

Agilent LCR Meters, Impedance Analyzers and Test Fixtures

Selection Guide



Material, Semiconductor, Component and In-Circuit Measurement Solutions



Cost Effective Solutions for Your Applications

Whether your application is in R&D, production, quality assurance, or incoming inspection, Agilent Technologies has the right impedance measurement solution for you. Agilent has a complete line of impedance test equipment and test accessories to help you task efficiently. Agilent offers:

Superior product performance: Agilent products provide the best in class accuracy and the repeatability with the fast measurement speed. Three types of impedance measurement solutions as shown in Table 1 are available meeting the various measurement needs.

Complete solution: Covering frequencies from 5 Hz to 3 GHz along with the wide variety of test accessories, Agilent's impedance product line offers you the widest selection of equipment for your application. This selection guide gives an overview of all the products and accessories you can choose from.

Technical expertise: Agilent has decades of experience providing impedance measurement solutions. Years of experience and continuing technical innovations go into the design and manufacturing of each Agilent LCR meter and impedance analyzer. Agilent also has a list of technical publication to assist you in many different applications (see page 15 for full listing.)

Advanced measurement techniques for a wide range of applications

Figure 1 is a comparison of different measurement techniques used in Agilent's LCR meters 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 of 20 Hz to 110 MHz. This technique is best for low-frequency, general-purpose testing.

Agilent's impedance analyzers/LCR meters measurement technique comparison 10% accuracy range

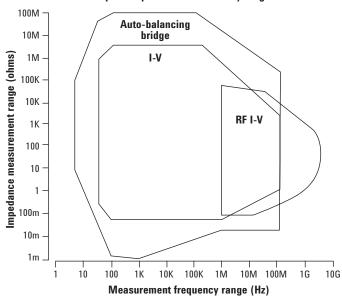


Figure 1. Impedance measurement techniques of impedance analyzers/LCR meters

Table 1. Impedance measurement product type

		Product Type	
Product Highlights	LCR Meter	Impedance Analyzer	Network Analyzer
Frequency Sweep Capability	Spot/List	Continuous (Start/Stop, Center/Span)	Continuous (Start/Stop, Center/Span)
Display	Numeric Only	Graphics	Graphics
Others	Handler interface, comparator	Equivalent circuit analysis built in, material measurements, in-circuit measurements	Equivalent circuit analysis built in, multiple function in one instrument
Advantages	Low-cost solution, ease of use, high speed	Widest measurement range, resonant analysis, circuit modeling	Cost-effective, versatile, compact size

- I-V technique covers from 40 Hz to 110 MHz with a more focused impedance measurement range. I-V technique also allows probing for in-circuit testing.
- RF I-V, an enhancement of the I-V technique, offers some of the high-frequency benefit of network analysis while retaining some of the impedance measurement range of the I-V technique. Designed for accuracy and high-frequency performance, the RF I-V technique is excellent for RF component analysis, especially for small inductance and capacitance values.
- In addition, Agilent's network analyzer offers an impedance measurement solution using the combination of three measurement techniques (reflection, series-thru, and shunt-thru) based on the S-parameter and gain-phase measurements.

How to use this selection guide

Table 2 is a summary of all of Agilent's impedance products. It is designed to assist you in better comparing Agilent'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 (measurement technique)
- · 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.

Table 2. Agilent impedance measurement products

Product Type	Freq. range	Positioning	Model	Frequency range (Hz)	Basic Z accuracy ¹ (%)	Measurement display range (Ω)	Feature ⁴	Measurement technique ⁵	Main application
Impedance analyzer	RF	High peformance/ material/high temperature	E4991A	1 M to 3 G	0.8	130 m to 20 k ³	A,B	RF-IV	LCR component, material, semiconductor
		Multi function	E5061B Option 3L5/005	5 to 3 G	2	1 to 2 k/5 to 20 k/1 m to 5 ³	A,B	Ref/Series/ Shunt	LCR component, PDN
	LF/HF	High peformance/material/C-V	4294A	40 to 110 M	0.08	25 m to 40 M ³	A,B	ABB	LCR component, material, semiconductor
		In-circuit (grounded), C-V	4294A with 42941A	40 to 110 M	1	50 m to 4 M ³	A,B	IV	In-circuit, semiconductor
LCR meter	RF	High performance/ high speed measurement	E4982A	1M to 3G	0.8	140 m to 4.8 k ³	С	RF I-V	LCR component
	HF	High performance/ material/C-V	4285A	75 k to 30 M	0.1	0.01 m to 100 M	D	ABB	LCR component, material, semiconductor
	LF	High performance/ material/C-V	E4980A	20 to 2 M	0.05	1.000000 a to 999.9999E	D	ABB	LCR component, material, semiconductor
		Low-cost/ transformer	4263B	100 to 100 k	0.1	0.01 m to 100 M	D	ABB	LCR component, transformer
Application specific	LF	For capacitor/ high speed measurement	E4981A	120, 1 k and 1M only	0.07	1.000000aF to 99.99999EF ²	D	ABB	MLCC

Basic Z accuracies are best-case values and vary depending on measurement conditions. See product data sheet for detail.

ABB: Auto-balancing bridge
I-V: I-V method
RF I-V: RF I-V method
Ref: Reflection method

Series: Series-thru method Shunt: Shunt-thru method

^{2.} Capacitance measurement only.

^{3.} Z range shows the 10% accuracy range.

^{4.} Feature code: A: Built-in equivalent circuit analysis

B: Frequency sweep with color LCD display

C: Spot frequency with color LCD display
D: Spot frequency with LCD display

^{5.} Measurement technique code:

Impedance Analyzers

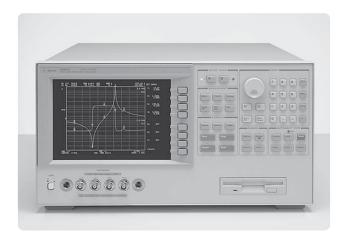
Impedance analyzers provide high measurement accuracy and sophisticated measurement functions:

- Frequency, DC bias, and AC voltage/current sweep capability lets you customize where and how test data will be taken.
- Built-in equivalent-circuit analysis computes a multielement circuit model of the device under test.
- Advanced calibration and compensation methods reduce measurement errors.
- Accessories for permittivity & permeability of materials, hightemperature characterization, various passive components, and impedance probe for grounded measurements available



E4991A RF impedance/material analyzer

- Provides top-of-the-line solution for measuring impedance from 1 MHz to 3 GHz, with an optional material-test function for measuring permitivity and permeability
- Ideal instrument for RF surface mount inductors, capacitors, PC board materials and magnetic toroids
- Option 001 DC bias source (0 to ±40 V, max ±50 mA)
- Measurement parameters: |Z|, |Y|, θ , R, X, G, B, C, L, D, Q
- Option 002 material measurements: ϵ , ϵ ', ϵ ", μ , μ ', μ "
- · Option 007 high temperature characteristic test kit
- · Option 010 probe station connection kit
- · Built-in LAN, GPIB interface



4294A precision impedance analyzer

- Highly accurate 4-terminal-pair impedance measurement in a wide frequency range of 40 Hz to 110 MHz. Extremely small variation in component characteristics can be precisely evaluated with sweep measurements of 0.08% basic accuracy.
- Best instrument for component evaluation like capacitors, inductors, resonators, semiconductors and for material evaluations like PC boards and toroidal cores. Improves evaluation efficiency with various measurement & analysis functions.
- In-circuit or grounded measurements with the 42941A Impedance Probe
- · 7-mm RF test fixtures combined with 42942A Terminal Adapter
- · Built-in LAN interface
- Measurement parameters: |Z|, |Y|, θ , R, X, G, B, L, C, D, Q
- Internal DC bias (0 to ±40 V, max ±100 mA)

Network Analyzer



E5061B-3L5 LF-RF network analyzer

The E5061B-3L5 LF-RF network analyzer with the option 005 impedance analysis function offers the network and impedance analysis capabilities in a single instrument. The E5061B-3L5/005 is a versatile and cost-effective solution suitable for general R&D use where various kinds of electronic components and circuits need to be evaluated:

- * S-parameter test port (5 Hz to 3 GHz) and gain-phase test port (5 Hz to 30 MHz, 1 M $\Omega/50~\Omega$ inputs)
- The E5061B-005 supports reflection, series-thru, and shunt-thru
 methods using the S-parameter test port or gain-phase test
 port. These methods are suitable for low-to-middle,
 middle-to-high, and very low milliohm impedance ranges,
 respectively. ¹
- Agilent's 7 mm type and 4-terminal pair type component test fixtures can be used in the reflection method (at the S-parameter test port) and the series-thru method (at the gainphase test port).
- Impedance measurement parameters:
 |Z|, |Y|, 0, R, X, G, B, C, L, D, Q
- Built-in DC voltage bias source (0 to ±40 V, max ±100 mA)

^{1.} For details about each method's impedance measurement range, refer to "E5061B-3L5 LF-RF Network Analyzer with Option 005 Impedance Analysis Function, Data Sheet" (5990-7033EN).

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 offer excellent performance at an affordable price:

- · Wide selection of frequency range from 20 Hz to 3 GHz
- Frequency list sweep for continuous testing at multiple frequency points
- Great for general-purpose testing of leaded components, surface-mount components, materials, and more
- GPIB and handler interface for easy test automation in production environment



E4982A LCR meter

- 1 MHz to 3 GHz with 100 kHz resolution
- High speed measurement: selectable from 0.9 ms (Mode 1), 2.1 ms (Mode 2), and 3.7 ms (Mode 3)
- 0.8% basic accuracy
- RF I-V technique provides a wide impedance range (0.14 Ω to 4.8 k Ω)
- Highly stable measurement of low-inductance and excellent Q accuracy for meeting chip inductor test requirements
- · Handler interface suitable for production testing
- Measurement parameter |Z|, |Y|, 0, R, X, G, B, L, C, D, Q, Rdc, Idc, Vdc, in user-definable combinations of parameters (up to 4 parameters)
- · Versatile PC connectivity GPIB, LAN, USB





E4980A precision LCR meter

- · 20 Hz to 2 MHz with 4-digit resolution
- 0.05% basic accuracy with superior measurement repeatability at low and high impedance
- · 201 points list sweep
- Option E4980A-001 adds ±20 Vrms/±100 mArms test signal, ±40 V/±100 mA internal dc bias, 2nd DC source, and Rdc/Vdc/ldc measurement functions.
- Option 005 as an entry model, which is same as basic model except for difference in measurement time (slow speed)
- Option 201 and 301 add handler interface and scanner interface respectively.
- For testing power inductors and transformers, choose Option 002, 42841A, and 42842A/B to get up to 20 A dc bias current ¹
- Measurement parameters: |Z|, |Y|, θ, R, X, G, B, L, C, D, Q, Option 001 adds Rdc, Idc and Vdc.
- Versatile PC connectivity LAN, USB (memory/USBTMC), GPIB

4285A precision LCR meter

- 75 kHz to 30 MHz
- 0.1% basic accuracy
- List sweep measurements
- Option 001 adds ±40 V dc bias voltage
- Option 002, 42841A, and 42842C provide up to 10 A dc bias current.
- Measurement parameters: |Z|, |Y|, θ, R, X, G, B, C, L, D, Q

^{1. 40}A dc bias current, when using 2 x 42841A and 1 x 42842B.





4263B LCR meter

- Spot frequency testing at 100 Hz, 120 Hz, 1 kHz, 10 kHz, 20 kHz and 100 kHz
- · Compact, easy-to-use, entry-level LCR meter
- Measurement parameters: |Z|, |Y|, θ, R, X, G, B, C, L, D, Q
- · N, M, and DCR for transformer/coil measurements
- · Set signal level (20 mVrms to 1 Vrms) in 5 mVrms steps
- · Monitor actual ac voltage and current levels
- Select the number of displayed digit (3, 4, or 5)
- · Fast 25 ms measurement time even at 100 and 120 Hz

4338B milliohm meter (10 $\mu\Omega$ to 100 $k\Omega$)

- 1 kHz ac measurement with selectable test signal current from 1 μArms to 10 mArms
- Designed for ultra-low resistance measurements of switches, batteries, relays, cables, connectors, and PC boards
- · Measurement parameters: R, X, |Z|, L, Q
- · Dry-circuit test mode for reliable tests
- · Select the number of displayed digits (3, 4, or 5)



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 $\Omega,$ 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, surface, and volume resistivity
- · Contact check function for reliable tests
- · Floating and grounded measurement capabilities





E4981A 120 Hz/1 kHz/1 MHz capacitance meter

- 120 Hz, 1 kHz and 1 MHz test frequencies
- High speed measurement: 2.3 ms (1 MHz), 3.0 ms (1 kHz), 11.0 ms (120 Hz)
- Basic accuracy C: 0.07%, D: 0.0005
- · Handler and scanner interfaces suitable for production testing
- · Measurement parameters: C, D, Q, ESR, G
- SLC feature provides constant test voltage for high-value capacitor measurements.

4349B 4-channel high-resistance meter

- 4-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: 1 pA to 100 μA

^{1.} The 4349B has 4 measurement channels, with no internal dc source. An external dc source is required.

Test Fixtures and Accessories (Four-Terminal-Pair)

Basic test fixtures



16034E SMD/chip test fixture

Frequency: ≤ 40 MHz

Maximum dc bias: ±42 V peak max



16034G small SMD/chip test fixture

Frequency: ≤ 110 MHz

Maximum dc bias: ±42 V peak max



16034H SMD/chip test fixture

Frequency: ≤ 110 MHz

Maximum dc bias: ±42 V peak max

Suitable for array-type devices



16043-60011 3-terminal test fixture 16043-60012 3-terminal test fixture

Frequency: ≤ 110 MHz

Maximum dc bias: ±42 V peak max



16044A SMD Kelvin contact test fixture

Frequency: ≤ 10 MHz

Maximum dc bias: ±42 V peak max



16334A SMD/chip tweezers test fixture

Frequency: ≤ 15 MHz

Maximum dc bias: ±42 V peak max



16047A/D axial & radial test fixture

Frequency: A: ≤ 13 MHz (Kelvin contact)

D: ≤ 40 MHz (2-terminal contact) **Maximum dc bias:** A: ±42 V peak max



16047E test fixture

Frequency: ≤ 110 MHz

Maximum dc bias: ±42 V peak max



16089A/B/C/D/E clip leads

Clip type: A/B/C/E: Kelvin

D: Alligator

Frequency: 5 Hz to 100 kHz Cable length: A/B/C/D: 0.94 m

E: 1.3 m

Maximum dc bias: ±42 V peak max

Test Fixtures and Accessories (Four-Terminal-Pair)

External DC bias fixtures



16065A axial and radial test fixture with safety cover

Frequency: 50 Hz to 2 MHz Maximum external dc bias: ± 200 V Blocking capacitor of 5.6 μ F is connected in series with the Hc terminal



16065C external bias adapter

Frequency: 100 Hz to 1 MHz Maximum external dc bias: ± 40 V Blocking capacitor of 50 μ F is connected in series with the Hc terminal

Test leads



16048A/D/E BNC test leads

Frequency: A: \leq 30 MHz, D: \leq 30 MHz, E: \leq 2 MHz

Cable length: A: 0.94 m, D: 1.89 m,

E: 3.8 m

Maximum dc bias: ±42 V peak max



16048-60030 SMC test leads

Frequency: ≤ 30 MHz **Cable length:** 0.94 m

Maximum dc bias: ±42 V peak max **16033-60001:** SMC male connector plate



16048G/H BNC test leads

Frequency: ≤ 110 MHz

Cable length: G: 1 m, H: 2 m

Maximum dc bias: ±42 V peak max

Use with only 4294A

Terminal adapters



42942A four-terminal-pair to 7 mm terminal adapter

Frequency: ≤ 110 MHz

Maximum dc bias: ±42 V peak max

Use with only 4294A



16085B four-terminal-pair to 7 mm terminal adapter

Frequency: ≤ 40 MHz
Maximum dc bias: ±40 V



16201A N-type to 7 mm terminal adapter

Frequency: ≤ 3 GHz Maximum dc bias: ±40 V Use with only E5061B

Test Fixtures and Accessories (Four-Terminal-Pair)

Material measurements



16451B dielectric test fixture

Measurement parameters:

capacitance (C), dissipation factor (D), and dielectric constant (Er', Er'')

Material-under-test size:

thickness: ≤ 10 mm diameter: 10 to 56 mm *Frequency:* ≤ 30 MHz



16452A liquid test fixture

Measurement parameter:

capacitance (C), dielectric constant (Er', Er'') Liquid sample

Quantity: ≤ 6.8 ml

Frequency: 20 Hz to 30 MHz

Others



42941A impedance probe kit

Frequency: 40 Hz to 110 MHz Maximum dc bias: ±42 V peak max Probe cable length: 1.5 m

Use with only 4294A



16060A transformer test fixture

Frequency: dc to 100 kHz

Switch swaps connections of primary and

secondary windings

Use with only 4263B

Test Fixtures and Accessories (7-mm Terminal)

RF SMD/chip components



16196A/B/C/D SMD test fixture

Coaxial fixture for parallel electrode SMDs.

Frequency: dc to 3 GHz

Maximum dc bias: ±42 V peak max

Applicable SMD size:

16196A: 1.6 mm x 0.8 mm 16196B: 1.0 mm x 0.5 mm 16196C: 0.6 mm x 0.3 mm 16196D: 0.4 mm x 0.2 mm



16197A bottom-electrode SMD test fixture

Frequency: dc to 3 GHz

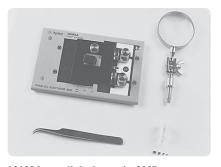
Maximum dc bias: ±42 V peak max



16092A axial, radial, and SMD test fixture

Frequency: ≤ 500 MHz

Maximum dc bias: ±42 V peak max



16192A parallel-electrode SMD test fixture

Frequency: dc to 2 GHz

Maximum dc bias: ±42 V peak max



16194A high temperature component test fixture

Frequency: dc to 2 GHz

Maximum dc bias: ±42 V peak max

Operating temperature: -55 °C to +200 °C



16200B external DC bias adapter

Frequency: 1 MHz to 1 GHz

Maximum external dc bias: Up to 5 A, ±40 V

Material measurements



16453A dielectric test fixture

Frequency: 1 MHz to 1 GHz
Sample size (smooth sheets only):
thickness: 0.3 mm to 3 mm

thickness: 0.3 mm to 3 mi diameter: \geq 15 mm



16454A magnetic test fixtures

Frequency: 1 kHz to 1 GHz Sample size (toroids only):

height: ≤ 8.5 mm inner diameter: ≥ 3.1 mm outer diameter: ≤ 20 mm

Simplify and Improve Your Measurements with Agilent's **Test Accessories**

Selecting a test fixture is as important as selecting the right instrument. Agilent 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.

- · more reliable and repeatable measurement
- · higher through-put
- fewer handling errors
- · tighter test limits
- · better measurement accuracy

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For additional p	For additional product information and literature, visit our								4294A with 42942A		_	
	eb site: www.agilent.com/find/accessories								h 42		otio	
Accessories vvi	en site. www.agiient.com/iniu/accessories			_		_	_		Witl	_	3 OF	
			38	80⊿	5A	81⊿	82⊿	4A	4A	91⊅	61E /00	
Table 3. Test	accessories/fixtures		4263B	E4980A	4285A	E4981A	E4982A	4294A	429	E4991A	E5061B Option 3L5/005	
16034E	SMD/chip test fixture	DC-40 MHz		•							•	
16034G	SMD/chip test fixture, small	DC-110 MHz									•	
16034H	SMD/chip test fixture, for Array-type	DC-110 MHz	•									
	3-terminal SMD test fixture	DC-110 MHz	•									
16044A	SMD/chip test fixture. Kelvin contacts	DC-10 MHz	•	•				•				
16047A	Axial and radial test fixture	DC-13 MHz	•	•				•				
16047D	Axial and radial test fixture	DC-40 MHz	•	•	•	•						
16047E	Axial and radial test fixture	DC-110 MHz	•	•	•	•		•			•	
16048A	One meter test leads, BNC	DC-30 MHz	•	•	•	•						
16048-60030	One meter test leads, SMC	DC-30 MHz	•	•	•							
16048D	Two meter test leads, BNC	DC-30 MHz	•	•								
16048E	Four meter test leads, BNC	DC-2 MHz	•	•								
16048G	One meter test leads, BNC	DC-110 MHz						•				
16048H	Two meter test leads, BNC	DC-110 MHz						•				
16060A	Transformer test fixture	DC-100 kHz	•									
16065A	Ext. voltage bias with safety cover (≤ 200 Vdc)	50 Hz-2 MHz	•	•	•	•		•				
16065C	External bias adapter (≤ 40 Vdc)	100 Hz-1 MHz	•	•	•	•						
16085B	Four-terminal pair to 7-mm adapter	DC-40 MHz	•	•	•	•						
16089A/B/C/D/E	Kelvin clip leads	5 Hz-100 kHz	•	•	•	•		•				
16092A	RF spring clip: axial, radial and SMD	DC-500 MHz	•1	•1	•1	•1	•4	•1	•	•	• 5	
16095A	LF impedance probe	DC-13 MHz	•3	•3	•3	•3						
16192A	Parallel electrode SMD test fixture	DC-2 GHz	•1	•1	•1	•1	•4	•1	•	•	. 5	
16194A	High temperature component test fixture	DC-2 GHz	•1	•1	•1	•1	•4	•1	•	•	. 5	
16196A/B/C/D	Parallel electrode SMD test fixture	DC-3 GHz	•1	•1	•1	•1	•4	•1	•	•	• 5	
16197A	Bottom electrode SMD test fixture	DC-3 GHz	•1	•1	•1	•1	•4	•1	•	•	•5	
16200B	External DC bias adapter	1 MHz-1 GHz					•4			•	• 5	
16201A	N-type to 7 mm terminal adapter	5 Hz to 3 GHz									•	
16334A	SMD/chip tweezers test fixture	DC-15 MHz	•	•	•	•		•				
16451B	Dielectric material test fixture	DC-30 MHz	•	•	•	•		•				
16452A	Liquid test fixture	20 Hz-30 MHz		•	•			•				
16453A	Dielectric material test fixture	1 MHz-1 GHz								•		
16454A	Magnetic material test fixture	1 kHz-1 GHz							•	•		
42842A/B	High bias current 20 A/40 A test fixture	20 Hz-1 MHz		•								
42842C	High bias current 10 A test fixture	75 kHz-30 MHz			•							
42941A	Impedance probe kit	DC-110 MHz						•				
42942A	Four-terminal pair to 7-mm adapter	DC-110 MHz						•				

Note: Refer to the accessory descriptions for frequency and operational limits.

^{1.} Compatible when used in conjunction with 16085B.

^{2. 7-}mm cable is required

^{3.} Do not connect the ground lead to the instrument

^{4. 3.5-}mm (M) to 7-mm adapter is required

^{5.} Compatible when used in conjunction with 16201A.

Applications Information

Helping you make better measurements

Agilent's application knowledge can help you make better measurements. Use the matrix below to select the Agilent Application Notes of interest. *8 Hints for Successful Impedance Measurement* (P/N 5968-1947E) and *Impedance Measurement Handbook* (P/N 5950-3000) are comprehensive guide to impedance measurements.

Beginning with the basics it contains in-depth practical advice to help you make better measurements. These documents answer many commonly asked questions.

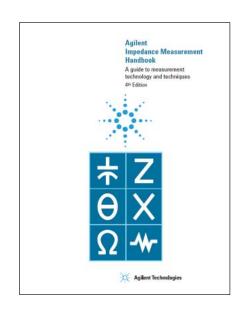


Table 4. List of application notes

	Number	St of application notes	Product	P/N
OT	-	Impedance Measurement Handbook 4th Edition	General	5950-3000
OT	-	Accessories Selection Guide For Impedance Measurement	General	5965-4792E
AN	346-2	Balanced Circuit Measurement with an Impedance Analyzer/LCR Meter/Network Analyzer	General AN	5091-4480E
AN	346-3	Effective Impedance Measurement Using OPEN/SHORT/LOAD Correction	General AN	5091-6553E
AN	346-4	8 Hints for Successful Impedance Measurements	General AN	5968-1947E
PN	-	16196A/B/C/D Correlating RF Impedance Measurements When Using SMD Test Fixtures	16196A/B/C/D	5980-1336E
AN	1305-3	Effective Transformer/LF Coil Testing	4263B	5967-5377E
AN	1305-4	Effective Electrolytic Capacitors Testing	4263B	5967-5378E
AN	1224-5	Effective Multi-tap Transformer Measurement using a Scanner and the 4263B LCR Meter	4263B	5091-6310E
AN	369-1	Optimizing Electronic Component and Material Impedance Measurements	4284A	5950-2949
AN	369-3	Impedance Measurements of Magnetic Heads Using Constant Current	4284A	5950-2951
AN	369-5	Multi-frequency C-V Measurements of Semiconductors	E4980A/4284A	5950-2953
AN	369-6	. ,	4284A	5950-2975
AN	369-7	Impedance Testing Using Scanner Measurement of Capacitance Characteristics of Liquid Crystal Cell	E4980A/4284A	5950-2975
AN		· · · · · · · · · · · · · · · · · · ·		
	369-8 369-9	Wide Range DC Current Biased Inductance Measurement	E4980A/4284A	5950-2367
AN	309-9	Improve Electronic Product Quality and Performance with Agilent Precision LCR Meters	E4980A/4284A	5090-0233
AN		Improving the Test Efficiency of the MEMS Capacitive Sensor using the Agilent E4980A Precision LCR Meter	E4980A	5989-6518EN
AN		Improving Test Efficiency of MEMS Electrostatic Actuator using the Agilent E4980A LCR Meter	E4980A	5989-6521EN
AN		Characterizing Electromagnetic MEMS Optical Switch Actuators Using the Agilent E4980A Precision LCR Meter	E4980A	5989-6519EN
AN		Characterizing Electromagnetic MEMS Optical Scanner using the Agilent E4980A Precision LCR Meter	E4980A	5989-6520EN
AN		MEMS On-wafer Evaluation in Mass Production	E4980A/4339B	5989-7691EN
AN	369-10	High Accuracy and Fast RF Inductor Testing	4285A	5091-1596E
AN	369-12	Measurement of Impedance of Magnetic Heads	4285A	5965-6663E
PN	4294-1	Reliable Electronic Component Evaluation and Circuit Design with the 4294A 110 MHz Precision Impedance Analyzer	4294A	5968-4505E
PN	4294-2	New Technologies For Accurate Impedance Measurements (40 Hz to 110 MHz)	4294A	5968-4506E
PN	4294-3	Evaluation of MOS Capacitor Oxide C-V Characteristics Using the 4294A	4294A	5988-5102EN
AN		Accurate Evaluation of MEMS Piezoelectric Sensors and Actuators Using the Agilent 4294A Precision Impedance Analyze	4294A	5989-6516EN
AN		Using a Network and Impedance Analyzer to Evaluate 13.56 MHz RFID Tags and Readers/Writers	4294A/E5061B	5990-3442EN
PN	E4991A-1	New Generation Analyzer Offers Exceptional and Powerful Analysis Functions for RF Impedance Measurement	E4991A	5988-0200EN
PN	E4991A-2	Achieving Fast Cycle Time Using an Electronic Design Automation (EDA) Tool and the E4991A RF Impedamce/Material Analyzer	E4991A	5988-3029EN
AN	1369-1	Solutions for Measuring Permittivity and Permeability with LCR Meters and Impedance Analyzers	4294A/E4991A	5980-2862EN
AN		Characterizing MEMS Magneto-Impedance Sensors Using Agilent 4294A and E4991A Impedance Analyzers	4294A/E4991A	5989-6517EN
AN	1369-2	Advanced Impedance Measurement Capability of the RF I-V Method Compared to the Network Analysis Method	E4991A	5988-0728EN
AN	1369-3	Accurate Impedance Measurement with Cascade Microtech Probe System	E4991A	5988-3279EN
AN	1369-6	How To Accurately Evaluate Low ESR/High Q RF Chip Devices	E4991A	5989-0258EN
AN	1464	Temperature Characteristic Evaluations of RF Components and Materials using the E4991A Impedance/Material Analyzer	E4991A	5988-9772EN
PN		Agilent New Generation Analyzer Offers Exceptional and Powerful Analysis Functions for RF Impedance Measurement	E4991A	5988-0200EN
AN	1369-4	Measurement of a Large Amount of Components by Usinig a Scanning System	General AN	5989-0260EN
AN	1369-5	Achieving Fast Design Cycle Time Using an Electronic Design Automation (EDA) Tool and Impedance Analyzers	General AN	5988-3029EN
AN	1305-3	Contact Resistance and Insulation Resistance Measurements of Electro-Mechanical Components	4338B/4339B	5968-0325E
AN	1300-1	Evaluating DC-DC Converters and PDN with the E5061B LF-RF Network Analyzer	E5061B	5990-5902EN
AN	-	Measuring Frequency Response with the Agilent E5061B LF-RF Network Analyzer	E5061B	5990-5578EN
AIN		measuring frequency nesponse with the Agnetic Esports EF-nr Network Analyzer	LJUUID	0000-00/0EIV

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 Agilent's impedance measurement products. Please contact each company directly if you are interested in its products. (Agilent does not make any special endorsement of these companies' products; this list is for reference only.)

_	man to a contract of the contract of	100 1 10 11
Company name	Product specialty/ expertise	Web site address
Cascade	RF and microwave probers and	www.cascademicrotech.com/
Microtech, Inc.	accessories for semiconductor and	
	IC applications.	
Inter-continental	Automated device handling systems, RF and	www.icmicrowave.com/
Microwave (ICM)	microwave test fixtures and non-coaxial	
	calibration standards.	
North Hills	Wide-band transformers (baluns) for balanced	www.northhills-sp.com/
Signal Processing	measurement.	
Espec/	Temperature chamber for component and	www.espec.com/
ESPEC Corp.	material testing.	www.espec.co.jp/english
(America)		
BH Electronics	Wideband transformers	www.bhelectronics.com/
ArumoTech (Asia)	Custom test fixtures	www.arumotech.co.jp/

Agilent Web Resources

LCR Meters/Impedance Analyzers: www.agilent.com/find/impedance

LCR Meter & Impedance Measurement Product Accessories: www.agilent.com/find/impedance-accessory

RF & MW test accessories: www.agilent.com/find/accessories



www.agilent.com/find/emailupdates

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Americas

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

www.agilent.com/find/contactus

(877) 894 4414
(11) 4197 3600
01800 5064 800
(800) 829 4444
1 800 629 485
800 810 0189
800 938 693
1 800 112 929
0120 (421) 345
080 769 0800
1 800 888 848
1 800 375 8100
0800 047 866

Europe & Middle East

Other AP Countries (65) 375 8100

Belgium	32 (0) 2 404 93 40
Denmark	45 45 80 12 15
Finland	358 (0) 10 855 2100
France	0825 010 700*
	*0.125 €/minute
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
United Kingdom	44 (0) 118 927 6201

For other unlisted countries:

www.agilent.com/find/contactus

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Product specifications and descriptions in this document subject to change without notice.

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