Amp One PT Ultra Low Voiding No-Clean Lead-Free Solder Paste

Introduction

Amp One PT solder paste is redefining the voiding standard for PCB assembly. Combining industry low levels of voiding performance with excellent activity allows Amp One PT to deliver an unmatched ability for assemblers to amplify their process window while achieving higher yields. Amp One PT has been formulated to generate flux residues which are pin testable.

When coupled with SN100CV or LF-C2 alloys, Amp One PT provides a high reliability solution for harsh environments. Amp One PT combined with TempSave B37 alloy (Nihon Superior) is an excellent low temperature solder paste. This lead-free alloy contains 37% Bismuth which eliminates the brittleness issues of standard Sn/Bi57/Ag1 and Sn/Bi58 alloys.

Attributes

- Best in class voiding performance.
- Pin testable flux residues which remain testable for over 5 days.
- Excellent printability and activity.
- Ideal reflow performance with excellent wetting, very low solder balling and graping.
- Halide and halogen free which may improve long term reliability.
- Passes JIS SIR & ECM and Bellcore Telcordia SIR & ECM.
- Designed for use with a variety of solder alloys including TempSave B37 alloy (Nihon Superior).
- Low temperature lead-free alloy that shows improved drop shock results over standard Sn/Bi57/Ag1 and Sn/Bi58 alloys.

Solder Alloy	Solder Powder Size Availability (IPC J-STD-005)	Melting Range (°C)
SAC305	Type 3 or 4	217 - 220
SN100C (Nihon Superior)	Type 3 or 4	227
SN100CV (Sn/Cu/Ni/Bi) (Nihon Superior)	Type 3 or 4	221 - 225
Sn/Ag 3.5%	Type 3	221
LF-C2 (Nihon Superior)	Type 3 or 4	205 - 213
TempSave B37 (Nihon Superior)	Type 4	139 - 174
Anti-tombstoning mixtures	Type 3 or 4	Range depends on the mixture

- Other sizes of solder powder are available upon request.
- The size range for the solder powder types are as follows:
  - Type 3 (25-45 µm >80%). Mesh -325/+500
  - Type 4 (20-38 µm >80%). Mesh -400/+635
  - Type 5 (15-25 µm >80%). Mesh -500/+800

Solder Paste Packaging	Net Weight (grams)
Jars	250, 500

Cartridges	500 or 600 (6 oz), 700 (8 oz), 1300 (12 oz)
Syringes	30, 100
Enclosed print systems	800

Compatible Products

NC120, NC160, NC165 liquid fluxes.
Amp One PT gel flux.

Storage and Handling

Best practices for storage and handling of solder paste are listed below. Additional details can be found in the Solder paste storage and handling guide.

- Shelf life is 12 months when stored at 0 to 10 °C (32 to 50 °F).
- Warm the solder paste to room temperature (18 to 29 °C / 65 to 85 °F) before use. Do not force warming by heating the solder paste. Keep the solder paste sealed while warming, which typically takes 3 to 4 hours at room temperature. Warming overnight is acceptable.
- Ideally solder paste should be mixed before use to bring it to a normal working consistency. This can be done by hand-stirring in a jar, or using a knead cycle on the printer.
- Best practice is to keep the solder paste at room temperature until completely used. Remaining fresh solder paste should be sealed in the original container along with all inserts, lids, etc.
- If solder paste is removed from the printer and stored, it is recommended to store it in a separate container from the fresh solder paste. The container should be sealed with all inserts, lids, etc.
- Once solder paste is applied to the circuit board, the best practice is to reflow the solder paste as soon as possible. It is acceptable to reflow within approximately 8 hours.

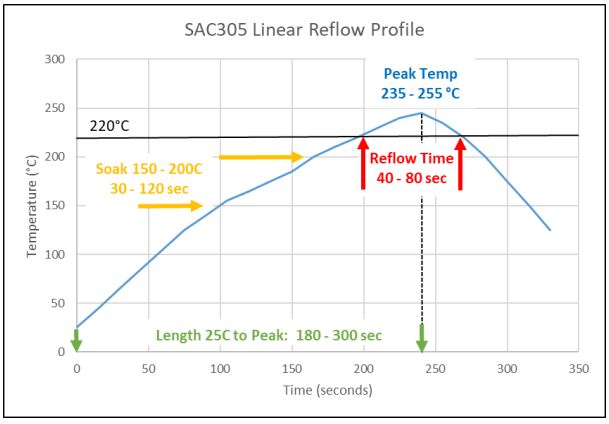
Print Parameter	Preferred	Acceptable
Solder paste bead size	1.5 to 2.0 cm (0.60 to 0.80 in)	1.0 to 2.5 cm (0.40 to 1.0 in)
Squeegee blade	Fine grain stainless steel. 60° from horizontal. 45° from horizontal for pin in paste.	Any type of stainless steel
Stencils	Fine grain (2-5 µm) or ultra-fine grain (1-2 µm) stainless steel	All types of commercially available stencils
Print speed	30 to 100 mm/sec (1.2 to 4.0 in/sec)	20 to 200 mm/sec (0.8 to 8.0 in/sec)
Pressure / blade length (increase with increasing speed)	0.18 to 0.27 kg/cm (1.0 to 1.5 lbs/in)	0.18 to 0.54 kg/cm (1.0 to 3.0 lbs/in)
Separation speed	1.0 to 5.0 mm/sec	0.5 to 10.0 mm/sec
Underside stencil cleaning	Wet / vacuum / vacuum cycle every 1-5 prints	Other cleaning cycles every 1 to 20 prints depending upon technology
Stencil life	8 hours at 18-29 °C (65-85 °F) and 10-70% RH.	Stencil life may be shorter outside of the preferred conditions.

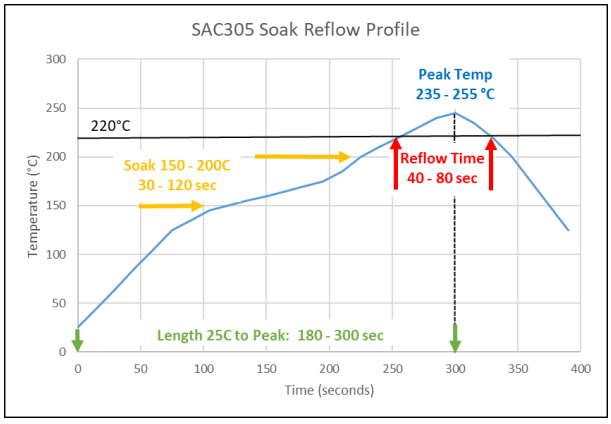
- Blade pressure should be set as low as possible to clean off the stencil. Higher blade pressures will increase stencil and blade wear, and can lead to "scooping" and other print defects.
- Underside stencil cleaning is best accomplished with commercial cleaners and high quality wipe materials. Nano-coated stencils can be used to reduce the frequency of underside cleaning.

Reflow Parameter	Preferred (all except TempSave)	Acceptable (all except TempSave)	Acceptable (TempSave B37)
Profile length (25 °C to peak)	3.5 to 4.5 min (210 to 270 sec)	3.0 to 5.0 min (180 to 300 sec)	4.5 to 5.5 min (270 to 330 sec)
Heating ramp rate (20 second window)	1.0 to 2.0 °C/sec	1.0 to 3.0 °C/sec	1.0 to 3.0 °C/sec
Preheat / soak time (150 - 200 °C)	60 to 90 sec	30 to 120 sec	60 to 90 sec
Peak temperature	240 to 250 °C for SAC alloys 245 to 255 °C for SN100C	235 to 255 °C for SAC alloys 240 to 260 °C for SN100C	190 to 220 °C
Reflow time (time above liquidus)	50 to 70 sec	40 to 80 sec	30 to 90 sec > 174 °C Min 60 sec > 140 °C
Cooling ramp rate (20 second window)	3.0 to 6.0 °C/sec	1.0 to 6.0 °C/sec	1.0 to 6.0 °C/sec

- Reflow time should be calculated based on the liquidus point of the alloy used: SN100C = 227°C, SAC305 = 220°C, Sn96.5/Ag3.5 = 221°C, SN100CV = 225°C, LF-C2 = 213°C, TempSave B37 = 139 - 174°C.

Example reflow profile graphs for SAC305 are shown below. These are a good starting point but they can be modified to fit the product and process. Contact FCT Assembly for assistance with reflow profiling.





Cleaning

Raw solder paste can be removed from the stencil, squeegee blades, and circuit boards using a variety of commercial cleaners. Isopropyl alcohol (IPA) can also be used.

After reflow, no-clean solder paste residues are designed to be “safe” and do not need to be removed from the circuit board. If removal of the flux residues is desired, then a commercial cleaning agent should be used. Several common cleaning agents have been tested and found to be effective. Please contact your cleaning chemical supplier for details.

Safety

Wear chemically resistant gloves when handling solder paste. Avoid breathing fumes, especially during reflow of the solder paste. Follow the guidelines detailed in the Safety Data Sheet (SDS).

J-STD-004B Flux Standard	Test Method	Result
J-STD-004B classification	J-STD-004B methods	ROL0
Halide ion content (Br^-, Cl^-, F^-, I^-)	IPC 2.3.28.1	0.0 % wt
Halogen content (Br and Cl)	EN 14582, IPC 2.3.28.1	0.0 % wt
Halide by silver chromate	IPC 2.3.33	No halides detected
Fluoride by spot test	IPC 2.3.35.1	None detected
Copper mirror	IPC 2.3.32	Low activity
Copper corrosion	IPC 2.6.15	No corrosion
Surface Insulation Resistance (SIR)	IPC 2.6.3.7	Pass > 1.00E+11 ohms
Electro Chemical Migration (ECM)	IPC 2.6.14.1	Pass, increase of resistance
JIS SIR (100V, 85C, 85%RH)	JIS 3197-2012 8.5.3	Pass > 2.6E+09 ohms
JIS ECM (48V, 85C, 85% RH, 1000 hours)	JIS 3197-2012 8.5.4	Pass
Bellcore Telcordia SIR (45V, 35C, 85% RH, 96 hours)	GR-78-CORE 13.1.3	Pass > 3.8E+11 ohms
Bellcore Telcordia ECM (10V, 85C, 85% RH, 500 hours)	GR-78-CORE 13.1.4	Pass
J-STD-005 Solder Paste Standard	**Test Method**	**Result**
Viscosity - Brookfield	IPC 2.4.34	Refer to the C of A
Slump - frosted glass	IPC 2.4.35	Pass
Solder balling - frosted glass	IPC 2.4.43	Preferred
Wetting - copper	IPC 2.4.45	Pass