0.50 SERIES CONNECTORS(SMT Type)

1. SCOPE:

1.1. Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of 0.50 Series I/O Connectors (SMT-Type.).
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. 114-5379 Application Specification : Crimping of 0.50 Receptacle Contact
C. 501-78233 Qualification Test Report
D. 411-78199 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
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. Materials :

A. Contact :

Description	Material	Finish
Tab(Male)	Brass	Post-Tinned or Selective Gold
Receptacle(Female)	Copper Alloy	Pre-Tinned or Selective Gold

Fig.1

B. Peg :

Description	Material	Finish
Peg	Brass	Post-Tinned

Fig.2

C. Housing : LCP

3.3. Ratings :

A. Voltage Rating : 12 V DC

B. Temperature Rating : －30～85℃

3.4. Performance Requirements and Test Descriptions :

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig.3 and Fig4. All tests shall be performed in the room temperature, unless otherwise specified.

The samples used in test are implemented by the lead free solder paste with 0.15mm thick metal mask.

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 114-5379	Visually ,dimensionally and functionally inspected per applicable quality inspection plan
Electrical Requirements			
3.5.2	Termination Resistance (Low Level)	10 mΩ Max. (Initial) 20 mΩ Max. (Final)	Subject mated contacts assembled in housing to 20 mV Max. Open circuit at 10 Ma. Fig. 5 TE Spec. 109-5311-1
3.5.3	Termination Resistance (Specified Current)	10 mV/A Max. (Initial) 20 mV/A Max. (Final)	Subject mated contacts assembled in housing to 12 V Max. Open circuit at 1A. Fig.5 TE Spec. 109-5311-2
3.5.4	Dielectric Withstanding Voltage	No creeping discharge or flashover shall occur.	Impressed voltage 1000VAC for 1 min. Mated connector. Fig.6 TE Spec. 109-5301
3.5.5	Insulation Resistance	100 MΩ Min. (Initial) 100 MΩ Min. (Final)	Impressed voltage 500VDC Mated connector. Fig.6 TE Spec. 109-5302
3.5.6	Current Leakage	3mA Max.	Impressed voltage 14VDC Fig.7 TE Spec. 109-5312
3.5.7	Temperature Rise	60℃ Max.	Measure temperature rising at wire crimped by applied current to all positions. Fig.11 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. 8
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 : 44.1 m / s^2 Vibration Direction : X, Y, Z Duration: 3hours each Mounting: Fig. 9

Fig.3 (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 Waveform : Half sine wave Duration : 6msec.Velocity Number of Drops: 3 drops each directions of X,-X, Y,-Y,Z and -Z axes, totally 18 drops Mounting : Fig. 9 TE Spec. 109-5208
3.5.11	Connector Mating Force	16Position Terminal 44N Max 24Position Terminal 56N Max 40Position Terminal 70N Max.	Operation Speed : 100mm/min. Measure the force required to mate connectors. TE Spec. 109-5206
3.5.12	Connector Unmating Force	70N Max	Operation Speed : 100mm / min. Measure the force required to unmate connectors. (without housing lock) TE Spec. 109-5206
3.5.13	Connector Locking Strength	100N Min.	Apply an axial pull-off load to one of the mated housing, measure locking strength. Operation Speed : 100mm/min. TE Spec. 109-5210
3.5.14	Terminal Insertion Force into Plug housing	10N Max.（per 1 terminal）	Measured insertion force of terminal fitting into housing. TE Spec. 109-5211
3.5.15	Terminal Retention Force (at final locked position)	30N Min.	Measure contact retention force with secondary lock set it effect. Operation Speed: 100mm/min. TE Spec. 109-5212
3.5.16	Crimp tensile strength	Wire size: 0.22 mm^2 — Tensile Strength【N】 Initial: 30 Min; Final: 20 Min Wire size: 0.35 mm^2 — Tensile Strength【N】 Initial: 50 Min; Final: 40 Min	Apply an axial pull-off load to crimped wire of contact secured on the tester. Release the insulation barrel. Operation speed: 100mm/min. TE spec. 109-5205 Condition B
3.5.17	Tab Retention Force	15N Min.	Measure retention force of tab contact , that contact is pushed out from housing in a direction from mating side to PCB side. Operation speed: 100mm/min.

Fig.3 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.18	Resistance to "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 Specification, 109-5215
3.5.19	Solderability	Wet Solder Coverage : 95 % Min. (with under plating)	Solder Temperature:250±5℃ Immersion Duration:5±0.5sec Flux: ULF-300R Solder: Sn-3Ag-0.5Cu
3.5.20	Solderability (Reflow Soldering)	Fillet shall be formed around all contact.	Test connector on P.C.B. Pre-Heat 170~190℃ 110secMin. Soldering 200℃ 70sec Min. Peak Temperature: 245 Min. Temperature shall be measured at contact. Solder: Sn-3Ag-0.5Cu Solder Paste Temperature at PCB :260℃Max.
3.5.21	Handling Ergonomics	No abnormalities allowed in manual mating/unmating handling.	Manually operated.
Environmental Requirements			
3.5.22	Thermal Shock	Satisfy requirements of test item on the "3.6 sequence".	-40℃/30min, 80℃/30min. Making this a cycle, repeat 1000 cycles. Monitor resistance-variation at closed circuit current of 10mA during the test. TE Spec. 109-5103
3.5.23	Humidity (Steady State)	Satisfy requirements of test item on the "3.6 sequence". Current Leakage : 3mA Max.	90～95%R. H. , 60℃ , 96hours Monitor current leakage during the test. TE Spec. 109-5105
3.5.24	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
3.5.25	Temperature Life (Heat Aging)	Satisfy requirements of test item on the "3.6 sequence".	120℃±3℃, 120hours TE Spec. 109-5104
3.5.26	Resistance to Cold	Satisfy requirements of test item on the "3.6 sequence".	-40℃±3℃, 120hours TE Spec. 109-5108

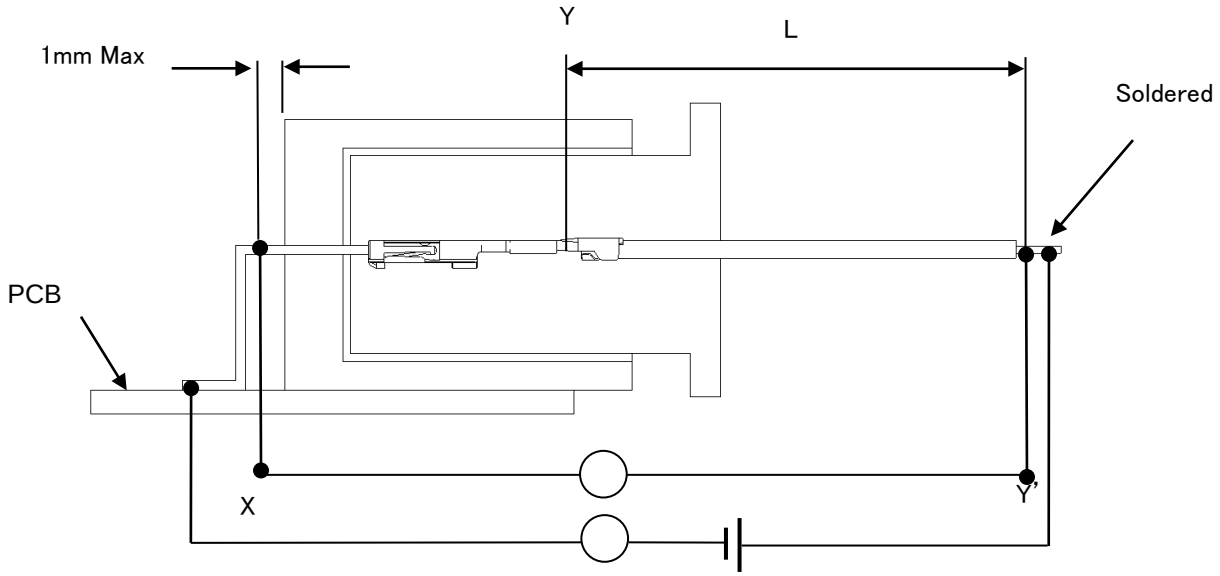
Fig.3 (To be continued)

Para.	Test Items	Requirements	Procedures
3.5.27	Humidity-Temperature Cycling	Satisfy requirements of test item on the “3.6 sequence”.	Condition : Fig. 10 Making this condition a cycle, repeated 10 cycles. Monitor fluctuation of electrical resistance at 10mA current loaded during the test.
3.5.28	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
3.5.29	Compound Environment Resistance	Satisfy requirements of test item on the “3.6 sequence”. No electrical discontinuity greater than 1 μ sec. shall occur.	Temperature : 100℃ Vibration Frequency : 20→200→20Hz/3Min. (Log) Acceleration : 44.1m/s^2 Vibration Direction : X, Y, Z Duration : 300hours Test Current : Fig. 12 Mounting : Fig. 9 Monitor resistance-variation, and after this test check if instant cutoff occurs for an hour on “3.5.9 vibration”.
3.5.30	Condensation	Satisfy requirements of test item on the “3.6 sequence”.	-30℃/60min.25℃/90%/60min. Making this a cycle, repeat 48 cycles. Monitor current leakage during the test.
3.5.31	Resistance to Reflow Soldering Heat	Tested housing shall no evidence of deformation or fusion of housing and no physical damage.	Test connector on P.C.B. Pre-Heat 170~190℃110sec Min. Soldering 200℃ 70sec Min. Peak Temperature: 245℃ Min. Temperature shall be measured at contact. Solder: Sn-3Ag-0.5Cu Solder Paste Temperature at PCB :260℃Max

Fig. 3 (End)

3.6. Product Qualification Test Sequence

No.	Teat Examination	Test Group																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		Test Sequence[a]																
3.5.1	Confimation of Product	1	1,3	1,5	1,6	1,4	1,5	1,5	1,8	1,5	1,6	1,3	1,7	1,5	1,7	1,5	1,3	1,3
3.5.2	Termination Resistance (Low Level)	4		2,6	2,7		2,6	2,6	2,9	2,6	2,7		2,8	2,6	2,8			
3.5.3	Termination Resistance (Rated Current)	5		3,7	3,8		3,7	3,7	3,10	3,7	3,8		3,9	3,7	3,9			
3.5.4	Dielectric withstanding Voltage	8							5,12				5,11					
3.5.5	Insuration Resistance	7							4,11				4,10			2,6		
3.5.6	Current Leakage								7							4		
3.5.7	Temperature Rise	6									4,9				5			
3.5.8	Over Current Loading			4														
3.5.9	Vibration (High Frequency)				5										6			
3.5.10	Shock					3												
3.5.11	Connector Mating Force	3																
3.5.12	Connector Unmating Force	9																
3.5.13	Connector Locking Strength		4					9	13		11		13					
3.5.14	Terminal Insertion Force into Plug housing	2																
3.5.15	Terminal Retention Force (at final locked position)	10						10	14		12	5	14					
3.5.16	Crimp tensile strength	11						11		8	13							
3.5.17	Tab Retention Force	12									14							
3.5.18	Resistance to “Kojiri”						4											
3.5.19	Solderability		2															
3.5.20	Solderability （Reflow）																	2
3.5.21	Handling Ergonomics							8			10	4	12					
3.5.22	Thermal Shock							4										
3.5.23	Humidity (Steady State)								6									
3.5.24	Industrial SO_2 Gas									4								
3.5.25	Temperature Life （Heat Aging）				4	2					5							
3.5.26	Resistance to Cold											2						
3.5.27	Humidity-Temperature Cycling												6					
3.5.28	Dust Bombardment													4				
3.5.29	Compound Envirioment Resistance														4			
3.5.30	Condensation															3		
3.5.31	Resistance to Reflow Soldering Heat																2	



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

Fig.5

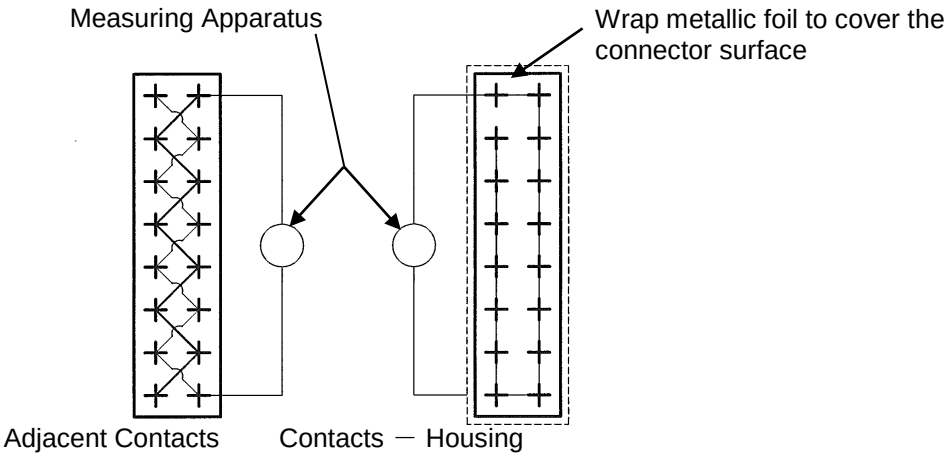


Fig.6

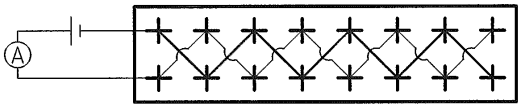


Fig.7

Fig.7Wire Size (mm^2)	Test Current (A)	Duration
0.35	11.0	60 min.
	13.5	10 sec.
	15.0	5 sec.
	20.0	1 sec.

Fig.8

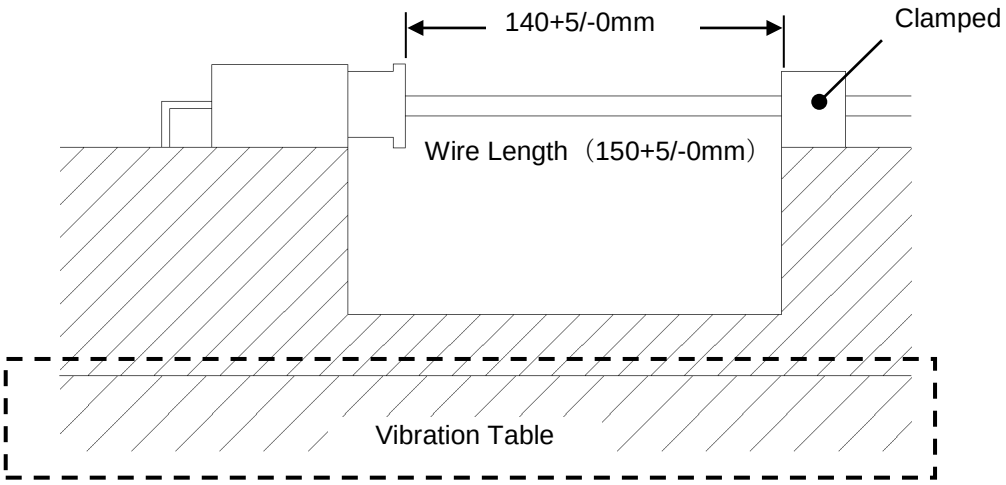

140+5/-0mm
Clamped
Wire Length（150+5/-0mm）
Vibration Table

Fig. 9

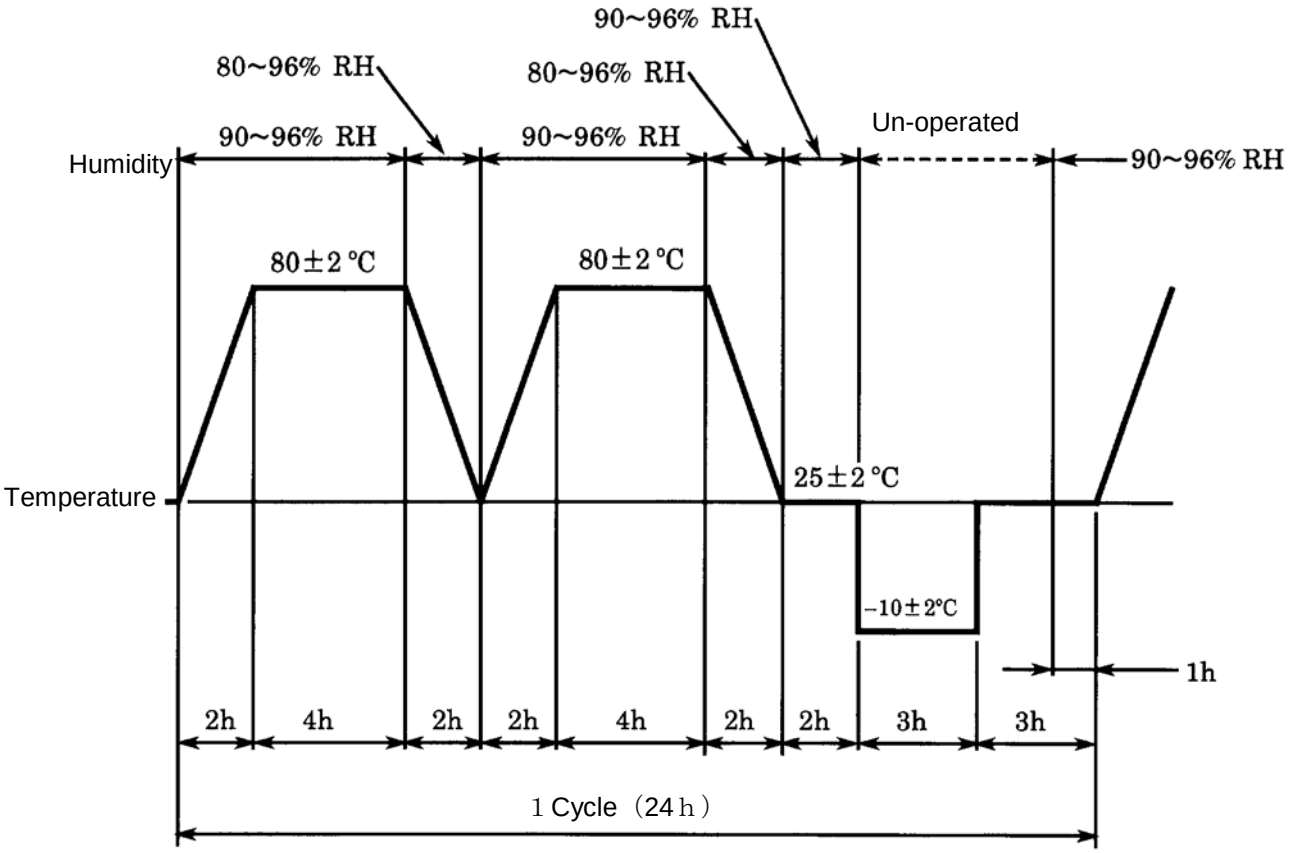

90~96% RH
80~96% RH
80~96% RH
Un-operated
Humidity
90~96% RH
90~96% RH
90~96% RH
80±2 ℃
80±2 ℃
Temperature
25±2 ℃
-10±2℃
1h
2h
4h
2h
2h
4h
2h
2h
3h
3h
1 Cycle（24ｈ）

Fig. 10

Kind of Connectors	Wire Size(mm^2)	Test Current(A)		Temperature Rise
		Single position	All position	
40 POS.	0.35	5	1	60℃ max.
24 POS.	0.35	5	1.5	
16 POS	0.35	5	2.0	

Fig.11

Kind of Connectors	Finish	Wire Size(mm^2)	Test Current(A)	Test Time
40 POS.	Sn	0.35	0.8	45min.ON、15min.OFF
	Au	0.35	0.01	300cycles

Fig.12

Product Part No.★	Description
1871806	0.50 SERIES 40POS CAP ASSY（MALE CONNECTOR）NONE BOSS TYPE
1827842	0.50 SERIES 40POS PLUG ASSY（FEMALE CONNECTOR）
2013029	0.50 SERIES 24POS CAP ASSY（MALE CONNECTOR）NONE BOSS TYPE
2013031	0.50 SERIES 24POS PLUG ASSY（FEMALE CONNECTOR）
2134217	0.50 SERIES 24POS CAP ASSY（MALE CONNECTOR） KEYING
2134219	0.50 SERIES 24POS PLUG ASSY（FEMALE CONNECTOR） KEYING
2367111	0.50 SERIES 16POS CAP ASSY（MALE CONNECTOR）
2367113	0.50 SERIES 16POS PLUG ASSY（FEMALE CONNECTOR）
1827855	0.50 RECEPTACLE CONTACT (Sn)
1903703	0.50 RECEPTACLE CONTACT (Au)
2069755	0.50 SERIES 40POS CAP ASSY（MALE CONNECTOR） KEYING
2069757	0.50 SERIES 40POS PLUG ASSY（FEMALE CONNECTOR） KEYING
1554287	0.50 SERIES 40POS CAP ASSY（MALE CONNECTOR） KEYING TYPE II
1554289	0.50 SERIES 40POS PLUG ASSY（FEMALE CONNECTOR）KEYING TYPE II

Appendix 1

★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.