

OSEP

NEMI Whisker Test Study

for SOIC 8L Package

(Sept. 16, 2003 NEMI Revision 4.5)

OSEP NEMI Whisker Test for SOIC Package

1 Scope

This evaluation addresses NEMI's three different test condition requirement for evaluating whisker growth i.e. two isothermal storage conditions and one temperature cycling condition.

2 Purpose

To evaluate and monitor the propensity of Matte Tin plating to grow whisker for various conditions after assembly.

The long term reliability of electronic assemblies can be compromised by electrical shorting that may be induced by metal whisker formations that have been known to occur in, but are not limited to, platings with high tin content.

3 Test Equipment

3.1 Scanning Electronic Microscope

SEM is used to make observations with a magnification capability of 100, 3kX then take photos of the test specimen.

SEM Supplier : HITACH

Model : S-3500N

3.2 Temperature Cycling Equipment

An air-to-air two chamber temperature oven which is capable of cycling from -80 to +200°C temperature.

Supplier : Votsch

Model : VT 7012 S2

3.3 Temperature Humidity Storage

A temperature/humidity storage chamber which is capable of 30 to 100°C, 40 ~100% Relative Humidity environments.

Supplier : Votsch

Model : VC 2033

4 Test Conditions

The condition below defines three separate environmental stresses in which parts must be tested to generate whiskers on the test components.

4.1 Ambient conditions

Test condition: 25±5°C; 30~80% RH

Duration: 5000 hours

4.2 Temperature and Humidity Soak

Test condition: 85°C; 85 % RH

Duration: 6 months

4.3 Temperature Cycling Test

Test condition: -55+0/-10°C to 85+10/-0 °C; 10 min. dwell time

Duration: 1000 cycles

5 Evaluation Results

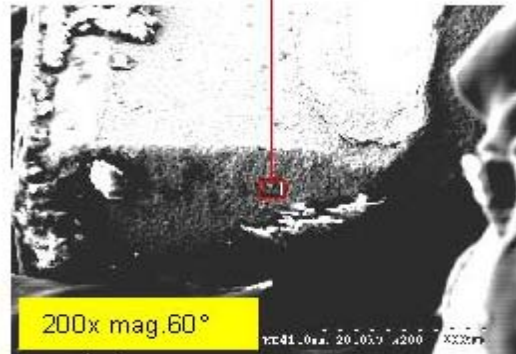
5.1 After 5000H Ambient condition Exposure

Suspected mounds were found on all samples. Refer to below SEM photo.

RN0423084-RT (Day 1) – after
5000H RT. Pin 1 of unit # 16.



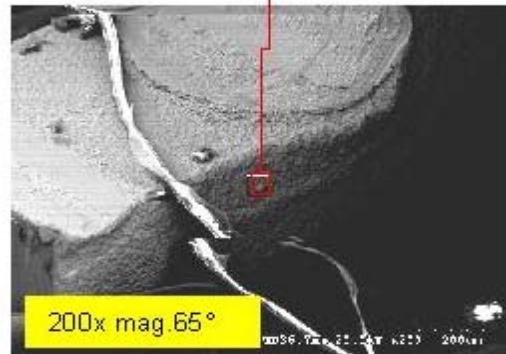
Approx. Measurement is 3.02 μm



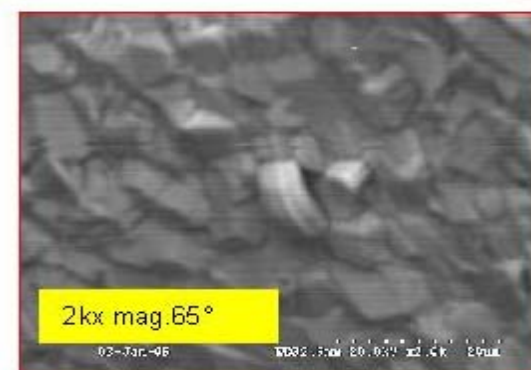
RN0423086-RT (Day 3) – after
5000H RT. Pin 2 of unit # 46.



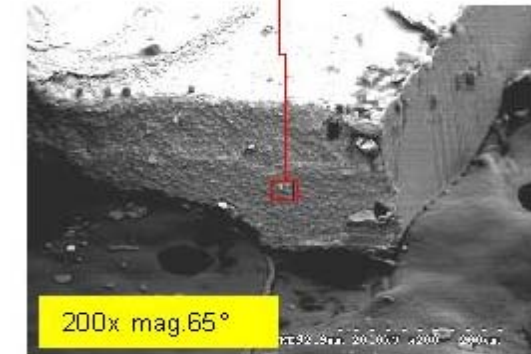
Approx. Measurement is 6.42 μm



RN0423088-RT (Day 5) – after
5000H RT. Pin 2 of unit # 76.

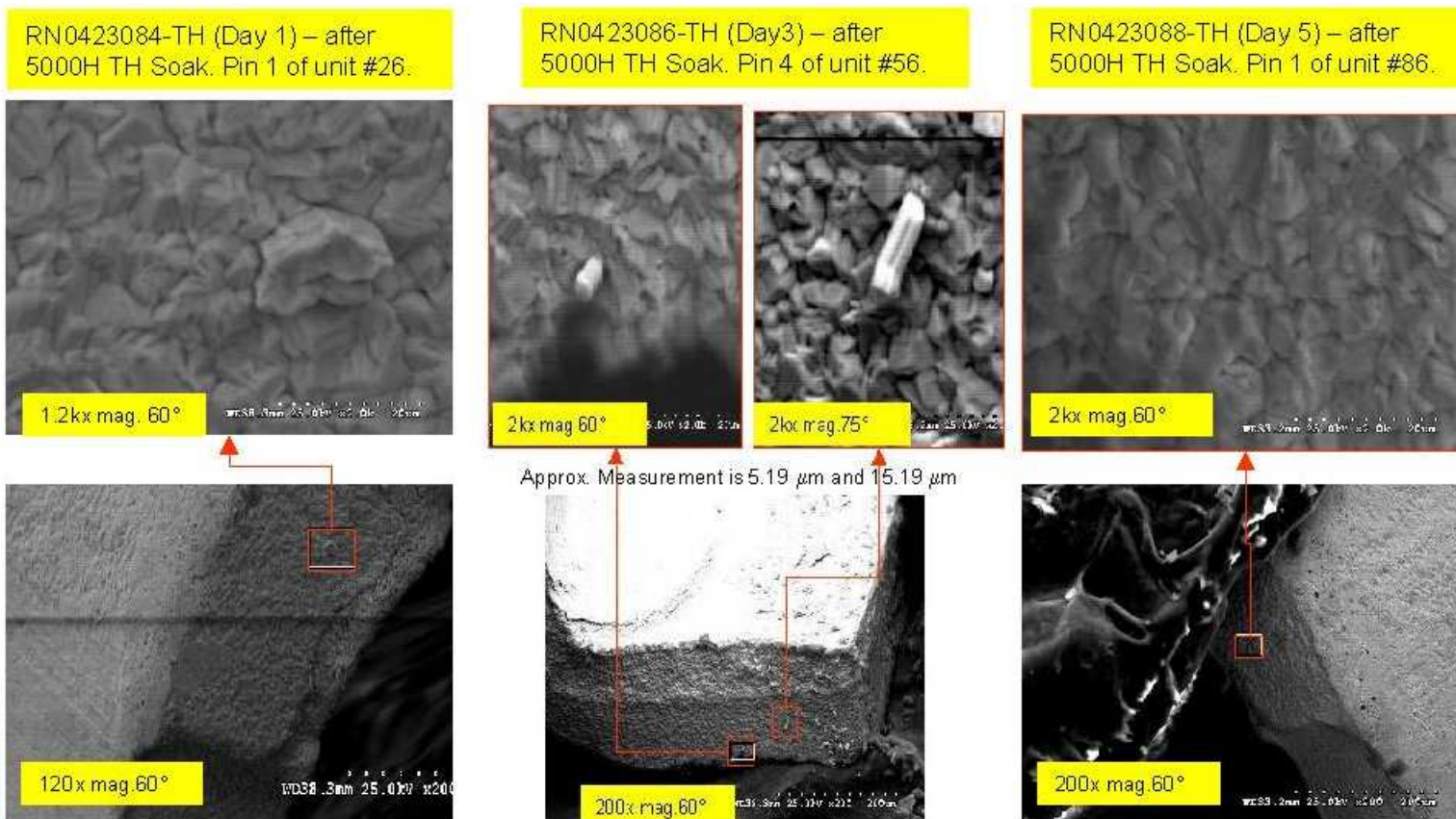


Approx. Measurement is 10.26 μm



5.2 After 5000H Temperature and Humidity Soak

Whisker formation were found after 5000H Temperature and humidity soak with a maximum measurement of approximately $15.19\mu\text{m}$ which is still acceptable base on NEMI $40\mu\text{m}$ requirement. Refer to below SEM photo.



5.3 After 1000 cycles Temp. Cycle Test

Whisker formation were found after 1000 cycles TCT with a maximum measurement of approximately $23.5\mu\text{m}$ which is still acceptable base on NEMI $40\mu\text{m}$ requirement. Refer to below SEM photo.

Day 1 at 3k magnification



Approx. Measurement = $20\mu\text{m}$

Day 3 at 3k magnification



Approx. Measurement = $23.5\mu\text{m}$

Day 5 at 3k magnification



Approx. Measurement = $21.75\mu\text{m}$