



High Frequency Circuit Materials

Rogers Corporation **Microwave Materials Division**

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DATA
RT 1.6002

RT/duroid® 6002 PTFE Composite Circuit Board Material for Microwave Applications

RT/duroid® 6002 microwave material is the first low loss and low dielectric constant laminate to offer superior electrical and mechanical properties essential in designing complex microwave structures which are mechanically reliable and electrically stable.

The thermal coefficient of dielectric constant is extremely low from -55°C to +150°C which provides the designers of filters, oscillators and delay lines the electrical stability in today's demanding applications.

A low Z axis coefficient of thermal expansion (CTE) ensures excellent reliability of plated through-holes. RT/duroid 6002 materials have been successfully temperature cycled (-55°C to 125°C) for over 5000 cycles without a single via failure.

Excellent dimensional stability (0.2 to 0.5 mils/inch) is achieved by matching the X and Y coefficient of expansion to copper. This often eliminates double etching to achieve tight positional tolerances.

The low tensile modulus (X, Y) greatly reduces the stress applied to solder joints and allows the expansion of the laminate to be constrained by a minimum amount of low CTE metal (6 ppm/°C) further increasing surface mount reliability.

¼ oz. to 2 oz./ft.² electrodeposited copper, or ½ oz. to 2 oz./ft.² rolled copper foil may be specified as cladding on dielectric thicknesses from 0.005" to 0.120". RT/duroid 6002 is also available clad with aluminum, brass, or copper plates.

Applications particularly suited to the unique properties of RT/duroid 6002 include flat and non-planar structures such as antennas, complex multilayer circuits with interlayer connections, and microwave circuits for aerospace designs in hostile environments. RT/duroid 6002 laminates have Underwriters Laboratories recognition under classification 94V-0 (Vertical Flammability Test).

(see reverse for product data)

RT/duroid 6002 Properties:

PROPERTY	TYPICAL VALUE [2]	DIRECTION	UNITS [1]	CONDITIONS	TEST METHOD
Dielectric Constant, ϵ_r	2.94 ± 0.04	Z	---	10 GHz/23 C	IPC-TM-650, 2.5.5.5
Thermal Coefficient of ϵ_r	+12	Z	ppm/ C	10 GHz/0-100 C	IPC-TM-650, 2.5.5.5
Dissipation Factor, Tan δ	0.0012	Z	---	1- GHz/23 C	IPC-TM-650, 2.5.5.5
Volume Resistivity	10 ⁶	Z	Mohm*cm	A	ASTM D257
Surface Resistivity	10 ⁷	Z	Mohm	A	ASTM D257
Tensile Modulus	828 (120)	X,Y	MPa (kpsi)	23 C	ASTM D638
Ultimate stress	6.9 (1.0)	X,Y	MPa (kpsi)		
	Ultimate strain	7.3	X,Y		
Compressive Modulus	2482 (360)	Z	MPa (kpsi)		
Water Absorption	0.1 0.13 max	----	%	D23/24 D48/50	IPC-TM-650, 2.6.2.1 ASTM D570
Specific Heat	0.93 (0.22)	----	J/g/K (BTU/lb/ F)	----	Calculated
Thermal Conductivity	0.60	----	W/m/K	80 C	ASTM C518
Coefficient of Thermal Expansion	16 24	X,Y Z	ppm/ C	(10K/min)	ASTM D3386

[1] S1 units given first, with other frequently used units in parentheses.

[2] References: Internal TRs 3824, 5016, 5017, 5035. Tests were at 23°C unless otherwise noted.

- Standard thicknesses:** 0.005 ± 0.0005 (0.13 ± 0.01mm), 0.010 ± 0.0007" (0.25 ± 0.02mm), 0.020 ± 0.001" (0.50 ± 0.03mm), 0.030 ± 0.001" (0.75 ± 0.04mm), 0.060 ± 0.002" 1.52 ± 0.08mm)
- Standard panels sizes:** 18" X 12" (610 X 457mm), 18" X 24" (305 X 457mm)
- Standard claddings:** ¼ (9 µm), ½ (17µm), 1 (35µm) , 2 (70µm) electrodeposited, ½ (17µm), 1 (35µm) , 2 (70µm) rolled copper and thick metal claddings are available.
Unclad material 0.020"and greater is available.

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These products may require an export license issued by the United States Department of Commerce for export of these materials from the United States or Canada.



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