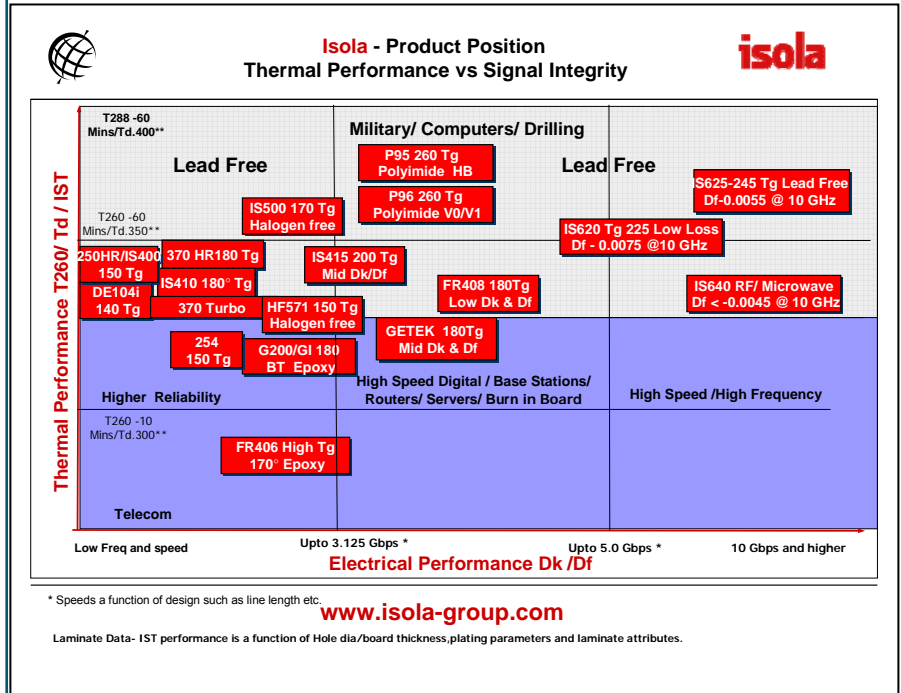




DE104i

Thin laminates and prepregs have an operative influence on the effectiveness of multilayers. Due to permanent optimization of the material components and the accordingly production technology, the DE 104i ML became a versatilely applicable base material with a glass transition temperature of 140 °C. The special resin formulation shows a high thermal resistance (time to delamination @ 260 °C > 60 min.) and is chemical resistant which reduces the risks of resin recession to a minimum. An excessive etch back in the drill holes is prevented, whereby a high reliability of the through-hole plating also under cyclic stress is implied. All thin laminates DE 104i ML corresponds to NEMA-Grade FR-4 and meets the requirements of the norm IPC-4104A, corresponding to data sheet 21.



Performance and Processing Advantages

- **High Thermal Performance**
Tg of 140 C (DSC)
Td of 350 C (TMA)
- **UV Blocking and AOI Fluorescence**
High throughput and accuracy during PCB fabrication and assembly

Purchasing Information

- **Industry Approvals**
IPC-4101A /21
UL Recognized – FR-4, File Number E41625
Qualified to UL’s MCIL Program
- **Standard Availability**
Thickness: 0.002" [.05 mm] to 0.093" [2.4 mm]
Available in sheet or panel form
- **Copper Foil Cladding:** Grade 3 (HTE), ½, 1 and 2 oz.
Foil Options: Reverse treat
- **Prepregs:** Available in roll or panel form

DE140i Typical Laminate Properties

	English			Metric			Test Method	
	Value	Specification	Units	Value	Specification	Units	IPC-TM-650 (or as noted)	
Glass Transition Temperature (Tg) by DSC, spec minimum	140	110-150	°C	140	110-150	°C	2.4.25	
Decomposition Temperature (Td) by TGA	350	—	°C	350	—	°C	ASTM D3850	
Thermal								
CTE, Z-axis	Pre-Tg Post-Tg	50 250	AABUS —	ppm/°C	50 250	AABUS —	ppm/°C	2.4.24
CTE, X-, Y-axes	Pre-Tg Post-Tg	13 14	AABUS —	ppm/°C	13 14	AABUS —	ppm/°C	2.4.24
% Z-Axis Expansion (50 – 260C)		3.0	AABUS	%	3.0	AABUS	%	2.4.24
Thermal Stress 10 Sec @ 288°C (550.4°F), spec minimum	Unetched Etched	Pass pass	Pass Visual Pass Visual	Rating	Pass pass	Pass Visual Pass Visual	Rating	2.4.13.1
Electrical								
Dk (Permittivity, Laminate & prepreg as laminated)	2 5	4.0 4.0	5.40 —	—	4.0 4.0	5.40 —	—	2.5.5.3 2.5.5.9 2.5.5.5
Df, Loss Tangent, spec maximum (Laminate & prepreg as laminated)	2 5	.020 .020	0.0350 —	—	.020 .020	0.0350 —	—	2.5.5.3 2.5.5.9 2.5.5.5
Volume Resistivity, spec minimum	96/35/90 After moisture resistance At elevated temperature	1.3x10 ⁶ 3.4x10 ⁷	— 10 ⁴ 10 ³	MΩ -cm	1.3x10 ⁶ 3.4x10 ⁷	— 10 ⁴ 10 ³	MΩ -cm	2.5.17.1
Surface Resistivity, spec minimum	96/35/90 After moisture resistance At elevated temperature	1.0x10 ⁶ 7.2x10 ⁶	— 10 ⁴ 10 ³	MΩ	1.0x10 ⁶ 7.2x10 ⁶	— 10 ⁴ 10 ³	MΩ	2.5.17.1
Thermal Conductivity		.36	—	W/mK	.36	—	W/mK	ASTM D5930
Dielectric Breakdown, spec minimum		>50	40	kV	>50	40	kV	2.5.6
Arc Resistance, spec minimum		120	60	Seconds	120	60	Seconds	2.5.1
Electric Strength, spec minimum (Laminate & prepreg as laminated)		39	30	kV/mm	39	30	kV/mm	2.5.6.2
Comparative Tracking Index (CTI)			—	Volts		—	Volts	UL-746A ASTM D3638
Physical								
Peel Strength, spec minimum	Low profile copper foil and very low profile – all copper weights >17 microns Standard profile copper 1. After thermal stress 2. At 125°C (257°F) 3. After process solutions	7.0 7.0 6.0 7.0	4.0 — 6.0 4.0 4.5	Lb/sqin	1.0 1.0 0.8 1.0	0.70 — 1.05 0.70 0.50	N/mm	2.4.8 2.4.8.2 2.4.8.3
Flexural Strength, minimum	Lengthwise direction Crosswise direction	64100 63100	60,190 50,040	lb/inch ²	442 435	415 345	Mpa	2.4.4
Moisture Absorption, spec maximum			0.30	%				2.6.2.1
UL		Value		IPC-4101 Specification		Unit		Test Method
CTI								
HWI								
HAI								
Max Operating Temp								
DSR								

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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