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AD300D™

Antenna Grade Laminates

AD300D™ High Frequency Laminates are specialty performance materials from Rogers Corporation, specifically engineered and manufactured to meet the specific demands of today's base station antenna market.

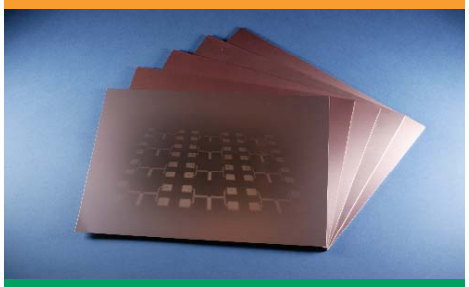
AD300D laminates extend the capabilities of the successful AD300™ product grade. This ceramic-filled, glass-reinforced, PTFE based material provides the controlled dielectric constant, low loss performance, very good passive intermodulation (PIM) response, and good circuit processability required for mobile infrastructure microstrip antenna applications.

These fourth generation, AD300 commercial microwave and RF laminate materials are designed with low dielectric, low cost and excellent low loss characteristics. These ceramic-filled, woven fiberglass reinforced PTFE composite materials combine a cost-effective construction with unique chemistry and processing to offer RF and Microwave designers an option for improving electrical and mechanical performance without the additional costs traditionally associated with higher performance material options.

AD300D laminates are ideal for Base Station Antenna designs where low loss (0.0021 at 10 GHz) and low PIM (-159 dBC at 30 mils) is critical. Materials are available with demonstrated low PIM performance, with values better than –159 dBC using two 43 dBm swept tones at 1900 MHz. Other key features include low moisture absorption (0.04%), low z-axis CTE (98ppm/°C), high copper peel strength (18.3 pli), and good dimensional and thermal stability. Its low dielectric constant value of 2.94 and tight tolerance (±0.05) enables high antenna efficiency and large bandwidth. It also provides a degree of miniaturization that is critical to the size constraints of some antenna designs. The low TCEr helps to maintain high antenna gain and performance over a wide operating temperature range by minimizing resonance frequency shifts and bandwidth roll off.

These laminates are compatible with the processing used for standard PTFE based printed circuit board substrates.

Data Sheet



Features and Benefits:

Low loss tangent (0.0021 @ 10 GHz), low and controlled Dk (2.94+0.05), and very good PIM performance
- Wide range of application use

PTFE resin system
- Compatible with standard PTFE fabrication

Excellent dimensional stability
- Greater yield on larger panel sizes

Uniform mechanical properties
- Maintains mechanical form during handling

Good thermal conductivity
- Improved power handling

Some Typical Applications:

- Cellular infrastructure base station antennas
- WiMax antenna networks

Standard Thicknesses	Standard Panel Sizes	Copper Cladding
0.030" (0.762 mm) 0.060" (1.524 mm)	12" X 18" (305 X 457 mm) 24" X 18" (610 X 457 mm)	½ oz. (18 µm) 1 oz. (35 µm) 2 oz. (70 µm)
Other thicknesses may be available. Inquire with Rogers' customer service for more options.	Additional sizes may be available. Please contact customer service for more information.	Electrodeposited copper (ED) and reverse treated ED foil available on both sides.

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Data Sheet

Electrical Properties[1]	AD300D	Units	Test Conditions		Test Method
PIM (30mil/60mil)[2]	-159/-163	dBc	Reflected 43 dBm swept tones at 1900MHz, S1/S1		Rogers internal 50 ohm
Dielectric Constant (process)	2.97 (2.94)	-	23°C @ 50% RH	10 GHz (1 MHz)	IPC TM-650 2.5.5.5 (IPC TM-650 2.5.5.3)
Dissipation Factor (process)	0.0021	-	23°C @ 50% RH	10 GHz	IPC TM-650 2.5.5.5
Dielectric Constant (design)	2.94	-	C-24/23/50	10 GHz	Microstrip Differential Phase Length
Thermal Coefficient of Dielectric Constant	-73	ppm/°C	0 to 100°C	10 GHz	IPC TM-650 2.5.5.5
Volume Resistivity	1.7 X 10^8	Mohm-cm	C-96/35/90	-	IPC TM-650 2.5.17.1
Surface Resistivity	5.1 X 10^7	Mohm	C-96/35/90	-	IPC TM-650 2.5.17.1
Electrical Strength (dielectric strength)	750	V/mil	-	-	IPC TM-650 2.5.6.2
Dielectric Breakdown	46	kV	D-48/50	X/Y direction	IPC TM-650 2.5.6
Comparative Tracking Index	II (400 ≤ V < 600)	class/volts	C-40/23/50	-	UL-746A, ASTM D3638
Thermal Properties[1]					
Decomposition Temperature (T_d)	>550	°C	2 hrs @ 105°C	5% Weight Loss	IPC TM-650 2.3.40
Coefficient of Thermal Expansion - X	24	ppm/°C	-	-55°C to 288°C	IPC TM-650 2.4.41
Coefficient of Thermal Expansion - Y	23	ppm/°C	-	-55°C to 288°C	IPC TM-650 2.4.41
Coefficient of Thermal Expansion - Z	98	ppm/°C	-	-55°C to 288°C	IPC TM-650 2.4.41
Thermal Conductivity	0.37	W/mK	-	z direction	ASTM D5470
Time to Delamination	>60	minutes	as received	288°C	IPC TM-650 2.4.24.1
Mechanical Properties[1]					
Copper Peel Strength after Thermal Stress	3.2 (18.3)	N/mm (lbs/in)	10s@288°C	35 µm foil	IPC TM-650 2.4.8
Flexural Strength (MD/CMD)	152.4/127.6 (22.1/18.5)	MPa (ksi)	25C +/-3C	-	ASTM D790
Tensile Strength (MD/CMD)	122.0/120.7 (17.7/17.5)	MPa (ksi)	23C/50RH	-	ASTM D3039/D3039-14
Flex Modulus (MD/CMD)	10,400/9,380 (1510/1390)	MPa (ksi)	25C +/-3C	-	IPC TM-650 Test Method 2.4.4
Dimensional Stability (MD/CMD)	-0.08/0.02	mils/inch	after etch + bake	-	IPC TM-650 2.4.39a
Physical Properties[1]					
Flammability	V-0	-	-	-	UL94
Moisture Absorption	0.04	%	E1/105 +D48/50	-	IPC TM-650 2.6.2.1
Density	2.23	g/cm^3	C-24/23/50	-	ASTM D792
Specific Heat Capacity	0.80	J/g°K	2 hours at 105°C	-	ASTM E2716
NASA Outgassing	0.01/0.01	%	-	TML/CVCM	ASTM E595

(1) Typical values are a representation of an average value for the population of the property using a 0.060" laminate.
(2) PIM Performance is heavily influenced by the copper choice. PIM values provided are typical values based on testing of the S1 foil using Rogers' internal test method on 0.030" thick and 0.060" thick laminates.

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