



## FR408HR

FR408HR 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.

FR408HR laminate and prepreg products are manufactured with Isola's patented 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. These properties coupled with superior moisture resistance at reflow, result in a product that bridges the gap from both a thermal and electrical perspective.

The FR408HR system is also laser fluorescing and UV blocking for maximum compatibility with Automated Optical Inspection (AOI) systems, optical positioning systems and photo-imagable solder mask imaging.

#### ORDERING INFORMATION:

Contact your local sales representative or visit [www.isola-group.com](http://www.isola-group.com) for further information.

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## Performance

**Tg 190°C**

**Td 360°C**

**Dk 3.68**

**Df 0.0092**

**zIPC- 4101C /21 /24 /26 /98 /101 /126**

**UL - File Number E41625**

**Qualified to UL's MCIL Program**

### Product Features

- Industry Recognition
  - UL File Number: E41625
  - Qualified to UL's MCIL Program
  - RoHS Compliant
- Performance Attributes
  - CAF resistant
  - Lead-free assembly compatible
- Processing Advantages
  - FR-4 process compatible
  - UV blocking and AOI fluorescence

### Product Availability

- Standard Material Offering: Laminate
  - 2 to 60 mil (0.5 to 1.5 mm)
  - Available in full size sheet or panel form
- Copper Foil Type
  - HTE Grade 3
  - VLP-2 (2 micron), 1 oz and below
  - RTF (Reverse Treat Foil)
- Copper Weight
  - ½ to 2 oz (18 to 70 µm) available
  - Heavier copper available
  - Thinner copper foil available
- Standard Material Offering: Prepreg
  - Roll or panel form
  - Tooling of prepreg panels
- Glass Fabric Availability
  - E-glass
  - Low Dk glass
  - Square weave glass
  - Mechanically spread glass

# FR408HR Specifications

Property		Typical Value	Units	Test Method
			Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC		190	°C	2.4.25
Decomposition Temperature (Td) by TGA @ 5% weight loss		360	°C	2.4.24.2
Time to Delaminate by TMA (Copper removed)	A. T260 B. T288	60 >30	Minutes	2.4.24.1
Z-Axis CTE	A. Pre-Tg B. Post-Tg C. 50 to 260°C, (Total Expansion)	55 230 2.8	ppm/°C ppm/°C %	2.4.24
X/Y-Axis CTE	Pre-Tg	16	ppm/°C	2.4.24.1
Thermal Conductivity		0.4	W/mK	ASTM E1952
Thermal Stress 10 sec @ 288°C (550.4°F)	A. Unetched B. Etched	Pass	Pass Visual	2.4.13.1
Dk, Permittivity	A. @ 100 MHz B. @ 1 GHz C. @ 2 GHz D. @ 5 GHz E. @ 10 GHz	3.72 3.69 3.68 3.64 3.65	—	2.5.5.3 2.5.5.9 Bereskin Stripline Bereskin Stripline Bereskin Stripline
Df, Loss Tangent	A. @ 100 MHz B. @ 1 GHz C. @ 2 GHz D. @ 5 GHz E. @ 10 GHz	0.0072 0.0091 0.0092 0.0098 0.0095	—	2.5.5.3 2.5.5.9 Bereskin Stripline Bereskin Stripline Bereskin Stripline
Volume Resistivity	A. After moisture resistance B. At elevated temperature	$4.4 \times 10^7$ $9.4 \times 10^7$	MΩ-cm	2.5.17.1
Surface Resistivity	A. After moisture resistance B. At elevated temperature	$2.6 \times 10^6$ $2.1 \times 10^8$	MΩ	2.5.17.1
Dielectric Breakdown		>50	kV	2.5.6
Arc Resistance		137	Seconds	2.5.1
Electric Strength (Laminate & laminated prepreg)		70 (1741)	kV/mm (V/mil)	2.5.6.2
Comparative Tracking Index (CTI)		3 (175-249)	Class (Volts)	UL 746A ASTM D3638
Peel Strength	A. Low profile copper foil and very low profile copper foil all copper foil >17 μm [0.669 mil] B. Standard profile copper 1. After thermal stress 2. After process solutions	1.14 (6.5) 0.96 (5.5) 0.90 (5.1)	N/mm (lb/inch)	2.4.8 2.4.8.2 2.4.8.3
Flexural Strength	A. Length direction B. Cross direction	72,500 58,000	lb/inch <sup>2</sup>	2.4.4
Tensile Strength	A. Length direction B. Cross direction	54,525 38,678	lb/inch <sup>2</sup>	ASTM D3039
Poisson's Ratio	A. Length direction B. Cross direction	0.137 0.133	—	ASTM D3039
Moisture Absorption		0.061	%	2.6.2.1
Flammability (Laminate & laminated prepreg)		V-0	Rating	UL 94
Max Operating Temperature		130	°C	UL 796

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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