

## RT/duroid® 6006/6010LM High Frequency Laminates

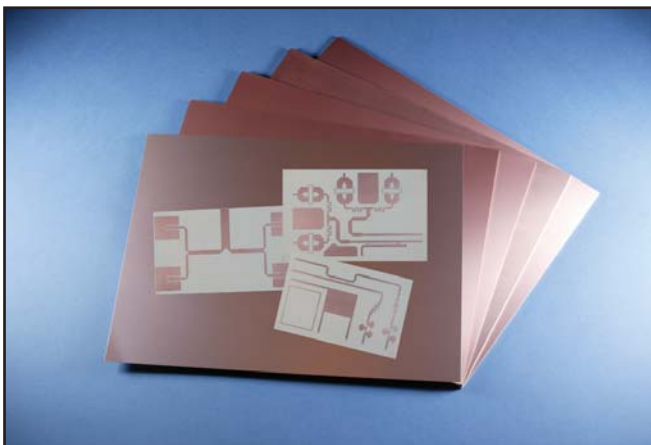


Features	
•	High dielectric constant for circuit size reduction.
•	Low loss. Ideal for operating at X-band or below.
•	Low Z-axis expansion for RT/duroid 6010LM. Provides reliable plated through holes in multilayer boards.
•	Low moisture absorption for RT/duroid 6010LM. Reduces effects of moisture on electrical loss.
•	Tight $\epsilon_r$ and thickness control for repeatable circuit performance.
Some Typical Applications	
•	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 1/2 oz. to 2 oz./ft<sup>2</sup> (18 to 70  $\mu$ m) standard and reverse treated electrodeposited copper foil. 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 and weight of copper foil required.

# Typical Values

# RT/duroid 6006, RT/duroid 6010LM Laminates

Property	Typical Value		Direction	Units [1]	Condition	Test Method
	RT/duroid 6006	RT/duroid 6010.2LM				
[2]Dielectric Constant $\epsilon_r$ <i>Process</i>	6.15± 0.15	10.2 ± 0.25	Z		10 GHz 23°C	IPC-TM-650 2.5.5.5 Clamped stripline
[3]Dielectric Constant $\epsilon_r$ <i>Design</i>	6.45	10.7	Z		8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor, tan $\delta$	0.0027	0.0023	Z		10 GHz/A	IPC-TM-650 2.5.5.5
Thermal Coefficient of $\epsilon_r$	-410	-425	Z	ppm/°C	-50 to 170°C	IPC-TM-650 2.5.5.5
Surface Resistivity	7X10 <sup>7</sup>	5X10 <sup>6</sup>		Mohm	A	IPC 2.5.17.1
Volume Resistivity	2X10 <sup>7</sup>	5X10 <sup>5</sup>		Mohm•cm	A	IPC 2.5.17.1
Youngs' Modulus						
under tension	627 (91) 517 (75)	931 (135) 559 (81)	X Y	MPa (kpsi)	A	ASTM D638 (0.1/min. strain rate)
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						
under compression	1069 (155)	2144 (311)	Z	MPa (kpsi)	A	ASTM D695 (0.05/min. strain rate)
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		g/cm <sup>3</sup>		ASTM D792
Thermal Conductivity						
	0.49	0.86		W/m <sup>2</sup> /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] Dielectric constant is based on .025 dielectric thickness, one ounce electrodeposited copper on two sides.

[3] 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) Non-standard thicknesses available	10" X 10" (254 X 254mm) 10" X 20" (254 X 508mm) *20" X 20" (508 X 508mm) - non-standard  18" X 12" (457 X 305 mm) *18" X 24" (457 X 610 mm) - non-standard (*note: the above 2 panel sizes are available in >0.025" only)	½ oz. (18 µm), 1 oz. (35µm), 2 oz. (70µm) electro-deposited & reverse treated EDC copper foil.  Heavy metal claddings are available, based on dielectric thickness. Contact Rogers' Customer Service.

The information in this data sheet is intended to assist you in designing with Rogers' circuit materials. It is not intended to and does not create any warranties express or implied, including any warranty of merchantability or fitness for a particular purpose or that the results shown on this data sheet will be achieved by a user for a particular purpose. The user should determine the suitability of Rogers' circuit materials for each application.

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