

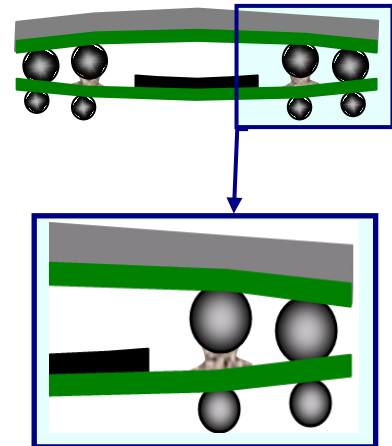
ALPHA[®] POP-959 SOLDER PASTE

No-Clean, Lead-Free Solder Paste for Package on Package Assembly

DESCRIPTION

To meet the demand of high-density and memory/logic options for sophisticated electronic devices, many assemblers are evaluating package on package (PoP) technology. PoP assemblies allow for higher electronic functionality per unit circuit board area, and allows low cost product memory customization, and highly flexible manufacturing. Unlike PoP flux, **ALPHA PoP-959** solder paste provides flux and solder powder, to help minimize defects associated with non-planar processor/memory combinations during the reflow process. The use of paste can help reduce costly defects associated with soldering known good memory devices to known good processor packages by bridging gaps that PoP flux alone may not.

ALPHA PoP-959 was designed to minimize expensive rework and scrap by providing highly repeatable paste volumes to Chip Scale (CSP) memory packages, while offering resistance to shear forces associated with PoP dip application equipment. **ALPHA PoP-959** maintains its rheology, even under frequent exposure to high shear, for at 24 hours. This means highly reproducible volumes of paste pick up in normal PoP dipping applications, reducing defects, increasing yields and reducing scrap. **ALPHA PoP-959** is a no-clean, lead-free solder paste. By optimizing ultra-fine solder powder and physical properties of flux, it is ideal for 150 to 300 μ offset Chip Scale packages, while leaving a clear, colorless, residue with very high electrical resistivity.



READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

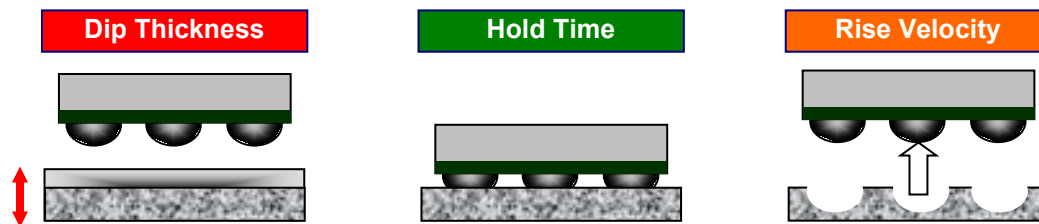
PRODUCT INFORMATION

<u>Alloy:</u>	SAC305 (96.5%Sn, 3.0%Ag, 0.5%Cu)
<u>Particle Diameter:</u>	Type 5 (15 to 20 μ m / IPC J-STD-005)
<u>Packaging:</u>	500g Jar, 600g/1200g Cartridges, 30CC Syringe (100g)

APPLICATION GUIDELINES

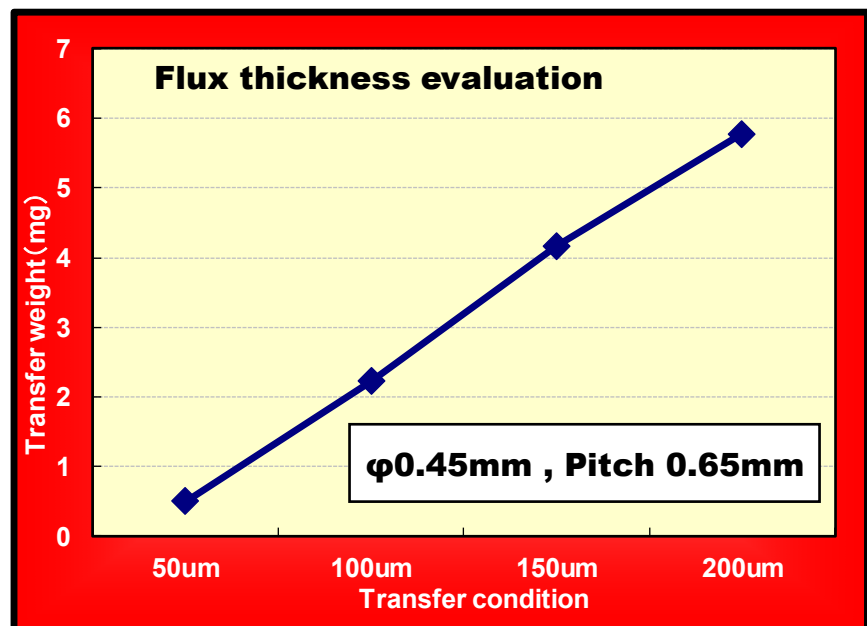
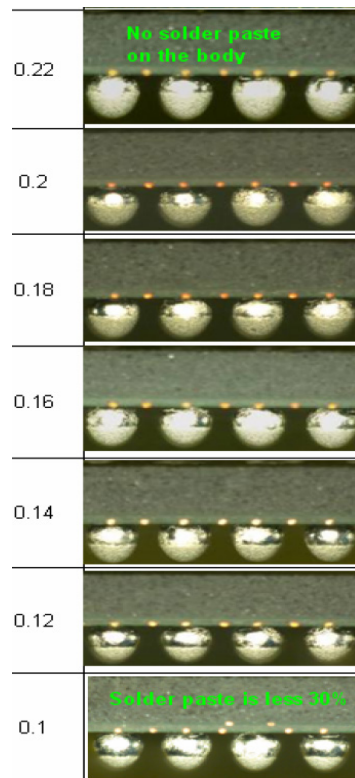
Transfer Property

For some PoP pastes, transfer weight depends on process parameters such as Dip thickness, hold time and rise velocity. **ALPHA PoP-959**'s pick up weight is primarily determined by dip thickness. Hold time and rise velocity have little or no effect. This gives PoP packagers a broad process window for dwell time and rise velocity.



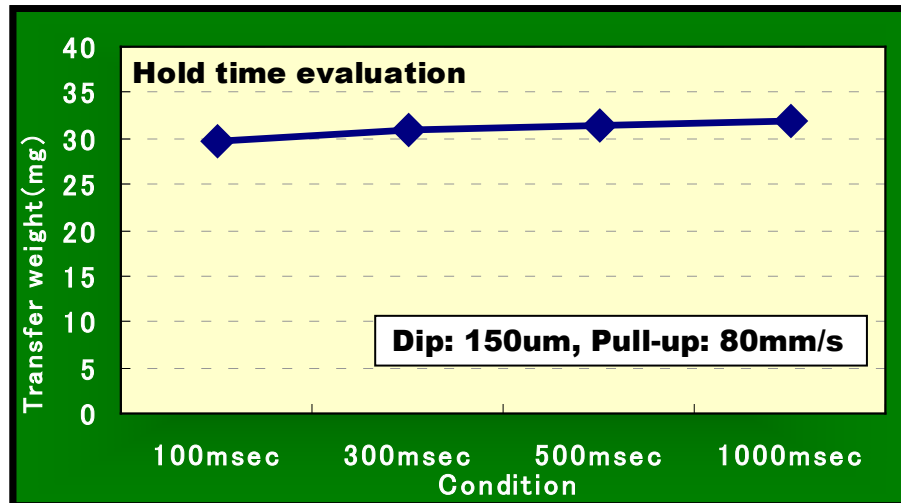
Dip Thickness

Generally, transfer amounts depend on flux thickness. Paste thickness in the dipping station should be 30 to 50% of the bump height. (30 to 50% of the distance from the bottom of the sphere to the bottom of the package).

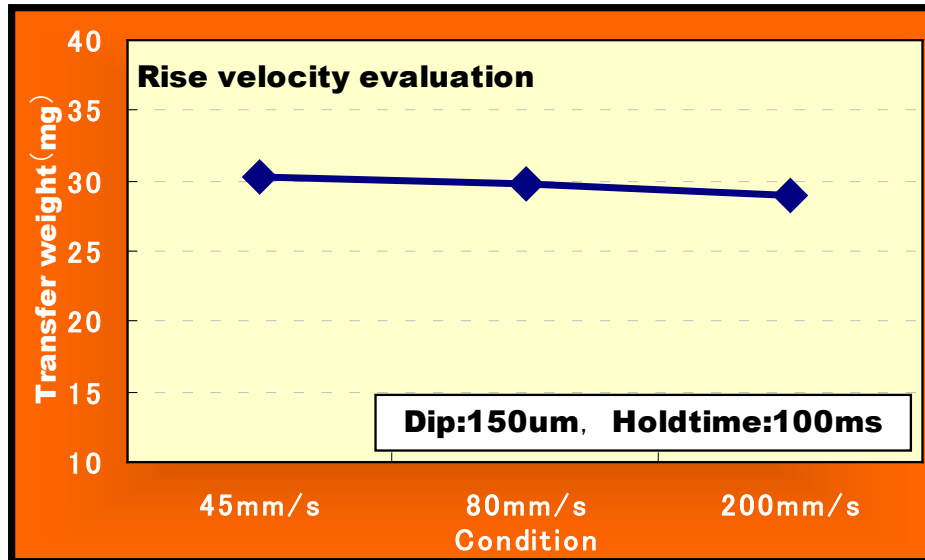


Hold Time

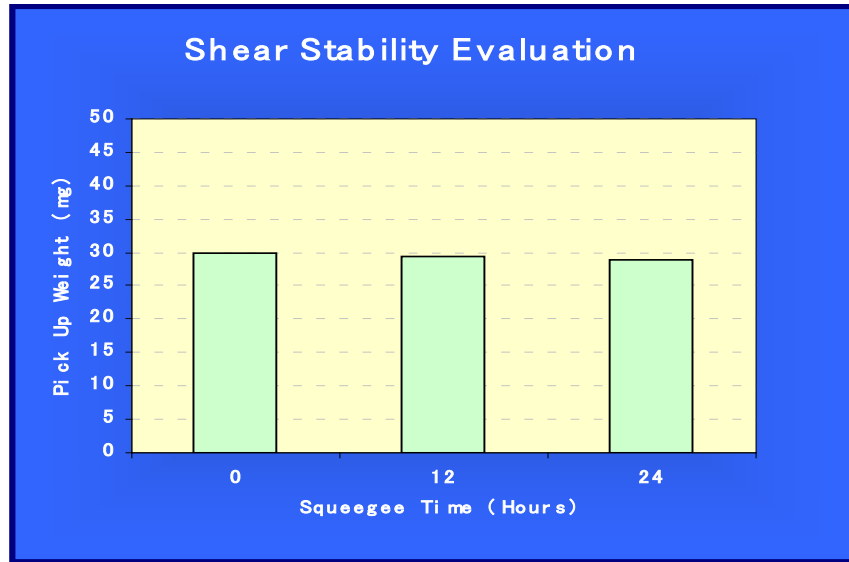
Hold time has less effect on transfer amounts. **ALPHA PoP-959** paste shows equivalent pick up weight in a window of dwell times between 100 milliseconds and 1 second.



Rise velocity has no effect on transfer amount between 50mm/sec and 200mm/sec

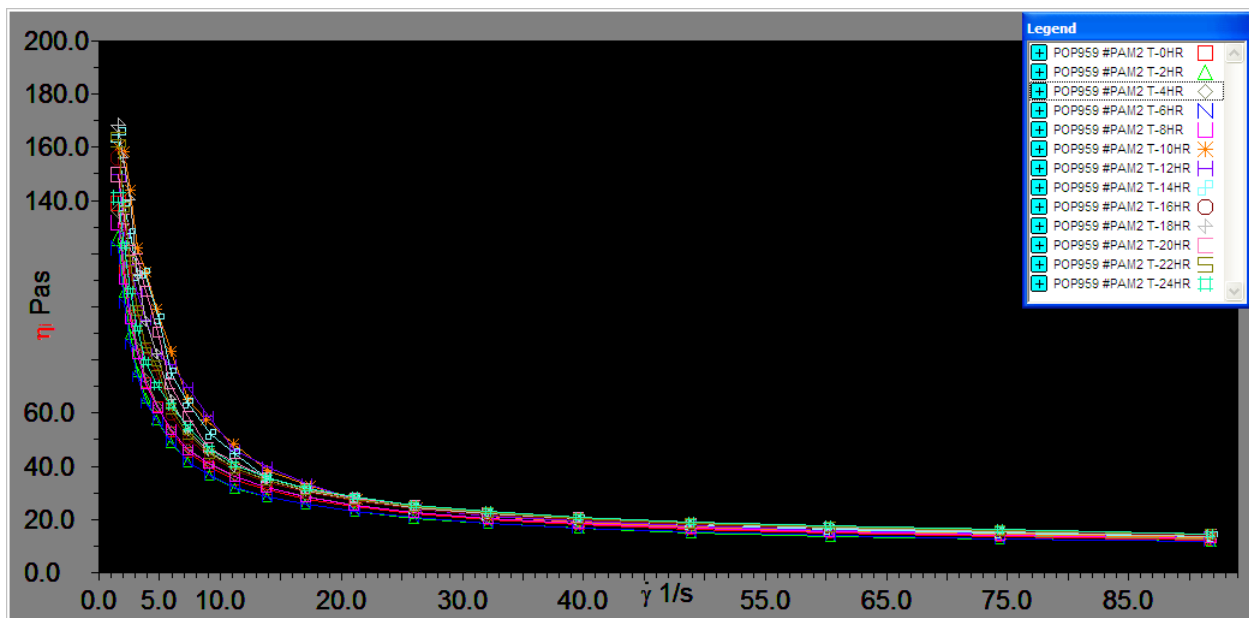


Continuous Squeegee Stability



ALPHA PoP-959 paste excels in bump transfer efficiency. This efficiency remains stable after continuous squeegee for 24 hours (25 °C/50%Rh). This graph shows how the rheology of **ALPHA PoP-959** remains stable over 24 hours exposure to shear. The shear was generated by a doctor blade passing at a height of 200 microns over the paste at a speed of 50mm/sec. (2 inches/sec.) in 30 second intervals.

Paste samples were then tested every 2 hours using a Bohlin Rheometer. No significant change in rheology over 24 hours was observed.



Joint Strength

Shear Strength for Bump	
Shear Speed	100µm/sec
Shear Height	50µm

Condition of Joint Strength Evaluation

Bump on the top side package:

SAC302

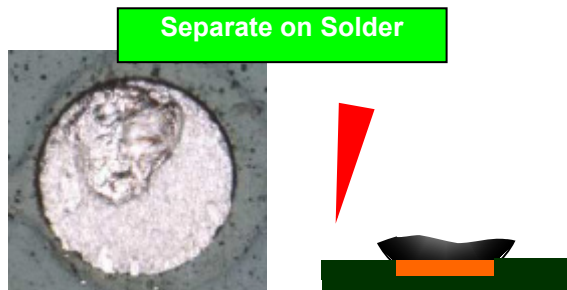
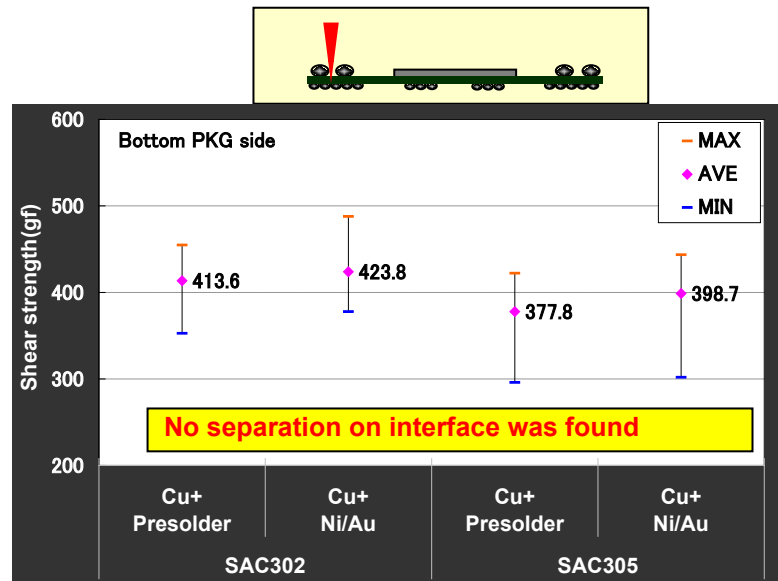
SAC305

Pad finishes for the bottom side package:

Cu HASL

Cu/Ni/Au

The result shows high joint strength under each Cu surface condition.



Shear starts from the solder not from the joint interface. The joint strength provided by this solder paste is sufficient.

TECHNICAL DATA

Category	Results	Procedure/Remarks
Chemical Properties		
Activity Level	ROL-0 = J-STD Classification	IPC J-STD-004
Halide Content	Halide Free (by titration & IC)	IPC J-STD-004
Ag Chromate Test	PASS	IPC J-STD-004
Copper Corrosion Test	PASS	IPC J-STD-004
	PASS	JIS Z 3197-1986
Talc Test	PASS	JIS Z 3197
Electrical Properties		
IPC SIR (168 hours @ 85 °C/85% RH)	PASS, 1.8×10^{10} ohms	IPC J-STD-004 {Pass $\geq 1 \times 10^8$ ohm min}
Bellcore SIR (96 hours @ 35 °C/85%RH)	PASS, 1.9×10^{12} ohms	Bellcore GR78-CORE {Pass $\geq 1 \times 10^{11}$ ohm min}
IPC/Bellcore Electro migration (Bellcore 96 hours @ 65 °C/85%RH 10V 500 hours)	PASS, Initial = 7.8×10^8 ohms Final = 8.2×10^9 ohms	Bellcore GR78-CORE {Pass = final > initial/10}
JIS Electro migration (1000 hours @ 85 °C/85%RH 48V 1000 hours)	Final reading > 1.0×10^{10} ohms No migration after 1000hrs PASS	JIS Z 3197:1999
HP ECM Test (28 days @ 50 °C/90%RH 5V)	PASS on Cu/ImmAg/ImmSn finish. No migration after 28 days	Hewlett-Packard EL-EN861-00 {Pass $\geq 1 \times 10^8$ ohm min}
Physical Properties		
Color	Clear, Colorless Flux Residue	
Viscosity	78% metal designated M04 80% metal designated M05	Malcom Spiral Viscometer; JIS Z 3284 Annex 6
Solder ball	Acceptable (SAC 305 alloy) Tested after 4 hours storage @ 25%, 50% and 85% RH.	IPC TM-650 2.4.43/JIS Z 3284 Annex 11
Stencil Life	> 24 hours	25 °C (77 °F)
Spread	> 80 %	JIS Z 3197:1999 8.3.1.1

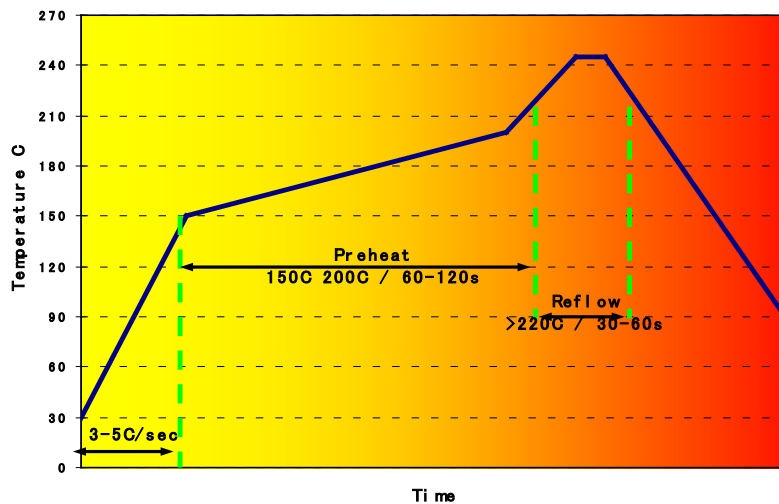
PROCESSING GUIDELINES

Storage & Handling

Condition Refrigeration @ 10 to 10 °C (32 to 50 °F)
 Period 6 months
 Test Method Malcolm Viscosity

REFLOW PROFILES

Atmosphere	N2 100ppm and below for pre-stack Air reflow for On-board-stack
Rate of Temperature Increase	3 to 5 °C/sec
Preheat	150 to 200 °C/60 to 120sec
Reflow	220 °C and above for 30 to 90sec.
Peak Temperature	240 to 250 °C within 10sec.



RECYCLING SERVICES

We provide safe and efficient recycling services to help companies meet their environmental and legislative requirements and at the same time, maximize the value of their waste streams.

Our service collects solder dross, solder scrap, and various forms of solder paste waste. Please contact your local sales representative for recycling capabilities in your area or [link here](#).



SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use. **Safety Data Sheets are available at MacdermidAlpha.com/assembly-solutions/knowledge-base.**

CONTACT INFORMATION

To confirm this document is the most recent version, please contact
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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE . Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588

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