



A27.02 SMD Soldering

Summary:

Students will practice soldering SMD components onto printed circuit boards. This will be a review of the soldering tutorial from earlier, as well as practice on more advanced SMDs

Expected Outcomes:

Students should become proficient in making electrically and mechanically sound SMD solder connections

Materials:

Each student(s) should have the following materials, equipment, and supplies:

(* indicates materials supplied as part of LaACES kit)

1. Soldering iron or temperature-controlled solder station
2. Small diameter rosin core solder
3. *Gikfun SMD Solder Practice Kit (EK1674)
4. Tweezers
5. **SAFETY GLASSES or GOGGLES**
6. Optional:
 - a. Magnifying glass for inspection
 - b. Flux for easier mounting of SMDs

The laboratory should also be equipped with the following:

1. Flat worktables sufficient to seat all students with plenty of workspace.
2. Sufficient light for soldering.



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Procedure:

There is no rush, practice makes perfect. It cannot be emphasized enough that one must wear SAFETY GLASSES. Molten solder can splash, and clipped wires can fly. Also, solder can contain up to 40% lead so wash your hands well after this activity. Most beginning solderers use too much solder and not enough heat. It is stressed that the **SOLDER PAD** melts the solder, not the iron tip. Only enough solder should be applied to flow onto the pad.

SMDs are usually tiny and can be lost easily. A clean, well-lit workstation is vital to not losing them. Keep all SMDs in their original packaging and remove them only as need. Also, placing

SMDs on top of a plain-white piece of paper when they are out of the packaging helps prevent them from disappearing.

1. PUT ON YOUR SAFETY GLASSES

2. Prepare soldering iron. Allow it to heat up to operating temperature, then use a *slightly* damp sponge to clean the tip. “Tin the tip” by applying a small amount of solder and then clean again with the sponge. ***Repeat this cleaning and tinning operation before every joint.***
3. Place a small amount of solder on *one* of the two pads on the board. It will cool and solidify quickly and that’s ok.
4. *Carefully*, remove the two-terminal SMD resistor from its packaging by peeling back the plastic with a pair of tweezers. If the SMD is going to be lost, it will most likely occur during this step.
5. Tweezers will help you considerably with this part. Align the resistor on the pads on the board. Once the resistor is aligned, hold it down firmly while you use the iron to re-melt the solder on the pad, and the resistor should become flush with the board. ***Keep holding the resistor down while the solder cools.***
6. Once the solder is cool, apply solder to the other side and inspect your work. It should be flush with the board and free of excess solder. Continue soldering more surface mount resistors until you feel comfortable and then move on to soldering multi-terminal IC.
7. If available, applying flux to the pads on the board will greatly assist in soldering of a multi-terminal IC.
8. Use tweezers to remove the IC from the packaging and align it with the pads of the board (no need to put solder down beforehand like you did for the surface mount resistor).



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9. While holding the IC down, tac down one of the corner pins with solder, and then check for proper alignment of the remaining pins. If they are not aligned, remove the solder tac and try again.
10. If you have used flux, jump to the next step. Otherwise, carefully apply a *small* amount of solder to the remaining leads. The motion and rhythm of this process will be similar to tapping each pad/pin connection with the solder and iron briefly as you move down the line of pins. Many ICs are temperature sensitive so practice giving the component a break from the iron heat after each side is done.
11. If you have used flux you can try the following technique with the remaining pins: tin you tip and then “brush” the remaining pins as if you were painting. Use a gentle, brief stroke of the tinned tip on the one side of the IC’s pins and the solder should flow into each pad/pin connection without effort. Wipe away excess flux when done.