

KB-6165F

HIGH PERFORMANCE LAMINATES and PREPREGS

*High Reliability, CAF Resistant, Mid Tg
Glass Cloth Based Epoxy Resin
Flame Retardant Copper Clad Laminates*

Product Description

The KB-6165F is specially formulated to cope with the increasing stringent demand in high complexity, high layer count, lead-free PCB design and applications. This material includes a high performance, Mid Tg, multi-functional cured epoxy resin with inorganic fillers.

Product Features

- Glass transition temperature: ~150°C (measured by DSC)
- High Decomposition temperature: > 325 °C
- Low water absorbability
- Compatible with lead-free assembly environment passed the lead-free reflow requirement at peak temperature of 260°C
- CAF-enhanced*
- Low z-axis expansion
- Able to withstand high thermal excursion during PCB fabrication and assembly
- Provide high thermal resistance and long term thermal reliability
- Wide operating window for multilayer processing
- Excellent thermal shock reliability
- Withstand stringent requirements of accelerated Thermal Cycling and IST cycles
- UV blocking for maximum compatibility with automated optical inspection
- Dimensionally stable

* Conductive Anodic Filament testing conditions:
1000 hours at 85°C/85%RH@100V DC

Applications

- High-layer count designs
- Backplanes
- High complexity multi-layers
- PC computers
- High-end servers
- Wireless communication infrastructure
- Automotive applications requiring high thermal resistance

Laminates Specification of KB-6165F

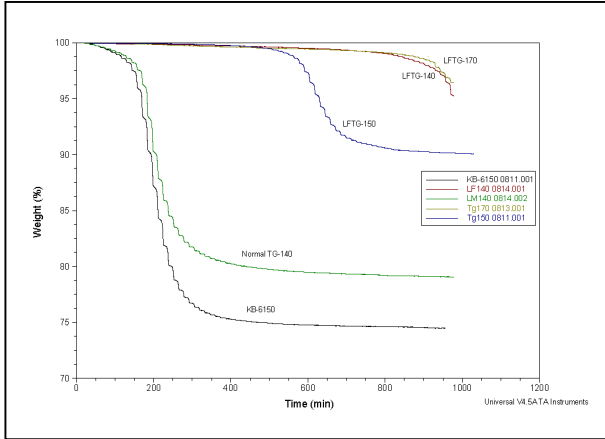
Property	Typical Value	IPC-4101B/99	Typical Value	IPC-4101B/99	Units	Method
Peel Strength, minimum						
1. After thermal stress	1.22(7.00)	0.80(4.57)	1.39(8.00)	1.05(6.00)	N/mm	2.4.8.2
2. At 125°C	1.05(6.00)	0.70(4.00)	1.13(6.50)	0.70(4.00)	(lb/inch)	2.4.8.3
3. After process solution	0.87(5.00)	0.55(3.14)	0.96(5.50)	0.80(4.57)		
Volume Resistivity, minimum						
A. C-96/35/90	2.6×10^{10}	10^6	-	-	MΩ-cm	2.5.17.1
B. After moisture resistance	-	-	5.8×10^{10}	10^4		
C. At elevated temperature E-24/125	3.2×10^{10}	10^3	8.3×10^{10}	10^3		
Surface Resistivity, minimum						
A. C-96/35/90	2.7×10^7	10^4	-	-	MΩ-cm	2.5.17.1
B. After moisture resistance	-	-	8.4×10^7	10^4		
C. At elevated temperature E-24/125	5.4×10^7	10^3	5.7×10^7	10^3		
Moisture Absorption, maximum	0.08	-	0.09	0.5	%	2.6.2.1
Dielectric Breakdown, minimum	-	-	53	40	kV	2.5.6
Permittivity, maximum (Laminate & Prepreg as laminated)						
1 MHz	4.5	5.4	4.7	5.4	-	2.5.5.3
1 GHz	4.4	-	4.6	-		
Loss Tangent, minimum (Laminate & Prepreg as laminated)						
1 MHz	0.017	0.035	0.017	0.035	-	2.5.5.3
1 GHz	0.019	-	0.019	-		
Flexural Strength, minimum						
1. Length direction	-	-	519	415	N/mm ²	2.4.4
2. Cross direction	-	-	443	345		
Arc Resistance, minimum	121	60	121	60	Sec	2.5.1
Thermal Stress 10s at						
1. Unetched	Pass	Pass Visual	Pass	Pass Visual	Rating	2.4.13.1
2. De-clad	Pass	Pass Visual	Pass	Pass Visual		
Electric Strength, minimum (Laminate & Prepreg as laminated)	65	30	-	-	KV / mm	
Flammability (Laminate & Prepreg as laminated)	V-0	V-0 minimum	V-0	V-0 minimum	Rating	UL94
Glass Transition Temperature	-	-	155±5	150 minimum	°C	2.4.25
Decomposition Temperature	-	-	334	325 minimum	°C	2.4.24.6
Z-Axis CTE						
A. Alpha1	-	-	49	60 maximum	PPM/°C	2.4.24
B. Alpha2	-	-	238	300 maximum	PPM/°C	
C. 50 -260 Degree C	-	-	3.2	3.5 maximum	%	
Thermal Resistance (Copper removed)						
A. T260	-	-	117	30 minimum		
B. T288	-	-	23.5	10 minimum	Minutes	2.4.24.1
C. T300	-	-	10.3	AABUS		

Note: Data shown are nominal value for reference only.

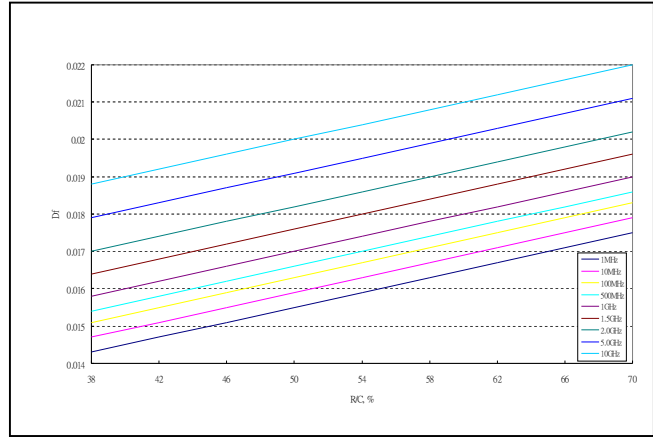
Characteristics Graph of Laminates

Thermal Cycling Test on Various Materials

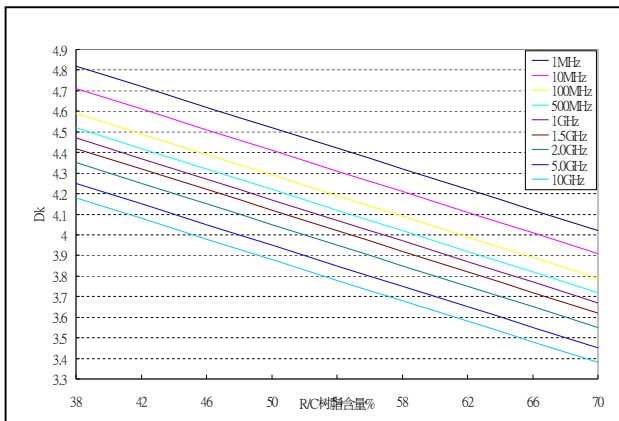
(TGA: Temp. was raised to 260°C at 10°C/min, then dropped to 200°C, and raised to 260°C, and so on and so on)



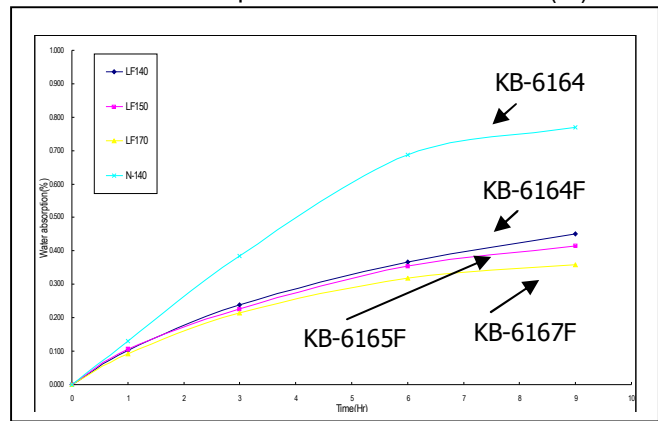
Loss Tangent



Dielectric constant



Water absorption after PCT some time (%)



Prepregs Specification of KB-6165F

Property	Typical Value	IPC-4101B/99	Units	Method
Volatile Content, maximum	0.3	0.75	%	2.3.19
Shelf Life @ Max. 50% RH, Max. 20°C	Meet requirement	90 (from delivery)	days	AABUS
Reinforcement	As per IPC-4412 or AABUS			
Prepreg Parameters			AABUS	AABUS
Flammability (as laminated)	V-0	V-0 minimum	Rating	UL94
Other	-	-	-	-

Note: 1 Recommended storage conditions: "relative humidity is below 55%" and "temperature is below 23°C".
2 AABUS = As agreed upon between user and supplier.

Laminates List of KB-6165F (Thin Cores)

Thickness	Construction	Tolerance (IPC-4101B)	Size	Copper Foil	
				Thickness	Type
0.0020"	1x106	Class C	1020*1220mm (40"*48")	1/3 oz	Reverse Treated Copper Foil (RTC)
0.0025"	1x106, 1x1078, 1x1086	Class C			
0.0027"	1x106, 1x1078, 1x1086	Class C			
0.0030"	1x1078, 1x1080, 1x1086	Class C			
0.0035"	1x2113, 1x3313, 2x106	Class C			
0.0040"	1x2116, 1x2113, 1x3313, 2x106	Class C			
0.0045"	1x2116	Class C			
0.0050"	1x2116, 1x3313, 2x1078, 2x1080, 2x1086	Class C			
0.0055"	1x2116	Class C			
0.0060"	1x1506, 2x1078, 2x1080, 2x1086	Class C			
0.0065"	1x1506	Class C			
0.0070"	1x7627, 1x7628, 2x2313, 2x3313	Class C			
0.0080"	1x7628, 2x2116, 2x2113, 2x2313, 2x3313	Class C			
0.0090"	1x7628, 2x2116	Class C			
0.0100"	2x2116	Class C			
0.0110"	2x2116	Class C			
0.0120"	2x1506	Class C			
0.0130"	2x1506	Class C			
0.0140"	2x7628	Class C			
0.0150"	2x7628	Class C			
0.0160"	2x7628	Class C			
0.0170"	2x7628, 2x7627+1x1080	Class C			

Note: All thickness measured do not include copper; and laminates of special requirements also available upon request and agreement between users and suppliers

Prepregs List of KB-6165F

Glass Fabric	Resin Content, %	Gel Time, Sec	Pressed Thickness, mil	Volatile, %
106	78.0±2.0	90±20	2.56±0.28	≤0.75
	75.0±2.0	90±20	2.22±0.22	≤0.75
	73.0±2.0	90±20	2.04±0.18	≤0.75
1080	68.0±2.0	90±20	3.17±0.24	≤0.75
	65.0±2.0	90±20	2.86±0.20	≤0.75
	63.0±2.0	90±20	2.68±0.18	≤0.75
	60.0±2.0	90±20	2.45±0.15	≤0.75
	56.0±2.0	90±20	2.18±0.13	≤0.75
	53.0±2.0	90±20	2.02±0.11	≤0.75
	2116	65.0±2.0	90±20	6.40±0.45
	63.0±2.0	90±20	6.00±0.40	≤0.75
	60.0±2.0	90±20	5.48±0.34	≤0.75
	57.0±2.0	90±20	5.03±0.29	≤0.75
	55.0±2.0	90±20	4.76±0.27	≤0.75
	53.0±2.0	90±20	4.51±0.25	≤0.75
	50.0±2.0	90±20	4.18±0.22	≤0.75
	47.0±2.0	90±20	3.89±0.18	≤0.75
2313	58.0±2.0	90±20	3.99±0.24	≤0.75
	53.0±2.0	90±20	3.48±0.19	≤0.75
3313	66.0±2.0	90±20	5.11±0.37	≤0.75
	63.0±2.0	90±20	4.63±0.31	≤0.75
	60.0±2.0	90±20	4.23±0.26	≤0.75
	57.0±2.0	90±20	3.88±0.22	≤0.75
	54.0±2.0	90±20	3.57±0.20	≤0.75
1506	51.0±2.0	90±20	6.74±0.35	≤0.75
	48.0±2.0	90±20	6.26±0.31	≤0.75
	45.0±2.0	90±20	5.83±0.28	≤0.75
7628U	48.0±2.0	90±20	8.34±0.42	≤0.75
	46.0±2.0	90±20	7.96±0.38	≤0.75
	44.0±2.0	90±20	7.60±0.36	≤0.75
7628M	48.0±2.0	90±20	7.89±0.39	≤0.75
	46.0±2.0	90±20	7.52±0.37	≤0.75
	44.0±2.0	90±20	7.18±0.34	≤0.75
7628L	48.0±2.0	90±20	7.70±0.38	≤0.75
	46.0±2.0	90±20	7.34±0.36	≤0.75
	44.0±2.0	90±20	7.01±0.33	≤0.75

Note: The width and length is 49.5" and 150 meters per roll respectively. For 106 & 1080, the length is 300 meters per roll. Other Prepreg types are also available according to customers' requirement.

Process Guideline

1 Prepreg Handling & Storage

- Shelf life is at least 3 months when Prepreg must be stored in a cool dry environment (<20°C and 50% RH).
- Prepreg exposed at atmosphere should be resealed to minimize moisture of Prepreg.
- Prepreg should be stored in dehumidifier 12 hours prior to being used.
- Prepreg supplied in rolls or panels should be stored horizontally. To avoid damage, no stacking is recommended.

2 Laminate Handling & Storage

- Laminates should be stored in a dry environment.
- Laminates should always be stored flat.

3 Oxide Treatments

- Inner layers should be baked for at least 1 hours at 100-120°C, if inner layers are not used within 24 hours after black or brown oxides treatment.

4 Laminating

- Stacks must be prepared in dry room to avoid the Prepreg absorbing moisture.
- Stacks with the core and Prepreg are recommended to use the vacuum process for 30 minutes before heated. Recommended pressure is as follow: Vacuum Hydraulic 300-400 psi, ADARA Press 200-300 psi.
- Heat ramp up rate (between 80°C-140°C) should be 1.5-2.0°C/min, and cooling rate is below 3°C/min.
- Curing condition should be maintained at 180°C or above for at least 60 minutes.
- Copper foil type HTg for the production of multilayer is recommended using.

5 Drilling

Drilling parameters mainly depend on aperture, layer thickness, layer number, copper thickness and stack height. For example, typical drilling parameters for 0.4-1.0 mm drill are as follow:

Drill machine	Hitachi ND-6L210E
Rotation Speed, RPM	105000-55000
Feed Speed, IPM	60-150
Max. Hit count, hits	1000-2000
Stack height	2-3 (4-6 Layers), 1-2 (> 8 Layers)

6 Desmear (Please consult the chemical supplier for suggested conditions)

The following Desmear parameter is also reference only:

-- Horizontal (JETCHEM)

Swell: 75°C for 100 s Mn+7: 55-65 g/l at 85°C for 180s

-- Vertical (ROHMHAAS)

Swell: 65°C for 365 s Mn+7: 65-75 g/l at 75°C for 750s