Agilent

E4980A Precision LCR Meter 20 Hz to 2 MHz

Setting a new standard for low frequency impedance measurements

Providing the best combination of accuracy, speed and versatility

Agilent Technologies

A New Standard for Impedance Measurements

Agilent's E4980A precision LCR meter provides the best combination of accuracy, speed, and versatility for a wide range of component measurements. Offering fast measurement speed and outstanding performance at both low and high impedance ranges, the E4980A is the ultimate tool for general R&D and manufacturing test of components and materials.

Fast measurement speed
The E4980A offers excellent speed:
- 5.6 ms (SHORT)[2]
- 88 ms (MED)[2]
- 220 ms (LONG)[2]

Accurate measurements
Exceptionally low noise at both low and high impedance for evaluating the characteristics of inductors and capacitors with excellent accuracy and repeatability.
- 0.05% basic impedance accuracy
- 1/2/4m cable extension capability
- Open/Short/Load correction

High-resolution LCD display
Full, 7-digit display and 6 display modes for clear and easy viewing.

Simple and intuitive operation
Easily configure measurements with soft keys (same interface as Agilent's 4284A LCR), one-touch front panel keys and an intuitive user interface.

USB interface (memory devices only)
Easily save measurement states, data logs, and screen captures to USB memory devices.

LED status lights
Conveniently view DC bias, DC source, and USB memory status.

DC source
Low noise DC source port provides more measurement flexibility. The DC source enables a one-box solution, making an additional DC source or multimeter unnecessary.
- 0 to ± 10 V[1]

100 µV to 2 Vrms/20 Vrms[1] variable test signals
Provides high signal levels to evaluate the AC voltage characteristics of your devices.

DC bias
Built-in, wide, DC-voltage-bias-range source provides accurate bias dependency evaluation for semiconductor wafer, C, L, and material measurements.
- 1.5 V and 2 V (standard)
- 0 to ± 40 V[1]
- Auto bias polarity control[1]

1. Option E4980A-001 required.
2. Measurement time at 1 MHz. Supplemental information. For additional details, refer to the E4980A data sheet (literature number 5989-4435EN).

Key Features

Accurate measurements
Exceptionally low noise at both low and high impedance to improve test quality.
- 0.05 % basic impedance accuracy
- Open/Short/Load compensation support
- Cable extension (1/2/4m) support

Fast measurement speed[1]
Fast speed provides more throughput reducing cost of test.
- 5.6 ms (SHORT)
- 88 ms (MED)
- 220 ms (LONG)

Measurement versatility
- 20 Hz to 2 MHz test frequency with 4-digit resolution at any frequency
- 16 impedance parameters
- 100 µV to 2 Vrms, 1 µA to 20 mA variable test signal
- Auto-level control
- 201 points of programmable list sweep

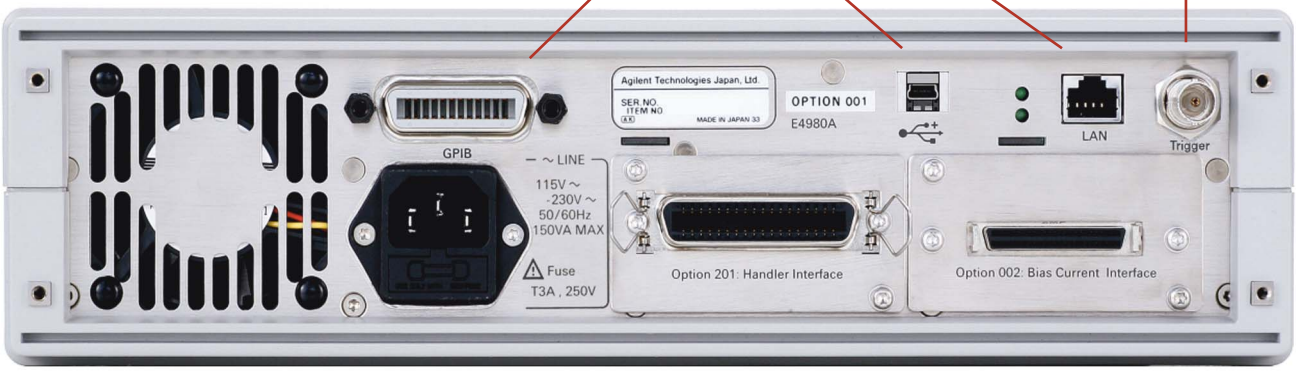
Option E4980A-001 power and DC bias enhancement
- 0 to 20 Vrms/100 mArms test signal
- Built-in 40 V DC bias with 0.3 mV resolution
- Built-in 10 V DC source
- DC resistance, DC current, and DC voltage measurement capability

Option E4980A-002 bias current interface and 42841A bias current source
DC current bias:
- 0.01 A to 20 A (with 42841A and 42842A)
- 0.02 A to 40 A (with 42841A x 2ea., 42842B and 42843A)

Compact and light weight
Small size for easy transportation
- 370 (W) x 105 (H) x 390 (D) mm
- 5.3 kg (11.7 lb.)

Standard LAN/USB/GPIB interface
Flexible PC connectivity and fast transfer speed
- 10/100 Base-T LAN
- USB (USBTMC) interface
- GPIB for robust instrument control and test automation

External trigger



Optional bias current, handler or scanner interfaces
Two of three interface options to choose from:
- Bias current interface to connect an Agilent 42841A bias current source (Option E4980A-002)
- Handler interface with 9 BIN outputs (Option E4980A-201)
- Scanner interface with 128 multi-channel correction (Option E4980A-301)

1. Measurement time at 1 MHz. Supplemental information. For additional details, refer to the E4980A data sheet (literature number 5989-4435EN).

Accurate, Fast Measurements up to 2 MHz

Accurate measurements provide design and test confidence

Broad range impedance measurements
The E4980A LCR meter offers excellent performance for all impedance measurements.

Reliable measurement performance is needed to meet the test requirements of today's latest devices. Only the E4980A offers fast measurement speed and outstanding performance within "both" low *and* high impedance ranges *with* exceptional dissipation factor accuracy.

Stable small ESR/low impedance measurements
The equivalent series resistance (ESR) of capacitors is becoming smaller and smaller to meet high-speed and low power-consumption circuit needs; and is difficult to measure. The E4980A provides exceptional measurement stability.

Exceptionally accurate, high impedance measurements
The capacitance values of chip-capacitors and semiconductor wafers are now down to femto-farad (fF) range. Thus, very stable and accurate high impedance measurements are required for higher yields and design reliability. Surpassing Agilent's previous industry-standard LCR meter (4284A), the E4980A further improves measurement stability for these small capacitance devices.

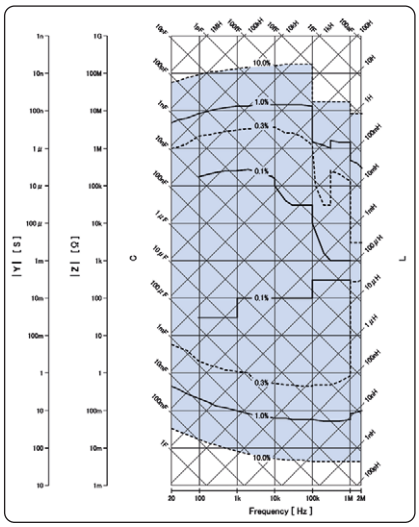


Figure 1. 10% impedance measurement accuracy range. Test signal 1 Vrms, MED mode, cable 0m.

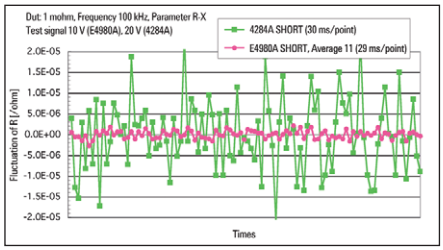


Figure 2. Low impedance evaluation (1 mΩ at 100 kHz).

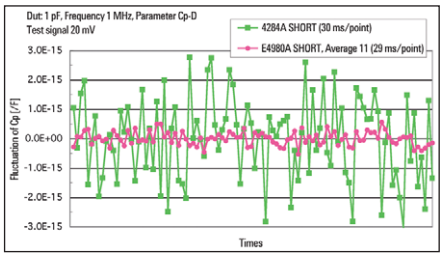


Figure 3. High impedance evaluation (1 pF at 1 MHz).

Offering the industry's best combination of speed and accuracy

Fast measurement speed for more throughput in manufacturing

- 5.6 ms per point at 1 MHz with SHORT mode [1]
- 88 ms per point at 1 MHz with MED mode [1]
- 220 ms per point at 1 MHz with LONG mode [1]

Average function (up to 999)
Enables users to improve measurement repeatability.

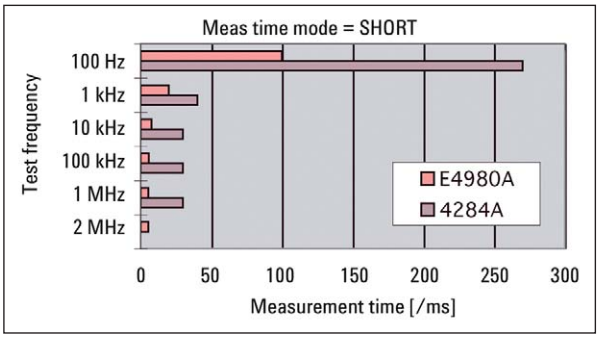


Figure 4. Measurement time[1]: standard E4980A LCR vs. 4284A LCR.

1. Measurement time at 1 MHz. Supplemental information. For additional details, refer to the E4980A data sheet (literature number 5989-4435EN).

Versatile Measurement Capability to Meet your Application Needs

Powerful features increase test reliability and efficiency

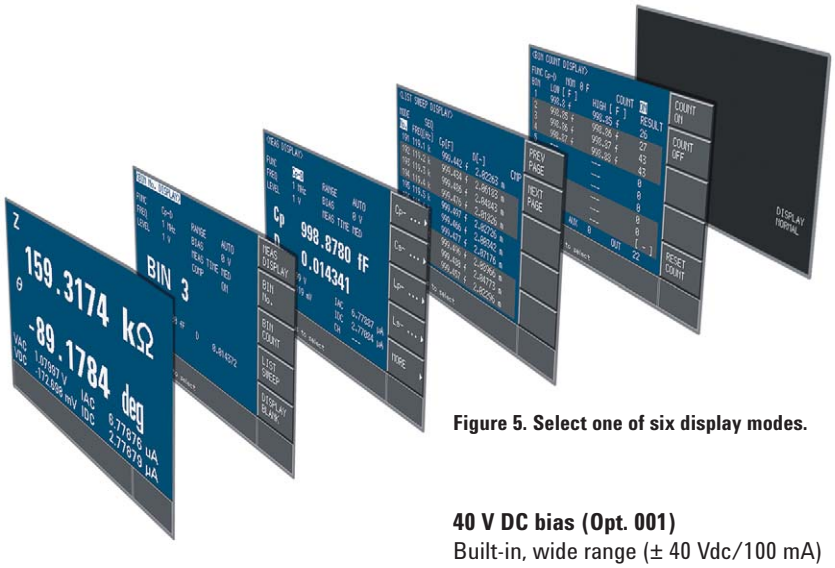


Figure 5. Select one of six display modes.

Six convenient display modes

Select one of six display modes to suit your particular measurement needs.

- **Normal** view for a data overview
- **Large display** view for enhanced readability
- **BIN No.** view for measurement comparison and device sorting
- **BIN count** view for statistical evaluation
- **LIST sweep** view for continuous data
- **Blank page** view for ultimate speed (Turns off display to save refresh time.)

201 points list sweep

Frequency, measurement range, and stimulus conditions, can be set as list parameters (max 201 points). You can choose two parameters independently to test under a variety of measurement conditions.

E4980A power and DC bias enhancement (Option E4980A-001)

20 Vrms test signal (Opt. 001)

A powerful AC test signal provides up to 20 Vrms, 100 mArms (maximum). This allows you to evaluate AC level dependency without an external amplifier.

DC parameter measurement (Opt. 001)

Simultaneously measure DC resistance, DC current, or DC voltage as well as impedance. For inductor measurements, Ls and Rdc parameters can be measured at the same time. Leakage current measurements are available for capacitance evaluation.

40 V DC bias (Opt. 001)

Built-in, wide range (± 40 Vdc/100 mA) DC bias source enables accurate DC bias verses impedance evaluation.

DC source (Opt. 001)

Provides an additional, independent DC source port to expand the flexibility of DC control and bias applications. For example, this option enables measurement of three terminal devices, allowing you to control your DUT, add extra bias, and control additional devices at the same time.

40 A DC current bias (with E4980A-002 and Agilent's 42841A)

Using the Agilent 42841A external DC current source, enables you to build a DC current bias evaluation system (up to 40 A DC) with a wide frequency range (20 Hz to 2 MHz) to make highly accurate and efficient DC current bias inductance measurements.

Figure 9. E4980A LCR with 42841A bias current source and 42842A bias current test fixture.

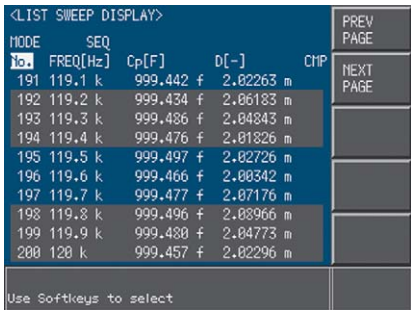


Figure 6. List sweep mode.

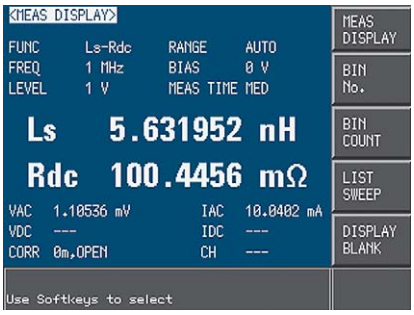


Figure 7. DCR measurement.

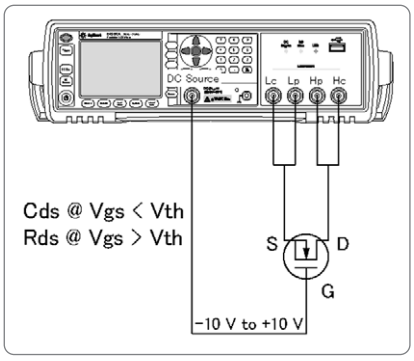


Figure 8. Measurement using DC source.

Exceeding Expectations in Productivity

Support for a large variety of test fixtures
The E4980A can be used with over thirty fixtures to meet a variety of evaluation needs; from materials to SMD components. Also, built-in compensation functions minimize the influence of test fixtures.

Figure 10. The E4980A LCR offers support for a large variety of test fixtures.

USB memory support
The front panel USB memory interface allows you to quickly and easily save state files, measurement log data, and display images to an external USB memory device (mass storage).

Figure 11. Example of use with USB storage device.

Figure 12. The E4980A LCR can conveniently be controlled over LAN with a computer and a Web browser.

PC connectivity
Standard GPIB/LAN/USB control interfaces provide a variety of paths for controlling the instrument. Using a LAN cable, you can even control the E4980A with a computer and Web browser.

Scanner or handler interface options
The E4980A offers an optically-isolated 9-BIN handler (Option 201) for integration into handler systems. A 128-channel scanner interface (Option 301) facilitates applications requiring a component scanner. Both interfaces have standard compatibility with other LCR system instruments (e.g. 4284A/88A/87A, etc.) for easy integration into systems. The multi-compensation function enables open/short/load compensations to perform scanning measurements independently in each scanner channel. This minimizes inconsistency in measured values between channels for more accurate measurements throughout the scanner system.

Entry Model (Option E4980A-005)

For users that do not require the ultimate measurement speed in a short length of time, an economical, entry model option is available. The entry model offers the same level of accuracy only with 2 to 5 times less speed than the standard model.

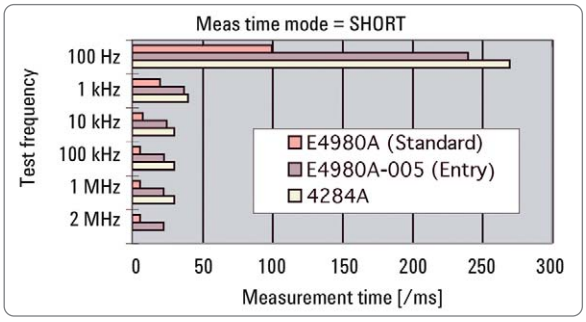


Figure 13. Measurement speed: standard E4980A LCR vs. economy model E5980A-005 LCR vs. 4284A LCR.

To our 4284A/4279A LCR Users, the E4980A Provides Even Greater Value!

Enhanced test efficiency
Both the Agilent 4284A Precision LCR Meter and 4279A 1 MHz C-V Meter have long been recognized as industry standard equipment for a wide range of impedance measurement applications.

The E4980A LCR combines fast, accurate measurements with powerful features to enhance your measurement efficiency and make your job easier.

High compatibility to ease migration
Almost all E4980A functions are compatible with the 4284A and 4279A, enabling users to migrate to the E4980A with ease. For detailed migration information, refer to the technical overview, *Migrating from an Agilent 4284A to an Agilent E4980A Precision LCR Meter* and *Migrating from an Agilent 4279A to an Agilent E4980A Precision LCR Meter* available on our Web site. **www.agilent.com/find/E4980A**

Key specifications and function compatibility

	E4980A Precision LCR	**4284A Precision LCR**	**4279A C-V meter**
Frequency	20 Hz to 2 MHz	20 Hz to 1 MHz	1 MHz
Test signal level	0 to 2 Vrms/0 to 20 mArms 0 to 20 Vrms/0 to 100 mArms[1]	0 to 2 Vrms/0 to 20 mArms 0 to 20 Vrms/0 to 200 mArms[2]	20 m, 50 m, 100 m, 200 m, 500 m, 1 Vrms
Auto level control (ALC)	Yes	Yes	No
DC bias capability	Built-in 1.5 V, 2 V ± 40 V[1]	Built in 1.5 V, 2 V ± 40 V[2]	Built-in ± 38 V External bias input
DC source	**± 10 V[1]**	No	No
Programmable list sweep	**201** points	10 points	51 points
Remote control	GPIB, **LAN, USB**	GPIB	GPIB
Web browser control	**Yes**	No	No
Control commands	**4284A compatible**	4284A unique	4279A unique
Basic accuracy	0.1 % @ SHORT 0.05 % @ MED/LONG	0.1 % @ SHORT 0.05 % @ MED/LONG	0.1 % @ SHORT
Parameters	Cp-D/Q/G/Rp, Cs-D/Q/Rs, Lp-D/Q/G/Rp, Ls-D/Q/Rs, R-X, Z-Ød/Ør, G-B, Y-Ød/Ør **Lp-Rdc[1], Ls-Rdc[1], Vdc-Idc[1]**	Cp-D/Q/G/Rp, Cs-D/Q/Rs, Lp-D/Q/G/Rp, Ls-D/Q/Rs, R-X, Z-Ød/Ør, G-B, Y-Ød/Ør	C-D/Q/ESR/G
Measurement time mode (SHORT/MED)	**Standard model** **330 ms/380 ms @ 20 Hz** **100 ms/180 ms @100 Hz** **20 ms/110 ms @ 1 kHz** **7.7 ms/92 ms @ 10 kHz** **5.7 ms/89 ms@ 100 kHz** **5.6 ms/88 ms @ 1 MHz** **5.6 ms/88 ms @ 2 MHz** **Entry model (E4980A-005)** 1040 ms/1150 ms @ 20 Hz 240 ms/380 ms @100 Hz 37 ms/200 ms @ 1 kHz 25 ms/180 ms @ 10 kHz 23 ms/180 ms @ 100 kHz 23 ms/180 ms @ 1 MHz 23 ms/180 ms @ 2 MHz	1500 ms/1500 ms @ 20 Hz 270 ms/400 ms @ 100 Hz 40 ms/190 ms@ 1 kHz 30 ms/180 ms @ 10 kHz 30 ms/180 ms @ 100 kHz 30 ms/180 ms @ 1 MHz	10 ms @ 1 MHz (List sweep mode, bias ON)
Storage devices	Internal/**USB memory**	Internal/memory card	Internal
Cable lengths	0, 1, 2, 4 m	0, 1, 2[3], 4[3] m	0, 1, 2 m
Cabinet dimensions (mm)	**370 (W) x 105 (H) x 390 (D) mm**	426 (W) x 177 (H) x 498 (D) mm	426 (W) x 177 (H) x 498 (D) mm
Weight	**5.3 kg**	15 kg	15 kg

1. Option E4980A-001 required.
2. Option 4284A-001 required.
3. Option 4284A-006 required.

Ordering Information

E4980A	Precision LCR Meter, 20 Hz to 2 MHz (ultimate accuracy and speed)
E4980A-005	Entry Model Precision LCR Meter, 20 Hz to 2 MHz (same accuracy, less speed)

Power and DC bias enhancement option

E4980A-001	Power and DC bias enhancement

Interface options

E4980A-710	No interface
E4980A-002	Bias current interface
E4980A-201	Handler interface
E4980A-301	Scanner interface

Additional options

E4980A-ABA	Add hardcopy user's guide (English)
E4980A-ABJ	Add hardcopy users guide (Japanese)
E4980A-1A7	Add ISO 17025 compliant calibration
E4980A-1CM[1]	Add rack mount kit

Power/DC bias related options (select one of two options below)

Features	E4980A Standard model	E4980A-001 Power and DC bias enhancement
AC test signal	0 to 2 Vrms, 20 mArms	0 to 20 Vrms, 100 mArms
DC bias	1.5 V and 2 V	0 to ±40 V, ±100 mA
DC Source	—	Yes (0 to ±10V)
DCR/DCI/DCV measurement	—	Yes
Auto bias polarity control	—	Yes

Interface related options (select two of four options below)[2]

Options	E4980A-710 No interface	E4980A-002 Bias current interface	E4980A-201 Handler interface	E4980A-301 Scanner interface
Function	Blank panel	Controls the 42841A bias current source	Enables connection to handler system	Enables connection to scanner system

Web Resources

Visit our E4980A Web site for additional product information and literature.
www.agilent.com/find/E4980A

LCR meters
www.agilent.com/find/LCRmeters

Impedance analyzers
www.agilent.com/find/impedance

1. A carrying handle is included with the standard option.
2. Two interface slots on the rear panel must be filled by selecting two different interface options: E4980A-002, -201, -301 and -710. However, if only a GPIB interface is required, two blank panels (2 x E4980A-710 No Interface "blank panel") can be selected.

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Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.

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Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you receive your new Agilent equipment, we can help verify that it works properly and help with initial product operation.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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www.agilent.com/find/contactus

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

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