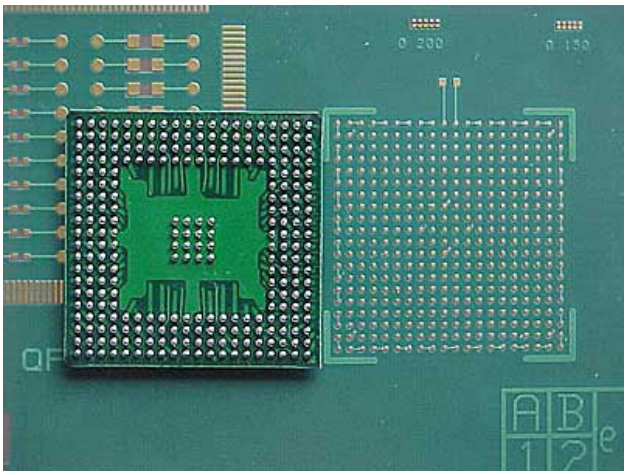
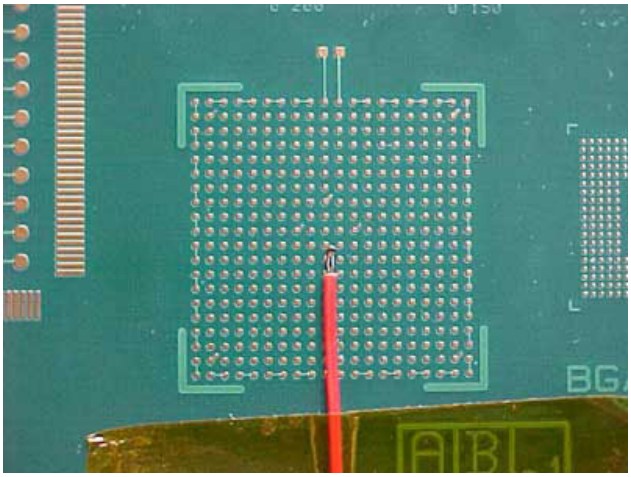
PROFILING BALL GRID ARRAYS FOR REWORK

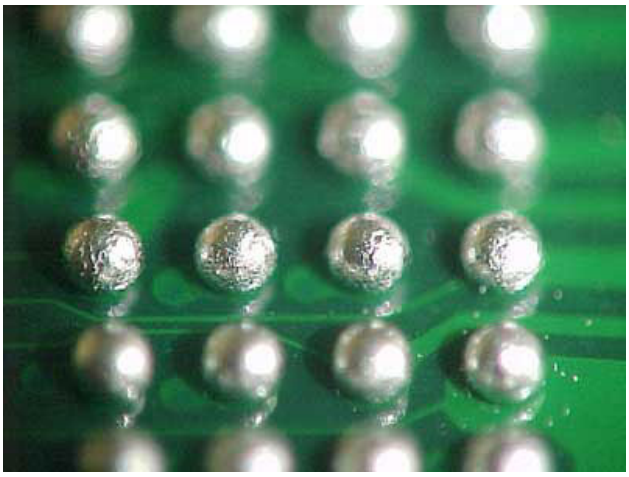
Select a printed circuit board and the area array component for testing profiling. An example of the actual board design and the component type should always be used



Select a thermocouple lead and place on the surface of the board. Hold the lead in position with Kapton tape. The bead is positioned on the centre pads. Solder the bead to a group of four pads with high temperature solder

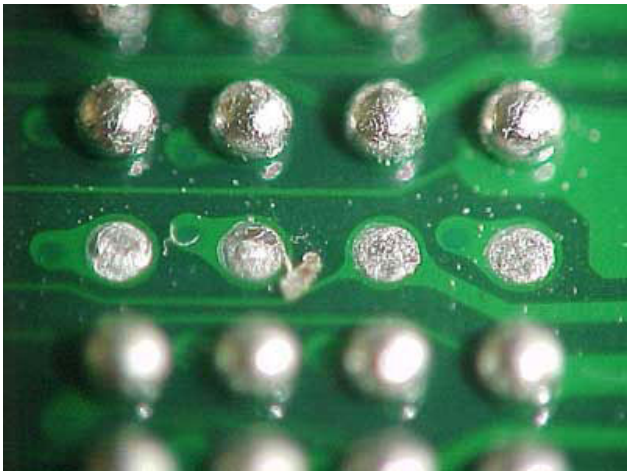


Hold the component firmly and locate the row of balls leading to the centre position of the component



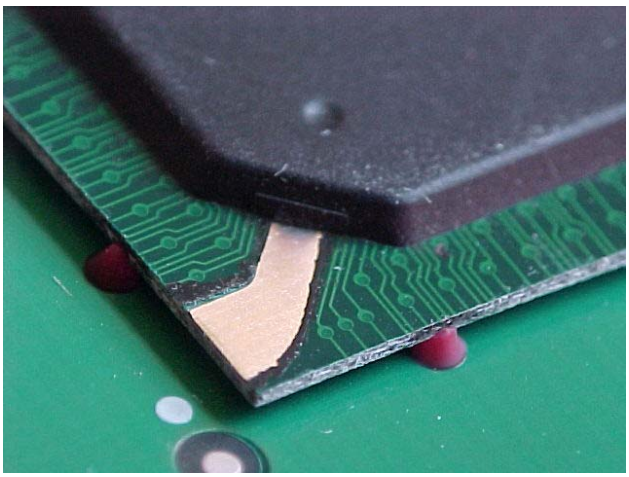
PROFILING BALL GRID ARRAY FOR REWORK

Remove the solder balls making sure that the area to be occupied by the thermocouple bead position is free



Place the BGA on to the surface of the board making sure that it sits flat on the pads. If the component does not sit flat then remove it. Reposition the lead, flux the pads and replace the BGA

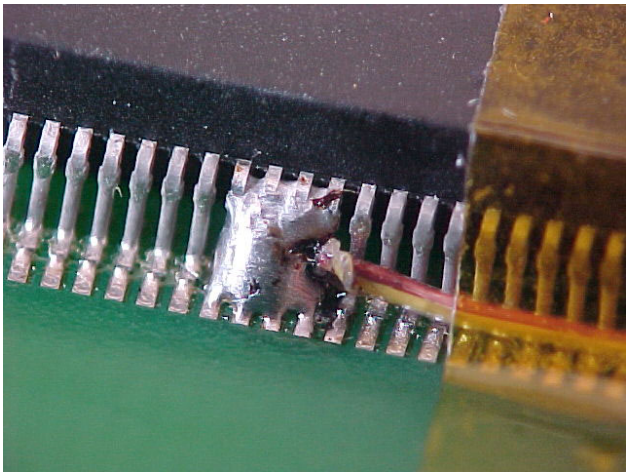
After initial reflow, place adhesive around the four sides of the component and cure the adhesive. This will reduce the possibility of the component coming off the board even when reflowed upside down



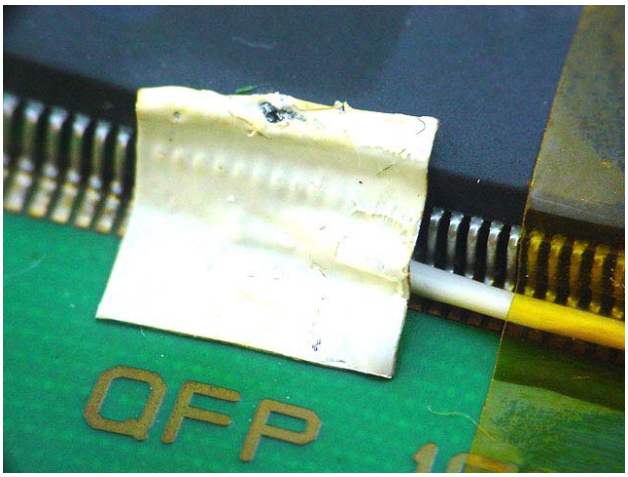
PROFILING QUAD FLAT PACK (QFP)

Solder the four corners of the QFP with high temperature solder or use adhesive to hold the component on the surface of the board. This prevents the component moving or falling off during profiling

Solder the thermocouple bead to one or two leads on the QFP. Using Kapton tape to hold the lead in position makes soldering easier and avoids strain being applied to the lead when profiling



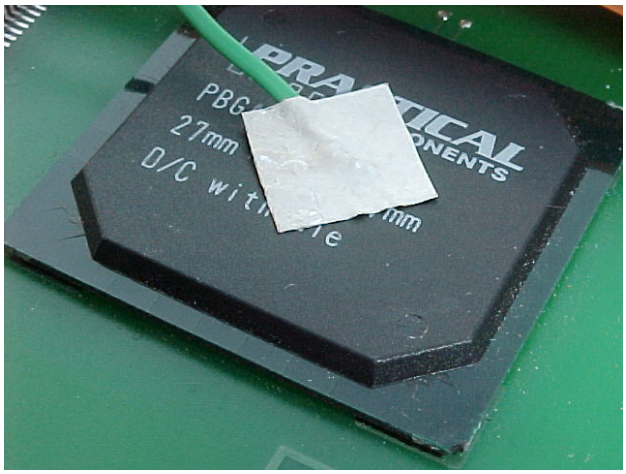
One alternative to high temperature solder for mounting beads is metallised tape which gives a similar performance to soldering the thermocouple beads



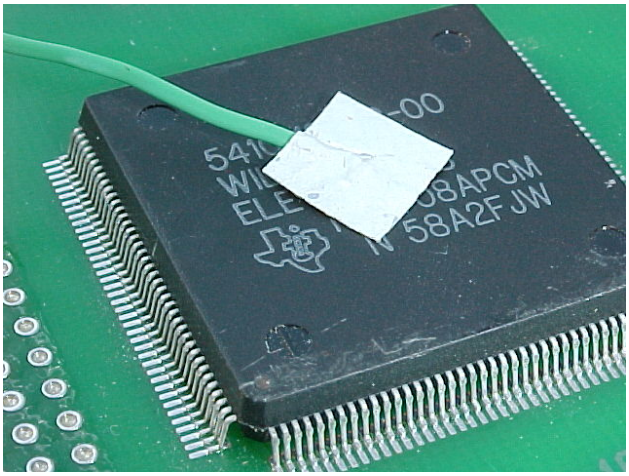
LEAD-FREE REWORK PROFILING

COMPONENT PROFILING

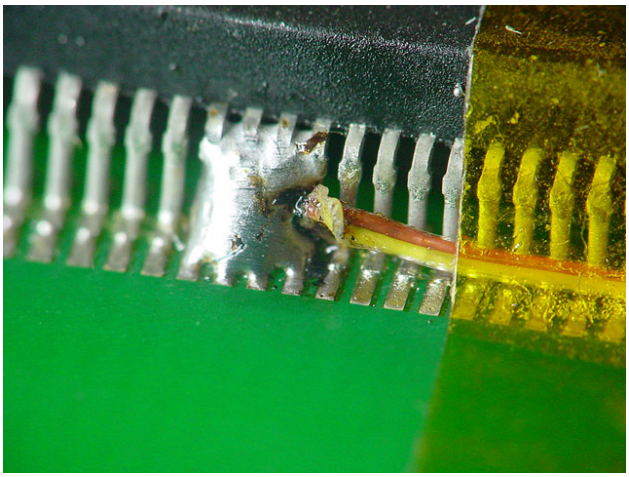
During rework profiling it is good practice to check the component body temperature as well as the solder joint area under the area array component



Both quad flat packs and area array devices will have a maximum temperature range for soldering specified by the supplier. Metallised tape can be used to cover the bead of the thermocouple to monitor the temperature rise



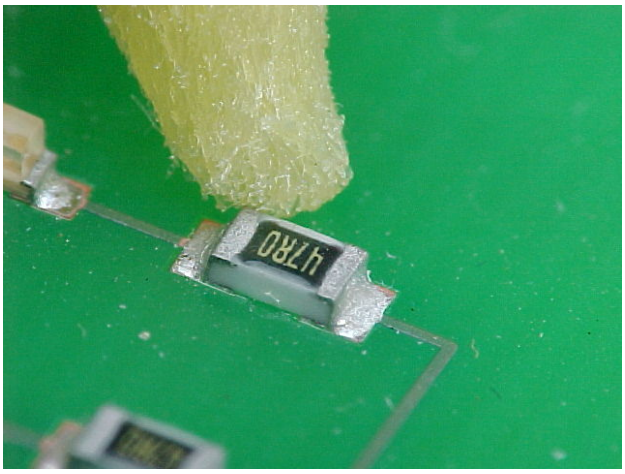
Comparing the component body, printed circuit board and solder joint temperature is normal practice during rework. Try to avoid too much solder being used when checking the solder junction



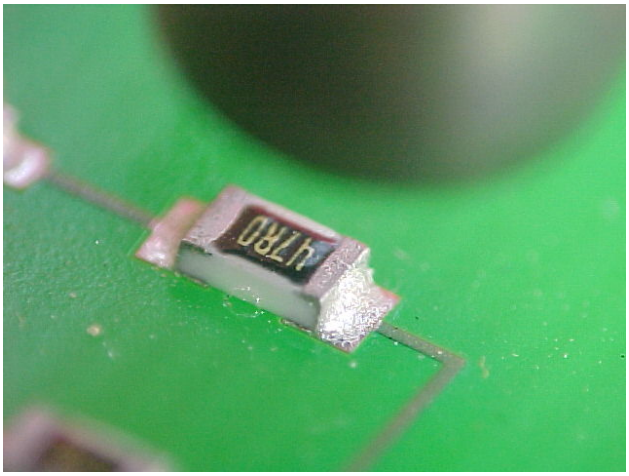
LEAD-FREE HOT AIR REWORK OF SURFACE MOUNT

CHIP COMPONENT

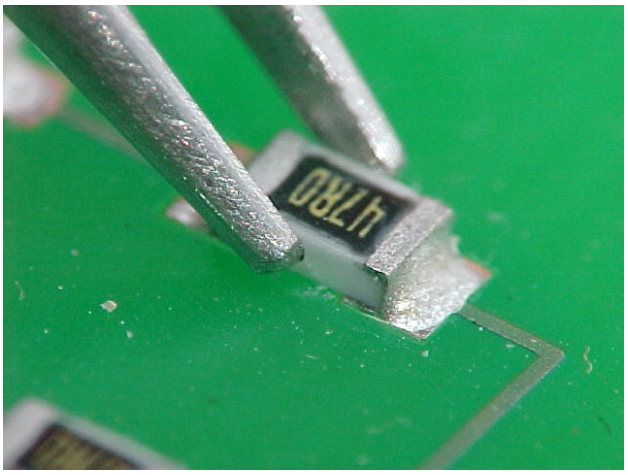
Apply liquid flux on each termination to reduce the possibility of solder spiking or uneven pad surfaces when the component is removed



Using a hot air pencil reflow the solder joints, avoid using too higher air pressure so that components are not blown off the pads. The flux on the surface of the joint makes it easier to see reflow of the joints taking place



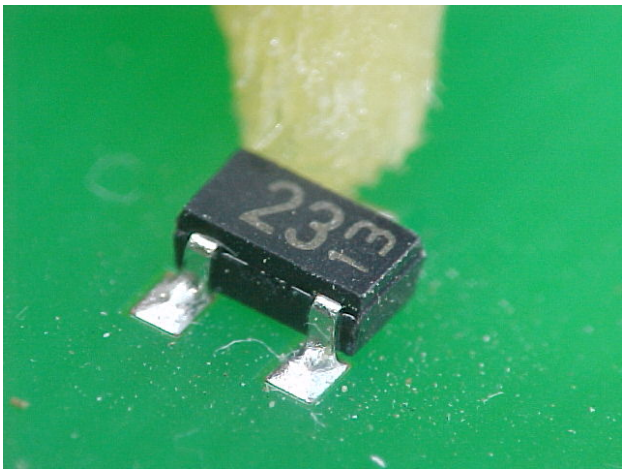
When the solder reflows on both joints lift the component off the surface of the board using a pair of fine tip tweezers. Check the surface of the pads for any damage



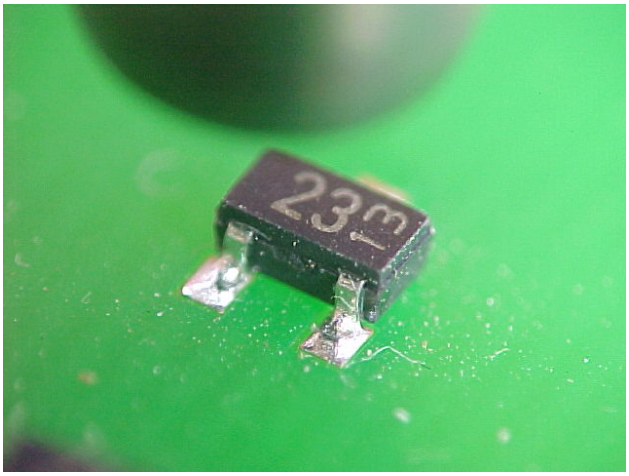
LEAD-FREE HOT AIR REWORK OF SURFACE MOUNT

SOT23 COMPONENT

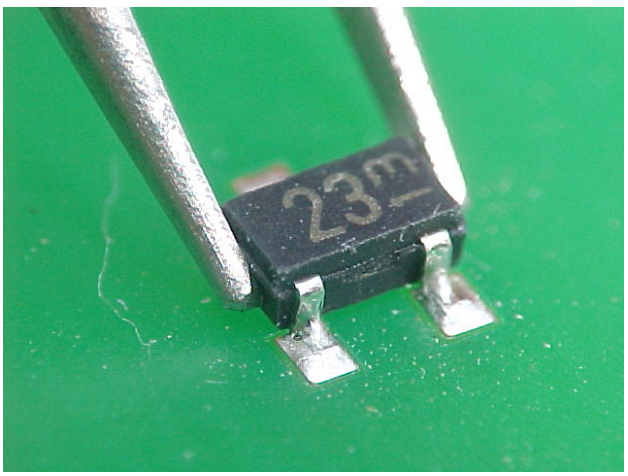
Apply liquid flux on each termination to reduce the possibility of solder spiking or uneven pad surfaces when the component is removed



Using a hot air pencil reflow the solder joints, avoid using too higher air pressure so that components are not blown off the pads. The flux on the surface of the joint makes it easier to see reflow of the joints taking place



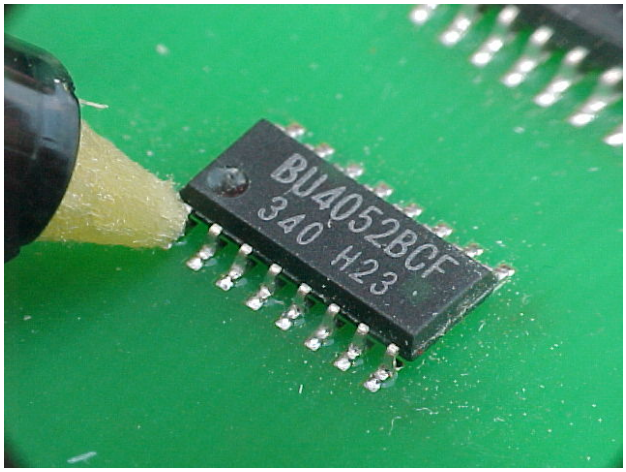
When the solder reflows on both joints lift the component off the surface of the board using a pair of fine tip tweezers. Check the surface of the pads for any damage



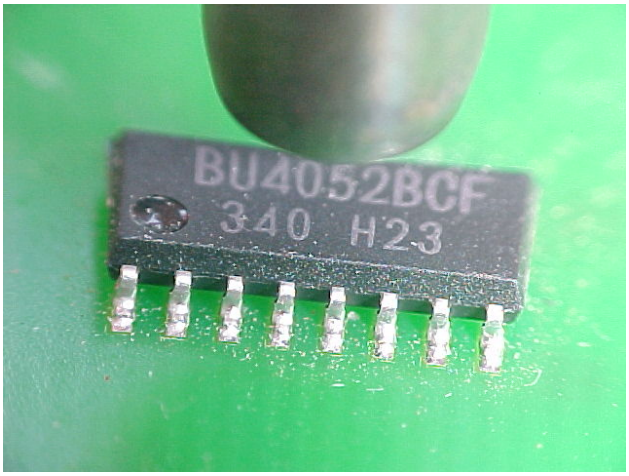
LEAD-FREE HOT AIR REWORK OF SURFACE MOUNT

SOIC COMPONENT

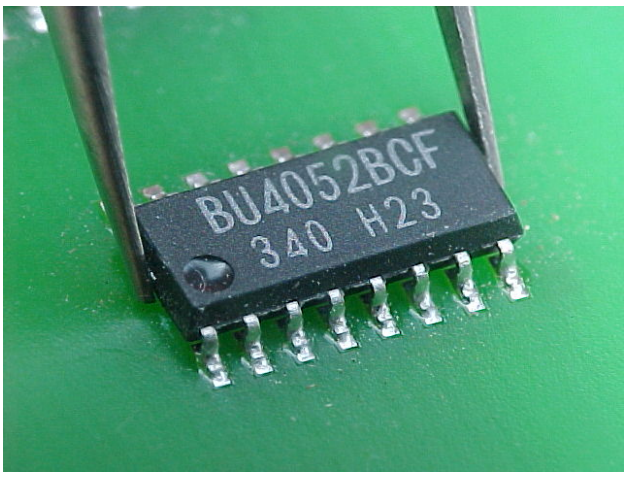
Apply liquid flux on each termination to reduce the possibility of solder spiking or uneven pad surfaces when the component is removed



Using a hot air pencil reflow the solder joints, move the hot air pencil over the leads to even out the heating. The flux on the surface of the joint makes it easier to see reflow of the joints taking place

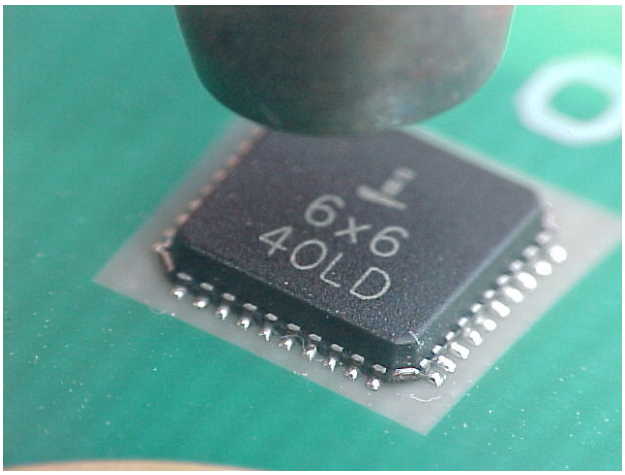


When the solder reflows on both joints lift the component off the surface of the board using a pair of fine tip tweezers. If you are not sure complete reflow has taken place just touch the body lightly to detect complete reflow. Check the surface of the pads for any damage

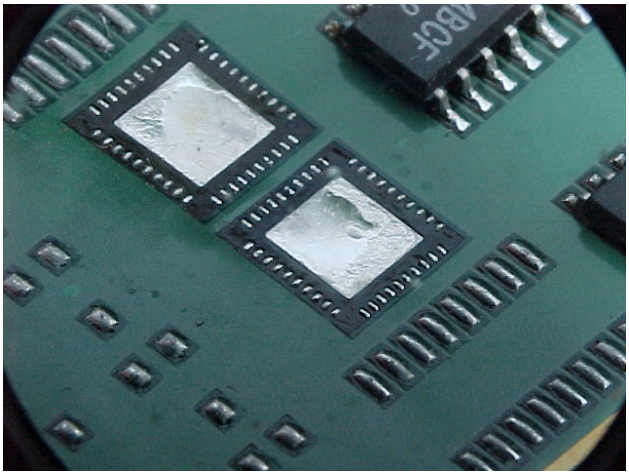


LEAD-FREE HOT AIR REWORK OF SURFACE MOUNT

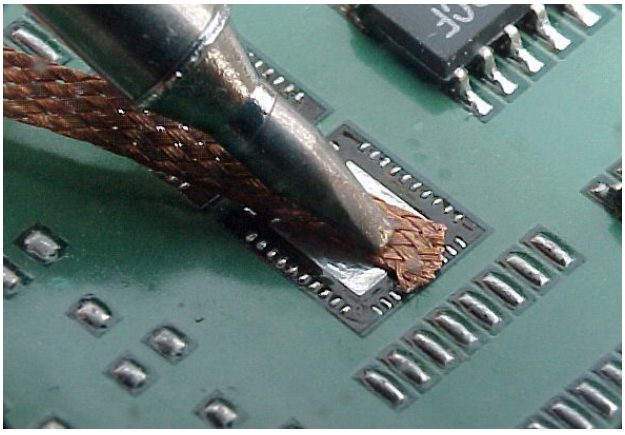
QFN COMPONENT



Using a hot air pencil reflow the solder joints, move the hot air over the terminations to even out the heating. When the solder reflows lift the component off the board using a pair of fine tip tweezers. If you are not sure of complete reflow just touch the body lightly to detect complete reflow.



Pads and the centre heat sink may well be an uneven solder coating when the component is removed. If the replacement component cannot be placed parallel on the surface of the board the solder must be levelled

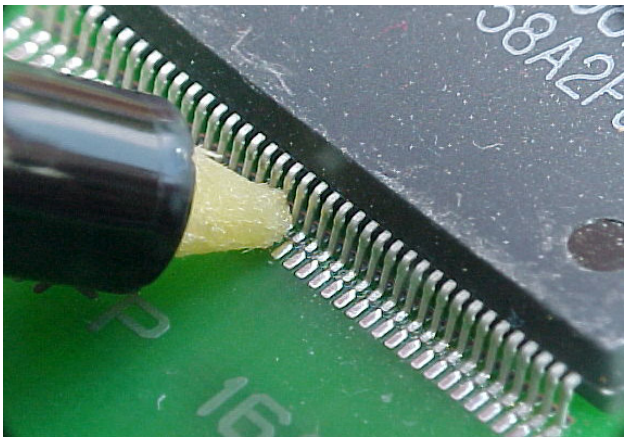


Solder wick may be used to remove the excess solder on the centre pad. If required a smaller gauge of wick is used for the component pads

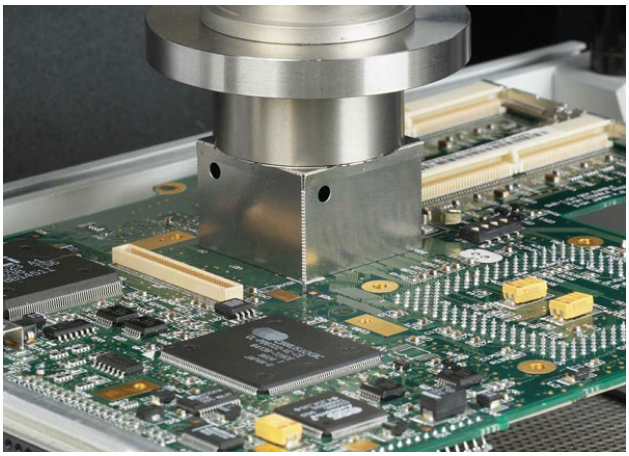
LEAD-FREE REWORK OF SURFACE MOUINT

QFP COMPONENT

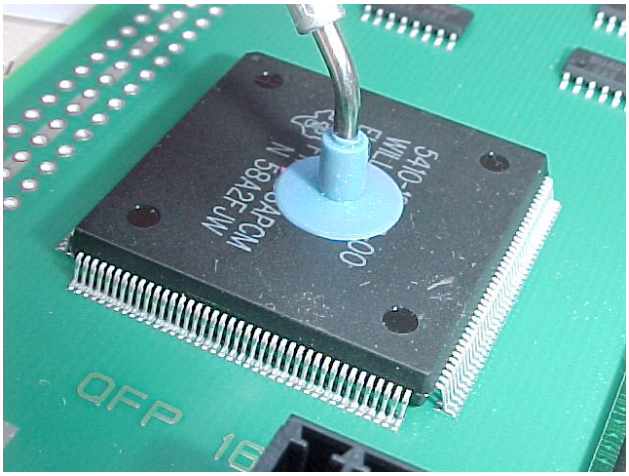
Apply liquid flux on terminations along each side of the device to reduce the possibility of solder spiking or uneven pad surfaces when the component is removed



Position the rework head over the device and lower to just above the board surface. Preheat the board assembly using the bottom heater prior to introducing the full heat from the top side and monitor the QFP for reflow



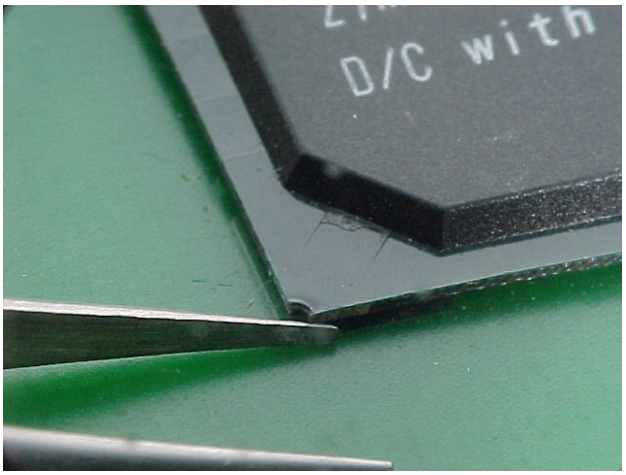
When all the terminations are reflowed the package can be lifted from the board surface using the vacuum pick-up on the machine. Alternatively a manual vacuum tool may be used



SURFACE MOUNT REWORK TIPS

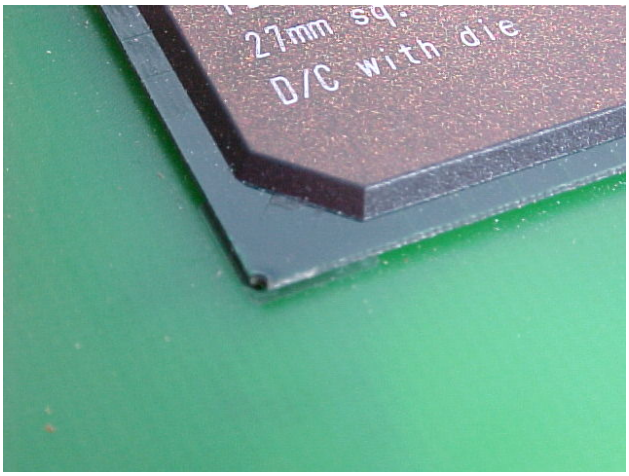
MISALIGNDED BGA COMPONENTS

Area array devices have the highest surface tension when the balls are in a liquid state. It is possible to lightly tap the device and it will swing back into position; it also guarantees complete reflow of the balls has occurred



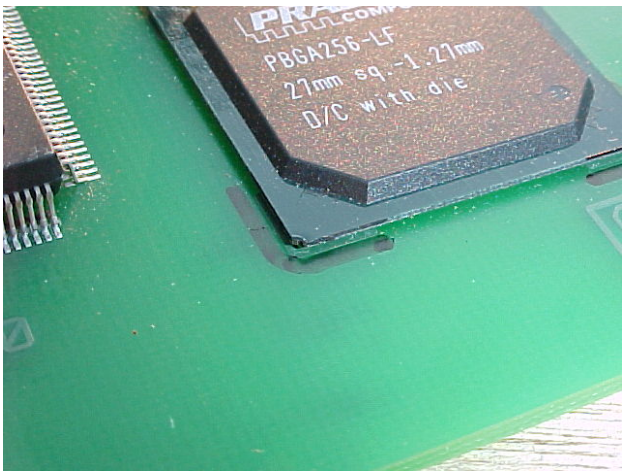
BGA REPLACEMENT

It is virtually impossible to align a BGA to the pad or solder paste surface without corner marks on the surface of the board if vision is not available on the rework equipment



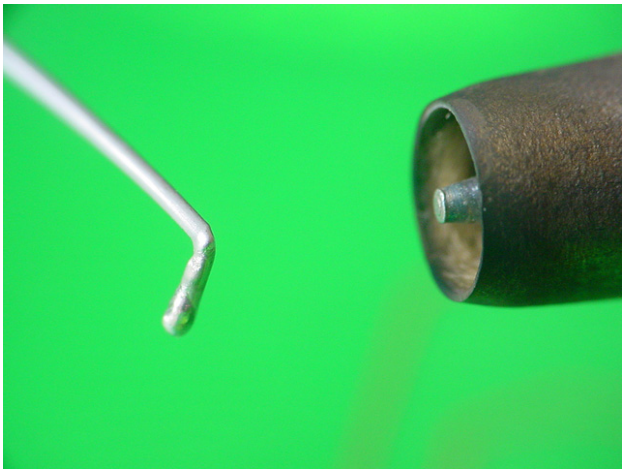
BGA REPLACEMENT

If corner marks are not incorporated on the BGA design, prior to component removal add them with a felt tip pen on two corners. After the rework operation the marks can be removed with a solvent cleaner



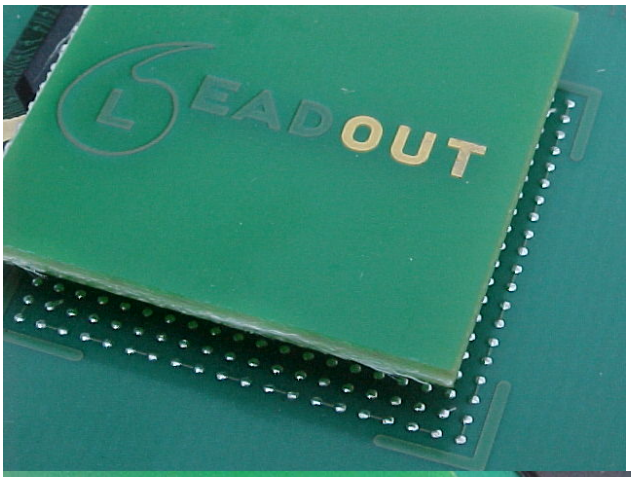
SURFACE MOUNT REWORK TIPS

HOT AIR TOOLS



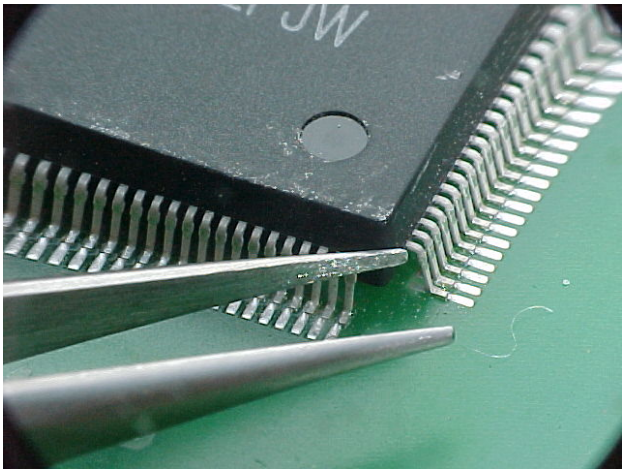
To set-up temperature and air pressure simply use a piece of cored wire. Hold the cored wire approximately 10-15mm from the tool and watch for reflow. Solder should not be blown off the wire tip as it reflows. If it does, turn down the air pressure

BGA REWORK TRAINING



Often during the introduction of BGA there are limited components for operators to practice with due to the cost of dummy parts. It is fairly easy to make your own BGAs with standard laminate

MISALIGNED COMPONENTS

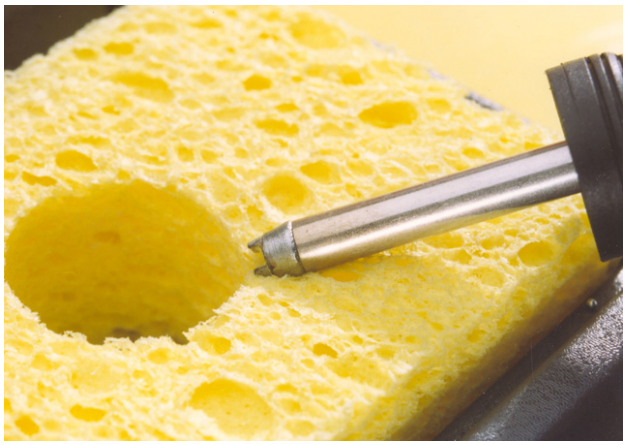


If during reflow a component is still misaligned try tapping the printed board and not the component. Tapping the board will often allow components to pull back in to line. Tapping the component often misaligns the component even more

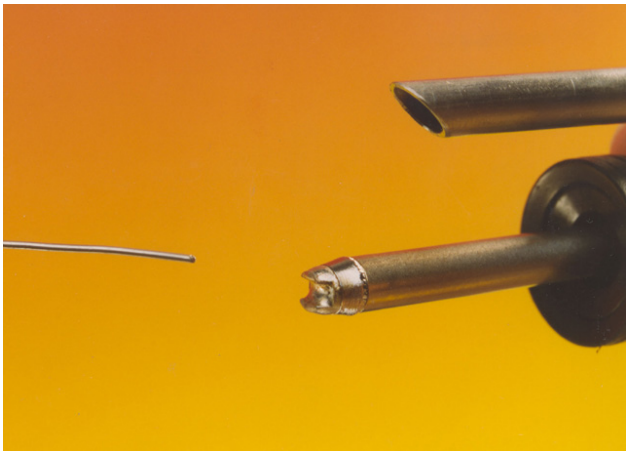
LEAD-FREE CONTACT REWORK OF SURFACE MOUNT

SOT23 COMPONENT

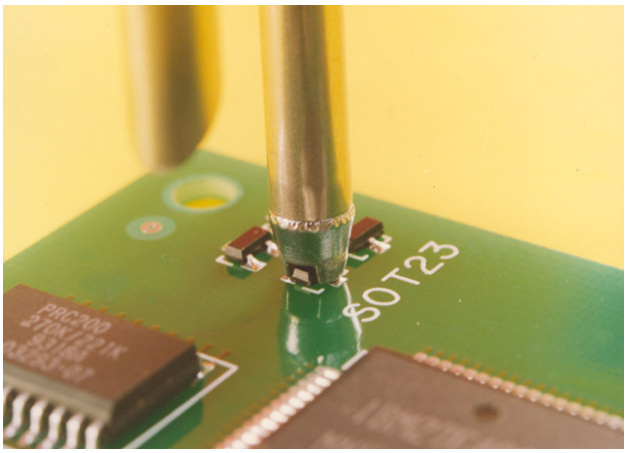
When using a special contact tool for component removal first clean the tip surface on a moist sponge



After cleaning tin the surfaces of the tip which will contact the component lead terminations. The tinning operation will speed up heat transfer for reflow of joints



Place the tinned tip in contact with the component terminations and watch for reflow of all terminations. When reflow is complete lift the tip off the surface of the joints. Surface tension of the solder should also lift the component from the pad surface

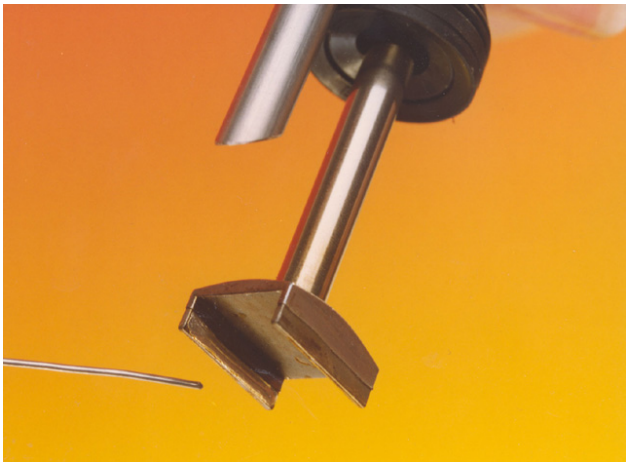


LEAD-FREE CONTACT REWORK OF SURFACE MOUNT

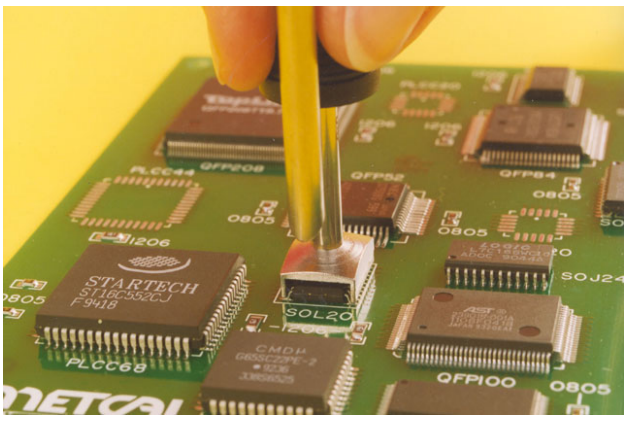
SOIC COMPONENT

When using a special contact tool for component removal first clean both sides of the tip surface on a moist sponge

After cleaning, tin the surfaces of the tip that will contact the component terminations. The tinning operation will speed up heat transfer for reflow of joints and aid component removal



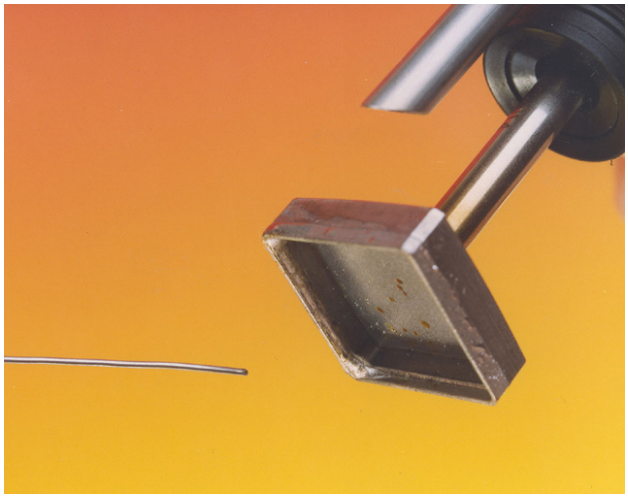
Place the tinned tip in contact with the component terminations and watch for reflow of all terminations. When reflow is complete lift the component from the pad surface. Large components may also require a pair of tweezers to be used



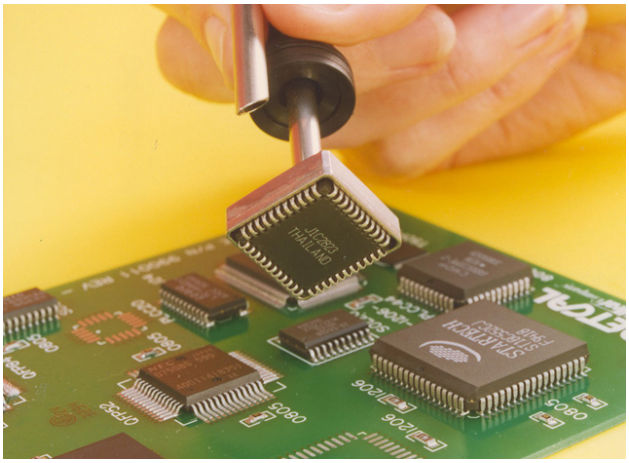
LEAD-FREE CONTACT REWORK OF SURFACE MOUNT

PLCC COMPONENT

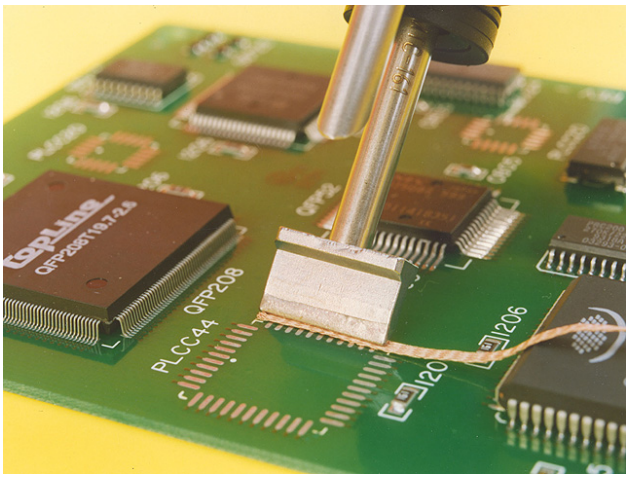
When using a special contact tool for component removal first clean and tin the four tip surfaces. Place the special tip over the component but avoid putting pressure on the surface of the board



When the tip is in contact with the terminations wait till complete reflow has taken place. At that point the component can be lifted from the surface of the board. Care needs to be taken that all terminations have reflowed on the board and the component does not fall out of the special tool



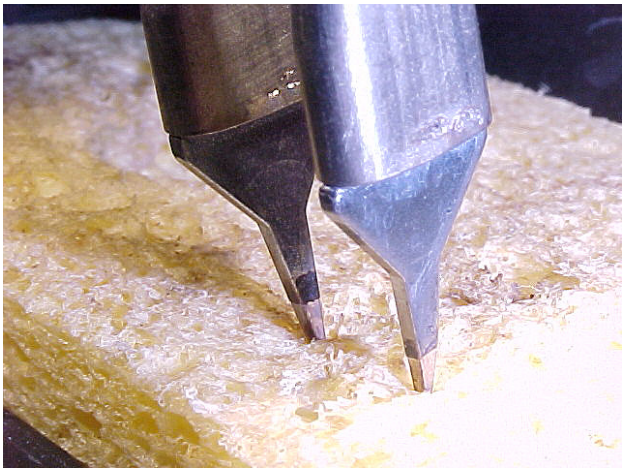
On large pad surfaces with multi pin devices it is often necessary to remove excess solder from the surface of the pads. Solder wick can be used with a long wedge blade to level the pads, care must be taken not to apply pressure to the pads and damage the board



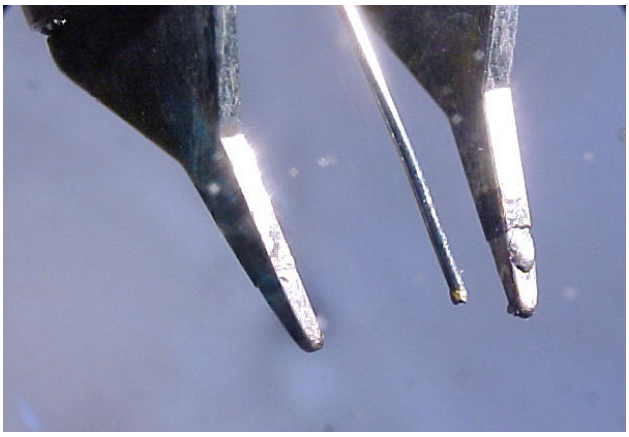
LEAD-FREE CONTACT REWORK OF SURFACE MOUNT

CHIP COMPONENT

When using hot tweezers for component removal, first lightly clean the tip surfaces on a moist sponge to remove solder and oxide coating



After cleaning, tin the surfaces of the tips with cored wire which will contact the component terminations. The tinning operation will speed up heat transfer for reflow of joints or protect tips when not being used

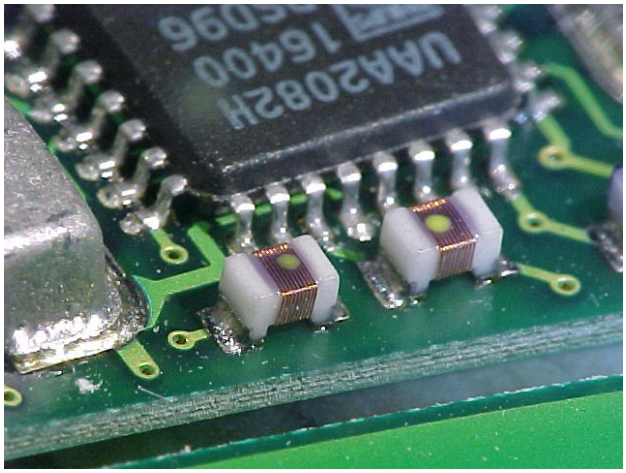


If tinning of the tips is found to be difficult a tip cleaning paste may occasionally be used. Touch the tips on the surface of the paste, do not rub or push the tips deep in to the paste. Check that tip tinning has been successful

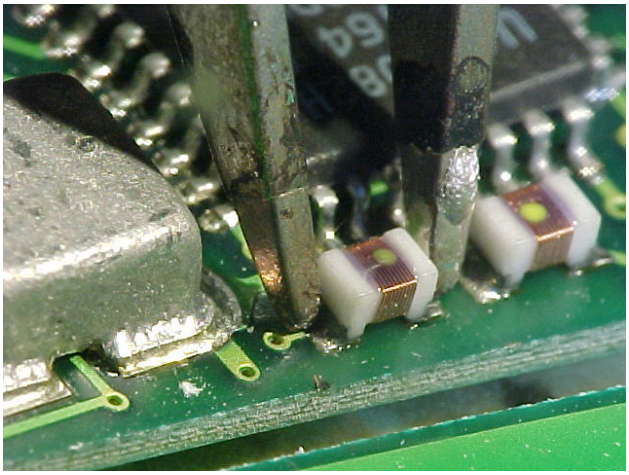
LEAD-FREE CONTACT REWORK OF SURFACE MOUNT

CHIP COMPONENT

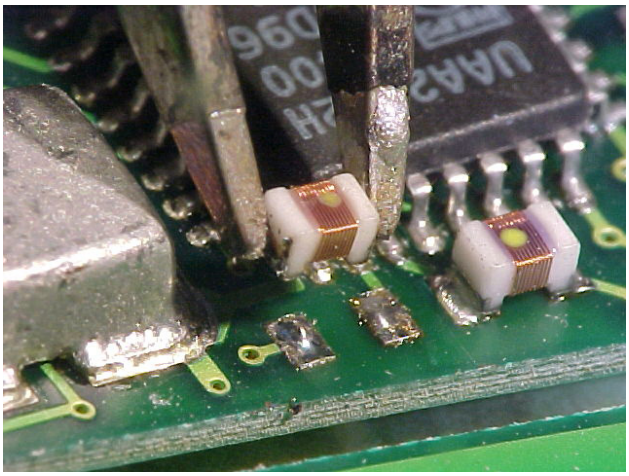
When using special contact tools for component removal check the clearance around the part. Select the size of the tools prior to component rework. This reduces the possibility of damage to other components



Place the tinned tips of the heated tweezers to contact the component terminations and wait till complete reflow has taken place. There is no need to apply pressure as the tinned tips will allow reflow to take place



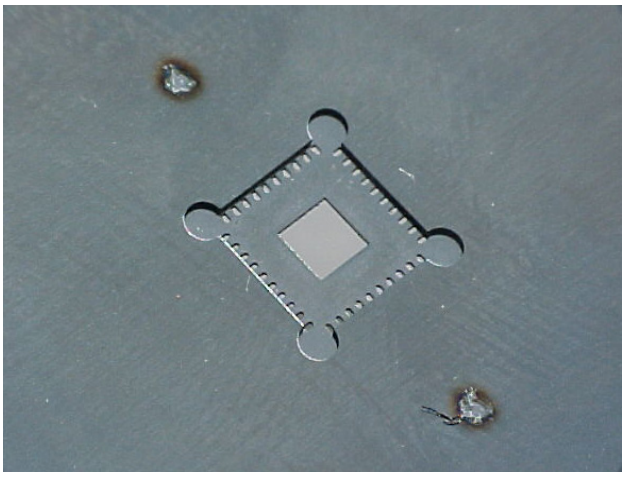
When the solder joints reflow the component can be lifted safely from the surface of the pads



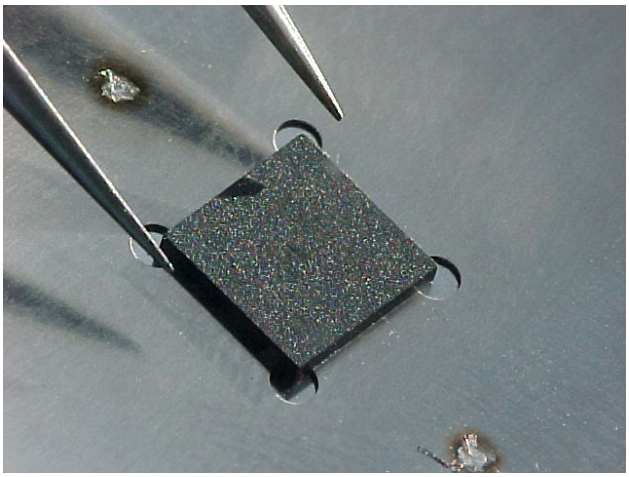
LEAD-FREE PRINTING OF LGA/QFN PACKAGES

STENCIL PRINTING

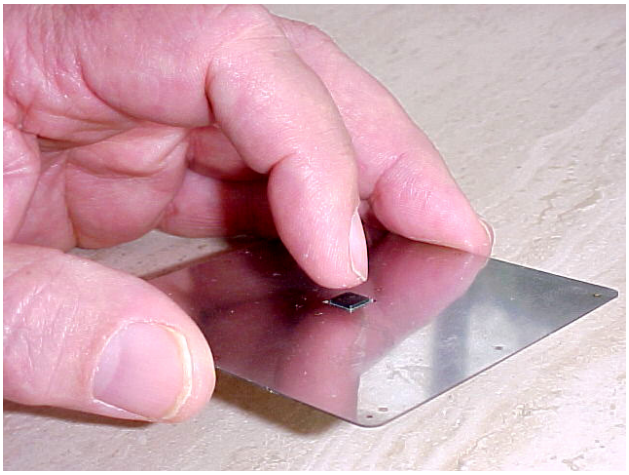
When using solder paste for repair of a LGA/QFN a special stencil will be required. The stencil will locate and position the component body in line with the component termination apertures



When the component has been placed in position in the stencil cavity there should be limited movement of the component to prevent misalignment of the paste on the terminations



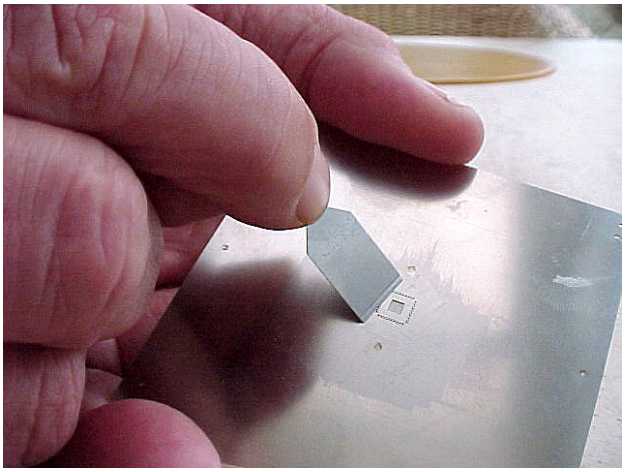
The component can simply be held in place with a finger while holding the stencil/frame for the manual printing operation



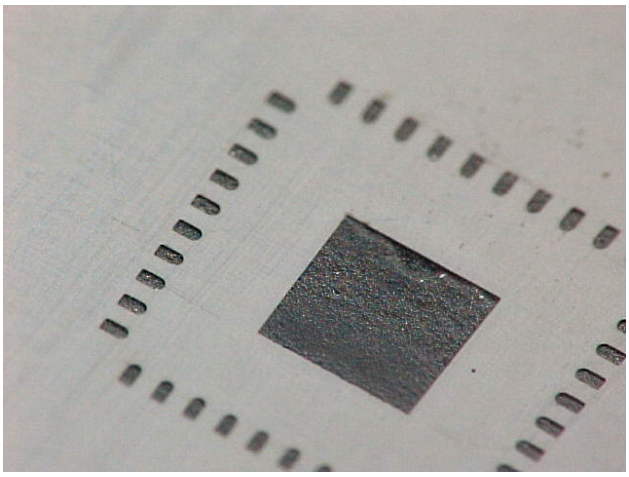
LEAD-FREE PRINTING OF LGA/QFN PACKAGES

STENCIL PRINTING

Solder paste can be manually printing directly on to the surface of the terminations with a mini squeegee blade. Normally printing thickness for rework is 0.004" (100um)



After printing inspect all solder paste apertures for complete fill. After satisfactory printing the stencil can be placed on a rework station and the component lifted directly from the stencil.



Example of the solder paste deposits on the edge terminations after removal from the stencil and prior to placement. The solder paste aperture on the centre pad is 50-60% of the pad area and printed centrally to reduce displacement of the paste during placement