

N4000-13

High-Speed Multifunctional Epoxy Laminate & Prepreg



Benefits

- Low DF and DK
- Excellent thickness control for tight tolerance
- Support for advanced technology PWB designs
- Available in a variety of constructions

Applications

- High Speed Storage Networks
- Internet Switches / Routing Systems
- Wireless Communication Infrastructure
- Backplanes



N4000-13 series is an enhanced epoxy resin system engineered to provide both outstanding thermal and high signal speed/low signal loss properties for use in high speed storage networks and wireless communication infrastructure.

Excellent Electrical Properties

- Excellent thickness control for tight tolerance impedance applications
- Support for advanced technology PWB designs
- Low DK and DF

Thermal and Mechanical Properties

- $T_g > 210^{\circ}\text{C}$
- Low Z-CTE and proven CAF resistance provide long-term reliability for RF and digital applications
- Lead-free assembly compatibility to 245°C *
- Long-term reliability

Excellent CAF Performance

- CAF resistant materials after high temperature reflow

High-Tg FR-4 Processing

- Processes similar to traditional high Tg FR-4 materials
- 90 mins press at 193°C and 275-350 psi

Meets UL 94V-0 and IPC-4101/29, /98, /99 and /101 Specifications
UL file number: E36295

** Lead-free assembly compatibility is design dependent. Contact your local technical representative to review your specific design.*

| Properties | Conditions | Typical Value | Unit | Test Method |
|--|---|----------------------------|-----------------------------------|---------------------|
| Electrical Properties | | | | |
| Dielectric Constant (50% resin content) | @ 2.5 GHz (Split Post Cavity) | 3.7 | | |
| | @ 10 GHz (Stripline) | 3.6 | | IPC-TM-650.2.5.5.5 |
| Dissipation Factor (50% resin content) | @ 2.5 GHz (Spilt Post Cavity) | 0.009 | | |
| | @ 10 GHz (Stripline) | 0.009 | | IPC-TM-650.2.5.5.5 |
| Volume Resistivity | C - 96 / 35 / 90 | 10 ⁸ | MΩ - cm | IPC-TM-650.2.5.17.1 |
| | E – 24 / 125 | 10 ⁷ | | |
| Surface Resistivity | C - 96 / 35 / 90 | 10 ⁷ | MΩ | IPC-TM-650.2.5.17.1 |
| | E - 24 / 125 | 10 ⁷ | | |
| Electric Strength | | 4.7x10 ⁴ (1200) | V/mm (V/mil) | IPC-TM-650.2.5.6.2 |
| Thermal Properties | | | | |
| *Glass Transition Temperature (Tg) | DMA(°C) (Tan d Peak) | 240 | °C | IPC-TM-650.2.4.24.2 |
| Degradation Temperature (TGA) | Degradation Temp (TGA) (5% wt. loss) | 350 | °C | IPC-TM-650.2.4.24.6 |
| T-260 | Time to delamination @ 260°C | 30+ | minutes | IPC-TM-650.2.4.24.1 |
| T-288 | Time to delamination @ 288°C | 10+ | minutes | IPC-TM-650.2.4.24.1 |
| Thermal Conductivity | | 0.350 | W/mK | ASTM E1461 |
| Mechanical Properties | | | | |
| Peel Strength | 1 oz (35μ) Cu | 1.31 (7.9) | N/mm (lbf/inch) | IPC-TM-650.2.4.8 |
| | After Solder Float | 1.31 (7.5) | 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 (50°C to Tg) | | 70 | ppm/°C | IPC-TM-650.2.4.24 |
| Z Axis CTE Alpha 2 (Tg to 260°C) | | 280 | ppm/°C | IPC-TM-650.2.4.24 |
| Z Axis Expansion | 50°C to 260°C | 3.5 | % | IPC-TM-650.2.4.24 |
| Young’s Modulus (X / Y) | | 28.5 / 22.4 (4.2 / 3.3) | GN/m2 (psi x 10 ⁶) | ASTM D3039 |
| Poisson’s Ratios (X / Y) | | 0.13 / 0.11 | | |
| Chemical / Physical Properties | | | | |
| Moisture Absorption | | 0.1 | 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
- N4000-13 can be manufactured in laminate thickness from 2 mil (0.05 mm) and up.
- N4000-13 is available in most common panel sizes.
- Please contact AGC for availability of any other constructions, copper weights and glass styles, including very low profile copper and RTFOIL®
- The resistor foil manufacturer covers the warranty for the copper foil that includes the resistor layer, as well as the performance and workability related to the copper foil. Our company does not take responsibility for the processing of resistor layers and the performance or workability of the final products.

