

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
<b>Complementary CCN:</b>	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
<b>Product:</b>	Switching Power Supply
<b>Model:</b>	RWS100B-5, RWS100B-12, RWS100B-15, RWS100B-24, and RWS100B-48
<b>Rating:</b>	Maybe followed by suffix "abcd" (a is /, b is CO2, c is FG, d is DIN; and "abcd" may be blank) Input: 100-240 Vac, 50-60 Hz, 1.0 A (for Model RWS100B-5) and 1.3 A (for Models RWS100B-12, RWS100B-15, RWS100B-24, and RWS100B-48)
<b>Applicant Name and Address:</b>	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.

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.

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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 14 A (maximum 70 W) (for RWS100B-5)
- 12 Vdc (10.8 Vdc - 13.8 Vdc), maximum 8.5 A (maximum 102 W) (for RWS100B-12)
- 15 Vdc (13.5 Vdc - 17.25 Vdc), maximum 6.8 A (maximum 102 W) (for RWS100B-15)
- 24 Vdc (21.6 Vdc - 27.6 Vdc), maximum 4.5 A (maximum 108 W) (for RWS100B-24)
- 48 Vdc (43.2 Vdc - 52.8 Vdc), maximum 2.1 A (maximum 100.8 W) (for RWS100B-48)

### Model Differences

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

RWS100B Series maybe followed by suffix "abcd" (a is /, b is CO2, c is FG, d is DIN; and "abcd" 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 0.4 kg
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) 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: [Model RWS100B-5] Primary - Secondary: 464 Vrms and 812 Vpk / Primary - Ground: 415 Vrms and 768 Vpk , [Model RWS100B-12] Primary - Secondary: 473 Vrms and 848 Vpk / Primary - Ground: 407 Vrms and 772 Vpk , [Model RWS100B-15] Primary - Secondary: 497 Vrms and 836 Vpk / Primary - Ground: 425 Vrms and 760 Vpk , [Model RWS100B-24] Primary - Secondary: 496 Vrms and 852 Vpk / Primary - Ground: 409 Vrms and 740 Vpk , [Model RWS100B-48] Primary - Secondary: 535 Vrms and 1010 Vpk / Primary - Ground: 413 Vrms and 744 Vpk
- The following secondary output circuits are SELV: Output of all models.
- The following secondary output circuits are at non-hazardous energy levels: Output of all models.
- 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 155(F))
- The following end-product enclosures are required: Electrical, Fire
- Line to Line Capacitor C1 have maximum 0.47  $\mu$ F for capacitance. Line to Line Capacitor C4 have maximum 0.33  $\mu$ F for capacitance. C1: 0.47 $\mu$ F and C4: 0.33 $\mu$ F were used in test. Therefore, consideration shall be given to conducting Capacitance Discharge Test in the end-product with respect to the variation in C1 and C4.
- Line to ground Capacitors C2, C3 has maximum 2200 pF for capacitance. Primary to ground Capacitor C10 have maximum 3300 pF for capacitance. C2, C3: 2200pF and C10: 3300pF were used in test. Therefore, consideration shall be given to conducting Touch Current Test in the end-product with respect to the variation in C2, C3 and C10.
- 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 RWS100B-5 was tested with Output Voltage Range of 4.5 - 5.75 Vdc (maximum 70 W). Model RWS100B-12 was tested with Output Voltage Range of 10.8 - 13.8 Vdc (maximum 102 W). Model RWS100B-15 was tested with Output Voltage Range of 13.5 - 17.25 Vdc (maximum 102 W). Model HWS100B-24 was tested with Output Voltage Range of 21.6 - 27.6 Vdc (maximum 108 W). Model RWS100B-48 was tested with Output Voltage Range of 43.2 - 52.8 Vdc (maximum 100.8 W).
- The following output circuits are at ES1 energy levels : Output of all models.

- The following output circuits are at PS3 energy levels: Output of all models.
- Humidity conditioning has been conducted by tropical condition.
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.
- This component has been evaluated in 'control of fire spread' method assuming appropriate fire enclosure is provided in end product. Unless the fire enclosure is made of non-combustible or V-0 material, the separation from the PIS shall be considered.

**Additional Information**

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

**Additional Standards**

The product fulfills the requirements of: The product fulfills the requirements of: The product fulfills the requirements of: The product fulfills the requirements of: The product fulfills the requirements of: UL 62368-1, 2nd Edition, 2014-12-01, CAN/CSA C22.2 No. 62368-1-14, 2nd Edition, 2014-12.

**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 - Rating	Rated current and voltage and type located on or adjacent to fuse or fuseholder.