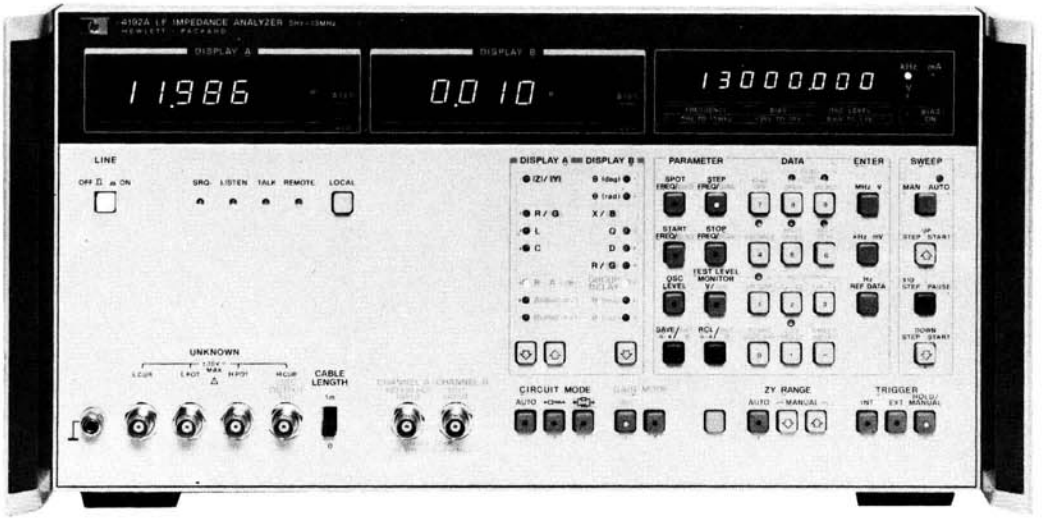
COMPONENT MEASUREMENT

LF Impedance Analyzer (5 Hz to 13 MHz)

Model 4192A

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



HP 4192A (shown with Opt. 907 handles)

DESIGNED FOR HP-IB SYSTEMS

Description

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

Automatic Swept Frequency Measurement of All Impedance Parameters

The HP 4192A can measure 11 impedance parameters (|Z|, |Y|, Θ, R, X, G, B, L, C, D, Q) over a wide range |Z|: 0.1 mΩ to 1 MΩ; |Y|: 1 nS to 10 S).

The built-in frequency synthesizer can be set from 5 Hz to 13 MHz with a maximum resolution of 1 mHz. This feature allows accurate characterization of high Q devices such as crystals. Test signal level is variable from 5 mV to 1.1 V with 1 mV resolution. Also, an internal dc bias voltage source provides ±35 V at 10 mV increments. Thus, the HP 4192A can evaluate components and entire circuits near actual operating conditions.

Specifications (complete specifications on data sheet)

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 Vrms 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).
OSC level accuracy: 5 Hz to 1 MHz: ±((5 + 10/f)% of setting + 2 mV) where f is in Hz. 1 MHz to 13 MHz: ±((4 + 1.5 × F)% of setting + 2 mV) where F is in MHz.
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)
Swept 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: ±1 V
Output voltage accuracy: ±(0.5% of voltage +20 mV)

Key status memory: 5 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, Δ%) of all parameters
Reference amplitude: 0 dBV = 1 Vrms, 0 dBm = 1 mW (with 50 Ω termination)
OSC output resistance: 50 Ω
Channels A and B: input impedance: 1 MΩ ±2%, shunt capacitance: 25 pF ±5 pF

Display Range and Resolution
B-A: 0 to ±100 dB, 0.001 dB (0 to ±20 dB), 0.01 dB (±20 to ±100 dB)
Θ: 0 to ±180°, 0.01°
Group delay: 0.1 ns to 19 s, max. resolution 4½ digits
A or B: +0.8 to −100 dBV, 0.001 dB (>−20 dB), 0.01 dB (≤−20 dB), +13.8 to −87 dBm, 0.001 dB (>−20 dBm), 0.01 dB (≤−20 dBm)

Measuring accuracy (23 ±5°C): specified at BNC unknown terminals after 30 minute warmup (test speed: normal or average)

B-A (relative amplitude) and Θ (phase) Measurement
Determined by sum of channel A and B accuracies given below (accuracy of each channel changes according to absolute input level)

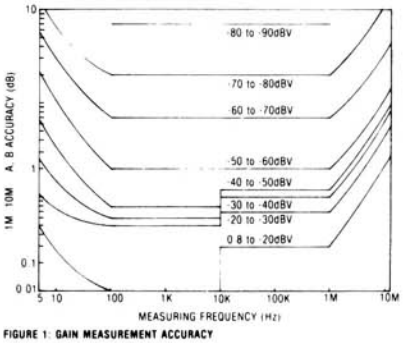


FIGURE 1: GAIN MEASUREMENT ACCURACY

Compensating range: 0 to 99.99 cm.

DC Bias

Internal dc Bias

Voltage range: −40 to +40 V, 10 mV step
Setting accuracy: 0.1% of setting +10 mV
Bias control: spot and swept

External dc Bias

Voltage range: −40 to +40 V
Max allowable current: 100 mA

Key status memory: 2 sets of measuring conditions can be stored and recalled at any time. These conditions are kept in storage even when LINE is turned off.
Ranging: Auto/Range hold
Trigger: Internal, External or Manual
Self-test: automatic internal program test
HP-IB data output and remote control: standard

Measuring Range, Resolution and Accuracy

Specified at APC-7 UNKNOWN connector for reflect coefficient measurement at measuring frequency and ambient temperature (0 – 55°C) where calibration is performed after the warm-up time of 40 minutes. Refer to General Information for temperature coefficient and typical measuring range/resolution and accuracies of other measuring parameters (see data sheet for detailed specifications).

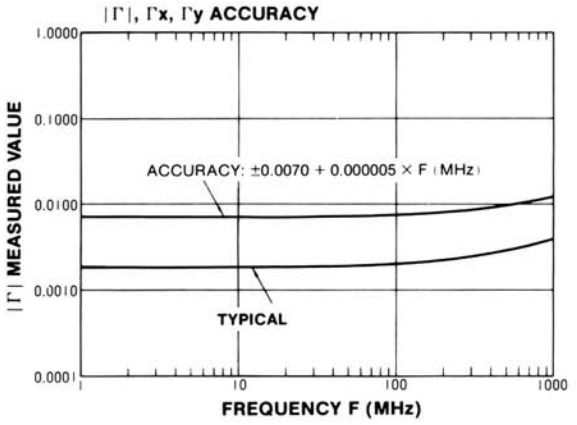
|Γ| – Θ/Γx – Γy Measurement

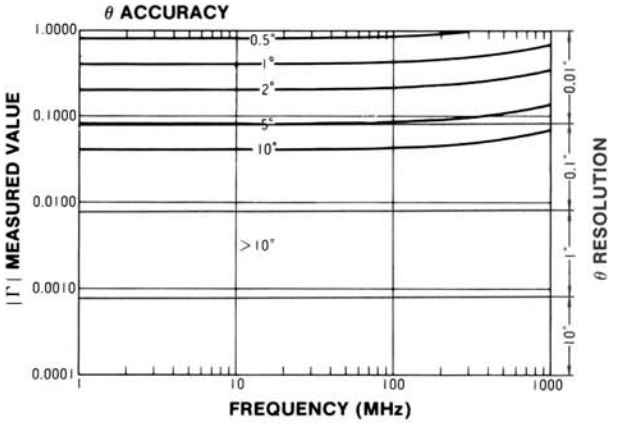
Measuring Range

|Γ|, Γx, Γy: 0.0001 to 1.0000
Θ: 0° to ±180.00° (0 to ±π rad.)
|Γ|, Γx, Γy resolution: 0.0001

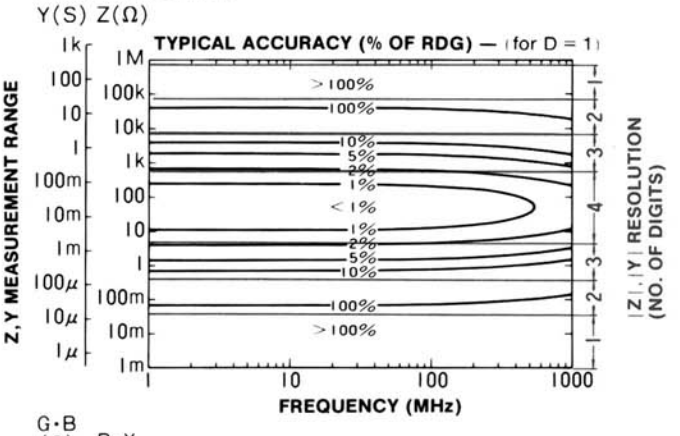
Referance Data (Not Specified)

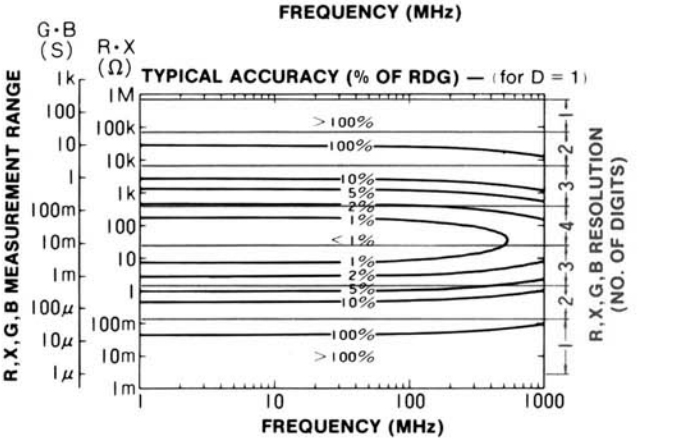
Temperature coefficient for |Γ|: 0.0001/°C (23 ± 5°C)
Measuring time: <800 ms or <250 ms (high speed mode)
Frequency switching time: ≤ 200 ms

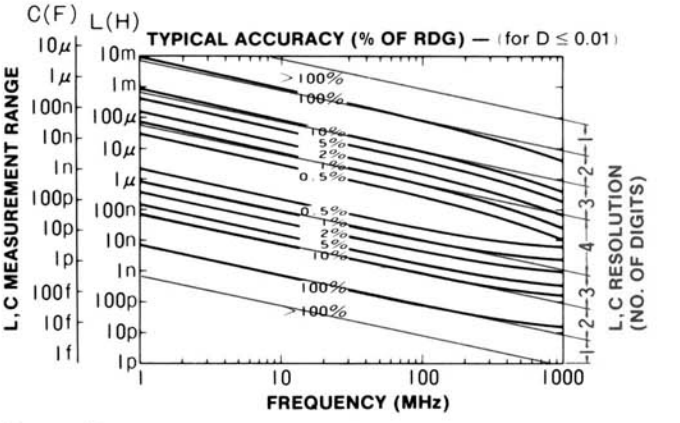




REFERENCE DATA (NOT SPECIFIED)
TYPICAL ACCURACY







General

Temperature: 0 - 55°C, < 95% RH
Power: 100, 120, 220 V ± 10%, 240 V + 5% – 10%, 48 – 66 Hz, 150 VA max.
Size: 425.5 mm W x 230 H x 574 mm D (16.75″ x 9″ x 22.6″).
Weight: approx. 24 kg (52.8 lb)

Accessories furnished: accessory case (with reference terminations included).

Accessories Available

HP 16091A Coaxial Test Fixture
HP 16092A Spring Clip Test Fixture
HP 16093A Binding Post Test Fixture
HP 16093B Binding Post Test Fixture
HP 16094A Probe Fixture

Options

002: 100 Hz/200 Hz resolution synthesizer
004: Recorder Outputs