

The Agilent ESA-E series

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

Flexible hardware/software environment allows focused applications like GSM and cdmaOne.

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 five 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)

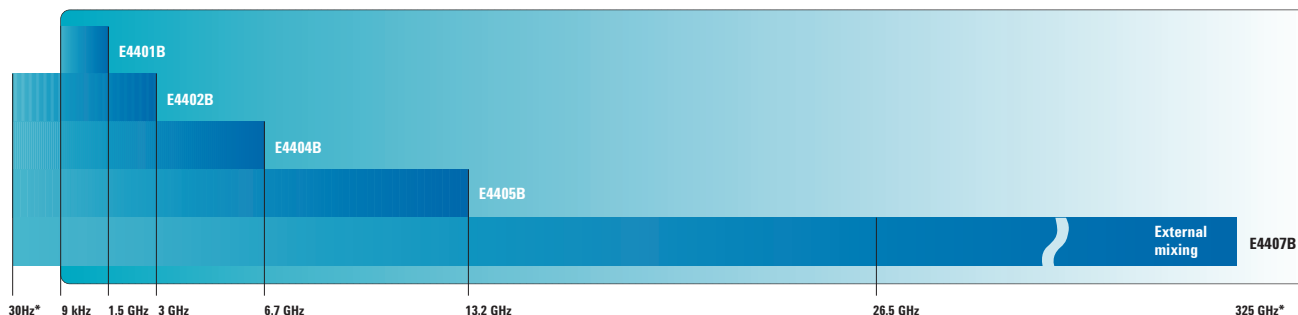
Weather resistant front panel allows operation in rain and high humidity.

**Speed, accuracy, and dynamic range
...with a flexible platform for the future!**

Designed for performance measurements and...

- Fast test times
- Superior resolution
- Wide dynamic range
- Measurement confidence

Frequency range summary*



A platform built for speed

Agilent uses the latest digital, RF and microwave designs to deliver the performance typically found in more expensive spectrum analyzers. The ESA-E series portable spectrum analyzers have a remarkable one-millisecond RF sweep time and virtual real-time measurement updates to the display or through GPIB. Along with narrow digital resolution bandwidth filters (10 Hz to 300 Hz), and fast, time-domain sweeps you'll spend less time testing and have your product to market faster.

Specification summary*

	E4401B	E4402B	E4404B/E4405B/E4407B
Speed			
Sweep time (<3 GHz)	1 ms to 4000 s	1 ms to 4000 s	1 ms to 4000 s
Zero span sweep time	25 ns to 4000 s	25 ns to 4000 s	25 ns to 4000 s
Local measurement rate	50/sec	45/sec	40/sec
Remote measurement & transfer rate	45/sec	45/sec	40/sec
RF center frequency tuning time	75 ms	75 ms	75 ms
Warm-up time for full accuracy	5 min	5 min	5 min
Resolution			
Resolution bandwidth range	10 Hz to 5 MHz	10 Hz to 5 MHz	10 Hz to 5 MHz
Residual FM	2 Hz p-p in 20 ms	2 Hz p-p in 20 ms	2 Hz p-p in 20 ms
Phase noise (10 KHz/1 MHz offsets)	-93 dBc/Hz	-90/-133 dBc/Hz	-90/-133 dBc/Hz + 20 Log N
Variable sweep (trace) point range	101 to 8192	101 to 8192	101 to 8192
Dynamic range			
Amplitude measurement range	-152 dBm to +30 dBm	-153 dBm to +30 dBm	-151 dBm to +30 dBm
Calibrated display range	85 to 120 dB	85 to 120 dB	85 to 120 dB
Maximum 2nd order dynamic range	85 dB (+35 dBm SHI)	90 dB (+45 dBm SHI)	90 dB (+45 dBm SHI)
Maximum 3rd order dynamic range	101 dB (+13.5 dBm TOI)	99 dB (+12.5 dBm TOI)	98 dB (+12.5 dBm TOI)
1-dB gain compression	0 dBm	0 dBm	0 dBm
Accuracy			
Frequency accuracy (stable temp.)	±101 Hz	±101 Hz	±101 Hz
Span accuracy (8192 sweep points)	±0.5%	±0.5%	±0.5%
Overall absolute amplitude accuracy	±1.0 dB	±1.0 dB	±1.0 dB, 2 dB >3 GHz, 2.5 dB >6.7 GHz

*Includes optional performance, see ESA-E Series technical specifications for complete details, literature number 5968-3386E.

...the flexibility to tailor that performance to your needs...

Choose the performance you need, when you need it

The Agilent ESA-E's flexible platform means you can get exactly what you need today while still protecting your investment into the future. The six-slot option card cage lets you choose only the performance you need now (without paying for unneeded capability) and upgrade in the future.

This scalable performance in combination with Agilent measurement personalities, downloaded into the internal memory, transform the ESA-E analyzer into an application-focused solution built around your unique needs.

Designed for upgradeability

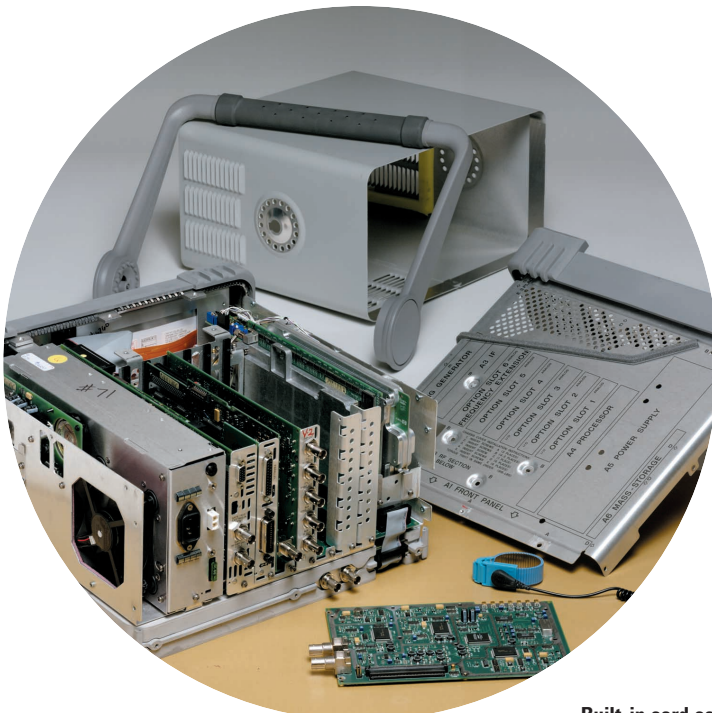
After the purchase of your analyzer, most optional performance can be installed and calibrated at an Agilent Service Center or in many cases, installed in your facility. Firmware upgrades, including many performance enhancements, are available free by download from the Agilent web site.

Over 35 options to choose from...and more in the future

Including:

- Digital resolution bandwidth filters of 10, 30, 100, 200 EMI, and 300 Hz
- Time-gated spectrum analysis
- FM demodulation/deviation measurements plus tune and listen
- TV trigger with color picture on screen
- 1.5/3.0 GHz built-in tracking generator
- 30 Hz low frequency extension
- Fast time-domain sweeps to 25 ns
- Additional user memory to 10 MB
- External mixing capability to 325 GHz
- RF and digital demodulation/communication hardware
- 75 Ω input
- Snap on battery pack or 12 Vdc operation
- Decreased phase noise at wide offsets for greater ACPR dynamic range

For a complete list of options and accessories with ordering and compatibility information please see the Agilent ESA/EMC Spectrum Analyzer Configuration Guide (literature #5968-3412E).



Built-in card cage provides the flexibility to add application-specific performance.



We'll build one just for you.

...then add measurement personalities to create application focused solutions.

Measurement personalities

For a growing number of applications Agilent offers unique software programs (provided on 3.5-in. disks) designed specifically for the ESA-E series. Downloaded into analyzer memory, each measurement personality provides measurement setups, routines, and results specific to your application, including a user interface with related terminology.

- Easy to use one-button measurements
- Complex algorithms executed with a button press
- Improved accuracy and repeatability
- Operator independent results
- Decreased training time
- Improved productivity

Combine the ESA-E series optional hardware configurations with downloadable measurement personalities to create application specific solutions.

General purpose measurement personalities

Cable fault location

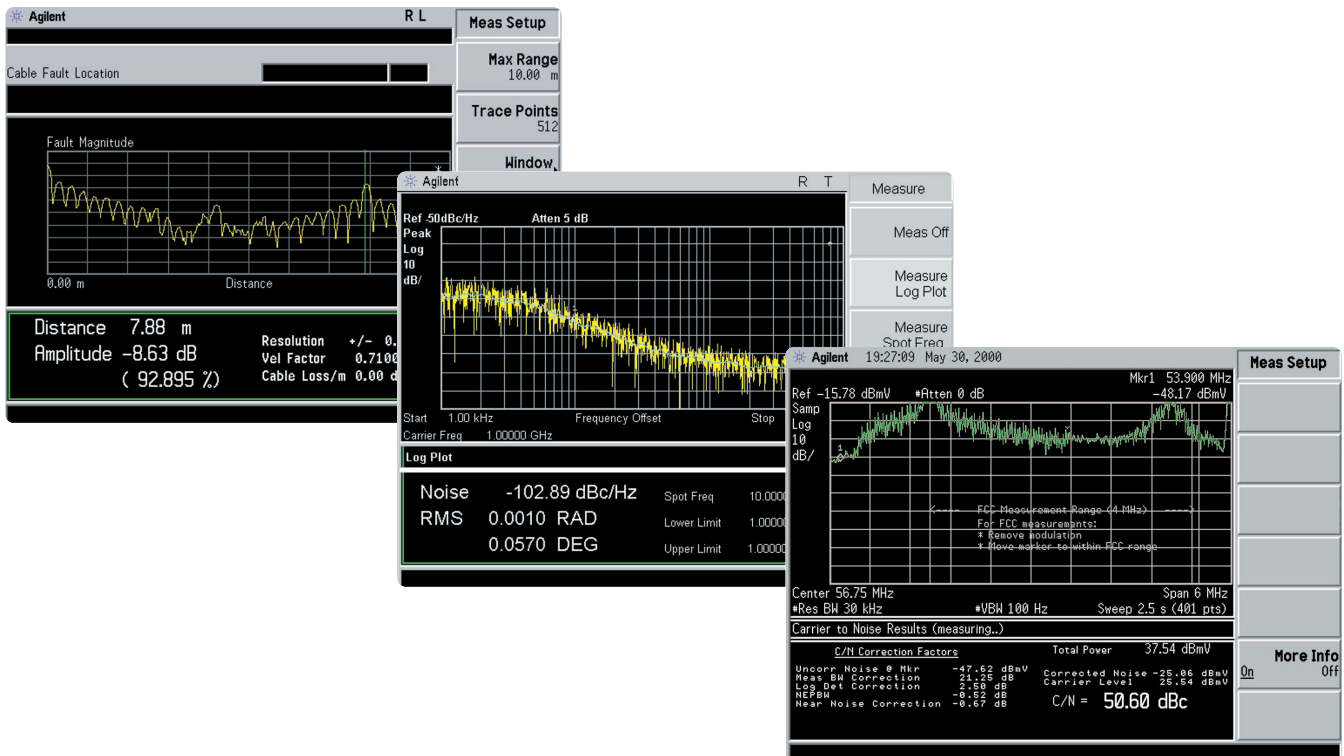
Options 225 (measurement personality), 1DN (tracking generator) and B7K (measurement kit) combine to identify distance to cable discontinuities for fault location and troubleshooting of cable installation and maintenance.

Phase noise

Option 226 (measurement personality) provides a log plot of phase noise in dBc/Hz versus offset frequency.

Cable TV service and installation

Option 227 (measurement personality) provides Cable TV operators fast, accurate and rugged spectrum analysis for field installation, ingress evaluation and troubleshooting.





Communication focused measurement personalities

cdmaOne

Options BAC (measurement personality) and B74 (RF and digital demodulation hardware) combine to make the cdmaOne standard tests such as ACPR that are required to verify the performance of cdmaOne transmitters.

GSM/GPRS

Options BAH (measurement personality) and B74 (digital demodulation hardware) combine to provide all the GSM 450/900, DCS1800, PCS1900 tests required to verify the performance of GSM/GPRS mobile and BTS transmitters.

Bluetooth™

Option 304 (measurement personality and digital demodulation hardware) provides one-button standard compliant Bluetooth transmitter measurements.



Features and benefits

Performance

1-ms RF sweep time	Combined with >40 measurements per second, provides virtual real-time updates. Responsive display makes circuit adjustment easier, while increasing the probability of intercepting intermittent signals.
High-speed data transfer (GPIB)	>40 measurement and transfers per second reduce measurement time in ATE environments (optional).
Variable sweep (trace) points	Ranging from 101 to 8192, optimizes measurements for frequency resolution and accuracy versus speed.
Narrow digital RBW filters	Adds 10 Hz, 30 Hz, 100 Hz, 200 Hz and 300 Hz resolution bandwidth filters for viewing closely spaced signals (optional).
Fully synthesized design	Provides continuously phase-locked precision throughout the entire sweep. Assures frequency accuracy, stability, and measurement repeatability, eliminating drift.
Fast time-domain sweeps	Sweeps as fast as 2.5 ns per division in zero span (optional).
Amplitude correction	Calibrates out frequency-related amplitude effects with built-in amplitude correction.
Automatic background alignment	Continuously calibrates the analyzer. Eliminates the need for daily calibration. Guarantees accuracy over changing temperatures.
Built-in preamplifier	High-gain, low-noise, fully calibrated preamplifier increases sensitivity (optional).
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. Synthesized design eliminate tracking drift (Agilent E4401B). One-button normalize function quickly calibrates the test setup .
5-dB step attenuator	Optimizes distortion-free dynamic range.
Built-in frequency counter	With 1 Hz resolution, minimizes the need for an external frequency counter.

Portability

Fast warm-up	Provides full measurement accuracy after just five minutes.
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.

Features and benefits

Ease-of-use

One-button measurements	Save setup and measurement time with adjacent channel power, occupied bandwidth, channel power, 10 peaks table, and harmonics table features.
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.
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.
Zoom windows	Split screen display shows wide spans while zooming in on signals of interest.
Parallel port	Supports output to the most popular HP printers (optional).
Floppy disk drive	Makes moving measurement results files to your PC quick and easy.
AM/FM demodulation	Combines with the built-in speaker for tune and listen applications (Optional FM demodulator provides deviation measurements).
200 trace and instrument state files	Provides internal storage of measurement data and setups for future analysis or comparison.
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 bandpower calculates total power between user-defined limits.
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.
Built-in clock/calendar	Provides time stamps on both stored and printed data.
Automatic overload protection	Protects RF input from overly large signals (available on the 1.5 GHz E4401B).
Automatic printer setup	Identifies connected HP printer models automatically.
IntuiLink software	PC software provides easy transfer of measurement results into MS Excel® and MS Word® applications. Included standard with Options 1AX and A4H.



Research and development

Productivity with speed, accuracy and dynamic range

Up to 220 times faster than analog

Now you don't have to buy a high-priced spectrum analyzer to get advanced technology. The ESA-E series with its optional digital 10 Hz resolution bandwidth gives you sweep times up to 220 times faster than analog!

Optional digital narrow resolution bandwidth filters (10 Hz, 30 Hz, 100 Hz, 200 Hz and 300 Hz) provide the resolving power to measure closely spaced signals, plus give a narrow shape factor ($\leq 5:1$) for superior resolution. The filters deliver a lower noise floor and increased measurement sensitivity for a larger measurement range.

Verify your designs with confidence

Reduce project time with spectrum-analysis capabilities that optimize your designs. The ESA-E series offers ± 1 dB amplitude accuracy, 0.5% span accuracy, ± 101 Hz frequency accuracy, and a continuously phase-locked synthesizer for stability and repeatability. Calibrate out the frequency-related amplitude effects with built-in amplitude correction. The automatic background alignment offers continuous calibration to assure measurement confidence.

Fewer measurement constraints

When a passband contains two or more signals such as CDMA or TDMA modulation, you don't want dynamic range to limit your measurements. The ESA-E series has sensitivity down to -153 dBm, plus a third-order intercept point of $+12.5$ dBm (typically $+16$ dBm) and a second harmonic intercept point of $+45$ dBm to give you wide distortion free measurement range.



Research and development

Measure

One-button results with measurement personalities

Measure your designs easier with Agilent Bluetooth™, GSM/GPRS, cdmaOne, and Phase Noise measurement personalities. Execute complex algorithms with the press of a button by utilizing downloaded measurement personalities in combination with optional hardware.

Expert yet easy EMI measurements

The Agilent E7400A series of EMC analyzers takes advantage of the ESA-E series platform to provide precompliance measurements for design analysis. For more information see the Agilent EMC Analyzers and EMI Software brochure, literature number 5968-2516.

Capture

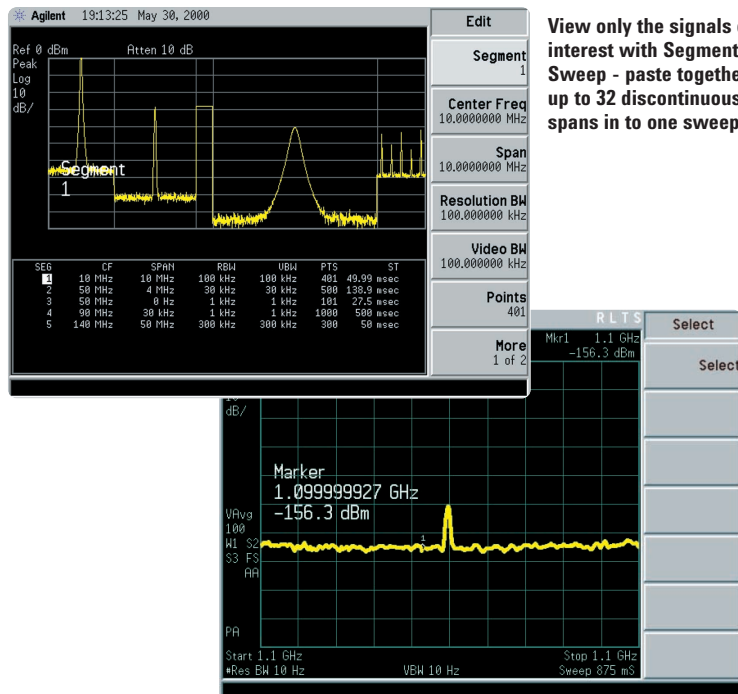
Capture measurement results easily and quickly with IntuiLink

IntuiLink PC software provides easy transfer of ESA measurement trace data and images directly into MS Excel and Word documents for analysis, archiving, presentations, or printing. Transfer data and images over GPIB, RS232, or LAN. Save and restore analyzer states. Utilize automatic measurement transfers by date and time. IntuiLink is included standard with GPIB and RS232 options.

Analyze

Analyze measurement results

Analyze breadboard results easier with ESA instrument links supported by the Agilent EEsof Advanced Design System.



View only the signals of interest with Segmented Sweep - paste together up to 32 discontinuous spans in to one sweep.

The ESA-E series has digital narrow resolution bandwidth filters and internal preamplifiers so you can identify low-level spurs.

Manufacturing

Every millisecond counts

Real-time response

Whether you are tuning oscillators manually or performing high-volume, automatic tests on wireless products, the ESA-E series of spectrum analyzers gives a real-time response with up to 45 measurements per second. Eliminate your measurement-speed bottlenecks to help meet your production goals.

This family of spectrum analyzers offers improved productivity, with a one-millisecond sweep time and as low as 25 ns in zero span.

Use *variable sweep points* to optimize speed versus frequency resolution. Maximize speed by measuring only the frequencies of interest with *segmented sweep*.

Unparalleled speed for manual or remote operation

The ESA-E series spectrum analyzers offer the following features to help you quickly build and test your products:

- One-millisecond RF sweep time
- 25 ns zero span sweep time (optional)
- Up to 45 measurements per second update to the display
- Large 13.8-cm color VGA TFT active matrix display with wide viewing angle
- Color VGA display output connector
- Enhanced circuit tuning with continuous peak search
- Instant printing (PCL5 printers)
- Limit lines with large, colorful pass/fail messages

Surpassing the GPIB speed record

The ESA-E series surpasses the speed of the record-holding Agilent 8566B high-performance spectrum analyzer for moving data from the analyzer to a computer. Vastly improved sweep time and measurement update rate eliminate the GPIB data-rate bottleneck to help you more easily meet your productivity goals.

- 45 measurements per second transferred to a computer
- 75 ms RF center frequency tuning time
- Standard Commands for Programmable Instruments (SCPI) compliant
- The Agilent 8590-series/ESA programming conversion guide
- VXI*plug&play* drivers for ease of program development



Measurements per second



ESA-E series
45 updates/sec. display
45 updates/sec. GPIB



8566B Turbo
24 updates/sec. display
15 updates/sec. GPIB

Swept-tuned spectrum analysis speed

Manufacturing

Reduce test margins

The excellent measurement accuracy reduces measurement uncertainty to allow for narrower test margins and improved yields. With an overall amplitude accuracy of ± 1 dB, and a frequency accuracy of ± 101 Hz plus the continuously phase-locked synthesizer, you get the performance you need to have confidence in your tests.

Individual calibration certificate included standard with every analyzer.

Built-in preamplifier maximizes sensitivity

When your application calls for measurements of very low-level signals, the optional built-in preamplifier (to 3 GHz) in the ESA-E series increases sensitivity. This high-gain, low-noise preamplifier lets you use wider bandwidths for even faster sweep times when searching for low-level signals.



For circuit adjustments with real-time results, the ESA-E series spectrum analyzers offers a one-millisecond sweep time and up to 45 measurement updates per second.

Field service

Calibrated field measurements in just FIVE minutes!

The ESA-E series takes only 5 minutes to warm-up so technicians spend little time waiting for instrument stabilization. The automatic, internal background alignment feature gives consistently accurate results over varying temperatures. Measurement results are easily saved, printed or integrated into external tools for analysis and documentation using the standard 3.5 in floppy disk drive. The easy-to-use file manager with a time and date stamp helps to organize storage of measurement data. And, the optional rechargeable battery provides up to 1.9 hours of cordless operation.



The tough ESA-E is field-rugged, yet offers uncompromising performance



Snap-on battery provides freedom from AC power mains

Field service

Easy, worry-free measurements

The ESA-E series offers outstanding lab-grade performance, and protection from the elements along with convenience and ease-of-use features tailored to field service.

- Rubber-encased frames and the lack of vibration-prone internal adjustments improve reliability during transportation.
- Snap-on rechargeable battery provides up to 1.9 hours of cordless operation (optional).
- 12 Vdc operation from automotive electrical systems
- Rain-resistant front panel, shielded vents, and side-mounted fan protect the instrument in adverse environments.
- Vibration and shock resistance with solid state internal memory.
- Continuous automatic background alignment provides accuracy over varying temperature conditions.
- Hard transit case, soft operating/carrying case or backpack provides choice of convenient transportation aids.
- Flexible tilt handle optimizes line of sight whether the analyzer is viewed from the bench or ground.
- Color display provides optimum readability regardless of lighting and viewing angle.
- Find cable problems with the Fault Location measurement personality.
- Troubleshoot cellular base stations with GSM and cdmaOne measurement personalities.



Backpack with ESA to remote locations

Get accurate measurements in every kind of field condition

Agilent ESA-E series – a whole product solution

The performance of the ESA-E 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. Please contact Agilent for more information.

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

PC connectivity & software

- Floppy disk drive
- GPIB or RS232 interfaces
- VXIplug&play drivers
- IntuiLink spectrum analyzer software
- EEs of Advanced Design System driver (instrument link)
- Programming examples on CD-ROM
- SCPI (Standard Commands for Programmable Instruments)
- Custom software service
- 8590-series/ESA programming conversion guide

Product peripherals and accessories

- Battery packs and 12 Vdc cables
- Rack mounts
- Operating/carrying, backpack and transit cases
- External mixers to 110 GHz
- Preamplifiers to 26.5 GHz
- High-impedance active probes
- RF/MW limiters, adapters & cables

Post-sales support

- Standard three-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

- Printer support matrix on Agilent's web site
- Factory service training
- Web-based support of frequently asked questions
- Operation, programming and calibration manuals on CD-ROM and on Agilent's Web site
- User and applications training
- Technical seminars
- Cellular/PCS base station troubleshooting course
- Calibration certificate standard
- Localized operation manuals

Agilent ESA-E series

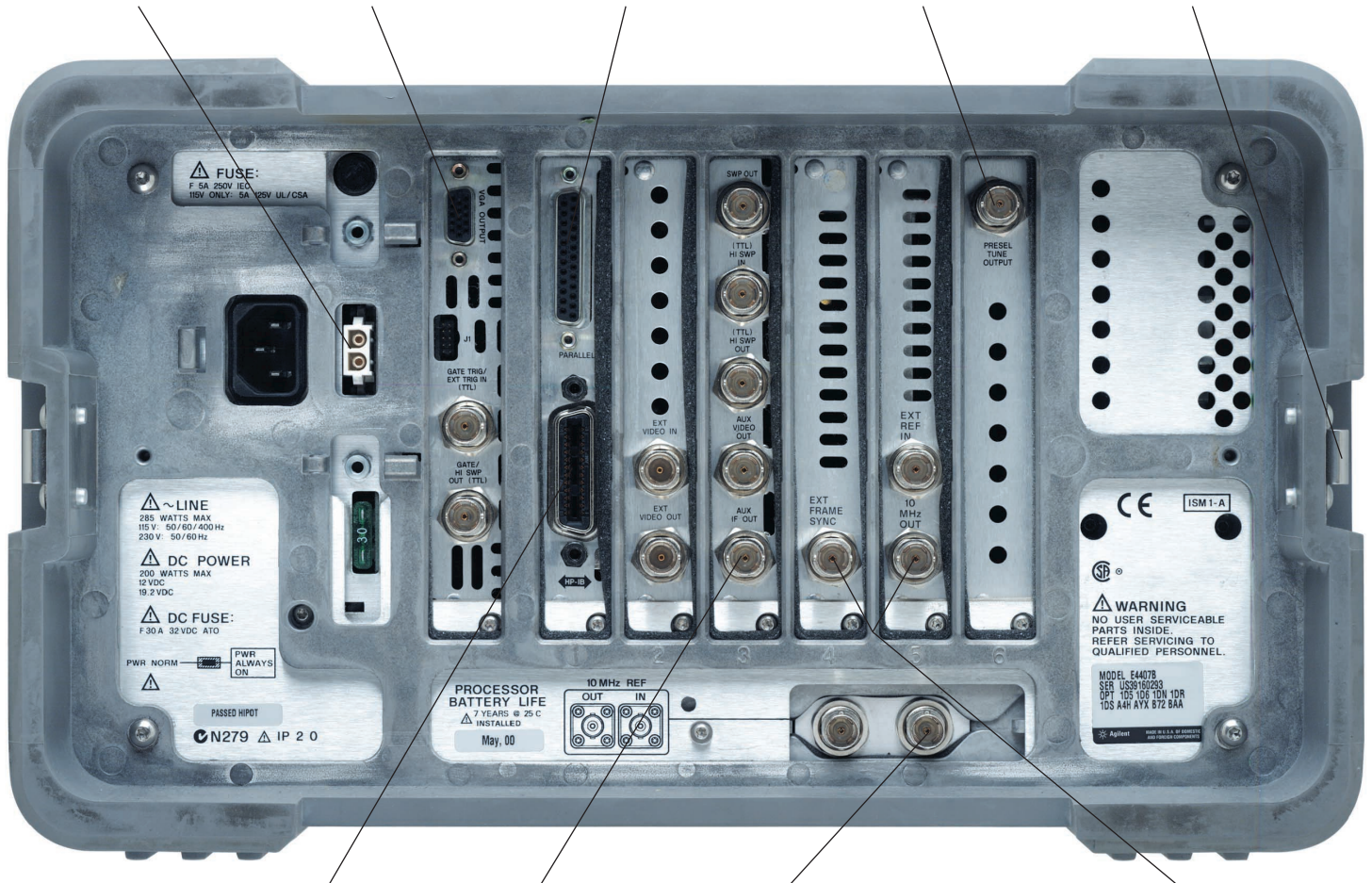
12 Vdc operation from automotive batteries.

Add an external VGA color monitor.

Parallel port supports most HP printers (optional).

Supports Agilent preselected external mixers (optional).

Snap-on battery pack for portability (optional).



High speed GPIB interface (optional).

Input signal down converted to 21.4 MHz (optional).

Use a external frequency reference for even more accuracy.

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

Agilent ESA-E series

Additional information

Agilent literature	Number
ESA-E Series Technical Specifications	5968-3386E
ESA-E Series Configuration Guide	5968-3412E
Spectrum Analyzer Selection Guide	5968-3413E
ESA-E Series Self-Guided Demo	5968-3658E
ESA Battery Pack Product Overview	5966-1851E
EMI Pre-compliance Brochure	5968-2515E
N2717A Calibration Software Product Overview	5968-5478E
GSM/GPRS Measurements Product Overview	5968-6871E
cdmaOne Measurements Product Overview	5968-6869E
TV Transmission Quality Measurements Flyer	5968-6874E
Measuring Signals Above 26.5 GHz Flyer	5968-6873E
Cable Fault Location Product Overview	5980-1915E
Phase Noise Product Overview	5980-1191E
Cable TV Product Overview	5980-2297E
Bluetooth™ Measurement Solutions Product Overview	5980-2786EN
IntuiLink Software Data Sheet ¹	5980-3115EN

Ordering information ESA-E series

Agilent E4401B Spectrum Analyzer 9 kHz to 1.5 GHz
Agilent E4402B Spectrum Analyzer 9 kHz to 3.0 GHz
Agilent E4404B Spectrum Analyzer 9 kHz to 6.7 GHz
Agilent E4405B Spectrum Analyzer 9 kHz to 13.2 GHz
Agilent E4407B Spectrum Analyzer 9 kHz to 26.5 GHz

For the latest information on the Agilent ESA-E series see our Web page at: www.agilent.com/find/esa



1. For more information about IntuiLink software visit our Web site at: <http://www.agilent.com/find/IntuiLink>

Agilent Technologies' Test and Measurement Support, Services, and Assistance

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 on-site 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.

By internet, phone, or fax, get assistance with all your test & measurement needs

Online assistance:

www.agilent.com/find/assist

Phone or Fax:

United States:

(tel) 1 800 452 4844

Canada:

(tel) 1 877 894 4414

(fax) (905) 282-6495

Europe:

(tel) (31 20) 547 2323

(fax) (31 20) 547 2390

Japan:

(tel) (81) 426 56 7832

(fax) (81) 426 56 7840

Latin America:

(tel) (305) 269 7500

(fax) (305) 269 7599

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Innovating the HP Way