

Quick Reference – Die Removal



1 EQUIPMENT/SUPPLIES

Equipment:

- Anti-Static Mat
- ESD Wrist Strap and ESD coat
- PCB Heat Plate
- Hot Air Gun
- Soldering Station
- Microscope
- Anti-Static Tweezers
- Exacto Knife or Scalpel

Consumables:

- Tacky Flux
- Lint Free Wipes
- Isopropyl Alcohol
- Solder Braid (wick)
- Flux Cleaning Pen
- Solder Mask Repair Pen



2 HANDLING DIE PRECAUTIONS

- ESD precautions are **REQUIRED**.
- Prevent overheating the work piece and die.
- Use a hot air gun nozzle with diameter slightly larger than the largest die dimension.
- ⚠ Warning: excessive airflow will move the die.
- Soldering temperatures are critical and deviations in excess of $\pm 10^{\circ}\text{C}$ can cause problems.

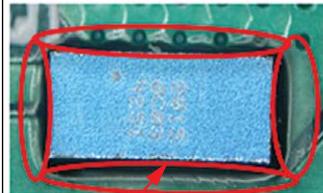
3 ANTI-STATIC MEASURES

- Rework must be done on an anti-static mat or bench that is connected to earth.
- Connect all equipment to ground.
- ESD wrist strap and ESD lab coat **MUST** be worn.

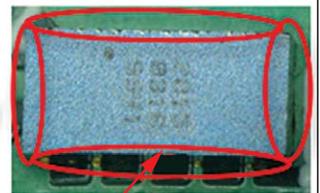


4A CHECK FOR UNDER FILL

- If die is encased in under fill, load the board onto a holding device such as a vice.
- Focus on the die location under a microscope.



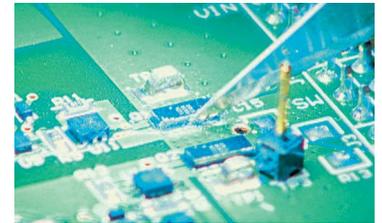
Under fill



No under fill

4B UNDER FILL REMOVAL (skip if no underfill present)

- Remove the underfill from around the die using a SHARP scalpel.
- Minimize damage to the die and PCB.
- Clean area around the die using isopropyl alcohol and lint free wipes and allow to dry.



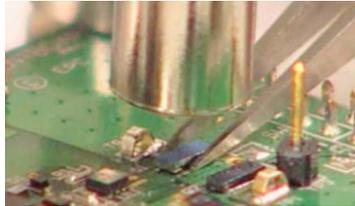
5 PREPARE PCB FOR HEATING

- Place PCB onto heat plate fixture.
- Attach the thermal sensor of the heat plate to the PCB.
- Insert the hot air gun into the hot plate gun holder.
- Center the nozzle of the hot air gun over the die to be removed.
- Raise the hot air gun to its highest position.



6 DIE REMOVAL

- Pre-heat work-piece to 150°C.
- Set hot air gun to 150°C with near minimum airflow to prevent the die from blowing away.
- Lower the hot air gun to approximately 1/16" (1.5mm) above the top of the die and set the temperature to 200°C for 45 seconds.
- Raise the gun temperature to 240°C for 30 seconds.
- Increase the gun temperature to 260°C.
- Once at 260°C for at least 12 seconds and no longer than 15 seconds, carefully pull die off the board with stainless steel tweezers.
- Avoid excessive force. If experiencing difficulties removing the die, then:
 - Increase temperature of the hot air gun by 10°C (Never exceed 280°C OR 25 seconds).
 - Turn-off hot air gun, allow to cool, and check for under-fill.



7 COOL DOWN AND CLEAN UP

- Once die has been removed, turn off hot air gun but not the heat plate – eases solder removal on pads with lots of copper.
- Place hot air gun into holder, not onto the heat plate.
- Using a soldering iron and wick, remove excess solder pad from the pads by stroking the braid in a lengthwise direction to reduce risk of damaging pads.
- Inspect work under a microscope.
- Turn off heat plate and allow PCB to cool.
- Clean die pad area with flux cleaner pen, wipes and/or isopropyl alcohol. Remove any residual under-fill and wipe clean.



Excess

Excess

Clean

8 INSPECT BOARD FOR DAMAGE

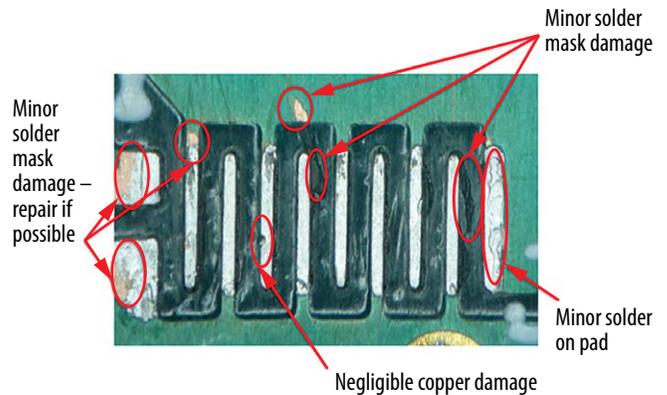
- Inspect the pad area to determine if PCB can be re-used/ repaired
- Use the evaluation criteria (#10 and #11 below) during the inspection to determine if board can be re-used
- Fix damaged solder mask areas using a Solder Mask Repair Overcoat Pen (Circuit Works CW3300G) – EPC dies are solder mask defined. If repairs are made, make sure all repairs are cured and dried prior to proceeding with die attach.



9 BOARD REWORK EVALUATION CRITERIA: ACCEPTABLE

Acceptable Damage (Board can be reworked):

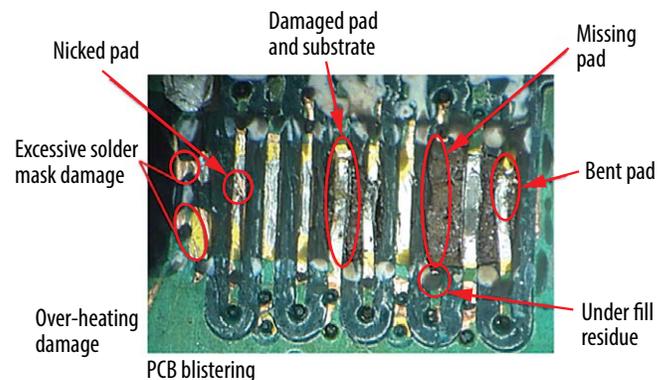
- Minor breaks in solder mask around die.
- Negligible damage to copper where die was attached.
- Any silk screen damage.
- Any copper damage well outside the die area.



10 BOARD REWORK EVALUATION CRITERIA: UNACCEPTABLE

Unacceptable Damage (Board will need to be scrapped):

- Any visible copper pad/trace damage (bending, scoring, buckling, breakage) in the area of the die.
- Any blistering of the PCB – can break internal vias.
- Any scorching of the PCB – can cause voltage breakdown.
- Any excessive mask damage – die is mask defined and needs the mask for proper alignment.



ANY ONE of these conditions present, then scrap the board