

## RO4400™ Series Prepreg Data Sheet

### RO4450B™ and RO4450F™ Prepreg



RO4000® dielectric materials have long been used in combination with FR-4 cores and prepreg as a means to achieve a performance upgrade of standard FR-4 multi-layer designs. RO4003C™, RO4350B™, RO4360™ and RO4000 LoPro™ glass reinforced hydrocarbon/ceramic laminates have been used in layers where operating frequency, dielectric constant, or high-speed signal requirements dictate the need for high performance materials. FR-4 cores and prepreg are still commonly used to inexpensively form less critical signal layers.

The RO4400™ prepreg family is comprised of four grades based on the RO4000 series core materials, and are compatible in multi-layer constructions with either RO4003C, RO4350B, RO4360 or RO4000 LoPro laminates. A high post-cure Tg (>280°C / >536°F) makes RO4400 series prepreg an excellent choice for multi-layers requiring sequential laminations as fully cured RO4400 prepreps are capable of handling multiple lamination cycles. In addition, FR-4 compatible bond requirements (177°C/350°F) permit RO4400 prepreg and low flow FR-4 prepreg to be combined into non-homogenous multi-layer constructions using a single bond cycle.

RO4450F™ prepreg has demonstrated improvement in lateral flow capability, and is becoming the first choice for new designs or as a replacement in designs that have difficult fill requirements.

RO4450B™ prepreg is available in both 3.6 mil and 4.0 mil thicknesses. The electrical properties of these two prepreg thicknesses differ slightly due to the resin-to-glass ratio, and this should be taken into consideration during electrical design review.

Each of the RO4450B and RO4450F prepreps are recognized by Underwriter Laboratories with the UL-94 flame rating, and are compatible with lead-free processes.



## Typical Values

## RO4450B and RO4450F Prepreg

PROPERTY			DIRECTION	UNITS	CONDITION	TEST METHOD	
	RO4450B	RO4450F					
Thickness	4 (0.101)	3.6 (0.091)	4 (0.101)	Z	mils (μm)	-	
Dielectric Constant, $\epsilon_r$	3.54 ± 0.05	3.30 ± 0.05	3.52 ± 0.05	Z	-	10GHz - 23°C	IPC-TM-650 2.5.5.5
Dissipation Factor, $\tan \delta$	0.004	0.004	0.004	Z	-	10GHz-23°C	IPC-TM-650 2.5.5.5
Dielectric Strength	1000	1000	1000	Z	V/mil	23°C/50% RH	IPC-TM-650 2.5.6
Volume Resistivity	9.26 X 10 <sup>7</sup>	9.26 X 10 <sup>7</sup>	8.93 X 10 <sup>8</sup>	-	MΩ•cm	23°C/50% RH	IPC-TM-650 2.5.17.1
Surface Resistivity	3.82 X 10 <sup>7</sup>	3.82 X 10 <sup>7</sup>	1.03 X 10 <sup>7</sup>	X,Y	MΩ	23°C/50% RH	IPC-TM-650 2.5.17.1
Thermal Conductivity	0.60	0.60	0.65	Z	W/m/K	80°C	ASTM C518
Moisture Absorption	0.05	0.10	0.09	-	%	48 hrs immersion 0.060" sample temperature 50°C	ASTM D570
Tg	>280	>280	>280	-	°C TMA	-60°C - 300°C @ 10°C/min	IPC-TM-650 2.4.24
Td	390	390	390	-	°C TGA		ASTM D3850
Density	1.86	1.80	1.83	-	gm/cm <sup>3</sup>	23°C	ASTM D792
Copper Adhesion	4.9 (0.86)	4.0 (0.70)	4.0 (0.70)	Z	pli (N/mm)	½ oz. EDC After Solder Float	IPC-TM-650 2.4.8
Coefficient of Thermal Expansion	19 17 50	19 17 60	19 17 50	X Y Z	ppm/°C	-55 to 280°C	IPC-TM-650 2.4.41
Color	White	White	White	-	-	-	-
Flammability	V-0	V-0	V-0				UL94
Lead-Free Process Compatible	Yes	Yes	Yes				

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

Rogers UL file number is E102763B.

STANDARD THICKNESS:	STANDARD SIZE:
RO4450F: 0.004", (0.101mm) RO4450B: 0.0036 (0.091mm), 0.004", (0.101mm)	24X18" Sheets (610mm X 457mm) Contact Customer Service for other available sizes.

The information contained in this data sheet and processing guide is intended to assist you in designing with Rogers' circuit materials and prepreg. 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 and processing guide will be achieved by a user for a particular purpose. The user is responsible for determining the suitability of Rogers' circuit materials and prepreg for each application.

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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