DC 12V Ultrasonic Suspension Electronic Soldering DIY Kit

1.Introduction:

This is a DC 12V Ultrasonic Suspension Electronic Soldering DIY kit. The suspension device operates at a frequency of 40KHz in the air and can capture light objects with a density of 2-3mm, such as foam balls.

It is a fun DIY electronic product that allows users to better understand circuits and learn soldering skills.

2.Feature:

1>.Ultrasonic Suspension: This device includes two ultrasonic transmitters that emit a 40KHz frequency towards each other, capable of capturing light objects with a diameter of 2-3mm, such as foam balls. Its main purpose is to teach and understand the principle of ultrasonic standing wave suspension.

2>.Usage Method: Simply clamp the small foam ball with tweezers, gently place it between the two ultrasonic probes, and the foam ball will be suspended.

3>.Working Principle: It refers to the resonant tank distance between the ultrasonic transmitter and the transmitter. During operation, emitted and reflected waves continuously overlap to form a standing wave. The acoustic force received by the object at the standing wave node overcomes the effect of gravity, ultimately achieving the suspension effect.

4>.Electronic Circuit: It consists of a simple circuit, making it perfect for beginners to learn soldering skills and familiarize themselves with electronic components. This DIY kit is ideal for learning circuit principles through experimental effects.

5>.DIY Hand Soldering: This kit includes various components that require users to install each one by hand. Assembling the kit not only exercises and improves soldering skills but also increases interest in electronic technology. It's perfect for electronics hobbyists, beginners, and for school and home education purposes.

3.Parameter:

1>.Item name: DC 12V Ultrasonic Suspension Electronic Soldering DIY Kit

2>.Work voltage:DC 12V

3>.Work current:0.5A-1A

4>.Diameter of suspended solids: 2~3mm

5>.Work Temperature:-20℃~85℃

6>.Work Humidity:0%~95%RH

7>.Size(Installed):44*40*66mm

4.Component listing:

NO.	Component Name	PCB Marker	Parameter	QTY
1	Electrolytic Capacitor	C3	33uF~100uF	1
2	DC-005 Power Socket	J1		1
3	Monolithic Capacitor	C1,C2	0.1uF 104	2
4	Metal Film Resistor	R1	4.7K	1
5	3mm Red LED	D1		1
6	AMS1117-5.0 Regulator	U1	SOT-223	1
7	STC15F104W	U2	SOP-8	1
8	TC4427 Driver	U3	SOP-8	1
9	Ultrasonic Transmitter		T	2
10	M2*4mm Screw			4
11	M2*7mm Copper Pillar			2
12	M2*39+3mm Copper Pillar Screw			2
13	M3*6mm Screw			4
14	M3*15mm Nylon Pillar			4
15	Foam Ball			5
16	Main PCB			1
17	TOP PCB			1
Note:Users can complete the installation according to the PCB silk screen and component list.				

5.Note:

1>.Light and small objects are required for suspension. Otherwise, they cannot be suspended.

2>.The ultrasonic transmitters are sensitive to vibrations, so avoid dropping or colliding with them. After soldering the probes, do not cut off any excess metal pins.

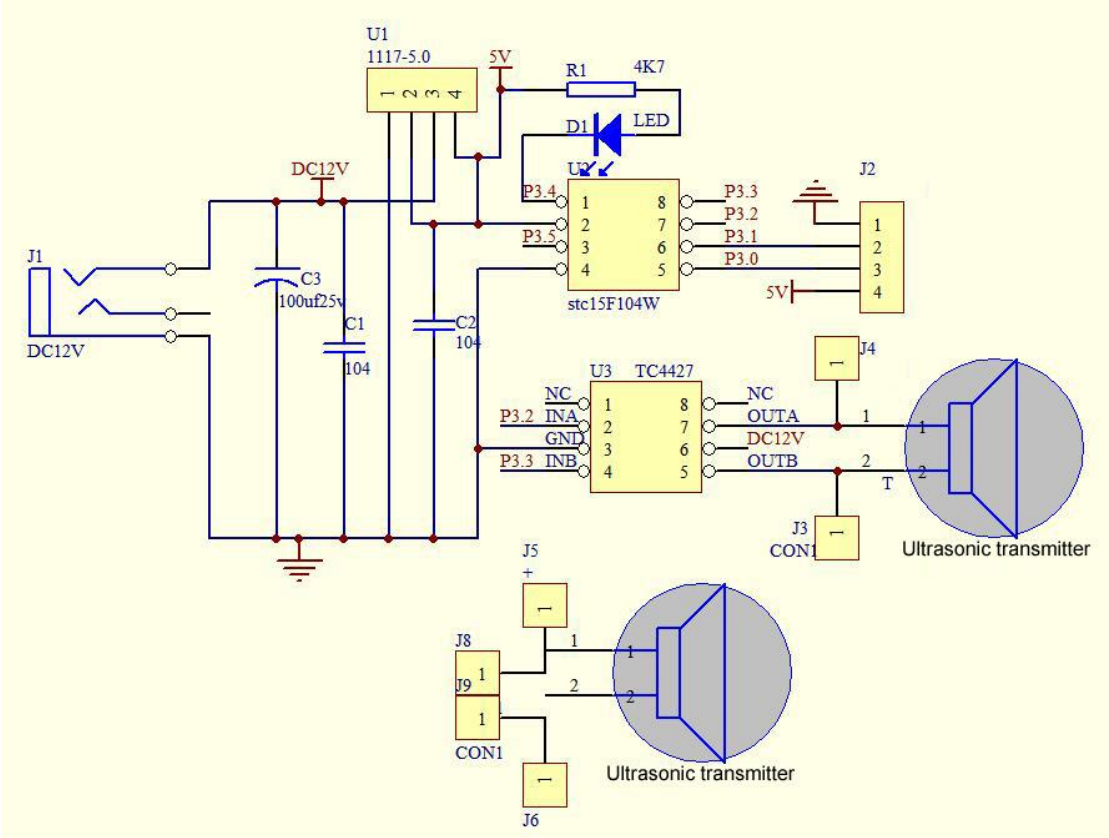
6.Application:

1>.Training soldering skills
2>.Student school
3>.DIY production
4>.Project Design
5>.Electronic competition
6>.Gift giving
7>.Crafts collection
8>.Home decoration
9>.Souvenir collection
10>.Graduation design
11>.Holiday gift

7.Installation Tips:

1>.Users need to prepare soldering tools in advance.
2>.Please wait patiently for the installation to be completed.
3>.The package is DIY kit.It need finish install by user.
4>.Do not allow the soldering iron to touch electronic components for extended periods (over 1.0 seconds), as it may damage the components.
5>.Pay attention to the polarity of the components.
6>.Short circuits are strictly prohibited.
7>.Install complex components first.
8>.Ensure the correct orientation and position of all components.
9>.Please wear anti-static gloves or anti-static wristbands when installing electronic components.
10>.We highly recommend reading the installation manual before starting the installation!!!

8.Schematic:



9.Installation Steps(Please be patient install!!!):

1>.Step 1: Install 1 SMD component (SOP-8 STC15F104W) on U2. There is a white seam on the PCB silkscreen at the U2 location, and there is a dot on the IC. These two points correspond to each other and indicate the installation orientation.

2>.Step 2: Randomly select a solder pad on the PCB and melt the solder on the pad.

3>.Step 3: Fix STC15F104W:

3.1>.Using the soldering iron, melt the solder on the pad, and with the other hand, use tweezers to hold the IC in place on U2 to prevent it from moving.

3.2>.Ensure each pin matches and aligns with its respective pad.

3.3>.After aligning the pins, remove the soldering iron.

3.4>.After the solder has cooled and solidified, remove the tweezers.

4>.Step 4: Using solder and a soldering iron, connect the remaining pins of STC15F104W to the solder pads on the PCB.Tips for one method:

4.1>.Cover all solder pads with a generous amount of solder.

4.2>.Make sure all pins and pads are covered with tin.

4.3>.Use a soldering iron to keep the tin in the melting state. At the same time, use a solder sucker or Desoldering Braid to remove the excess solder.

5>.Step 5: Install 1 SMD component (SOP-8 TC4427 Driver) on U3 using the same method.

6>.Step 6: Install 1 SMD component (SOT-223 AMS1117-5.0 voltage regulator) on U1 using the same method.

7>.Step 7: Install 1 4.7K metal film resistor on R1.

8>.Step 8: Install 2 0.1uF 104 monolithic capacitors on C1 and C2.

9>.Step 9: Install 1 3mm red LED on D1. Note: the longer pin is the positive electrode, connect it to the '+' pad.

10>.Step 10: Install 1 DC-005 power socket on J1.

11>.Step 11: Install 1pcs 33uF~100uF Electrolytic Capacitor at C3. Note: The longer pin is positive pole and connect to ‘ + ’ pad.

12>.Step 12: Install 1pcs Ultrasonic Transmitter at T on PCB another side. Note: It is positive pole which the pin has a bigger black mark, that need connect to ‘ + ’ pad. It is not recommended to cut off excess metal pins to avoid damaging the transmitter.

13>.Step 13: Install 1pcs Ultrasonic Transmitter at T on another smaller PCB. Note: It is positive pole which the pin has a bigger black mark, that need connect to ‘ + ’ pad. It is not recommended to cut off excess metal pins to avoid damaging the transmitter.

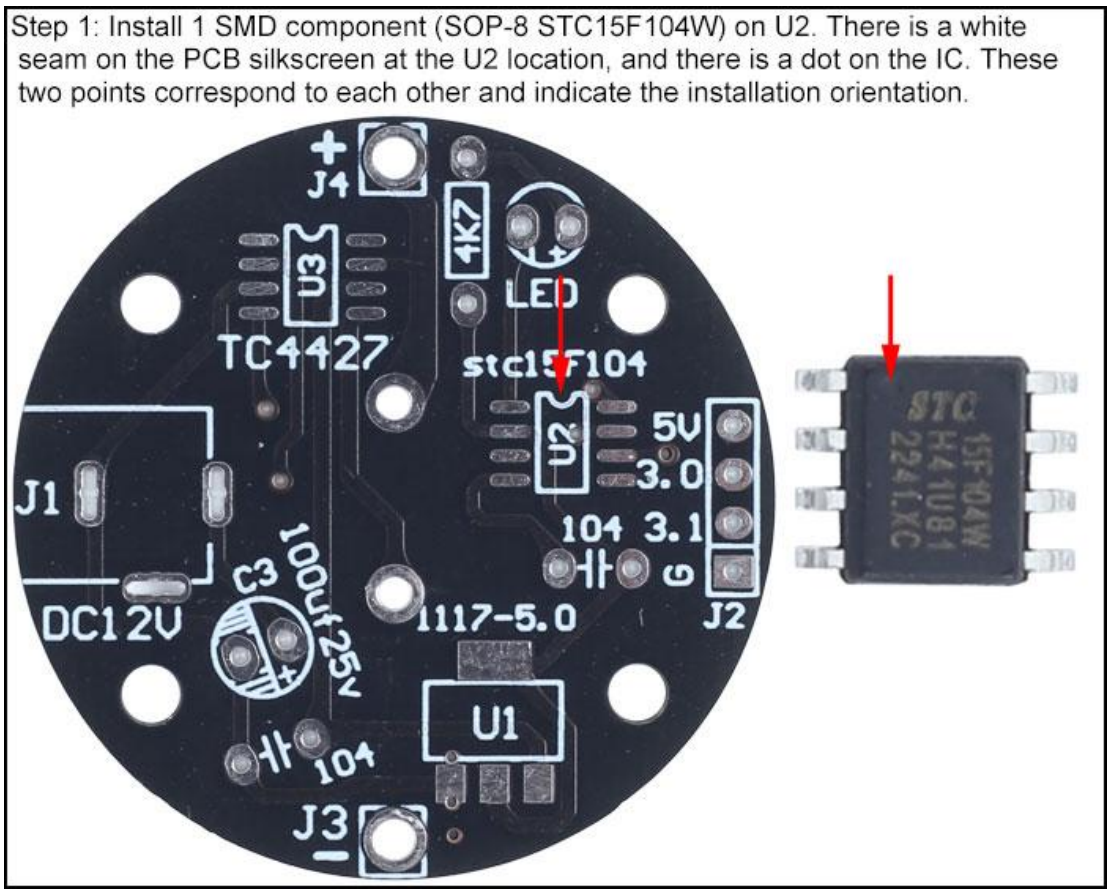
14>.Step 14: Splices M2*7mm Copper Pillar and M2*39+3mm Copper Pillar Screw to 46mm Copper Pillar.

15>.Step 15: Fix 4pcs M3*15mm Nylon Pillar on the bigger PCB by 2pcs M2*4mm Screw.

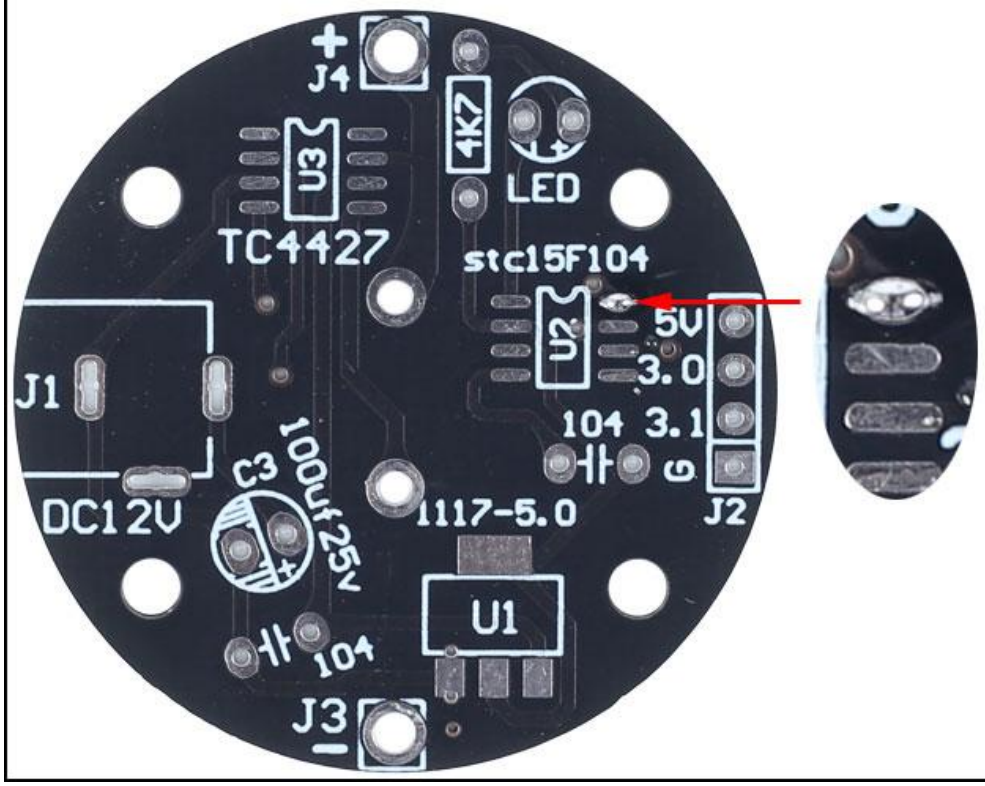
16>.Step 16: Fix 2pcs spliced 46mm Copper Pillar on the bigger PCB.

17>.Step 17: Fix the smaller PCB by 2pcs M2*4mm Screw. Note that the positive electrodes of the two PCB correspond to each other.

10.Install shown steps:



Step 2: Randomly select a solder pad on the PCB and melt the solder on the pad.



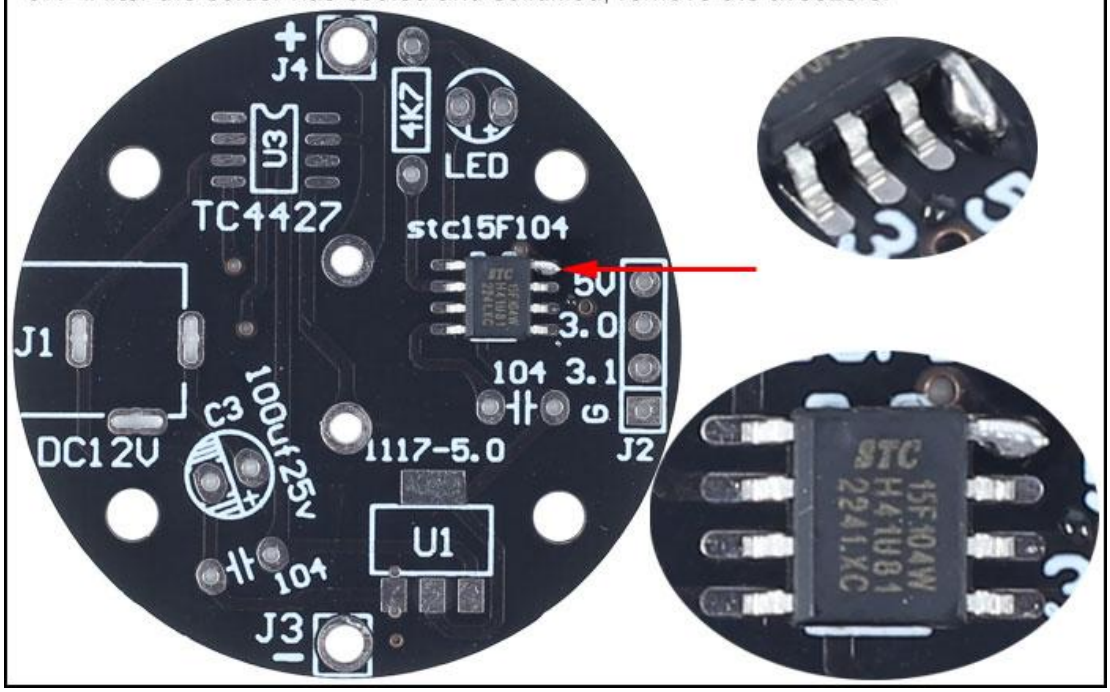
Step 3: Fix STC15F104W:

3.1>.Using the soldering iron, melt the solder on the pad, and with the other hand, use tweezers to hold the IC in place on U2 to prevent it from moving.

3.2>.Ensure each pin matches and aligns with its respective pad.

3.3>.After aligning the pins, remove the soldering iron.

3.4>.After the solder has cooled and solidified, remove the tweezers.

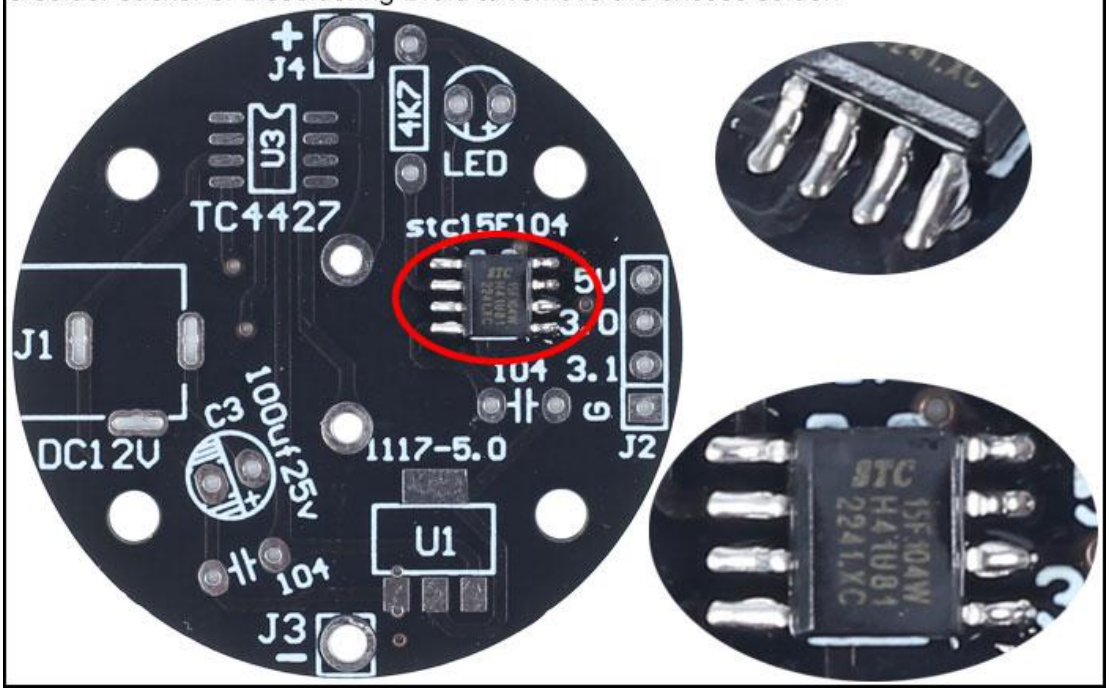


Step 4: Using solder and a soldering iron, connect the remaining pins of STC15F104W to the solder pads on the PCB.Tips for one method:

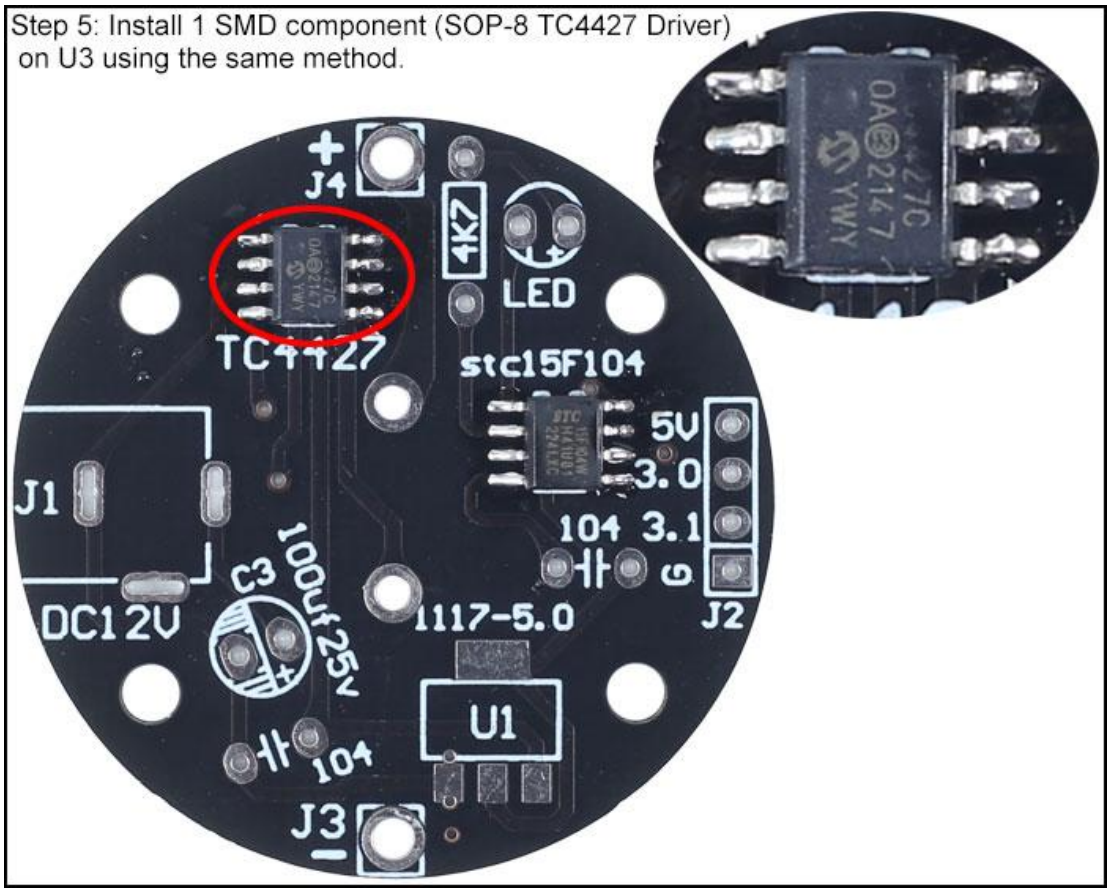
4.1>.Cover all solder pads with a generous amount of solder.

4.2>.Make sure all pins and pads are covered with tin.

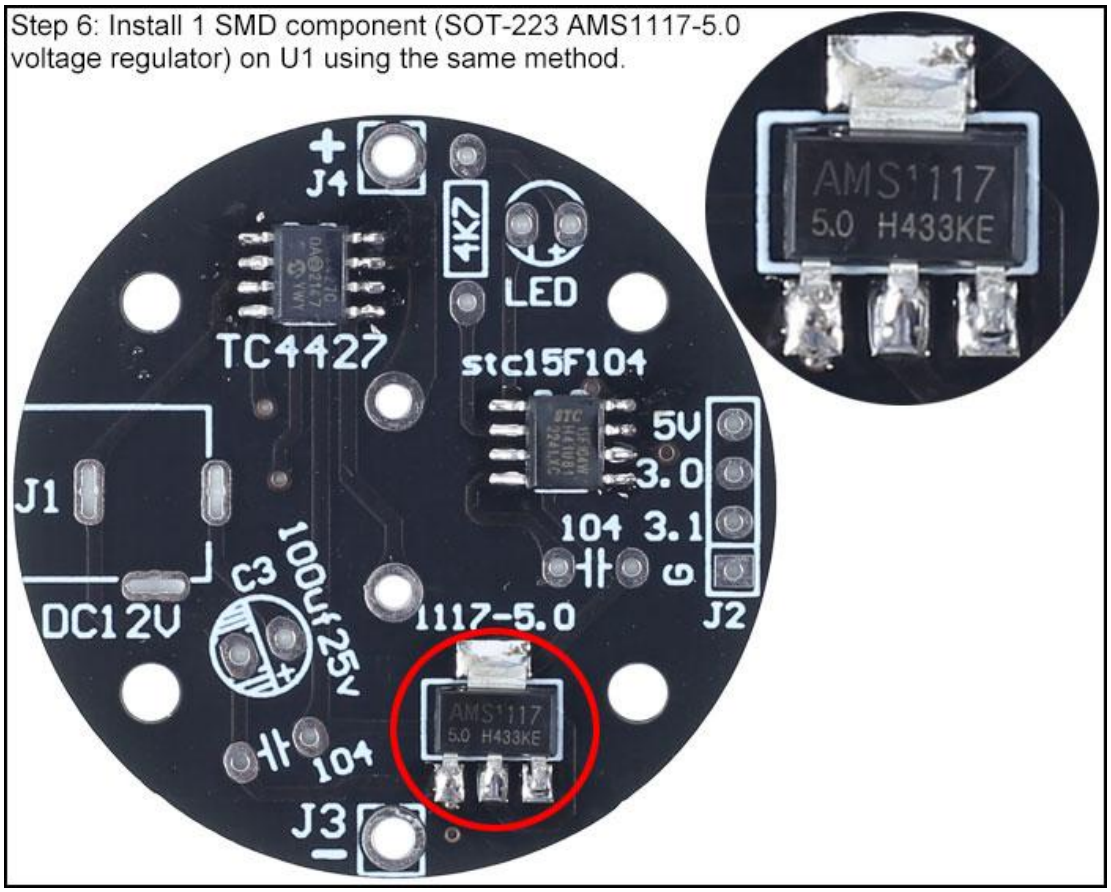
4.3>.Use a soldering iron to keep the tin in the melting state. At the same time, use a solder sucker or Desoldering Braid to remove the excess solder.



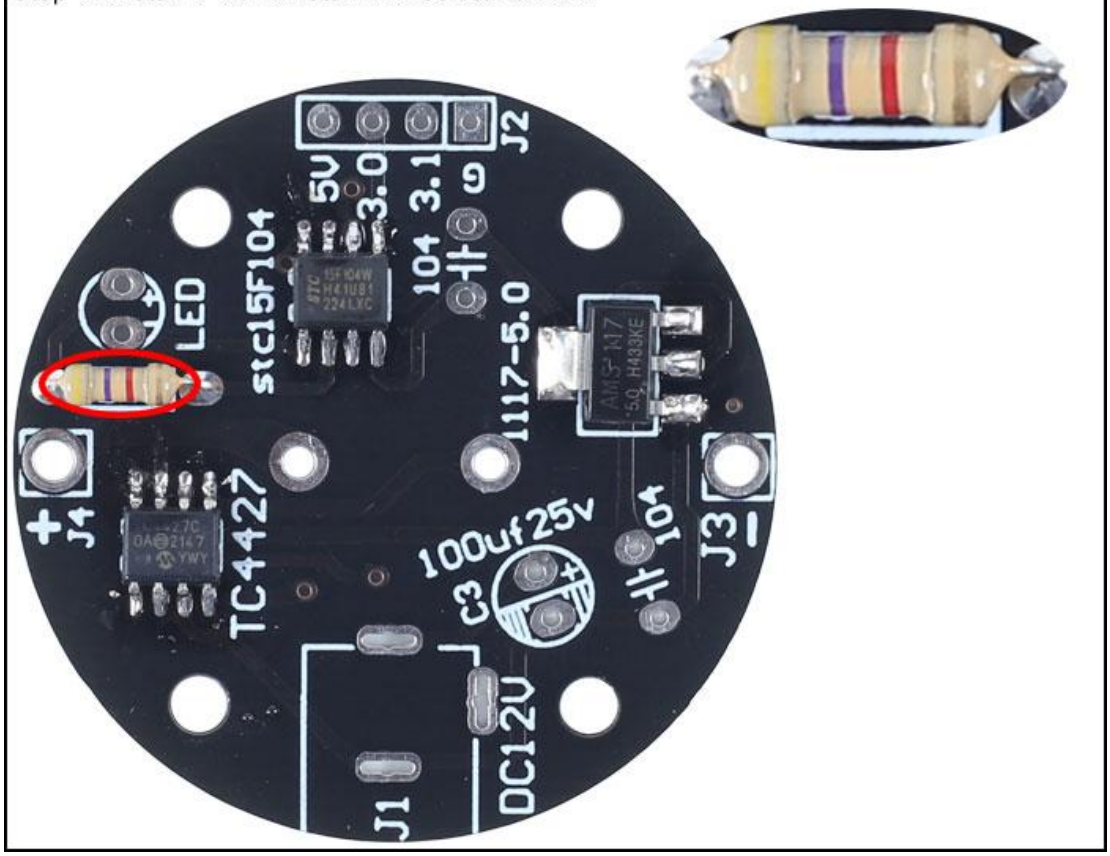
Step 5: Install 1 SMD component (SOP-8 TC4427 Driver) on U3 using the same method.



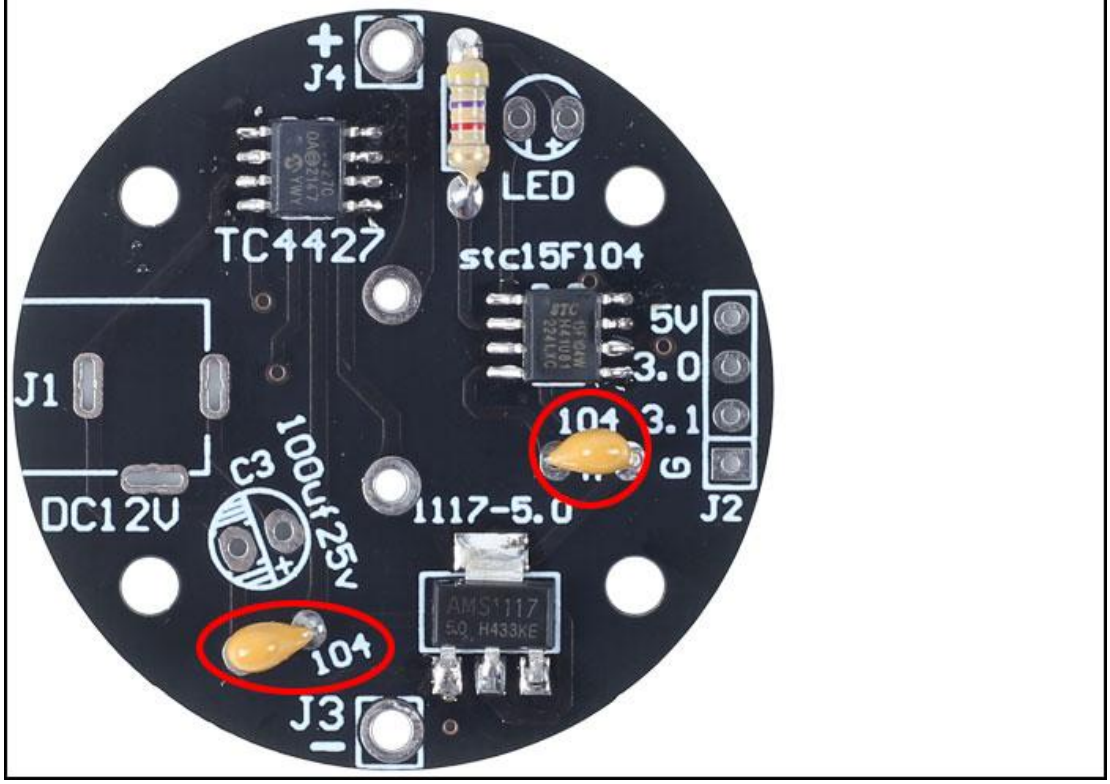
Step 6: Install 1 SMD component (SOT-223 AMS1117-5.0 voltage regulator) on U1 using the same method.



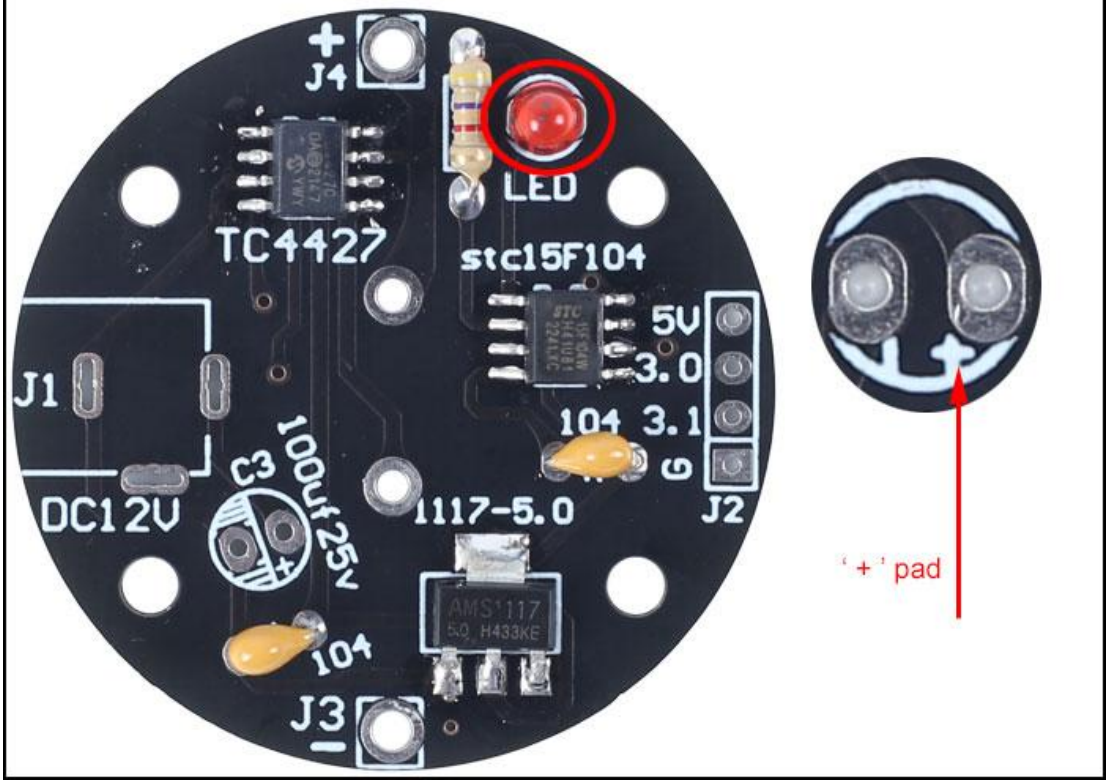
Step 7: Install 1 4.7K metal film resistor on R1.



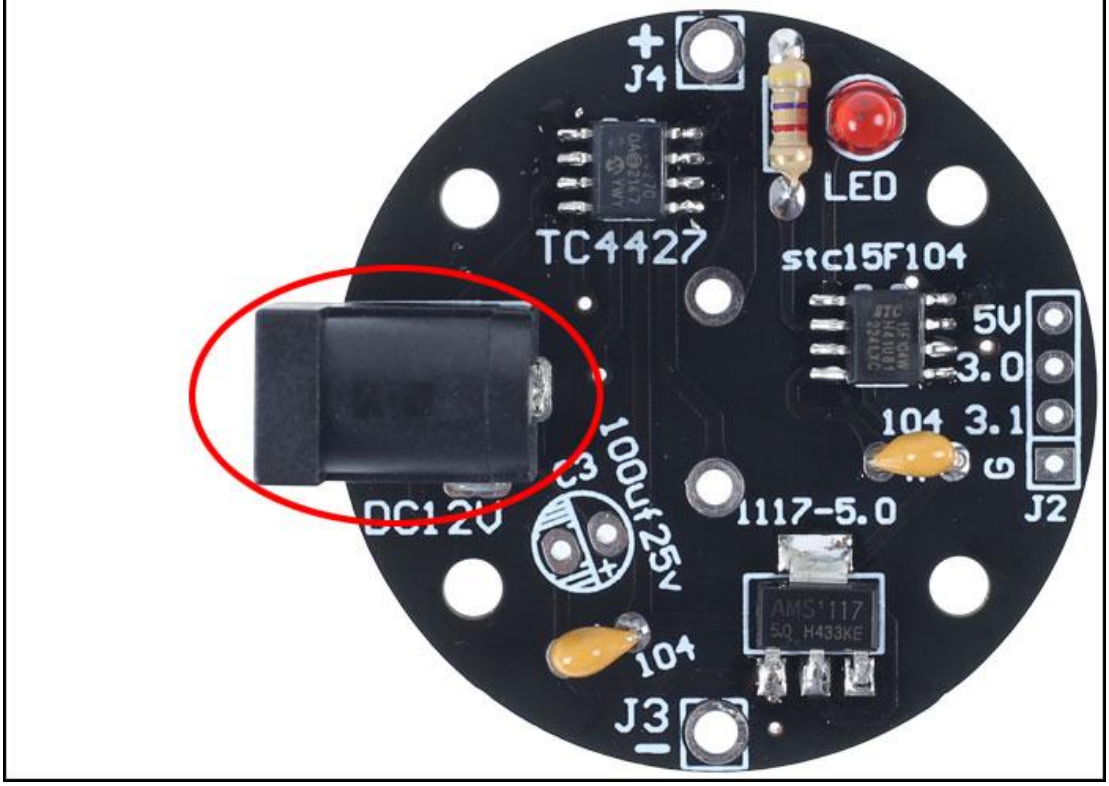
Step 8: Install 2 0.1uF 104 monolithic capacitors on C1 and C2.



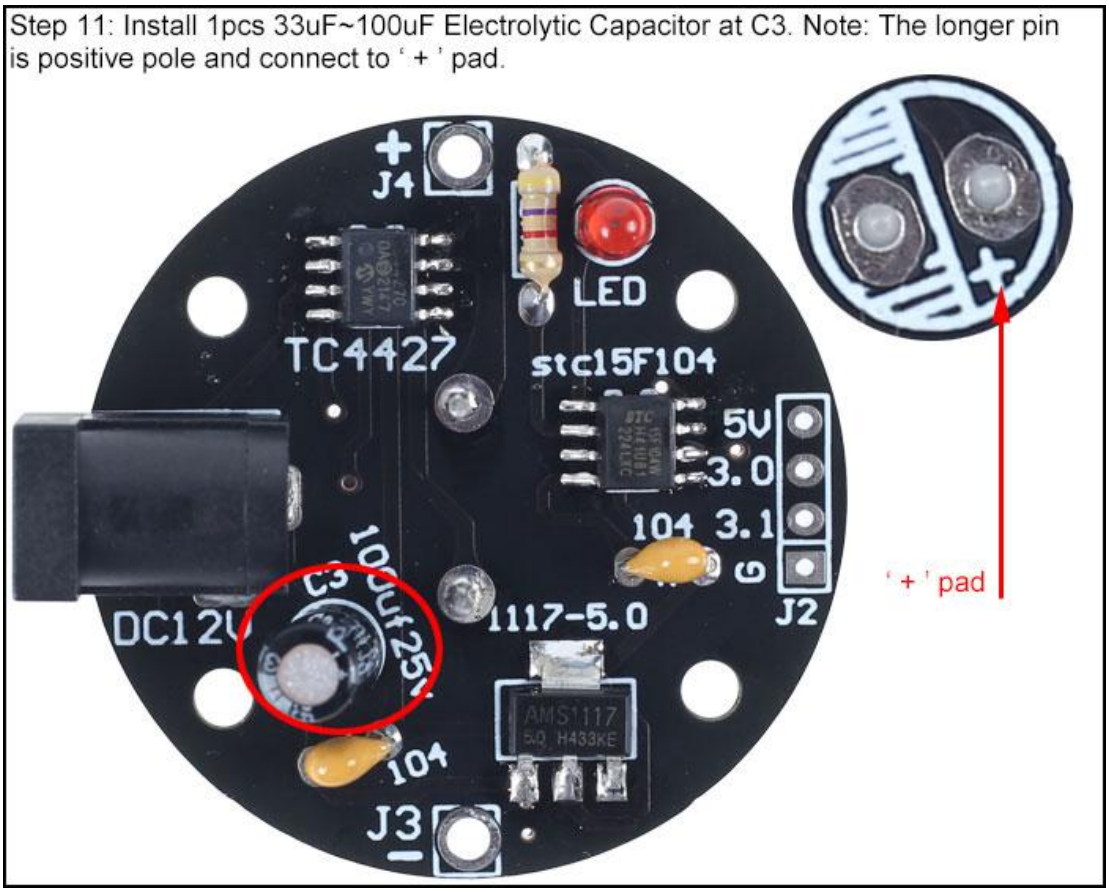
Step 9: Install 1 3mm red LED on D1. Note: the longer pin is the positive electrode, connect it to the '+' pad.



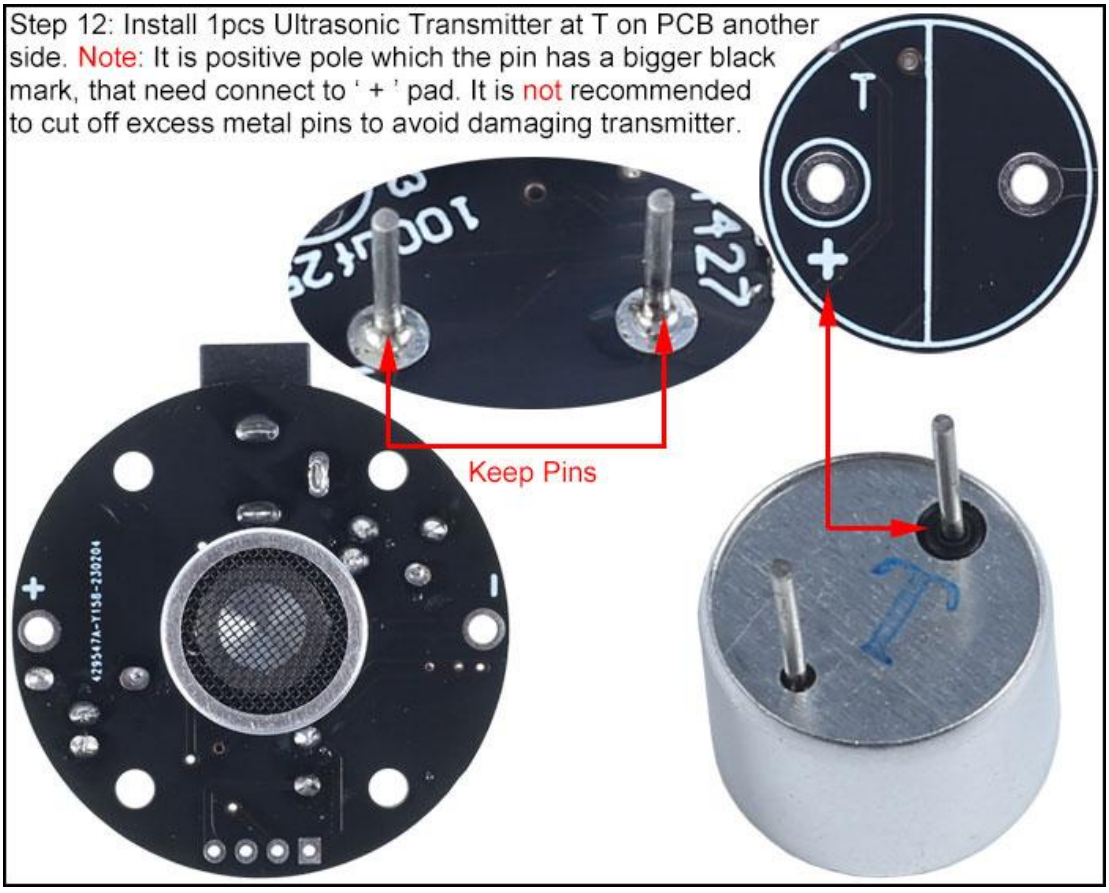
Step 10: Install 1 DC-005 power socket on J1.



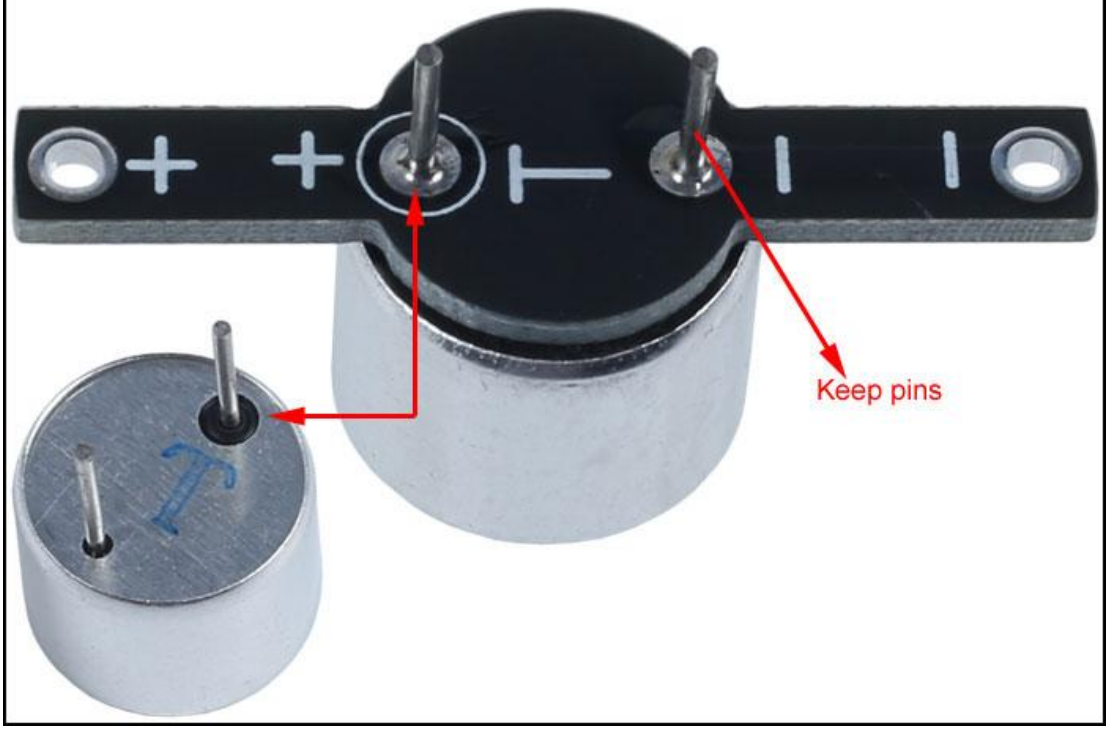
Step 11: Install 1pcs 33uF~100uF Electrolytic Capacitor at C3. Note: The longer pin is positive pole and connect to ' + ' pad.



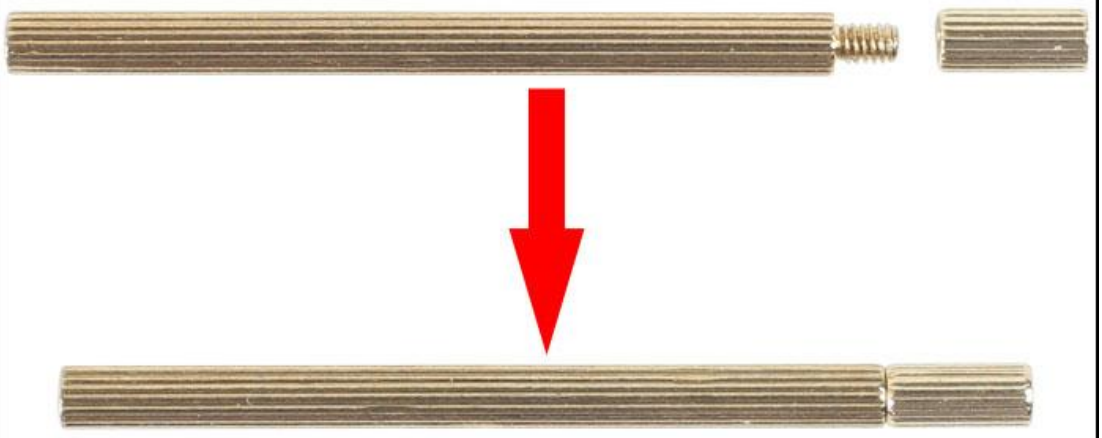
Step 12: Install 1pcs Ultrasonic Transmitter at T on PCB another side. Note: It is positive pole which the pin has a bigger black mark, that need connect to ' + ' pad. It is not recommended to cut off excess metal pins to avoid damaging transmitter.



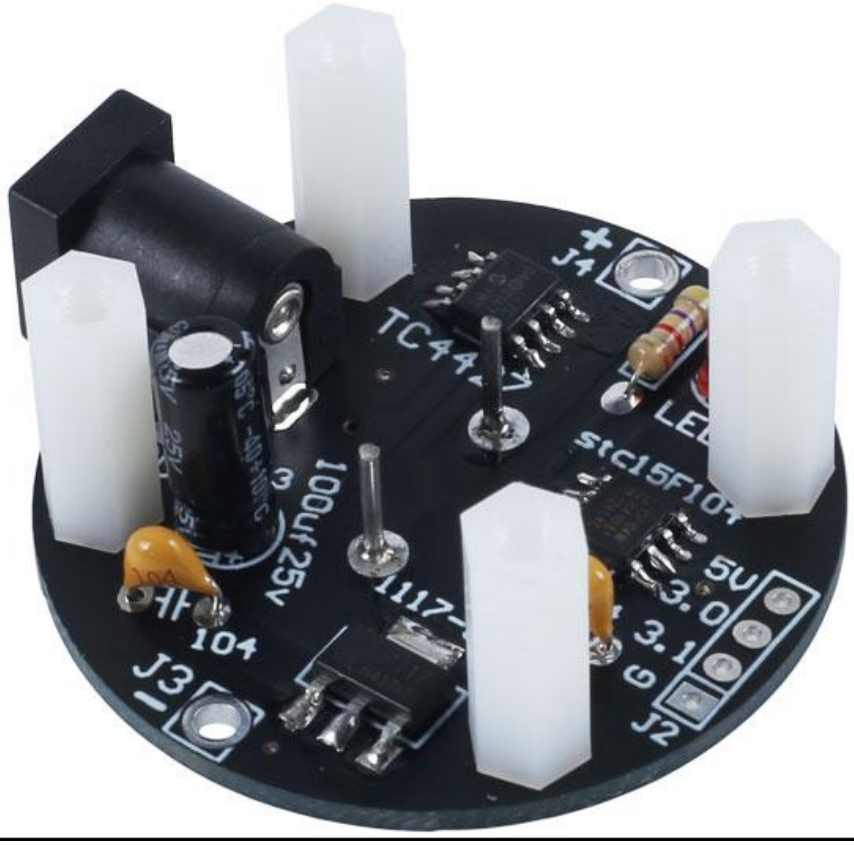
Step 13 Install 1pcs Ultrasonic Transmitter at T on another smaller PCB.
Note: It is positive pole which the pin has a bigger black mark, that need connect to ' + ' pad.
It is not recommended to cut off excess metal pins to avoid damaging the transmitter.



Step 14: Splices M2*7mm Copper Pillar and M2*39+3mm Copper Pillar Screw to 46mm Copper Pillar.



Step 15: Fix 4pcs M3*15mm Nylon Pillar on the bigger PCB by 2pcs M2*4mm Screw.



Step 16: Fix 2pcs spliced 46mm Copper Pillar on the bigger PCB.

Step 17: Fix the smaller PCB by 2pcs M2*4mm Screw.
Note that the positive electrodes of the two PCB correspond to each other.