

## PRODUCT DATA SHEET

# InFORCE™ MF

## Pressure-Assisted Silver Sinter Paste for Die-Attach

### Introduction

**InFORCE™ MF** is a pressure-assisted silver sinter paste specifically formulated for stencil printing. Proprietary processing ensures no silver particle agglomerations, thus maintaining high print yields throughout the stencil life. The high metal load, low organics formulation ensures that the material loss (post-sintered BLT vs. printed thickness) is approximately 50% so stencil thicknesses should be double the thickness of the final joint target thickness.

**InFORCE™ MF** is a high-reliability die-attach material with superior electrical and thermal conductivity that will increase the lifetime of power electronics and is especially suited to the higher power density and higher operating temperature conditions associated with wide band gap die technologies, like SiC and GaN.

### Features

- High metal content, >91% by weight
- Fast pre-dry times due to low organic content
- Predictable post-sintered BLT due to minimal material loss (~50%)
- High thermal conductivity for increased reliability\*
- High electrical conductivity for higher efficiency\*
- Capable of high operating temperatures >175°C with no loss of performance
- Sinters to Ag (preferred), bare Cu, and Au

\*compared to solders



### Pressure Sinter Die-Attach Process Flow

#### Preparation

##### Surface Cleanliness

- Bare Cu surfaces may require a pre-clean with plasma or HCOOH

##### Paste Pre-Mixing

- Planetary mixer
- 500–800rpm for 2–4 minutes

#### Process

##### Stencil Print

- 100mm/s print speed
- 1mm/s separation speed

##### Pre-Dry

- 10–15 minutes @150°C, plus ramp time

##### Die Bond

- Substrate and die temperature >100°C
- >7kg force
- >0.5 seconds

##### Pressure Sinter

- 250°C, >12MPa, 3 minutes for Ag surface
- Increase time and/or pressure for Au and Cu

*Adjustments may be necessary according to equipment types*

**From One Engineer To Another®**



Form No. 100320 R0

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### Processing InFORCE™MF

#### Stabilization Time

**InFORCE™MF** should be at ambient temperature before use to ensure material stability. If stored in the freezer below 0°C, allow 8 hours at room temperature before use. If stored in a refrigerator between 0–10°C, allow 4 hours stabilization before use.

InFORCE™MF Properties	
Metal	Ag
Metal content (by weight)	91%
Max. particle size	10µm
Paste application	Printing
Sintering temperature	250°C typical
Sintering atmosphere	Air, N <sub>2</sub>
Shear strength (5x5 SiC die)	>150kgf
Thermal conductivity	>280W/mK
Halogens	Zero
Compatible surfaces	Ag, Cu, Au

#### Re-Homogenization

Before applying to the stencil, **InFORCE™MF** should be re-homogenized using a planetary centrifugal mixer. Speeds of between 500–800rpm are recommended. At 500rpm, mix for 4–5 minutes. At 800rpm, mix for 2–2.5 minutes. Paste should appear smooth and free from bubbles.

### Stencil Printing

Fast print speeds of 100mm/s are recommended for good paste rolling. Separation speeds of 1mm/s minimize lifted edges or “dog ears.” Print speed can be adjusted for good stencil clearing, 3kgf is recommended to start. Stencil life of 8 hours can be expected under continuous use. Maximum pause time on the stencil should be 1 hour; beyond this, the paste may require re-homogenizing.

### Pre-Drying

Actual profile depends on equipment capability. Ramp to 150°C (typically ~15 minutes), hold at 150°C for 10 minutes, cool down.

### Pressure Sintering

**InFORCE™MF** sinters most easily to Ag surfaces. 12MPa at 250°C for 3 minutes is suitable for 5x5mm SiC die, resulting in low porosity and shear strengths >150kgf (~60MPa). Sintering to Cu or Au surfaces increased pressure and/or time is required.

InFORCE™MF Reliability		
Test	Condition	Result
Adhesion	Mandrel bend	Passed (no lifting)
TCT (Temperature Cycling Test)	-65°C–150°C 3,000 cycles	Passed (no delamination – CSAM)
PCT (Power Cycling Test)	ΔT = 100°K 150K cycles	Passed (no test failure)

### Storage and Handling

**InFORCE™MF** can be stored in a freezer below 0°C, in a refrigerator at 0–10°C, and even at room temperature <30°C.

InFORCE™MF Features	
Work life	8 hours (continuous)
Max. pause time on stencil	1 hour
Paste shelf life	6 months
Residue cleaning	No residue to clean
Recommended storage	0°C–10°C

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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)

ASIA +65 6268 8678 • CHINA +86 (0) 512 628 34900 • EUROPE +44 (0) 1908 580400 • USA +1 315 853 4900



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