FCT Assembly
LEADERS IN TECHNOLOGY

Product Data Sheet

WS889 Water Soluble Solder Paste
Lead-Free SN100C or SAC Alloy

- ORH1 Per IPC-J-STD-004
- Non-Hygroscopic
- Slump Resistant

INTRODUCTION

WS889 water washable solder paste is designed to meet the requirements for reliable solder joints in PCB assemblies. WS889 displays previously unseen levels of repeatability and consistency even in a wide range of temperatures (65°-85°F) and relative humidity (25% - 65% RH). Residues are clear and can be cleaned using warm water.

ATTRIBUTES

- Excellent wetting characteristics on all surface finishes, including OSP, Ni/Au, Ni/Pd/Au, Sn, and Ag
- Excellent volume transfer efficiency
- High resistance to slump and dry-out, even in extreme humidity conditions 70°-77°F & 45%-65%RH
- High speed stencil printing up to 100mm/sec
- Excellent low-voiding performance that exceeds IPC Class III requirement
- Clear Residue
- Very cleanable paste residues with hot DI water (120°-140°F)

PRODUCT INFORMATION

Alloys:	• SN100C – MP=227°C • SAC305 – MP=217-220°C • Compatible with most lead-free alloys
Applications:	• Automatic / Manual Printing • Automatic / Manual Dispensing
Powder Size:	• Type-3 and Type-4 standard • Type-5 available upon request
Packaging:	• 500 gram jars or cartridges standard • Enclosed print head systems. • Other packaging upon request
Repair Flux:	• 10CC and 30CC syringes • Larger package sizes upon request

PRINTING

Stencil aperture design and stencil quality are major factors in achieving excellent print consistency with any solder paste.

UltraSlic™ (SAR ≥ 0.45) and Slic™ (SAR ≥ 0.55) stencils from Fine Line Stencil are recommended for optimal print performance, and can be custom designed to minimize rework and improve the yields of any process. Some general stencil aperture design guidelines follow:

- **Fine pitch components (≤ 0.020")**
  A 0.001" reduction (L & W) to minimize bridging and create proper gasketing between the stencil and SMT pad
- **Discrete components**
  A 0.002" reduction (L & W) for water washable and a 0.002" reduction (L & W), with "U-shaped" home-plates, for no clean to minimize mid-chip solder beads.

  Contact Fine Line Stencil at 719-579-8055 for process-specific stencil design recommendations.
  www.finelinestencil.com

PRINTER OPERATION

The following are general recommendations for stencil printer optimization. Further adjustments may be necessary based on specific process requirements.

Solder Paste Bead Size:	• 2 cm (~0.75") on startup • Add when bead < 1.4 cm (~0.5") Maintaining a minimal controlled volume of solder paste on the stencil at all times will ensure paste consistency as well as print process repeatability and reliability
Squeegee:	• Metal, Slic™ blade preferred • 60 degrees from horizontal
Speed:	• 25 to 100 mm/sec. (1 to 6 in/sec) Adjust printer for a pull or print-on-demand process
Pressure:	• 0.18-0.27 Kg/cm (squeegee length) Apply only enough pressure to achieve a clean top-side wipe of the stencil surface after each squeegee pass
Underside Wipe:	• Slic™ and Ultraslic™ stencils should exceed >10 prints/wipe
Stencil life / Environment:	• >8 hours • 65°-85°F & 45%-60%RH • 75°F & 45%RH Optimal

STORAGE AND HANDLING

- Cartridges should be stored tip down.
- Paste can be stored up to two weeks at room temperature.
- To prolong shelf life of **WS889**, refrigerate between 5°C~10°C, (41°F~50°F). At this range the shelf life will exceed 9 months.
- **WS889** should not be allowed to freeze.
- When refrigerated, solder paste must be allowed to warm up to room temperature.
- Paste must be ≥22°C, (~66°F) prior to applying to stencil for processing.
- First-In-First-Out (FIFO) inventory management practices should be used with all solder pastes.

REFLOW PROFILE

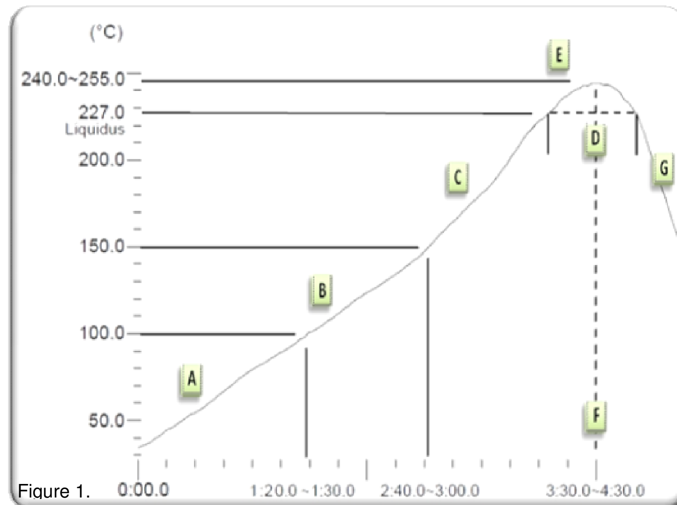

Figure 1.

*See FCT Assembly's "Linear Profile Process Guide" for SN100C.

HEATING

A linear ramp of 0.7˚C to 2.0˚C C/second is suggested to gradually remove the solvents and other volatile components in the solder paste. This also helps in minimizing solder balls, beading and bridging from hot slump.

A linear ramp also helps minimize depletion of flux activity which can occur with excessive temperature, extended preheat times, and at very high reflow temperatures.

Void formation on BGA and CSP devices can be reduced by increasing peak temperature by 10-15°C. We do not recommend use of a long soak with WS889 solder paste, because it may result in void formation.

While a linear profile typically does not produce tombstoning, a short 10-20 second dwell prior to transitioning into the liquidus point of the solder, and minimizing the ΔT between soak and liquid temperatures will help minimize tombstoning if experienced.

STANDARD LINEAR PROFILE GUIDELINES

A linear ramp-style profile (Figure 1) is recommended with **WS889**; however, it will also perform well in ramp-soak profiles. Some general guidelines for a standard linear profile:

Standard Linear Profile	
Ramp Rate	• 0.7˚C ~ 2.0˚C Per Second Typical
Time Above Liquidus (TAL)	• Target 50~55 Seconds Nominal • 45~75 Second Process Window
Peak Temperature	• 245˚C Nominal for Sn100C • 242˚C~255˚C Process Window
Profile Length	• 3½ ~ 4 ½ Minutes Max • From 45˚C to Profile Peak
Cool Down	• 3.0˚C ~ 4.0˚C Per Second Typical

COOLING

A cooling rate of 2°C-3°C per second is typical for most lead free applications. These parameters should be utilized to insure a fine grain solder structure and minimal IMC layer.

CLEANING

Post reflow residues from WS889 must be removed. It is suggested that the residues are removed as soon after reflow as possible; however, effective cleaning can be accomplished up to 3 days after reflow, if the boards are held at room temperature.

When double sided surface mount processing is done, we recommend cleaning the WS889 flux residues after each reflow cycle. This will ensure that the flux residues can be completely removed.

MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets (MSDS) are available upon request, and online at www.fctassembly.net

TEST RESULTS

J-STD-004 (IPC TM-650) Test	Result
Flux Type (per J-STD-004)	ORH1
Copper mirror	High activity
Halide test	0.30 – 0.60%
Silver chromate	Halide present
Fluoride test	None detected
Ion Chromatography	Halides present
J-STD-005 (IPC-TM-650) Test	**Result**
Brookfield viscosity Type 3	680 – 760 Kcps
Brookfield viscosity Type 4	680 – 760 Kcps
Slump	Pass
Solder Ball	Pass
Wetting	Pass
Bellcore Test	**Result**
SIR	Pass – Cleaned
Electromigration	Pass - Cleaned