ORMET CIRCUITS, INC.

Technical Data Sheet
Ormet 700
January 2009

PRODUCT DESCRIPTION

Ormet 700 is a lead-free conductive paste used to form Z-axis interconnects by filling microvias in multilayer boards and substrates used in the semiconductor and electronics industries. The innovative metal matrix utilizes Ormet Circuits' patented Thermal Liquid Phase Sintering (TLPS) technologies to make robust, reliable interconnects. TLPS compounds enable lead-free metallic bonding at temperatures as low as 150°C, and after reacting are capable of withstanding thermal excursions to 265°C without remelting.

TYPICAL PROPERTIES

Property	Test Method	Value
Color 'As-received'	Visual	Copper color
Color 'Post-reaction'	Visual	Grey color[1]
Filler Type	Copper Filler and Tin Alloy Filler	
Nominal Particle Size	Hegman Gauge	< 10 microns
Viscosity	Brookfield TE Spindle @ 5 rpm	300 kcps
Thixotropic Index	Ratio of viscosity 1rpm / 10rpm	2
Approximate Specific Gravity		4.9 grams/cc
Electrical Resistivity	Volume Resistivity 4-point probe	50µm ohm*cm
Thermal Conductivity	Laser Flash Diffusivity	25 W/mK
CTE	TMA expansion mode	22 ppm/°C
Extractable Ionics • Chlorine • Sodium • Potassium • Fluorine	Ion Chromotography 16 hr Par-bomb	 Cl: < 10ppm Na: < 5ppm K: < 5ppm Fl: < 5ppm
Lap Shear	Copper to Copper (0.125 in^2 overlap)	1300 psi[2]
Die Shear @ 25°C[3]	Copper to Copper (.15x.15 in die)	3.1 kg/mm^2
Weight Loss on Cure	TGA	4%
Work Life	Application testing after RT storage	24 hours @ 25°C
Estimated Screen Life	Via fill applications testing	8 hours
Estimated Storage Life		12 months < -10°C

[1] Surface may remain copper color if reacted in air or an atmosphere with sufficient oxygen to prevent fluxing of outer copper particles.

[2] SnPb solder paste tested as a control provided a value of 2200psi.

[3] In this trial SnPb solder control tested at 4.3 kg/mm^2; typical value for conductive adhesives <4kg/mm^2

10080 Willow Creek Road • San Diego, CA 92131 • T: 858-831-0010 • F: 858-831-1437
Website: http://www.ormetcircuits.com

TYPICAL APPLICATIONS

Ormet 700 is used in via fill applications when conventional plated through hole (PTH), or plated microvia interconnects are problematic. **Ormet 700** offers an alternative interconnect solution in printed circuit boards for many advanced interconnection designs where plating processes are cost and yield prohibited. Some applications that may be candidates for **Ormet 700** include:

- Filling high-aspect ratio holes (down to 50um in diameter) where plating is a time consuming and low yield process
- Replacing plated through holes in high frequency applications
- Enabling the placement of blind and buried vias in multilayer substrates at lower cost and at a higher throughput and yield than sequential copper plating
- Interconnecting layers in via-in-pad PCB applications

MATERIAL DEPOSITION GUIDELINES

Ormet 700 can be applied by a range of techniques. Most frequently **Ormet 700** is applied by a printing process utilizing a polyester-based stencil formed in-situ during the laser drilling process. The material can also be applied by dispensing or conventional stencil or screening printing. It is recommended that a metal blade squeegee be used during printing in order to fill the via flush with the top of the hole. In some cases, a second filling step after the first fill has been dried. A second filling step can provide additional volume of paste to ensure robust electrical contact between layers of the PCB while accommodating variations in b-stage adhesive flow during lamination. Please refer to Ormet's Applications Guide for additional detail.

SINTERING PROCESS GUIDELINES[4]

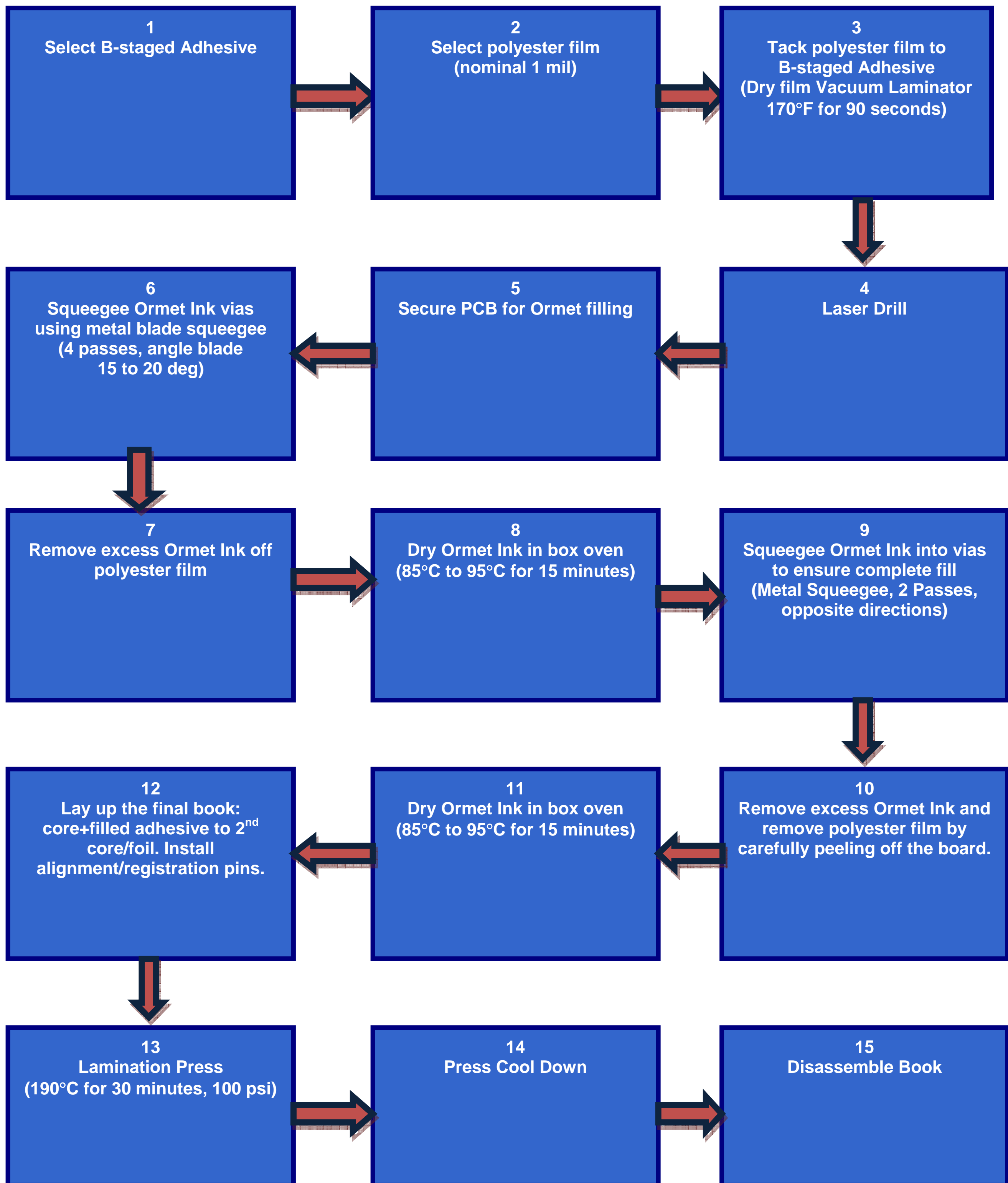
	Recommended Profile	**Alternate Profiles**
Solvent Removal (Drying)	30 minutes @ 95°C	30 minutes @115°C 60 minutes @ 75°C
Sintering	60 minutes @ 190°C[5]	120 minutes @ 165°C[6] 15 minutes @ 210°C

[4] **Ormet 700** is often installed in vias formed in b-staged adhesive layers with the purpose of interconnecting two layers of multilayer substrate. Electrical interconnect and mechanical bonding is formed simultaneously during the lamination cycle. As such the pressure used in lamination is an important factors in order to achieve successful results. The pressure used during lamination should be selected to address the needs the b-stage adhesive with causing too much flow or creating voids around the Ormet interconnect.

[5] If voids are present after sintering, a 30 minute ramp from room temperature to the sintering temperature may reduce or eliminate the voids.

[6] The ultimate conductivity of Ormet materials may not develop at very low temperatures, but will improve upon subsequent thermal exposures. A post-sintering thermal exposure above 210°C will quickly condition the material and develop its final properties.

GENERIC PROCESS FLOW CHART for VIA FILL APPLICATION



STORAGE AND HANDLING

Ormet 700 is supplied in 250 gram jars and a range of syringe and cartridge sizes. and must be stored at -10°C MAX. **Ormet 700** must be stabilized to room temperature for 30 minutes before opening the jars for use.

GENERAL INFORMATION

The Material Safety Data Sheet (MSDS) contains safe handling information for this product. Please read carefully before handling or using this product.

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This product is covered by United States and foreign patents, both issued and pending, for the material compositions, applications and techniques for use. Refer to www.ormetcircuit.com for detailed patent information.

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