



**FR408HR** Laminate & Prepreg

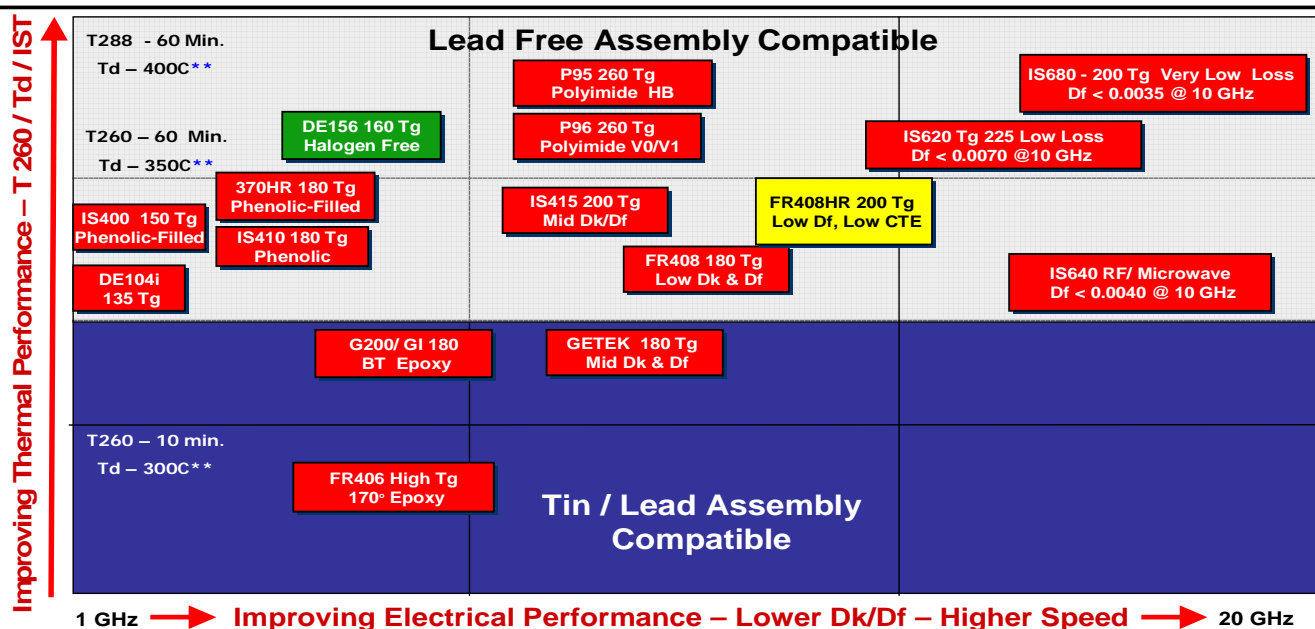
408HR is a proprietary high performance 230°C (DMA) glass transition temperature (Tg) FR-4 system for multilayer printed wiring board (PWB) applications where maximum thermal performance and reliability are required. 408HR laminate and prepreg products are manufactured with Isola's patentable high performance 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 photoimageable 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, /121, /124, /129  
UL Recognized – FR-4, File Number E41625  
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	4.4x10 <sup>7</sup>			
	C. At elevated temperature	9.4 x10 <sup>7</sup>			
Surface Resistivity, spec minimum	A. 96/35/90	—	MΩ	2.5.17.1	
	B. After moisture resistance	2.6x10 <sup>6</sup>			
	C. At elevated temperature	2.1x10 <sup>8</sup>			
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 <sup>2</sup>	2.4.4
	B. Crosswise direction	62,000	—		
Moisture Absorption, spec maximum	0.061	—	%	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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