



GA-170-LL(M)

High Tg175(TMA) Phenolic Curing Laminate and Prepreg

GA-170-LL(M) is an advanced High Tg (175°C/TMA) multifunctional epoxy laminate. Excellent heat resistance, CAF resistance and Low CTE performance, suitable for through-hole reliability, Lead Free process and high multilayer PCB process, high density PCB.

Laminate:GA-170-LL(M)
Prepreg: GA-170B-LL(M)

Key Features

- I Tg: 175°C(TMA)**
This material with high performance, multi-function resin , crosslink density is high. Material Tg values can reach above 175 °C(TMA).
- I Z-CTE(50-260):2.2%**
Its remarkable very low expansion coefficient, is more suitable for making high multilayer PCB, ensure the reliability of high temperature welding and assembly process.
- I Td: 370°C**
Excellent resistance to aging temperature, keep the material performance in high thermal shock or high temperature environment impact.
- I T288: ≥60min**
Suitable for Lead-free process. Subjected to thermal shock for many times, still can maintain good material performance. And excellent dimensional stability and low expansion coefficient, apply to high order HDI.

Applications

- Ø High Multilayer PCB
- Ø Servers
- Ø LCD Panels
- Ø Telecommunications
- Ø Memory Module
- Ø Heavy Copper Application

Industrial Approvals

- Ø IPC-4101E/98/99/101/126
- Ø UL File Number : e186152
- Ø UL Type Designation : FR-4.0
- Ø Flammability Rating : 94V-0
- Ø Maximum Operating Temperature : 130°C

Normal Size & Thickness

Thickness Inch (mm)	Size Inch mm	Thickness Tolerance
0.002 (0.05)	49×37 1244×0940	IPC-4101 Class C/M
To	49×41 1244×1042	
0.125 (3.2)	49×43 1244×1093	

Characteristic GA-170-LL(M)		Unit	Test Method	Typical Values	SPEC.
			IPC-TM-650 (or as noted)		
Volume Resistivity		MΩ-cm	2.5.17.1	7X10 ⁹	≥ 10 ⁶
Surface Resistivity		MΩ	2.5.17.1	2X10 ⁸	≥ 10 ⁴
Permittivity (RC 50%)	At 1MHz	-	2.5.5.9	4.80	≤ 5.40
	At 1GHz		2.5.5.9/2.5.5.13	4.25/4.40	≤ 5.20/-
	At 5GHz		2.5.5.13	4.15	/
	At 10GHz		2.5.5.13	4.05	/
Loss Tangent (RC 50%)	At 1MHz	-	2.5.5.9	0.0100	/
	At 1GHz		2.5.5.9/2.5.5.13	0.0110/0.0120	≤ 0.035/-
	At 5GHz		2.5.5.13	0.0135	/
	At 10GHz		2.5.5.13	0.0145	/
Arc Resistance		Sec	2.5.1	120	≥ 60
Dielectric Breakdown		KV	2.5.6	40	≥ 40
Dielectric Strength(thickness<0.5mm)		KV/mm	2.5.6.2	40	≥ 30
CTI		PLC(V)	ASTM D3638	3(175-249)	/
Thermal Stress Test		-	2.4.13.1	Pass	Pass
Td (5% Weight loss)		°C	2.4.24.6	370	≥ 340
Glass Transition Temperature	DMA	°C	2.4.24.2	200	/
	DSC	°C	2.4.25	190	≥ 170
	TMA	°C	2.4.24	175	/
Thermal Conductivity		W/mK	ASTM D5470	0.40	/
Most Operation Temperature(MOT)		°C	UL Cert	130	130
T288		Min	2.4.24.1	≥ 60	≥ 15
T300		Min	2.4.24.1	≥ 60	≥ 2
X/Y-Axis CTE	Before Tg	PPM/°C	2.4.24	14/14	/
Z-Axis CTE	Before Tg	PPM/°C	2.4.24	40	≤ 60
	After Tg	PPM/°C		200	≤ 300
Z-Axis CTE (50~260°C)		%	2.4.24	2.2	≤ 3.0
Peel Strength (HTE 1OZ)		Lb/in(N/mm)	2.4.8	8(1.40)	≥ 6(1.05)
Flexural Strength	LW	N/mm ²	2.4.4	450	≥ 415
	CW	N/mm ²		400	≥ 345
E-modulus	LW/CW	Gpa	---	23/22	/
Flexural Modulus	LW/CW	Gpa	---	24/23	/
Moisture Absorption		%	2.6.2.1	0.10	≤ 0.5
Flammability		-	UL94	V-0	V-0

Note: 1.Test sample is 62mil 1/1(without special remark).

2. The data above is only for reference, and the actual data will have deviation, according to varieties of test equipment and method.