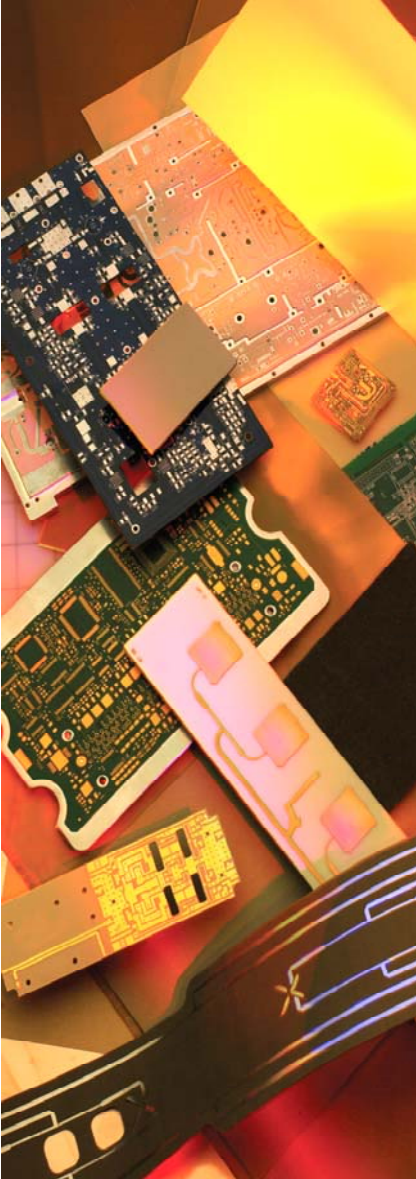


# 47N

## EPOXY LOW-FLOW PREPREG



47N is a low-flow epoxy prepreg engineered for binding multilayer epoxy rigid-flex or attaching heat sinks to multilayer PCBs. An optional low lamination temperature protects components already mounted on the PCB.

### Features:

- Tetrafunctional modified epoxy resin system with a Tg of 130°C
- Optimized bond to aluminum and copper heat sinks – typical lap shear 1000 PSI
- Cure temperature as low as 300°F (150°C)
- Engineered with discrete flow ranges and fiberglass styles for optimal process flexibility
- Electrical and mechanical properties meeting the requirements of IPC-4101/21, modified to be “Low-Flow”
- RoHS/WEEE compliant
- Cost competitive for high volume commercial applications

### Typical Applications:

- Bonding multilayer epoxy rigid-flex
- Attaching heat sinks to multilayer PCBs
- Dielectric insulators

# Typical Properties:

**47N**

| Property   | Units             | Value                 | Test Method         |
|--|-------------------|-----------------------|---------------------|
| <b>1. Electrical Properties</b>                    |                   |                       |                     |
| Dielectric Constant <i>(may vary with Resin %)</i> |                   |                       |                     |
| @ 1 MHz  | -                 | 4.3                   | IPC TM-650 2.5.5.3  |
| @ 1 GHz  | -                 |                       | IPC TM-650 2.5.5.9  |
| Dissipation Factor                                 |                   |                       |                     |
| @ 1 MHz  | -                 | 0.022                 | IPC TM-650 2.5.5.3  |
| @ 1 GHz  | -                 |                       | IPC TM-650 2.5.5.9  |
| Volume Resistivity                                 |                   |                       |                     |
| C96/35/90  | MΩ-cm             | 5.1 x 10 <sup>7</sup> | IPC TM-650 2.5.17.1 |
| E24/125  | MΩ-cm             | 7.4 x 10 <sup>7</sup> | IPC TM-650 2.5.17.1 |
| Surface Resistivity                                |                   |                       |                     |
| C96/35/90  | MΩ                | 8.8 x 10 <sup>6</sup> | IPC TM-650 2.5.17.1 |
| E24/125  | MΩ                | 1.5 x 10 <sup>6</sup> | IPC TM-650 2.5.17.1 |
| Electrical Strength                                | Volts/mil (kV/mm) | 1000 (39.4)           | IPC TM-650 2.5.6.2  |
| Dielectric Breakdown                               | kV                |                       | IPC TM-650 2.5.6    |
| Arc Resistance                                     | sec               |                       | IPC TM-650 2.5.1    |
| <b>2. Thermal Properties</b>                       |                   |                       |                     |
| Glass Transition Temperature (Tg)                  |                   |                       |                     |
| TMA  | °C                |                       | IPC TM-650 2.4.24   |
| DSC  | °C                | 130                   | IPC TM-650 2.4.25   |
| Decomposition Temperature (Td)                     |                   |                       |                     |
| Initial  | °C                | 295°                  | IPC TM-650 2.3.41   |
| 5%   | °C                | 315°                  | IPC TM-650 2.3.41   |
| T260   | min               | 18                    | IPC TM-650 2.4.24.1 |
| T288   | min               |                       | IPC TM-650 2.4.24.1 |
| T300   | min               |                       | IPC TM-650 2.4.24.1 |
| CTE (x,y)  | ppm/°C            | 15-17                 | IPC TM-650 2.4.41   |
| CTE (z)  |                   |                       |                     |
| < Tg   | ppm/°C            | 85                    | IPC TM-650 2.4.24   |
| > Tg   | ppm/°C            |                       | IPC TM-650 2.4.24   |
| z-axis Expansion (50-260°C)                        | %                 |                       | IPC TM-650 2.4.24   |
| <b>3. Mechanical Properties</b>                    |                   |                       |                     |
| Peel Strength to Copper (1 oz/35 micron)           |                   |                       |                     |
| After Thermal Stress                               | lb/in (N/mm)      | 9.0 (1.6)             | IPC TM-650 2.4.8    |
| At Elevated Temperatures                           | lb/in (N/mm)      |                       | IPC TM-650 2.4.8.2  |
| After Process Solutions                            | lb/in (N/mm)      |                       | IPC TM-650 2.4.8    |
| Young's Modulus                                    | Mpsi (GPa)        | 2.6 (17.9)            | IPC TM-650 2.4.18.3 |
| Flexural Strength                                  | kpsi (MPa)        |                       | IPC TM-650 2.4.4    |
| Tensile Strength                                   | kpsi (MPa)        |                       | IPC TM-650 2.4.18.3 |
| Compressive Modulus                                | kpsi (MPa)        |                       | ASTM D-695          |
| Poisson's Ratio (x, y)                             | -                 | 0.17                  | ASTM D-3039         |
| <b>4. Physical Properties</b>                      |                   |                       |                     |
| Water Absorption (0.062")                          | %                 | 0.1                   | IPC TM-650 2.6.2.1  |
| Specific Gravity                                   | g/cm <sup>3</sup> | 1.75                  | ASTM D792 Method A  |
| Thermal Conductivity                               | W/mK              | 0.25                  | ASTM E1461          |
| Flammability                                       | class             | V-0                   | UL-94               |

## Availability:

| Arlon Part Number | Glass Style | Resin % | Mil/Ply | Flow %        |
|-------------------|-------------|---------|---------|---------------|
| 47N0475           | 104         | 75      | 0.0021  | 0.030"-0.090" |
| 47N0672           | 106         | 72      | 0.0024  | 0.030"-0.090" |
| 47N8065           | 1080        | 65      | 0.0032  | 0.030"-0.080" |
| 47N067201         | 106         | 72      | 0.0024  | 0.050-0.100"  |
| 47N806501         | 1080        | 65      | 0.0032  | 0.050"0.100"  |

## Recommended Process Conditions:

Process inner-layers through develop, etch, and strip using standard industry practices. Bake inner layers in a rack for 60 minutes at 225°F - 250°F (107°C - 121°C) immediately prior to lay-up. Vacuum desiccate the prepreg for 8 - 12 hours prior to lamination.

### Lamination Cycle:

- 1) Pre-vacuum for 30 - 45 minutes
- 2) Control the heat rise to 8°F - 12°F (4°C - 6°C) per minute between 150°F and 250°F (65°C and 121°C)
- 3) Lamination Pressure: 150-300 PSI (11-21 Kg/cm<sup>2</sup>) depending on complexity
- 4) Product temperature at start of cure = 340°F (171°C).
- 5) Cure time at temperature = 60 minutes
- 6) Cool down under pressure at  $\leq 10^{\circ}\text{F}/\text{min}$  (6°C/min)

Drill at 350-400 SFM. Undercut bits are recommended for vias 0.023" (0.9cm) and smaller

De-smear using alkaline permanganate or plasma with settings appropriate for epoxy; plasma is preferred for positive etchback

Conventional plating processes are compatible with 47N

Standard profiling parameters may be used; chip breaker style router bits are not recommended

Bake for 1 - 2 hours at 250°F (121°C) prior to solder reflow or HASL

# 47N

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