

Icstation DIY Levitation Electronic Kit

1.Introduction:

This is a mini ultrasonic levitation device that can levitate foam balls. The device consists of a single-chip microcomputer, a driver chip and two ultrasonic probes. Ideal for students or DIY electronics enthusiasts.

2.Feature:

- 1>.Compact project kit using Surface Mount Devices, SMD, for soldering skill refinement.
- 2>.2 LED indicators for power and ultrasonic operation.
- 3>.Supports long-term suspension,the motherboard will be slightly hot.

3.Parameter:

- 1>.Input Voltage: 12V DC (Power supply not included)
- 2>.Max Input Current: 70mA
- 3>.Probe Spacing: 22mm
- 4>.Working Temperature: -25C - 85C
- 5>.Working Humidity: 5% - 95% RH
- 6>.Size (assembled): 62mm x 42mm x 42mm

4.Working Principle:

Ultrasonic standing wave suspension is achieved when 2 ultrasonic sources interact with each other at a particular distance called the resonant cavity distance.

This kit has an ultrasonic transmitter at one end and a 2nd transmitter at the other end. The two ultrasonic waves interact and are continuously superimposed on each other to form a standing wave at particular points between them called nodes. The sound wave force at the nodes is sufficient to counteract gravity and achieve suspension of few styrofoam balls.

5.Component Listing:

NO.	Component Name	PCB Marker	Parameter	QTY
1	0805 SMD Capacitor	C1,C2,C4,C5	0.1uF	4
2	Electrolytic capacitor	C3	25V 10uF	1
3	DC Power Socket	CON1	DC-005	1
4	SMD LED	LED1,LED2	Red and Green	2
5	Curved Row Needle	P1	4P	1
6	0805 SMD Resistor	R1,R3,R4	5.1Kohm	3
7	0805 SMD Resistor	R2	10Kohm	1
8	SMD Single Chip Microcomputer	U1	STC15F104W	1
9	SMD IC	U2	TPS70933	1
10	SMD IC	U3	TC4427	1
11	Ultrasonic Probe	T		2
12	Single Pass Copper Column		M2*12+3	4
13	Single Pass Copper Column		M2*17+3	4
14	Double Pass Copper Column		M2*5	4
15	Screw		M2*6	4
16	Round PCB board		40*40*1.6mm	3

Note:Users can complete the installation according to the PCB silk screen and component list.

iron for greater than 1 second.

4>.Some components are polarized; pay attention to positive and negative terminals on the components.

5>.Ensure there are no solder bridges or short circuits between components or component pins.

6>.LEDs are polarized and will not light if installed backwards.

7>.Double check component placement and orientation before completely soldering as SMD components can be more challenging to remove.

8>.This is a DIY kit and user assumes responsibility to not damage components during the install. Use an anti-static work environment including workbench, wrist-straps and anti-static gloves for best results.

9>.Components are very small and easy to lose during assembly. Work in a well lit work space with plenty of room.

10>.Scan code to learn how to solder?



11>.How do you levitate foam pellets?



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

1>.Step 1: Install the SMD IC STC15F104W at U1. Confirm the installation direction of the IC. The small dot on the printed circuit board (PCB) coincides with the IC to indicate the proper component orientation.

2>.Step 2: Select a U1 pad on the PCB and melt a little solder on it.

3>.Step 3: Using tweezers, align U1 on the PCB so that each pin of U1 is properly positioned on its corresponding pad. Remelt the solder previously placed to fix U1 into place.

4>.Step 4: Solder all the other pins of U1 being careful not to leave the soldering iron tip on any pin for longer than a second.

5>.Step 5: Install SMD IC TPS70933 at U2 using the same instructions as U1.

6>.Step 6: SMD IC TC4427 has no pin 1 marking. Reference the photo for pin 1 and align with the PCB at U3. Follow the instructions for U1 (steps 2 and 3).

7>.Step 7: Install a 10K ohm chip resistor at R2. Marked as 103. Similar to U1, melt a little solder onto one of the pads. Using tweezers, position the resistor into place while remelting the solder just placed. Once the resistor is in position, remove soldering iron, allow a few seconds for the solder to solidify and then solder the other pad of the resistor.

8>.Step 8: Install three 5.1K ohm resistors at R1, R3, and R4. Marked as 512.

9>.Step 9: Install four 0.2uF chip capacitors at C1, C2, C4, and C5. Chip capacitors are not marked.

10>.Step 10: Install two SMD LEDs at LED1 and LED2. The LEDs need to be oriented correctly or they will not work. Orient the green side of the LED to the thicker white line on the

PCB; or may also be a double line. Reference the photo.

11>.Step 11: Install the 25V 10uF electrolytic capacitor at C2. Pay attention to the white stripe on the capacitor and ensure it aligns with the white lines on the PCB for C3. Reference the photo.

12>.Step 12: Install the DC-005 Power Socket at CON1.

13>.Step 13: Install the two ultrasonic transmitters at T. Note the small black circle pin of the transmitter corresponds to the through hole next to the T designation. Reference the photo.

14>.Step 14: On the P1 board, install 2 screws and two M2x5 copper posts. Pay attention to the installation direction.

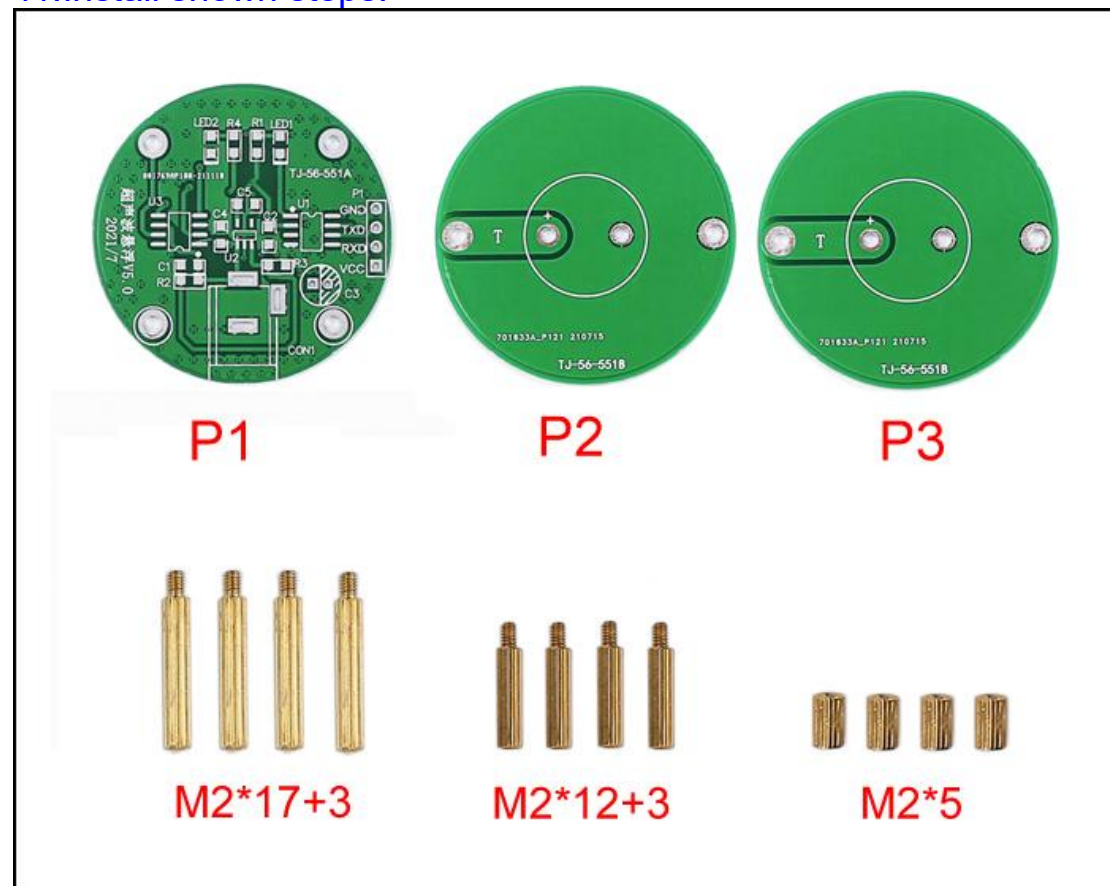
15>.Step 15: Install two M2x5 copper posts on one side and two M2x12+3 copper pillars on the other. Pay attention to the installation direction.

16>.Step 16: Connect the P2 board to the P1 board pillars using two M2x12+3 copper pillars.

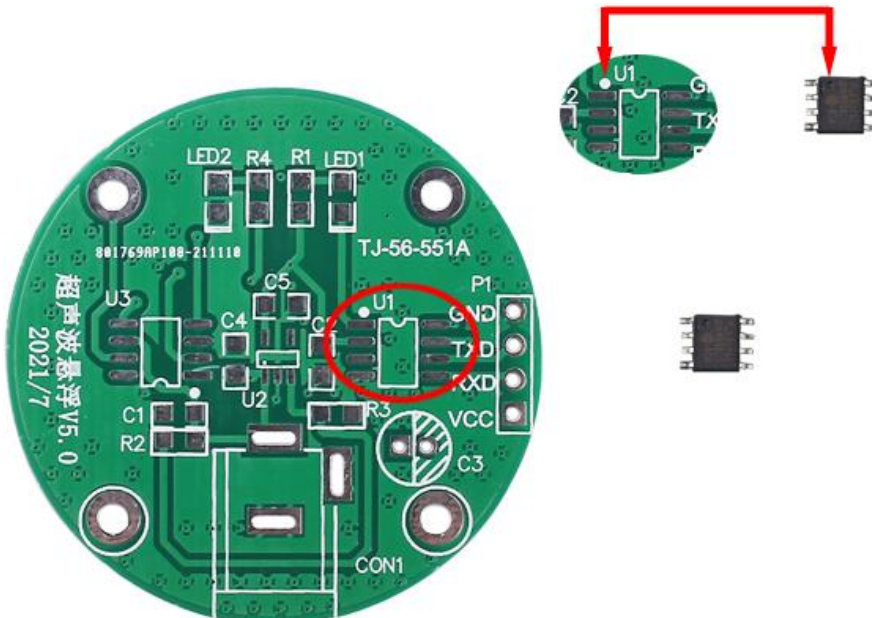
17>.Step 17: Connect four M2x17+3 copper pillars to the M2x12+3 copper pillars respectively.

18>.Step 18: Finally, connect the P3 board using the 2 remaining screws.

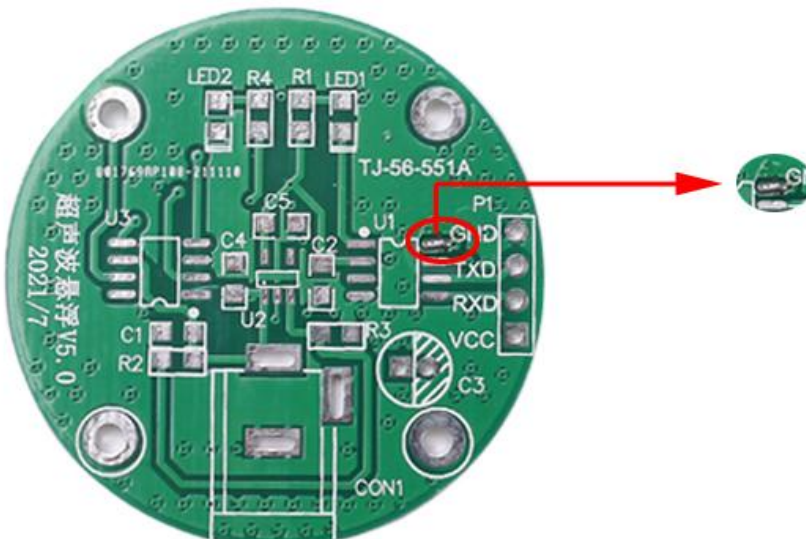
11.Install shown steps:



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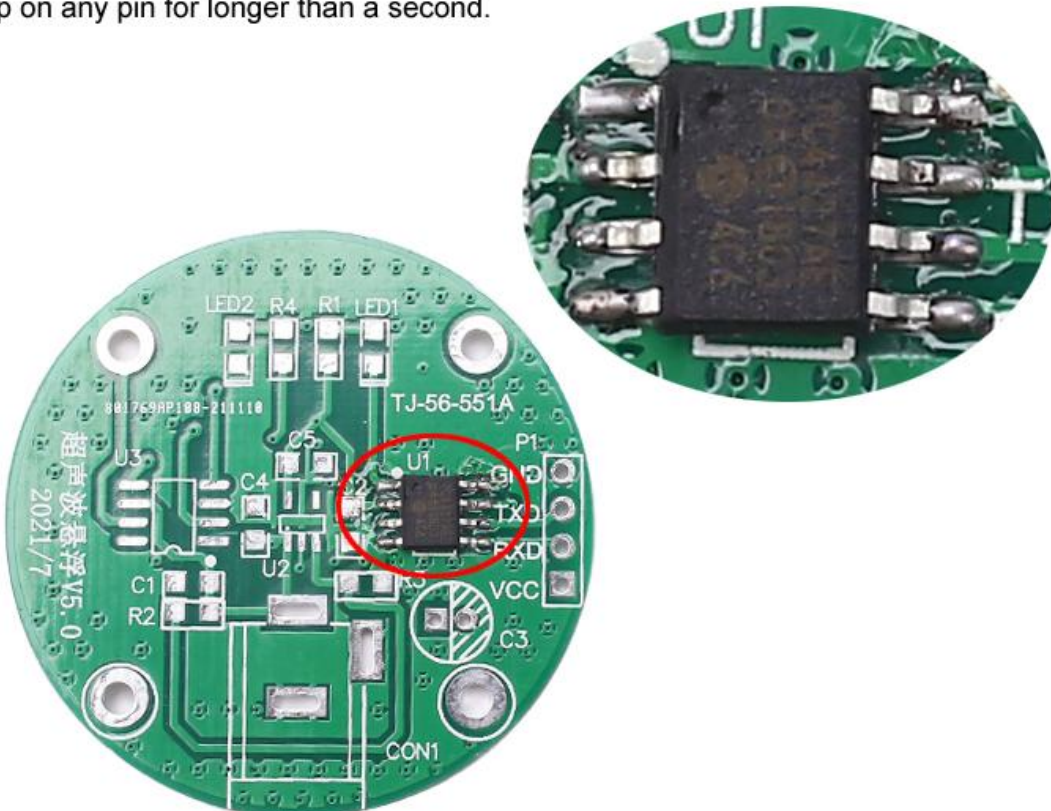
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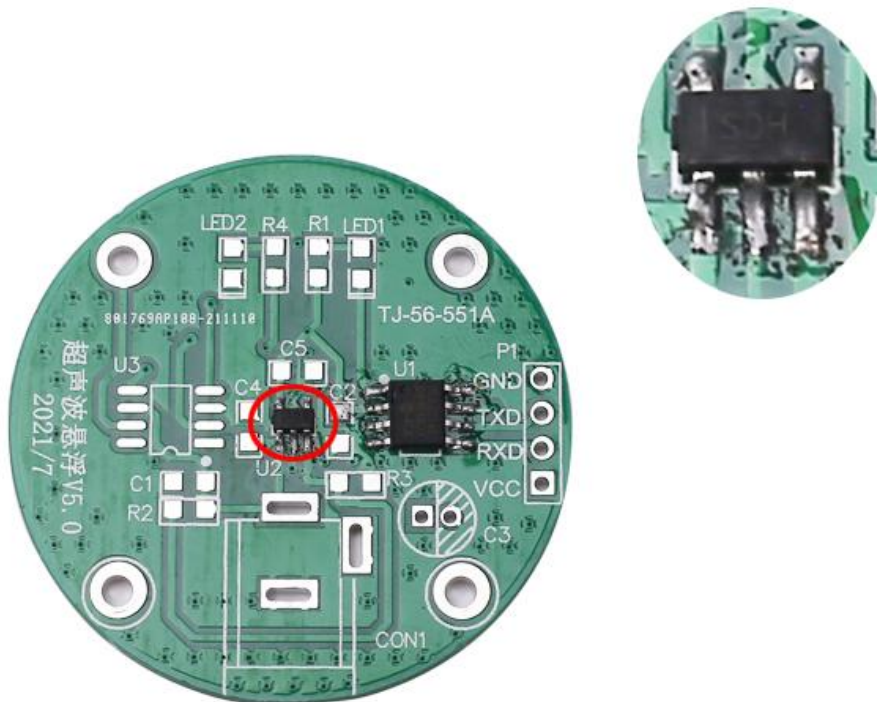
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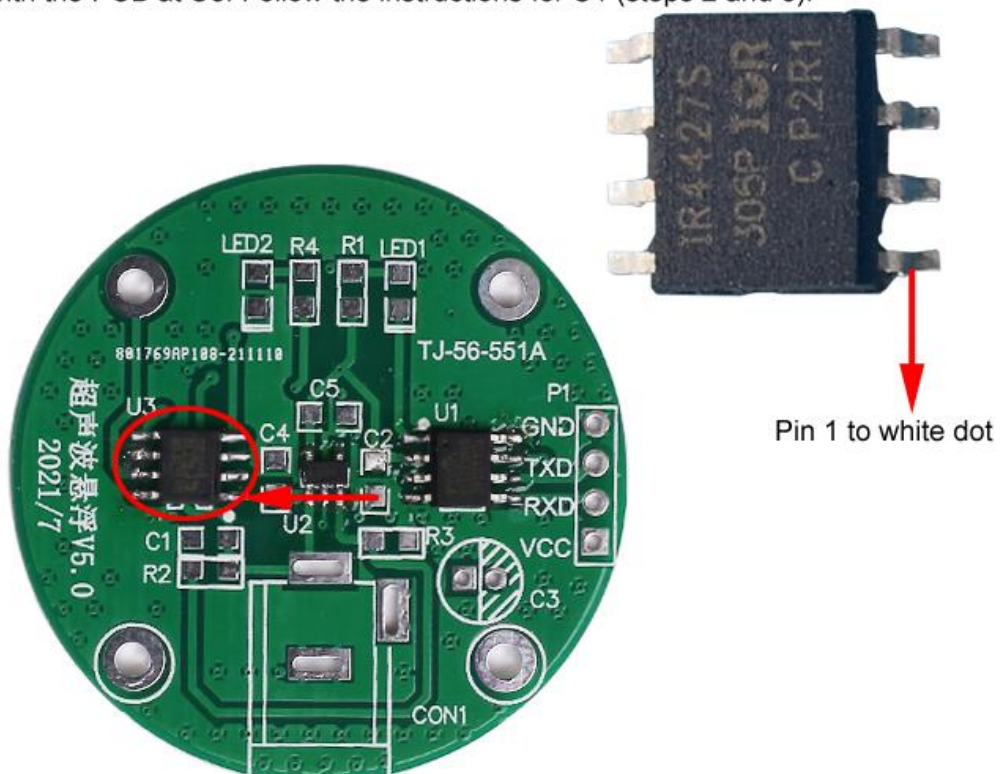
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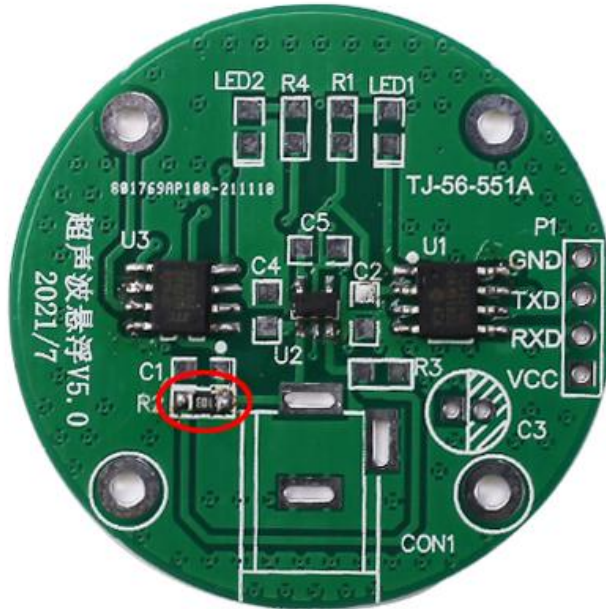
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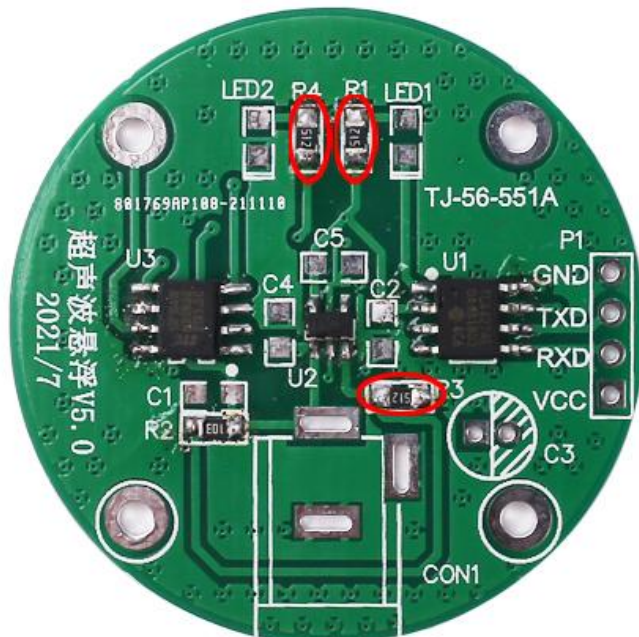
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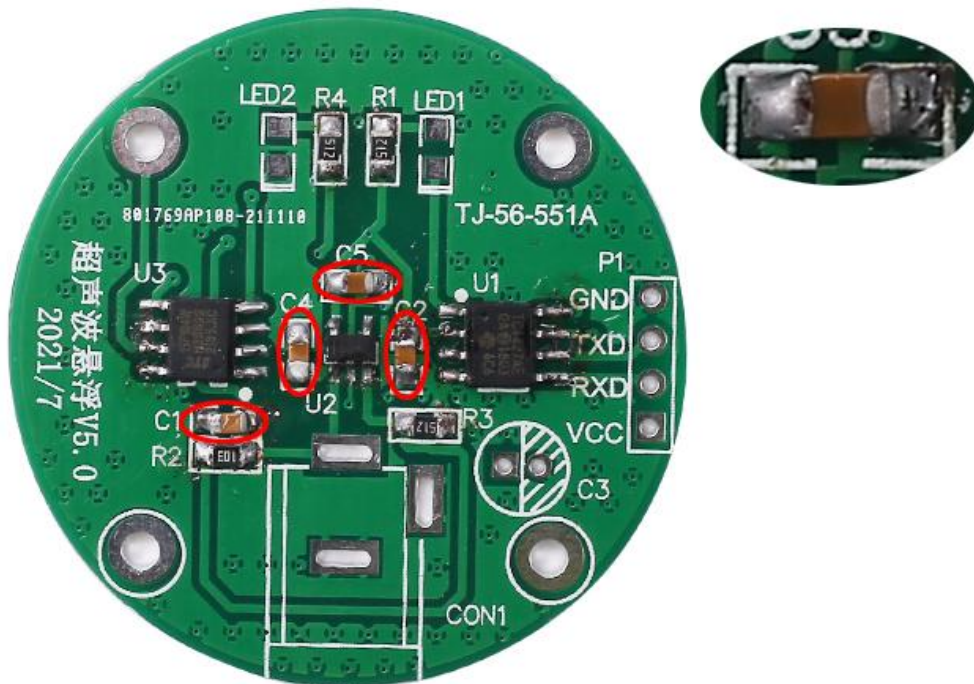
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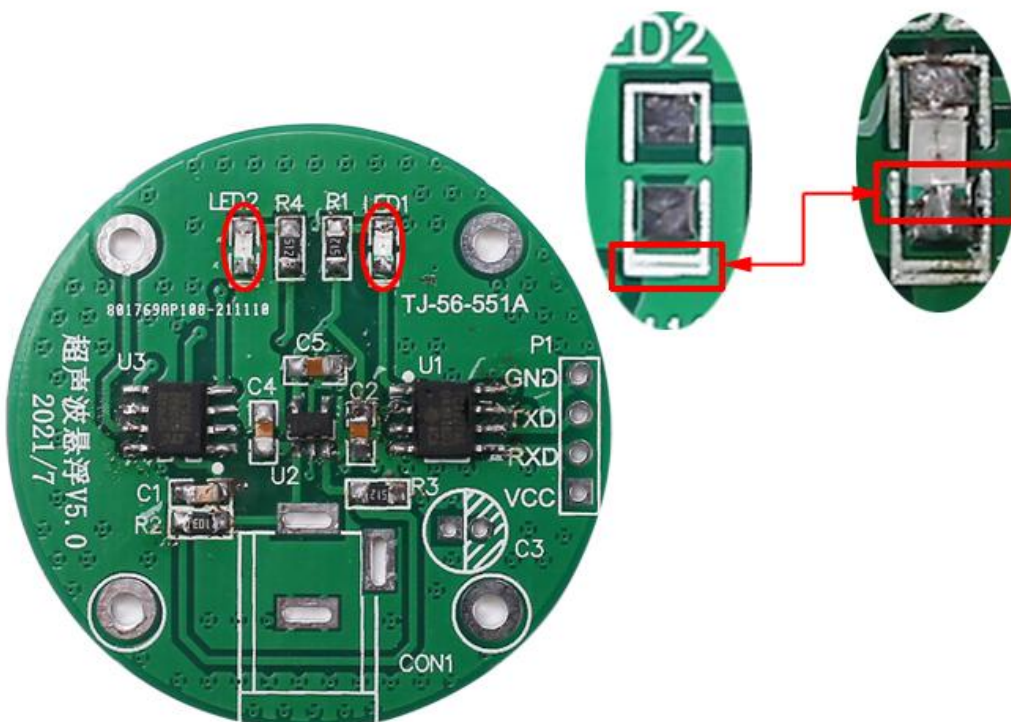
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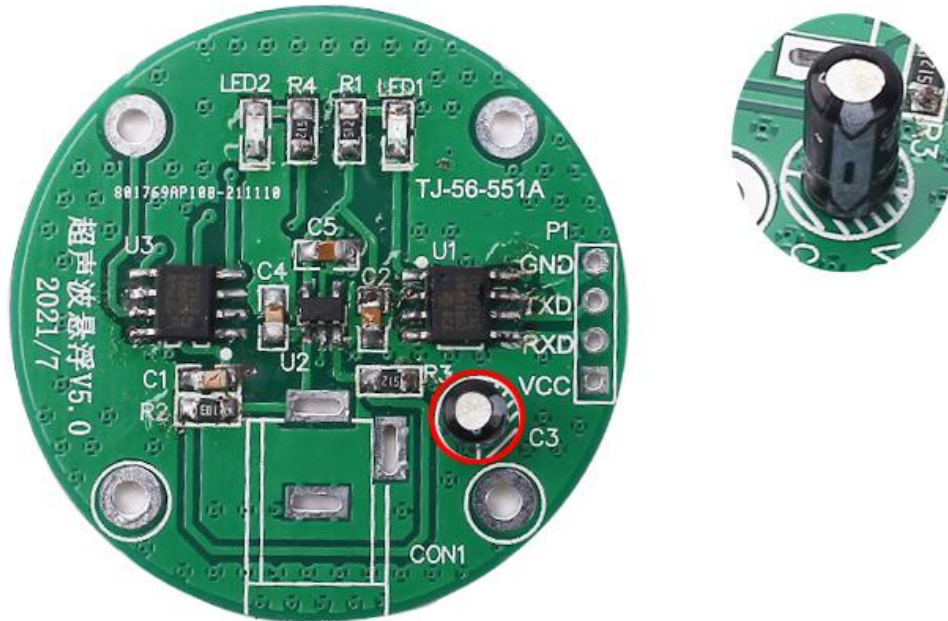
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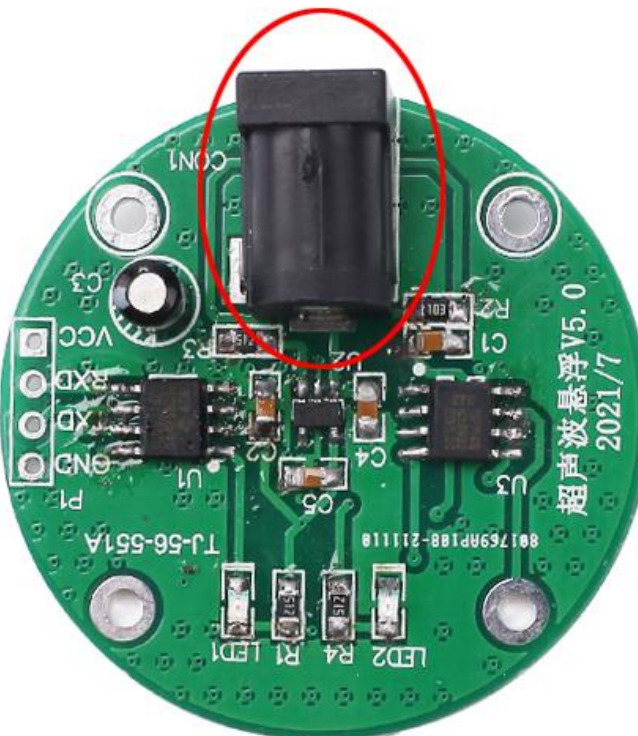
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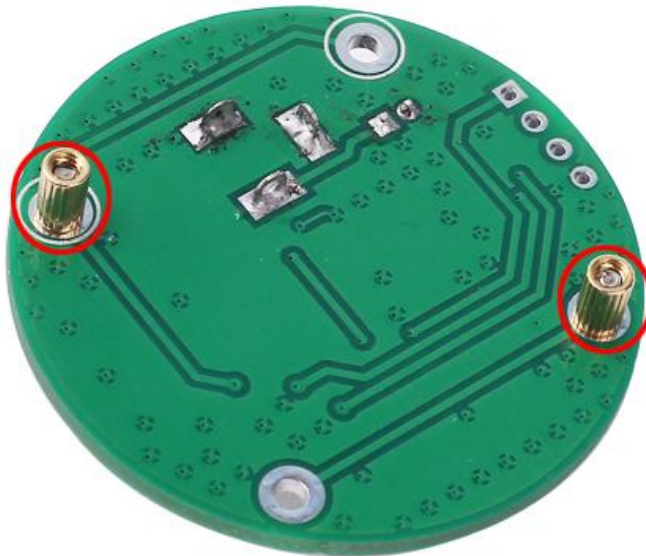
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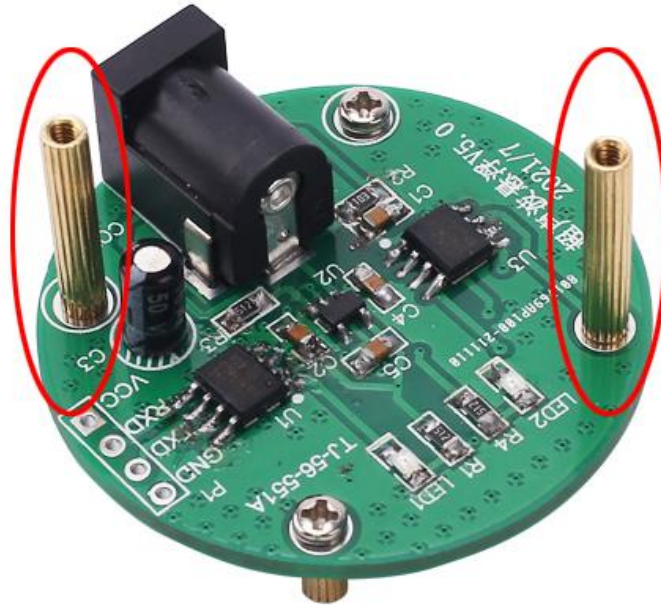
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