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:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Product:	Switching Power Supply
Model:	HWS30A-3, HWS30A-5, HWS30A-12, HWS30A-15, HWS30A-24, HWS30A-48. Maybe followed by optional suffix "abcde" (a is "/", b is "HD", c is "A", d is "FG", e is "DIN"; "a", "b", "c", "d", "e" may be blank) HWS30A-3/B200V, HWS30A-5/B200V, HWS30A-12/B200V, HWS30A-15/B200V, HWS30A-24/B200V, HWS30A-48/B200V. Maybe followed by optional suffix "bde" (b is "HD", d is "FG", e is "DIN"; "b", "d", "e" may be blank)
Rating:	Input: AC100-240 V, 50-60 Hz, 0.5 A (for model HWS30A-3) and 0.7 A (for all models except for HWS30A-3) AC200-240V, 50-60 Hz, 0.35 A (for model HWS30A-3/B200V) and 0.45 A (for models HWS30A-5/B200V, HWS30A-12/B200V, HWS30A-15/B200V, HWS30A-24/B200V, and HWS30A-48/B200V)
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.

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:	Toshiyuki Suzuki / Project Handler	Reviewed By:	Masatomo Takiyama / 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

The product covered in this report is building-in type switching power supply having a single output circuit.

Output:

3.3 V (2.97 V-3.96 V), maximum 6 A (maximum 19.8 W) (for HWS30A-3 and HWS30A-3/B200V)

5 V (4.0 V-6.0 V), maximum 6 A (maximum 30.0 W) (for HWS30A-5 and HWS30A-5/B200V)

12 V (9.6 V-14.4 V), maximum 2.5 A (maximum 30.0 W) (for HWS30A-12 and HWS30A-12/B200V)

15 V (12.0 V-18.0 V), maximum 2 A (maximum 30.0 W) (for HWS30A-15 and HWS30A-15/B200V)

24 V (19.2 V-28.8 V), maximum 1.3 A (maximum 31.2 W) (for HWS30A-24 and HWS30A-24/B200V)

48 V (38.4 V-52.8 V), maximum 0.65 A (maximum 31.2 W) (for HWS30A-48 and HWS30A-48/B200V)

Model Differences

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

HWS30A Series maybe followed by suffix "abcde" (a is "/" or blank, b is "HD" or blank, c is "A" or blank, d is "FG", e is "DIN" or blank)

1. HD: Model with thin coating (QMJU2) on both component and solder side of PWB and maximum operating temperature is 71°C.

2. A: Model with metal cover.

3. FG: Model with Low Leakage (the capacitances between Primary - FG reduced).

4. DIN: Model with Din Rail Mounting Bracket.

Model HWS30A-3/B200V, HWS30A-5/B200V, HWS30A-12/B200V, HWS30A-15/B200V, HWS30A-24/B200V and HWS30A-48/B200V is identical to model HWS30A-3, HWS30A-5, HWS30A-12, HWS30A-15, HWS30A-24 and HWS30A-48 respectively, except for Input voltage rating, input terminal type, output terminal type, and some minor components.

Test Item Particulars

Mass of equipment (kg)	Approx. 0.24 Kg
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 4000 m
Altitude of test laboratory (m)	Approximately 10 to 20 m

Technical Considerations

- 1.4 The product is intended for use on the following power systems: TN
- 1.2 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.

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:

- 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 HWS30A-3, HWS30A-3/B200V were tested with output Voltage Range of 2.97 - 3.96 Vdc (maximum 19.8 W). , Model HWS30A-5, HWS30A-5/B200V were tested with output Voltage Range of 4.0 - 6.0 Vdc (maximum 30 W). , Model HWS30A-12, HWS30A-12/B200V were tested with output Voltage Range of 9.6 - 14.4 Vdc (maximum 30 W). , Model HWS30A-15, HWS30A-15/B200V were tested with output Voltage Range of 12.0 - 18.0 Vdc (maximum 30 W). , Model HWS30A-24, HWS30A-24/B200V were tested with output Voltage Range of 19.2 - 28.8 Vdc (maximum 31.2 W). , Model HWS30A-48, HWS30A-48/B200V were tested with output Voltage Range of 38.4 - 52.8 Vdc (maximum 31.2 W). , Adjustment was made via Variable Resistor (VR51).
- Unless otherwise noted, all test conducted with optional cover.
- 1.3 The end-product Electric Strength Test shall take into account the maximum working voltage of: [Model HWS30A-3, HWS30A-3/B200V] Primary - Secondary: 270Vrms, 488Vpk, Primary - Ground: 270Vrms, 488Vpk, [Model HWS30A-5, HWS30A-5/B200V] Primary - Secondary: 273Vrms, 480Vpk, Primary - Ground: 273Vrms, 480Vpk, [Model HWS30A-12, HWS30A-12/B200V] Primary - Secondary: 264Vrms, 448Vpk, Primary - Ground: 264Vrms, 448Vpk, [Model HWS30A-15, HWS30A-15/B200V] Primary - Secondary: 269Vrms, 444Vpk, Primary - Ground: 269Vrms, 444Vpk, [Model HWS30A-24, HWS30A-24/B200V] Primary - Secondary: 269Vrms, 456Vpk, Primary - Ground: 269Vrms, 456Vpk, [Model HWS30A-48, HWS30A-48/B200V] Primary - Secondary: 268Vrms, 444Vpk, Primary - Ground: 268Vrms, 444Vpk
- 1.5 The following secondary output circuits are SELV: Output of all models
- 1.7 The following secondary output circuits are at non-hazardous energy levels: Output of all models
- 1.11 The power supply terminals and/or connectors are: Suitable for factory wiring only
- 1.12 The maximum investigated branch circuit rating is: 20 A
- 1.13 The investigated Pollution Degree is: 2
- 1.15 Proper bonding to the end-product main protective earthing termination is: Required
- 1.16 An investigation of the protective bonding terminals has: Not been conducted
- 1.18 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): T1 (Class 155(F))
- 1.19 The following end-product enclosures are required: Electrical
  Fire
- The following secondary output circuits are ES1: Output of all models
- The following secondary output circuits are at PS2 energy level: Output of all models
- Line to Line Capacitor C1 may have variation in capacitance up to 0.22 uF. Therefore, consideration shall be given in controlling the capacitance value in the end-product application with respect to capacitance discharge issue.
- Line to Ground Capacitors C2 and C3 may have variations in capacitance up to 1000 pF. Primary to Ground Capacitor C4 may have variations in capacitance up to 2200pF. Therefore, consideration shall be given in controlling the capacitance values in end product application with respect to touch Current issue.
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.

Additional Information

This product has three types of PWB (Type PZA-082A, Type PZA-082C and Type PZA-082x (x=D to Z)). Difference by Type of PWB is only overvoltage protection circuit and some components (Refer to Table 1.5.1 for details).

The Clearances and Creepage Distances have additionally been assessed for suitability up to 4000 m elevation.

Unless otherwise noted, tests were performed on models without suffix "/B200V", and were considered representative.

Additional Standards

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
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.