Technical Data Sheet
Water Soluble Solder Paste
WS353 SAC305

Features:

- Broad Printing Process Window
- Easily Cleaned Residues
- Reduces Voiding Under BGAs

- Excellent Wetting
- Lengthy Stencil Life and Tack Time
- Low Foaming during Washing

Description:

WS353 water soluble solder paste has been developed in response to electronics manufacturers demand for an all-purpose, reliably consistent water-soluble solder paste. WS353 offers extended stencil life and tack time, robust environmental tolerance and printing characteristics, excellent activity, a broad cleaning process window, and compatibility with both tin-lead and lead-free solder alloys. WS353 can be used in fine pitch printing applications and has proven effective in the assembly of 0201 components. WS353 provides consistent printing characteristics and slump resistance during high-speed printing. The excellent activity of WS353 makes it a suitable choice when soldering to standard or difficult-to-wet parts, including lead-free alloys and finishes. In addition, WS353 has proven to substantially reduce voiding under micro-BGAs. The residues of WS353 may be cleaned easily in straight water, with the result being exceptional electrical reliability. In addition, WS353 is designed to not foam during washing, even in high-pressure wash systems.

Handling and Storage:

- WS353 has a refrigerated shelf life of 6 months at 4° C (40° F)
- Allow the solder paste to warm up completely and naturally to ambient temperature (8 hrs.) prior to breaking the seal for use. Do not force warm.
- Mix the product lightly and thoroughly (1-2 mins. max) to ensure even distribution of any separated material
- Do not store new and used paste in the same container, and reseal any opened containers while not in use.
- Replace the internal plug and cap of the 500 gram jars to ensure the best possible seal.

Paste Application:

- Apply sufficient paste to the stencil to allow a smooth, even roll during the print cycle (a bead diameter of ½ to 5/8 inch is normally sufficient to begin.)
- Apply small amounts of fresh solder paste to the stencil at controlled intervals to maintain paste chemistry and workable properties. WS353 provides the necessary tack time/force for today's high-speed placement equipment.
- Ensuring proper support of PCBs during assembly and handling will enhance product performance and reliability.

Printing:

- Snap-off distance = on contact (0.00")
- PCB Separation Distance = .030-.100"
- PCB Separation Speed = Slow-Medium
- Squeegee Pressure =1-1.7lbs/ In. of blade
- Print Speed .5 – 4 inches per second

Cleaning:

- WS353 can be cleaned easily with normal tap water. Deionized water is recommended for the final rinse. A temperature of less than 120° F is sufficient for removing residues. An in-line or other pressurized spray cleaning system is suggested, but is not required.

Paste Tech Tips: Problems and Possible Causes:

- Bridging - excessive solder, pad component solder ability, alignment
- Solder Balls - low preheat temperature, oxidized or excess paste, too rapid initial ramp up
- Tomb Stoning - excessive delta temperature, rapid heat rate, component to pad mismatch, paste registration
- Discolored Joints - excessive peak temperature, board paste component contamination, excessive soak time
- White Residue - solder paste oxidation, excessive time at temperature
- Beading - excess solder paste, component placement
- Leaching - excessive reflow time or temperature

Reflow Profile (Sn/Ag/Cu):
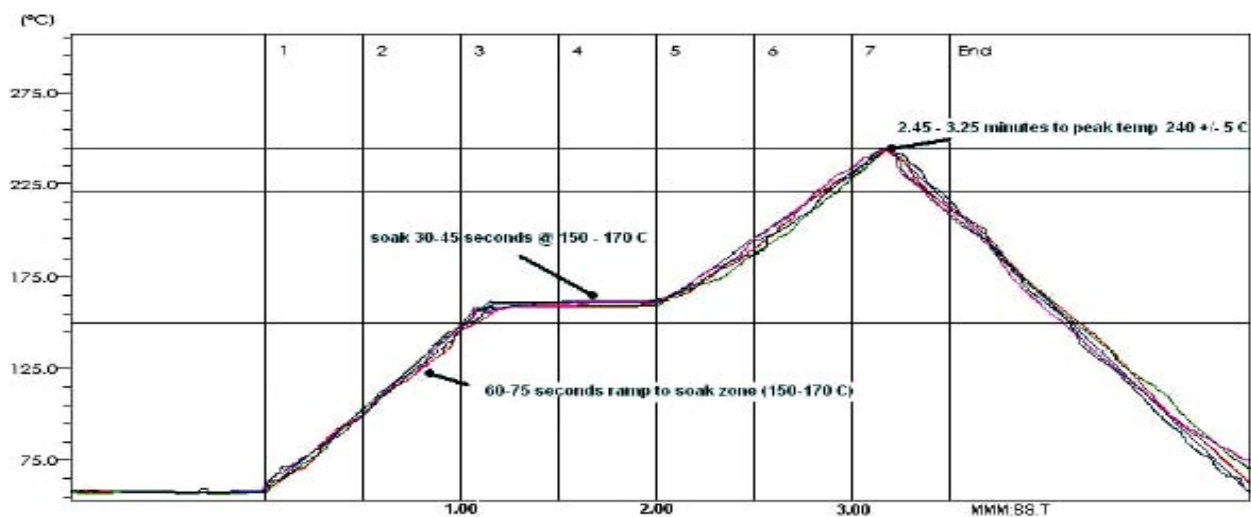
RSS Profile Guidelines:

The typical initial rate of rise for the RSS profile is 1.4 to 1.8°C/second.

Ramp up to 150°C and then soak the assembly for 30 to 60 seconds.

The soak zone should be controlled between 150 -170°C.

Proceed to spike immediately once the PCB has reached thermal stability.

Peak temperature is 240ºC ± 5ºC.

Time above liquidus is 45 ± 15 seconds.

The total profile length should be between 2 ¾ - 3 ½ minutes from ambient to peak temperature.

Cool down should be controlled within 4°C/second.

WS353 Compatible Products:

- Electropure Solder Bar
- WS353Tacky Flux
- WS715; WS735 Spray Flux
- WS482 Cored Wire
- Epoxy 4044 – Chip Bonding Epoxy
- 200AX – Stencil Cleaner

Surface Insulation Resistance Testing – Two Week Delayed Cleaning

General References:

Surface Insulation Resistance (SIR) test for solder paste was carried out according to J-STD-004 and IPC-TM-650 method 2.6.3.3.

Procedure:

IPC-B-24 coupons were cleaned according to IPC-TM-650 §5.2.3. Solder paste was stencil printed onto the coupons and reflowed in convection oven using standard AIM thermo-profile WS-J for water-soluble paste. After reflow, the coupons were left for 2 weeks at ambient conditions before cleaning under tap water at 55-58oC for 120 seconds. The coupons were then dried for 30 minutes at room temperature before testing.

Pass Fail Criteria and Data Evaluation:

#	Reference	Property	Pass-Fail Criteria	Result
1	IPC-TM-650 §5.5.1	Quality of control coupons	>1E9 Ω at 96 and 168 h	PASS
2	-STD-004 §3.2.4.5.1	SIR of test coupons	>1E8 Ω at 96 and 168 h	PASS
3	IPC-TM-650 §5.5.2	Post-test visual inspection	No dendrite growth or corrosion	PASS

Conclusions:

The results of the qualification tests indicate that the AIM WS353 solder paste complies with the requirements of IPC TM-650, Method 2.6.3.3 for Surface Insulation Resistance (SIR) with two weeks between reflow and cleaning.

Test Data:

Control		Initial 24 hours 96 hours	168 hours
#1	A B C D	1.00E+14 3.77E+10 2.48E+10 1.10E+14 4.38E+10 2.72E+10 1.10E+14 4.24E+10 2.60E+10 1.00E+14 4.01E+10 2.52E+10	2.14E+10 2.27E+10 2.14E+10 2.16E+10
#2	A B C D	1.10E+14 4.13E+10 2.55E+10 1.00E+14 4.39E+10 2.66E+10 1.00E+14 4.13E+10 2.49E+10 1.10E+14 4.23E+10 2.56E+10	2.15E+10 2.23E+10 2.05E+10 2.13E+10
#3	A B C D	1.00E+14 3.95E+10 2.60E+10 1.01E+12 4.29E+10 2.63E+10 1.00E+14 4.32E+10 2.51E+10 1.00E+14 4.55E+10 2.68E+10	2.21E+10 2.23E+10 2.07E+10 2.24E+10
WS353 (2 weeks standing before cleaning)			
#1	A B C D	2.34E+12 7.98E+08 2.41E+09 1.97E+12 6.06E+08 2.30E+09 1.65E+12 6.50E+08 2.50E+09 2.96E+12 6.81E+08 2.35E+09	3.87E+09 3.64E+09 3.75E+09 3.73E+09
#2	A B C D	2.34E+12 6.40E+08 2.05E+09 1.04E+12 4.46E+08 1.91E+09 2.18E+12 3.79E+08 1.56E+09 1.25E+12 4.73E+08 1.69E+09	3.34E+09 3.15E+09 2.73E+09 3.01E+09
#3	A B C D	4.79E+12 8.38E+08 2.46E+09 4.19E+12 5.28E+08 2.04E+09 5.24E+10 5.78E+08 2.09E+09 4.93E+10 6.51E+08 2.21E+09	3.81E+09 3.26E+09 3.34E+09 3.63E+09

Slump Test IPC-TM-650 2.4.35

Stencil IPC –A-20 (0.1mm thick)			
Pad size 0.33 x 2.03mm		Pad size 0.2x2.03mm	
Cold 10-20min T: 25°C ± 5°C RH: 50% ±10%	Hot 10-15min T:150°C ±10°C	Cold 10-20min T: 25°C ± 5°C RH: 50% ±10%	Hot 10-15min T : 150°C ± 10°C
Bridging	**Bridging**	**Bridging**	**Bridging**
Max :0.25mm	**Max :0.30mm**	**Max :0.175mm**	**Max :0.20mm**

Stencil IPC-A-21 (0.2mm thick)			
Pad size 0.63 x 2.03mm		Pad size 0.33x2.03mm	
Cold 10-20min T: 25°C ± 5°C RH: 50% ±10%	Hot 10-15min T : 150°C ± 10°C	Cold 10-20min T: 25°C ± 5°C RH: 50% ±10%	Hot 10-15min T:150°C ± 10°C
Bridging	**Bridging**	**Bridging**	**Bridging**
Max :0.56mm	**Max :0.63mm**	**Max :0.25mm**	**Max :0.30mm**

Powder Test IPC-TM 650 2.2.14:

Particle Size Distribution	
<25μ	3%
25μ-45μ	97%
45-50 μ	0%
>53 μ	0%
ASPECT RATIO <1.3	98%

Other Test Data:

VISCOSITY: IPC-TM 650 2.4.34	**698 Kcps**
SOLDER BALLS: IPC-TM-650 2.4.43	**Pass**
TACK: IPC-TM 650 2.4.44	**Time: 8hrs./ Avg. Value 11.0 gf**
WETTING: IPC-TM-650 2.4.45	**Pass**

The information contained herein is based on data considered accurate and is offered at no charge. Product information is based upon the assumption of proper handling and operating conditions. All information pertains to solder paste produced with 45-micron powder. No warranty is expressed or implied regarding the accuracy of this data. Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

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