Arlon 38N®

Electronic Substrates

No-Flow Polyimide Prepreg

- Low Temperature Cure
- High Tg – Thermally Stable
- Reduced Z Direction Expansion
- No-Flow in Relief Areas

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MATERIALS FOR ELECTRONICS

General Introduction

No-flow polyimide prepreg fills a need in three areas:

1. Bonding rigid-flexible printed wiring board (RFPWB) layers together and bonding rigid (0.005"/0.127mm polyimide) caps to flexible layers.

   Acrylic adhesive used to bond flexible layers together has a high coefficient of thermal expansion. This freuently causes plated through hole failures during thermal cycling (cracked barrels, lifted pads and pull away). Epoxy prepreg used to bond caps in place likewise has a relatively high expansion above its 125°C Tg contributing to PTH failures. Arlon's 38N no-flow has expansion characteristics similar to HI-3003 polyimide laminate which eliminates or greatly reduces the probability of PTH failures.

2. Bonding polyimide (0.005"/0.127mm unclad) insulators to polyimide PWB's.

   Insulators frequently contain clearance areas (cutouts) which must remain free of resin flow. Epoxy or acrylic prepreg will not withstand the thermal cycling requirements and may delaminate. 38N no-flow thermal properties match those of the polyimide PWB.

3. Bonding heat sinks to polyimide PWB's.

   Epoxy or acrylic prepregs may not withstand the thermal excursions required and result in failed bonds. As in the case of bonding insulators to PWB's, 38N no-flow has thermal performance equivalent to conventional polyimide.

Arlon's No-Flow Polyimide Prepreg is ideally suited for those applications which require:

1. Reduction in Z-axis expansion as compared to epoxy and acrylic systems.

2. Improvement in thermal stability over epoxy or acrylic.

3. Non-flowing into clearance/relief areas. [Clearance/relief areas are 1) clearances in an outer layer of material that provide access to the layer under it, usually for component mounting and 2) the demarcation line between rigid and flex portions (the section where the rigid polyimide cap steps down to the flexible layer) of rigid-flex PWB's.]

Arlon 38N prepreg is made with a proprietary modified bismaleimide resin system. This system is curable at low temperature (350 to 380°F/176-193°C) and attains a Tg of 200°C, or above. It has maximum resistance to flow during lamination and offers:

1. Compatibility with most rigid flex and bonding processes.

2. Low Z-axis expansion.

3. Resistance to high temperatures.

Mechanical and electrical properties meet the requirements of MIL-S-13949H.

Arlon 38N prepreg is available as:

38N8060	60% Resin Content on 1080	Scaled Flow 3.0 Mils (0.076mm)
38N0666	66% Resin Content on 106	Scaled Flow 2.0 Mils (0.051mm)

MIL-S-13949H 4” x 4” (10cm x 10cm) flow is < 3.0%.

Process Guidelines

Because of varying storage conditions that exist, it is recommended that 38N prepreg be dried at 29" (736mm) Hg for 12 to 24 hours. This step is the same as for standard polyimide prepreg.

38N No-Flow prepreg is very process tolerant. It laminates well with either a cold platen press start or with a hot start. Vacuum or vacuum assist lamination is recommended for the removal of moisture and air. No-Flow products do not flow out air voids as well as standard prepregs, and the vacuum will help assure a void free final product.

Use of a silicone rubber pad or other hydraulic material to balance pressure over the board area is also suggested in many flex-rigid applications.

Lamination cycle:

1. Vacuum draw down the package for 60 minutes at < 29" (736mm) Hg prior to loading in the press. Maintain the vacuum beyond the set point of the resin, i.e., above 320°F (160°C).

2. Use a platen temperature in the range of 360° to 380°F (182-193°C).

3. Control the heat rise to about 15° to 20°F per minute between 200° and 300°F (93° and 149°C).

4. Use a pressure of 180 to 350 PSI (12.6 to 24 kg/sq.cm) depending on panel size and complexity. Following are recommended pressures relative to panel size to use as starting points:

Panel Size		Panel Size	
In	Cm	PSI	kg/sq. cm
9 x 12	22 x 30	180	13
12 x 12	30 x 30	200	14
12 x 18	30 x 30	250	18
16 x 18	40 x 46	290	20
18 x 24	46 x 61	330	23
24 x 24	61 x 61	350	24

5. Cure time is 90 to 120 minutes at temperature.

The subsequent processing should be the same as those normally used for RFPWB's.

Typical Properties

(0.0063"/0.16mm 2 Ply 1080 Laminate)

Property	Required		Typical
Peel strength at elevated temperature-lbs./in(N/mm)	5.0 min. (0.88)	Av.	8.0 (1.22)
Peel strength after process solutions-lbs./in(N/mm)	5.0 min. (0.88)	Av.	8.0 (1.22)
Volume Resistivity after moisture res.	6.0E4	Av.	8.2E7
Surface Resistivity after moisture res.	1.0E4	Av.	4.4E6
Volume Resistivity at elevated temperature	6.0E4	Av.	4.7E9
Surface Resistivity at elevated temperature	6.0E4	Av.	1.2E9
Electrical strength-volts/mil (kV/mm)	750 min. (29.6)	Av.	1600 (7.9)
Permitivity at 1 GHz	4.8 min.	Av.	4.25
Loss Tangent Factor at 1 MHz	0.026 max.	Av.	0.010
Arc Resistant-seconds	120 min.	Av.	124

Other Properties

Property	Required
Thermal Conductivity BTU-in/HR/FT^2/ºF (watts/m/k)	2.3 (0.33)
Tensile Strength (PSI/MPa min.) ASTM D 412, M.A.D.C.	32,000 (220)
Elongation Min/Max. % ASTM D 412	4 - 6
Continuous Use Temperature (ºC)	-65/200

Typical Physical Properties

Property	Required
Flexural Strength at Ambient, ksi (MPa)	60(400)
Fexural modulus at Ambient, ksi (MPa)	2347 (16,200)
Poisson's Ratio	0.17
Tg	210ºC
CTE 50-250ºC	65ppm/ºC
Moisture abstorption (%)	<1%
Solder Float 550ºF (5 min.)	pass

Data is believed to be accurate but values are average and not guaranteed. All sales of these products are governed by the terms and conditions under which they are sold. Determination of the suitability of any of these materials for a particular application is the sole responsibility of the user.

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MATERIALS FOR ELECTRONICS

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