Surface Mount Soldering

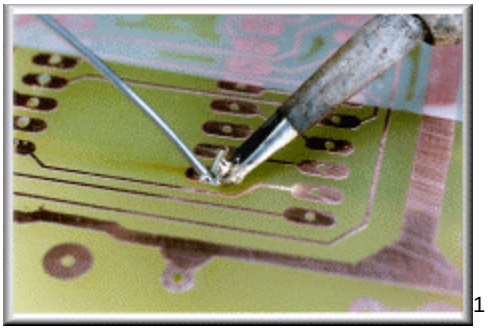
Tools Required:

1. Fine Tipped Tweezers
2. Rosin Flux
3. Rosin Core Solder (small diameter is easiest to work with)
4. Soldering Iron with a small CLEAN tip

A spool of fine (0.075") solderwick will come in handy when doing rework.
You will need Isopropyl alcohol and cotton swabs for cleanup.

Soldering Iron:

The most important characteristic of your soldering iron is that it must be equipped with a *small*, *clean* tip. If the tip is too large or is covered with oxidation, creating a well-flowed solder joint will be nearly impossible. Wipe your tip on a sponge before each joint - it must be shiny and well-tinned in order to transfer its heat properly.

 [1]

This is a well-tinned soldering iron

Proper Solder Joints:

Proper joints *Poor joints*

The illustrations above show a proper and a poor solder joint. In the proper joint, the flux has "wetted" both mating surfaces, allowing the molten solder to adhere to both the printed circuit board pad and the component lead. In the illustration of the poor connection, insufficient heat or flux has forced the solder to ball up on the end of the component, without making it to the PCB pad. The component is not attached properly, and the electrical connection will be intermittent at best. This connection can be salvaged by applying flux and heat to the PCB pad to get the solder to flow to the area between the pad and the component.

[1] Picture from: http://www.epemag.com/solderfaq/pictures.htm

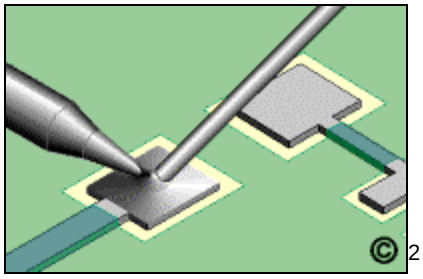
Procedure:

1. Clamp your board in the movable vise – it is easier to work with when held in place at a convenient angle.

2. Pre-heat the soldering iron for approximately 30 seconds (the soldering irons get hot quick, be careful), tin the tip, and roll the tip on a moistened sponge until it appears bright and shiny. Brush the soldering iron tip on the moistened sponge prior to each use to remove burnt rosin and to ensure proper heat transfer.

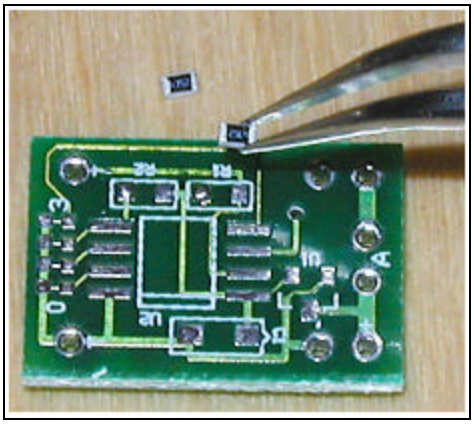
3. The first step is to apply a small bead of solder to one of the PCB pads.

    a. Place the pre-heated, tinned, soldering iron tip on one pad and hold it there for about 3 seconds.
    b. Keep the soldering iron on the pad and apply a small amount of solder.
    c. Lift the solder then the soldering iron.



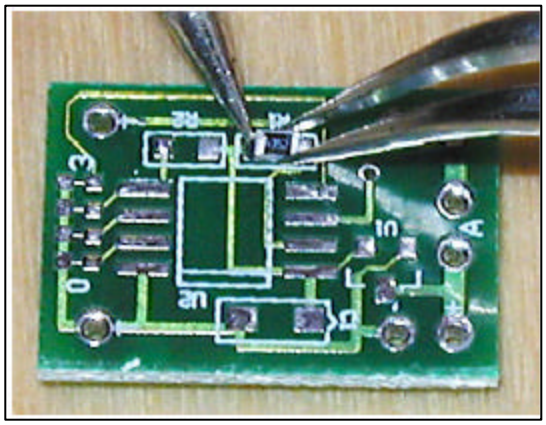
[2]

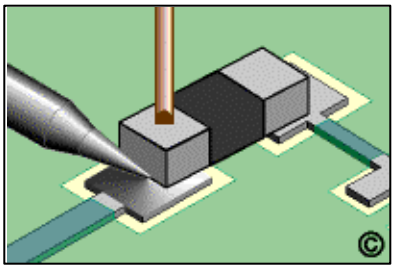
    d. Apply some *rosin based* flux from a flux pen (or whatever form the flux is in) to the solder bead and to the other component pad(s). Flux helps the solder flow properly and is key to a good connection.
    e. Next, using a pair of tweezers, pick up the component to be installed and place it over the appropriate pads.



[2] Pictures from: http://www.circuittechctr.com

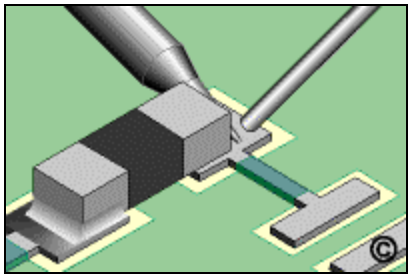
f. With the part in position, move the soldering iron to the solder bead on the PCB pad. Apply a small amount of heat from the iron to flow the bead, simultaneously lowering the part against the board and correcting for any rotational misalignment. Remove the iron and allow the solder to cool.





Inspect the joint -- at this point you are not concerned about the quality of the actual solder joint, just the positioning of the component. The part should be flush against the PCB, with both ends properly contacting the pads. The part should be straight, and centered between the two pads.

g. Heat the currently unsoldered end of the component and the adjacent pad with the soldering iron, and carefully apply a small amount of solder by intersecting the soldering iron, solder and pad at the same time.



h. Make sure that the solder has flowed onto the pad as well as the component lead - <u>don't be fooled</u> by a lump of solder on the end of the component that doesn't flow under the component and onto the PCB pad.

After the second end is soldered, go back to the original solder joint and reheat the solder. The flux will allow the solder to flow freely, and a good fillet should be observed. If there seems to be insufficient solder, add a little more.