

IPC-4101 /21 UL - File Number E41625

FR402 consists of a modified tetrafunctional epoxy resin system engineered for multilayer applications that require performance characteristics exceeding those of difunctional epoxies.

PRODUCT FEATURES

Industry Recognition

- UL File Number: E41625
- RoHS Compliant

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)

Copper Foil Type

- HTE Grade 3

Copper Weight

- ½, 1 and 2 oz (18, 35 and 70 µm) 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
- Mechanically spread glass

The formulation of FR402 is designed to enhance throughput and accuracy of laser based Automated Optical Inspection (AOI) equipment. FR402 offers superior resistance to chemical and thermal degradation.

PRODUCT ATTRIBUTES



ORDERING INFORMATION:

Contact your local sales representative or contact info@isola-group.com for further information.

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Typical Values Table

Property		Typical Value	Units	Test Method
			Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC		140	°C	2.4.25C
Decomposition Temperature (Td) by TGA @ 5% weight loss		315	°C	2.4.24.6
Time to Delaminate by TMA (Copper removed)	A. T260 B. T288	30 >5	Minutes	2.4.24.1
Z-Axis CTE	A. Pre-Tg B. Post-Tg C. 50 to 260°C, (Total Expansion)	50 250 4.2	ppm/°C ppm/°C %	2.4.24C
X/Y-Axis CTE	Pre-Tg	15	ppm/°C	2.4.24C
Thermal Conductivity		.36	W/m·K	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. @ 500 MHz C. @ 1 GHz	4.60 4.27 4.25	—	2.5.5.3 2.5.5.9 2.5.5.5
Df, Loss Tangent	A. @ 100 MHz B. @ 500 MHz	0.016 0.015	—	2.5.5.3 2.5.5.9
Dk, Permittivity	@ 1 GHz	0.015	—	2.5.5.5
Volume Resistivity	A. C-96/35/90 B. After moisture resistance C. At elevated temperature	4.0×10^8 — 7.0×10^7	MΩ·cm	2.5.17.1
Surface Resistivity	A. C-96/35/90 B. After moisture resistance C. At elevated temperature	3.0×10^6 — 6.0×10^6	MΩ	2.5.17.1
Dielectric Breakdown		>50	kV	2.5.6B
Arc Resistance		120	Seconds	2.5.1B
Electric Strength (Laminate & laminated prepreg)		29 (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]	1.05 (8.0)	N/mm (lb/inch)	2.4.8C
	B. Standard profile copper	1.45 (9.0)		2.4.8.2A
	1. After thermal stress	1.25 (8.0)		2.4.8.3
	2. At 125°C (257°F)	1.45 (9.0)		2.4.8.3
Flexural Strength	A. Length direction	634 (92.0)	MPa (kpsi)	2.4.4B
	B. Cross direction	430 (62.3)		
Tensile Strength	A. Length direction	414 (60.0)	MPa (kpsi)	ASTM D3039
	B. Cross direction	298 (43.2)		
Young's Modulus	A. Length direction	3500	ksi	ASTM D790-15e2
	B. Cross direction	3000		
Moisture Absorption		0.3	%	2.6.2.1A
Flammability (Laminate & laminated prepreg)		V-0	Rating	UL 94
Relative Thermal Index (RTI)		130	°C	UL 796

NOTES

Visit our site <http://www.isola-group.com> for more details.

Revisions:

A: Initial release - 4/17

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

C: Change MOT to RTI 5/19

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