

DuPont™ Pyralux® AP

All-Polyimide Flexible Laminate

A Family of High-Performance Adhesiveless Laminates for Flexible Printed Circuit Applications

Product Description

Pyralux® AP double-sided, copper-clad laminate is an all-polyimide composite of polyimide film bonded to copper foil. This material system is ideal for multilayer flex and rigid flex applications which require advanced material performance, temperature resistance, and high reliability.

Offered in a full range of dielectric thicknesses, Pyralux® AP provides designers, fabricators, and assemblers a versatile option for a wide variety of flexible circuit constructions.

- Low CTE for rigid flex multilayers
- Excellent thermal resistance
- Thin Cu-clads with superior handling
- Unique thick-core product for controlled impedance
- Excellent dielectric thickness tolerance/electrical performance
- High Cu-polyimide adhesion strength
- Full compatibility with PWB industry processes, IPC 4204/11 certified
- UL 94V-0, UL 796, 180°C (356°F) max. operating temperature

Table 1
Pyralux® AP Product Offerings*

Product Code	Dielectric Thickness, mil	Copper Thickness, μm (oz/ft ²)
AP 7163E**	1.0	9 (.25)
AP 7164E**	1.0	12 (.33)
AP 8515R	1.0	18 (0.5)
AP 9111R	1.0	35 (1.0)
AP 7156E**	2.0	9 (.25)
AP 7125E**	2.0	12 (.33)
AP8515E	1.0	18 (0.5)
AP 8525R	2.0	18 (0.5)
AP 9121R	2.0	35 (1.0)
AP 9222R	2.0	70 (2.0)
AP 8535R	3.0	18 (0.5)
AP 9131R	3.0	35 (1.0)
AP 9232R	3.0	70 (2.0)
AP 8545R	4.0	18 (0.5)
AP 9141R	4.0	35 (1.0)
AP 9242R	4.0	70 (2.0)
AP 8555R	5.0	18 (0.5)
AP 9151R	5.0	35 (1.0)
AP 9252R	5.0	70 (2.0)
AP 8565R	6.0	18 (0.5)
AP 9161R	6.0	35 (1.0)
AP 9262R	6.0	70 (2.0)

Add "R" to the end of the code to specify rolled-annealed copper foil (e.g., AP9121R). Add "E" to the end of the code to specify electro-deposited copper foil (e.g., AP9121E). If rolled-annealed double-treat copper foil is specified, add the letter "D" to the end of the product code (e.g., AP9121D).

* Additional balanced/unbalanced copper constructions and dielectrics (>6 mil) are available through your DuPont Representative.

** Available in ED copper only.



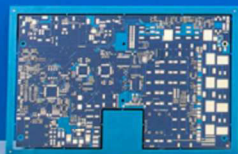
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Table 2
Pyralux® AP Material Properties

Laminate Property	IPC TM-650 (* or other)	AP-9111 1 mil dielectric	AP-9121 2 mil dielectric	AP-9131-9161 3-6 mil dielectric
Adhesion to Cu (Peel Strength)	Method 2.4.9			
As fabricated, N/mm (lb/in)		1.6 (9)	>1.8 (10)	>1.8 (10)
After solder, N/mm (lb/in)		1.6 (9)	>1.8 (10)	>1.8 (10)
Solder Float at 288°C (550°F)	Method 2.4.13	Pass	Pass	Pass
Dimensional Stability	Method 2.2.4			
Method B, %		-.04 to -.08	-.04 to -.08	-.03 to -.06
Method C, %		-.05 to -.08	-.04 to -.07	-.03 to -.06
Dielectric Thickness Tolerance, %	Method 4.6.2	±10	±10	±10
UL Flammability Rating	*UL-94	V-0	V-0	V-0
Dielectric Constant*, 1 MHz	Method 2.5.5.3	3.4	3.4	3.4
Dissipation Factor*, 1 MHz	Method 2.5.5.3	0.003	0.002	0.002
Dielectric Strength, kV/mil	Method 2.5.6.1	6-7	6-7	6-7
Volume Resistivity, ohm-cm	Method 2.5.17.1	E16	E17	E17
Surface Resistance, ohms	Method 2.5.17.1	>E16	>E16	>E16
Moisture and Insulation Res., ohms	Method 2.6.3.2	E11	E11	E11
Moisture Absorption, %	Method 2.6.2	0.8	0.8	0.8
Tensile Strength, MPa (kpsi)	Method 2.4.19	>345 (>50)	>345 (>50)	>345 (>50)
Elongation, %	Method 2.4.19	>50	>50	>50
Initiation Tear Strength, g	Method 2.4.16	700-1000	900-1200	900-1200
Propagation Tear Strength, g	Method 2.4.17.1	>10	>20	>20
Chemical Resistance, min. %	Method 2.3.2	Pass, >95%	Pass, >95%	Pass, >95%
Solderability	*IPC-S-804, M. 1	Pass	Pass	Pass
Flexural Endurance, min. cycles	Method 2.4.3	6000	6000	6000
Glass Transition (T _g), C	—	220	220	220
Modulus, kpsi	—	700	700	700
In-Plane CTE (ppm/C) T<T _g	—	25	25	25
In-Plane CTE (ppm/C) T>T _g	—	40 (est.)	40 (est.)	40 (est.)

*See Page 6, Figures 6 and 7 for dielectric constant and loss tangent performance at higher frequencies

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