

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 for building -in
Model:	HWS1000L-X /YYYYYYY, SWS1000L-X /YYYYYYY, where X can be 3, 5, 12, 15, 24, 36, 48, or 60. And, /YYYYYYY can be /RF, /RFHC, /RFCO2, /HC, /HCCO2, /CO2, /RFHCCO2, /LLF, /LLFCO2, /LNF1 (only for X is 48) or blank
Rating:	HWS1000L-X /BATz, where X can be 36 or 60. And, z can be 3 digit max which consist of 0 to 9 and/or A to Z or blank. Input: 100-240 Vac, 13A, 50/60 Hz. Output: HWS1000L-3, SWS1000L-3, +3.3Vdc, 200A; HWS1000L-5, SWS1000L-5, +5Vdc (+4Vdc - +6Vdc), 200A max; HWS1000L-12, SWS1000L-12, +12Vdc (+9.6Vdc - +14.4Vdc), 88A max; HWS1000L-15, SWS1000L-15, +15Vdc (+12Vdc - +19.5Vdc), 70A max; HWS1000L-24, SWS1000L-24, +24Vdc (+19.2Vdc - +28.8Vdc), 44A max; HWS1000L-36, SWS1000L-36, +36Vdc (+28.8Vdc - +43.2Vdc), 29A max; HWS1000L-48, SWS1000L-48, +48Vdc (+38.4Vdc - +56Vdc), 22A max; HWS1000L-60, SWS1000L-60, +60Vdc (+48Vdc - +66 Vdc), 17A max, where information in bracket indicate voltage tolerances.
Applicant Name and Address:	TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN

Issue Date: 2015-02-06
2019-02-07

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Report Reference #

E122103-A162-UL

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: Nao Maede

Reviewed by: Tetsuo Iwasaki

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

- Electronic components mounted on PWB and housed with metal enclosure;
- Provided with 2 fans operating in variable speed, which is related to ambient temperature for normal fan mode;
- Provided with 2 fans operating in fixed speed, which is independent of ambient temperature for reverse fan mode;

Model Differences

All Models are similar to each other, except the following:-

- a) Output rating;
- b) Layout;
- c) Transformer (T2) secondary winding;
- d) Model designation (refer to Additional information more designation information);

Model HWS1000L-X /YYYYYYY is identical to model SWS1000L-X /YYYYYYY except for the designation, where X can be 3, 5, 12, 15, 24, 36, 48, or 60. And, /YYYYYYY can be /RF, /RFHC, /RFCO2, /HC, /HCCO2, /CO2, /RFHCCO2, /LLF, /LLFCO2, /BATz, /LNF1 (only when X is 48) or blank.

- 1) /RF: Reverse Fan
- 2) /HC: Hiccup mode
- 3) /CO2: Carbon coating
- 4) /LLF: Long Life Fan
- 5) /BATz: For power up batteries
- 6) /LLFCO2: Long Life Fan and Carbon coating
- 7) /LNF1 : Low Noise Fan

Model HWS1000L-36 /BATz and HWS1000L-60 /BATz are identical to basic model except for the designation (z = 3 digit max which consist of 0 to 9 and/or A to Z or blank for marketing purpose).

The OCP setting for all models except /BATz model maybe adjusted from 30% - 100% of the rated current and OCP adjustment can only be adjusted by factory. Additional evaluation may be required during end product evaluation.

The OCP setting for /BATz model maybe adjusted from 30% - 100% of the rated current and OCP adjustment can only be adjusted by factory personnel or TDK-Lambda appointed service person when installed into end product. Additional evaluation may be required during end product evaluation.

The PCB maybe additionally coated (not evaluated to clause 2.10.6.2 - Coated Printed Boards).

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : for building-in
- Operating condition : continuous
- Access location : operator accessible
- 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) : NA

- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 20
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : Up to 3000
- Altitude of test laboratory (m) : Up to 2000
- Mass of equipment (kg) : < 18 (2.3kg)
- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: T_{ma} for Power Supply with Normal Fan Mode configuration is 50°C; while T_{ma} for Power Supply with Reverse Fan Mode configuration is 35°C. See Enclosure Miscellaneous id.7-05 for Models HWS1000L-48/LNF1, and SWS1000L-48/LNF1.
- The product is intended for use on the following power systems: TN
- The following are available from the Applicant upon request: Instructions / Manual

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 following Production-Line tests are conducted for this product: Earthing Continuity, Electric Strength,
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 234 Vrms, 333Vpk, Primary-SELV: 433 Vrms, 617 Vpk
- The following secondary output circuits are SELV: +3.3Vdc for SWS/HWS1000L-3; , +4Vdc - +6Vdc for SWS/HWS1000L-5; , +9.6Vdc - +14.4Vdc for SWS/HWS1000L-12; , +12Vdc - +19.5Vdc for SWS/HWS1000L-15; , +19.2Vdc - +28.8Vdc for SWS/HWS1000L-24; , +28.8Vdc - +43.2Vdc for SWS/HWS1000L-36; , +38.4Vdc - +56Vdc for SWS/HWS1000L-48.
- The following secondary output circuits are at hazardous energy levels: +3.3Vdc for SWS/HWS1000L-3; , +4Vdc - +6Vdc for SWS/HWS1000L-5; , +9.6Vdc - +14.4Vdc for SWS/HWS1000L-12; , +12Vdc - +19.5Vdc for SWS/HWS1000L-15; , +19.2Vdc - +28.8Vdc for SWS/HWS1000L-24; , +28.8Vdc - +43.2Vdc for SWS/HWS1000L-36; , +38.4Vdc - +56Vdc for SWS/HWS1000L-48; , +48Vdc - +66Vdc for SWS/HWS1000L-60.
- The following output terminals were referenced to earth during performance testing: Transformer T2 (pin 11, 13, 14) and T4 (pin 1, pin 4)
- 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: Been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral: Terminal Block TB1 (pin3)
- 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 T2 (Class 155(F)), Transformer T4 (Class 155 (F))
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The maximum continuous power supply output (Watts) relied on forced air cooling from: 1300 W fan (B1 and B2) at 27.5 cfm applied to rear end power supply.

- Terminal Block (TB1) was not evaluated as terminal block for direct connecting of power supply cord.
- Normal FAN mode configuration is evaluated at ambient of up to 50°C at 100% loading condition declared by manufacturer.
- Reverse FAN mode configuration is evaluated at ambient of up to 35°C at 100% loading condition declared by manufacturer.
- Upper limit of HWS/SWS1000L-60 is maximum at 66Vdc. Additional consideration is required for accessibility to the output voltage of this model, and appropriate segregation/insulation of the hazardous output voltage is required during end product evaluation. Otherwise, step down transformer or electronic circuit is required to reduce the voltage to SELV limits for accessible connection
- 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.
- The fans included as part of this component are suitable for use in a user access area: No
- Fans: The fan provided in this sub-assembly is not intended for operator access.
- 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.
- The following output circuits are at ES1 energy levels : +3.3Vdc for SWS/HWS1000L-3; +4Vdc - +6Vdc for SWS/HWS1000L-5; +9.6Vdc - +14.4Vdc for SWS/HWS1000L-12; +12Vdc - +19.5Vdc for SWS/HWS1000L-15; +19.2Vdc - +28.8Vdc for SWS/HWS1000L-24; +28.8Vdc - +43.2Vdc for SWS/HWS1000L-36; +38.4Vdc - +56Vdc for SWS/HWS1000L-48
- The following output circuits are at ES2 energy levels : +48Vdc - +66Vdc for SWS/HWS1000L-60.
- The following output circuits are at PS3 energy levels : +3.3Vdc for SWS/HWS1000L-3; +4Vdc - +6Vdc for SWS/HWS1000L-5; +9.6Vdc - +14.4Vdc for SWS/HWS1000L-12; +12Vdc - +19.5Vdc for SWS/HWS1000L-15; 19.2Vdc - +28.8Vdc for SWS/HWS1000L-24; +28.8Vdc - +43.2Vdc for SWS/HWS1000L-36; +38.4Vdc - +56Vdc for SWS/HWS1000L-48; +48Vdc - +66Vdc for SWS/HWS1000L-60

Additional Information

This Report was transferred from file E252373-A4 under Project:2237442.532078.

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

EUT consists of the following:

<Configuration_1>:

Transformer T4: 50T-6014B (Insulation System Class 130(B)) (NOTE)

DC Fan: 9A0612G4D041

<Configuration_2>:

Transformer T4: 50T-6014E (Insulation System Class 155(F)) (NOTE)

DC Fan: 9A0612G4D041

<Configuration_3>:

Transformer T4: PA57805_ (Insulation System Class 155(F))

DC Fan: 9A0612G4D041

<Configuration_4>:

Transformer T4: PA57805_ (Insulation System Class 155(F))
DC Fan: 109L0612G4DXX

During the tests, OCP rating was set for Models SWS1000L-38 /BATz and SWS1000L-60 /BATz to "55%~100%", for other standard models to "30%~100%".

<Configuration_5>:

Transformer T4: PA57805_ (Insulation System Class 155(F))
DC Fan: 109L0612G4DXX

During the tests, output voltage adjustment within voltage range were considered.

(NOTE)

The following transformers are not currently used due to client's request. However, information is included in the report as a reference for use in engineering consideration. Refer to Enclosure Ids. 4-02, 4-15, 4-16 for the difference of each transformer.

- Transformer T4: 50T-6014B
- Transformer T4: 50T-6014E

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: 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
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
1.7.6 Fuses - Rating	Rated current and voltage and type located on or adjacent to fuse or fuseholder.
4.5.4 Marking of hot parts	Parts inside the equipment that are hot and may be touched are marked with
1.7.7.2 Terminals for external primary power supply conductors	Capital letter "N" located adjacent to a terminal intended exclusively for connection of the primary power neutral conductor

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1.7.1 Power rating - Model	Model Number
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