NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION.
COPPER CLAD LAMINATE DEPARTMENT
NO. 390 SEC 6 NANJING E RD, NEIHU DISTRICT, TAIPEI, TAIWAN

Issued: 2012/02/04
New: 2026/08/13

Glass cloth base epoxy resin
Flame retardant copper clad laminate

NPG-170DR

■ 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 170℃(DSC) and low C.T.E will provide excellent dimensional stability and through-hole reliability
- IPC-4101E L127/128

■ PERFORMANCE LIST

Characteristics		Unit	Condition	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 1GHz		-	C-24/23/50	4.0-4.1	-	2.5.5.9
Loss Tangent 1GHz		-	D-24/23/50	0.005-0.006	-	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	45↑	40↑	2.5.6
Moisture absorption		%	D-24/23	0.05-0.10	0.8↓	2.6.2.1
Flammability		-	C-48/23/50	V-0	V-0	UL94
Peel strength 1 oz (≥0.5mm)		lb/in	288℃x10" solder floating	7-8	6↑	2.4.8
Thermal stress		SEC	288℃ solder dipping	600↑	10↑	2.4.13.1
Pressure cooker (2 atm 120℃)	1/2 hr	SEC	288℃ dipping	600↑	N/A	-
	1 hr	SEC	288℃ dipping	600↑	N/A	-
	2 hrs	SEC	288℃ dipping	600↑	N/A	-
Flexural strength	LW	N/mm^2	A	475-550	415↑	2.4.4
	CW	N/mm^2	A	360-440	345↑	2.4.4
Dimensional stability X-Y axis		%	E-2/150	0.005-0.030	0.050↓	2.4.39
Coefficient of thermal expansion X-Y axis Z-axis before Tg Z-axis after Tg 50-260℃		 ppm/℃ ppm/℃ ppm/℃ %	 TMA TMA TMA TMA	 9-13 30-40 200-230 2.4	N/A	2.4.24
Glass transition temperature		℃	DSC	170 ± 5	N/A	2.4.25
			TMA	160↑	N/A	2.4.24
Decomposition temperature (Td 5% W/L)		℃	TGA	380	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 .062" 1/1.
Test method per IPC-TM-650

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Issued: 2012/02/04
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Glass cloth base epoxy resin
Flame retardant copper clad laminate

NPG-170DTL

■ 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 170℃ (DSC) and low C.T.E will provide excellent dimensional stability and through-hole reliability
- IPC-4101E L127/128

■ PERFORMANCE LIST

Characteristics	Unit	Condition	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 (RC50%/70%) 10GHz (Cavity Resonator) Impedance simulation Er	-	C-24/23/50	3.81/3.30 3.2	-	2.5.5.13
Loss tangent (RC50%/70%) 10GHz (Cavity Resonator)	-	C-24/23/50	0.0070/0.0070	-	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	0.20-0.30	0.8 ↓	2.6.2.1
Flammability	-	C-48/23/50	V-0	V-0	UL94
Peel strength 1 oz (≥0.5mm)	lb/in	288℃x10" solder floating	7-8	6 ↑	2.4.8
Thermal stress	SEC	288℃ solder dipping	600 ↑	10 ↑	2.4.13.1
Glass transition temperature	℃	DSC	170 ± 5	N/A	2.4.25
		TMA	160 ↑	N/A	2.4.24
Dimensional stability X-Y axis	%	E-4/105	0.01-0.03	0.05 ↓	2.4.39
Coefficient of thermal expansion X-Y axis Z-axis before Tg Z-axis after Tg 50-260℃	 ppm/℃ ppm/℃ ppm/℃ %	 TMA TMA TMA TMA	 9-13 30-40 200-230 2.4	N/A	2.4.24
Decomposition temperature (Td 5% W/L)	℃	TGA	380	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 mm	mil	CONSTRUCTION		THICKNESS mm	mil	CONSTRUCTION	
0.05 sp	2	1067	1 ply	0.20 2p	8	3313	2 plies
0.08 1p	3	1086	1 ply	0.26	10	2116	2 plies
0.10	4	1080	2 plies	0.30 3p	12	3313	3 plies
0.11	4	2116	1 ply	0.35 4p	14	3313	4 plies
0.13	5	1080	2 plies	0.38 4p	15	3313	4 plies
0.13 sp	5	2116	1 ply	0.45 4p	18	2116	4 plies
0.15 2p	6	1086	2 plies	0.50 5p	20	3313	5 plies
0.18 2p	7	3313	2 plies	0.53 5p	21	2116	5 plies

・Construction with glass fabrics type thicker than 2116 (excluded) is not recommended.

・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 inch	mm	THICKNESS TOLERANCE
0.002 (0.05) to 0.039 (1.0)	H (17) 1.0 (35) 2.0 (70) 3.0 (102)	48.8 x 36.6 48.8 x 40.5 48.8 x 42.5	1240 x 0930 1240 x 1030 1240 x 1080	IPC-4101E SPEC CLASS C/M

■ **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.**

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Glass cloth base epoxy resin
Flame retardant prepreg

NPG-170DB

■ 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.
- Tg: 170±5℃

■ PERFORMANCE LIST

Specification: IPC-4101E is applicable
Data shown are nominal values for reference only.

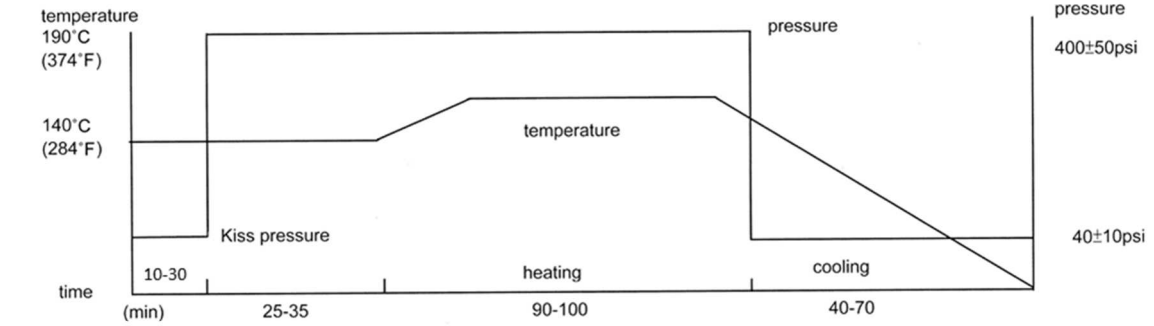
Glass style	RC%	GT sec (171℃)	VC%	After Pressed Thickness (per ply)	
				mm	mil
1506MR	54 ± 3	240 ± 20	1.5↓	0.197 ± 0.01	7.8 ± 0.4
1506	50 ± 3			0.178 ± 0.01	7.0 ± 0.4
2116HR	60 ± 3			0.150 ± 0.01	5.9 ± 0.4
2116MR	56 ± 3			0.134 ± 0.01	5.3 ± 0.4
2116	52 ± 3			0.120 ± 0.01	4.7 ± 0.4
3313MR	61 ± 3			0.123 ± 0.01	4.8 ± 0.4
3313	57 ± 3			0.110 ± 0.01	4.3 ± 0.4
1080HR	70 ± 3			0.096 ± 0.008	3.8 ± 0.3
1080MR	67 ± 3			0.086 ± 0.008	3.4 ± 0.3
1080	64 ± 3			0.078 ± 0.008	3.1 ± 0.3
106HR	76 ± 3			0.062 ± 0.008	2.4 ± 0.3
106MR	74 ± 3			0.057 ± 0.008	2.2 ± 0.3
106	70 ± 3			0.048 ± 0.008	1.9 ± 0.3

Storage Stability

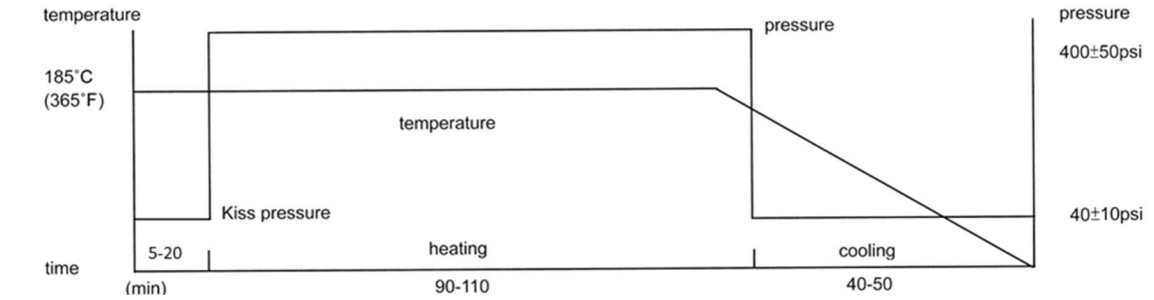
Condition 1: 180 days when stored at <5℃
Condition 2: 90 days when stored at < 23℃ and <50% RH
(Condition 1 or 2 for the applicable specification sheet requirement)

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 80℃(176°F) and 140℃(284°F)
   1-3℃/min (1.8~5.4°F/min) is acceptable.
   1.5-2.5℃/min (2.7~4.5°F/min) would be better.
2. Temperature of material over 180℃(356°F) must be held for at least 80min 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℃/min (4.5°F/min) when the temperature of material is over 100℃(212°F), in order to avoid introducing twist.

■ CERTIFICATION UL

- UL File No.: E98983
- ANSI TYPE: FR-4.1
- UL 746 Recognition

Minimum Material Thickness inch (mm)	Clad cond. Thickness Min. mils (μm)	Clad cond. Thickness Max. mils (μm)	Max. Area Diameter inch (mm)	Max. Operating Temp	Solder Lts Temp ℃	Solder Lts Time sec	UL 94 Flame Class
0.0016 (0.04)	0.59 (15)	4.02 (102)	2.0 (50.8)	130	288	30	94V-0