

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	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)
<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>	HWS1800T-3, HWS1800T-5, HWS1800T-6, HWS1800T-7, HWS1800T-12, HWS1800T-15, HWS1800T-24, HWS1800T-36, HWS1800T-48, and HWS1800T-60 may be followed by /CO, /HD or /SB.
<b>Rating:</b>	3 Phase, 200-240 Vac, 50/60 Hz 4.5 A: HWS1800T-3 6.0 A: HWS1800T-5, HWS1800T-6, HWS1800T-7, HWS1800T-12, and HWS1800T-15 7.0 A: HWS1800T-24, HWS1800T-36, HWS1800T-48, and HWS1800T-60
<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.

Prepared By: Tetsuo Iwasaki / Project Handler      Reviewed By: Ikuro Kinno / 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**

These products are non-temperature dependent type component AC/DC Switching Power Supplies equipped with Fan intended for use in Information Technology Equipment.

**Model Differences**

All models are identical, except for output rating, Transformer (T201), Inductor (L401) and some components on secondary circuit (output diodes etc.) (see appended table 1.5.1).

Optional suffixes demote minor variation as follows:

The optional suffix /CO is used to identify models provided with conformal coating on Solder Side of PWB

The optional suffix /HD is used to identify models provided with conformal coating on Component Side of PWB.

The optional suffix /SB: This suffix model is identical in construction to models without the /SB suffix except that the /SB model's output terminal (+ and -) is shorter by 11.0 mm.

Maximum Output Power:

Models HWS1800T-15, HWS1800T-24, HWS1800T-36, HWS1800T-48, and HWS1800T-60 are 1800 W.

Models HWS1800T-5, HWS1800T-6, HWS1800T-7, HWS1800T-12 are 1500 W.

Model HWS1800T-3 is 990 W.

**Test Item Particulars**

Mass of equipment (kg)	approximately 3.8 kg
Equipment mobility	for building-in
Connection to the mains	N/A
Operating condition	continuous
Access location	N/A
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -15%
Tested for IT power systems	Yes
IT testing, phase-phase voltage (V)	230 V
Class of equipment	Class I (earthed)
Considered current rating of protective device as part of the building installation (A)	30 A
Pollution degree (PD)	PD 2
IP protection class	IP X0

Altitude of operation (m)	less than 2000 m
Altitude of test laboratory (m)	approximately 10 m
<b>Technical Considerations</b>	
<ul style="list-style-type: none"><li>The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of : 50°C [with 100% load of output rating] and 71°C [with 50% load of output rating] except for Models HWS1800T-3 and HWS1800T-5. See Enclosure #7-21 for details. , 40°C [with 100% load of output rating] and 71°C [with 50% load of output rating] for Models HWS1800T-3 and HWS1800T-5. See Enclosure #7-22 for details.</li></ul>	
<b>Engineering Conditions of Acceptability</b>	
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 components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : T201 (Maximum 165°C). Tma was 50°C at 100% Load, 65°C at 75% Load, 71°C at 50% Load for Models HWS1800T-6, HWS1800T-7, HWS1800T-12, HWS1800T-15, HWS1800T-24, HWS1800T-36, HWS1800T-48, and HWS1800T-60., T201 (Maximum 165°C).Tma was 40°C at 100% Load , 56°C at 75% Load, 71°C at 50% Load for Models HWS1800T-3 and HWS1800T-5.
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : 302 Vrms, 880 Vpk
- The following secondary output circuits are SELV : Output Circuit of Models HWS1800T-3, HWS1800T-5, HWS1800T-6, HWS1800T-7, HWS1800T-12, HWS1800T-15, HWS1800T-24, HWS1800T-36, and HWS1800T-48.
- The following secondary output circuits are at hazardous energy levels : Output Circuit of HWS1800T-3, HWS1800T-5, HWS1800T-6, HWS1800T-7, HWS1800T-12, HWS1800T-15, HWS1800T-24, HWS1800T-36, HWS1800T-48, and HWS1800T-60.
- The power supply terminals and/or connectors are : Suitable for factory wiring only
- The maximum investigated branch circuit rating is : 30 A
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required (via chassis)
- An investigation of the protective bonding terminals has : Been conducted (except for Protective Earth Trace Fault Test)
- 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) : T201 (Class H), T700 (Class B), L3 (RTI:130°C) and T203 (Class B). Class B of T203 is Types DA03304 and DLCT01B only. (see appended table 1.5.1)
- The following end-product enclosures are required : Mechanical, Fire, Electrical
- All tests measuring temperatures of components were conducted with the Power Supply mounted in horizontal position (Position A: Nameplate/Rating Label side up). Heating Test shall be considered in end-product.
- The output of Model HWS1800T-60 is considered HAZ/V (separated by double reinforced from PRI circuitry).
- Consideration shall be given to the Capacitance Discharge Test in end-product.
- Conformal Coating applied to PWB is used for performance purposes only. Spacings on PWBs were evaluated in accordance with tables 2H, 2J, 2K, and 2L.
- The following output circuits are at ES1 energy levels : All models' output except Model HWS1800T-60
- The following output circuits are at ES2 energy levels : Output of Model HWS1800T-60
- The following output circuits are at PS3 energy levels : All models' output
- 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.
- X-Capacitor (C1, C2, C3, and C28, C29) may have variation in capacitance up to 1.0µF and 0.22µF maximum. Therefore, consideration shall be given in controlling the capacitance value in end-product application with respect to capacitance discharge issue

#### Additional Information

##### Output Rating:

Model HWS1800T-3: 2.64 to 3.96Vdc, Maximum 300 A, Maximum 990W  
Model HWS1800T-5: 4.0 to 6.0Vdc, Maximum 300 A, Maximum 1500W  
Model HWS1800T-6: 4.8 to 7.2Vdc, Maximum 250 A, Maximum 1500W  
Model HWS1800T-7: 6.0 to 9.0Vdc, Maximum 200 A, Maximum 1500W  
Model HWS1800T-12: 9.6 to 14.4Vdc, Maximum 125 A, Maximum 1500W  
Model HWS1800T-15: 12.0 to 18.0Vdc, Maximum 100 A, Maximum 1500W  
Model HWS1800T-24: 19.2 to 28.8Vdc, Maximum 75 A, Maximum 1800W  
Model HWS1800T-36: 28.8 to 43.2Vdc, Maximum 50 A, Maximum 1800W

Model HWS1800T-48: 37.5 to 52.5Vdc, Maximum 37.5 A, Maximum 1800W  
Model HWS1800T-60: 48 to 66.0Vdcdc, Maximum 30 A, Maximum 1800W  
Note: Output ratings can be used under Tma 40°C or 50°C. See CE1.2 in Engineering Consideration for details.

**Additional Standards**

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
1.7.1 Power rating - Model	Model Number
1.7.1 Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number