台灣半導體股份有限公司
231 台北縣新店市北新路三段205號11樓
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TAIWAN SEMICONDUCTOR CO., LTD.
11F, No. 205 Sec. 3, Beishin RD.
Shindian Dist., New Taipei City, Taiwan, R.O.C. 231
Tel:886-2-8913-1588 Fax:886-2-8913-1788

Dimple change comparison report
Involved rectifiers: RS1A thru RS1M series

Prepared by Owen Wang
Checked by Jack Leu
Approved by Quayer Chen
Issued date at 21st Jan., 2013
Reversion for A

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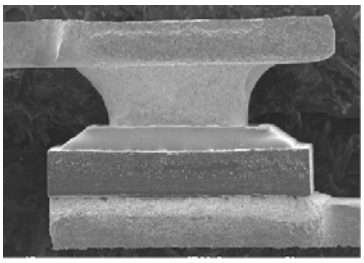
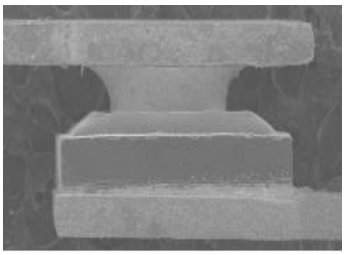
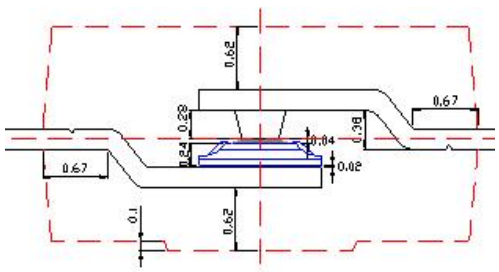
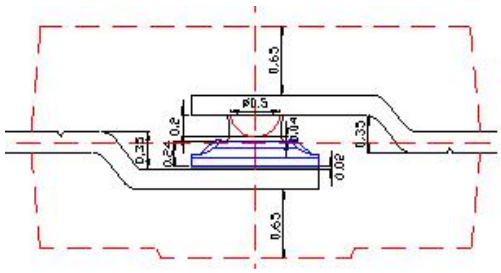
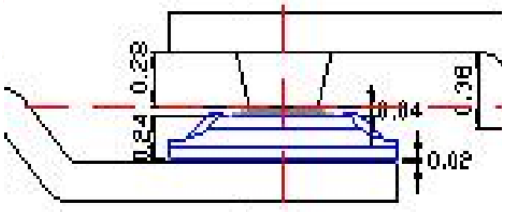
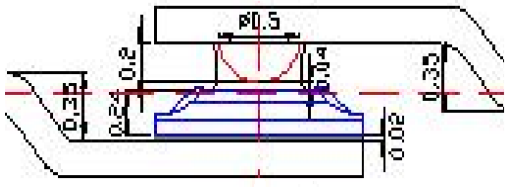
Comparison report (RS1A thru RS1M)

Construction photo compared:

	Old	New	Result
Die structure	STD GPP	STD GPP	a) Outside appearance has no change. b) Leadframe of dimple shape has changed.
Photo of x-ray			
Diagram			

Dimension compared:

	Old	New	Result
Die(mil)	50 x 50	50 x 50	a) Outside dimension has no change. b) There are the leadframe of dimension change in the dimple height, the dimple diameter & the down set.
Inside			

Item		Old	New
Lead-frame	Down set(mm)	0.38	0.35
	Dimple diameter(mm)	0.38	0.5
	Dimple height(mm)	0.28	0.2
Solder wafer(mm)		1.2 x 0.05	1.2 x 0.05
Free gap between dimple and die surface(mm)		0.04	0.04

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Comparison report (RS1A thru RS1M)

Electrical characteristics compared:

Test condition/Specification	RS1G		Result
	Old	New	
Maximum Instantaneous Forward Voltage V_F < 1.3V @ 1.0A	1.150 ~ 0.982	1.119 ~ 0.978	The electrical characteristics drift seen is in normal process distribution.
Maximum Recurrent Peak Reverse Voltage V_{RRM} > 400V @ 5.0uA	1141 ~ 769	983 ~ 806	
Maximum DC Reverse Current I_R < 5.0uA @ 400V	0.015 ~ 0.001	0.004 ~ 0.001	
Maximum Reverse Recovery Time Trr < 150nS(Reverse Recovery Test Conditions: IF=0.5A, IR=1.0A, IRR=0.25A)	120 ~ 64	97 ~ 64	
Test condition/Specification	RS1J		
	Old	New	
Maximum Instantaneous Forward Voltage V_F < 1.3V @ 1.0A	1.087 ~ 0.969	1.038 ~ 0.944	
Maximum Recurrent Peak Reverse Voltage V_{RRM} > 600V @ 5.0uA	1194 ~ 792	957 ~ 764	
Maximum DC Reverse Current I_R < 5.0uA @ 600V	0.010 ~ 0.001	0.007 ~ 0.001	
Maximum Reverse Recovery Time Trr < 250nS(Reverse Recovery Test Conditions: IF=0.5A, IR=1.0A, IRR=0.25A)	134 ~ 65	114 ~ 86	
Test condition/Specification	RS1M		
	Old	New	
Maximum Instantaneous Forward Voltage V_F < 1.3V @ 1.0A	1.160 ~ 0.972	1.048 ~ 0.978	
Maximum Recurrent Peak Reverse Voltage V_{RRM} > 1000V @ 5.0uA	1359 ~ 1281	1410 ~ 1253	
Maximum DC Reverse Current I_R < 5.0uA @ 1000V	0.040 ~ 0.001	0.040 ~ 0.001	
Maximum Reverse Recovery Time Trr < 500nS(Reverse Recovery Test Conditions: IF=0.5A, IR=1.0A, IRR=0.25A)	186 ~ 117	140 ~ 90	
Maximum Forward Surge Current, 8.3ms sigle half sine-wave I_{FSM} > 30A	45	45	
Typical Thermal Resistance Rth j-A = 105.0℃/W	105	105	
Typical Thermal Resistance Rth j-c = 32.0℃/W	32	32	

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Production Part Approval - Material, Performance Test Results
Discrete Semiconductor Component Qualification Plan

Customer P/N：	RS1M	Product Engineer：	Meifang
Customer Spec. #：	N/A	General Specification：	
Supplier Name：	Taiwan Semiconductor Corp.	Supplier Manufacturing Site：	YEW
Supplier Generic P/N：	SMA 1.0Amps SMD rectifiers	Required PPAP Submission Date：	10-Apr-12
Supplier Internal P/N：	RS1A thru RS1M	Family Type：	FR GPP
Reason for Qual.：	Dimple shape/dimension change		

Item	Test	Test Condition	Exceptions	Est. Start	Est. Comp.	# Lots	S.S.	Remarks
1	Electrical Test	Electrical characterization	@25℃	9-Apr-12	9-Apr-12	ALL	616	ACC
2	External Visual	Inspect device construction, marking and workmanship	N/A	9-Apr-12	9-Apr-12	ALL	616	ACC
3	Parameter Verification	Electrical characterization	@25/150℃	9-Apr-12	9-Apr-12	1	10	ACC
4	Pre-conditioning	Per specification	N/A	10-Apr-12	21-Apr-12	1	308	ACC
5	H.3T.R.B	Ta = 85 ± 2℃, R.H = 85 ± 5%VR = 80%	168hrs	21-Apr-12	29-Apr-12	1	77	ACC
6	H.T.R.B.	80% Rated VR (T=150℃)	168hrs	9-Apr-12	17-Apr-12	1	77	ACC
7	Temperature Cycle	-55°C/15Min, 150°C/15Min, 25°C/5Min (T	100cycles	21-Apr-12	26-Apr-12	1	77	ACC
8	Autoclave	Ta = 121 ± 2℃ 15Psig	96hrs	21-Apr-12	26-Apr-12	1	77	ACC
9	Intermittent Operating Life	On/5min, Off/5min	2520cycles	21-Apr-12	29-Apr-12	1	77	ACC
10	Humidity	Ta = 85 ± 2℃, R.H = 85 ± 5%	168hrs	9-Apr-12	17-Apr-12	1	77	ACC
11	Low Temperature Storage	Ta = -55 ± 3℃	168hrs	9-Apr-12	17-Apr-12	1	77	ACC
12	High Temperature Storage	Ta = 150(+10/-0)℃	168hrs	9-Apr-12	17-Apr-12	1	77	ACC
13	DPA	Per specification	N/A	30-Apr-12	1-May-12	1	2	ACC
14								
15								
16								
17								
18								

Comment：

Prepared by：	Reben	Approved by：	Hejun
Date：	2-May-12	Date：	3-May-12
Title：	Hi-rel supervisor	Title：	QA leader

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Dimple change comparison report
Involved rectifiers: S1A thru S1M series

Prepared by Owen Wang
Checked by Jack Leu
Approved by Quayer Chen
Issued date at 218st Jan., 2013
Reversion for A

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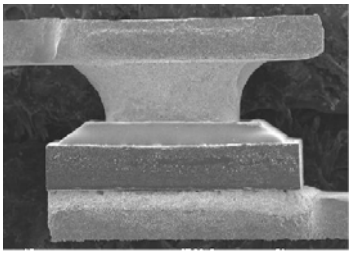
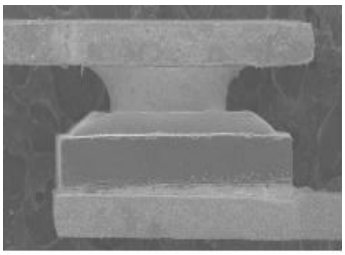
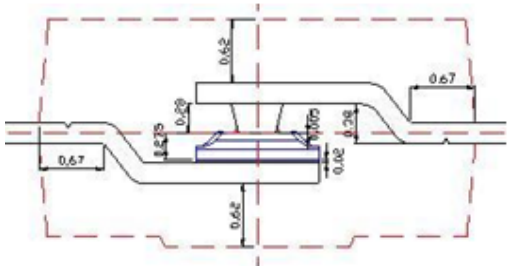
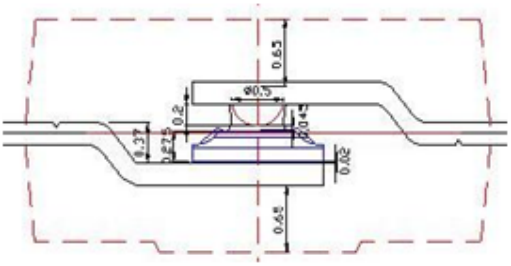
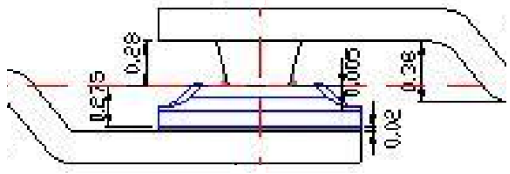
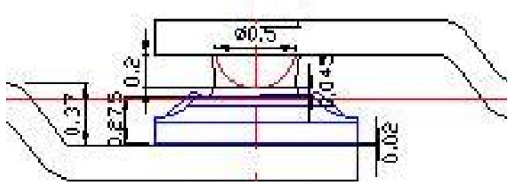
Comparison report (S1A thru S1M)

Construction photo compared:

	Old	New	Result
Die structure	STD GPP	STD GPP	a) Outside appearance has no change. b) Leadframe of dimple shape has changed.
Photo of x-ray			
Diagram			

Dimension compared:

	Old	New	Result
Die(mil)	50 x 50	50 x 50	a) Outside dimension has no change. b) There are the leadframe of dimension change in the dimple height, the dimple diameter, the down set & the free gap.
Inside			

Item		Old	New
Lead-frame	Down set(mm)	0.38	0.37
	Dimple diameter(mm)	0.38	0.5
	Dimple height(mm)	0.28	0.2
Solder wafer(mm)		1.2 x 0.05	1.2 x 0.05
Free gap between dimple and die surface(mm)		0.005	0.04

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Comparison report (S1A thru S1M)

Electrical characteristics compared:

Test condition/Specification	S1J		Result
	Old	New	
Maximum Instantaneous Forward Voltage V_F < 1.1V @ 1.0A	0.984 ~ 0.943	0.957 ~ 0.934	The electrical characteristics drift seen is in normal process distribution.
Maximum Recurrent Peak Reverse Voltage V_{RRM} > 600V @ 1.0uA	1224 ~ 946	1215 ~ 887	
Maximum DC Reverse Current I_R < 1.0uA @ 600V	0.009 ~ 0.001	0.005 ~ 0.001	
Maximum Forward Surge Current, 8.3ms sigle half sine-wave I_{FSM} > 40A	45	45	
Typical Thermal Resistance Rth j-A = 75.0℃/W	75	75	
Typical Thermal Resistance Rth j-L = 27.0℃/W	27	27	
Test condition/Specification	S1K		
	Old	New	
Maximum Instantaneous Forward Voltage V_F < 1.1V @ 1.0A	0.982 ~ 0.898	0.972 ~ 0.942	
Maximum Recurrent Peak Reverse Voltage V_{RRM} > 800V @ 1.0uA	1573 ~ 1336	1615 ~ 1395	
Maximum DC Reverse Current I_R < 1.0uA @ 800V	0.199 ~ 0.012	0.029 ~ 0.016	
Test condition/Specification	S1M		
	Old	New	
Maximum Instantaneous Forward Voltage V_F < 1.1V @ 1.0A	0.979 ~ 0.893	0.970 ~ 0.948	
Maximum Recurrent Peak Reverse Voltage V_{RRM} > 1000V @ 1.0uA	1564 ~ 1403	1626 ~ 1330	
Maximum DC Reverse Current I_R < 1.0uA @ 1000V	0.034 ~ 0.001	0.036 ~ 0.016	
Maximum Forward Surge Current, 8.3ms sigle half sine-wave I_{FSM} > 30A	40	40	
Typical Thermal Resistance Rth j-A = 85.0℃/W	85	85	
Typical Thermal Resistance Rth j-L = 30.0℃/W	30	30	

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Production Part Approval - Material, Performance Test Results
Discrete Semiconductor Component Qualification Plan

Customer P/N：	S1J	Product Engineer：	Meifang
Customer Spec. #：	N/A	General Specification：	
Supplier Name：	Taiwan Semiconductor Corp.	Supplier Manufacturing Site：	YEW
Supplier Generic P/N：	SMA 1.0Amps SMD rectifiers	Required PPAP Submission Date：	12-May-12
Supplier Internal P/N：	S1A thru S1M	Family Type：	STD GPP
Reason for Qual.：	Dimple shape/dimension change		

Item	Test	Test Condition	Exceptions	Est. Start	Est. Comp.	# Lots	S.S.	Remarks
1	Electrical Test	Electrical characterization	@25℃	10-May-12	10-May-12	ALL	616	ACC
2	External Visual	Inspect device construction, marking and workmanship	N/A	10-May-12	10-May-12	ALL	616	ACC
3	Parameter Verification	Electrical characterization	@25/150℃	11-May-12	11-May-12	1	10	ACC
4	Pre-conditioning	Per specification	N/A	11-May-12	22-May-12	1	308	ACC
5	H.3T.R.B	Ta = 85 ± 2℃, R.H = 85 ± 5%VR = 80%	168hrs	11-May-12	19-May-12	1	77	ACC
6	H.T.R.B.	80% Rated VR (T=150℃)	168hrs	11-May-12	19-May-12	1	77	ACC
7	Temperature Cycle	-55°C/15Min, 150°C/15Min, 25°C/5Min (T	100cycles	22-May-12	27-May-12	1	77	ACC
8	Autoclave	Ta = 121 ± 2℃ 15Psig	96hrs	22-May-12	27-May-12	1	77	ACC
9	Intermittent Operating Life	On/5min, Off/5min	2520cycles	22-May-12	30-May-12	1	77	ACC
10	Humidity	Ta = 85 ± 2℃, R.H = 85 ± 5%	168hrs	11-May-12	19-May-12	1	77	ACC
11	Low Temperature Storage	Ta = -55 ± 3℃	168hrs	11-May-12	19-May-12	1	77	ACC
12	High Temperature Storage	Ta = 150(+10/-0)℃	168hrs	11-May-12	19-May-12	1	77	ACC
13	DPA	Per specification	N/A	28-May-12	29-May-12	1	2	ACC
14								
15								
16								
17								
18								

Comment：

Prepared by：	Reben	Approved by：	Hejun
Date：	29-May-12	Date：	30-May-12
Title：	Hi-rel supervisor	Title：	QA leader