zQSFP+Stacked Connector and Cage Assembly

1. SCOPE

1.1. Content

This specification defines performance, test and quality requirements for the zQSFP+Stacked connector with cage assembly.

1.2. Qualification

When tests are performed on subject product, procedures specified in this specification shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

2.1. TE Connectivity (TE) Documents

- 108-19437 Signal integrity specification zQSFP+ connector
- 114-60015 Application Specification zQSFP+Stacked connector with cage
- 501-128802 Qualification Test Report zQSFP+Stacked connector with cage

2.2. Industry Documents

- EIA-364 Electrical Connector/Socket Test Procedures Including Environmental Classifications
- SFF-8662 Draft QSFP+ 28 Gb/s 4X Connector (Style A)
- SFF-8663 Draft QSFP+ 28 Gb/s Cage (Style A)

2.3. Reference Documents

- 109-197: Test Specification (TE Test Specifications vs. EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

Products shall be of design, construction and physical dimensions as specified on the applicable product drawing.

3.2. Materials and Finish

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

3.3. Ratings

- Working Voltage: 30 VDC Maximum
- Current Carrying capacity: 0.5 A maximum per contact (Signal application only)
- Operating Temperature: -40°C to 85°C
- Non-operating Temperature: -55°C to 105°C

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3.4. Performance and Test Description

The product is designed to meet electrical, mechanical and environmental performance specified in this paragraph as tested per test sequence specified in Paragraph 3.5. Unless otherwise specified, all tests are performed at ambient environmental conditions and are performed with connectors in fully mated condition.

3.5. Test Requirements and Procedures Summary

Table 1

Test Description	Requirement	Procedure
Initial examination of product	Meets requirements of product drawing.	EIA-364-18. Visual examination and dimensional (C of C) inspection per product drawing.
Final examination of product	Meets visual requirements.	EIA-364-18. Visual examination.
ELECTRICAL		
Low Level Contact Resistance (LLCR)	For shield and signal contacts: Baseline (Initial) $\triangle$R 10 mΩ maximum change from initial (Baseline)	EIA-364-23. Max. Open voltage 20mV. Max current 100 mA DC. All contacts to be measured. Measuring points shall be as indicated in Figure 1.
Insulation resistance	1000 MΩ minimum	EIA-364-21. Test voltage 100V DC. Duration: 1 minute. Measure between adjacent contacts.
Withstanding voltage	No breakdown or flashover.	EIA-364-20, Condition I. Test voltage: 300 volts AC at sea level. Duration 1 minute. Test between adjacent contacts, signal to signal and signal to ground
MECHANICAL		
Random vibration	No contact discontinuity ≥ 1 microsecond See Note.	EIA-364-28, Test Condition VII, Test Condition Letter D. Subject mated specimens to 3.10 G's RMS between 20 to 500 Hz. 15 minutes in each of 3 mutually perpendicular planes.
Mechanical shock	No contact discontinuity ≥ 1 microsecond See Note.	EIA-364-27, Test Condition H. Subject mated specimens to 30 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 100 cycles with cage latch operable, Rate: 500 cycles/hour, 10mm/s.

Table 1

Test Description	Requirement	Procedure
Transceiver Mating force	40 N maximum	EIA-364-13, Method A. Measure force to mate cable plug into zQSFP+Stacked connector including cage. Maximum rate of 12.7mm per minute.
Transceiver Unmating force	30 N minimum	EIA-364-13, Method A. Measure force to unmate cable plug from zQSFP+Stacked connector including cage by pulling at latching release feature.
Rotational cable pull	33.4 N minimum without displacement of cage assembly or connector from PCB.	Load cable module into connector with cage assembly applied to PCB with attached bezel. Rotate cable 40 degrees toward PCB, and then rotate 360 degrees with the load still applied.
Press-fit insertion force	Cage individual pin 40N maximum Conn individual pin 20N maximum	TE Spec 109-41. Measure force necessary to press connector with cage assembly into the PCB at a maximum rate of 12.7 mm [.50 inch] per minute.
Press-fit retention force	Cage and connector individual compliant pin 4N minimum	TE Spec 109-30. Measure force necessary to remove connector with cage assembly from the PCB at a maximum rate of 12.7 mm [.50 inch] per minute.
Module Retention	No damage to module below ≦ 90 N	Load cable module into connector with cage assembly applied to PCB with attached bezel. Apply specified axial load to engaged module at a maximum rate of 6.35 mm [.25 inch] per minute and hold 1 minute to very module retention and cag latch strength.
Cage latch, axial retention	125 N minimum.	EIA 364-98. Measure fore necessary to remove zQSFP+ module from cage assembly with latches enabled.
Reseating	See note.	Manually unmate and mate specimens. Perform 3 such cycles.

ENVIRONMENTAL		
Test Description	**Requirement**	**Procedure**
Thermal shock	See Note.	EIA-364-32, Method A, Test Condition I. Subject mated specimens to 10 cycles between -55° and 85°C with 30 minute dwells at temperature extremes and 1 minute transition between temperatures.
Temperature/ Humidity cycling.	See Note.	EIA-364-31, Method III. Subject mated specimens between 25℃±3°C at 80% RH and 65°C ±3°C at 50% RH. Ramp times should be 0.50 hour and dwell should be 1.0 hour. Perform 24 such cycles.
Temperature life (preconditioning).	See Note.	EIA-364-17, Method A, Test condition 4. Test subject specimens mated to blank transceivers to 105°C for 72 hours.
Temperature life	See Note.	EIA-364-17, Method A, Test condition 4. Test Subject mated specimens to 105°C for 240 hours.
Thermal disturbance	See Note.	EIA-364-10, Condition A. Subject mated and board mounted specimens to 10 cycles between 15 ±3°C and 85 ±3°C as measured on the specimen. Ramp times > 2°C per minute with dwell times long enough to ensure contacts reach the temperature extremes (5 minutes minimum). Humidity is not controlled. Perform 10 such cycles.
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA (4 gas). Subject board mounted specimens to environmental Class IIA for 14 days. One-half of the specimens (receptacle only) unmated for 224 hours followed by 112 hours mated. The remaining one-half of the specimens mated for 14 days.
Dust	See Note.	EIA-364-91 Expose unmated connectors to dust contamination. Dust composition: #1. Flow rate: 300 meters/minute. Exposure time: 1 hour

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 Table 2.*

3.6. Resistance Measurement

Resistance within the mated terminated connectors shall be measured with four-circuit measuring method. It consists of bulk resistance of the contacts, resistance of the connector contact to cable printed circuit board (PCB) transition, and the resistances of the fixed contact connections to cable and PCB. Bulk resistance of circuits outside the connector, such as PCB paths and cable wire outside the terminated section, are not included in the requirement and therefore, shall be measured and documented separately for reference (in case of significant influence).

3.7. Test Frames

During vibration and mechanical shock tests, an electrical circuit is checking that no electrical contact interruptions occur that exceed the requirement.

Test-frames shall provide mechanical stability of the connector in relation to its mating parts and shall cover the requirements specified in the TE application specification.

3.8. Product Qualification and Requalification Test Sequence

Table 2

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7	8
	Test Sequence (b)							
Initial examination of product	1	1	1	1	1	1	1	1
Low Level Contact Resistance	2,4,6	2,4,6,8	2,4,7	2,4,6,8,10	4,6	2,4		
Insulation resistance					2,7			
Withstanding voltage					3,8			
Random vibration			5					
Mechanical shock			6					
Durability					5			
Transceiver mating force								2(f)
Transceiver unmating force								3(f)
Rotational cable pull							3	
Press-fit insertion force							2	
Press-fit extraction force							5	
Module Retention							4	
Cage latch, axial retention						5		
Reseating	5	7		9				
Thermal shock		3(c)(d)						
Humidity/temperature cycling		5(d)						
Temperature life (preconditioning)			3(c)(d)	3(c)(d)				
Temperature life	3(c)(d)							
Thermal disturbance				7(d)				
Mixed flowing gas				5				
Dust						3(c)		
Final examination of product	7	9	8	11	9	6	6	4

NOTE

(a) See Paragraph 4.1.A.

(b) Numbers indicate sequence in which tests are performed.

(c) Precondition specimens with 20 durability cycles with latches engaged.

(d) Mated to blank transceivers (no components added to cable connector PCB).

(e) Transceivers not exposed.

(f) Modified transceiver that removes the kick-out spring and latch from the test.

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification testing

A. Sample selection

Samples shall be prepared in accordance with applicable instructions and shall be selected at random from current production. Unless otherwise specified, all test groups shall consist of a minimum of 5 connectors of which all contacts shall be tested.

B. Test sequence

Qualification inspection shall be verified by testing samples as specified in Paragraph 3.5.

4.2. Requalification testing

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

4.3. Acceptance

Acceptance is based upon verification that product meets requirements of Paragraph 3.4. Failures attributed to equipment, test set-up, applied customer components, or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for requalification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality conformance inspection

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