

1. Introduction

1.1 Testing was performed on the LGA1207 socket to determine if it meets the requirements of product specification 108-78375

1.2 Scope

This report covers the electrical, mechanical and environmental performance requirements of the LGA1207 socket.

1.3 Product description

LGA1207 socket has arrayed contacts and solder to printed circuit board (PCB). The socket is used by compressing its contacts to the arrayed CPU land in the normal direction of the PCB. The CPU lands are arrayed with same grid pitch to the socket and has gold plating finish on the surface. LGA1207 socket is actuated by the lever and generates required compression force by the back plate attach to the bottom side of the PCB and the socket actuation mechanism.

1.4 Conclusion

1.2 This test report confirmed that Tyco socket F 1207 satisfied the requirements of the product specification of 108-78375 Rev.A

1.5 Test samples

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

Part Number	Description
0-1871554-1	LF-LGA1207 socket (Lead free) Right / U-lever shape
0-1871554-2	Leaded-LGA1207 socket (Leaded) Right / U-lever shape

Fig. 1

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)	20 mΩ Max. (Maximum per contact) *1	Acceptable
2.3	Dielectric withstanding voltage	650VACs, 1 minute No abnormality allowed. Current leakage : 5mA Max.	Acceptable
2.4	Insulation resistance	Impressed voltage 100 VDC. 1000MΩ 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 5kgf Max.	Acceptable

Fig. 2 (to be continued)

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 5kgf Max.	Acceptable
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Mechanical Requirements			
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2.7	Durability (Repeated mating / unmating)	Operation speed:8 cycle/min. No. of cycles: Test group2: 50 cycles Test group5: 5 cycle 20 mΩ Max. (Maximum per contact) (Final) *1	Acceptable
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2.8	Vibration, random.	Vibration Frequency: 10 to 500Hz (Random) Accelerated Velocity: 30.38 m/s ² (3.1G),rms. Vibration Direction: In each of 3 mutually perpendicular planes Duration: 45 minute each 100 mA applied. No electrical discontinuity greater than 1 μ sec. shall occur. 20 mΩ Max. (Maximum per contact) (Final) *1	Acceptable
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Fig. 2 (to be continued)

2.9	Physical shock	<p>Accelerated velocity: 490 m/s² (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. No electrical discontinuity greater than 1 μ sec. shall occur. 20 mΩ Max. (Maximum per contact) (Final) *1</p>	Acceptable
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Environmental Requirements

2.10	Cyclic humidity	<p>Test package mated socket with compressive load from heat sink 25°C - 85 °C, 90 - 95 % R.H. 1000 hour 20 mΩ Max (Maximum per contact) (Final) *1</p>	Acceptable
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2.11	Temperature life (Heat aging)	<p>Test package mated socket with compressive load from heat sink 115 °C, Duration : 500 hours 20 mΩ Max. (Maximum per contact) (Final) *1</p>	Acceptable
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Fig. 2 (to be continued)

2.12	Thermal shock	Test package mated socket with compressive load from heat sink -55 °C / 30 min., +110 °C / 30 min. (1cycle) No. of cycle : 10 cycles. (Test group2,3) 20 mΩ Max. (Maximum per contact) (Final) *1	Acceptable
2.13	Thermal cycling	Test package mated socket with compressive load from heat sink -55 °C / 20 min., +110 °C / 15 min. (1cycle) No. of cycle : 1000 cycles. (Test group1,10) 20 mΩ Max. (Maximum per contact) (Final) *1	Acceptable
2.14	Resistance to reflow soldering heat	Test socket on PCB. (Tin-Lead, Sn-Pb series) Solder ball part Pre-Heat 100~150 °C : 90~120sec Heat 200 °C min. : 60~90sec Heat Peak : 215±5 °C (Lead Free, Sn-Ag-Cu series) Solder ball part Pre-Heat 150~170 °C : 90 sec Min. Heat 225 °C min. : 60~90sec Heat Peak : 245±5 °C Other than solder ball : 260 ~ 265°C 10sec Max No physical damage.	Acceptable

*1 Bulk resistances of test CPU are subtracted.

Fig. 2 (End)

3. Test sequence

Test examination / Test sequence	Test Group									
	1(b)	2	3	4	5	6	7	8	9	10
Evaluated solder type (C)	LF&Pb	LF&Pb	LF	LF&Pb	LF	LF	LF	LF	LF&Pb	LF&Pb
Test sequence (a)										
Examination of product	1	1	1	1	1	1	1	1	1	1
Termination resistance (Low Level)	2,4,6,8	2,4,6,8		2,4	2,4,6,8	2,4			2,4	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			3					
Cyclic humidity		7	7							
Temperature life (Heat aging)				3						
Thermal shock		5	4							
Thermal cycling	7									3
Mix Gas					5,7					
Current rating						3				
Resistance to solvents									5	
Resistance to reflow soldering heat									3	
Contact retention force								4		
Solder ball shear force								5		
Gold plating thickness								6		
Nickel plating thickness								7		
Porosity								8		
Capacitance							2			
Inductance							3			
Cross talk							4			

2. Product qualification test sequence

(a) Numbers indicate sequence in which the tests are performed.

(b) Discontinuities shall not occur in this test group, during tests.

(c) Some tests of leaded was omitted because result of some test group is not affected by solder type. LF represents lead free products and Pb represents leaded products

4. Test result

Conditions	Measure Item	n	Unit	Results					Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.	Cpk		
Test Group 1 (Lead free)										
Initial LLCR	Termination resistance	25 socket (7500 chain) *1	mΩ	18.97	10.63	14.03	1.841	1.081	20 mΩ Max	Acceptable
Continuity during Physical shock	Circuit discontinuity	25 socket	μs	No discontinuity					1 μs Max.	Acceptable
LLCR after shock	Termination resistance	25 socket (7500 chain) *1	mΩ	19.08	10.88	14.32	1.131	1.672	20 mΩ Max	Acceptable
Continuity during vibration	Circuit discontinuity	25 socket	μs	No discontinuity					1 μs Max.	Acceptable
LLCR after vibration	Termination resistance	25 socket (7500 chain) *1	mΩ	19.09	10.38	13.55	1.164	1.846	20 mΩ Max	Acceptable
LLCR after thermal cycling 250cycle	Termination resistance		mΩ	19.92	9.80	13.06	1.255	1.844	20 mΩ Max	Acceptable
LLCR after thermal cycling 500cycle	Termination resistance		mΩ	19.08	9.09	12.74	1.181	2.049	20 mΩ Max	Acceptable
LLCR after thermal cycling 750cycle	Termination resistance		mΩ	19.24	9.45	12.71	1.220	1.992	20 mΩ Max	Acceptable
LLCR after thermal cycling 1000cycle	Termination resistance		mΩ	19.24	9.34	12.76	1.278	1.888	20 mΩ Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

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

Test Group 1 (Leaded)										
Initial LLCR	Termination resistance	25 socket (7500 chain) *1	mΩ	18.02	10.10	14.52	0.977	1.872	20 mΩ Max	Acceptable
Continuity during Physical shock	Circuit discontinuity	25 socket	μs	No discontinuity					1 μs Max.	Acceptable
LLCR after shock	Termination resistance	25 socket (7500 chain) *1	mΩ	18.64	9.84	14.55	1.079	1.685	20 mΩ Max	Acceptable
Continuity during vibration	Circuit discontinuity	25 socket	μs	No discontinuity					1 μs Max.	Acceptable
LLCR after vibration	Termination resistance	25 socket (7500 chain) *1	mΩ	17.58	10.46	14.05	0.993	1.999	20 mΩ Max	Acceptable
LLCR after thermal cycling 250cycle	Termination resistance		mΩ	19.65	9.33	13.33	1.203	1.849	20 mΩ Max	Acceptable
LLCR after thermal cycling 500cycle	Termination resistance		mΩ	19.52	9.58	13.34	1.238	1.794	20 mΩ Max	Acceptable
LLCR after thermal cycling 750cycle	Termination resistance		mΩ	19.50	9.46	13.53	1.314	1.640	20 mΩ Max	Acceptable
LLCR after thermal cycling 1000cycle	Termination resistance		mΩ	19.36	9.24	13.45	1.336	1.635	20 mΩ Max	Acceptable

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

Test Group 2 (Lead free)										
Initial	Termination resistance	15 socket (4500 chain)	mΩ	19.60	11.57	16.17	1.259	1.015	20 mΩ Max	Acceptable
After 50 cycle actuation	Termination resistance		mΩ	19.25	11.16	15.87	1.250	1.100	20 mΩ Max	Acceptable
After thermal cycling 10cycle	Termination resistance		mΩ	19.46	13.01	15.73	1.091	1.306	20 mΩ Max	Acceptable
After humidity 250H	Termination resistance		mΩ	18.89	12.93	15.28	1.048	1.502	20 mΩ Max	Acceptable
After humidity 500H	Termination resistance		mΩ	19.38	10.15	15.39	1.144	1.342	20 mΩ Max	Acceptable
After humidity 750H	Termination resistance		mΩ	19.41	10.08	15.40	1.175	1.305	20 mΩ Max	Acceptable
After humidity 1000H	Termination resistance		mΩ	19.37	10.52	15.46	1.193	1.268	20 mΩ Max	Acceptable

Test Group 2 (Leaded)										
Initial	Termination resistance	15 socket (4500 chain)	mΩ	19.48	13.08	16.23	1.115	1.127	20 mΩ Max	Acceptable
After 50 cycle actuation	Termination resistance		mΩ	19.49	12.91	15.94	1.111	1.219	20 mΩ Max	Acceptable
After thermal cycling 10cycle	Termination resistance		mΩ	18.91	12.62	15.60	1.048	1.399	20 mΩ Max	Acceptable
After humidity 250H	Termination resistance		mΩ	19.39	12.57	15.16	1.065	1.515	20 mΩ Max	Acceptable
After humidity 500H	Termination resistance		mΩ	19.43	12.34	15.52	1.205	1.240	20 mΩ Max	Acceptable
After humidity 750H	Termination resistance		mΩ	19.49	12.53	15.58	1.221	1.207	20 mΩ Max	Acceptable
After humidity 1000H	Termination resistance		mΩ	19.48	12.57	15.72	1.240	1.150	20 mΩ Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

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

Test Group 3 (Lead free)										
Initial	Dielectric strength	25 point	—	No abnormalities					No abnormalities	Acceptable
	Insulation resistance	25 point	Ω	Over 1000 M Ω .					1000 M Ω Min.	Acceptable
After thermal cycling	Dielectric strength	25 point	—	No abnormalities					No abnormalities	Acceptable
	Insulation resistance	25 point	Ω	Over 1000 M Ω .					1000 M Ω Min.	Acceptable
After cyclic humidity	Dielectric strength	25 point	—	No abnormalities					No abnormalities	Acceptable
	Insulation resistance	25 point	Ω	Over 1000 M Ω .					1000 M Ω Min.	Acceptable

Test Group 4 (Lead free)										
Initial	Termination Resistance	12 socket (3600 chain)	m Ω	19.46	11.63	15.15	1.325	1.221	20 m Ω Max	Acceptable
After 115 °C temperature life 250H	Termination Resistance		m Ω	19.64	9.93	13.91	1.527	1.330	20 m Ω Max	Acceptable
After 115 °C temperature life 500H	Termination Resistance		m Ω	19.86	9.94	13.99	1.498	1.338	20 m Ω Max	Acceptable

Test Group 4 (Leaded)										
Initial	Termination Resistance	12 socket (3600 chain)	m Ω	18.46	12.18	15.18	0.987	1.627	20 m Ω Max	Acceptable
After 115 °C temperature life 250H	Termination Resistance		m Ω	19.35	11.38	14.44	1.356	1.366	20 m Ω Max	Acceptable
After 115 °C temperature life 500H	Termination Resistance		m Ω	18.63	10.57	14.29	1.277	1.491	20 m Ω Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

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

Test Group 5 (Lead free)										
Initial	Termination resistance	8 socket (2400 chain)	mΩ	19.42	12.75	15.45	1.165	1.303	20 mΩ Max	Acceptable
After 5 cycle actuation	Termination resistance		mΩ	17.72	11.66	14.26	1.088	1.759	20 mΩ Max	Acceptable
After Mix Gas 5days (CPU mating)	Termination resistance	4 socket (1200 chain)	mΩ	17.55	11.55	14.11	1.099	1.788	20 mΩ Max	Acceptable
After Mix Gas 5days (CPU unmating)	Termination resistance		mΩ	18.67	12.03	14.80	1.114	1.554	20 mΩ Max	Acceptable
After Mix Gas 10days (CPU mating)	Termination resistance		mΩ	17.62	11.53	14.06	1.091	1.815	20 mΩ Max	Acceptable
After Mix Gas 10days (Unmate first 5days and mate with last 5days)	Termination resistance		mΩ	18.48	11.62	14.49	1.190	1.544	20 mΩ Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

Test Group 6 (Lead free)										
Initial LLCR	Termination resistance	4 socket (1200 chain)	mΩ	18.04	12.12	15.01	0.985	1.689	20 mΩ Max	Acceptable
Current rating during test	Temperature increase	4 socket X 5 points	Deg C	29.03	24.60	26.27	1.892	0.657	30 deg.C Max.	Acceptable
LLCR after current rating	Termination resistance	4 socket (1200 chain)	mΩ	16.69	11.30	14.08	0.955	2.066	20 mΩ Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

Test Group 7 (Lead free)										
Capacitance	(Horizontal)	8 socket	pF	0.308	0.297	0.302	0.0033	71.41	1.0 pF Max	Acceptable
	(vertical)	8 socket	pF	0.309	0.297	0.303	0.0037	63.33	1.0 pF Max	Acceptable
Inductance	(Without solder ball, Horizontal)	8 socket	nH	3.96	3.61	3.82	0.069	0.89	4.0nH Max	Acceptable
	(Without solder ball, Vertical)	8 socket	nH	3.77	3.45	3.59	0.663	2.17	4.4nH Max	Acceptable
	(With solder ball, Horizontal)	8 socket	nH	4.07	3.81	3.96	0.059	2.47	4.0nH Max	Acceptable
	(With solder ball, Vertical)	8 socket	nH	4.04	3.64	3.79	0.08	2.55	4.4nH Max	Acceptable
Near end cross talk	35ps	8 socket	%	7.06	6.54	6.75	0.188	2.22	8% Max	Acceptable
	100ps	8 socket	%	6.23	5.53	5.79	0.235	3.14	8% Max	Acceptable

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

Test Group8 (Lead free)										
Initial	Package mating operation force of lever	20 socket	Kgf	3.90	1.90	2.86	0.519	1.379	5kgf Max	Acceptable
Initial	Package unmating operation force of lever	20 socket	kgf	0.70	0.20	0.37	0.127	12.12	5kgf Max	Acceptable
Initial	Contact retention force	20 cont x 4skt	gf	245	133	184	29.3	1.357	65gf Min	Acceptable
Initial	Solder ball shear force	20 cont x 4skt	gf	1124	819	939	59.2	1.066	750gf Min	Acceptable
Initial	Gold plating thickness	20 cont x 4skt	Micr o-m	0.855	0.792	0.820	0.0151	1.318	0.76 micro-m Min	Acceptable
Initial	Nickel plating thickness	20 cont x 4skt	Micr o-m	2.068	1.313	1.796	0.1802	1.916	1.27 micro-m Min	Acceptable

Porosity test	Visual observation by magnify scope	30 cont acts	—	No pores					2pores Max	Acceptable
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Conditions	Measure Item	n	Unit	Results					Requirement	Judgement
				MAX.	MIN.	AVE.	SIG.	Cpk		

Test Group 9 (Lead free)										
Initial	Termination Resistance	8 socket (2400 chain)	mΩ	18.72	11.87	14.48	1.034	1.779	20 mΩ Max	Acceptable
Initial	Socket flatness	8 socket	mm	0.127	0.115	0.120	0.004	6.052	0.2mm Max	Acceptable
After soldering heat	Termination Resistance	8 socket (2400 chain)	mΩ	18.91	11.43	14.46	1.079	1.711	20 mΩ Max	Acceptable
After soldering heat	Socket flatness	8 socket	mm	0.149	0.122	0.136	0.008	2.846	0.2mm Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

Test Group 9 (Lead free)								
Resistance to reflow soldering heat	(Appearance)	8 socket	-	No abnormalities			No abnormalities	Acceptable
Resistance to solvents	(Appearance)	8 socket	-	No abnormalities			No abnormalities	Acceptable

Conditions	Measure Item	n	Unit	Results					Require ment	Judgement
				MAX.	MIN.	AVE.	SIG.	Cpk		

Test Group 9 (Leaded)										
Initial	Termination Resistance	8 socket (2400 chain)	mΩ	18.74	12.06	15.02	1.022	1.623	20 mΩ Max	Acceptable
Initial	Socket flatness	8 socket	mm	0.127	0.110	0.117	0.005	5.519	0.2mm Max	Acceptable
After soldering heat	Termination Resistance	8 socket (2400 chain)	mΩ	18.24	11.90	14.72	1.012	1.737	20 mΩ Max	Acceptable
After soldering heat	Socket flatness	8 socket	mm	0.146	0.123	0.131	0.007	3.424	0.2mm Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

Test Group 9 (Leaded)								
Resistance to reflow soldering heat	(Appearance)	8 socket	-	No abnormalities			No abnormalities	Acceptable
Resistance to solvents	(Appearance)	8 socket	-	No abnormalities			No abnormalities	Acceptable

Conditions	Measure Item	n	Unit	Results					Require ment	Judgement
				MAX.	MIN.	AVE.	SIG.	Cpk		

Test Group 10 (Lead free)										
Initial	Termination Resistance	25 socket (7500 chain)	mΩ	19.90	9.59	15.17	1.144	1.408	20 mΩ Max	Acceptable
After thermal cycling 250cycle	Termination Resistance		mΩ	19.69	9.68	13.34	1.141	1.945	20 mΩ Max	Acceptable
After thermal cycling 500cycle	Termination Resistance		mΩ	19.75	9.83	13.12	1.119	2.049	20 mΩ Max	Acceptable
After thermal cycling 750cycle	Termination Resistance		mΩ	19.45	9.54	13.19	1.214	1.870	20 mΩ Max	Acceptable
After thermal cycling 1000cycle	Termination Resistance		mΩ	19.49	9.53	13.14	1.255	1.822	20 mΩ Max	Acceptable

Test Group 10 (Leaded)										
Initial	Termination Resistance	25 socket (7500 chain)	mΩ	19.97	9.72	14.35	1.115	1.690	20 mΩ Max	Acceptable
After thermal cycling 250cycle	Termination Resistance		mΩ	18.60	8.43	13.21	1.185	1.911	20 mΩ Max	Acceptable
After thermal cycling 500cycle	Termination Resistance		mΩ	19.47	8.08	13.35	1.223	1.813	20 mΩ Max	Acceptable
After thermal cycling 750cycle	Termination Resistance		mΩ	19.34	9.59	13.43	1.267	1.729	20 mΩ Max	Acceptable
After thermal cycling 1000cycle	Termination Resistance		mΩ	19.75	9.21	13.60	1.317	1.620	20 mΩ Max	Acceptable

*1) One chain represents 2 contacts electrically connected together by the CPU package

REV	REV. RECORD	PREPARED		CHECK		APPROVAL	
A	RELEASE	Y.SEKIBA	4 SEP '06	S.HASHIMOTO	4 SEP '06	H.SHIRAI	4 SEP '06
B	REVISED	Y.SEKIBA	25 SEP '06	S.HASHIMOTO	25 SEP '06	H.SHIRAI	25 SEP '06