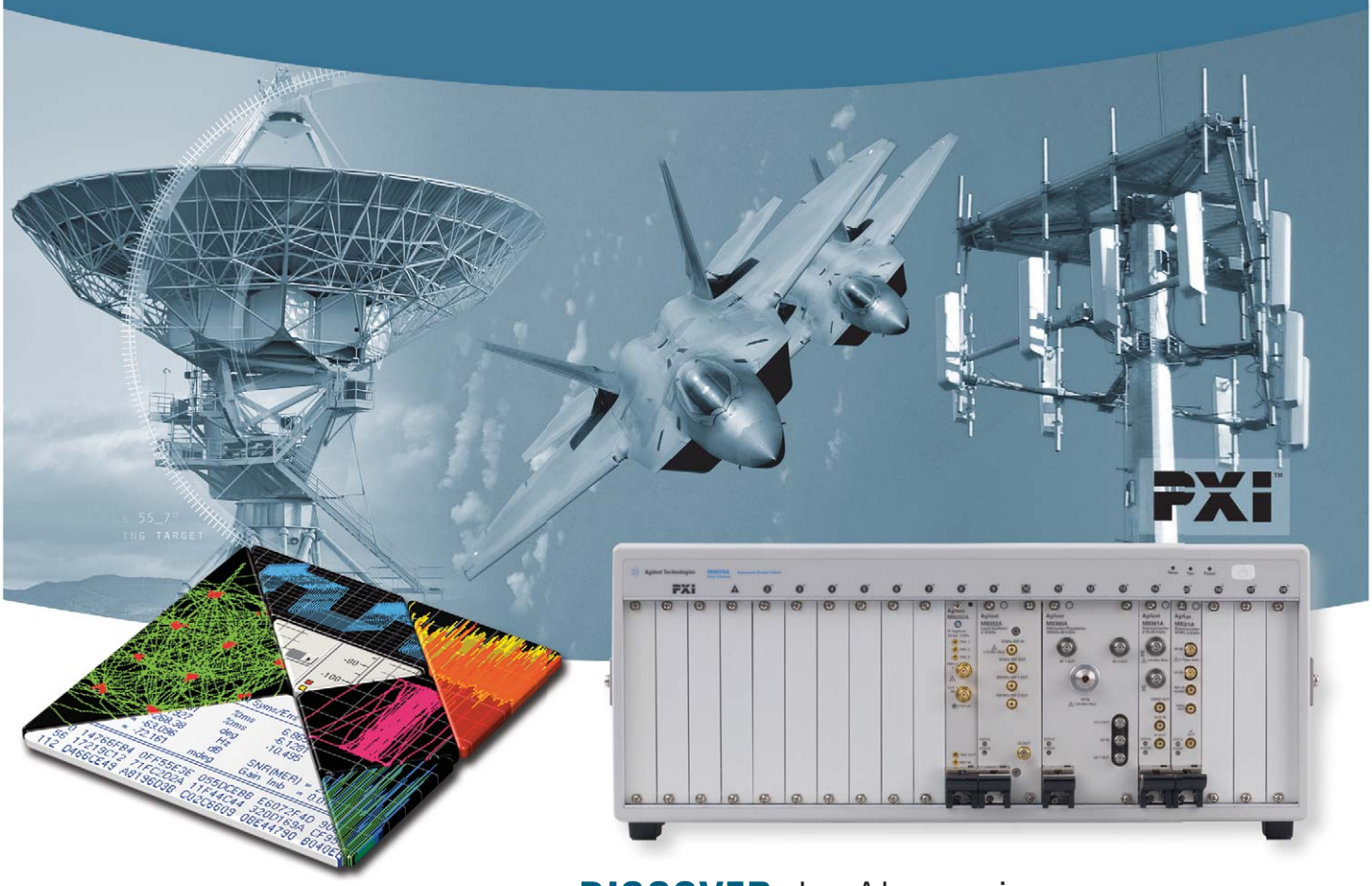
Agilent M9392A
PXI Vector Signal Analyzer

50 MHz to 26.5 GHz

Brochure



DISCOVER the Alternatives...

... Agilent **MODULAR** Products

Agilent Technologies

Providing you with easier test system design

Our recent expansion into modular products is an extension of Agilent's proven measurement expertise. Whether you create test solutions within a manufacturing company or as a system integrator, Agilent invites you to experience a complete Microwave PXI Vector Signal Analyzer solution enabling analysis of communications, radar, and avionics signals in a modular, open-system standard.

Range of applications:

- Aerospace and defense
- Wireless communications
- Radar and wideband signal capture
- Electronic test

What this brochure covers...

- Agilent's modular offerings: easy setup, test and maintenance benefits
- Agilent's PXI Vector Signal Analyzer and individual PXI building blocks with their features and benefits

  PXI Vector Signal Analyzer

  PXI Local Oscillator module

  PXI Attenuator/Preselector module

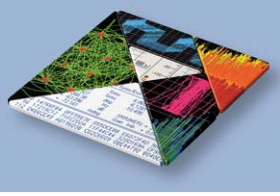
  PXI Downconverter modules

  PXIe IF Digitizer
- Measurement example using Agilent's PXI Vector Signal Analyzer and 89600 VSA software
- Characteristic performance
- Customer support and warranty information

The Modular Tangram

The four-sided geometric symbol that appears throughout this document is called a tangram. This seven-piece puzzle originated in China a few centuries ago. The goal is to create shapes—from simple to complex—that form an identifiable silhouette. As with a tangram, the possibilities may seem infinite as you begin to create a new test system. With a set of clearly defined elements—architecture, hardware, software—Agilent can help you create the system you need, from simple to complex.

DISCOVER the Alternatives ...
... Agilent **MODULAR** Products



Agilent's modular offerings: easy setup, test and maintenance benefits

Architecture

High performance, flexible architecture

To ensure that you get the best performance from your test platform, the entire path from the controller to the instrument has been designed for speed.

- PCI Express® IO path from the controller to the instrument enables high-speed connectivity from faster, less-expensive remote controllers.
- High-speed memory-mapped registers reduce firmware overhead and communication latency.
- Optimized software drivers.

Software...the choice is yours

Agilent provides you an open software environment with a variety of drivers for a range of applications that works with your choice of software.

Drivers

Agilent modular instruments come with IVI-COM, IVI-C, LabVIEW and MATLAB software drivers that work in the most popular T&M development environments including, Visual Studio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB. The instrument drivers provide context sensitive help as well as complete documentation and examples so you can get started quickly and complete complex tasks.

IO Libraries

Agilent IO Libraries Suite offers FAST and EASY connection to PXI modular instruments and traditional instruments. With multiple vendor I/O software installed, you get the best solution with Agilent's open IO Libraries Suite. During installation, the IO Libraries Suite automatically detects National Instrument's software and safely installs the Suite in a side by side mode allowing the existing I/O software and Agilent software to work together.

Vector Signal Analysis Software

Agilent's industry-leading vector signal analysis software (VSA) helps see through the complexity of emerging and existing industry standards. Serving as your window into complex signal interactions the VSA software enables:

- Measurement for more than 70 signal standards and modulation types
- Measurement clarity with 20:20 trace/marker capabilities
- Multi-Domain digital persistence and cumulative history traces
- Signal analysis virtually anywhere in block diagrams.

Software soft front panels

Agilent soft front panels provide easy to use instrument communications. The graphical user interfaces guide developers through module setup. Users can quickly configure the instrument parameters. More sophisticated functions are available through the instrument's numerous programmatic interfaces.

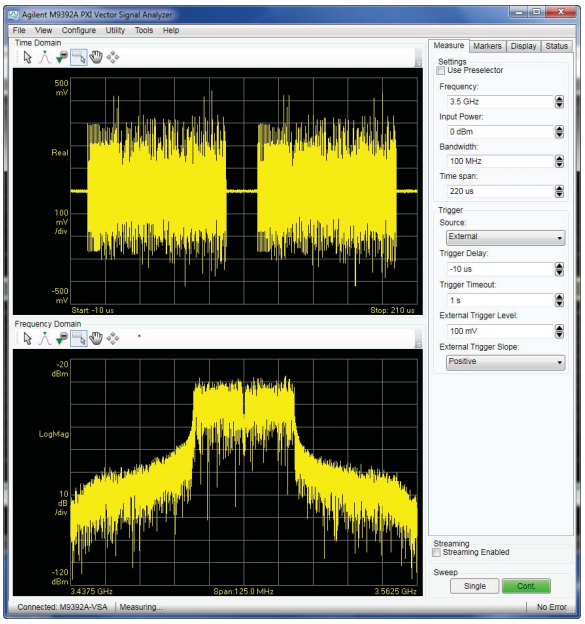


Figure 1. Agilent M9392A PXI Vector Signal Analyzer, software interface

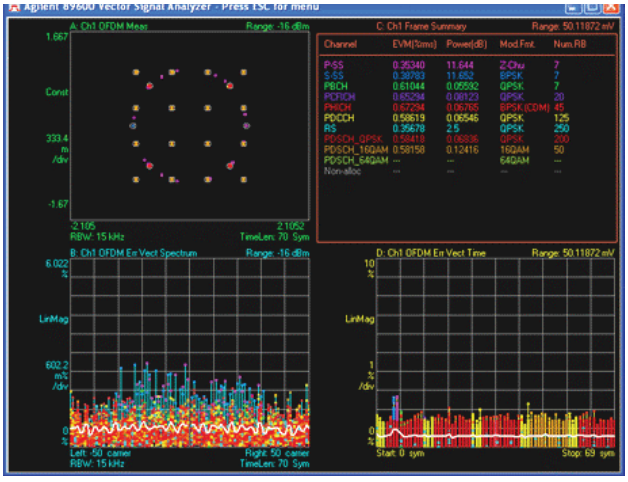


Figure 2. Agilent vector signal analysis software interface

Calibration intervals

Each module is individually factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate. A one year calibration cycle is recommended.

Agilent's Modular Products

Meet the M9392A PXI Vector Signal Analyzer

Figure 3. Agilent M9392A PXI Vector Signal Analyzer.

- ***Measurement Expertise:*** Benefit from the Agilent 89600 vector signal analysis software to characterize complex, time-varying signals with detailed and simultaneous spectrum, modulation and time waveform analysis
- ***Simple:*** Single vendor solution facilitates integration and simplifies technical support
- ***Open Standard:*** Modular and software-defined building blocks provide flexible system configurations to meet diverse test needs. Connector compatibility allows easy integration with other test and automation modules in PXIe Hybrid chassis, and the PXI form-factor conforms to government requirements for modular system design
- ***Fast:*** Reduced development time enabled with included drivers, soft front panels and programming examples in Visual Studio, with support for VisualStudio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB.

www.agilent.com/find/m9392a

Our goal is to deliver the measurements you need today and enable new capabilities not previously available. The new M9392A PXI Vector Signal Analyzer when combined with the new M9018A 18-slot PXIe chassis and Agilent 89600 VSA software, delivers a complete microwave vector signal analyzer solution enabling analysis of communicatins, radar, and avionics signals from 50 MHz to 26.5 GHz with 250 MHz of instantaneous bandwidth and up to 100 MHz streamed analog bandwidth. The M9392A PXI Vector Signal Analyzer system consists of the M9202A PXIe IF Digitizer, M9302A PXI Local Oscillator, M9360A PXI Attenuator/Preselector, and the M9361A and M9351A PXI Downconverter modules.

Real-time digital down conversion

The digital down-conversion (DDC) algorithm in the FPGA of the M9202A IF Digitizer improves analog performance such as spurious free dynamic range and signal-to-noise ratio as well as reduces data upload time. With the M9202A PXI Express backplane connection, the M9392A supports continuous data streaming to disk.

Long gapless signal capture

The M9392A provides up to 100 MHz bandwidth of continuous, compact, modular and cost-effective signal capture. It includes basic software tools to enable signal identification and signal export to analysis software such as the Agilent 89600 VSA.

Agilent's Modular Products

Meet the M9392A PXI Vector Signal Analyzer

Main Features and Benefits

Product features	Your benefit
Frequency range	50 MHz to 26.5 GHz
12-bit, 2 GS/s digitizer	Measure broadband communications and radar signals
Real-time digital down conversion (DDC) algorithm	Data decimation, analog performance improvement
100 MHz streamed analog bandwidth	Measure distortion products of more signals
PXI form-factor	Conforms to Modular Open Systems Approach (MOSA)
Chassis slot compatibility	cPCI(J1), PXI-1, PXIe Hybrid
Included drivers, soft front panels and programming examples in VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB	Easy integration and reduced development time
Seamless integration with Agilent 89600 VSA software	Immediate access to the industry's broadest, most advanced general-purpose and standards-based demodulation and signal analysis

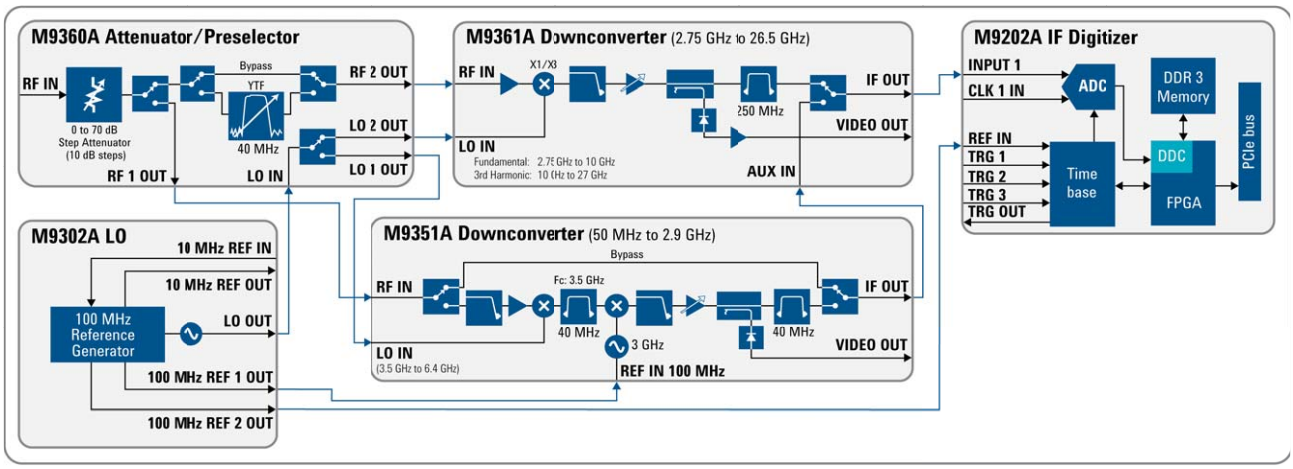


Figure 4. M9392A simplified block diagram.

Agilent's Modular Products

PXI Vector Signal Analyzer Modules

Models

M9302A PXI Local Oscillator

The Agilent M9302A PXI Local Oscillator (LO) is a VCO-based 3 GHz to 10 GHz LO optimized for fast settling time to allow for fast frequency down conversion applications. The fast switching time and low phase noise of this LO make it an ideal component of a microwave vector signal analyzer.

Main Features and Benefits

Product features	Your benefit
Frequency range	3 GHz to 10 GHz (under range 2.75 GHz)
Size	2 slot, 3U
Weight	2 lbs/1 kg
Tuning resolution	0.1 Hz
Frequency temperature stability	± 0.5 ppm (over 0 °C to 50 °C)
Settling time	1 ms, 500 µs typical
Phase noise	-115 dBc/Hz at 10 GHz, 10 kHz offset
Chassis slot compatibility	cPCI (J1), PXI-1, PXIe Hybrid

Customer values
Tuning resolution provides greater frequency accuracy
1 ms settling time speeds up your test time
Multiple programmatic interfaces enable easy integration into existing test environments and reduced development time
Included drivers, soft front panels and programming examples in Visual Studio, with support for VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Conforms to Modular Open Systems Approach (MOSA)

www.agilent.com/find/m9302a

M9302A LO

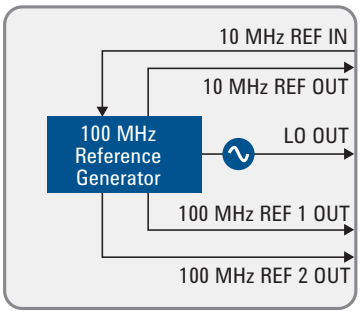


Figure 5. Simplifed block diagram of the M9302A PXI Local Oscillator.

Agilent's Modular Products

Models

M9360A PXI Attenuator/Preselector

The Agilent M9360A PXI Attenuator/Preselector provides attenuation and preselection signal conditioning for numerous system applications with an electronically tuneable, 4-stage, YIG-tuned filter (YTF) based RF-input pre-selector, and broadband switches for signal distribution. The M9360A provides the necessary input signal conditioning and routing for the Agilent M9351A and M9361A Downconverters.

Main Features and Benefits

Product features	Your benefit
Frequency range	100 kHz to 26.5 GHz
Size	3 slot, 3U
Weight	3.5 lbs/1.6 kg
Bandwidth (3 dB) preselector	35 MHz min, 120 MHz max (< 3 GHz)
	40 MHz min, 120 MHz max (≥ 3 GHz)
Bypass path	Automatically route signals around the band limited preselector for additional bandwidth
YTF path	2.7 GHz to 26.5 GHz
Step attenuator	70 dB
Chassis slot compatibility	cPCI (J1), PXI-1, PXIe Hybrid

Customer values
Multiple programmatic interfaces enable easy integration into existing test environments and reduced development time
Analyze large bandwidth signals
Included drivers, soft front panels and programming examples in Visual Studio, with support for VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Conforms to Modular Open Systems Approach (MOSA)

www.agilent.com/find/m9360a

M9360A Attenuator/Preselector

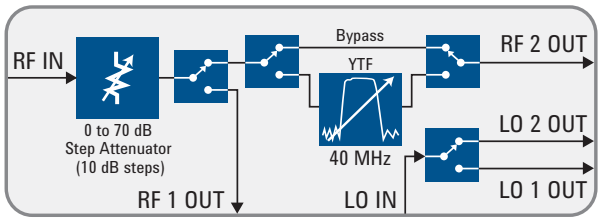


Figure 6. Simplifed block diagram of the M9360A PXI Attenuator/ Preselector.

Agilent's Modular Products

Models

M9351A PXI Downconverter

The Agilent M9351A PXI Downconverter converts RF signals from 50 MHz to 2.9 GHz into baseband frequency signals centered at an IF frequency of 500 MHz for use with Agilent's newest generation of PXI digitizers. The built-in pre-amp enables very low-level signal measurements, and the built-in calibration simplifies system power budget calculations.

Main Features and Benefits

Product features	Your benefit
Frequency range	50 MHz to 2.9 GHz
	50 MHz to 625 MHz (bypass mode), (useable to 1 MHz)
IF center frequency (user adjustable)	500 MHz, nominal
Size	1 slot, 3U
Weight	3.5 lbs/1.6 kg
Bandwidth	40 MHz (3 dB)
Built-in pre-amp	Able to acquire low-level signals
Image protected conversion	No need for a preselector
40 dB solid state IF attenuator with 0.5 dB steps	Fast IF power control
Chassis slot compatibility	cPCI (J1), PXI-1, PXIe Hybrid

Customer values
Multiple programmatic interfaces enable easy integration into existing test environments and reduced development time
Included drivers, soft front panels and programming examples in Visual Studio, with support for VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Conforms to Modular Open Systems Approach (MOSA)

www.agilent.com/find/m9351a

M9351A Downconverter (50 MHz to 2.9 GHz)

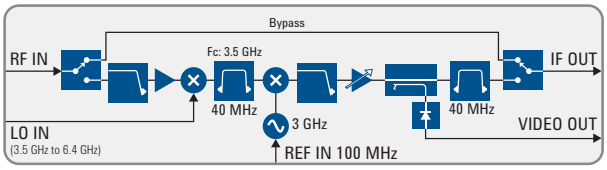


Figure 7. Simplifed block diagram of the M9351A PXI Downconverter.

Agilent's Modular Products

Models

M9361A PXI Downconverter

The Agilent M9361A PXI Downconverter converts microwave signals from 2.75 GHz to 26.5 GHz into baseband frequency signals centered at an IF frequency of 500 MHz for use with Agilent's newest generation of PXI digitizers. The built-in pre-amp enables very low-level signal measurements, and the built-in calibration simplifies system power budget calculations.

Main Features and Benefits

Product features	Your benefit
Frequency range	2.75 GHz to 26.5 GHz (under range to 2.25 GHz)
Size	1 slot, 3U
Weight	0.9 lbs/0.4 kg
IF center frequency (user adjustable)	500 MHz, nominal
Operating range	< 9.5 GHz: -160 dBm to -30 dBm (nominal)
	9.5 GHz to 26.5 GHz: -146 dBm to -30 dBm (nominal)
Built-in pre-amp	Able to acquire low-level signals
Fast IF power control with 40 dB solid state IF attenuator with 0.5 dB steps	Effectively route signals directly from other downconverters to a digitizer without external switching
Auxiliary input/switch for signal routing	
Chassis slot compatibility	cPCI (J1), PXI-1, PXIe Hybrid

Customer values
Multiple programmatic interfaces enable easy integration into existing test environments and reduced development time
Analyze large bandwidth signals
Included drivers, soft front panels and programming examples in Visual Studio, with support for VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Conforms to Modular Open Systems Approach (MOSA)

www.agilent.com/find/m9361a

M9361A Downconverter (2.75 GHz to 26.5 GHz)

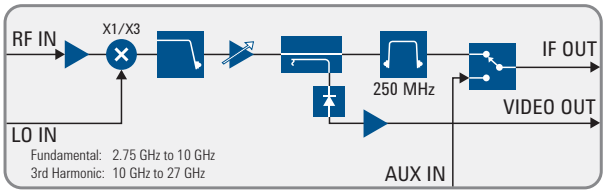


Figure 8. Simplifed block diagram of the M9361A PXI Downconverter.

Agilent's Modular Products

Models

M9202A PXIe IF Digitizer

The Agilent M9202A PXIe IF Digitizer is a 12-bit wideband IF digitizer running at 2 GS/s, with up to 1 GHz instantaneous analog bandwidth. The M9202A is featured with on-board signal processing capability and a large DDR3 memory. With its PXI Express backplane connection, the M9202A supports continuous data streaming to disk.

Main Features and Benefits

Product features	Your benefit
2 GS/s sampling rate	Fastest 12-bit PXIe Digitizer
Size	1 slot, 3U
Weight	0.8 lb/ 0.4 kg
Up to 1 GHz bandwidth	Able to capture wide bandwidth signals
512 MB DDR3 memory	Large on-board memory
Implemented digital down-conversion algorithm	Data decimation, SNR performance improvement
On-board Xilinx Virtex-6 FPGA	On-board processing capability
Software support for easy integration	Reduced development time
PXIe backplane	Fastest digitized data upload
Chassis slot compatibility	PXIe Hybrid, PXIe

Customer values
Multiple programmatic interfaces enable easy integration into existing test environments and reduced development time
Analyze large bandwidth signals
Included drivers, soft front panels and programming examples in Visual Studio, with support for VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Conforms to Modular Open Systems Approach (MOSA)

www.agilent.com/find/m9202a

M9202A IF Digitizer

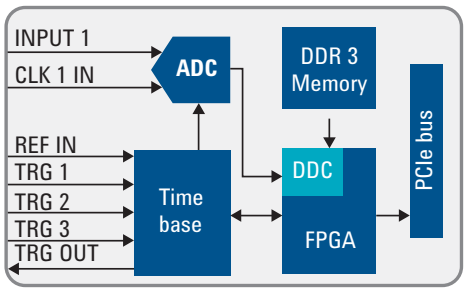


Figure 9. Simplified block diagram of the M9202A PXIe IF Digitizer.

Simple, user-friendly soft front panel display

The included soft front panel display quickly and easily displays the status of the modules, time and frequency domain traces of a measurement, allows for marker placement, and more.

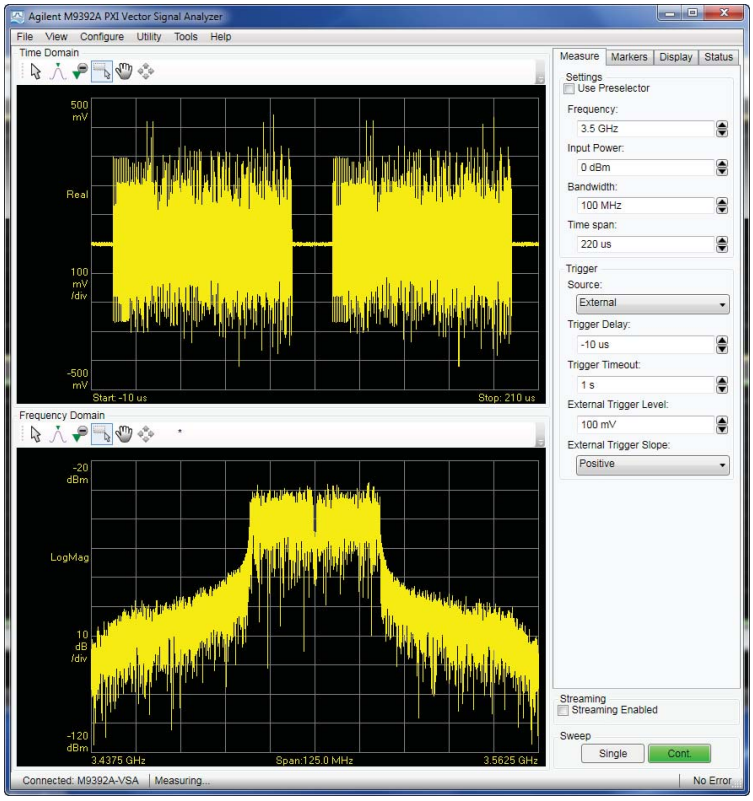


Figure 10. Agilent M9392A display of a WLAN signal measurement using the included soft front panel.

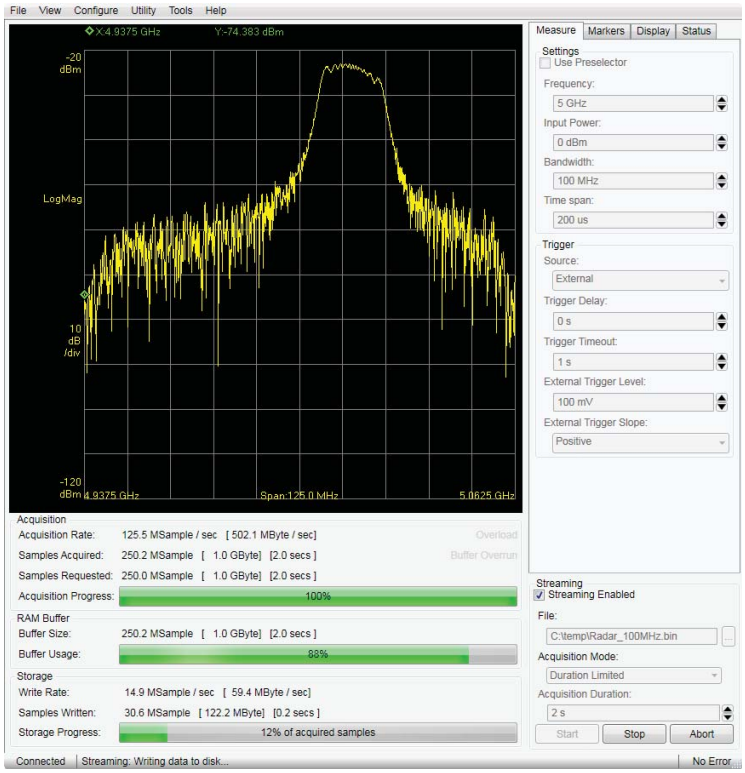


Figure 11. Agilent M9392A display of the status menu with streaming enabled.

Measurement Examples

Linear FM Chirp

In this example, the Agilent SystemVue radar modeling library is used to create a 250 MHz linear FM chirp signal that is downloaded into the M9330A Arbitrary Waveform Generator to create a wideband modulation signal. The differential outputs of the AWG are connected to the wide-band inputs of the E8267D PSG Vector Signal Generator. This signal is applied to the DUT and the M9392A measures the data from the output of the DUT. Analysis is done using the 89600 VSA software.

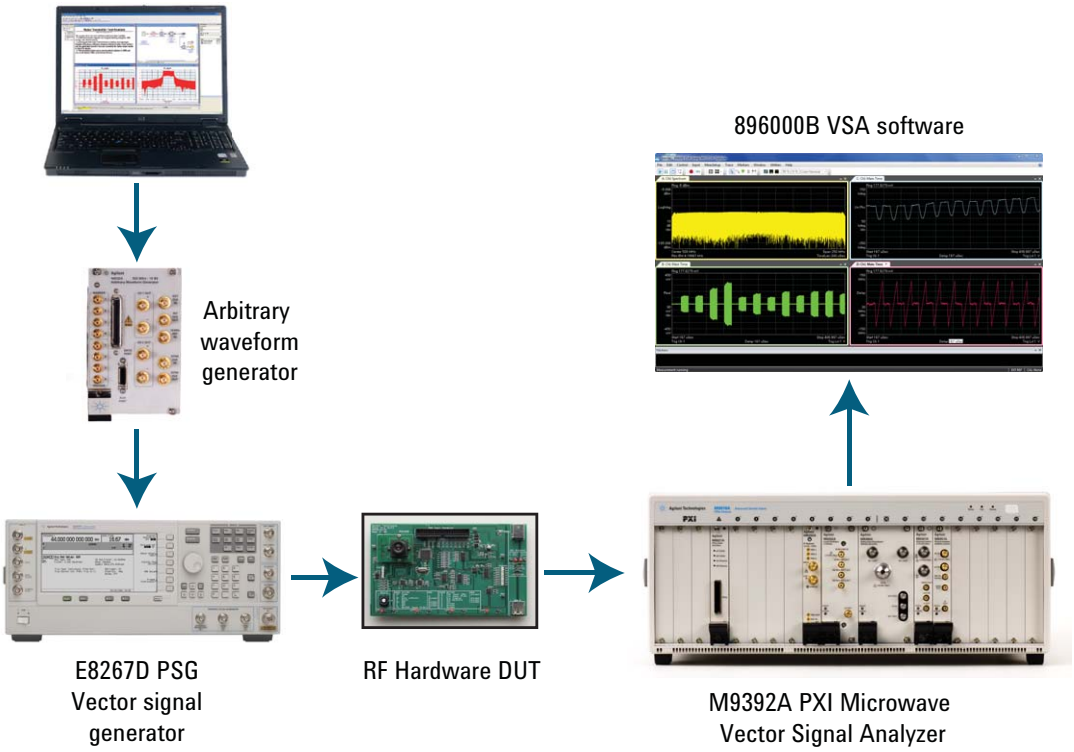


Figure 12. Simulate radar measurements using SystemVue, the M9330A Arbitrary Waveform Generator, and a signal generator; then capture the signal with the M9392A PXI Vector Signal Analyzer and display the results using the Agilent 89600 VSA software.

Figure 13. Spectrum, phase, frequency, and time domain displays of a chirped radar signal using the Agilent 89600 VSA software and the M9392A PXI Vector Signal Analyzer.

Long gapless signal capture

In this example, the Agilent SystemVue radar modeling library is used to create a 100 MHz linear FM chirp that is downloaded into the M9330A Arbitrary Waveform Generator (AWG) to create a wideband modulated signal.

The differential outputs of the AWG are connected to the wideband inputs of the E8267D PSG Vector Signal Generator. This signal is applied to the DUT and the M9392A measures the data from the output of the DUT. The data is then sent to a JMR RAID storage device as well as to a controller for viewing and analysis using the data viewer and 89601B VSA software.

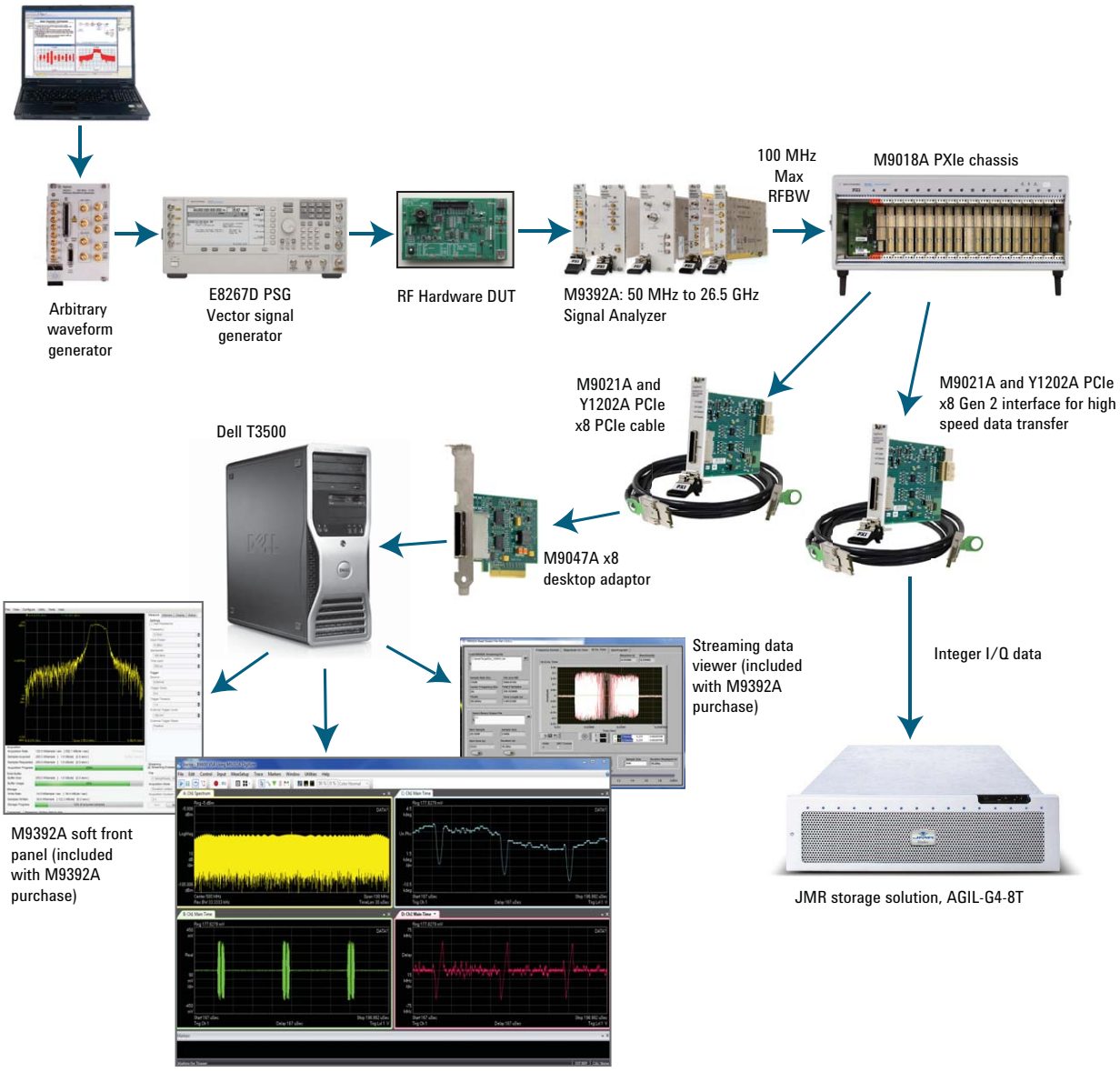
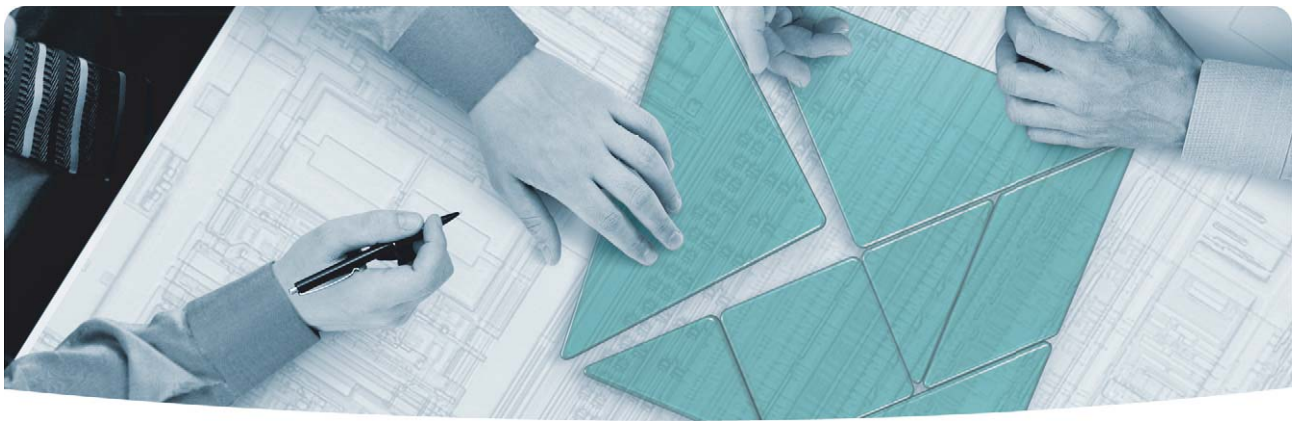


Figure 14. Simulate radar measurements using SystemVue, the M9330A Arbitrary Waveform Generator, and a signal generator; then capture the streamed data signal with the M9392A PXI Vector Signal Analyzer, store the results on a JMR RAID, and analyze using the Agilent 89600 VSA software.



Specifications and Characteristic Performance	
RF IN frequency range with optional M9351A	50 MHz to 26.5 GHz
Sample rate	2 GS/s
Analysis bandwidth	40 MHz (< 2.75 GHz)
	250 MHz (≥ 2.75 GHz)
Streamed analog bandwidth[1] Maximum Frequency band (50 MHz to 2.9 GHz) Frequency band (2.75 GHz to 26.5 GHz) Frequency band (2.75 GHz to 26.5 GHz)	 25 MHz 50 MHz, 100 MHz (option) (bypass YTF path) 25 MHz (YTF enabled)
Absolute amplitude accuracy at -10 dBm (bypass path)	± 0.6 dB, < 2.75 GHz, *(nominal)*, after field calibration (corrected)
	± 0.5 dB, 2.25 GHz to 2.75 GHz, BW > 40 MHz, *(nominal)*, after field calibration (corrected)
	± 0.5 dB, ≥ 2.75 GHz, *(nominal)*, after field calibration (corrected)
	± 2 dB, *(nominal)*, using auto path selection, without field calibration (uncorrected)
DANL (bypass path)	-158 dBm/Hz, ≤ 9.5 GHz, *(nominal)*
	-147 dBm/Hz, > 9.5 GHz, *(nominal)*
RF IN operating level	-160 to +30 dBm, *(nominal)*
REF IN frequency	10 MHz, *(nominal)*
REF IN impedance	50 Ω, *(nominal)*
Temperature range	0 °C to 50 °C (operating)
	-40 °C to +70 °C (non-operating)

1. Controller must be able to consume data at a rate ≥ 500 MB/s.

Definitions for specifications

Specifications describe the warranted performance of calibrated instruments that have been stored for a minimum of 2 hours within the operating temperature range of 0 °C to 50 °C, unless otherwise stated, and after a 45 minute warm-up period. Data represented in this document are specifications unless otherwise noted.

Characteristics *describe product performance that is useful in the application of the product, but that is not covered by the product warranty. Characteristics are often referred to as Typical or Nominal values.*

- ***Typical*** *describes characteristic performance, which 80% of instruments will meet when operated over a 20 °C to 30 °C temperature range. Typical performance is not warranted.*
- ***Nominal*** *describes representative performance that is useful in the application of the product when operated over a 20 °C to 30 °C temperature range. Nominal performance is not warranted.*

Note: All graphs contain measured data from several units at room temperature unless otherwise noted.

Ordering Information

	Model	Description
☑	M9392A[1]	PXI Vector Signal Analyzer: 50 MHz to 26.5 GHz with 50 MHz BW streaming
☑	M9302A[2]	PXI Local Oscillator: 3 GHz to 10 GHz
☑	M9360A[2]	PXI Attenuator/Preselector: 100 kHz to 26.5 GHz
☑	M9202A[2]	PXIe IF Digitizer: 2 GS/s, 1 GHz, 50 MHz BW streaming (with options -C01, -F02, -M05, -DDS, -V05)
☐	M9202A-V10	PXIe IF Digitizer: 100 MHz BW streaming option
☑	M9361A[2]	PXI Downconverter: 2.75 GHz to 26.5 GHz
☑	M9351A	PXI Downconverter: 50 MHz to 2.9 GHz
☑	89601B	VSA software
☑	89601B-200	Basic Vector Signal Analyzer
☑	89601B-300	Connectivity option
☑	89601B-AYA	Vector modulation analysis
☑	M9021A	PCIe Cable Interface
☑	M9018A	18-slot PXIe Chassis
☑	M9045A	PCIe ExpressCard Adaptor
☑	Y1200A	PCIe cable: x4 to x8, 2.0m (used with M9045A)

☑ *Recommended configuration*

1. For the M9392A to work properly, at least one PXI chassis and one PXI controller type must be available.
2. Included with purchase of M9392A.

Advantage Services: Calibration and Warranty

Agilent Advantage Services is committed to your success throughout your equipment's lifetime.

R1282A	Annual calibration
R-51B-001-3C	1 year return-to-Agilent warranty extended to 3 years
R-51B-001-5C	1 year return-to-Agilent warranty extended to 5 years

Figure 15. Agilent M9392A PXI Vector Signal Analyzer modules placed within the M9018A PXIe Chassis.

CUSTOMER SUPPORT AND WARRANTY INFORMATION

Customer Support

For your ease of ordering, the product information pages within this catalog come complete with product descriptions and model numbers. In addition, the ordering information includes: typical product configuration, typical system configuration, related products and accessories.

Product Information: www.agilent.com/findcontactus

or call 1 800 829-4444 US

Repair and Calibration: www.agilent.com/find/infoline

Parts and Accessories: www.parts.agilent.com

Email updates: www.agilent.com/find/emailupdate

For all modular products: www.agilent.com/find/modular

Advantage Services: Calibration and Warranty

What is covered by warranty?

Global Warranty

Agilent Technologies provides an excellent factory warranty with all of its test and measurement equipment. It provides the peace-of-mind that today's high-tech industry requires. Your investment is protected by Agilent's global reach in more than 100 countries (either directly or through distributors). Convenient, the warranty gives you standard coverage for the country in which the product is in use, eliminating the need to ship equipment back to the country of purchase. Agilent warranty services provide:

- All parts and labor necessary to return your instrument to full specified performance
- Recalibration for products supplied originally with a calibration certificate
- Return shipment

Warranty Coverage

Agilent warrants Agilent hardware products against defects in materials and workmanship and that Agilent hardware products conform to Agilent published specifications. Warranty does not cover visible abuse, negligence or shipping damage, nor does it apply to defects resulting from improper or inadequate maintenance or calibration by Customer or unauthorized parties, Customer-supplied software, interfacing or supplies, unauthorized modification or improper use of Product, operation outside of the published environmental specifications for the Product, or improper site preparation or maintenance by Customer. For specific operation environment specifications, refer to the product manual.

Advantage Services: Calibration and Warranty	
Agilent Advantage Services is committed to your success throughout your equipment's lifetime.	
R1282A	Annual calibration
R-51B-001-3C	1 year return-to-Agilent warranty extended to 3 years
R-51B-001-5C	1 year return-to-Agilent warranty extended to 5 years

www.agilent.com/find/advantageservices

The Modular Tangram

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DISCOVER the Alternatives ...
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