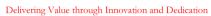


Validation Services Hi-Tg Halogen free Low Loss laminate and prepreg







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ThunderClad 1

Core: TU-863

Prepreg: TU-863P

ThunderClad 1 Hi–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: E189572Flammability 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





Validation Services Hi-Tg Halogen free Low Loss laminate and prepreg





Delivering Value through Innovation and Dedication

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Typical Properties Typical Values Test Condition SPEC Thermal Tg (DMA) 210 °C Tg (DSC) 180 °C E-2/105+des N/A Tg (TMA) 170°C Td (TGA) 365 °C CTE x-axis 11~15 ppm/°C Ambient to Tg N/A CTE y-axis 11~15 ppm/°C Ambient to Tg N/A 50 to 260°C < 3.0% CTE z-axis 2.6 % Thermal Stress, > 10 sec Solder Float, 288°C > 60 sec T-260 > 60 min > 30 min E-2/105+des> 15 min T-288 > 60 min Flammability 94V-0 E-24/125+des 94V-0 Electrical Permittivity (RC50%) 1GHz (SPC method/HP4291B) 4.1/3.9 C-24/23/50 N/A 5GHz (SPC method) 4.0 10GHz (SPC method) 3.9 Loss Tangent (RC50%) 1GHz (SPC method/HP4291B) 0.008/0.006 C-24/23/50 N/A 5GHz (SPC method) 0.009 10GHz (SPC method) 0.0095 $> 10^{10}~M\Omega \cdot cm$ C-96/35/90 Volume Resistivity $> 10^6~M\Omega \cdot cm$ Surface Resistivity $> 10^8 \ M\Omega$ C-96/35/90 $> 10^4 \ M\Omega$ **Electric Strength** > 40 KV/mm > 30 KV/mm > 40 KV Dielectric Breakdown Voltage > 50 KV Mechanical Young's Modulus Warp Direction 26 GPa Α N/A Fill Direction 24 GPa Flexural Strength > 60,000 psi Lengthwise > 60,000 psi Α > 50,000 psi Α Crosswise > 50,000 psi Peel Strength, > 4 lb/in 1.0 oz. Cu foil 5~7 lb/in

NOTE:

Water Absorption

- 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.

0.13 %

3. This product is based on a patent pending technology



E-1/105+des+D-24/23

< 0.8 %