IMPEEDANCE MEASURING INSTRUMENTS
LF Impedance Analyzer, 5 Hz to 13 MHz
HP 4192A

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

HP 4192A LF Impedance Analyzer
The HP 4192A LF impedance analyzer performs both network analysis and impedance analysis on such devices as telecommunications 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° ± 5° 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: ± 50 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 sweep 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: ± 1 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 A-B (dB) and phase θ (degrees or radians), A-A and group delay, absolute amplitude A dBm or dBV), or B dBm or dBV), and deviation (Δ, Δ%) of all parameters.
Reference Amplitude: 0 dBV = 1 V rms, 0 dBm = 1 mW (with 50 Ω termination).
Osc Output Resistance: 50 Ω
Channel A and B: Input impedance: 1 MΩ ± 2%, shunt capacitance: 25 pF ± 5 pF.
Measurement Accuracy (23° ± 5° C): Specified at BNC unknown terminals after 30-minute warm-up (test speed: normal or average).
B-A (relative amplitude) and θ (phase) measurement:
± 0.01 dB, ± 0.05° (at – 20 to 0.8 dB V input, freq. = 100 to 10 kHz)
A, B (absolute amplitude) measurement:
± 0.4 dB (at – 50 to 0.8 dB V input, freq. = 100 to 1 MHz)

Impedance Measurement
Display: 4½ digits, max display 12999 counts, 19999 for L & C.
Circuit Mode: Series equivalent circuit (+––– ––) and parallel equivalent circuit (+–– – –). Automatic selectable 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° ± 5° 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.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement Range</th>
<th>Basic Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Z, R, X</td>
<td>10,000 Ω to 1,000 MΩ</td>
</tr>
<tr>
<td></td>
<td>Y, G, B</td>
<td>10,000 µS to 10,000 S</td>
</tr>
<tr>
<td>e</td>
<td>– 180° to 180°</td>
<td>0.08°</td>
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</tbody>
</table>

Maximum measurement range:
2.5 GHz

R accuracy (D ≥ 10); X accuracy (D ≤ 1)
G accuracy (D > 1); B accuracy (B ≤ 0.5)

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measuring Range*</th>
<th>Basic Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(1/Q)</td>
<td>0.001 to 19.999</td>
<td>0.001 (C-measurement)</td>
</tr>
<tr>
<td>L</td>
<td>0.01 nH to 1000 H</td>
<td>0.27%</td>
</tr>
<tr>
<td>C</td>
<td>0.1 F to 199 F</td>
<td>0.15%</td>
</tr>
</tbody>
</table>

*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° ± 5° C): 0.5% of setting ± 5 mV
Bias Control: Spot and sweep, using front panel controls or HP-IB.

General Specifications
Measuring Time (high speed mode)
B-A and e, A or B: 88 to 127 ms (≥ 400 Hz)
Imbalance parameters: 58 to 91 ms (≥ 1 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, ≤ 95% RH at 40° C.
Power: 100, 120, 220 V ± 10%, 240 V ± 5% to – 10%, 48 to 66 Hz, 150 VA max.
Size: 425.5 mm W × 235 mm H × 615 mm D (16.75 in × 9 in × 22.6 in)
Weight: Approximately 19 kg (41.9 lb)

Furnished Accessories and Parts:
HP 16047A test fixture, HP 11048C 30 Ω feed thru terminals (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
Price $855
HP 16096A 2-Port Component Test Fixture
Price $1,600
HP 16097A Accessory Kit
Price $2,445
HP 16047C Test Fixture
Price $360
HP 16048A Test Leads (BNC connector)
Price $350

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