



Case Study: CSAM Evaluation for GEIA-0006 Solder Dip Process

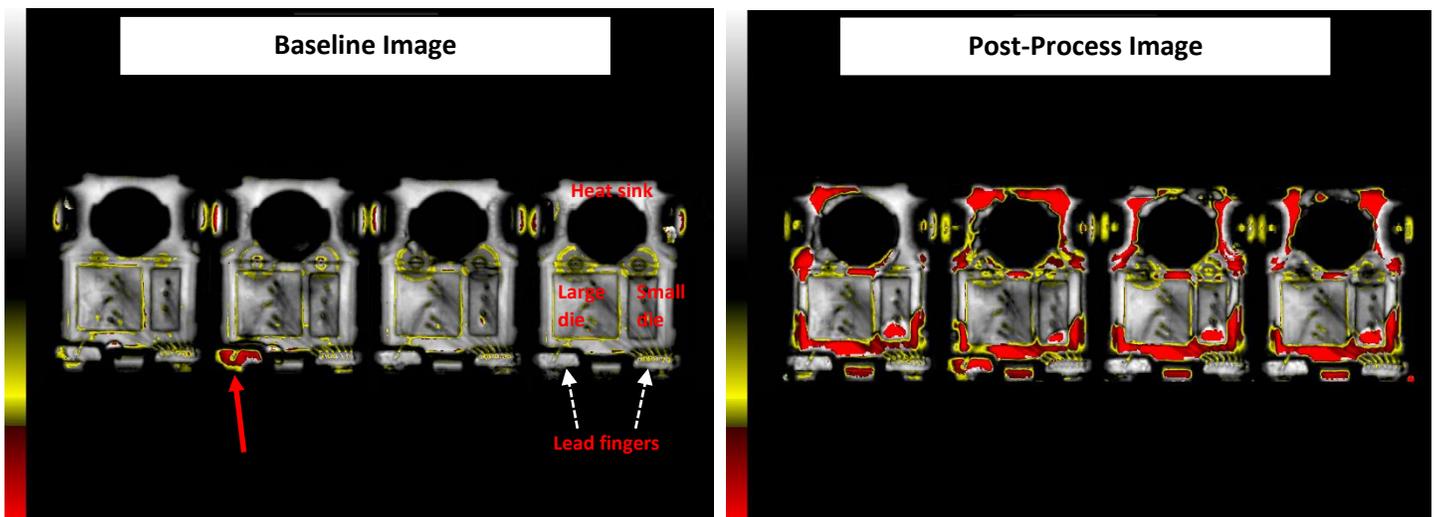
When performing solder dip for reflowing of component leads according to GEIA-0006, scanning acoustic microscopy (SAM) is required on a sample of parts before and after the solder dip process. The purpose is to ensure that no significant internal changes occur as a result of the heating experienced by the component body during the solder dip process.

Package Type: TO274AA-3

Solution: The entire lot to be subjected to solder dip was inspected using SAM prior to processing. Approximately 3% of the lot was rejected due to lead finger delamination at wirebonded locations. This finding does not meet the IPC/JEDEC J-STD-020 criteria which is referenced by GEIA-0006 Method 300.

At the completion of the solder dip process, the lot was reinspected. A significant increase in delamination was observed in all devices. The delamination resulted in rejection of the lot due both to failure to meet the J-STD-020 criteria and to the fact that the delamination represented an increase of more than 10%, which is disallowed by GEIA-0006 Method 300.

Representative before and after images are shown below.



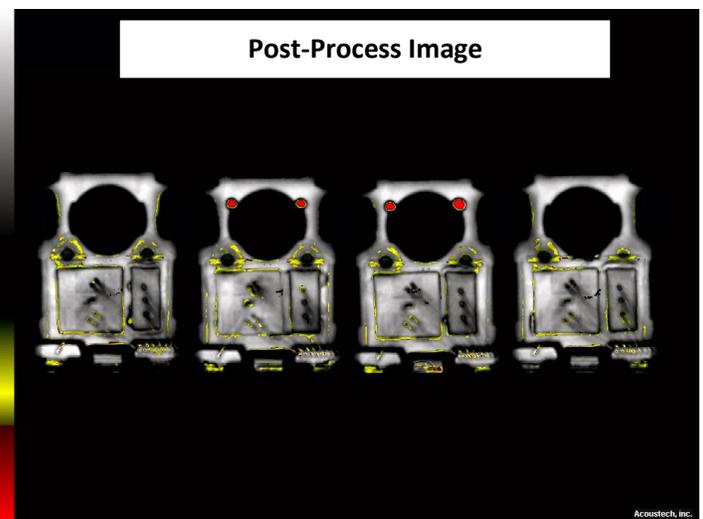
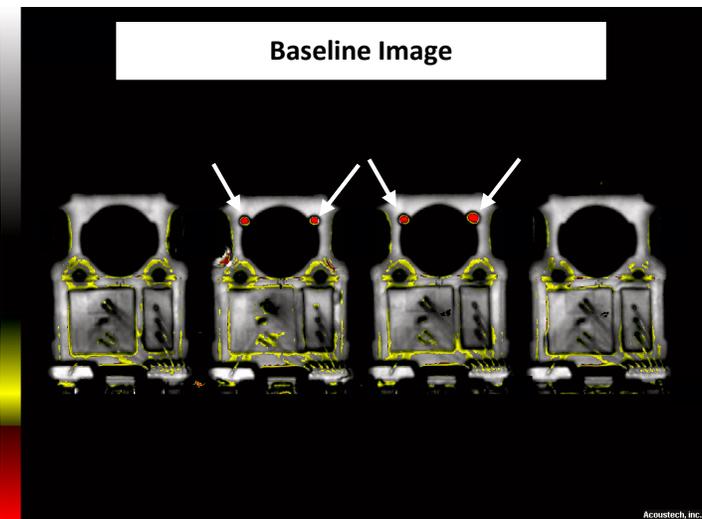
During the baseline inspection very minor paddle delamination was noted in some devices. One device exhibited leadframe delamination (see arrow) which affects a wirebond location. This finding does not meet the J-STD-020 criteria.

Increased delamination was observed in all devices as compared to the baseline inspection. All devices exhibited delamination between the mold compound and the top of the small die and between the mold compound and the top of the heat sink.



Root Cause:

Subsequent investigation determined that the solder dip process had been properly controlled. Inherent weakness within the package, resulting in inability to withstand the heat required to adequately strip and replate the exposed heat sink, was ultimately determined to be the cause of the poor SAM result. A different batch of parts – same part number but different date code – survived the same retraining process with no ill effects (see images below).



Baseline image of a different date code. Minor areas of delamination are visible at the heat sink in two samples.

No changes following solder dip.

Summary: Scanning Acoustic Microscopy identified two areas of concern that did not meet the specified criteria. First, lead finger delamination was observed in a small percentage of parts prior to any processing. This delamination presents a potential reliability concern and is rejected by J-STD-020. By performing a baseline SAM inspection, the solder dip process was eliminated as a possible cause of the lead finger delamination. Second, SAM identified significant internal changes that occurred during the solder dip process. This was later determined to be the result of a deficiency within the component construction. Other date codes were demonstrated to survive the retraining process.