

Hi-Tg Halogen free Low Loss laminate and prepreg



ThunderClad 1+ FR-15.1

Core: TU-863+ FR-15.1**Prepreg: TU-863P+ FR-15.1**

ThunderClad 1+ FR-15.1 High Tg / MOT150 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 with maximum operation temperature 150°C for high speed low loss, high frequency & thermal robust multilayer circuit board applications. Unlike conventional low loss material using brominated resin as flame retardant. ThunderClad 1+ FR-15.1 achieves flammability class of UL94V-0 by incorporating phosphorus and nitrogen compounds in the materials. ThunderClad 1+ FR-15.1 material is suitable for environmental protection lead free process and also compatible with FR-4 processes. This green material is designed to achieve superior 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
- Lead free process compatible
- Environmental friendly materials
- Compatible to PCB processes
- Low coefficient of thermal expansion
- Moisture resistance
- Anti-CAF capability
- Higher Tg thermal robust characteristics

Industry Approvals

- IPC-4101E Type Designation : /127, /128, /130
- IPC-4101E/130
- UL Designation – ANSI Grade: FR-15.1
- UL File Number: E189572
- Flammability Rating: 94V-0
- Maximum Operating Temperature: 150°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)	210°C	E-2/105
Tg (DSC)	180°C	
Tg (TMA)	170°C	
Td (TGA)	375°C	
CTE x-axis	11~15 ppm/°C	E-2/105
CTE y-axis	11~15 ppm/°C	
CTE z-axis	2.2 %	
Thermal Stress, Solder Float, 288°C	> 60 sec	A
T260	> 60 min	E-2/105
T288	> 60 min	
T300	> 30 min	
Flammability	94V-0	E-24/125
Electrical		
Permittivity (RC50%)		E-2/105
1GHz (SPC method)	4.1	
5GHz (SPC method)	4.1	
10GHz (SPC method)	4.0	
Loss Tangent (RC50%)		E-2/105
1GHz (SPC method)	0.005	
5GHz (SPC method)	0.006	
10GHz (SPC method)	0.007	
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		A
Warp Direction	26 GPa	
Fill Direction	24 GPa	
Flexural Strength		A
Lengthwise	> 60,000 psi	
Crosswise	> 50,000 psi	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

