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:	CCB250PSXX (where xx can be any number between 12 and 48 designating the output voltage), maybe followed with additional suffix "SF" provided with or without "-".
Rating:	Input Rated: 100-240 V~, 50/60 Hz, 3.2 A Output Rated: 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

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of Underwriters Laboratories Inc. ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

Prepared by: Linus Park
Underwriters Laboratories Inc.

Reviewed by: Paul Hilgeman
Underwriters Laboratories Inc.

Supporting Documentation

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

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

B. Generic Inspection Instructions -

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

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

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

Product Description

Products covered are open frame power supplies intended for building-in to be used with Medical Electrical Equipment. Units are intended for used with Class I or Class II end-products.

Model Differences

The power supplies in this series are differentiated by the output voltage and current ratings, number of turns of primary/secondary windings in the Power Transformers (T302), type of Chassis Fan Cover and minor differences in the secondary circuit components and PWB layout. See below for Model Ratings for up to 50°C ambient:

All models are provided with Fan Supply Connection (12Vdc, 0.5 A) and Standby Connection (5 Vdc, 0.2A).

See also Enclosure-Miscellaneous for additional details.

Technical Considerations

- Classification of installation and use : For building-in
- Supply connection : For building-in
- Accessories and detachable parts included in the evaluation: None
- Options included: None
- The product was investigated to the following additional standards:: ANSI/AAMI ES60601-1:2005/C1:2009 (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 evaluation: Clause 7.5 (Safety Signs), Clause 7.9 (Accompanying Documents), Clause 9 (ME

Hazard), Clause 10 (Radiation), Clause 14 (PEMS), Clause 16 (ME Systems)

- Supply connection: Overvoltage Category II
- The product is Classified only to the following hazards: Casualty, Fire, Shock
- The degree of protection against harmful ingress of water is: Ordinary
- The mode of operation is: Continuous
- Software is relied upon for meeting safety requirements related to mechanical, fire and shock: No
- The product is suitable for use in the presence of a flammable anesthetics mixture with air or oxygen or with nitrous oxide: No
- The product was submitted and evaluated for use at the maximum ambient temperature (Tmra) permitted by the manufacturer's specification of: 50°C with output loaded to 100% rated and 70°C with output loaded to 50% rated (See De-rating Curve, Enclosure 7-01 (Ill. 10) for details).

Risk Controls/Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc. When installed in an end-product, consideration must be given to the following:

- The component shall be installed in compliance with the Marking (clause 7) and Separation (clause 8) requirements of the end use application.
- Repeating leakage current testing and consideration of non-frequency weighted leakage to be considered as part of the end product.
- This power supply was evaluated with Two MOPP between Primary and Secondary; One MOPP primary and Earth.
- 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 mm Clearance between the primary side of the power supply and any accessible conductive parts.
- Unit provided with One MOPP for 250 Vrms between secondary and ground/floating mounting holes, for consideration in BF applications as part of the end product
- 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 should 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 output connectors are not acceptable for field connections; they are only intended for connection to mating connectors of the end-use equipment.
- The maximum investigated branch circuit rating is: 20 A
- The Dielectric Withstand Voltage Test conducted on this power supply was based upon a maximum working voltage of: Primary-Earthed Dead Metal (Class I units): 344 Vpk, 242 Vrms; Primary-SEC: 670 Vpk, 324 Vrms.
- 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): PFC, L2, L3, L5, L6 and T1-T5 (min. Class F, min. 155°C)
- Printed Wiring Board rated 130°C.
- Cleaning test to 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.
- Units provided with additional suffix “SF”, provided with only one fuse. Need for additional fusing to be determined as part of the end product.

Additional Information

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

Markings and instructions

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

Direct current	
Power Input	Amps, VA, or Watts
Output	Rated output voltage, power, frequency.
Functional Earth Terminal	

Special Instructions to UL Representative

N/A

Production-Line Testing Requirements

Test Exemptions - The following models are exempt from the indicated test

Model	Grounding Continuity	Dielectric Voltage Withstand	Patient Circuit Dielectric Voltage Withstand
All Models	Test	Test	Exempt

Solid-State Component Test Exemptions - The following solid-state components may be disconnected from the remainder of the circuitry during either Dielectric Voltage Withstand Test:

N/A

Sample and Test Specifics for Follow-Up Tests at UL

The following tests shall be conducted in accordance with the Generic Inspection Instructions

Model	Samples	Test	Test Details
N/A			

CERTIFICATE OF COMPLIANCE

Certificate Number	20130422-E139109
Report Reference	E139109-A87-UL
Issue Date	2013-APRIL-22
Issued to:	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	Power Supplies for Information Technology Equipment Including Electrical Business Equipment Switching Power Supplies - CCB250PSXX (where XX = represents the output voltage between 12, 15, 24, 36, 48, maybe followed with additional suffix "SF")
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 60950-1 and CSA C22.2 No. 60950-1-07 - Information Technology Equipment - Safety - Part 1: General Requirements.
Additional Information:	See the UL Online Certifications Directory at www.ul.com/database 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

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 Supplies
Model:	CCB250PSXX (where XX = represents the output voltage between 12, 15, 24, 36, 48, maybe followed with additional suffix "SF")
Rating:	Input: 100-240 Vac, 50/60 Hz, 3.2 A Output: See Model Differences for Output Ratings details
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: Sal Oseguera Reviewed by: Benjamin Mapes

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 component AC-DC power supply for building-in, open frame type provided with a metal chassis, incorporating primary and SELV components.

The main PWB is secured to the chassis studs by multiple machine screws.

Model Differences

The power supplies in the series are differentiated by the output voltage and current ratings, number of turns of primary/secondary windings in the Transformers (T3 (Power)) and minor differences in the secondary circuit components.

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

Model CCB250PS12: Output Rated: 12 Vdc, 20.8 A (250 W); Stand-by: 5 V, 0.5A
Model CCB250PS15: Output Rated: 15 Vdc, 16.7 A (250 W); Stand-by: 5 V, 0.5A
Model CCB250PS24: Output Rated: 24 Vdc, 10.4 A (250 W); Stand-by: 5 V, 0.5A
Model CCB250PS28: Output Rated: 28 Vdc, 8.9 A (250 W); Stand-by: 5 V, 0.5A
Model CCB250PS36: Output Rated: 36 Vdc, 6.9 A (250 W); Stand-by: 5 V, 0.5A
Model CCB250PS48: Output Rated: 48 Vdc, 5.2 A (250 W); Stand-by: 5 V, 0.5A

See Enclosure-Miscellaneous for details.

Additional suffix "SF" provided for units provided with only one fuse in the line and no fuse in the neutral.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : To be determined in the end-use product.
- Operating condition : continuous
- Access location : To be determined in the end-use product.
- 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) : 5.0 A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 3048
- Altitude of test laboratory (m) : 40
- Mass of equipment (kg) : 0.8
- 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 half rated load (See Enclosure - Miscellaneous for de-rating curve details).
- The product is intended for use on the following power systems: TN
- The equipment disconnect device is considered to be: determined in the end-product.,
- 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: 242 Vrms, 344 Vpk, Primary-SELV: 322 Vrms, 670 Vpk
- The following secondary output circuits are SELV: All outputs
- The following secondary output circuits are at hazardous energy levels: Power output
- 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: CON4 (N)
- 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): PFC, L3, L2, L5, L6 and T1-T5 (Class F),
- The following end-product enclosures are required: Mechanical, Fire, Electrical,
- Consideration to repeating Heating and Touch Current Tests should be given in the end-product evaluation.

Additional Information

The clearance distances have additionally been assessed for suitability up to 3048 m elevation (1.15 correction factor as per IEC 60664-1, Table A2).

Marking label is representative of all models.

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, IEC 60950-1:2005 + A1:2009, UL 60950-1 2nd Ed. Revised 2011-12-19

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
Warning to service personnel	"CAUTION: Double pole/neutral fusing"

Special Instructions to UL Representative

Units provided with optional fuse, F2, should also be provided with the "CAUTION: Double pole/neutral fusing". The marking is not required for single pole fused units.

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-T5)	-	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					

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
Printed Wiring Board	Interchangeable	Interchangeable	Overall approx. 15.3 by 10.2 cm, min. 2 mm thick. Rated min. V-1, min. 130°C.	ZPMV2	UL	
Primary Connector (CON4)	Molex	41791 Series (P/N 26-60-4050)	5 pos (pins 2, 4 removed), Rated min. 250 V, 7.0 A, 105°C.	ECBT2. (E29179)	UL	
Primary Connector (CON4) - Alternate	AMP/Tyco	MTA-156 Series (640445-5)	5 pos (pins 2, 4 removed), Rated min. 250 V, 7.0 A, 105°C.	ECBT2, ECBT8 (E28476)	UL, cUL	
Primary Connector (CON4) - Alternate	Interchangeable	Interchangeable	5 pos (pins 2, 4 removed), Rated min. 250 V, 7.0 A, 105°C.	XCFR2 or RTRT2 or ECBT2 or QMFZ2	UL	
Fuse (FS1, FS2)	Littelfuse (Wickmann Werke)	374 Series	Rated 5A, min. 250V, Time Lag (Non-operator replaceable).	JDYX, JDYX7 (E67006)	UL, cUL	
Fuse (FS1, FS2) - Alternate	Bel Fuse Inc.	MRT Series	Rated 5A, min. 250V, Time Lag (Non-operator replaceable).	JDYX2,JDYX8 (E20624)	UL, cUL	
Diode Bridge (BR1)	Fairchild Semiconductor	GBU8	Rated min. 8A, min. 800V. Secured to Bridge Diode Heatsink using screws, washer, and nut.	QQIJ2 (E54214)	UL	
Diode Bridge (BR1) - Alternate	Interchangeable	Interchangeable	Rated min. 8A, min. 800V. Secured to Bridge Diode Heatsink using screws, washer, and nut.	-	-	
Bridge Diode Heatsink (PRI)	Interchangeable	Interchangeable	L-shaped. Aluminum. Overall approx. 44.3 by 39 by 31.3 mm, min. 1.9 mm thick.	-	-	
Relay (RL1)	Tyco Electronics	RE 03 Series	Rated min. 30V, min. 6A (Non-isolating).	NLDX2 (E214025)	UL	
Relay (RL1) - Alternate	Imo Precision Control	SRD Series	Rated min. 30V, min. 6A (Non-isolating).	NRNT2 (E146487)	UL	
Thermistor (TH1)	Epcos	B57326 Series	NTC. Rated 20 Ohm, 25°C min,	XGPU2	UL	

			2.8A min. steady state current (Not relied upon for safety).	(E69802)		
Thermistor (TH1) - Alternate	Interchangeable	Interchangeable	NTC. Rated 20 Ohm, 25°C min, 2.8A min. steady state current (Not relied upon for safety).	-	-	
X-Cap (C17, C18, C23)	Vishay	339 Series, MKP338 Series , or MKP336 1 Series	Rated max. 0.47 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E112471)	UL, cUL	
X-Cap (C17, C18, C23) - Alternate	Faratronic (Xiamen) Co Ltd	MKP62 series, C44 (MKP64 Series), C45 (MKP65 Series) or C46 (MKP66 Series)	Rated max. 0.47 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E186600)	UL, cUL	
X-Cap (C17, C18, C23) - Alternate	Panasonic	ECQUA or ECQUL Series	Rated max. 0.47 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E62674)	UL, cUL	
X-Cap (C17, C18, C23) - Alternate	Epcos/Siemens	B3291 or B3292 Series	Rated max. 0.47 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E97863)	UL, cUL	
X-Cap (C17, C18, C23) - Alternate	Vishay	F1772, F1774, or F1778	Rated max. 0.47 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E100682)	UL, cUL	
X-Cap (C1, C20, C22)	Evox Rifa	PHE840 Series	Rated max. 1.0 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E73869)	UL, cUL	
X-Cap (C1, C20, C22) - Alternate	Vishay	MKP 338, MKP336 1 Series	Rated max. 1.0 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E112471)	UL, cUL	
X-Cap (C1, C20, C22) - Alternate	Panasonic	ECQUL, ECQUA Series	Rated max. 1.0 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E62674)	UL, cUL	
X-Cap (C1, C20, C22) - Alternate	Xiamen Faratronic	C44 (MKP64 Series) , C45 (MKP65 Series), C46 (MKP66 Series), MKP61R or MKP62 Series	Rated max. 1.0 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E18660)	UL, cUL	
X-Cap (C1, C20, C22) - Alternate	Epcos/Siemens	B3291 or B3292 Series	Rated max. 1.0 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E97863)	UL, cUL	
X-Cap (C1, C20, C22) -	Panasonic	ECQUA or	Rated max. 1.0 uF, min. 250 V,	FOWX2, FOWX8	UL, cUL	

Alternate		ECQUL Series	marked “X1” or “X2”.	(E62674)		
X-Cap (C1, C20, C22) - Alternate	Vishay	F1772, F1774, or F1778 Series	Rated max. 1.0 uF, min. 250 V, marked “X1” or “X2”.	FOWX2, FOWX8 (E100682)	UL, cUL	
Y-cap (C25, C27) - Alternate	Murata	KX Series	Rated max. 470 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E37921)	UL, cUL	
Y-cap (C25, C27) - Alternate	Panasonic	NS-A, TS or VS Series	Rated max. 470 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E62674)	UL, cUL	
Y-cap (C25, C27) - Alternate	Kemet Electronics	ERP610 Series	Rated max. 470 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E73869)	UL, cUL	
Y-cap (C25, C27) - Alternate	TDK-EPC Corp	CD Series	Rated max. 470 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, (E37861)	UL, cUL	
Y-cap (C25, C27) - Alternate	Vishay	VY1 Series (VY1221K31Y5S Q63V0)	Rated max. 470 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E183844)	UL, cUL	
Y-Cap (C42)	Murata	KX Series	Rated max. 680 pF max, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E37921)	UL, cUL	
Y-Cap (C42) - Alternate	TDK	CD Series	Rated max. 680 pF max, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E38761)	UL, cUL	
Y-Cap (C42) - Alternate	Vishay	VY1 Series	Rated max. 680 pF max, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E183844)	UL, cUL	
Y-Cap (C42) - Alternate	Kemet	ERP610 Series	Rated max. 680 pF max, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E73869)	UL, cUL	
Y-Cap (C28, C29) (Optional)	Murata	KX Series	Rated max. 1500 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E37921)	UL, cUL	
Y-Cap (C28, C29) (Optional) -Alternate	Vishay	WKP or VY1 Series	Rated max. 1500 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E183844)	UL, cUL	
Y-Cap (C28, C29) (Optional) -Alternate	Kemet	ERK 610 Series	Rated max. 1500 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E73869)	UL, cUL	
Y-Cap (C28, C29) (Optional) -Alternate	Kemet	ERP610 Series	Rated max. 1500 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E73869)	UL, cUL	
Y-Cap (C28, C29) (Optional) -Alternate	TDK-EPC	CD Series	Rated max. 1500 pF, min. 250 V, min. 85°C, marked "Y1".	FOWX2, FOWX8 (E37861)	UL, cUL	

Bleeder Resistors (R16)	Interchangeable	Interchangeable	Rated max. 470 Kohm, min. 0.25 W.	-	-	
Electrolytic Capacitor (C12)	Interchangeable	Interchangeable	Rated max. 270 uF, min. 420 V, min. 105°C. Provided with integral pressure relief.	-	-	
MOSFET (TR2-TR4)	Fairchild Semiconductor	FQP18N50V2	Rated min. 500 V, min. 18A, min. 150°C. Secured to MOSFET Heat Sink using Insulating Sheet, see Insulating Sheet, screw, nut and washer.	-	-	
MOSFET (TR2-TR4) - Alternate	Interchangeable	Interchangeable	Rated min. 500 V, min. 18A, min. 150°C. Secured to MOSFET Heat Sink using Insulating Sheet, see Insulating Sheet, screw, nut and washer.	-	-	
MOSFET Heat Sink (PRI)	Interchangeable	Interchangeable	Two provided. U- Shaped. Overall approx. 38.5 by 32.3 by 6.1 mm, min. 1.9 mm thick.	-	-	
Insulator Sheet (For D2, TR2, TR3, TR4)	Bergquist Co	900 (Sil-Pad)	Rated V-0, min. 150°C. Overall approx. 3.4 by 2.3 cm by min 0.20 mm thick.	QMFZ2 (E59150)	UL	
MOSFET (TR15-TR18)	Vishay	IRFB18N50KPBF	Rated min. 500 V, min. 17A, min. 150°C.	-	-	
MOSFET (TR15-TR18) - Alternate	Fairchild Semiconductor	FQP13N50	Rated min. 500 V, min. 12.5A, min. 150°C.	-	-	
MOSFET (TR15-TR18) - Alternate	Interchangeable	Interchangeable	Rated min. 500 V, min. 12.5A, min. 150°C.	-	-	
Inductor (PFC)	XP Power	Interchangeable (100xxxxxwhere x can be any number between 0 and 9. Construction of transformer 10009267 represents the	Open-type. Concentrically wound magnet wire, (OBWM2), rated min. 150°C. Core: Approx.42 by 30 by 27 mm, min. 3 mm thick. Bobbin: See Transformer – Bobbin Material for details. See Enclosure 4-07 for details.	-	-	

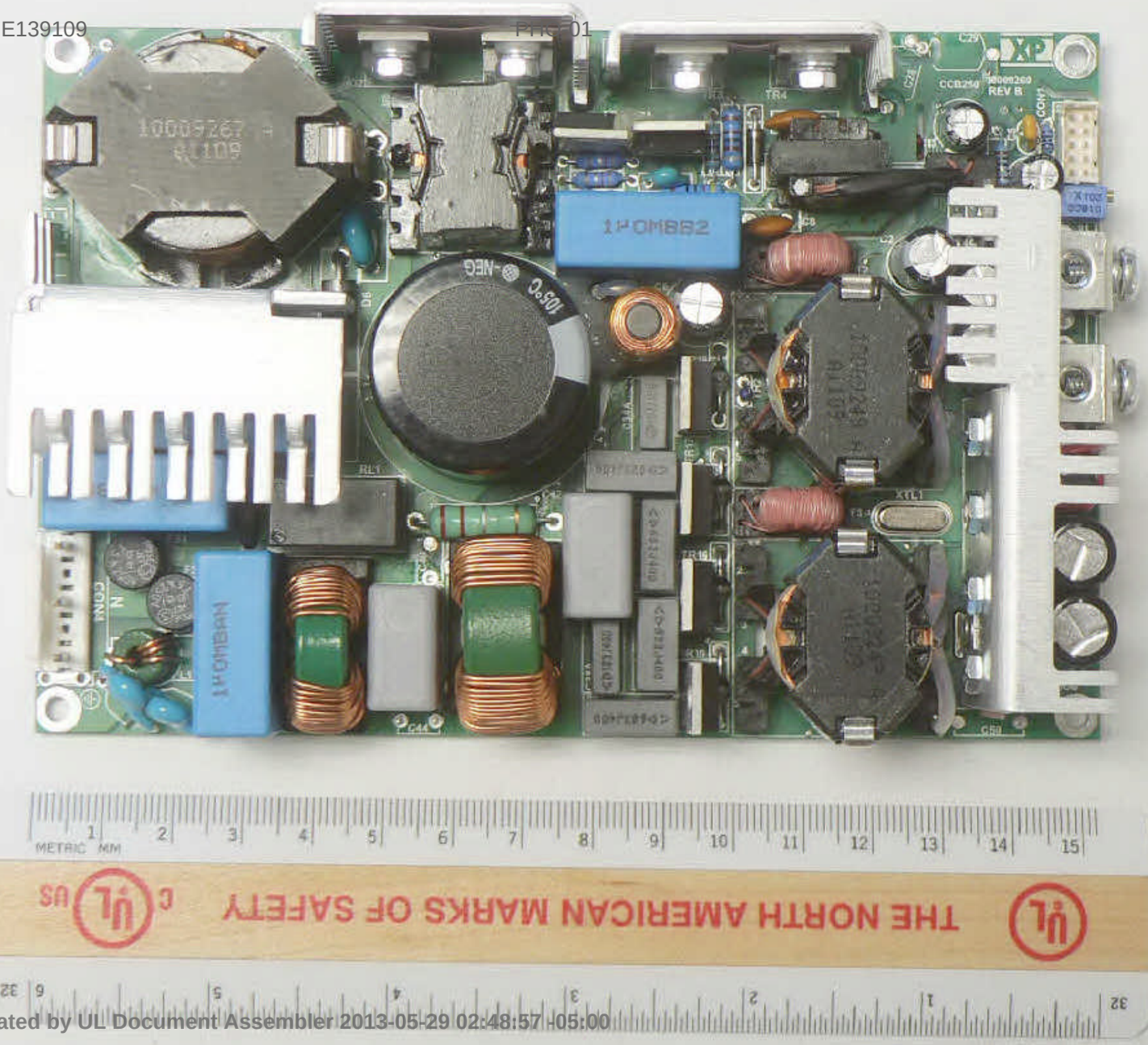
		entire series)				
Inductor (L3)	XP Power	Interchangeable (100xxxxx where x can be any number between 0 and 9. Construction of transformer 10009269 represents the entire series)	Open-type. Concentrically wound magnet wire, (OBWM2), rated min. 150°C. Core: Approx. 42 by 30 by 27 mm. See Enclosure 4-05 for details.	-	-	
Inductor (L5)	XP Power	Interchangeable (100xxxxx where x can be any number between 0 and 9. Construction of transformer 10009270 represents the entire series)	Toroidal. Copper Magnet Wire, (OBWM2), rated min. 150°C, wound on ferrite core. Overall approx. 23 mm dia. by 11 mm wide. See Enclosure 4-04 for details.	-	-	
Inductor (L6)	XP Power	Interchangeable (100xxxxx where x can be any number between 0 and 9. Construction of transformer 10009271 represents the entire series)	Toroidal. Copper Magnet Wire, (OBWM2), rated min. 150°C, wound on ferrite core. Overall approx. 28 mm dia. by 13 mm wide. See Enclosure 4-06 for details.	-	-	
Transformer (T1)	XP Power	Interchangeable (100xxxxx where x can be any number between 0 and 9.	Open-type. Provided with a Class F insulation system, see Transformer– Insulation System for details. Overall approx. 16.5 by 16.3 by 11.25	-	-	

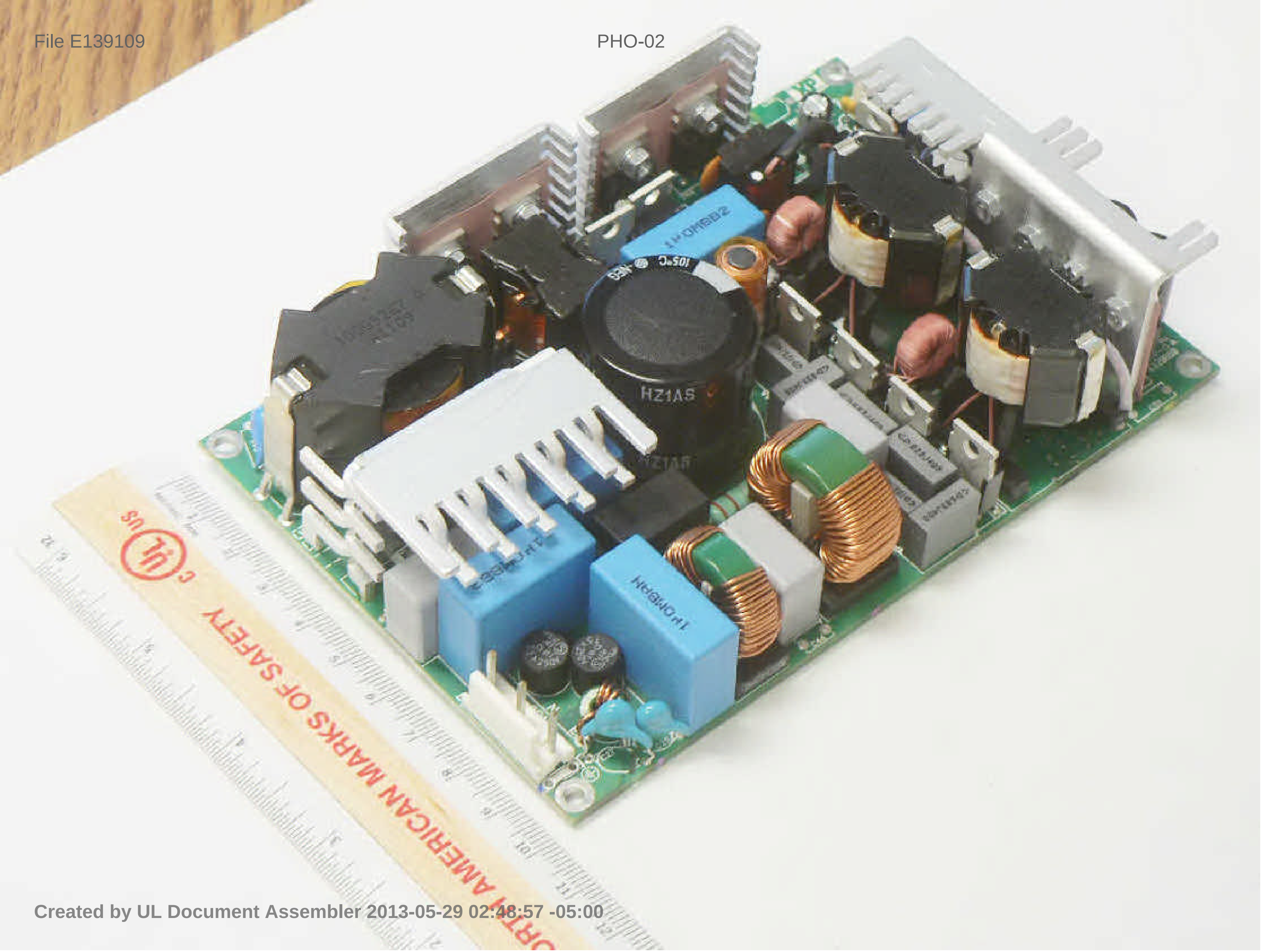
		Construction of transformer 10009266 represents the entire series)	mm. Bobbin: Overall approx.16.8 by 11.2 by 11. 2 mm, min. 1.0 mm thick, see Transformer – Bobbin Material for details. See Enclosure 4-01 for details.			
Transformer (T2, T3)	XP Power	Interchangeable (100xxxxx, where x can be any number between 0 and 9. Construction of transformer 10009265 represents the entire series)	Toroidal. Provided with a Class F insulation system, see Transformer– Insulation System for details. Overall approx. 1.1 cm dia. by 5.3 mm. Secured to board using Carrier, min. 1.0 mm thick, see Transformer – Bobbin Material for details. See Enclosure 4-02 for additional construction details.	-	-	
Transformer (T4, T5)	XP Power	Interchangeable (100xxxxx, where x can be any number between 0 and 9). Construction of transformer 10009249 represents the entire series)	Open-type. Provided with a Class F insulation system, see Transformer– Insulation System for details. Overall approx. 3.0 by 2.2 by 1.9 cm. Bobbin: Overall approx.3.2 by 2.9 by 2.6 cm, min. 1.0 mm thick, see Transformer – Bobbin Material for details. Transformer secured min. 1.3 cm above PWB. See Enclosure 4-03 for additional construction details.	-	-	
Transformer (T1- T5) – Insulation System	XP Power	Designated F	Class F, Rated 155°C	OBJY2 (E324960)	UL	
Transform – Bobbin Material	El Dupont De Nemours & Co Inc	FR530	Rated V-0, min. 155°C, min. 1.5 mm thick.	QMFZ2, QMFZ8 (E41938)	UL, cUL	
Transformer (T1- T5) – Triple Insulated Wire	Rubadue Wire Co. Inc.	TxxAxxFxxx-x TxxAxxPxxx-x	Reinforced Insulation, rated 155°C (Class F), 1000 Vpk	OBJT2 (E206198)	UL	

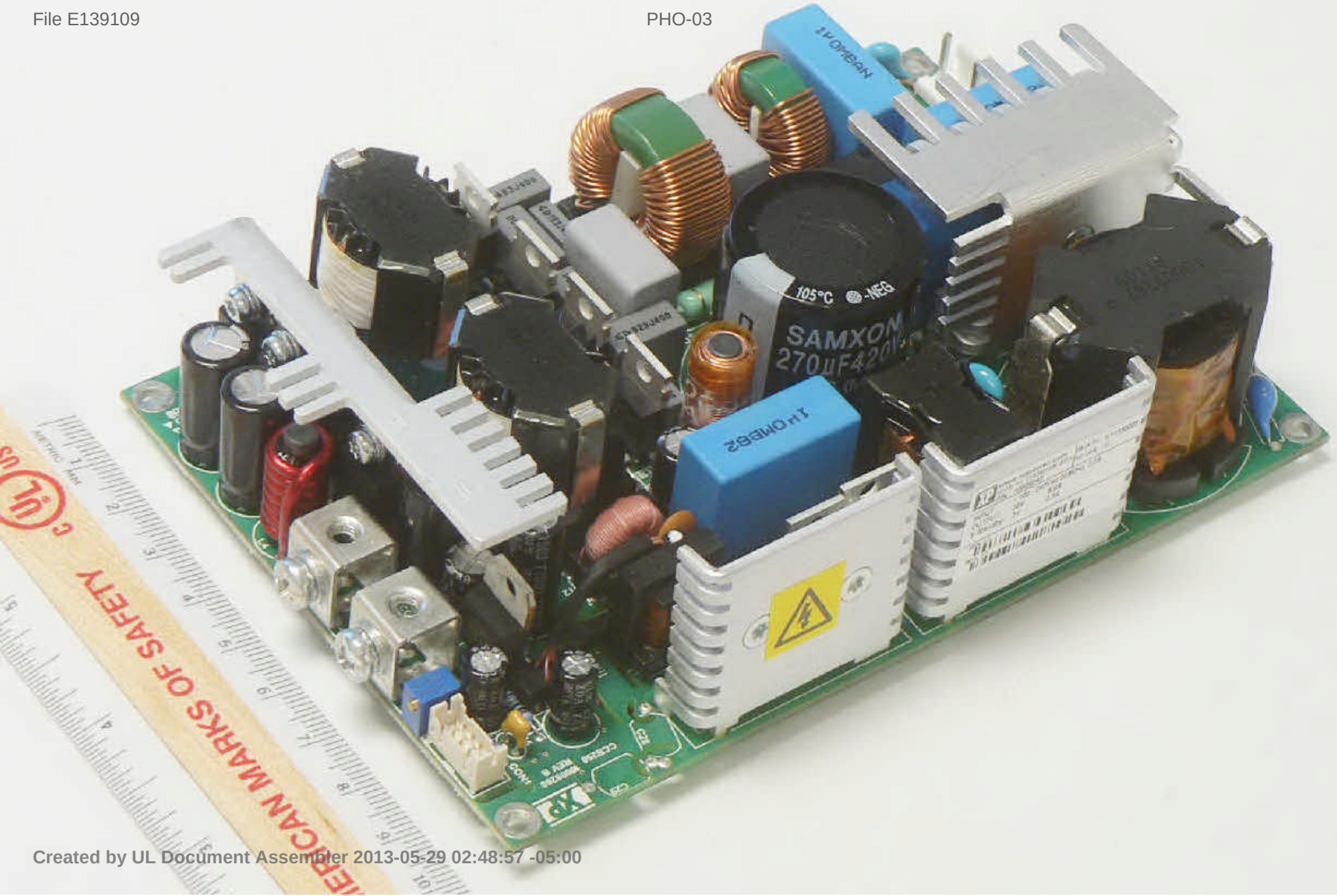
		TxxAxxTxxx-x, where x can be any number between 0 - 9.	(Dielectric test conducted at 7kV as part of component evaluation).			
Transformer (T1, T4, T5) – Tape	3M	92, 1205, or 1350F	Polyester film tape, min. 1.0 mils (0.025 mm) thick, rated min. 130°C (Passed 2500 Vac dielectric).	QMFZ2 (E17385)	UL	
Optical Isolator (OPT301, OPT302)	Lite-On	LTV-816	Double protection, isolation voltage 5000 V. DTI min. 0.4mm.	FPQU2, FPQU8 (E113898)	UL, cUL	
Optical Isolator (OPT301, OPT302, OPT303)	NEC	PS2561L-1	Double protection, isolation voltage 5000 V. DTI min. 0.4mm.	FPQU2 (E72422)	UL	
MOSFET (TR10 – TR13)	Interchangeable	Interchangeable	Rated min. 48V, min. 130°C.	-	-	
Secondary Heatsink (SEC)	Interchangeable	Interchangeable	T-Shaped. Overall approx. 7 by 3.2 by 2.3 cm, min. 1.9 mm thick	-	-	
Insulator Sheet (TR10 - TR13)	Bergquist Co	900 (Sil-Pad)	Rated V-0, min. 150°C Overall approx. 4.5 by 2.5 cm by min. 0.20 mm thick.	QMFZ2 (E59150)	UL	
Electrolytic Capacitors (SEC)	Interchangeable	Interchangeable	Rated min. 25 V, 105°C. Provided with integral pressure relief.	-	-	
Output Connector (CON2)(SEC)	Interchangeable	Interchangeable	Two provided. Each overall approx. 1.3 by 1.1 by 1.1 cm, min. 0.9 mm thick. Secured through PWB and soldered.	-	-	

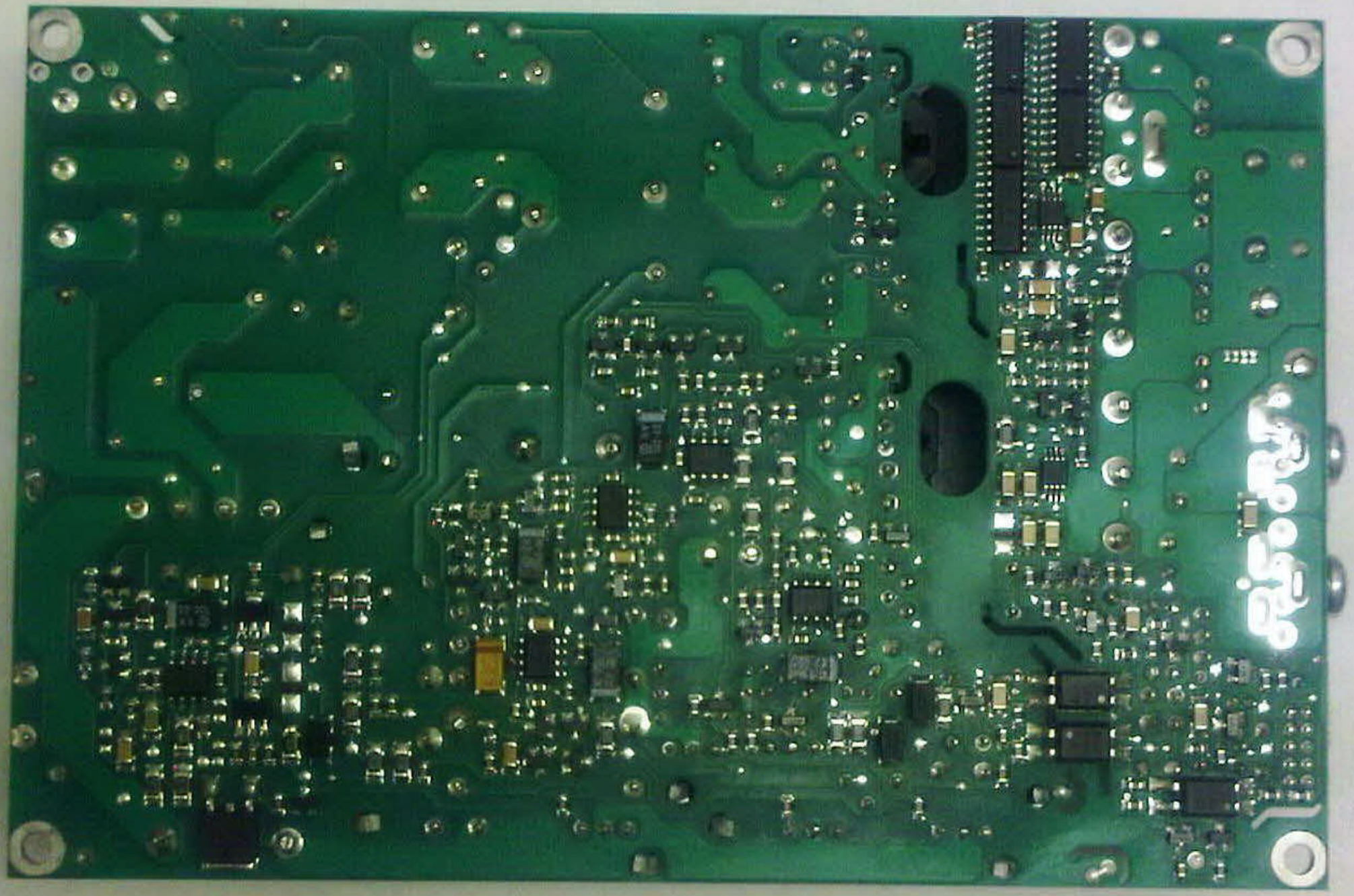
Enclosures

Type	Supplement Id	Description
Photographs	3-01	Overall Top View: Model CCB250PSXX Series
Photographs	3-02	Overall Input Side Top View: Model CCB250PSXX Series
Photographs	3-03	Overall Output Side Top View: Model CCB250PSXX Series
Photographs	3-04	Overall Bottom View: Model CCB250PSXX Series
Diagrams	4-01	Transformer (T1): Model CCB250PSXX Series
Diagrams	4-02	Transformer (T2, T3): Model CCB250PSXX Series
Diagrams	4-03	Transformer (T4, T5): Model CCB250PSXX Series
Diagrams	4-04	Inductor (L5): Model CCB250PSXX Series
Diagrams	4-05	Inductor (L3): Model CCB250PSXX Series
Diagrams	4-06	Inductor (L6): Model CCB250PSXX Series
Diagrams	4-07	Inductor (PFC): Model CCB250PSXX Series
Schematics + PWB	5-01	Component Layout
Schematics + PWB	5-02	PWB Trace Layout
Manuals		
Miscellaneous	7-01	Output De-rating Curve
Miscellaneous	7-02	Manufacturer's Letter of Assurance




HZ1AS
105°C
ORTH AMERICAN MARKS OF SAFETY


105°C
SAMXON
270µF420V
AMERICAN MARKS OF SAFETY



REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
01	.	1ST PROTOTYPE	.	.	SJT	09JUL09
02	.	2nd PROTOTYPE	.	.	MJB	13Nov09
A	.	PRODUCTION RELEASE	CFW	10Jun10	RGL	10Jun10

DWG.NO. 10009266 SHT 1 REV A

NOTES: SEE SHEET 4.

THIRD ANGLE PROJ.

PLOTTED 12-05-2010

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NEXT ASSY	USED ON

TOLERANCE		
XX	XXX	ANGLE
	SEE NOTE	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

CONTRACT NO. .

APPROVALS	DATE
DRAWN SJT/MJB	13Nov09
CHECKED CFW	12MAY10
ENGINEER RGL	12MAY10
CUST. APPV'L .	.

CAD DWG NO 10009266A0.dwg

XP Power Limited.
FYFIELD ROAD, ONGAR, ESSEX CM5 0GN

TITLE
TRANSFORMER ASSY
AUX WINDING
CCB

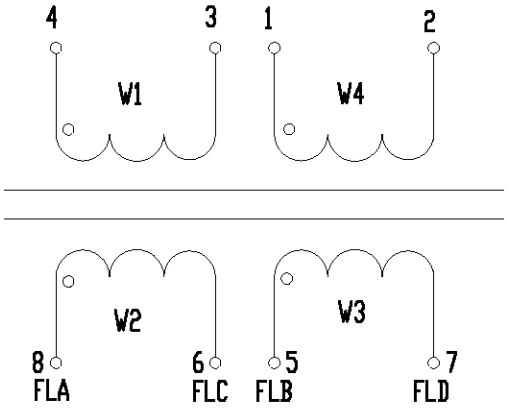
SIZE	DWG.NO	REV
A	10009266	A

SCALE NONE SHT 1 OF 4

REVISIONS
REVISIONS--SEE SHEET ONE

DWG.NO. 10009266 SHT. 2 REV A

A. SCHEMATIC DIAGRAM



B. WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	LAYERS	TAPE	COMMENTS
1 (OR SEE NOTE 9)	1	140	0.15mm ECW HEAVY	4	3	2.5	1,1,2	1 TURN OF TAPE BETWEEN EACH LAYER & 2 TURNS OF TAPE FINISH. TAPE = ITEM 4 (OR SEE NOTE 9).
2 (OR SEE NOTE 9)	2	9	0.33mm TRIPLE INS.	8 FLA	6 FLC	1	2	W2 & W3, FIRST 9T WOUND BIFILAR IN 1 LAYER. W3 CONTINUE ON SECOND LAYER TO FINISH. TAPE = ITEM 4 (OR SEE NOTE 9).
2 (OR SEE NOTE 9)	3	18	0.33mm TRIPLE INS.	5 FLB	7 FLD	2		
3 (OR SEE NOTE 9)	4	21	0.2mm ECW SGL	1	2	1	3	TAPE = ITEM 4 (OR SEE NOTE 9).

TEST SPECIFICATIONS:

INDUCTANCE TEST @ 1KHz 0.1Vac

4 – 3	2.5 – 2.9mH
8 – 6	10.0 – 13.0uH
5 – 7	41.0 – 52.0uH
1 – 2	56.0 – 71.0uH

LEAKAGE INDUCTANCE

320uA MAX. W1 – W2,W3,W4 S/C

FLASH TEST

FROM 1, 2, 3, 4 TO FLA, FLB, FLC, FLD
4000V rms FOR 1 MINUTE

\DC RESISTANCE

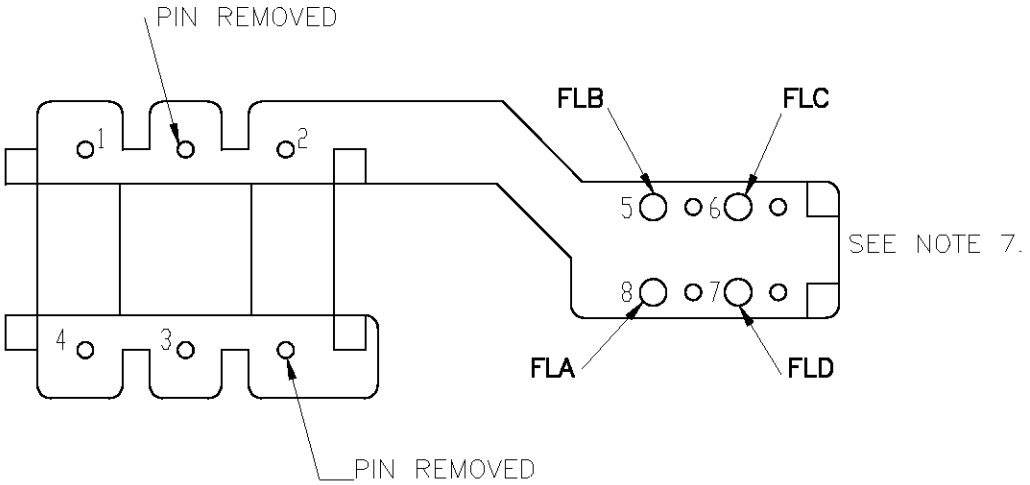
PLOTTED 12-05-2010

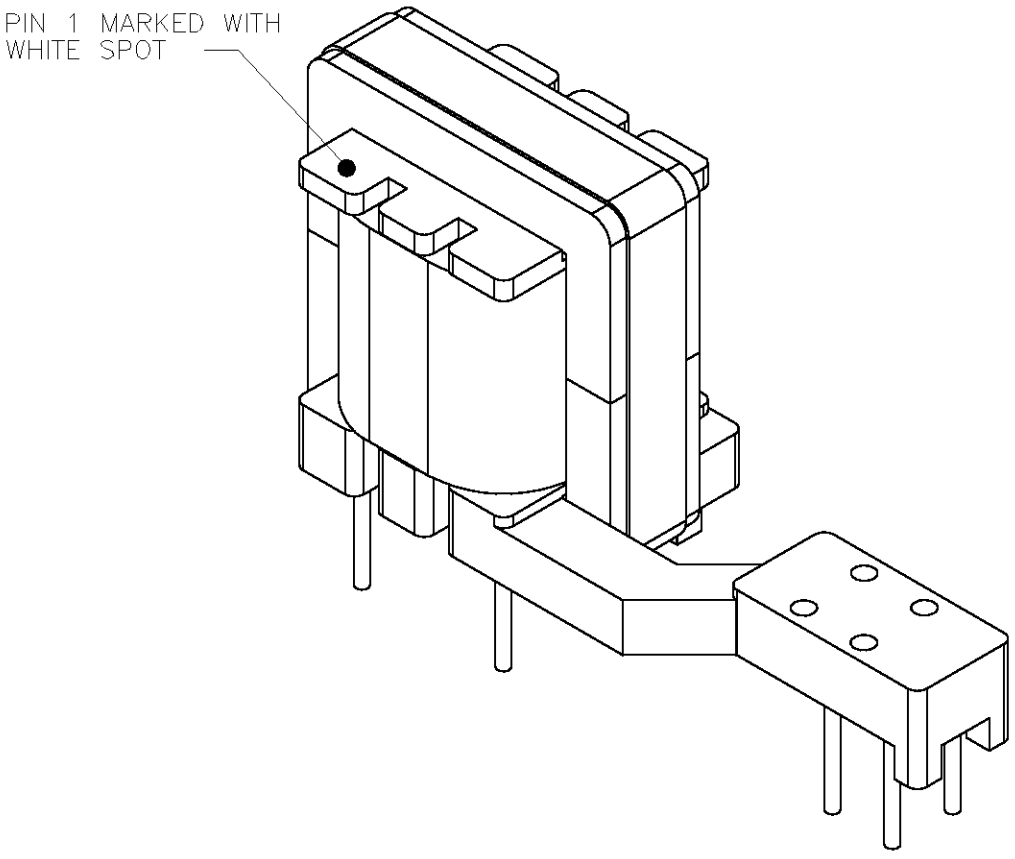
SIZE	DWG.NO	REV
A	10009266	A
SCALE: NONE		SHT 2 OF 4

REVISIONS
REVISIONS--SEE SHEET ONE

DWG.NO. 10009266 SHT. 3 REV A

PIN VIEW





PLOTTED 12-05-2010	SIZE A	DWG.NO 10009266	REV A
	SCALE: NONE		SHT 3 OF 4

REVISIONS
REVISIONS--SEE SHEET ONE

DWG.NO. 10009266 SHT. 4 REV A

CONSTRUCTION NOTES:

1. MATERIAL : SEE SEPARATE BILL OF MATERIALS (10009266).
2. FLYING LEADS SHOULD EXIT BOBBIN AT TOP ON PINS 1–2 SIDE.
   SLEEVE FLA – FLD 25mm USING ITEM 5, (OR SEE NOTE 9).
3. BOBBIN: ITEM 9.
   CORES: 1 UNGAPPED CORE ITEM 6 (OR SEE NOTE 9) AND
   1 GAPPED CORE ITEM 7 (OR SEE NOTE 9).
4. GLUE CORES USING ARALDITE 2012 OR EQUIVALENT.
5. FINISHED PART TO BE INDELIBLY MARKED WITH '10009266', REVISION NO AND BATCH / DATE CODE ON TOP SIDE.
6. FINISHED PART TO BE DIPPED VARNISHED USING AEV LTD 2000/372 (OR SEE NOTE 9).
   NOTE: VARNISH MUST NOT COVER PINS.
7. WIRES PASSED DOWN THROUGH HOLES, WRAPPED AND SOLDERED.
8. CLASS 155 (F) INSULATION SYSTEM.
9. EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.

PLOTTED 12–05–2010

SIZE	DWG.NO	REV
A	10009266	A
SCALE: NONE		SHT 4 OF 4

REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
01	.	1ST PROTOTYPE	.	.	SJT	09JUL09
02	.	2nd PROTOTYPE	.	.	MJB	13Oct09
A	.	PRODUCTION RELEASE	CFW	10Jun10	RGL	10Jun10

DWG.NO. 10009265 SHT 1 REV A

NOTES: SEE SHEET 3.

THIRD ANGLE PROJ

PLOTTED 12-05-2010

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NEXT ASSY	USED ON

TOLERANCE

XX	XXX	ANGLE
	SEE NOTE	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

CONTRACT NO. .

APPROVALS	DATE
DRAWN SJT/MJB	10Jun10
CHECKED CFW	10Jun10
ENGINEER RGL	10Jun10
CUST. APP'L .	.

CAD DWG NO 10009265A0.dwg

XP Power Limited.
FYFIELD ROAD, ONGAR, ESSEX, CM5 0GN

TITLE
TRANSFORMER ASSY,
DRIVE WINDING
CCB

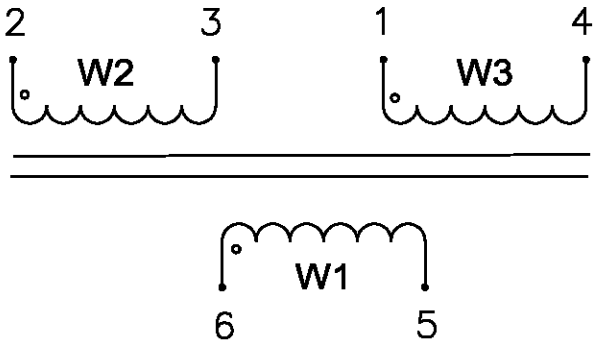
SIZE	DWG.NO	REV
A	10009265	A

SCALE NONE SHT 1 OF 3

REVISIONS
REVISIONS–SEE SHEET ONE

DWG.NO. 10009265 SHT 2 REV A

A. SCHEMATIC DIAGRAM



B. WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	LAYERS	COMMENTS
2 (OR SEE NOTE 5)	W1	23	0.2mm TRIPLE INS.	PIN 6	PIN 5	3 TRIFILAR	WIRES TO BE PASSED THROUGH RELEVANT FEED HOLE FROM TOP, WRAPPED A MINIMUM OF TWO TURNS AROUND PIN, AND SOLDERED SECURELY
2 (OR SEE NOTE 5)	W2	23	0.2mm TRIPLE INS.	PIN 2	PIN 3		
2 (OR SEE NOTE 5)	W3	23	0.2mm TRIPLE INS.	PIN 1	PIN 4		

C. TEST SPECIFICATION

INDUCTANCE.

PINS 5–6 293–621.6uH @ 10KHz 0.1Vac

LEAKAGE INDUCTANCE.

FLASH TEST.

FROM W1 TO W2, W3 4000 Vac rms 2 SECS (NO BREAKDOWN).

DC RESISTANCE

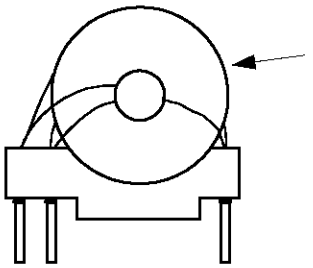
PLOTTED 12–05–2010

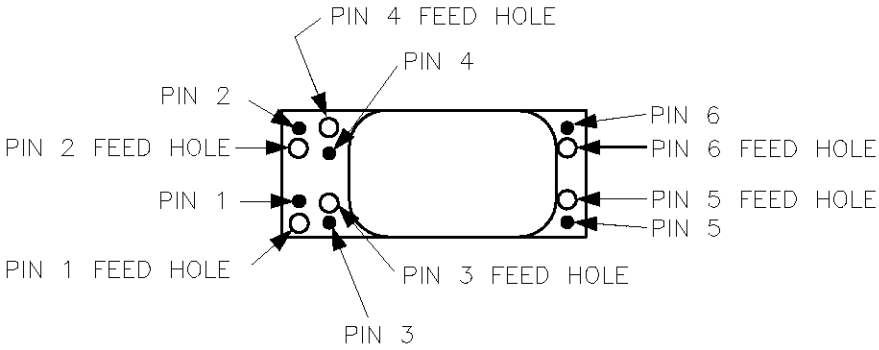
SIZE	DWG.NO	REV
A	10009265	A
SCALE: NONE		SHT 2 OF 3

REVISIONS
REVISIONS--SEE SHEET ONE

DWG.NO. 10009265 SHT 3 REV A

CONSTRUCTION





VIEW FROM PIN SIDE (UNDERNEATH)

CONSTRUCTION NOTES.

1. ALIGN WOUND SUB ASSEMBLY SQUARELY TO BASE AND FIX WITH GLUE ARALDITE 2012 OR EQUIVALENT.
2. FINISHED PART TO BE INDELIBLY MARKED WITH " 10009265 ", REVISION NUMBER AND BATCH / DATE CODE.
3. No. OF TURNS TO BE EXACT FOR ALL WINDINGS.
4. CLASS 155 (F) INSULATION SYSTEM.
5. **EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.**

PLOTTED 12-05-2010

SIZE	DWG.NO	REV
A	10009265	A
SCALE:NONE		SHT 3 OF 3

REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
01	.	1ST PROTOTYPE	.	.	SJT	26Oct09
A	.	PRODUCTION RELEASE	CFW	09JUNE10	RGL	09JUNE10
.	.	.	.	.	.	.

DWG.NO. 10009249 SHT 1 REV A

NOTES: SEE SHEET 3.

THIRD ANGLE PROJ.

PLOTTED 03-06-2010

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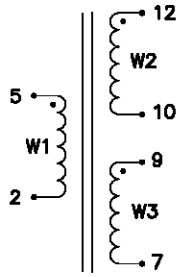
.	.		APPROVALS / DATE	TITLE: TRANSFORMER ASSY MAIN WINDING CCB 36V	
.	.		DRAWN MJB 09JUNE10		
.	.		CHECKED CFW 09JUNE10		
.	.	TOLERANCE: XX XXX ANGLE; SEE NOTE	ENGINEER RGL 09JUNE10	SIZE A / DWG.NO 10009249 / REV A	
.	.		CUST. APP'L . .		
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM	CAD DWG NO 10009249A0.dwg	SCALE NONE	SHT 1 OF 4

REVISIONS

REVISIONS--SEE SHEET ONE

DWG.NO. 10009249 SHT 2 REV A

A. SCHEMATIC DIAGRAM



B. WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	LAYERS	TAPE ITEM 5 (OR SEE NOTE 9)	COMMENTS
2 (OR SEE NOTE 9)	W1	67T	0.5mm TRIPLE INS.	5	2	5	1T	SEE NOTE 2.
3 (OR SEE NOTE 9)	W2	12T	33/0.1	12	10	1	1T	WIND BIFILAR.
3 (OR SEE NOTE 9)	W3	12T	33/0.1	9	7			SEE CONSTRUCTION NOTES 2, 3, 4 & SK'A'

C. TEST SPECIFICATION

INDUCTANCE TEST

1. W1 5.0 – 6.5mH @ 10KHz. / 0.1 Vac

LEAKAGE INDUCTANCE

1. SHORT W2, INDUCTANCE OF W1 NOW < 52uH @ 10KHz.
2. SHORT W3, INDUCTANCE OF W1 NOW < 52uH @ 10KHz.
3. RESULT OF 2. & 3. TO BE WITHIN 5% OF EACH OTHER.

FLASH TEST

FROM W1 TO W2, W3, CORE. – 4KVac rms FOR 1 MINUTE (NO BREAKDOWN).
FROM W2 TO W3 – 300Vac rms FOR 1 MINUTE (NO BREAKDOWN).
FROM W2,W3 TO CORE. – 500Vac rms FOR 1 MINUTE (NO BREAKDOWN).

DC RESISTANCE

PLOTTED 03-06-2010

SIZE	DWG.NO	REV
A	10009249	A
SCALE: NONE		SHT 2 OF 4

REVISIONS

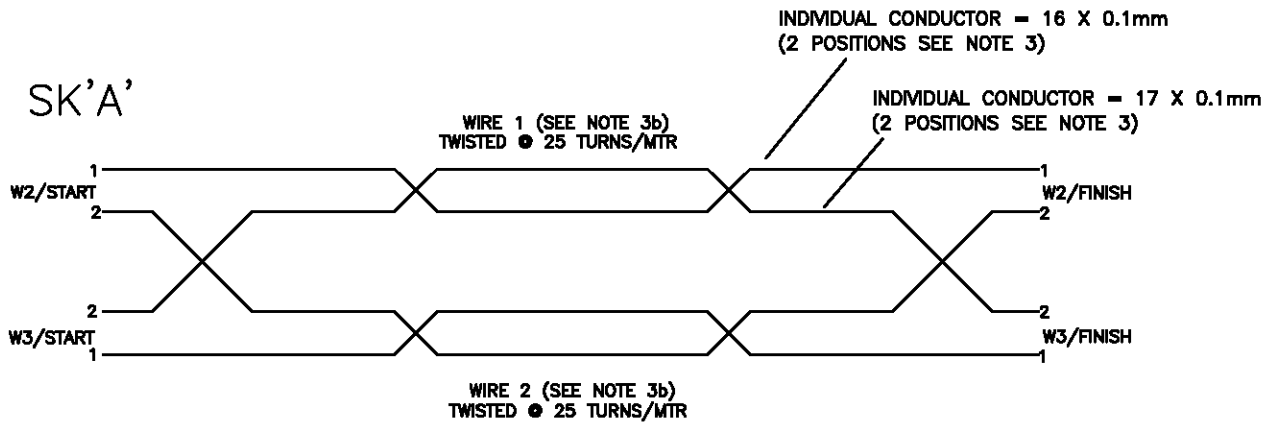
REVISIONS–SEE SHEET ONE

DWG.NO. 10009249 SHT. 3 REV. A

NOTES:

1. MATERIAL: SEE SEPARATE BILL OF MATERIALS 10009249.
2. ALL WINDINGS WOUND IN SAME DIRECTION. No. OF TURNS TO BE EXACT.
   W1 START AND FINISH WIRES MUST EXIT BASE OF BOBBIN VIA SLOT.
   AFTER W1 & W2 TAPE, BUT BEFORE W2/W3, APPLY A LENGTH OF KAPTON TAPE, ITEM 7, (APPROX 35mm LONG)
   AS SHOWN IN SK'C'. AFTER W2/W3 FOLD OVER PROTRUDING TAPE TABS AND SECURE WITH W2/W3 TAPE.
3. W2/W3 COMPOSITION SEE SK'A'.
   (a) 2 INDIVIDUAL CONDUCTORS (NUMBERED 1 ON SK'A') CONSTRUCTED FROM 16 STRANDS OF 0.1mm TWISTED TOGETHER @ 50 ±10% TURNS/METRE.
   2 INDIVIDUAL CONDUCTORS (NUMBERED 2 ON SK'A') CONSTRUCTED FROM 17 STRANDS OF 0.1mm TWISTED TOGETHER @ 50 ±10% TURNS/METRE.
   (b) WIRE 1 AND 2 ARE EACH MADE FROM 2 CONDUCTORS, (1 x 16 STRAND AND 1 x 17 STRAND, AS DETAILED ABOVE), TWISTED TOGETHER 25±10% TURNS PER METRE.
   (c) TAKE THE 16 STRAND CONDUCTOR FROM WIRE 1 AND THE 17 STRAND CONDUCTOR FROM WIRE 2, TO FORM THE START OF W2. (SEE SK'A').
   TAKE THE REMAINING 2 CONDUCTORS FROM WIRE 1 AND WIRE 2, TO FORM THE START OF W3.
   REPEAT THE SAME OPERATION ABOVE WITH THE FINISH OF W2 AND W3.
   ENSURE THE SAME 2 CONDUCTORS START AND FINISH TOGETHER. (SEE SK'A').
4. AFTER WINDING W2,W3 BIFILAR, SLEEVE EXPOSED SECTIONS WITH ITEM 9 AND PASS DOWN THROUGH CORRECT HOLES IN BOBBIN. TWIST, TIN AND TRIM ENDS TO 3.6mm (MEASURED FROM LOWEST FACE OF BOBBIN).
   IF NECESSARY SECURE WIRES TO BOBBIN USING ARALDITE 2012 OR EQUIVALENT.
5. 1 UNGAPPED CORE ITEM 1, (OR SEE NOTE 9) AND 1 GAPPED CORE ITEM 4, (OR SEE NOTE 9), SECURED USING CLIPS ITEM 8 AND GLUED WITH ARALDITE 2012 OR EQUIVALENT.
6. VACUUM IMPREGNATE WITH VARNISH. CLEAN VARNISH OFF LEADS.
7. FINISHED PART TO BE INDELIBLY MARKED WITH '10009249', REVISION NUMBER AND BATCH / DATE CODE.
8. CLASS 155 (F) INSULATION SYSTEM.
9. EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.

SK'A'



PLOTTED 03-06-2010

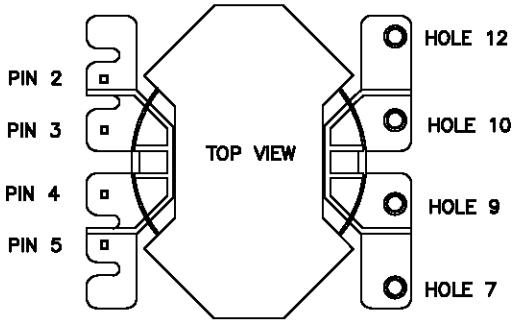
SIZE	DWG.NO	REV
A	10009249	A
SCALE: NONE		SHT 3 OF 4

CONSTRUCTION

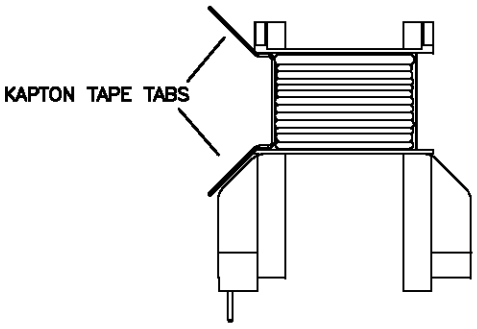
REVISIONS
REVISIONS--SEE SHEET ONE

DWG.NO. 10009249 SHT. 4 REV. A

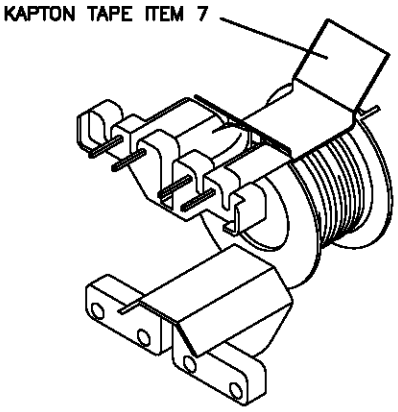
SK'B' PIN OUTS.



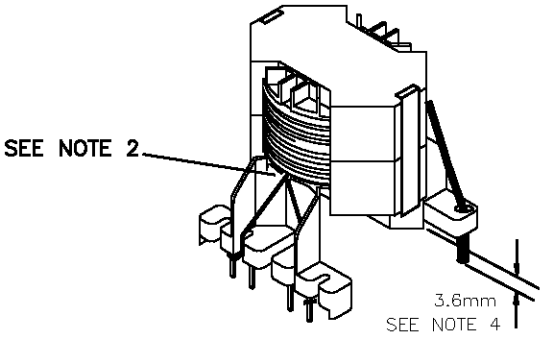
SK'C' EXTRA INSULATION BETWEEN PRIMARY & SECONDARY WINDINGS.

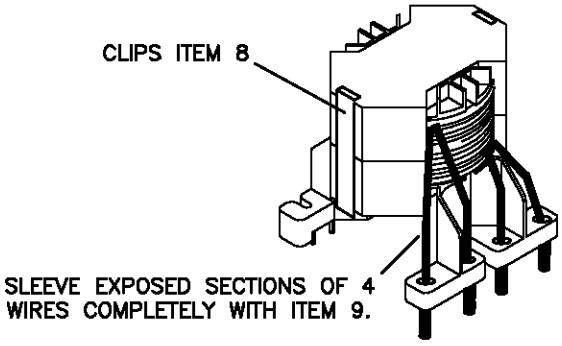


SEE NOTE 2



SK'D' VIEW OF FINISHED WINDING.





PLOTTED 03-06-2010

SIZE	DWG.NO	REV
A	10009249	A
SCALE: NONE		SHT 4 OF 4

REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
A		PRODUCTION RELEASE	CFW	22JULY10	RGL	22JULY10

DWG.NO. 10009270 SHT 1 REV A

NOTES: SEE SHEET 3.

THIRD ANGLE PROJ.

PLOTTED 22-07-2010

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NEXT ASSY	USED ON

TOLERANCE

XX	XXX	ANGLE
	SEE NOTE	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

CONTRACT NO. .

APPROVALS	DATE
DRAWN SJT	16JUL09
CHECKED CFW	15Jun10
ENGINEER RGL	22JUL10
CUST. APPV'L .	.

CAD DWG NO 10009270A0.dwg

XP Power Limited.
FYFIELD ROAD, ONGAR, ESSEX, CM5 0GN

TITLE
INDUCTOR ASSY
COMMON MODE INPUT
CCB

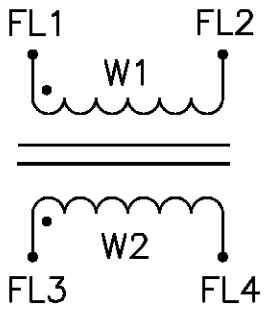
SIZE	DWG.NO	REV
A	10009270	A

SCALE NONE SHT 1 OF 3

REVISIONS
REVISIONS—SEE SHEET ONE

DWG.NO. 10009270 SHT 2 REV A

A. SCHEMATIC DIAGRAM



B. WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	COMMENTS
2 (OR SEE NOTE 6)	W1	26T	0.75mm ECW HEAVY	FL1	FL2	W1 & W2 TO BE SEPARATED BY 2mm.
2 (OR SEE NOTE 6)	W2	26T	0.75mm ECW HEAVY	FL3	FL4	

TEST SPECIFICATIONS

INDUCTANCE
4.58mH MIN @ 1KHz / 0.5Vac (W1 & W2 TO BE IDENTICAL).

LEAKAGE INDUCTANCE

FLASH TEST
FROM W1 (FL1, FL2) TO W2 (FL3, FL4)
1500 Vac rms 1 MINUTE (NO BREAKDOWN).

DC RESISTANCE TEST (TOTAL W1 & W2)
CONNECT FL2–FL3
MEASURE FL1 TO FL4 73m OHMS MAX

PLOTTED 22-07-2010

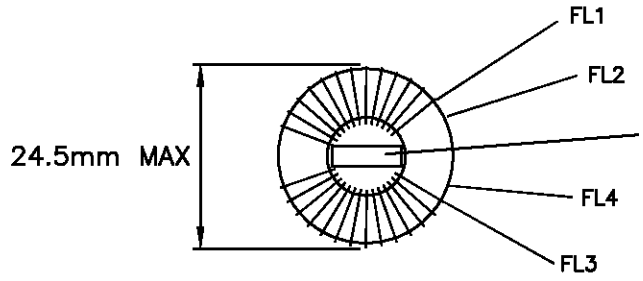
SIZE	DWG.NO	REV
A	10009270	A
SCALE: NONE		SHT 2 OF 3

REVISIONS

REVISIONS–SEE SHEET ONE

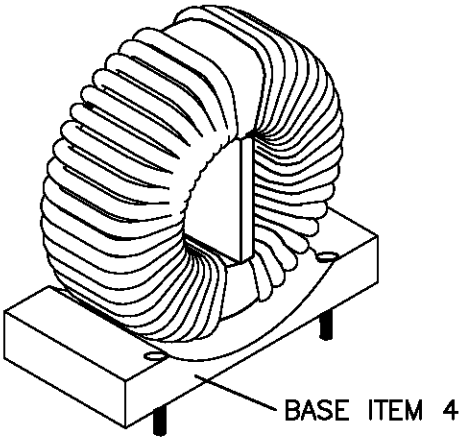
DWG.NO. 10009270 SHT 3 REV A

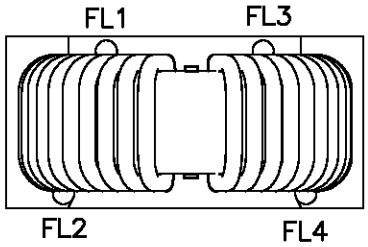
CONSTRUCTION – STAGE 1



WINDINGS TO BE SEPARATED BY 2mm +/–0.2mm USING SPACER MADE FROM SUITABLE MATERIAL, (TO MEET XP CLASS 155(F) INSULATION REQUIREMENTS), GLUED INTO CENTRE OF TORROID USING ARALDITE 2012 OR EQUIVALENT.

CONSTRUCTION – STAGE 2





CONSTRUCTION NOTES.

1. MATERIAL : SEE SEPARATE BILL OF MATERIALS (10009270).

2. No. OF TURNS TO BE EXACT. WINDING TO BE NEAT AND FLAT WITH MINIMAL CROSSING OF TURNS.

3. AFTER WINDING, PLACE ON BASE ITEM 4 AND PASS WIRES DOWN THROUGH HOLES AS INDICATED. USE ARALDITE 2012 OR EQUIV. TO SECURE WINDING TO BASE AND WIRES INTO HOLES IN BASE.

4. FINALLY STRIP, TIN AND TRIM WIRES TO 4mm IN LENGTH. (MEASURED FROM UNDERSIDE OF BASE ITEM 4).

5. FINISHED PART TO BE INDELIBLY MARKED WITH '10009270', REVISION NUMBER AND BATCH / DATE CODE.

6. EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.

7. CLASS 155 (F) INSULATION SYSTEM.

PLOTTED 22-07-2010

SIZE	DWG.NO	REV
A	10009270	A
SCALE: NONE		SHT 3 OF 3

REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
01	.	IST PROTOTYPE	.	.	SJT	15JULY09
02	.	2nd PROTOTYPE	.		MJB	25Sept09
A	.	PRODUCTION RELEASE	CFW	13MAY10	RGL	13MAY10

DWG.NO. 10009269 SHT. 1 REV. A

NOTES: SEE SHEET 3.

THIRD ANGLE PROJ.

PLOTTED 13-05-2010

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NEXT ASSY	USED ON

TOLERANCE

XX	XXX	ANGLE
	SEE NOTE	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

CONTRACT NO. .

APPROVALS	DATE
DRAWN MJB	20Oct09
CHECKED CFW	13MAY10
ENGINEER RGL	13MAY10
CUST. APPVL .	.

CAD DWG NO 10009269A0.dwg

XP Power Limited.
FYFIELD ROAD, ONGAR, ESSEX, CM5 0GN

TITLE
INDUCTOR ASSY
BOOST CCB

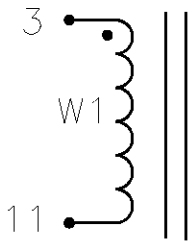
SIZE	DWG.NO	REV
A	10009269	A

SCALE NONE SHT 1 OF 3

REVISIONS
REVISIONS--SEE SHEET ONE

DWG.NO. 10009269 SHT 2 REV A

SCHEMATIC DIAGRAM



WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	LAYERS	TAPE (ITEM 5 OR SEE NOTE 8)	COMMENTS
2 (OR SEE NOTE 9)	W1	85.5T	34 X 0.07mm	3	11		2T	SEE NOTE 2

TEST SPECIFICATION

INDUCTANCE:- 0.82mH ±10% @ 1KHz 0.1Vac

LEAKAGE INDUCTANCE:-

FLASH TEST:- FROM W1 TO CORES
1500 Vac rms 1 MINUTE (NO BREAKDOWN).

DC RESISTANCE:- 0.7 OHMS MAX.

PLOTTED 13-05-2010

SIZE	DWG.NO	REV
A	10009269	A
SCALE: NONE		SHT 2 OF 3

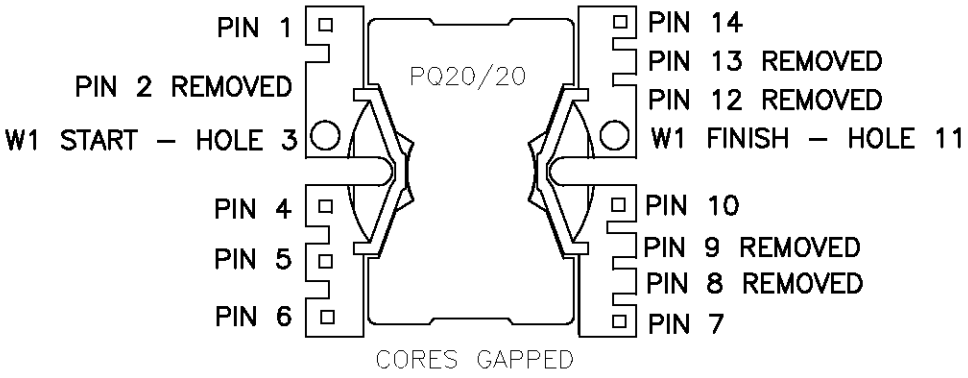
REVISIONS

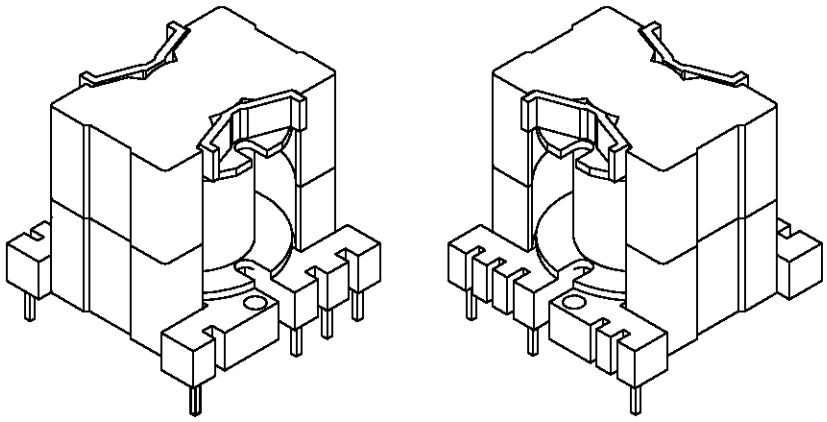
REVISIONS–SEE SHEET ONE

DWG.NO. 10009269 SHT 3 REV A

CONSTRUCTION

TOP VIEW OF BOBBIN





CONSTRUCTION NOTES :-

1. MATERIAL : SEE SEPARATE BILL OF MATERIALS : 10009269.
2. WINDING WIRE = 34 x 0.07mm TWISTED TOGETHER @ 45 +/–5 TURNS/METRE.
3. No. OF TURNS TO BE EXACT. ALL WINDINGS TO BE WOUND IN SAME DIRECTION.
4. W1 LEADS TO BE PASSED DOWN THROUGH CORRECT HOLES IN BOBBIN ITEM 3, TWISTED,TINNED AND TRIMED TO 4mm (MEASURED FROM BOTTOM FACE OF BOBBIN). SECURE WIRES TO BOBBIN USING ARALDITE 2012 OR EQUIVALENT.
5. 1 GAPPED CORE (ITEM 1, OR SEE NOTE 9) & 1 UNGAPPED CORE (ITEM 4, OR SEE NOTE 9) TO BE GLUED TOGETHER USING ARALDITE 2012 OR EQUIVALENT.
6. VACUUM IMPREGNATE WITH VARNISH. CLEAN VARNISH OFF LEADS.
7. FINISHED PART TO BE INDELIBLY MARKED WITH " 10009269 ", REVISION NUMBER AND BATCH / DATE CODE.
8. CLASS 155 (F) INSULATION SYSTEM.
9. EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.

PLOTTED 13–05–2010

SIZE	DWG.NO	REV
A	10009269	A
SCALE: NONE		SHT 3 OF 3

REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
01	.	1ST PROTOTYPE	.	.	SJT	12MAR10
02		UPDATED	-	-	SJT	16MAR10
A	.	PRODUCTION RELEASE	CFW	22JULY10	RGL	22JULY10

DWG.NO. 10009271 SHT. 1 REV. A

NOTES: SEE SHEET 3.

THIRD ANGLE PROJ.

PLOTTED 22-07-2010

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NEXT ASSY	USED ON

TOLERANCE

XX	XXX	ANGLE
	SEE NOTE	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

CONTRACT NO. .

APPROVALS	DATE
DRAWN SJT	12MAR10
CHECKED CFW	15Jun10
ENGINEER RGL	22JUL10
CUST. APPV'L .	.

CAD DWG NO 10009271A0.dwg

XP Power Limited.
FYFIELD ROAD, ONGAR, ESSEX, CM5 0GN

TITLE
INDUCTOR ASSY
COMMON MODE INPUT LARGE

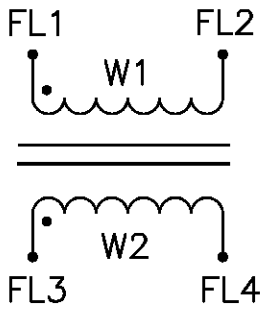
SIZE	DWG.NO	REV
A	10009271	A

SCALE NONE SHT 1 OF 3

REVISIONS
REVISIONS–SEE SHEET ONE

DWG.NO. 10009271 SHT 2 REV A

A. SCHEMATIC DIAGRAM



B. WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	COMMENTS
2 (OR SEE NOTE 6)	W1	32T	0.8mm ECW HEAVY	FL1	FL2	W1 & W2 TO BE SEPARATED BY 4mm.
2 (OR SEE NOTE 6)	W2	32T	0.8mm ECW HEAVY	FL3	FL4	

TEST SPECIFICATIONS

INDUCTANCE
6.22 – 11.56 mH (W1 & W2 TO BE IDENTICAL)

LEAKAGE INDUCTANCE
> 45uH

FLASH TEST
FROM W1 (FL1, FL2) TO W2 (FL3, FL4)
1500 Vac rms 1 MINUTE (NO BREAKDOWN).

DC RESISTANCE TEST (TOTAL W1 & W2)
CONNECT FL2–FL3
MEASURE FL1 TO FL4 82 MILLI OHMS MAX

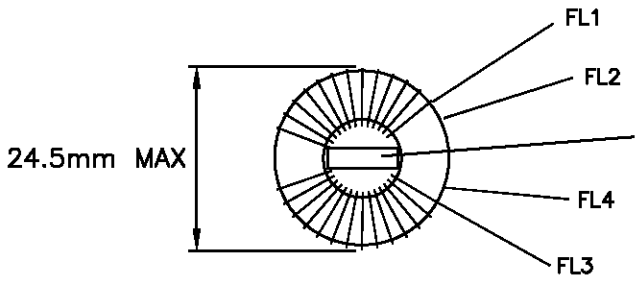
PLOTTED 22-07-2010

SIZE	DWG.NO	REV
A	10009271	A
SCALE: NONE		SHT 2 OF 3

REVISIONS
REVISIONS–SEE SHEET ONE

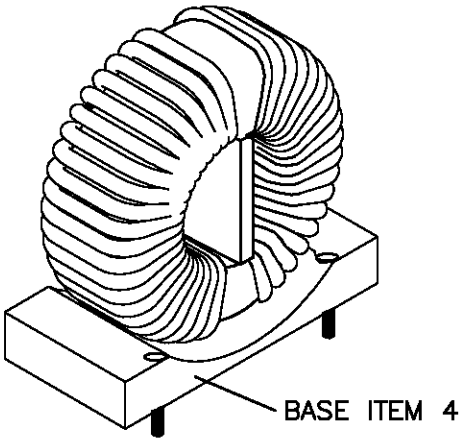
DWG.NO. 10009271 SHT. 3 REV. A

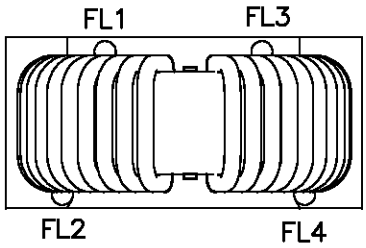
CONSTRUCTION – STAGE 1



WINDINGS TO BE SEPARATED BY 4mm +/–0.2mm USING SPACER MADE FROM SUITABLE MATERIAL, (TO MEET XP CLASS 155(F) INSULATION REQUIREMENTS), GLUED INTO CENTRE OF TORROID USING ARALDITE 2012 OR EQUIVALENT.

CONSTRUCTION – STAGE 2





CONSTRUCTION NOTES.

1. MATERIAL : SEE SEPARATE BILL OF MATERIALS (10009271).

2. No. OF TURNS TO BE EXACT. WINDING TO BE NEAT AND FLAT WITH MINIMAL CROSSING OF TURNS.

3. AFTER WINDING, PLACE ON BASE ITEM 4 AND PASS WIRES DOWN THROUGH HOLES AS INDICATED. USE ARALDITE 2012 OR EQUIV. TO SECURE WINDING TO BASE AND WIRES INTO HOLES IN BASE.

4. FINALLY STRIP, TIN AND TRIM WIRES TO 4mm IN LENGTH. (MEASURED FROM UNDERSIDE OF BASE ITEM 4).

5. FINISHED PART TO BE INDELIBLY MARKED WITH '10009271', REVISION NUMBER AND BATCH / DATE CODE.

6. EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.

7. CLASS 155 (F) INSULATION SYSTEM.

PLOTTED 22-07-2010

SIZE	DWG.NO	REV
A	10009271	A
SCALE: NONE		SHT 3 OF 3

REVISIONS						
REV	ECO	DESCRIPTION	CHECK	DATE	ENGR	DATE
01	.	1ST PROTOTYPE	.	.	SJT	16JULY09
02		2nd PROTOTYPE	-	-	RGL	21Sept09
A	.	PRODUCTION RELEASE	CFW	12MAY10	RGL	12MAY10

DWG.NO. 10009267 SHT. 1 REV. A

NOTES: SEE SHEET 3.

THIRD ANGLE PROJ.

PLOTTED 12-05-2010

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NEXT ASSY	USED ON

TOLERANCE

XX	XXX	ANGLE
	SEE NOTE	

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM

CONTRACT NO. .

APPROVALS	DATE
DRAWN MJB	21Sept09
CHECKED CFW	12MAY10
ENGINEER RGL	12MAY10
CUST. APPV'L .	.

CAD DWG NO 10009267A0.dwg

XP Power Limited.
FYFIELD ROAD, ONGAR, ESSEX, CM5 0GN

TITLE
INDUCTOR ASSY PFC CCB

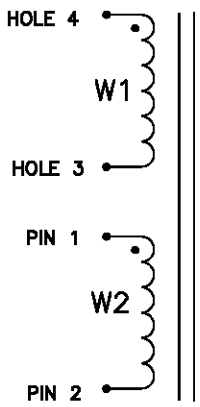
SIZE	DWG.NO	REV
A	10009267	A

SCALE NONE SHT 1 OF 3

REVISIONS
REVISIONS–SEE SHEET ONE

DWG.NO. 10009267 SHT 2 REV A

A. SCHEMATIC DIAGRAM



B. WINDING TABLE

ITEM	WINDING	TURNS	WIRE	START	FINISH	LAYERS	TAPE	COMMENTS
1 (OR SEE NOTE 9)	W1	53T	100/0.1	HOLE 4	HOLE 3	5	–	SEE NOTE 3
2 (OR SEE NOTE 9)	W2	11T	0.5mm TRIPLE INS.	PIN 1	PIN 2	1	1T	TAPE ITEM 3 OR SEE NOTE 9.

TEST SPECIFICATIONS

INDUCTANCE TEXT

W1 239–314uH @ 1KHz 0.1Vac

LEAKAGE INDUCTANCE

FLASH TEST

FROM W1 TO W2 500Vac FOR 1 MINUTE (NO BREAKDOWN).
FROM W1,W2 TO CORE 1KVac FOR 1 MINUTE (NO BREAKDOWN).

DC RESISTANCE

PLOTTED 12–05–2010

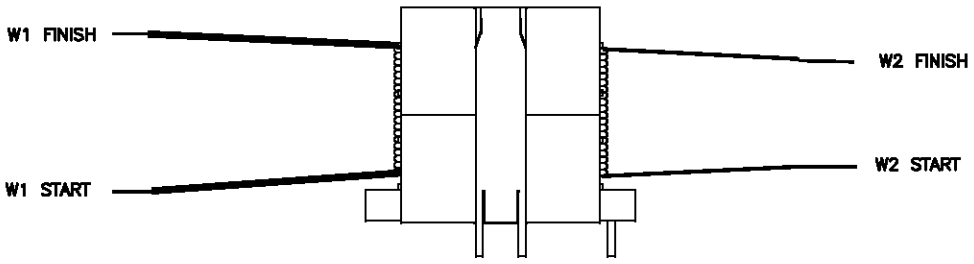
SIZE	DWG.NO	REV
A	10009267	A
SCALE: NONE		SHT 2 OF 3

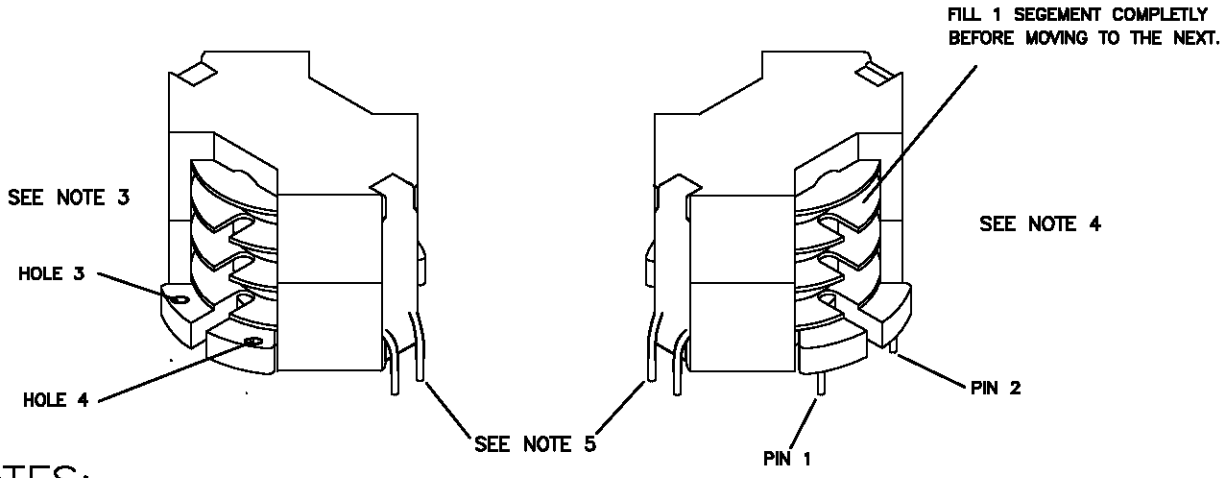
REVISIONS

REVISIONS—SEE SHEET ONE

DWG.NO. 10009267 SHT 3 REV A

CONSTRUCTION



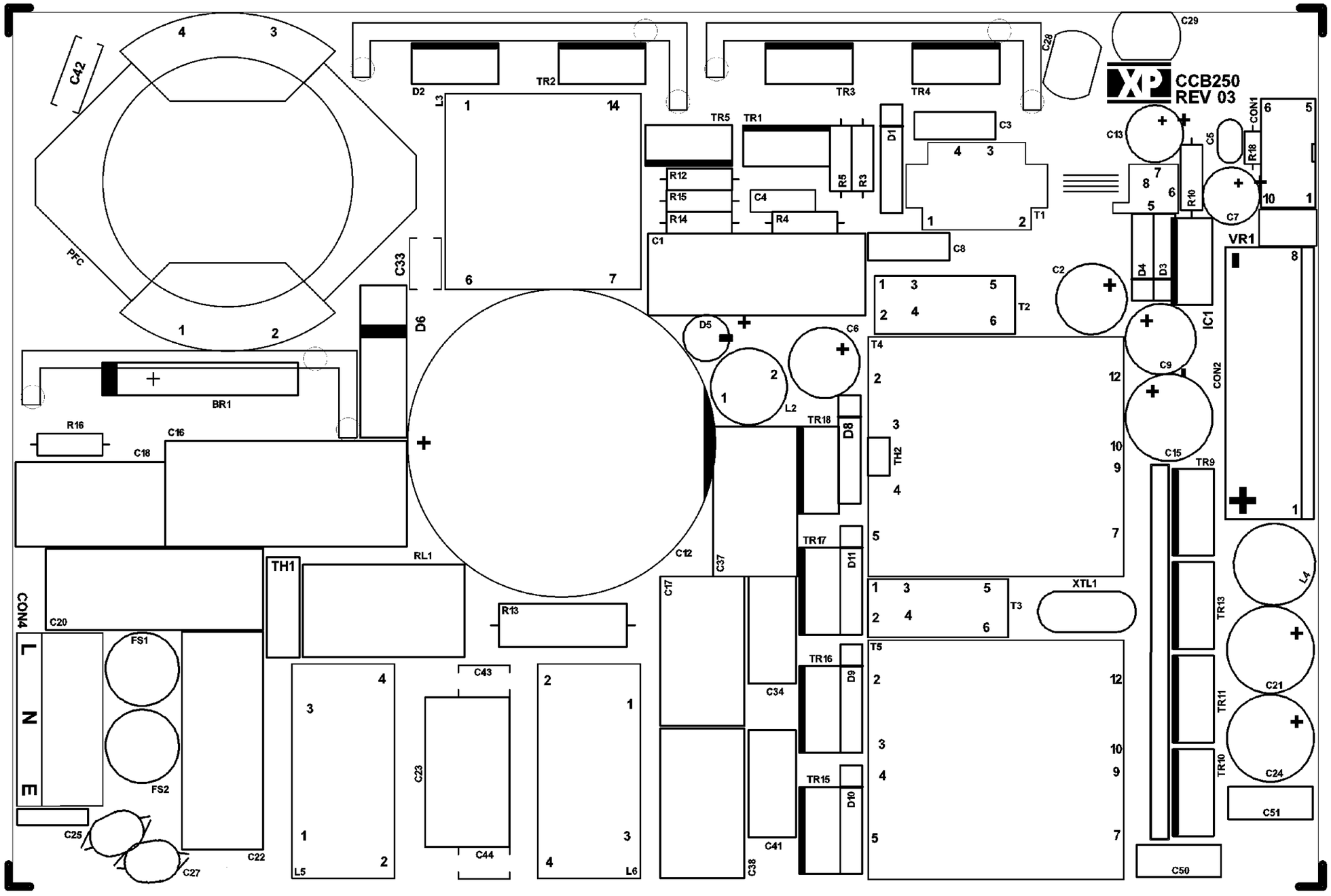


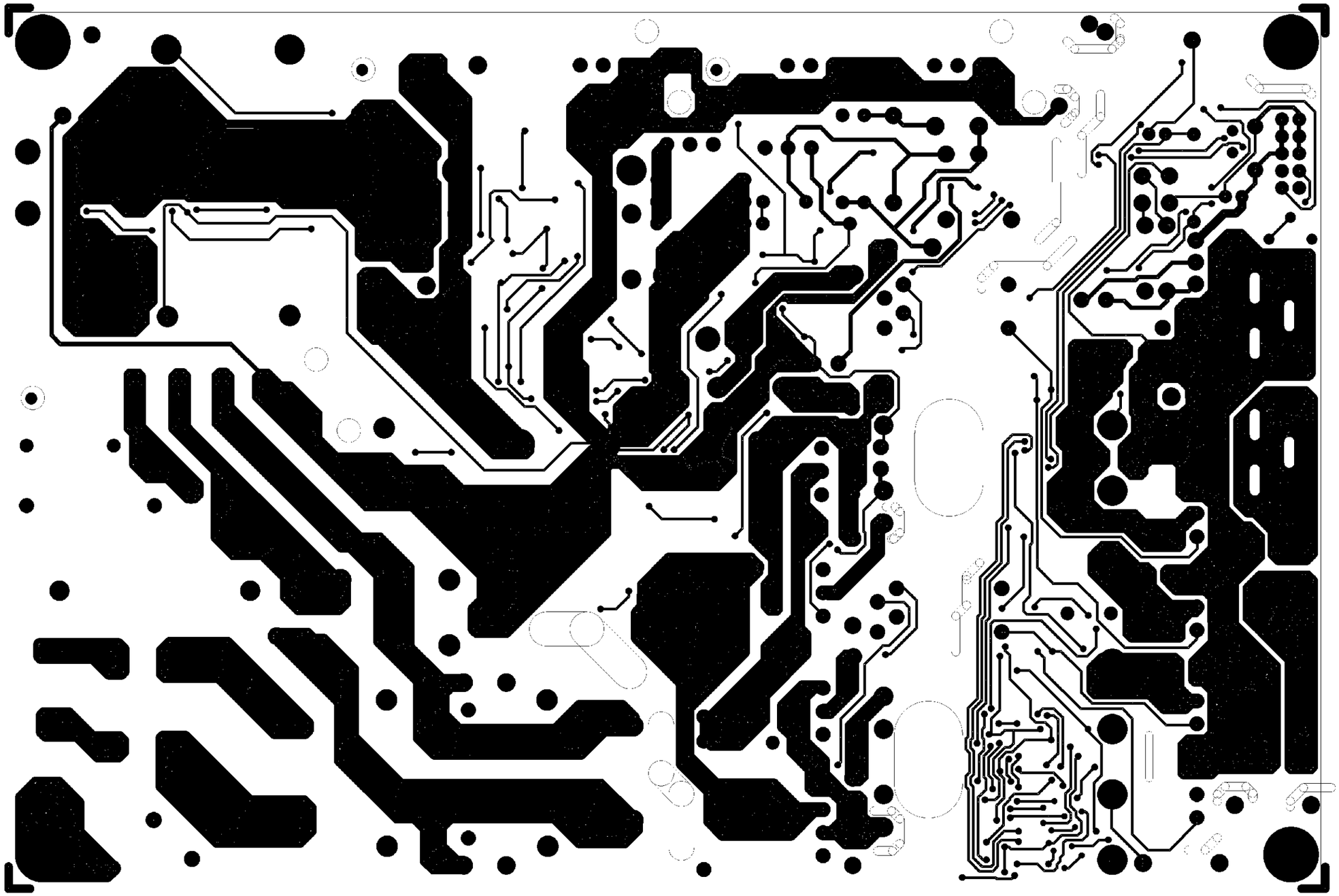
NOTES:

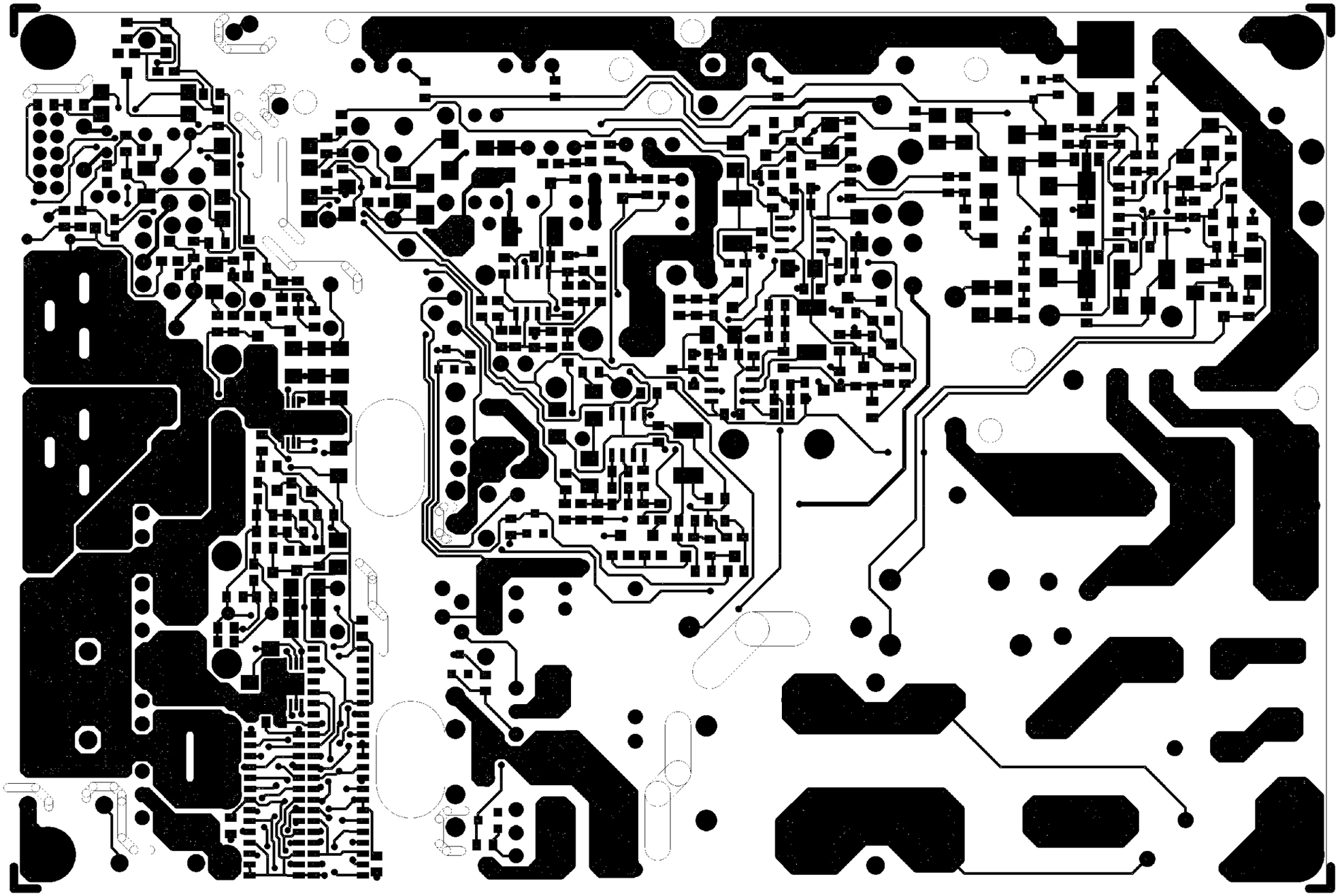
1. MATERIAL: SEE SEPARATE BILL OF MATERIALS.
2. No. OF TURNS TO BE EXACT AND ALL WINDINGS WOUND IN SAME DIRECTION.
3. PASS W1 WIRES DOWN THROUGH CORRECT HOLES IN BOBBIN ITEM 10, AND PULL TIGHT.
   REMOVE ALL INSULATION UP TO BOBBIN, TWIST WIRES TOGETHER & TIN ENDS.(DIA. OF LEADS NOT TO EXCEED 2mm).
   TRIM TO 4mm +/− 1mm IN LENGTH (MEASURED FROM UNDERSIDE OF BOBBIN).
4. W2 WIRES TO BE WRAPPED ROUND CORRECT PINS AND SOLDERED.
5. 2−OFF GAPPED CORES ITEM 9 TO BE GLUED USING ARALDITE 2012 OR EQUIVALENT, ALSO SECURE WITH CLIPS, ITEM 11.
6. VACUUM IMPREGNATE WITH VARNISH.
7. FINISHED PART TO BE INDELIBLY MARKED WITH "10009267" ,
   REVISION No., AND BATCH CODE.
8. CLASS 155 (F) INSULATION SYSTEM.
9. EQUIVALENT TO MEET XP CLASS 155 (F) INSULATION REQUIREMENTS WHERE APPLICABLE.

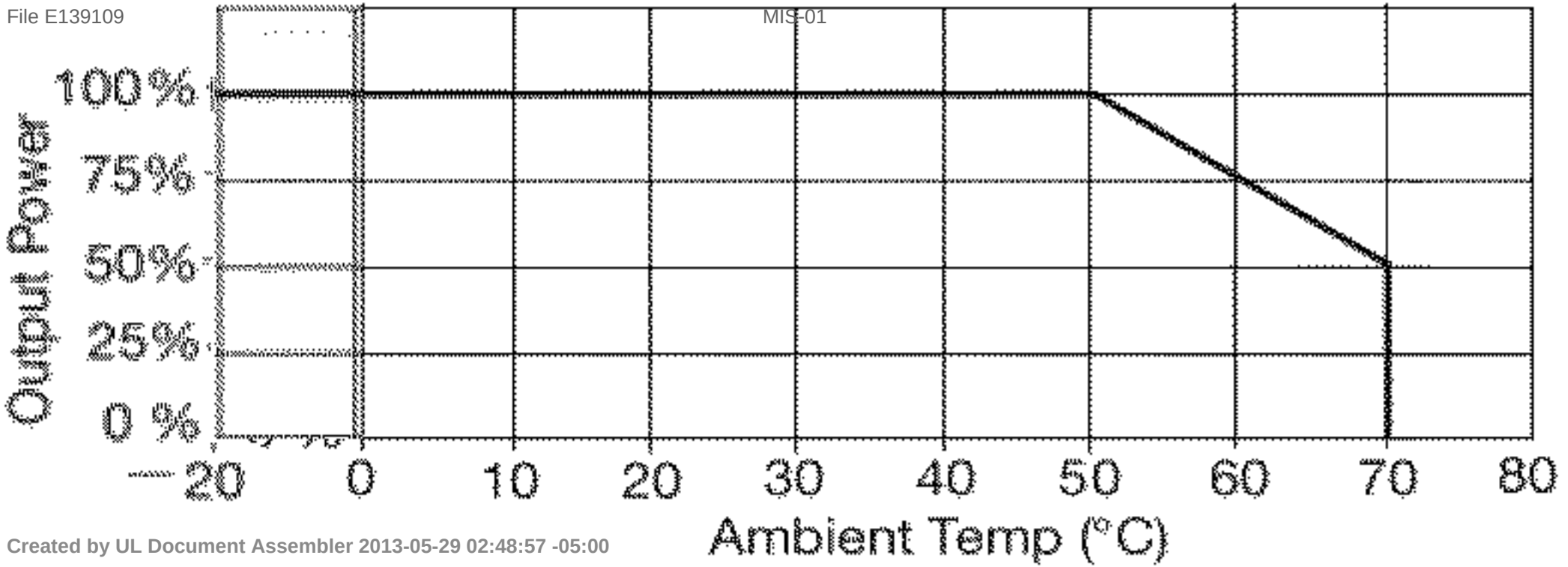
PLOTTED 12-05-2010

SIZE	DWG.NO	REV
A	10009267	A
SCALE: NONE		SHT 3 OF 3


CCB250
REV 03
C42
PFC
BR1
R16
C16
C18
C33
D6
D2
TR2
L3
TR5
TR1
R12
R15
R14
R5
R3
C4
R4
C1
D1
C3
T1
C8
TR3
TR4
C28
C29
C13
C5
R18
CON1
R10
C7
VR1
D4
D3
IC1
C2
T2
D5
C6
T4
L2
TR18
D8
TH2
C9
C15
TR9
CON2
C12
C37
TR17
D11
C17
C34
TR16
D9
C38
C41
TR15
D10
XTL1
T3
T5
TR13
TR11
TR10
L4
C21
C24
C51
C50
TH1
RL1
R13
C20
CON4
LINE
FS1
FS2
C25
C27
C22
C43
C23
C44
L5
L6






Output Power
100%
75%
50%
25%
0 %
-20
0
10
20
30
40
50
60
70
80
Ambient Temp (°C)

THE XPERTS IN POWER

XP Power, 1241 E. Dyer Road, Suite 150, Santa Ana, California 92705 USA
Tel: +1 714-597-7100 Fax: +1 714-597-7143 Website: www.xppower.com

April 12, 2011

To: UNDERWRITERS LABORATORIES INC.
2929 E Imperial Hwy Ste. 100
Brea, CA 92821 USA

Attn.: Mr. Linus Park
Email: Linus.Park@us.ul.com
Subject: National Differences

Dear: Mr. Park

This document confirms that XP Power will provide the following items needed to the accepting NCB along with the CB test report.

Markings and Safety Instructions - Safety instructions and markings in the language suitable for countries listed in the attached report will be provided at the time the CB test report is submitted to the accepting NCB.

EMC Test Report – Where detailed in the National Differences, an EMC Test report or Declaration of Conformity will accompany this product when sent to countries that require EMC test results as part of their certification process, e.g. Korea.

We confirm that:

Power Supply Cords and Plugs - All power cords and plug assemblies provided with the unit will be certified and suitable for use in the countries listed in the attached CB test report.

RoHS - Restriction of the use of certain hazardous substances in electrical and electronic equipment. The substances to which the RoHS directive applies are: Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls, Polybrominates diphenyl ethers.

Multiple Factories - This confirms that samples submitted for certification are representative of the products from each factory. The factories are as noted in this CB Test Report.

Tac Pham
Manager, Product Compliance
XP Power LLC