



**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.
- 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.
- HTE copper foil applied to prevent corner cracking.
- IPC-4101C specification is applicable.

■ 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 ⁷ | 10 ⁴ ↑ | 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 | 90 ↑ | 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:

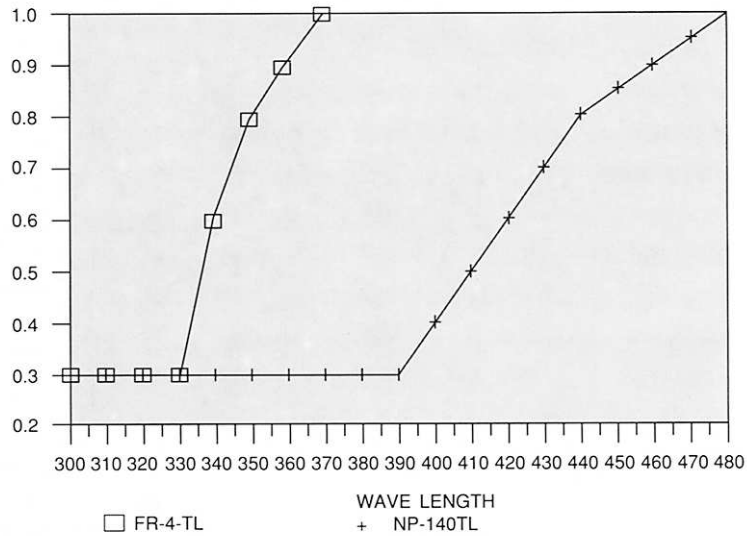
The average value in the table refers to samples of .020" 1/1.

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

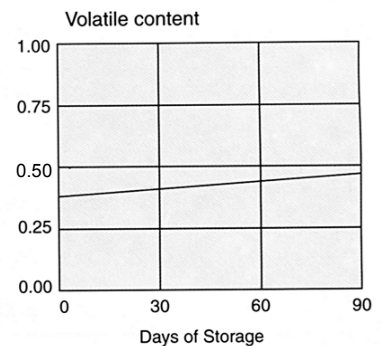
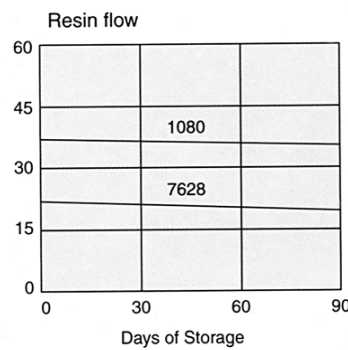
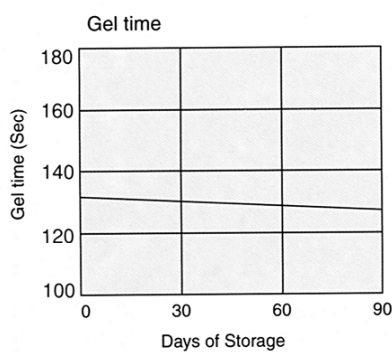
■ PERFORMANCE LIST

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



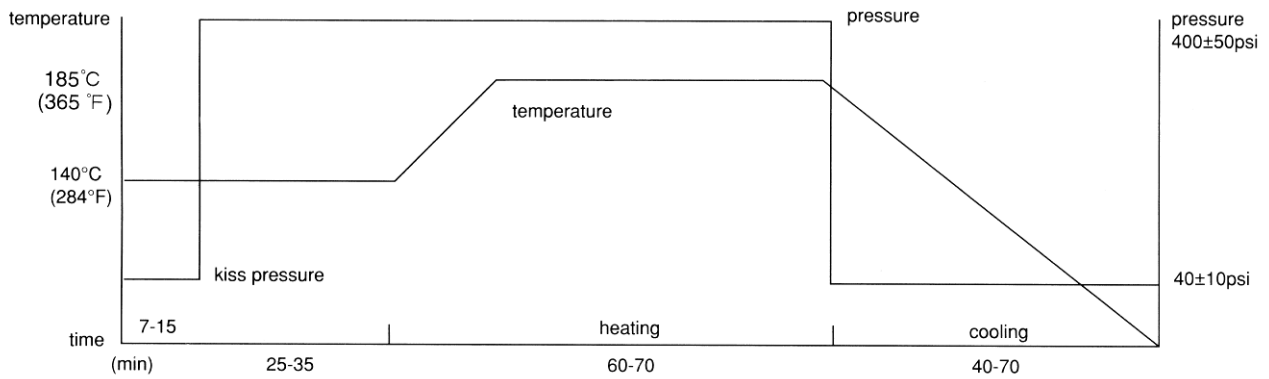
Storage Condition : 20°C, 50% RH for 3 months
 : Max 5°C for 6 months

Data shown are nominal values for reference only.

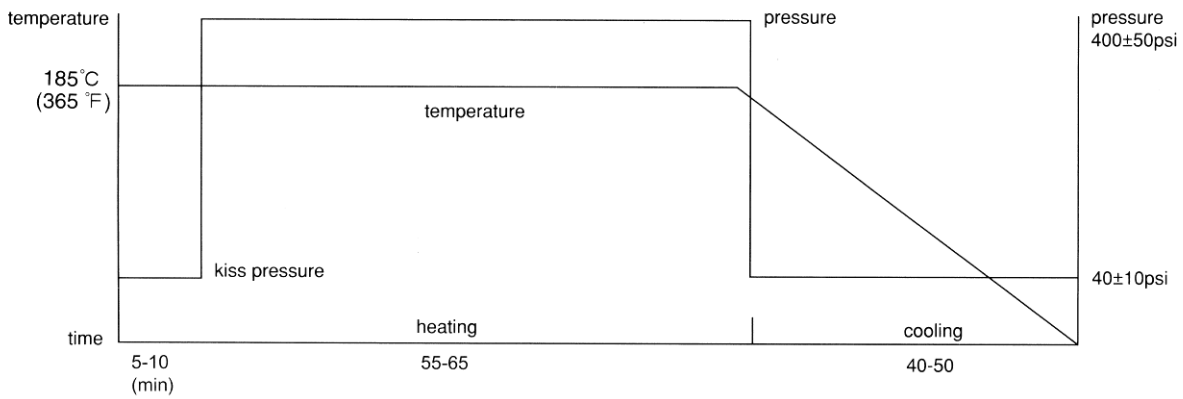


Recommended press cycles:

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 (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 4.08 (17) (102) | 2.0 (50.8) | @ @ | 94V-0 | 130 |

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