



FR408HR Laminate & Prepreg

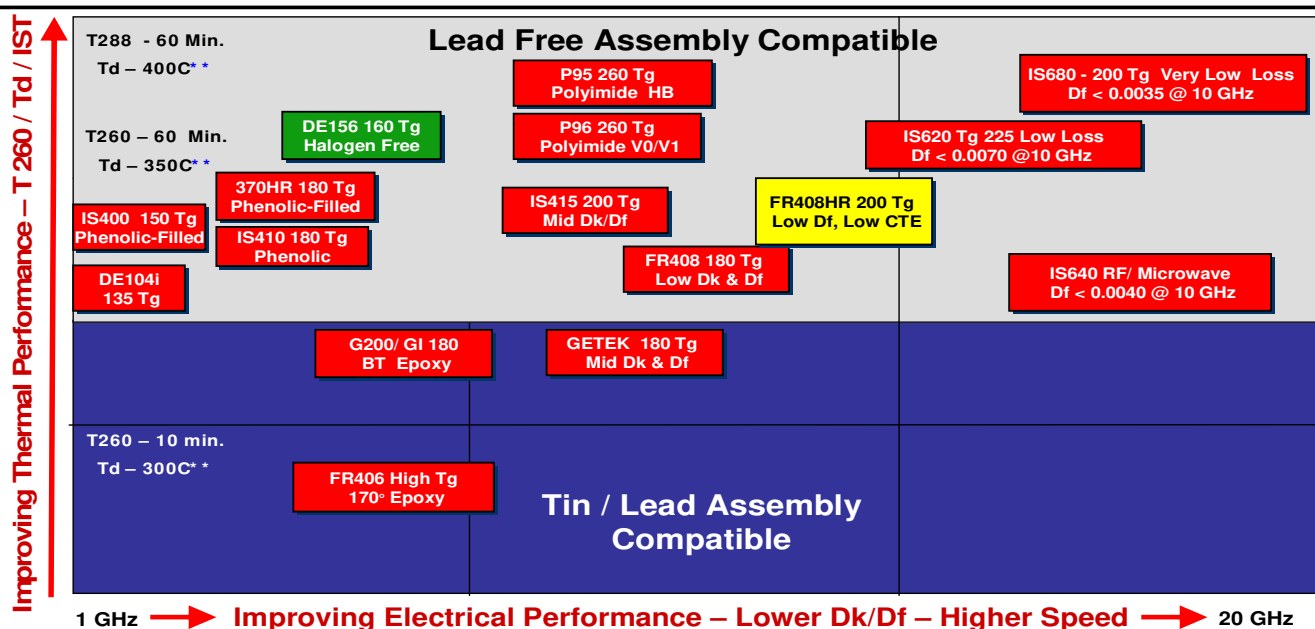
408HR is a proprietary high performance 230°C (DMA) glass transition temperature (Tg) FR-4 system for multilayer printed wiring board (PWB) applications where maximum thermal performance and reliability are required. 408HR laminate and prepreg products are manufactured with Isola's patentable high performance multifunctional resin system, reinforced with electrical grade (E-glass) glass fabric. This system delivers a 30% improvement in Z axis expansion and offers 25% more electrical bandwidth (lower loss) than competitive products in this space. When these properties are coupled with its superior moisture resistance at reflow you have a product that bridges the gap from both a thermal and electrical perspective.

The 408HR system is also laser fluorescing and UV blocking for maximum compatibility with automated optical inspection systems (AOI), optical positioning systems and photoimagable soldermask imaging.

- **High Thermal Performance**
Tg of 200 (DSC), 230°C (DMA)
Low CTE for reliability
- **Lead-free Compatible & RoHS Compliant**
- **UV Blocking and AOI Fluorescence**
High throughput and accuracy during PCB fabrication and assembly
- **Superior Processing**
Closest to conventional FR-4 processing of all high speed materials
- **Industry Approvals**
IPC-4101B /21, /24, /98, /99, /101, /126
UL Recognized – FR-4, File Number E45456
Qualified to UL's MCIL Program
- **Standard Availability**
Thickness: 0.0025" [.05 mm] to 0.093" [2.4 mm]
Available in sheet or panel form
- **Copper Foil Cladding: Grade 3 (HTE), ½, 1 and 2 oz.** Foil Options: Reverse treat
- **Prepregs:** Available in roll or panel form



Isola - Product Position Thermal Performance vs Signal Integrity



Speed is a function of design such as line length etc.

** Laminate Data - IST performance is a function of Hole diameter, board thickness, plating parameters and laminate attributes.

| FR408HR | | | | | |
|---|--|----------------------|------------------|--------------------------|---------|
| Property | Typical Values | | | | |
| | Typical Value | Specification | Units | Test Method | |
| | | | Metric (English) | IPC-TM-650 (or as noted) | |
| Glass Transition Temperature (Tg) by DSC/DMA, spec minimum | 200/230 | 170-200 | °C | 2.4.25 | |
| Decomposition Temperature (Td) @ 5% wt loss | 360 | — | °C | ASTM D3850 | |
| CTE, Z-axis | A. Pre-Tg PCB (.059 laminate) | 55 (<55) | ppm/°C | 2.4.24 | |
| | B. Post-Tg | 230 | | | |
| CTE, X-, Y-axes | A. Pre-Tg | 16 | ppm/°C | 2.4.24 | |
| | B. Post-Tg | 18 | | | |
| % Z-Axis Expansion (50-260C) | 2.8 | — | % | 2.4.24 | |
| Thermal Conductivity | 0.4 | — | W/mK | ASTM D5930 | |
| Thermal Stress 10 Sec @ 288°C (550.4°F), spec min | A. Unetched | pass | Rating | 2.4.13.1 | |
| | B. Etched | pass | | | |
| Permittivity, spec maximum (Laminate & prepreg as laminated) | A. @ 100 MHz HP4285A | 3.72 | — | 2.5.5.3 | |
| | B. @ 1 GHz HP4291A | 3.69 | | 2.5.5.9 | |
| | C. @ 2 GHz Bereskin Stripline | 3.68 | | 2.5.5.5 | |
| | D. @ 5 GHz Bereskin Stripline | 3.64 | | 2.5.5.5 | |
| | E. @ 10 GHz Bereskin Stripline | 3.65 | | 2.5.5.5 | |
| Loss Tangent, spec maximum (Laminate & prepreg as laminated) | A. @ 100 MHz HP4285A | 0.0072 | — | 2.5.5.3 | |
| | B. @ 1 GHz HP4291A | 0.0091 | | 2.5.5.9 | |
| | C. @ 2 GHz Bereskin Stripline | 0.0092 | | 2.5.5.5 | |
| | D. @ 5 GHz Bereskin Stripline | 0.0098 | | 2.5.5.5 | |
| | E. @ 10 GHz Bereskin Stripline | 0.0095 | | 2.5.5.5 | |
| Volume Resistivity, spec minimum | A. 96/35/90 | — | MΩ -cm | 2.5.17.1 | |
| | B. After moisture resistance | 3.81x10 ⁸ | | | |
| | C. At elevated temperature | 2.1 x10 ³ | | | |
| Surface Resistivity, spec minimum | A. 96/35/90 | — | MΩ | 2.5.17.1 | |
| | B. After moisture resistance | 2.6x10 ⁶ | | | |
| | C. At elevated temperature | 2.1x10 ⁸ | | | |
| Dielectric Breakdown, spec minimum | >50 | — | kV | 2.5.6 | |
| Arc Resistance, spec minimum | 137 | 60 | Seconds | 2.5.1 | |
| Electric Strength, spec minimum (Laminate & prepreg as laminated) | 70 | 30 | kV/mm | 2.5.6.2 | |
| | 1741 | 750 | (V/mil) | | |
| Comparative Tracking Index (CTI) | 3 (175 - 249) | - | Class (volts) | UL-746A ASTM D3638 | |
| Peel Strength, Spec Minimum | A. Low profile copper foil and very low profile – all copper weights >17 microns | 6.5(1.14) | 4.0(0.70) | lb/inch(N/mm) | 2.4.8 |
| | B. Standard profile copper | — | — | lb/inch(N/mm) | 2.4.8.2 |
| | 1. After thermal stress | 5.5(0.96) | 4.5(0.8) | | 2.4.8.3 |
| | 2. At 125°C (257°F) | — | 4.0(0.70) | | — |
| | 3. After process solutions | 5.1(0.09) | 3.0(0.55) | — | — |
| Flexural Strength, minimum | A. Lengthwise direction | 67,000 | — | lb/inch ² | 2.4.4 |
| | B. Crosswise direction | 62,000 | — | | |
| Moisture Absorption, spec maximum | 0.24 | — | % | 2.6.2.1 | |
| Flammability (Laminate & prepreg as laminated), spec min | V0 | — | Rating | UL-94 | |
| HWI | — | — | — | — | |
| Max Operating Temperature | 130 (150) | UL Cert (tested) | Deg C | — | |
| DSR | — | — | — | — | |

The data, while believed to be accurate and based on analytical methods considered to be reliable, is for information purposes only. Any sales of these products will be governed by the terms and conditions of the agreement under which they are sold.

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