

# ALPHA<sup>®</sup> OM-353 SOLDER PASTE

No-Clean, Low-Silver, Lead-Free, Zero-Halogen, ROL0, Ultra-Fine Feature Print & Air Reflow Capable Solder Paste

## DESCRIPTION

**ALPHA OM-353** is a low silver and SAC305 capable paste designed for Type 5 (15 to 25  $\mu\text{m}$ ) powder to meet market segments requiring ultra-fine features application. It has been tested to give excellent printing performance down to 180  $\mu\text{m}$  pad size dimension with a 60° angled squeegee on stencil at 50 mm/s speed, 2 mm/s release speed and 0.18 N/m pressure printing parameters. **ALPHA OM-353** is also available in Type 4 (20 to 38  $\mu\text{m}$ ) powder size distribution.

**ALPHA OM-353** has been shown to result in low Non-Wet-Open, Head-In-Pillow, Low Residue. Additional testing demonstrates there is low residue spread and low flux wicking.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

## FEATURES & BENEFITS

- **Long Stencil Life: up to 80 hours** stencil life as tested per Alpha internal procedures, engineered for consistent performance in warm/humid production climates while 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  $\text{N}_2$  environment, using high ramp rates and soak profiles as high as 170 °C to 180 °C
- **Good Coalescence under the following conditions**

Powder Size	Reflow Profile (Air)	Alloy	
		SAC305	SACX 0307
T5	Low Soak	160 microns	170 microns
	High Soak	160 microns	170 microns

- **Reduced Mid Chip Solder Balling, Head-in-Pillow** minimizes rework and increases first time yield
- **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:** Pass IPC-7095 Class 3 classification for BGA

- **Halogen Content:** Zero Halogen, no halogen intentionally added
- **Reliability:** Pass JIS Copper Corrosion Test and all standard SIR Tests
- **Safe and Environmentally Friendly:** Materials comply with ROHS, TSCA, EINECS and Halogen-free requirements (Zero-halogen, see table below)
- **Low-Silver** alloy availability

### PRODUCT INFORMATION

<u>Alloys:</u>	SAC305, SAC105, Sn96.5Ag3.5, SACX Plus 0307, Innolot
<u>Powder Size:</u>	Type 4 (20 to 38 µm), Type 5 (15 to 25 µm)
<u>Packaging Sizes:</u>	500 gram jars, 6 inch & 12 inch 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

NOTE 1: For other alloys, powder size and packaging sizes, contact your local MacDermid Alpha Sales Office.

### HALOGEN STATUS

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

**TECHNICAL DATA**

Category	Results	Procedures/Remarks
<b>Chemical Properties</b>		
Flux Classification	ROL0	IPC J-STD-004B
Halide Content	Halide-free (by I.C.), < 0.05%	IPC J-STD-004B
Fluoride Spot Test	Pass, No fluoride present	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, No Halides present	IPC J-STD-004B
		JIS Z 3197:1999 8.1.4.2.3
Copper Mirror Test	Pass, Low activity, no breakthrough	IPC J-STD-004B
		JIS Z 3197:1999 8.4.2
Copper Corrosion Test	Pass, Low activity, no corrosion	IPC J-STD-004B
		JIS Z 3197:1999 8.4.1
<b>Electrical Properties</b>		
Water Extract Resistivity	11,500 ohm-cm	JIS Z 3197:1999 8.1.1
SIR (7 days, 40 °C/90% RH 12V)	Pass, $\geq 10^8$ Ohms for 7 days down to 100 $\mu$ m spacing	IPC J-STD-004B, IPC TM-650 2.6.3.7 (Pass $\geq 1 \times 10^8$ ohm)
SIR (7days, 85 °C/85%RH)	Pass, $\geq 10^8$ Ohms for 7 days down to 100 $\mu$ m spacing	IPC J-STD-004A, IPC TM-650 2.6.3.3 (Pass $\geq 1 \times 10^8$ ohm)
JIS Electromigration (1000 hrs @ 85 °C/85% RH 48V)	Pass	JIS Z 3197:1999 8.5.4 (Pass $\geq 1 \times 10^9$ ohm)
Bono Test 85 °C/85% RH and 50V bias	Pass	Bono Test

Category	Results	Procedures/Remarks
<b>Physical Properties</b>		
Color	Clear, Colorless Flux Residue	
Tack Life	Pass, Change of <1 g/mm <sup>2</sup> over 24 hrs @ 25 ± 2 °C and 50 ± 10% Relative Humidity	IPC J-STD-005 TM-650 2.4.44
	Pass, Change of <10% when stored at 25 ± 2 °C and 50 ± 10% Relative Humidity	JIS Z 3284 Annex 9
Coalescence Test – finest feature	160 µm (SAC305, T5 powder)	Internal Test Method
Solder Ball	Preferred	IPC J-STD-005, IPC TM-650 2.4.43
Spread	>80%	JIS Z 3197:1999
Wetting Time	Pass, 1.6 seconds	Rhesca Test, zero cross time T0
Stencil Life	~80 hours	@ 50% RH/25 °C (77 °C)
Cold Slump (25 °C /50% RH)	Pass, no bridging at 0.20 mm gap & above	IPC J-STD-005A
	Pass, no bridging at 0.20 mm gap & above	JIS Z 3284:1994 Annex 7
Hot Slump (150 °C/10min)	Pass, no bridging at 0.25 mm gap & above	IPC J-STD-005A
	Pass, no bridging at 0.40 mm gap & above	JIS Z 3284:1994 Annex 8
Dryness Test (Talc)	Pass	JIS Z 3197:1999 8.5.1

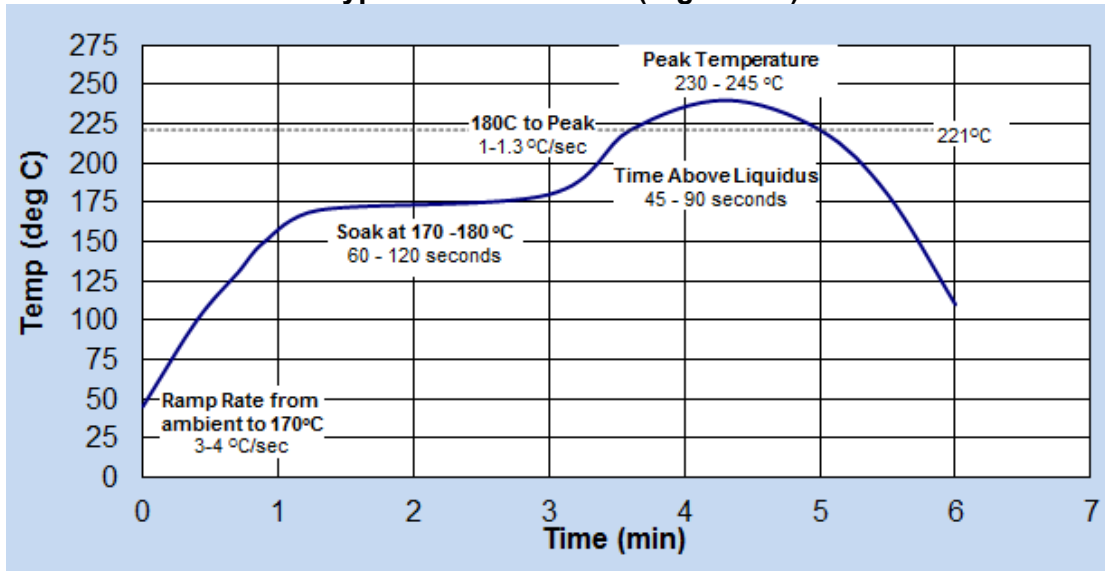
**PROCESSING GUIDELINES**

Storage & Handling	Printing	Reflow (See Fig. 1)	Cleaning
<p>1. Refrigerate to guarantee stability @ 0 to 10 °C (32 to 50 °F). When stored under these conditions, the shelf life of OM-353 is 6 months.</p> <p>2. Paste can be stored for 2 weeks at room temperature up to 25 °C (77 °F) prior to use</p> <p>3. When refrigerated, warm up 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 set up of printer. Printing can be performed at temperatures from 35 °C (95 °F) and at relative humidities ranging from 35 to 65% RH.</p> <p>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.</p> <p>5. Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste.</p>	<p><u>STENCIL</u>: Recommend ALPHA CUT, ALPHA NICKEL-CUT, ALPHA TETRABOND, or ALPHA FORM stencils @ 0.100 mm to 0.150 mm (4 to 6 mil) thick for 0.4 to 0.5 mm (0.016 inch or 0.020 inch) pitch. Stencil design is subject to many process variables. Contact your local Alpha Sales Rep for advice.</p> <p><u>SQUEEGEE</u>: Metal (recommended)</p> <p><u>PRESSURE</u>: 0.21 to 0.36 kg/cm of blade (1.25 to 2.0 lbs/inch)</p> <p><u>SPEED</u>: 25 to 150 mm/sec (1 to 6 inch/sec)</p> <p><u>PASTE ROLL</u>: 1.5 to 2.0 cm diameter and make additions when roll reaches 1 cm (0.4 inch) diameter (min.). Max. roll size will depend upon blade.</p> <p><u>STENCIL RELEASE SPEED</u>: 5 to 20 mm/sec (0.20 to 0.79 inch/sec)</p> <p><u>LIFT HEIGHT</u>: 8 to 14 mm (0.31 to 0.55 inch)</p>	<p><u>ATMOSPHERE</u>: Clean-dry air or nitrogen atmosphere.</p> <p><u>PROFILE</u>: Soak: 155 to 175 °C, 60 to 100 seconds soak profiles have been determined to give optimal results, please see profile chart, <b>ALPHA OM-353 SAC305/SACX Plus 0307</b> Typical Reflow Profile. If required, good results are also achievable with high soak temperature profiles of 170 to 180 °C for 60 to 120 seconds, especially in N<sub>2</sub>. Typical peak temperature is 235 to 245 °C.</p> <p><u>NOTE 2</u>: Keeping the peak temperature below 241 °C may reduce the number and size of BGA and QFN voids.</p> <p><u>NOTE 3</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><b>ALPHA OM-353</b> residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, Vigon A201 (in line cleaning), Vigon A 250 (Batch Cleaning) or Vigon US (Ultrasonic Cleaning) are recommended. Vigon is a registered trademark of Zestron.</p> <p>Misprints and stencil cleaning may be done with IPA, <b>ALPHA SM-110E &amp; ALPHA SM-440</b>.</p>

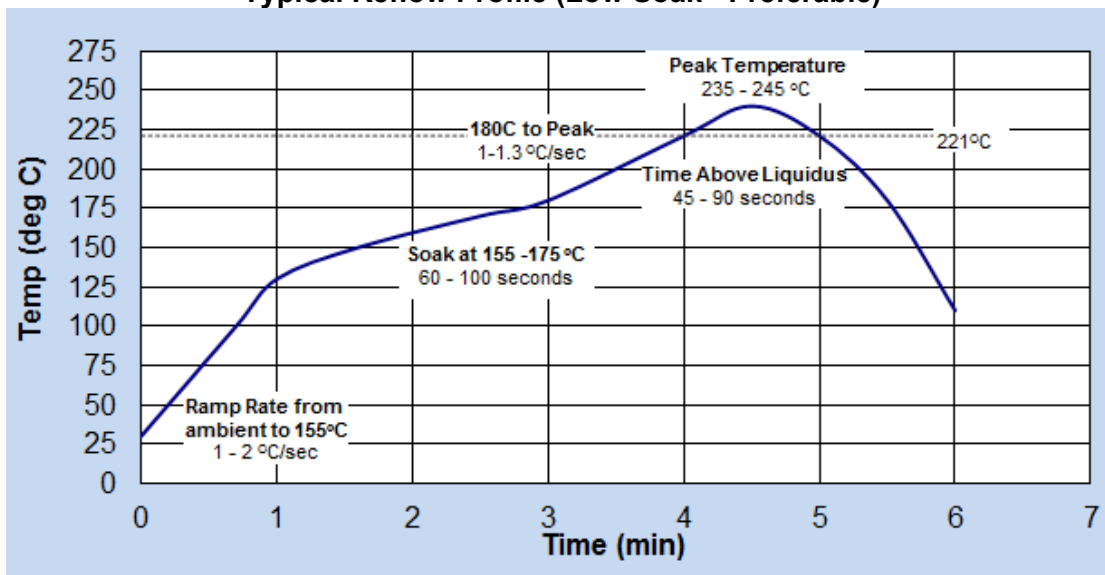
These are starting recommendations and all process settings should be reviewed independently.

REFLOW PROFILES

**Fig 1: ALPHA OM-353 SAC305/SACX Plus 0307  
Typical Reflow Profile (High Soak)**



**Fig 2: ALPHA OM-353 SAC305/SACX Plus 0307  
Typical Reflow Profile (Low Soak - Preferable)**



NOTE 4: 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. (Graphs not strictly to scale, for illustration purposes only.)

**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](http://MacdermidAlpha.com/assembly-solutions/knowledge-base).**

**CONTACT INFORMATION**

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