

HU-053 电容电感频率表套件

Original 核芯风暴智能科技 核芯风暴 2023年12月02日 09:54

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HU-053 电容电感频率表套件

Capacitance and inductance frequency meter kit

I、功能介绍 Function introduction

- 1、可以测量无极性电容
- 2、可以测量有极性电容
- 3、可以测量电感
- 4、可以测量频率

1. Non-polar capacitance can be measured

2, can measure polar capacitance

3, can measure the inductance

4, can measure the frequency

II、套件特性 Kit characteristics

1、由专用电路板、LCD1602、单片机等部件组成

2、无极性电容测量范围1pF~2200pF

3、有极性电容测量范围1uF~12000uF

4、电感测量范围1uH~1H

6、频率测量范围 20Hz~400KHz

7、电源：USB供电 直流5V

8、工作电压：5V

9、工作电流：空载小于50mA

10、PCB长度：91x90mm，纯手工测量，有1~2mm误差

11、外壳长度：106x90mm，纯手工测量，有1~2mm误差

1, by the special circuit board, LCD1602, MCU and other components

2, non-polar capacitance measurement range 1pF~2200pF

3, polar capacitance measurement range 1uF~12000uF

4, inductance measurement range 1uH~1H

6, frequency measurement range 20Hz~400KHz

7, Power supply: USB power supply DC 5V

8. Working voltage: 5V

9, working current: no load less than 50mA

10, PCB length: 91x90mm, pure manual measurement, there is 1~2mm error

11, shell length: 106x90mm, pure manual measurement, there is an error of 1~2mm

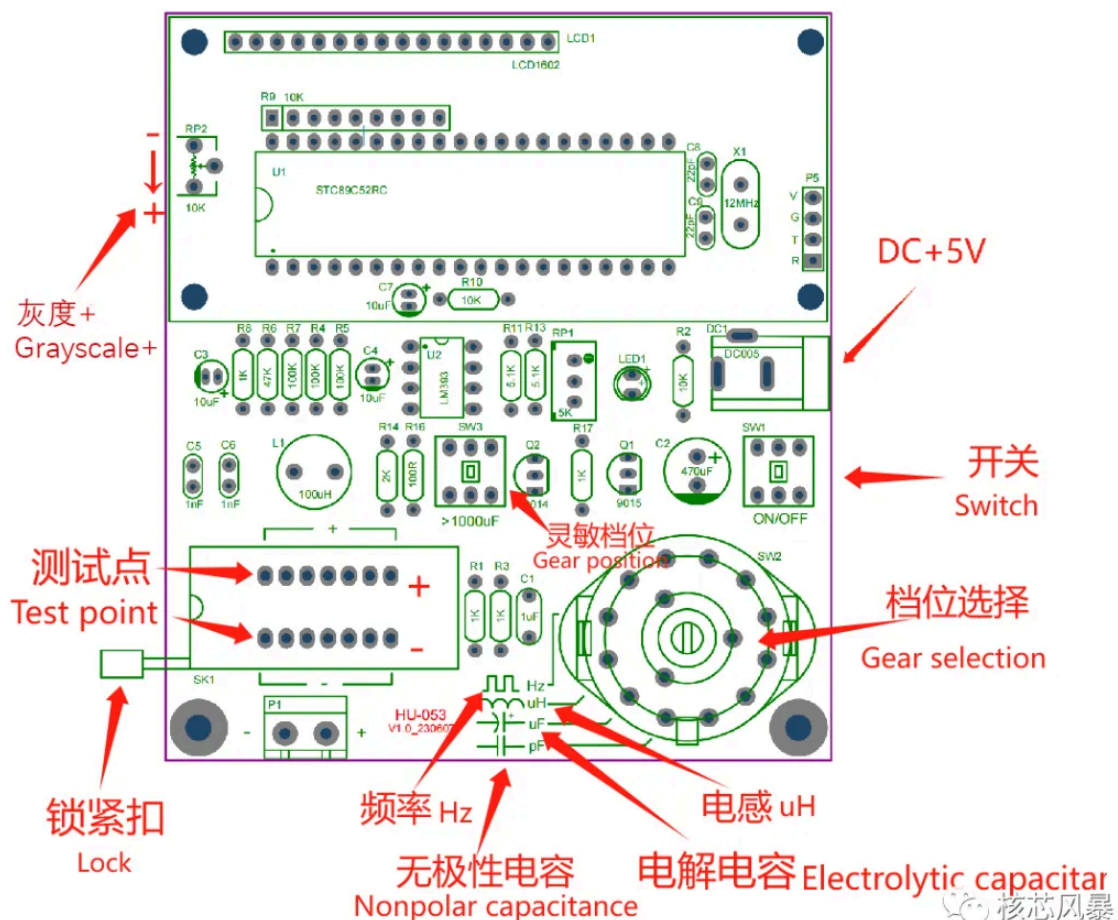
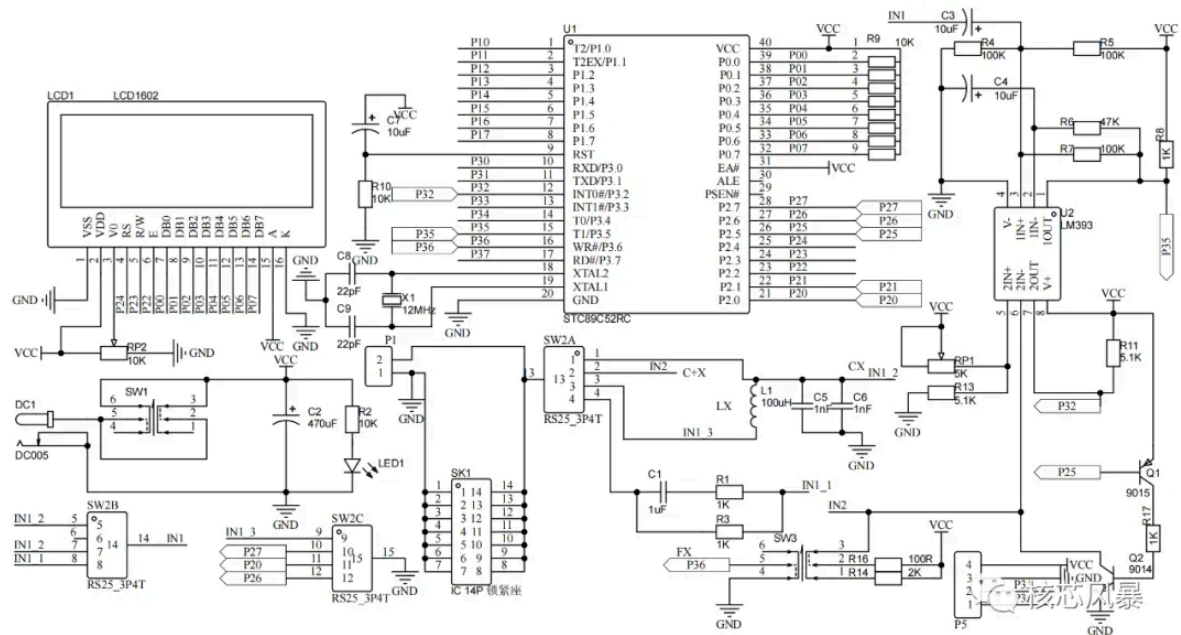
III. 元件清单BOM

序号	名称	Name	标号 /Label	数量/ Number	备注/ Note
1	独石电容 105	Monolithic capacitor 105	C1	1	无极性
2	瓷片电容 102	Chip capacitance 102	C5, C6	2	Nonpolarity
3	瓷片电容 22pF	Chip capacitance 22pF	C8, C9	2	
4	3mm 红发红直插LED	3mm red red plug-in LED	LED1	1	引脚:长正短负
5	直插电解电容 470uF	DIP E-capacitor 470uF	C2	1	Pin length: Long + and short-
6	直插电解电容 10uF	DIP E-capacitor 10uF	C3, C4, C7	3	
7	5.5*2.1MM DC电源插座	5.5*2.1MM DC power socket	DC1	1	
8	LCD1602 液晶屏 5V 黄	LCD1602 screen 5V yellow	LCD1602	1	
9	1*16单排母座 2.54mm	1*16 single row bus 2.54mm	LCD1	1	
10	1*16P排针 2.54mm	1*16P stitch 2.54mm	LCD1602	1	
11	5mm 蓝色接线端子 2P	5mm blue terminal 2P	P1	1	
12	直插三极管 9015	DIP triode 9015	Q1	1	缺口方向
13	直插三极管 9014	DIP triode 9014	Q2	1	Notch direction
14	工字电感 100uH	Inductance 100uH	L1	1	无极性
15	直插电阻 100Ω	DIP resistor 100Ω	R16	1	Nonpolarity

16	直插电阻 1k	DIP resistor 1K	R1, R3, R8, R1 7	4	
17	直插电阻 2K	DIP resistor 2K	R14	1	
18	直插电阻 5.1K	DIP resistor 5.1 K	R11, R 13	2	
19	直插电阻 10k	DIP resistor 10K	R2, R1 0	2	
20	直插电阻 47K	DIP resistor 47K	R6	1	
21	直插电阻 100K	DIP resistor 100 K	R4, R5, R7	3	
22	9脚直插排阻 1 0K	9 Pin DIP inserti on 10K	R16	1	
23	滑动变阻器 5K	Sliding rheostat 5K	RP1	1	
24	立式 可调电阻 1 0K	Vertical potenti ometer 10K	RP2	1	
25	直插自锁开关	DIP self-locking switch	SW1, S W3	2	
26	换档位旋转开关	Shift position ro tary switch	SW2	1	
27	直插无源晶振 1 2MHz	DIP passive crys tal 12MHz	X1	1	
28	主控芯片STC89 C52RC	Main control chi p STC89C52RC	U1	1	
29	测试座	Test stand	SK1	1	
30	驱动芯片 LM39 3P	Driver chip LM3 93P	U2	1	
31	IC座 直插 8P	DIP iC seat 8P	U1	1	
32	IC座 直插 40P	DIP iC seat 40P	U2	1	
33	黄色自锁开关帽	Yellow self-locki ng switch cap	SW1, S W3	2	
34	蓝色旋转开关帽	Blue rotary swit ch cap	SW2	1	
35	USB转DC电源线	USB to DC powe r cable		1	

36	外壳	shell		1	
37	螺丝包	Screw bag		1	
38	电路板	PCB		1	
39	说明书	Manual		1	

IV. 电路原理&元件分布图 Schematic&Component map

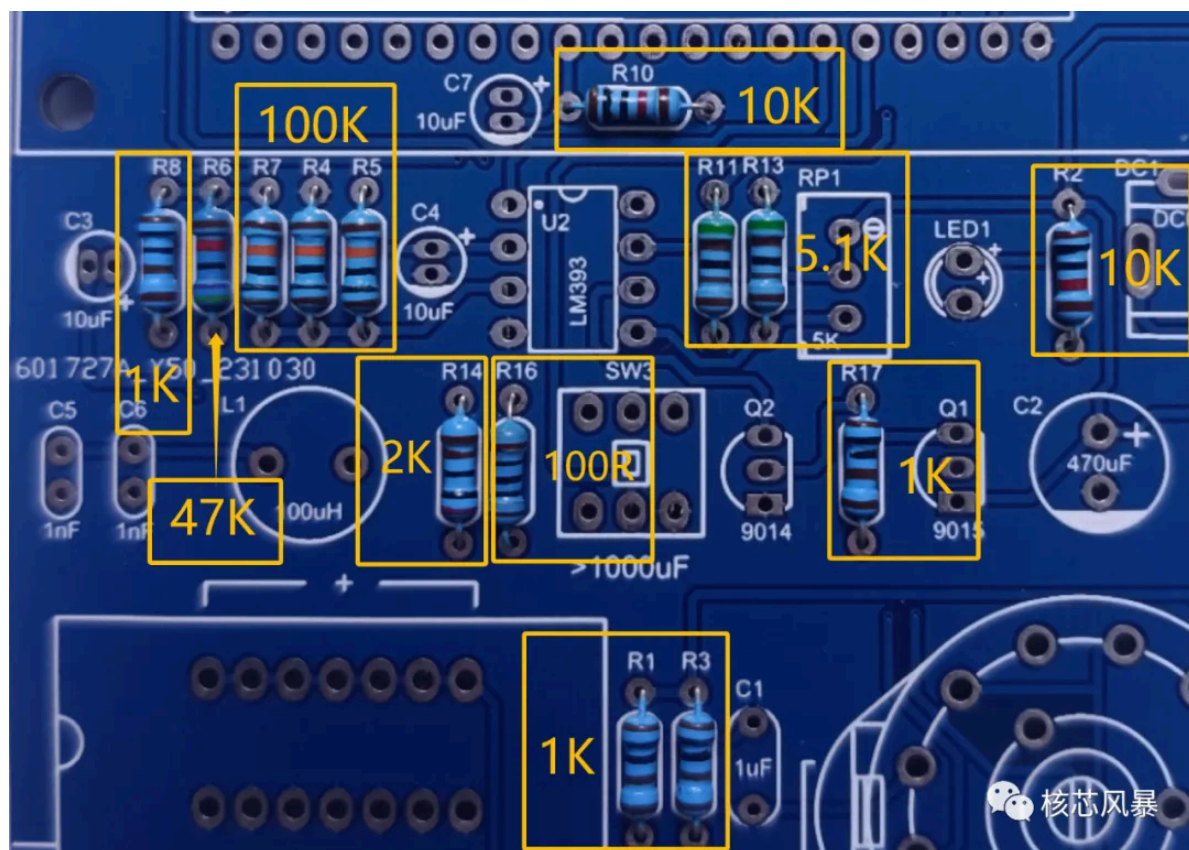


V. 焊接及安装 Welding and installation

(1) 焊接部分(Welding part)：

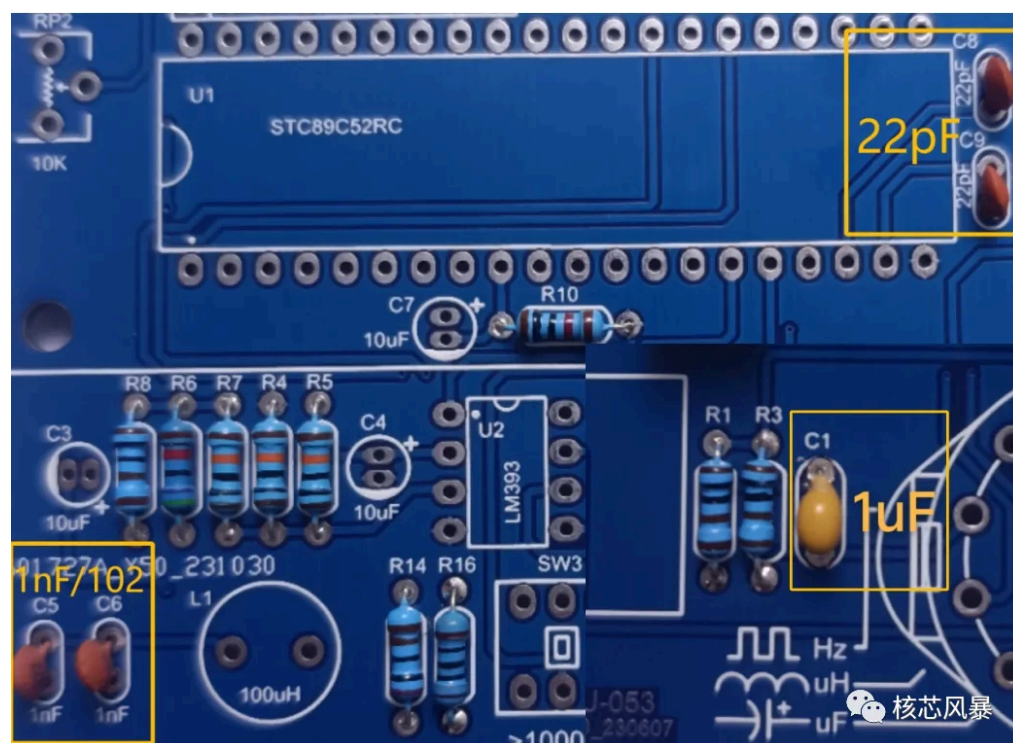
1.焊接直插电阻1K、2K、5.1K、10K、47K、100K、100Ω。

Welding resistance in line 1K, 2K, 5.1K, 10K, 47K, 100K, 100Ω.



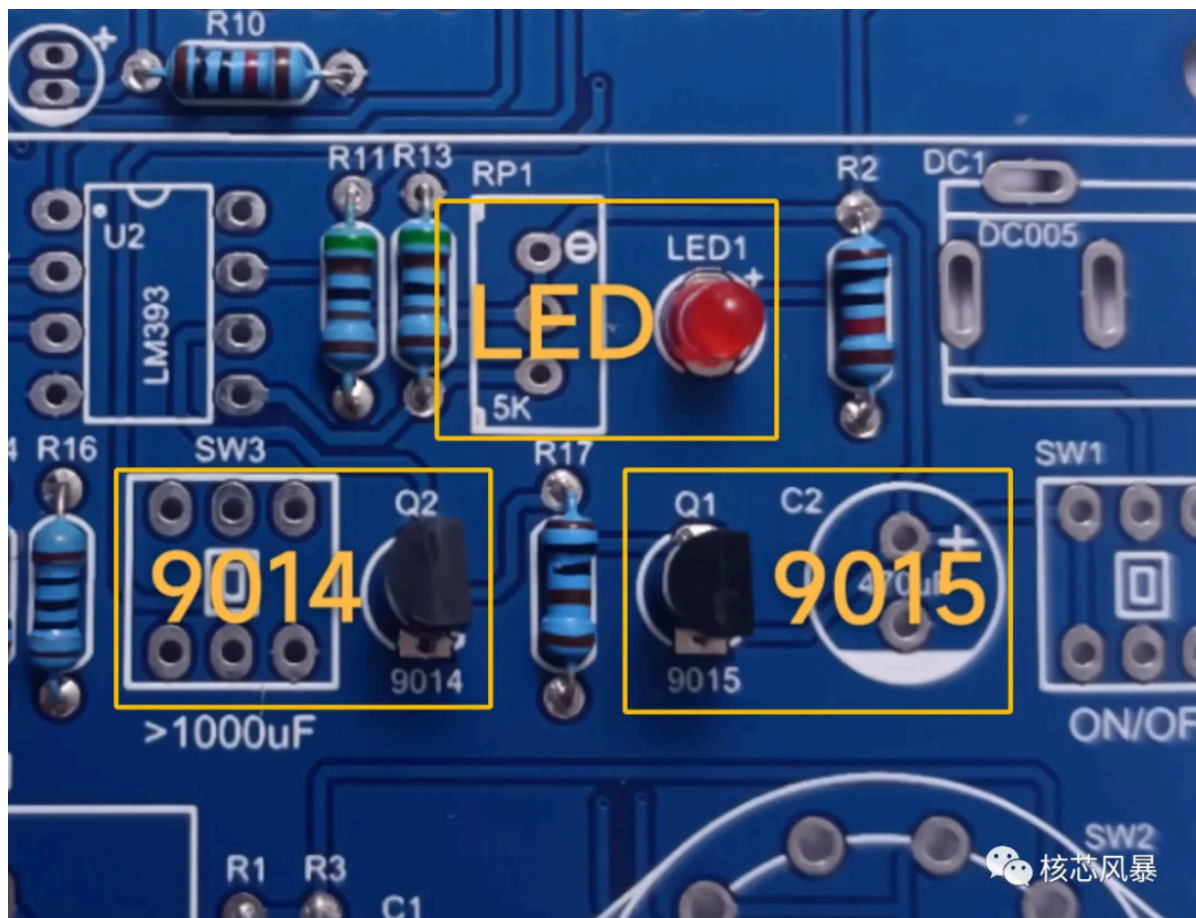
2.焊接瓷片电容1nF、22pF和105/1uF独石电容。

Welding chip capacitors 1nF, 22pF and 105/1uF monolithic capacitor.



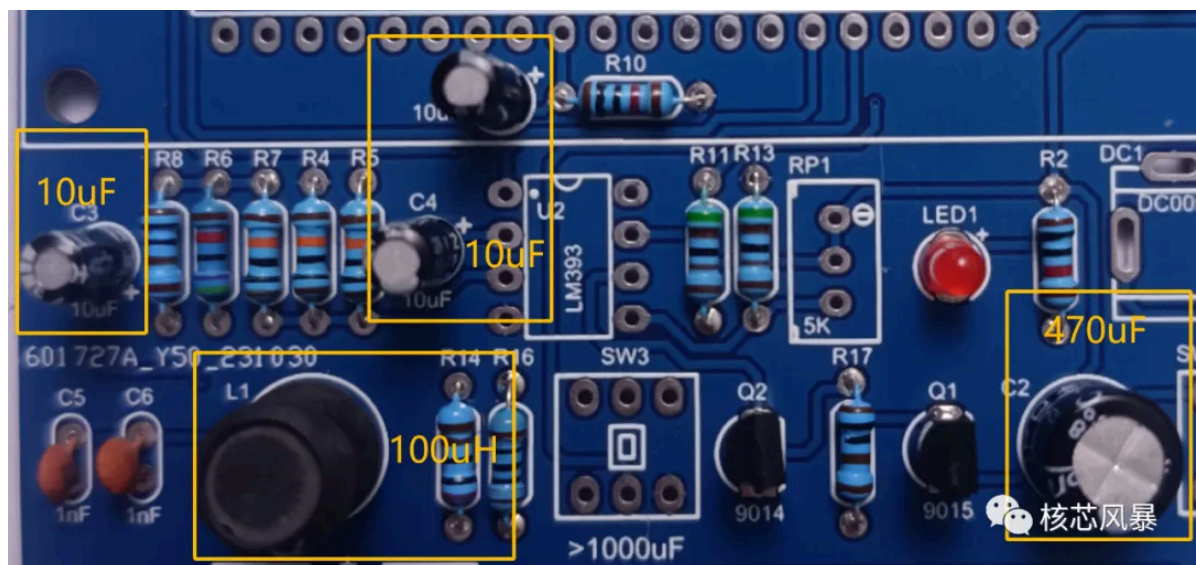
3.焊接红色LED灯、9014、9015三极管。

Welding red LED light, 9014, 9015 triode.



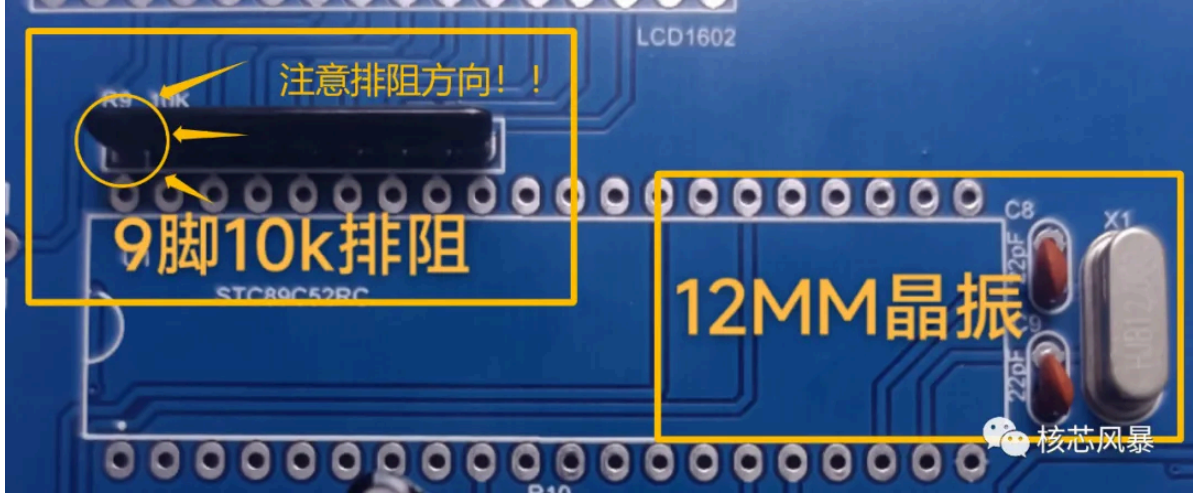
4.焊接10uF、470uF电解电容和100uH工字电感。

Welding 10uF, 470uF electrolytic capacitors and 100uH I-inductors.



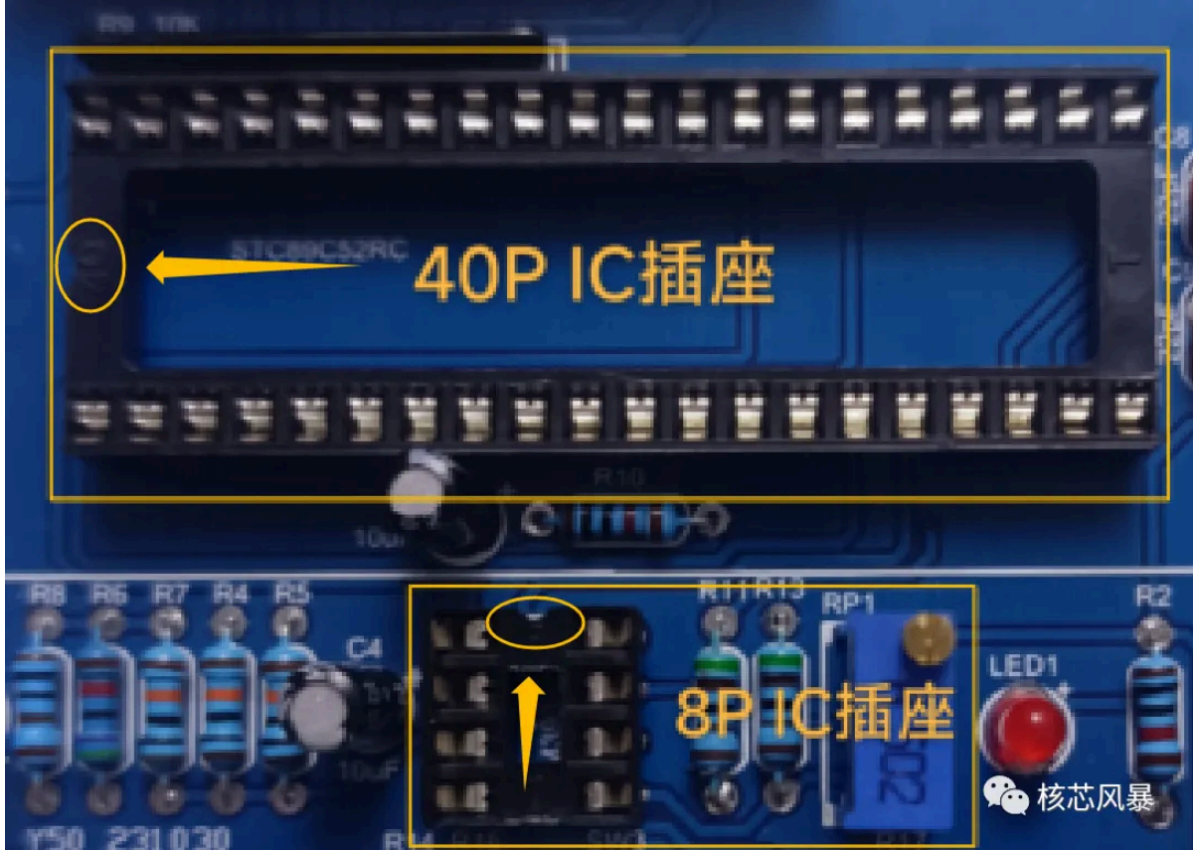
5.焊接9脚10K排阻、5K可调电阻、自锁开关和12mm晶振。注意排阻方向。

Welding 9-pin 10K exclusion, 5K adjustable resistance, self-locking switch and 12mm crystal oscillator. Note the exclusion direction.



6.焊接40P、8P的芯片插座，注意插座的缺口位置。

Weld 40P, 8P chip socket, pay attention to the socket gap position.



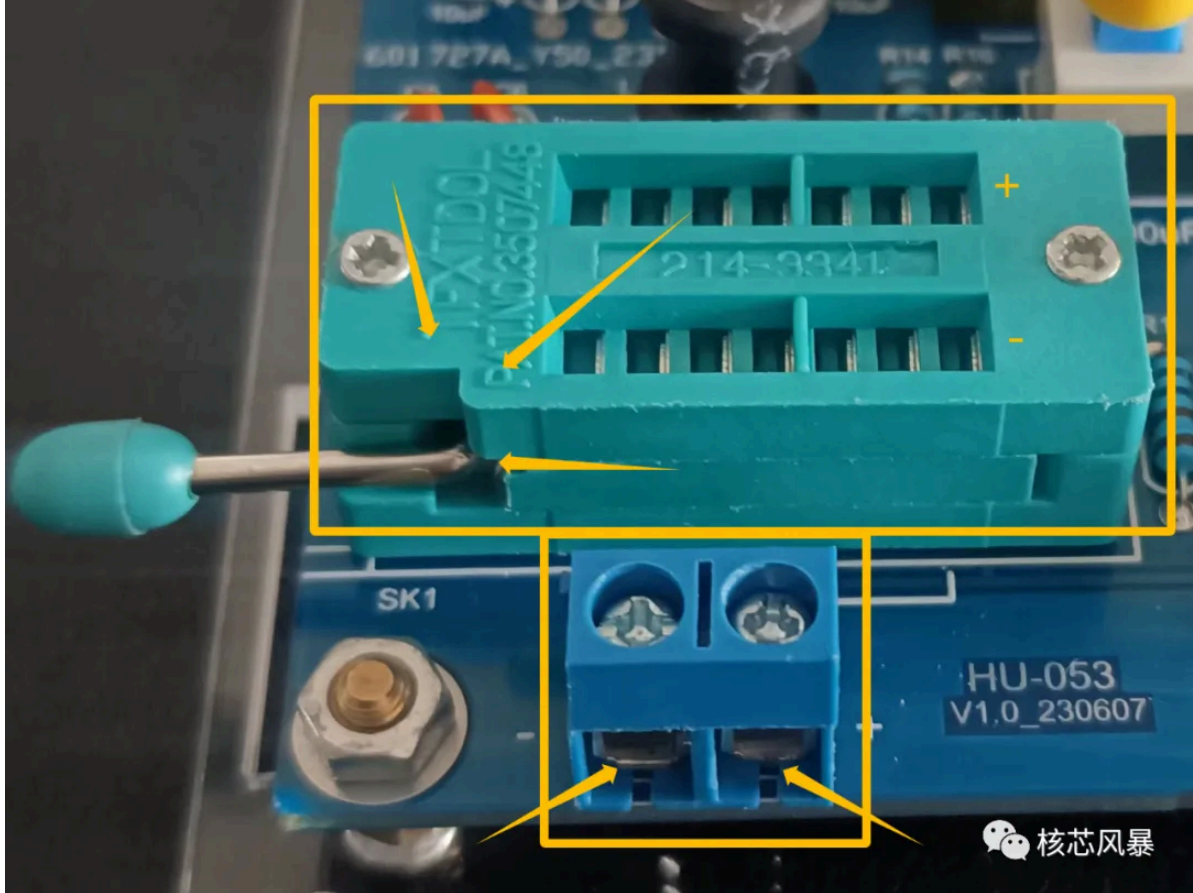
7.焊接16P排母和10K立式可调电阻。

Welding 16P busbar and 10K vertical adjustable resistance.



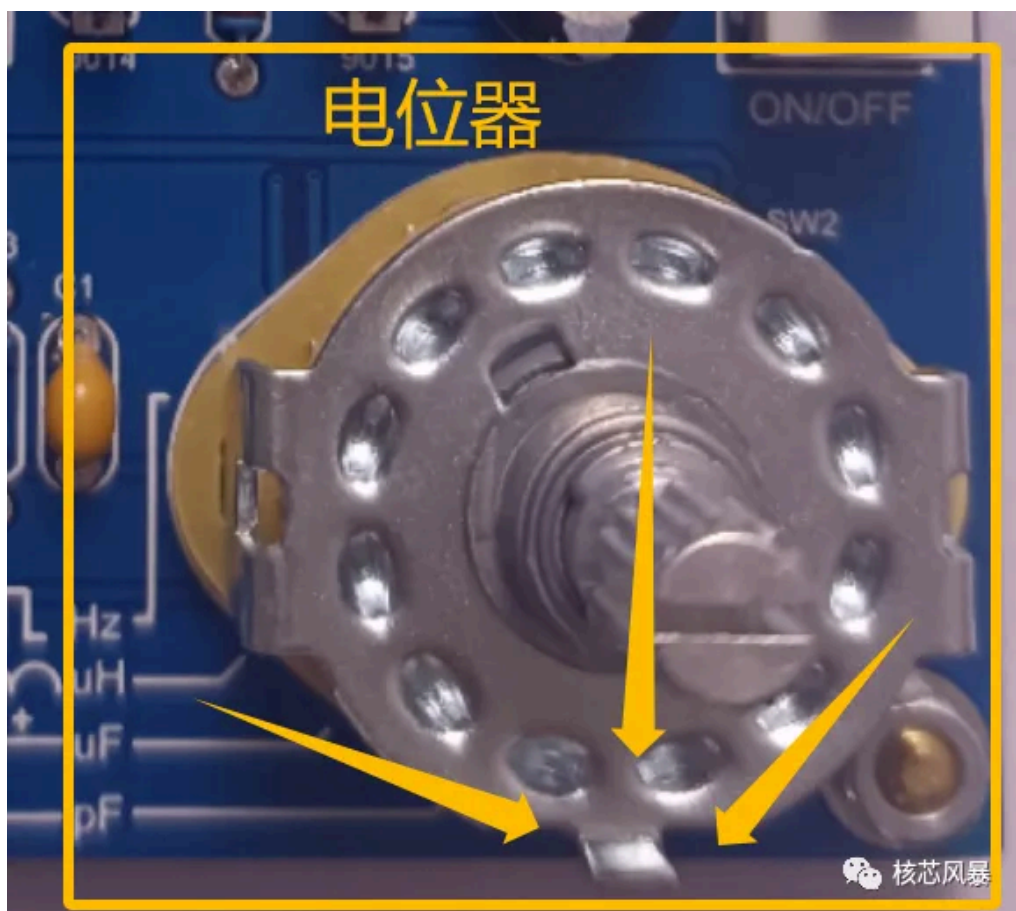
8.焊接2P接线端子、锁紧座，注意端子和锁紧座方向。

Weld the 2P terminal and lock seat, paying attention to the direction of the terminal and lock seat.



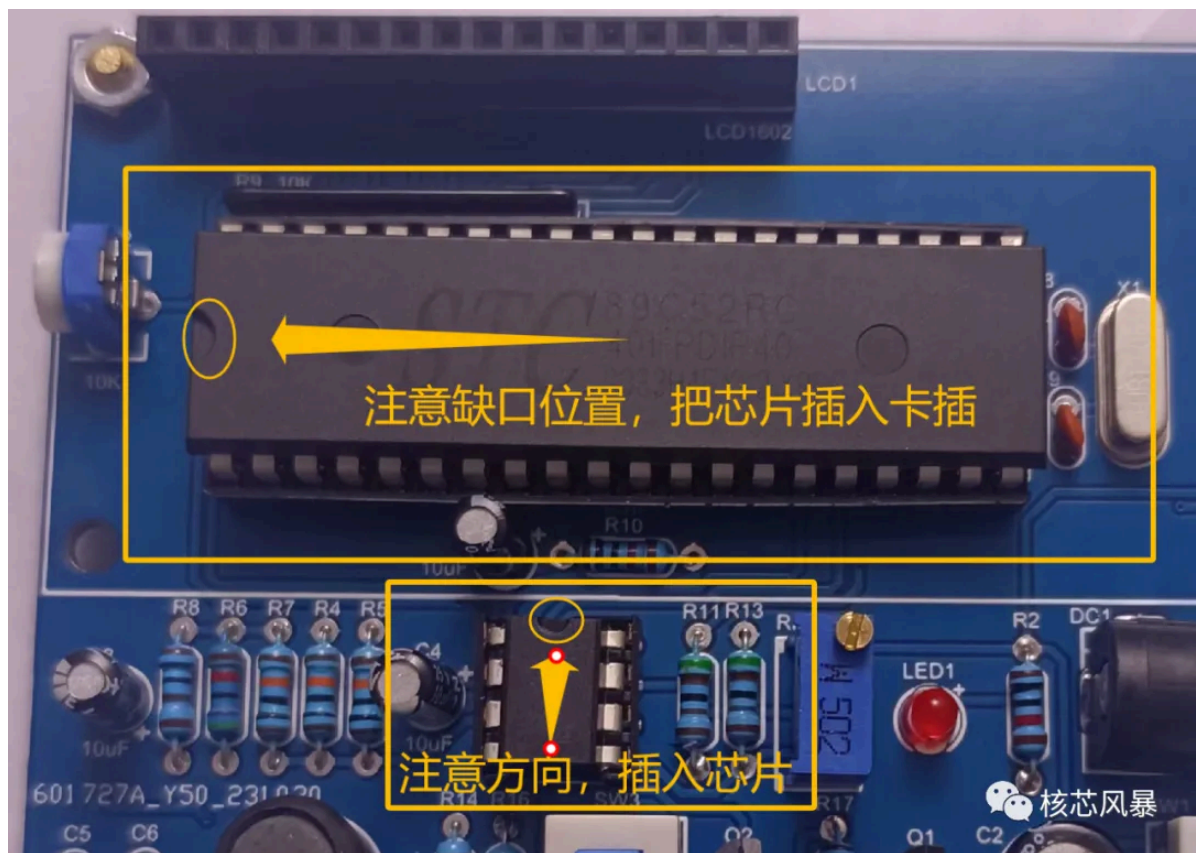
9.焊接电位器，注意方向。

Welding potentiometer, note the direction.



10.注意芯片的缺口位置，把芯片正确的插入卡插。

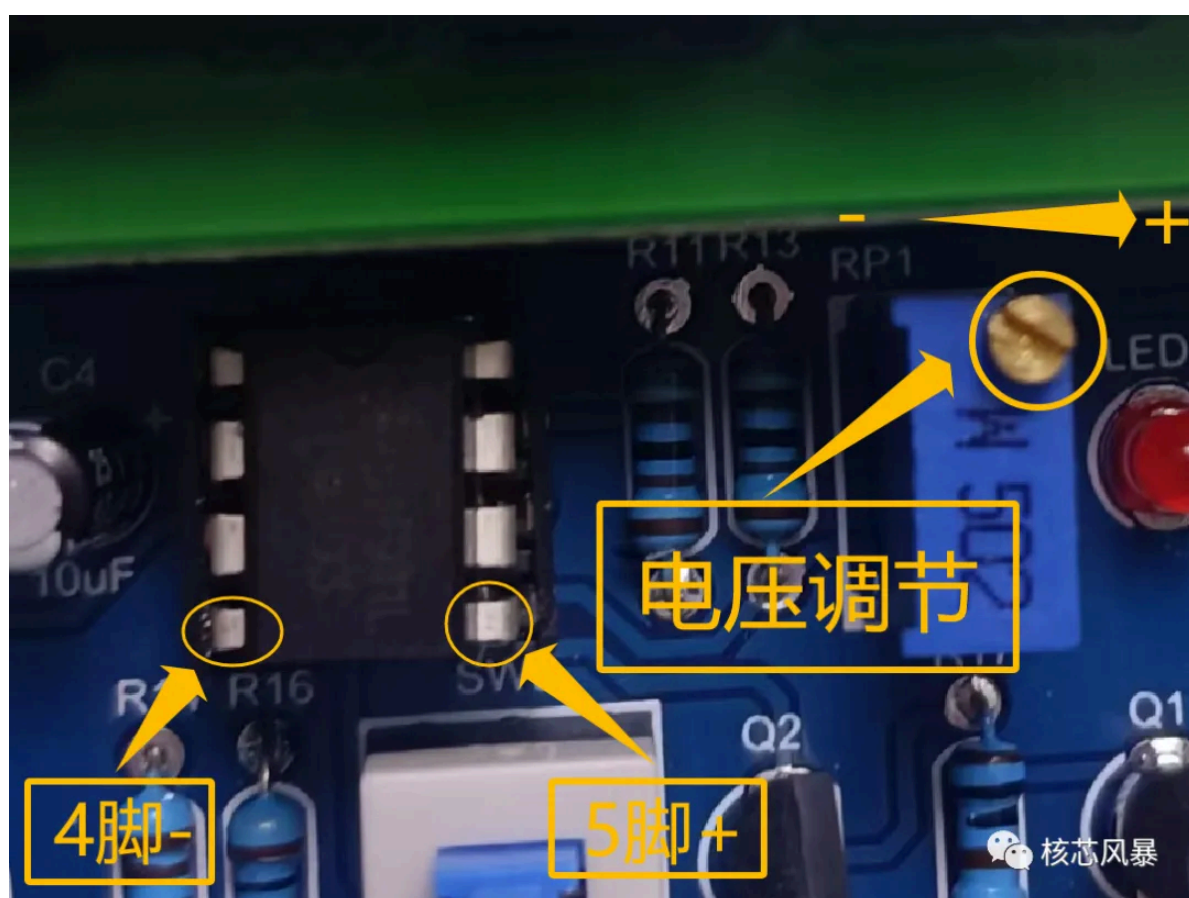
Finally, Weld the speaker wire and USB power cord.



11.焊接排针，注意对齐，不要焊歪，把屏幕插入在排母里面，注意不要插反。Weld the row pins, alignment, do not weld crooked, insert the screen inside the row, do not insert backwards.



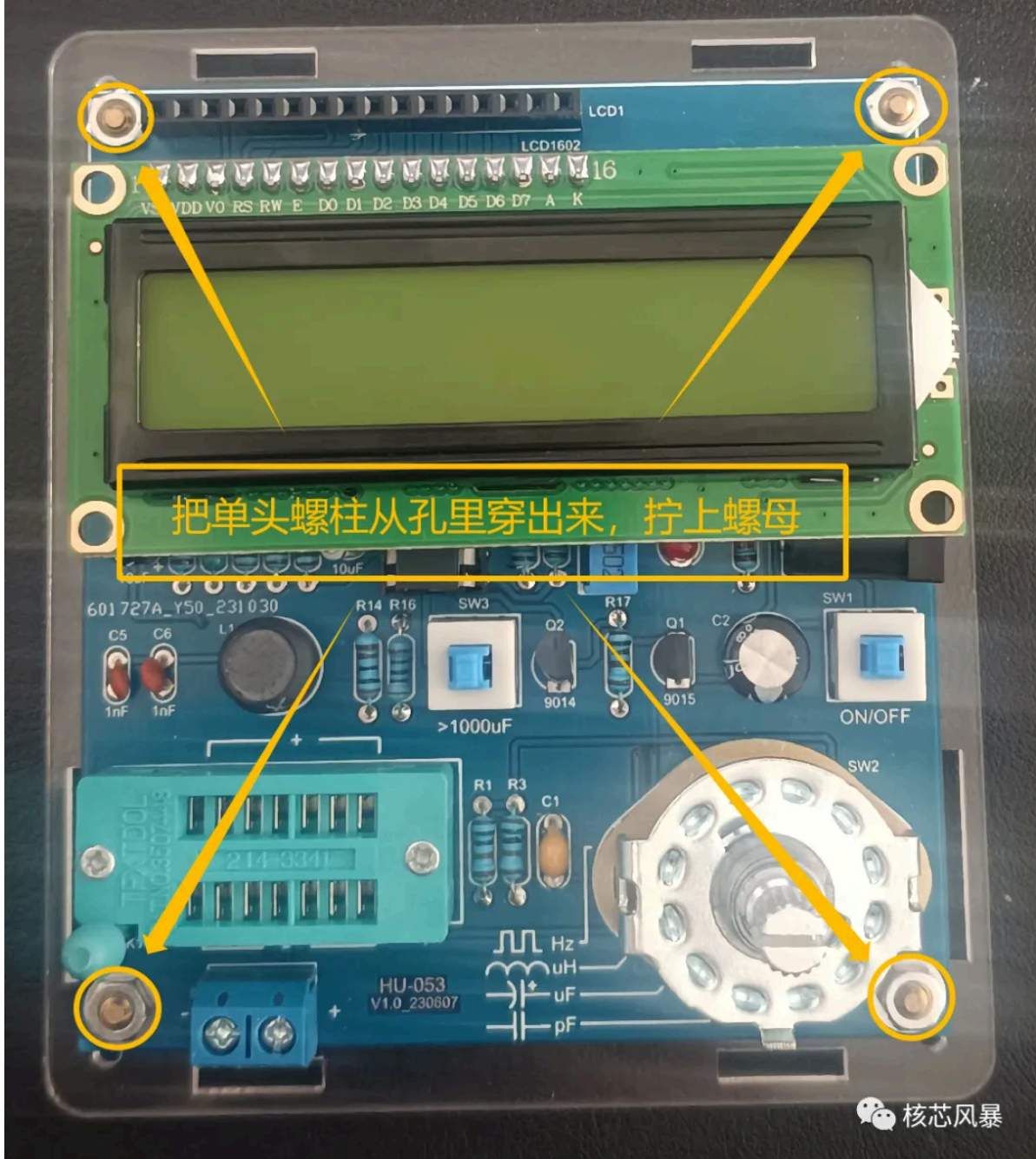
12.如果屏幕亮起，但是不显示，或者全是黑体，需要调节灰度。电容测量不准确，我们需要测量芯片4脚5脚电压，提前调节电位器，调整到3.16V左右。If the screen lights up, but does not show, or is all black body, need to adjust the gray level. Capacitance measurement is not accurate, we need to measure the chip 4 pin 5 pin voltage, adjust the potentiometer in advance, adjust to about 3.16V.



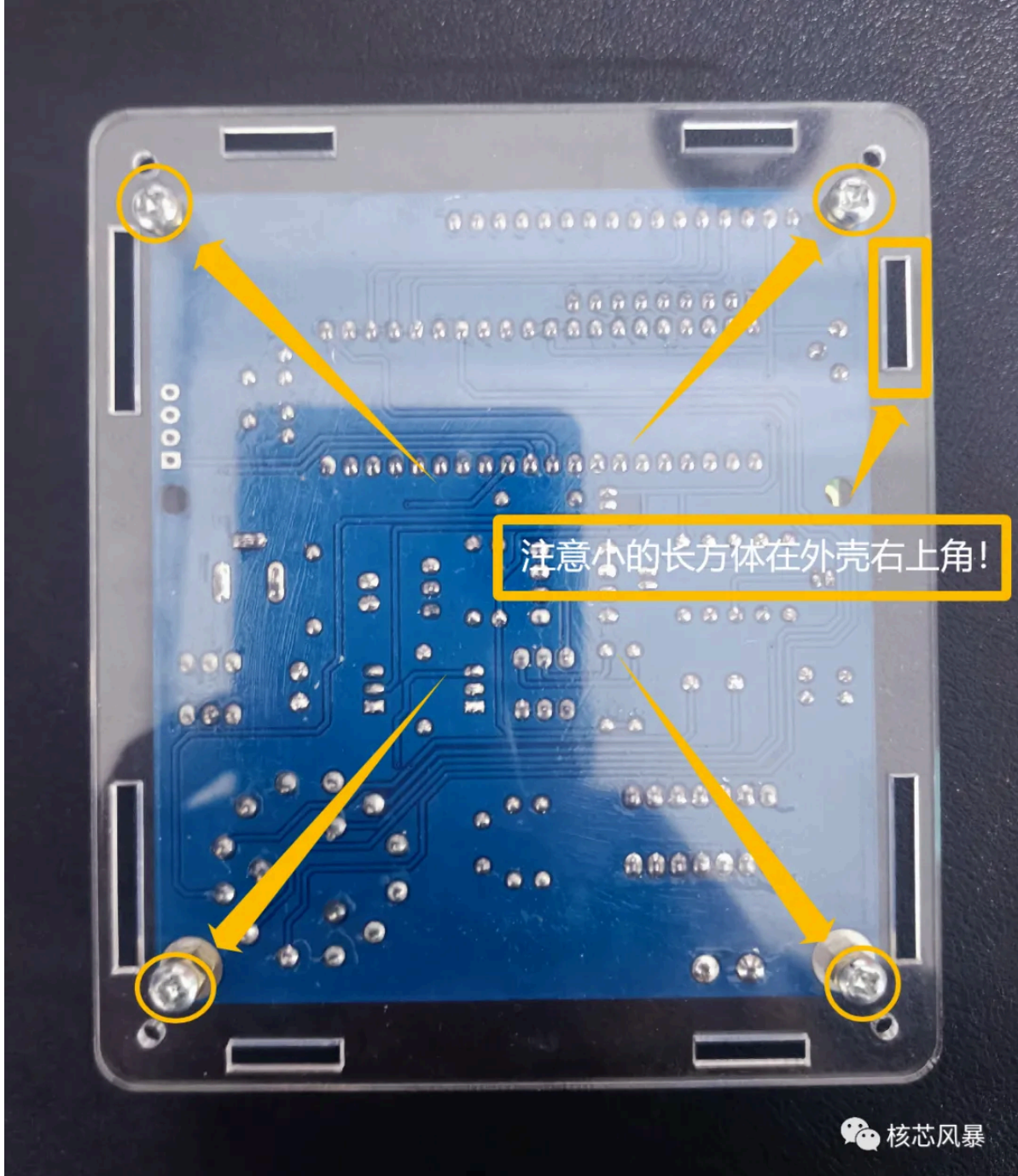
(2) 安装部分 (Mounting section) :

1. 单头铜柱、M3螺母固定电路板。

Single head copper column, M3 nut fixed circuit board.

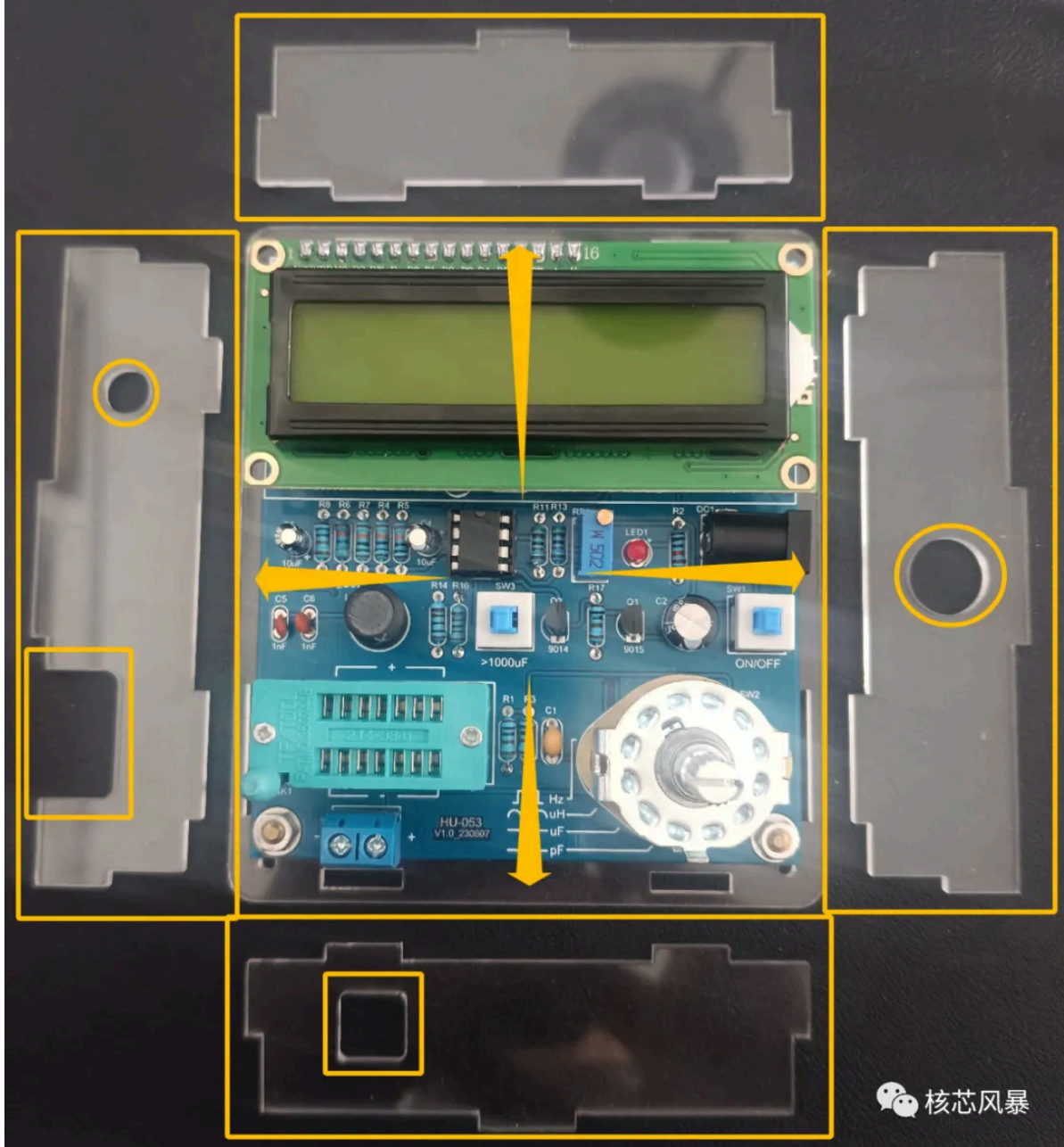


2.用M3螺丝固定在底部外壳，注意小的长方体在外壳右上角!!! Attach to the bottom shell with M3 screws, notice the small cuboid in the upper right corner of the shell!!



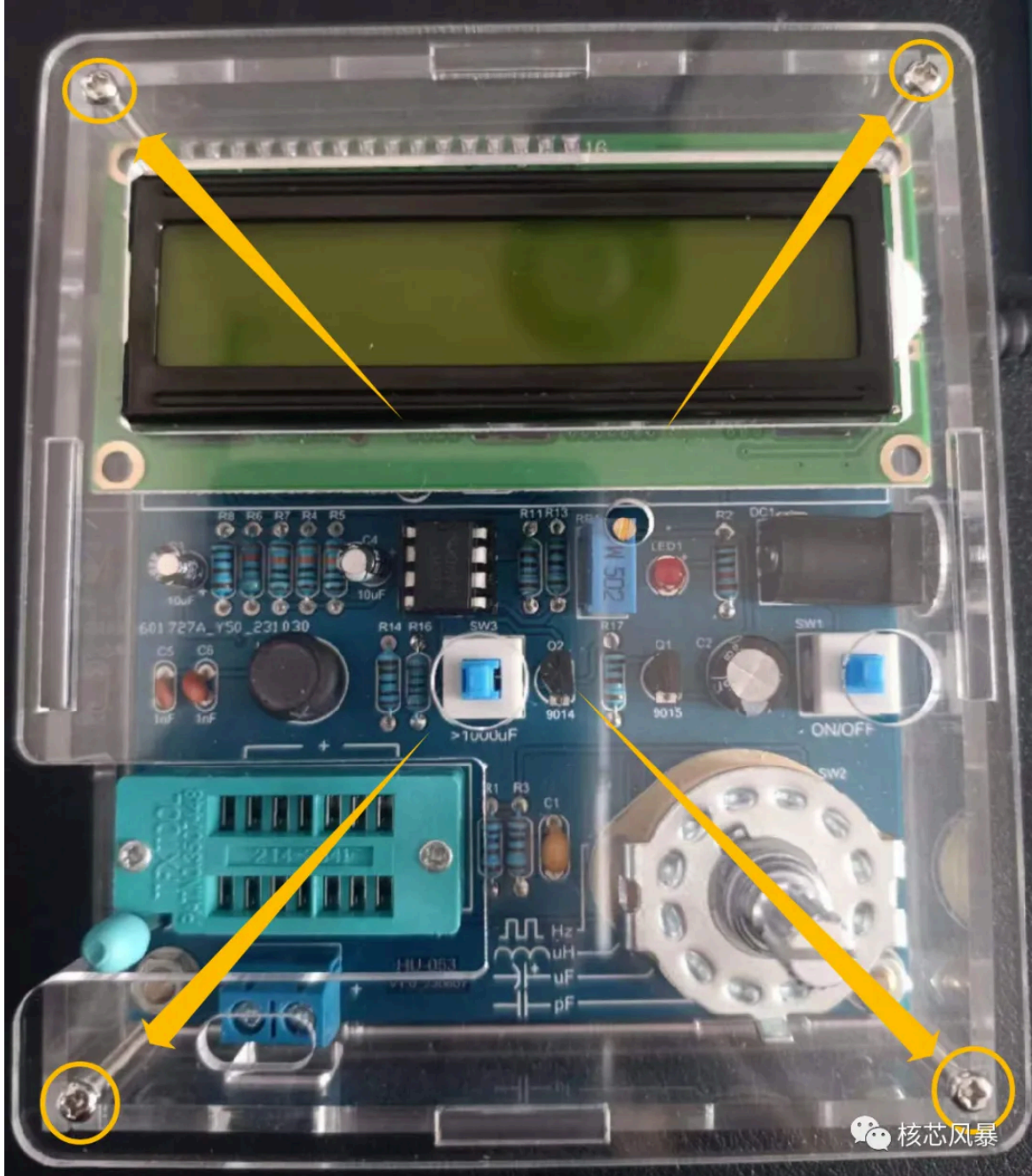
3.注意每块外壳的位置，不要放错！按位置插入即可！

Pay attention to the position of each shell, do not misplace! Insert according to the position!



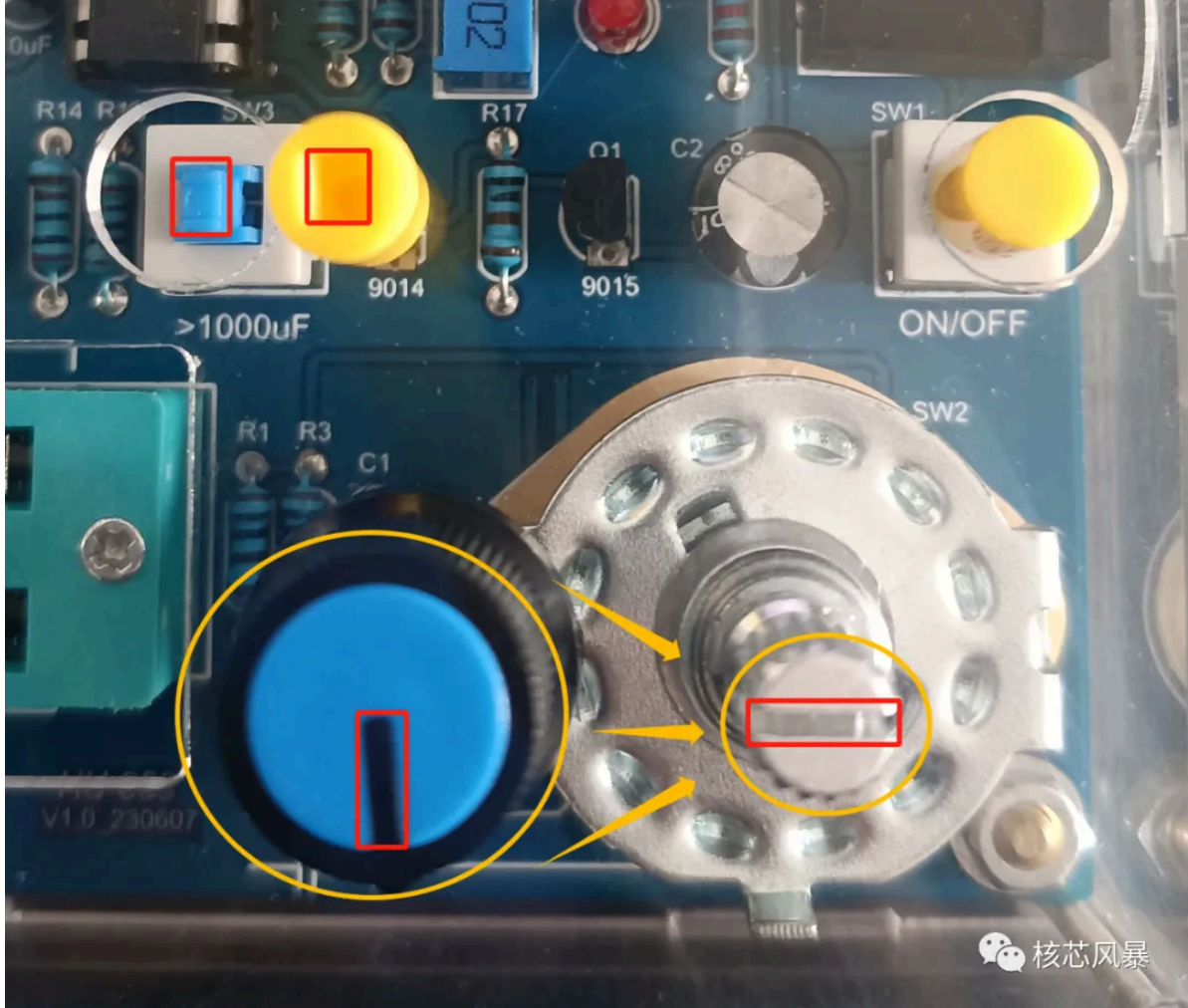
4.把M2螺丝拧到外壳底部，并用M2螺母拧紧。

Screw the M2 screw to the bottom of the housing and tighten with the M2 nut.



5.把按键帽插入对应位置，注意缺口方向！电位器旋转到水平状态，旋帽朝下，插入即可。

Insert the button cap into the corresponding position, pay attention to the notch direction! The potentiometer is rotated to a horizontal state, with the cap facing down, and inserted.

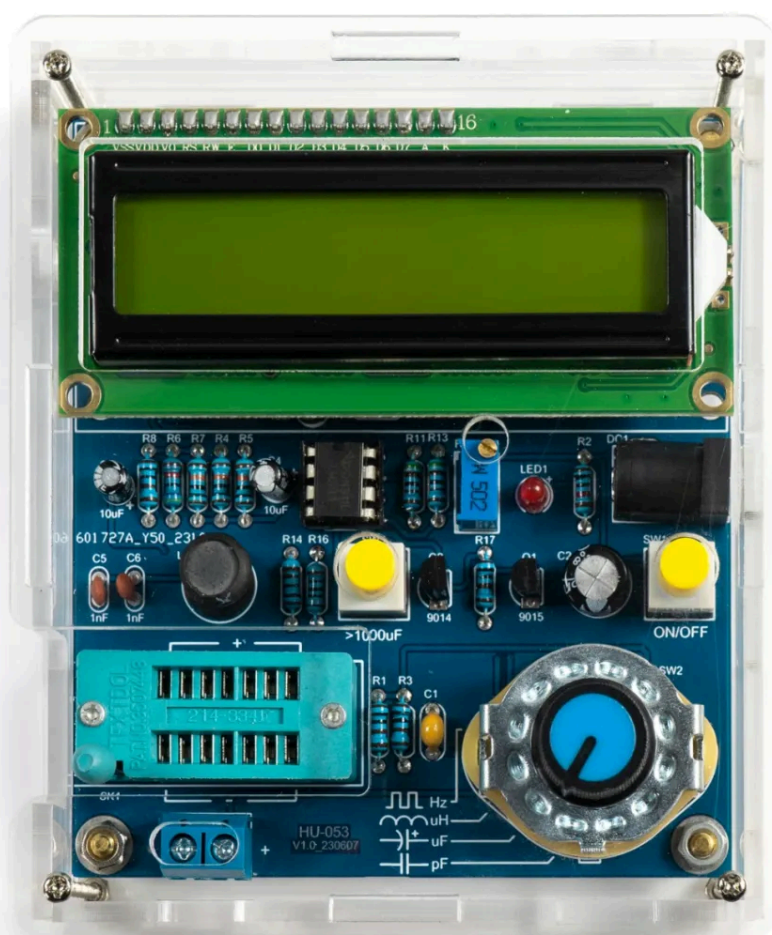


焊接组装完成展示图

Welding assembly completed display drawing



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VI、使用说明 Instructions for use

1、SW1为电源开关按键，按下为开，弹起为关。

1. SW1 is the power switch button. Press it to open, and flip it to close.

2、SW3 自锁开关功能

(1) 测量无极性电容时，SW3开关用于调零（校准）；自锁开关由弹起状态按下，开始调零（校准），调零（校准）完成后再按一下让开关弹起。

(2) 测量有极性电容时，SW3用于选择测量量程；开关自锁时，量程为大于1000uF，平常使用为弹开状态。

2, SW3 self-locking switch function

(1) When measuring non-polar capacitance, SW3 switch is used to zero (calibrate); Press the self-locking switch from the spring state to start zero adjustment (calibration), and press again to make the switch spring after the zero adjustment (calibration) is completed.

(2) When measuring polar capacitance, SW3 is used to select the measuring range; When the switch is self-locking, the range is greater than 1000uF, and it is usually used as a spring-off state.

3.校准步骤(只需操作一次)

(1)

➤不接器件，自锁开关SW3处于弹起状态，

➤挡位开关打到pF挡位

➤再开机

➤按一下SW3，等待提示complete，再按一下SW3，让SW3弹起即可

(2) 上电后，不接器件，调节RP1，使LM393第4脚和第5脚电压为3.16V。

3.Calibration steps (Only one operation)

(1)

➤no device, self-locking switch SW3 is in the spring state,

➤switch to pF gear

➤restart

➤Click SW3, wait for the prompt to complete, click SW3 again, and let SW3 spring up

(2) After the LM393 is powered on, adjust the voltage of pins 4 and 5 to 3.16V without connecting the device.



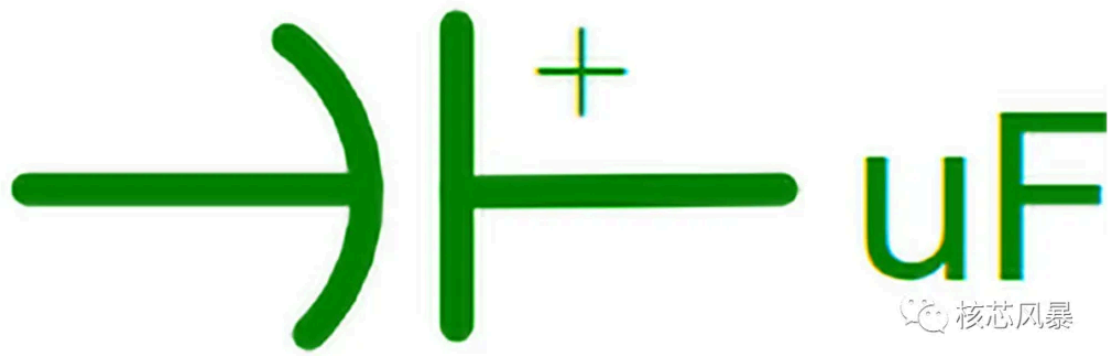
4、功能选择Function selection

旋转挡位开关，选择不同功能Rotate the gear switch to select different functions.

(1)、测量无极性电容Measure non-polar capacitance



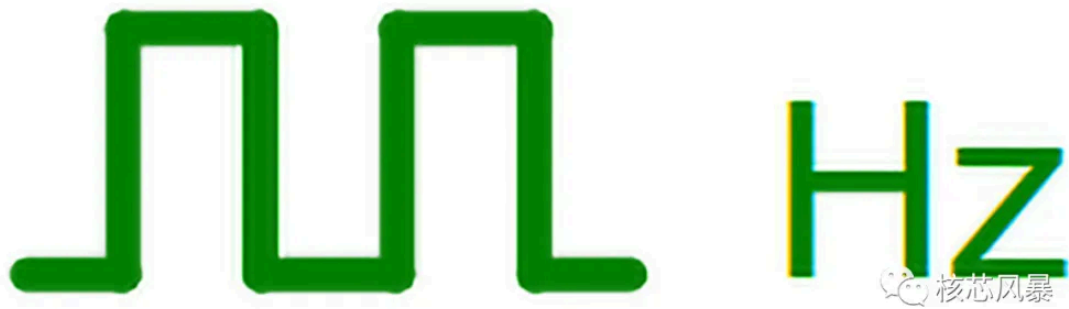
(2)、测量有极性电容Measure polar capacitance



(3)、测量电感Measuring inductance



(4)、测量频率Measurement frequency



→ 1、测量无极性电容

(1) 电容接到锁紧座上，等待LCD显示数据稳定，即测得当前容值

(2) 注意事项：

➤如果没有接入器件时容值不为0，再执行校准步骤

➤刚开机的一两分钟内设备处于预热阶段，测量小容量电容时需先校准

(3) 因为电路板上的电容C5，C6电容容值与实际容值有误差，并且测量的电容与实际标值也是有误差，所以测量值误差可能稍大。

→ 1. Measure non-polar capacitance

(1) The capacitor is connected to the lock seat and waits for the LCD display data to be stable, that is, the current capacity value is measured

(2) Precautions:

➤If the tolerance is not 0 when no component is added, perform the calibration procedure

➤The device is in the preheating phase within one or two minutes after the device is powered on. Calibrate the small-capacity capacitance before measuring it

(3) Because the capacitance C5 and C6 on the circuit board have errors with the actual capacitance, and the measured capacitance is also wrong with the actual standard value, the measurement error may be slightly larger.



→2、测量有极性电容

(1) 使用前先校准(只需操作一次), 上电后, 不接器件, 调节RP1, 使LM393 第4脚和第5脚电压为3.16V

(2) 挡位开关打到uF挡位

(3) 电容接到锁紧座上，注意区分正负，等待LCD显示数据稳定，即测得当前容值

(4) 如果电容大于1000uF，需要按一下自锁开关SW3，处于自锁状态

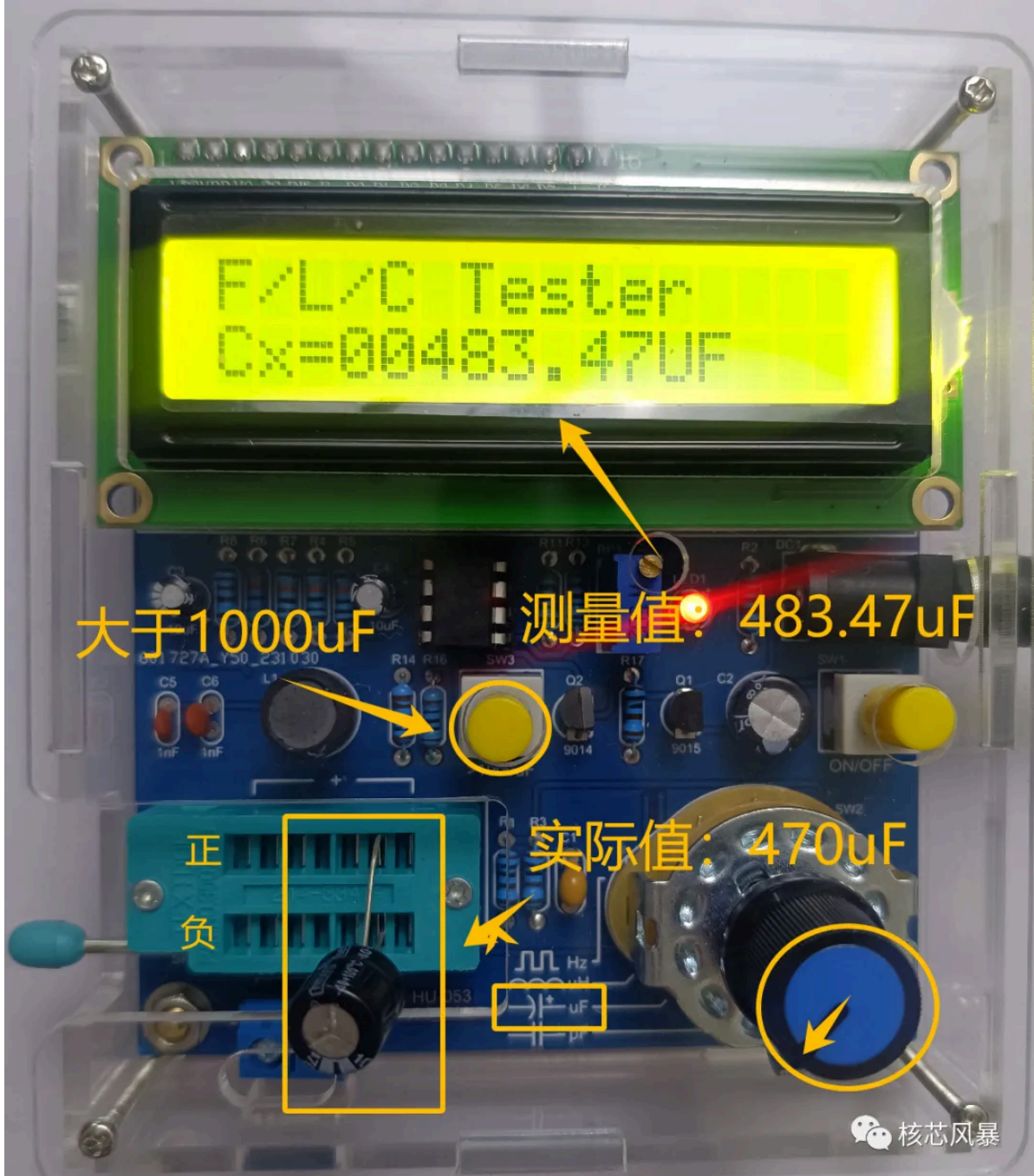
→2, measure polar capacitance

(1) Calibrate before use (only one operation). After power-on, do not connect the device, adjust RP1, so that the voltage of pin 4 and pin 5 of LM393 is 3.16V

(2) Gear switch to uF gear

(3) The capacitor is connected to the lock seat, pay attention to distinguish the positive and negative, and wait for the LCD display data to be stable, that is, the current capacity value is measured

(4) If the capacitor is greater than 1000uF, it is necessary to press the self-locking switch SW3 to be in the self-locking state



→3、测量电感

(1) 挡位开关打到uH档位

(2) 电感接到锁紧座上，等待LCD显示数据稳定，即测得当前感量

如果不显示数据或者数据不准确，需要执行校准步骤，然后再打回uH档位进行测试。

→3, Measure the inductance

(1) Gear switch to uH gear

(2) The inductor is connected to the lock seat and waits for the LCD display data to be stable, that is, the current inductance is measured

If the data is not displayed or is inaccurate, you need to perform the calibration step and then hit the uH gear back to test.



→4、测量频率

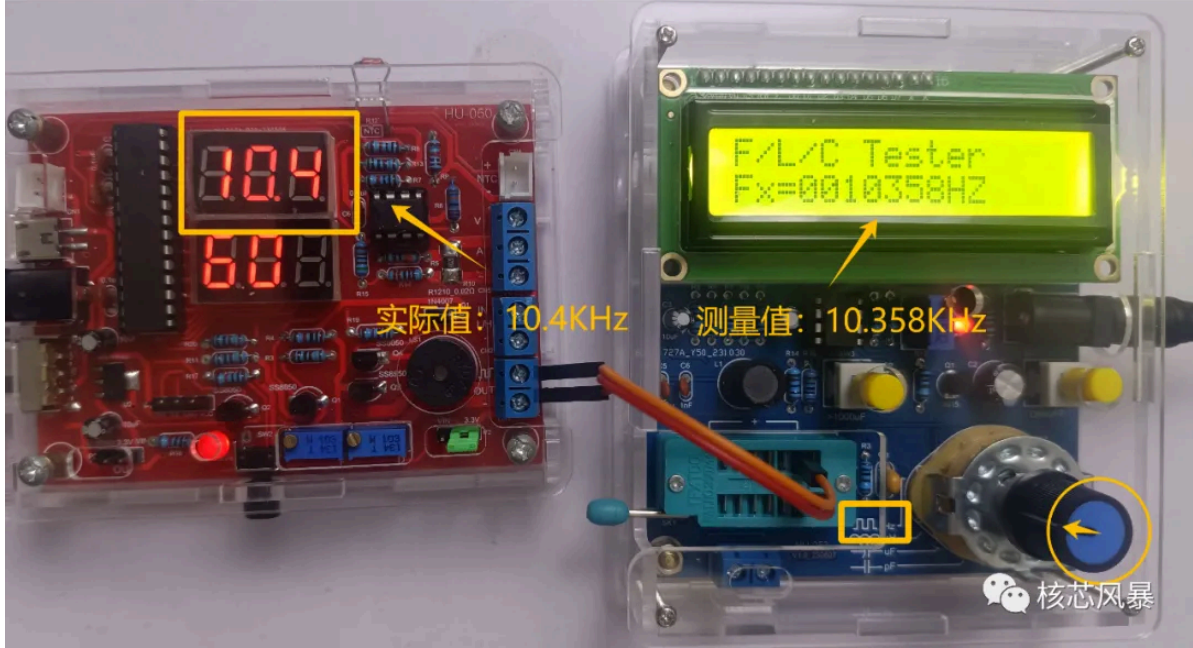
(1) 挡位开关打到Hz挡位

(2) 信号线接到锁紧座上，注意区分正负，等待LCD显示数据稳定，即测得当前频率

→4, measure the frequency

(1) The gear switch is set to Hz gear

(2) The signal line is connected to the lock seat, pay attention to distinguish the positive and negative, and wait for the LCD display data to be stable, that is, the current frequency is measured.



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