High Performance

FR408HR

Data Sheet

Tg 190, Td 360
Dk 3.68, Df 0.0092
/98 /99/ 101 /126

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 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.

FR408HR IS is a product extension of FR408HR, manufactured with Isola's patentable high performance multifunctional resin system, reinforced with electrical grade (low Dk) glass fabric. The low Dk glass significantly reduces the Dk of the material to 3.39, allowing increased trace widths and also reduces skew caused by Dk differences between the glass and resin.

This material is also available as FR408HR BC with buried capacitance technology, which allows for a very thin dielectric layer that provides distributive decoupling capacitance and takes the place of conventional discrete capacitors. Unlike standard laminates, special copper foils and foil orientation are required to ensure uniform capacitance and electrical integrity.

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

www.isola-group.com/products/FR408HR

ORDERING INFORMATION:

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

Isola Group
3100 West Ray Road
Suite 301
Chandler, AZ 85226
Phone: 480-893-6527
Fax: 480-893-1409
info@isola-group.com

Isola Asia Pacific (Hong Kong) Ltd.
Unit 3512 - 3522, 35/F
No. 1 Hung To Road, Kwun Tong,
Kowloon, Hong Kong
Phone: 852-2418-1318
Fax: 852-2418-1533
info.hkg@isola-group.com

Isola GmbH
Isola Strasse 2
D-52348 Düren, Germany
Phone: 49-2421-8080
Fax: 49-2421-808164
info-dur@isola-group.com

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
- 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
  - Low Dk glass fabric available
  - Square weave glass fabric available
- Industry Approvals
  - IPC-4101D WAM1 /98 /99/ 101 /126 (IPC-4101C /21 /24 /26 /121 /124 /126)
  - UL - File Number E41625
  - Qualified to UL's MCIL Program

FR408HR Typical Values

Property		Typical Values		
			Units	Test Method
		Typical Value	Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC		190	ºC	2.4.25
Decomposition Temperature (Td) by TGA @ 5% weight loss		360	ºC	ASTM D3850
T260		60	Minutes	ASTM D3850
T288		>30	Minutes	ASTM D3850
CTE, Z-axis	A. Pre-Tg B. Post-Tg	55 230	ppm/ºC	2.4.24
CTE, X-, Y-axes	A. Pre-Tg B. Post-Tg	16 18	ppm/ºC	2.4.24
Z-axis Expansion (50-260ºC)		2.8	%	2.4.24
Thermal Conductivity		0.4	W/mK	ASTM D5930
Thermal Stress 10 sec @ 288ºC (550.4ºF)	A. Unetched B. Etched	Pass	Rating	2.4.13.1
Dk, Permittivity (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 1 GHz (HP4291A) B. @ 2 GHz (Bereskin Stripline) C. @ 5 GHz (Bereskin Stripline) D. @ 10 GHz (Bereskin Stripline)	3.69 3.68 3.64 3.65	–	2.5.5.9 2.5.5.5 2.5.5.5 2.5.5.5
Df, Loss Tangent (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 1 GHz (HP4291A) B. @ 2 GHz (Bereskin Stripline) C. @ 5 GHz (Bereskin Stripline) D. @ 10 GHz (Bereskin Stripline)	0.0091 0.0092 0.0098 0.0095	–	2.5.5.9 2.5.5.5 2.5.5.5 2.5.5.5
FR408HR IS Dk, Permittivity (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 2 GHz (Bereskin Stripline) B. @ 5 GHz (Bereskin Stripline) C. @ 10 GHz (Bereskin Stripline)	3.39 3.38 3.37	–	2.5.5.5
FR408HR IS Df, Loss Tangent (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 2 GHz (Bereskin Stripline) B. @ 5 GHz (Bereskin Stripline) C. @ 10 GHz (Bereskin Stripline)	0.0088 0.0094 0.0092	–	2.5.5.5
Volume Resistivity	A. 96/35/90 B. After moisture resistance C. At elevated temperature	– $4.4x10^7$ $9.4x10^7$	MΩ-cm	2.5.17.1
Surface Resistivity	A. 96/35/90 B. After moisture resistance C. At elevated temperature	– $2.6x10^6$ $2.1x10^8$	MΩ	2.5.17.1
Dielectric Breakdown		>50	kV	2.5.6
Arc Resistance		137	Seconds	2.5.1
Electric Strength (Laminate & prepreg as laminated)		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 – all copper weights >17 microns B. Standard profile copper 1. After thermal stress 2. At 125ºC (257ºF) 3. 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. Lengthwise direction B. Crosswise direction	72,500 58,000	$lb/inch^2$	2.4.4
Tensile Strength	A. Lengthwise direction B. Crosswise direction	54,525 38,678	$lb/inch^2$	–
Young's Modulus	A. Grain direction B. Fill direction	3695 3315	ksi	ASTM D790-15e2
Poisson's Ratio	A. Grain direction B. Fill direction	0.137 0.133	–	ASTM D3039-95a
Moisture Absorption		0.061	%	2.6.2.1
Flammability (Laminate & prepreg as laminated)		V-0	Rating	UL 94
Max Operating Temperature		130	ºC	–

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

isola

03/17 DSFR408HRI