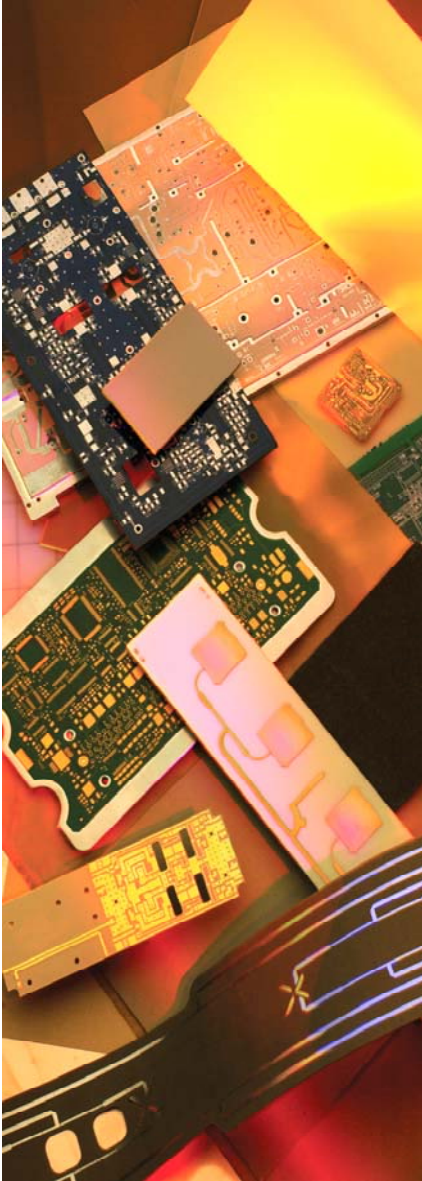


POLYIMIDE LAMINATE AND PREPREG



33N is a flame retardant (UL-94 V0) polyimide laminate and prepreg system where the excellent high performance properties of polyimide need to be combined with flame retardance. High Tg [250°C] results in low overall processing, and minimizes risk of latent PTH defects in-service.

Features:

- Tg greater than 250°C
- Certified to the flammability requirements of UL-94 V-0
- Low Z-expansion of 1.2% between 50-260°C (vs. 2.5-4.0% for typical high-performance epoxies)
- Low-Z expansion minimizes the risk of PTH defects caused during solder reflow and device attachment
- Decomposition temperature of 390°C (vs. 300-360°C for typical high-performance epoxies) offering outstanding long term high-temperature performance
- Electrical and mechanical properties meeting the requirements of IPC-4101/40 and /41
- Toughened, Non-MDA chemistry resists drill cracking
- Compatible with lead-free processing
- RoHS/WEEE compliant

Typical Applications:

- PCBs that are subjected to high temperatures during processing, such as lead-free soldering
- Applications with significant lifetimes at high temperatures, such as aircraft engine instrumentation, down hole drilling, under-hood automotive controls, burn-in boards, or industrial sensors.

Typical Properties:



| Property | Units | Value | Test Method |
|--|-------------------|-------------------|---------------------|
| 1. Electrical Properties | | | |
| Dielectric Constant | | | |
| @ 1 MHz | - | 4.0 | IPC TM-650 2.5.5.3 |
| @ 1 GHz | - | | IPC TM-650 2.5.5.9 |
| Dissipation Factor | | | |
| @ 1 MHz | - | 0.01 | IPC TM-650 2.5.5.3 |
| @ 1 GHz | - | | IPC TM-650 2.5.5.9 |
| Volume Resistivity | | 7.3 | |
| C96/35/90 | MΩ-cm | 7.2×10^7 | IPC TM-650 2.5.17.1 |
| E24/125 | MΩ-cm | 4.5×10^8 | IPC TM-650 2.5.17.1 |
| Surface Resistivity | | | |
| C96/35/90 | MΩ | 4.1×10^8 | IPC TM-650 2.5.17.1 |
| E24/125 | MΩ | 1.6×10^9 | IPC TM-650 2.5.17.1 |
| Electrical Strength (typical) | Volts/mil (kV/mm) | 1290 (50.8) | IPC TM-650 2.5.6.2 |
| Dielectric Breakdown | kV | | IPC TM-650 2.5.6 |
| Arc Resistance | sec | 170 | IPC TM-650 2.5.1 |
| 2. Thermal Properties | | | |
| Glass Transition Temperature (Tg) | | | |
| TMA | °C | >250 | IPC TM-650 2.4.24 |
| DSC | °C | | IPC TM-650 2.4.25 |
| Decomposition Temperature (Td) | | | |
| Initial | °C | 353 | IPC TM-650 2.4.24.6 |
| 5% | °C | 389 | IPC TM-650 2.4.24.6 |
| T260 | min | >60 | IPC TM-650 2.4.24.1 |
| T288 | min | 23 | IPC TM-650 2.4.24.1 |
| T300 | min | 8 | IPC TM-650 2.4.24.1 |
| CTE (x,y) | ppm/°C | 16 | IPC TM-650 2.4.41 |
| CTE (z) | | | IPC TM-650 2.4.24 |
| < Tg | ppm/°C | 53 | IPC TM-650 2.4.24 |
| > Tg | ppm/°C | 164 | IPC TM-650 2.4.24 |
| z-axis Expansion (50-260°C) | % | 1.2 | IPC TM-650 2.4.24 |
| 3. Mechanical Properties | | | |
| Peel Strength to Copper (1 oz/35 micron) | | | |
| After Thermal Stress | lb/in (N/mm) | 7.2 (1.2) | IPC TM-650 2.4.8 |
| At Elevated Temperatures | lb/in (N/mm) | 7.2 (1.2) | IPC TM-650 2.4.8.2 |
| After Process Solutions | lb/in (N/mm) | 7.5 (1.3) | IPC TM-650 2.4.8 |
| Young's Modulus | Mpsi (GPa) | 3.2 | 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) | - | 0.15 | ASTM D-3039 |
| 4. Physical Properties | | | |
| Water Absorption | % | 0.21 | IPC TM-650 2.6.2.1 |
| Specific Gravity | g/cm ³ | 1.6 | ASTM D792 Method A |
| Thermal Conductivity | W/mk | 0.2 | ASTM E1461 |
| Flammability | class | V-0 | UL-94 |

Prepreg Availability:

| Arlon Part Number | Glass Style | Resin % | Scaled Flow Hf (mils) | Scaled Flow ΔH (mils) |
|-------------------|-------------|---------|-----------------------|-----------------------|
| 33N0672 | 106 | 72 ± 3 | 1.9 ± 0.3 | 0.55 ± 0.20 |
| 33N8063 | 1080 | 63 ± 3 | 2.6 ± 0.3 | 0.55 ± 0.20 |
| 33N2355 | 2313 | 55 ± 3 | 3.6 ± 0.3 | 0.55 ± 0.20 |
| 33N2650 | 2116 | 50 ± 3 | 4.3 ± 0.3 | 0.55 ± 0.20 |
| 33N2840 | 7628 | 50 ± 3 | 6.8 ± 0.3 | 0.55 ± 0.20 |

Recommended Process Conditions:

Process inner-layers through develop, etch, and strip using standard industry practices. Use brown oxide on inner layers. Adjust dwell time in the oxide bath to ensure uniform coating. Bake inner layers in a rack for 60 minutes at 225°F - 250°F (107°C - 121°C) immediately prior to lay-up. Store prepreg at 60° -70°F at or below 30% RH. 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). Vacuum lamination is preferred. Start point vacuum lamination pressures are shown in the table below:

| Panel Size | | Pressure | | Pressure / 29" Vacuum | |
|------------|---------|----------|----------|-----------------------|--------------------|
| in | cm | psi | kg/sq cm | psi | kg/cm ² |
| 12 x 18 | 40 x 46 | 275 | 19 | 200 | 14.0 |
| 16 x 18 | 30 x 46 | 350 | 25 | 250 | 17.5 |
| 18 x 24 | 46 x 61 | 400 | 28 | 300 | 21.0 |

- 3) Product temperature at start of cure = 410°F (218°C). 33N does not require a two step cure. A straight ramp to 410-420° is recommended.
- 4) Cure time at temperature = 1.5 - 2.0 hours
- 5) Cool down under pressure at ≤ 10°F/min (5°C/min)

Drill at 350 SFM. Undercut bits are recommended for vias 0.018" and smaller

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

Conventional plating processes are compatible with 33N

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 to reflow of HASL

33N

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