KEYSIGHT TECHNOLOGIES (AGILENT HP)

4192A

The Keysight HP 4192A is a high-performance LF Impedance Analyzer designed for both network analysis and impedance analysis on telecommunication filters, audio/video electronic circuits, and basic components. Operating over a 5 Hz to 13 MHz frequency range, it offers mHz-level frequency resolution, a variable test signal, and integrated DC bias. The 4192A supports both floating and grounded device testing with automated sweep capabilities and HP-IB (GPIB) programmability.

SPECIFICATIONS

General

Interfaces	HP-IB (GPIB)
Display	Dual 4 1/2-digit 7-segment LED displays with parameter indicators
Warm-up Time	30 minutes

Physical

Power Supply	100 / 120 / 220 / 240 V ±10% (switchable), 48 to 66 Hz, ≤150 VA
Operating Temperature	0 to 55 °C °C
Dimensions (W×H×D)	425.5 mm × 235 mm × 612 mm mm
Weight	19 kg kg

Measurement Parameters & Functions

Primary Parameters	|Z|, |Y|, Gain-Phase (relative amplitude, phase, group delay)
Secondary Parameters	Theta, R, X, G, B, L, C, D, Q, Delta, Delta%
Ranging Modes	Auto, Manual
Device Measurement Compatibility	Floating or grounded devices
Zero Compensation	Automated zero adjustment (Open/Short)
Self-Test Capability	Built-in automatic self-test

Test Signal (Stimulus) Specifications

Frequency Range	5 Hz to 13 MHz
Frequency Resolution (5 Hz to 10 kHz)	1 mHz
Frequency Resolution (10 kHz to 100 kHz)	10 mHz
Frequency Resolution (100 kHz to 1 MHz)	0.1 Hz
Frequency Resolution (1 MHz to 13 MHz)	1 Hz
AC Test Signal Level Range	5 mV to 1.1 Vrms
AC Test Signal Level Resolution (5 mV to 100 mV)	1 mV
AC Test Signal Level Resolution (100 mV to 1.1 V)	5 mV

DC Bias Source

Internal DC Bias Range	-35.00 V to +35.00 V
Internal DC Bias Resolution (0.00 V to ±9.99 V)	10 mV
Internal DC Bias Resolution (±10.0 V to ±35.0 V)	50 mV
External DC Bias Input Range	Up to ±45 V

Measurement Ranges

Impedance Range (|Z|, R, X)	0.1 mOhm to 1.2999 MOhm
Admittance Range (|Y|, G, B)	1 nS to 1.2999 S
Capacitance Range (C)	0.1 fF to 129.99 mF
Inductance Range (L)	0.01 nH to 1299.9 H
Dissipation Factor Range (D)	0.0001 to 19.999
Quality Factor Range (Q)	0.01 to 10000
Phase Angle Range (Theta)	-180.00° to +180.00°

Measurement Speed & Sweep Capabilities

Sweep Parameters	Frequency, DC Bias
Sweep Modes	Single, Continuous, Manual

Front Panel & Display

Measurement Terminals	4-terminal pair configuration BNC

Rear Panel Interfaces & Control

Recorder Outputs	X, Y1, Y2 analog recorder outputs (rear panel)

Performance

Basic Measurement Accuracy	±0.1%
Frequency Accuracy	±0.005%
Measurement Time (Normal Mode)	187 ms (at ≥ 10 kHz)
Measurement Time (Fast Mode)	87 ms (at ≥ 10 kHz)

System & Control

Trigger Modes	Internal, Manual, External, HP-IB
HP-IB Interface Functions	SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP1, DC1, DT1, C0

Electrical

Power Consumption	≤ 150 VA

Environmental

Operating Humidity	≤ 95% RH at 40 °C

DC Bias

Internal DC Bias Current Capacity	40 mA max.
External DC Bias Maximum Input Voltage	±35 V
External DC Bias Maximum Current	100 mA max.

Reference Oscillator

Option 001 Reference Aging Rate	±5 × 10^-8 per day
Option 001 Reference Temp Stability	±1 × 10^-8 (0 °C to 55 °C)

Rear Panel Connections

DC Bias Monitor Output	1/10 of actual DC bias voltage (output impedance 10 kΩ)
External Trigger Input	BNC, TTL compatible, active on negative-going transition (pulse width ≥ 2 µs)
External Reference Input	BNC, 1 MHz, 2 MHz, or 5 MHz (≥ 0 dBm into 50 Ω)
Reference Frequency Output	BNC, 1 MHz (≥ 0 dBm into 50 Ω)

Measurement Functions

Deviation Measurement Modes	Δ (difference) and Δ% (percent difference) from stored reference

TECHNOLOGY

LF Impedance Analyzer

APPLICATIONS

Impedance and gain-phase characterization of components, filters, and circuits