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 3.08 @ 10GHz
- Dissipation factor is 0.0020 @ 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

- IPC-4101E Specification Number : /102
- IPC-4101E/102 Validation Services QPL Certified
- UL File Number: E189572
- ANSI Grade: No-ANSI
- Flammability Rating: 94V-0
- Maximum Operating Temperature: 140°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, 2116 and other prepreg grades are available upon request.

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Typical Properties		
	Typical Values	Conditioning
Thermal		
Tg (DMA) Tg (TMA) Td (TGA)	220 °C 170 °C 390 °C	E-2/105
CTE x/y axis CTE z-axis α1 CTE z-axis α2 CTE z-axis	12/13 ppm/°C 35 ppm/°C 240 ppm/°C 2.5 %	Ambient to Tg Pre-Tg Post-Tg 50 to 260°C
Thermal Stress, Solder Float, 288°C	> 120 sec	A
T-260 T-288 T-300	> 60 min > 60 min > 60 min	E-2/105
Flammability	94V-0	E-24/125
Electrical		
Permittivity (RC70%) 10 GHz (SPC method) Impedance simulation DK	 3.08 2.54	E-2/105
Loss Tangent (RC70%) 10 GHz (SPC method)	 0.0020	E-2/105
Volume Resistivity	> 10^{10} MΩ·cm	C-96/35/90
Surface Resistivity	> 10^{8} MΩ	C-96/35/90
Electric Strength	> 40 KV/mm	A
Dielectric Breakdown Voltage	> 50 KV	A
Mechanical		
Young's Modulus Warp Direction Fill Direction	 23 GPa 21 GPa	A
Flexural Strength Lengthwise Crosswise	 > 60,000 psi > 50,000 psi	A
Peel Strength, 1.0 oz. Cu foil	 4~7 lb/in	A
Moisture Absorption	0.06 %	E-1/105 + D-24/23

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.

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