

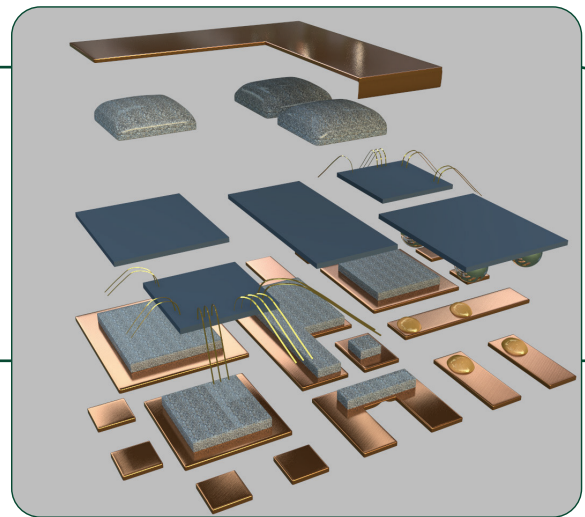
PRODUCT DATA SHEET

“Power-Safe” NC-SMQ75

Die-Attach Solder Paste

Introduction

Indium Corporation’s “Power-Safe” NC-SMQ75 is the world’s first and only solder paste suitable for use in non-cleaned clip bond applications in power semiconductor die-attach. The ultra-low flux residue, combined with a benign, low reactivity flux chemistry, enables power semiconductor assemblers to eliminate the costs of cleaning completely in clipbond applications. It is suited for both print and dispense applications.



Features

- Ultra-low post-reflow residue <0.5%w/w of solder paste
- “Power-Safe” residue compatible with overmolding compounds without delamination
 - e.g., Hitachi 9420, Sumitomo G770
- Halogen-free
 - No halogens used in formulation
- Consistent dispensing deposit size without clogging
 - Powder Types 3, 4, 5, 6
- Airlessly syringe-packed (bubble-free) and jar pack available
- Wide range of alloy compatibility
- Reflow up to 400°C
 - Low oxygen or forming gas needed (<100ppmO₂)
- Low voiding for smaller die
 - < 6mm x 6mm
 - Meets <5% single, <10% total industry voiding standard
- Good wetting with common metal finishes
 - Leadframe: Cu, Cu spot-plate silver
 - Die: NiAg, NiAu, NiPdAu

Example Product Specifications

Alloy	Metal Content	Mesh Size	Particle Size	Recommended Needle Size ¹
Sn10/Pb88/Ag2 Sn5/Pb92.5/Ag2.5 Sn5/Pb95 Sn5/Pb85/Sb10	88%	Type 3	25 to 45 microns (Type 3)	20 gauge*

BELLCORE and J-STD Tests & Results

Test	Result
J-STD-004 (IPC-TM-650)	
Flux Type Classification	ORLO
Presence of Halide Fluoride Spot Test	Pass
Elemental Analysis	Halogen-free
Post Reflow Flux Residue (ICA Test)	0.4% of solder paste
Corrosion	Pass
SIR (Post Clean)	Pass
Acid Value (Typical)	31.5
Test	Result
J-STD-005 (IPC-TM-650)	
Typical Solder Paste Viscosity (Pb92.5/Sn5/Ag2.5, Type 3, 88%) Brookfield (TF 5rpm) Brookfield (R7 10rpm)	230kcps 170kcps
Slump Test	Pass
Solder Ball Test	Pass
Wetting Test	Pass
Standard Metal Load	88%

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

From One Engineer To Another®

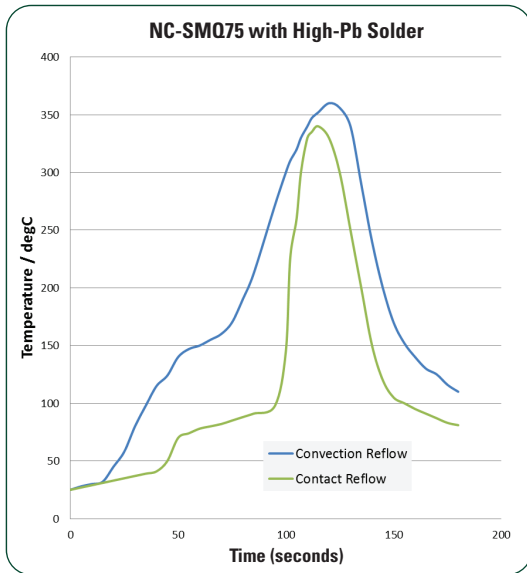


PRODUCT DATA SHEET

"Power-Safe" NC-SMQ75 Die-Attach Solder Paste

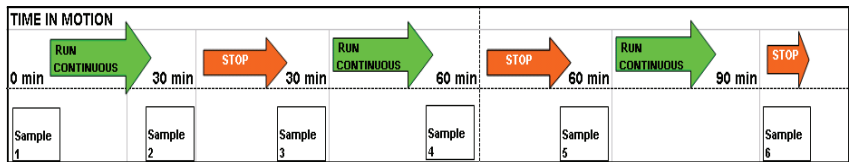
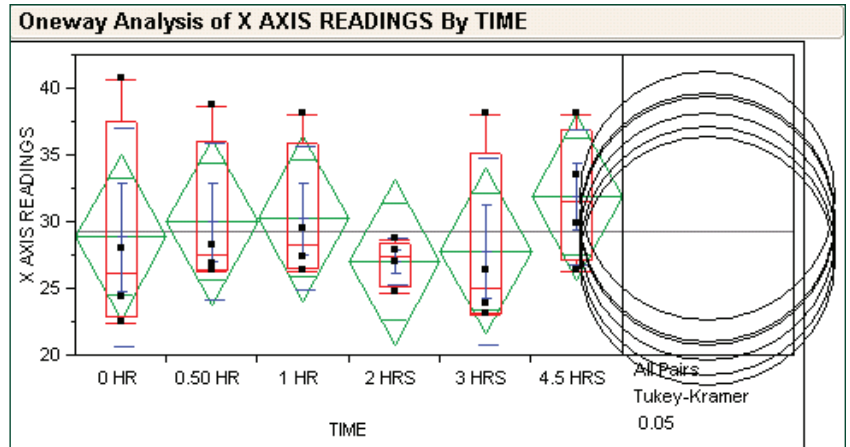
High-Pb Solder Reflow

- Must be <100ppmO₂ in N₂ or H₂/N₂
- Spike: 320–390°C
- Higher temperature → lower voiding
- Minimum 15 seconds TAL
- Preheat plateau eliminates volatiles from flux



NC-SMQ75 Dispense Consistency

Statistically-based dispense trials showed no variation in deposit size, even after multiple start/stop cycles, including dispense after a 90-minute pause.



Standard Die-Attach Solder Paste Alloys

	Die-Attach Application	Comments	Elemental %w/w					degC	
			Sn	Ag	Sb	Au	Bi	Solidus	Liquidus
Pb-free	IGBT and modules	Low Tj IGBT usage	96.5	3.5				221	Eutectic
		High reliability	65	25	10			233	340
	Through-hole components	Lowest Sb level alloy	95		5			237	240
		Most common Sb-based alloy	90		10			243	257
		High tensile strength; high cost	20			80		280	Eutectic

	Die-Attach Application	Comments	Elemental %w/w					degC		
			Sn	Ag	Sb	Pb	In	Solidus	Liquidus	
Pb-containing		Step-soldering usage	5		10	85		240	256	
		Good tilt control		2.5		92.5	5	300	310	
	SMT components	Poor thermal cycling	10	2		88		268	290	
		Automotive usage		5			95		308	312
				10			90		275	302
				5	2.5		92.5		287	296
			2	2.5		95.5		299	304	

Commonly used alloy

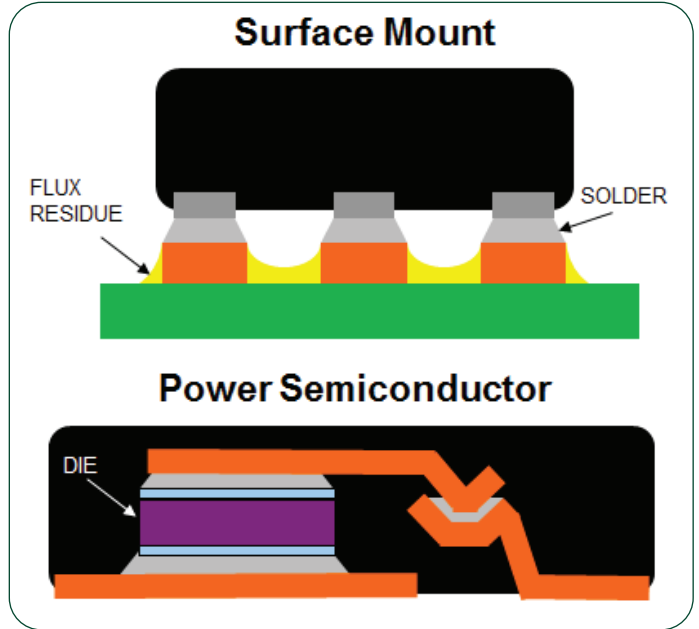


PRODUCT DATA SHEET

“Power-Safe” NC-SMQ75 Die-Attach Solder Paste

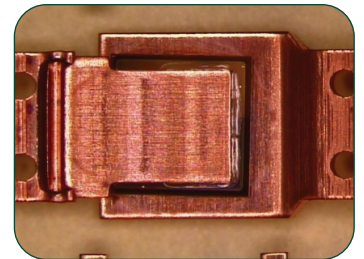
Why “power-safe” and not no-clean?

- **Possible concerns with flux residues**
 - Electrical “short” between adjacent conductors
 - Current leakage
 - Breakover voltage degradation
 - Contamination of wirebond pads
 - Interference with overmolding compound (OMC) adhesion
 - Delamination during MSL testing (JEDEC/IPC J-STD-020)
- **“Power-Safe” versus “No-Clean” terminology**
 - “No-clean”
 - Only for PCB assembly failure modes
 - Only standards are ANSI/IPC - PCB/SMT standards
 - No formal standard for semiconductor “no-clean”
 - “Power-Safe” term for customer-proven materials reliability
- **Device applicability**
 - “Power-safe” for selective non-wire bond applications, especially clip-bonding
 - Cleaning still dominant for wire bonded die



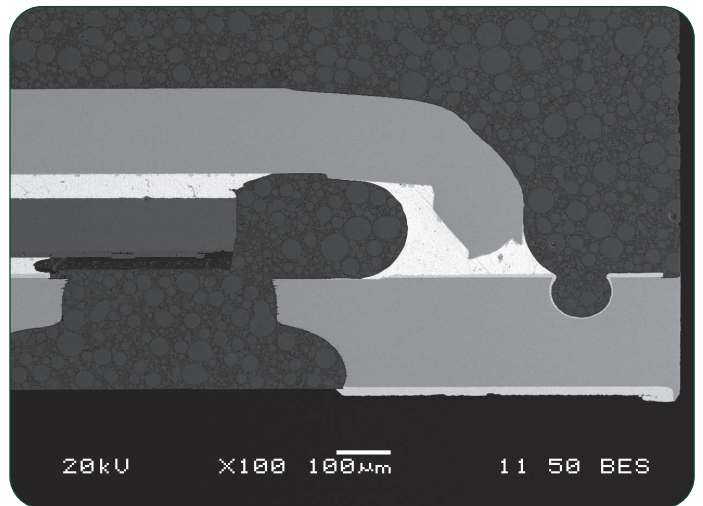
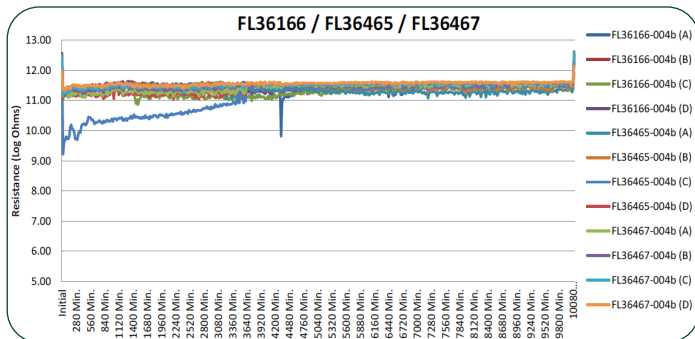
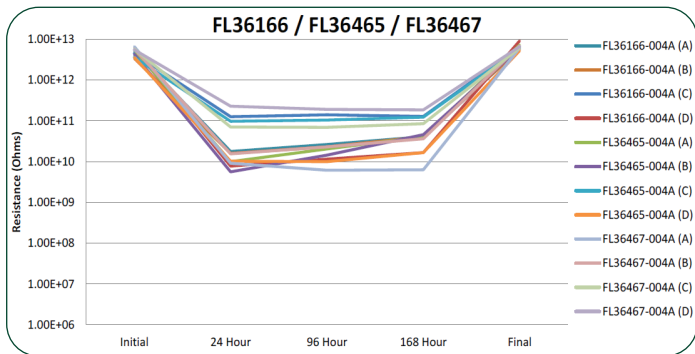
Compatibility with OMC NC-SMQ75

- Clip-bonded package
- 1,000 hours thermal cycle (-55°C–150°C)
- SEM of cross-section:
 - No evidence of flux residues
 - No delamination



SIR Results

Surface insulation resistance (SIR) test is for SMT failure modes, but may be indicative of utility in “Power-Safe” applications.



Contact our engineers: askus@indium.com

Learn more: www.indium.com

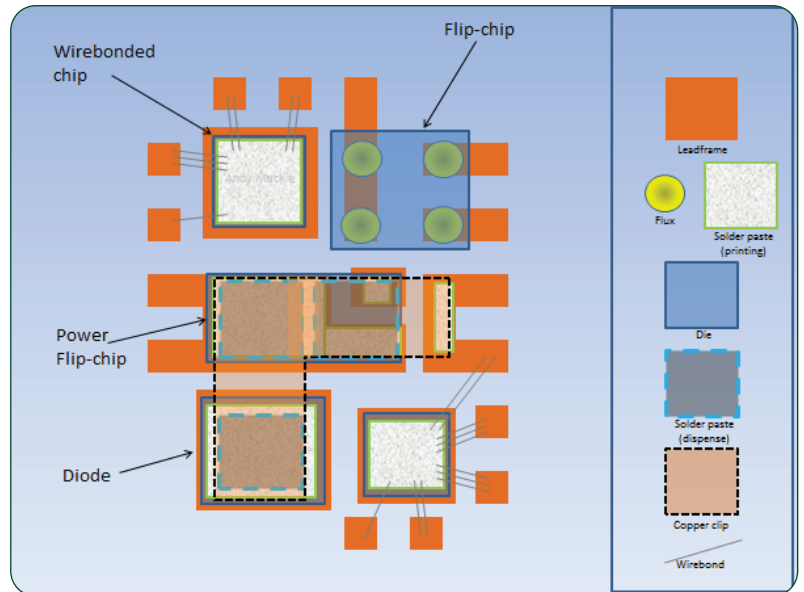


PRODUCT DATA SHEET

"Power-Safe" NC-SMQ75 Die-Attach Solder Paste

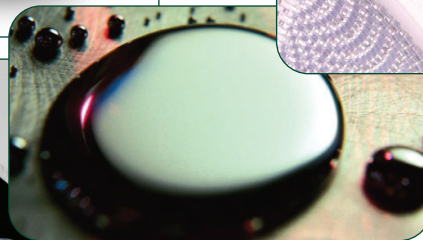
Assembly Materials for PQFN Packages

- **Die-attach**
 - High temperature Pb-free solder paste
- **Flip-chip on leadframe**
 - Fluxes
 - No-clean and water-wash
 - Solder pastes
 - Fine and ultra-fine pitch
 - Types 4, 5, 5.5, 6, 6-SG,7



Other Materials

- Solder pastes
- Fluxes
- Thermal interface materials
- Preforms



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

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



©2023 Indium Corporation