



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.

www.isola-group.com/products/FR406

ORDERING INFORMATION:

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

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High Performance

FR406 Data Sheet

T_g 170, T_d 300
Dk 3.93, Df 0.0167
/21 /24 /26

Features

- High Thermal Performance
 - ▶ T_g: 170°C (DSC)
 - ▶ T_d: 300°C (TGA @ 5% wt loss)
 - ▶ Superior chemical and thermal resistance
 - ▶ Lower CTE from ambient to 288°C
- T260: 10 minutes
- T288: >2 minutes
- RoHS Compliant
- UV Blocking and AOI Compatible
 - ▶ UV blocking and enhanced fluorescence
 - ▶ Compatible with all AOI equipment, including laser-enhanced reflectance systems
- Standard FR-4 Processing
 - ▶ No post bake after pressing
 - ▶ Drilling parameters and hole wall preparation are standard
- Core Material Standard Availability
 - ▶ Thickness: 0.002" (0.05 mm) to 0.125" (3.2 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)
- 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-4101D WAM1 /21 /24 /26
 - ▶ UL - File Number E41625

FR406 Specifications

Property	Typical Values				
			Units	Test Method	
	Typical Value	Specification	Metric (English)	IPC-TM-650 (or as noted)	
Glass Transition Temperature (Tg) by DSC	170	110-170	°C	2.4.25	
Decomposition Temperature (Td) by TGA @ 5% weight loss	300	–	°C	ASTM D3850	
T260	10	–	Minutes	2.4.25	
T288	>2	–	Minutes	2.4.25	
CTE, Z-axis	A. Pre-Tg	60	AABUS	ppm/°C	2.4.24
	B. Post-Tg	250	–		
CTE, X-, Y-axes	A. Pre-Tg	13	AABUS	ppm/°C	2.4.24
	B. Post-Tg	14	–		
Z-axis Expansion (50-260°C)	3.5	–	%	2.4.24	
Thermal Conductivity	0.3-0.4	–	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 50% resin	A. @ 100 MHz (HP4285A)	4.00	5.4	–	2.5.5.3
	B. @ 1 GHz (HP4291A)	3.95	–		2.5.5.9
	C. @ 2 GHz (Bereskin Stripline)	3.93	–		2.5.5.5
	D. @ 5 GHz (Bereskin Stripline)	3.92	–		2.5.5.5
	E. @ 10 GHz (Bereskin Stripline)	3.92	–		2.5.5.5
Df, Loss Tangent (Laminate & prepreg as laminated) Tested at 50% resin	A. @ 100 MHz (HP4285A)	0.0130	0.035	–	2.5.5.3
	B. @ 1 GHz (HP4291A)	0.0161	–		2.5.5.9
	C. @ 2 GHz (Bereskin Stripline)	0.0167	–		2.5.5.5
	D. @ 5 GHz (Bereskin Stripline)	0.0172	–		2.5.5.5
	E. @ 10 GHz (Bereskin Stripline)	0.0172	–		2.5.5.5
Volume Resistivity	A. 96/35/90	9.0x10 ⁷	1.0x10 ⁶	MΩ-cm	2.5.17.1
	B. After moisture resistance	–	–		
	C. At elevated temperature	3.0x10 ⁷	1.0x10 ³		
Surface Resistivity	A. 96/35/90	3.0x10 ⁸	1.0x10 ⁴	MΩ	2.5.17.1
	B. After moisture resistance	–	–		
	C. At elevated temperature	8.0x10 ⁸	1.0x10 ³		
Dielectric Breakdown	>50	40	kV	2.5.6	
Arc Resistance	90	60	Seconds	2.5.1	
Electric Strength (Laminate & prepreg as laminated)	44 (1100)	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	1.19 (7.0)	0.70 (4.0)	N/mm (lb/inch)	2.4.8
	B. Standard profile copper	1.60 (9.0)	–		2.4.8.2
	1. After thermal stress	1.19 (7.0)	0.80 (4.5)		2.4.8.3
	2. At 125°C (257°F)	1.19 (7.0)	0.70 (4.0)		–
	3. After process solutions	1.60 (9.0)	0.55 (3.0)	–	
Flexural Strength	A. Lengthwise direction	93,700	–	lb/inch ²	2.4.4
	B. Crosswise direction	78,200	–		
Tensile Strength	A. Lengthwise direction	62,950	–	lb/inch ²	–
	B. Crosswise direction	47,680	–		
Young's Modulus	A. Grain direction	3684	–	ksi	ww
	B. Fill direction	3116	–		
Poisson's Ratio	A. Grain direction	0.191	–	–	xx
	B. Fill direction	0.154	–		
Moisture Absorption	0.2	–	%	2.6.2.1	
Flammability (Laminate & prepreg as laminated)	V-0	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.

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