



FR406

High Performance Epoxy Laminate and Prepreg

FR406 sets the industry standard for high performance epoxy materials.

This product is engineered to meet the demands of the multilayer printed circuit board industry, while maintaining standard FR-4 processing. FR406 offers improved dimensional control, superior chemical and thermal performance and product consistency.

Product Attributes

Legacy Materials

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Data Sheet

Tg 170°C

Td 300°C

Dk 3.93

Df 0.0167

IPC-4101/21 /24 /26

UL - File Number E41625

Last Updated December 7, 2017
Revision No: 9

Product Features

Product Availability

FR406 Typical Values

Last Updated Dec 7, 2017

Property	Typical Value	Units		Test Method
		Metric (English)	IPC-TM-650 (or as noted)	
Glass Transition Temperature (Tg) by DSC	170	°C	2.4.25C	
Decomposition Temperature (Td) by TGA @ 5% weight loss	300	°C	2.4.24.6	
Time to Delaminate by TMA (Copper removed)	A. T260 B. T288	10 >2	Minutes	2.4.24.1
Z-Axis CTE	A. Pre-Tg B. Post-Tg C. 50 to 260°C, (Total Expansion)	60 250 3.5	ppm/°C ppm/°C %	2.4.24C
X/Y-Axis CTE	Pre-Tg	13	ppm/°C	2.4.24C
Thermal Conductivity		0.3-0.4	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	4.00	—	2.5.5.3
	B. @ 1 GHz	3.95		2.5.5.9
	C. @ 2 GHz	3.93		2.5.5.5
	D. @ 5 GHz	3.92		2.5.5.5
	E. @ 10 GHz	3.92		2.5.5.5
Df, Loss Tangent	A. @ 100 MHz	0.0130	—	2.5.5.3
	B. @ 1 GHz	0.0161		2.5.5.9
	C. @ 2 GHz	0.0167		2.5.5.5
	D. @ 5 GHz	0.0172		2.5.5.5
	E. @ 10 GHz	0.0172		2.5.5.5
Volume Resistivity	A. C-96/35/90 B. After moisture resistance C. At elevated temperature	9.0 x 10 ⁷ — 3.0 x 10 ⁷	MQ-cm	2.5.17.1
Surface Resistivity	A. C-96/35/90 B. After moisture resistance C. At elevated temperature	3.0 x 10 ⁸ — 8.0 x 10 ⁸	MQ	2.5.17.1
Dielectric Breakdown		>50	kV	2.5.6B
Arc Resistance		90	Seconds	2.5.1B
Electric Strength (Laminate & laminated prepreg)		44 (1100)	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	1.19 (7.0)	N/mm (lb/inch)	2.4.8C
		1.60 (9.0)		2.4.8.2A
		1.19 (7.0)		2.4.8.3
		1.60 (9.0)		2.4.8.3
Flexural Strength	A. Length direction B. Cross direction	93,700 78,200	ksi	2.4.4B
Tensile Strength	A. Length direction B. Cross direction	62,950 47,680	ksi	ASTM D3039
Young's Modulus	A. Length direction B. Cross direction	3684 3116	ksi	ASTM D790-15e2
Poisson's Ratio	A. Length direction B. Cross direction	0.191 0.154	—	ASTM D3039
Moisture Absorption		0.2	%	2.6.2.1A
Flammability (Laminate & laminated prepreg)		V-0	Rating	UL 94
Max Operating Temperature		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.

