



## I-Speed® IS High Performance Laminate and Prepreg

**I-Speed® IS** is a product extension of I-Speed and 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.

The I-Speed system is also 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-SpeedIS](http://www.isola-group.com/products/I-SpeedIS)

### ORDERING INFORMATION:

Contact your local sales representative or visit [www.isola-group.com](http://www.isola-group.com) for further information.

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High Performance

# I-Speed® IS

Data Sheet

Tg 180, Td 360

Dk 3.28, Df 0.0066

/21 /24 /121 /124 /129

## 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
  - ▶ High throughput and accuracy during PCB fabrication and assembly
- 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
  - ▶ Low Dk glass fabric available
  - ▶ Square weave glass fabric available
  - ▶ Spread glass fabric available
- Industry Approvals
  - ▶ IPC-4101C /21 /24 /121 /124 /129
  - ▶ UL - File Number E41625
  - ▶ Qualified to UL's MCIL Program

# I-Speed® IS Specifications

Property		Typical Values			
		Typical Value	Specification	Units	Test Method
				Metric (English)	IPC-TM-650 (or as noted)
<b>Glass Transition Temperature (Tg) by DSC</b>		180	170-200	°C	2.4.25
<b>Decomposition Temperature (Td) by TGA @ 5% weight loss</b>		360	–	°C	ASTM D3850
<b>T260</b>		>60	–	Minutes	ASTM D3850
<b>T288</b>		>60	–	Minutes	ASTM D3850
<b>CTE, Z-axis</b>	A. Pre-Tg PCB (.059 laminate)	60	AABUS	ppm/°C	2.4.24
	B. Post-Tg	230	–		
<b>CTE, X-, Y-axes</b>	A. Pre-Tg	16	AABUS	ppm/°C	2.4.24
	B. Post-Tg	18	–		
<b>Z-axis Expansion (50-260°C)</b>		2.7	–	%	2.4.24
<b>Thermal Conductivity</b>		0.4	–	W/mK	ASTM D5930
<b>Thermal Stress 10 sec @ 288°C (550.4°F)</b>	A. Unetched	Pass	Pass Visual	Rating	2.4.13.1
	B. Etched				
<b>Dk, Permittivity (Laminate &amp; prepreg as laminated) Tested at 56% resin</b>	A. @ 2 GHz (Bereskin Stripline)	3.30	–	–	2.5.5.5
	B. @ 5 GHz (Bereskin Stripline)	3.28	–		2.5.5.5
	C. @ 10 GHz (Bereskin Stripline)	3.27	–		2.5.5.5
<b>Df, Loss Tangent (Laminate &amp; prepreg as laminated) Tested at 56% resin</b>	A. @ 2 GHz (Bereskin Stripline)	0.0064	–	–	2.5.5.5
	B. @ 5 GHz (Bereskin Stripline)	0.0066	–		2.5.5.5
	C. @ 10 GHz (Bereskin Stripline)	0.0064	–		2.5.5.5
<b>Volume Resistivity</b>	A. 96/35/90	–	1.0x10 <sup>6</sup>	MΩ-cm	2.5.17.1
	B. After moisture resistance	4.4x10 <sup>7</sup>	–		
	C. At elevated temperature	9.4x10 <sup>7</sup>	1.0x10 <sup>3</sup>		
<b>Surface Resistivity</b>	A. 96/35/90	–	1.0x10 <sup>4</sup>	MΩ	2.5.17.1
	B. After moisture resistance	2.6x10 <sup>6</sup>	–		
	C. At elevated temperature	2.1x10 <sup>8</sup>	1.0x10 <sup>3</sup>		
<b>Dielectric Breakdown</b>		>50	–	kV	2.5.6
<b>Arc Resistance</b>		137	60	Seconds	2.5.1
<b>Electric Strength (Laminate &amp; prepreg as laminated)</b>		70 (1741)	30 (750)	kV/mm (V/mil)	2.5.6.2
<b>Comparative Tracking Index (CTI)</b>		3 (175-249)	–	Class (Volts)	UL-746A ASTM D3638
<b>Peel Strength</b>	A. Low profile copper foil and very low profile – all copper weights >17 microns	1.14 (6.5)	0.70 (4.0)	N/mm (lb/inch)	2.4.8
	B. Standard profile copper	–	–		2.4.8.2
	1. After thermal stress	0.96 (5.5)	0.80 (4.5)		2.4.8.3
	2. At 125°C (257°F)	–	0.70 (4.0)		–
	3. After process solutions	0.90 (5.1)	0.55 (3.0)	–	–
<b>Flexural Strength</b>	A. Lengthwise direction	67.00	–	lb/inch <sup>2</sup>	2.4.4
	B. Crosswise direction	62.00			
<b>Tensile Strength</b>	A. Lengthwise direction	TBD	–	lb/inch <sup>2</sup>	–
	B. Crosswise direction	TBD			
<b>Young's Modulus</b>	A. Grain direction	2868	–	ksi	ww
	B. Fill direction	2730			
<b>Poisson's Ratio</b>	A. Grain direction	0.173	–	–	xx
	B. Fill direction	0.152			
<b>Moisture Absorption</b>		0.061	–	%	2.6.2.1
<b>Flammability (Laminate &amp; prepreg as laminated)</b>		V-0	–	Rating	UL 94
<b>Max Operating Temperature</b>		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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