

## Lead-free Solder Paste SM-388

### General Description

Lead-free solder paste SM-388 has been developed to exceed the requirements for reliable lead-free solder joints. This no clean paste uses a highly heat stable synthetic resin as its flux base. With this resin, the residues left after reflow are much lighter in colour as compared to those left by traditional solder pastes. SM-388 meets requirements of class RELO of J-STD-004 and DIN EN 61190-1-1 specifications. The no clean paste flux used in this solder paste consists of additives such as high-boiling solvents, corrosion inhibitors, thixotropic agents and heat stable resins. These additives provide SM-388 paste the desired rheology for SMT applications.

The residue left by SM-388 is chemically non-corrosive and electrically nonconductive. It is nearly colourless and therefore can be widely accepted for no clean application. As SM-388 uses a high heat stable resin, the residue is also more resistant to moisture and water. Therefore, the residue would hardly develop so-called "white powdery residues" after post clean with water when the PCB's are wave soldered with water soluble fluxes. SM-388 solder paste is conforming to J-STD-005 specification.

- High activity on all substrates including OSP-boards
- High printing speeds up to 150 mm/s
- Stable wetting behavior over a wide range of profiles
- Stencil life of up to 8 hours under proper process parameters
- Very good tack time of up to 16 hours
- J-STD-004 Flux classification: RELO
- Very good printing characteristics to 0.4 mm pitch with type 3 powder
- Very good slump characteristics

### Physical Properties

Data given for Sn96.5Ag3Cu0.5, metal 87.5 %, particle size 3, 25 – 45 µm

#### Viscosity: 600 – 700 Pa·s

IPC-TM-650 2.4.34

### Reliability Properties

Data given for Sn96.5Ag3Cu0.5, metal 87.5 % particle size 3, 25 – 45 µm

#### Copper Mirror Corrosion: Class L

J-STD-004, IPC-TM-650, Method 2.3.32

#### Silver Chromate Test: Pass

J-STD-004, IPC-TM-650, Method 2.3.33

#### Solder Balling Test: Class 1

J-STD-005, IPC-TM-650, Method 2.4.43

**Insulation Resistance:  $2.0 \times 10^8 \Omega$**  after 168 hours of humidity exposure, IPC-TM-650 2.6.3.3

Details see Page 2

### Application

SM-388 solder paste can be applied by dispensing, stencil or screen-printing. As a general guide, the following metal loading and viscosity ranges for each type of application method are available. Other particle sizes and alloys are available on request.

# Technical Product Information

## Lead-free Solder Paste SM-388

Alloy T3 (25-24 µm)	Melting point / -range [°C]	Metal content for screen / stencil printing [%]	Metal content for dispensing [%]
SnAg3Cu0.5	217 – 219	87 – 88	85 – 86
SnAg3.8Cu0.7	217 – 219	87 – 88	85 – 86
SnAg3.5Cu0.7	217 – 219	87 – 88	85 – 86
SnCu0.7	227	87 – 88	85 – 86
SnAg3.5	221	87 – 88	85 – 86

### Cleaning

SM-388 solder paste is a no clean formula. The residues do not need to be removed. Although SM-388 is a no clean formula, its residues can be easily removed using automated cleaning equipment with a variety of commercially available cleaning agents.

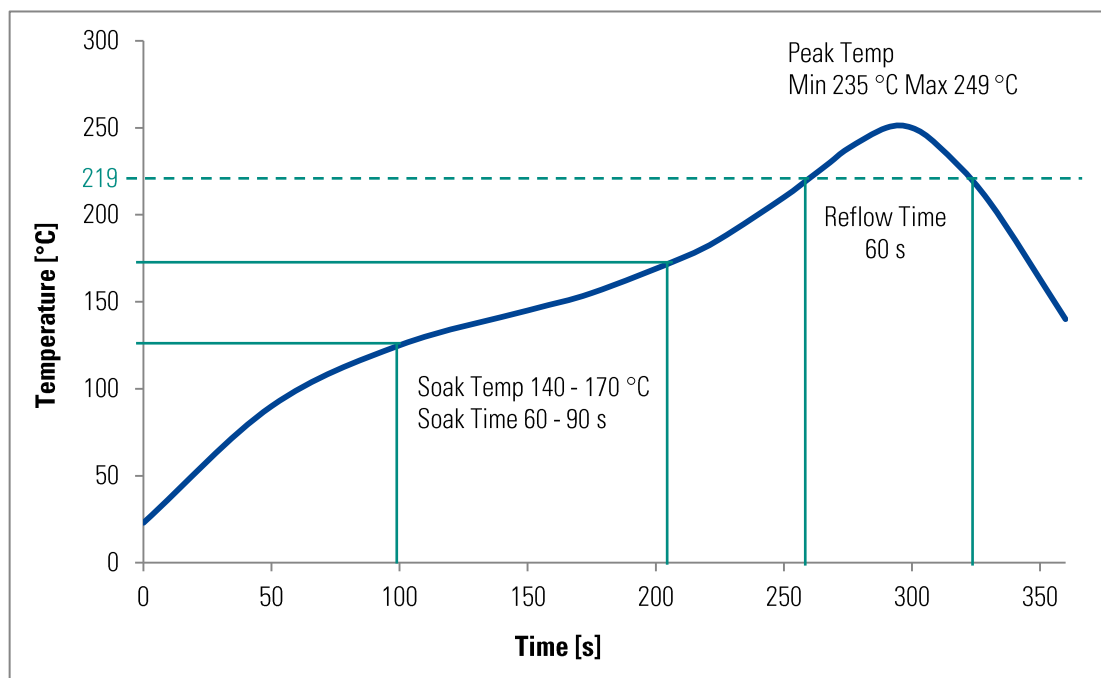
### Packaging

Jars: 250 g and 500 g                      Cassettes: DEK ProFlow cassette 750 g  
Cartridges: 600 g and 1200 g              Syringes: 10 cc (35 g) and 30cc (100 g)

### Storage and Shelf Life

Jars/Cartridges: Maximum 6 months in a sealed jar, kept under standard refrigeration between 6 – 16 °C  
Syringes: Maximum 3 months kept under standard refrigeration between 6 – 16°C

### Reflow Profile when using Sn96.5Ag3Cu0.5 alloy



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## Lead-free Solder Paste SM-388

### Details of Insulation Resistance Measurement

Product: SM-388 Alloy: Sn96.5Ag3Cu0.5 Tested @ 50 V, humidity 85 %, temperature 85 °C  
Particle size: 25 – 45 µm Metal: 88 % Duration: 24 hrs, 96 hrs, 168 hrs: bias applied  
Lot#: R&D 188-2 Reading @ 100 V, humidity 85 %, temperature 85 °C

Sample	Ambient	24 hrs	96 hrs	168 hrs	Ambient
	Thu	Fri	Mon	Thu	Thu
A COMB	$10 \times 10^{11}$	$2.0 \times 10^8$	$1.5 \times 10^8$	$2.0 \times 10^8$	$x10^{12}$
B COMB	$x10^{12}$	$1.0 \times 10^8$	$1.4 \times 10^8$	$2.4 \times 10^8$	$x10^{12}$
C COMB	$12 \times 10^{11}$	$1.3 \times 10^8$	$2.0 \times 10^8$	$3.2 \times 10^8$	$x10^{12}$
D COMB	$x10^{12}$	$1.3 \times 10^8$	$0.9 \times 10^8$	$2.0 \times 10^8$	$x10^{12}$

Control	Ambient	24 hrs	96 hrs	168 hrs	Ambient
A COMB	$x10^{12}$	$0.7 \times 10^{10}$	$0.8 \times 10^{10}$	$1.6 \times 10^{10}$	$x10^{12}$
B COMB	$x10^{12}$	$0.6 \times 10^{10}$	$0.6 \times 10^{10}$	$1.8 \times 10^{10}$	$x10^{12}$
C COMB	$x10^{12}$	$0.7 \times 10^{10}$	$1.0 \times 10^{10}$	$2.0 \times 10^{10}$	$x10^{12}$
D COMB	$x10^{12}$	$0.9 \times 10^{10}$	$1.3 \times 10^{10}$	$1.5 \times 10^{10}$	$x10^{12}$

All readings are in  $\Omega$

**Comment: after 7 days or 168 hours total test time, SM-388 passed.**

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