

Tin Whisker Growth Results on Tin Surface Finished Products

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Whisker growth test methods and conditions per JESD-201 and JEDEC22a121.01.
In case of deviation between the two methods, JESD-201 was used.

Definitions per JESD-201 and JEDEC22a121.01

Whisker Class Level

- Class 3: Mission / Life critical applications such as military, aerospace and medical applications.
Pure tin and high tin content alloys are not typically acceptable.
- Class 2: Business critical applications such as Telecom Infrastructure equipment, High-end Servers, Automotive, etc.
(long product lifetimes).
- Class 1: Industrial / consumer products (medium product lifetimes).
- Class 1A: Consumer products (short product lifetimes).

Maximum Whisker Density Range

- Low: < 10 whiskers per (mm²)
- Medium: 10 - 45 whiskers per (mm²)
- High: > 45 whiskers per (mm²)

Whisker Definition

- Spontaneous columnar or cylindrical filament emanating from the surface
- Length ≥ 10µm.
- Aspect ratio (l/w) > 2.

Preconditioning Exposure

- A: No preconditioning
- C: SnPb reflow conditions, 220°C peak
- D: Pb-free reflow conditions, 260°C peak

Configuration	Rectangular / Square 5 Side Termination			Inward Formed L-Shaped Leadframe						Ceramic Two Lead Radial Configuration				
	Applicable Products			Aluminum (AO-CAP), Conductive Polymer (KO CAP), Tantalum MnO ₂ Chips		Conductive Polymer (KO CAP), Tantalum MnO ₂ Chips				C3xx, C6xx, C052 and C062 Ceramic Through-Hole Product Series				
Example														
Termination Code	C			T		T				C or T				
Termination Finish	100% Matte Tin			100% Matte Tin		100% Matte Tin				100% Matte Tin				
Finish Thickness	100 - 400 µ-inch			160 - 320 µ-inch		160 - 320 µ-inch				160 - 480 µ-inch				
Barrier Plating	Nickel			Nickel		Copper				Nickel				
Barrier Thickness	50 µ-inch min.			50 µ-inch min.		80 - 120 µ-inch				50 µ-inch min.				
Terminals Inspected	18			18		18				18				
Inspection Area per Terminal	3.4 mm ²			3.6 mm ²		3.6 mm ²				20.4 mm ³				
Inspection Equipment / Mag	SEM / 3000X			SEM / 3000X		SEM / 3000X				SEM / 3000X				
Preconditioning	A	C	D	A	C	D	A	C	D	A	C	D		
Exposure	Temperature / Humidity Storage 30°C, 60% RH, 4000 hours	Whisker Count	0	0	0	0	0	0	0	0	0	0	0	0
		Longest Whisker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Meets Class Level	2	2	2	2	2	2	2	2	2	2	2	2
		Whisker Density Range	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	High Temp / Humidity Storage 55°C and 85% RH, 4000 hours	Whisker Count	0	3	4	0	1	5	0	11	6	0	2	4
		Longest Whisker	n/a	26 µm	20 µm	n/a	34	22 µm	n/a	35	34 µm	n/a	25 µm	20 µm
		Meets Class Level	2	2	2	2	2	2	2	2	2	2	2	2
		Whisker Density Range	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	Temperature Cycling -55 to +85°C, 1000 cycles	Whisker Count	0	>45	0	0	0	0	0	0	0	0	6	0
		Longest Whisker	n/a	43 µm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	30 µm	n/a
		Meets Class Level	2	2	2	2	2	2	2	2	2	2	2	2
		Whisker Density Range	Low	High	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low