

III Fabrication Guidelines

RO4830™ Plus Copper Clad Laminates

Quick Reference Processing Guide

III Material Description

RO4830™ Plus copper clad laminates are being developed for use as cap layers in hybrid millimeter wave automotive radar applications. The RO4830™ Plus materials are made using an unreinforced low dielectric constant/low electrical loss thermosetting resin system. While processing evaluations are underway, it has already been demonstrated that RO4830 Plus laminates, when used as cap layers, are compatible for use in hybrid MLBs with FR4 core & prepreg layers. The processing recommendations offered below are based upon experience to date and will be updated as new information becomes available.

III Storage

Store at ambient conditions in a manner that is supportive and protects the soft materials from mechanical exposures that may result in the formation of pits, dents, and scratches.

III Inner-Layer Prep

As the unreinforced laminates are soft, chemical preparation of copper surfaces is highly preferred over mechanical processes that may tend to distort the layers. The materials are compatible with most dry film photoresists and processing methodologies although leaders may be required to support the thin cores through conveyORIZED systems. Material distortion and bow and twist through inner-layer processing can be minimized by retaining as much copper as possible. Inner-layers can be processed as standard through the oxide/alternative oxide process that is recommended for the prepreg system of choice.

III Lamination

Temperature and pressure profiles recommended for the prepreg system should be used. A maximum allowable press temperature for the RO4830 Plus materials is not yet understood. For the time being, it is recommended to use press temperatures below 250C.

III Drilling

For mechanical drilling, it is recommended to drill MLBs with the RO4830™ Plus materials on the top (entry side) of the drill stack. Phenolic or aluminum entry material and phenolic exit materials can be used. New standard geometry or undercut carbide drill bits are recommended as are conservative parameters (200-300 SFM, 0.002-0.003"/" infeed, and 300-500 IPM retract rate) and hit counts (500) which should be based upon based upon hole quality.

UV/CO2 combination lasers have been used successfully to form L1-L2 depth drilled microvias. A UV laser or traditional photoimage & etch can be used to form openings in the surface copper layer. Six-ten CO2 pulses can be used to form vias through 125 micron thick material layers. The use of a defocused UV laser beam to clear the L2 copper surfaces is preferred over chemical and/or plasma preparation.

Desmear

RO4830 Plus materials are compatible with chemical (potassium permanganate) and plasma (CF₄/O₂) desmear methodologies. However, longer cycle times may be required and should be defined through evaluation of the specific in-house process.

Plating

Standard direct deposit and/or electroless copper processes can be used to metallize properly prepared holes and vias. Panel or pattern plating is possible. If pattern plating, there may be benefit in flash plating 6-7 microns of copper prior to imaging.

Image & Etch

RO4830 Plus materials are compatible with traditional DES & SES processes.

Final Surface

RO4830 Plus materials are compatible with most chemically and thermally applied final finishes and coatings. The materials are also compatible with most LPI and LDI solder mask options and OSP coatings which all can be applied using standard procedures.

Singulation

Carbide multi-fluted spiral chipbreaker or diamond cut router bits are preferred for routing RO4830 Plus materials. Single- or double-fluted spiral-up endmills can be used, but expected tool life may be shortened. Routing parameters would include surface speeds below 500 SFM and lateral feed rates of 0.0010"-0.0015" (0.0254-0.0381 mm)/revolution.

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