

D.I.Y Function Generator Kit

Level: Beginner AK-200



Component list:

- 5x Ceramic capacitors
- 5x ¼ W resistors *
- 3x Potentiometer Knob
- 3x Taper potentiometer (R2-50K, R7-50k, R8-100k)
- 3x Electrolytic Capacitors (C1-100µf, C3-10µf, C4-10µf)
- 16 pin IC socket
- XR2206 Monolithic Function Generator IC (U1)
- 5x 2-row straight pin headers set (Frequency selection)
- 2x 2-row straight pin headers set (Wave selection)
- 4x M3 Screw x 18mm
- 4x M3 Screw x 7mm
- 8x M3 hexagonal nuts
- 3-pin Output screw terminal block
- 2x 2-pin jumpers
- DC Barrel Jack
- Clear acrylic case set

*Color code (Ω):

1k: brown, black, black, brown, brown;

5.1k: green, brown, black, brown, brown;

330: orange, orange, black, black, brown;

Copy first 2 digits Suffix with 4 Zeros

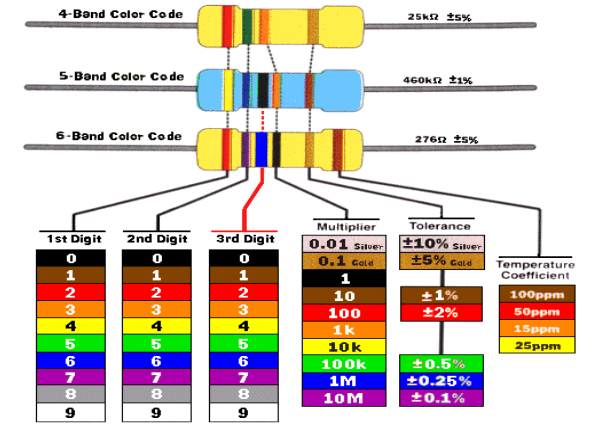
$$104 = 10 \times 10^4$$

$$10\ 0000\ \text{pf}$$

Ceramic capacitors:

Ceramic capacitors are usually of orange color. Above is a simple and easy way of calculating their values using only the number written on them as reference.

Ceramic capacitors	Value
C2	100nf (104)
C5	1µf (105)
C6	47nf (473)
C7	2200pf (222)
C8	100pf (101)



Resistors	Value
R1	1k
R3-5-6	5.1k
R4	330

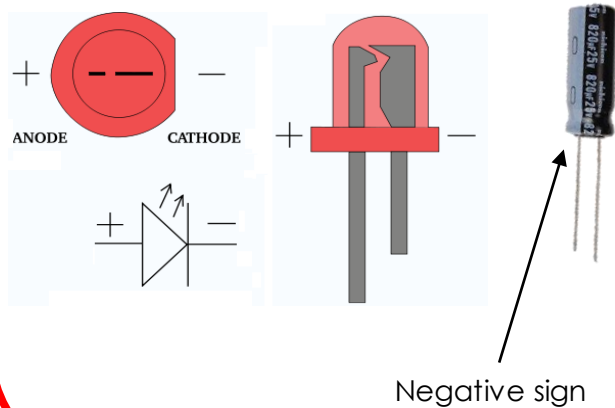
Make use of the chart to identify resistor values. Note that number of bands drawn on the resistor dictate how to calculate your values.

Component polarity:

When dealing with polarized components, it is important to be able to identify which pins represent the anode (positive) and cathode (negative).

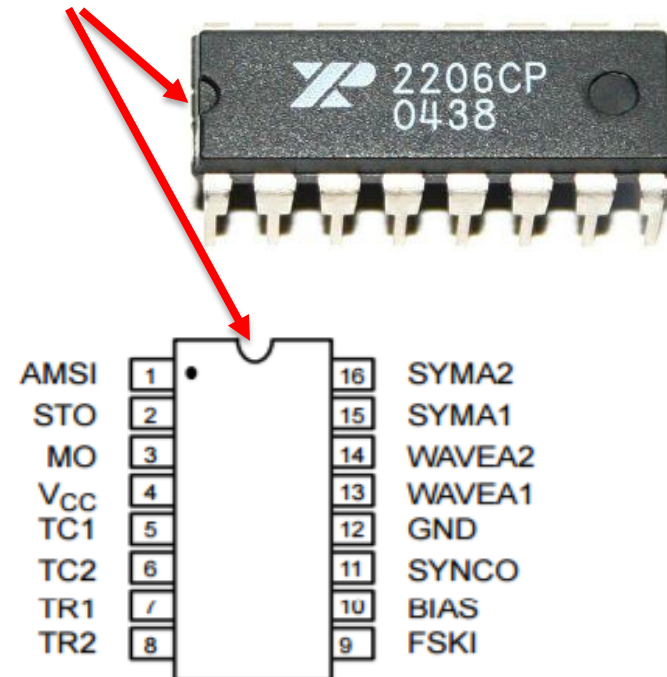
Here are a few ways of doing so for LEDs and capacitors:

- The shorter pin usually is the cathode (negative). However, for LEDs if the leads are cut you can assume the cathode lead is on the side of the LED that has a flat cut. For capacitors, there usually is a sign on the component itself indicating which lead is the cathode (-).



Chip Pinout (XR2206):

Use **dent** or dot as reference



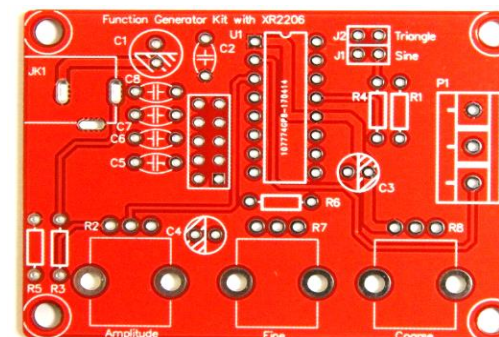
Guide:

1) Turn on iron to 330°C (626°F) temperature (solder used for this kit 60 tin/40 lead).

2) Place in components and solder (make sure the side of the board with the silkscreen is facing up when inserting components):

2.1) Start placing the resistors and make sure their values match, refer to component list, resistor color code and silkscreen. Use Multimeter if needed. **Tip:** Bend the leads of the resistor outwards on the back of the board to provide minimal mechanical grip but ensure that the angle formed by the bend is not smaller than 45 degrees.

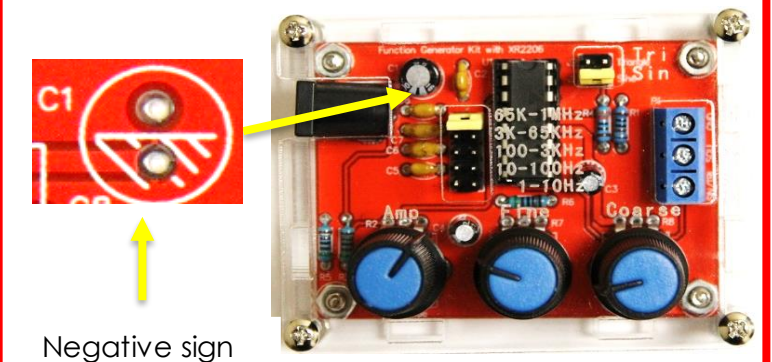
2.2) Solder the leads of the placed resistors to the pads and cut them off once done soldering. (using a flush cutter)



2.3) Next, begin placing the capacitors. When placing the polarized capacitors, refer to previous notes about identifying component polarity. You must make sure the negative lead of the capacitor is placed in the filled area of the capacitor silkscreen on the board. For ceramic capacitors, there is no polarity. Don't forget to verify if your values match, refer to component list.

2.4) Solder the capacitor leads and cut when done.

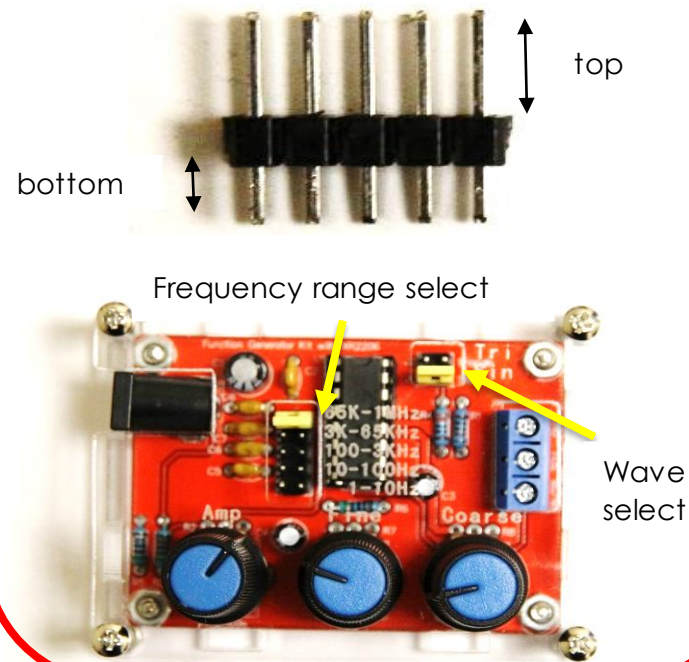
Use the silkscreen to help you



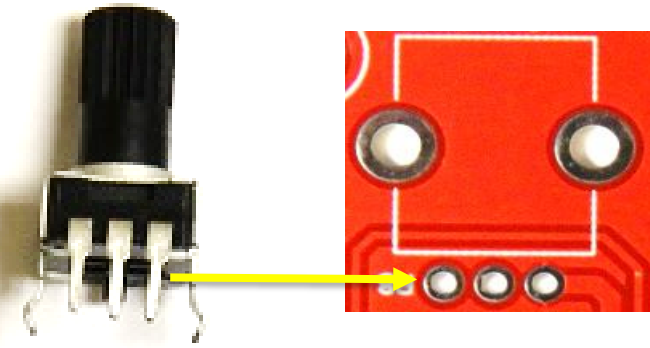
Negative sign

2.5) Now, look for your straight pin headers. Make sure that the length of the pin when its sticking out from the top is longer than it is from the bottom. Take the one with 10 pins (5 x 2-row) and place it (to the left of U1). Then do the same for the one with 4 pins (2 x 2-row)(place where J2 and J1 is labeled).

2.6) Solder and cut the leads if needed.

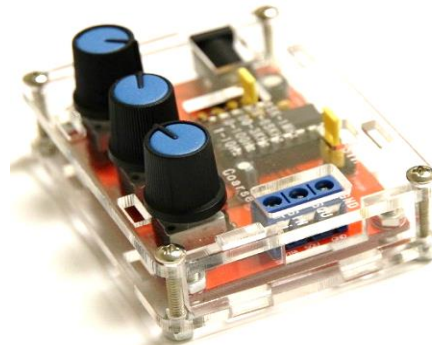


Use silkscreen as reference



2.7) Next, place the potentiometer. Insert them as is and use silkscreen as reference. (Don't place knobs yet!!)

2.8) Solder the leads and cut.

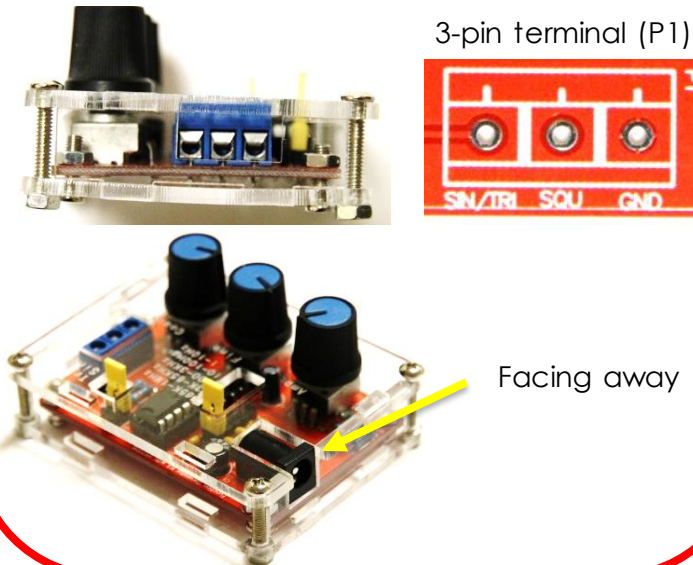


2.9) Now place the screw terminals. Use the silkscreen as reference. The 3-pin terminal (blue) should be placed in the area indicated by the label "P1". Make sure the opening is facing outwards.

2.10) Solder and cut if necessary.

2.11) Place the DC barrel jack. Make sure it is facing outwards and place it in the area referred to as "JK1" on the silkscreen.

2.12) Solder and cut if necessary.

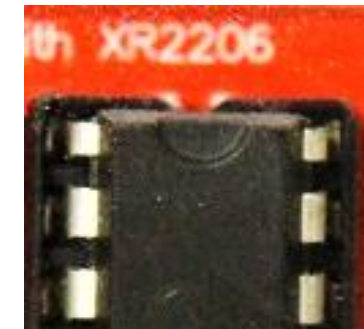


2.13) Now, place the socket you will have to insert the chip in. Place the 16-PIN socket which belongs to the XR2206 chip (U1). **IMPORTANT:** Make sure that the dent on the socket aligns with the dent on the silkscreen layout for this chip. This will make it easier for you to place the chip.

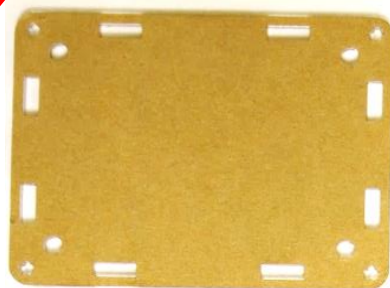


2.14) Solder and cut the leads.

Align all dents



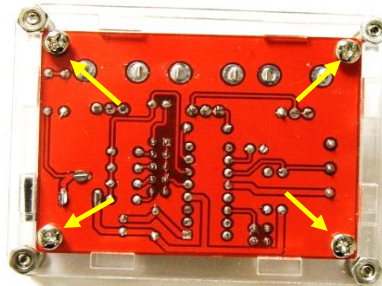
2.15) Place the chip but make sure the dent of the chip aligns with the dent of the silkscreen. **Tip:** The reason you solder sockets instead of just soldering the chip right on is to have the ability to switch out burnt or broken chips for new ones.



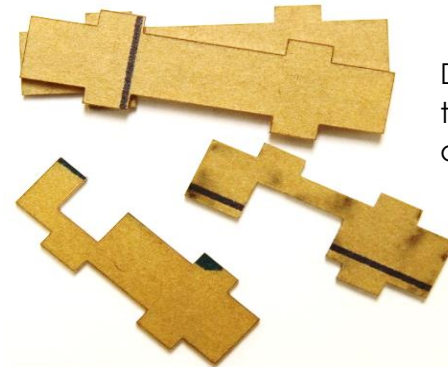
3) Once assembly is done, you can start putting together the acrylic case around your PCB. (remember to remove the brown adhesive paper from the boards)

Bottom acrylic board

3.1) You must first screw on the PCB board to the bottom piece. Make sure you have the right board. The bottom board has less openings than the top one (look at image). Align the holes of the bottom board with the drilling holes of PCB. Then start passing all the M3 x 7mm screws through the holes from the bottom. Finally, ensure mechanical grip by placing the hex nuts on the top side of the PCB.

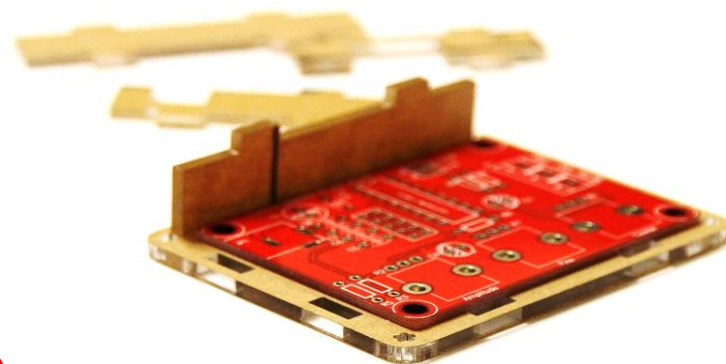


Screw hex nuts top side

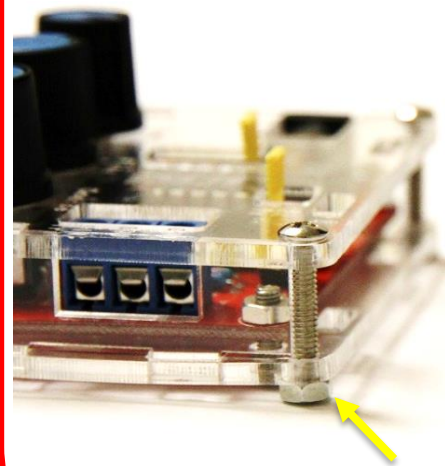
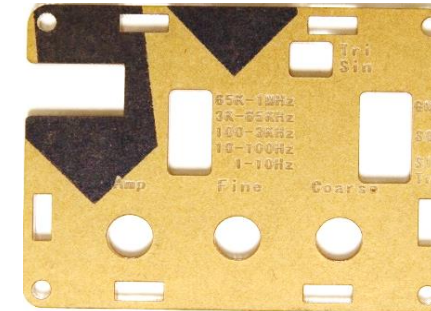


Don't forget to remove the adhesive

3.2) Once the PCB is properly screwed in to the bottom board, you can start placing the front, back and side pieces accordingly.



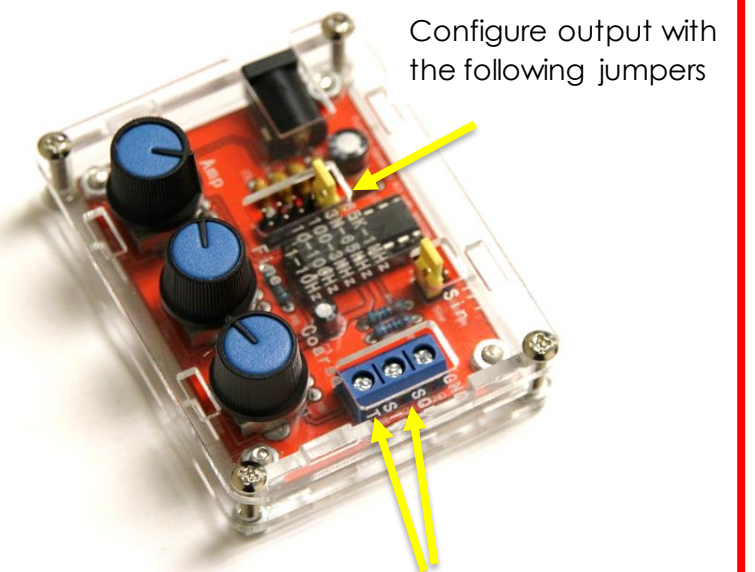
Top acrylic board



Screw Hex nuts from bottom

3.3) Finally, place the top board. It should naturally fit in. Once in place, take the M3 x 17mm screws and connect the top board with bottom one. Then, take the remaining hex nuts and tighten each of the screws from the bottom board to ensure mechanical grip. You can now also place the potentiometer knobs.

4) When all is done, connect the system to a DC voltage source in the range of 9V-12V through the DC jack. Use your jumpers to configure the settings of your desired output wave and control its amplitude and frequency in real time with the three potentiometers. You can even connect the output to an oscilloscope to better visualize the wave.



Configure output with the following jumpers

Wave output (Triangle, Sin and Square wave)