

HU-013 Laser Electronic Piano DIY Kit

1.Introduction:

HU-013 is a Laser Electronic Piano Electronic Soldering DIY Kit. It adopts the principle of laser emission and reception, and simulates strings to control and change music through laser simulation. the speaker emits the corresponding scale when the laser is blocked, which is very suitable for fun teaching and entertainment.

It is a very interesting DIY electronic product which enables users to understand the circuit more clearly and learn soldering skills.

2.Feature:

1>.Seven Musical Scale. It can simulate 7 scales do,re,mi,fa,sol,la,si. Speaker emits the corresponding scale when the laser is blocked.Quickly change different laser channels to simulate playing a song.

2>.Three tones. It can switch select Treble, Alto and Bass by right button. It is used to play songs with different tones and providing a richer performance.

3>.Strum/Play Mode. Users can play music according to the music score at Strum Mode or play the built-in music at Play Mode. Switch mode by left button and there are two built-in music.

4>.Scale LED Indicator.the corresponding LED indicator will indicate when playing to change the scale, which is used to further show the scale to the user.

5>.DIY Hand Soldering. It's a DIY kit which comes with various components. User need to install each component by hand. It not only can exercise and improve soldering skills, but also increase the interest in electronic technology. Great for electronics hobbyists, beginners, school and home education.

3.Parameter:

- 1>.Product Name:HU-013 Laser Electronic Piano DIY Kit
- 2>.Work Voltage:DC 5V
- 3>.Musical Scale:do,re,mi,fa,sol,la,si
- 4>.Tones:Treble, Alto, Bass
- 5>.Play Mode:Strum Mode and Play Mode
- 6>.Built-in music: 2 songs
- 7>.Control Type:Laser transmitters and photoresistor receiver
- 8>.Speaker:8ohm 0.5W
- 9>.Laser power:<5mW
- 10>.Work Temperature:-20℃~85℃
- 11>.Work Humidity:5%~85%RH
- 12>.Size(Installed):170*153*25mm

4.Component Listing:

NO.	Component Name	PCB Marker	Parameter	QTY
1	Metal Film Resistors	R1-R7,R16-R18	1Kohm	10
2	Metal Film Resistors	R8-R15	10Kohm	8
3	Metal Film Resistors	R26	510Kohm	1
4	Crystal Oscillator	X1	12MHz	1
5	IC Socket	U1	DIP-40	1
6	STC89C52RC	U1	DIP-40	1
7	Blue LED	LED1-LED10	3mm	10
8	GL5528 Photoresistor	R19-R25		7
9	Ceramic capacitor	C2,C3	22pF	2
10	S8550 Transistor	Q1	TO-92	1
11	Electrolytic capacitor	C1	10uF	1
12	DC-005 Power Socket	DC1		1
13	Self-locking Switch	SW	6*6mm	1
14	Self-locking Switch Cap	SW	Red	1
15	Black Button	KEY1,KEY2	12mm	1
16	Heat Shrink Tubing		8cm	1
17	Speaker	BUZZER	8ohm 0.5W	1
18	Speaker Red/Black Wire		5cm	1
19	Black Double-sided Tape			1
20	Laser Transmitter	D1-D7	<5mW	7

21	Red/Black Wire		15cm	1
22	USB Wire		80cm	1
23	Acrylic Board		170*153*30mm	2
24	Copper Column Screw		M3*6+6mm	5
25	Copper Column		M3*10mm	5
26	Screw		M3*5mm	10
27	Main PCB Board		100*40*1.6mm	1
28	Laser PCB Board		100*15*1.6mm	1

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

5.Application:

- 1>.Training welding 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 gifts

6.Installation Tips:

- 1>.User needs to prepare the welding tool at first.
 - 1.1>.Soldering iron (<=60 Watt)
 - 1.2>.Rosin core ("radio") solder
 - 1.3>.Wire cutters
 - 1.4>.Wire strippers
 - 1.5>.Philips screwdriver
- 2>.Please be patient until the installation is complete.
- 3>.The package is DIY kit.It need finish install by user.
- 4>.The soldering iron can't touch the components for a long time(3s), otherwise damage components.
- 5>.Pay attention to the positive and negative of the components.
- 6>.Strictly prohibit short circuit.
- 7>.User must install the LED according to the specified rules.Otherwise some LED will not light.
- 8>.Install complex components preferentially.
- 9>.Make sure all components are in right direction and right place.
- 10>.Check that all of the LED can be illuminated.
- 11>.It is strongly recommended to read the installation manual before starting installation!!!
- 12>.Please wear anti-static gloves or anti-static wristbands when installing electronic components.

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

- 1>.Step 1: Install 10pcs 1Kohm Metal Film Resistors at R1-R7,R16-R18.
- 2>.Step 2: Install 8pcs 10Kohm Metal Film Resistors at R8-R15.
- 3>.Step 3: Install 1pcs 510Kohm Metal Film Resistors at R26.
- 4>.Step 4: Install 1pcs 12MHz Crystal Oscillator at X1.
- 5>.Step 5: Install 1pcs DIP-40 IC Socket at U1.There is a gap mark on one end of the IC Socket and there is a gap mark on PCB silk screen where the IC Socket can place on.These two marks are corresponding to each other and are used to specify the installation direction of the IC Socket.
- 6>.Step 6: Identify the positive(anode) and negative(cathode) lead of LED.The leads of the LED must be installed correctly, otherwise the LED cannot be turned on.Here are four methods as following:
 - 6.1>.According to the length of the LED lead to distinguish. The longer pin is positive(anode) lead. The shorter pin is negative(cathode) lead.
 - 6.2>.Identify the negative(cathode) of the LED is to look into the plastic case where one can see that the negative(cathode) is much thicker/bigger inside the plastic case than the anode lead.
 - 6.3>.Identify by edge of plastic case.The negative(cathode) lead of the LED should be the pin nearest the flat on the plastic case.
 - 6.4>.Test by 3V battery or multimeter.The pin is positive(anode) lead which has connect to the positive of 3V if LED can light up after connect 3V power supply.(LED should not be powered directly from the 3V for a short time:less then 0.5second)
 - 6.5>.It is positive(anode) where the white mark " + " pointing to on PCB.
- 7>.Step 7: Install 10pcs 3mm Blue LED at LED1-LED10.
- 8>.Step 8: Install 7pcs GL5528 Photoresistor at R19-R25. Take care to bend the photoresistor and

keep a distance of about 10mm.

9>.Step 9: Install 2pcs 22pF Ceramic capacitor at C2,C3.

10>.Step 10: Install 1pcs TO-92 S8550 Transistor at Q1. Pay attention to the installation direction. The arc on the PCB corresponds to the arc of the components.

11>.Step 11: Install 1pcs 10uF Electrolytic Capacitor at C1 and bending. Pay attention to distinguish between positive and negative.The Longer pin is positive pole.

12>.Step 12: Install 1pcs DC-005 Power Socket at DC1.

13>.Step 13: Install 1pcs Self-locking Switch at SW.

14>.Step 14: Install 2pcs Black Button at KEY1,KEY2.

15>.Step 15: Install 1pcs Red Self-locking Switch Cap on Self-locking Switch.

16>.Step 16: Install 1pcs DIP-40 IC STC89C52RC at U1.There is a gap mark on one end of the IC and there is a gap mark on DIP-8 IC Socket where the IC can place on.These two marks are corresponding to each other and are used to specify the installation direction of the IC.

17>.Step 17: Cut Heat Shrink Tubing to 7pcs about 1cm for each one. Then fix on photoresistor by heating heat shrink tubing.

18>.Step 18: Connect 1pcs 8ohm 0.5W Speaker to PCB. Speaker do not need to distinguish between positive and negative.

19>.Step 19: Stick the speakers on the back of the PCB by double-sided tape.

20>.Step 20: Cut the excess wire from 5mW laser transmitter and keep 10mm wire.

21>.Step 21: Fix 7pcs 5mW Laser Transmitter at D1-D7. Pay attention to the positive and negative. It is positive pole where the side with the resistor is the positive pole.

22>.Step 22: Connect two PCB by 15cm red/black wires.

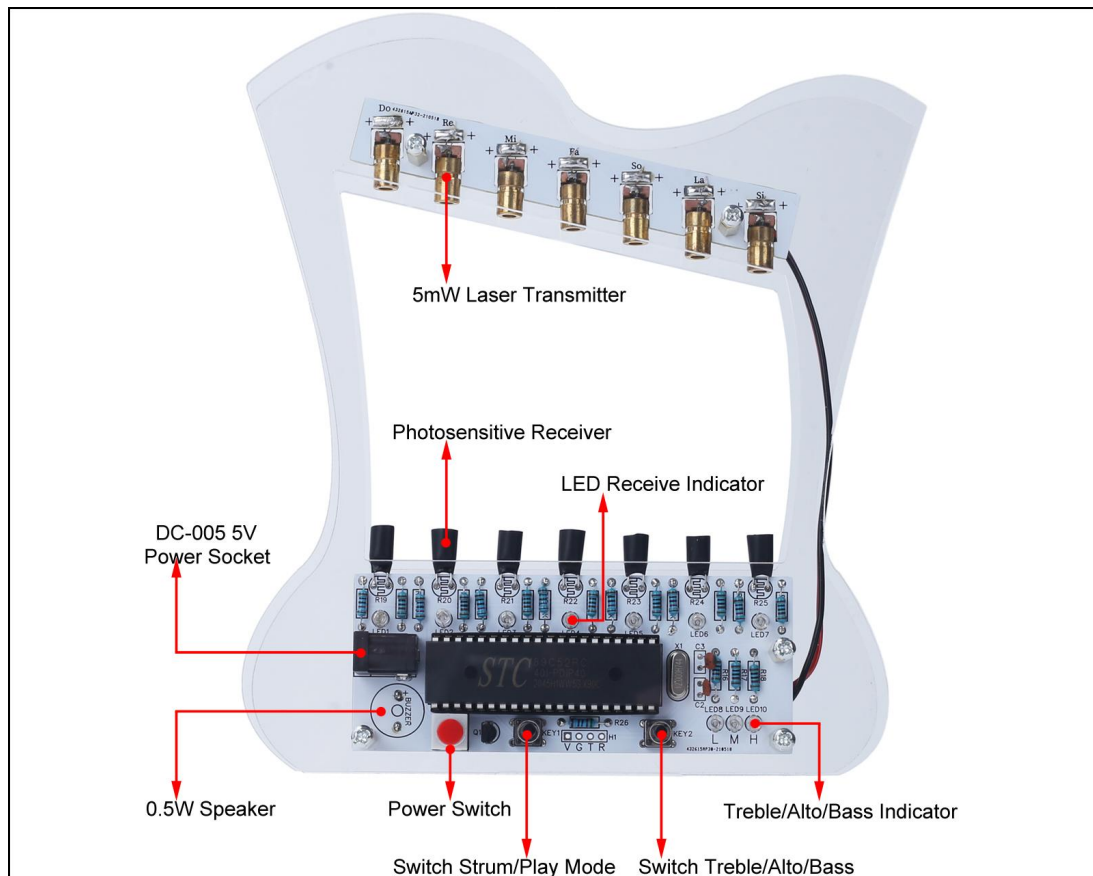
23>.Step 23: Tear off the protective film on the surface of the acrylic board.

24>.Step 24: Fix 5pcs M3*6+6mm Copper Column Screw on one acrylic board by 5pcs M3*5mm Screw.

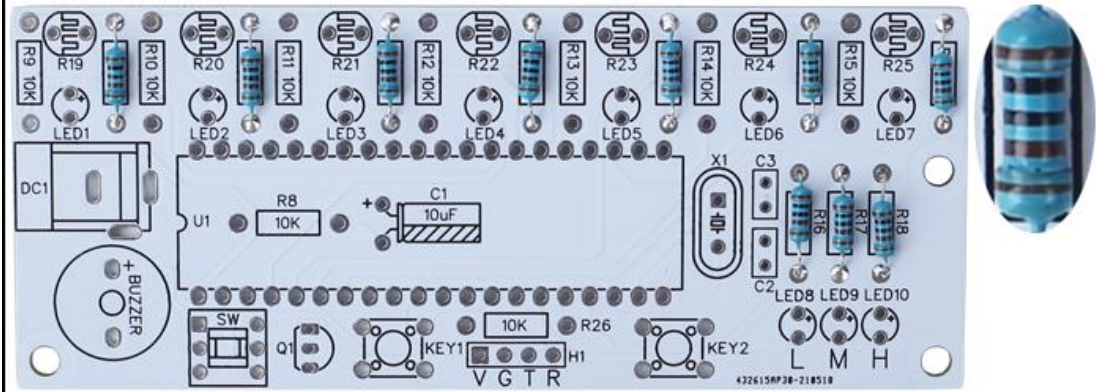
25>.Step 25: Fix two PCB by 5pcs M3*10mm Copper Column.

26>.Step 26: Fix another acrylic board by 5pcs M3*5mm Screw.

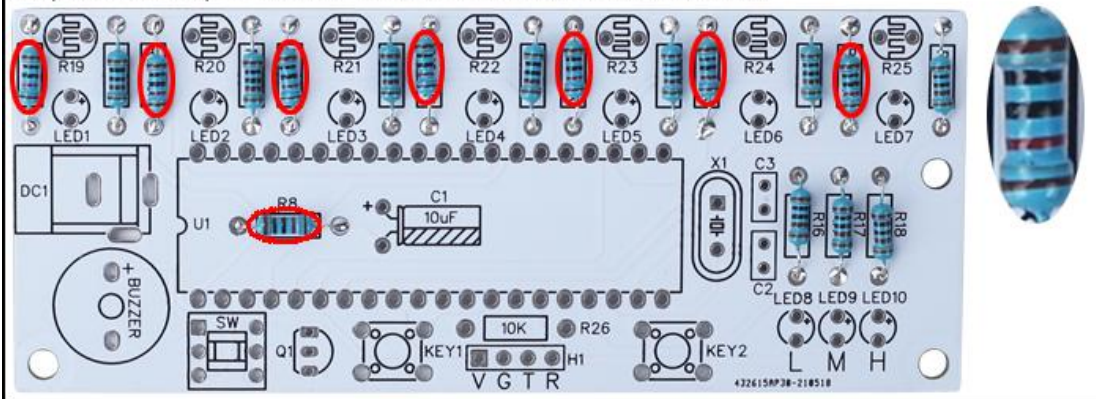
8.Install shown steps:



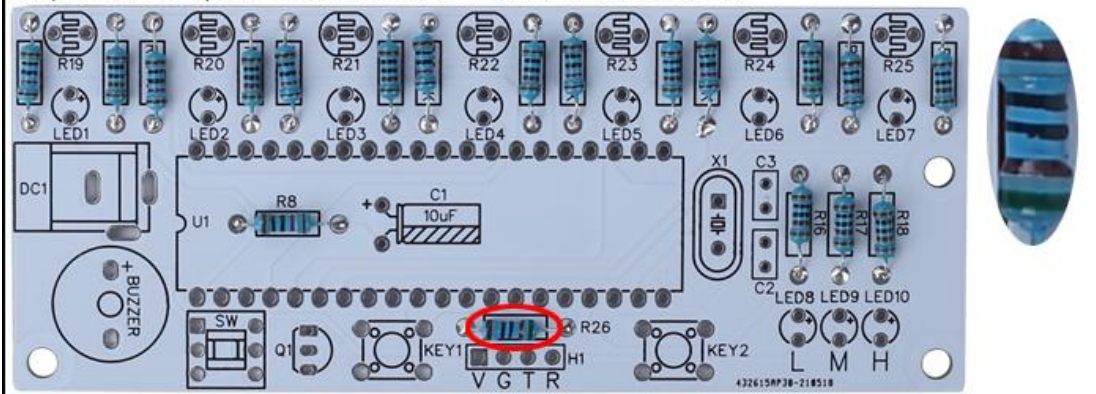
Step 1: Install 10pcs 1Kohm Metal Film Resistors at R1-R7,R16-R18.



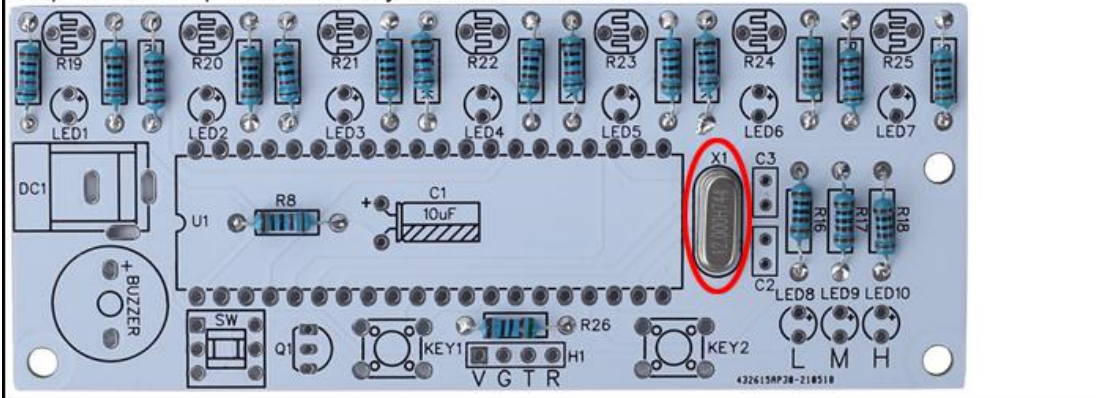
Step 2: Install 8pcs 10Kohm Metal Film Resistors at R8-R15.



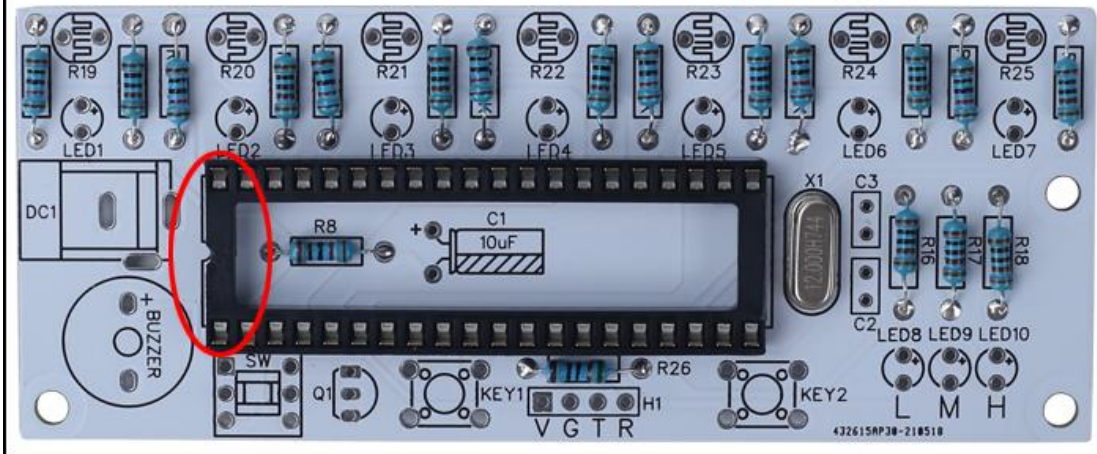
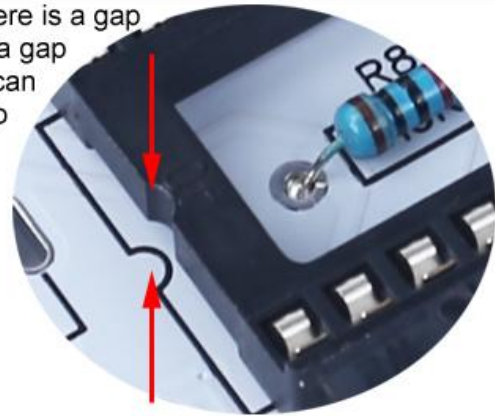
Step 3: Install 1pcs 510Kohm Metal Film Resistors at R26.



Step 4: Install 1pcs 12MHz Crystal Oscillator at X1.

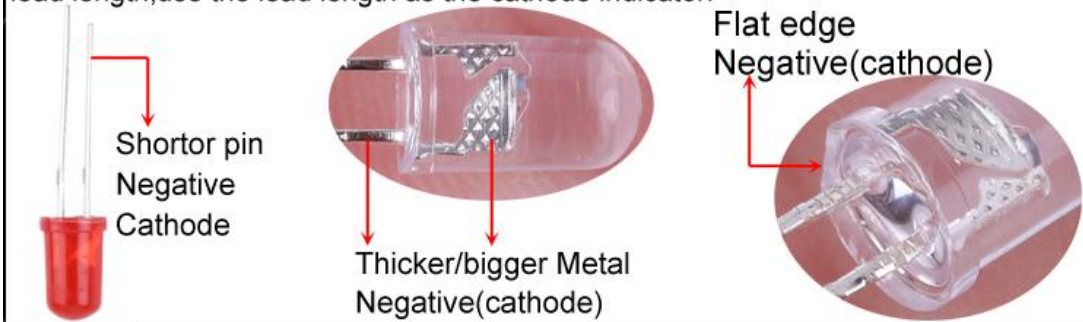


Step 5: Install 1pcs DIP-40 IC Socket at U1. There is a gap mark on one end of the IC Socket and there is a gap mark on PCB silk screen where the IC Socket can place on. These two marks are corresponding to each other and are used to specify the installation direction of the IC Socket.

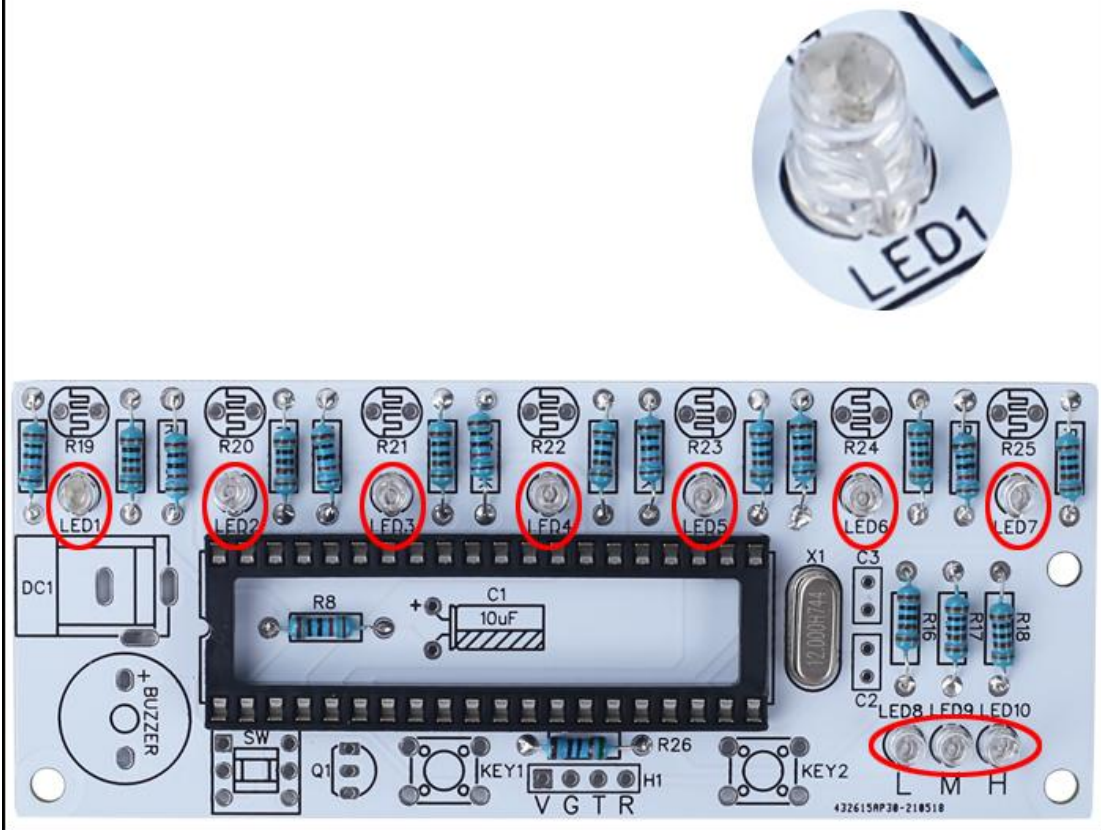


Step 6: Identify the positive(anode) and negative(cathode) lead of LED. The leads of the LED must be installed correctly, otherwise the LED cannot be turned on. Here are four methods as following:

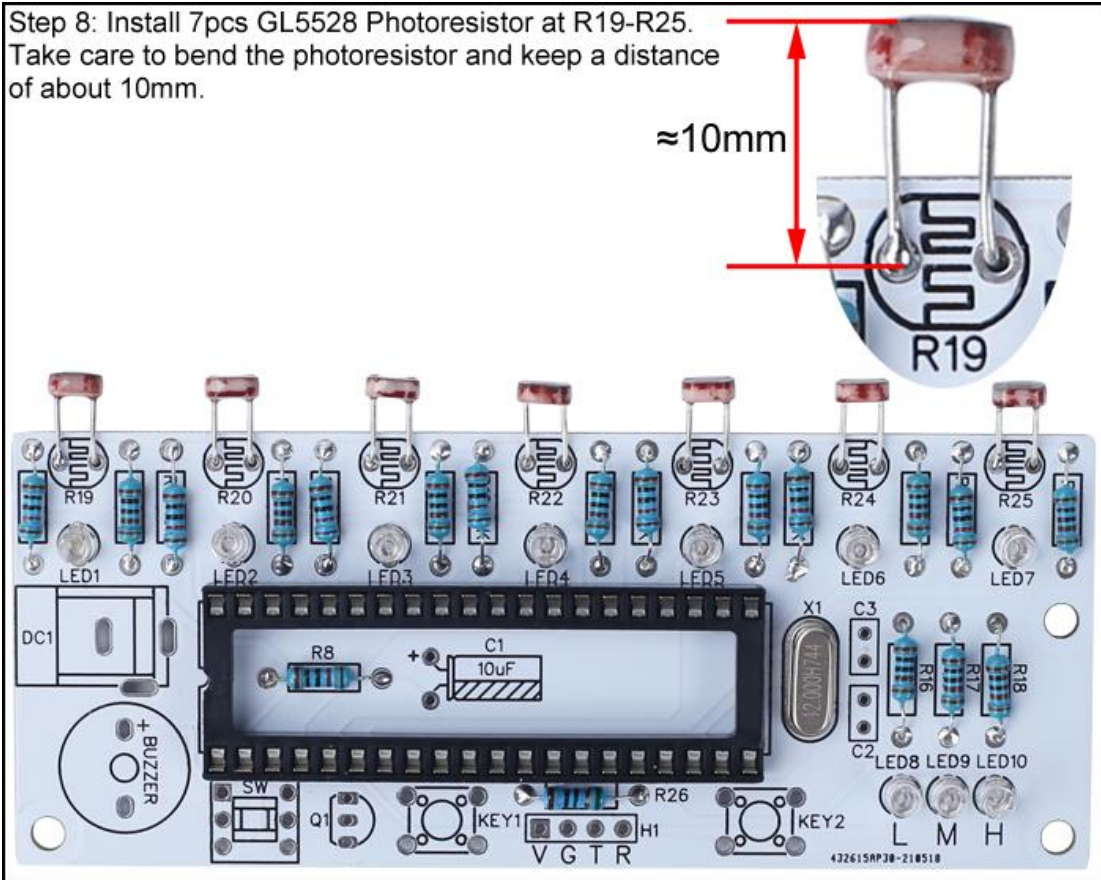
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- 6.3>.Identify by edge of plastic case. The negative(cathode) lead of the LED should be the pin nearest the flat on the plastic case.
- 6.4>.Test by 3V battery or multimeter. The pin is positive(anode) lead which has connect to positive of 3V if LED can light up after connect 3V power supply. (LED can not be powered directly from 3V for a short time:less then 0.5second)
- 6.5>.Note:If the flat on package disagrees with other indicators(short lead,large cathode lead end), then other indicators take priority. I.e. if the flat disagrees with the lead length,use the lead length as the cathode indicator.



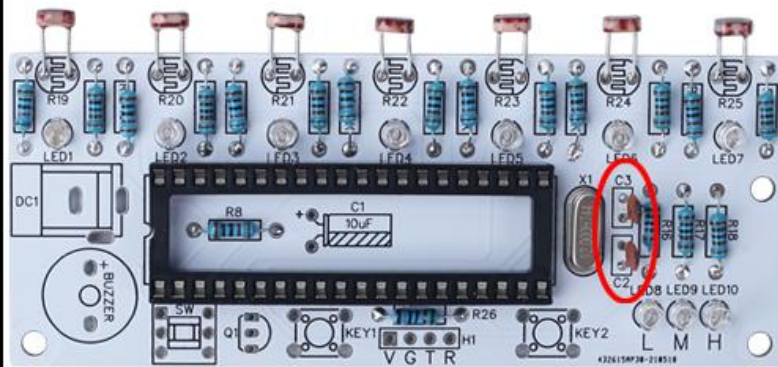
Step 7: Install 10pcs 3mm Blue LED at LED1-LED10.



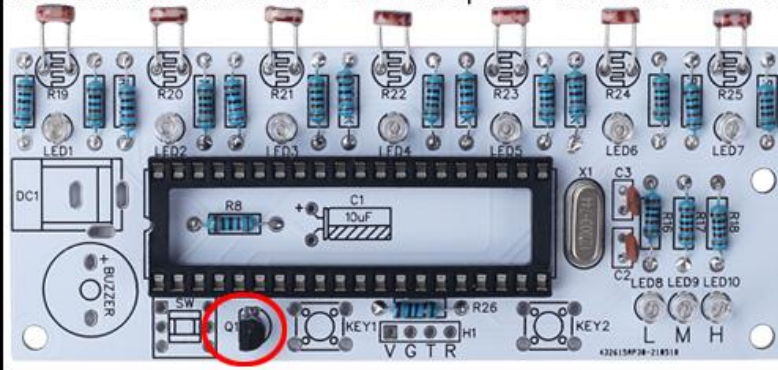
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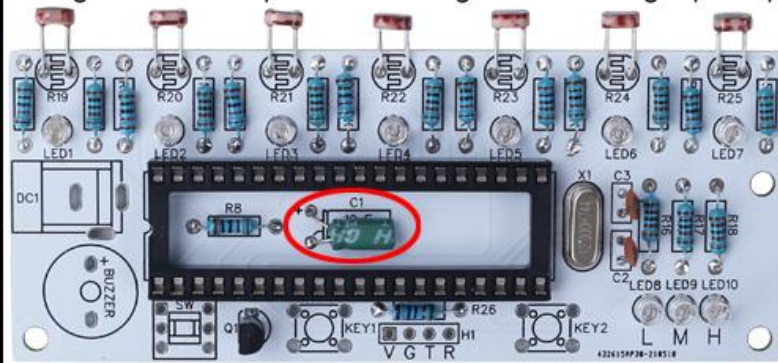
Step 9: Install 2pcs 22pF Ceramic capacitor at C2,C3.



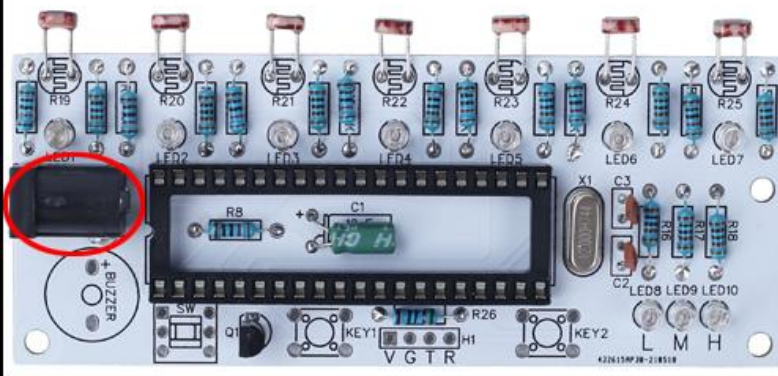
Step 10: Install 1pcs TO-92 S8550 Transistor at Q1. Pay attention to the installation direction. The arc on the PCB corresponds to the arc of the components.



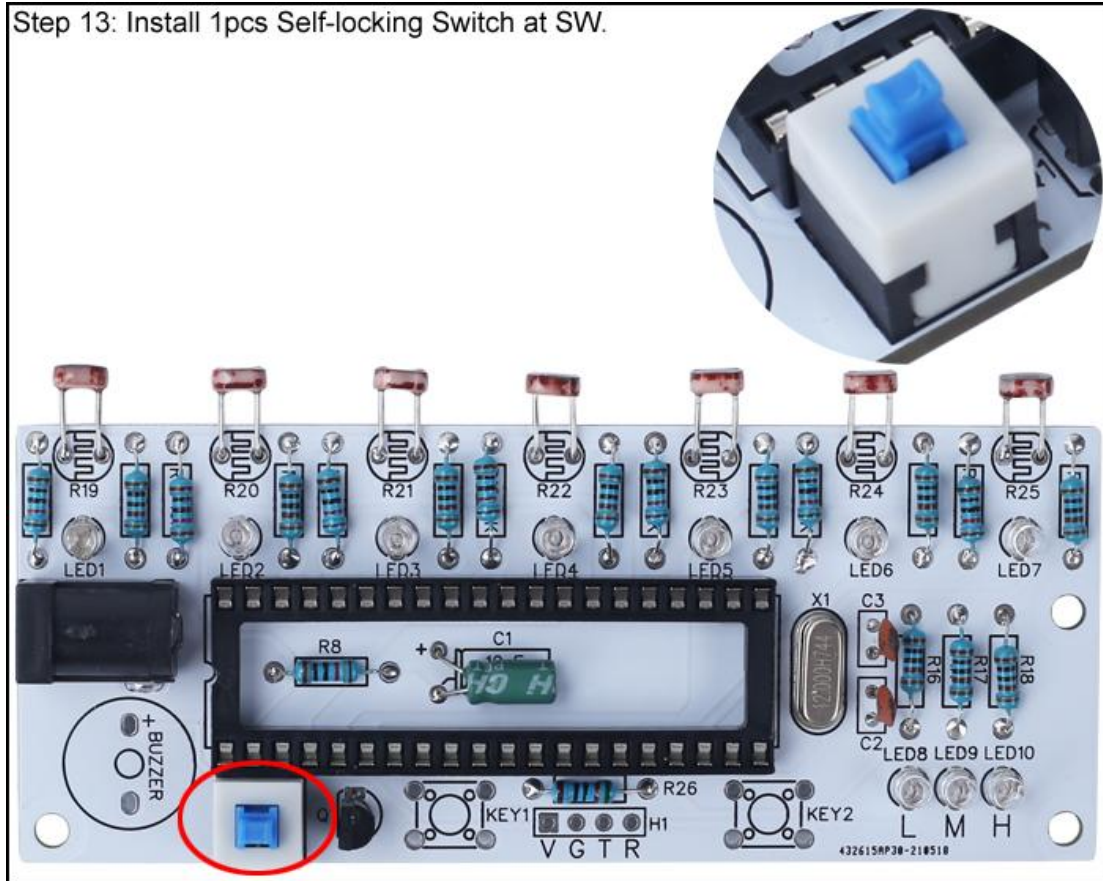
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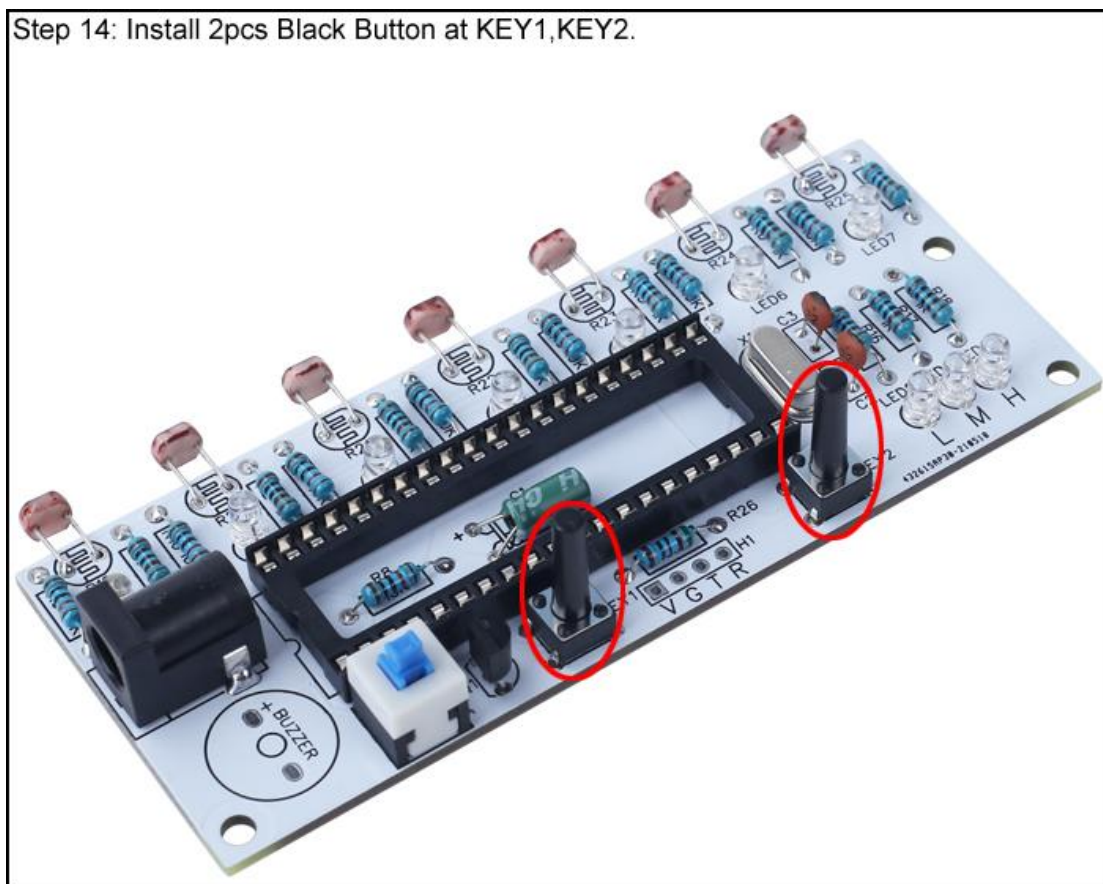
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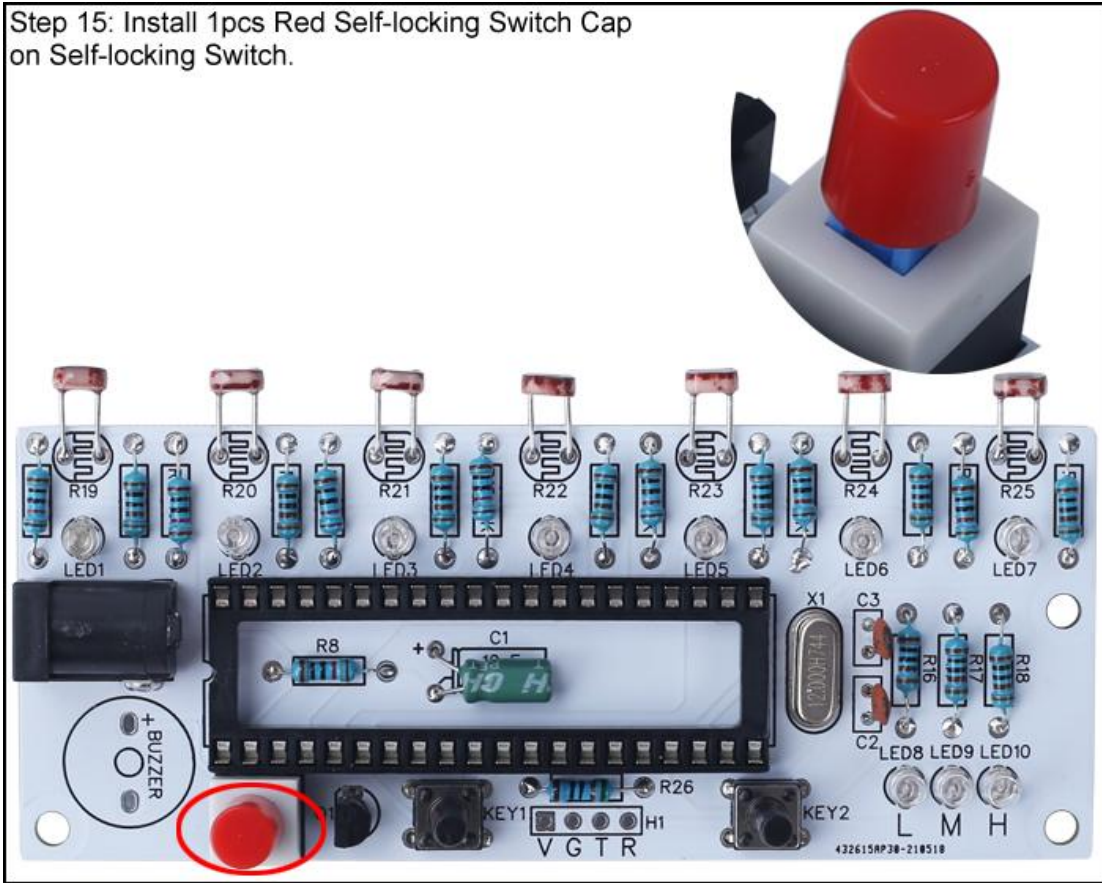
Step 13: Install 1pcs Self-locking Switch at SW.



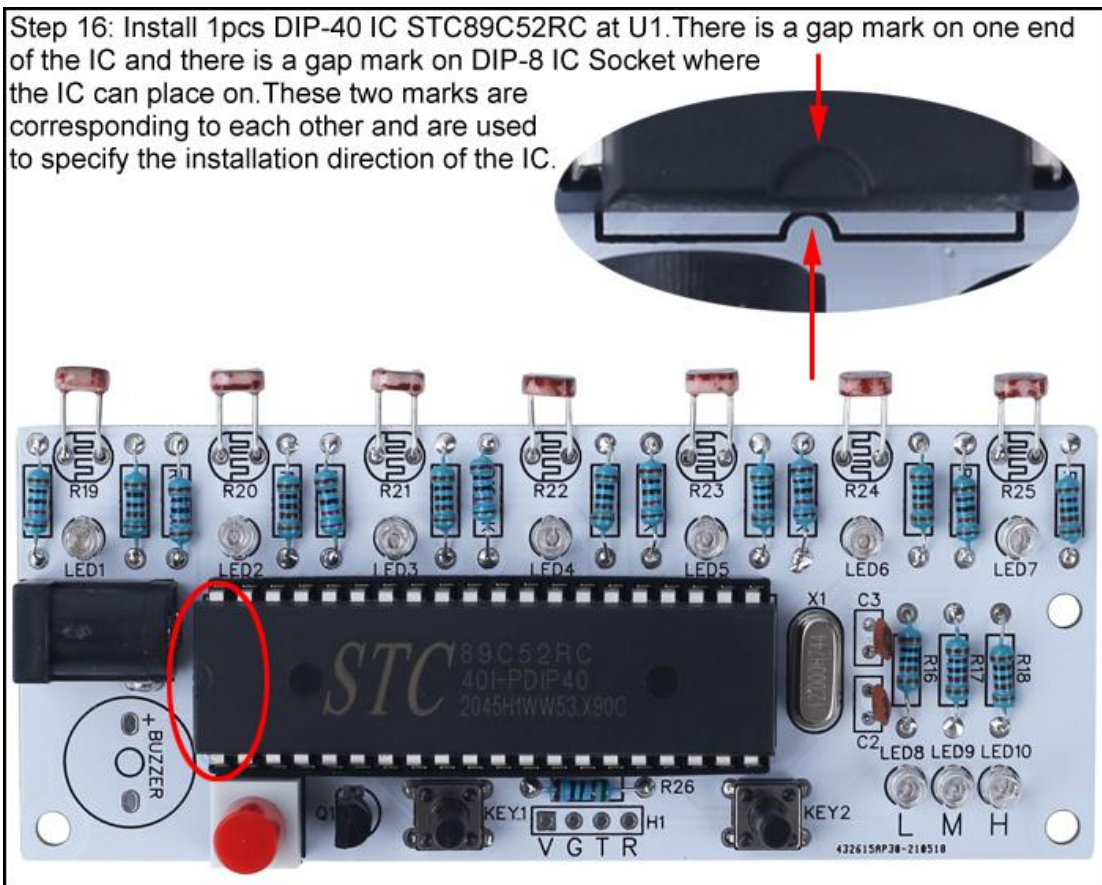
Step 14: Install 2pcs Black Button at KEY1,KEY2.



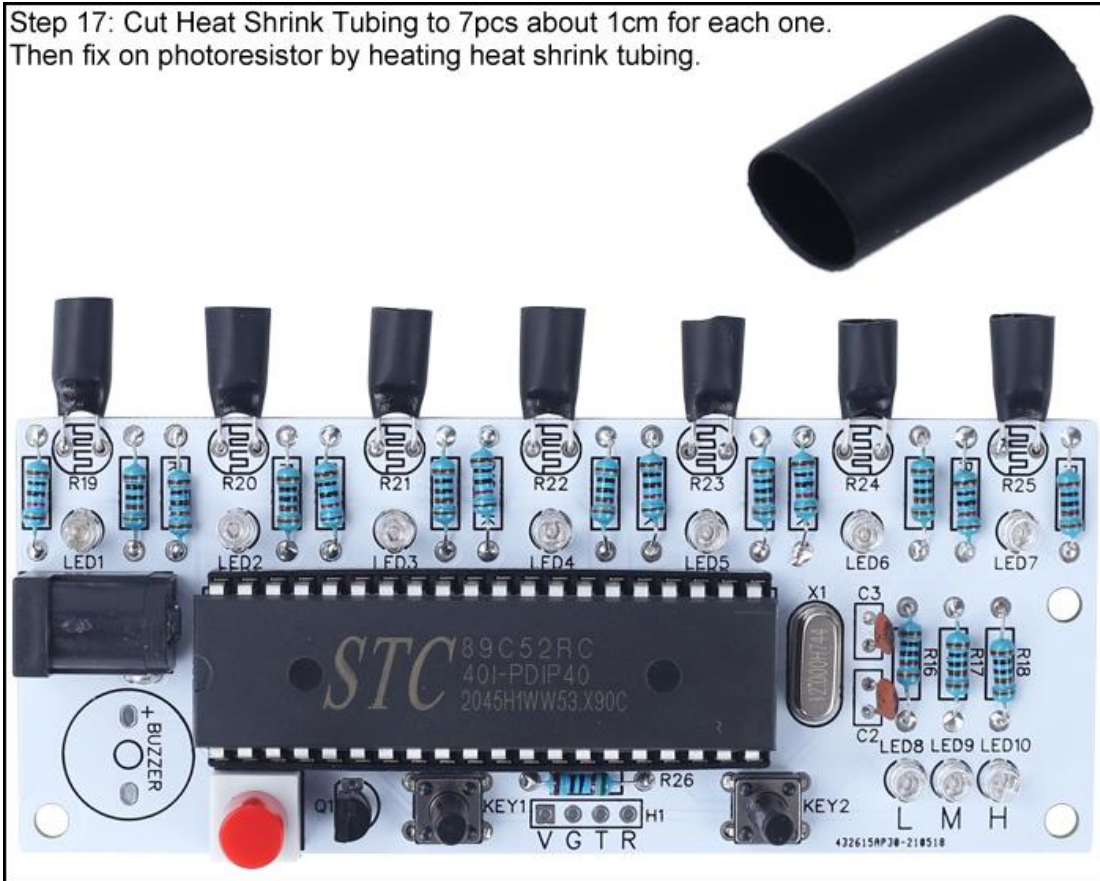
Step 15: Install 1pcs Red Self-locking Switch Cap on Self-locking Switch.



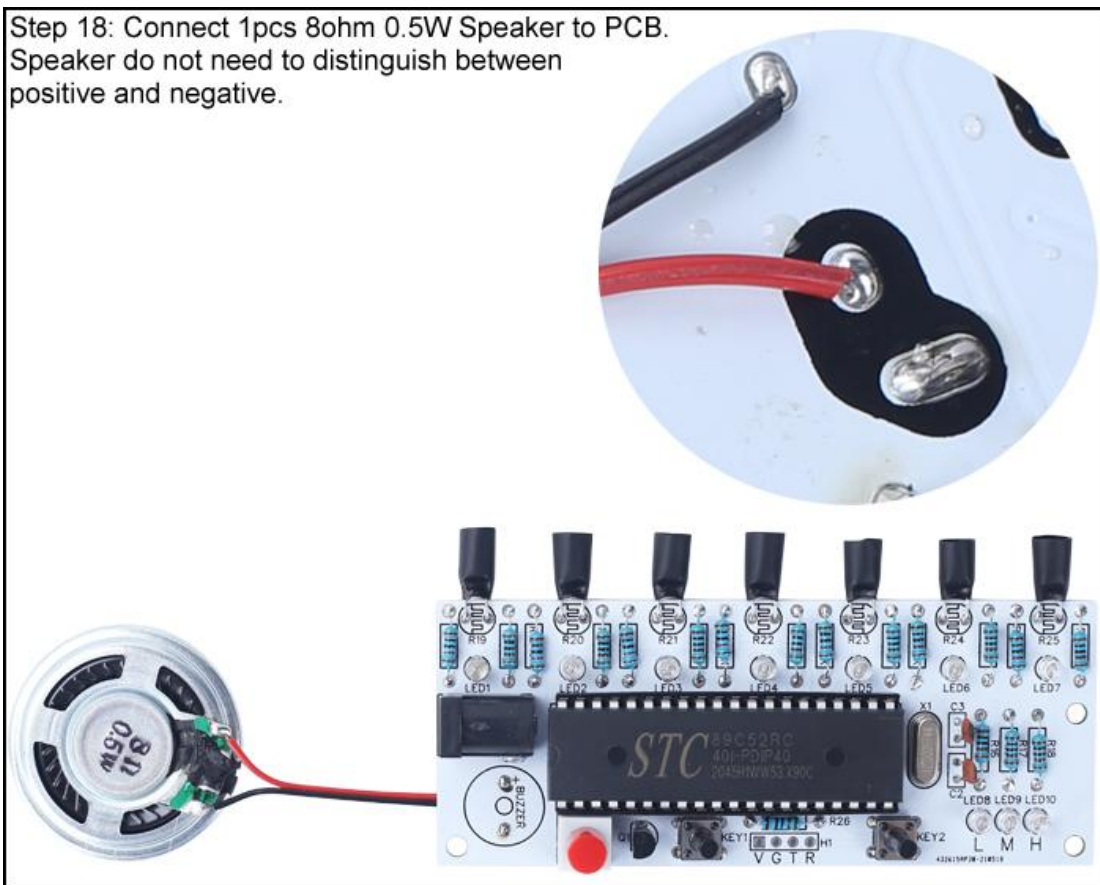
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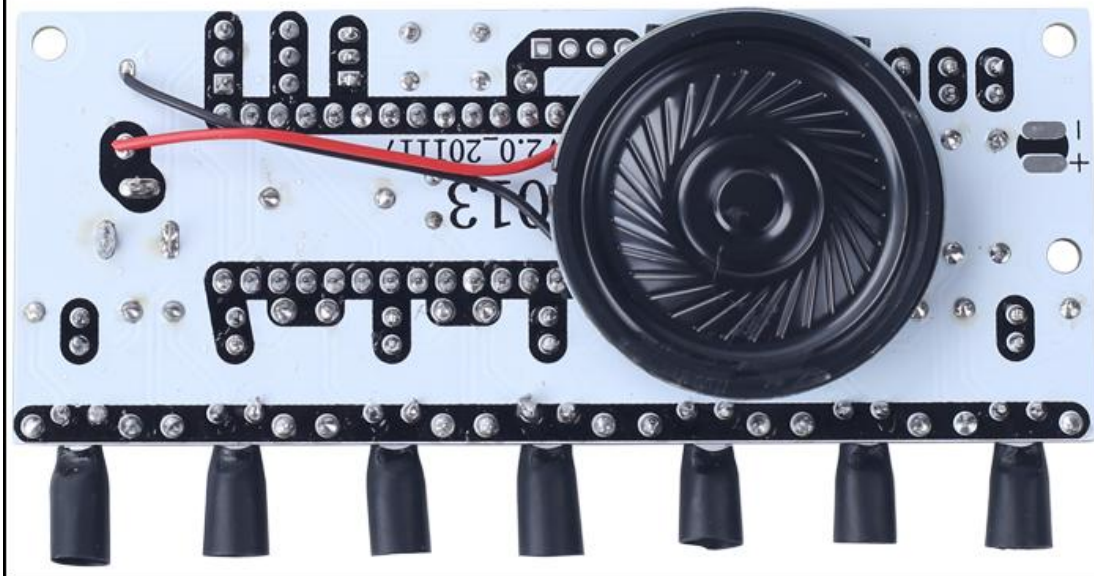
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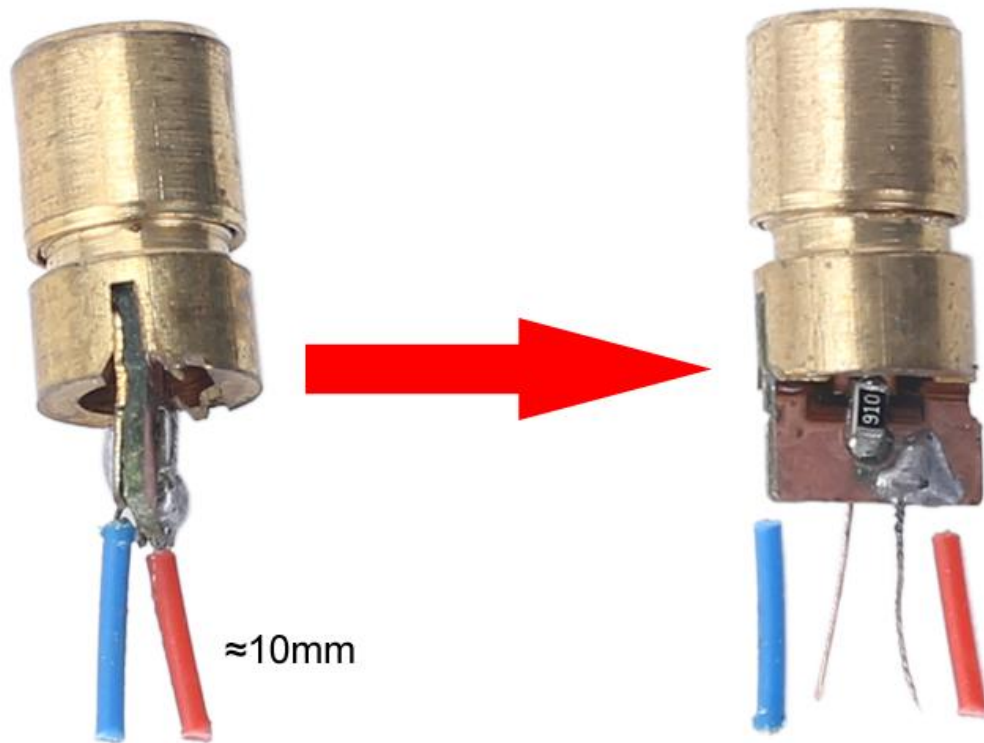
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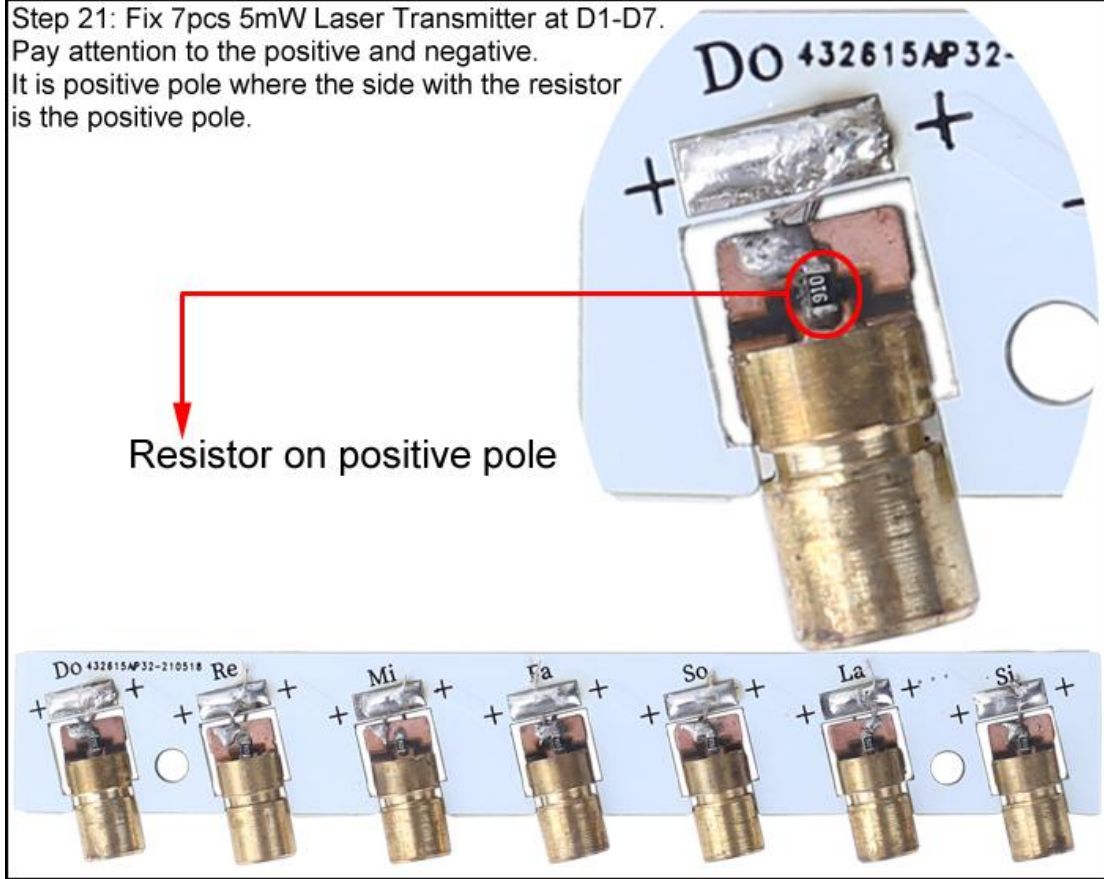
Step 19: Stick the speakers on the back of the PCB by double-sided tape.



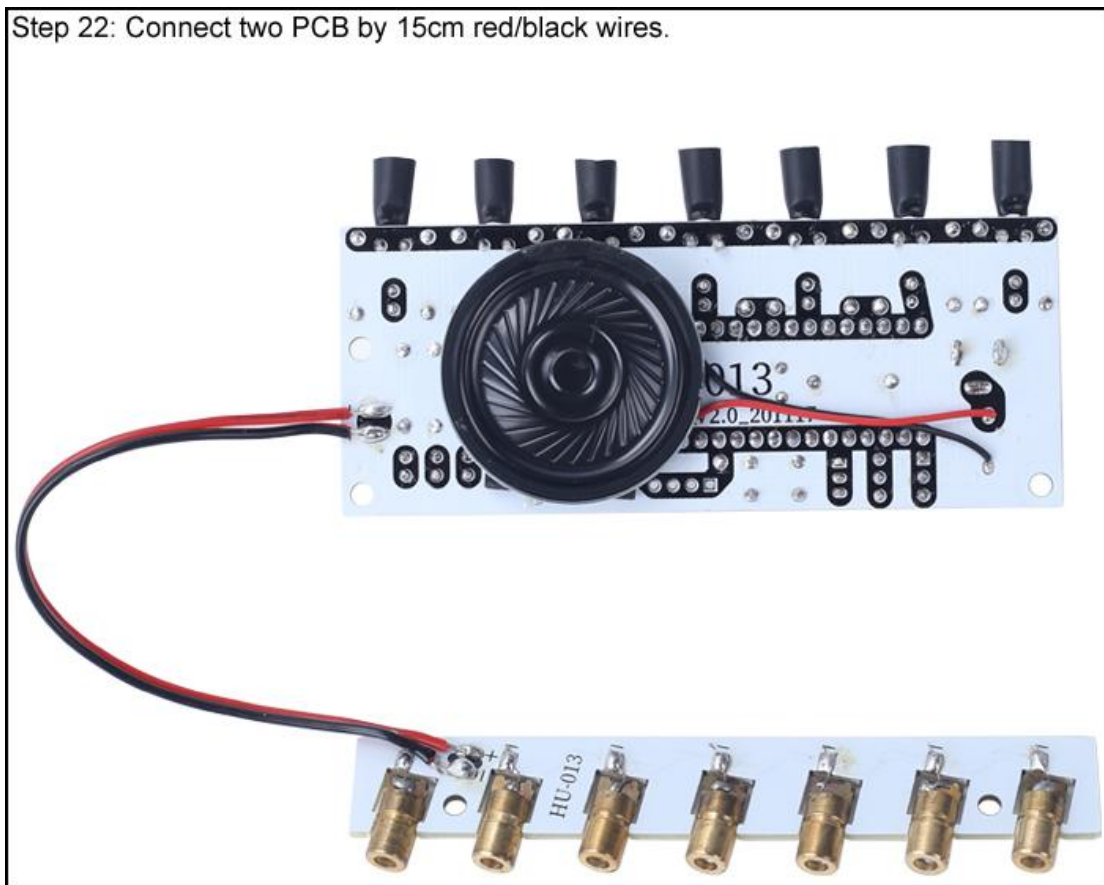
Step 20: Cut the excess wire from 5mW laser transmitter and keep 10mm wire.



Step 21: Fix 7pcs 5mW Laser Transmitter at D1-D7.
Pay attention to the positive and negative.
It is positive pole where the side with the resistor



Step 22: Connect two PCB by 15cm red/black wires.



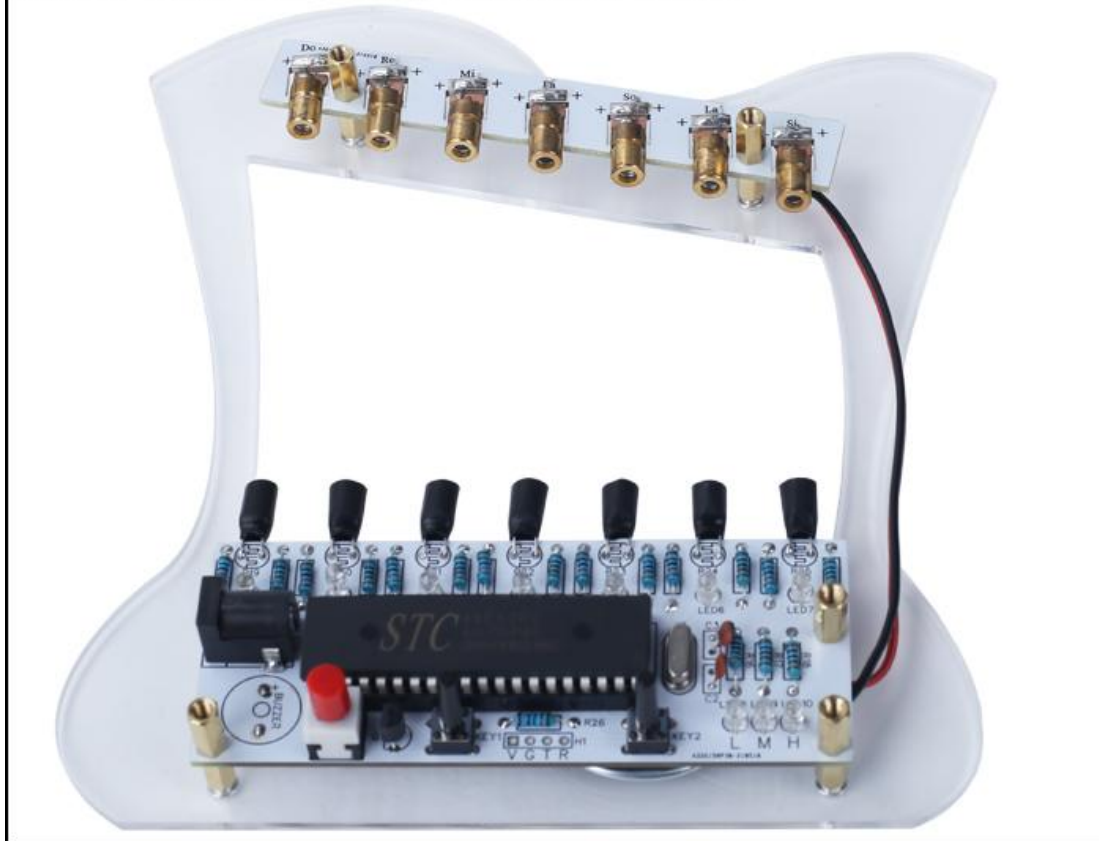
Step 23: Tear off the protective film on the surface of the acrylic board.



Step 24: Fix 5pcs M3*6+6mm Copper Column Screw on one acrylic board by 5pcs M3*5mm Screw.



Step 25: Fix two PCB by 5pcs M3*10mm Copper Column.



Step 26: Fix another acrylic board by 5pcs M3*5mm Screw.

