DuPont™ Pyralux® AC Copper-Clad Laminate

All-Polyimide Flexible Laminate

Description

Pyralux® AC single-sided copper-clad laminate is an all-polyimide composite of polyimide film on copper foil. Pyralux® AC all-polyimide copper-clad laminates are ideal for use in single-sided applications such as: display driver, multilayer digital camera or rigidflex camcorder circuits that require thin, light and high density circuitry along with chip on flex attachment. Techniques commonly used in the manufacture of flexible circuits can be used to process Pyralux® AC composites.

Specifications

- Excellent dimensional stability (Figure 1)
- Low moisture absorption
- High modulus
- Excellent thermal resistance
- Excellent long term thermal aging (Figures 2 and 3)
- Thermal/humidity resistance (Figure 4)
- Low CTE
- UL 94 recognition: V-0

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

Constructions

Standard Pyralux® AC copper-clad products are listed in Table 1. The polyimide base substrate is available in thicknesses of 12 um (0.5 mil), 20 um (0.8 mil) and 25 um (1 mil). Rolled-annealed (RA) copper foil weight is available in 18 um (1/2 oz/ft^2. Electro-deposited (ED) copper foil weight is available in 12 um (1/3 oz/ft^2) and 18 um (1/2 oz/ft^2. µm).

Packaging

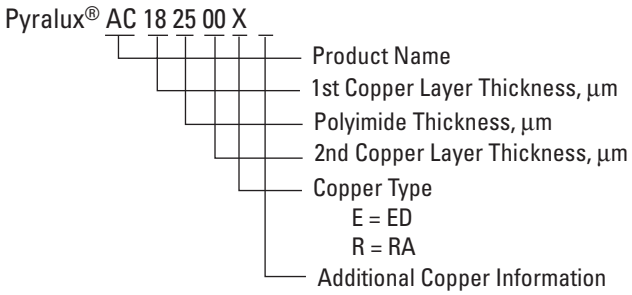
Pyralux® AC copper-clad laminate is supplied in standard widths of 9.84 in (250 mm) and 19.68 in (500 mm). Roll length is 164 ft (50 m) or 328 ft (100 m) on a nominal 9.5 cm core. Other sizes are available by special order. All packaging materials are 100% recyclable.

Table 1
Single-Sided Pyralux® AC Product Offerings

Product Codes	Copper µm (oz/ft^2)	Copper Type	Polyimide µm (mil)
AC 182500R	18 (1/2)	RA	25 (1)
AC 182000R	18 (1/2)	RA	20 (0.8)
AC 181200R	18 (1/2)	RA	12 (0.5)
AC 182500RH	18 (1/2)	RA-H type	25 (1)
AC 182000RH	18 (1/2)	RA-H type	20 (0.8)
AC 181200RH	18 (1/2)	RA-H type	12 (0.5)
AC 181200RT	18 (1/2)	RA-T type	12 (0.5)
AC 122500EM	12 (1/3)	ED-M type	25 (1)
AC 122000EM	12 (1/3)	ED-M type	20 (0.8)
AC 121200EM	12 (1/3)	ED-M type	12 (0.5)
AC 182500EY	18 (1/2)	ED-Y type	25 (1)
AC 182000EY	18 (1/2)	ED-Y type	20(0.8)
AC 181200EY	18 (1/2)	ED-Y type	12 (0.5)

Certified to IPC-4204/11: "Flexible Metal-Clad Dielectrics (Polyimide Adhesiveless)." Please contact your DuPont Sales Representative for information on non-standard offerings or new constructions in development.

Product Code Description



Processing

In general a surface treatment of the polyimide surface will improve the adhesion with bonding films. Your bond strength results will vary depending on circuit processing and material selection. Additional treatment is required for those applications requiring pre-pregs. Please specify our "Plus" version for use with pre-pregs. "Plus" is specifically treated for additional bond strength.

Table 2
Pyralux® AC Material Properties

Property	Typical Value	Test Method
Adhesion to Cu (Peel Strength*)		IPC-TM-650, Method 2.4.9
As Received, N/mm (lb/in)	1.19 (6–7)	Method B
After Soldering, N/mm (lb/in)	1.19 (6–7)	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
	–0.02	Method B, %
	–0.04	Method C, %
Dielectric Constant (at 1 MHz)	3.7	IPC-TM-650, Method 2.5.5.3
Dissipation Factor (at 1 MHz)	0.0014	IPC-TM-650, Method 2.5.5.3
Dielectric Strength, kV/mm (Kv/mil)	200 (4.9)	ASTM D-149
Volume Resistivity (damp heat), megohm	10^{10}	IPC-TM-650, Method 2.5.17.1
Surface Resistance (damp heat), megohm	10^{6}	IPC-TM-650, Method 2.5.17.1
Moisture Absorption, %	0.94	IPC-TM-650, Method 2.6.2
CTE, ppm/°C	19	ASTM D-696-91
CHE, ppm/% RH	8.0	
Propagation Tear Strength†, g	3.0	IPC-TM-650, Method 2.4.17.1
Initiation Tear Strength††, g	400–700	IPC-TM-650, Method 2.4.16
Tensile Strength, Mpa (kpsi)	193 (28)	IPC-TM-650, Method 2.4.19
Tensile Modulus, Mpa (kpsi)	7580 (1100)	ASTM D-882-91
Elongation, %	21	IPC-TM-650, Method 2.4.19
Flammability	V-0	UL-94

* Peel strength method is 180° instead of 90°

† With exception to IPC-TM-650, Method 2.4.17.1, Propagation Tear Strength

††With exception to IPC-TM-650, Method 2.4.16, Initiation Tear Strength

Storage Conditions/Shelf Life

Pyralux® AC flexible laminates are warranted for two years from the date of manufacturing when stored in the original packaging at temperatures of 4-29°C (40-85°F) 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® AC products, some individuals may be more sensitive than others.

Anyone handling Pyralux® AC 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® AC copper-clads should be cautioned and provided with suitable gloves to minimize potential cuts.

Pyralux® AC 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® AC flexible composites, provide adequate vacuum around the drill head to minimize worker exposure to dust.

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

Figure 1. Typical Dimensional Stability at 200°C (392°F) (25 µm dielectric, 18 µm Cu)

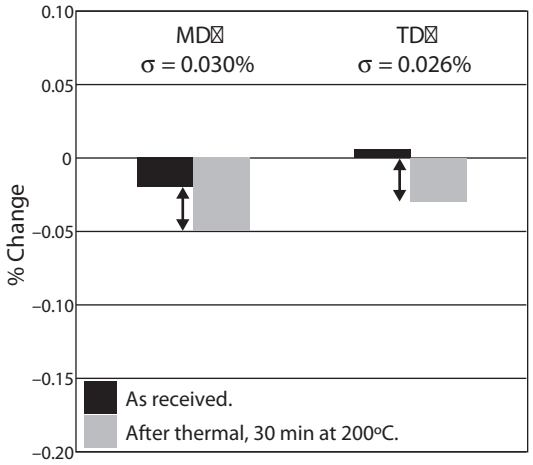


Figure 2. Typical Bond Strength—Pyralux® AC 182500R

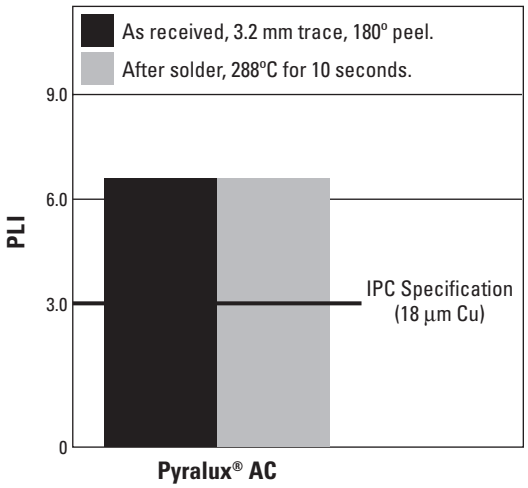


Figure 3. Temperature/Humidity Aging at 85°C (185°F)/85% RH

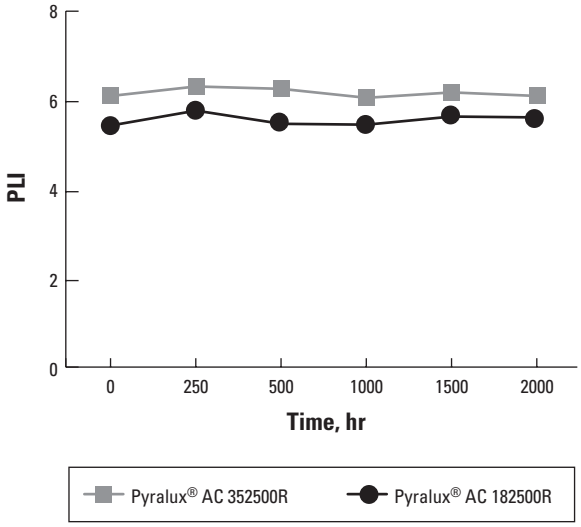
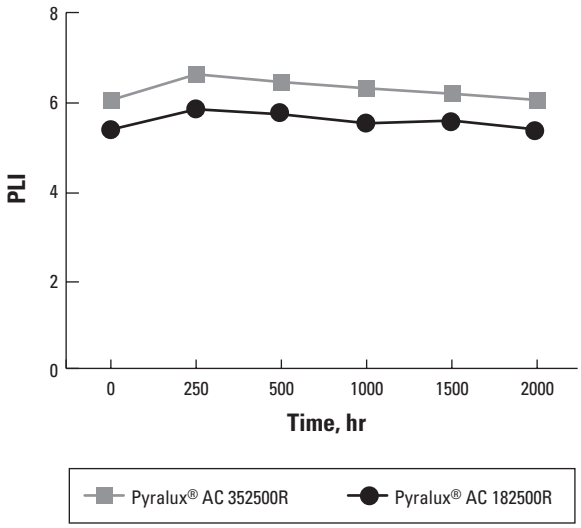


Figure 4. Temperature/Humidity Aging at 150°C (302°F) for 2,000 hours



DuPont Electronic Materials · 14 T.W. Alexander Drive · Research Triangle Park, NC 27709-4425

(800) 243-2143, Ext. 3637

www.pyralux.dupont.com

H-73247 (11/06) Printed in U.S.A.

The miracles of science™