
4P Low Profile Mid-mount Battery Connector

1.0 Scope:**1.1 Content:**

This specification covers the requirements for product performance, test methods and quality assurance provisions of the Low Profile Battery Connector.

2.0 Applicable Documents:

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1 TE connectivity Documents:

501-115062: Qualification Test Report

2.2 TE connectivity Drawings:

C-2199062 Customer drawing of "4P Low profile Mid-mount battery connector, 2.5mm pitch"

2.3 Commercial standards and specifications:

2.3.1 MIL-STD-202: Test methods for electronic and electrical component parts.

2.3.2 EIA 364: Test specification

3.0 Requirements:**3.1 Design and Construction:**

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2 Material:

3.2.1 Contact: Copper alloy, Nickel-under plated all over. Gold plated at contact area. Gold flash plated at soldering area

3.2.2 Housing: Thermoplastic molding compound, black.

3.2.3 Solder Peg : Metal alloy, Nickel-under plated all over. Tin plated overall.

3.3 Ratings:

A. Voltage rating: 30V DC

B. Current rating: 0.5A for signal contact & 3A for power contact.

C. Temperature rating: -40°C to $+85^{\circ}\text{C}$ High limit temperature includes raised temperature by operation

3.4 Performance requirements and test descriptions:

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in section 3.5. All tests shall be performed in the room temperature, unless otherwise specified.

3.5 Test Requirements and Procedures Summary:

3.5.1 Examination:

Test Description	Requirement	Procedures
Visual examination of product	Meets requirements of product drawing and applicable instructions on customer drawing, and application specification.	Visual, dimensional and functional per applicable inspection plan. In according with IEC 60512-1-1 Magnification 10x

3.5.2 Electrical

Test Description	Requirement	Procedures
Low level contact resistance (LLCR)	30m Ω Max. excluding the contact bulk resistance at 1.0mm stroke (Initial& Final).	Subject specimens to 20mV Max. open circuit at 100mA. Need to exclude wire resistance from measurement. Refer to Fig 1. Per EIA 364-23
Withstanding Voltage	Neither creeping discharge nor flashover shall occur Current leakage: 0.5mA Max.	Unmated Connector with 500 VAC between adjacent contact for 1 minute. Per EIA 364-20
Insulation resistance	1000 M Ω Min.	Subject specimens to 500VDC, 1 minute hold. Test between adjacent contacts. Per EIA 364-21
Temperature rise	Rated current is applied to the contacts, the delta temperature shall not exceed +30 ^o C.	Apply 3.0A current to power/GND contact and 0.5A to signal contact . Stabilize at a single current level until 3 readings at 5 minute intervals are within 1 ^o C. Refer to figure 2. (PCB trace width for 3A circuit at least 1.5mm, thickness 1oz) Per EIA 364-70,Method 2

3.5.3 Mechanical

Test Description	Requirement	Procedures
Contact normal force	1.1 N Min. at 1.0mm stroke (Initial)	Measure force necessary to mate samples at minimum rate of 10mm a minute. Refer to Fig 3. Per EIA-364-13 ,Method A
Durability	No physical damage to any part of the connectors. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Mate/unmating samples for 5000 cycles at maximum rate of 10~20 cycles per minute with 1.2mm stroke. Refer to Fig 3. Per EIA-364-09
Vibration	No electrical discontinuities greater than 1 microsecond shall occur. No evidence of physical damage. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Mated connectors subject to 5-9-200 Hz,4m/s ² . 5 Cycles for each directions, and 100mA current applied. Refer to Fig 4. Per EIA 364-28 Condition I
Physical shock	No electrical discontinuities greater than 1 microsecond shall occur. No evidence of physical damage. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Accelerated Velocity: 490m/s ² (50G) Waveform: Half sin Duration: 11m sec. Number of drops: 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops. 100mA applied Per EIA 364-27 Method A
Peeling strength	No visible physical damage shall be noticed to a soldered connector when it is pulled up from the PCB in the 4 directions with a minimum force of 30N.	Solder connectors onto PCB, and press the connector from 4 directions.. Refer to figure 5.
Mini-drop test	30 CM height drop, NO power off, 10 times / 6 surfaces	Soldering connector to real / mockup phone. Real / mockup phone is dropped to hard wood board with power on. 10sec/cycle.

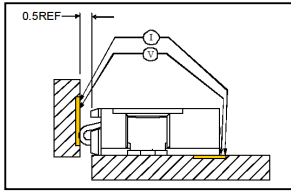


Fig 1 Contact resistance

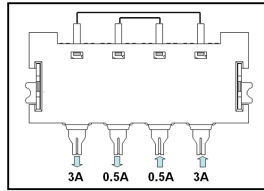


Fig 2 Temperature rise

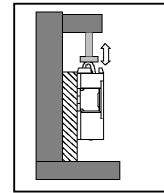


Fig 3 Normal force

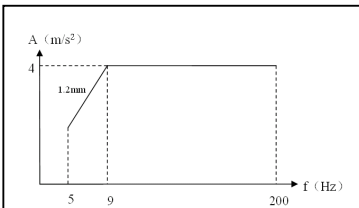


Fig 4 Vibration test curve

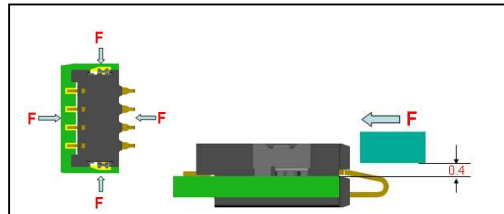


Fig 5 Peeling strength

3.5.4 Environmental

Test Description	Requirement	Procedures
Thermal shock	No mechanical damage, no performance change. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Subject mated samples to 24 cycles between -40°C for 1H and $+85^{\circ}\text{C}$ for 1H, the Temperature transfer time less than 20S, then cool to ambient. Recovery 2hours at ambient atmosphere. Per EIA 364-32 Condition I
High Temperature Storage	No mechanical damage, no performance change. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Subject mated samples to $+70^{\circ}\text{C}$ for 24hours, then cool to ambient. Recovery 1hours at ambient atmosphere. Per EIA 364-17 ,Method A
Low Temperature Storage	No mechanical damage, no performance change. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Subject mated samples to -40°C for 24hours, then cool to ambient. Recovery 1hours at ambient atmosphere. Per EIA 364-17 ,Method A
Humidity (Steady state)	No mechanical damage, no performance change. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Subject samples to 90~95 %RH, 60°C 240hours. Measure after leaving 1hour in the room temperature & humidity. Per EIA 364-31 ,Method II, Condition B
Humidity-temperature cycling	No mechanical damage, no performance change. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Subject mated samples to $25\sim 65^{\circ}\text{C}$, 90~95% R.H. 24 hours for 10 cycles. Cold shock -10°C performed. Measure after leaving 1hour in the room temperature & humidity. Per EIA 364-31 Method III
Salt spray	No corrosion that damages function of connector allowed. Contact resistance : 30m Ω Max. at 1.0mm stroke(Final)	Subject mated connectors with 5 %, 35°C concentration for 48 hours Per EIA 364-26 Condition B
Solderability	Contact solder pad shall have a Min. 95% solder coverage	Dip solder tails into the molten solder (held at 255°C) up to 0.5mm from the tip of tails for 3 ± 0.5 seconds. Flux: Alpha 100 Per EIA 364-52
Resistance to reflow heat	No physical damage shall occur	Temperature profile; See Fig. 6. Per EIA 364-56

3.5.5 Resistance to soldering reflow heat test condition:

Resistance to soldering-heat test shall cover the IR-soldering heat-curve as indicated in figure 6.

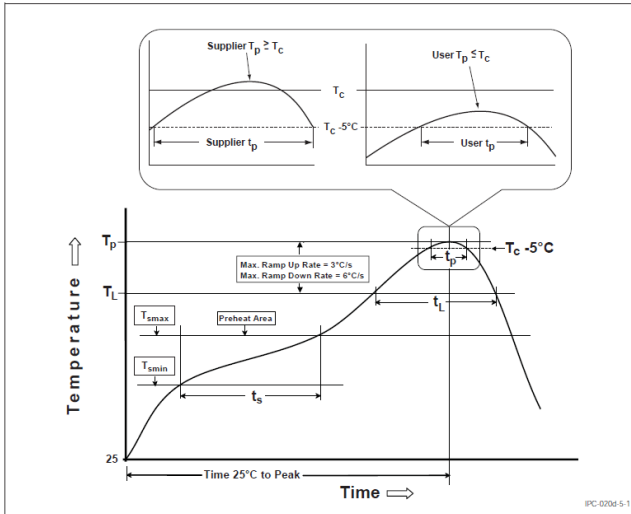


Figure 5-1 Classification Profile (Not to scale)

	Condition
Time from 150°C to 200°C	100~120sec
The speed of temperature rising	3.0 °C /s Max
Time of up to 217°C	100~150 °C
Temperature of Minimum peak point	255°C
Time of above 250°C	30sec Min.
The speed of temperature dropping	-6°C/sec Max.
Time of 25°C~Tp	8Min. Max.

Fig 6 : Temperature profile for IR reflow

3.6 Product Qualification Test Sequence (Sample Size for each group : 5pcs)

Test group	a	b	c	d	e	f	g	h	i	j	K
Visual examination of product	1,7	1,8	1,6	1,7	1,10	1,6	1,6	1,4	1,4	1	1
Low level contact resistance (LLCR)	3,6	3,7	3,5	3,6	3,7	3,5	3,5				
Withstanding Voltage					4,8						
Insulation resistance					5,9						
Temperature rise									3		
Contact normal force		4,6									
Durability		5									
Vibration	4										
Physical shock	5										
Peeling strength								3			
Thermal shock			4								
High Temperature Storage				4							
Low Temperature Storage				5							
Humidity					6						
Cyclic temperature & Humidity						4					
Salt spray							4				
Solderability										2	
Resistance to soldering reflow heat	2	2	2	2	2	2	2	2	2		
Mini-drop test											2

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