



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

NPG-170N

■ FEATURES

- Halogen, antimony, and red phosphorous free
- Flammability meets UL 94 V-0
- Excellent long term reliability
- UV blocking type
- Superior CAF-Resistance (Anti-migration)
- Reactive type flame retardants
- High Tg 170°C (DSC) and low C.T.E will provide excellent dimensional stability and through-hole reliability
- ANSI type : FR-4.1

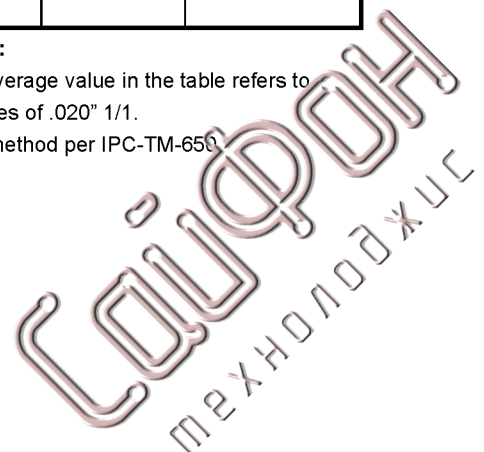
■ PERFORMANCE LIST

| 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 GHZ | - | C-24/23/50 | 4.1-4.3 | - | 2.5.5.9 |
| Loss Tangent 1 GHZ | - | C-24/23/50 | 0.009-0.012 | - | 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°Cx10" solder floating | 7-9 | 6 ↑ | 2.4.8 |
| Thermal stress | SEC | 288°C solder dipping | 300 ↑ | 10 ↑ | 2.4.13.1 |
| Glass transition temp | °C | 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 | | | | | |
| X-Y axis | ppm/°C | TMA | 9-13 | N/A | 2.4.24 |
| Z-axis before Tg | ppm/°C | TMA | 30-50 | | |
| Z-axis after Tg | ppm/°C | TMA | 200-230 | | |
| Decomposition Temperature (Td 5% W/L) | °C | TGA | 360 | N/A | 2.4.24.6 |

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 | | CONSTRUCTION | THICKNESS | | CONSTRUCTION |
|-----------|-----|--------------|-----------|------|---------------|
| mm | mil | | mm | mil | |
| 0.05 | 2 | 106 1 PLY | 0.35 | 14 | 7628 2 plies |
| 0.08 | 3 | 2112 1PLY | 0.38 | 15 | 7628 2 plies |
| 0.10 | 4 | 1080 2 plies | 0.45 | 17 | 7628x2+1080x1 |
| 0.11 | 4 | 2116 1 ply | 0.50 | 20 | 7628 3 plies |
| 0.13 | 5 | 1080 2 plies | 0.53 | 21 | 7628 3 plies |
| 0.13sp | 5 | 2116 1 ply | 0.60 | 24 | 7628 3 plies |
| 0.15 | 6 | 1506 1 ply | 0.77 | 30 | 7628 4 plies |
| 0.16 | 6 | 2112 2 plies | 0.8 | 31.5 | 7628 4 plies |
| 0.21 | 8 | 7628 1 ply | 0.9 | 36 | 7628 5 plies |
| 0.26 | 10 | 2116 2 plies | 1.0 | 39 | 7628 5 plies |
| 0.30 | 12 | 2116 3 plies | 1.1 | 43 | 7628 6 plies |
| 0.30sp | 12 | 1506 2 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 | | SIZE | | THICKNESS TOLERANCE |
|-----------------------|---------------------------------------|--|-------------|-------------|-----------------------------|
| | OZ (µm) | | INCH | mm | |
| 0.004 (0.1) | H (17) 2.0 (70) 1.0 (35) 3.0 (105) | | 48.8 x 36.6 | 1240 x 0930 | IPC-4101C SPEC CLASS C/M |
| to | | | 48.8 x 40.5 | 1240 x 1030 | |
| 0.039 (1.0) | | | 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.





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

NPG-170NB

■ FEATURES

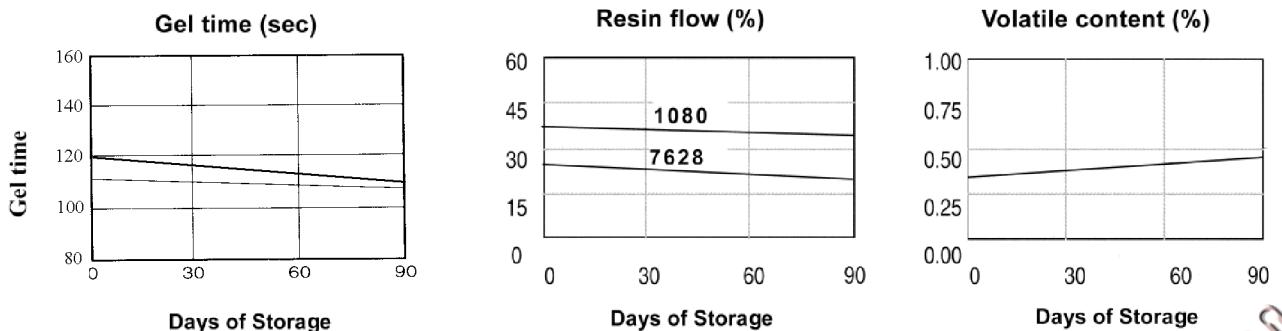
- Halogen, antimony, and red phosphorous free
- Rheology of resin controlled to benefit the lamination of the boards.
- Modified phosphorous epoxy provides excellent heat and chemical resistance.
- Tg: 170±5°C

■ PERFORMANCE LIST

Specification : IPC-4101C is applicable

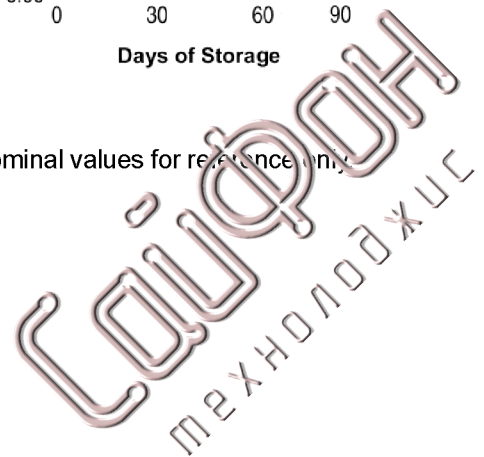
| Glass style | RC% | RF% | GT sec (171°C) | VC% | After Pressed Thickness (per ply) | |
|-------------|--------|--------|-------------------|--------|-----------------------------------|-----------|
| | | | | | mm | Mil |
| 7628HR | 50 ± 3 | 28 ± 5 | 120 ± 20 | 0.75 ↓ | 0.193 ± 0.01 | 7.6 ± 0.4 |
| 7628MR | 47 ± 3 | 25 ± 5 | | | 0.183 ± 0.01 | 7.2 ± 0.4 |
| 7628 | 43 ± 3 | 17 ± 5 | | | 0.173 ± 0.01 | 6.8 ± 0.4 |
| 1506MR | 52 ± 3 | 28 ± 5 | | | 0.157 ± 0.01 | 6.2 ± 0.4 |
| 1506 | 48 ± 3 | 23 ± 5 | | | 0.145 ± 0.01 | 5.7 ± 0.4 |
| 2116HR | 58 ± 3 | 35 ± 5 | | | 0.120 ± 0.01 | 4.7 ± 0.4 |
| 2116MR | 54 ± 3 | 30 ± 5 | | | 0.109 ± 0.01 | 4.3 ± 0.4 |
| 2116 | 50 ± 3 | 25 ± 5 | | | 0.097 ± 0.01 | 3.8 ± 0.4 |
| 2113 | 56 ± 3 | 32 ± 5 | | | 0.081 ± 0.01 | 3.2 ± 0.4 |
| 2112 | 60 ± 3 | 37 ± 5 | | | 0.069 ± 0.008 | 2.7 ± 0.3 |
| 1080HR | 68 ± 3 | 44 ± 5 | | | 0.064 ± 0.008 | 2.5 ± 0.3 |
| 1080MR | 65 ± 3 | 40 ± 5 | | | 0.061 ± 0.008 | 2.4 ± 0.3 |
| 1080 | 62 ± 3 | 34 ± 5 | | | 0.058 ± 0.008 | 2.3 ± 0.3 |
| 106 | 68 ± 3 | 35 ± 5 | | | 0.040 ± 0.008 | 1.6 ± 0.3 |

Storage Stability



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

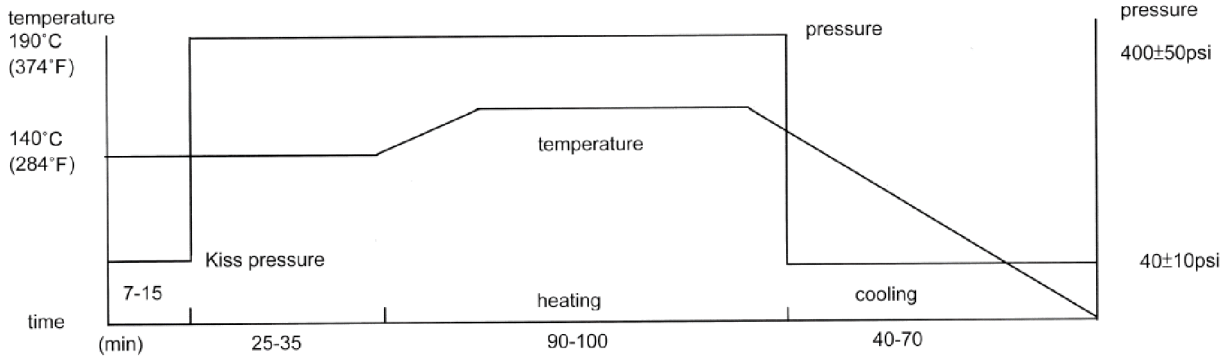
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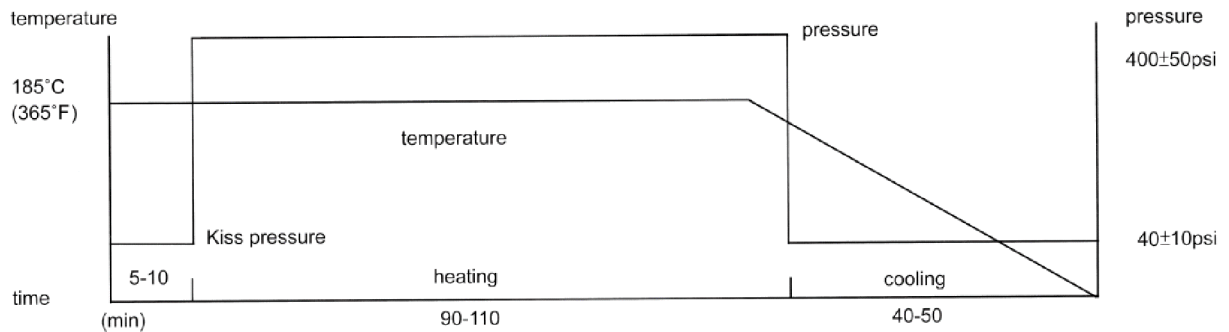


Recommended press cycles:

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 60min to allow 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-4.1

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. Spreading Rate mm/min |
|--|---|---------------------------------------|---------------------------------|-------------------------|----------------------------------|
| 0.002 (0.051) | 0.67 4.08 (17) (102) | 2.0 (50.8) | 288 30 | 94V-0 | 100 |

