



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.

MIXED TIMER 32P PLUG ASSEMBLY

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of MIXED TIMER 32P 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

- 2005333: Customer Drawing (MIXED TIMER 32P PLUG ASSEMBLY)

3. REQUIREMENTS

3.1. Design and Construction

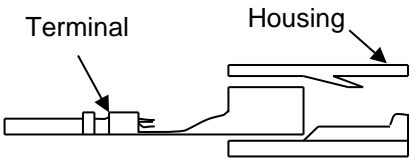
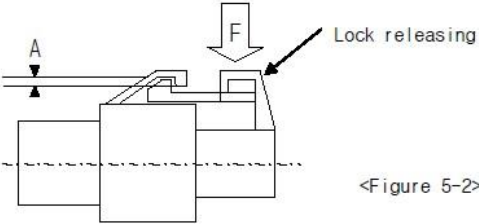
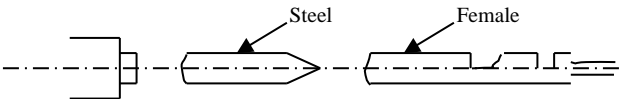
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

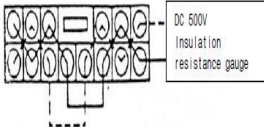
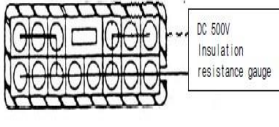
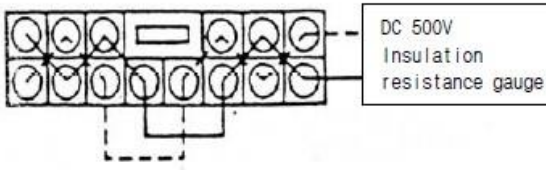
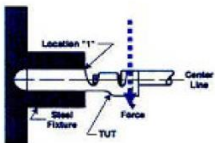
3.2. Ratings

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

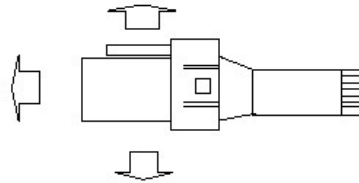
3.3. Test Requirements and Procedures Summary

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

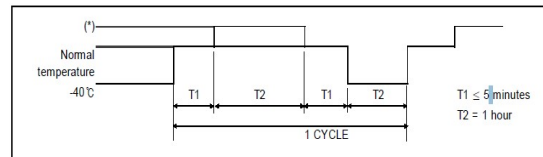
TEST DESCRIPTION	REQUIREMENT		PROCEDURE
Appearance	No crack, damage, distortion are permitted		Using sense of sight and touch.
CONN engage and disengage force	Max 7.6 kgf and less		Measure force by inserting and disengaging the connector with terminal assembled at constant 50 mm/min speed. However, remove 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.
Reverse insertion between terminal and housings	Min 5 kgf		Applicated the maximum size wire onto the terminal and insert it by applying a 5 kgf force or hand reversely to the housing.
Engage force between terminal and housing	Max 1.5kgf		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		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	030~060: Min 8kgf 070~312: Min 10kgf		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	040~060: 0.2~0.8kgf 250: 0.5~2.0kgf	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	040~060: 0.15~0.8kgf 250: 0.5~2.1kgf	

Crimp strength (kgf)	Apply ES91101-00.		Apply ES91101-00.												
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="834 527 1408 653"> <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 100 MΩ		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.   <Figure 5-6: Between neighboring terminals> <Figure 5-7: Between neighboring terminal and housing surface>												
Leakage current	Max 10 μA		Measure it by applying DC 14V between neighboring terminals (figure 5-6).  <Figure 5-6: Between neighboring terminals>												
High voltage test	No allowed Insulation breakdown		Measured by applying test potential of 1000 V AC between the adjacent contact between the contact and housing.												
Terminal bending strength	No torn or No crack		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. Accroding to the thickness of raw material, apply power to the table below.  <table border="1" data-bbox="1092 1581 1427 1728"> <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	Appearance	No crack, damage, distortion are permitted	Apply 8kgf force on the end part of combined connector 10 times each in the (front, rear, left, right) directions perpendicular to axial direction.												
	Voltage Drop	Max 10mV/A													

Connector Engage and Disengage Endurance Test	Appearance	No crack, damage, distortion are permitted		Make combine connectors engage and disengage at 100mm/min. Perform it 50 times. (Do not use locking device)	
	Voltage Drop	Max 10mV/A			
Over Current Cycle Test	Appearance	No crack, damage, distortion are permitted		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.	
	Voltage Drop	Max 10mV/A			
	Temperature Rise	Max 40°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	Min 100 MΩ	Between terminals		
			housing surface		
	Current Leakage	Max 1 μA			
Temperature Rise	Max 40°C				
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. (ENG ROOM : 120°C, ENG ROOM except : 80°C)	
	Voltage Drop	Max 10mV/A			
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			
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					



<Figure 6-1>



High Temperature	Connector Using Part
80°C	Unseal Connector

	Current Leakage	Max 1 μ A	<p style="text-align: center; font-size: small;">< 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		
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 M Ω		Between terminals housing surface
	Current Leakage	Max 1 μ A		
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 \pm 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		
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 \pm 5pphm Ozone for 100hour. Then pick connector out of chamber and dry it for 2hours or more.	
	Voltage Drop	Max 10mV/A		
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 \pm 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		

Mechanical shock test	Instant short circuit	Max 10 μ S	Apply 1960, 3920, 5880, 9822m/s ² shock in each direction assembled male and female samples. Perform test in current application condition of DC13V open voltage and 10mA short circuit current.																																
Complex environment endurance 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 in the temperature chamber of 120°C or 80°C (follows table 7) for 48 hours.																																
	Crimp Tensile Strength	Apply ES91101-00.	<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" data-bbox="786 590 1450 1016"> <thead> <tr> <th>Division</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>Ambient temperature/humidity</td> <td>Refer to figure 5-8, 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>4.4</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> <div data-bbox="789 1031 1089 1184"> <table border="1" data-bbox="1110 1031 1338 1184"> <thead> <tr> <th>Duration Min</th> <th>Temperature °C</th> </tr> </thead> <tbody> <tr><td>0</td><td>20</td></tr> <tr><td>60</td><td>-40</td></tr> <tr><td>150</td><td>-40</td></tr> <tr><td>210</td><td>20</td></tr> <tr><td>300</td><td>T_{max}*</td></tr> <tr><td>410</td><td>T_{max}*</td></tr> <tr><td>480</td><td>20</td></tr> </tbody> </table> </div> <p><Figure 5-8></p>	Division	Condition	Ambient temperature/humidity	Refer to figure 5-8, 90~95%	Applied current	Basic current (Connector electrodes in series.)	Current application cycle	120 CYCLE (45 minutes-ON, 15 minutes-OFF)	Vibration acceleration	4.4	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	Duration Min	Temperature °C	0	20	60	-40	150	-40	210	20	300	T _{max} *	410	T _{max} *	480	20
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Instant short circuit	Max 10 μ S	<div data-bbox="789 1717 1182 1871"> <table border="1" data-bbox="1045 1759 1170 1829"> <thead> <tr> <th>Greenpoint (dB)</th> <th>Magnitude (G²/Hz)</th> </tr> </thead> <tbody> <tr><td>60.0</td><td>0.00100</td></tr> <tr><td>20.0</td><td>1.50000</td></tr> <tr><td>21.0</td><td>0.10000</td></tr> <tr><td>100.0</td><td>0.10000</td></tr> </tbody> </table> </div> <p><Figure 6-8></p>	Greenpoint (dB)	Magnitude (G ² /Hz)	60.0	0.00100	20.0	1.50000	21.0	0.10000	100.0	0.10000																							
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3.4. Applied Part No List

TE Part no	Description
2005333-2	MIXED TIMER 32P PLUG ASSEMBLY
2005333-3	MIXED TIMER 32P PLUG ASSEMBLY