1.   Introduction

1.1   Testing was performed on the LGA1366 / LGA1356 socket to determine if it meets the requirements of product specification 108-78496

1.2   Scope

This report covers the electrical, mechanical and environmental performance requirements of the LGA1366 / LGA1356 socket.

1.3   Conclusion

This test report confirmed that Tyco Electronics LGA1366 / LGA1356 socket satisfied the requirements of the product specification of 108-78496

1.4   Test samples

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

Part Number	Description
1981837-1	LGA1366 Socket assy
1939738-1	ILM assembly U-lever shape
1939739-1	Desk top back plate (Stiffener plate assy A)
1981467-1	Server back plate (Stiffener plate assy B)

Fig. 1

Tyco Electronics

2. Test Contents

No.	Test Items	Requirements	Judgement
2.1	Examination of product	Visual Inspection No physical damage	Acceptable

Electrical Requirements			
2.2	Termination resistance (Low level)	28 mΩ Max. (Daisy chain LLCR) 15.2mΩ Max. (Socket average LLCR)	Acceptable
2.3	Dielectric withstanding voltage	360Vrms, 1 minute Current leakage : 0.5mA Max.	Acceptable
2.4	Insulation resistance	Impressed voltage 500 VDC. 800MΩ Min.	Acceptable
2.5	Package mating operation force of lever	Operation speed: 100mm/min. Measure the vertical force required to lock the lever by loading at the tip of the lever. Operation force 49N (5kgf) Max.	Acceptable
2.6	Package unmating operation force of lever	Operation speed: 100mm/min. Measure the vertical force required to unlock the lever by loading at the tip of lever Operation force 49N (5kgf) Max.	Acceptable

Fig. 2 (to be continued)

Mechanical Requirements			
2.7	Durability (Repeated mating / unmating)	Operation speed:8 cycle/min. No. of cycles: 30 cycles 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

2.8	Vibration, random.	Vibration Frequency: 10 to 2000Hz (Random) Accelerated Velocity: 30.38 m/s^2 (3.1G),rms. Vibration Direction: In each of 3 mutually perpendicular planes Duration: 15 minute each 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

2.9	Physical shock	Accelerated velocity: 490 m/s^2 (50 G) Waveform: Halfsine Duration: 11 m sec. Number of drops: 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops. 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

Environmental Requirements		

2.10	Thermal humidity	Test package mated socket with compressive load from heat sink 85 ℃, 85 % R.H. 1000 hour 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

2.11	Temperature life (Heat aging)	Test package mated socket with compressive load from heat sink 125 ℃, Duration : 1500 hours 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

2.12	Thermal cycling	Test package mated socket with compressive load from heat sink -25 ℃ / 15 min., +100 ℃ / 15 min. (1cycle) No. of cycle : 1500 cycles. 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

2.13	Mixed flowing Gas	Test package mated socket with ILM loading Subject specimens to environmental Class IIA for a total of 10 days. For the first 5 days, 1/2 of the specimens shall be mated, the other half unmated. For the second 5 days, all specimens shall be mated. 28 mΩ Max. (Daisy chain LLCR) (Final) *1 15.2mΩ Max. (Socket average LLCR) (Final)*1	Acceptable

2.14	Resistance to reflow soldering heat	Test socket on PCB.
		  (Lead Free, Sn-Ag-Cu solder ball)
		    Solder ball part
		       Pre-Heat 150～170 ℃ : 90 sec Min.
		       Heat 217 ℃ Min. : 40～100sec
		       Heat Peak : 245±5 ℃
		 Other than solder ball : 260 ℃ Max
		 No physical damage.
			Acceptable

2.15	Porosity test	EIA-364-60. Test must be performed on 30 loose contacts 2Pores Max per 30 contacts	Acceptable

*1 Bulk resistances of test CPU are subtracted.

Fig. 2

3. Test sequence

Test examination / Test sequence	Test Group							
	1	2	3	4	5	6	7	8
Test sequence (a)								
Examination of product	1	1	1	1	1	1	1	1
Termination resistance (Low Level)	2,4,6	2,4	2,4		2,4	2,4,6,8		2,4
Dielectric withstanding voltage				2,5,8				
Insulation resistance				3,6,9				
Vibration　(Low frequency)	5							
Physical shock	3							
Package mating operation force of lever							2	
Package unmating operation force of lever							3	
Durability (Repeated mate/unmating)			3 (b)			3(c)		
Temperature humidity		3(d)		7				
Temperature life (Heat aging)					3(e)			
Thermal cycling				4				3(g)
Mix flowing Gas						5,7(f)		
Solder ball shear force							4	
Porosity							5	
Resistance to reflow soldering heat							6	

(a) Numbers indicate sequence in which the tests are performed.
(b) Durability 30X
(c) Durability 5X
(d) Perform termination resistance every 250 hours (until 1000 hours).
(e) Perform termination resistance every 250 hours (until 1500 hours).
(f) Perform termination resistance after 5 and 10 days of mixed flowing gas exposure.
(g) Perform termination resistance every 250 cycles (until 1500 cycles)

Tyco Electronics

4. Test result

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		
Test Group 1 (Shock & vibration)									
Initial LLCR	Termination resistance	9 socket (774 chain) *1	mΩ	12.27	6.82	8.75	0.708	28 mΩ Max	Acceptable
LLCR after shock			mΩ	11.59	7.05	8.73	0.703	28 mΩ Max	Acceptable
LLCR after vibration			mΩ	10.43	6.46	8.25	0.632	28 mΩ Max	Acceptable

*1) One daisy chain includes 8~16 contacts electrically connected together by the CPU package

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		
Test Group 2 (Temperature humidity)									
Initial	Termination resistance	12 socket (1032 chain) *1	mΩ	11.70	5.70	7.31	0.647	28 mΩ Max	Acceptable
Temp. humidity 250H			mΩ	10.28	5.42	7.14	0.663	28 mΩ Max	Acceptable
Temp. humidity 500H			mΩ	9.93	5.35	7.19	0.653	28 mΩ Max	Acceptable
Temp. humidity 750H			mΩ	10.20	5.31	7.20	0.753	28 mΩ Max	Acceptable
Temp. humidity 1000H			mΩ	9.79	5.32	7.20	0.757	28 mΩ Max	Acceptable

*1) One daisy chain includes 8~16 contacts electrically connected together by the CPU package

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		

Test Group 3 (Durability)									
Initial	Termination resistance	5 socket (430 chain) *1	mΩ	18.88	6.98	9.49	1.425	28 mΩ Max	Acceptable
Durability 5th			mΩ	14.89	6.40	8.57	0.977	28 mΩ Max	Acceptable
Durability 10th			mΩ	13.42	6.42	8.69	1.014	28 mΩ Max	Acceptable
Durability 20th			mΩ	16.46	6.41	8.85	1.132	28 mΩ Max	Acceptable
Durability 30th			mΩ	16.05	6.51	9.07	1.103	28 mΩ Max	Acceptable

*1) One daisy chain includes 8~16 contacts electrically connected together by the CPU package

Test Group 4 (Dielectric withstand voltage, Insulation resistance)						
Initial	Dielectric Withstand voltage	25 point	—	No abnormalities	No abnormalities	Acceptable
	Insulation resistance	25 point	Ω	Over 1000 MΩ.	1000 MΩ Min.	Acceptable
After thermal cycling	Dielectric Withstand voltage	25 point	—	No abnormalities	No abnormalities	Acceptable
	Insulation resistance	25 point	Ω	Over 1000 MΩ.	1000 MΩ Min.	Acceptable
After temp. humidity	Dielectric Withstand voltage	25 point	—	No abnormalities	No abnormalities	Acceptable
	Insulation resistance	25 point	Ω	Over 1000 MΩ.	1000 MΩ Min.	Acceptable

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		

Test Group 5 (Temperature life)									
Initial	Termination Resistance	12 socket (1032 chain) *1	mΩ	10.19	6.17	7.61	0.582	28 mΩ Max	Acceptable
After 125 ℃ temperature life 250H			mΩ	12.01	5.87	7.80	0.769	28 mΩ Max	Acceptable
After 125 ℃ temperature life 500H			mΩ	12.75	6.11	8.08	0.784	28 mΩ Max	Acceptable
After 125 ℃ temperature life 750H			mΩ	14.09	6.27	8.44	0.954	28 mΩ Max	Acceptable
After 125 ℃ temperature life 1000H			mΩ	14.75	6.23	8.51	1.105	28 mΩ Max	Acceptable
After 125 ℃ temperature life 1500H			mΩ	16.00	6.45	9.38	1.284	28 mΩ Max	Acceptable

*1) One daisy chain includes 8~16 contacts electrically connected together by the CPU package

Tyco Electronics   **Qualification Test Report**

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		
Test Group 6 (Mix flowing gas)									
Initial	Termination resistance	8 socket (688 chain) *1	mΩ	9.88	5.72	7.20	0.499	28 mΩ Max	Acceptable
After 5 cycle actuation			mΩ	9.17	5.56	7.02	0.548	28 mΩ Max	Acceptable
After Mix Gas 5days (CPU mating)	Termination resistance	4 socket (344 chain) *1	mΩ	11.26	5.57	7.47	0.682	28 mΩ Max	Acceptable
After Mix Gas 5days (CPU unmating)			mΩ	10.02	6.16	7.67	0.649	28 mΩ Max	Acceptable
After Mix Gas 10days (CPU mating)			mΩ	10.14	5.38	7.67	0.645	28 mΩ Max	Acceptable
After Mix Gas 10days (Unmate first 5days and mate with last 5days)			mΩ	12.83	6.14	7.78	0.759	28 mΩ Max	Acceptable

*1) One daisy chain includes 8~16 contacts electrically connected together by the CPU package

Tyco Electronics

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		

								Test Group7		
Initial	Package mating operation force of lever	10 skt	Kgf	2.50	2.27	2.38	0.072	5kgf Max	Acceptable
Initial	Package unmating operation force of lever	10 skt	kgf	1.31	0.80	1.04	0.216	5kgf Max	Acceptable
Initial	Solder ball shear force (Lead free solder ball)	10 cont x 4skt	gf	890	700	794	51	600gf Min	Acceptable

Conditions	Measure Item	n	Unit	Results	Requirement	Judgement
Porosity test	Visual observation by magnify scope	30 contacts	—	No pores	2pores Max	Acceptable
Resistance to reflow soldering heat	Visual observation by magnify scope	6skt	—	No housing damage, irregularity	No irregularity	Acceptable

Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.		
Test Group 10 (Thermal cycling)									
Initial	Termination Resistance	12 socket (1032 chain) *1	mΩ	10.23	5.86	7.20	0.535	28 mΩ Max	Acceptable
After thermal cycling 250cycle				8.51	5.32	6.59	0.472	28 mΩ Max	Acceptable
After thermal cycling 500cycle				8.30	5.25	6.56	0.487	28 mΩ Max	Acceptable
After thermal cycling 750cycle				8.24	5.23	6.53	0.489	28 mΩ Max	Acceptable
After thermal cycling 1000cycle				8.37	5.33	6.62	0.518	28 mΩ Max	Acceptable
After thermal cycling 1500cycle				8.34	5.18	6.50	0.541	28 mΩ Max	Acceptable

*1) One daisy chain includes 8~16 contacts electrically connected together by the CPU package

Rev.	Rev. Record	Prepared		Check		Approval	
A	RELEASE	Y.S	18th Aug 2008	Y.S	18th Aug 2008	S.H	18th Aug 2008
B	REVISED	T.S	19th Nov 2010	Y.S	19th Nov 2010	I.E	19th Nov 2010