



GA-150-LL

GA-150-LL is an advanced medium Tg (155 °C/DSC) multifunctional epoxy laminate . Excellent heat resistance, CAF resistance and Low CTE performance, suitable for through-hole reliability, Lead Free process, high multilayer PCB process , and HDI process.

Laminate:GA-150-LL

Prepreg: GA-150B-LL

Key Features

- **Tg: 155 °C(DSC)**
This material with high performance, multi-function resin, Tg values can reach above 150 °C(DSC).
- **Z-CTE(50-260):3.2%**
Its remarkable low expansion coefficient, is more suitable for making high multilayer PCB, ensure the reliability of high temperature welding and assembly process.
- **Td: 350 °C**
Excellent resistance to aging temperature, keep the material performance in high thermal shock or high temperature environment impact.
- **T288: 30min**
Suitable for Lead-free process. Subjected to thermal shock for many times, still can maintain good material performance. Excellent dimensional stability and low expansion coefficient, apply to HDI process.

Applications

- Multilayer PCB
- HDI
- Servers
- LCD Panels
- Telecommunications
- Storage
- Automotive circuit board

Industrial Approvals

- IPC-4101E/98/99/101
- 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 GA-150-LL		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	4.92	≤ 5.40
	At 1GHz		2.5.5.9/2.5.5.13	4.30/4.53	/
Loss Tangent (RC 50%)	At 1MHz	-	2.5.5.9	0.0128	≤ 0.035
	At 1GHz		2.5.5.9/2.5.5.13	0.0160/0.0180	/
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	350	≥ 325
Glass Transition Temperature	DMA	°C	2.4.24.4	165	/
	DSC	°C	2.4.25	155	≥ 150
Thermal Conductivity		W/mK	ASTM D5470	0.40	/
Most Operation Temperature(MOT)		°C	UL Cert	130	/
T288		Min	2.4.24.1	30	≥ 5
X/Y-Axis CTE	Before Tg	PPM/°C	2.4.24	14/15	/
Z-Axis CTE	Before Tg	PPM/°C	2.4.24	45	≤ 60
	After Tg	PPM/°C		250	≤ 300
Z-Axis CTE (50~260°C)		%	2.4.24	3.2	≤ 3.5
Peel Strength (HTE 1OZ)		Lb/in(N/mm)	2.4.8	9(1.58)	≥ 6(1.05)
Flexural Strength	LW	N/mm ²	2.4.4	500	≥ 415
	CW	N/mm ²		440	≥ 345
E-modulus	LW/CW	Gpa	---	22/22	/
Flexural Modulus	LW/CW	Gpa	---	24/22	/
Moisture Absorption		%	2.6.2.1	0.095	≤ 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.