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

Issued: 2012/03/01
New: 2025/10/27

Glass cloth base epoxy resin
Flame retardant copper clad laminate

NP-175FMR

■ FEATURES

- Dicy-Free & Low C.T.E
- Lead-Free Compatible
- Excellent dimensional stability and through-hole reliability
- Superior CAF-Resistance (Anti-migration)
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- IPC-4101E L99/101/126

■ PERFORMANCE LIST

Characteristics		Unit	Condition	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 1GHz		-	C-24/23/50	4.1-4.3	-	2.5.5.9
Loss Tangent 1GHz		-	C-24/23/50	0.010-0.012	-	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	0.5 ↓	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	8-10	6 ↑	2.4.8
Thermal stress		SEC	288℃x10" 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	480-550	415 ↑	2.4.4
	CW	N/mm^2	A	415-480	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 Z-axis before Tg Z-axis after Tg 50-260℃		 ppm/℃ ppm/℃ %	 TMA TMA TMA	 40-60 210-230 3.0%	 60 ↓ 300 ↓ 3.0% ↓	2.4.24
Glass transition temperature		℃	DSC	175 ± 5	170 ↑	2.4.25
T260		min	TMA	>60	30 ↑	2.4.24.1
T288		min	TMA	>20	15 ↑	2.4.24.1
Decomposition temperature (Td 5% W/L)		℃	TGA	351	340 ↑	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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NP-175FMTL

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■ 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 x10^8	10^4 ↑	2.5.17
Permittivity 1 GHz	-	C-24/23/50	3.8-4.0	-	2.5.5.9
Loss Tangent 1 GHz	-	C-24/23/50	0.010-0.012	-	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	0.20-0.30	0.5 ↓	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	8-10	6 ↑	2.4.8
Thermal stress	SEC	288℃ solder dipping	600 ↑	10 ↑	2.4.13.1
Glass transition temperature	℃	DSC	175 ± 5	170 ↑	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 50-260℃	 ppm/℃ ppm/℃ %	 TMA TMA TMA	 40-60 210-230 3.0%	 60 ↓ 300 ↓ 3.0% ↓	2.4.24
T260	min	TMA	>60	30 ↑	2.4.24.1
T288	min	TMA	>20	15 ↑	2.4.24.1
Decomposition temperature (Td 5% W/L)	℃	TGA	351	340 ↑	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

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■ CONSTRUCTION

THICKNESS mm	THICKNESS mil	CONSTRUCTION		THICKNESS mm	THICKNESS mil	CONSTRUCTION	
0.05	2	106	1 ply	0.35	14	7628	2 plies
0.08	3	2112	1 ply	0.38	15	7628	2 plies
0.10	4	1080	2 plies	0.45	18	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
0.13 sp	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 plies
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
0.30 sp	12	1506	2 plies	1.2	47	7628	6 plies

• 1.2, 1.1, 1.0, 0.9, 0.8, 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
0.002 (0.05) to 0.047 (1.2)	Q (9)	3.0 (102)	48.8 x 36.6	1240 x 0930	IPC-4101E SPEC CLASS C/M
	T (12)	4.0 (140)	48.8 x 40.5	1240 x 1030	
	H (17)	5.0 (175)	48.8 x 42.5	1240 x 1080	
	1.0 (35)	6.0 (210)			
	2.0 (70)				

- **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.**
- **We recommend to evaluate the drilling property.**
- **Different oxide treatment may result in variations in the heat resistance properties of the laminates after processing. Pre-production batch runs are recommended to ensure compatibility of materials with chemicals.**

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Glass cloth base epoxy resin
Flame retardant prepreg

NP-175FMB

■ FEATURES

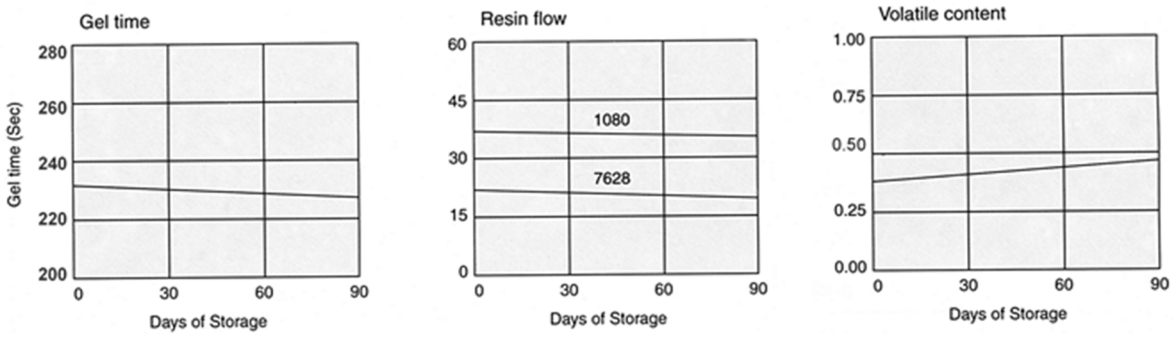
- Dicy-Free & Low C.T.E
- Lead-Free Compatible
- Excellent dimensional stability and through-hole reliability
- Superior CAF-Resistance (Anti-migration)
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- IPC-4101E L99/101/126
- We recommend to evaluate the drilling property.
- Different oxide treatment may result in variations in the heat resistance properties of the laminates after processing.
- Pre-production batch runs are recommended to ensure compatibility of materials with chemicals.

■ PERFORMANCE LIST

Specification: IPC-4101E is applicable
Data shown are nominal values for reference only. (Remained Copper 70-80%)

Glass style	RC%	GT sec (171℃)	VC%	After Pressed Thickness (per ply)	
				mm	mil
7628HR	52 ± 3	230 ± 20	1.5 ↓	0.199 ± 0.01	7.8 ± 0.4
7628MR	49 ± 3			0.191 ± 0.01	7.5 ± 0.4
7628	45 ± 3			0.181 ± 0.01	7.1 ± 0.4
1506	50 ± 3			0.150 ± 0.01	6.0 ± 0.4
2116HR	60 ± 3			0.132 ± 0.01	5.2 ± 0.4
2116MR	56 ± 3			0.118 ± 0.01	4.6 ± 0.4
2116	52 ± 3			0.105 ± 0.01	4.1 ± 0.4
2113	58 ± 3			0.090 ± 0.01	3.5 ± 0.4
2112	62 ± 3			0.079 ± 0.008	3.1 ± 0.3
1080HR	70 ± 3			0.076 ± 0.008	3.0 ± 0.3
1080MR	67 ± 3			0.071 ± 0.008	2.8 ± 0.3
1080	64 ± 3			0.064 ± 0.008	2.5 ± 0.3
106	70 ± 3			0.048 ± 0.008	1.91 ± 0.3

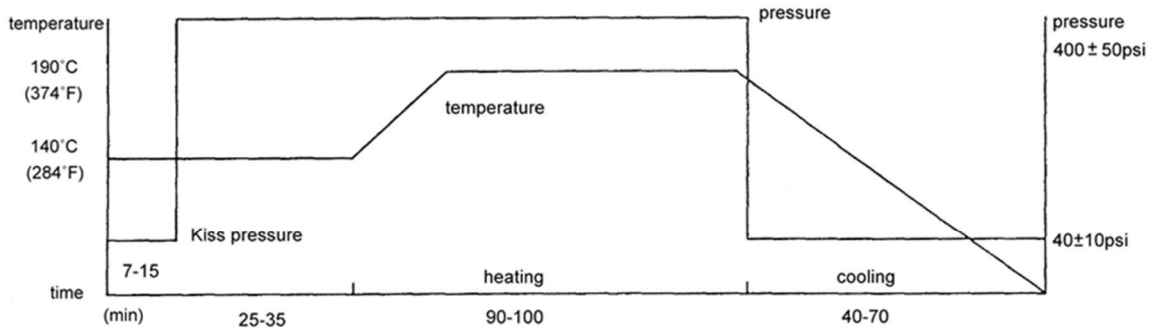
Storage Stability



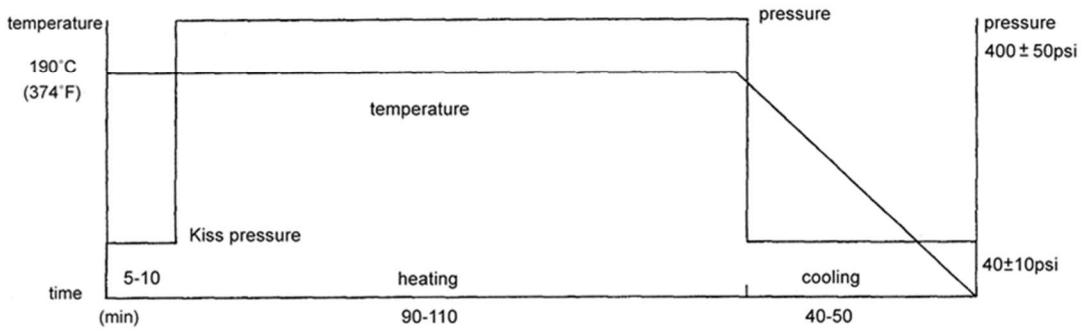
Condition 1: 180 days when stored at <5℃
Condition 2: 90 days when stored at <23℃ and <50%RH
(cond.1 or cond. 2 for the applicable specification sheet requirements.)

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 60min. 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)	Clad cond. Thickness Min. mils (μm)	Clad cond. Thickness Max. mils (μm)	Max. Area Diameter inch (mm)	Solder Lts Temp ℃	Solder Lts Time sec	UL 94 Flame Class	Max. Operating Temp
0.002 (0.05)	0.36 (9)	8.40 (210)	2.0 (50.8)	300	30	94V-0	130