Typical Properties:

TC350

Property	Units	Value	Test Method
1. Electrical Properties			
Dielectric Constant (may vary by thickness)			
@1 MHz	-	3.50	IPC TM-650 2.5.5.3
@1.8 GHz	-	3.50	RESONANT CAVITY
@10 GHz	-	3.50	IPC TM-650 2.5.5.5
Dissipation Factor			
@1 MHz	-	0.0015	IPC TM-650 2.5.5.3
@1.8 GHz	-	0.0018	RESONANT CAVITY
@10 GHz	-	0.0020	IPC TM-650 2.5.5.5
Temperature Coefficient of Dielectric	-		
TCεr @ 10 GHz (-40-150°C)	ppm/°C	-9	IPC TM-650 2.5.5.5
Volume Resistivity			
C96/35/90	MΩ-cm	$7.4x10^6$	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	$1.4x10^8$	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	$3.2x10^7$	IPC TM-650 2.5.17.1
E24/125	MΩ	$4.3x10^8$	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	780 (31)	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV	40	IPC TM-650 2.5.6
Arc Resistance	sec	>240	IPC TM-650 2.5.1
2. Thermal Properties			
Decomposition Temperature (Td)			
Initial	°C	520	IPC TM-650 2.4.24.6
5%	°C	567	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	7, 7	IPC TM-650 2.4.41
Thermal Expansion, CTE (z) 50-150°C	ppm/°C	23	IPC TM-650 2.4.24
% z-axis Expansion (50-260°C)	%	1.2	IPC TM-650 2.4.24
3. Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb/in (N/mm)	7 (1.2)	IPC TM-650 2.4.8
At Elevated Temperatures (150°C)	lb/in (N/mm)	9 (1.6)	IPC TM-650 2.4.8.2
After Process Solutions	lb/in (N/mm)	7 (1.2)	IPC TM-650 2.4.8
Young's Modulus	kpsi (MPa)		IPC TM-650 2.4.18.3
Flexural Strength (Machine/Cross)	kpsi (MPa)	14/10 (97/69)	IPC TM-650 2.4.4
Tensile Strength (Machine/Cross)	kpsi (MPa)	11/8 (76/55)	IPC TM-650 2.4.18.3
Compressive Modulus	kpsi (MPa)		ASTM D-3410
Poisson's Ratio	-		ASTM D-3039
4. Physical Properties			
Water Absorption	%	0.05	IPC TM-650 2.6.2.1
Density, ambient 23°C	g/cm^3	2.30	ASTM D792 Method A
Thermal Conductivity	W/mK	0.72	ASTM D5470
Specific Heat	J/gK	0.90	ASTM D5470
Flammability	class	V0	UL-94
NASA Outgassing, 125°C, ≤10^{-6} torr			
Total Mass Loss	%	0.02	NASA SP-R-0022A
Collected Volatiles	%	0.01	NASA SP-R-0022A
Water Vapor Recovered	%	0.01	NASA SP-R-0022A

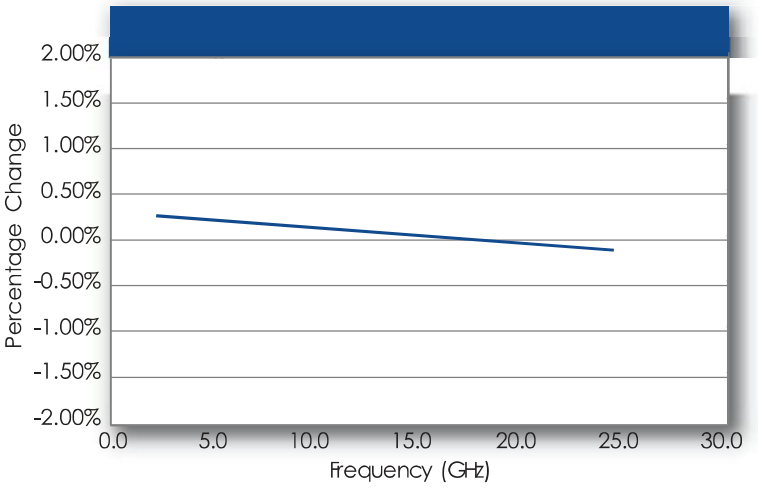

Figure 1
Demonstrates the Stability of Dielectric Constant across Frequency.This information was correlated from data generated by using a free space and circular resonator cavity. This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, thus simplifying the final design process when working across EM spectrum. The stability of the Dielectric Constant of TC350 over frequency ensures easy design transition and scalability of design.

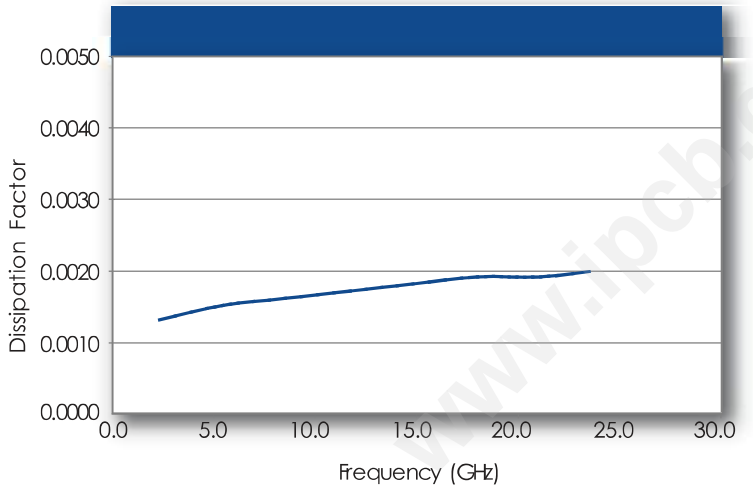

Figure 2
Demonstrates the Stability of Dissipation Factor across Frequency.This characteristic demonstrates the inherent robustness of Arlon Laminates across Frequency, providing a stable platform for high frequency applications where signal integrity is critical to the overall performance of the application.

Resonant Cavity Methods yielded slightly lower Dissipation Factor results than IPC 650-TM 2.5.5.5. Df across 1.8 GHz to 25.6 GHz averaged 0.0017 in the Z-Axis. Dielectric loss best correlates with Z-Axis (E-field perpendicular to the board) as the signal propagation down the length of the board maintains the E-Field perpendicular to the plane of the board (right hand rule), such asa microstrip or stripline design.

Material Availability:

TC350 laminate is supplied with 1/2, 1 or 2 ounce electrodeposited or reverse treat copper on both sides. Other copper weights may be available. TC350 is available bonded to heavy metal ground planes. Aluminum, brass or copper plates also provide an integral heat sink and mechanical support to the substrate.

When requesting samples of TC350 product, please specify thickness, cladding, panel size, and any other special considerations. Panel sizes cut from a master sheet include: 12” x 18”, 18” X 24”, 16” X 18”. Contact Customer Service for other custom panel sizes.