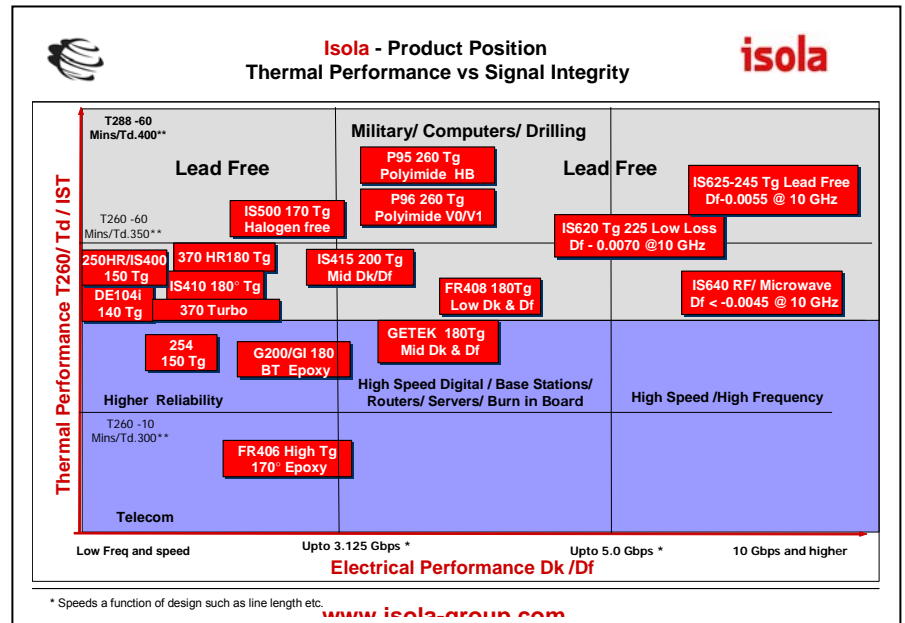




DE104i

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 330 C (TMA)
- **UV Blocking and AOI Fluorescence**
High throughput and accuracy during PCB fabrication and assembly

Purchasing Information

- **Industry Approvals**
IPC-4101B /21, /121
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

DE104i 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	150 - 200	°C	140	150 - 200	°C	2.4.25	
Decomposition Temperature (Td) by TGA	@ 5% weight loss	330	—	°C	330	—	°C	ASTM D3850
T260	Minutes	60	min	60	min	min	2.4.25	
T288	Minutes	>5	min	>5	min	min		
CTE, Z-axis	Pre-Tg	50	AABUS	ppm/°C	50	AABUS	ppm/°C	2.4.24
	Post-Tg	250	—	ppm/°C	250	—	ppm/°C	
CTE, X-, Y-axes	Pre-Tg	13	AABUS	ppm/°C	13	AABUS	ppm/°C	2.4.24
	Post-Tg	14	—	ppm/°C	14	—	ppm/°C	
Z-Axis Expansion (50 – 260C) %		3.00	AABUS	%	3.00	AABUS	%	2.4.24
Thermal Stress 10 Sec @ 288°C (550.4°F), spec minimum	Unetched	Pass	Pass Visual	Rating	Pass	Pass Visual	Rating	2.4.13.1
	Etched	Pass	Pass Visual	Rating	Pass	Pass Visual	Rating	
Dk (Permittivity, Laminate & prepreg as laminated) Berskin Strip line Method	2 Ghz	4.00	5.4	—	4.00	5.4	—	2.5.5.3
	5 Ghz	4.00	—	—	4.00	—	—	2.5.5.9
	10 Ghz	na	—	—	na	—	—	2.5.5.5
Df, Loss Tangent, spec maximum (Laminate & prepreg as laminated) Berskin Stripline Method	2 Ghz	0.020	0.035	—	0.020	0.035	—	2.5.5.3
	5 Ghz	0.022	—	—	0.022	—	—	2.5.5.9
	10 Ghz	na	—	—	na	—	—	2.5.5.5
Volume Resistivity, spec minimum	96/35/90		—	MIΠ -cm		—	MIΠ -cm	2.5.17.1
	After moisture resistance At elevated temperature	1.3x10 ⁶ 3.4x10 ⁷	1.04E+02 1.03E+02	MIΠ -cm	1.3x10 ⁶ 3.4x10 ⁷	1.04E+02 1.03E+02	MIΠ -cm	
Surface Resistivity, spec minimum	96/35/90		—	MIΠ		—	MIΠ	2.5.17.1
	After moisture resistance At elevated temperature	1.0x10 ⁶ 7.2x10 ⁶	1.04E+02 1.03E+02	MIΠ	1.0x10 ⁶ 7.2x10 ⁶	1.04E+02 1.03E+02	MIΠ	
Thermal Conductivity		0.36	—	W/mK	0.36	—	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)		1350	736	V/mil	54000	29000	V/mm	2.5.6.2
Peel Strength, spec minimum	Low profile copper foil and very low profile – all copper weights >17 microns	7	4	(lb/inch)	123	70	N/mm	2.4.8
	1. After thermal stress	9	6		158	105		2.4.8.3
	2. At 125°C (257°F)	7	4		123	70		
	3. After process sssolutions	9	4.5		158	80		
Moisture Absorption, spec maximum		0.3	0.8	%	0.3	0.8	%	2.6.2.1
CTI		3	175 - 249	volts				
HWI		0						
HAI		3						
Max Operating Temp		130						
DSR		yes						
	Grain		Fill					
Flexural Strength (ksi)		99	54					
Tensile Strength (Ksi)		na	na					
Poisson's Ratio		na	na					
Youngs Modulus (million psi)		na	na					
Taylors Modulus (million psi)		na	na					

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.

ORDERING INFORMATION:

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 Isola Group 3100 W Ray Road, Chandler, AZ 85226
 Phone: 480-893-6527
 For further information visit www.isola-group.com



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