

# TECHNICAL INFORMATION

## Super Low Void Solder Paste

### SE/SS/SSA48-M956-2

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**KOKI COMPANY LIMITED**

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## 1. FEATURES

- 1) Ensures outstanding continual printability to fine pitch (0.5mm/20mil) at even super fine pitch (0.4mm/16mil) application.
- 2) Carefully selected thixotropic materials ensure excellent slump resistance and significantly reduce occurrence of bridging and solder beading.
- 3) Assures joining strength due to sound fillet formation with excellent wetting.
- 4) Reduces the occurrence of void significantly thanks to carefully selected flux formation system based on thorough research and development.

## 2. SPECIFICATIONS

### 1) Alloy

Item	Unit	SE48-M956-2	SS48-M956-2	SSA48-M956-2	Remarks
Composition	%	Sn63, Pb37	Sn62, Pb36, Ag2	Sn62.6, Pb36.8, Ag0.4, Sb0.2	JIS E grade
Shape	--	Spherical			Microscope×50
Particle size	μm	20 ~ 45			

### 2) Flux

Halogen content	%	0.0		Potentiometer
SIR* <sup>1</sup>	Initial value	$> 1 \times 10^{12}$		JIS comb type electrode type II
	After humidification	$> 1 \times 10^{11}$		
Aqueous solution resistivity* <sup>2</sup>	Ωcm	$> 1 \times 10^4$		Conductivity
Flux type	-	ROL0		ANSI/J-STD-004

### 3) Solder paste

Flux content	%	10.0		By weight
Viscosity* <sup>3</sup>	Pa.S	200 ± 20		Malcom PCU-205
Copper plate corrosion* <sup>4</sup>	--	Passed		--
Solder spread factor	%	> 90		Copper plate
Tack time	hour	> 36		Malcom FG-1
Shelf life	month	6		Below 10°C

1. SIR ..... 40°C×90%RH×96Hr
2. Aqueous solution resistivity ..... In accordance with MIL specifications.
3. Viscosity ..... Malcom spiral type viscometer, PCU-205 at 25°C 10rpm
4. Copper plate corrosion ..... In accordance with JIS

### 3. VISCOSITY VARIATION IN CONTINUAL PRINTING

#### Test method

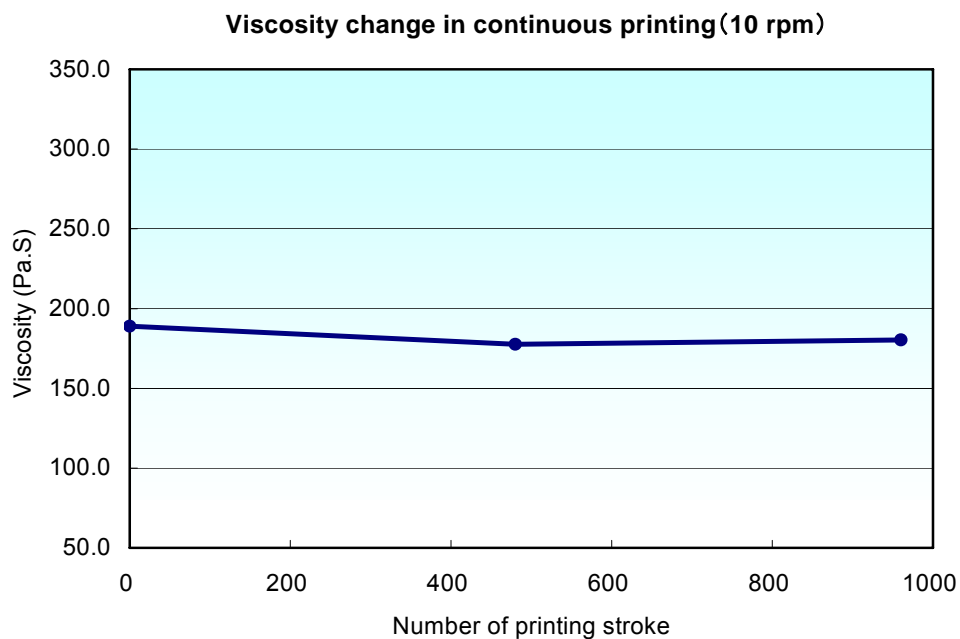
Observe the viscosity change after conducting continuous rolling on the stencil without apertures.

#### Measuring condition

- 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

#### Result / SE48-M956-2

Time passage	Initial	4 H	8 H
Number of squeegee stroke	Initial	480	960
Viscosity (Pa.S)	189.0	177.7	180.3



## 4. PRINTABILITY

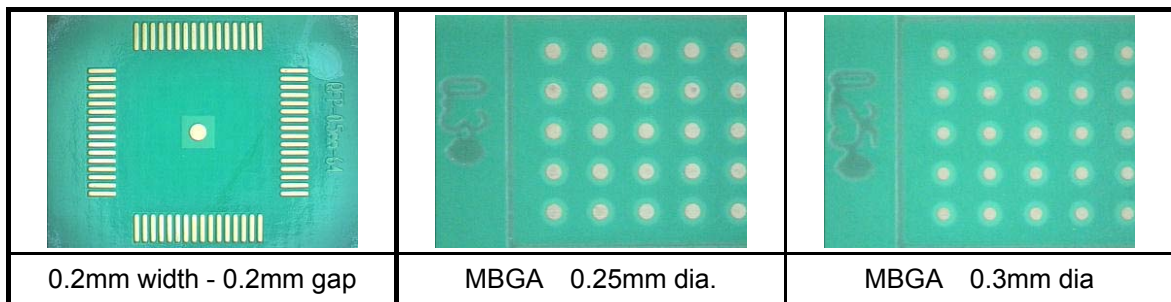
### Test method

Observe the state of solder paste printed based on following condition

### Printing condition

- 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

### PCB pad pattern


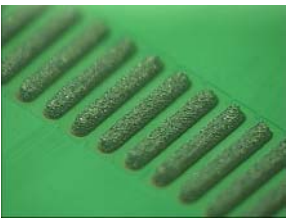
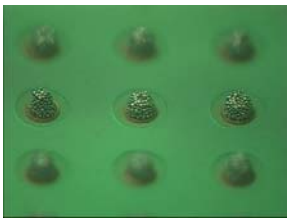
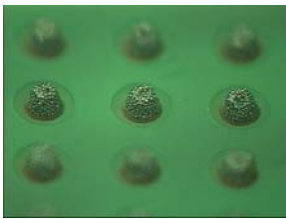


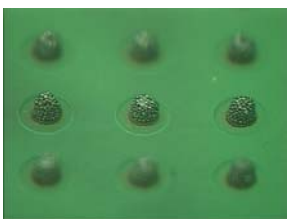
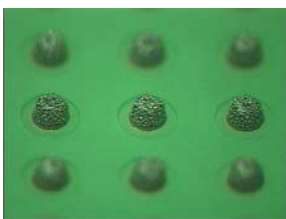



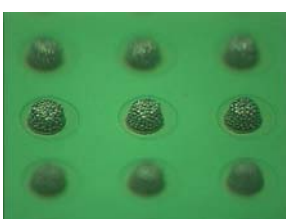


### Printing test result / Paste separation condition out of stencil aperture

Time passage	Number of printing	0.2mm width - 0.2mm gap		MBGA	
		Vertical	Parallel	0.25mm dia.	0.3mm dia.
Initial	1	Very good	Very good	Very good	Very good
	5	Very good	Very good	Very good	Very good
	10	Very good	Very good	Very good	Very good
After 200 strokes	1	Very good	Very good	Very good	Very good
	5	Very good	Very good	Very good	Very good
	10	Very good	Very good	Very good	Very good

### Solder paste after continuous printing

Model: SE48-M956-2 / Initial


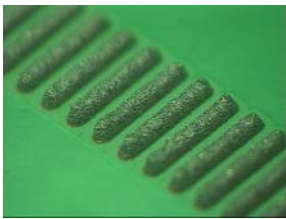
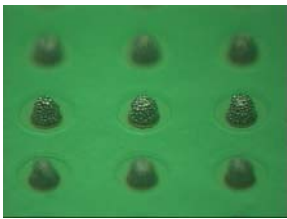
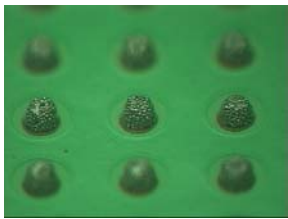
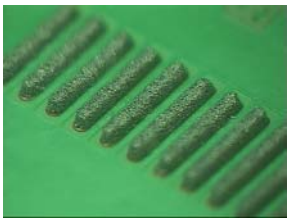

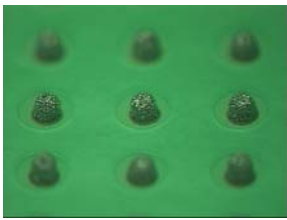
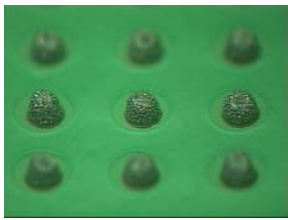
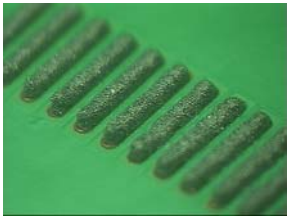

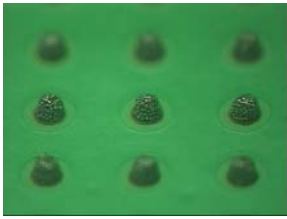
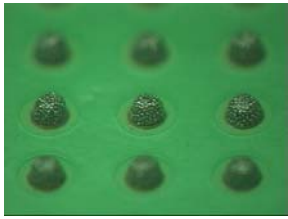
No. of printing	0.20W - 0.20G		CSP	
	Parallel direction	Vertical direction	0.25mm dia.	0.3mm dia.
1 <sup>st</sup>				
5th				
10th				

Number of clogging in the aperture of CSP pad, and the number of smearing after printing with the aperture sized 1mm width and 0.15 gap between pads.

No.	No. of stencil apertures clogged	
	0.25CSP	0.3CSP
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

## Solder paste after continuous printing

Model: **SE48-M956-2** / Printing after 200 strokes of printing

No. of printing	0.20W - 0.20G		CSP	
	Parallel direction	Vertical direction	0.25mm dia.	0.3mm dia.
1 <sup>st</sup>				
5th				
10th				

No.	No. of stencil apertures clogged	
	0.25CSP	0.3CSP
201	0	0
202	0	0
203	0	0
204	0	0
205	0	0
206	0	0
207	0	0
208	0	0
209	0	0
210	0	0

## 5. TACKINESS

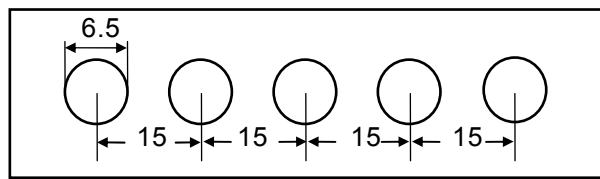
- Test method

Print the solder paste on AN alumina plate with a 0.2mm thick stencil that has five 6.5mm dia. holes, to obtain the test piece.

Press the flat tip cylindrical probe of the Malcom Solder Checker FG-1 onto the printed solder paste with a pressure of 50gs for 0.2mm sec. and pull it back up at the speed of 10mm/sec. to measure the maximum tensile strength needed to separate the probe from the paste.

Evaluate tackiness of the solder paste from the obtained tack force and time after printing.

\*Ambient condition : 25°C 50±10%RH.



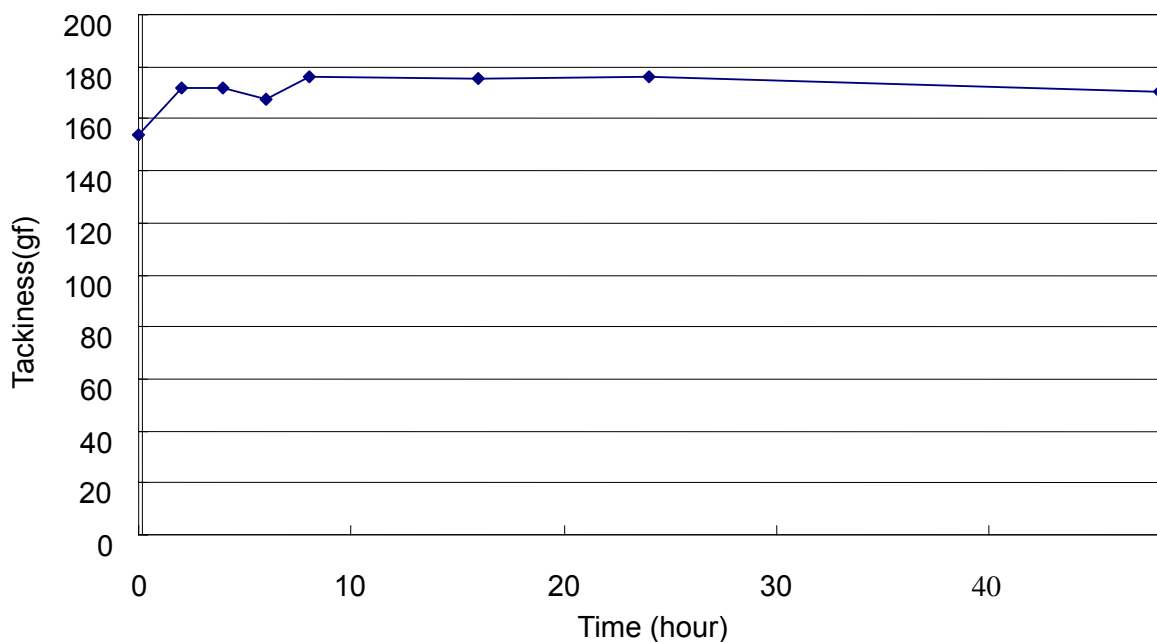
\*Unit : mm

Stencil used

Product	Time (hour)									
	0	2	4	6	8	16	24	36	48	
SSA48-M956-2	154	172	172	167	176	176	176	176	176	171

Unit : (gf) Average of n = 5

Tackiness Data



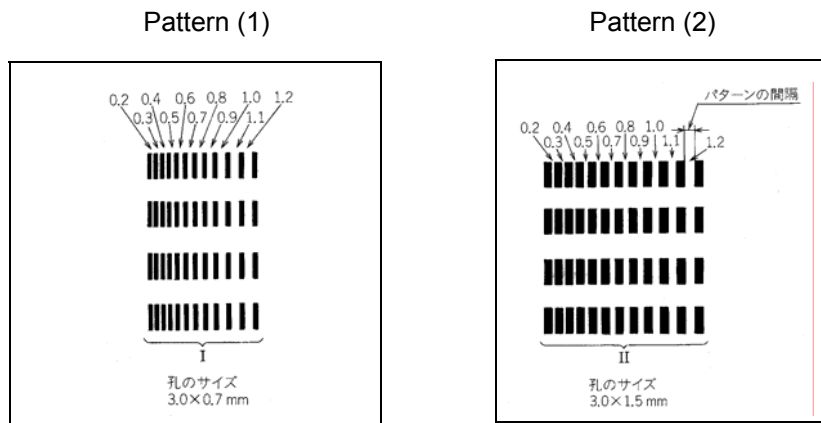
## 6. SLUMP

### • Test method

Using 0.2mm thick stainless steel stencil with two patterns of apertures, (1)3.0mm×0.7mm, (2)3.0mm×1.5mm arranged as grids with the spacing between the apertures varying from 0.2mm to 1.2mm in steps of 0.1mm, print the solder paste on 1.6mm thick copper clad laminate plate to obtain test pieces.

(1) Observe the slump behavior after leaving the test pieces at room temperature for 1 hour.

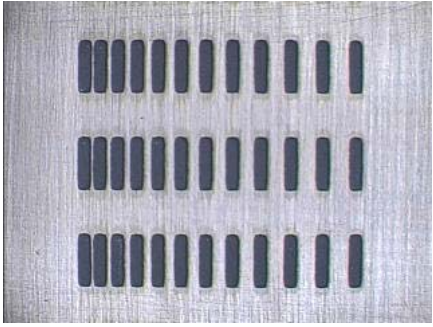
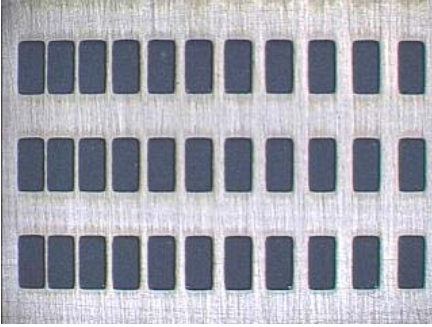
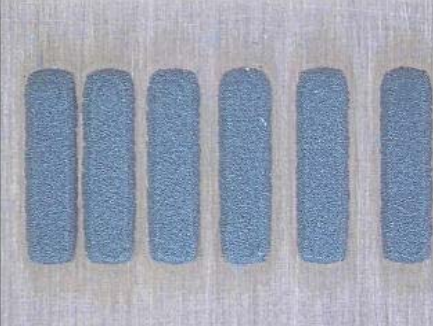
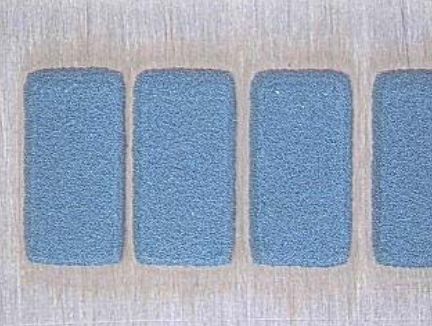
(2) Observe the minimum spacing across which the paste has not merged after storing the test pieces at room temperature for 1 hour, and heating it for 5 minutes at 150°C in the thermostatic oven.



### Test result

Condition	Pattern (1)	Pattern (2)
After printing	0.2mm Pass	0.2mm Pass
5min. after at 150°C	0.2mm Pass	0.2mm Pass



Condition	Pattern (1)	Pattern (2)
After 150°C × 5 min		
		

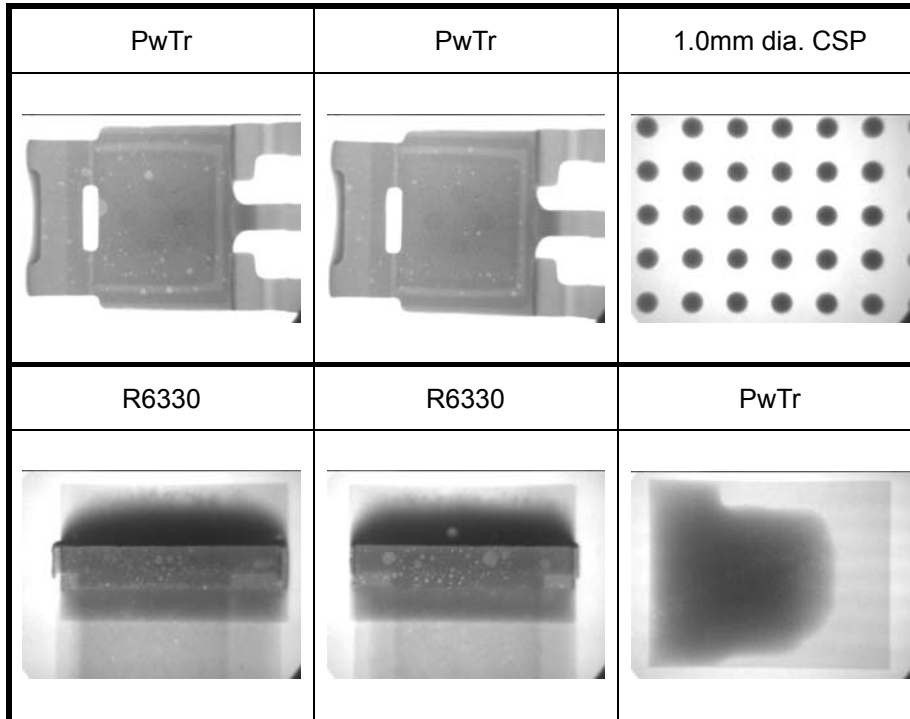
## 7. VOID

### Condition

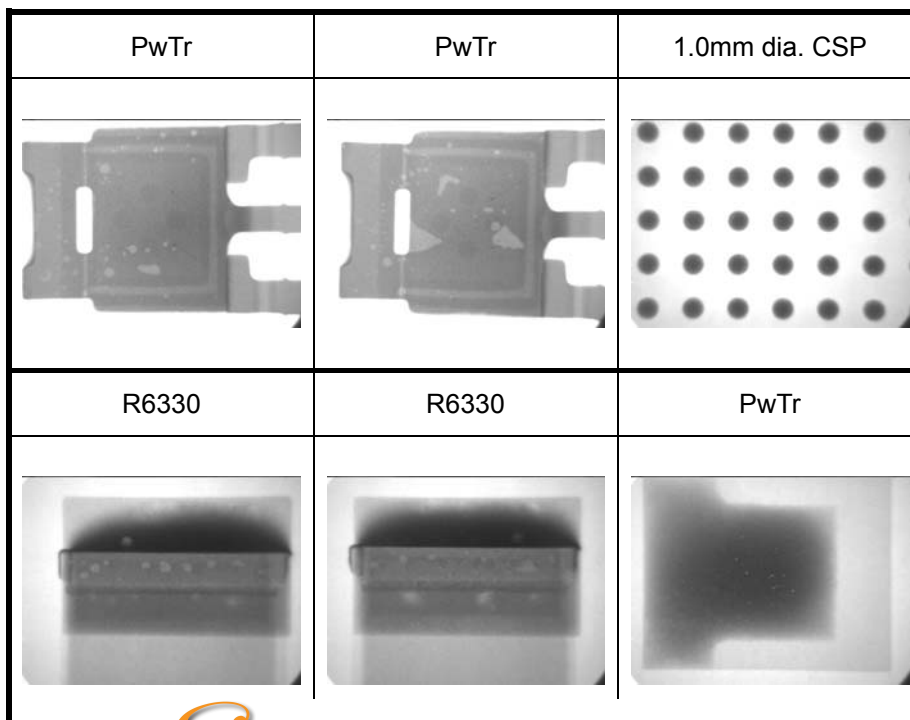
PCB: Koki test boardSP-RTP-003Ver2 (OSP)  
 Stencil: 120 $\mu$ m / manual printing  
 Reflow: Koki convection type oven (Saddle type profile in air)

### SSA48-M956-2

### Initial

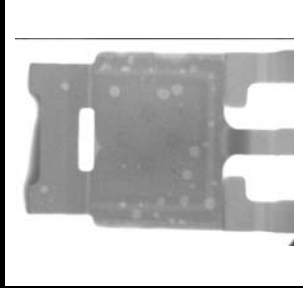
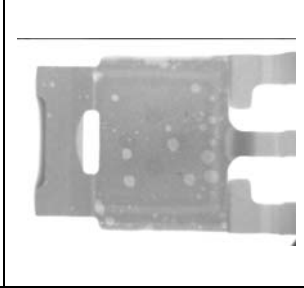
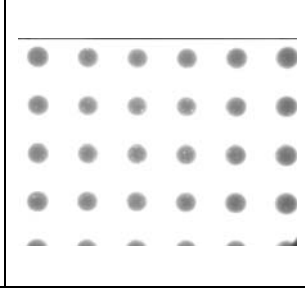
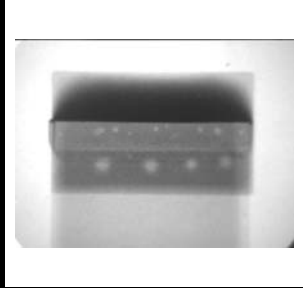
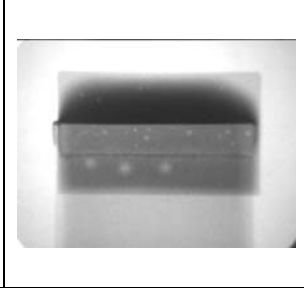
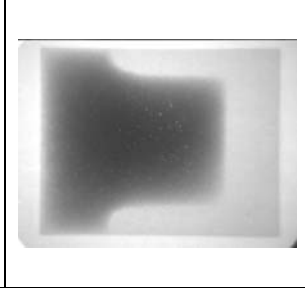


### After 8 hours rolling on sealed-up stencil

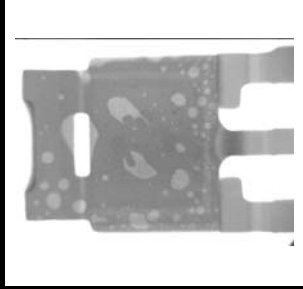
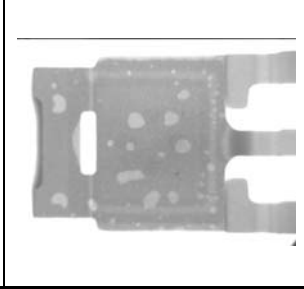
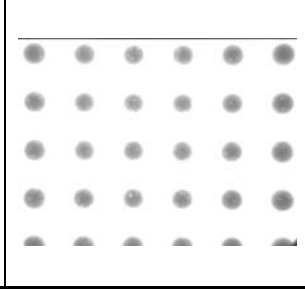
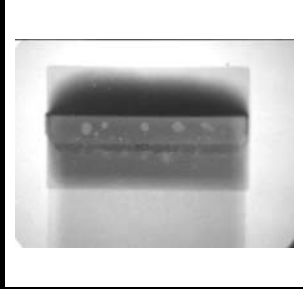
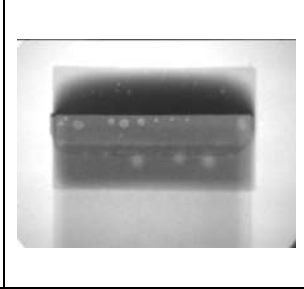
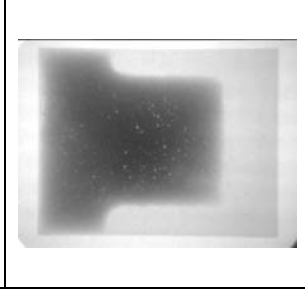


**Conventional paste (SSA48-M954-2)**

Initial

PwTr	PwTr	1.0mm dia. CSP
		
R6330	R6330	PwTr
		

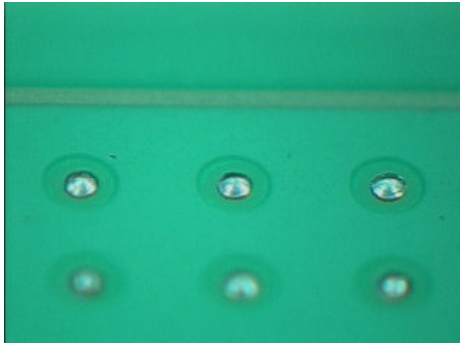
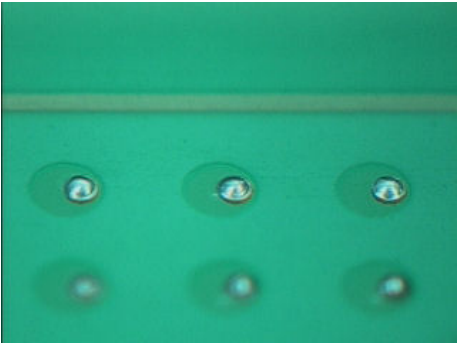
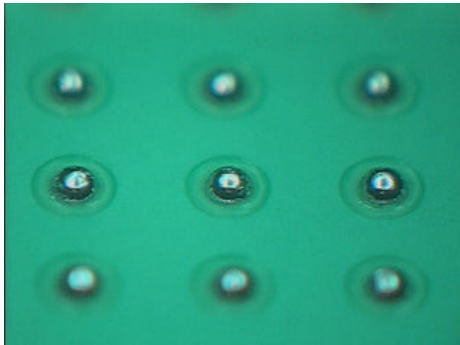
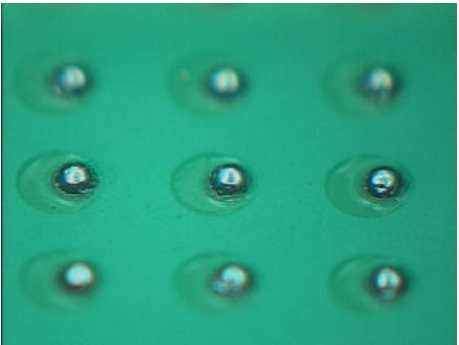
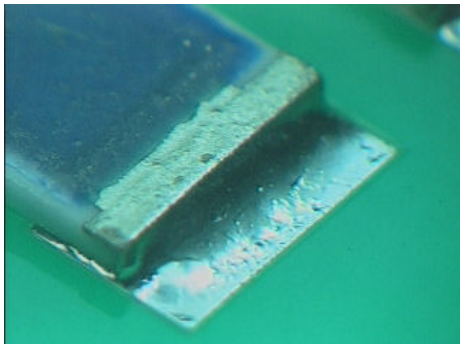
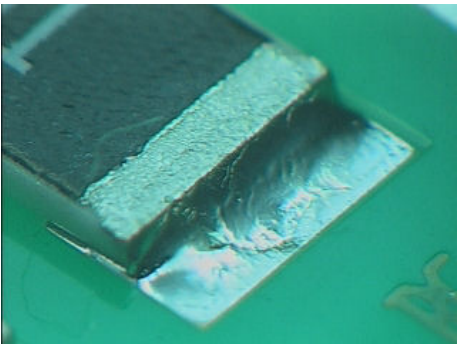
After 8 hours rolling on sealed-up stencil

PwTr	PwTr	1.0mm dia.CSP
		
R6330	R6330	PwTr
		

## 8. WETTING

### Condition

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

Pattern	Initial	After 8 hours of rolling on the stencil
0.2mm dia. CSP		
0.25mm dia CSP		
R6330		

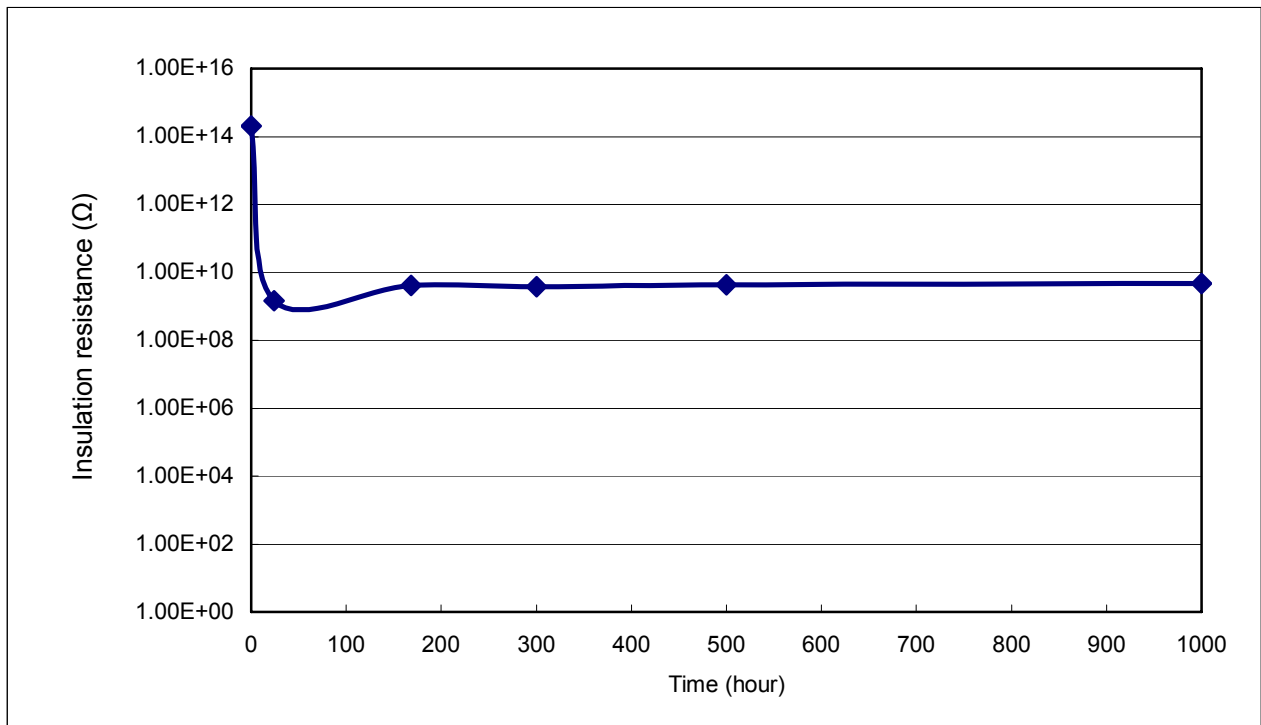
## 9. VOLTAGE APPLIED SIR

Prepare IPC-B-25B comb pattern and using a stencil of 0.1mm in thickness, print the solder paste on to the copper clad pattern (*where is to be overlapped by the contact surface of "PCB-to-stencil plate"*). Then, heat the PCB through reflow process (hot air method) under the condition of [preheating 160°C x 50secs and temperature above 220°C x 30sec. (peak temp: 235°C)] and use it as a test piece.

Put the test pieces in the thermo-hygrostat, which is controlled at 85 +/- 2°C, 85 +/- 2% RH and apply DC50V to the test pieces.

Measure the values of surface insulation resistance after 24.168.300.500hrs (initial) and 1000hrs (final). This measurement shall be done at the inside of the thermo-hygrostat, and measuring voltage at the time should be 50V.

After 1000hrs later, take the test pieces out of the bath, and observe occurrence of electro-migration.



\*No evidence of electro-migration was observed.

## 10. USE OF KOKI SOLDER PASTE

In order to make the paste use of KOKI SOLDER PASTE, please refer to the following guideline carefully before use.

### 1. Preparation for printing

#### 1) Temperature

After taking a solder paste out of the refrigerator, in which the temperature is controlled to be below 10°C, wait the paste temperature come back to a room temperature

\*Caution : Do not open the jar while it is cold, or it causes condensation of moisture on the paste, and could be a cause of poor performance, such as increase of viscosity, solder balling and etc.

Do not heat the paste.

#### 2) Stirring

By using a stainless steel or chemically resistive plastic spatula, stir up the paste before use.

It is recommended to stir it for at least 1~2 min. to obtain uniform and stable viscosity.

\*Caution : When an automatic stirring equipment is used, do not stir the paste longer than 4 min.

### 2. 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. Snap-off distance : 0~0.5mm

\*Although on-contact (0mm snap-off) is normally recommendable for fine pitch printing, if a printing equipment is not provided with a stencil separation speed control system, proper snap-off distance shall be provided to ensure smooth and gradual separation of the stencil from the substrate for good solder paste deposits.

3. Fixing method o substrate : It is recommended to have a fixture or vacuum system to hold the substrate in position during printing to prevent movement of PC board and to have a good separation from the stencil.
4. It is strongly recommended to set stencil separation speed as slow as possible

##### (3) Ambiance

1. Temperature : 25 ± 5°C
2. Humidity : 40~60%RH
3. Wind : Wind badly affects stencil life and tack performance of solder pastes.

\*Caution : When local air conditioner is equipped, make sure it is not enhancing drying out of solder paste.

