

## **MULTI-BEAM HD POWER DISTRIBUTION CONNECTOR SYSTEM**

### **1. SCOPE**

#### 1.1. Content

This specification covers performance, tests and quality requirements for the TE connectivity Multi-Beam HD Power Distribution Connector System.

#### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 4 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

### **2. APPLICABLE DOCUMENTS AND FORMS**

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 requirement 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

- 109 Series: Test Specifications as indicated in Figure 3
- 109-197: Test Specification (TE connectivity Test Specifications vs EIA and IEC Test Methods)
- 501-128026: Qualification Test Report (Multi-Beam HD Power Distribution Connector System)

#### 2.2. Industry Documents

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
- Operating Temperature: -40 to 125°C

Contact Type	Contact Pitch(MM)	Within Primary Circuits(V)	Primary to Secondary Circuits(V)	Primary to Ground Circuits(V)	Within Secondary Circuits(V)
Signal	2.0	NR	NR	NR	60(See note)
LP	3.0	60	60	60	60
LP	5.0	300	300	300	300
Power	5.0	60	60	60	60
Power	6.0	200	200	200	200
Power	7.0	300	300	300	300



Denotes Safety Extra Low Voltage (SELV) circuits.

Figure 1  
Volts RMS or DC

Signal Contacts current rating	
15 Adjacent (A)	3.5

Power Contacts				
Type	Module(power) Contact Pitch(mm)	Single Power Contact(A)	Four adjacent Power Contact(A)	Eight adjacent Power Contact(A)
Power	5.0	135	93	75
Power	6.0	135	100	78
Power	7.0	135	100	NA
Low Power	3.0	42	32	22
Low Power	5.0	42	33	23



Connectors are applied to test boards with 4 layers X 2 ounce copper power planes for per contact

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 inspection Per product drawing
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
<b>ELECTRICAL</b>		
Low level contact resistance, signal and power contacts.	Power contacts (LP Included): 10 milliohms maximum initial. 20 milliohms maximum final. Signal contacts: 20 milliohms maximum initial. 30 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 3.5 milliohm average, end of life 4.5 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 meg-ohm minimum for signal contacts. 1000 meg-ohm 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 2. 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
<b>MECHANICAL</b>		
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 un-mate specimens for 500 cycles at a maximum rate of 500 cycles per hour.
Mating force.	3.5 N max. per power contact 1.5 N max. per low power contact 1 N max. per signal contact	EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Un-mating force.	2.2 N minimum per power contact. 0.5 N minimum per low power contact 0.2 N minimum per signal contact.	EIA-364-13. Measure force necessary to un-mate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Compliant pin insertion.	50 N 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 holes distortion.	0.070 mm maximum radial distortion. 0.008 mm minimum copper holes wall remaining.	EIA-364-96. Measure at 0.2 to 0.5 mm [.008 to .020 in] depth.
Compliant pin retention.	6.7 N 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.	TE Electronics 109-202, Condition B.

Solderability dip test.	Solderable area shall have a minimum of 95% solder coverage. See Note.	EIA-364-52.
Test Description	Requirement	Procedure
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).

**i** 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						
	1	2	3	4	5	6(a)	7
	Test Sequence (b)						
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					11		
Insulation resistance			2,6				
Withstanding voltage			3,7				
Temperature rise vs current					4		
Vibration, random		5			9		
Mechanical shock		6					
Durability	3(c)	4			3(d)		
Mating force		2(e)					
Un-mating force		8(e)					
Compliant pin insertion							2
Radial hole distortion							3
Compliant pin retention							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	12	4	6



- (a) Split into subgroups as needed for on and off board tests.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Precondition specimens with 5 durability cycles.
- (d) Precondition specimens with 25 durability cycles.
- (e) Power contact only in housing and signal contact only in housing

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 through 6 shall consist of 5 mated pair connectors. Test Group 7 shall consist of 5 Eye-of-the-Needles (cutout EON from the contact) tails tested on printed circuit boards.

#### 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.