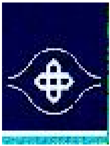


NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION.
COPPER CLAD LAMINATE DEPARTMENT
NO. 201. TUNG HWA N. ROAD, TAIPEI, TAIWAN.

Issued: 2008/03/01
New: 2014/04/30

Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-150R

■ FEATURES

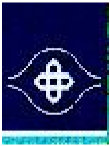
- High luminance of epoxy contrast with copper for laser type A.O.I.
- UV solder mask may be applied simultaneously to increase yields.
- High performance epoxy resin blended to achieve higher heat resistance than that of FR-4-86
- Thickness 0.8mm capability.

■ PERFORMANCE LIST

Characteristics		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	4.5-4.7	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	0.015-0.020	0.035↓	2.5.5.9
Loss Tangent 1GHZ		-	D-24/23/50	0.011-0.013	-	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℃x10" solder floating	10-14	6↑	2.4.8
Thermal stress		SEC	288℃ solder dipping	200↑	10↑	2.4.13.1
Pressure cooker (2 atm 120℃)	1/2 hr	SEC	288℃ dipping	150↑	N/A	-
	1 hr	SEC	288℃ dipping	150↑	N/A	-
	2 hr	SEC	288℃ dipping	150	N/A	-
Flexural strength	LW	N/mm^2	A	480-550	415↑	2.4.4
	CW	N/mm^2	A	415-480	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						
Z-axis before Tg		ppm/℃	TMA	50-70	N/A	2.4.24
Z-axis after Tg		ppm/℃	TMA	250-350		
Glass transition temp		℃	DSC	150 ± 5	N/A	2.4.25
Decomposition Temperature (Td 5% W/L)		℃	TGA	310	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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COPPER CLAD LAMINATE DEPARTMENT
NO. 201. TUNG HWA N. ROAD, TAIPEI, TAIWAN.

Issued: 2008/03/01
New: 2014/04/30

Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-150TL

■ FEATURES

- Multi-functional epoxy resin renders the material outstanding resistance, better dimensional stability, and through-hole reliability that benefit the performance of high layer count multilayer boards.
- HTE copper foil applied to prevent corner cracking.
- High luminance of epoxy contrast with copper for laser type AOI.
- UV solder mask may be applied simultaneously in order to increase yields.
- IPC-4101C specification is applicable.

■ 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	4.0-4.2	-	2.5.5.9
Loss Tangent 1 MHZ	-	C-24/23/50	0.015-0.020	0.035 ↓	2.5.5.9
Loss Tangent 1 GHZ	-	C-24/23/50	0.011-0.013	-	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℃x10" solder floating	10-14	6 ↑	2.4.8
Thermal stress	SEC	288℃ solder dipping	200 ↑	10 ↑	2.4.13.1
Glass transition temp	℃	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 Z-axis before Tg Z-axis after Tg	 ppm/℃ ppm/℃	 TMA TMA	 50-70 250-350	N/A	2.4.24
Decomposition Temperature (Td 5% W/L)	℃	TGA	310	N/A	2.4.24.6

Data shown are nominal values for reference only.

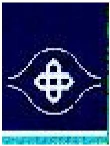
NOTE:
The average value in the table refers to samples of .020" 1/1.
Test method per IPC-TM-650

■ CONSTRUCTION:

THICKNESS mm	mil	CONSTRUCTION		THICKNESS mm	mil	CONSTRUCTION	
0.08	3	2112	1 ply	0.38	15	7628	2 plies
0.10	4	1080	2 plies	0.45	17	7628 x 2 + 1080 x 1	
0.11	4	2116	1 ply	0.46	17	7667	2 plies
0.13	5	1080	2 plies	0.50	20	7628	3 plies
0.13sp	5	2116	1 ply	0.53	21	7628	3 plies
0.15	6	1506	1 ply	0.60	24	7628	3 plies
0.16	6	2112	2 plies	0.77	30	7628	4 plies
0.21	8	7628	1 ply	0.8	31.5	7628	4 plies
0.26	10	2116	2 plies	0.9	36	7628	5 plies
0.30	12	2116	3 plies	1.0	39	7628	5 plies
0.30sp	12	1506	2 plies	1.1	43	7628	6 plies
0.35	14	7628	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

■ **Keeping the core and prepreg in the same grain direction is crucial to ensure the flatness of multiplayer boards.**
Grain direction is shown on the Certificate of Conformance



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

Issued: 2008/03/01
New: 2008/09/01

Glass cloth base epoxy resin
flame retardant prepreg

NP-150B

■ 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: 150 ± 5℃

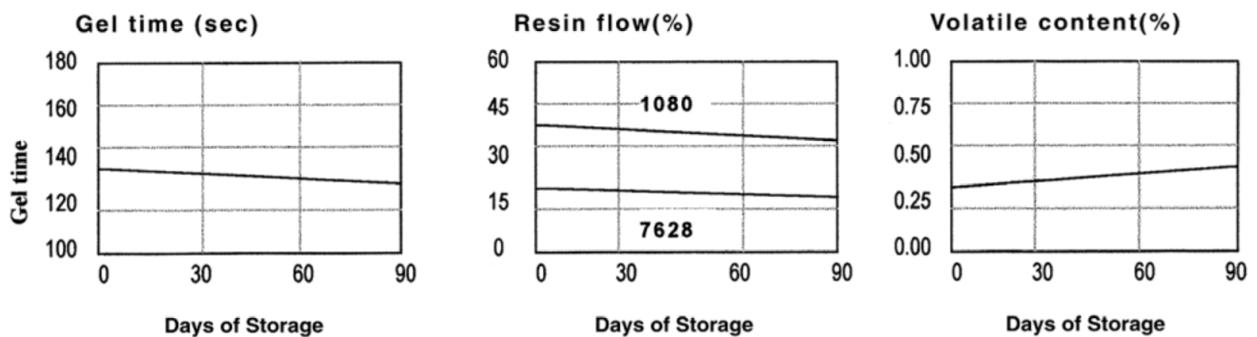
■ PERFORMANCE LIST

Specification: IPC-4101C is applicable

Glass style	RC%	RF%	GT sec (171℃)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	50 ± 3	28 ± 5	130 ± 20	0.75 ↓	0.200 ± 0.01	7.9 ± 0.4
7628MR	47 ± 3	25 ± 5			0.190 ± 0.01	7.5 ± 0.4
7628	43 ± 3	20 ± 5			0.180 ± 0.01	7.1 ± 0.4
1506MR	52 ± 3	30 ± 5			0.160 ± 0.01	6.3 ± 0.4
1506	48 ± 3	25 ± 5			0.150 ± 0.01	6.0 ± 0.4
2116HR	58 ± 3	35 ± 5			0.130 ± 0.01	5.0 ± 0.4
2116MR	54 ± 3	30 ± 5			0.118 ± 0.01	4.6 ± 0.4
2116	50 ± 3	25 ± 5			0.105 ± 0.01	4.1 ± 0.4
2313	55 ± 3	30 ± 5			0.090 ± 0.01	3.5 ± 0.4
2113	56 ± 3	32 ± 5			0.090 ± 0.008	3.5 ± 0.4
2112	60 ± 3	37 ± 5			0.075 ± 0.008	3.0 ± 0.3
1086	62 ± 3	38 ± 5			0.074 ± 0.008	2.9 ± 0.3
1080HR	68 ± 3	47 ± 5			0.071 ± 0.008	2.8 ± 0.3
1080MR	65 ± 3	43 ± 5			0.068 ± 0.008	2.7 ± 0.3
1080	62 ± 3	38 ± 5			0.065 ± 0.008	2.6 ± 0.3
106	68 ± 3	40 ± 5			0.053 ± 0.008	2.1 ± 0.3
* 1086	62 ± 3	38 ± 5			0.074 ± 0.008	2.9 ± 0.3
* 1067	68 ± 3	36 ± 5			0.056 ± 0.008	2.2 ± 0.3
* 1078	62 ± 3	35 ± 5			0.065 ± 0.008	2.6 ± 0.3

*Laser drillable prepreg

Storage ability

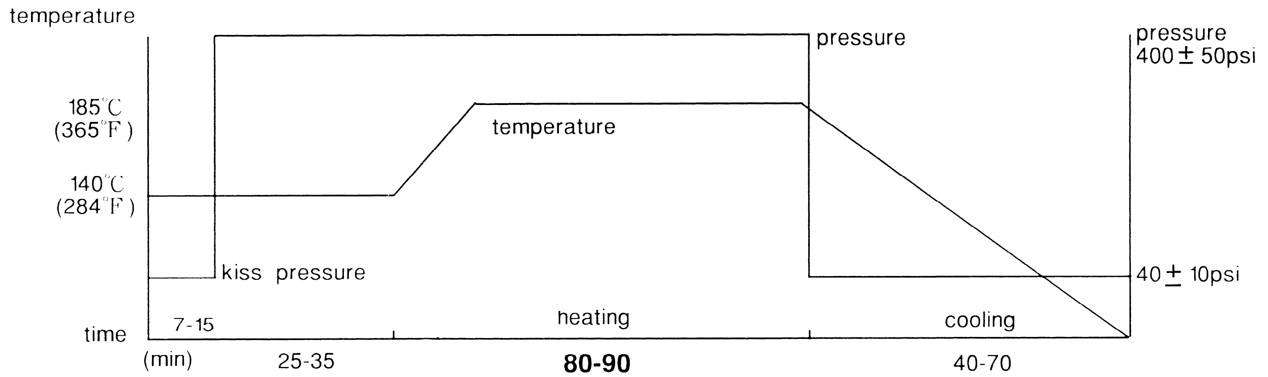


Storage Condition : 20℃, 50% RH for 3 months
: Max 5℃ for 6 months

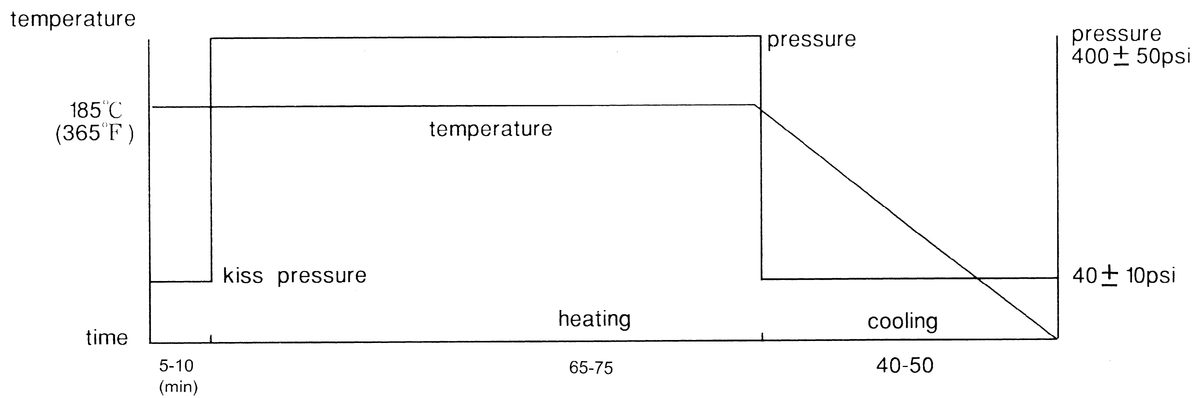
Data shown are nominal values for reference only.

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℃ and 140℃
   1-3℃/min is acceptable.
   1.5-2.5℃/min would be better.
2. Temperature of material over 170℃ must be held for at least 40min. to allow epoxy 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 when the temperature of material is over 100℃, in order to avoid introducing twist.

■ CERTIFICATION UL

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

UL 746 Recognition

Minimum Material Thickness Inch (mm)	Sold Lts Temp Time ℃ sec	UL 94 Flame Class	Max. Operating Temp
0.002 (0.051)	288 30	94V-0	130