

KEYSIGHT TECHNOLOGIES (AGILENT HP)

ESA

The Keysight (Agilent) ESA Series of spectrum analyzers comprises highly versatile, portable test instruments offering a wide frequency coverage and configurable options for laboratory, manufacturing, and field environments. The series features ESA-E performance analyzers and ESA-L basic analyzers, including models such as E4401B, E4402B, E4404B, E4405B, and E4407B.

SPECIFICATIONS

General

Interfaces	GPIB, RS-232, Parallel (standard or option dependent)
Display	6.6 in (168 mm) color TFT LCD

Physical

Power Supply	90 to 132 V AC (47 to 440 Hz), 195 to 250 V AC (47 to 66 Hz), maximum 260 W
Operating Temperature	0 to +55 °C °C
Dimensions (W×H×D)	373 mm × 222 mm × 409 mm mm
Weight	12.0 kg to 17.1 kg (model and configuration dependent) kg

Frequency Specifications

Frequency Range	9 kHz to 1.5 GHz (E4401B / E4403B), 3.0 GHz (E4402B / E4408B), 6.7 GHz (E4404B), 13.2 GHz (E4405B), 26.5 GHz (E4407B)
Frequency Span Range	0 Hz (zero span), 100 Hz to maximum frequency of model
Internal Reference Frequency Accuracy	$\pm 2 \times 10^{-6}$ per year (standard), $\pm 1 \times 10^{-7}$ per year (with Option 1D5)
Reference Frequency Temperature Stability	$\pm 1 \times 10^{-6}$ (standard), $\pm 1 \times 10^{-8}$ (with Option 1D5)
Phase Noise at 10 kHz Offset	≤ -101 dBc/Hz (ESA-E, 1 GHz carrier), ≤ -90 dBc/Hz (ESA-L, 1 GHz carrier)
Phase Noise at 100 kHz Offset	≤ -113 dBc/Hz (ESA-E, 1 GHz carrier), ≤ -105 dBc/Hz (ESA-L, 1 GHz carrier)
Phase Noise at 1 MHz Offset	≤ -125 dBc/Hz (ESA-E, 1 GHz carrier), ≤ -115 dBc/Hz (ESA-L, 1 GHz carrier)

Bandwidth Specifications

Resolution Bandwidth (RBW) Range	10 Hz to 5 MHz (standard ESA-E), 1 Hz to 5 MHz (with Option 1DR on ESA-E), 1 kHz to 5 MHz (ESA-L)
RBW Steps	1-3-10 sequence
Video Bandwidth (VBW) Range	1 Hz to 5 MHz (ESA-E), 30 Hz to 3 MHz (ESA-L)

Amplitude Specifications

Measurement Range	Displayed average noise level (DANL) to +30 dBm
Maximum Safe Input Level (AC)	+30 dBm (1 W)
Maximum Safe Input Level (DC)	0 V (dc-coupled), 100 V (ac-coupled, E4401B and E4411B)
Input Attenuator Range	0 to 75 dB in 5 dB steps
Displayed Average Noise Level (DANL) - Preamplifier Off	-135 dBm (typical -141 dBm) at 1 GHz with 10 Hz RBW (ESA-E)
Displayed Average Noise Level (DANL) - Preamplifier On	-150 dBm (typical -154 dBm) at 1 GHz with Option 1DS (ESA-E)
Absolute Amplitude Accuracy	± 0.54 dB at 50 MHz reference frequency (ESA-E)
Scale Fidelity	± 0.4 dB over 0 to -85 dB range (ESA-E with Option 1D5/1DR)

Sweep and Trigger

Sweep Time Range (Span > 0 Hz)	1 ms to 4000 s (ESA-E), 4 ms to 4000 s (ESA-L)
Sweep Time Range (Zero Span)	1 μ s to 4000 s (ESA-E), 4 ms to 4000 s (ESA-L)

Measurement Modes and Suites

Standard Measurement Functions	Channel Power, Adjacent Channel Power (ACP), Occupied Bandwidth (OBW), Harmonic Distortion, Spectrum Emission Mask
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Inputs and Outputs

RF Input Connector Type	Type-N female (50 ohm) standard (APC 3.5 mm male standard on E4407B; Type-N female on E4407B with Option 0C6)
RF Input Impedance	50 ohms (standard), 75 ohms (Option 1DP for E4401B / E4403B)
External Reference Input Frequency	10 MHz
External Reference Output Frequency	10 MHz

System and User Interface

Display Resolution	640 x 480 VGA
External Storage Support	3.5-inch 1.44 MB DOS-format floppy disk drive
Command Language Compatibility	SCPI (Standard Commands for Programmable Instruments)

Physical and Power Specifications

Line Frequency Range	47 to 440 Hz (90 to 132 V AC), 47 to 66 Hz (195 to 250 V AC)
Warm-up Time	5 minutes (for frequency reference stability), 45 minutes (for full accuracy specifications)
Weight (E4401B)	12.0 kg
Weight (E4407B)	17.1 kg

Environmental and Compliance

Storage Temperature Range	-40 °C to +75 °C
Recommended Calibration Cycle	1 year

Available Options and Hardware Configurations

Option 1D5	High stability frequency reference (OCXO)
Option 1DR	Narrow resolution bandwidths down to 1 Hz (ESA-E)
Option 1DS	100 kHz to 3.0 GHz internal preamplifier
Option 1DN	9 kHz to 1.5 GHz tracking generator (50 ohm)
Option 1DQ	9 kHz to 3.0 GHz tracking generator (50 ohm)
Option 1DP	75 ohm RF input impedance (E4401B / E4403B)
Option B72	Expansion memory (16 MB SDRAM)
Option B7D	Digital demodulation hardware
Option AYX	Fast digitizer

Environmental

Operating Altitude	Up to 4,600 m
Non-Operating Altitude	Up to 15,240 m
Relative Humidity	95% RH non-condensing (0 °C to 40 °C)
Environmental Compliance	Meets MIL-PRF-28800F Class 3

Options

Option A4H	GPIB and Parallel interfaces
Option 1D6	Time-gated spectrum analysis
Option 226	Phase Noise measurement personality
Option 219	Noise Figure measurement personality
Option 228	Distance-to-fault measurement personality
Option 1CP	Rackmount kit
Option 1A7	ISO 17025 compliant calibration
Option UK6	Commercial Calibration Certificate with Test Data
Option 1D7	50 to 75 Ohm Matching Pad
Option B7E	RF Communications Hardware
Option 215	External Source Control
Option 225	Bluetooth Measurement Personality
Option 227	Bluetooth Premium Measurement Personality
Option 229	Modulation Analysis Measurement Personality
Option A5D	12 VDC Power Cable
Option 1AX	RS-232 and Parallel Interface

Receiver & Dynamic Range

1 dB Gain Compression	0 dBm @ ≥ 10 MHz (at input mixer)
Third-Order Intermodulation (TOI)	+11 dBm (typical, 100 MHz to 3.0 GHz, E4402B/E4407B)
Second Harmonic Distortion (SHI)	+40 dBm (typical, 10 MHz to 1.5 GHz, E4402B/E4407B)

Sweep & Traces

Trace Detectors	Peak, Negative Peak, Sample, RMS, Average, Quasi-Peak (option dependent)
Number of Sweep Points	401
Log Display Scale	0.1 to 20 dB/division
Linear Display Scale	10 divisions
Amplitude Units	dBm, dBmV, dBμV, V, W, A

TECHNOLOGY

Superheterodyne Spectrum Analyzer

APPLICATIONS

RF and Microwave Spectrum Analysis

Generated by SpecAtlasHub (specatlashub.com). Specifications are compiled from available sources and are subject to change — verify critical values against the manufacturer before purchase.