1. Introduction

1.1 Testing was performed on the DDR4 DIMM SOCKET SMT 288P to determine if it meets the requirement of Product Specification , 108-115068 Rev.A

1.2 Scope

This report covers the electrical, mechanical and environmental performance requirements of the DDR4 DIMM SOCKET SMT 288P.

The qualification testing for standard type was performed between 28 Nov 2013 and 25 Mar 2014, then added 15u" Au MFG test and finished on 7 Jul 2015.

1.3 Conclusion

DDR4 DIMM SOCKET SMT 288P Type meets the electrical, mechanical and environmental performance requirements of Product Specification, 108-115068 Rev.A

1.4 Test Samples

Samples were taken randomly from current production. The following samples were used.

Part Number	Description
2199155-2	DDR4 DIMM SOCKET 0.85mm Pitch SMT 288Pos. 30u" Au version
	Did all test group(MFG field life 7 years)
2199155-1	DDR4 DIMM SOCKET 0.85mm Pitch SMT 288Pos. 15u" Au version
	Did test group 4 (MFG field life 5 years)

Fig. 1

2. Test Contents

NO.	Test Items	Requirements	Judgment
2.1	Examination of Product	Visual, inspection No physical damage.	Acceptable
		Electrical Requirements	
2.2	Termination Resistance (Low Level)	Standard Type: 10mΩ Max. (Initial) ΔR = 10mΩMax. (Final)	Acceptable
2.3	Insulation Resistance	Impressed voltage 500V DC for 1 minute. Test between adjacent circuits of unmated connector. 1MΩ Min.	Acceptable
2.4	Dielectric withstanding Voltage	500 V AC for 1 minute. Test between adjacent circuits of unmated connector. No creeping discharge nor flashover shall occur. Current leakage: 0.5mA Max.	Acceptable
2.5	Current carrying capability / Temperature Rising	30℃ Max. (Only 10 contacts) Load with 0.5A	Acceptable

Fig. 2 (to be continued)

Mechanical Requirements			
2.6	Reseating	No physical damege after 3 times.	Acceptable
2.7	Solderability, lead free	95% coverage. No physical damage; contact gap within manufacturer's tolerance. JESD22-B-102, Condition C, Method 1. Thirty second exposure at 190℃ oven. Processing criteria: solder 260±5℃ for 5 seconds.	Acceptable
2.8	Resistance to Reflow Soldering Heat	No physical damege shall occur. Test connector on PCB	Acceptable
2.9	Vibration (Random)	Vibration Frequency: 5~500 Hz / 1 minute Amplitude:1.52mm Vibration Direction: In each of 3 mutually pependicular Planes Duration: 2 hours 100mA applied. No electrical discontinuity greater than 1μsec shall occur.	Acceptable
2.10	Mechanical shock	Module thickness:1.40 mm Module weight 65 ± 5 g Profile: Trapezoidal shock of 50 g ± 10%. Velocity change: 170 inches/sec ± 10%. Quantity: Three drops in each of 6 directions are applied to each of the three samples. 100mA applied. No electrical discontinuity greater than 1 μ sec shall occur.	Acceptable
2.11	Durability	Mate and unmate specimens with 1.50 mm thick steel gauge for 25 cycles at a maximum rate of 500 cycles per hour.	Acceptable
2.12	Mating force	Measure force necessary to mate specimens with a 1.50 mm steel gauge at a maximum rate of 5 mm per minute 106.8 N maximum.	Acceptable

Fig. 2 (to be continued)

2.13	Unmating force (per pin pair)	Axial Tension/Compression machine such as an Instron Tensile Tester. Rate: 12.7 mm/min GS-005 Gauge 14 gf min.	Acceptable
2.14	Contact backout wipe	Fully seat daisy chain module. Pull module upward until stopped by latches while monitoring for discontinuities. No discontinuities of 1 microsecond or longer duration	Acceptable
2.15	Latch opening force	Measure force necessary to unmate specimens from a 1.50 mm steel gage at a maximum rate of 5 mm per minute. 32.4 N maximum per latch.	Acceptable
2.16	Contact retention	Apply specified load to contact tail and hold for 6 seconds. 3 N minimum per pin. No movement of contact more than 0.38 mm	Acceptable
2.17	Fork lock retention (where applicable)	Apply specified load to fork lock and hold for 6 seconds. 13.3 N minimum per fork lock. Maximum movement of 0.38 mm	Acceptable
		Environmental Requirements	
2.18	Thermal Shock	-55 and 85℃, perform 5 cycles in mated condition.	Acceptable
2.19	Cyclic Temperature & Humidity	Subject mated and mounted specimens to 10 cycles between 25℃ at 80% RH and 65℃ at 50% RH. Ramp times shall be 0.5 hour with 1 hour dwell time.	Acceptable
2.20	Thermal cycling	Subject mated and mounted specimens to 500 cycles between 15±3℃ and 85±3℃ as measured on the specimen). Ramps times shall be a minimum of 2℃ per minute. Dwell times shall ensure that the contacts reach the temperature extreme (5 minutes minimum). Humidity not controlled.	Acceptable
2.21	Temperature Life	Subject mated and mounted specimens to 105℃ for 240 hours.	Acceptable

Fig. 2 (to be continued)

2.22	Mixed flowing Gas	EIA-364-65, Class IIA. 30u" Au version (field life 7 years): Five specimens unmated for 160 hours, mated for 80 hours. Five specimens mated for 240 hours. Store module cards at laboratory ambient during the unmated portion of the exposure. 15u" Au version (field life 5 years): Five specimens unmated for 112 hours, mated for 56 hours. Five specimens mated for 168 hours. Store module cards at laboratory ambient during the unmated portion of the exposure.	Acceptable
2.23	Thermal Disturbance	Subject mated and mounted specimens to 10 cycles between 15±3℃ and 85±3℃ as measured on the part. Ramps shall be a minimum of 2℃ per minute. Dwell times shall ensure that the contacts reach the temperature extreme (5 minutes minimum). Humidity not controlled.	Acceptable

Fig. 2 (End)

3. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence (b)										
Initial examination of product	1	1	1	1	1	1	1	1	1	1	1
Low level contact resistance	2,6,8	2,7,9,13	2,4,6,8,10	2,5,7,9,11						2,5,7,9	
Insulation resistance		3,10									
Withstanding voltage		4,11									
Current carrying capacity									2		
Reseating	7	12		10						8	
Solderability						2					
Resistance to Reflow Soldering Heat											2
Vibration, random			7								
Mechanical shock			9								
Durability	4(c)	5(c)	3(c)	3(c)						3(c)	
Mating force					2						
Unmating force per pin pair								2			
Latch opening force					3						
Contact retention							3				
Fork lock retention							2				
Contact backout wipe	3										
Thermal shock		6									
Cyclic temperature & humidity		8									
Thermal cycling										6	
Temperature life	5		5(d)	4(d)						4(d)	
Mixed flowing gas				6							
Thermal disturbance				8							
Final examination of product	9	14	11	12	4	3	4	3	3	10	3

NOTE

(a) *See paragraph 4.1.A.*

(b) *Numbers indicate sequence in which tests are performed.*

(c) *Durability preconditioning with only 5 cycles.*

(d) *Temperature life preconditioning, 120 hours duration.*

(e) *Measure contact gaps across mating interface.*

Figure 3

4. TEST RESULT

4.1 TEST RESULT For Standard Type

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 1								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
	Termination Resistance	1440	mΩ	8.94mΩ	5.22mΩ	6.43mΩ	10mΩMAX.	Acceptable
After Durability	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
After Contact backout wipe	Circuit Continuity	5	μS	No discontinuity			1μsec. MIN.	Acceptable
After Temperature life	Termination Resistance	1440	mΩ	15.84mΩ	5.76mΩ	8.48mΩ	-	-
	ΔR	1440	mΩ	9.68mΩ	-0.85mΩ	2.05mΩ	10mΩMAX.	Acceptable
After Reseating	Termination Resistance	1440	mΩ	16.44mΩ	4.67mΩ	8.80mΩ	-	-
	ΔR	1440	mΩ	9.80mΩ	-1.44mΩ	2.37mΩ	10mΩMAX.	Acceptable
Final	Appearance	5	-	No abnormalities			No abnormalities	Acceptable

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 2								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
	Termination Resistance	1440	mΩ	8.91mΩ	5.66mΩ	6.78mΩ	10mΩMAX.	Acceptable
	Insulation resistance	5	-	$1.2 \times 10^{10}\Omega$ MIN.			1MΩMIN	Acceptable
	Withstanding voltage	5	-	No creeping discharge nor flashover occurred.			No abnormalities	Acceptable
After Durability	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
After Thermal shock	Termination Resistance	1440	mΩ	14.33mΩ	5.66mΩ	7.05mΩ	-	-
	ΔR	1440	mΩ	7.79mΩ	-2.24mΩ	0.27mΩ	10mΩMAX.	Acceptable
After Cyclic temperature & humidity	Termination Resistance	1440	mΩ	15.44mΩ	5.99mΩ	7.05mΩ	-	-
	ΔR	1440	mΩ	8.73mΩ	-2.40mΩ	0.27mΩ	10mΩMAX.	Acceptable
	Insulation resistance	5	-	$2.5 \times 10^{10}\Omega$ MIN.			1MΩMIN	Acceptable
	Withstanding voltage	5	-	No creeping discharge nor flashover occurred.			No abnormalities	Acceptable
After Reseating	Termination Resistance	1440	mΩ	12.19mΩ	5.48mΩ	7.11mΩ	-	-
	ΔR	1440	mΩ	5.42mΩ	-1.61mΩ	0.34mΩ	10mΩMAX.	Acceptable
Final	Appearance	5	-	No abnormalities			No abnormalities	Acceptable

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 3								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
	Termination Resistance	1440	mΩ	8.83mΩ	5.01mΩ	6.38mΩ	10mΩMAX.	Acceptable
After Durability	Termination Resistance	1440	mΩ	11.32mΩ	4.92mΩ	6.97mΩ	-	-
	ΔR	1440	mΩ	5.24mΩ	-1.88mΩ	0.59mΩ	10mΩMAX.	Acceptable
After Temperatur e life	Termination Resistance	1440	mΩ	16.86mΩ	4.94mΩ	8.84mΩ	-	-
	ΔR	1440	mΩ	9.48mΩ	-1.84mΩ	2.46mΩ	10mΩMAX.	Acceptable
Vibration (Random) During test	Circuit Continuity	5	μS	No discontinuity			1μsec. MIN.	Acceptable
After Vibration	Termination Resistance	1440	mΩ	16.34mΩ	4.62mΩ	7.69mΩ	-	-
	ΔR	1440	mΩ	9.96mΩ	-1.74mΩ	1.31mΩ	10mΩMAX.	Acceptable
Mechanical Shock During test	Circuit Continuity	5	μS	No discontinuity			1μsec. MIN.	Acceptable
After Mechanical Shock	Termination Resistance	1440	mΩ	16.31mΩ	4.10mΩ	8.60mΩ	-	-
	ΔR	1440	mΩ	9.87mΩ	-1.98mΩ	2.22mΩ	10mΩMAX.	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 4 (P/N 2-2199154-4 30u" Au version, field life 7 years)								
Initial	Appearance	10	-	No abnormalities			No abnormalities	Acceptable
	Termination Resistance	2880	mΩ	9.90mΩ	4.46mΩ	6.77mΩ	10mΩMAX.	Acceptable
After Durability	Appearance	10	-	No abnormalities			No abnormalities	Acceptable
After Temperature life	Termination Resistance	2880	mΩ	15.90mΩ	5.19mΩ	8.36mΩ	-	-
	ΔR	2880	mΩ	9.87mΩ	-1.93mΩ	1.59mΩ	10mΩMAX.	Acceptable
After MFG	Termination Resistance	2880	mΩ	18.21mΩ	5.42mΩ	10.05mΩ	-	-
	ΔR	2880	mΩ	9.98mΩ	-2.05mΩ	3.28mΩ	10mΩMAX.	Acceptable
After Thermal Disturbance	Termination Resistance	2880	mΩ	17.81mΩ	3.43mΩ	10.56mΩ	-	-
	ΔR	2880	mΩ	9.99mΩ	-4.07mΩ	3.79mΩ	10mΩMAX.	Acceptable
After Reseating	Termination Resistance	2880	mΩ	17.84mΩ	5.63mΩ	10.64mΩ	-	-
	ΔR	2880	mΩ	9.99mΩ	-1.77mΩ	3.87mΩ	10mΩMAX.	Acceptable
Final	Appearance	10	-	No abnormalities			Final	Appearance

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 4 (P/N 2199155-1 15u" Au version, field life 5 years)								
Initial	Appearance	10	-	No abnormalities			No abnormalities	Acceptable
	Termination Resistance	2880	mΩ	9.64mΩ	6.03mΩ	7.41mΩ	10mΩMAX.	Acceptable
After Durability	Appearance	10	-	No abnormalities			No abnormalities	Acceptable
After Temperature life	Termination Resistance	2880	mΩ	15.41mΩ	6.01mΩ	8.08mΩ	-	-
	ΔR	2880	mΩ	8.30mΩ	-1.20mΩ	0.67mΩ	10mΩMAX.	Acceptable
After MFG	Termination Resistance	2880	mΩ	10.77mΩ	6.00mΩ	7.48mΩ	-	-
	ΔR	2880	mΩ	4.38mΩ	-2.90mΩ	0.07mΩ	10mΩMAX.	Acceptable
After Thermal Disturbance	Termination Resistance	2880	mΩ	12.93mΩ	6.71mΩ	7.62mΩ	-	-
	ΔR	2880	mΩ	5.76mΩ	-2.50mΩ	0.22mΩ	10mΩMAX.	Acceptable
After Reseating	Termination Resistance	2880	mΩ	9.97mΩ	6.29mΩ	7.60mΩ	-	-
	ΔR	2880	mΩ	2.71mΩ	-2.31mΩ	0.20mΩ	10mΩMAX.	Acceptable
Final	Appearance	10	-	No abnormalities			Final	Appearance

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 5								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
Mating force	Mating force	5	N	102.3 N	98.2 N	101.3 N	106.8N MAX.	Acceptable
Latch opening force	Latch opening force	5	N	14.51 N	11.16 N	12.46 N	32.4N MAX.	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance
Test Group 6								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
Solderability	Appearance	5	-	More than 95% of tested area was covered with fresh, wet solder			95% MIN.	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance
Test Group 7								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
Fork lock retention	Fork lock retention	5	N	13.3N MIN			13.3N MIN	Acceptable
Contact retention	Contact retention	5	N	3N MIN			3N MIN	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 8								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
Unmating force per pin pair	Unmating force per pin pair	5	g	24.5 g	20.4 g	21.4 g	14g MIN.	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance
Test Group 9								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
Current carrying capacity.	Current carrying capacity.	5	℃	6.01℃	3.58 ℃	4.50℃	30℃ MAX.	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance

Fig. 4 (to be continued)

Condition	Measure Item	N	Unit	Results			Requirement	Judgment
				MAX.	MIN.	AVE.		
Test Group 10								
Initial	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
	Termination Resistance	1440	mΩ	9.15mΩ	5.67mΩ	6.86mΩ	10mΩMAX.	Acceptable
After Durability	Appearance	5	-	No abnormalities			No abnormalities	Acceptable
After Temperature life	Termination Resistance	1440	mΩ	17.16mΩ	4.11mΩ	8.60mΩ	-	-
	ΔR	1440	mΩ	9.68mΩ	-2.66mΩ	1.74mΩ	10mΩMAX.	Acceptable
After Thermal cycling	Termination Resistance	1440	mΩ	16.96mΩ	5.44mΩ	8.47mΩ	-	-
	ΔR	1440	mΩ	8.92mΩ	-2.12mΩ	1.61mΩ	10mΩMAX.	Acceptable
After Reseating	Termination Resistance	1440	mΩ	16.90mΩ	5.81mΩ	9.09mΩ	-	-
	ΔR	1440	mΩ	9.91mΩ	-1.55mΩ	2.23mΩ	10mΩMAX.	Acceptable
Final	Appearance	5	-	No abnormalities			Final	Appearance

Fig. 4 (to be continued)

Test Group 11						
Initial	Appearance	5	-	No abnormalities	No abnormalities	Acceptable
Resistance to Reflow Soldering Heat	Appearance	5	-	No abnormalities	No abnormalities	Acceptable
Final	Appearance	5	-	No abnormalities	Final	Appearance

Fig. 4 (END)