

# TT555 Assembly Instructions

v1.0 © 2022 Tiny Transistors <https://www.tinytransistors.net>

Thanks for buying the TT555 Soldering Kit! With this kit you'll be able to assemble a discrete-component version of the famous NE555 timer IC that's the same size as the original DIP package. You can plug it in anywhere you would normally use a DIP 555 chip and get similar performance. Please read these instructions carefully to get the most out of your TT555 kit.

## Components included

- One TT555 printed circuit board
- 20 MMBT3904LP NPN transistors
- 20 MMBT3906LP PNP transistors
- Resistors of the following values and sizes:
  - 4.7 kΩ 01005
  - 820 Ω 01005
  - 1 kΩ 01001
  - 100 kΩ 01005
  - 15 kΩ 01001
  - 4.7 kΩ 0402
  - 6.8 kΩ 0201
  - 3.9 kΩ 01005
  - 220 Ω 01005
  - 100 Ω 01005
- Two four-pin headers
- Schematic
- Bill of Materials
- Assembly drawing
- This Assembly Manual

Resistors come in strips of 5 or 10, even if only one or two are needed. This is to keep the strips at a manageable size, and also gives you a few spare parts in case you lose them. For the same reason a few spare transistors of each type are included. Note that the 4.7 kΩ resistors come in two different sizes!

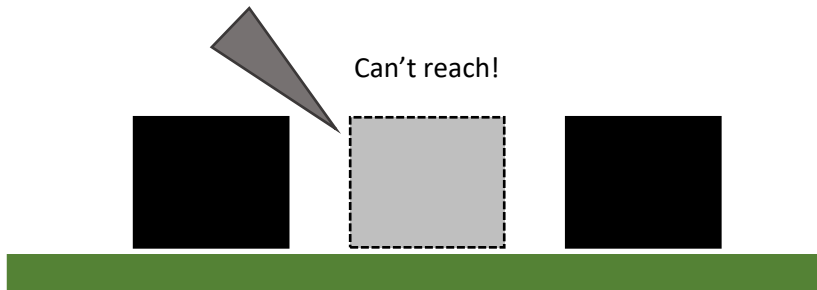
## Tools needed

- A soldering iron with a fine tip. Get the finest one you can get for your iron; we recommend a tip diameter of 0.25 mm or smaller.
- Fine solder wire. Again, get the smallest diameter possible. We recommend 0.3 mm thickness or less; both lead-free and leaded solder will work. Using solder paste is also possible, although you will need a dispenser that can deliver very small amounts very accurately. Note that the kit does not come with an SMD stencil.
- Sharp tweezers.
- A stereo microscope. Unless you have superhuman vision, you really need a microscope to properly assemble this kit. The smallest components are just 0.4 mm long and 0.2 mm wide, and you should be able to position them with sufficient accuracy.
- Desoldering braid. A width of 0.5 mm or smaller is recommended.

## Assembly procedure

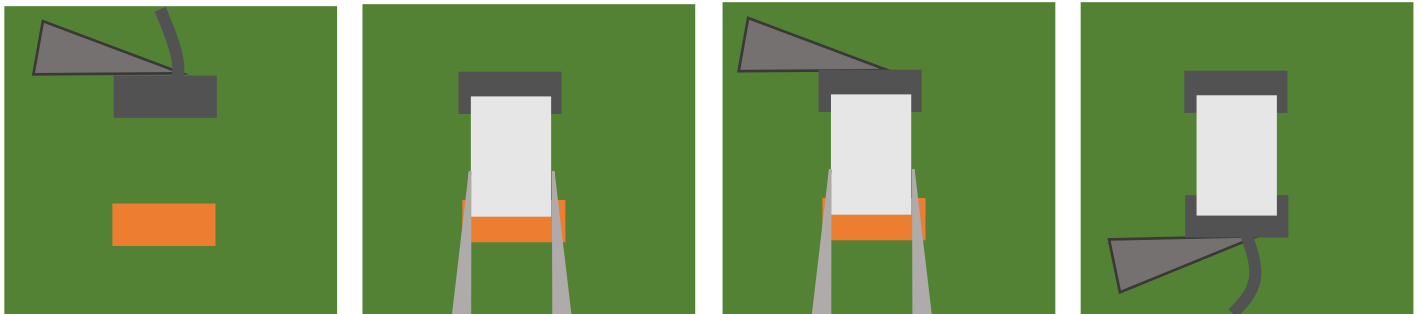
Use the Assembly Drawing and Bill of Materials to figure out which component goes where. Remember to solder the pin headers last! This will make your work much easier, since it allows you to place the PCB flat on your bench while soldering the SMD components.

There is no preferred order in which you should solder the SMD components, but it's recommended to either start on one edge of the board and work your way across, or to start in the middle and work your way outward. This way, you won't have to squeeze a component in between two others, where you can't reach it with your soldering iron.



For the resistors you can use the standard SMD hand-soldering technique:

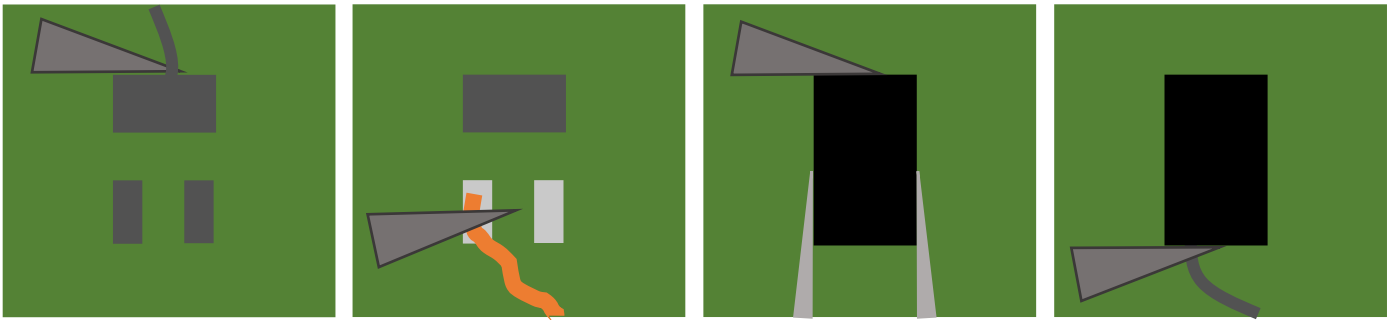
1. Apply solder to one pad.
2. Position the component.
3. Melt the solder while keeping the component in place.
4. Wait for the solder to solidify, then apply solder to the other pad.



This doesn't work for the transistors however, because their pads are located at the bottom of the component where you can't touch them with your iron. There are several ways to solder them correctly; below is one suggestion.

1. Apply solder to all three pads.
2. Use desoldering braid to remove the solder again from the smaller two pads. Note that there will always be a thin layer of solder remaining; the important thing is that the pads are perfectly flat again.
3. Position the transistor and touch your iron where it meets the board. Once the solder melts, you'll notice the transistor being pulled down towards the board.
4. Touch the iron near one of the smaller pads and apply some solder. At first it will flow onto your iron, but at some point it will suddenly flow under the transistor. The pre-tinning process of step 1 makes this much easier than it would be on bare copper.

5. Repeat step 4 for the other small pad.



Since you can't really see whether you've made a good connection here, it's a good idea to check each connection after soldering. You can do this using a multimeter set to diode mode, remembering that each transistor has two diodes inside with the base (the bottom-left pin) being a common anode for NPN devices or a common cathode for PNP devices.

As an example, below you can see the two diodes inside Q11, a PNP device. After soldering Q11 you should be able to see these diodes on your multimeter; the easiest way to probe them is to use pads for components that you haven't soldered yet (circled in green).

