



SMD Soldering Guide by Infidigm



Purpose

The purpose of this guide is to introduce SMD (Surface Mount Device) hand soldering. The guide is organized into different methods. Each method is used specifically for a group of SMD components. A simplified list is included with each method to identify which types of SMD components are for the appropriate method.

Please visit [Introduction to soldering](#) in general, if you have never soldered before.

SMD Hand Soldering Methods

- [Method 1 - Pin by pin](#) Used for : two pin components (0805 caps & res), pitches ≥ 0.0315 " in Small Outline Package, (T)QFP and SOT (Mini 3P).
- [Method 2 - Flood and suck](#) Used for : pitches ≤ 0.0315 " in Small Outline Package and (T)QFP
- [Method 3 - Solder paste](#) Used for BGA, MLF / MLA packages; where the pins are underneath the part and inaccessible.
- [Desoldering SMD](#) Special methods for desoldering without the need for special soldering iron tips.

Method 1 - Pin by pin

Used for :

Diodes, Capacitors and Resistors in sizes like 0603, 0805, 1206, 1210, 1812, 1825, 3216, 3528, 6032, and 7343.

Small Outline Packages and QFP with pitches ≥ 0.0315 ". Like SO.050" and SO.80mm (0.0315") SOT packages like SOT223, SOT23, SOT143, SOT89, Mini-5P, and Mini-6P.

0805 Capacitor example :

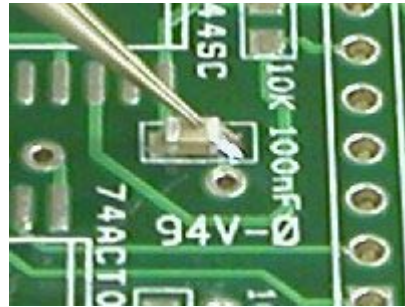
Step 1 Place a small amount of solder on one of the two pads. Aprox. 0.5mm in height.



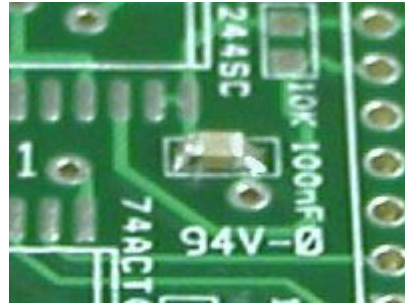
Step 2 Grab the 805 part with very fine tweezers. Bring the part overtop of the pads, slight to one side so that the part can sit flat against the PCB. Heat the pad already with solder and slide the part onto the pad so that it is centered between the pads. Remove heat.



Step 3 Put a small force down on the part and re-heat the one pad to guarantee that the parts is flat against the PCB.



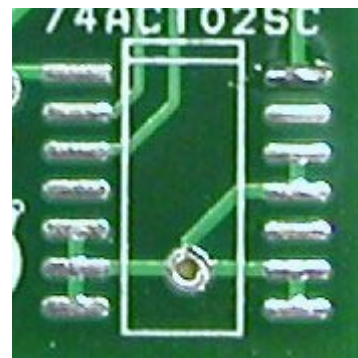
Step 4 Solder the other side of the part.



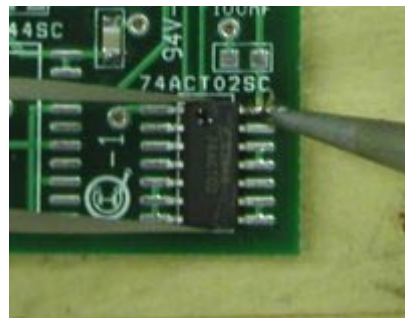
The solderings should not look like "round ball" on either side of the parts. If this is the cast, there is too much solder being applied to the joint. A properly soldered joint should have a curved line from the end of the pad to the top of the part as shown in the pictures.

Small Outline Package - SO.050 example :

Step 1 Place a small amount of solder on one of the conner pads. Aprox. 0.5mm in height.



Step 2 Grab the 14 pin SOP part with very fine tweezers. Bring the part overtop of the pads, sit the part on top of the pads. Heat the pad with solder and adjust the part so that it lines up with the pads. Besure the part is flat and aligned, then remove the heat.

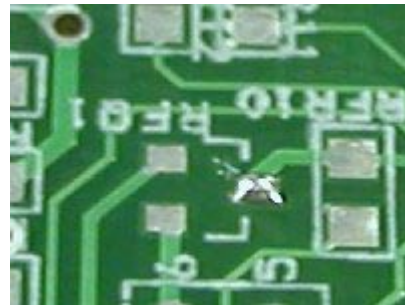


Step 3 Now solder the rest of the pins, one-at-a-time. Use a chise tip (1/32" wide). Contact the pin and pad at the same time with the corner of the tip. Do not use the end of the tip or solder will flow from pin to pin. Start with the pin at the adjacent corner to the pin already started.

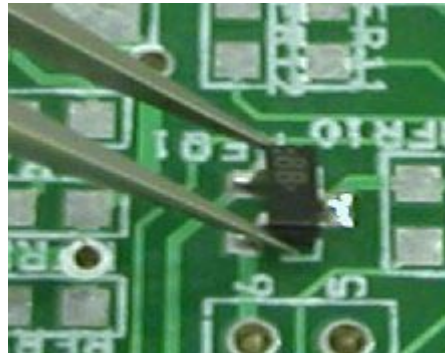


SOT23 example :

Step 1 Place a small amount of solder on one of the three pads. Aprox. 0.5mm in height.



Step 2 Grab the SOT23 part with very fine tweezers. Bring the part overtop of the pads, slight to one side so that the part can sit flat against the PCB. Heat the pad already with solder and slide the part onto the pad so that it is centered between the three pads. Remove heat.



Step 3 Put a small force down on the part and re-heat the one pad to guarantee that the parts is flat against the PCB.



Step 4 Now solder the other two pins, one-at-a-time. Use a chise tpye tip (1/32" wide). Contact the pin and pad at the same time with the corner of the tip. Do not use the end of the tip or solder will flow from pin to pin.



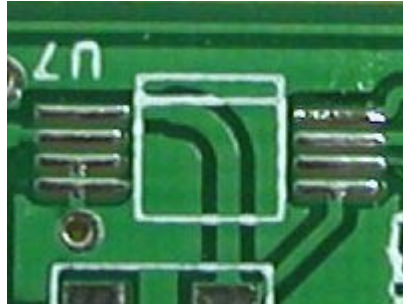
Method 2 - Flood and suck

Used for :

Small Outline packages and (T)QFP with pitches $\leq 0.0315"$. Like SO.025", SO.80mm (0.0315"), SO.65mm (0.0256"), SO.50mm, SO.40mm, and SO.30mm.

Small Outline Package - SO.65mm example :

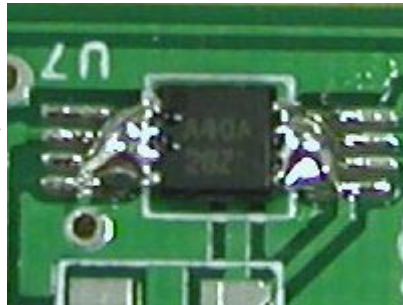
Step 1 Place a small amount of solder on one of the corner pads. Aprox. 0.5mm in height.



Step 2 Grab the 8 pin SOP part with very fine tweezers. Bring the part overtop of the pads, sit the part on top of the pads. Heat the pad with solder and adjust the part so that it lines up with the pads. Besure the part is flat and aligned, then remove the heat.



Step 3 Now flood the opposite row of pins with solder so that there is one continuous flow across the pins as shown. Continue by flooding the other row of pins. Try to keep the solder across the pins as even as possible.



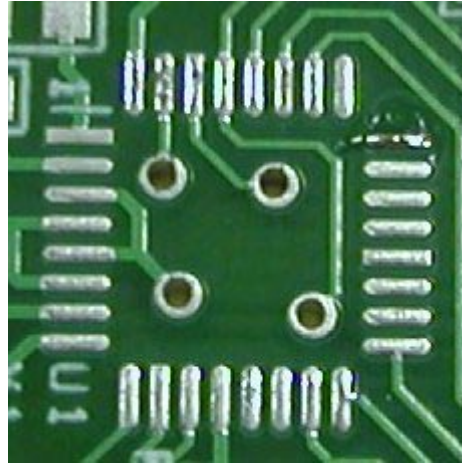
Step 4 Using the iron, (or a heated sucker) heat one end of the pins until the solder is melted 2-3 pins in length from the end. Quickly remove the iron and using a solder sucker, suck the excess solder from between the pins. Heat the solder on the next 2-3 pins and do the same until the other end is reached. Do the same on the other side of the chip.



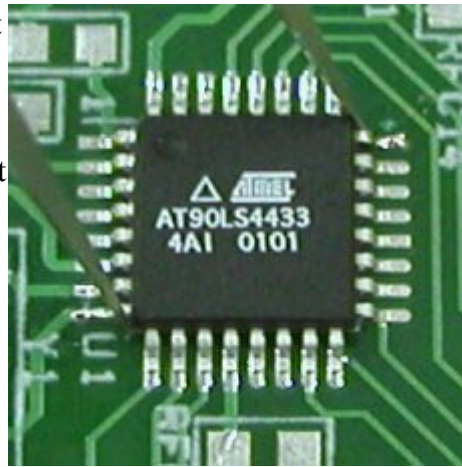
Finally inspect the pins to check if any solder is left between them. If there is, re-apply solder between the pins and re-suck. This method works because sucking only removes the solder between the pins and not the solder between the pad and pin.

(Thin) Quad Flat Package - SO.80mm example :

Step 1 Place a small amount of solder on one of the conner pads. Aprox. 0.5mm in height.



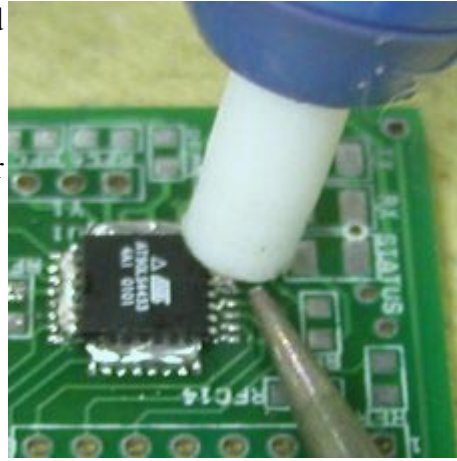
Step 2 Grab the 32 pin TQFP part with very fine tweezers. Bring the part overtop of the pads, sit the part on top of the pads. Heat the pad with solder and adjust the part so that it lines up with the pads. Besure the part is flat and aligned on all four sides, then remove the heat.



Step 3 Now flood the opposite row of pins with solder so that there is one continuous flow across the pins as shown. Continue by flooding the other three rows of pins. Try to keep the solder across the pins as even as possible.



Step 4 Using the iron, (or a heated sucker) heat an end of a row until the solder is melted 2-3 pins in length from the end. Quickly remove the iron and using a solder sucker, suck the excess solder from between the pins. Heat the solder on the next 2-3 pins and do the same until the other end is reached. Do the same on the other three sides of the chip. Finally inspect the pins to check if any solder is left between them. If there is, re-apply solder between the pins and re-suck. This method works because sucking only removes the solder between the pins and not the solder between the pad and pin.



Method 3 - Solder paste

Used for :

Used for BGA, MLF / MLA packages; where the pins are underneath the part and inaccessible.

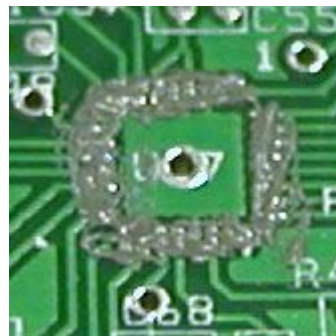
Example :

To use this method you will need a heat gun or a PCB oven. The following instructions are for a heat gun only. Mount the circuit board in a vise that will not burn when heated. It is recommended that the BGA, MLF / MLA parts be soldered to the PCB first in order not to disturb the soldering of the other regular components. If this is not possible then tin foil can be used to shield the regular components.

Step 1 Set the part on the board and line it up as it would be soldered. Take note and or mark the PCB so that you will be able to correctly place the part when heating.



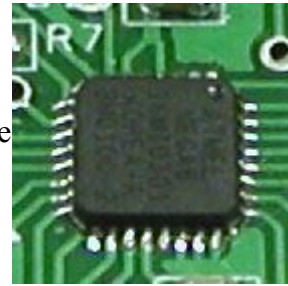
Step 2 Spread a thin layer of solder paste across the PCB on the pad area for the BGA, MLF / MLA part. The thickness of the solder paste should be thin enough so that the PCB and pads should be semi-visible. The amount is learned by trail and error and experience.



Step 3 Place the BGA, MLF / MLA part on the PCB and align. Use needle-nose pliers to hold the part in place while heating. Make sure the pliers are not bare metal or they will get too hot to handle when heating. Using the heat gun, apply heat to the part by holding the heat gun 8cm (3") away from the board.



Step 4 Keep heating until the solder paste has melted into solder all the way around the part. (Should take 20 - 40 seconds) Be sure that the part is aligned and remove the heat. Blow on the part to harden the solder. Inspect around the edges of the part for solder bridges from pad to pad. If there are bridges you will need to reheat the part, remove it, suck the solder from the pads and the part, and repeat the procedure with less solder paste.



Desoldering SMD

De-soldering SMD components without special soldering iron tips involves creativity. In most cases the SMD component is destroyed. Try to find the proper tip / tool to de-solder before trying the following examples.

0805 Capacitor / Resistor de-soldering :

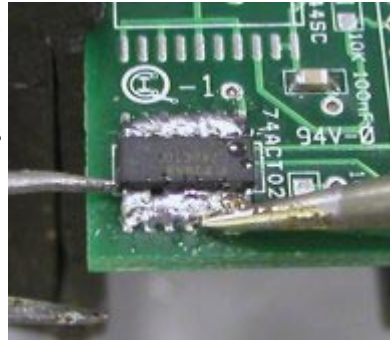
Two pin SMD component, such as a 0805 chip capacitor or resistor, is the easiest to de-solder with a regular soldering iron tip. Simply heat one side until the solder is melted, then quickly move to the other side until the solder is melted. Keep alternating between sides. This will build up heat on each side and the part will slide off the pads in 5 - 10 seconds.

Small Outline Package - SO.050 example :

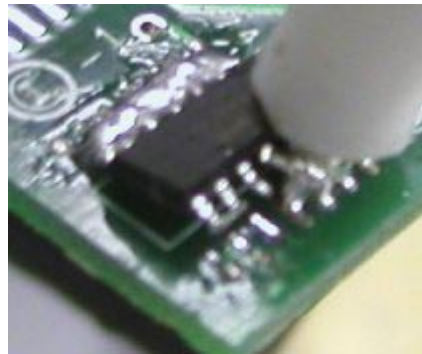
Step 1 Flood the each row of pins with solder so that there is one continuous flow across the pins as shown. Try to keep the solder across the pins as even as possible. Get a small screwdriver ready to insert under the part.



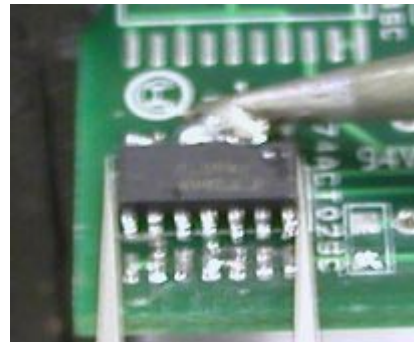
Step 2 Heat one side and move the iron back and forth until the whole row of pins is melted. Insert the screwdriver under that side and pry up until the pins are off the PCB and out of the solder.



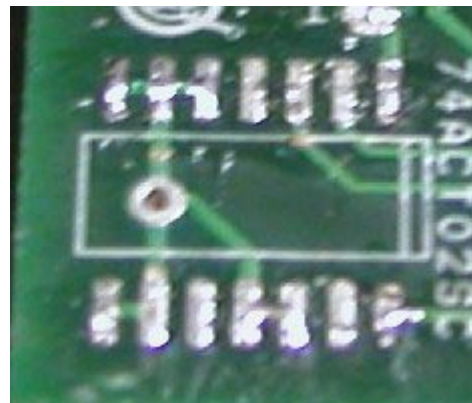
Step 3 Suck any extra solder that is left between the pads and the part.



Step 4 Grip the part with needle-nose pliers. Heat the other side in the same manner and when the whole row is melted remove the part.



Step 5 Suck the solder off the pads ready for the new part.



BGA, MLF / MLA de-soldering :

Cover the PCB in tin foil except for the BGA, MLF / MLA part and the area around it. Heat the part / PCB 8cm (3") away with a heat gun. Try heating both the top and bottom side of the PCB. Keep side pressure on the part with fine point needle-nose pliers so it will slide off when the solder melts.
