

## RT/duroid® 5870 /5880 High Frequency Laminates



RT/duroid® 5870 and 5880 glass microfiber reinforced PTFE composites are designed for exacting stripline and microstrip circuit applications.

The randomly oriented microfibers result in exceptional dielectric constant uniformity.

The dielectric constant of RT/duroid 5870 and 5880 laminates is uniform from panel to panel and is constant over a wide frequency range.

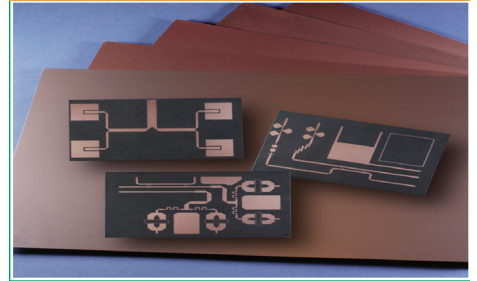
Its low dissipation factor extends the usefulness of RT/duroid 5870 and 5880 laminates to Ku-band and above.

RT/duroid 5870 and 5880 laminates are easily cut, sheared and machined to shape. They are resistant to all solvents and reagents, hot or cold, normally used in etching printed circuits or in plating edges and holes.

Normally supplied as a laminate with electrodeposited copper of  $\frac{1}{2}$  to 2 ounces/ft.<sup>2</sup> (8 to 70 $\mu$ m) or reverse treated EDC on both sides, RT/duroid 5870 and 5880 composites can also be clad with rolled copper foil for more critical electrical applications. Cladding with aluminum, copper or brass plate may also be specified.

When ordering RT/duroid 5870 and 5880 laminates, it is important to specify dielectric thickness, tolerance, rolled, electrodeposited or reverse treated copper foil, and weight of copper foil required.

### Data Sheet



#### Features:

- Lowest electrical loss for reinforced PTFE material
- Low moisture absorption
- Isotropic
- Uniform electrical properties over frequency
- Excellent chemical resistance

#### Some Typical Applications:

- Commercial Airline Broadband Antennas
- Microstrip and Stripline Circuits
- Millimeter Wave Applications
- Military Radar Systems
- Missile Guidance Systems
- Point to Point Digital Radio Antennas

PROPERTY	TYPICAL VALUES				DIRECTION	UNITS <sup>[3]</sup>	CONDITION	TEST METHOD
	RT/duroid 5870		RT/duroid 5880					
<sup>[1]</sup> Dielectric Constant, $\epsilon_r$ Process	2.33 2.33 ± 0.02 spec.		2.20 2.20 ± 0.02 spec.		Z Z	N/A	C24/23/50 C24/23/50	1 MHz IPC-TM-650 2.5.5.3 10 GHz IPC-TM-2.5.5.5
<sup>[4]</sup> Dielectric Constant, $\epsilon_r$ Design	2.33		2.20		Z	N/A	8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor, tan $\delta$	0.0005 0.0012		0.0004 0.0009		Z Z	N/A	C24/23/50 C24/23/50	1 MHz IPC-TM-650, 2.5.5.3 10 GHz IPC-TM-2.5.5.5
Thermal Coefficient of $\epsilon_r$	-115		-125		Z	ppm/°C	-50 - 150°C	IPC-TM-650, 2.5.5.5
Volume Resistivity	2 X 10 <sup>7</sup>		2 X 10 <sup>7</sup>		Z	Mohm cm	C96/35/90	ASTM D257
Surface Resistivity	2 X 10 <sup>7</sup>		3 X 10 <sup>7</sup>		Z	Mohm	C/96/35/90	ASTM D257
Specific Heat	0.96 (0.23)		0.96 (0.23)		N/A	J/g/K (cal/g/C)	N/A	Calculated
Tensile Modulus	Test at 23 °C	Test at 100 °C	Test at 23 °C	Test at 100 °C	N/A	MPa (kpsi)	A	ASTM D638
	1300 (189)	490 (71)	1070 (156)	450 (65)	X			
ultimate stress	1280 (185)	430 (63)	860 (125)	380 (55)	Y	MPa (kpsi)	A	ASTM D638
	50 (7.3)	34 (4.8)	29 (4.2)	20 (2.9)	X			
ultimate strain	42 (6.1)	34 (4.8)	27 (3.9)	18 (2.6)	Y	%	A	ASTM D638
	9.8	8.7	6.0	7.2	X			
Compressive Modulus	9.8	8.6	4.9	5.8	Y	%	A	ASTM D638
	1210 (176)	680 (99)	710 (103)	500 (73)	X			
ultimate stress	1360 (198)	860 (125)	710 (103)	500 (73)	Y	MPa (kpsi)	A	ASTM D695
	803 (120)	520 (76)	940 (136)	670 (97)	Z			
ultimate strain	30 (4.4)	23 (3.4)	27 (3.9)	22 (3.2)	X	%	A	ASTM D695
	37 (5.3)	25 (3.7)	29 (5.3)	21 (3.1)	Y			
ultimate strain	54 (7.8)	37 (5.3)	52 (7.5)	43 (6.3)	Z	%	A	ASTM D695
	4.0	4.3	8.5	8.4	X			
Moisture Absorption	0.02		0.02		N/A	%	.062" (1.6mm) D48/50	ASTM D570
Thermal Conductivity	0.22		0.20		Z	W/m/K	80°C	ASTM C518
Coefficient of Thermal Expansion	22		31		X	ppm/°C	0-100°C	IPC-TM-650, 2.4.41
	28		48		Y			
	173		237		Z			
Td	500		500		N/A	°C TGA	N/A	ASTM D3850
Density	2.2		2.2		N/A	gm/cm <sup>3</sup>	N/A	ASTM D792
Copper Peel	27.2 (4.8)		31.2 (5.5)		N/A	pli (N/mm)	1 oz (35mm) EDC foil after solder float	IPC-TM-650 2.4.8
Flammability	V-0		V-0		N/A	N/A	N/A	UL94
Lead-Free Process Compatible	Yes		Yes		N/A	N/A	N/A	N/A

[1] Specification values are measured per IPC-TM-650, method 2.5.5.5 @ ~10GHz, 23°C. Testing based on 1 oz. electrodeposited copper foil.  $\epsilon_r$  values and tolerance reported by IPC-TM-650 method 2.5.5.5 are the basis for quality acceptance, but for some products these values may be incorrect for design purposes, especially microstrip designs. We recommend that prototype boards for new designs be verified for desired electrical performance.

[2] Typical values should not be used for specification limits, except where noted.

[3] SI unit given first with other frequently used units in parentheses.

[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>.

Standard Thickness		Standard Panel Size	Standard Copper Cladding	Non-Standard Copper Cladding
0.005" (0.127mm)	0.031" (0.787mm)	18" X 12" (457 X 305mm)	½ oz. (18µm) and 1 oz. (35µm) electrodeposited and rolled copper foil	¼ oz. (9 µm) electrodeposited copper foil ½ oz. (18µm), 1 oz. (35µm) and 2 oz. (70µm) reverse treat copper foil 2 oz. (70µm) electrodeposited and rolled copper foil
0.010" (0.254mm)	0.062" (1.575mm)	18" X 24" (457 X 610mm)	Thick metal claddings may be available based on dielectric and plate thickness. Contact customer service for more information on available non-standard and custom thicknesses, claddings and panel sizes	
0.015" (0.381mm)		Non-standard sizes may be available up to 18" X 48" (457 X 1219 mm)		
0.020" (0.508mm)				
Non-standard thicknesses are available				

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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