



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further deta

MCP 9.5 5P SEALED PLUG ASSEMBLY

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of MCP 9.5 5P Sealed Plug Assembly

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line has not been completed. The Qualification Test Report number will be issued upon successful qualification testing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

- 2005307: Customer Drawing (MCP 9.5 5P SEALED PLUG ASSEMBLY)

3. REQUIREMENTS

3.1. Design and Construction

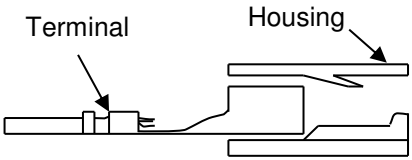
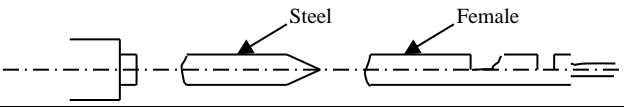
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

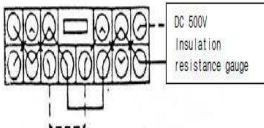
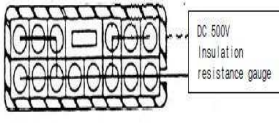
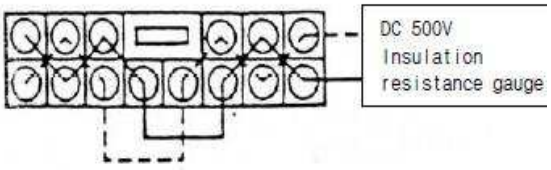
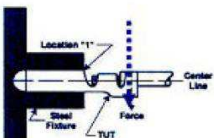
3.2. Ratings

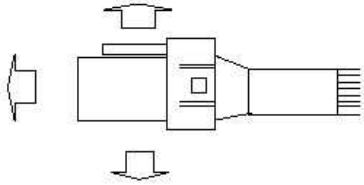
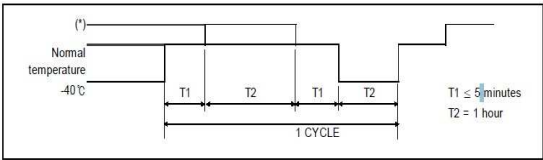
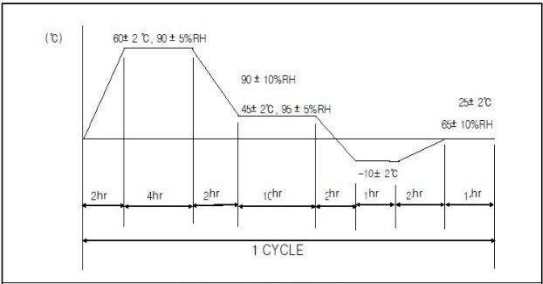
Voltage	Temperature	Humidity
12V DC	25±5°C	60±20%

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT		PROCEDURE												
Appearance	No crack, damage, distortion are permitted		Using sense of sight and touch.												
CONN engage and disengage force	Max 10 kgf and less		Measure force by inserting and disengaging the connector with terminal assembled at constant 50 mm/min speed. However, remove lock part when measuring disengage force.												
Reverse insertion between housings	It shall not be incorrectly inserted by applying force of 20kgf.		Insert the housing with terminal by pushing it in reverse direction with applying 20kgf.												
Engage force between terminal and housing	375: Max 5.0kgf or less		As shown in the following figure 4-1, measure the weight while inserting terminal into fixed housing at 50mm/min speed.  <Figure 4-1>												
Strength of HSG lock	Min 10kgf or less		Combine housing only, fix the one side of housing in completely locked condition, and extend the other side in axial direction and 30 angle direction at a constant speed of 50mm/min. Then measure weight when lock structure is disengaged or destroyed.												
Terminal retention force	Min 14kgf or more		Fix the housing after inserting crimped terminals. Extend one line of cable in axial direction at a speed of 50mm/min at a position 50~100mm away from crimped part, and measure weight when terminal is disengaged from the housing.												
Terminal engage and disengage force (kgf)	Engage	0.5~4.0kgf	As shown in figure 4-3, engage and disengage male terminal or steel gauge into or from female terminal at 50 mm/min speed. 												
	Disengage	0.5~4.0kgf													
Crimp strength (kgf)	8SQ: Min 50kgf or more 10SQ: Min 53kgf or more		Fix the crimped terminal, and draw the cable at a position 50±5 mm away from crimped part in axial direction at 100 mm/min speed. Then measure the weight when cable is cut or disengaged from the crimped part												
Voltage Drop	Max 3mV/A		Measure the circuit voltage drop (V) by sending voltage and current described in the table 5-1 with terminal combined on the connector. Then calculate a voltage drop (VD) in terminal by subtracting cable resistance (L) from the circuit voltage drop (V). 1) HARNESS versus UNIT: $VD = V(L3+L4)$ <table border="1" data-bbox="833 1764 1404 1885"> <thead> <tr> <th>Application</th> <th>Open voltage</th> <th>Short circuit current</th> <th>Division</th> </tr> </thead> <tbody> <tr> <td>Signal circuit</td> <td>20 ± 5 mV</td> <td>10 mA</td> <td>ECU, Sensor</td> </tr> <tr> <td>Power circuit</td> <td>13 V</td> <td>1 A</td> <td>Other than the above</td> </tr> </tbody> </table> <Table5-1>	Application	Open voltage	Short circuit current	Division	Signal circuit	20 ± 5 mV	10 mA	ECU, Sensor	Power circuit	13 V	1 A	Other than the above
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Signal circuit	20 ± 5 mV	10 mA	ECU, Sensor												
Power circuit	13 V	1 A	Other than the above												

Insulation resistance	Min 250 MΩ		<p>Measure resistance between neighbor terminals (figure 5-6), and between terminal and housing surface (figure 5-7) with DC 500V insulation resistance gauge with connector combined.</p>   <p><Figure 5-6: Between neighboring terminals> <Figure 5-7: Between neighboring terminal and housing surface></p>										
	Leakage current	1 μA or less		<p>Measure it by applying DC 14V between neighboring terminals (figure 5-6).</p>  <p><Figure 5-6: Between neighboring terminals></p>									
High voltage test		No allowed insulation breakdown		<p>Measured by applying test potential of 1000 V AC between the adjacent contact between the contact and housing.</p>									
Terminal bending strength	No torn or No crack		<p>Terminal is ready to sample. As Shown in the figure, makes fixed. After applying force on 15sec, expand at least 10 bent portion and scans. The new sample was fixed to rotate 90,180 degrees and then is measured in the same way. According to the thickness of raw material, apply power to the table below.</p>  <table border="1" data-bbox="1096 1081 1429 1228"> <thead> <tr> <th>Terminal Material Thickness(mm)</th> <th>Applied Force</th> </tr> </thead> <tbody> <tr> <td>≤ 0.20</td> <td>0.4kaf</td> </tr> <tr> <td>≤ 0.30</td> <td>1kaf</td> </tr> <tr> <td>≤ 0.40</td> <td>1.5kaf</td> </tr> <tr> <td>≥ 0.40</td> <td>2kaf</td> </tr> </tbody> </table>	Terminal Material Thickness(mm)	Applied Force	≤ 0.20	0.4kaf	≤ 0.30	1kaf	≤ 0.40	1.5kaf	≥ 0.40	2kaf
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Twisting Test - Connector Engage and Disengage Endurance Test	Appearance	No crack, damage, distortion are permitted											
	Voltage Drop	Max 10mV/A											
Over Current Cycle Test	Appearance	No crack, damage, distortion are permitted											
	Voltage Drop	Max 10mV/A											
	Temperature Rise	Max 60°C											
Cold temperature test	Appearance	No crack, damage, distortion are permitted											
	Voltage Drop	Max 10mV/A											
	Insulation	Sealed	Between	<p>Apply 8kgf force on the end part of combined connector 10 times each in the (front, rear, left, right) directions perpendicular to axial direction.</p> <p>Make combine connectors engage and disengage at 100mm/min. Perform it 50 times. (Do not use locking device)</p> <p>Engage and disengage connector with terminal assembled 10 times with hands, and apply the following current 1000 cycles for the connector with electrodes in series at 60 °C of ambient temperature.</p> <p>Engage and disengage connector with terminal assembled 10 times with hands, and leave it in temperature chamber of -40°C for 120 hours. Make connector engaged and disengaged 5 times immediately, and drop it onto the concrete surface from 1m height 3 times in the direction of figure 6-1. (Voltage drop & Temperature rise test perform at normal temperature) :</p>									

	Resistance	CONN'R : Min 100 MΩ	terminals housing surface	 <p><Figure 6-1></p>				
	Current Leakage	Max 100 μA						
	Temperature Rise	Max 60°C						
	Sealing	Min 0.5kgf/cm ²						
Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage Connector with terminal assembled 10 times with hands, this repeats 200 CYCLE by below test condition. (Sealed : 120°C, Non-Seald : 80°C)</p> 				
	Voltage Drop	Max 10mV/A						
	Sealing	Min 0.5kgf/cm ²						
High temperature test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state at the temperature chamber of the table 6-1 for 300 hours. Then pick it out and leave it until it returns to normal temperature.</p> <table border="1" data-bbox="786 915 1341 1031"> <tr> <td>High Temperature</td> <td>Connector Using Part</td> </tr> <tr> <td>120°C</td> <td>Waterproof Connector</td> </tr> </table>	High Temperature	Connector Using Part	120°C	Waterproof Connector
	High Temperature	Connector Using Part						
	120°C	Waterproof Connector						
Voltage Drop	Max 10mV/A							
Sealing	Min 0.5kgf/cm ²							
Temperature Humidity Test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage connector with terminal assembled 10 times with hands, and leave it at 25°C ambient temperature and 65% relative humidity for 25 hours. And perform 5 cycles of the method specified in figure 6-3. Then pick connector out of chamber and dry it for 2 hours or more.</p>  <p>< Figure 6-3 : Test pattern ></p>				
	Voltage Drop	Max 10mV/A						
	Insulation Resistance	Min 100 MΩ	Between terminals housing surface					
	Current Leakage	Max 100 μA						
	Sealing	Min 0.5kgf/cm ²						
Dust Test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage connector with terminal assembled 10 times with hands, and diffuse 1.5kg Portland cement(JIS R5210) with fan (or others) for 10 seconds per 15 minutes while maintaining 150mm distance from wall in the closed container of 900~1200mm length, width and height, with connector combined. After 1 hour, measure it.</p>				
	Voltage Drop	Max 10mV/A						
	Sealing	Min 0.5kgf/cm ²						
Waterproof Test	Appearance	No crack, damage, distortion are permitted		<p>Make combined connectors engaged and disengaged 10 times with hands, and leave it in combined state at 120 °C ambient temperature for 40 minutes and then spray water of normal temperature for 2</p>				
			Between					

	Insulation Resistance	Min 100 MΩ	terminals housing surface	minutes according to S2 of JIS D0203. Repeat 48 cycles of this. * JIS D0203 S2 condition: attach specimen at 400mm distance from the waterproof pipe with water spray hole or water discharge hole and rotate waterproof pipe 23 times per minute around the axis.
	Current Leakage	Max 100 μA		
	Sealing	Min 0.5kgf/cm ²		
Oil and liquid test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and perform test each sample with connector combined. A. Immerse connector in combined state for 2 hours in mixed oil of 50±2°C ENG oil (SAE10W) or equivalent oil and B. Immerse connector in combined state for 1 hour in car gasoline (JIS K2202) at normal temperature, and then pick it out. C. Immerse connector in combined state for 1 hour in brake liquid (pure product) at normal temperature, and then pick it out. D. Immerse connector in combined state for 1 hour in 100% washer liquid (pure product) at normal temperature, and then pick it out. E. Immerse connector in combined state for 1 hour in 50% LLC (Long life coolant) at normal temperature, and then pick it out.
	Voltage Drop	Max 10mV/A		
	Sealing	Min 0.5kgf/cm ²		
Ozone Test	Appearance	No crack, damage, distortion are permitted		Engage and disengage Connector with terminal assembled 10 times with hands, and samples keep at 40°C and 50±5pphm Ozone for 100hour. Then pick connector out of chamber and dry it for 2hours or more.
	Voltage Drop	Max 10mV/A		
	Sealing	Min 0.5kgf/cm ²		
Salt Water Test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and put it in 35°C temperature regulation chamber, spray 5% salty water for 24 hours according to JIS Z2371, and, maintain room temperature without spray for 1 hour, Then repeat this four times. Then pick connector out of chamber and dry it at room temperature for 2 hours or more.
	Voltage Drop	Max 10mV/A		
	Insulation Resistance	Min 100 MΩ	Between terminals housing surface	
	Current Leakage	Max 100 μA		
Sulfur (SO ₂) gas test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and expose it in combined state to sulfur gas of 40±3°C, density 10ppm, humidity 90~95%, for 24 hours. Then pick connector out of chamber and dry it for 2 hours or more.
	Voltage Drop	Max 10mV/A		
	Sealing	Min 0.5kgf/cm ²		
Mechanical shock test	Instant short circuit: Max 10 μs			Engage and disengage Connector with terminal assembled 10 times with hands, and apply 1960, 3920, 5880, 9822 m/s ² shock in each direction of figure 20 and 21 using assembled male and female samples. Perform test in current application condition of DC13V open voltage and 10mA short circuit current.

			<p>HARNESS 200mm or more < Fig. 6-4 > < Fig. 6-5 ></p>																																	
Complex environment endurance test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state in the temperature chamber of 120°C or 80°C (follows table 7) for 48 hours.</p> <p>And then perform the following vibration test. Then measure instant short circuit according to the method of clause 4.16 for 4 hours for X, Y, Z each.</p> <p>1) Sin Wave Test</p> <table border="1"> <thead> <tr> <th>Division</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>Ambient temperature/humidity</td> <td>Refer to figure 4-8, 90~95%</td> </tr> <tr> <td>Applied current</td> <td>Basic current (Connector electrodes in series.)</td> </tr> <tr> <td>Current application cycle</td> <td>120 CYCLE (45 minutes-ON, 15 minutes-OFF)</td> </tr> <tr> <td>Vibration acceleration</td> <td>Follow figure 6-7</td> </tr> <tr> <td>Frequency</td> <td>20Hz ~ 200Hz (sweep time: 3 minutes or less)</td> </tr> <tr> <td>Vibration time</td> <td>40 hours for X, Y, Z each</td> </tr> <tr> <td>Connector attaching method</td> <td>Test mode A, B, C</td> </tr> </tbody> </table> <p>2) Random Wave Test</p> <table border="1"> <thead> <tr> <th>Division</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>Ambient temperature/humidity</td> <td>Refer to figure 4-8, 90~95%</td> </tr> <tr> <td>Applied current</td> <td>Basic current (Connector electrodes in series.)</td> </tr> <tr> <td>Current application cycle</td> <td>24 CYCLE (45 minutes-ON, 15 minutes-OFF)</td> </tr> <tr> <td>Vibration acceleration</td> <td>Follow figure 6-8</td> </tr> <tr> <td>Frequency</td> <td>20Hz ~ 200Hz (sweep time: 3 minutes or less)</td> </tr> <tr> <td>Vibration time</td> <td>8 hours for X, Y, Z each</td> </tr> <tr> <td>Connector attaching method</td> <td>Test mode D, E, F</td> </tr> </tbody> </table>	Division	Condition	Ambient temperature/humidity	Refer to figure 4-8, 90~95%	Applied current	Basic current (Connector electrodes in series.)	Current application cycle	120 CYCLE (45 minutes-ON, 15 minutes-OFF)	Vibration acceleration	Follow figure 6-7	Frequency	20Hz ~ 200Hz (sweep time: 3 minutes or less)	Vibration time	40 hours for X, Y, Z each	Connector attaching method	Test mode A, B, C	Division	Condition	Ambient temperature/humidity	Refer to figure 4-8, 90~95%	Applied current	Basic current (Connector electrodes in series.)	Current application cycle	24 CYCLE (45 minutes-ON, 15 minutes-OFF)	Vibration acceleration	Follow figure 6-8	Frequency	20Hz ~ 200Hz (sweep time: 3 minutes or less)	Vibration time	8 hours for X, Y, Z each	Connector attaching method	Test mode D, E, F
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Temperature Rise	Max 60°C																																			
Instant short circuit	Max 10 μ s																																			

	Sealing	Min 0.5kgf/cm ²	<table border="1" data-bbox="1133 289 1315 388"> <thead> <tr> <th>Breakpoint (Hz)</th> <th>Magnitude (G²/Hz)</th> </tr> </thead> <tbody> <tr> <td>60.0</td> <td>0.00100</td> </tr> <tr> <td>200.0</td> <td>1.50000</td> </tr> <tr> <td>210.0</td> <td>0.10000</td> </tr> <tr> <td>1000.0</td> <td>0.10000</td> </tr> </tbody> </table>	Breakpoint (Hz)	Magnitude (G ² /Hz)	60.0	0.00100	200.0	1.50000	210.0	0.10000	1000.0	0.10000
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60.0	0.00100												
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3.4. Applied Part No List

TE Part no	Description
2005307-2	MCP 9.5 5P SLD PLUG ASSY