



FR408HR High Performance Laminate and Prepreg

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 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. 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 photoimagable solder mask imaging.

For low Dk glass styles, consider the FR408HRIS.

www.isola-group.com/products/FR408HR

ORDERING INFORMATION:

Contact your local sales representative or visit www.isola-group.com for further information.

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High Performance

FR408HR

Data Sheet

Tg 190, Td 360
Dk 3.68, Df 0.0092
/21 /24 /26 /121 /124
/129

Features

- High Thermal Performance
 - ▶ Tg: 190°C (DSC), 230°C (DMA) (Base Laminate)
 - ▶ Td: 360°C (TGA @ 5% wt loss)
 - ▶ Low CTE for reliability
- T260: 60 minutes
- T288: >30 minutes
- Lead-free Compatible and 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
- Core Material Standard Availability
 - ▶ Thickness: 0.002" (0.05 mm) to 0.059" (1.5 mm)
 - ▶ Available in full size sheet or panel form
- Prepreg Standard Availability
 - ▶ Roll or panel form
 - ▶ Tooling of prepreg panels available
- Copper Foil Type Availability
 - ▶ Standard HTE Grade 3
 - ▶ RTF (Reverse Treat Foil)
 - ▶ VLP-2 (2 micron)
- Copper Weights
 - ▶ ½, 1 and 2 oz (18, 35 and 70 µm) available
 - ▶ Heavier copper available upon request
 - ▶ Thinner copper foil available upon request
- Glass Fabric Availability
 - ▶ Standard E-glass
 - ▶ Square weave glass fabric available
- Industry Approvals
 - ▶ IPC-4101C /21 /24 /26 /121 /124 /129
 - ▶ UL - File Number E41625
 - ▶ Qualified to UL's MCIL Program

FR408HR Specifications

Property		Typical Values			
				Units	Test Method
		Typical Value	Specification	Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC		190	170-200	°C	2.4.25
Decomposition Temperature (Td) by TGA @ 5% weight loss		360	–	°C	ASTM D3850
T260		60	–	Minutes	ASTM D3850
T288		>30	–	Minutes	ASTM D3850
CTE, Z-axis	A. Pre-Tg	55	AABUS	ppm/°C	2.4.24
	B. Post-Tg	230	–		
CTE, X-, Y-axes	A. Pre-Tg	16	AABUS	ppm/°C	2.4.24
	B. Post-Tg	18	–		
Z-axis Expansion (50-260°C)		2.8	–	%	2.4.24
Thermal Conductivity		0.4	–	W/mK	ASTM D5930
Thermal Stress 10 sec @ 288°C (550.4°F)	A. Unetched	Pass	Pass Visual	Rating	2.4.13.1
	B. Etched				
Dk, Permittivity (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 100 MHz (HP4285A)	3.72	5.4	–	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
Df, Loss Tangent (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 100 MHz (HP4285A)	0.0072	0.035	–	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	A. 96/35/90	–	1.0x10 ⁶	MΩ-cm	2.5.17.1
	B. After moisture resistance	4.4x10 ⁷	–		
	C. At elevated temperature	9.4x10 ⁷	1.0x10 ³		
Surface Resistivity	A. 96/35/90	–	1.0x10 ⁴	MΩ	2.5.17.1
	B. After moisture resistance	2.6x10 ⁶	–		
	C. At elevated temperature	2.1x10 ⁸	1.0x10 ³		
Dielectric Breakdown		>50	–	kV	2.5.6
Arc Resistance		137	60	Seconds	2.5.1
Electric Strength (Laminate & prepreg as laminated)		70 (1741)	30 (750)	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 – all copper weights >17 microns	1.14 (6.5)	0.70 (4.0)	N/mm (lb/inch)	2.4.8
	B. Standard profile copper	–	–		2.4.8.2
	1. After thermal stress	0.96 (5.5)	0.80 (4.5)		2.4.8.3
	2. At 125°C (257°F)	–	0.70 (4.0)		–
	3. After process solutions	0.90 (5.1)	0.55 (3.0)	–	–
Flexural Strength	A. Lengthwise direction	72,500	–	lb/inch ²	2.4.4
	B. Crosswise direction	58,000			
Tensile Strength	A. Lengthwise direction	54,525	–	lb/inch ²	–
	B. Crosswise direction	38,678			
Young's Modulus	A. Grain direction	3695	–	ksi	ww
	B. Fill direction	3315			
Poisson's Ratio	A. Grain direction	0.137	–	–	xx
	B. Fill direction	0.133			
Moisture Absorption		0.061	–	%	2.6.2.1
Flammability (Laminate & prepreg as laminated)		V-0	–	Rating	UL 94
Max Operating Temperature		130	UL Cert	°C	–

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.

www.isola-group.com/products/FR408HR

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