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 bondline thickness (BLT) vs. printed thickness] is approximately 50%, so the stencil thicknesses should be double the thickness of the final joint's 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. It 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



From One Engineer To Another[®]

CORPORATION

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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 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 ₂	
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 rehomogenized 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). When 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 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	3 months	
Residue cleaning	No residue to clean	
Recommended storage	0°C-30°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 Learn more: 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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