

DuPont™ Pyralux® AP

Flexible Circuit Materials

Product Description

DuPont™ Pyralux® AP flexible circuit material is a double-sided, all-polyimide, copper-clad laminate consisting of a polyimide composite film bonded to copper foil. This material system is ideal for multilayer flex and rigid flex applications which require advanced performance, such as low dissipation loss for high speed, high frequency, thermal resistance and high reliability. These clads provide designers and fabricators outstanding options in building circuits with high reliability and yield for controlled impedance and high-performance applications.

Key Features and Benefits

- 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
- Superior electrical performance and signal integrity
- Improved interconnect reliability
- High Cu-polyimide adhesion strength
- Full compatibility with PWB industry processes
- IPC 4204/11 certification
- UL 94V-0, UL 746E, 200°C (392°F) MOT, UL File E124294

Offered in a full range of dielectric thicknesses and copper weights, Table 1 outlines the range of copper and polyimide thickness. Table 2 outlines some of the available constructions. Additional balanced/unbalanced copper constructions available through your DuPont representative.

Table 1 - Pyralux® AP Range of Thickness

| Double-sided Clads | Thickness range |
|---|--|
| Copper Foil μm (oz/ft ²) | 6 (0.17) 9 (0.25), 12 (0.33), 18 (0.5), 35 (1.0), 70 (2.0), 105 (3.0), 140 (4.0) |
| Copper Type | RA, ED and Double-treat RA |
| Dielectric Thickness mil (μm) | 0.5 (12), 1.0 (25), 2.0 (50), 3.0 (75), 5.0 (125), 6.0 (150) |

Table 2 - Pyralux® AP Product Offering

A more extensive list of this product offering is available at <http://www.pyralux.com/selector>

| Product Code | Side 1 Copper Thickness μm (oz/ft ²) | Dielectric Thickness mil (μm) | Side 2 Copper Thickness μm (oz/ft ²) |
|--------------|---|--|---|
| AP 7163E | 9 (.25) | 1.0 (25) | 9 (.25) |
| AP 7164E | 12 (.33) | 1.0 (25) | 12 (.33) |
| AP 8515R | 18 (0.5) | 1.0 (25) | 18 (0.5) |
| AP 9111R | 35 (1.0) | 1.0 (25) | 35 (1.0) |
| AP 8525E | 18 (0.5) | 2.0 (50) | 18 (0.5) |
| AP 8525R | 18 (0.5) | 2.0 (50) | 18 (0.5) |
| AP 9121R | 35 (1.0) | 2.0 (50) | 35 (1.0) |
| AP 9122R | 35 (1.0) | 2.0 (50) | 70 (2.0) |
| AP 9222R | 70 (2.0) | 2.0 (50) | 70 (2.0) |
| AP 8535R | 18 (0.5) | 3.0 (75) | 18 (0.5) |
| AP 9131R | 35 (1.0) | 3.0 (75) | 35 (1.0) |
| AP 8545R | 18 (0.5) | 4.0 (100) | 18 (0.5) |
| AP 9141R | 35 (1.0) | 4.0 (100) | 35 (1.0) |
| AP 8555R | 18 (0.5) | 5.0 (125) | 18 (0.5) |
| AP 9151R | 35 (1.0) | 5.0 (125) | 35 (1.0) |
| AP 8565R | 18 (0.5) | 6.0 (150) | 18 (0.5) |
| AP 9161R | 35 (1.0) | 6.0 (150) | 35 (1.0) |

Table 3 - DuPont™ Pyralux® AP Material Properties

| Laminate Property | IPC TM-650 (* or other) | AP-9121R Typical Value |
|--|-------------------------|------------------------|
| Peel Strength | | |
| As received, N/m (lb/in) width - method B | Method 2.4.9 | >1400 (8.0) |
| After solder, N/m (lb/in) width - method D | | >1400 (8.0) |
| Dimensional Stability | | |
| Method B, % | Method 2.2.4 | -.04 to -.08 |
| Method C, % | | -.04 to -.07 |
| Solder Float at 288°C (550°F) - method B | Method 2.4.13 | Pass |
| Permittivity, range 1 MHz | Method 2.5.5.3 | 3.4 |
| Loss Tangent, maximum 1 MHz | Method 2.5.5.3 | 0.002 |
| Dielectric Strength, minimum V/μm (V/1000 uin) | *ASTM-D-149 | 200 (5000) |
| Volume Resistivity, Mohm-cm | Method 2.5.17 | E11 |
| Surface Resistance, Mohms | Method 2.5.17 | >E10 |
| Moisture and Insulation Res., Mohms | Method 2.6.3.2 | E5 |
| Moisture Absorption, % | Method 2.6.2 | 0.8 |
| Initiation Tear Strength, g | Method 2.4.16 | 900-1200 |
| Propagation Tear Strength, g | Method 2.4.17.1 | 20 |
| Chemical Resistance, min. % | Method 2.3.2 method A | Pass 95 |
| Solderability | *J-STD-003, Test A | Pass |
| Flexural Endurance, min. cycles | Method 2.4.3 | 6000 |
| UL Flammability Rating | | |
| <25um for unclad base thickness | *UL-94 | VTM-0 |
| ≥25um for unclad base thickness | | V-0 |
| Tensile Strength, MPa (kpsi) | Method 2.4.19 | 345 (50) |
| Elongation, % | Method 2.4.19 | 50 |
| Glass Transition (Tg), C | *TMA | 220 |
| Modulus, kpsi | *ASTM D-882-91 | 700 |
| In-Plane CTE (ppm/C) T<Tg | --- | 25 |
| In-Plane CTE (ppm/C) T>Tg | --- | 30 |

DuPont™ Pyralux® AP Flexible Circuit Materials Processing

DuPont™ Pyralux® AP copper clad laminates handling and processing requirements are fully compatible with all conventional flexible circuit fabrication processes including oxide treatment and wet chemical plated-through-hole desmearing. Fabricated circuits can be cover coated and laminated together to form multilayers using polyimide, acrylic, or epoxy adhesives.

General Information

Quality and Traceability

DuPont™ Pyralux® AP copper clad laminates are manufactured and certified to IPC-4204B/Specification Sheet 11. Complete material and manufacturing records, which include archive samples of finished product, are maintained by DuPont. Each manufactured lot is identified for reference and traceability. The packaging label serves as the primary tracking mechanism in the event of customer inquiry and includes the product name, batch number, size, and quantity.

Storage Conditions and Warranty

DuPont™ Pyralux® AP flexible copper clad laminates should be stored in the original packaging at temperatures of 4-29°C (40-85°F) and below 70% humidity. The product should not be frozen and should be kept dry, clean and well protected. Subject to compliance with the foregoing handling and storage recommendations, the DuPont warranty, as provided in the DuPont Standard Conditions of Sale, shall remain in effect for a period of two years following the date of shipment.

Safe Handling

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

DuPont™ Pyralux® AP copper clad laminates are 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 made with DuPont™ Pyralux® AP, provide adequate vacuum around the drill to minimize worker exposure to generated dust.

As with all thin, copper-clad laminates, sharp edges present a potential hazard during handling. All personnel involved in handling Pyralux® AP copper clad laminates should use suitable gloves to minimize potential cuts.

Packaging

Additional sheet sizes may be available through your DuPont representative.

All DuPont™ Pyralux® AP packaging materials are 100% recyclable.



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For more information on DuPont™ Pyralux® AP or other DuPont products, please visit our website.

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