zQSFP+ Stacked Connector and Cage Assembly

1. INTRODUCTION

1.1. Purpose

Testing was performed on the TE connectivity (TE) zQSFP+ Stacked Connector and Cage Assemblies to determine their conformance to the requirements of Product Specification 108-60102 Revision A1.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the zQSFP+ Stacked Connector and Cage Assemblies. Testing was performed at the Engineering Assurance Product Testing Laboratory between November 03, 2014 and MAY 19, 2015. The test files number for these testing are TP-14-02421, TP-15-00240 and TP-15-00724. These documentations are on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The zQSFP+ Stacked Connector and Cage Assemblies listed in paragraph 1.5, conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-60102, Revision A.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Quantity	Part Number	Description
40 PCS	2227671-1	zQSFP+ stacked connector and age assemblies, Au plating
56 PCS	2053638-3	Cable assemblies
15 PCS 10 PCS 15 PCS	FP131206-1 (ENIG) FP131206-2 (OSP) FP131206-3 (Sn)	Printed Circuit Board (PCB)
12 PCS	BZ565671-2	Bezel

Figure 1

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

- Temperature: 15 to 35℃
- Relative Humidity: 25 to 75%

1.6. Qualification Test Sequence

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 1.4

(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.

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance (C of C) was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Low Level Contact Resistance (LLCR) - Test Groups 1, 2, 3, 4, 5 and 6

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a change in resistance (ΔR) of less than 10 milliohms after testing.

2.3. Insulation Resistance - Test Group 5

All insulation resistance measurements were greater than 1 G ohms.

2.4. Withstanding Voltage - Test Group 5

No dielectric breakdown or flashover occurred.

2.5. Random Vibration - Test Group 3

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

2.6. Mechanical Shock - Test Group 3

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.7. Durability - Test Group 5

No physical damage occurred as a result of mating and unmating the specimens 100 times with the cage latch operable.

2.8. Transceiver Mating Force - Test Group 8

All transceiver mating force measurements were less than 40 N when mate cable plug into zQSFP+Stacked connector including cage

2.9. Transceiver Unmating Force - Test Group 8

All transceiver unmating force measurements were less than 30 N when unmate cable plug from zQSFP+Stacked connector including cage by pulling at latching release feature

2.10. Rotational Cable Pull - Test Group 7

There was no displacement of the cage assembly or connector from the PCB when subjected to a minimum load of 33.4 N

2.11. Press-fit Insertion Force - Test Group 7

All press-fit insertion force measurements were less than 40N per cage pin and less than 20N per conn pin.

2.12. Press-fit Extraction Force - Test Group 7

Cage press-fit extraction force measurements were greater than 4 per pin of cage and connector

2.13. Module retention force - Test Group 7

All cage latch strength measurements were greater than 90 N

2.14. Reseating - Test Groups 5, 7 and 9

No physical damage occurred as a result of unmating and mating the specimens 3 times.

2.15. Thermal Shock - Test Group 2

No evidence of physical damage was visible as a result of thermal shock testing.

2.16. Thermal Disturbance - Test Groups 4

No evidence of physical damage was visible as a result of thermal disturbance testing.

2.17. Humidity/temperature Cycling - Test Groups 2

No evidence of physical damage was visible as a result of humidity/temperature cycling.

2.18. Temperature Life, Preconditioning - Test Group 3 and 4

No evidence of physical damage was visible as a result of preconditioning temperature life testing.

2.19. Temperature Life - Test Groups 1

No evidence of physical damage was visible as a result of temperature life testing.

2.20. Mixed Flowing Gas, Unmated - Test Group 4

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.21. Mixed Flowing Gas, Mated - Test Group 4

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.22. Dust - Test Group 6

No evidence of physical damage was visible as a result of exposure to a dust laden atmosphere.

2.23. Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Initial Examination of Product

A C of C was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

3.2. LLCR

LLCR measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of mated specimens. A test voltage of 300 volts DC was applied for 1 minutes before the resistance was measured.

3.4. Withstanding Voltage

A test potential of 300 volts AC was applied between adjacent contacts of mated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Random Vibration

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The Power Spectral Density (PSD) was flat at 0.02 G^2/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.6. Mechanical Shock

Mated specimens were subjected to a mechanical shock test having a half-sine waveform of 30 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Durability

Specimens were mated and unmated 100 times with the cage latch operable at a maximum rate of 500 cycles per hour.

3.8. Transceiver Mating Force

The force required to insert the transceiver into the receptacle with kick-out springs inoperable was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.9. Transceiver Unmating Force

The force required to extract the transceiver from the receptacle with kick-out springs inoperable was measured using a tensile/compression device with a free floating fixture and a maximum rate of travel of 12.7 mm [.5 in] per minute.

3.10. Rotational Cable Pull

The cable was held in a test fixture at approximately a 40 degree angle. A 33.4 N [7.5 lbf] weight was attached to the end of the cable and then rotated through 360 degrees at an approximate rate of 4 revolutions per minute for 1 revolution.

3.11. Press-fit Insertion Force

The force required to insert the specimen onto the PCB into proper seating location was measured using a tensile/compression device with a free floating fixture with seating tool 2215020-3 at a maximum rate of travel of 12.7 mm [.5 in] per minute.

3.12. Press-fit Extraction Force

The force required to extract the specimen from the PCB was measured using a tensile/compression device with a free floating fixture with seating tool 2215024-3 at a maximum rate of travel of 12.7 mm [.5 in] per minute.

3.13. Cage Latch Strength

PCB mounted specimen and bezel with cable module inserted was held in a clamp attached to a movable crosshead while a force of 90 N [20.2 lbf] was applied to the free end of the cable at a maximum rate of 6.35 mm [.25 in] per minute and held for 1 minute.

3.14. Reseating

Specimens were unmated and mated 3 times.

3.15. Thermal Shock

Mated specimens were subjected to 10 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 85℃ with 1 minute transition bet ween temperatures.

3.16. Thermal Disturbance

Mated specimens were cycled 10 times between 15 ± 3℃ and 85 ± 3℃ at a maximum rate of 2℃ per minute.

3.17. Humidity/temperature Cycling

mated specimens between 25℃±3℃ at 80% RH and 65℃ ±3℃ at 50% RH. Ramp times should be 0.50 hour and dwell should be 1.0 hour. Perform 24 such cycles.

Temperature Life, Preconditioning

3.18. Specimens mated to blank transceivers were exposed to a temperature of 105℃ for 72 hours.

3.19. Temperature Life

Specimens mated to blank transceivers were exposed to a temperature of 105℃ for 240 hours. Specimens were preconditioned with 20 durability cycles.

3.20. Mixed Flowing Gas, Unmated, Class IIA

Unmated specimens were exposed for 224 hours to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30℃ and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, $H_2$2S at 10 ppb and SO_2 at 100 ppb.

3.22. Mixed Flowing Gas, Mated, Class IIA

Mated specimens were exposed for 112 hours to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30℃ and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, H_2S at 10 ppb and SO_2 at 100 ppb.

3.23. Dust

Unmated specimens were exposed 1 hour to a benign dust concentration of 9 g/ft^3 at a flow rate of 300 meters per minute.

3.24. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.