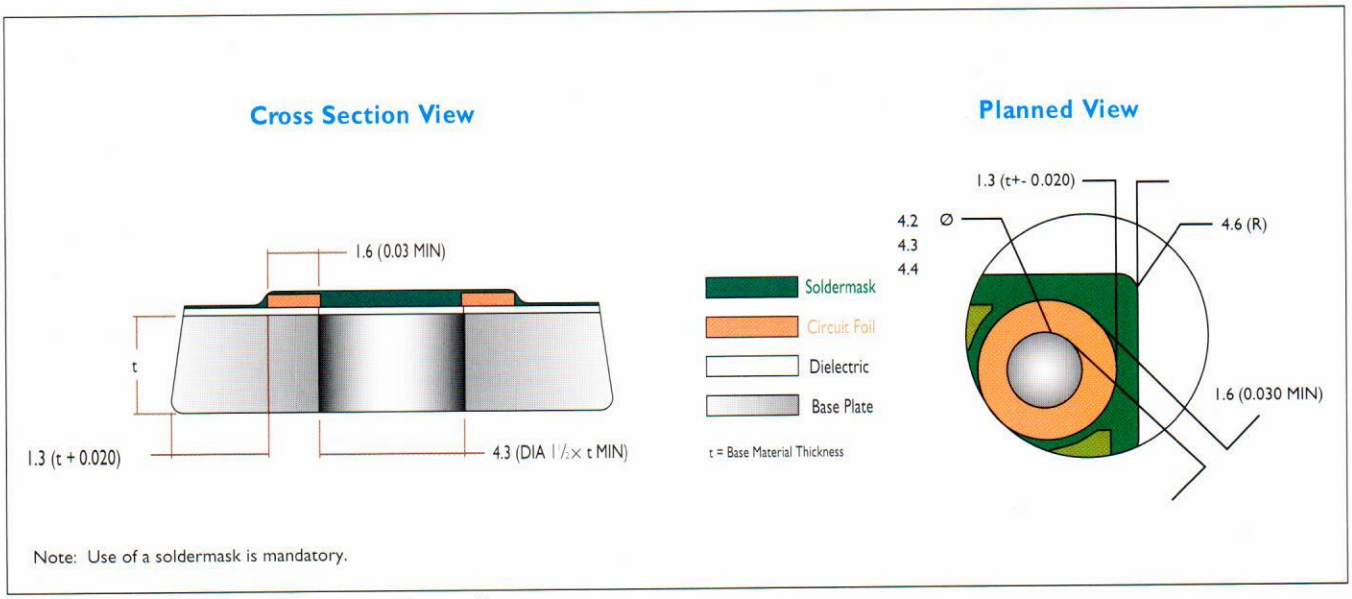
Circuit Design Recommendations

This section will address circuit design with respect to etching, surface finishing and mechanical fabrication processes; such as holes, flatness, singulation and tolerances.

Fabrication of Thermal Clad is similar to traditional FR-4 circuit boards with regard to wet processing operations. However, secondary mechanical operations are unique, therefore consideration to specific design recommendations are critical to insure manufacture of reliable cost effective Thermal Clad circuits. This section will address design recommendations for circuit image, soldermask, legend screen, and mechanical fabrication. Additional consideration for trace widths, spacing and clearances may be required for electrical integrity based in application voltage (see electrical design considerations pages 18-19).



Bold numbers within these drawings reference the adjacent table.

Part Singulation Methods

Milling/Routing/Drilling

Processes typically selected for prototype or low volume production with complex geometries. Unique designs with selective areas of removed dielectric may require milling/routing processes. Milling operations require fixturing. Milling/routing is typically not cost effective for moderate to high volume applications.

V-Scoring

V-scoring is a viable process selection for both low and high volume production by taking advantage of material utilization. V-scoring is also a preferred process for prototypes with rectangular geometries with the benefit of no tooling costs. Holes can be drilled, or punched prior to scoring.

Blanking

Blanking is one of the most cost effective process for moderate to high volume applications. Blank tooling can accommodate complex part geometries, as well as pierce internal holes.

Flatness

Part design as well as the manufacturing process affects flatness of a Thermal Clad board. There is also an effect from the differential thermal coefficient of expansion (TCE) between the circuit and the base layer. That effect is determined by the base plate material selection, ratio of copper foil to base plate thickness and copper circuit pattern design.

For Thermal Clad, panel or part, there is always some bow caused by the difference in CTE between the circuit layer and the substrate. Flatness is most evident when the substrate metal is aluminum and the circuit layer is copper. Generally, if the thickness of the copper layer is less than 10% of the substrate thickness, the aluminum will be mechanically dominant. Constructions with more circuit copper than 10% of the substrate thickness can exhibit a bow.