Agilent ESA Series Spectrum Analyzer

Three express analyzers available for faster delivery and best value

Flexibility to select the right level of functionality for your needs

- 0.4 dB amplitude accuracy
- –101 dBc/Hz phase noise at 10 kHz offset
- Fast sweep times, 1ms minimum in the frequency domain
- 5 minute warm up to guaranteed performance
- Wide set of built-in power measurements
- Integrated measurements for noise figure and phase noise (opt)
- RMS, quasi-peak, peak detectors, and EMI bandwidths are available
- Built-in help
- Worldwide customer support

Agilent Technologies

The Agilent ESA Spectrum Analyzer

Large high-resolution, high-contrast color display makes viewing multiple traces easy.

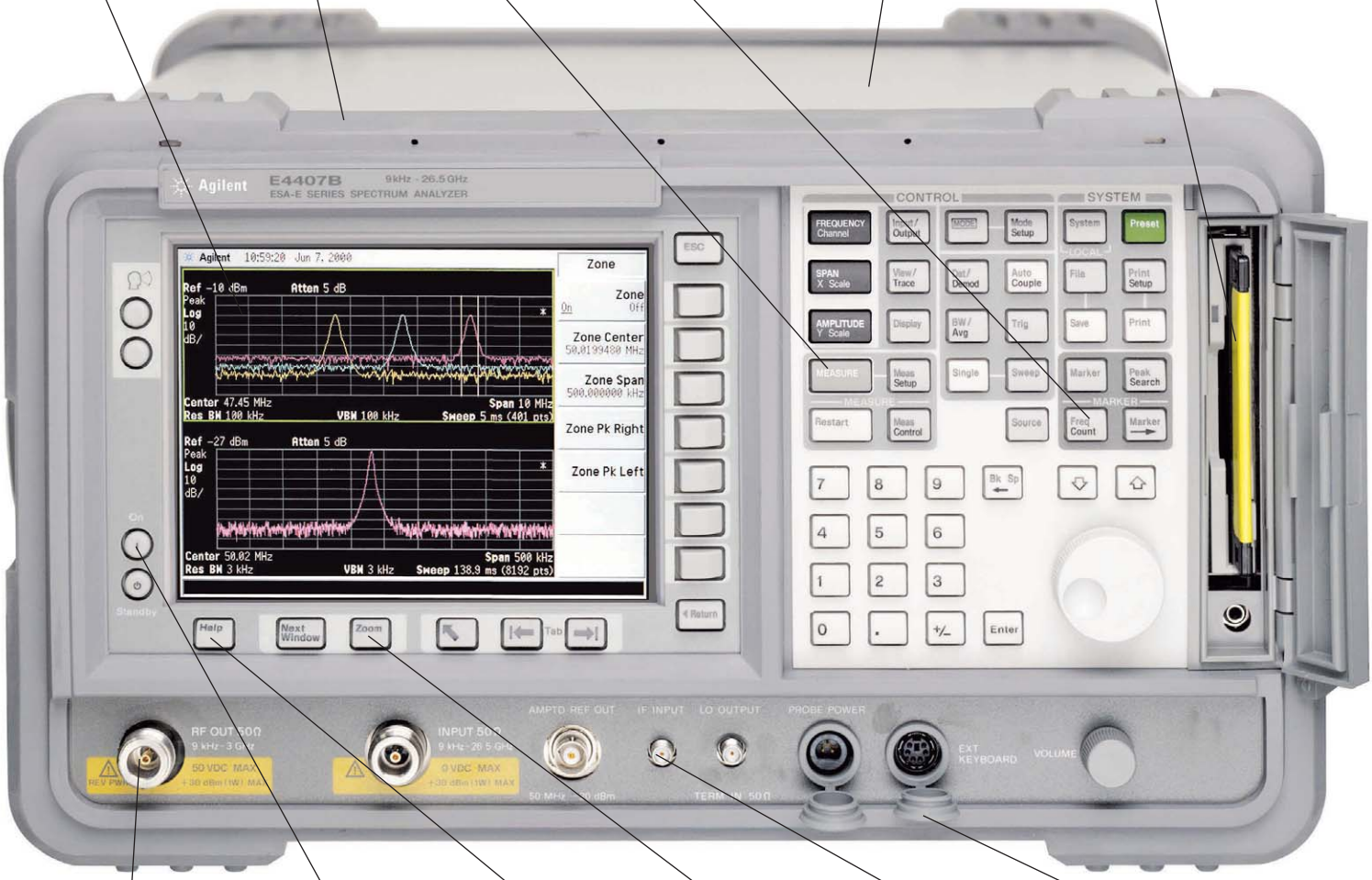
Rugged case with rubber encased front and rear frames resists transportation stresses.

Built in one-button measurement routines.

Built-in counter precisely identifies signals using the 1 Hz resolution marker-based counter.

Flexible hardware/software environment allows focused applications like GSM/EDGE and modulation analysis.

Built-in floppy disk drive provides PC compatibility and data archiving.



Built-in tracking generator provides an RF source for scalar network analysis (optional).

Full measurement accuracy after just a 5 minute warm-up.

Built-in help function eliminates the need to carry manuals into the field.

Zoom windows provides split screen display with both wide and narrow spans.

External mixing extends frequency range to 325 GHz (optional).

Weather resistant front panel allows operation in rain and high humidity.

Durable, rugged design

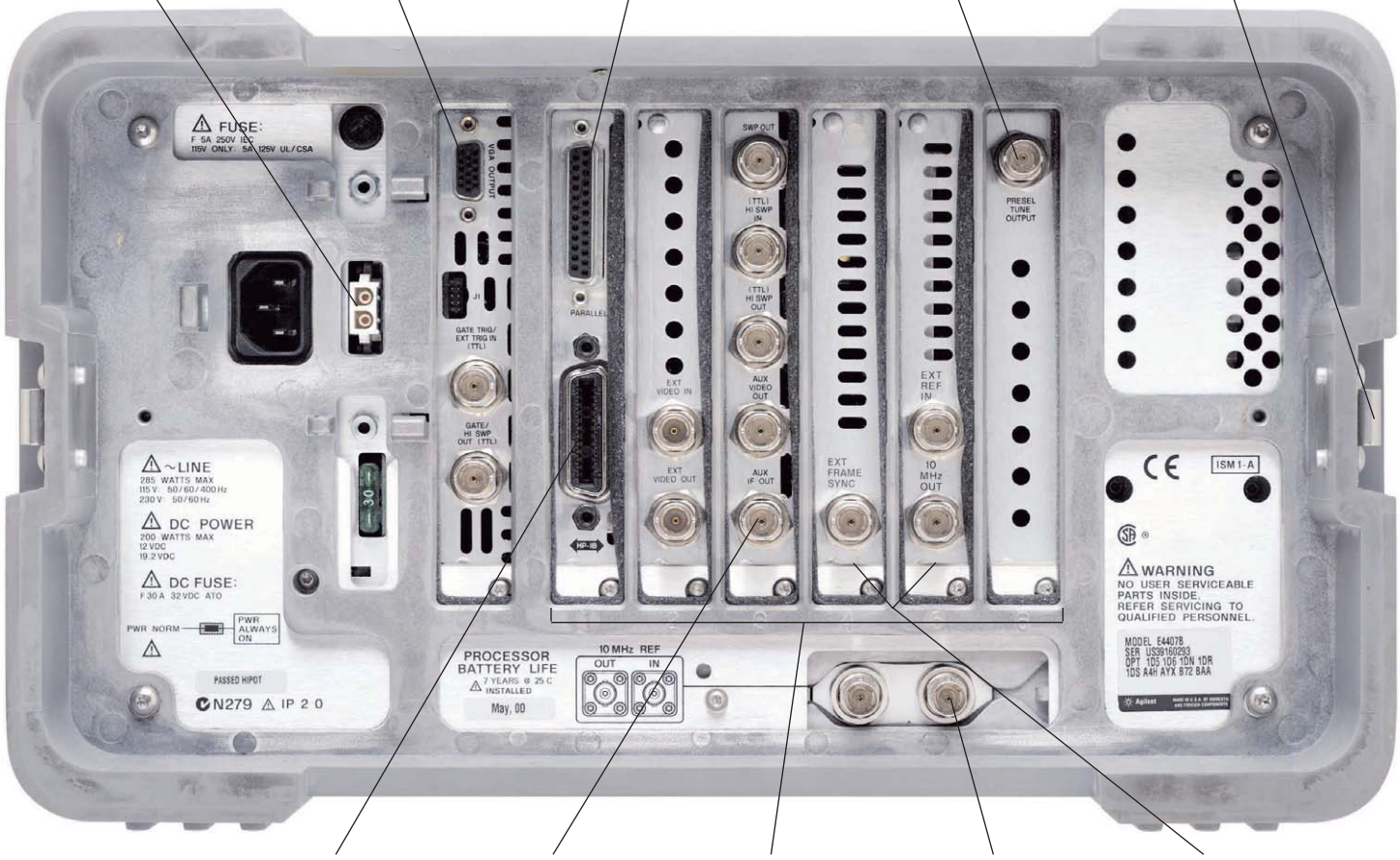
12 Vdc operation from automotive batteries.

Add an external VGA color monitor.

Parallel port supports most HP-compatible printers.

Supports Agilent preselected external mixers (optional).

Snap-on battery pack for portability (optional).



High speed GPIB interface (standard). RS-232 (optional) can replace GPIB.

Input signal down converted to 21.4 MHz (optional).

Flexible card cage allows you to customize the ESA and add future upgrade enhancements.

Use an external frequency reference for even more accuracy.

Digital demodulation hardware for current and future communications systems (optional).

Flexibility to select the right functionality and performance for your need

The features and benefits of the ESA series spectrum analyzer

The ESA was designed and built by spectrum analysis experts. Hewlett-Packard introduced the first spectrum analyzer enabling a whole new world of technology. Agilent has inherited this legacy and continues to build upon the tradition of dependability and excellence.

From years of practice Agilent has come to know the intricacies and nuances of spectrum analysis. This is why the ESA is able to provide the most complete set of traceable, guaranteed, and warranted specifications compared to other spectrum analyzers in its class.

Agilent's leadership and commitment combined with the ESA's robust and flexible instrument design and most complete set of built-in measurement features is why more engineers choose the ESA over other spectrum analyzers on the market.

- **Flexible performance**
- **Flexible price**
- **Flexible platform**

Express analyzers

The ESA is available in three express analyzers.

ESA basic analyzer

For basic, quality, spectrum analysis on RF or microwave signals at an affordable price. Includes many built in measurement functions.

ESA standard analyzer

For general spectrum analysis of RF or microwave signals. Includes advanced set of firmware features and functions in an upgradable platform. Optional measurement features available such as noise figure and phase noise.

ESA communication test analyzer

For spectrum analysis and vector signal analysis including demodulation capability. Select from the ESA's optional built-in demodulation analysis applications or use with the Agilent 89601A VSA software for full featured vector signal analysis.

Simple to order, fast delivery, best value...

Express analyzer options are based on the most frequently ordered ESA configurations and most popular options. The express analyzer options simplify the ordering process while maintaining the flexibility of the ESA platform. Just select the ESA express analyzer that meets your needs and budget.

Leading performance

Amplitude accuracy

The ESA offers leading performance in accuracy with a guaranteed overall amplitude accuracy of less than 1.0 dB error (< 3 GHz) based on traceable and warranted specifications. Other mid-range analyzers may specify only typical performance levels. For comparison, the ESA's typical level of performance based on a 2 sigma value (95%) is 0.4 dB. The ESA excels in overall amplitude accuracy whether comparing guaranteed specifications or expected levels of performance.

Frequency accuracy

The ESA provides a warranted internal frequency reference that may not be available in other mid-range analyzers. Further, the ESA has excellent frequency readout accuracy, a function of the frequency reference error as well as the span error coefficient, RBW, center frequency, and number of sweep points. The table below shows the excellent frequency readout accuracy as warranted on the ESA for some example test setups.

Warranted frequency readout accuracy

Frequency	Span	RBW	Sweep points	Option 1D5	Frequency readout accuracy
1 GHz (basic analyzer)	400 kHz	3 kHz	401	No	5.46 kHz
1 GHz	400 kHz	3 kHz	8192	Yes	2.15 kHz
300 MHz	1 kHz	10 Hz	8192	Yes	47 Hz
26 GHz	100 MHz	1 MHz	8192	Yes	665 kHz

Leading performance – continued

Superb measurement range and dynamic range

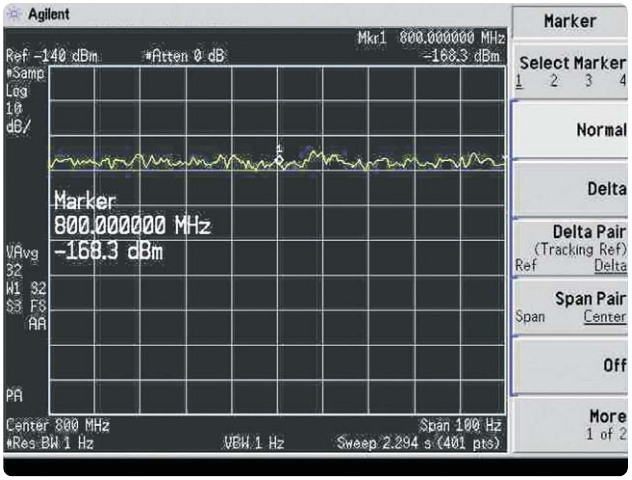
A spectrum analyzers measurement range is tested by two types of measurements:

Measuring low level signals such as spurs

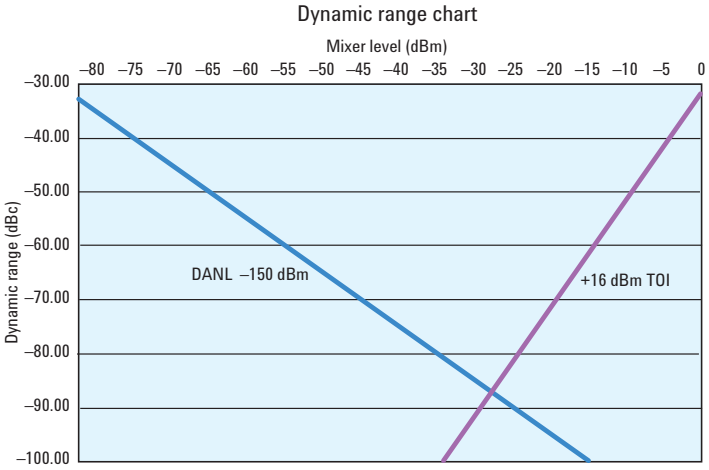
The ESA offers top performance thanks to its optional built in low noise, high gain preamplifier. Achieving a Displayed Average Noise Level (DANL) of better than –167 dBm.

Measuring lower level signals next to higher power signal

A spectrum analyzers dynamic range is a function of both its display average noise level (DANL) performance and its intermodulation distortion performance. The ESA third order intermodulation distortion performance is excellent with a performance level of +16 dBm third order intercept (TOI) (+7.5 for basic analyzer configurations). Combined with the ESA's DANL performance of –150 dBm/Hz, the ESA's overall dynamic range sets the standard for the medium class analyzer. In addition, the ESA features a standard 5 dB step attenuator making it easy to optimize the spectrum analyzers mixer level settings to achieve the best dynamic range.



Wide measurement range with built-in preamplifier



Excellent third order intermodulation provides the maximum dynamic range

Leading performance – continued

5 Minute warm up time

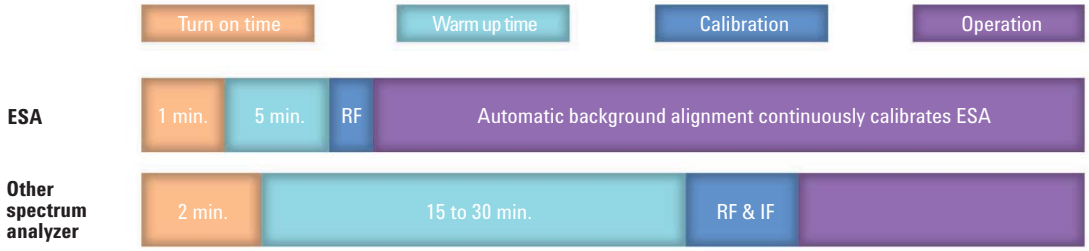
Most spectrum analyzers take 15 minutes to 1 hour to warm up before the specifications in the data sheet are valid. Not with the ESA. The ESA Series takes only 5 minutes to warm-up so technicians and engineers spend little time waiting for instrument stabilization.

Automatic background alignment

The automatic, internal background alignment feature gives consistently accurate results over varying temperatures. This is especially beneficial when operating the ESA outdoors or in varying temperature conditions. Further, the ESA provides guaranteed performance specifications over wide temperature range of 0 to 55 degrees centigrade.

Fast sweep times

The ESA Series spectrum analyzer features very fast sweep times. With sweep times as low as 1 ms for an RF sweep and 25 ns for a zero span sweep the ESA has the fastest sweep times for an analyzer in its class. Fast sweep times are particularly useful when searching for low level signals. Sometimes, setups can take seconds or even minutes. For ease of use the ESA's sweep times are auto coupled to ensure you are getting the fastest speed with warranted performance.



Five minute warm up time with advanced background alignment

Leading performance – continued

Wide selection of detectors

The ESA has a wide selection of detectors to meet all of your test needs; including averaging (RMS), peak, negative peak, sample, and quasi-peak (optional). Notably, the ESA's RMS averaging detector improves your measurement repeatability and efficiency when testing noise like signals such as today's 2G and 3G formats. In addition the RMS detector provides RMS results as required by several standards.

The ESA's optional quasi-peak detector enables you to verify your EMI performance of your DUT, making the ESA a flexible tool for all types of design and verification testing.

For a dedicated EMI instrument with established measurement routines and EMI software the E7400A Series EMC precompliance analyzer may be more appropriate.

Narrow resolution bandwidth filters

Achieve the maximum frequency resolution with the ESA spectrum analyzers optional narrow resolution bandwidths. The flexibility of the ESA allows you to select the resolution that you need. The base performance of the ESA includes a 1 kHz RBW. Add the narrow resolution bandwidth option (1DR) to get 10 Hz minimum RBW's (100 Hz on the basic analyzer). Or, for the maximum performance, order the high stability timebase option (1D5) in addition to the narrow resolution bandwidth option to get 1 Hz RBW's.

Remote transfer rate

The ESA has excellent measurement speed allowing up to 45 remote trace transfers per second over GPIB. In addition, several features of the ESA allow you flexibility in your test setups to optimize for speed.

Fast sweep times - ESA achieves the fastest minimum sweep times for an analyzer in its class with minimum RF sweep time of 1 ms or 25 ns for a zero span measurement. (4 ms minimum sweep time for basic analyzer)

Flexible sweep points - the number of sweep points in the standard and communication test analyzers can be varied from 101 to 8192 points or 2 to 8192 in zero span. Lowering the number of sweep points means a shorter trace to transfer. If necessary, increasing the number of sweep points provides better frequency resolution.

Flexible data formats - data formats in the ESA can be set to ASCII, INT32, INT16, REAL32, and binary. Optimum speed is achieved using binary format.

Segmented sweep - Using segmented sweep you can measure up to 32 discontinuous segments of the spectrum at one time with one sweep. (standard or communication test analyzer)

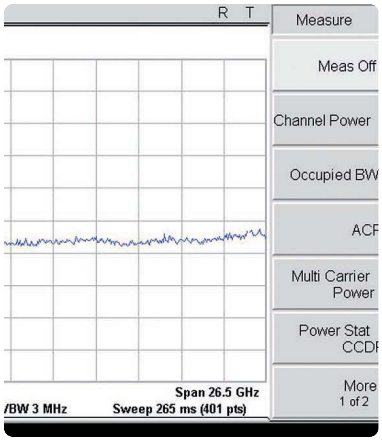
Measurements made easy

PowerSuite - Absolute confidence in making power measurements

The ESA simplifies the task of making common power measurements through its built-in power measurements. These measurement functions are easy to use.

Step 1

- **Press the measurement button on the front panel.**

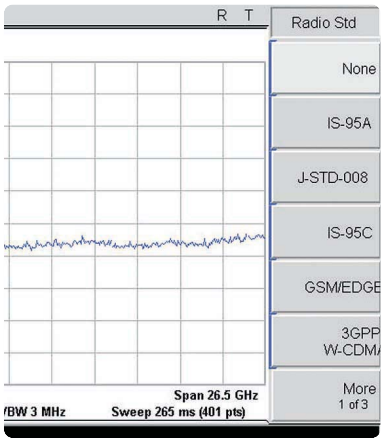


Step 2

- **Select the desired measurement functions.**

The ESA offers the widest selection of built-in power measurements available in a mid range instrument:

- Channel power
- Occupied bandwidth
- Adjacent channel power (ACP)
- Multi-carrier ACP
- Power statistics (CCDF) (not available on the basic analyzer)
- Harmonic distortion
- Burst power
- Intermodulation distortion (TOI)
- Spurious emissions
- Spectrum emissions mask



Step 3

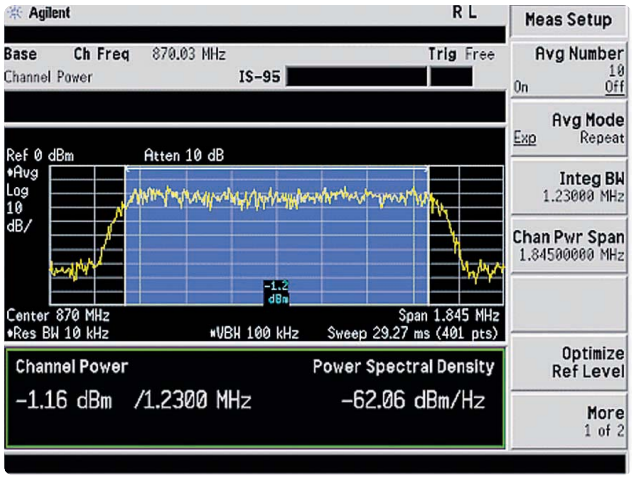
- **Select your desired standard-based format or customize your test setup**

The ESA includes a wide selection of standards based test setups including the following formats:

- cdmaOne (IS-95A/C)
- cdmaOne (J-STD-008)
- NADC
- GSM/EDGE
- W-CDMA 3GPP
- cdma2000 SR1
- cmda2000 SR3-MC
- cdma2000 SR3-DS
- PDC
- Bluetooth
- TETRA
- WLAN 802.11a,b,g
- HiperLAN/2
- DVB-T

Choose the desired standard-based test setup by pressing Mode, Radio Std and then selecting the desired radio standard. Or, if desired, the measurement may be customized to meet your need.

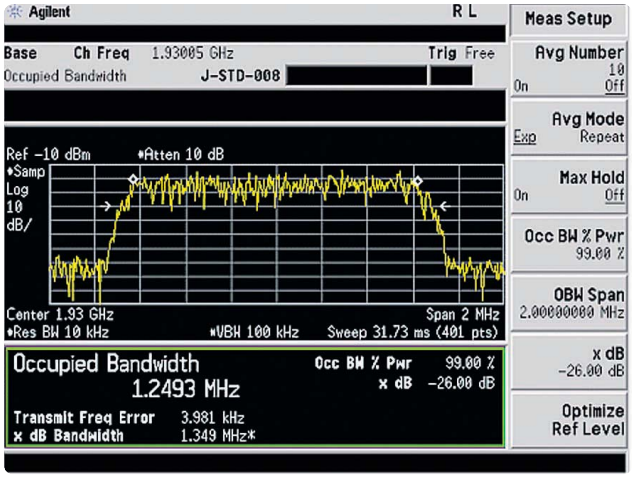
Measurements made easy – continued
Example of ESA PowerSuite functions



Channel power measurement of IS95 cdmaOne signal

Channel power

The channel power measurement measures and reports the power (integrated) in the channel as well as the computed power spectral density. For best accuracy and speed the ESA employs its built-in averaging detector (RMS).



OBW measurement of J-STD-008 cdma signal

Occupied bandwidth

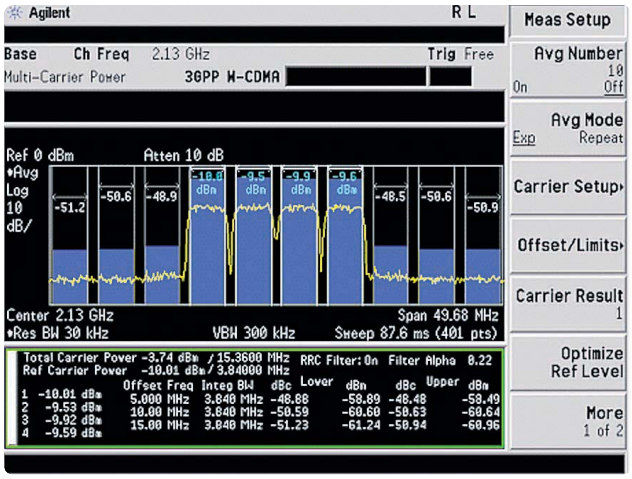
The occupied bandwidth measurement places markers at the frequencies for which the specified percentage of the power is contained and reports this bandwidth. In addition, it reports the frequency error of the signal. The ESA's leading performance in span accuracy facilitates very accurate results.

ACLR measurement of 3GPP W-CDMA signal

Adjacent channel power

The ESA's ACP measurement is very flexible providing the measurement of up to 6 offsets at once. For convenience, a root raised cosine filter is available for NADC and W-CDMA signals as required by the standards. In addition the ESA takes advantage of its built-in averaging detector (RMS) to improve measurement speed and accuracy and meet test standard requirements for RMS detection.

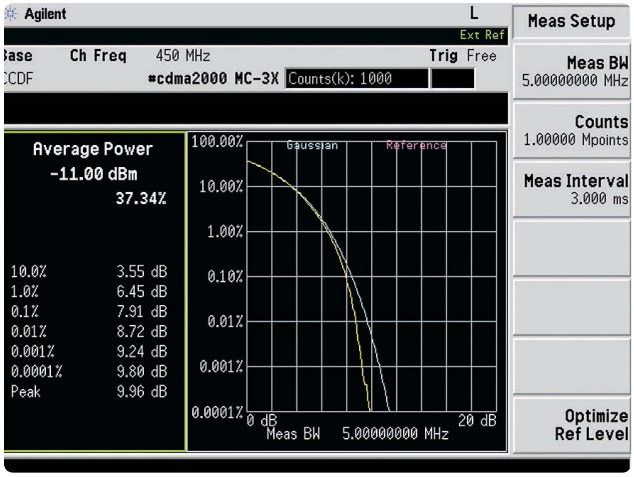
Measurements made easy – continued
Example of ESA PowerSuite functions



ACLR measurement of 4 carrier 3GPP W-CDMA signal

Multi-carrier power ACP

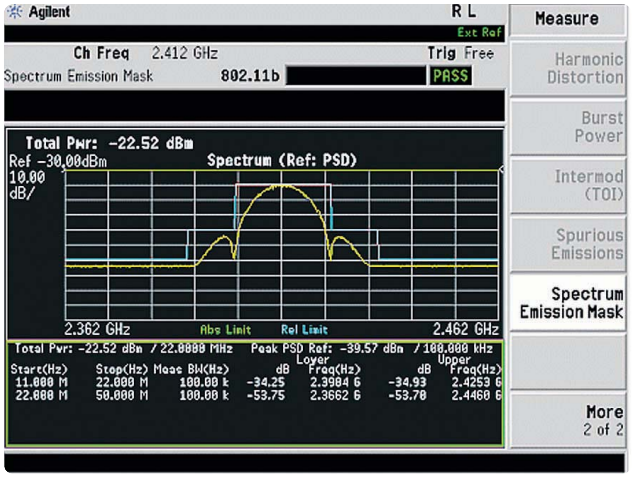
Multi-carrier signals are becoming more common in modern transmitter designs. The ESA can easily manage multi-carrier signals, as the ESA's function allows you to designate the reference carrier, set an RRC filter, and measure up to 3 offsets on each side of the signal.



CCDF measurement of four carrier cdma2000 signal

Power statistics (CCDF)

The ESA provides a complimentary cumulative distribution function (CCDF) curve that describes the amount of time the waveform spends at or above a given power level. In addition the measurement reports the peak to average power ratio. The ESA CCDF measurement provides accurate results for signals with OBW of up to 5 MHz or less. Using advanced calibration techniques the ESA can measure CCDF of bandwidths up to 10 MHz when used with Agilent's 89601A software. (standard and communication test analyzers only)



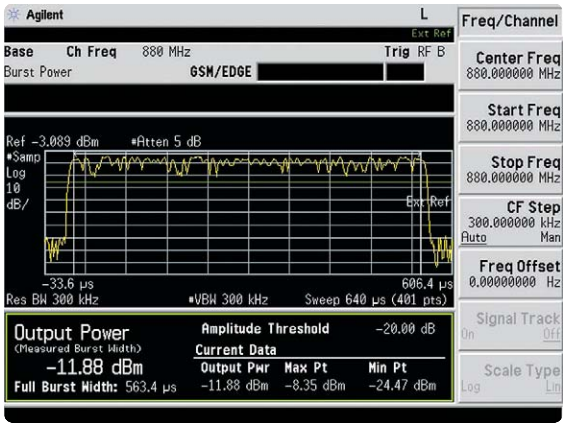
802.11b WLAN SEM test

Spectrum emissions mask (SEM)

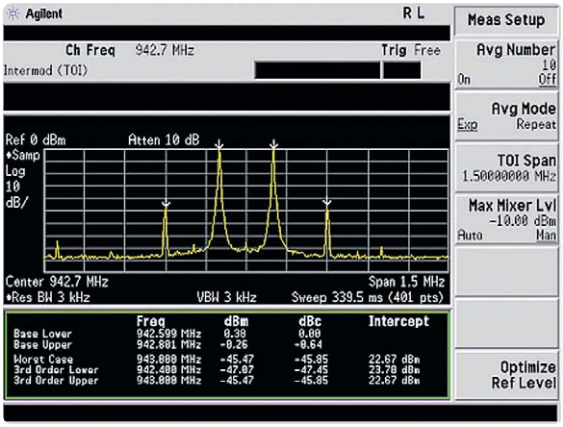
Quickly determine the in-channel power and out-of channel power spurious emissions as required for W-CDMA and wireless LAN formats. Or for custom test setup, the spectrum emission mask (SEM) measurements allows you to select up to five offsets with individual settings for RBWs and limits.

Measurements made easy – continued

Example of ESA PowerSuite functions



Average burst power of EDGE signal



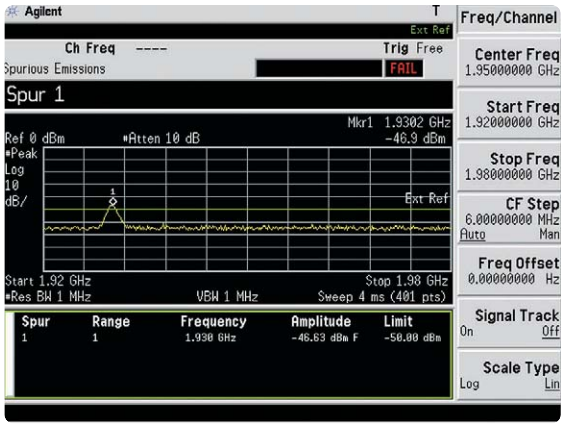
Intermediation of a two-toned signal

Burst power

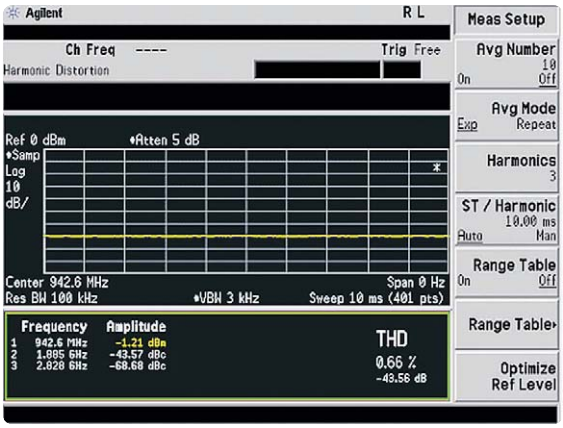
Measures the average power in zero span mode for the captured burst. The burst location and width can be automatically determined and reported by the ESA using its built in burst trigger, or if desired, an external trigger can be used.

Third-order intermodulation (TOI)

Measuring TOI is simple using the ESA. Just start the measurement and the ESA will find the two tones on screen and adjust markers to measure the lower and upper intermodulation products. The ESA's excellent internal TOI performance of +16 dBm ensures optimum dynamic range and accuracy.



3GPP W-CDMA TS 21.141 spurious emissions test



Measurement of the harmonics of a distorted CW signal at 1 GHz

Spurious emissions

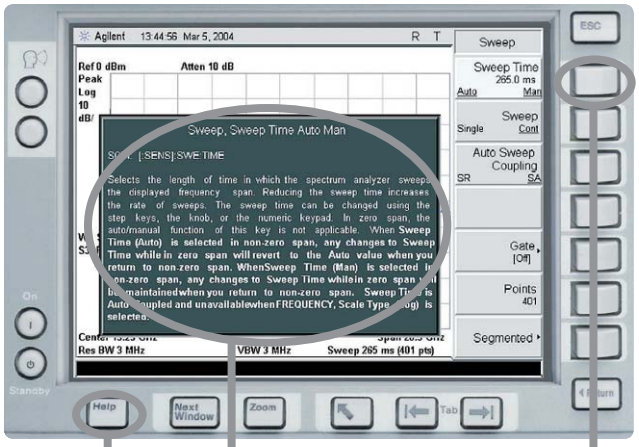
The spurious emissions measurement identifies and determines the power level of spurious emissions in user defined frequency bands. The measurement allows the user to set pass or fail limit lines and a reported spur threshold value. The results are conveniently displayed in a results table that can show up to 200 values.

Harmonic distortion

Easily measure a signal's harmonics. Simply activate the measurement and the ESA will find the highest signal on screen, then tune and measure each of its harmonics in zero span up to and including the 10th harmonic. In addition the ESA will report the total harmonic distribution (THD) or the percentage of the signals power that is contained in the harmonics.

Measurements made easy – continued

ESA measurement features



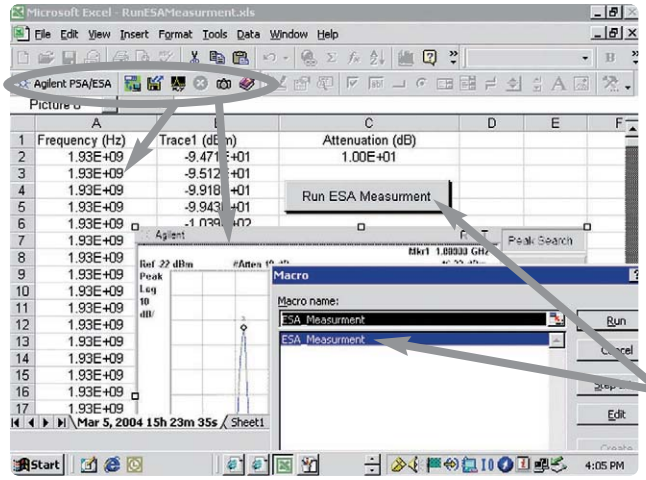
Step 1
Press Help

Step 3
A help screen appears with explanation and equivalent SCPI command (if applicable) for the key pressed

Step 2
Press any key or soft key

Built-in context sensitive help

The ESA's context sensitive help menus make it very easy to look up front panel, soft key, and hard key information, including its equivalent remote SCPI commands.

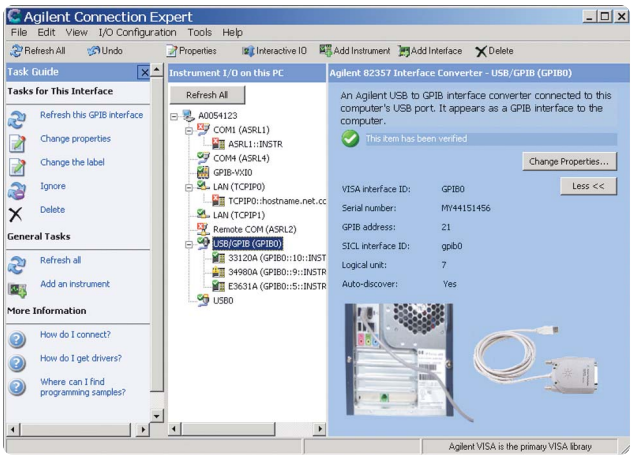


Easily record trace data, or screen shots in MicroSoft® Word or Excel with IntuiLink toolbar

IntuiLink

With IntuiLink software you can conveniently save and document your results by linking the ESA to MS Word or Excel applications. In addition the IntuiLink software provides a simple programming interface to the ESA spectrum analyzer allowing you to easily write macros or functions within windows applications to control the ESA spectrum analyzer. IntuiLink is included free of charge with every ESA.

Write macros or programs to automate the ESA's measurement using IntuiLinks Active X/COM object.



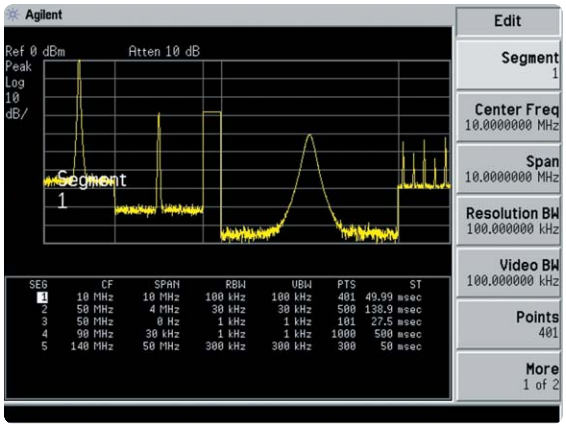
Connectivity made simple with Agilent's IO Libraries Suite

Agilent's IO Libraries Suite

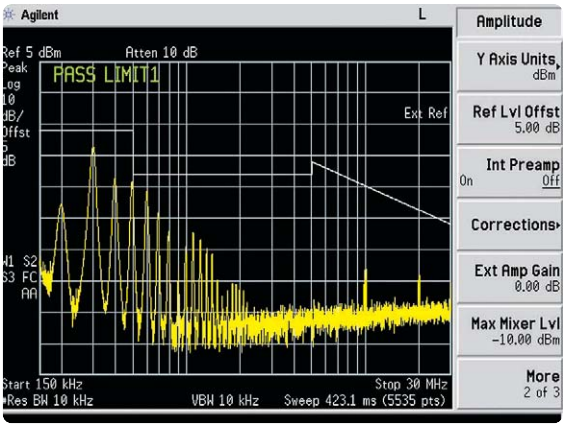
Agilent's IO Libraries Suite ships with the ESA Series spectrum analyzers to help you quickly establish an error-free connection between your PC and instruments – regardless of the vendor. It provides robust instrument control and works with the software development environment you choose. For additional description of Agilent's IO Libraries Suite features and installation requirements, please go to **www.agilent.com/find/iosuite/data-sheet.**

Measurements made easy – continued

ESA measurement features



View separate parts of the spectrum at the same time



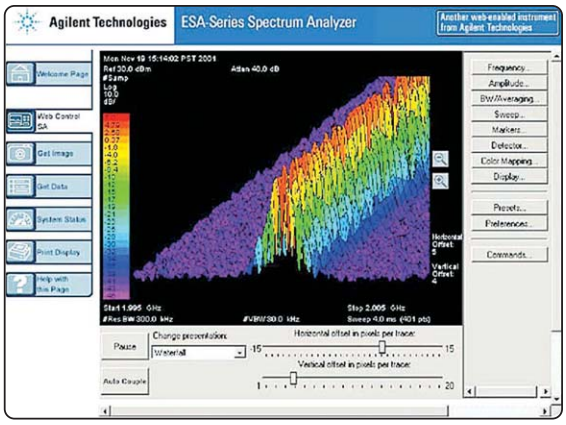
EN55011 Class A limit line with log scale

Segmented sweep

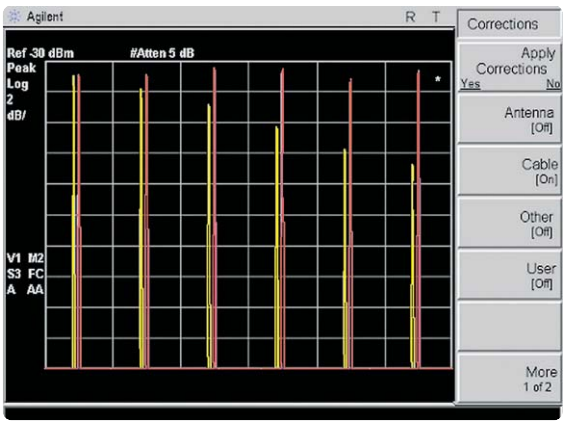
Segmented sweep allows you to view up to 32 discontinuous segments of the spectrum with varying levels of resolution at the same time. This feature allows you to view problem spots at the same time and save time while doing so by eliminating the need to retune or make long sweeps (standard and communication test analyzers only).

Log sweep

The log sweep function on the ESA makes it very easy to setup limit lines and view the spectrum in log scale. This is useful for meeting test requirements, such as CISPR, that specify requirements on a log scale (standard and communication test analyzers only).



3GPP W-CDMA TS 21.141 spurious emissions test



Add correction factors for cables, antennas, or other devices

Remotely control and monitor the ESA over the internet

BenchLink web remote control (Option 230) enables you to remotely control your instrument over the internet or intranet. The software operates on a locally-networked computer connected to the ESA by GPIB. The ESA can then be controlled remotely from any client computer on the internet or intranet with a standard web browser.

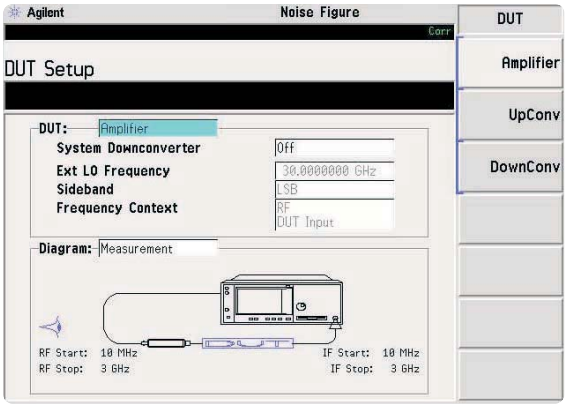
Amplitude corrections

Making amplitude corrections for cables, antennas, external mixers or other peripheral used with the ESA is simple using the ESA's built-in amplitude correction tables. Simply populate the ESA's amplitude correction table with correction factors and then turn the corrections on. Up to 4 correction tables may be loaded and applied at any one time.

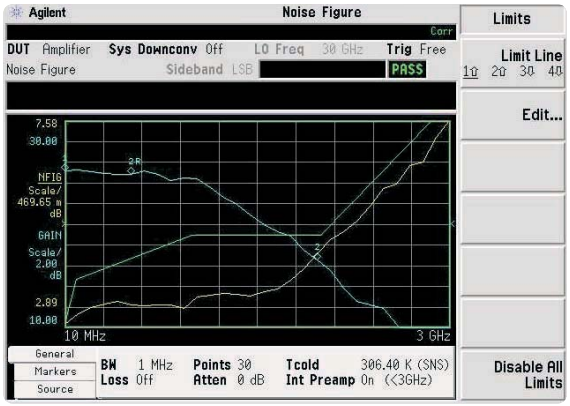
Application focused solutions

Noise figure

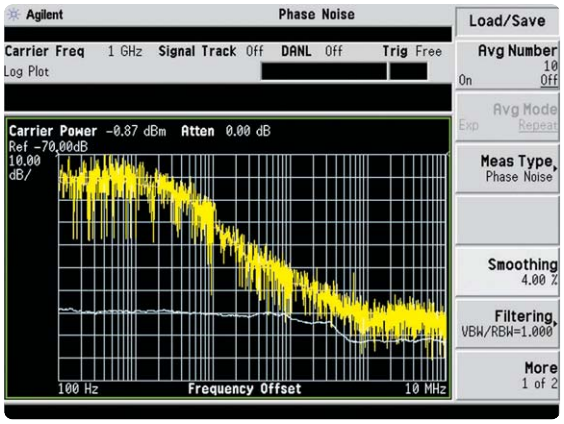
Option 219 (measurement personality), provides fast one-button noise figure and gain measurements via a user-friendly interface. Smart noise source (SNS) support, DUT setup menus, limit lines with pass/fail functionality, and context sensitive help are just some of the features that simplify noise figure measurements. Electronic storage and automatic download of excess noise ratio (ENR) data from SNS to the ESA speeds up overall setup time and minimizes potential user error. The ESA also has an integrated uncertainty calculator that assists you with making valid measurements. With the optional internal preamplifier (Option 1DS) the instrument noise figure uncertainty is as low as ± 0.24 dB below 3 GHz, which will allow you to confidently characterize low noise figure devices.



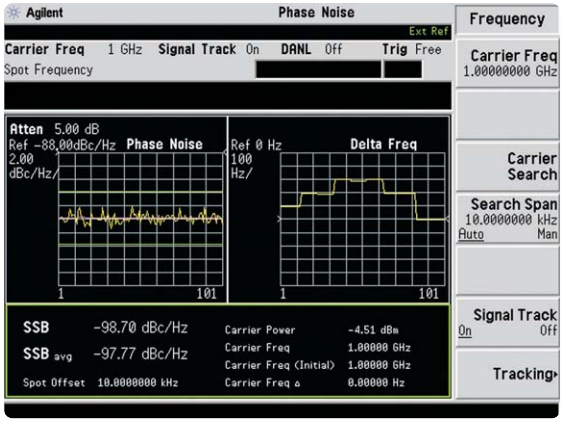
DUT setup menu



Noise figure and gain measurement with limit line testing



Phase noise versus offset frequency

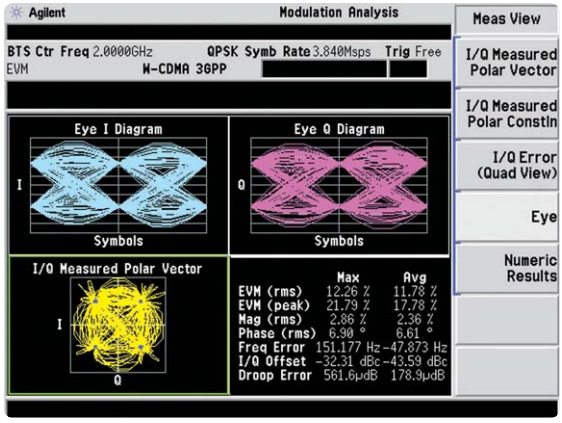


Phase noise and carrier drift

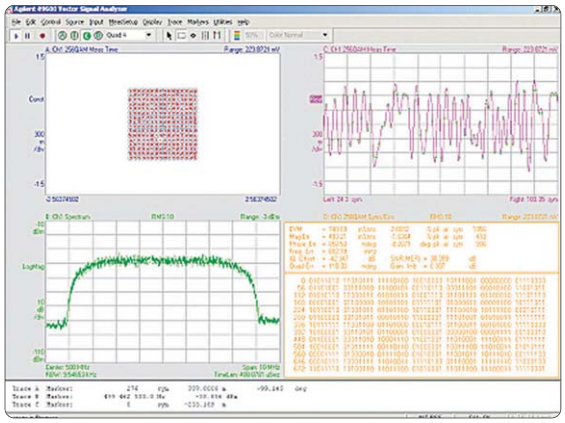
Phase noise

Option 226 (measurement personality) provides a log plot of phase noise in dBc/Hz versus offset frequency. Examine phase noise at a single offset frequency, or make phase jitter measurements utilizing an intuitive user interface.

Application focused solutions – continued



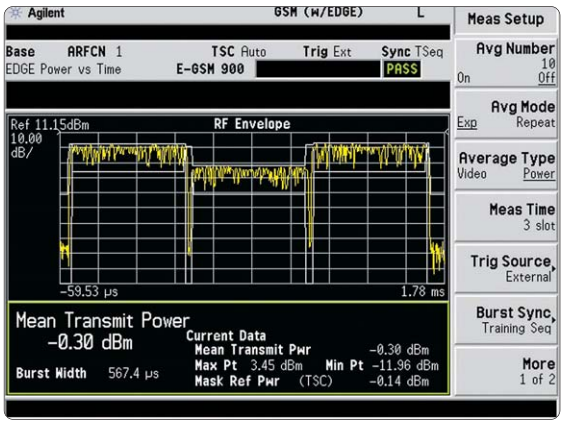
EVM measurement and eye diagram of QPSK signal



Flexible demodulation up to 256 QAM

Modulation analysis

Option 229 (measurement personality) and COM (communication test analyzer) combine to enable you to make measurements of EVM and related metrics for all major 2G/3G formats. Constellation and eye diagrams are provided to help verify modulation quality. For full flexible demodulation and analysis, the free link to the 89601A VSA software is included.



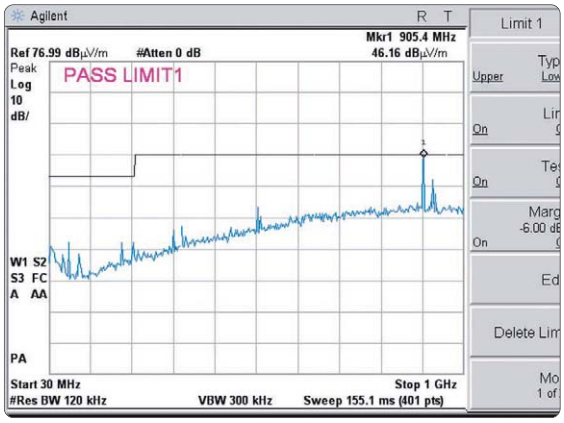
Power versus time of amplitude varying EDGE signal

GSM/GPRS/EDGE

Options BAH and 252 (measurement personalities) and COM (communication test analyzer) combine to provide all the GSM 450/900, DCS1800, PCS1900 tests required to verify the performance of GSM/GPRS/EDGE mobile and BTS transmitters.

89601A VSA link

Option 231 (ESA to 89601A Vector Signal Analysis software link utility) adds vector signal analysis capabilities of the 89601A software to the ESA Communication Test analyzer (Option COM). The 89601A software provides vector signal analysis features such as displaying phase information, time selective frequency domain measurements, time-data displays, spectrogram displays, and more. Waveforms can be recorded and stored on your PC for further signal processing and for future comparisons. Additional 89601A options enable you to perform complex modulation analysis on WLAN, 3G cellular, and custom signals.



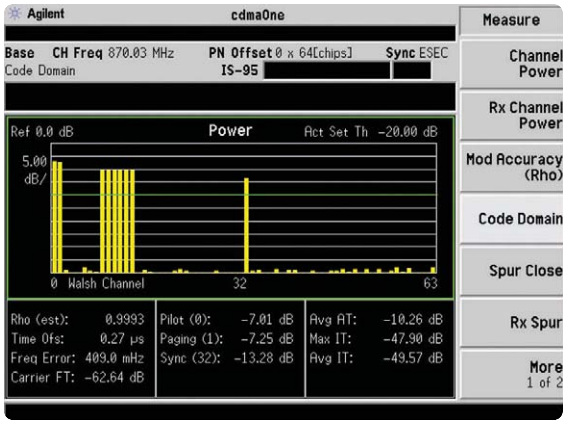
EMI measurement with limit lines enabled

Basic EMI capability

Avoid costly redesign by measuring the radiated and conducted emissions of your design early in the development process. Perform basic[1] EMI measurements by using the ESA's EMI detectors. Additionally, the following EMI bandwidths are available: 200 Hz, 9 kHz, & 120 kHz. EMI limit lines and standard EMI correction factors for antennas and other devices are available for the ESA.

1. For a complete EMI precompliance solution, use the Agilent E7402A or E7405A EMC Spectrum Analyzers (EMI receivers). The PSA Series analyzer also offers EMI measurement capability.

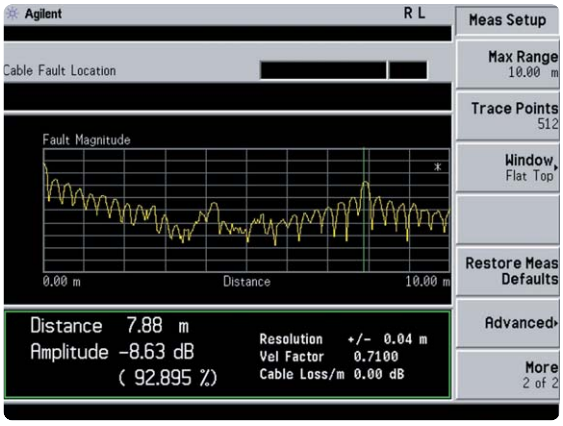
Application focused solutions – continued



Code domain power

cdmaOne

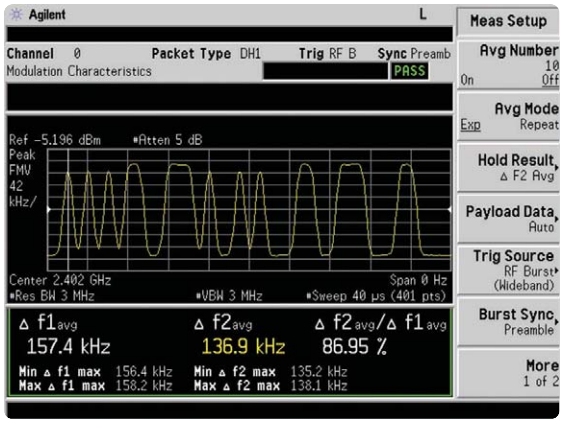
Options BAC (measurement personality) and COM (communication test analyzer) combine to make the cdmaOne standard tests, that are required to verify the performance of cdmaOne transmitters. Measurements include code domain power, ACPR, Rho, spurios, and more.



Distance to fault calculation

Cable fault location

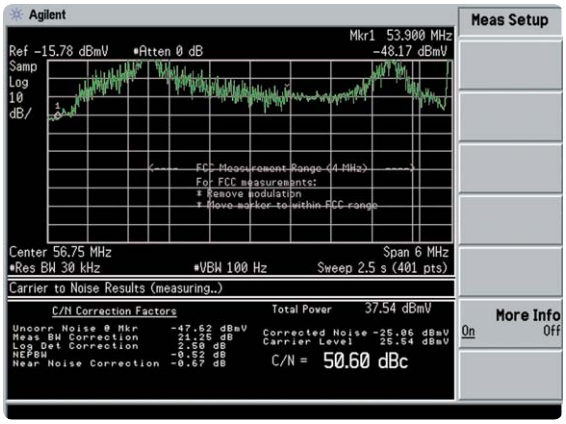
Options 225 (measurement personality), 1DN (tracking generator) and B7K (measurement kit) combine to identify distance to cable discontinuities for fault location and troubleshooting of cable installation and maintenance.



Modulation characteristic

Bluetooth™

Option 304 (measurement personality and digital demodulation hardware) provides one-button standards-based Bluetooth transmitter measurements, including modulation characteristics and ACP.



Carrier to noise measurement

Cable TV field service and analog broadcast

Option 227 (measurement personality) provides cable TV operators fast, accurate and rugged spectrum analysis for field installation, ingress evaluation and troubleshooting. Perform DTV measurements by adding Option COM and using the 89601A vector signal analysis software.

Features and benefits summary

Leading performance

0.4 dB overall amplitude accuracy	For maximum measurement confidence based on 95% specification. 1.0 dB accuracy guaranteed.
Guaranteed frequency readout accuracy	Based on internal frequency reference.
Wide dynamic range with 16 dBm TOI	(Third order intercept) giving the ESA the widest dynamic range of any analyzer in its class.
–167 dBm DANL with built-in pre-amplifier	High-gain, low-noise, fully calibrated pre-amplifier increases sensitivity (optional).
Wide offset phase noise	Performance of –150 dBc Hz at 1 MHz offset (optional).
1-ms RF sweep time	Combined with > 45 measurements per second, provides virtual real-time updates. Responsive display makes circuit adjustment easier, while increasing the probability of intercepting intermittent signals.
Five-minute warm-up	Provides full measurement accuracy after just 5 minutes.
High-speed data transfer (GPIB)	> 45 measurements and transfers per second reduces measurement times in ATE environments.
Variable sweep (trace) points	Ranging from 101 to 8192, optimizes measurements for frequency resolution and accuracy versus speed.
Narrow digital RBW filters	Adds 1, 3, 10, 30, 100, 200, and 300 Hz resolution bandwidth filters. The 200 Hz bandwidth enables you to perform EMI tests. The 9 kHz and 120 kHz EMI bandwidths come standard.
Fast time-domain sweeps	Sweeps as fast as 2.5 ns per division in zero span.
Amplitude correction	Calibrates out frequency-related amplitude effects with built-in amplitude correction factor table. Common EMI correction factors are available for EMC measurements.
Automatic background alignment	Continuously calibrates the analyzer. Guarantees accuracy over changing temperatures.
85 to 120 dB calibrated display range	Allows simultaneous display of large and small signals.
Optional built-in tracking generator	Combines spectrum and scalar test capability in a single instrument. One-button normalize function quickly calibrates the test setup.
5 dB step attenuator	Optimizes distortion-free dynamic range.
Wide selection of detectors	Including peak, RMS, average, negative peak, sample, and optional quasi-peak detector.
Temperature range	Guaranteed specifications provided over a wide temperature range of 0 to 55 °C.

Measurements made easy

One-button power measurements with standards-based setups	Quick setup and measurement time with one-button RF power measurements for all major 2G/3G, WLAN, and DVB-T digital video standards.
Optimize reference level	Button included with the built in power measurements simplifies the setting up of your measurement by automatically adjusting the reference level and attenuator based on signal level.
Segmented sweep	Saves measurement and setup time by viewing in one sweep only the frequency spans of interest. Paste together up to 32 discontinuous frequency or zero spans in one sweep. Eliminate multiple setups and sweeping through unwanted frequencies.
Log sweep	Display swept measurements on a logarithmic scale of the frequency domain.
Zoom windows	Split screen display shows wide spans while zooming in on signals of interest.
Marker functions	Provides digital resolution of measurement details through peak search, continuous peak search, delta markers, marker table, and carrier-to-noise ratio. Signal track keeps unstable signals centered on the screen while band power calculates total power between user-defined limits.
Frequency counter	With 1 Hz resolution, minimizes the need for an external frequency counter.
Softkey/hardkey interface	Provides a simple user interface while retaining access to sophisticated features.
Built-in help button	Eliminates carrying manuals into the field to determine softkey/hardkey functions and remote SCPI commands.
Limit lines	Built-in limit lines and pass/fail messages simplify testing. EMI limit lines are available.
Built-in clock/calendar	Provides time stamps on both stored and printed data.
Automatic overload protection	Protects RF input from overly large signals (E4411B).
Automatic printer setup	Identifies connected Hewlett-Packard printer models automatically.
IntuiLink software	PC software provides easy transfer of measurement results into Microsoft® Excel and Microsoft Word.
SCPI programming interface	Allows full remote control and programming of the ESA spectrum analyzer.
IVI COM drivers	Provides interface for programming in many environments, including Visual Studio ®, LabVIEW, and Agilent VEE.

Features and benefits summary – continued

Application and measurement solutions

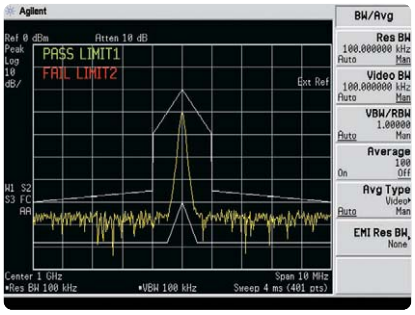
AM/FM demodulation	Combines with the built-in speaker for tune and listen applications and FM deviation measurement (optional FM demodulator provides deviation measurements).
BenchLink web remote control software	Enables remote control of analyzer over the internet or intranet. Control basic analyzer functions, view trace, waterfall, spectrogram, analog plus, and persistence displays.
Built-in power measurements	PowerSuite includes the following: channel power, occupied bandwidth, adjacent channel power, multi-carrier power ACP, CCDF, harmonic distortion, burst power, TOI, spurious emissions, SEM.
Noise figure measurement	Personality integrated into the instrument with support of smart noise source.
Phase noise measurement	Provides a convenient and fast way of measuring phase noise versus offset frequency and jitter.
Modulation analysis measurement	Provides EVM measurements for signals with PSK modulation formats up to 8PSK.
Flexible demodulation analysis	Links to 89601A vector signal analysis software.
GSM/GPRS/EDGE measurement	Provides built-in measurement capability including power versus time, output RF spectrum (ORFS), and modulation analysis.
CdmaOne measurement	Provides built in measurements for cdma including code domain power and symbol constellation.
Cable fault location measurement	Provides easy to use tool to locate faults in cables.
Cable TV field service and analog broadcast	Provides tools for installing and trouble shooting cable TV.
Bluetooth measurement	Enables demodulation of Bluetooth signals including deviation.
Quasi-peak detector	Provides additional EMI analysis capability (also includes FM demodulation).

Instrument design

Large, color VGA display with output	16.8 cm, high-resolution color display makes detailed observations easy. Includes 15-pin color VGA rear output connector for external color monitor.
Fully synthesized design	Provides continuously phase-locked precision throughout the entire sweep. Assures frequency accuracy, stability, and measurement repeatability, eliminating drift.
Snap-on battery	Eliminates the restrictions of power cords.
Rubber-encased front and rear frames	Provides impact protection in the field.
Rain-resistant front panel	Combined with louvered air vents, allows operation in diverse weather conditions.
12 Vdc power cable	Allows direct operation from automotive and truck batteries.
Parallel port	Supports output to the most popular Hewlett-Packard printers.
Floppy disk drive	Move measurement results files to your PC quickly and easily.
8.0 MB data storage	Provides internal storage of measurement data and setups for future analysis or comparison.

Three New Express Analyzers

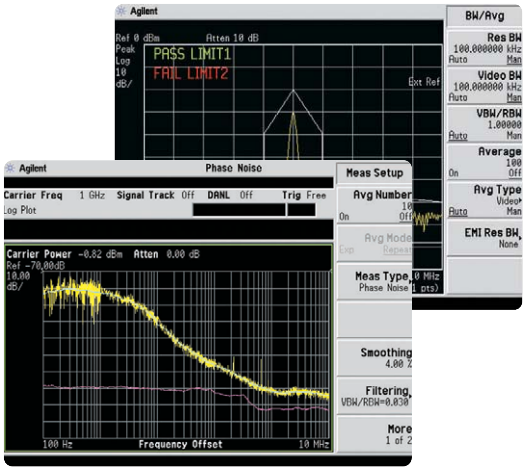
Receive faster delivery and a favorable price when you order one of the three new ESA express analyzers. The express analyzer options are based on the most frequently ordered ESA configurations and most popular options. The express analyzer options simplify the ordering process while maintaining the flexibility of the ESA platform. Just select the ESA express analyzer that meets your needs and budget.



ESA
Basic analyzer
(Option BAS)

For basic RF/µW measurements

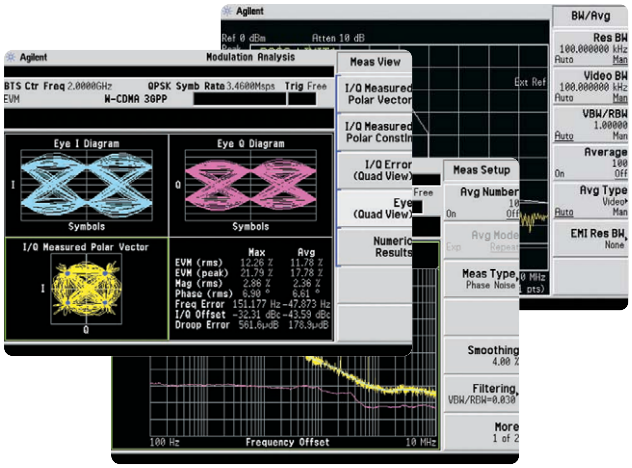
- 1.1 dB overall amplitude accuracy
- +7.5 dBm TOI
- 1 kHz or 100 Hz minimum RBW
- Standard firmware features



ESA Series
Standard analyzer
(Option STD)

For general RF/µW measurements and extended measurement capability

- 0.4 overall amplitude accuracy
- +16 dBm TOI
- 1 kHz, 10 Hz, or 1 Hz minimum RBW
- Upgradable
- Advanced firmware features and optional measurement personalities



ESA Series
Communication test analyzer
(Option COM)

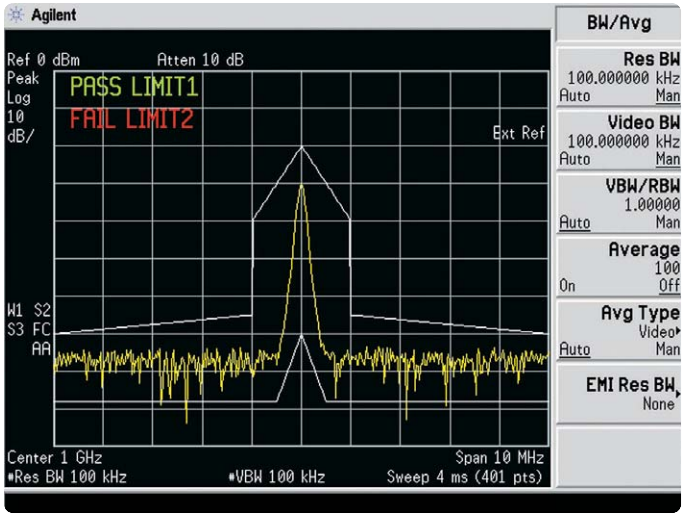
For RF/µW measurements and extended measurement capability and digital demodulation options

- 0.4 dB overall amplitude accuracy
- +16 dBm TOI
- 1 Hz minimum RBW
- Upgradable
- Advanced firmware features and optional demodulation personalities

Basic analyzer
(Option BAS)

The basic analyzer provides general spectrum analysis with the speed, accuracy and dynamic range to give you confidence in your measurement results.

- 1.5 GHz, 3.0 GHz, and 26.5 GHz Frequency range
- 1.1 dB overall amplitude accuracy
- 100 Hz RBW (optional)
- +7.5 dBm TOI
- 5 minute warm-up to guaranteed measurement accuracy
- Rugged design, weather resistant, snap on battery pack
- Fastest sweep time for its class (1 ms minimum)



Basic analyzer

- ESA-L Series spectrum analyzer
- IF/sweep port (A4J)
- GPIB connection (A4H)

Available frequencies

- 1.5 GHz (E4411B)
- 3.0 GHz (E4403B)
- 26.5 GHz (E4408B)

Available options

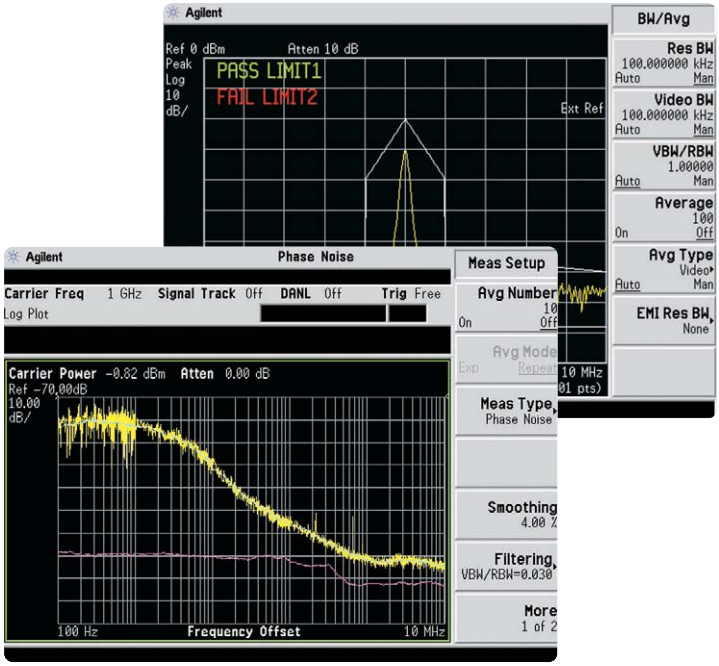
- Narrow resolution bandwidth (1DR)
- Tracking generator (BTG)
- GPIB (A4H)/Serial port (1AX)
- All accessories

When performance and reliability count as much as your budget

Standard analyzer
(Option STD)

The standard analyzer includes a wide set of built-in functions and features while maintaining the flexibility to add the most popular ESA options. The standard analyzer provides the best value in spectrum analysis with performance tied to traceable specifications, worldwide support and the most comprehensive set of instrument features for a mid-performance spectrum analyzer.

- 0.4 dB overall amplitude accuracy
- 10 Hz RBW (1 Hz with option)
- +16 dBm TOI
- FM demodulation
- Optional measurement applications including phase noise and noise figure
- Upgradable platform for future needs
- Fastest sweep time for its class (1 ms min, 50 ns zero span)



Standard analyzer

- ESA-E Series spectrum analyzer
- Faster sweep, IF sweep ports (AYX)
- FM demodulation (BAA)
- GPIB connection (A4H)

Available frequencies

- 3.0 GHz (E4402B)
- 6.7 GHz (E4404B)
- 13.2 GHz (E4405B)
- 26.5 GHz (E4407B)

Available options

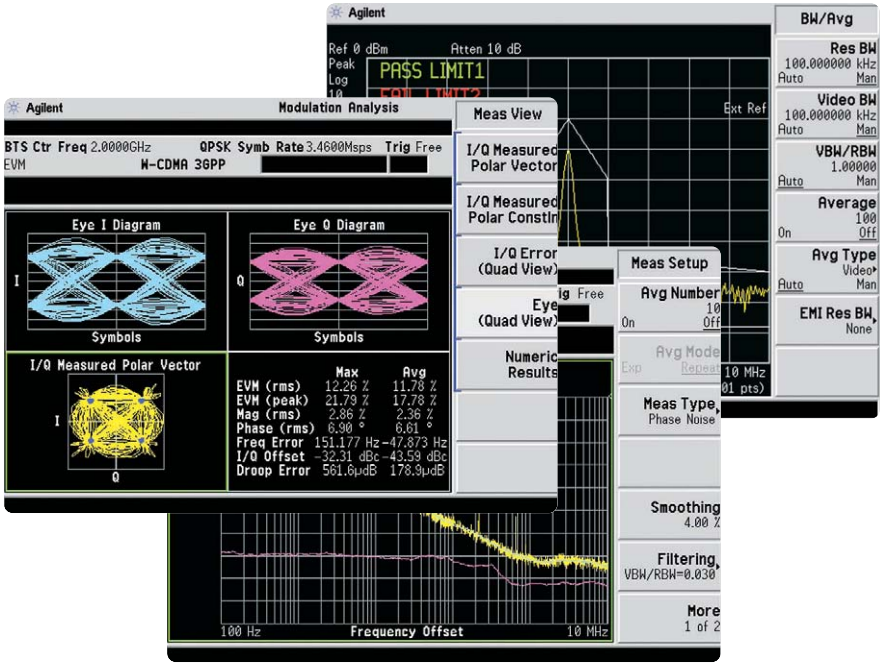
- Performance option bundle (Includes 1D5, 1DR, 1DS)
- High stability frequency reference (1D5)
- Timegating (1D6)
- Tracking generator (STG)
- Narrow resolution bandwidth (1DR)
- Preamplifier (1DS)
- Replace GPIB with serial port (1AX)
- Noise figure measurement (219)
- Cable fault location (225)
- Phase noise measurement (226)
- CATV applications (227)
- Code compatibility software
- All accessories

The industry standard in mid performance spectrum analysis

Communication test analyzer
(Option COM)

Expand on the leading performance and functionality of the standard analyzer with the addition of built-in demodulation hardware. When combined with the communication focused measurement personalities or Agilent VSA software, the communication test analyzer makes a powerful tool for communications device development.

- 0.4 dB overall amplitude accuracy
- 1 Hz RBW
- Precision frequency reference
- 10 MHz demodulation bandwidth
- Optional communications focused applications such as flexible modulation analysis, GSM/EDGE, and cdmaOne
- Link to the popular Agilent 89601A vector signal analysis software for fully flexible demodulation analysis and in depth trouble shooting tools.



Communication test analyzer

- ESA-E Series spectrum analyzer
- High stability frequency reference (1D5)
- Narrow resolution bandwidth (1DR)
- 89601A VSA software link (231)
- DSP & Fast ADC (B7D)
- RF communication hardware (B7E)
- FM demodulation (BAA)
- GPIB connection (A4H)

Available frequencies

- 3.0 GHz (E4402B)
- 6.7 GHz (E4404B)
- 13.2 GHz (E4405B)
- 26.5 GHz (E4407B)

Available options

- Time-gating (1D6)[1]
- Preamplifier (1DS)[1]
- Replace GPIB with serial port (1AX)
- Noise figure measurement (219)
- Phase noise measurement (226)
- CATV applications (227)
- Modulation analysis (229)
- cdmaOne measurement (BAC)
- GSM/GPRS/EDGE measurement (BAH/252)
- Code compatibility software
- All accessories

1. Recommended options

The standard in mid-performance spectrum analysis with built-in digital demodulation capability

Customize your own ESA

Need additional functionality later on? No problem. Most ESA options are also available as upgrades.

The ESA's flexible platform means we can build you an ESA exactly the way you need it. You can pick from a wide set of options facilitated by the ESA's six-slot card cage and flexible firmware set.

Recommended options:

1D5 High stability time base
1DR Narrow resolution bandwidth

Available options:

Connectivity

1AX Replace GPIB connection (A4H) with serial Port
A4H GPIB and parallel printer interface

Extended functionality options

060 Low emissions shielding
120 Wide offset phase noise improvement and ACPR dynamic range extension
1D6 Time-gated spectrum analysis
1DN 50 ohm tracking generator (3.0 GHz)
1DS Preamplifier built-in for enhanced sensitivity (3.0 GHz)
AYQ Quasi peak detection and FM demodulation
AYX Fast time domain sweep; IF, sweep, and video output ports
AYZ External mixing
B7B TV trigger and picture on screen
B7D Digital processing and fast ADC
B7E RF communications hardware
B7K Cable fault location accessory kit (50 ohm)
BAA FM demodulation deviation
BAB ACP 3.5 mm input connector
H26 Built-in uncalibrated pre-amp to 26.5 GHz
H70 70 MHz IF output
UKB 100 Hz (30 Hz usable) frequency range extension

Measurement applications

219 Noise figure measurement personality
225 Cable fault location measurement personality
226 Phase noise measurement personality
227 Cable TV field service and analog broadcast measurement personality
229 Modulation analysis personality
230 Benchlink web remote control software
231 ESA to 89601A vector signal analysis software link utility
252 EDGE upgrade to GSM/GPRS measurement personality
304 Bluetooth measurement analyzer/FSK demodulator
BAC cdmaOne measurement personality
BAH GSM/GPRS measurement personality
266 HP 8566/68 programming code compatibility
290 8590 programming code compatibility

Custom options available on E4411B only

1DP 75 Ω impedance
1DQ 75 Ω tracking generator

We'll build one just for you ...

Express analyzer features and performance summary

	Basic analyzer (Option BAS)	Standard analyzer (Option STD)	Communication test analyzer (Option COM)	ESA optional performance with custom configuration
Frequency range	9 kHz to 1.5, 3.0, 26.5 GHz	9 kHz to 3.0, 6.7, 13.2, 26.5 GHz	9 kHz to 3.0, 6.7, 13.2, 26.5 GHz	30 Hz to 3.0, 6.7, 13.2, 26.5 GHz (Option UKB)
Speed				
Sweep time (< 3 GHz)	4 ms to 4000 s	1 ms to 4000 s	1 ms to 4000 s	1 ms to 4000 s (Option 1D5)
Zero span sweep	4 ms to 4000 s	50 ns to 4000 s	25 ns to 4000 s	25 ns to 4000 s (Option B7D/B7E)
Remote trace transfer	30/sec	45/sec	45/sec	45/sec
Warm up time	5 min	5 min	5 min	5 min
Dynamic range				
Resolution bandwidth (Option 1DR)	100 Hz to 5 MHz	10 Hz to 5 MHz 1Hz with Option 1D5	1 Hz to 5 MHz	1 Hz to 5 MHz (Option 1DR and 1D5)
Phase noise 10 kHz/1MHz offset	–93 dBc + 20 LogN	–101 dBc/Hz + 20 LogN	–101 dBc/Hz + 20 LogN	–101 dBc/Hz + 20 LogN (Option 120)
Measurement range (Option 1DR)	–130 dBm to +30 dBm	–140 dBm[1] to +30 dBm –156 dBm[1] with Option 1DS	–150 dBm to +30 dBm –167 dBm with Option 1DS	–167 dBm to +30 dBm (Options 1DR, 1D5, 1DS)
TOI for SFDR (spurious free dynamic range)	+7.5 dBm	+16 dBm	+16 dBm	+16 dBm
Accuracy				
Frequency accuracy	±101 Hz	±101 Hz	±101 Hz	±101 Hz
Span accuracy	±0.5%	±0.5%	±0.5%	±0.5%
Amplitude accuracy	±1.1 dB	0.4 dB	0.4 dB	0.4 dB
Measurement capability				
Sample of available features	PowerSuite one button measurements, IntuiLink connectivity to MS Office, amplitude corrections	Basic features plus: log sweep, segmented sweep, optional preamp, CCDF function, FM demodulation, variable sweep points	Basic and standard features plus: digital demodulation capability	Basic, standard, and communication test features plus: 75 ohm (1DP), quasi peak detection (AYQ), external mixing (AYZ), Class B emissions (060), and wide offset phase noise (120)
Available measurement applications	Cable TV	Noise figure, phase noise, cable fault, cable TV	Flexible demodulation with 89601A software, modulation analysis, GSM/EDGE, cdmaOne, noise figure, phase noise	Basic, standard, and communication test applications plus Bluetooth (304)
Future upgrades	Limited	Available	Available	Available

1. Enhanced performance is available with different option configurations. Up to -167 dBm performance is available with Options 1DR, 1D5, and 1DS.

ESA accessories

Custom backpack for carrying the ESA Series analyzer (042)

A whole product solution

The performance of the ESA Series spectrum analyzer is only a small part of what you get from Agilent Technologies. Agilent strives to provide complete solutions that go beyond our customers' expectations. Only Agilent offers the depth and breadth of enhancements, software, services, connectivity, accessibility and support to help our customers reach their measurements objectives. replace with: For more informaton, go to **www.agilent.com/find/esa**

The Agilent ESA Series is manufactured in an ISO 9001 registered facility to Agilent's exacting standards.

Product peripherals and accessories

- battery packs and 12 Vdc cables
- rack mounts
- operating/carrying, backpack and transit cases
- external mixers to 325 GHz
- pre-amplifiers to 26.5 GHz
- high-impedance active probes
- RF/MW limiters, adapters & cables

PC connectivity & software

- floppy disk drive
- GPIB or RS232 interfaces
- VXI*plug&play* drivers
- IVI-COM drivers
- MS Word and Excel connectivity with IntuiLink software
- Agilent's IO Libraries Suite
- EEsof Advanced Design System driver (instrument link)
- programming examples on CD-ROM
- SCPI (Standard Commands for Programmable Instruments)
- custom software service
- BenchLink web remote control software
- HP 8566/68 programming code compatibility
- 8590 Series programming code compatibility
- 8590 Series/ESA programming conversion guide

Post-sales support

- 1, 3, or 5 year global warranty
- worldwide call center and calibration service center support network
- one-year calibration intervals
- FREE firmware upgrades and service notes available from Agilent's Web site
- PC-based calibration software
- computer-based service training on CD-ROM
- flexible support options to meet your needs

Pre-sales services

- rentals, leasing, and financing
- application engineering and consulting services
- application notes
- custom product modifications
- custom downloadable programs
- product literature available from Agilent's Web site
- demonstration units available for evaluation
- trade-up programs
- support at least 5 years beyond production life of product

Training and access to information

- download firmware, manuals, application notes, and other documentation from web
- web-based support and FAQ's
- built in context sensitive help
- factory service training
- technical seminars
- localized operating manuals
- On-site or remote consultation services

Related literature

Agilent IntuiLink Software – Data Sheet	5980-3115EN
AN150, Signal Analysis Basics – Application Note	5952-0292
AN1286-1; 8 Hints for Making Better Spectrum Analyzer Measurements	5965-7009E
BenchLink Web Remote Control Software Option 230 – Technical Overview	5988-2610EN
Bluetooth Measurement Solution for the ESA-E Series Spectrum Analyzer – Technical Overview	5980-2786E
Cable Fault Location Personality for the ESA-E Series Spectrum Analyzers Option 225 – Technical Overview	5980-1915E
Cable TV Personality for the ESA E-Series Spectrum Analyzers, Option 227 – Technical Overview	5980-2297E
cdmaOne Measurement Solutions for the Agilent ESA-E Series Spectrum Analyzers – Technical Overview	5968-6869E
E1779A Snap-on Battery Pack – Technical Overview	5966-1851E
ESA Series Spectrum Analyzer – Data Sheet	5968- 3386E
EMC Analyzers and EMI Software – Brochure	5968-2516E
ESA Phase Noise – Technical Overview	5988-4348EN
ESA-E Series Spectrum Analyzers GSM with EDGE Measurement Personality – Technical Overview	5968-6871E
ESA-E Series Spectrum Analyzer Performance Guide Using the 89601A Vector Signal Analysis Software – Application Note	5988-4097EN
ESA Series Spectrum Analyzer Self Guided Demo – Application Note	5968-3658E
ESA Series Spectrum Analyzers Noise Figure Measurements Personality – Technical Overview with Self-Guided Demonstration	5989-0215EN
ESA Series Noise Figure Measurement Personality – Photo Card	5989-0344EN
ESA/EMC Spectrum Analyzer – Configuration Guide	5968-3412E
ESA-E Series Self-Guided Demonstration for the Modulation Analysis Measurement Personality – Application Note	5988-2521EN
ESA-E Series Spectrum Analyzer Bluetooth Measurement Option Self-Guided Demo – Application Note	5980-2577EN
GSM/GPRS Measurement Solutions for the Agilent ESA-E Series Spectrum Analyzers – Technical Overview	5968-6871E
Measuring signals above 26.5 GHz – Photo Card	5968-6873E
Modulation Analysis Measurement Personality for the ESA-E Series Spectrum Analyzers – Technical Overview	5988-2116EN
N2717A Performance Verification and Adjustment Software for the Agilent ESA Series Spectrum Analyzer – Technical Overview	5968-5478E
Phase Noise Measurement Personality ESA-E Series Spectrum Analyzers Option 226 – Photo Card	5980-1191E
Select the Right Spectrum Analyzer for Your Needs – Selection Guide	5968-3413E
TV Transmission Quality Measurements – Photo Card	5968-6874E

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