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 trough-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.

- **Industry Approvals**
  IPC-4101B /21, /121
  UL Recognized – FR-4, File Number E41625
  Qualified to UL's MCIL Program

- **High Thermal Performance**
  Tg of 140 C (DSC)
  Td of 330 C (TMA)

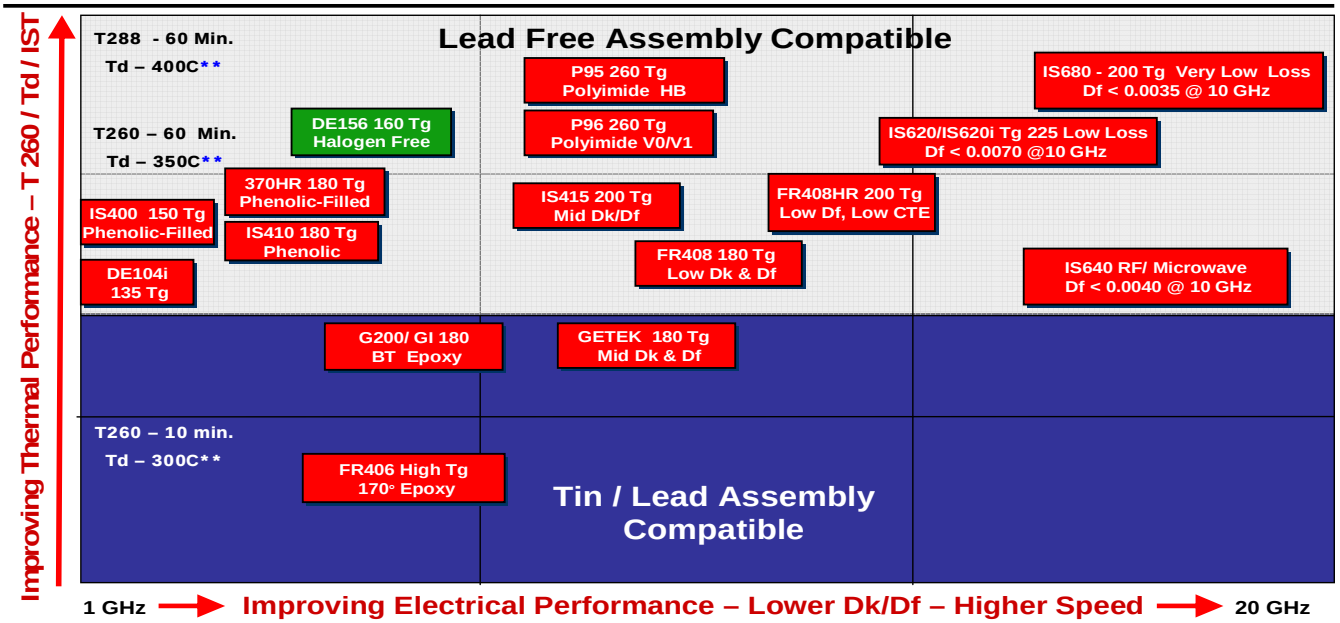
- **UV Blocking and AOI Fluorescence**
  High throughput and accuracy during PCB fabrication and assembly

- **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

Isola - Product Position
Thermal Performance vs Signal Integrity



Speed is a function of design such as line length etc.

** Laminate Data - IST performance is a function of Hole diameter, board thickness, plating parameters and laminate attributes.

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	2.4.25
T288		>5		min	>5		min	
CTE, Z-axis	**Pre-Tg**	50	AABUS	ppm/°C	50	AABUS	ppm/°C	2.4.24
	Post-Tg	250	—		250	—		
CTE, X-, Y-axes	**Pre-Tg**	13	AABUS	ppm/°C	13	AABUS	ppm/°C	2.4.24
	Post-Tg	14	—		14	—		
Z-Axis Expansion (50 – 260C) %		3.00	AABUS	%	3.00	AABUS	%	2.4.24
Thermal Stress 10 Sec	**Unetched**	Pass	Pass Visual	Rating	Pass	Pass Visual	Rating	2.4.13.1
@ 288°C (550.4°F), spec minimum	**Etched**	Pass	Pass Visual		Pass	Pass Visual		
Dk (Permittivity, Laminate & prepeg 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**		—	MΠ -cm		—	MΠ -cm	2.5.17.1
	After moisture resistance	$1.3x10^6$	1.04E+02		$1.3x10^6$	1.04E+02		
	At elevated temperature	$3.4x10^7$	1.03E+02		$3.4x10^7$	1.03E+02		
Surface Resistivity, spec minimum	**96/35/90**		—	MΠ		—	MΠ	2.5.17.1
	After moisture resistance	$1.0x10^6$	1.04E+02		$1.0x10^6$	1.04E+02		
	At elevated temperature	$7.2x10^6$	1.03E+02		$7.2x10^6$	1.03E+02		
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
	Standard profile copper							2.4.8.2
	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:
Contact your local sales representative or the Customer Service Department in Chandler, AZ
Isola Group 3100 W Ray Road, Chandler, AZ 85226
Phone: 480-893-6527
For further information visit www.isola-group.com

REV 5-14-08

©2006 Isola Group