

Power BU Tin Whisker Testing Report

For Temperature Cycle Test, Ambient Temperature and Humidity
High Temperature Test






August 2016

1. Testing Purpose

To confirm if the most common termination styles have the risk of tin whisker growth for lead-free product, which can cause electrical short, disruption of moving parts etc.)

2. Termination Style

There categories of termination styles, which covers the majority of Pulse Power parts, were identified.

Termination Style	Pulse PN	Photo	Base Material	Under Plating	Over Plating	Hot Dip Finish
Tin Plated Leadframe	PA0512.700NL		Phosphor bronze	Nickel 50-100 uinches	Matte Tin 200~500 uinches	None
Solder Dipped Tin Plated Pins	PA1005.100NL		Phosphor bronze	Nickel 50-100 uinches	Matte Tin 200~500 uinches	Sn0.7Cu
Solder Dipped Copper Wire Leads	P0751.153NL		Copper	None	None	Sn0.7Cu
Solder Dipped Copper Wire Leads	PG0426.152NL		Copper	None	None	Sn0.7Cu
Solder Dipped Copper Wire Leads	PG0702.682NL		Copper	None	None	Sn0.7Cu






3. Testing Condition

The following tests, in accordance with JESD22-A121A (July 2008) and JESD201A (September 2008) were carried out.

Test Items	Temperature Cycle Test	Ambient Temperature Test	High Temp & Humidity
Test Condition	Temp: -40+0/-10C ~85+10/-0C	Temp: 30+/-2C Humidity: 60+/-3%RH	Temp: 55+/-5C Humidity: 85~90%RH
Test Intervals	500, 1000, 1500 Cycles	1000, 2000, 3000 Hours	1000, 2000, 3000 Hours
Samples No.	1 - 24	25-48	49-72

4. Testing completed

The following number of Cycles/Hours were completed

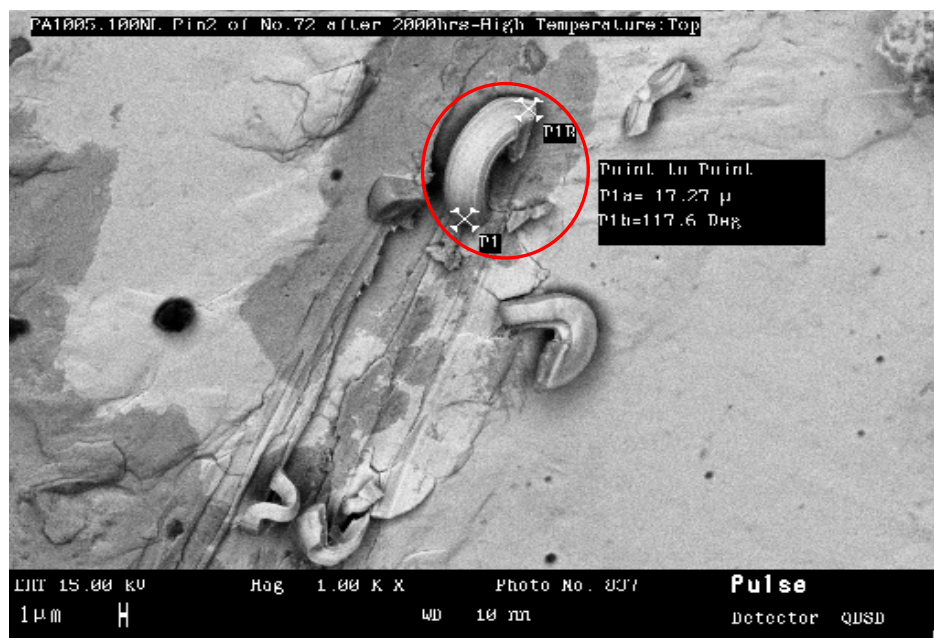
Termination Style	Pulse PN	Photo	Thermal Cycles	Hi Temp Hours
Lead Frame	PA0512.700NL		1000	2000
Pin	PA1005.100NL		1500	2000
Self Leaded	P0751.153NL		1500	3000
Self Leaded	PG0426.152NL		1000	3000
Self Leaded	PG0702.682NL		1500	3000

5. Test Result

- 5.1 The initial pre-test inspection was performed on all samples once before the test samples are exposed to any test. No tin whisker was identified.
- 5.2 Screening inspection and detailed inspection: The screening inspections were done for all samples at each read out following exposure to any test condition. The detailed inspection was performed on all terminations or areas identified in the screening inspection. If whiskers are observed in the screening inspection then the detailed inspection is required.
- 5.3 After screen inspection under 50X magnification of all pins. Only 1 pin was found with tin whisker growth on PA1005.100NL after 2000Hrs of high temperature and humidity exposure.
- 5.4 Whisker length: The straight line distance from the point of emergence of the whisker to the most distant point on the whisker (i.e., the radius of a sphere containing the whisker with its center located at the point of emergence).

SEM Photo

High Temp/Hum test after 2000hrs



Tin whisker with 17.27 on top portion of sample 72 pin 2

6. Test Conclusions
Test passed due to less than 40um tin whisker growth per Class 2 acceptance criteria.
Pulse follows industry best practice and has demonstrated an effective mitigation against tin whiskers growth.
7. Remark
N/A
8. Reference Documents:
JESD22-A121A (July 2008) and JESD201A (September 2008)

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