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| **UL TEST REPORT AND PROCEDURE** | | | | |
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| **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 | | |
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| **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). | | |
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| **Applicant Name and Address:** | | BLOCK TRANSFORMATOREN-ELEKTRONIK GMBH  MAX-PLANCK-STRASSE 36-46  27283 VERDEN GERMANY | | |
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| 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 |

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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**  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 | | | |
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| **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. | | | |

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| **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:** | | | | | | |
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| **BD1.3** | **Electric Strength Test Exemptions – This test is not required for the following models:** | | | | | | |
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| **BD1.4** | **Electric Strength Test Component Exemptions – The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:** | | | | | | |
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| **BE1.0** | **Sample and Test Specifics for Follow-Up Tests at UL** | | | | | |  |
| Model | | Component | Material | Test | Sample (s) | Test Specifics | |
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| **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**

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| **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 |