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100 Hz／120 Hz／1 KHz／10 KHz／100 KHz, Professional

LCR METER

Model : LCR-9184

Your purchase of this LCR METER marks a step forward for you into the field of precision measurement. Although this LCR METER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

OPERATION MANUAL

TABLE OF CONTENTS

1. FEATURES

* 19,999/1,999 counts dual LCD display.
* AutoLCR smart check and measurement.
* Serial/Parallel modes are selectable.
* Ls/Lp/Cs/Cp with D/Q/θ /ESR parameters.
* Support DCR mode 1.00 Ω to 200.0 MΩ .
* Five different test frequency are available :
  100 Hz/120 Hz/1 KHz/10 KHz/100 KHz.
* Test AC signal level : 0.6 V rms typically.
* Test range : (ex. F = 1 KHz)
  L : 20.0 uH to 200.00 H
  C : 20.0 pF to 2000 uF
  R : 20.000Ω to 200.0 MΩ
* Multi-level battery detector.
* LCD with green light backlight，easy reading.
* RS232/USB PC Computer interface.
* Can default auto power off.

2. SPECIFICATIONS

2-1 General Specifications

Display	LCD size：66.8 X 52.8 mm. LCD with green backlight (ON /OFF)
Test frequency	100 Hz/120 Hz/1 KHz/10 KHz/100 KHz
Function	L/C/R Function selector Frequency selector D/Q/θ /ESR selector Sorting mode selector Backlight
Dissipation factor	0.000 to 1999
Quality factor	0.000 to 1999

θ measurement	± 90°
Sorting tolerance mode	± 0.25%, ± 0.5%, ± 1%, ± 2%, ± 5% ± 10%, ± 20%, +80% -20%
Calibration	Open/Short calibration
Data Hold	Freeze the display reading
Data output	RS232/USB PC computer interface
Power off	Auto shut off (within 5 minutes) saves battery life or manual off by push button.
Operating temperature	0℃ to 50℃
Operating humidity	Less then 85% R.H.
Power Supply	006P DC 9V battery ** Alkaline or Heavy duty type*
	DC 9V adapter input ** AC/DC power adapter is optional.*
Power consumption	DC 16 mA approximately ** Under LCD backlight off.*
Dimension	193 x 88 x 41mm
Weight	385 g ** meter only*
Standard Accessories Included	* Instruction manual.....1 PC * Alligator clips.....1 Pair
Optional Accessories	SMD tester, SMDA-22 SMD test clip, SMDC-21 Holster, HS-03 AC to DC 9V adapter Hard carrying case, CA-06 Soft carrying case, CA-05A USB cable, USB-01 RS232 cable, UPCB-02 Excel data acquisition software, SW-E803

2-2 Electrical Specifications (23± 5 ℃)

Resistance (DCR)

Range	***Accuracy***	***Remark***
20 Ω	± (0.5% + 5d)	After calibration
200 Ω	± (0.5% + 5d)	
2 KΩ	± (0.5% + 5d)	
20 KΩ	± (0.5% + 5d)	
200 KΩ	± (0.5% + 5d)	
2 MΩ	± (0.5% + 5d)	After calibration
20 MΩ	± (1% + 5d)	After calibration
200 MΩ	± (2% + 5d)	After calibration

Resistance (Rp/Rs)

Range	***Accuracy***	***Accuracy***	***Remark***
	100 Hz/120 Hz	1000 Hz	
20 Ω	± (1% + 5d)	± (1% + 5d)	After calibration
200 Ω	± (0.5% + 5d)	± (0.5% + 5d)	
2 KΩ	± (0.5% + 5d)	± (0.5% + 5d)	
20 KΩ	± (0.5% + 5d)	± (0.5% + 5d)	
200 KΩ	± (0.5% + 5d)	± (0.5% + 5d)	
2 MΩ	± (1% + 5d)	± (1% + 5d)	After calibration
20 MΩ	± (1% + 5d)	± (2% + 5d)	After calibration
200 MΩ	± (2% + 5d)	± (5% + 5d)	After calibration

Range	***Accuracy***	***Accuracy***	***Remark***
	10 KHz	100 KHz	
20 Ω	± (1% + 5d)	± (2% + 5d)	After calibration
200 Ω	± (0.5% + 5d)	± (0.5% + 5d)	
2 KΩ	± (0.5% + 5d)	± (0.5% + 5d)	
20 KΩ	± (0.5% + 5d)	± (0.5% + 5d)	
200 KΩ	± (0.5% + 5d)	± (0.5% + 5d)	
2 MΩ	± (1% + 5d)	± (2% + 5d)	After calibration
20 MΩ	± (2% + 5d)	----------	After calibration

Remark :

**** Don't apply voltage larger than 30 V to input terminals.***

**** If the impedance is less than 10 KΩ , Rs is shown on the display.***

**** If intend to obtain the accurate value, please test the component into the " Pin terminals " (3-11, Fig. 1) and use the battery power supply to make the measurement.***

Capacitance (Cp/Cs) : D ≦ 0.1

Range	***Accuracy***	***Accuracy***	***Remark***
	100 Hz/120 Hz	1000 Hz	
20 pF	± (2% + 5d)	± (1% + 5d)	After calibration
200 pF	± (1% + 5d)	± (1% + 5d)	After calibration
2000 pF	± (0.8% + 5d)	± (0.8% + 5d)	After calibration
20 nF	± (0.5% + 5d)	± (0.5% + 5d)	
200 nF	± (0.5% + 5d)	± (0.5% + 5d)	
2000 nF	± (0.5% + 5d)	± (0.5% + 5d)	
20 uF	± (0.5% + 5d)	± (0.5% + 5d)	
200 uF	± (0.5% + 5d)	± (0.5% + 5d)	After calibration
2000 uF	± (1% + 5d)	± (1% + 5d)	After calibration
20 mF	± (2% + 5d)	----------	After calibration

Range	***Accuracy***	***Accuracy***	***Remark***
	10 KHz	100 KHz	
20 pF	± (1% + 5d)	± (1% + 5d)	After calibration
200 pF	± (0.5% + 5d)	± (0.5% + 5d)	After calibration
2000 pF	± (0.5% + 5d)	± (0.5% + 5d)	After calibration
20 nF	± (0.5% + 5d)	± (0.5% + 5d)	
200 nF	± (0.5% + 5d)	± (0.5% + 5d)	
2000 nF	± (0.5% + 5d)	± (0.5% + 5d)	
20 uF	± (0.8% + 5d)	± (0.8% + 5d)	
200 uF	± (1% + 5d)	----------	After calibration

Remark :

**** Don't apply voltage larger than 30 V to input terminals.***

**** Discharge capacitor before measurement.***

**** If the impedance is larger than 10 KΩ , Cp is shown on the display.***
**** If the impedance is less than 10 KΩ , Cs is shown on the display.***
**** If intend to obtain the accurate value, please test the component into the " Pin terminals " (3-11, Fig. 1) and use the battery power supply to make the measurement.***

Inductance (Lp/Ls) : D ≦ 0.1

Range	***Accuracy***	***Accuracy***	***Remark***
	100 Hz/120 Hz	1000 Hz	
20 uH	± (1% + 5d)	± (1% + 5d)	After calibration
200 uH	± (1% + 5d)	± (1% + 5d)	After calibration
2000 uH	± (0.8% + 5d)	± (0.8% + 5d)	
20 mH	± (0.5% + 5d)	± (0.5% + 5d)	
200 mH	± (0.5% + 5d)	± (0.5% + 5d)	
2000 mH	± (0.5% + 5d)	± (0.5% + 5d)	
20 H	± (0.5% + 5d)	± (0.5% + 5d)	
200 H	± (0.5% + 5d)	± (0.8% + 5d)	
2000 H	± (1% + 5d)	----------	After calibration

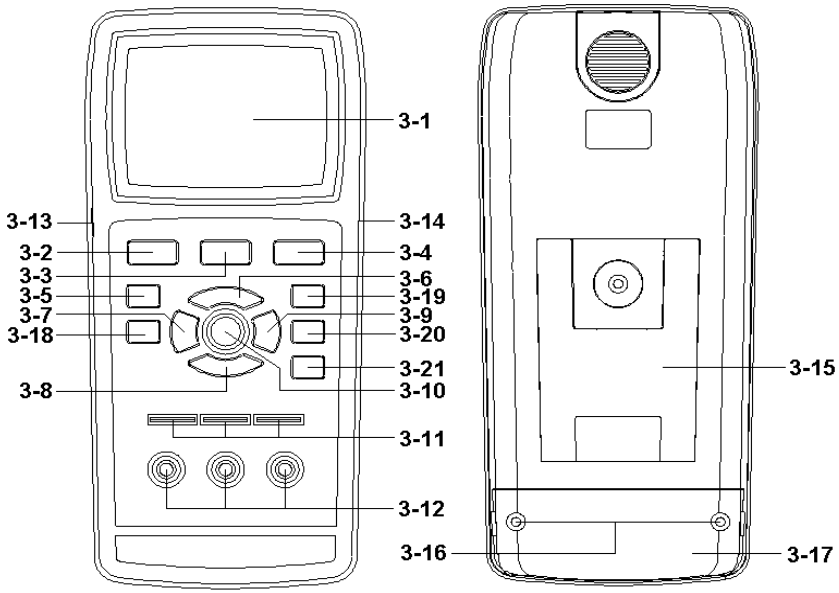
Range	***Accuracy***	***Accuracy***	***Remark***
	10 KHz	100 KHz	
20 uH	± (1% + 5d)	± (1% + 5d)	After calibration
200 uH	± (0.8% + 5d)	± (0.8% + 5d)	After calibration
2000 uH	± (0.5% + 5d)	± (0.5% + 5d)	
20 mH	± (0.5% + 5d)	± (0.5% + 5d)	
200 mH	± (0.5% + 5d)	----------	
2000 mH	± (0.5% + 5d)	----------	

Remark :

**** Don't apply voltage larger than 30 V to input terminals.***
**** Discharge inductor before measurement.***

**** If the impedance is larger than 10 KΩ , Lp is shown on the display.***
**** If the impedance is less than 10 KΩ , Ls is shown on the display.***
**** If intend to obtain the accurate value, please test the component into the " Pin terminals " (3-11, Fig. 1) and use the battery power supply to make the measurement.***

3. FRONT PANEL DESCRIPTION



3-1 Display
3-2 Frequency Button
3-3 Hold Button
3-4 L/C/R Button
3-5 CAL Button
3-6 ▲ Button, RS232 Button
3-7 < Button, D/Q/θ Button
3-8 REL/%/▼ Button
3-9 > Button, SER/PAL Button
3-10 Power Button
3-11 Input terminals (pin terminals)
3-12 Input terminals (banana terminals)
3-13 DC 9V Power Adapter Input Socket
3-14 RS-232/USB Output Terminal
3-15 Stand
3-16 Battery Cover's Screws
3-17 Battery Compartment/Cover
3-18 LCD backlight Button
3-19 Enter Button
3-20 Sorting Button
3-21 Setup Button

4. MEASURING PROCEDURE

4-1 Measuring procedure

1) Power on by pressing the " power on/off key ", the all segments of LCD will be ON for 2 seconds .
2) The default mode is AUTO LCR smart mode and the default test frequency is 1 KHz.
3) In order to extend the battery life，it is recommended to use the external power supply and the APO setting (Auto power off setting). . When all function button do not be push within 5 minutes，the system will launch the alarm buzzer beep at three times before the power-off state .
4) When AUTO/L/C/R function selection button (L/C/R) is pushed，the main test mode could be selected sequentially：

Auto-LCR mode→Auto-L mode→
Auto-C mode→Auto-R mode→
DCR mode→Auto-LCR mode.

The default test mode is Auto LCR mode which could check the type of impedance smartly and enter to the L/C/R measurement mode automatically . The secondary parameter will follow the L/C/R measurement .

When Auto-L or Auto-C mode is selected, the impedance measurement is auto ranging.

The primary LCD display will show the inductance or capacitance of DUT (device under testing). The secondary LCD display will show the quality (Q) or dissipation (D) factor.

The phase angel (θ) or equivalent resistance (ESR) can also be shown by pushing the PARAMETER (D/Q/θ) keypad to choose D/Q/θ /ESR . When Auto-R(ACR mode) or DCR mode is selected, the secondary parameter is omitted .

Note 1 :
When Auto LCR mode is active, the secondary parameter will show the equivalent resistance in parallel mode (Rp) to replace the D factor if the C measured value of DUT (device under testing) is less then 5 pF .

Note 2 :
At Auto LCR mode only . During Auto R mode or DCR mode, the secondary parameter is not available .

4-2 Data hold

During the measurement, push the HOLD key to stop the reading of DUT (device under testing) on primary display.
Push the HOLD key again to cancel the hold mode and original measurement mode .

4-3 Serial/Parallel

When any L/C/R function mode is selected, the default measurement in serial or parallel mode is auto selected and the AUTO segment will be shown on LCD display. It depends on the total equivalent impedance measured. If the impedance is larger than 10KΩ , parallel mode will be set and Lp/Cp/Rp will be shown on the display. If it is less than 10KΩ , serial mode will be set and Ls/Cs/Rs will be shown on the display. When SER/PAL key is pushed, the impedance measurement will be set in serial mode or in parallel

4-4 The select of test frequency

When FREQ key is pushed, the test frequency will be changed sequentially. There are five different test frequencies (100Hz/120Hz/1KHz/10KHz/100KHz) can be selected . The LCR impedance scale range are depended on the test frequency, See the specifications.

4-5 REL /%

The REL /% mode help the user to make a relative value of the component . At first, select the function to inductors, capacitors, resistors (push L/C/R button), then put under test DUT (device under testing) side, LCD will be shown the testing value. Until tested value is stable, push REL button, LCD will appear △ and 0.0%. This testing is the first analytic value as a bench mark, the next DUT are compared with the first percentage. Then push the REL/% button, the △ indicator will be flashing, LCD will be shown the first value and the comparison percentage.

** Press REL/% button ≧ 2 seconds continuously will exit this function.*

4-6 Sorting

The sorting mode could help the user to make a quick sort for a bunch of components. Push Sort key to the sorting mode which will be set to 2000 digits display automatically. If the LCD reading is OL or less than 200 counts, the SORT key is not available. The primary display to show PASS or FAIL status depends on whether the impedance measured exceeds tolerance range. The current measurement result will be shown on secondary display. When sorting mode is active, push SETUP keypad to modify the reference value, range and the tolerance setting sequentially . If the target is reached, push ENTER keypad to confirm it. Use the direction keypads(↑ / ↓ /←/→)to change the target data easily. The reference value setting is available from 20 to 1999 counts.

The tolerance range setting selection :

± 0.25%→± 0.5%→± 1%→± 2%→± 5%
→± 10%→ ± 20%→+80% -20%

The default tolerance is ± 1% .

** Press Sorting button once will exit this function.*

4-7 Calibration

In order to improve the accuracy for high/low impedance, it is recommended to do OPEN/SHORT calibration mode before the measurement. Push CAL key larger than 2 seconds to start the open/short calibration procedure :

OPEN ready→OPEN calibration→SHORT ready →SHORT calibration.

During open or short calibration processing, the 30-second countdown will be shown on LCD panels. If the calibration procedure is finished, the PASS or FAIL symbol will be shown on the primary display. If the PASS symbol appear on for both OPEN and SHORT modes, the calibration data will be saved to EEPROM after push CAL key again

**** If you use the optional accessories (SMDA-22, SMDC-21), it should make the above " OPEN and SHORT calibration " for the complete set (meter + accessory) again.***

4-8 Backlight

When user push BKLIT button (LCD backlight Button), the backlight driver will be active . Push the BKLIT button again to disable the backlight driver .

4-9 RS232 output

When you want to send the measurement value to the PC (computer), push the RS232 key to start a 9600 bps RS232 transmission active . Push the RS232 button again to cancel the transmission， When RS232 output port is transmitting, a RS232 indicator of LCD segment will be active.

5. POWER SUPPLY from DC ADAPTER

The meter also can supply the power supply from the DC 9V power adapter (optional). Insert the plug of power adapter into " DC 9V Power Adapter Input Socket ".

6. BATTERY REPLACEMENT

When the lower left of LCD display show "  ", it is necessary to replace the battery.
However, in-spec . measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate . When the display show " batt " and the power will be shut down.

7. OPTIONAL ACCESSORIES

SMD TESTER
Model : SMDA-22
* Optional SMD tester for LCR-9184, LCR-9183.
* Useful tool for SMD components (Resistor, Capacitor,Inductor) LCR value measurement.

SMD TEST CLIP

Model : SMDC-21

* Optional SMD test clip for LCR-9184,LCR-9183.
* Useful test clip for SMD components (Resistor, Capacitor,Inductor) LCR value measurement.