

# LCR-58

## Tweezer LCR Meter with ESR

## User Manual



## SAFETY INFORMATION

**CE** EMC: Conforms to EN61326-1.

The following safety information must be observed to insure maximum personal safety during the operation of this meter:

Use the meter only as specified in this manual or the protection provided by the meter might be impaired.

Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.

Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.

Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.

When using the probes, keep your fingers behind the finger guards on the probes.

Measuring voltages which exceed the limits of the multimeter may damage the meter and expose the operator to a shock hazard.

## SPECIFICATIONS\*

- Display: 6000 counts.
- Polarity: Automatic, (-) negative polarity indication.
- Overrange: " OL " mark indication.
- Low battery indication:
  - When a new battery, the LCD will show the battery capacity at full status (■). If the meter is used for a many hours, the capacity indication may show half battery status (▣). After a long time of operation, the battery may be exhausted and low battery status is shown (□). Then " batt " displays accompanied by a continuous beep sound, and then the meter will shut down in 5 seconds, and no further measurement is possible.
- Measurement rate: 2 times per second, nominal.
- Auto power off: approx. 30 minutes.
- Operating environment:
  - 0°C to 40°C (32°F 104°F) at <70% R.H.
- Storage temperature:
  - -20°C to 60°C (-4°F to 140°F) at < 80% R.H. with battery removed from meter.
- Temperature Coefficient:
  - 0.1 x(specified accuracy) per °C. (0°C to 18°C, 28°C to 40°C).

- Power: 3.0V button-type lithium batteries x2, CR2032.
- Battery life: 50 hours continuous operation.
- Dimensions:
  - 205mm (H) X 40mm (W) X 24.5mm (D).
- Weight:
  - Approx. 3.9 oz. (110g) including battery .

\*(Accuracy at 23°C±5 °C, <70% R.H.)

## 1.1 INDUCTANCE (L)

- Ranges: 600μH, 6000μH, 60mH, 600mH, 6H, 60H, 200H
- Resolution: 0.1μH
- Accuracy: (Q >10)
- Level: Test signal amplitude 0.5V RMS
  - ± (1.0% rdg + 5 dgts) on 60mH to 200H ranges
  - ± (2.0% rdg + 5 dgts) on 600μH, 6000μH ranges
- Level: Test signal amplitude 0.1V RMS
  - ± (1.5% rdg + 5 dgts) on 60mH to 60H ranges
  - ± (3.0% rdg + 5 dgts) on 600μH, 6000μH ranges
- Test Frequency:
  - (100Hz/120Hz: 60mH, 600mH, 6H, 60H, 200H ranges)
  - (1kHz: 6000μH, 60mH, 600mH, 6H, 60H ranges)
  - (10kHz: 600μH, 6000μH, 60mH, 600mH, 6H ranges)
- Minimum Input Range: >1.6μH
- Note: For Q >1~Q <10, accuracy is the printed specifications x 1.5
- Overload protection: 10VDC or 10VAC RMS

## 1.2 CAPACITANCE (C)

- Ranges: 600pF, 6nF, 60nF, 600nF, 6μF, 60μF, 600μF, 6mF
- Resolution: 0.1PF
- Accuracy: (D<0.1)
- Level: Test signal amplitude 0.5V RMS
  - ± (2.0% rdg + 8 dgts) on 600pF range
  - ± (1.0% rdg + 5 dgts) on 60nF, 600nF, 6μF ranges
  - ± (2.0% rdg + 5 dgts) on 6nF, 60μF, 600μF, 6mF ranges
- Level: Test signal amplitude 0.1V RMS
  - ± (3.0% rdg + 8 dgts) on 600pF range
  - ± (1.5% rdg + 5 dgts) on 60nF, 600nF, 6μF ranges
  - ± (3.0% rdg + 5 dgts) on 6nF, 60μF, 600μF, 6mF ranges

- Test Frequency:
  - (100Hz/120Hz: 60nF, 600nF, 6 $\mu$ F, 60 $\mu$ F, 600 $\mu$ F, 6mF ranges)
  - (1kHz: 6nF, 60nF, 600nF, 6 $\mu$ F, 60 $\mu$ F, 600 $\mu$ F ranges, on 600 $\mu$ F range maximum input range: < 300 $\mu$ F)
  - (10kHz: 600pF, 6nF, 60nF, 600nF, 6 $\mu$ F ranges)
- Minimum Input Range: > 0.8pF
- Note: For  $D > 0.1 \sim D < 1$ , accuracy is the printed specifications x 1.5
- Overload protection: 10VDC or 10VAC RMS
- Discharge capacitor before connecting.

### 1.3 RESISTANCE (R)

- Ranges: 60 $\Omega$ , 600 $\Omega$ , 6k $\Omega$ , 60k $\Omega$ , 600k $\Omega$ , 6M $\Omega$ , 20M $\Omega$
- Resolution: 0.01 $\Omega$
- Accuracy: (Q < 0.1)
- Level: Test signal amplitude 0.5V RMS
  - $\pm$  (2.0% rdg + 10 dgts) on 60 $\Omega$  range
  - $\pm$  (1.0% rdg + 5 dgts) on 600 $\Omega$  to 600k $\Omega$  ranges
  - $\pm$  (2.0% rdg + 5 dgts) on 6M $\Omega$ , 20M $\Omega$  ranges
- Level: Test signal amplitude 0.1V RMS
  - $\pm$  (2.0% rdg + 10 dgts) on 60 $\Omega$  range
  - $\pm$  (1.5% rdg + 5 dgts) on 600 $\Omega$  to 600k $\Omega$  ranges
  - $\pm$  (3.0% rdg + 5 dgts) on 6M $\Omega$ , 20M $\Omega$  ranges
- Test Frequency:
  - (100Hz, 120Hz, 1kHz, 10kHz: on 60 $\Omega$  to 6M $\Omega$  ranges)
  - (100Hz, 120Hz, 1kHz: on 20M $\Omega$  range)
- Minimum Input Range: > 0.1 $\Omega$
- Overload protection: 10VDC or 10VAC RMS

### 1.4 LCR AUTO CHECK MODE

- For  $Q < 0.15$  the R+ Q mode is selected.
- For  $Q > 0.15$  the L+ Q mode is selected.
- For  $D < 6.66$  the C+ D mode is selected.
- Level: Test signal amplitude 0.5V RMS
- Test Frequency : 1kHz
- Overload protection: 10VDC or 10VAC RMS

### 1.5 RESISTANCE (DCR)

- Ranges: 60 $\Omega$ , 600 $\Omega$ , 6k $\Omega$ , 60k $\Omega$ , 600k $\Omega$ , 6M $\Omega$ , 20M $\Omega$
- Resolution: 0.01 $\Omega$

- Accuracy:
  - $\pm$  (2.0% rdg + 10 dgts) on 60 $\Omega$  range
  - $\pm$  (1.0% rdg + 5 dgts) on 600 $\Omega$  to 600k $\Omega$  ranges
  - $\pm$  (2.0% rdg + 5 dgts) on 6M $\Omega$ , 20M $\Omega$  ranges
- Open circuit volts: 0.5Vdc typical
- Overload protection: 10VDC or 10VAC RMS

## 1.6 DIODE TEST

- Test current: 0.8 mA ( approximate )
- Accuracy:  $\pm$  (2% rdg + 5dgts)
- Open circuit volts: 2.0Vdc typical
- Audible indication: Less than 0.05V
- Overload protection: 10VDC or 10VAC RMS

## OPERATION

### 1.7 ON/OFF SWITCH: Power.

### 1.8 LCR / DCR / $\rightarrow$ ( LCR AUTO CHECK > 2 sec ) Button

- Shift " L ( Inductance ) "  $\rightleftharpoons$  " C ( Capacitance ) "  $\rightleftharpoons$  " R ( Resistance ) "  $\rightleftharpoons$  " DCR ( DC Resistance ) "  $\rightleftharpoons$  "  $\rightarrow$  DIODE TEST " ranges.
- Depress this button for more than 2 seconds to enter LCR AUTO TEST mode.
- Depress this button again for more than 2 seconds to exit.
- Note: In the LCR Auto Check mode, the " AUTO " symbol will flash continuously on the display.

### 1.9 DQR ( SER / PAL > 2 sec ) Button

Use this button to shift between dissipation (D) and equivalent resistance (R) [ESR or RP depending on the PAL or SER mode you are in] when in capacitance mode (C). When you are in inductance mode (L), this button will switch you from quality factor (Q) and equivalent resistance (R). In resistance mode (R), this button will only switch you between PAL and SER. In DCR mode this button will have no function.

Depress this button for more than 2 seconds to enter " SER ( Series test mode ) "  $\rightleftharpoons$  PAL ( Parallel test mode ) ".

The SER or PAL will be blinking while it is in changing mode. To set the mode depress this button again for more than 2 seconds to exit. The PAL mode does not seem to lock in when you switch over to it. It just keeps blinking. Just moved thru the LCR button until you come back to C and it should be locked in then. Once the mode is locked in you can press the button to shift thru D, ESR(or RP), Q.

Auto-detection is defaulted for the SER ( series test mode ) and PAL ( parallel test mode ). SER ( series test mode ) defaults for resistance to be measured lower than 10k $\Omega$ ; and PAL ( parallel test mode ) defaults for resistance to be measured higher than 10k $\Omega$ . Depressing

DQR/SER/PAL button can settle to either SER ( series test mode ) or PAL ( parallel test mode ).

### **1.10 FREQ (LEVEL 0.1V/0.5V RMS > 2 sec) Button**

- Shift " 100Hz " ⇌ " 120Hz " ⇌ " 1kHz " ⇌ "10kHz" test frequency.
- Depress this button for more than 2 seconds to enter " 0.1V " RMS ⇌ " 0.5V " RMS test signal amplitude ( LCR mode ) .

### **1.11 Data Hold Feature**

- Press [HOLD] button to toggle in and out of the Data Hold mode.
- In the data hold mode, the "HOLD" annunciator is displayed and the last reading is held on the display.
- Press [HOLD] button again to release the hold and current readings are once again displayed.

### **1.12 Inductance ( L ) Measurements**

- Set the function " L " position.
- Touch the probes to the Inductance.
- Read the Inductance directly from the display.
- In the Inductance ( L ) mode, if a capacitor is measured by mistake, the meter will show a negative value on the display to indicate the mistaken measurement.
- When performing tests, do not touch the metal part of the tweezers by hands, otherwise the readings would be disturbed and inaccurate.

### **1.13 Capacitance ( C ) Measurements**

- Set the Function to " C " position.
- Touch the probes to the capacitor.
- Read the capacitance directly from the display.
- Discharge the capacitor before taking capacitance measurements.
- In the Capacitance ( C ) mode, if an inductor is measured by mistake, the meter will show a negative sign in front of the reading on the display to indicate the mistaken measurement.
- When performing tests, do not touch the metal part of the tweezers by hands, otherwise the readings would be disturbed and inaccurate.

### **1.14 Resistance Measurements**

- Set the function to " R " or " DCR " position.
- Turn off power to the circuit under test. External voltage across the components causes invalid readings.
- Touch the probes to the test points. In ohms, the value indicated in the display is the measured value of resistance with proper decimal point and annunciate or indication.
- When performing tests, do not touch the metal part of the tweezers by hands, otherwise the readings would be disturbed and inaccurate.

## 1.15 Testing Diodes

- Set the Function to " \* " position.
- Turn off power to the circuit under test. External voltage across the components causes invalid readings.
- Touch probes to the diode. A forward-voltage drop is about 0.6V ( typical for a silicon diode ).
- Reverse probes. If the diode is good, " OL " is displayed. If the diode is shorted, a value near 0mV will be displayed.
- If the diode is open, " OL " is displayed in both directions.
- Audible Indication: Less than 0.05V.

## 1.16 Auto Power off

- Auto power off: approx. 30 minutes.
- After auto power off, ON/OFF switch to restart the meter.
- To disable this feature press and hold the ( HOLD ) button while moving slide switch from "OFF" to "ON." The auto power off feature is now disabled. Note " APO " indicator is missing from the LCD.
- To enable this feature press and hold the ( HOLD ) button while moving slide switch from "ON" to "OFF." The auto power off feature is enabled. " APO " should now be visible on the LCD.

## CLEANING

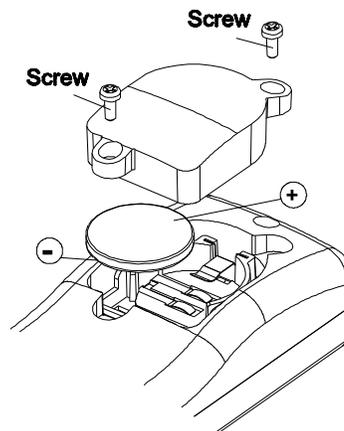
Wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

## BATTERY REPLACEMENT

Remove the batteries if the meter will not be used for an extended time.

Power is supplied by 3 volt button-type lithium batteries x2, CR2032. "  " appears on the LCD display when replacements are needed.

1. Set the Function Switch to OFF.
2. Remove battery cover screw.
3. Slide off battery cover and change battery.
4. Replace battery cover and screw.



**Battery  
Compartment Cover  
Battery Replacement**