GA-170-LL(M)

High Tg190 Phenolic Curing Laminate and Prepreg

GA-170-LL(M) is an advanced High Tg (175℃/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

- **Tg: 175℃(TMA)**
  This material with high performance, multi-function resin，crosslink density is high. Material Tg values can reach above 175 ℃(TMA).
- **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.
- **Td: 370℃**
  Excellent resistance to aging temperature, keep the material performance in high thermal shock or high temperature environment impact.
- **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

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

Industrial Approvals

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

Normal Size & Thickness

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

Characteristic GA-170-LL(M)		Unit	Test Method IPC-TM-650 （or as noted）	Typical Values	SPEC.
Volume Resistivity		MΩ-cm	2.5.17.1	$7X10^9$	≧10^6
Surface Resistivity		MΩ	2.5.17.1	$2X10^5$	≧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	4.20/4.30	≦5.20/-
	At 5GHz		2.5.5.13	4.10	/
	At 10GHz		2.5.5.13	4.00	/
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)		℃	2.4.24.6	370	≧340
Glass Transition Temperature	DMA	℃	2.4.24.2	200	/
	DSC	℃	2.4.25	190	≧170
	TMA	℃	2.4.24	175	/
Thermal Conductivity		W/mK	ASTM D5470	0.40	/
Most Operation Temperature(MOT)		℃	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/℃	2.4.24	14/14	/
Z-Axis CTE	Before Tg	PPM/℃	2.4.24	40	≦60
	After Tg	PPM/℃		200	≦300
Z-Axis CTE (50~260℃)		%	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.