GA-HF-PF5

Halogen-free Tg150 Phenolic Curing Middle Loss Laminate and Prepreg

GA-HF-PF5 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-PF5
Prepreg: GA-HFB-PF5

Key Features

- ***Tg: 153℃(DSC)***
  This material with high performance multi-function resin, Tg values can reach above 150 ℃(DSC).
- ***Df: 0.0100***
  Within the scope of the 1 MHz - 10GHz, the lower signal loss can ensure signal integrity.
- ***Z-CTE(50-260):2.8%***
  Its remarkable very low expansion coefficient, is more suitable for making high multilayer PCB, ensure the reliability of high temperature welding.
- ***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*
- *High order HDI*
- *Cellular phone*
- *LCD Panels*
- *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-PF5		Unit	Test Method IPC-TM-650 （or as noted）	Typical Values	SPEC.
Volume Resistivity		MΩ-cm	2.5.17.1	$2X10^9$	$\geqq 10^6$
Surface Resistivity		MΩ	2.5.17.1	$1X10^6$	$\geqq 10^4$
Permittivity (RC 50%)	At 1MHz	-	2.5.5.9	4.80	≦5.40
	At 1GHz		2.5.5.9/2.5.5.13	4.30/4.40	/
	At 5GHz		2.5.5.13	4.35	/
	At 10GHz		2.5.5.13	4.29	/
	At 15GHz		2.5.5.13	4.26	/
Loss Tangent (RC 50%)	At 1MHz	-	2.5.5.9	0.0070	≦0.035
	At 1GHz		2.5.5.9/2.5.5.13	0.0100/0.0120	/
	At 5GHz		2.5.5.13	0.0135	/
	At 10GHz		2.5.5.13	0.0145	/
	At 15GHz		2.5.5.13	0.0155	/
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	≧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	0.40	/
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	14/14	/
Z-Axis CTE	Before Tg	PPM/℃	2.4.24	40	≦60
	After Tg	PPM/℃		225	≦300
Z-Axis CTE (50~260℃)		%	2.4.24	2.8	≦3.5
Peel Strength (HTE 1OZ)		Lb/in(N/mm)	2.4.8	8.8(1.57)	≧6(1.05)
Flexural Strength	LW	N/mm^2	2.4.4	560	≧415
	CW	N/mm^2		440	≧345
E-modulus	LW/CW	Gpa	---	24/23	/
Flexural Modulus	LW/CW	Gpa	---	22/20	/
Moisture Absorption		%	2.6.2.1	0.08	≦0.8
Flammability		-	UL94	V-0	V-0

Note: 1.Test sample is 62 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.