UL TEST REPORT AND PROCEDURE

Standard:	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)
Certification Type:	Component Recognition
CCN:	QQHM2, QQHM8 (Power Supplies, Medical and Dental)
Product:	Switching Power Supply
Model:	EMH250PSXXYY-ZZ and EMH350PSXXYY-ZZ, where XX is 12-48, where YY is any number between 0-9, ZZ is "SF" or blank, may also be provided with additional suffixes "-TF", "-VF", "D" and "-S", where "-" considered optional; and EMH350PS12-01 XB0188. **EMH350PS12-XA1007**
Rating:	For Model EMH250PSXXYY-ZZ Series: Input: 100-240Vac, 50/60, Hz, 3.8A, 250W Output: Refer to Model Differences for details. For Model EMH350PSXXYY-ZZ Series and Model EMH350PS12-01 XB0188: Input: 100-240Vac, 50/60, Hz, 4.8A, 350W Output: Refer to Model Differences for details. For **EMH350PS12-XA1007:** **Input: 100-240Vac, 50/60, Hz, 4.8A, 350W** **Output:12Vdc, 29.2 A**
Applicant Name and Address:	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 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.

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*Prepared by: **Melissa DeGuia**
UL LLC

*Reviewed by: UL LLC

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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

Products are component power supplies intended to be used as part of Medical Electrical Equipment. It is an open frame power supply intended for building-in Class I or Class II end-products.. Earthing symbol may only be provided for Class I power supplies.

Model Differences

Model EMH250PSXXYY-ZZ Series and Model EMH350PSXXYY-ZZ Series are identical with exception that the EMH250PSXXYY-ZZ Series is designed to be rated for a 250 W output power and the EMH350PSXXYY-ZZ Series designed to be rated for a 350 W output power.

All models within the each series are identical with exception to the output rating, mains transformer windings, and minor secondary components.

Model EMH350PS1201 B0188 is identical to Model EMH350PSXXYY-ZZ except standby output is 12V instead of 5V.

Models EMH250PSXXYY-ZZ and EMH350PSXXYY-ZZ have the following nomenclature:

XX = 12-48, denotes the rated output voltage.
YY= 0-9, denotes non-safety related functions
ZZ = SF or blank, denotes either single pole fusing (SF) or double fusing (blank)

Units provided with additional suffix "-TF" or "-VF" provided with Top Fan and Cover.
Units provided with additional suffix "-S" indicates models provided with input screw terminals.
Units provided with additional suffix "D" provided with integral O-ring diode located in the secondary

See below for the Output Rating for 50°C Ambient provided with 12 CFM Forced Air Cooling. 3 inches Fan distance from Input side with inward air-flow direction.

Model EMH250PS12YY-ZZ: 12 Vdc, 21 A
Model EMH250PS18YY-ZZ: 18 Vdc, 14 A
Model EMH250PS24YY-ZZ: 24 Vdc, 10.5 A
Model EMH250PS33YY-ZZ: 33 Vdc, 7.6 A
Model EMH250PS36YY-ZZ: 36 Vdc, 6.9 A
Model EMH250PS48YY-ZZ: 48 Vdc, 5.2 A

Model EMH350PS12YY-ZZ: 12 Vdc, 29.2 A
Model EMH350PS18YY-ZZ: 18 Vdc, 19.5 A
Model EMH350PS24YY-ZZ: 24 Vdc, 14.6 A
Model EMH350PS33YY-ZZ: 33 Vdc, 10.6 A
Model EMH350PS36YY-ZZ: 36 Vdc, 9.8 A
Model EMH350PS48YY-ZZ: 48 Vdc, 7.3 A

Stand-by Output for all models: 5Vdc, 2 A or 12 Vdc, 0.8 A
Fan Output for all models (V2): 12 Vdc, 0.6 A (Optionally marked on nameplate)

See Enclosure 7-02 for de-rating curve. For Fan or external 12CFM cooling: 50°C at 100% of rated load; 70°C ambient at: 50% of rated load.

Model EMH350PS12-XA1007 is the same as Model EHM350PS12YY-ZZ except Capacitor (C21, C22) are rated 220pF.

Technical Considerations

- The product was investigated to the following additional standards: ANSI/AAMI ES60601-1:2005/C1:2009 (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 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 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
- 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 anaesthetics mixture with air or oxygen or with nitrous oxide: No
- Manufacturer's Recommended Ambient: 50°C at 100% rated output and 70°C at 50% rated output ((See Enclosure 7-02 for De-rating Curve details)
- Classification of installation and use: Building-in
- Supply connection: Building-in
- Accessories and detachable parts included in the evaluation: None
- Options included: None
- Units provided with either a Cover or Chassis should be used only in a Class I application with earthing symbol applied. The cover and chassis shall be reliably earthed in the end-use application.
- Unit also complied with spacing requirements of UL60601-1 (1st), CSA C22.2 No. 60601-1 (2nd), and IEC 60601-1 (2nd) for Basic for 250 Vac from Primary to Ground, Double/Reinforced for 250 Vac from Primary to Secondary, and Basic for 250Vrms from Secondary to Earth/Chassis.

Risk Controls/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:

- Considerations to the Applied Parts requirements shall be considered as part of the end-product evaluation.
- The end-product evaluation shall ensure that the requirements related to Accompanying Documents, Clause 7.9 are met.
- 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 output circuits have not been evaluated for direct patient connection (Type B, BF or CF).
- 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 not acceptable for field connections, they are only intended for connection to mating connectors of internal wiring inside the end-use equipment.
- Primary Heatsink was considered floating live and should not be connected to earth in the end-product.
-
- The "floating" mounting hole shall be mounted on insulating post or properly earthed for Class I end-product.
- Units may be provided with one fuse in the Line side for models with SF suffix or one fuse in both the Line and Neutral sides. The need for additional fusing shall be determined as part of the end-product evaluation.
- Units provided with either a Cover or Chassis should be used only in a Class I application with earthing symbol applied. The cover and chassis shall be reliably earthed in the end-use application.
- When installed in a Class I end product, and if the Chassis and Cover are not provided, the power supply shall be mounted in a manner that provides, at a min. 2.8 mm Clearance between the primary side of the 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. 5.5 mm Clearance between the primary side of the power supply and any accessible conductive parts.
- Power supply provides the following MOPP (means of patient protection): two MOPP based upon a working voltage 250 Vrms, 680 Vpk between Primary to Secondary, one MOPP based upon a working voltage 250 Vrms, 354 Vpk between Primary and Earth/Enclosure. Power supply additionally provides one MOPP based for 250Vrms between secondary and earthing trace or chassis consistent with BF output consideration.
- Temperature, Leakage Current including when measured with a non-frqeuency-weighted device (Clause 8.7.3e), Protective Bonding, 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 evaluated for use at the maximum ambient temperature (Tmra) permitted by the manufacturer's specification of: 50°C at 100% rated output and 70°C at 50% rated output with external 12CFM forced air ((See De-rating Curve Enclosure 7-02 for details)
- Temperature test was conducted with 12CFM force air cooling as part of this evaluation. Suitability of convection cooling shall be fully determined as part of the end product evaluation and Temperature Test.
- Magnetic devices T1, T2 L12, L13, and PFC employ a Class F (155°C) insulation system.
- The PWB is rated 130°C.
- 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 need for Marking Durability and Legibility of Marking testing to be considered as part of the end

product application.

- The power supplies have been evaluated as continuous operation and have not been evaluated for use in the presence of flammable anesthetic mixture with air, oxygen or nitrous oxide.
- Fire/ Mechanical/ Electrical Enclosure to be provided as part of the end product.
- A single maximum current rating of 3.8A or 4.8A were provided for the entire 100-240Vac voltage range. The end product evaluation shall consider the acceptability of this component power supply rating as it relates to the requirements of Clause 7.2.7.

Additional Information

The clearance distances have additionally been assessed for suitability up to 3000 m elevation.
The need for the additional testing and evaluation shall be determined in the end product investigation.

The power supply series covered by this report employ Double/Reinforced Insulation between Primary and Secondary circuits.

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.

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			

UL TEST REPORT AND PROCEDURE

Standard:	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)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Product:	Switching Power Supply
Model:	EMH250PSXXYY-ZZ and EMH350PSXXYY-ZZ, where XX is 12-48, where YY is any two numbers between 0-9 or blank, ZZ is "SF" or blank , may also be provided with additional suffixes "-TF", "-VF", "D" and "-S"; all "-" considered optional. EMH350PS12-01 XB0118
Rating:	For Model EMH250PSXXYY-ZZ Series: Input: 100-240Vac, 50/60, Hz, 3.8A, 250W Output: Refer to Model Differences for details. For Model EMH350PSXXYY-ZZ Series and EMH350PS12-01 XB0118: Input: 100-240Vac, 50/60, Hz, 4.8A, 350W Output: Refer to Model Differences for details.
Applicant Name and Address:	XP POWER LLC SUITE 150 1241 E DYER RD SANTA ANA CA 92705 UNITED STATES

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Prepared by: Sal Oseguera Reviewed by: David E. Drewes

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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 products evaluated are switching power supplies for building-in to an end-use product information technology products.

Model Differences

Model EMH250PSXXYY-ZZ Series and Model EMH350PSXXYY-ZZ Series are identical with exception that the EMH250PSXXYY-ZZ Series is designed to be rated for a 250 W output power and the EMH350PSXXYY-ZZ Series designed to be rated for a 350 W output power.

All models within the each series are identical with exception to the output rating, mains transformer windings, and minor secondary components.

Models EMH250PSXXYY-ZZ and EMH350PSXXYY-ZZ have the following nomenclature:

XX = 12-48, denotes the rated output voltage.
YY= 0-9, denotes non-safety related functions
ZZ = SF or blank, denotes either single pole fusing (SF) or double fusing (blank)

Units provided with additional suffix "-TF" or "-VF" provided with Top Fan and Cover.
Units provided with additional suffix "-S" indicates models provided with input screw terminals.
Units provided with additional suffix "D" provided with integral O-ring diode located in the secondary

See below for the Output Rating for 50°C Ambient provided with Forced Air Cooling .

Model EMH250PS12YY-ZZ: 12 Vdc, 21 A
Model EMH250PS18YY-ZZ: 18 Vdc, 14 A
Model EMH250PS24YY-ZZ: 24 Vdc, 10.5 A
Model EMH250PS33YY-ZZ: 33 Vdc, 7.6 A
Model EMH250PS36YY-ZZ: 36 Vdc, 6.9 A
Model EMH250PS48YY-ZZ: 48 Vdc, 5.2 A

Model EMH350PS12YY-ZZ: 12 Vdc, 29.2 A
Model EMH350PS18YY-ZZ: 18 Vdc, 19.5 A
Model EMH350PS24YY-ZZ: 24 Vdc, 14.6 A
Model EMH350PS33YY-ZZ: 33 Vdc, 10.6 A

Model EMH350PS36YY-ZZ: 36 Vdc, 9.8 A
Model EMH350PS48YY-ZZ: 48 Vdc, 7.3 A

Stand-by Output for all models: 5Vdc, 2 A or 12Vdc, 0.8 A
Fan Output for all models (V2): 12 Vdc, 0.6 A (Not marked on nameplate)

See Enclosure 7-02 for Output Rating Curve.

Model EMH350PS12-01 XB0118 is identical to Model EMH350PS12 except for model number.

Technical Considerations

- § Equipment mobility : for building-in
- § Connection to the mains : pluggable A
- § Operating condition : continuous
- § Access location : for building-in
- § Over voltage category (OVC) : OVC II
- § Mains supply tolerance (%) or absolute mains supply values : +10%, -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) : For Model EMH250PSXXYY Series: 3.8 A/ For Model EMH350PSXYY Series: 4.8 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) : 410 g
- § The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50°C (Output loaded to 100% of rated) de-rated linearly to 70°C (Output loaded to 50% of rated),
- § 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 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).

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: 240 Vrms, 362 Vpk, Primary-SELV: 243 Vrms, 680 Vpk,

- The following secondary output circuits are SELV: All
- The following secondary output circuits are at hazardous energy levels: Main Power Output
- 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: Electric Strength
- 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, L12, L13, L7, PFC (min. Class F),
- The following end-product enclosures are required: Fire, Electrical
- The maximum continuous power supply output (Watts) relied on forced air cooling from: For Model EMH350PSXXYY Series: 350 W output rating with 12 cfm fan applied Inward from the Input side from 3 in. (7.62 cm) or provided with Top Fan option.,
- Fans: The fan provided in this sub-assembly is not intended for operator access, to be evaluated in the end product.
- The following warning or its equivalent to be provided as part of the end product without additional suffix "SF": CAUTION. Double pole/neutral fusing.
- Temperature, Leakage, Earthing, and Dielectric to be considered as part of the end product investigation.

Additional Information

This report is a reissue of CBTR Ref. No. E139109-A76-CB-1, CB Test Certificate Ref. No. US-17178-UL and US-17178-A1-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 standard.

No tests were conducted under this investigation due to reissue of CB Test Report Ref. No. E139109-A76-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.

Component licenses may be older than 3 years, manufacturer to provide updated licenses upon request.

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

Special Instructions to UL Representative

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 and T2	-	Primary to Secondary	3000	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					

CERTIFICATE OF COMPLIANCE

Certificate Number	20140106-E146893
Report Reference	E146893-A48-UL
Issue Date	2014-January-06
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, MEDICAL AND DENTAL See Addendum Page
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	ANSI/AAMI ES60601-1 and CAN/CSA-C22.2 No. 60601-1 - Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance
Additional Information:	See the UL Online Certifications Directory at 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	20140106-E146893
Report Reference	E146893-A48-UL
Issue Date	2014-January-06

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

Component switching power supply - EMH350PDXX, where XX can be 21-25 to represent model number code, may also be provided with additional suffixes "-U", "-EF", "-SF", "-S", and "-L"; all "-" considered optional.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

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UL TEST REPORT AND PROCEDURE

Standard:	ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10)(Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) CAN/CSA-C22.2 No. 60601-1 (2008) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance)
Certification Type:	Component Recognition
CCN:	QQHM2, QQHM8 (Power Supplies, Medical and Dental)
Product:	Component switching power supply
Model:	EMH350PDXX, where XX can be 21-25 to represent model number code, may also be provided with additional suffixes "-U", "-EF", "-SF", "-S", and "-L"; all "-" considered optional.
Rating:	Input: 100-240Vac, 50/60Hz, 4.8A Output: See Model Differences for details.
Applicant Name and Address:	XP POWER L L C SUITE 150 1241 E DYER RD SANTA ANA CA 92705 UNITED STATES

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Prepared by: Melissa DeGuia Reviewed by: Michael J. Howell

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Product Description

The models covered in this report are dual output component power supplies intended for use in Medical Electrical Equipment. They are open frame power supplies intended for building-in.

Model Differences

All models in the Model EMH350PDXX series are identical with exception to the Mains Transformer, T1, and minor secondary components that allow for different output voltage ratings.

See below for Model Ratings Table for 50°C ambient with 16 cfm fan applied 1 inch from input side, blowing inward.

EMH350PD21: V1 - 10.1Vdc to 13.5Vdc, 16.5A Max; V2 - 21.1Vdc to 26.0Vdc, 8.3A Max; 350W Max
EMH350PD22: V1 - 10.1Vdc to 13.5Vdc, 16.5A Max; V2 - 33.1Vdc to 42.0Vdc, 5.5A Max; 350W Max
EMH350PD23: V1 - 10.1Vdc to 13.5Vdc, 16.5A Max; V2 - 42.1Vdc to 54.0Vdc, 4.2A Max; 350W Max
EMH350PD24: V1 - 21.1Vdc to 26.0Vdc, 8.3A Max; V2 - 42.1Vdc to 54.0Vdc, 4.2A Max; 350W Max
EMH350PD25: V1 - 54.1Vdc to 66.0Vdc, 5.83A Max; V2 - 54.1Vdc to 66.0Vdc, 5.83A Max; 350W Max

Stand-by Output for all models: 5Vdc, 2A
Fan Output for all models: 12 Vdc, 0.6 A

Units provided with suffix "-U" provided with U-Channel.
Units provided with suffix "-EF" provided with End Fan and Cover.
Units provided with suffix "-SF" indicates models provided with single fusing.
Units provided with suffix "S" to indicate screw terminal block.
Units provided with suffix "L" to indicate fly leads.
Units provided with suffix "-S" provided with screw terminal.

Technical Considerations

- § Classification of installation and use : for building-in
- § Device type (component/sub-assembly/ equipment/ system) : Component
- § Intended use (Including type of patient, application location) : Component switching power supply
- § Mode of operation : Continuous
- § Supply connection : for building-in
- § Accessories and detachable parts included : None
- § Other options include : None
- § The product was investigated to the following additional standards:: ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10) (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)
- § 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 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
- § The means of connection to the mains supply is: for building-in, to be determined in end-product

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:

- § These components have been judged on the basis of the required spacings in the ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10)(Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance)CAN/CSA-C22.2 No. 60601-1 (2008) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance), which covers the end-use product for which the component was designed
- § The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50°C at full rated load and 70°C at 50% of rated load.
- § Power supply provides the following MOPP (means of patient protection): two MOPP based upon a working voltage 240 Vrms, 610 Vpk between Primary to Secondary, one MOPP based upon a working voltage 263 Vrms, 400 Vpk between Primary and Earth/Enclosure, two MOPP based upon a working voltage 60Vdc between secondary to floated earth trace on PWB for BF output consideration, one MOPP based upon a working voltage 250 Vrms between secondary and earthing trace or chassis for BF output consideration.
- § The power supply terminals and/or connectors are: Not investigated for field wiring
- § 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 input terminals/connectors must be connected to the end-product supply neutral: Input Connector (CON1) N terminal.
- § 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, L7 (Class F, 155°C)
- § The following end-product enclosures are required: Electrical, Mechanical, Fire
- § Suitable disconnect device is to be provided in the end system
- § Temperature, Leakage and Dielectric Strength testing shall be considered in the end system and consideration of non-frequency weighted leakage current (clause 8.7.3e) to also be considered as part of the end product.
- § Clearance spacing evaluated for 5000 m altitude. Additional consideration maybe necessary in the end-use product.
- § Printed Wiring Board rated 130°C
- § Units provided with additional suffix "SF", provided with only one fuse. The need for additional fusing shall be determined as part of the end product.
- § Heatsinks are floating and considered live. They should not be accessible in the end-product
- § The device shall be installed in compliance with the enclosure, mounting, spacing, casualty, markings, and segregation requirements of the end-use application
- § ME Equipment is component for building-in. Applicability of the following is to be determined in End Product Evaluation: 5.9 - Accessibility, 7 - Identification marking and Documents, 8.4.2 - Accessible Parts Including Applied Parts, 8.6 - Protective Earthing, 8.11.1 - Isolation from Supply Mains, 8.11.3 - Power Supply Cords, 9 - Protection against mechanical hazards, 11.3 - Fire Enclosure, 11.8 - Interruption of power supply, 15.3 - Mechanical Strength, 15.4.1 - Construction of Connectors, 15.4.4 - Indicators

- § Overcurrent releases of adequate breaking capacity must be employed in the end product.
- § 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 available voltage for the secondary outputs does not exceed 25 Vac or 60 Vdc, under normal and single fault conditions
- § Cleaning test shall 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.

Additional Information

Output V1 and V2 can be connected in series to achieve a maximum total output voltage of 120 Vdc, 350 W max.

The required clearance values have been assessed for suitability up to 5000 m elevation (1.29 correction factor as per Table 8 of IEC 60601-1).

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

The nameplate markings provided are considered representative of the entire series.

The power supply series covered by this report employ 2 MOPP between Primary and Secondary circuits.

Testing to IEC 60601-1-2 was not conducted by UL and no supporting evidence of compliance has been presented. 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 IEC 60601-1-2.

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 Connection	Voltage range, ac/dc, phases if more than single phase
Alternating current	
Direct current	
Supply Frequency	Rated frequency range in hertz
Power Input	Amps, VA, or Watts
Output	Rated output voltage, power, frequency.

Protective earth ground	

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	Exempt	Not exempt	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			

CERTIFICATE OF COMPLIANCE

Certificate Number	20131126-E139109
Report Reference	E139109-A129-UL
Issue Date	2013-NOVEMBER-26
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
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements 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 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

William R. Carney, Director, North American Certification Programs

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at www.ul.com/contactus

CERTIFICATE OF COMPLIANCE

Certificate Number	20131126-E139109
Report Reference	E139109-A129-UL
Issue Date	2013-NOVEMBER-26

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

Product:

Switch Mode Power Supply

EMH350PDXX, where XX can be 21-25 to represent model number code, may also be provided with additional suffixes "-U", "-EF", "-SF", "-S", and "-L"; all "-" considered optional.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at www.ul.com/contactus

UL TEST REPORT AND PROCEDURE

Standard:	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)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Product:	Switch Mode Power Supply
Model:	EMH350PDXX, where XX can be 21-25 to represent model number code, may also be provided with additional suffixes "-U", "-EF", "-SF", "-S", and "-L"; all "-" considered optional.
Rating:	100-240Vac, 50/60Hz, 4.8A
Applicant Name and Address:	XP POWER L L C 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 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.

Prepared by: Nathan Escalante Reviewed by: David E. Drewes

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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 dual output switching power supplies for building-in to Information Technology Equipment.

Model Differences

All models in the Model EMH350PDXX series are identical with exception to the Mains Transformer, T1, and minor secondary components that allow for different output voltage ratings.

See below for Model Ratings Table for 50°C ambient with 16 cfm fan applied 1 inch from input side, blowing inward.

EMH350PD21: V1 - 10.1Vdc to 13.5Vdc, 16.5A Max; V2 - 21.1Vdc to 26.0Vdc, 8.3A Max; 350W Max

EMH350PD22: V1 - 10.1Vdc to 13.5Vdc, 16.5A Max; V2 - 33.1Vdc to 42.0Vdc, 5.5A Max; 350W Max

EMH350PD23: V1 - 10.1Vdc to 13.5Vdc, 16.5A Max; V2 - 42.1Vdc to 54.0Vdc, 4.2A Max; 350W Max

EMH350PD24: V1 - 21.1Vdc to 26.0Vdc, 8.3A Max; V2 - 42.1Vdc to 54.0Vdc, 4.2A Max; 350W Max

EMH350PD25: V1 - 54.1Vdc to 66.0Vdc, 5.83A Max; V2 - 54.1Vdc to 66.0Vdc, 5.83A Max; 350W Max

Stand-by Output for all models: 5Vdc, 2A
Fan Output for all models: 12 Vdc, 0.6 A

See Enclosure 7-01 for additional ratings information.

Units provided with suffix "-U" provided with U-Channel.
Units provided with suffix "-EF" provided with End Fan and Cover.
Units provided with suffix "-SF" indicates models provided with single fusing.
Units provided with suffix "S" to indicate screw terminal block.
Units provided with suffix "L" to indicate fly leads.

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 : +10%, -10%
- § Tested for IT power systems : Yes
- § IT testing, phase-phase voltage (V) : 230
- § Class of equipment : Class I or Class II (Determined by end product)
- § Considered current rating of protective device as part of the building installation (A) : 20 A
- § Pollution degree (PD) : PD 2
- § IP protection class : IP X0
- § Altitude of operation (m) : 5000
- § Altitude of test laboratory (m) : less than 2000 meters
- § Mass of equipment (kg) : less than 1 Kg
- § The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50°C at 100% load, 70 °C at 50% load
- § 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: TT, IT, TN
- § The following accessible locations (with circuit/schematic designation) are within a limited current circuit: C33

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,
- § The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 259 Vrms, 620 Vpk, Primary-Earthed Dead Metal: 263 Vrms, 400 Vpk
- § The following secondary output circuits are SELV: All outputs with the exception of model EMH350PD25.
- § The following secondary output circuits are at hazardous energy levels: All
- § The power supply terminals and/or connectors are: Not investigated for field wiring
- § 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 when the power supply is used in a Class I end product. The Earth connection pin of CON1 is not suitable as the main protective earth terminal. Earthing must be done either at the earthing terminal on the PWB or the chassis must be directly bonded to Protective Earth in the end product.
- § An investigation of the protective bonding terminals has: Not been conducted
- § The following input terminals/connectors must be connected to the end-product supply neutral: CON1
- § 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 and T2 (Class F, 155°C)

- § The following end-product enclosures are required: Mechanical, Fire, Electrical
- § The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: C1 (105°C)
- § The maximum continuous power supply output (Watts) relied on forced air cooling from: 16 cfm fan applied 1 inch from input side, blowing inward.
- § The equipment is suitable for direct connection to: AC mains supply. Means of connection will need to be evaluated in the end product.
- § Fans: The fan provided in this sub-assembly is not intended for operator access, to be evaluated in end product.
- § Printed Wiring Board rated 130°C.
- § Clearance spacing evaluated for 5000 m altitude. Additional consideration maybe necessary in the , end-use product.
- § End product to determine the need for "Double Pole Fuse" Marking for units provided with double pole fusing.
- § The equipment may be provided with a fuse in both the Line and Neutral of the primary circuit.
- § Temperature, Leakage, Earthing, and Dielectric to be considered as part of the end product , investigation.
- § Heating test was not conducted on unit with input/output leads. If unit is provided with input and/or output leads, then temperature on leads must be measured and cannot exceed 105°C.
- § The fan connector (CON6) is in the Primary circuit. Fans provide basic insulation (greater than 0.4 mm).
- § Heatsinks are floating and considered live. They should not be accessible in the end-product.

Additional Information

Output V1 and V2 can be connected in series to achieve a maximum total output voltage of 120 Vdc, 350 W max.

The clearance distances have additionally been assessed for suitability up to 5000 m elevation (1.48 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 are considered representative of the entire series.

The power supply series covered by this report employ Double/Reinforced Insulation between Primary and Secondary circuits.

Additional Standards

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

Markings and instructions

Clause Title	Marking or Instruction Details
Inter-connecting cables - External detachable	Listee's Name and Part number (Marking or Instruction)
Power rating - Ratings	