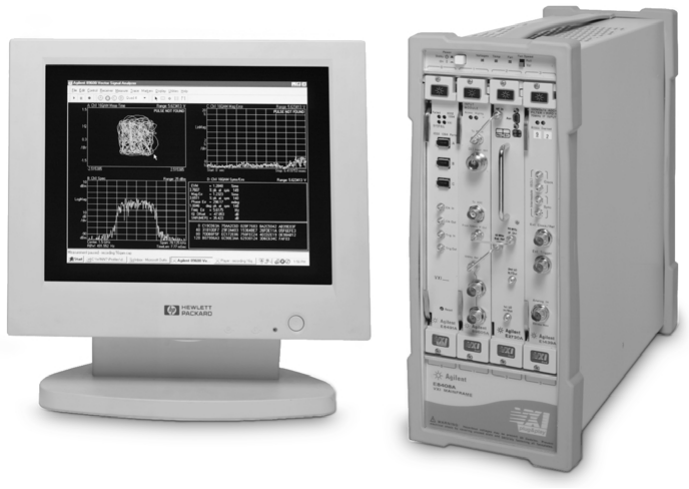
Agilent 89600 Series Vector Signal Analyzers

Configuration Guide

For engineers working with today's emerging broadband communication systems, the Agilent 89600 series vector signal analyzers (VSAs) are the indispensable tool for basic research, product development, manufacturing, and even field testing.



The 89000 VSAs may be ordered as pre-configured standard vector signal analyzers or as user-configured, factory integrated systems. This configuration guide contains the instructions and information required to configure a factory integrated VSA system. Configuring a system provides maximum flexibility for customers who want to determine the configuration of each piece of hardware and software that goes into their system. Pre-configured analyzers are designed to meet the needs of users who want the convenience of turnkey instrument-like ordering. Details of the pieces provided in the pre-configured, standard systems are included later in this guide.

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Agilent Technologies

Custom Configuring Your 89600

The following steps will help you configure your 89600 system. We recommend that you read the instructions for each step carefully. If you have questions, please contact your local Agilent representative.

Step 1 – Specify system reference model numbers

By including the no-cost system reference model numbers (quantity 1), you insure your order is integrated at the factory before it is shipped to you. Integration includes loading the operating system and analysis software on the system disk (if a controller is included in your configuration), setting all module addresses, inserting the modules in the mainframe, and testing the system.

Component	Order number	Notes
VSA system reference	89600S	Required.
Custom system	89600CS	Required.

Step 2 – Choose one system controller

You have three choices for a system controller. If you already own a PC (desktop or laptop) and want to use it to control your system, go to step 2A. If you want to purchase a laptop PC from Agilent to use as a controller, go to step 2B.

Step 2A – To use your own PC as a controller select from the following:
You can control an 89600 system with your desktop or laptop PC as long as it meets the requirements outlined in the "User-Supplied Controller Requirements" section of this configuration guide. You must also order one of the IEEE-1394 PC link to VXI interface configurations shown. Go to step 3.

Component	Order number	Notes
VXI I/O (required):		
IEEE-1394 PC link to VXI	E8491B	Provides VXI module and cable, assumes your PC has IEEE-1394 I/O built-in. Required to link user-supplied laptop or desktop PC with a VSA system.
	E8491B-001	Provides cable and PCI card for desktop. Required for desktop PC only.
	1150-7825	SIIG PCMCIA card (model NN2611) for laptop PC. Also see www.agilent.com/find/iolib for alternative laptop links.
	8121-0630	Six-pin-to-six-pin, six-foot firewire cable. Required for SIIG PCMCIA card only.

Step 2B – To use an Agilent-supplied laptop PC as a controller, select the following (available in the U.S. and Canada only):
This selection is for customers who want Agilent to provide a laptop PC to control their VSA system. Agilent loads the software and tests the laptop with the 89600 VSA system before shipment. You must also order an IEEE-1394 PC link to VXI interface to link the laptop to the VSA system. Go to step 3.

Component	Order number	Notes
Controller (required):		
Agilent-supplied laptop PC controller with IEEE-1394 interface	LTPC1	
IEEE-1394 PC link to VXI	E8491B	Required to link laptop PC and VSA system.

Step 3 – Select software configuration

Component	Order number	Notes
VSA software (required):		
VSA software	89601A	Includes one year of software support.
	89601A-100	Basic vector signal analysis option. One required per system. Note: Not required for upgrades.
To add VSA software options, choose from the following:		
Vector modulation analysis	89601A-AYA	
3G modulation analysis	89601A-B7N	
WLAN modulation analysis	89601A-B7R	
Dynamic link to EEsof/ADS	89601A-105	
To add VSA software support contract:		
89601AS	89601AS	Software support service. One year of software support included automatically with purchase of 89601A VSA software.
Software support contract	89601A-0RU	One month of software support. Must order at least 12 months but no more than 23 months. Provides automatic upgrade to all revisions released during length of contract. If you already own a VSA, this option also provides immediate upgrade of your 89601A software and options to current release.

Step 4 – Select a baseband, IF, or RF configuration

Step 4A – For a VXI RF VSA, select from the following:

A RF VSA system must have one RF input module (89605B), one RF tuner module (E2730, E2731), and one digitizer module (E1439) with a minimum of 144 MB of memory.

Component	Order number	Notes
RF channel with memory	89600-OC-RF	One required.
RF tuner (one required):		
20 – 2700 MHz	E2730	
20 – 6000 MHz	E2731	
RF input module	89605B	One required.
RF digitizer (one required)		
95 Msa/s ADC	E1439	One memory option required.
Add 144 MB memory	E1439-144	
Add 288 MB memory	E1439-288	
Add 1.2 GB memory	E1439-001	

Note: The digitizer module may also be used as an IF/baseband input. To add a second IF/baseband input to your RF VSA, go to step 4B.

Step 4B – For a VXI IF VSA, or to add a second IF/baseband channel to an RF VSA, select from the following:

An IF VSA system or a second IF/baseband channel for an RF VSA must have one digitizer module (E1439) with a minimum of 144 MB of memory and one RF input module.

Component	Order number	Notes
IF channel with memory	89600S-OC-IF	One required. Order two if you want two IF/baseband channels.
RF input module	89605B	One required.
RF digitizer (required):		
95 Msa/s ADC	E1439	One memory option required.
Add 144 MB memory	E1439-144	
Add 288 MB memory	E1439-288	
Add 1.2 GB memory	E1439-001	
Cable set:		
Second channel cable set	89600S-610	Required if you want two IF/baseband channels.
IF cable set	89605B-611	Includes SMA cable and BNC to SMA adapter to connect to external tuner.

Step 4C – For a VXI baseband only (DC – 40 MHz) VSA, select from the following:

A baseband only VSA system must have one baseband input module (89606B) and at least one digitizer (E1438) with a minimum of 144 MB of memory.

Component	Order number	Notes
Baseband channel with memory	89600CS-0C-BB	One required. Order two if you want two baseband-only channels.
Baseband input module (required):		
Baseband input module	89606B	For 1 or 2 baseband channels.
Baseband digitizer (required):		
100 Msa/s ADC, 144 MB memory	E1438-144	One memory option required.
100 Msa/s ADC, 288 MB memory	E1438-288	
100 Msa/s ADC, 1.2 GB memory	E1438-001	
Cable set:		
Cabling for second	89600S-610	Required only if you want a second baseband channel.

Step 5 – Select a mainframe

All VXI VSA systems must have a mainframe. To select a mainframe, you must know the number of mainframe slots your custom system will use. The worksheet below will help you determine the minimum number of slots needed for your configuration. Step 5A will guide you through selecting a mainframe with enough slots.

Component		Model number	Slots per module	X	Quantity of modules ordered	=	Slots needed
Controller	IEEE-1394 PC link to VXI with or without E8491B-001 (step 2A or B)	E8491B	1	X	_____	=	_____
Baseband input module (from Step 4C)	Baseband input module	89606B	1	X	_____	=	_____
Baseband digitizer (from Step 4C)	100 Msa/s ADC with or without Options E1438-144, -288, or -001	E1438	1	X	_____	=	_____
RF modules	20 – 6000 MHz RF tuner module	E2731	1	X	_____	=	_____
(from Step 4A)	20 – 2700 MHz RF tuner module	E2730	1	X	_____	=	_____
	RF input module	89605B	1	X	_____	=	_____
RF digitizer (from Step 4A/B)	95 Msa/s ADC, with Options E1439-144, -288, or -001	E1439	1	X	_____	=	_____
					Total number of mainframe slots required (sum of slots needed)		_____

Step 5A – Select a mainframe

Use the "Total number of mainframe slots required" determined in the worksheet, to guide your selection of a mainframe. The number of slots provided in the mainframe is given in the Component column.

Component	Order number	Notes
Mainframe (one required):		All options listed are required.
4-slot portable VXI mainframe	E8408A	133 mm H x 362 mm W x 558 mm D; 8.6 kg.
Backplane connector RF shield	E8408-80900	
Enhanced current supply	E8408A-001	175 W usable power.
13-slot C-size VXI mainframe	E8403A	352 mm H x 428 mm W x 631 mm D; 20 kg; 1000 W power supply.
Backplane connector shield	E1401-80918	

Configuration Examples

Example 1:

To configure a 2.7-GHz VSA system with a laptop PC that includes vector modulation analysis software, one RF channel, and the maximum high-speed digitizer memory, order:

Quantity	Order number	Slots required	Description
1	**89600S**	**0**	**Integrate one 89600S VSA consisting of:**
1	89600CS	0	Custom system.
1	LTPC1	0	Laptop PC.
1	E8491B	1	IEEE-1394 PC link to VXI.
1	89601A	0	Vector signal analysis software.
1	89601A-100	0	Basic vector signal analysis.
1	89601A-AYA	0	Vector demodulation analysis.
1	89600-OC-RF	0	RF channel with memory.
1	89605B	1	RF input module.
1	E2730	1	20 – 2700 MHz RF tuner module.
1	E1439	1	95 Msa/s ADC.
1	E1439-001	0	Add 1.2 GB time capture memory.
1	E8408A	n/a	4-slot, C-size VXI mainframe.
1	E8408-80900	n/a	Backplane connector RF shield.
1	E8408A-001	n/a	175 W usable power.

Example 2:

To configure a VSA system for use with your desktop PC that includes the vector modulation analysis, two baseband channels, one 6-GHz RF channel, and maximum high-speed digitizer memory, order:

Quantity	Order number	Slots required	Description
1	**89600S**	**0**	**Integrate one VSA consisting of:**
1	89600CS	0	Custom system.
1	E8941B	1	IEEE-1394 PC link to VXI.
1	E8941B-001	0	OHCI-based IEEE-1394/PCI card.
1	89601A	0	Vector signal analysis software.
1	89601A-100	0	Basic vector signal analysis.
1	89601A-AYA	0	Vector demodulation analysis.
1	89600-OC-RF	0	RF channel with memory.
1	89605B	1	RF input module for 89600-OC-RF.
1	E1439	1	95 Msa/s ADC for 89600-OC-RF.
1	E1439-001	0	Add 1.2 GB time capture memory for 89600-OC-RF.
1	E2731	1	20 – 6000 MHz RF tuner module for 89600-OC-RF.
1	89600-OC-IF	0	IF/baseband channel with memory.
1	89605B	1	RF input module for 89600-OC-IF.
1	E1439	1	95 Msa/s ADC for 89600-OC-IF.
1	E1439-001	0	Add 1.2 GB time capture memory for 89600-OC-IF.
1	89600S-610	0	Cabling for second IF/baseband channel
1	E8403A	n/a	13-slot C-size VXI mainframe.
1	E1401-80918	n/a	Backplane connector RF shield.

Adding to a System

You can add software and hardware to your 89600 series vector signal analyzer as long as you follow the rules given in the custom configuration section.

Adding VXI hardware modules to the 89600 VSA

To retrofit a second baseband input with 288 MB memory to an existing 89610A, order:

Quantity	Order number	Slots required	Description
1	E1438	1	100 Msa/s ADC.
	E1438-288	0	Add 288 MB of time capture memory.
	89600S-610	0	Cabling to add second channel.

To add an E2731 6.0 GHz RF tuner module to an existing 89611A, order:

Quantity	Order number	Slots required	Description
1	E2731A	1	20 – 6000 MHz RF tuner.

To add an E2731A 6.0 GHz RF tuner module to an exisiting 89640A, order:

Quantity	Order number	Slots required	Description
1	E2731A	1	20 – 6000 MHz RF tuner.
1	89605-69201	0	Exchange program that updates an 89605A module to 6.0 GHz operation. Not required for serial number prefix 4211 or greater, or for any 89605B.

Adding/updating software to the 89600 VSA

To retrofit WLAN modulation analysis software (Option 89601A-B7R) to an existing 89610A, 89640A, or 89641A, order:

Quantity	Order number	Slots required	Description
1	89601A-B7R	0	Adds WLAN modulation analysis to 89610A/11A/40A/41A.

To update the 89601A vector signal analysis software and all installed options order:

Quantity	Order number	Slots required	Description
1	89601AS	0	Software support service.
12	89601AS-ORU	0	One year software support contract purchased in monthly increments (12 month minimum order). Provides immediate upgrade of 89601A software and options to current release. Also provides automatic upgrade to all revisions released during length of contract.

Controlling an Agilent signal generator from an 89600 VSA

Any VSA system, with version 4.00 software or above, can control certain Agilent series signal generators. This control expands the usefulness of the VSA for stimulus/response measurements. The VSA controls the signal type, frequency, and level features of the signal generator and downloads files to the signal generator modulation source to simulate a wide range of digitally modulated signals. The files can be 89600 signal captures or even simulated waveforms from ADS design software.

Playback requires that the arbitrary waveform generator be installed in the signal generator. Signal playback bandwidth is limited by the bandwidth of the arbitrary waveform generator.

The signal generator can be controlled via GPIB or LAN.

See the figures on the next page for typical connections.

Compatible signal generators

Type	Models	Notes
ESG Series digital RF signal generators	E4431B, E4432B, E4433B, E4434B, E4435B, E4436B, E4437B, E4438C	Requires firmware version B.03.50 or later and must include the arbitrary waveform generator Option E44xx-UND with firware version 1.2.92 or later.
PSG Series microwave signal generators	E8267C	Requires Option E8267C-002 internal baseband generator.

PC interface and cables (GPIB and LAN)

Component	Model number	Notes
PCI High performance GPIB interface card for Windows 95/98/NT/2000/XP	82350A	Use when controller is a desktop PC. Requires one PCI slot in PC. Must also order GPIB cable (10833A).
GPIB Cardbus interface	NI778034-2	Use when controller is a laptop PC. Requires one empty PCMCIA slot and Windows 2000 or XP Professional OS. Includes a two-meter cable. Order from National Instruments Company.
GPIB cable	10833A	One meter GPIB cable for connecting the analyzer to the PC. Not needed if PC GPIB card comes with a cable. Not needed with USB/GPIB interface.
USB/GPIB interface	82357A	Requires USB port and Windows 2000 or XP Professional.
LAN cross-over cable	8121-0545	
LAN/GPIB gateway I/O libraries for MS Windows	E5810A	LAN/GPIB gateway.

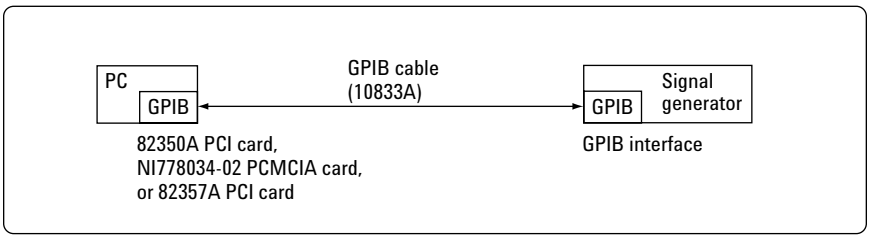


Figure 1. Typical GPIB connection (see 89600 user manual for detailed installation instructions)

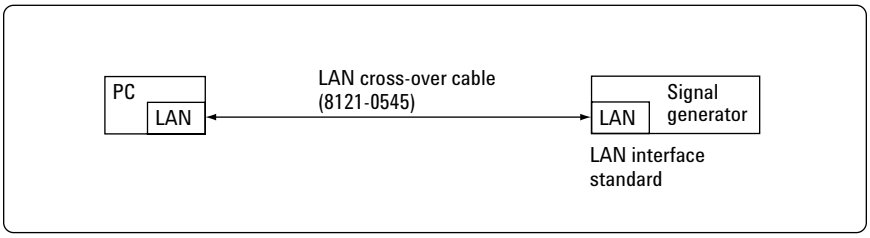


Figure 2. Typical LAN connection (see 89600 user manual for detailed installation instructions)

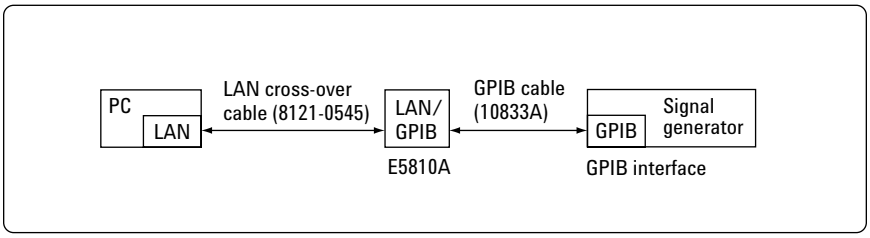


Figure 3. Typical GPIB to LAN connection (see 89600 user manual for detailed installation instructions)

Controlling other Agilent analyzers using 89601A signal analysis software

The 89601A vector signal analysis software used in the 89600 vector signal analyzers can link to several other Agilent analyzers via GPIB or LAN. This teaming adds the 89601A advanced vector modulation analysis capabilities to the feature set of the analyzer.

The following tables list the analyzers the software can link with and the cables and PC interfaces needed to complete the links.

See the figures on page 13 for typical connections.

Compatible analyzers

Analyzers	Models	Connection
ESA-E series Spectrum Analyzers	E4402B, E4404B E4405B, E4407B	GPIB
PSA series High Performance Spectrum Analyzers	E4440A, E4443A, E4445A, E4446A, E4448A	GPIB/LAN
VSA Transmitter Tester	E4406A	GPIB/LAN
Infiniium Scopes	54810A, 54845A/B, 54846A/B, 54830B/D, 54831B/D, 54832B/D	GPIB/LAN

PC interface and cables (GPIB and LAN)

Component	Model number	Notes
PCI High performance GPIB interface card for Windows 95/98/NT/2000/XP	82350A	Use when controller is a desktop PC. Requires one PCI slot in PC. Must also order GPIB cable (10833A).
GPIB Cardbus interface	NI778034-2	Use when controller is a laptop PC. Requires one empty PCMCIA slot and Windows 2000 or XP Professional OS. Includes a two-meter cable. Order from National Instruments Company.
GPIB cable	10833A	One meter GPIB cable for connecting the analyzer to the PC. Not needed if PC GPIB card comes with a cable. Not needed with USB/GPIB interface.
USB/GPIB interface	82357A	Requires USB port and Windows 2000 or XP Professional.
LAN cross-over cable	8121-0545	
LAN/GPIB gateway I/O libraries for MS Windows	E5810A	LAN/GPIB gateway.

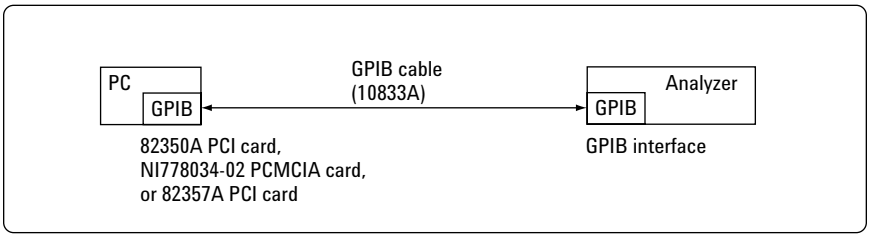


Figure 4. Typical GPIB connection (see 89600 user manual for detailed installation instructions)

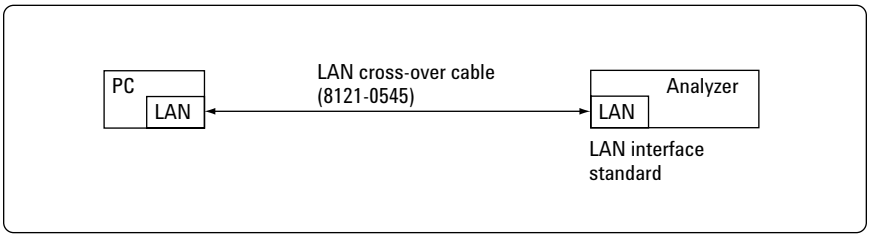


Figure 5. Typical LAN connection (see 89600 user manual for detailed installation instructions)

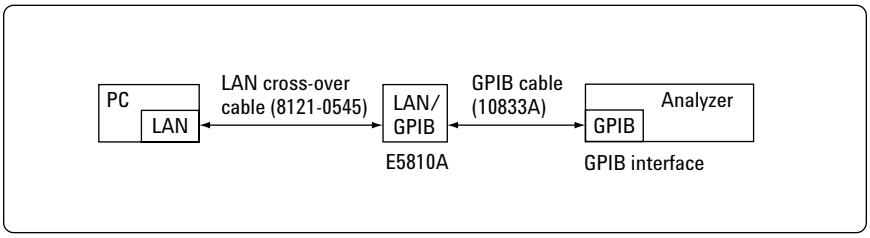


Figure 6. Typical GPIB to LAN connection (see 89600 user manual for detailed installation instructions)

Standard Vector Signal Analyzers

Agilent's pre-configured standard VSA systems come with factory-configured and tested hardware. Simply install the software and I/O card on your PC, and you're ready to start making measurements.

The 89600 VSAs include four pre-configured instruments:

89610A DC – 40 MHz baseband vector signal analyzer

89611A 52 – 88 MHz IF vector signal analyzer

89640A DC – 2700 MHz RF vector signal analyzer

89641A DC – 6000 MHz RF vector signal analyzer

These analyzers include the following:

- Pre-configured measurement front-end hardware in a VXI mainframe.
- Agilent VSA software on CD-ROM.
- IEEE-1394 high-speed interface PCI card, to be installed in user's PC. Includes 4.5 meter cable. *Other VXI controller interfaces, such as GPIB and MXI-2, are currently unsupported for 89600 VSAs.*
- Complete user documentation and getting-started video.

	89610A	**89611A**	**89640A**	**89641A**
Frequency range	DC – 40 MHz	52 – 88 MHz	DC – 2700 MHz	DC – 6000 MHz
Max instantaneous bandwidth	39 MHz	36 MHz	36 MHz	36 MHz
Input channels allowed	2	2	2	2
Components				
E8408A four-slot VXI with E8408A-001 mainframe (enhanced current for –5.2 V supply)	X	X	X	X
E8403A 13-slot VXI mainframe (required for 2nd IF/baseband channel)		X	X	X
E8491B IEEE–1394 Controller/Interface module with E8491B-001 (OHCI-based PCI card)	X	X	X	X
E1438 100 Msa/s digitizer module with 144 MB memory	X			
E1439 95 Msa/s digitizer module with 144 MB memory		X	X	X
E2730A RF tuner module			X	
E2731A RF tuner module				X
89605B RF input/calib module		X	X	X
89606B baseband input/calib module	X			
89601A vector signal analysis software	X	X	X	X

Vector Signal Analyzer Options

Vector modulation analysis:

Provides comprehensive analysis of a wide variety of digitally modulated signals, ranging from simple BPSK to 256QAM and more.

Vector modulation analysis 89601A-AYA

3G modulation analysis:

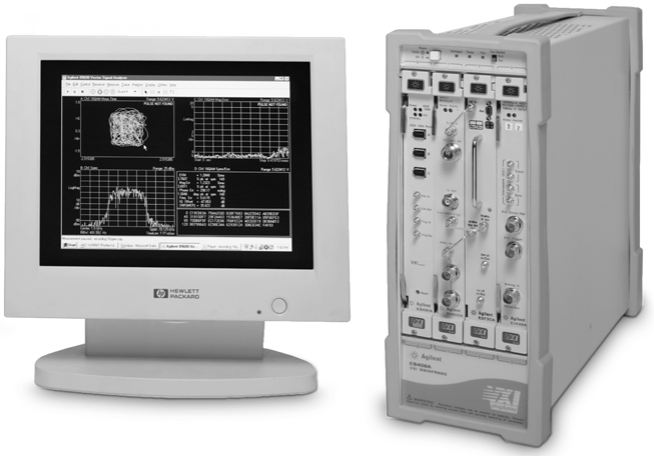
Provides flexible analysis of W-CDMA, TD-SCDMA, 1xEV-DO, and cdma2000 communication formats.

3G modulation analysis 89601A-B7N

WLAN modulation analysis:

Provides analysis of 802.11a, 802.11b, 802.11g, and HiperLAN2 WLAN signaling formats.

WLAN modulation analysis 89601A-B7R



Memory expansion:

Provides additional high-speed RAM for increased depth of real-time signal capture.

144 MB time capture memory E143x-144

288 MB time capture memory E143x-288

1.2 GB time capture E143x-001

Where x = 8 or 9

Dynamic link to EEsof/ADS:

Allows your Agilent vector signal analyzer to operate both as a stand-alone instrument and as an embedded "virtual" instrument for the Agilent/EEsof Advanced Design System EDA software. *Requires Option AYA, vector modulation analysis.*

Dynamic link to EEsof/ADS 89601A-105

User-Supplied Controller Requirements

The 89600 VSAs require a PC to control the hardware and display results. You can use your PC for this task. The following are the minimum requirements for a user-supplied PC.

For best immunity to electrostatic discharge (ESD), use a desktop PC.

	Desktop	Laptop
CPU	180 MHz Pentium®, or AMD-K6 (> 300 MHz recommended)	> 300 MHz Pentium, or AMD-K6
Empty slots	1 PCI-bus slot (two recommended)	1 CardBus Type II slot (two recommended)
RAM	192 MB (256 MB recommended)	192 MB (256 MB recommended)
Video RAM	4 MB (8 MB recommended)	4 MB (8 MB recommended)
Hard disk space	100 MB available	100 MB available
Operating system	Microsoft Windows 2000 Windows NT 4.0 (service pack 6a or greater required), or XP Professional	MIcrosoft Windows 2000 or XP Professional
Additional drives	CDROM or 3.5 inch floppy (if no network access available)	CDROM or 3.5 inch floppy (if no network access available)
Interface support		IEEE-1394-1995[1]

1. For a list of supported interfaces, see www.agilent.com/find/iolib or contact your local Agilent call center or sales office.

Licensing

Agilent VSA software is licensed for use on a single PC. During installation, you will be provided an immediate 14-day license, longer for a software upgrade, plus instructions for contracting Agilent to obtain your permanent license. Networked and site licenses are currently unavailable.

Software Support Contracts

Software support contracts for Agilent VSA systems are available. Refer to step 3, "Select software configuration," for ordering instructions or contact your local Agilent representative.

Warranty

Agilent warrants our hardware, accessories and supplies to be free from defects in materials and workmanship. Agilent will, at its option, either repair or replace products that prove to be defective. In general, products must be returned to Agilent for repair. On-site service contracts are available. Please contact your Agilent representative for more information.

Agilent also warrants our software will not fail to execute its programming instructions after the date of purchase, for the period specified in the following table, due to defects in material and workmanship. Agilent will replace software media which does not execute its programming instructions due to such defects. The warranty periods for the products contained in a custom configured 89600S VSA system vary. Consult the table for information on specific products.

Warranty period in months.

Item	Description	Warranty period (months)
89601A	VSA software and options	3
89605B	RF input module	36
89606B	Baseband input module	36
E1438	100 Msa/s baseband digitizer and options	36
E1439	95 Msa/s RF digitizer and options	36
E2730	2.7 GHz RF tuner	36
E2731	6 GHz RF tuner	36
E8403A	VXI mainframe and options	36
E8408A	VXI mainframe and options	36
E8491B	IEEE-1394 PC link to VXI and options	36
LTPC1	Laptop PC	3
82350A	GPIB interface	36
89610A	Standard VSA system (0 – 40 MHz)	36
89611A	70 MHz IF standard VSA system (52 – 88 MHz)	36
89640A	Standard VSA system (20 – 2700 MHz)	36
89641A	Standard VSA system (0 – 6000 MHz)	36

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Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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