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TITLE OCP ORv3 AC Input Connector and Cable Assembly		PAGE 1 of 11	REVISION A
		AUTHORIZED BY Wesley. Lee	DATE 2022/09/29
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1.0 Objective

This specification defines the performance, test, quality, and reliability requirements of the OCP ORv3 AC input connectors and cable assemblies.

2.0 Scope

This specification is applicable to the termination characteristics of the OCP ORv3 AC input connector and cable assembly products which provides a separable interface for power to OCP ORv3 AC input applications.

3.0 Ratings

3.1 Current Rating and Nominal Voltage Rating:

Connector Descriptions	CSA/CUL/CNR @30°C Temperature Rise		UL/UNR(Max)@RTI Temperature	
	Current Rating (A)	Voltage, VDC/VAC	Current Rating (A)	Voltage, VDC/VAC
Male PCB Connector mated with Female Crimp Connector (8AWG) (10156981, 10156982, 10156987, 10156988 mated with RPS07CN0203)	40	600	80	600
Male Panel Mount Crimp Connector (8AWG) mated with Female Crimp Connector (8AWG) (RPS07CN0103 mated with RPS07CN0203)	32	600	75	600
Male PCB Connector mated with Female Crimp Connector (10AWG) (10156981, 10156982, 10156987, 10156988 mated with RPS07CN0202)	30	600	65	600
Male Panel Mount Crimp Connector (10AWG) mated with Female Crimp Connector (10AWG) (RPS07CN0102 mated with RPS07CN0202)	29	600	55	600
Male PCB Connector mated with Female Crimp Connector (12AWG) (10156981, 10156982, 10156987, 10156988 mated with RPS07CN0201)	25	600	50	600
Male Panel Mount Crimp Connector (12AWG) mated with Female Crimp Connector (12AWG) (RPS07CN0101, RPS07CN0201)	20	600	45	600
Male PCB Connector mated with Female Crimp Connector (12AWG) with Overmolded and Hard Shell Covers (10156981, 10156982, 10156987, 10156988 mated with RPS0700749-XXX, 10167314-XXX)	20	600	NA	NA

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Connector Descriptions	TUV @30℃ Temperature Rise		TUV(Max) @RTI Temperature	
	Current Rating (A)	Voltage, VDC/VAC	Current Rating (A)	Voltage, VDC/VAC
Male PCB Connector mated with Female Crimp Connector (8AWG) (10156981、10156982、10156987、10156988 mated with RPS07CN0203)	40	600	80	600
Male Panel Mount Crimp Connector (8AWG) mated with Female Crimp Connector (8AWG) (RPS07CN0103 mated with RPS07CN0203)	32	600	75	600
Male PCB Connector mated with Female Crimp Connector (10AWG) (10156981、10156982、10156987、10156988 mated with RPS07CN0202)	32	600	65	600
Male Panel Mount Crimp Connector (10AWG) mated with Female Crimp Connector (10AWG) (RPS07CN0102 mated with RPS07CN0202)	29	600	55	600
Male PCB Connector mated with Female Crimp Connector (12AWG) (10156981、10156982、10156987、10156988 mated with RPS07CN0201)	25	600	50	600
Male Panel Mount Crimp Connector (12AWG) mated with Female Crimp Connector (12AWG) (RPS07CN0101、RPS07CN0201)	20	600	45	600
Male PCB Connector mated with Female Crimp Connector (4mm ² wire) with Overmolded and Hard Shell Covers (10156981、10156982、10156987、10156988 mated with RPS0700739-XXX、10167313-XXX)	32	600	NA	NA

3.2 Operating Temperature Range:

Connector Part Number	Description	Operating Temperature Range
10156981、10156982、10156987、10156988 RPS0700859-XXX、RPS0700869-XXX、RPS0700879-XXX、RPS0700889-XXX、RPS07CN0101、RPS07CN0102、RPS07CN0103、RPS07CN0201、RPS07CN0202、RPS07CN0203	PCB Board connectors (Right Angle and Vertical). High temperature resistant wire cable (UL3132 wire) assemblies.	-40~105℃
RPS0700739-XXX、10167313-XXX	Female cable assemblies with cable type:H07RN-F 5G4mm ² .	-40~60℃
RPS0700749-XXX、10167314-XXX	Female cable assemblies with cable type: SOOW 5x12AWG.	-40~90℃

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4.0 Applicable Documents

4.1 Specifications

4.1.1 Engineering drawings: OCP ORv3 AC input related drawings

4.1.2 Application specification(s): GS-20-0780

4.2 National or International Standards

4.2.1 Flammability: UL94V-0

4.2.2 EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications.

EIA 364-1000: Environmental test methodology for assessing the performance of electrical connectors and sockets used in business office applications.

EIA 364-1004: Environmental test methodology for verifying the current rating of freestanding power contacts or electrical connectors and sockets.

4.3 Laboratory Reports - Supporting Data

QTR Report number: T0275-22

4.5 Safety Agency Approvals

Standard	Parts
UL 1682	IEC 309 AC connector to the branch circuitry
UL498	NEMA AC connector to the branch circuitry
UL1977	Output connector that mates with connector in the power shelf
UL62, UL817, EN50525	Flexible power cord that can be used for AC wiring
UL 94 V0	All components
IEC/EN 61984	Connector safety requirements and tests
IPC/WHMA-A-620 REV D	Entire assembly

5.0 Requirements

5.1 Qualification

Connectors furnished under this specification shall be capable of meeting the qualification test requirements specified herein.

5.2 Material

The material for each component shall be as specified herein or equivalent.

Power Receptacle Contacts: Copper alloy

Female contact -spring: Copper alloy

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Housings: High temperature thermoplastic, UL 94V-0 compliant

5.3 Finish: Gold flash over 1.27um Min. nickel underplated.

6.0 Electrical Characteristics

6.1 Contact Resistance, Specified Current

The contact resistance at a specified current shall not exceed 0.6mΩ initially or after any treatment and/or environmental exposure.

Measurements shall be in accordance with EIA 364-06.

The following details shall apply:

- a. Test Current - refer to section 6.4.

6.2 Insulation Resistance

The insulation resistance of unmated connectors shall not be less than 5000MΩ (mega ohms) for power contact.

Measurements shall be in accordance with EIA 364-21.

The following details shall apply:

- a. Test Voltage – 500 volts DC.
- b. Electrification Time - 2 minutes, unless otherwise specified.
- c. Points of Measurement - Between adjacent contacts

6.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current >1mA (ampere) when unmated connectors are tested in accordance with EIA 364-20.

The following details shall apply:

- a. Test Voltage - 4000V DC for power contact
- b. Test Duration - 60 seconds.
- c. Test Condition - 1 (760 Torr - sea level).
- d. Points of Measurement - Between adjacent contacts

6.4 Current Rating

The temperature rise above ambient shall not exceed 30 deg C at any point in the system when all contacts are powered at specified current as below.

The following details shall apply:

- a. Current Rating: see 3.1
- b. Ambient Conditions –Still air at lab room ambient.
- c. Reference - EIA 364-70

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6.5 Crimp Resistance, Low Level

The low-level contact resistance shall not exceed 0.6mΩ initially. Measurements shall be in accordance with EIA 364-23.

The following details shall apply:

- Test Voltage - 20 milli-volts DC max. open circuit.
- Test Current - Not to exceed 100 milli-amperes.

7.0 Mechanical Characteristics

7.1 Mating/Unmating Force

The following details shall apply:

- Mating Force :156N Max.
- Un-Mating Force : 9.73N Min.
- Cross Head Speed - 25.4mm per minute.
- Utilize free floating fixtures.
- Reference – EIA 364-3.

7.2 Contact retention

Test condition: Per EIA-364-29C, method C, a maximum rate of 25.4mm per minute

Requirement:

Power Contact: individual power pin shall withstand an axial retention load of 67N minimum

7.3 Reseating

Test condition: Manual plug/unplug the connector with module board.

Requirement: Perform 3 such cycles.

7.4 Durability

- Number Cycles - 100 cycles
- Cycling Rate - 500 ± 50 cycle/hour
- Use free floating fixtures
- Reference - EIA 364-09

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7.5 Durability (preconditioning)

- a. Number Cycles - 10 cycles
- b. Cycling Rate - 500 ± 50 cycle/hour
- c. Use free floating fixtures
- d. Reference - EIA 364-09

7.6 Crimp Tensile Strength - EIA-364-08

- a. Cross Head Speed - 25.4mm per minute
- b. Crimp Tensile Strength:
 - 8 AWG: 489 N min.
 - 10 AWG: 489 N min.
 - 12 AWG: 489N min.
 - 16 AWG: 222 N min.
- c. Values derived using silver - tin plated copper wires
- d. Reference - UL486A-2001

7.7 Female cable connector contact pull out force: 111 N min.

7.8 Threaded Insert Pull out force: 111 N min.

8.0 Environmental Conditions

After exposure to the following environmental conditions in accordance with the specified test procedure and/or details, the product shall show no physical damage and shall meet the electrical and mechanical requirements per paragraphs 6.0 and 7.0 as specified in the Table 1 test sequences. Unless specified otherwise, assemblies shall be mated during exposure.

8.1 Thermal Shock – EIA 364-32.

- a. Number of Cycles -10
- b. Temperature Range - Between -55°C and 105°C
- c. Time at each Temperature – 60 minutes
- d. Transfer Time - 5 minutes, maximum

8.2 Cyclic Temperature and Humidity – EIA 364-31 method IV (cyclic temperature)

- a. Relative Humidity - 80% to 98%
- b. Temperature - 25°C~85°C
- c. Duration - 240 hours
- d. Omit step 7b (vibration) where applicable

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8.3 High Temperature Life - EIA 364-17.

- a. Test Temperature – 125 ± 2°C
- b. Test Duration - 168 hours

8.4 High Temperature Life (preconditioning) - EIA 364-17.

- a. Test Temperature - 125 ± 2°C
- b. Test Duration - 84 hours

8.5 Salt Spray

No abnormal nicks, cracks, or scratches on finished surfaces that indicate the removal of the normal protective coating. The following details shall apply:

- a) Reference: EIA 364-26, Test Condition
- b) Temperature: 35°C+1/-2°C.
- c) Humidity: 95%~98% RH.
- d) Concentration: 5%
- e) Duration: 48 hours.
- f) Contact resistance meets the requirements.

8.6 Vibration (Random) – EIA 364-28

- a. Test Condition - Test condition VII, Test condition E
- b. 15 minutes duration in each of the three mutually perpendicular direction
- c. Mounting - Rigidly mount assemblies
- d. No discontinuities greater than 1 microseconds or nanoseconds

8.7 Mechanical Shock - EIA 364-27

- a. Condition - Test condition A (50G, 11 millisecond, half-sine pulse type)
- b. Shocks - 3 shocks in both directions along each of three orthogonal axes (18 shocks total)
- c. Mounting - Rigidly mount assemblies
- d. No discontinuities greater than 1 microsecond.

8.8 Dust - EIA 364-91

- a. Dust Composition #1 (benign)
- b. Duration: 1.0 hour

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c. Unmated connector to be placed in the chamber

8.9 Solder ability - ANSI-J-STD-002

- a. Steam aging - 8 hours
- b. Minimum solder coverage: 95%

8.10 Thermal Disturbance - EIA 364-110

- a. Number of Cycles - 10, 2 Hours/Cycle
- b. Temperature Range - Between $+15 \pm 3^{\circ}\text{C}$ and $+85 \pm 3^{\circ}\text{C}$
- c. Dwell time for each extreme temperature - 5 minutes minimum
- d. Ramp rate - a minimum of 2°C per minute

8.11 Resistance to Solder Heat - EIA 364-56

- a. Test Condition - Condition H, Procedure 3
- b. There shall be no evidence of physical or mechanical damage

8.12 Plating Thickness - EIA 364-48A

- a. Test Condition - XRF, method C
- b. Au plating thickness: refer to corresponding drawing specification

9.0 QUALITY ASSURANCE PROVISIONS

9.1 Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with ISO 9000.

9.2 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

- a. Temperature: $25 \pm 5^{\circ}\text{C}$
- b. Relative Humidity: 30% to 60%
- c. Barometric Pressure: Local ambient

9.3 Sample Quantity and Description

The sample size and description are listed for each test in the appropriate section of this document.

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9.4 Acceptance

9.4.1 Electrical and mechanical requirements placed on test samples as indicated in paragraphs 6.0 and 7.0 shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with this product specification shall meet the stated requirements.

9.4.2 Failures attributed to equipment, test setup, or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken, and samples resubmitted for qualification.

9.5 Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequences shall be as shown in the qualification test table.

9.6 Re-Qualification Testing

If any of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix.

- a. A significant design change is made to the existing product which impacts the product form, fit or function. Examples of significant changes shall include, but not be limited to, changes in the plating material composition or thickness, contact force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.
- b. A significant change is made to the manufacturing process which impacts the product form, fit or function.
- c. A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

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9.7 Qualification Test Table

TEST GROUP ID:		1	2	3	4	5	6	7	8	9	10	11	12
TEST DESCRIPTION	SECTION	Temp Life	Thermal Shock & Humidity	Mech. Shock & Vibration	Salt Spray	Dielectric	Dust	Durability	Current Rating	THERMAL DISTURBANCE	Crimp	Whip connector Pull out force	Threaded Insert Pull out force
VISUAL EXAMINATION		1,9	1,11	1,11	1, 13	1,10	1,11	1,10	1,4	1, 5	1	1	1
MATE MALE & FEMALE		2	2	2	2		2	2	2			2	2
ELECTRICAL:													
CONTACT RESISTANCE	6.1	3,6,8	3,6, 8,10	3,6, 8,10	3,6,8, 10,12		3,6, 8,10	4,8					
INSULATION RESISTANCE	6.2					2,5,8							
DIELECTRIC WITHSTANDING VOLTAGE	6.3					3,6,9		3,9					
CURRENT RATING	6.4								3				
CRIMP RESISTANCE	6.5										2		
MECHANICAL:													
MATING /UNMATING FORCE	7.1							5,7					
CONTACT RETENTION	7.2									2			
RESEATING	7.3	7	9		11		9						
DURABILITY, 100 Cycles	7.4							6					
DURABILITY, 10 CYCLES (Preconditioning)	7.5	4	4	4	4		4						
Crimp Tensile Strength	7.6										3		
Whip connector Pull out force	7.7											3	
Threaded Insert Pull out force	7.8												3
ENVIRONMENTAL:													
THERMAL SHOCK	8.1		5			4							
Cyclic Temperature & Humidity	8.2		7			7							
HIGH TEMPERATURE LIFE	8.3	5											
HIGH TEMPERATURE LIFE (Preconditioning)	8.4			5	5								
SALT SPRAY	8.5				7								
RANDOM VIBRATION	8.6			7									
MECHANICAL SHOCK	8.7			9									
DUST CONTAMINATION	8.8						5						
SOLDERABILITY	8.9									4			
THERMAL DISTURBANCE	8.10				9		7						
COMPONENT HEAT RESISTANCE TO WAVE SOLDERING	8.11									3			
SAMPLES QUANTITY(PCS)		5	5	5	5	5	5	5	5	5	5	5	5

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REVISION RECORD

REV	PAGE	DESCRIPTION	ECN#	DATE
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