Sealed 0.50/1.0 Connector

1. Scope:

1.1. Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of Sealed 0.50/1.0 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. TE Specifications

A. 109-5000 : Test Specification, General Requirements for Test Methods
B. 114-5400 : Application Specification: Crimping of Sealed 0.50/1.0 Receptacle Contact
C. 501-78318 : Test Report
D.411-78252 : Instruction Sheet

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

3. Requirements

3.1. Design and Construction

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

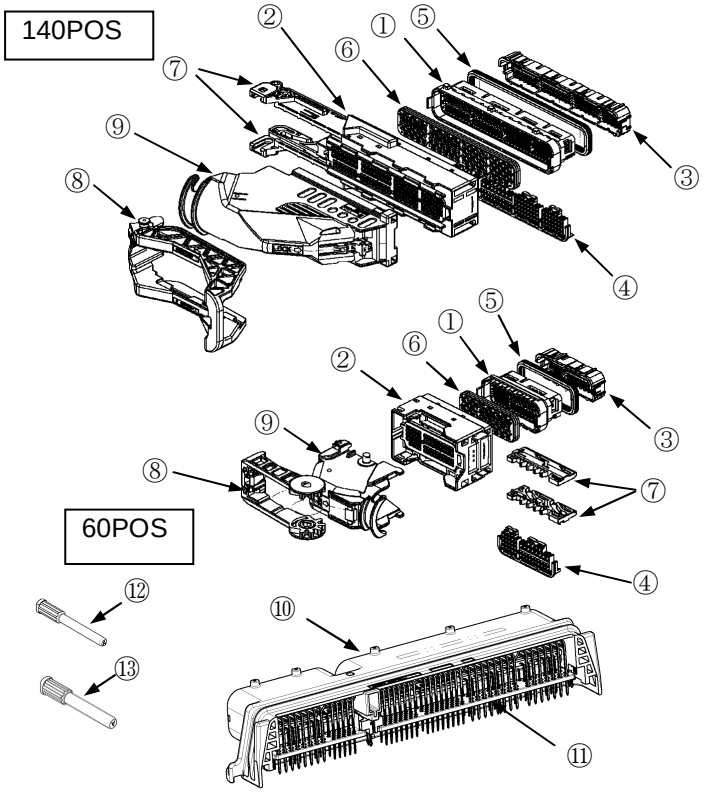
3.2. Materials

A. Terminals

Description	Material	Finish
0.50Tab（Male）	Brass	Selective Gold plating over Ni under plating. Selective Tin plating over Ni under plating
1.0Tab（Male）	Brass	Selective Tin plating over Ni under plating
Board Lock(Male)	Brass	Pre-Tinned
0.50Receptacle(Female)	Copper Alloy	Selective Gold plating over Ni under plating. Pre-Tinned
1.0Receptacle(Female)	Copper Alloy	Pre-Tinned

B. Housing

No.	Description	Material
1	Plug Housing	PBT
2	Outer Housing	PBT
3	Front Cavity	PBT
4	Retainer	PBT
5	Seal Ring	Silicone
6	Wire Seal	Silicone
7	Slide	PBT
8	Lever	PBT
9	Wire Cover	PBT
10	Cap Housing	PBT
11	Tine Plate	PBT
12	0.50 Cavity Plug	PBT
13	1.0 Cavity Plug	PBT



C. Wire

Terminal type	Applicable wire range
0.50	CAN 0.22mm² 0.3～0.5mm²
1.0	0.75～1.25mm²

※Application Specification of each terminal indicates the details of wires

3.3. Ratings

A. Voltage rating　：12V　DC

B. Temperature rating：-40℃ ～ 100℃ (When applying current, conform to「3.5.7 Temperature rise」)

3.4. Performance Requirements and Test Descriptions

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig.1. 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	Meets requirements of product drawing and TE Specification.	Visually ,dimensionally and functionally inspected per applicable quality inspection plan
Electrical Requirements			
3.5.2	Termination Resistance (Low Level)	0.50 10mΩ Max. (Initial) 20mΩ Max. (Final)	Subject mated contacts assembled in housing. Open voltage:20 mV Short-circuit current:10mA See Fig. 3 TE Spec. 109-5311-1
		1.0 5mΩ Max.（Initial) 10mΩ Max. (Final)	
3.5.3	Termination Resistance (Specified Current)	0.50 10mV/A Max. (Initial) 20mV/A Max. (Final)	Subject mated contacts assembled in housing. Open voltage:12 V Short-circuit current:1A Fig.3 TE Spec. 109-5311-2
		1.0 5mV/A Max. (Initial) 10 mV/A Max. (Final)	
3.5.4	Insulation Resistance	100MΩ Min.	Impressed voltage 500V DC Mated connector. Fig.4 TE Spec. 109-5302
3.5.5	Dielectric Withstanding Voltage	No creeping discharge or flashover shall occur	Impressed voltage 1kV AC for 1 min. Mated connector. Fig.4 TE Spec. 109-5301
3.5.6	Current Leakage	50μA Max.	Impressed voltage 14VDC Fig.5 TE Spec. 109-5312
3.5.7	Temperature Rise	Temperature Rise: 60℃ Max. And measurement value:140℃ Max.	Measure temperature rising at wire crimped by applied current to all positions. 0.50：1.0A / 1.0：2.0A TE Spec. 109-5310
3.5.8	Over Current Loading	No ignition is allowed during the test.	Apply the current to only one position. Applied Current : Fig. 6
Physical Requirements			
3.5.9	Vibration (High Frequency)	No electrical discontinuity greater than 1μsec. shall occur. Satisfy requirements of test item on the “3.6 sequence”.	Vibration Frequency and Acceleration: 20～200Hz 88m/s^2(continuous) Sweep time:3min/both way Direction: X, Y, Z Duration: 3hours each Mounting:Fig.7

Fig.1（To be continued）

Para.	Test Items	Requirements	Procedures
3.5.10	Shock	No electrical discontinuity greater than 1 μ sec. shall occur.	Acceleration: 980m/s^2 Duration:6msec Waveform : Half sine wave Number of Drops: 3 drops each Directions of X,-X, Y,-Y,Z and –Z axes, totally 18 drops Mounting: Fig.7 TE Spec. 109-5208
3.5.11	Lever Operation force	40N Max.	Mating male connector and female connector with all terminals loaded. Measured operation force for rotating lever from position A to B and from B to A in Fig.8.
3.5.12	Connector Locking Strength	100N Min.	Measured axial tensile strength with pulling one of mated connectors. Operation speed: 100mm/min. TE Spec.109-5210
3.5.13	Terminal Insertion Force into Plug housing	20N Max.（per 1 terminal）	Measured insertion force of terminal fitting into housing. TE Spec. 109-5211
3.5.14	Terminal Retention Force (at final locked position)	100N Min. Above crimp tensile strength in the event that crimp tensile strength is not enough for 100N Min.	Measure contact retention force with secondary lock set it effect. Operation Speed: 100mm/min. TE Spec. 109-5212
3.5.15	Crimp tensile strength	Wire size / Tensile Strength【N】 0.3mm^2: Initial 50 Min., Final 40 Min. 0.5 mm^2: Initial 70 Min., Final 50 Min. 0.75 mm^2: Initial 100 Min., Final 90 Min. 1.25 mm^2: Initial 175 Min., Final 130 Min.	Apply an axial pull-off load to crimped wire of contact secured on the tester. Bar out insulation barrel crimp. Operation speed: 100mm/min. TE spec. 109-5205 Condition B
3.5.16	Resistance of “Kojiri”	Satisfy requirements of test item on the “3.6 sequence”.	Repeated mating-unmating by hand in up-down and right-left directions for 10 cycles. TE Spec. 109-5215
3.5.17	Solderability	Wet Solder Coverage: 90 % Min.	Solder:Sn-3Ag-0.5Cu Solder Temperature :260±5℃ Immersion Duration :10±1sec. Flux: ULF-300R
3.5.18	Handling Ergonomics	No abnormalities allowed in manual mating/unmating handling.	Manually operated.

Fig.1（To be continued）

Para.	Test Items	Requirements		Procedures
3.5.19	Watertight Sealing	Initial	50kPa Min.	Blow compressed air into mated connectors through a small hole. In this test, wire ends are sealed with solder and adhesive masking. Put the connector into water. Check air leakage at 9.8kPa air for 30 sec. If the leakage from them isn't checked, increase pressure at a rate of 9.8kPa each time until air leakage takes place. When insert cavity plug, test method is same way.
		Final	30kPa Min.	
3.5.20	Retention Force of Wire Cover	100N Min.		The pull wire cover comes off from the electric wire while installed on the female connector is measured.
3.5.21	Locking Strength of lever point	100N Min.		The lever is pulled without pushing the release button from the state of the lever lock, and the retentively of the lever lock is measured.
Environmental Requirements				
3.5.22	Heat Aging (Temperature Life)	Satisfy requirements of test item on the "3.6 sequence".		140℃、120Hours TE Spec. 109-5104
3.5.23	Resistance to Cold	Satisfy requirements of test item on the "3.6 sequence".		-40℃、120Hours TE Spec. 109-5108
3.5.24	Thermal Shock	Satisfy requirements of test item on the "3.6 sequence".		-40℃/30min., 100℃/30min. Making this a cycle, repeated 1000 cycles. Monitor fluctuation of electrical resistance at 10mA current loaded during the test. TE Spec. 109-5103
3.5.25	Humidity-Temperature Cycling	Satisfy requirements of test item on the "3.6 sequence".		Condition : Fig. 9 Making this condition a cycle, repeated 10 cycles. Monitor fluctuation of electrical resistance at 10mA current loaded during the test. TE Spec. 109-5106
3.5.26	Salt Water Spray	Satisfy requirements of test item on the "3.6 sequence".		Spraying salt water on hanged mated connectors in closed chamber. Condition of salt water is 5±1mass% at 35℃ and specific gravity 1.0268～1.0413 and pH6.5～7.2 and Compressed air supplied 68.6～176.5kPa. And then, leave connectors at 80℃, 90～95%RH for 96 hours. Monitoring current leakage during test. TE Spec. 109-5101

Fig.1 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.27	Water Spray	Satisfy requirements of test item on the “3.6 sequence”.	Hanged mated connectors in closed chamber and heated them at 100±3℃ for 40min. And then spray with water of room temperature for 20min. immediately. Test condition is JIS D 0203 S1. Monitoring current leakage during test. TE Spec. 109-5109
3.5.28	Resistance to High Pressure Washing	Satisfy requirements of test item on the “3.6 sequence”.	Place the connector in a thermostatic chamber and heat in for 1 hour under 100±3℃. Then subject the connector to high pressure washing for 30sec under 8MPa. Fix the specimen horizontally and rotate the fixing table at a speed of 5±1 r/min.
3.5.29	Humidity (Steady State)	Satisfy requirements of test item on the “3.6 sequence”.	85℃、90～95%RH 96 hour Monitoring current leakage during test. TE Spec. 109-5105
3.5.30	Dust Bombardment	Satisfy requirements of test item on the “3.6 sequence”.	Subject JIS R 5210 cement blow of 1.5kg per 10 seconds in 15 minutes intervals for 8 cycles, with mating/unmating per 2 cycles. TE Spec. 109-5110
3.5.31	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 TE Spec. 109-5107
3.5.32	Compound Environment Resistance	No electrical discontinuity greater than 1 μ sec. shall occur. Satisfy requirements of test item on the “3.6 sequence”.	Temperature: 120℃ Vibration Frequency and Acceleration: 20～200Hz 88m/s^2(continuous) Sweep time:3min/both way Direction: X, Y, Z Test Time: 300 hours Mounting: Fig.7 Current loaded：Fig.10 Monitor fluctuation of electrical resistance during test. After testing, check discontinuity based on Para. 3.5.9”Vibration” for an hour.
3.5.33	Resistance to Oil	Satisfy requirements of test item on the “3.6 sequence”.	Test (1) Immerse mated connectors as the following oil at 85±2℃ for an hour. Leave samples under room temperature for 24 hours after each immersion. ① Torque converter oil at 85±2℃ ② Transmission oil ③ Engine oil ④ Crutch oil or Brake oil Testing after leaving samples under room temperature for 24 hours.

Fig.1 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.33	Resistance to Oil	Satisfy requirements of test item on the “3.6 sequence”.	Test (2) Immerse mated connectors in the following procedure for an hour. Leave samples under room temperature for 24 hours after each immersion. ① Windshield washer liquid as concentration: 30%, at 50±2℃ ② Long life coolant 30% at 118±5℃ Testing after leaving samples under room temperature for 24 hours. Test (3) Immerse mated connectors of other specimens in the following oil at 23±5℃ for an hour. ・ Gasoline ・ Gas oil ・ Battery liquid Testing after leaving samples under room temperature for 24 hours.

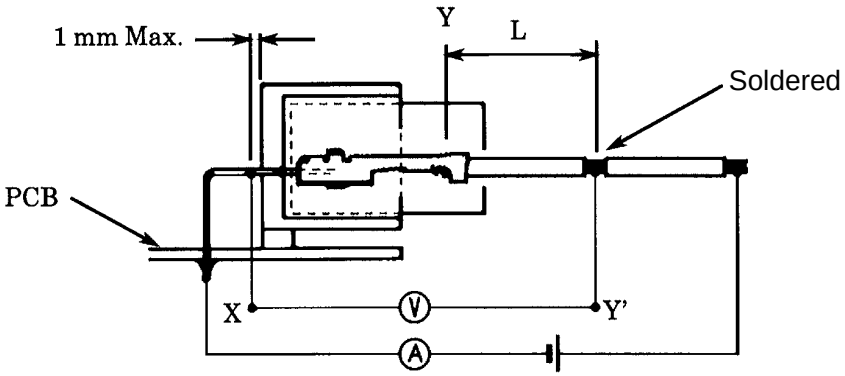
Fig.1（End）

3.6. Product Qualification Test Sequence

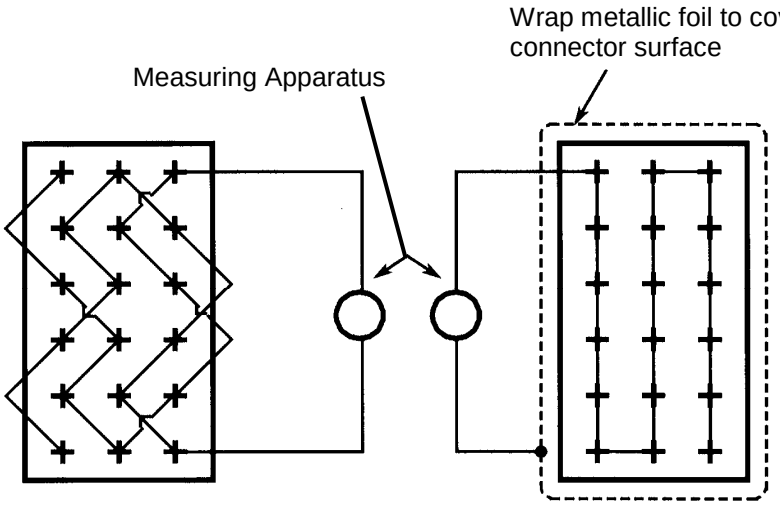
Para	Test Item	Test Group																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		Test Procedure[(a)]																
3.5.1	Confirmation of Product	1	1,3	1,3	1,3	1,3	1,3	1,4	1,4	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3
3.5.2	Termination Resistance (Low level)	5	4	4		4	4	5				4	4	4		4	4	
3.5.3	Termination Resistance (Specified Current)	6	5	5		5	5	6				5	5	5		5	5	
3.5.4	Insulation Resistance	8					6	7	5	4	4							
3.5.5	Dielectric Withstanding Voltage	9					7	8	6		5							
3.5.6	Current Leakage							3	3									
3.5.7	Temperature Rise	7		6													6	
3.5.8	Over Current Loading															2		
3.5.9	Vibration (High Frequency)													2				
3.5.10	Shock														2			
3.5.11	Lever Operation force (ON)	4																
	Lever Operation force (OFF)	11																
3.5.12	Connector Locking Strength	13		9		8	10				6							
3.5.13	Terminal Insertion Force	2																
3.5.14	Terminal Retention Force	14		10	5	9	11	9			7							
3.5.15	Crimp tensile strength	15		11		10							6					
3.5.16	Resistance of “Kojiri”		2															
3.5.17	Solderability	3																
3.5.18	Handling Ergonomics	12		8		7	9											
3.5.19	Watertight Sealing	10	6	7	4	6	8											4
3.5.20	Retention Force of Wire Cover	16																
3.5.21	Locking Strength of lever point	17																
3.5.22	Heat Aging			2														
3.5.23	Resistance to Cold				2													
3.5.24	Thermal Shock					2												
3.5.25	Humidity-Temperature Cycling						2											
3.5.26	Salt Water Spray							2										
3.5.27	Water Spray								2									
3.5.28	Resistance to High Pressure Washing									2								
3.5.29	Humidity (Steady State)										2							
3.5.30	Dust Bombardment											2						
3.5.31	Industrial Gas (SO_2)												2					
3.5.32	Compound Environment Resistance																2	
3.5.33	Resistance to Oil																	2

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

Fig.2



Deduct resistance of Y-Y' (wire "L") from X-Y'.
Fig.3



Adjacent Contacts Contacts — Housing
Fig.4

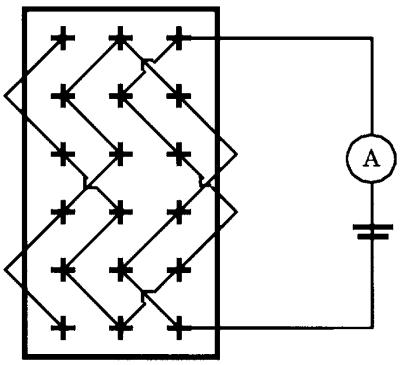


Fig.5

Wire Size (mm^2)	Current Type	Test Current (A)	Duration
0.5	①	16.5	60 min.
	②	20.2	200 sec.
	③	22.5	5 sec.
	④	30.0	1 sec.
1.25	①	33.0	60 min.
	②	40.5	100 sec.
	③	45.0	10 sec.
	④	60.0	2 sec.

Fig.6

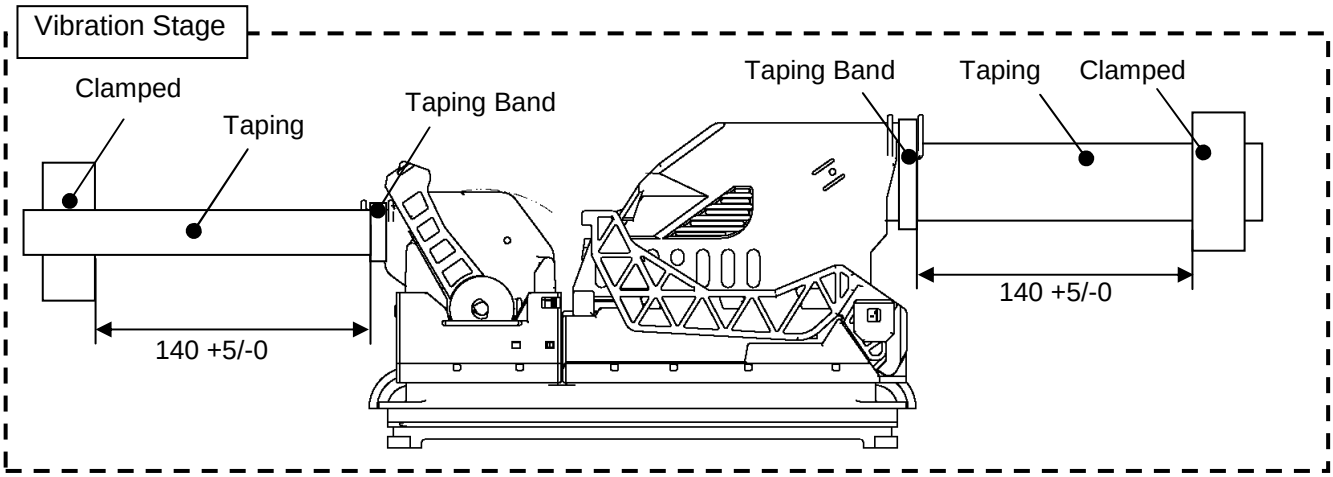


Fig.7(Top view for vibration stage)

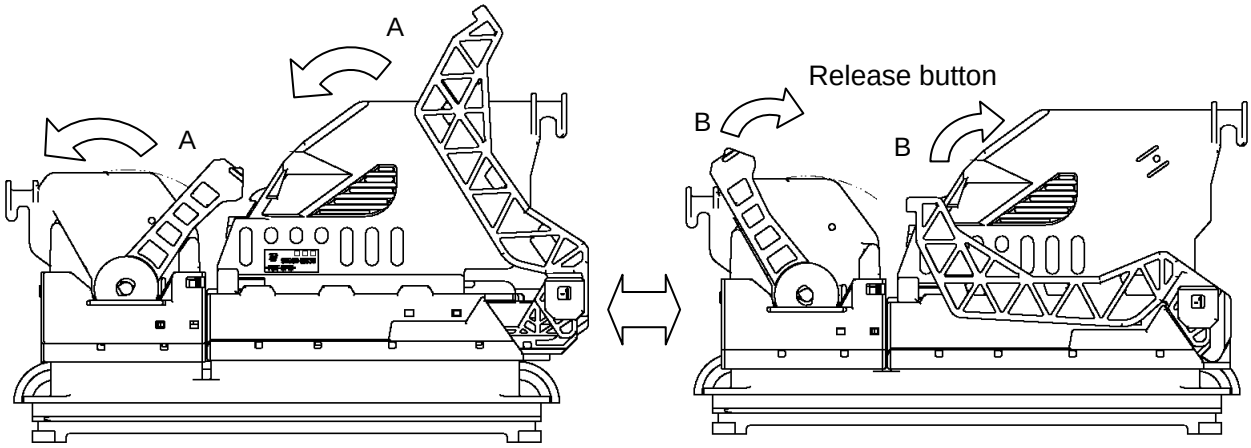


Fig.8

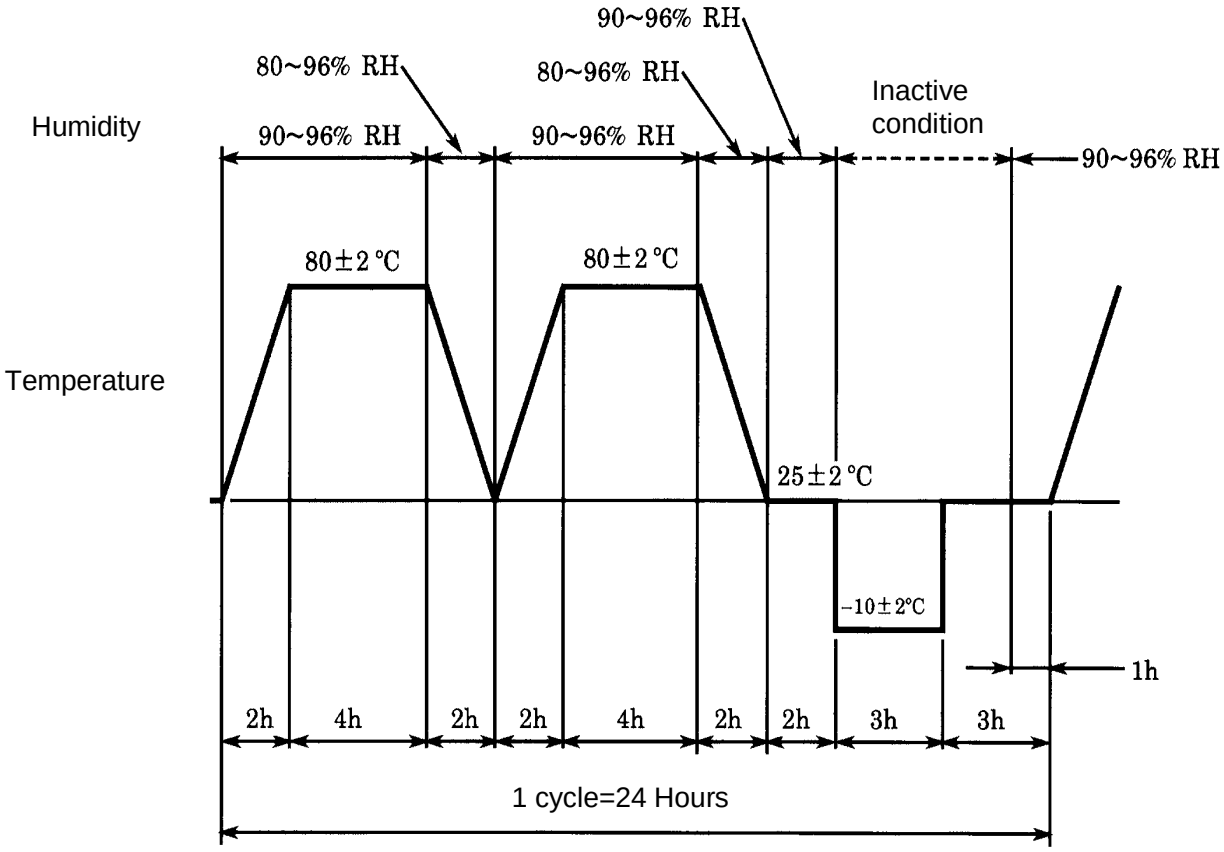


Fig.9

Terminal	Finish	Wire Size (mm^2)	Loading Current	Temperature Rise
0.50	Sn	0.5	1.2A	45min.ON、15min.OFF 300cycles
	Au		10mA	
1.0	Sn	1.25	2.0A	

Fig.10

The applicable product descriptions and part numbers

Part Number★1	Description
1939921	Sealed 0.50/1.0 Conn. 200Pos. Cap Housing Assembly (Male Connector)
1939927	Sealed 0.50/1.0 Conn. 140Pos. Plug Housing Assembly (Female Connector)
1554930	
2069842	Sealed 0.50/1.0 Conn. 100Pos. Plug Housing Assembly (Female Connector)
1939938	Sealed 0.50/1.0 Conn. 60Pos. Plug Housing Assembly (Female Connector)
1554545	
1939932	Sealed 0.50/1.0 Conn. 140Pos. Lever
2013360	Sealed 0.50/1.0 Conn. 140Pos. Wire Cover
2040009	Sealed 0.50/1.0 Conn. 60Pos. Wire Cover Assembly
1939349	Sealed 0.50 Receptacle (Sn)
1939350	Sealed 0.50 Receptacle (Au)
1981878	Sealed 0.50 Receptacle S Size(Sn)
1939351	Sealed 1.0 Receptacle (Sn)
1981561	Sealed 0.50 Cavity Plug
1981562	Sealed 1.0 Cavity Plug
2069957	Restricted Product
1554740	Restricted Product
2229025	Restricted Product

Appendix 1

★1 : 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.