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 for building-in
Model:	ECP225PSXX-Y (where XX can be any number between 12 and 48 designating the output voltage, -Y can be -A or blank to represent additional 5V standby output), may also be provided with suffix "SF" or "3X5"
Rating:	Input: 100-240 Vac, 50/60 Hz, 3.0 A Output: Model Name (Convection cooling) ECP225PS12: 12 Vdc, 12.5 A ECP225PS15: 15 Vdc, 10.0 A ECP225PS24: 24 Vdc, 6.25 A ECP225PS28: 28 Vdc, 5.36 A ECP225PS48: 48 Vdc, 3.1 A Model Name (Forced cooling) ECP225PS12: 12 Vdc, 18.75 A ECP225PS15: 15 Vdc, 15.0 A ECP225PS24: 24 Vdc, 9.38 A ECP225PS28: 28 Vdc, 8.04 A ECP225PS48: 48 Vdc, 4.69 A
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 Drewes

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 product is a AC/DC switching mode power supply with open-frame type, and it is intended for building-in from factory installation as a component of the end product Information Technology Equipment (ITE).

Model Differences

All models in the Model ECP225PSXX-Y series are identical with exception to the Mains Transformer, TR1, and minor secondary components that allow for different output voltage ratings.

Additional Suffix "SF" denotes units provided with only a single line side fuse.

Additional suffix "3X5" denotes extended PCB with no change in the PCB traces. Refer to Enclosure 5-01 for 2.5x5 PCB size and 5-03 for 3X5 PCB size.

Additional suffix "A" denotes unit with 5V standby output (V2). See below for standby output ratings:
Convection cooling - 5Vdc, 1A
Forced cooling - 5Vdc, 2A

Units are provided with additional output to power an external fan. See below for external fan output ratings:
ECP225PSXX: V2: 12V, 0.5A
ECP225PSXX-A: V3: 12V, 0.5A

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : N/A
- Operating condition : continuous
- Access location : To be determined in end product
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10% (manufacturer declared)
- 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) : 20
- 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) : 0.35
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50°C for full load; 70°C for half load.
- 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)
- The following accessible locations (with circuit/schematic designation) are within a limited current circuit: Load side of CY7, CY8, CY9
- The Clearances and Creepage Distances have additionally been assessed for suitability up to 5000m elevation. (Table A.2 of IEC 60664-1: 2007 was applied to determinate the minimum required clearance. The factor for 5000 m is 1.48).

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: 275 Vrms, 500 Vpk
- The following secondary output circuits are SELV: ECP225PS12: 12 Vdc, ECP225PS15: 15 Vdc, ECP225PS24: 24 Vdc, ECP225PS28: 28 Vdc, ECP225PS48: 48 Vdc
- The following secondary output circuits are at hazardous energy levels: ECP225PS12: 12 Vdc, ECP225PS15: 15 Vdc, ECP225PS24: 24 Vdc, ECP225PS28: 28 Vdc, ECP225PS48: 48 Vdc
- The following secondary output circuits are Limited Current Circuits: Load side of CY7, CY8, CY9
- The following output terminals were referenced to earth during performance testing: TR1 pin 9.
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- The maximum investigated branch circuit rating is: 20 A
- The investigated Pollution Degree is: 2
- Proper bonding to the end-product main protective earthing termination is: Required
- An investigation of the protective bonding terminals has: Not been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral: CN1 pin 2
- 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): TR1, class B
- The following end-product enclosures are required: Electrical, Mechanical, Fire
- End-product shall provide an external forced air cooling, min. 13 CFM, towards DUT, located at input

connector with a distance of 4 cm.

- Units provided with fuses in the line and neutral shall be considered for the need for "Double Pole Fusing" warning markings as part of the end-product.

Additional Information

No tests conducted under this investigation due to transfer of CB Test Report Ref. No. E346017-A2-CB-1-Original. All required tests were carried out under the original investigation.

This report is a reissue of CBTR Ref. No. E346017-A2-CB-1-Original, issued date: 2012-12-21 with CB Test Certificate Ref. No. DK-29957-UL, issued date: 2012-12-21. 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 continues to comply with the standard

Maximum Output Load conditions:

Condition A: Convectional Cooling at Tma=50°C, 100% load :
ECP225PS12: 12 Vdc, 12.5 A
ECP225PS15: 15 Vdc, 10.0 A
ECP225PS24: 24 Vdc, 6.25 A
ECP225PS28: 28 Vdc, 5.36 A
ECP225PS48: 48 Vdc, 3.1 A

Condition B: Convectional Cooling at Tma=70°C, 50% load :
ECP225PS12: 12 Vdc, 6.25 A
ECP225PS15: 15 Vdc, 5.0 A
ECP225PS24: 24 Vdc, 3.13 A
ECP225PS28: 28 Vdc, 2.68 A
ECP225PS48: 48 Vdc, 1.55 A

Condition C: Force air cooling at Tma=50°C, 100% load :
ECP225PS12: 12 Vdc, 18.75 A
ECP225PS15: 15 Vdc, 15.0 A
ECP225PS24: 24 Vdc, 9.38 A
ECP225PS28: 28 Vdc, 8.04 A
ECP225PS48: 48 Vdc, 4.69 A

Condition D: Force air cooling at Tma=70°C, 50% load :
ECP225PS12: 12 Vdc, 9.38 A
ECP225PS15: 15 Vdc, 7.5 A
ECP225PS24: 24 Vdc, 4.69 A
ECP225PS28: 28 Vdc, 4.02 A
ECP225PS48: 48 Vdc, 2.35 A

Additional Standards

The product fulfills the requirements of: EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011

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
Enclosure 5-06	Verify the two measurements that are indicated in enclosure 5-06, "ECP225PSXX-A series - PWB Layout (Bottom)"
Special Instructions to UL Representative	
Inspect the transformer(s) listed in BD1.1 per AA1.1– (C). When the tests are conducted at other location, inspect test record and specification sheet provided by the component manufacturer. Verify the specification sheet indicates 100% routine test specified in BD1.1 be conducted at the component manufacturer.	

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:	Power Supply
Model:	ECP225PSXX-Y (where XX can be any number between 12 and 48 designating the output voltage, -Y can be -A or blank to represent additional 5V standby output), may also be provided with suffix "SF" or "3x5".
Rating:	Input: 100-240 Vac, 3.0A, 50/60 Hz Output: Model Name (Convection cooling) ECP225PS12: 12 Vdc, 12.5 A ECP225PS15: 15 Vdc, 10.0 A ECP225PS24: 24 Vdc, 6.25 A ECP225PS28: 28 Vdc, 5.36 A ECP225PS48: 48 Vdc, 3.1 A Model Name (Forced cooling) ECP225PS12: 12 Vdc, 18.75 A ECP225PS15: 15 Vdc, 15.0 A ECP225PS24: 24 Vdc, 9.38 A ECP225PS28: 28 Vdc, 8.04 A ECP225PS48: 48 Vdc, 4.69 A See Model Differences for Models with suffix -A
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.

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Prepared by: Bernadette Matsuoka Reviewed by: Michael J. Howell

Supporting Documentation

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

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.

ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.

iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

Products covered are open frame power supplies intended for building-in to be used with Medical Electrical Equipment.

Model Differences

All models in the Model ECP225PSXX-Y Series are identical with exception to the Mains Transformer TR1, and minor secondary components that allow for different output voltage ratings. The XX can be any number between 12 and 48 designating the output voltage, -Y can be -A or blank to represent additional 5V standby output. See below for output ratings for up to 50°C and forced cooling airflow from a 15 CFM fan:

Model Name (Convection cooling)
ECP225PS12: 12 Vdc, 12.5 A
ECP225PS15: 15 Vdc, 10.0 A
ECP225PS24: 24 Vdc, 6.25 A
ECP225PS28: 28 Vdc, 5.36 A
ECP225PS48: 48 Vdc, 3.1 A

Model Name (Forced cooling)
ECP225PS12: 12 Vdc, 18.75 A
ECP225PS15: 15 Vdc, 15.0 A
ECP225PS24: 24 Vdc, 9.38 A
ECP225PS28: 28 Vdc, 8.04 A
ECP225PS48: 48 Vdc, 4.69 A

See below for output ratings for up to 70°C and forced cooling airflow from a 15 CFM fan:

Convectional Cooling at Tma=70°C, 50% load
ECP225PS12: 12 Vdc, 6.25 A
ECP225PS15: 15 Vdc, 5.0 A
ECP225PS24: 24 Vdc, 3.13 A
ECP225PS28: 28 Vdc, 2.68 A
ECP225PS48: 48 Vdc, 1.55 A

Force air cooling at Tma=70°C, 50% load :
ECP225PS12: 12 Vdc, 9.38 A
ECP225PS15: 15 Vdc, 7.5 A
ECP225PS24: 24 Vdc, 4.69 A
ECP225PS28: 28 Vdc, 4.02 A
ECP225PS48: 48 Vdc, 2.35 A

Additional suffix "SF" denotes units provided with only a single line side fuse;
Additional suffix "3x5" denotes extended PCB with no change in the PCB traces. Refer to Enclosure 5-01 for 2.5x5 PCB size and 5-02 for 3x5 PCB size.

Additional suffix "A" denotes unit with 5V standby output (V2). See below for standby output ratings:
Convection cooling - 5Vdc, 1A
Forced cooling - 5Vdc, 2A

Units are provided with additional output to power an external fan. See below for external fan output ratings:
ECP225PSXX: V2: 12V, 0.5A
ECP225PSXX-A: V3: 12V, 0.5A

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) : Provide regulated power
- 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:: EN 60601-1: 2006 + CORR: 2010 (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) (includes National Differences for Canada), 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)
- The product was not investigated to the following standards or clauses:: Biocompatibility (ISO 10993-1), Clause 14, Programmable Electronic Systems, Electromagnetic Compatibility (IEC 60601-1-2)
- 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 power supply was evaluated for use in 50°C ambient at Full Rated Output and 50% of the Rated Output in 70°C ambient.
- 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

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:

- Note: No default COAs exist for 60601: ,
- 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.
- Power supply, Model ECP225PSXX provides the following MOPP (means of patient protection): 2MOPP based upon a working voltage 240 Vrms, 500 Vpk between Primary to Secondary, 1MOPP based upon a working voltage 240 Vrms, 375 Vpk between Primary and Earth/Enclosure, and 1MOPP based upon a working voltage 240 Vrms (input voltage) between Secondary and

Earth/Enclosure

- This power supply has been evaluated as a continuous operation, ordinary equipment and has not been evaluated for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide. The output circuits have not been evaluated for direct patient connection (Type B, BF or CF).
- The end product shall ensure that the requirements related to accompanying documents, clause 7.9, are met.
- The available voltage for the secondary outputs does not exceed 25 Vac or 60 Vdc, under normal and single fault conditions.
- The Dielectric Strength Test conducted on this power supply was based upon a maximum working voltage of: Primary-Earthed Dead Metal (Class I units): 375 Vpk, 240 Vrms; Primary-SEC: 500 Vpk, 240 Vrms for Model ECP225PSXX; and Primary-Earthed Dead Metal (Class I units): 375 Vpk, 240 Vrms; Primary-SEC: 542 Vpk, 348 Vrms for Model Power supply, Model ECP225PSXX-Y
- Protective bonding testing shall be considered 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): TR1 (Class B, 130°C) and T2 (Class B, 130°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.
- The products were tested on a 20 A branch circuit. If used on a branch circuit greater than this, additional testing may be necessary.
- 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.
- Unit to be suitably earthed as part of the end product.
- Q1 Heatsink considered live and should not be earthed.
- End product shall provide necessary creepage and clearance for 250Vrms from input connector pins to mounting means.
- Power supply fuse was provided with limited breaking capacity and was evaluated for installation where the maximum fault current was limited. End product shall ensure the power supply is used in applications where the limited breaking capacity does not result in unacceptable risk.
- The input/output connectors are not acceptable for field connections, they are only intended for factory wiring inside the end-use 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.
- Considerations to the applied parts requirement, to be conducted as end-product
- The product was submitted and tested for use at the manufacturer's recommended ambient temperature (Tmra) of 50°C at Full Load and 70°C at Half Load.
- End-product shall provide an external forced air cooling, 15 CFM max, towards DUT, located at input connector with a distance of 4 cm
- Power supply, Model ECP225PSXX-Y provides the following MOPP (means of patient protection): 2MOPP based upon a working voltage 348 Vrms, 542 Vpk between Primary to Secondary, 1MOPP based upon a working voltage 240 Vrms, 375 Vpk between Primary and Earth/Enclosure, and 1MOPP based upon a working voltage 240 Vrms (input voltage) between Secondary and

Earth/Enclosure

Additional Information

No tests conducted under this investigation due to transfer of CB Test Report Ref. No. E346017-A3-CB. All required tests were carried out under the original investigation.
This report shall be read in conjunction with the following original reports:
1) CB test report ref No. E346017-A3-CB-1, issued 2013 Feb 19th with CB test certificate US-20923-M1-UL, issued 2013 Feb 26th.

Additional Standards

The product fulfills the requirements of: ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10), CAN/CSA-C22.2 No. 60601-1 (2008), IEC 60601-1: 2005, EN 60601-1: 2006 + CORR: 2010

Markings and instructions

Clause Title	Marking or Instruction Details
Model	Model number
Company identification	Classified or Recognized company's name, Trade name, Trademark or File
Supply Connection	Voltage range, ac/dc, phases if more than single phase
Alternating current	
Supply Frequency	Rated frequency range in hertz
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	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	N/A	N/A	N/A