



ThunderClad 3

Core: TU-933

Prepreg: TU-933P

ThunderClad 3 is an advanced material designed for high speed computing, telecommunications, radio frequency super low loss filed applications. ThunderClad 3's electrical performance is competitive with PTFE-based, hydrocarbon-based very low loss materials, but capable for high layer count circuit board design with excellent thermal reliability.

ThunderClad 3 laminates also exhibit excellent moisture resistance, improved CTE, superior chemical resistance, thermal stability, CAF resistance, and also compatible with modified FR-4 processes.

Applications

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

Performance and Processing Advantages

- Excellent electrical and thermal properties
- Dielectric constant is 3.4 @ 10Gz
- Dissipation factor is 0.0025 @ 10Ghz
- Stable and flat Dk/Df performance over frequency and temperature variance.
- Compatible with modified FR-4 processes
- Excellent moisture resistance and Lead Free reflow process compatible
- Improved z-axis thermal expansion
- Superior dimensional stability, thickness uniformity and flatness
- Anti-CAF capability
- Excellent through-hole and soldering reliability

Industry Approvals

- UL File Number: E189572
- ANSI Grade: No-ANSI
- Flammability Rating: 94V-0
- Maximum Operating Temperature: 130°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: 1035, 1078, 2113, 2116 and other prepreg grades are available upon request.





Typical Properties			
	Typical Values	Test Condition	SPEC
Thermal			
Tg (DMA) Tg (TMA) Td (TGA)	220 °C 170 °C 390 °C	E-2/105+des	N/A
CTE z-axis α1 CTE z-axis α2 CTE z-axis	35 ppm/°C 250 ppm/°C 2.7 %	Pre-Tg Post-Tg 50 to 260°C	< 60 ppm/°C < 300 ppm/°C < 3.0%
Thermal Stress, Solder Float, 288°C	> 120 sec	A	> 10 sec
T-260 T-288 T-300	> 60 min > 60 min > 60 min	E-2/105+des	> 30 min > 15 min
Flammability	94V-0	E-24/125+des	94V-0
Electrical			
Permittivity (RC50%) 10 GHz (SPC method)	3.4	C-24/23/50	N/A
Loss Tangent (RC50%) 10 GHz (SPC method)	0.0025	C-24/23/50	N/A
Volume Resistivity	> 10 ¹⁰ MΩ·cm	C-96/35/90	> 10 ⁶ MΩ·cm
Surface Resistivity	> 10 ⁸ MΩ	C-96/35/90	> 10 ⁴ MΩ
Electric Strength	> 40 KV/mm	-	> 30 KV/mm
Dielectric Breakdown Voltage	> 50 KV	-	> 40 KV
Mechanical			
Young's Modulus Warp Direction Fill Direction	24 GPa 22 GPa	A	N/A
Flexural Strength Lengthwise Crosswise	> 60,000 psi > 50,000 psi	A A	> 60,000 psi > 50,000 psi
Peel Strength, 1.0 oz. Cu foil	4~6 lb/in	A	> 4 lb/in
Water Absorption	0.06 %	E-1/105+des+D-24/23	< 0.8 %

NOTE:

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

