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## ON SEMICONDUCTOR TIN WHISKER REPORT

### ON semiconductor Philippines Assembly Site, Matte Tin over Copper

#### Introduction

This report is for an evaluation being conducted to measure tin whisker growth on a copper leadframe package assembled at ON Semiconductor's Carmona, Philippines assembly site. The results of this evaluation are applicable to all Cu based leadframe packages at this assembly site.

Package type: SOIC8

Leadframe material: Cu

Plating: Matte tin

Anneal: 1 hour at 150°C within 24 hours of plating

#### Test Conditions/Procedure

Three test conditions are being used, per JEDEC standard JESD201:

Temp Cycle (-55/85°C) for 3000 cycles (inspections at 500 cycle intervals)

Storage at 55°C/85%RH for 4000 hours (inspections at 1000 hour intervals)

Storage at 30°C/60%RH for 4000 hours (inspections at 1000 hour intervals)

Testing is being conducted on units with three different preconditioning treatments:

1. no preconditioning
2. units preconditioned with a SnPn reflow profile (peak temp 220°C)
3. units preconditioned with a Pb-free reflow profile (peak temp 260°C).

Samples were taken from three separate assembly lots. Three units per lot, three leads per sample, and five areas per lead are inspected by SEM at each inspection point.

#### Results

The maximum whisker length observed for each unit was noted and compared to the acceptance criteria listed in JESD201 for Class 2 products (40μ maximum for the storage tests and 45μ maximum for temperature cycle).

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**WHISKER INSPECTION RESULTS**

| Precon. | 30°C/60%RH (hours) |      |      |      | 55°C/85%RH (hours) |      |      |      | Temp Cycles |      |      |      |      |      |
|---------|--------------------|------|------|------|--------------------|------|------|------|-------------|------|------|------|------|------|
|         | 1000               | 2000 | 3000 | 4000 | 1000               | 2000 | 3000 | 4000 | 500         | 1000 | 1500 | 2000 | 2500 | 3000 |
| None    | Pass               | Pass | Pass | Pass | Pass               | Pass | Pass | Pass | Pass        | Pass | Pass | Pass | Pass | Pass |
| SnPb    | Pass               | Pass | Pass | Pass | Pass               | Pass | Pass | Pass | Pass        | Pass | Pass | Pass | Pass | Pass |
| Pb-free | Pass               | Pass | Pass | Pass | Pass               | Pass | Pass | Pass | Pass        | Pass | Pass | Pass | Pass | Pass |

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