Application Brief

Reworking LLP Chip Scale Package

Application Brief 107

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Leadless Leadframe Package (LLP)

LLP is a "Leadless Leadframe Package" – there are no leads extending beyond the package body. The contact pads are exposed and flush with the bottom of the package, providing a more compact footprint. Exposed die attach pad when soldered to the board provides a direct path for heat to transfer from the package to the PCB providing excellent thermal performance.

Standard surface mount equipment can be used to assemble LLP onto the PCB. There are design guidelines and recommendations that have been established by National Semiconductor (see AN-1187 at www.national.com/an/AN/AN-1187.pdf) to achieve high surface mount assembly yield.

The rework process for LLP is similar to BGA and laminate CSP type packages where contacts are underneath the package. Commercially available equipment is used for LLP rework.

Typical rework process involves:
- Localized heating & device removal
- Site cleaning after device removal
- Application of solder paste
- Component placement
- Localized reflow
- Inspection

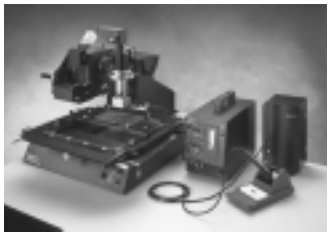


Photo Courtesy of Metcal

Rework Equipment

Localized Heating & Device Removal

Removal of LLP from PCB is achieved by preheating the board from underside with hot air and then using a localized heating head and vacuum nozzle. It is recommended to bake the board for 4 hours at 125˚C prior to rework to remove any residual moisture from the PCB and other components. *Figure 1* shows a localized heating head and vacuum nozzle for component removal.

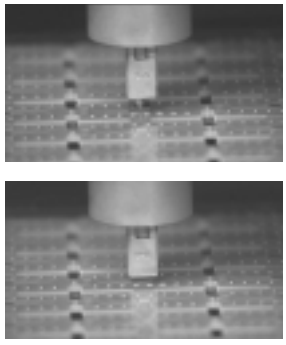


Figure 1. Localized Heating & Component Removal

Site Preparation

Once the component is removed, the site must be cleaned and prepared for attachment of a new component. Typical cleaning procedures such as using low temperature, blade style conductive tool and de-soldering braid works well for cleaning. Care must be taken during the cleaning process to avoid damage to the PCB and the adjacent components.

Solder Paste Application

Application of a uniform solder paste for rework is very important in successful rework process. One method to achieve a uniform solder paste application is to apply the solder paste on the component pads rather than the PCB. The component is placed and clamped in a fixture and solder paste is applied to the pads through the openings in the stencil as shown in *Figure 2*.

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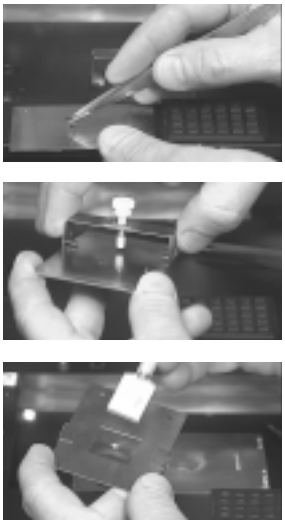
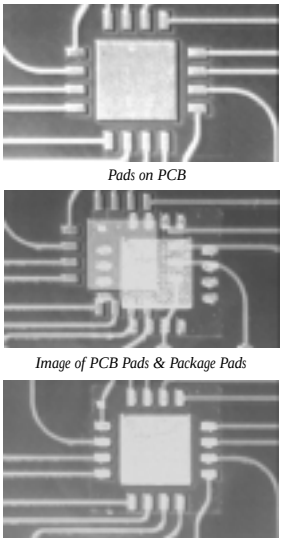


Figure 2. Solder Application

Component Alignment & Placement

Placement of the LLP package on the pads requires precision tools available on most CSP rework stations. Best results are achieved with non-contact alignment, using a split field vision system to view the PCB pads and the component images simultaneously, as shown in *Figure 3*.



Pads on PCB

Image of PCB Pads & Package Pads

PCB & Package Pads Aligned

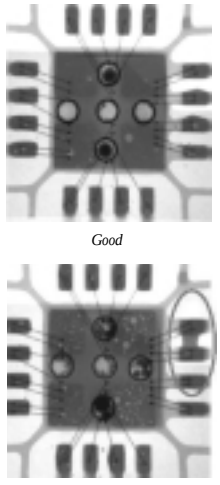
Figure 3. Component Alignment & Placement

Localized Reflow

After placing the component on the board, underside preheating and localized heating of the component is utilized to reflow solder and create solder joints. The localized reflow profile for reflow and removal of the component can be programmed to the same profile that was used in the original assembly.

Inspection After Rework

After rework, X-rays can be used to check the quality of the solder joints and detect any solder defects. *Figure 4* shows X-ray images of solder joints. One example is of good solder joints, and one example shows solder bridging.



Good

Solder Bridge

Figure 4. X-ray Images

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