

KEYSIGHT TECHNOLOGIES (AGILENT HP)

E4401B

The Keysight (Agilent) E4401B is an ESA-E series RF spectrum analyzer offering a frequency range of 9 kHz to 1.5 GHz. Designed to provide a balance of speed, dynamic range, and accuracy, it features a rugged, portable build ideal for R&D, manufacturing, and field applications. The instrument offers configurable options such as high-stability frequency references, digital resolution bandwidths down to 1 Hz, and a tracking generator.

SPECIFICATIONS

General

Interfaces	GPIB (Option A4H), RS-232, Parallel (Centronics), VGA out
Display	16.8 cm (6.6 in) TFT color LCD, 640 x 480 resolution

Physical

Power Supply	90 to 132 V rms (47 to 440 Hz), 195 to 250 V rms (47 to 66 Hz), < 300 W power consumption
Operating Temperature	0 to +55 °C °C
Dimensions (W×H×D)	373 mm W × 222 mm H × 409 mm D (without bumpers and handle) mm
Weight	12.0 kg kg

Frequency Specifications

Frequency Range	9 kHz to 1.5 GHz
Frequency Resolution	1 Hz
Frequency Reference Aging Rate	$\pm 2 \times 10^{-6}$ / year
Frequency Reference Temperature Stability	$\pm 5 \times 10^{-6}$
Frequency Span Range	0 Hz (zero span), 100 Hz to 1.5 GHz
Span Accuracy	$\pm 1\%$ of span
Sweep Time Range (Span > 0 Hz)	4 ms to 4000 s
Sweep Time Range (Zero Span)	4 ms to 4000 s
Sweep Time Accuracy	$\pm 1\%$
Sweep Trigger Sources	Free Run, Single, Line, Video, External, Delay

Bandwidth (RBW / VBW)

Resolution Bandwidth (RBW) Range	1 kHz to 5 MHz (in 1-3-10 sequence); down to 10 Hz with Option 1DR
RBW Accuracy	$\pm 15\%$ (1 kHz to 5 MHz)
RBW Selectivity (60 dB / 3 dB Bandwidth Ratio)	< 15:1 (for analog RBW)
Video Bandwidth (VBW) Range	30 Hz to 3 MHz; down to 1 Hz with Option 1DR

Amplitude Specifications

Measurement Range	DANL to +30 dBm
Maximum Safe Input Level	+30 dBm (1 W) continuous, with ≥ 15 dB attenuation
DC Input Voltage Limit	0 Vdc
Frequency Response	± 0.5 dB (9 kHz to 1.5 GHz)
Attenuator Range	0 to 60 dB
Attenuator Step Size	5 dB
1 dB Gain Compression Point	≥ 0 dBm at input mixer
Reference Level Range	-149.9 dBm to +30 dBm in 0.1 dB steps
Scale Units	dBm, dBmV, dB μ V, V, W, A
Overall Amplitude Accuracy	± 1.1 dB

Spectral Purity & Phase Noise

SSB Phase Noise (10 kHz offset)	≤ -90 dBc/Hz
SSB Phase Noise (100 kHz offset)	≤ -113 dBc/Hz
SSB Phase Noise (1 MHz offset)	≤ -134 dBc/Hz
Residual FM	≤ 150 Hz p-p in 100 ms (standard)

Spurious and Distortion

Third-Order Intercept (TOI)	+5 dBm
Second Harmonic Distortion (SHI)	+30 dBm (+40 dBm typical)
Input-Related Spurious Responses	≤ -65 dBc (for mixer level ≤ -30 dBm)
Residual Responses	≤ -90 dBm (with 50 ohm termination and 0 dB attenuation)

Tracking Generator (Optional)

Tracking Generator Frequency Range (Option 1DN)	9 kHz to 1.5 GHz
Tracking Generator Output Power Range	-2 to -66 dBm
Tracking Generator Output Impedance	50 ohms (nominal)

Inputs and Outputs

RF Input Connector	Type-N female (50 ohms nominal)
External Trigger Input	BNC female, > 10 kohms, TTL levels
VGA Output	15-pin D-sub, VGA compatible
GPIB Interface	Optional (Option A4H)

Measurement Suites & Software

Marker Functions	Peak Search, Next Peak, Delta Marker, Marker Noise, Band Power
Measurement Capabilities	Adjacent Channel Power (ACP), Occupied Bandwidth (OBW), Channel Power, Multi-carrier ACP, Harmonic Distortion
Variable Trace Points	101 to 8192
Trace Detection Modes	Normal, Peak, Sample, Negative Peak, Average

Power and Environmental

AC Power Supply Voltage	90 to 132 V rms, 195 to 250 V rms
AC Power Frequency	47 to 440 Hz (90-132 V), 47 to 66 Hz (195-250 V)
Storage Temperature Range	-40 °C to +75 °C
Relative Humidity Range	Up to 95% non-condensing
Warm-Up Time	5 minutes

Physical Characteristics

Enclosure Type	Rugged, portable benchtop with carrying handle
Cooling Mechanism	Forced air fan

Inputs & Outputs

RF Input Impedance	50 ohms (standard), 75 ohms (Option 1DP)
Option 1DP RF Input Connector	75 ohm BNC (female)
Probe Power Output	+15 Vdc, -12.6 Vdc (150 mA max)
Auxiliary Interface Connector	9-pin sub-D female (provides sweep ramp, start-of-sweep, end-of-sweep)
Earphone Jack	3.5 mm monaural

Configuration Options

Option 1DP Input Impedance	75 ohms
Option 1D5 Frequency Reference	Oven-controlled crystal oscillator (OCXO) for high stability
Option 1DR Resolution Bandwidths	Adds 10 Hz, 30 Hz, 100 Hz, and 300 Hz digital RBW filters
Option B72 Memory Extension	Adds 16 MB flash memory and 16 MB RAM

Data Storage

Floppy Disk Drive	3.5-inch MS-DOS compatible, 1.44 MB
Internal Storage Capacity	Up to 200 traces or states

Standards & Compliance

Environmental Compliance	Designed to meet MIL-PRF-28800F, Class 3
Electromagnetic Compatibility	Conforms to EN 61326-1 and CISPR 11 (Class A, Group 1)
Safety Standards	Conforms to EN 61010-1 and CSA C22.2 No. 1010.1

Environmental

Operating Altitude	Up to 3,000 meters (9,842 feet)
Storage Altitude	Up to 15,240 meters (50,000 feet)
Operating Vibration	Random vibration, 5 Hz to 500 Hz, 0.21 g RMS

Options & Accessories

Option 1DS Preamplifier Frequency Range	100 kHz - 1.5 GHz
Option 1DS Preamplifier Gain	20 dB (nominal)
Option 290 Programming Code Compatibility	HP 8590 Series compatible
Option 1D6 Time-Gated Sweep Gate Trigger Input	BNC female

TECHNOLOGY

RF Spectrum Analysis

APPLICATIONS

General Purpose RF testing, R&D, Manufacturing, Field Service

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