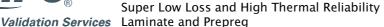
**LISTED** 









Prepreg: TU-933P+



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Core: TU-933+ ThunderClad 3+

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 3.16 @ 10GHz
- Dissipation factor is 0.0021 @ 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**

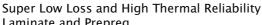
- IPC-4101E Specification Number: /102
- IPC-4101E/102 Validation Services QPL Certified
- UL File Number: E189572
- ANSI Grade: No-ANSI
- Flammability Rating: 94V-0
- Maximum Operating Temperature: 140°C

### 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.



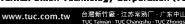
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Validation Services Laminate and Prepreg







Delivering Value through Innovation and Dedication



Lead Free Process Compatible

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	Turical Values	Canditioning
	Typical Values	Conditioning
Thermal		
Γg (DMA)	220 °C	
Гg (TMA)	170 °C	E-2/105
Γd (TGA)	390 ℃	
CTE α1	35 ppm/°C	
CTE α2	240 ppm/°C	E-2/105
CTE z-axis	2.5 %	
Thermal Stress,		
Solder Float, 288°C	> 120 sec	A
Г-260	> 60 min	
Γ–288	> 60 min	E-2/105
Г-300	> 60 min	
Flammability	94V-0	E-24/125
Electrical		
Permittivity (RC64%)		
10 GHz (SPC method)	3.16	E-2/105
Loss Tangent (RC64%)		
10 GHz (SPC method)	0.0021	E-2/105
Volume Resistivity	$> 10^{10}~{ m M}\Omega \cdot { m cm}$	C-96/35/90
Surface Resistivity	$> 10^8~\text{M}\Omega$	C-96/35/90
Electric Strength	> 40 KV/mm	Α
Dielectric Breakdown Voltage	> 50 KV	Α
Mechanical		
Young's Modulus		
Warp Direction	23 GPa	
Fill Direction	21 GPa	Α
Flexural Strength		
Lengthwise	> 60,000 psi	
Crosswise	> 50,000 psi	Α
Peel Strength,		
1.0 oz. Cu foil	4~7 lb/in	А
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.

