

CERTIFICATE OF COMPLIANCE

Certificate Number 2015-7-16-E321744
Report Reference E321744-D1004-1-ULCB
Issue Date 2015-7-16
Issued to: XP POWER L L C
Applicant Company: 15641 RED HILL AVE, SUITE 100
TUSTIN CA 92780 USA
Listed Company: Same as Applicant

This is to certify that representative samples of Component DC-to-DC Converter
IMM02xxSyyy and IMM02xxDyyy (where xx is 05 or 12 representing input voltage; yyy is 03, 3V3, 05, 12 or 15 representing output voltage)

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)

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

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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)
Certification Type:	Component Recognition
CCN:	QQHM2 / QQHM8
Product:	Component DC-to-DC Converter
Model:	IMM02xxSyyy and IMM02xxDyyy (where xx is 05 or 12 representing input voltage; yyy is 03, 3V3, 05, 12 or 15 representing output voltage)
Rating:	4.5 Vdc - 9 Vdc or 9Vdc to 18Vdc
Applicant Name and Address:	XP POWER L L C 15641 RED HILL AVE, 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.

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

Prepared by: Bernadette Matsuoka Reviewed by: Melissa DeGuia

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 component dc to dc Converter to be used as part of Medical Electrical Equipment, and is intended to

provide one MOPP between input circuits to output circuit

Refer to the Report Modifications page for any modifications made to this report.

Model Differences

IMM02xxSyyy and IMM02xxDyyy, where xx is 05 or 12 representing input voltage; and yyy is 03 or 3V3, 05, 12 or 15 representing output voltage)

Model IMM02xxDzzz Series is identical to Model IMM02xxSzzz Series except it is provided with two output instead of one.

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

See below for Model Output Ratings @ 60°C.

IMM02XXS3V3: 3.3Vdc, 606mA

IMM02XXS05: 5 Vdc, 400mA

IMM02XXS12: 12Vdc, 167mA

IMM02XXS15: 15Vdc, 133mA

IMM02XXD03: +3.3Vdc, 303mA; -3.3Vdc, 303mA

IMM02XXD05: +5 Vdc, 200mA; -5 Vdc, 200mA

IMM02XXD12: +12Vdc, 83mA; -12Vdc, 83mA

IMM02XXD15: +15Vdc, 66mA; -15Vdc, 66mA

Where XX can be 05, 12 and denotes nominal input voltage ranges as follows:

05 = 4.5-9Vdc

12 = 9-18Vdc

Additional Information

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

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.

Technical Considerations


- The product was investigated to the following additional standards:
- The following additional investigations were conducted: None
- 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: None
- No Other Considerations.

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 component dc to dc converter has been judged on the basis of the required creepage and clearances for 1 MOPP based on a working voltage of 250Vrms, 354Vpk between input and output circuits at an altitude of 5000m in accordance with Standard for Medical Electrical Equipment, Part 1: General requirements for basic safety and essential performance, ANSI/AAMI ES 60601-1:2005 (R) 2012, CSA C22.2 No. 60601-1:2014 and IEC 60601-1, Edition 3.1, 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
- .
- 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 dc-to-dc converter 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 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.
- The label has not been evaluated, the need to conduct the durability of marking and legibility of marking tests should be determined in the end product.
- The product is a component for building in, the accessibility shall be determined as part of the end product investigation.

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
Serial number or lot or batch identifier	Serial number or lot or batch identifier
Date of manufacture or use by date	Date of manufacture or use by date
Supply Connection	Voltage range, ac/dc, phases if more than single phase
Direct current	
Output	Rated output voltage, power, frequency.

Special Instructions to UL Representative
None

Production-Line Testing Requirements		
<u>Test Exemptions</u> - The following models are exempt from the indicated test		
Test	Exemption Specifics	Details
Grounding Continuity	The following models are exempt from the indicated test:	IMM02 series
Dielectric Voltage Withstand	The following models are exempt from the indicated test:	IMM02 series
Patient Circuit Dielectric Voltage Withstand	The following models are exempt from the indicated test:	IMM02 series
Solid-State Components	The following solid-state components may be disconnected from the remainder of the circuitry during either Dielectric Voltage Withstand Test:	IMM02 series

<u>Sample and Test Specifics for Follow-Up Tests at UL</u>			
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	Wah Hong	WH-9100	Rated V-0, 130°C, min 1.0mm thick	UL 746C, UL 94 (QMFZ2 (E150608))	UL	
PWB	Interchangeable	Interchangeable	Rated V-0, 130C, see Enclosure Schematics + PWB for trace and component layouts	UL 758 (ZPMV2)	UL	
Transformer (TR)	Sheng Chuan electronics Co., Ltd	B-888	Rated 130°C (Class B insulation system), constructed with the following components, see also Enclosure Diagram	UL 1446 (OBJY2)	UL	
Transformer (TR) Core	Interchangeable	Interchangeable	Toroidal, ferrite with overall dimensions approx. 6.8mm OD and 3mm ID, 3 mm wide			
Transformer (TR) Primary wire	Interchangeable	Interchangeable	Enameled Copper wire, rated130degC	UL 1446 (OBMW2)	UL	
Transformer (TR) Secondary wire	Rubadue Wire Co Inc	TCA3 or T-AA-X-XX-T-XXX-2 or T-AA-X-XX-T-XXX-1.5	Rated 707V, 155°C, Rated 1000 Vpk, 155°C. (Dielectric Strength of 14kVrms conducted on twisted pair during component evaluation)	UL 2353 (OBJT2 (E206198))	UL	
Transformer (TR) Secondary wire - alternate for Models IMM0205S3V3, IMM0205S05, IMM0212S3V3, IMM0212S05	Furukawa	TEX-E	Rated 130°C (Class B) 1.41kVpeak (Dielectric Strength of 6kVrms conducted on twisted pair during component evaluation)	UL 2353 (OBJT2 (E206440))	UL	
Optoisolator (IC1)	Everlight Electronics Co. Ltd.	EL3H7	Isolation voltage 3000 V min. (DTI min. 0.4mm)	UL1577, IEC 60747-5-2, VDE 0884 (FPQU2,8 (E214129))	UL, cUL, VDE (Lic. #132249)	
Optoisolator (IC1) - Alternate	Cosmo Electronics Corp	KPS2801	Isolation voltage 3000 V min. (DTI min. 0.4mm)	UL1577, IEC 60747-5-2, VDE 0884 (FPQU2,8 (E169586))	UL, cUL, VDE (Lic. # 40010469)	
Optoisolator (IC1) - Alternate	Avago Technologies Pte. Ltd	ACPL-217	Isolation voltage 3000 V min. (DTI min. 0.4mm)	UL1577, IEC 60747-5-2, VDE 0884 (FPQU2 (E55361))	UL, cUL, VDE (Lic. #140045)	
Optoisolator (IC1) - Alternate	Lite-on Technology Corp	LTV-217	Isolation voltage 3000 V min. (DTI min. 0.4mm)	UL1577, IEC 60747-5-2, VDE 0884 (FPQU2,8 (E113898))	UL, cUL, VDE (Lic. # 138213)	
Optoisolator (IC1) - Alternate	Toshiba Corp	TLP291	Isolation voltage 3000 V min. (DTI min. 0.4mm)	UL1577, IEC 60747-5-2, VDE 0884 (FPQU2,8 (E67349))	UL, cUL, VDE (Lic. # 40009347)	

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	
Potting Compound	Lord Corporation	CK-6009	Min V-1, 90°C	UL 94 (QMFZ2 (E84716))	UL, cUL	
Potting Compound - alternate	Interchangeable	Interchangeable	Min V-1, min 90°C	UL 94 (QMFZ2)	UL, cUL	

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 Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	5.7	Humidity Conditioning	XP Power Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
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 Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
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 Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	8.8.4.1	Ball Pressure	XP Power Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	11	Temperature	XP Power Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)	13	Abnormal Operation Testing	XP Power Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
IEC 60601-1: 2005 + CORR. 1:2006 + CORR.	13.1.2	Power Availability	

2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)			
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 Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598
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 Limited, 401 Commonwealth Drive, Haw Par Technocentre, Lobby B, #02-02, Singapore 149598

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

<u>Supplement ID</u>	<u>Description</u>
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----- END OF APPENDIX D -----