

## High Performance Polyimide



84HP is a high-performance polyimide prepreg with micro-fine proprietary fillers designed for use in filling etched polyimide multilayers that contain thick copper layers and clearance holes in metal cores. 84HP's revolutionary filler system serves to reduce shrinkage and inhibit crack formation during through-hole drill in filled clearance areas. 84HP is matched to copper's CTE at 17 ppm X-Y for controlled expansion during large temperature variations reducing the potential of resin damage due to CTE mismatch.

### Features:

- Conforms to IPC4101/40, /41 and Validated to IPC4101/43 specifications
  - Pure polyimide, no secondary resin
  - No epoxy added, blended or reacted
- Best-in-Class thermal properties
  - Tg=> 250°C
  - Decomposition temperature 430°C
  - Tc = 0.5 W/mK, 2x thermal conductivity
  - T300>60 min.
- Reduced Z-axis expansion
- Minimizes cracking and wicking
- RoHS/WEEE compliant

### Typical Applications:

- High process or assembly temperatures (lead-free soldering)
- Designs with high layer counts and MLB complexity
- Equipment exposed to extreme temperatures
  - Defense systems
  - Aircraft engine instrumentation
  - Semiconductor testing (burn-in boards)
  - Petroleum exploration (down-hole drilling)
  - Under-hood automotive
  - Industrial sensor systems
  - Space and satellites

## Typical Properties:

Property	Units	Value	Test Method
<b>Electrical Properties</b>			
Dielectric Constant @ 1 MHz	@ 80% RC	3.8	IPC TM-650 2.5.5.3
Dissipation Factor @ 1 MHz	@ 80% RC	0.009	IPC TM-650 2.5.5.3
Volume Resistivity			
C96/35/90	MΩ-cm	$8 \times 10^7$	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	$5.9 \times 10^7$	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	$1.6 \times 10^9$	IPC TM-650 2.5.17.1
E24/125	MΩ	$6.9 \times 10^7$	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	1208 (48)	IPC TM-650 2.5.6.2
Arc Resistance	sec	182	IPC TM-650 2.5.1
<b>Thermal Properties</b>			
Glass Transition Temperature (Tg)			
TMA	°C	≥250	IPC TM-650 2.4.24C
Decomposition Temperature			
Initial	°C	380	IPC TM-650 2.4.24.6
5% weight loss	°C	430	IPC TM-650 2.4.24.6
T260	min	>60	IPC TM-650 2.4.24.1
T288	min	>60	IPC TM-650 2.4.24.1
T300	min	>60	IPC TM-650 2.4.24.1
CTE (X,Y)	ppm/°C	17, 17	IPC TM-650 2.4.41
CTE (Z)			
< Tg	ppm/°C	38.8	IPC TM-650 2.4.24C
> Tg	ppm/°C	154	IPC TM-650 2.4.24C
z-axis Expansion (50-260°C)	%	≤1	IPC TM-650 2.4.24C
<b>Mechanical Properties</b>			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb./in (N/mm)	6.3 (1.11)	IPC TM-650 2.4.8C
At Elevated Temperatures	lb./in (N/mm)	5.2 (.92)	IPC TM-650 2.4.8.2A
After Process Solutions	lb./in (N/mm)	5.3 (.93)	IPC TM-650 2.4.8C
Young's Modulus CD/MD	Mpsi (GPa)	3.0	ASTM E111
Tensile Strength CD/MD	kpsi (MPa)	35 (241)	ASTM D3039
Poisson's Ratio	-	0.15	ASTM E13204
<b>Physical Properties</b>			
Water Absorption (0.062")	%	0.19	IPC TM-650 2.6.2.1A
Density	g/cm3	1.7	ASTM D792 Method A
Thermal Conductivity	W/mK	0.5	ASTM E1461
Flammability	class	HB	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.			

# 84HP

## Availability:

Arlon Part Number	Glass Style	Resin (%)	Ho (mils)	Scaled Flow Hf (mils)	Scaled Flow $\Delta H$ (mils)
84H0680	106	80	3.10	2.20	0.90

## Recommended Process Conditions:

Vacuum desiccate the prepreg for 8 - 12 hours prior to lamination.

Process inner-layers through develop, etch, and strip using standard industry practices. Use brown oxide or alternatives on inner layers. Adjust dwell time in the oxide bath to ensure uniform coating. Bake inner layers in a rack for 60 minutes at 107°C - 121°C (225°F - 250°F) immediately prior to lay-up.

Lamination Cycle: (Steps 1-5)

- 1) Pre-vacuum for 30 - 45 minutes
- 2) Control the heat rise to 4.5°C - 6.5°C (8°F - 12°F) per minute between 100°C and 150°C (210°F and 300°F). Vacuum lamination is preferred. Start point vacuum lamination pressures are shown in the table below:

Panel Size		Pressure	
in.	mm	psi	kg/cm <sup>2</sup>
12 x 18	305 x 457	275	19
16 x 18	406 x 457	350	25
18 x 24	457 x 610	400	28

- 3) Product temperature at start of cure = 218°C (425°F)
- 4) Cure time at temperature = 2.0 hours
- 5) Cool down under pressure at  $\leq 5^\circ\text{C}/\text{min}$  ( $10^\circ\text{F}/\text{min}$ )

Drill at 350-400 SFM. Undercut bits are recommended for vias 0.018" (0.45mm) 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 85HP.

Standard profiling parameters may be used;

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

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