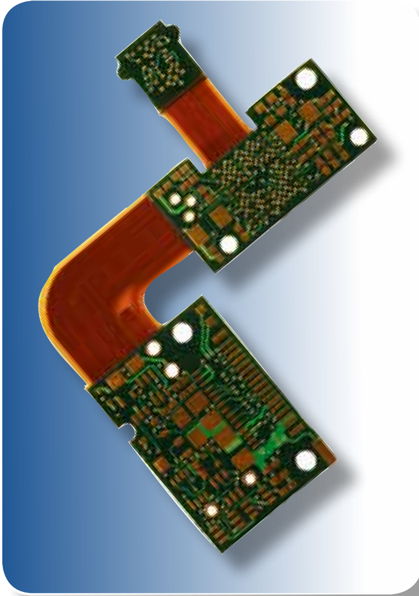
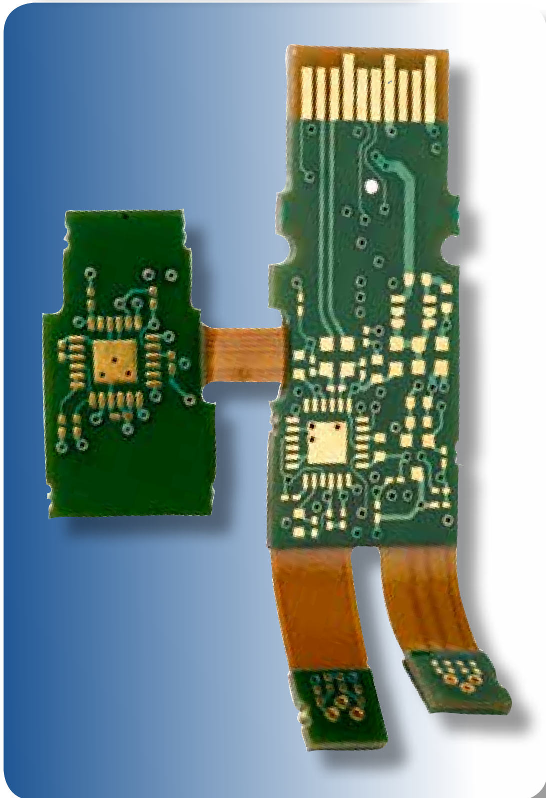
47N

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"
- 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:

Property	Units	Value	Test Method
1. 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	-	0.022	IPC TM-650 2.5.5.3
@ 1 GHz	-		IPC TM-650 2.5.5.9
Volume Resistivity			
C96/35/90	MΩ-cm	5.1×10^7	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		IPC TM-650 2.5.1
2. Thermal Properties			
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
3. Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb/in (N/mm)	9.0 (1.6)	IPC TM-650 2.4.8
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
Tensile Strength CD/MD	kpsi (MPa)	6.5 (45)	IPC TM-650 2.4.18.3
Poisson's Ratio	-	0.17	ASTM D-3039
4. Physical Properties			
Water Absorption (0.062")	%	0.1	IPC TM-650 2.6.2.1
Specific Gravity	g/cm3	1.35	ASTM D792 Method A
Thermal Conductivity	W/mK	0.25	ASTM E1461
Flammability	class	V-O	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.

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/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

Optimal processing requirements may vary depending on specific equipment and operating conditions. These recommendations are offered only as a starting point.

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