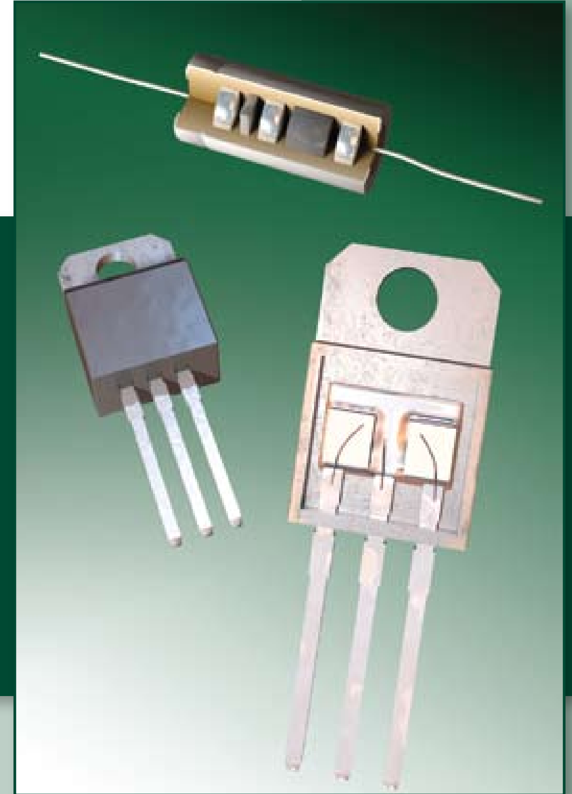
Power Semiconductor Assembly



Overview

Indium Corporation's customers include some of the largest Power Semiconductor manufacturers in the world. With the current "derogations" (allowances) for use of lead (Pb) in European End-of-Life Vehicle legislation potentially running out in the next two years, many Power Semiconductor manufacturers are now searching for Pb-Free solder options for component assembly, based on temperature-tolerance, high electrical and thermal conductivity, and fatigue resistance. Indium Corporation is able to offer a variety of environmentally-friendly die-attach grade solder materials, including options that are:

- Halogen-Free
- Pb-Free
- No-Clean

No-Clean in Power Semiconductor Assembly

The term "no-clean" has previously only been used in the context of surface mount technology (SMT). However, an increasing number of Indium Corporation customers are using our solder pastes in no-clean applications for die-attach. Although there is no standard test method for no-clean assembly materials and processes under the high voltage and high temperature conditions typically experienced by semiconductor materials, customers are validating our materials for no-clean usage under their own test conditions.

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Die-Attach Grade Solder Paste

Features:

- Low voiding in reflow (<5%)
- Long dispense life
- No tailing
- Bubble-free packaging
  - — Cleanability: Non-staining on bondpads
  - — No-Clean: Compatible with overmolding material

Die-Attach Solder Pastes

Product Name	Flux Type	Residue Level	Halogen-free	Designed for Pb-free Alloys	No-Clean*	Power Semi No-Clean**
Indium9.52	REL0	2.0%	YES	YES	YES	YES
Indium9.32	ORL0	0.4%	YES	YES	YES	YES

Tested in accordance with ANSI/IPC standard test methods as suitable for use in a no-clean process

***Validated in long-term reliability testing for specific Power Semiconductor applications*

Die-Attach Grade Solder Wire

Features:

- Ultra-low oxide
- High alloy purity (>99.95%)
- Industry-leading wire diameter tolerance
- Oxygen/moisture-free packaging

Die-Attach Grade Solder Ribbon

Features:

- Ultra-low oxide
- High alloy purity (>99.95%)
- Industry-leading dimensional tolerance (thickness and width)
- Oxygen/moisture-free packaging

Die-Attach Grade Solder Alloy Physical Properties

		Melting Point			Elemental Composition (% by weight)									
Indalloy Number	Alloy Designation	Liquidus °C	Solidus °C	Density (g/cm³)	Sn	Ag	Cu	Sb	Bi	Au	Ge	Si	Zn	Al
241	SAC387	220	217	7.40	95.5	3.8	0.7							
256	SAC305	220	217	7.40	96.5	3.0	0.5							
121	Tin/Silver Eutectic	221	221	7.50	96.5	3.5								
246	SAC405	225	217	7.40	95.5	4.0	0.5							
123		226	221	7.34	97.5	2.5								
258	SAC105	227	215	7.32	98.5	1.0	0.5							
244	Tin/Copper Eutectic	227	227	7.31	99.3		0.7							
128	Pure Tin	232	232	7.28	100.0									
209	J-alloy	233	233	7.80	65.0	25.0		10.0						
129		235	235	7.27	99.0			1.0						
131		238	232	7.26	97.0			3.0						
132		240	221	7.39	95.0	5.0								
133		240	235	7.25	95.0			5.0						
139		251	134	9.64	5.0				95.0					
148		271	271	9.80					100.0					
259		272	250	7.24	90.0			10.0						
182	Tin/Gold Eutectic	280	280	14.51	20.0					80.0				
156		295	221	7.51	90.0	10.0								
160		300	227	7.32	97.0		3.0							
183	Gold/Germanium Eutectic	356	356	14.67						88.0	12.0			
184	Gold/Silicon Eutectic	363	363	15.40						96.8		3.2		
176	Zinc/Aluminum Eutectic	382	382	6.60									95.0	5.0
186	Germanium/ Aluminum Eutectic	424	424	3.71							55.0			45.0

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