Thai Laminate Manufacturer Co.,Ltd.

FR4–TLM510(HT)

Halogen Free Laminate and Prepreg

TLM-510(HT) products are Halogen free materials manufactured with a unique high performance epoxy resin reinforced with electrical grade (E-glass) glass fabric.

TLM-510(HT) offers enhanced thermal resistance due to a high Tg value, Tg 170ºC 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 the AOI process and exhibit the UV block characteristic.

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

Performance and Processing Advantages

- High performance epoxy blend which yield a higher heat resistance
- Superior dielectric thickness control
- Wide processing window for maximum lamination performance
- Enhanced thermal and chemical resistance
- Compatible with automatic optical inspection process
- UV-block feature
- Lead free solder process compatible
- CAF-Resistance capability
- Meet IPC 4101E/130 specification

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, 2313, 2116 and 7628

Industry Approvals

UL-Recognized – FR-4, File Number E174552

Thai Laminate Manufacturer Co.,Ltd.

TLM-510(HT) 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 min.	173	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.	>50	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	>300	288°C solder float x 10 sec.	2.4.13.1
	Etched		Pass visual	>300		
Thermal Conductivity		W/mK	-	0.35	-	ASTM D5930
Peel Strength (spec minimum)	1.0 oz. (35 micron)	Lb/inch (N/mm)	6.0 (1.05)	7-9(1.22-1.58)	After thermal stress	2.4.8
Dielectric Constant (DK)	1 MHz	-	5.4 max.	4.80	C-24/23/50	2.5.5.3
	500 MHz	-	-	4.50		
	1 GHz	-	-	4.40		
Loss Tangent (Df)	1 MHz	-	0.035 max.	0.015	C-24/23/50	2.5.5.3
	500 MHz	-	-	0.013		
	1 GHz	-	-	0.013		
Volume Resistivity		Mohm-cm	10^6	3.2×10^8	C-96/35/90	2.5.17.1
Surface Resistivity		Mohm	10^4	2.4×10^7		
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.

Thai Laminate Manufacturer Co.,Ltd.

TLM-510(HT) 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	76 ± 3.0	50 ± 6.0	0.50 Max.	150 ± 30	2.0 ± 0.4	0.051 ± 0.01	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
1080HRC	68 ± 3.0	45 ± 6.0			2.7 ± 0.4	0.066± 0.01	3.3 ± 0.4	0.084 ± 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
7628LRC	41 ± 3.0	19 ± 4.0			6.6 ± 0.4	0.168 ± 0.01	7.0 ± 0.4	0.178 ± 0.01
7628MRC	43 ± 3.0	22 ± 4.0			6.7 ± 0.4	0.170 ± 0.01	7.3 ± 0.4	0.185 ± 0.01
7628HRC	47 ± 3.0	26 ± 4.0			6.9 ± 0.4	0.175 ± 0.01	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

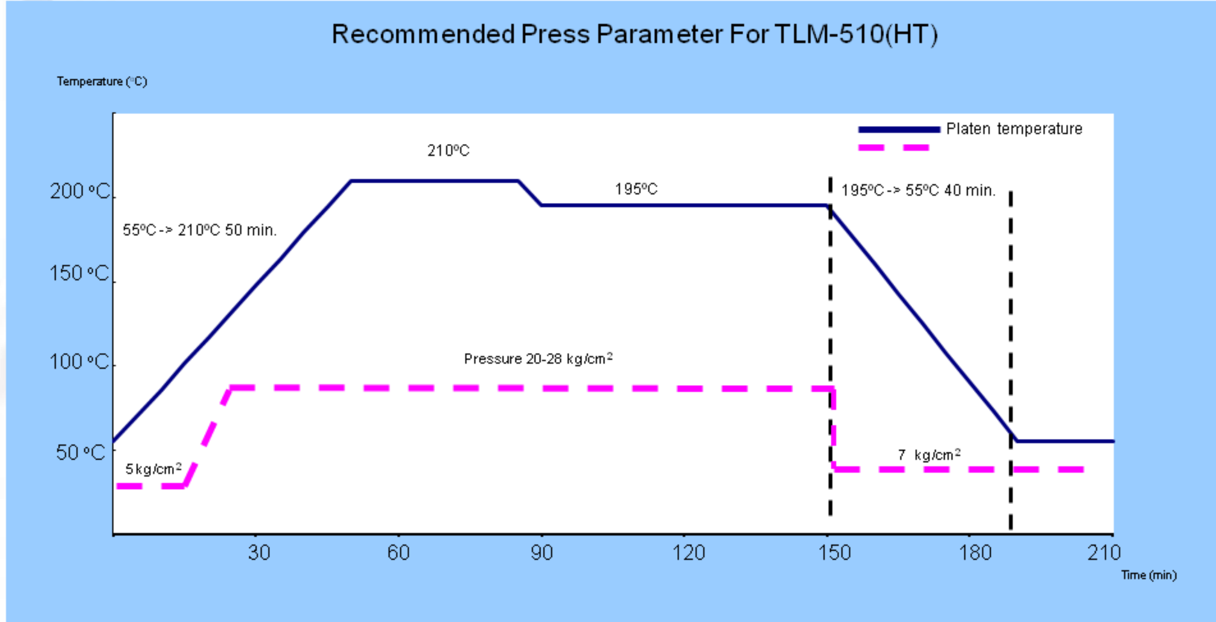
3 Volatile content for all prepregs is less than 0.5%

Storage condition:

- Prepreg properties will be 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.