

# METEORWAVE® 5000 HF

## Very Low Loss, Halogen Free Laminate & Prepreg For High Layer Count Printed Circuit Board Designs

### Benefits

- Halogen Free
- Excellent Electrical Properties
- Stable dielectric performance over a wide frequency range
- Very high reliability and fracture toughness
- High Conductive Anodic Filament (CAF) resistance

### Applications

- Telecommunications
- High Speed Services and Storage Networks
- Data and Wireless Communications
- Switching, Routing and Backplanes



Meteorwave® 5000 HF high speed and low loss digital electronic material offers advanced electrical performance and high reliability for Halogen Free circuit board requirements.

Meteorwave 5000 HF is designed for multiple high temperature lead-free assemblies and high layer count printed circuit board designs which require a halogen free material with very high levels of reliability.

#### Excellent Electrical Properties

- Very low Dk/Df electrical performance
- Stable electrical properties versus frequency when tested over environmental conditions

#### Good Thermal and Mechanical Properties

- Good peel strength on ultra smooth coppers
- $T_{300} > 120$  minutes
- High Decomposition Temperature ( $T_d$ ) at 430°C
- Excellent IST performance
- Meets NASA outgassing specification
- Lead-free assembly compatibility

#### Highly CAF Resistant

- Highest quality and purest materials used to insure consistent CAF resistance.

#### High-T<sub>g</sub> FR-4 Processing

- Processes similar to other high-T<sub>g</sub> materials
- 90 minutes cure at 216°C and 400-500 psi

Meets UL 94V-0 and IPC-4101/96 Specifications

UL file number: E36295

| Properties                            | Conditions                              | Typical Value              | Unit  | Test Method                     |
|---------------------------------------|---|----------------------------|---|---------------------------------|
| <b>Electrical Properties</b>          |   |                            |   |                                 |
| Dielectric Constant                   | @ 10 GHz                                | 3.40                       |   | IPC-TM-650.2.5.5.5              |
| Dissipation Factor                    | @ 10 GHz                                | 0.0033                     |   | Split-Post Dielectric Resonator |
| Volume Resistivity                    | C - 96 / 35 / 90                        | 8.10 x 10 <sup>6</sup>     | MΩ - cm                                       | IPC-TM-650.2.5.17.1             |
|                                       | E - 24 / 125                            | 2.70 x 10 <sup>8</sup>     |   |                                 |
| Surface Resistivity                   | C - 96 / 35 / 90                        | 2.10 x 10 <sup>6</sup>     | MΩ  | IPC-TM-650.2.5.17.1             |
|                                       | E - 24 / 125                            | 1.30 x 10 <sup>8</sup>     |   |                                 |
| Electric Strength                     |   | 3.6x10 <sup>4</sup> (900)  | V/mm (V/mil)                                  | IPC-TM-650.2.5.6.2              |
| <b>Thermal Properties</b>             |   |                            |   |                                 |
| *Glass Transition Temperature (Tg)    | TMA(°C)                                 | 160                        | °C  | IPC-TM-650.2.4.24c              |
|                                       | DMA(°C) (Tan d Peak)                    | 185                        | °C  | IPC-TM-650.2.4.24.3             |
| Degradation Temperature (TGA)         | Degradation Temp (TGA)<br>(5% wt. loss) | 430                        | °C  | IPC-TM-650.2.3.40               |
| T-300                                 | Time to delamination @<br>300°C         | >120                       | minutes                                       | IPC-TM-650.2.4.24.1             |
| Thermal Conductivity                  |   | 0.52                       | W/mK  | ASTM E1461                      |
| Specific Heat                         |   | 1.06                       | J/gK  | ASTM E1461                      |
| <b>Mechanical Properties</b>          |   |                            |   |                                 |
| Peel Strength                         | 1/2 oz VLP Cu (18μ)                     | 0.52 (3.0)                 | N/mm (lbf/inch)                               | IPC-TM-650.2.4.8                |
|                                       | After Solder Float                      | 0.58 (3.3)                 | N/mm (lbf/inch)                               | IPC-TM-650.2.4.8                |
| X / Y CTE                             | -40°C to + 125°C                        | 10 / 14                    | ppm/°C  | IPC-TM-650.2.4.41               |
| Z Axis CTE Alpha 1 / Alpha 2          | 50°C to Tg / Tg to 260°C                | 46 / 215                   | ppm/°C  | IPC-TM-650.2.4.24               |
| Z Axis Expansion                      | 50°C to 260°C                           | 3.0                        | %   | IPC-TM-650.2.4.24               |
| Young's Modulus (X / Y)               |   | 22.7 / 24.8<br>(3.3 / 3.6) | GN/m <sup>2</sup><br>(psi x 10 <sup>6</sup> ) | ASTM D3039                      |
| Poisson's Ratios (X / Y)              |   | 0.157 / 0.178              |   |                                 |
| Flexural Strength (X / Y)             | @125°C                                  | 0.25 / 0.32<br>(3.7 / 4.6) | GN/m <sup>2</sup><br>(psi x 10 <sup>6</sup> ) |                                 |
|                                       | @ 150°C                                 | 0.24 / 0.29<br>(3.5 / 4.2) | GN/m <sup>2</sup><br>(psi x 10 <sup>6</sup> ) |                                 |
| <b>Chemical / Physical Properties</b> |   |                            |   |                                 |
| Moisture Absorption                   |   | 0.12                       | wt. %   | IPC-TM-650.2.6.2.1              |

\* DMA is the preferred method for measuring Tg - other methods may be less accurate.

- \* All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a company representative directly
- \* Meteorwave® 5000HF can be manufactured in laminate thickness from 2 mil (0.050 mm) and up.
- \* Meteorwave® 5000HF is available in most common panel sizes.
- \* Please contact AGC for availability of any other constructions, copper weights and glass styles including ultra-low profile copper and RTFOIL®

