UL TEST REPORT AND PROCEDURE

Standard:	UL 62368-1, 2nd Ed, 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CSA C22.2 No. 62368-1-14, 2nd Ed., Issue Date: 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements)
Certification Type:	Component Recognition
CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Complementary CCN:	N/A
Product:	Switching Power Supply
Model:	ECM140USXX Where the XX can be any number between 12 and 48. May be provided with additional suffix "-A".
Rating:	INPUT ~ 100 - 240VAC 50/60Hz 2.5 A OUTPUT: See Model Differences for details.
Applicant Name and Address:	XP POWER L L C 15641 RED HILL AVE, SUITE 100 TUSTIN CA 92780 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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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: Lucio Cinelli / Project Handler Reviewed By: Lorenzo Iorio / Project Reviewer

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 model covered in this report is a component switching power supply intended for use in Information Technology Equipment. It is an open frame power supply intended for building-in Class I or Class II endproducts.

Model Differences

All models in the series are identical with exception to the Mains Transformer, T1, and minor secondary components that allow for different output voltage ratings. Models with suffix "-A" provided with optional standby transformer T2.

Main power supply output is refered to as "Output 1", fan (12V/0.5A) is refered to as "Output 2", and optional standby (5V/0.5A) is refered to as "Output 3" in some documentation.

Total output (Outputs 1, 2, and 3) is rated 148W at 60°C with 10 CFM fan, 122.5W at 50°C with convection cooling (No fan, standby at 5V/0.5A).

Output 1 is rated max. 140W at 60°C with 10 CFM fan, 120W at 50°C with convection cooling.

Output 1 ratings at 60°C ambient with 10 CFM fan cooling:

Model ECM140US12: Output Rated: 12 Vdc, 11.7 A

Model ECM140US15: Output Rated: 15 Vdc, 9.3 A

Model ECM140US18: Output Rated: 18 Vdc, 7.7 A

Model ECM140US24: Output Rated: 24 Vdc, 5.8 A

Model ECM140US28: Output Rated: 28 Vdc, 5.0 A

Model ECM140US48: Output Rated: 48 Vdc, 2.9 A

Test Item Particulars

Classification of use by	Ordinary person
Supply Connection	AC Mains
Supply % Tolerance	+10%/-10%
Supply Connection – Type	For building-in
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in

Over voltage category (OVC)	OVC II
Class of equipment	Not classified
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	See Model Differences section.
IP protection class	IPX0
Power Systems	TN
Altitude during operation (m)	3048 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	0.32

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : See Model Differences section.
- The product is intended for use on the following power systems : TN
- The equipment disconnect device is considered to be : To be determined in the end-product.
- Required Clearances have been adjusted by multiplying the clearance at sea level by a factor of 1.15 for operating at an altitude of 3048 meters. If the calculated Clearance exceeded the Creepage, the Creepage was adjusted to the value of clearance.
- Power supplies covered by this report were evaluated for both Class I and Class II (double insulated). Double insulated symbol is optionally provided. Earthing symbol may only be provided for Class I power supplies.

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 product-line tests are conducted for this product : Electric Strength
- The following output circuits are at ES1 energy levels : All Outputs
- The following output circuits are at PS3 energy levels : All Outputs
- 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 (Class I)
- 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 : AC N
- The following end-product enclosures are required : Mechanical, Fire, Electrical
- 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, L3,L4, T1, and T2 are Class F (155°C)
- The power supply was evaluated to be used at altitudes up to : "3048 m"
- When installed in a Class I end product, the power supply shall be mounted in a manner that provides the minimum required Clearance between the primary side of power supply and protectively earthed accessible conductive parts.
- When installed in a Class II end product, the power supply shall be mounted on insulating posts in a manner that provides the minimum required Clearance between the power supply and any accessible conductive parts.
- Heatsinks are floating and considered live. They should not be accessible in the end-product.
- A suitable main disconnect device shall be provided in the end product.
- The power supplies covered by this report have a fuse in the neutral of the primary circuit. The need for a marking to warn a service person of the hazards associated with double pole/neutral fusing shall be considered in the end product.
- Consideration to repeating the Touch Current test should be given in the end-product evaluation.
- The power supplies in this report have been subject to Capacitance Discharge testing. Additional testing should not be needed if directly connected to mains e.g. using an appliance inlet, wiring terminals, etc.

Additional Information

Marking Plate is representative of all models.

This report is based on a previous evaluation to IEC 60950-1:2005 (2nd Ed.), Am1:2009 + Am2:20013 under CBTR Ref. No. E139109-A126-CB-6 including Amendments, CBTC Ref. No. US-25733-UL. Based on the previously conducted performance testing, only the tests conducted as part of this investigation were considered necessary.

The following tests were conducted under CTDP SMT/CTF Stage 3 to IEC 60950-1 E2+A1+A2 at XP Power LLC, Suite 150, 1241 E Dyer Rd, Santa Ana, CA 92705 USA:
Input: Single-Phase (1.6.2)
Capacitance Discharge (2.1.1.7)
SELV Reliability Test Including Hazardous Voltage Measurements (2.2.2, 2.2.3, 2.2.4, Part 22 6.1)
Humidity (2.9.1, 2.9.2, 5.2.2)
Determination of Working Voltage; Working Voltage Measurement (2.10.2)
Heating (4.5.1, 1.4.12, 1.4.13)
Ball Pressure (4.5.5, 4.5)
Electric Strength (5.2.2)
Component Failure (5.3.1, 5.3.4, 5.3.7)
Abnormal Operation (5.3.1 - 5.3.9)
Transformer Abnormal Operation (5.3.3, 5.3.7b, Annex C.1)
Power Supply Output Short-Circuit/Overload (5.3.7)

The following additional tests were conducted on a sample of model ECM140US48 in accordance with IEC 62368-1:2014 (Second Edition) at XP POWER LLC, 15641 RED HILL AVE, SUITE 100, TUSTIN, CA 92780 USA:
Electric Strength Test (5.4.9)
Prospective Touch Voltage and Touch Current Measurement (5.7)

This is a technical amendment. Based on a review of product technical documentation such as photos, schematics, and wiring diagrams, changes associated with this report are considered not to affect compliance with the requirements of the standard. Because of this and previously performed testing, no sample or additional testing was considered necessary. Changes and notes:

-Test Item Particulars: "ES1" removed.
-Model Differences: Statements added explaining rated output wattage.
-Technical Considerations: Altitude statement corrected.
-Energy Source Table and Safeguards Table: MS evaluation removed. To be evaluated in end product.
-Clause 5.4.4: Evaluation corrected as TIW is used.
-Clause F.3.5.3: Comment updated for clarity.
-Clause F.3.6: Verdicts and comments corrected.
-Clause G.8: Verdicts and comments corrected.
-Table 4.1.2: Additional information about testing added to labels.
-Table 5.2: Additional applicable data added from original 60950-1 evaluation.
-Table 5.4.9: Inapplicable test results removed.
-Table 5.4.9: Locations expanded to be more specific.
-Table B.2.5: "Hz" column added to Input Test Table.

This is a technical amendment. Based on a review of product technical documentation such as photos, schematics, and wiring diagrams, changes associated with this report are considered not to affect compliance with the requirements of the standard. Because of this and previously performed testing, no sample or additional testing was considered necessary. Changes and notes:

-Previous technical amendment statement moved from "Model Differences" to "Additional Information" section.
-60950-1 CTF-3 testing location corrected to "Santa Ana" location.
-License numbers added to all X and Y capacitors.
-Added alternate x-capacitors for C1, C7 (Vishay 338 4 and Xiamen MKP62).

Project 4791235108 (UL Only Revision) - Revision to component table to add alternate label and add Neutral Fuse symbol to warning marking.

Project SR594464 (UL Only) - Correction to add missing component table revisions from project 4791235108

Additional Standards

The product fulfills the requirements of: EN 62368-1:2014 + A11:2017

Markings and Instructions

Clause Title	Marking or Instruction Details
Equipment identification marking – Manufacturer identification	Listee’s or Recognized companys name, Trade Name, Trademark or File Number
Equipment identification marking – model identification	Model Number

Equipment rating marking – ratings	"Input Ratings (voltage, frequency/dc, current/power)", "Output Ratings (voltage, frequency/dc, current/power)"
Warning to service personnel	"CAUTION: Double pole, neutral fusing. Disconnect mains before servicing. "/"ATTENTION. Double pôle/fusible sur le neutre. Débrancher lalimentation avant lentretien." and optional symbol IEC 60417-5016 (2002-10) (modified to add alphanumeric notation N for the neutral conductor) - see Enclosure 4-11.
Special Instructions to UL Representative --	

BD1.0	TABLE: Production-Line Testing Requirements					
BD1.1	**Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.**					
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
All Models	--	--	Primary to Secondary	2830	4000	1
BD1.2	**Earthing Continuity Test Exemptions – This test is not required for the following models:**					
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BD1.3	**Electric Strength Test Exemptions – This test is not required for the following models:**					
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BD1.4	**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.**					
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BE1.0	Sample and Test Specifics for Follow-Up Tests at UL				
Model	Component	Material	Test	Sample (s)	Test Specifics

4.1.2	TABLE: List of critical components					Pass
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Product Category CCN(s)	Mark(s) of conformity	Supplement ID
Connector J1 (Primary)	Molex Inc	Series 5273-NA (09-65-2038)	Rated 7A, 250V, min. 105°C, 94-V2	ECBT2 (E29179)	UL	
Connector J1 (Primary) - Alternate	Interchangeable	Interchangeable	Rated min. 250Vac, 2.5A or copper alloy pins housed in bodies of (QMFZ2), and V-2 minimum	ECBT2 or RTRT2	UL	
Connector J2 (Secondary)	Molex	Series 5273-NA (09-65-2088)	Rated 7A, 250V, min., 105°C, 94-V2	ECBT2 (E29179)	UL	
Connector J2 (Secondary) - Alternate	Interchangeable	Interchangeable	Rated min. 250Vac, 7A or copper alloy pins housed in bodies of (QMFZ2), and V-2 minimum	ECBT2 or RTRT2	UL	
Fuses (F1, F2)	BelFuse	RST Series (RST 5)	Rated 250 V, 5A, time lag.	JDYX2, JDYX8 (E20624)	UL	
Fuses (F1, F2) - Alternate	Hollyland Co., Ltd.	5ET Series (5ET-050H)	Rated 250 V, 5A, time lag.	JDYX2, JDYX8 (E156471)	UL	
Fuses (F1, F2) - Alternate	Ever Island Electric Co. Ltd & Walter Electric	2010 Series (2010 5A)	Rated 250 V, 5A, time lag.	JDYX2, JDYX8 (E220181)	UL	
Thermistor (RT1, RT2) not relied for safety	Thinking Electronic Industrial Co Ltd	SCK series (SCK15075LSY)	Type NTC, 7 Ohm, 25°C min, 3A min. steady state current	XGPU2 (E138827)	UL	
Thermistor (RT1, RT2) - Alternate not relied for safety	Interchangeable	Interchangeable	NTC, min. 240 V, min 7 Ohm @ 25°C, 3A min. steady state current	-	-	
Diode Bridge (CR1)	Diodes Inc	GBU606	Rated 600V, 6A min., 150°C	QQQX2 (E94661)	UL-	

Diode Bridge (CR1) - Alternate	Lite-On Semiconductor Corp	GBU606	Rated 600V, 6A min., 150°C	QQQX2 (E95060)	UL	
Diode Bridge (CR1) - Alternate	Vishay General Semiconductor	GBU6J-E3	Rated 600V, 6A min., 150°C	QQIJ2 (E54214)	UL	
X-Capacitor (C1, C7)	Winday Electronics Industrial Co Ltd (Yuon Yu Electronic)	MPX series (SMPXX105K0275A B2323-YYEXX)	Rated max. 1uF, min. 250V, marked with “X2”	FOWX2, FOWX8 (E302125)	UL, cUL	
X-Capacitor (C1, C7) - Alternate	Vishay Capacitors Belgium N V	339 Series (2222 339 24105)	Rated max. 1uF, min. 250V, marked with “X2”	FOWX2 (E354331)	UL, CSA	
X-Capacitor (C1, C7) - Alternate	Vishay Capacitors Belgium N V	338 4 Series	Rated max. 1uF, min. 250V, marked with “X2”	FOWX2 (E354331)	UL, CSA	
X-Capacitor (C1, C7) - Alternate	Xiamen Faratronic Co Ltd	MKP62 Series	Rated max. 1uF, min. 250V, marked with “X2”	FOWX2 (E186600)	UL, CSA	
X-Capacitor (C3, C8, C9)	Vishay Capacitors Belgium N V	MKP 338 2 Series (2222 338 24 104)	Rated max. 0.1uF, min. 250Vac, marked with “X2”	FOWX2 (E354331)	UL, CSA	
X-Capacitor (C3, C8, C9) – Alternate	Kemet Electronics OY (Evox-Rifa)	PHE840M Series (PHE840MA6100M A04R17)	Rated max. 0.1uF, min. 250Vac, marked with “X2”	FOWX2, FOWX8 (E73869)	UL, cUL	
X-Capacitor (C3, C8, C9) – Alternate	Kemet Electronics Italia SRL (Arcotronics)	R.46 Series (R46KF310050M1M)	Rated max. 0.1uF, min. 250Vac, marked with “X2”	FOWX2, FOWX8 (E97797)	UL, cUL	
X-Capacitor (C3, C8, C9) – Alternate	Yuon Yu Electronics Co. Ltd. (Winday Elect. Industrial)	MPX Series (SMPXX104K0275A B1020)	Rated max. 0.1uF, min. 250Vac, marked with “X2”	FOWX2, FOWX8 (E302125)	UL, cUL	
Optional Y-Capacitor (C4, C5)	Murata Mfg. Co. Ltd.	KX Series (DE1B3KX331KA4B L01)	Rated max. 330pF, min. 250V, marked with “Y1”	FOWX2 (E37921)	UL, CSA	
Optional Y-Capacitor (C4, C5) - Alternate	Panasonic Corp	NS-A Series (ECKANA331KB)	Rated max. 330pF, min. 250V, marked with “Y1”	FOWX2 (E62674)	UL, CSA	

Optional Y-Capacitor (C4, C5) - Alternate	Vishay Electronic GmbH	VY1 Series	Rated max. 330pF, min. 250V, marked with “Y1”	FOWX2 (E183844)	UL, CSA	
Capacitor (C6)	Nichicon (America) Corp	LGG2G331MELC25	Rated 330uF max, min. 400V, 105°C. Provided with integral pressure relief.	-	-	
Capacitor (C6) - Alternate	Interchangeable	Interchangeable	Rated 330uF max, min. 400V, 105°C. Provided with integral pressure relief.	-	-	
Optional Y-Capacitor (C20)	Murata Mfg. Co. Ltd.	KX Series (DE1E3KX222MA5BA01) (DE1E3KX222MB4BL01)	Rated max. 2200pF, min. 250V, marked with “Y1”	FOWX2 (E37921)	UL, CSA	
Optional Y-Capacitor (C20) - Alternate	Vishay Electronic GMBH	WKP series (WKP222MCPEF0KR)	Rated max. 2200pF, min. 250V, marked with “Y1”	FOWX2, FOWX8 (E183844)	UL, cUL	
Optional Y-Capacitor (C43)	Kemet Electronics OY (Evox Rifa AB)	ERP610 Series (ERP610VH4470M)	Rated max. 4700pF, min. 250 V, marked with “Y1”	FOWX2, FOWX8 (E73869)	UL, cUL	
Optional Y-Capacitor (C43) - Alternate	Murata Mfg. Co. Ltd.	KX Series (DE1E3KX472MA4BL01)	Rated max. 4700pF, min. 250 V, marked with “Y1”	FOWX2(E37921)	UL, CSA	
Optional Y-Capacitor (C43) - Alternate	Murata Mfg. Co. Ltd.	KX Series (DE1E3KX472MA5BA01)	Rated max. 4700pF, min. 250 V, marked with “Y1”	FOWX2(E37921)	UL, CSA	
Optional Y-Capacitor (C43) - Alternate	Vishay Electronic GMBH	VKP series (VKP472MCQED0KR)	Rated max. 4700pF, min. 250 V, marked with “Y1”	FOWX2, FOWX8 (E183844)	UL, cUL	
Optical Isolators (U3, U4, and U6)	Lite On Semiconductor	LTV-816 Series (LTV-816M-A)	Double protection, isolation voltage 5300 V. (DTI min. 0.4 mm)	FPQU2, FPQU8 (E113898)	UL, cUL	

Optical Isolators (U3, U4, and U6) – Alternate	Renesas Electronics Corp (NEC)	PS2561 Series (PS2561AL-1-V-E3-A (H))	Double protection, isolation voltage 5000 V. (DTI min. 0.4 mm)	FPQU2, (E72422)	UL, CSA	
Rectifier (CR2 and CR3)	ON Semiconductor Inc	MBR Series (MBR2545CTG)	Rated 30A, 45 V, 150°C	-	-	
Rectifier (CR2,CR3) - Alternate	Fairchild Semiconductor Inc	MBR series (MBRP3045N NL)	Rated 16A, 400V max, 150°C	-	-	
Rectifier (CR2,CR)3 - Alternate	International Rectifier (IRF)	25CTQ045PBF	Rated 16A, 400V max, 150°C	-	-	
Rectifier (CR2,CR3) - Alternate	ST Microelectronics (SGS)	STPS3045CT or STPS3045CTC	Rated 16A, 400V max, 150°C	-	-	
Rectifier (CR2,CR3) - Alternate	Interchangeable	Interchangeable	Rated 16A, 400V max, 150°C	-	-	
Mosfet (Q1)	Infineon Technologies	SPA20N60C3	Rated 600V, 20A min, 150°C	-	-	
Mosfet (Q1) - Alternate	Interchangeable	Interchangeable	Rated 5A, 600V min, 150°C	-	-	
Mosfet (Q3, A4)	Vishay	IRF840ASPBF	Rated 500V, 8A min, 150°C	-	-	
Mosfet (Q3, A4)	Interchangeable	Interchageable	Rated 500V, 8A min, 150°C	-	-	
Inductor L1	XP Power Ltd (Factory: Kunshan)	1000xxxx (where x can be any number from 0 to 9). Part no. 10008871 represents entire series)	Toroidal (16.85mH). Magnetic Wire, (OBWM2), rated min. 135°C, wound on Ferrite Core. Overall approx. 2.6 cm OD by 1.3 cm wide. Also provided with 1 layer of Outerwrap, see Inductor – Outerwrap Tape See Enclosure 4-01 and 4-02 for details.	-	Evaluated as part of this investigation	

Inductor L2	XP Power Ltd (Factory:Kunshan)	1000xxxx (where x can be any number from 0 to 9). Part no. 10006268 represents entire series)	Toroidal (7.6uH). Magnetic Wire, (OBWM2), rated min. 135°C, wound on Ferrite Core. Overall approx. 2.6 cm OD by 1.1 cm wide. Also provided with 1 layer of Outerwrap, see Inductor - Outerwrap. See Enclosure 4-03 for details.	-	Evaluated as part of this investigation	
Inductor L3	XP Power Ltd (Factory:Kunshan)	1000xxxx (where x can be any number from 0 to 9). Part no. 10006270 represents entire series)	Open type (232uH), magnet wire, (OBWM2), Concentrically wound, overall dimension 28 mm by 26 mm by 22 mm. See 4-03 for details.	-	Evaluated as part of this investigation	
Inductor L4 (secondary)	XP Power Ltd (Factory:Kunshan)	1000xxxx (where x can be any number from 0 to 9). Part no. 10006732 represents entire series)	Toroid (0.2uH), magnet wire, (OBWM2), overall dimension 10.0 mm by 5.0 mm See Enclosure 4-04 for details.	-	Evaluated as part of this investigation	
Inductor (L1,L2,L3) - Insulation System	XP Power	Class 155 (F)	Rated 155°C	OBJY2 (E324960)	UL	
Inductor (L3) - Bobbin	Sumitomo Bakelite Co., Ltd.	PM-9820 (2601-2/PM9820 or PQ26(12P)/PQ or PQ-2625-2 PM-9820)	Rated V-0, min. 1 mm thick, 150°C.	QMFZ2 (E41429)	UL	
Inductor (L3) - Bobbin - Alternate	E I Dupont De Nemours & Co Inc	Rynite FR530	Rated V-0, 155°C, min. 0.8 mm thick.	QMFZ2 (E41938)	UL	

Inductor (L1,L2,L3) - Outer Wrap	3M Corp	1350 Series (1350FW-1)	Rated 130°C. (one layer has been found to be sufficient to provide a dielectric strength of 5000 V)	OANZ2 (E17385)	UL	
Inductor (L1,L2,L3) - Outer Wrap - Alternate	Jingjiang Yahua Pressure Sensitive Glue Co Ltd	CT286	Rated 130°C. (one layer has been found to be sufficient to provide a dielectric strength of 5000 V)	OANZ2 (E165111)	UL	
Output Transformer (T1)	XP Power	1000xxxx (where x can be any number from 0 to 9). Part no. 10006267 represents entire series)	Open-type. Concentrically wound. Primary Windings: (OBWM2), Magnet Wire, rated min. 130°C Core: Approx. 2.7 by 2.6 by 1.9 cm, min. 5 mm thick. Bobbin: See Transformer (T1) - Bobbin for details. Provided with a Class F insulation system, see below for details. See Enclosure 4-06 to 4-09 for details.	-	Evaluated as part of this investigation	
Standby Transformer (T2) - For Models with Suffix "-A" only	XP Power	1000xxxx (where x can be any number from 0 to 9). Part no. 10006733 represents entire series)	Open-type. Concentrically wound. Primary Windings: (OBWM2), Magnet Wire, rated min. 130°C Core: Approx. 18 by 17 by 12 mm, min. 1.3 mm thick. Provided with a Class F insulation system, see below for details. See Enclosure 4-10 for details.	-	Evaluated as part of this investigation	

Transformer (T1,T2) - Insulation System	XP Power	Class F	Class 155 (F), 130°C	OBJY2 (E324960)	UL	
Transformer (T1,T2) - Bobbin	Sumitomo Bakelite Co., Ltd.	PM-9820 (2601-2/PM9820 or PQ26(12P)/PQ or PQ-2625-2 PM-9820)	Rated V-0, min. 1 mm thick, 150°C.	QMFZ2 (E41429)	UL	
Transformer (T1,T2) – Bobbin - Alternate	E I Dupont De Nemours & Co Inc	Rynite FR530	Rated V-0, 155°C, min. 0.8 mm thick.	QMFZ2 (E41938)	UL	
Transformer (T1) - Triple Insulating Wire	Rubadue Wire Co.	T18A01TXXX-2 or T26A01TXXX-1.5	Provided on Secondary Windings: Reinforced Insulation. Rated 155°C, 1000 Vpk, 1.25 mm OD. (Dielectric strength conducted 7 kV as part of the component evaluation).	OBJT2 (E206198)	UL	
Transformer (T2) - Triple Insulating Wire	Rubadue Wire Co.	T24A01TXXX-1.5	Reinforced Insulation. Rated 155°C, 1000 Vpk, 0.74mm OD. (Dielectric strength conducted 7 kV as part of the component evaluation).	OBJT2 (E206198)	UL	
Transformer (T1,T2) - Insulating Tape(Outer Wrap)	3M Corp	1350 Series (1350FW-1)	Rated 130°C. (one layer has been found to be sufficient to provide a dielectric strength of 5000 V) Transformer T2 provided with 2 layers to completely cover any exposed wires.	OANZ2 (E17385)	UL	
Printed Wiring Board	Interchangeable (Kunshan Wanzheng PCB Co Ltd)	Interchangeable (WZ-1)	Overall 12.7 by 7.6 cm. Rated min. V-0, 130°C, rated for direct support of live parts.	ZMPV2 (E211670)	UL	

Printed Wiring Board - Alternate	Evergreen (HK) PCB Ltd	M or ML	Overall 12.7 by 7.6 cm. Rated min. V-0, 130°C, rated for direct support of live parts.	ZMPV2 (E211670)	UL	
Printed Wiring Board - Alternate	Liang Dar Technology Co. Ltd	5, M, or M2	Overall 12.7 by 7.6 cm. Rated min. V-0, 130°C, rated for direct support of live parts.	ZMPV2 (E211670)	UL	
Printed Wiring Board - Alternate	Yan Tat Technology Ltd	Y-01, or Y-07	Overall 12.7 by 7.6 cm. Rated min. V-0, 130°C, rated for direct support of live parts.	ZMPV2 (E211670)	UL	
Printed Wiring Board - Alternate	Interchangeable	Interchangeable	Rated min. V-1, 105 °C	ZPMV2	UL	
Bonding Conductor	Rubadue Wire Co. Inc.	T24A01T090-2	Connected from earthing pad E3 to Solder Point E4. Reinforced Insulation, rated 155°C (Class F), 1000 Vpk, 24 AWG. Also provided with tubing, see Insulating Tubing/Sleeving for details.	OBJT2 (E206198)	UL	
Insulating Sleeving/Tubing	Tyco Electronics Corp.	Versafit	Rated 600 V, 125°C, VW-1, 3/8 in. diameter,	YDPU2	UL	
Insulating Sleeving/Tubing - alternate	Sumitomo Electric Fine Polymer Inc.	Sumitube F32 or 941 or B2	Rated 600 V, 125°C, VW-1, 3/8 in. diameter,	YDPU2	UL	
Insulating Sleeving/Tubing - alternate	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; min. 80ºC, min. 300 V	UZFT2, YDPU2, YDRY2, YDTU2	UL	
Label	Brady Worldwide Inc.	B-423	Rated min. 150°C and suitable for application to metal. Previously	PDGQ2 (MH17154)	UL	

			tested for XP Power in CBTR E139109-A24-CB-2, Amendment 2.			
Label	3M Company	7816	Rated min. 150°C and suitable for application to metal. Suitable for use with inks identified in UL Listing.	PGJI2 (MH16411)	UL	
Label-Alternate	Interchangeable	Interchangeable	Rated min. 60°C and suitable for application to metal. Suitable for use with inks identified in UL Listing.	PGJI2	UL	
Label - Alternate	Interchangeable	Interchangeable	Rated min. 60°C and suitable for application to metal	PDGQ2	UL	
Optional Conformal Coating	Dow Corning	1-2577	Rated V-0, min. 130, min. 60- 120 microns. (not relied upon for reduced creepage and clearances.)	UL 746E	UL	

Enclosures

Type	Supplement Id	Description
Photographs	03-01	Top View
Photographs	03-02	Bottom View
Diagrams	04-01	Model ECM140US12 - Inductor (L1)
Diagrams	04-02	Model ECM140USXX - Inductor (L1)
Diagrams	04-03	Model ECM140USXX - Inductor (L2)
Diagrams	04-04	Model ECM140USXX - Inductor (L3)
Diagrams	04-05	Model ECM140USXX - Inductor (L4)
Diagrams	04-06	Model ECM140US12 - Transformer (T1)
Diagrams	04-07	Model ECM140US15 - Transformer (T1)
Diagrams	04-08	Model ECM140US24 - Transformer (T1)
Diagrams	04-09	Model ECM140US48 - Transformer (T1)
Diagrams	04-10	Model ECM140USXX - Transformer (T2)
Diagrams	04-11	Double Pole Neutral Fuse Marking
Schematics + PWB	05-01	PWB Component and Trace Layouts
Miscellaneous	07-01	Manufacturer's Letter of Assurance
Marking Plate	13-01	ECM140US12-A Marking Plate