UL TEST REPORT AND PROCEDURE

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)
Complementary CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Product:	Switching Power Supply
Model:	RWS600B-5, RWS600B-12, RWS600B-15, RWS600B-24, RWS600B-36, RWS600B-48, EVS36-16R7, EVS57-10R6 Maybe followed by optional suffix "abcdefg" (a is /, b is R, c is CO2, d is FG, e is FO, f is H, g is RF, HU, or HULNF, and "abcdefg" maybe blank. Note: "HULNF" for model RWS600B-24 only.). RWS600B-24/650, RWS600B-24/H650 May have optional suffix "bcde" after "/" (b is R, c is CO2, d is FG, e is FO, and "bcde" maybe blank.)
Rating:	Input: 100-240 Vac, 50-60 Hz, 6.5 A (for Model RWS600B-5) and 7.0 A (for Models RWS600B-12, RWS600B-15, RWS600B-24, RWS600B-36, RWS600B-48, EVS36-16R7 and EVS57-10R6) 7.0 A (for Models RWS600B-24/650, RWS600B-24/H650)
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 - 5.7 Vdc), maximum 100 A (maximum 500 W) (for RWS600B-5)
12 Vdc (10.8 Vdc - 13.8 Vdc), maximum 50 A (maximum 600 W) (for RWS600B-12)
15 Vdc (13.5 Vdc - 17.2 Vdc), maximum 40 A (maximum 600 W) (for RWS600B-15)
24 Vdc (21.6 Vdc - 27.6 Vdc), maximum 25 A (maximum 600 W) (for RWS600B-24)
24 Vdc (21.6 Vdc - 27.6 Vdc), maximum 27 A(*) (maximum 648 W(*)) (for RWS600B-24/650, RWS600B-24/H650)
(*) 27A (648W) at Input voltage condition 170V-240V, 25A (600W) at Input voltage condition 110V-170V. Refer to Output Derating specification (Enclosure-Miscellaneous id. 7-07) for details.
36 Vdc (32.4 Vdc - 41.4 Vdc), maximum 16.7 A (maximum 601.2 W) (for RWS600B-36)
36 Vdc (24 Vdc - 36 Vdc), maximum 16.7 A (maximum 601.2 W) (for EVS36-16R7)
48 Vdc (43.2 Vdc - 52.8 Vdc), maximum 12.5 A (maximum 600 W) (for RWS600B-48)
57 Vdc (48Vdc - 57 Vdc), maximum 10.6 A (maximum 604.2 W) (for EVS57-10R6)

Model Differences

Each model is identical, except for model designation, output rating, secondary winding and internal construction of Transformer (T2), and secondary components.

Model EVS57-10R6 is identical to model RWS600B-48 except for output voltage, adjustable range of overcurrent protection, adjustment of overcurrent protection by VR1 which is available for end-product manufacturer, and some minor components.

Model EVS36-16R7 is identical to model RWS600B-36 except for adjustable range of overcurrent protection, adjustment of overcurrent protection by VR1 which is available for end-product manufacturer, and some minor components.

Model RWS600B-24/HULNF is identical to model RWS600B-24/HU except for model name, Fan (lower speed) and output derating curve.

Model RWS600B-24/650 is identical to model RWS600B-24 except for output current rating at input voltage condition 170V-240V, OCP setting, and output derating curve.

Model RWS600B-24/H650 is identical to model RWS600B-24/650 except for long hold-up time feature. (employing electrolytic capacitor (C7) with higher capacitance)

RWS600B Series and EVS Series maybe followed by optional suffix "abcdefg" (a is /, b is R, c is CO2, d is FG, e is FO, f is H, g is RF, HU, or HULNF; and "abcdefg" may be blank. Note: "HULNF" is for model RWS600B-24 only).
Models RWS600B-24/650 and RWS600B-24/H650 may have optional suffix "bcde" after "/" (b is R, c is CO2, d is FG, e is FO; and "bcde" may be blank.)

1. R: Model with optional ON/OFF control function.
2. CO2: Model with optional thin coating (QMJU2) on both sides of PWB.
3. FG: Model with Low Leakage (the capacitances for Primary - FG reduced).
4. FO: Model with Remote Sensing, Parallel operation, Low output voltage alarm.
5. H: Model of long hold-up time. (employing electrolytic capacitor (C7) with higher capacitance)
6. RF: Model with opposite direction and air flow of Fan and different Output Derating Curve.
7. HU: Over Current Protection is Constant current limit and hiccup with automatic recovery.
8. HULNF: HU with lower speed FAN and different Output Derating Curve.

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 1.6 kg
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer’s specification of: See Enclosure Id. 7-01, 7-02, 7-03, 7-06, and 7-07
- 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 RWS600B-5] Primary - Secondary: 240 Vrms and 450 Vpk / Primary - Ground: 240 Vrms and 450 Vpk, [Model RWS600B-12] Primary - Secondary: 240 Vrms and 452 Vpk / Primary - Ground: 240 Vrms and 452 Vpk, [Model RWS600B-15] Primary - Secondary: 240 Vrms and 456 Vpk / Primary - Ground: 240 Vrms and 420 Vpk, [Model RWS600B-24, RWS600B-24/650, RWS600B-24/H650] Primary - Secondary: 242 Vrms and 466 Vpk / Primary - Ground: 242 Vrms and 466 Vpk, [Model RWS600B-36 and EVS36-16R7] Primary - Secondary: 256 Vrms and 640 Vpk / Primary - Ground: 240 Vrms and 428 Vpk, [Model RWS600B-48] Primary - Secondary: 275 Vrms and 780 Vpk /

Primary - Ground: 275 Vrms and 780 Vpk, [Model EVS57-10R6] Primary - Secondary: 277 Vrms and 728 Vpk / Primary - Ground: 240 Vrms and 432 Vpk

- The following secondary output circuits are SELV: Output of all models.
- The following secondary output circuits are at 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): T2 (Class F) for Model RWS600B-5, T2 (Class B) except for Model RWS600B-5.
- The following end-product enclosures are required: Mechanical, Electrical, Fire
- Line to Line Capacitor C1 has maximum 1.0uF for capacitance. C1: 1.0uF was used in test. Therefore, consideration shall be given to conducting Capacitance Discharge Test in the end-product 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 RWS600B-5 was tested with Output Voltage Range of 4.5 - 5.7 Vdc (maximum 500 W). Model RWS600B-12 was tested with Output Voltage Range of 10.8 - 13.8 Vdc (maximum 600 W). Model RWS600B-15 was tested with Output Voltage Range of 13.5 - 17.2 Vdc (maximum 600 W). , Model RWS600B-24 was tested with Output Voltage Range of 21.6 - 27.6 Vdc (maximum 600 W). , Model RWS600B-24/650 and RWS600B-24/H650 were tested with Output Voltage Range of 21.6 - 27.6 Vdc (maximum 648 W at input voltage condition 170V-240V, maximum 600 W at input voltage condition 110V-170V). , Model RWS600B-36 was tested with Output Voltage Range of 32.4 - 41.4 Vdc (maximum 601.2 W). , Model RWS600B-48 was tested with Output Voltage Range of 43.2 - 52.8 Vdc (maximum 600 W). , Model EVS36-16R7 was tested with Output Voltage Range of 24 - 36 Vdc (maximum 601.2 W). , Model EVS57-10R6 was tested with Output Voltage Range of 48 - 57 Vdc (maximum 604.2 W).
- The following output circuits are at ES1 energy levels : Output of all models.
- The following output circuits are at PS3 energy levels : Outputs 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

This product has two types of PWB (Type PZA-088 and Type PZA-088C).
Each PWB is identical, except for location of Thermistor (TH1), and secondary components.

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: 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.