

PRODUCT EVALUATION



Date: January 24, 2008

**PRODUCT EVALUATION REPORT FOR
ClearONE™ PRODUCTS
TIN WHISKER TEST**

Purpose:

To evaluate tin whisker growth situation on Clear One products with pure tin terminations built in CTS Singapore.

Sampling Plan and Test Plan:

The tin whisker test sampling plan and test plan are based on JESD22A121.01: Test Method for Measuring Whisker Growth on Tin and Tin Alloy Surface Finishes.

For Clear One products, RT2402B7 and RT2300B6 samples are submitted to test. For each model, samples are divided into three groups, six samples in each group; go through different test condition as outlined in *Table 1*.

	Stress Type	Test Conditions	Sample Size	Inspection Intervals	Duration
Group A	Temperature Cycling	-55C to 85C, air to air, 10mins dwell at each temp zone.	6pcs	500 cycles	1000 cycles
Group B	Ambient Temperature / Humidity Storage	30 °C and 60% RH	6pcs	1000 hours	3000 hours
Group C	High Temperature / Humidity Storage	60°C and 90% RH	6pcs	1000 hours	3000 hours

Table 1: Test conditions.

Sample termination construction:

- Inner material (copper ball): Cuprum.
- Outer plating: Tin plating.

Definitions Criteria for Tin Whisker:

As defined in JESD22A121.01, the criteria of tin whiskers are:

- An aspect ratio (length/width) greater than 2.
- Can be kinked, bent or twisted.
- Usually have a uniform cross-sectional shape.
- Typically consist of a single columnar filament that rarely branches.
- May have striations along the length of the column and/or rings around the circumference of the column.
- Length of 10 microns or more.

Test Result:

Visual inspection is performed at initial, each inspection intervals and the end of the test with optical microscope of 80X magnification.

Group A: No whisker found after 500 cycles and 1000 cycles temperature cycling.

Group B: No whisker found after 1000 hours, 2000 hours and 3000 hours ambient temperature/humidity storage.

Group C: No whisker found after 1000 hours, 2000 hours and 3000 hours high temperature/humidity storage.