



I-Speed® High Performance Laminate and Prepreg

I-Speed® is a proprietary high performance 180°C glass transition temperature (Tg) FR-4 system for multilayer Printed Wiring Board (PWB) applications where maximum thermal performance and reliability are required. I-Speed laminate and prepreg products are manufactured with Isola's patentable high performance multifunctional 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.

I-Speed IS is a product extension of I-Speed, manufactured with Isola's patentable high performance multifunctional resin system, reinforced with electrical grade (low Dk) glass fabric. The low Dk glass significantly reduces the Dk of the material to 3.30, allowing increased trace widths and also reduces skew caused by Dk differences between the glass and resin.

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

www.isola-group.com/products/I-Speed

ORDERING INFORMATION:

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

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High Performance

I-Speed® Data Sheet

Tg 180, Td 360
Dk 3.64, Df 0.0060
/98 /99/ 101 /126

Features

- High Thermal Performance
 - ▶ Tg: 180°C (DSC), (Base Laminate)
 - ▶ Td: 360°C (TGA @ 5% wt loss)
 - ▶ Low CTE for reliability
- T260: >60 minutes
- T288: >60 minutes
- Lead-free Compatible and RoHS Compliant
- UV Blocking and AOI Fluorescence
- Superior Processing
 - ▶ Closest to conventional FR-4 processing of all high speed digital materials
- Core Material Standard Availability
 - ▶ Thickness: 0.002" (0.05 mm) to 0.060"/0.062" (1.5 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
 - ▶ VLP-2 (2 micron) standard offering
 - ▶ RTF (Reverse Treat Foil)
 - ▶ Standard HTE Grade 3
- 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
 - ▶ Low Dk glass fabric available
 - ▶ Square weave glass fabric available
 - ▶ Spread glass fabric available
- Industry Approvals
 - ▶ IPC-4101D WAM1 /98 /99/ 101 /126 (IPC-4101C /21 /24 /26 /121 /124 /129)
 - ▶ UL - File Number E41625
 - ▶ Qualified to UL's MCIL Program

I-Speed® Typical Values

Property	Typical Values		
	Typical Value	Units	Test Method
		Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC	180	°C	2.4.25
Decomposition Temperature (Td) by TGA @ 5% weight loss	360	°C	ASTM D3850
T260	>60	Minutes	ASTM D3850
T288	>60	Minutes	ASTM D3850
CTE, Z-axis	A. Pre-Tg PCB (.059 laminate) B. Post-Tg	60 230	ppm/°C 2.4.24
CTE, X-, Y-axes	A. Pre-Tg B. Post-Tg	16 18	ppm/°C 2.4.24
Z-axis Expansion (50-260°C)	2.7	%	2.4.24
Thermal Conductivity	0.4	W/mK	ASTM D5930
Thermal Stress 10 sec @ 288°C (550.4°F)	A. Unetched B. Etched	Pass	Rating 2.4.13.1
Dk, Permittivity (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 1 GHz (HP4291A) B. @ 2 GHz (Bereskin Stripline) C. @ 5 GHz (Bereskin Stripline) D. @ 10 GHz (Bereskin Stripline)	3.65 3.64 3.63 3.63	– 2.5.5.9 2.5.5.5 2.5.5.5 2.5.5.5
Df, Loss Tangent (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 1 GHz (HP4291A) B. @ 2 GHz (Bereskin Stripline) C. @ 5 GHz (Bereskin Stripline) D. @ 10 GHz (Bereskin Stripline)	0.0058 0.0060 0.0067 0.0071	– 2.5.5.9 2.5.5.5 2.5.5.5 2.5.5.5
I-Speed IS Dk, Permittivity (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 2 GHz (Bereskin Stripline) B. @ 5 GHz (Bereskin Stripline) C. @ 10 GHz (Bereskin Stripline)	3.30 3.28 3.27	– 2.5.5.5 2.5.5.5 2.5.5.5
I-Speed IS Df, Loss Tangent (Laminate & prepreg as laminated) Tested at 56% resin	A. @ 2 GHz (Bereskin Stripline) B. @ 5 GHz (Bereskin Stripline) C. @ 10 GHz (Bereskin Stripline)	0.0064 0.0066 0.0064	– 2.5.5.5 2.5.5.5 2.5.5.5
Volume Resistivity	A. 96/35/90 B. After moisture resistance C. At elevated temperature	– 4.4x10 ⁷ 9.4x10 ⁷	MΩ-cm 2.5.17.1
Surface Resistivity	A. 96/35/90 B. After moisture resistance C. At elevated temperature	– 2.6x10 ⁶ 2.1x10 ⁸	MΩ 2.5.17.1
Dielectric Breakdown	>50	kV	2.5.6
Arc Resistance	137	Seconds	2.5.1
Electric Strength (Laminate & prepreg as laminated)	70 (1741)	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 B. Standard profile copper 1. After thermal stress 2. At 125°C (257°F) 3. After process solutions	1.14 (6.5) – 0.96 (5.5) – 0.90 (5.1)	– N/mm (lb/inch) 2.4.8 2.4.8.3 – –
Flexural Strength	A. Lengthwise direction B. Crosswise direction	67000 62000	lb/inch ² 2.4.4
Tensile Strength	A. Lengthwise direction B. Crosswise direction	48348 35598	lb/inch ² ASTM D3039-95a
Young's Modulus	A. Grain direction B. Fill direction	2868 2730	ksi ASTM D790-15e2
Poisson's Ratio	A. Grain direction B. Fill direction	0.173 0.152	– ASTM D3039-95a
Moisture Absorption	0.061	%	2.6.2.1
Flammability (Laminate & prepreg as laminated)	V-0	Rating	UL 94
Max Operating Temperature	130	°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.

www.isola-group.com/products/I-Speed

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