



V349 3-4LFF1-E WATER SOLUBLE SOLDER PASTE



As this is a new product, contents in this document will be updated again within ½ year.

INTRODUCTION

Singapore Asahi has developed the **Viromet*** Series Lead Free alloys. Asahi's Water Soluble Viromet Lead Free Solder Paste V349 3-4LFF1-E, with a composition Sn/Ag/Cu/In + X, is formulated for ease of drop-in replacement for conventional SnPb solders in reflow soldering. It can be used even in a four zone hot air forced convection reflow oven and N₂ environment is not needed. With a short reflow cycle time, use of this solder paste minimizes damage to components and board materials.

The flux residue is easily removed with plain water (ultrasonic) or semi-aqueous cleaning methods, providing the board with high ionic cleanliness.

** Viromet is a patented product of Singapore Asahi.*

SPECIFICATIONS (PRELIMINARY)

SODLER ALLOY

ITEM	CHARACTERISTICS	TEST METHOD
Alloy	Sn / Ag / Cu / In + X (X: Proprietary Additive)	-
Alloy Melting Temperature	205 - 210 °C	Differential Scanning Calorimetry
Powder Size	25 - 45µm, Type III, Mesh Size -325 / +500	IPC TM-650 2.2.14
Powder Shape	>95% spherical	Scanning Electron Microscope

PASTE FLUX

ITEM	SPECIFICATIONS	TEST STANDARDS
Flux Content	12.0 +/- 0.5 wt%	IPC-TM-650 2.2.20
Halide Content	<0.05 wt%	IPC-TM-650 2.3.35B JIS Z 3197: 1999 8.1.4.2.2
Copper Mirror Test	Pass, Classified as "H"	IPC-TM-650 2.3.32 JIS Z 3197: 1999 8.4.2

SOLDER PASTE

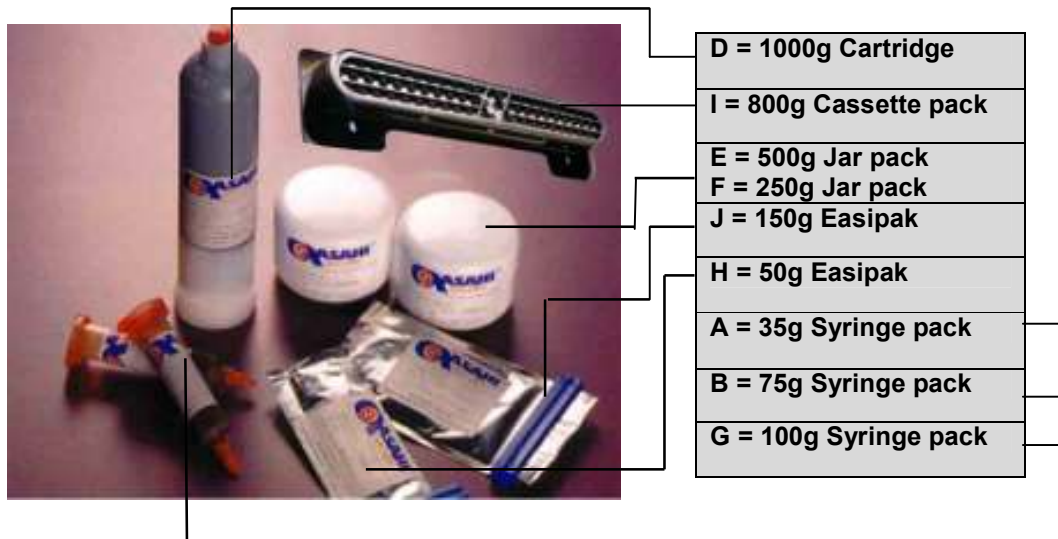
ITEM	SPECIFICATIONS	TEST STANDARDS
Viscosity	600 +/- 15% kcPs (12.0 wt% flux) 180 +/- 20 Pa.s	IPC-TM-650 2.4.34 JIS Z 3284: 1994 Annex 6
Thixotropic Index	0.40 +/- 0.05	JIS Z 3284: 1994 Annex 6
Surface Insulation Resistance (after flux removal / washing)	>1 x 10 ⁸ Ω (1000hrs) >1 x 10 ¹¹ Ω (1000hrs)	IPC-TM-650 2.6.3.3 JIS Z 3284:1994 Annex 14
Slump Test	No slump observed	JIS Z 3284: 1994 Annex 7, Annex 8
Solder Ball Test	No solder balls	IPC-TM-650 2.4.43 JIS Z 3284: 1994 Annex 11

ORDERING INFORMATION

LABEL CODE

ALLOY TYPE	POWDER SIZE	SERIES TYPE	FORMULATION	PACKAGING
V349 3	-	4 LFF1	-	E
<p>Various type of solder alloy is available for specific application</p> <p>e.g.:</p> <p>Sn63/Pb37, Sn43/Pb43/Bi14, Sn10/Pb88/Ag2, Sn96/Ag4, Sn57/Pb40/Bi3, Sn62.8/Pb36.8/Ag0.4 Viromet349, Viromet 347</p> <p>Singapore Asahi welcome requests for special alloy.</p>	<p>A few different types of powder size are available for standard alloys:</p> <p>Type/Powder Size:</p> <p>2 /45 - 75 μm 2.5 /38 - 53 μm 3 /25 - 45 μm</p> <p>For special alloys, the different sizes depends on the availability and its' processability.</p>	<p>5 Series refers to No-Clean Paste Flux</p> <p>2 Series refers to RMA Paste Flux</p> <p>4 Series refers to Water-Soluble Paste Flux</p>	<p>LF is specially formulated for Lead Free applications in SMT.</p>	<p>Refer to Packaging Information below</p>

PACKAGING



USAGE GUIDELINES

- 1) Solder paste has to be thawed to room temperature (25°C) first before using. Normal thawing time of paste is 4 to 8 hours if the paste is stored in 5 to 10°C environment.
- 2) If stirring of paste before use is a practice by the user, stirred gently, do not beat the paste.
- 3) Do not handle the paste with your bare hand. Use proper tool when handling the paste. If the paste touches the skin, wash thoroughly with soap and water.
- 4) Solder paste work life on the stencil is at least 6 hours. Paste left on the stencil should not be put back into the container together with the unused paste. It is preferable not to re-use solder paste left on the stencil after printing.
- 5) This paste could be used on the 0.5 mm pitch pattern. The minimum opening dimension of stencil is:

Width	:	0.25 mm (10mils)
Length	:	1.50 mm
Thickness	:	0.15 mm (6 mils)
- 6) The paste life on the board could be left on the line for 4 hours before component mounting.
- 7) The paste life on the board after components mounting could be left on the line for at least 6 hours before reflow.
- 8) Washing of the PCB after reflow is necessary to remove the flux residue and soldered PCB should be washed within 4 hours after reflow. The flux residue can be easily removed by de-ionized water using automated cleaning equipment. Water temperature shall be 40 to 60 °C and water pressure shall be 45 to 65psi.

STORAGE AND HANDLING

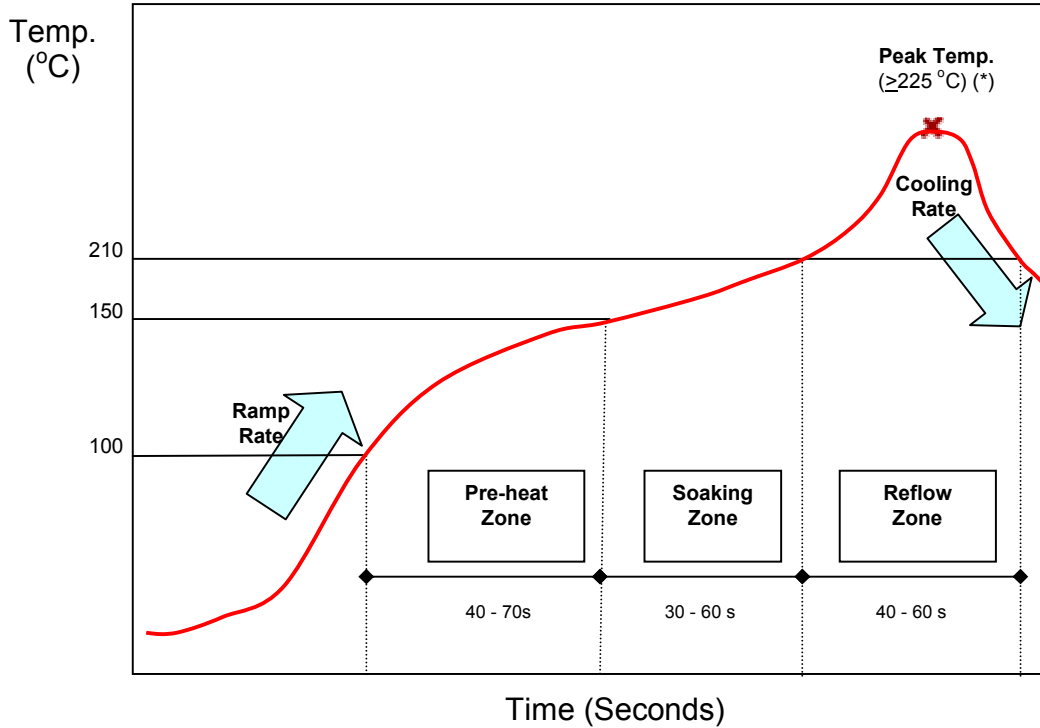
- 1) Generally the shelf life for unopened jar of solder paste if kept under proper condition and temperature could last for 3 months. The following is the shelf life of unopened jar based on temperature and humidity:

Temperature	Humidity	Shelf Life	Estimated Thawing Time
> 28 °C	-	Not Recommended	-
26 - 28 °C	40 – 60 %RH	<24 hours	-
20 - 25 °C	40 – 60 %RH	<1 week	Approx. ½hour
15 - 18 °C	30 – 50 %RH	1 week to 1 ½month	> 2 hours
5 - 10 °C	30 – 50 %RH	2 to 3 months	> 4 hours

Note: All paste stored under these condition has to be thawed to room temperature first before opening. This is to avoid any condensation.

- 2) Solder paste once opened and stirred in the jar has to be used up as soon as possible. For unused paste in an open jar, shelf life varied with condition such as stirring and exposure of paste to the environment.
- 3) The solder paste has at least 6 hours stencil life with continuous printing provided the environment has a temperature of 23 to 25°C and relative humidity of 50 to 65 %RH. Avoid leaving the paste on the stencil for too long (more than 1 hour) if no printing is being carried out. This will eliminate any human factor or environmental factor, which may cause severe damage to the solder paste.
- 4) Solder paste can be thawed / stirred with a mechanical softener.
- 5) Store the paste in cool condition. The unopened solder paste could be stored at 20 to 25°C for 2 weeks without any paste damage and guaranteed to have 3 months shelf life if stored at 5 to 10°C.

RECOMMENDED REFLOW PROFILE (V349 3-4LFF1-E)



	PRE-HEAT	SOAKING	REFLOW
Temperature Range (°C)	100 - 150	150 - 210	> 210
Duration (secs)	40 - 70	30 - 60	40 - 60
Ramp Rate (°C/sec)	1.2 to 3		
Cooling Rate (°C/sec)	2 to 4		
Peak Temperature (°C)	≥ 225°C (*)		

(*) Note: Minimal peak temperature to be achieved but is dependent on PCB design/material and process capability & profiling in accuracy.

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TEST ANALYSIS

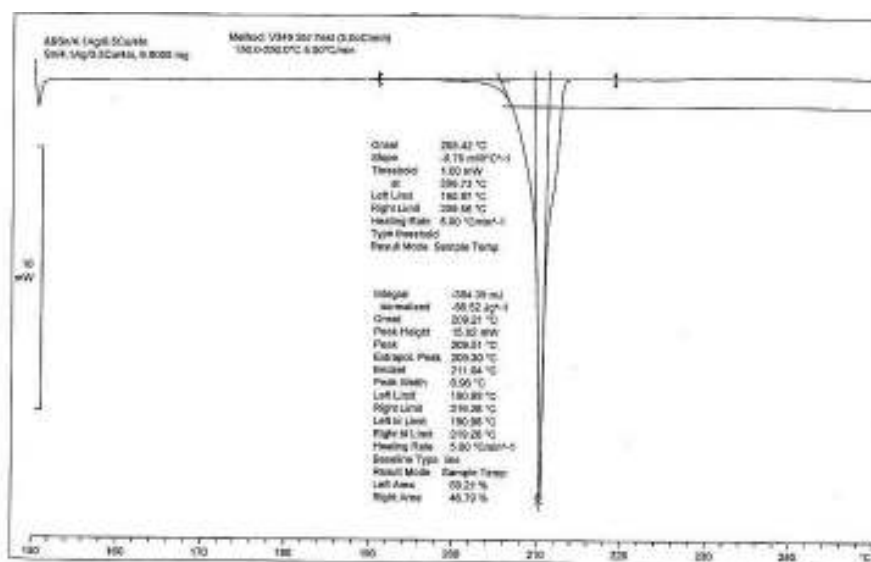
SOLDER POWDER CHEMICAL COMPOSITION

Composition		IPC J-STD-006B Specs (Wt%)
Tin	Sn	Remainder
Silver	Ag	4.1 +/- 0.2
Copper	Cu	0.5 +/- 0.1
Indium	In	4.0 +/- 0.5
Contamination		
Aluminium	Al	0.005 max
Arsenic	As	0.03 max
Gold	Au	0.05 max
Bismuth	Bi	0.10 max
Cadmium	Cd	0.002 max
Iron	Fe	0.02 max
Nickel	Ni	0.01 max
Lead	Pb	0.05 max
Antimony	Sb	0.05 max
Zinc	Zn	0.003 max

ALLOY MELTING TEMPERATURE

This is the temperature range measured using the DSC method.

Temperature Range: 205°C - 210°C

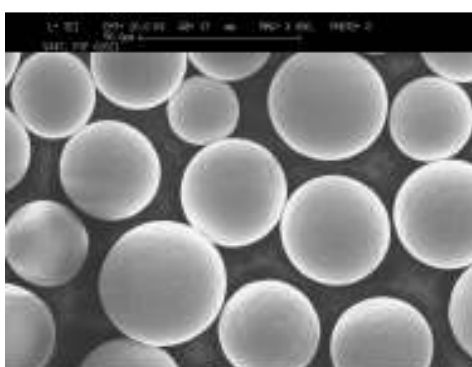


POWDER SHAPE

Specifications: Powder to have minimum 90% spherical.

Instrument : Scanning Electron Microscope (SEM)

Method : Physical count on the number of spherical powders



SEM Measurement on the Sphericity of the Solder Powder

Result : >95% spherical

HALIDE CONTENT TEST

Standard : IPC-TM-650 2.3.35B

Method : By titration method with end point determination. The % chlorides calculated based on the following formula:

$$\text{Halides, as \% Chlorides} = \frac{3.55 \text{ VN} \times 100}{\text{ms}}$$

Result : < 0.05 wt%

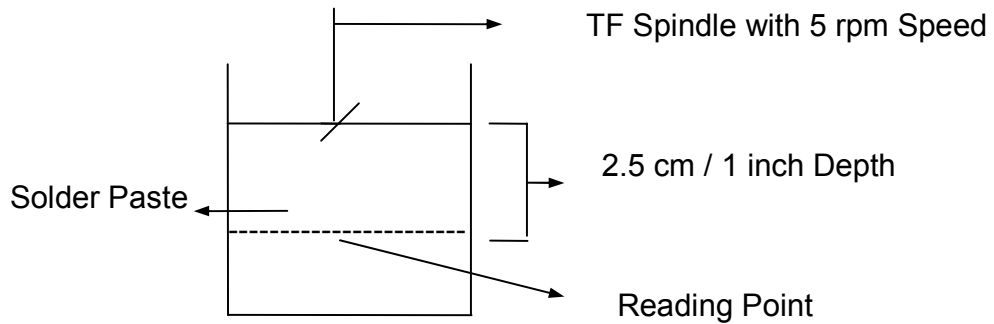
VISCOSITY

Method I

Standard : IPC-TM-650 2.4.34

Method : T-Bar Spin Spindle Method

- Using the Brookfield viscometer.
- Immerse T-F Spindle into the solder paste (thawed to room temp. 25°C).
- Set spindle speed to 5 rpm.
- Measure viscosity at 2.5 cm or 1 inch depth from solder paste surface.
- Take the average from two readings.



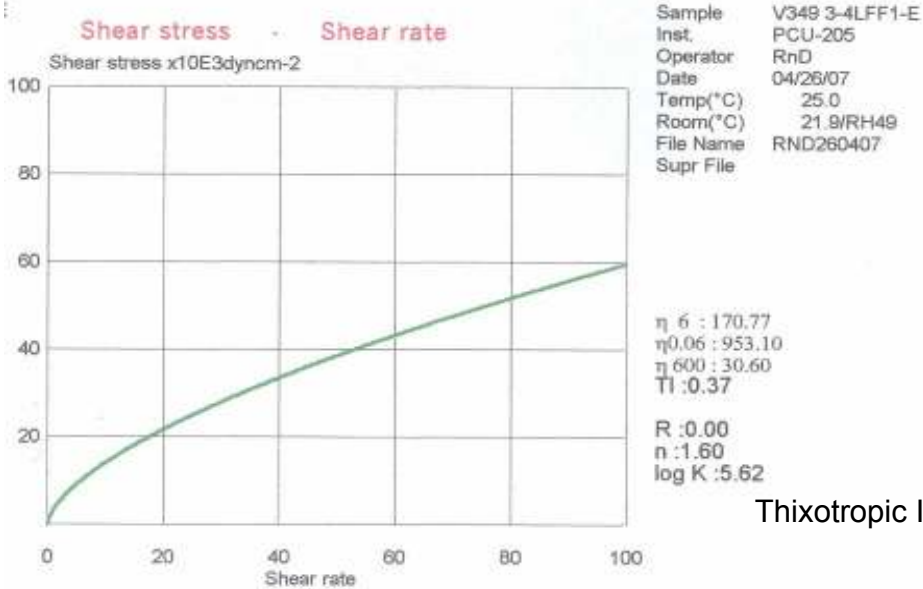
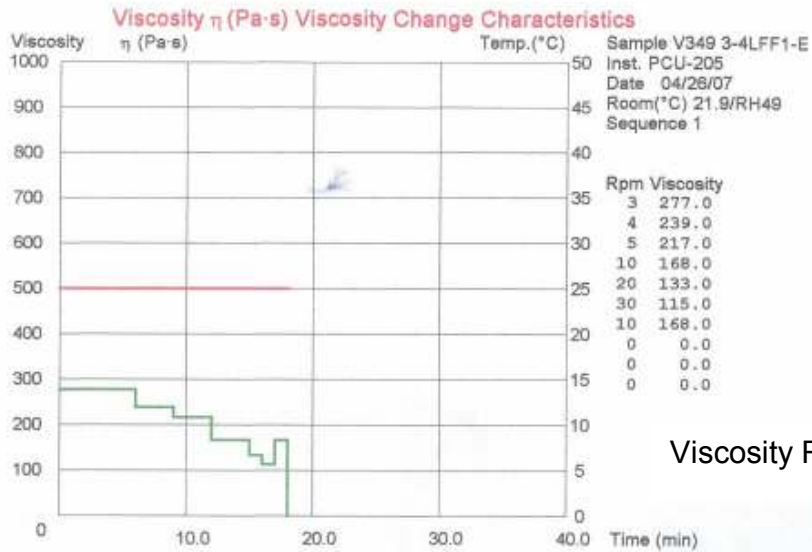
Result : 600 +/- 15% kcPs (12.0 wt% Flux)

Method II

Standard : JIS Z 3284: 1994 Annex 6

Method : Malcom Viscometer PCU 205

Result :



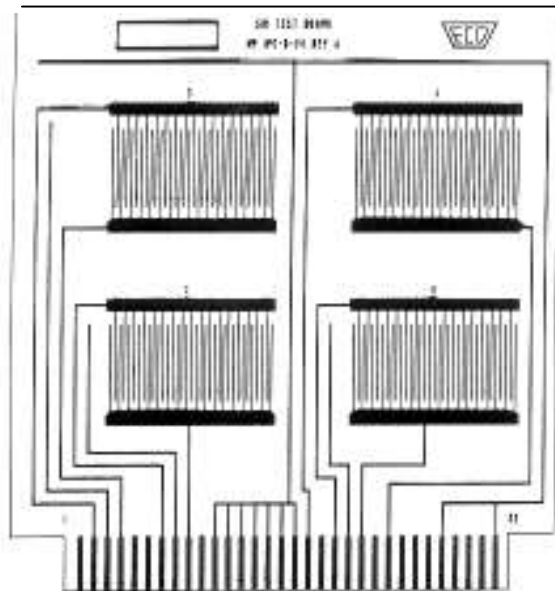
SURFACE INSULATION RESISTANCE (SIR)

Method I

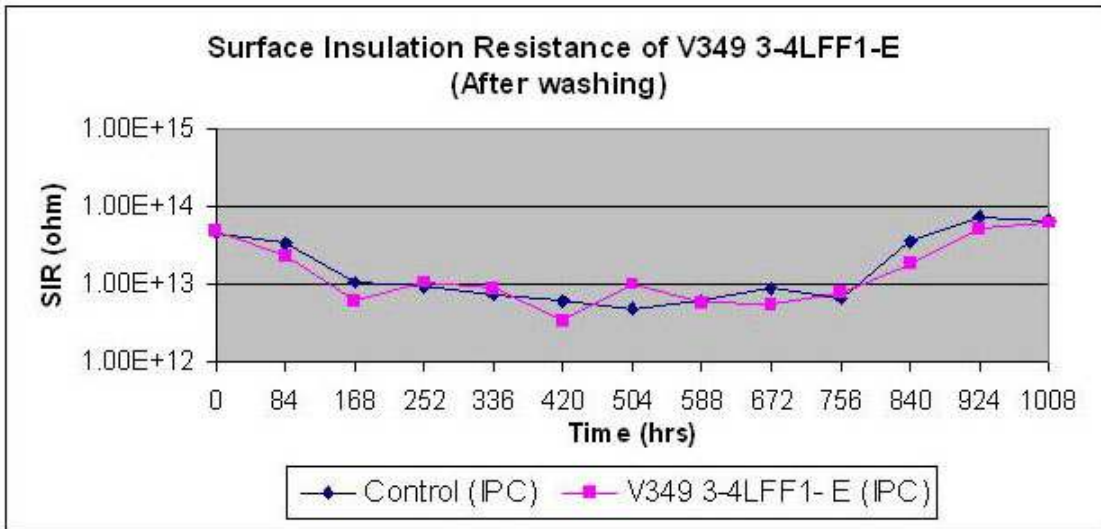
Standard : IPC TM-650 2.6.3.3

Conditions :

Temperature	: 85°C
Humidity	: 85 %RH
Applied Voltage	: +50V Biased
Test Voltage	: -100V D.C.
Test Coupon	: IPC B-24 coupon
Duration	: 1000hrs



Test Coupon: "Typical Comb Pattern" (from IPC-B-24 coupon)



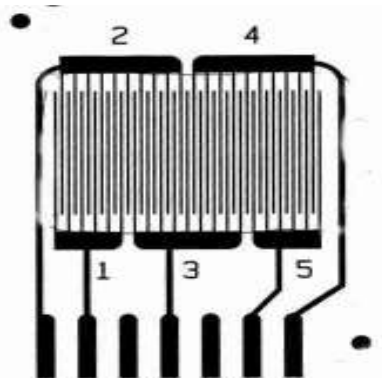
Result : Surface Insulation Resistance > $1 \times 10^{12} \Omega$ (1000hrs), passed.

Method II

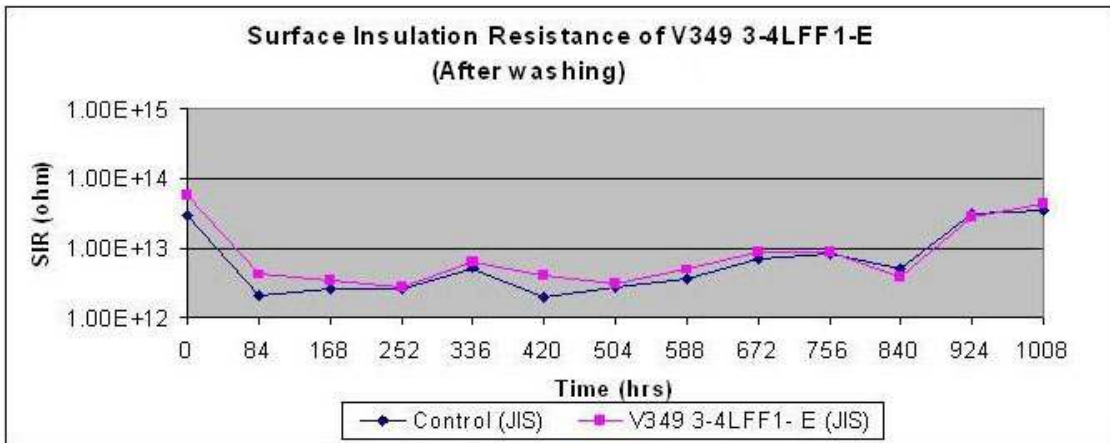
Standard : JIS Z 3284: 1994 Annex 14

Conditions :

Temperature	: 85°C
Humidity	: 85 %RH
Applied Voltage	: +50V Biased
Test Voltage	: -100V D.C.
Test Coupon	: JIS C 6480 coupon
Duration	: 1000hrs



Test Coupon: “Typical Comb Pattern” (JIS C 6480 coupon)



Result : Surface Insulation Resistance is $>1 \times 10^{12} \Omega$ (1000hrs), passed.

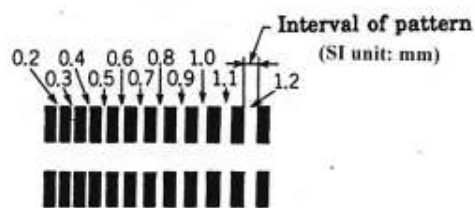
SLUMP TEST

Cold Slump

Standard : JIS Z 3284:1994 Annex 7

Method :

- Store paste specimen at 25 +/- 5 °C and 50 +/- 10 %RH for an hour.
- Print paste onto glass slides using a stencil with slump test stencil aperture as shown.
- Leave solder for 10 mins under ambient condition.
- Examine under microscope for the minimum interval of slump result.



JIS Stencil Design

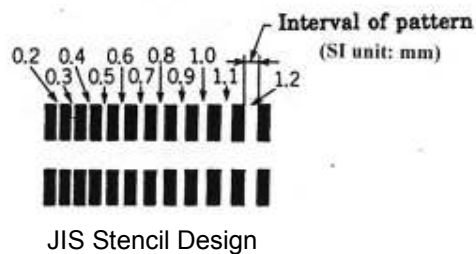
Result : No slump observed.

Hot Slump

Standard : JIS Z 3284:1994 Annex 8

Method :

- Store paste specimen at 25 +/- 5 °C and 50 +/- 10 %RH for an hour.
- Print paste onto glass slides using a stencil with slump test stencil aperture as shown.
- Heat printed slides @150 +/- 10 °C for 10 mins.
- Cool to ambient and examine for slump.
- Examine under microscope for the minimum interval of slump result.



Result : No slump observed.

SOLDER BALL TEST

Standard : IPC-TM-650 2.4.43
JIS Z 3284: 1994 Annex 11

Method :

- Print paste onto glass slides using a stencil with 3 circular apertures (as of slump test).
- Heat printed glass slides at temperature 25 +/- 3 °C above the alloy's liquidus temperature on a hot plate.
- Examine the slides under 10X to 20X magnification for solder balls.
- Repeat test for a second set of specimens with solder paste printed and leave under ambient condition for 4 hours.

Result :

Reflow Time	Solder Ball Accept Test			
	0 hr	1 hr.	2 hr.	3 hr.
Immediate Reflow	Pass	Pass	Pass	Pass
Exposed for 4 hrs before reflow	Pass	Pass	Pass	Pass

DISCLAIMER OF LIABILITY

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