

N7000-2HT, N7000-3 and N7000-3F

General Processing Guidelines

Toughened Polyimide

N7000-2HT, N7000-3 and N7000-3F non-MDA toughened polyimide materials offer superior board performance, reliability, excellent thermal performance. These PCB materials are appropriate for device-undertest (DUT).

Material Handling & Storage

Store laminates flat in a dry environment. Do not bend, scratch or dent laminate.
Store prepreg flat, with a storage temperature of <72° F (<23°C) and ≤50% RH.
For extended prepreg storage, reduce storage temperature to <41° F (<5°C).
Place prepreg under vacuum or in a desiccant chamber 12 - 24 hours prior to lay-up for best results.
Reseal opened bags of unused prepreg.

Copper & Surface Preparation

Prepare copper surface for photo resist application according to the following options:
The type of copper surface preparation employed should relate to the foil type as specified below:

- **Reverse Treat Foil (RTFoil®)**: Chemical clean followed by a light tack clean.
- **Shiny Copper Foil**: Chemical and / or Mechanical clean followed by a light tack clean.
- **Double Treat Foil**: Chemical clean followed by a light tack clean.

Note: Chemical clean consists of a mild cleaner to remove soils followed by a mild acid to remove the passivation.

Bond Enhancing Treatments

One of the following options can be used successfully:

- Option 1: Brown oxide with DMAB (dimethylamino borane) reduction.

- Option 2: Peroxysulfuric oxide alternative or white (Sn) oxide.

Note: The brown oxide deposit should be tested using a weight loss test. Thick oxide deposits tend to yield poor thermal resistance. The oxide deposit should not exceed 0.4 mg/cm².

Inner Layer Drying

Inner layers should be oven dried to remove absorbed moisture. Absorbed moisture in the inner layer can affect the curing properties of the prepreg. Conveyorized warm air drying is usually not effective in removing absorbed moisture from the etched layer.

	Recommendations
Signal layers	230°F (110°C) in vertical racks with minimum 0.5" (12 mm) separations for 30 minutes
Plane layers and plated sub-lam layers	230°F (110°C) in vertical racks with minimum 0.5" (12 mm) separation for 60 minutes

- Note: 1) Check with oxide supplier if using DMAB oxide reducer. Excessive exposure to heat may re-oxidize the reduced treatment.
2) If inner layers are baked horizontally in stacks of 1 - 2" (25-50mm) extend time to 90 minutes.
3) Drying temperatures below 212°F (100°C) are not effective in removing absorbed moisture from the layer.
4) If slip sheets are used to protect layers it is important that they not contain wax or silicon based materials which can transfer between cores and affect adhesion after lamination.

Lay-up

For best results, use inner layers within 2 hours after drying. Rebake inner layers if not used within 24 hours.

Note: In some cases, interactions between ammoniacal etching processes and certain copper foil types can increase the likelihood of high resistance shorts. Contact your local technical service representative to discuss choice of copper foil to be used in lay-up.

Lamination

For best results, fully cure in vacuum assisted hydraulic press

	Recommendations
Vacuum Gauge Pressure	A minimum of 28.5" Hg (965 mbars) for 30 minutes before applying heat & pressure.
Heat Up Rate*	8 - 12°F (4.4 – 6.5 °C) per minute
Critical Range	180 – 280°F (80 – 140°C)
Pressure	225 - 300 psi (15.5 – 20.6 bar)
Cure Time, Temp	135 minutes @ 425 °F (135 minutes @ 218 °C)
Cool Down Rate	7°F (4°C) per minute or less until stack reaches 260°F (127°C)
Breakdown	After panels have cooled below 225°F (107 °C)

Notes: Heat rise is usually controlled by using an acceptable thermal lagging such as kraft paper or press pads. Alternately the heat rise can be controlled by ramping the platen temperature about 5 – 10 °F (5 °C) higher than book temperatures and controlling the heat up rate through the critical temperature range.

For partial cure in press and full cure in oven, laminate product 60 minutes at 400°F (204°C) followed by a 60 minute postbake in the oven at 425°F (218°C). Care should be taken in handling the undercured polyimide panel to avoid localized delamination.

For PCB's requiring multiple laminations, it may be beneficial to undercure the laminated sub-assemblies (sub-lams). Sublams can be initially cured at 400°F (204°C) for 90 minutes. Use the standard lamination process for final cure

Drilling

Typical Drill Parameters	Recommendations	
Drill Sizes	0.010" – 0.020" (0.30 – 0.50 mm)	0.020" - 0.040" (0.50 – 1.0 mm)
Surface Speed	300 – 400 SFM (91– 122 m/min.)	350-450 SFM (107 – 138 m/min.)
Chip Load	0.5 – 1.5 mils/rev (12 – 38 µm/rev)	0.8 – 2.0 mils/rev (20 – 50 µm/rev)
Maximum Hit Count	500 - 1000	750 – 1200
Typical Stack Height	0.045" – 0.100" (1.1 – 2.5 mm)	0.045" – 0.100" (1.1 - 2.5 mm)

Note: Undercut drills are recommended for small hole drills < 0.0185" (0.47 mm). Peck drilling is recommended for panel thicknesses greater than .100" (2.5mm). Lubricated entry and/or back-up materials may be used to reduce the heat generation during drilling.

Drilling parameters should be adjusted depending on hole size, layer count, panel thickness, copper content and stack height. For specific feed and speed parameters, contact your drill supplier or AGC'S technical representative. Detailed typical drilling parameters are available for many products. Please contact agc-ml.multimaterial@agc.com.

Hole Cleaning (Resin Smear Removal)

Most solvent swell and permanganate etch processes are suitable. Aggressive solvent swell processes and double pass chemical desmear processes should be avoided.

Plasma: Typical desmear conditions

Temperature	Gas mixture	Power	Time
80± 2°C	10%CF ₄ , 80% O ₂ , 10% N ₂	4000 W	20-30 min

Note: Depending on the amount of resin removal required, a preheat cycle and an oxygen burn cycle for ash removal may be necessary. Longer dwell times will be required if full etch-back is required. See your technical representative for additional information.

Chemical Desmear:

Type	Temp (°F /°C)	Time
Cyclic Amine 100%	130 ± 5 / 54 ± 2	3 - 5 min.
Cyclic Amine 50% v/v	170 ± 5 / 77 ± 2	6 - 8 min.
Butyl / hydroxide solvent	173 ± 5 / 78 ± 2	6 - 8 min.
Alkaline Permanganate oxidizer	175 ± 5 / 79 ± 2	12 - 16 min.

Routing

Typical Drill Parameters	Recommendations
Stack Height	0.250" (≤6.25 mm)
Tool Size	0.093" (2.4 mm)
Feed Rate	36 IPM (0.9 m/min.)
Speed	24K RPM

These guidelines can provide only basic and reference information for PCB fabricators. Because of different environment, equipment, tooling and so on, in all instances, the user shall determine suitability in any given conditions or applications. For more detailed processing information, please contact with the AGC engineer or sales representative.