ROGERS CORPORATION

Advanced Circuit Materials

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Data Sheet
1.6000

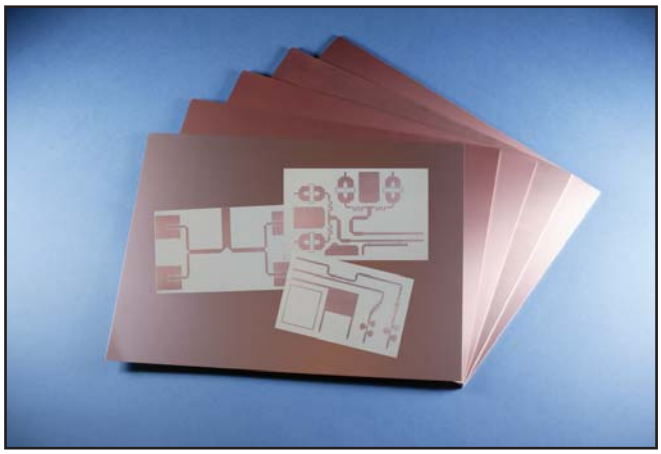
RT/duroid® 6006/6010LM High Frequency Laminates

Features

- High dielectric constant for circuit size reduction.
- Low loss. Ideal for operating at X-band or below.
- Low Z-axis expansion for RT/duroid 6010LM. Provides reliable plated through holes in multilayer boards.
- Low moisture absorption for RT/duroid 6010LM. Reduces effects of moisture on electrical loss.
- Tight ε_r and thickness control for repeatable circuit performance.

Some Typical Applications

- Space Saving Circuitry
- Patch Antennas
- Satellite Communications Systems
- Power Amplifiers
- Aircraft Collision Avoidance Systems
- Ground Radar Warning Systems



RT/duroid® 6006/6010LM microwave laminates are ceramic-PTFE composites designed for electronic and microwave circuit applications requiring a high dielectric constant. RT/duroid 6006 laminate is available with a dielectric constant value of 6.15 and RT/duroid 6010LM laminate has a dielectric constant of 10.2.

RT/duroid 6006/6010LM microwave laminates feature ease of fabrication and stability in use. They have tight dielectric constant and thickness control, low moisture absorption, and good thermal mechanical stability.

RT/duroid 6006/6010LM laminates are supplied clad both sides with ¼ oz. to 2 oz./ft^2 (8.5 to 70 μm) electrodeposited copper foil. Cladding with rolled copper foil is also available. Thick aluminum, brass, or copper plate on one side may be specified.

Standard tolerance dielectric thicknesses of 0.010", 0.025", 0.050", 0.075", and 0.100" (0.254, 0.635, 1.270, 1.905, 2.54 mm) are available. When ordering RT/duroid 6006 and RT/duroid 6010LM laminates, it is important to specify dielectric thickness, electrodeposited or rolled, and weight of copper foil required.

Typical Values

RT/duroid 6006, RT/duroid 6010LM Laminates

Property	Typical Value [2]		Direction	Units [1]	Condition	Test Method
	RT/duroid 6006	RT/duroid 6010.2LM				
[3]Dielectric Constant ε_r *Process*	6.15± 0.15	10.2 ± 0.25	Z		10 GHz 23°C	IPC-TM-650 2.5.5.5 Clamped stripline
[4]Dielectric Constant ε_r *Design*	6.45	10.9	Z		8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor, tan δ	0.0027	0.0023	Z		10 GHz/A	IPC-TM-650 2.5.5.5
Thermal Coefficient of ε_r	-410	-425	Z	ppm/°C	-50 to 170°C	IPC-TM-650 2.5.5.5
Surface Resistivity	$7X10^7$	$5X10^6$		Mohm	A	IPC 2.5.17.1
Volume Resistivity	$2X10^7$	$5X10^5$		Mohm•cm	A	IPC 2.5.17.1
Youngs' Modulus						ASTM D638 (0.1/min. strain rate)
under tension	627 (91) 517 (75)	931 (135) 559 (81)	X Y	MPa (kpsi)	A	
ultimate stress	20 (2.8) 17 (2.5)	17 (2.4) 13 (1.9)	X Y	MPa (kpsi)	A	
ultimate strain	12 to 13 4 to 6	9 to 15 7 to 14	X Y	%	A	
Youngs' Modulus						ASTM D695 (0.05/min. strain rate)
under compression	1069 (155)	2144 (311)	Z	MPa (kpsi)	A	
ultimate stress	54 (7.9)	47 (6.9)	Z	MPa (kpsi)	A	
ultimate strain	33	25	Z	%		
Flexural Modulus	2634 (382) 1951 (283)	4364 (633) 3751 (544)	X	MPa (kpsi)	A	ASTM D790
ultimate stress	38 (5.5)	36 (5.2) 32 (4.4)	X Y	MPa (kpsi)	A	
Deformation under load	0.33 2.10	0.26 1.37	Z Z	%	24 hr/ 50°C/7MPa 24 hr/150°C/7MPa	ASTM D621
Moisture Absorption	0.05	0.01		%	D48/50°C, 0.050" (1.27mm) thick	IPC-TM-650, 2.6.2.1
Density	2.7	3.1				ASTM D792
Thermal Conductivity	0.49	0.86		W/m/°K	80°C	ASTM C518
Thermal Expansion	47 34, 117	24 24,47	X Y,Z	ppm/°C	0 to 100°C	ASTM 3386 (5K/min)
Td	500	500		°C TGA		ASTM D3850
Specific Heat	0.97 (0.231)	1.00 (0.239)		J/g/K (BTU/lb/°F)		Calculated
Copper Peel	14.3 (2.5)	12.3 (2.1)		pli (N/mm)	after solder float	IPC-TM-650 2.4.8
Flammability Rating	V-0	V-0				UL94
Lead-Free Process Compatible	Yes	Yes				

[1] SI unit given first with other frequently used units in parentheses.
[2] References: APR4022.33 DJS 4019.27-32, Internal TR 2610. Tests were at 23°C unless otherwise noted.
[3] Dielectric constant is based on .025 dielectric thickness, one ounce electrodeposited copper on two sides.
[4] The design Dk is an average number from several different tested lots of material and on the most common thickness/s. If more detailed information is required, please contact Rogers Corporation. Refer to Rogers' technical paper "Dielectric Properties of High Frequency Materials" available at http://www.rogerscorp.com/acm.

Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.

STANDARD THICKNESS:	STANDARD PANEL SIZE:	STANDARD COPPER CLADDING:
0.005" (0.127mm) 0.010" (0.254mm) 0.025" (0.635mm) 0.050" (1.27mm) 0.075" (1.90mm) 0.100" (2.50mm)	10" X 10" (254 X 254mm) 10" X 20" (254 X 508mm) 20" X 20" (508 X 508mm) *18" X 12" (457 X 305 mm) *18" X 24" (457 X 610 mm) (*note: the above 2 panel sizes are not available in the 0.005" (0.127mm) and 0.010" (0.254mm) thicknesses)	¼ oz. (8.5 μm) electrodeposited copper foil. ½ oz. (18 μm), 1 oz. (35μm), 2 oz. (70μm) electrodeposited and rolled copper foil. Heavy metal claddings are available. Contact Rogers' Customer Service.

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