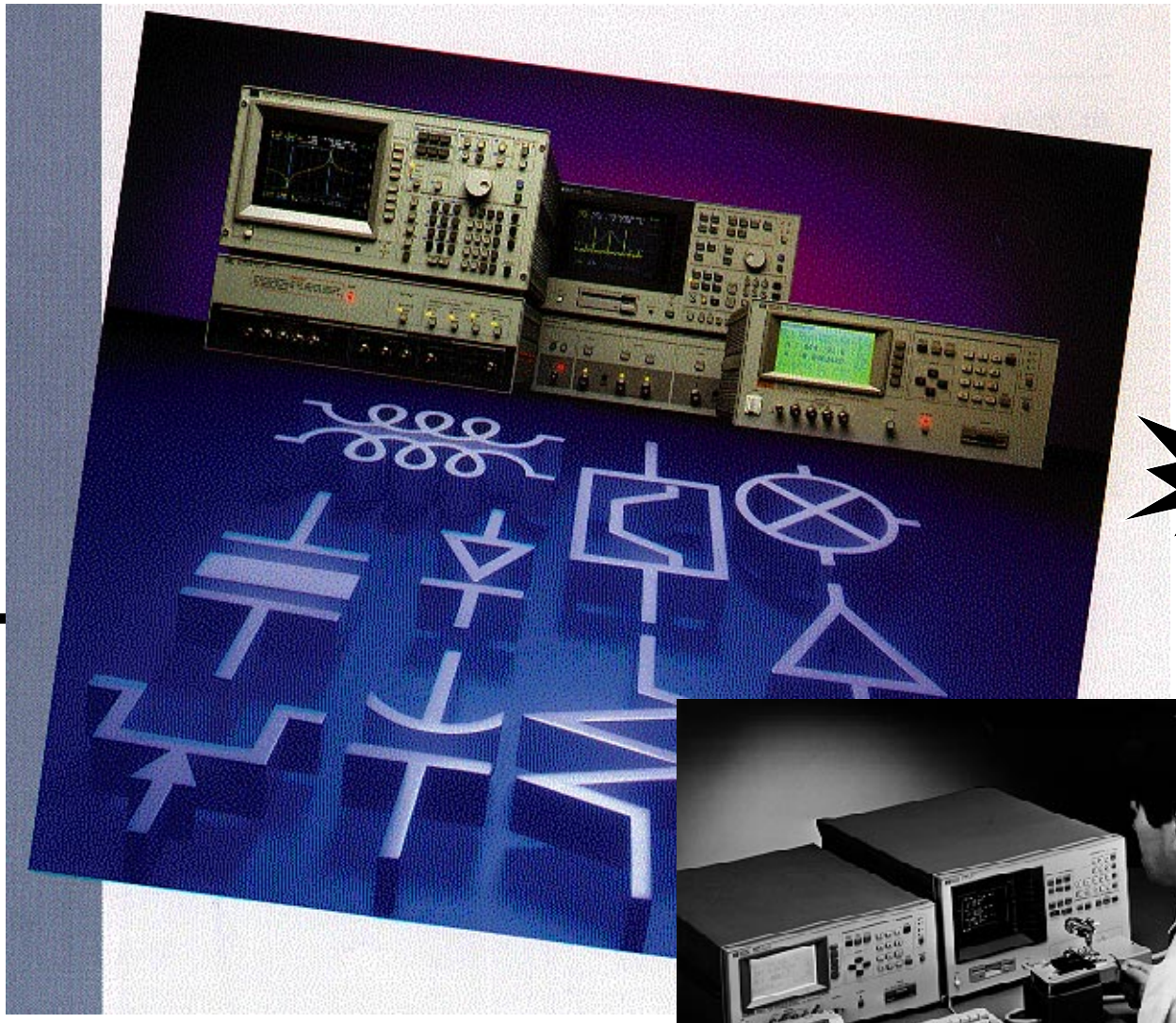
HEWLETT® PACKARD

LCR Meters, Impedance Analyzers, and Test Fixtures Selection Guide

Component and Material Measurement Solutions



New!

See pages 7, 8, 9

Cost Effective Solutions for Your Applications

Whether your application is in R&D, production, quality assurance, or incoming inspection, HP has the right impedance measurement solution for you. HP has a complete line of impedance test equipment and test accessories to help you task efficiently. When you choose an impedance measurement product from HP, you get more than accurate and reliable test results. HP offers:

Complete solution: Covering frequencies from 5 Hz to 1.8 GHz, HP's impedance product line offers your the widest selection of equipment for your application. In addition, several third-party companies have complementary products designed to work with HP equipment for special applications. This brochure gives an overview of all the products you can choose from.

Knowledge: HP has decades of experience providing impedance measurement solutions. Years of experience and continuing technical innovations go into the design and manufacturing of each HP LCR meter and impedance analyzer. HP also has a list of technical publication to assist you in many different applications (see page 14 for full listing.)

Convenience : Any time you have an impedance measurement need, help is only one phone call away. Calling HP will put you in contact with one of our trained engineers to help you find a solution.

Selecting the Best solution

HP's offers three types of impedance measurement solutions:

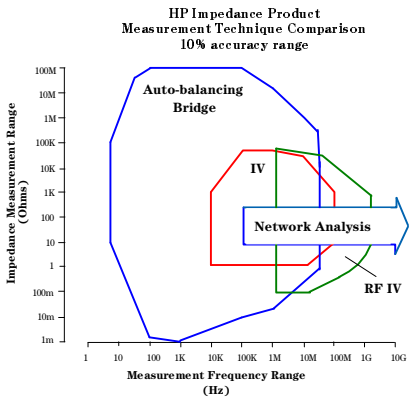
	Product Type		
Product Highlights	**LCR Meter**	**Impedance Analyzer**	**Combination Analyzer**
Frequency sweep capability	Spot	Continuous	Continuous
Display	Digital	CRT (1)	CRT
Others	Handler interfaces	Equivalent circuit analysis built in	Equivalent circuit analysis built in, multiple functions in one instrument
Advantage	Lower-cost solution, ease of use	Frequency characteristics and resonant analysis, circuit modeling	Cost-effective, time-saving, and compact in size

(1) Except HP 4192A, which has an LCD display and no equivalent circuit analysis function

Advanced Measurement Techniques for a Wide Range of Applications

Figure 1 is a comparison of different measurement techniques used in HP's LCR meter and impedance analyzers. As you can see, each technique has special measurement advantages:

- Auto-balancing bridge offers widest impedance measurement range with typical frequency range with typical frequency range of 5 Hz to 40 MHz. This technique is best for low-frequency, general-purpose testing.
- IV technique covers from 10 kHz to 100 MHz with a more focused impedance measurement range. IV technique also allows probing for in-circuit testing.
- Network analysis offers the highest frequency coverage, but works best when the measurement range is close to 50 ohms. With this measurement technique, impedance values are derived from reflection coefficients. Network analysis is most widely used for RF and microwave component and circuit analysis.
- RF IV, an enhancement of the IV technique, offers some of the high-frequency benefit of network analysis while retaining some of the impedance measurement range of the IV technique. Designed for accuracy and high-frequency performance, the RF IV technique is excellent for RF component analysis, especially for small inductance and capacitance values.



How to Use This Selection Guide

Table 1 is a summary of all of HP's impedance products. It is designed to assist you in better comparing HP's wide range of instrumentation and in choosing possible solutions for your applications, depending on your requirements in the following areas:

- Test frequency range.
- Device type or application type.
- Accuracy requirement.
- Any other special needs.

If you find several possible solutions for your application, go to the corresponding pages to find more details about each product. Call HP if you need further assistance.

Product Family	Type of Measurement	HP Solution	Pg	Transistor, Bipolar	Transistor, FET	Transformer. IF/RF	Transformer, LF & Power	Transducer, Sonar & Pressure	Solenoid	Semiconductor, Input/Output	Semiconductor, C-V	Resonator, Ceramic	Resistor	Read Channel (Disk Drive)	Power Supply	PC Board	Optical Isolator	Magnetic Head	Liquid Materials	LCD Material	Inductor, IF/RF	Inductor, Power, LF	Integrated Circuit Packaging	Filter	Diode, Varactor & RF	Dielectric Material	Crystal	Circuit Design	Capacitor, Freq. Analysis	Capacitance High Accuracy	Cable	Battery	Antenna	Amplifier	Device Type/Applications	Frequency Range (Hz)	Basic Z Accuracy(%)[3]	Z Measurement Range (ohms)	Special Features
HF/RF Analyzers	Impedance	HP 4291A	4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	★	★	★	★	★	●	●	1M to 1.8G	0.8	0.1 to 50k	A,B
	Network/Spectrum/ Impedance	HP 4195A[1]	5	●	●	●	●	●	●	●	★	●	★	●	●	●	●	●	●	●	●	●	●	●	●	★	★	★	★	★	★	★	★	★	★	100k to 500M	1.5	0.03 to 30k	A,B
		HP 4396A[2]	5	●	●	●	★	●	●	●	★	●	★	●	●	●	●	●	●	●	●	●	●	●	●	★	★	★	★	★	★	★	★	★	★	100k to 1.8G	3	2 to 5k	A,B
Impedance Analyzers	Impedance and Gain-Phase	HP 4192A	9	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	5 to 13M	0.1	0.1m to 1M	C
		HP 4194A	4	★	●	●	★	★	●	●	★	★	★	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	100 to 40M	0.17	0.01 to 100M	A,B
		HP 4194A with HP 41941A/B	4	★	★	●	●	●	●	●	★	★	★	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	10k to 100M	1.5	0.1 to 1M	A,B
LCR Meters	Precision	HP 4284A	6	●	★	●	★	★	●	●	★	★	★	●	●	●	●	●	●	●	●	●	●	●	●	●	★	★	★	★	★	★	●	●	●	20 to 1M	0.05	0.01m to 99.9999	D
		HP 4285A	6	●	●	●	●	●	★	●	★	★	★	●	●	●	●	●	●	●	●	●	●	●	●	●	★	★	★	★	★	★	●	●	●	75k to 30M	0.1	0.01m to 99.9999	D
		HP 4286A	7	★	●						★		★									●					★		★		●					1M to 1G	1.0	200m to 3k	E
	High Speed/Precision	HP 4278A	9	●	★																										★					1k & 1M only	0.05	0.001p to 200µ[4]	D
	Low Cost	HP 4263B	8		★		●				●		●									●					★		★		●					1100 to 100k	0.1	1m to 100M	D
		HP E4196A with Opt. 001 and 010	8		●	★	●	●			●		●									★					●	★	●	★	●					1M to 180M	3	200m t o10k	D
	Precision Q	HP 4285A with HP 42851A	6																								★	★		★						75k to 30M	5	Q: 5 to 1000	D
	Resistance: Milliohm	HP 4338B	7			●		●							●							★					★		★				★			1k only	0.4	10µ to 100k	D
	High Resistance	HP 4339B/HP 4349B	8			★		★							●																	★				HP 4339B=dc only	0.6	10k to 1.6x10[16]	D
																																				HP 4349B=dc only	2	10k to 1.0x10[15]	D

1 Refer to HP 4195A data sheet (P/N 5952-7970) for configuration information. 2 Refer to HP 4396A data sheet (P/N 5091-5189E) for configuration information.
3 Basic Z and D accuracies are best-case values and vary depending on measurement conditions. See product data sheet for details. 4 Capacitance measurement only.

★ Best ● Very Good

Special Feature Code:
A: Built-in equivalent circuit analysis.
B: Frequency sweep with CRT display.
C: Frequency sweep with LCD display.
D: Spot frequency only with LDC display.
E: Spot frequency with CRT display.

Product Highlights: Impedance Analyzers

Impedance analyzers provide high measurement accuracy and sophisticated measurement functions:

- Frequency sweep capability lets you customize where and how test data will be takes.
- Built-in equivalent-circuit analysis computes a multi-element circuit model of the device-under-test.
- Color CRT can display multiple sets of measurement curves at the same time.
- Advanced calibration and compensation methods reduce measurement errors.

HP 4291A 1.8 GHz Impedance/Material Analyzer

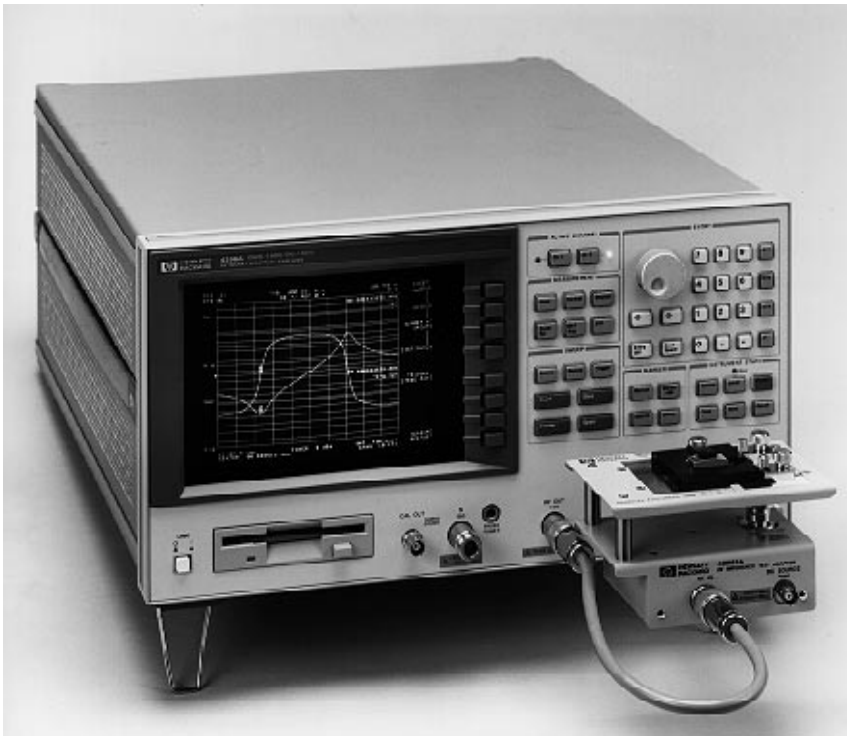
- Provides top-of-the-line solution for measuring impedance from 1 MHz to 1.8 GHz, with an optional material-test function for measuring permitivity and permeability.
- Ideal instrument for RF Surfacemount inductors, capacitors, PC board materials. and magnetic toroids.
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q.
- Material parameters : ε, ε', ε", μ, μ', μ"

HP 4194A Impedance/ Gain-Phase Analyzer

- Versatile instrument with 3 measurement capabilities: Impedance only: 100 Hz to 40 MHz Impedance with HP 41941A/B impedance probe: 10 kHz to 100 MHz Gain/phase: 10 MHz to 100 MHz
- Great R/D tool for all types of component and circuit analysis.
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q.

Product Highlights: Network/Spectrum/Impedance Analyzers

These combination analyzers offer a cost-effective and time-saving alternative. Instead of buying a rack full of stand-alone test equipment and spending extra time to make them work together, you can get a combination analyzer that has all the functions you need and is ready to go when you press the power-on button. For impedance analyzers have the same advanced features as the impedance analyzers described on page 4.



HP 4396A Network/Spectrum/ Impedance Analyzer (with HP 43961A RF Impedance Test Kit and HP 4396A opt.010)

- 1.8 GHz three-in-one analyzer with no sacrifice in performance.
- Advanced features for meeting your future test requirements: gated spectrum analysis for pulsed signal analysis, digital resolution bandwidth for faster sweeps, and more.
- Saves you money and time for RF component and circuit analysis.
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q.

HP 4195A Network/Spectrum/ Impedance Analyzer (with HP 41951A Impedance Test Set)

- Most popular combination analyzer for components and circuit design from 5 Hz to 500 MHz
- Three functions for a complete analog measurement system.
- Best-valued bench-top tool for R&D.
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q.

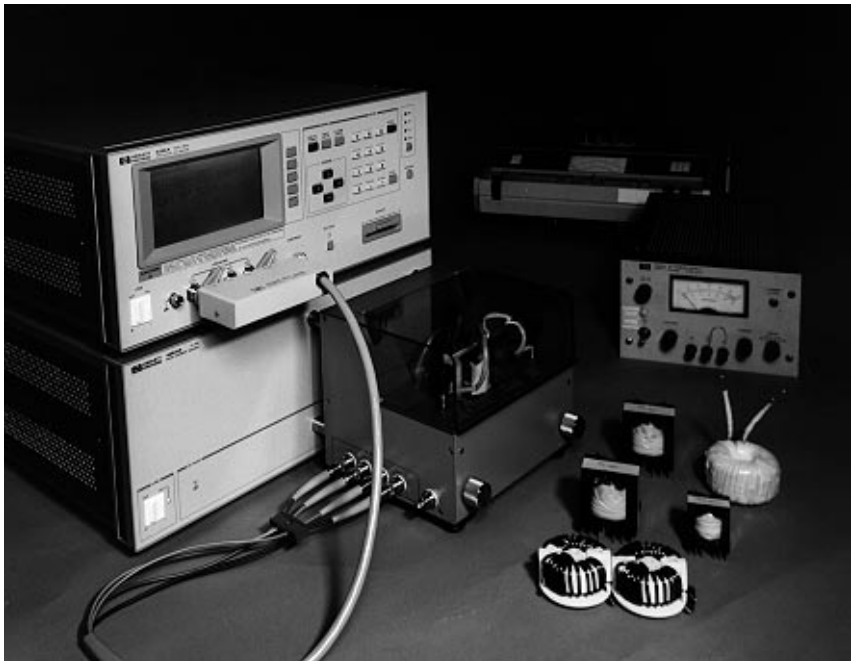
Product Highlights: Precision LCR Meters

Designed for measurement precision and ease-of-use, this family of LCR meters fits both R&D and production applications. Although the LCR meters do not have all the sophisticated features as impedance analyzers, the LCR meters offers excellent performance at an affordable price:

- Wide selection of frequency range from 20 Hz to 1 GHz.
- Frequency list sweep for continuos testing at multiple frequency points.
- Great for general-purpose testing of leaded components surface-mount components, materials, and more.
- HP-IB and handler interface for easy test automation in production environment.

HP 4284A Precision LCR Meter

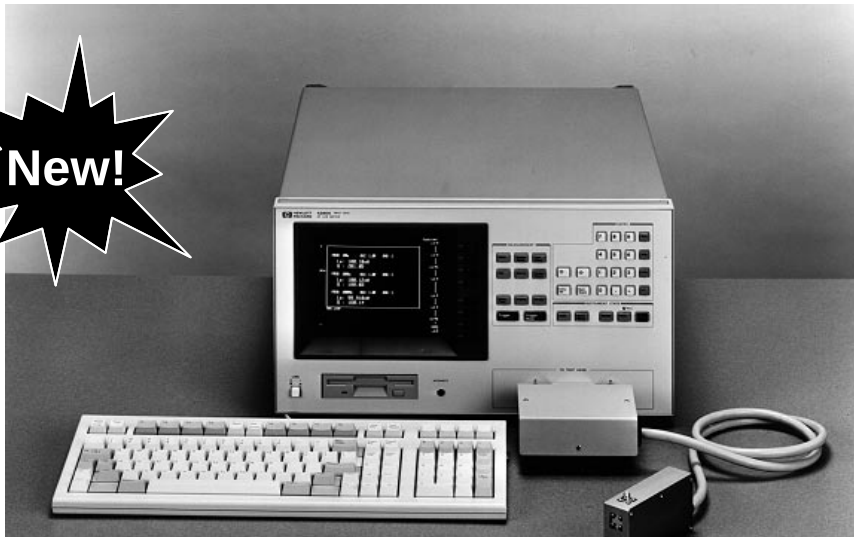
- 0.05% basic accuracy.
- 20 Hz to 1 MHz
- Option 001 adds ± 40V internal dc bias voltage
- For testing power inductors and transformers, choose option 002, HP 42841A, and HP 42841A/B to get up to 20 A dc bias current.[1]
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q, ESR



HP 4285A Precision LCR Meter

- 0.1% basic accuracy
- 75 kHz to 30 MHz
- Option 001 adds ± 40V dc bias voltage.
- Option 002, HP 42841A, and HP 42842C provide up to 10 A dc bias current.
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q, ESR.
- Best Q measurement solution up to 30 MHz when used with option 002 and HP 42851A Precision Q Adapter.

Product Highlights: Precision RF LCR Meter



HP 4286A RF LCR Meter

- 1.0% basic accuracy and wide impedance range
- Reliable Q measurement (6% @Q=100, 100MHz)
- 1 MHz to 1 GHz frequency range
- Measurement time fo 15 msec
- Handler and HP-IB Interfaces
- 1m/3m selectable extension cable with small APC3.5 test head
- SMD fixtures
- Measuremet parameters: |Z|, |Y|, θ, R, X, G, B, C, L, R, D, Q

Product Highlights: Basic Products

The following products are designed for basic or special-purpose applications.

Their features are optimized to achieve maximum performance for the particular applications.

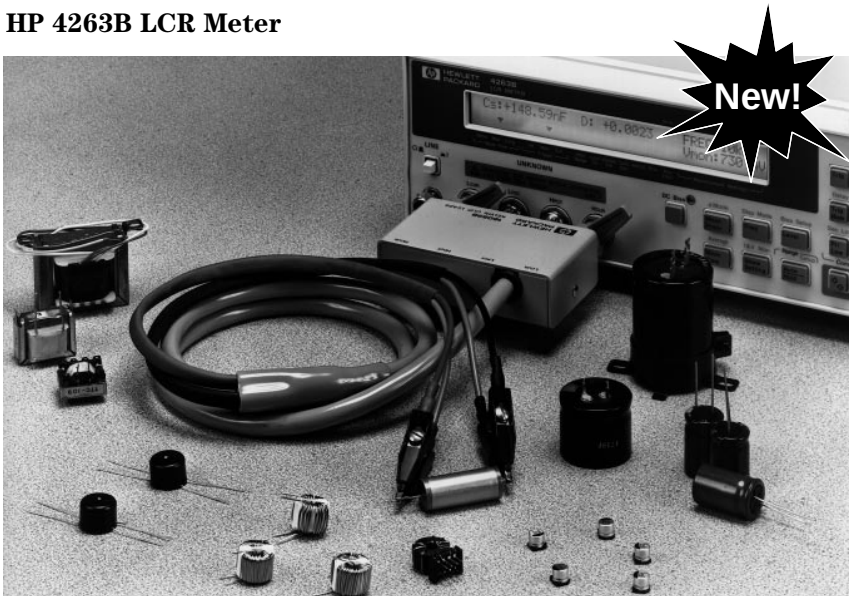
New!

HP 4338B Milliohmmeter (1mΩ to 100kΩ)

- 1 kHz ac measurement with selectable test signal current from 1 mA to 10 mA.
- Designed for utra-low resistance measurements of switches, batteries, relays, cables, connectors, and PC boards.
- Measurement parameters: R, X, |Z|, L, θ.
- Contact check function for reliable tests.
- Select the number of displayed digits (3, 4, or 5).

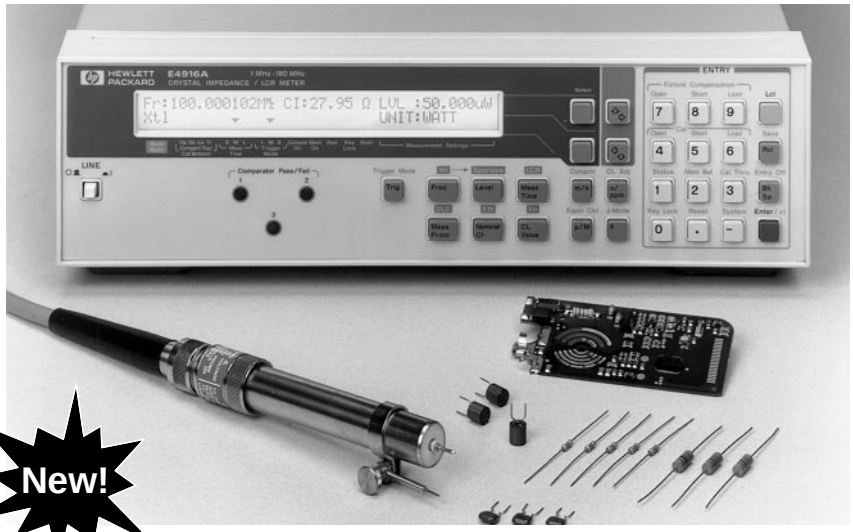
Product Highlights: Basic Products

HP 4263B LCR Meter



- Spot frequency testing at 100 Hz, 120 Hz, 1 kHz, 10 kHz, and 100 kHz. (optional 20 kHz)
- Compact, easy-to-use, entry-level LCR Meter.
- Measurement Parameters: |Z|, |Y|, θ, R, X, G, B, C, L, R, D, Q, ESR.
- Add N, M, DCR (Option 001) for transformer/Coil measurements.
- Set signal level (20 mV to 1 Vrms) in 5 mVrms steps.
- Monitor actual ac voltage and current levels.
- Contact check function for reliable tests.
- Select the number of displayed digits (3, 4, or 5).

HP E4916A Crystal Impedance / LCR Meter (with Opt. 001 and 010)



- Spot frequency testing from 1 MHz to 180 MHz.
- Compact, easy to use, entry-level RF LCR meter.
- 3.0% basic accuracy.
- Floating or grounded measurement.
- Measurement parameters: |Z|,|Y|,θ,R,X,G,B,C,L,R,D,Q.
- Special function for crystal resonator testing.

HP 4339B High-Resistance Meter

- Test voltage: 0.1 to 1000 Vdc.
- Measurement range: R: 1 x 10^3 Ω to 1.6 x 10^{16} Ω, I: 60 fA to 100 µA.
- Great solution for evaluating leakage current and insulation resistance of components.
- Can be programmed to measure surface and volume resistivity.
- Measurement parameters: I, R, volume and surface resistivity.
- Contact check function for reliable tests.
- Select the number of displayed digits (3, 4, or 5).

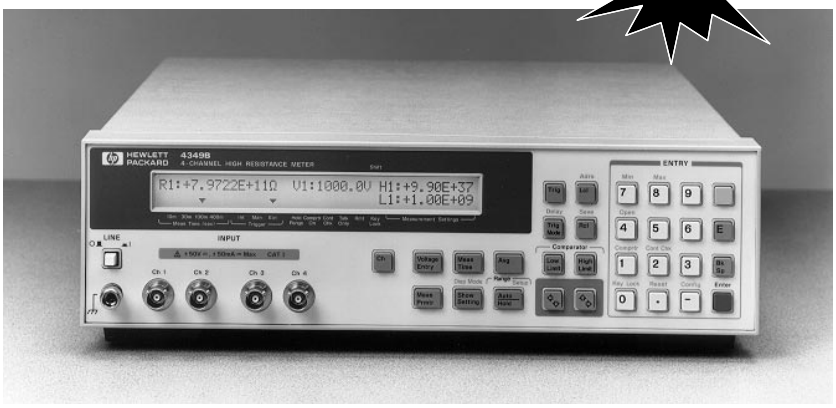
Product Highlights: Special Interest Products

HP 4349B 4-channel High-Resistance Meter

New!

- Four-channel simultaneous testing.[1]
- Fast contact check function for reliable testing.
- Measurement range: R: 1 x 10^3 Ω to 1.0 x 10^{15} Ω, I: 3 pA to 100 μA

1. HP 4349B, because it has 4-measurement channels, has no internal dc source so an external dc source must be required.



HP 4192A LF Impedance Analyzer

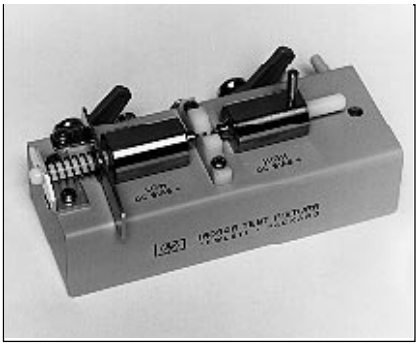
- Unique 5 Hz-to-13 MHz frequency range for component test or circuit design evaluation.
- Only 4-terminal instrument that can make grounded or floating measurement.
- Measurement parameters: |Z|, |Y|, Θ, R, X, G, B, C, L, R, D, Q.
- Floating or grounded measurements.

HP 4278A Capacitance Meter

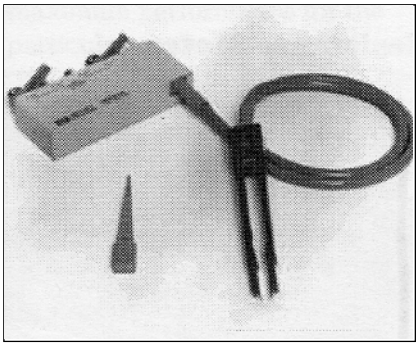
- Two standard frequencies (1 kHz and 1 MHz) for capacitor testing.
- Measurement speed and accuracy optimized for production testing
- Measurement parameters : C, D, Q, ESR, G.

Test Fixtures and Accessories
Four-terminal-pair Test Fixtures

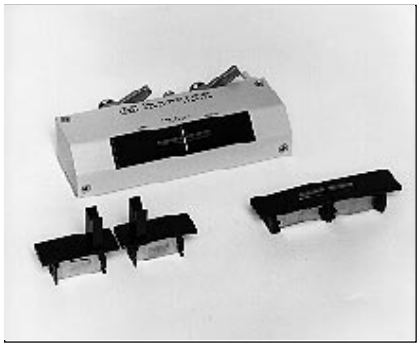
Components



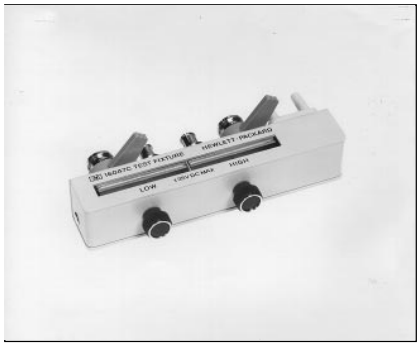
HP 16034E SMD/Chip Test Fixtures
Frequency: <= 40 MHz
Maximum dc bias: ± 40V



HP 16334A SMD/Chip Tweezers
Frequency: <= 15 MHz
Maximum dc bias: ± 42V

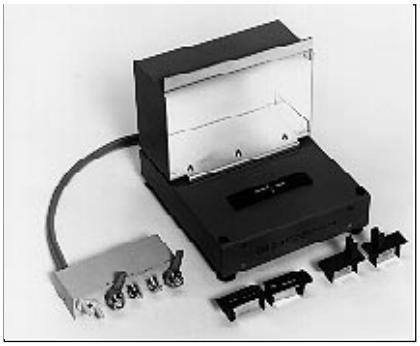


HP 16047A/D Axial & Radial Test Fixture
Frequency: A: <=13 MHz,
D: <= 40 MHz
Maximum dc bias: A: ± 35 V,
D: ± 40 V



HP 160 47C High Frequency Test Fixture
Frequency: <= 40 MHz
Maximum dc bias: ± 35V

HP 16047B Axial and Radial Test Fixture with Safety Cover
Frequency: <= 2 MHz
Maximum dc bias supplied from instrument: ± 35V

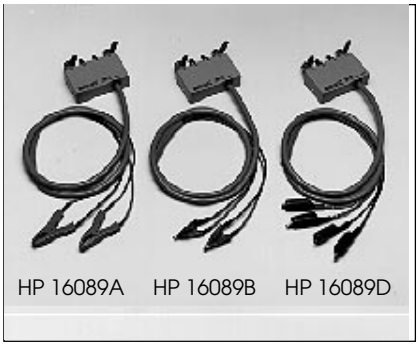


HP 16005A Axial and Radial Test Fixture with Safety Cover
Frequency: <= 2 MHz
Maximum externally supplied dc bias: ± 200V

Test Leads and Clips

HP 16048A/D/E BNC Test Leads
Frequency: A: <= 30 MHz, D: <= 30 MHz,
E: <= 1 MHz
Cable length: A: 0.94m, D: 1.89m, E: 3.8m
Maximum dc bias: ± 300V

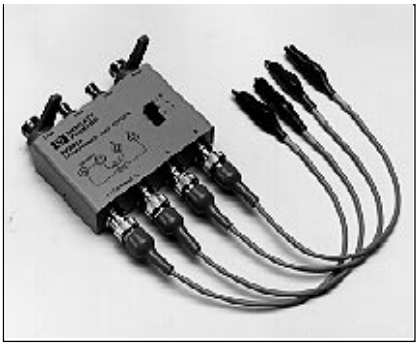
HP 16048B SMC Test Leads
Frequency: <= 30 MHz
Cable length: 0.94m
Maximum dc bias: ± 300V



HP 16089A/B/C/D Clip Leads
Connector type: A/B/C: Kelvin, D: Alligator
Frequency: 5 Hz to 100 kHz
Cable length: A/B/C: 0.94 m, D: 1.3m

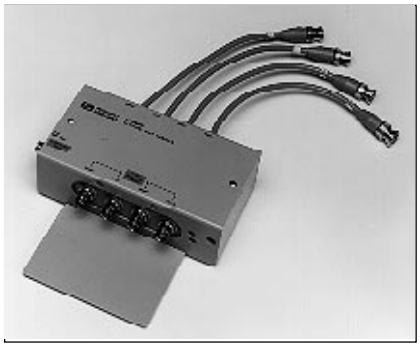
Test Fixtures and Accessories
Four-terminal-pair Test Fixtures

Others



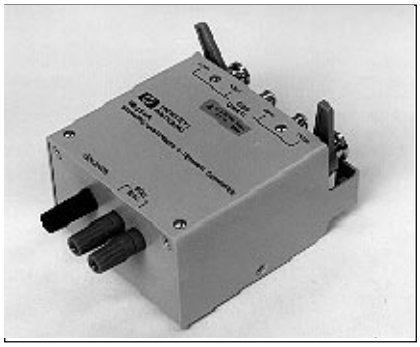
HP 16060A Transformer Test Fixture
Frequency: dc to 100 kHz
Use with only HP 4263B

HP 16064A LED
Display/Trigger Box
For production test applications.



HP 16065C External Bias Adapter
Frequency: 100 Hz to 1 MHz
Maximum externally supplied dc bias: ± 40 V

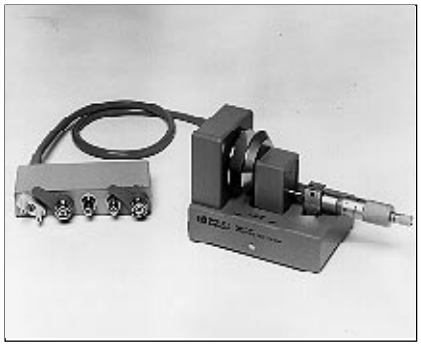
Balanced/Unbalanced Test Fixture



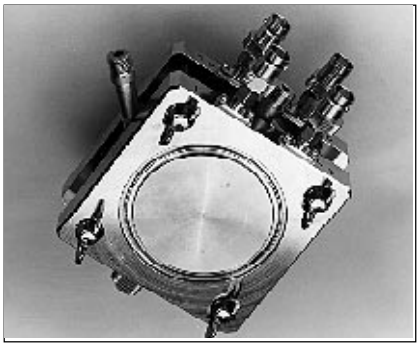
HP 16314A Balanced/Unbalanced 4-Terminal Converter
Frequency: 100 Hz to 10 MHz
Connectors: 4 BNCs (unbal.), 2 signal terminals & 1 ground terminal (bal.)
Characteristic Z: 50 ohms

Material Measurements

Both are recommended for use with HP 4284A & HP 4285A LCR Meters and HP 4194A Impedance Analyzer.

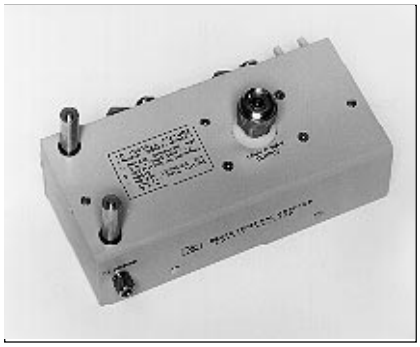


HP 16451B Dielectric Test Fixture
Measurement parameters:
Capacitance (C), and dissipation factor (D) Material-under-test size: thickness: <=10 mm. diameter: 10 to 56 mm
Frequency: <= 30 MHz



HP 16452A Liquid Test Fixture
Measurement parameter: *impedance, dielectric constant (er) Liquid sample quantity*: <=6.8 ml
Frequency: <= 20 Hz to 30 MHz

RF Adapters



HP 16085B Four-terminal-pair to APC7 Adapter
Frequency: <= 40 MHz
Maximum dc bias: ± 40V

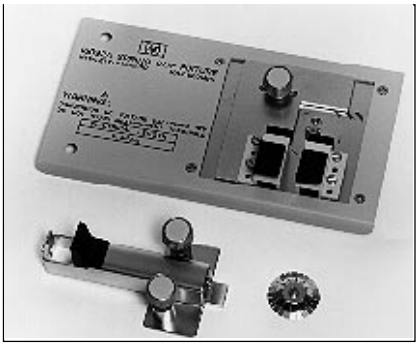
Balanced/Unbalanced Test Fixtures

HP 16315A 50 ohm Balanced/50 ohm Unbalanced Converter
Frequency: 100 Hz to 10 MHz
HP 16316A 100-ohm Balanced/50-ohm Unbalanced Converter
Frequency: 100 Hz to 10 MHz
HP 16317A 600-ohm Balanced/ 50-ohm Unbalanced Converter
Frequency: 100 Hz to 3 MHz

All have 1 BNC connector (unbalanced) and 2 signal terminals and 1 ground terminal (balanced).

Test Fixtures and Accessories
APC7 Test Fixtures

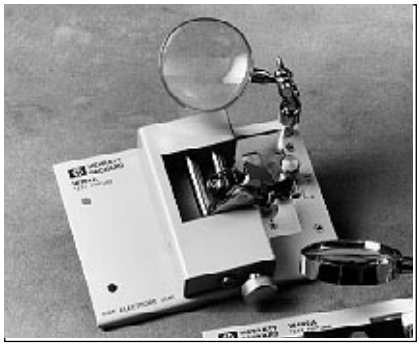
RF SMD/Chip Components



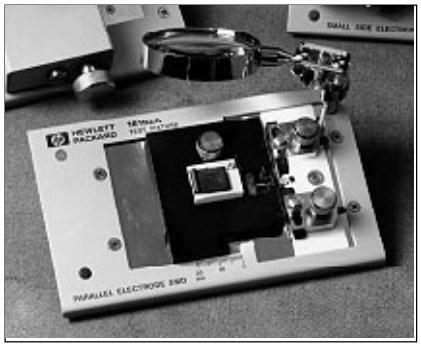
HP 16092A Axial, Radial, and SMD Test Fixture
Frequency: <= 500 MHz
Maximum dc bias: ± 40 V

HP 16093A Two-terminal Binding Post Test Fixture
Frequency: <= 250 MHz
Maximum dc bias: ± 40V

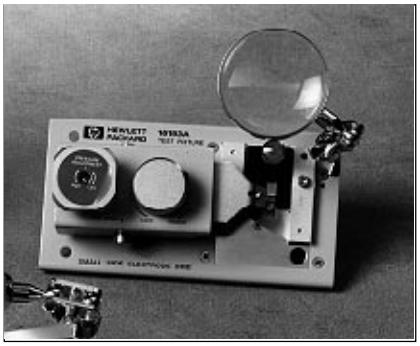
HP 16093B Three-terminal Binding Post Test Fixture
Frequency: <= 125 MHz
Maximum dc bias: ± 40 V



HP 16191A Side-Electrode SMD Test Fixture
Frequency: dc to 2 GHz
Maximum dc bias: ± 40 V



HP 16192A Parallel-Electrode SMD Test Fixture
Frequency: dc to 2 GHz
Maximum dc bias: ± 40 V



HP 16193A Small Side-Electrode SMD Test Fixture
Frequency: dc to 2 GHz
Maximum dc bias: ± 40V

Material Measurements

HP 16200A External DC Bias Adapter
Freequency: 1 MHz to 1 GHz
External dc bias: Up to 5A, ± 40 V

HP 16453A Dielectric Test Fixture
Frequency: 1 MHz to 1.8 GHz
Sample size (smooth sheets only):
thickness: <=3 mm, diameter: >= 15 mm

HP 16454A Magnetic Test Fixtures
Frequency: 1 MHz to 1.8 GHz
Sample size (toroids only) :
height: <=10 mm,
inner diameter: >=3.1 mm,
outer diameter: <=20 mm

Simplify and Improve Your Measurements With HP Test Accessories

Selecting a test fixture is as important as selecting the right instrument. HP offers a wide range of accessories for axial. radial and SMD/Chip devices. In addition, a variety of test leads are available to simplify remote testing and systems applications.

External test fixtures with safety covers are also available.

You will improve your measurement results with the proper test fixture.

- Move reliable and repeatable measurement
- Higher through-put
- Fewer handling errors
- Tighter test limits
- Better measurement accuracy

For sales information or technical assistance call Hewlett-Packard.

		HP 4192A	HP 4194A	HP 4194A with HP 41941A/B	HP4195A with HP 41951A	HP 4263B	HP 4278A	HP 4284A	HP 4285A	HP 4286A	HP 4291A	HP 4396A with opt. 010 and HP 43961A	HP E4916A with Opt.001 and 010
HP 16034E	SMD/Chip Test Fixtures	●	●			●	●	●	●				
HP 16047A	Axial and Radial	●	●			●	●	●	●				
HP 16047B	Axial and Radial with Safety Cover	●	●			●	●	●	●				
HP 16047C	HF Axial and Radial	●	●			●	●	●	●				
HP 16047D	Axial and Radial	●	●			●	●	●	●				
HP 16048A	One Meter Test Leads, BNC	●	●			●	●	●	●				
HP 16048B	One Meter Test Leads, SMC	●	●			●	●	●					
HP 16048D	Two Meter Test Leads, BNC					●	●	●	●				
HP 16048E	Four Meter Test Leads, BNC					●		●					
HP 16060A	Transformer Test Fixture					●							
HP 16065A	Ext. Voltage Bias with Safety Cover	●	●			●	●	●	●				
HP 16065C	External Bias Adapter (<=40 vdc)	●	●			●	●	●	●				
HP 16085B	Four-Terminal Pair to APC-7 Adapter	●	●			●	●	●	●				
HP 16089A/B/C/D	Clip Leads	●	●			●	●	●	●				
HP 16092A	RF Spring Clip: Axial, Radial and SMD	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●[1]	●	●	●[2]
HP 16093A	RF Two Terminal Binding Post	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●[1]	●	●	●[2]
HP 16093B	RF Three Terminal Binding Post	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●[1]	●	●	●[2]
HP 16094A	RF Probe Tip/Adapter	●[1,3]	●[1,3]	●[3]	●[3]	●[1,3]	●[1,3]	●[1,3]	●[1,3]	●[5]	●[3]	●[3]	
HP 16095A	LF Probe Adapter	●	●			●	●	●	●				
HP 16099A	RF Probe to APC-7 Adapter			●									●[2]
HP 16191A	Side-Electrode SMD Test Fixture	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●	●	●	●[2]
HP 16192A	Parallel Electrode SMD Test Fixture	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●	●	●	●[2]
HP 16193A	Small Side Electrode SMD Test Fixture	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●	●	●	●[2]
HP 16194A	High Temperature Component Test Fixture, SMD and Leaded	●[1]	●[1]	●[2]	●	●[1]	●[1]	●[1]	●[1]	●	●	●	●[2]
HP 16200A	External DC Bias Adapter									●	●		
HP 16314A	4-Terminal Balun	●	●			●	●	●	●				
HP 16315/6/7A	BNC Balun/Binding Post Balun	●	●	●	●								●
HP 16334A	SMD/Chip Tweezer	●	●			●	●	●	●				
HP 42842A/B	High Bias Current 20A/40A Test Fixture							●[4]					
HP 42842C	High Bias current 10A Test Fixture								●[4]				
HP 16451A	Dielectric Material Test Fixture	●	●			●	●	●	●				
HP 16452A	Liquid Test Fixture	●	●			●	●	●	●				
HP 16453A	Dielectric Test Fixture											●	
HP 16454A	Magnetic Test Fixture											●	

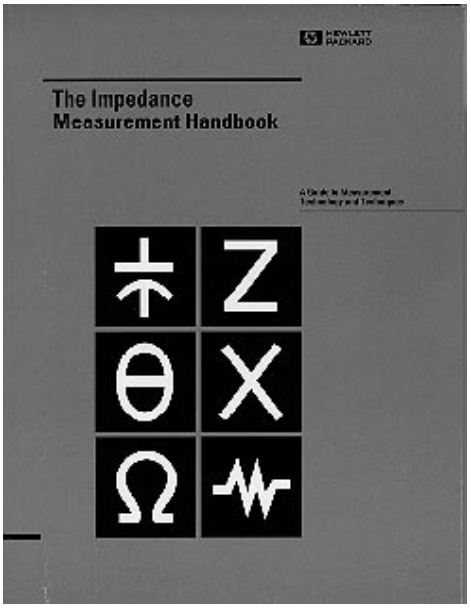
Note: Refer to the accessory descriptions for frequency and operational limits. 1.Compatible when used in conjunction with HP 16085B.
2.Compatible when used in conjunction with HP 16099A. 3.APC-7 to APC-7 cable is required. 4.See page 6 for configuration details
5.Do not connect the ground lead to the instrument. 6.APC-3.5 to APC-7 Adapter is required.

Applications Information

Helping You Make Better Measurements

HP's application knowledge can help you make better measurements. Use the matrix below to select the HP Application Notes of interest. For copies of these Application Notes, contact your local HP sales office

App Note	Title/Subject	Featured	HP Pub#
1210-1	Package & component meas.	HP 4194A, ICM	5091-1799E
380-2	Measuring cable parameters	HP 4284/5A	5950-2399
369-10	High accuracy & fast RF inductor testing	HP 4285A	5091-1596E
369-8	DC current-biased inductance meas.	HP 4284A,	5950-2367
369-7	Cap meas. of liquid crystal cells	HP 4284A	5950-2994
369-6	Impedance testing using scanners	HP 4284A	5950-2975
369-5	Multi-frequency C-V meas. of semiconductor	HP 4284A	5950-2953
369-4	Incoming inspection	HP 4284A	5950-2952
369-3	Impedance meas. of magnetic head	HP 4284A	5950-2951
369-1	Component & material impedance meas.	HP 4284A	5950-2949
357-4	Testing magnetic disk read circuit	HP 4195A	5950-2398
357-3	Filter evaluation & limit testing	HP 4195A	5950-2933
357-2	S-parameter & distortion meas. of amplifier	HP 4195A	5950-2932
357-1	Evaluation of IF circuits	HP 4195A	5950-2931
346-3	Impedance meas. using open/short/load comp.	General	5091-6553E
346-2	Balance circuit meas.	General	5091-4480E
346	Designing external dc bias circuit	General	5950-2912
339-14	Testing switching power supplies	HP 4194A	5950-2977
339-13	Solid mat'l dielectric constant meas.	HP 4194A	5950-2935
339-12	HP-IB programming hints	HP 4194A	5950-2929
339-11	Filter testing for production	HP 4194A	5952-7887
339-9	Negative impedance meas. of crystal osc.	HP 4194A	5950-2924
339-8	Constant current meas.	HP 4194A	5950-2923
339-7	Evaluation of LISN & voltage probes for EMI	HP 4194A	5950-2922
339-6	Static head testing for disk drives	HP 4194A	5952-7871
339-5	Multi-frequency C-V meas. for semiconductor	HP 4194A	5950-2919
339-4	Characteristic impedance of balanced cables	HP 4194A	5952-2918
339-3	Crosstalk & impedance meas. of PCB patterns	HP 4194A	5952-7863
339-2	Characteristic impedance of PCB	HP 4194A	5950-2908
339-1	Impedance char. of resonators	HP 4194A	5950-2882
339	Component & circuit evaluation	HP 4194A	5950-2856
317	Practical design & evaluation of hi-freq. circuits	HP 4193A	5953-6910
SN4291-1	Chip capacitor testing	HP 4291A	5091-9267E
SN4291-2	Chip inductor testing	HP 4291A	5091-9904E
SN4291-3	Temperature coefficient testing for components	HP 4291A	5962-6922E
SN4291-4	Permitivity measurement	HP 4291A	5962-6973E
SN4291-5	Permeability measurement	HP 4291A	5962-6972E
SN4291-6	Electronic characterization of IC packages	HP 4291A	5962-9725E
PN16451B-1	Dielectric constant meas. using the HP 16451B	HP 16451B	5962-9522E
	Impedance Meas. Handbook	General	5950-3000



The Impedance Measurement Handbook is a comprehensive guide to impedance measurements. Beginning with the basics it contains in-depth practical advice to help you make better measurements. This 104-page handbook answers many commonly asked questions.

To get your copy, contact your local HP sales office.

Complementary Products and Accessories

To help you find a complete solution, we have listed the following companies that make complementary products or specialized accessories for HP's impedance measurement products. Please contact each company directly if you are interested in its products. (HP does not make any special endorsement of these companies' products; this list is for reference only.)

Company Name	Product Specialty/Expertise	Address & Phone Number
Cascade Microtech Inc.	Microwave frequency probes, probe stations, and accessories for semiconductor & IC applications.	14255 SW Brigadoon Ct. Beaverton, OR 97005 (503) 626-8245
Innovative Measurement Solutions (IMS)	Software and consulting for material analysis.	P.O.Box 70546 Marietta, GA (404) 578-8695
Inter-continental Microwave	Standard and custom-designed RF and microwave test fixtures and calibration standards	1515 Wyatt Drive Santa Clara, CA 95054 (408) 727-1596
Ismeca USA, Inc.	Standard and custom-designed assembly and automation equipment (e.g. handlers) for electronic manufacturing.	2440 Impala Drive Carlsbad, CA 92008 (619) 931-1153
North Hills Electronics	Wide-band transformers (baluns) to 300 mHz for balanced measurement.	575 Underhill Blvd. Syosset, NY 11791 (516) 682-7740
Palomar Systems	Standard and custom designed assembly and automation equipment (e.g. handlers) for electronic manufacturing.	2310 Aldergrove Ave. Escondido, CA 92029 (619) 741-9717
Tabai Espec/ ESPEC Corp. (America)	Temperature chamber for component & material Testing.	425 Gordon Inductrial Ct.SW Grand Rapids, MI 49509 (616) 878-0270, or 1-800-537-7320

For more information on Hewlett-Packard Test and Measurement products, applications, or services please call your local Hewlett-Packard sales office. A current listing is available via the Web through AccessHP at http://www.hp.com. If you do not have access to the internet, please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

United States:
Hewlett-Packard Company
Test and Measurement Organization
5301 Stevens Creek Blvd.
Bldg. 51L-SC
Santa Clara, CA 95052-8059
1 800 452 4844

Canada:
Hewlett-Packard Canada Ltd.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
(905) 206 4725

Europe:
Hewlett-Packard
European Marketing Centre
P.O. Box 999
1180 AZ Amstelveen
The Netherlands

Japan:
Hewlett-Packard Japan Ltd.
Measurement Assistance Center
9-1, Takakura-cho, Hachioji-shi,
Tokyo 192, Japan
Tel: (81) 426 48 3860
Fax: (81) 426 48 1073

Latin America:
Hewlett-Packard
Latin American Region Headquarters
5200 Blue Lagoon Drive
9th Floor
Miami, Florida 33126
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(305) 267 4245/4220

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31-41 Joseph Street
Blackburn, Victoria 3130
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Hong Kong
(852) 2599 7070

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