NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION.
COPPER CLAD LAMINATE DEPARTMENT
NO. 201. TUNG HWA N. ROAD, TAIPEI, TAIWAN.

Issued: 2008/09/01
New: 2014/04/30

Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-180FR

■ FEATURES

- High Tg 180℃(DSC)
- Excellent dimension stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C specification is applicable
- Outstanding heat resistance
- U.L file number E98983(s)
- High luminance of multi- functional epoxy contrast with copper for A.O.I
- U.L designation：ANSI grade FR-4.0

■ PERFORMANCE LIST

haracteristics		Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity		MΩ-cm	C-96/35/90	$3 \times 10^8 \sim 5 \times 10^9$	10^6 ↑	2.5.17
Surface resistivity		MΩ	C-96/35/90	$5 \times 10^7 \sim 7 \times 10^8$	10^4 ↑	2.5.17
Permittivity 1MHZ		-	C-24/23/50	4.7-4.9	5.4 ↓	2.5.5.9
Permittivity 1GHZ		-	C-24/23/50	4.2-4.4	-	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	0.08-0.12	0.35 ↓	2.6.2.1
Flammability		-	C-48/23/50	94V0	94V0	UL94
Peel strength 1 oz		lb/in	288℃x10" solder floating	7-9	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 hr	SEC	288℃ dipping	600 ↑	N/A	-
Flexural strength	LW	N/mm^2	A	420-480	415 ↑	2.4.4
	CW	N/mm^2	A	350-420	345 ↑	2.4.4
Dimensional stability X-Y axis		%	E-0.5/170	0.003-0.015	0.050 ↓	2.4.39
Coefficient of thermal expansion X-Y axis Z-axis before Tg Z-axis after Tg		 ppm/℃ ppm/℃ ppm/℃	 TMA TMA TMA	 11-15 30-45 160-210	N/A	2.4.24
Glass transition temp		℃	DSC	180± 5	N/A	2.4.25
Decomposition Temperature (Td 5% W/L)		℃	TGA	351	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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New: 2014/04/30

Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-180FTL

■ FEATURES

- High Tg 180℃(DSC)
- Excellent dimension stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C specification is applicable
- Outstanding heat resistance
- U.L file number E98983(s)
- High luminance of multi- functional epoxy contrast with copper for A.O.I
- U.L designation：ANSI grade FR-4.0

■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	4.5×10^8 ~6.0×10^9	10^6 ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	6.0×10^7 ~8.0×10^8	10^4 ↑	2.5.17
Permittivity 1 MHZ	-	C-24/23/50	4.3-4.8	5.4 ↓	2.5.5.9
Permittivity 1 GHZ	-	C-24/23/50	3.9-4.4	-	2.5.5.9
Loss Tangent 1 MHZ	-	C-24/23/50	0.012-0.016	0.035 ↓	2.5.5.9
Loss Tangent 1 GHZ	-	C-24/23/50	0.010-0.014	-	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	0.12-0.16	0.35 ↓	2.6.2.1
Flammability	-	C-48/23/50	94V0	94V0	UL94
Peel strength 1 oz	lb/in	288℃x10" solder floating	7-9	6 ↑	2.4.8
Thermal stress	SEC	288℃ solder dipping	600 ↑	10 ↑	2.4.13.1
Glass transition temp	℃	DSC	180 ± 5	N/A	2.4.25
Dimensional stability X-Y axis	%	E 4/105	0.005-0.02	0.05 ↓	2.4.39
Coefficient of thermal expansion X-Y axis Z-axis before Tg Z-axis after Tg	 ppm/℃ ppm/℃ ppm/℃	 TMA TMA TMA	 11-15 30-45 160-210	N/A	2.4.24
Decomposition Temperature (Td 5% W/L)	℃	TGA	351	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	2	106	1 PLY	0.35	14	7628	2 plies
0.08	3	1080	1PLY	0.38	15	7628	2 plies
0.10	4	1080	2 plies	0.45	17	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	30	7628	4 plies
0.16	6	2112	2 plies	0.8	31.5	7628	4 ples
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 OZ (μm)		SIZE INCH	mm	THICKNESS TOLERANCE
0.004 (0.1) to 0.039 (1.0)	H (17)	2.0 (70)	48.8 x 36.6	1240 x 0930	IPC-4101C SPEC CLASS C/M
	1.0 (35)	3.0 (102)	48.8 x 40.5	1240 x 1030	
			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.

■ **This material can not be use in horizontal brown oxide process**

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

Issued: 2008/09/01
New: 2012/09/25

Glass cloth base epoxy resin
flame retardant prepreg

NP-180FB

■ FEATURES

- Rheology of resin controlled to benefit the lamination of the boards.
- Multi-functional epoxy provides outstanding heat resistance, better dimensional stability, and through-hole reliability.
- Higher Tg: 180±5℃
- This material can not be used in horizontal brown oxide process

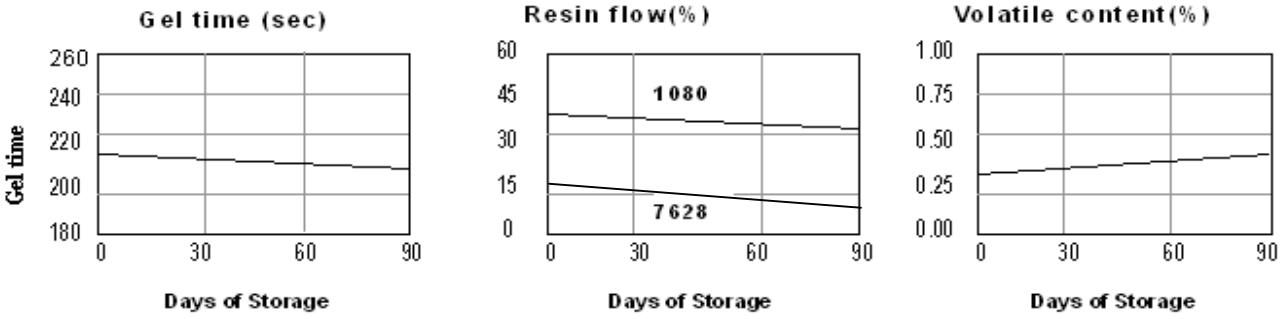
■ PERFORMANCE LIST

Specification : IPC-4101C is applicable

Glass style	RC%	RF%	GT sec (171℃)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	53 ± 3	28 ± 5	210 ± 20	0.75 ↓	0.200 ± 0.01	7.9 ± 0.4
7628MR	50 ± 3	25 ± 5			0.190 ± 0.01	7.5 ± 0.4
7628	46 ± 3	20 ± 5			0.180 ± 0.01	7.1 ± 0.4
1506MR	55 ± 3	30 ± 5			0.160 ± 0.01	6.3 ± 0.4
1506	41 ± 3	25 ± 5			0.150 ± 0.01	5.9 ± 0.4
2116HR	61 ± 3	35 ± 5			0.130 ± 0.01	5.1 ± 0.4
2116MR	57 ± 3	30 ± 5			0.118 ± 0.01	4.6 ± 0.4
2116	53 ± 3	25 ± 5			0.105 ± 0.01	4.1 ± 0.4
2113	59 ± 3	30 ± 5			0.085 ± 0.01	3.3 ± 0.4
2112	63 ± 3	35 ± 5			0.075 ± 0.008	3.0 ± 0.3
1080HR	71 ± 3	45 ± 5			0.071 ± 0.008	2.8 ± 0.3
1080MR	68 ± 3	40 ± 5			0.068 ± 0.008	2.7 ± 0.3
1080	65 ± 3	35 ± 5			0.065 ± 0.008	2.6 ± 0.3
106	71 ± 3	35 ± 5			0.053 ± 0.008	2.1 ± 0.3
* 1086	65 ± 3	35 ± 5			0.067 ± 0.008	2.6 ± 0.3
* 1067	71 ± 3	35 ± 5			0.055 ± 0.008	2.2 ± 0.3
* 1078	65 ± 3	35 ± 5			0.063 ± 0.008	2.5 ± 0.3

*Laser drillable prepreg

Storage Stability

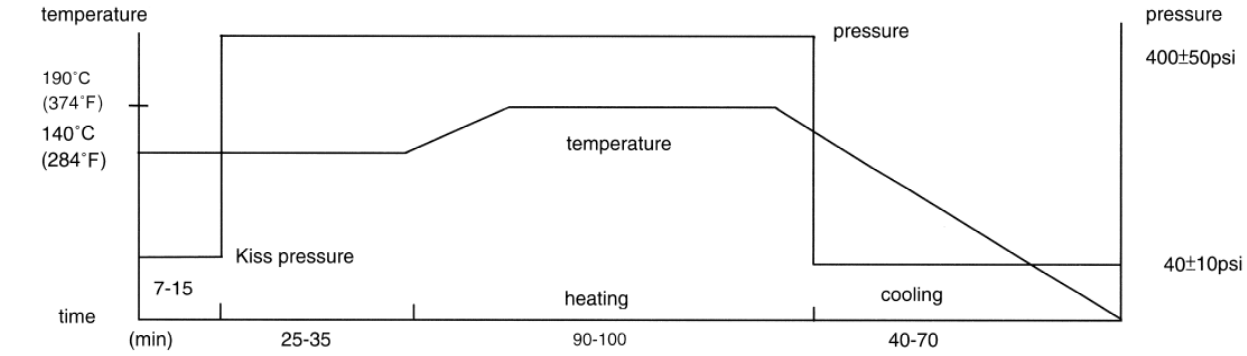


Storage Condition : 20℃ 50% RH for 3 months
: Max 5℃ for 6 months

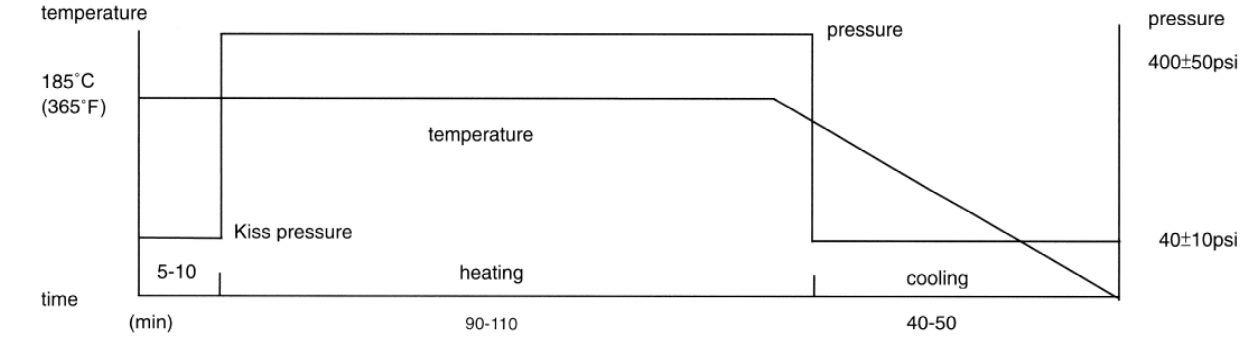
Data shown are nominal values for reference only.

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℃(158℉) and 140℃(284℉).
   1-3℃/min (1.8~5.4℉/min) is acceptable.
   1.5-2.5℃/min (2.7~4.5℉/min) would be better.
2. Temperature of material over 170℃(338℉) 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℃/min (4.5℉/min) when the temperature of material is over 100℃(212℉), in order to avoid introducing twist.

■ CERTIFICATION UL

・UL File No. : E98983 ・ANSI TYPE:FR-4.0