

LCR-Reader®

Automatic LCR
and ESR meter



Automatic LCR measurements
Basic accuracy of 0.5%
Rechargeable battery
Weighs 1 oz.

Model LCR-R1
User Manual



SIBORG 
SYSTEMS INC

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Safety Notices

CAUTION

Cautions must be observed to avoid minor injury to yourself or damage to the product or other property.

WARNING

Warnings must be followed carefully to avoid personal injury, death or damage to the product or other property.

SAFETY CONSIDERATIONS

Read the information below before using this meter. This meter is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. The following general safety precautions must be observed during all phases of operation, service, and repair of this meter.

Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards for design, manufacture, and intended use of the meter. Siborg Systems Inc. assumes no liability for the customer's failure to comply with these requirements

Caution

- Disconnect power and discharge all high-voltage capacitors before testing
- De-energize circuits before connecting them to probes when measuring in-circuit components
- Battery must be charged by a power source with output voltage of DC 5V +/- 5%
- Keep the battery charged. Complete discharge may result in battery failure
- Indoor use only at altitudes up to 2000 meters

Warning

- Use this meter only as specified in this manual; any unauthorized use will render the warranty null and void
- Inspect the meter before use; looking for any faults. Do not use if broken
- Do not touch exposed metal during measurement; keep fingers on insulated sleeves
- Do not use if meter is operating abnormally
- Do not operate in wet environments, around vapour or explosive gases.
- Do not get meter wet.
- Use only authorized replacement parts when repairing or maintaining device
- If replacing the battery, dispose of in battery recycling. Never dispose of batteries in household waste or in an incinerator
- Do not use damaged cables or chargers. Do not charge in damp environments. Damage to the device, property or self may occur.

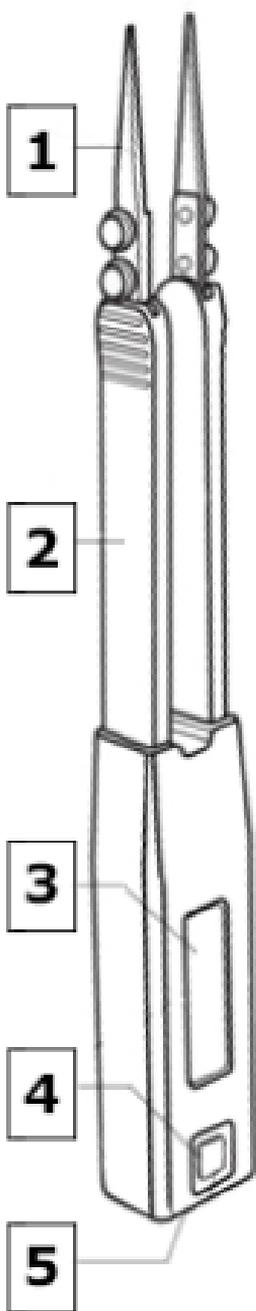
Overview

Product Overview

The LCR-Reader is a 1 oz. weight LCR-meter that is ultimately portable while still offering a high basic accuracy of 1%. It is an indispensable tool for testing and troubleshooting Surface Mount Technology in all aspects from manufacturing, lab-work, repair and maintenance, etc.

The unique design combines a set of gold-plated tweezers and an LCR-meter with test frequencies of 100Hz, 1kHz, and 10kHz. The tweezers are able to gain a full contact hold on all components to a 0201 size, either loose or mounted. It significantly reduces time required for measurements due to fully automatic diagnosis of the component and instantly displayed results.

Features



1. Replaceable gold-plated stainless steel tweezer tips

2. Insulated handles

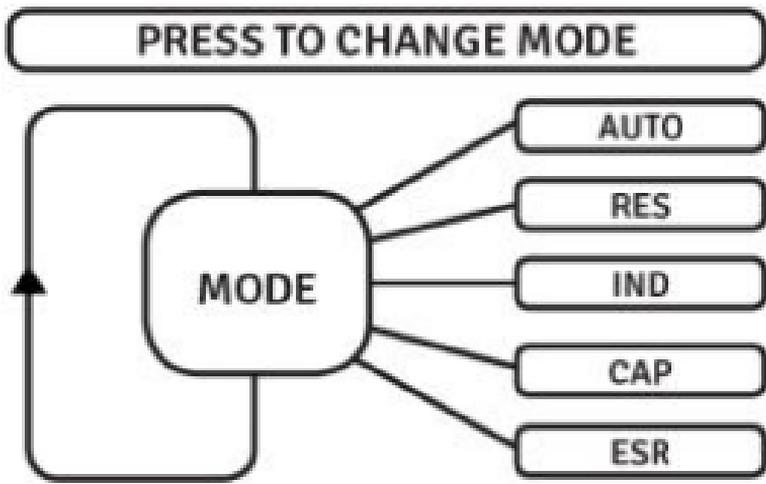
3. OLED display

4. One-button navigation

5. Micro-USB connector

Navigation

LCR-Reader is controlled with one button. To wake the device up, simply press the button.



To select a measurement mode, press the button. The device cycles through the modes with each press as shown.

Charging the Battery

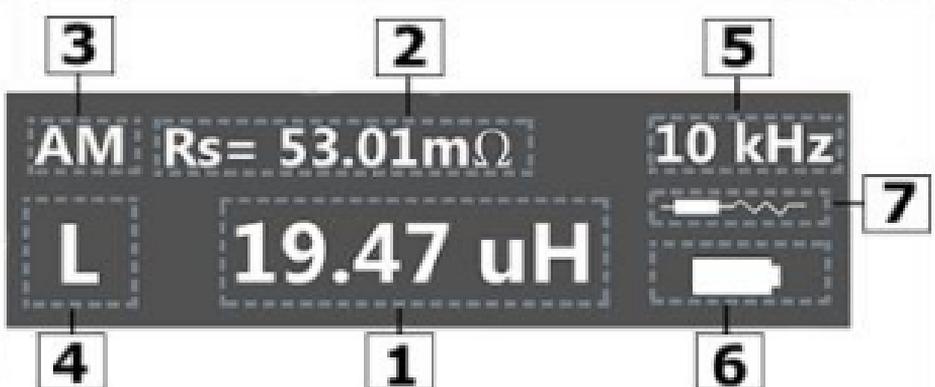
The battery icon on the display gives an indication of the remaining charge. This icon will be filled in when the battery is full and will "empty" as the battery depletes.

The LCR-Reader is powered by a Li-Ion battery and is rechargeable via a micro-USB. To charge the battery, simply plug the device into a power source like a computer or USB-wall adapter. The adapter should have an output voltage of $5V \pm 5\%$ with an output current of 100 mA or greater. It takes about 2 hours for a full charge, and will last up to 80 hours of continuous use.

Display

General Display Overview

The LCR-Reader's OLED display is divided into 7 sections.



1. *Primary Parameter*: The main impedance value.

2. *Secondary Parameter*: Displays secondary impedance value (ESR and other).
3. *Automatic Measurement Mode*: Displays 'AM' when automatic mode is on: the device will determine the type of component its measuring, L for Inductor, R for Resistor and C for Capacitor.
4. *Component Type and Measurement Function*: The LCR-Reader will display what test mode it is operating under; showing R for Resistance, etc.
5. *Test Frequency*: Displays the test frequency being used. i.e. 100Hz, 1kHz or 10kHz,
6. *Battery Icon*: This shows the battery's remaining charge.
7. *Component Measurement Model*: Displays if the component model is Serial (Rs) or Parallel (Rp).

Display Indicators

In the following table, the different icons and indicators are explained

Indicator	Description
A	'Automatic' measurement mode
L	'Inductance' measurement mode
C	'Capacitance' measurement mode
R	'Resistance' measurement mode
100 Hz	100 Hz test frequency
1 kHz	1 kHz test frequency
10 kHz	10 kHz test frequency
AC	Automatic circuit mode selection
	Battery level indicator

Measurement Units

The following table outlines the primary display measurements

Indicator	Description
M	Mega 1E+06
K	Kilo 1E+03
m	Milli 1E-03
u	Micro 1E-06
n	Nano 1E-09
P	Pico 1E-12
uH, mH, H	Henry, units for inductance
pF, nF, uF, mF	Farad, units for capacitance
mΩ, Ω, kΩ, MΩ	Ohm, units for resistance and impedance
Hz, kHz	Hertz, units for test frequency

Care and Maintenance

Warning: To avoid damage to the device, keep the insides of the housing dry. Use a damp cloth with little to no extra moisture. Be sure that all parts are dry before storage.

The LCR-Reader may need cleaning or maintenance after an extended period of time.

To clean the device, wipe down with a damp, gentle cloth. Be sure not to leave extra moisture on the device. Clean the case out with a damp cloth and mild detergent.

To clean the tweezers' tips, wipe with isopropyl and soft cloth.

The tips may wear out over time due to use causing slight inaccuracies for measurements.

To replace the tips, remove the old tips, screws and washers. Clean the tweezers' arms and screws with isopropyl. Be aware of any debris as it can cause false readings. The debris may be caught between the threads of the screw holes in the arms; clean out any debris using a metalworking

tap and wipe with isopropyl.

Reassemble with new tips.

If the device gives false readings, remove the tips and clean with isopropyl before replacing.

Making Measurements

LCR-Reader is capable of fully automatic measurements, with the ability to select manual test modes for specific tasks. When a component is in electrical contact with the tweezers, the device will automatically determine the type of component while in 'Automatic Mode'; all measurement values, including any secondary value, are automatically displayed.

To manually select the measurement mode, press the button. For more information, see the *Navigation* section of this manual

Note: Some devices require a higher than 0.45 V test voltage used in LCR-Reader, e.g. Z5U ceramic capacitors may need 1.0 V and therefore readings may be not up to accuracy specs.

Warning: To avoid electrical hazards and possible damage to the meter or to the equipment under test, always discharge the capacitor to be tested before measuring. For in circuit measurements, always disconnect the circuit power and discharge all high-voltage capacitors before testing.

Safety & EMC Compliance	IEC61000-4-2 ESD (4 kV Contact, 8 kV Air)
	EN 61000-4-3 Radiated Immunity
	IEC61000-4-8 Magnetic Field Immunity
	FCC15/EN 55011/ICES- 003- Class A, Radiated Emissions
	FCC15 Class A Conducted Emissions

Specifications

Basic Accuracy

Resistance	0.5%
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Capacitance	1%
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Inductance	1%
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Measurement Ranges

Resistance R	0.1 Ω to 10 Ω
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Capacitance C	2 pF to 5mF
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Inductance L	0.5 μ H to 999 mH
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Technical Specifications

Test Frequency	1 kHz, 10 kHz, 100Hz
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Test Signal Level	0.45 +/- 5% Vrms Sine wave
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Source Impedance	62.5 Ω /1K Ω /15k Ω +/- 1%
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Physical Specification

Size	14.8 x 2.0 x1.5 cm (5.8 x 0.76 x 0.57 in)
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Weight	29 grams (0.063 lb)
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Display	0.91-inch, 128x32 OLED display
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Battery Type	3.7V LiPO Rechargeable 220 mAh
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Battery Life	40 hours (2-hour charging cycle)
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Charging Source	USB power adapter (output voltage DC 5V)
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Storage Compliance	-20 $^{\circ}$ to 60 $^{\circ}$, 0% to 80% RH
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Operating Temperature	0 $^{\circ}$ C to 50 $^{\circ}$ C
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Warranty

Notice: To the best of our knowledge this document is believed to be accurate. The manufacturer reserves the right to change the information and does not assume any responsibility for omissions and/or errors found in this document.

Warranty: Manufacturer warrants his product to be free from defects in materials and workmanship for a period of one (1) year from the shipment date. Manufacturer warrants the following items for ninety (90) days from the date of shipment:

rechargeable batteries and documentation. During the warranty period, the manufacturer will, at its discretion, either repair or replace any product that proves to be defective. To exercise this warranty, write or call your local distributor. You will be given prompt assistance and return instructions. Please send the product with shipping prepaid to the indicated service facility. Repairs will be made and the product will be returned to you. Repaired or replaced products are warranted for the balance of the original warranty period, or ninety (90) days from the date of the repair.

This warranty does not cover the repair of any product whose serial number has been altered, defaced or removed. This warranty does not cover finishes (scratches on surface or screen), normal wear and tear, nor does it cover damage resulting from misuse, dirt, liquids, proximity or exposure of heat, accident, abuse, neglect, misapplication, operation outside of the environmental specifications, tampering, unreasonable use, service performed or attempted by an unauthorized service centres, failure to provide reasonable and necessary maintenance.

This warranty does not apply to defects resulting from product modification without manufacturer's express written consent, or misuse of any product or part. This warranty also does not apply to software, non-rechargeable batteries, damage from battery leakage, and improper polarity of the batteries or problems arising from normal wear or failure to follow instructions. This warranty does not cover OLED display damage, physical damage to the joystick button, USB charger connector; electrical

damage of the product due to high voltage, exposure to charged capacitor or improper battery type.

The design and implementation of any circuit based on this product is the sole responsibility of the customer. Manufacturer does not warrant any damage that occurs as result of the user's circuit or any defects that result from user-supplied products. This warranty does not apply to repairs or replacements necessitated by any cause beyond the control of factory including, but not limited to. Operation contrary to furnished instructions, shipping accidents, modification or repair by the user, neglect, accidents or others acts of God.

The foregoing is in lieu of all other expressed warranties and the manufacturer does not assume or authorize any party to assume for it any obligation or liability. The duration of any warranties that may be implied by law (including the warranties of merchantability and fitness) is limited to the term of this warranty. In no event shall the manufacturer be liable for special, incidental or consequential damages arising from ownership or use of this product, or for any delay in the performance of its obligations under this warranty due to causes beyond its control. This warranty is limited in duration to one (1) year from the date of the original purchase.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. The remedies provided herein are buyer's sole and exclusive remedies. Neither manufacturer, nor any of its employees, shall be liable for any direct, indirect, special, incidental or consequential damages arising out of the use of its devices and software even if manufacturer has been advised in advance of the possibility of such damages. Such excluded damages shall include, but are not limited to: costs of removal and installation, losses sustained as the result of injury to any person, or damage to property



SPECIFICATIONS

Test Frequency:

100Hz, 1kHz, 10kHz

Test Signal Level:

0.45 +/- 5% Vrms
Sine Wave

Basic Accuracy:

0.5% Basic accuracy

Resistance*

1% $R < 1\Omega$
0.5% $1\Omega < R < 100K\Omega$
1% $R > 100K\Omega$

Inductance

2% $L < 10\mu H$
1% $10\mu H < L < 1mH$
2% $L > 1mH$

Capacitance*

2% $C < 100pF$
1% $100pF < C < 100\mu F$
2% $C > 100\mu F$

Charge Time:

up to 3 hours,
DC 5V, 50mA

Battery Life:

up to 20 hours of
continuous use

Physical Specifications:

Dimensions

148x20x15mm

Weight

29 grams

Operating Temperature

0-50 C

* Offset subtracted from the result. Typical offset for resistance - 0.035 Ohm, for capacitance - 0.3pF.

* Not applicable to some ceramic capacitors requiring higher test voltage.