Industrial Mini I/O Connector

1. Scope

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of Industrial Mini I/O Connector.
Applicable product description and part numbers are as shown in Fig 1.

P/N	Description
1971885-1 1-1971885-1 2271656-1 1-2271656-1 4-2271656-1	Industrial Vertical Mini I/O Connector SMT type I
1971885-2 1-1971885-2 2271656-2 1-2271656-2	Industrial Vertical Mini I/O Connector SMT type II
1971886-1	Industrial Vertical Mini I/O Connector THR type I
1971886-2	Industrial Vertical Mini I/O Connector THR type II

(Fig 1)

2. 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 Specifications:

A. 501-106087-1: Test Report: (SMT TYPE)
B. 501-106087-2: Test Report: (DIP TYPE)

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2.2 Commercial Standards and Specifications:

A. EIA364 series

3. Requirements:

3.1 Design and Construction:

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

3.2 Materials:

Receptacle:

A. Contact :
Material: Copper alloy
Finish: Nickel plating all over
Contact area: Au plating
Soldering area: Tin plating

B. Housing:
Material: Thermo plastic
Flammability: UL94 V-0

C. Shell:
Material: Phosphor Bronze
Finish: Tin plating over Ni under-plating

3.3 Ratings:

A. Voltage Rating : 50 V a.c. / 60 V d.c.
B. Current Rating: 0.5A
C. Temperature Rating : －40° C to 85° C

3.4 Performance Requirements and Test Descriptions :

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig.2.

All tests shall be performed in the room temperature, unless otherwise specified.

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3.5 Test Requirements and Procedures Summary

Para	Test Items	Requirements	Procedures
3.5.1	Examination of Product	Meets requirements of product drawing.	Visual inspection No physical damage.
Electrical Requirements			
3.5.2	Termination Resistance (Low Level)	40 mΩMax. (Initial) 50 mΩMax. (After Test)	Subject mated contacts assembled in housing to 20mV Max open circuit at 100mA. Fig.3. EIA364-23
3.5.3	Insulation Resistance	500MΩMin.	100V DC. 1minute hold. Test between adjacent circuits of mated connectors.EIA364-21
3.5.4	Dielectric withstanding Voltage	No creeping discharge or flashover shall occur. Leak current: 0.5mA Max.	DWV test condition (1 minute hold); 1000V DC : Between contact to contact 1500V DC : Between contact to shell Test between adjacent circuits of mated connectors. EIA364-20
3.5.5	Temperature Rising	30° CMAX under loaded rating current.	Measure temperature rising by energized current.
Mechanical Requirements			
3.5.6	Connector Mating Force	30 N Max.	Operation speed: 10mm/min. Measure force necessary to mate samples. EIA364-13
3.5.7	Connector Un-mating Force	30 N Max.	Set lock operation part of plug connector to open. Operation speed: 10mm/min. Measure force necessary to unmate samples. EIA364-13
3.5.8	Durability (Repeated Mate/Unmating)	Termination Resistance (Low Level).	Operation Speed :200cycles/hour No. of Cycles: 1500cycles.(SMT HDR) No. of Cycles: 1500cycles.(DIP HDR) EIA364-09
3.5.9	Cable Pull-Out	No damage on soldering place. No disconnection between shield wire to shell.	Apply axial load to cable on plug connector. Fig.4 EIA364-38 Retention force for KIT products shall be determined by cable. Retention force for CABLE ASSY products shall be specified on CABLE ASSY drawing.

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Fig.2(CONT.)

Para	Test Items	Requirements	Procedures
3.5.10	Lock Strength	Connector must not unmate. No destruction on Lock elements, no destruction on Receptacle connector with PC-Board and no harmful damage on other parts.	Mate connector and make lock mechanism effective. Apply axial load to cable on plug connector. 98 N. 1 minute. Fig.4
3.5.11	Elasticity	Connector must not unmate. No destruction on Lock elements, no destruction on Receptacle connector with PC-Board and no harmful damage on other parts.	Mate connector and make lock mechanism effective. Apply axial load to cable on plug connector 20N and bend cable to direction 45 degrees each on both side up to 20 cycles. Fig.5
3.5.12	Fixed Strength to PC-Board	No destruction on Receptacle connector with PC-Board and no harmful damage on other parts.	Mate connector. Apply load to edge of plug connector. Load one direction on one sample. Fig 6 40 N. 1 minute for PN:*-227165-* 15N. 1 minute for PN:*-1971885-* Recommend panel protection for bigger strength application (Fig.7)
3.5.13	Vibration (Low Frequency)	No electrical discontinuity greater than 1μsec shall occur. Termination Resistance (Low Level).	Subject mated connectors to 10-55-10 Hz traversed in 1 minute at 1.52mm amplitude 2 hours each of 3 mutually perpendicular planes. EIA364-28
3.5.14	Physical Shock	No electrical discontinuity greater than 1μsec shall occur. Termination Resistance (Low Level).	Accelerated Velocity : 30G Waveform : Half-sin wave Duration: 11 millisecond Number of drops: 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops. EIA364-27

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3.5.15-1	Solder ability (DIP Products)	Appearance of the specimen shall be inspected after the test with the assistance of a magnifier capable of giving a magnifier of 10X. The soldered surface shall be covered with a smooth solder coating with no more than small amounts of scattering imperfections such as pin-holes or un-wet or de-wet areas.	Eutectic solder Solder Temperature : 235±5° C Immersion Duration: 3±0.5 sec. Lead-Free solder（Sn-Ag-Cu） Solder Temperature : 245±5° C Immersion Duration: 3±0.5 sec. MIL-STD-202 Method 208
Para	**Test Items**	**Requirements**	**Procedures**
3.5.15-2	Solder ability (SMT Products)	Appearance of the specimen shall be inspected after the test with the assistance of a magnifier capable of giving a magnifier of 10X. The soldered surface shall be covered with a smooth solder coating with no more than small amounts of scattering imperfections such as pin-holes or un-wet or de-wet areas.	Conform to IEC60068-2-58 7.Solder reflow method. Preheating: 150±10° C, 60～120sec Soldering: 235±5° C, 10±1 sec Number of reflow : 2
Environmental Requirements			
3.5.16	Temperature Life (Heat Aging)	Termination resistance (Low Level)	Mated connector 85° C, 315 Hours EIA364-17
3.5.17	Humidity (Steady State)	Insulation resistance Dielectric Strength Termination resistance (Low Level)	Mated connector 90-95%R.H. 40° C 240 hours EIA364-31
3.5.18	Thermal Shock	Termination Resistance (Low Level)	Mated connector －55° C/ 30 min. +85° C/ 30 min. Making this a cycle, repeat 10 cycles. EIA364-32
3.5.19	Humidity-Temperatu re Cycling	Insulation resistance Dielectric Strength Termination resistance (Low Level)	Mated connector, 25～65° C, 80~100%R.H. 7 cycles Cold shock –10° C performed EIA364-31

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3.5.20	Salt Spray	Termination resistance(Low Level) After it is left for 1 hour under a steady temperature/humidity, it is measured.	Mated connector Salt concentration: 5%, 35±2° C, 48 hours EIA364-26 (MIL-STD-202F Method 101 Condition B)
3.5.21	Hydrogen sulfide Gas (H_2S)	Termination resistance (Low Level)	Mated connector H_2S Gas :3±1ppm, 40±2° C, 96 hours

Fig.2(CONT.)

Para	Test Items	Requirements	Procedures
3.5.22-1	Resistance to Soldering Heat (DIP Products)	No physical damage shall occur.	Test connector on PCB. Solder Temperature : 260±5° C Immersion Duration : 10±0.5 sec. AMP Spec. 109-5204, Condition B MIL-STD-202, Condition 210 In case of manual soldering iron, apply it as 360±10° C for 3±0.5° C seconds without forcing pressure to affect the tine of contact.
3.5.22-2	Resistance to Soldering Heat (SMT Products)	Appearance of the specimen shall be inspected after the test with the assistance of a magnifier capable of giving a magnification of 10X, No physical damage such as cracks, chips or malting.	Test connector on PC-Board. Reflow Average ramp rate: 3° C/ sec max Preheat temperature:150～200° C Preheat time: 60～180sec Ramp to peak: 3° C/ sec max Time over liquid's (217° C):60～150 seconds Peak temperature: 260 +0/-5 ° C Time within 5° C of peak:20～40 sec Ramp - cool down: 6° C/ sec max Time 25° C to peak: 8 min max After reflow, then DIP (Legs of shell) Solder temperature 260° C±5° C Immersion duration 10±1sec. Number of reflow : 2 EIA-364-56

NOTE *Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Re qualification Test Sequence shown in Figure 3.*

Fig. 2 (END)

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3.6 Product Qualification Test Sequence

Test Examination	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Examination of Product	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Termination Resistance (Low Level)				2,6			2,4	2,5		2,4	2,4	2,4	2,4	2,4	2,4	
Insulation Resistance	2,5	2,5														
Dielectric withstanding Voltage	3,6	3,6														
Temperature Rising			2													
Conn. Mating Force				3												
Conn. Unmating Force				4												
Durability Repeated mate/Unmating				5												
Cable Pull-Out					2											
Lock Strength																
Elasticity						2										
Fixed strength to PC-Board							3									
Vibration (High Frequency)								3								
Physical Shock								4								
Solder ability									2							
Temperature Life (Heat Aging)										3						
Humidity (Steady State)	4										3					
Thermal Shock												3				
Humidity-Temperature Cycling		4											3			
Salt Spray														3		
Hydrogen sulfide Gas (SO_2)															3	
Resistance to Soldering Heat																2

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

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4. QUALITY ASSURANCE PEOVISIONS

4.1 Qualification Testing

A. Specimen Selection

Plugs and jacks shall be prepared in accordance with applicable Instruction Sheet and shall be selected at random from current production. Each test group shall consist of a minimum of 5 specimens unless otherwise stated.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in figure 3.

4.2 Requalification testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process or controlling industry specification, product assurance, shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

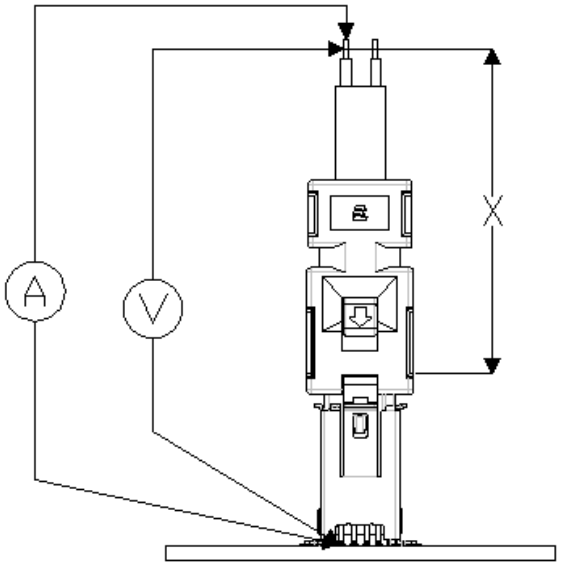
4.3 Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 2. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmitted.

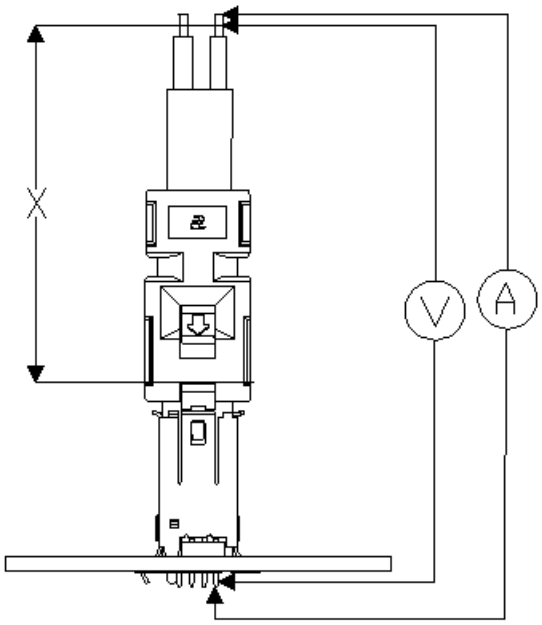
4.4 Quality conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

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SMT Type



DIP Type

Fig.3

(Cable balk resistance of length X is deducted from measurement value.)

Termination Resistance Measurement Points

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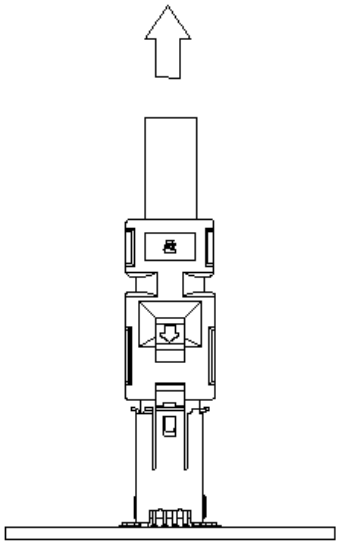


Fig.4
Cable Pull-Out、Lock Strength Measurement Method
(Fig of DIP Type is omitted.)

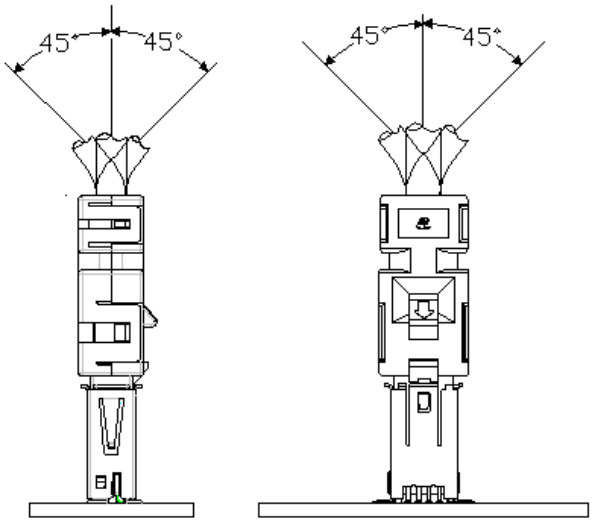


Fig.5
Elasticity Measurement Method
(Fig of DIP Type is omitted)

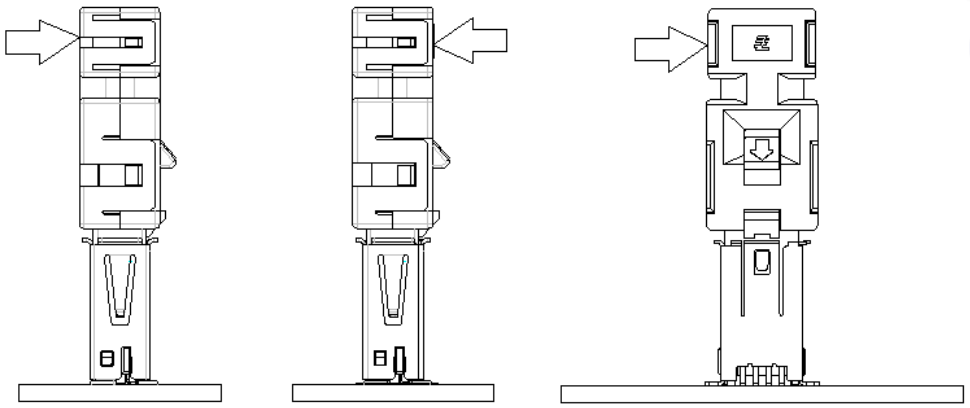


Fig.6
(Fix P.C.Board. Load as shown figure、1 direction per 1 sample.)
Fixed strength to PC-Board Measurement Points
(Fig of DIP Type is omitted)

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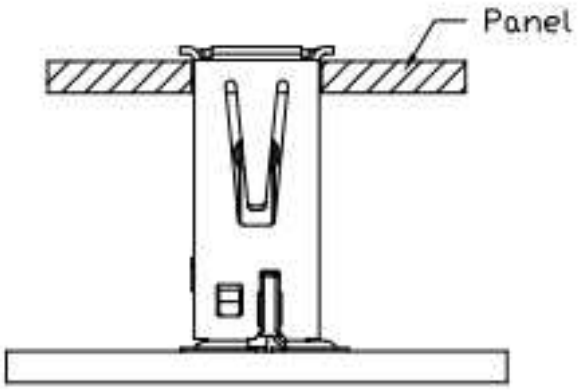


Fig.7

(Recommend panel protection for bigger strength application)

(Fig of DIP Type is omitted)

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