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ALPHA

TECHNICAL BULLETIN

SM871-13

ALPHA® OM-338-T

ULTRA FINE FEATURE LEAD-FREE SOLDER PASTE

DESCRIPTION

ALPHA OM-338-T is a lead-free, no-clean solder paste designed for a broad range of applications. **ALPHA OM-338-T's** broad processing window is designed to minimize transition concerns from tin/lead to lead free solder paste. This material is engineered to deliver the comparable performance to a tin lead process.* **ALPHA OM-338-T** yields excellent print capability performance across various board designs and, particularly, with ultra fine feature repeatability (11 mil Squares) and high throughput applications.

Outstanding reflow process window delivers good soldering on CuOSP with excellent coalescence on a broad range of deposit sizes, excellent random solder ball resistance and mid-chip solder ball performance. **ALPHA OM-338-T** is formulated to deliver exceptional visual joint cosmetics. Additionally, **ALPHA OM-338-T's** capability of IPC Class III for voiding and ROL0 IPC classifications ensures maximum long-term product reliability.

ALPHA OM-338-T is also known as ALPHA OM-338 with M13 viscosity.

**Although the appearance of these lead-free alloys will be different to that of tin-lead, the mechanical reliability is equal to or greater than with that of tin-lead or tin-lead-silver.*

FEATURES & BENEFITS

- Maximizes reflow yield for lead-free processing, allowing full alloy coalescence at circular dimensions as small as 0.25mm (0.010") with 0.100mm (4mil) stencil thickness.
- Excellent print consistency with high process capability index across all board designs.
- Print speeds of up to 200mm/sec (8"/sec), enabling a fast print cycle time and a high throughput.
- Wide reflow profile window with good solderability on various board / component finishes.
- Excellent solder and flux cosmetics after reflow soldering
- Reduction in random solderballing levels, minimizing rework and increasing first time yield
- Meets highest IPC 7095 voiding performance classification of Class III.
- Excellent reliability properties, halide-free material
- Compatible with either nitrogen or air reflow

PRODUCT INFORMATION

Alloys:	SAC305 (96.5%Sn/3.0%Ag/0.5%Cu) SAC387 (95.5%Sn/3.8%Ag/0.7%Cu) SAC396 (95.5%Sn/3.9%Ag/0.6%Cu) SAC405 (95.5%Sn/4.0%Ag/0.5%Cu) SACX Plus™ 0307(98.9%Sn/0.3%Ag/0.7%Cu/0.1%Bi) SACX Plus™ 0807 (98.4%Sn/0.8%Ag/0.7%Cu/0.1%Bi) e1 alloys per JESD97 Classification For other alloys, contact your local Cookson Electronics Sales Office.
Powder Size:	Type 3, (25-45µm per IPC J-STD-005) Available in Type 4 by Special Request. All data below was developed using Type 3 powder.
Residues:	Approximately 5% by (w/w)

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Packaging Sizes: 500 gram jars, 6" & 12" cartridges, and 10cc and 30cc dispense syringes.
Flux Gel: OM-338 Flux Gel is available in 10cc and 30cc syringes for rework applications.
Lead Free: Complies with RoHS Directive 2002/95/EC.

APPLICATION

Formulated for both standard and fine pitch stencil printing, at print speeds of between 25mm/sec (1"/sec) and 200mm/sec (8"/sec), with stencil thickness of 0.100mm (0.004") to 0.150mm (0.006"), particularly when used in conjunction with ALPHA® Stencils. Blade pressures should be 0.16-0.34 kg/cm of blade (0.9 -2Ibs/inch), depending upon the print speed. The higher the print speed employed, the higher the blade pressure that is required. The reflow process window will give high soldering yield with good cosmetics and minimized rework.

SAFETY

While the **ALPHA OM-338-T** flux system is not considered toxic, its use in typical reflow will generate a small amount of reaction and decomposition vapors. These vapors should be adequately exhausted from the work area. Consult the MSDS for additional safety information.

STORAGE

ALPHA OM-338-T should be stored in a refrigerator upon receipt at 0 to 10°C (32-50°F). **ALPHA OM-338-T** should be permitted to reach room temperature before unsealing its package prior to use (see handling procedures on page 2). This will prevent moisture condensation build up in the solder paste.

ALPHA OM-338-T TECHNICAL DATA

CATEGORY	RESULTS	PROCEDURES/REMARKS
CHEMICAL PROPERTIES		
Activity Level	ROL-0 = J-STD Classification	IPC J-STD-004A
Halide Content	Halide free (by titration). Passes Ag Chromate Test	IPC J-STD-004A
Copper Mirror Test	**Pass**	IPC J-STD-004A
Copper Corrosion Test	**Pass**, (No evidence of Corrosion)	IPC J-STD-004A
ELECTRICAL PROPERTIES		
SIR (IPC 7 days @ 85° C/85% RH)	**Pass**, > 1.9×10^{10} ohms	IPC J-STD-004A {Pass ≥ 1×10^{8} ohm min}
SIR (Bellcore 96 hours @ 35°C/85%RH)	**Pass**, 8.3×10^{12} ohms	Bellcore GR78-CORE {Pass ≥ 1×10^{11} ohm min}
Electromigration (Bellcore 96 hours @ 65°C/85%RH 10V 500 hours)	**Pass**, Initial= 5.3×10^{10} ohms Final= 1.5×10^{11} ohms	Bellcore GR78-CORE {Pass=final > initial/10)
PHYSICAL PROPERTIES		Using 88.5% Metal, Type #3 Powder.
Color	Clear, Colorless Flux Residue	SAC 305, 405 alloy
Tack Force vs. Humidity (t=8 hours)	**Pass** -Change of <1 g/mm^2 over 24 hours at 25% and 75 % Relative Humidity	IPC J-STD-005
	Pass -Change of <10% when stored at 25 ± 2°C and 50 ± 10% relative humidity.	JIS Z3284 Annex 9
Viscosity	OM-338-T: 88.5% metal load designated M13 for printing. OM-338: 83.3% metal load designated M04 for dispensing.	Malcom Spiral Viscometer; J-STD-005
Solderball	**Acceptable** (SAC 305 and SAC405 alloys)	IPC J-STD-005
	Pass Class 2, 1 hour and 72 hour	DIN Standard 32 513, 4.4

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Stencil Life	> 8 hours	@ 50%RH, 23°C (74°F)
Spread	**Pass**	JIS-Z-3197: 1999 8.3.1.1
Flux Tackiness Test	**Pass**	DIN 32513 Talc Test
Slump	**Pass**	IPC J-STD-005 (10 min 150°C)
	Pass	DIN Standard 32 513, 5.3
	Pass	JIS-Z-3284-1994 Annex 8

ALPHA OM-338-T Processing Guidelines

STORAGE-HANDLING

- Refrigerate to guarantee stability @ 0-10°C (32-50°F)
- Shelf life of refrigerated paste is six months.
- Paste can be stored for 2 weeks at room temperatures up to 25°C (77°F) prior to use.
- When refrigerated, warm-up of paste container to room temperature for up to 4 hours. Paste must be ≥19°C (66°F) before processing. Verify paste temperature with a thermometer to ensure paste is at 19°C (66°F) or greater before setup. Printing can be performed at temperatures up to 29°C (84°F).
- Do not remove worked paste from stencil and mix with unused paste in jar. This will alter rheology of unused paste.
- These are starting recommendations and all process settings should be reviewed independently.

PRINTING

STENCIL: Recommend Cookson Electronics ALPHA CUT or ALPHA FORM stencils @ 0.100mm - 0.150 mm (4-6 mil) thick for 0.4 - 0.5 mm (0.016" or 0.020") pitch. Stencil design is subject to many process variables. Contact your local Cookson Electronics stencil site for advice.

SQUEEGEE: Metal (recommended)
PRESSURE: 0.16-0.34 kg/cm of squeegee length (0.9-2.0 lbs./inch).
SPEED: 25 to 200mm per second (1 to 8 inches per second).
STENCIL RELEASE SPEED: 5-20mm/sec.
PASTE ROLL: 1.5-2.0 cm diameter and make additions when roll reaches 1-cm (0.4") diameter (min). Max roll size will depend upon blade.
PRINT PUMP HEAD: Passes MPM 2000 print compaction and DEK ProFlow™ testing.

REFLOW (See Figure #1)

ATMOSPHERE: Clean-dry air or nitrogen atmosphere.
PROFILE (SAC Alloys):
A straight ramp profile @ 0.8°C to 1.7°C per second ramp rate is recommended (TAL 35 - 90 sec and peak 232-250°C). (1) Higher density assemblies may require preheating with within the profile and may be accomplished as follows:

- From 40°C to Liquidus: Between 2min 30 sec. and 4 min. (optimum(2) is 3 min.)
- From 170°C to Liquidus: Between 45 sec. and 75 sec. (optimum(2) is 1 min.)
- From 130°C to Liquidus: Between 1min. 20 sec. and 2 min. 15 sec. (optimum(2) is 1min. 30 sec.)
- Time above liquidus: Between 30 sec. and 90 sec. (optimum(2) is 45 sec. to 70 sec.)

Note 1: Refer to component and board supplier data for thermal properties at elevated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.
Note 2: OM-338 is designed to work under a wide range of reflow profiles in order to find the optimum profile for your process. This can be achieved by balancing:

(1) Minimum Delta T's (depending on board mass and thermal oven characteristics)
(2) Maximum Reflow Yield (includes voiding, cosmetics, solder balling, etc.)
(3) Minimum Stress and Overheat for Components and Boards (refer to suppliers' guidelines and specifications.

Contact your local Cookson Electronics Application Engineer for further details.

CLEANING

ALPHA OM-338-T residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, ALPHA BC-2200 aqueous cleaner is recommended. For solvent cleaning, agitation for 5 min in the following cleaners is recommended:
- ALPHA SM-110E
- Bioact™ SC-10E
- Kyzen Micronox MX2501
- ATRON® AC 205 (Zestron)

Misprints and stencil cleaning may be done with ALPHA SM-110E, ALPHA SM-440, ALPHA BC-2200, Bioact™ SC-10E and ZESTRON ® SD 301 cleaners.

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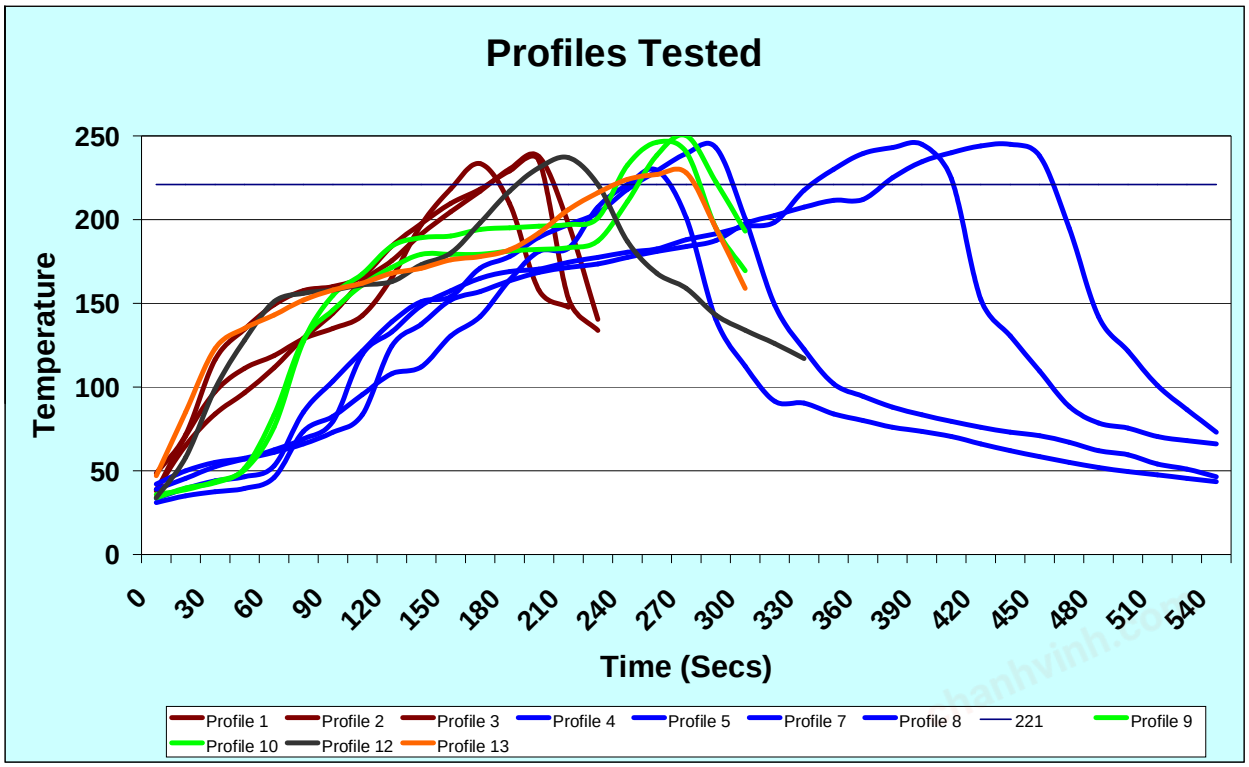
Figure #1 – Reflow Envelope



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