

# RT/duroid® 6002

## High Frequency Laminates

RT/duroid® 6002 microwave material was 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 (-67°F to 302°F) which provides the designers of filters, oscillators and delay lines the electrical stability needed 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 [-67°F to 257°F]) 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.

½ oz. to 2 oz./ft.<sup>2</sup> electrodeposited copper, ½ oz. to 1 oz. reverse treated electrodeposited copper or ½ oz. to 2 oz./ft.<sup>2</sup> rolled copper may be specified as cladding on dielectric thicknesses from 0.005" to 0.125" (0.13 to 3.18mm). RT/duroid 6002 laminate is also available clad with aluminum, brass, or copper plates and resistive foils.

Applications particularly suited to the unique properties of RT/duroid 6002 material include flat and non-planar structures such as antennas, complex multi-layer circuits with inter-layer 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).



## Data Sheet



### FEATURES AND BENEFITS

#### Low Loss

- Excellent high frequency performance

#### Excellent mechanical and electrical properties

- Reliable multi-layer board constructions

#### Extremely low thermal coefficient of dielectric constant

- Excellent dimensional stability

#### In-plane expansion coefficient matched to copper

- Allows for more reliable surface mounted assemblies
- Ideal for applications sensitive to temperature change
- Excellent dimensional stability

#### Low Z-axis expansion

- Reliable plated through-holes

#### Low outgassing

- Ideal for space applications

### SOME TYPICAL APPLICATIONS:

- Phased Array Antennas
- Ground Based and Airborne Radar Systems
- Global Positioning System Antennas
- Power Backplanes
- High Reliability Complex Multi-layer Circuits
- Commercial Airline Collision Avoidance
- Beam Forming Networks

Property	Typical Value RT/duroid 6002	Direction	Units [1]	Conditions	Test Method
Dielectric Constant, $\epsilon_r$ Process	2.94 ± 0.04	Z	-	10GHz/23°C	IPC-TM-650, 2.5.5.5
<sup>[2]</sup> Dielectric Constant, $\epsilon_r$ Design	2.94			8GHz-40GHz	Differential Phase Length Method
Dissipation Factor, TAN $\delta$	0.0012	Z	-	10 GHz/23°C	IPC-TM-650, 2.5.5.5
Thermal Coefficient of $\epsilon_r$	+12	Z	ppm/°C	10 GHz 0-100°C	IPC-TM-650, 2.5.5.5
Volume Resistivity	10 <sup>6</sup>	Z	Mohm cm	A	ASTM D257
Surface Resistivity	10 <sup>7</sup>	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)		ASTM D638
Moisture Absorption	0.02	-	%	D48/50	IPC-TM-650, 2.6.2.1 ASTM D570
Thermal Conductivity	0.60	-	W/m/K	80°C	ASTM C518
Coefficient of Thermal Expansion	16 16 24	X Y Z	ppm/°C	(10K/min) TMA	ASTM D3386 IPC-TM-650 2.4.41
Td	500		°C TGA		ASTM D3850
Density	2.1		gm/cm <sup>3</sup>		ASTM D792
Specific Heat	0.93 (0.22)	-	J/g/K (BTU/lb/°F)	-	Calculated
Copper Peel	8.9 (1.6)		lbs/in (N/mm)		IPC-TM-650 2.4.8
Flammability	V-0				UL94
Lead-Free Process Compatible	YES				

**NOTES:**

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

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

[2] 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 or refer to Roger's technical reports on the Rogers Technology Support Hub at <http://www.rogerscorp.com>.

Standard Thickness	Standard Panel Size	Standard Copper Cladding	Non-Standard Copper Cladding
0.005" (0.127mm) 0.010" (0.254mm) 0.020" (0.508mm) 0.030" (0.762mm) 0.060" (1.524mm) 0.120" (3.048mm)	18" X 12" (457mm X 305mm) 18" X 24" (457mm X 610mm)  Non-standard panel sizes are available up to 24" X 54" (610mm X 1.37m)	½ oz. (18µm) and 1oz (35µm) electrodeposited and rolled copper cladding	¼ oz. (9µm) electrodeposited copper cladding 2 oz. (70µm) electrodeposited and rolled copper cladding ½ oz. (18µm), 1oz (35µm) and 2 oz. (70µm) reverse treated copper cladding
<b>Non-Standard Thickness</b> 0.015" (0.381mm) 0.025" (0.635mm) 0.035" (0.889mm) 0.040" (1.016mm) 0.050" (1.270mm) 0.090" (2.286mm) 0.100" (2.540mm) 0.125" (3.175mm)		Thick metal cladding may be available based on dielectric and plate thickness. Please contact customer service for more information on available non-standard and custom thicknesses, claddings and panel sizes	

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