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**QSFP Double Density 1XN Cage AND QSFP 1XN Cage**

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**1. INTRODUCTION**

1.1. Purpose

Testing was performed on the TE Connectivity (TE) QSFP Double Density 1XN Cage and QSFP 1XN Cage to determine its conformance to the requirements of Product Specification 108-60122 Rev B.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of 1XN CAGE. Testing was performed at the Shang Hai Electrical Components Test Laboratory between 10DEC18 and 10JAN19. The test file number for this testing is TP-18-03622. And TP-19-03207 Between 22NOV2019 AND 29NOV2019 for 1X1 cage, this documentation is on file at and available from the Shang Hai Electrical Components Test Laboratory.

1.3. Conclusion

QSFP Double Density 1XN listed in paragraph 1.5, conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-60122 Revision B.

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                               |
|----------|-------------|-------------------------------------------|
| 20       | 2324882-2   | 1X4 QSFPDD CAGE with Heatsink             |
| 5        | 2324193-1   | 1X1 QSFPDD CAGE with Heatsink for group 1 |
| 20       | 2318579-2   | QSFPDD PT CONNECTOR                       |
| 15       | 2323767-1   | Cable assembly QSFPDD                     |
| 15       | 60-1942764  | Test PCB                                  |

Figure 1.5

1.5. Environmental Conditions

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

Temperature: 15 to 35°C

Relative Humidity: 20 to 80%

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1.6. Qualification Test Sequence

Table 2

| Test or Examination             | Test Group (a)    |   |   |         |
|---------------------------------|-------------------|---|---|---------|
|                                 | 1                 | 2 | 3 | 4       |
|                                 | Test Sequence (b) |   |   |         |
| Initial examination of product  | 1                 | 1 | 1 | 1       |
| Durability                      | 4                 |   |   |         |
| Mating force                    | 2,5               |   |   |         |
| Un-mating force                 | 3,6               |   |   |         |
| Rotational cable pull           | 8                 |   |   |         |
| Module retention force          | 7                 |   |   |         |
| Cage Latch Strength             |                   |   |   | 3       |
| Temperature life (Precondition) |                   |   |   | 2(c)(d) |
| Salt Spray                      |                   | 2 |   |         |
| Compliant pin insertion force   |                   |   | 2 |         |
| Compliant pin retention force   |                   |   | 3 |         |
| Final examination of product    | 9                 | 3 | 4 | 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)

Figure 2

**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 Salt Spray - Test Group 2

No galvanic corrosion on dissimilar metal, No crack, no deformation.

2.3 Random Vibration - Test Group 1

Following vibration testing, no evidence of physical damage detrimental to product performance was visible.

2.3 Mechanical Shock - Test Group 1

Following mechanical shock testing, no evidence of physical damage detrimental to product performance was visible.

2.4. Durability - Test Group 1

No evidence of physical damage detrimental to product performance was visible as a result of mating and un-mating the specimens with the cage latches engaged 100 times.

2.5. Transceiver Mating Force - Test Group 1

All transceiver mating force measurements were less than 90 N when mate cable plug into Cage with Connector

| Test Item    | Condition | Test Result |       |       |      |
|--------------|-----------|-------------|-------|-------|------|
|              |           | Max         | Min   | Ave   | Unit |
| Mating force | Initial   | 38.75       | 22.39 | 31.76 | N    |
| Mating force | Final     | 29.92       | 18.37 | 27.24 | N    |

2.6. Transceiver Un-mating Force - Test Group 1

All transceiver un-mating force measurements were less than 50 N when un-mate cable plug from Cage with connector by pulling at latching release feature

Connector

| Test Item       | Condition | Test Result |       |       |      |
|-----------------|-----------|-------------|-------|-------|------|
|                 |           | Max         | Min   | Ave   | Unit |
| Un-mating force | Initial   | 34.84       | 20.35 | 25.96 | N    |
| Un-mating force | Final     | 31.66       | 17.63 | 24.93 | N    |

2.7. Module retention force - Test Group 1

No damage to module and displacement of cage below  $\leq 90$  N

2.8. Rotational Cable Pull - Test Group 1

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

2.9. Salt Spray - Test Group 2

No galvanic corrosion on dissimilar metal, No crack, no deformation.

2.10. Press-fit Insertion Force - Test Group 3

All press-fit insertion force measurements were less than 40N per cage pin

| Test Item                                       | Test Result |       |       |      |
|-------------------------------------------------|-------------|-------|-------|------|
|                                                 | Max         | Min   | Ave   | Unit |
| Compliant pin insertion force Per pin (Average) | 30.9        | 27.38 | 28.91 | N    |

2.11. Press-fit Extraction Force - Test Group 3

Cage press-fit extraction force measurements were greater than 9.5N per pin of cage

| Test Item                                        | Test Result |       |       |      |
|--------------------------------------------------|-------------|-------|-------|------|
|                                                  | Max         | Min   | Ave   | Unit |
| Compliant pin Extraction force Per pin (Average) | 14.39       | 11.85 | 13.07 | N    |

2.12. Temperature life, Preconditioning - Test Group 4

No evidence of physical damage detrimental to product performance was visible as a result of temperature life, preconditioning testing.

2.13. Cage Latch Strength - Test Group 4

All cage latch strength measurements were greater than 125 N minimum.

| Test Item           | Test Result |       |       |      |
|---------------------|-------------|-------|-------|------|
|                     | Max         | Min   | Ave   | Unit |
| Cage Latch strength | 211.4       | 166.8 | 185.3 | N    |

2.14. 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

AC 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. Durability

Specimens were mated and unmated 100 times with the cage latch operable at a maximum rate of 300 cycles per hour.

3.3. Transceiver Mating Force

The force required to mate individual specimens with the latch engaged 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.

3.4. Transceiver Un-mating Force

The force required to un-mate individual specimens with the latch engaged 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.

3.5. Module Retention force

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 verify module retention and cage latch strength.

3.6. Rotational Cable Pull

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.

3.7. Salt Spray

Subject was inserted to 5% salt concentration for 48 hours

3.8. Press-fit Insertion Force

The force required to mate individual specimens into a printed circuit board 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. Press-fit Extraction Force

The force required to extract individual specimens from a printed circuit board 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.

3.10. Temperature Life, Preconditioning

Mated specimens were exposed to a temperature of 105°C for 72 hours. Specimens were preconditioned with 20 cycles of durability.

**NOTE** *Due to the temperature rating of the cable, dummy plugs were substituted for the plug assembly.*

3.11. Cage Latch Strength

Measure force necessary to remove module from cage assembly with latches enabled.

3.12. Final Examination of Product

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