
QSFP+ Stacked Connector and Cage Assemblies

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Quad Small Form-Factor Pluggable (QSFP+) Stacked Connector and Cage Assemblies.

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.

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

- 108-2286: Product Specification (QSFP Copper Module Direct Attach Cable Assembly and Cage)
- 114-32020: Application Specification (QSFP+ Stacked Through Bezel Connector and Cage Assemblies)
- 501-134009: Qualification Test Report (QSFP+ Stacked Connector and Cage Assemblies)

2.2. Industry Document

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

2.3. Reference Documents

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

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: 120 volts AC
- Current: Signal application only
- Temperature: -55 to 105°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.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Low Level Contact Resistance (LLCR).	ΔR 10 milliohms maximum for shield and signal contacts.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation resistance.	1×10^9 ohms minimum.	EIA-364-21. 300 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. 300 volts AC at sea level. Test between adjacent contacts of mated specimens.
MECHANICAL		
Random vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition VII, Condition Letter D. Subject mated specimens to 3.10 G's rms between 20 to 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, 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 for 100 cycles at a maximum rate of 500 cycles per hour with cage latch operable.
Transceiver insertion force.	40 N [9.0 lbf] maximum.	EIA-364-13. Measure force necessary to insert the transceiver into the receptacle with kick-out springs inoperable at a maximum rate of 12.7 mm [.50 inch] per minute.

Test Description	Requirement	Procedure
Transceiver extraction force.	30 N [6.7 lbf] maximum.	EIA-364-13. Measure force necessary to extract the transceiver from the receptacle with kick-out springs inoperable at a maximum rate of 12.7 mm [.50 inch] per minute.
Rotational cable pull.	33.4 N [7.5 lbf] minimum without displacement of cage assembly or connector from Printed Circuit Board (PCB).	Load cabled module into cage/connector 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.	1.3 kN [292 lbf] maximum per 2x1 connector/cage assembly.	Measure force necessary to press the specimen onto the PCB into proper seating location at a maximum rate of 12.7 mm [.50 inch] per minute.
Press-fit extraction force.	155 N [34.8 lbf] minimum per 2x1 connector/cage assembly.	Measure force necessary to extract the specimen from the PCB at a maximum rate of 12.7 mm [.50 inch] per minute.
Module retention.	90 N [20.2 lbf] minimum.	Load cable module into cage/connector 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 for 1 minute to verify module retention and cage latch strength.
Cage latch, axial retention.	130 N [29.2 lbf] minimum.	EIA 364-98. Measure force necessary to remove QSFP module from cage assembly with latches enabled.
Reseating.	See Note.	Unmate and mate specimens 3 times.
Mate/unmate.	See Note.	Unmate and mate specimens 1 time.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32, Test Condition VII. Subject mated specimens to 5 cycles between -55 and 105°C with 30 minute dwells at temperature extremes and 1 minute transition between temperatures.
Thermal disturbance.	See Note.	Cycle mated specimens between 15 ± 3°C and 85 ± 3°C at a maximum rate of 2°C per minute for 10 cycles.
Humidity/temperature cycling.	See Note.	EIA-364-31, Method III. Subject mated specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.

Test Description	Requirement	Procedure
Temperature life, preconditioning.	See Note.	EIA-364-17, Method A, Test Condition 4. Subject specimens mated to blank transceivers to 105°C for 120 hours.
Temperature life.	See Note.	EIA-364-17, Method A, Test Condition 4. Subject specimens mated to blank transceivers to 105°C for 240 hours.
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA (4 gas). Subject specimens to environmental Class IIA for 20 days (10 days unmated followed by 10 days mated).
Dust.	See Note.	EIA-364-91. Subject unmated specimens to benign dust contamination for 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 Figure 2.*

Figure 1

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Initial examination of product	1	1	1	1	1	1	1
LLCR		2,5,8	3,5,7	2,4,6,8,10,12,14		2,4,6,8	
Insulation resistance					2,6		
Withstanding voltage					3,7		
Random vibration		6					
Mechanical shock		7					
Durability		3					
Transceiver insertion force							2(f)
Transceiver extraction force							3(f)
Rotational cable pull	2						
Press-fit insertion force			2				
Press-fit extraction force			8				
Module retention							4
Cage latch strength	3						
Reseating				13		7	
Mate/unmate				7			
Thermal shock					4(d)		
Thermal disturbance				11		5	
Humidity/temperature cycling			6		5		
Temperature life, preconditioning		4(d)					
Temperature life			4(c)(d)	3(c)(d)			
Mixed flowing gas, unmated				5(e)			
Mixed flowing gas, mated				9			
Dust						3(c)	
Final examination of product	4	9	9	15	8	9	5

- NOTE**
- (a) See Paragraph 4.1.A.
 - (b) Numbers indicate sequence in which tests are performed.
 - (c) Precondition specimens with 20 durability cycles.
 - (d) Mated to blank transceivers.
 - (e) Transceivers not exposed.
 - (f) Modified transceiver that removes the kick-out spring and latch from the test.

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. Test groups 1, 3, 5, 6 and 7 shall each consist of 5 palladium nickel plated specimens. Test group 2 and 4 shall consist of 5 gold plated specimens and 5 palladium nickel plated specimens.

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.