UYEMURA
Japan

Uyemura Immersion Tin Process

Presa® RMK-30
Evaluation Report

- Surface Structure
- Purity
- Wetting Balance
- Surface Insulating Resistance
- Electrochemical Migration

Sample preparation

PLATING PROCESS

CLEANER

ETCHING

ACID DIP

Sn STRIKE

IMMERSION Sn

CONDITIONS:

- Sn STRIKE
  RMK-30, 30C, 30sec.
- IMMERSION Sn
  RMK-30, 70C, 12min.

Tin Thickness Result / Unit: um (micron)

	Wetting Balance Coupon	Comb pattern PWB	
		Small Pad	Large Pad
1	1.26	1.12	1.23
2	1.17	1.15	1.17
3	1.26	1.15	1.25
4	1.16	-----	-----
Ave.	1.21	1.14	1.17

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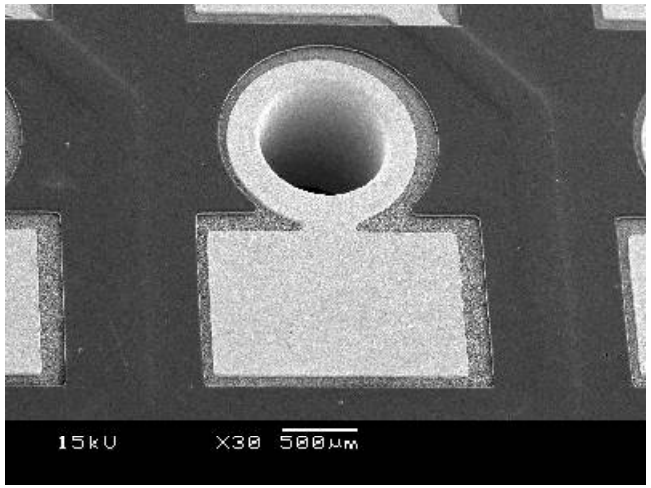
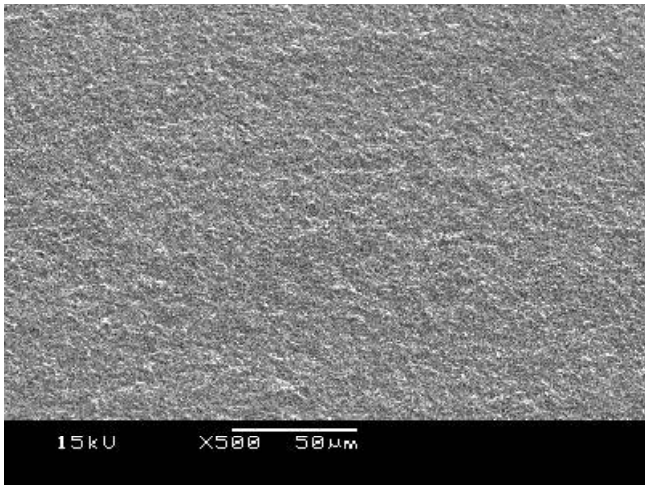
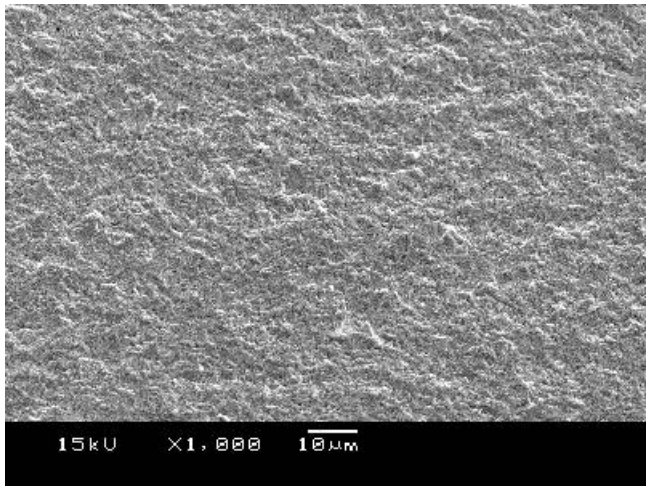
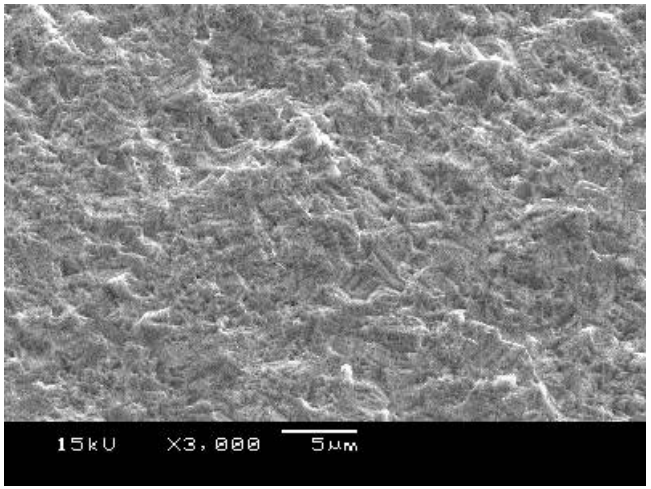
Surface structure









Purity of tin coating

Method: Plating --> Stripping --> ICP analysis

Equipment: ICP (Inductively Coupled Plasma Spectrometry)
/ SHIMADZU ICPS-7500

Stripping Chemical: Nitric acid type

	Result
Tin	Approx. 99%
Additive	1.03%
alkaline and alkaline-earth metal (Na, K, Mg, Ca)	Slightly detected
Other metals (without copper)	Not detected

Wetting balance #1

Conditions (IPC J-STD-003a)

Solder: 63Sn37Pb (eutectic), 235°C
Flux: ROL1-type, Senju ESR-250
Dipping rate: 5.0mm/sec, Dipping depth: 0.2mm
Dipping duration: 5sec, Dipping angle: vertical (90°)
Equipment: Tartin-Kester

Pre-conditioning

1. As is plated (without aging) -> AS
2. Baking (155C x 4hrs) -> Shelf Life / SL
3. Three times IR reflow -> RF
4. Steam aging (93C x 8hrs) -> ST

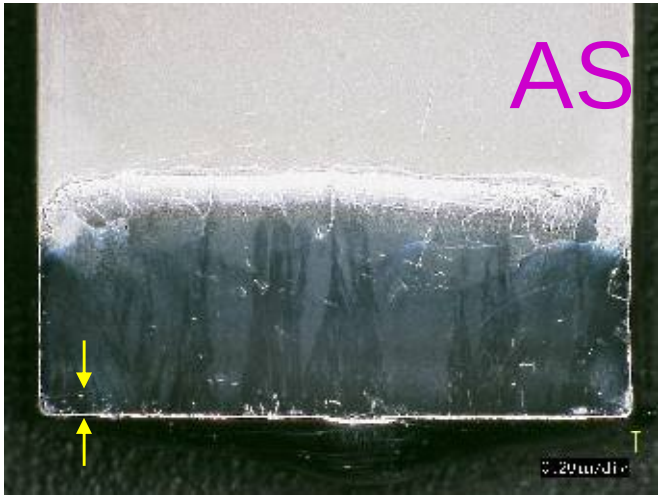
Wetting balance #2

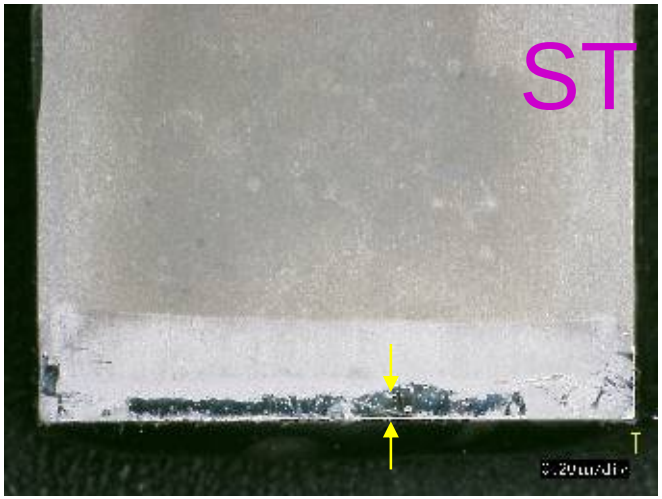
	ZCT Ave. (Zero Cross Time)	Fmax Ave.
AS	0.55 sec	5.09 mN
SL	0.72 sec	4.48 mN
RF	1.07 sec	3.91 mN
ST	3.22 sec	1.82 mN

Note) The above data have been corrected by buoyancy calculation based on J-STD-003a 6.2. The buoyancy value was 0.153 mN.

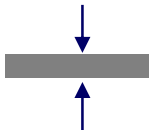
Wetting balance #3

Appearance after wetting balance test





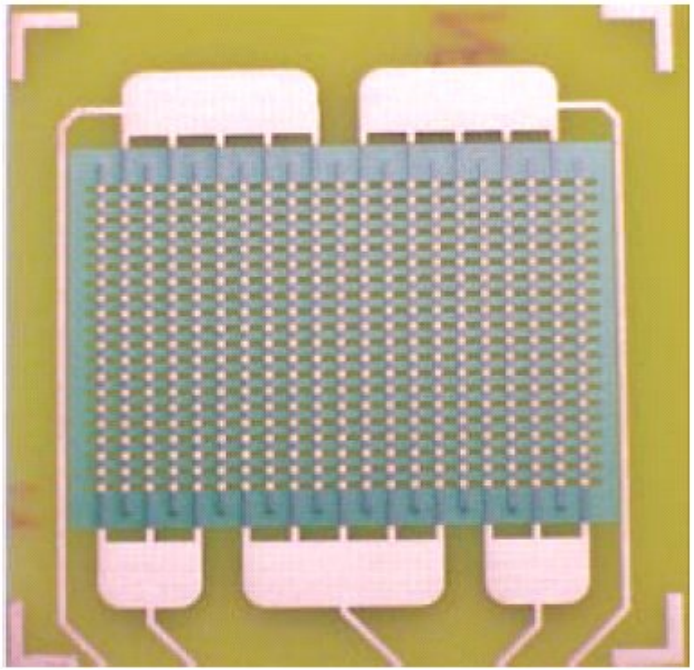
Immersion Depth 0.2mm



Surface insulating resistance #1

Conditions (IPC TM-650 2.6.3.5)

- Specimen as the below figure.
  Eight test patterns were produced for test.
- 35C x 87.5%RH x 24hrs without electrical potential.
- Then, 100VDC x 60sec (in-situ)



Equipment: ETAC SIR12

Surface insulating resistance #2

Measurement Result

No.	Pattern	Resistance (Ohms)	LogOhms
1	1-2	4.44E+11	11.65
2	3-2	2.50E+12	12.40
3	3-4	3.76E+10	10.57
4	5-4	1.33E+12	12.12
5	1-2	3.66E+11	11.56
6	3-2	8.33E+11	11.92
7	3-4	1.67E+12	12.22
8	5-4	9.41E+10	10.97
9	1-2	8.33E+11	11.92
10	3-2	8.13E+10	10.91
11	3-4	2.50E+12	12.40
12	5-4	2.50E+12	12.40
13	1-2	5.92E+10	10.77
14	3-2	1.71E+11	11.23
15	3-4	2.50E+12	12.40
16	5-4	1.83E+12	12.26

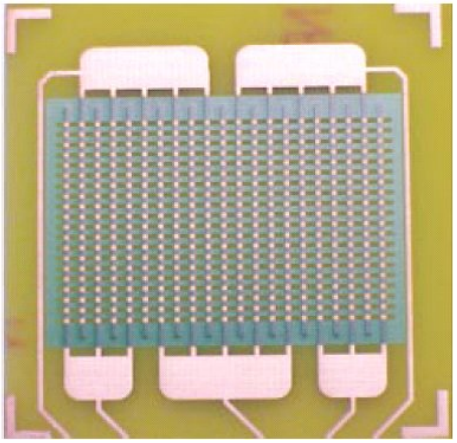
No.	Pattern	Resistance (Ohms)	LogOhms
17	1-2	2.89E+11	11.46
18	3-2	2.50E+12	12.40
19	3-4	1.06E+10	10.02
20	5-4	6.11E+11	11.79
21	1-2	1.33E+12	12.12
22	3-2	1.46E+11	11.17
23	3-4	2.50E+12	12.40
24	5-4	2.50E+12	12.40
25	1-2	1.31E+11	11.12
26	3-2	4.20E+10	10.62
27	3-4	2.50E+12	12.40
28	5-4	1.89E+11	11.28
29	1-2	6.11E+11	11.79
30	3-2	7.51E+10	10.88
31	3-4	2.50E+12	12.40
32	5-4	2.22E+11	11.35

- The blanks in this table means ‘incapable measurement’ on account of any reason; handling, wire connect, ……..
- The maximum limit is LogOhms=12.40 by our equipment in this test condition.

Electrochemical migration #1

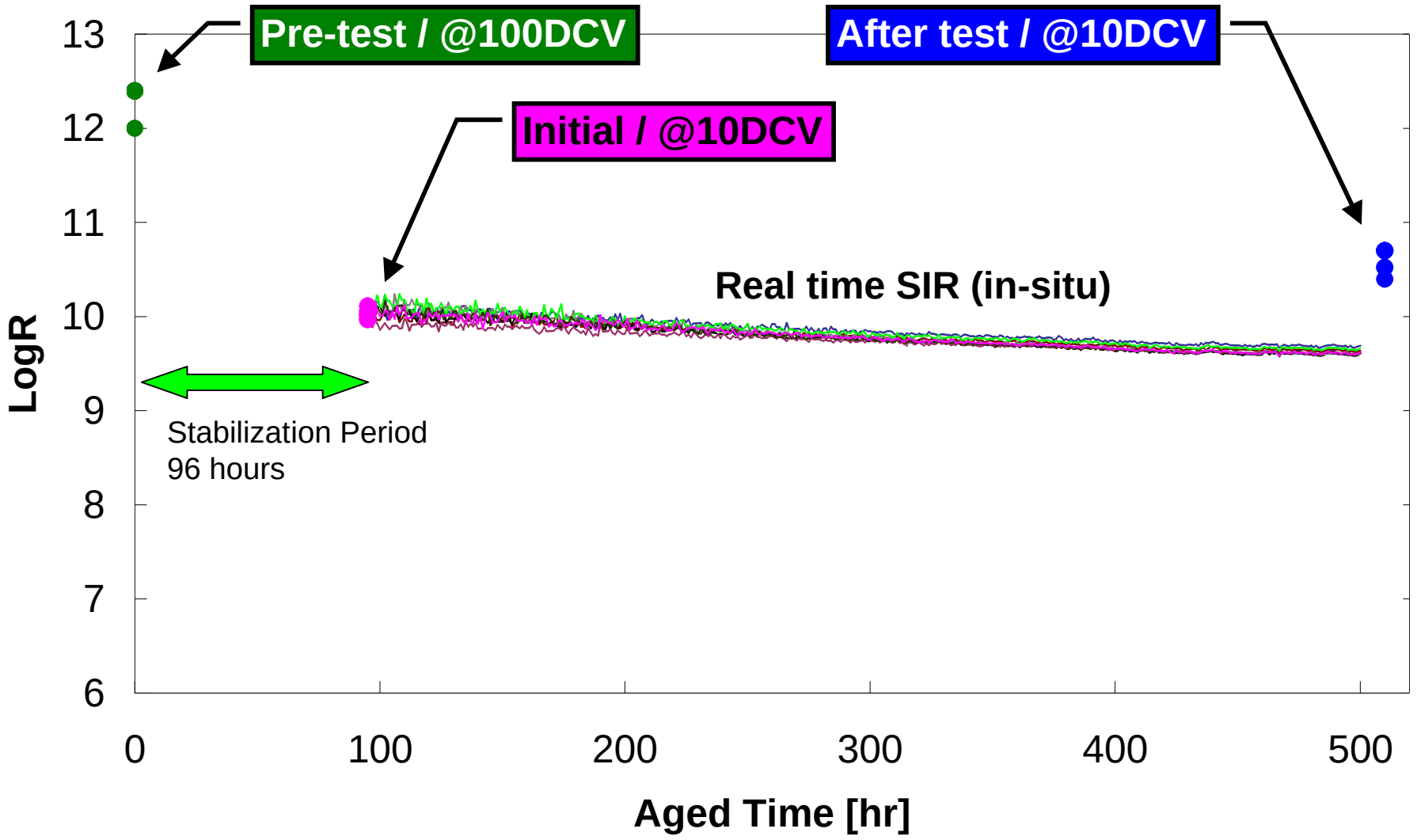
Conditions (IPC TM-650 2.6.14)

- Specimen as the below figure.
  Three test patterns were produced for test.
- Prior to testing, take IR measurement at 100VDC.
- Initial measurement after 85C x 85%RH x 96hrs.
- Then, apply 10VDC at 85C x 85%RH for 404hrs.
  Record IR every hour, and monitor electrochemical migration at intervals of 40msec.
- After 500hrs,
  measure IR again at 100VDC. And check MIG by microscope.



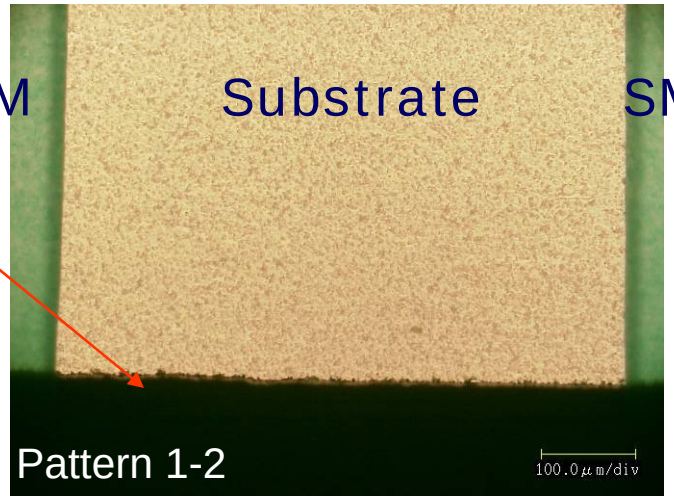
Equipment: ETAC SIR12

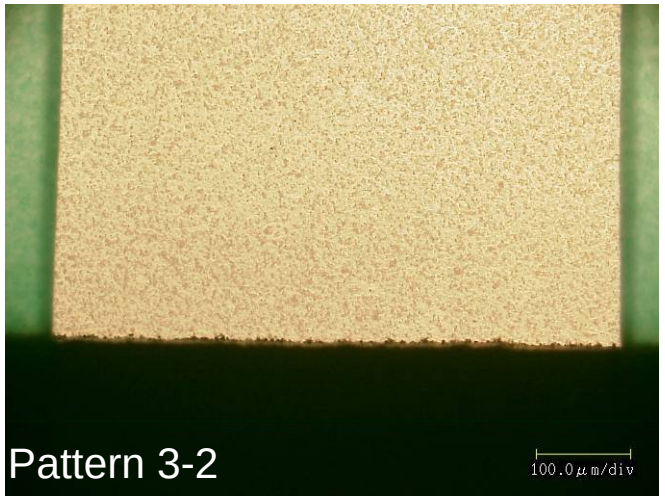
Electrochemical migration #2

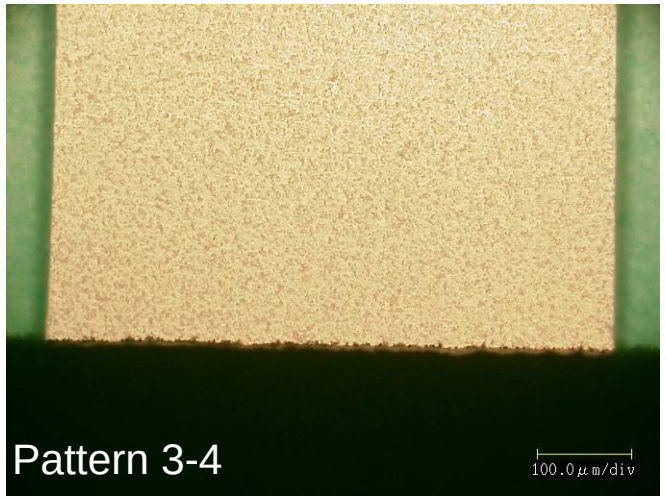


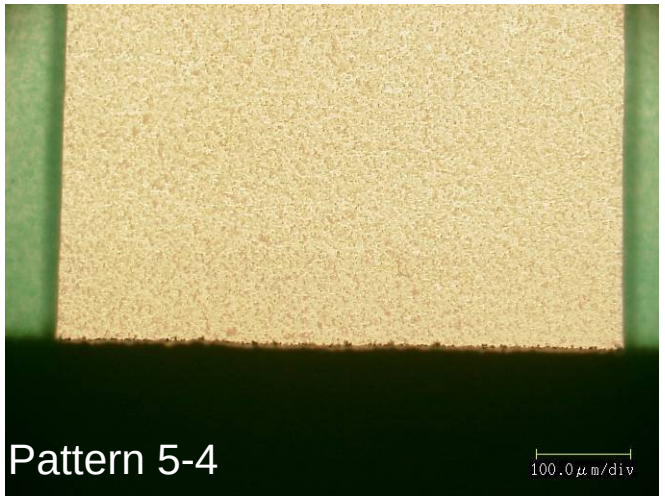
Electrochemical migration #3

Visual inspection with backlighting / No filament growth









Conclusion

Surface Structure

Uniform tin surface was observed. There were no extraneous plating, skip plating, edge pull back, dark, and discolored pads.

Purity of Tin Coating

Approximately 1% additive was included in RMK-30 tin coating. The other metals were not detected by ICP measurement.

Wetting Balance

Except for 'Steam Aging', RMK-30 showed good performance (ZCT, Fmax, appearance).

'Steam Aging' is a harsh conditioning (93C steam and 8 hours) for immersion tin coating.

Surface Insulating Resistance (SIR)

All SIR values were more than 1E+10 ohm. Rinse steps after tin plating is important to SIR issue.

Electrochemical Migration

No migration was detected by the real time monitoring (40msec switching). And it was also confirmed by visual inspection with backlighting.