

MESR100 V2 User Guide V1.0

Features:

JINGYAN MESR-100 V2 Auto-ranging capacitor ESR and Low Ohm Meter
Measuring range from 0.001 to 100.0R, support IN CIRCUIT Testing.

Using true 100 KHz sine wave to measure the ESR value, which is equal to the testing method of capacitor manufacturer.

In the market, there is some technique using short pulse method to testing, but the value will be varying vs the capacitance and sometimes reading is different from the manufacturer's value.

What is ESR of capacitor?

There is a series resistor inside capacitor, using 100kHz to remove the impedance $1/(2\pi F C)$, the impedance become small, and we can then measure the true series resistor value.

A bad E-capacitor will have larger ESR and create large ripple rather than filtering noise. Normally, a big capacitor is larger than 3 ohm.

Using this theory, we can measure the capacitor is bad/ damaged or good in condition.

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Because our ESR meter only applies less than 15mV DC or peak to peak on a good capacitor, as a result we can use it as in circuit test. Because this low testing voltage, it cannot turn on the semiconductor inside a circuit under testing.

During repairing TV, LCD, Audio board, etc. we can in circuit testing the capacitor is good or not.

*Dual terminal, for fast and easy inspect general capacitor or resistor, a printed ESR table for fast check

Compare MESR100 old V1 and new V2 Improvement:

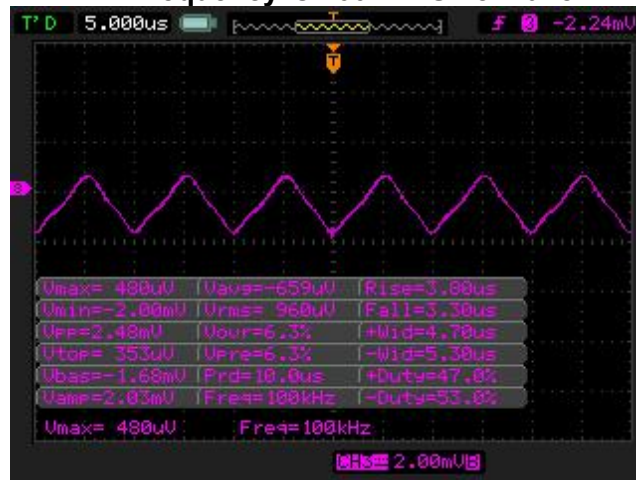
- 1) Change square wave to sine wave 100 KHz, reduce square wave's high frequency component, and affect the reading passing the test leads and capacitor.
- 2) Higher Resolution up to 0.001 ohm.
- 3) 128X64 dot matrix LCD, with more larger value display and information
- 4) Embedded 25V capacitor table at LCD, auto display the capacitor is good or bad reference to common 25V electrolytic capacitor.
- 5) New plastic case, curve design for hand carrying. New stand for 60 degree stand on desk.
- 6) Use 2X AA battery, more convenience and longer battery life than 9V battery.

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7) Support external USB power, using standard micro-USB port.

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MEASURING 220uF 25V Electrolytic Capacitor
Vpk to pk is 2.48mV
Frequency is 100kHz Sine Wave



Specification:

Range	Accuracy (After Zero, tested with 1,10,100R resistor)	Refresh Time (Manual Mode) *Auto mode take 0 to 2s more time depend on value
0.000 to 1.000R	1%+2Digit	~0.4s
1.000 to 10.00R	1%+1Digit	~0.4s
10.00 to 100.0R	2%+1Digit	~0.4s

***Accuracy maybe affected by the test lead's length and contact point resistance. Standard test leads is 15cm, for longer test leads need special shielding to affect the EMI inference (Can contact sales' person for more detail)**

1) Accuracy: Up to 1% (detail on above table)

Wide Measurement Range: $>1\mu\text{F}$ (for $0.1\mu\text{F}$ the error will be larger on equation $1/(2*\pi*F*C)$ @ 100Khz)

2) High Resolution: 4 digit, or 0.001Ω @ 1 Ohm range

3) Measuring voltage: $<\sim 40\text{mV RMS}$ (TESTING VOLTAGE)

- 4) Clamping voltage: $\sim 0.15V$ (open voltage)
- 5) Battery 2X AA 1.5V battery
- 6) External Power: 5V micro USB
- 7) Operating current 0.02A
- 8) Battery Life time: >80 Hours

Operating Introduction:

1) POWER ON

Press and hold the ON/ OFF circle orange button for 2 to 3 second to power on.
Press and release the ON/ OFF button to shut down meter.

2) AUTO/ MANUAL mode:

i) Auto Range:

Press and release the RANGE button and at the first line of LCD will show "AUTO:"
At auto mode meter will automatically select the best range to detect.

ii) Manual Range:

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Scroll the manual range from 1R, 10R and 100R range by press and release the RANGE button

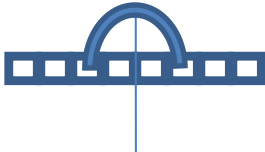
In LCD will show MANUAL at first LCD line and show at second line: 0-1R, 1-10R and 10-100R.

3) 1 Key Zero:

Short circuit the test leads' terminal, cancelling the wire resistance.

Press and release the "ZERO" button, LCD shows "ZERO" and wait the zero disappear.

If you are using the meter array socket, you need to use a short pin to short circuit to set zero.



NEGATIVE POSITIVE

4) Backlight:

LCD backlight will on during power on

5) Auto Sleep:

Around 10 hours for not testing, it will shut down automatically to save power.

6) OVERFLOW or OL:

Display overflow when the value is out of range, you can check that you are zero correctly.

7) ESR TABLE:

It is for reference only, different manufacturer of capacitor has different ESR, better to test a good cap ESR and compare with what you are testing, usually bad cap with higher ESR few times larger than good one.

Standard Worst-Case Electrolytic Capacitor ESR Table

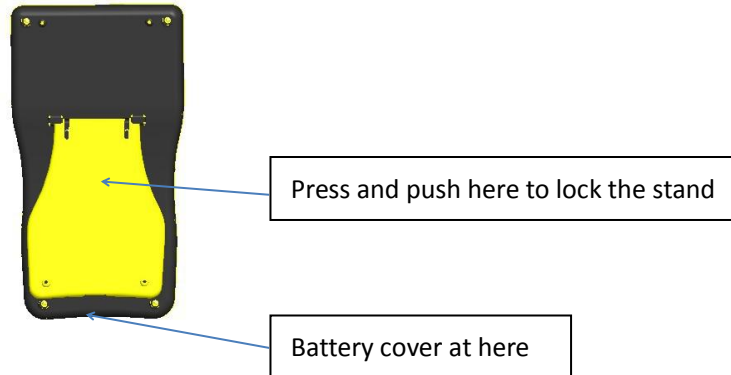
	10V	16V	25V	35V	63V	100V	250V
1uF				14	16	18	20
2.2uF			6.0	8.0	10	10	18
4.7uF			15	7.5	4.2	2.3	5.0
10uF		8.0	5.3	3.2	2.4	3.0	2.5
22uF	5.4	3.6	2.1	1.5	1.5	1.5	1.8
47uF	2.2	1.6	1.2	0.68	0.56	0.7	0.8
100uF	1.2	0.7	0.32	0.32	0.3	0.15	0.8
220uF	0.6	0.33	0.23	0.17	0.16	0.09	0.5
470uF	0.24	0.18	0.12	0.09	0.09	0.05	0.3
1000uF	0.12	0.09	0.08	0.07	0.05	0.06	
4700uF	0.23	0.20	0.12	0.08	0.04		
10000uF	0.12	0.08	0.06	0.04			

7) SOFTWARE ESR:

Put the 25V Electrolytic capacitor value to LCD, and compare,
GOOD if $C < XX\mu F$, means the capacitor maybe good condition if it is less than $XX\mu F$

8) PLASTIC STAND:

If you don't use the stand, press and push the lock position:



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*PLEASE DISCHARGE THE CAPACITOR BEFORE TESTING, you can use a screwdriver to short circuit, or series with a resistor around 10 ohm and short for 5 to 10s. There is 2 fast diode inside the meter to prevent high voltage, but it is important to discharge the capacitor firstly, as it is a large surge current and voltage and may damage the meter.

MESR100 V2 使用说明书 V1.0

产品特点:

晶研 MESR-100 V2 自动量程切换测量电容内阻 (ESR) 和小电阻测试表。

测量量程从 0.001 到 100.0R, 支持在线路中测量。

使用真正的 100 KHz 正弦波测量电容内阻值 (ESR), 相当于电容生产厂商的测试方法。

在市场上, 有一些测试方法是使用瞬间脉冲的技术来测试。但是测试出来的电容值变化的, 有时候测试出来的数值和生产厂商的数值完全不一样。

什么是电容的内阻 (ESR) ?

电容里面含有一个串联的电阻, 使用 100kHz 去消除阻抗 $1/(2\pi * F * C)$, 阻抗会变小, 然后我们就能测试串联的电阻的实际值。

一个坏的电解电容具有较大的内阻 (ESR) 会在电路中产生一个大的波动而不会起到滤波作用。通常一个大电容要大于 3 ohm。

依据这个理论, 我们可以测量一个电容的状况是坏的/损坏的还是好的。

因为我们的 ESR 表仅允许小于 15mV 的直流电或者峰值之间在一个好的电容,，所以我们可以 在电路中测量。

由于是低电压测试，在测试回路中不能打开任何半导体。

在修理电视, LCD 屏幕, 音频线路板等。我们可以在电路中测试电容是好的还是坏的。

*双测试口，可以快速和简单测试一般的电容电阻，ESR 表格方便快速检测。

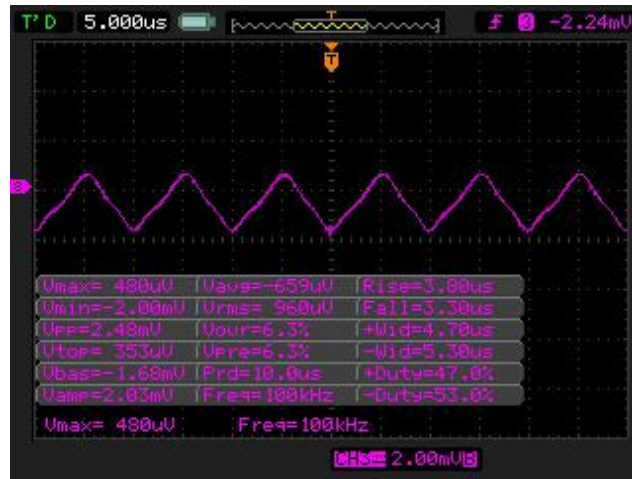
MESR100 新版 V2 相较于旧版 V1 的改进：

- 8) 将方波改成 100 KHz 正弦波，消除了方波里面的高频成分，否则会传导至测试线和电容影响测量结果。
- 9) 高分辨率达到 0.001 ohm。
- 10) 128X64 点阵 LCD 显示屏，可以显示更大的数字和更多信息。
- 11) LCD 屏幕内嵌有 25V 电容表格，可以自动参考同样 25V 电解质电容然后显示电容是好还是坏。
- 12) 新塑料盒，曲线设计方便抓握。新支撑架可以 60 度支撑在桌面上。
- 13) 使用两节 AA 电池 (1.5V)，比 9V 电池更加方便，电池使用寿命更长。
- 14) 支持 USB 电源, 使用标准 micro-USB 接口。

测量 220uF 25V 电解质电容

Vpk 到 pk 是 2.48mV

频率为 100kHz 正弦波



规格:

量程范围	精度(归零后, 分别测试 1, 10, 100R 电阻)	刷新时间(手动控制模式) *自动模式会花费 0 到 2s 具体时间取决于电容 的大小
0.000 至 1.000R	1%+2 位数	~0.4s
1.000 至 10.00R	1%+1 位数	~0.4s
10.00 至 100.0R	2%+1 位数	~0.4s

***精度也可能受到测试线的长度和接触点的电阻影响。**

标准测试线长度为 15cm, 长的测试线需要特殊屏蔽以消除 EMI (更多细节可以联系销售人员)

9) 精度: 高达 1%(具体细节如上表)

- 10) 宽的测量范围: $>1\mu\text{F}$ (当 $0.1\mu\text{F}$ 误差会非常大依据公式 $1/(2*\pi*F*C)$ @ 100KHz)
- 11) 高分辨率: 4 位数, 或 0.001R @ 1R 量程
- 12) 测量电压: $<\sim 40\text{mV RMS}$ (测试电压)
- 13) 钳位电压: $\sim 0.15\text{V}$ (开路电压)
- 14) 电池: 2X AA 1.5V 电池
- 15) 外部电源: 5V 微型 USB (micro USB)
- 16) 工作电流: 0.02A
- 17) 电池续航时间; >80 小时

操作指引:

2) 开机

长按 ON/ OFF 圆形橙色按键 1 至 2 秒就会开机。

按一下 ON/ OFF 按键就会关闭 ESR 表电源.

2) 自动模式/ 手动模式:

i) 自动切换量程:

按一下 RANGE 按键, LCD 屏幕第一行会显示 "AUTO:"
在自动模式下 ESR 表会自动选择最适宜的量程进行测试.

ii) 手动切换量程:

当按下 RANGE 按键电容表会循环切换 1R, 10R 和 100R 这三个之间量程。
LCD 屏幕第一行会显示 MANUAL, LCD 屏幕第二行会显示: 0-1R, 1-10R 和 10-100R.

3) 一键归零:

将测试线短接, 消除导线电阻。

按下 "ZERO" 按键, LCD 屏幕会显示 "ZERO" 然后等待直到 ZERO 消失。
如果您使用的是阵列式插座, 你需要一个短线将插座短路然后归零。



负极 正极

4) 屏幕背光:

一旦开机 LCD 屏幕背光会处于一直开的状态。

5) 自动关机:

大约 10 小时没有测试, ESR 表会自动关机以节约电量。

6) 超量程或低于量程:

当测试值超出量程时会显示 overflow, 您可以检测一下归零是否正确。

7) ESR 表格:

表格仅供参考, 不同制造商生产的电容拥有不同的 ESR, 最好测试一个好电容的 ESR 然后和你要测试的进行对比, 通常一个坏的电容具有较高的 ESR 是好的电阻几倍以上。

Standard Worst-Case Electrolytic Capacitor ESR Table

	10V	16V	25V	35V	63V	100V	250V
1uF				14	16	18	20
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4700uF	0.23	0.20	0.12	0.08	0.04		
10000uF	0.12	0.08	0.06	0.04			

7) 软件 ESR:

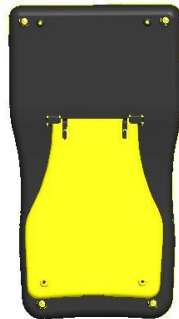
将 25V 电解质电容容值显示在 LCD 屏幕上，然后对比，

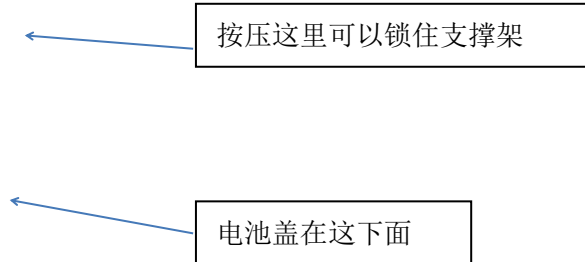
如果 $C < XX\mu F$ 是好的，表示如果电容状态是良好的那么电容容值小于 $XX\mu F$

8) 塑料支撑架:

如果不使

用支撑架，按压后锁的锁定位置:





***测试电容前请给电容放电。**，您可以使用螺丝刀对电容进行短路，或者串联一个 10 ohm 电阻大概 5 到 10s。电容表里面有 2 个快速齐纳二极管预防高电压，但是必须对二极管进行放电，否则一个强浪涌电流和电压会损坏电容表。