

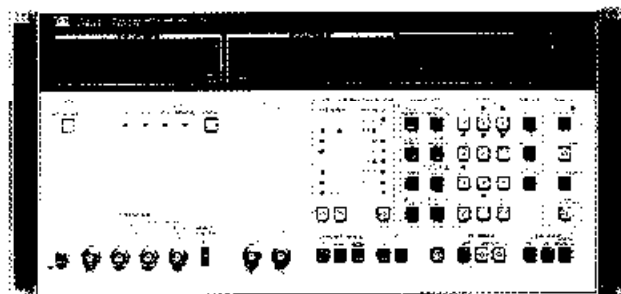
IMPEDANCE MEASURING INSTRUMENTS

LF Impedance Analyzer, 5 Hz to 13 MHz

HP 4192A

395

- 5 Hz to 13 MHz variable measuring frequency
- Gain-phase measurement: Amplitude, phase, group delay
- Floating or grounded devices
- Impedance measurement: $|Z| \cdot |Y| \cdot \theta \cdot R \cdot X \cdot G \cdot B \cdot L \cdot C \cdot D \cdot Q \cdot A \cdot \Delta$
- Standard HP-IB



HP 4192A (shown with Option 907 handles)



HP 4192A LF Impedance Analyzer

The HP 4192A LF impedance analyzer performs both network analysis and impedance analysis on such devices such as telecommunication filters, audio/video electronic circuits, and basic electronic components. Both floating and grounded devices can be tested.

Specifications (Refer to data sheet for complete specifications.)

Measuring Signal ($23^\circ \pm 5^\circ \text{C}$)

Frequency Range: 5 Hz to 13 MHz

Frequency Step: 0.001 Hz (5 Hz to 10 kHz), 0.01 Hz (10 kHz to 100 kHz), 0.1 Hz (100 kHz to 1 MHz), 1 Hz (1 MHz to 13 MHz).

Frequency Accuracy: $\pm 50 \text{ ppm}$

OSC Level: 5 mV to 1.1 V rms variable into 50 Ω (amplitude-phase measurement) or open circuit (impedance measurement).

OSC Level Step: 1 mV (5 mV to 100 mV), 5 mV (100 mV to 1.1 V).

Level Monitor (impedance measurement): Current through or voltage across sample can be monitored

Control: Spot and sweep via front panel or HP-IB

Measuring Mode

Spot Measurement: At specific frequency (or dc bias)

Sweep Measurement: Manual or automatic sweep from START to STOP frequency (or dc bias) at selected STEP frequency (or dc bias) rate

Sweep Mode: Linear or logarithmic (frequency only)

Recorder Outputs: Output dc voltage proportional to each measured value, and frequency or dc bias.

Maximum output voltage: $\pm 1 \text{ V}$

Key Status Memory: Five sets of measuring conditions can be stored and recalled at any time.

HP-IB Data Output and Remote Control: Standard

Self-Test: Automatic introspective testing

Trigger: Internal, external, manual, or HP-IB

Amplitude-Phase Measurement

Parameter Measured: Relative amplitude B-A (dB) and phase θ (degrees or radians), B-A and group delay, absolute amplitude A (dBm or dBV) or B (dBm or dBV), and deviation (Δ , $\Delta\%$) of all parameters

Reference Amplitude: 0 dBV = 1 V rms, 0 dBm = 1 mW (with 50 Ω termination)

OSC Output Resistance: 50 Ω

Channels A and B: Input impedance: 1 M $\Omega \pm 2\%$, shunt capacitance: 25 pF $\pm 5 \text{ pF}$

Measurement Accuracy ($23^\circ \pm 5^\circ \text{C}$): Specified at BNC unknown terminals after 30-minute warm-up (test speed: normal or average)

B-A (relative amplitude) and θ (phase) measurement: $\pm 0.01 \text{ dB}$, $\pm 0.05^\circ$ (at -20 to 0.8 dB V input, freq. = 100 to 10 kHz)

A, B (absolute amplitude) measurement: $\pm 0.4 \text{ dB}$ (at -50 to 0.8 dB V input, freq. = 100 to 1 MHz)

Impedance Measurement

Parameter Measured: $|Z|$, θ , $|Y|$, θ , R-X, G-B, L-D-Q-R, G, C-D-Q-R-G and deviation (Δ , $\Delta\%$) of all parameters

Display: 4 1/2 digits, max display 12999 counts, 19999 for L & C

Circuit Mode: Series equivalent circuit (—) and parallel equivalent circuit (—). Automatic selection available.

Auto ZERO Adjustment: Automatic normalization of the readout offset due to residuals of the test fixture by pushbutton operation (at spot frequency)

Measuring Range and Accuracy ($23^\circ \pm 5^\circ \text{C}$): Specified at BNC unknown terminals after 30 minute warmup when OSC level is more than 0.1 V and when auto ZERO adjust is performed (test speed: normal or average). Accuracy given below is only valid when the measured value is equal to full scale of each range.

$|Z|$ - θ , R-X, $|Y|$ - θ , G-B Measurement:

Parameters	Measurement range	Basic accuracy
$ Z $, R, X	1.0000 Ω to 1.000 M Ω	0.15%
$ Y $, G, B	10.000 μS to 10.00 S	0.15%
θ	-180.00 $^\circ$ to 180.00 $^\circ$	0.08 $^\circ$

R accuracy ($D \geq 10$); X accuracy ($D < 1$)

G accuracy ($D > 1$); B accuracy ($D \leq 0.1$)

L - D-Q, C - D-Q Measurement: (automatically calculated from measured Z/Y values)

Parameter	Measuring range*	Basic accuracy
L	0.01 nH to 1000 H	0.27%
C	0.1fF to 199** mF	0.15%
D (1/Q)	0.0001 to 19.999	0.001 (C-measurement) 0.003 (L-measurement)

*Varies with measuring frequency except for D (1/Q)

**Accuracy of C ranges over 100 mF is not specified

Internal dc Bias: Standard (impedance measurement only)

Voltage Range: -35 V to +35 V, 10 mV step

Setting Accuracy ($23^\circ \pm 5^\circ \text{C}$): 0.5% of setting + 5 mV

Bias Control: Spot and swept, using front panel controls or HP-IB

General Specifications

Measuring Time (high speed mode)

B-A and θ , A or B: 88 to 127 ms ($\geq 400 \text{ Hz}$)

Impedance parameters: 58 to 91 ms ($\geq 1 \text{ kHz}$)

Test Level Monitor Range (impedance measurement)

Voltage: 5 mV to 1.1 V

Current: 1 μA to 11 mA

Operating Temperature: 0° to 55°C , $\leq 95\% \text{ RH}$ at 40°C

Power: 100, 120, 220 V $\pm 10\%$, 240 V + 5% to -10%, 48 to 66 Hz, 150 VA max.

Size: 425.5 mm W $\times$ 235 mm H $\times$ 61.5 mm D (16.75 in $\times$ 9 in $\times$ 2.6 in)

Weight: Approximately 19 kg (41.9 lb)

Furnished Accessories and Parts: HP 16047A test fixture,

HP 11048C 50 Ω feed thru terminations (2 ea), power splitter,

HP 11170A BNC cables (2 ea), BNC adapter

Key Literature

HP 4192A LF Impedance Analyzer Data Sheet, p/n 5952-8896.

Ordering Information

HP 4192A LF Impedance Analyzer

Price

\$19,900

Accessories

HP 16095A Probe Fixture

\$855

HP 16096A 2-Port Component Test Fixture

\$1,600

HP 16097A Accessory Kit

\$2,445

HP 16047C Test Fixture

\$360

HP 16048A Test Leads (BNC connector)

\$350

☎ For off-the-shelf shipment, call 800-452-4844.

For the most current prices and product information, contact your local Hewlett-Packard sales office—see page 691.