Thai Laminate Manufacturer Co.,Ltd.

FR4–TLM510(D)

Low Dk/Df Laminate and Prepreg

TLM-510(D) products are Halogen free materials manufactured with a unique high performance epoxy resin reinforced with electrical grade (E-glass) 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-510(D) offers enhanced thermal resistance due to a high Tg value with lower z-CTE Value and designed to eliminate the use of halogenated resins due to the potential hazardous effects from the environmental concerns. These materials are compatible with Lead free process and exhibit the UV block characteristic.

TLM-510(D) also exhibit superior chemical resistance, thermal stability and CAF-resistance.

Performance and Processing Advantages

- Improved Dielectric properties
  - Dk ~ 3.9 and Df ~ 0.014 (1 GHz)
- High performance epoxy blend which yield a higher heat resistance
- Superior dielectric thickness control
- Enhanced thermal and chemical resistance
- Compatible with automatic optical inspection process
- UV-block feature
- 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″

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

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TLM-510(D) 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		ºC	170 ±5	170	E-2/105	2.4.25
Decomposition Temperature (Td)		ºC	350 min.	365	TGA	ASTM D3850
TD-260		Minutes	35 min.	60	TMA	2.4.24.1
TD-288		Minutes	10 min.	60	TMA	2.4.24.1
CTE X-Axis Y-Axis		ppm/ºC	- -	13 15	Ambient to Tg	2.4.24
CTE Z-Axis	Pre-Tg	ppm/ºC	60 max.	~40	TMA	2.4.24
	Post-Tg		300 max.	~225		
	50- 260 ºC		3.00% max.	135 (2.9%)		
Thermal Stress 10 Sec @ 288 ºC	Unetched	Seconds	Pass visual	>200	288°C solder float x 10 sec.	2.4.13.1
	Etched		Pass visual	>200		
Thermal Conductivity		W/mK	-	0.35	-	ASTM D5930
Peel Strength (spec minimum)	1.0 oz. (35 micron)	Lb/inch (N/mm)	5.0 (0.87)	5-7(0.87-1.22)	After thermal stress	2.4.8
Dielectric Constant (DK)	1 MHz	-	5.4 max.	4.05	C-24/23/50	2.5.5.3
	1 GHz	-	-	3.90		
Loss Tangent (Df)	1 MHz	-	0.035 max.	0.015	C-24/23/50	2.5.5.3
	1 GHz	-	-	0.014		
Volume Resistivity		Mohm-cm	10^6	4.4×10^8	C-96/35/90	2.5.17.1
Surface Resistivity		Mohm	10^4	2.0×10^7		
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		%	0.50 max.	0.25	E1/105+ D-24/23	2.6.2.1
Flexural Strength CW LW		psi	50,000 min. 60,000 min.	65,000 75,000	As received	2.4.4
Flammability		rating	V-0	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 Copper 1/1 Oz.
Information contained in this data sheet represents typical or average values and does not constitute any warranty or guarantee.

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TLM-510(D) 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
0106MRC	75 ± 3.0	43 ± 6.0	0.50 Max.	150 ± 30	-	-	2.6 ± 0.4	0.066 ± 0.01
1080MRC	66 ± 3.0	42 ± 6.0			2.5 ± 0.4	0.061 ± 0.01	3.1 ± 0.4	0.079 ± 0.01
2113MRC	58 ± 3.0	34 ± 5.0			3.3 ± 0.4	0.084 ± 0.01	3.9 ± 0.4	0.100 ± 0.01
2313MRC	58 ± 3.0	35 ± 5.0			3.4 ± 0.4	0.086 ± 0.01	4.0 ± 0.4	0.102 ± 0.01
2116MRC	55 ± 3.0	33 ± 5.0			4.0 ± 0.4	0.101 ± 0.01	5.0 ± 0.4	0.127 ± 0.01

Note: 1 Other fabric styles are available upon request.

2 Property values are adjustable for special processing needs

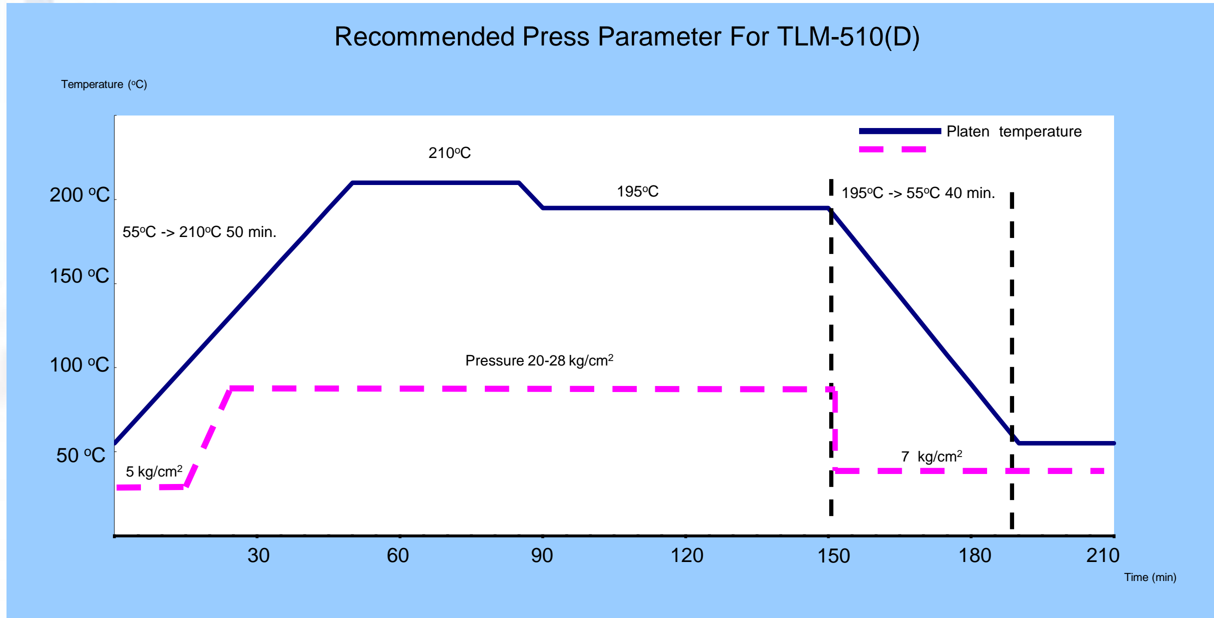
3 Volatile content for all prepregs is less than 0.5%

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/cm²
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.