



Terminal Electrode Layer Comparison Report

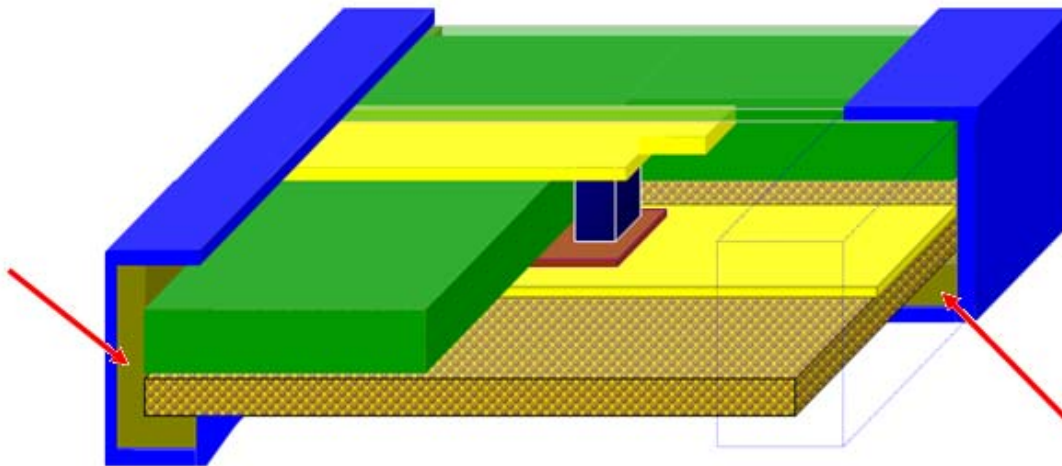
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Reversion for B








Comparison report (Terminal electrode layer)

Process comparison :

	Before	After
Process	Coating silver	Vacuum sputtering Nickel-Chromium alloy
Machine		

Below illustrate the structure:



-  Silver (From "Coating Silver Process" change to "Vacuum Sputtering Nickel-Chromium Alloy")
-  Ceramic  Chip  Conductor
-  Epoxy  Silver  Plating

Comparison report (Terminal electrode layer)

Pull test performance comparison:

	Before	After
Package	0603	
Max. (kg)	1.750	2.000
Avg. (kg)	1.045	1.430
Min. (kg)	0.600	1.000
Package	0805	
Max. (kg)	2.590	3.540
Avg. (kg)	1.750	2.330
Min. (kg)	1.070	0.579
Package	1206	
Max. (kg)	2.860	3.500
Avg. (kg)	2.100	3.080
Min. (kg)	1.020	2.800

Bending strength test performance comparison:

	Before	After
Package	0603	
2mm	0/11	0/11
3mm	0/11	0/11
4mm	0/11	0/11
5mm	0/11	0/11
Package	0805	
2mm	0/11	0/11
3mm	0/11	0/11
4mm	0/11	0/11
5mm	0/11	0/11
Package	1206	
2mm	0/11	0/11
3mm	0/11	0/11
4mm	0/11	0/11
5mm	1/11	0/11

Conclusion:

Based on pull test and bending strength test performance result that vacuum sputtering process is better than coating process.

Reliability Tested Report

2014-7-29

(Electrode terminal Layer With Vacuum sputtering Ni-Cr alloy)

Include:

1. Tested Products
2. Reliability Testing Items
3. Reliability Testing Results
4. Pulling Tested Compare With Silver Layer And Ni-Cr Alloy Layer
5. Bending Tested Compare With Silver Layer And Ni-Cr Alloy Layer

Checker: Edward Shieh Issue: Clyde Liu

Tested Products: TS4148 RXG、TS4148 RYG、TS4148C RZG、TS4148 RAG、TS4148 RBG、TS4148C RCG、
 BZY55B 系列、BZY55C 系列、BZS55C 系列 及 BZS55B 系列

1.

Products: **Reliability Testing Items(total 14 items)**

NO	Item	Reference Doc./Std.	Test Condition
1	Solderability	MIL-STD-202G, METHOD208H	245±5°C, 2±0.5sec tin dipping. Soldering area >95%
2	Steam Aging Solderability	JESD22-B102-C	98±3 °C, 100%RH, after 4hrs do Solderability 245±5°C, 2±0.5sec tin dipping. Soldering area >95%
3	Coating resist	Application	260±5 °C, 10±1sec, Absorbent cotton wipe. Protective layer & Marking no broken
4	Plating Thickness	Process control	X-RAY Measurement of plating thickness , 3~15um
5	Forward Surge Current	MIL-STD-750D, METHOD 4066.4	500mA, 1sec. No breakdown, Electrical characteristics within specifications
6	Resistance to soldering heat	MIL-STD-750D, METHOD2031.2	260±5 °C, 10±1sec. No breakdown, Electrical characteristics within specifications
7	Hi-Pressure Steady State	JESD22-A102-B	24hrs at 121°C 1atm(101KPa) 100%RH. ,Electrical characteristics within specifications
8	Thermal Shock	MIL-STD-750D, METHOD1056.7	-55 ±3 °C/5min→150±3 °C/5min ; 10cycles. ,Electrical characteristics within specifications
9	Bending	MIL-STD-750D, METHOD2036.4	Bending 2mm. Appearance no physical damage, Electrical characteristics within specifications



10	Temperature Cycle	MIL-STD-750D, METHOD1051.5	-55±3 °C/ 30min.→25±3 °C/10 min→150±3 °C/30 min→25±3 °C/10 min ; 20 cycles, Electrical characteristics within specifications
11	Humidity Steady State	MIL-STD-202G, METHOD103B	At 85±3 °C 85%RH ,168hrs, Electrical characteristics within specifications
12	Continue Forward Operating Life	MIL-STD-750D, METHOD1026.5	IF=1.1*IO(165mA) , 1000hrs, Electrical characteristics within specifications
13	Intermittent Forward Operating Life	MIL-STD-750D, METHOD1036.3	IF=1.5*IO(225mA), ON 5min off 5min, 1000 cycles, Electrical characteristics within specifications
14	Hi-Temperature Reverse Bias	MIL-STD-750D, METHOD1038.4	150±3 °C VR=80% RATED VR(80V), 1000hrs, Electrical characteristics within specifications

2. Reliability Testing Results(Before change):

NO	Item	TS4148 RXG/ TS4148 RAG	TS4148 RYG/ TS4148 RBG	TS4148C RZG/ TS4148C RCG	BZY55B	BZY55C	BZS55B	BZS55C
1	Solderability	0/45	0/45	0/45	0/45	0/45	0/45	0/45
2	Steam Aging Solderability	0/45	0/45	0/45	0/45	0/45	0/45	0/45
3	Coating resist	0/45	0/45	0/45	0/45	0/45	0/45	0/45
4	Plating Thickness	5.1um	5.4um	5.2um	5.3um	5.3um	5.2um	5.0um
5	Forward Surge Current	0/45	0/45	0/45	0/45	0/45	0/45	0/45
6	Resistance to soldering heat	0/45	0/45	0/45	0/45	0/45	0/45	0/45
7	Hi-Pressure Steady State	0/45	0/45	0/45	0/45	0/45	0/45	0/45
8	Thermal Shock	0/45	0/45	0/45	0/45	0/45	0/45	0/45
9	Bending	0/11	0/11	0/11	0/11	0/11	0/11	0/11
10	Temperature Cycle	0/45	0/45	0/45	0/45	0/45	0/45	0/45
11	Humidity Steady State	0/45	0/45	0/45	0/45	0/45	0/45	0/45
12	Continue Forward Operating Life	0/45	0/45	0/45	0/45	0/45	0/45	0/45
13	Intermittent Forward Operating Life	0/45	0/45	0/45	0/45	0/45	0/45	0/45
14	Hi-Temperature Reverse Bias	0/45	0/45	0/45	0/45	0/45	0/45	0/45

4. Reliability Testing Results(After change):

NO	Item	TS4148 RXG/ TS4148 RAG	TS4148 RYG/ TS4148 RBG	TS4148C RZG/ TS4148C RCG	BZY55B	BZY55C	BZS55B	BZS55C
1	Solderability	0/45	0/45	0/45	0/45	0/45	0/45	0/45
2	Steam Aging Solderability	0/45	0/45	0/45	0/45	0/45	0/45	0/45
3	Coating resist	0/45	0/45	0/45	0/45	0/45	0/45	0/45
4	Plating Thickness	5.5um	5.6um	5.0um	5.1um	5.2um	4.9um	5.2um
5	Forward Surge Current	0/45	0/45	0/45	0/45	0/45	0/45	0/45
6	Resistance to soldering heat	0/45	0/45	0/45	0/45	0/45	0/45	0/45
7	Hi-Pressure Steady State	0/45	0/45	0/45	0/45	0/45	0/45	0/45
8	Thermal Shock	0/45	0/45	0/45	0/45	0/45	0/45	0/45
9	Bending	0/11	0/11	0/11	0/11	0/11	0/11	0/11
10	Temperature Cycle	0/45	0/45	0/45	0/45	0/45	0/45	0/45
11	Humidity Steady State	0/45	0/45	0/45	0/45	0/45	0/45	0/45
12	Continue Forward Operating Life	0/45	0/45	0/45	0/45	0/45	0/45	0/45
13	Intermittent Forward Operating Life	0/45	0/45	0/45	0/45	0/45	0/45	0/45
14	Hi-Temperature Reverse Bias	0/45	0/45	0/45	0/45	0/45	0/45	0/45

4. Pulling Tested Compare With Silver Layer And Ni-Cr Alloy

According to the pulling below tested result, sputtering process better than silver coated process

Pulling		MAX (kg)	MIN (kg)	AVG (kg)	STD
Sputtering process	TS4148 RXG/ TS4148 RAG	3.50	2.80	3.08	2.089
	TS4148 RYG/ TS4148 RBG	3.54	1.50	2.33	0.579
	TS4148C RZG/ TS4148C RCG	2.00	1.00	1.43	3.430
Coating silver process	TS4148 RXG/ TS4148 RAG	2.86	1.02	2.10	0.512
	TS4148 RYG/ TS4148 RBG	2.59	1.07	1.75	0.408
	TS4148C RZG/ TS4148C RCG	1.75	0.60	1.045	3.623

5 Bending Tested Compare With Silver Layer And Ni-Cr Alloy

According to the below bending tested result, sputtering process better than silver coated process

Bending		2mm	3 mm	4 mm	5 mm
Sputtering process	TS4148 RXG/ TS4148 RAG	0/11	0/11	0/11	0/11
	TS4148 RYG/ TS4148 RBG	0/11	0/11	0/11	0/11
	TS4148C RZG/ TS4148C RCG	0/11	0/11	0/11	0/11
Coating Silver Process	TS4148 RXG/ TS4148 RAG	0/11	0/11	0/11	1/11
	TS4148 RYG/ TS4148 RBG	0/11	0/11	0/11	0/11
	TS4148C RZG/ TS4148C RCG	0/11	0/11	0/11	0/11