

**DESIGN OBJECTIVES**

The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. therefore, AMP(Japan), Ltd. makes no representation or warranty, express or implied, that product will comply with these requirements. Further, AMP(Japan), Ltd. may change these requirements based on the results of additional testing and evaluation.

Contact AMP Engineering for further details.

In case when "product specification" is referred to in this document, it should be read as "design objectives" for all times as applicable.

**1.Scope:**

## 1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of .040 II / .070 II HD HYBRID I/O Connector 96Pos./126Pos. for Wire-to-Board Termination.

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. 114-5159 : Application Specification. Crimping .040 II Series Receptacle & Tab Contact.
- C. 114-5160 : Application Specification. Crimping .070 II Series Receptacle & Tab Contact.

## 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 :

a. Receptacle Contact : Pre-tinned brass or Pre-tinned Phosphor bronze

b. Tab Contact : Pre-tinned brass

##### B. Housing : PBT resin

#### 3.3 Ratings:

A. 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. 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	Product shall be conforming to the requirements of applicable product drawing and Application Specification. No.114-5159,114-5160	Visually,dimensionally and functionally inspected per applicable quality inspection plan.
<b>Electrical Requirements</b>			
3.5.2	Termination Resistance (Specified Current)	(.040 II ) 10m $\Omega$ Max. (Initial) 20m $\Omega$ Max. (Final) (.070 II ) 3m $\Omega$ Max. (Initial) 10m $\Omega$ Max. (Final)	Measure initial millivolt drop of contact test circuit in mated connectors. Fig.3 AMP Spec.109-5311-2
3.5.3	Termination Resistance (Low Level)	(.040 II ) 10m $\Omega$ Max. (Initial) 20m $\Omega$ Max. (Final) (.070 II ) 3m $\Omega$ Max. (Initial) 10m $\Omega$ Max. (Final)	Subject mated contacts assembled in housing to closed circuit current of 10mA Max.at open circuit voltage of 20mV Max. Fig.3 AMP Spec.109-5311-1
3.5.4	Dielectric Strength	No creeping discharge nor flash-over shall occur.	1kV AC for 1 minute. Test between adjacent circuits of mated connectors. Fig.4 AMP Spec. 109-5301
3.5.5	Insulation Resistance	100M $\Omega$ Min.	Impressed voltage 500V DC. Test between adjacent circuits of mated connectors. Fig.4 AMP Spec. 109-5302
3.5.6	Current Leakage	1mA Max	12V DC impressed 1minute. Fig.5 AMP Spec. 109-5312
3.5.7	Temperature Rising	60°C Max.under loaded specified current.	Measure temperature rising by engaged current. Fig.6&7. AMP Spec. 109-5310
3.5.8	Current Cycling	(.040 II ) 20m $\Omega$ Max. (Final) (.070 II ) 10m $\Omega$ Max. (Final) No ignition is allowed during the test.	Applied Current: Fig.6&7. 45minutes"ON",15minutes"OFF", 200cycles. AMP Spec.109-5308

Fig.1(To be continued)

Physical Requirements											
Para.	Test Items	Requirements	Procedures								
3.5.9	Vibration (High Frequency)	No electrical discontinuity greater than 1 $\mu$ sec. shall occur. (.040 II) 20m $\Omega$ Max. (Final) (.070 II) 10m $\Omega$ Max. (Final)	Vibration Frequency: 20~200~20Hz/3min. Accelerated Velocity : 44.1m/s <sup>2</sup> <table border="1"> <tr> <td>Vibration Direction</td> <td>Up and Down</td> <td>Back and Force</td> <td>Right and Left</td> </tr> <tr> <td>Directions</td> <td>4hours</td> <td>2hours</td> <td>2hours</td> </tr> </table> Fig.10	Vibration Direction	Up and Down	Back and Force	Right and Left	Directions	4hours	2hours	2hours
Vibration Direction	Up and Down	Back and Force	Right and Left								
Directions	4hours	2hours	2hours								
3.5.10	Vibration+ Current Cycle	No electrical discontinuity greater than 1 $\mu$ sec. shall occur. (.040 II) 20m $\Omega$ Max. (Final) (.070 II) 10m $\Omega$ Max. (Final)	Vibration Frequency: 20~200~20Hz/3min. Accelerated Velocity: 44.1m/s <sup>2</sup> <table border="1"> <tr> <td>Vibration Direction</td> <td>Up and Down</td> <td>Back and Force</td> <td>Right and Left</td> </tr> <tr> <td>Directions</td> <td>100 hours</td> <td>50 hours</td> <td>50 hours</td> </tr> </table> Test Current;(.040II)4.4A DC (.070II)10A DC Fig.10	Vibration Direction	Up and Down	Back and Force	Right and Left	Directions	100 hours	50 hours	50 hours
Vibration Direction	Up and Down	Back and Force	Right and Left								
Directions	100 hours	50 hours	50 hours								
3.5.11	Contact Mating Force	.040 II Series : 5.8N Max .070 II Series : 5.8N Max	Operation Speed : 100mm/min. Measure the force required to mate contacts. AMP Spec.109-5206								
3.5.12	Contact Unmating Force	.040 II Series : 0.98N Min. .070 II Series : 0.98N Min.	Operation Speed : 100mm/min. Measure the force required to unmate contacts. AMP Spec.109-5206								
3.5.13	Connector Mating Force	32Pos.147N Max. 30Pos.147N Max.	Operation Speed : 100mm/min. Measure the force required to mate connectors. AMP Spec.109-5206								
3.5.14	Connector Unmating Force	32Pos.147N Max. 30Pos.147N Max.	Operation Speed:100mm/min. Measure the force required to unmate connectors. AMP Spec. 109-5206								
3.5.15	Housing Locking Strength	98N Min.	Measure housing locking strength. Operation Speed:100mm/min. AMP Spec. 109-5210								

Fig.1(To be continued)

Para.	Test Items	Requirements		Procedures	
3.5.16	Contact Insertion Force	9.8N Max. par contact.		Measure the force required to insert contacts into housing. AMP Spec. 109-5211	
3.5.17	Contact Retention Force (Pre-Lock)	49N Min.		Apply an axial pull-off load to crimped wire. Operation Speed: 100mm/min. AMP Spec. 109-5212	
3.5.18	Contact Retention Force (Secondary-Lock)	78N Min.		Apply an axial pull-off load to crimped wire. Operation Speed: 100mm/min.	
3.5.19	Crimp Tensile Strength	Wire Size		Apply an axial pull-off load to crimped wire of contact secured on the tester. Operation Speed: 100mm/min. AMP Spec. 109-5205	
		mm <sup>2</sup>	(AWG)		Crimp Tensile(min.)
		0.3	22		N
		0.5	20		58
		0.85	18		83
		1.25	16	127	
				177	
3.5.20	Durability (Repeated Mate/Unmating)	(.040 II) 20m Ω Max. (Final) (.070 II) 10m Ω Max. (Final)		Operation Speed: 100mm/min. No. of Cycles:30 Cycles. AMP Spec.109-5213	
3.5.21	Resistance to "Kojiri"	(.040 II) 20m Ω Max. (Final) (.070 II) 10m Ω Max. (Final)		Secure one of the connectors on the table, and apply the bending force of 98N in front-rear and right-left directions two times. Making this a cycle, repeat 10 cycle. Fig.9	
3.5.22	Solderability	Wet Solder Coverage: 95%Min.		Solder Temperature :230 ± 5°C Immersion Duration :3 ± 0.5seconds Flux:Alpha 100 AMP Spec. 109-5203	
3.5.23	Handling Ergonomics	No abnormalities allowed in manual mating/unmating handling.		Manually operated	
3.5.24	Double Lock Plate Locking Strength	59N Min.		Operation Speed: 100mm/min. Measure the force required to lock the double lock plate	
<b>Environmental Requirements</b>					
3.5.25	Thermal Shock	(.040 II) 20m Ω Max. (Final) (.070 II) 10m Ω Max. (Final)		-30°C/60min., 80°C/60min. Making this a cycle, repeat 5cycles. AMP Spec. 109-5103	
3.5.26	Humidity, Steady State	Insulation resistance (Final) 100m Ω Min. Termination resistance (.040 II) 20m Ω Max. (Final) (.070 II) 10m Ω Max. (Final)		Mated connector, 90~95%R.H., 60°C 96hours AMP Spec. 109-5105	

Fig.1(To be continued)

Para.	Test Items	Requirements	Procedures
3.5.27	Industrial Gas (SO <sub>2</sub> )	(.040 II) 20mΩ Max. (Final) (.070 II) 10mΩ Max. (Final)	SO <sub>2</sub> Gas : 10ppm, 95% R.H. 20°C, 24hours AMP Spec. 109-5107
3.5.28	Temperature Life (Heat Aging)	(.040 II) 20mΩ Max. (Final) (.070 II) 10mΩ Max. (Final)	100°C, Duration: 120hours AMP Spec. 109-5104
3.5.29	Resistance to Cold	(.040 II) 20mΩ Max. (Final) (.070 II) 10mΩ Max. (Final)	-40°C ± 5°C, 120hours AMP Spec. 109-5108
3.5.30	Dust Bombardment	(.040 II) 20mΩ Max. (Final) (.070 II) 10mΩ Max. (Final)	Subject JIS R 5210 cement blow of 1.5Kg per 10 seconds in 15 minutes intervals for 90minutes. AMP Spec. 109-5110

Fig.1 (End)

3.6 Product Qualification Test Sequence

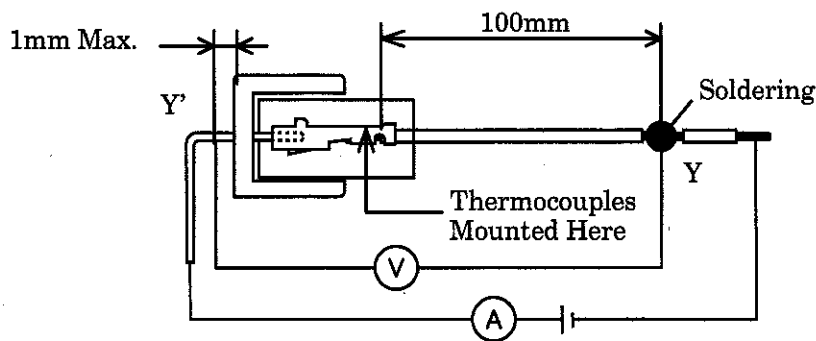
Para.	Test Items	Test Group										
		1	2	3	4	5	6	7	8	9	10	11
		Test Sequence (a)										
3.5.1	Confirmation of Product	1	1	1	1	1,9	1,11	1,11	1,13	1,16	1,11	1
3.5.2	Termination Resistance (Specified Current)			4								
3.5.3	Termination Resistance (Low Level)			3		3,5,7	3,6,8	3,6,8	3,6,8,10	2,7,9,14	3,6,8	
3.5.4	Dielectric Strength				3					4,12		
3.5.5	Insulation Resistance				2					3,11		
3.5.6	Current Leakage				4					5,10		
3.5.7	Temperature Rising			5								
3.5.8	Current Cycling								9			
3.5.9	Vibration (High Frequency)								7			
3.5.10	Vibration + Current Cycle										7	
3.5.11	Contact Mating Force	2										
3.5.12	Contact Unmating Force	3										
3.5.13	Connector Mating Force			2				2,10	2,10	2,12		2,10
3.5.14	Connector Unmating Force			6				4,9	4,9	4,11		4,9
3.5.15	Housing Locking Strength		2									
3.5.16	Contact Insertion Force											2
3.5.17	Contact Retention Force(Pre-Lock)											3
3.5.18	Contact Retention Force(Secondary-Lock)			7								
3.5.19	Crimp Tensile Strength	4										
3.5.20	Durability (Repeated Mate/Unmating)									6		
3.5.21	Resistance to "Kojiri"							5	5		5	
3.5.22	Solderability					2						
3.5.23	Handling Ergonomics					8				15		
3.5.24	Double Lock Plate Locking Strength											4
3.5.25	Thermal Shock					4						

Fig.2(To be continued)

Para.	Test Items	Test Group										
		1	2	3	4	5	6	7	8	9	10	11
		Test Sequence (a)										
3.5.26	Humidity, Steady State					6				8		
3.5.27	Industrial Gas (SO <sub>2</sub> )									13		
3.5.28	Temperature Life (Heat Aging)						5					
3.5.29	Resistance to Cold						7					
3.5.30	Dust Bombardment							7				

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

Fig.2(End)



From the measured readings, deduct the resistance of the 100mm long wire used for termination. When testing for rated current measurement, apply 12 V DC, 1A to the circuit. For obtaining uniformity of the current density on probing points Y-Y', apply soldering on the probing points prior testing.

Fig.3 Measurement of Termination Resistance



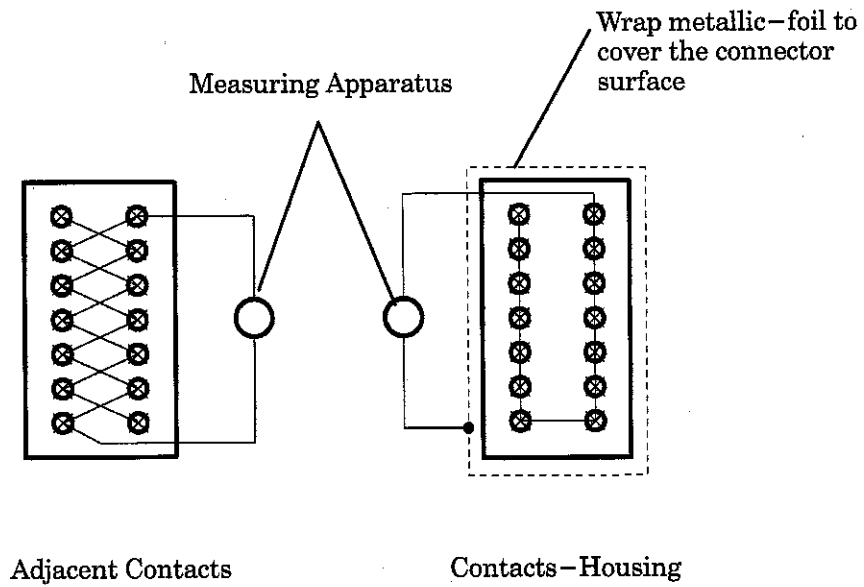


Fig.4

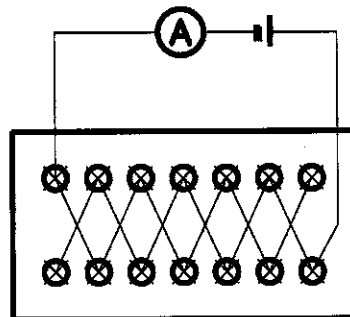


Fig.5

Wire Size(mm <sup>2</sup> )	Allowable Current (DC A)
0.3	9
0.5	11
0.85	15
1.25	19

Fig.6 Maximum Allowable Current ( $I_{max}$ )

Number of Energized Contacts	Reduction Coefficient
1	1
2~3	0.75
4~5	0.6
6~8	0.55
9~12	0.5
13~	0.4

Fig.7 Reduction Coefficient (Kd)

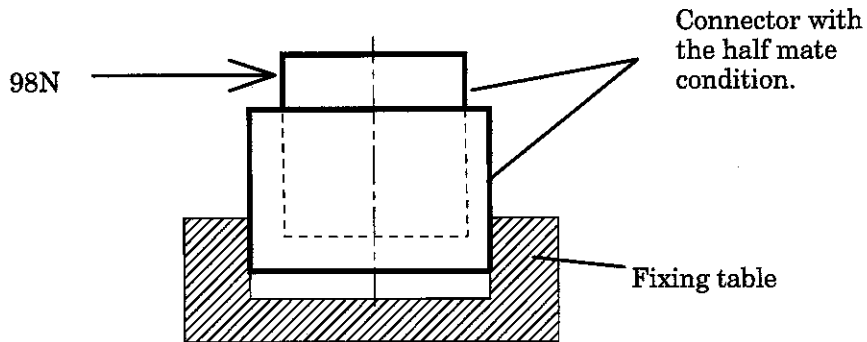
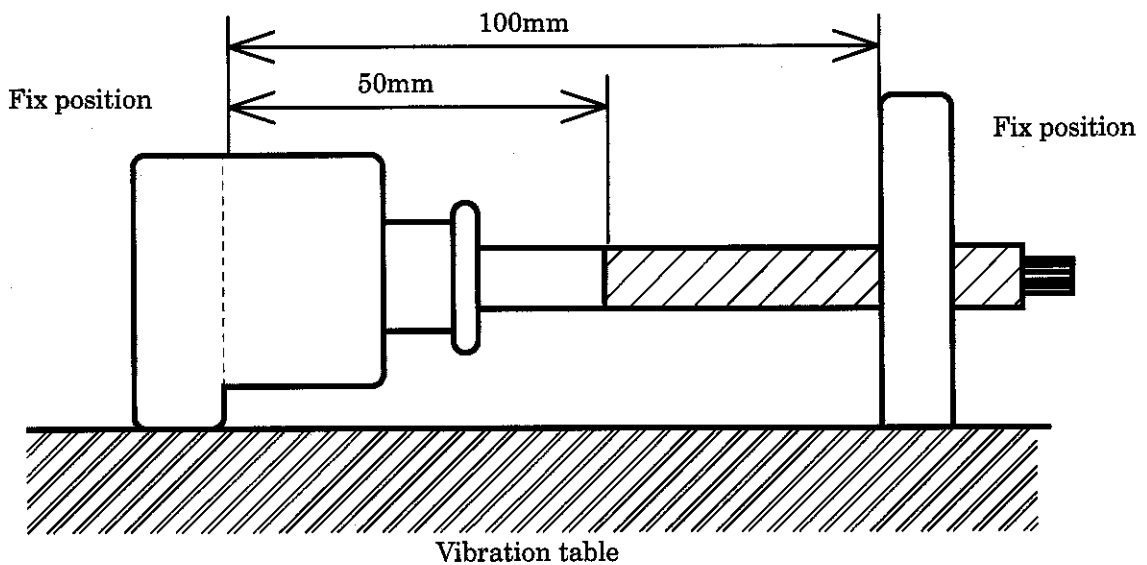


Fig.9



Remarks: Apply taping in the manner of half-overlapped rounds from the position 50mm apart from the tip end the contact.

Fig.10

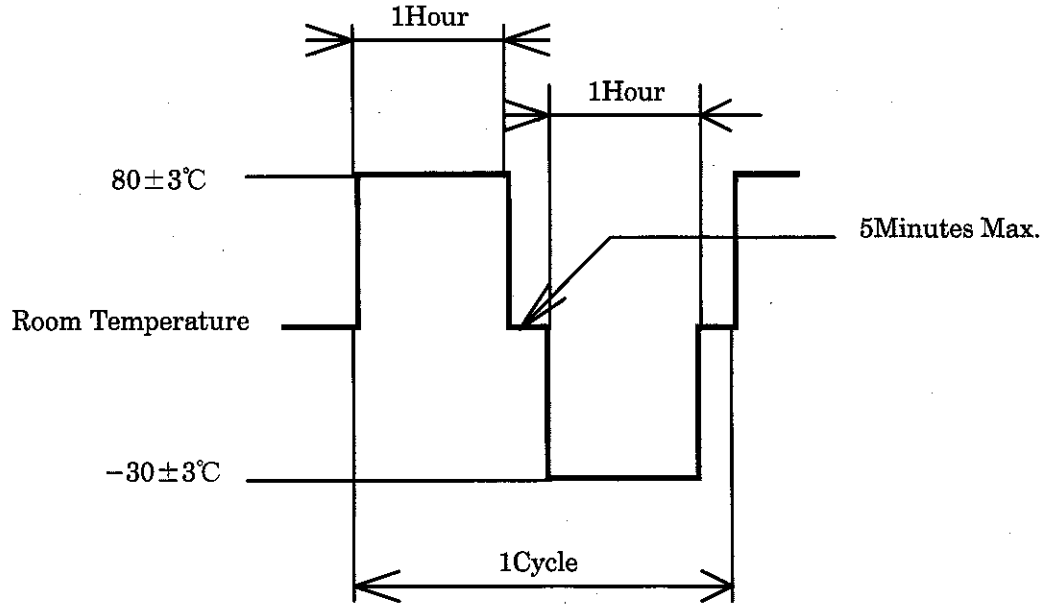


Fig.11

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

Appendix 1

Prod. P/N	Description
353212	.040 II / .070 II HD Hybrid I/O Connector 32Pos. Plug Hsg. Assy AType
353213	.040 II / .070 II HD Hybrid I/O Connector 32Pos. Plug Hsg. Assy BType
353214	.040 II / .070 II HD Hybrid I/O Connector 32Pos. Plug Hsg. Assy CType
353217	.040 II / .070 II HD Hybrid I/O Connector 30Pos. Plug Hsg. Assy
353220	.040 II / .070 II HD Hybrid I/O Connector 96Pos. Cap Hsg. Assy
353222	.040 II / .070 II HD Hybrid I/O Connector 126Pos. Cap Hsg. Assy
175265	.040 II "S" Receptacle Contact (Pre-Tin)
175268	.070 II "S" Receptacle Contact (Pre-Tin)
175269	.070 II "M" Receptacle Contact (Pre-Tin)