#55020-3
First issue on October 10, 2017
Revised on June 26, 2018

Koki no-clean LEAD FREE solder paste

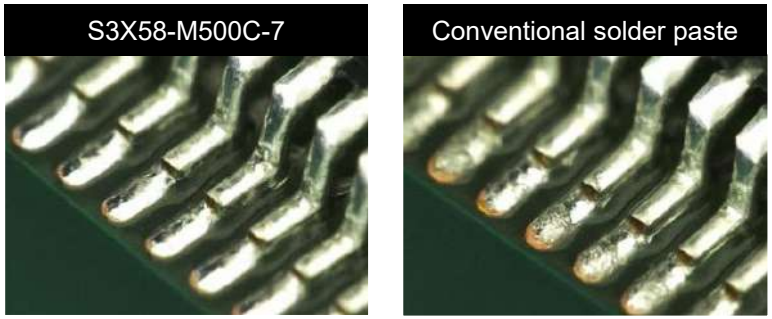
Contents

Powerful Wetting Lead Free Solder Paste

S3X48-M500C-7

S3X58-M500C-7

Product information



Disclaimer

This Product Information contains product performance assessed strictly according to our own test procedures and is not the guaranteed results at end-users. Please conduct thorough process optimization before mass production application.

Contents

Feature

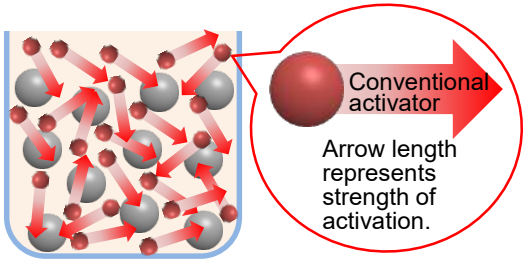
- Solder alloy composition is **Sn 3.0Ag 0.5Cu** (SAC305)
- **EXCELLENT WETTING** on severely oxidized pads (Copper, Tin and Nickel Palladium, etc.)
- **PERFECT MELTING** and **WETTING** on super fine pitch (>0.4mm pitch) and micro (>0.25mm dia CSP, 0603 chip) components.
  *S3X48-M500C-7: >0.3mm dia.
- Specially formulated flux chemistry ensures **EXTREMELY LOW VOIDING** with CSPs and large pad area components like power transistors, QFNs.
- Designed to prevent occurrence of **Head-In-Pillow (HiP) DEFECTS**.
- Enables **REUSE** of leftover paste from previous day **(ECONOMICAL)**

Contents

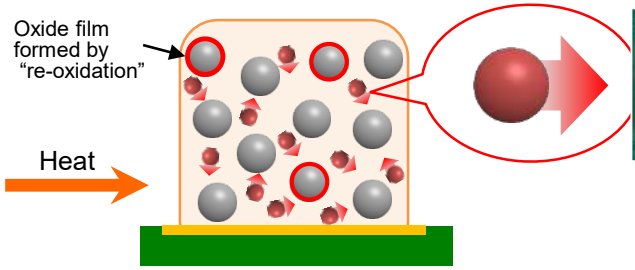
Feature – Activator technique

Conventional formulation

Aggressive activators to achieve powerful wetting leads to intense chemical reaction with solder powder.



During storage, reaction between activator and metal oxides from solder powder continues to takes place.

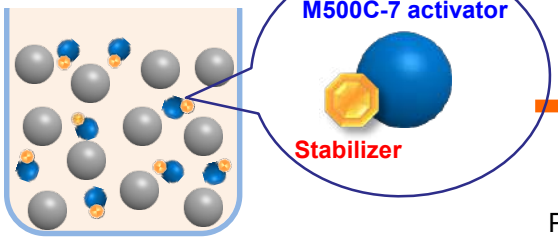


Activation strength is reduced during the storage which disables prevention/reduction of oxide film formed by re-oxidation.

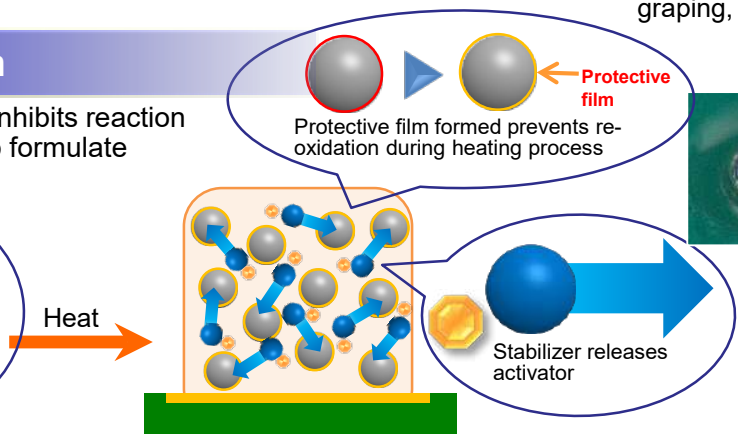
Insufficient activation strength results in poor wetting and results in defects such as graping, etc.

S3X58-M500C-7 formulation

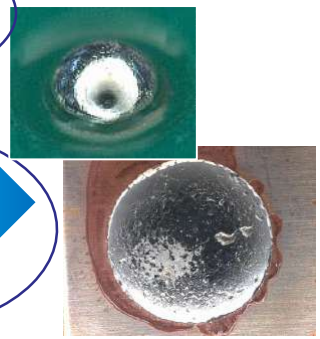
New activator technique, that effectively inhibits reaction with metal oxide during storage, allows to formulate powerful activator component.



"Stabilizer" inhibits chemical reaction between flux and solder particles.



Powerful activator gets released from "stabilizer" after being heated, efficiently eliminates metal oxides from each particle and forms protective film against "re-oxidation".



Perfect wetting and coalescence!

Contents

Specification

Application		Printing	
Product name		S3X48-M500C-7	S3X58-M500C-7
Alloy	Alloy composition (%)	Sn 3.0Ag 0.5Cu	
	Melting point (ºC)	217 - 219	
	Shape	Spherical	
	Particle size (μm)	20 - 45	20 - 38
Flux	Halide content (%)	0	
	Flux type*1	ROL0	
Solder paste	Flux content (%)	11.8±1.0	11.8±1.0
	Viscosity *2 (Pa.s 25ºC)	200±30	200±30
	Copper plate corrosion*3	Passed	
	Tack time	> 72 hours	
	Shelf life (below 10ºC)	6 months	

*1 Flux type: IPC J-STD-004
*2 Viscosity: Malcom spiral type viscometer,PCU-205 at 25ºC 10rpm
*3 Copper plate corrosion: IPC TM650−2.6.15

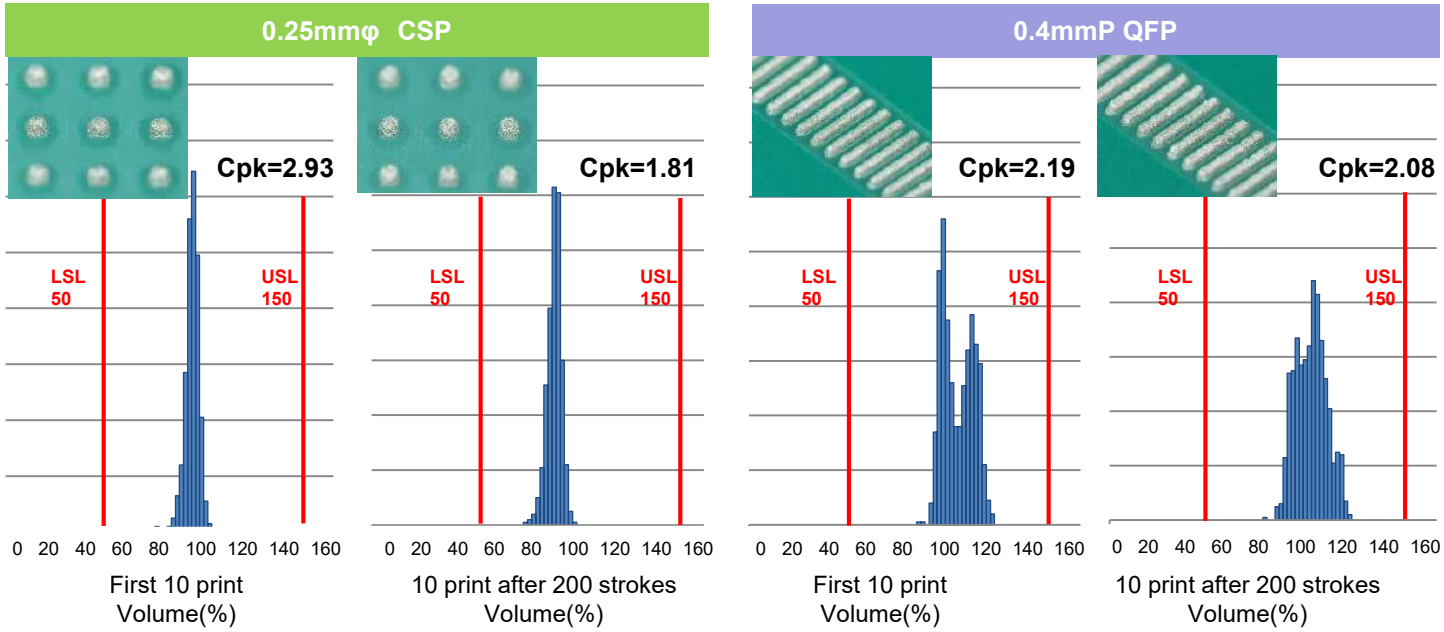
Contents

Continual printability (S3X58-M500C-7)

Evaluation Method:

Print 10 test PCBs, measure and inspect the print transfer rate. Roll the solder paste for 200 strokes, then clean the stencil.
Print another 10 test PCBs and inspect the print transfer rate.

- Metal Stencil: 0.12mm thick (laser etched)
- Printer: YVP-Xg YAMAHA Motor
- Squeegee: Metal, angle is 60º
- Print Speed: 40 mm/sec
- Test Environment: 24~26 ºC (50~60%RH)
- Evaluation Lands: 0.4mmP QFP pad (80 pins)
  0.25mmΦ CSP (50 pads)
- SPI KOHYOUNG aSPIer



Consistent and high transfer efficiency can be achieved on 0.25mm dia. pattern and 0.4mm pitch QFP pattern.

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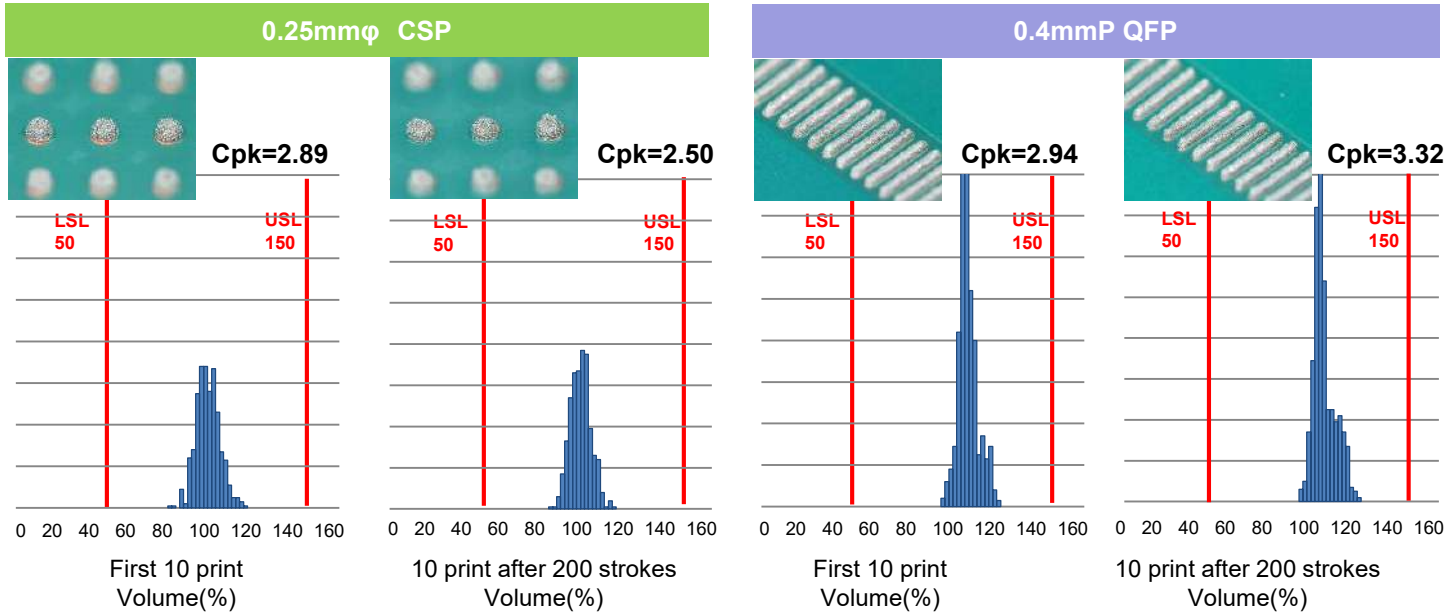

Consistent and high transfer efficiency can be achieved on 0.25mm dia. pattern and 0.4mm pitch QFP pattern.

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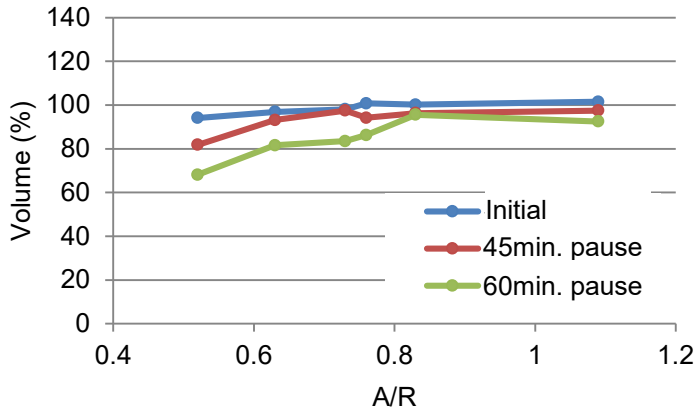
Intermittent printability (S3X58-M500C-7)

Evaluation Method:

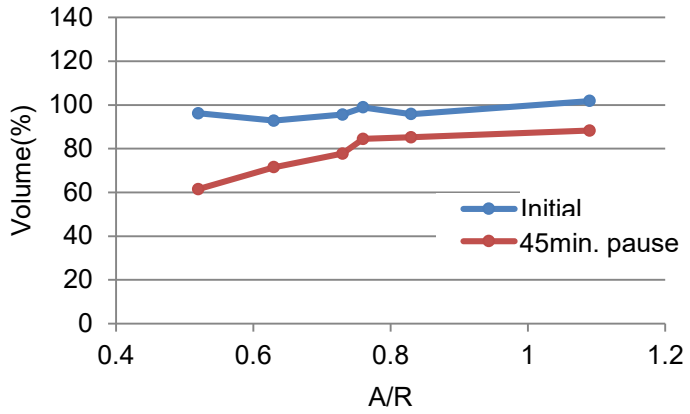
Pause printing for 45 and 60 minutes, then resume printing. Verify the print transfer rate after the pause.

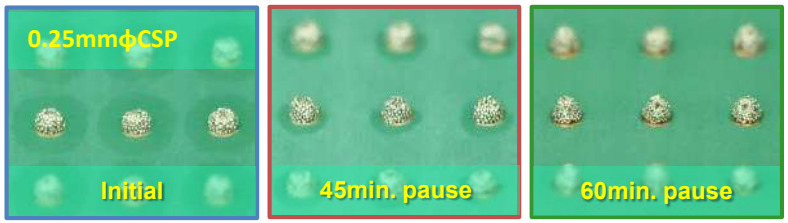
- Metal Stencil: 0.12mm thick (laser etched)
- Printer: YVP-Xg YAMAHA Motor
- Squeegee: Metal, angle is 60°
- Print Speed: 40 mm/sec
- Test Environment: 24~26 ºC (50~60%RH)
- Evaluation lands: 0.25, 0.30, 0.35 and 0.40mmφ CSP
  0.4, 0.5 mmpQFP
- SPI KOHYOUNG aSPIer

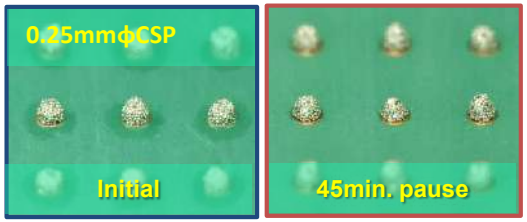
S3X58-M500C-7 formulation



Conventional formulation







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- Evaluation lands: 0.25, 0.30, 0.35 and 0.40mmφ CSP
  0.4, 0.5 mmpQFP
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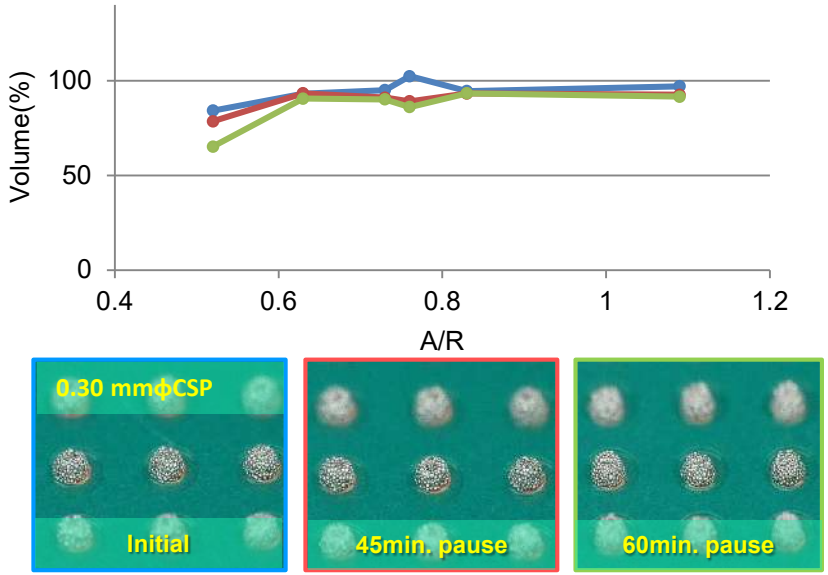
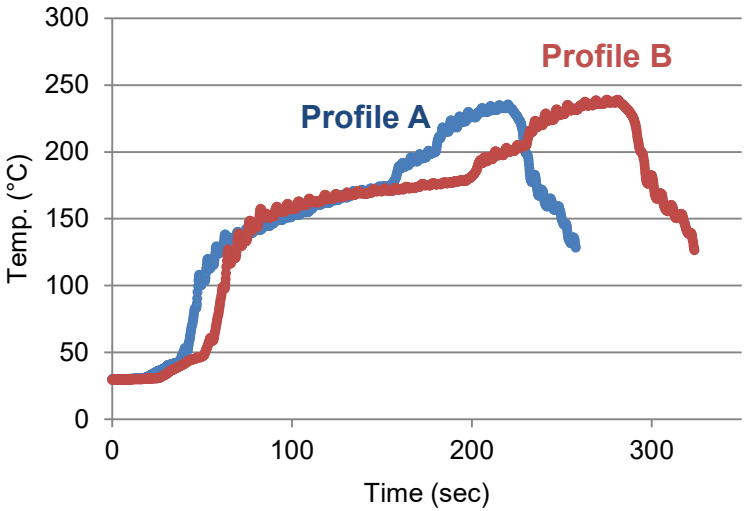
S3X48-M500C-7 formulation



Meltability

Test conditions

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.12mm (laser cut)
- Pad size : 0.25mm diameter
  Component: 0.4mmP QFP
- Stencil aperture : 100% aperture opening to pad
- Heat source : Hot air convection
- Reflow profile : Refer below reflow profiles.

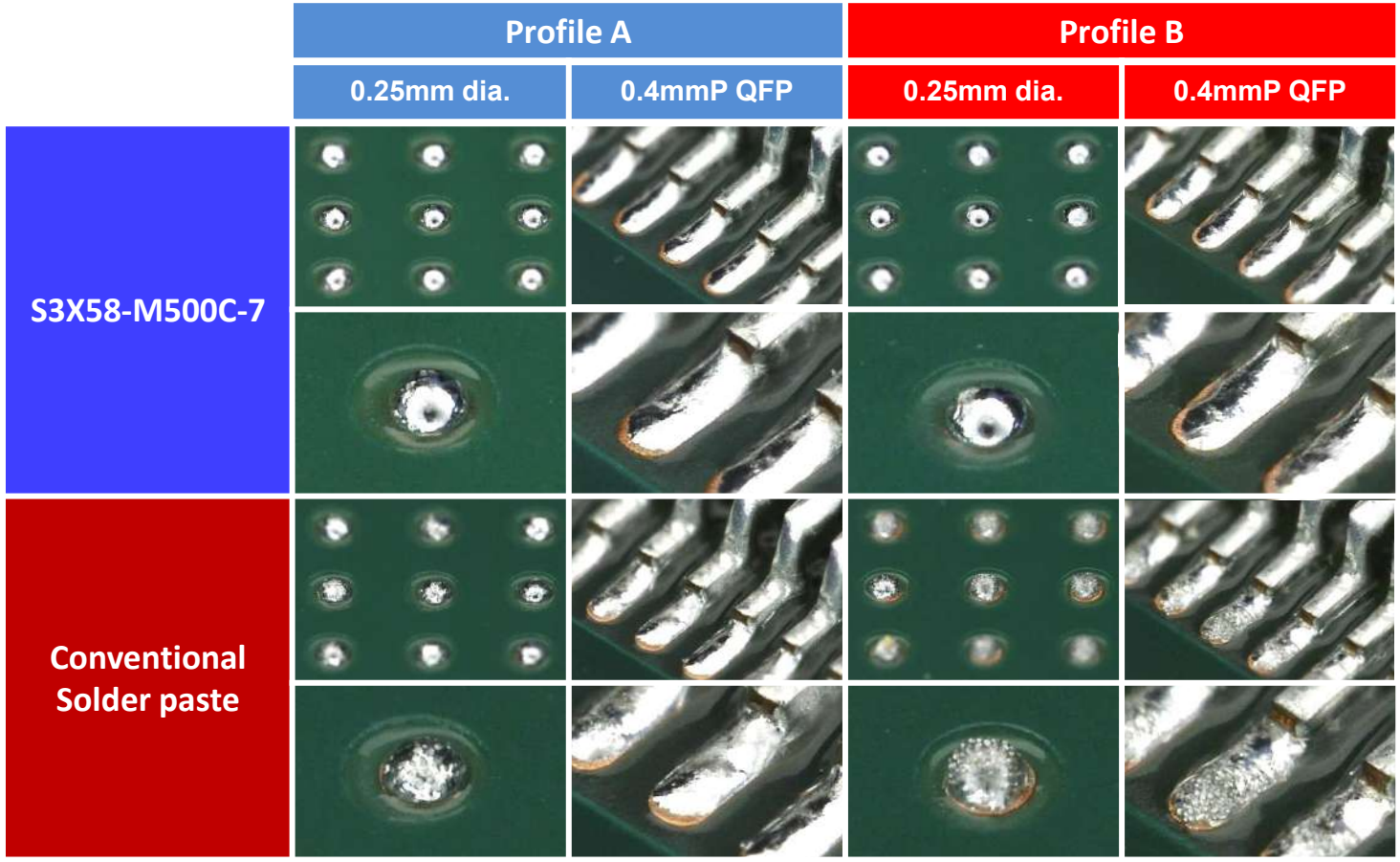


Hellar MK5

	Profile A	Profile B
150~190°C	70sec	130sec
190~220°C	20sec	30sec

Contents

Meltability



S3X58-M500C-7 ensures superior wetting to the leads and also complete coalescence on micro pads even under harsher reflow profile.

De-wetting

Test condition

- Material pieces : Nickel, Copper, ImSn
- Stencil thickness : 0.20mm (laser cut)
- Stencil aperture : 6.5mm diameter
- Heat source: Same as *"Wetting test"*

Preparation (Ni)

The nickel plates must be cleaned with acetone, dry with a mop, put them in a hydrochloride acid bath (1.75% in weight) for 2 min, then clean the acid with de-ionized water and air dry.

Store inside the oven in boiling de-ionized water for 5 minutes.

Preparation (ImSn)

Store inside the oven at 180°C (10 hrs).

Preparation (Cu)

The copper plates must be cleaned with acetone, dry with a mop, put them in a hydrochloride acid bath (1.75% in weight) for 5 min, and then clean the acid with de-ionized water and air dry.

Store inside the oven at 70°C in a pot of de-ionized water (70 %RH for 24 hrs).

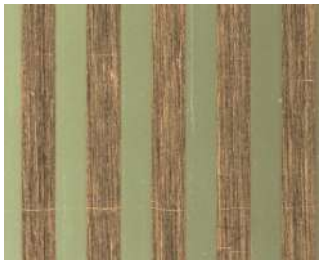
	Oxidized Cu	Oxidized Sn	Oxidized Ni
S3X58-M500C-7			
Conventional Solder paste			

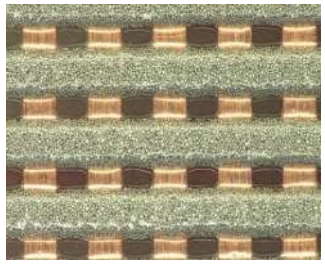
Contents

Coagulation property

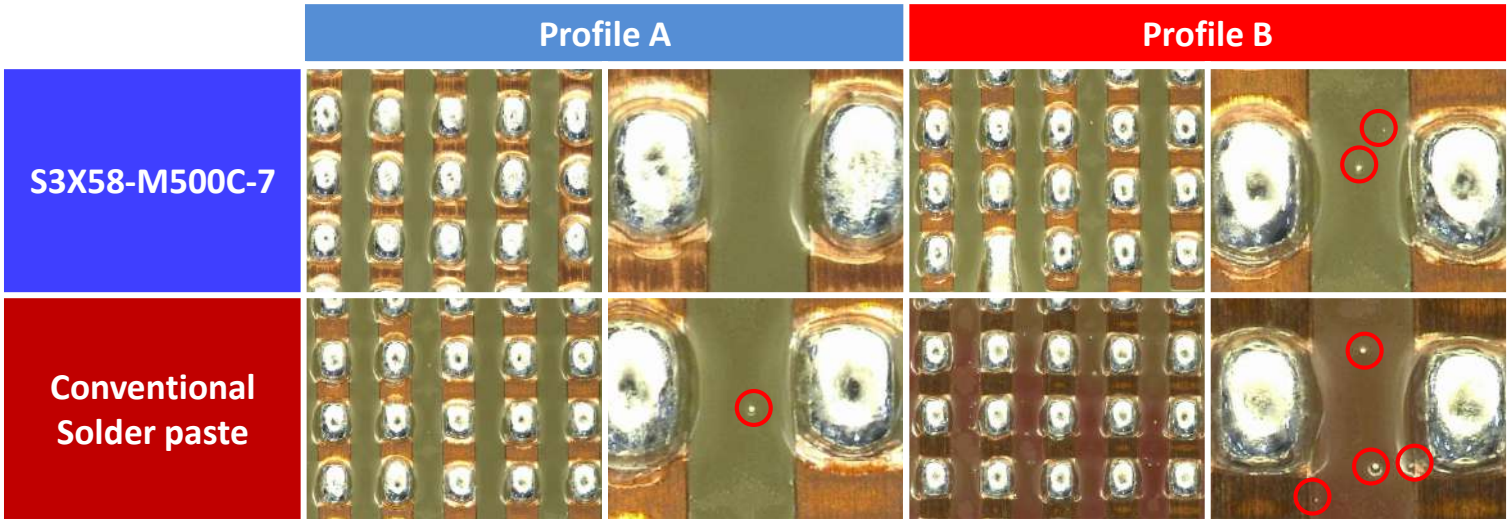
Test conditions

- Stencil: 100um
- Substrate: Comb electrode coupon
  IPC-B-25 (L/S:0.318/0.318mm; Cu)
- Reflow profile: Profile A, B *Refer to “Meltability”





Print solder pate across the tracks and observe coagulation property.



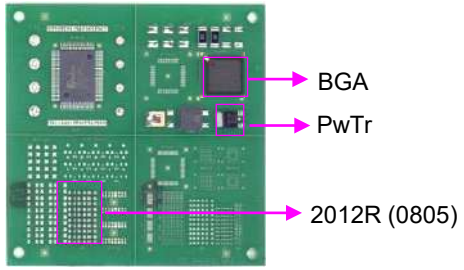
S3X58-M500C-7 resulted with no solder balls with conventional reflow profile and very few solder balls with an harsher profile suggesting its suitability for over-print application.

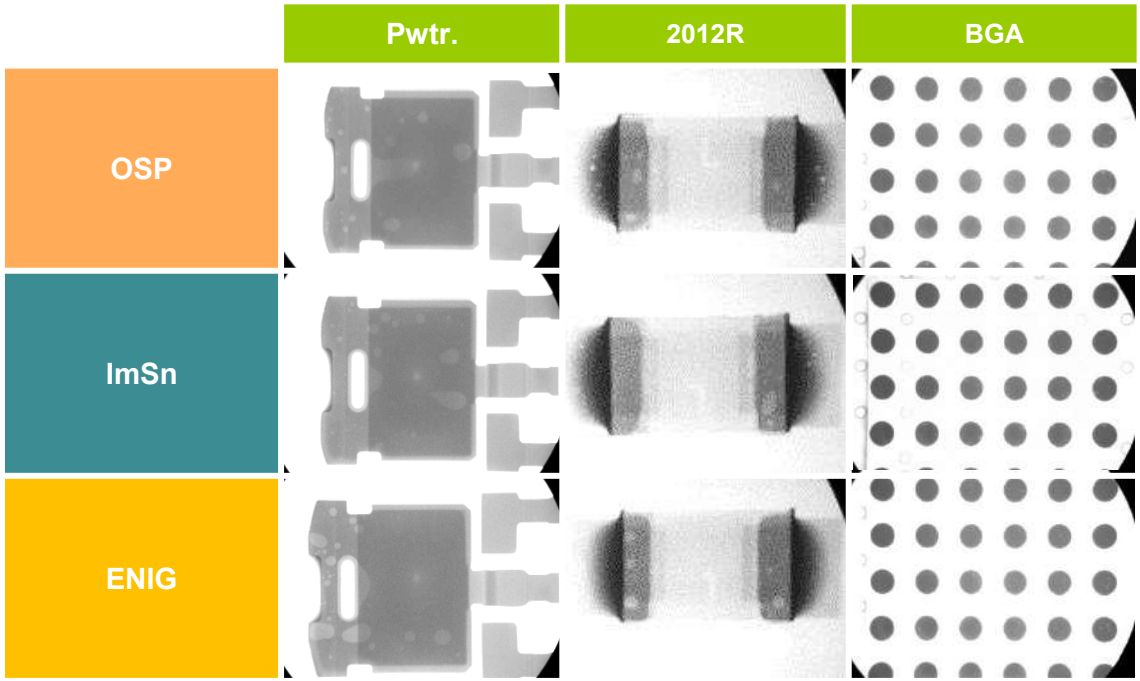
Contents

Voiding

Test condition

- Material : Glass epoxy FR-4
- Surface treatment : OSP, ImSn, ENIG
- Stencil thickness : 0.12mm (laser cut)
- Components PwTr,2012R (0805)100% - Sn plated
  BGA ball - SAC305, QFN Sn plated
- Heat source : Hot air convection
- Atmosphere : Air
- Reflow profile : Refer to “Meltability”



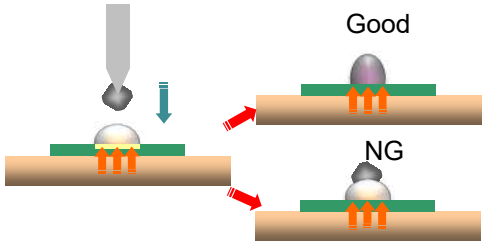


Contents

Anti-Head-in-Pillow property

Test condition

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.12mm (laser cut)
- Pad size : 0.8 x 0.8mm diameter
- Component: 0.76mm ball SAC305
- Stencil aperture : 100% aperture opening to pad
- Heat source : Solder pod 275ºC
- mount interval: 10sec.



Drop a solder ball every 10 sec. after the solder paste has melted to see the heat durability of flux.

	30 sec.	40 sec.	50 sec.	60 sec.
S3X58-M500C-7	Complete merger	Complete merger	Complete merger	Complete merger
Conventional solder paste	Complete merger	Partial merger	Partial merger	Head-in-Pillow

S3X58-M500C-7 indicates much longer heat durability (up to 60 sec) as compared to a conventional solder paste (less than 40 sec.) once the solder paste started to melt. The result demonstrates that S3X58-M500C-7 effectively prevents the occurrence of head-in-pillow defects.

Contents

General properties

Item	Result	Method
Tack time	> 72 hours (>100g.f)	JIS Z 3284-3
Heat slump	0.3mm pass	JIS Z 3284-3 150ºC-10min
Solder balling	Category	JIS Z 3284-4
Copper mirror corrosion	Type L	IPC-TM650-2.3.32
Copper plate corrosion	Pass	IPC-TM650-2.6.15
Voltage applied SIR	> 1E+9	IPC-TM650-2.6.3.3
ECM	No evidence of electrochemical migration	IPC-TM650-2.6.14.1

Handling guide

1. Printing - Recommended Printing Condition

(1) Squeegee

1. Shape:	Flat
2. Material:	Metal or Urethane
3. Angle:	60~70º
4. Print Pressure:	Low (no solder paste smear on stencil)
5. Squeegee Speed:	20~80mm/ sec.

(2) Metal Stencil

1. Thickness:	0.10~0.15mm for 0.4~0.65mm pitch lands
2. Fabrication Method:	Laser or chemical etched
3. Stencil Release Speed:	7.0~10.0mm/ sec.
4. Clearance:	0mm

(3) Ambient

1. Temperature:	23~27°C
2. Humidity:	40~60%RH
3. Air Conditioning:	Direct air blow on metal stencil would cause the solder paste to dry up quicker. **Please use a shield to adjust the airflow.**

2. Product Life

Stored at 0~10ºC: 6 months from the date of production

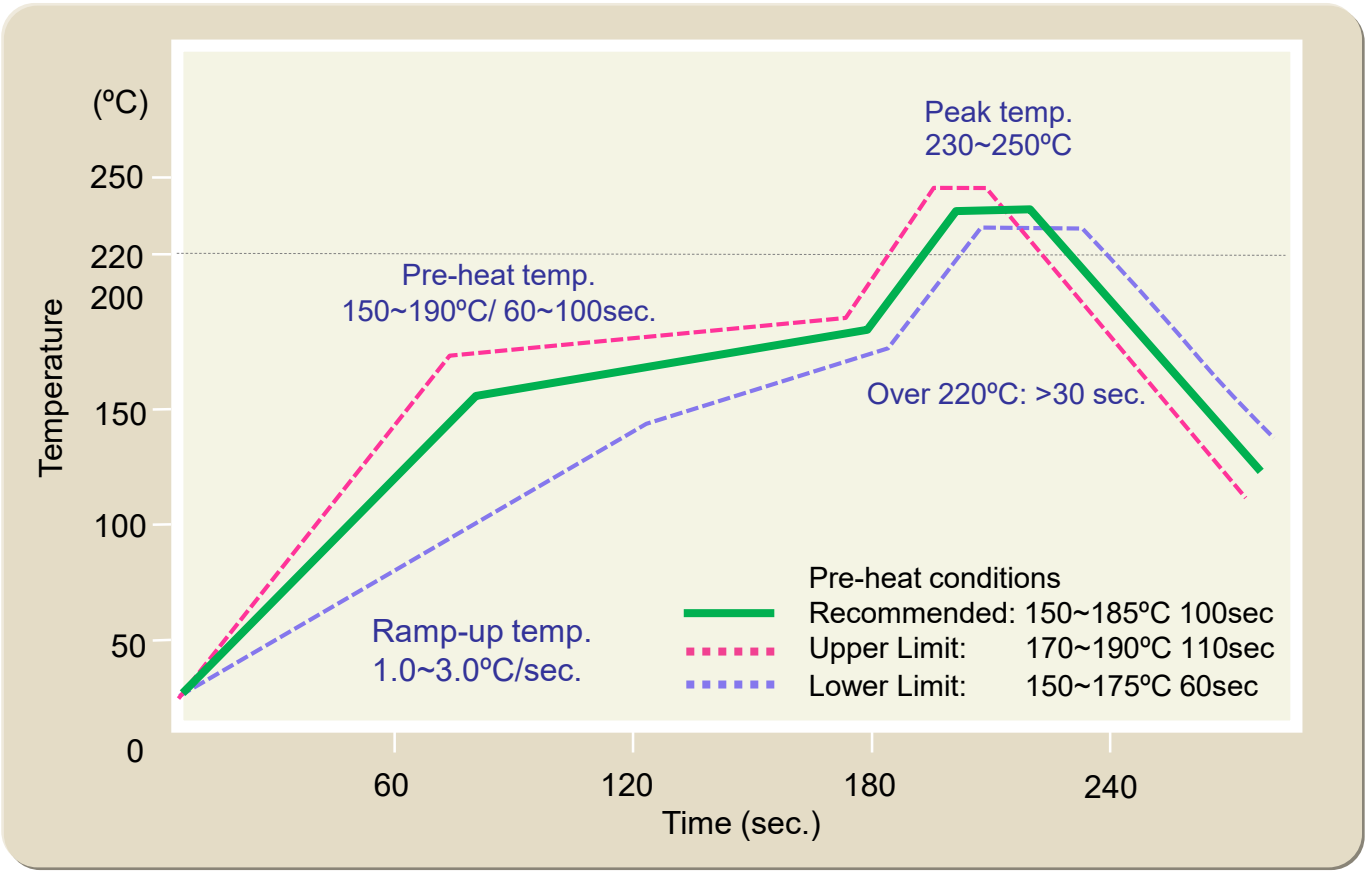
3. Note: Clean the back of the stencil every 2 to 10 prints to prevent any print defect

* How to interpret lot number

ex. **Lot No. 7 10 12 2**

- **Batch number: 2nd batch**
- **Production date: 12th**
- **Production month: October**
- **Production year: 2017**

Handling guide – Recommended reflow profile



Handling guide- Supplemental Information on Reflow Profile

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