

## 0.50 THR type Connector

Restricted to TOYOTA MOTOR CORPORATION (TMC) and any electric equipment supplier to supply for TMC.

(トヨタ自動車株式会社、およびトヨタ自動車株式会社への納入を目的とする供給者 限定)

### 1. SCOPE:

#### 1.1. Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of 0.50 Series unsealed Connectors. 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. 109-1 Test Specification, General Requirements for Testing
- B. 114-5379 Application Specification: Crimping of 0.50 Receptacle Contact
- C. 501-78583 Qualification Test Report: 0.50 Series Connectors (THR Type)

#### 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	part of Post-Tinned(nickel under plating) or Selective Gold(nickel under plating)
Receptacle(Female)	Copper Alloy	Pre-Tinned or Selective Gold

Fig.1

B. Board lock

Description	Material	Finish
Boardlock	Brass	Post-Tinned(nickel under plating)

Fig.2

C. Housing: SPS resin

D. Wire: The used wire is according to the following table

Tab	Wire used
0.50	0.35mm <sup>2</sup> (Applicable wire refer to 114-5379)

Fig.3

3.3. Ratings:

- A. Voltage Rating: 12 V DC
- B. Temperature Rating: -30°C~85°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.4 and Fig5. 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 114-5379		Visually ,dimensionally and functionally inspected per applicable quality inspection plan	
Electrical Requirements					
3.5.2	Termination Resistance (Low Level)	Initial	10 mΩ Max.	Subject mated contacts assembled in housing to 20 mV Max. Closed circuit at 10 mA. Fig. 6	
		Final	20 mΩ Max.		
3.5.3	Termination Resistance (Specified Current)	Initial	10 mV/A Max.	Subject mated contacts assembled in housing to 12 V Max. Closed circuit at 1A. Fig. 6	
		Final	20 mV/A Max.		
3.5.4	Dielectric Withstanding Voltage	No creeping discharge or flashover shall occur.		Impressed voltage 1kVAC for 1 min. Use mated connector. Fig.7	
3.5.5	Insulation Resistance	100 MΩ Min. (Initial) 100 MΩ Min. (Final)		Impressed voltage 500VDC Use mated connector. Fig. 7	
3.5.6	Current Leakage	3mA Max.		Impressed voltage 14VDC Fig. 8	
3.5.7	Temperature Rise	60°C Max.		Measure temperature rising at wire crimped by applied current to single position and all positions. Fig. 12	
3.5.8	Over Current Loading	No ignition is allowed during the test.		Apply the current to only one position. Applied Current : Fig.9	
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".		Test connector on P. C. B Mount: Fig. 10	
				Vibration Frequency(Hz)	20→200→20
				Sweep time(min)	3
				Acceleration(m / s <sup>2</sup> )	44.1
				Vibration Direction	X, Y, Z
				Duration	3hours each
3.5.10	Shock	No electrical discontinuity greater than 1μ sec. shall occur.		Test connector on P. C. B Mount: method at Fig. 10	
				Acceleration(m/s <sup>2</sup> )	980
				Duration(msec)	6
				Waveform	Half sine wave
				Direction and number of Drops	3 drops each directions of X,-X, Y,-Y,Z and -Z axes, totally 18 drops
3.5.11	Connector Mating Force	70N Max		Operation Speed : 100mm/min. Measure the force required to mate connectors.	
3.5.12	Connector Unmating Force	70N Max		Operation Speed : 100mm / min. Measure the force required to unmate connectors. (without housing lock)	

Fig.4 (To be continued)



Para.	Test Items	Requirements			Procedures		
Physical Requirements							
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.		
3.5.14	Terminal Insertion Force into Plug housing	10N Max. (per 1 terminal)			Measured insertion force of terminal fitting into housing.		
3.5.15	Terminal Retention Force (at final locked position)	40N Min.			Measure contact retention force with secondary lock set it effect. Operation Speed: 100mm/min.		
3.5.16	Crimp tensile strength	Wire size (mm <sup>2</sup> )	Tensile Strength (N)		Apply an axial pull-off load to crimped wire of contact secured on the tester. Release the insulation barrel. Operation speed: 100mm/min.		
			Initial	Final			
		0.35	50 Min.	40 Min.			
3.5.17	Tab Retention Force	3N Min			Push tab contact from P. C. Board side to the mating side, measure the contact retention force. Operation speed: 100mm/min.		
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.		
3.5.19	Solder ability	Wet Solder Coverage (only the plating side) : 95 % Min. (with under plating)			Test condition is according to the following table		
					Solder	Sn-3Ag-0.5Cu	
					Solder temperature(°C)	250±5	
					Immersion duration(s)	5±0.5	
				Flux	ULF-300R		
3.5.20	Resistance to Soldering Heat	Tab retention force satisfying follows.			After the soldering, go on test after cooling to the room temperature. See 3.5.17 Tab retention force.		
		3N Min			Solder	Sn-3Ag-0.5Cu	
					Solder temperature	260±5°C	
					Immersion duration	10±1 sec	
Flux	ULF-300R						
3.5.21	Handling Ergonomics	No abnormalities allowed in manual mating / unmating handling.			Manually operated.		
3.5.22	Thermal Shock	Satisfy requirements of test item on the “3.6 sequence”.			[1],[2] in the following table as one cycle. Repeat 1000 cycles. Monitor resistance-variation at closed circuit current of 10mA during the test.		
						[1]	[2]
					Time(hr)	0.5	0.5
				Temperature	80±3      -30±3		

Fig.4 (To be continued)



Para.	Test Items	Requirements	Procedures		
Environmental Requirements					
3.5.23	Humidity (Steady State)	Satisfy requirements of test item on the "3.6 sequence". Current Leakage: 3mA Max.	Test condition is shown in the following table. Monitor current leakage during the test.		
			Time(Hr)	96	
			Temperature(°C)	60±2	
			Humidity(%RH)	90~95	
3.5.24	Industrial Gas (SO <sub>2</sub> )	Satisfy requirements of test item on the "3.6 sequence".	Using unmated connector Value the performance of mated connector after test		
			Gas Type	SO <sub>2</sub>	
			Gas density(ppm)	25	
			Gas temperature(°C)	Room temperature	
			Gas humidity(%RH)	75	
Test period(Hr)	96				
3.5.25	Temperature Life (Heat Aging)	Satisfy requirements of test item on the "3.6 sequence".	100°C±3°C, 120hours		
3.5.26	Resistance to Cold	Satisfy requirements of test item on the "3.6 sequence".	-30°C±3°C, 120hours		
3.5.27	Humidity-Temperature Cycling	Satisfy requirements of test item on the "3.6 sequence".	Condition : Fig. 11 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.		
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.	Test condition is shown in the following table. Monitor resistance-variation, and after this test check if instant cutoff occurs for an hour on "3.5.9 vibration".		
			Temperature(°C)	80	
			Vibration Frequency(Hz)	20→200→20 / 3Min. (Log)	
			Sweep time(min)	3	
			Acceleration(m/s <sup>2</sup> )	44.1	
			Vibration Direction	X, Y, Z	
			Duration(Hr)	300	
			Test Current	Fig.13	
Method of fixation	Fig.10				
3.5.30	Condensation	Satisfy requirements of test item on the "3.6 sequence".	[1],[2] in the following table as one cycle. Repeat 48 cycles. move [1] to [2] directly Monitor current leakage during the test.		
				[1]	[2]
			Time(Hr)	1	1
			Temperature(°C)	-30	+25
			Humidity(%RH)	---	90~95
			Current loaded	Yes	Yes

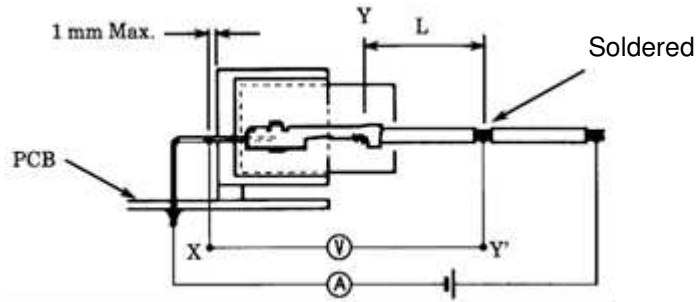
Fig. 4 (End)

3.6. Product Qualification Test Sequence

No.	Test Examination	Test Group															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Test Sequence*															
3.5.1	Examination of Product	1, 3	1, 3	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
3.5.2	Termination Resistance (Low Level)	6			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 (Specified Current)	7			3, 7	3, 8		3, 7	3, 7	3, 10	3, 7	3, 8		3, 9	3, 7	3, 9	
3.5.4	Dielectric with standing Voltage	9								5, 12				5, 11			
3.5.5	Insulation Resistance	8								4, 11				4, 10			2, 6
3.5.6	Current Leakage									7							4
3.5.7	Temperature Rising	10										4, 9				5	
3.5.8	Over Current Loading				4												
3.5.9	Vibration (High Frequency)					5										6	
3.5.10	Physical Shock						3										
3.5.11	Connector Mating Force	5															
3.5.12	Connector Unmating Force	11															
3.5.13	Connector Locking Strength			2					9	13		11		13			
3.5.14	Contact Insertion Force	4															
3.5.15	Contact Retention Force (Secondary)	12							10	14		12	5	14			
3.5.16	Crimp Tensile Strength	13							11		8	13					
3.5.17	Tab retention force	14															
3.5.18	Resistance to "Kojiri"							4									
3.5.19	Solderbility	2															
3.5.20	Resistance to Soldering Heat		2														
3.5.21	Handling Ergonomics		4						8			10	4	12			
3.5.22	Thermal Shock								4								
3.5.23	Humidity(Steady State)									6							
3.5.24	Industrial SO <sub>2</sub> 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 environment resistance															4	
3.5.30	Condensation																3

\*Numbers indicate sequence in which tests are performed.

Fig.5



Deduct resistance of wire "L"

Fig.6

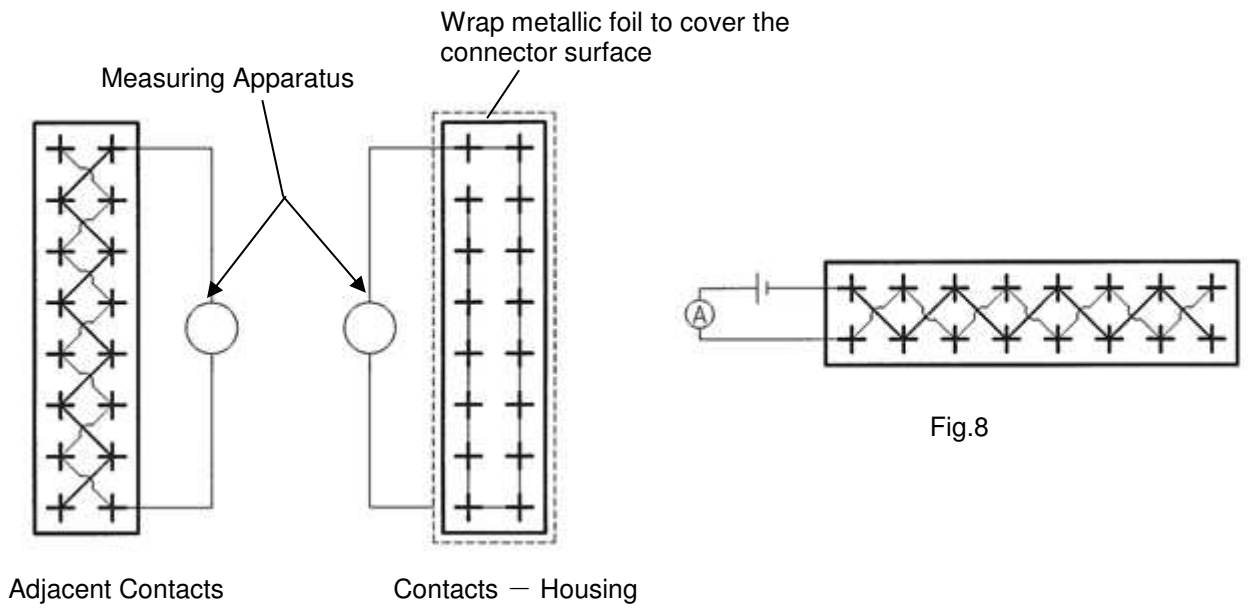


Fig.7

Fig.8

Wire Size (mm <sup>2</sup> )	Type	Test Current (A)	Duration
0.35	①	11.0	60 min.
	②	13.5	10 sec.
	③	15.0	5 sec.
	④	20.0	1 sec.

Fig.9

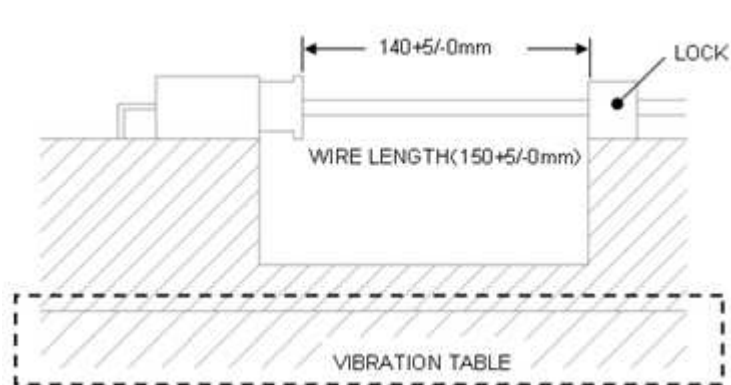


Fig.10

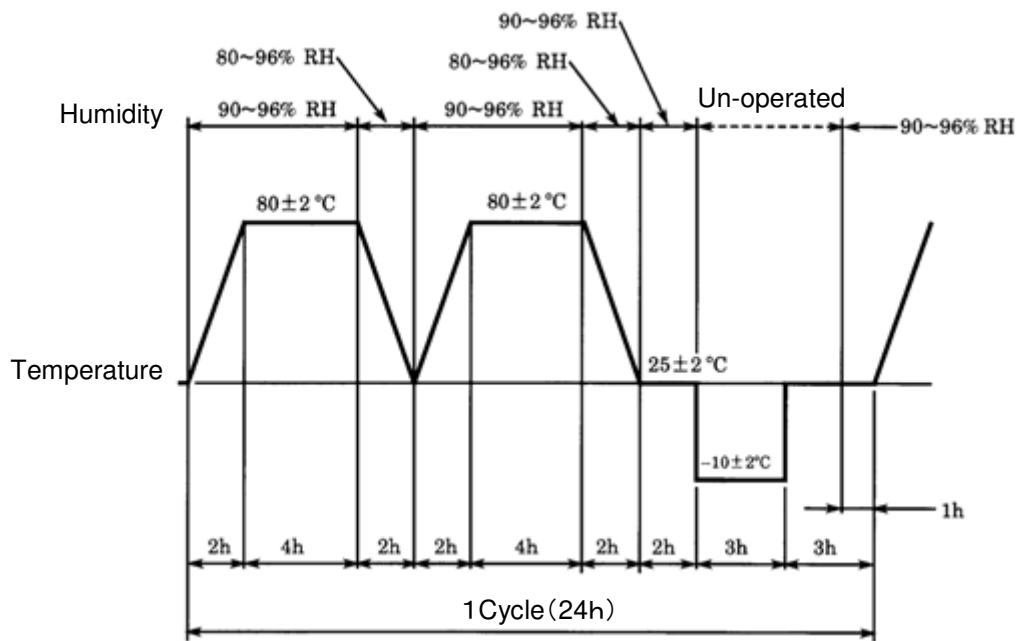


Fig.11

Contact	Wire Size (mm <sup>2</sup> )	Test Current(A)		Temperature Rise (Δt)
		Single Pos	All Pos	
0.50	0.35	5	1.5	60°C Max.

Fig.12

Contact	Wire Size (mm <sup>2</sup> )	Test Current(A)	Test time
0.50	0.35	1.2	45 min ON、15 min OFF for one cycle. 300 cycles operation

Fig.13





Applicable product and part number is appendix 1.

Product Part No.* <sup>1</sup>	Description
○Cap Assembly (Male Connector)	
2201816	0.50 75Pos(21Pos+27Pos+27Pos) Cap Assembly
2260992	0.50 78Pos(21Pos+30Pos+27Pos) Cap Assembly
2298340* <sup>2</sup>	0.50/0.64 56Pos(21Pos+27Pos+8Pos) Cap Assembly
2300181* <sup>2</sup>	0.50/0.64 104Pos(21Pos+27Pos+21Pos+27Pos+8Pos) Cap Assembly
○Plug Assembly (Female Connector)	
2229097	0.50 21Pos Plug Assembly
2229101	0.50 27Pos Plug Assembly
2822015	0.50 30Pos Plug Assembly
○Receptacle Contact (Female Contact)	
1827855	0.50 Receptacle Contact (S) (M) (L) (C) (Post-Tinned)
1903703	0.50 Receptacle Contact (M) (Selective-Gold)

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.

\*2: See 108-140151 for 0.64III 8Pos Plug Assembly

