Issured : 2008-03-01
New : 2008-03-01

**NAN YA PLASTICS CORPORATION**
ELECTRONIC MATERIALS DIVISION.
**COPPER CLAD LAMINATE DEPARTMENT**

NO. 201. TUNG HWA N. ROAD,
TAIPEI, TAIWAN.

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

# NP-170TL

## ■ FEATURES

- High Tg 170℃ (DSC)
- Excellent dimensional stability and through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- IPC-4101B specification is applicable
- U. L designation: ANSI grade FR-4
- U.L file number E98983
- Outstanding heat resistance
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- Traditional FR-4 methods processability

## ■ PERFORMANCE LIST

| Characteristics | Unit | Conditioning | Typical Values | SPEC | Test Method |
|---|---|---|---|---|---|
| Volume resistivity | MΩ-cm | C-96/35/90 | 5.0 x$10^9$ | $10^6$ ↑ | 2.5.17 |
| Surface resistivity | MΩ | C-96/35/90 | 5.0 x$10^7$ | $10^4$ ↑ | 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 | 0.013-0.015 | - | 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℃x10" solder floating | 8-12 | 6 ↑ | 2.4.8 |
| Thermal stress | SEC | 288℃ solder dipping | 200 ↑ | 10 ↑ | 2.4.13.1 |
| Glass transition temp | ℃ | DSC | 170 ± 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<br>Z-axis before Tg<br>Z-axis after Tg | ppm/℃<br>ppm/℃ | TMA<br>TMA | 50-70<br>200-300 | N/A | 2.4.24 |

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

## ■ CONSTRUCTION:

| THICKNESS mm | THICKNESS mil | CONSTRUCTION | |
|---|---|---|---|
| 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 mm | THICKNESS mil | CONSTRUCTION | |
|---|---|---|---|
| 0.38 | 15 | 7628 | 2 plies |
| 0.45 | 18 | 7628x2+1080x1 | |
| 0.50 | 20 | 7628 | 3 plies |
| 0.53 | 21 | 7628 | 3 plies |
| 0.60 | 24 | 7628 | 3 plies |
| 0.77 | 31 | 7628 | 4 plies |
| 0.8 | 32 | 7628 | 4 ples |
| 0.9 | 36 | 7628 | 5 plies |
| 1.0 | 39 | 7628 | 5 plies |
| 1.1 | 43 | 7628 | 6 plies |
| 1.2 | 47 | 7628 | 6 plies |

・1.2, 1.1, 1.0, 0.9 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 |
|---|---|---|---|---|
| 0.004 (0.1) | 0.5 (17) | 48.8 x 36.6 | 1240 x 0930 | IPC-4101B SPEC CLASS C/M |
| to | 1.0 (35) | 48.8 x 40.5 | 1240 x 1030 | |
| 0.039(1.0) | 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**

## ■ CERTIFICA TION UL

・UL File No.: E98983

UL 746 Recognition

| Minimum Material Thickness Inch (mm) | Clad cond. Thickness min. mils (mic) | Clad cond. Thickness max. mils (mic) | Max. Area Diameter Inch (mm) | Sold Lts Temp ℃ | Sold Lts Time sec | UL 94 Flame class | Max. Operating Temp |
|---|---|---|---|---|---|---|---|
| 0.002 0.051 | 0.68 (17) | 4.08 (102) | 2.0 (50.8) | 288 | 30 | 94V-0 | 130 |