

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:	Open Frame Switching Power Supply
Model:	TES20-X (X can be 03, 05, 09, 12, 15, 24, 30, 48, 01D, 02D or 03D) and ECP20UX (X can be S03, S05, S09, S12, S15, S24, S30, S48, D12, D15 or D24)
Rating:	Input: 100-240 Vac, 50-60 Hz, 0.4 A Output: See Model Differences for details.
Applicant Name and Address:	XP POWER INC 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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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

A. Models TES20-05, TES20-48 and TES20-01D are similar to Models TES20-X (X can be 03, 09, 12, 15, 24, 30, 02D or 03D) except for model designation, PWB layout, and output ratings.

B. Model nomenclature:

- a. Model TES20-X (X can be 03, 05, 09, 12, 15, 24, 30 or 48):
 - X may be 03, 05, 09, 12, 15, 24, 30 or 48, which represents output voltage itself but 03. (03 = 3.3 Vdc)
- b. Model TES20-X (X can be 01D, 02D or 03D):
 - X may be 01D, 02D or 03D, which represents output voltage +12 and -12 Vdc for 01D, +15 and -15 Vdc for 02D, and +24 and -24 Vdc for 03D.

C. Model ECP20UX (X can be S03, S05, S09, S12, S15, S24, S30, S48, D12, D15 or D24) Series is identical to Model TES20-X (X can be 03, 05, 09, 12, 15, 24, 30, 48, 01D, 02D or 03D), with exception to the marketing model designation, see Rating Table for Correlation.

Ratings Table.

TES20-03 and ECP20US03: 3.3 Vdc, 4 A
TES20-05 and ECP20US05: 5 Vdc, 4 A
TES20-09 and ECP20US09: 9 Vdc, 2.23 A
TES20-12 and ECP20US12: 12 Vdc, 1.67 A
TES20-15 and ECP20US15: 15 Vdc, 1.34 A
TES20-24 and ECP20US24: 24 Vdc, 0.84 A
TES20-30 and ECP20US30: 30 Vdc, 0.67 A;
TES20-48 and ECP20US48: 48 Vdc, 0.42 A
TES20-01D and ECP20UD12: +12 Vdc, 0.84 A and -12 Vdc, 0.84 A
TES20-02D and ECP20UD15: +15 Vdc, 0.67 A and -15 Vdc, 0.67 A
TES20-03D and ECP20UD24: +24 Vdc, 0.42 A and -24 Vdc, 0.42 A

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% (manufacturer declared)
- § Tested for IT power systems : No
- § IT testing, phase-phase voltage (V) : N/A
- § Class of equipment : Class II
- § Considered current rating of protective device as part of the building installation (A) : 0.4
- § 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) : 0.045
- § The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: 50°C
- § The means of connection to the mains supply is: for building-in, to be determined in the end product.
- § The product is intended for use on the following power systems: TN
- § The equipment disconnect device is considered to be: for building-in, to be determined in the end product.
- § The following accessible locations (with circuit/schematic designation) are within a limited current circuit: Load side of CY2 (Pri to Sec bridging capacitor)
- § The following circuit locations (with circuit/schematic designation) were investigated as a limited power source (LPS): All Output Circuits

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: 254 Vrms, 508 Vpk,
- § The following secondary output circuits are SELV: All power outputs
- § The following secondary output circuits are at non-hazardous energy levels: All power outputs
- § The following secondary output circuits are Limited Current Circuits: Load side of CY2 (Pri to Sec bridging capacitor)
- § The following secondary output circuits are supplied by a Limited Power Source: Power outputs 9 Vdc, 48 Vdc, +12 Vdc and -12 Vdc,
- § 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
- § 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: Mechanical, Fire, Electrical

§ The equipment is suitable for direct connection to: AC mains supply

Additional Information

Required values for clearance are adjusted for 3048 m (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 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
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						
<u>Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.</u>						
Model	Component	Removable Parts	Test probe location	V rms	V dc	Test Time, s
All Models	Transformer, TR1	-	Primary to SELV	300 0	4242	1
<u>Earthing Continuity Test Exemptions - This test is not required for the following models:</u>						
All Models						
<u>Electric Strength Test Exemptions - This test is not required for the following models:</u>						
<u>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:</u>						
<u>Sample and Test Specifics for Follow-Up Tests at UL</u>						
Model	Component	Material	Test	Sample(s)	Test Specifics	
N/A						

1.5.1	TABLE: list of critical components					Pass
Object/part or Description	Manufacturer/ trademark	type/model	technical data	Product Category CCN(s)	Required Marks of Conformity	Supplement ID
1. Fuse (F1)	Bel Fuse Inc.	RST	T1A, 250 V	JDYX2	UL	3-01
1-1. Fuse (F1) (alternate)	Wickmann-Werke Gmbh.	392	T1A, 250 V	JDYX2	UL	
1-2. Fuse (F1) (alternate)	Walter Electronic Co., Ltd.	2010	T1A, 250 V	JDYX2	UL	
1-3. Fuse (F1) (alternate)	Conquer Electronics Co., Ltd.	MST	T1A, 250 V	JDYX2	UL	
1-4. Fuse (F1) (alternate)	Save Fusetech Inc	SS-5	T1A, 250 V	JDYX2	UL	
2. Thermistor (RT1) (optional)	Interchangeable	Interchangeable	Rated 20 ohm at 25°C, Min. 0.3 A (not relied upon for safety)	--	--	3-01
3. Varistor (Z1) (optional)	Thinking Electronic Industrial Co., Ltd.	TVR05471	300 Vac, 385 Vdc	VZCA2, VZCA8 (E314979)	UL, cUL	3-01
4. X-capacitor (CX1) (optional)	Vishay BC Components BV	MKP 338 2	Max. 0.22 uF, Min. 250 Vac, 105°C. Provided with VDE or SEV marks.	FOWX2	UL	3-01
4-1. X-capacitor (CX1) (optional) (alternate)	Carli Electronics Co., Ltd.	MPX	Max. 0.22 uF, Min. 250 Vac, 100°C. Provided with VDE or SEV marks.	FOWX2	UL	
4-2. X-capacitor (CX1) (optional) (alternate)	Cheng Tung Industrial Co., Ltd.	CTX	Max. 0.22 uF, Min. 250 Vac, 100°C. Provided with VDE or SEV marks.	FOWX2	UL	
4-3. X-capacitor (CX1) (optional) (alternate)	Chiefcon Electronics Co Ltd	CKX	Max. 0.22 uF, Min. 250 Vac, 100°C. Provided with VDE or SEV marks.	FOWX2	UL	
4-4. X-capacitor (CX1) (optional) (alternate)	Matsushita Electric Industrial Co Ltd Panasonic Corp Of North America	ECQUG	Max. 0.22 uF, Min. 250 Vac, 100°C. Provided with VDE or SEV marks.	FOWX2	UL	
4-5. X-capacitor (CX1) (optional) (alternate)	Jenn Fu Electronics Corp	MPX	Max. 0.22 uF, Min. 250 Vac, 100°C. Provided with VDE or SEV marks.	FOWX2	UL	
4-6. X-capacitor (CX1)	EVOX Rifa Group Oyj	PHE 840M	Max. 0.22 uF, Min. 250 Vac,	FOWX2	UL	

(optional) (alternate)			100°C. Provided with VDE or SEV marks.			
4-7. X-capacitor (CX1) (optional) (alternate)	EVOX Rifa Group Oyj	PHE 830M	Max. 0.22 uF, Min. 250 Vac, 100°C. Provided with VDE or SEV marks.	FOWX2	UL	
4-8. X-capacitor (CX1) (optional) (alternate)	Iskra Kondenzatorji D D	KNB1560	Max. 0.22 uF, Min. 250 Vac, 110°C. Provided with VDE or SEV marks.	FOWX2	UL	
5. Bleeder Resistor (R2, R5)	Interchangeable	Interchangeable	Each rating 680K ohm, 0.25 W	--	--	3-01
6. Bridge diode (BR1)	Interchangeable	Interchangeable	Min. 600 V	--	--	3-01
7. Storage capacitor (C6)	Interchangeable	Interchangeable	47 uF, Min. 400 V, 105°C	--	--	3-01
8. Transistor (Q2)	Interchangeable	Interchangeable	Min. 600V, 6 A min.	--	--	3-01
9. Bridging-capacitor (CY1, CY2) (optional)	Matsushita Electric Industrial Co Ltd Panasonic Corp Of North America	NS-A	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	3-01
9-1. Bridging-capacitor (CY1, CY2) (optional)	Murata Mfg Co Ltd	KX	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	
9-2. Bridging-capacitor (CY1, CY2) (optional)	Success Electronics Co Ltd	SE	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	
9-3. Bridging-capacitor (CY1, CY2) (optional)	Jya-Nay Co Ltd	JN	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	
9-4. Bridging-capacitor (CY1, CY2) (optional)	TDK Corp	CD	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	
9-5. Bridging-capacitor (CY1, CY2) (optional)	Welson Industrial Co Ltd	WD	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	
9-6. Bridging-capacitor (CY1, CY2) (optional)	Walsin Technology Corp	AH	Each 2200 pF, min. 250 V, 85°C min, Y2 type. Provided with VDE or SEV marks.	FOWX2	UL	

10. Optocouplers (IC3)	NEC Electronics Corp Compound Semiconductor Device Div	PS2561	Isolation voltage 5000 Vac. Max. Operating temperature 100°C. Provided with VDE or FI marks.	FPQU2	UL	3-01
10-1. Optocouplers (IC3) (alternate)	Fairchild Semiconductor Corp	H11A817A, H11A817B, H11A817C	Isolation voltage 5000 Vac. Max. Operating temperature 110°C. Provided with VDE or FI marks.	FPQU2	UL	
10-2. Optocouplers (IC3) (alternate)	Lite-On Technology Corp	LTV817	Isolation voltage 5000 Vac. Max. Operating temperature 110°C. Provided with VDE or FI marks.	FPQU2	UL	
10-3. Optocouplers (IC3) (alternate)	Toshiba Corp, Semiconductor Co Discrete Semiconductor Div	TLP721, TLP721F	Isolation voltage 4000 Vac. Max. Operating temperature 100°C. Provided with VDE or FI marks.	FPQU2	UL	
10-4. Optocouplers (IC3) (alternate)	Toshiba Corp, Semiconductor Co Discrete Semiconductor Div	TLP621, TLP621-2, TLP621-3, TLP621-4, TLP421	Isolation voltage 5000 Vac. Max. Operating temperature 100°C except 125 degree for TLP421. Provided with VDE or FI marks.	FPQU2	UL	
10-5. Optocouplers (IC3) (alternate)	Vishay Semiconductor Gmbh	TCET1100, TCET1101, TCET1102, TCET1103, TCET1104, TCET1105	Isolation voltage 5000 Vac. Max. Operating temperture 110°C. Provided with VDE or FI marks.	FPQU2	UL	
10-6. Optocouplers (IC3) (alternate)	Sharp Corp Electronic Components Group	PC817	Isolation voltage 5000 Vac. Max. Operating temperature 110°C. Provided with VDE or FI marks.	FPQU2	UL	
10-7. Optocouplers (IC3) (alternate)	Cosmo Electronics Corp	K1010, KPC817	Isolation voltage 5000 Vac. Max. Operating temperature 110°C. Provided with VDE or FI marks.	FPQU2	UL	
11. Choke (L2) (optional)	Interchangeable	Interchangeable	Rated 105°C	--	--	4-01

11-1. - coil	Interchangeable	Interchangeable	Copper magnet wire. See Enclosure 4-01 for details.	OBMW2	UL	
11-2. - core	Interchangeable	Interchangeable	Ferrite, toroidal, overall 12.4 OD by 6.0 ID by 4.2 mm.	--	--	
12-1. Transformer (TR1) - insulation system	Ain Hsin Electronic Co Ltd	SBI4.2	Class B	OBJY2	UL	
12-1-1. - core	Interchangeable	Interchangeable	Ferrite, overall 19 by 19 by 6.5 mm	--	--	
12-1-2. - coil	Interchangeable	Interchangeable	Copper magnet wire. See enclosure for details.	OBMW2	UL	
12-1-3. - bobbin	Sumitomo Bakelite Co., Ltd.	PM-9820	Phenolic, rated V-0, minimum 0.71 mm thick.	QMFZ2	UL	
12-1-4. - triple wire (in secondary)	Totoku Electric Co Ltd	TIW-2X	Min. 130°C, triple insulated wire	OBJT2	UL	
12-1-5. - insulation tape	3M Company	1350F-1	130°C, polyester Film tape, min. 0.025 mm thick.	OANZ2	UL	
12-1-6. - tubing	Great Holding Industrial Co., Ltd.	TFL	Min. 200°C	YDPU2	UL	
12-1-7. - varnish	John C Dolph Co	BC-346A	Min. 200°C	OBOR2	UL	
13. PWB	Interchangeable	Interchangeable	V-1 or better, min. 130°C	ZPMV2	UL	5-01
14. Label	Interchangeable	Interchangeable	Rated min 85°C, for application to plastic.	PGDQ2 or PGJ12	UL	

Enclosures

<u>Type</u>	<u>Supplement Id</u>	<u>Description</u>
Photographs	3-01	Component Side View of Unit (For Model TES20-X, where X may be 03, 05, 09, 12, 15, 24, 30, 48)
Photographs	3-02	Trace Side View of Unit (For Model TES20-X, where X may be 03, 05, 09, 12, 15, 24, 30, 48)
Photographs	3-03	Component Side View of Unit (For Model TES20-X, where X may be 01D, 02D, 03D)
Photographs	3-04	Trace Side View of Unit (For Model TES20-X, where X may be 01D, 02D, 03D)
Diagrams	4-01	Choke (L2) Specification
Diagrams	4-02	Transformer (TR1) Specification
Schematics + PWB	5-01	PWB Layout for Model TES20-X (X can be 03, 05, 09, 12, 15, 24, 30, 48)
Schematics + PWB	5-03	PWB Layout for Model TES20-X (X can be 01D, 02D, 03D)
Manuals		
Miscellaneous	7-01	Additional Test Tables