









Delivering Value through Innovation and Dedication





# ThunderClad 2

Core: TU-883 Prepreg: TU-883P

ThunderClad 2 (TU-883) is a very low loss category material based on a high performance resin. This material is reinforced with regular woven E-glass and designed with very low dielectric constant and dissipation factor resin system for high speed low loss, radio frequency and wireless applications. ThunderClad 2 material is suitable for environmental protection lead free process and also compatible with FR-4 processes. ThunderClad 2 laminates also exhibit excellent moisture resistance, improved CTE, superior chemical resistance, thermal stability and CAF resistance.

## **Applications**

- Radio frequency
- Backplane, High performance computing
- Line cards, Storage
- Servers, Telecom, Base station, Office Routers

## Performance and Processing Advantages

- Excellent electrical properties
- Dielectric constant less than 4.0
- Dissipation factor less than 0.005
- Stable and flat Dk/Df performance over frequency and temperature
- Compatible with modified FR-4 processes
- Excellent moisture resistance and Lead Free reflow process compatible
- Improved z-axis thermal expansion
- Anti-CAF capability
- · Excellent through-hole and soldering reliability
- Halogen Free

## **Industry Approvals**

- IPC-4101 Type Designation: /134
- IPC-4101/134 Validation Services QPL Certified
- UL File Number : E189572
- ANSI Grade : No-ANSI
- Flammability Rating: 94V-0
- Maximum Operating Temperature: 160°C

### Standard Availability

- Thickness: 0.002"[0.05mm] to 0.062" [1.58mm], available in sheet or panel form
- Copper Foil Cladding: 1/3 to 5 oz for built-up & double sides
- Prepregs: Available in roll or panel form
- Glass Styles: 106, 1080, 3313, 2116 and other prepreg grades are available upon request











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Typical Properties Typical Values **Test Condition** SPEC Thermal Tg (DMA) 220 °C Tg (TMA) 170 °C E-2/105+desN/A Td (TGA) 420 °C CTE z-axis α1 35 ppm/°C Pre-Tg  $< 60 \ ppm/^{\circ}C$ CTE z-axis α2 240 ppm/°C Post-Ta < 300 ppm/°C 2.5 % CTE z-axis 50 to 260°C < 3.0% Thermal Stress, Solder Float, 288°C > 60 sec > 10 sec > 60 min T-260 > 30 min > 60 min T-288 E-2/105+des> 15 min T-300 > 60 min Flammability 94V-0 E-24/125+des 94V-0 Electrical Permittivity (RC63%) 1GHz (SPC method) 3.60 5GHz (SPC method) C-24/23/50 N/A 3.58 10GHz (SPC method) 3.57 Loss Tangent (RC63%) 0.0030 1GHz (SPC method) 5GHz (SPC method) 0.0037 C-24/23/50 N/A10GHz (SPC method) 0.0046  $> 10^{10} \,\mathrm{M}\Omega \cdot \mathrm{cm}$ Volume Resistivity C-96/35/90  $> 10^6\,M\Omega\cdot cm$ Surface Resistivity  $> 10^8 \ M\Omega$ C-96/35/90  $> 10^4\,M\Omega$ **Electric Strength** > 40 KV/mm > 30 KV/mm > 40 KV Dielectric Breakdown Voltage > 50 KV Mechanical Young's Modulus Warp Direction 28 GPa N/A Fill Direction 26 GPa Flexural Strength Lengthwise > 60,000 psi > 60,000 psi Crosswise > 50,000 psi Α > 50,000 psi Peel Strength. > 4 lb/in 1.0 oz. Cu foil 4~6 lb/in Α Water Absorption 0.08 % E-1/105+des+D-24/23 < 0.8 %

#### NOTE:

- 1. Property values are for information purposes only and not intended for specification.
- 2. Any sales of these products will be governed by the terms and conditions of the agreement under which they are sold.
- 3. This product is based on a patent pending technology.

