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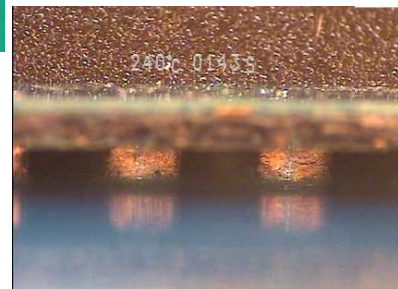
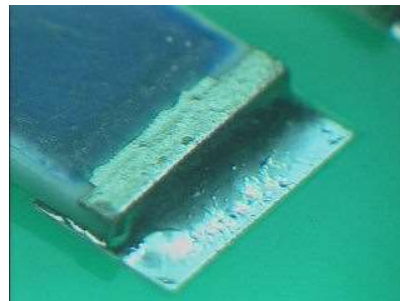
Handling guide

# Koki no-clean **Leaded** solder paste

## Super Low Void Solder Paste

### SE48-956-2 series

## Product information



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

- Solder alloy composition is **Sn37Pb**.
- Employment of rigidly classified 20□38 micron solder powder ensures outstanding continual printing with fine pitch (0.5mm/20mil) and even super fine pitch (0.4mm/16mil) application and long stencil idle time.
- Carefully selected flux chemistry ensures low voids formation.
- Extremely long stencil idle time and tack time offers a wide process window
- Low color flux residue offers superior cosmetic appearance.
- Conforms to Bellcore tests (Copper Mirror, Halides, Surface Insulation Resistance, Electro migration) GR-78-CORE, Issue 1.

No clean ROL0	Powder Type 3 or 4	Fine pattern 0.4mm pitch CSP<0.3mm	Idle time > 60 min. CSP 0.3mm	Tack time >36hrs.	High heat slump resist	Powerful wetting	Low beading	Low voiding	High reliability
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## Specifications

Application		Printing - Stencil
Product		<b>SE-48-956-2</b>
Alloy	Composition (%)	Sn63, Pb37
	Melting point (°C)	183
	Shape	Spherical
	Particle size (µm)	20 – 45
Flux	Halide content (%)	0.0
	Flux type	ROL0*3
Product	Flux content (%)	10 ± 0.5
	Viscosity*1 (Pa.S)	200 ± 10%
	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 JIS  
 3. Flux type : According to IPC J-STD-004



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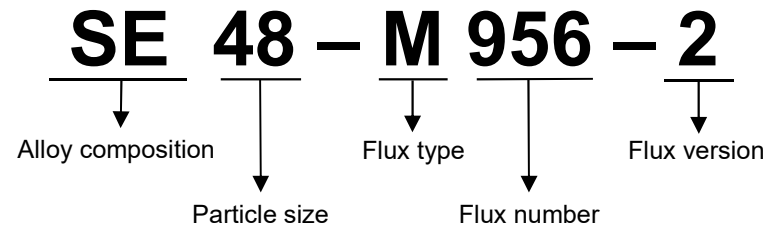
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## Specifications – Alloy selections



Alloy composition (%)	<b>SE</b> : Sn37Pb
Particle size (μm)	<b>58</b> : 20 ~ 38 <b>48</b> : 20 ~ 45
Flux type	<b>M</b> : Low halide, halide free <b>N</b> : Nitrogen use
Flux number	Solids and solvent used



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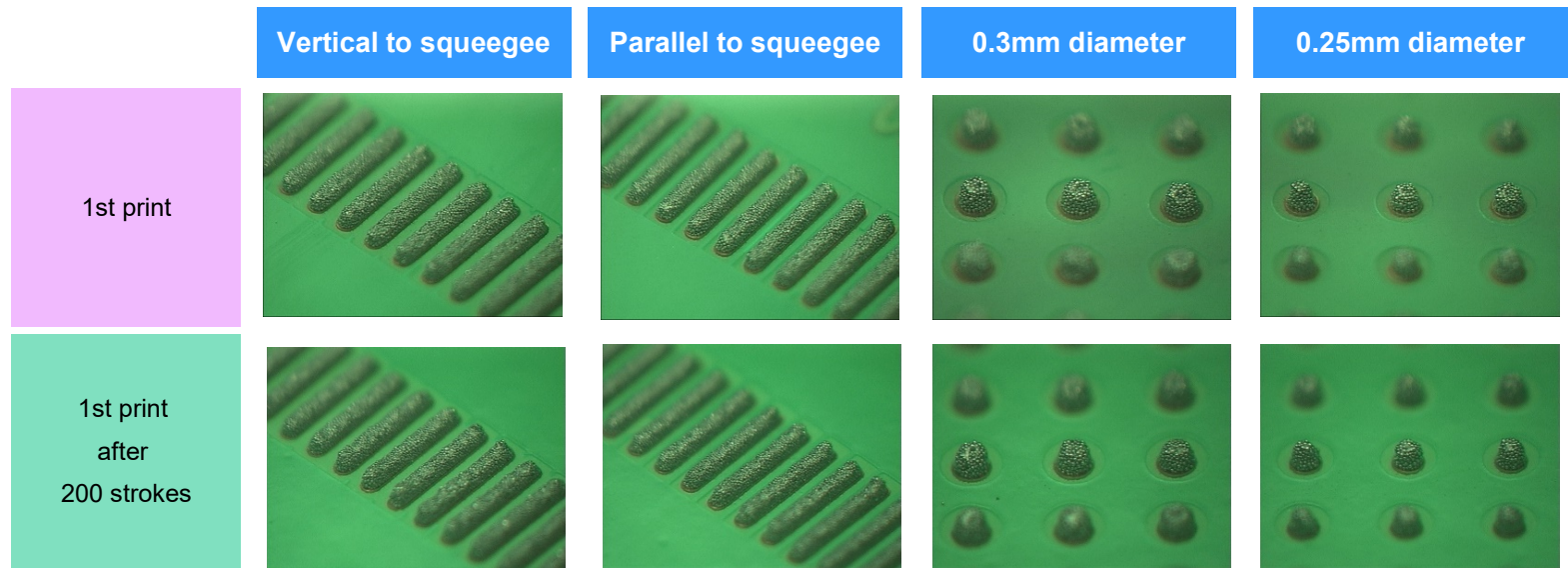
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## Continual printability

- Stencil thickness: 0.12mm (laser cut)
- Printer: YAMAHA YVP-Xg
- Squeegee type: Metal
- Squeegee travel speed: 40mm/sec Squeegee angle:60°
- Squeegee separating speed: 10mm/sec
- The number of printing: 10 pcs. on continuous basis
- Printing ambit: 25.5-26.0°C (50-60%RH)
- Solder paste condition: Initial and the one after 100 strokes of rolling



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.



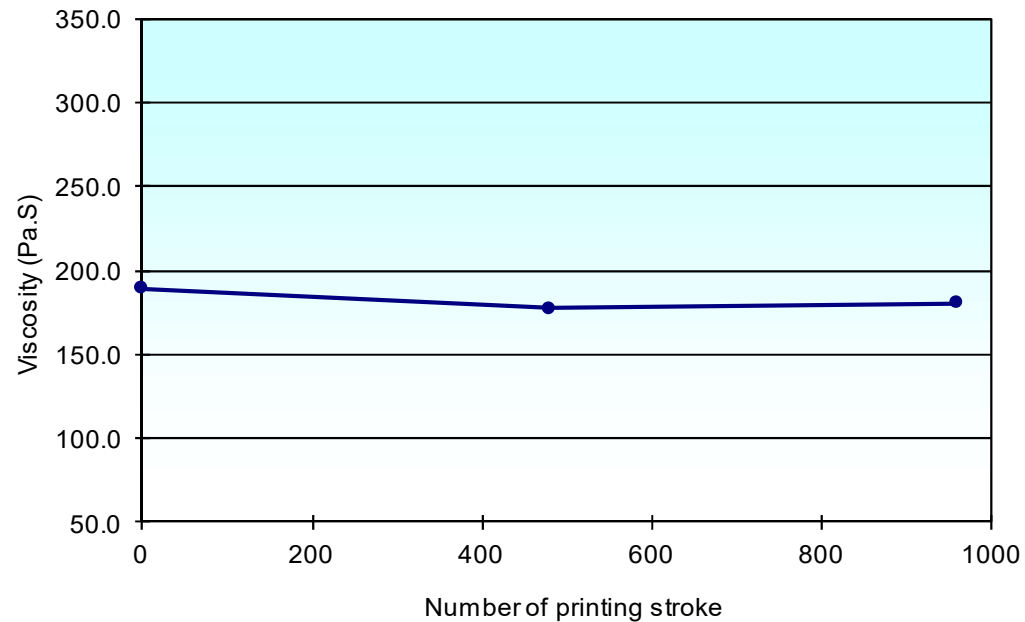
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## Viscosity variation in continual printing

- Printer: Printer with rolling function
- Stencil: Stencil without apertures
- Squeegee: Metal
- Squeegee angle: 60°
- Squeegee travel speed: 40mm/sec
- Squeegee stroke: 300mm
- Squeegee cycle: 30sec/stroke
- Printing ambit: 22.0-25.0° C (30-50% RH)
- Measuring viscosity condition: Malcom CPU-205, 10rpm

Viscosity change in continuous printing (10 rpm)





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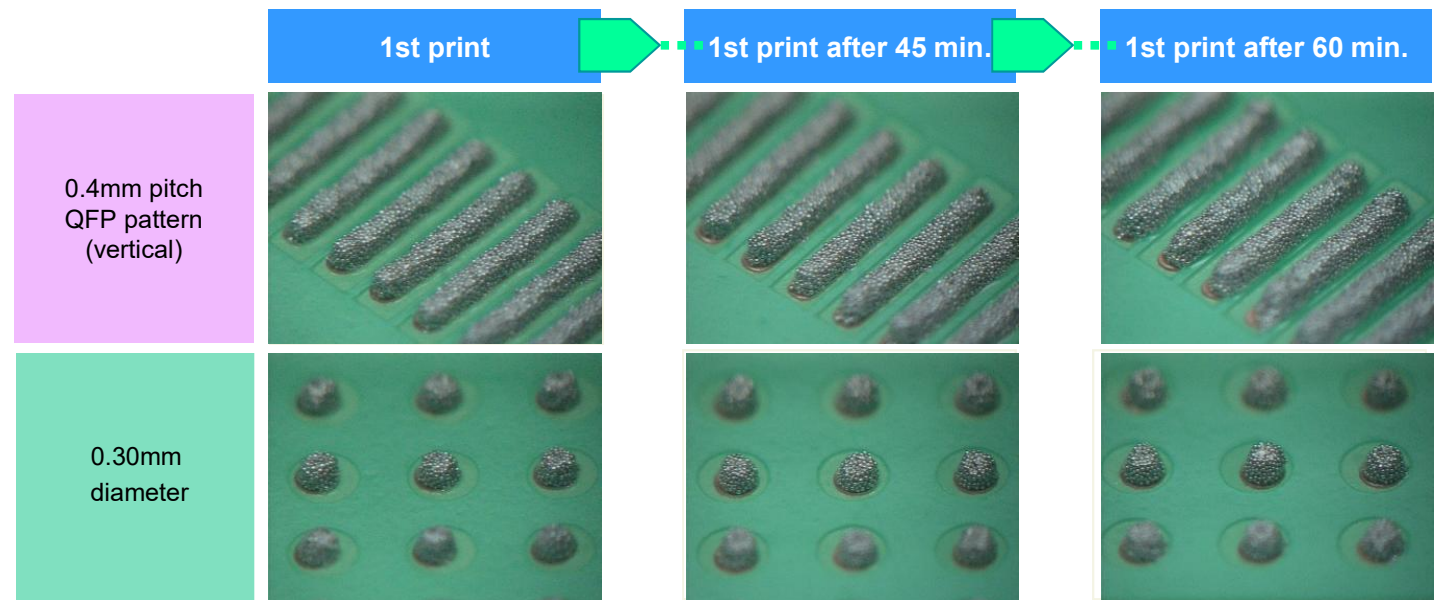
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## Intermittent printability (Stencil idle time)

- Print solder paste continuously and stop to idle the paste for 60, 90 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 : 25+/-1°C, 60+/-10%RH
- Test pattern : QFP pad pattern - Width 0.20 mm Length 1.5 mm Distance 0.2 mm  
MBGA pad pattern - Diameter 0.30 mm



**Unique formulation solvent system assures extremely long stencil idle time, eliminating printing faults and improving process window and production yields.**

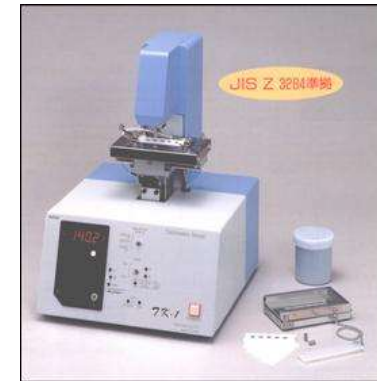
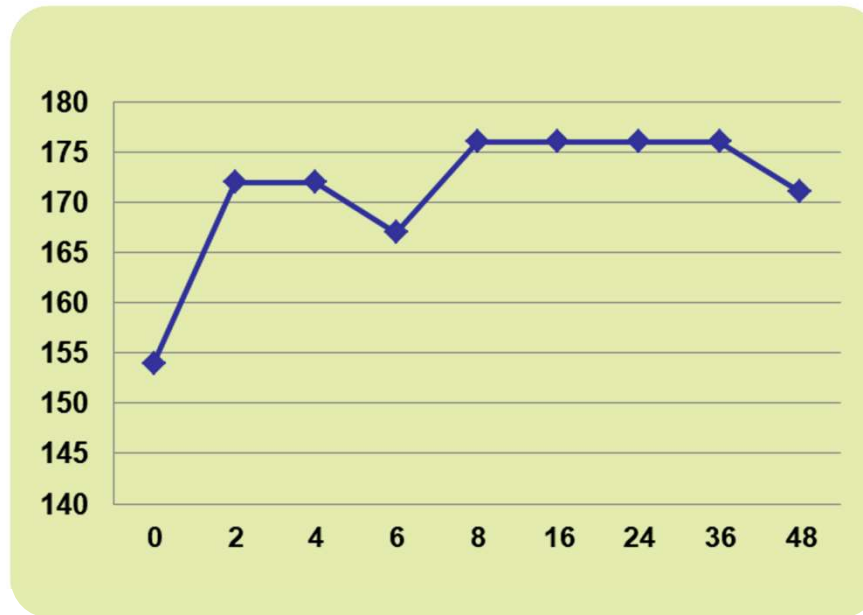


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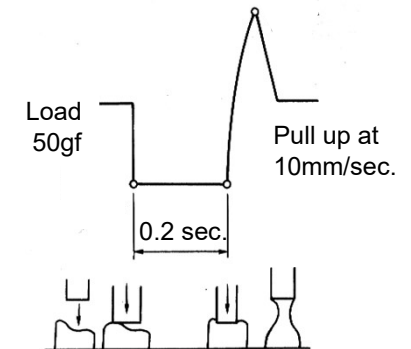
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## Tack time

- Stencil : 0.2mm thick, 0.6mm dia. aperture
- Measurement instrument : Malcom tackimeter TK-1
- Probe pressure : 50gs
- Pressurizing time : 0.2sec.
- Pull speed : 10mm/sec.
- Test method : In accordance with JIS Z 3284
- Test environment : 25+/-1°C, 50+/-10%RH



Tensile strength = Tack force



**Unique solvent system has succeeded to extend tack time dramatically (>72 hours) helps widen process window significantly.**



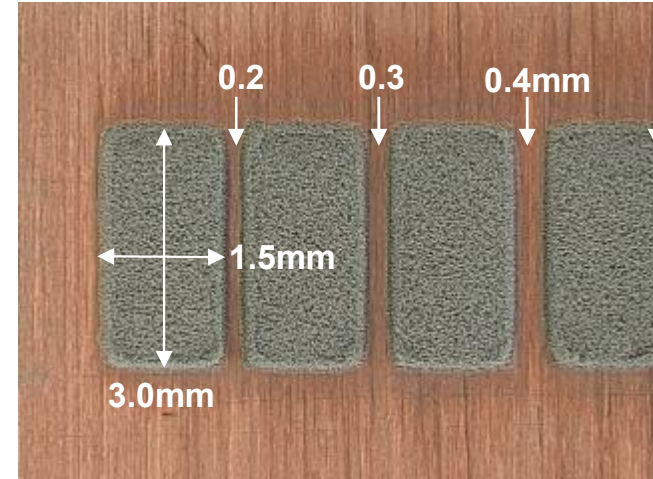
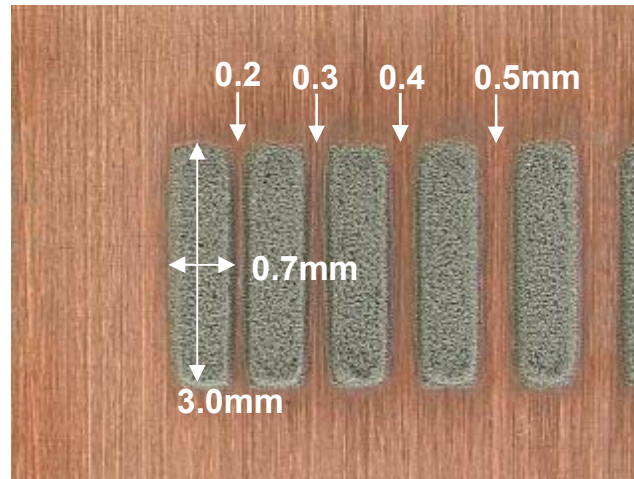
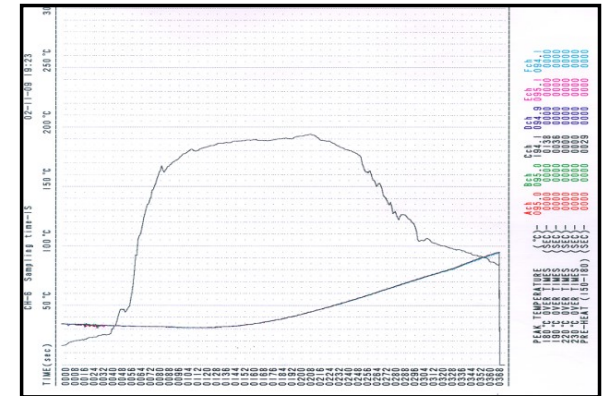


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## Heat slump

- 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 : 150°C × 300 sec.
- Test method : In accordance with JIS Z 3284



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



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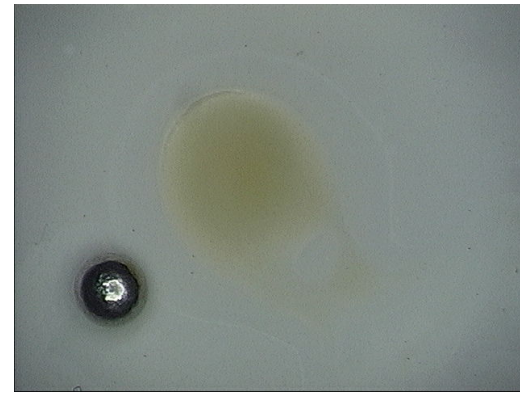
## Solder balling (Residue cosmetics)

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

Category 1	2	3	4

\*Solder paste tested: S3X48-M406-3

1 hour after printing



Category 2

24 hours after printing



Category 3

**Almost no solder balling and resistant to ambient temperature and humidity.**



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**Voiding**

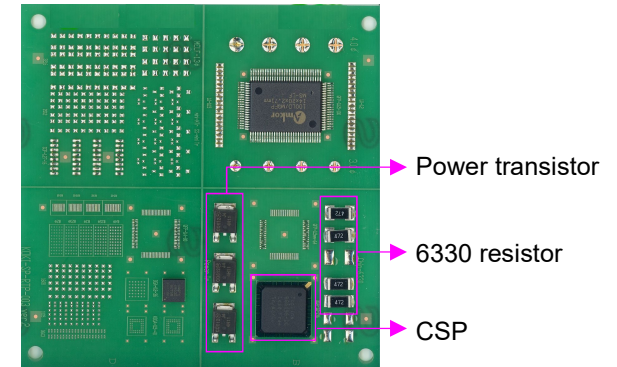
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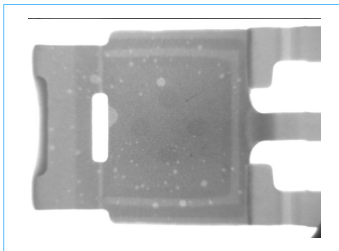
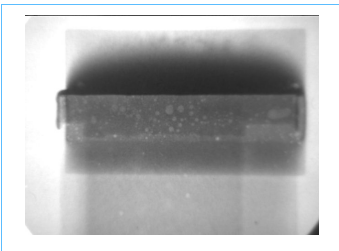
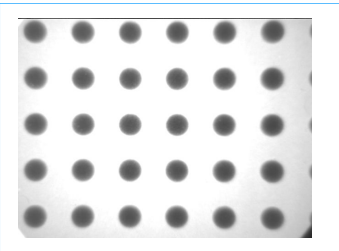
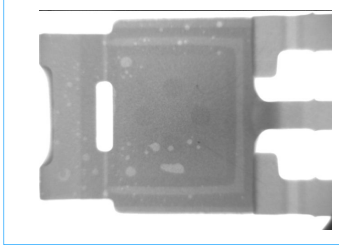
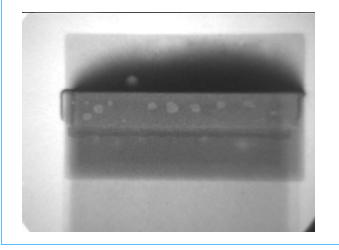
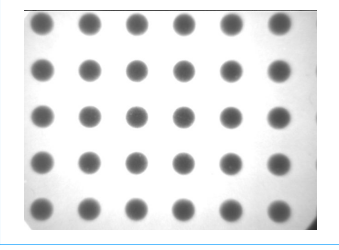
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## Voiding

- Material : Glass epoxy FR-4
- Surface treatment : OSP
- Stencil thickness : 0.12mm (laser cut)
- Stencil aperture : 100% aperture opening to pad
- Components
  - 6330 resistor : 100% Sn plated
  - Power transistor : 100% Sn plated
  - CSP : SnPb bumps 1.0mm pitch
- Heat source : Hot air convection
- Zone structure : 5 pre-heat zones +2 peak zones
- Atmosphere : Air
- Reflow profile : Same as "Solder beading"



	Power transistor (100Sn)	6330 chip resistor (100Sn)	CSP (1.0mm dia)
Initial			
After 4-hour kneading on sealed-up stencil			

**Voiding with various components has been drastically reduced and offers consistent level of voiding even after continual print for more than 8 hours.**



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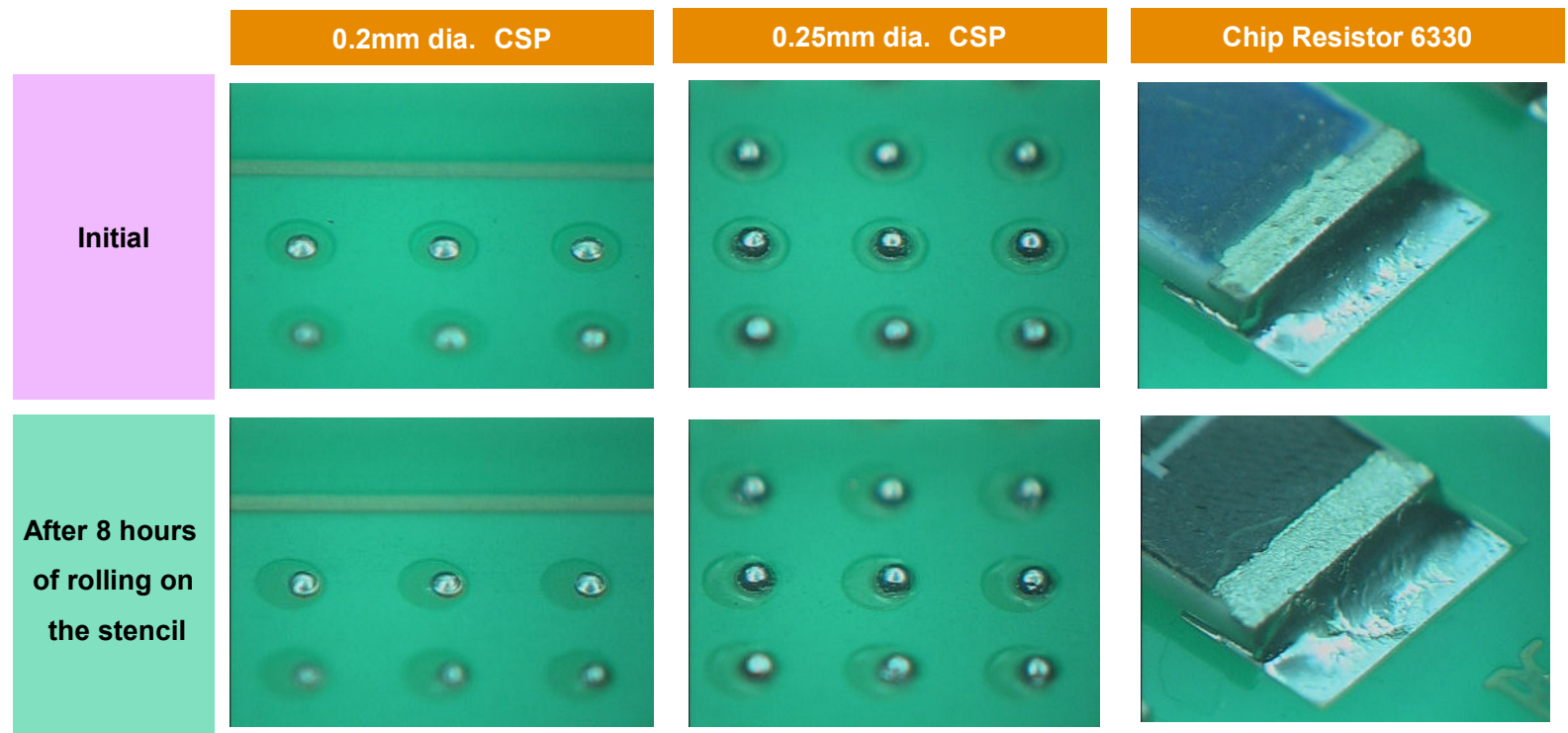
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## Wetting Condition

- PCB: Koki test boardSP-RTP-003Ver2 (OSP)
- Stencil: 120 $\mu$ m / manual printing
- Reflow: Koki convection type oven (Saddle type)





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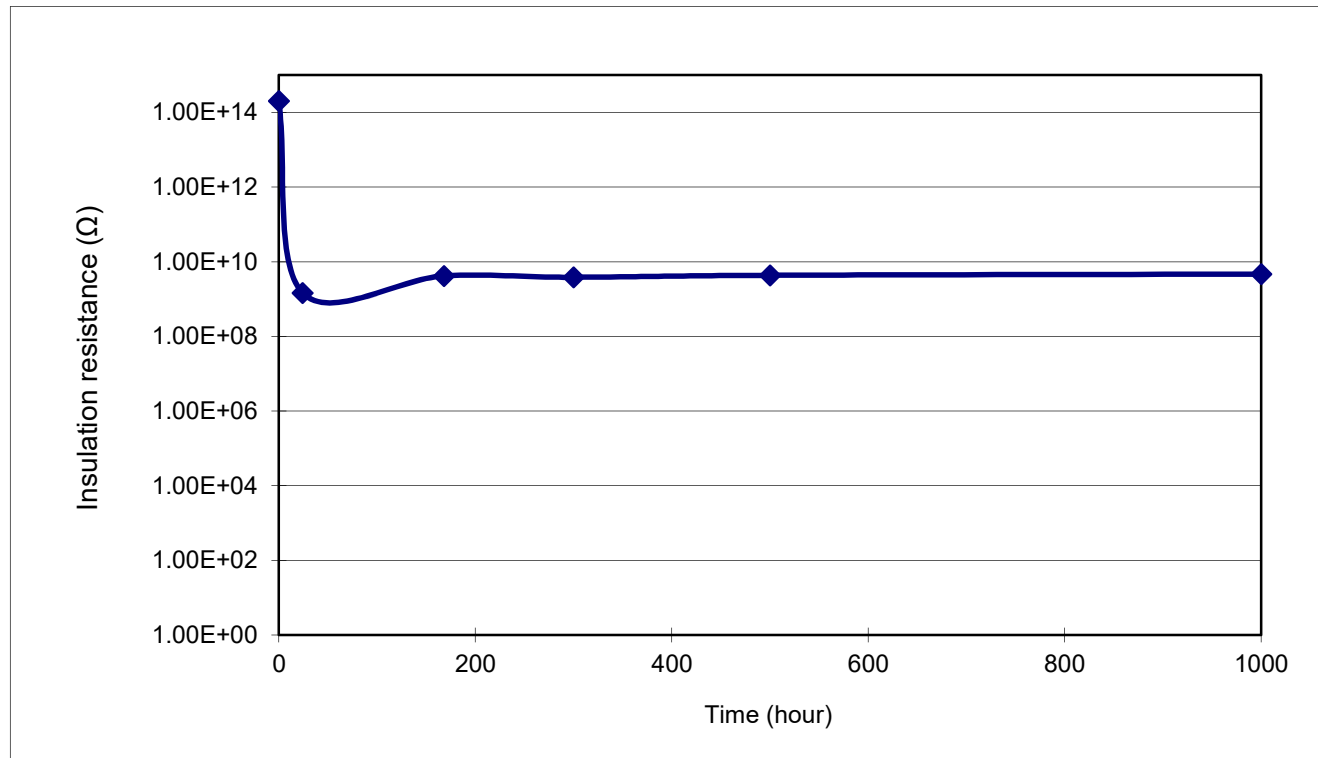
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## Voltage applied surface insulation resistance

- Test conditions : 85±2°C × 85%RH for 1000 hours
- Stencil thickness : 100 micron
- 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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### 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 : 10~40mm/sec

##### (2) Stencil

1. Thickness : 200~120μm for 0.65~0.4mm pitch pattern
2. Type : Laser or electroform
3. Separation speed : 0.5~10.0mm/sec.
4. Snap-off distance : 0 – 0.5mm

##### (3) Ambiance

1. Temperature : 25 ± 5°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

- 1) 0~10°C : 6 months from manufacturing date
- 2) At 20~30°C : 1 month from manufacturing date

\* Manufacturing date can be obtained from the lot number

ex. Lot No. 6 07 21 2

6	07	21	2	No. of lot : 2nd
				Date : 21st
				Month : July
				Year : 2006





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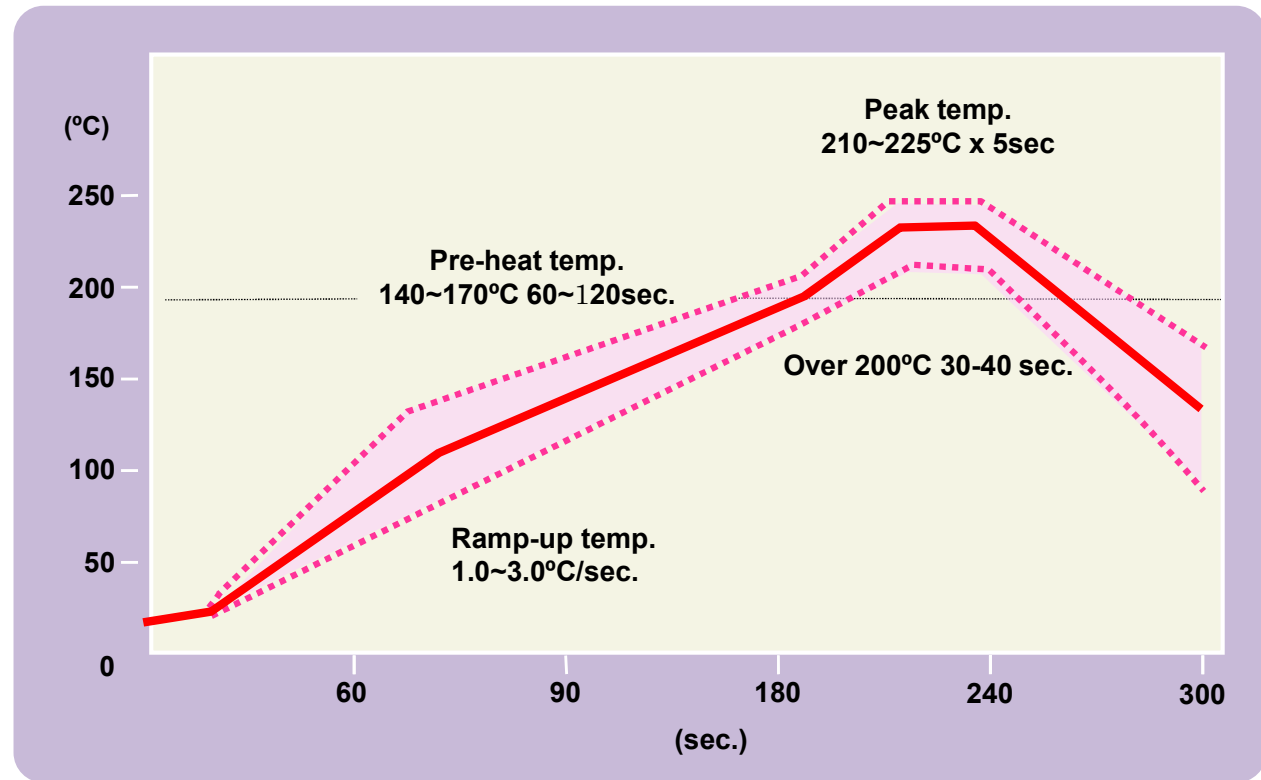
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## Handling guide - Recommended reflow profile



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 .

