UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2019-05-09 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (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)
Complementary CCN:	N/A
Product:	Switch-Mode Power Supply
Model:	PM-0224-038-0
Rating:	Input: 200-500 VAC, 50/60 Hz, 0.82-0.52 A Output: 24 Vdc, 3.8 A (maximum).
Applicant Name and Address:	BLOCK TRANSFORMATOREN-ELEKTRONIK GMBH MAX-PLANCK-STRASSE 36-46 27283 VERDEN GERMANY

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: Longjie Zhang / Project Handler Reviewed By: Gregory A. Ray / 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

This product is DIN switch mode power supply for building in.

Model Differences

N/A

Test Item Particulars	
Mass of equipment (kg)	0.39kg
Equipment mobility	for building-in
Connection to the mains	for building-in, to be determined in the end product
Operating condition	continuous
Access location	for building-in
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -10%
Tested for IT power systems	No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	Class II (double insulated)
Considered current rating of protective device as part of the building installation (A)	20 A
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	up to 2000m
Altitude of test laboratory (m)	Less than 2000m

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 70°C (-2.5% / K derating for ambient greater than 55 deg C.)
- The means of connection to the mains supply is : Unit is intended for building in. To be evaluated as an element of the end product.
- The product is intended for use on the following power systems : TN
- LEDs provided in the product are considered low power devices : Yes
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual

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 following secondary output circuits are SELV : 24 Vdc output
- The investigated Pollution Degree is : 2
- The maximum investigated branch circuit rating is : 20 A
- The power supply terminals and/or connectors are : Not investigated for field wiring.
- The following input terminals/connectors must be connected to the end-product supply neutral : Input Terminal (marked "N")
- The following end-product enclosures are required : Mechanical, Fire and Electrical
- The equipment is suitable for direct connection to : AC mains supply (for all AC models)
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-SELV: 213 Vrms, 510 Vpk
- The following secondary output circuits are at non-hazardous energy levels : 24 Vdc output
- 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) : Transformer L3 - Class F, (150-2110)
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : Transformer L3
- The following LEDs operate within the exempt group per IEC 62471 : Indicator LEDs

Additional Information

N/A

Additional Standards

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 + A1:2011 + A2:2014.

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 companys name, Trade Name, Trademark or File Number
Power rating - Model	Model Number
Power rating - Class II symbol	Symbol for Class II construction  (60417-2-IEC-5172)
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

Inspect the transformer(s) listed in BD1.1 per AA1.1- (C). When the tests are conducted at other location, inspect test record and specification sheet provided by the component manufacturer. Verify the specification sheet indicates 100% routine test specified in BD1.1 is conducted at the component manufacturer. The test record noted above shall be submitted to the manufacturer from transformer manufacturer. The test record can be in the form of an actual test record. A stamp or sticker on the transformer or other method verifying the routine test is being completed on 100% production is also acceptable.

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
PM-0224-038-0	Transformer L3	--	Pri to Sec pins	3000	4242	1
BD1.2	**Earthing Continuity Test Exemptions – This test is not required for the following models:**					
	--					
BD1.3	**Electric Strength Test Exemptions – This test is not required for the following models:**					
	--					
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:**					
	--					

BE1.0	**Sample and Test Specifics for Follow-Up Tests at UL**				
Model	Component	Material	Test	Sample (s)	Test Specifics

1.5.1	**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
Enclosure	Sabic Innovative Plastics	'Lexan' 500R	Minimum 1.5 mm thick, V-0, 130C. Approx. dimensions 90 mm x 104 mm x 52 mm. Two parts construction, secured together with snap-fit.	QMFZ2	UR	
Enclosure - Alternate	Interchangeable	Interchangeable	Rated minimum V-1 at minimum thickness, minimum 115 deg C	QMFZ2	UR	
Primary Input Terminal Block (X2)	Conta-Clip	PBK 2,5	2 poles. 600 V, 20 A, 115ºC, AWG 24 to 12 Cu, FW2.	XCFR2	UR (E95701)	
Primary Input Terminal Block (X2)-Alternate	Wago	Series 721	300V, min. 10A, 105°C, AWG 24-12(but every second pole is not connected)	XCFR2	UR (E45172)	
Secondary Output Terminal Block (X1)	Conta-Clip	PBK 2,5	5 poles. 300 V, 20 A, 120ºC, AWG 24 to 12 Cu, FW2.	XCFR2	UR (E95701)	
Secondary output Terminal Block (X1) –Alternate	Wago	2092 series	300V, 15A, 120°C, AWG 24-12, Cu, FW2	XCFR2	UR (E45171)	
Secondary output Terminal Block (X1) -Alternate	Anytek Technology Corp	Type NJ	300V, 10A, 115°C, AWG 24 to 16 Cu	XCFR2	UR (E202113)	
Secondary output Terminal Block (X1) -Alternate	Phoenix Contact	SPT 2.5	300V, 20A, 115°C, AWG 24 to 12 Cu	XCFR2	UR (E60425)	

Secondary output Terminal Block (X1) -Alternate	Wago	Series 721	300V, min. 10A, 105°C, AWG 24-12.	XCFR2	UR (E45172)	
Fuse (F1)	Littelfuse	477	600 Vac, 3.15A	JDYX2	UR (E10480)	
Fuse (F1) alternate	Cooper Bussmann LLC	S505H	600Vac, 3.15A	JFHR2	UR (E56412)	
Fuse (F1) alternate	Interchangeable	Interchangeable	Min. 550V, 3.15A	JDYX	UL	
Varistor (R48)	Epcos	S14K625E2K1	625Vac max continuous, (SPD type 2 application). Body is V-1 material.	VZCA2	UR (E321126)	
Varistor - Alternate	Nippon Chemi-Con Corp	TND14V102K or TNR14V102K	625Vac max continuous, (SPD type 2 application), minimum V-1 housing (for the body).	VZCA2	UR (E323623)	
Thermistor NTC (R47)	Interchangeable	Interchangeable	Rated 10 Ohm, min. 3 A (not for thermal control).	--	--	
Capacitor (C26, C27)	Interchangeable	Interchangeable	(Type X2) 0.47µF, min. 275V	FOWX2, FOKY2	UR	
Capacitor (C25, C28)	Interchangeable	Interchangeable	Electrolytic capacitor, 120 uF, 420V minimum	FOWX2, FOKY2	UR	
Capacitor (C23)	Interchangeable	Interchangeable	Rated 2.2nF min. 500V (Y1)	FOWX2, FOKY2	UR	
Diode (D14,D15,D33,D34)	Interchangeable	Interchangeable (S5Y)	min.1500V, min. 3A	--	--	
Inductor (L5)	Interchangeable	SKD 26/0.85 or equivalent	Min.26mH, 0.85A	--	--	

Optical Isolator (OK1)	Vishay or equivalent	VOL617A series or equivalent	Insulation voltage min. 5000V, provides reinforced insulation.	FPQU2	UR	
Transistor (T3, T6) located on Heat sink1	Interchangeable	Interchangeable (STF6N95K5)	Rated min.6A, min. 900V	--	--	
Diode D2 (located on the heat sink2)	Interchangeable	Interchangeable (MUR1520)	Rated min. 200V,10A	--	--	
Inductor L4	Interchangeable	150-2015 or +8400-0446, or +8400-0446xxx, where x can be any number or letter	Class B (130 deg C)	--	--	
Inductor L4 – Insulation system	Block Transformatoren or Wujiang Volt or Click Technology Co Ltd	BLO-B2 or GH-130 or SBI 4.2	130 deg C	OBJY2	UR	
Inductor (L1)	Interchangeable	150-0799 or +8000-0005 or +8000-0005TV, or 8000-0005DER, or 8000-0005xxx	Rated mini. 1.5 uH, 4 A	--	--	
Inductor (L1) Insulation System	Block Transformatoren GmbH	Viking B2	Class B (130 deg C)	OBJY2	UR (E216803)	
Inductor (L1) Insulation System - alternate Insulation system	Wujiang Volt Electronic Industry	GH-130	Class B (130 deg C)	OBJY2	UR (E149436)	

Inductor (L1) Insulation System - alternate Insulation system	Wuxi Derun Electronics Industry	DER-B	Class B (130 deg C)	OBJY2	UR (E352011)	
Inductor (L1) Insulation System - alternate Insulation system	CLICK TECHNOLOGY CO LTD	SBI 4.2	Class B (130 deg C)	OBJY2	UR (E199817)	
Main Transformer (L3)	Interchangeable	150-2110 or +8300-0202 or +8300-0202TVE or 8300-0202DER or 8300-0202xxx, where x can be any number or letter	155 deg C. Consists of the following	--	--	
Main Transformer (L3) Insulation System	Block Transformatoren GmbH	BLO-155P	Class F (155 deg C). Marked “BLOCK” or “E216803”.	OBJY2	UR (E216803)	
Main Transformer (L3) Insulation System - Alternate	Wujiang Volt Electronic Industry	SBI 5.1	Class F (155 deg C). Marked “TVE” or “E149436” or “E352011”	OBJY2,	UR (E149436)	
Main Transformer (L3) Insulation System - Alternate	Wuxi Derun Electronic Industry	SBI 5.1	Class F (155 deg C). Marked “E352011” or “DER”	OBJY2,	UR (E352011)	
Main Transformer (L3) Insulation System - Alternate	CLICK TECHNOLOGY CO LTD	SBI 5.1	Class F (155 deg C). Marked “E199817”	OBJY2	UR (E199817)	
Transformer (L3) – Bobbin	EI Dupont De Nemours	FR530 (L)	155 deg C, V-0, minimum 1 mm thick (For BLO-155P)	QMFZ2	UR (E41938)	
Transformer (L3) – Bobbin (Alternate)	Sumitomo Bakelite	PM-9630 or PM-9820	150 deg C, V-0, minimum 1.0 mm thick (For SBI5.1)	QMFZ2	UR (E41429)	

Transformer (L3) – Core	Interchangeable	Interchangeable	Ferrite core, approx. 39.5 by 40 by 12.5 mm	--	--	
Transformer (L3) - Wndings	Interchangeable	Interchangeable	Minimum 150 deg C, copper magnet wire	OBMW2	UR	
Transformer (L3) – Insulation Tape	Interchangeable (within the insulation system)	Interchangeable (within the insulation system)	Per transformer drawing and its insulation system. Minimum 155 deg C	OANZ2	UR	
Transformer (L3) – Margin Tape	Interchangeable (within the insulation system)	Interchangeable (within the insulation system)	Per transformer drawing and it's insulation system. Minimum 155 deg C minimum Minimum 4.5 mm on both sides of the bobbin	OANZ2	UR	
Transformer (L3) – Sleeving	Great Holding	TFS/TFS-201	PTFE, minimum 130 deg C, provided on all windings exits	YDPU2/8	UR (E156256)	
Transformer (L3) – Sleeving alternate	Varflex Corp	Varglas A-397	Fiberglass minimum 130 deg C, provided on all windings exits	YDPU2/8	UR (E63450)	
Transformer (L3) – Varnish	E I Dupont De Nemours	Voltatex 2010	Minimum 155 deg C	--	--	
Transformer (L3) – Varnish Alternate	Elantas Zhuhai	V-1630FS	Minimum 155 deg C	OBOR2	UR (E314793)	
Transformer (L3) – Varnish Alternate	John C Dolph	AC-43	Minimum 155 deg C	OBOR2	UR	
Heat sink1	Interchangeable	Interchangeable	See Illustration1	--	--	
Heat sink2	Interchangeable	Interchangeable	See Illustration 2	--	--	
Printed Wiring Board	Interchangeable	Interchangeable	Minimum V-1, 130°C.	ZPMV2	UR	

Enclosures

Type	Supplement Id	Description
Photographs	03-01	Overall View
Photographs	03-02	Overall View
Photographs	03-03	Component View
Photographs	03-04	Trace View
Diagrams	04-01	Inductor L1
Diagrams	04-02	Inductor L4
Diagrams	04-03	Inductor L5
Diagrams	04-04	Main Transformer L3
Diagrams	04-05	Heat Sink Drawing
Schematics + PWB	05-01	Schematic/Circuit Diagram
Schematics + PWB	05-02	Printed Wiring Board