How To Solder Surface Mount Parts

by Robin Caplett of the
Instrumentation Development Lab
in the Physics Department at the
University of Hawaii at Manoa

Watanabe Hall Room 214
2505 Correa Road
Honolulu, HI 96822
Lab: (808) 956-2920
Fax: (808) 956-2930
E-mail: idlab@phys.hawaii.edu

This is a passive component such as a resistor or capacitor.

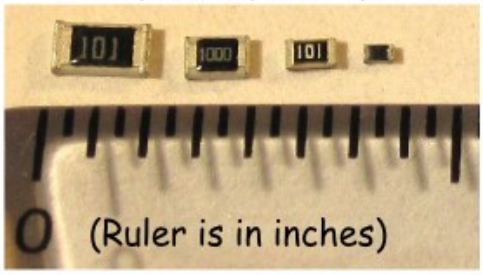
These are pads.
Or "solder pads".

In the case of resistors, the value is usually marked on the top like so:

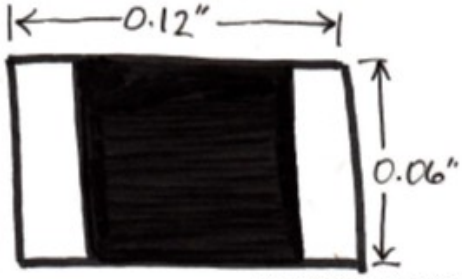
The marking can be read ABx10^C therefore "102" would be 10x10^2 or 1,000 ohms, and "183" would be 18x10^3 or 18,000 ohms.

These passive components come in several different sizes. For example:

1206, 0805, 0603, 0402.



Those numbers indicate the size in hundreths of inches. For example, the 12 in 1206 is 0.12" and the 06 is 0.06".



So 0402 parts are tiny!

The main difference between through-hole and surface mounts is obvious:

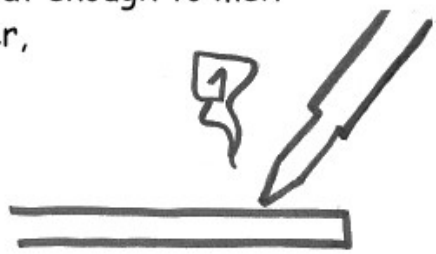
Through-hole resistor

Surface Mount resistor

However, there are other important differences...

Robin Caplett - University of Hawaii at Manoa

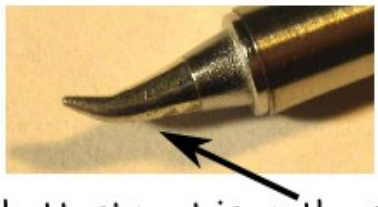
Another difference is heat time. Through holes take a moment to heat enough to melt solder,



whereas surface mounts heat up almost instantly.

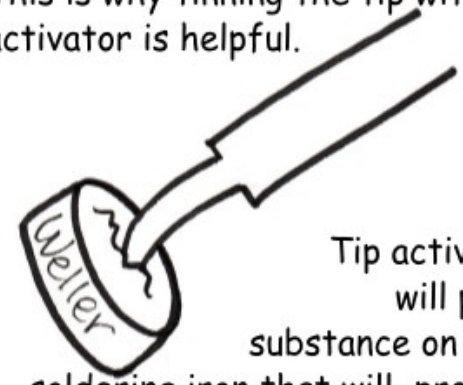
It is also important to note that there are "cold spots" on the soldering iron.

This curved tip is a good example:



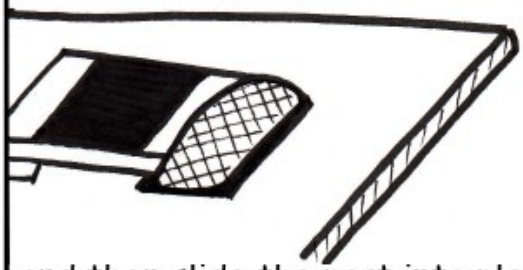
The hottest part is on the side, not the very tip.

This is why tinning the tip with tip activator is helpful.



Tip activator will put a substance on your soldering iron that will prevent oxidation and aid in heat transfer.

One method of soldering resistors and capacitors is to put solder on one of the two pads,

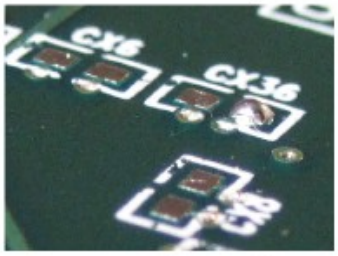


and then slide the part into place. Continue for a closer look:

If you touch the soldering iron to the first pad, it will heat almost immediately if there is good thermal contact.

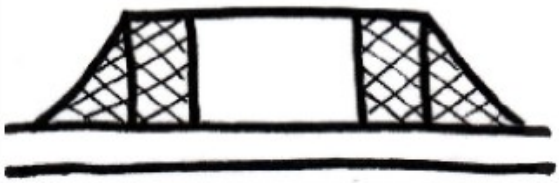
700° F is a good temperature for your soldering iron.

Once the pad is hot, put a little solder into the pad. It should flow and cover the entire pad.



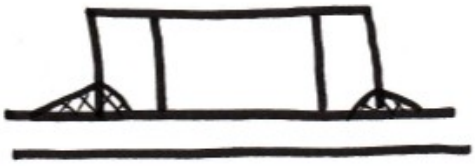
The next page shows how much solder should be used:

This is just the right amount of solder. Ideally, you want it to form a convex shape on each side of the part.



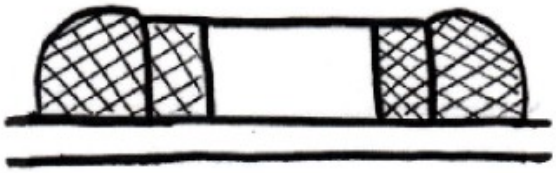
You should try to make all your connections look like this.

This is not enough solder:



Not enough solder is bad because the part is not making a good enough electrical connection to the pads. Add more solder.

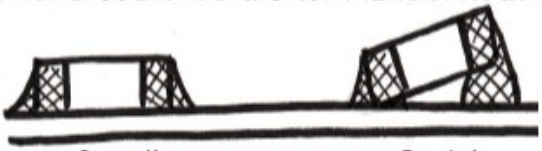
This is too much solder. When the solder is convex like this, you run the risk of shorting this part to another.



To remove solder is quick and easy with a soldering wick.

Soldering wick (or desoldering braid) is a copper braid used to soak up excess solder.

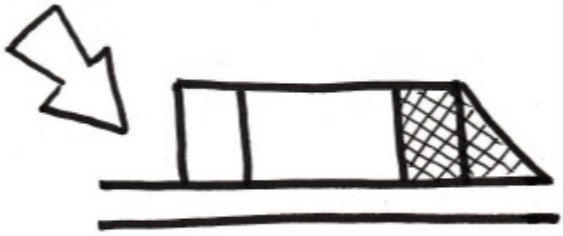
It is also important to make sure that the component is properly seated. If the component is raised there could be a short underneath.



Good! BAD!

It is also easy to accidentally shear the part from the board if it is raised like this.

Don't forget to solder the other side of your component! If you don't solder both ends, you could end up with an open circuit.



This is very bad!

Robin Caplett - University of Hawaii at Manoa