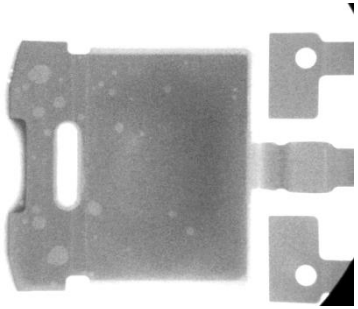
Koki no-clean LEAD FREE solder paste

Contents

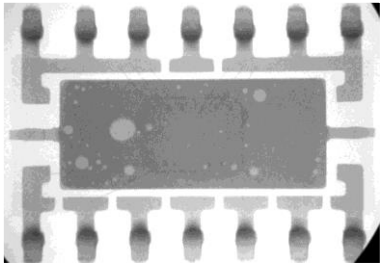
High Performance Low Voiding Lead-Free Solder Paste

S3X58-G803

Product Information



DPack



SOP

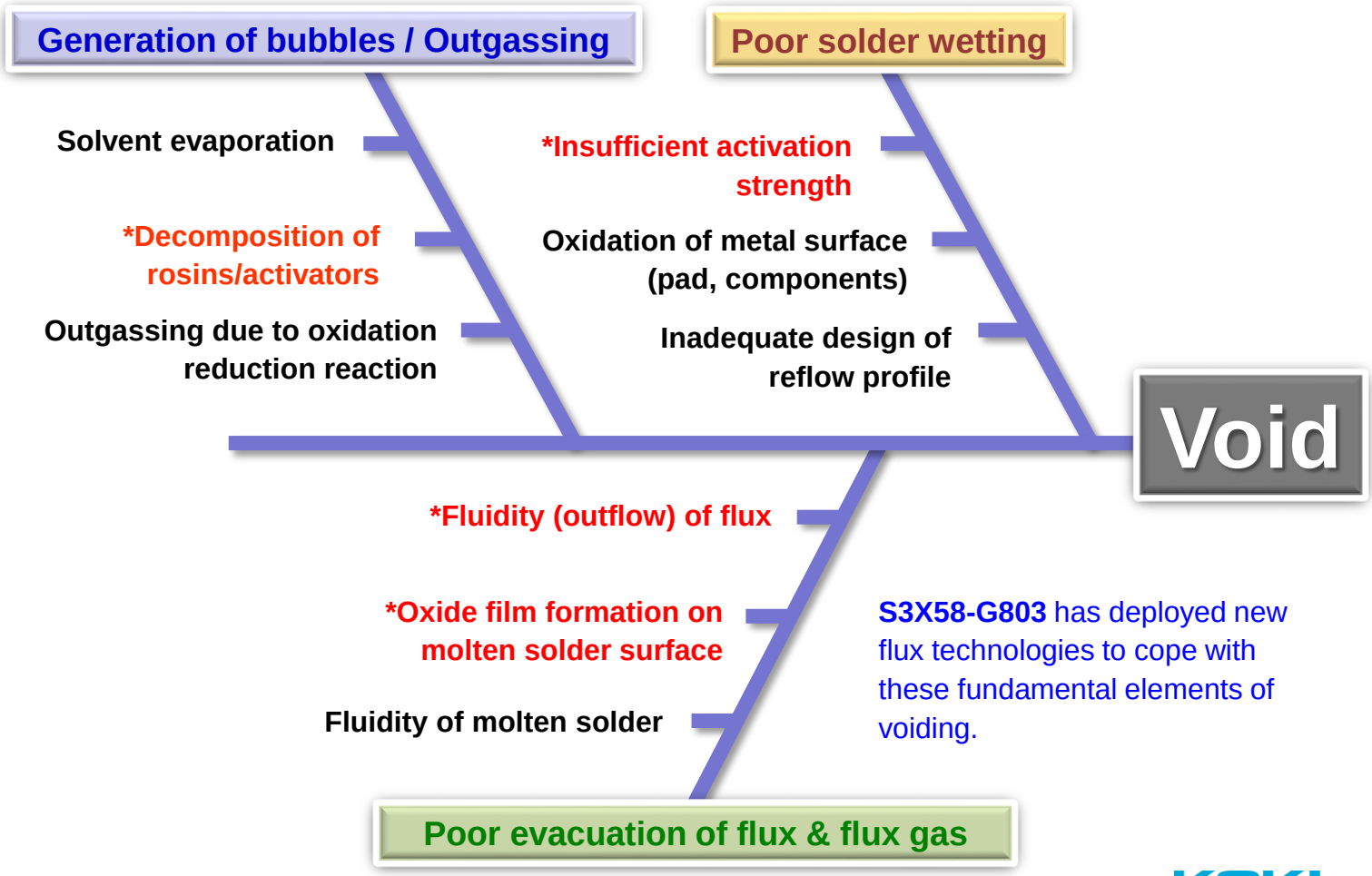
Disclaimer
This Product Information contains product performance assessed strictly according to our own test procedures and is not the guaranteed results at end-users. Please conduct thorough process optimization before mass production application.

Features

- Solder alloy composition: Sn 3.0Ag 0.5Cu (SAC305)
- Ensures consistent continual printability with fine pitch component board pad patterns.
- The combination of carefully selected low volatile ingredients and newly developed flux chemistry enables fast wetting to the substrate, ensures low void occurrence in the solder joints regardless of the type of component and surface finish.
- A heat-resistant flux activator system enables good solder coalescence with micro-components (0603 metric size chip) even under harsh reflow profiles

Contents

Development – Approach to reduce voiding



S3X58-G803 has deployed new flux technologies to cope with these fundamental elements of voiding.

Development – Approach to reduce voiding

Contents

To realize **CONSISTENTLY LOW VOIDING**

regardless of;

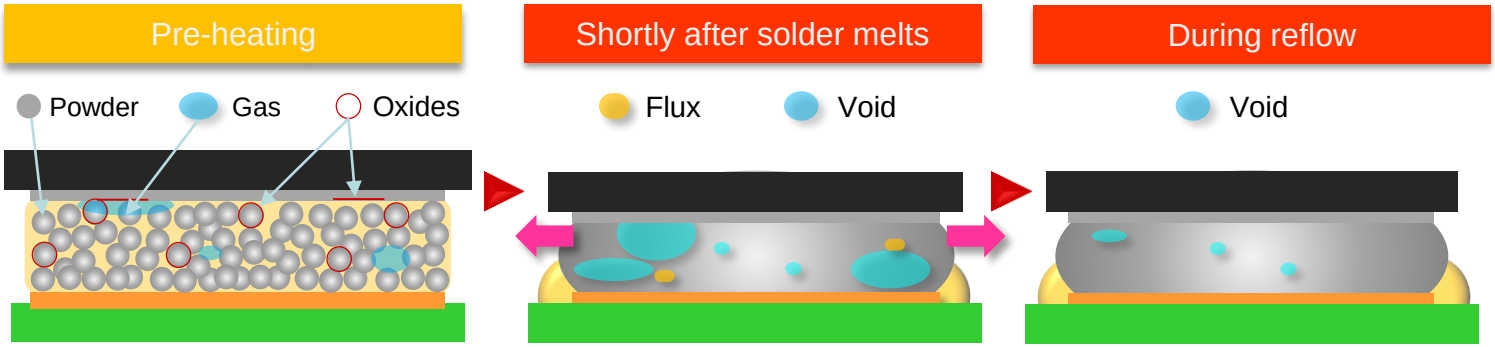
- metallization condition of component/PC board
- type (shape) of components

Key design concept of S3X58-G803

- **Removal of oxidation BEFORE solder melts**
- **Swift evacuation of flux**

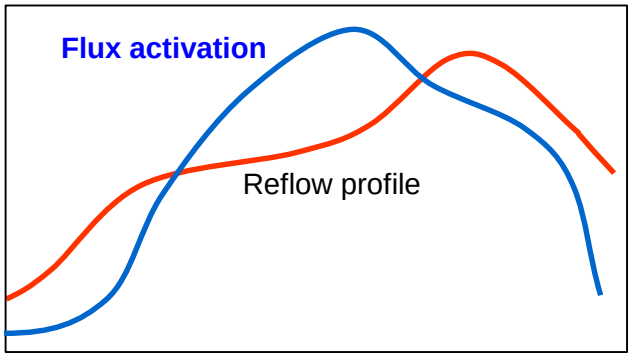
Development – Approach to reduce voiding

S3X58-G803: New void reduction technique



- Removal of oxides during pre-heating enhances quick wetting to the metallization of component and pad, and effectively discharges flux gas.
- No flux residue remains in molten solder.

- Swift discharge of flux gas and almost no remaining flux in molten solder that prevents continuous outgassing effectively reduces voids in solder joint.



S3X58-G803 design of flux formulation

Maximum activation = oxide reduction reaction is designed to occur before solder melts / during pre-heating stage.

- Quick solder wetting action effectively and swiftly discharges flux gas once solder melts.
- Almost no non-wet locations are left = no flux remains in joint with no continuous outgassing.
- Oxidation reduction reaction takes place before solder melts → generation of flux gas while solder is molten is limited.

Contents

Specification

Application		Print
Product Name		**S3X58-G803**
Alloy Properties	Alloy Composition (%)	Sn 3.0Ag 0.5Cu
	Melting Point (ºC)	217 - 219
	Powder Shape	Spherical
	Grain Size (µm)	20 - 38
Flux Properties	Halide Content (%)	0
	Flux Designation *1	ROL0
Solder Paste Properties	Flux Content (%)	12.0±1.0
	Viscosity *2 (Pa.s)	200±30
	Cu Plate Corrosion *3	Passed
	Tack Time	> 48 hours
	Shelf Life (below 10ºC)	6 months

*1 Flux Designation: In accordance with IPC J-STD-004
*2 Viscosity: Measured by Malcom Viscometer at 25ºC, 10rpm
*3 Cu Plate Corrosion: In accordance with IPC-TM-650-2.6.15

Contents

Continual printing

Evaluation method:

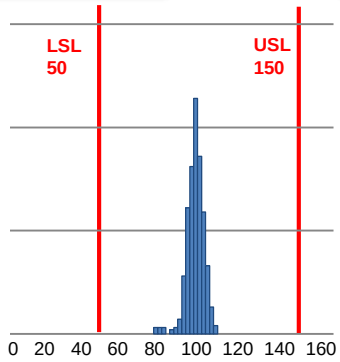
Print 10 test PCBs, measure and inspect the print transfer rate. Roll the solder paste for 200 print strokes, then clean the stencil. Print another 10 test PCBs and inspect the paste to calculate print transfer rate.

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

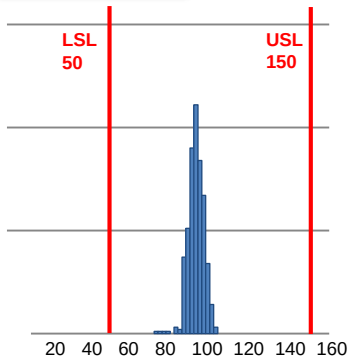
0.25mmφ CSP

Cpk=3.66

Cpk=3.03

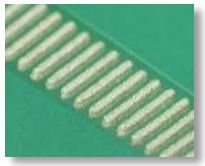


First 10 prints
Volume(%)

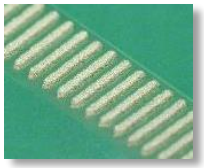


10 prints after 200 strokes
Volume(%)

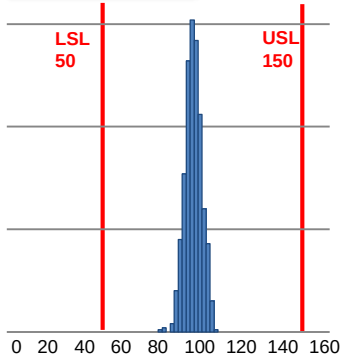
0.4mmp QFP



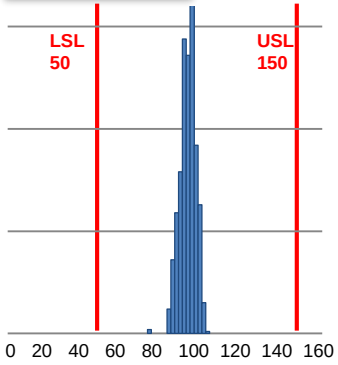
Cpk=3.24



Cpk=3.22



First 10 prints
Volume(%)



10 prints after 200 strokes
Volume(%)

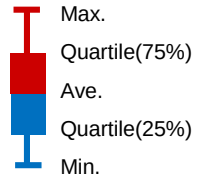
S3X58-G803 indicated consistent and stable transfer volume at 0.25mm dia. CSP and 0.4mmP QFP patterns.

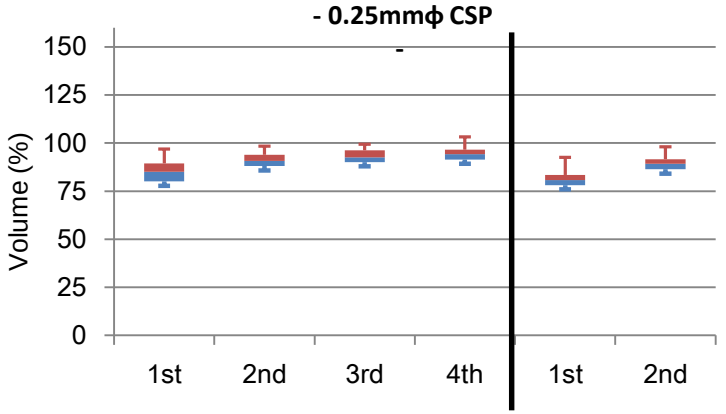
Intermittent printability (Print-to-Pause)

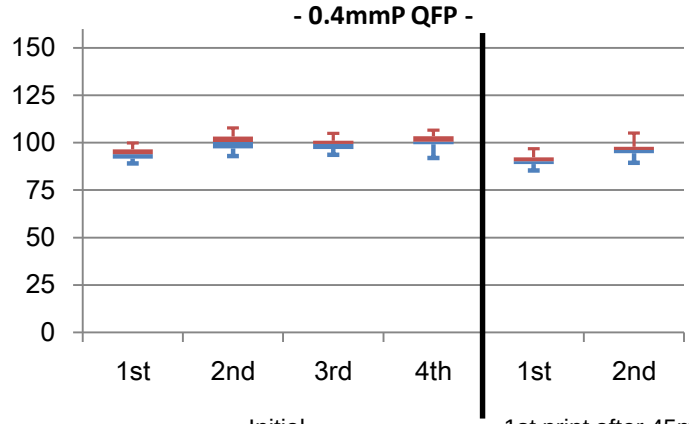
Evaluation method:

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

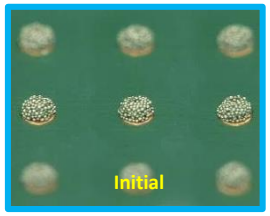
- Metal Stencil: 0.12mm thick (laser etched)
- Printer: YVP-Xg YAMAHA Motor
- Squeegee: Metal, angle is 60º
- Print Speed: 40 mm/sec
- Test Environment: 24~26ºC (50~60%RH)
- Evaluation lands: 0.25mmφ CSP
  0.4mmp QFP (0.2x1.5mm)
- SPI: KOHYOUNG aSPIre



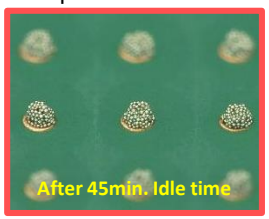




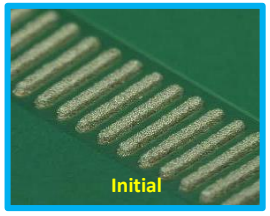
Initial



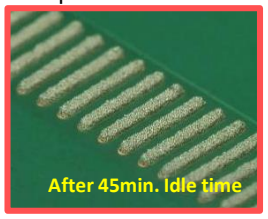
1st print after 45min.



Initial



1st print after 45min.



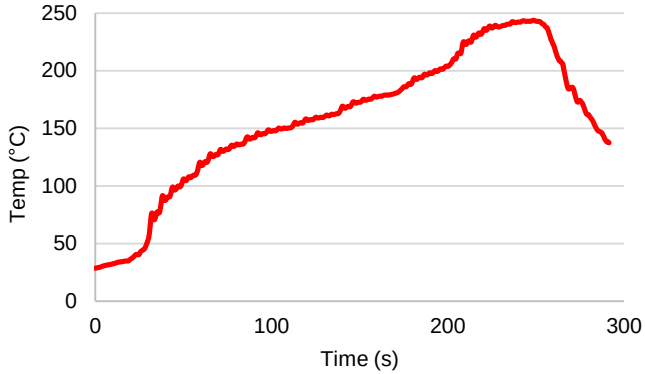
S3X58-G803 exhibited limited decrease in its paste volume after 45min. of pause and quickly recovers its paste volume from the 2nd print onwards.

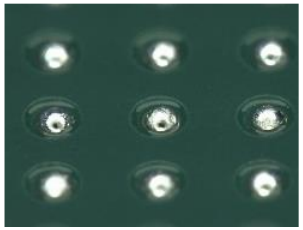
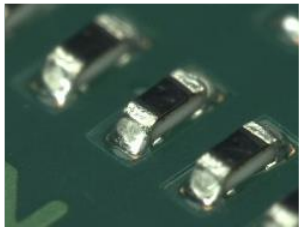
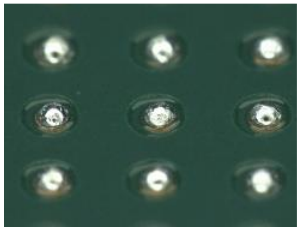
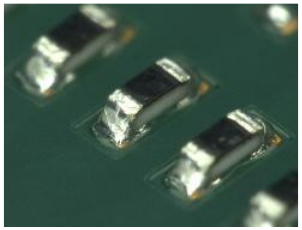
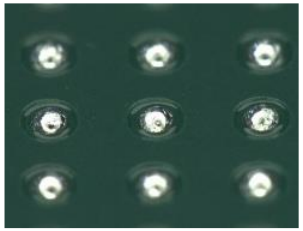
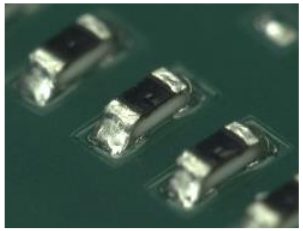
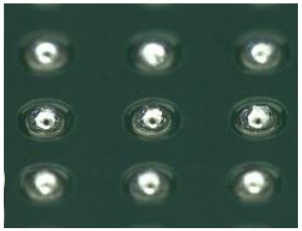
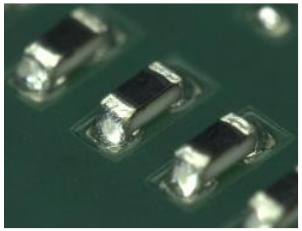
Contents

Meltability – Fine pattern wetting

Test conditions

- Material : Glass epoxy FR-4
- Surface finish : OSP, ImSn heating
- Stencil thickness : 0.12mm (laser cut)
- Pad size : 0.25mm diameter
- Component : 0603R (0201R) / Sn plated
- Stencil aperture : 100% aperture opening to pad
- Heat source : Hot air convection
- Reflow profile : Refer to reflow profile.



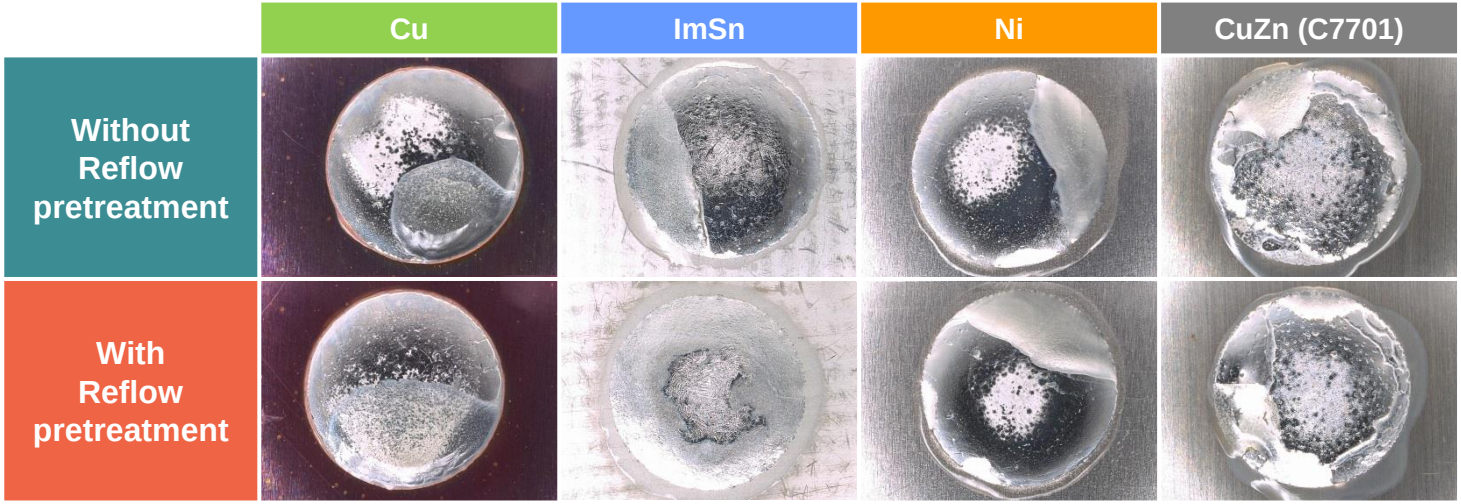
	No oxidation pretreatment		Intentionally oxidized (reflowed twice)	
	0.25mm dia.	0603R	0.25mm dia.	0603R
OSP				
ImSn				

Contents

Meltability - De-wetting

Test condition

- Material pieces : Nickel, Copper, ImSn, C7701 (CuZn)
- Pretreatment: Reflowed twice in advance
- Stencil thickness : 0.20mm (laser cut)
- Stencil aperture : 6.5mm diameter
- Heat source: Same as *"Meltability"*

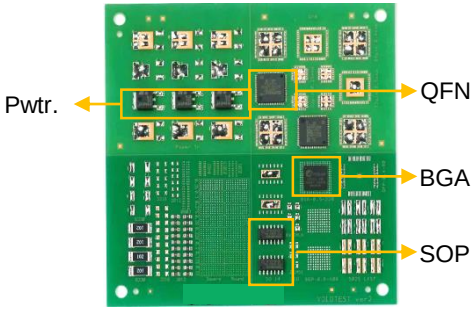


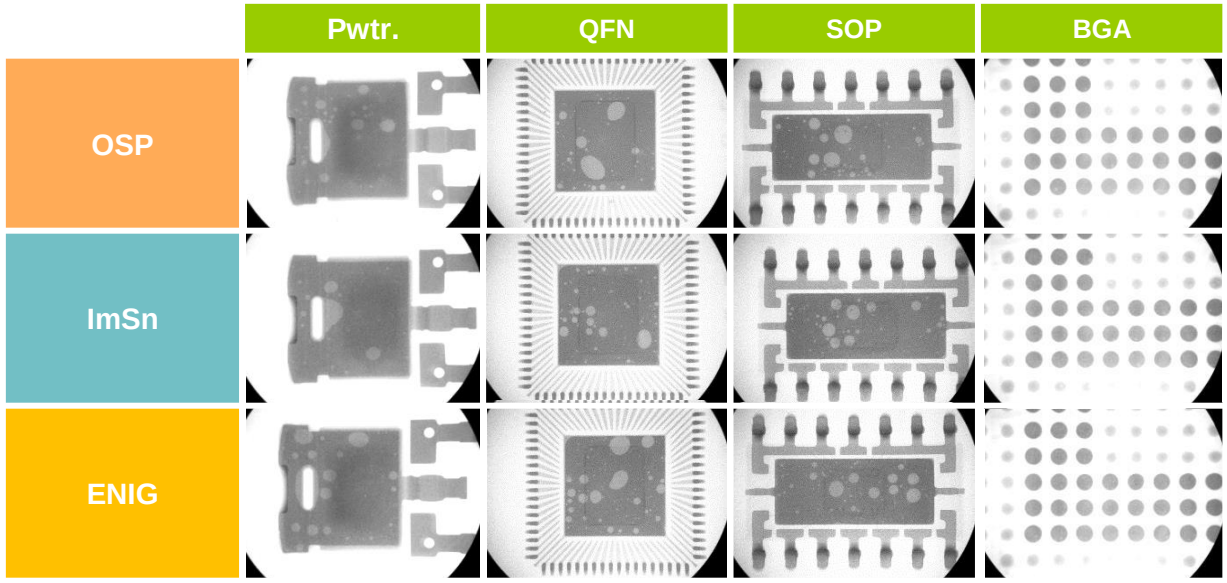
No de-wetting is observed regardless of substrate material, even with pretreated (twice reflowed) substrates.

Voiding

Test condition

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



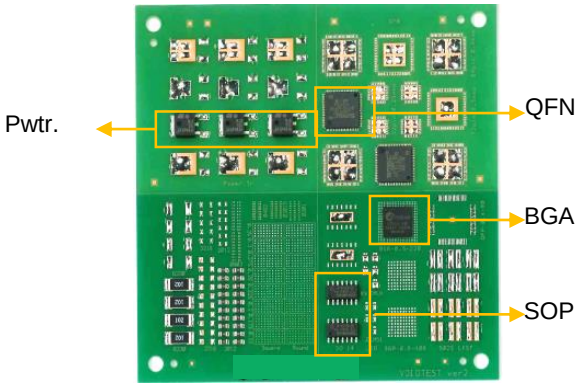


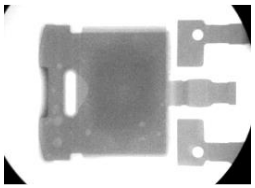
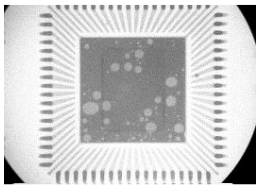
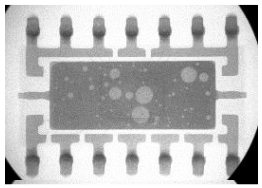
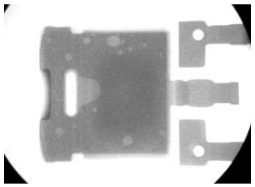
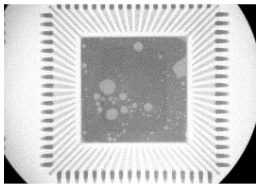
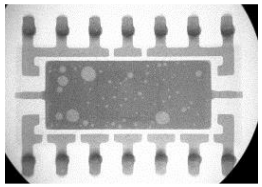
S3X58-G803 exhibits consistently low voiding regardless of the type of the components

Voiding – Pretreated (oxidized PC board)

Test condition

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

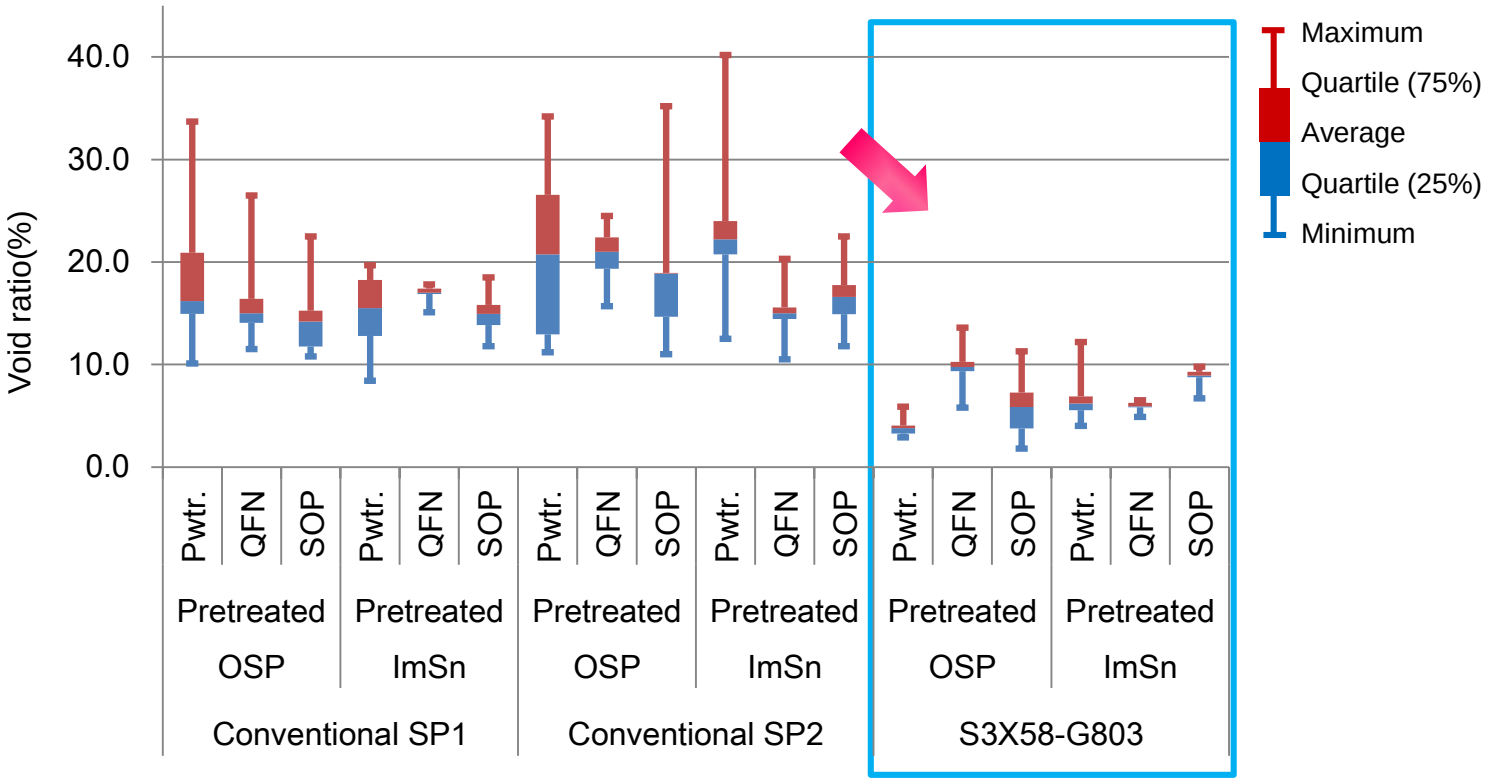


	Pwtr.	QFN	SOP	BGA
Reflow Pretreated OSP				
Reflow Pretreated ImSn				

S3X58-G803 exhibits consistently low voiding regardless of the type of the components even with the pretreated (oxidized) PC board.

Contents

Voiding – Void rate

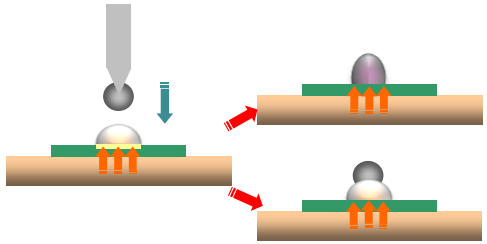


S3X58-G803 exhibits consistently low voiding regardless of the types of component with even pretreated PC board (reflowed twice prior to the test).

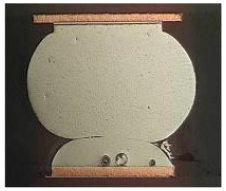
Anti-Head-in-Pillow property

Test condition

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.20mm (laser cut)
- Pad size : 0.8mm diameter
- Component: 0.76mm ball SAC305
- Stencil aperture : 100% aperture opening to pad
- Heat source : Solder pot 280ºC
- mount interval: 10sec.



Pillow defect



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-G803	Complete merger	Complete merger	Complete merger	Complete merger
Conventional solder paste	Complete merger	Partial merger	Head-in-Pillow	Head-in-Pillow

S3X58-G803 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-G803 effectively prevents the occurrence of head-on-pillow defects.

General property

Item	Result	Method
Tack Time	> 48 hours (>100g.f)	JIS Z 3284-3
Slump Property	0.3mm pass	JIS Z 3284-3 Heating Condition: 150ºC for 10 min.
Solder Balling Test	Within category 3	JIS Z 3284-4
Cu Mirror Corrosion Test	Type L	IPC-TM-650-2.3.32
Cu Plate Corrosion Test	Pass	IPC-TM-650-2.6.15
Surface Insulation Resistance Test	> 1E+9	IPC-TM-650-2.6.3.3
Electromigration Test	No evidence of electrochemical migration	IPC-TM-650-2.6.14.1

Handling guide

1. Printing

(1) Squeegee

1. Shape:	Flat
2. Material:	Metal or Urethane
3. Angle:	60~70º
4. Squeegee pressure:	Low (Squeegee barely wipes clean solder paste 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 separation speed:	7.0~10.0mm/ sec.
4. Snap-off distance:	0mm

(3) Ambient

1. Temperature:	23~27°C
2. Humidity:	40~60%RH
3. Air Conditioning:	Minimum; draft in the printer may affect stencil life and tack performance of solder paste.

2. Shelf life

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

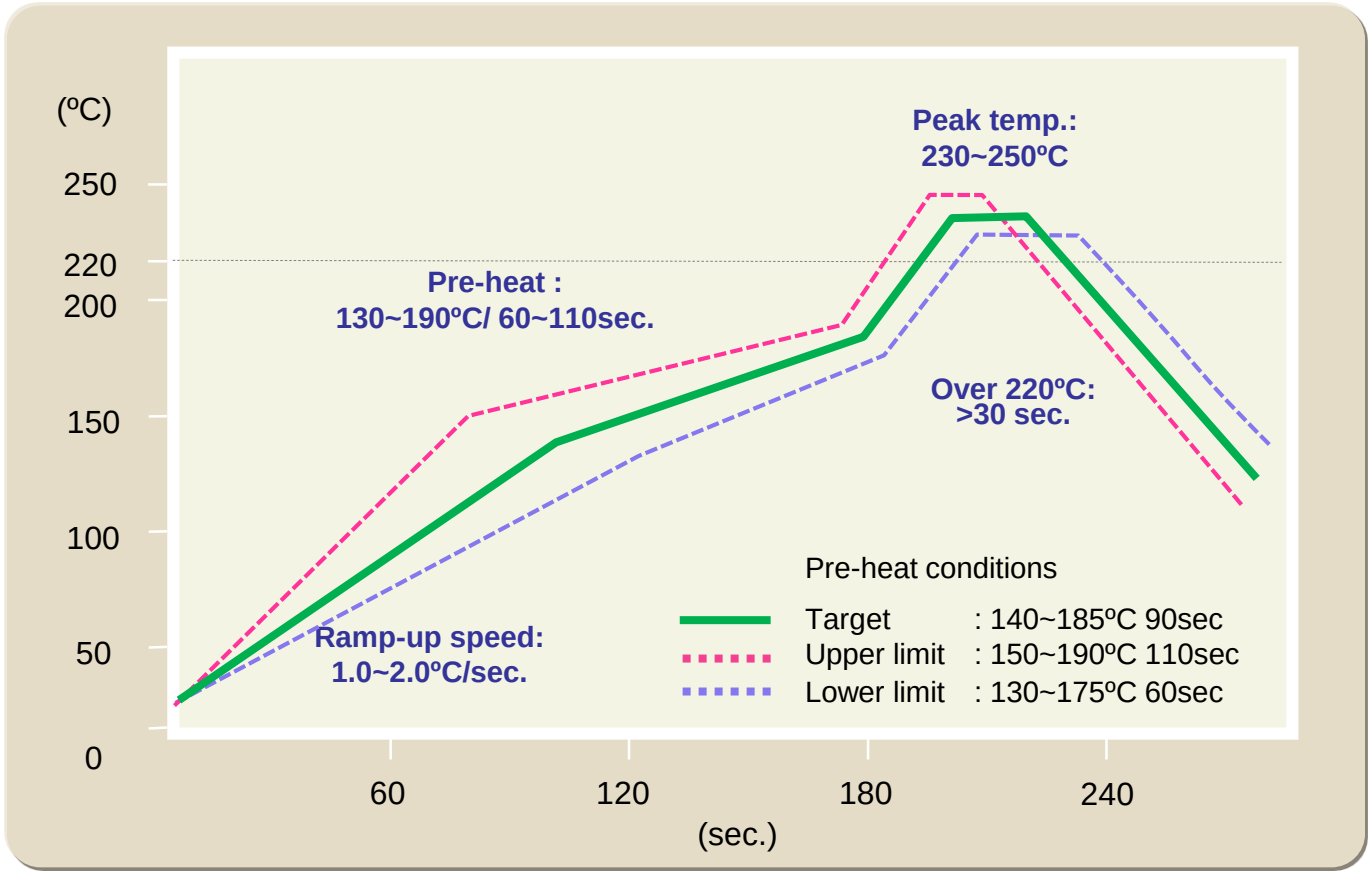
* Directions to interpret lot number

ex. **Lot No. 9 12 23 2**

- **Batch number: 2nd batch**
- **Production date: 23rd**
- **Production month: December**
- **Production year: 2018**

Contents

Handling Guide – Recommended Reflow Profile



Handling Guide- Supplemental Information on Reflow Profile