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MacDermid Alpha ELECTRONICS SOLUTIONS

TECHNICAL DATA SHEET

ALPHA® OM-5100

Fine Pitch Solder Paste

DESCRIPTION

ALPHA OM-5100, is a low residue, no-clean solder paste designed to maximize SMT line yields. The flux vehicle is rheologically formulated to provide excellent repeatability and resistance to environmental conditions. The **ALPHA OM-5100** activation system has been optimized to enhance joint solderability, limit soldering defects and maintaining long term reliability. Minimizing defects requires robust and repeatable processes, equipment and materials.

ALPHA OM-5100's wide reflow profile window enables soldering of lead free components with this tin lead paste. Tests show that complex assemblies with small (0201) tin finished passives and large (1 mm pitch) BGA components with SAC 305 spheres can be assembled. Small print deposits remain fully coalesced, even in profiles hot enough to collapse SAC 305 BGA spheres.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- Quick start up and simple product substitution from current material
- Print Consistency: Lower "deposit to deposit" variation drives maximization of first pass print and reflow yields
- Print Repeatability: Lower variability after production dwells, ensuring a continuous production flow with minimized level of insufficient solder joints
- Solder Ball Reduction: Minimizing both mid chip and random solder balls helps to maximize reflow yields
- Excellent Solder Spread: Compatibility with a variety of pad and lead finishes drives overall cosmetics and yields up!
- Response to pause performance, generating less defects due to start up
- High print speed, up to 150 mm/sec (6 inch/sec)
- Efficient activation system providing defect free soldering with a wide range of oven profiles
- Low residue level with minimal spread for reliable underfilling processes and results
- Excellent reliability properties, halide-free material
- Enables assembly of Pb free components with tin lead solder paste

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PRODUCT INFORMATION

Alloys:	62Sn/36Pb/2Ag, 63Sn/37Pb, 5Sn/92.5Pb/2.5Ag and 62.8Sn/36.8Pb/0.4Ag (NT4S, Anti Tombstoning Alloy)
Powder Size:	Type 3 (25 to 45 μm) or Type 4 (20 to 38 μm) per IPC J-STD-005.
Packaging Sizes:	500 gram jars, 6 inch and 12 inch cartridges, and DEK ProFlow™ cassettes.
Flux Gel:	Available in 10cc and 30cc syringes for rework applications.

APPLICATION GUIDELINES

Formulated for both standard and fine pitch SMT stencil printing with apertures down to 0.3 mm (12 mil) diameter and print speeds up to 150 mm/sec (6 inch/sec) with standard stencil thickness of 0.100 mm (4 mil) to 0.150 mm (6 mil), particularly when used in conjunction with ALPHA Stencils.

TECHNICAL DATA

Category	Results	Procedures/Remarks
Chemical Properties		
Activity Level	ROL0 = J-STD Classification (Passes Copper Mirror Test (L))	IPC J-STD-004
	Passes Copper Corrosion Test	IPC J-STD-004
Halide Content	Halide-free (by titration); Passes Ag Chromate Test	IPC J-STD-004
Electrical Properties		
SIR (IPC 7 days @ 85 °C /85% RH)	2.6 x 10^9 ohms	Pass, IPC J-STD-004 {Pass = 1 x 10^8 ohm min, uncleaned}
SIR (Bellcore 96 hrs @ 35 °C/85%RH)	1.9 x 10^{12} ohms	Pass, Bellcore GR78-CORE {Pass = 1 x 10^{11} ohm min}
Electromigration (Bellcore 500 hrs @ 65 °C/85° RH)	*initial* 1.4 x 10^9 ohms, *final* 9.3 x 10^9 ohms	Pass, Bellcore GR78-CORE 62Sn/36Pb/2Ag {Pass= final > initial/10}
Physical Properties	Using 90% Metal, Type #3 Powder	
Flux Residue Cosmetics	Clear, Colorless Flux Residue.	63Sn/37Pb alloy

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Category	Results	Procedures/Remarks
Tack Force vs. Humidity (24 hrs)	Less than 1g/mm^2 change at 25%,50% and 75% RH	IPC J-STD-005
Solderball	Pass < 10 count (62Sn/36Pb/2Ag, 63Sn/37Pb alloy)	Pass IPC J-STD-005
Stencil Life	> 8 hours	@ 50%RH, 23 °C (74°F)
Slump	Hot Slump & Cold Slump Pass	IPC J-STD-005
	Pass	DIN Standard 32 513, 5.3

PROCESSING GUIDELINES

Storage & Handling	Printing	Reflow	Cleaning
Refrigerate to guarantee stability @ 0 to 10 °C (32 to 50 °F)Shelf life of refrigerated paste is six months. Paste can be stored for 4 weeks at room temperatures up to 25 °C (77 °F). When refrigerated, warm-up of paste container to room temperature for up to 8 hours. Paste must be ≥18 °C (64 °F) before processing. Verify paste temperature with a thermometer to ensure paste is at 18 °C (64 °F) or greater before setup. Printing can be performed at temperatures up to 28 °C (82 °F). Do not remove worked paste from stencil and mix with unused paste in jar. This will alter rheology of unused paste.	Stencil: Recommend ALPHA CUT or ALPHA FORM stencils @ 0.100 to 0.150 mm (4 to 6 mil) thick for 0.4 to 0.5 mm (0.016 to 0.020 inch pitch. Stencil design is subject to many process variables. Contact your local Alpha site for advice. Squeegee: Metal. Pressure: 0.15 to 0.3 kg per cm (0.8 to 1.5 pounds per linear inch) of squeegee length. Speed: 25 to 150 mm (1 to 6 inch) per second. Paste Roll: 1.5 to 2.0 cm (0.6 to 0.8 inch) diameter and make additions when roll reaches 1-cm (0.4 inch) diameter. Maximum roll size will depend upon blade type. Print Pump Head: ALPHA OM-5100 is suitable for use in both MPM RheoPump and DEK ProFlow systems.	Atmosphere: Clean-dry air or nitrogen atmosphere. Profile : 63Sn/37Pb, 62Sn/36Pb/2Ag and 62.8Sn/36.8Pb/0.4Ag alloys: A straight ramp profile @ 0.8 to 1.2 °C per second ramp rate is recommended with a 30 to 90 sec TAL and 210 to 220 °C peak. High density assemblies may require preheating as follows: - Ramp @ 1 to 2 °C/sec. to 140 to 160 °C. - Dwell @ 140 to 160 °C for 0 to 1.0 minutes. - Ramp @ 1 to 2 °C/sec to 210 to 220 °C peak - Time above liquidus = 30 to 90 secs - Ramp down to R.T. @ 60 to 150 °C/min.	ALPHA OM-5100 residue is designed to remain on the board after reflow. Misprints and soft flux residues remaining after rework may be removed with ALPHA Electronic Cleaners SM-110 & SM-110E and Hydrex™ SP Aqueous cleaners available from Alpha.

These are starting recommendations and all process settings should be reviewed independently.

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REFLOW PROFILES

Figure #1: Typical Reflow Profiles

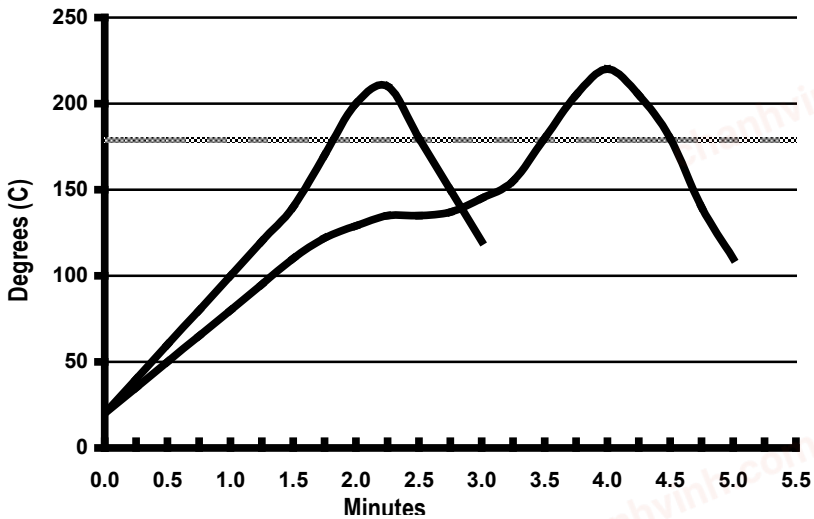
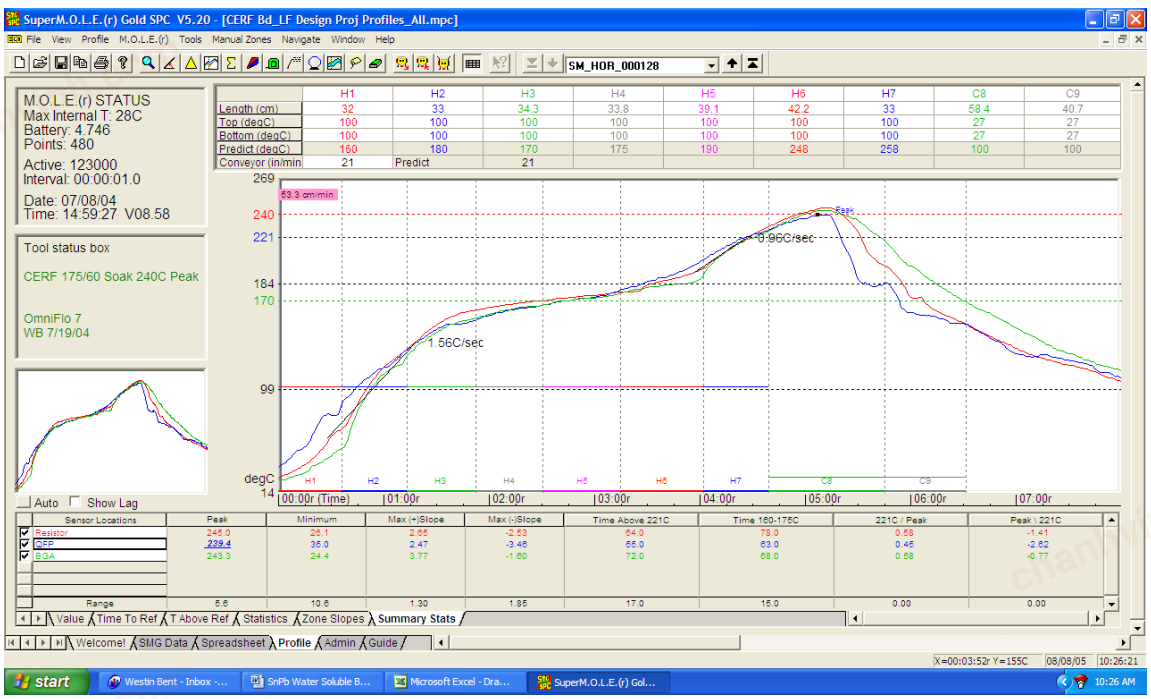


Figure #2 –ALPHA OM-5100 Paste with Typical SAC Reflow Profile Phrase
ALPHA OM-338 Reflow Profile: High Soak: 175 °C/60 sec Soak 240 °C Peak 60 sec TAL



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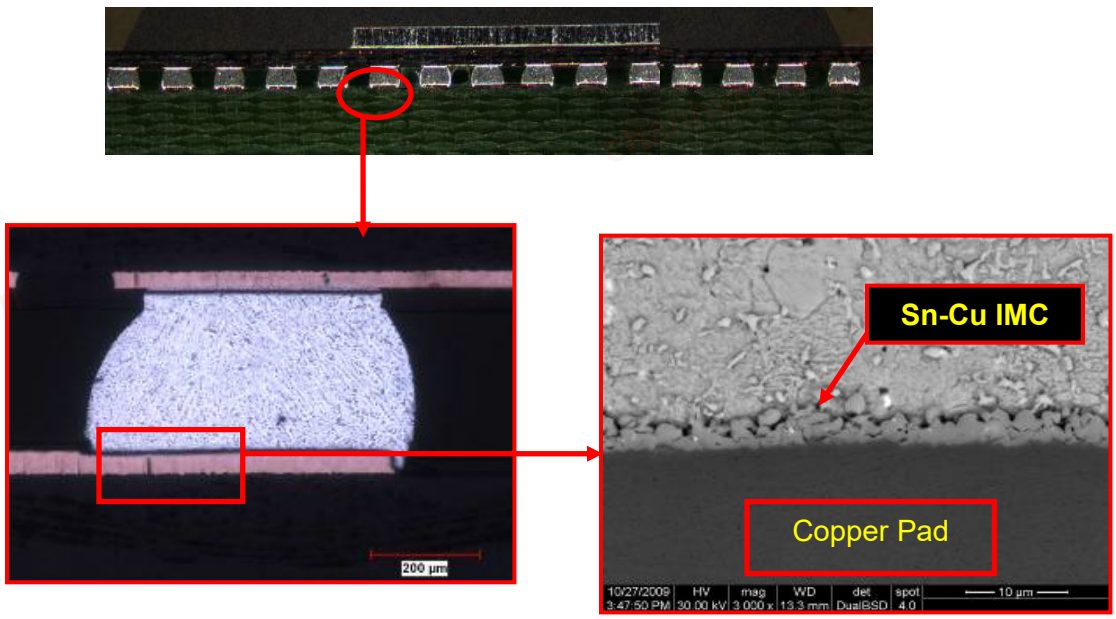
Analyses of OM-5100 Eutectic paste reflowed with SAC305 Spheres on BGA Package

As Sn/Pb components become more and more difficult to source mixed formulation solder joints are now becoming common place in electronics assemblies. For example, area array components (BGA/CSP) are almost exclusively available with led free Sn-Ag-Cu (SAC) solder spheres. These parts are often assembled to printed circuit boards using traditional Sn-Pb eutectic solder paste. This is now common in Medical, Military and Automotive industries. ALPHA OM-5100's unique flux chemistry allows the user to process the eutectic alloy of ALPHA OM-5100 paste with lead free components in a typical lead-free reflow profile. The figures below are examples of ALPHA OM-5100 eutectic solder paste reflowed with a SAC305 BGA package and Sn coated chip components.

The pictures in Figures 3 and 4 are on the same board. Showing lead free components re-flowing into eutectic solder paste as well as allowing fine feature printing and full joint coalescence at the 0201 feature pad.

Figure #3 – ALPHA OM-5100 Paste reflowed to BGA having SAC305 solder spheres



These cross section photos illustrate the formation of a uniform and continuous IMC layer at the eutectic solder paste and SAC sphere interfaces. Note how upon collapse, the SAC alloy and the Sn63 from the paste form a continuous joint.

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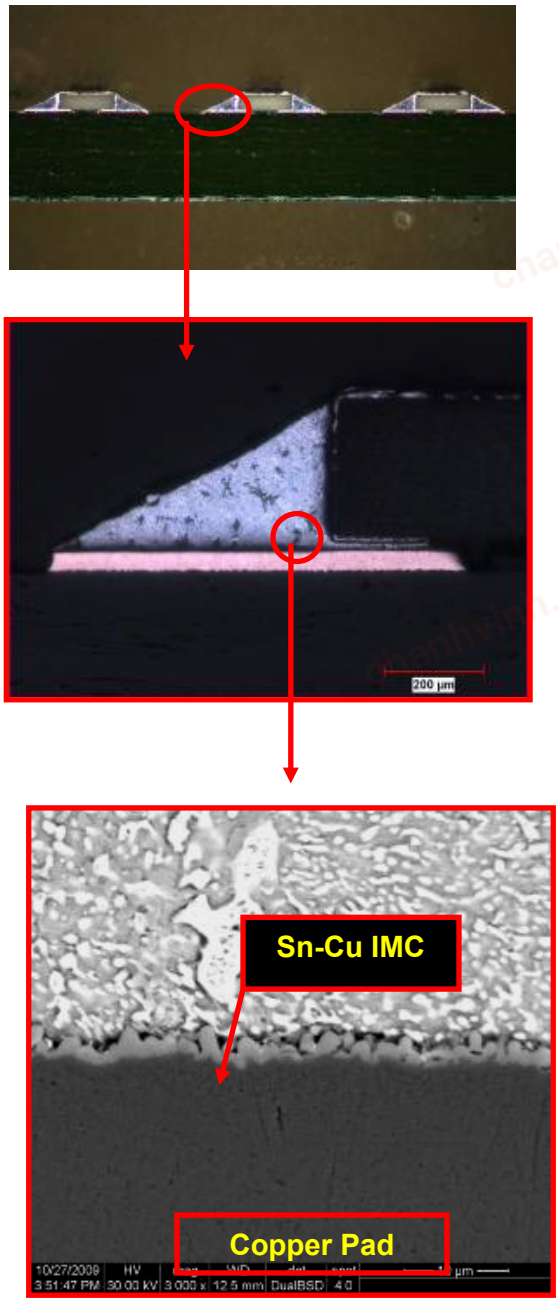
Figure #4 – ALPHA OM-5100 Paste reflowed to Sn plated 0201 Chip component



The cross section of the 0201 chip component reveals formation of a uniform and continuous IMC layer at the interface.

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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.



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.**

STORAGE

ALPHA OM-5100 should be stored in a refrigerator upon receipt at 0 to 10 °C (32 to 50 °F). Permit paste to reach room temperature prior to opening, as this will prevent condensation of moisture on the solder paste. Other storage conditions are shown on page 3.

CONTACT INFORMATION

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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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