PTFE/Woven Fiberglass/Micro-Ceramic Filled Laminate for RF & Microwave Printed Circuit Boards

**Features:**
- Cost-Effective Construction using PTFE and microdispersed ceramic
- High Volume Manufacturing Design
- Excellent PIM Performance
- Reduced Thermal Coefficient of Dielectric Constant ($\varepsilon_r$)
- High Thermal Conductivity ideal for Higher Power Designs

**Benefits:**
- Low Dielectric Loss (Loss Tangent)
- Low Insertion Loss (S21)
- Excellent Copper Bond Strength
- Low Moisture Absorption

**Typical Applications:**
- Base Station Antennas
- Power Amplifiers (PA), Tower Mounted Amplifiers (TMA) and Tower Mounted Booster Amplifiers (TMB)
- Multimedia Transmission Systems

AD320A is a woven fiberglass reinforced PTFE/Microfine Ceramic composite material and is a significant improvement in cost/performance over traditional fluoropolymer-glass laminates that do not use ceramics. This combination offers designers an advantage for improving electrical performance through the use of advanced material without the additional cost traditionally associated with higher performance.

AD320A was specifically developed for Base Station Antennas and Base Station Power Amplifiers where low loss and low PIM is critical. Other key performance attributes include low moisture absorption, low thermal coefficient of the dielectric ($\varepsilon_r$), high copper peel strength and good dimensional and thermal stability. The 3.20 Dielectric Constant also provides a small degree of miniaturization that is critical to the size constraints of some antenna designs.

AD320A is compatible with the processing used for standard PTFE based printed circuit board substrates. In addition, the low Z-axis thermal expansion provided by the ceramic loading, will improve plated through hole reliability compared to typical PTFE based laminates.
### Typical Properties: AD320A

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Constant (10GHz)</td>
<td>IPC TM-650 2.5.5.5</td>
<td>C23/50</td>
<td>3.20 ± 0.04</td>
</tr>
<tr>
<td>Dielectric Constant (1MHz)</td>
<td>IPC TM-650 2.5.5.3</td>
<td>C23/50</td>
<td>3.20</td>
</tr>
<tr>
<td>Dissipation Factor (10GHz)</td>
<td>IPC TM-650 2.5.5.5</td>
<td>C23/50</td>
<td>0.0032</td>
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<tr>
<td>Thermal Coefficient of Dielectric constant</td>
<td>IPC TM-650 2.5.5.5</td>
<td>Adapted</td>
<td>-125</td>
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<tr>
<td>Peel Strength (lbs per inch) 1 Ounce ED Copper</td>
<td>IPC TM-650 2.4.8</td>
<td>After Thermal Stress</td>
<td>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>8.2 x 10^7 meghohm-cm</td>
</tr>
<tr>
<td>Surface Resistivity (MΩ)</td>
<td>IPC TM-650 2.5.17.1</td>
<td>C96/35/90</td>
<td>4.3 x 10^7 meghohm</td>
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<tr>
<td>Arc Resistance (seconds)</td>
<td>ASTM D-495</td>
<td>D48/50</td>
<td>&gt;185 seconds</td>
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<tr>
<td>Tensile Modulus (x,y)</td>
<td>ASTM D-638</td>
<td>A, 23°C</td>
<td>700, 500 kpsi</td>
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<tr>
<td>Tensile Strength (x,y)</td>
<td>ASTM D-882</td>
<td>A, 23°C</td>
<td>20, 17 kpsi</td>
</tr>
<tr>
<td>Compressive Modulus</td>
<td>ASTM D-695</td>
<td>A, 23°C</td>
<td>1600 kpsi</td>
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<tr>
<td>Flexural Modulus</td>
<td>ASTM D-790</td>
<td>A, 23°C</td>
<td>1500 kpsi</td>
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<td>Breakdown kV</td>
<td>ASTM D-149</td>
<td>D48/50</td>
<td>&gt; 40 kV</td>
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<tr>
<td>Specific Gravity (unitless) / Mass (g/cm³)</td>
<td>ASTM D-792 Method A</td>
<td>A, 23°C</td>
<td>2.09</td>
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<tr>
<td>Water Absorption</td>
<td>IPC TM-650 2.6.2.2</td>
<td>E1/105 + D24/23</td>
<td>&lt; 0.02%</td>
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<tr>
<td>Coefficient of Thermal Expansion (ppm/°C)</td>
<td>0°C to 100°C</td>
<td></td>
<td>14</td>
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<tr>
<td>X Axis</td>
<td></td>
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<td>14</td>
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<tr>
<td>Y Axis</td>
<td></td>
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<td>128</td>
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<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>0.45</td>
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<tr>
<td>Flammability</td>
<td>UL 94</td>
<td>C48/23/50, E24/125</td>
<td>Meets UL94-V0</td>
</tr>
</tbody>
</table>

**Material Availability:**
AD320A is currently built 0.030” and 0.045” Thicknesses. Other thicknesses may be available. Inquire with Arlon Customer Service for other options. AD320A is supplied with 1/2 ounce, 1 ounce or 2 ounce electrodeposited copper foil on both sides. These materials are also available to a heavy metal ground plane. Aluminum, brass and copper plate may be specified, providing an integral heat sink and mechanical support to the substrate. AD320A is built in 36” x 48” or 36” x 72” Sheets. Common panel sizes include: 12” x 18”, 16” x 18” and 18” x 24”. Other panel sizes available.

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.
CONTACT INFORMATION:

For samples, technical assistance, customer service or for more information, please contact Arlon Materials for Electronics Division at the following locations:

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