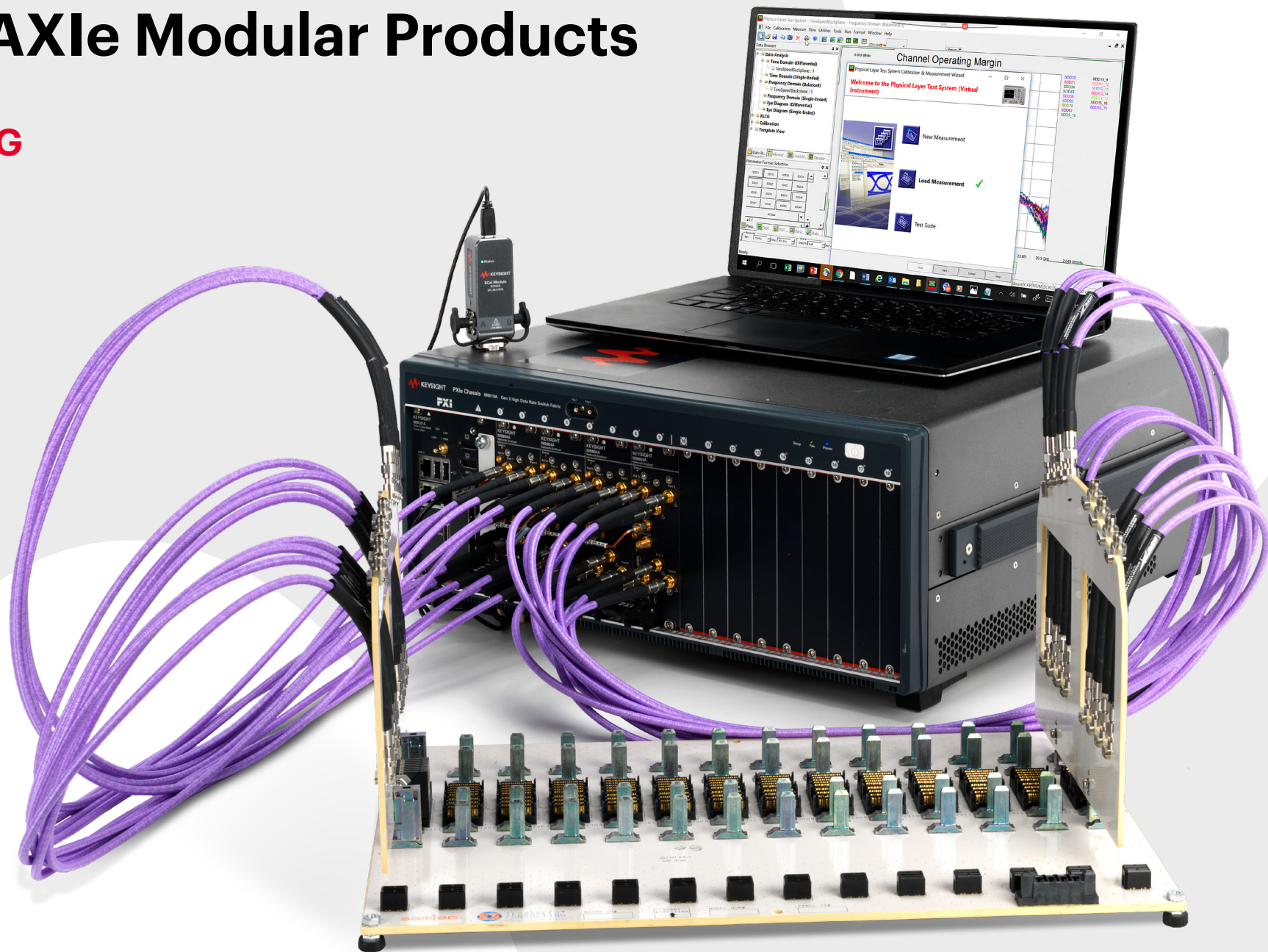


# PXI / AXIe Modular Products

CATALOG



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Gain Faster Insights with Proven PXI and AXIe Test Solutions

# Design and Test Complex Devices with Confidence

As commercial and military communications systems increase in complexity, R&D engineers continue to optimize space by replacing multiple discrete subsystems with a single compact chip or module. These highly integrated devices must be high-performance, power-efficient, and reasonably cost-effective to produce and test.

Keysight helps you test highly integrated multichannel or multiport devices with speed and accuracy using our line of PXI and AXIe instruments. Here are a couple of examples:

- Keysight's flagship **PXI vector network analyzer (VNA)** has demonstrated a significant reduction in manufacturing test time at many customer sites. It provides true multiport capability — simultaneously testing up to 50 ports in one chassis without switches.
- Keysight's **AXIe M8194A arbitrary waveform generator (AWG)** addresses coherent optical and multilevel / multichannel signal requirements. It delivers the highest bandwidth (up to 50 GHz) and best ENOB, enabling signal generation up to 100 Gbaud on four channels simultaneously, with femtosecond channel-to-channel synchronization.

We also provide time-saving starting points for test system creation — **documented solutions** that address specific measurement applications such as 5G infrastructure testing and quantum computing. Keysight's PathWave test software, usable with benchtop and modular instruments, helps development teams transition designs from the lab to high-volume production where modular instruments offer the added benefit of efficient, high-speed test.

Keysight helps you tackle your toughest RF, microwave, and digital test challenges. Our foundation is the industry's most accurate measurement science, giving you maximum confidence to achieve your first, best measurement and insight into what's next.



## PXI modular instruments — interoperability, size, speed, and scalability

PXI, an open, multivendor standard governed by the PXI Systems Alliance, ensures interoperability of modules and chassis from different vendors. The PXIe backplane bus leverages PCI Express® technology, which significantly improves test speed and reduces latency, especially for data- and transaction-intensive test applications. The bus also enables the scalability of the system as your test needs change. Integrate PXI instruments into an existing test system of benchtop, PXIe, or AXIe instruments.



M9804A and N1930B Physical Layer Test System (PLTS) 2020 Software

## AXIe modular instruments — truly advanced, cutting-edge technology

AXIe is a next-generation open standard based on Advanced Telecommunications Computing Architecture (AdvancedTCA). Increasing the power and headroom available to each slot allowed the development of higher-performance modules with faster switching speeds, larger power draws, and more complex measurement architectures. AXIe instruments provide timing, triggering, and module-to-module data movement features for high-performance test and measurement systems used in aerospace / defense, high-energy physics, semiconductor test, and other industries. The chassis and modules complement benchtop and PXI products and include PCIe and LAN interfaces that allow them to act like virtual PXI or benchtop instruments.



M8194A 120 GSa/s Arbitrary Waveform Generator

# High-Speed Chassis, Controllers, and I/O Components

Build a modular system by choosing the compatible chassis and controllers that meet your needs. Keysight offers a variety of modular chassis and system modules with different sizes and performance characteristics.

## PXIe chassis

Choose PCIe Gen 3 chassis, controllers and system modules for superior performance or Gen 2 for more power.

Technical overview	M9005A	M9010A	M9018B	M9019A
Module compatibility	PXIe, PXI-hybrid, PXI-1 (J1 only), cPCI (J1 only)			
Number of slots	5	10	18	18
Backplane fabric	Gen 1 (PCIe 1.0)	Gen 3 (PCIe 3.0)	Gen 2 (PCIe 2.0)	Gen 3 (PCIe 3.0)
Max data bandwidth	215 MB/s (system slot) 250 MB/s (slot to slot)	24 GB/s (system slot) 8 GB/s (slot to slot)	8 GB/s (system slot) 4 GB/s (slot to slot)	24 GB/s (system slot) 8 GB/s (slot to slot)
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M9019A PXIe Chassis: 18-slot, 3U, 24 GB/s, Gen 3

## AXIe chassis

When you need truly cutting-edge instruments that provide timing, triggering, and module-to-module data movement features.

Technical overview	M9502A	M9505A	M9514A	M9506A
<b>Module compatibility</b>	AXIe 1 Revision 2.0			AXIe 1 Revision 2.0 AXIe 1 Revision 3.0
<b>Number of slots</b>	2	5	14	5
<b>Backplane fabric</b>	PCIe 2.0	PCIe 2.0	PCIe 2.0	PCIe 3.0
<b>Max data bandwidth</b>	2 GB/s (system slot) 4 GB/s (slot to slot)	2 GB/s (system slot) 4 GB/s (slot to slot)	24 GB/s (system slot) 8 GB/s (slot to slot)	16 GB/s (system slot) 16 GB/s (slot to slot)
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

## PXIe and AXIe controllers

Technical overview	M9037A	M9537A
<b>Instrumentation</b>	PXIe	AXIe
<b>CPU</b>	Intel quad-core i7-4700EQ (2.4 GHz)	Intel i7 6820EQ 2.8 GHz quad-core
<b>Memory and storage</b>	4 GB std, 16 GB max, 240 GB SSD	8 GB std, 16 GB max, optional 400 GB NVMe disk cache, 240 GB SSD
<b>Max data bandwidth</b>	16 GB/s (CPU to backplane)	16 GB/s (CPU to backplane)
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

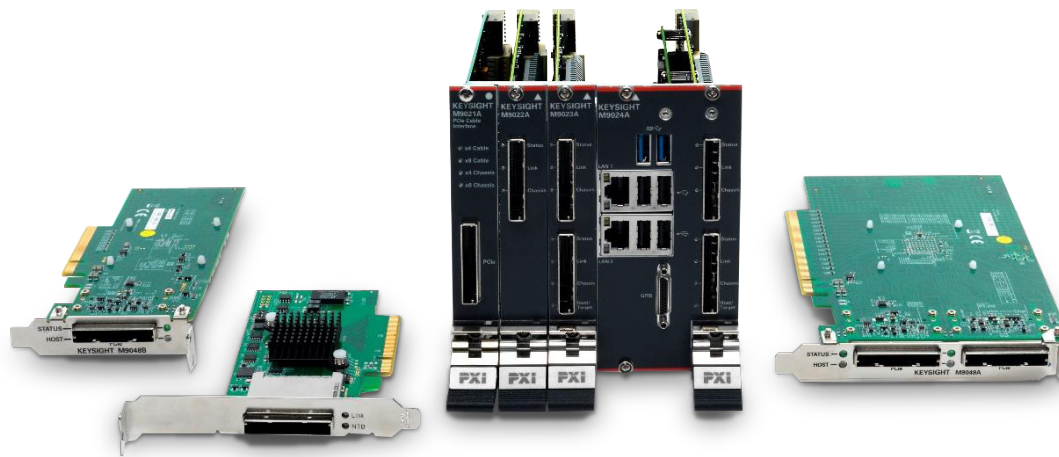


M9506A AXIe 5-Slot Chassis

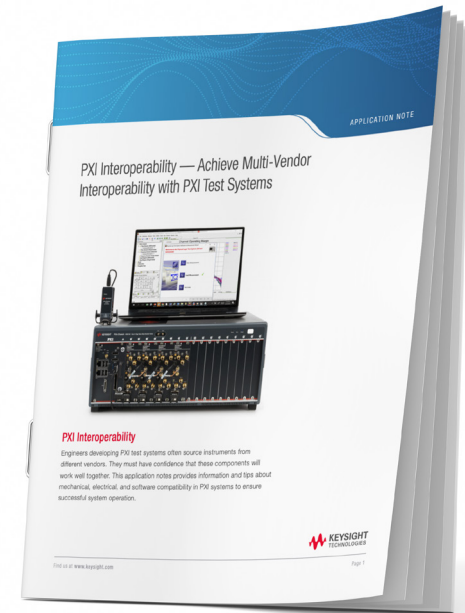


## PXIe and AXIe interface modules and adapters

Achieve a high-performance and reliable connection from a remote or embedded computer to one or multiple chassis with the Keysight PCIe and PXIe interface modules. Keysight's high-performance Gen 2 and Gen 3 interface modules enable connections from your PC, remote or embedded, to a PXIe or AXIe test system or to multiple PXIe or AXIe chassis.



Interface Modules and Adapters PXIe and AXIe systems



### How to achieve multivendor interoperability in PXI systems

The PXI standard ensures interoperability of modules and chassis from different vendors. Download the application to note learn about specific hardware and software variations and how to improve interoperability.

# PXIe RF Instruments for Fast, Direct Test of Multichannel Devices

Modern multiport or multichannel devices demand faster and more accurate measurements than a standard measurement system can provide. External switches are often used to multiplex or add the number of ports available to measure on standard measurement equipment. External switches, even when calibrated, fundamentally affect measurement performance. In addition, switches require significant operator intervention for setup, calibration, and adjusting configurations, decreasing test throughput.

Keysight's PXIe RF modules help you overcome these challenges. They allow scalable solutions without the need for external components, thus providing consistent, accurate results with proven Keysight measurement science.



# PXI signal generators

Built for applications that require multichannel measurement capabilities and test speed, PXIe signal generators also offer scalability and a small footprint:

- Configure solutions with a shared processor, chassis, and other modular instruments.
- Use the same software as benchtop signal generators for measurement consistency throughout the product development cycle.

## Simplify signal creation with PathWave signal generation software

The PathWave signal generation software is a flexible suite of signal-creation tools that will reduce the time you spend on signal simulation. Its performance-optimized reference signals — validated by Keysight — enhance the characterization and verification of your devices.



M9383B Microwave Signal Generator, 1 MHz to 44 GHz

Technical overview	M9380A CW source	M9381A vector signal generator	M9383A microwave signal generator	M9383B VXG-m microwave signal generator
Number of slots	3	5	4-12	8
Frequency range	1 MHz to 3 or 6 GHz	1 MHz to 3 or 6 GHz	1 MHz to 14, 20, 31.8, or 44 GHz	44 GHz
RF bandwidth	NA	40, 100, or 160 MHz	40, 160, 500, or 1,000 MHz	2 GHz
Amplitude accuracy	±0.4 dB	±0.4 dB	±1.0 dB	±0.5 dB
Phase noise (10 kHz offset)	-122 dBc/Hz at 1 GHz	-122 dBc/Hz at 1 GHz	-118 dBc/Hz at 10 GHz	-127 dBc/Hz at 10 GHz
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

<sup>1</sup> Must use in conjunction with the M9043A chassis and the M9037A controller. For details, please refer to the configuration guide.

## PXI signal analyzers

Ideal for design validation and manufacturing applications that require fast, high-quality measurements, PXIe signal analyzers provide essential quality controls, product conformance, and test optimization:

- Achieve scalability and the flexibility to configure a solution with a shared processor, frame / chassis, display, and interface.
- Build single or multichannel test solutions with PXIe vector signal analyzer building blocks.
- Using Keysight's known and trusted PathWave X-Series measurement applications and the PathWave vector signal analysis (VSA) software, so you can count on consistent, repeatable measurement results across form factor and product development life cycle.

## Transform your PXI signal analyzer with PathWave X-Series measurement applications

The PathWave X-Series measurement applications provide proven, ready-to-use measurements for signal analysis. Capturing measurement expertise and delivering repeatable results, the applications let you see and understand the performance of your devices and designs.

## See through the complexity with PathWave VSA software

The PathWave 89600 VSA software is a comprehensive set of tools for demodulation and vector signal analysis. These tools enable you to explore virtually every facet of a signal and optimize your most advanced designs.

Technical overview	M9290A CXA-m signal analyzer	M9391A vector signal analyzer	M9393A vector signal analyzer
Number of slots	4	4	5
Frequency range	10 Hz to 3, 7.5, 13.6, or 26.5 GHz	1 MHz to 3 or 6 GHz	9 kHz to 8.4, 14, 18, or 27 GHz Extended: 3.6 to 50 GHz
Analysis bandwidth	10 or 25 MHz	40, 100, or 160 MHz	40, 100, or 160 MHz
Amplitude accuracy	±0.5 dB	±0.45 dB	±0.13 dB
Display average noise level	-160 dBm/Hz at 1 GHz	-157 dBm/Hz at 1 GHz	-168 dBm/Hz at 1 GHz
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

# PXI vector transceivers

Get both signal generation and analysis in one PXIe module with real-time field-programmable gate array (FPGA)-accelerated measurements for faster throughput. The PXIe vector transceiver is perfect for manufacturing test of wireless devices, RF power amplifiers, and front-end modules:

- Open source test libraries and reference solutions reduce development time.
- PathWave **X-series measurement applications** and **signal generation software** ensure specific wireless standards conformance.

VXT PXI Vector Transceiver

Technical overview	M9421A	M9410A / M9411A	M9415A
Number of slots	4	2 / 3	3
Frequency range	60 MHz to 3.8 or 6 GHz	380 MHz to 6 GHz	380 MHz to 6, 8 or 12 GHz
Analysis bandwidth	40, 80, or 160 MHz	300, 600, or 1,200 MHz	400, 800, or 1,200 MHz
Maximum output power	+ 20 dBm	+ 20 dBm	+ 20 dBm
Display average noise level (1 GHz)	-160 dBm/Hz at 1 GHz (SA)	-163 dBm/Hz at 1 GHz (SA)	-167 dBm/Hz at 1 GHz (SA)
Phase noise (1 GHz, 10 kHz offset)	-112 dBc/Hz (SG) -111 dBc/Hz (SA)	-133 dBc/Hz (SG) -130 dBc/Hz (SA)	-133 dBc/Hz (SG) -130 dBc/Hz (SA)
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>



# Powerful troubleshooting tools and consistent measurement science

Keysight's VXT supports a wide range of applications using the same measurement application software as benchtop instruments. These trusted measurement applications offer users powerful troubleshooting tools and consistent measurement science to more easily and quickly transition from R&D to production.

- PathWave X-Series measurement applications
- PathWave vector signal analysis (89600 VSA)
- PathWave signal generation software



## Accelerate 5G Testing:

### 5G Manufacturing Test Considerations

The promise of 5G is faster and more reliable communications. To enable mobile broadband communications, 5G uses existing and new technologies to achieve extreme data throughputs. Learn about the impact of the 3rd Generation Partnership Project (3GPP) evolution on the testing and solutions available to help you scale to production quickly.





## PXI vector network analyzers

Take on the most demanding multiport challenges with industry-leading, true multiport architecture that offers exceptional performance no matter how many ports you use. Significantly increase test speed and efficiency, reducing your cost of test.

PXI VNAs provide these benefits:

- Get industry-leading speed, dynamic range, trace noise, and stability. Improve accuracy, yield, and margins.
- Our M980xA series lets you simultaneously characterize up to 50 ports with a single PXI chassis. All test ports are fully synchronous, so you can measure multiple ports simultaneously with multiport error correction applied.
- PXIe VNAs are compatible with the same software applications as benchtop VNAs and provide the same quality results.



M9804A PXI Vector Network Analyzers

Technical overview	M937xA VNA	M9804A VNA	M9808A VNA
<b>Number of slots</b>	1	1 (2 ports), 2 (4 and 6 ports)	1 (2 ports)
<b>Frequency range</b>	300 kHz to 26.5 GHz	9 kHz to 20 GHz	100 kHz to 53 GHz
<b>Dynamic range at 4 GHz</b>	115 dB (at 10 Hz IFBW)	140 dB (at 10 Hz IFBW)	140 dB (at 10 Hz IFBW)
<b>Trace noise at 4 GHz</b>	0.002 dB rms (1 kHz IFBW)	0.0015 dB rms (10 kHz IFBW)	0.0015 dB rms (10 kHz IFBW)
<b>Max number of ports</b>	2 ports per module, up to 32 in one PXI chassis	2, 4, or 6 ports per module, up to 50 ports in one PXI chassis	2 ports per module, up to 34 ports in one PXI chassis
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

# Software and accessories for PXI vector network analyzers

## Enhance your network analyzer with application software

Network analyzer software tools enable you to investigate, characterize, and troubleshoot your designs in a variety of measurement applications, including mixer / converter, automated measurement, automatic fixture removal, multiport calibration, time-domain analysis, pulse-RF, noise figure, embedded LO, gain-compression, and spectrum analysis.

## PXI digital and analog I/O for VNAs

The Keysight M9341B PXIe digital and analog input / output (I/O) comes with a 24-bit digital I/O connector and an 8-bit digital interface to allow users to control the device under test (DUT) directly with serial or parallel digital signals. This allows you to use a PXI VNA, such as the Keysight M937xA and M9485A, in an automated test environment.



### Multiport and Multi-site Test Optimization Techniques

If you're designing or manufacturing devices with multiple ports, you may want to know about the advantages that come with a true multiport VNA. This application note explains the difference between a switch-based system and a PXI multiport VNA that does not require an external switch matrix.

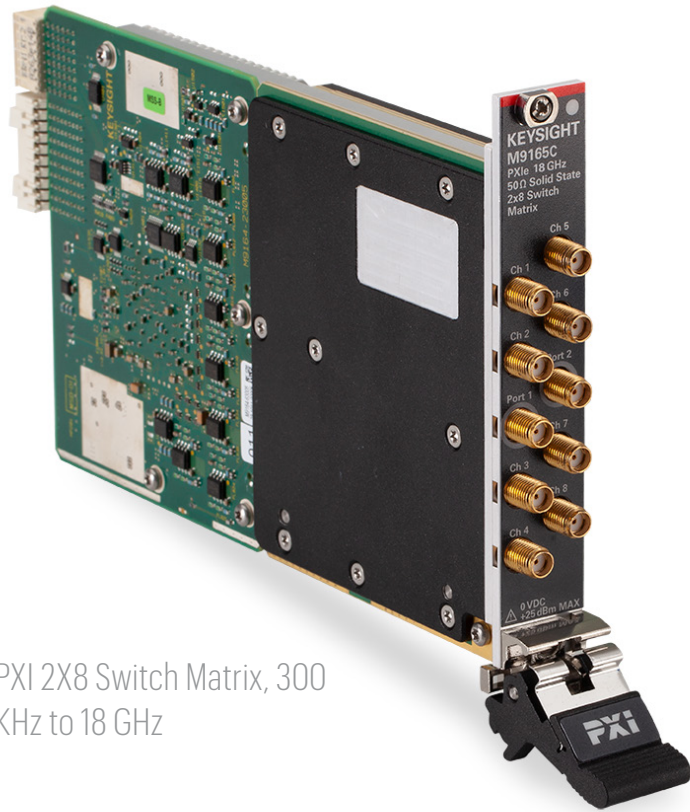
# PXI vector component analyzers perform network and spectrum analysis

You need to balance continuous-wave and modulated signal measurements when characterizing antenna arrays and front-end modules. Vector Component Analyzers (VCAs) enable you to perform network analyzer measurements in addition to EVM and ACP over a single connection. Based on the M980xA, the VCA solution adds a modulated signal stimulus to your test setup.

- Easily perform complex measurements with application software.
- Configure the modular form factor to fit your needs.
- Measure high-power amplifiers with optional direct receiver access configurations.



Product number	M9815AS	M9816AS	M9817AS	M9818AS
Frequency range	100 kHz to 26.5 GHz	100 kHz to 32 GHz	100 kHz to 44 GHz	100 kHz to 53 GHz
Noise floor	-130 dBm at 10 Hz IFBW	-130 dBm at 10 Hz IFBW	-130 dBm at 10 Hz IFBW	-130 dBm at 10 Hz IFBW
DANL @ 1 GHz	-144 dBm/Hz	-144 dBm/Hz	-144 dBm/Hz	-144 dBm/Hz
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>



PXI 2X8 Switch Matrix, 300 KHz to 18 GHz

## Expand your test capability with PXI RF and microwave test accessories

RF and microwave modules benefit from additional or expanded capability when combined with switch, signal attenuation, and signal conditioning modules as they are integrated into test system solutions. These modules provide the capabilities higher-frequency applications require.

### PXI RF and microwave switches

The PXI RF and microwave switches deliver high-performance, high-density switching up to 40 GHz. They are available in multiple switch configurations to integrate into a variety of test environments.

Technical overview	M9128A	M9164A/B/C M9165A/B/C	M9146-49A	M9155-57C M9155-57CH40	M9161D
Type	Matrix	Full-cross bar matrix	Multiplexer	Coaxial / transfer	Solid state
Max frequency	300 MHz	18 GHz	3 GHz	40 GHz	20 GHz
Configuration	8x12	2x8, 2x16	1x4, 1x8, 1x16	Dual SPDT, dual transfer, single SP6T	Dual SP4T
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>



## PXI attenuators

Keysight offers step attenuator modules that operate across a broad frequency range of DC to 50 GHz

## PXI frequency reference

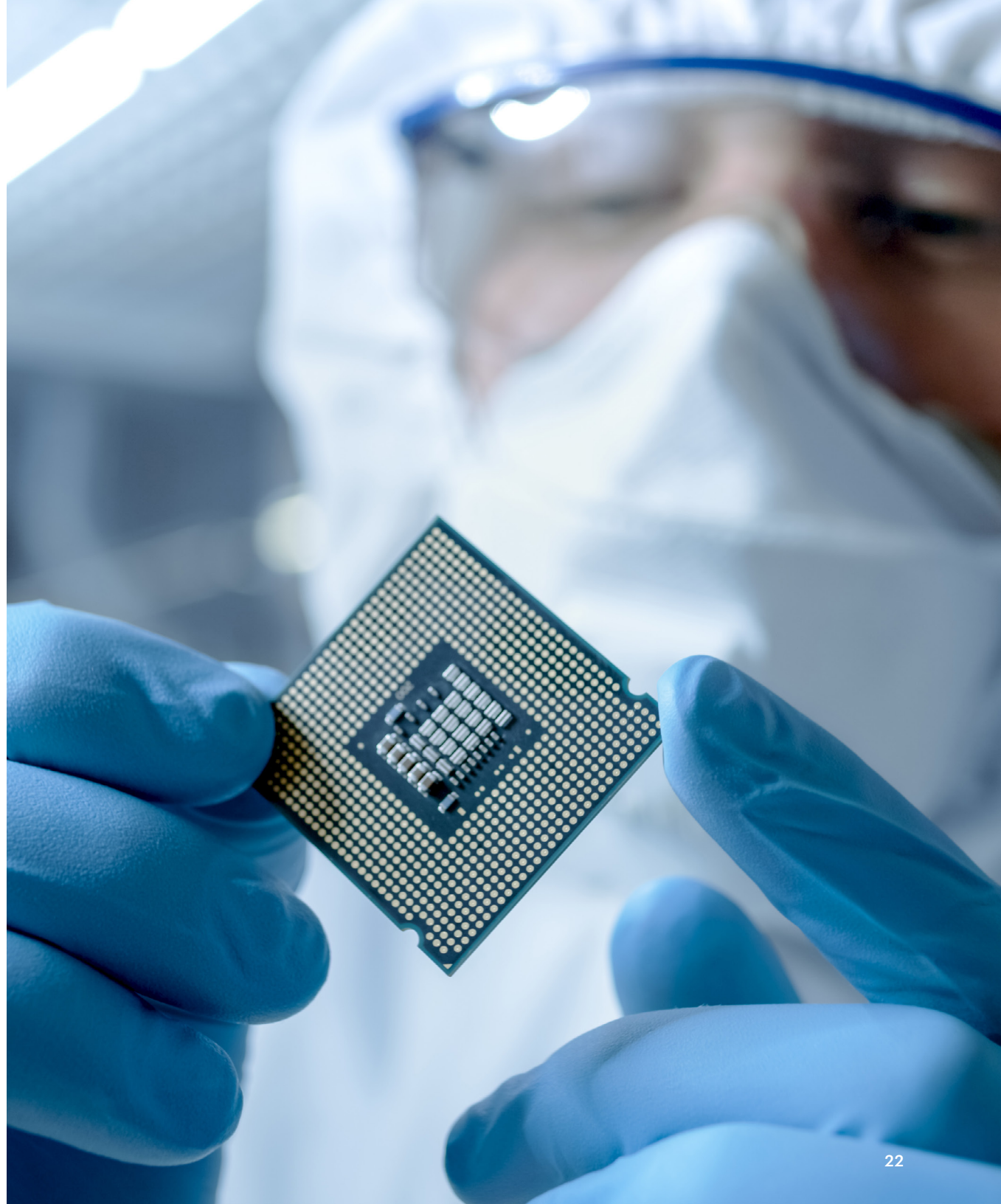
The M9300A PXIe frequency reference is a PXIe modular instrument that provides 10 MHz or 100 MHz frequency reference in various solutions.

## PXI signal conditioning

For RF and microwave measurements, Keysight PXI signal conditioning modules modify an analog signal to meet the requirements of the next stage for signal processing.

# AXIe Instruments for Cutting-Edge Digital Test

High-performance AXIe products provide timing, triggering, and module-to-module data movement features. Those features are important for implementing high-performance test and measurement systems used in aerospace / defense, high-speed digital, high-energy physics, 400GE, semiconductor test, and other industries.



# High-speed, high-fidelity AXIe arbitrary waveform generators address your toughest measurement challenges

The Keysight M8100A Series AWGs offers stimulus sources that address a wide range of applications. The precision, high speeds, and flexibility of the AWGs help meet your most difficult challenges.



M8190A 12 GSa/s Arbitrary Waveform Generators

Technical overview	M8190A	M8194A	M8195A	M8196A	M8199A
Size (slot)	2	1	1	1	2
Maximum sample rate	12 GSa/s	120 GSa/s	65 GSa/s	92 GSa/s	256 GSa/s
Maximum baud rate	~10 GBd	~100 GBd	~50 GBd	~64 GBd	~128 GBd
Maximum bandwidth	5 GHz	45 GHz	25 GHz	32 GHz	70 GHz
Resolution (bit)	12 / 14	8	8	8	8
Maximum SFDR	-90 dBc	-35 dBc	-80 dBc	-73 dBc	-48 dBc
Channel	1 / 2 (differential)	1 / 2 / 4 (differential)	1 / 2 / 4 (differential)	1 / 2 / 4 (differential)	2 or 4 (differential)
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## Multichannel synchronization module gives you precise alignment for repeatable measurements

Complex testing sometimes requires playing multiple waveforms in parallel. The M8192A and M8197A synchronization modules fit in a standard AXIe frame and allow engineers to synchronize multiple AXIe AWGs.

Technical overview	M8192A	M8197A
<b>Max channels</b>	12 (up to 6 M8190A) 10 (Up to 4 M8051A and 1 M8041A)	16 (up to 4 M8195A)
<b>Skew repeatability</b>	2 ps	2 ps
<b>Skew resolution</b>	50 fs	50 fs
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>



### Pulse, Pattern, Function, and Arbitrary Waveform Generators For Digital and Analog Testing

Choosing the correct type of signal generation instrument to match your application requirements.



# Industry-leading AXIe bit error ratio test (BERT) solutions

Whether you are working on data center or computing technologies, Keysight BERTs enable physical-layer characterization, verification, and compliance testing for both NRZ (non-return-to-zero) and PAM4 (pulse-amplitude modulation 4-level) coding schemes. Master your next design with flexible modules, intuitive software, advanced analysis applications, and expert-level support.

## Extend the capabilities of your BERT with software applications

Customize your BERT with additional features and functions. Our selection of software, accessories, and services ensures you get the most out of your instrument. These are available for purchase with the equipment or any time afterward.



Technical overview	M8020A			M8040A	
	M8041A	M8051A	M8062A	M8045A	M8046A
Module type	PG <sup>1</sup> , ED <sup>2</sup>	PG <sup>1</sup> , ED <sup>2</sup>	PG <sup>1</sup> , ED <sup>2</sup>	PG <sup>1</sup>	ED <sup>2</sup>
Data format	NRZ			NRZ, PAM3, and PAM4	NRZ and PAM4
Data rate / symbol rate	0.256 to 16 Gbit/s		0.512 to 32 Gbit/s	2 to 64 Gbaud	NRZ: 5 to 64 Gbaud PAM4: 5 to 58 Gbaud
Channels	1, 2, or 4			1 or 2	
<a href="#">Get a Quote &gt;</a>			<a href="#">Get a Quote &gt;</a>		

<sup>1</sup> PG: pattern generator <sup>2</sup> ED: error detector

## AXIe logic analysis and protocol testers

Keysight's AXIe modular logic analysis and protocol test modules and powerful analysis software provide essential capabilities for engineers working on fast digital designs and chipsets using high-speed parallel and serial buses, such as DDR and PCI Express Gen 3.



U4421A Protocol Analyzer and Exerciser  
for MIPI D-PHY Interfaces

# General-Purpose Oscilloscopes, Digitizers and More

## PXIe oscilloscopes – Keysight oscilloscope technology in a compact form factor

Keysight's InfiniiVision PXIe oscilloscopes are the first full-featured oscilloscopes in PXI to offer up to 1 GHz bandwidth for quick analysis and troubleshooting of wideband signals. With an update rate of 1 million waveforms per second and advanced probing technology, the oscilloscope enables troubleshooting of random and intermittent signals not easily seen with digitizer technology.



PXIe 1 GHz Oscilloscope and AutoProbe Power Module

Technical overview	M9241A	M9242A	M9243A
Max bandwidth	200 MHz	500 MHz	1 GHz
Size / channel	1 slot / 2 channels	1 slot / 2 channels	1 slot / 2 channels
Update rate	1,000,000 wfms/s	1,000,000 wfms/s	1,000,000 wfms/s
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

## Probing solutions for PXI modular

M924XA Series oscilloscopes require the M9240A PXIe AutoProbe power module to use Keysight active probes. The M9240A provides power and the communication circuit required for proper operation of the active probes.

## Expand your oscilloscope's capabilities with powerful applications

The InfiniiVision PXIe oscilloscope software package for the M924xA PXIe modular oscilloscopes provides all the serial bus protocol trigger and decode capabilities, as well as all the advanced measurement capabilities, of the individual licensed industry / application software packages. They include automotive, aerospace and defense, NFC automated test, and embedded analysis.

## PXIe / AXIe digitizers

The Keysight PXIe / AXIe digitizer's portfolio combines high channel density, measurement fidelity, and high throughput to build scalable acquisition systems with high channel count and fast, accurate measurements in a compact form factor.

### Insert your logic into Keysight PXI / AXIe digitizers — PathWave FPGA programming environment

Keysight opened its PXI and AXI instruments, allowing you to insert custom user data or processes into the instrument FPGA. PathWave FPGA enables engineers of all FPGA skill levels to add logic, control, and combinatorial routines to a wide range of Keysight instruments. PathWave FPGA ships with a rich set of built-in library elements that you can drop into your schematic.



PXIe Digitizer 100 MSa/s, 14 bit, 100 MHz

AXIe High-Speed Digitizer/DAQ, 8-bit, 1 GS/s, 32-ch



	M3100A	M3300A <sup>1</sup>	M3302A <sup>1</sup>	M3102A	M9203A	M9703B	M9709A	M9710A
Technical overview	PXIe				AXIe			
Size (slot)	1	2	2	1	2	1	1	1
Max bandwidth	100 MHz		100 MHz		1.4 GHz	1.4 GHz	500 MHz	2.5 GHz
Resolution / ENOB	14 / 10.8 bits		12 / 10.6 bits		12 / 9.1 bits	12 / 9.1 bits	8	10 / 7.3 bits
SFDR	79 dBc		71 dBc		65 dBc	65 dBc	50 dBc	56 dBc
Channel	4 / 8	4 / 8	2	2 / 4	2	8	32	4
	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>	<a href="#">Get a Quote &gt;</a>

<sup>1</sup> AWG and digitizer combination

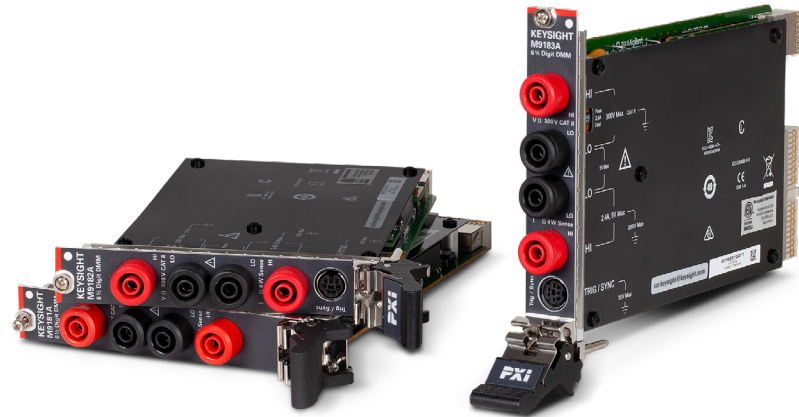
## Understanding the Differences Between Oscilloscopes and Digitizers for Wideband Signal Acquisitions

Both oscilloscopes and wideband digitizers use ADC technology for waveform acquisitions. Although there are many similarities between oscilloscopes and wideband digitizers, they have different targeted applications, and their architectures and features have been optimized for those applications.



## High throughput PXI digital multimeters

Keysight’s M9181A PXI digital multimeter (DMM) provides the most popular measurement functions, including DCV, ACV, DCI, ACI, and two- and four-wire resistance, at an affordable price. The M9182A and M9183A 6½-digit high-performance PXI DMMs offer fast throughput, flexible measurements, and reliable results.



Technical overview	M9181A	M9182A	M9183A
<b>Resolution</b>	6½ digits	6½ digits	6½ digits
<b>Max reading speed</b>	150 readings / s	4,500 readings / s	15,000 readings / s
<b>DCV, ACV</b>	200 mV to 200 V	200 mV to 300 V	200 mV to 300 V
<b>DCI; ACI</b>	2 mA to 2 A	2 mA to 2 A	200 nA to 2 A; 2 mA to 2 A
<b>2- &amp; 4-wire resistance</b>	200 Ω to 20 MΩ	200 Ω to 20 MΩ	20 Ω to 200 MΩ
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## PXIe audio analyzer — fast, accurate audio test

What makes Keysight’s M9260A different from other PXI digitizer modules used for audio measurements? To start, it comes with a 1 million-sample arbitrary waveform buffer and a 1 million-sample “limitless” input buffer to achieve fast test speed and high performance. Additionally, the super-linear / low-noise amplifiers and digital-to-analog converters enable ultra-low residual distortion and high amplitude accuracy.

# PXIe arbitrary waveform generators

Keysight's PXI AWGs deliver unprecedented performance for creating complex wideband waveforms. High sampling rate and high bit resolution provided in a single instrument enable designers to create ideal waveforms for accurate test of radar, satellite, and frequency agile systems.

Technical overview	M3201A	M3300A <sup>1</sup>	M3302A <sup>1</sup>	M3202A	M9336A
Size (slot)	1	2	2	1	PXIe
Max bandwidth	200 MHz		400 MHz		540 MHz
Resolution (bit)	16		14		16
SFDR	64 dBc at 80 MHz		54 dBc at 160 MHz		67 dBc (DC to 135 MHz)
Channel	2 / 4	2 / 4	2	2 / 4	3 (differential)
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<sup>1</sup> AWG and digitizer combination

PXIe Arbitrary Waveform Generators



## Insert your logic into Keysight PXI AWGs — PathWave FPGA programming environment

Keysight opened its PXI and AXI instruments, allowing you to insert custom user data or processes into the instrument FPGA. PathWave FPGA enables engineers of all FPGA skill levels to add logic, control, and combinatorial routines to a wide range of Keysight instruments. PathWave FPGA ships with a rich set of built-in library elements that you can drop into your schematic.



# PXIe source / measure units (SMU)

Keysight's PXI SMUs provide high accuracy, high resolution, high density, high speed, and measurement flexibility for broad applications such as integrated circuit tests and semiconductor parametric / reliability tests.

Technical overview	M9111A	M9601A	M9602A	M9603A	M9614A	M9615A
<b>Channel</b>	1	1	1	1	5	5
<b>Maximum output</b>	13 V / 1A or 6V / 3A	210 V / 315 mA	60 V / 3.5 A (10.5 A pulsed)	60 V / 3.5 A (10.5 A pulsed)	30 V / 500 mA	30 V / 500 mA
<b>Minimum resolution</b>	120 $\mu$ V / 1.4 nA	500 nV / 10 fA	6 $\mu$ V / 1 pA	6 $\mu$ V / 100 fA	6 $\mu$ V / 100 pA	6 $\mu$ V / 10 pA
<b>Minimum pulse width</b>	50 $\mu$ s	20 $\mu$ s	10 $\mu$ s	10 $\mu$ s	100 $\mu$ s	100 $\mu$ s
<b>Sampling rate</b>	200 k samples/s	1.25 M samples/s	15 M samples/s	15 M samples/s	500 k samples/s	500 k samples/s
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PXIe 5-channel Source/  
Measure Units

## PXI multiplexer and matrix switches

The PXI high-density multiplexer switches deliver high-speed signal routing of numerous channels to a single point. They are ideal for routing multiple analog signals to a measurement device in automated test environments or data acquisition systems. The PXI matrix switch modules deliver medium- to high-density switching of multiple channels in a single instance. You can connect any row to any column, which is ideal for routing multiple signals between the DUT and instruments.

Technical overview	M9101A	M9102A	M9103A	M9120A	M9121A	M9122A
Switch type	Multiplexer			Matrix		
Channel	64	128	99	4x32	4x64	8x32
Connection	2-wire, reed	1-wire, reed	2-wire, armature	2-wire, armature	2-wire, reed	1-wire, armature
Max volt	100 Vrms	100 Vrms	100 Vrms	100 Vrms	100 Vrms	100 Vrms
Max switch / carry rating	0.5 A / 1.0 A	0.5 A / 1.0 A	1.0 A / 1.0 A	2.0 A / 2.0 A	0.5 A / 0.5 A	2.0 A / 2.0 A
Bandwidth	5 MHz	5 MHz	1 MHz	7.5 MHz	10 MHz	5 MHz
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## PXI general-purpose switches

The PXI general-purpose switch modules deliver fast, reliable switching in a variety of configurations. Cycle power to products under test, control indicator and status lights, or actuate external power relays and solenoids with independent, single-pole, double-throw (Form C) or single-pole, single-throw (Form A) switches in a single PXI module.

Technical overview	M9130A	M9131A	M9132A	M9133A	M9135A
Channel	26	64	50	100	20
Connection	SPDT, armature	SPDT, reed	SPST, reed	SPST, reed	SPST, reed
Max volt	250 Vrms	100 Vrms	100 Vrms	100 Vrms	250 Vrms
Max switch / carry rating	2 A / 2A	0.25 A / 1 A	1 A / 1 A	1 A / 1 A	5 A / 5 A
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## PXI digital input / output

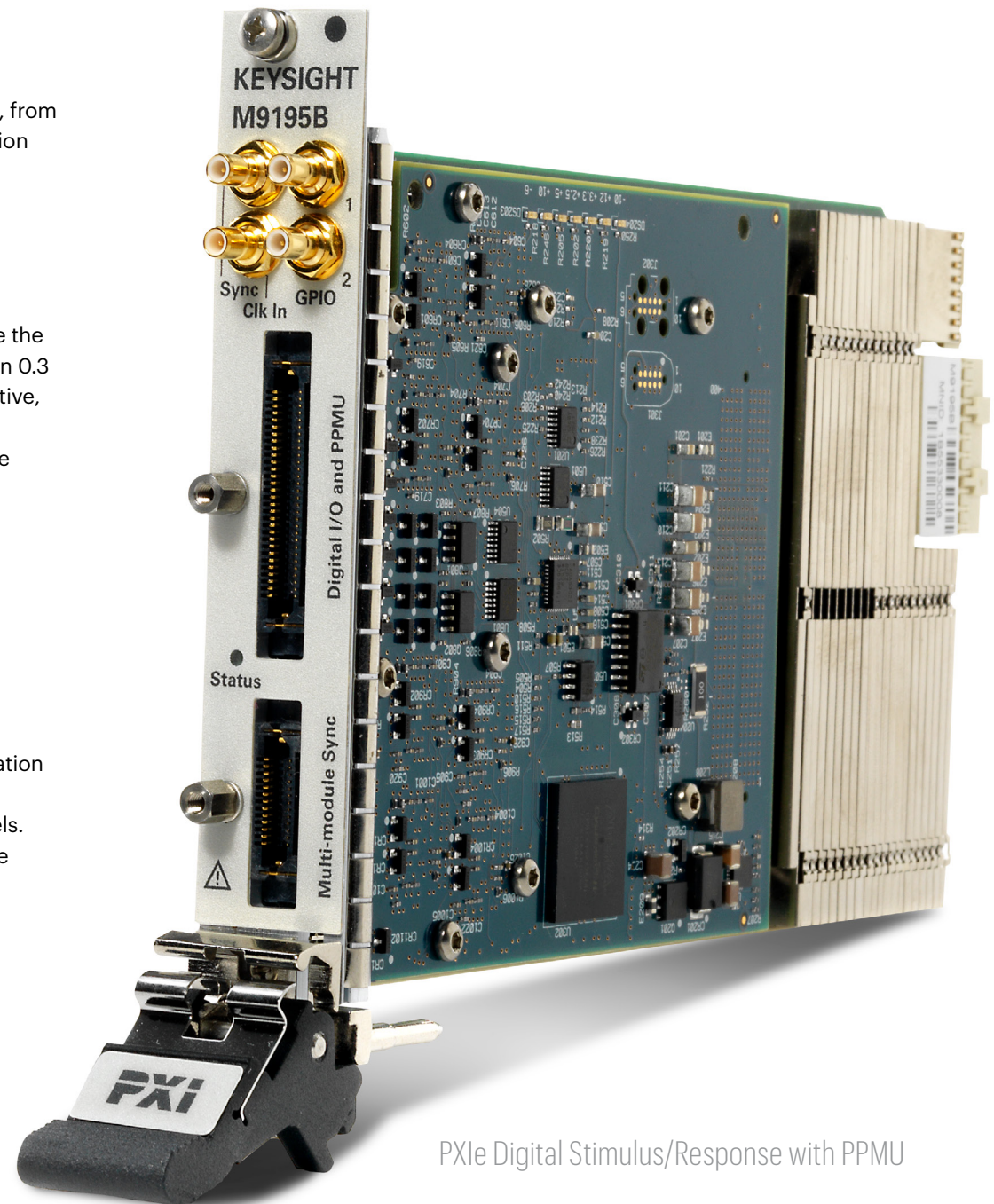
The Keysight PXI digital I/O modules cover a wide range of applications, from system monitoring and relay control to integrated circuit design validation and automated test in manufacturing.

### PXI digital I/O

The M9187A digital I/O control module has 32 I/O channels. You can use the input channels for comparing inputs to user-defined thresholds between 0.3 and 50 V, with 12.5 mV setting resolution. Aerospace / defense, automotive, and electronic test applications typically use the module, which offers configuration flexibility with programmable input thresholds and flexible output drive capability.

### PXIe digital stimulus / response with PPMU

The M9195B digital stimulus / response (DSR) provides speed, configuration flexibility, and multisite capability for RF chipset emulation and device characterization. The DSR synchronizes up to 12 modules or 192 channels. With the M9192A or M9193A DSR pattern-editing software packages, the M9195B offers high performance, time-saving per-channel parametric measurements, programmable delay, and more.



PXIe Digital Stimulus/Response with PPMU

# Gain Faster Insights with Proven PXI and AXIe Test Solutions

Try out our proven test solutions optimized for specific applications. Our application engineers built these reference test systems that come with programming examples using Keysight's PXI and AXIe instruments, software to help you get measurement insights faster.

## 6G sub-terahertz R&D testbed for prototyping and testing

The 6G sub-terahertz R&D testbed is flexible and scalable to address a multitude of frequency bands, frequency bandwidths, and waveform types. This flexibility allows you to tackle emerging 6G R&D testing challenges with up to 10 GHz of bandwidth at D-band (110–170 GHz) and G-band (140–220 GHz).

## Automate, accelerate, and scale across your test workflow — PathWave Test Automation

PathWave Test Automation delivers significant cost- and time-saving benefits over traditional test automation and analysis tools. With PathWave Test Automation, your team has all the tools they need to meet even the most aggressive product release schedules.



## 5G multiband vector transceiver for high-volume test

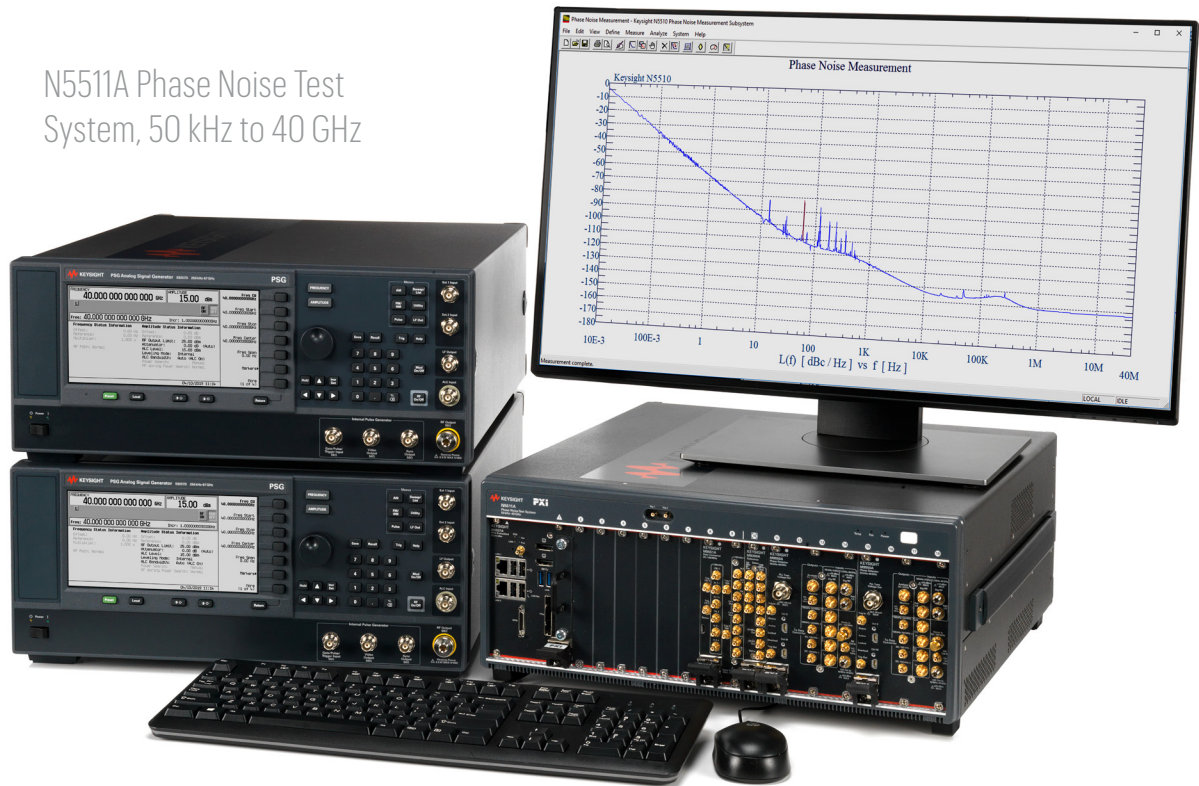
The S9130A 5G performance multiband vector transceiver test solution is a streamlined, nonsignaling measurement system that enables automated testing of 5G NR infrastructure equipment in both the frequency range 1 (sub-6 GHz) and frequency range 2 (24–44 GHz) spectrum bands. This compact solution enables users to validate 5G RF radio performance in high-volume test in 4G as well as 5G millimeter wave. It offers the precision required for in-band design validation in all the new 5G NR bands. Together with a modular architecture, easy-to-use API, and Keysight PathWave solution software, the S9101A reduces your cost of test and accelerates your time to volume, especially in millimeter-wave applications.



S9130A 5G Performance Multi-Band Vector Transceiver

## Phase noise test system measures at the limits of physics

Keysight's N5511A Phase Noise Test System (PNTS) is a replacement for the "gold-standard" Keysight E5500 phase noise measurement system. PNTS is the foundation of test systems that can measure phase noise down to  $kT$  (-177 dBm / Hz at room temperature). This thermal phase noise floor is the theoretical limit for any measurement. Therefore, the PNTS can measure at the limits of physics.



## Modulation Distortion Solution TO Characterize Nonlinear DUT Behavior

The modulation distortion solution enables fast and accurate active-device modulation distortion characterization under modulated stimulus conditions up to 53 GHz. The wide dynamic range and vector error correction of the M980xA results in an extremely low residual EVM of the test setup to give you a complete picture of your device's performance without test system interference. The solution not only measures EVM, NPR, ACPR, it can also decompose nonlinear signals and linear signals with the spectral correlation between input and output spectrum without doing demodulation.



S95070B Modulation Distortion up to 53 GHz

## Military and public safety radio test set

Keysight's M8920A Radio Test Set supports many formats by combining PXI hardware with application-specific software in a single flexible and scalable chassis, providing broad multiformat coverage for next-generation radio testing. It has a scalable modular architecture for efficient and complete test development and execution needed for the manufacturing and radio maintenance environment.



M8920A Radio Test Set

## Digital interconnect test system

When you need to measure advanced S-parameters with a fast, low-cost, and easy-to-use test solution, the Digital Interconnect Test System gives you a significant edge. It provides a full 50-port VNA configured in a single PXI chassis — ideal for high-speed cable testing. And it lets you test any linear passive interconnect — including backplanes, connectors, and PCBs — faster and easier. Sharpen your edge with Keysight's Digital Interconnect Test System, which enables signal integrity characterization of multiport interconnect products.



N1930B Physical Layer Test System



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at [www.keysight.com](http://www.keysight.com).

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