



# Generic Tin Whisker Monitor Data

# Whisker Monitor Data

**Section 1-** Overview, Test Conditions & Summary of Results

**Section 2-** Raw Monitor Data for 2006  
(Pb-Free Compatibility Data)

Page 8

**Section 3-** Raw Monitor Data for 2007  
(Pb-Free and Backward Compatibility Data)

Page 16

**Section 4-** Raw Monitor Data for 2008  
(Pb-Free and Backward Compatibility Data)

Page 25

**Section 5-** Raw Monitor Data for 2009  
(Pb-Free Compatibility Data)

Page 32

# OVERVIEW

## HISTORY

- Production materials from Carsem M& S-Sites have been monitored for whisker growth propensity for over 5 years. When the Jedec whisker test method was created in 2006, Carsem adopted that test method and has been monitoring its Tin plated product to that method starting in Q1'2006.

## DETAILS

- The Pb-free Reflow was chosen as the standard preconditioning treatment throughout Q1'2007. Initial Technology Assessment and ongoing Process Acceptance Tests requirements have been satisfied.
- Backward compatibility preconditioning was performed on monitors of Q2-Q3'2007 material. 2008 material will be monitored using Pb-Free Reflow Conditions.

## SUMMARY OF RESULTS TO DATE

- The monitoring results, to date, shows that all the materials were able to pass the Class 2 acceptance criteria defined in JESD201 for all 3 stress tests: Temperature Cycle, Temperature/ Humidity Storage and Ambient Storage.

# Test Method - JESD201

## Preconditioning

- (For Pb-free Compatibility) - 3x IRR @ 260°C- Q1'2006 thru Q1'2007  
(Pb-free reflow monitoring to resume on 2008 product)*
- (For Backward Compatibility) - 3x IRR @ 220°C- Q2-4'2007*
- (For Backward Compatibility) - No Reflow Preconditioning - Q2-4'2007*

## Whisker Tests

### ***a) Room Temperature Storage***

*30 ± 2°C and 60 ± 3% RH*

*test interval : 3, 6 months*

### ***b) Temperature Humidity Storage***

*55 ± 3°C, 85 ± 3% RH*

*test interval : 3, 6 months*

### ***c) Temperature Cycle***

*-55 (+0/-10)°C to 85 (+10/-0)°C*

*test interval : 500, 1000, 1500 cycles*

# Whisker Monitor Acceptance Criteria

## **Whisker Length Acceptance Criteria (Class 2 , JESD 201)**

T/C : 45  $\mu\text{m}$

High T/H Storage : 40  $\mu\text{m}$

Ambient Storage : 40  $\mu\text{m}$

## **Whisker Density Range (JESD22A121)**

Low < 10 whiskers /  $\text{mm}^2$

Medium 10 - 45 whiskers /  $\text{mm}^2$

High > 45 whiskers /  $\text{mm}^2$

*for information only*

# Tin Whisker Sampling Plan

## 2006 and Q1'2007

| Assy Site | Package type              | Leadframe material | # of lots/test | # of units/lot | Total units/test | # of leads for Screening Inspection<br>(min. 250x by SEM) | # of leads for Detail Inspection<br>(Only if whiskers are detected during screening inspection. 2KX to 3KX) |
|-----------|---------------------------|--------------------|----------------|----------------|------------------|---|---|
| S-Site    | SOICN (8 - 16ld)          | Copper             | 2              | 3              | 6                | 42 - 54 leads (complete 1 side/ unit)#                    | 12 (2 leads/ unit)  |
|           | SOICW (16 - 28ld)         |                    | 2              | 3              | 6                | 48 - 84 leads (complete 1 side/ unit)                     | 12 (2 leads/ unit)  |
|           | TSSOP (14 - 56ld)         |                    | 2              | 3              | 6                | 42 - 84 leads (complete 1 side/ unit)                     | 12 (2 leads/ unit)  |
|           | SSOP (20 - 28ld)          |                    | 2              | 3              | 6                | 60 - 84 leads (complete 1 side/ unit)                     | 12 (2 leads/ unit)  |
|           | PDIP (8 - 16ld)           |                    | 2              | 3              | 6                | 24 - 48 leads (complete 1 side/ unit)                     | 12 (2 leads/ unit)  |
|           | QSOP (36 - 44 ld )        |                    | 2              | 3              | 6                | 36 - 132 leads (complete 1 side/ unit)                    | 12 (2 leads/ unit)  |
|           | LQFP & TQFP               |                    | 2              | 3              | 6                | Complete 2 sides/ unit                                    | 12 (2 leads/ unit)  |
|           | MQFP                      |                    | 2              | 3              | 6                | Complete 2 sides/ unit                                    | 12 (2 leads/ unit)  |
|           | PLCC (28 - 44ld)          |                    | 2              | 2              | 4                | 56 - 88 leads (complete 2 sides/ unit)                    | 8 (2 leads/ unit)   |
|           | MLPQ-sawn                 |                    | 2              | 3              | 6                | ≤ 20 leads => all leads ; >20 leads => 2 sides            | 18 (3 leads/ unit)  |
| M-Site    | QSOP (16 - 28 ld )        | Copper             | 2              | 3              | 6                | 48 - 84 leads (complete 1 side/ unit)                     | 12 (2 leads/ unit)  |
|           | SOICNM 8ld                |                    | 2              | 3              | 6                | All leads   | 12 (2 leads/ unit)  |
|           | MSOP (8, 10 ld)           |                    | 2              | 3              | 6                | All leads   | All leads   |
|           | SOT23 (5-8L)              |                    | 2              | 6              | 12               | All leads   | All leads   |
|           | MLP-m / SOT66x            |                    | 2              | 6              | 12               | All leads   | All leads   |
|           | MLP-Hi density            |                    | 2              | 3              | 6                | ≤ 20 leads => all leads ; >20 leads => 2 sides            | 18 (3 leads/ unit)  |
|           | SOT223                    |                    | 2              | 6              | 12               | All leads   | All leads   |
|           | SPAK                      |                    | 2              | 3              | 6                | All leads   | All leads   |
|           | T0220                     |                    | 2              | 3              | 6                | All leads   | All leads   |
|           | SC70/ SOT23-3L/<br>SOT143 | Alloy 42           | 2              | 6              | 12               | All leads   | All leads   |
|           |                           | 2                  | 6              | 12             | All leads        | All leads   |   |

# Revised Tin Whisker Sampling Plan

## Q2'2007 Onwards

| Package grouping                     | Test Vehical | Lead pitch (mm) | Leadframe material | Leadform | Facility/ Site | Lead surface area <sup>(a)</sup> (mm <sup>2</sup> ) | Tin Finished area <sup>(b)</sup> (mm <sup>2</sup> ) | Number of terminations for Screening Inspection <sup>(b)</sup> (per test) | Min. number of samples (per test) | Total number of units per Precond treatment (x 3 tests) | X 3 Precond Treatments (no precon/ SnPb reflow/ Pb-free reflow) |
|--------------------------------------|--------------|-----------------|--------------------|----------|----------------|---|---|---|-----------------------------------|---|---|
| <b>SOIC/ SSOP/ MLP</b>               | 16SOICWMM    | 1.27 BSC        | C194               | G        | S              | 1.14  | > 0.85  | 66  | 6                                 | 18  | 54  |
| <b>TSSOP/ LQFP/ MQFP/ MLP</b>        | 48LQFP       | 0.5 BSC         | C7025              | G        | S              | 1.41  | > 0.85  | 53  | 6                                 | 18  | 54  |
| <b>PLCC</b>                          | 28PLCC       | 1.27            | CDA151             | J        | S              | 4.66  | > 0.85  | 16  | 6                                 | 18  | 54  |
| <b>SOICNM/ MSOP/ QSOP/ SOT23 MLP</b> | 8SOICN       | 1.27            | C194               | G        | M              | 1.23  | >0.85   | 48  | 6                                 | 18  | 54  |
|                                      | 28QSOP       | 0.635 BSC       | C194               | G        | M              | 0.97  | > 0.85  | 77  | 6                                 | 18  | 54  |
| <b>SOT223</b>                        | SOT223       | 2.3 NOM         | OMCL               | G        | M              | 2.36  | > 0.85  | 32  | 6                                 | 18  | 54  |
| <b>DDPAK/ TOSTAG / TO220</b>         | 5DDPAK       | 1.7 REF         | HCL 12 S           | G        | M              | 9.42  | > 0.85  | 8   | 6                                 | 18  | 54  |
| <b>SC70/ 3SOT23/ SOT143</b>          | 6SC70        | 0.65 BSC        | Alloy 42           | G        | M              | N/A   | < 0.85  | 96  | 16                                | 48  | 144   |
| <b>MLP-sawn</b>                      | 16 MLPQ 3X3V | 0.5             | C194               | N        | SZ             | N/A   | N/A   | 60  | 6                                 | 18  | 54  |
| <b>MLP-sawn</b>                      | 3 MLPD 2X2   | 0.5             | C7025              | N        | SZ             | N/A   | N/A   | 60  | 6                                 | 18  | 54  |

Revised per JStd201- Categorized per Leadframe material per most aggressive lead form per plating line.

# Whisker Monitor Data

## **Section 2 – Tin Whisker Monitor Raw Data using 260°C reflow preconditioning. Products tested were built in 2006**

Note: Both Tech Assessment and Process acceptance testing per JESD201 have been performed.

Note 2: This monitor data pertains to Malaysia built product. Suzhou process acceptance testing at 260c starts on product pulled in Q1'08

# Whisker Inspection Raw Data - Feb'06

| 260°C Reflow   |          | Temperature Cycle       |                             |         |                         |                             |         |                         |                             |         |
|----------------|----------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                |          | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 1500 cyc                |                             |         |
|                |          | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| Package        | Customer |                         |                             |         |                         |                             |         |                         |                             |         |
| 8SOICN         | Lot1     | 0/24                    | N/A                         | N/A     | 2/24                    | 12.6                        | Low     | 1/24                    | 12.6                        | Low     |
|                | Lot2     | 0/24                    | N/A                         | N/A     | 6/24                    | 14.2                        | Low     | 4/24                    | 15.0                        | Low     |
| 16SOICW        | Lot1     | 0/24                    | N/A                         | N/A     | 2/24                    | 14.6                        | Low     | 3/24                    | 18.7                        | Low     |
|                | Lot2     | 0/24                    | N/A                         | N/A     | 7/24                    | 19.3                        | Low     | 2/24                    | 20.5                        | Low     |
| 14TSSOP        | Lot1     | 0/21                    | N/A                         | N/A     | 9/21                    | 15.1                        | Low     | 7/21                    | 16.8                        | Low     |
|                | Lot2     | 0/21                    | N/A                         | N/A     | 7/21                    | 16.2                        | Low     | 7/21                    | 16.1                        | Low     |
| 20SSOP         | Lot1     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|                | Lot2     | 0/30                    | N/A                         | N/A     | 2/30                    | 11.9                        | Low     | 1/30                    | 11.2                        | Low     |
| 8PDIP          | Lot1     | 1/12                    | 11.4                        | Low     | 7/12                    | 20.9                        | Low     | 3/12                    | 21.9                        | Low     |
|                | Lot2     | 1/12                    | 11.8                        | Low     | 7/12                    | 14.6                        | Low     | 0/12                    | N/A                         | N/A     |
| 36QSOP         |          |                         |                             |         |                         |                             |         |                         |                             |         |
| 32LQFP         | Lot1     | 0/48                    | N/A                         | N/A     | 6/48                    | 18.3                        | Low     | 2/48                    | 16.8                        | Low     |
|                | Lot2     | 0/48                    | N/A                         | N/A     | 3/48                    | 11.6                        | Low     | 1/48                    | 12.0                        | Low     |
| 44MQFP         |          |                         |                             |         |                         |                             |         |                         |                             |         |
| 28PLCC         | Lot1     | 0/28                    | N/A                         | N/A     | 4/28                    | 21.4                        | Low     | 0/28                    | N/A                         | N/A     |
|                | Lot2     | 0/28                    | N/A                         | N/A     | 1/28                    | 11.1                        | Low     | 0/28                    | N/A                         | N/A     |
| 20 MLPQ 4X4    | Lot1     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
|                | Lot2     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
| 16QSOP         | Lot1     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|                | Lot2     | 0/24                    | N/A                         | N/A     | 2/24                    | 13.9                        | Low     | 1/24                    | 12.5                        | Low     |
| 8MSOPM         | Lot1     | 0/24                    | N/A                         | N/A     | 2/24                    | 11.2                        | Low     | 2/24                    | 15.9                        | Low     |
|                | Lot2     | 0/24                    | N/A                         | N/A     | 5/24                    | 19.2                        | Low     | 4/24                    | 18.1                        | Low     |
| 8SOICN/M       | Lot1     | 0/24                    | N/A                         | N/A     | 2/24                    | 12.6                        | Low     | 2/24                    | 13.3                        | Low     |
|                | Lot2     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 5SOT23         | Lot1     | 0/30                    | N/A                         | N/A     | 3/30                    | 18.3                        | Low     | 2/30                    | 17.2                        | Low     |
|                | Lot2     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 3/30                    | 13.8                        | Low     |
| MLP-m /SOT66x  |          |                         |                             |         |                         |                             |         |                         |                             |         |
| MLP-Hi density |          |                         |                             |         |                         |                             |         |                         |                             |         |
| 5SC70M         | Lot1     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 1/30                    | 17.5                        | Low     |
|                | Lot2     | 0/30                    | N/A                         | N/A     | 1/30                    | 18.5                        | Low     | 0/30                    | N/A                         | N/A     |
| SOT223         | Lot1     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|                | Lot2     | 0/18                    | N/A                         | N/A     | 1/18                    | 12.8                        | Low     | 1/18                    | 17.1                        | Low     |
| SPAK           |          |                         |                             |         |                         |                             |         |                         |                             |         |
| 7/6 TOSTAG     | Lot1     | 0/18                    | N/A                         | N/A     | 13/18                   | 22.7                        | Medium  | 10/18                   | 16.0                        | Medium  |
|                | Lot2     | 0/18                    | N/A                         | N/A     | 9/18                    | 19.11                       | Low     | 7/18                    | 16.6                        | Low     |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

# Whisker Inspection Raw Data - Feb'06

(continued).

| 260°C Reflow   |          | Temperature/ Humidity Storage |                             |         |                         |  |         | Ambient Storage         |                             |         |                         |                             |         |
|----------------|----------|-------------------------------|-----------------------------|---------|-------------------------|--|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                |          | 3 mths                        |                             |         | 6 mths                  |  |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|                |          | # of leads with whisker       | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length - per JESD 201 (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| Package        | Customer |                               |                             |         |                         |  |         |                         |                             |         |                         |                             |         |
| 8SOICN         | Lot1     | 1/24                          | 18.3                        | Low     | 1/24                    | 16.2                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|                | Lot2     | 0/24                          | N/A                         | N/A     | 6/24                    | 35.3                                       | Medium  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16SOICW        | Lot1     | 0/24                          | N/A                         | N/A     | 1/24                    | 26.4                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|                | Lot2     | 0/24                          | N/A                         | N/A     | 1/24                    | 15.0                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 14TSSOP        | Lot1     | 0/21                          | N/A                         | N/A     | 0/21                    | N/A  | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
|                | Lot2     | 0/21                          | N/A                         | N/A     | 1/21                    | 11.6                                       | Low     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 20SSOP         | Lot1     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A  | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|                | Lot2     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A  | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 8PDIP          | Lot1     | 0/12                          | N/A                         | N/A     | 5/11*                   | 31.1                                       | Medium  | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     |
|                | Lot2     | 1/12                          | 13.1                        | N/A     | 6/12                    | 32.7                                       | Medium  | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     |
| 36QSOP         |          |                               |                             |         |                         |  |         |                         |                             |         |                         |                             |         |
| 32LQFP         | Lot1     | 0/48                          | N/A                         | N/A     | 1/48                    | 12   | Low     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
|                | Lot2     | 0/48                          | N/A                         | N/A     | 6/47*                   | 36.0                                       | Low     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 44MQFP         |          |                               |                             |         |                         |  |         |                         |                             |         |                         |                             |         |
| 28PLCC         | Lot1     | 1/28                          | 24.0                        | Low     | 7/28                    | 29.0                                       | Medium  | 0/28                    | N/A                         | N/A     | 0/28                    | N/A                         | N/A     |
|                | Lot2     | 5/28                          | 26.2                        | Low     | 10/28                   | 28.8                                       | Medium  | 0/28                    | N/A                         | N/A     | 0/28                    | N/A                         | N/A     |
| 20 MLPQ 4X4    | Lot1     | 0/60                          | N/A                         | N/A     | 2/59*                   | 33.2                                       | Low     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
|                | Lot2     | 0/60                          | N/A                         | N/A     | 3/60                    | 34.3                                       | Low     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
| 16QSOP         | Lot1     | 0/24                          | N/A                         | N/A     | 3/24                    | 22.8                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|                | Lot2     | 2/24                          | 35.4                        | Low     | 7/24                    | 22.4                                       | Medium  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8MSOPM         | Lot1     | 2/24                          | 20.2                        | Low     | 5/24                    | 24.7                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|                | Lot2     | 0/24                          | N/A                         | N/A     | 5/24                    | 20.0                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8SOICN/M       | Lot1     | 5/24                          | 35.9                        | Low     | 2/24                    | 28.2                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|                | Lot2     | 2/24                          | 16.5                        | Low     | 3/24*                   | 22.4                                       | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 5SOT23         | Lot1     | 0/30                          | N/A                         | N/A     | 6/29*                   | 23.0                                       | Low     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|                | Lot2     | 0/30                          | N/A                         | N/A     | 4/29*                   | 30.1                                       | Low     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| MLP-m /SOT66x  |          |                               |                             |         |                         |  |         |                         |                             |         |                         |                             |         |
| MLP-Hi density |          |                               |                             |         |                         |  |         |                         |                             |         |                         |                             |         |
| 5SC70M         | Lot1     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A  | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|                | Lot2     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A  | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| SOT223         | Lot1     | 3/18                          | 16.5                        | N/A     | 2/48                    | 21.0                                       | Low     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|                | Lot2     | 0/18                          | N/A                         | N/A     | 0/30                    | N/A  | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| SPAK           |          |                               |                             |         |                         |  |         |                         |                             |         |                         |                             |         |
| 7/6 TOSTAG     | Lot1     | 1/18                          | 37.7                        | Low     | 8/17*                   | 36.6                                       | Medium  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|                | Lot2     | 1/18                          | 39.0                        | Low     | 7/17*                   | 30.9                                       | Medium  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |

**Black font : Passed Criteria**

**Red font : Failed Criteria**

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XXX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

260°C Reflow

| Package    | Lot   | Temperature Cycle       |                             |         |                         |                             |         | Temperature/Humidity Storage |                             |         |                         |                             |         | Ambient Storage         |                             |         |                         |                             |         |
|------------|-------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|            |       | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 3 mths                       |                             |         | 6 mths                  |                             |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|            |       | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker      | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| 14SOICN    | Lot 1 | 0/21                    | N/A                         | N/A     | 3/21                    | 14.1                        | Low     | 0/21                         | N/A                         | N/A     | 1/21                    | 14.9                        | Low     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 14SOICN    | Lot 2 | 0/21                    | N/A                         | N/A     | 3/21                    | 14.9                        | Low     | 0/21                         | N/A                         | N/A     | 3/21                    | 38.9                        | Low     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 20SOICWM   | Lot 1 | 2/40                    | 12.7                        | Low     | 9/40                    | 19.7                        | Low     | 2/40                         | 22.9                        | Low     | 5/40                    | 26.4                        | Low     | 0/40                    | N/A                         | N/A     | 0/40                    | N/A                         | N/A     |
| 20TSSOP    | Lot 1 | 1/30                    | 12.7                        | Low     | 0/30                    | N/A                         | N/A     | 0/30                         | N/A                         | N/A     | 2/30                    | 15.8                        | Low     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 20TSSOP    | Lot 2 | 0/30                    | N/A                         | N/A     | 2/30                    | 10.0                        | Low     | 0/30                         | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 24SSOP     | Lot 1 | 0/36                    | N/A                         | N/A     | 1/36                    | 13.6                        | Low     | 0/36                         | N/A                         | N/A     | 3/36                    | 32.1                        | Low     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 24SSOP     | Lot 2 | 0/36                    | N/A                         | N/A     | 2/36                    | 13.8                        | Low     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 14PDIP     | Lot 1 | 4/21                    | 14.6                        | Low     | 3/21                    | 14.2                        | Low     | 1/21                         | 23.7                        | Low     | 1/21                    | 31.1                        | Low     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 14PDIP     | Lot 2 | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 2/21                         | 34.9                        | Low     | 6/21                    | 38.2                        | Low     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| QSOP       |       |                         |                             |         |                         |                             |         |                              |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 48LQFP     | Lot 1 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                         | N/A                         | N/A     | 2/72                    | 35.7                        | Low     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| 48LQFP     | Lot 2 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                         | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| 44MQFP     | Lot 1 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                         | N/A                         | N/A     | 3/66                    | 29.7                        | Low     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| 44MQFP     | Lot 2 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                         | N/A                         | N/A     | 3/66                    | 37.5                        | Low     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| 44PLCC     | Lot 1 | 0/44                    | N/A                         | N/A     | 0/44                    | N/A                         | N/A     | 0/44                         | N/A                         | N/A     | 0/44                    | N/A                         | N/A     | 0/44                    | N/A                         | N/A     | 0/44                    | N/A                         | N/A     |
| 44PLCC     | Lot 2 | 0/44                    | N/A                         | N/A     | 0/44                    | N/A                         | N/A     | 0/44                         | N/A                         | N/A     | 0/44                    | N/A                         | N/A     | 0/44                    | N/A                         | N/A     | 0/44                    | N/A                         | N/A     |
| 32MLPQ5X5  | Lot 1 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                         | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 32MLPQ5X5  | Lot 2 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                         | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 28QSOP     | Lot 1 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                         | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 28QSOP     | Lot 2 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                         | N/A                         | N/A     | 1/42                    | 20.2                        | Low     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 8SOICNM    | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                         | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8SOICNM    | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                         | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 10MSOPM    | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                         | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 10MSOPM    | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                         | N/A                         | N/A     | 1/30                    | 32.3                        | Low     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 6ld SOT23  | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 6ld SOT23  | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| SOT666 IP  | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| SOT666 IP  | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 20MLPQH4x4 | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                         | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 20MLPQH4x4 | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                         | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| SOT223     | Lot 1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                         | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| SOT223     | Lot 2 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                         | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| SSPAK      | Lot 1 | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                         | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| SSPAK      | Lot 2 | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                         | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| DDPAK 3ld  | Lot 1 | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 1/9                          | 27.9                        | Low     | 7/7*                    | 37.9                        | High    | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| DDPAK 3ld  | Lot 2 | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 1/9                          | 39.0                        | Low     | 4/9                     | 32.7                        | High    | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| SC70M 6ld  | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| SC70M 6ld  | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                         | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XXX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

| 260°C Reflow |       | Temperature Cycle       |                             |         |                         |                             |         | Temperature/ Humidity Storage |                             |         |                         |                             |         | Ambient Storage         |                             |         |                         |                             |         |
|--------------|-------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
| Package      | Lot # | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 3 mths                        |                             |         | 6 mths                  |                             |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|              |       | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker       | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| 16SOICN      | Lot1  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 1/24                    | 14.9                        | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 1/24                    | 13.1                        | Low     | 0/24                          | N/A                         | N/A     | 1/24                    | 30.7                        | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 24SOICW      | Lot1  | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 1/36                    | 18.7                        | Low     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 1/24                    | 12.1                        | Low     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16TSOP       | Lot1  | 0/24                    | N/A                         | N/A     | 1/24                    | 10.6                        | Low     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 6/42                    | 14.7                        | Low     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 28SOICP      | Lot1  | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 4/24                    | 13.9                        | Low     | 0/24                          | N/A                         | N/A     | 1/24                    | 25.6                        | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16PDIP       | Lot1  | 0/24                    | N/A                         | N/A     | 11/24                   | 16.9                        | Low     | 0/24                          | N/A                         | N/A     | 2/24                    | 28.4                        | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 36QSOFP      | Lot1  | 0/96                    | N/A                         | N/A     | 1/96                    | 14.5                        | Low     | 0/96                          | N/A                         | N/A     | 1/96                    | 13.4                        | Low     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| 64LQFP       | Lot1  | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                          | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
|              | Lot2  | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                          | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| 80MQFP       | Lot1  | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 28PLCC       | Lot1  | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 16MLPQ323    | Lot1  | 0/36                    | N/A                         | N/A     | 1/36                    | 13.3                        | Low     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 24QSOFP      | Lot1  | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| MINI 508M    | Lot1  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 88SOICM      | Lot1  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot2  | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 1/24                    | 26.4                        | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 80MLPM3038P  | Lot1  | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
|              | Lot2  | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 48MLPQH757   | Lot1  | 0/144                   | N/A                         | N/A     | 0/144                   | N/A                         | N/A     | 0/144                         | N/A                         | N/A     | 0/144                   | N/A                         | N/A     | 0/144                   | N/A                         | N/A     | 0/144                   | N/A                         | N/A     |
|              | Lot2  | 0/30                    | N/A                         | N/A     | 1/30                    | 13.4                        | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 38OT23       | Lot1  | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|              | Lot2  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 38OT23       | Lot1  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|              | Lot2  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 8OT223       | Lot1  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|              | Lot2  | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 58PAK        | Lot1  | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                          | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
|              | Lot2  | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                          | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| 7DDPAK       | Lot1  | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 1/42                    | 28                          | Low     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XX\*

Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

| 260°C Reflow |       | Temperature Cycle       |                             |         |                         |                             |         | Temperature/ Humidity Storage |                             |         |                         |                             |         | Ambient Storage         |                             |         |                         |                             |         |
|--------------|-------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|              |       | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 3 mths                        |                             |         | 6 mths                  |                             |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|              |       | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker       | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| 8SOICN       | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 28SOICWMM    | Lot 1 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
|              | Lot 2 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 8TSSOP       | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 1/24                          | 25.0                        | Low     | 1/24                    | 27.8                        | Low     | 0/24                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 20SSOP       | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|              | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 8PDIP        | Lot 1 | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                          | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     |
| QSOP         |       |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 64LQFP       | Lot 1 | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                          | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MQFP         |       |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| PLCC         |       |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| MLPQ         |       |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 16QSOP       | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| MiniSO10M    | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|              | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 8SOICM       | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|              | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| MSOP         |       |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 8MLPM3X3EP   | Lot 1 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/47*                   | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
|              | Lot 2 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/47*                   | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 8MLPDH5X6V1  | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 6SOT23COL    | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
|              | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| SOT223       | Lot 1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|              | Lot 2 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| SSPAK        | Lot 1 | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                          | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
|              | Lot 2 | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                          | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| 3DDPAK       | Lot 1 | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                           | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

XXXX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

## 260°C Reflow

| Package    | Lot  | Temperature Cycle       |                             |         |                         |                             |         | Temperature/ Humidity Storage |                             |         |                         |                             |         | Ambient Storage         |                             |         |                         |                             |         |
|------------|------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|            |      | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 3 mths                        |                             |         | 6 mths                  |                             |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|            |      | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker       | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| 8SOICN     | Lot1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16SOICW    | Lot1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 20TSSOP    | Lot1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 1/30                          | 29.8                        | Low     | 0/29*                   | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|            | Lot2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 20SSOP     | Lot1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|            | Lot2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 8PDIP      | Lot1 | 1/12                    | 13.9                        | N/A     | 1/12                    | 13.1                        | Low     | 0/12                          | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 36QSOP     | Lot1 | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                          | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
|            | Lot2 | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                          | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| 48LQFPM-EP | Lot1 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 1/72                          | 23.5                        | Low     | 0/71*                   | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
|            | Lot2 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                          | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| 44MQFP     | Lot1 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                          | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
|            | Lot2 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                          | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| PLCC       | Lot1 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 48MLPQ7x7  | Lot1 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                          | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 28QSOP     | Lot1 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
|            | Lot2 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 8SOICNM    | Lot1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 1/24                          | 27.5                        | Low     | 1/24                    | 27.5                        | Low     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8SOT23     | Lot1 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 1/48                          | 14.9                        | Low     | 1/48                    | 16.3                        | Low     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
|            | Lot2 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                          | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 8MLPM3X3   | Lot1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 8MLPDH5X6  | Lot1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| SOT223     | Lot1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|            | Lot2 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 5SPAK      | Lot1 | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                          | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 3DDPAK     | Lot1 | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                           | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
|            | Lot2 | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                           | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| 10MSOP     | Lot1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|            | Lot2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| SC70M 6ld  | Lot1 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
|            | Lot2 |                         |                             |         |                         |                             |         |                               |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XXX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

## 260°C Reflow

| Package    | Lot # | Temperature Cycle       |                             |         |                         |                             |         | Temperature/ Humidity Storage |                             |         |                         |                             |         | Ambient Storage         |                             |         |                         |                             |         |
|------------|-------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|            |       | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 3 mths                        |                             |         | 6 mths                  |                             |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|            |       | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker       | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| 8SOICN     | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16SOICW    | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 28TSSOP    | Lot 1 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
|            | Lot 2 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 20SSOP     | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|            | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 8PDIP      | Lot 1 | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                          | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     |
|            | Lot 2 | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                          | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     | 0/12                    | N/A                         | N/A     |
| 36QSOP     | Lot 1 | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                          | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
|            | Lot 2 | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                          | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| 48LQFP     | Lot 1 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                          | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
|            | Lot 2 | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                          | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| 44MQFP     | Lot 1 | 0/66                    | N/A                         | N/A     | 1/66                    | 17                          | Low     | 0/66                          | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
|            | Lot 2 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                          | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| 28PLCC     | Lot 1 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
|            | Lot 2 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 8MLPD5X5V  | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 28MLPQ5X5V | Lot 1 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
|            | Lot 2 | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                          | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| 24QSOP     | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
|            | Lot 2 | 0/36                    | N/A                         | N/A     | 1/36                    | 14.4                        | Low     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 8SOICM     | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| MINISO8    | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 5SOT23     | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
|            | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                          | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| SOT666IP   | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 8MLPD5X6V1 | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
|            | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                          | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| SOT223     | Lot 1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
|            | Lot 2 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                          | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 7DDPAK     | Lot 1 | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 2/21                          | 29.4                        | Low     | *0/19                   | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 6SC70M     | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
|            | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                          | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 8TSOTM     | Lot 1 | 0/48                    | N/A                         | N/A     | 1/48                    | 13.1                        | Low     | 0/48                          | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XXX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

# Whisker Monitor Data

## **Section 3 – Tin Whisker Monitor Raw Data for products built in 2007.**

- Q1 data using Pb-Free Preconditioning (260°C)
- Q2/3 Data using Backward Compatibility Preconditioning<sup>1</sup>
  - Backward Compatible conditions includes no preconditioning and also preconditioning at 220°C
  - Monitor Data includes samples from Ipoh and Suzhou

## 260°C Reflow

| Package    | Lot   | Temperature Cycle       |                             |         |                         |                             |         | Temperature / Humidity Storage |                             |         |                         |                             |         | Ambient Storage         |                             |         |                         |                             |         |
|------------|-------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|--------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|            |       | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 3 mths                         |                             |         | 6 mths                  |                             |         | 3 mths                  |                             |         | 6 mths                  |                             |         |
|            |       | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker        | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| 16SOICNM   | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16SOICNM   | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 20SOICW    | Lot 1 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                           | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 20SOICW    | Lot 2 | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                           | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     | 0/30                    | N/A                         | N/A     |
| 14TSSOP    | Lot 1 | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                           | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 14TSSOP    | Lot 2 | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                           | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 24SSOP     | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 24SSOP     | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 14PDIP     | Lot 1 | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                           | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 14PDIP     | Lot 2 | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                           | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     | 0/21                    | N/A                         | N/A     |
| 44QSOP     | Lot 1 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                           | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| 44QSOP     | Lot 2 | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                           | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| 32LQFP     | Lot 1 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                           | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 32LQFP     | Lot 2 | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                           | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| 80MQFP     | Lot 1 | 0/120                   | N/A                         | N/A     | 0/120                   | N/A                         | N/A     | 0/120                          | N/A                         | N/A     | 0/120                   | N/A                         | N/A     | 0/120                   | N/A                         | N/A     | 0/120                   | N/A                         | N/A     |
| 80MQFP     | Lot 2 |                         |                             |         |                         |                             |         |                                |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| PLCC       | Lot 1 |                         |                             |         |                         |                             |         |                                |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| PLCC       | Lot 2 |                         |                             |         |                         |                             |         |                                |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 8MLPD      | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8MLPD      | Lot 2 |                         |                             |         |                         |                             |         |                                |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 16QSOP     | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 16QSOP     | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| MINISO8M   | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| MINISO8M   | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8SOICNM    | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8SOICNM    | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 6MLPM3X3EP | Lot 1 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 6MLPM3X3EP | Lot 2 | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| 8MLPD5X6   | Lot 1 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 8MLPD5X6   | Lot 2 | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                           | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     | 0/24                    | N/A                         | N/A     |
| 3SOT523    | Lot 1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                           | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 3SOT523    | Lot 2 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                           | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| SOT223     | Lot 1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                           | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| SOT223     | Lot 2 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                           | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 76SPAK     | Lot 1 | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                           | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |
| 76SPAK     | Lot 2 |                         |                             |         |                         |                             |         |                                |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| 3TO220     | Lot 1 | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                            | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| 3TO220     | Lot 2 |                         |                             |         |                         |                             |         |                                |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |

Black font : Passed Criteria

Red font : Failed Criteria

Failed Class 2 but passed Class 1A

Failed both classes

No material received

X/XXX\* Unit from sample size removed due to corrosion on terminals (caused by T/H chamber condensation).

Removal of samples allowed by JESD201

# Whisker Monitor Data

Q2-Q3 '2007

## Summary of Backward Compatibility Monitor Results

|              | Longest Whisker Measured ( $\mu\text{m}$ ) |                   |                   |             |      |      |      |                 |      |      |      |
|--------------|--|-------------------|-------------------|-------------|------|------|------|-----------------|------|------|------|
|              | T/C  |                   |                   | T/H Storage |      |      |      | Ambient Storage |      |      |      |
|              | 500  | 1000              | 1500              | 1000        | 2000 | 3000 | 4000 | 1000            | 2000 | 3000 | 4000 |
| No reflow    | 18.8 <sup>a</sup>                          | 27.7 <sup>a</sup> | 32.9 <sup>a</sup> | 0           | 0    | 0    | 0    | 0               | 0    | 0    | 0    |
| PbSn (220°C) | 0  | 19.5 <sup>b</sup> | 23.7 <sup>c</sup> | 0           | 0    | 0    | 0    | 0               | 0    | 0    | 0    |

All the materials passed the Technology Acceptance Test, Class 2 Criteria of JSTD-201.

| <b><u>No Reflow</u></b>               |                     |                        |                           | <b>Temperature Cycle</b>       |                                    |                |                                |                                    |                |                                |                                    |                |
|---------------------------------------|---------------------|------------------------|---------------------------|--------------------------------|------------------------------------|----------------|--------------------------------|------------------------------------|----------------|--------------------------------|------------------------------------|----------------|
|                                       |                     |                        |                           | <b>500 cyc</b>                 |                                    |                | <b>1000 cyc</b>                |                                    |                | <b>1500 cyc</b>                |                                    |                |
| <b>Package grouping</b>               | <b>Test Vehical</b> | <b>Lead pitch (mm)</b> | <b>Leadframe material</b> | <b># of leads with whisker</b> | <b>Longest whisker length (µm)</b> | <b>Density</b> | <b># of leads with whisker</b> | <b>Longest whisker length (µm)</b> | <b>Density</b> | <b># of leads with whisker</b> | <b>Longest whisker length (µm)</b> | <b>Density</b> |
| SOIC/<br>SSOP/<br>MLPQ/MLPD           | 16SOICWM            | 1.27 BSC               | C194                      | 2/66                           | 13.4                               | Low            | 7/66                           | 30.7                               | Medium         | 5/66                           | 24.5                               | Low            |
| TSSOP/<br>LQFP/<br>MQFP/MLPQ<br>/MLPD | 48LQFP              | 0.5 BSC                | C7025                     | 0/54                           | N/A                                | N/A            | 0/54                           | N/A                                | N/A            | 0/54                           | N/A                                | N/A            |
| PLCC                                  | 28PLCC              | 1.27                   | CDA151                    | 0/42                           | N/A                                | N/A            | 0/42                           | N/A                                | N/A            | 0/42                           | N/A                                | N/A            |
| SOICNM/<br>MSOP/<br>QSOP/<br>SOT23    | 8SOICN              | 1.27                   | C194                      | 2/48                           | 14.0                               | Low            | 2/48                           | 16.8                               | Low            | 2/48                           | 27.1                               | Low            |
|                                       | 28QSOP              | 0.635 BSC              | C194                      | 0/84                           | N/A                                | N/A            | 1/84                           | 16.9                               | Low            | 1/84                           | 20.1                               | Low            |
| SOT223                                | SOT223              | 2.3 NOM                | OMCL                      | 0/36                           | N/A                                | N/A            | 0/36                           | N/A                                | N/A            | 0/36                           | N/A                                | N/A            |
| DDPAK/<br>TOSTAG/<br>TO220            | 5DDPAK              | 1.7 REF                | HCL 12 S                  | 3/15                           | 18.8                               | Low            | 3/15                           | 27.7                               | Low            | 12/15                          | 32.9                               | Low            |
| SC70/<br>3SOT23/<br>SOT143            | 6SC70               | 0.65 BSC               | Alloy 42                  | 0/108                          | N/A                                | N/A            | 0/108                          | N/A                                | N/A            | 3/108                          | 20.8                               | Low            |
| MLPQ-sawn                             | 16 MLPQ<br>3X3V     | 0.5                    | C194                      | 0/72                           | N/A                                | N/A            | 0/72                           | N/A                                | N/A            | 0/72                           | N/A                                | N/A            |
| MLPD-sawn                             | 3 MLPD<br>2X2       | 0.5                    | C7025                     | 0/18                           | N/A                                | N/A            | 0/18                           | N/A                                | N/A            | 0/18                           | N/A                                | N/A            |

All package types passed the Class 2 criteria (45 µm)

The longest whisker : 32.9 µm on 5DDPAK

## Reflow (220°C)

| Package grouping                      | Test Vehical    | Lead pitch (mm) | Leadframe material | Temperature Cycle       |                             |         |                         |                             |         |                         |                             |         |
|---------------------------------------|-----------------|-----------------|--------------------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                                       |                 |                 |                    | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 1500 cyc                |                             |         |
|                                       |                 |                 |                    | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/<br>SSOP/<br>MLPQ/MLPD           | 16SOICWM        | 1.27 BSC        | C194               | 0/66                    | N/A                         | N/A     | 2/66                    | 19.5                        | Low     | 8/66                    | 23.1                        | Low     |
| TSSOP/<br>LQFP/<br>MQFP/MLPQ/<br>MPLD | 48LQFP          | 0.5 BSC         | C7025              | 0/54                    | N/A                         | N/A     | 3/54                    | 16.7                        | Low     | 4/54                    | 23.7                        | Low     |
| PLCC                                  | 28PLCC          | 1.27            | CDA151             | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| SOICNM                                | 8SOICN          | 1.27            | C194               | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/<br>QSOP/ SOT23                  | 28QSOP          | 0.635 BSC       | C194               | 0/84                    | N/A                         | N/A     | 3/84                    | 17.2                        | Low     | 6/84                    | 17.6                        | Low     |
| SOT223                                | SOT223          | 2.3 NOM         | OMCL               | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/<br>TOSTAG                      | 5DDPAK          | 1.7 REF         | HCL 12 S           | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 1/15                    | 19.5                        | Low     |
| SC70/<br>3SOT23/<br>SOT143            | 6SC70           | 0.65 BSC        | Alloy 42           | 0/108                   | N/A                         | N/A     | 1/108                   | 12.7                        | Low     | 0/108*                  | N/A                         | N/A     |
| MLP-sawn                              | 16 MLPQ<br>3X3V | 0.55            | C194               | 0/72                    | N/A                         | N/A     | 1/72                    | 16.1                        | Low     | 1/72                    | 16.2                        | Low     |
| MLP-sawn                              | 3 MLPD<br>2X2   | 1               | C7025              | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |

All package types passed the Class 2 criteria (45 µm)

The longest whisker : 19.5 µm on 16SOICW

\* The whisker detected at 1000 cycles readout was missing after the 1500 T/C

## No Reflow

| Package grouping             | Test Vehical | Lead pitch (mm) | Leadframe material | High Temp/ Humidity Storage (No reflow) |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
|------------------------------|--------------|-----------------|--------------------|---|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                              |              |                 |                    | 1000 hrs                                |                             |         | 2000 hrs                |                             |         | 3000 hrs                |                             |         | 4000 hrs                |                             |         |
|                              |              |                 |                    | # of leads with whisker                 | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/ SSOP/ MLPQ/MLPD        | 16SOICWM     | 1.27 BSC        | C194               | 0/66                                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/ LQFP/ MQFP/MLPQ/ MPLD | 48LQFP       | 0.5 BSC         | C7025              | 0/54                                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                         | 28PLCC       | 1.27            | CDA151             | 0/42                                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| SOICNM                       | 8SOICN       | 1.27            | C194               | 0/48                                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/ QSOP/ SOT23            | 28QSOP       | 0.635 BSC       | C194               | 0/84                                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     |
| SOT223                       | SOT223       | 2.3 NOM         | OMCL               | 0/36                                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/ TOSTAG                | 5DDPAK       | 1.7 REF         | HCL 12 S           | 0/15                                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| SC70/ 3SOT23/ SOT143         | 6SC70        | 0.65 BSC        | Alloy 42           | 0/108                                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |
| MLP-sawn                     | 16 MLPQ 3X3V | 0.55            | C194               | 0/72                                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| MLP-sawn                     | 3 MLPD 2X2   | 1               | C7025              | 0/18                                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |

No whiskers were detected after 4000 hrs storage

## Reflow (220°C)

|                                       |                 |                 |                    | High Temp/ Humidity Storage (220°C Reflow) |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
|---------------------------------------|-----------------|-----------------|--------------------|--|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                                       |                 |                 |                    | 1000 hrs                                   |                             |         | 2000 hrs                |                             |         | 3000 hrs                |                             |         | 4000 hrs                |                             |         |
|                                       |                 |                 |                    | # of leads with whisker                    | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| Package grouping                      | Test Vehical    | Lead pitch (mm) | Leadframe material |  |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
| SOIC/<br>SSOP/<br>MLPQ/MLPD           | 16SOICWMM       | 1.27 BSC        | C194               | 0/66                                       | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/<br>LQFP/<br>MQFP/MLPQ<br>/MPLD | 48LQFP          | 0.5 BSC         | C7025              | 0/54                                       | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                                  | 28PLCC          | 1.27            | CDA151             | 0/42                                       | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| SOICNM                                | 8SOICN          | 1.27            | C194               | 0/48                                       | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/<br>QSOP/<br>SOT23               | 28QSOP          | 0.635 BSC       | C194               | 0/84                                       | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     |
| SOT223                                | SOT223          | 2.3 NOM         | OMCL               | 0/36                                       | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/<br>TOSTAG                      | 5DDPAK          | 1.7 REF         | HCL 12 S           | 0/15                                       | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| SC70/<br>3SOT23/<br>SOT143            | 6SC70           | 0.65 BSC        | Alloy 42           | 0/108                                      | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |
| MLP-sawn                              | 16 MLPQ<br>3X3V | 0.55            | C194               | 0/72                                       | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| MLP-sawn                              | 3 MLPD<br>2X2   | 1               | C7025              | 0/18                                       | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |

No whiskers were detected after 4000 hrs storage

## No Reflow

| Package grouping                      | Test Vehical    | Lead pitch (mm) | Leadframe material | Ambient Storage (No reflow) |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
|---------------------------------------|-----------------|-----------------|--------------------|-----------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                                       |                 |                 |                    | 1000 hrs                    |                             |         | 2000 hrs                |                             |         | 3000 hrs                |                             |         | 4000 hrs                |                             |         |
|                                       |                 |                 |                    | # of leads with whisker     | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/<br>SSOP/<br>MLPQ/MLP<br>D       | 16SOICWM        | 1.27 BSC        | C194               | 0/66                        | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/<br>LQFP/<br>MQFP/MLP<br>Q/MPLD | 48LQFP          | 0.5 BSC         | C7025              | 0/54                        | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                                  | 28PLCC          | 1.27            | CDA151             | 0/42                        | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| SOICNM                                | 8SOICN          | 1.27            | C194               | 0/48                        | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/<br>QSOP/<br>SOT23               | 28QSOP          | 0.635 BSC       | C194               | 0/84                        | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     |
| SOT223                                | SOT223          | 2.3 NOM         | OMCL               | 0/36                        | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/<br>TOSTAG                      | 5DDPAK          | 1.7 REF         | HCL 12 S           | 0/15                        | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| SC70/<br>3SOT23/<br>SOT143            | 6SC70           | 0.65 BSC        | Alloy 42           | 0/108                       | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |
| MLP-sawn                              | 16 MLPQ<br>3X3V | 0.55            | C194               | 0/72                        | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| MLP-sawn                              | 3 MLPD<br>2X2   | 1               | C7025              | 0/18                        | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |

No whiskers were detected after 4000 hrs storage

## Reflow (220°C)

| Package grouping          | Test Vehical | Lead pitch (mm) | Leadframe material | Ambient Storage (220°C Reflow) |                             |         |                         |                             |         |                         |                             |         |                         |                             |         |
|---------------------------|--------------|-----------------|--------------------|--------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                           |              |                 |                    | 1000 hrs                       |                             |         | 2000 hrs                |                             |         | 3000 hrs                |                             |         | 4000 hrs                |                             |         |
|                           |              |                 |                    | # of leads with whisker        | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/SSOP/MLPQ/MLPD       | 16SOICWMD    | 1.27 BSC        | C194               | 0/66                           | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/LQFP/MQFP/MLPQ/MPLD | 48LQFP       | 0.5 BSC         | C7025              | 0/54                           | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                      | 28PLCC       | 1.27            | CDA151             | 0/42                           | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     | 0/42                    | N/A                         | N/A     |
| SOICNM                    | 8SOICN       | 1.27            | C194               | 0/48                           | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/QSOP/SOT23           | 28QSOP       | 0.635 BSC       | C194               | 0/84                           | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     | 0/84                    | N/A                         | N/A     |
| SOT223                    | SOT223       | 2.3 NOM         | OMCL               | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/TOSTAG              | 5DDPAK       | 1.7 REF         | HCL 12 S           | 0/15                           | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     | 0/15                    | N/A                         | N/A     |
| SC70/3SOT23/SOT143        | 6SC70        | 0.65 BSC        | Alloy 42           | 0/108                          | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |
| MLP-sawn                  | 16 MLPQ 3X3V | 0.55            | C194               | 0/72                           | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     | 0/72                    | N/A                         | N/A     |
| MLP-sawn                  | 3 MLPD 2X2   | 1               | C7025              | 0/18                           | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     | 0/18                    | N/A                         | N/A     |

No whiskers were detected after 4000 hrs storage

# Whisker Monitor Data

## Section 4 – Tin Whisker Monitor Raw Data for products built in 2008.

- Q2 data using Pb-Free Preconditioning (260°C)
- Q4 Data including Backward Compatibility Preconditioning<sup>1</sup>
  - Backward Compatible conditions includes no preconditioning and also preconditioning at 220°C
  - Monitor Data includes samples from Ipoh and Suzhou

## Reflow (260°C)

| Package grouping                      | Test Vehical    | Lead pitch (mm) | Leadframe material | Facility/ Site | Temperature Cycle       |                             |         |                         |                             |         |                         |                             |         |
|---------------------------------------|-----------------|-----------------|--------------------|----------------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                                       |                 |                 |                    |                | 500 cyc                 |                             |         | 1000 cyc                |                             |         | 1500 cyc                |                             |         |
|                                       |                 |                 |                    |                | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/<br>SSOP/<br>MLPQ/MLPD           | 16SOICWM        | 1.27 BSC        | C194               | S              | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/<br>LQFP/<br>MQFP/MLPQ<br>/MLPD | 48LQFP          | 0.5 BSC         | C7025              | S              | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                                  | 28PLCC          | 1.27            | CDA151             | S              | 0/16                    | N/A                         | N/A     | 0/16                    | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICNM/<br>MSOP/<br>QSOP/<br>SOT23    | 8SOICNM         | 1.27            | C194               | M              | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
|                                       | 16QSOP          | 0.635 BSC       | C194               | M              | 0/77                    | N/A                         | N/A     | 0/77                    | N/A                         | N/A     | 2/77                    | 14.8                        | Low     |
| SOT223                                | SOT223          | 2.3 NOM         | OMCL               | M              | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/<br>TOSTAG /<br>T0220           | 7DDPAK          | 1.7 REF         | HCL 12 S           | M              | 0/8                     | N/A                         | N/A     | 0/8                     | N/A                         | N/A     | 0/8                     | N/A                         | N/A     |
| SC70/<br>3SOT23/<br>SOT143            | 6SC70           | 0.65 BSC        | Alloy 42           | M              | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLPQ-sawn                             | 28 MLPQ<br>5X5V | 0.5             | C194               | SZ             | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |

Remark: Whiskers found on 16QSOP (2/77 terminals)- All within acceptable limits.

# Whisker inspection Raw Data – Q2'08

## Reflow (260°C)

| Package grouping             | Test Vehical | Lead pitch (mm) | Leadframe material | Facility/ Site | High Temp/ Humidity Storage |                             |         |                         |                             |         |
|------------------------------|--------------|-----------------|--------------------|----------------|-----------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                              |              |                 |                    |                | 3 mths                      |                             |         | 6 mths                  |                             |         |
|                              |              |                 |                    |                | # of leads with whisker     | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/ SSOP/ MLPQ/MLPD        | 16SOICWMM    | 1.27 BSC        | C194               | S              | 0/66                        | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/ LQFP/ MQFP/MLPQ/M PLD | 48LQFP       | 0.5 BSC         | C7025              | S              | 0/54                        | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                         | 28PLCC       | 1.27            | CDA151             | S              | 0/16                        | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICNM                       | 8SOICNM      | 1.27            | C194               | M              | 0/48                        | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/ QSOP/ SOT23            | 16QSOP       | 0.635 BSC       | C194               | M              | 0/77                        | N/A                         | N/A     | 0/77                    | N/A                         | N/A     |
| SOT223                       | SOT223       | 2.3 NOM         | OMCL               | M              | 0/36                        | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/ TOSTAG/ T0220         | 7DDPAK       | 1.7 REF         | HCL 12 S           | M              | 0/8                         | N/A                         | N/A     | 0/8                     | N/A                         | N/A     |
| SC70/ 3SOT23/ SOT143         | 6SC70        | 0.65 BSC        | Alloy 42           | M              | 0/96                        | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLPQ-sawn                    | 28 MLPQ 5X5V | 0.5             | C194               | SZ             | 0/60                        | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |

Remark : No whisker found on all the packages after 6 months T/H storage

## Whisker inspection Raw Data – Q2'08

### Reflow (260°C)

|                           |              |                 |                    |                | Ambient Storage         |                             |         |                         |                             |         |
|---------------------------|--------------|-----------------|--------------------|----------------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                           |              |                 |                    |                | 3 mths                  |                             |         | 6 mths                  |                             |         |
|                           |              |                 |                    |                | # of leads with whisker | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| Package grouping          | Test Vehicle | Lead pitch (mm) | Leadframe material | Facility/ Site |                         |                             |         |                         |                             |         |
| SOIC/SSOP/MLPQ/MLPD       | 16SOICWMM    | 1.27 BSC        | C194               | S              | 0/66                    | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/LQFP/MQFP/MLPQ/MPLD | 48LQFP       | 0.5 BSC         | C7025              | S              | 0/54                    | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| PLCC                      | 28PLCC       | 1.27            | CDA151             | S              | 0/16                    | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICNM                    | 8SOICNM      | 1.27            | C194               | M              | 0/48                    | N/A                         | N/A     | 0/48                    | N/A                         | N/A     |
| MSOP/QSOP/SOT23           | 16QSOP       | 0.635 BSC       | C194               | M              | 0/77                    | N/A                         | N/A     | 0/77                    | N/A                         | N/A     |
| SOT223                    | SOT223       | 2.3 NOM         | OMCL               | M              | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK                     | 7DDPAK       | 1.7 REF         | HCL 12 S           | M              | 0/8                     | N/A                         | N/A     | 0/8                     | N/A                         | N/A     |
| SC70/3SOT23/SOT143        | 6SC70        | 0.65 BSC        | Alloy 42           | M              | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLP-sawn                  | 28 MLPQ 5x5V | 0.5             | C194               | SZ             | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |

Remark : No whisker found on all the packages after 6 months Ambient storage

# Whisker inspection Raw Data – Q4 '08

## Various Reflow Conditions

|                           |              |                 |                    |                | Temperature Cycle (No reflow)    |                             |         |                         |                             |         |                         |                             |         |
|---------------------------|--------------|-----------------|--------------------|----------------|----------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                           |              |                 |                    |                | 500 cyc                          |                             |         | 1000 cyc                |                             |         | 1500 cyc                |                             |         |
| Package grouping          | Test Vehical | Lead pitch (mm) | Leadframe material | Facility/ Site | # of leads with whisker          | Longest whisker length (μm) | Density | # of leads with whisker | Longest whisker length (μm) | Density | # of leads with whisker | Longest whisker length (μm) | Density |
| SOIC/SSOP/MLPQ/MLPD       | 16SOICWM     | 1.27 BSC        | C194               | S              | 4/66                             | 15.6                        | Low     | 14/66                   | 20.1                        | Low     | 14/66                   | 21.1                        | Low     |
| TSSOP/LQFP/MQFP/MLPQ/MLPD | 48LQFP       | 0.5 BSC         | C7025              | S              | 0/54                             | N/A                         | N/A     | 3/54                    | 17.5                        | Low     | 3/54                    | 17.9                        | Low     |
| MLPQ-sawn                 | 3 MLPD 2X2   | 0.5             | C7025              | SZ             | 0/60                             | N/A                         | N/A     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
| MLPQ-sawn                 | 16 MLPQ 3X3V | 0.5             | C194               | SZ             | 0/60                             | N/A                         | N/A     | 0/60                    | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
|                           |              |                 |                    |                | Temperature Cycle (220°C reflow) |                             |         |                         |                             |         |                         |                             |         |
| PLCC                      | 44PLCC       | 1.27            | CDA151             | S              | 0/16                             | N/A                         | N/A     | 0/16                    | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICNM/MSOP/QSOP/SOT23    | 8SOICNM      | 1.27            | C194               | M              | 0/62                             | N/A                         | N/A     | 0/62                    | N/A                         | N/A     | 0/62                    | N/A                         | N/A     |
|                           | 28QSOP       | 0.635 BSC       | C194               | M              | 0/77                             | N/A                         | N/A     | 0/77                    | N/A                         | N/A     | 0/77                    | N/A                         | N/A     |
|                           |              |                 |                    |                | Temperature Cycle (260°C reflow) |                             |         |                         |                             |         |                         |                             |         |
| SOT223                    | SOT223       | 2.3 NOM         | OMCL               | M              | 0/36                             | N/A                         | N/A     | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/TO220               | 5DDPAK       | 1.7 REF         | HCL 12 S           | M              | 0/9                              | N/A                         | N/A     | 0/9                     | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| SC70/3SOT23/SOT143        | 6SC70M       | 0.65 BSC        | Alloy 42           | M              | 0/108                            | N/A                         | N/A     | 0/108                   | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |

Remark: Whiskers found on **16SOICWM (14/66 terminals)** & **48LQFP (3/54 terminals)** - All within acceptable limits.

## Various Reflow Conditions

|                             |              |                 |                    |                | High Temp/ Humidity Storage (No Reflow)    |                             |         |                         |                             |         |
|-----------------------------|--------------|-----------------|--------------------|----------------|--|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                             |              |                 |                    |                | 3 mths                                     |                             |         | 6 mths                  |                             |         |
| Package grouping            | Test Vehical | Lead pitch (mm) | Leadframe material | Facility/ Site | # of leads with whisker                    | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/ SSOP/ MLPQ/MLPD       | 16SOICWMM    | 1.27 BSC        | C194               | S              | 0/66                                       | N/A                         | N/A     | 5/66                    | 15.64                       | Low     |
| TSSOP/ LQFP/ MQFP/MLPQ/MLPD | 48LQFP       | 0.5 BSC         | C7025              | S              | 0/54                                       | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| MLPQ-sawn                   | 3 MLPD 2X2   | 0.5             | C7025              | SZ             | 0/60                                       | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
| MLPQ-sawn                   | 16 MLPQ 3X3V | 0.5             | C194               | SZ             | 0/60                                       | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
|                             |              |                 |                    |                | High Temp/ Humidity Storage (220°C Reflow) |                             |         |                         |                             |         |
| PLCC                        | 44PLCC       | 1.27            | CDA151             | S              | 0/16                                       | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICNM/ MSOP/ QSOP/ SOT23   | 8SOICNM      | 1.27            | C194               | M              | 0/62                                       | N/A                         | N/A     | 0/62                    | N/A                         | N/A     |
|                             | 28QSOP       | 0.635 BSC       | C194               | M              | 0/77                                       | N/A                         | N/A     | 0/77                    | N/A                         | N/A     |
|                             |              |                 |                    |                | High Temp/ Humidity Storage (260°C Reflow) |                             |         |                         |                             |         |
| SOT223                      | SOT223       | 2.3 NOM         | OMCL               | M              | 0/36                                       | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/ TOSTAG / TO220       | 5DDPAK       | 1.7 REF         | HCL 12 S           | M              | 0/9  | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| SC70/ 3SOT23/ SOT143        | 6SC70M       | 0.65 BSC        | Alloy 42           | M              | 0/108                                      | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |

Remark : Whiskers found on 16SOICWMM (5/66 terminals) – All within acceptable limits.

## Various Reflow Conditions

|                             |              |                 |                    |                | Ambient Storage (No reflow)    |                             |         |                         |                             |         |
|-----------------------------|--------------|-----------------|--------------------|----------------|--------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                             |              |                 |                    |                | 3 mths                         |                             |         | 6 mths                  |                             |         |
| Package grouping            | Test Vehical | Lead pitch (mm) | Leadframe material | Facility/ Site | # of leads with whisker        | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/ SSOP/ MLPQ/MLPD       | 16SOICWMM    | 1.27 BSC        | C194               | S              | 0/66                           | N/A                         | N/A     | 0/66                    | N/A                         | N/A     |
| TSSOP/ LQFP/ MQFP/MLPQ/MLPD | 48LQFP       | 0.5 BSC         | C7025              | S              | 0/54                           | N/A                         | N/A     | 0/54                    | N/A                         | N/A     |
| MLPQ-sawn                   | 3 MLPD 2X2   | 0.5             | C7025              | SZ             | 0/60                           | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
| MLPQ-sawn                   | 16 MLPQ 3X3V | 0.5             | C194               | SZ             | 0/60                           | N/A                         | N/A     | 0/60                    | N/A                         | N/A     |
|                             |              |                 |                    |                | Ambient Storage (220°C reflow) |                             |         |                         |                             |         |
| PLCC                        | 44PLCC       | 1.27            | CDA151             | S              | 0/16                           | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICNM/ MSOP/ QSOP/ SOT23   | 8SOICNM      | 1.27            | C194               | M              | 0/62                           | N/A                         | N/A     | 0/62                    | N/A                         | N/A     |
|                             | 28QSOP       | 0.635 BSC       | C194               | M              | 0/77                           | N/A                         | N/A     | 0/77                    | N/A                         | N/A     |
|                             |              |                 |                    |                | Ambient Storage (260°C reflow) |                             |         |                         |                             |         |
| SOT223                      | SOT223       | 2.3 NOM         | OMCL               | M              | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/ TOSTAG / TO220       | 5DDPAK       | 1.7 REF         | HCL 12 S           | M              | 0/9                            | N/A                         | N/A     | 0/9                     | N/A                         | N/A     |
| SC70/ 3SOT23/ SOT143        | 6SC70M       | 0.65 BSC        | Alloy 42           | M              | 0/108                          | N/A                         | N/A     | 0/108                   | N/A                         | N/A     |

Remark : No whisker found on all the packages after 6 months Ambient storage

# Whisker Monitor Data

## Section 5 – Tin Whisker Monitor Raw Data for products built in 2009.

- Using Pb-Free Preconditioning (260°C)

*Note, the monitoring frequency has been revised to **once per year** from 2009 onwards.*

# Whisker inspection Raw Data – Q1/2 '09

## Reflow (260°C)

|                                   |              |                 |                    |          |                | Temperature Cycle       |                             |            |                         |                             |            |                         |                             |            |
|-----------------------------------|--------------|-----------------|--------------------|----------|----------------|-------------------------|-----------------------------|------------|-------------------------|-----------------------------|------------|-------------------------|-----------------------------|------------|
|                                   |              |                 |                    |          |                | 500 cyc                 |                             |            | 1000 cyc                |                             |            | 1500 cyc                |                             |            |
|                                   |              |                 |                    |          |                | # of leads with whisker | Longest whisker length (μm) | Density    | # of leads with whisker | Longest whisker length (μm) | Density    | # of leads with whisker | Longest whisker length (μm) | Density    |
| Package grouping                  | Test Vehical | Lead pitch (mm) | Leadframe material | Leadform | Facility/ Site |                         |                             |            |                         |                             |            |                         |                             |            |
| SOIC/ SSOP/ QSOP / MLPQ/D         | 36MLPQ6X6    | 0.65 BSC        | C194               | G        | S              | 0/96                    | N/A                         | N/A        | 0/96                    | N/A                         | N/A        | 0/96                    | N/A                         | N/A        |
| TSSOP/ LQFP/ MQFP/ MLPQ/D         | 20TSSOP      | 0.65 BSC        | C7025              | G        | S              | 0/96                    | N/A                         | N/A        | <b>1/96</b>             | <b>14.0</b>                 | <b>Low</b> | <b>1/96</b>             | <b>14.7</b>                 | <b>Low</b> |
| PLCC                              | 28PLCC       | 1.27            | CDA151             | J        | S              | 0/16                    | N/A                         | N/A        | 0/16                    | N/A                         | N/A        | 0/16                    | N/A                         | N/A        |
| SOICN / MSOP/ QSOP/ SOT23/ SOT666 | 10MSOP       | 0.5 BSC         | C194               | G        | M              | <b>1/96</b>             | <b>10.4</b>                 | <b>Low</b> | <b>2/96</b>             | <b>14.12</b>                | <b>Low</b> | <b>5/96</b>             | <b>19.4</b>                 | <b>Low</b> |
| SOT223                            | SOT223       | 2.3 NOM         | OMCL               | G        | M              | 0/36                    | N/A                         | N/A        | 0/36                    | N/A                         | N/A        | 0/36                    | N/A                         | N/A        |
| DDPAK/ TOSTAG/ TO220              | 3TO220       | 1.57            | HCL 12 S           | G        | M              | 0/6                     | N/A                         | N/A        | 0/6                     | N/A                         | N/A        | 0/6                     | N/A                         | N/A        |
| SC70/ 3SOT23/ SOT143              | 6SC70        | 0.65 BSC        | Alloy 42           | G        | M              | 0/96                    | N/A                         | N/A        | <b>1/96</b>             | <b>20.0</b>                 | <b>Low</b> | <b>3/96</b>             | <b>21.1</b>                 | <b>Low</b> |
| MLP-sawn                          | 40 MLPQ 6X6W | 0.5             | C194               | N        | SZ             | 0/96                    | N/A                         | N/A        | 0/96                    | N/A                         | N/A        | 0/96                    | N/A                         | N/A        |
| MLP-sawn                          | 3 MLPD 2X2   | 0.5             | C7025              | N        | SZ             | 0/96                    | N/A                         | N/A        | 0/96                    | N/A                         | N/A        | 0/96                    | N/A                         | N/A        |

**Remark:**

Whiskers found on **20TSSOP, 10MSOP & 6SC70** with the longest whisker measured at 21.1 μm post 1500 cycles. All whiskers detected were within the acceptable limits.

## Reflow (260°C)

|                                   |              |                 |                    |          |                | High T/H Storage        |                             |         |                         |                             |         |
|-----------------------------------|--------------|-----------------|--------------------|----------|----------------|-------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                                   |              |                 |                    |          |                | 3 mths                  |                             |         | 6 mths                  |                             |         |
|                                   |              |                 |                    |          |                | # of leads with whisker | Longest whisker length (μm) | Density | # of leads with whisker | Longest whisker length (μm) | Density |
| Package grouping                  | Test Vehical | Lead pitch (mm) | Leadframe material | Leadform | Facility/ Site |                         |                             |         |                         |                             |         |
| SOIC/ SSOP/ QSOP / MLPQ/D         | 36MLPQ6X6    | 0.65 BSC        | C194               | G        | S              | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| TSSOP/ LQFP/ MQFP/ MLPQ/D         | 20TSSOP      | 0.65 BSC        | C7025              | G        | S              | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| PLCC                              | 28PLCC       | 1.27            | CDA151             | J        | S              | 0/16                    | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICN / MSOP/ QSOP/ SOT23/ SOT666 | 10MSOP       | 0.5 BSC         | C194               | G        | M              | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| SOT223                            | SOT223       | 2.3 NOM         | OMCL               | G        | M              | 0/36                    | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/ TOSTAG / TO220             | 3TO220       | 1.57            | HCL 12 S           | G        | M              | 0/6                     | N/A                         | N/A     | 0/6                     | N/A                         | N/A     |
| SC70/ 3SOT23/ SOT143              | 6SC70        | 0.65 BSC        | Alloy 42           | G        | M              | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLP-sawn                          | 40 MLPQ 6X6W | 0.5             | C194               | N        | SZ             | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLP-sawn                          | 3 MLPD 2X2   | 0.5             | C7025              | N        | SZ             | 0/96                    | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |

**Remark :**

No whiskers were found on all the packages after 6 mths storage.

## Reflow (260°C)

|                                   |              |                 |                    |          |                | Ambient Storage (260°C Reflow) |                             |         |                         |                             |         |
|-----------------------------------|--------------|-----------------|--------------------|----------|----------------|--------------------------------|-----------------------------|---------|-------------------------|-----------------------------|---------|
|                                   |              |                 |                    |          |                | 3 mths                         |                             |         | 6 mths                  |                             |         |
| Package grouping                  | Test Vehical | Lead pitch (mm) | Leadframe material | Leadform | Facility/ Site | # of leads with whisker        | Longest whisker length (µm) | Density | # of leads with whisker | Longest whisker length (µm) | Density |
| SOIC/ SSOP/ QSOP / MLPQ/D         | 36MLPQ6X6    | 0.65 BSC        | C194               | G        | S              | 0/96                           | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| TSSOP/ LQFP/ MQFP/ MLPQ/D         | 20TSSOP      | 0.65 BSC        | C7025              | G        | S              | 0/96                           | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| PLCC                              | 28PLCC       | 1.27            | CDA151             | J        | S              | 0/16                           | N/A                         | N/A     | 0/16                    | N/A                         | N/A     |
| SOICN / MSOP/ QSOP/ SOT23/ SOT666 | 10MSOP       | 0.5 BSC         | C194               | G        | M              | 0/96                           | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| SOT223                            | SOT223       | 2.3 NOM         | OMCL               | G        | M              | 0/36                           | N/A                         | N/A     | 0/36                    | N/A                         | N/A     |
| DDPAK/ TOSTAG / TO220             | 3TO220       | 1.57            | HCL 12 S           | G        | M              | 0/6                            | N/A                         | N/A     | 0/6                     | N/A                         | N/A     |
| SC70/ 3SOT23/ SOT143              | 6SC70        | 0.65 BSC        | Alloy 42           | G        | M              | 0/96                           | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLP-sawn                          | 40 MLPQ 6X6W | 0.5             | C194               | N        | SZ             | 0/96                           | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |
| MLP-sawn                          | 3 MLPD 2X2   | 0.5             | C7025              | N        | SZ             | 0/96                           | N/A                         | N/A     | 0/96                    | N/A                         | N/A     |

**Remark :**

No whiskers were found on all the packages after 6 months Ambient storage