台灣半導體股份有限公司
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TAIWAN SEMICONDUCTOR CO., LTD.
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Shindian Dist., New Taipei City, Taiwan, R.O.C. 231
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Comparison Report

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Checked by James Yu
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Reversion for A

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Comparison report

No.	Item	Specification	Old	New
1	Electrical test data	Refer to TSC data sheet	Page 3	Page 3
2	Plating thickness	8~20 um	Page 4	Page 4
3	Plating Material	1. Alloy type: Pure Tin 2. Finish type: Matte	1. Alloy type: Pure Tin 2. Finish type: Matte	1. Alloy type: Pure Tin 2. Finish type: Matte
4	Solderability test (JESD22-B102)	JESD22-B102 (>95% coverage)	Page 5	Page 5
5	Plating method	N/A	Strip plating	Strip plating
6	Whisker growth check	JEDEC22-A121A	Page 6	Page 6
7	Reliability test	AEC-Q101-D	Pass TC/AC/H3TRB/RSH test	Pass TC/AC/H3TRB/RSH test

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Certification of design, construction and qualification

Electrical Parameter Comparison

Test data comparison

Supplier	Old			New		
P/N	TSN520M60			TSN520M60		
Package	PDFN56			PDFN56		
Lot.	L5-150911-004			I5-150914-011		
Test Item	VF(V)	VBR(V)	IR(uA)	VF(V)	VBR(V)	IR(uA)
Test Condition	IF=20A	IR=1mA	VR=60V	IF=20A	IR=1mA	VR=60V
Min	0.469	69.4	33.5	0.478	70.4	21.2
Max	0.481	73.3	49.6	0.489	72.8	40.5
Mean	0.473	71.6	42.4	0.481	71.3	29.8
Avg	0.474	71.8	42.5	0.482	71.4	30.1
Sigma	0.002	0.670	4.090	0.002	0.573	4.780
Data Book	0.58	60	500	0.58	60	500
CPK1	17.667	5.871	37.286	16.333	6.632	32.768

Test data comparison

Supplier	Old			New		
P/N	TSF30H150C			TSF30H150C		
Package	ITO-220AB			ITO-220AB		
Lot	L2-151012-015			I2-150915-023		
Test Item	VF(V)	VBR(V)	IR(uA)	VF(V)	VBR(V)	IR(uA)
Test Condition	IF=30A	IR=1mA	VR=150V	IF=30A	IR=1mA	VR=150V
Min	0.86	169.5	0.25	0.856	168.7	0.25
Max	0.882	172.1	0.83	0.871	173.4	1.15
Mean	0.865	170.9	0.52	0.861	171	0.46
Avg	0.868	171	0.536	0.862	171.1	0.477
Sigma	0.005	0.603	0.171	0.003	1.019	0.273
Data Book	0.98	150	150	0.98	150	150
CPK1	7.467	11.609	291.353	13.111	6.902	182.568

Test data comparison

Supplier	Old			New		
P/N	TSPB15U50S			TSPB15U50S		
Package	SMPC			SMPC		
Lot	L4-151014-010			I4-150917-002		
Test Item	VF(V)	VBR(V)	IR(uA)	VF(V)	VBR(V)	IR(uA)
Test Condition	IF=15A	IR=1mA	VR=50V	IF=15A	IR=1mA	VR=50V
Min	0.467	71.7	19.3	0.472	73.3	14.9
Max	0.477	76.4	29.1	0.484	75.9	22.5
Mean	0.469	73.8	24	0.476	74.6	18
Avg	0.471	73.9	24.1	0.477	74.6	18.1
Sigma	0.002	0.804	2.470	0.002	0.635	1.760
Data Book	0.56	50	2000	0.56	50	2000
CPK1	14.833	9.909	266.653	13.833	12.913	375.360

Test data comparison

Supplier	Old					New				
P/N	TSM100N06CZ					TSM100N06CZ				
Package	TO-220					TO-220				
Lot	L6-150803-020					I2-150918-008				
Test Item	VGSth(V)	IGSS(nA)	IDSS(nA)	RDSON(Ohm)	BVDSS(V)	VGSth(V)	IGSS(nA)	IDSS(nA)	RDSON(Ohm)	BVDSS(V)
Test Condition	ID=250uA	VGS=20V	VDSS=48V	ID=30A	ID=250uA	ID=250uA	VGS=20V	VDSS=48V	ID=30A	ID=250uA
Min	3.184	1.3	1.1	5.086	67.8	3.192	1.5	0.8	4.97	66.2
Max	3.243	10.7	14.6	5.88	70.3	3.289	10.3	9.1	5.79	69.9
Mean	3.219	5.6	5.8	5.71	69.2	3.233	6	5.3	5.14	68.4
Avg	3.22	5.65	5.81	5.71	69.24	3.235	6.16	5.53	5.28	68.46
Sigma	0.016	2.218	4.144	0.243	0.741	0.024	2.020	2.016	0.322	0.884
Data Book	4	100	1000	6.7	60	4	100	1000	6.7	60
CPK1	16.250	14.179	79.970	1.358	4.157	10.625	15.485	164.430	1.470	3.190

Old

PACKAGE	P/N	THICKNES SPEC	MIN	MAX	AVG	SIGMA	1	2	3	4	5	6
PDFN	TSN520M60	8~20μm	11.2	13.7	12.6	0.89	13.7	12.9	11.9	12.8	12.9	11.2
TO	TSM70N600CL	8~20μm	11.2	15	13	1.54	12.5	12.7	15	14.7	11.2	11.8
SMPC	TSPB20U80S	8~20μm	10	11.6	10.6	0.53	10.9	10.6	10	10.5	11.6	10.4
ITO	TSF30H150C	8~20μm	11.4	12.7	12	0.53	12.1	12.4	11.4	12.7	11.4	12.1

New

PACKAGE	P/N	THICKNES SPEC	MIN	MAX	AVG	SIGMA	1	2	3	4	5	6
PDFN	TSN520M60	8~20μm	10.2	12.7	11.3	0.93	11	11.4	12.7	10.2	11.9	10.5
TO	TSM70N600CL	8~20μm	12.4	14.8	13.6	1.02	12.7	14	12.4	12.9	14.5	14.8
SMPC	TSPB20U80S	8~20μm	10.2	12.2	11.2	0.77	11.2	12.2	11.9	10.2	10.5	11.3
ITO	TSF30H150C	8~20μm	10.4	11.3	10.9	0.34	11.2	11.3	10.8	10.6	11.1	10.4

Solderability test

Condition of soldering:Pb free solderability 245±5℃, 5sec.

Test quantity(pcs)		30
P/N		TSN520M60
Package		PDFN56
Judgement(>95% coverage)		PASS
Before Solderability test	TOP	
	BOTTOM	
After Solderability test	BOTTOM	

Test quantity(pcs)		30
P/N		TSF30H150C
Package		ITO-220
Judgement(>95% coverage)		PASS
Before Solderability test	TOP	
	BOTTOM	
After Solderability test	TOP	

Test quantity(pcs)		30
P/N		TSPB15U50S
Package		SMPC
Judgement(>95% coverage)		PASS
Before Solderability test	TOP	
	BOTTOM	
After Solderability test	BOTTOM	

Test quantity(pcs)		30
P/N		TSM100N06CZ
Package		TO-220
Judgement(>95% coverage)		PASS
Before Solderability test	TOP	
	BOTTOM	
After Solderability test	TOP	

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Tin Whisker growth test- TC

Package	JEDEC Standard No. 22-A121A		1500cys
	Pre-conditioning	Test condition	
PDFN5x6	Tpeak=215℃	Min Temperature -55℃ Max Temperature 85℃ air to air, 10minute soak; ~3 cycles/hour	2015/12/28
	Tpeak=250℃		2015/12/28

Tin Whisker growth test- High Temperature/High Humidity

Package	JEDEC Standard No. 22-A121A		4000 Hrs
	Pre-conditioning	Test condition	
PDFN5x6	Tpeak=215℃	55±3 ℃ and 85±3 % RH	2016/3/22
	Tpeak=250℃		2016/3/22

Tin Whisker growth test- Temperature/ Humidity

Package	JEDEC Standard No. 22-A121A		4000 Hrs
	Pre-conditioning	Test condition	
PDFN5x6	Tpeak=215℃	30±2 ℃ and 60±3 % RH	2016/9/7
	Tpeak=250℃		2016/9/7