



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.

SPT SLD 3P PLUG ASSEMBLY

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of SPT SLD 3P 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

- 1743271: Customer Drawing (SPT SLD 3P PLUG ASSY)

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

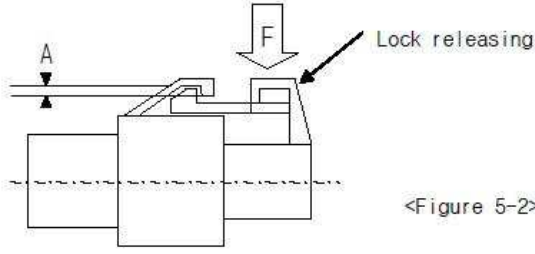
| | | |
|---------|-------------|----------|
| Voltage | Temperature | Humidity |
| 12V DC | 25±5°C | 60±20% |

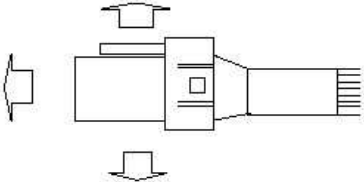
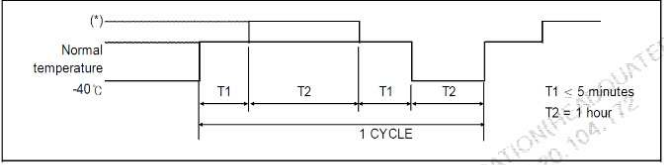
3.3. Test Requirements and Procedures Summary

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

3.3.1 ES91500-00

| TEST DESCRIPTION | REQUIREMENT | PROCEDURE |
|---------------------------------|--|---|
| Appearance | No crack, damage, distortion are permitted | Using sense of sight and touch. |
| CONN engage and disengage force | Min 10kgf | 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 | Max 1.5kgf | Measure the weight while inserting terminal into fixed housing at 50mm/min speed. | | | | | | | | | | | | |
| 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.  <p style="text-align: right;"><Figure 5-2></p> | | | | | | | | | | | | |
| Terminal retention force | 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. | | | | | | | | | | | | |
| Engage and disengage force of terminal | Engage: 0.5~2.0kgf Disengage: 0.5~2.1kgf | Engage and disengage male terminal or steel gauge into or from female terminal at 50mm/min speed. | | | | | | | | | | | | |
| Crimp strength | 2.0SQ: Min 20kgf 3.0SQ: Min 35kgf | Fix the crimped terminal and draw the cable at a position 50~100mm away from crimped part in axial direction at 100mm/min speed. Then measure the weight when cable is cut or disengage from the crimped part. | | | | | | | | | | | | |
| Voltage Drop | 090~375series: Max 3mV/A | Measure the circuit voltage drop (V) by sending voltage and current described in the table -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). <table border="1" data-bbox="792 1549 1365 1675"> <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 style="text-align: center;"><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 | | | | | | | | | | | |
| Insulation resistance | Min 250 MΩ | Measure resistance between neighbor terminals and between terminal and housing surface with DC 500V insulation resistance gauge with connector combined. | | | | | | | | | | | | |
| Leakage current | Max 1 μA | Measure it by applying DC 14V between neighboring terminals. | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|------------------------------------|--|--|---------------------------------|-----------------------|--------------------------|--------------------------|--------------------------------|---------------------------------|-----------------|--------------------------|---------------------------|------------------------------------|
| High voltage test | There shall be no insulation break | | Apply AC 1000V voltage of normal frequency 1 minute between neighboring terminals, and between housing surfaces of terminal, with connector combined. | | | | | | | | | | |
| 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 | | | | | | | | | | | |
| Overcurrent cycle test | Appearance | No crack, damage, distortion are permitted | | | | | | | | | | | |
| | Voltage Drop | Max 10mV/A | Condition A | | | | | | | | | | |
| | | | Condition B | | | | | | | | | | |
| | Temperature Rise | Max 40 °C | Condition A | | | | | | | | | | |
| Condition B | | | | | | | | | | | | | |
| | | | <table border="1"> <tr> <td rowspan="2">Current application condition A</td> <td>Applied current</td> <td>2 times of basic current</td> </tr> <tr> <td>Current application time</td> <td>1 minute - ON, 9 minutes - OFF</td> </tr> <tr> <td rowspan="2">Current application condition B</td> <td>Applied current</td> <td>5 times of basic current</td> </tr> <tr> <td>Current application time</td> <td>10 seconds - ON, 590 seconds - OFF</td> </tr> </table> | Current application condition A | Applied current | 2 times of basic current | Current application time | 1 minute - ON, 9 minutes - OFF | Current application condition B | Applied current | 5 times of basic current | Current application time | 10 seconds - ON, 590 seconds - OFF |
| Current application condition A | Applied current | 2 times of basic current | | | | | | | | | | | |
| | Current application time | 1 minute - ON, 9 minutes - OFF | | | | | | | | | | | |
| Current application condition B | Applied current | 5 times of basic current | | | | | | | | | | | |
| | Current application time | 10 seconds - ON, 590 seconds - OFF | | | | | | | | | | | |
| Cold 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 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>  <p style="text-align: right;"><Figure 6-1></p> | | | | | | | | | | |
| | Voltage Drop | Max 10mV/A | | | | | | | | | | | |
| | Insulation Resistance | Min 250MΩ | | | | | | | | | | | |
| | Leakage current | Max 100 μA | | | | | | | | | | | |
| | Temperature Rise | Max 40°C | | | | | | | | | | | |
| | Sealing | Min 0.5kg/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, and leave it in combined state at -40 °C for 2 hours, and perform 200 cycles according of the method specified in the figure 6-2. Then leave it at room temperature for 2 hours or more ((*) follows table 6-1)</p>  <p style="text-align: center;">< Figure 6- 2 : Test pattern ></p> <table border="1"> <tr> <td>Division</td> <td>High temperature (*)</td> <td>Connector using part</td> </tr> <tr> <td>A</td> <td>120 °C</td> <td>waterproof connector</td> </tr> <tr> <td>B</td> <td>80 °C</td> <td>Non- waterproof connector</td> </tr> </table> <p style="text-align: center;">< Table 6- 1 ></p> | Division | High temperature (*) | Connector using part | A | 120 °C | waterproof connector | B | 80 °C | Non- waterproof connector | |
| | Division | High temperature (*) | | Connector using part | | | | | | | | | |
| | A | 120 °C | | waterproof connector | | | | | | | | | |
| B | 80 °C | Non- waterproof connector | | | | | | | | | | | |
| Voltage Drop | Max 10mV/A | | | | | | | | | | | | |
| Sealing | Min 0.5kg/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 0.5kg/cm ² | | | | | | | | | | |
| | | | <table border="1"> <thead> <tr> <th>Division</th> <th>High temperature (*)</th> <th>Connector using part</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>120℃</td> <td>waterproof connector</td> </tr> <tr> <td>B</td> <td>80℃</td> <td>Non- waterproof connector</td> </tr> </tbody> </table> <p style="text-align: center;">< Table 6-1 ></p> | Division | High temperature (*) | Connector using part | A | 120℃ | waterproof connector | B | 80℃ | Non- waterproof connector |
| Division | High temperature (*) | Connector using part | | | | | | | | | | |
| A | 120℃ | waterproof connector | | | | | | | | | | |
| B | 80℃ | Non- 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℃ 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 250MΩ | | | | | | | | | | |
| | Leakage current | Max 100 μA | | | | | | | | | | |
| | Sealing | Min 0.5kg/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, Engage and disengage connector with terminal assembled 3 times with hands. And measure it. | | | | | | | | | |
| | Voltage Drop | Max 10mV/A | | | | | | | | | | |
| | Sealing | Min 0.5kg/cm ² | | | | | | | | | | |
| Waterproof 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 120℃ ambient temperature for 40 minutes and then spray water of normal temperature for 20 minutes according to S2 of JIS D0203. Repeat 48 cycles of this. | | | | | | | | | |
| | Insulation Resistance | Min 250MΩ | | | | | | | | | | |
| | Current Leakage | Max 100 μA | | | | | | | | | | |
| | Sealing | Min 0.5kg/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℃ 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 0.5kg/cm ² | | | | | | | | | | |

| Ozone 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 ozone of 40°C 50±5pphm for 100 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 | | | | | | | | | | |
| 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 hours. Then repeat this four times. Then pick connector out of chamber and dry it for 2 hours or more. | | | | | | | | | |
| | Voltage Drop | Max 10mV/A | | | | | | | | | | |
| | Insulation Resistance | Min 250MΩ | | | | | | | | | | |
| | 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 | | | | | | | | | | |
| 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 80°C for 48 hours. And then perform the following vibration test. Then measure instant short circuit according to the method of below for X, Y, Z each</p> <p>test Mode A test Mode B test Mode C</p> <p>test Mode D test Mode E test Mode F</p> <p>■ Vibration test A (for waterproof connector)</p> <table border="1"> <thead> <tr> <th>Division</th> <th>Sine wave test</th> <th>Random wave test</th> </tr> </thead> <tbody> <tr> <td>Ambient temperature/humidity</td> <td>120°C</td> <td>120°C</td> </tr> <tr> <td>Applied current</td> <td>Basic current</td> <td>Basic current</td> </tr> </tbody> </table> | Division | Sine wave test | Random wave test | Ambient temperature/humidity | 120°C | 120°C | Applied current | Basic current | Basic current |
| | Division | Sine wave test | | Random wave test | | | | | | | | |
| | Ambient temperature/humidity | 120°C | | 120°C | | | | | | | | |
| Applied current | Basic current | Basic current | | | | | | | | | | |
| Crimp Tensile Strength | 0.5SQ: Min 9kgf 0.85SQ: Min 13kgf | | | | | | | | | | | |
| Voltage Drop | Max 10mV/A | | | | | | | | | | | |

| | Temperature Rise | General Connector Max 40°C | Current application cycle | 120 CYCLE 45 minutes-ON 15 minutes-OFF | 24 CYCLE 45 minutes-ON 15 minutes-OFF | | | | | | | | | | |
|-----------------|--------------------------------|-------------------------------|---|---|---|-----------------|--------------------------------|------|---------|-------|---------|-------|---------|--------|---------|
| | | | Vibration acceleration | Refer Figure 6-9 | Refer Figure 6-10 | | | | | | | | | | |
| | | | Frequency | 20Hz ~ 200Hz (sweep time: 3 minutes or less) | Refer Figure 6-10 | | | | | | | | | | |
| | | | Vibration time | 40 hours for X, Y, Z each | 8 hours for X, Y, Z each | | | | | | | | | | |
| | | | Connector attaching method | Test mode A, B, C | Test mode D, E, F | | | | | | | | | | |
| | Instant Short Circuit | Max 10 μ s | | | | | | | | | | | | | |
| | Sealing | Min 0.5kgf/cm ² | <table border="1"> <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 |
|-------------|----------------------|
| 1743271-2/3 | SPT SLD 3P PLUG ASSY |