technical datasheet

Ormet® PCB-701

Pb-Free Printed Circuit Board Via Filling Paste

PRODUCT DESCRIPTION

Ormet PCB-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 Transient 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 PCB-701** was specifically designed to maintain low and stable resistance in micro via applications and lead-free component assembly cycles.

TYPICAL APPLICATIONS

Ormet PCB-701 is used in via fill applications to increase yield and reduce product manufacturing time. **Ormet PCB-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 PCB-701** include:

- Filling high-aspect ratio holes (down to 50um in diameter) where plating is a time consuming and low yield process
- 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

TYPICAL PROPERTIES, PRE-SINTERED

PROPERTY	UNIT OF MEASURE	TYPICAL VALUE
Paste Color "As Received"	Visual	Copper
Filler Type		Copper and Tin Alloy
Nominal Particle Size	Micron	<10
Viscosity at 5 RPM, kcps	Brookfield TE Spindle	130
Thixotropic Index	Slope 1:10 rpm	1.4
Work Life at 25°C	Hours	8
Storage Life, < -10°C	Months	12

TYPICAL PROPERTIES, POST-SINTERED

PROPERTY	UNIT OF MEASURE	TYPICAL VALUE
Metal Loading	weight percent	89
Volume Resistivity	μΩ*cm	50
Coefficient Thermal Expansion	ppm/C	22

DEPOSITION GUIDELINES

Ormet PCB-701 can be applied by several techniques. Most frequently **Ormet PCB-701** is applied using a printing process with a polyester-based stencil formed in-situ during the laser drilling process. **Ormet PCB-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, particularly when the aspect ratio of the hole is greater than 0.7, a second filling step is performed after the first fill has been settled. 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.

SINTERING METHOD

The **Ormet PCB-701** provides the electrical interconnection during lamination while the prepreg or adhesive layer crosslinks to form the mechanical properties of the substrate or printed circuit board. A two-stage process is recommended to avoid solvent entrapment in the assembly. (See Table 1 for details). Please consult with your Merck Performance Materials Account Representative for additional processing guidelines for selected prepreg/adhesives.

Table 1

	PREFERRED PROFILE	ALTERNATE PROFILE
Settle (Removal of any entrapped air from bottom of blind via)	15 min @ 60°C	30 min @ 50°C 10 min @ 75°C
Solvent Removal (Drying)	30 min @ 95°C	20 min @115°C 60 min @ 75°C
Sintering and Lamination	60 min @ 190°C	15 min @ 210°C

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POST-SINTERING PROCESS

Ormet PCB-701 is designed for no-clean applications and will leave benign, electrically inert residues on surfaces. Ormet recommends testing adhesion compatibility with molding compounds and coating materials to determine if a post sintering cleaning process is required.

PACKAGING AND SHIPPING

Ormet PCB-701 is available in multiple jar and cartridge sizes. The **Ormet PCB-701** is shipped in low-temperature containers and should be placed in cold storage (-10°C or below) immediately upon receipt. Shipping temperature indicators are available upon request.

STORAGE AND HANDLING

For best results, **Ormet PCB-701** should be stored at or below -10°C and containers should be kept tightly closed to avoid moisture contamination. **Ormet PCB-701** must be warmed to and held at ambient temperature for a minimum time of 45 minutes prior to use. Ormet does not recommend the use of mixers or centrifuges to accelerate the warm-up time. Cumulative life at room temperature should not exceed 72 hours.

HEALTH AND SAFETY INFORMATION

Product safety information is available in safety datasheets. Before handling, read safety datasheets and labels on product. Ormet has a comprehensive team of product safety and regulatory compliance specialists available in each area. For further information please see our website, www.ormetcircuits.com, or consult with your local EMD Performance Materials Account Representative.

GENERAL INFORMATION

The information within the technical datasheet is based upon internal testing conducted by Merck KGaA, Darmstadt, Germany. The application and use of the product is dependent on the customer and is beyond the control of Ormet.

Ormet recommends that customers completely characterize this product for use within their applications. Ormet's sole warranty is the product will meet the sales specification in effect at the time of shipment. Specification writers should contact Ormet for sales specification prior specifying material.

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