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

タイコ エレクトロニクス アンプ株式会社（〒213-8535 川崎市高津区久本 3-5-8）
Tyco Electronics AMP K.K. (3-5-8 Hisamoto Takatsu-ku Kawasaki, 213-8535)

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℃ to 105℃

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:10mΩ 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. 025 / 30 040 / 40	Operation Speed : 100 mm/min. Apply an axial pull-off load to crimped wire.
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. 0.3 / 70* 0.5 / 90 0.85 / 130 1.25 / 180 *Included the insulation grip	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
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℃ 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℃ 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℃ 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℃/30min., 100℃/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℃ 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℃, 96 hours
3.5.27	Temperature Life (Heat Aging)	Satisfy requirements of test item on the "3.6 sequence"	Mated connector, 120℃, 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℃, 120 hours AMP Spec.109-5108 Condition D
3.5.29	Humidity-Temperatur e 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℃ 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

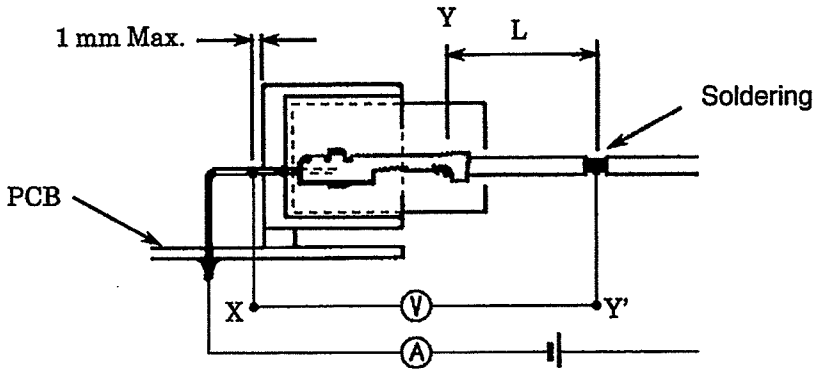
Fig.2(End)

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

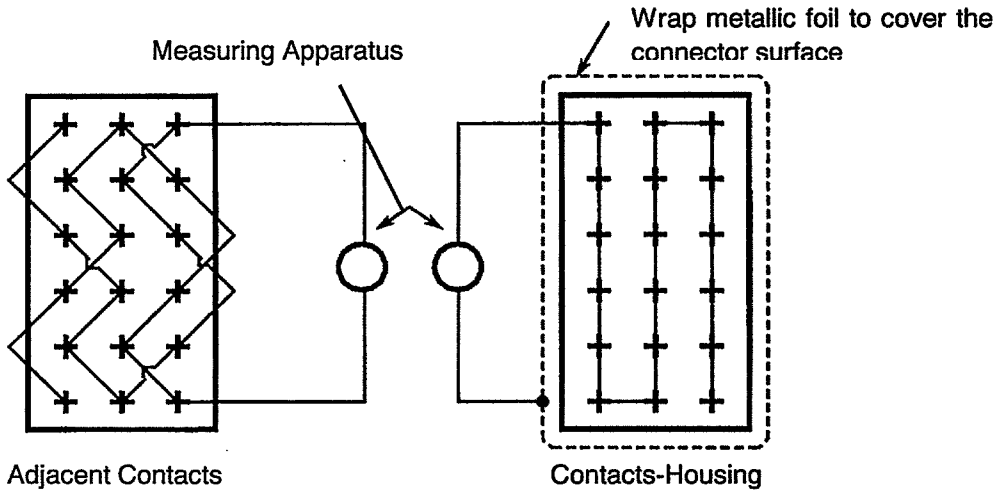


Fig.5

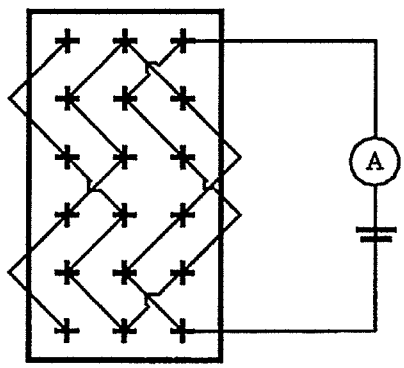


Fig.6

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

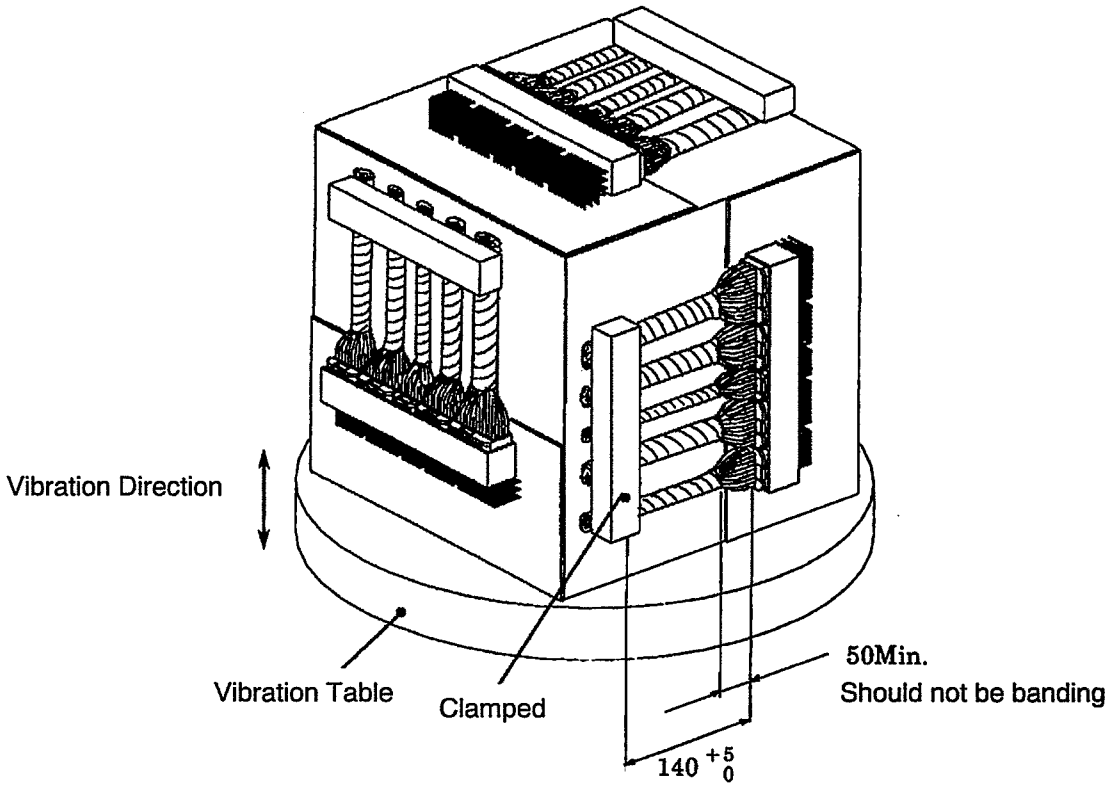


Fig. 8

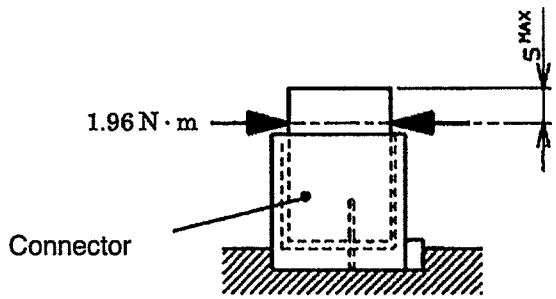


Fig. 9 Resistance to "Kojiri"

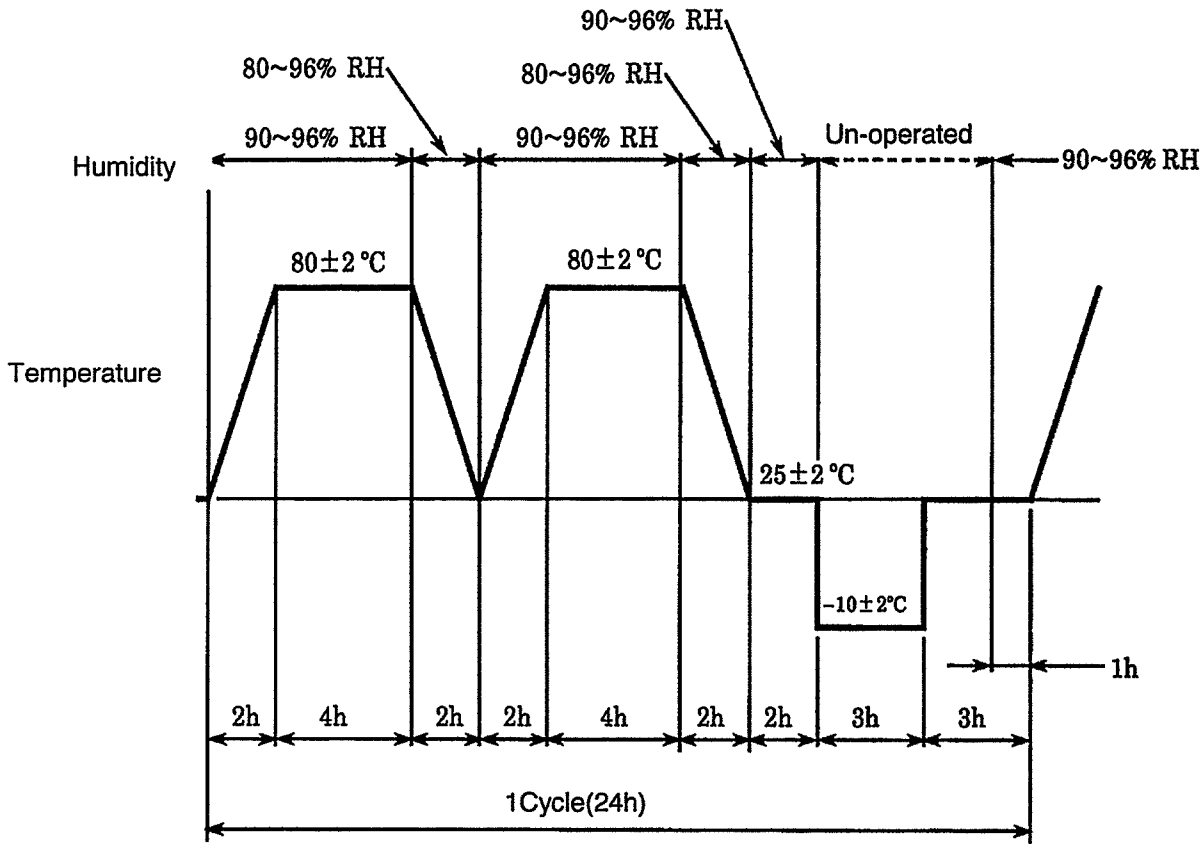


Fig. 10 Humidity-Temperature Cycling

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.