

The processing guidelines contained in this document were developed through in-house testing and field experience. However, they *should be considered to be starting points that will require further adjustment*. Read the following review of processes for applicability to your particular Printed Wiring Board (PWB) fabrication environment. Remember that the suggestions contained herein can not account for all possible board designs or processing environments. Additional adjustments by the fabricator will be necessary. Isola can and will assist with this process, but the fabricator, not Isola, is ultimately responsible for their process and the end results. **Fabricators should verify that PWBs made using these suggestions meet all applicable quality and performance requirements.**

Part 1: Prepreg Storage and Handling

Isola Group's prepreg bonding sheets for use in multilayer printed circuit board applications are manufactured to specifications that include physical and electrical properties and processing characteristics relative to the laminating application. Handling and storage factors have an important influence on the desired performance of the prepreg. Some parameters are affected by the environment in which prepregs are stored. They can also deteriorate over extended periods of storage. The prepreg received by the customer is a glass fabric that has been impregnated with a stated quantity of low volatile, partially polymerized resin. The resin is tack-free but somewhat brittle. Many lamination problems arise from resin loss off the fabric due to improper handling. The fabric used is based on the order and supplies the required thickness. In most cases the amount of resin carried by the fabric increases as the fabric thickness decreases.

Handling Suggestions

Handle all prepreg using clean gloves. Use sharp, precision equipment when cutting or paneling prepreg. Treat all prepreg as being very fragile. Use extreme care when handling very high resin content prepreg (glass fabrics 1080 and finer).

Storage Suggestions

Upon receipt, all prepreg should be immediately moved from the receiving area to a controlled environment. All prepreg should be used as soon as possible. A First-In-First-Out (FIFO) inventory management system should be used.

If not handled properly, IS300MD prepreg will absorb moisture, which will lead to depressed T_gs and cure and affect flow in the press. If extended storage is required, separate facilities should be reserved with appropriate environmental control. Prepreg should be stored at $\leq 23^{\circ}\text{C}$ and below 50% humidity.

Prepreg packages should be allowed to equilibrate to layup room conditions before opening to prevent moisture condensation on the prepreg.

Stabilization time will depend on storage temperature. In cases where storage temperature is significantly below room temperature, keep prepreg in package or plastic wrapping during the stabilization period to prevent moisture condensation. Once the original packaging is opened, the prepreg should be used immediately. Remaining prepreg should be resealed in the original packaging with fresh desiccant, do not vacuum seal IS300MD prepreg. Storage should be in the absence of catalytic environments such as high radiation levels or intense ultraviolet light.

Part 2: Innerlayer Preparation

Isola Group's IS300MD laminates are fully cured and ready for processing.

Imaging and Etching

IS300MD laminates are imaged using standard aqueous dry films and are compatible with both cupric chloride and ammoniacal etchants.

Bond Enhancement

Oxide alternative chemistries have been used successfully in fabricating IS300MD multilayer boards to date. Users should make sure the oxide replacement coating exhibits a consistent, uniformly dark color.

For conveyORIZED oxide replacements, an efficient dryer at the end of a conveyORIZED oxide replacement line should remove all moisture from the inner layer surface. **However, drying of layers for 30 minutes minimum @ 100°C or higher is considered a "best practice", especially for boards to be subjected to "lead-free" processes. Drying in racks is preferred.**

If immersion tin adhesion treatments are used, the fabricator should test the coating to verify adequate bond strength is developed with IS300MD prepregs.

Part 3: Lamination

Standard Lamination

The amount of time at cure temperature, and to some extent the actual cure temperature of IS300MD, will be determined by the thickness of the multilayer package being produced. Very thick boards will require a longer cure time to assure optimum material performance.

Sequential Lamination

Use the full cycle for both subassembly as well as final lamination.

Removal of IS300MD flash should be performed by routing rather than shearing to minimize crazing along the panel edges.

Table 1: IS300MD General Lamination Parameters

Vacuum Time	On Risers: 10 min.
Curing Temperature	190-200°C (375-390°F) Do Not Exceed 210°C Product Temperature
Curing Time	190°C (375°F) 60 min 200°C (390°F) 45 min
Resin Flow Window	110-150°C (230-300°F) Maintain heat ramp in this temperature range.
Heat Ramp	3.5-5.0°C/min. (6.5-9°F/min.)
Pressure	350 PSI (25 Kg/cm ²) 425 PSI (30 Kg/cm ²)
Pressure Application	-Single Stage Apply pressure after vacuum dwell time. -Dual Stage 50 PSI (3.5 Kg/cm ²) after vacuum dwell time, switch to high pressure ≤ 90°C product temperature.
Cool Down	Cool to 135-140°C (275-285°F) at 2.8°C/min. (5.0°F/min.) with 50 PSI (3.5 Kg/cm ²) pressure prior to removing or transferring the load.

Part 4: Hole Wall Preparation

General

Good desmear and electroless copper deposition performance are more easily achieved when the drilled hole quality is good. The generation of smooth, debris free hole walls is influenced by the degree of resin cure, drilling conditions and board design considerations. This helps reduce smear generation, which improves desmear performance and can ultimately help to reduce copper wicking.

Factors which influence chemical desmear rates, and therefore the suggestions in this document, include:

resin type, chemistry type, bath dwell times, bath temperatures, chemical concentrations in each bath and the *amount of solution transfer through the holes*.

Factors which influence the *amount of solution transfer through the holes* include: hole size, panel thickness, work bar stroke length, panel separation in the rack and the use of solution agitation, rack vibration and rack "bumping" to remove air bubbles from the holes.

Chemical Desmear

Trials show that IS300MD shows good response to chemical desmear. Processing parameters used for 170 Tg FR-4 should be used, excessive dwell time will cause etchback.

Plasma Desmear

Plasma can be used with or without a single permanganate pass (to be determined by each fabricator). Standard plasma gas mixtures and process cycles designed for conventional FR-4 epoxy are suggested for use as initial starting parameters for IS300MD.

Secondary Drilling

The use of entry and backer material may be necessary during the secondary drilling of larger hole sizes to avoid crazing/fracturing at the hole perimeter.

Additionally, sharper plunge point angle geometries may be necessary to avoid crazing around secondary drilled hole perimeters.

Routing and Scoring

Modifications of the final PWB route fabrication process may be necessary. **Table 2** lists initial starting parameters. **Note that parameters listed may require further adjustment.**

Table 2: Suggested Routing Parameters for Initial IS300MD Setup

Stack Height (Max) Inch	Spindle Speed RPM	Table Speed Inch/min.	Router Bit Life Linear Feet
0.200	25,000	25	35

The customer should contact the scoring equipment and/or bit supplier for application specific suggestions for use with IS300MD materials. Your Isola Technical Account Manager may also be able to provide some initial suggestions, but these should be validated through testing by the individual PWB fabricator.

Part 6: Packaging and Storage

IS300MD finished boards have low moisture sensitivity and good shelf life. However, Isola recommends using best practices in storage and packaging, as noted below, to reduce risk during lead-free assembly.

IS300MD boards should be dry prior to packaging to ensure the most robust lead-free performance. For some complex, high reliability designs, baking prior to solder mask application can be implemented to ensure maximum floor life in assembly processing. Printed boards made for high temperature assembly from IS300MD, which require a long shelf life, the best protection is provided using a Moisture Barrier Bag (MBB) with a Humidity Indicator Card (HIC) and adequate drying desiccant inside the MBB to prevent moisture absorption during shipment and long-term storage.

Upon opening the MBB, the boards should be processed within 168 hours when maximum shop floor conditions are at < 30°C (85°F)/60% RH. MBB bags that are opened for inspection should be resealed immediately to protect the boards from moisture uptake.

Part 7: Health and Safety

Always handle laminate with care. Laminate edges are typically sharp and can cause cuts and scratches if not handled properly. Handling and machining of prepreg and laminate can create dust (see IS680 Material Safety Data Sheet). Appropriate ventilation is necessary in machining/punching areas. The use of protective masks is suggested to avoid inhaling dust. Gloves, aprons and/or safety glasses are suggested if individuals have frequent or prolonged skin or eye contact with dust.

Isola Group does not use polybromide biphenyls or polybromide-biphenyl oxides as flame retardants in any product. Material Safety Data Sheets are available upon request.

Part 8: Ordering Information

Contact your local sales representative or visit: www.isola-group.com for further information.

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The Isola logo consists of the word "isola" in a bold, lowercase, sans-serif font. The letters are a vibrant red color. The 'i' has a dot, and the 'a' has a tail that extends to the right.