

Messrs.

Request for Acceleration of Switching the Plating Type for Two-Terminal SMD Diodes

Dear Valued Customer,

We asked our customers the switching to Sn plating in our letter dated July 7, 2005 (Ref. No. 83-033) and, thanks to your cooperation, the progress of the transition is much faster than expected. Therefore, we hereby inform you that Shindengen is about to discontinue the manufacture of the Sn-Bi plating type for two-terminal SMD diodes. Below shows the planned schedule.

<Products concerned>

1F, 2F, and M2F package products

<Planned schedule of discontinuation>

Shindengen now plans to stop the manufacture at the end of September, 2007. If you have not completed the changeover yet, you are kindly requested to accelerate the transition.

We hope this will not cause you too much trouble, and your cooperation would be highly appreciated.

Shindengen Electric Mfg. Co., Ltd.



Masatoshi Nagashima

Manager

Semiconductor Quality Assurance Sect.

Ref. No. 83-033
July 7, 2005

Messrs.

Change Notice of the Plating Type for Two-Terminal SMD Diodes

Dear Sirs,

We hereby inform you of the change of the plating type for the captioned devices. Please see below for the details:

<Intended Packages>

1F, 2F, M2F package products (See attached sheet for the type number of each device)

<Content of Change>

The Pb free plating shall be unified to Sn plating. In accordance with the unification, the spec code will be altered from 7xxx to 5xxx.

<Reason to Change>

In order to unify the two types of Pb free plating (Sn and Sn-Bi).

<Implementation>

As the productions are being switched gradually, it would be highly appreciated if you could expedite the change to Sn plating type.

<Electrical Characteristics>

Equivalent to those of Sn-Bi plating type products and there will be no change.

<Reliability>

Equivalent to those of Sn-Bi plating type products and there will be no change.

If you have any questions, please do not hesitate to contact us.

Shindengen Electric Mfg. Co., Ltd.



Masatoshi Nagashima

Manager

Quality Assurance Section #1

Electronic Device Quality Assurance Dept.

[Intended Packages]

Exhibit

1F Package Products (example)

1)D1F20	2)D1F60	3)D1F60A	4)D1FL20U	5)D1FL40	6)D1FH3
7)D1FM3	8)D1FP3	9)D1FS4	10)D1FS4N	11)D1FS4A	12)D1FS6
13)D1FJ4	14)D1FJ10	15)D1FK60	16)D1FK70	17)G1VL8C	18)G1VL10C
19)G1VL22C	20)KL3L07	21)KL3N14	22)KL3R20	23)KL3Z07	24)KL3Z18
25)DL04-18F1	26)ST03-58F1	27)ST03-68F1	28)ST04-14F1	29)ST04-16F1	30)ST04-18F1
31)ST04-27F1	32)VR-61F1				

2F Package Products (example)

1)D2F20	2)D2F60	3)D3F60	4)D4F60	5)D2FL20U	6)D2FL40
7)D2FS4	8)D2FS6	9)D3FP3	10)D3FS4A	11)D3FS6	12)D3FJ10
13)D2FK60	14)KP10L06	15)KP10L07	16)KP10L08	17)KP10N14	18)KP10R25
19)KP15L08	20)KP15N14	21)KP15R25	22)KP4L07	23)KP4N12	24)ST02D-170F2
25)KP10LU07	26)K1VP15C	27)K1VP24	28)KP4F8	29)KP4F12	

M2F Package Products (example)

1)M2FH3	2)M2FM3	3)KU10L08	4)KU10N14	5)KU10N16	6)KU5R29N
7)KU10R23N	8)KU10R27N	9)KU10R29N	10)KU10S35N	11)KU10S40N	12)KU15N14
13)KU5N12	14)KU10LU07	15)KU10S31N	16)KU5S31N	17)KU4F8	18)KU4F12

Technical Data

Evaluation of Sn and Sn-Bi plated products

- 1 . Solderability
- 2 . Solder joint reliability
- 3 . Whisker
- 4 . Recommended soldering conditions
- 5 . Reliability Tests

Evaluation of Sn and Sn-Bi plated products

1 . Evaluation of Solderability by wetting balance method

(1) Conditions

Temperature of solder bath : 245 to 255

Type of solder : Sn-37Pb / Sn-3.0Ag-0.5Cu

Preconditioning : 105 / 100%RH / 8h

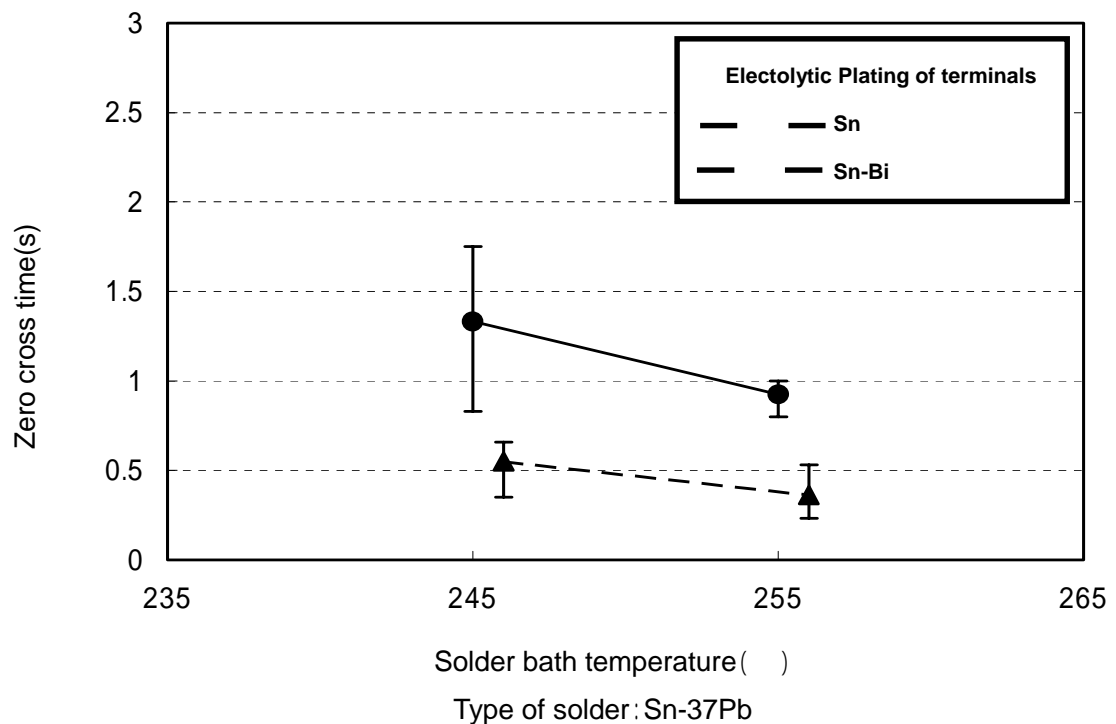
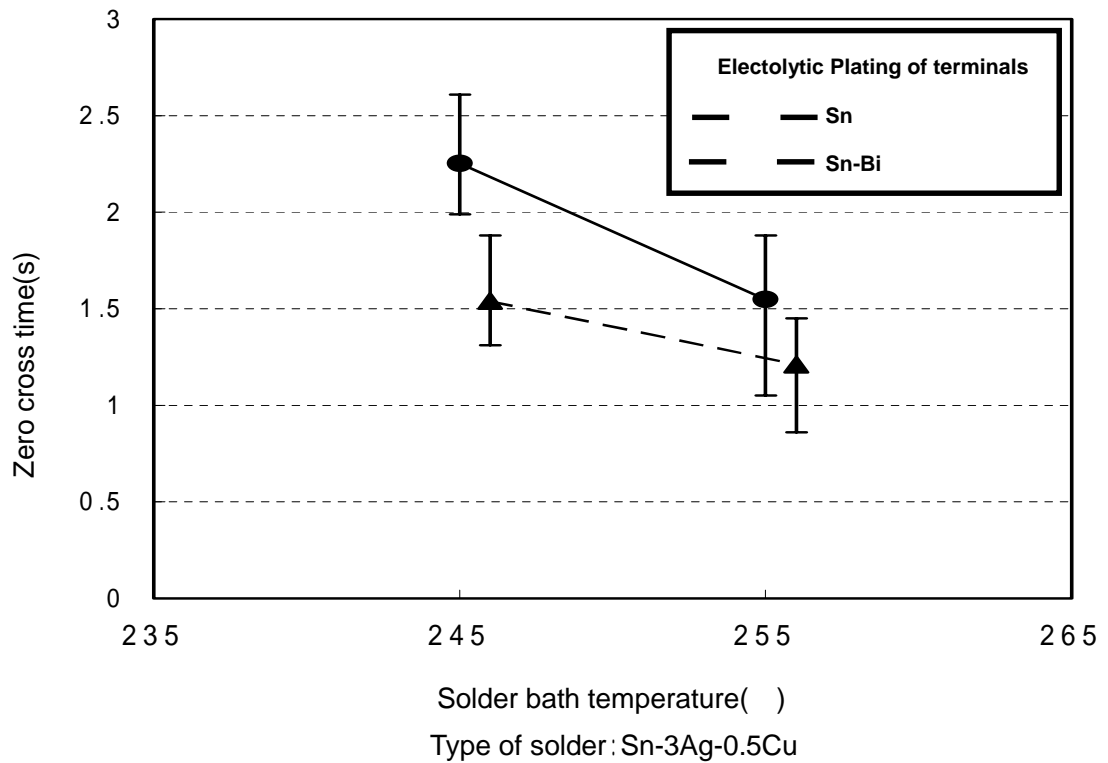
Testing method : Wetting balance method(measurement of zero-cross time)

Dipping speed : 2mm/s

Dipping depth : 0.2mm

Sample number : 11

(2) Evaluation Result <2F>



Notice: Above data are only for reference of the characteristics of a certain Product, and cannot be guaranteed

2 . Evaluation of solder junction reliability(Pull-off strength of the terminal)

(1) Conditions

Type of solder paste: Sn-37Pb / Sn-3.0Ag-0.5Cu

Testing substrate: FR-4 $t=1.6\text{mm}$ Thickness of copper foil: $35\text{ }\mu\text{m}$

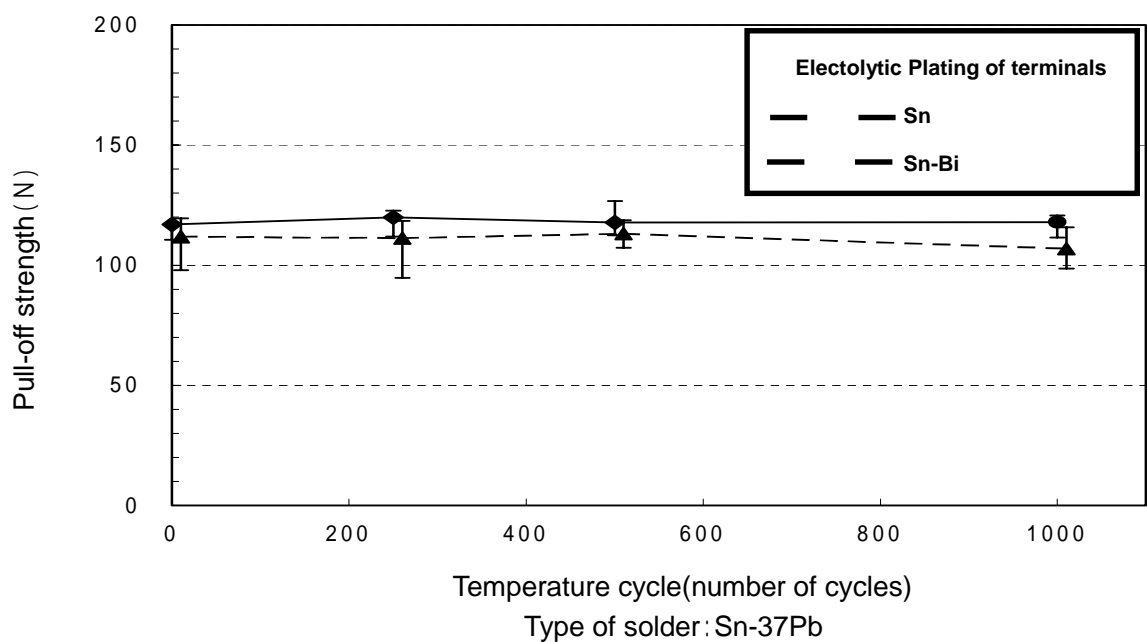
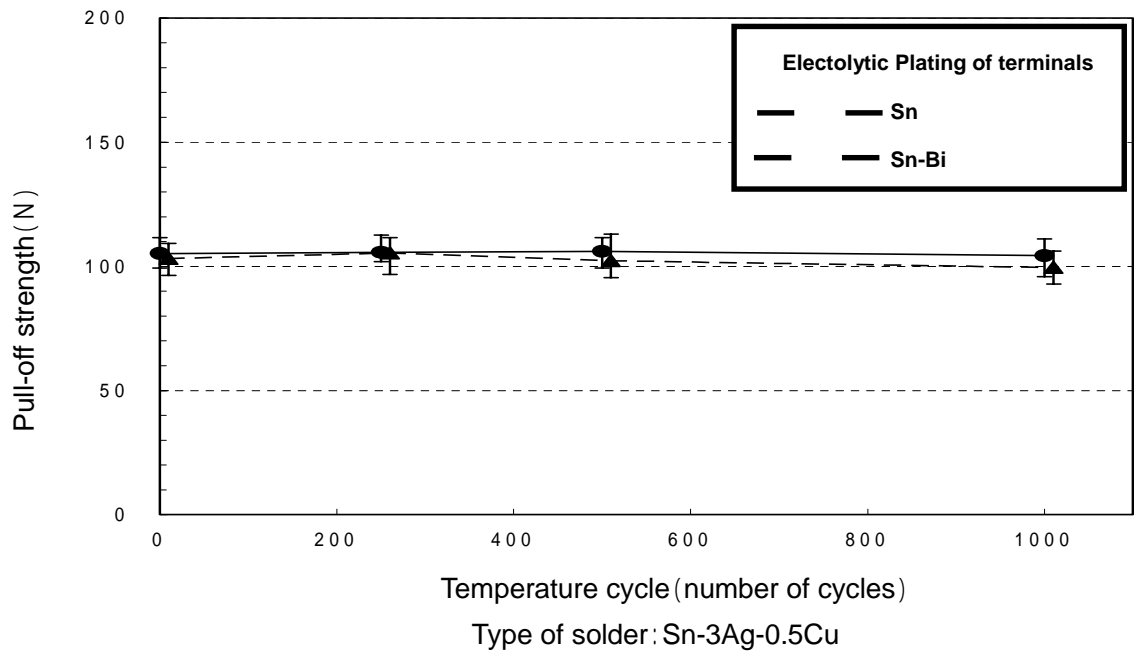
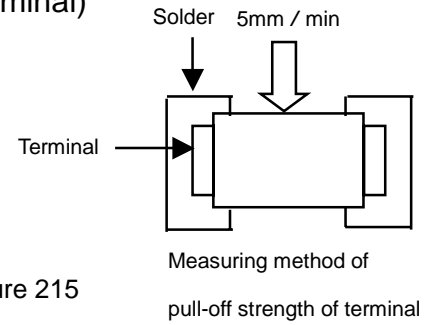
Pretreatment: 105 / 100%RH / 8h

Soldering conditions:

Sn-37Pb Pre heat 140 to 160 60sec. To 120sec. Peak temperature 215

Sn-3.0Ag-0.5Cu Pre heat 150 to 190 60sec. To 120sec. Peak temperature 240

Testing method: measurement of pull-off strength of the terminal after temperature cycle (-40 to 125) No. of samples: $n=11$



Notice: Above data are only for reference of the characteristics of a certain Product, and cannot be guaranteed

3 . Sn Plating whisker evaluation of a terminal

(1) Conditions

Room temperature test: 1year

Constant temperature/humidity test: 60 / 85%, 1000h

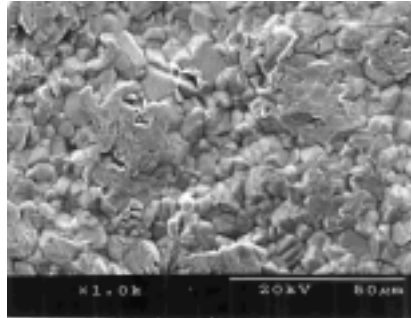
Temperature cycle test: -30 to 80 ,1000cy

(2) Result

The result which observed the terminal surface by SEM (scanned type electron microscope) is shown.

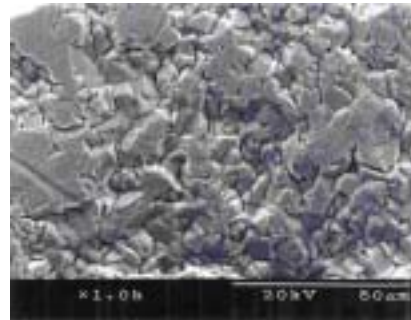
< 2F >

Room temperature test, 1year



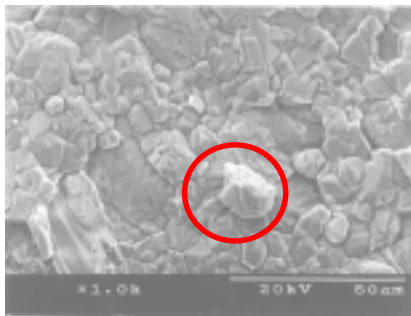
Generating of a whisker is not seen.

Constant temperature/humidity test: 60 / 85%, 1000h



Generating of a whisker is not seen.

Temperature cycle test: -30 to 80 ,1000cy



About 5 μ m of whisker() is generated,

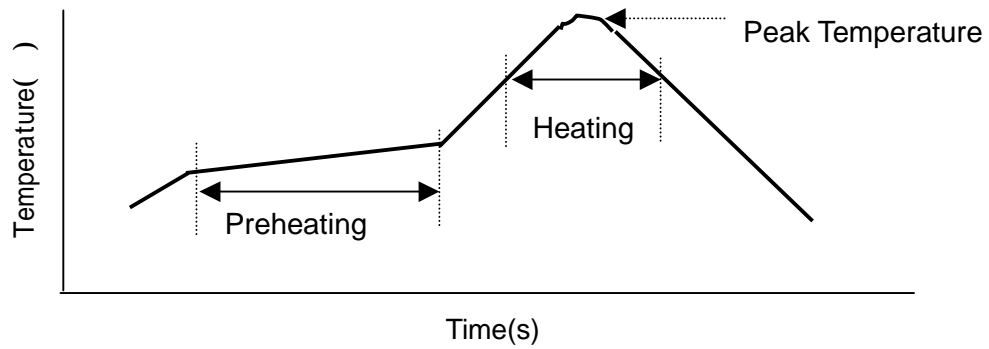
But there are practically no problem

Notice: Above data are only for reference of the characteristics of a certain Product, and cannot be guaranteed

4 . Recommended soldering conditions

< 1F · 2F · M2F · G1F >

4 . 1 Infrared reflow method



Preheating temperature and time	150 to 180 90+30 - 30s
Heating temperature and time	230 30+30 - 30s
Peak Temperature	250 ,10s or less Max255
Number of Heating times	2

4 . 2 Wavesolder conditions

Solder temperature: 260+5 - 5

Heating time: 10+1 - 1s

Number of times: 1

4 . 3 Hand solder conditions

Packages	Temperature of soldering iron	Heating time	Number of times
G1F	350+10 - 10	3+1 - 1s	1
1F · 2F · M2F	380+10 - 10	3+1 - 1s	1

5 . Reliability tests

< 1F·2F·M2F·G1F >

5 . 1 Resistance to soldering heat test

Moisture soaking : 125 , 24h 85 , 65%, 168h(expect for THD)

Soldering heat conditions : (1) Infrared-ray reflow

(2) Wavesoldering

Solder heat resistance conditions refer to "4. Recommendation soldering conditions" .

Result

Infrared-ray reflow	Wavesoldering
0/22	0/22

5 . 2 Temperature cycle test

Preconditioning: Resistance to soldering heat test

Test conditions: Tstg Min 30min RT 5min Tstg Max 30min 100cycles

Result

Infrared-ray reflow	Wavesoldering
0/22	0/22

5 . 3 Moisture resistance test

Preconditioning: Resistance to soldering heat test

Test conditions: 85+2-2 , 85+5-5%RH, 1000h

Result

Infrared-ray reflow	Wavesoldering
0/22	0/22

Notice: Above results of temperature cycle test and moisture resistance test are reference data.