



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 details.

MCP 9.5 3P SEALD PLUG ASSEMBLY FOR EOP

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of MCP 9.5 3P Sealed Plug Assembly for EOP

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

- 114-61114: INTERFACE DRAWING FOR MCP 9.5MM 3P PLUG
- 2005301: Customer Drawing (MCP 9.5 3P PLUG ASSEMBLY FOR EOP)

3. REQUIREMENTS

3.1. Design and Construction

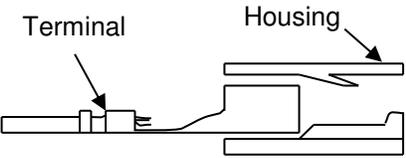
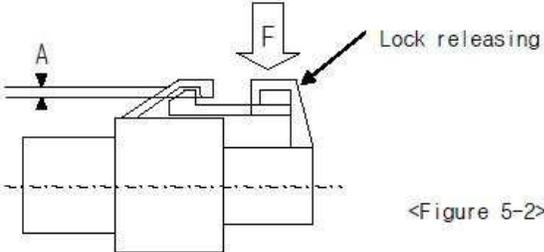
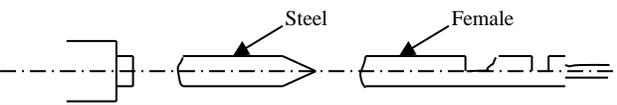
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

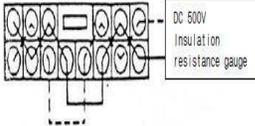
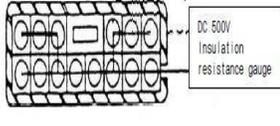
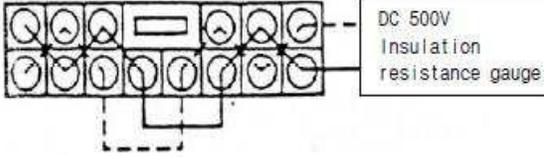
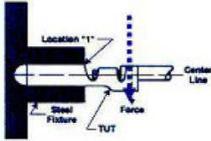
3.2. Ratings

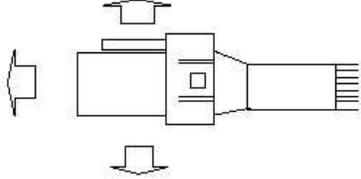
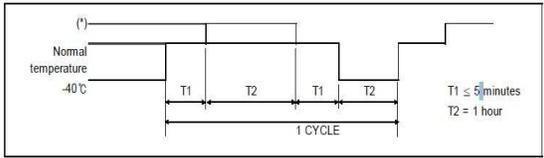
Voltage	Temperature	Humidity
12V DC	25±5°C	60±20%

3.3. Test Requirements and Procedures Summary

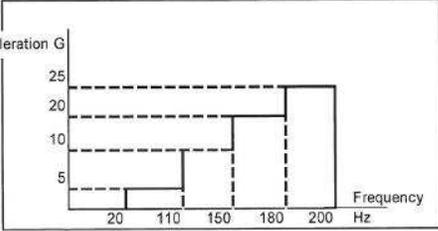
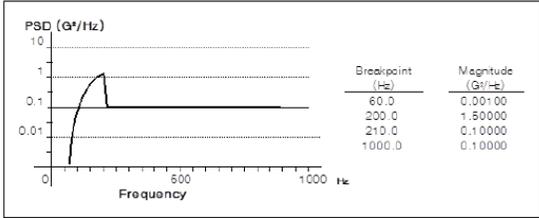
Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

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		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.
HSG lock releasing force	Max 6kgf		Apply force (F) to lock releasing part, and measure weight on the point of A=0. However, cut connector and then perform test at the section in order to secure visibility.  <Figure 5-2>
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)	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

<p>Voltage Drop</p>	<p>Max 3mV/A</p>		<p>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).</p> <p>1)HARNESS versus UNIT:VD =V(L3+L4)</p> <table border="1" data-bbox="834 415 1409 537"> <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> <p><Table5-1></p>	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
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												
<p>Insulation resistance</p>	<p>Min 250 MΩ</p>		<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>												
<p>Leakage current</p>	<p>1 μA or less</p>		<p>Measure it by applying DC 14V between neighboring terminals (figure 5-6).</p>  <p><Figure 5-6: Between neighboring terminals></p>												
<p>High voltage test</p>	<p>No allowed Insulation breakdown</p>		<p>Measured by applying test potential of 1000 V AC between the adjacent contact between the contact and housing.</p>												
<p>Terminal bending strength</p>	<p>No torn or No crack</p>		<p>Terminal is ready to sample. As Shown in the figure, makes fixed. After applying force on 15sec, expand at least 10bent 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="1094 1472 1430 1612"> <thead> <tr> <th>Terminal Material Thickness(mm)</th> <th>Applied Force</th> </tr> </thead> <tbody> <tr> <td>≤ 0.20</td> <td>0.4kgf</td> </tr> <tr> <td>≤ 0.30</td> <td>1kgf</td> </tr> <tr> <td>≤ 0.40</td> <td>1.5kgf</td> </tr> <tr> <td>≥ 0.40</td> <td>2kgf</td> </tr> </tbody> </table>	Terminal Material Thickness(mm)	Applied Force	≤ 0.20	0.4kgf	≤ 0.30	1kgf	≤ 0.40	1.5kgf	≥ 0.40	2kgf		
Terminal Material Thickness(mm)	Applied Force														
≤ 0.20	0.4kgf														
≤ 0.30	1kgf														
≤ 0.40	1.5kgf														
≥ 0.40	2kgf														
<p>Twisting Test - Connector Engage and Disengage Endurance Test</p>	<p>Appearance</p>	<p>No crack, damage, distortion are permitted</p>	<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>Voltage Drop</p>	<p>Max 10mV/A</p>	<p>Make combine connectors engage and disengage at 100mm/min. Perform it 50 times. (Do not use locking device)</p>												
	<p>Appearance</p>	<p>No crack, damage, distortion are</p>	<p>Engage and disengage connector with terminal assembled 10 times with hands, and apply the following current 1000 cycles</p>												

Over Current Cycle Test		permitted		for the connector with electrodes in series at 60 °C of ambient temperature.			
	Voltage Drop	Max 10mV/A					
	Temperature Rise	Max 60°C					
Cold temperature test	Appearance	No crack, damage, distortion are permitted		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) :			
	Voltage Drop	Max 10mV/A					
	Insulation Resistance	Sealed CONN'R : Min 100 MΩ	Between terminals		housing surface		
	Current Leakage	Max 100 μA					
	Temperature Rise	Max 60°C					
	Sealing	Min 0.5kgf/cm ²					
		 <p><Figure 6-1></p>					
Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted		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)			
	Voltage Drop	Max 10mV/A					
	Sealing	Min 0.5kgf/cm ²					
							
High temperature test	Appearance	No crack, damage, distortion are permitted		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.			
	Voltage Drop	Max 10mV/A					
	Sealing	Min 0.5kgf/cm ²					
		<table border="1" data-bbox="787 1312 1339 1417"> <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						
Temperature Humidity Test	Appearance	No crack, damage, distortion are permitted		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.			
	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					

			<p style="text-align: center;">< Figure 6-3 : Test pattern ></p>	
Dust Test	Appearance	No crack, damage, distortion are permitted		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.
	Voltage Drop	Max 10mV/A		
	Sealing	Min 0.5kgf/cm ²		
Waterproof Test	Appearance	No crack, damage, distortion are permitted		Make combined connectors engaged and disengaged 10 times by hands, and leave it in combined state at 120 °C ambient temperature for 40 minutes and then spray water of normal temperature for 2 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.
	Insulation Resistance	Min 100 MΩ	Between terminals	
			housing surface	
	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

Temperature Rise	Max 60°C (Base Current: 48.5A)																	
Instant short circuit	Max 10 μ S	<p>2) Random Wave Test</p> <table border="1" data-bbox="786 493 1450 919"> <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	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
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																	
Sealing	Min 0.5kgf/cm ²	 <table border="1" data-bbox="1133 1035 1312 1129"> <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						
Breakpoint (Hz)	Magnitude (G ² /Hz)																	
60.0	0.00100																	
200.0	1.50000																	
210.0	0.10000																	
1000.0	0.10000																	

3.4. Applied Part No List

TE Part no	Description
2005301-2	MCP 9.5 3P SLD PLUG ASSY FOR EOP