

UL TEST REPORT AND PROCEDURE

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|------------------------------------|---|
| Standard: | UL 60950-1, 2nd Edition, 2014-10-14 (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) |
| Product: | Switching Power Supply |
| Model: | RWS150B-5, RWS150B-12, RWS150B-15, RWS150B-24, RWS150B-28, and RWS150B-48 Maybe followed by suffix "abc" (a is /, b is CO2, c is FG, DIN; and "abc" may be blank). |
| Rating: | Input: 100-240 Vac, 50-60 Hz, 1.5 A (for Model RWS150B-5) and 1.9 A (for Models RWS150B-12, RWS150B-15, RWS150B-24, RWS150B-28, and RWS150B-48) |
| Applicant Name and Address: | TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN |

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

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Supporting Documentation

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

- A. Authorization - The Authorization page may include additional Factory Identification Code markings.
- B. Generic Inspection Instructions -
 - i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
 - ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.
 - iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

The product covered in this Test Report is building-in type switching power supply with a single output circuit.

Output:

5 Vdc (4.5 Vdc - 5.75 Vdc), maximum 21 A (maximum 105 W) (for RWS150B-5)
12 Vdc (10.8 Vdc - 13.8 Vdc), maximum 13 A (maximum 156 W) (for RWS150B-12)
15 Vdc (13.5 Vdc - 17.25 Vdc), maximum 10 A (maximum 150 W) (for RWS150B-15)
24 Vdc (21.6 Vdc - 27.6 Vdc), maximum 6.5 A (maximum 156 W) (for RWS150B-24)
28 Vdc (25.2 Vdc - 32.2 Vdc), maximum 5.4 A (maximum 151.2 W) (for RWS150B-28)
48 Vdc (43.2 Vdc - 52.8 Vdc), maximum 3.3 A (maximum 158.4 W) (for RWS150B-48)

Model Differences

Each model is identical, except for model designation, output rating, secondary winding and internal construction of Transformer (T1), and secondary components.

Standard model is Terminal Block model with Chassis and Cover.

And RWS150B Series maybe followed by suffix "abc" (a is /, b is CO2, c is FG, DIN; and "abc" may be blank).

1. CO2: Model with optional thin coating (QMJU2) on both sides of PWB.
2. FG: Model with Low Leakage (the capacitances for Primary - FG reduced).
3. DIN: Model with Cover and DinRail Mounting Bracket.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : N/A
- Operating condition : continuous
- Access location : N/A (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 I (earthed)
- 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 3000 m
- Altitude of test laboratory (m) : approximately 10 to 20 m
- Mass of equipment (kg) : approximately 0.5 kg
- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: See Enclosure Id. 7-01.
- The product is intended for use on the following power systems: TN

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 end-product Electric Strength Test is to be based upon a maximum working voltage of: The end-product Electric Strength Test is to be based upon a maximum working voltage of: [Model RWS150B-5] Primary - Secondary: 443 Vrms and 680 Vpk / Primary - Ground: 443 Vrms and 680 Vpk , [Model RWS150B-12] Primary - Secondary: 434 Vrms and 680 Vpk / Primary - Ground: 434 Vrms and 680 Vpk , [Model RWS150B-15] Primary - Secondary: 446 Vrms and 676 Vpk / Primary - Ground: 381 Vrms and 640 Vpk , [Model RWS150B-24] Primary - Secondary: 456 Vrms and 768 Vpk / Primary - Ground: 456 Vrms and 768 Vpk , [Model RWS150B-28] Primary - Secondary: 463 Vrms and 780 Vpk / Primary - Ground: 409 Vrms and 740 Vpk, [Model RWS150B-48] Primary - Secondary: 457 Vrms and 728 Vpk / Primary - Ground: 457 Vrms and 728 Vpk
- The following secondary output circuits are SELV: Output of Models RWS150B-5, RWS150B-12, RWS150B-15, RWS150B-24, RWS150B-28, and RWS150B-48
- The following secondary output circuits are at non-hazardous energy levels: Output of Models RWS150B-5, RWS150B-12, RWS150B-15, RWS150B-24, RWS150B-28, and RWS150B-48
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- The maximum investigated branch circuit rating is: 20 A
- The investigated Pollution Degree is: 2
- 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 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 (T1) (Class F)
- The following end-product enclosures are required: Electrical, Fire
- Line to Line Capacitor C1 have maximum 0.47uF for capacitance. C1: 0.47uF was used in test. Therefore, consideration shall be given in conducting Discharge Test in the end product application with respect to the variation in C1.
- Line to ground Capacitors C2, C3 has maximum 2200pF for capacitance. Primary to ground Capacitor C8 have maximum 3300pF for capacitance. C2, C3: 2200pF and C8: 3300pF were used in test. Therefore, consideration shall be given in conducting Touch Current Test in the end product application with respect to the variation in C2, C3 and C8.
- Earth terminal provided on Terminal Block (TB1) has not been evaluated as protective earthing terminal. This component is intended to be connected to a protective earth via earthed parts of end-product. If protective earthing conductor is connected to the earth terminal on Terminal Block (TB1)

in the end product, Limited Short-Circuit Test per CSA C22.2 No.04 shall be conducted.

- Model RWS150B-5 was tested with Output Voltage Range of 4.5 - 5.75 Vdc (maximum 105 W), Model RWS150B-12 was tested with Output Voltage Range of 10.8 - 13.8 Vdc (maximum 156 W), Model RWS150B-15 was tested with Output Voltage Range of 13.5 - 17.25 Vdc (maximum 150 W), Model RWS150B-24 was tested with Output Voltage Range of 21.6 - 27.6 Vdc (maximum 156 W), Model RWS150B-28 was tested with Output Voltage Range of 25.2 - 32.2 Vdc (maximum 151.2W), Model RWS150B-48 was tested with Output Voltage Range of 43.2 - 52.8 Vdc (maximum 158.4 W). Adjustment was made via Variable Resistor (VR51).

Additional Information

The Clearances and Creepage Distances have additionally been assessed for suitability up to 3000 m elevation.

Markings and instructions

| Clause Title | Marking or Instruction Details |
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| 1.7.1 Power rating - Ratings | Ratings (voltage, frequency/dc, current) |
| 1.7.1 Power rating - Company identification | Listee's or Recognized company's name, Trade Name, Trademark or File Number |
| 1.7.1 Power rating - Model | Model Number |
| 1.7.6 Fuses - Rating | Rated current and voltage and type located on or adjacent to fuse or fuseholder. |