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Meteorwave/M-PLY

General Processing Guidelines

Very Low Loss and Ultra Low Loss Material Systems

The Meteorwave family, including M-Ply™ bonding materials, offer very advanced electrical performance and very high reliability. They are intended for use in next generation core routers, high speed switches, supercomputers and applications where low signal attenuation, high reliability and high data transfer rates are critical. Meteorwave products are designed to facilitate high temperature lead-free assemblies and high layer count printed circuit board designs that require high reliability, CAF resistance and low Z-axis expansion.

Material Handling & Storage

Store laminates flat in a dry environment. Do not bend, scratch or dent laminate.
Store prepreg flat, in a cool, dry environment at less than 72°F (23°C) and ≤50% RH.
Vacuum reseal opened bags of unused prepreg.

Copper & Surface Preparation

Prepare copper surface for photo resist application with a mild micro-etch.

Bond Enhancing Treatments

Meteorwave products are meant for high speed signal integrity circuitry. Brown and black oxide may be used but are not recommended for signal integrity.

Alternative oxides such as Atotech Bondfilm HF or equivalent are recommended.

Inner Layer Drying

Inner layers should be oven dried to remove adsorbed moisture prior to re-lamination.

Adsorbed moisture in the inner layer can affect the curing properties of the prepreg. Conveyorized warm air drying is usually not effective in removing adsorbed moisture from the etched layer.

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

Note: 1) If cores are allowed to sit exposed for 24 hours or greater they should be re-baked.
2) Baking cores in stacks does not provide an effective airflow to remove entrapped moisture from the cores and should be avoided.
3) Cores with thickness greater than 100 mils (2.54mm) may require greater than 30 minutes baking.

Sub-Assembly Baking

Post oxide bake is also recommended for each sub-assembly before relamination. The same recommendations outlined above in Inner Layer Drying should be followed.

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Lay-up

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

Lamination

For best results, fully cure in vacuum assisted hydraulic press

	Recommendations
Vacuum Gauge Pressure	A minimum of 28.5" Hg (965 mbars) for 20 minutes before applying heat & pressure. Maintain vacuum throughout press cycle
Heat Up Rate*	4 - 7°F (2 - 4 °C) per minute
Critical Range	180 – 330°F (82 – 165°C)
Pressure	400 - 500 psi (27 - 35 bar)
Cure Time, Temp	>90 minutes @ 420 °F (>90 minutes @ 216 °C)
Stress Relief (Optional)	After 30 minutes of cure at 420°F (216°C), reduce pressure to 50 – 75 psi (3.5 - 5 bar)
Cool Down Rate	**<5ºF (3°C) per minute or less until stack reaches 260°F (127°C)**
Breakdown	After panels have cooled below 150°F (65 °C)

*Note: 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.

Drilling

Typical Drill Parameters	Recommendations	
Drill Sizes	0.010" – 0.20" (0.25 – 0.5 mm)	0.020" - 0.040" (0.5 – 1.0 mm)
Surface Speed	315 – 400 SFM (96 – 122 m/min.)	400 SFM (122m/min.)
Chip Load	0.7 – 1.2 mils (0.018-0.030 mm/rev)	1.2 – 1.5 mils (0.030 – 0.038 mm/rev)
Maximum Hit Count	750 - 1000	1000 -1500
Typical Stack Height	≤0.180" (≤4.5 mm)	≤0.240" (≤6.0 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.info-maltimaterial@agc.com.

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Hole Cleaning (Resin Smear Removal)

Chemical desmear is preferred, but a plasma desmear followed by a mild permanganate desmear can be used.

Plasma: Typical desmear conditions

Temperature	Gas mixture	Power	Time
80± 2°C	10%CF_4, 80% O_2, 10% N_2	4000 W	15-20 min

Note: Depending on the amount of resin removal required, a preheat cycle and an oxygen burn cycle for ash removal may be necessary.

Chemical Desmear:

Type	Temp (°F /°C)	Time
Cyclic Amine 50%	173 ± 5 / 78 ± 2	4 - 6 min.
Alkaline Permanganate Oxidizer	175 ± 5 / 80 ± 2	8 - 12 min.

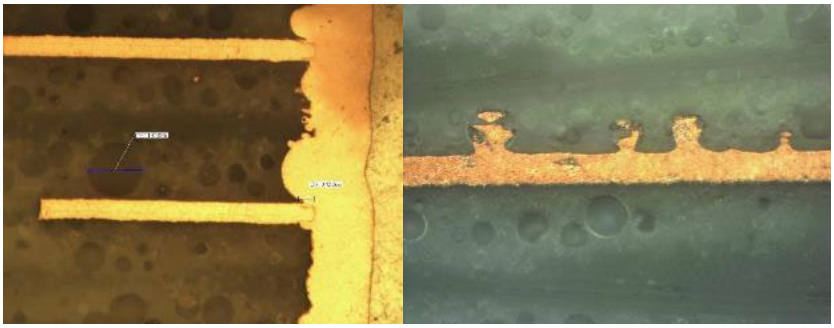
Panels > 0.180" (4.6 mm): Desmear process must be evaluated to insure adequate solution transfer through vias. It may be necessary to use a very light plasma cycle followed by chemical desmear on very thick panels with high aspect ratio vias. Due to variations in plasma equipment, proper process times and equipment settings should be evaluated for effectiveness when desmearing Meteorwave material.

Routing

Typical Drill Parameters	Recommendations
Stack Height	0.250" (6 mm)
Tool Size	0.093" (2.4 mm)
Feed Rate	60 IPM (1.5 m/min.)
Speed	24K RPM

Meteorwave 8300 Design and Cross Section Considerations

Our unique low loss resin system contains glass spheres. Design and cross section analysis should take account of the spheres in PTH/coupon design(s) including a clearance allowance for anti-pads and analyzing test coupons. Spheres vary from 20-40 microns in diameter. Below are two examples of PTH and cross-sections.



- Etch back measurement may be affected by the size variation of hollow glass spheres.
- Copper may be smeared into the hollow glass sphere(s) during the cross section grinding process which may cause a false rejection based on minimum dielectric thickness.

A micro etch is recommended post cross section to remove the artifact of cross section for proper analysis.

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.

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