



# ThunderClad 2 Sp

Core: TU-883 Sp

Prepreg: TU-883P Sp

ThunderClad 2 Sp ( TU-883 Sp ) is a very low loss category material based on a high performance resin. This material is reinforced with low Dk woven glass fabric and designed with very low dielectric constant and dissipation factor resin system for high speed low loss, radio frequency and wireless applications. ThunderClad 2 Sp material is suitable for environmental protection lead free process and also compatible with FR-4 processes. ThunderClad 2 Sp 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 3.6
- Dissipation factor less than 0.004
- 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

- UL File Number : E1 89572
- 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 3 oz for built-up & double sides
- Prepregs: Available in roll or panel form
- Glass Styles: 106, 1080, 2113, 2116 and other prepreg grades are available upon request





Typical Properties			
	Typical Values	Test Condition	SPEC
<b>Thermal</b>			
Tg (DMA) Tg (TMA) Td (TGA)	220 °C 170 °C 420 °C	E-2/105+des	N/A
CTE α1 CTE α2 CTE z-axis	35 ppm/°C 240 ppm/°C 2.5 %	Ambient to Tg Ambient to Tg 50 to 260°C	< 60 ppm/°C < 300 ppm/°C < 3.0%
Thermal Stress, Solder Float, 288°C	> 60 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
<b>Electrical</b>			
Permittivity (RC65%)  10GHz (SPC method) 20GHz (SPC method)	  3.22 3.18	  C-24/23/50	  N/A
Loss Tangent (RC65%)  10GHz (SPC method) 20GHz (SPC method)	  0.0029 0.0032	  C-24/23/50	  N/A
Volume Resistivity	> 10 <sup>10</sup> MΩ·cm	C-96/35/90	> 10 <sup>6</sup> MΩ·cm
Surface Resistivity	> 10 <sup>8</sup> MΩ	C-96/35/90	> 10 <sup>4</sup> MΩ
Electric Strength	> 40 KV/mm	-	> 30 KV/mm
Dielectric Breakdown Voltage	> 50 KV	-	> 40 KV
<b>Mechanical</b>			
Young's Modulus Warp Direction Fill Direction	28 GPa 26 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. HTE Cu foil	4~6 lb/in	A	> 4 lb/in
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.

