



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

CONNECTOR SERIES:

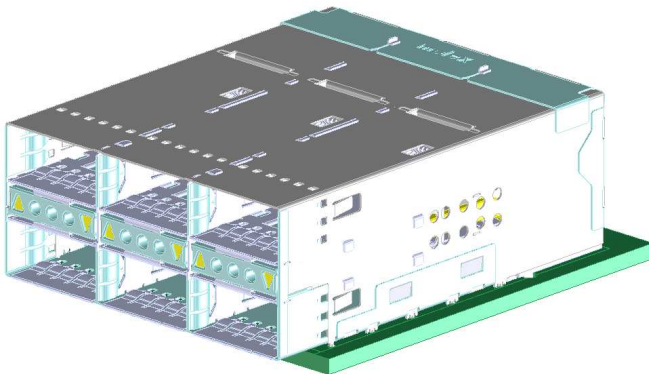
76871

76870 (STANDARD)

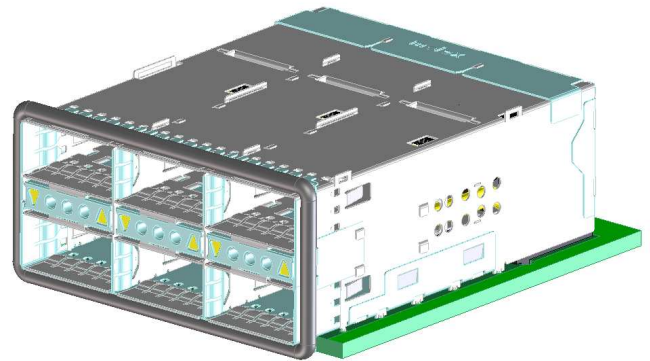
76894 (LOW-PROFILE)



76871 SERIES



76894 SERIES



76870 SERIES

TABLE OF CONTENTS

| | | | |
|---|---|---|-----------------------------------|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 1 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION

QSFP+ STACKED CONNECTORS

| | | |
|------------|---|-----------|
| 1.0 | SCOPE | 3 |
| 2.0 | PRODUCT DESCRIPTION | 3 |
| 2.1 | PRODUCT NAME AND SERIES NUMBER(S)..... | 3 |
| 2.2 | DIMENSION, MATERIALS, PLATING AND MARKINGS..... | 3 |
| 2.3 | SAFETY AGENCY APPROVALS..... | 3 |
| 2.4 | PIN ASSIGNMENTS..... | 3 |
| 2.5 | ADDITIONAL GENERAL SPECIFICATIONS..... | 3 |
| 3.0 | APPLICABLE DOCUMENTS AND SPECIFICATIONS | 3 |
| 3.1 | MOLEX DOCUMENTS..... | 3 |
| 3.2 | INDUSTRY DOCUMENTS..... | 4 |
| 4.0 | QUALIFICATION | 4 |
| 5.0 | RATINGS | 4 |
| 5.1 | VOLTAGE..... | 4 |
| 5.2 | CURRENT..... | 4 |
| 5.3 | TEMPERATURE..... | 4 |
| 5.4 | DURABILITY..... | 4 |
| 6.0 | PERFORMANCE (MECHANICAL & ENVIRONMENTAL) | 5 |
| 6.1 | TEST GROUP 1..... | 5 |
| 6.2 | TEST GROUP 2..... | 6 |
| 6.3 | TEST GROUP 3..... | 7 |
| 6.4 | TEST GROUP 4..... | 8 |
| | TEST GROUP 4 (CONTINUED)..... | 9 |
| 6.5 | TEST GROUP 7..... | 10 |
| 6.6 | MECHANICAL TEST GROUP 1..... | 11 |
| 6.7 | MECHANICAL TEST GROUP 2..... | 11 |
| 6.8 | MECHANICAL TEST GROUP 3..... | 12 |
| 6.9 | MECHANICAL TEST GROUP 4..... | 12 |
| 6.10 | MECHANICAL TEST GROUP 5..... | 13 |
| 6.11 | MECHANICAL TEST GROUP 6..... | 13 |
| 7.0 | PACKAGING | 14 |
| 8.1 | CONNECTOR..... | 14 |
| 8.2 | PLUG AND CABLE ASSEMBLY..... | 14 |
| 8.0 | GAGES AND FIXTURES | 15 |
| 9.0 | OTHER INFORMATION | 16 |
| 10.1 | INVERTED SMT APPLICATION..... | 16 |
| 10.2 | PCB REQUIREMENTS..... | 16 |

| | | | | |
|-------------------------|---|---|--------------------|---------------------|
| <u>REVISION:</u> | <u>ECR/ECN INFORMATION:</u> | <u>TITLE:</u> | | <u>SHEET No.</u> |
| D | EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | | 2 of 17 |
| <u>DOCUMENT NUMBER:</u> | | <u>CREATED / REVISED BY:</u> | <u>CHECKED BY:</u> | <u>APPROVED BY:</u> |
| PS-76870-001 | | S. BOGIEL/JGONZALEZ | HAVERY | M. BANAKIS |



PRODUCT SPECIFICATION

QSFP+ STACKED CONNECTORS

1.0 SCOPE

This Product Specification covers the QSFP – Stacked 2X1,2X3 Connector Series

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER(S)

Product Name: QSFP - Stacked Connector Family
 Connector Series: 76870, 76871, 76894

2.2 DIMENSION, MATERIALS, PLATING AND MARKINGS

See the appropriate sales drawing for information on dimensions, materials, plating, marking, and footprint patterns.

2.3 SAFETY AGENCY APPROVALS

UL file: E29179

2.4 PIN ASSIGNMENTS

Refer to appropriate sales drawing of the specific part number for the correct pin assignment.

2.5 ADDITIONAL GENERAL SPECIFICATIONS

MATERIALS:

- Cage: Nickel Silver - Unplated
- EMI Springs: Phos-Bronze – Nickel plated
- Air-Vents/EMI Shields: Die-cast Alloy – Nickel plated
- Light-pipes (if used): Polycarbonate
- Signal-Connector Housing: Thermoplastic, 94V-0
- Signal Terminals: Copper Alloy - Hard Gold plated over Nickel

2.6 MATING CONNECTORS

Plug & Cable Series: 74547, 74763, 111048

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

3.1 MOLEX DOCUMENTS

AS-76870-001 Application Specification
 PK-76870-001 Packaging Specification
 PS-45499-002 Cosmetic Specification

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|--|--|--|-------------------------------------|
| <u>REVISION:</u> D | <u>ECR/ECN INFORMATION:</u> EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | <u>TITLE:</u> PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | <u>SHEET No.</u> 3 of 17 |
| <u>DOCUMENT NUMBER:</u> PS-76870-001 | | <u>CREATED / REVISED BY:</u> S. BOGIEL/JGONZALEZ | <u>CHECKED BY:</u> HAVERY |
| | | <u>APPROVED BY:</u> M. BANAKIS | |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

3.2 INDUSTRY DOCUMENTS

| | |
|----------------|---|
| EIA 364 Series | Electrical Connector Test Procedures Including Environmental Classifications with Test Procedures |
| EIA 364-1000 | Environmental Test Methodology for Assessing the Performance of Connectors and Sockets Used in Business Office Applications |

4.0 QUALIFICATION

Laboratory condition and sample selection are in accordance with EIA 364

5.0 RATINGS

5.1 VOLTAGE

30 Volts AC (RMS)/DC Max.

5.2 CURRENT

0.5 Amps Max.

5.3 TEMPERATURE

| | |
|----------------|-----------------|
| Operating: | -40°C to +85°C |
| Non-operating: | -55°C to +105°C |

5.4 DURABILITY

PL2 #15 – Performance Level 1 – 0.76 µm Au – 250 cycles, 10 year Life (FMG)

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|--|--|--|--|
| <u>REVISION:</u> D | <u>ECR/ECN INFORMATION:</u> EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | <u>TITLE:</u> PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | <u>SHEET No.</u> 4 of 17 |
| <u>DOCUMENT NUMBER:</u> PS-76870-001 | <u>CREATED / REVISED BY:</u> S. BOGIEL/JGONZALEZ | <u>CHECKED BY:</u> HAVERY | <u>APPROVED BY:</u> M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.0 PERFORMANCE (MECHANICAL & ENVIRONMENTAL)

6.1 TEST GROUP 1

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|------------------------------|---|-----------|--------------------------------|--------------|
| 1 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | baseline | N/A |
| 2 | Durability (precondition) | EIA-364-09; perform plug & unplug cycles: 20 | | No evidence of physical damage | PASS |
| 3 | Temperature Life | EIA-364-17, method A, Test Condition 3 at 105°±2°C: 120 hours | Mated | None | |
| 4 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 5 | Reseating | Manually unplug & plug the connector, 3 cycles | | No evidence of physical damage | PASS |
| 6 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |

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|---|---|---|-----------------------------------|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 5 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.2 TEST GROUP 2

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|-------------------------------|---|-----------|--------------------------------|--------------|
| 1 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | baseline | N/A |
| 2 | Durability (precondition) | EIA-364-09; perform plug & unplug cycles: 20 | | No evidence of physical damage | PASS |
| 3 | Thermal Shock | EIA-364-32, test condition I (10 cycles): 120 hours | Mated | None | |
| 4 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 5 | Cyclic Temperature & Humidity | EIA-364-31 Cycle connectors between 25° ± 3°C at 80% RH and 65 °± 3 °C at 50% RH (24 cycles) Ramp times should be 0.5 hour and dwell should be 1.0 hour. | Mated | None | |
| 6 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 7 | Reseating | Manually unplug & plug the connector, 3 cycles | | No evidence of physical damage | PASS |
| 8 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |

REVISION:

D

ECR/ECN INFORMATION:

EC No: UCP2012-2334

DATE: 2012 / 01 / 25

TITLE:

**PRODUCT SPECIFICATION
STACKED QSFP+ CONNECTORS**

SHEET No.

6 of 17

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M. BANAKIS



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.3 TEST GROUP 3

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|---------------------------------|--|-----------|--|--------------|
| 1 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | baseline | N/A |
| 2 | Durability (precondition) | EIA-364-09; perform plug & unplug cycles: 20 | | No evidence of physical damage | PASS |
| 3 | Temperature Life (precondition) | EIA-364-17, method A, Test Condition 3 at 105°±2°C 72 hours | Mated | None | |
| 4 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 5 | Mechanical Vibration | EIA-364-28 test condition VII test condition letter D 15 minutes in each of 3 mutually perpendicular directions. Both mating halves rigidly fixed to not contribute to relative motion of one contact against another. | Mated | Discontinuity < 1 μsec No evidence of physical damage | PASS |
| 7 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| | | | | | |

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|---|---|---|-----------------------------------|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 7 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.4 TEST GROUP 4

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|---------------------------------|--|-----------|--------------------------------|--------------|
| 1 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | baseline | N/A |
| 2 | Durability (precondition) | EIA-364-09; perform plug & unplug cycles: 20 | | No evidence of physical damage | PASS |
| 3 | Temperature Life (precondition) | EIA-364-17, method A, Test Condition 3 at 105°±2°C 72 hours | Mated | None | |
| 4 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 5 | Mixed Flowing Gas | EIA-364-35 class IIA, Option 1A & 1B test condition VII 14 days | See Note | None | |
| 6 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |

Note:

1. Expose ½ of the specimens unmated for 2/3 of the test duration. Mate the specimen to the same one used during preconditioning temperature life. Expose for the duration of the test.
2. Characterize porosity & plating thickness before test sequence.

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|---|---|---|-----------------------------------|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 8 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

TEST GROUP 4 (CONTINUED)

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|-------------------------------------|--|-----------|--------------------------------|------------------------|
| 7 | Thermal Disturbance | Cycle connectors 10 times between 15° ± 3°C at 80% RH and 85 °± 3 °C at 50% RH. Ramps should be a minimum of 2°C per minute and dwell times should insure that the contacts reach the temperature extremes for a minimum of 5 minutes. | Mated | None | |
| 8 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA . | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 9 | Reseating | Manually unplug & plug the connector, 3 cycles | | No evidence of physical damage | PASS |
| 10 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA . | Mated | <10 mΩ Δ max | <10 mΩ Δ max |

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| <u>REVISION:</u> D | <u>ECR/ECN INFORMATION:</u> EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | <u>TITLE:</u> PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | <u>SHEET No.</u> 9 of 17 |
| <u>DOCUMENT NUMBER:</u> PS-76870-001 | <u>CREATED / REVISED BY:</u> S. BOGIEL/JGONZALEZ | <u>CHECKED BY:</u> HAVERY | <u>APPROVED BY:</u> M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.5 TEST GROUP 7

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|--|---|-----------|--|------------------------|
| 1 | Dielectric Withstanding Voltage | EIA-364-20; apply a voltage of 300 VDC for 1 minute between adjacent terminals and between adjacent terminals and ground. | Mated | No disruptive discharge No leakage current in excess of 5mA | PASS |
| 2 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | baseline | N/A |
| 3 | Durability | EIA-364-09; perform plug & unplug cycles: 250 | | No evidence of physical damage | PASS |
| 4 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |
| 5 | Dielectric Withstanding Voltage | EIA-364-20; apply a voltage of 300 VDC for 1 minute between adjacent terminals and between adjacent terminals and ground. | Mated | No disruptive discharge No leakage current in excess of 5mA | PASS |

Note:

1. Separate sets of test specimens will be used to access dielectric withstanding voltage and the change in low level contact resistance.
2. Dielectric withstanding voltage testing will use different contacts than those used for low level contact resistance testing.

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| <u>REVISION:</u> D | <u>ECR/ECN INFORMATION:</u> EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | <u>TITLE:</u> PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | <u>SHEET No.</u> 10 of 17 |
| <u>DOCUMENT NUMBER:</u> PS-76870-001 | <u>CREATED / REVISED BY:</u> S. BOGIEL/JGONZALEZ | <u>CHECKED BY:</u> HAVERY | <u>APPROVED BY:</u> M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.6 MECHANICAL TEST GROUP 1

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|--|--|-----------|---|--|
| 1 | Temperature Rise (via current cycling) | Measure the temperature rise at the rated current after 96 hours. (45 minutes ON and 15 minutes OFF). Fixture as required. | Mated | Temperature Rise: +30°C maximum | 0.3 A min. with < 30°C Temperature Rise |

6.7 MECHANICAL TEST GROUP 2

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|--|--|-----------|--|-----------------------------------|
| 1 | Connector Mate Forces (Module only) | Mate connector at a rate of 25 mm per min. | Mate | 2.5 N / contact pair MAX insertion force | 0.5-0.75 N / force |
| 2 | Connector Un-mate Forces (Module only) | Un-mate connector at a rate of 25 mm per min. | Un-mate | 0.5 N / contact pair MAX withdrawal force | 0.25-0.35 N / contact pair |
| 3 | Plug Mate Forces | Mate connector at a rate of 25 mm per min. | Mate | 2.5 N / contact pair plus 50 N MAX | 62 N – 82 N |
| 4 | De-Latch Plug (Axial Load) | Mate connector and place axial load on latch pull to de-latch plug | Un-mate | 0.5 N / contact pair plus 20 N MAX | 18 N – 24 N |
| 5 | Latch Pull (Axial Load) | Place axial load on plug pull with 6.35 mm diameter pin | Mate | 25 N MIN | No physical damage |

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|---|---|---|-----------------------------------|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 11 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.8 MECHANICAL TEST GROUP 3

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|---------------------------------|--|-----------|---|---|
| 1 | Terminal Retention Force | Axial pullout force on the terminal in the housing at a rate of 25 mm (1 in) per min. | | 4.5 N MINIMUM retention force | 6.2 N MINIMUM |
| 2 | Normal Force | Apply a perpendicular force. | | 0.49 N, (50 grams) MINIMUM normal force | 0.49 N, (50 grams) MINIMUM normal force |

6.9 MECHANICAL TEST GROUP 4

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|---|--|-----------|------------------|----------------------------------|
| 1 | Latitudinal Load | Mate connector and load plug with latitudinal load until open circuit. See section 9. | Mated | 75 N MIN | 90 N (no open circuit) |
| 2 | Longitudinal Load | Mate connector and load plug with longitudinal load until open circuit. See section 9. | Mated | 75 N MIN | 90 N (no open circuit) |
| 3 | Cable Pullout Force (Axial Load) | Mate plug to connector and apply an axial pullout force on the wire at a rate of 25 mm per min. | Mated | 100 N MIN | 133 N – 142 N |
| 4 | Cable Pullout Force (Right Angle Load) | Mate plug to connector and apply an right angle pullout force on the wire at a rate of 25 mm per min. | Mated | 75 N MIN | 125 N – 145 N |

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|--|--|--|--|
| <u>REVISION:</u> D | <u>ECR/ECN INFORMATION:</u> EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | <u>TITLE:</u> PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | <u>SHEET No.</u> 12 of 17 |
| <u>DOCUMENT NUMBER:</u> PS-76870-001 | <u>CREATED / REVISED BY:</u> S. BOGIEL/JGONZALEZ | <u>CHECKED BY:</u> HAVERY | <u>APPROVED BY:</u> M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

6.10 MECHANICAL TEST GROUP 5

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|------------------------------|---|-----------|--|-------------------------------|
| 1 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | baseline | N/A |
| 2 | Wire Flex | Flex cable 180° for 20 cycles. Test per EIA 364-41 test cond. I: 24 AWG – with X = 40 mm 26 AWG – with X = 30 mm 28 AWG – with X = 30 mm | Mated | 10 mΩ MAX (change from initial) No physical damage | 20 cycles, no physical damage |
| 3 | Low Level Contact Resistance | EIA-364-23; apply a maximum voltage of 20 mV and a current of 100 mA. | Mated | <10 mΩ Δ max | <10 mΩ Δ max |

6.11 MECHANICAL TEST GROUP 6

| ITEM | TEST | TEST PROCEDURE | CONDITION | REQUIREMENT | ACTUAL |
|------|-----------------------------------|---|-----------|--|-------------|
| 1 | Compliant Pin Insertion into PCB | Apply an axial insertion force on the terminal at a rate of 25± 6 mm/min. | | 35 N (7.9 LBF) MAX. | 1330 N MAX. |
| 2 | Compliant Pin Extraction into PCB | Apply an axial extraction force on the terminal at a rate of 25± 6 mm/min | | 9 N (2 lbf) MAX. retention force per pin | 342 N MIN. |

REVISION:

D

ECR/ECN INFORMATION:

EC No: UCP2012-2334

DATE: 2012 / 01 / 25

TITLE:

**PRODUCT SPECIFICATION
STACKED QSFP+ CONNECTORS**

SHEET No.

13 of 17

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M. BANAKIS



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

7.0 PACKAGING

8.1 CONNECTOR

8.1.1 Product shall be packaged in Trays with Lids placed in Cartons, per the packaging specification as called out on the applicable assembly print.

8.1.2 Packaging shall meet the requirements of and be tested per the packaging specification as called out on the applicable assembly print.

8.2 PLUG AND CABLE ASSEMBLY

8.2.1 Product shall be packaged to protect against damage during handling, transit and storage.

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| <u>REVISION:</u> D | <u>ECR/ECN INFORMATION:</u> EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | <u>TITLE:</u> PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | <u>SHEET No.</u> 14 of 17 |
| <u>DOCUMENT NUMBER:</u> PS-76870-001 | <u>CREATED / REVISED BY:</u> S. BOGIEL/JGONZALEZ | <u>CHECKED BY:</u> HAVERY | <u>APPROVED BY:</u> M. BANAKIS |

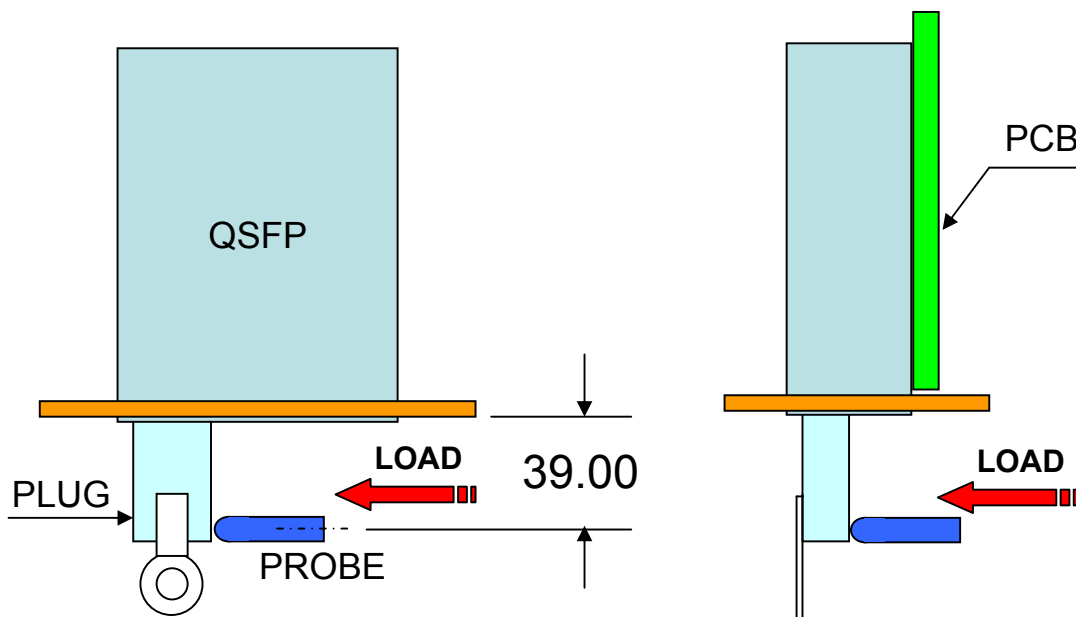


PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

8.0 GAGES AND FIXTURES

Test setup for latitudinal and longitudinal load testing and shell retention testing. Probe is about 6mm in diameter with a full radius nose. The probe is to be placed 20mm from the front edge of the receptacle and located at the centerline of the plug. Apply load to plug at a rate of 25mm per minute.

Test setup for peel and shear testing. Apply load to plug at a rate of 25mm per minute.



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|---|---|---|-----------------------------------|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 15 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS

9.0 OTHER INFORMATION

10.1 INVERTED SMT APPLICATION

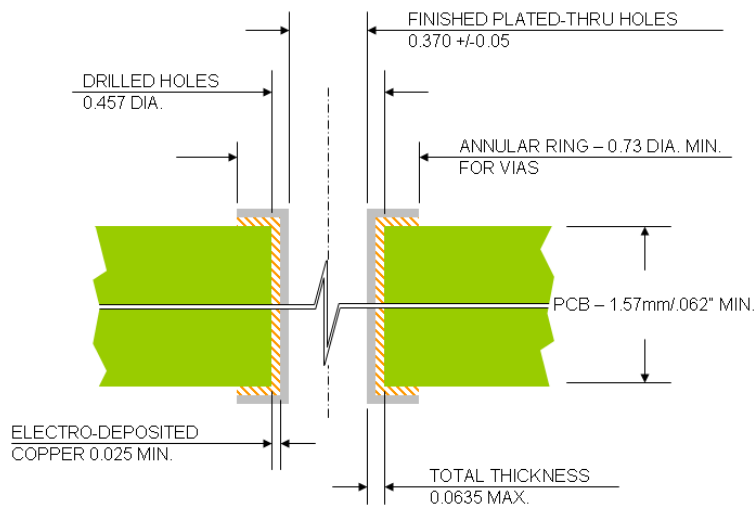
See AS-75586-001 Application Specification for inverted SMT application.

10.2 PCB REQUIREMENTS

The compliant pin shall be capable of being inserted one time.

The PCB hole shall be capable of retaining the compliant pin for a maximum of three insertions. The removal of the compliant pin from the PCB shall not damage the PCB hole beyond the point to be able to retain a compliant pin (that has not been inserted into a PCB).

0.370 mm Compliant Pin Drilled Hole Size: 0.457 mm (# 77 Drill)
 1.050 mm Cage Tail Drilled Hole Size: 1.092 mm (# 57 Drill)

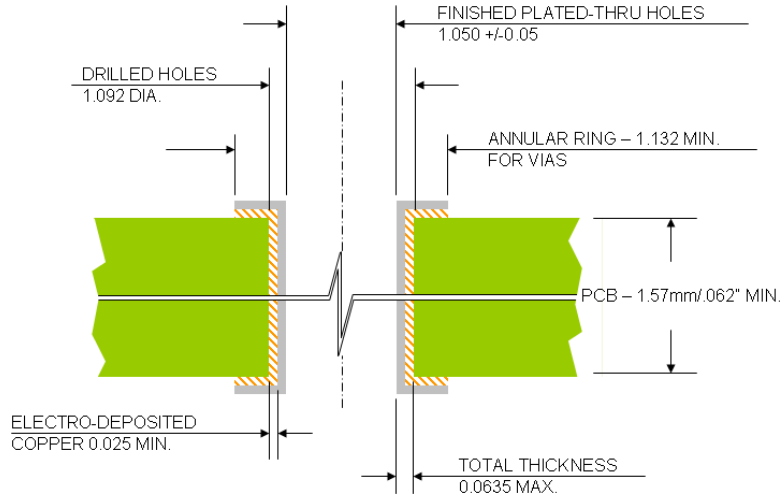


COMPLIANT PIN-HOLE DETAIL

| | | | | |
|--|--|--|-------------------------------------|--|
| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | | SHEET No. 16 of 17 |
| DOCUMENT NUMBER: PS-76870-001 | | CREATED / REVISED BY: S. BOGIEL/JGONZALEZ | CHECKED BY: HAVERY | APPROVED BY: M. BANAKIS |



PRODUCT SPECIFICATION QSFP+ STACKED CONNECTORS



CAGE TAIL HOLE DETAIL

Note:

Depending upon the plating finish and plating process, a larger drill diameter may be used to achieve the finished hole specification.

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| REVISION: D | ECR/ECN INFORMATION: EC No: UCP2012-2334 DATE: 2012 / 01 / 25 | TITLE: PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS | SHEET No. 17 of 17 |
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