



FR4-TLM170(LD)

Low Dk/Df Laminate and Prepreg

TLM-170(LD) products are manufactured with a unique high performance resin reinforced with electrical grade glass fabric and provide the low dielectric constant (Dk) and low dissipation factor (Df) demanded by high speed, low loss Printed Wiring Board (PWB) designs and applications.

TLM-170(LD) offers enhanced thermal resistance due to a high Tg value, lower z-CTE Value and achieve flammability class of UL94 V-0. These materials are compatible with Lead free process and also exhibit superior chemical resistance, thermal stability and CAF-resistance.

Performance and Processing Advantages

- Improved Dielectric properties
 - Dk < 3.8 and Df < 0.0075 (10 GHz)
- Excellent electrical performance
- Superior dielectric thickness control
- Enhanced thermal and chemical resistance
- Compatible with automatic optical inspection process
- Lead free solder process compatible
- CAF-Resistance capability

Availability

Thickness: 0.0025" [0.05 mm] to 0.125" [3.2 mm]

Size: 40"x48", 42"x42", 42"x48", 48"x48", 54"x48", 58"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

Glass Styles: 1080, 2116 and 7628

Industry Approvals

UL-Recognized – FR-4, File Number E174552



TLM-170(LD) 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	> 180	185	E-2/105	2.4.25	
Decomposition Temperature (Td)	°C	340 min.	365	TGA	ASTM D3850	
TD-260	Minutes	30 min.	>30	TMA	2.4.24.1	
TD-288	Minutes	15 min.	>30	TMA	2.4.24.1	
CTE X-Axis	ppm/°C	-	13	Ambient to Tg	2.4.24	
Y-Axis		-	15			
CTE Z-Axis	Pre-Tg	60 max.	~40	TMA	2.4.24	
	Post-Tg	300 max.	~225			
Thermal Stress 10 Sec @ 288 °C	50- 260 °C	3.00% max.	125 (2.6%)	288°C solder float x 10 sec.	2.4.13.1	
	Unetched	Pass visual	>200			
	Etched	Pass visual	>200			
Peel Strength (spec minimum)	1.0 oz. (35 micron)	Lb/inch (N/mm)	4.0 (0.70)	5-7(0.87-1.22)	After thermal stress	2.4.8
Dielectric Constant (DK)	10 GHz	-	N/A	3.80	C-24/23/50	2.5.5.13
Loss Tangent (Df)	10 GHz	-	N/A	0.0075	C-24/23/50	2.5.5.13
Volume Resistivity		Mohm-cm	10 ⁶	5.1 x 10 ⁸	C-96/35/90	2.5.17.1
Surface Resistivity		Mohm	10 ⁵	1.4 x 10 ⁷		
Dielectric Breakdown, spec minimum		kV	40 min.	>60	D-48/50	2.5.6
Arc resistance		Seconds	60 min.	120		2.5.1
Comparative Tracking Index (CTI)		Volts	-	175-250 (CL=3)	IEC 60112	UL-746A ASTM D3638
Water Absorption		%	0.20 max.	0.15	E1/105+ D-24/23	2.6.2.1
Flexural Strength	CW	psi	50,040 min.	55,000	As received	2.4.4
	LW		50,040 min.	60,000		
Flammability		rating	V-0	V-0	C-24/23/50+E-24/125	UL-94

Material Thickness Tested 1.5 mm. thickness Copper 1/1 Oz.

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



TLM-170(LD) PREPREG TYPICAL PROPERTY VALUES

Fabric Style ¹	Resin Content ² (%)	Gel Time ² (sec)	After Pressed Thickness ²	
			mil	mm
1080MRC	66 ± 3.0	150 ± 30	2.9 ± 0.4	0.074 ± 0.01
1080HRC	68 ± 3.0		3.1 ± 0.4	0.079 ± 0.01
2116MRC	55 ± 3.0		5.0 ± 0.4	0.127 ± 0.01
2116HRC	57 ± 3.0		5.3 ± 0.4	0.135 ± 0.01
7628LRC	41 ± 3.0		7.0 ± 0.4	0.178 ± 0.01
7628MRC	43 ± 3.0		7.3 ± 0.4	0.185 ± 0.01
7628HRC	47 ± 3.0		7.9 ± 0.4	0.201 ± 0.01

Note: 1 Other fabric styles are available upon request.

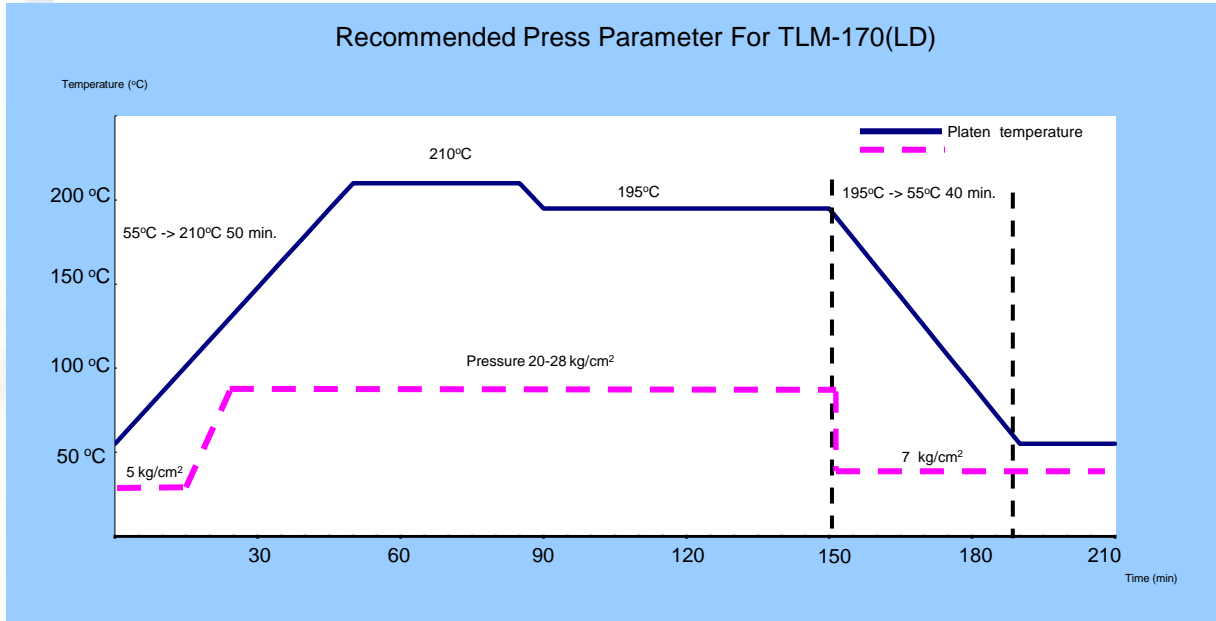
2 Property values are adjustable for special processing needs

Storage condition:

- Prepreg properties will maintained for 3 months when keep it under 23°C and under 50%RH
- Beware of moisture, always keep it wrapped in damp proof material.

Recommendation

Press Cycle:



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

Product heating rate (@ 60-120°C)	1.4– 2.0 °C/min
Cure time @ 190°C	70 - 90 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 it based on genuine process .

PCB packaging:

PCB packaging shall be a proper packaging to prevent moisture uptake by PCB with vacuum seal condition include adequate desiccant material to prevent PCB from moisture which diffuse in the packaging material. Using the right packaging materials and maintain in a good condition, PCB's can be stored for up to one year without absorbing excess moisture.