

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

Arlon's AD250C is the third generation, commercial microwave and RF laminate material designed with low dielectric, low cost and excellent low loss characteristics. AD250C is built on a cost-effective combination of composite chemistry and construction to yield an uncompromising level of price-performance for today's telecommunication infrastructure.

AD250C combines the superior thermal properties of a fluoropolymer resin system with selected ceramic materials and fiberglass reinforcement to yield a laminate material with lower loss ($D_f=0.0014$ at 10GHz), lower thermal expansion properties and lower passive intermodulation (PIM). AD250C also represents further improvements over Arlon's AD250A product in terms of cost.

Stability of PTFE over wide frequency and temperature ranges with low loss properties, makes AD250C ideal for a variety of microwave and RF applications in telecom infrastructure. The inclusion of micro-dispersed ceramic provides thermal stability to the laminate in the form of lower CTE values and greater phase stability across temperatures.

The net combination of properties of AD250C are highly desired in applications where higher frequency and expectations for longevity in material performance for high gain and broadband signals, which are typically beyond the performance capabilities offered by low loss thermosets.

AD250C is compatible with the processing used for standard PTFE based printed circuit board substrates. Its low Z-axis thermal expansion improves plated through-hole (PTH) reliability compared to typical PTFE based laminates. Low X-Y expansion improves BGA solder-joint reliability.

Features:

- Very Low Loss PTFE and Ceramic Filled Composite (0.0014 Loss Tangent at 10GHz and Base Station Frequencies)
- Dielectric Constant (2.50) with Tight Tolerance
- Low Dielectric Loss (Loss Tangent)
- Low Profile Copper (lower conductive losses and lowest PIM)
- Low Z-Direction CTE
- Large Panel Sizes Available

Benefits:

- Higher Antenna Efficiencies
- Lower Insertion Loss
- Low PIM for Antenna Applications
- Improved TCER for Phase Stability
- Ceramic Provides Higher Degree of Dielectric Constant Stability as Temperatures Change or Cycle

Typical Applications:

- Base Station Antenna Applications
- Commercial Antennas
- Digital Audio Broadcasting (DAB) Antennas (Satellite Radio)
- Radar Manifolds and Feed Networks

The Arlon logo is rendered in a bold, red, sans-serif font. The letter 'A' is stylized with a white negative space cutout.

TECHNOLOGY ENABLING INNOVATION

Typical Properties:

AD250C

| Property | Units | Value | Test Method |
|--|-------------------|---------------------|---------------------|
| 1. Electrical Properties | | | |
| Dielectric Constant (may vary by thickness) | | | |
| @1 MHz | - | 2.50 | IPC TM-650 2.5.5.3 |
| @ 10 GHz | - | 2.50 | IPC TM-650 2.5.5.5 |
| Dissipation Factor | | | |
| @ 1 MHz | - | 0.0011 | IPC TM-650 2.5.5.3 |
| @ 10 GHz | - | 0.0014 | IPC TM-650 2.5.5.5 |
| Temperature Coefficient of Dielectric | - | | |
| TC _{εr} @ 10 GHz (-40-150°C) | ppm/°C | -75 | IPC TM-650 2.5.5.5 |
| Volume Resistivity | | | |
| C96/35/90 | MΩ-cm | 1.1x10 ⁹ | IPC TM-650 2.5.17.1 |
| E24/125 | MΩ-cm | | IPC TM-650 2.5.17.1 |
| Surface Resistivity | | | |
| C96/35/90 | MΩ | 4.5x10 ⁷ | IPC TM-650 2.5.17.1 |
| E24/125 | MΩ | | IPC TM-650 2.5.17.1 |
| Electrical Strength | Volts/mil (kV/mm) | | IPC TM-650 2.5.6.2 |
| Dielectric Breakdown | kV | >45 | IPC TM-650 2.5.6 |
| Arc Resistance | sec | >180 | IPC TM-650 2.5.1 |
| 2. Thermal Properties | | | |
| Decomposition Temperature (Td) | | | |
| Initial | °C | >500 | IPC TM-650 2.4.24.6 |
| 5% | °C | >500 | IPC TM-650 2.4.24.6 |
| T260 | min | >60 | IPC TM-650 2.4.24.1 |
| T288 | min | >60 | IPC TM-650 2.4.24.1 |
| T300 | min | >60 | IPC TM-650 2.4.24.1 |
| Thermal Expansion, CTE (x,y) 50-150°C | ppm/°C | 16, 16 | IPC TM-650 2.4.41 |
| Thermal Expansion, CTE (z) 50-150°C | ppm/°C | 50 | IPC TM-650 2.4.24 |
| % z-axis Expansion (50-260°C) | % | | IPC TM-650 2.4.24 |
| 3. Mechanical Properties | | | |
| Peel Strength to Copper (1 oz/35 micron) | | | |
| After Thermal Stress | lb/in (N/mm) | 12 (2.1) | IPC TM-650 2.4.8 |
| At Elevated Temperatures (150°) | lb/in (N/mm) | | IPC TM-650 2.4.8.2 |
| After Process Solutions | lb/in (N/mm) | | IPC TM-650 2.4.8 |
| Young's Modulus | kpsi (MPa) | | IPC TM-650 2.4.18.3 |
| Flexural Strength (Machine/Cross) | kpsi (MPa) | | IPC TM-650 2.4.4 |
| Tensile Strength (Machine/Cross) | kpsi (MPa) | >20 (m or C) | IPC TM-650 2.4.18.3 |
| Compressive Modulus | kpsi (MPa) | >350 | ASTM D-3410 |
| Poisson's Ratio | - | | ASTM D-3039 |
| 4. Physical Properties | | | |
| Water Absorption | % | 0.04 | IPC TM-650 2.6.2.1 |
| Density, ambient 23°C | g/cm ³ | 2.30 | ASTM D792 Method A |
| Thermal Conductivity | W/mK | 0.30 | ASTM E1461 |
| Flammability | class | Meets V0 | UL-94 |
| NASA Outgassing, 125°C, ≤10 ⁻⁶ torr | % | | NASA SP-R-0022A |
| Total Mass Loss | % | | NASA SP-R-0022A |
| Collected Volatiles | % | | NASA SP-R-0022A |
| Water Vapor Recovered | % | | NASA SP-R-0022A |

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.

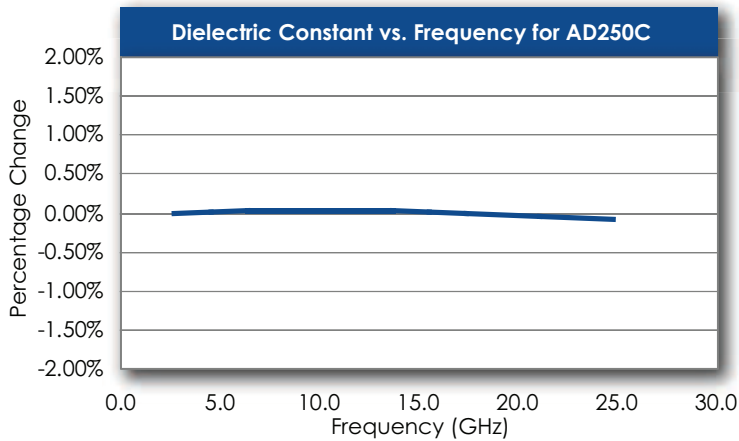


Figure 1

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 AD250C over frequency ensures easy design transition and scalability of design.

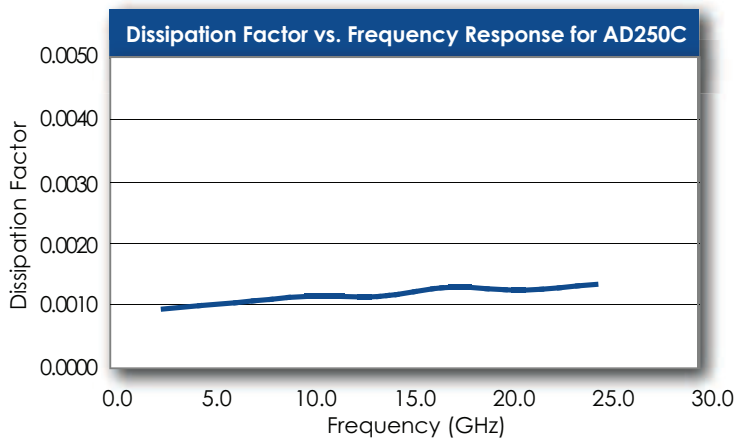


Figure 2

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 the overall performance of the application.

Material Availability:

Current Standard Production is based on 0.030" and 0.060" thickness designs. Other thicknesses may be available upon request. Please contact Arlon Customer Service to discuss your application. AD250C is supplied with 1/2, 1 or 2 ounce electrodeposited copper on both sides. Reverse Treat ED Copper is recommended for Reduced PIM Performance. Inquire about PIM+ performance option.

When ordering AD250C, specify dielectric thickness, cladding, panel size and any other special considerations. Typical Panels are cut from a Master Sheet. The standard master sheet is 48" x 54". Typical panel sizes cut from a master sheet include: 12" x 18", 18" X 24", 16" X 18". Contact Customer Service for larger master sheet or custom panel sizes.



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Arlon Microwave Materials... Challenge Us

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