



FR408

High Performance Laminate and Prepreg

FR408 is a high-performance FR-4 epoxy laminate and prepreg system designed for advanced circuitry applications.

Its low dielectric constant (Dk) and low dissipation factor (Df) make it an ideal candidate for broadband circuit designs requiring faster signal speeds or improved signal integrity. FR408 is compatible with most FR-4 processes. This feature allows the use of FR408 without adding complexity to current fabrication techniques.

Product Attributes

Legacy Materials

Typical Market Applications

Aerospace & Defense , Computing, Storage & Peripherals , Networking & Communication Systems , Medical, Industrial & Instrumentation

ORDERING INFORMATION:

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Data Sheet

Tg 180°C
Td 360°C
Dk 3.67
Df 0.0120

IPC-4101 - / 24 / 121 / 124

UL - File Number E41625

Last Updated June 22, 2020
Revision No: C

Product Features

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

Product Availability

- Standard Material Offering: Laminate
 - 2 to 125 mil (0.05 to 3.2 mm)
 - Available in full size sheet or panel form
- Copper Foil Type
 - HTE Grade 3
 - 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
 - Square weave glass

FR408 Typical Values

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Property	Typical Value	Units	Test Method
		Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC	180	°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 15	Minutes 2.4.24.1
Z-Axis CTE	A. Pre-Tg B. Post-Tg C. 50 to 260°C, (Total Expansion)	60 228 3.5	ppm/°C ppm/°C % 2.4.24C
X/Y-Axis CTE	Pre-Tg	13	ppm/°C 2.4.24C
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	3.69 3.66 3.67 3.66 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	0.0094 0.0117 0.0120 0.0127 0.0125	— 2.5.5.3 2.5.5.9 Bereskin Stripline Bereskin Stripline Bereskin Stripline
Volume Resistivity	A. After moisture resistance B. At elevated temperature	4.6 x 10 ⁷ 2.8 x 10 ⁸	MΩ-cm 2.5.17.1
Surface Resistivity	A. After moisture resistance B. At elevated temperature	2.81 x 10 ⁶ 2.64 x 10 ⁸	MΩ 2.5.17.1
Dielectric Breakdown		>50	kV 2.5.6B
Arc Resistance		120	Seconds 2.5.1B
Electric Strength (Laminate & laminated prepreg)		55 (1400)	kV/mm (V/mil) 2.5.6.2A
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. At 125°C (257°F) 3. After process solutions	1.14 (6.5) 1.225 (7.0) 1.14 (6.5) 0.90 (5.1)	N/mm (lb/inch) 2.4.8C 2.4.8.2A 2.4.8.3 2.4.8.3
Flexural Strength	A. Length direction B. Cross direction	81.4 64.1	ksi 2.4.4B
Tensile Strength	A. Length direction B. Cross direction	59.3 42.0	ksi ASTM D3039
Young's Modulus	A. Length direction B. Cross direction	3685 3044	ksi ASTM D790-15e2
Poisson's Ratio	A. Length direction B. Cross direction	0.162 0.138	— ASTM D3039
Moisture Absorption		0.15	% 2.6.2.1A
Flammability (Laminate & laminated prepreg)		V-0	Rating UL 94
Relative Thermal Index (RTI)		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.

<https://www.isola-group.com/products/all-printed-circuit-materials/fr408/>

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Revisions:

A: Initial release - 4/17

B: Corrected units for Flexural and Tensile Strength - 8/18

C: Change MOT to RTI 5/19