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**Multi-Beam XL\* Board Mount Receptacle or Plug Connector System**

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**1. SCOPE****1.1. Content**

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Multi-Beam XL\* Board Mount Receptacle or Plug Connectors.

**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.

**1.3. Qualification Test Results**

Successful qualification testing on the subject product line was completed on 21Dec06. The Qualification Test Report number for this testing is 501-646. 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. TE Documents**

- 108-2157-1: Product Specification (Multi-Beam XL Cable Plug)
- 109 Series: Test Specifications as indicated in Figure 3
- 109-197: Test Specification (TE Test Specifications vs EIA and IEC Test Methods)
- 114-13038: Application Specification (Multi-Beam XL Connectors)
- 501-597-1: Qualification Test Report (Multi-Beam XL Cable Plug)
- 501-646: Qualification Test Report (Multi-Beam XL Board Mount Receptacle or Plug 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
- Temperature: -20 to 105°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)
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		Power Contacts				
Single Signal Contact	24 Adjacent Signal Contacts	Module (Power Contact Pitch)	Single Power Contact	Two Adjacent Power Contacts	Four Adjacent Power Contacts	Eight Adjacent Power Contacts
4	1.5	.300 inch [7.62 mm]	55	50	47	-----
		.250 inch [6.35 mm]	55	-----	42	35

**NOTE** A test system consists of 8 adjacent power contacts on .250 inch [6.35 mm] contact pitch or 4 adjacent power contacts on a .300 inch [7.62 mm] contact pitch. Connectors are applied to test boards with 2, 4 ounce thick copper power planes.

Figure 2  
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. 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.	0.7 milliohm maximum, end of life.	EIA-364-6. 47 amperes for .300 centerline. 35 amperes for .250 centerline. See Figure 2.
Insulation resistance.	500 megohms minimum for signal contacts. 1000 megohms minimum for power contacts.	EIA-364-21. 500 volts DC, 2 minute hold. Test between adjacent contacts of mated specimens.
Withstanding voltage.	1 minute hold with no breakdown or flashover.	EIA-364-20, Condition I. 1000 volts DC at sea level for signal contacts. 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.
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.

Figure 3 (continued)

Test Description	Requirement	Procedure
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 250 cycles at a maximum rate of 500 cycles per hour.
Mating force.	9 N [2 lbf] maximum for power contact. Average mating force for signal contacts shall be less than 1.7 N [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.	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.	TE Spec. 109-41. 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.	TE Spec. 109-136. 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.	TE Spec 109-30-1. 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.	TE Spec. 109-202, Condition B.
Solderability dip test.	Solderable area shall have a minimum of 95% solder coverage. See Note.	TE Spec. 109-11-11, Test Method A.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32. Subject mated specimens to 36 cycles between -20 and 105°C.

Figure 3 (continued)

Test Description	Requirement	Procedure
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 4. Subject mated specimens to 105°C for 504 hours (21 days).
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA. Subject mated specimens to environmental Class IIA for 14 days.

**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)
	Test Sequence (c)						
Initial examination of product	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
Radial hole distortion							3
Compliant pin retention							4
Component heat resistance to wave soldering						2	
Solderability dip test						3	
Thermal shock			4				
Humidity-temperature cycling			5				
Temperature life				3	7		
Mixed flowing gas	4				5		
Final examination of product	6	9	8	5	13	4	5

**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 50 durability cycles.  
(g) Power only in housing, signal with gage as shown in 108-2157.

Figure 4

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#### 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 and 4 were carried over from the qualification results of the MBXL Cable Plug program (see Qualification Test Report 501-597-1) since the contact interface is identical to the vertical header. Test Group 2 shall consist of 15 vertical headers with soldertails mated to right angle receptacles with soldertails. Five of these headers shall be fully loaded with power and signal contacts, 5 with power contacts only, and 5 with signal contacts only. Test Group 3 shall consist of 3 vertical headers with soldertails mated to 3 right angle receptacles with soldertails. Test Group 5 shall consist of 5 vertical headers with soldertails mated to 5 right angle receptacles with soldertails. Test Group 6 shall consist of 5 vertical headers with soldertails. Test Group 7 shall consist of 8 vertical headers with press-fit, Eye-of-the-Needle tails.

###### 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 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 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.