ThunderClad 1+

Core: TU-863+

Prepreg: TU-863P+

ThunderClad 1+ High Tg halogen free low loss material is made of high performance epoxy resin and regular woven E-glass fabric, designed with low dielectric constant and low dissipation factor for high speed low loss and high frequency multilayer circuit board applications. Unlike conventional low loss material using brominated resin as flame retardant. ThunderClad 1+ achieves flammability class of UL94V-0 by incorporating phosphorus and nitrogen compounds in the materials. ThunderClad 1+ material is suitable for environmental protection lead free process and also compatible with FR-4 processes. This green material is designed to achieve thermal robust, low signal attenuation and eliminate the use of potential hazardous halogenated resins.

Applications

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

Performance and Processing Advantages

- Halogen, antimony, and red phosphorous free
- Low Dk & Df performance
- Moisture resistance
- Anti-CAF capability
- Higher Tg characteristics
- Low coefficient of thermal expansion
- Compatible to PCB processes
- Lead free process compatible
- Environmental friendly materials

Industry Approvals

- IPC-4101E Type Designation : /127, /128, /130
- IPC-4101E/130 Validation Services QPL Certified
- UL Designation - ANSI Grade: FR-4.1
- UL File Number: E189572
- 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 and H to 2 oz
- Prepregs: Available in roll or panel form
- Glass Styles: 106, 1080, 3313, 2116 etc and other prepreg grades are available upon request

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Typical Properties

	Typical Values	Conditions
Thermal		
Tg (DMA) Tg (DSC) Tg (TMA) Td (TGA)	210°C 180°C 170°C 375°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 210 ppm/°C 2.2 %	Ambient to Tg Pre-Tg Post-Tg 50 to 260°C
Thermal Stress, Solder Float, 288°C	> 60 sec	A
T260 T288 T300	> 60 min > 60 min > 30 min	E-2/105
Flammability	94V-0	E-24/125
Electrical		
Permittivity (RC70%) 10GHz (SPC method) Impedance simulation DK	 3.45 3.22	E-2/105
Loss Tangent (RC70%) 10GHz (SPC method)	 0.0072	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	
Dielectric Breakdown	> 50 KV	
Mechanical		
Young's Modulus Warp Direction Fill Direction	 26 GPa 24 GPa	 A
Flexural Strength Lengthwise Crosswise	 > 60,000 psi > 50,000 psi	 A A
Peel Strength, 1.0 oz RTF copper foil	 4~7 lb/in	 A
Water Absorption	0.13 %	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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