PTFE/Woven Fiberglass Laminates
Microwave Printed Circuit Board Substrates

Arlon’s AD Series is a group of woven fiberglass-reinforced PTFE composite materials designed for use as printed circuit board substrates. These materials combine the excellent low loss electrical properties of PTFE resin with the enhanced value of cost-effective heavier fiberglass styles to provide low cost laminate materials suitable for high volume commercial wireless communication applications.

The AD Series is currently available in a limited combination of dielectric thickness (0.015” - 0.062”) and dielectric constant (2.5 - 3.5). Thicker dielectrics can be developed to meet customer requirements. The higher weight ratio of fiberglass to PTFE resin yields laminates with greater dimensional stability than is normally expected of PTFE-based substrates.

Stability of PTFE over a wide frequency range and low loss makes AD Series materials ideal for a variety of microwave and R/F applications in telecom industry. AD Series laminate materials may be processed with standard PTFE materials. Because there is a relatively higher percentage of fiberglass, thermal expansion is reduced in all directions, improving plated through hole reliability.

### Features:
- Cost-Effective Construction
- Reduced PTFE/Glass Ratio
- Volume Manufacturing

### Benefits:
- PTFE Performance Stability over Frequency
- Low Loss
- Improved Registration
- Commercial Cost Structure
- Quick-Turn Delivery

### Typical Applications:
- Power Amplifiers, Low Noise Amplifiers
- Antennas
- Microwave Components
- Microwave Modules

Arlon Microwave Materials... Challenge Us

www.arlon-med.com
### Typical Properties: AD Series

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Constant/</td>
<td>IPC TM-650 2.5.5.5</td>
<td>C23/50</td>
<td>AD250 2.50 / 0.0018</td>
</tr>
<tr>
<td>Dissipation Factor (10 GHz)</td>
<td></td>
<td></td>
<td>AD255 2.55 / 0.0018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD270 2.70 / 0.0023</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD300 3.00 / 0.003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD320 3.20 / 0.003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD350 3.50 / 0.003</td>
</tr>
<tr>
<td>Thermal Coefficient of Dielectric Constant</td>
<td>IPC TM-650 2.5.5.5</td>
<td>-10°C to +140°C</td>
<td>-110</td>
</tr>
<tr>
<td>Peel Strength (lbs. per inch)</td>
<td>IPC TM-650 2.4.8</td>
<td>After Thermal Stress</td>
<td>AD250 -14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD255 -14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD270 -14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD300 -14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AD320 -14</td>
</tr>
<tr>
<td>Volume Resistivity (MΩ-cm)</td>
<td>IPC TM-650 2.5.17.1</td>
<td>C96/35/90</td>
<td>1.2 x 10⁸ (MΩ-cm)</td>
</tr>
<tr>
<td>Surface Resistivity (MΩ)</td>
<td>IPC TM-650 2.5.17.1</td>
<td>C96/35/90</td>
<td>4.5 x 10⁷ (MΩ)</td>
</tr>
<tr>
<td>Arc Resistance (second)</td>
<td>ASTM D-495</td>
<td>D48/50</td>
<td>&gt;180 seconds</td>
</tr>
<tr>
<td>Tensile Modulus (X,Y)</td>
<td>ASTM D-638</td>
<td>A, 23°C</td>
<td>706, 517 kpsi</td>
</tr>
<tr>
<td>Tensile Strength (X,Y)</td>
<td>ASTM D-882</td>
<td>A, 23°C</td>
<td>20.9, 17.3 kpsi</td>
</tr>
<tr>
<td>Compressive Modulus</td>
<td>ASTM D-695</td>
<td>A, 23°C</td>
<td>365 kpsi</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>ASTM D-790</td>
<td>A, 23°C</td>
<td>540 kpsi</td>
</tr>
<tr>
<td>Breakdown (kV)</td>
<td>ASTM D-149</td>
<td>D48/50</td>
<td>&gt;45</td>
</tr>
<tr>
<td>Density (g/cm³)</td>
<td>ASTM D-792 Method A</td>
<td>A, 23°C</td>
<td>2.40</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>IPC TM-650 2.6.2.2</td>
<td>E1/105 + D24/23</td>
<td>0.07%</td>
</tr>
<tr>
<td>Coefficient of Thermal Expansion (ppm/°C)</td>
<td></td>
<td>0°C to 100°C</td>
<td>12</td>
</tr>
<tr>
<td>X Axis</td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Y Axis</td>
<td></td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>Z Axis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Conductivity (W/mK)</td>
<td>ASTM E-1225</td>
<td>100°C</td>
<td>0.235</td>
</tr>
<tr>
<td>Flammability</td>
<td>UL 94</td>
<td>C48/23/50, E24/125</td>
<td>Meets requirements of UL94-V0</td>
</tr>
</tbody>
</table>

**Material Availability:**

AD Series materials are supplied with 1/2 ounce, 1 ounce or 2 ounce electrodeposited copper foil on both sides. Aluminum, brass and copper plate may be specified, providing an integral heat sink and mechanical support to the substrate.

When ordering AD Series products, please specify dielectric constant, dielectric thickness, choice of cladding, panel size, and any other special considerations. Panels are available up to 36” x 72”.

*Results listed above are typical properties; they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of Arlon laminates may vary, depending on the design and application.*
Results listed above are typical properties; they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of Arlon laminates may vary, depending on the design and application.

Figure 1
Demonstrates the Stability of Dielectric Constant across Frequency. This information was correlated from data generated by using a free space and circular resonator cavity. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, thus simplifying the final design process when working across EM spectrum. The stability of the Dielectric Constant of AD250 over frequency ensures easy design transition and scalability of design.

Figure 2
Demonstrates the Stability of Dissipation across Frequency. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, providing a stable platform for high frequency applications where signal integrity is critical to overall performance.
Results listed above are typical properties; they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of Arlon laminates may vary, depending on the design and application.

**Figure 3**
Demonstrates the Stability of Dielectric Constant across Frequency. This information was correlated from data generated by using a free space and circular resonator cavity. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, thus simplifying the final design process when working across EM spectrum. The stability of the Dielectric Constant of AD300 over frequency ensures easy design transition and scalability of design.

**Figure 4**
Demonstrates the Stability of Dissipation across Frequency. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, providing a stable platform for high frequency applications where signal integrity is critical to overall performance.
Results listed above are typical properties; they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of Arlon laminates may vary depending on the design and application.

**Figure 5**
Demonstrates the stability of dielectric constant across Frequency. This information was correlated from data generated by using a free space and circular resonator cavity. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, thus simplifying the final design process when working across EM spectrum. The stability of the Dielectric Constant of AD320 over frequency ensures easy design transition and scalability of design.

**Figure 6**
Demonstrates the Stability of Dissipation Factor across Frequency. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, providing a stable platform for high frequency applications where signal integrity is critical to overall performance.
For samples, technical assistance, customer service or for more information, please contact Arlon Materials for Electronics Division at the following locations:

**NORTH AMERICA:**
Arlon, Inc.
Electronic Substrates
9433 Hyssop Drive
Rancho Cucamonga, CA  91730
Tel:   (909) 987-9533
Fax:   (909) 987-8541

Arlon, Inc.
Microwave Materials
1100 Governor Lea Road
Bear, DE  19701
Tel:   (800) 635-9333
Outside U.S. & Canada: (302) 834-2100
Fax:   (302) 834-2574

**EUROPE:**
Arlon, Inc.
44 Wilby Avenue
Little Lever
Bolton, Lancaster  BL31QE
United Kingdom
Tel:   (44) 120-457-6068
Fax:   (44) 120-479-6463

**SOUTHERN CHINA:**
Arlon, Inc.
Room 805, Unit 3, Bldg 4
Liyuan, Xincun Holiday Road
Huaqiao Cheng, Shenzhen  518053
China
Tel/Fax:   (86) 755-269-066-12

**NORTHERN CHINA:**
Arlon, Inc.
Room 11/401, No. 8
Hong Gu Road
Shanghai, China  200336
Tel/Fax:   (86) 21-6209-0202

Or visit us on the web at:
www.arlon-med.com