

COMPONENT MEASUREMENT

Vector Impedance Meter (400 kHz to 110 MHz)

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HP 4193A

- 400 kHz to 110 MHz spot or swept frequency
- Measure impedance magnitude (10 m Ω to 120 k Ω) and phase (-180.0° to $+180.0^\circ$)
- Test components in-circuit and out-of-circuit

- Fixtures include low-grounded probe, spring clip fixture, and binding post fixture
- Standard HP-IB and analog outputs



HP 4193A

HP 4193A Vector Impedance Meter

The HP 4193A Vector Impedance Meter measures impedance magnitude and phase. An internal oscillator provides test signals from 400 kHz to 110.0 MHz. The test signal is a constant current between 10 μ A and 100 μ A, depending on $|Z|$ range.

Reliable and Accurate Impedance Measurement

The HP 4193A can measure and display impedance magnitudes from 10 m Ω to 120 k Ω . Impedance phase is displayed from $+180.0^\circ$ to -180.0° . Accuracy is as good as 3.0 percent of reading (magnitude) and 3.2° (phase).

Also, the HP 4193A's 3½-digit resolution makes it easy to see small changes in measurement results during adjustment procedures, for example.

Frequency Sweep for Complex Component Testing

When you're testing complex components such as ceramic resonators, it's useful to sweep frequency to get the big picture, and to identify such critical impedance points as the series resonant point. This requires both swept measurement and measurements at individual "spot" frequencies. The HP 4193A can do both.

The HP 4193A can be tuned to any individual frequency from 400 kHz to 110.0 MHz with a maximum resolution of 1 kHz. If a greater frequency resolution is required, it can be provided by connecting an external synthesized source such as the HP 3335A or HP 8656B to the HP 4193A EXT OSC input.

Flexible internal frequency sweep is an exciting HP 4193A feature. Frequency can be swept linearly over any portion of the HP 4193A frequency range or swept logarithmically over the entire 400 kHz to 110.0 MHz range.

Test In-Circuit and Out-of-Circuit Components

Several test fixtures help adapt the HP 4193A to your device under test. For example, the handy L-ground probe is useful for in-circuit testing. The HP 16099A Test Fixture Adapter and three associated fixtures help connect to out-of-circuit devices of various sizes and shapes.

Specifications (Refer to data sheet for complete specifications.)

Test Signal Output Specifications

Test signal is output from the furnished low-ground probe.

Frequency range: 400 kHz to 110.0 MHz

Frequency resolution

400 kHz to 9.999 MHz: 1 kHz resolution

10.00 MHz to 99.99 MHz: 10 kHz resolution

100.0 MHz to 110.0 MHz: 100 kHz resolution

Frequency accuracy: $\pm 0.01\%$ of setting after calibration.

Frequency stability: ± 100 ppm per month (0 to 55° C)

Frequency control

Spot: Spot frequency is set using coarse, medium and fine controls

Full sweep: Logarithmic sweep at 43 points over full range of 400 kHz to 110 MHz

Partial sweep: Linear sweep from selected START to STOP frequency. Number of steps is selected as 100, 1000 or "HIGH RESOLN." When "HIGH RESOLN." steps are selected, the operator must also select "coarse," "medium," or "fine" resolution.

EXT OSC: increase frequency resolution by connecting an external frequency synthesizer

Impedance Measurement Specifications

Input configuration: low-grounded probe (furnished)

Digital display of impedance: 3½ digits

$|Z|$: 0 to 1999 counts (0 to 120 counts on 100 k Ω range)

θ : -1800 to $+1800$ counts (-180 to $+180$ counts on 100 k Ω range)

Measurement trigger: Internal, external, and manual

Measurement range control: Auto, hold, and manual

Measurement Range

$|Z|$: Five decade ranges: 10 Ω , 100 Ω , 1 k Ω , 10 k Ω , 100 k Ω

minimum $|Z|$ (sensitivity): 10 m Ω

maximum $|Z|$: 120 k Ω

θ : One range: -180.0° to $+180.0^\circ$

Reference Data

Test Signal Output

Frequency settling time: 5 ms to 400 ms. Best case is when $(\Delta f/f)\%$ is less than 10% (below 10 MHz) and less than 1% (above 10 MHz).

Signal purity

Spurious: -60 dBc (dBc is dB below carrier)

Harmonics: -30 dBc

Residual FM: Measured in a 100 Hz band centered on the carrier

1 MHz to 110 MHz: 100 Hz p-pFM

Test level: Constant current source

Impedance Measurement

Residual Impedance of Probe (at probe tip)

Resistance: $\leq 0.55 \Omega$

Inductance: $\leq (4.9 + 10/f)$ nH where f is measuring frequency in MHz

Parallel capacitance: ≤ 0.11 pF

Measuring speed: Assumes range is fixed; recorder output is OFF

HI SPEED: Approximately 150 ms per measurement

NORMAL: Approximately 1 s per measurement

Ranging time: Approximately 1.2s

Temperature coefficient at 23° C $\pm 5^\circ$ C

$|Z|$: 2 m Ω° C, θ : 0.02°/° C

General

Operating temperature/humidity: 0 to 55° C, $\leq 95\%$ RH @ 40° C. Note that measurement error in 0° C to 55° C temperature range is typically double the error in the 23° C $\pm 5^\circ$ C range.

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

Size: 426 mm W \times 178 mm H \times 498 mm D (16.75 in \times 7 in \times 19.6 in)

Weight: 18 kg (40 lb)

Accessories furnished: The low-ground probe kit includes a probe, spare pins, spare clips, BNC adapter, component mounting adapter, probe socket, and accessory case.

Ordering Information

HP 4193A Vector Impedance Meter

Price

\$12,120

Accessories

HP 16099A Test Fixture Adapter (used with HP 16092A and HP 16093A/B)

\$505 ☎

HP 16092A Spring Clip Fixture (used with HP 16099A)

\$555 ☎

HP 16093A Binding Post Fixture (used with HP 16099A)

\$225 ☎

HP 16093B Binding Post Fixture (used with HP 16099A)

\$240 ☎

Refer to page 357 for accessories.

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