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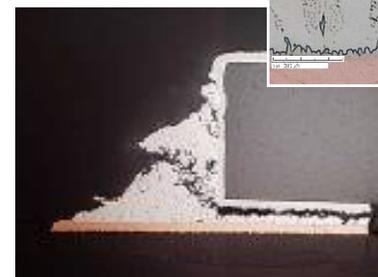
Koki no-clean **LEAD FREE** solder paste **SB6N58-M500SI**

Product information

Sn Ag3.5 Bi0.5 In6.0



Sn Ag3.5 Bi0.5 In8.0



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



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Product Features

- Indium contained helps the solder alloy thermal stress resistant and prevents occurrence of cracks in the solderjoints.
The alloy composition is **Sn Ag3.5 Bi0.5 In6.0**.
- Suffers **LESS DEFORMATION** by heat and retains reliability in a severe application environment.
- Ensures **OUTSTANDING** continual **PRINTABILITY** with super fine pitch (0.4mm/16mil) and CSP (>0.3mm dia.) applications for normal to fast printing (20 ~ 80mm/sec.) and long stencil idle time.
- **Conforms to Halogen-free** standard (Cl+Br: 0ppm) BS EN14582



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Application		Printing – Stencil
Product		SB6N58-M500SI
Alloy	Composition (%)	Sn Ag3.5 Bi0.5 In6.0
	Melting point (°C)	202 - 210
	Shape	Spherical
	Particle size (µm)	20 - 38
Flux	Halogen content* ³ (%)	0
	Type* ⁴	ROL0
Product	Flux content (%)	11.1 ± 1.0
	Viscosity* ¹ (Pa.s)	200 ± 30
	Copper plate corrosion* ²	Passed
	Tack time	> 48 hours
	Shelf life (below 10°C)	6 months

1. Viscosity: Malcom spiral type viscometer, PCU-205 at 25°C 10rpm
2. Copper plate corrosion: In accordance with IPC J-STD-004A & JIS
3. Halogen content: BS EN14582
4. Flux Type: IPC J-STD-004A

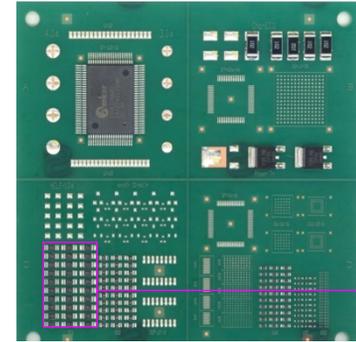


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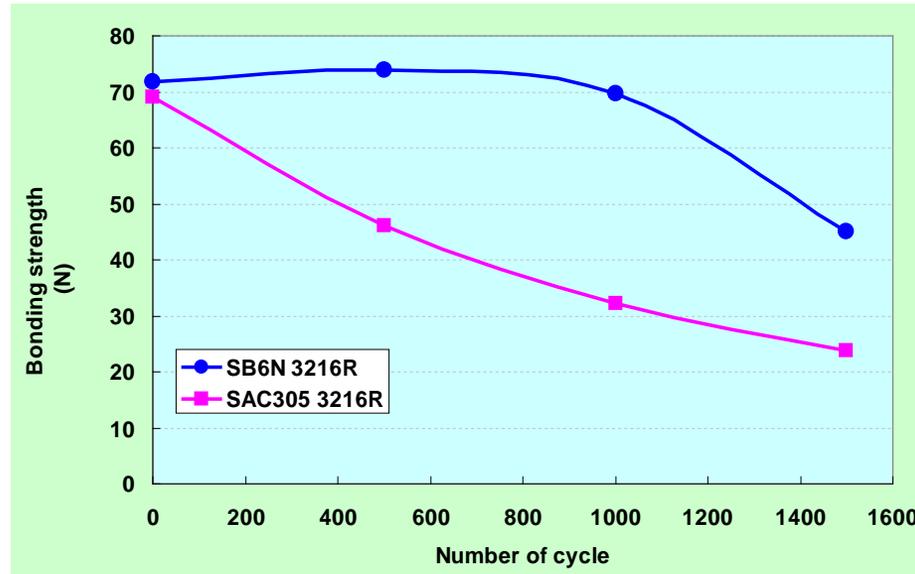
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Alloy features - Bonding strength

- Material: Glass epoxy FR-4
- Surface treatment: OSP
- Stencil thickness: 0.12mm (laser cut)
- Test point: 3216 R
- Conditions: -40 °C 30min. ~150 °C 30min
- Test method: By pushing



3216R



Much higher bonding strength than SAC305



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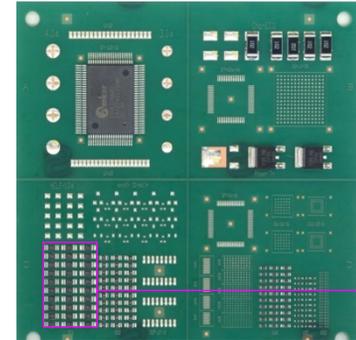
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Handling guide

Alloy features – Occurrence of cracks

- Material: Glass epoxy FR-4
- Surface treatment: OSP
- Stencil thickness: 0.12mm (laser cut)
- Test point: 3216 R
- Conditions: -40 °C 30min. ~150 °C 30min



3216R

	0cycle	500cycle	1000cycle	1500cycle
SAC305				
SB6N				

While a certain crack started to develop in the joint after 1000cycles with SAC305, no such cracking occurred with SB6N alloy.



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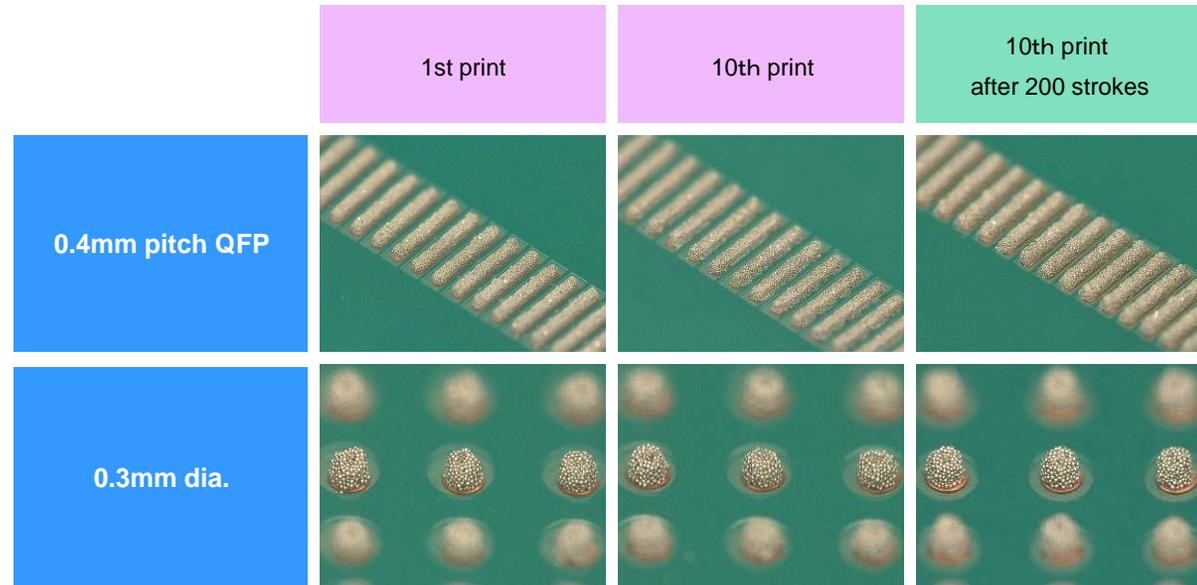
Continual printability

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: 24~26°C (40~60%RH)

Test patterns

1. QFP pad pattern: Width 0.20 mm
Length 1.5 mm Distance 0.2 mm
2. MBGA pad pattern: Diameter 0.3mm



Newly developed additives provide a lubricating effect that greatly improve the paste release properties and assures excellent print quality with microBGA at high speed printing.



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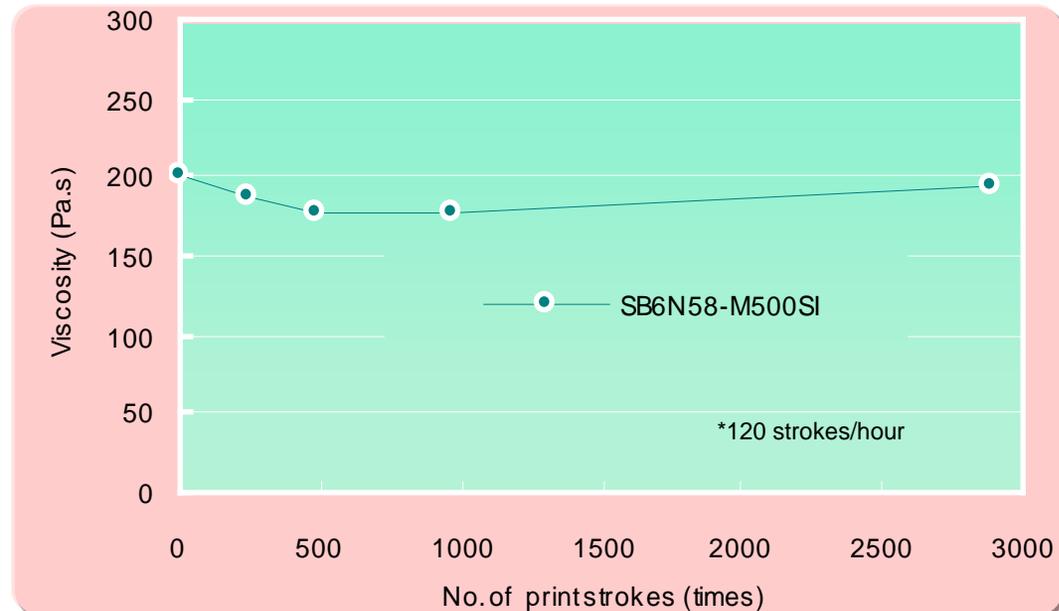
Voltage applied SIR

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Handling guide

Viscosity variation in continual printing

- Print (knead) solder paste on the sealed-up stencil continually up 2880 strokes and observe viscosity variation.
- Squeegee: Metal blades
- Squeegee angle: 60°
- Squeegee speed: 30mm/sec.
- Print stroke: 300mm
- Printing environment: 24.0~26.0°C, 40~60%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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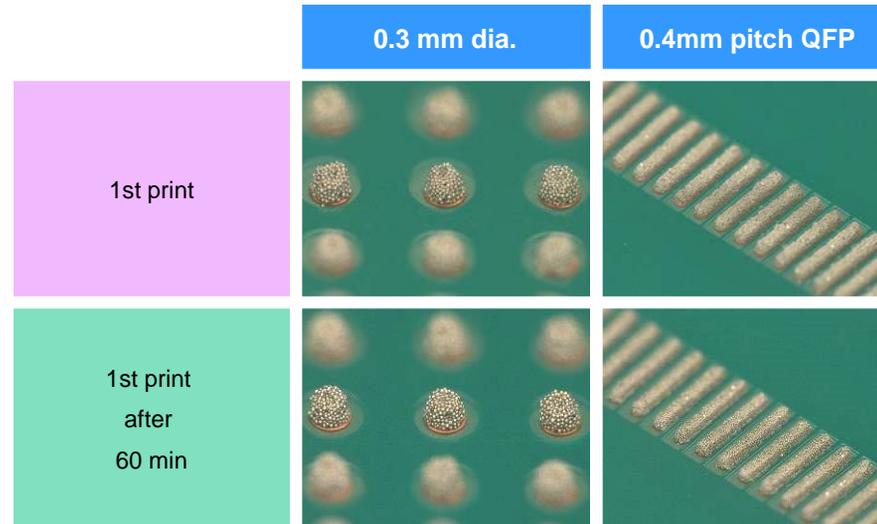
Voltage applied SIR

Halogen content

Handling guide

Intermittent printability (Stencil idle time)

- Print solder paste continuously and stop to idle the paste for 60 min. intervals, and resume the printing and observe the 1st print result to verify intermittent printability.
- Squeegee: Metal blades
- Squeegee angle: 60°
- Squeegee speed: 40mm/sec.
- Print stroke: 300mm
- Printing environment: 24~26°C, 40~60%RH
- Test pattern: QFP pad pattern - Width 0.20 mm Length 1.5 mm Distance 0.2 mm
MBGA pad pattern - dia. 0.3 mm



Newly developed additives provide a lubricating effect that greatly improve the paste release properties and assures excellent print quality with microBGA at high speed printing.

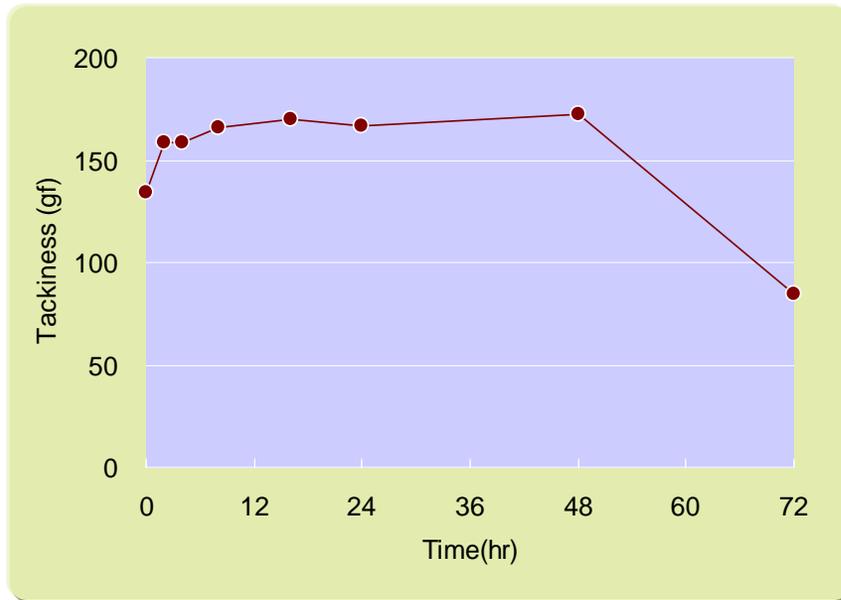


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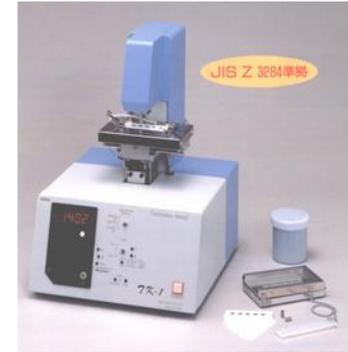
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Tack time

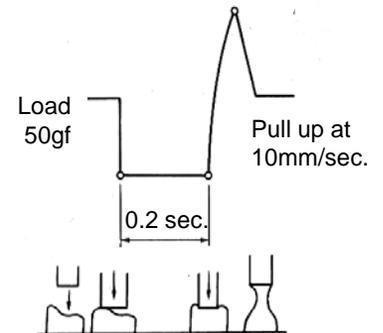
- Stencil: 0.2mm thick, 6.5mm dia. aperture
- Measurement instrument: Malcom tackimeter TK-1
- Probe pressure: 50gf
- Pressurizing time: 0.2sec
- Pull speed: 10mm/sec.
- Test method: In accordance with JIS Z 3284
- Test environment: 24~26°C, 40~60%RH



Unique solvent system successfully assures sufficient tack time.



Tensile strength = Tack force



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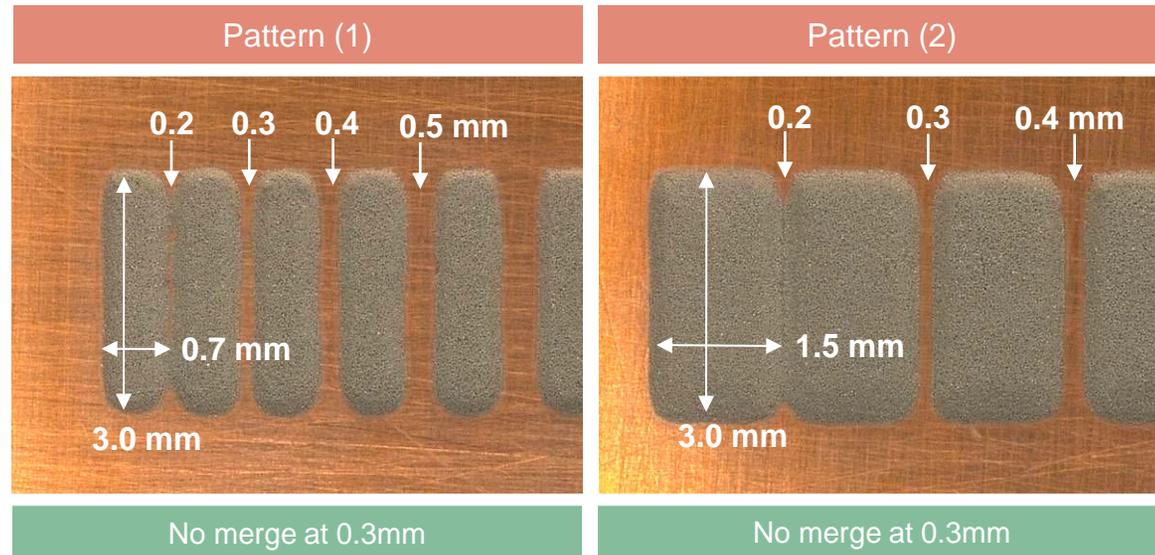
Voltage applied SIR

Halogen content

Handling guide

Heat slump

- Stencil thickness: 0.2mm
- Stencil aperture:
Pattern (1) 3.0mm × 0.7mm
Pattern (2) 3.0mm × 1.5mm
- Spacing between apertures: 0.2mm to 1.2mm
- Heat profile: 180°C × 5min.



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



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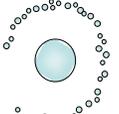
Voltage applied SIR

Halogen content

Handling guide

Solder balling (Residue cosmetics)

- Stencil: 0.2mm thick
- Stencil aperture: 6.5mm dia.
- Solder pot temperature: 250°C
- Test method: In accordance with JIS Z 3284

Category 1	2	3	4
			

1 hour after printing



Category 3

24 hour after printing



Category 3



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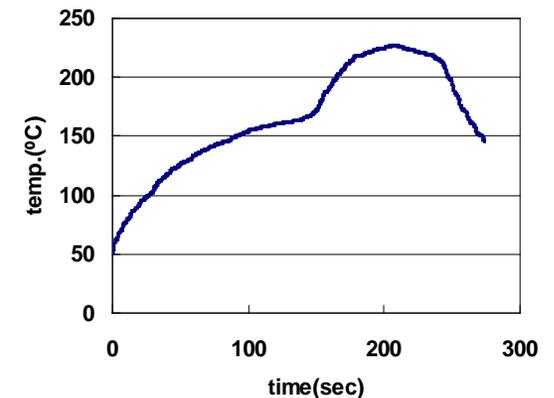
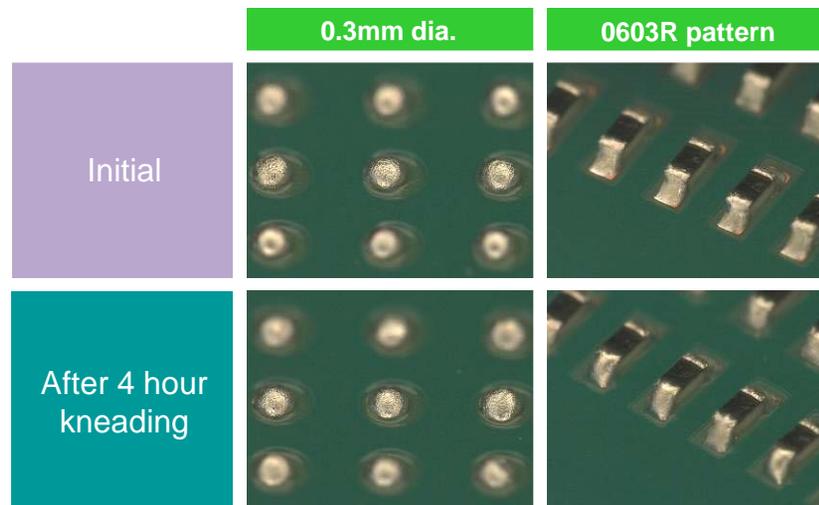
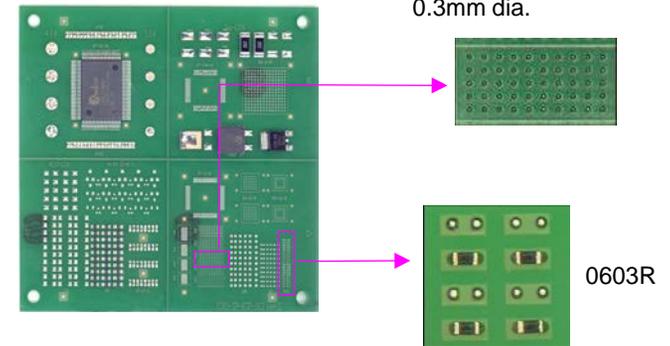
Voltage applied SIR

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Handling guide

Super fine pattern wetting

- Material: Glass epoxy FR-4
- Surface treatment: OSP
- Stencil thickness: 0.12mm (laser cut)
- Pad size: 0.3mm dia.
- Component: 0603R,
- 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



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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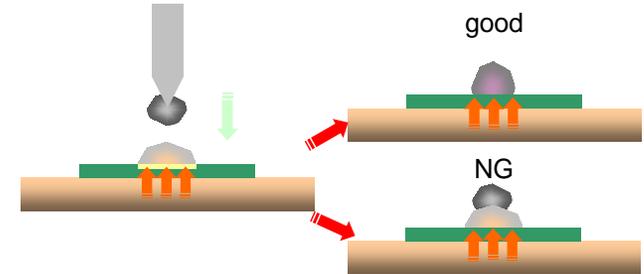
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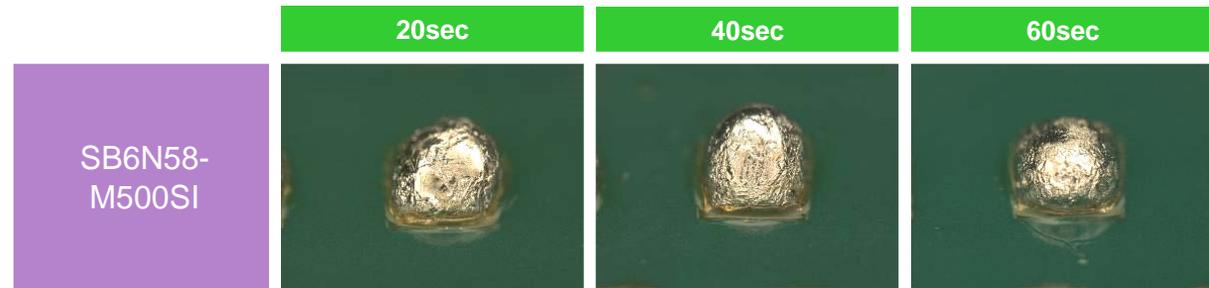
Handling guide

Anti-Pillow test

- Material: Glass epoxy FR-4
- Surface treatment: OSP
- Stencil thickness: 0.12mm (laser cut)
- Pad size: 0.8 × 0.8mm
- Component: 0.76mm ball SAC305
- Stencil aperture: 100% aperture opening to pad
- Heat source: Solder pod 275°C
- mount interval: 20sec



Drop solder ball every 20 sec. after the solder paste has melted to see heat durability of flux.



SB6N58-M500SI indicated heat durability and complete merge with the solder ball even at 60 sec.



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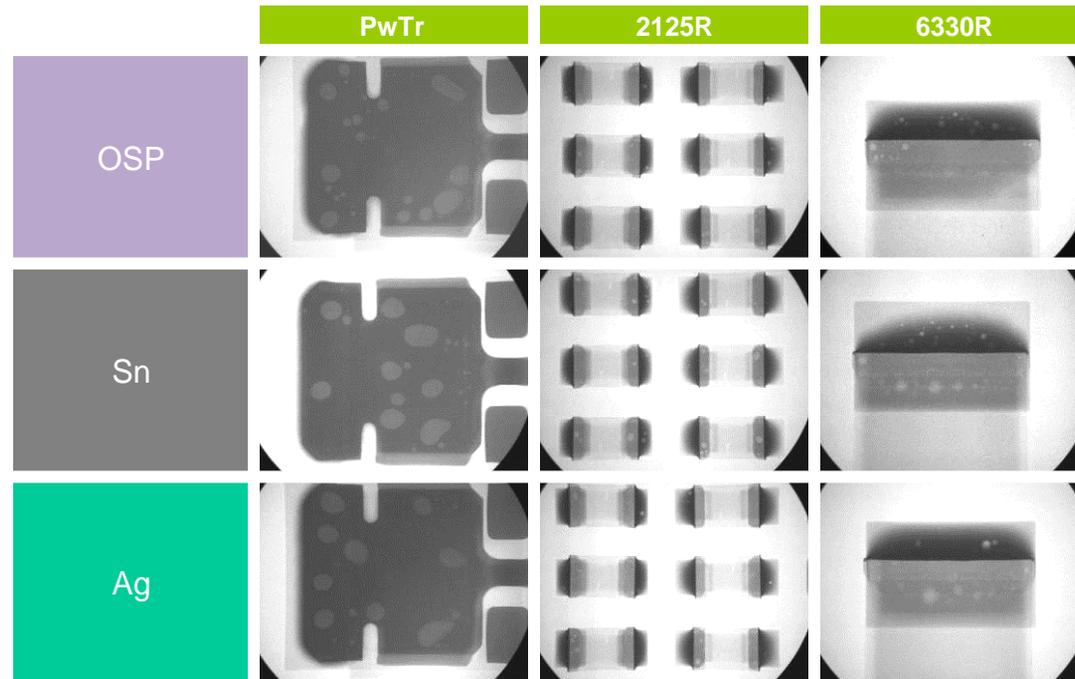
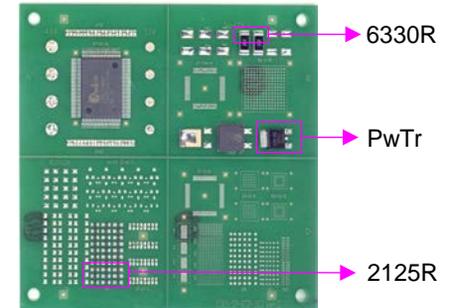
Voltage applied SIR

Halogen content

Handling guide

Voiding

- Material: Glass epoxy FR-4
- Surface treatment: OSP Sn Ag
- Stencil thickness: 0.12mm (laser cut)
- Stencil aperture: 100% aperture opening to pad
- Components: PwTr, 2125R, 6330R
- Heat source: Hot air convection
- Zone structure: 5 pre-heat zones +2 peak zones
- Atmosphere: Air
- Reflow profile: Same as "Super fine pattern wetting"



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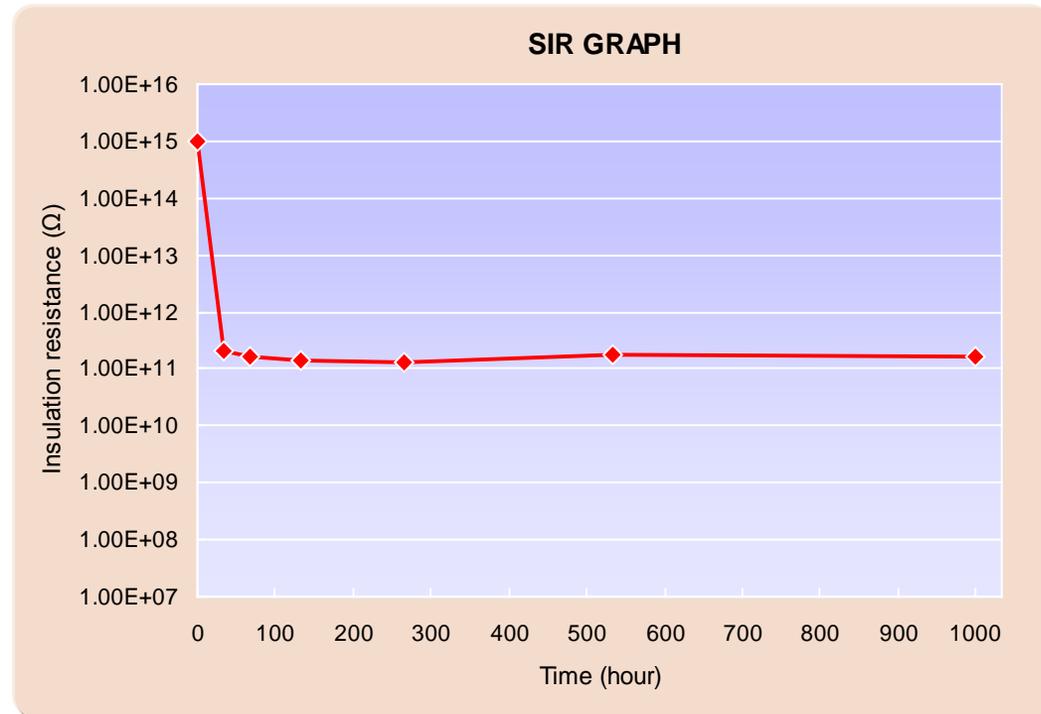
Voltage applied SIR

Halogen content

Handling guide

Voltage applied surface insulation resistance

- Test conditions: 83~87°C × 85%RH for 1000 hours
- Stencil thickness: 0.1mm
- Comb type electrode: JIS type-II
- Measurement voltage: DC100V
- Voltage applied: DC50V
- Test method: JIS Z 3197



No evidence of electromigration can be observed.



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Halogen content

- Test method: BS EN14582
- Measurement instrument: ICS-1500 (DIONEX)
AQF-100 (MITSUBISHI CHEMICAL ANALYTECH)

Halogen content (Unit:wt%)

Method	n1	n2
Chlorine	Not detected	Not detected
Bromine	Not detected	Not detected



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1. Printing

1) Recommended printing parameters

(1) Squeegee

- | | |
|--------------------|--------------------------------|
| 1. Kind: | Flat |
| 2. Material: | Rubber or metal blade |
| 3. Angle: | 60~70° (rubber) or metal blade |
| 4. Pressure: | Lowest |
| 5. Squeegee speed: | 20~80mm/sec. |

(2) Stencil

- | | |
|-----------------------|---|
| 1. Thickness: | 0.1~0.15mm for 0.65~0.4mm pitch pattern |
| 2. Type: | Laser or electroform |
| 3. Separation speed: | 7.0~10.0mm/sec. |
| 4. Snap-off distance: | 0mm |

(3) Ambiance

- | | |
|-----------------|--|
| 1. Temperature: | 23~27°C |
| 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

0~10°C: 6 months from manufacturing date

* Manufacturing date can be obtained from the lot number

ex. Lot No. 1 01 06 2

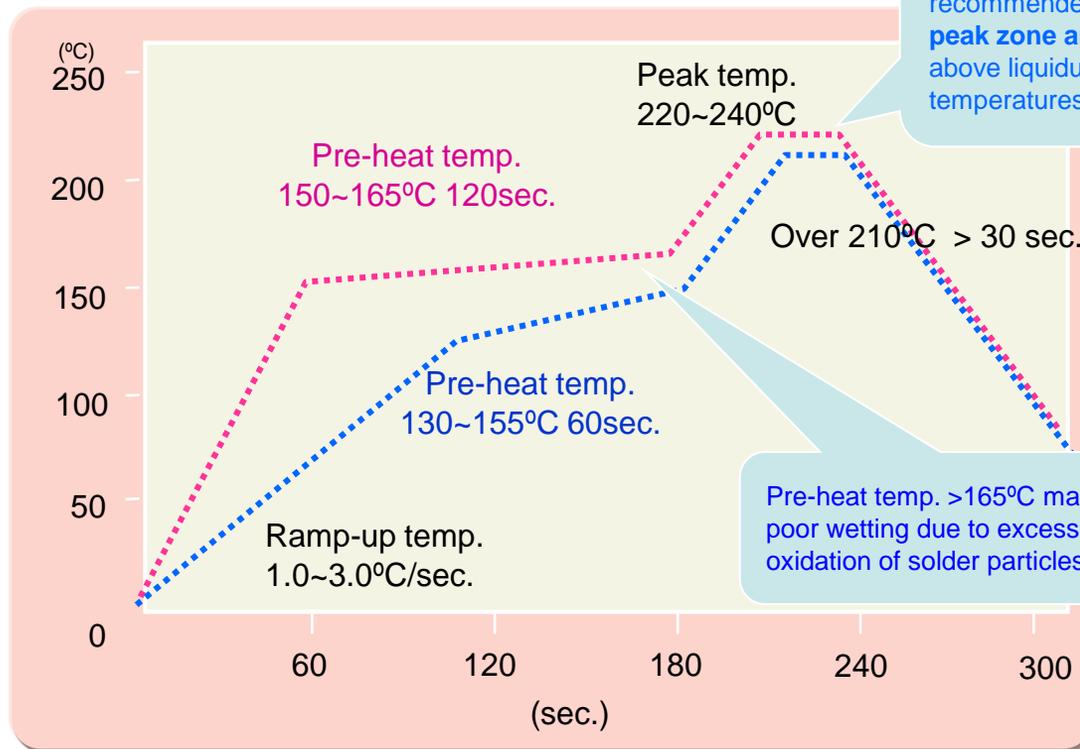
→	No. of batch:	2nd
→	Date	: 6th
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→	Year	: 2011



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Handling guide - Recommended reflow profile



For reduction of voids, it is recommended to have **>230°C at peak zone and >45 sec.** as time above liquidus and **>220°C of peak temperatures.**

Pre-heat temp. **>165°C** may result in poor wetting due to excessive oxidation of solder particles.

..... Lower limit: 130~155°C 60sec
 Upper limit: 150~165°C 120sec

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 .

