

## /// Datasheet

# RO4835™ Laminate Data Sheet

## High Frequency Circuit Materials

Thermoset laminate materials, including FR-4, are affected by oxidation over time and temperature. This can slightly increase the dielectric constant and dissipation factor of the circuit substrate. The change rate and impact on circuit performance vary based on design and operating temperature. Rogers' RO4835™ laminate, part of the RO4000® series, offers enhanced stability at high temperatures and is more resistant to oxidation than other hydrocarbon materials. RO4835 laminates share similar electrical and mechanical properties with RO4350B™ laminates and are designed for high frequency performance and cost-effective circuit fabrication. It uses standard epoxy/glass (FR-4) processes and is competitively priced.

For frequencies above 500 MHz, RO4000 materials are ideal due to their low dielectric loss, making them suitable for RF microwave circuits and controlled impedance transmission lines. The material's thermal coefficient of expansion (CTE) matches copper, ensuring excellent dimensional stability and reliable plated through-hole quality in mixed dielectric multi-layer boards, even under thermal shock. RO4000 laminates have a Tg of >280°C (536°F), ensuring stable expansion characteristics throughout circuit processing temperatures.

RO4000 series laminates can be processed using standard FR-4 techniques without specialized via preparation. They are rigid, thermoset laminates, compatible with automated systems and scrubbing equipment for copper surface preparation. RO4835 laminates are RoHS compliant and suitable for UL 94V-0 certified applications.



## /// Standard Offerings

Standard Thicknesses	Standard Panel Sizes	Standard Cladding
0.004" (0.10mm) +/- 0.0007"	12" X 18" (305 X 457 mm)	Electrodeposited Copper Foil 1/2 oz. (18µm) 1 oz. (35µm)
0.0066" (0.17mm) +/- 0.0007"	24" X 18" (610 X 457 mm)	
0.010" (0.25mm) +/- 0.0010"	24" X 36" (610 X 915 mm)	
0.020" (0.51mm) +/- 0.0015"	48" X 36" (1219 X 915 mm)	
0.030" (0.76mm) +/- 0.0020"		
0.060" (1.52mm) +/- 0.0040"		

\*Contact Customer Service or Sales Engineering to inquire about other available product configurations including additional thicknesses, panel sizes and claddings.

## /// Features and Benefits:

Significantly improved oxidation resistance compared to typical thermoset microwave materials

- Designed for performance sensitive, high volume applications.

Low loss

- Excellent electrical performance allows application with higher operating frequencies.
- Ideal for automotive applications.

Tight dielectric constant tolerance

- Controlled impedance transmission lines

Lead-free process compatible

- No blistering or delamination

Low Z-axis expansion

- Reliable plated through holes

Low in-plane expansion coefficient

- Remains stable over an entire range of circuit processing temperatures

CAF resistant

## /// Typical Applications:

- Automotive Radar and Sensors
- Point-to point Microwave
- Power Amplifiers
- Phased - Array Radar
- RF Components

## Standard Properties Table

Properties	Typical Value	Units	Test Conditions		Test Method
Electrical Properties					
Dielectric Constant (Process) <sup>2</sup>	3.48 ± 0.05 <sup>1</sup>	-	23°C	10 GHz	IPC TM-650 2.5.5.5
Dielectric Constant (Design) <sup>3</sup>	3.66	-	-	8 - 40 GHz	Differential Phase Length
Dissipation Factor	0.0037	-	23°C	10 GHz	IPC TM-650 2.5.5.5
Thermal Coefficient of Dielectric Constant	+50	ppm/°C	-50°C to 150°C		IPC TM-650 2.5.5.5
Volume Resistivity	5 X 10 <sup>8</sup>	MΩ-cm	Condition A		IPC-TM-650, 2.5.17.1
Surface Resistivity	7 X 10 <sup>8</sup>	MΩ			
Electrical Strength (dielectric strength)	30.2 (755)	KV/mm (V/mil )	-		IPC TM-650 2.5.6.2
Thermal Properties					
Decomposition Temp (Td)	390	°C TGA	-		ASTM D3850
Glass Transition Temp (Tg)	>280	°C TMA	A		IPC-TM-650 2.4.24.3
Coefficient of Thermal Expansion - x	10	ppm/°C	-55°C to 288°C		IPC TM-650 2.4.41
Coefficient of Thermal Expansion - y	12				
Coefficient of Thermal Expansion - z	31				
Thermal Conductivity	0.66	W/(m·K)	80°C		ASTM C518
Dimensional Stability (x,y)	<0.5	mm/m (mils/in)	after etch	+E2/150°C	IPC TM-650 2.4.39a
Mechanical Properties					
Copper Peel Strength	0.88 (5.0)	N/mm (pli)	After solder float 35 µm ED foil		IPC TM-650 2.4.8
Young's Modulus	7780 (1128)	MPa (kpsi)	RT		ASTM D638
Tensile Strength	136 (19.7)	MPa (kpsi)	RT		ASTM D638
Flexural Strength	186 (27)	MPa (kpsi)			IPC-TM-650 2.4.4
Physical Properties					
Flammability	V-0	-	-		UL 94
Moisture Absorption	0.05	%	50°C	48 Hr	ATSM D570
Density	1.92	g/cm <sup>3</sup>	23°C		ASTM D792
Lead Free Process compatible	YES	-	-		-

<sup>1</sup> RO4835 4mil laminates have a process Dk of 3.33±0.05 and are in conformance with IPC-4103A/240. All other RO4835 laminate thicknesses are /11 and /240 compliant.

<sup>2</sup> The IPC clamped stripline method can potentially lower the actual dielectric constant due to presence of airgaps between the laminates under test and the resonator card. Dielectric constant in practice may be higher than the values listed.

<sup>3</sup> 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>

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

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