

Glass cloth base epoxy resin
Flame retardant copper clad laminate

NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION
COPPER CLAD LAMINATE DEPARTMENT

FR4-86 UV BLOCK

FEATURES

- UV solder mask may be applied simultaneously in order to increase yields
- Excellent dimensional stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C L21 specification is applicable
- UL designation : ANSI grade FR-4
- UL file number E98983
- Outstanding heat resistance
- High luminance of multi-functionnal Epoxy contrast with copper for A.O.I.
- Traditionnal FR4 method processability
- CAF Resistent laminates

PERFORMANCE LIST

Characteristics		Unit	Conditioning	Test Method	Spec.	Typical values	
ELECTRICAL PROPRIETY	Volume resistivity	MΩ-cm	C-96/35/90	02/05/17	10 ⁶ ↑	5.0x10 ⁸ - 5.0x10 ⁹	
	Surface resistivity	MΩ			10 ⁴ ↑	5.0x10 ⁶ - 5.0x10 ⁷	
	Permittivity 1 Mhz	-	C-24/23/50	2.5.5.9	5.4 ↓	4.5 - 4.7	
	Permittivity 100 Mhz	-			-		
	Permittivity 1 Ghz	-	C-24/23/50	2.5.5.9	-	4.0 - 4.2	
	Permittivity 2 Ghz	-			-		
	Loss tangent 1Mhz	-	C-24/23/50	2.5.5.9	0.035 ↓	0.015-0.020	
	Loss tangent 100 Mhz	-			-		
	Loss tangent 1 Ghz	-	C-24/23/50	2.5.5.9	-	0.012-0.014	
	Loss tangent 2 Ghz	-			-		
	Arc resistance	Seconde	D-48/50+D-05/23	02/05/01	60 ↑	120 ↑	
	Dielectric breakdown	KV	D-48/50	02/05/06	40 ↑	60 ↑	
Electric strength	KV/mm	-	2.5.6.2.	30 ↑	40 ↑		
C.T.I.	-	-	UL94	N/A	3 (175V-249V)		
THERMAL PROP.	Thermal stress	Seconde	288°C solder dipping	2.4.13.1	10 ↑	200 ↑	
	Thermal conductivity	Kcal/mh°C	Hot wire test	JIS R2618	N/A	0,0493	
	Flammability	-	C-24/23/50+E-24/125	UL94	94 V0	94V0	
	Glass transition temp.	°C	DSC	2.4.25	N/A	140 ±5	
	TMA 260°C Delamination	Minute	TMA	2.4.24.1	N/A	> 20'	
	TMA 288°C Delamination	Minute	TMA	2.4.24.1	N/A	>2'	
	Td (5% weight loss)	°C	TGA, 10°C/min	-	N/A	> 310	
	Td (5% weight loss)		TGA, 20°C/min		N/A	N.A.	
MECHANICAL PROPRIETY	Yield stress test (1mm↑)		0.71 MM – 1.3 mm/min (A condition)				
	- Bend strength WD	Kg/cm ²			N/A	4120	
	- Bend strength FD	Kg/cm ²			N/A	3553	
	- Flexibility WD	Kg/mm ²			N/A	3035	
	- Flexibility FD	Kg/mm ²			N/A	2592	
	Young's Modulous						
	- Pull extend strength WD	Kg/cm ²	0.71 MM – 20 mm/min (A condition)		N/A	4315	
	- Pull extend strength FD	Kg/cm ²			N/A	3391	
	- Flexibility WD	Kg/mm ²			N/A	1001	
	- Flexibility FD	Kg/mm ²			N/A	939	
	Dimensional stability X-Y axis	%		E 4/105	02/04/39	0.05 ↓	0.005-0.030
	Z axis expansion						
Others	C.T.E. :						
	- X-Y axis						
	- Z axis before Tg	ppm/°C	TMA	02/04/24	N/A	50-70	
	- Z axis after Tg	ppm/°C	TMA	02/04/24	N/A	250-350	
Moisture absorption	%	D-24/23	2/6/2/1	0.35 ↓	0.05-0.10		
Peel strength 35µ	lb/in	288°Cx10" solder floating	02/04/08	6 ↑	10.0-14.0		

Data shown are nominal values for reference only.
Test method per IPC-TM-650

Note : The average value in the table refers to samples
0.062 " 1/1

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Agent NAN YA for Belgium – France – Netherlands – UK

FR4 86 UV BLOCK

CERTIFICATION UL – UL FILE N° E98983

INDUSTRIAL LAMINATES

industrial laminates furnished as sheets

ANSI Type	Color	Build up Min Thk (mm)	Flame Class	R.T.I. Elec C	Mech C	HWI	HAI	H VTR	CTI	Meets 764E DSR
FR-4	NC	0.18	V-0	130	105	0	0	-	-	yes
		0.38			130					
		0.64			140					
		1.40			140					

ULTRATHIN BUILD UPS

Ultrathin industrial laminates and bonding layers, furnished in sheet form, for use in multilayer printed wiring boards where the thickness is built up to the minimum specified.

Build up				Laminate			Preg		
ANSI Type	Min Thk (mm)	TI Elec	TI Mec	Mtl Dsg	Thk (mic)	TI Elec	Mtl Dsg	Thk (mic)	TI Elec
FR-4	0.18	130	105	FR-4-86, FR-4-TL, UV BLOCK FR-4-86	100	120	NYP-1	50	90
	0.38		130						
	0.64		140						

METAL CLAD INDUSTRIAL LAMINATES

Metal clad industrial laminates for use in multilayer printed wiring boards with copper on one or both sides, furnished as sheets

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
FR-4-86, FR-4-TL, UV BLOCK FR-4-86	NYP-1	FR-4	0.64	17	102	102	50.8	V-0	130	288	30

Metal clad industrial laminates for use in single layer printed wiring boards with copper on one or both sides, furnished as sheets.

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts		
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)	
FR-4-86, FR-4-TL, UV BLOCK FR-4-86	-	FR-4	0.38	17	137	-	50.80	V-0	130	288	30	
			0.64	17	102	-	50.80	V-0	130	180	1200	
											230	120
											260	20
									260	20		

Glass cloth base epoxy resin
Flame retardant copper clad laminate

NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION
COPPER CLAD LAMINATE DEPARTMENT

NP 140 MD

FEATURES

- UV solder mask may be applied simultaneously in order to increase yields
- Excellent dimensional stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C L21/121
- UL designation : ANSI grade FR-4
- UL file number E98983
- Outstanding heat resistance
- High luminance of multi-functionnal Epoxy contrast with copper for A.O.I.
- Traditionnal FR4 method processability
- CAF Resistent laminates

PERFORMANCE LIST

Characteristics		Unit	Conditioning	Test Method	Spec.	Typical values
ELECTRICAL PROPRIETY	Volume resistivity	MΩ-cm	C-96/35/90	02/05/17	10 ⁶ ↑	5.0x10 ⁹
	Surface resistivity	MΩ			10 ⁴ ↑	5.0x10 ⁷
	Permittivity 1 Mhz	-	C-24/23/50	2.5.5.9	5.4 ↓	4.2-4.4
	Permittivity 100 Mhz	-			-	
	Permittivity 1 Ghz	-	C-24/23/50	2.5.5.9	-	3.8-4.0
	Permittivity 2 Ghz	-			-	
	Loss tangent 1Mhz	-	C-24/23/50	2.5.5.9	0.035 ↓	0.015-0.020
	Loss tangent 100 Mhz	-			-	
	Loss tangent 1 Ghz	-	C-24/23/50	2.5.5.9	-	0.012-0.014
	Loss tangent 2 Ghz	-			-	
	Arc resistance	Seconde	D-48/50+D-05/23	02/05/01	60 ↑	120 ↑
	Dielectric breakdown	KV	D-48/50	02/05/06	40 ↑	60 ↑
	Electric strength	KV/mm	-	2.5.6.2.	30 ↑	40 ↑
C.T.I.	-	-	UL94	N/A	3 (175V-249V)	
THERMAL PROP.	Thermal stress	Seconde	288°C solder dipping	2.4.13.1	10 ↑	90 ↑
	Thermal conductivity					
	Flammability		C-24/23/50+E-24/125	UL94	94 V0	94V0
	Glass transition temp.	°C	DSC	02/04/25	N/A	135 ±5
	TMA 260°C Delamination	Minute	TMA	2.4.24.1	N/A	> 30'
	TMA 288°C Delamination	Minute	TMA	2.4.24.1	N/A	>5'
	Td (5% weight loss)	°C	TGA, 10°C/min	-	N/A	> 310
	Td (5% weight loss)		TGA, 20°C/min		N/A	N.A.
MECHANICAL PROPRIETY	Yield stress test (1mm↑)		0.71 MM – 1.3 mm/min (A condition)			
	- Bend strength WD	Kg/cm ²			N/A	4120
	- Bend strength FD	Kg/cm ²			N/A	3553
	- Flexibility WD	Kg/mm ²			N/A	3035
	- Flexibility FD	Kg/mm ²			N/A	2592
	Young's Modulous		0.71 MM – 20 mm/min (A condition)			
	- Pull extend strength WD	Kg/cm ²			N/A	4315
	- Pull extend strength FD	Kg/cm ²			N/A	3391
	- Flexibility WD	Kg/mm ²			N/A	1001
	- Flexibility FD	Kg/mm ²			N/A	939
	Dimensional stability X-Y axis	%	E 4/105	02/04/39	0.05 ↓	0.01-0.03
	Z axis expansion	%				
	C.T.E. :					
- X-Y axis						
- Z axis before Tg	ppm/°C	TMA	02/04/24	N/A	50-70	
- Z axis after Tg	ppm/°C	TMA	02/04/24	N/A	250-350	
Others	Moisture absorption	%	D-24/23	2/6/2/1	0.35 ↓	0.20-0.30
	Peel strength 35μ	lb/in	288°Cx10" solder floating	02/04/08	6 ↑	10.0-14.0

Data shown are nominal values for reference only.
 Test method per IPC-TM-650

Note : The average value in the table refers to samples
 0.20 " 1/1

NP140 MD

CONSTRUCTION

Thickness		Construction	
Mm	Mil		
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		Construction	
Mm	Mil		
0,38	15	7628	2 plies
0,45	18	7628x2+1080x1	
0,50	20	7628	3 plies
0,53	5	7628	3 plies
0,60	24	7628	3 plies
0,77	30	7628	4 plies
0,80	31	7628	4 plies
0,90	35	7628	5 plies
1,00	39	7628	5 plies
1,10	12	7628	6 plies
1,20	47	7628	6 plies

- 1,2 mm – 1,1 mm – 1,0 mm – 0,9 mm – 0,77 mm Thicknesses include cladding / All others exclude cladding

PRODUCT SIZE & THICKNESS

Thickness		Copper Cladding
Mm	Mil	
0.05 to 1.2	2 to 47	12 micron to 105 micron

Size		Thickness Tolerance
Inch	Mm	
48.8 x 36.6	1240x930	IPC-4101B Spec Class C/M
48.8 x 42.5	1240x1080	

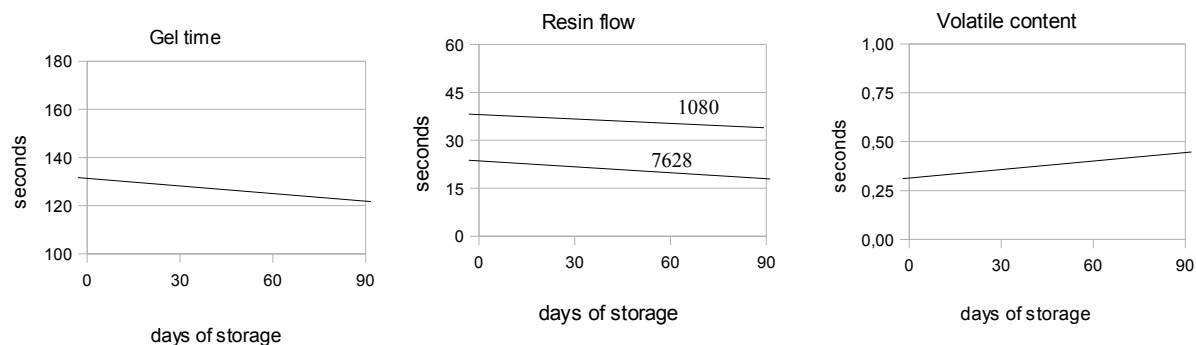
Keeping the core and prepreg in the same grain direction is crucial to ensure the flatness of multilayer boards
Grain direction is shown on the certificate of conformance

NP140 MD

PERFORMANCE LIST

Glass style	RC%	RF%	GT sec (170°C)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628 HR	50 ± 3	28 ± 5	130 ± 20	0.75 ↓	0.200 ± 0.010	7.9 ± 0.4
7628 MR	47 ± 3	25 ± 5			0.190 ± 0.010	7.5 ± 0.4
7628	43 ± 3	20 ± 5			0.180 ± 0.010	7.1 ± 0.4
1506 MR	52 ± 3	30 ± 5			0.160 ± 0.010	6.3 ± 0.4
1506	48 ± 3	25 ± 5			0.150 ± 0.010	6.0 ± 0.4
2116HR	58 ± 3	35 ± 5			0.130 ± 0.010	5.0 ± 0.4
2116MR	54 ± 3	30 ± 5			0.118 ± 0.010	4.6 ± 0.4
2116	50 ± 3	25 ± 5			0.105 ± 0.010	4.1 ± 0.4
2313	55 ± 3	30 ± 5			0.090 ± 0.010	3.5 ± 0.4
2113	56 ± 3	30 ± 5			0.090 ± 0.010	3.5 ± 0.4
2112	60 ± 3	35 ± 5			0.075 ± 0.008	3.0 ± 0.3
1080 HR	68 ± 3	45 ± 5			0.071 ± 0.008	2.8 ± 0.3
1080 MR	65 ± 3	40 ± 5			0.068 ± 0.008	2.7 ± 0.3
1080	62 ± 3	35 ± 5			0.065 ± 0.008	2.6 ± 0.3
106	68 ± 3	40 ± 5			0.053 ± 0.008	2.1 ± 0.3

STORAGE STABILITY



Storage Condition : 20°C 50% RH for 3 months, max. 5°C for 6 months

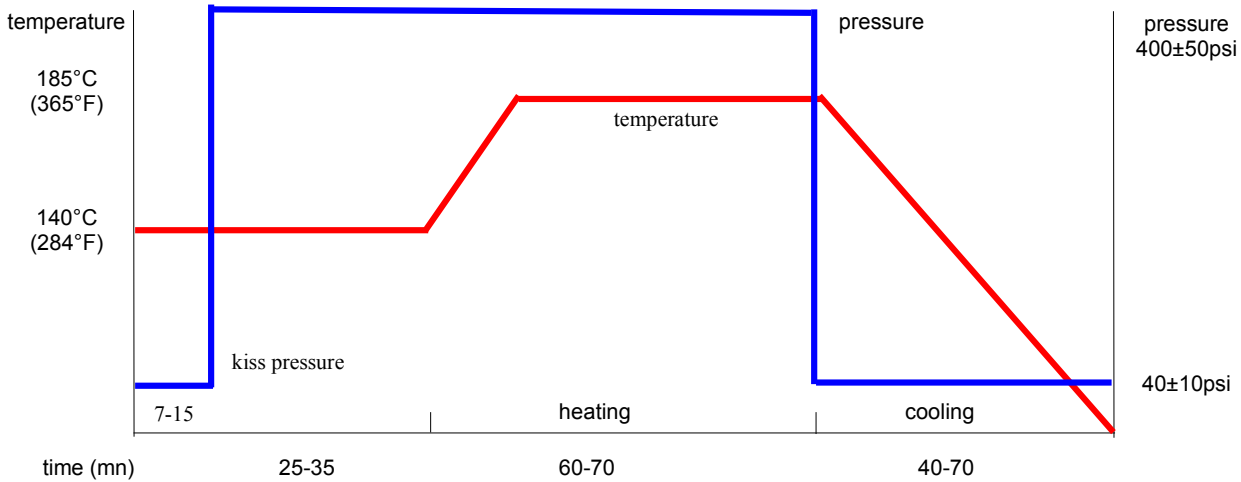
Data shown are nominal values for reference only



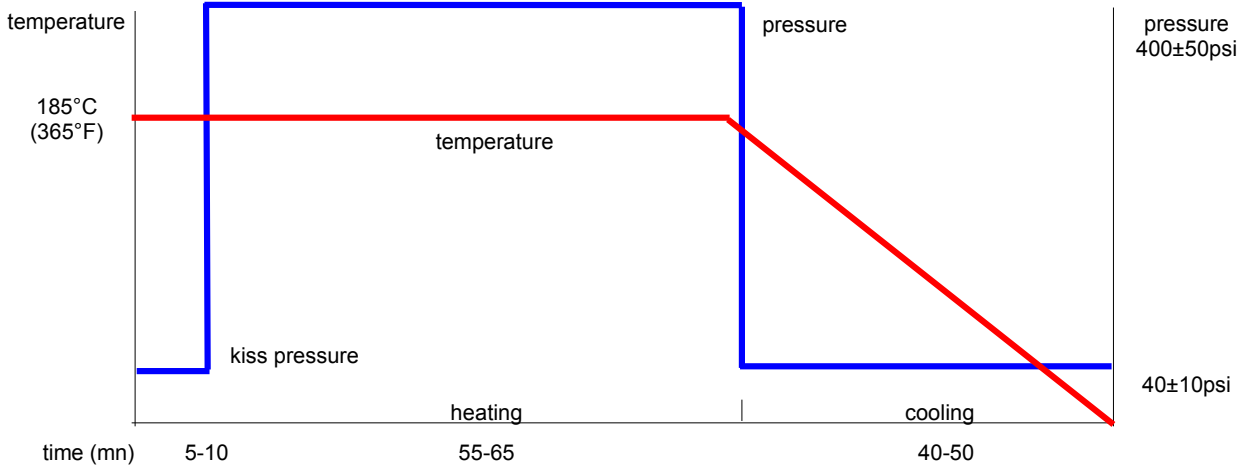
NP140 MD

RECOMMENDED PRESS CYCLE

2 steps



hot press



Suggestions

1. Heating rate of material between 70°C and 140°C
 1-3°C/mn is acceptable
 1.5-2.5°C/min would be better
2. Temperature of material over 170°C must be held for at least 60 minutes to allow epoxy resin to fully cure
3. The pressure should be kept below 7 bars during cooling to ambient temperature
4. Cooling rate of material should be kept under 2.5°C/mn when the temperature of material is over 100°C in order to avoid introducing twist

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NP140 MD UL

CERTIFICATION UL – UL FILE N° E98983

INDUSTRIAL LAMINATES

industrial laminates furnished as sheets

ANSI Type	Color	Build up Min Thk (mm)	Flame Class	R.T.I. Elec C	Mech C	HWI	HAI	H VTR	CTI	Meets 764E DSR
FR-4		0.25	V-0	120	130	3	3	-	-	yes
		0.38		130	130	0	3	-	-	yes
		0.64		130	140	0	3	4	-	yes
		1.40		130	140	0	2	4	3	yes
		0.04		90	90	3	4	-	-	-

ULTRATHIN BUILD UPS

Ultrathin industrial laminates and bonding layers, furnished in sheet form, for use in multilayer printed wiring boards where the thickness is built up to the minimum specified.

ANSI Type	Build up			Laminate			Preg		
	Min Thk (mm)	TI Elec	TI Mec	Mtl Dsg	Thk (mic)	TI Elec	Mtl Dsg	Thk (mic)	TI Elec
FR-4	0.25	120	130	NP-140R, NP-140TL, NP-140MR, NP-140MTL	50	90	NP-140B, NP-140MB	38	50
	0.38	130	130						
	0.64	130	140						

METAL CLAD INDUSTRIAL LAMINATES

Metal clad industrial laminates for use in multilayer printed wiring boards with copper on one or both sides, furnished as sheets

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-140R, NP-140TL, NP-140MR, NP-140MTL	NP-140B, NP-140MB	FR-4	0.25	17	102	68	50.80	V-0	120	288	30
			0.38						130	288	30
			0.64						130	180	1200
									230	120	
									260	20	

Metal clad industrial laminates for use in single layer printed wiring boards with copper on one or both sides, furnished as sheets.

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-140R, NP-140TL, NP-140MR, NP-140MTL	-	FR-4	0.25	17	102	-	50.80	V-0	120	288	30
			0.38	17	102	-	50.80	V-0	130	288	30
			0.64	17	102	-	50.80	V-0	130	180	1200
										230	120
										260	20
										260	20
				12	102	-	50.80	V-0	90	288	30

Glass cloth base epoxy resin
Flame retardant copper clad laminate

NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION

NP170

FEATURES

- High Tg 170°C (DSC)
- Excellent dimensional stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C L24/26
- UL designation : ANSI grade FR-4
- UL file number E98983
- Outstanding heat resistance
- High luminance of multi-functionnal Epoxy contrast with copper for A.O.I.
- Traditionnal FR4 method processability
- CAF Resistent laminates

PERFORMANCE LIST

Characteristics		Unit	Conditioning	Test Method	Spec.	Typical values	
ELECTRICAL PROPRIETY	Volume resistivity	MΩ-cm	C-96/35/90	2.5.17.1	10 ⁶ ↑	5.0x10 ⁶ -5.0x10 ⁹	
	Surface resistivity	MΩ			10 ⁴ ↑	5.0x10 ⁶ – 5.0x10 ⁷	
	Permittivity 1 Mhz	-	C-24/23/50	2.5.5.2	5.4 ↓	4.2-4.6	
	Permittivity 100 Mhz	-		2.5.5.3	-	4.1 - 4.3	
	Permittivity 1 Ghz	-	C-24/23/50	2.5.5.9	-	3.9-4.2	
	Permittivity 2 Ghz	-		2.5.5.5	-	3.8-4.2	
	Loss tangent 1Mhz	-	C-24/23/50	2.5.5.2	0.035 ↓	0.020	
	Loss tangent 100 Mhz	-		2.5.5.3	-	0.016 – 0.018	
	Loss tangent 1 Ghz	-	C-24/23/50	2.5.5.9	-	0.012-0.014	
	Loss tangent 2 Ghz	-		2.5.5.5	-	0.011 – 0.013	
	Arc resistance	Seconde	D-48/50+D-05/23	2.5.1	60 ↑	120 ↑	
	Dielectric breakdown	KV	D-48/50	2.5.6	40 ↑	60 ↑	
Electric strength	KV/mm	-	2.5.6.2.	30 ↑	40 ↑		
C.T.I.	-	-	UL94	N/A	4 (100V-174V)		
THERMAL PROP.	Thermal stress	Seconde	288°C solder dipping	2.4.13.1	10 ↑	90 ↑	
	Thermal conductivity	Kcal/mh°C	Hot wire test	JIS R2618	N/A	0,0493	
	Flammability	-	C-24/23/50+E-24/125	UL94	94 V0	94V0	
	Glass transition temp.	°C	DSC	2.4.25	N/A	170 ±5	
	TMA 260°C Delamination	Minute	TMA	2.4.24.1	N/A	25	
	TMA 288°C Delamination	Minute	TMA	2.4.24.1	N/A	3	
	Td (5% weight loss)	°C	TGA, 10°C/min	ASTM D3850	N/A	>320	
	Td (5% weight loss)	°C	TGA, 20°C/min	ASTM D3850	N/A	>330	
MECHANICAL PROPRIETY	Yield stress test (1mm↑)		0.26 MM – 1.3 mm/min (A condition)				
	- Bend strength WD	Kg/cm ²			N/A	N/A	
	- Bend strength FD	Kg/cm ²			N/A	N/A	
	- Flexibility WD	Kg/mm ²			N/A	N/A	
	- Flexibility FD	Kg/mm ²				N/A	N/A
	Young's Modulous		0.26 MM – 20 mm/min (A condition)				
	- Pull extend strength WD	Kg/cm ²			N/A	2987	
	- Pull extend strength FD	Kg/cm ²			N/A	82	
	- Flexibility WD	Kg/mm ²			N/A	3057	
	- Flexibility FD	Kg/mm ²				N/A	80
	Dimensional stability X-Y axis	%	E 4/105	2.4.39	0.05 ↓	0.01-0.03	
	Z axis expansion	%				4.1 – 4.2	
C.T.E. :		TMA	2.4.24	N/A			
- X-Y axis	ppm/°C				15-18		
- Z axis before Tg	ppm/°C				50-70		
- Z axis after Tg	ppm/°C				270-300		
Others	Moisture absorption	%	D-24/23	2.6.2.1	0.35 ↓	0.20-0.30	
	Peel strength 35μ	N/mm	288°Cx10" solder floating	2.4.8.2	1.05 ↑	1.40 ↑	

Data shown are nominal values for reference only
Test method per IPC-TM-650

Note : The average value in the table refers to samples
0.20 " 1/1

NP170

CONSTRUCTION

Thickness		Construction	
Mm	Mil		
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		Construction	
Mm	Mil		
0,38	15	7628	2 plies
0,45	18	7628x2+1080x1	
0,50	20	7628	3 plies
0,53	5	7628	3 plies
0,60	24	7628	3 plies
0,77	30	7628	4 plies
0,80	31	7628	4 plies
0,90	35	7628	5 plies
1,00	39	7628	5 plies
1,10	12	7628	6 plies
1,20	47	7628	6 plies

- 1,2 mm – 1,1 mm – 1,0 mm – 0,9 mm – 0,77 mm Thicknesses include cladding / All others exclude cladding

PRODUCT SIZE & THICKNESS

Thickness		Copper Cladding
Mm	Mil	
0.05 to 1.2	2 to 47	12 micron to 105 micron

Size		Thickness Tolerance
Inch	Mm	
48.8 x 36.6	1240x930	IPC-4101B Spec Class C/M
48.8 x 42.5	1240x1080	

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

Glass cloth base epoxy resin
Flame retardant copper clad laminate

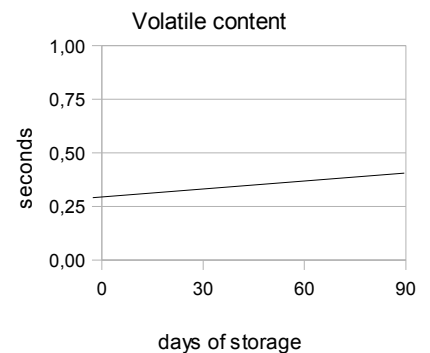
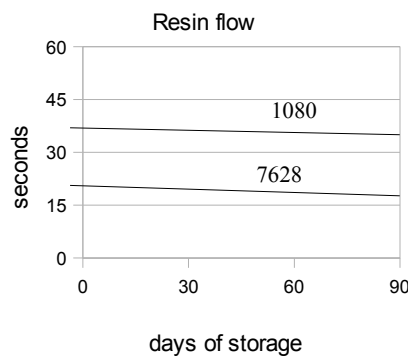
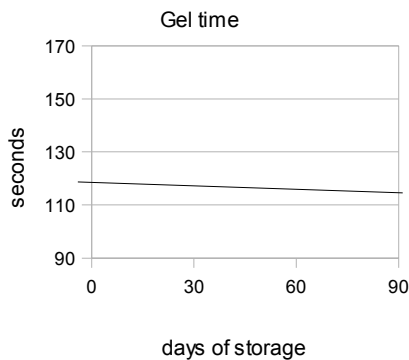
NAN YA PLASTICS CORPORATION
ELECTRONIC MATERIALS DIVISION
COPPER CLAD LAMINATE DEPARTMENT

NP 170

PERFORMANCE LIST

Glass style	RC%	RF%	GT sec (170°C)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	50 ± 3	28 ± 5	120 ± 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	30 ± 5			0.090 ± 0.01	3.5 ± 0.4
2112	60 ± 3	35 ± 5			0.075 ± 0.008	3.0 ± 0.3
1080HR	68 ± 3	45 ± 5			0.071 ± 0.008	2.8 ± 0.3
1080MR	65 ± 3	40 ± 5			0.068 ± 0.008	2.7 ± 0.3
1080	62 ± 3	35 ± 5			0.065 ± 0.008	2.6 ± 0.3
106	68 ± 3	40 ± 5			0.053 ± 0.008	2.1 ± 0.3

STORAGE STABILITY



Storage Condition : 20°C, 50% RH for 3 months, max. 5°C for 6 months

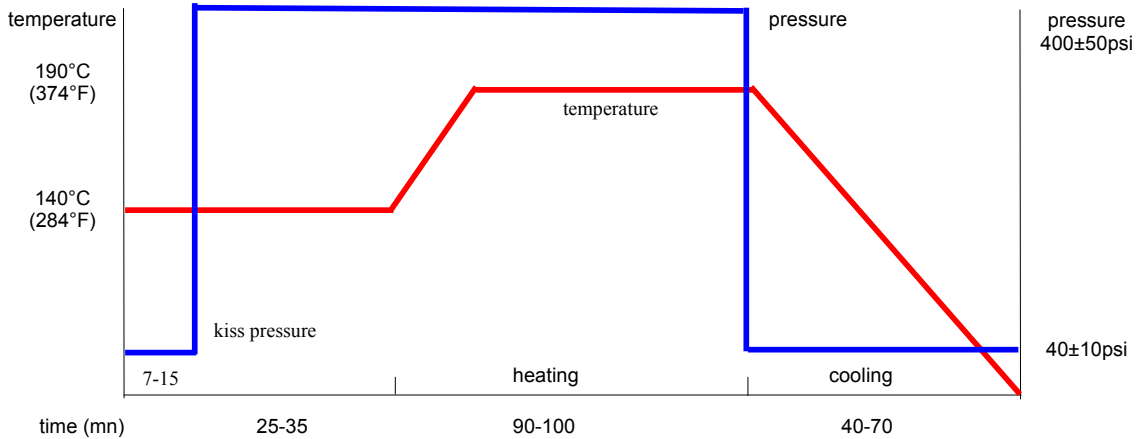
Data shown are nominal values for reference only

Winside – ZI La Marinière – Rue Charles de Gaulle – 91070 Bondoufle
 Contact : Sylvestre Cottard - +33 (0)1 69 11 81 15 - +33 (0)6 13 54 48 46
 Agent NAN YA for Belgium – France – Netherlands – UK

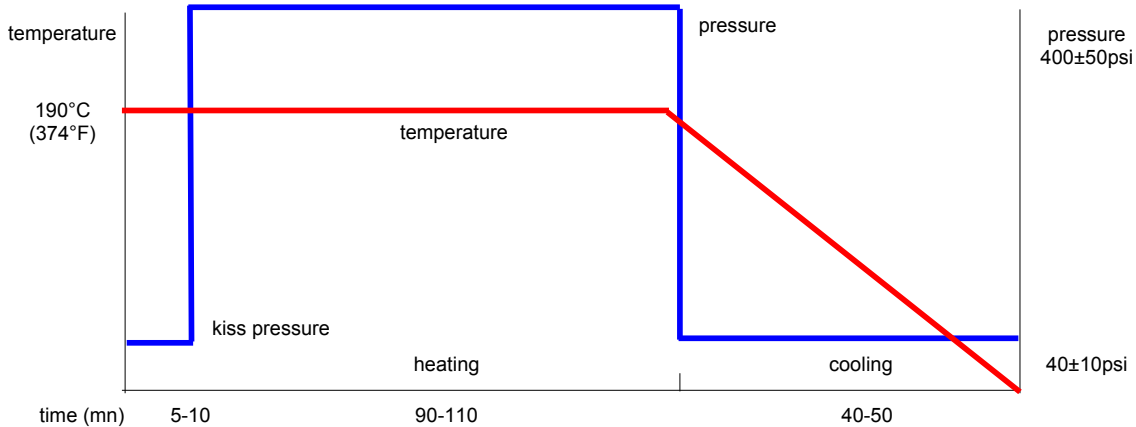
NP170

RECOMMENDED PRESS CYCLE

2 steps



hot press



1. 3°C/mn is acceptable 1.5-2.5°C/min would be better
2. Temperature of material over 170°C must be held for at least 60 minutes to allow epoxy resin to fully cure
3. The pressure should be kept below 7 bars during cooling to ambient temperature
4. Cooling rate of material should be kept under 2.5°C/mn when the temperature of material is over 100°C in order to avoid introducing twist



NP170 UL

CERTIFICATION UL – UL FILE N° E98983

INDUSTRIAL LAMINATES

industrial laminates furnished as sheets

ANSI Type	Color	Build up Min Thk (mm)	Flame Class	R.T.I. Elec C	Mech C	HWI	HAI	H VTR	CTI	Meets 764E DSR
FR-4	NC	0.035	V-0	-	-	-	-	-	-	-
		0.040		90	90	0	4	-	-	-
		0.380		130	130	0	4	-	-	-
		0.640		130	140	0	3	4	-	yes
		1.400		130	140	0	2	4	4	yes

ULTRATHIN BUILD UPS

Ultrathin industrial laminates and bonding layers, furnished in sheet form, for use in multilayer printed wiring boards where the thickness is built up to the minimum specified.

Build up				Laminate			Preg		
ANSI Type	Min Thk (mm)	TI Elec	TI Mec	Mtl Dsg	Thk (mic)	TI Elec	Mtl Dsg	Thk (mic)	TI Elec
FR-4	0.38	130	130	NP-170R, NP-170TL, NP-170SR, NP-170STL	50	90	NP-170B, NP-170SB	50	90
	0.64		140						

METAL CLAD INDUSTRIAL LAMINATES

Metal clad industrial laminates for use in multilayer printed wiring boards with copper on one or both sides, furnished as sheets

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-170R, NP-170TL, NP-170SR, NP-170STL	NP-170B, NP-170SB	FR-4	0.38	17	102	102	50.80	V-0	130	300	30

Metal clad industrial laminates for use in single layer printed wiring boards with copper on one or both sides, furnished as sheets.

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-170R, NP-170TL, NP-170SR, NP-170STL	-	FR-4	0.04	12	102	-	50.80	V-0	90	288	30
			0.38	17					130		

**Glass cloth base epoxy resin
Flame retardant copper clad laminate**

NP175 F

FEATURES

- High Tg 170°C (DSC)
- Excellent dimensional stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C L99/126
- DICY Free material
- UL file number E98983
- Outstanding heat resistance
- High luminance of multi-functional Epoxy contrast with copper for A.O.I.
- Fillers added to low the C.T.E.
- CAF Resistent laminates

PERFORMANCE LIST

	Characteristics	Unit	Conditioning	Test Method	Spec.	Typical values
ELECTRICAL PROPRIETY	Volume resistivity	MΩ-cm	C-96/35/90	2.5.17.1	10 ⁶ ↑	5.0x10 ⁹ – 5.0x10 ¹⁰
	Surface resistivity	MΩ			10 ⁴ ↑	5.0x10 ⁸ – 5.0x10 ⁹
	Permittivity 1 Mhz	-	C-24/23/50	2.5.5.2	5.4 ↓	4.2-4.9
	Permittivity 100 Mhz	-		2.5.5.3	-	4.1-4.7
	Permittivity 1 Ghz	-		2.5.5.9	-	4.0-4.6
	Permittivity 2 Ghz	-		2.5.5.5	-	3.9-4.0
	Loss tangent 1Mhz	-		2.5.5.2	0.035 ↓	0.015-0.019
	Loss tangent 100 Mhz	-		2.5.5.3	-	0.012-0.016
	Loss tangent 1 Ghz	-		2.5.5.9	-	0.011-0.013
	Loss tangent 2 Ghz	-		2.5.5.5	-	0.011-0.012
	Arc resistance	Seconde	D-48/50+D-05/23	2.5.1.	60 ↑	120 ↑
	Dielectric breakdown	KV	D-48/50	2.5.6.	40 ↑	60 ↑
	Electric strength	KV/mm	-	2.5.6.2.	30 ↑	40
	C.T.I.	-	-	UL94	N/A	3 (175V – 249V)
THERMAL PROP.	Thermal stress	Seconde	288°C solder dipping	2.4.13.1	10 ↑	600 ↑
	Thermal conductivity	Kcal/mh°C	Hot wire test	JIS R2618	N/A	0.049
	Flammability	-	C-24/23/50+E-24/125	UL94	94V1 ↓	94V0
	Glass transition temp.	°C	DSC	2.4.25.	> 150	170 ±5
	TMA 260°C Delamination	Minute	TMA	2.4.24.1	> 30'	> 60'
	TMA 288°C Delamination	Minute	TMA	2.4.24.1	> 5'	>40'
	Td (5% weight loss)	°C	TGA, 10°C/min	ASTM D3850	> 325	351
	Td (5% weight loss)	°C	TGA, 20°C/min	ASTM D3850	> 325	372
MECHANICAL PROPRIETY	Yield stress test (1mm↑)		0.71 MM – 1.3 mm/min (A condition)			
	- Bend strength WD	Kg/cm ²		N/A	4145	
	- Bend strength FD	Kg/cm ²		N/A	3826	
	- Flexibility WD	Kg/mm ²		N/A	2796	
	- Flexibility FD	Kg/mm ²		N/A	2609	
	Young's Modulous		0.71 MM – 20 mm/min (A condition)			
	- Pull extend strength WD	Kg/cm ²		N/A	3532	
	- Pull extend strength FD	Kg/cm ²		N/A	2943	
	- Flexibility WD	Kg/mm ²		N/A	903	
	- Flexibility FD	Kg/mm ²		N/A	1001	
	Dimensional stability X-Y axis	%	E 4/105	2.4.39.	0.05 ↓	0.01-0.03
	Z axis expansion	%			3,5 ↓	3,0
C.T.E. :		TMA	2.4.24.			
- X-Y axis	ppm/°C			N/A	13-15	
- Z axis before Tg	ppm/°C			60 ↓	40-60	
- Z axis after Tg	ppm/°C			300 ↓	250-270	
Others	Moisture absorption	%	D-24/23	2.6.2.1.	0.35 ↓	0.20 – 0.30
	Peel strength 35μ	N/mm	288°Cx10" solder floating	2.4.8.2.	1.05 ↑	1.40 ↑

Data shown are nominal values for reference only.

Test method per IPC-TM-650

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

Material without logo from 0.05 mm to 1.2 mm

Material with logo from 0.8 mm to 3.2 mm

NP175 F

CONSTRUCTION

Thickness		Construction		Thickness		Construction	
Mm	Mil			Mm	Mil		
0,10	4	1080	2 plies	0,38	15	7628	2 plies
0,11	4	2116	1 ply	0,45	18	7628x2+1080x1	
0,13	5	1080	2 plies	0,50	20	7628	3 plies
0,13sp	5	2116	1 ply	0,53	5	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	0,80	31	7628	4 plies
0,26	10	2116	2 plies	0,90	35	7628	5 plies
0,30	12	2116	3 plies	1,00	39	7628	5 plies
0,30sp	12	1506	2 plies	1,10	12	7628	6 plies
0,35	14	7628	2 plies	1,20	47	7628	6 plies

- 1,2 mm – 1,1 mm – 1,0 mm – 0,9 mm – 0,77 mm Thicknesses include cladding / All others exclude cladding

PRODUCT SIZE & THICKNESS

Thickness		Copper Cladding	Size		Thickness Tolerance
Mm	Mil		Inch	Mm	
0.05 to 3.2	2 to 126	9 micron to 210 micron	48.8 x 36.6 48.8 x 42.5	1240x930 1240x1080	IPC-4101B 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

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 material with chemicals.

Material without logo from 0.05 mm to 1.2 mm

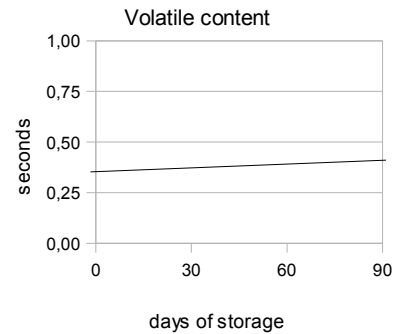
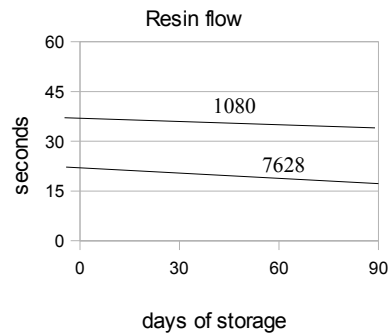
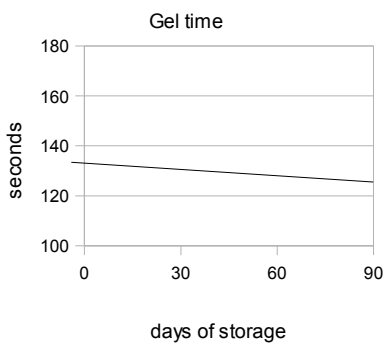
Material with logo from 0.8 mm to 3.2 mm

NP175 F

PERFORMANCE LIST

Glass style	RC%	RF%	GT sec (170°C)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	52 ± 3	31 ± 5	170 ± 20	1.5 ↓	0.199 ± 0.01	7.8 ± 0.4
7628MR	49 ± 3	28 ± 5			0.191 ± 0.01	7.5 ± 0.4
7628	45 ± 3	21 ± 5			0.181 ± 0.01	7.1 ± 0.4
1506MR	54 ± 3	34 ± 5			0.160 ± 0.01	6.3 ± 0.4
1506	50 ± 3	27 ± 5			0.150 ± 0.01	5.9 ± 0.4
2116HR	60 ± 3	40 ± 5			0.132 ± 0.01	5.2 ± 0.4
2116MR	56 ± 3	34 ± 5			0.118 ± 0.01	4.6 ± 0.4
2116	52 ± 3	28 ± 5			0.105 ± 0.01	4.1 ± 0.4
2313	57 ± 3	34 ± 5			0.090 ± 0.01	3.5 ± 0.4
2113	58 ± 3	35 ± 5			0.090 ± 0.01	3.5 ± 0.4
2112	62 ± 3	35 ± 5			0.079 ± 0.008	3.1 ± 0.3
1080HR	70 ± 3	50 ± 5			0.076 ± 0.008	3.0 ± 0.3
1080MR	67 ± 3	45 ± 5			0.071 ± 0.008	2.8 ± 0.3
1080	64 ± 3	40 ± 5			0.064 ± 0.008	2.5 ± 0.3
106HR	76 ± 3	54 ± 5			0.053 ± 0.009	2.1 ± 0.3
106MR	74 ± 3	47 ± 5			0.051 ± 0.010	2.0 ± 0.3
106	70 ± 3	42 ± 5			0.048 ± 0.008	1.9 ± 0.3

STORAGE STABILITY



Storage Condition : 20°C – 50% RH : 3 months – 5°C – 50% RH : 6 months

Data shown are nominal values for reference only

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

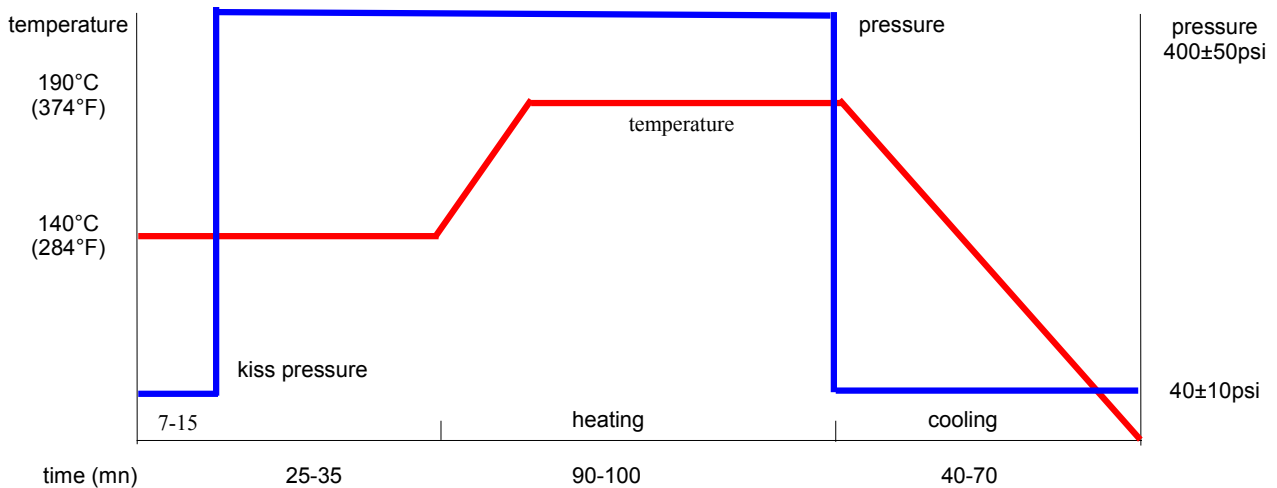
We recommend to evaluate the drilling property

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 material with chemicals.

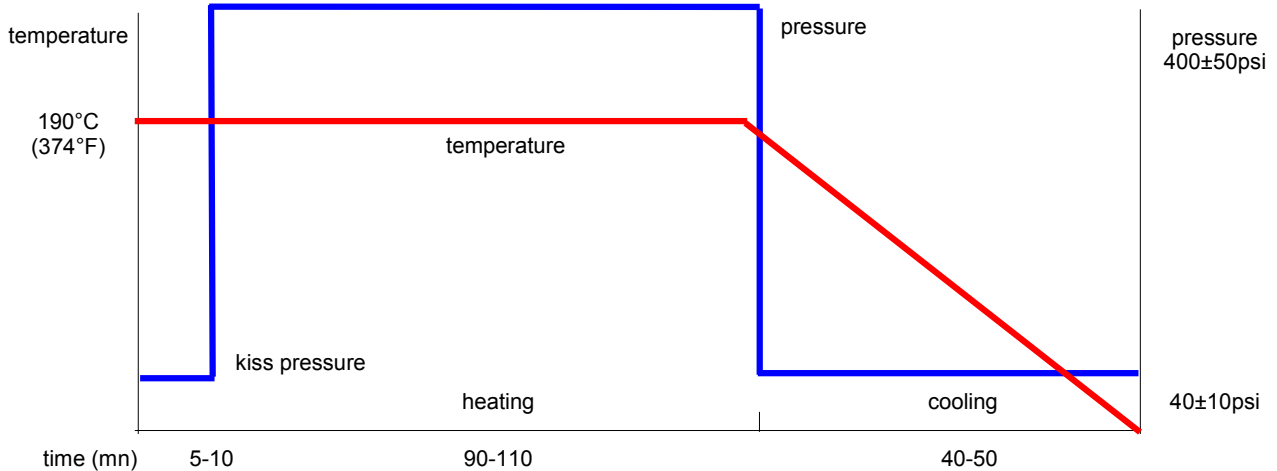
NP175 F

RECOMMENDED PRESS CYCLE

2 steps



hot press



Suggestions

1. Heating rate of material between 70°C and 140°C
1-3°C/mn is acceptable
1.5-2.5°C/min would be better
2. Temperature of material over 170°C must be held for at least 60 minutes to allow epoxy resin to fully cure
3. The pressure should be kept below 7 bars during cooling to ambient temperature
4. Cooling rate of material should be kept under 2.5°C/mn when the temperature of material is over 100°C in order to avoid introducing twist

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

NP175 F

CERTIFICATION UL – UL FILE N° E98983

INDUSTRIAL LAMINATES

industrial laminates furnished as sheets

ANSI Type	Color	Build up Min Thk (mm)	Flame Class	R.T.I. Elec (C)	R.T.I. Mech (C)	HWI	HAI	H VTR	CTI	Meets 764E DSR
FR4	NC	0.38	V-0	130	130	0	0	-	-	Yes
		0.64		130	140	0	0		-	
		1.60		130	140	0	0		3	

ULTRATHIN BUILD UPS

Ultrathin industrial laminates and bonding layers, furnished in sheet form, for use in multilayer printed wiring boards where the thickness is built up to the minimum specified.

Build up			Laminate				Preg		
ANSI Type	Min Thk (mm)	TI Elec	TI Mec	Mtl Dsg	Thk (mic)	TI Elec	Mtl Dsg	Thk (mic)	TI Elec
FR4	0.38	130	130	NP-175FR	50	50	NP-175FB	50	50
	0.38		130	NP-175FTL					

METAL CLAD INDUSTRIAL LAMINATES

Metal clad industrial laminates for use in multilayer printed wiring boards with copper on one or both sides, furnished as sheets

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-175FR NP-175FTL	NP-175FB	FR4	0.38	9	102	210	50.80	V-0	130	300	30

Metal clad industrial laminates for use in single layer printed wiring boards with copper on one or both sides, furnished as sheets.

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-175FR NP-175FTL	-	FR4	0.38	9	102	-	50.80	V-0	130	300	30

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

Material without logo from 0.05 mm to 1.2 mm
 Material with logo from 0.8 mm to 3.2 mm



**Glass cloth base epoxy resin
Flame retardant copper clad laminate**

NP180 FA

FEATURES

- High Tg 175°C (DSC)
- Excellent dimensional stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101C L23/126
- DICY Free material
- UL file number E98983
- Outstanding heat resistance
- High luminance of multi-functional Epoxy contrast with copper for A.O.I.
- Fillers added to low the C.T.E.
- CAF Resistent laminates

PERFORMANCE LIST

	Characteristics	Unit	Conditioning	Test Method	Spec.	Typical values
ELECTRICAL PROPRIETY	Volume resistivity	MΩ-cm	C-96/35/90	2.5.17.1	10 ⁶ ↑	5.0x10 ⁹
	Surface resistivity	MΩ			10 ⁴ ↑	5.0x10 ⁸
	Permittivity 1 Mhz	-	C-24/23/50	2.5.5.2	5.4 ↓	4.4-4.7
	Permittivity 100 Mhz	-		2.5.5.3	-	4.2-4.5
	Permittivity 1 Ghz	-		2.5.5.9	-	4.1-4.3
	Permittivity 2 Ghz	-		2.5.5.5	-	4.0-4.1
	Loss tangent 1Mhz	-		2.5.5.2	0.035 ↓	0.019-0.020
	Loss tangent 100 Mhz	-		2.5.5.3	-	0.016-0.018
	Loss tangent 1 Ghz	-		2.5.5.9	-	0.012-0.013
	Loss tangent 2 Ghz	-		2.5.5.5	-	0.011-0.012
	Arc resistance	Seconde	D-48/50+D-05/23	2.5.1.	60 ↑	120 ↑
	Dielectric breakdown	KV	D-48/50	2.5.6.	40 ↑	60 ↑
	Electric strength	KV/mm	-	2.5.6.2.	30 ↑	40 ↑
C.T.I.	-	-	UL94	N/A	3 (175V-249V)	
THERMAL PROP.	Thermal stress	Seconde	288°C solder dipping	2.4.13.1	10 ↑	600 ↑
	Thermal conductivity	Kcal/mh°C	Hot wire test	JIS R2618	N/A	0,0493
	Flammability	-	C-24/23/50+E-24/125	UL94	94V1 ↓	94V0
	Glass transition temp.	°C	DSC	2.4.25.	> 150	175 ±5
	TMA 260°C Delamination	Minute	TMA	2.4.24.1	> 30'	> 60'
	TMA 288°C Delamination	Minute	TMA	2.4.24.1	> 5'	>40'
	Td (5% weight loss)	°C	TGA, 10°C/min	ASTM D3850	> 325	355
Td (5% weight loss)	°C	TGA, 20°C/min	ASTM D3850	> 325	370	
MECHANICAL PROPRIETY	Yield stress test (1mm↑)		0.71 MM – 1.3 mm/min (A condition)			
	- Bend strength WD	Kg/cm ²		N/A	4120	
	- Bend strength FD	Kg/cm ²		N/A	3553	
	- Flexibility WD	Kg/mm ²		N/A	3035	
	- Flexibility FD	Kg/mm ²		N/A	2592	
	Young's Modulous		0.71 MM – 20 mm/min (A condition)			
	- Pull extend strength WD	Kg/cm ²		N/A	4315	
	- Pull extend strength FD	Kg/cm ²		N/A	3391	
	- Flexibility WD	Kg/mm ²		N/A	1001	
	- Flexibility FD	Kg/mm ²		N/A	939	
	Dimensional stability X-Y axis	%	E 4/105	2.4.39.	0.05 ↓	0.01-0.03
	Z axis expansion	%				2.3-2.4
C.T.E. :		TMA	2.4.24.	N/A		
- X-Y axis	ppm/°C				15-18	
- Z axis before Tg	ppm/°C				40-45	
- Z axis after Tg	ppm/°C				150-200	
Others	Moisture absorption	%	D-24/23	2.6.2.1.	0.80 ↓	0.10
	Peel strength 35µ	N/mm	288°Cx10" solder floating	2.4.8.2.	1.05 ↑	1.40 ↑

Data shown are nominal values for reference only.
Test method per IPC-TM-650

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

The material can not be used in horizontal brown oxide process

Material without logo from 0.05 mm to 1.2 mm

Material with logo from 0.8 mm to 3.2 mm

NP180 FA

CONSTRUCTION

Thickness		Construction		Thickness		Construction	
Mm	Mil			Mm	Mil		
0,10	4	1080	2 plies	0,38	15	7628	2 plies
0,11	4	2116	1 ply	0,45	18	7628x2+1080x1	
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	0,80	31	7628	4 plies
0,26	10	2116	2 plies	0,90	35	7628	5 plies
0,30	12	2116	3 plies	1,00	39	7628	5 plies
0,30sp	12	1506	2 plies	1,10	12	7628	6 plies
0,35	14	7628	2 plies	1,20	47	7628	6 plies

- 1,2 mm – 1,1 mm – 1,0 mm – 0,9 mm – 0,77 mm Thicknesses include cladding / All others exclude cladding

PRODUCT SIZE & THICKNESS

Thickness		Copper Cladding	Size		Thickness Tolerance
Mm	Mil		Inch	Mm	
0.05 to 3.2	2 to 126	12 micron to 210 micron	48.8 x 36.6 48.8 x 42.5	1240x930 1240x1080	IPC-4101B 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

The material can not be used in horizontal brown oxide process

Material without logo from 0.05 mm to 1.2 mm

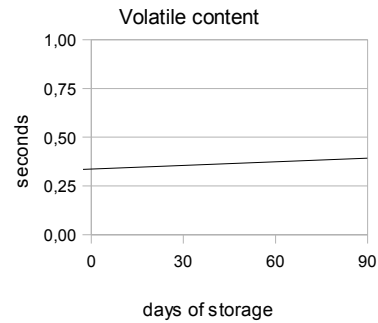
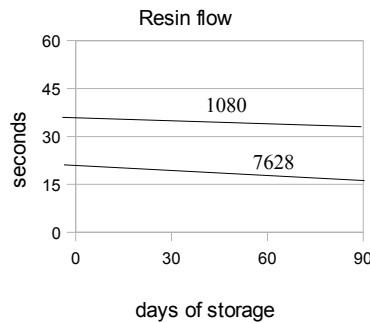
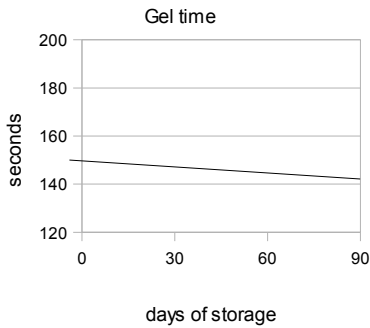
Material with logo from 0.8 mm to 3.2 mm

NP180 FA

PERFORMANCE LIST

Glass style	RC%	RF%	GT sec (170°C)	VC%	After Pressed Thickness (per ply)	
					mm	Mil
7628HR	50 ± 3	33 ± 5	150 ± 20	0.75 ↓	0.193 ± 0.01	7.6 ± 0.4
7628MR	47 ± 3	34 ± 5			0.183 ± 0.01	7.2 ± 0.4
7628	43 ± 3	35 ± 5			0.173 ± 0.01	6.8 ± 0.4
1506MR	52 ± 3	36 ± 5			0.157 ± 0.01	6.2 ± 0.4
1506	48 ± 3	37 ± 5			0.145 ± 0.01	5.7 ± 0.4
2116HR	58 ± 3	38 ± 5			0.120 ± 0.01	4.7 ± 0.4
2116MR	54 ± 3	32 ± 5			0.109 ± 0.01	4.3 ± 0.4
2116	50 ± 3	26 ± 5			0.097 ± 0.01	3.8 ± 0.4
2313	55 ± 3	33 ± 5			0.081 ± 0.01	3.2 ± 0.4
2113	56 ± 3	32 ± 5			0.081 ± 0.01	3.2 ± 0.4
2112	60 ± 3	38 ± 5			0.069 ± 0.008	2.7 ± 0.3
1080HR	68 ± 3	48 ± 5			0.066 ± 0.008	2.6 ± 0.3
1080MR	65 ± 3	44 ± 5			0.061 ± 0.008	2.4 ± 0.3
1080	62 ± 3	38 ± 5			0.058 ± 0.008	2.3 ± 0.3
106	68 ± 3	41 ± 5			0.046 ± 0.008	1.8 ± 0.3

STORAGE STABILITY



Storage Condition : 20°C – 50% RH : 3 months – 5°C – 50% RH : 6 months

Data shown are nominal values for reference only

Keeping the core and prepreg in the same grain direction is crucial to ensure the flatness of multilayer boards

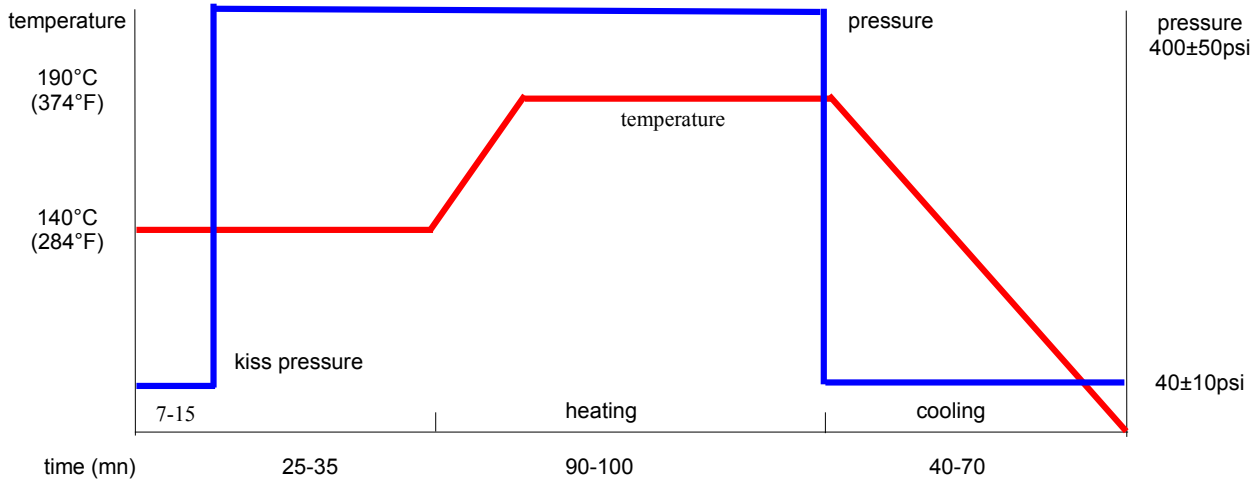
Grain direction is shown on the certificate of conformance

The material can not be used in horizontal brown oxide process

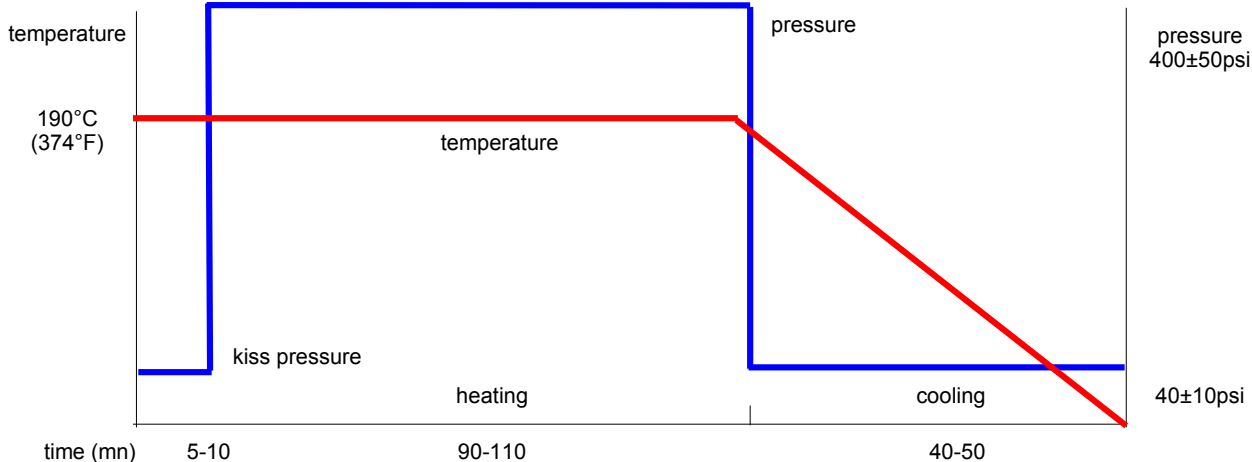
NP180 FA

RECOMMENDED PRESS CYCLE

2 steps



hot press



Suggestions

1. Heating rate of material between 70°C and 140°C
1-3°C/mn is acceptable
1.5-2.5°C/min would be better
2. Temperature of material over 170°C must be held for at least 60 minutes to allow epoxy resin to fully cure
3. The pressure should be kept below 7 bars during cooling to ambient temperature
4. Cooling rate of material should be kept under 2.5°C/mn when the temperature of material is over 100°C in order to avoid introducing twist

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

The material can not be used in horizontal brown oxide process

Material without logo from 0.05 mm to 1.2 mm

Material with logo from 0.8 mm to 3.2 mm



NP180 FA

CERTIFICATION UL – UL FILE N° E98983

INDUSTRIAL LAMINATES

industrial laminates furnished as sheets

ANSI Type	Color	Build up Min Thk (mm)	Flame Class	R.T.I. Elec (C)	R.T.I. Mech (C)	HWI	HAI	H VTR	CTI	Meets 764E DSR
FR4										

ULTRATHIN BUILD UPS

Ultrathin industrial laminates and bonding layers, furnished in sheet form, for use in multilayer printed wiring boards where the thickness is built up to the minimum specified.

Build up				Laminate			Preg		
ANSI Type	Min Thk (mm)	TI Elec	TI Mec	Mtl Dsg	Thk (mic)	TI Elec	Mtl Dsg	Thk (mic)	TI Elec
FR4	0.38	130	130	NP180FR	50	50	NP-180FB	50	50
	0.64		140	NP-180FTL					

METAL CLAD INDUSTRIAL LAMINATES

Metal clad industrial laminates for use in multilayer printed wiring boards with copper on one or both sides, furnished as sheets

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-180FR NP-180FTL	NP-180FB	FR4	0.38	9	102	210	50.80	V-0	130	300	30

Metal clad industrial laminates for use in single layer printed wiring boards with copper on one or both sides, furnished as sheets.

Laminates Dsg	Prepreg Dsg	ANSI Type	Build up Min Thk (mm)	Clad Cond Thk			Max Area Diam (mm)	Flame Class	Max Oper Temperature (°C)	Solder Lts	
				Min Ext (mic)	Max Ext (mic)	Max Int (mic)				Temp (°C)	Time (Sec)
NP-180FR NP-180FTL	-	FR4	0.38	9	102	-	50.80	V-0	130	300	30

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

The material can not be used in horizontal brown oxide process

Material without logo from 0.05 mm to 1.2 mm

Material with logo from 0.8 mm to 3.2 mm