09 APR 2013 Rev.C

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	Visual Inspection	Acceptable
		No physical damage	
		Electrical requirements	
2.2	Termination resistance	-35m Ω Max. : 1.0mm stroke(Initial)	Acceptable
	(Low level)	-40m Ω Max. : 1.0mm stroke(Final)	
2.3	Dielectric withstanding	•500VAC for 1 minute	Acceptable
	voltage	 Test between adjacent circuits of unmated connectors 	
		No creeping discharge or flashover shall occur	
	!	·Current leakage must be 1mA Max.	
2.4	Insulation resistance	Impressed voltage 100 V DC. for 1 minute	Acceptable
	!	 Test between adjacent circuits of unmated connectors 	
	!	-100MΩ Min.	
2.5	Temperature rising	•30°C Max. under loaded rating current	Acceptable
		Rating current: 2A	
		Mechanical requirements	•
2.6	Contact normal force	-1.0 N Min./ 1.0mm stroke (Initial)	Acceptable
2.7	Durability (Repeated	-1.0mm stroking	Acceptable
	mating / un-mating)	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	

Fig. 2 (to be continued)



No.	Test items	Requirements	Judgment
2.8	Durability (Repeated	•Full stroking	Acceptable
	mating / un-mating,	Operation speed: 10~20cycles/min.	
	Full stroke)	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	
2.9	Vibration	 Mated connectors to 10-55-10 Hz traversed in 1 minute at 	Acceptable
	(Low frequency)	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	
0.40	D	•No physical damage allowed	
2.10	Physical shock	•Accelerated velocity: 490m/s ² (50G)	Acceptable
		•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	
2.11	Coldorability	•No physical damage allowed	Acceptable
2.11	Solderability	•Wet solder coverage 95% Min.	Acceptable
		•Solder temperature 245 ± 5 °C •Immersion duration 3± 0.5 sec.	
2.12	Thermal shock	Environmental requirements •Mated connector	Acceptable
2.12	THEITIAI SHOCK	40°C /30min, 85°C /30 min.	Acceptable
		•Make this cycle repeating 10 cycles	
		•Contact resistance to meet the spec 2.2	
		No physical damage allowed No physical damage allowed	
2.13	Temperature life	•Subject mated connector, 85°C, 240hours	Acceptable
2.13	(Heat aging)	•Contact resistance to meet the spec 2.2	Acceptable
	(Float aging)	No physical damage allowed No physical damage allowed	
2.14	Humidity		Accontable
2.14	(Steady state)	•Subject mated connector, 90~95 %RH, 60°C, 240hours	Acceptable
	(Cicacy state)	• 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	
2.15	Humidity tomporature	•No physical damage allowed	Acceptable
2.13	Humidity-temperature cycling	•Subject mated connector, 25~65°C, 90~95% R.H.	Acceptable
	oyoming .	•24 hours a cycle, repeat 10 cycles	
		Contact resistance to meet the spec 2.2	
2.16	Colt oprov	•No physical damage allowed	Aggartable
2.10	Salt spray	•35°C,Concentration 5% 48H	Acceptable
		•Contact resistance to meet the spec 2.2	
		•No corrosion that damages function of connector allowed	
2.17	Industrial gas (SO ₂)	•10ppm, 40°C, 75%RH, 48hours	Acceptable
		 Mated connector leaves in the gas 	
		•Contact resistance to meet the spec 2.2	
2.18	Resistance to	•Test connector on PCB	Acceptable
	soldering heat	•Soldering iron temperature, 380±10°C, 5sec. Max.	
		·No physical damage allowed	<u> </u>
2.19	Resistance to	No physical damage shall occur	Acceptable
	reflow heat	 Temperature profile: as shown in Appendix 2 and Fig.4 	

Fig. 2 (End)

Rev.C 2 of 8



3. Product qualification test sequence

Appendix 1

				App	endix								
							est gro						
Test examination	1	2	3	4	5	6	7	8	9	10	11	12	13
					Tes	st sequ	uence						
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.

Rev.C 3 of 8



4. Test results

Test item	Unit			Result		Spec.	Judge-
Test item	Offic	N	Max.	Min.	Ave.	Spec.	ment
			Test g	roup 1			_
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able
Resistance to reflow heat	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	28.25	26.33	26.77	35m Ω Max. (Initial)	Accept- able
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.	Accept- able
Physical shock	-	6	greater tl	I discontin nan 1 μ se damage d	c. and	No electrical discontinuity greater than 1 μ sec. shall occur. No physical damage allowed.	Accept- able
Termination resistance (Low level)	mΩ	18	27.46	25.98	26.69	40m Ω Max.(Final)	Accept- able
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able

Test item	Unit			Result		Spec.	Judge-
Test item	Offic	Ν	Max.	Min.	Ave.	Spec.	ment
			Test g	roup 2			
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able
Resistance to reflow heat	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	27.16	26.18	26.68	35m Ω Max. (Initial)	Accept- able
Contact normal force	N	18	1.42	1.27	1.35	1N MIN.	Accept- able
Durability (Repeated mating/un-mating)	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
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.	Accept- able
Termination resistance (Low level)	mΩ	18	27.57	26.31	26.97	40m Ω Max.(Final)	Accept- able
Examination of product	-	6	Met required drawing.	irement of	product	Meets requirement of product drawing.	Accept- able

Fig. 3 (To be continued)

Rev.C 4 of 8



Test item	Unit	Result				Snoo	Judge-
rest item	Offile	N	Max.	Min.	Ave.	Spec.	ment
			Test g	roup 3			
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Resistance to reflow heat	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	27.75	26.67	27.14	35m Ω Max. (Initial)	Accept- able
Contact normal force	N	18	1.40	1.33	1.37	1N MIN.	Accept- able
Durability (Repeated mating/un-mating, Full stroke)	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Contact normal force	Ν	18	1.10	1.07	1.08	-	-
Final Contact normal force/ Initial Contact normal force	%	18	82.5	77.4	79.3	70% Min.	Accept- able
Termination resistance (Low level)	mΩ	18	29.02	26.78	27.67	40m Ω Max.(Final)	Accept- able
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able

Test item	Unit			Result		Snoo	Judge-
restitem	Unit	N	Max.	Min.	Ave.	Spec.	ment
			Test g	roup 4			
Examination of product	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able
Resistance to reflow heat	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	26.87	24.42	26.03	35m Ω Max. (Initial)	Accept- able
Thermal shock	ı	6	Met required drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	27.03	25.21	26.20	40m Ω Max.(Final)	Accept- able
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able

Test item	Unit			Result		Cnoo	Judge-					
rest item	OTIL	N	Max.	Min.	Ave.	Spec.	ment					
	Test group 5											
Examination of product	-	6	Met requirement of product			Meets requirement of	Accept- able					
			drawing.	product drawing.	0							
Resistance to reflow heat	-	6	Met requiction of the drawing.	irement of	product	Meets requirement of product drawing.	Accept- able					
Termination resistance (Low level)	mΩ	18	27.44	25.58	26.31	35m Ω Max. (Initial)	Accept- able					
Temperature life (Heat aging)	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able					
Termination resistance (Low level)	mΩ	18	27.92	25.19	26.22	40m Ω Max.(Final)	Accept- able					
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able					

Fig. 3 (To be continued)

Rev.C 5 of 8



Test item	Unit			Result		Cnoo	Judge-					
rest item		N	Max.	Min.	Ave.	Spec.	ment					
	Test group 6											
Examination of product	_	6	Met requ	irement of	product	Meets requirement of	Accept-					
Examination of product	_	O	drawing.			product drawing.	able					
Resistance to reflow heat		6	Met requ	irement of	product	Meets requirement of	Accept-					
Resistance to renow near	-	U	drawing.			product drawing.	able					
Termination resistance	mΩ	18	27.13	26.31	26.68	35m O May (Initial)	Accept-					
(Low level)	111 36	10	27.10	20.01	20.00	SSITI SE IVIAX. (ITIIIIAI)	able					
Humidity (Steady state)		6	Met requ	irement of	product	Meets requirement of	Accept-					
Turnidity (Steady State)	_	O	drawing.			product drawing. Meets requirement of product drawing. 35m Ω Max. (Initial)	able					
Termination resistance	mΩ	18	34.07	26.65	28.74	40m O May (Final)	Accept-					
(Low level)	111.75	10	34.07	20.03	20.74	40111 32 IVIAX.(I IIIAI)	able					
Examination of product	-	6	Met requ	irement of	product	Meets requirement of	Accept-					
Examination of product		Ö	drawing.			product drawing.	able					

Test item	Unit	N	Result	Spec.	Judge- ment
			Test group 7		ment
Examination of product	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Accept- able
Dielectric withstanding voltage	-	12	The breakdown and flashover didn't occur.	No breakdown or no flashover shall occur.	Accept- able
Insulation resistance	МΩ	12	>100M Ω	100M Ω min.	Accept- able
Humidity (Steady state)	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Accept- able
Dielectric withstanding voltage	-	12	The breakdown and flashover didn't occur.	No breakdown or no flashover shall occur.	Accept- able
Insulation resistance	МΩ	12	>100M Ω	100M Ω min.	Accept- able
Examination of product	-	6	Met requirement of product drawing.	Meets requirement of product drawing.	Accept- able

Test item	Unit			Result		Spec.	Judge-
rest item	Offic	N	Max.	Min.	Ave.	Spec.	ment
			Test g	roup 8			
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Resistance to reflow heat	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	28.22	26.11	26.97	35m Ω Max. (Initial)	Accept- able
Humidity-temperature cycling	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able
Termination resistance (Low level)	mΩ	18	34.60	27.10	30.88	40m Ω Max.(Final)	Accept- able
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able

Fig. 3 (To be continued)

Rev.C 6 of 8



Test item	Unit	Result				Spec.	Judge-		
rescilent		N	Max.	Min.	Ave.	Spec.	ment		
Test group 9									
Examination of product		6	Met requirement of product			Meets requirement of	Accept-		
Examination of product	_		drawing.			product drawing.	able		
Resistance to reflow heat	_	6	Met requirement of product			Meets requirement of	Accept-		
	_		drawing.			product drawing.	able		
Termination resistance	mΩ	18	27.36	26.27	26.83	35m Ω Max. (Initial)	Accept-		
(Low level)	111.35	10	27.00	20.21	20.00	` ,	able		
Calt apray	_	6	Met requirement of product			Meets requirement of	Accept-		
Salt spray		O	drawing.			product drawing.	able		
Termination resistance	mΩ	18	27.67	26.29	26.75	40m Ω Max.(Final)	Accept-		
(Low level)	111 25	10	21.01	20.29	20.73	4011 32 Max.(Fillal)	able		
Examination of product		6	Met requirement of product		product	Meets requirement of	Accept-		
Examination of product	_	O	drawing.			product drawing.	able		

Test item	Unit	Result				Snoo	Judge-		
r est item		N	Max.	Min.	Ave.	Spec.	ment		
Test group 10									
Examination of product		6	Met requirement of product			Meets requirement of	Accept-		
Examination of product	_		drawing.			product drawing.	able		
Resistance to reflow heat	sistance to reflow heat -		6 Met requirement of p			Meets requirement of	Accept-		
			drawing.			product drawing.	able		
Termination resistance (Low level)	mΩ	18	29.09	26.32	27.15	35m Ω Max. (Initial)	Accept- able		
Industrial gas (SO ₂)	-	6	Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able		
Termination resistance (Low level)	mΩ	18	32.61	26.10	27.41	40m Ω Max.(Final)	Accept- able		
Examination of product	-	6	Met requ drawing.	irement of	product	Meets requirement of product drawing.	Accept- able		
			urawing.			product drawing.	avic		

Test item	Unit	Result				Spec.	Judge-	
i est item		N	Max.	Min.	Ave.	Spec.	ment	
Test group 11								
Examination of product	-	6	6 Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able	
Resistance to reflow heat	-	6	6 Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able	
Temperature rising	°C	6	20.7	16.6	18.8	30°C MAX.	Accept- able	
Examination of product	ı	6	6 Met requirement of product drawing.			Meets requirement of product drawing.	Accept- able	

Test item	Unit	N	Result	Spec.	Judge- ment	
Test group 12						
Examination of product	-	6	Met requirement of product	Meets requirement of	Accept-	
			drawing.	product drawing.	able	
Solderability		6	Met requirement of product	Meets requirement of	Accept-	
Solderability		כ	drawing.	product drawing.	able	
Examination of product	-	6	Met requirement of product	Meets requirement of	Accept-	
			drawing.	product drawing.	able	

Fig. 3 (To be continued)

Rev.C 7 of 8



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

X Number of reflow times; 2 times.

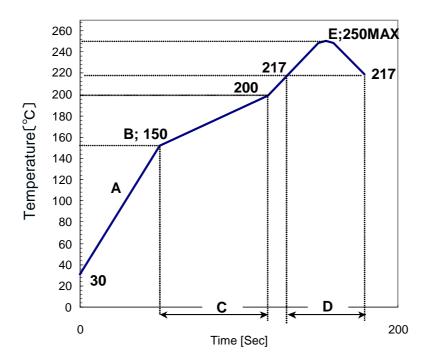


Fig.4 Reflow profile

Rev.C 8 of 8