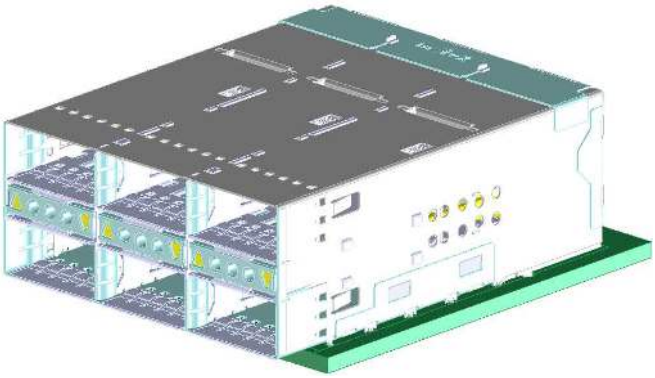
PRODUCT SPECIFICATION
QSFP+ STACKED CONNECTORS

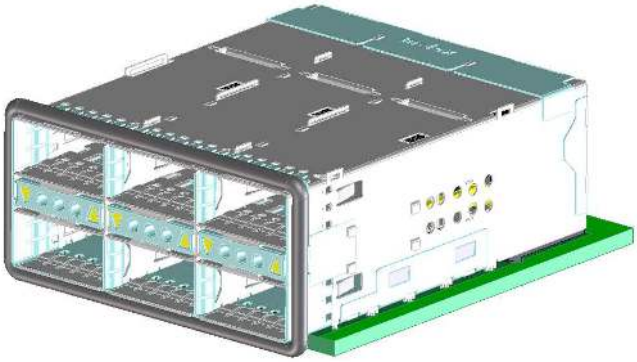
CONNECTOR SERIES:

76871
76870 (STANDARD)
76894 (LOW-PROFILE)

76871 SERIES



76894 SERIES



76870 SERIES

TABLE OF CONTENTS

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
D	EC No: **UCP2012-2334** DATE: **2012 / 01 / 25**	**PRODUCT SPECIFICATION STACKED QSFP+ CONNECTORS**	**1** of **17**

DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
PS-76870-001	**S. BOGIEL/JGONZALEZ**	**HAVERY**	**M. BANAKIS**

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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

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:	-40ºC to +85ºC
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)

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

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**º ± **3**ºC at 80% RH and **65** º± **3** ºC 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

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

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.

TEST GROUP 4 (CONTINUED)

ITEM	TEST	TEST PROCEDURE	CONDITION	REQUIREMENT	ACTUAL
7	**Thermal Disturbance**	Cycle connectors **10** times between **15**º ± **3**ºC at 80% RH and **85** º± **3** ºC 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

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.

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

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

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.

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.

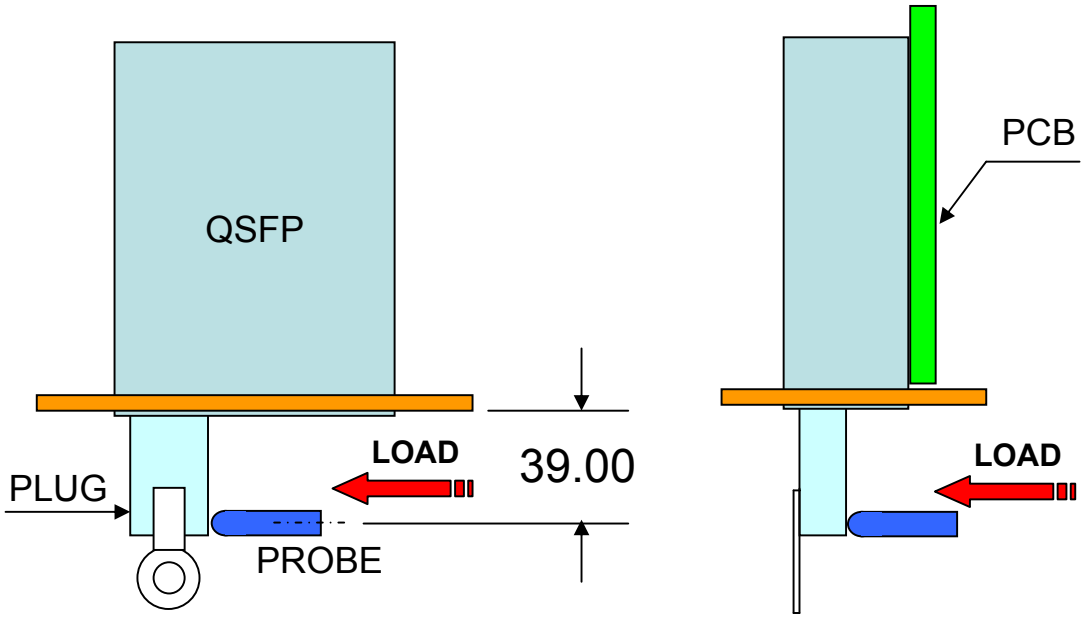
8.2 PLUG AND CABLE ASSEMBLY

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

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.



9.0 OTHER INFORMATION

10.1INVERTED SMT APPLICATION

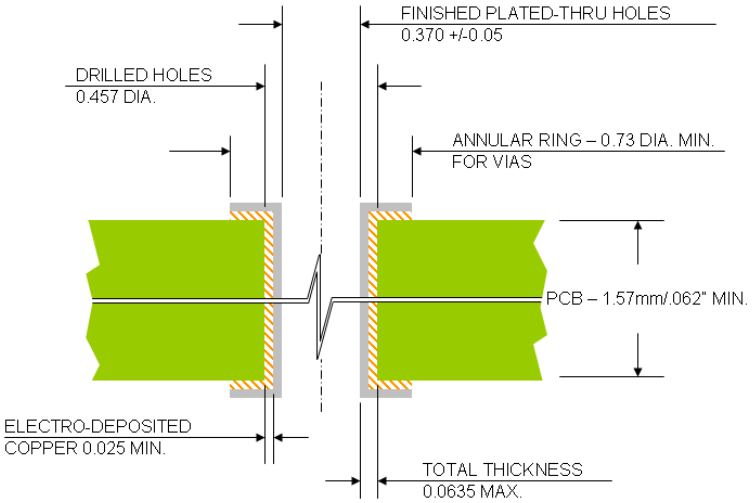
See AS-75586-001 Application Specification for inverted SMT application.

10.2PCB REQUIREMENTS

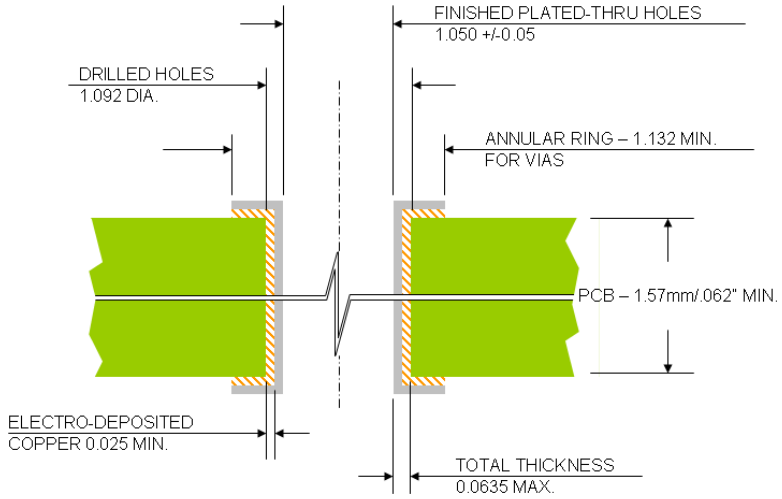
The compliant pin shall be capable of being inserted one time.

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



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.