Agilent
ESA-L Series Spectrum Analyzers
Product Overview

When speed and accuracy count as much as your budget
Expanded to 3 and 26.5 GHz!
Speed, accuracy, affordability

High-resolution, high-contrast monochrome display makes viewing multiple traces easy.

Rugged package with rubber-encased frames resists transportation stresses.

Automatic background alignment helps eliminate calibration worries.

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

Full measurement specifications after just a five minute warm-up.

Help key quickly communicates hardkey/softkey functions on screen.

4ms sweep time and virtual real-time display update for easier circuit tuning.

Weather-resistant front panel allows operation in tough environments.

Disk drive provides PC compatibility and data archiving.

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* These options are available for an additional charge.
Your budget is limited – your test equipment doesn’t have to be.

Now you can get the speed and accuracy you need and still have money left in your budget. The Agilent ESA-L series portable spectrum analyzers have a remarkable four-millisecond RF sweep time and virtual real-time measurement updates to the display or through GPIB interface. With excellent accuracy and easy, reliable operation, the ESA-L series is full of innovations, such as continuously phase-locked synthesizer, all at a surprisingly low cost.

Specification summary

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency range 9 kHz to:</th>
<th>Frequency accuracy (at 1 GHz)</th>
<th>Phase noise (10 kHz offset)</th>
<th>Residual FM bandwidth range</th>
<th>Maximum amplitude accuracy</th>
<th>Overall dynamic range (2nd/3rd order)</th>
<th>Measurement rate (characteristic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E4411B</td>
<td>1.5 GHz</td>
<td>±2 kHz</td>
<td>≤-90 dBC/Hz</td>
<td>≤150 Hz peak to peak</td>
<td>±1.1 dB</td>
<td>≥76 dB/83 dB</td>
<td>≥28 updates/sec</td>
</tr>
<tr>
<td>E4403B</td>
<td>3 GHz</td>
<td></td>
<td></td>
<td>1 kHz to 5 MHz</td>
<td></td>
<td>≥79 dB/83 dB</td>
<td></td>
</tr>
<tr>
<td>E4408B</td>
<td>26.5 GHz</td>
<td></td>
<td></td>
<td>–119 –117 –116 to +30 dBm</td>
<td></td>
<td>≥78 dB/82 dB</td>
<td></td>
</tr>
</tbody>
</table>

For complete specifications, see page 10. Ordering information is shown on page 13.
## ESA-L series features and benefits

### Performance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-ms RF sweep time</td>
<td>Combined with 28 measurements per second, provides virtual real-time updates. Responsive display makes circuit adjustment easier, while increasing the probability of intercepting intermittent signals.</td>
</tr>
<tr>
<td>High-speed data transfer (GPIB)*</td>
<td>Fast processing helps reduce measurement time in ATE environments (optional).</td>
</tr>
<tr>
<td>Fully synthesized design</td>
<td>Provides continuously phase-locked precision throughout the entire sweep. Improves frequency accuracy, stability, and measurement repeatability, eliminating drift.</td>
</tr>
<tr>
<td>Automatic background alignment</td>
<td>Continuously calibrates the analyzer. Guarantees repeatability over changing temperatures.</td>
</tr>
<tr>
<td>85-dB calibrated display range</td>
<td>Allows simultaneous display of large and small signals.</td>
</tr>
<tr>
<td>Built-in tracking generator*</td>
<td>Combines spectrum and scalar test capability in a single instrument (optional). Synthesized design eliminates tracking drift (E4411B only). One-button normalize function for quick setup.</td>
</tr>
<tr>
<td>5-dB step attenuator</td>
<td>Optimizes distortion-free dynamic range.</td>
</tr>
<tr>
<td>Built-in frequency counter</td>
<td>With 1-Hz resolution, minimizes the need for an external frequency counter.</td>
</tr>
</tbody>
</table>

### Portability

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast warm-up</td>
<td>Provides full measurement accuracy after just five minutes.</td>
</tr>
<tr>
<td>Snap-on battery*</td>
<td>Eliminates the restrictions of power cords.</td>
</tr>
<tr>
<td>Rubber-encased front and rear frames</td>
<td>Provides impact protection in the field.</td>
</tr>
<tr>
<td>Rain-resistant front panel</td>
<td>Combined with louvered air vents, allows operation in diverse weather conditions.</td>
</tr>
<tr>
<td>12-Vdc power cable*</td>
<td>Allows direct operation from automotive and truck batteries.</td>
</tr>
</tbody>
</table>

### Ease-of-use

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large, monochrome VGA display with output</td>
<td>16.8 cm, high-resolution VGA monochrome display with wide viewing angle makes detailed observations easy. Includes 15-pin VGA rear output connector for external monitor.</td>
</tr>
<tr>
<td>Parallel port*</td>
<td>Supports output to the most popular printers (optional).</td>
</tr>
<tr>
<td>Disk drive</td>
<td>Makes saving and moving measurement results to your PC quick and easy.</td>
</tr>
<tr>
<td>One-button measurements</td>
<td>Save set-up and measurement time with adjacent channel power, occupied bandwidth, channel power, peaks table, and harmonics table features.</td>
</tr>
<tr>
<td>AM demodulation</td>
<td>Combines with the built-in speaker for tune and listen applications.</td>
</tr>
<tr>
<td>200 trace or instrument state files</td>
<td>Provides internal storage of measurement data and setups for future analysis or comparison.</td>
</tr>
<tr>
<td>Marker functions</td>
<td>Provides digital resolution of measurement details through 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.</td>
</tr>
<tr>
<td>Softkey/hardkey interface</td>
<td>Provides a simple user interface while retaining access to sophisticated features.</td>
</tr>
<tr>
<td>Built-in help button with function display</td>
<td>Eliminates carrying manuals into the field to determine keypad and softkey functions.</td>
</tr>
<tr>
<td>Limit lines</td>
<td>Built-in-limit lines and pass/fail messages simplify testing.</td>
</tr>
<tr>
<td>Built-in clock/calendar</td>
<td>Provides storage of time stamps and printed data.</td>
</tr>
<tr>
<td>Automatic overload protection</td>
<td>Protects RF input from overly large signals (only available on the 1.5 GHz E4411B).</td>
</tr>
<tr>
<td>Automatic printer setup</td>
<td>Identifies connected printer models automatically.</td>
</tr>
</tbody>
</table>

### The ESA-L series now comes with a standard THREE-YEAR warranty!

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1 For higher performance requirements, Agilent also offers the ESA-E series of spectrum analyzers. With its cardcage architecture, the ESA-E series is an investment in a flexible platform and a wider range of options, such as narrow-resolution bandwidth filters for viewing closely spaced signals and a built-in high-gain, low-noise preamplifier for better sensitivity measurements. For more information, order the ESA family literature shown on page 13.

* These options are available for an additional charge.
Eliminate measurement speed bottlenecks

Increase manufacturing throughput

Get real-time measurement feedback for circuit tuning and adjustment with up to 28 measurement updates per second and 4-millisecond RF sweep time.

Speed up manual or automated testing with built-in limits lines and easy-to-interpret pass/fail messages.

The ESA-L series is SCPI-compliant (Standard Commands for Programmable Instruments) and reduces test time by automating repetitive measurements using the GPIB interface and VXIplug&play drivers.

Decrease training time

Save training time with the easy-to-use hardkey/softkey interface.

Reduce operator uncertainty with the easy-to-view, high-resolution digital display and numeric marker readouts.

View large and small signals simultaneously on screen with 85-dB calibrated display range.

Enlarge the display by removing the softkey interface or connecting to an external VGA monitor.

Increase measurement confidence and reliability

With ±1.1 dB amplitude accuracy, the ESA-L series instruments are fully synthesized and phase locked over the entire sweep for frequency accuracy, stability and repeatability.

Automatic background alignment improves accuracy and offers continuous calibration to assure measurement accuracy.

The ESA-L series is manufactured in an ISO 9001-registered facility to Agilent’s exacting standards.
Take lab-grade performance into the field

Get fully synthesized performance in a rugged portable package for lasting accuracy in tough environments.

Continuous background alignment provides accuracy over varying temperatures.

The Analyzer conforms to the environmental specifications of MIL-PRF-28800F class 3.

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

Calibrated field measurements in just FIVE minutes!

Easy-to-use, portable performance.

Snap-on rechargeable battery for up to 1.9 hours of cordless operation (optional).

12-Vdc power cable for running the analyzer on a vehicle battery (optional).

Built-in tracking generator and frequency counter means less equipment to carry (optional).

Flexible tilt handle for optimum viewing angles on the bench or floor.

Easy data transfer to a computer with built-in floppy disk drive.
Research and development

Verify your designs with confidence

The ESA-L series offers ±1.1 dB amplitude accuracy, ±1% span accuracy, ±2 kHz frequency accuracy, and a continuously phase-locked synthesizer for stability and repeatability.

Transfer measurement results directly to your computer with the help of the Agilent EEsof Advanced Design System instrument link/driver or BenchLink Spectrum Analyzer software.

Sophisticated performance at a budget price eliminates the need to share analyzers.

Education

Save money and stay competitive

For education, equip your students with fast, accurate spectrum analyzers, at an affordable price.

Fully synthesized digital design provides accurate and repeatable measurements.

Rugged design, such as the input overload protection available on the 1.5 GHz E4411B, guards against damage to the analyzer.

Easy-to-understand interface simplifies operation and aids access to more sophisticated functions.

Now you don’t have to buy a high-priced spectrum analyzer to get advanced technology on every engineer’s bench.

Provide students with fast and accurate spectrum analysis while conserving your budget.
The performance of the ESA-L 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 offers the depth and breadth of enhancements, software, services, connectivity, accessibility and support to help our customers reach their measurements objectives. Please contact us for more information.

For the latest information on the ESA-L series see our Web page at: [www.agilent.com/find/esa](http://www.agilent.com/find/esa)
Specifications

All specifications apply over 0 °C to +55 °C. The analyzer will meet its specifications five minutes after it is turned on, when the analyzer is within one year of calibration cycle, after two hours of storage within the operating temperature range, and Auto Align All is selected. *ITALICS* = supplemental information, characteristics, typical performance, or nominal values.

**Frequency specifications**

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>Frequency range specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>E4411B</td>
<td>50 Ω</td>
</tr>
<tr>
<td>E4403B</td>
<td>9 kHz to 1.5 GHz</td>
</tr>
<tr>
<td>E4408B</td>
<td>1 MHz to 1.5 GHz</td>
</tr>
<tr>
<td>Band 1</td>
<td>9 kHz to 3.0 GHz</td>
</tr>
<tr>
<td>Band 2</td>
<td>6.2 GHz to 13.2 GHz</td>
</tr>
<tr>
<td>Band 3</td>
<td>12.8 GHz to 19.2 GHz</td>
</tr>
<tr>
<td>Band 4</td>
<td>18.7 GHz to 26.5 GHz</td>
</tr>
</tbody>
</table>

**Aging rate**

±2×10⁻⁶/year, ±0.1×10⁻⁷/day, characteristic

**Settability**

±5×10⁻⁷

**Temperature stability**

±5×10⁻⁴

**Accuracy**

±(marker frequency x frequency reference error¹ + counter resolution)

**Frequency reference counter**

Accuracy

±(marker frequency x frequency reference error¹ + counter resolution)

Resolution

Selectable from 1 Hz to 100 kHz

**Frequency span**

- Range: 0 Hz (zero span), and 100 Hz to 1.5 GHz
- E4411B: 100 Hz to 1.5 GHz
- E4403B: 100 Hz to 3.0 GHz
- E4408B: 100 Hz to 26.5 GHz

**Accuracy**

≤±1% of span

**Sweep time**

Range

4 ms to 4000 sec.

Accuracy

≤±1%

Sweep trigger

Free Run, single, line, video, offset, delayed trigger, and external

Offset trigger range

±327 ms to ±323 Ks

Sweep (trace) points

401

**Resolution bandwidth**

Range

-3 dB bandwidth: 1 kHz to 3 MHz in 1-3-10 sequence and 5 MHz
-6 dB bandwidth: 9 kHz and 120 kHz

Accuracy

- 1 kHz to 3 MHz RBW: ±15%
- 5 MHz RBW: ±30%

Selectivity

60 dB/3 dB bandwidth ratio: <15:1, characteristic

**Video bandwidth range**

-3 dB bandwidth: 30 Hz to 1 MHz in 1-3-10 sequence, 3 MHz, characteristic

**Stability**

Noise sidebands (1 kHz RBW, 30 Hz VBW and sample detector) E4411B

- ≥10 kHz offset from CW signal: ≤90 dBc/Hz
- ≥20 kHz offset from CW signal: ≤100 dBc/Hz
- ≥30 kHz offset from CW signal: ≤102 dBc/Hz
- ≥100 kHz offset from CW signal: ≤112 dBc/Hz

E4403B, E4408B

- ≥10 kHz offset from CW signal: ≤90 dBc/Hz + (20 Log N2 for frequencies > 6.7 GHz)
- ≥20 kHz offset from CW signal: ≤88 dBc/Hz + 20 Log N2
- ≥30 kHz offset from CW signal: ≤100 dBc/Hz + 20 Log N2
- ≥100 kHz offset from CW signal: ≤112 dBc/Hz + 20 Log N2

Residual FM

1 kHz RBW, 1 kHz VBW

System-related sidebands

≥30 kHz offset from CW signal: ≤150 Hz peak-to-peak x N2 in 100 ms

CW signal

±≤85 dBc + (20 Log N2 for frequencies > 6.7 GHz)

Amplitude specifications

**Absolute amplitude accuracy**

Overall amplitude accuracy³

20 °C to 30 °C: ±(0.6 dB + absolute frequency response)

At reference settings⁴

= ±0.4 dB

**Measurement range**

Display average noise level

To maximum safe input level

Input attenuator range

E4411B

0 to 60 dB, in 5 dB steps

E4403B, E4408B

0 to 65 dB, in 5 dB steps

**Maximum safe input level**

Average continuous power

E4411B (≥15 dB attenuation): +30 dBm (1W)

E4403B, E4408B (≥30 dB attenuation): +30 dBm (1W)

Peak pulse power

E4411B (≥15 dB attenuation): +30 dBm (1W)

E4403B, E4408B (≥30 dB attenuation): +50 dBm (100W)

**1-dB gain compression** (total power at input mixer)⁵

E4411B

0 dBm

E4403B, E4408B

0 dBm

**Display average noise level**

(In input terminated, 0 dB attenuation, sample detector, reference level = –10 dBm, 1 kHz RBW, 30 Hz VBW)

E4411B

50 MHz to 6.7 GHz: 0 dBm

6.7 GHz to 13.2 GHz: –3 dBm

13.2 GHz to 26.5 GHz: –5 dBm

**Frequency reference error**

1 Frequency reference error = (aging rate x period of time since adjustment + settability + temperature stability).

2 N = Harmonic mixing mode. N = 1 for E4411B and E4403B.

3 For reference level 0 to −50 dBm: input attenuation, 10 dB; 50 MHz; RBW, 3 kHz; VBW, 3 kHz; log range 0 to 50 dB; sweep time coupled, signal input, 0 to −50 dBm; span, ≤60 kHz.

4 Mixer Power Level (dBm) = Input Power (dBm) – Input Attenuator. (dB).

5 For RBW ≤30 kHz, maximum input signal amplitude must be ≤ reference level + 10 dB.

6 Settings are: reference level = −25 dBm for E4411B, −20 dBm for E4403B and E4408B; input attenuation 10 dB; center frequency 50 MHz; resolution bandwidth 3 kHz; video bandwidth 3 kHz; span 2 kHz; sweep time coupled; signal at reference level.

7 For RBW ≥30 kHz, maximum input signal amplitude must be ≤ reference level + 10 dB.
Specifications, continued

**E4403B**
10 MHz to 1.0 GHz ≤–117 dBm
1.0 GHz to 2.0 GHz ≤–116 dBm
2.0 GHz to 3.0 GHz ≤–114 dBm

**E4408B**
10 MHz to 1.0 GHz ≤–116 dBm
1.0 GHz to 2.0 GHz ≤–115 dBm
2.0 GHz to 6.0 GHz ≤–112 dBm
6.0 GHz to 12.0 GHz ≤–110 dBm
12.0 GHz to 22.0 GHz ≤–107 dBm
22.0 GHz to 26.5 GHz ≤–101 dBm

**Sporuous responses**
Second harmonic distortion
E4411B
2 MHz to 750 MHz ≤–75 dBc for –40 dBm signal at input mixer

E4403B, E4408B
10 MHz to 500 MHz ≤–60 dBc for –30 dBm signal at input mixer
500 MHz to 1.5 GHz ≤–70 dBc for –30 dBm signal at input mixer
1.5 GHz to 2.0 GHz ≤–80 dBc for –10 dBm signal at input mixer
2.0 GHz to 13.25 GHz ≤–95 dBc for –10 dBm signal at input mixer

Maximum achievable second order dynamic range
E4411B (at 1 GHz) 76 dB (+65 dBm S.H.I.)
E4403B (at 1 GHz) 79 dB (+40 dBm S.H.I.)
E4408B (at 1 GHz) 78 dB (+40 dBm S.H.I.)

Third order intermodulation distortion
E4411B
10 MHz to 1.5 GHz ≤–75 dBc for two –30 dBm signals at input mixer, >90 kHz separation

E4403B, E4408B
100 MHz to 6.7 GHz ≤–75 dBc for two –30 dBm signals at input mixer, >50 kHz separation
6.7 GHz to 26.5 GHz ≤–70 dBc for two –30 dBm signals at input mixer, >50 kHz separation

Maximum achievable third order dynamic range
E4411B (at 1 GHz) 83 dB (+7.5 dBm T.O.I.)
E4403B (at 1 GHz) 83 dB (+7.5 dBm T.O.I.)
E4408B (at 1 GHz) 82 dB (+7.5 dBm T.O.I.)

Other input-related spurious
E4411B ≤–65 dBc, 30 kHz ≤ offset ≤1.2 GHz,
E4403B, E4408B ≤–65 dBc, >30 kHz offset, ≤20 dBm signal at input mixer

**Residual responses**
Input terminated and 0 dB attenuation ≤–90 dBm

**Display range**
Log scale
0 to –95 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps; ten divisions displayed.

Linear scale
10 divisions

Scale units dBm, dBmV, dBµV, V, W, and Hz

**Marker readout resolution**
Log scale
0.04 dB
Linear scale
0.01% of reference level

**Reference level**
Range
–149.9 dBm to maximum mixer level + attenuator setting

Resolution
Log scale ≤±0.1 dB
Linear scale ≤±0.12% of reference level

Accuracy (at a fixed frequency, a fixed attenuation, and referenced to –35 dBm)
Reference level – input attenuator setting
–10 dBm to > –60 dBm ≤±0.3 dB
–60 dBm to > –85 dBm ≤±0.5 dB
–95 dBm to > –90 dBm ≤±0.7 dB

**Frequency response (10 dB attenuation, 20 °C to 30 °C)**
Absolute
9 kHz to 3.0 GHz ±0.5 dB
3.0 GHz to 6.7 GHz ±1.5 dB
6.7 GHz to 26.5 GHz ±2.0 dB

Relative
9 kHz to 3.0 GHz ≤±0.5 dB
3.0 GHz to 6.7 GHz ≤±1.3 dB
6.7 GHz to 26.5 GHz ≤±1.8 dB

**Resolution bandwidth switching uncertainty**
(Referenced to 1 kHz RBW, at reference level)
3 kHz to 3 MHz RBW ±0.3 dB
5 MHz RBW ±0.6 dB

**Linear to log switching** ≤±0.15 dB at reference level

**Display scale fidelity**
Log maximum cumulative
0 to –85 dB from reference level ±(0.3 dB + 0.01 x dB from reference level)
Log incremental accuracy
0 to –80 dB from reference level ≤0.4 dB/4 dB
Linear accuracy ≤±2% of reference level

**General specifications**

**Measurement speed (characteristic)**

<table>
<thead>
<tr>
<th>Specification</th>
<th>E4411B</th>
<th>E4403B</th>
<th>E4408B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local measurement and display update rate</td>
<td>≥35/sec</td>
<td>≥30/sec</td>
<td>≥28/sec</td>
</tr>
<tr>
<td>Remote measurement and GPIB transfer rate</td>
<td>≥30/sec</td>
<td>≥30/sec</td>
<td>≥30/sec</td>
</tr>
<tr>
<td>RF center frequency tuning time</td>
<td>≤90ms</td>
<td>≤90ms</td>
<td>≤90ms</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Operating 0 °C to +55 °C</td>
<td>Storage –40 °C to +75 °C</td>
<td>Disk drive 10 °C to 40 °C</td>
</tr>
<tr>
<td>EMI compatibility</td>
<td>Conducted and radiated emission is in compliance with CISPR Pub. 11/1990 Group 1 Class A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Specifications, continued

Audible noise (ISO 7779)
Sound pressure at 25 °C <40 dBa, (<5.3 Bels power)

Power requirements
ac Voltage 90 to 132 Vrms, 195 to 250 Vrms
Frequency 47 to 440 Hz, 47 to 66 Hz
Power consumption, on <300 W
Power consumption, standby <5 W
dc Voltage 12 to 20 Vdc
Power consumption <200 W

Weight (without options)
E4411B 13.2 kg (29.1 lb), characteristic
E4403B 15.5 kg (34.2 lb), characteristic
E4408B 17.1 kg (37.7 lb), characteristic

Dimensions
Height 222 mm (8.75 in) without handle
Width 373 mm (14.7 in) without handle
Depth 409 mm (16.1 in) without handle

Data storage
Internal 200 traces or states, nominal

Inputs/outputs
Amplitude reference1
Internal
E4411B –25 dBm, nominal
E4411B, Option 1DP +28.75 dBmV, nominal
External, BNC (f)
E4403B, E4408B –20 dBm, nominal
Front panel connectors
Input
Option 1DP (E4411B) Type N (f), 50 Ω nominal
Option BAB (E4408B) BNC (f), 75 Ω nominal
RF Out
Option 1DN Type N (f), 50 Ω nominal
Option 1DQ (E4411B) BNC (f), 75 Ω nominal
Probe power, voltage/current +15 Vdc, –2.6 Vdc at 150 mA maximum
Speaker
Headphone 3.5 mm (1/8 in) miniature audio jack
External keyboard 6-pin mini-din
Rear panel connectors
10 MHz ref output BNC (f), 50 Ω, >0 dBm, characteristic
10 MHz ref input BNC (f), 50 Ω, –15 to +10 dBm, characteristic
External trigger input BNC (f), (5V TTL)
VGA output VGA compatible, 15-pin mini D-SUB, 640 x 480 resolution

IF sweep and video ports (Option A4J)
Aux IF output BNC (f), 21.4 MHz, nominal –10 to –70 dBm (uncorrected), characteristic
Aux video out BNC (f), 0 to 1 V (uncorrected), characteristic
Hi swp in BNC (f), (5 V TTL)
Hi swp out BNC (f), (5 V TTL)
Swp out BNC (f), 0 to +10 V ramp, characteristic

GPIB interface
Option A4H IEEE-488 bus connector

Serial interface
Option 1AX 9-pin D-SUB (m), RS-232

Parallel printer interface
Option A4H or 1AX 25-pin D-SUB (f), printer port only

Tracking generator (Option 1DN and Option 1DQ)

Output frequency range
E4411B 50 Ω (Opt. 1DN) 9 kHz to 1.5 GHz
E4411B 75 Ω (Opt. 1DQ) 9 kHz to 1.5 GHz
E4403B, E4408B (Opt. 1DN) 9 kHz to 3.0 GHz

Output power level2
Range
E4411B 50 Ω 0 to –70 dBm (20 °C to 30 °C)
E4411B 75 Ω +42.75 to –27.25 dBmV
E4403B, E4408B 50 Ω –2 to –66 dBm

Output power sweep2
Range
E4411B 50 Ω –15 dBm to 0 dBm –
source attenuator setting
E4411B 75 Ω +27.76 dBmV to +42.76 dBmV –
source attenuator setting
E4403B, E4408B 50 Ω –10 dBm to –1 dBm –
source attenuator setting

Output flatness
E4411B 50 Ω (referenced to 50 MHz, 0 dB attenuation)
10 MHz to 1.5 GHz ±1.5 dB
E4411B 75 Ω (referenced to 50 MHz, 0 dB attenuation)
10 MHz to 1.5 GHz ±2 dB
E4403B, E4408B 50 Ω (referenced to 50 MHz, –20 dB signal level)
10 MHz to 3.0 GHz ±2 dB

Spurious output
Harmonic spurs
E4411B, 50 Ω (0 dBm output), 75 Ω (+42.8 dBmV output)
20 MHz to 1.5 GHz <-25 dBc
E4403B, E4408B 50 Ω (–1 dBm output)
9 MHz to 3 GHz <-25 dBc

Dynamic range
Maximum output power level–
displayed average noise level

Output tracking
E4411B
Drift No error
Swept tracking error
E4403B, E4408B
Drift Swept tracking error
1.5 kHz/5 minutes, characteristic
Usable in 1 kHz RBW after 5 minutes
of warm up

Output VSWR
E4411B <2.5:1, characteristic
E4403B, E4408B <2.0:1, characteristic

1 Amplitude reference actual power might differ from the nominal value. Actual calibration power is stored internally.
2 E4411B: 20 °C to 30 °C.
Ordering information

- **E4411B RF Spectrum Analyzer**
  9 kHz to 1.5 GHz
- **E4403B RF Spectrum Analyzer**
  9 kHz to 3.0 GHz
- **E4408B Microwave Spectrum Analyzer**
  9 kHz to 26.5 GHz

**Options**

- **A4H**
  GPIB and parallel (Centronics) interfaces
  (not compatible with Option 1AX)
- **1AX**
  RS-232 and parallel (Centronics) interfaces
  (not compatible with Option A4H)
- **BAB**
  APC 3.5mm input connector (E4408B only)
- **1DN**
  50-Ohm tracking generator
  (9 kHz to 1.5 GHz for E4411B)
  (9 kHz to 3.0 GHz for E4403B and E4408B)
- **1DP**
  75-Ohm input impedance
  (1 MHz to 1.5 GHz) E4411B only
- **1DQ**
  75-Ohm tracking generator
  (1 MHz to 1.5 GHz) (requires Option 1DP)
- **1D7**
  50 to 75-Ohm matching pad
  (type n (m) to BNC (f))
- **A5D**
  12-Vdc power cable
- **AYT**
  Soft operating/carrying case (grey)
- **AYU**
  Soft operating/carrying case (yellow)
- **AXT**
  Hard transit case
- **UK9**
  Front-panel protective cover
- **1CP**
  Rack-mount kit with handles and slides
- **0B0**
  Deletes printed manuals (retains CD-ROM manuals)
- **0BV**
  Component level service documentation
- **0B1**
  Additional user and calibration guides
- **0BW**
  Assembly-level service guide
- **UK6**
  Commercial calibration certificate with data
- **8ZE**
  Refurbished spectrum analyzer (as available)
- **W32**
  Three-year calibration
- **W50/52**
  Additional two-year service and support/ five-year calibration

**Accessories**

- **C2950A**
  Parallel printer cable (2 meter)
- **10833A**
  GPIB cable (1 meter)
- **24542U**
  RS-232 cable (3 meter, 9 pin F to 9 pin F) (for serial 9 pin PC connection to analyzer)
- **24542G**
  RS-232 cable (3 meter, 25 pin M to 9 pin F) (for serial 25 pin PC or printer connection to analyzer)
- **24542M**
  RS-232 cable (3 meter, 25 pin M to 9 pin F) (for serial 25 pin modem connection to analyzer)
- **87405A**
  Preamplifier (10 MHz to 3 GHz, 24 dB gain) (fastened to RF input, powered from analyzer)
- **85905A**
  75 Ohm preamplifier (45 MHz to 1 GHz, 20 dB gain) (powered from analyzer)
- **41800A**
  Active probe (5 Hz to 500 MHz)
- **85024A**
  High frequency active probe (300 kHz to 3 GHz)
- **E1779A**
  Battery pack
- **E4444A**
  BenchLink Spectrum Analyzer software (PC image and data transfer)

**VXIplug&play** instrument drivers available via the World Wide Web at:
http://www.agilent.com/find/inst_drivers
(Click on VXIplug&play universal instrument drivers.)

**Literature**

- **ESA Self-Guided demo**
  5968-3658E
- **Spectrum Analysis Basics, AN 150**
  5952-0292E
- **ESA-E series spectrum analyzer brochure**
  5968-3278E
- **ESA-E series specifications**
  5968-3386E
- **8560 EC-series spectrum analyzer brochure**
  5968-9571E
- **E4444A BenchLink spectrum analyzer product overview**
  5966-0676E
- **E1779A rechargeable battery pack**
  5966-1851E
- **ESA cable TV service and installation analyzer product overview**
  5980-0845E
Improve frequency accuracy with external frequency reference

GPIB or RS232 interfaces provide remote control and PC connectivity (optional)

Parallel printer port supports PCL 3/5 HP printers (optional)

VGA connector for large screen monitor

12 Vdc operation with optional power cable

Snap on battery pack for portability (optional)

Parallel printer port supports PCL 3/5 HP printers (optional)
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