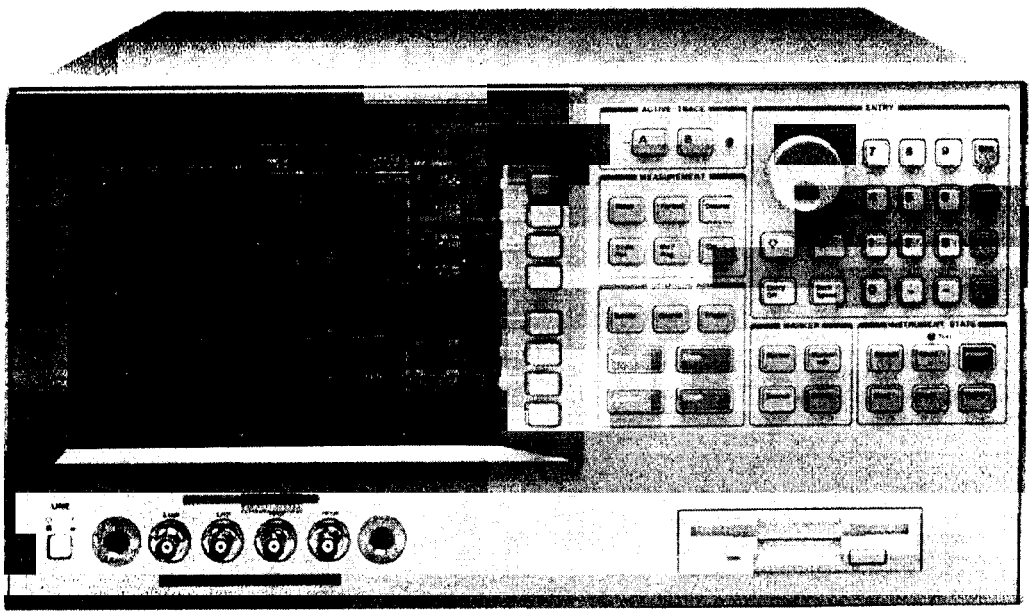
474 Precision Impedance Analyzer

HP 4294A

NEW

- Accurate measurement over wide impedance range and wide frequency range
- Basic impedance accuracy: ± 0.08%
- 40 Hz to 110 MHz, 3 mΩ to 500MΩ
- Powerful impedance analysis function
- Ease of use and versatile PC connectivity



HP 4294A

HP 4294A Precision Impedance Analyzer

The HP 4294A Precision Impedance Analyzer is an integrated solution for efficient impedance measurement and analysis of components and circuits. The HP 4294A covers a broader test-frequency range (40Hz to 110MHz) with Basic impedance accuracy:±0.08%. Excellent High Q / Low D accuracy enables analysis of low-loss components. The wide signal-level ranges enable device evaluation under actual operating conditions. The test signal level range is 5mV to 1Vrms or 200μA to 20mArms, and the DC bias range is 0V to ±40V or 0mA to ±100mA. Advanced calibration and error compensation functions eliminate measurement error factors when performing measurements on in-fixture devices. The HP 4294A is a powerful tool for design, qualification and quality control, and production testing of electronic components. Circuit designers and developers can also benefit from the performance/functionality offered.

Wide-Range Accurate Measurement

The HP 4294A enables impedance measurement using the auto-balancing bridge technique over the frequency range 40 Hz to 110 MHz. The basic impedance accuracy is ± 0.08%, and the typical Q accuracy is ±3% @Q=100, ≤10MHz. This advantage permits accurate evaluations of impedance characteristics for a wide variety of electronic devices as well as electronic and non-electronic material within a wide frequency range.

Versatile Analysis

The HP 4294A graphically displays impedance measurement results. This permits easy analysis of the resonant frequency and impedance values of electronic components using the marker functions. The marker functions offer a simple method to pinpoint the resonant frequency of components, as well, these functions assist users in many other observations. The combination of the accumulate mode (to superimpose traces) and the list sweep functions permits observation of the change in a DUT's characteristics due to a change in the measurement condition. Versatile and high-speed automatic testing is possible using the list sweep function in conjunction with the limit line function. The list-sweep function provides the ability to enhance test throughput by segmenting the sweep to include only necessary measurement frequencies, while the limit-line function (for Go/No-Go Testing) provides the ability to apply test limits within each segment. These functions greatly support the quality and performance required evaluating modern and improved electronic components, equipment and materials.

Equivalent Circuit Analysis

The equivalent-circuit analysis function provides advanced modeling (three and four element models) based on circuit constant values of five available circuit models. This function simulates the frequency characteristics of components by using derived circuit values or user-specified values. Comparison of design values to measurement values can assist with efficient component design.

Programming

Full programmability is provided using built-in Instrument (IBASIC). Desired measurements and computations, including graphics analysis, can be programmed simply by storing front-panel keystroke operations. The one-key execution function allows easy selection and execution of customized IBASIC programs. Several forms of storage are built-in (10Mbyte no-volatile memory, RAM disk or Floppy Disk).

Good PC Connectivity

Features fit to the latest PC environment include LAN (Local Area Network) capability, VGA monitor output, and the TIFF file format. LAN capability permits simplified networking ability when collecting, sharing and analyzing data. VGA monitor output improves productivity and reduces eyestrain. TIFF file format allows easy transfer of graphics to a PC.

Abundance of Accessories

Various four-terminal-pair test fixtures can be used with the HP 4294A. The HP 42941A Impedance Probe Kit (1.5m), which covers 40 Hz to 110 MHz, enables in-circuit impedance measurement of electronic circuits or components. Grounded devices can also be measured. The HP 42942A Terminal Adapter, which covers 40 Hz to 110 MHz, converts the four-terminal-pair port configuration to an APC-7 (7mm) Test Port. This adapter permits the use of familiar APC-7 (7mm) test fixtures. Again, grounded measurement is available. The permittivity of a dielectric solid or liquid material can be accurately measured using existing dielectric test fixtures such as the HP 16451B or the HP 16452A. Impedance measurement, permittivity calculation, and data analysis can be automatically and efficiently executed using the built-in Instrument BASIC programming function and/or the GPIB or LAN interface. The HP 16454A magnetic material (APC-7) test fixture for troidal cores can also be used with the HP 4294A/HP 42942A configuration for permeability evaluation. These various accessories satisfy a wide variety of fixture needs.

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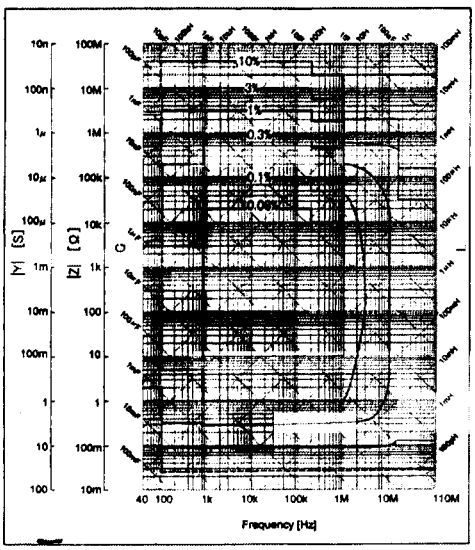
Specifications

Measurement Parameters
|Z|-θ, R-X, Ls-Rs, Ls-Q, Cs-Rs, Cs-Q, Cs-D, |Y|-θ, G-B, Lp-G, Lp-Q, Cp-G, Gp-Q, Cp-D, |Z|-Ls, |Z|-Cs, |Z|-Cp, |Z|-Q, |Z|-D, |Z|-Ls, Complex Z-Y, Lp-Rp, Cp-Rp
Basic Measurement Accuracy
Basic Impedance Accuracy (Four Terminal Pair): ± 0.08%
(See figure in detail)
Basic Impedance Accuracy with HP 42941A: ± 0.8%
Basic Impedance Accuracy with HP 42942A: ± 0.6%



HP 4294A Impedance Accuracy @Four-Terminal-Pair, OSC=0.5V)

Source Characteristics

Test Frequency: 40 Hz to 110 MHz
Frequency Resolution: 1 mHz
Frequency Accuracy:
± 20 ppm (±0.13ppm with Opt.1D5)
OSC Level: 5mV to 1Vrms/200μA to 20mArms
OSC Level Resolution: 1mVrms/20μA
OSC Level Accuracy
Voltage: ± ((10+0.05 * f(MHz))% + 1mV) @ UNKNOWN Terminal OPEN
Current:: ± (10+0.3*f(MHz))% + 50μA)@ UNKNOWN Terminal SHORT
Level Monitor Function: Voltage, Current

DC Bias

DC Bias Level: 0 to ±40V, 0 to ± 100mA (Auto level control function available)
DC Bias Level Resolution: 1mV/40μA
DC Bias Voltage Accuracy: ± (0.1% + (5+30*Imon (mA)))mV
DC Bias Current Accuracy: ± (2% + (0.2 * Vmon (V)/20) mA
DC Level Monitor Function: DCV, DCI

Sweep Characteristic

Sweep Parameter: Frequency, ac voltage, ac current, dc bias voltage, dc bias current
Sweep Type: Linear, Log, List, Zero Span, Manual Sweep, Up/Down Sweep
Number of Points: 2 to 801

Calibration/Compensation/Adapter Type

Calibration: Open/Short/Load
Compensation: Open/Short/Load, port extension (electrical length)
Adapter Type: None, 1m. 2m, APC7 Adapter (HP 42942A), Probe (HP 42941A)

Display

Size: 8.4 inch
Type: Color LCD (TFT)

Analysis

Marker: 8 markers, delta marker function, search function, analysis function
Equivalent Circuit Function: Approximation, simuration
Others: Instrument BASIC, Limit Line, Accumulate mode

Interface

LAN Interface: 10 Base-T Ethertwist, RJ45 Connector, TCP/IP
Other Interface: GPIB Interface, Printer (Centronics), 8 bit I/O, 24 bit I/O, VGA monitor output

Storage

Type: Built-in 3.5inch floppy disk drive, 10 Mbyte non-volatile memory, 512kbyte volatile RAM disk memory
Disk Format: DOS
Programming: HP Instrument BASIC

General Information

Operating Temperature and Humidity: 0 to 40° C, 15% to 80% RH
Power Requirements: 90 V to 132 V, or 198V to 264 V, 47 to 63 Hz, 300 VA Max.
Size: 426 mm W * 222 mm H x 502 mm D
Weight: 25kg

Key Literature

HP 4294A Precision Impedance Analyzer Profile, p/n 5968- 3808E
HP 4294A Technical Specification, p/n 5968-3809E

Ordering Information

Ordering Information	Price
HP 4294A Precision Impedance Analyzer	$34000
Furnished Accessories: Operation manual, floppy disk, and power cable. (No test fixture is supplied with the HP 4294A.)	
Opt 1D5 Add High-Stability Frequency Reference	+$1585
Opt UK6 Supplies commercial Calibration certificate with test data	+$330
HP 42941A Impedance Probe Kit	$2700
HP 42942A Terminal Adapter	$3300
Opt 001 Delete APC-7 Open/Short/Load set	-$1400
HP 16047E Test Fixture for axial lead components	$570
HP 16034G SMD Test Fixture	$1340
HP 16048G 1m Cable	$610
HP 16048H 1m Cable	$790
HP 16451B Dielectric Test Fixture	$4525
HP 16454A Magnetic Material Fixture	$3640