
Multi-Beam XLE Power Distribution Connector System**1. SCOPE**

1.1. Content

This specification covers performance, tests and quality requirements for the Tyco Electronics Multi-Beam XLE Power Distribution Connector System.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 3 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

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

- 114-13251: Application Specification
- 109 Series: Test Specifications as indicated in Figure 3
- 109-197: Test Specification (Tyco Electronics Test Specifications vs EIA and IEC Test Methods)
- 501-115016: Qualification Test Report (Multi-Beam XLE Power Distribution Connector System)

2.2. Industry Standard

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

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: See Figure 1
- Current: See Figure 2,3 and Engineering report for full test PCB details and further current test results
- Temperature: -40 to 125°C

| Contact Type | Contact Pitch | Within Primary Circuits | Primary to Secondary Circuits | Primary to Ground Circuits | Within Secondary Circuits |
|--------------|---------------------|-------------------------|-------------------------------|----------------------------|---------------------------|
| Signal | .100 inch [2.54 mm] | NR | NR | NR | 60 (see Note) |
| LP | .115 inch [2.92 mm] | 60 (see Note) | 60 (see Note) | 60 (see Note) | 60 (see Note) |
| Power | .200 inch [5.08 mm] | 60 (see Note) | 60 (see Note) | 60 (see Note) | 60 (see Note) |
| Power | .250 inch [6.35 mm] | 200 | NR | 200 | 200 |
| Power | .300 inch [7.62 mm] | 300 | 150 | 300 | 300 |

NOTE Denotes Safety Extra Low Voltage (SELV) circuits.

Figure 1
Volts RMS or DC

| Signal Contacts | | | |
|-----------------------|----------------------------|----------------------------|-----------------------------|
| Single Signal Contact | 2 Adjacent Signal Contacts | 4 Adjacent Signal Contacts | 24 Adjacent Signal Contacts |
| 8 | 6 | 5 | 2 |

| Contact Type | Power Contacts | | | | |
|--------------|------------------------------|----------------------|------------------------------|-------------------------------|--------------------------------|
| | Module (Power Contact Pitch) | Single Power Contact | Four Adjacent Power Contacts | Eight Adjacent Power Contacts | Twelve Adjacent Power Contacts |
| P | .300 inch [7.62 mm] | 50 | 42 | NA | NA |
| P | .250 inch [6.35 mm] | 50 | 38 | 33 | 30 |
| P | .200 inch [5.08 mm] | 50 | 36 | 31 | 28 |
| LP | .115 inch [2.92 mm] | 30 | 19 | 16 | NA |

NOTE A test system consists of 4 power contacts on .300 inch [7.62 mm] contact pitch or 12 power contacts on .250 inch [6.35 mm] contact pitch or 12 power contacts on .200 inch [5.08 mm] contact pitch or 8 low power contacts on .115 inch [2.92 mm] contact pitch. Connectors are applied to test boards with 2 layers X 2 ounce copper power planes.

Figure 2
Current Per Contact (amperes)

| Contact Type | Power Contacts | | | | |
|--------------|------------------------------|----------------------|------------------------------|-------------------------------|--------------------------------|
| | Module (Power Contact Pitch) | Single Power Contact | Four Adjacent Power Contacts | Eight Adjacent Power Contacts | Twelve Adjacent Power Contacts |
| P | .300 inch [7.62 mm] | 75 | 67 | NA | NA |
| P | .250 inch [6.35 mm] | 75 | 63 | 48 | 45 |
| P | .200 inch [5.08 mm] | 75 | 58 | 45 | 43 |
| LP | .115 inch [2.92 mm] | 49 | 28 | 27 | NA |

NOTE Same as the note in Figure 2 but Connectors are applied to test boards with 10 layers X 2 ounce copper power planes

Figure 3
Current Per Contact (amperes)

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 3. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure |
|--|---|--|
| Initial examination of product. | Meets requirements of product drawing. | EIA-364-18. Visual and dimensional (C of C) inspection per product drawing. Document gold plating thickness at contact interfaces. |
| Final examination of product. | Meets visual requirements. | EIA-364-18. Visual inspection. |
| ELECTRICAL | | |
| Low level contact resistance, signal and power contacts. | Power contacts: 10 milliohms maximum initial. 20 milliohms maximum final. Low power contact: 15 milliohms maximum initial. 20 milliohms maximum final. Signal contacts: 15 milliohms maximum initial. 20 milliohms maximum final. | EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. |
| Contact resistance at rated current, power contacts. | Power contacts 0.35 milliohm average, end of life 0.7 milliohm maximum, end of life. Low power contacts 0.85 milliohm average, end of life 1.5 milliohm maximum, end of life. | EIA-364-6. Current TBD at 30°C temperature rise result at rated current shown in Figure 2. |
| Insulation resistance. | 500 megohms minimum for signal contacts. 1000 megohms minimum for power contacts (LP included). | EIA-364-21. 500 volts DC, 2 minute hold. Test between adjacent contacts of mated specimens. |
| Withstanding voltage. | One minute hold with no breakdown or flashover. | EIA-364-20, Condition I. 1000 volts DC at sea level for signal contacts (LP Included). 2500 volts DC for power contacts. Test between adjacent contacts of mated specimens. |
| Temperature rise vs current. | 30°C maximum temperature rise at specified current. | EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C. Test with single energized contact and with all adjacent power contacts energized. |

Figure 3 (continued)

| Test Description | Requirement | Procedure |
|--|--|---|
| MECHANICAL | | |
| Vibration, random. | No discontinuities of 1 microsecond or longer duration. See Note. | EIA-364-28, Test Condition VII, Condition E. Subject mated specimens to 4.90 G's rms between 20-500 Hz. Fifteen minutes in each of 3 mutually perpendicular planes. |
| Mechanical shock. | No discontinuities of 1 microsecond or longer duration. See Note. | EIA-364-27, Method A. Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. |
| Durability. | See Note. | EIA-364-9. Mate and unmate specimens for 500 cycles at a maximum rate of 500 cycles per hour. |
| Mating force. | 5 N [18 ozf] maximum for power contacts. Average mating force for signal contacts shall be less than 1.7 N [6 ozf] per contact. Average mating force for LP contacts shall be less than 1 N [3.6 ozf] per contact. | EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 12.7 mm [.5 in] per minute. |
| Unmating force. | 2.2 N [8 ozf] minimum per power contact. 0.2 N [.7 ozf] minimum per signal contact. 0.5 N [1.8 ozf] minimum per LP contact. | EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute. |
| Compliant pin insertion. | 111.2 N [25 lbf] maximum per pin. | EIA-364-5. Measure force necessary to correctly apply a specimen to a printed circuit board at a maximum rate of 12.7 mm [.5 in] per minute. |
| Radial hole distortion. | 0.070 mm [.00276 in] maximum radial distortion. 0.008 mm [.00032 in] minimum copper hole wall remaining. | EIA-364-96. Measure at 0.2 to 0.5 mm [.008 to .020 in] depth. |
| Compliant pin retention. | 6.7 N [1.5 lbf] minimum per pin. | EIA-364-29. Measure force necessary to remove a correctly applied specimen from its printed circuit board at a maximum rate of 12.7 mm [.5 in] per minute. |
| Component heat resistance to wave soldering. | See Note. | Tyco Electronics 109-202, Condition B. |

Figure 3 (continued)

| Test Description | Requirement | Procedure |
|-------------------------------|--|--|
| Solderability dip test. | Solderable area shall have a minimum of 95% solder coverage. See Note. | EIA-364-52. |
| ENVIRONMENTAL | | |
| Thermal shock. | See Note. | EIA-364-32. Subject mated specimens to 36 cycles between -40 and 125°C. |
| Humidity-temperature cycling. | See Note. | EIA-364-31, Method III. Subject mated specimens to 10 cycles (10 days) between 25 and 40°C at 80 to 100% RH. |
| Temperature life. | See Note. | EIA-364-17, Method A, Test Condition 5. Subject mated specimens to 125°C for 504 hours. |
| Mixed flowing gas. | See Note. | EIA-364-65, Class IIA. Subject specimens to environmental Class IIA for 14 days (7 days mated, 7 days unmated). |

NOTE

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 4.

Figure 3 (end)

3.6. Product Qualification and Requalification Test Sequence

| Test or Examination | Test Group (a) | | | | | | | |
|---|-------------------|------|-----|-----|----------|------|------|---|
| | 1 | 2 | 3 | 4 | 5 | 6(b) | 7(b) | 8 |
| | Test Sequence (c) | | | | | | | |
| Initial examination of product | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Low level contact resistance, signal and power contacts | 2,5 | 3,7 | | 2,4 | | | | |
| Low level contact resistance, power contacts only | | | | | 2,6,8,10 | | | |
| Contact resistance at rated current, power contacts | | | | | 12 | | | |
| Insulation resistance | | | 2,6 | | | | | |
| Withstanding voltage | | | 3,7 | | | | | |
| Temperature rise vs current | | | | | 4,11 | | | |
| Vibration, random | | 5 | | | 9(d) | | | |
| Mechanical shock | | 6 | | | | | | |
| Durability | 3(e) | 4 | | | 3(f) | | | |
| Mating force | | 2(g) | | | | | | |
| Unmating force | | 8(g) | | | | | | |
| Compliant pin insertion | | | | | | | 2 | 2 |
| Radial hole distortion | | | | | | | 3 | 3 |
| Compliant pin retention | | | | | | | 4 | 5 |
| Component heat resistance to wave soldering | | | | | | 2 | | |
| Solderability dip test | | | | | | 3 | | |
| Thermal shock | | | 4 | | | | | |
| Humidity-temperature cycling | | | 5 | | | | | |
| Temperature life | | | | 3 | 7 | | | 4 |
| Mixed flowing gas | 4 | | | | 5 | | | |
| Final examination of product | 6 | 9 | 8 | 5 | 13 | 4 | 5 | 6 |

NOTE

- (a) See paragraph 4.1.A.
- (b) Split into subgroups as needed for on and off board tests.
- (c) Numbers indicate sequence in which tests are performed.
- (d) Energize at current for 18°C temperature rise.
- (e) Precondition specimens with 5 durability cycles.
- (f) Precondition specimens with 25 durability cycles.
- (g) Power only in housing, signal with gage as shown in 108-2157.

Figure 4

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. Test Groups 1 through 6 shall consist of... TBD. Test Group 7 shall consist of 8 vertical plugs with press fit, Eye-of-the-Needle tails tested on printed circuit boards. Test Group 8 shall consist of 8 vertical plugs with press fit, Eye-of-the-Needle tails tested on copper bus bars.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 4.

4.2. Requalification Testing

If changes significantly affecting form, fit or functions 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 3. 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.

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