Select the Right Agilent Signal Analyzer for Your Needs

Selection Guide

Models

ESA-L Series
ESA-E Series
856x EC Series
PSA Series
89600 Series
89400 Series
E4406A

Agilent Technologies

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How a vector signal analyzer differs from a spectrum analyzer

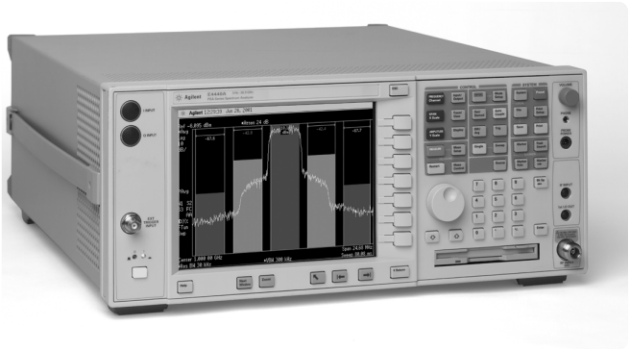
Traditional spectrum analyzers have a swept-tuned architecture, a higher frequency range and wider dynamic range than vector signal analyzers, and usually better RF characteristics overall.

A vector signal analyzer's strength lies in its ability to perform signal analysis separately from signal acquisition, its ability to demodulate complex and time-varying signals, and to preserve both the magnitude and phase information of a signal in order to perform advanced time-, frequency-, and modulation-domain analysis.

Analyzer Family Overviews

Spectrum analyzers

PSA Series
- Agilent's most advanced high-performance spectrum analyzer
- up to 50 GHz frequency ranges (325 GHz with external mixing)
- leading edge performance, flexibility, and connectivity
- comprehensive spectrum and one-button format-based modulation analysis for 2G/3G communications systems and components
- Power Suite toolset allows for fast and accurate one-button, format-based power measurements
- general-purpose and communication-focused measurement personalities
- 8566B/8568B programming code compatibility for ease of migration
- link to 89601A PC software for flexible in-depth vector modulation analysis



E4440A

Analyzer Family Overviews, continued

856x EC Series

- high-performance portable analyzers suited for R&D, field service, and manufacturing
- up to 50 GHz frequency ranges (325 GHz with external mixing)
- adaptable to specific applications with optional measurement personality cards
- outstanding phase noise and sensitivity
- rugged portability, color display, 1 Hz RBW

8563EC

ESA-E Series

- scalable, mid-performance platform with excellent speed, accuracy, and dynamic range
- up to 26.5 GHz frequency ranges (325 GHz with external mixing)
- general-purpose and communication-focused measurement personalities plus 6-slot card cage to accept optional hardware cards
- portable, ideal for field installation and maintenance
- 8566B/8568B and 8590 Series programming code compatibility for ease of migration
- link to 89601A PC software for flexible in-depth vector modulation analysis

E4407B

ESA-L Series

- Agilent's most affordable solution for basic spectrum analysis needs
- rugged, reliable, and easy to use
- fast, accurate results
- color display
- built-in floppy disk drive
- ready-to-go with minimal options

E4408B

Vector signal analyzers

E4406A

- optimized for wireless manufacturing and final design verification with one-button standards-based measurements
- measure signals at up to 4 GHz
- fast measurements and ease of use allow for increased production and throughput
- optional measurement personalities support up to eight wireless formats
- baseband IQ inputs allow you to test the complete signal path
- link to 89601A PC software for flexible in-depth vector modulation analysis

E4406A

89400 Series

- flexible in-depth vector modulation analysis
- optimized for in-depth R&D diagnostic analysis and troubleshooting
- quickly identify and quantify modulation impairments with extensive, flexible built-in tools
- superb phase noise, built in arbitrary source
- 8 MHz information bandwidth from DC up to 2.65 GHz

89441A

89600 Series

- flexible in-depth vector modulation analysis
- PC software with VXI front end hardware to 6.0 GHz
- 36 MHz analysis bandwidth
- powerful time, frequency, and modulation domain analysis
- extensive, flexible demodulation tools
- seamless integration with PC-based tools for unparalleled flexibility in simulation, troubleshooting, and diagnostics
- test your system even with missing hardware through links to Agilent's Advanced Design System (ADS) software simulation tools
- bridge the gap between virtual design world and real physical hardware
- phase coherent, two-channel RF measurements

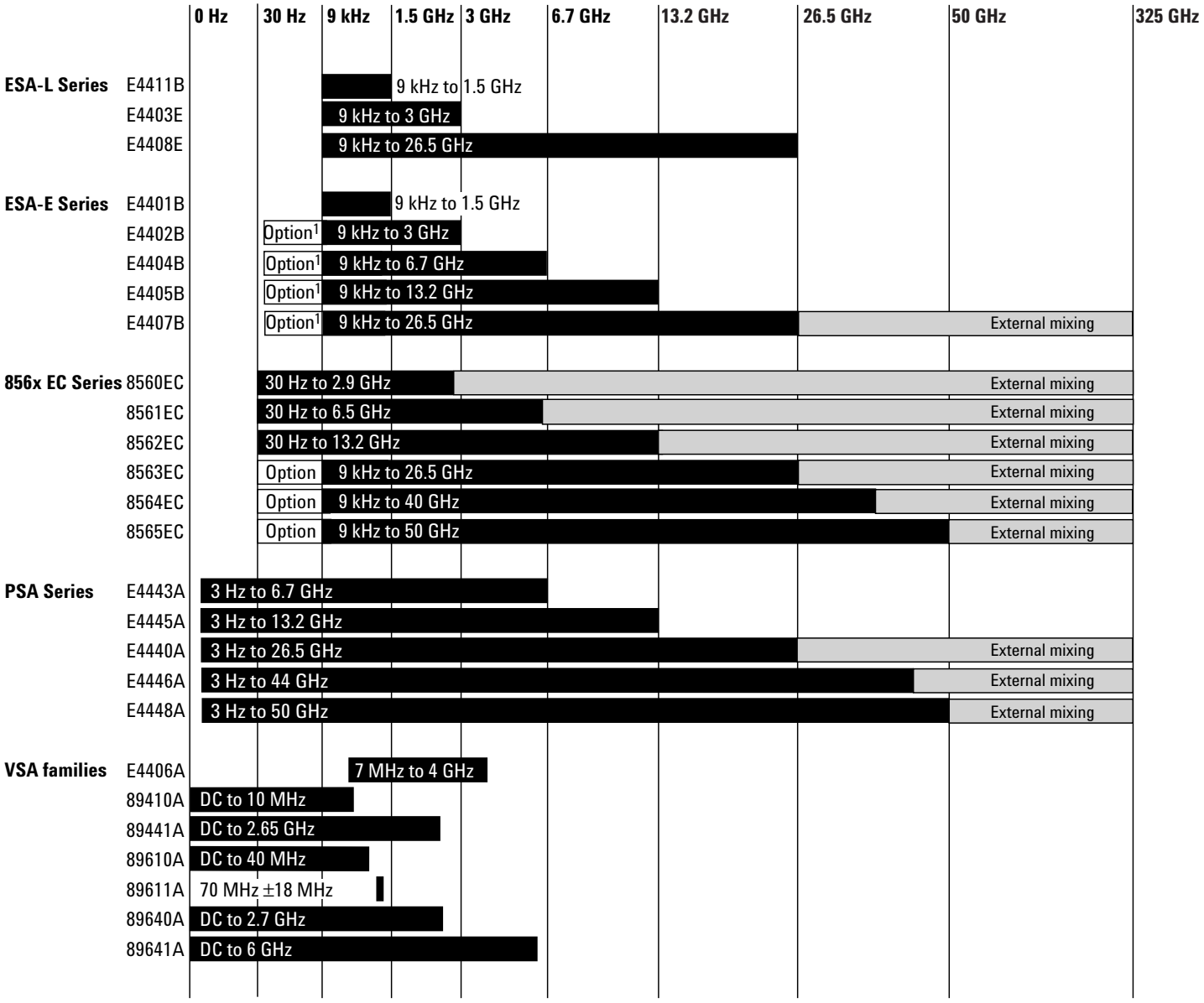
89640A

89601A software link to E4406A, ESA-E Series, PSA Series

- use the E4406A, ESA-E or PSA as an RF front end for 89601A software
- flexible in-depth vector modulation analysis and one-button wireless standards-based design tests with one configuration
- extend modulation analysis capabilities of E4406A, ESA-E and PSA analyzers with the modulation troubleshooting tools of 89601A
- add time gating and signal capture with playback

E4407B with 89601A software

Frequency Ranges at a Glance



Note 1: 100 Hz option

Recommended Solutions for Your Application

Spectrum analysis solutions

Optional measurement personalities[1]	ESA-L Series	ESA-E Series	856x EC Series	PSA Series
Bluetooth™		●		
Broadcast TV		●		
Cable TV	●	●		
Cable fault location		●		
cdma2000				●
cdmaOne		●		●
Digital radio			●	
EDGE				●
EMI Precompliance		●[2]		
GSM/DCS1800/PCS1900		●		●
GPRS		●		
Modulation analysis (EVM)		●		●[3]
NADC (includes PCS)				●
Noise figure		●		●
PDC				●
Phase noise		●	●	●
Spurious response			●	
TD-SCDMA				●
W-CDMA				●
HSDPA (W-CDMA)				●
1xEV-DO				●
1xEV-DV (cdma2000)				●
8566B/8568B programming code compatibility		●		●
8590x Series programming code compatibility	●	●		

1. Generally available as a combination of optional hardware and measurement personalities (application-specific software downloaded into the analyzer memory)
2. Available in E7400 Series
3. Available as format-based measurements in individual measurement personalities

Vector signal analysis solutions

Application-specific solutions	E4406A	89400 Series	89600 Series
Flexible vector/digital modulation analysis [1]	89601A link	●	●
Wideband R&D analysis			●
Narrowband R&D troubleshooting		●	●
Standard-compliant production and design verification	●	●	● [3]
Non-standard signal analysis		●	●
Software simulation, integration, and analysis [2]			●
Base station transmitter test	●		●
Mobile transmitter test	●		●
Standards-based preset measurements [4]			
1xEV-DO	●		●
1xEV-DV (cdma2000)	●		Future
HSDPA (W-CDMA)	●		Future
802.11a			●
802.11b			●
802.11g			●
APCO 25		●	●
Bluetooth		●	●
cdma2000	●		●
cdmaOne	●	●	
CDPD		●	●
DECT		●	●
DTV8 (VSB8)		●	●
DTV16 (VSB16)		●	●
DVB16 (QAM16)		●	●
DVB32 (QAM32)		●	●
DVB64 (QAM64)		●	●
DVB-T			●
EDGE	●	●	●
GSM	●	●	●
HIPERLAN Type 1 (high bit rate)			●
HIPERLAN Type 1 (low bit rate)			●
HIPERLAN Type 2			●
iDEN	●		
NADC (includes PCS)	●	●	●
PDC	●	●	●
PHP (PHS)		●	●
TD-SCDMA			●
TETRA		●	●
W-CDMA	●	●	●

1. Flexible modulation analysis refers to an analyzer's ability to demodulate non-standard or custom-made signals
2. With link to Agilent Advanced Design System (ADS)
3. Wireless LAN 802.11a/b/g
4. Available on E4406A through optional measurement personalities

Feature and Specification Comparison Tables

Spectrum analyzers

	ESA-L Series Basic spectrum analysis	**ESA-E Series** Mid-performance platform	**856x EC Series** High performance portable	**PSA Series** Advanced high performance platform
Overview				
Performance	★	★★★	★★★★	★★★★★
Price	$	$$	$$$	$$$$
Application specific solutions		★★★★	★	★★★★★
Expandable platform		SStandard		Standard
Performance options		Available	Standard	Standard
Frequency range	9 kHz to 26.5 GHz	30 Hz to 26.5 GHz [1]	30 Hz to 50 GHz	3 Hz to 50 GHz
with external mixing		30 Hz to 325 GHz [1,2]	30 Hz to 325 GHz [1,2]	3 Hz to 325 GHz [1,2]
Specification summary				
Speed				
Minimum RF sweep time	4 ms	1 ms	50 ms	1 ms
Minimum zero span sweep time	4 ms	25 ns [1]	50 ms	1 µs
Local measurement rate [11]	≥ 28/second	≥ 40/second	10/second	≥ 50/second
Remote measurement rate over GPIB [11]	≥ 30/second	≥ 40/second	7/second	≥ 45/second
RF center frequency tuning time [11]	≤ 90 ms	≤ 75 ms		
Warm-up time	5 minutes	5 minutes	5 minutes	30 minutes
Phase noise/stability				
Phase noise at 1 GHz (10 kHz offset)	–90 dBc/Hz	–90 dBc/Hz	–113 dBc/Hz	–116 dBc/Hz
Phase noise at 1 GHz (1 MHz offset)		–133 dBc/Hz [1]	–132 dBc/Hz [10]	–145 dBc/Hz
Phase noise at 1 GHz (10 MHz offset)		–137 dBc/Hz [1]		–155 (–157 [11]) dBc/Hz
Dynamic range				
Maximum third-order dynamic range at 1 GHz	88 dB [1]	108 dB [1, 10]	108 dB	113 dB
Maximum second-order dynamic range at 1 GHz	83 dB [1]	97.5 dB [1, 10]	95 dB	103 dB
1 dB gain compression [5]	0 dBm	0 dBm	–5 dBm	+3 dBm
Maximum safe input	+30 dBm	+30 dBm	+30 dBm	+30 dBm
Attenuator range and step size	0 to 65 dB [3] in 5 dB steps	0 to 65 dB [3] in 5 dB steps	0 to 70 dB [4] in 10 dB steps	0 to 70 dB in 2 dB steps
Displayed average noise level (DANL) at 1 GHz	–125 dBm [1]	–150 dBm [1,10]/-166 dBm [6,10]	151 dBm [1]	–154 dBm / –168 dBm [6]
Calibrated display range (log amplifier)	85 to 120 dB [1]	85 to 120 dB [1]	100 dB [7]	> 110 dB
W-CDMA adjacent channel power ratio		–66.5 dB [1,11]	–73 dB [1,11]	–81 dB [10]
Accuracy				
Overall amplitude accuracy (9 kHz to 3 GHz)	± 1.1 dB	± 1.0 dB	± 1.9 dB	± 0.62 dB (±0.24 dB [12])
Span accuracy	± 1.0 %	± 0.5 %	± 1% to ± 5%	± 0.2%
Frequency accuracy at 1 GHz [9]	± 2001 Hz	± 101 Hz	± 103 Hz	± 100 Hz
Resolution				
RBW range	100 Hz [1] to 5 MHz	1 Hz [1] to 5 MHz	1 Hz to 2 MHz	1 Hz to 8 MHz
Best selectivity	5:1 [1]	5:1	5:1	4.1:1
RBW step size	1, 3, 10	1, 3, 10	1, 3, 10	10% steps [8]
Residual FM	≤ 30 Hz [11]	≤ 2 Hz [1]	< 1 Hz	< 1 Hz
EMI resolution bandwidths	200 Hz [1], 9 kHz, & 120 kHz	200 Hz [1], 9 & 120 kHz		
Information bandwidth				10 MHz [11]
Maximum IF bandwidth		> 30 MHz [11,14]		> 30 MHz [11,13] 80 MHz [15]

1. Optional
2. To 110 GHz with Agilent mixers
3. 0 to 60 dB in 1.5 GHz models
4. 0 to 60 dB for 40 & 50 GHz models
5. At frequencies < 3 GHz
6. With optional built-in preamp
7. RBW ≤ 100 Hz, 90 dB for RBW ≥ 300 Hz
8. From 1 Hz to 3 MHz
9. Doesn't include settability or temperature stability
10. Typical
11. Nominal
12. 95% confidence
13. Option E444xA-H70
14. Option E440xB-H55
15. Option E444xA-HNQ/HN8 (AKA PSA-80BW)

Spectrum analyzers, continued

Features	ESA-L Series	ESA-E Series	856x EC Series	PSA Series
Performance				
AM/FM demodulation	AM only	Available	Standard	Via 89601A link
Background auto-alignment	Standard	Standard	Standard	Standard
Battery (snap-on)/12 V DC operation	Available	Available		
Card cage for optional hardware		6-slots		2-slots
Digital demodulation		Standards-based		Standards-based
Flexible in-depth vector modulation analysis		Via 89601A link		Via 89601A link
FFT function – AM analysis			Standard	
High stability frequency reference		Available	Standard	Standard
Measurement personalities		Available	Available	Available
Preamplifier built-in		Available (3, 26.5 GHz)		Available (3, 26.5 GHz)
RMS detector	Standard	Standard		Standard
Time gating		Gated video[1]	Gated video	Gated sweep, FFT
Tracking generator built-in	Available	Available	Available[2]	
TV trigger		Available		
Weight (nominal)	13.2 to 17.1 kg (29.1 to 37.7 lbs)	13.2 to 17.1 kg (29.1 to 37.7 lbs)	20 kg (44 lbs)	23 kg (50 lbs)
Zero span offset trigger	Pre/post	Pre/post	Pre/post	Pre/post
Connectivity				
Agilent ADS software link	Available	Available		
BenchLink PC software	Available	Available	Available	
BenchLink Web Remote software	Available	Available		Available
IntuiLink PC connectivity software	Standard	Standard		Standard
8566B/8568B programming code compatibility		Available		Available
8590 programming code compatibility	Available	Available		
Monitor output	VGA	VGA	VGA	VGA
Remote interface	GPIB, RS-232[1]	GPIB, RS-232[1]	GPIB	GPIB, LAN
Remote programming	SCPI	SCPI	Standard	SCPI
Removable storage media	3.5" floppy disk	3.5" floppy disk	Memory card	3.5" floppy disk
VXI plug&play drivers	Standard	Standard	Standard	Standard
IVI COM drivers	Standard	Standard		Standard
Display				
Display	Color	Color	Color	Color
Size	16.8 cm	16.8 cm	16 cm	21.3 cm
Expandable display	Standard	Standard	Standard	Standard
Segmented sweep		Standard		
Log sweep		Standard		
Split-screen display	Standard	Standard		
Sweep (trace) points	401	101 to 8192[4]	601	101 to 8192[4]
Support				
Calibration interval	1 year	1 year	2 years[3]	1 year
Calibration / adjustment software	Available	Available	Available	Available
Help built-in	Standard	Standard		
Standard warranty	1 year global	1 year global	1 year global	1 year global

1. Optional
2. 8560-EC only
3. 1 year for 8564-EC and 8565-EC
4. 2 to 8192 for zero span
5. Time gating via 89601A software link

Spectrum analyzers, continued

Power Suite one-button measurements[7]

Measurement	ESA-L Series	ESA-E Series	856x EC Series	PSA Series
Channel power	●	●	●	●
Occupied bandwidth	●	●	●	●
Multicarrier, multi-offset ACP	●	●	●[1, 8]	●
Multicarrier power	●	●	●[1]	●
CCDF		●		●
Harmonic distortion	●	●		●
Burst power	●	●		●
Intermod (TOI)	●	●		●
Spurious emissions	●	●		●
Spectrum emission mask	●	●		●

Vector signal analyzers

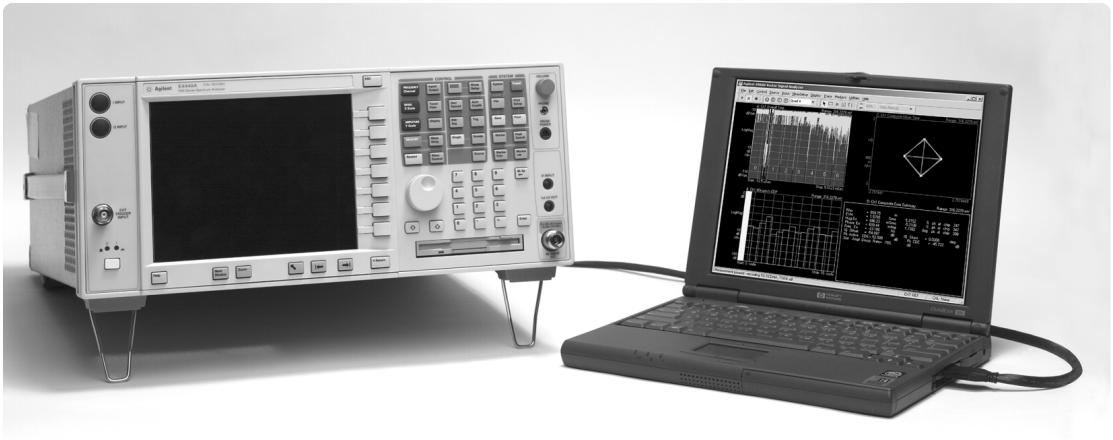
Specification summary	E4406A	89400 Series	89600 Series
Frequency range	7 MHz to 314 MHz, 329 MHz to 4 GHz	DC to 2.65 GHz	DC to 6.0 GHz
Analysis bandwidth	8 MHz	8 MHz	36 MHz (> 1 GHz with links[6])
RBW range	10 Hz to 7.5 MHz	< 1 Hz to 3 MHz	< 1 Hz to 10 MHz
Phase noise at 1 GHz (10 kHz offset)	–96 dBc/Hz	–116 dBc/Hz	–99 dBc/Hz[2]
Third order intercept	17 dBm[3]	6.5 dBm	4.0 dBm
Time capture	> 900 ksamples[3]	1 Msample	384 Msamples
Sensitivity at 1 GHz	–136 dBm/Hz[4]	–159 dBm/Hz	–159 dBm/Hz
Maximum safe input	+ 35 dBm	+ 25 dBm	+ 20 dBm
Attenuator range and step size	0 to 40 dB in 1 dB steps	0 to 75 dB in 5 dB steps	0 to 75 dB in 5 dB steps
Amplitude accuracy	± 0.6 dB	± 1.1 dB	± 2.1 dB
Frequency accuracy[4]	± 100 Hz[5]	± 100 Hz	± 100 Hz
RBW step size	arbitrary	arbitrary	arbitrary
Warm-up time	1 hour	30 minutes	30 minutes
Features			
Agilent ADS software link		Standard (file Only)	Dynamic[1]
Analog demodulation		AM/FM/PM	AM/FM/PM
Calibration interval	1 year	1 year	2 years
Digital demodulation	Standards-based[1]	Flexible	Flexible/standards-based[9,1]
Flexible vector modulation analysis	Via 89601A link	Available	Available
Help built-in		Standard	Standard
Monitor output	VGA	VGA	User PC
Preamplifier built-in		Standard	Standard
Remote interface	GPIB, LAN	GPIB, RS232, LAN	GPIB, RS232, LAN
Removable storage	3.5" floppy disk	3.5" floppy disk	User PC
Source		Internal source[1]	Via ESG link
Spectrogram	Via 89601A link	Available	Standard
Split-screen display	Available	Standard	Standard
Time gating	Via 89601A link	Standard	Standard
User interface	Front panel	Front panel	User PC
Warranty (standard)	1-year global	1-year global	3-year global
Weight	19 kg (42 lbs)	25 kg (55 lbs)	16 kg (36 lbs)
Baseband IQ inputs	Available		Available
Oscilloscope/analyzer links			E4406A, ESA-E, PSA and Infiniium oscilloscopes (54810A, 54845A/B, 54830B/D, 54846B, 54831B/D, 54832B/D, 54853A, 54854A, 54855A)
IVI COM drivers	Standard		Not applicable

1. Optional
2. Typical
3. Nominal
4. With +24 dB ADC gain
5. Does not include temperature drift, or settability
6. Links to 54810A, 54830A, 54845A, 54846A oscilloscopes
7. Supported one-button, wireless format setups:
   PSA, ESA-L/E: cdmaOne, cdma2000, GSM/EDGE, W-CDMA, NADC, PDC, *Bluetooth*, Tetra, 802.11 a/b/g, HiperLAN/2, DVB-T
8. Single carrier
9. 802.11A/B/G

89601A vector modulation analysis software/hardware links[1]

The 89601A vector signal analysis software is PC-based and can be "linked" by LAN, IEEE 1394, or GPIB cable to Agilent VXI hardware, spectrum analyzers, signal analyzers, and high-speed oscilloscopes. These combinations of Agilent hardware and the vector modulation analysis software from the 89600 can provide a broad array of analysis and measurement capabilities, dynamic range and bandwidths.[2]

Model	Frequency range	Maximum analysis bandwidth	Residual EVM (typical)	3rd order dynamic range (typical)	Connection	Memory
PSA Series spectrum analyzers						
E4440A	3 Hz – 26.5 GHz	8 MHz (36 MHz[3], 80 MHz[5])	< 1.0% rms	< -70 dBc	LAN	900 ksa
E4443A	3 Hz – 6.7 GHz	Same	< 1.0% rms	< -70 dBc	LAN	900 ksa
E4445A	3 Hz – 13.2 GHz	Same	< 1.0% rms	< -70 dBc	LAN	900 ksa
E4446A	3 Hz – 44.0 GHz	Same	< 1.0% rms	< -70 dBc	LAN	900 ksa
E4448A	3 Hz – 50.0 GHz	Same	< 1.0% rms	< -70 dBc	LAN	900 ksa
ESA-E Series spectrum analyzers						
E4402B	9 kHz – 3.0 GHz	10 MHz (36 MHz[3])	< 1.8% rms	-55dBc	GPIB	124 ksa
E4404B	9 kHz – 6.7 GHz	Same	< 1.8% rms	-55dBc	GPIB	124 ksa
E4405B	9 kHz – 13.2 GHz	Same	< 1.8% rms	-55dBc	GPIB	124 ksa
E4407B	9 kHz – 26.5 GHz	Same	< 1.8% rms	-55dBc	GPIB	124 ksa
E4406A VSA						
E4406A	7 MHz – 4 GHz	8 MHz	< 1% rms	< -70 dBc	LAN or GPIB	900 ksa
Infiniium oscilloscopes						
54810A	DC – 390 MHz	390 MHz	< 2% rms	≤ -40 dBc	LAN or GPIB	32 ksa
54845A/B	DC – 1.56 GHz	1.56 GHz	< 2% rms	≤ -40 dBc	LAN or GPIB	64 ksa
54846B	DC – 2.2G Hz	2.2 GHz	< 2% rms	≤ -40 dBc	LAN or GPIB	2 Msa
54830B/D	DC – 780 MHz	780 MHz	< 2% rms	≤ -40 dBc	LAN or GPIB	2 Msa
54831B/D	DC – 780 MHz	780 MHz	< 2% rms	≤ -40 dBc	LAN or GPIB	2 Msa
54832B/D	DC – 1.0 GHz	1.0 GHz	< 2% rms	≤ -40 dBc	LAN or GPIB	2 Msa
54853A	DC – 2.5 GHz	2.5 GHz	< 2% rms	≤ -40 dBc	LAN or GPIB	32 Msa
54854A	DC – 4 GHz	4 GHz	< 2% rms	≤ -40 dBc	LAN or GPIB	32 Msa
54855A	DC – 6 GHz	6 GHz	< 2% rms	≤ -40 dBc	LAN or GPIB	32 Msa
89600 VXI bundled systems						
89610A	DC – 39 MHz	39 MHz	< 1% rms	< -70 dBc	IEEE 1394	48 Msa (384 Msa available)
89611A[4]	52 – 88 MHz	36 MHz	< 1% rms	< -70 dBc	IEEE 1394	Same
89640A[4]	DC – 2.7 GHz	36 MHz	< 1% rms	< -65 dBc	IEEE 1394	Same
89641A[4]	DC – 6 GHz	36 MHz	< 1% rms	< -65 dBc	IEEE 1394	Same



1. 89600 software also links with Agilent ESG Series signal generators and EEsof Advanced Design Software.
2. For more information on hardware performance using the 89601A software, please reference the appropriate performance guide available on the product Web page: ESA – p/n 5988-4097E; PSA – p/n 5988-5015EN; E4406A – p/n 5988-2906EN; Infiniium – p/n 5988-4096EN.
3. With Option E444xA-H70 or E440xB-H70 and when combined with 89611A.
4. Baseband inputs available.
5. With Option E444xA-HNQ/HN8 (AKA PSA-80BW) and when combined with 89610A.
6. Phase coherent, two channel RF measurements available.

Information Resources

For the latest product and support information including brochures, datasheets, manuals, application notes, and frequently asked questions, please visit our product Web pages:

http://www.agilent.com/find/psa
http://www.agilent.com/find/esa
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(fax) (31 20) 547 2390
Japan:
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