

# ALPHA<sup>®</sup> WSX-ICP

## Improved Cleaning Water-Soluble Solder Paste

### DESCRIPTION

**ALPHA WSX-ICP** is a halide-free and zero-halogen solder paste offering the ideal combination of printability and cleanability in a water-soluble lead-free alloy solder paste. **ALPHA WSX-ICP** was specifically formulated to address the emerging need to improve cleaning performance at lower water wash temperatures.

### FEATURES & BENEFITS

- High spread/wetting lead-free paste compatible with lead-free alloys and surface finishes
- Excellent cleanability performances in that residues are easily cleaned with DI H2O temperatures from 30 to 60 °C
- Halide-Free and Zero-Halogen formulation

### PRODUCT INFORMATION

<u>Alloys:</u>	SAC305
<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>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 Sales Office.

### APPLICATION GUIDELINES

ALPHA WSX-ICP is applicable to both printing and dispensing applications. This paste is formulated for print speeds between 20 mm/sec and 55 mm/sec, with a stencil thickness between 0.100 to 0.150 mm (4 to 6 mil) thick for 0.4 to 0.5 mm (0.016 inch or 0.020 inch) pitch, particularly when used in conjunction with ALPHA Stencils. Blade pressures should be 0.16 to 0.22 kg/cm of blade, 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.

**HALOGEN STATUS**

Halogen Standards			
Standard	Requirement	Test Method	Status
<b>JEITA ET-7304</b> <i>Definition of Halogen Free Soldering Materials</i>	< 1000 ppm Br, Cl, 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> <i>A Guideline for Defining "Low Halogen" Electronics</i>	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>		
Activity Level	ORH0	IPC J-STD-004
Halide Content	Halide free (by titration)	IPC J-STD-004
Halogen Test	<b>Pass</b> , ND	EN14582, by oxygen bomb combustion, Non detectable (ND) at < 50 ppm
Ag Chromate Test	<b>Pass</b>	IPC J-STD-004
Copper Corrosion Test	<b>Pass</b> , No Evidence of Corrosion	IPC J-STD-004
<b>Electrical Properties</b>		
SIR (IPC 7 days @ 85° C/85% RH)	<b>Pass</b> , $1.9 \times 10^{10}$ ohms	IPC-TM-650 method 2.6.3.3 (Pass $\geq 1 \times 10^8$ ohm)
<b>Physical Properties</b>		
Color	Clear, Colorless Flux Residue	

**PROCESSING GUIDELINES**

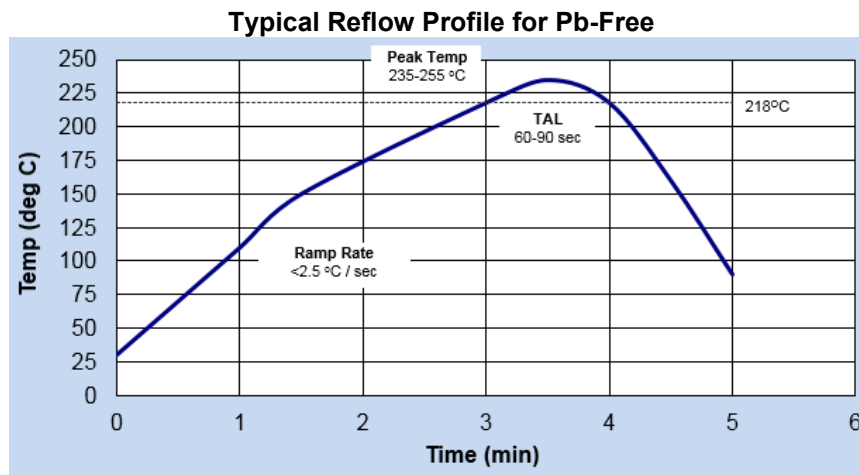
Storage & Handling	Printing	Reflow (See Fig. 1, Page 4)	Cleaning
<ol style="list-style-type: none"> <li>1. Refrigerate to guarantee stability @ 0 to 10 °C (32 to 50 °F). When stored under these conditions, the shelf life of ALPHA WSX-ICP is 3 months.</li> <li>2. Paste can be stored for 2 weeks at room temperature up to 25 °C (77 °F) prior to use.</li> <li>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 setup of printer.</li> <li>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.</li> <li>5. Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste.</li> <li>6. These are starting recommendations and all process settings should be reviewed independently.</li> </ol>	<p><u>Stencil</u>: 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 inch or 0.020 inch) pitch. Stencil design is subject to many process variables. Contact your local Alpha stencil site for advice.</p> <p><u>Squeegee</u>: Metal (recommended)</p> <p><u>Pressure</u>: 0.16 to 0.22 kg/cm of blade</p> <p><u>Speed</u>: 20 to 55 mm per second</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>: 1 to 5 mm/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>ALPHA WSX-ICP Pb-Free Typical Reflow Profile - <u>Soak</u>: The initial ramp rate should be at 1 to 2 °C per second to a peak temperature of 235 up to 255 °C for SAC lead-free type alloys. The liquidus temperature is at 218 °C for SAC305/405 alloys. Cooling rate should &gt;-3 °C per second to room temperature.</p> <p>NOTE 2: Keeping the peak temperature below 241 °C may reduce the number and size of BGA and QFN voids.</p> <p>NOTE 3: Refer to component and board supplier data for thermal properties at elevated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.</p>	<ul style="list-style-type: none"> <li>• The flux residues from ALPHA WSX-ICP are water cleanable.</li> <li>• Clean using deionized water.</li> <li>• Without use of saponifier, clean at temperatures of 30 to 60 °C.</li> <li>• Spray pressures of 30 to 60 psi are sufficient to remove all residues.</li> </ul>

**REFLOW PROFILES**

Reflow can be accomplished in an air or nitrogen-controlled atmosphere. Nitrogen reflow with O<sub>2</sub> levels of 300 ppm and below is preferred and will typically provide significantly improved yield results.

The chart below lists general reflow profile parameters. The initial ramp rate should be at 1 to 2 °C per second to a peak temperature of 235 to 245 °C for SAC lead-free type alloys. The liquidus temperature is at 218 °C for SAC305/405 alloys. Cooling rate should >-3 °C per second to room temperature.

**FIGURE 1**



**Alloys**

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 result.

**RESIDUE REMOVAL**

Cleaning using deionized water at temperatures of 30 to 60 °C, without the use of a saponifier, achieves excellent results. It is recommended that water temperatures not exceed 60 °C. Spray pressures of 36 to 60 psi are sufficient to remove all residues.

**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**

**To confirm this document is the most recent version, please contact [Assembly@MacDermidAlpha.com](mailto:Assembly@MacDermidAlpha.com)**

[www.macdermidalpha.com](http://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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