



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

**NP-140TL**

**FEATURES**

- Multi-functional epoxy renders the material outstanding heat resistance, better dimensional stability, and through-hole reliability that benefit the performance of high layer count multilayer boards.
- HTE copper foil applied to prevent corner cracking.
- High luminance of epoxy contrast with copper for laser type A.O.I.
- UV solder mask may be applied simultaneously in order to increase yields.
- IPC-4101D specification is applicable.

**PERFORMANCE LIST**

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	5.0 x10 <sup>9</sup>	10 <sup>6</sup> ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	5.0 x10 <sup>7</sup>	10 <sup>4</sup> ↑	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	0.012-0.014	-	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°C x10" solder floating	10-14	6 ↑	2.4.8
Thermal stress	SEC	288°C solder dipping	200 ↑	10 ↑	2.4.13.1
Glass transition temp	°C	DSC	140 ± 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	ppm/°C	TMA	50-70	N/A	2.4.24
Z-axis after Tg	ppm/°C	TMA	250-350		
Decomposition Temperature (Td 5% W/L)	°C	TGA	310	N/A	2.4.24.6

**NOTE:**

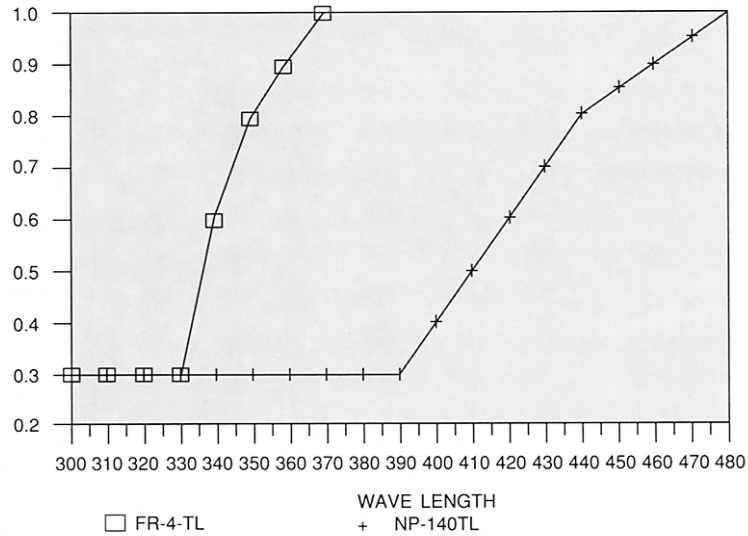
The average value in the table refers to samples of .020" 1/1.

Test method per IPC-TM-650

Data shown are nominal values for reference only.



**■ UV TRANSMISSION CURVE OF 0.2mm CCL**



**■ PRODUCT SIZE & THICKNESS**

THICKNESS INCH(mm)	COPPER CLADDING OZ (µm)	SIZE		THICKNESS TOLERANCE
		INCH	mm	
0.004 (0.1)	0.5 (17)	48.8 x 36.6	1240 x 0930	CLASS C/M
to	1.0 (35)	48.8 x 40.5	1240 x 1030	
0.047 (1.2)	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**

**■ CERTIFICATION UL**

• UL File No. : E98983 • ANSI TYPE: FR-4.0



**■ CONSTRUCTION:**

THICKNESS		CONSTRUCTION	THICKNESS		CONSTRUCTION
mm	mil		mm	mil	
0.08	3	2112 1 ply	0.38	15	7628 2 plies
0.10	4	1080 2 plies	0.45	17	7628 x 2 + 1080 x 1
0.11	4	2116 1 ply	0.46	17	7667 2 plies
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	0.8	31.5	7628 4 plies
0.26	10	2116 2 plies	0.9	36	7628 5 plies
0.30	12	2116 3 plies	1.0	39	7628 5 plies
0.30sp	12	1506 2 plies	1.1	43	7628 6 plies
0.35	14	7628 2 plies	1.2	47	7628 6 plies

\*1.2,1.1,1.0,0.9,0.77 mm, THICKNESS INCLUDES CLADDING. ALL OTHERS EXCLUDE CLADDING.



Glass cloth base epoxy resin  
**flame retardant prepreg**

# NP-140B

## ■ 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: 138~142°C

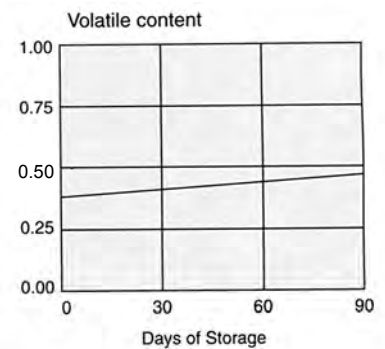
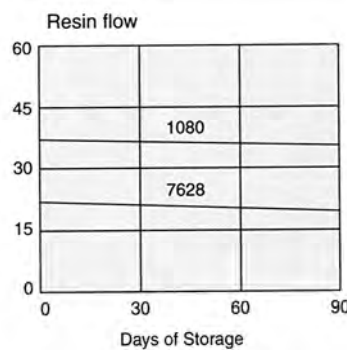
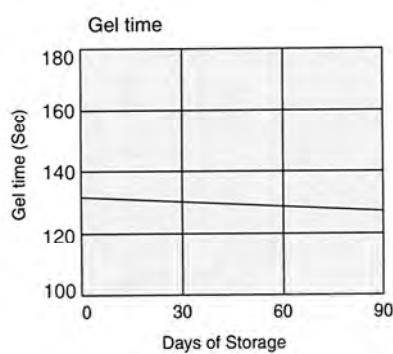
## ■ PERFORMANCE LIST

**Specification: IPC-4101C is applicable**

Glass Style	RC%	RF%	GT sec (171°C)	VC%	After Pressed Thickness (per ply)	
					mm	mil
7628HR	50 ± 3	28 ± 5	130 ± 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	32 ± 5			0.090 ± 0.01	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 Stability



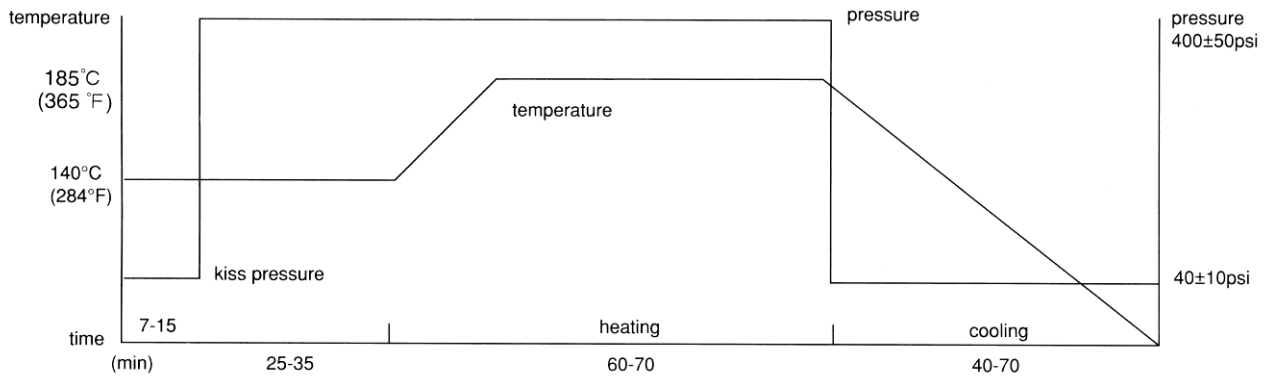
Storage Condition : 20°C, 50% RH for 3 months  
 : Max 5°C for 6 months

Data shown are nominal values for reference only.

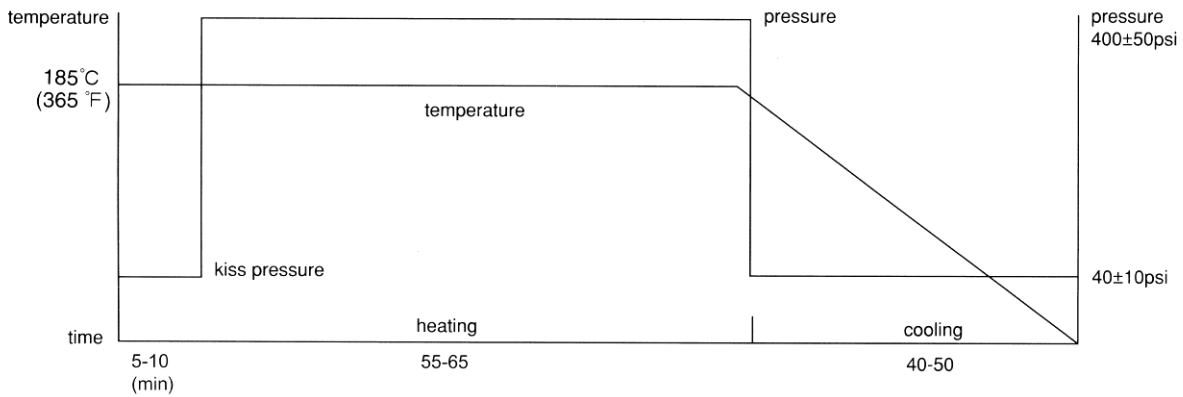


**Recommended press cycles:**

**A:2T2P (2 temperature step/2 pressure step)**



**B:1T2P (1 temperature step/2 pressure step)**



**Suggestions:**

1. Heating rate of material between 70°C (158°F) and 140°C (284°F)  
 1-3°C/min (1.8-5.4°F/min) is acceptable.  
 1.5-2.5°C/min (2.7-4.5°F/min) would be better.
2. Temperature of material over 170°C/min(338°F) must be held for at least 40min. 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°C/min(4.5°F/min) when the temperature of material is over 100°C (212°F), 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. Max. Mils Mils (mic) (mic)		Max. Area Diameter Inch (mm)	Sold Lts Temp Time °C sec	UL 94 Flame Class	Max. Operating Temp
0.02 (0.051)	0.68 (17)	4.08 (102)	2.0 (50.8)	@ @	94V-0	130

@-Preheat 180°C/20min, then 230°C/2min, then 260°C/20sec, the 260°C/20sec.