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 application. Unlike conventional low loss material using brominated resin as flame retardant. ThunderClad 1 achieves flammability class of UL94V-0 by incorporating 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

- Backpanel, 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 characteristics

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 (HTE) for built-up & double sides and H to 2 oz (MLS)
- 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	Conditioning	IPC-4101 /130
Thermal			
Tg (DMA)	210°C		
Tg (DSC)	180°C	E-2/105	> 170°C
Tg (TMA)	170°C		
Td (TGA)	365°C		> 340°C
CTE x-axis	11~15 ppm/°C		N/A
CTE y-axis	11~15 ppm/°C	E-2/105	N/A
CTE z-axis	2.6 %		< 3.0%
Thermal Stress,			
Solder Float, 288°C	> 60 sec	A	> 10 sec
T-260	> 60 min		> 30 min
T-288	> 60 min	E-2/105	> 15 min
T-300	> 30 min		> 2 min
Flammability	94V-0	E-24/125	94V-0
Electrical			
Permittivity (RC50%)			
1GHz (SPC method/HP4291B)	4.1/3.9		
5GHz (SPC method)	4.0	E-2/105	N/A
10GHz (SPC method)	3.9		
Loss Tangent (RC50%)			
1GHz (SPC method/HP4291B)	0.008/0.006		
5GHz (SPC method)	0.009	E-2/105	N/A
10GHz (SPC method)	0.0095		
Volume Resistivity	> 10^{10} MΩ·cm	C-96/35/90	> 10^{6} MΩ·cm
Surface Resistivity	> 10^{8} MΩ	C-96/35/90	> 10^{4} MΩ
Electric Strength	> 40 KV/mm	A	> 30 KV/mm
Dielectric Breakdown	> 50 KV	A	> 40 KV
Mechanical			
Young's Modulus			
Warp Direction	26 GPa	A	N/A
Fill Direction	24 GPa		
Flexural Strength			
Lengthwise	> 60,000 psi	A	> 60,000 psi
Crosswise	> 50,000 psi	A	> 50,000 psi
Peel Strength,			
1.0 oz RTF copper foil	5~7 lb/in	A	> 4 lb/in
Water Absorption	0.13 %	E-1/105+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

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