I-Speed®

Low Loss, Epoxy Laminate and Prepreg

Tg 180°C Td 360°C Dk 3.63 Df 0.0060

IPC-4101 /98 /99 /101 /126 **UL - File Number E41625**

I-Speed® is a 180°C Tg FR-4 resin system for multilayer PWB applications where maximum thermal performance and reliability are required.

PRODUCT FEATURES

Industry Recognition

- UL File Number: E41625
- Qualified to UL's MCIL Program
- RoHS Compliant

Performance Attributes

- Lead-free assembly compatible

Processing Advantages

- FR-4 process compatible
- UV blocking and AOI fluorescence
- Multiple lamination cycles
- HDI technology compatible

PRODUCT AVAILABILITY

Standard Material Offering: Laminate

- 2 to 28 mil (0.05 to 0.71 mm)

Copper Foil Type

- HTE Grade 3
- HVLP (VLP2) ≤2.5 micron Rz JIS
- RTF (Reverse Treat Foil)
- Embedded resistor foil

Copper Weight

- ½, 1 and 2 oz (18, 35 and 70 µm) available
- Heavier copper foil available
- Thinner copper foil available

Standard Material Offering: Prepreg

- Tooling of prepreg panels
- Moisture barrier packaging

Glass Fabric Availability

- E-glass
- Square weave glass
- Mechanically spread glass

I-Speed® laminate and prepreg products are manufactured with Isolas' patentable high performance multi-functional resin system, reinforced with electrical grade (E-glass) glass fabric. This system delivers a 15% improvement in Z-axis expansion and offers 25% more electrical bandwidth (lower loss) than competitive products in this space. These properties coupled with superior moisture resistance at reflow, result in a product that bridges the gap from both a thermal and electrical perspective.

The I-Speed® resin system is laser fluorescing and UV blocking for maximum compatibility with Automated Optical Inspection (AOI) systems, optical positioning systems and photo imagable solder mask imaging.

PRODUCT ATTRIBUTES

HIGH DENSITY INTERCONNECT

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HIGH THERMAL RELIABILITY

TYPICAL MARKET APPLICATIONS

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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		180	°C	2.4.25C
Glass Transition Temperature (Tg) by DMA		195	°C	2.4.24.4
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	Minutes	2.4.24.1
Z-Axis CTE	A. Pre-Tg B. Post-Tg C. 50 to 260°C, (Total Expansion)	45 230 2.5	ppm/°C ppm/°C %	2.4.24C
X/Y-Axis CTE	Pre-Tg	16	ppm/°C	2.4.24C
Thermal Conductivity		0.4	W/m·K	ASTM E1952
Thermal Stress 10 sec @ 288ºC (550.4ºF)	A. Unetched B. Etched	Pass	Pass Visual	2.4.13.1
Dk, Permittivity	A. @ 1 GHz B. @ 2 GHz C. @ 5 GHz D. @ 10 GHz	3.65 3.64 3.63 3.63	—	2.5.5.9 Bereskin Stripline Bereskin Stripline Bereskin Stripline
Df, Loss Tangent	A. @ 1 GHz B. @ 2 GHz C. @ 5 GHz D. @ 10 GHz	0.0057 0.0059 0.0059 0.0060	—	2.5.5.9 Bereskin Stripline Bereskin Stripline Bereskin Stripline
Volume Resistivity	A. After moisture resistance B. At elevated temperature	4.4×10^7 9.4×10^7	MΩ-cm	2.5.17.1
Surface Resistivity	A. After moisture resistance B. At elevated temperature	2.6×10^6 2.1×10^8	MΩ	2.5.17.1
Dielectric Breakdown		>50	kV	2.5.6B
Arc Resistance		137	Seconds	2.5.1B
Electric Strength (Laminate & laminated prepreg)		70 (1741)	kV/mm (V/mil)	2.5.6.2A
Comparative Tracking Index (CTI)		2 (250-399)	Class (Volts)	UL 746A ASTM D3638
Peel Strength	A. Standard profile copper 1. After thermal stress 2. After thermal stress 3. After process solutions	1.14 (6.5) 0.96 (5.5) 0.90 (5.1)	N/mm (lb/inch)	2.4.8C 2.4.8.2A 2.4.8.3
Flexural Strength	A. Length direction B. Cross direction	462 (67.0) 427 (62.0)	MPa (kpsi)	2.4.4B
Tensile Strength	A. Length direction B. Cross direction	330 (48.3) 254 (35.6)	MPa (kpsi)	ASTM D3039
Young's Modulus	A. Length direction B. Cross direction	2868 2730	ksi	ASTM D790-15e2
Poisson's Ratio	A. Length direction B. Cross direction	0.173 0.152	—	ASTM D3039
Moisture Absorption		0.061	%	2.6.2.1A
Flammability (Laminate & laminated prepreg)		V-0	Rating	UL 94
Relative Thermal Index (RTI)		130	°C	—

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NOTES

Revisions:
A: Initial release - 4/17
B: Corrected units for Flexural and Tensile Strength - 8/18
C: Removed Low Dk glass option - 10/18
D: Change MOT to RTI - 5/19
E: Revised CTI to 2 - 1/21
F: Changed VLP2 to HVLP to align with common industry terms 4/21
G: Corrected data sheet Df values to align with Construction table values 12/22
H: Added construction option to 28 mils and added DMA Tg- 3/24
I: Modified alpha 1 CTE from 60 to 45 ppm/C and overall from 50-260C from 2.7% to 2.5% (6x2116 30 mil data) 8/24

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