GA-HF-15

Halogen-free Tg150 Dicy Curing Laminate and Prepreg

GA-HF-15 is an advanced Halogen-free medium Tg150(DSC) multifunctional epoxy Laminate. Excellent heat resistance、CAF resistance and Low CTE, suitable for through-hole reliability, Lead Free process, high multilayer PCB and high order HDI process. Environmental-friendly material, absence of highly toxic dioxins, Antimony-free and no toxic evolution during waste burning.

Laminate:GA-HF-15
Prepreg: GA-HFB-15

Key Features

- **Tg: 153℃(DSC)**
  This material with high performance multi-function resin, Tg values can reach above 150 ℃(DSC).
- **Z-CTE(50-260):2.9%**
  Its remarkable very low expansion coefficient, is more suitable for making high multilayer PCB, ensure the reliability of high temperature welding.
- **Td: 360℃**
  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 HDI process.

Applications

- Multilayer PCB
- Cellular phone
- Servers
- Mobile Communication
- Memory Module

Industrial Approvals

- IPC-4101D/127/128
- UL File Number：e186152
- UL Type Designation：FR-4.1
- Flammability Rating：94V-0
- Maximum Operating Temperature： 130℃

Normal Size & Thickness

Thickness Inch (mm)	Size Inch mm	Thickness Tolerance
0.0012 (0.03) To 0.125 (3.2)	49×37 1244×0940 49×41 1244×1042 49×43 1244×1093	IPC-4101 Class C/M

Characteristic GA-HF-15		Unit	Test Method IPC-TM-650 （or as noted）	Typical Values	SPEC.
Volume Resistivity		MΩ-cm	2.5.17.1	$2X10^9$	≧10^6
Surface Resistivity		MΩ	2.5.17.1	$2X10^5$	≧10^4
Permittivity (RC 50%)	At 1MHz	-	2.5.5.9	4.90	≦5.40
	At 1GHz		2.5.5.9/2.5.5.13	4.59/4.75	/
Loss Tangent (RC 50%)	At 1MHz	-	2.5.5.9	0.0122	≦0.035
	At 1GHz		2.5.5.9/2.5.5.13	0.0158/0.0161	/
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	360	≧325
Glass Transition Temperature	DMA	℃	2.4.24.2	165	/
	DSC	℃	2.4.25	153	≧150
	TMA	℃	2.4.24	145	/
Thermal Conductivity		W/mK	ASTM D5470	0.45	/
Most Operation Temperature(MOT)		℃	UL Cert	130	/
T288		Min	2.4.24.1	≧60	≧5
X/Y-Axis CTE	Before Tg	PPM/℃	2.4.24	15/14	/
Z-Axis CTE	Before Tg	PPM/℃	2.4.24	35	≦60
	After Tg	PPM/℃		220	≦300
Z-Axis CTE (50~260℃)		%	2.4.24	2.9	≦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	550	≧415
	CW	N/mm^2		440	≧345
E-modulus	LW/CW	Gpa	---	24/24	/
Flexural Modulus	LW/CW	Gpa	---	24/20	/
Moisture Absorption		%	2.6.2.1	0.10	≦0.8
Flammability		-	UL94	V-0	V-0

Note: 1.Test sample is 40 mil 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.