DuPont™ Pyralux® AX Copper-Clad Laminate

All-Polyimide Flexible Laminate

Description

Pyralux® AX double-sided copper-clad laminate is an all-polyimide composite of polyimide film bonded to copper foil. Pyralux® AX all-polyimide copper-clad laminates are ideal for use in commercial double-sided applications such as cell phone hinge circuits and chip-on-flex (COF) display driver circuits for OLED, LCD and PDP flat panel displays. Pyralux® AX is excellent for demanding COF circuits that require thin, light and laser via high density circuitry. Techniques commonly used in the manufacture of flexible circuits can be used to process Pyralux® AX composites.

Specifications

- Excellent dimensional stability
- High modulus, excellent for COF applications
- Thermal/humidity resistance
- Low CTE
- UL 94 recognition: V-0, MOT 165° C
- Halogen free

Typical physical and electrical properties along with applicable test methods are shown in **Table 2**.

Constructions

Standard Pyralux® AX copper-clad products are listed in **Table 1**. Polyimide base substrate thickness is 25 µm with rolled-annealed (RA) copper foil weight of 18 µm and electro-deposited (ED) copper foil weights from 9 µm to 18 µm.

Table 1
Double-Sided Pyralux® AX Product Offerings

Product Codes	Copper µm	Polyimide µm	Copper µm
AX182518GB	18	25	18
AX182518S	18	25	18
AX122512H	12	25	12
AX122512S	12	25	12
AX092509H	09	25	09
AX092509S	09	25	09

Pyralux® AX 18 25 18 X

- Product Name
- 1st Copper Layer Thickness, µm
- Polyimide Thickness, µm
- 2nd Copper Layer Thickness, µm
- Copper Type
  - GB = Gould Black RA Copper
  - S = Mitsui SQ-VLP ED Copper
  - H = Nippon Denkai USLP ED Copper

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Table 2
Pyralux® AX Material Properties

Property	Typical Value	Test Method
Adhesion to Cu (Peel Strength)		IPC-TM-650, Method 2.4.9
As Received, N/mm	1.37	Method B
After Soldering, N/mm	1.20	Method D
Solder Float		IPC-TM-650, Method 2.4.13
10 sec at 288°C (550°F)	Pass	Method B
Dimensional Stability, %		IPC-TM-650, Method 2.2.4
	–0.04 to –.08	Method B, %
	–0.05 to –.08	Method C, %
Dielectric Constant (at 1 MHz)	3.4	IPC-TM-650, Method 2.5.5.3
Dissipation Factor (at 1 MHz)	0.003	IPC-TM-650, Method 2.5.5.3
Dielectric Strength, kV/mm	>240	ASTM D-149
Volume Resistivity (damp heat), megohms	10^{10}	IPC-TM-650, Method 2.5.17.1
Surface Resistance (damp heat), megohms	10^{10}	IPC-TM-650, Method 2.5.17.1
Moisture Absorption, %	0.8	IPC-TM-650, Method 2.6.2
CTE, ppm/°C; x, y axis	25	ASTM D-696-91
CHE, ppm/% RH	9.3	
Propagation Tear Strength, g	>10	IPC-TM-650, Method 2.4.17.1
Initiation Tear Strength, g	700–1,000	IPC-TM-650, Method 2.4.16
Tensile Strength, Mpa	>345	IPC-TM-650, Method 2.4.19
Tensile Modulus, Mpa	4,800	
Elongation, %	>50	IPC-TM-650, Method 2.4.19
Flammability	V-0	UL-94

Packaging

Pyralux® AX copper-clad laminate is supplied in the sheet sizes listed in **Table 3**. All packaging materials are 100% recyclable.

Table 3
Standard Packaging for Pyralux® AX

Width (mm)	Length (mm)
250 x 260	500 x 260
250 x 270	500 x 270
250 x 290	500 x 290
250 x 303	500 x 303
250 x 320	500 x 320
250 x 330	500 x 330
250 x 420	500 x 420
250 x 500	500 x 500

Width = TD = transverse direction
Length = MD = machine direction

Processing

Pyralux® AX is fully compatible with all conventional flexible circuit fabrication processes.

Storage Conditions/Shelf Life

Pyralux® AX flexible laminates are warranted for one year when stored in the original packaging at temperatures of 4-29°C and below 70% relative humidity. The products do not require refrigeration and should not be frozen. The material should be kept clean and well protected from physical damage.

Safe Handling

Although DuPont is not aware of anyone developing contact dermatitis when using Pyralux® AX products, some individuals may be more sensitive than others. Anyone handling Pyralux® AX should wash their hands with soap before eating, smoking or using restroom facilities. Gloves, finger cots and finger pads should be changed daily.

As with all thin, copper-clad laminates, sharp edges present a potential hazard during handling. All personnel involved in handling Pyralux® AX copper-clads should be cautioned and provided with suitable gloves to minimize the potential cuts.

Pyralux® AX is fully cured when delivered. However, lamination areas should be well ventilated with a fresh air supply to avoid build-up from trace quantities of residual solvent (typical of polyimides) that may volatilize during press lamination. When drilling or routing parts with Pyralux® AX flexible composites, provide adequate vacuum around the drill head to minimize worker exposure to dust.

Pyralux® AX flexible composites do not contain polybrominated biphenyls (PBBs) or polybrominated biphenyl oxides (PBBOs).

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