

ALPHA[®] OM-351

No Clean, Lead-Free Solder Paste, Zero Halogen, Ultra-Low Voids, Ultra-Fine Feature, Excellent Pin Test Performance.

DESCRIPTION

ALPHA OM-351 is a lead-free, zero-halogen no-clean solder paste designed for applications where ultra-low voiding performance, excellent ICT pin testing first pass yield, and the ability to pass JIS Copper Corrosion test are required.

ALPHA OM-351 is engineered to enable consistent fine pitch printing capability, down to 220µm squares using a 100µm thickness stencil and for 01005 chip components applications.

ALPHA OM-351 has been shown to yield good coalescence for 170µm circle deposits and excellent IPC Class III ultra-low voids performance. This product was engineered for optimum performance under a soak reflow profile in an N₂ environment.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- **Long Stencil Life:** Engineered for consistent performance in warm/humid production climates, reducing variations in print performance and paste dry-out
- **High Tack Force Life:** Ensures high pick-and-place yields, good self-alignment
- **Wide Reflow Profile Window:** Enables quality soldering of complex, high density PWB assemblies in an N₂ environment, using high ramp rates and soak profiles as high as 175 to 185 °C
- **Reduced Mid Chip Solder Balling and Head-in-Pillow Defects:** Minimizes rework and increases first time yield
- **Excellent Coalescence and Wetting Performance:** Coalesces well for 170µm small circle deposit at high soak profile nitrogen environment
- **Excellent Solder Joint and Flux Residue Cosmetics:** Residue does not char or burn after reflow soldering, even when using long/high thermal soaking
- **Excellent Voiding Performance:** Exceeds IPC7095 Class III requirement for BGA and best in class for LGA
- **Halogen Content:** Zero Halogen, no halogen intentionally added

- **Residue:** Excellent ICT Pin Testing property and Pass JIS Copper Corrosion Test
- **Safe and Environmentally Friendly:** Materials comply with ROHS, TOSCA, EINECS and Halogen-free requirements (Zero Halogen, see table below)

PRODUCT INFORMATION

<u>Products:</u>	ALPHA OM-351 Solder Paste 96.5Sn/3.0Ag/0.5Cu 89.0-4.5-M17 Jar/0.50kg (Item: 160601)
<u>Alloys:</u>	SAC305 (96.5%Sn/3.0%Ag/0.5%Cu)
<u>Powder Size:</u>	Type 4, Type 4.5 and Type 5
<u>Packaging Sizes:</u>	500 gram jars, 6" & 12" cartridges
<u>Flux Gel:</u>	Flux gel is available in 10 and 30 cc syringes for rework applications
<u>Lead Free:</u>	RoHS Directive EU/2015/863; amending Annex II of 2011/65/EU

APPLICATION GUIDELINES

ALPHA OM-351 is a Zero Halogen product and passes the standards listed in the Table below:

Halogen Standards			
Standard	Requirement	Test Method	Status
JEITA ET-7304A Definition of Halogen Free Soldering Materials	< 1000 ppm Br, Cl, I, F in solder material solids	TM EN 14582	Pass
IEC 612249-2-21	Post Soldering Residues contain <900 ppm each or total of < 1500 ppm Br or Cl from flame retardant source		Pass
JEDEC A Guideline for Defining "Low Halogen" Electronics"	Post soldering residues contain <1000 ppm Br or Cl from flame retardant source		Pass
Zero Halogen: No halogenated compounds have been intentionally added to this product			

TECHNICAL DATA

Category	Results	Procedures/Remarks
Chemical Properties		
Activity Level	ROLO	IPC J-STD-004B
Halide Content	Halide free (by titration)	IPC J-STD-004B
Fluoride Spot Test	Pass	JIS-Z-3197-1999 8.1.4.2.4
Halogen Test	Pass , Zero Halogen - No halogen intentionally added	EN14582, by oxygen bomb combustion, Non-detectable (ND) at < 50 ppm
Ag Chromate Test	Pass	IPC J-STD-004B
	Pass	JIS-Z-3197-1999 8.1.4.2.3
Copper Mirror Test	Pass	IPC J-STD-004B
	Pass	JIS-Z-3197-1999 8.4.2
Copper Corrosion Test	Pass (No evidence of Corrosion)	IPC J-STD-004B
	Pass (No evidence of Corrosion)	JIS-Z-3197-1999 8.4.1
Electrical Properties		
Water Extract Resistivity	18,900 ohm-cm	JIS-Z-3197-1999 8.1.1
SIR (7 days, 40 °C/90%RH, 12 V bias)	Pass	IPC J-STD-004B TM-650 2.6.3.7 (Pass ≥ 1 x 10 ⁸ ohm)
Electromigration (Bellcore 500 hrs @ 5 °C/85%RH10V)	Pass	Bellcore GR78-CORE (Pass=final > initial/10)
JIS Electromigration (1000 hrs @ 85°C/85%RH 48V)	Pass	JIS-Z-3197-1999 8.5.4
Physical Properties		
Color	Clear, Colorless Flux Residue	
Tack Force vs. Humidity	Pass , > 100gf over 24 hrs at 25%, 50% and 75% Relative Humidity	JIS Z-3284-1994, Annex 9
	Pass , Change of <1g/mm ² over 24 hrs at 25% and 75 % Relative Humidity	IPC J-STD-005 TM-650 2.4.44

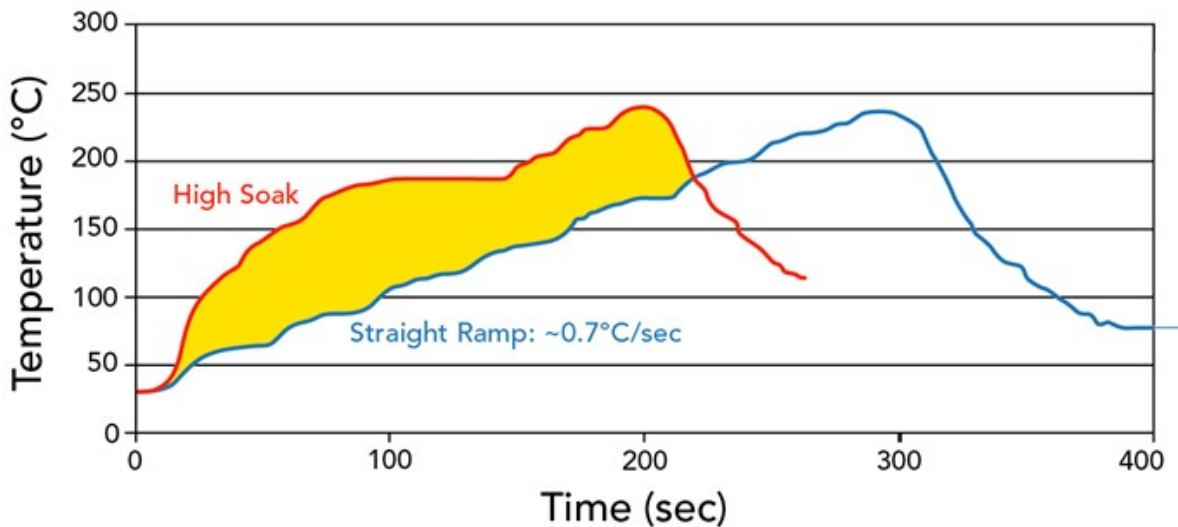
Category	Results	Procedures/Remarks
Viscosity	89.0% metal load, Type 4.5. Designated M17 for printing	Malcom Spiral Viscometer; J-STD-005
Viscosity Stability at 25 °C for 14 days	Pass	Malcom Spiral Viscometer
Continuous Viscosity Measurement at 25 °C for 96 hrs	Pass	Malcom Spiral Viscometer
24-hrs Rolling(Kneading) Viscosity Test @ 25 °C	Pass	Internal Test Method
Coalescence Test @ Cu surface finish, 100µm stencil, N ₂ reflow high soak profile environment	170 µm	Internal Test Method
Solder Ball	Preferred	IPC J-STD-005 TM-650 2.4.43
Wetting Time	Pass 0.34 second	Rhesca Test, Test Time T2, 3 seconds
Stencil Life	>8 hours	@ 50% RH 23°C (74°C)
Cold Slump	No bridge for 0.1 mm space	JIS-Z-3284-1994 Annex 7
	Not tested	IPC J-STD-005 TM-650 2.4.35
Hot Slump	No bridge for 0.4 mm space	JIS-Z-3284-1994 Annex 8
	Not tested	IPC J-STD-005 TM-650 2.4.35
Dryness Test (Talc)	Pass	JIS-Z-3197-1999 8.5.1

PROCESSING GUIDELINES

Storage & Handling	Printing	Reflow (see Fig. 1)	Cleaning
<ol style="list-style-type: none"> 1. Refrigerate to guarantee stability @ 0 to 10 °C (32 to 50 °F). When stored under these conditions, the shelf life of ALPHA OM-351 is 6 months. 2. Paste can be stored for 2 weeks at room temperature up to 25 °C (77 °F) prior to use. 3. When refrigerated, warm up paste container to room temperature for up to 4 hrs. 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 set-up of printer. Printing can be performed at temperatures up to 32 °C (89 °F). 4. Paste can be manually stirred before use. A rotating / centrifugal force mixing operation is not required. If a rotating/centrifugal force mixing is used, 30 to 60 seconds at 300 RPM is adequate. 5. Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste. 6. These are starting recommendations and all process settings should be reviewed independently. 	<p>Stencil: Recommend ALPHA CUT, ALPHA NICKEL- CUT, ALPHA TETRABOND, or ALPHA FORM stencils @ 0.100 to 0.150 mm (4 to 6 mil) thick for 0.4 to 0.5 mm (0.016" or 0.020") pitch. Stencil design is subject to many process variables, Contact your local Alpha stencil site for advice.</p> <p>Squeegee: Metal (recommended)</p> <p>Pressure: 0.21 to 0.36 kg/cm of blade (1.25 to 2.0 lbs/inch)</p> <p>Speed: 25 to 150 mm per second (1 to 6 inches per second).</p> <p>Paste Roll: 1.5 to 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>Stencil Release Speed: 1 to 5 mm/sec.</p> <p>Lift Height: 8 to 14mm (0.31 to 0.55")</p>	<p>Atmosphere: Nitrogen atmosphere preferred.</p> <p>Profile (SAC Alloys):</p> <p>Straight Ramp: 0.7 °C /sec & 1.3 °C /sec ramp profiles, 45 to 60 TAL, Peak Temperature 235 to 245 °C.</p> <p>Soak: 155 to 175 °C, 60 to 100 sec soak profiles have been determined to give optimal results. If required, good results are also achievable with high soak temperature profiles of 175 to 185 °C for 60 s. Typical peak temperature is 235 to 245 °C.</p> <p><u>Note 1:</u> Keeping the peak temperature below 241 °C may reduce the number and size of BGA and QFN voids.</p> <p><u>Note 2:</u> Refer to component and board supplier data for thermal properties at elevated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.</p> <p><u>Note 3:</u> These are profiles that were tested in the lab with acceptable reflow and coalescence performance, optimization to each board application should still be carried out by users to ensure best results.</p>	<p>ALPHA OM-351 residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, BC-2200 aqueous cleaner is recommended. For solvent cleaning, agitation for 5min in the following cleaners is recommended:</p> <ul style="list-style-type: none"> - SM-110E - Bioact™ SC-10E - Kyzen Micronox MX2501 - ATRON® AC205 (ZESTRON) <p>Misprints & stencil cleaning may be done with:</p> <ul style="list-style-type: none"> - SM-110E - SM-440 - BC-2200 - Bioact™ SC-10E - ZESTRON® SD - 301 cleaners. <p>Bioact is a registered trademark of Petroferm.</p>

REFLOW PROFILES

Fig 1: ALPHA[®] OM-351 SAC305 Typical Reflow Profile



*Note: Comparatively better voiding results have been observed under soak type profiles

General Reflow Profile Guidelines		
Parameter	Guideline	Additional Information
Atmosphere	N2	
SAC305	217 to 225 °C Melting Range	
Setting Zone*	Optimal Dwell Period	Extended window
40 to 225 °C	2:30 to 4:30 min.	< 5:00 min.
170 to 225 °C	0:30 to 2:00 min	< 2:30 min.
120 to 225 °C	1:25 to 3:00 min.	< 3:30 min.
TAL (217 to 225 °C)	45 to 90 sec.	Not Recommended
Peak temperature	235 to 245 °C	Compatible with most common surface finishes. (Entek HT, Entek OM, Alpha Star, ENIG, SACX HASL)
Joint cool down rate from 170 °C	1 to 6 °C /second	Recommended to prevent surface cracking issues.

RECYCLING SERVICES

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

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



SAFETY & WARNING

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

STORAGE

ALPHA OM-351 should be stored in a refrigerator upon receipt at 0 to 10°C (32 to 50°F). ALPHA OM-351 should be permitted to reach room temperature before unsealing its package prior to use. This will prevent moisture condensation build up in the solder paste.

CONTACT INFORMATION

To confirm this document is the most recent version, please contact Assembly@MacDermidAlpha.com

www.macdermidalpha.com

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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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