

# PRODUCT DATA SHEET

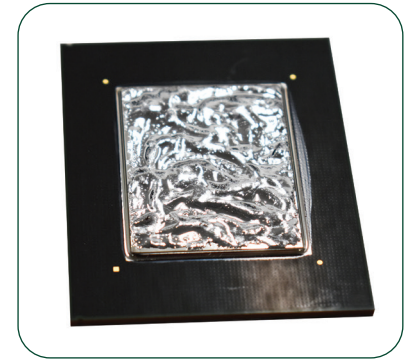
# LMP\*

## 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 100% metal—like standard gallium-based liquid metals—but through a proprietary process and certain additives, the viscosity is increased to form a homogeneous dispensable, jettable, and/or printable thermal paste for use in high-volume applications. Thermal resistance as low as  $0.03\text{K}^\circ/\text{W}$  can be achieved and bulk thermal conductivity can be as high as  $24\text{W}/\text{mK}$ . **LMP** can reduce  $T_j$  by  $6\text{--}10^\circ\text{C}$  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 isotopically and is less prone to pump-out compared to alternatives, such as silicone greases. **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** is corrosive to aluminum and contact with aluminum must be avoided.



### Features

- Alloy composition 66.5Ga/20.5In/13Sn
- No flux, metallization, or reflow required
- Easy application via dispensing, jetting and/or printing
- Achievable thermal resistance of  $0.03\text{K}^\circ/\text{W}$
- Higher viscosity for improved application and stability against leakage
- Achievable BLT as low as  $25\mu\text{m}$
- Not compatible with aluminum

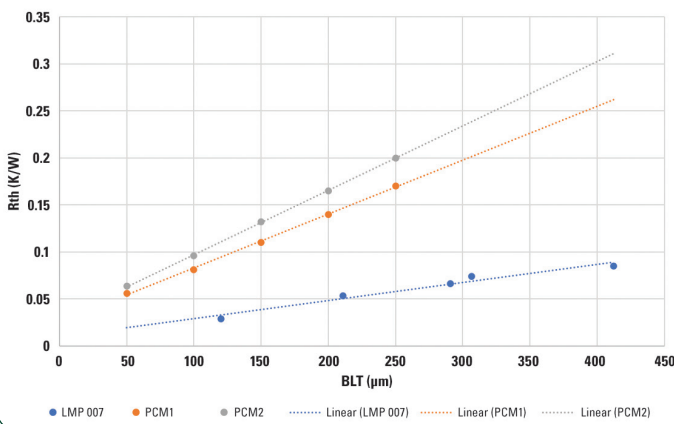


Standard gallium-based liquid metals do not spread isotopically when under pressure.



LMP: Due to its higher viscosity, liquid metal paste will spread isotopically.

LMP 007 vs. PCM1 and PCM2 (85°C)



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

\*Patent pending

## From One Engineer To Another®



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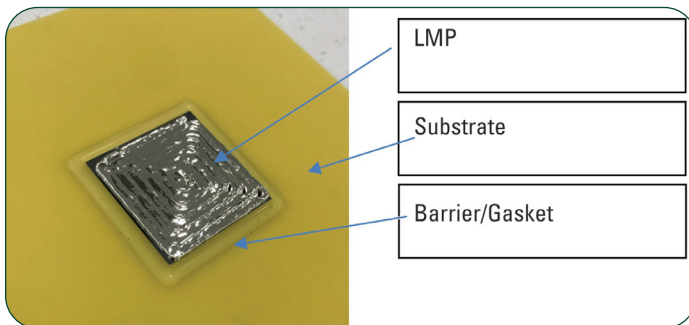
### Properties

	LMP-007	LMP-008
IPN	INGOTIA-052014	INGOTIA-052067
Thermal Conductivity	>18W/mK	>20W/mK
Specific Gravity	5.3–5.8	5.3–5.8
Viscosity (PA-s)	<5,000	>28,000
Electrical Conductivity (S/m)	2.0 x 10 <sup>6</sup> to 2.5 x 10 <sup>6</sup>	
Recommended Application Method	Jetting	Printing

### Application Method

LMP can be dispensed, jetted and/or printed. 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 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.



### 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.

Contact our engineers: [askus@indium.com](mailto:askus@indium.com)

Learn more: [www.indium.com](http://www.indium.com)

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