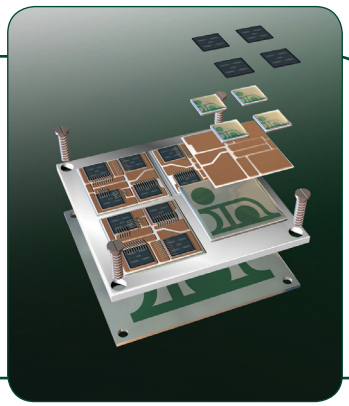
PRODUCT DATA SHEET

Indium8.9-LDA Pb-Free Solder Paste

for IGBT Module Manufacturing



Introduction

Indium8.9-LDA is specially designed for IGBT manufacturing. The formulation has been optimized for vacuum reflow soldering of large area die. Ultra-low total voids are possible (typically <0.5%) using a variety of reflow profiles; two examples of suitable vacuum reflow profiles are shown on page 2. The paste is formulated to be cleaned easily using common aqueous-based cleaning solutions. Good cleanability ensures consistently high wirebonding pull-strength. **Indium8.9-LDA** is suitable for application by either screen or stencil printing, and offers unprecedented print transfer efficiency with a long open life, making it suitable for use in a broad range of processes.

Features

- Ultra-low voiding, even on large die
- Easily cleaned for high wirebond strength
- High print transfer efficiency using screen or stencil
- Versatile profiling characteristics for optimum results
- Improved process yields and material utilization

Alloys

Indalloy®121 (96.5Sn/3.5Ag) is the standard alloy used in IGBT die-attach solder paste, but alternative Pb-free alloys are also available.

Standard Product Specifications

Alloy	Metal Load (Type 3)	
	Printing	Dispensing
Indalloy®121 (96.5Sn/3.5Ag)	88.5%	84%
Indalloy®256 (96.5Sn/3.0Ag/0.5Cu)	88.5%	84%
Indalloy®133 (95Sn/5Sb)	88.5%	84%
Indalloy®276 (90.6Sn/3.2Ag/0.7Cu/5.5Sb)	88.5%	84%

Bellcore and J-STD Tests and Results

Test	Result	Test	Result
J-STD-004A (IPC-TM-650)		**J-STD-005 (IPC-TM-650)**	
Flux Type (per J-STD-004A)	ROL1	Typical Solder Paste Viscosity Type 3 Malcom (10rpm)	1,750 poise
Flux Induced Corrosion (Copper Mirror)	Type L	Slump Test	Pass
Presence of Halide Silver Chromate Fluoride Spot Test	Pass	Solder Ball Test	Pass
Ion Chromatography	<0.5% Cl^- eq.	Typical Tackiness	50g
SIR	Pass	Wetting Test	Pass
		BELLCORE GR-78	
		SIR	Pass
		Electromigration	Pass

All information is for reference only.
Not to be used as incoming product specifications.

Packaging

Indium8.9-LDA is currently available in 500g jars or 600g cartridges. Packaging for enclosed print head systems is also readily available. Alternative packaging options may be available upon request.

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **Indium8.9-LDA** is 6 months when stored at <10°C. Solder paste packaged in cartridges should be stored tip down.

Solder paste should be allowed to reach ambient working temperature prior to use. Best procedure is to store long term in a refrigerator and short term line storage at room temperature. Generally, paste should be removed from refrigeration at least 6 hours before the material is used. Actual time to reach thermal equilibrium will vary with container size. Jars and cartridges should be labeled with date and time of opening.

Technical Support

Indium Corporation's internationally experienced engineers provide in-depth technical assistance to our customers. Thoroughly knowledgeable in all facets of Material Science as it applies to the electronics and semiconductor sectors, Technical Support Engineers provide expert advice in solder preforms, wire, ribbon, and paste. Indium Corporation's Technical Support Engineers provide rapid response to all technical inquiries.

Safety Data Sheets

The SDS for this product can be found online at http://www.indium.com/sds

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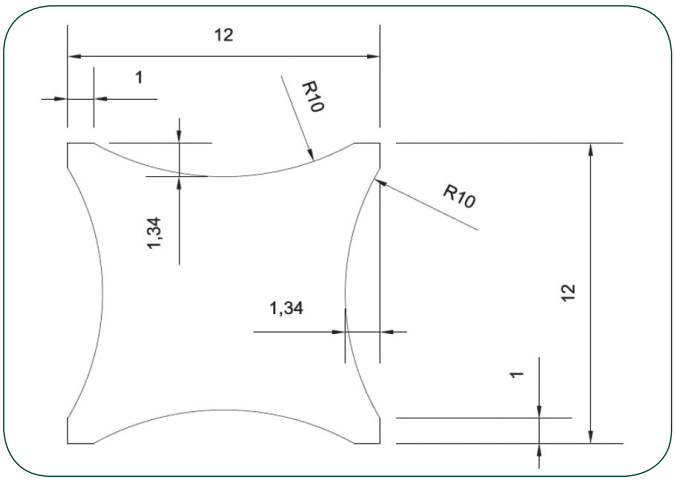
Printing

Indium8.9-LDA can be printed by screen or stencil; thus, large, small, and complex apertures can be printed on the same substrate with no loss of efficiency. On larger die size, a modified X shape is usually used to aid solder spread and void reduction on reflow, and also to reduce squeegee "scoop." Response-to-pause and open life are excellent.



Aperture design for void reduction.
Screen material: SD 245/65 mesh at 22°C, plus 200µm emulsion.

Printer Operation

The following are general recommendations for printer optimization. Adjustments may be necessary based on specific process requirement:

Screen Print

A standard flood/print process will give good results, with some basic starter settings as follows:

Print Speed	20–75mm/second
Squeegee	80 or 90 durometer diamond
Snap-Off	Adjust to give the desired bondline thickness in the final solder joint

Stencil Print

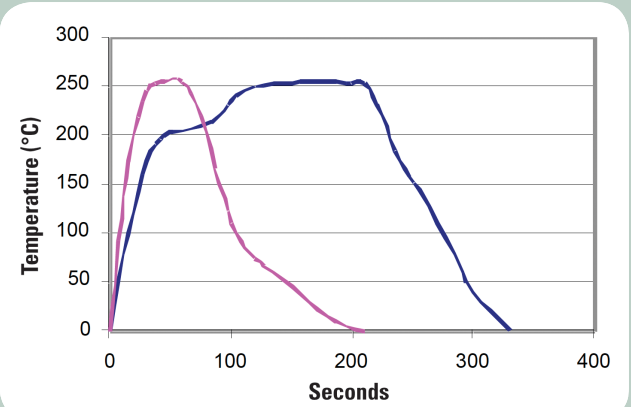
Solder Paste Bead Size	20–25mm in diameter
Print Speed	50–100mm/second
Squeegee Pressure	0.018–0.027kg/mm of blade length
Solder Paste Printer Life (unreplenished)	>6 hours @ 30–60% RH & 22–28°C

Cleaning

Rigorous testing has shown that the reflowed residues of **Indium8.9-LDA** are cleanable to power semiconductor wirebonding standards using recognized aqueous-based flux residue removers. Contact your Indium Corporation Technical Support Engineers for recommendations. Stencil or screen cleaning can be performed using isopropyl alcohol (IPA) as a solvent. Most commercially available stencil cleaners will also work well.

Reflow

Recommended Profile for Indalloy®121:



Users should define a suitable vacuum reflow profile that minimizes voids, reduces intermetallic formation, gives good residue cleanability, reduces die skew and die shift, and has good wetting onto metal surfaces.

Liquidus Stage:

A peak temperature of 15–30°C above the melting point (liquidus) of the solder alloy is recommended to achieve acceptable wetting and form a quality solder joint. The use of higher peak temperatures and longer times-above-liquidus (TAL) will minimize voiding. However, care must be taken with high-tin (Sn) solders and copper (Cu) surfaces that excessive Sn/Cu intermetallics are not formed, as these can lead to dewetting.

Cooling Stage:

A rapid cool down (from -4 to -10°C/second), assists in forming a fine-grain structure to increase solder joint fatigue resistance.

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