



FR4-TLM140

Tetra-functional Epoxy Laminate and Prepreg

TLM-140 products are manufactured with a unique high performance epoxy resin reinforced with electrical grade (E-glass) glass fabric. TLM-140 offers enhanced thermal resistance and achieve flammability class of UL94V-0.

These materials are compatible with the AOI process , photoimable for solder mask and exhibit the UV block characteristic.

Performance and Processing Advantages

- Superior performance through multiple thermal excursions
- Superior dielectric thickness control
- Wide processing window for maximum lamination performance
- Enhanced thermal and chemical resistance
- Compatible with automatic optical inspection process
- UV blocking and AOI compatible
- Meet IPC-4101C /21 specification

Availability

Thickness: 0.0025" [0.0635 mm] to 0.125" [3.2 mm]

Size: 40"x48", 42"x42", 42"x48", 48"x48", 54"x48"

Option: special size available.

Copper Foil Cladding: Grade 3 (HTE), 0.5 to 3.0 oz.

Option: Low profile & very low profile copper foil.

Prepreg: Available in roll form 42" & 48" width

Industry approval

UL-Recognized – FR-4, File Number E174552



TLM-140 TYPICAL LAMINATE PROPERTIES

Property	UNITS	Specification	Typical Value	CONDITION	Test Method (IPC-TM-650 or As noted)	
Glass Transition Temperature (Tg) by DSC, spec minimum	°C	135 - 145	139	E-2/105	2.4.25	
Decomposition Temperature (Td)	°C	-	315	TGA	ASTM D3850	
TD-260	Minutes	-	10-15	TMA	2.4.24.1	
CTE X-Axis Y-Axis	Ambient to Tg	-	13	TMA	2.4.24	
	Pre-Tg	-	~ 60			
CTE Z-Axis	Post-Tg	-	~ 300	TMA	2.4.24	
	50 - 260 °C	-	175 (3.9%)			
Thermal Stress	Unetched	Seconds	Pass visual	288°C solder dipping X 10 sec.	2.4.13.1	
	Etched	Seconds	Pass visual			
Thermal Conductivity	W/mK	-	0.35	-	ASTM D5930	
Peel Strength (spec minimum)	0.5 oz. (17 micron)	Lb/inch (N/mm)	6.0 (1.05)	8.0(1.40)	After thermal stress	2.4.8
	1.0 oz. (35 micron)		8.0 (1.40)	10.0(1.80)	After thermal stress	
Dielectric Constant (DK)	1 MHz	-	5.4 max.	4.60	-	2.5.5.3
	500 MHz	-	-	4.50	C-24/23/50	2.5.5.9
	1 GHz	-	-	4.40	-	2.5.5.9
Loss Tangent (Df)	1 MHz	-	0.035 max.	0.015	-	2.5.5.3
	500 MHz	-	-	0.015	C-24/23/50	2.5.5.9
	1 GHz	-	-	0.015	-	2.5.5.9
Volume Resistivity	Mohm-cm	10 ⁶	8.2 x 10 ⁶	C-96/35/90	2.5.17.1	
Surface Resistivity	Mohm	10 ⁴	6.0 x 10 ⁷	C-96/35/90	2.5.17.1	
Dielectric Breakdown, spec minimum	kV	40 min.	80	D-48/50	2.5.6	
Arc resistance	Seconds	60 min.	126	D-48/50	2.5.1	
Comparative Tracking Index (CTI)	Volts	-	175-250 (CL=3)	IEC 60112	UL-746A ASTM D3638	
Moisture Absorption	%	0.35 max.	0.12	E1/105+ D-24/23	2.6.2.1	
Flexural Strength	CW	psi	50,000 min.	70,000	As received	2.4.4
	LW		60,000 min.	90,000		
Flammability	rating	V-0 min.	V-0	C-24/23/50+E-24/125	UL-94	
Bow & Twist	%	0.75 max.	0.30	As received/Etched	2.4.22.1	

Material Thickness Tested 1.5 mm. thickness , Cu 1/1 Oz.

Information contained in this data sheet represents typical or average values and does not constitute any warranty or guarantee.



TLM-140 PREPREG TYPICAL PROPERTY VALUES

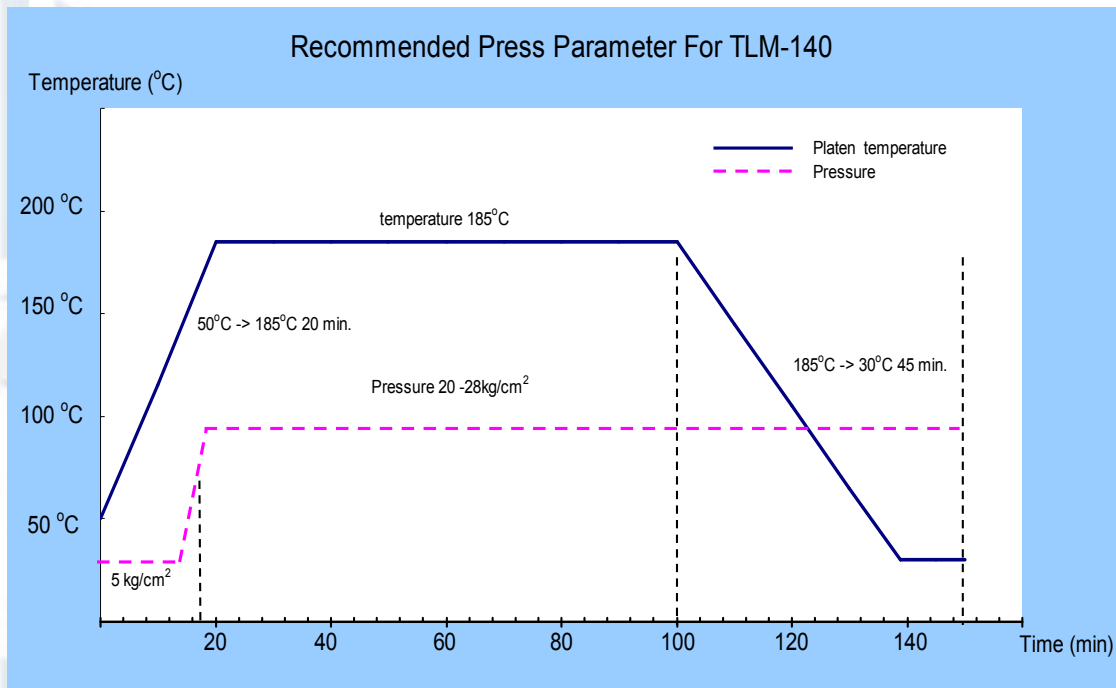
Fabric Style ¹	Resin Content ² (%)	Resin Flow ² (%)	Volatile Content ³ (%)	Gel Time ² (sec)	Scale flow Thickness ²		After Pressed Thickness ²	
					mil	mm	mil	mm
106MRC	75 ± 3.0	50 ± 6.0	0.50 Max.	125 ± 20	1.9 ± 0.4	0.048 ± 0.01	2.5 ± 0.4	0.064 ± 0.01
1080LRC	62 ± 3.0	39 ± 6.0		125 ± 20	2.4 ± 0.4	0.061 ± 0.01	2.7 ± 0.4	0.069 ± 0.01
1080MRC	65 ± 3.0	40 ± 6.0		125 ± 20	2.6 ± 0.4	0.066 ± 0.01	2.9 ± 0.4	0.074 ± 0.01
1080HRC	68 ± 3.0	42 ± 6.0		125 ± 20	2.9 ± 0.4	0.074 ± 0.01	3.1 ± 0.4	0.079 ± 0.01
2313MRC	55 ± 3.0	34 ± 5.0		125 ± 20	3.5 ± 0.4	0.089 ± 0.01	4.0 ± 0.4	0.102 ± 0.01
2116LRC	50 ± 3.0	28 ± 5.0		125 ± 20	4.1 ± 0.4	0.104 ± 0.01	4.8 ± 0.4	0.122 ± 0.01
2116MRC	53 ± 3.0	30 ± 5.0		125 ± 20	4.4 ± 0.4	0.112 ± 0.01	5.0 ± 0.4	0.127 ± 0.01
2116HRC	55 ± 3.0	32 ± 5.0		125 ± 20	4.8 ± 0.4	0.122 ± 0.01	5.5 ± 0.4	0.140 ± 0.01
2116VHRC	57 ± 3.0	34 ± 5.0		125 ± 20	4.8 ± 0.4	0.122 ± 0.01	5.6 ± 0.4	0.142 ± 0.01
1500MRC	45 ± 3.0	23 ± 5.0		125 ± 20	5.7 ± 0.4	0.145 ± 0.01	6.0 ± 0.4	0.152 ± 0.01
7628LRC	40 ± 3.0	20 ± 5.0		125 ± 20	6.7 ± 0.4	0.170 ± 0.01	7.0 ± 0.4	0.178 ± 0.01
7628MRC	42 ± 3.0	20 ± 5.0		125 ± 20	6.8 ± 0.4	0.173 ± 0.01	7.3 ± 0.4	0.185 ± 0.01
7628HRC	45 ± 3.0	24 ± 5.0		125 ± 20	6.8 ± 0.4	0.173 ± 0.01	7.9 ± 0.4	0.201 ± 0.01
7628VHRC	47 ± 3.0	25 ± 5.0		125 ± 20	7.5 ± 0.4	0.190 ± 0.01	8.2 ± 0.4	0.208 ± 0.01

Note: 1 Other fabric styles are available upon request.

2 Property values are adjustable for special processing needs

3 Volatile content for all prepregs is less than 0.5%

Recommended Press Cycle:



Cushion: Kraft paper 162 g/m² top and bottom 9-12 sheets each
Number of sheets: 6-8 layers

Product heating rate	2 - 3.5 °C/min
Critical range	65 – 120 °C/min
Cure time @ 173°C	30 - 35 min
Full Pressure	20 – 28 kg/cm ²
Cool down rate	< 2 °C/min

Note : This press cycle is just recommendation only.
PCB Manufacturer may adjust based on genuine process .