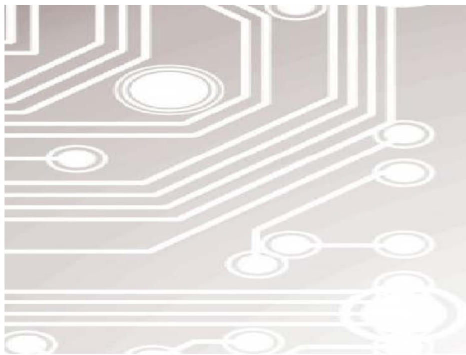
47N

ARLON
ELECTRONIC MATERIALS

Epoxy Low-Flow Prepreg



47N is a low-flow epoxy prepreg engineered for bonding multilayer epoxy rigid-flex or attaching heat sinks to multilayer PCBs. An optional reduced 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”
- Cost competitive for high volume commercial applications
- RoHS/WEEE compliant

Typical Applications:

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

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Typical Properties:

Property	Units	Value	Test Method
Electrical Properties			
Dielectric Constant @ 1 MHz	-	4.3	IPC TM-650 2.5.5.3
@ 1 GHz	-		IPC TM-650 2.5.5.9
Dissipation Factor @ 1 MHz		0.02	IPC TM-650 2.5.5.3
@ 1 GHz			IPC TM-650 2.5.5.9
Volume Resistivity			
C96/35/90	MΩ-cm	5.7×10^7	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	7.4×10^7	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	8.8×10^6	IPC TM-650 2.5.17.1
E24/125	MΩ	1.5×10^6	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	125	IPC TM-650 2.5.1
Thermal Properties			
Glass Transition Temperature (Tg)			
TMA	°C		IPC TM-650 2.4.24C
DSC	°C	135	IPC TM-650 2.4.25D
Decomposition Temperature			
Initial	°C	305	IPC TM-650 2.4.24.6
5% weight loss	°C	315	IPC TM-650 2.4.24.6
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	16	IPC TM-650 2.4.41
CTE (Z)			
< Tg	ppm/°C	85	IPC TM-650 2.4.24C
> Tg	ppm/°C		IPC TM-650 2.4.24C
z-axis Expansion (50-260°C)	%		IPC TM-650 2.4.24C
Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb./in (N/mm)	9.0 (1.6)	IPC TM-650 2.4.8C
At Elevated Temperatures	lb./in (N/mm)		IPC TM-650 2.4.8.2A
After Process Solutions	lb./in (N/mm)		IPC TM-650 2.4.8C
Young's Modulus CD/MD	Mpsi (GPa)	2.6 (17.9)	ASTM E111
Tensile Strength CD/MD	kpsi (MPa)	6.5 (45)	ASTM D3039
Poisson's Ratio	-	0.17	ASTM E13204
Physical Properties			
Water Absorption (0.062")	%	0.1	IPC TM-650 2.6.2.1A
Density	g/cm^3	1.65	ASTM D792 Method A
Thermal Conductivity	W/mK	0.25	ASTM E1461
Flammability	class	V0	UL-94

Results listed above are typical properties, provided without warranty, expressed or implied, and without liability. Properties may vary, depending on design and application. Arlon reserves the right to change or update these values.

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Availability:

Arlon Part Number	Glass Style	Resin (%)	Mil/Ply	Flow
47N0672	106	72	0.0024	0.030" - 0.090"
47N8065	1080	65	0.0032	0.030" - 0.090"
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 about 8°F - 12°F per minute (4.5°C - 6.5°C) between 210°F and 300°F (100°C and 150°C)
3) Lamination Pressure: 150-300 PSI (11-21 Kg/cm2) 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 ≤ 10°F/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

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