



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

NPG-186

■FEATURES

- Very low dissipation factor at high frequency range
- High Tg 210°C↑ (DMA) and low CTE
- Halogen and antimony free
- Excellent dimensional stability and through-hole reliability
- Flammability: UL 94V-0
- Application: server, storage, router and switch

■PERFORMANCE LIST

Characteristics	Unit	Condition		Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90		5x10 ⁹	10 ⁶ ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90		5 x10 ⁷	10 ⁴ ↑	2.5.17
Permittivity 3GHz (RC54.0%)	-	C-24/23/50		3.68	-	2.5.5.13
Permittivity 10GHz (RC54.0%)		C-24/23/50		3.66	-	2.5.5.13
Loss tangent 3GHz (RC54.0%)	-	C-24/23/50		0.004	-	2.5.5.13
Loss tangent 10GHz (RC54.0%)		C-24/23/50		0.005	-	2.5.5.13
Arc resistance	SEC	D-48/50+D-0.5/23		120 ↑	60 ↑	2.5.1
Dielectric breakdown	KV	D-48/50		45↑	40 ↑	2.5.6
Moisture absorption	%	D-24/23	<0.53mm	0.12	-	2.6.2.1
Flammability	-	C-48/23/50		V-0	V-0	UL94
Peel strength 1 oz (≥0.5mm)	lb/in	288°Cx10" solder floating		5~6	2.5 ↑	2.4.8
Heat resistance	SEC	288°Csolder dipping		300 ↑	10 ↑	2.4.13.1
Glass transition temp	°C	DMA		>210	210 ↑	2.4.24.4
	°C	TMA		>180	180 ↑	2.4.24
Coefficient of thermal expansion						
Z-axis before Tg	ppm/°C	TMA		40-60	N/A	2.4.24
Z-axis after Tg	ppm/°C	TMA		200-250		
Decomposition temperature (Td 5% W/L)	°C	TGA, 10°C/min		>400	325 ↑	2.4.24.6

NOTE:

The average value in the table refers to samples of 0.008"(0.20mm) 1/1.
Test method per IPC-TM-650

Data shown are nominal values for reference only.



■ CONSTRUCTION

THICKNESS mm mil		CONSTRUCTION		THICKNESS mm mil		CONSTRUCTION	
0.05	2	1067	1 ply	0.18	7	1086	2 plies
0.06 1p	2.5	1078	1 ply	0.20	8	3313	2 plies
0.08	3	1086	1 ply	0.25	10	2116	2 plies
0.09 1p	3.5	1086	1 ply	0.30	12	3313	3 plies
0.09 2p	3.5	1037	2 plies	0.35	14	3313	3 plies
0.10	4	3313	1 ply	0.38	15	2116	3 plies
0.10 2p	4	1067	2 plies	0.40	16	3313	4 plies
0.13 1p	5	2116	1 ply	0.45	18	3313	4 plies
0.13	5	1078	2 plies	0.50	20	3313	5 plies
0.15	6	1078	2 plies	0.53	21	3313	5 plies

Requirement for not listed glass fabrics types, please contact our technical customer service team for discussion in advance.

■ PRODUCT SIZE & THICKNESS

THICKNESS inch (mm)	COPPER CLADDING oz (μm)	SIZE		THICKNESS TOLERANCE
		inch	mm	
0.002(0.05) to 0.021 (0.53)	3/8 (12)	48.8 x 36.6	1240 x 0930	IPC-4101E SPEC CLASS C/M
	0.5 (17)	48.8 x 40.5	1240 x 1030	
	1.0 (35)	48.8 x 42.5	1240 x 1080	
	2.0 (70)			

■ 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.

■ CERTIFICATION UL

- UL File No.: E98983



Glass cloth base modified epoxy resin
Flame retardant prepreg

NPG-186B

■ FEATURES

- Rheology of resin controlled to benefit the lamination of the multilayers.
- Halogen and antimony free
- Modified epoxy provides excellent heat and chemical resistance.

■ PERFORMANCE LIST

Specification: IPC-4101E is applicable

Data shown are nominal values for reference only

Glass style	RC%	After Pressed Thickness (per ply)	
		mm	mil
2116HR	60	0.158 ± 0.01	6.23 ± 0.4
2116MR	56	0.140 ± 0.01	5.53 ± 0.4
2116	54	0.133 ± 0.01	5.22 ± 0.4
2113	58	0.111 ± 0.01	4.36 ± 0.4
3313	57	0.112 ± 0.01	4.39 ± 0.4
1080HR	70	0.103 ± 0.008	4.03 ± 0.3
1080MR	67	0.092 ± 0.008	3.60 ± 0.3
1080TR	65	0.085 ± 0.008	3.36 ± 0.3
1078HR	70	0.103 ± 0.008	4.03 ± 0.3
1078MR	67	0.092 ± 0.008	3.60 ± 0.3
1078TR	65	0.085 ± 0.008	3.36 ± 0.3
1067HR	76	0.083 ± 0.008	3.26 ± 0.3
1067MR	74	0.076 ± 0.008	2.98 ± 0.3
1067	70	0.064 ± 0.008	2.52 ± 0.3
106HR	76	0.066 ± 0.008	2.61 ± 0.3
106MR	74	0.061 ± 0.008	2.38 ± 0.3
1037HR	76	0.066 ± 0.008	2.61 ± 0.3
1037MR	74	0.061 ± 0.008	2.38 ± 0.3
1035SR	78	0.088 ± 0.008	3.48 ± 0.3
1035HR	76	0.080 ± 0.008	3.15 ± 0.3
1035MR	74	0.073 ± 0.008	2.88 ± 0.3

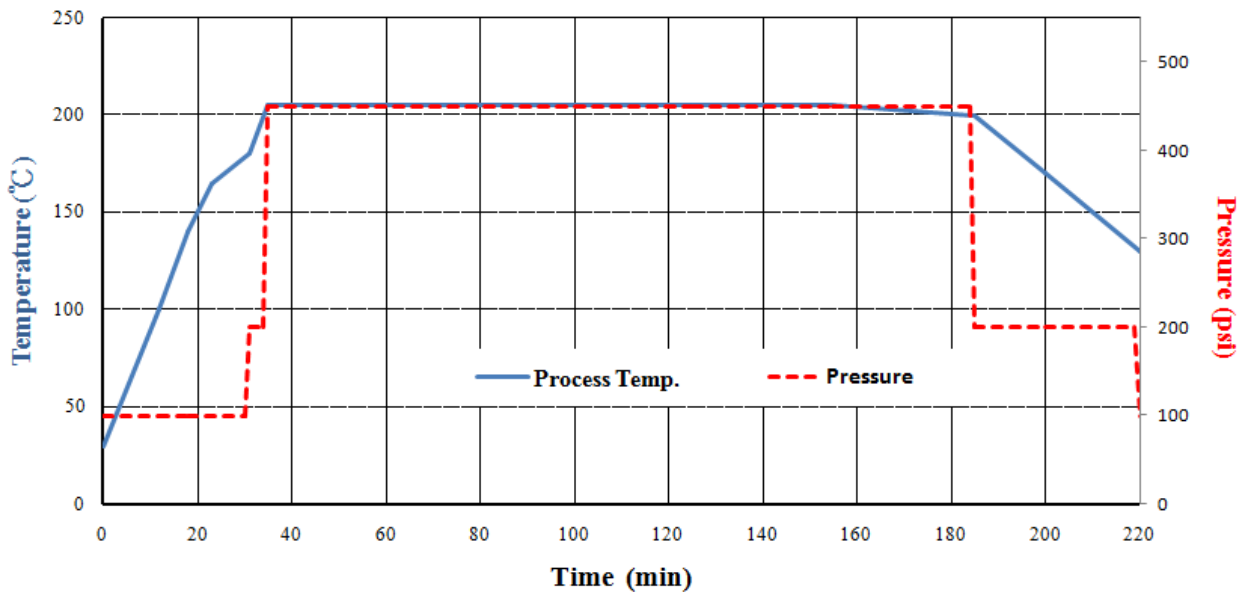
Requirement for not listed glass fabrics types, please contact our technical customer service team for discussion in advance.

■ Storage Stability

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



Recommended press cycles:



Suggestions:

1. Heating rate (110°C~150°C)
3.5°C/min is acceptable.
4.0°C/min is preferred.
2. Product temperature should be kept at higher **205°C** for more than 90 min to fully cure resin.
3. Pressure should be up to **450psi**, high pressure is better for resin flowing and filling in the gaps.
4. Pressure should be kept below 200psi during cooling period.
5. Vacuum should be kept for at least 30 min from start.
6. Cushion for pressure evenness is needed.