

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	ANSI/AAMI ES 60601-1:2005 (Medical electrical equipment – Part 1: General requirements for basic safety and essential performance) CSA C22.2 No. 60601-1:08 (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>	Switching Power Supply
<b>Model:</b>	HPU1K5PSXX-M (where XX can be any number 12-48, may also be followed by suffix SF).
<b>Rating:</b>	Input Rated: ~ 100-240 Vac, 50/60 Hz, 16.5 A  Output Rated: See Model Differences for details.
<b>Applicant Name and Address:</b>	XP POWER LLC SUITE 150 1241 E DYER RD SANTA ANA CA 92705 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 Underwriters Laboratories Inc. ('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 Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

\*Prepared by: **Melissa DeGuia**  
Underwriters Laboratories Inc.

\*Reviewed by: **Timothy L. Gambrell**  
Underwriters Laboratories Inc.

**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**

Model covered in this report is a component power supply intended for use in Medical Electrical Equipment. The need for the additional testing and evaluation shall be determined in the end product evaluation. This is a Class I, open frame power supply intended for building-in.

**Model Differences**

The power supplies in the series are differentiated by the output voltage and current ratings, number of turns of primary/secondary windings in the Transformers (T2 (Power)) and minor differences in the secondary circuit components and PWB layout.

See below for Model Ratings Table for 50°C below:

\*

Model No.	V1 Output			
	Voltage (Vdc)	Input Rated (Vac)	Max. Current (A)	Max. Power (W)
HPU1K5PS12-M	10.1 to 13.5	100-240	100	1200
HPU1K5PS15-M	13.6 to 17	100-240	80.0	1200
HPU1K5PS18-M	17.1 to 21	100-240	66.6	1200
HPU1K5PS24-M	21.1 to 26	100-180	50.0	1200
HPU1K5PS24-M	21.1 to 26	180-240	62.5	1500
HPU1K5PS28-M	26.1 to 31	100-180	42.80	1200
HPU1K5PS28-M	26.1 to 31	180-240	53.57	1500
HPU1K5PS33-M	31.1 to 33	100-180	36.36	1200
HPU1K5PS33-M	31.1 to 33	180-240	45.45	1500
HPU1K5PS36-M	33.1 to 42	100-180	33.3	1200

HPU1K5PS36-M	33.1 to 42	180-240	41.6	1500
HPU1K5PS48-M	42.1 to 54	100-180	25.0	1200
HPU1K5PS48-M	42.1 to 54	180-240	31.25	1500

See Enclosure-Miscellaneous for details for output de-rating table for higher ambient.

Units provided with SF suffix only provided with one fuse in the line side.

#### Technical Considerations

- § Classification of installation and use : Building-in
- § Supply connection: Building-in
- § Accessories and detachable parts included in the evaluation: None
- § Options included: None
- § The product was investigated to the following additional standards: ANSI/AAMI ES60601-1:2005/C1:2009/A2:2010 (includes National Differences for USA); CAN/CSA-C22.2 No. 60601-1:08 (includes National Differences for Canada), EN 60601-1:2006
- § Scope of Power Supply evaluation defers the following clauses to 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 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 Anesthetic Mixtures Protection: Annex G
- § Supply connection: Overvoltage Category II
- § The product is Classified only to the following hazards: Casualty, Fire, Shock
- § The degree of protection against harmful ingress of water is: Ordinary
- § The mode of operation is: Continuous

- § Software is relied upon for meeting safety requirements related to mechanical, fire and shock: No
- § The product is suitable for use in the presence of a flammable anesthetics mixture with air or oxygen or with nitrous oxide: No
- Unit also complied with spacing requirements of UL60601-1 (1<sup>st</sup>), CSA C22.2 No. 60601-1 (2<sup>nd</sup>), and IEC 60601-1 (2<sup>nd</sup>) for Basic for 240 Vac from Primary to Ground, Double/Reinforced for 261Vac from Primary to Secondary.

#### **Risk Controls/Engineering Conditions of Acceptability**

For use only in or with complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc. 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.
- § The power supply was evaluated for use in 50°C ambient at Full Rated Output and 50% of the Rated Output in 70°C ambient. (See De-rating Curve, Enclosure 7-01 for details)
- § Consideration shall 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.
- § Repeat of leakage current testing and consideration of non-frequency weighted leakage test shall be considered in the end product application.
- § This power supply was evaluated with Two MOPP between Primary and Secondary; One MOPP 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 42.4 Vac peak or 60 Vdc, under normal and single fault conditions.
- § The secondary output circuits exceed 240 VA.
- § The output connectors are suitable for factory wiring only.
- § The maximum investigated branch circuit rating is: 20 A
- § The Electric Strength Test conducted on this power supply was based upon a maximum working voltage of: Primary-Earthed Dead Metal: 231 Vrms, 494 Vpk; Primary-SEC: 261 Vrms, 444 Vpk.
- § Proper bonding to the end-product main protective earthing termination is required. Protective earthing testing shall be conducted in the end product application
- § 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, T3, T4, L1-L4, L6, L7 and L8 (Class F, 155°C)
- § Printed Wiring Board rated 130°C.
- § 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 provided with suffix SF only provided with one line side fuse. Consideration should be made in the end-use product to determine the need of double pole fusing.

**Additional Information**

Marking label is representative of all models. The nameplate labels included in this report depict the draft artwork for the marking plate pending approval by National Certification Bodies and it will not be affixed to products prior to such approval.

**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
Alternating current	
Supply Connection	Voltage range, ac/dc, phases if more than single phase
Direct current	
Power Input	Amps, VA, or Watts
Output	Rated output voltage, power, frequency.
Earthing	
Serial or lot or batch number	Eight alpha numeric characters (A BB CC DDD where A = factory code; BB = year; CC=week; DDD = serial number)
Date of manufacturer	Provided as part of serial number

**Special Instructions to UL Representative**

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	Test	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:

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

Model	Samples	Test	Test Details
N/A			

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20140524-E139109  
**Report Reference** E139109-A25-UL  
**Issue Date** 2014-MAY-24

**Issued to:** XP POWER L L C  
SUITE 150  
1241 E DYER RD  
SANTA ANA CA 92705



**This is to certify that representative samples of** COMPONENT - POWER SUPPLIES, INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT  
See addendum page for model

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

**Standard(s) for Safety:** UL 60950-1 and CSA C22.2 No. 60950-1-07- Information Technology Equipment - Safety - Part 1: General Requirements

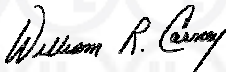
**Additional Information:** See the UL Online Certifications Directory at [www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Recognized Component Marks for the U.S. and Canada should be considered as being covered by UL's Recognition and Follow-Up Service and meeting the appropriate U.S. and Canadian requirements.

The UL Recognized Component Mark for the U.S. generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: , may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions. The UL Recognized Component Mark for Canada consists of the UL Recognized Mark for Canada:  and the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory.

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 Recognized Component Mark on the product.



William R. Carney, Director, North American Certification Programs

UL LLC

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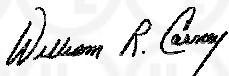
# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20140524-E139109  
**Report Reference** E139109-A25-UL  
**Issue Date** 2014-MAY-24

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

## Switching Power Supply Series

HPU1K5PSXX, where XX can be any number 12-48 indicating output voltage. May also be provided with additional suffix "SF" indicating Single Fuse or "-M".



William R. Carney, Director, North American Certification Programs

UL LLC

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## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) 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>	Switching Power Supply Series
<b>Model:</b>	HPU1K5PSXX, where XX can be any number 12-48 indicating output voltage. May also be provided with additional suffix "SF" indicating Single Fuse or "-M".
<b>Rating:</b>	Input: 100-240 Vac, 50/60 Hz, 16.5 A  Output: See Model Differences.
<b>Applicant Name and Address:</b>	XP POWER L L C SUITE 150 1241 E DYER RD SANTA ANA CA 92705 UNITED STATES

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Prepared by: Nathan Escalante

Reviewed by: David Drewes



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### Product Description

The product is a component AC-DC power supply for building-in, provided with an overall metal enclosure, incorporating primary and SELV components.

The main PWB is secured to the chassis bottom by multiple machine screws. An insulating sheet is installed between PWB and chassis, wrapped around the board assembly, covering the sides and extending over the top. The control PWB is mounted vertically on the side of the main PWB and secured by multi-pin soldering.

The unit is provided with 2 cooling fans mounted internally behind the rear panel acting as fan guard.

### Model Differences

The power supplies in the series are differentiated by the output voltage and current ratings, number of turns of primary/secondary windings in the Transformers (T2 (Power)) and minor differences in the secondary circuit components and PWB layout.

See below for Model Ratings Table Below:

- Model HPU1K5PS12: Output Rated: 10.1 Vdc to 13.5 Vdc, 100 A Max (1200 W)
- Model HPU1K5PS15: Output Rated: 13.6 Vdc to 17 Vdc, 80 A Max (1200 W)
- Model HPU1K5PS18: Output Rated: 17.1 Vdc to 21 Vdc, 66.7 A (1200 W)
- Model HPU1K5PS24: Output Rated: 21.1 Vdc to 26 Vdc, 50 A (1200 W)
- Model HPU1K5PS24: Output Rated: 21.1 Vdc to 26 Vdc, 62.5 A Max (1500 W for Input rated: 180-240 Vac)
- Model HPU1K5PS28: Output Rated: 26.1 Vdc to 31 Vdc, 43 A (1200 W)
- Model HPU1K5PS28: Output Rated: 26.1 Vdc to 31 Vdc, 53 A Max (1500 W for Input rated: 180-240 Vac)
- Model HPU1K5PS33: Output Rated: 31.1 Vdc to 33 Vdc, 36.4 A (1200 W)
- Model HPU1K5PS33: Output Rated: 31.1 Vdc to 33 Vdc, 45.5 A Max (1500 W for Input rated: 180-240 Vac)
- Model HPU1K5PS36: Output Rated: 33.1 Vdc to 42 Vdc, 33.3 A (1200 W)
- Model HPU1K5PS36: Output Rated: 33.1 Vdc to 42 Vdc, 41.7 A Max (1500 W for Input rated: 180-240 Vac)
- Model HPU1K5PS48: Output Rated: 42.1 Vdc to 54 Vdc, 25 A (1200 W)
- Model HPU1K5PS48: Output Rated: 42.1 Vdc to 54 Vdc, 31.25 A (1500 W for Input rated: 180-240 Vac)

Suffix "SF" indicates single fuse provided in the line side of the primary.

Suffix "-M" is identical to HPU1K5PSXX except for model designation for marketing purposes.

See Enclosure-Miscellaneous for details.

### 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 : Yes
- IT testing, phase-phase voltage (V) : 230
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 20A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 3048
- Altitude of test laboratory (m) : less than 2000
- Mass of equipment (kg) : 3
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: Full-rated output load: 50°C. 75% of output load: 60°C. Half-rated output load: 70°C., ,
- 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, IT
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 (which includes all European national differences, including those specified in this test report).
- The clearance distances of the equipment have additionally been assessed for suitability up to 3048m elevation.

### 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: Earthing Continuity, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 235 Vrms, 494 Vpk, Primary-SELV: 254 Vrms, 644 Vpk,
- The following secondary output circuits are SELV: All outputs
- The following secondary output circuits are at hazardous energy levels: DC Output Buss
- 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 suitability of the protective bonding terminal shall be evaluated in the end system.,
- The following input terminals/connectors must be connected to the end-product supply neutral: AC-N, neutral terminal is provided as part of the input terminal block, however the unit is for building and compliance shall be determined in the end product. ,
- 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): L1, L2, L4, L5, L6, L7, L8, T1(Bias), T2(Power), T1 (Drive), T3 (Drive), T4 (Current). T5 (Current) are Class F (155°C),
- The following end-product enclosures are required: Electrical, Mechanical, Fire,
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: L6 (124°C), T2 (123°C), L7 (113°C), L8 (115°C),
- Fans: The fan provided in this sub-assembly is not intended for operator access. Compliance shall be determined in the end product. ,
- The equipment may be provided with a fuse in both the Line and Neutral of the primary circuit. The need for a marking warning service person of the hazards associated with neutral fusing shall be considered in the end-product.

**Additional Information**

This report is a reissue of CBTR Ref. No. E139109-A25-CB-1, CB Test Certificate Ref. No. US/13910/UL. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, only limited testing was deemed necessary and has been determined that the product complies with the upgrade of the Second Edition of the Standard to Amendment 1.

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.

**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 - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File 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
Terminals for external primary power supply conductors	Capital letter "N" located adjacent to a terminal intended exclusively for connection of the primary power neutral conductor
1.7.7.1 Protective Bonding Marking	Protective bonding terminal is marked with either the earth symbol (60417-2-IEC-5017) near the terminal or not provided.
<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
N/A						

**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					