

# Assembly Recommendations

## Solder Assembly

Solder joints deserve additional consideration in the design of Thermal Clad assemblies. This section covers solder surface finishes, application and thickness, alloy and flux.

### Surface Finishes

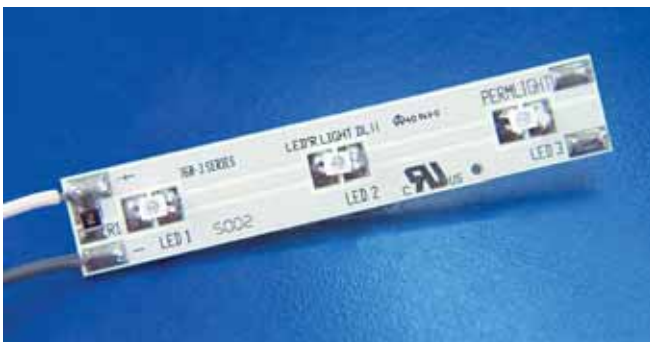
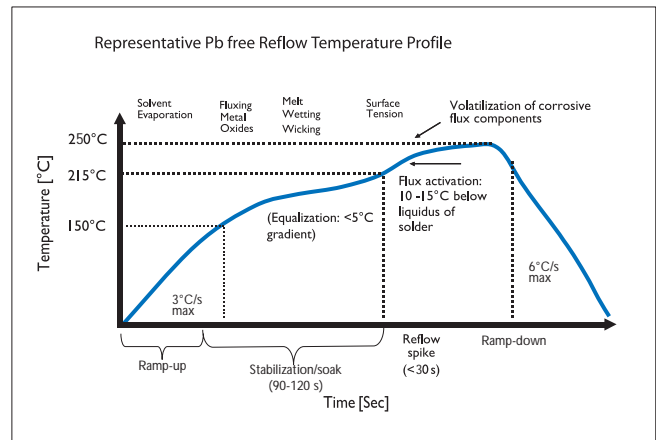
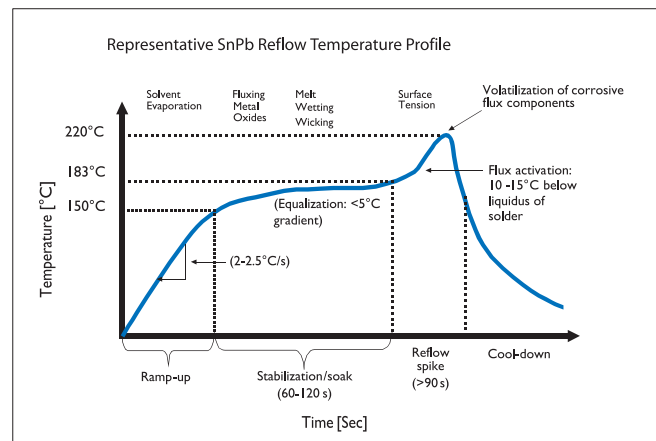
Standard circuit board finishes are available for Thermal Clad circuit boards.

- ENIG (Electroless Nickel/Immersion Gold)
- OSP (Organic Solderability Protectant)
- Immersion silver or tin and lead-free HASL
- Standard tin/lead HASL
- ENEPIG (Electroless Nickel/Electroless Palladium/Immersion Gold)
- Electroless gold

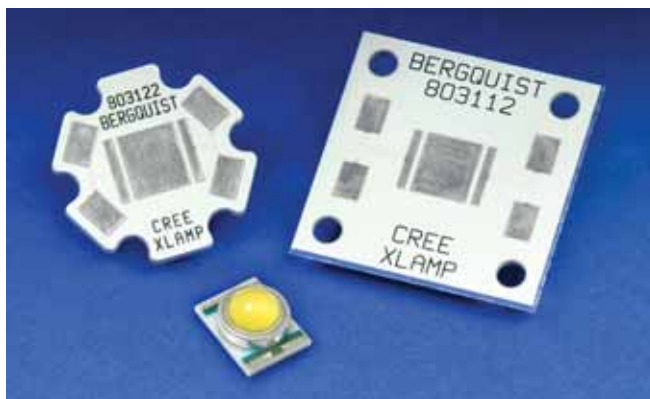
### Application and Thickness - Solder Paste

The typical application technique is metal stencil. Dispensing of solder to specific locations is used for secondary operations or special attachment requirements. No other decision will effect the reliability of the solder joint as much as the thickness of the solder to be used. A minimum of 0.004" (102µm) is recommended (after reflow). This thickness dissipates stress buildup in the joint. Additional information regarding solder joint reliability is offered in the appendix.

*Note: Additional thickness and/or larger stencil opening may need to be utilized for RoHS compliance applications. Use profile recommended by the component manufacturer.*



Wire soldering on Thermal Clad.



Standard stars and squares in the most popular LED footprints available through distribution. Contact Bergquist Sales for more information.

## Now Available

### T-Clad Bond-Ply 450 PA

Thermal Clad with Bond-Ply 450 PA is a thermally conductive adhesive tape that is the first of many pre-applied offerings to come. This material features a release liner on the back side for easy removal and application to a heat sink. T-Clad PA substrate release liners can withstand high temperatures and will maintain adhesion and release characteristics even after exposure to the extreme heat of solder reflow. For a complete data sheet, contact Bergquist Sales.

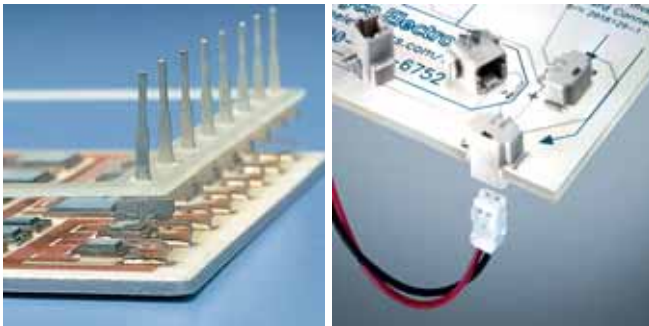


## Connection Techniques

Connection techniques common throughout the industry are being used successfully on Thermal Clad IMS substrates. Surface mount connectors are manufactured using plastic molding materials with thermal coefficients of expansion that roughly match the characteristics of the baseplate metal. However, the plastic molding compounds do have a different thermal capacity and thermal conductivity that can cause stress in the assembly as it cools after soldering and during any significant temperature excursion. Process-caused thermal mechanical stress is specific to the solder reflow process used. For this reason, designs that capture the metal pin without rigidity are preferred, particularly if the major dimension of the connector is large.

### Pin Connectors

Pin connectors and pin headers are often used in Thermal Clad assembly when an FR-4 panel is attached to a Thermal Clad assembly. The differential coefficient of expansion between the control panel and the base metal will cause stress in the solder joint and dielectric. The most advanced designs incorporate stress relief in the fabrication of the pin. Redundant header pins are often used to achieve high current carrying capacity.



Manufacturers such as AutoSplice and Zierick have off the shelf pins ideal for IMS applications. Custom pins and connectors are also available.

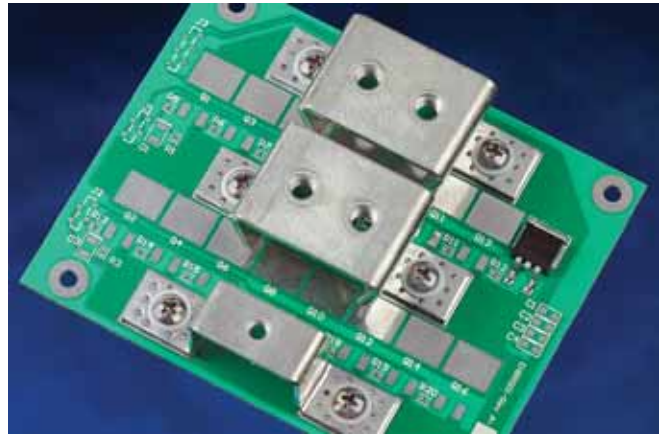
This Tyco Electronics™ SMT thru-board connector provides a way to bring power from the underside of a Thermal Clad IMS board, eliminating issues of dressing wires on the top side of LED boards.

### Power Connections

Only a few companies supply spade or threaded fastener connectors for surface mount power connections. In many cases these are lead frame assemblies soldered to the printed circuit pads and bent to accommodate the shell used for encapsulation. Designs incorporating stress relief and a plastic retainer suitable for high amperage are also available. Thru-board connectors will require adherence to fabrication design rules for IMS PWB's.

### Edge Connectors

When using edge connectors as part of the Thermal Clad printed wiring pattern, it is suggested that interfacing conductors be finished with a hard gold plating over sulfamate nickel plating. A 45° chamfer is recommended when using an edge connector. Remember to maintain the minimum edge to conductor distance to prevent shorting.

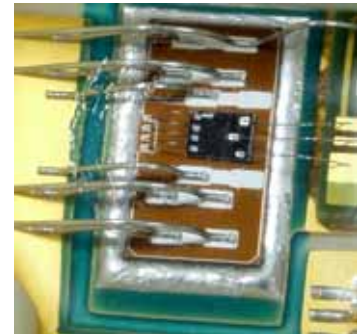


### Custom Connectors

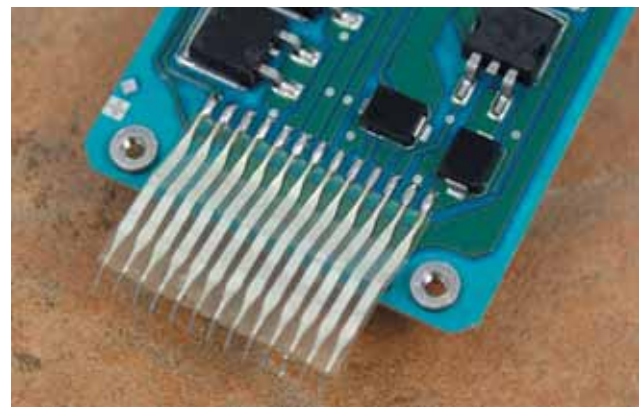
In the example above, the application required a large cable connection to the T-Clad IMS board. Precautions were taken for the best electrical connection with minimized mechanical strain on the etched circuit. This solution addresses both electrical and mechanical fastening. The small holes allow for complete void-free soldering. Also, the insulated shoulder washer prevents shorting to the base plate. These types of connectors are usually custom made and are not commercially available.

### Wire Bonding – Direct Die

Wire bonding is particularly useful in the design of packages with Chip-On-Board (COB) architecture. This technique uses the surface mount and interconnect capability of Thermal Clad in a highly efficient thermal design. See page 10 for additional information.



Close up view of a direct die attachment in a power application.



Flex attachment on Thermal Clad.