

PRODUCT DATA SHEET

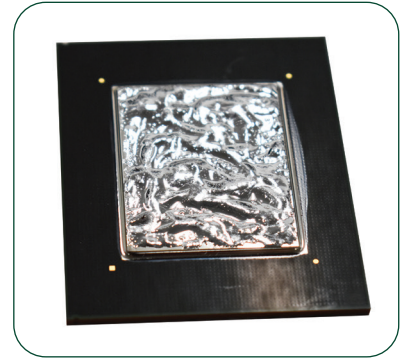
LMP*

Liquid Metal Paste



Introduction

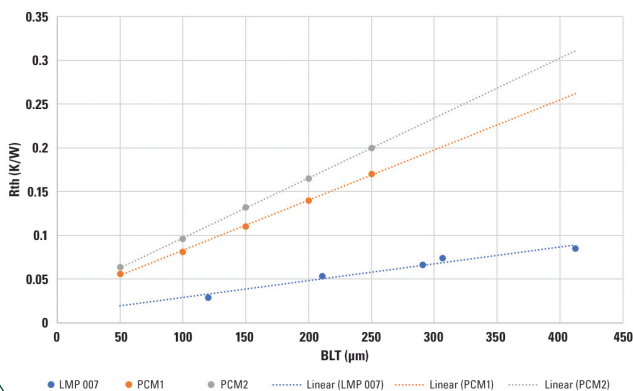
LMP is a next generation liquid metal-based thermal paste designed specifically for thermal management of HPC semiconductor applications, such as CPU, GPU, and MCM. It is similar to standard gallium-based liquid metals—but through a proprietary process and certain additives, the viscosity is modified to form a homogeneous dispensable/jettable thermal paste for use in high-volume applications. Thermal resistance as low as $0.03\text{K}^\circ/\text{W}$ can be achieved. **LMP** can reduce T_j by $3\text{--}6^\circ\text{C}$ compared to polymer-based PCMs, depending on application. **LMP** provides improved thermal cycling performance compared to traditional liquid metals. **LMP** has stable Thermal Impedance through accelerated aging tests: HAST $85^\circ\text{C}/85\% \text{RH}$ for 168 hours, TCT $-40^\circ\text{C}\text{--}125^\circ\text{C}$ for $>2,000$ cycles (with a barrier layer around TIM material). Unlike traditional liquid metals, **LMP** spreads isotropically. **LMP** is a reflow-free metal TIM with optimal wetting directly to copper, Ni-plated copper, gold, silicon, glass, etc. It is non-volatile, RoHS-compliant, and environmentally friendly. **LMP** may be corrosive to aluminum and contact with aluminum should be avoided.



Features

- Indalloy Numbers Used:
 - LMP 007: Indalloy 51E
 - LMP 009: Indalloy 306
- No flux, metallization, or reflow required
- Easy application via dispensing/jetting
- Achievable thermal resistance of $0.03\text{K}^\circ/\text{W}$
- Improved rheology for better application and stability against leakage
- Achievable BLT as low as $25\mu\text{m}$
- Should not be used with aluminum

LMP 007 vs. PCM1 and PCM2 (85°C)



Thermal resistance vs. bondline thickness for LMP and two standard Phase Change Materials (PCM).

a.



b.



c.

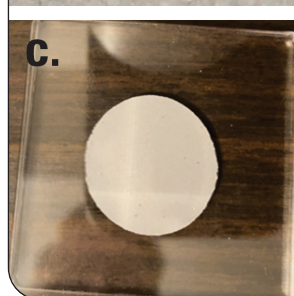


Figure 1. Viscosity of liquid metal (a) vs. LMP-007 liquid metal paste (b) vs. LMP-009 liquid metal paste (c).

*Patent pending

From One Engineer To Another®



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LMP Liquid Metal Paste

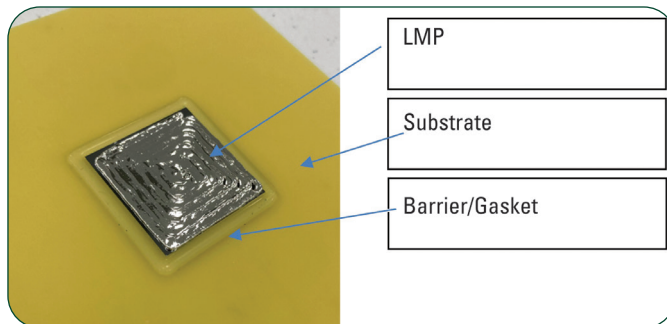
Properties

	LMP-007	LMP-009
Thermal Resistance	$\geq 0.02\text{k/W}$	$\geq 0.02\text{k/W}$
Specific Gravity	5.3–5.8	3.4–4.0
Viscosity (PA-s)	<5,000	>6,000
Electrical Conductivity (S/m)	2.0×10^6 to 2.5×10^6	N/A
Recommended Application Method	Dispense/Jetting	Dispense/Jetting

Application Method

LMP can be dispensed or jetted. Every application is different and there is no “one size fits all” method, therefore, please reach out to Indium Corporation’s experts for specific formula and potential deposition method/parameters required for your unique application.

Indium Corporation recommends that a barrier/gasket be applied around the perimeter of the die in most applications to prevent leakage and moisture intrusion into the stack-up. Indium Corporation used Dymax Ultra Light Weld® GA-201 UV/Visible light-cure gasket resin for internal testing, but a variety of gasketing materials can be used to contain this material, such as various thermal adhesives or gasket/foam barriers.



Packaging

LMP can be packaged in polyethylene jars or EFD Optimum syringes. Please contact your Indium Corporation representative for packaging options. All shipments are made in accordance with federal and international regulations.

Shelf Life and Storage

Gallium-based liquid metals are very stable at, and should be stored at, room temperature. Shelf life is one year when stored at room temperature in the original sealed container. Care should be taken not to use these materials on or in close proximity to aluminum surfaces.

Cleaning Recommendation

Wipe the excess paste with a dry paper towel first, and then clean the residual material using a paper towel soaked with IPA or MEK.

This product data sheet is provided for general information only. It is not intended, and shall not be construed, to warrant or guarantee the performance of the products described which are sold subject exclusively to written warranties and limitations thereon included in product packaging and invoices. All Indium Corporation's products and solutions are designed to be commercially available unless specifically stated otherwise.

All of Indium Corporation's solder paste and preform manufacturing facilities are IATF 16949:2016 certified.
Indium Corporation is an ISO 9001:2015 registered company.

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