

## UL TEST REPORT AND PROCEDURE

|                                    |   |
|------------------------------------|---|
| <b>Standard:</b>                   | ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10)(Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance)<br>CAN/CSA-C22.2 No. 60601-1 (2008) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) |
| <b>Certification Type:</b>         | Component Recognition   |
| <b>CCN:</b>                        | QQHM2, QQHM8 (Power Supplies, Medical and Dental)   |
| <b>Product:</b>                    | Component Switching Power Supply  |
| <b>Model:</b>                      | RCL175PXY series (where X can be S, D, T or Q indicating single, dual, triple, or quad output configurations, Y can be 00 to 99, or AA-ZZ), may be provided with additional suffixes U, C, F, or blank and/or W. See Model Differences for nomenclature.  |
| <b>Rating:</b>                     | Model 101372-xx (where x can be any alphanumeric character or blank)<br>Input: 100-240 V~, 50/60 Hz, 2.7 A<br><br>See Model Differences for output configurations.  |
| <b>Applicant Name and Address:</b> | XP POWER LLC<br>SUITE 150<br>1241 E DYER RD<br>SANTA ANA CA 92705<br>UNITED STATES  |

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Issue Date: 2012-01-10  
2012-06-06

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Report Reference #

E146893-A37-UL

Prepared by: Linus Park

Reviewed by: Michael J. Howell

### **Supporting Documentation**

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

- A. Authorization - The Authorization page may include additional Factory Identification Code markings.
- B. Generic Inspection Instructions -
  - i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
  - ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.
  - iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

### Product Description

The products covered in this report are component power supplies intended for use in Medical Electrical Equipment.

### Model Differences

Model numbers are as follows: RCL175PXY, where X can be S, D, T, or Q, indicating single, double, triple or quad (4) output configurations respectively, where Y can be 0 to 99 or AA thru ZZ. The 0 to 99 representing output voltages from 3.3 to 60 Vdc for Models where X is S, and AA to ZZ represents the no. of output and configurations. Individual Outputs V1-V4 have the following limitations; V1: 3.3-60 Vdc, 204 W max; V2: 3.3-60 Vdc, 120 W max; V3: 3.3-60 Vdc, 120 W max; V4: 3.3-60 Vdc, 30 W max. Total maximum combined input power is 204 Watts when provided with fan cover. TMRA is 50 degrees Celsius. See models and ratings and Enclosure Diagram 4-01 for specific ratings.

The power supply chassis can be provided in 4 configurations - No suffix = open frame with heatsinks; Suffix -U provided with U channel chassis; Suffix -C provided with Cover; Suffix -F provided with fan cover kit. See enclosure Enclosures Diagram 4-02 for further details.

Models followed with the suffix W are provided with two Y1 bridging capacitors (C41 and C41A) and provide two MOPP between primary and secondary and Models without the suffix W are provided with one Y1 bridging capacitor (C41) and provide one MOPP between primary and secondary. When configured for Class II construction, with the suffix W, Capacitors C6A, C7A and C10A are also provided.

Model 101372-xx (where x can be any alphanumeric character or blank) is identical to Model RCL175PSAA provided with optional open frame fan assembly with exception to the model designation. "xx" suffix is a revision indicator.

### Technical Considerations

- Classification of installation and use : Building-in
- Device type (component/sub-assembly/ equipment/ system) : Component
- Intended use (Including type of patient, application location) : To supply regulated power
- Mode of operation : Continuous
- Supply connection : To be determined in the end product
- Accessories and detachable parts included : Fan Cover, U Channel Chassis
- Other options include : None
- The product was investigated to the following additional standards:: ANSI/AAMI ES60601-1 (2005 + C1:09) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) (includes Deviations for United States), CAN/CSA-C22.2 No. 60601-1 (2008) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) (includes National Differences for Canada), EN 60601-1: 2006 (Medical electrical equipment Part 1:

General requirements for basic safety and essential performance)

- The product was not investigated to the following standards or clauses: Electromagnetic Compatibility (IEC 60601-1-2), Clause 14, Programmable Electronic Systems, Biocompatibility (ISO 10993-1)
- The degree of protection against harmful ingress of water is: Ordinary
- The following accessories were investigated for use with the product: Fan Cover, U Channel Chassis
- The mode of operation is: Continuous
- The product is suitable for use in the presence of a flammable anesthetics mixture with air or oxygen or with nitrous oxide: No
- Scope of Power Supply evaluation excludes the following: Patient applied parts clauses: 4.6, 7.2.10, 8.3, 8.5.2, 8.5.5, 8.7.4.7-8.7.4.9, 8.9.1.15; Battery related clauses: 7.3.3, 15.4.3; Hand Control related clauses: 8.10.4; Oxygen related clauses: 11.2.2; Fluids related clauses: 11.6.2 – 11.6.4; Sterilization clause: 11.6.7; Biocompatibility Clause: 11.7 (ISO 10993); Motor related clauses: 13.2.13.3, 13.4; Heating Elements related clause: 13.2; Flammable Anaesthetic Mixtures Protection: Annex G
- Supply connection: Overvoltage Category II
- Software is relied upon for meeting safety requirements related to mechanical, fire and shock: No

#### **Engineering Conditions of Acceptability**

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The component shall be considered for compliance with the Marking (clause 7) and Separation (clause 8) requirements as part of the end use application evaluation.
- Temperature, leakage and Dielectric Tests should be considered in the end product.
- Touch current test to be conducted as part of the end product.
- Power supply Models with the suffix W are provided with two Y1 bridging capacitor (C41 and C41A) and evaluated with Two MOPP between Primary and Secondary; One MOPP primary and Earth and Models without the suffix W are provided with one Y1 bridging capacitor (C41) and evaluated for 1 MOPP between primary and secondary and 1 MOPP between primary and earth.

- This power supply has been evaluated as a continuous operation, ordinary equipment and has not been evaluated for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide. The output circuits have not been evaluated for direct patient connection (Type B, BF or CF).
- The end product shall ensure that the requirements related to accompanying documents, clause 7.9, are met.
- The available voltage for the secondary outputs does not exceed 25 Vac or 60 Vdc, under normal and single fault conditions.
- The input/output connectors are suitable for factory wiring only.
- The maximum investigated branch circuit rating is: 20 A. If used on a branch circuit greater than this, additional testing may be necessary.
- The Electric Strength Test conducted on this power supply was based upon a maximum working voltage of: Primary-Earthed Dead Metal (Class I units): 240Vrms, 466 Vpk; Primary-SEC: 466 Vpk, 240Vrms.
- When installed in a Class I end product, the power supply shall be mounted in a manner that provides, at a minimum, 2.5 mm Clearance/4 mm Creepage between the primary sides of power supply and protectively earthed accessible conductive parts. In addition, when installed in a Class I end product, the protective bonding terminal of the power supply shall be reliably connected to the main protective earthing terminal of the end product.
- When installed in a Class II end product, the power supply shall be mounted, on insulating posts, in a manner that provides, at a min. 5 mm Clearance/8 mm Creepage between the power supply and any accessible conductive parts. Capacitors C6A, C7A and C10A shall be provided when two MOPP is required.
- An investigation of the protective bonding terminal has: Not been conducted.
- For Class I application: Protective bonding testing shall be considered in the end product application.
- Proper bonding to the Class I end-product main protective earthing termination is required (via mounting holes on the PCB), unless for Class II applications. For Class II applications the primary side mounting pads are isolated from accessible conductive chassis by Reinforced Insulation
- The equipment has been evaluated for use in a Pollution Degree 2 environment.
- Residual Voltage in Attachment Plug should be conducted in the end product with the final configuration/values of Y and bridging capacitors.
- Consideration should be given to the measuring the temperature on the ferromagnetic components when installed in the end product. Primary components T1, T2, T3, L1, L2, L3 and L4 are provided

with Class F insulation systems. Secondary components L5, L6 and L9 are provided with Class F insulation systems.

- The PWB is rated 130°C.
- Cleaning test to be considered as part of end product evaluation.
- The need for Marking Durability and Marking Legibility Testing shall be considered as part of the end product installation.
- Fire/ Mechanical/ Electrical Enclosure to be provided as part of the end product.
- Models RCL175PXY is rated for use in an ambient of 50°C.
- The total maximum combined output power shall not exceed 175 Watts.
- For Class II applications, the power supply must be configured as an open frame and must not be used with the U-channel chassis or fan cover options. Capacitor connected between primary and earth terminal is type Y1.
- For Class I operation, consideration for conducting the grounding impedance test, from heatsink 1 and heatsink 2 to the protective earth terminal in the end product, should be given.
- The need to measure the leakage current with a non-frequency weighted device per Clause 8.7.3 (e) shall be considered in the end-product.

#### **Additional Information**

When submitting this Test Report to other Certification Body, the manufacturer is responsible for providing any additional information that the Body may need in order to issue its Mark, including testing for compliance with the applicable collateral standards.

Manufacturer to provide up to date IEC Licensed for component licenses greater than 3 years upon request.

Only one marking plate is provided which is representative of the other models in the series except for the output ratings.


The Heating Test data and peak working voltage measurements were derived from CB Report issue to IEC 60950-1:2005 covered in Test Report Reference E139109-A11-CB-1 issued 2010-12-14 with CB Test Certificate US/16253/UL issued 2010-12-14.

#### **Additional Standards**

The product fulfills the requirements of: ANSI/AAMI ES60601-1 (2005 + C1:09) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) (includes Deviations for United States), CAN/CSA-C22.2 No. 60601-1 (2008) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) (includes National Differences for Canada), EN

60601-1: 2006 (Medical electrical equipment Part 1: General requirements for basic safety and essential performance)

**Markings and instructions**

| Clause Title                                     | Marking or Instruction Details  |
|--|---|
| Company identification                           | Classified or Recognized company's name, Trade name, Trademark or File            |
| Model  | Model number  |
| Supply Frequency                                 | Rated frequency range in hertz  |
| Supply Connection                                | Voltage range, ac/dc, phases if more than single phase                            |
| Alternating current                              |  |
| Power Input                                      | Amps, VA, or Watts  |
| Output   | Rated output voltage, power, frequency.   |
| <b>Special Instructions to UL Representative</b> |   |
| N/A  |   |

**Production-Line Testing Requirements**

**Test Exemptions** - The following models are exempt from the indicated test

| Model      | Grounding Continuity | Dielectric Voltage Withstand | Patient Circuit Dielectric Voltage Withstand |
|------------|----------------------|------------------------------|--|
| All models | Exempt               | Test                         | Exempt                                       |

**Solid-State Component Test Exemptions** - The following solid-state components may be disconnected from the remainder of the circuitry during either Dielectric Voltage Withstand Test:

| Component |
|-----------|
| N/A       |

**Sample and Test Specifics for Follow-Up Tests at UL**

The following tests shall be conducted in accordance with the Generic Inspection Instructions

| Plastic Enclosure or Part | Test | Sample(s) | Test Specifics |
|---------------------------|------|-----------|----------------|
| N/A                       |      |           |                |



## UL TEST REPORT AND PROCEDURE

|                                    |  |
|------------------------------------|--|
| <b>Standard:</b>                   | UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements)<br>CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements)  |
| <b>Certification Type:</b>         | Component Recognition  |
| <b>CCN:</b>                        | QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)   |
| <b>Product:</b>                    | Switch Mode Power Supply   |
| <b>Model:</b>                      | RCL175PXY Series (where X can be S, D, T or Q indicating single, dual, triple, or quad output configurations, Y can be 00 to 99, or AA-ZZ), may be provided with additional suffixes U, C, F, or blank.  |
| <b>Rating:</b>                     | Input Rated:<br>100-240 Vac, 50/60 Hz, 2.7 A Max<br><br>Outputs Rated:<br>1 to 4 outputs provided, Max 175 W with Fan option and 120 W convection cooling.<br><br>V1: 3.3-60 Vdc<br>V2: 3.3-60 Vdc<br>V3: 3.3-60 Vdc<br>V4: 3.3-60 Vdc<br><br>See Miscellaneous enclosure for specific output ratings. |
| <b>Applicant Name and Address:</b> | XP POWER L L C<br>SUITE 150<br>1241 E DYER RD<br>SANTA ANA CA 92705<br>UNITED STATES   |

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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Issue Date: 2006-07-27  
2013-03-26

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Report Reference #

E139109-A11-UL

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Prepared by: Sal Oseguera

Reviewed by: Gregory Ray

### Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

- A. Authorization - The Authorization page may include additional Factory Identification Code markings.
- B. Generic Inspection Instructions -
  - i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
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  - iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

### Product Description

The power supplies covered under this report are component open frame switch mode power supplies for building-in.

The RCL175 series power supply is rated at up to 120 Watts with convection cooling and maximum 175 Watts when provided with the optional 12 cfm fan. The RCL175 is available with one to four outputs: 3V to 60V on output one, 5V to 60V on output two, and 5V to 30V on outputs three and four. Mechanical options include open frame, U-channel, U-channel with cover and U-channel with fan cover.

### Model Differences

All models are similar, except designation, chassis options, PWB population, number of outputs and output electrical ratings. See Miscellaneous enclosure for specific output ratings.

Model RCL175PXY Series

Where X can be S, D, T or Q indicating single, dual, triple, or quad output, respectively

Where Y can be 00 to 99, or AA-ZZ indicating the output voltage

Additional suffixes U, C, F, or blank indicating various mechanical chassis options, indicated below:

- 1) Open frame with heat sinks (no suffix)
- 2) U-Channel with heat sinks (suffix U)
- 3) U-Channel with cover (suffix C)
- 4) U-Channel with fan cover (suffix F)

Model RCL175PSAJ is identical to RCL175PS24 except for secondary connector, thermistor, and trace layout modified for accommodating the secondary connector.

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : for building-in
- Operating condition : continuous

- Access location : for building-in
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +6%, -10%
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : N/A
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 2.7 A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 3048
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : 0.8
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: 50°C at full load and 70°C at 50% load (See Enclosure 7-02 for de-rating curve)
- The means of connection to the mains supply is: for building-in, to be determined in the end-product.
- The product is intended for use on the following power systems: TN
- The equipment disconnect device is considered to be: for building-in, to be determined in the end-product.
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A12:2010 + A12:2011 (which includes all European national differences, including those specified in this test report).

#### **Engineering Conditions of Acceptability**

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The following Production-Line tests are conducted for this product: Electric Strength, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 281V<sub>rms</sub>, 466 V<sub>pk</sub>, Primary-SELV: 281 V<sub>rms</sub>, 466 V<sub>pk</sub>,
- The following secondary output circuits are SELV: All outputs
- The following secondary output circuits are at hazardous energy levels: Model RCL175PS12: V1 Output; Model RCL175PS24: V1 Output; Model RCL175PS60: V1 Output; Model RCL175PD22: V1, V2 Outputs; Model RCL175PQ42: V1 Output; Model RCL175PQ43: V1 Output; Model RCL175PQ45: V1, V2 Output; RCL175PQ47: V1, V2 Output; RCL175PQ60: V1, V2, V4 Output.
- The following secondary output circuits are at non-hazardous energy levels: Model RCL175PS05: V1 Output; Model RCL175PS48: V1 Output; Model RCL175PQ42: V2, V3, V4 Output; Model RCL175PQ43: V2, V3, V4 Output; Model RCL175PQ45: V3, V4 Output; Model RCL175PQ47: V3, V4 Output; Model RCL175PQ60: V3 Output.,
- The following secondary output circuits are Limited Current Circuits: Load side of Bridging Capacitor C41,
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- The maximum investigated branch circuit rating is: 20 A

- The investigated Pollution Degree is: 2
- Proper bonding to the end-product main protective earthing termination is: Required
- An investigation of the protective bonding terminals has: Not been conducted
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C): T1, T2, L1, L2 and L4 (Class F),
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- Fans: The fan provided in this sub-assembly is not intended for operator access, to be evaluated in the end product.
- Printed Wiring Boards are rated minimum 130°C. Electrolytic capacitors are rated minimum 105°C.
- Equipment considered Class I. Additional evaluation required for Class II applications.
- Fuses provided with unambiguous cross-reference to servicing instructions (FS1, FS2). End product servicing instructions to contain fuse type and ratings; 3.15 A, 250 V, Type T.
- Maximum 10 A on V1 and V2 with convection cooling. 12 cfm fan (optionally provided) required for maximum output power of 175 W. Output current de-rated 50% for Tmra of 70°C.
- Equipment employs double pole/neutral fusing. Cautionary markings for service persons to be consider during end product evaluation.
- The need for additional Protective Earthing Test to 40A to be considered as part of the end-product installation.

**Additional Information**

This report is a reissue of CBTR Ref. No. E139109-A11-CB-1, CB Test Certificate Ref. No. US/16253/UL. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product complies with the upgrade of the Second Edition of the Standard to Amendment 1.

No tests were conducted under this investigation due to reissue of CB Test Report Ref. No. E139109-A11-CB-1. All required tests were carried out under the original investigation.

The required clearance values have been assessed for suitability up to 3048 m elevation (1.15 correction factor as per IEC 60664-1, Table A2).

The need for the additional testing and evaluation shall be determined in the end product investigation.

The nameplate markings provided as an Enclosure - Marking Plate are considered representative of the entire series and only the output ratings may vary.

**Additional Standards**

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 + A1:2011, EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011, UL 60950-1 2nd Ed. Revised 2011-12-19, IEC 60950-1:2005 + A1:2009

**Markings and instructions**

| Clause Title           | Marking or Instruction Details                                       |
|------------------------|--|
| Power rating - Ratings | Ratings (voltage, frequency/dc, current)                             |
| Power rating -         | Listee's or Recognized company's name, Trade Name, Trademark or File |

|  |  |
|--|--|
| Company identification                           | Number   |
| Power rating - Model                             | Model Number   |
| Fuses - Non-operator access/soldered-in fuses    | Unambiguous reference to service documentation for instructions for replacement of fuses replaceable only by service personnel |
| <b>Special Instructions to UL Representative</b> |  |
| N/A  |  |

**Production-Line Testing Requirements**

**Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.**

| Model      | Component       | Removable Parts | Test probe location  | V rms    | V dc | Test Time, s |
|------------|-----------------|-----------------|----------------------|----------|------|--------------|
| All Models | Transformer, T1 | -               | Primary to Secondary | 300<br>0 | 4242 | 1            |
| All Models | Inductor, L2    | -               | Primary to Secondary | 300<br>0 | 4242 | 1            |

**Earthing Continuity Test Exemptions - This test is not required for the following models:**

**Electric Strength Test Exemptions - This test is not required for the following models:**

**Electric Strength Test Component Exemptions - The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:**

**Sample and Test Specifics for Follow-Up Tests at UL**

| Model | Component | Material | Test | Sample(s) | Test Specifics |
|-------|-----------|----------|------|-----------|----------------|
| N/A   |           |          |      |           |                |