

KEYSIGHT TECHNOLOGIES (AGILENT HP)

E4991B

The Keysight E4991B is a high-performance impedance analyzer designed for R&D, quality assurance, and production testing of passive electronic components, semiconductor devices, and materials. With three frequency options from 1 MHz up to 3 GHz, it provides industry-leading accuracy and material measurement capabilities.

SPECIFICATIONS

General

Display	10.4-inch TFT color LCD with resistive touch screen
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Physical

Power Supply	90 V to 264 V AC, 47 Hz to 63 Hz, 300 VA maximum power consumption
Operating Temperature	5 °C to 40 °C °C
Dimensions (W×H×D)	426 mm × 185 mm × 415 mm (main unit) mm
Weight	13 kg (main unit) kg
Test Head Cable Length	1 m (standard)
Test Head Dimensions (W×H×D)	145 mm × 70 mm × 170 mm

Stimulus AC Signal Characteristics

Frequency Options	1 MHz to 500 MHz (Option 050), 1 MHz to 1 GHz (Option 100), 1 MHz to 3 GHz (Option 300)
Frequency Resolution	1 mHz
Frequency Accuracy	±10 ppm (standard), ±1 ppm (with Option 1E5 high stability time base)
AC Voltage Signal Level Range	4.4 mV to 1 Vrms (at test port)
AC Current Signal Level Range	0.089 mA to 20 mArms (at test port)
AC Power Signal Level Range	-40 dBm to +1 dBm
Source Output Impedance	50 Ω (nominal)

Measurement Capabilities & Parameters

Primary Measurement Parameters	Z , Y , R, X, G, B
Secondary Measurement Parameters	θ, Ls, Lp, Cs, Cp, Rs, Rp, D, Q
Material Measurement Parameters	Complex Permittivity (ϵ' , ϵ''), Complex Permeability (μ' , μ'')
Basic Impedance Accuracy	±0.65%

DC Bias Source

Internal DC Bias Voltage Range	-40 V to +40 V (requires Option 001)
Internal DC Bias Current Range	-100 mA to +100 mA (requires Option 001)
DC Bias Monitor Outputs	DC Bias monitor voltage and current available via display and SCPI commands

Sweep & Measurement Speed

Sweep Types	Linear frequency, Logarithmic frequency, Segment frequency, AC level (V/I), DC Bias (V/I, with Option 001)
Number of Sweep Points	2 to 1601 points
Averaging Factor Range	1 to 999

Calibration & Compensation

Calibration Types	Open, Short, Load, Low-Loss Capacitor Calibration
Compensation Functions	Port Extension, Fixture Compensation

Display & User Interface

Trace Formats	Log/Linear/Segment magnitude, Phase, Real/Imaginary, Cole-Cole plot, Polar plot
Maximum Number of Channels	4 channels
Maximum Number of Traces	4 traces per channel
Equivalent Circuit Analysis	5 built-in circuit models

Interfaces & Connectivity

External Trigger Input	BNC female, 10 k Ω nominal input impedance
External Reference Input	10 MHz $\pm$ 10 ppm, BNC female
Internal Reference Output	10 MHz, BNC female

Physical & Environmental

Storage Temperature Range	-20 °C to 60 °C
Operating Humidity Range	20% to 80% RH (non-condensing, wet-bulb temp < 29 °C)
Test Head Weight	1.8 kg

Measurement Port

Test Port Connector Type	APC-7
Test Port Nominal Impedance	50 Ω

Frequency Reference

Standard Frequency Stability	$\pm$ 7 ppm/year, $\pm$ 5 ppm (5 °C to 40 °C)
High Stability Timebase (Option 1E5) Frequency Stability	$\pm$ 1 ppm/year, $\pm$ 0.5 ppm (0 °C to 40 °C)

Measurement Options

Probe Station Connection Kit (Option 001)	Enables connection to external RF probe stations
Material Measurement Firmware (Option 002)	Supports permittivity and permeability analysis
Temperature Characteristic Test Kit (Option 007)	Enables measurements from -55 °C to +150 °C with high-temperature cable

System Features

Limit Line Testing	Pass/Fail testing against user-defined limits
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Power

Power Consumption	350 VA maximum
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System

LXI Compliance	LXI Core 2011 Compliant
Operating System	Windows 7 or Windows 10 (depending on date of manufacture)

Calibration

Calibration Standards	Open, Short, Load, Low-Loss Capacitor
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Options

Removable SSD Option	Option 017
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TECHNOLOGY

RF Impedance Analyzer / Material Analyzer

APPLICATIONS

Passive component evaluation, semiconductor wafer-level measurements, dielectric/magnetic material characterization

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