



## GA-170-LL

GA-170-LL is an advanced High Tg (170 °C/DSC) 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

Prepreg: GA-170B-LL

### Key Features

- **Tg: 175 °C(DSC)**  
This material with high performance, multi-function resin · crosslink density is high. Material Tg values can reach above 170 °C(DSC).
- **Z-CTE(50-260):2.6%**  
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: 340 °C**  
Excellent resistance to aging temperature, keep the material performance in high thermal shock or high temperature environment impact.
- **T288: 20min**  
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
- Storage
- Heavy Copper Application

### Industrial Approvals

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

### Normal Size & Thickness

Thickness Inch (mm)	Size		Thickness Tolerance
	Inch	mm	
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 <b>GA-170-LL</b>		Unit	Test Method	Typical Values	SPEC.
			IPC-TM-650 (or as noted)		
Volume Resistivity		MΩ-cm	2.5.17.1	7X10 <sup>9</sup>	≥ 10 <sup>6</sup>
Surface Resistivity		MΩ	2.5.17.1	2X10 <sup>8</sup>	≥ 10 <sup>4</sup>
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
Loss Tangent (RC 50%)	At 1MHz	-	2.5.5.9	0.0128	≤ 0.035
	At 1GHz		2.5.5.9/2.5.5.13	0.0165/0.0185	≤ 0.035
Arc Resistance		Sec	2.5.1	120	≥ 60
Dielectric Breakdown		KV	2.5.6	40	≥ 40
Electric 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	340	≥ 340
Glass Transition Temperature	DMA	°C	2.4.24.4	187	/
	DSC	°C	2.4.25	175	≥ 170
Thermal Conductivity		W/mK	ASTM D5470	0.40	/
Most Operation Temperature(MOT)		°C	UL Cert	130	/
T288		Min	2.4.24.1	20	≥ 15
T300		Min	2.4.24.1	10	≥ 2
X/Y-Axis CTE	Before Tg	PPM/°C	2.4.24	14/14	/
Z-Axis CTE	Before Tg	PPM/°C	2.4.24	45	≤ 60
	After Tg	PPM/°C		230	≤ 300
Z-Axis CTE (50~260°C)		%	2.4.24	2.6	≤ 3.0
Peel Strength (HTE 1OZ)		Lb/in(N/mm)	2.4.8	8.5(1.49)	≥ 6(1.05)
Flexural Strength	LW	N/mm <sup>2</sup>	2.4.4	500	≥ 415
	CW	N/mm <sup>2</sup>		440	≥ 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.