FR408HR

Lead Free, Mid Loss Laminate and Prepreg

Tg 190°C Td 360°C Dk 3.68 Df 0.0092

IPC-4101 /98 /99 /101 /126 **UL - File Number E41625**

FR408HR is a high-performance FR-4 resin system with a 230°C (DMA) Tg for multilayer PCB applications where maximum thermal performance and reliability are required.

PRODUCT FEATURES

Industry Recognition

- RoHS Compliant

Performance Attributes

- CAF resistant
- Lead-free assembly compatible
- 6x 260°C reflow capable
- 6x 288°C solder float capable

Processing Advantages

- FR-4 process compatible
- Via filling capability
- Multiple lamination cycles

PRODUCT AVAILABILITY

Standard Material Offering: Laminate

- 2 to 30 mil (0,05 to 0.75 mm)

Copper Foil Type

- HTE Grade 3
- RTF (Reverse Treat Foil)
- Embedded resistor foil

Copper Weight

- ½, 1 and 2 oz (18, 35 and 70 µm) available
- Heavier copper foil available
- Thinner copper foil available

Standard Material Offering: Prepreg

- Tooling of prepreg panels

Glass Fabric Availability

- E-glass
- Square weave glass
- Mechanically spread glass

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.

PRODUCT ATTRIBUTES

HIGH DENSITY INTERCONNECT

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HIGH THERMAL RELIABILITY

TYPICAL MARKET APPLICATIONS

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ORDERING INFORMATION:

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Typical Values Table

Property		Typical Value	Units	Test Method
			Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC		190	°C	2.4.25C
Decomposition Temperature (Td) by TGA @ 5% weight loss		360	°C	2.4.24.6
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 %	2.4.24C
X/Y-Axis CTE	Pre-Tg	16	ppm/°C	2.4.24C
Thermal Conductivity		0.4	W/m·K	ASTM E1952
Thermal Stress 10 sec @ 288ºC (550.4ºF)	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	4.4×10^7 9.4×10^7	MΩ-cm	2.5.17.1
Surface Resistivity	A. After moisture resistance B. At elevated temperature	2.6×10^6 2.1×10^8	MΩ	2.5.17.1
Dielectric Breakdown		>50	kV	2.5.6B
Arc Resistance		137	Seconds	2.5.1B
Electric Strength (Laminate & laminated prepreg)		70 (1741)	kV/mm (V/mil)	2.5.6.2A
Comparative Tracking Index (CTI)		2 (250-399)	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)	2.4.8C 2.4.8.2A 2.4.8.3
Flexural Strength	A. Length direction B. Cross direction	500 (72.5) 400 (58.0)	MPa (kpsi)	2.4.4B
Tensile Strength	A. Length direction B. Cross direction	376 (54.5) 267 (38.7)	MPa (kpsi)	ASTM D3039
Young's Modulus	A. Length direction B. Cross direction	3695 3315	ksi	ASTM D790-15e2
Poisson's Ratio	A. Length direction B. Cross direction	0.137 0.133	—	ASTM D3039
Moisture Absorption		0.061	%	2.6.2.1A
Flammability (Laminate & laminated prepreg)		V-0	Rating	UL 94
Relative Thermal Index (RTI)		130	°C	UL 796

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NOTES

Visit our site http://www.isola-group.com for more details.
Revisions:
A: Initial release - 4/17
B: Corrected units for Flexural and Tensile Strength - 8/18
C: Removed Low Dk Glass Option - 10/18
D: Change MOT to RTI - 5/19
E: Revised CTI to 2 - 1/21
F: Removed "0.8 mm pitch" feature seen as limitation versus capability - 6/24

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