Issured : 2008-03-01
New : 2008-03-01

NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION.
COPPER CLAD LAMINATE DEPARTMENT

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

Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-170R

■ FEATURES

- High Tg 170℃ (DSC)
- Excellent dimensional stability and through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101B specification is applicable
- U. L designation: ANSI grade FR-4
- U.L file number E98983
- Outstanding heat resistance
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- Traditional FR-4 methods processability

■ PERFORMANCE LIST

Characteristics		Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity		MΩ-cm	C-96/35/90	$5 \times 10^8 \sim 5 \times 10^9$	10^6 ↑	2.5.17
Surface resistivity		MΩ	C-96/35/90	$5 \times 10^6 \sim 5 \times 10^7$	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	4.0-4.2	-	2.5.5.9
Loss Tangent 1MHZ		-	C-24/23/50	0.015-0.020	0.035 ↓	2.5.5.9
Loss Tangent 1GHZ		-	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	0.05-0.10	0.35 ↓	2.6.2.1
Flammability		-	C-48/23/50	94V0	94V0	UL94
Peel strength 1 oz		lb/in	288℃x10" solder floating	8-12	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 Z-axis after Tg		 ppm/℃ ppm/℃	 TMA TMA	 50-70 200-300	 N/A	 2.4.24
Glass transition temp		℃	DSC	170 ± 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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Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-170TL

■ FEATURES

- High Tg 170℃ (DSC)
- Excellent dimensional stability and through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101B specification is applicable
- U. L designation: ANSI grade FR-4
- U.L file number E98983
- Outstanding heat resistance
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- Traditional FR-4 methods processability

■ 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	0.015-0.020	0.035 ↓	2.5.5.9
Loss Tangent 1 GHZ	-	C-24/23/50	0.013-0.015	-	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	8-12	6 ↑	2.4.8
Thermal stress	SEC	288℃ solder dipping	200 ↑	10 ↑	2.4.13.1
Glass transition temp	℃	DSC	170 ± 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	50-70 200-300	N/A	2.4.24

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	THICKNESS mil	CONSTRUCTION	
0.10	4	1080	2 plies
0.11	4	2116	1 ply
0.13	5	1080	2 plies
0.13sp	5	2116	1 ply
0.15	6	1506	1 ply
0.16	6	2112	2 plies
0.21	8	7628	1 ply
0.26	10	2116	2 plies
0.30	12	2116	3 plies
0.30sp	12	1506	2 plies
0.35	14	7628	2 plies

THICKNESS mm	THICKNESS mil	CONSTRUCTION	
0.38	15	7628	2 plies
0.45	18	7628x2+1080x1	
0.50	20	7628	3 plies
0.53	21	7628	3 plies
0.60	24	7628	3 plies
0.77	31	7628	4 plies
0.8	32	7628	4 ples
0.9	36	7628	5 plies
1.0	39	7628	5 plies
1.1	43	7628	6 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	SIZE mm	THICKNESS TOLERANCE
0.004 (0.1)	0.5 (17)	48.8 x 36.6	1240 x 0930	IPC-4101B SPEC CLASS C/M
to	1.0 (35)	48.8 x 40.5	1240 x 1030	
0.039(1.0)	2.0 (70)	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

■ CERTIFICA TION UL

・UL File No.: E98983

UL 746 Recognition

Minimum Material Thickness Inch (mm)	Clad cond. Thickness min. mils (mic)	Clad cond. Thickness max. mils (mic)	Max. Area Diameter Inch (mm)	Sold Lts Temp ℃	Sold Lts Time sec	UL 94 Flame class	Max. Operating Temp
0.002 0.051	0.68 (17)	4.08 (102)	2.0 (50.8)	288	30	94V-0	130

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Glass cloth base epoxy resin flame retardant prepreg

NP-170B PREPREG

■ 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: 170 ± 5℃
- Other properties are similar to standard FR-4

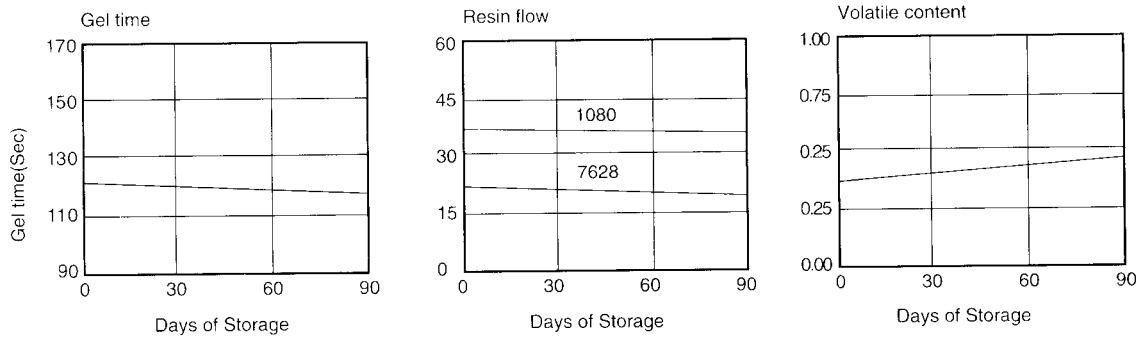
■ PERFORMANCE LIST

Specification: IPC-4101B is applicable

Glass style	RC%	RF%	GT sec (170℃)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	50 ± 3	30 ± 5	120 ± 20	0.75 ↓	0.200 ± 0.01	7.9 ± 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	36 ± 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.