ROGERS CORPORATION

Data Sheet

Data Sheet and Processing Guidelines for RO3000® Series Bondply

Rogers RO3000® series bondply is an undensified version of RO3000 laminates that can be used to process highly reliable, homogeneous RO3000 multi-layer boards (MLB's). The bondply is used in a manner analogous to prepreg in FR-4 constructions and, once bonded, becomes the equivalent of a normal RO3000 core layer.

RO3000 series bondply offers electrical and thermal-mechanical advantages over most other adhesive systems that can be used to bond RO3000 material multi-layer constructions. In addition, improvements offered by bondply layers over core-to-core fusion bonding include improved layer-to-layer registration, tighter control over Z-axis spacing of copper layers, better encapsulation of buried metal features at lower applied pressures, and design flexibility.

During a MLB bonding process, the bondply will reduce in thickness to about five mils and closely match predictable electrical properties. A Rogers' Technical Support Engineer (TSE) should be contacted for design data.

PROCESSING GUIDELINES:

INNER-LAYER PREPARATION:
Cores should be processed through inner-layer as standard. If copper roughening is required (ground or power planes), a microetch or a subtractive process oxide alternative such as Atotech's Bondfilm or MacDermid's MultiBond LE should be used. Traditional additive process oxide treatments lack the thermal stability to survive the high temperature bond conditions.

PTFE activation by sodium or plasma treatment should be avoided. All inner-layers should be baked at 125°C to 150°C (257°F - 302°F) for at least one hour prior to MLB bonding.

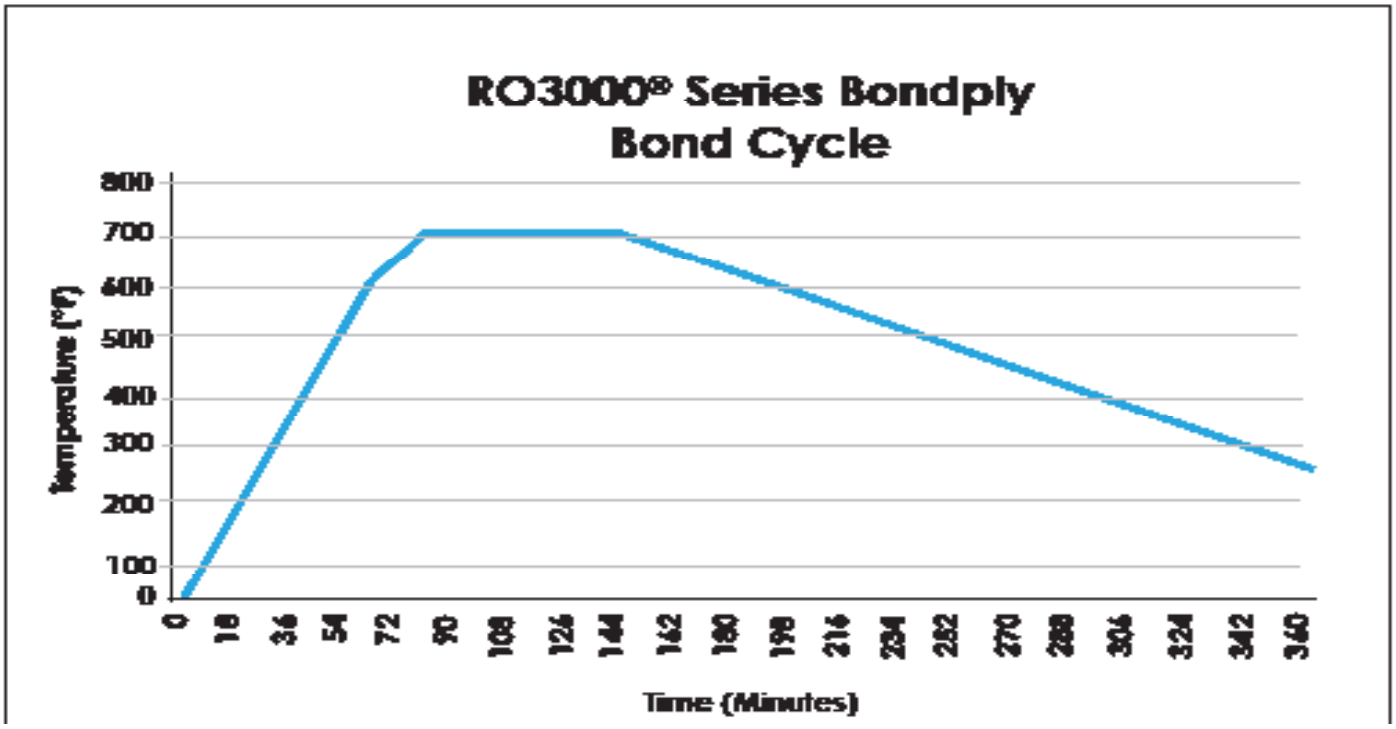
PREPARATION OF MLB BOOK:
RO3000 bondply layers require careful handling to avoid tearing. Pinning holes can be punched, drilled, or routed. Entry material should be used during drill or rout to shield the bondply layers from debris.
Due to in-plane expansion characteristics, type 304 stainless steel separator plates are recommended. Five to ten mil thick sheets of aluminum should be placed between the multi-layers and the separator plates.

Foil bonding of outer-layers is possible but a Rogers' Technical Service Engineer should be consulted prior to processing foil-bonded constructions.

BOND CYCLE:

Temperature control is most critical between 600ºF (315ºC) and 700ºF (371ºC) during the ramp up, and between 700ºF (371ºC) 500ºF (260ºC) during the cool down. The ramp rate to 600ºF (315ºC) can be up to 10ºF (5.5ºC)/min, but the ramp from 600ºF (315ºC) to 700ºF (371ºC) should be 5ºF (2.7ºC)/Min. The dwell at 700ºF (371ºC) should be 30-60 minutes. The cooling rate to 500ºF (260ºC) should be at a rate of 2ºF (1.1ºC)/Min. An accelerated cool can be used, but materials should remain in the press until package temperatures are less than 250ºF (121ºC).

Applied pressure will depend upon press (autoclave or flat bed) equipment and fill requirements, but will probably fall into a range of 250 to 500 PSI.



OUTER-LAYER PROCESSING:

Standard processing guidelines for RO3000 cores would serve as the best starting point for processing homogeneous multi-layer constructions.

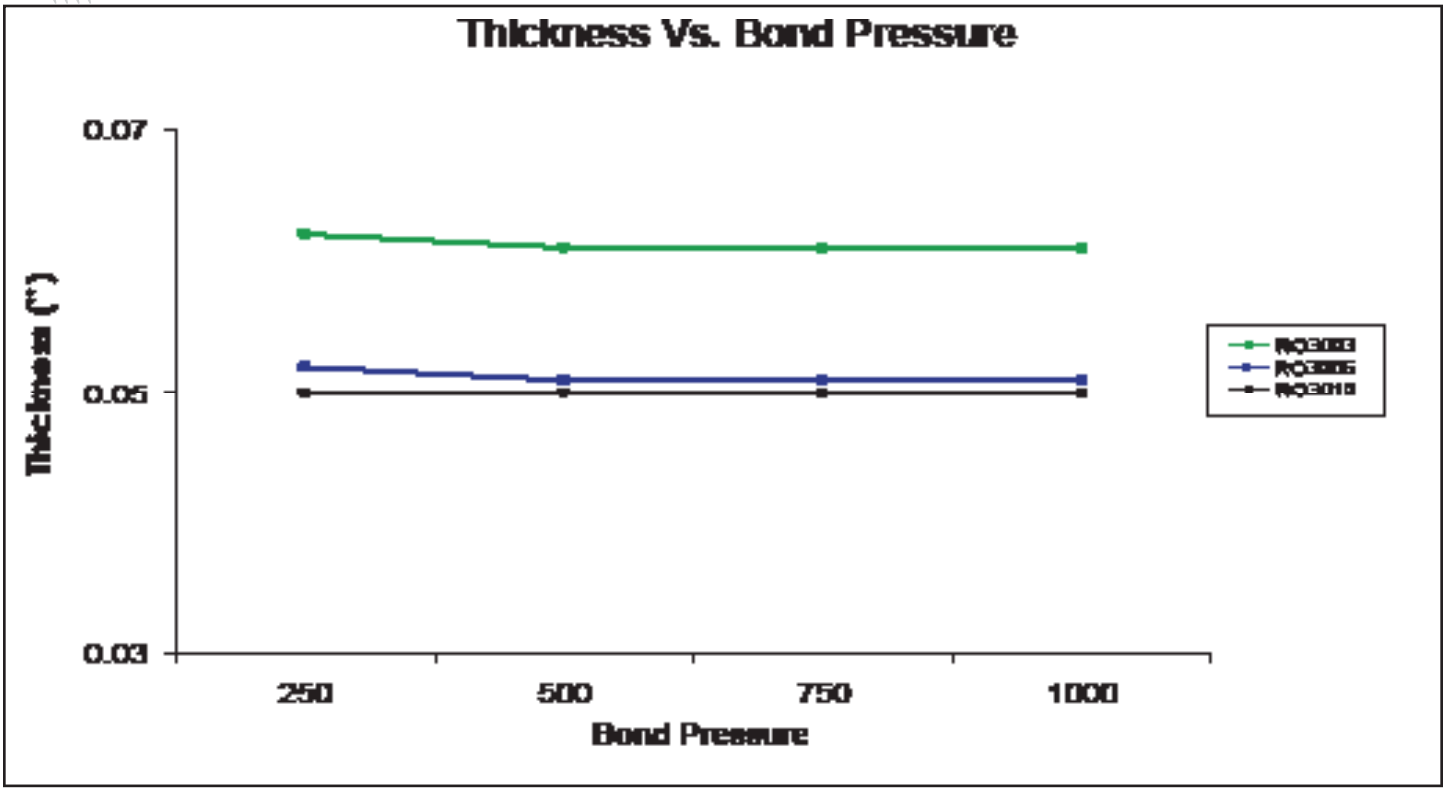


Chart 1: RO3000 Bondply Thickness vs. Bond Pressure

The data in Chart 1 demonstrates the uniform thickness over bond pressure of RO3003™, RO3006™, and RO3010™ bondply.

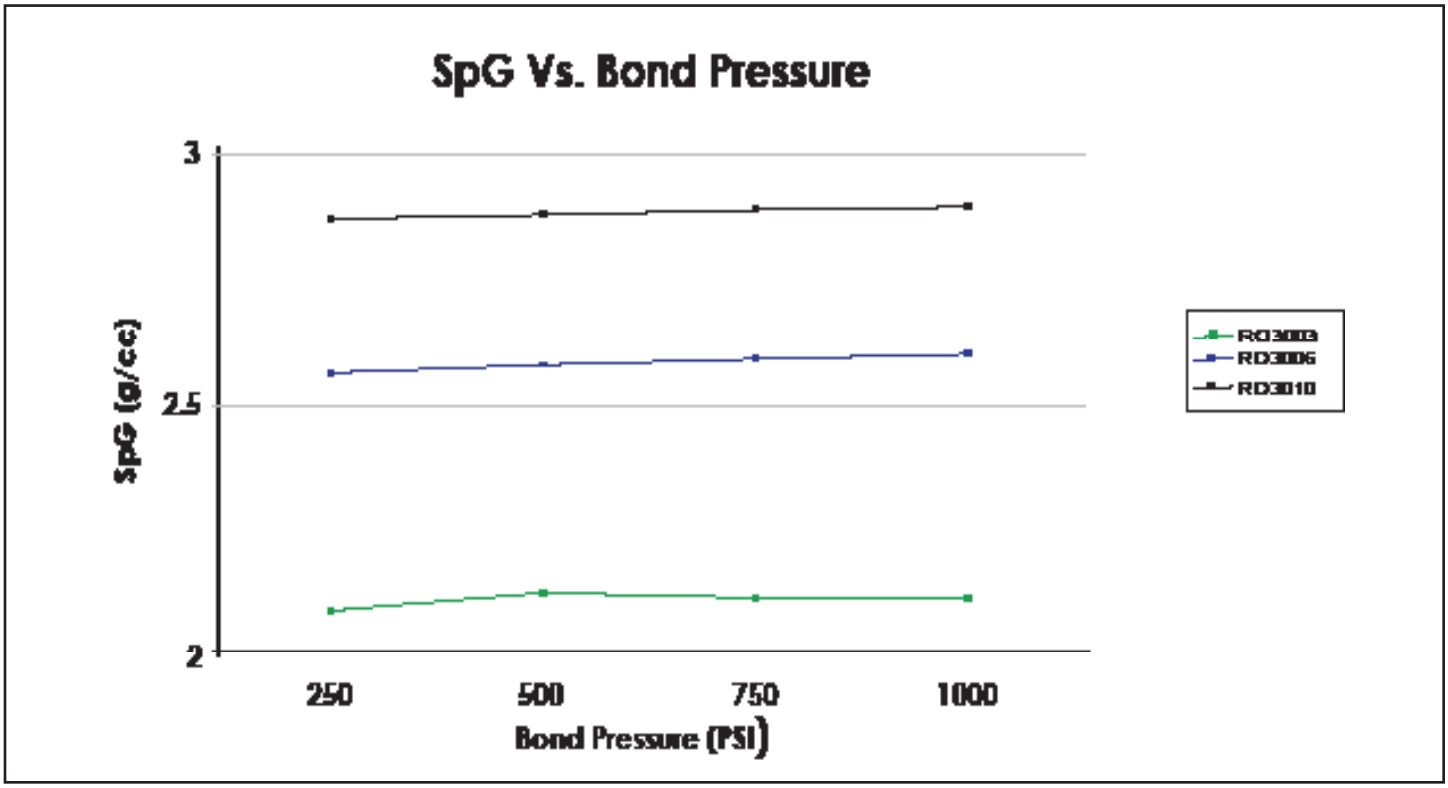


Chart 2: RO3000 Bondply Specific Gravity vs. Bond Pressure

The data in Chart 1 demonstrates the excellent stability of specific gravity over bond pressure of RO3003, RO3006, and RO3010 bondply.

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PROPERTY	TYPICAL VALUE (1) RO3003	RO3006	RO3010	DIRECTION	UNIT	CONDITION	TEST METHOD
Dielectric Constant, ε_r Process	3.00 ± 0.04(2)	6.15 ± 0.15	10.2 ± 0.30	Z	-	10GHz 23°C	IPC-TM-650 2.5.5.5 Clample Stripline
(2) Dielectric Constant, ε_r Design	3.00	6.50	11.20	Z	-	8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor	0.0010	0.0020	0.0022	Z	-	10GHz 23°C	IPC-TM-650 2.5.5.5
Thermal Coefficient of ε_r	-3	-262	-395	Z	ppm/°C	10GHz 50 to 150°C	IPC-TM-650 2.5.5.5
Dimensional Stability	-0.06 0.07	-0.27 -0.15	-0.35 -0.31	X Y	mm/m	COND A	IPC TM-650 2.2.4
Volume Resistivity	10^7	10^5	10^5		MΩ•cm	COND A	IPC 2.5.17.1
Surface Resistivity	10^7	10^5	10^5		MΩ	COND A	IPC 2.5.17.1
Tensile Modulus	900	2068	1500	X,Y	MPa	23°C	ASTM D638
Moisture Absorption	0.04	0.02	0.05	-	%	D48/50	IPC-TM-650 2.6.2.1
Specific Heat	0.9	0.86	0.8		J/g/K		Calculated
Thermal Conductivity	0.50	0.79	0.95	-	W/m/K	80°C	ASTM C518
Coefficient of Thermal Expansion	17 16 25	17 17 24	13 11 16	X Y Z	ppm/°C	-55 to 288°C	ASTM D3386-94
Td	500	500	500		°C TGA		ASTM D3850
Density	2.1	2.6	2.8		gm/cm^3		
Flammability	94V-0	94V-0	94V-0				UL
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.

Shelf Life: Two years from date of shipment

(1) References: Internal T.R.'s 1430, 2224, 2854. Tests at 23°C unless otherwise noted. Typical values should not be used for specification limits.
(2) The nominal dielectric constant of an 0.060" thick RO3003 laminate as measured by the IPC-TM-650, 2.5.5.5 will be 3.02, due to the elimination of biasing caused by air gaps in the test fixture. For further information refer to Rogers T.R. 5242.

Standard Thickness	Standard Size	
0.005" (0.13mm)	RO3003: 25.5"X18" RO3006: 25.5"X18"	RO3010: 25.5"X18"

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