



**Glass cloth base epoxy resin
Flame retardant copper clad laminate**

NPG-180INBK

■ FEATURES

- Halogen, antimony, and red phosphorous free
- Flammability meets UL 94V-0
- Excellent long term reliability
- UV blocking type
- Superior CAF-Resistance (Anti-migration)
- Reactive type flame retardants
- High Tg (DMA above 230°C) and low C.T.E will provide excellent dimensional stability and through-hole reliability
- ANSI type: No ANSI

■ PERFORMANCE LIST

Characteristics	Unit	Condition	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	6.0 x10 ⁹	10 ⁶ ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	6.0 x10 ⁷	10 ⁴ ↑	2.5.17
Permittivity 1 MHz	-	C-24/23/50	4.2-4.8	5.4 ↓	2.5.5.9
Loss Tangent 1 MHz	-	C-24/23/50	0.010-0.016	0.035 ↓	2.5.5.9
Arc resistance	SEC	D-48/50+D-0.5/23	120 ↑	60 ↑	2.5.1
Dielectric breakdown	KV	D-48/50	60 ↑	40 ↑	2.5.6
Moisture absorption	%	D-24/23	0.20-0.25	0.7 ↓	2.6.2.1
Flammability	-	C-24/23/50+E-24/125	V-0	V-0	UL94
Peel strength 1 oz	lb/in	288°C x10" solder floating	6-9	6 ↑	2.4.8
Thermal stress	SEC	288°C solder dipping	600 ↑	10 ↑	2.4.13.1
Glass transition temp	°C	DMA	>230	N/A	2.4.24.4
Dimensional stability X-Y axis	%	E-4/105	0.01-0.03	0.05 ↓	2.4.39
Coefficient of thermal expansion					
X-Y axis	ppm/°C	TMA	11-13	N/A	2.4.24
Z-axis before Tg	ppm/°C	TMA	20-40		
Z-axis after Tg	ppm/°C	TMA	70-110		
Decomposition Temperature (Td 5% W/L)	°C	TGA	375	N/A	2.4.24.6

NOTE:

The average value in the table refers to samples of .020" 1/1.

Test method per IPC-TM-650

Data shown are nominal values for reference only.



■ CONSTRUCTION

THICKNESS		CONSTRUCTION		THICKNESS		CONSTRUCTION	
mm	mil	Glass style	plies	mm	mil	Glass style	plies
0.03	1.2	1027	1	0.25 3P	10	3313	3
0.04	1.6	1037	1	0.30	12	2116	3
0.05 SP	2	1067	1	0.40 4P	16	2116	4
0.05 2P	2	1027	2	0.50 5P	20	2116	5
0.06 1P	2.5	1078	1	0.60 6P	24	2116	6
0.06 2P	2.5	1037	2	0.70 7P	28	2116	7
0.08 BP	3.5	1067	2	0.8 8P	31.5	2116	8
0.10 2P	4	1078	2	0.9 9P	36	2116	9
0.13 2P	5	1078	2	1.0 10P	40	2116	10
0.15 3P	6	1078	3	1.1 11P	44	2116	11
0.20	8	2116	2	1.2 12P	47	2116	12
0.20 4P	8	1078	4				

■ PRODUCT SIZE & THICKNESS

THICKNESS	COPPER CLADDING	SIZE		THICKNESS TOLERANCE
inch(mm)	oz (μm)	inch	mm	
0.0012(0.03)	B(2)	48.8 x 36.6	1240 x 0930	IPC-4101E SPEC CLASS C/M
to	to	48.8 x 40.5	1240 x 1030	
0.047(1.2)	3(102)	48.8 x 42.5	1240 x 1080	

■ Keeping the core and prepreg in the same grain direction is crucial to ensure the flatness of multilayer boards.

■ Grain direction is shown on the certificate of conformance



**Glass cloth base epoxy resin
Flame retardant prepreg**

NPG-180INBKB

■ FEATURES

- Rheology of resin controlled to benefit the lamination of the boards.
- Modified phosphorous epoxy provides excellent heat and chemical resistance.
- Black color.

■ PERFORMANCE LIST

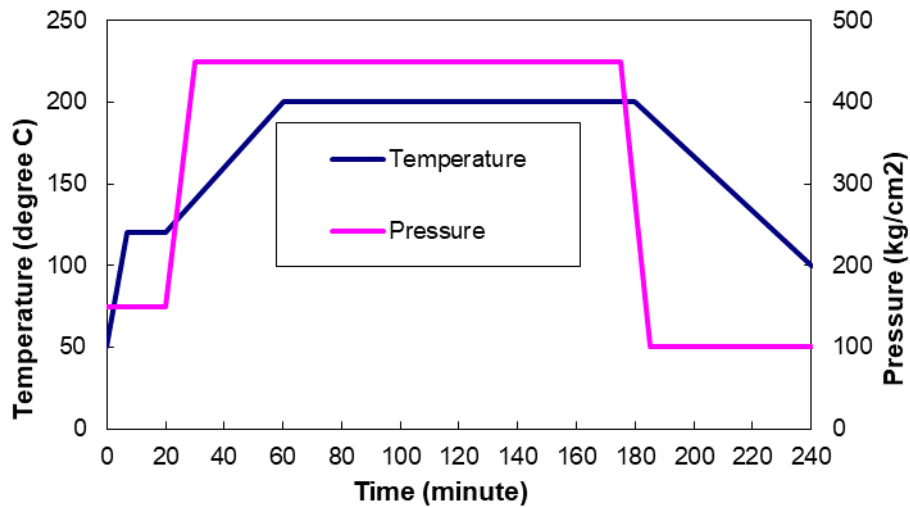
Specification: IPC-4101E is applicable

Data shown are nominal values for reference only

Glass style	RC%	After Pressed Thickness (100%Cu, per ply)	
		mm	mil
1017	74 ± 2	0.025	1.0
1017MR	76 ± 2	0.028	1.1
1017HR	79 ± 2	0.032	1.3
1027	74 ± 2	0.041	1.6
1027MR	76 ± 2	0.044	1.7
1027HR	79 ± 2	0.051	2.0
1037	71 ± 2	0.045	1.8
1037MR	75 ± 2	0.053	2.1
1037HR	77 ± 2	0.058	2.3
106	71 ± 2	0.045	1.8
106MR	75 ± 2	0.053	2.1
106HR	77 ± 2	0.058	2.3
1067	71 ± 2	0.057	2.2
1067MR	75 ± 2	0.067	2.6
1067HR	77 ± 2	0.073	2.9
1078	65 ± 2	0.073	2.9
1078MR	68 ± 2	0.081	3.2
1078HR	71 ± 2	0.091	3.6
1080	65 ± 2	0.073	2.9
1080MR	68 ± 2	0.081	3.2
1080HR	71 ± 2	0.091	3.6
2112	63 ± 2	0.100	3.9
2116	53 ± 2	0.113	4.4
2116MR	57 ± 2	0.126	5.0
2116HR	61 ± 2	0.141	5.6
1506	51 ± 2	0.167	6.6



Recommended press cycles:



Suggestions:

1. Heating rate of material between 90°C(194°F) and 130°C(266°F)
1-3°C/min (1.8~5.4°F/min) is acceptable.
1.5-2.0°C/min (2.7~3.6°F/min) would be better.
2. Temperature of material over 190°C(374°F) must be held for at least 60min to allow resin to fully cure.
3. The pressure should be kept below 100psi during cooling to ambient temperature.
4. Cooling rate of material should be kept under 2.5°C/min (4.5°F/min) when the temperature of material is over 100°C(212°F), in order to avoid introducing twist.



**Glass cloth base epoxy resin
Flame retardant prepreg**

NPG-180INB

■ FEATURES

- Rheology of resin controlled to benefit the lamination of the boards.
- Modified phosphorous epoxy provides excellent heat and chemical resistance.
- Tg: DMA above 200°C
- Nature color

■ PERFORMANCE LIST

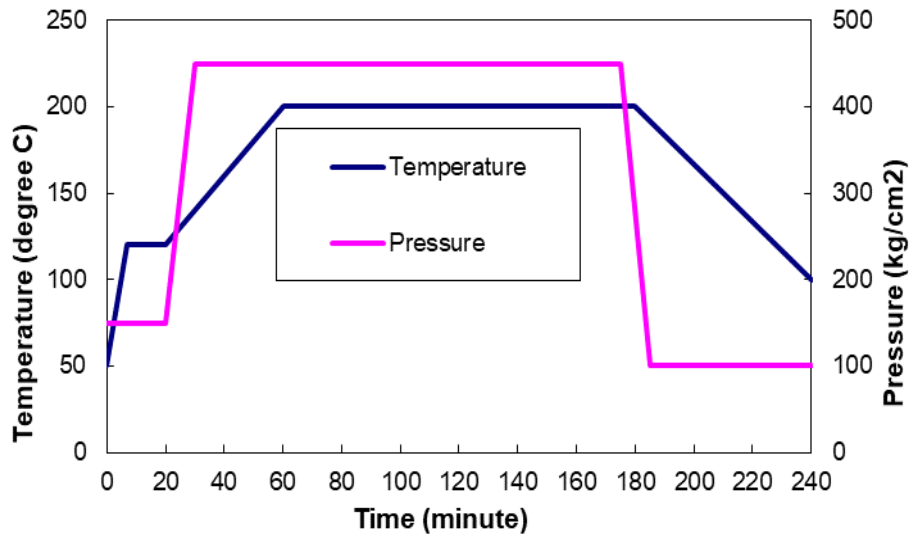
Specification: IPC-4101E is applicable

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Glass style	RC%	After Pressed Thickness (100%Cu, per ply)	
		mm	mil
1506MR	55 ± 3	0.186 ± 0.01	7.2 ± 0.4
1506	51 ± 3	0.168 ± 0.01	6.5 ± 0.4
2116HR	61 ± 3	0.140 ± 0.01	5.5 ± 0.4
2116MR	57 ± 3	0.125 ± 0.01	4.9 ± 0.4
2116	53 ± 3	0.113 ± 0.01	4.4 ± 0.4
2112	63 ± 3	0.101 ± 0.008	4.0 ± 0.3
1080HR	71 ± 3	0.090 ± 0.008	3.5 ± 0.3
1080MR	68 ± 3	0.080 ± 0.008	3.2 ± 0.3
1080	65 ± 3	0.073 ± 0.008	2.9 ± 0.3
1078HR	71 ± 3	0.090 ± 0.008	3.5 ± 0.3
1078MR	68 ± 3	0.080 ± 0.008	3.2 ± 0.3
1078	65 ± 3	0.073 ± 0.008	2.9 ± 0.3
1067HR	77 ± 3	0.073 ± 0.008	2.9 ± 0.3
1067MR	75 ± 3	0.067 ± 0.008	2.7 ± 0.3
1067	71 ± 3	0.057 ± 0.008	2.3 ± 0.3
106HR	77 ± 3	0.058 ± 0.008	2.3 ± 0.3
106MR	75 ± 3	0.053 ± 0.008	2.1 ± 0.3
106	71 ± 3	0.045 ± 0.008	1.8 ± 0.3
1037HR	77 ± 3	0.058 ± 0.008	2.3 ± 0.3
1037MR	75 ± 3	0.053 ± 0.008	2.1 ± 0.3
1037	71 ± 3	0.045 ± 0.008	1.8 ± 0.3
1027HR	79 ± 3	0.050 ± 0.008	2.0 ± 0.3
1027MR	76 ± 3	0.045 ± 0.008	1.7 ± 0.3
1027	74 ± 3	0.040 ± 0.008	1.6 ± 0.3
1017HR	79 ± 3	0.032 ± 0.008	1.3 ± 0.3
1017MR	76 ± 3	0.028 ± 0.008	1.1 ± 0.3
1017	74 ± 3	0.025 ± 0.008	1.0 ± 0.3



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■ CERTIFICATION UL

- UL File No.: E98983
- UL 746 Recognition

Minimum Material Thickness inch (mm)	Clad cond. Thickness		Max. Area Diameter inch (mm)	Solder Lts		UL 94 Flame Class
	Min.	Max.		Temp	Time	
	mils (μm)	mils (μm)		°C	sec	
0.0012 (0.03)	0.12 (3)	4.08 (102)	2.0 (50.8)	288	30	94V-0