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ROGERS CORPORATION
Advanced Circuit Materials

Data Sheet
RF1.3000

ULTRALAM® 3000
Liquid Crystalline Polymer Circuit Material
Double-Clad Laminates

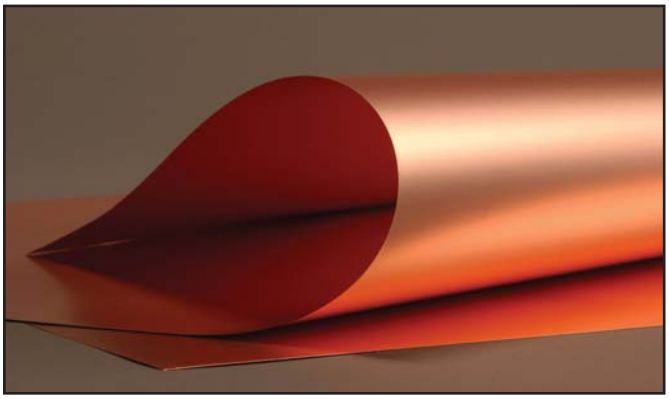
Features:	Benefits:
Excellent high frequency properties	• Stable electrical properties for tightly controlled impedance matching • Excellent thickness uniformity for maximum signal integrity • Allows use of thinner dielectric layer with minimal signal distortion
Good dimensional stability Low modulus	• Bends easily for flex and conformal applications • Offers design flexibility and maximizes circuit density requirements
Extremely low moisture absorption	• Reduces bake times • Maintains stable electrical, mechanical and dimensional properties in humid environments
Flame resistant	• Halogen-free. Meets WEEE. • UL94VTM/0 – meets requirement for consumer products

Typical Applications:	
• High speed switches and routers	• Hybrid substrates
• Chip packaging	• Handheld and RF devices
• MEM's	• Base station antennas
• Military satellites and radar sensors	

ULTRALAM® 3850 laminate circuit materials from Rogers Corporation, utilize highly temperature resistant liquid crystalline polymer (LCP) as the dielectric film. These products were developed specifically for single layer and multilayer substrate constructions. These adhesiveless laminates are well suited for high speed and high frequency applications in telecommunication network equipment, high-speed computer data links and other high performance applications.

ULTRALAM 3850 circuit materials are characterized by low and stable dielectric constant and dielectric loss, which are key requirements for high frequency, high-speed products. ULTRALAM 3850 is offered as a double copper clad laminate. offered in panels. It can be used, for multilayer constructions with ULTRALAM 3908 bonding film.

ULTRALAM 3000 laminate UL file number is E122972.



MYW Semitech Exhibit 2022
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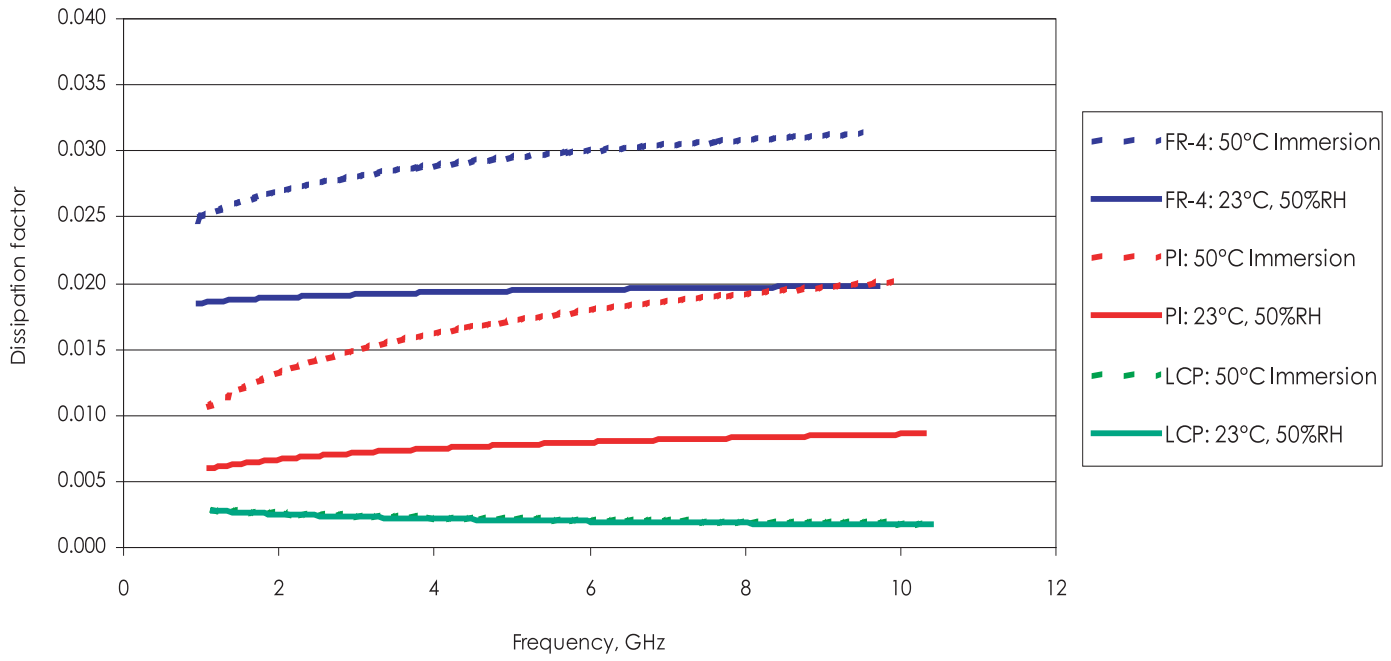
Dissipation Factor Variation: LCP, All Polyimide, and FR-4 laminates



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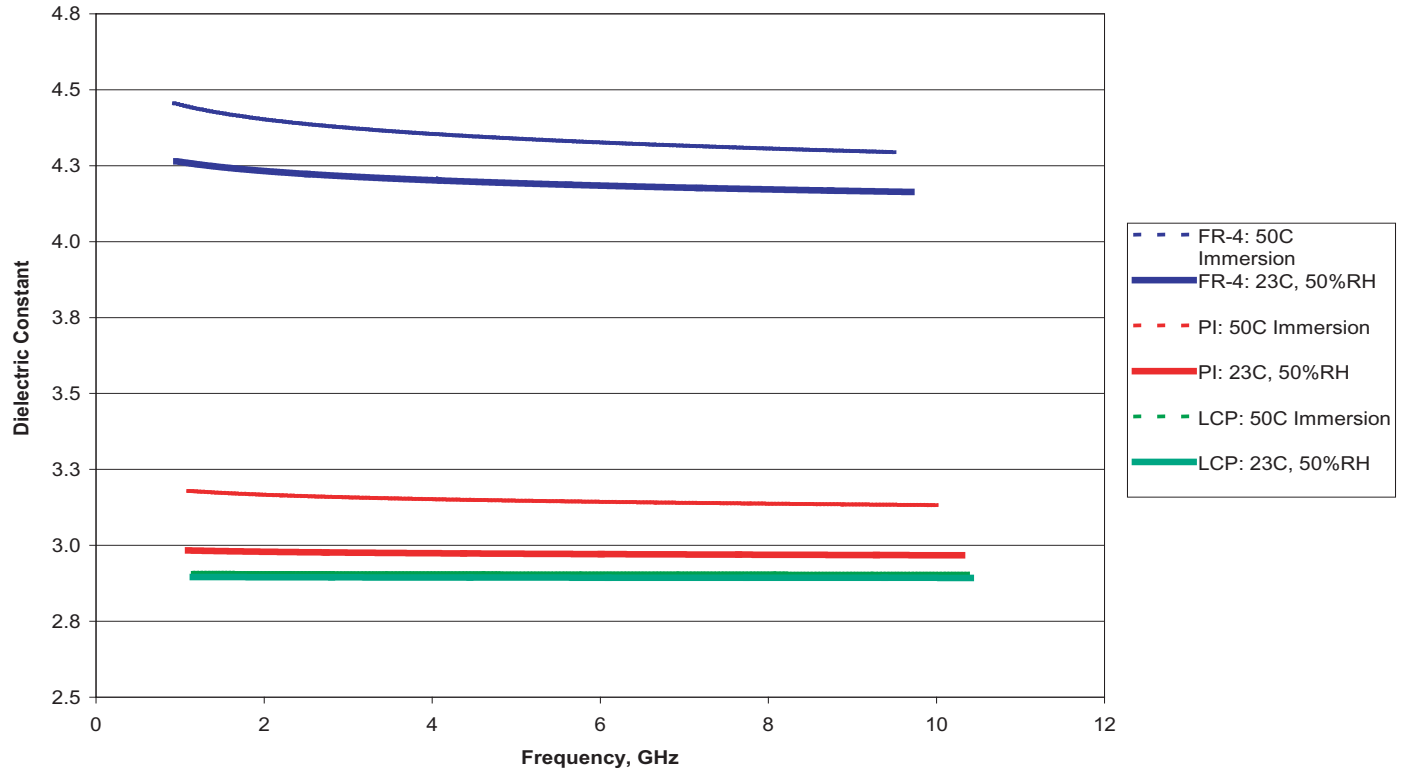

Data obtained from cast all polyimide and high Tg FR-4 laminate materials.

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Typical Values

ULTRALAM® 3000 Laminates

Property		Typical Value	Unit	Test Conditions
		ULTRALAM® 3850		
Mechanical Properties				
Dimensional Stability	MD	-0.06	%	IPC 2.2.4 method B
	CMD	-0.03		
Peel Strength		0.95 (8.52)	N/mm (lbs/in)	IPC 2.4.8 (1/2 oz. ED foil)
Initiation Tear Strength, min		1.4 (3.1)	Kg (lbs)	IPC 2.4.16
Tensile Strength		200 (29)	MPa (Kpsi)	IPC 2.4.16
Tensile Modulus		2255 (327)	MPa (Kpsi)	IPC 2.4.19
Density		1.4	gm/cm^3, Typical	
Thermal Properties				
Coefficient of Thermal Expansion, CTE (30°C to 150°C)	X	17	ppm/°C	IPC 2.4.41.3
	Y	17		
	Z	150		
Solder Float, Method B (288°C)		PASS		IPC 2.4.13
Melting Temperature		315	°C (Typical)	DSC
Relative Thermal Index - RTI	mechanical	190	°C	
	electrical	240		
Thermal Conductivity		0.2	W/m/°K	ASTM C518
Thermal Coefficient of ε_r, -50°C to 150°C		(+)24	ppm/°C	IPC 2.5.5.5, 8 GHz
Electrical Properties				
Dielectric Constant, 10 GHz, 23°C		2.9		IPC 2.5.5.5.1
Dissipation Factor, 10 GHz, 23°C		0.0025		IPC 2.5.5.5.1
Surface Resistivity		$1X10^{10}$	MOhm	IPC 2.5.17
Volume Resistivity		$1X10^{12}$	MOhm cm	IPC 2.5.17
Dielectric Breakdown Strength		1378 (3500)	KV/cm (V/mil)	ASTM-D-149
Environmental Properties				
Chemical Resistance		98.7	%	IPC 2.3.4.2
Water Absorption (23°C, 24 hrs)		0.04	%	IPC 2.6.2
Coefficient of Hygroscopic Expansion, CHE (60°C)		4	ppm/%RH	60°C
Flammability		VTM-0		UL-94

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

STANDARD THICKNESS	STANDARD SIZE	STANDARD COPPER CLADDING
ULTRALAM 3850: 0.001" (25μm) 0.002" (50μm) 0.004" (100μm)	**ULTRALAM 3850:** 18" X 12" (457mm X 305mm) panel 18" X 24" (457mm X 610mm) panel Custom sizes available upon request	**ULTRALAM 3850:** ½ oz. (18μm) **Copper Type:** Very low profile ED copper per IPC 4562 3.4.5 (<Rz 5.1 mm). Other claddings available.

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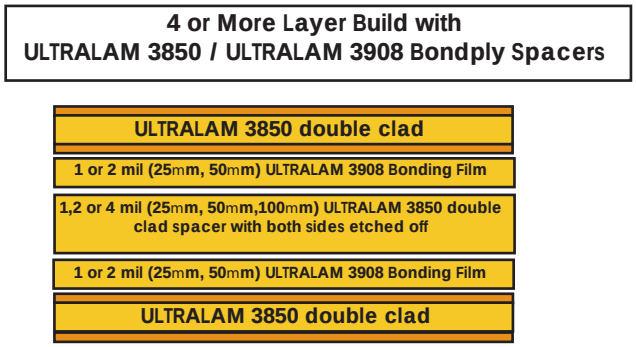
ULTRALAM® 3850 circuit materials can be used in combination with ULTRALAM 3908 bonding films to create truly adhesiveless all-LCP multi-layer circuit constructions:

ULTRALAM® 3908 bondply should never be stacked together in a design in order to increase the bondply thickness. In designs where a bondply spacing greater than 0.002" (.0508mm) is required, it is recommended to use the following multi-layer bondply approach to achieve the desired dielectric thickness.



ULTRALAM® 3000 circuit materials can also be combined with RO4450B™ prepreg, R/flex CRYSTAL® 7200 adhesive, SPEEDBOARD® C prepreg, or other types of epoxy, acrylic, cyanate ester, or PTFE resin systems to enhance the properties of a multi-layer design as needed

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