

Low Profile Battery Connector

1. Introduction

1.1 Objective

Testing was performed on the Low Profile Battery Connector to determine if it meets the requirements of product specification, 108-78965.

1.2 Scope

This report covers the electrical, mechanical and environmental performance requirements of the Low Profile Battery Connector.

The qualification testing was performed between 18 Jan. 2013 and 29 Mar. 2013.

1.3 Conclusion

The Low Profile Battery Connector meets the electrical, mechanical and environmental performance requirements of product specification, 108-78965.

1.4 Test samples

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

Product part No.	Description
2229056-1	Low Profile Battery Connector, 3 Pos.

Fig. 1

2. Test contents

No.	Test items	Requirements	Judgment
2.1	Examination of product	<ul style="list-style-type: none"> • Visual Inspection • No physical damage 	Acceptable
Electrical requirements			
2.2	Termination resistance (Low level)	<ul style="list-style-type: none"> • 35mΩ Max. : 1.0mm stroke(Initial) • 40mΩ Max. : 1.0mm stroke(Final) 	Acceptable
2.3	Dielectric withstanding voltage	<ul style="list-style-type: none"> • 500VAC for 1 minute • Test between adjacent circuits of unmated connectors • No creeping discharge or flashover shall occur • Current leakage must be 1mA Max. 	Acceptable
2.4	Insulation resistance	<ul style="list-style-type: none"> • Impressed voltage 100 V DC. for 1 minute • Test between adjacent circuits of unmated connectors • 100MΩ Min. 	Acceptable
2.5	Temperature rising	<ul style="list-style-type: none"> • 30°C Max. under loaded rating current • Rating current: 2A 	Acceptable
Mechanical requirements			
2.6	Contact normal force	<ul style="list-style-type: none"> • 1.0 N Min./ 1.0mm stroke (Initial) 	Acceptable
2.7	Durability (Repeated mating / un-mating)	<ul style="list-style-type: none"> • 1.0mm stroking • Operation speed: 10~20cycles/min. • Number of cycles: 5000 cycles • Contact resistance to meet the spec 2.2 • Contact normal force should be more than 70% of initial force at 1.0mm stroke from initial contact point 	Acceptable

Fig. 2 (to be continued)

No.	Test items	Requirements	Judgment
2.8	Durability (Repeated mating / un-mating, Full stroke)	<ul style="list-style-type: none"> • Full stroking • Operation speed: 10~20cycles/min. • Number of cycles: 200 cycles • Contact resistance to meet the spec 2.2 • Contact normal force should be more than 70% of initial force at 1.0mm stroke from initial contact point 	Acceptable
2.9	Vibration (Low frequency)	<ul style="list-style-type: none"> • Mated connectors to 10-55-10 Hz traversed in 1 minute at 1.52mm amplitude 2 hours each of 3 mutually perpendicular planes. 100 mA applied • No electrical discontinuity greater than 1 μ sec. shall occur • Contact resistance to meet the spec 2.2 • No physical damage allowed 	Acceptable
2.10	Physical shock	<ul style="list-style-type: none"> • Accelerated velocity: 490m/s²(50G) • Waveform: Half Sinusoidal Wave, • Duration: 11m sec. Number of drops: 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops • 100 mA applied • No electrical discontinuity greater than 1 μ sec. shall occur • Contact resistance to meet the spec 2.2 • No physical damage allowed 	Acceptable
2.11	Solderability	<ul style="list-style-type: none"> • Wet solder coverage 95% Min. • Solder temperature 245 \pm 5 $^{\circ}$C • Immersion duration 3\pm 0.5 sec. 	Acceptable
Environmental requirements			
2.12	Thermal shock	<ul style="list-style-type: none"> • Mated connector • -40$^{\circ}$C /30min, 85$^{\circ}$C /30 min. • Make this cycle repeating 10 cycles • Contact resistance to meet the spec 2.2 • No physical damage allowed 	Acceptable
2.13	Temperature life (Heat aging)	<ul style="list-style-type: none"> • Subject mated connector, 85$^{\circ}$C, 240hours • Contact resistance to meet the spec 2.2 • No physical damage allowed 	Acceptable
2.14	Humidity (Steady state)	<ul style="list-style-type: none"> • Subject mated connector, 90~95 %RH, 60$^{\circ}$C, 240hours • Contact resistance to meet the spec 2.2 • Dielectric withstanding voltage to meet the spec 2.3 • Insulation resistance to meet the spec 2.4 • No physical damage allowed 	Acceptable
2.15	Humidity-temperature cycling	<ul style="list-style-type: none"> • Subject mated connector, 25~65$^{\circ}$C, 90~95% R.H. • 24 hours a cycle, repeat 10 cycles • Contact resistance to meet the spec 2.2 • No physical damage allowed 	Acceptable
2.16	Salt spray	<ul style="list-style-type: none"> • 35$^{\circ}$C, Concentration 5% 48H • Contact resistance to meet the spec 2.2 • No corrosion that damages function of connector allowed 	Acceptable
2.17	Industrial gas (SO ₂)	<ul style="list-style-type: none"> • 10ppm, 40$^{\circ}$C, 75%RH, 48hours • Mated connector leaves in the gas • Contact resistance to meet the spec 2.2 	Acceptable
2.18	Resistance to soldering heat	<ul style="list-style-type: none"> • Test connector on PCB • Soldering iron temperature, 380\pm10$^{\circ}$C, 5sec. Max. • No physical damage allowed 	Acceptable
2.19	Resistance to reflow heat	<ul style="list-style-type: none"> • No physical damage shall occur • Temperature profile : as shown in Appendix 2 and Fig.4 	Acceptable

Fig. 2 (End)

3. Product qualification test sequence

Appendix 1

Test examination	Test group												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	Test sequence (a)												
Examination of product	1,7	1,8	1,8	1,6	1,6	1,6	1,7	1,6	1,6	1,6	1,4	1,3	1,3
Termination resistance (Low level)	3,6	3,7	3,7	3,5	3,5	3,5		3,5	3,5	3,5			
Dielectric withstanding voltage							2,5						
Insulation resistance							3,6						
Temperature rising											3		
Contact normal force		4,6	4,6										
Durability(Repeated mating /un-mating)		5											
Durability(Repeated mating /un-mating, Full stroke)			5										
Vibration (Low frequency)	4												
Physical shock	5												
Solderability												2	
Thermal shock				4									
Temperature life (Heat aging)					4								
Humidity (Steady state)						4	4						
Humidity-temperature cycling								4					
Salt spray									4				
Industrial gas (SO ₂)										4			
Resistance to soldering heat													2
Resistance to reflow heat	2	2	2	2	2	2		2	2	2	2		

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

4. Test results

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 1							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	m Ω	18	28.25	26.33	26.77	35m Ω Max. (Initial)	Acceptable
Vibration (Low frequency)	-	6	Electrical discontinuity greater than 1 μ sec. and physical damage didn't occur.			No electrical discontinuity greater than 1 μ sec. shall occur. No physical damage allowed.	Acceptable
Physical shock	-	6	Electrical discontinuity greater than 1 μ sec. and physical damage didn't occur.			No electrical discontinuity greater than 1 μ sec. shall occur. No physical damage allowed.	Acceptable
Termination resistance (Low level)	m Ω	18	27.46	25.98	26.69	40m Ω Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 2							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	m Ω	18	27.16	26.18	26.68	35m Ω Max. (Initial)	Acceptable
Contact normal force	N	18	1.42	1.27	1.35	1N MIN.	Acceptable
Durability (Repeated mating/un-mating)	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Contact normal force	N	18	1.37	1.27	1.33	-	-
Final Contact normal force/ Initial Contact normal force	%	18	100.0	96.5	98.8	70% Min.	Acceptable
Termination resistance (Low level)	m Ω	18	27.57	26.31	26.97	40m Ω Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Fig. 3 (To be continued)

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 3							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	27.75	26.67	27.14	35mΩ Max. (Initial)	Acceptable
Contact normal force	N	18	1.40	1.33	1.37	1N MIN.	Acceptable
Durability (Repeated mating/un-mating, Full stroke)	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Contact normal force	N	18	1.10	1.07	1.08	-	-
Final Contact normal force/ Initial Contact normal force	%	18	82.5	77.4	79.3	70% Min.	Acceptable
Termination resistance (Low level)	mΩ	18	29.02	26.78	27.67	40mΩ Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 4							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	26.87	24.42	26.03	35mΩ Max. (Initial)	Acceptable
Thermal shock	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	27.03	25.21	26.20	40mΩ Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 5							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	27.44	25.58	26.31	35mΩ Max. (Initial)	Acceptable
Temperature life (Heat aging)	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	27.92	25.19	26.22	40mΩ Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Fig. 3 (To be continued)

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 6							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	m Ω	18	27.13	26.31	26.68	35m Ω Max. (Initial)	Acceptable
Humidity (Steady state)	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	m Ω	18	34.07	26.65	28.74	40m Ω Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	N	Result	Spec.	Judgement
Examination of product	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Acceptable
Dielectric withstanding voltage	-	12	The breakdown and flashover didn't occur.	No breakdown or no flashover shall occur.	Acceptable
Insulation resistance	M Ω	12	>100M Ω	100M Ω min.	Acceptable
Humidity (Steady state)	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Acceptable
Dielectric withstanding voltage	-	12	The breakdown and flashover didn't occur.	No breakdown or no flashover shall occur.	Acceptable
Insulation resistance	M Ω	12	>100M Ω	100M Ω min.	Acceptable
Examination of product	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Acceptable

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 8							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	m Ω	18	28.22	26.11	26.97	35m Ω Max. (Initial)	Acceptable
Humidity-temperature cycling	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	m Ω	18	34.60	27.10	30.88	40m Ω Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Fig. 3 (To be continued)

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 9							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	27.36	26.27	26.83	35mΩ Max. (Initial)	Acceptable
Salt spray	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	27.67	26.29	26.75	40mΩ Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 10							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	29.09	26.32	27.15	35mΩ Max. (Initial)	Acceptable
Industrial gas (SO ₂)	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Termination resistance (Low level)	mΩ	18	32.61	26.10	27.41	40mΩ Max.(Final)	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	Result				Spec.	Judgement
		N	Max.	Min.	Ave.		
Test group 11							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Resistance to reflow heat	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Temperature rising	°C	6	20.7	16.6	18.8	30°C MAX.	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Test item	Unit	N	Result			Spec.	Judgement
			Max.	Min.	Ave.		
Test group 12							
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Solderability	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Acceptable

Fig. 3 (To be continued)

Test item	Unit	N	Result	Spec.	Judge-ment
Test group 13					
Examination of product	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Accept-able
Resistance to soldering heat	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Accept-able
Examination of product	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Accept-able

Fig. 3 (END)

Appendix 2

	Condition
A: The speed of temperature rising	3°C/sec Max.
B: The start temperature of pre-heating	150~200°C
C: Time of pre-heating	60~180sec.
D: Time of upper 217 °C	60sec MIN. 150sec MAX.
E: Temperature of peak point	250°C

※ Number of reflow times; 2 times.

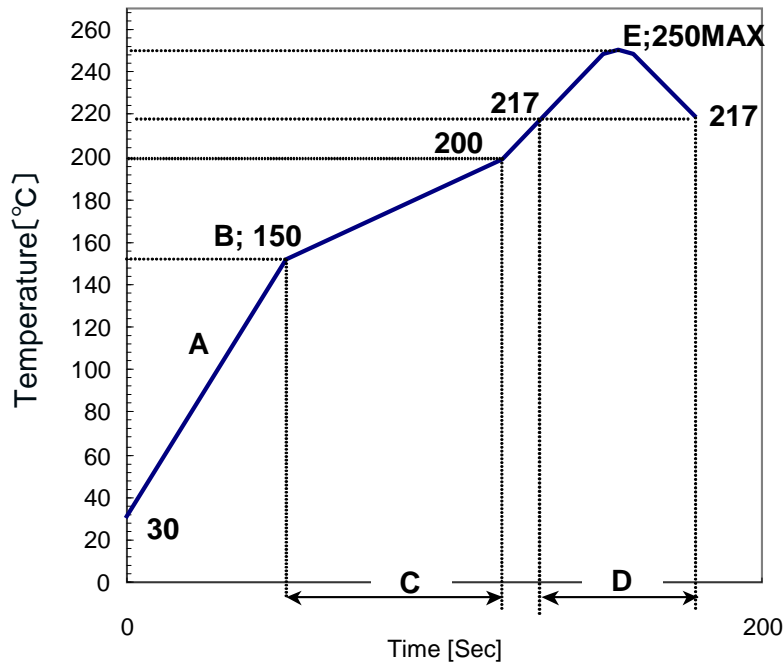


Fig.4 Reflow profile