

# M181 LCR Meter DIY Kit

## Assembly Guide (Rev. 1)

**Model:** M181 LCR

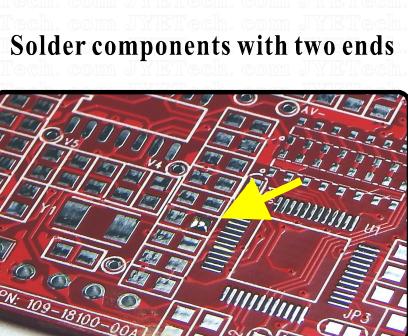
**PCB:** 109-18100-00D

**Firmware:** 113-18101-050 or newer

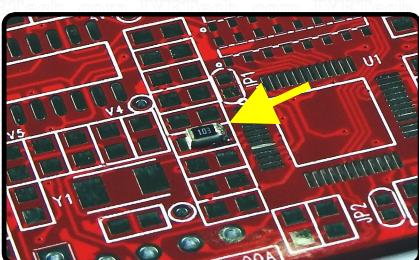
### Tools required

- 1 20 - 25W iron with sharp tip (ideally with about 1mm diameter)
- 2 Rosin core solder wire in 0.3 - 0.5mm diameter
- 3 Tweezers
- 4 Wire cutter
- 5 Needle nose pliers
- 6 Phillips screwdriver, #0
- 7 Digital multi-meter
- 8 USB cable with micro-USB plug

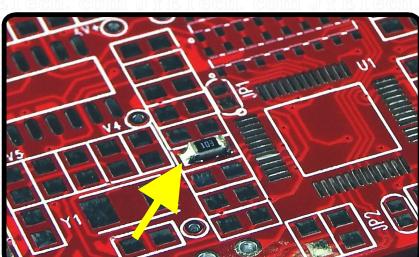
### How to solder SMD parts



Apply solder to one of the pads where the component is to be soldered to

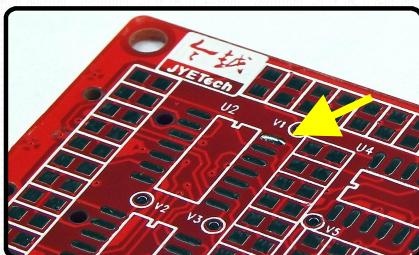


Hold the component to the pads with tweezers. Solder the end where solder has been applied.

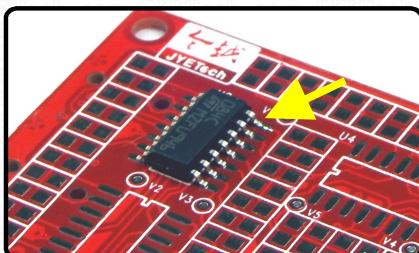


Solder the other end

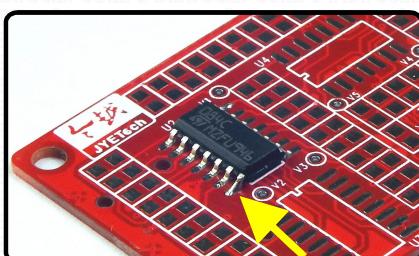
## Solder components with multiple pins



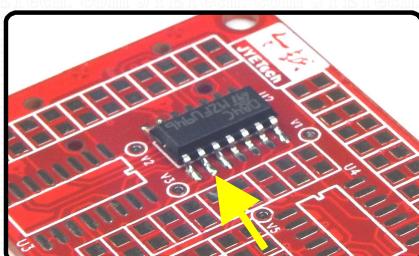
Apply solder to one of the pads where the component is to be soldered to. Usually select a pad that is at a corner



Carefully align all the pins of the component to the pads . Solder the pin to the pad where solder has been applied to.

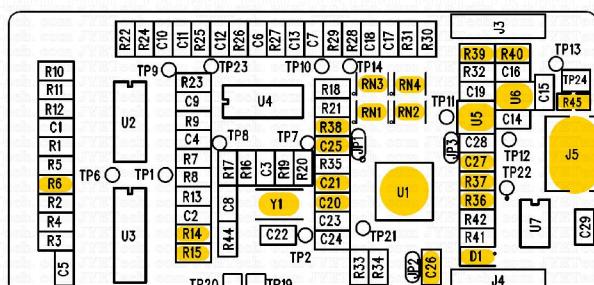


Solder the pin at the opposite corner. Make sure all the pins are well aligned to their corresponding pads.



Solder the rest pins one by one.

## Component locations



The highlighted components have been pre-soldered to the PCB. All the rest components are to be soldered by users.

# Assembly

## 1 Solder ICs

Part Type/Value	Mount Location
<b>TL084</b>	<b>U2, U4</b>
<b>74HC4053</b>	<b>U3</b>
<b>CH340N</b>	<b>U7</b>

## 2 Solder resistors

Part Type/Value	Mount Location
<b>10 Ω</b>	<b>R31, R32</b>
<b>51 Ω</b>	<b>R21</b>
<b>150 Ω</b>	<b>R1, R4, R30</b>
<b>470 Ω</b>	<b>R10, R35, R41</b>
<b>1K Ω</b>	<b>R2, R3, R5, R7, R8, R9, R11, R12, R13, R22</b>
<b>5.1K Ω</b>	<b>R19, R20, R33, R34, R42, R17</b>
<b>10K Ω</b>	<b>R23, R27, R28, R16</b>
<b>22K Ω</b>	<b>R25, R26, R24, R44</b>
<b>100K Ω</b>	<b>R18, R29</b>

**Note:** The packages of the resistors can be 0805 or 0603. Their tolerance is 1%.

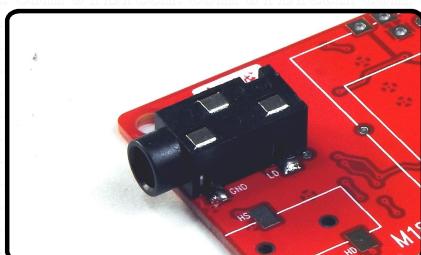
## 3 Solder capacitors

Part Type/Value	Mount Location
<b>0.01 μ F</b>	<b>C7, C9, C11, C12, C13</b>
<b>0.1 μ F</b>	<b>C1, C2, C3, C4, C5, C6, C8, C10, C22, C23, C28, C29</b>
<b>10 μ F</b>	<b>C14, C15, C16, C17, C18, C19, C24</b>

**Note:** The packages of the capacitors can be 0805 or 0603. Their tolerance is 20%.

## 4 Solder connectors

Part Type/Value	Mount Location
<b>Phone jack, 3.5mm, PJ302B</b>	<b>J1, J2</b>



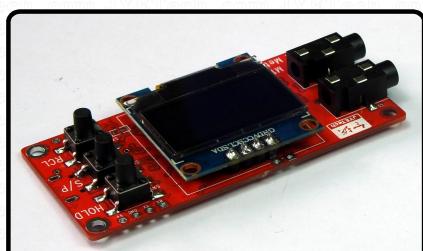
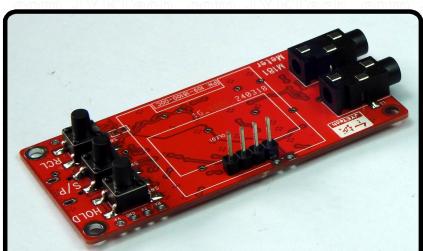
## 5 Solder buttons

Part Type/Value	Mount Location
<b>Tact button, 6x6x9mm, SMD</b>	<b>SW1, SW2, Sw3</b>

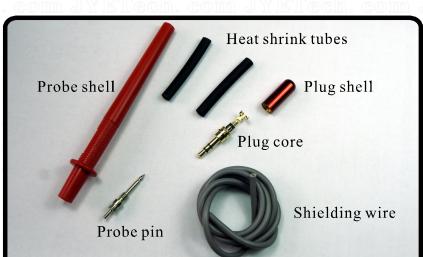


## 6 Solder OLED

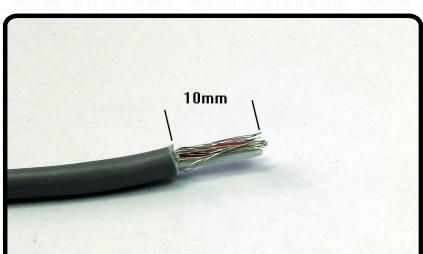
Part Type/Value	Mount Location
OLED, 0.96", blue	OLED1



## 7 Assemble probes

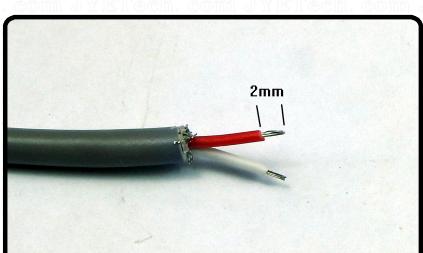


### Parts required to make one probe

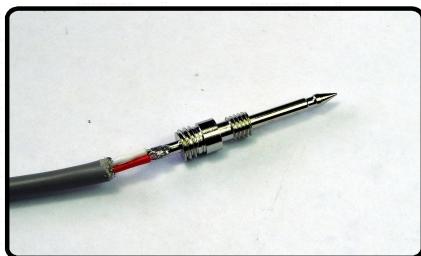


At one end of the shielding wire, remove 10mm of the outer tube.

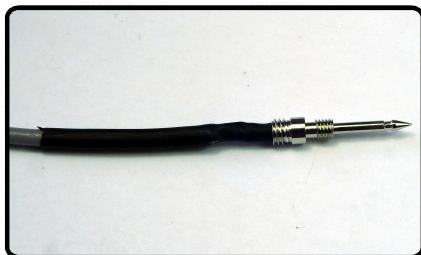
Do not damage the internal wires.



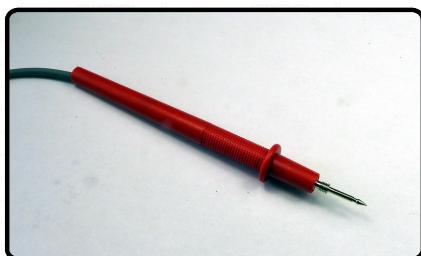
Cut the shielding meshes that have been exposed. Remove 2mm of the insulation layer of the two internal wires.



Merge the two internal wires and solder them to the probe pin



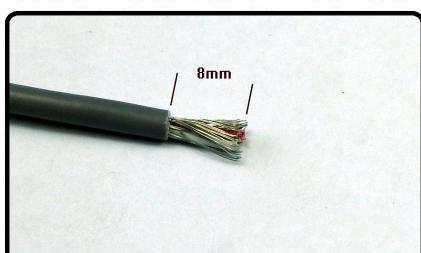
Sleeve one of the heat shrink tubes to a place so as the soldered joint is fully covered. Use a hair drier to heat up the tube so that it tightly wraps the joint and the shielding wire.



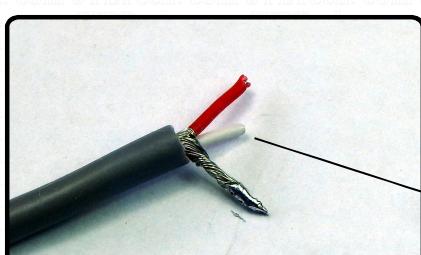
Put the shielding wire through the probe shell. Screw the probe pin into the probe shell. Now one end of the probe is down.



Before assemble the other end of the probe, Sleeve in the plug shell and another heat shrink tube to the shielding wire (see photo). Pay attention to the direction of the plug shell.

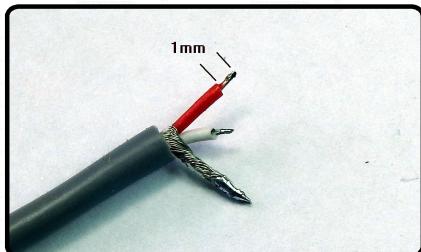


Remove 8mm outer tube of the shielding wire. Do not damage the shielding meshes and the internal wires.

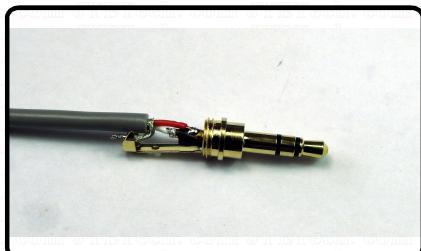


Move the exposed shielding meshes to one side. Twist the straids together and apply solder to prevent them from getting lose.

Cut the white wire off by 2mm



Remove about 1mm of the insulation layer on each of the internal wire. Apply solder.



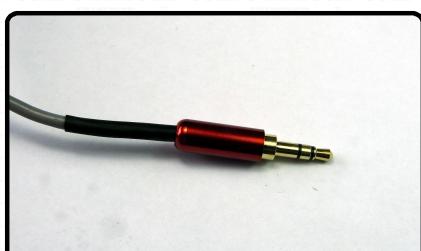
Solder the two internal wire to the plug core as shown in the photo.



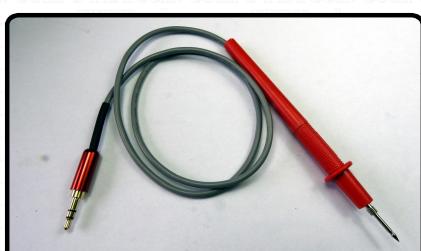
Put the shielding wire and the exposed shielding meshes between the two clip arms of the plug core. Clamp the two clips with pliers so that they clamp on shielding wire tightly. Make sure the exposed shielding meshes are held under the clip arms.



Shift the heat shrink tube that has been sleeved in earlier to cover the soldering joints. Use a hair drier to heat up the tube so that it tightly wraps the joints and the shielding wire.



Screw up the plug shell with the plug core.



One probe is down.

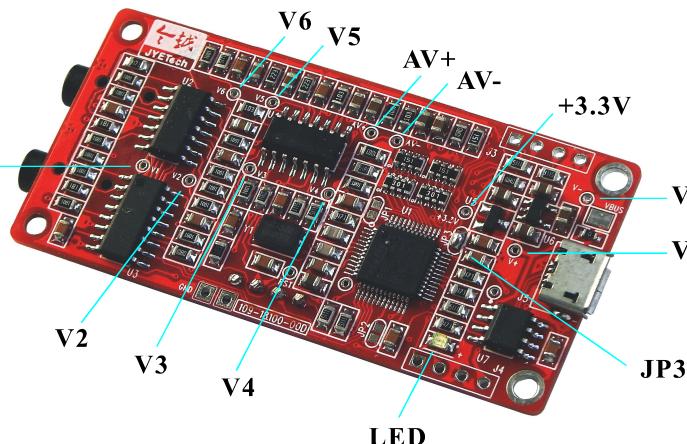
Follow the same procedures to assemble the other probe.

# Power up test

## Check power supply voltages

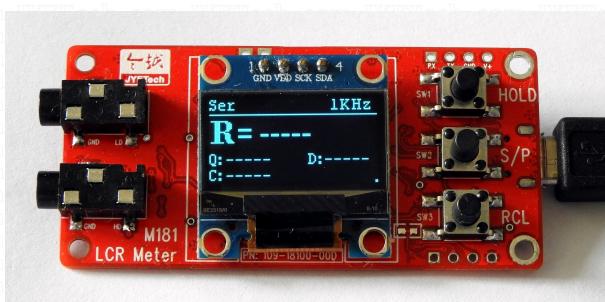
Connect the circuit board to a USB power supply. Measure the voltages at the test points given in the table below. Compare their values to the references given. Ensure that they meet the requirements.

Test Points	References	Remarks
V+	+5.05V	This value depends on the power supply. It should be around +5V.
AV+	+4.91V	This value depends on V+. It should be higher than +4V.
V-	-4.53V	Due to the difference in V+ and the parts used these values vary.
AV-	-4.39V	They are good as long as AV- is lower (more negative) than -3.5V.
3.3V	+3.32V	This value is normal if it is within $+3.3V \pm 2\%$ range.



## Check Display

Disconnect power supply. Short **JP3** with solder. Reconnect the power supply. Check whether the LED blinks twice when the power is applied. The OLED should first displays two splash screens that show product model, company name, and firmware version, etc. It then enters a state that has a display similar to the photo below.



## Check the voltages of the analog portion

With a multimeter, check the DC voltages of test points V1 to V6 and the AC voltages (RMS value) of V5 and V6. Compare them to the references given in the table below.

Test Points	References(DC)	References(RMS)	Remarks
<b>V1</b>	<b>0.0V</b>		
<b>V2</b>	<b>0.0V</b>		
<b>V3</b>	<b>-1.65V</b>		
<b>V4</b>	<b>+1.65V</b>		
<b>V5</b>	<b>+1.50V</b>	<b>0.88V</b>	Measured under 1KHz test signal
<b>V6</b>	<b>0.0V</b>	<b>0.20V</b>	Measured under 1KHz test signal

## Measurement tests

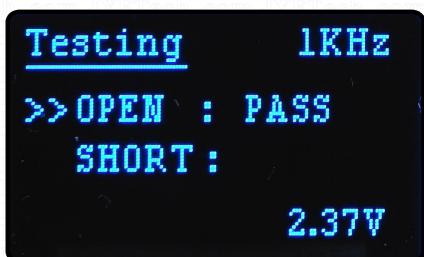
Do some measurement tests if all the above checks are good. Plug in the two probes to the jacks and connect the meter to a power supply. Use the remaining parts or your own parts to verify the meter is working correctly.

## Self Test Mode

The Self Test mode can be used to check the analog channel by verifying the signal levels.

### Enter Self Test mode

Under normal measurement state, press HOLD button to freeze display. Then hold down RCL button for about 2 seconds. The following display appears.



### Verify signal levels

Use S/P button to select Open or Short test. An arrow on the screen left indicates the selected test.

When Open test is selected, The word "Pass" should be displayed if the two pens are open. The word "Failed" should be displayed if the two pens are shorted.

When Short test is selected, The word "Pass" should be displayed if the two pens are shorted. The word "Failed" should be displayed if the two pens are open.

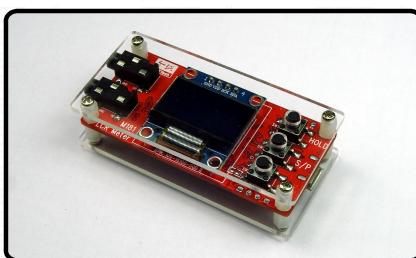
If the test results meet the requirements described above, the analog channel is good.

The RCL button can be used to switch signal frequency between 1KHz and 100Hz so as the tests can be carried out for each frequency.

## Assemble the Panels



First screw the nylon standoffs to the four corners of the circuit board.



Please make sure that the shorter standoffs are on the side where the screen locates.

Attach the panels to the nylon standoffs with 8 M2x4 screws (provided).

## Technical Support

Need help? Please send your questions to [jyetek@gmail.com](mailto:jyetek@gmail.com). Or you can post your questions to the forum at <https://forum.jyetech.com>.