



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

NPG-180INBK

■ FEATURES

- Halogen, antimony, and red phosphorous free
- Flammability meets UL 94 V-0
- Excellent long term reliability
- UV blocking type
- Superior CAF-Resistance (Anti-migration)
- Reactive type flame retardants
- High Tg (DMA above 240±10°C) and low C.T.E will provide excellent dimensional stability and through-hole reliability
- ANSI type : No ANSI

■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	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	%	C-24/23	0.20-0.25	0.7 ↓	2.6.2.1
Flammability	-	C-24/23/50+E-24/125	94V0	94V0	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	240±10	N/A	2.4.25
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	30-50		
Z-axis after Tg	ppm/°C	TMA	80-120		
Decomposition Temperature (Td 5% W/L)	°C	TGA	375	N/A	2.4.24.6

Data shown are nominal values for reference only.

NOTE:

The average value in the table refers to samples of .020" 1/1.
 Test method per IPC-TM-650



■ **CONSTRUCTION:**

THICKNESS		CONSTRUCTION		THICKNESS		CONSTRUCTION	
mm	mil	Glass style	plies	mm	mil	Glass style	plies
0.03	1.2	1027	1	0.2	8	2116	2
0.04	1.6	1037	1	0.2 4P	8	1078	4
0.05 1P	2	1078	1	0.25	10	2313	3
0.05 2P	2	1027	2	0.3	12	2116	3
0.06 1P	2.5	1078	1	0.4	16	2116	4
0.06 2P	2.5	1037	2	0.6	24	2116	6
0.10	4	1078	2	0.7 7P	28	2116	7
0.15 2P	6	2112	2	0.7 8P	28	2116	8
0.15 3P	6	1078	3	0.8	31.5	2116	8

■ **PRODUCT SIZE & THICKNESS**

THICKNESS	COPPER CLADDING	SIZE		THICKNESS TOLERANCE
INCH(mm)	OZ (µm)	INCH	mm	
0.0012(0.03)	3/8 (12)	48.8 x 36.6	1240 x 0930	IPC-4101C SPEC CLASS C/M
to	to	48.8 x 40.5	1240 x 1030	
0.047(1.2)	3.0 (105)	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 copper clad laminate**

NPG-180INB(BP)

■ FEATURES

- Rheology of resin controlled to benefit the lamination of the boards.
- Modified phosphorous epoxy provides excellent heat and chemical resistance.
- Tg: DMA above 230°C.

■ PERFORMANCE LIST

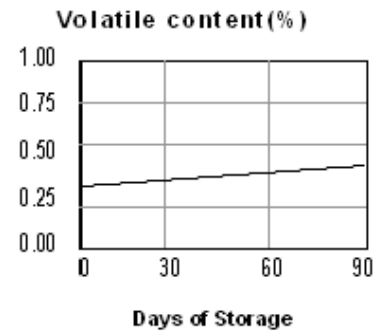
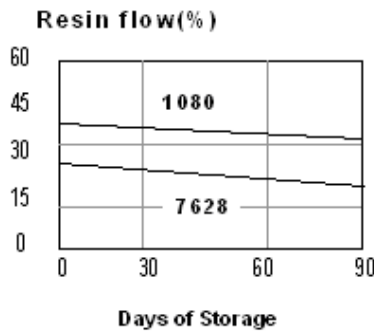
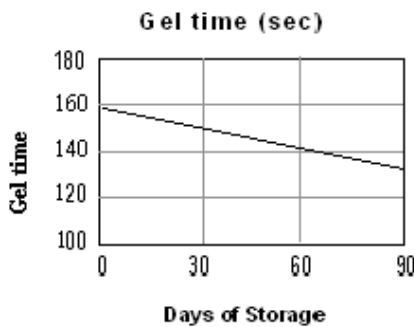
Specification : IPC-4101C is applicable

Glass style	RC%	RF%	GT sec (171°C)	VC%	After Pressed Thickness (100%Cu,per ply)	
					mm	Mil
7628	46 ± 3	25 ± 5	160 ± 20	0.75 ↓	0.189 ± 0.01	7.5 ± 0.4
1506	51 ± 3	30 ± 5			0.168 ± 0.01	6.6 ± 0.4
2116HR	61 ± 3	40 ± 5			0.140 ± 0.01	5.5 ± 0.4
2116MR	57 ± 3	37 ± 5			0.125 ± 0.01	4.9 ± 0.4
2116	53 ± 3	30 ± 5			0.113 ± 0.01	4.4 ± 0.4
2112	63 ± 3	30 ± 5			0.101 ± 0.008	4.0 ± 0.3
1080HR	71 ± 3	42 ± 5			0.090 ± 0.008	3.5 ± 0.3
1080MR	68 ± 3	37 ± 5			0.080 ± 0.008	3.2 ± 0.3
1080	65 ± 3	35 ± 5			0.073 ± 0.008	2.9 ± 0.3
106HR	77 ± 3	45 ± 5			0.058 ± 0.008	2.3 ± 0.3
106MR	75 ± 3	42 ± 5			0.053 ± 0.008	2.1 ± 0.3
106	71 ± 3	35 ± 5			0.045 ± 0.008	1.8 ± 0.3
1037HR	77 ± 3	40 ± 5			0.058 ± 0.008	2.3 ± 0.3
1037	71 ± 3	35 ± 5			0.045 ± 0.008	1.8 ± 0.3
1027HR	79 ± 3	40 ± 5			0.050 ± 0.008	2.0 ± 0.3
1027	74 ± 3	30 ± 5			0.040 ± 0.008	1.76 ± 0.3
1015HR	79 ± 3	40 ± 5			0.045 ± 0.008	1.78 ± 0.3
1015	74 ± 3	30 ± 5			0.036 ± 0.008	1.41 ± 0.3
1000 \$	74 ± 3	30 ± 5			0.023 ± 0.008	0.093 ± 0.3

\$ Under assessment

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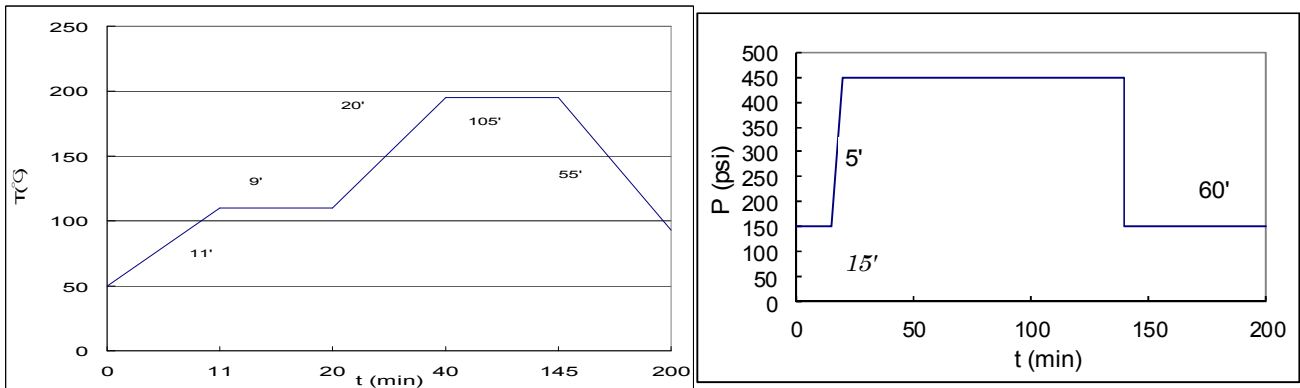
■ Storage Stability



Storage Condition :20°C 50% RH for 3 months
 : Max 5°C for 6 months



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 180°C(356°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.

■ CERTIFICATION UL

• UL File No. : E98983 • ANSI TYPE:No ANSI

UL 746 Recognition

Minimum Material Thickness inch (mm)	Clad cond. Thickness Min. Max. Mils Mils (mic) (mic)		Max. Area Diameter Inch (mm)	Sold Lts Temp Time °C sec	UL 94 Flame class	Max. Operating Temp
0.002 (0.051)	0.68 (17)	4.08 (102)	2.0 (50.8)	288 30	94V-0	130