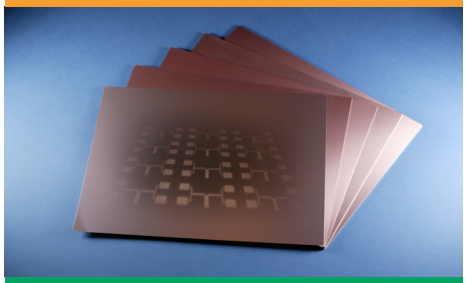
ROGERS CORPORATION

RO4835T™ Laminate Data Sheet

Data Sheet



RO4835T™ laminates are 3.3 Dk low loss, spread glass reinforced, ceramic thermoset materials that were designed as inner-layers for use in multilayer board designs, and to complement RO4835™ laminates when thinner cores are needed.

The world has seen the ongoing evolution of mobile networks, GSM, WCDMA and LTE that has enabled users to grow data consumption at amazing rates and Rogers high frequency materials have played a key role in this market. Antennas, Power Amplifiers, and microwave backhaul radios are needed to create these mobile networks and dielectric constant controlled, low loss materials are the foundation on which this technology is based. High frequency materials are a key enabling technology in the development of the next generation mobile network, 5G which will reach frequencies well into millimeter wave bands where multilayer board designs are prevalent. RO4835T laminates' multiple thickness thin core options are fully compatible with RO4450F™ bondply, the new RO4450T™ thin bondplies, and CU4000™/CU4000 LoPro® foil lamination options. When coupled with RO4835 laminates and RO4000® bonding materials, these material sets provide designers flexibility to achieve requirements related to high multilayer board (MLB) count designs.

RO4835T laminates offer the same resistance to oxidation as RO4835 laminates, are low loss, have excellent Dk tolerance, and a tight thickness control for outstanding, repeatable wireless performance. They feature high performance material attributes that provide the optimum blend of price, performance and durability, and can be fabricated using standard epoxy/glass (FR-4) processes.

RO4835T laminates utilize RoHS compliant flame-retardant technology for applications requiring UL 94 V-0 certification. These materials conform to the requirements of IPC-4103, slash sheet / 240.

FEATURES AND BENEFITS:

Significantly improved oxidation resistance compared to typical thermoset microwave materials
- Designed for performance sensitive, high volume applications.

Low loss
- Excellent electrical perfomance allows application with higher operating frequencies.

Spread Glass
- Minimizes local variation of dielectric constant.

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:

- Point-to-point Microwave
- Power Amplifiers
- Cellular infrastructure antennas
- Phased-Array Radar
- RF Components
- Test and Measurement

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RO4835T™	TYPICAL VALUES [1]				Direction	Units	Conditions	Test Method
	2.5 (0.064)	3 (0.076)	4 (0.101)	5(0.127)	Z	mils (mm)		
Electrical Properties								
[2] Dielectric Constant Process	3.33	3.33	3.32	3.33	Z	-	10 GHz - 23°C	IPC TM-650 2.5.5.5 [2] Clamped Stripline
Dielectric Constant Design	3.52	3.50	3.49	3.48	Z	-	8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor	0.0030	0.0034	0.0036	0.003	Z	-	10 GHz - 23°C	IPC TM-650 2.5.5.5
Volume Resistivity	1.34×10^8	1.24×10^8	1.43×10^8	6.27×10^9	-	MΩ-cm	23°C/50% RH	IPC TM-650 2.5.17.1
Surface Resistivity	1.17×10^6	1.47×10^6	1.11×10^6	5.83×10^7	X, Y	MΩ	23°C/50% RH	IPC TM-650 2.5.17.1
Electrical Strength	1320	1260	1265	1960	Z	V/mil	23°C/50% RH	IPC TM-650 2.5.6.2
Thermal Properties								
Td	389	389	389	389	-	°C TGA	2 hrs @ 105°C	IPC TM-650 2.3.40
Tg	>280	>280	>280	>280	-	°C TMA	-	IPC-TM-650 2.4.24.5
Coefficient of Thermal Expansion	14 16 62	15 16 60	17 13 60	14 16 62	X Y Z	ppm/°C	-55°C - 288°C	IPC TM-650 2.4.41
Thermal Conductivity	0.52	0.52	0.54	0.52	Z	W/m/°K	50°C	ASTM D5470
Mechanical Properties								
Copper Adhesion	3.9 (0.68)	3.9 (0.68)	3.7 (0.65)	3.7 (0.65)	Z	pli (N, mm)	1 oz. EDC After Solder Float	IPC TM-650 2.4.8
Flexural Strength	226 (32.8) 214 (31.0)	227 (32.9) 214 (31.0)	265 (38.4) 157 (22.8)	226 (32.8) 214 (31.0)	X Y	Mpa (kpsi)	-	IPC-TM-650 2.4.4
Tensile Strength	163 (23.6)	102 (14.8)	111 (16.1)	163 (23.6)	Y	Mpa (kpsi)	RT	ASTM D638
Tensile Modulus	11,300 (1640)	9310 (1350)	12,400 (1800)	11,300 (1640)	Y	Mpa (kpsi)	RT	ASTM D638
Dimensional Stability	<0.5	<0.5	<0.5	<0.5	X, Y	mm/m (mils/inch)	after etch +E2/150°C	IPC-TM-650 2.4.39a
Physical Properties								
Density	1.81	1.81	1.80	1.81	-	gm/cm^3	23°C	ASTM D792
Flammability	V-0	V-0	V-0	V-0	-	-	-	UL 94
Moisture Absorption	0.20	0.15	0.13	0.12	-	%	48 hrs & 50°C	IPC TM-650 2.6.2.1
Lead-Free Process Compatible	YES	YES	YES	YES	-	-	-	-

Standard Thicknesses		Standard Panel Size	Standard Copper Cladding
0.0025" (0.064mm) 0.0030" (0.076mm)	0.0040" (0.101mm) 0.0050" (0.127mm)	12" X 18" (305 X 457 mm) 24" X 18" (610 X 457 mm)	½ oz. (18 µm) electrodeposited copper foil (5E/5E) 1 oz. (35 µm) electrodeposited copper foil (1E/1E)

Notes:
[1] Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.
[2] 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.

Prolonged exposure in an oxidative environment may cause changes to the dielectric properties of hydrocarbon based materials. The rate of change increases at higher temperatures and is highly dependent on the circuit design. Although Rogers' high frequency materials have been used successfully in innumerable applications and reports of oxidation resulting in performance problems are extremely rare, Rogers recommends that the customer evaluate each material and design combination to determine fitness for use over the entire life of the end product.

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