
2X9 Sealed GET Market Plug Assembly

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the Tyco Electronics 2X9 Sealed Global Electronic Technology (GET) Market Plug Assembly. This plug assembly is designed to use the 0.64 mm GET terminal with tin or gold plating and 22 to 18 AWG (1.19 to 2.06 mm maximum insulation OD) stranded wire.

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 was completed. The Qualification Test Report number for this testing is 501-643. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. 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. Tyco Electronics Documents

- 114-13060: Application Specification (GET 0.64 mm Pin and Socket Contacts for GET Market Connectors)
- 114-13150: Application Specification (GET Sealed Market Plug Connector Assembly)
- 501-643: Qualification Test Report (2X9 Sealed GET Market Plug Assembly)

2.2. Industry Standards

USCAR-2, Revision 4: Performance Standard for Automotive Electrical Connector Systems

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

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Voltage/current: 22 AWG wire 6.5 amperes at 12 volts DC, 18 AWG wire 8.2 amperes at 12 volts DC
- Temperature: -40 to 85°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure |
|--|--|--|
| Initial examination of product. | Meets requirements of product drawing. | USCAR-2, Rev 4, 5.1.8. Visual inspection. |
| Final examination of product. | Meets requirements of product drawing. | USCAR-2, Rev 4, 5.1.8. Visual inspection. |
| MECHANICAL | | |
| Terminal/connector insertion force. | Terminal insertion force < 15 N. Terminal push through force ≥ 50 N. | USCAR-2, Rev 4, 5.4.1. Measure force necessary to push the terminal into the connector at a maximum rate of 50 mm per minute. At forward stop, continue applying the force until a minimum force of 50 N is reached or the wire buckles. |
| Terminal/connector extraction force. | Terminal extraction without TPA > 30 N. Terminal extraction with TPA > 75 N. Terminal extraction with TPA after moisture conditioning > 75 N. | USCAR-2, Rev 4, 5.4.1. Measure the force required to extract the terminal from the connector using the primary lock and using the primary and secondary lock. |
| Connector/connector mating/unmating force. | Connector mating force ≤ 75 N. Connector unmating force with primary lock ≥ 110 N. Connector unmating force without primary lock ≤ 75 N. Primary latch disengaging force > 10 N and ≤ 70 N. | USCAR-2, Rev 4, 5.4.2. Non-mechanical assist connectors. |
| Polarization feature effectiveness. | Mismating force > 220 N. | USCAR-2, Rev 4, 5.4.4. Mating a connector with incorrect mate. Mating a correct connector with the correct mate improperly oriented. |

Figure 1 (continued)

| Test Description | Requirement | Procedure |
|---|---|---|
| Miscellaneous component engage/disengage force. | Insertion: preset to full engage 60 N maximum with terminals, 15 N minimum without terminals. Extraction: Full engage to preset 60 N maximum, 18 N minimum after initial removal. Preset to removal 25 N minimum. | USCAR-2, Rev 4, 5.4.4. SDS EL-0036. Measure and record forces needed to insert and extract TPA. |
| Connector/connector audible click. | 7 dB above recorded ambient for unconditioned parts, 5 dB above recorded ambient for moisture conditioned parts. | USCAR-2, Rev 4, 5.4.7, SDS EL-0017. Measure and record ambient sound. Measure and record noise level of connector latch engaging. Moisture condition parts to 95 to 98% RH at 40°C for 6 hours and then measure and record noise level of connector latch engaging. |

ELECTRICAL

| | | |
|-------------------------------|--|---|
| Vibration/mechanical shock. | Dry circuit resistance 20 milliohms maximum. Continuity monitoring. Voltage drop 20 milliohms maximum. | USCAR-2, Rev 4, 5.4.6. Subject specimens to random motion for components not coupled to engine for 8 hours in each of 3 mutually perpendicular planes. |
| Thermal shock. | Dry circuit resistance 20 milliohms maximum. Continuity monitoring. Voltage drop 20 milliohms maximum. | USCAR-2, Rev 4, 5.6.1. Subject specimens to the profile shown in Figure 3 for 100 cycles. |
| Temperature/humidity cycling. | Dry circuit resistance 20 milliohms maximum. Voltage drop 20 milliohms maximum. Isolation resistance 20 milliohms at 500 volts DC. | USCAR-2, Rev 4, 5.6.2. Subject specimens to the profile shown in Figure 4 for 40 cycles at 85°C. |
| High temperature exposure. | Dry circuit resistance 20 milliohms maximum. Voltage drop 20 milliohms maximum. | USCAR-2, Rev 4, 5.6.3. Subject specimens to 85°C for 1008 hours with no restriction of air flow around the specimens. |

Figure 1 (continued)

| Test Description | Requirement | Procedure |
|--|--|--|
| ENVIRONMENTAL | | |
| Fluid resistance. | Fluids tested: engine oil at 50°C, engine coolant at 100°C, grease at 25°C, calcium chloride at 25°C, Armor All at 25°C, car wash soap at 25°C, windshield washer fluid at 25°C and kerosene at 25°C. | USCAR-2, Rev 4, 5.6.4. Fluid resistance for sealed connectors to various fluids found in and around vehicles. Specimens submerged for 30 minutes at temperature and then allowed to set at ambient for 7 days prior to isolation resistance and visuals. |
| High temperature exposure with submersion. | Dry circuit resistance 20 milliohms maximum. Voltage drop 20 milliohms maximum. Isolation resistance 20 milliohms at 500 volts DC. No trace of fluid ingress. | USCAR-2, Rev 4, 5.6.3 and 5.6.5. Long term exposure to maximum class temperature for 1008 hours followed by submersion in salt water solution for 30 minutes. |
| High temperature exposure with pressure/vacuum. | Dry circuit resistance 20 milliohms maximum. Voltage drop 20 milliohms maximum. Isolation resistance 20 milliohms at 500 volts DC. No visible bubbles from specimens (pressure). No trace of fluid ingress (vacuum). | USCAR-2, Rev 4, 5.6.3 and 5.6.6. Long term exposure to maximum class temperature for 1008 hours followed by pressure/vacuum test in salt water solution. |
| Temperature/humidity cycling with submersion. | Dry circuit resistance 20 milliohms maximum. Voltage drop 20 milliohms maximum. Isolation resistance 20 milliohms at 500 volts DC. No trace of fluid ingress. | USCAR-2, Rev 4, 5.6.2 and 5.6.5. Exposure to temperature and humidity variations for 320 hours followed by submersion in salt water solution for 30 minutes. |
| Temperature/humidity cycling with pressure/vacuum. | Dry circuit resistance 20 milliohms maximum. Voltage drop 20 milliohms maximum. Isolation resistance 20 milliohms at 500 volts DC. No visible bubbles from specimens (pressure). No trace of fluid ingress (vacuum). | USCAR-2, Rev 4, 5.6.2 and 5.6.5. Exposure to temperature and humidity variations for 320 hours followed by pressure/vacuum testing in salt water solution. |

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

| Test or Examination | Test Group (a) | | | | |
|--|-------------------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 |
| | Test Sequence (b) | | | | |
| MECHANICAL | | | | | |
| Initial examination of product | 1 | 1 | 1 | 1 | 1 |
| Terminal/connector insertion/extraction force | 2 | | | | |
| Connector/connector mating/unmating force | | 2 | | | |
| Polarization feature effectiveness | | | 2 | | |
| Miscellaneous component engage/disengage force | | | | 2 | |
| Connector/connector audible click | | | | | 2 |
| Final examination of product | 3 | 3 | 3 | 3 | 3 |
| ELECTRICAL | | | | | |
| Initial examination of product | 1 | 1 | 1 | 1 | |
| Connector cycling | 2 | 2 | 2 | 2 | |
| Circuit continuity monitoring | 4 | 4 | | | |
| Dry circuit resistance | 3,5 | 3,5 | 3,5 | 3,5 | |
| Voltage drop resistance | 6 | 6 | 6 | 6 | |
| Isolation resistance | | | 7 | | |
| Vibration/mechanical shock | 4 | | | | |
| Thermal shock | | 4 | | | |
| Temperature/humidity cycling | | | 4 | | |
| High temperature exposure | | | | 4 | |
| Final examination of product | 7 | 7 | 8 | 7 | |
| ENVIRONMENTAL | | | | | |
| Initial examination of product | 1 | 1 | 1 | 1 | 1 |
| Connector cycling | | 2 | 2 | 2 | 2 |
| Isolation resistance | 2,4 | 3,5,7 | 3,5,7 | 3,5,7 | 3,5,7 |
| Fluid resistance | 3 | | | | |
| High temperature exposure | | | | 4 | 4 |
| Temperature/humidity cycling | | 4 | 4 | | |
| Submersion | | 6 | | 6 | |
| Pressure/vacuum | | | 6 | | 6 |
| Final examination of product | 5 | 8 | 8 | 8 | 8 |

NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Prior to testing, specimens shall meet the requirements of the product drawing and Application Specification 114-13150. All test groups shall consist of specimen sizes as required by the individual test requirement.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

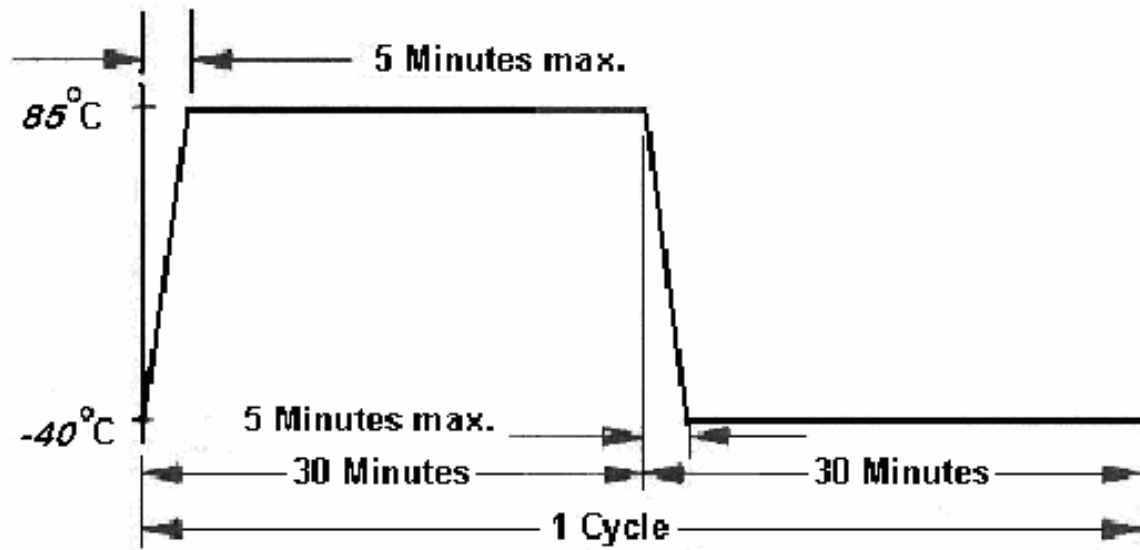
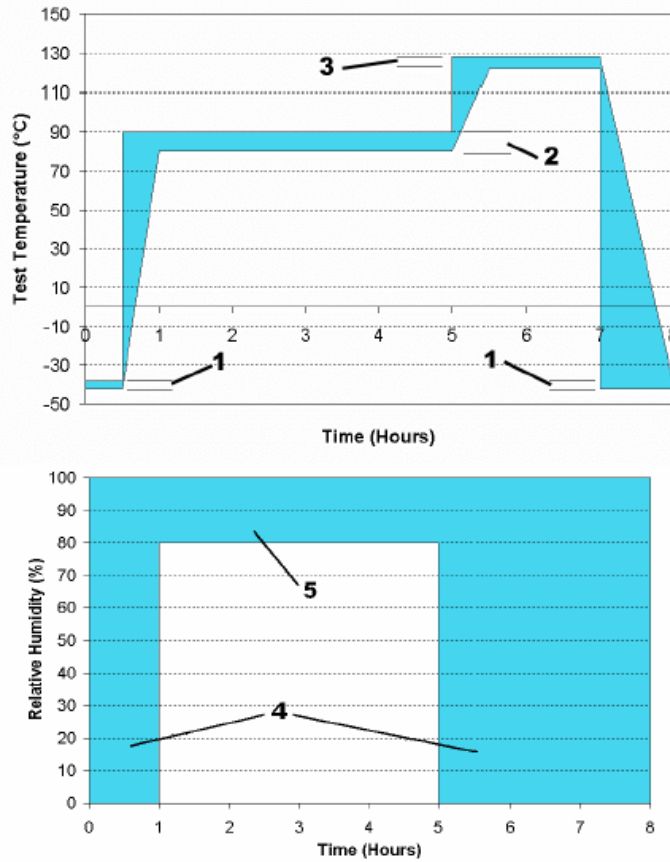


Figure 3
Thermal Shock Profile



Key:

- 1 (-40)°C
- 2 (80 – 90)°C
- 3 Test temperature, see Figure 5.1.4 (Class 3 shown for illustration only)
- 4 Relative humidity, uncontrolled. Do not vent chamber at hour 5
- 5 (80 – 100)% Relative humidity

Figure 4
Temperature/Humidity Cycling Profile