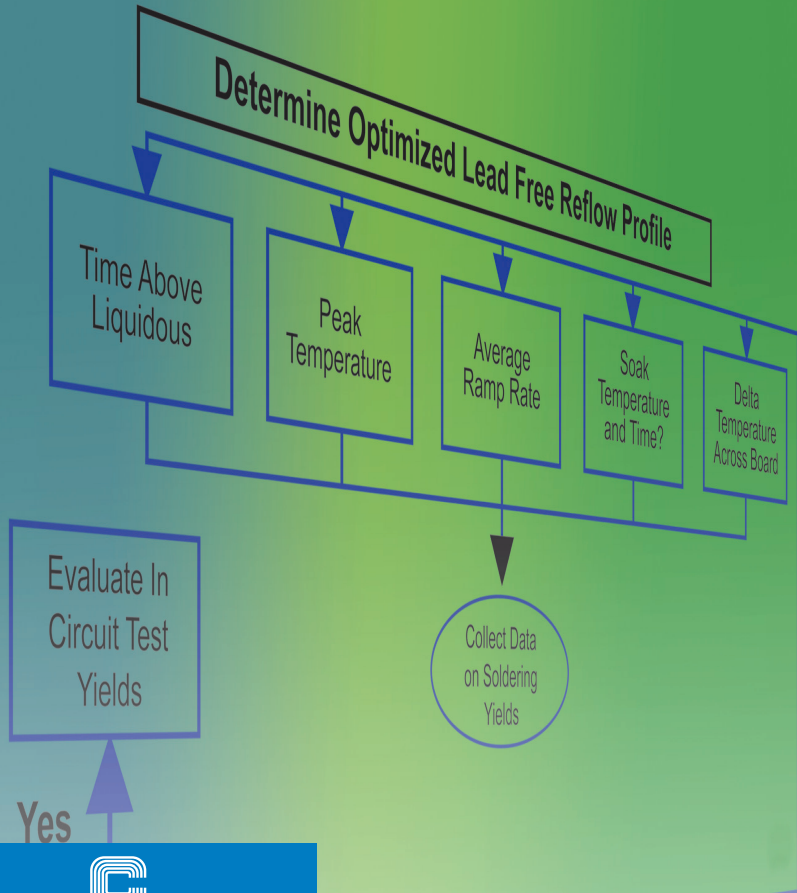


the product:

a superior lead-free solder paste that simplifies the transition to lead-free soldering.



ALPHA OM-338 Solder Paste

product guide

alpha



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SM809

Determine if Targeted Yield Levels Achieved



OM-338 solder paste

Introduction

Performance Summary

Printing Capabilities

Reflow Capabilities

Reliability Data

Applications Information

Summary

Technical Bulletin

MSDS

Welcome to the ALPHA OM-338 Solder Paste Interactive Product Guide

Simply click on the navigation buttons to quickly locate specific product information.

There are links to other documents and to Cookson Electronic's website, where you can obtain additional information. To use this feature, you must launch your internet browser.

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OM-338 solder paste

Introduction

- Delivery of a leading Lead-Free solder paste

[BACK TO MAIN MENU](#)

Introduction

With the electronics assembly industry accelerating towards Lead-Free processing, material suppliers must have products available that meet customer requirements.

Cookson Electronics is meeting this challenge today with a new broad latitude, no clean Lead-Free solder paste – ALPHA OM-338.

Careful analysis of the requirements for Lead-Free processing aligned Cookson Electronics' R&D department to deliver the product performance demanded by this new technology trend.

Using leading competitive products that are strongest in each of the product performance categories as benchmarks, Cookson Electronics evaluated its new product against the best performing products with the goal of delivering the new, best in class Lead-Free, no clean solder paste – ALPHA OM-338.

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OM-338 solder paste

Performance Summary

[BACK TO MAIN MENU](#)

- [Introducing ALPHA OM-338](#)

Performance Summary

Process Benefit	ALPHA OM-338 Attributes	Performance Capability
Print Process Window	Print Consistency	Best in class volume repeatability during 8 hours of continuous printing
	Ultra Fine Feature Transfer Efficiency	Excellent print repeatability to 0.25mm (10mil) circles and 0.4mm (16mil) pitch QFP
	Print Temperature	Excellent performance over a wide operating range of temperatures, 19°C to 29°C (66°F to 84°F)
	Response to Pause	Zero knead strokes required on 0.25mm (10 mil) circle apertures after 1 hour idle time
Print Cycle Time	Squeegee Speed	Excellent print consistency volume across a wide range of print speeds, 25mm/sec to 200mm/sec (1in/sec to 8in/sec)
Reflow Yield	Mid-Chip Solderballing	Good mid-chip solderball performance, even at 150 μ (6mil) stencil thickness, using laboratory testing procedure
	Voiding Performance	Superior voiding performance. Class III as per IPC 7095 7.4.1.6
	Random Solderballs	Passes IPC J-STD 005, DIN 32513 and JIS standards
	Post-Reflow Solder Cosmetics	Bright, smooth joints, suitable for ultra fine features {sub 0.3mm (12mil) circles} reflow coalescence with low volume, clear, colorless flux residues. No discoloration of flux residue even at elevated thermal profiles
	Pad Surface Compatibility	Excellent spread on NiAu, Immersion Ag and Sn pad finishes. Consistent solder spread on Cu OSP, supporting double sided reflow
	Hot/cold Slump Performance	Excellent hot and cold slump performance. Tested as per IPC, DIN and JIS standards



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OM-338 solder paste

Print Capabilities

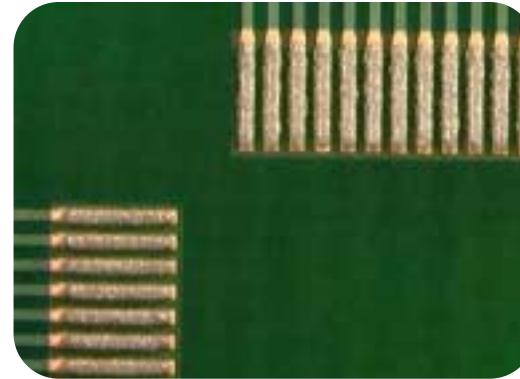
- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- Print Volume Consistency
- Print Temperature Window
- Response to Pause
- Print Speed
- Enclosed Head Capability

BACK TO MAIN MENU

Ultra-Fine Feature Print Definition



0.25 mm (10mil)
circular paste deposits



0.4mm (16mil) pitch deposits
after 4 prints without wiping

Delivering High Ultra-Fine Feature Print Yields

- Excellent print definition and consistent volumetric performance to 0.25mm (10mil) circles and 0.4mm (16mil) pitch pads
- Delivers repeatable 0201 component print and reflow capability using standard type 3 Lead-Free powder
- 5 to 8 prints per wipe at 0.4mm (16 mil pitch)
 - A higher number of prints per wipe will be achieved at larger pitches than 0.4mm (16mil)



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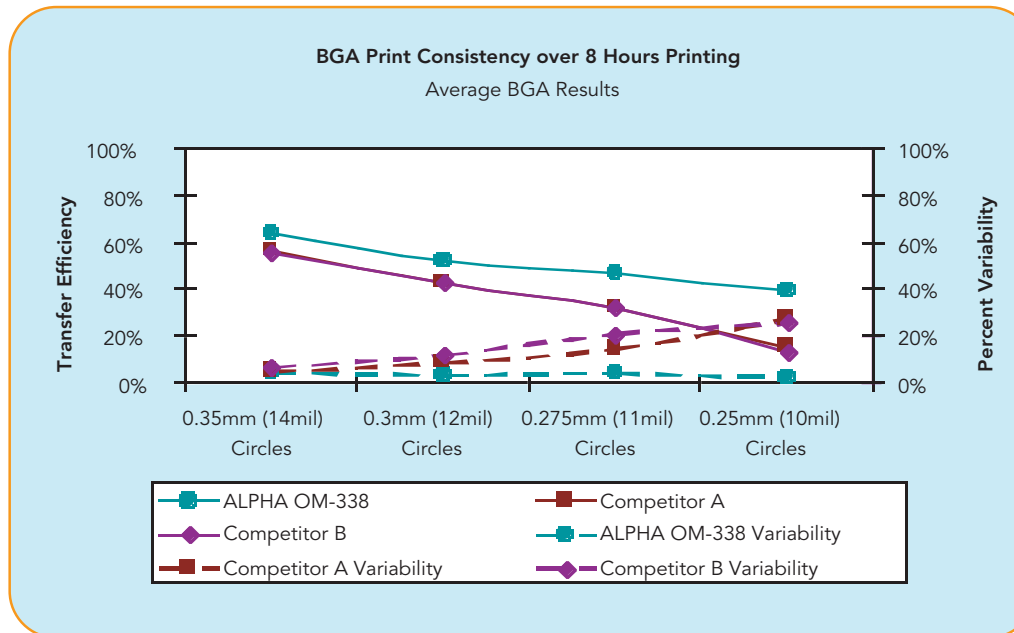
OM-338 solder paste

Print Capabilities

- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- Print Volume Consistency
- Print Temperature Window
- Response to Pause
- Print Speed
- Enclosed Head Capability

BACK TO MAIN MENU

Ultra Fine Feature Transfer Efficiency



Test Parameters

- Stencil Thickness: 0.125mm (5mil)
- Over 15,00 data points measured
- Print Speed 100mm/sec (4 in/sec)
- Pressure 0.22Kg/cm (1.25 lb/in)
- Separation speed = 0.75mm/sec (0.030"/sec)

Excellent Print Volume Efficiency Supports High Yield BGA Process

- Highest transfer efficiency and lowest variability
 - Across all products and features tested
- Suitable for high volume BGA applications, especially where 100% inspection is not possible

Note: Transfer efficiency is the percent of the measured volume to actual volume
Percent variability measured as a percentage of the transfer efficiency



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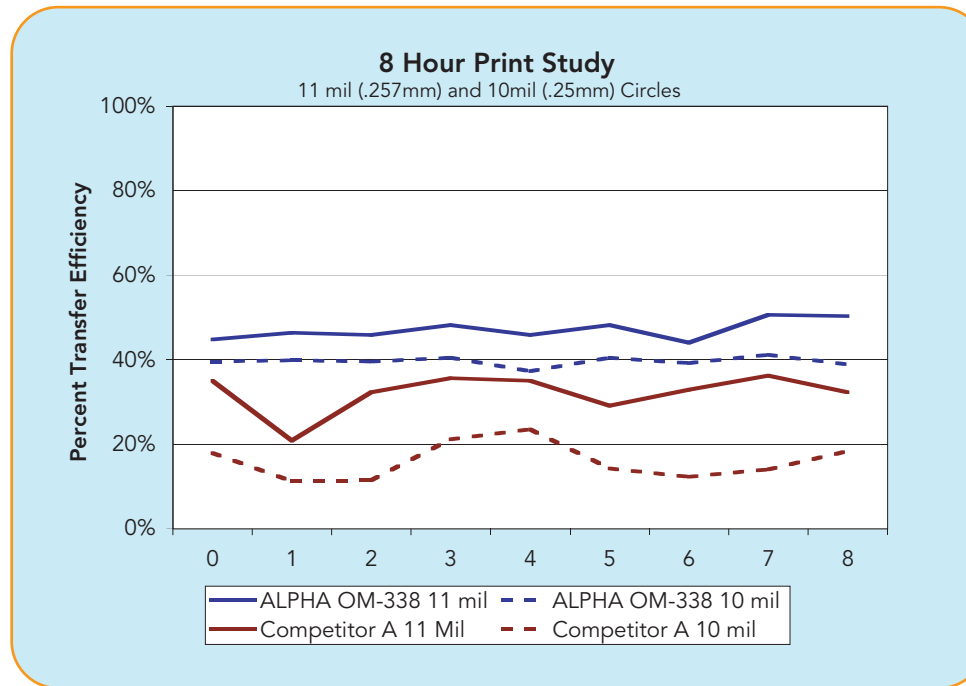
OM-338 solder paste

Print Capabilities

- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- **Print Volume Consistency**
- Print Temperature Window
- Response to Pause
- Print Speed
- Enclosed Head Capability

[BACK TO MAIN MENU](#)

Print Volume Consistency



Test Parameters

- Stencil Thickness: 0.125mm (5mil)
 - Print Speed 100mm/sec (4 in/sec)
 - Test boards are continually printed and samples are removed after every hour to measure volume deposition
 - Test board contains a range of QFP and BGA devices
 - QFP: 0.3 to 0.65mm (12 to 25mil) pitch
 - BGA: 0.25 to .36mm (10 to 14mil) circles
 - Test conducted with an SVS 8200 laser profiling measurement system
- Note: Solder Paste replenished as required.

Repeatable Volumes Over Time Support High Print Yields

- Continuous monitoring of paste volume over an 8 hour production run demonstrated ALPHA OM-338 as the best performer in recent global benchmark study involving over 14,000 data points
 - Highest transfer efficiency
 - Lowest variation during production



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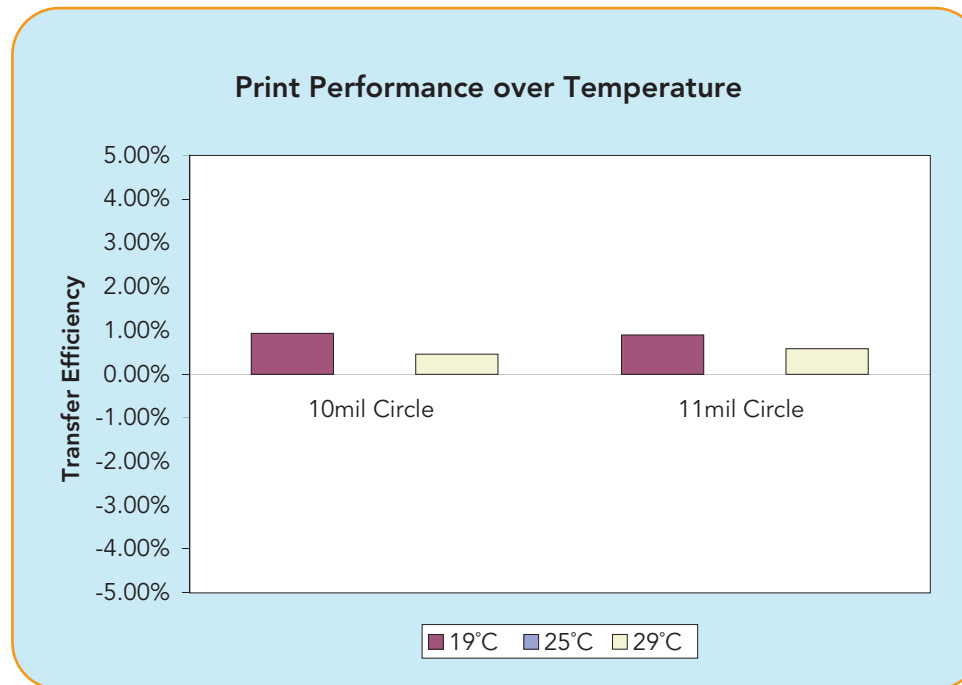
OM-338 solder paste

Print Capabilities

- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- Print Volume Consistency
- **Print Temperature Window**
- Response to Pause
- Print Speed
- Enclosed Head Capability

BACK TO MAIN MENU

Print Temperature Window



Performance Indicator

- Less than 1% change in transfer efficiency over wide temperature range demonstrates almost no process sensitivity.

Wide Print Temperature Window Reduces Cold Start-Up Related Defects

- Consistent deposition volume from cold start-up to full production temperatures
- Wide print temperature window 19°C to 29°C (66°F to 84°F)
 - Good release from print blades at all temperatures
 - No paste smearing on the top side of the stencil at cold temperatures
 - No requirements to increase squeegee pressures at lower temperatures



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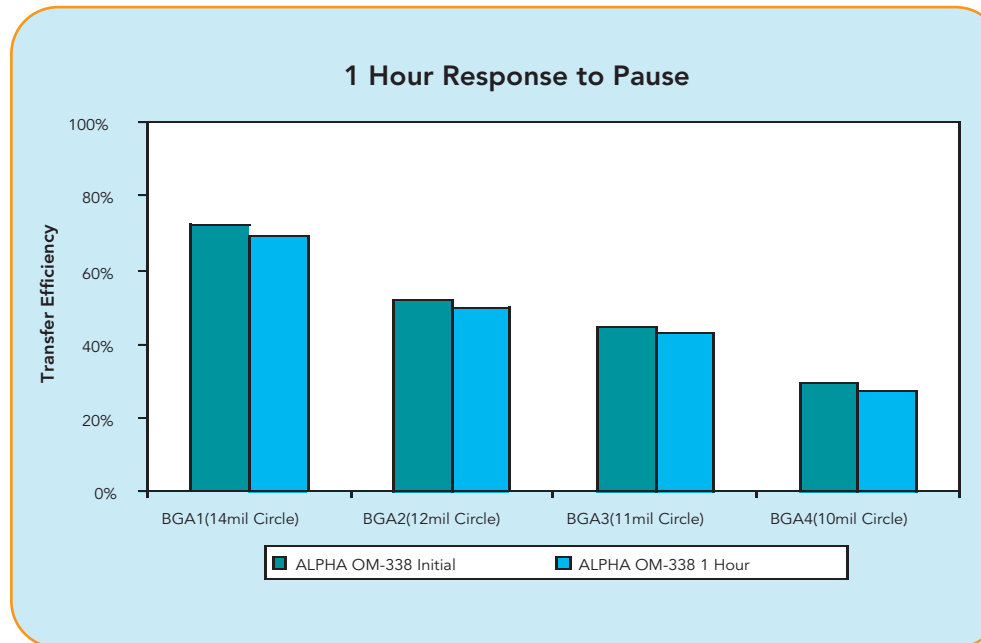
OM-338 solder paste

Print Capabilities

- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- Print Volume Consistency
- Print Temperature Window
- **Response to Pause**
- Print Speed
- Enclosed Head Capability

BACK TO MAIN MENU

Response to Pause



Performance Indicator

- Less than 2% loss in transfer efficiency over a period of 1 hour

Excellent Response to Pause Reduces Line Restart Defects

- Leading product in benchmark study for 1 hour response to pause
 - Lowest variability in fine feature performance
 - Highest transfer efficiency against leading competitive products
- Compensates for production line stoppages

Note: A wipe is conducted prior to running the response to pause test



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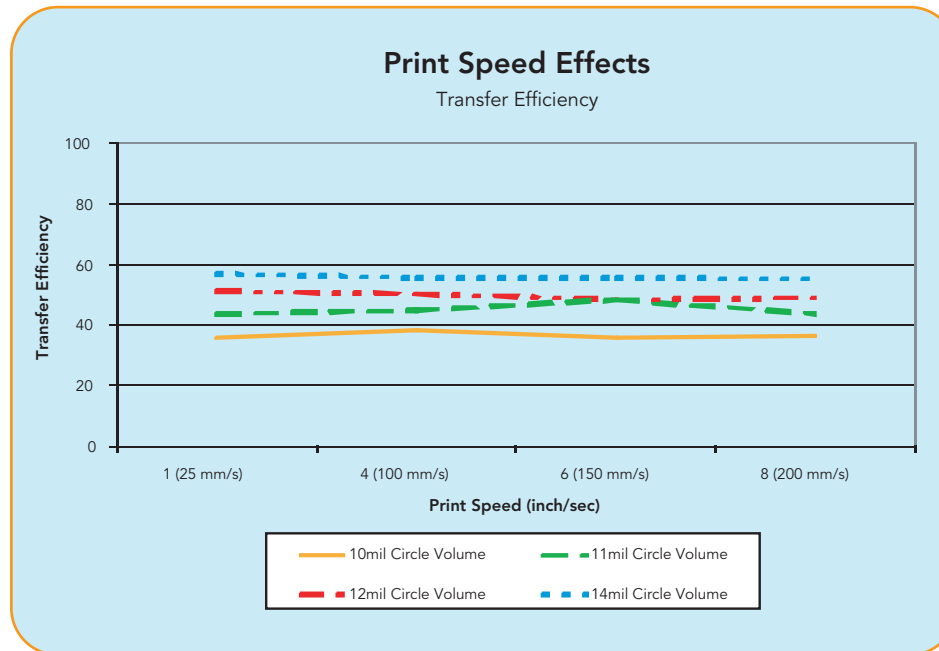
OM-338 solder paste

Print Capabilities

- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- Print Volume Consistency
- Print Temperature Window
- Response to Pause
- **Print Speed**
- Enclosed Head Capability

BACK TO MAIN MENU

Print Speed



Performance Indicator

- Consistent Transfer Efficiency (i.e. flat line) over print speed range indicates decreased process sensitivity

Wide Print Speed Capability Maximizes Print Process Window

- Repeatable volume deposition and low variability
 - Throughout print speed range: 25mm/sec to 200mm/sec (1in/sec to 8 in/sec)
 - Down to 0.25mm (10mil) circles across 0.1mm to 0.15mm (4mil to 6mil) thick stencils



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Print Capabilities

- Ultra Fine Feature Print Definition
- Ultra Fine Feature Transfer Efficiency
- Print Volume Consistency
- Print Temperature Window
- Response to Pause
- Print Speed
- Enclosed Head Capability

BACK TO MAIN MENU

Enclosed Head Capability



Speedline Rheopump™



Dek Proflow™

Ideal for Enclosed Head Printing Applications

- Excellent fine feature print deposition down to 0.4mm (16mil) pitch devices
- Excellent consistency measured over the 2,000 board run
- Passes both Speedline Version 3.0 Rheopump™ and Dek Proflow™ performance tests

Rheopump is a registered trademark of Speedline Technologies

Proflow is a registered trademark of Dek Printing Systems



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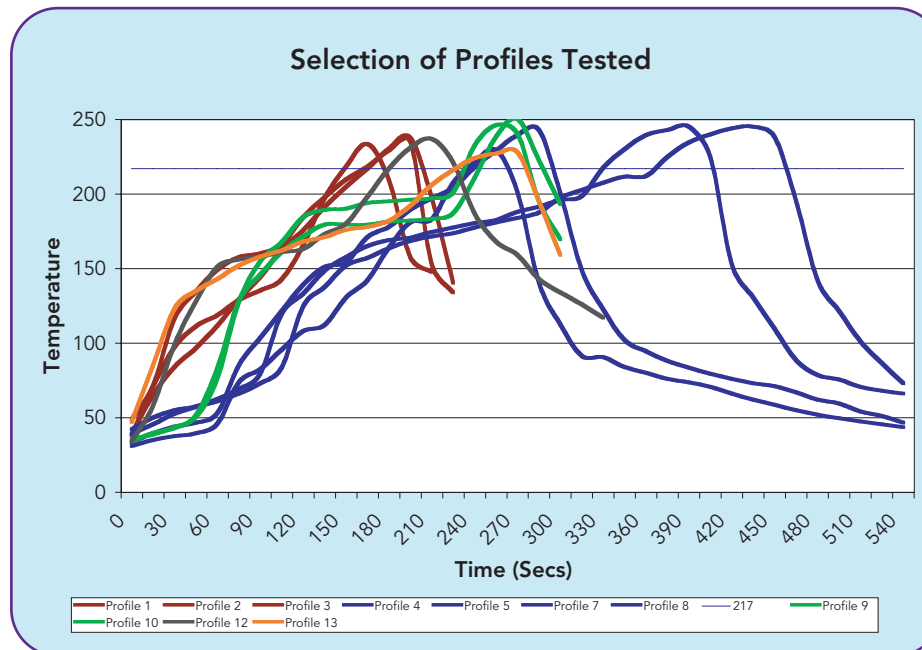
OM-338 solder paste

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- Voiding
- Random Solderballing
- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

[BACK TO MAIN MENU](#)

Wide Process Window



Consistent Performance and Cosmetics over a Wide Range of Profiles

- Wide capability for processes with range of Delta temperatures across the boards
- Delivers outstanding performance requiring minimal reflow performance optimization



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OM-338 solder paste

Reflow Capabilities

- Wide Process Window
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- Solder Spread
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BACK TO MAIN MENU

Hot/Cold Slump

DIN 32513 Hot/Cold Slump Results:

- Stencil thickness 150µm (6 mils), stored for 1 hour at room temperature 25 +/- 2°C (77+/-36°F)
- Stencil thickness 200µm (8 mils), run through oven at 160°C with air reflow after 1 hour room temperature

Result: PASS – No bridging on pads spaced greater than or equal to 0.2 mm (8 mil)



Conditioned coupon- 150°C for 10 minutes

J-Std 005 Hot/Cold Slump Results:

Pad Size	Cold Slump 25C/50% RH		Hot Slump Oven 150°C/ 10mins	
	00.63 x 2.03mm	00.33 x 2.03mm	00.63 x 2.03mm	00.33 x 2.03mm
OM 338	No Bridges	0.2	0	0.2
IPC max gap bridge allowed	0.48	0.2	0.56	0.25
	Pass	Pass	Pass	Pass

Result: PASS – IPC requirement for maximum allowable gap



Print at t=0



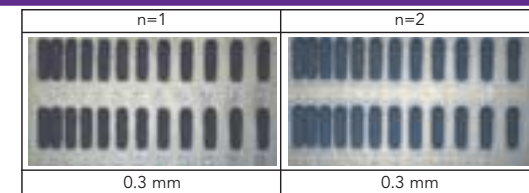
Print after 150°C exposure

JIS-Z-3284-1994 Annex 8

Stencil thickness is 200µm (8mil). Two patterns are tested. The samples are then heated at 150°C for 20 seconds.

- 3.0 x 0.7mm
- 3.0 x 1.5mm

Result: PASS – Maximum bridge for test patterns = 0.3mm



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OM-338 solder paste

Reflow Capabilities

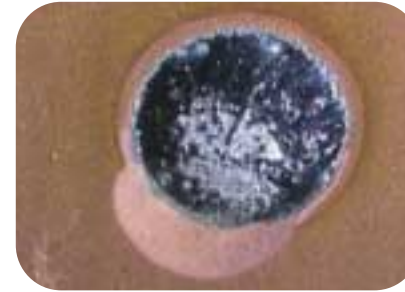
- Wide Process Window
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- **Solder Spread**
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- Post Reflow Cleaning

[BACK TO MAIN MENU](#)

Solder Spread



Immersion Silver



Cu OSP



Nickel Gold



Immersion Tin

Wide Pad Finish Capability

- Smooth, uniform reflowed solder joint with 10% spread on board finishes tested
- Excellent solder spread on Nickel Gold
- No dewetting on any substrate finish tested
- Tested on high soak (155°C), high peak temperature profile (255°C), ramp rate 0.76°C/sec



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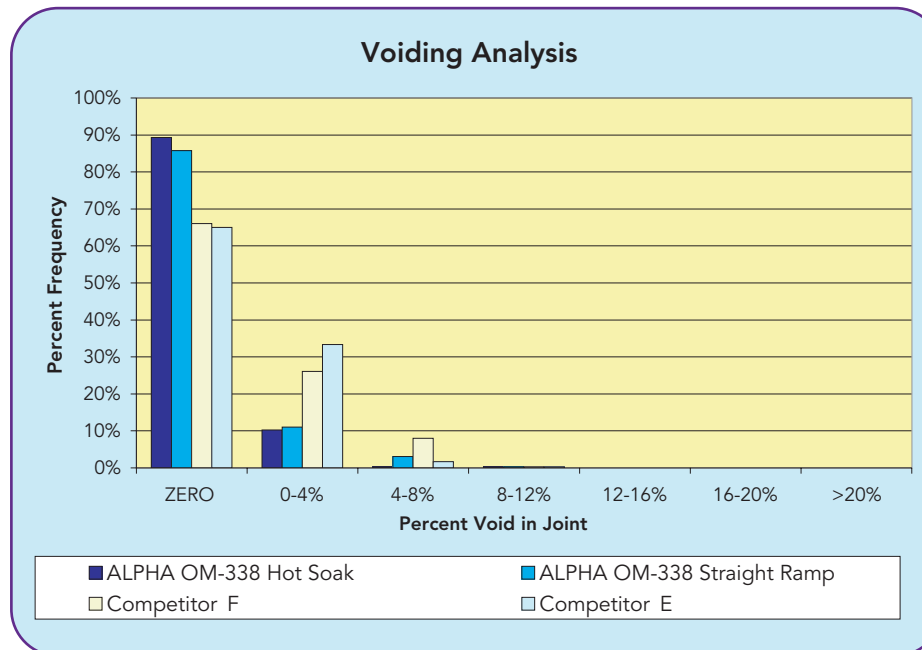
OM-338 solder paste

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- **Voiding**
- Random Solderballing
- Mid Chip Solderballing
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- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

BACK TO MAIN MENU

Voiding



Performance Indicator

- Theoretically 100% at “zero voids” would be ideal result
- IPC calls for less than 9% void in joint area (See page 17 for details)

Reflow Conditions:

160°C soak, 240°C peak
Straight ramp profile to 240°C peak

Measured Features:

Ultra fine features: 0.25mm (10mil) circles

Components:

Tin-Lead and Lead-Free BGA components

Excellent, Low Voiding Performance

- Exceeds IPC 7095 Class III requirements
 - Highest level of joints with zero voids against leading competitive products
 - Measured on boards with flat pads and microvias
 - Delivers reliable performance in both Tin-Lead/Lead-Free and Lead-Free/Lead-Free solder sphere/paste/alloy combinations



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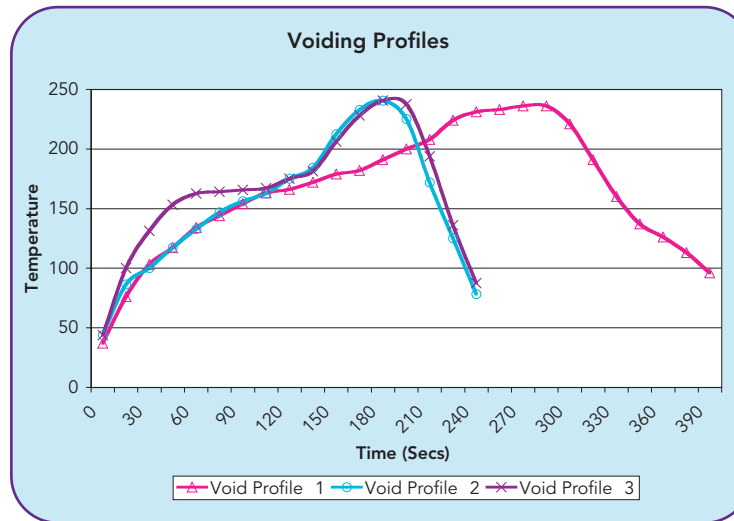
OM-338 solder paste

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- **Voiding**
- Random Solderballing
- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

[BACK TO MAIN MENU](#)

Voiding



Average Void Size

Lead-Free Solder Spheres

Tin-Lead Solder Spheres

Profile	Via in Pad	No Via in Pad	Via in Pad	No Via in Pad
#1 Longer	Pass IPC Class III	Pass IPC Class III	Pass IPC Class III	Pass IPC Class III
#2 Straight Ramp	Pass IPC Class III	Pass IPC Class III	Pass IPC Class III	Pass IPC Class III
#3 Hot Soak	Pass IPC Class III	Pass IPC Class III	Pass IPC Class III	Pass IPC Class III

Minimal Impact on Voiding Performance due to Reflow Profile

- Tested on a wide range of reflow profiles
- Exceeds IPC 7095 Class III for joint area requirements on all experiments conducted
- No impact on voiding performance due to reflow profile



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OM-338 solder paste

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- **Voiding**
- Random Solderballing
- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

BACK TO MAIN MENU

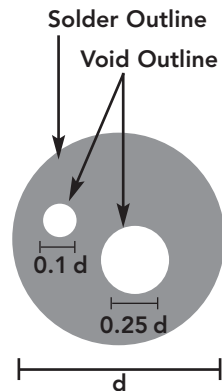
Voiding

IPC Criteria for Voids in BGAs, IPC 7095 7.4.1.6

The IPC criteria provide three classes of acceptance for both the solder sphere and the sphere-pad interface.

Where multiple voids exist, the dimensions will be added to calculate total voiding in the joint.

Location of Void	Class I	Class II	Class III
Void in Solder (Solder Sphere)	60% of diameter = 36% of Area	42% of diameter = 20.25% of Area	30% of diameter = 9% of Area
Void at Interface of Solder (Sphere) and Substrate	50% of diameter = 25% of Area	35% of diameter = 12.25% of Area	20% of diameter = 4% of Area



Exceeds IPC 7095 Class III requirements for solder joint area: 0 voids greater than 9% on all trials conducted

Example:
Total Void Diameter
 $0.10d + 0.25d = 0.35d$



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OM-338 solder paste

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- **Voiding**
- Random Solderballing
- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

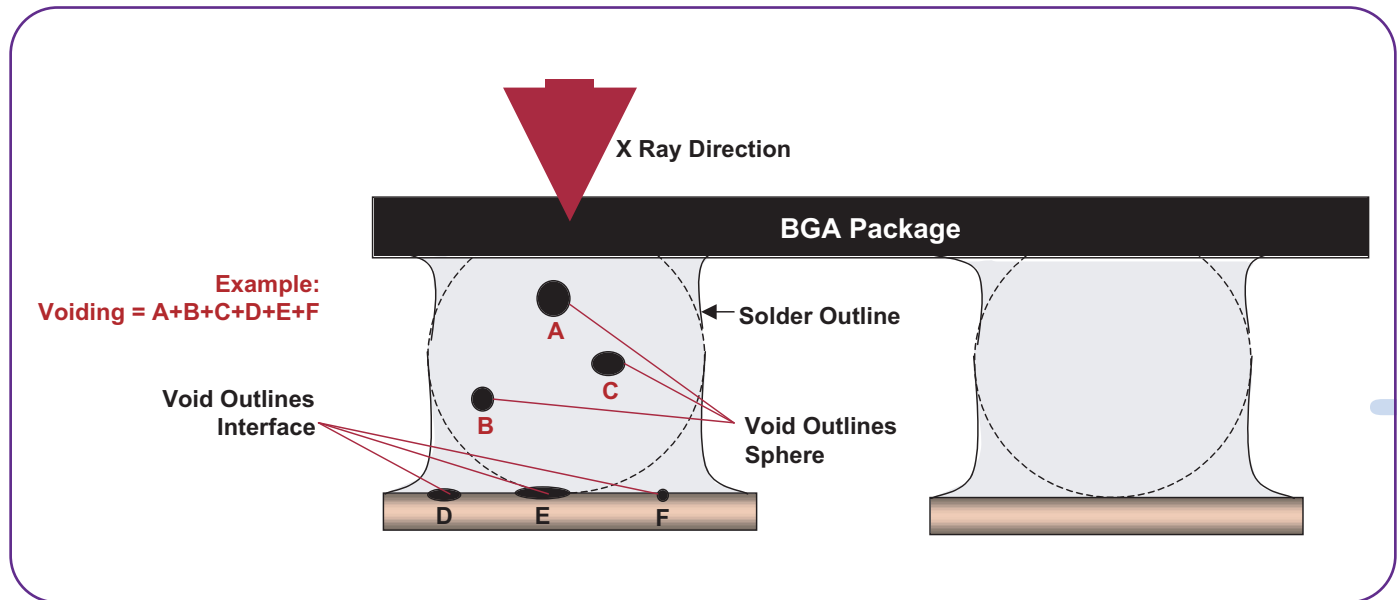
BACK TO MAIN MENU

Voiding

Implications of Measurement Technique

Note that voids are often measured from the top of the package. This technique generates voiding data representing a cumulative value of the total cross-sectional voided area in both the body of the joint and at the pad interface.

Using the criteria for the void interface is particularly conservative because this measurement includes both populations of voids.



epqta



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OM-338 solder paste

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- Voiding
- **Random Solderballing**
- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

BACK TO MAIN MENU

Random Solderballs per IPC, DIN & JIS

J-Std-005 Random Solderballing Results:



Sample reflowed immediately



Sample conditioned at 25°C/50%RH for 4 hrs then reflowed

Result: Rated "Acceptable" & "Preferred"

For solderballing using immediate reflow and conditioning at 25°C/50%RH for 4 hours with profiles

- 130°C Soak, 236°C Peak
- Straight Ramp, 240°C Peak
- 160°C Soak, 240°C Peak

DIN 32513 Random Solderballing Results:



1 hr @ 50 % RH



72 hours @ 50 % RH

Result: Accept - Class 2

Paste has formed one large solder sphere with no more than 3 small satellite solder balls.

DIN 32513 is the German industry standard for soft solder alloys. The standard has 4 classifications for visual standard when inspected by a 10x magnification.

DIN 32513 Random Solderballing Results:



Sample reflowed immediately



24 hours at 25°C/60%RH

Result: Accept - Class 1

The solder powder is melted to make a large ball, and no solder balls are found around it.

JIS-Z-3284 is the Japanese industry standard for soft solder alloys. The standard has 5 classifications of aggregation of solder.



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OM-338 solder paste

Mid Chip Solderballs Tested "On Board"



Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- Voiding
- Random Solderballing
- **Mid Chip Solderballing**
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

BACK TO MAIN MENU

Very Good Resistance to Mid Chip Solderballs

- Tested on various boards surfaces (Cu OSP, Nickel Gold)
- Mid Chip Solder Ball test
 - 125 and 150 microns (5 and 6mil) thick stencil
 - Printed with a range of stencil aperture to pad ratio
 - Reflow profiles evaluated
 - Straight ramp with 240°C peak
 - 160°C soak and 240°C peak

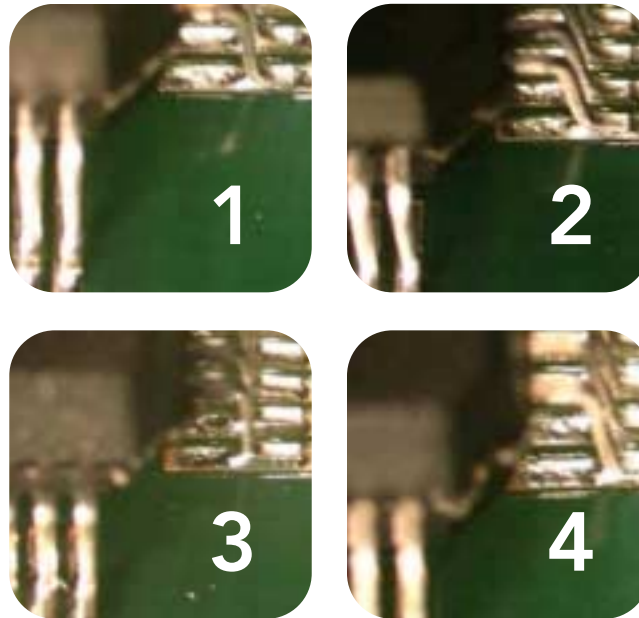


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Joint Cosmetics



All board finishes are Cu OSP

No	Lead Material	Lead Finish
1	Copper Lead	Sn/Pb
2	Alloy 42	Sn/Pb
3	Copper Lead	Ni/Pd
4	Copper Lead	Sn/Cu

Reflow Conditions:

160°C soak, 240°C peak
High Soak profile: 175°C peak

Measured Features:

0.625mm (25mil) Tinned

Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- Voiding
- Random Solderballing
- Mid Chip Solderballing
- **Joint Cosmetics**
- Vertical Lead Wetting
- Flux Cosmetics
- Post Reflow Cleaning

[BACK TO MAIN MENU](#)

Excellent Solder Cosmetics across all Profiles

- Smooth, uniform reflowed solder joint, tested on a combination of lead materials and finishes
- Delivers excellent fillet wetting providing robust mechanical strength to the component
- Good full fillet wetting performance on all component/lead finishes tested
- Delivers good visual joint inspection properties



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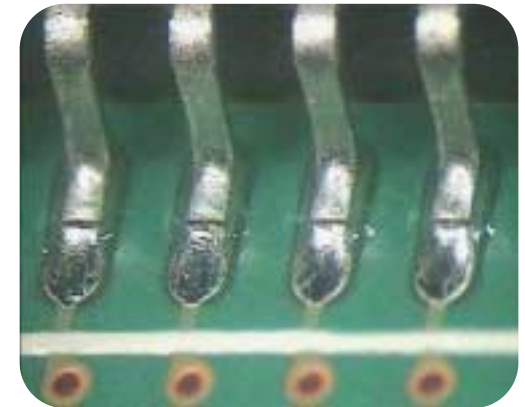
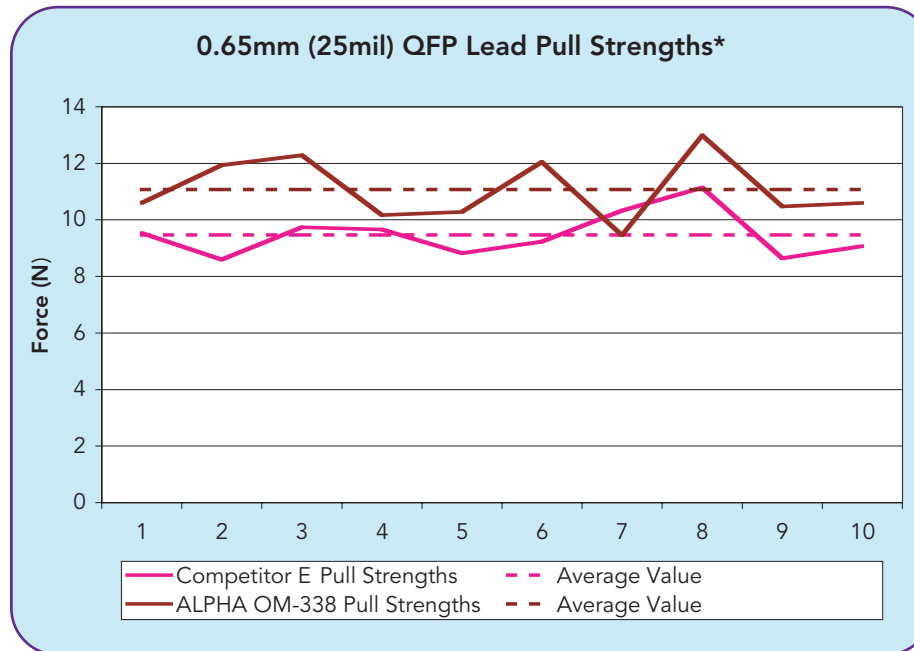
OM-338 solder paste

Reflow Capabilities

- Wide Process Window
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- Solder Spread
- Voiding
- Random Solderballing
- Mid Chip Solderballing
- Joint Cosmetics
- **Vertical Lead Wetting**
- Flux Cosmetics
- Post Reflow Cleaning

BACK TO MAIN MENU

Vertical Lead Wetting



Good Fillet Wetting Provides Mechanical Strength to Solder Joint

- Increase of 17% force required to pull the component lead from the soldered joint compared to competitive product
- Lowest measured value is no lower than the average value of competitive product
- Improved mechanical strength supports high level of joint integrity

*Note: Each data point represents 15 measurements with Cu OSP pad finish



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Reflow Capabilities

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- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- **Flux Cosmetics**
- Post Reflow Cleaning

BACK TO MAIN MENU

Flux Cosmetics



Reflow Conditions:

180°C soak, 250°C peak. 100 seconds above 217°C, 6 minutes to peak

Performance Indicator

- Products that do not deliver clear residues can lead to inconsistent flux cosmetics increasing the difficulty of visual inspection

Excellent Flux Residue Cosmetics

- Clear, colorless residues across all profiles, including
 - Demanding hot soak profiles — 6 minutes to peak / 100 secs above 217°C
 - Cold straight ramp profiles — 3 minutes to peak / 30 sec. above 217°C
- Ensures that production's visual inspection standards are not compromised
 - No difference in flux cosmetics from the cold to hot areas on the board



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Reflow Capabilities

- Wide Process Window
- Hot/Cold Slump
- Solder Spread
- Voiding
- Random Solderballing
- Mid Chip Solderballing
- Joint Cosmetics
- Vertical Lead Wetting
- Flux Cosmetics
- **Post Reflow Cleaning**

[BACK TO MAIN MENU](#)

Post Reflow Cleaning

	Application	Detail	Suggested Material
Fresh Material	Stencil & Misprint Cleaning	Machine Cleaning Manual	Kyzen Aquanox 4512P, Bioact™ SC10 Wipes
	Stencil Printer Cleaning	Understencil Wiping	Kyzen Ionox 3400, Bioact™ SC10E
Post Reflow Residues	Electronic Assembly Defluxing	Dishwasher	Aquanox A4512C
		Batch Immersion	Ionox 3302
	Batch Cleaning	Aqueous Spray in Air Rework Applications	Aquanox XJN Plus Micronox MX2501

Reflow Conditions:

Samples are made using a long hot soak (180°C for 120sec.) reflow profile as this provides the greatest challenge to cleaning. (100 seconds above 217°C, 6 minutes to peak)

Boards used:
Ceramic and FR4

Excellent Cosmetics After Cleaning

- Less flux residues remaining versus leading competitive products tested
- Residues effectively removed after agitation in board cleaner



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apart


OM-338 solder paste

Summary Table

Chemical

Cu corrosion	IPC J-STD 004	PASS	
Cu mirror	IPC J-STD 004	PASS	
Ag Chromate paper test	IPC J-STD 004	No halides detected	

Electrical

IPC SIR	7 day 85°C / 85% RH	PASS	
Bellcore SIR	96 hours @ 35°C/85% RH	PASS	
Bellcore Electromigration	500 hours @ 65°C/85° RH	PASS	

J-Standard Classification: ROL-0

Tack	Capable for use with high speed moving table pick and place	PASS – verified in field trials
------	---	---------------------------------

Reliability Data

- Summary Table Electrical Reliability Data

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OM-338 solder paste

Electrical Reliability Data

Passes IPC J-STD-004 SIR Test

Surface Insulation Resistance Test Results — IPC-J-Standard 004

Material Tested/Condition	SIR(ohms) (1 day)	SIR (4 days)	SIR (7 days)	Comments
Test #:0333-1i Date:9/12/2003	5.8E+09	1.3E+10	2.2E+10	Meets Electrical and Visual Requirements
MATERIAL TESTED/ ALPHA OM-338	2.4E+09	9.1E+09	1.9E+10	
CONDITION	6.7E+09	1.2E+10	1.9E+10	
Comb up	7.9E+09	1.3E+10	2.0E+10	
Uncleaned SAC405	6.4E+09	1.4E+10	2.7E+10	
	2.5E+09	7.1E+09	1.6E+10	
	5.3E+09	1.3E+10	2.5E+10	
	2.0E+09	6.0E+09	1.3E+10	
	5.8E+09	1.2E+10	2.1E+10	
	2.2E+09	5.7E+09	1.2E+10	
	2.1E+09	5.7E+09	1.2E+10	
	3.3E+09	7.6E+09	1.6E+10	
Arithmetic mean:	4.4E+09	9.9E+09	1.9E+10	

Tested by: K. Tellefsen T/H/B 85C/85%RH/-48V Reported by: K.Tellefsen Control boards	3.5E+10	3.8E+10	5.2E+10	
	2.5E+10	2.6E+10	3.5E+10	
	2.3E+10	2.4E+10	3.3E+10	
	1.5E+10	2.8E+10	4.4E+10	
	4.0E+09	7.0E+09	1.5E+10	
	3.5E+09	5.7E+09	1.2E+10	
	2.9E+09	4.8E+09	9.8E+09	
	3.4E+09	5.8E+09	1.2E+10	
	3.8E+09	6.8E+09	1.5E+10	
	3.8E+09	5.9E+09	1.2E+10	
	3.8E+09	6.2E+09	1.2E+10	
	3.7E+09	6.5E+09	1.4E+10	
	Arithmetic mean:	1.1E+10	1.4E+10	

Reliability Data

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OM-338 solder paste

Electrical Reliability Data

Passes Bellcore SIR Test

Surface Insulation Resistance Test Results — Bellcore GR-78-CORE (Issue 1, September 1997)

Material Tested/Condition	SIR (1 day)	SIR (4 days)	Comments
ALPHA OM-338 SAC405	1.7E+13	2.0E+13	Visually OK
Reflowed paste	1.4E+13	1.7E+13	
uncleaned	3.4E+13	2.5E+13	
Test #.0333-1b	1.4E+13	2.5E+13	
Date:9/12/03	2.5E+13	2.5E+13	
T/H/B:35/85/-48	2.5E+13	1.7E+13	
	2.0E+13	2.5E+13	
	1.7E+13	5.0E+13	
	1.0E+13	1.0E+13	
	2.5E+13	3.4E+13	
	7.0E+09	2.5E+10	
	3.2E+10	1.2E+11	
Arithmetic mean:	5.8E+12	8.3E+12	
Control boards	5.0E+12	5.3E+12	
	5.6E+12	6.3E+12	
	5.6E+12	5.9E+12	
	5.0E+12	5.3E+12	
	2.0E+13	2.5E+13	
	3.7E+12	5.0E+12	
	1.5E+12	3.8E+11	
	1.1E+12	3.5E+11	
	5.0E+12	2.7E+12	
	5.6E+12	2.6E+12	
	5.6E+11	5.4E+11	
	5.7E+11	5.4E+11	
Arithmetic mean:	3.1E+12	2.4E+12	

Reliability Data

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OM-338 solder paste

Electrical Reliability Data

Passes Bellcore Electromigration Test

Electromigration Test Results — Bellcore GR-78-CORE (Issue 1, September 1997)

Material Tested/Condition	SIR (96 hour)	SIR (500 hour)	Comments Bias
ALPHA OM-338 SAC405	1.2E+11	4.4E+11	Passed electrical and visual requirements
IPC-B-25 pattern B	1.0E+11	3.5E+11	
Reflowed paste	9.7E+10	3.1E+11	
uncleaned	5.8E+10	1.8E+11	
Test #:0333-5e	7.2E+10	3.7E+11	
Start date:9/8/02	7.1E+10	1.7E+11	
bias = 10 V T/H: 65/85	4.5E+10	3.0E+10	
	4.0E+10	2.5E+10	
	7.2E+10	4.7E+11	
	4.8E+10	2.0E+11	
	4.5E+10	6.6E+10	Pass/Fail final >initial/10
	5.0E+09	3.8E+10	

Arithmetic mean: 5.3E+10 1.5E+11

Control Boards	5.8E+11	4.9E+11	Passed electrical and visual requirements
IPC-B-25 pattern B	6.5E+11	4.3E+11	
	4.0E+11	3.6E+11	
	5.5E+11	4.9E+11	
	4.8E+11	4.1E+11	
	5.3E+11	3.8E+11	
	3.8E+11	3.2E+11	
	4.9E+11	3.9E+11	
	1.7E+11	4.3E+11	
	5.1E+11	3.9E+11	
	3.4E+11	3.1E+11	Pass/Fail final >initial/10
	5.2E+10	5.8E+10	

Arithmetic mean: 3.7E+11 3.4E+11

Reliability Data

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OM-338 solder paste

Stencil Design Implications: Lead-Free Solder Spread

Lead-Free Processing Issues: Impact of Alloy Type

Surface Tension

Alloy	Air (Liquidus + 50°C)
Typical Tin-Lead Alloy	417 mN/m
Typical Lead-Free Alloy	431 mN/m

Generally, high Tin alloys have a higher surface tension than Tin-Lead. This significantly reduces solder spread performance. Tin-Lead alloy solder spread characteristics are more forgiving versus high Tin alloys.

Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

[BACK TO MAIN MENU](#)

Determining Constraints of Lead-Free

- Two related issues that negatively impact board and joint cosmetics are:
 - Aperture reductions for optimizing Mid Chip Solder Ball or bridging of QFP performance.
 - Inaccurate board to stencil alignment

Use of Nitrogen can increase solder spread performance on difficult to solder surfaces.



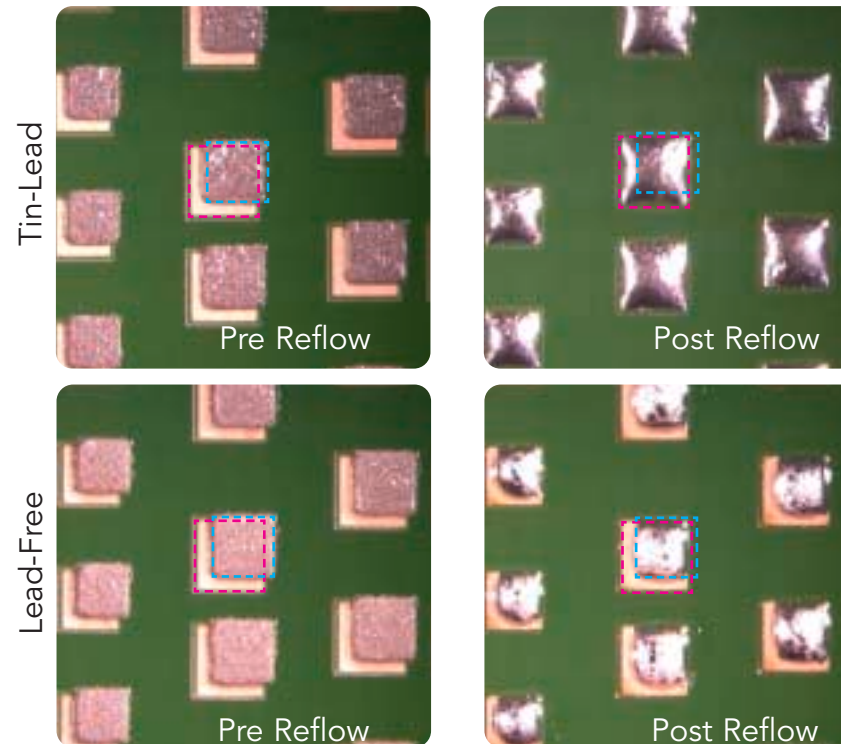
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OM-338 solder paste

Stencil Design Implications: Lead-Free Solder Spread

Determining Implications of Transfer to Lead-Free Processing



In-House Test to Demonstrate Effect of Alloy in Solder Spread:

- Print using a known stencil to board **offset**
- Reflow boards using oven profile correct for alloy type
- Compares Tin-Lead to Lead-Free post-reflow results

High Tin containing alloys do not spread as well to the edges of Cu OSP pads as Tin-Lead.

Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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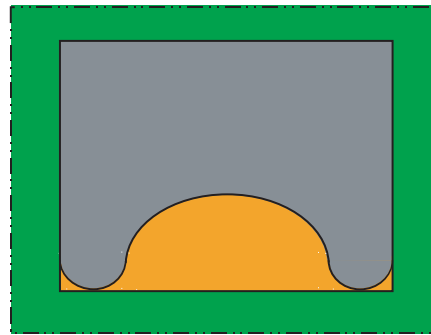
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OM-338 solder paste

Stencil Design Implications

Lead-Free Stencil Designs for Cu OSP



33% radial inset aperture design



Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Designs for Lead-Free Manufacturing

- Use of innovative stencil aperture designs will support a reduction of Mid Chip Solder Ball incidence, while eliminating exposed Cu on OSP pads
 - Overall 1:1 aperture to pad ratio for non passive components
 - Passive components:
 - 1:1
 - 33% Radial Inset
 - Rounded corners to avoid angles $<90^\circ$
 - Area Array (BGA) rules same as Tin-Lead
 - $BGA \leq 16 \text{ mil}/0.4 \text{ mm} = 1:1$
 - $BGA > 16 \text{ mil}/0.4 \text{ mm} = + 4 \text{ mil} (300 \text{ } \mu\text{m})$
- Use of sophisticated controls over positional accuracy of PCBs and stencils
 - Or compensate in the stencil for PCB inaccuracies (= PCB Scaling)

Appropriate Lead-Free stencil technology can effectively support Lead-Free processing of Cu OSP pads.



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OM-338 solder paste

iReflow Implications

Elevated Temperature Issues



Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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At elevated temperatures

- Potential for increased board damage
 - Board warpage leading to difficult board handling and difficulty processing second sided boards
- Challenges for Lead-Free solders
 - To provide excellent joint and flux cosmetics across boards with large delta temperatures
 - Cu OSP soldering performance is even more challenging at elevated temperatures
 - Avoid exceeding the component's rated temperature. The requirement of the solder paste is to solder effectively at peak temps below 245°C

Consider the use of higher capability laminates and OSP technologies for Lead-Free processing.



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Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Reflow Implications

Ovens & Heat Transfer

At elevated temperatures (cont.):

- Ovens with excellent heat transfer efficiency are critical, with a typical delta temperature across a board of 10°C to 15°C (50°F to 59°F)
- Special attention should be made to control oven performance
 - Air flows. Poor air flows impact the thermal transfer efficiency to the board
 - Tunnel temperature variations decrease the process capability of the oven
 - Ovenloading: the rate of boards entering oven should be evaluated to ensure effective heating of the PCB and the delta temperatures are appropriate
- Reflow peak temperature needs to be 10°C to 23°C above liquidus (ie for SAC 305 232°C min. to 245°C max.)
- Evaluate the board with the largest delta temperature to understand current processing capabilities

Use of an efficient and statistically capable oven is an increased requirement for Lead-Free solders.

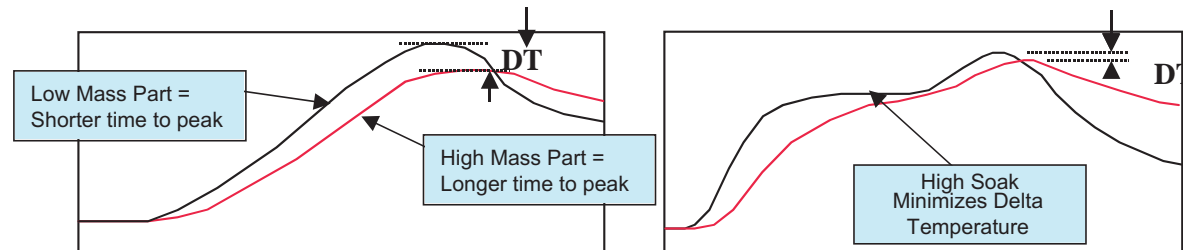


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Profiles and Delta Temperatures



Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Profile	Issue	Recommendation
Delta temperature board being used	A large Delta temperature creates cool spots and hot spots on board. Hot spots may create uneven flux cosmetics	A longer higher soak may be required to minimize Delta temperature at reflow
Maximum peak temperature of components on board	Hot spots cause damaged components	Preferred maximum temperature on the board is 245°C
Minimum temperature of components on board	Cold spots create poor solder connections	Minimal preferred temperature is 230°C
Time above liquidus	Correct time above liquidus develops good solder intermetallics	Preferred time above liquidus is 40 to 90 seconds
Soak temperature and time	Minimizes Delta temperature across the board	Increase soak temperature is approximately 170°C from 130°C to 160°C. Need to increase soak temperature is driven by large Delta temperature. 30 to 70 seconds is recommended time at soak
Average ramp rate	Impacts solderballing, wetting and mid chip solderballing	Recommended ramp rate is 0.7°C to 1.5°C/second

Use ALPHA OM-338 for maximum performance and processing window.

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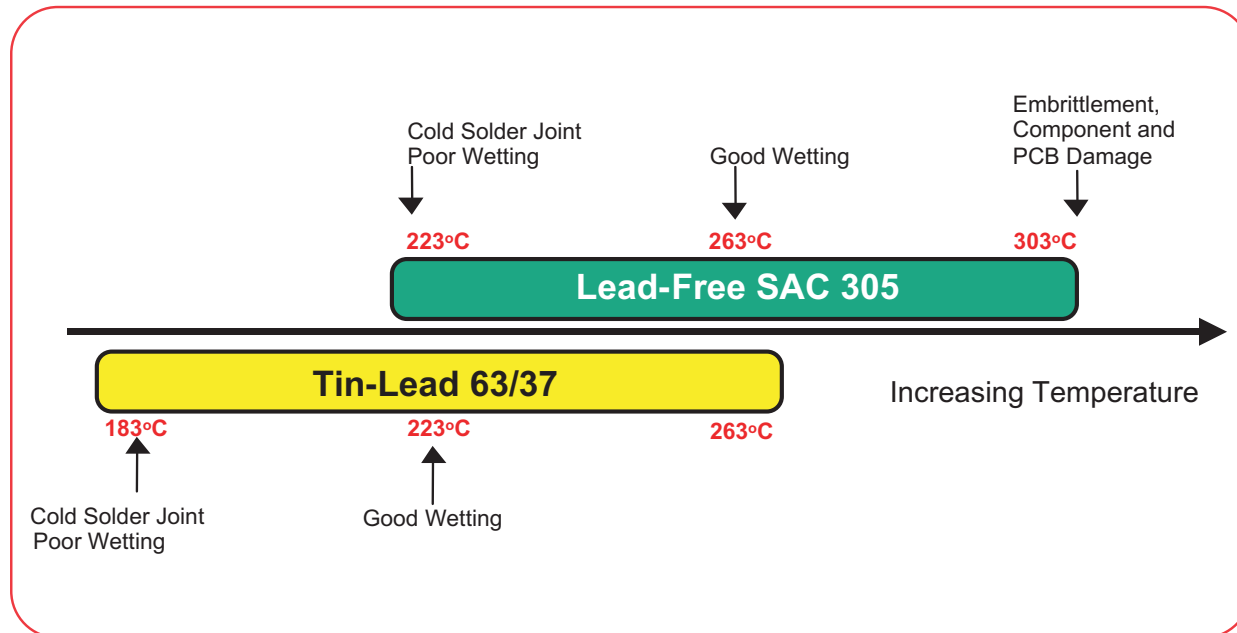


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Elevated Rework Temperature Effects



Lead-Free Rework Considerations:

- Heat transfer to the component and board is less controlled than any other process due to manual nature of repair work
- Soldering iron tips will corrode quicker using high tin Lead-Free alloys

Use CEAM's cored wire and target the optimum rework temperatures to deliver reliable joints.

Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Recommendations for Successful Lead-Free Joint



Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Impact of Higher Soldering Temperatures and Longer Contact Times:

- Increased chances of
 - Printed circuit board and/or component damage
 - Can generate more intermetallics and hence brittle joint
 - Premature flux fuming, yielding less flux on the joint, during the rework process

Manual rework training for Lead-Free will be required in the transition to Lead-Free.



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OM-338 solder paste

Solder Iron Requirements



Solder Iron Settings

- Temperature of piece that is to be soldered (not the iron) should be around 250°C (482°F) and the solder iron tip should be a temperature of about 370°C (698°F). This should give an acceptable heat transfer time using the correct tip size.
- Aim for a contact time of 2-3 seconds. Overheating a joint damages the board and may lead to board reliability issues over the lifetime of the product.
- Use a soldering iron bit that is suitable (see figure above): a bit that is too small may prevent the formation of a joint or slow down the rework operation.
- Do not overheat as this can cause an increase in the depth of the intermetallic layer resulting in a weaker joint.

Planning the processing methods for the manual rework operation is critical to delivering a reliable Lead-Free Process.

Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Barriers to a Successful Lead-Free Joint



Applications Information

- Stencil Guidance
- Reflow Implications
- Rework

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Solutions to Lead-Free Rework Issues:

- Minimize heat transfer to the board and component – more heat – more potential damage
- Use Lead-Free alloy with fastest wetting speed and lowest melting point, typically rework alloy parallels solder paste alloy
- Ensure that there is enough flux on the joint to make a bond in the shortest time possible
- Use an iron with suitable controller that minimizes its temperature variance

Cookson Electronic Assembly Materials provides solutions for your Lead-Free processing issues.



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OM-338 solder paste

Summary

- Delivery of Leading Lead-Free Solder Paste
- Complete Line of Solder Pastes
- Global Capability

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High Yield Capability

Delivers Wide Reflow Process Window

- Wide reflow capability, even on boards with large thermal differentials
- Excellent flux residue cosmetics even with long hot profiles
- Extremely effective vertical lead wetting supporting increased mechanical joint strength
- Excellent hot slump performance minimizes post reflow solder shorts

Delivers Wide Print Process Window

- Repeatable ultra fine feature volumes deliver a high yielding Lead-Free Print Process
- Excellent fine feature print capability:
 - Repeatable volumes down to 0.25mm (10mil) circles and 0.4mm (16mil) pitch components
- Wide print temperature performance between 19°C and 29°C minimizing defects relating to environment

Delivers Excellent Voiding Performance

- Minimal voiding due to reflow profile.
- Capable of IPC 7095 Class III BGA voiding requirements verified with and without microvia conditions
- Compatible with both Tin-Lead and Lead-Free solder ball BGA components



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OM-338 solder paste

The Complete Line of ALPHA Solder Pastes

Application	Series
Universal, no-clean	ALPHA OM-5000
Universal, water-soluble	ALPHA WS-700
Fine-feature, high-throughput	ALPHA OM-6000
Universal, lead-free	ALPHA OM-300

Summary

- Delivery of Leading Lead-Free Solder Paste
- Complete Line of Solder Pastes
- Global Capability

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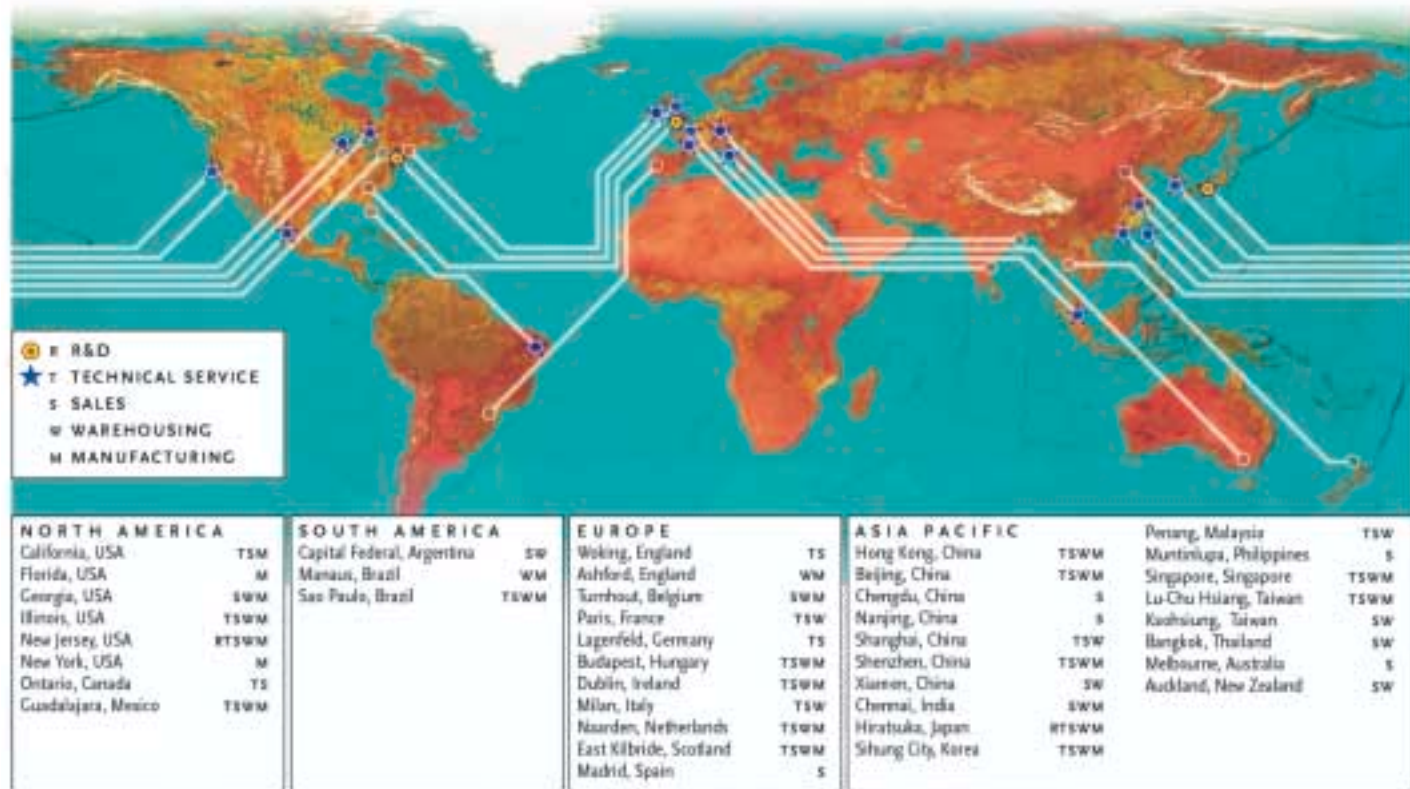
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OM-338 solder paste

Worldwide Capacity

Cookson Electronics helps make you more efficient and profitable with enabling technology, products and service support available worldwide.



Summary

- Delivery of Leading Lead-Free Solder Paste
- Complete Line of Solder Pastes
- Global Capability

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For additional information, visit Cookson Electronics Assembly Materials at www.alphametals.com



ALPHA OM-338 ULTRA FINE FEATURE LEAD-FREE SOLDER PASTE

DESCRIPTION

ALPHA OM-338 is a lead-free, no-clean solder paste designed for a broad range of applications. ALPHA OM-338'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. OM-338 yields excellent print capability performance across various board designs and particularly with ultra fine feature repeatability (11 mil Squares) and high through-put applications.

Outstanding reflow process window delivers good soldering on CuOSP with excellent coalescence on broad range of deposits sizes, excellent random solder ball resistance and mid-chip solder ball performance. ALPHA OM-338's cosmetic capabilities deliver excellent visual inspection. Additionally, ALPHA OM-338's capability of IPC Class III for voiding and ROL0 IPC classifications ensures maximum long-term product reliability.

**Although the appearance of these lead-free alloys will be different to that of tin-lead, with mechanical reliability 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)¹.
- 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 voiding performance classification of Class III.
- Excellent reliability properties, halide-free material
- Compatible with either nitrogen or air reflow

Note 1: tested with a 0.1mm (4mil) stencil thickness

PHYSICAL PROPERTIES

Alloys: SAC405 (95.5%Sn/4.0%Ag/0.5%Cu), SAC305 (96.5%/Sn 3.0%Ag 0.5%Cu)
Powder Size: Type 3, (25-45µm per IPC J-STD-005).
Residues: Approximately 5% by (w/w)
Packaging Sizes: 500gm jars, 6 & 12 cartridges and ProFlo™ cassettes.

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 0.004 (0.10mm) to 0.006 (0.15mm). Blade pressures should be 0.16-0.34 kg/cm of blade (0.9 -2lbs/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

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**SAFETY**

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

STORAGE

ALPHA OM-338 should be stored in a refrigerator upon receipt at 3 to 7°C. ALPHA OM-338 should be permitted to reach room temperature before unsealing its package prior to use (see handling procedures on page 2). This will prevent condensation build up of moisture on the solder paste.

ALPHA OM-338 TECHNICAL DATA

CATEGORY	RESULTS	PROCEDURES/REMARKS
CHEMICAL PROPERTIES		
Activity Level	ROL-0 = J-STD Classification	IPC J-STD-004
Halide Content	Halide free (by titration). Passes Ag Chromate Test	IPC J-STD-004,
Copper Mirror Test	Pass	IPC J-STD-004,
Copper Corrosion Test	Pass , (No evidence of Corrosion)	IPC J-STD-004,
ELECTRICAL PROPERTIES		
SIR (IPC 7 days @ 85° C/85% RH)	Pass , > 1.9 x 10 ¹⁰ ohms	IPC J-STD-004 {Pass ± 1 x 10 ⁸ ohm min}
SIR (Bellcore 96 hours @ 35°C/85%RH)	Pass , 8.3 x 10 ¹² ohms	Bellcore GR78-CORE {Pass ± 1 x 10 ¹¹ ohm min}
Electromigration (Bellcore 96 hours @ 65°C/85%RH 10V 500 hours)	Pass , Initial= 5.3 x 10 ¹⁰ ohms Final= 1.5 x 10 ¹¹ ohms	Bellcore GR78-CORE {Pass=final > initial/10}
PHYSICAL PROPERTIES		
Color	Clear, Colorless Flux Residue	Using 88.5% Metal, Type #3 Powder. 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	88.5% metal load designated M11	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
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

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ALPHA OM-338 Processing Guidelines

STORAGE-HANDLING	PRINTING	REFLOW (See Figure #1)	CLEANING
<ul style="list-style-type: none"> Refrigerate to guarantee stability @3-7°C (35-45°F) Shelf life of refrigerated paste is six months. Paste can be stored for 2 weeks at temperatures up to 25°C. When Refrigerated, warm-up of paste container to room temperature for up to 8 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 	<p>STENCIL: Recommend ALPHA CUT Laser Cut Stencil or ALPHA FORM Electroform Stencil @ 0.125mm (0.004) to 0.15 mm (0.006) thick for 0.4 or 0.5 mm (0.016 or 0.020) pitch</p> <p>SQUEEGEE: Metal (recommended)</p> <p>PRESSURE: 0.9-2.0 lbs./inch of squeegee length (0.16-0.34 kg/cm).</p> <p>SPEED: 25 to 200mm per second (1 to 8 inches per second).</p> <p>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.</p> <p>PRINT PUMP HEAD: Passes MPM 200 print compaction testing</p>	<p>ATMOSPHERE: Clean-dry air or nitrogen atmosphere.</p> <p>PROFILE (SAC305/405): A straight ramp profile @ 0.8°C to 1.7°C per second ramp rate is recommended (TAL 30-90 sec and peak 230-250°C)¹. Higher density assemblies may require preheating within the profile and may be accomplished as follows:</p> <ul style="list-style-type: none"> Ramp @ 0.8-1.7°C/sec. to 135-160°C. Slow ramp to 180-190°C over 60-90 seconds. Ramp @ 1-2°C/sec to 230-250°C peak temp. Time above 217°C = 30-90 seconds Ramp down to R.T. @ 1.5 to 2°C per second. <p>Note 1: Refer to component and board supplier data for thermal properties at elevated temperatures</p>	<p>ALPHA OM-338 residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, a recommendation of agitation for 5 min in either Bioact™ SC-30 & SC-10E solvents.</p> <p>Misprints and stencil cleaning may be with Bioact™ SC-30 & SC-10E solvents available from Alpha Metals.</p>

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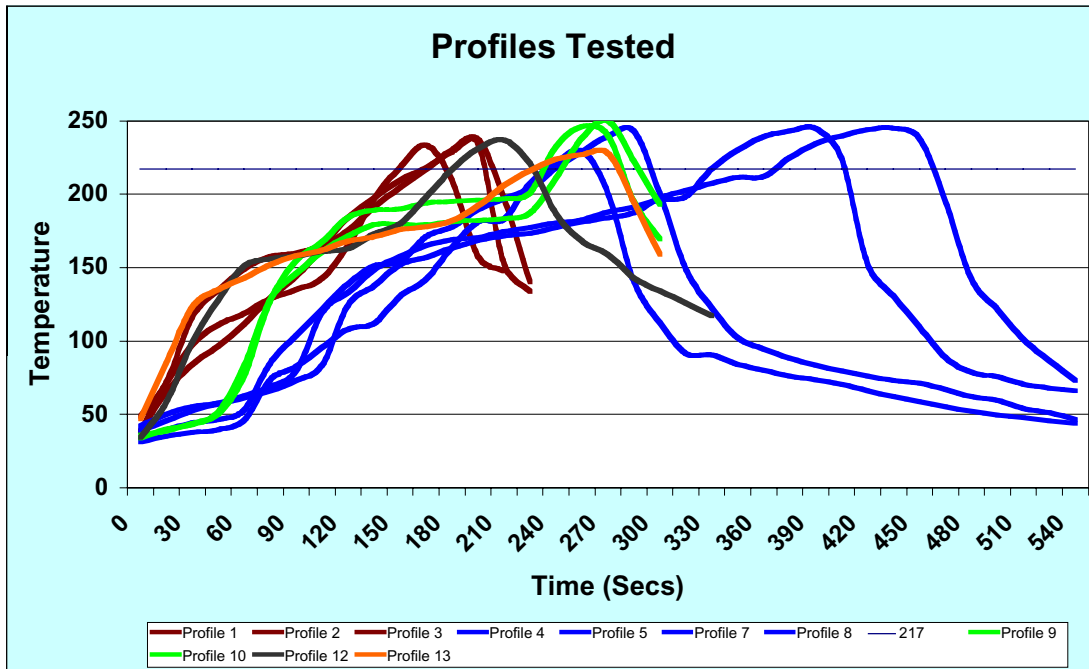


Figure #1 – Reflow Envelope

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SAFETY DATA SHEET



Cookson Electronics ASSEMBLY MATERIALS

Alpha OM-338 Solder Paste 96.5Sn3.0Ag0.5Cu 88-3-M11

1. Identification of the substance/preparation and of the company/undertaking

Product name : Alpha OM-338 Solder Paste
96.5Sn3.0Ag0.5Cu 88-3-M11

Code : 143729

Head Office : Cookson Electronics **Manufacturer** : Ashford Manufacturing Site
Forsyth Road Henwood Industrial Estate
Sheerwater Hythe Road
Woking Ashford
Surrey Kent
GU21 5RZ TN24 8DH
Tel: +44(0)1483 758400 Tel: +44 (0) 1233 610110
Fax: +44(0)1483 728837 Fax: +44 (0) 1233 664323

2. Composition/information on ingredients

Substance/Preparation : Preparation

Chemical name*	CAS no.	%	EC Number	Classification
Europe				
tin	7440-31-5	80-100	231-141-8	
silver	7440-22-4	1-5	231-131-3	
rosin, hydrogenated	65997-06-0	1-5	266-041-3	R43
Colophony	8050-09-7	1-5	232-475-7	R43
See Section 16 for the full text of the R Phrases declared above				

* Occupational Exposure Limit(s), if available, are listed in Section 8

3. Hazards identification

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

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Classification : R43
Classification : R43
Classification : R43
Classification : R43

Skin contact : Irritation of the product in case of skin contact: Not available.
Hazardous in case of skin contact (sensitizer).

Aggravating conditions : Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

4. First-aid measures

First-Aid measures

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion : Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : In case of contact, immediately flush skin copiously with water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Obtain medical attention.

Eye Contact : Check for and remove any contact lenses. In case of contact, immediately flush eyes with a copious amount of water for at least 15 minutes. Obtain medical attention.

[Return to Product Manual](#)

5. Fire-fighting measures

Extinguishing Media

Suitable : SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special fire-fighting procedures : Fire fighters should wear self-contained positive pressure breathing apparatus (SCBA) and full turnout gear.

Protection of fire-fighters : Be sure to use an approved/certified respirator or equivalent.

6. Accidental release measures

Personal Precautions : Splash goggles. Dust respirator. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Environmental precautions and cleanup methods : Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Note: See section 8 for personal protective equipment and section 13 for waste disposal.

7. Handling and storage

Handling : Keep locked up. Do not breathe dust. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible.

Storage : Keep container tightly closed. Keep container in a cool, well-ventilated area.

Packaging materials

Recommended use : Use original container.

Danish Fire Class : Not applicable.

8. Exposure controls/personal protection

Engineering measures : Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Hygiene measures : Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.

<u>Ingredient Name</u>	<u>Occupational Exposure Limits</u>
Europe	
tin	ACGIH TLV (United States, 2001). Skin STEL: 0.2 mg/m ³ 15 minute(s). TWA: 0.1 mg/m ³ 8 hour(s).
silver	EU OEL (Europe, 2000). Notes: Indicative TWA: 0.1 mg/m ³ 8 hour(s).
Sweden	
silver	AFS (Sweden, 2000). NGV: 0.1 mg/m ³ 8 hour(s). Form: Dust
Denmark	
silver	Arbejdstilsynet (Denmark, 2000). GV: 0.01 mg/m ³ 8 hour(s).
Norway	
silver	Arbejdstilsynet (Norway, 2001). AN: 0.01 mg/m ³ 8 hour(s). AN: 0.1 mg/m ³ 8 hour(s). Form: Dust and fumes
France	
silver	INRS (France, 1999). Notes: Not Legal VME: 0.1 mg/m ³ 8 hour(s).
Colophony	INRS (France, 1999). Notes: Not Legal VME: 0.1 mg/m ³ 8 hour(s).
rosin, hydrogenated	INRS (France, 1999). Notes: Not Legal VME: 0.1 mg/m ³ 8 hour(s).
Netherlands	
tin	Nationale MAC-lijst (Netherlands, 2001). Notes: Tentative TGG 8 uur: 2 mg/m ³ 8 hour(s).
silver	Nationale MAC-lijst (Netherlands, 2001). Notes: Tentative TGG 8 uur: 0.1 mg/m ³ 8 hour(s).
Germany	

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tin	MAK-Werte Liste (Germany, 2000). Skin Spitzenbegrenzung: 0.2 mg/m ³ 4 times per shift, 30 minute(s). Form: Inhalable fraction TWA: 0.1 mg/m ³ 8 hour(s). Form: Inhalable fraction TRGS900 MAK (Germany, 2001). TWA: 2 mg/m ³ 8 hour(s).
silver	MAK-Werte Liste (Germany, 2000). Spitzenbegrenzung: 0.1 mg/m ³ 1 times per shift, 30 minute(s). Form: Inhalable fraction TWA: 0.01 mg/m ³ 8 hour(s). Form: Inhalable fraction TRGS900 MAK (Germany, 2001). Spitzenbegrenzung: 0.04 mg/m ³ TWA: 0.01 mg/m ³ 8 hour(s).
Finland	
tin	Työterveyslaitos (Finland, 2001). TWA: 2 mg/m ³ 8 hour(s).
silver	Työterveyslaitos (Finland, 2001). STEL: 0.03 mg/m ³ 15 minute(s). TWA: 0.1 mg/m ³ 8 hour(s).
United Kingdom (UK)	
tin	EH40-OES (United Kingdom (UK), 2002). TWA: 2 mg/m ³ 8 hour(s). STEL: 4 mg/m ³ 15 minute(s).
silver	EH40-OES (United Kingdom (UK), 2002). Notes: OES TWA: 0.1 mg/m ³ 8 hour(s).
rosin, hydrogenated	EH40-MEL (United Kingdom (UK), 2002). Sensitiser skin, Sensitiser inhalation TWA: 0.05 mg/m ³ 8 hour(s). Form: Rosin-based solder flux fume STEL: 0.15 mg/m ³ 15 minute(s). Form: Rosin-based solder flux fume
Colophony	EH40-MEL (United Kingdom (UK), 2002). Sensitiser skin, Sensitiser inhalation TWA: 0.05 mg/m ³ 8 hour(s). Form: Rosin-based solder flux fume STEL: 0.15 mg/m ³ 15 minute(s). Form: Rosin-based solder flux fume
Austria	
tin	BMWA_MAK (Austria, 2001). STEL: 4 mg/m ³ 4 times per shift, 15 minute(s). TWA: 2 mg/m ³ 8 hour(s).
silver	BMWA_MAK (Austria, 2001). STEL: 0.1 mg/m ³ 1 times per shift, 30 minute(s). TWA: 0.01 mg/m ³ 8 hour(s).
Switzerland	
silver	SUVA (Switzerland, 2001). Notes: Not Temporary MAK: 0.1 mg/m ³ 8 hour(s). Form: Dust
Belgium	
tin	Lijst Grenswaarden (Belgium, 1998). Skin VL: 2 mg/m ³ 8 hour(s).
silver	Lijst Grenswaarden (Belgium, 1998). VL: 0.1 mg/m ³ 8 hour(s).
Spain	
tin	INSHT (Spain, 2001). TWA: 2 mg/m ³ 8 hour(s).
silver	INSHT (Spain, 2001). TWA: 0.1 mg/m ³ 8 hour(s).

Personal protective equipment

- Respiratory system** : Dust respirator. Be sure to use an approved/certified respirator or equivalent.
- Skin and body** : Lab coat.
- Hands** : Gloves.
- Eyes** : Safety glasses.

9. Physical and chemical properties

- Physical state** : Solid. (paste)
- Colour** : Grey.
- Odour** : Not available.
- pH** : Not applicable.
- Melting point** : 217°C (422.6°F)
- Flash point** : Not available.
- Explosive properties** : Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
- Oxidizing properties** : Not available.
- Density** : The only known value is 7.31 g/cm³ (tin).
- Solubility** : Insoluble in cold water, hot water.

10. Stability and reactivity

- Stability** : The product is stable.
- Hazardous decomposition products** : **rosin, hydrogenated** Sensitized persons may subsequently show asthmatic symptoms when exposed to atmospheric concentrations well below the OEL.
Colophony Sensitized persons may subsequently show asthmatic symptoms when exposed to atmospheric concentrations well below the OEL.

11. Toxicological information

Local effects

- Sensitization** : Hazardous in case of skin contact (sensitizer).
- Chronic toxicity** : Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

12. Ecological information

Ecotoxicity Data

<u>Ingredient Name</u>	<u>Species</u>	<u>Period</u>	<u>Result</u>
silver	Daphnia magna (EC50)	48 hours	0.0092 mg/l
	Pimephales promelas (LC50)	96 hours	0.00213 mg/l

13. Disposal considerations

- Methods of disposal ; Waste of residues ; Contaminated packaging** : Waste must be disposed of in accordance with federal, state and local environmental control regulations.
- Waste Classification** : Not applicable.
- European Waste Catalogue (EWC)** : Not available.
- Hazardous Waste** : The classification of the product may meet the criteria for a hazardous waste


14. Transport information

International transport regulations

Regulatory Information	UN number	Proper shipping name	Class	Packing group	Label	Additional Information
ADR/RID Class	Not regulated.	-	-			-
IMDG Class	Not regulated.	-	-			-
IATA-DGR Class	Not regulated.	-	-			-

15. Regulatory information

EU Regulations

- Hazard symbol(s)** : 
- Indication of Danger** : Irritant
- Risk Phrases** : R43- May cause sensitization by skin contact.
- Safety Phrases** : S24- Avoid contact with skin.
S37- Wear suitable gloves.
- Contains** : rosin, hydrogenated
Colophony

266-041-3
232-475-7

[Return to Product Manual](#)

Alpha OM-338 Solder Paste
96.5Sn3.0Ag0.5Cu 88-3-M11

Product Use : Classification and labelling have been performed according to EU directives 67/548/EEC, 1999/45/EC, including amendments and the intended use.
- Industrial applications.

EC Statistical Classification (Tariff Code) : 32089091

National regulations

Irritant

Denmark

Additional Warning Phrases : Not applicable.

Denmark – Cancer Risks : Not available.

Denmark – Restrictions on Use : Not to be used by professional users below 18 years of age, see the National Working Environment Authorities Executive Order on young peoples dangerous work.

Statutory Order 571 on Aerosols : Not applicable.

Netherlands

K-Klasse : K5

CPR : j

SHHR : 2JZ

Germany

Employment restrictions in accordance with § 15b of the Hazardous Substance Ordinance : Yes.

Hazardous Incident Ordinance : No.

Ordinance on Combustible Liquids : Class: Omitted

Technical instruction on air quality control : Class III 3.1.4: 0.4%

Hazard class for water : 3

16. Other information

Full text of R-Phrases with no. appearing in Section 2 - Europe : R43- May cause sensitization by skin contact.

Text of classifications appearing in Section 2 - Europe : None assigned.

HISTORY

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Version : 1

Prepared by : Simon Hosken
Environmental, Health and Safety Manager

Notice to Reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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SAFETY DATA SHEET



Cookson Electronics ASSEMBLY MATERIALS

Alpha OM-338 Solder Paste 95.5Sn4.0Ag0.5Cu 88-3-M11

1. Identification of the substance/preparation and of the company/undertaking

Product name : **Alpha OM-338 Solder Paste**
95.5Sn4.0Ag0.5Cu 88-3-M11

Code : **143727**

Head Office : **Cookson Electronics** **Manufacturer** : **Ashford Manufacturing Site**
Forsyth Road **Henwood Industrial Estate**
Sheerwater **Hythe Road**
Woking **Ashford**
Surrey **Kent**
GU21 5RZ **TN24 8DH**
Tel: +44(0)1483 758400 **Tel: +44 (0) 1233 610110**
Fax: +44(0)1483 728837 **Fax: +44 (0) 1233 664323**

2. Composition/information on ingredients

Substance/Preparation : **Preparation**

Chemical name*	CAS no.	%	EC Number	Classification
Europe				
tin	7440-31-5	80-100	231-141-8	
silver	7440-22-4	1-5	231-131-3	
rosin, hydrogenated	65997-06-0	1-5	266-041-3	R43
Colophony	8050-09-7	1-5	232-475-7	R43
See Section 16 for the full text of the R Phrases declared above				

* Occupational Exposure Limit(s), if available, are listed in Section 8

3. Hazards identification

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Classification : R43
Classification : R43
Classification : R43
Classification : R43
Skin contact : Irritation of the product in case of skin contact: Not available.
Hazardous in case of skin contact (sensitizer).

Aggravating conditions : Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

4. First-aid measures

First-Aid measures

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion : Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : In case of contact, immediately flush skin copiously with water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Obtain medical attention.

Eye Contact : Check for and remove any contact lenses. In case of contact, immediately flush eyes with a copious amount of water for at least 15 minutes. Obtain medical attention.

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5. Fire-fighting measures

Extinguishing Media

Suitable : SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special fire-fighting procedures : Fire fighters should wear self-contained positive pressure breathing apparatus (SCBA) and full turnout gear.

Protection of fire-fighters : Be sure to use an approved/certified respirator or equivalent.

6. Accidental release measures

Personal Precautions : Splash goggles. Dust respirator. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Environmental precautions and cleanup methods : Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Note: See section 8 for personal protective equipment and section 13 for waste disposal.

7. Handling and storage

Handling : Keep locked up. Do not breathe dust. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible.

Storage : Keep container tightly closed. Keep container in a cool, well-ventilated area.

Packaging materials

Recommended use : Use original container.

Danish Fire Class : Not applicable.

8. Exposure controls/personal protection

Engineering measures : Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Hygiene measures : Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.

<u>Ingredient Name</u>	<u>Occupational Exposure Limits</u>
Europe	
tin	ACGIH TLV (United States, 2001). Skin STEL: 0.2 mg/m ³ 15 minute(s). TWA: 0.1 mg/m ³ 8 hour(s).
silver	EU OEL (Europe, 2000). Notes: Indicative TWA: 0.1 mg/m ³ 8 hour(s).
Sweden	
silver	AFS (Sweden, 2000). NGV: 0.1 mg/m ³ 8 hour(s). Form: Dust
Denmark	
silver	Arbejdstilsynet (Denmark, 2000). GV: 0.01 mg/m ³ 8 hour(s).
Norway	
silver	Arbejdstilsynet (Norway, 2001). AN: 0.01 mg/m ³ 8 hour(s). AN: 0.1 mg/m ³ 8 hour(s). Form: Dust and fumes
France	
silver	INRS (France, 1999). Notes: Not Legal VME: 0.1 mg/m ³ 8 hour(s).
Colophony	INRS (France, 1999). Notes: Not Legal VME: 0.1 mg/m ³ 8 hour(s).
rosin, hydrogenated	INRS (France, 1999). Notes: Not Legal VME: 0.1 mg/m ³ 8 hour(s).
Netherlands	
tin	Nationale MAC-lijst (Netherlands, 2001). Notes: Tentative TGG 8 uur: 2 mg/m ³ 8 hour(s).
silver	Nationale MAC-lijst (Netherlands, 2001). Notes: Tentative TGG 8 uur: 0.1 mg/m ³ 8 hour(s).
Germany	

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tin	MAK-Werte Liste (Germany, 2000). Skin Spitzenbegrenzung: 0.2 mg/m ³ 4 times per shift, 30 minute(s). Form: Inhalable fraction TWA: 0.1 mg/m ³ 8 hour(s). Form: Inhalable fraction TRGS900 MAK (Germany, 2001). TWA: 2 mg/m ³ 8 hour(s).
silver	MAK-Werte Liste (Germany, 2000). Spitzenbegrenzung: 0.1 mg/m ³ 1 times per shift, 30 minute(s). Form: Inhalable fraction TWA: 0.01 mg/m ³ 8 hour(s). Form: Inhalable fraction TRGS900 MAK (Germany, 2001). Spitzenbegrenzung: 0.04 mg/m ³ TWA: 0.01 mg/m ³ 8 hour(s).
Finland	
tin	Työterveyslaitos (Finland, 2001). TWA: 2 mg/m ³ 8 hour(s).
silver	Työterveyslaitos (Finland, 2001). STEL: 0.03 mg/m ³ 15 minute(s). TWA: 0.1 mg/m ³ 8 hour(s).
United Kingdom (UK)	
tin	EH40-OES (United Kingdom (UK), 2002). TWA: 2 mg/m ³ 8 hour(s). STEL: 4 mg/m ³ 15 minute(s).
silver	EH40-OES (United Kingdom (UK), 2002). Notes: OES TWA: 0.1 mg/m ³ 8 hour(s).
rosin, hydrogenated	EH40-MEL (United Kingdom (UK), 2002). Sensitiser skin, Sensitiser inhalation TWA: 0.05 mg/m ³ 8 hour(s). Form: Rosin-based solder flux fume STEL: 0.15 mg/m ³ 15 minute(s). Form: Rosin-based solder flux fume
Colophony	EH40-MEL (United Kingdom (UK), 2002). Sensitiser skin, Sensitiser inhalation TWA: 0.05 mg/m ³ 8 hour(s). Form: Rosin-based solder flux fume STEL: 0.15 mg/m ³ 15 minute(s). Form: Rosin-based solder flux fume
Austria	
tin	BMWA_MAK (Austria, 2001). STEL: 4 mg/m ³ 4 times per shift, 15 minute(s). TWA: 2 mg/m ³ 8 hour(s).
silver	BMWA_MAK (Austria, 2001). STEL: 0.1 mg/m ³ 1 times per shift, 30 minute(s). TWA: 0.01 mg/m ³ 8 hour(s).
Switzerland	
silver	SUVA (Switzerland, 2001). Notes: Not Temporary MAK: 0.1 mg/m ³ 8 hour(s). Form: Dust
Belgium	
tin	Lijst Grenswaarden (Belgium, 1998). Skin VL: 2 mg/m ³ 8 hour(s).
silver	Lijst Grenswaarden (Belgium, 1998). VL: 0.1 mg/m ³ 8 hour(s).
Spain	
tin	INSHT (Spain, 2001). TWA: 2 mg/m ³ 8 hour(s).
silver	INSHT (Spain, 2001). TWA: 0.1 mg/m ³ 8 hour(s).

Personal protective equipment

- Respiratory system** : Dust respirator. Be sure to use an approved/certified respirator or equivalent.
- Skin and body** : Lab coat.
- Hands** : Gloves.
- Eyes** : Safety glasses.

9. Physical and chemical properties

- Physical state** : Solid. (paste)
- Colour** : Grey.
- Odour** : Not available.
- pH** : Not applicable.
- Melting point** : 217°C (422.6°F)
- Flash point** : Not available.
- Explosive properties** : Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
- Oxidizing properties** : Not available.
- Density** : The only known value is 7.31 g/cm³ (tin).
- Solubility** : Insoluble in cold water, hot water.

10. Stability and reactivity

- Stability** : The product is stable.
- Hazardous decomposition products** : **rosin, hydrogenated** Sensitized persons may subsequently show asthmatic symptoms when exposed to atmospheric concentrations well below the OEL.
Colophony Sensitized persons may subsequently show asthmatic symptoms when exposed to atmospheric concentrations well below the OEL.

11. Toxicological information

Local effects

- Sensitization** : Hazardous in case of skin contact (sensitizer).
- Chronic toxicity** : Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

12. Ecological information

Ecotoxicity Data

<u>Ingredient Name</u>	<u>Species</u>	<u>Period</u>	<u>Result</u>
silver	Daphnia magna (EC50)	48 hours	0.0092 mg/l
	Pimephales promelas (LC50)	96 hours	0.00213 mg/l

13. Disposal considerations

- Methods of disposal ; Waste of residues ; Contaminated packaging** : Waste must be disposed of in accordance with federal, state and local environmental control regulations.
- Waste Classification** : Not applicable.
- European Waste Catalogue (EWC)** : Not available.
- Hazardous Waste** : The classification of the product may meet the criteria for a hazardous waste


14. Transport information

International transport regulations

Regulatory Information	UN number	Proper shipping name	Class	Packing group	Label	Additional Information
ADR/RID Class	Not regulated.	-	-			-
IMDG Class	Not regulated.	-	-			-
IATA-DGR Class	Not regulated.	-	-			-

15. Regulatory information

EU Regulations

- Hazard symbol(s)** : 
- Indication of Danger** : Irritant
- Risk Phrases** : R43- May cause sensitization by skin contact.
- Safety Phrases** : S24- Avoid contact with skin.
S37- Wear suitable gloves.
- Contains** : rosin, hydrogenated
Colophony

266-041-3
232-475-7

[Return to Product Manual](#)

Alpha OM-338 Solder Paste
95.5Sn4.0Ag0.5Cu 88-3-M11

Product Use : Classification and labelling have been performed according to EU directives 67/548/EEC, 1999/45/EC, including amendments and the intended use.
- Industrial applications.

EC Statistical Classification (Tariff Code) : 32089091

National regulations

Irritant

Denmark

Additional Warning Phrases : Not applicable.

Denmark – Cancer Risks : Not available.

Denmark – Restrictions on Use : Not to be used by professional users below 18 years of age, see the National Working Environment Authorities Executive Order on young peoples dangerous work.

Statutory Order 571 on Aerosols : Not applicable.

Netherlands

K-Klasse : K5

CPR : j

SHHR : 2JZ

Germany

Employment restrictions in accordance with § 15b of the Hazardous Substance Ordinance : Yes.

Hazardous Incident Ordinance : No.

Ordinance on Combustible Liquids : Class: Omitted

Technical instruction on air quality control : Class III 3.1.4: 0.4%

Hazard class for water : 3

16. Other information

Full text of R-Phrases with no. appearing in Section 2 - Europe : R43- May cause sensitization by skin contact.

Text of classifications appearing in Section 2 - Europe : None assigned.

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Environmental, Health and Safety Manager

Notice to Reader

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Version 1.01

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