



NAN YA PLASTICS CORPORATION

ELECTRONIC MATERIALS DIVISION.

COPPER CLAD LAMINATE DEPARTMENT

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

NO. 201. TUNG HWA N. ROAD,
TAIPEI, TAIWAN.

NPG-R

■ FEATURES

- Halogen, antimony, and red phosphorous free
- Flammability meets UL 94 V-0
- Excellent long term reliability
- UV blocking type
- Reactive type flame retardants
- High Tg and lower C.T.E will provide excellent through-hole reliability
- Superior CAF-Resistance (Anti-migration)

■ PERFORMANCE LIST

haracteristics		Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity		MΩ-cm	C-96/35/90	5 x10 ⁸ ~ 5x10 ⁹	10 ⁶ ↑	2.5.17
Surface resistivity		MΩ	C-96/35/90	5 x10 ⁶ ~ 5x10 ⁷	10 ⁴ ↑	2.5.17
Permittivity 1MHZ		-	C-24/23/50	4.6-4.8	5.4 ↓	2.5.5.9
Permittivity 1GHZ		-	C-24/23/50	4.1-4.3	-	2.5.5.9
Loss Tangent 1MHZ		-	D-24/23/50	0.014-0.016	0.035 ↓	2.5.5.9
Loss Tangent 1GHZ		-	D-24/23/50	0.012-0.014	-	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	0.05-0.10	0.35 ↓	2.6.2.1
Flammability		-	C-48/23/50	94V0	94V0	UL94
Peel strength 1 oz		lb/in	288°Cx10" solder floating	7-9	6 ↑	2.4.8
Thermal stress		SEC	288°C solder dipping	200 ↑	10 ↑	2.4.13.1
Pressure cooker (2 atm 120°C)	1/2 hr	SEC	288°C dipping	150 ↑	N/A	-
	1 hr	SEC	288°C dipping	150 ↑	N/A	-
	2 hr	SEC	288°C dipping	150	N/A	-
Flexural strength	LW	N/mm ²	A	430-500	415 ↑	2.4.4
	CW	N/mm ²	A	350-420	345 ↑	2.4.4
Dimensional stability X-Y axis		%	E-0.5/170	0.005-0.030	0.050 ↓	2.4.39
Coefficient of thermal expansion						
X-Y axis		ppm/°C	TMA	9-13	N/A	2.4.24
Z-axis before Tg		ppm/°C	TMA	30-50		
Z-axis after Tg		ppm/°C	TMA	200-230		
Glass transition temp		°C	DSC	150± 5	N/A	2.4.25

Data shown are nominal values for reference only.

NOTE:

The average value in the table refers to samples of .062" 1/1.

Test method per IPC-TM-650



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NPG-TL

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- Halogen, antimony, and red phosphorous free
- Flammability meets UL 94 V-0
- Excellent long term reliability
- UV blocking type
- Reactive type flame retardants
- High Tg and lower C.T.E will provide excellent through-hole reliability
- Superior CAF-Resistance (Anti-migration)

■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	5.0 x10 ⁹	10 ⁶ ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	5.0 x10 ⁷	10 ⁴ ↑	2.5.17
Permittivity 1 MHZ	-	C-24/23/50	4.2-4.4	5.4 ↓	2.5.5.9
Permittivity 1 GHZ	-	C-24/23/50	3.8-4.0	-	2.5.5.9
Loss Tangent 1 MHZ	-	C-24/23/50	0.014-0.016	0.035 ↓	2.5.5.9
Loss Tangent 1 GHZ	-	C-24/23/50	0.012-0.014	-	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	0.20-0.30	0.35 ↓	2.6.2.1
Flammability	-	C-48/23/50	94V0	94V0	UL94
Peel strength 1 oz	lb/in	288°C x10" solder floating	7-9	6 ↑	2.4.8
Thermal stress	SEC	288°C solder dipping	200 ↑	10 ↑	2.4.13.1
Glass transition temp	°C	DSC	150 ± 5	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	9-13	N/A	2.4.24
Z-axis before Tg	ppm/°C	TMA	30-50		
Z-axis after Tg	ppm/°C	TMA	200-230		

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		mm	mil	
0.05	2	106 1 PLY	0.35	14	7628 2 plies
0.08	3	2112 1PLY	0.38	15	7628 2 plies
0.10	4	1080 2 plies	0.45	18	7628x2+1080x1
0.11	4	2116 1 ply	0.50	20	7628 3 plies
0.13	5	1080 2 plies	0.53	21	7628 3 plies
0.13sp	5	2116 1 ply	0.60	24	7628 3 plies
0.15	6	1506 1 ply	0.77	31	7628 4 plies
0.16	6	2112 2 plies	0.8	32	7628 4 plies
0.21	8	7628 1 ply	0.9	36	7628 5 plies
0.26	10	2116 2 plies	1.0	39	7628 5 plies
0.30	12	2116 3 plies	1.1	43	7628 6 plies
0.30sp	12	1506 2 plies	1.2	47	7628 6 plies

• 1.2, 1.1, 1.0, 0.9 0.77 mm THICKNESS INCLUDE CLADDING, ALL OTHERS EXCLUDE CLADDING

■ PRODUCT SIZE & THICKNESS

THICKNESS INCH(mm)	COPPER CLADDING		SIZE		THICKNESS TOLERANCE
	OZ (µm)		INCH	mm	
0.004 (0.1)	H (17)	2.0 (70)	48.8 x 36.6	1240 x 0930	IPC-4101C SPEC CLASS C/M
to		1.0 (35) 3.0 (105)	48.8 x 40.5	1240 x 1030	
0.039 (1.0)			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.



Issued : 2008-03-01

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

NPG-B PREPREG

■ FEATURES

- Halogen, antimony, and red phosphorous free
- Rheology of resin controlled to benefit the lamination of the boards.
- Modified phosphorous epoxy provides excellent heat and chemical resistance.
- Higher Tg: 150±5°C
- Other properties are similar to standard FR-4

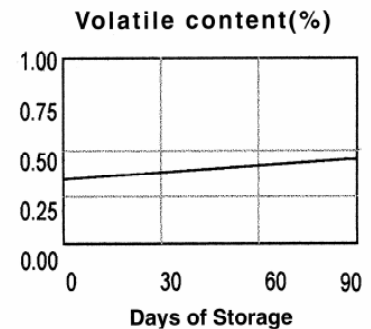
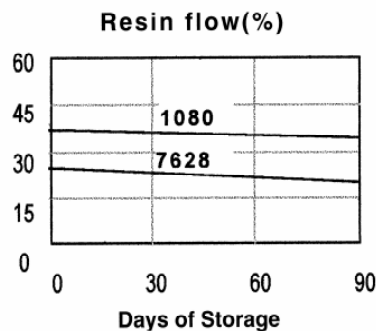
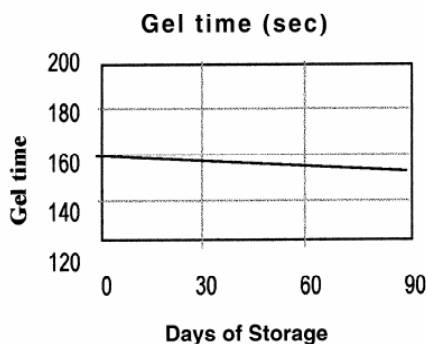
■ PERFORMANCE LIST

Specification : IPC-4101C is applicable

Glass style	RC%	RF%	GT sec (170°C)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	50 ± 3	26 ± 5	160 ± 20	0.75 ↓	0.193 ± 0.01	7.6 ± 0.4
7628MR	47 ± 3	21 ± 5			0.183 ± 0.01	7.2 ± 0.4
7628	43 ± 3	15 ± 5			0.173 ± 0.01	6.8 ± 0.4
1506MR	52 ± 3	30 ± 5			0.157 ± 0.01	6.2 ± 0.4
1506	48 ± 3	21 ± 5			0.145 ± 0.01	5.7 ± 0.4
2116HR	58 ± 3	33 ± 5			0.120 ± 0.01	4.7 ± 0.4
2116MR	54 ± 3	28 ± 5			0.109 ± 0.01	4.3 ± 0.4
2116	50 ± 3	21 ± 5			0.097 ± 0.01	3.8 ± 0.4
2113	56 ± 3	27 ± 5			0.081 ± 0.01	3.2 ± 0.4
2112	60 ± 3	31 ± 5			0.069 ± 0.008	2.7 ± 0.3
1080HR	68 ± 3	44 ± 5			0.064 ± 0.008	2.5 ± 0.3
1080MR	65 ± 3	38 ± 5			0.061 ± 0.008	2.4 ± 0.3
1080	62 ± 3	32 ± 5			0.058 ± 0.008	2.3 ± 0.3
106	68 ± 3	33 ± 5			0.046 ± 0.008	1.8 ± 0.3
* 1086	62 ± 3	35 ± 5			0.066 ± 0.008	2.6 ± 0.3
* 1067	68 ± 3	34 ± 5			0.049 ± 0.008	1.9 ± 0.3
* 1078	62 ± 3	32 ± 5			0.058 ± 0.008	2.3 ± 0.3

*Laser drillable prepreg

Storage Stability

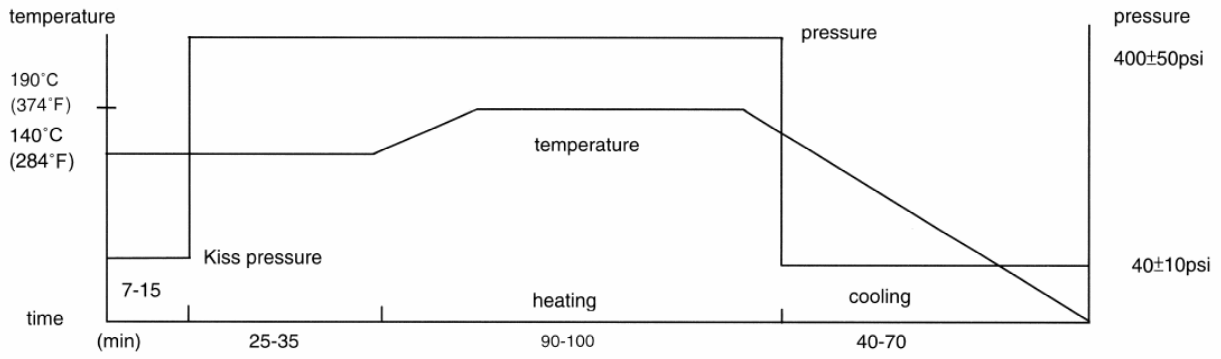


Storage Condition : 20°C 50% RH for 3 months
: Max 5°C for 6 months

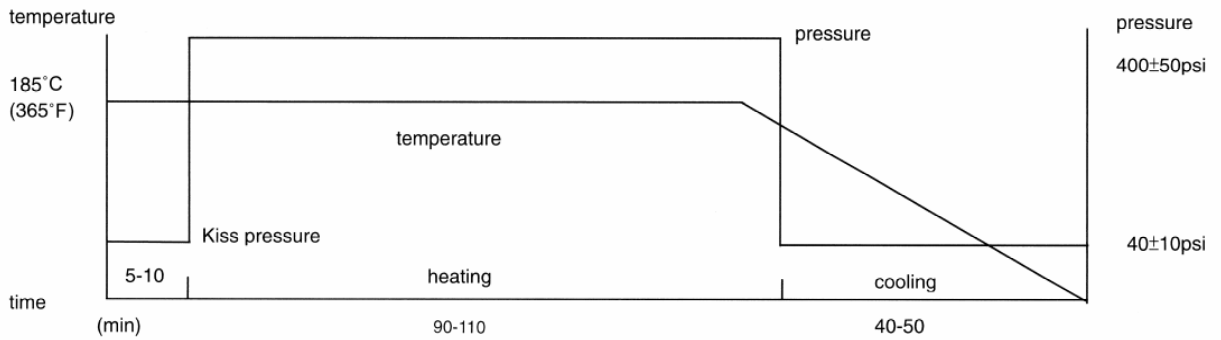
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Recommended press cycles:

A:2T2P(2 temperature step/2 pressure step)



B:1T2P(1 temperature step/2 pressure step)



Suggestions:

1. Heating rate of material between 70°C(158°F) and 140°C(284°F).
 1-3°C/min (1.8~5.4°F/min) is acceptable.
 1.5-2.5°C/min (2.7~4.5°F/min) would be better.
2. Temperature of material over 170°C(338°F) must be held for at least 60 min 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: FR-4

UL 746 Recognition

Minimum Material Thickness Inch (mm)	Clad cond. Thickness min. max. mils mils (mic) (mic)		Max. Area Diameter inch (mm)	Max. Operating Temp	Sold Lts Temp Time °C sec	UL 94 Flame class
0.002 (0.051)	0.59 (15)	4.02 (102)	2.0 (50.8)	130	288 30	94V-0