Test Results of Copper Wire Bonding	ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.	Design	Approval
		In Haga	M.Yamagami

Package type	HTSSOP-B54	Approved Date	Oct.03/2011
Device Name	BD xxxx	Wire Diameter	25um 30um 35um
Process	Cu	Document No.	CU-001-E

1.Wire Bonding Results

Items	TEST Condition	N[pcs]	Pn[pcs]
1st shearing strength	Using shearing tester (DAZY-4000)	44	0
1st shearing mode	Inspect the Mode after Shear test by binocular microscope x200	44	0
Wire pulling strength	Using pull tester(DAZY-4000)	44	0
2nd peeling mode	Inspect the 2nd peel Mode by binocular microscope x40	44	0
Damage under the pad	Eliminate Aluminum layer, then inspect the under-pad crack by binocular microscope x500	44	0

1. Wire Bonding Failure Criteria (JESD22-B116)

Items	Failure Criteria
1st shearing strength	>90mN for 20umφ wire, >200mN for 25 and 30 umφ wires, >300mN for 35umφ
1st shearing mode	Aluminum sliding mark and residue on the back side of the 1st ball
Wire pulling strength	>30mN for 20umφ wire, >40mN for 25um, >60mN for 30umφ wire, >80mN for 35umφ wire Breaking point must be the 1st wire neck or wire hooking points
2nd Peel Mode	Copper must remain on the 2nd tail area
Damage under the pad	No under-pad damage

2.Reliability Test Results

Items	Standard	Test Condition	N[pcs]	Pn[pcs]
HAST	JESD22-A110	130℃/85% 5V 96h	22	0
PCT	JESD22-A102	121℃/100% 300h	44	0
HST	JESD22-A103	150℃ 1000H	44	0
TCY	JESD22-A104	-60℃/150℃ 30min 500cycle	44	0

Pre treatment : Storage at MSL Humidity condition, then 260℃ Peak reflow 3times

2. Reliability Test Failure Criteria

Items	Failure Citeria
HAST	Electrical characteristics must be within the specified values.
PCT	Electrical characteristics must be within the specified values.
HST	Electrical characteristics must be within the specified values.
TCY	Electrical characteristics must be within the specified values.

3.TOTAL JUDGMENT

PASS

ROHM SEMICONDUCTOR

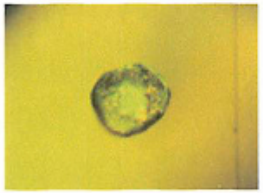
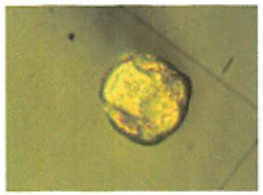
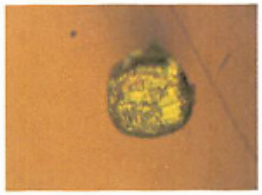
Test Results Copper Wire		Test Item : 1st Shearing Test Results		ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.
Approved Date	2011/9/12	Test Condition	Measure shearing strength using a shearing tester and inspect its result by binocular microscope x200	
Document No.	Cu-002-E			
Device Name	BD xxxx			
Package type	HTSSOP-B54	Failure Criteria	Shearing strength must be more than 300mN. Aluminum sliding marks and residue must be seen on the back side of the 1st ball. (JESD22-B116)	
Wire diameter	35umφ	Judgment	PASS	

Shearing strength measurement results (N=44Ball)

max	493.5
AVE	446.4
min	420.6

(Unit :mN)

Shear Mode Results (N=44ball)

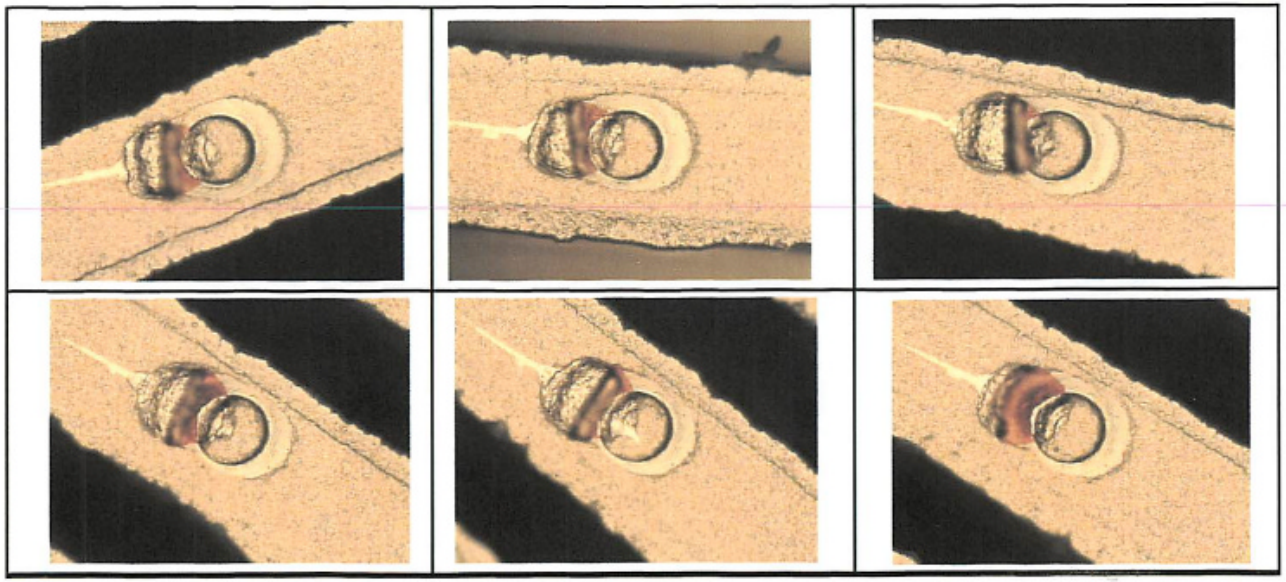
	Shear Mode		
Pad Side			
Backside of 1st Ball			

Results : PASS。

FORM No : Rel-4

Test Results of Copper Wire		Test Item : 2nd Peeling Test Results		ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.
Approved Date	2011/3/22	Test Condition	After wire cutting and peeling , inspect the 2nd peeling mode by binocular microscope x40	
Document No.	Cu-001-E			
Device Name	BD xxxx			
Package type	HTSSOP-B54	Failure Criteria	Remain copper in the 2nd tail area	
Wire diameter	35umφ	Judgment	PASS	

Peeing Test Results (N=44 wire)

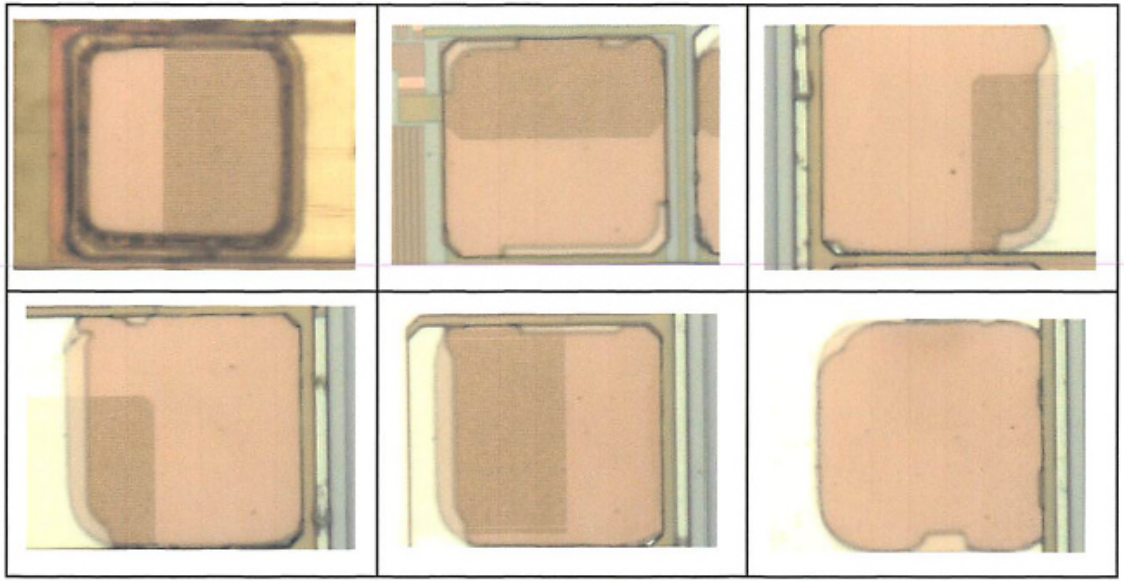


Results : PASS。

FORM No : Rel-4

Test Results of Copper Wire		Test Item : Under-pad Crack		ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.
Approved Date	2011/3/22	Test Condition	Eliminate Aluminum Pad layer, then inspect the under-pad crack by binocular microscope x500	
Document No.	Cu-001-E			
Device Name	BD xxxx			
Package type	HTSSOP-B54	Failure Criteria	No Crack and Damage	
Wire diameter	35umφ	Judgment	PASS	

Under-pad crack results (N=44pcs)



Results : PASS

FORM No : Rel-4

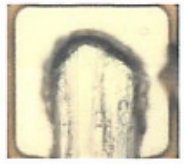
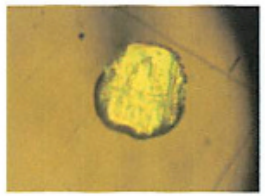
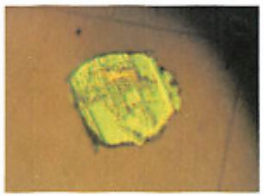
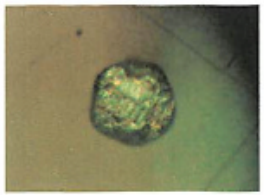
Test Results Copper Wire		Test Item : 1st Shearing Test Results		ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.
Approved Date	2011/9/12	Test Condition	Measure shearing strength using a shearing tester and inspect its result by binocular microscope x200	
Document No.	Cu-002-E			
Device Name	BD xxxx			
Package type	HTSSOP-B54	Failure Criteria	Shearing strength must be more than 200mN. Aluminum sliding marks and residue must be seen on the back side of the 1st ball. (JESD22-B116)	
Wire diameter	25umφ、30umφ	Judgment	PASS	

Shearing strength measurement results (N=44Ball)

max	348.0
AVE	329.9
min	313.0

(Unit :mN)

Shear Mode Results (N=44ball)

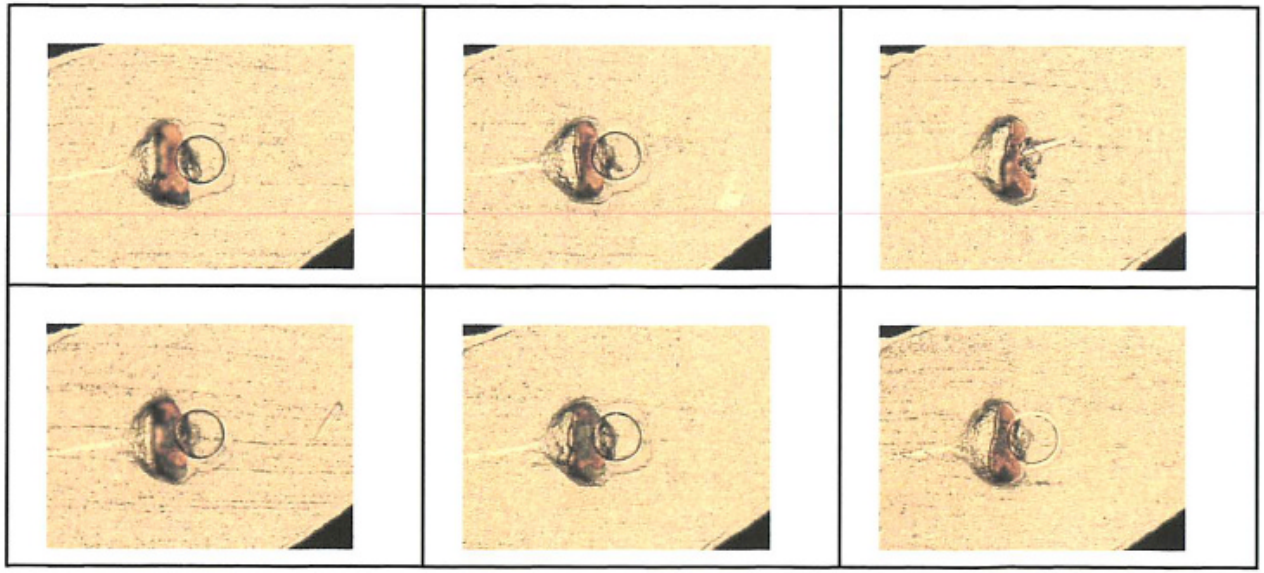
	Shear Mode		
Pad side			
Backside of 1stBall			

Results : PASS。

FORM No : Rel-4

Test Results of Copper Wire		Test Item : 2nd Peeling Test Results		ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.
Approved Date	2011/3/22	Test Condition	After wire cutting and peeling , inspect the 2nd peeling mode by binocular microscope x40	
Document No.	Cu-001-E			
Device Name	BD xxxx			
Package type	HTSSOP-B54	Failure Criteria	Remain copper in the 2nd tail area	
Wire diameter	25umφ、30umφ	Judgment	PASS	

Peeing Test Results (N=44 wire)



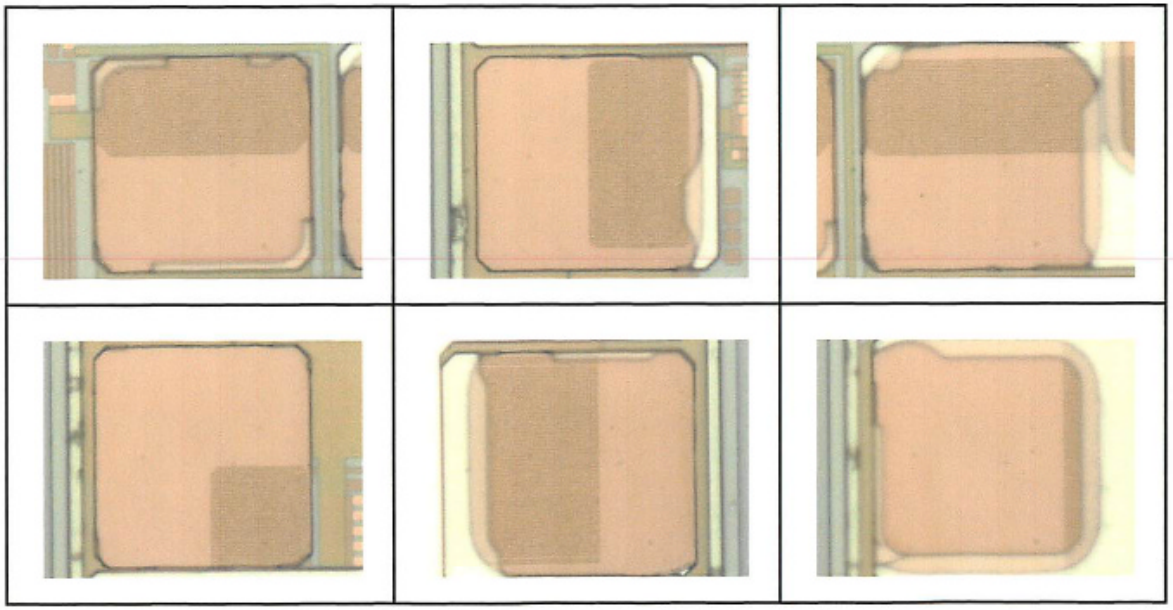
Results : PASS。

FORM No : Rel-4

ROHM SEMICONDUCTOR

Test Results of Copper Wire		Test Item : Under-pad Crack		ROHM CO.,LTD. LSI Manufacturing Headquarters LSI Package Engineering Div.
Approved Date	2011/3/22	Test Condition	Eliminate Aluminum Pad layer, then inspect the under-pad crack by binocular microscope x500	
Document No.	Cu-001-E			
Device Name	BD xxxx			
Package type	HTSSOP-B54	Failure Criteria	No Crack and Damage	
Wire diameter	25umφ、30umφ	Judgment	PASS	

Under-pad crack results （N=44pcs）



Results : PASS

FORM No : Rel-4