

1. Scope:

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of .025/.040 I/O Connector.

Applicable product description and part numbers are as shown in Appendix 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 AMP Specifications:

- A. 109-5000 : Test Specification, General Requirements for Test Methods
- B. 114-5217 : Application Specification
Crimping .040III Series Unsealed Receptacle Contact
- C. 114-5250 : Application Specification
Crimping of .025 Receptacle Contact
- D. 501-5371 : Test Report

2.2 Commercial Standards and Specifications

- A. JASO D605 : Multi-pole Connector for automobiles
- B. JASO D7101 : Test Methods for Plastic Molded Parts
- C. JIS C3406 : Low-Voltage Wires and Cables for Automobiles
- D. JIS D0203 : Method of Moisture, Rain and Spray Test for Automobile Parts
- E. JIS D0204 : Method of High and Low Temperature Test for Automobile Parts
- F. JIS D1601 : Vibration Testing Method for Automobile Parts
- G. JIS R5210 : Portland Cement
- H. MIL-STD-202 : Testing Method 208: Method of Soldering

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 Material:

A. Contact:

| Description | Material | Finish |
|--------------------|--------------|---|
| Tab(Male) | Brass | Selective Gold or Tin plating over Ni under plating, or Pre-Tinned. |
| Receptacle(Female) | Copper Alloy | Selective Gold plating over Ni under plating, or Pre-Tinned. |

Fig.1

B. Housing : PBT or SPS

3.3 Ratings:

- A. Voltage Rating : 12VDC
- B. Temperature Rating : -30°C to 105°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 and Fig.3. All tests shall be performed in the room temperature, unless otherwise specified.

3.5 Test Requirements and Procedures Summary:

| Para. | Test Items | Requirements | | | Procedures |
|--------------------------------|--|---|----------------------|---------------|---|
| 3.5.1 | Confirmation of Product | Meet requirements of product drawing and AMP Specification 114-5217, 114-5250. | | | Visually, dimensionally and functionally inspected per applicable quality inspection plan. |
| Electrical Requirements | | | | | |
| 3.5.2 | Termination Resistance (Low Level) | .025 | 8mΩ Max.(Initial) | | Subject mated contacts assembled in housing to 20mV Max. open circuit at 10mA. Fig.4 AMP Spec. 109-5311-1 |
| | | | 16mΩ Max.(Final) | | |
| | | .040 | 3mΩ Max.(Initial) | | |
| | | | 10mΩ Max.(Initial) | | |
| 3.5.3 | Termination Resistance (Specified Current) | .025 | 8mV/A Max.(Initial) | | Measure mill volt drop of contact in mated connectors, open circuit at 1A. Fig.4 AMP Spec. 109-5311-2 |
| | | | 16mV/A Max.(Final) | | |
| | | .040 | 3mV/A Max.(Initial) | | |
| | | | 10mV/A Max.(Initial) | | |
| 3.5.4 | Dielectric Withstanding Voltage | No creeping discharge nor flashover shall occur. | | | Impressed voltage 1kVAC for 1 min. Mated connector. Fig.5 AMP Spec. 109-5301 |
| 3.5.5 | Insulation Resistance | 100MΩ Min. | | | Impressed voltage 500VDC Mated connector Fig.5 AMP Spec.109-5302 |
| 3.5.6 | Current Leakage | 1mA Max. | | | Impressed voltage 14VDC Fig.6 AMP Spec.109-5312 |
| 3.5.7 | Temperature Rise | Wire Size (mm ²) | Current (A) | Max. Rise(°C) | Measure temperature rising at wire crimped by applied current to all positions. AMP Spec.109-5310 |
| | | 0.5 | 2.4 | 60 | |
| | | 1.25 | 4.2 | | |
| 3.5.8 | Over current Loading | No ignition is allowed during the test. | | | Apply the current to only one position. Applied Current:Fig.7 |
| Physical Requirements | | | | | |
| 3.5.9 | Vibration (High Frequency) | No electrical discontinuity greater than 1 μ sec. Shall occur. Satisfy requirements of test item on the "3.6 sequence". | | | Vibration Frequency: 20→200→20Hz/3min. Acceleration:44.1m/s ² Vibration Direction: X,Y,Z Duration:3hours each Mounting:Fig.8 |

Fig.2(To be continued)

| Para. | Test Items | Requirements | | Procedures |
|--------|--|---|---------------------------|---|
| 3.5.10 | Shock | No electrical discontinuity greater than 1 μ sec. Shall occur. Final:10m Ω Max. | | Acceleration: 980m/s ² Waveform: Half sine wave Duration: 6msec. Velocity: 3.75 m/s Number of drops: 3 drops each directions of X,Y,and Z axes, total 18 drops Fig.8 AMP Spec.:109-5208-D |
| 3.5.11 | Connector Mating Force | 70N Max. | | Operation Speed: 25~100mm/min Measure the force required to mate connectors. AMP Spec. 109-5206-A |
| 3.5.12 | Connector Unmating force | 70N Max. | | Operation Speed: 25~100mm/min Measure the force required to unmate connectors. (without housing lock) AMP Spec. 109-5206-A |
| 3.5.13 | Connector Locking Strength | 100N Min. | | Operation Speed : 100mm/min Apply an axial pull-off load to one of the mated housing, measure locking strength. AMP Spec. 109-5210 |
| 3.5.14 | Contact Insertion Force | 10N Max. per contact | | Measure the force required to insert contact into housing. AMP Spec. 109-5211 |
| 3.5.15 | Contact Retention Force (Lance only) | Contact | Tensile Strength (N) Min. | Operation Speed : 100 mm/min. Apply an axial pull-off load to crimped wire. |
| | | 025 | 30 | |
| | | 040 | 40 | |
| 3.5.16 | Contact Retention Force (Secondary Lock) | 100N Min. | | Measure contact retention force with secondary lock set it effect. Operation Speed: 100mm/min. |
| 3.5.17 | Crimp Tensile Strength | Wire Size (mm ²) | Tensile Strength (N) Min. | Apply an axial pull-off load to crimped wire of contact secured on the tester. Operation speed: 100mm/min AMP Spec. 109-5205 Condition B |
| | | 0.3 | 70* | |
| | | 0.5 | 90 | |
| | | 0.85 | 130 | |
| | | 1.25 | 180 | |
| | | *Included the insulation grip | | |
| 3.5.18 | Retention Force of TAB | 20N Min. (PBT housing) 15N Min. (SPS housing) | | Measure the retention force between housing and tab contact. Operation speed: 100mm/min |

Fig.2(To be continued)

| Para. | Test Items | Requirements | Procedures |
|-----------------------------------|------------------------------|---|---|
| 3.5.19 | Resistance to "Kojiri" | Satisfy requirements of test item on the "3.6 sequence" | Hold one of mated connectors on bench, apply repeated torque motions of 1.96N·m in front-rear, and right-left directions for 30 cycles each at the every depth of 1mm graduation. This test may be alternatively performed manually. See Fig.9 AMP Spec. 109-5215 |
| 3.5.20 | Solderability | Wet Solder Coverage: (Plated area only) 95% Min. (with substrate area) 50% Min. (without substrate area) | Solder bath : Sn-40Pb Solder Temperature: 235±5°C Immersion Duration: 5±0.5 seconds Flux: Alpha 100 AMP Spec. 109-5203 |
| | | | Matte Tin plating only Solder bath : Sn-3Ag-0.5Cu Solder Temperature: 250±5°C Immersion Duration: 5±0.5 seconds Flux: ULF-300R |
| 3.5.21 | Handling Ergonomics | No abnormalities allowed in manual mating/unmating Handling. | Manually operated |
| 3.5.22 | Resistance to Soldering Heat | Application to SPS housing only. No gap with PCB and omission of screw. Retention Force of Tab : 15N Min. | Test connector solder dipped after mounted on PCB with screw. It should be checked and measured after test connector become room temperature. Solder Temperature: 260±5°C Immersion Duration: 10±1 sec. AMP Spec. 109-5204 Condition B |
| 3.5.23 | Fasting Toque for Screw | No Cracks and compression Bucklings of housing permissible | Operation torque value on customer drawing. |
| Environmental Requirements | | | |
| 3.5.24 | Thermal Shock | Satisfy requirements of test item on the "3.6 sequence" | Mated connector. -40°C/30min., 100°C/30min. Making this a cycle. Repeat 1000 cycles. |
| 3.5.25 | Humidity, Steady State | Insulation resistance 100MΩ Min.(Final) Termination resistance 10mΩ Max.(Final) Current Leakage 1Ma Max. | Mated connector. 90~95% R.H. 60±5°C 96 hours 14V applied. Fig. 6 |

Fig.2(To be continued)

| Para. | Test Items | Requirements | Procedures |
|--------|----------------------------------|---|---|
| 3.5.26 | Industrial Gas(SO ₂) | Satisfy requirements of test item on the "3.6 sequence" | Unmated connector SO ₂ Gas: 25ppm, 75% R.H. 25°C, 96 hours |
| 3.5.27 | Temperature Life (Heat Aging) | Satisfy requirements of test item on the "3.6 sequence" | Mated connector, 120°C, 120 hours AMP Spec. 109-5104-5 Condition B |
| 3.5.28 | Resistance to Cold | Satisfy requirements of test item on the "3.6 sequence" | Mated connector, -40°C, 120 hours AMP Spec.109-5108 Condition D |
| 3.5.29 | Humidity-Temperature Cycling | Satisfy requirements of test item on the "3.6 sequence" | Mated connector Condition: Fig.10 10cycles |
| 3.5.30 | Dust Bombardment | Satisfy requirements of test item on the "3.6 sequence" | Mated connector Subject JIS R5210 cement blow of 1.5kg per 10 seconds in 15 minutes intervals for 8 cycles, with Unmate/Re-mating per 2 cycles AMP Spec. 109-5110 |
| 3.5.31 | Compound Environment Resistance | Resistance should not be over 7Ω greater than 1 μ sec. | Temperature: 80°C Vibration frequency: 20→200→20Hz/3min.(log) Accelerated Velocity: 44.1m/s ² Vibration Direction: X,Y,Z Duration: 300 hours Test Current: Fig.11 Mounting: Fig.8 |

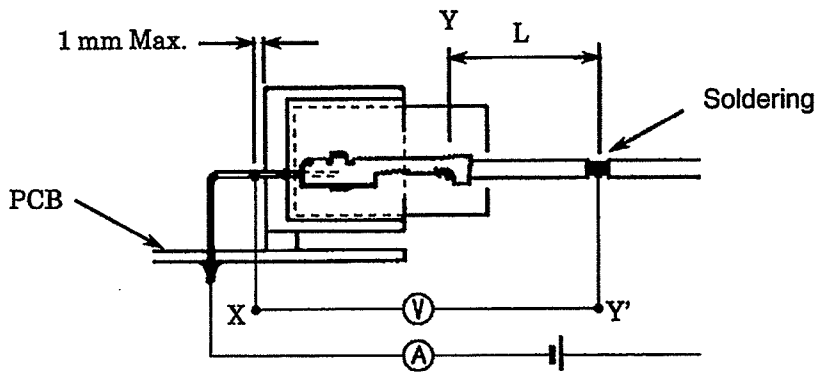
Fig.2(End)

3.6 Product Qualification Test Sequence

| Test Examination | Test Group | | | | | | | | | | | | |
|--|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | Test Sequence* | | | | | | | | | | | | |
| Examination of Product | 1 | 1,5 | 1,6 | 1,3 | 1,5 | 1,5 | 1,5 | 1,6 | 1,5 | 1,6 | 1,6 | 1,5 | 1,5 |
| Termination Resistance (Low Level) | 4 | 2,6 | 2,7 | | 2,6 | 2,6 | 2,6 | 2,7 | 2,6 | 2,7 | 2,7 | 2,6 | 2,6 |
| Termination Resistance (Rated Current) | 5 | 3,7 | 3,8 | | 3,7 | 3,7 | 3,7 | 3,8 | 3,7 | 3,8 | 3,8 | 3,7 | 3,7 |
| Dielectric with standing Voltage | 7 | | | | | 9 | 9 | | | | | | |
| Insulation Resistance | 6 | | | | | 8 | 8 | | | | | | |
| Current Leakage | | | | | | | 4 | | | | | | |
| Temperature Rising | 8 | | 4,9 | | | | | | | | | | 4 |
| Over Current Loading | | | | | | | | | | | | 4 | |
| Vibration (High Frequency) | | | | | | | | | | 5 | | | 8 |
| Physical Shock | | | | | | | | | | | 5 | | |
| Connector Mating Force | 3 | | | | | | | | | | | | |
| Connector Unmating Force | 9 | | | | | | | | | | | | |
| Connector Locking Strength | 10 | | 11 | 5 | 9 | 11 | 11 | | | | | | |
| Contact Insertion Force | 2 | | | | | | | | | | | | |
| Contact Retention Force | 11 | | | | | | | | | | | | |
| Contact Retention Force (Double Lock) | 12 | | 12 | 6 | 10 | 12 | 12 | | | | | | |
| Crimp Tensile Strength | 13 | | 13 | | 11 | | | | 8 | | | | |
| Retention Force of TAB | 15 | | | | | | | | | | | | |
| Resistance to "Kojiri" | | 4 | | | | | | | | | | | |
| Solderability | 14 | | | | | | | | | | | | |
| Handling Ergonomics | 17 | | 10 | 4 | 8 | 10 | 10 | | | | | | |
| Resistance to Soldering Heat | 16 | | | | | | | | | | | | |
| Fasten Torque | 18 | | 14 | | 12 | 13 | | | | | | | |
| Thermal Shock | | | | | 4 | | | | | | | | |
| Humidity(Steady State) | | | | | | | 4 | | | | | | |
| Industrial SO ₂ Gas | | | | | | | | | 4 | | | | |
| Temperature Life (Heat Aging) | | | 5 | | | | | 4 | | 4 | 4 | | |
| Resistance to Cold | | | | 2 | | | | | | | | | |
| Humidity-Temperature Cycling | | | | | | 4 | | | | | | | |
| Dust Bombardment | | | | | | | | 5 | | | | | |
| Compound Environment Resistance | | | | | | | | | | | | | 4 |

* Numbers indicate sequence in which tests are performed.

Fig. 3



Deduct resistance of Y-Y' (wire "L") from X-Y'
Fig.4

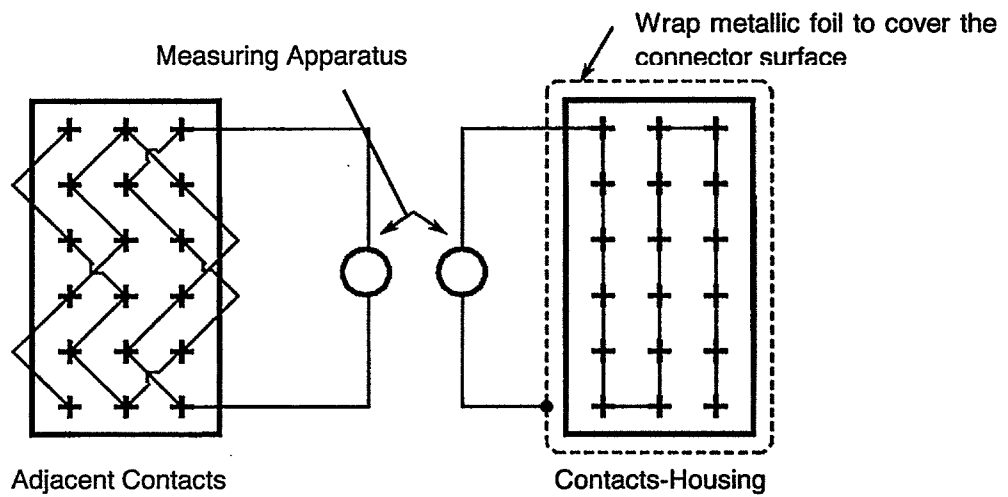
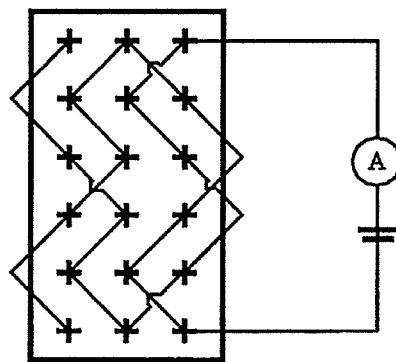


Fig.5



Fia.6

| Wire size(mm ²) | Sequence | Test Current(A) | Duration |
|-----------------------------|----------|-----------------|------------|
| 0.5 | ① | 16.5 | 60 minutes |
| | ② | 20.2 | 200 sec. |
| | ③ | 22.5 | 5 sec. |
| | ④ | 30.0 | 1 sec. |
| 1.25 | ① | 16.5 | 60 minutes |
| | ② | 20.2 | 200 sec. |
| | ③ | 22.5 | 5 sec. |
| | ④ | 30.0 | 1 sec. |

Fig. 7 Over current loading

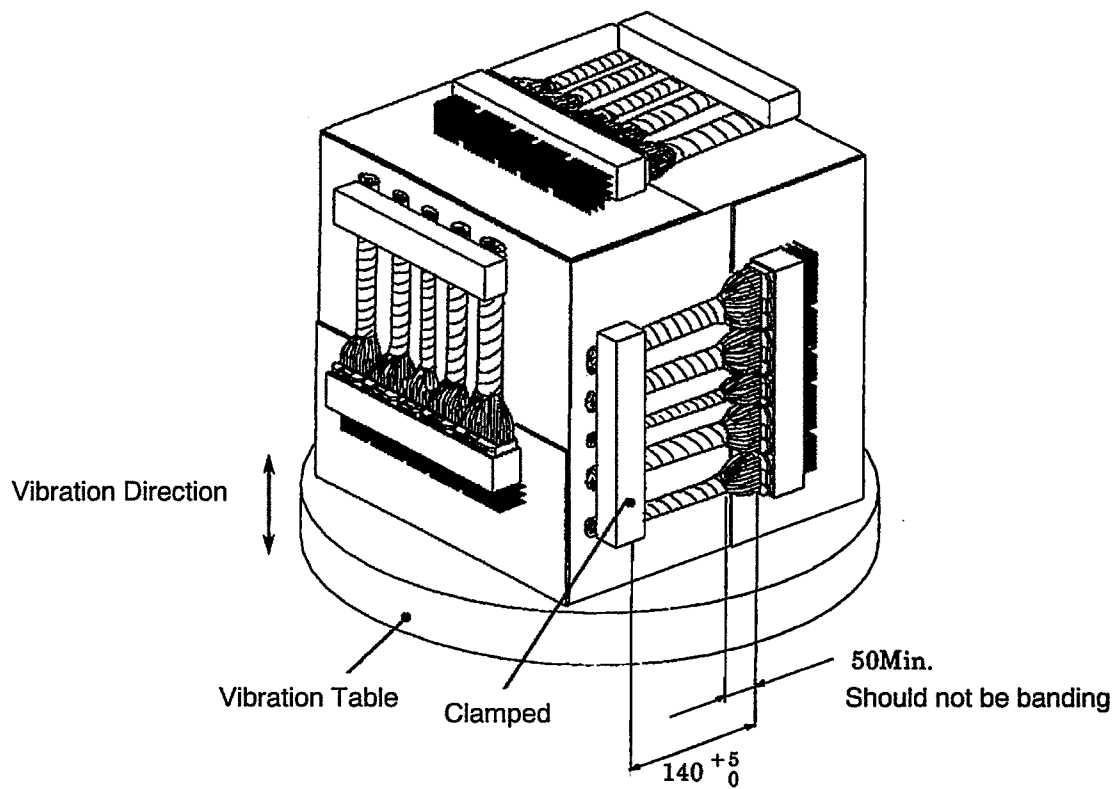


Fig. 8

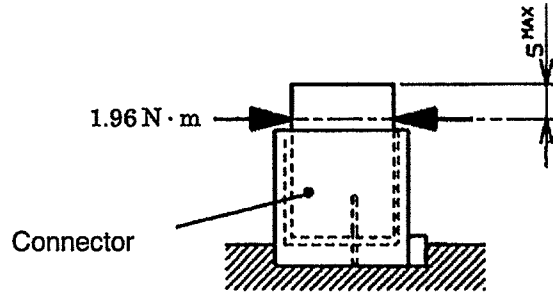


Fig. 9 Resistance to "Kojiri"

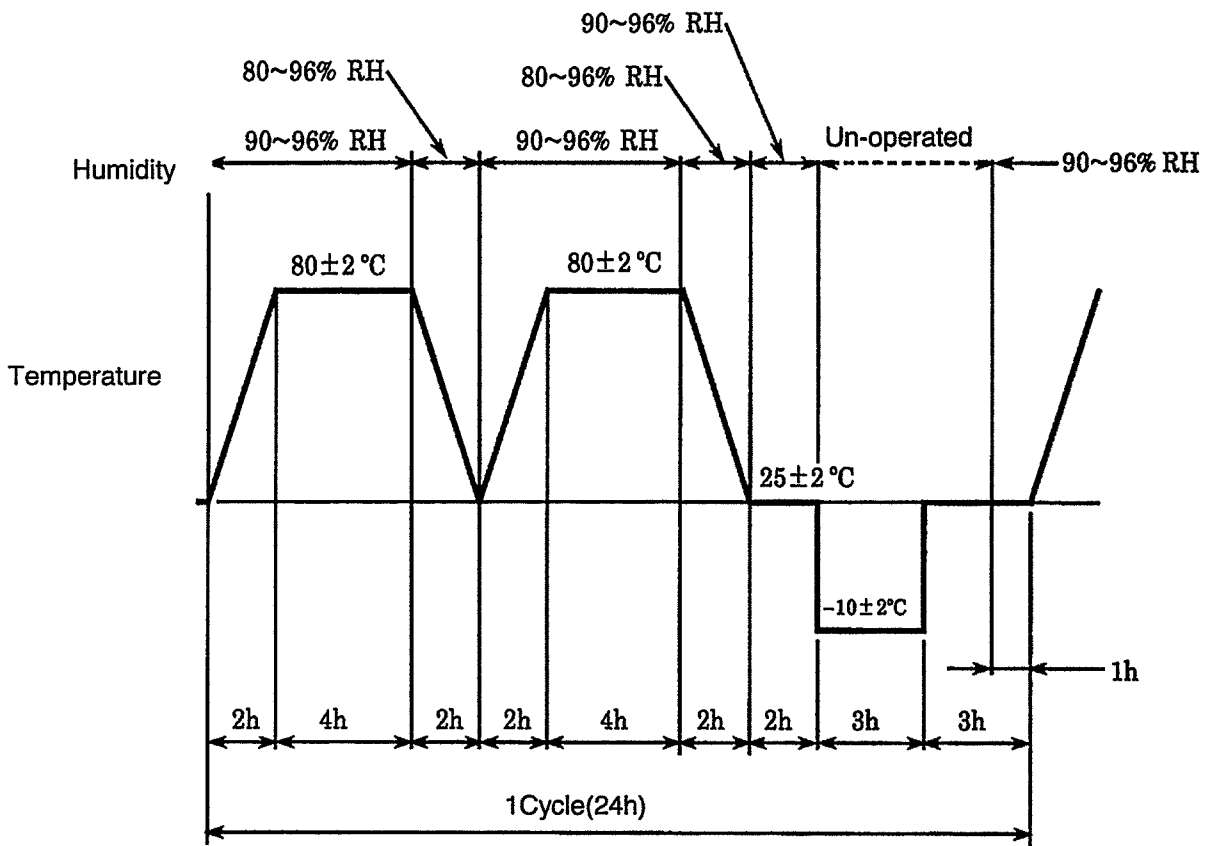


Fig. 10 Humidity-Temperature Cycling

| Terminal Type | | Wire Size | Testing Method | |
|---------------|----------------|----------------------|----------------|---|
| Tab Size | Finish | | Test Current | Procedures |
| 040 | Tin | 1.25 mm ² | 4 A | 45 min : ON 15 min : OFF 300 Cycles |
| | Selective Gold | 0.5 mm ² | 10 mA | |
| 025 | Tin | 0.5 mm ² | 1 A | |
| | Selective Gold | 0.5 mm ² | 10 mA | |

Fig.11 Compound Environment Test Current

The applicable product descriptions and part numbers are as shown in Appendix. 1

| Product Part No.* | Description |
|-------------------|---|
| 1318813 | 025/040 I/O Connector 167Pos. Cap Housing Assembly |
| 6318813 | |
| 1612435 | 025/040 I/O Connector 167Pos. Standard Cap Housing Assembly |
| 1376430 | 025/040 I/O Connector 135Pos. Cap Housing Assembly |
| 6376430 | |
| 1473193 | 025/040 I/O Connector 70Pos. Cap Housing Assembly |
| 6473193 | |
| 1473649 | 025/040 I/O Connector 200Pos. Cap Housing Assembly |
| 6473649 | |
| 1123337 | 025/040 I/O Connector 34Pos. Plug Housing Assembly |
| 1123338 | 025/040 I/O Connector 35Pos.(A) Plug Housing Assembly |
| 1123339 | 025/040 I/O Connector 32Pos. Plug Housing Assembly |
| 1123340 | 025/040 I/O Connector 35Pos.(B) Plug Housing Assembly |
| 1123341 | 025/040 I/O Connector 31Pos. Plug Housing Assembly |
| 1473651 | 025/040 I/O Connector 33Pos. Plug Housing Assembly |
| 1123343 | 025 Receptacle Contact(Sn) |
| 1123343 | 025 Receptacle Contact(Au) |
| 316836 | 040 Receptacle Contact(S) (Sn) |
| 316837 | 040 Receptacle Contact(S) (Au) |
| 316837 | |
| 316838 | 040 Receptacle Contact(M) (Sn) |
| 316838 | 040 Receptacle Contact(M) (Au) |
| 1674769 | 040 Receptacle Contact(ML) (Sn) |

Appendix 1

(a) Applicable cap housing assembly for test must be regular dimensions

*Note : Part number is consisted from listed base number and 1 digit numeric prefix and Suffix with dash. Refer to catalog or customer drawing for specific part numbers for each base number. When prefix is zero, zero and dash are omitted.