Issured : 2008-03-01
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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

NPG-170TL

■ FEATURES

- Halogen, antimony, and red phosphorous free
- Flammability meets UL 94 V-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
- ANSI type : FR-4

■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	5.0×10^{9}	10^{6} ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	5.0×10^{7}	10^{4} ↑	2.5.17
Permittivity 1 MHZ	-	C-24/23/50	4.3-4.5	5.4 ↓	2.5.5.9
Permittivity 1 GHZ	-	C-24/23/50	3.9-4.1	-	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℃x10" solder floating	7-9	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					
X-Y axis	ppm/℃	TMA	9-13	N/A	2.4.24
Z-axis before Tg	ppm/℃	TMA	30-50		
Z-axis after Tg	ppm/℃	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 mm	mil	CONSTRUCTION	
0.05	2	106	1 PLY
0.08	3	2112	1PLY
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

THICKNESS mm	mil	CONSTRUCTION	
0.35	14	7628	2 plies
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) to 0.039 (1.0)	H (17) 1.0 (35)	2.0 (70) 3.0 (105)	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-4101C 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 copper clad laminate

NP-180R

■ FEATURES

- High Tg 175℃ (DSC)
- Excellent dimensional stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C specification is applicable
- U.L. designation:ANSI grade FR-5
- U.L. file number E98983
- Outstanding heat resistance
- High luminance of multi-functional epoxy contrast with copper for A.O.I.

■ PERFORMANCE LIST

Characteristics		Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity		MΩ-cm	C-96/35/90	$5 \times 10^{9} \sim 5 \times 10^{10}$	10^{6} ↑	2.5.17
Surface resistivity		MΩ	C-96/35/90	$5 \times 10^{8} \sim 5 \times 10^{9}$	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	4.3-4.5	-	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	0.014-0.018	-	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	8-10	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	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	200-300		
Glass transition temp		℃	DSC	175 ± 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