

## ALPHA<sup>®</sup> WS698

### High Activity Water-Soluble Flux for Semiconductor Applications

#### DESCRIPTION

**ALPHA WS-698** water soluble flux is engineered to be used in the soldering of a variety of lead-free and tin-lead eutectic alloys onto area array packages. The flux is highly compatible with Cu-OSP, electrolytic Ni-Au, and ENIG pad finishes. **ALPHA WS-698** is a halogen-free compliant material with very high fluxing activity for performance advantages in the areas of wetting, spread, and missing ball rate/yield.

Due to **ALPHA WS-698** high fluxing activity it is not recommended to be used as a pre-cleaning flux for cleaning substrates and boards.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

#### FEATURES AND BENEFITS

- Excellent activity allows for excellent soldering to ENIG and Cu OSP soldering process
- Superior wetting maximizing assembly yields to provide highest ball attach and flip chip yield rates
- Excellent material stability whereas the flux maintains tack and viscosity over multiple print cycles (without replenishment up to 8 hours)
- Excellent cleanability performance in that residues are easily cleaned with DI water
- IPC Halogen free formulation

#### APPLICATION

- Pin Transfer
- Flip Chip / Ball Dip
- Printing

**PHYSICAL AND CHEMICAL PROPERTIES**

| ALPHA WS-698 TECHNICAL DATA                            |                                  |   |
|--|----------------------------------|---|
| Category   | Results                          | Procedures/Remarks  |
| <b>Chemical Properties</b>                             |                                  |   |
| Activity Level (J-STD Classification)                  | ORH0                             | IPC J-STD-004   |
| Copper Corrosion Test (after washing)                  | Pass, (No evidence of Corrosion) | IPC J-STD-004   |
| <b>Electrical Properties</b>                           |                                  |   |
| SIR (IPC 7 days @ 85 °C/85% RH) (after washing) (ohms) | Pass, > 1.9 x 10 <sup>10</sup>   | IPC-TM-650 method 2.6.3.3<br>{Pass ≥ 1 x 10 <sup>8</sup> ohm min} |
| <b>Physical Properties</b>                             |                                  |   |
| Appearance   | Light Amber, Smooth              | ASP-WI-QC-009FS   |
| Tack Strength (Time-0)                                 | ~ 140 gF                         | IRC-SOP-CSP 0011  |
| Viscosity; Malcom Spiral Viscometer (@10 rpm)          | ~ 250 to 550                     | GLB-AMG-STM00541  |
| Acid Number  | ~ 65 to 85                       | ASP-WI-QC-001FS   |
| pH   | ~ 3 to 6                         | IPC-TM-650 pH Meter   |

**REFLOW**

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.

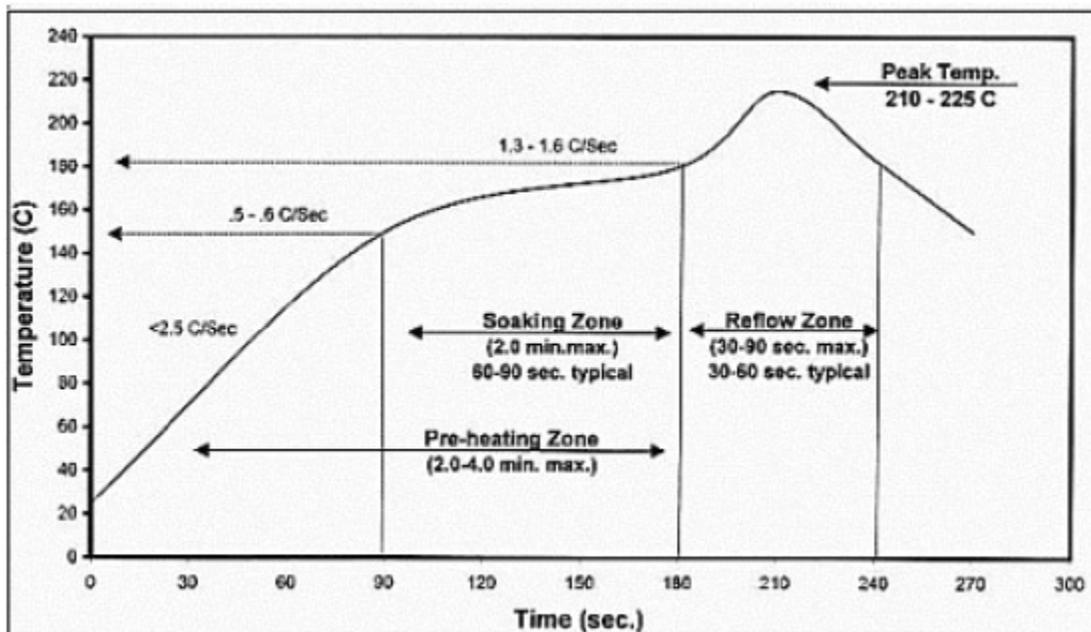
The below table lists general reflow profile parameters. The initial ramp rate should be at 40 to 130 °C per minute to a peak temperature of 230 to 245 °C for SAC lead-free type alloys or 210 to 225 °C for Sn63/Pb37 & Sn62/Pb36/Ag2 lead bearing eutectic alloys. The liquidus temperatures are 183 °C for Sn63Pb37 and 220 °C for SAC305/405 alloys. Cooling rate should 1.0~-6.0 °C/sec to 150 °C (ideal is -3.0~-6.0 °C).

Given the uniform furnace loading and low mass associated with typical BGA/CSP packaging assemblies, a lengthy soak or dwell is usually not required and may negatively impact yield rates. Pb free bearing alloys typically employ a slower ramp rate than that used for tin lead eutectic solder alloy reflow processing.

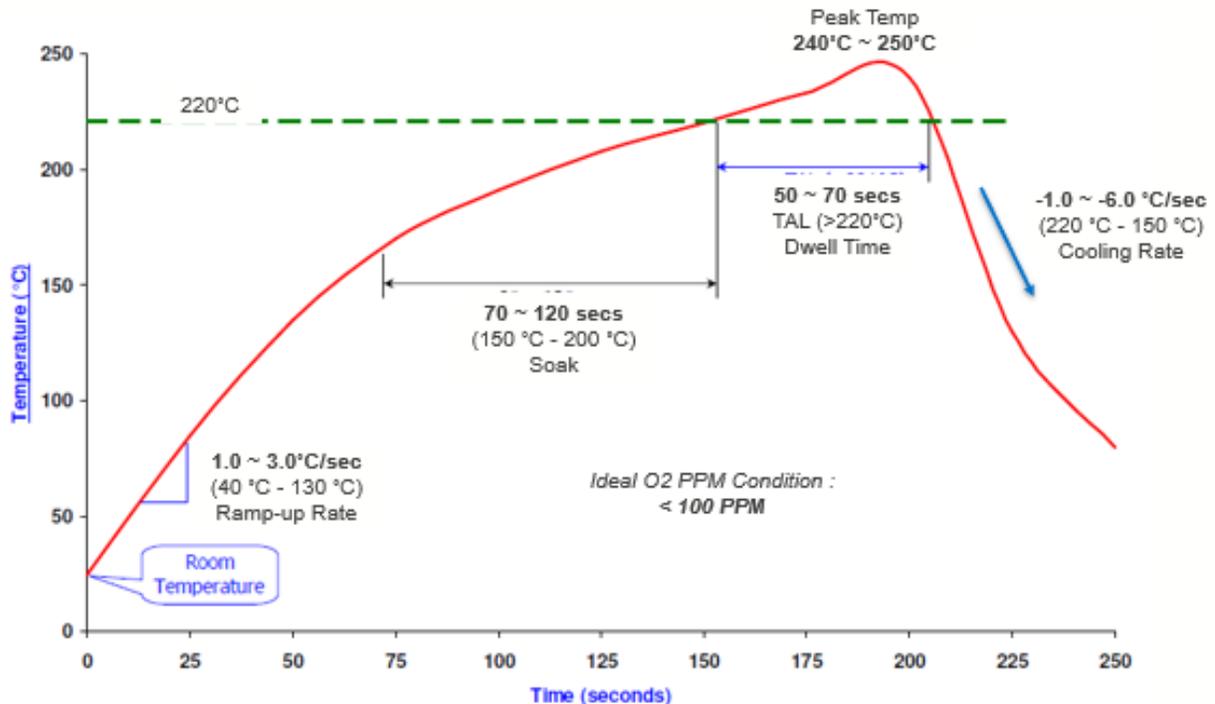
| Reflow Parameters             | Sn/Pb Eutectic | Pb Free                        |
|-------------------------------|----------------|--------------------------------|
| Ramp Rate (°C/Sec)            | 1.0 to 2.0     | 1.0 to 3.0                     |
| Pre-heat 30 to 150 °C (sec)   | not applicable | 90 to 130                      |
| Soak Time 150 to 200 °C (sec) | not applicable | 70 to 120                      |
| Time Above Liquidus (sec)     | 30 to 60       | 50 to 70                       |
| Typical Peak Temp Range (°C)  | 210 to 225     | 240 to 250                     |
| Cool Down Rate (°C/sec)       | > 3.0          | -1.0~-6.0<br>(Ideal -3.0~-6.0) |

Example reflow profiles:

### SnPb Eutectic Reflow Profile



## SAC Reflow Profile Reference



*Note: This is just an illustration and reference. Graph not strictly to scale*

### RESIDUE REMOVAL

#### For Ballattach Process:

Cleaning using hot deionized water at temperatures of 55 to 60 °C with spray pressures of 35 to 60 PSI are sufficient to remove all residues and achieve good flux residue cleanliness. The use of a saponifier or semi-aqueous cleaning chemistries will achieve excellent cleanliness results for extremely fine pitch high densely populated BGA.

#### For Flip chip Process:

Cleaning using hot deionized water at temperatures of 55 to 60 °C with spray pressures of 50 to 60 PSI are sufficient to remove residues on standard smaller flip chip devices. The use of a saponifier or semi-aqueous cleaning chemistries will achieve excellent results for extremely low stand-off devices or large densely flip chip devices.

**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.**

**STORAGE**

This flux should be stored in sealed containers at 15 to 25 °C. The shelf-life ALPHA WS-698 in sealed container is expected to be 6 months. If a container has been chilled, the container should be allowed to reach room temperature before opening in order to prevent moisture condensation from ambient air onto the flux.

**CONTACT INFORMATION**

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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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