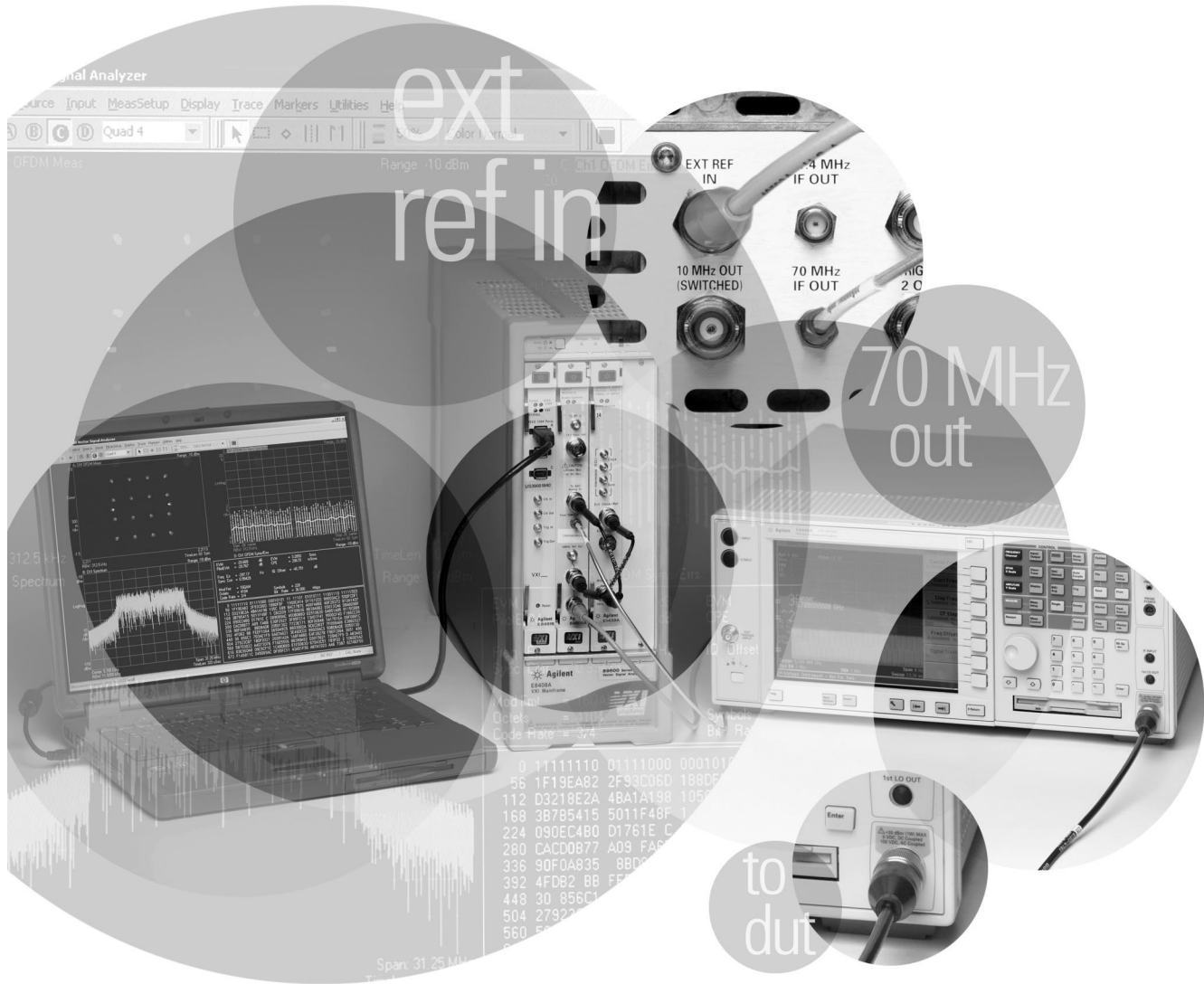


Agilent 89611A 70 MHz IF Vector Signal Analyzer

Product Overview

For use with external downconverters
that have a 70 MHz IF output



Agilent 89611A 70 MHz IF vector signal analyzer

The Agilent 89600 series PC-based vector signal analyzers (VSAs) are noted for their cutting-edge digital signal processing features, particularly for emerging communications standards. You can take advantage of these features by using your own downconverter to provide an IF signal at a nominal 70 MHz to the 89611A. The 89611A performs digitization of the IF signal and signal recording, and its software gives you full access to a wide range of vector signal analysis tools.

89600 series VSAs

For engineers working with today's emerging broadband communications systems, the 89600 series vector signal analyzers are the indispensable tools for basic research, product development, manufacturing and field testing.

Along with wide IF bandwidths (36 MHz), this family of VSAs offers signal capture memory, IF triggering, a wide variety of analog and digital demodulators, and an extensive set of time, frequency and modulation analysis tools. These capabilities make these VSAs ideal for evaluating narrowband and broadband digital communications signals.

You can analyze a wide variety of standard and non-standard signal formats. Twenty-three standard signal presets cover GSM, GSM (EDGE), cdmaOne, cdma2000, W-CDMA, 802.11a, 802.11b, HiperLAN1, HiperLAN2 and more. For emerging standards, these VSAs offer 24

digital demodulators with variable center frequency, symbol rate, filter type and alpha/BT. A user-adjustable adaptive equalizer is also provided.

You can also perform time domain analysis on your designs. Evaluate pulse shape with the Main Time display, select specific portions of a burst for demodulation or other analysis with the Time Gating feature, and use statistical tools like CCDF and CDF to characterize the noise-like behavior of your modern communications signals.

Simplify the characterization of your signals with the frequency domain analysis tools in the 89600 series VSAs. Match the measurement span to your signal bandwidth, thus maximizing signal-to-noise ratio (SNR), with the wide selection of spans available in these analyzers. Resolution bandwidths down to less than 1 Hz provide all the resolution needed for frequency domain investigations. A PSD (power spectral density) function is useful for estimating the level of the noise floor when calculating SNR. And a spectrogram display is provided for monitoring the wideband behavior of hopping or transient signals over time.

The modulation domain analysis tools allow you to quickly evaluate and troubleshoot digitally modulated signals. Examine symbol behavior with trellis/eye diagrams. Use the constellation and vector diagrams for an overall indication of signal behavior and clues to the cause of a problem. Take advantage of the EVM (error vector magnitude), EVM spectrum and EVM time capabilities for a more sensitive examination of signal errors.

If you are familiar with Microsoft® Windows® applications, you can quickly master an 89600 series VSA. Just load the software on your PC and connect it via the IEEE 1394 interface to the VSA's VXI hardware, and you're up and running.

Look to the 89600 series vector signal analyzers when the job requires analysis of complicated signals. Whether you're evaluating IEEE 802.11a, cdma2000, GSM or DECT signals, or a signal for an emerging standard, the 89600 series VSAs provide the tools you need to do the job right. And the PC-based graphical user interface makes using the tools a lot less complex than the signals you'll be evaluating.

89601AS software update service

The 89601AS software update service helps you get the most out of your investment by keeping your 89600 series VSA current with new enhancements. This product provides automatic notification and shipment of new software upgrades as soon as they become available. A detailed installation procedure is included with each shipment to speed the software loading process.

One year of the software update service is provided free with each 89611A.

Configuration

The 89611A IF VSA bundle consists of the following standard pieces:

- 89601A vector signal analysis software with Option 100 (vector signal analysis)
- E8408A 4-slot, C-size, VXI mainframe with Option 001 (enhanced current supply) and Option 918 (installed backplane connector shields)
- E8491B IEEE 1394 PC link to VXI, C-size with Option 001 (OHCI-based IEEE 1394/PCI card)
- E1439A VXI 70 MHz IF digitizer
- 89605B RF input module with Option 611 (cable adapter kit)
- 89601AS software update service for 1 year (Option 0RU, quantity 12).

The 89611A requires a user-supplied downconverter with a nominal 70 MHz (± 18 MHz) IF. It also requires a user-supplied PC.

Minimum requirements for a user-supplied desktop PC are:

- 180 MHz Pentium, or AMD-K6, CPU (>300 MHz CPU recommended)
- One empty PCI-bus slot (2 slots recommended)
- 192 MB RAM (256 MB recommended)
- 4 MB video RAM (8 MB recommended)
- Hard disk with 100 MB available space
- Microsoft Windows NT® 4.0 (Service Pack 5 or greater required) or Windows 2000
- CD-ROM drive (can be provided via network access)
- 3.5-inch floppy disk drive (can be provided via network access)

The 89611A may also be used with a laptop PC. Minimum requirements for a user-supplied laptop PC:

- 300 MHz Pentium, or AMD-K6, CPU
- One empty Cardbus Type II slot (2 slots recommended)
- 192 MB RAM (256 MB recommended)
- 4 MB video RAM (8 MB recommended)
- Microsoft Windows 2000

- CD-ROM drive (can be provided via network access)
- 3.5-inch floppy disk drive (can be provided via network access)
- Supported IEEE 1394-1995 interface (may not be available in all places worldwide). See www.agilent.com/find/iolib for a list of supported interfaces.

Note that use with a laptop requires an 89600S custom VSA system. See the *Agilent 89600 Series Vector Signal Analyzers Configuration Guide* (literature number 5968-9350E) for complete details.

System connections

The 89611A VSA can be used with an Agilent PSA series spectrum analyzer equipped with special Option H70 (70 MHz IF output), or with external downconverters. The system connections for these two configurations are shown in Figures 1 and 2.

The 89611A provides only the 89600 series vector signal analysis application. The swept spectrum application is not supported.

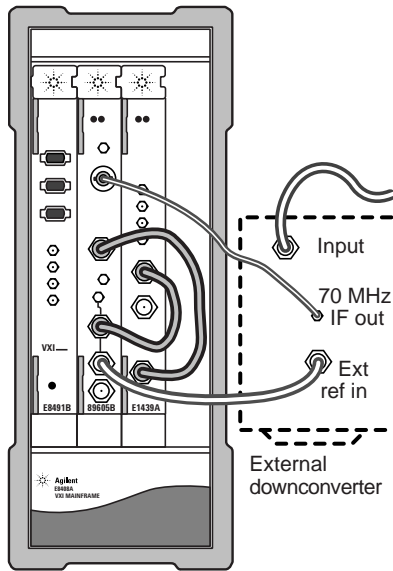


Figure 1. 89611A with customer-supplied downconverter

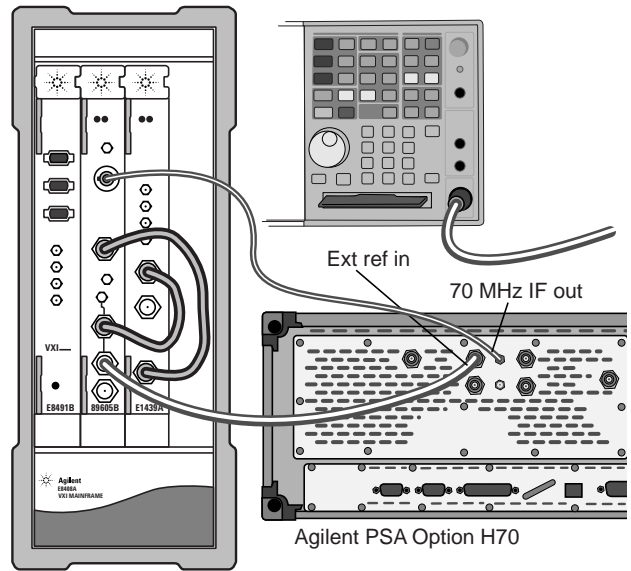


Figure 2. 89611A connected to Agilent PSA series spectrum analyzer with Option H70 (70 MHz IF output)

89611A with PSA series Option H70

The 89611A comes standard with the ability to control any Agilent PSA series spectrum analyzer configured with Option H70. Connection is possible via LAN or GPIB (Figure 3).

When the PSA series spectrum analyzer configured with Option H70 is being controlled by the 89611A running 89601A VSA software, users have control of the following features on the spectrum analyzer:

Frequency: The correct frequency will display on the 89600 VSA software GUI (graphical user interface).

Span: 36 MHz. This takes advantage of the PSA series spectrum analyzer's wideband architecture.

Input attenuator and ADC gain: Available indirectly through input range feature of 89601A software.

Triggering: IF magnitude, external front/rear, hold-off, level, delay and slope.

External reference:

10 MHz (may be input to 89611A or the spectrum analyzer).

Calibration

Overload detection

Time record length/ resolution bandwidth

The front panel keys of the spectrum analyzer are disabled. You can gain access to them by choosing **Disconnect** on the VSA software's control menu.

89611A with user-supplied downconverter

If the 89611A is being used with a user-supplied downconverter, no direct control of the downconverter is provided. The user is responsible for controlling the downconverter manually.

However, users can manually enter the IF center frequency and RF-to-IF gain. These features allow traces to have the proper x- and y-axis annotation.

Calibration

The 89611A self-calibrates its IF path. Regardless of the downconverter you use, it can also accept external files to apply amplitude compensation or correct for the frequency response of the external downconverter.

Instructions for performing amplitude compensation are included in the online Help (under "89611, setup" in the index), which is installed along with the 89600 series VSA software. The software, online Help and installation guide are provided on the demo CD (literature number 5980-1989E). The procedure requires the use of a sine wave with a known level at the desired center frequency.

You can characterize and compensate for your downconverter or other frequency-translating device by supplying frequency response data in a file with the appropriate headers and data. The format for this file is given in the Help text. For more information about this process, see Agilent Application Note 1287-7, *Improving Network Analysis Measurements of Frequency Translating Devices* (literature number 5966-3318E).

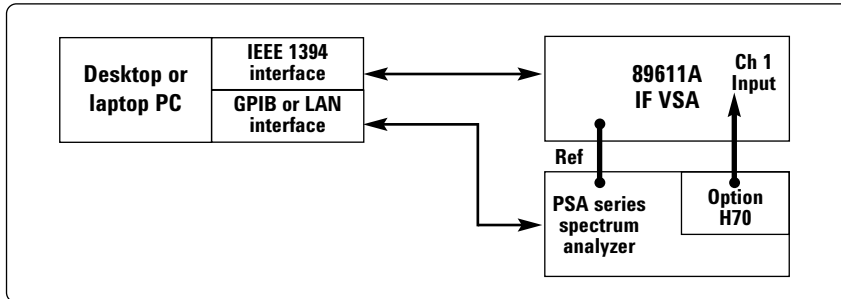


Figure 3. PSA series spectrum analyzer with the 89611A. Either GPIB, a point-to-point LAN connection or connection to a multipoint LAN network may be used to control the spectrum analyzer.

Key specifications

Frequency range	
Band 1	70 ±18 MHz ¹
Band 2	dc to 36 MHz ²
Frequency stability (spectral purity)	
Phase noise, 10 MHz input (typical)³	
100 Hz offset	<-108 dBc/Hz
1 kHz offset	<-118 dBc/Hz
>10 kHz offset	<-120 dBc/Hz
Phase noise, 70 MHz input (typical)³	
100 Hz offset	<-92 dBc/Hz
1 kHz offset	<-102 dBc/Hz
>10 kHz offset	<-110 dBc/Hz
Amplitude accuracy	
Accuracy specifications apply with flat-top window selected. Amplitude accuracy is the sum of absolute full-scale accuracy and amplitude linearity.	
Absolute full-scale accuracy	
Band 1	
0 – 50° C	±0.8 dB
Band 2	
0 – 50° C	±0.8 dB
Amplitude linearity	
0 to -30 dBfs	±0.10 dB
-30 to -50 dBfs	±0.15 dB
-50 to -70 dBfs	±0.20 dB
Flatness	
Frequency response across the measurement span in vector signal analysis mode (included in amplitude accuracy specifications).	
Bands 1,2 (typical)	±0.2 dB
Amplitude frequency correction	
External frequency correction is available to correct for downconverter signal path imperfections. The user must provide a calibration trace file. Details are given in the online Help (under “calibration, external IF” in the index), also available on the demo CD (literature number 5980-1989E).	

1 The analyzer can be configured to display and accept frequency settings based on the user's RF analysis band.

2 Overrange provided to 37.11 MHz

3 Characterized for systems using Agilent E8408B VXI mainframe with Options 001 and 918; for other mainframes, figures shown are typical.

Dynamic range	
Dynamic range indicates the amplitude range that is free of erroneous signals within the measurement bandwidth	
Intermodulation distortion	
(Two input signals, each -6 dBfs to -10 dBfs, separation >1 MHz. Specified relative to either signal, 20 – 30° C)	
Third-order, bands 1 and 2	<-70 dBc <-67 dBc (0–50° C)
Second-order, band 1	<-64 dBc (0–50° C)
Second-order, band 2 (<30 MHz)	<-70 dBc
Harmonic distortion	
(Single input signal, 0 to -10 dBfs, 20 – 30° C)	
Bands 1, 2	<-70 dBc
Spurious responses	
(Full-scale input signal within analyzer frequency range)	
Bands 1,2	<-70 dBc
Spurious sidebands	
(Full-scale input signal) ⁴	
Band 1 (>1 kHz offset)	<-70 dBc
Band 2 (>1 kHz offset)	<-70 dBc
Residual responses	
(Input port terminated and shielded, >10 kHz)	
Bands 1,2	maximum of -77 dBfs or -100 dBm
Input noise density	
(Range ≥-30 dBm)	
Band 1	<-118 dBfs/Hz
Band 2 (>0.1 MHz)	<-122 dBfs/Hz
Sensitivity	
(Most sensitive range)	
Band 1	<-159 dBm/Hz
Band 2	<-152 dBm/Hz
Phase linearity	
Group delay deviation across maximum measurement span, using flat-top window.	
Band 1 (typical)	±6 ns
Band 2 (typical)	±2 ns

4 Specified for systems using Agilent E8408B VXI mainframes with Options 001 and 918; for other mainframes, figures shown are typical.

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