AD300C

The Next Generation of AD300A with Improved Performance and Cost for RF/Microwave Applications

Arlon's AD300C is the third generation, commercial microwave and RF laminate material designed with low dielectric, low cost and excellent low loss characteristics. This ceramic-filled, woven fiberglass reinforced PTFE composite material is built on a cost-effective construction of unique chemistry formulation and processing to offer RF and Microwave designers an advantage for improving electrical and mechanical performances without the additional cost traditionally associated with higher performance. AD300C provides a significant improvement in cost/performance over the existing AD300A product line and other traditional fluoropolymer-glass laminates.

AD300C is ideal for Base Station Antennas and Base Station Power Amplifiers where low loss and low PIM is critical. Other key features include low moisture absorption, lowest in class TCEr (-25ppm/°C) and very low CTExyz (9, 15 and 54ppm/°C, respectively), high copper peel strength and good dimensional and thermal stability. Its Dielectric Constant 2.97 and tighter DK tolerance (±0.05) is desired for achieving high antenna efficiency and large bandwidth, and also provides a small degree of miniaturization that is critical to the size constraints of some antenna designs. Its lowest-in-class TCEr helps antenna designs to maintain high antenna gain and performance over wider operating temperature ranges by minimizing resonance frequency shift and bandwidth roll off at the temperature swings.

AD300C 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 (PTH) reliability compared to typical PTFE based laminates.

Features:

- Excellent Thermal Coefficient of Dielectric Constant (TCEr=-25ppm/°C)
- Excellent PIM Performance
- High Thermal Conductivity ideal for Higher Power Designs
- Reduced Coefficient of Thermal Expansion in z-direction (CTEz)
- Cost-Effective Advanced Material for Commercial RF Applications and High Volume Manufacturing Design
- Tightest Commercial Laminate DK Tolerance for Impedance Control

Benefits:

- Low Dielectric Loss (Loss Tangent)
- Low Insertion Loss (S21)
- Excellent Electrical Phase Stability vs. Temperature
- 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)
- Antenna Feed Networks
- RF Passive Components
- Multimedia Transmission Systems

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Typical Properties:

AD300C

Property	Units	Value	Test Method
1. Electrical Properties			
Dielectric Constant (may vary by thickness)			
@1 MHz	-	2.97	IPC TM-650 2.5.5.3
@ 10 GHz	-	2.97	IPC TM-650 2.5.5.5
Dissipation Factor			
@ 1 MHz	-	0.0014	IPC TM-650 2.5.5.3
@ 10 GHz	-	0.0020	IPC TM-650 2.5.5.5
Temperature Coefficient of Dielectric	-		
TCεr @ 10 GHz (-40-150°C)	ppm/°C	-25	IPC TM-650 2.5.5.5
Volume Resistivity			
C96/35/90	MΩ-cm	$1.2x10^8$	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	$1.9x10^8$	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	$2.5x10^8$	IPC TM-650 2.5.17.1
E24/125	MΩ	$7.7x10^8$	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	430 (17)	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV	30	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	555	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	9, 15	IPC TM-650 2.4.41
Thermal Expansion, CTE (z) 50-150°C	ppm/°C	54	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)	>10 (1.8)	IPC TM-650 2.4.8
At Elevated Temperatures (150°)	lb/in (N/mm)	>10 (1.8)	IPC TM-650 2.4.8.2
After Process Solutions	lb/in (N/mm)	12 (2.1)	IPC TM-650 2.4.8
Young's Modulus	kpsi (MPa)	560 (3861)	IPC TM-650 2.4.18.3
Flexural Strength (Machine/Cross)	kpsi (MPa)	10/13 (69/90)	IPC TM-650 2.4.4
Tensile Strength (Machine/Cross)	kpsi (MPa)	5.9/7.6 (41/52)	IPC TM-650 2.4.18.3
Compressive Modulus	kpsi (MPa)		ASTM D-3410
Poisson's Ratio	-	0.25	ASTM D-3039
4. Physical Properties			
Water Absorption	%	0.06	IPC TM-650 2.6.2.1
Density, ambient 23°C	g/cm^3	2.07	ASTM D792 Method A
Thermal Conductivity	W/mK	0.50	ASTM E1461
Flammability	class	Meets V0	UL-94
NASA Outgassing, 125°C, $\leq 10^{-6}$ torr			
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.

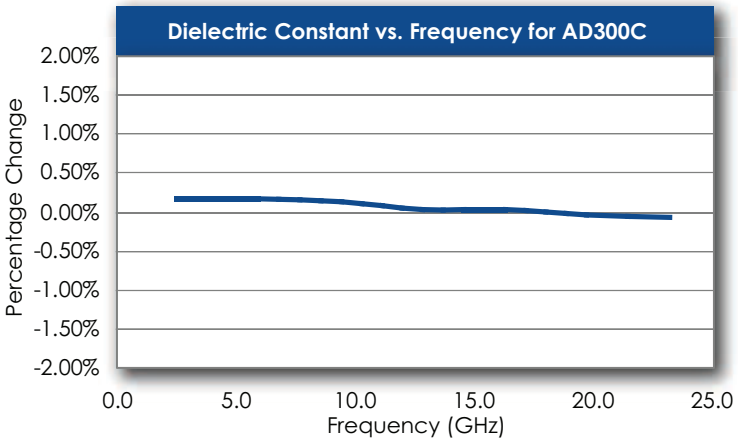

Figure 1
Demonstrates the Stability of Dielectric Constant across Frequency. This information was correlated from data generated by using a free space and circular resonator cavity. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, thus simplifying the final design process when working across EM spectrum. The stability of the Dielectric Constant of AD300C over frequency ensures easy design transition and scalability of design.

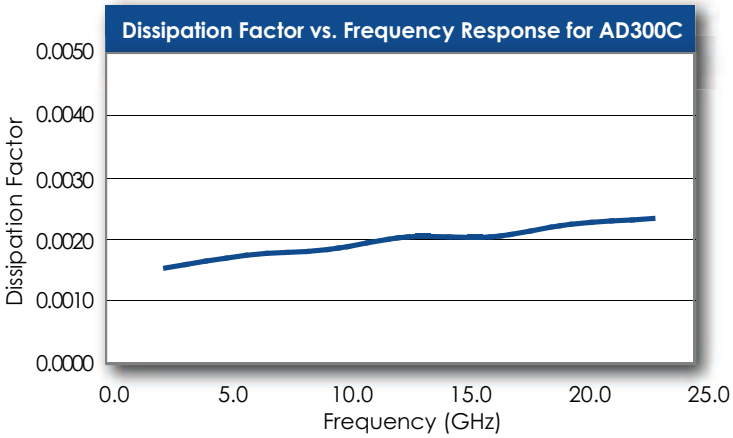

Figure 2
Demonstrates the Stability of Dissipation Factor across Frequency. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, providing a stable platform for high frequency applications where signal integrity is critical to the overall performance of the application.

Material Availability:

AD300C is currently built on 0.030" and 0.060" Thicknesses. Other thicknesses may be available. Inquire with Arlon Customer Service for other options. AD300C is supplied with 1/2 ounce, 1 ounce or 2 ounce electrodeposited copper foil on both sides. Reverse Treat ED Copper is recommended for Reduced PIM Performance. Inquire about PIM+ performance option.

When ordering AD300C, specify dielectric thickness, cladding, panel size and any other special considerations. AD300C is built in 48" x 54" Standard Master Sheets. Common panel sizes include: 12" x 18", 16" x 18" and 18" x 24". Contact Customer Service for other panel sizes.

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