Eco+PLUS® series
Lead free SOLUTIONS you can TRUST

www.ko-ki.co.jp

Ver. 45008 E-2
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- Intermittent printability
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- Voiding
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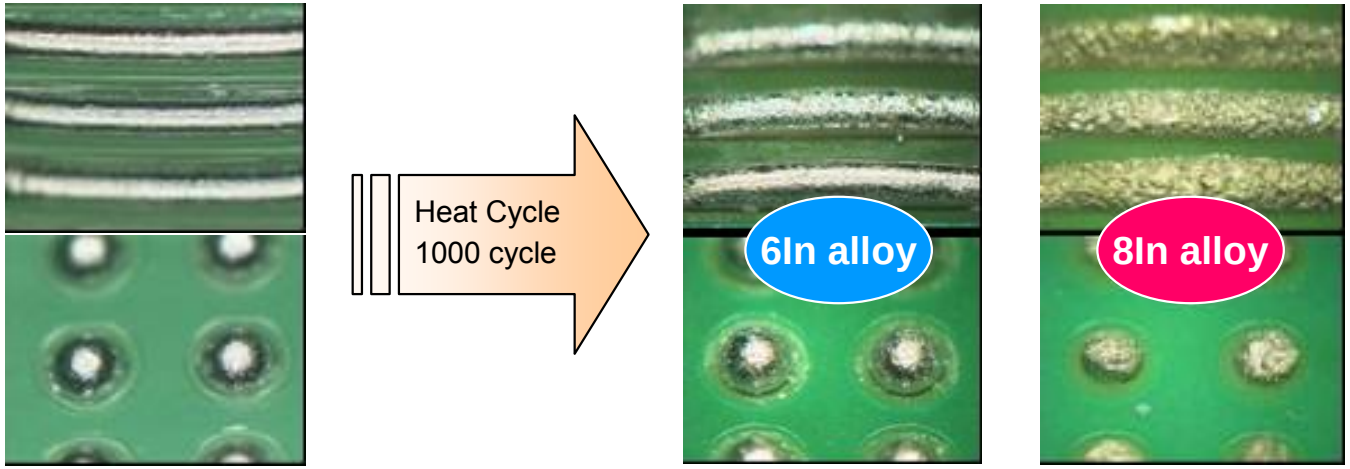
- Handling guide

Koki no-clean LEAD FREE solder paste

Low Melting point & Anti Crack Alloy
SB6N58-A730-3

Product information (provisional)



This Product Information contains product performance assessed strictly according to our own test procedures and may not be compatible with results at end-users.

KOKI
CHALLENGING NEW TECHNOLOGIES

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Product Features

- Uses high Indium content solder alloy for thermal-cycling crack free. Alloy composition is **Sn/3.5Ag/0.5Bi/6.0In**.
- Suffers **LESS DEFORMATION** by heat and retains reliability in severe usage environment.
- **PERFECT MELTING** and wetting at super fine pitch (<0.4mm pitch) and micro components (<0.3mm dia CSP, 0603 chip).
- Specially formulated flux chemistry ensures extremely **LOW VOIDING** with CSPs and broad contact area components.

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Specifications

Application		Printing - Stencil
Product		SB6N58-A730-3
Alloy	Composition(%)	Sn3.5Ag0.5Bi6.0In
	Melting point (ºC)	201 – 210
	Shape	Spherical
	Particle size (μ m)	20 – 38
Flux	Halide content (%)	0.2
Product	Flux content (%)	11.2 ± 0.5
	Viscosity*1 (Pa.S)	200 ± 20
	Tack time	> 24 hours
	Shelf life (below 10ºC)	3 months

Viscosity : Malcom spiral type viscometer,PCU-205 at 25ºC 10rpm

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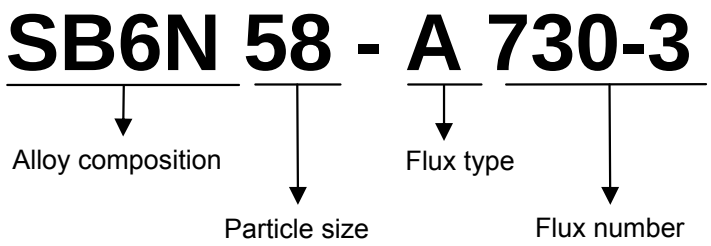
Specifications – Alloy selections



Alloy composition (%)	**SB6N** : Sn3.5Ag0.5Bi6.0In
Particle size (μm)	**58** : 20 ~ 38
Flux type	**A** : Halide containing
Flux number	Solids and solvent used

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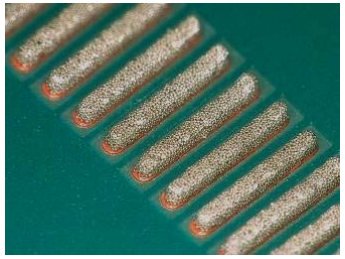
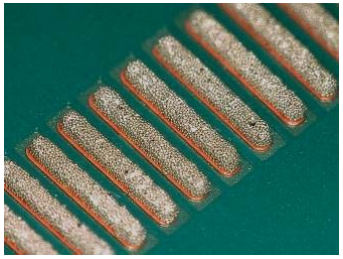
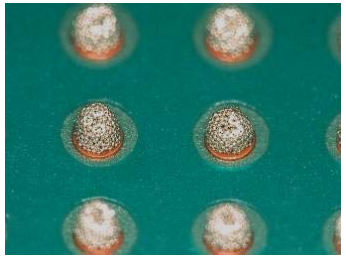
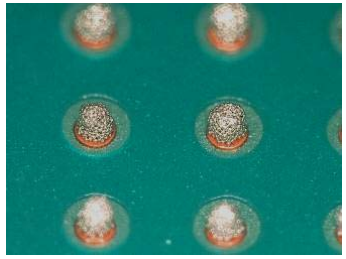
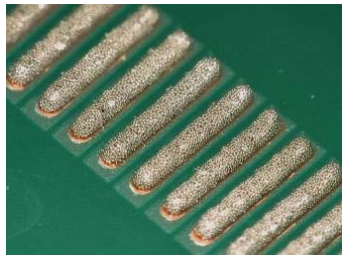
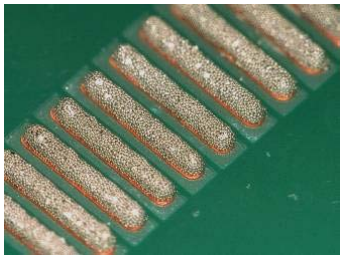
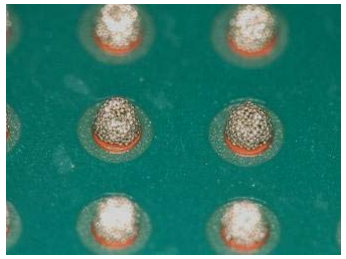
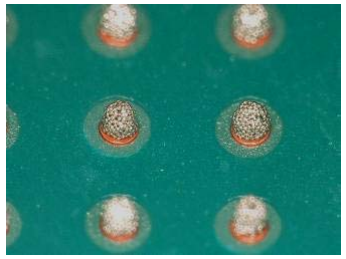
Continual printability

Print parameters

- Stencil : 0.12mm thickness, laser cut stencil
- Printer : Model Yamaha YVP-Xg
- Squeegee : Metal blade, Angle - 60°
- Print speed : 40 mm/sec
- Stencil separation speed : 10.0 mm/sec
- Atmosphere : 24.5~25.5°C (50~60%RH)

Test patterns

1. QFP pad pattern : Width 0.20 mm
   Length 1.5 mm Distance 0.2 mm
2. MBGA pad pattern : 1) Diameter 0.30 mm
   2) Diameter 0.25 mm

	Vertical to squeegee	Parallel to squeegee	0.30mm diameter	0.25mm diameter
1st print				
1st print after 200 strokes				

Newly developed additives provide a lubricating effect that greatly improve the paste release properties and assures excellent print quality even with microBGA, 0603 and super fine pitch components.

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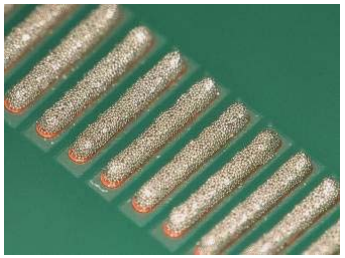
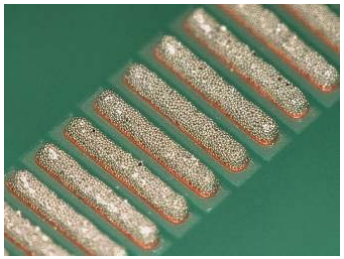
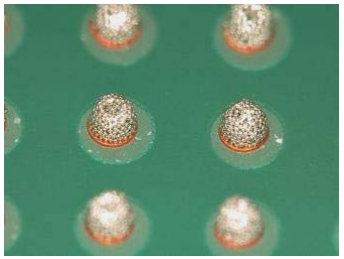
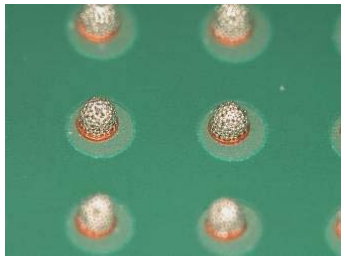
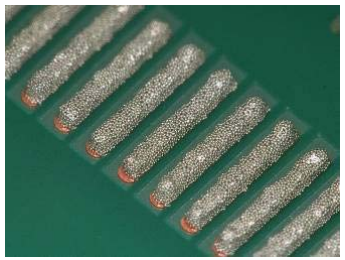
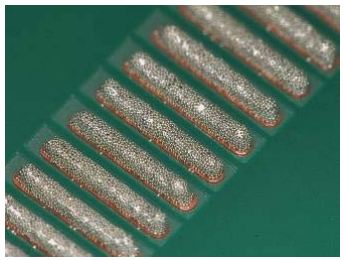
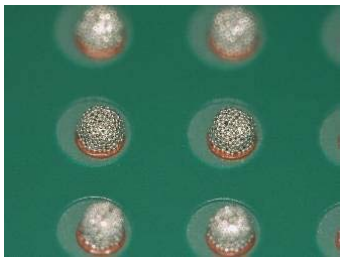
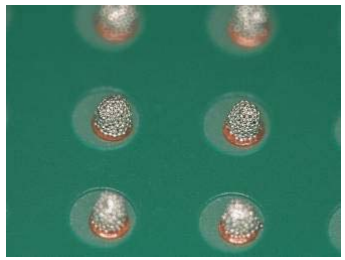
Intermittent printability

Print parameters
Stencil : 0.12mm thickness, laser cut stencil
Printer : Model Yamaha YVP-Xg

Squeegee : Metal blade, Angle - 60°
Print speed : 40 mm/sec

Stencil separation speed : 10.0 mm/sec
Atmosphere : 24.5~25.5° C (50~60%RH)

Test patterns
1. QFP pad pattern : Width 0.20 mm
Length 1.5 mm
Distance 0.2 mm
2. MBGA pad pattern : Diameter 0.30 mm
Diameter 0.25mm

	Vertical to squeegee	Parallel to squeegee	0.30mm diameter	0.25mm diameter
1st print				
1st print After 60min				

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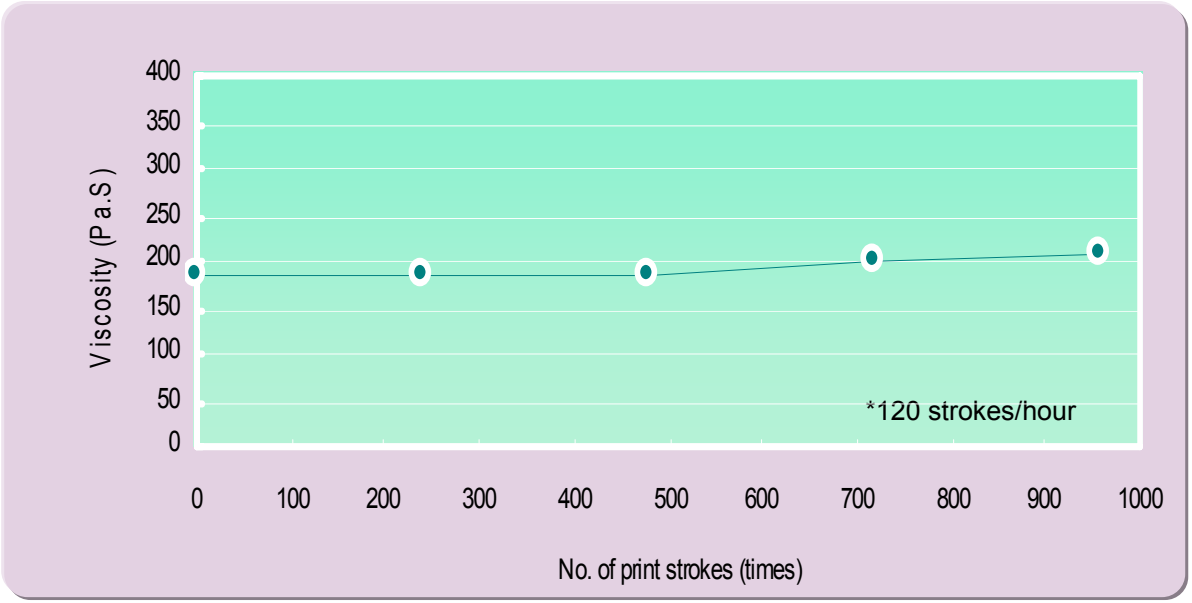
Viscosity variation in continual printing

- Print (knead) solder paste on the sealed-up stencil continually and observe viscosity variation.
- Squeegee : Metal blades
- Squeegee angle : 60°
- Squeegee speed : 30mm/sec.
- Print stroke : 300mm
- Printing environment : 25.0~28.0°C, 50~60%RH



A newly developed flux formula has succeeded to realize consistent long term printability by preventing excess viscosity drop due to shear thinning and excess increase due to chemical reaction between solder powder and flux during print rolling

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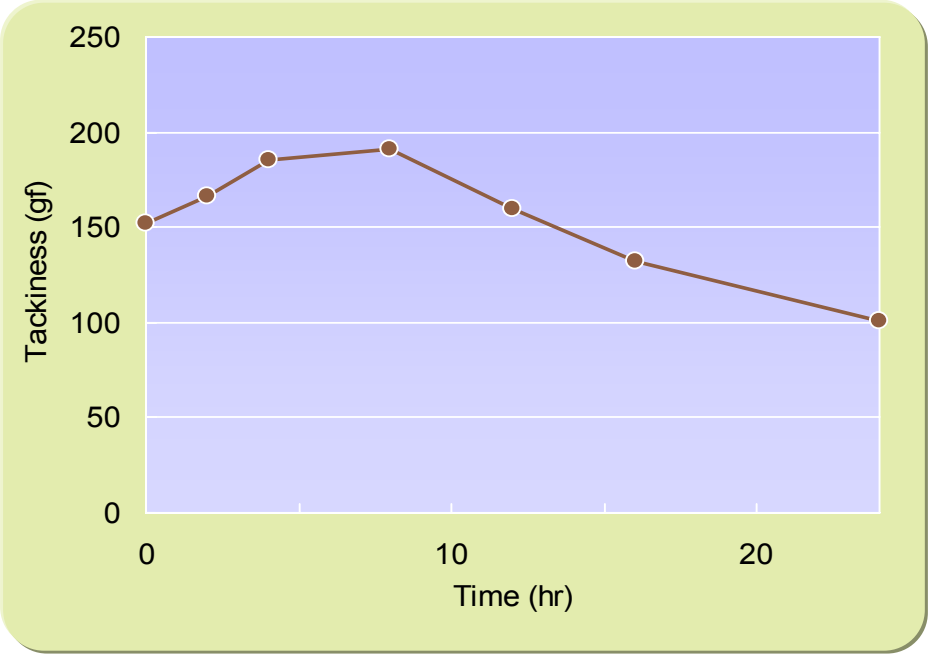
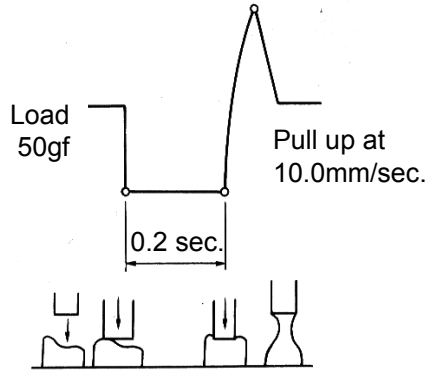
Tack time

- Stencil : 0.2mm thick, 6.5mm dia. aperture
- Measurement instrument : Malcom tackimeter TK-1
- Probe pressure : 50gf
- Pressurizing time : 0.2s
- Pull speed : 10mm/sec.
- Test method : In accordance with JIS Z 3284
- Test environment : 25+/-1°C, 60+/-10%RH



Tensile strength = Tack force



Unique solvent system successfully assures sufficient tack time.

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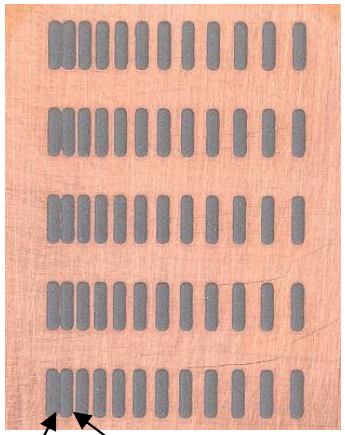
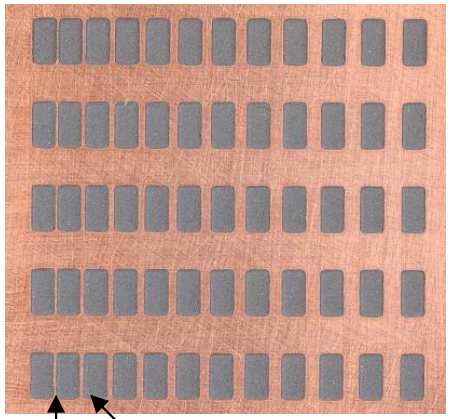
Heat slump

- Stencil thickness : 0.2mm
- Stencil aperture : Pattern (1) 3.0mm × 0.7mmm
  Pattern (2) 3.0mm × 1.5mm
- Spacing between apertures: 0.2mm to 1.2mm
- Heat profile : 180ºC × 300 sec.

Pattern (1)	Pattern (2)
	
0.2mm 0.3mm	0.2mm 0.3mm
No merge at 0.3mm	No merge at 0.3mm

Improved heat slump property assures reduced soldering defects, such as solder beading and bridging.

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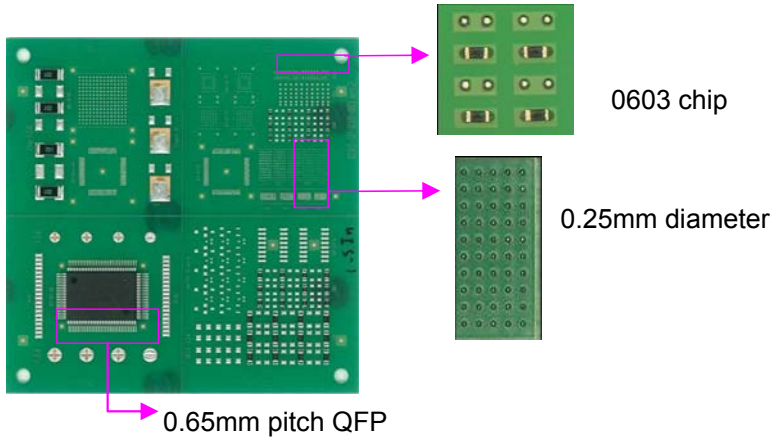
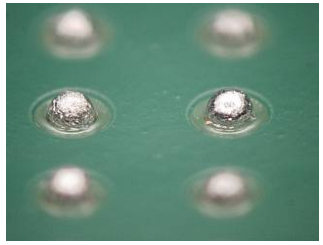
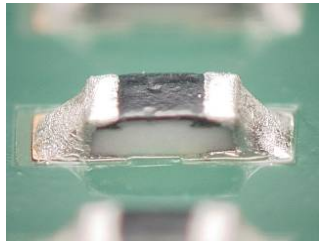
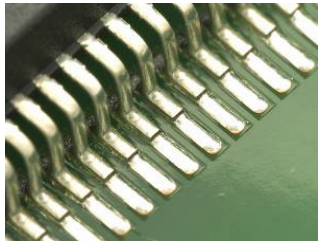
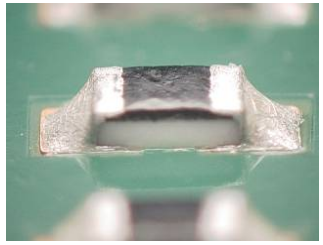
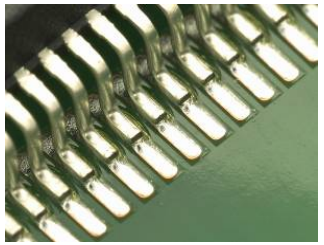
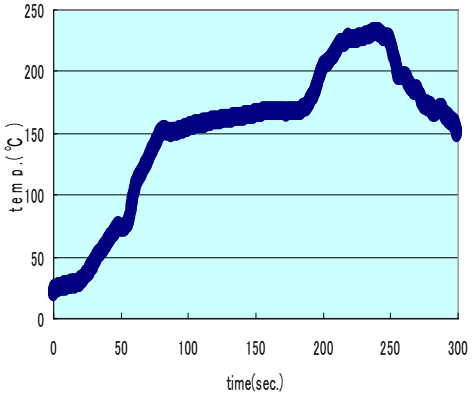
Solder wetting

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.12mm (laser cut)
- Pad size : 0.25mm diameter
- Component: 0603 chip, 0.65mm pitch QFP
- Stencil aperture : 100% aperture opening to pad
- Heat source : Hot air convection
- Zone structure : 5 pre-heat zones +2 peak zones
- Atmosphere : Air
- Reflow profile : See below



	0.25mm diameter	0603 chip pattern	0.65mm pitch QFP
Initial			
After 8 hour kneading			



Larger relative surface areas of solder paste exposed due to miniaturization of components (CSP, 0603 chips), often cause incomplete melting due to excess oxidation during the reflow. An improved flux formula ensures complete coalescence by minimum deterioration of barrier performances .

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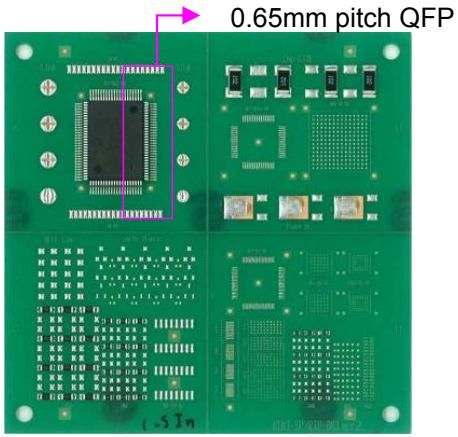
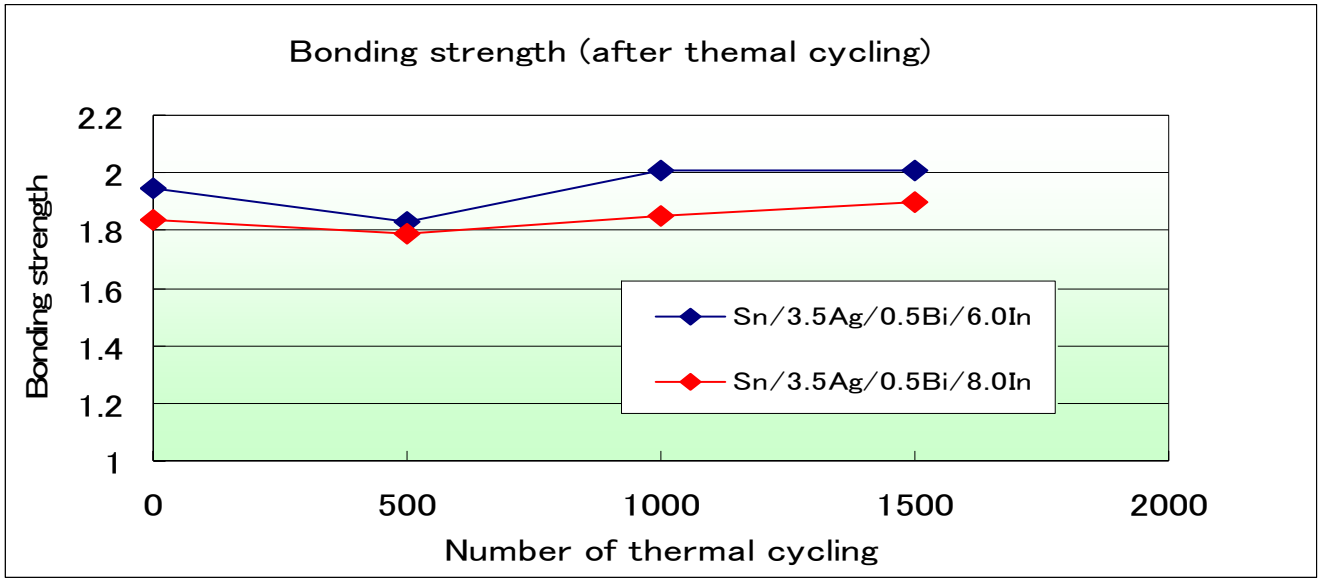
Bonding strength

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.12mm (laser cut)
- Pad size : 0.5mm diameter
- Stencil aperture : 100% aperture opening to pad
- Component : 0.65mm pitch QFP (Sn100) ▸ Peel strength
  Heat source : Hot air convection
- Atmosphere : Air
- Reflow profile : Same as *"Solder wetting"*





Bonding strength of SB6N(Sn/3.5Ag/0.5Bi/6.0In) indicates at least or even more than SB8N(Sn/3.5Ag/0.5Bi/8.0In).

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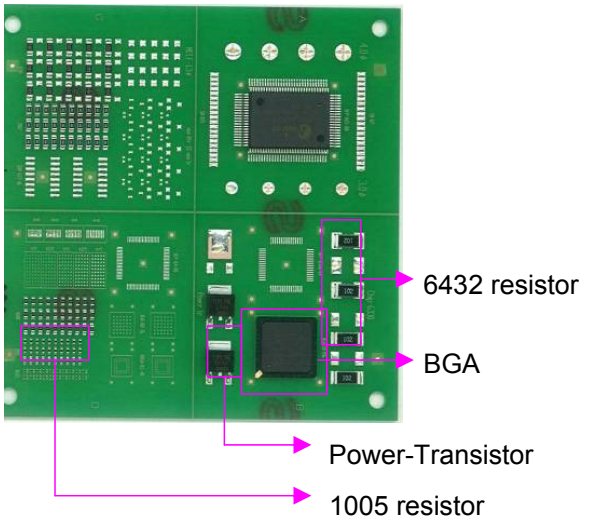
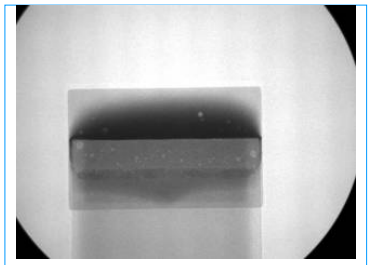
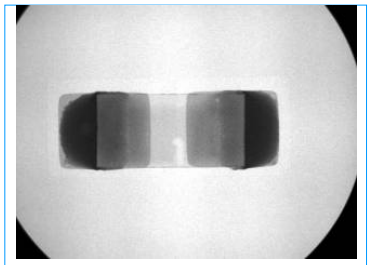
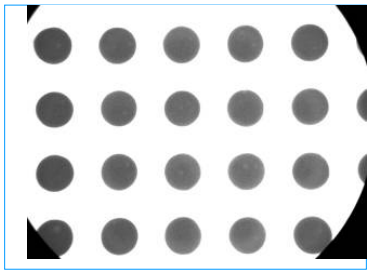
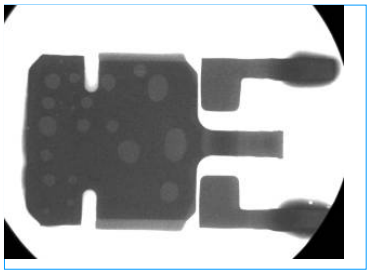
Voiding

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.12mm (laser cut)
- Stencil aperture : 100% aperture opening to pad
- Components
  6432 ,1005 resistor : 100% Sn plated
  1.0mm pitch BGA: SnAgCu bumps
  Power-Transistor: 100% Sn plated
- Heat source : Hot air convection
- Zone structure : 5 pre-heat zones +2 peak zones
- Atmosphere : Air
- Reflow profile : Same as *"Solder wetting"*



6432R (100Sn)	1005R (100Sn)	BGA (Sn3Ag0.5Cu)	Power-Tr (100Sn)
			

Voiding with various components has been drastically reduced.

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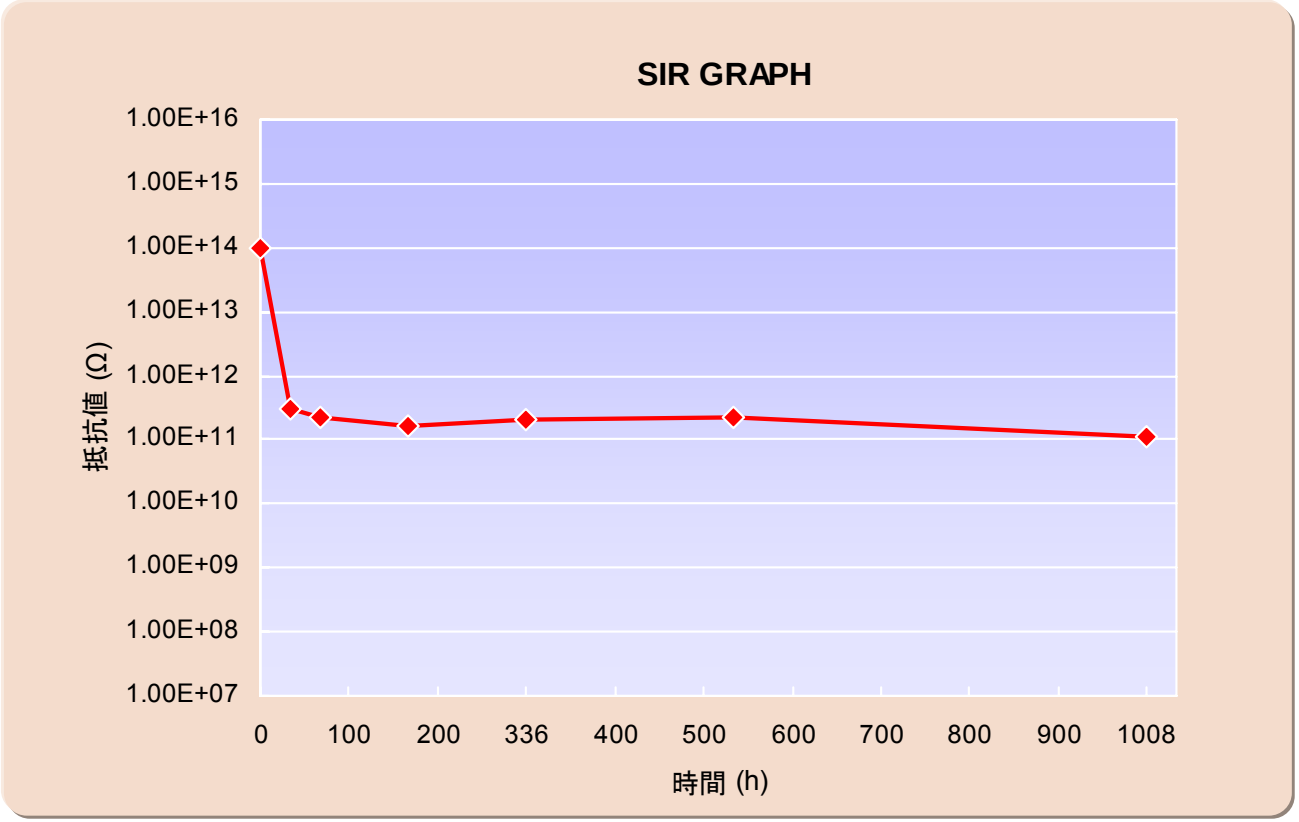
Voltage applied surface insulation resistance

- Test conditions: 85+/-2ºC x 85+/-2%RH for 1000hours
- Stencil thickness: 100 micron
- Comb type electrode: JIS type 2
- Measurement voltage: DC100V
- Voltage applied: DC50V
- Test method: JIS Z 3197



No evidence of electromigtaion can be observed.

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1. Printing
   1) Recommended printing parameters
      (1) Squeegee
         1. Kind : Flat
         2. Material : Rubber or metal blade
         3. Angle : 60~70º (rubber) or metal blade
         4. Pressure : Lowest
         5. Squeegee speed : 10~50mm/sec.

      (2) Stencil
         1. Thickness : 150~100μm for 0.65~0.4mm pitch pattern
         2. Type : : Laser or electroform
         3. Separation speed : 0.5~10.0mm/sec.
         4. Snap-off distance : 0mm

      (3) Ambiance
         1. Temperature : 22~25ºC
         2. Humidity : 40~60%RH
         3. Air draft : Air draft in the printer badly affects stencil life and tack performance of solder pastes.

2. Shelf life
   1) 0~10ºC : 3 months from manufacturing date

* Manufacturing date can be obtained from the lot number

ex. **Lot No. 8 05 20 2**

- **No. of lot : 2nd**
- **Date : 20th**
- **Month : May**
- **Year : 2008**

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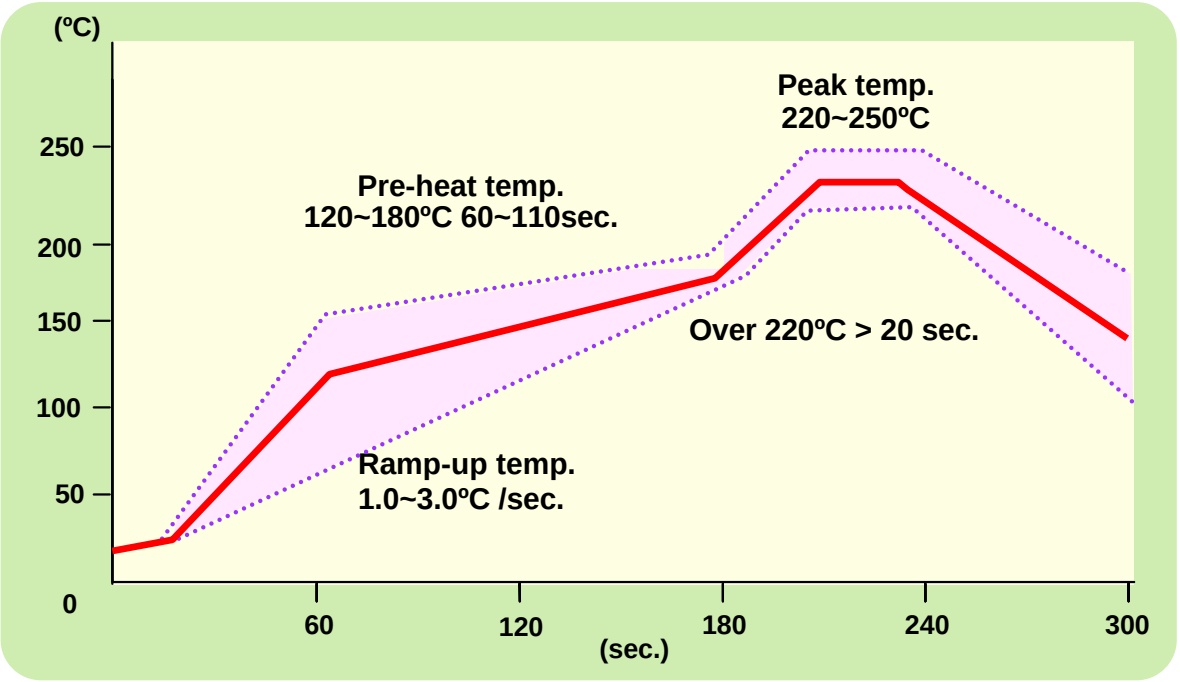
Handling guide - Recommended reflow profile

Zone	Phase	upper	Lower	Recommended
A	Pre-heat Start	150 ºC	120 ºC	120 ºC
B	Pre-heat End	180 ºC	150 ºC	160 ºC
A-B	Pre-heat Time	110sec.	60sec.	85sec.
C	Peak Temp.	250 ºC	220 ºC	230 ºC
D	Over 220 ºC	60sec.	20sec.	45sec.



Excess pre-heating (time & temperature) may cause too much oxidation.
Relatively short and low pre-heat may be recommendable, especially for fine pitch/micro pattern components.