

## RO3200™ Series Circuit Materials

### RO3203™, RO3206™ and RO3210™

#### High Frequency Circuit Laminates



RO3203™, RO3206™ and RO3210™ high frequency circuit materials are ceramic-filled laminates reinforced with woven fiberglass. These materials are engineered to offer exceptional electrical performance and mechanical stability at competitive prices. The RO3200™ series high frequency materials were designed as an extension of the RO3000® series high frequency circuit materials with one distinguishing characteristic - **improved mechanical stability**.

The dielectric constant of RO3203 high frequency circuit materials is 3.02. This, along with a dissipation factor of 0.0016, extends the useful frequency range beyond 40 GHz. The dielectric constant for RO3206 laminate is 6.15 and 10.2 for RO3210 laminate. The dissipation factor for RO3206 and RO3210 laminates is 0.0027.

RO3200 series laminates combine the surface smoothness of a non-woven PTFE laminate, for finer line etching tolerances, with the rigidity of a woven-glass PTFE laminate. These materials can be fabricated into printed circuit boards using standard PTFE circuit board processing techniques as described in the application note, "Fabrication Guidelines for RO3000 Series High Frequency Circuit Materials."

RO3200 series laminates are manufactured under an ISO 9002 certified quality system.

## Data Sheet



### FEATURES AND BENEFITS

Woven glass reinforcement

- Improves rigidity for easier handling

Uniform electrical and mechanical performance

- Ideal for complex multi-layer high frequency structures

Low dielectric loss

- High frequency performance (RO3203™ laminate) can be used in applications exceeding 20 GHz

Low in-plane expansion coefficient (matched to copper)

- Suitable for use with epoxy multi-layer board hybrid designs
- Reliable surface mounted assemblies

Excellent dimensional stability

- High production yields

Economically priced

- Cost effective volume manufacturing

Surface smoothness

- Allows for finer line etching tolerances

### SOME TYPICAL APPLICATIONS:

- Automotive collision avoidance systems
- Automotive global positions satellite antennas
- Wireless telecommunications systems
- Microstrip patch antennas for wireless communications
- Direct broadcast satellites
- Datalink on cable systems
- Remote meter readers
- Power backplanes
- LMDS and wireless broadband
- Base station infrastructure

Property	Typical Value <sup>(1)</sup>			Direction	Unit	Condition	Test Method
	RO3203	RO3206	RO3210				
Dielectric Constant, $\epsilon_r$ Process	3.02± 0.04	6.15± 0.15	10.2± 0.50	Z	-	10 GHz 23°C	IPC-TM-650 2.5.5.5 Clamped Stripline
<sup>(2)</sup> Dielectric Constant, $\epsilon_r$ Design	3.02	6.6	10.8	Z	-	8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor, $\tan \delta$	0.0016	0.0027	0.0027	Z	-	10 GHz 23°C	IPC-TM-650 2.5.5.5
Thermal Coefficient of $\epsilon_r$	-13	-212	-459	Z	ppm/°C	10 GHz 0-100°C	IPC-TM-650 2.5.5.5
Dimensional Stability	0.8	0.8	0.8	X,Y	mm/m	COND A	ASTM D257
Volume Resistivity	10 <sup>7</sup>	10 <sup>3</sup>	10 <sup>3</sup>		MΩ•cm	COND A	IPC 2.5.17.1
Surface Resistivity	10 <sup>7</sup>	10 <sup>3</sup>	10 <sup>3</sup>		MΩ	COND A	IPC 2.5.17.1
Tensile Modulus	409,351	462,462	578,517	MD, CMD	kpsi	23°C	ASTM D638
Water Absorption	<0.1	<0.1	<0.1	-	%	D24/23	IPC-TM-650 2.6.2.1
Specific Heat	0.95	0.85	0.79		J/g/K		Calculated
Thermal Conductivity	0.48	0.67	0.81	-	W/m/K	80°C	ASTM C518
Coefficient of Thermal Expansion	13 58	13 34	13 34	X,Y, Z	ppm/°C	-55 to 288°C	ASTM D3386-94
Td	500	500	500		°C	TGA	ASTM D3850
Color	Tan	Tan	Off White				
Density	2.1	2.7	3.0		gm/cm <sup>3</sup>		
Copper Peel Strength	10.2	10.7	11.0		pli	1 oz. EDC After Solder Float	IPC-TM-2.4.8
Flammability	V-0	V-0	V-0				UL 94
Lead Free Process Compatible	YES	YES	YES				

**NOTES:**

[1] References: Internal T.R.'s 1430, 2224, 2854. Tests at 23°C unless otherwise noted. Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.

[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/acm/technology>.

Standard Thickness	Standard Panel Size	Standard Copper Cladding
<b>RO3203:</b> 0.010" (0.25mm) 0.020" (0.50mm) 0.030" (0.75mm) 0.060" (1.52mm)	12" X 18" (305 X 457mm) 24" X 18" (610 X 457mm)	½ oz. (17µm) electrodeposited copper foil (.5ED/.5ED)
		1 oz. (35µm) electrodeposited copper foil. (1ED/1ED)
		2 oz. (70µm) electrodeposited copper foil. (2ED/2ED)
		Other claddings may be available. Contact customer service.
<b>RO3206/RO3210:</b> 0.025" (0.64mm) 0.050" (1.28mm)		

The information in this data sheet is intended to assist you in designing with Rogers' circuit material laminates. 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 material laminates for each application.