Issued：2009-04-01

NAN YA PLASTICS CORPORATION
（KunShan） ELECTRONIC MATERIALS
COPPER CLAD LAMINATE Dept.
201. CHANG JIANG SOUTH RD., KUN SHAN CITY,
JIANG SU PROV., CHINA

Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-175FR

■ 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-4101B/98/99

■ 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	4.2-4.4	-	2.5.5.9
Loss Tangent 1MHZ		-	C-24/23/50	0.016-0.020	0.035 ↓	2.5.5.9
Loss Tangent 1GHZ		-	C-24/23/50	0.014-0.016	-	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-24/23/50+E-24/125	94V0	94V0	UL94
Peel strength 1 oz		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 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-2/150	0.005-0.030	0.050 ↓	2.4.39
Coefficient of thermal expansion						2.4.24
Z-axis before Tg		ppm/℃	TMA	40-60	60 ↓	
Z-axis after Tg		ppm/℃	TMA	250-270	300 ↓	
50-260℃		%	TMA	3.0%	3.5% ↓	
Glass transition temp		℃	DSC	170	≧165	2.4.25
T260		min	TMA	>60	30 ↑	2.4.24.1
T288		min	TMA	>20	5 ↑	2.4.24.1
Td (5% Weight Loss)		℃	TGA, 10℃/min	351	325 ↑	2.4.24.6

NOTE:
1. Data shown are nominal values for reference only, and test methods follow IPC-TM-650
2. The average value in the table refers to samples of .062" 1/1.

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Glass cloth base epoxy resin
flame retardant copper clad laminate

NP-175FTL

■ 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-4101B/98/99

■ 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 x10^8	10^4 ↑	2.5.17
Permittivity 1 MHZ	-	C-24/23/50	4.4-4.6	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	0.016-0.020	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-24/23/50+E-24/125	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
Glass transition temp	℃	DSC	170	≧165	2.4.25
Dimensional stability X-Y axis	%	E-2/150	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	 40-60 250-270 3.0%	 60 ↓ 300 ↓ 3.5% ↓	2.4.24
T260	min	TMA	>60	30 ↑	2.4.24.1
T288	min	TMA	>20	5 ↑	2.4.24.1
Td (5% Weight Loss)	℃	TGA, 10℃/min	351	325 ↑	2.4.24.6-

NOTE:
1. Data shown are nominal values for reference only, and test methods follow IPC-TM-650
2. The average value in the table refers to samples of .062” 1/1.

■ CONSTRUCTION:

THICKNESS mm	mil	CONSTRUCTION			THICKNESS mm	mil	CONSTRUCTION	
0.05	2	106	1 ply		0.38	15	7628	2 plies
0.06	2.5	1080	1 ply		0.4	16	7628	2 plies
0.08	3	2112	1 ply		0.4SP	16	7567	2 plies
0.08 SP	3	1080	1 ply		0.46	18	7667	2 plies
0.10	4	1080	2 plies		0.5	20	7628	3 plies
0.11	4	2116	1 ply		0.53	21	7628	3 plies
0.13	5	1080	2 plies		0.55	22	7628	3 plies
0.13sp	5	2116	1 ply		0.6	24	7628	3 plies
0.14	5.5	1506	1 ply		0.6 SP	24	7567	3 plies
0.15	6	1506	1 ply		0.64	25	7667	3 plies
0.16	6	2112	2 plies		0.71	28	7628	4 plies
0.18	7	1506	1 ply		0.71 SP	28	7627	4 plies
0.18SP	7	7627	1 ply		0.74	29	7628	4 plies
0.2	8	2116	2 plies		**＊0.77 1/1**	**28**	**7628**	**4 plies**
0.21	8	7628	1 ply		0.8	31	7628	4 plies
0.26	10	2116	2 plies		**＊0.9SP 1/1**	**33**	**7627**	**5 plies**
0.30	12	2116	3 plies		**＊1.0 1/1**	**36**	**7628**	**5 plies**
0.30sp	12	1506	2 plies		**＊1.1 1/1**	**40**	**7628**	**6 plies**
0.35	14	7628	2 plies		**＊1.2 1/1**	**44**	**7628**	**6 plies**

＊ 1.2、 1.1、 1.0、 0.9 、0.77 mm THICKNESS INCLUDE CLADDING. HERE ARE SHOWN THE TYPICALDATAS. ALL OTHERS EXCLUDE .CLADDING.

■ PRODUCT SIZE & THICKNESS

THICKNESS INCH (mm)	COPPER CLADDING OZ (μm)		SIZE INCH	mm	THICKNESS TOLERANCE
0.004 (0.1)	Q（9）	T（12）	48.8 x 36.6	1240 x 0930	IPC-4101B SPEC CLASS C/M
to	H (17)	1.0 (35)	48.8 x 40.5	1240 x 1030	
0.039 (1.0)	2.0 (70)	3.0（105）	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.**

■ **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 copper clad laminate

NP-175FB PREPREG

■ FEATURES

- Dicy-Free & Low C.T.E , IPC-4101B/98/99
- Lead-Free Compatible
- Excellent dimensional stability and through-hole reliability
- We recommend to evaluate the drilling property.
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- Superior CAF-Resistance (Anti-migration)
- 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

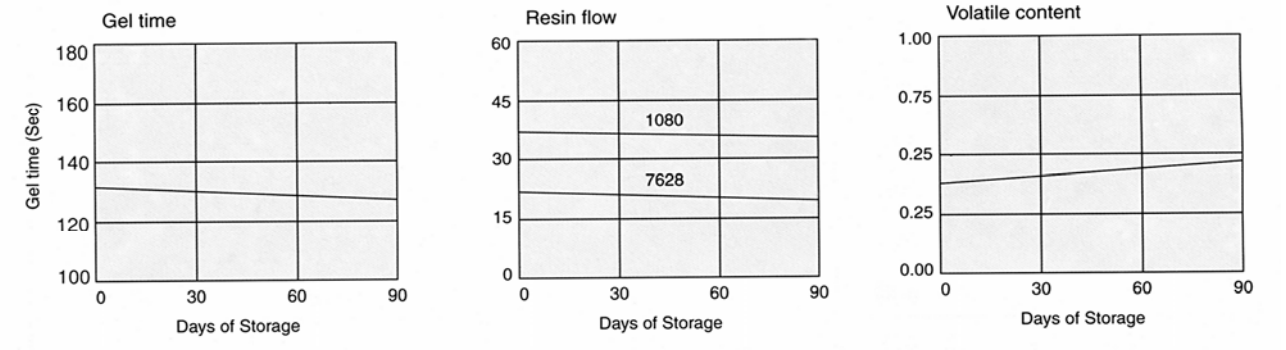
Specification: IPC-4101B is applicable

Glass style	RC%	RF%	GT sec (170℃)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	52 ± 3	29 ± 5	130 ± 20	1.5↓	0.231 ± 0.02	9.1 ± 0.9
7628MR	49 ± 3	24 ± 5			0.213 ± 0.02	8.4 ± 0.8
7628	45 ± 3	19 ± 5			0.193 ± 0.02	7.6 ± 0.7
1506MR	54 ± 3	32 ± 5			0.188 ± 0.02	7.4± 0.7
1506	50 ± 3	25 ± 5			0.170 ± 0.02	6.7 ± 0.7
2116HR	60 ± 3	37 ± 5			0.145 ± 0.01	5.7 ± 0.6
2116MR	56 ± 3	32 ± 5			0.118 ± 0.01	5.1 ± 0.5
2116	52 ± 3	25 ± 5			0.105 ± 0.01	4.6 ± 0.5
2313	57 ± 3	32 ± 5			0.104 ± 0.01	4.1 ± 0.4
2113	58 ± 3	31 ± 5			0.104 ± 0.01	4.1 ± 0.4
2112	62 ± 3	35 ± 5			0.101 ± 0.01	4.0 ± 0.4
1080HR	70 ± 3	46 ± 5			0.094 ± 0.009	3.7 ± 0.4
1080MR	67 ± 3	42 ± 5			0.084 ± 0.008	3.3 ± 0.3
1080	64 ± 3	36 ± 5			0.076 ± 0.008	3.0 ± 0.3
106	70 ± 3	40 ± 5			0.046 ± 0.005	1.8 ± 0.2

notes:

1.＊ Laser drillable prepreg
2. RF test method：wt. of PP is about 20g
3. the thickness data is based on 100% copper , and data shown are nominal values for reference only

Storage Stability

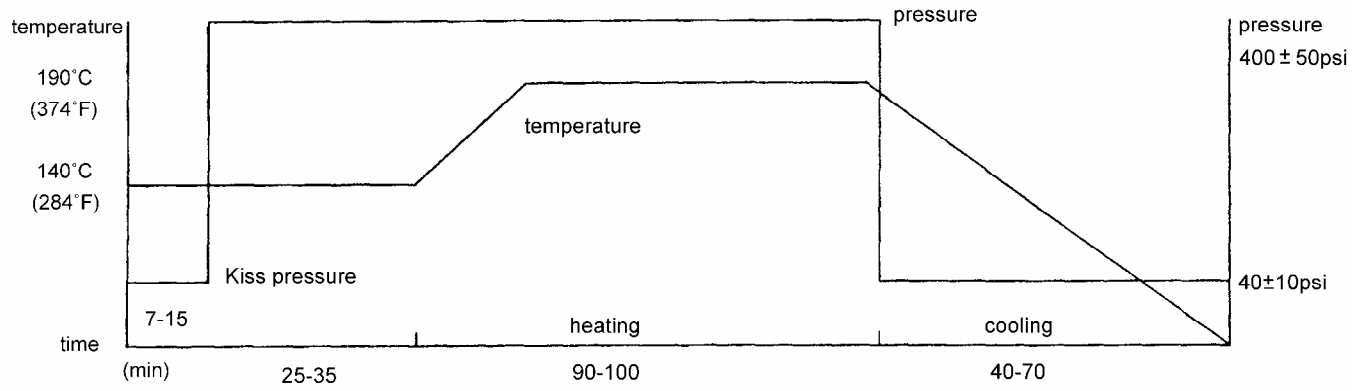


Storage Condition: 20℃, 50% RH for 3 months
: Max 5℃ for 6 months

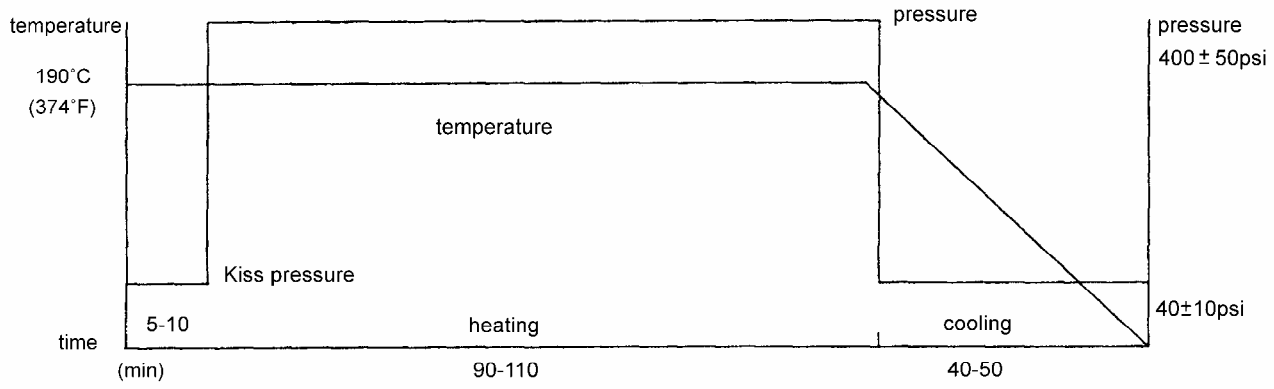
Data shown are nominal values for reference only.

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°F) and 140℃ (284°F)（**70**℃～140℃ 升溫速率）
   1-3 ℃/min (1.8+5.4°F/min) is acceptable.
   1.5-2.5℃/min (2.7-4.5°F/MIN) would be better.（較佳條件：**1.5-2.5℃/min**）
2. Temperature of material over 170℃(338°F) must be held for at least 60min. to allow epoxy resin to fully cure （固化時間：料溫超過 **17**0℃，需達 60 分鐘以上）
3. The pressure should be kept about 100psi during cooling to amibient temperature.
   （冷卻段壓力約爲 **100psi**）
4. Cooling rate of material should be kept under 2.5℃/min(4.5°F/min) when the temperature of material is over 100℃ (212°F), in order to avoid introducing twist.
   （料溫超過 **10**0℃之冷卻速率須在 **2.5℃↓/min，避免造成熱應力板翹**）
5. The temp. of center of book is about 65℃ for increasing pressure, and the top temp. of book is 90℃ or so. The flow area is about 10 ㎜ better.

（中心張上壓點的料溫為 65℃左右,最外張上壓點為 90℃左右,流膠量以 10mm 為最佳）