

QSFP Double Density SMT Connector

1. SCOPE

1.1. Content

This specification defines performance, test and quality requirements for the QSFP Double Density SMT connector with cage.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Table 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies. In the event of conflict between the requirements of the specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the reference documents, this specification shall take precedence.

2.1. TE Documents

- 114-130007 Application Specification
- 501-134092 Qualification Test Report
- 501-134117 Qualification Test Report

2.2. Industry Documents

- EIA-364 Electrical Connector/Socket Test Procedures Including Environmental Classifications
- J-STD-002 Surface Mount Solderability

2.3. Reference Document

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

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Ratings

Working Voltage	Current	Operating Temperature
<30 VDC	Signal Application	-55 to 85°C

3.3. 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 3.7. Unless otherwise specified, all tests are performed at ambient environmental conditions and are performed with connectors in fully mated condition.

3.4. 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)	ΔR 20 m Ω maximum	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 M Ω minimum	EIA-364-21. Test voltage 100V DC. Duration: 1 minute. Measure between adjacent contacts, signal to signal and signal to ground.
Withstanding voltage	No breakdown or flashover.	EIA-364-20, Condition I. Test voltage: 300 volts AC at sea level. Test between adjacent contacts, signal to signal and signal to ground
MECHANICAL		
Random vibration	No discontinuity > 1 microsecond See Note.	EIA-364-28, Test Condition VII, Test Condition Letter D. Subject mated specimens to 3.10 G RMS between 20 to 500 Hz. Fifteen minutes in each of 3 mutually perpendicular planes.
Mechanical shock	No discontinuity > 1 microsecond See Note.	EIA-364-27, Test Condition H. Subject mated specimens to 30 G 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. Include latching/release function as intended. Operation cycles: 50. Rate: 300 cycles/hour. (max)
Mating force	90 N maximum	EIA-364-13, Method A. Measure force to mate cable plug into QSFP DD connector including cage. 25.4mm/min
Un-mating force	50 N maximum	EIA-364-13, Method A. Measure force to un-mate cable plug from QSFP DD connector including cage by pulling at latching release feature. 25.4mm/min.

ENVIRONMENTAL		
Solderability	95% minimum wetting	IPC/ECA J-STD-002. Conditioning: 8 hours ± 15 minutes steam. Preheat: 150° to 180°C / 60-120 seconds Reflow: 230° to 260°C / 30-60 second
Resistance to reflow soldering heat	See Note.	TEC-109-201 Method-A, Condition-B. Subject SMD connector to 3x reflow curve 260°C peak.
Thermal shock.	See Note.	EIA-364-32, Method A, Test Condition VII. Subject un-mated specimens to 5 cycles between -55° and 105°C with 30-minute dwells at temperature extremes and 1 minute transition between temperatures.
Humidity/temperature cycling.	See Note.	EIA-364-31, Method IV. Subject mated specimens to 10 cycles (10 days) between 25° and 65°C at 80 to 100% RH.
Temperature life.	See Note.	EIA-364-17, Method A, Test Subject mated specimens to 105°C for 240 hours.
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 7 days followed by 7 days mated. The remaining one-half of the specimens mated for 14 days.
Thermal Cycling	See Note.	EIA-364-110, Condition A. Subject mated and board mounted specimens to 10 temperature cycles between 15±3° and 85±3° 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 not controlled.
Re-seating	See Note.	Manually un-mate and mate the specimen 1 time.
Minute disturbance	See Note.	Manually un-mate and mate the specimen 3 times.

Table 1 End



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.

3.5. Resistance Measurement

Resistance within the mated terminated connectors shall be measured as indicated in Figure 1. It consists of bulk resistance of the contacts, resistance of the connector contacts 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).

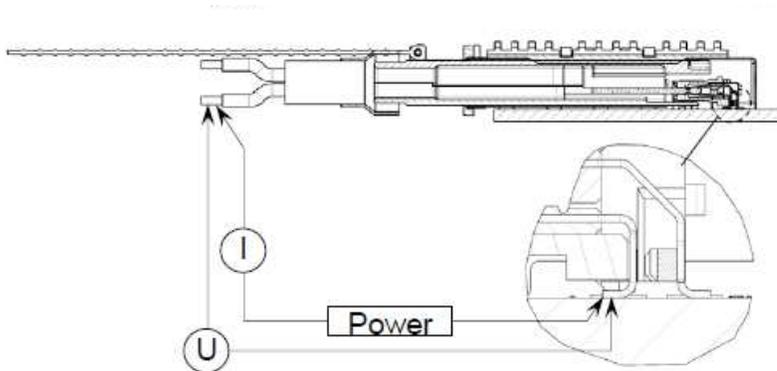


Figure 1 (typical pluggable IO shown)

3.6. 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.

3.7. Product Qualification and Requalification Test Sequence

Table 2

Test or Examination	Test Group (a)					
	1	2	3	4	5	6
	Test Sequence (b)					
Initial examination of product	1	1	1	1	1	1
Low Level Contact Resistance	3,5,9	2,4,6,9	3,6,9			
Insulation resistance				2,6		
Withstanding voltage				3,7		
Random vibration	6					
Mechanical shock	7					
Durability	4					
Mating force	2					
Un-mating force	10					
Connector solderability					2	
Resistance to reflow soldering heat						2
Thermal shock				4		
Humidity/temperature cycling		7		5(d)		
Temperature life		3(c)				
Mixed flowing gas			4(e)			
Thermal cycling			7			
Minute disturbance			5			
Re-seating	8	5,8	2,8			
Final Examination of product	11	10	10	8	3	3

i **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) Un-Mated
- (e) Six samples, 3 mated 14 days, 3 un-mated 7 days, mated 7 days.

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 3.7

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.