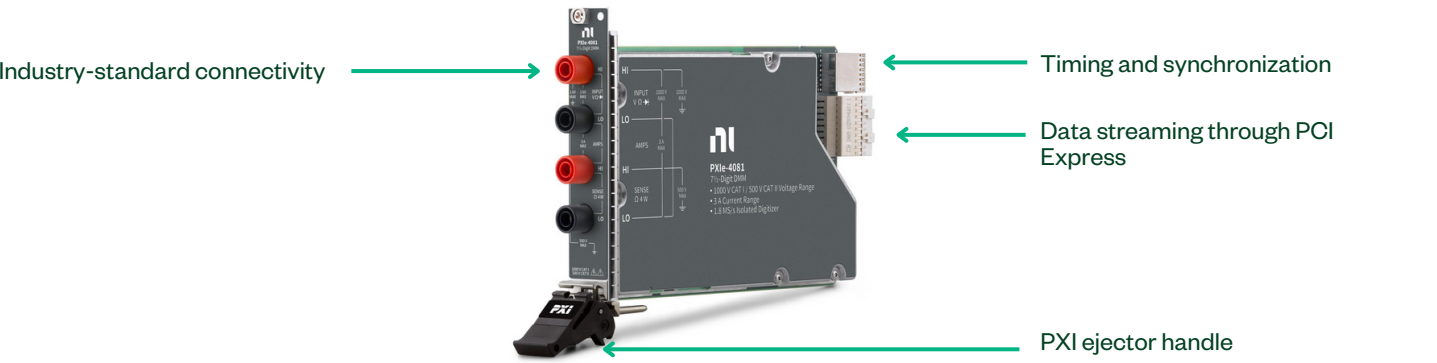


FIGURE 2 The PXIe-4081 has the functionality of a box DMM with all the feature benefits of PXI.

# Digital Multimeter Devices

USB-4065, PCI-4065, and PCIe-4065



FIGURE 3

USB-4065 and PCIe-4065 Digital Multimeter Devices

- Software: Includes interactive soft front panel in InstrumentStudio™, API support for LabVIEW and text-based languages, shipping examples, and detailed help files
- Voltage measurements up to 300 V
- Current measurements up to 3 A
- 2-wire and 4-wire resistance measurements up to 100 M $\Omega$
- Up to  $\pm 300$  VDC/VRMS common-mode isolation
- Up to 1.8 MS/s isolated, 300 V waveform acquisition

## Built for Automated Test and Measurement

NI's PC-based DMMs perform AC/DC voltage, AC/DC current, and 2- or 4-wire resistance measurements, as well as diode tests. Some models include specialized features such as extended calibration cycles and an isolated, high-voltage digitizer mode with sample rates up to 1.8 MS/s. Combined in a single instrument, these features provide a solution to the measurement challenges inherent in traditional precision instruments: limited measurement throughput and flexibility. These DMMs deliver a smarter way to tackle difficult applications in industries ranging from consumer electronics to aerospace and defense.

Table 2. NI offers DMMs ranging from low-cost USB-powered devices to high-performance PCI-based devices.

|                                   | <u>USB-4065</u>    | <u>PCI-4065</u> | <u>PCIe-4065</u> |
|-----------------------------------|--------------------|-----------------|------------------|
| Description                       | Basic 6½-Digit DMM |                 |                  |
| Maximum Voltage (V)               | 300                |                 |                  |
| Maximum Current (A)               | 3                  |                 |                  |
| Maximum Sample Rate (kS/s)        | 3                  |                 |                  |
| Voltage Accuracy (10 VDC, 2-Year) | 90 + 12 ppm        |                 |                  |
| Maximum Calibration Cycle         | 1-year             |                 |                  |
| DC and AC Voltage                 | •                  |                 |                  |
| DC and AC Current                 | •                  |                 |                  |
| 2-Wire and 4-Wire Resistance      | •                  |                 |                  |
| Frequency/Period                  | -                  |                 |                  |

## Detailed View of USB-4065 6½-Digit DMM

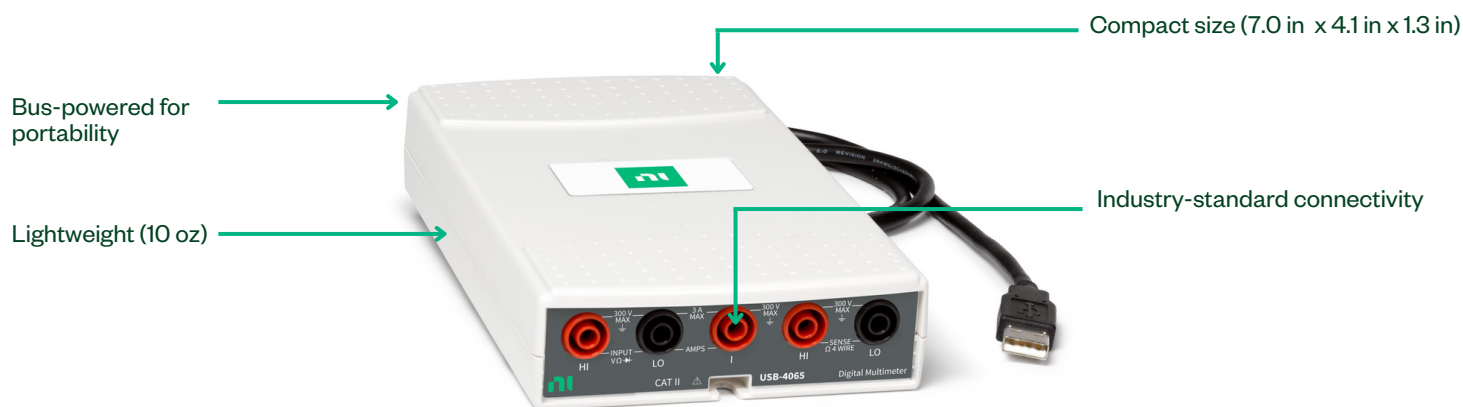


FIGURE 4

The USB-4065 DMM has the functionality of a traditional box DMM in a lightweight form factor with USB connectivity.

## Key Features

## High-Precision Measurements

The analog-to-digital converter (ADC) is the backbone of high-performance PXIe-408x DMMs. A unique combination of off-the-shelf high-speed ADC technology and a custom-designed sigma-delta converter provides the noise, linearity, and speed performance required to achieve high-speed and high-precision measurements.

## 12-hour DMM Noise and Drift Test

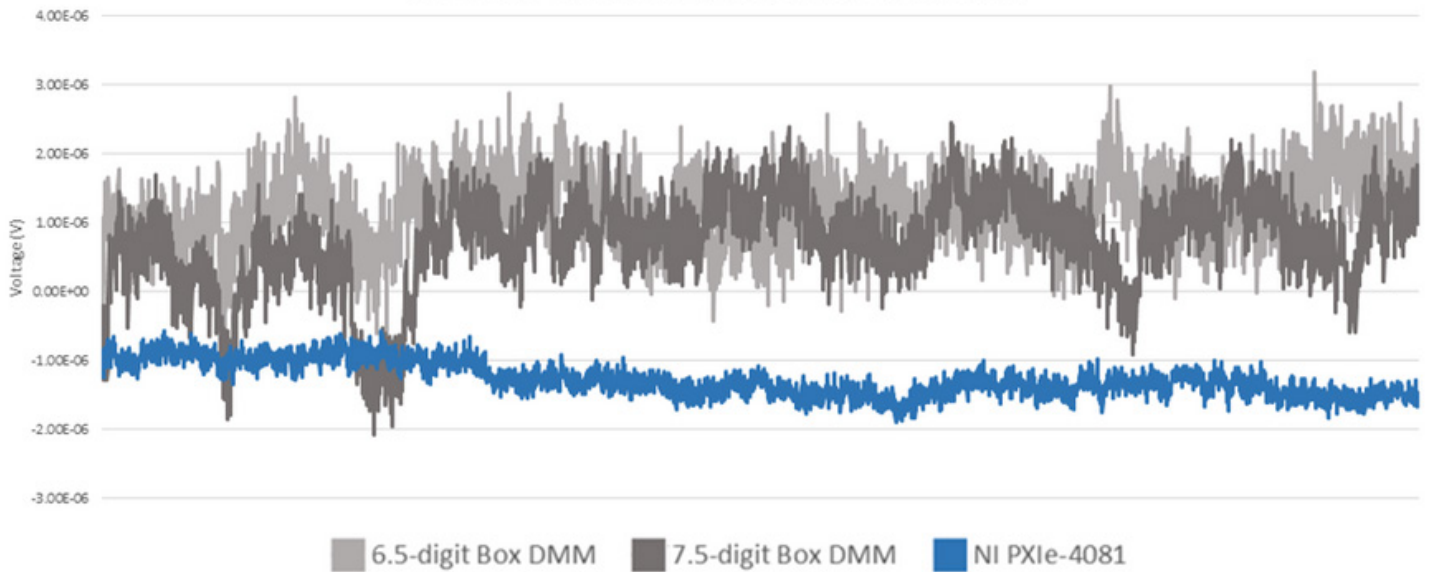


FIGURE 5

Over a 12-hour noise and drift test of 0 VDC with each DMM set to 100 mV input range with 10 power line cycle (PLC) aperture time, the PXIe-4081 (blue) outperforms both the leading 6½-digit (light grey) and 7½-digit (dark grey) benchtop DMMs.

The PXIe-4081 uses stable onboard voltage references to provide steady performance across temperature and time. No other DMM in this price range offers this reference source and its accompanying stability, which is why the PXIe-4081 includes a two-year guaranteed accuracy of 12 ppm to further reduce the cost of test by minimizing downtime for instrument calibration. This beats the one-year accuracy specifications of most traditional benchtop DMMs, providing you with more accurate measurements with lower cost of ownership and less downtime. The PXIe-4081 also uses advanced DMM measurement techniques such as offset compensated ohms, high-order DC noise rejection, and self-calibration to ensure accurate measurements.

## Flexible Measurement Rate with an Isolated Digitizer

Traditional DMMs are designed to provide high resolution and precision, with little regard to acquisition speed. The unique architecture of the PXIe-408x DMMs offers a continuously variable reading rate that ranges from 7 S/s to 10 kS/s, so you can choose the sample rate and resolution you need for your application.

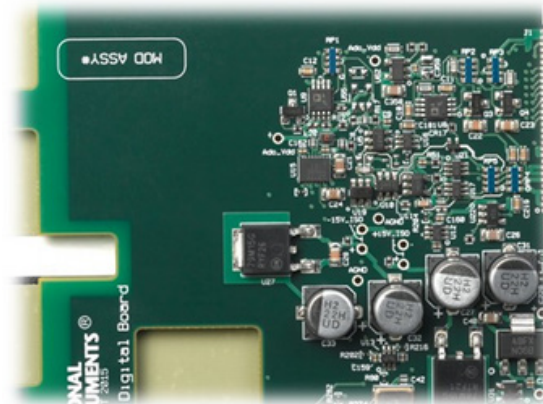


FIGURE 6

The unique combination of off-the-shelf high-speed ADC technology and a custom-designed sigma-delta converter optimizes linearity and noise for up to 7½-digit precision and stability while offering digitizer sample rates up to 1.8 MS/s.



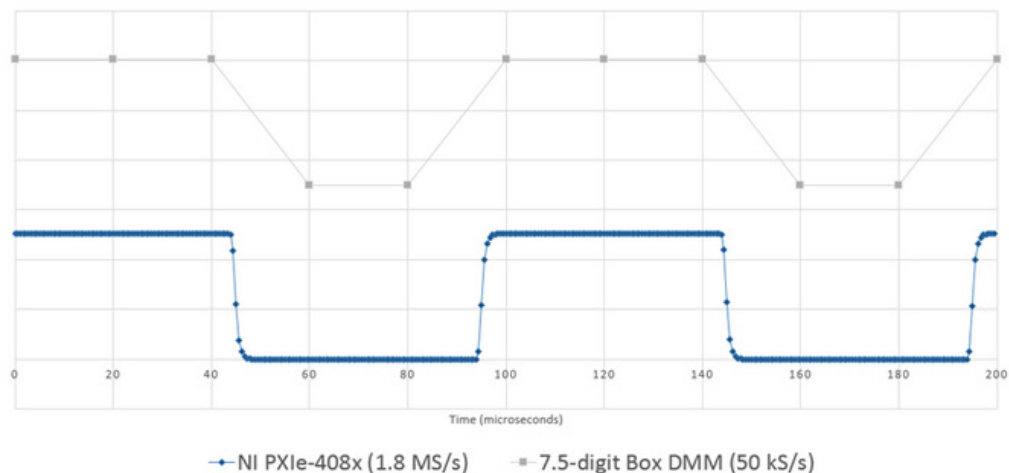


FIGURE 7

PXIe-408x DMMs can acquire 36X faster than traditional benchtop DMMs, which gives you increased insight into your device under test.

## Synchronization and Integration

NI PXI DMMs use the inherent timing and synchronization capabilities of the PXI platform to communicate with switches and other instruments within the PXI chassis. You can use switches with a DMM to expand the instrument's measurement capability to hundreds or thousands of test points. NI DMMs "handshake" with NI switches by sending and receiving hardware-timed triggers over the PXI backplane and scanning through a list of switch connections stored in memory on board the switch module. This method of scanning removes the software overhead associated with traditional scan lists and can create a deterministic scan list for faster test execution with more repeatable timing.

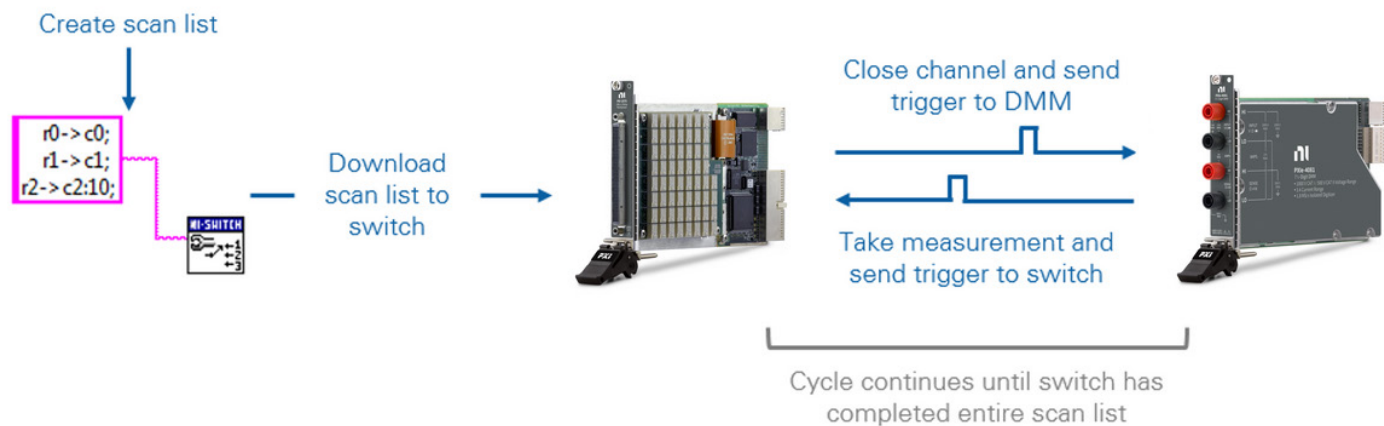


FIGURE 8

Depiction of the Scanning Process from the NI-SWITCH API to the DMM

## Self-Calibration and Two-Year Guaranteed Specifications

NI DMMs offer self-calibration, which is traditionally found in only the highest resolution DMMs. Self-calibration corrects for all DC gain and offset drifts within the DMM using a precision, high-stability internal voltage reference that has an outstanding temperature coefficient and time drift that account for all resistance and current source drifts. Using the self-calibration feature makes NI DMMs highly accurate and stable at any operating temperature—well outside the traditional 18 °C to 28 °C range.



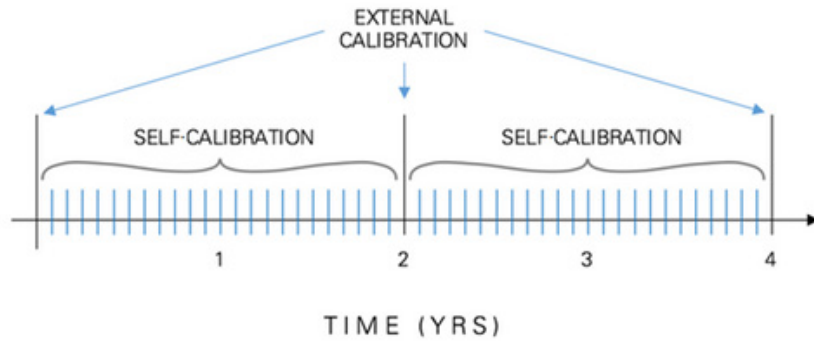


FIGURE 9  
Calibration Timeline

This operation takes less than a minute to complete and requires no external calibrator, which minimizes the maintenance burden of deployed systems. PXIe-408x DMMs have a two-year external calibration cycle thanks to the self-calibration precision circuitry that minimizes the maintenance burden of deployed systems. Visit [ni.com](http://ni.com) to learn more about [NI's calibration services](#).

## Software

### Synchronization and Integration

In addition to the soft front panel in InstrumentStudio, the [NI-DMM driver](#) includes a best-in-class API that works with a variety of development options such as LabVIEW, C, C#, and others. To ensure long-term interoperability of DMMs, the NI-DMM driver API is the same API used for all past and current NI DMMs. The driver also provides access to help files, documentation, and dozens of ready-to-run shipping examples you can use as a starting point for your application.

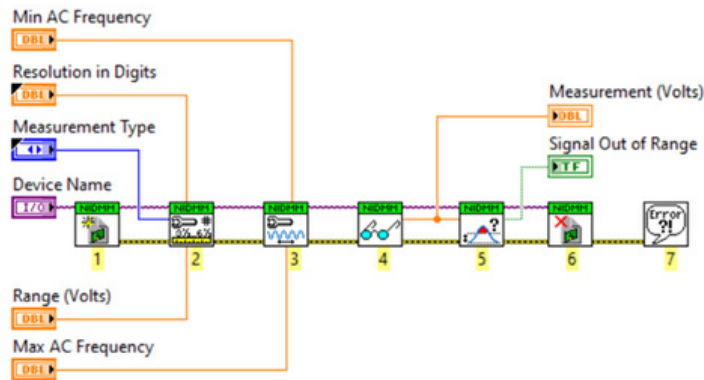
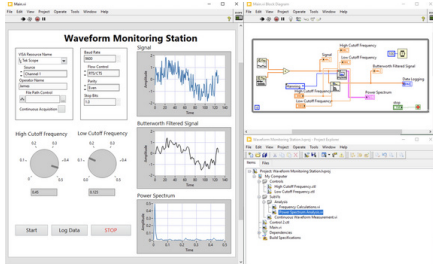


FIGURE 10  
LabVIEW VI Built with the NI-DMM API

# NI Software-The Right Tool for the Job

NI has a variety of software for engineers working on research, validation, and production test applications. Learn about our software that helps engineers perform quick ad-hoc tests, build an automated test system, automate data analysis and reporting, develop test sequences, and more.

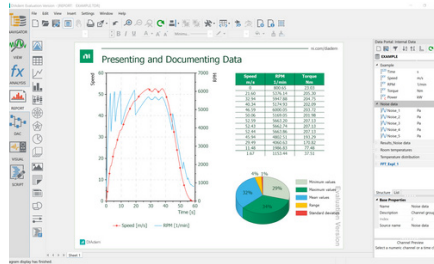
## LabVIEW



Graphical programming environment that engineers use to develop automated research, validation, and production test systems.

- Acquire data from NI and third-party hardware and communicate using industry protocols
- Use configurable, interactive display elements
- Take advantage of available analysis functions

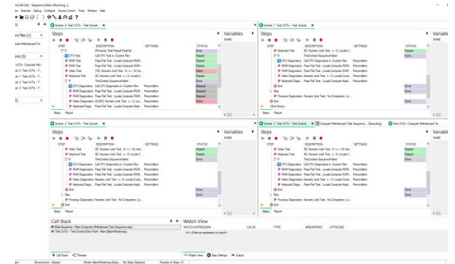
## DIAdem



Data analytics software for measurement data search, inspection, analysis, and automated reporting.

- Display data in multiple 2D-axis systems
- Perform calculations with a simple point-and-click interface
- Automate your measurement data analysis workflow, from import to analysis

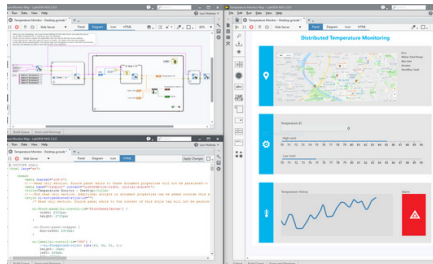
## TestStand



Test executive software that accelerates system development for engineers in validation and production.

- Call and execute tests in LabVIEW, Python, C/C++, or .NET
- Conduct complex tasks, such as parallel testing
- Create customer operator interfaces and robust tools for deployment and debugging

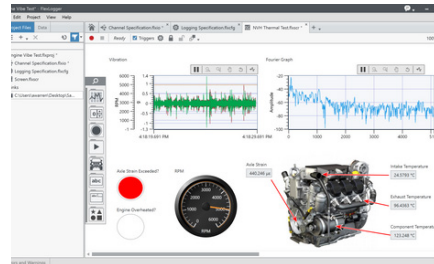
## G Web



Development software that helps engineers create web-based user interfaces without the need for traditional web development skills.

- Data transfer APIs for connecting to systems written in LabVIEW, Python, or C#
- Pre-built objects for data display and user input
- Included hosting on SystemLink™ Cloud

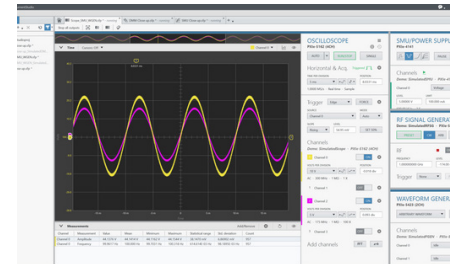
## FlexLogger™



No-code data acquisition software engineers use to build validation and verification test applications.

- Interactive visualization tools for monitoring tests with drag-and-drop charts, graphs, and controls
- Ability to set alarms that monitor single channels or groups for unexpected behavior

## InstrumentStudio™



Application software that simplifies setup and configuration of NI PXI hardware

- Customizable layouts for monitoring multiple instruments at once
- Interactively debug in tandem with code
- TDMS file export containing instrument settings, measurements, and raw data

# Supporting Documentation

Table 3. NI Digital Multimeter Documentation

| Document Type         | Model   |
|-----------------------|---|
| Getting Started Guide | <a href="#">NI Digital Multimeters</a>  |
| Specifications        | <a href="#">PXI-4065</a> , <a href="#">PXIe-4080</a> , <a href="#">PXIe-4081</a> , <a href="#">PXIe-4082</a><br><a href="#">USB-4065</a> , <a href="#">PCI-4065</a> , <a href="#">PCle-4065</a> |

## Configure a Custom NI System

NI's online system advisors help you create a custom system based on your specific requirements. Use the advisor to choose compatible hardware, software, accessories, and services and then save your selections as configurations for easy quoting and purchasing later. Visit [ni.com/advisor](http://ni.com/advisor) to learn more.

# What Is PXI?

## A Platform Approach to Test and Measurement

Powered by software, PXI is a rugged PC-based platform for measurement and automation systems. PXI combines PCI electrical-bus features with the modular, Eurocard packaging of CompactPCI and then adds specialized synchronization buses and key software features. PXI is both a high-performance and low-cost deployment platform for applications such as manufacturing test, military and aerospace, machine monitoring, automotive, and industrial test. Developed in 1997 and launched in 1998, PXI is an open industry standard governed by the PXI Systems Alliance (PXISA), a group of more than 70 companies chartered to promote the PXI standard, ensure interoperability, and maintain the PXI specification.

### Software

#### Test Management and Code Development

Code sequencing, database reporting, user management, operator interface, parallel execution, signal processing. LabVIEW, C/C++, .NET, Python

### Computer

#### PXI Embedded Controller

Windows and Real-Time OS options, Intel Xeon processing, peripheral ports, display output, integrated hard drive

### Timing and Synchronization

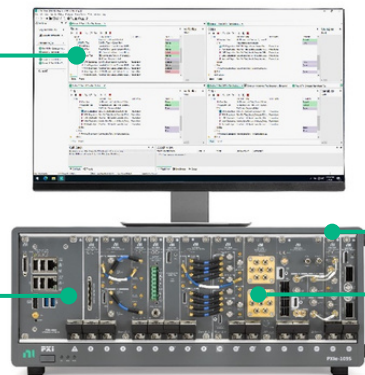
#### PXI Chassis

PCI Express Gen 3 throughput up to 24 GB/s sub-nanosecond latency, P2P streaming, integrated triggering

### Instrumentation

#### PXI Modules

DC to mmWave, oscilloscope, programmable power supply, switch/MUX, DMM, VSA, VSG, VST, AWG, SMU, DAQ



## Integrated with the Latest Commercial Technology

By leveraging the latest commercial technology for our products, we can continually deliver high performance and high-quality products to our users at a competitive price. The latest PCI Express Gen 3 switches deliver higher data throughput, the latest Intel multicore processors facilitate faster and more efficient parallel (multisite) testing, the latest FPGAs from Xilinx help to push signal processing algorithms to the edge to accelerate measurements, and the latest data converters from TI and ADI continually increase the measurement range and performance of our instrumentation.

### HIGHER DATA THROUGHPUT



PCI Express Gen 3

### PARALLEL TEST EXECUTION



Multicore Processors

### MEASUREMENT ACCELERATION



FPGAs

### INCREASED MEASUREMENT RANGE



Data Converters

# PXI Instrumentation

NI offers more than 600 different PXI modules ranging from DC to mmWave. Because PXI is an open industry standard, nearly 1,500 products are available from more than 70 different instrument vendors. With standard processing and control functions designated to a controller, PXI instruments need to contain only the actual instrumentation circuitry, which provides effective performance in a small footprint. Combined with a chassis and controller, PXI systems feature high-throughput data movement using PCI Express bus interfaces and sub-nanosecond synchronization with integrated timing and triggering.



## Oscilloscopes

Sample at speeds up to 12.5 GS/s with 5 GHz of analog bandwidth, featuring numerous triggering modes and deep onboard memory



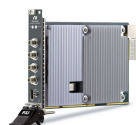
## Digital Multimeters

Perform voltage (up to 1000 V), current (up to 3A), resistance, inductance, capacitance, and frequency/period measurements, as well as diode tests



## Digital Instruments

Perform characterization and production test of semiconductor devices with timing sets and per channel pin parametric measurement unit (PPMU)



## Waveform Generators

Generate standard functions including sine, square, triangle, and ramp as well as user-defined, arbitrary waveforms



## Frequency Counters

Perform counter timer tasks such as event counting and encoder position, period, pulse, and frequency measurements



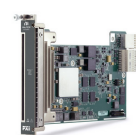
## Source Measure Units

Combine high-precision source and measure capability with high channel density, deterministic hardware sequencing, and SourceAdapt transient optimization



## Power Supplies & Loads

Supply programmable DC power, with some modules including isolated channels, output disconnect functionality, and remote sense



## FlexRIO Custom Instruments & Processing

Provide high-performance I/O and powerful FPGAs for applications that require more than standard instruments can offer



## Switches (Matrix & MUX)

Feature a variety of relay types and row/column configurations to simplify wiring in automated test systems



## Vector Signal Transceivers

Combine a vector signal generator and vector signal analyzer with FPGA-based, real-time signal processing and control



## GPIB, Serial, & Ethernet

Integrate non-PXI instruments into a PXI system through various instrument control interfaces



## Data Acquisition Modules

Provide a mix of analog I/O, digital I/O, counter/timer, and trigger functionality for measuring electrical or physical phenomena

# NI Hardware Services

All NI hardware includes a one-year warranty for basic repair coverage and calibration in adherence to NI specifications prior to shipment. PXI systems also include basic assembly and a functional test. NI offers additional entitlements to improve uptime and lower maintenance costs with service programs for hardware. Learn more at [ni.com/services/hardware](https://ni.com/services/hardware).

|   | Hardware                      | Standard          | Premium                | Description  |
|---|-------------------------------|-------------------|------------------------|--|
| Duration at Point of Sale                               | 1 year; included              | 3 years; optional | 3 years; optional      | NI enhances warranty coverage with additional service benefits provided with a hardware service program.   |
| Maximum Duration with Renewal                           | ≤3 years with service program | ≤3 years          | ≤3 years               | NI maintains the high performance and availability of your hardware for up to three years with a hardware service program.                         |
| Extended Repair Coverage                                | •                             | •                 | •                      | NI restores your device's functionality and includes firmware updates and factory calibration; < 10 working days <sup>4</sup> + standard shipping. |
| System Configuration, Assembly, and Test <sup>1</sup>   |                               | •                 | •                      | NI technicians assemble, install software in, and test your system per your custom configuration prior to shipment.                                |
| Advanced Replacement <sup>2</sup>                       |                               |                   | •                      | NI stocks replacement hardware that can be shipped immediately if a repair is needed.  |
| System Return Material Authorization (RMA) <sup>1</sup> |                               |                   | •                      | NI accepts the delivery of fully assembled systems when performing repair services.  |
| Technical Support                                       | •                             | •                 | •                      | NI provides access to support resources for your hardware.   |
| Calibration Plan (Optional)                             |                               | Standard          | Expedited <sup>3</sup> | NI performs the requested level of calibration at the specified calibration interval for the duration of the service program.                      |

<sup>1</sup> This option is only available for PXI, CompactRIO, and CompactDAQ systems.

<sup>2</sup> This option is not available for all products in all countries. Contact your local NI sales engineer to confirm availability.

<sup>3</sup> Expedited calibration is only available for the Traceable calibration level.

<sup>4</sup> This applies to non-RF products only. Standard extended repair coverage for RF products is <15 working days + standard shipping.

## PremiumPlus Service Program

NI can customize the offerings listed above or offer additional entitlements such as on-site calibration, custom sparing, and lifecycle services through a [PremiumPlus Service Program](#). Contact your NI sales representative to learn more.

## Technical Support

NI hardware service programs and warranty include access to technical support provided by NI support agents during local business hours. Service requests can be managed online. Additionally, take advantage of NI's award-winning [online resources](#) and [communities](#).

