

PRODUCT DESCRIPTION

Ormet 701 is a lead-free conductive paste used to fill micro via structures that create z-axis interconnections between circuit layers in semiconductor packaging and printed circuit boards. The innovative metal matrix incorporates Ormet Circuits' patented Thermal Liquid Phase Sintering (TLPS) technology to make robust, reliable via structures and interconnects. Ormet Circuits' TLPS compounds enable lead-free metallic bonding at temperatures as low as 175°C. The metallurgy of **Ormet 701** was specifically designed to maintain low and stable resistance in micro via applications and lead-free component assembly cycles.

TYPICAL PROPERTIES

<u>Property</u>	<u>Test Method</u>	<u>Value</u>
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	1.4
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
Lap Shear	Copper to Copper (0.125 in ² overlap)	1300 psi 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.

TYPICAL APPLICATIONS

Ormet 701 is used in via fill applications to increase yield and reduce product manufacturing time in both conventional plated through hole (PTH) and plated micro via configurations. **Ormet 701** also enables an alternative z-axis interconnect solution in printed circuit boards for many advanced interconnection designs where plating processes are cost and/or yield prohibited. Some applications that may be candidates for **Ormet 701** 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 701 can be applied by several techniques. Most frequently **Ormet 701** is applied using a printing process with a polyester-based stencil formed in-situ during the laser drilling process. **Ormet 701** can also be applied by dispensing or conventional stencil- or screen-printing. It is recommended that a metal blade squeegee be used during printing in order to minimize scavenging and to fill flush with the top of the hole. In some cases, a second filling step is performed 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 GUIDELINES³

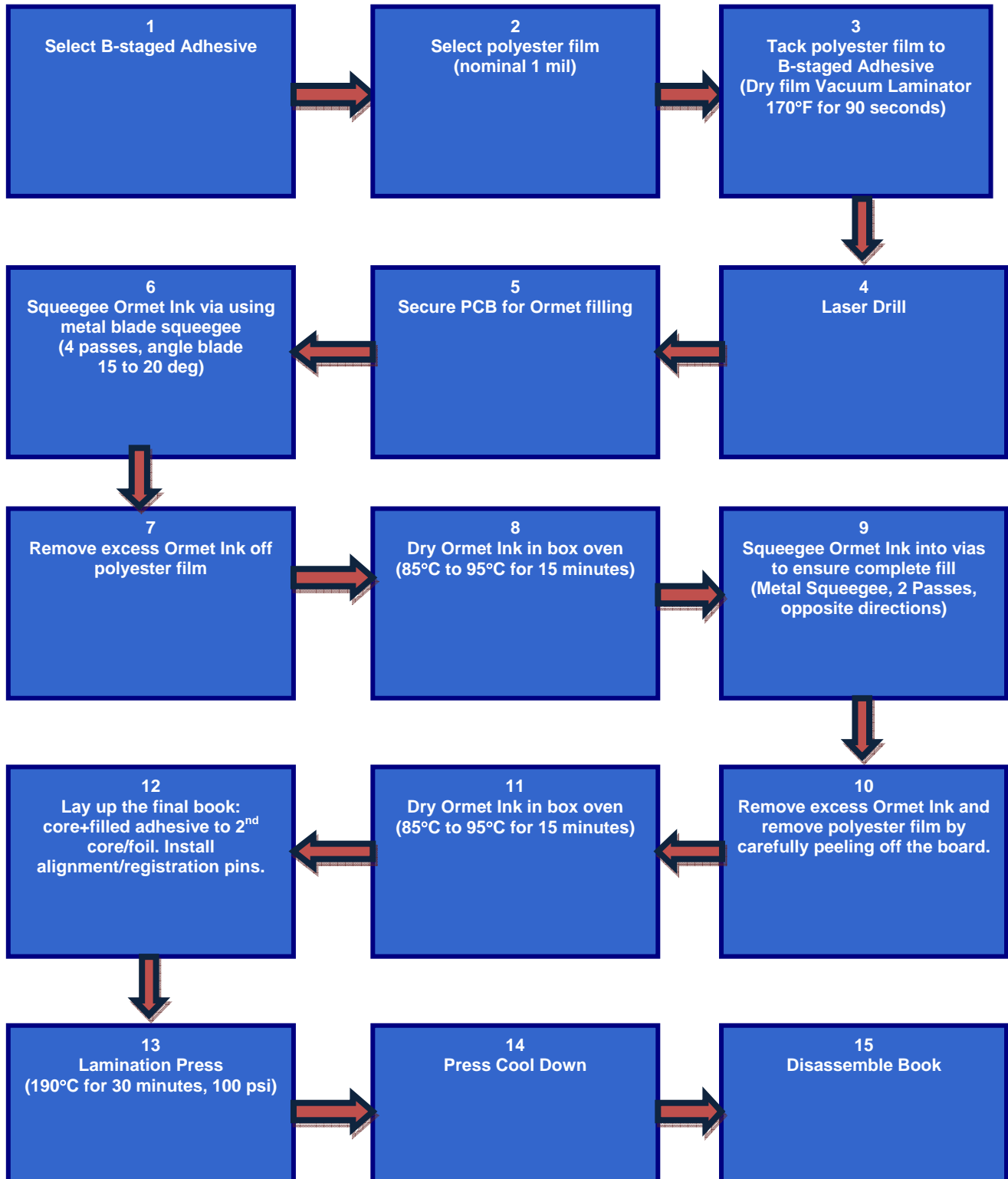
	<u>Recommended Profile</u>	<u>Alternate Profiles</u>
Solvent Removal (Drying)	30 minutes @ 95°C	30 minutes @ 115°C 60 minutes @ 75°C
Sintering	60 minutes @ 190°C ⁴	120 minutes @ 165°C ⁵ 15 minutes @ 210°C

³ **Ormet 701** 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 factor in order to achieve successful results. The pressure used during lamination should be selected to address the b-stage adhesive without causing too much flow or creating voids around the Ormet interconnect.

⁴ If voids are present after sintering, a thirty minute ramp from room temperature to the sintering temperature may reduce or eliminate the voids.

⁵ The ultimate conductivity of Ormet materials may not develop at very low temperatures, but will improve upon brief thermal conditioning. A post-sintering thermal exposure above 210°C will develop its final properties.

GENERIC PROCESS FLOW CHART for VIA FILL APPLICATION



STORAGE AND HANDLING

Ormet 701 is supplied in 250 gram jars and a range of syringe and cartridge sizes. The storage temperature is -10°C MAX. **Ormet 701** 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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