CERTIFICATE OF COMPLIANCE

Certificate Number	2015-12-7-E321744
Report Reference	E321744-D1009-1/A0/C0-ULCB
Issue Date	2015-12-7
Issued to:	XP POWER LLC
Applicant Company:	15641 REDHILL AVENUE SUITE 100 TUSTIN, CA 92780 USA
Listed Company:	Same as Applicant
This is to certify that representative samples of	DC/DC Converter JHL03XXYZZ and JHL06XXYZZ series (where 'XX' =12 or 24; 'Y' = S or D, 'ZZ' = 05, 12, 15) Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	ANSI/AAMI ES60601-1:2005/(R)2012, CSA CAN/CSA-C22.2 NO. 60601-1:14, IEC 60601-1 Edition 3.1 (2012), IEC 60601-1 Edition 3.1 (2012) / EN 60601-1 (2006) + A11 + A1 + A12
Additional Information:	See the UL Online Certifications Directory at www.ul.com/database for additional information.

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Bruce Mahrenholz, Assistant Chief Engineer, Global Inspection and Field Services, UL LLC
Joseph Hosey, General Manager, Director of Sales – Canada, UNDERWRITERS LABORATORIES OF CANADA INC.

Helena Y. Wolf, Director, Global Market Access Operations, UL LLC

Description

UL TEST REPORT AND PROCEDURE

Standard:	ANSI/AAMI ES60601-1:2005/(R)2012, CSA CAN/CSA-C22.2 NO. 60601-1:14, IEC 60601-1 Edition 3.1 (2012), IEC 60601-1 Edition 3.1 (2012) / EN 60601-1 (2006) + A11 + A1 + A12
Certification Type:	Component Recognition
CCN:	QQHM2, QQHM8
Complementary CCNs:	
Product:	DC/DC Converter
Model:	JHL03XXYZZ and JHL06XXYZZ series (where 'XX' =12 or 24; 'Y' = S or D, 'ZZ' = 05, 12, 15)
Rating:	Input: For Models JHL0312YZZ and JHL0612YZZ Series: 10-17 VDC; For Models JHL0324YZZ and JHL0624YZZ Series: 20-30 VDC; Output: See Model Differences for details.
Applicant Name and Address:	XP POWER LLC 15641 REDHILL AVENUE SUITE 100 TUSTIN, CA 92780, USA

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 as applicable.

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

Prepared by: Haydee Gonzalez Reviewed by: Timothy L. Gambrell

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 unit is a DC/DC Converter to be used as part of Medical Electrical Equipment, and is intended to provide Two MOPP between DC input circuits to DC output circuit.

The unit is provided with top and bottom plastic enclosure. All components inside the unit are mounted on PWB.
Refer to the Report Modifications page for any modifications made to this report.

Model Differences

Model JHL03XXYZZ Series and Model JHL06XXYZZ Series where XX can be 12 or 24 and denotes DC input voltage. "S" stands for single output and "D" stands for Double output. ZZ denotes the output voltage.

All models within a series are identical except for transformer windings, inductance and MOSFETs, and output ratings.

See below for Model Output Ratings @ 50°C.
JHL0312S05: 5 VDC, 600 mA
JHL0312S12: 12 VDC, 250 mA
JHL0312S15: 15 VDC, 200 mA
JHL0324S05: 5 VDC, 600 mA
JHL0324S12: 12 VDC, 250 mA
JHL0324S15: 15 VDC, 200 mA
JHL0612S05: 5 VDC, 1200 mA
JHL0612S12: 12 VDC, 500 mA
JHL0612S15: 15 VDC, 400 mA
JHL0624S05: 5 VDC, 1200 mA
JHL0624S12: 12 VDC, 500 mA
JHL0624S15: 15 VDC, 400 mA

Output: Dual Output Units:
JHL0312D12: +/-12 VDC, 125 mA
JHL0312D15: +/-15 VDC, 100 mA
JHL0324D12: +/-12 VDC, 125 mA
JHL0324D15: +/-15 VDC, 100 mA
JHL0612D12: +/-12 VDC, 250 mA
JHL0612D15: +/-15 VDC, 200 mA
JHL0624D12: +/-12 VDC, 250 mA
JHL0624D15: +/-15 VDC, 200 mA

Additional Information

Marking label submitted is representative of all models in this Report.

CB Test certificates for components are included in Licenses Enclosure. In accordance with the current rules of CB Scheme, CB Test certificate is effective for 3 years. Recognizing NCB may challenge the CBTC when certificates are more than 3 years old.

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.

Ball pressure tests considered covered under Test Report E321744-D1001, CB Certificate US-24943-UL.

Technical Considerations

- The product was investigated to the following additional standards: CAN/CSA-C22.2 No. 60601-1 (2008), ANSI/AAMI ES60601-1 (2005 + C1:09 +A2:10), IEC 60601-1, 3rd ed (2005), EN 60601-1:2006
- The following additional investigations were conducted: N/A
- The product was not investigated to the following standards or clauses: Electromagnetic Compatibility (IEC 60601-1-2), Clause 14, Programmable Electronic Systems, Biocompatibility (ISO10993-1)
- The following accessories were investigated for use with the product: N/A
- The degree of protection against harmful ingress of water is: Ordinary
- The following accessories were investigated for use with the product: None
- 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 this evaluation defers the following clauses to the be determined as part of the end product: Clause 7.5 (Safety Signs), Clause 7.9 (Accompanying Documents), Clause 9 (ME Hazard), Clause 10 (Radiation), Clause 14 (PEMS), Clause 16 (ME Systems).
- Scope of this 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.

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:

- This power supply has been judged on the basis of the required creepage and clearances in the Third Edition of the Standard for Medical Electrical Equipment, IEC 60601-1, Sub-clause 8.9, which covers the end-use product for which the component was designed.
-
- The unit is a DC/DC converter and not evaluated for the separation to SUPPLY MAINS; suitable MAINS separation shall be provided during final installation.
-
- Temperature, Leakage Current, Protective Earthing Dielectric Voltage Withstand and Interruption of the Power Supply tests should be considered as part of the end product evaluation.
-
- The product was submitted and tested for use at the manufacturer's recommended ambient temperature (Tmra) of 60°C at Full Load.
-
- The output circuit has not been evaluated for connecting to Applied Parts. For end products intended to connect to Applied Parts, suitable evaluation should be considered.
-

- Considerations to the applied parts requirement, to be conducted as end-product
-
- Consideration should be given to measuring the temperature on power electronic components and transformer windings when the power supply is installed in the end-use equipment. The end-use product shall ensure that the power supply is used within its ratings.
-
-
- The end-product evaluation shall ensure that the requirements related to Accompanying Documents, Clause 7.9 are met.
-
- End product Risk Management Process to include consideration of requirements specific to the Power Supply.
-
- End product Risk Management Process to consider the need for simultaneous fault condition testing.
-
- End product Risk Management Process to consider the need for simultaneous fault condition testing.
-
- End product to determine the acceptability of risk in conjunction to insulation to resistance to heat, moisture, and dielectric strength.
-
- End product to determine the acceptability of risk in conjunction to the Leakage of Liquids as part of the power supply.
-
- End product to determine the acceptability of risk in conjunction to the selection of components as it pertains to the intended use, essential performance, transport, storage conditions as part of the power supply.
-
- The products were tested on a 20 A branch circuit. If used on a branch circuit greater than this, additional testing may be necessary.

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

Special Instructions to UL Representative
None

Production-Line Testing Requirements		
Test Exemptions - The following models are exempt from the indicated test		
Test	Exemption Specifics	Details
Grounding Continuity	The following models are exempt from the indicated test:	All models
Dielectric Voltage Withstand	The following models are exempt from the indicated test:	NA
Patient Circuit Dielectric Voltage Withstand	The following models are exempt from the indicated test:	All models
Solid-State Components	The following solid-state components may be disconnected from the remainder of the circuitry during either Dielectric Voltage Withstand Test:	NA

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
None	NA	NA	NA

TABLE: List of Critical Components

8.10	TABLE: List of critical components				Pass
Component/ Part No.	Manufacturer/ Trademark	Type No./model No./	Technical data	Standard No./ Edition [2]	Mark(s) & Certificates of conformity [1]
Enclosure (Plastic)	Wah Hong Industrial Corp.	WH-9100	Min. V-0; rated 130°C; thickness 0.75 mm	QMFZ2(E150608)	UL
Capacitor (C1) - For Models JHL0324S05 orJHL0624S05	Interchangeable	Interchangeable	Rated 1 uF, min. 50 V	-	-
Capacitor (C1) – For Model JHL03XX or JHL06XX Series 10-17 VDC input only	Interchangeable	Interchangeable	Rated 10 uF, min. 25 V	-	-
Capacitor (C1) – For Model JHL03XX or JHL06XX Series 20-30 VDC input only	Interchangeable	Interchangeable	Rated 1 uF, min. 50 V	-	-
Capacitor (C2) - Model JHL03XX or JHL06XX Series 10-17 VDC input only	Interchangeable	Interchangeable	Rated 10 uF, min. 25 V	-	-
Capacitor (C2) - For Model JHL03XX or JHL06XX Series 20-30 VDC input only	Interchangeable	Interchangeable	Rated 3.3 uF, min. 50 V	-	-
Inductor (L1) – For Model JHL03XX or JHL06XX Series 10-17 VDC input only	Interchangeable	Interchangeable	Ferrite core wrapped with magnetic wire, (OBWM2), rated min. 130°C (rated 12 uH, 25 V)	-	-
Inductor (L1) – For Model JHL03XX or JHL06XX Series 20-30 VDC input only	Interchangeable	Interchangeable	Ferrite core wrapped with magnetic wire, (OBWM2), rated min. 130°C (rated 47 uH, 25 V)	-	-
Transformer (T1)	Ain Hsin Electronic Co. Ltd.	TR-JHM03XX-Y-ZZ or TR-JHM06XX-Y-ZZ(where XX=12 or 24;where Y=S or D and ZZ=05,12, or15)	Concentrically wired transformer with Ferrite Core by Nicera Corp., Acme Electrics or Tomita Ferrite. Refer to Enclosure 4-01 to 4-20. Constructed as follows:	-	-
Transformer (T1) - Insulation system	Sumitomo Bakelite Co. Ltd. or Cincon Electronics Co., Ltd	SBI4.2	Class B, rated 130°C	OBJY2(E209189 or E305999)	UL
Transformer (T1) - Magnetic Wire	Interchangeable	Interchangeable	MW 28 or 75, rated min. 130°C	OBMW2	UL
Transformer (T1) - Bobbin	Sumitomo Bakelite Co. Ltd.	PM-9630	Rated min 130°C, V-0.	QMFZ2(E41429)	UL
Transformer (T1) - Bobbin -Alternate	Sumitomo Bakelite Co. Ltd.	LCP E4008	Rated min 130°C, V-0.	QMFZ2(E54705)	UL

8.10	TABLE: List of critical components				Pass
Component/ Part No.	Manufacturer/ Trademark	Type No./model No./	Technical data	Standard No./ Edition [2]	Mark(s) & Certificates of conformity [1]
Transformer (T1) - Tape	3M	1350-1	Polyester film tape, rated 130°C	QMFZ2(E17385)	UL
Transformer (T1) - Triple insulation wire	Totoku Electric Co Ltd	TIW-2S	Rated min 130°C, 250V (evaluated for twisted pair, Reinforced insulation, at 8000V dielectric)	OBJT2 (E166483)	UL
Transformer (T1) - Triple insulation wire -Alternate	Totoku Electric Co Ltd	TIW-2	Rated min 130°C, 250V (evaluated for twisted pair, Reinforced insulation, at 8000V dielectric)	OBJT2 (E166483)	UL
MOSFET (Q1) – For Model JHL03XX or JHL06XX Series 10-17 VDC input only	IR	IRFL014 Series	Rated min. 55 V, min. 1.9 A	-	-
MOSFET (Q1) – Alternate - For Model JHL03XX or JHL06XX Series 10-17 VDC input only	Interchangeable	Interchangeable	Rated min. 55 V, min. 1.9 A	-	-
MOSFET (Q1) – For Model JHL03XX or JHL06XX Series 20-30 VDC input only	IR	IRFL110 Series	Rated min. 100 V, min. 1.5 A	-	-
MOSFET (Q1) – Alternate – For Model JHL03XX or JHL06XX Series 20-30 VDC input only	Interchangeable	Interchangeable	Rated min. 100 V, min. 1.5 A	-	-
Optocoupler (IC1)	Toshiba Corp.	TLP781,TLP383,TLP385	Provided with 0.4 mm DTI min.; Rated 5000 Vrms isolation voltage	FPQU2, FPQU8 (E67349)	UL, cUL, VDE
Optocoupler (IC1) - Alternate	COSMO Corp	K1010	Provided with 0.4 mm DTI min.; Rated 5000 Vrms isolation voltage	FPQU2 (E169586)	UL, CSA, VDE
Optocoupler (IC1) - Alternate	Sharp Corp.	PC817	Provided with 0.4 mm DTI min.; Rated 5000 Vrms isolation voltage	FPQU2 (E64380)	UL, CSA, VDE
Printed Wiring Board	Interchangeable	Interchangeable	Min. V-0; rated 130 °C	ZPMV2	UL
Encapsulant	Dow Corning (Shanghai) Co. Ltd.	CN-8760	Min. V-1; rated 105 °C (not relied on for creepage and clearance)	QMFZ2(E251343)	UL
Encapsulant - Alternate	SHIN-ETSU	KET-132H	Min. V-0; rated 105 °C (not relied on for creepage and clearance)	QMFZ2(E174951)	UL
Encapsulant - Alternate	Dow Corning Corp.	Sylgard 160	Min. V-0; rated 105 °C (not relied on for creepage and clearance)	QMFZ2(E40195)	UL

8.10	TABLE: List of critical components				Pass
Component/ Part No.	Manufacturer/ Trademark	Type No./model No./	Technical data	Standard No./ Edition [2]	Mark(s) & Certificates of conformity [1]
Label	Koan Hao Enterprise Co. Ltd.	Polyester	Polyester label material with adhesive backing; rated 100°C max.	UL 969	UL
Alternate Label	Guang Zhou City Hai Zhu District Jin Wang Printing Factory	JW-1	Polyester label material with adhesive backing; rated 95°C max.	UL 969	UL

Supplementary information:

The (CB) Test Laboratory has verified the component information.

1) An asterisk indicates a mark which assures the agreed level of surveillance. See Licenses and Certificates of Conformity for verification.

2) Identify the UL Product Category CCN(s)/File Number in brackets "()" if component is a UL Certified component and this report includes a UL Certification. This is useful for the UL Follow-Up Service Inspection associated with the UL Mark.

---------- END OF APPENDIX C ----------

TEST RESULTS:

APPENDIX D: Test Datasheets Enclosures

The following tests have been performed as part of this report:

Standard	Clause No.	Test Name	Testing Location / Comments
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	4.11	Power Input	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	5.7	Humidity Conditioning	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	8.5.4	Working Voltage Measurements	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	8.7	Leakage Current Tests	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	8.7.4.6	Touch Leakage Current	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	8.8.3	Dielectric Voltage Withstand	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	8.8.4.1	Ball Pressure	Evaluated under report E321744-D1001
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	11	Temperature	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	13	Abnormal Operation Testing	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	15.5.1.2	Transformer Short Circuit	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	15.5.1.3	Transformer Overload	XP POWER LTD/ CTF Stage 3
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	15.5.2	Transformer Dielectric Voltage Withstand	XP POWER LTD/ CTF Stage 3

NOTE: If testing location is blank then the test was performed at the CB Testing Laboratory as specified at the beginning of this report.

The following datasheet enclosures are provided in this section of the report. If blank, no separate enclosures are attached.

Enclosures

Supplement ID	Description

---------- END OF APPENDIX D ----------