



Test Report issued under  
the responsibility of:



**TEST REPORT**  
**IEC 60950-1**  
**Information technology equipment - Safety -**  
**Part 1: General requirements**

**Report Reference No** .....: E122103-A138-CB-2

Date of issue .....: 2015-06-25

Total number of pages .....: 91

**CB Testing Laboratory** .....: UL Japan, Inc.

Address .....: 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan

**Applicant's name** .....: TDK-LAMBDA CORP  
NAGAOKA TECHNICAL CENTER

Address .....: R&D DIV  
2704-1 SETTAYA-MACHI  
NAGAOKA-SHI  
NIIGATA 940-1195 JAPAN

**Test specification:**

Standard .....: IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013

Test procedure .....: CB Scheme

Non-standard test method .....: N/A

**Test Report Form No.** .....: IEC60950\_1F

Test Report Form originator .....: SGS Fimko Ltd

Master TRF .....: Dated 2014-02

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**General disclaimer**

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Test item description .....	Switching Power Supply
Trade Mark .....	<b>TDK-Lambda</b>
Manufacturer .....	TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN
Model/Type reference .....	HWS80A-3, HWS80A-5, HWS80A-12, HWS80A-15, HWS80A-24, HWS80A-48  HWS100A-3, HWS100A-5, HWS100A-12, HWS100A-15, HWS100A- 24, HWS100A-48.  Maybe followed by suffix "abcde" (a is /, b is HD, c is R, d is A, B or AB, e is FG, DIN; and "abcde" may be blank)
Ratings .....	Input: AC100-240 V, 50-60 Hz  0.8A (for model HWS80A-3) 1.1A (for all HWS80A series except for HWS80A-3) 1.0 A (for model HWS100A-3) 1.4 A (for all HWS100A series except for HWS100A-3)

<b>Testing procedure and testing location:</b>	
<input checked="" type="checkbox"/> <b>CB Testing Laboratory</b>	Testing location / address .....: UL Japan, Inc. 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan
<input type="checkbox"/> <b>Associated CB Test Laboratory</b>	Testing location / address .....:
	Tested by (name + signature) .....: Tetsuo Iwasaki
	Approved by (name + signature).....: Masatomo Takiyama
	<i>T. Iwasaki</i>
	<i>M. Takiyama</i>
<input type="checkbox"/> <b>Testing Procedure: TMP/CTF Stage 1</b>	Testing location / address .....:
	Tested by (name + signature) .....:
	Approved by (name + signature).....:
<input type="checkbox"/> <b>Testing Procedure: WMT/CTF Stage 2</b>	Testing location / address .....:
	Tested by (name + signature) .....:
	Witnessed by (name + signature) ...:
	Approved by (name + signature).....:
<input type="checkbox"/> <b>Testing Procedure: SMT/CTF Stage 3 or 4</b>	Testing location / address .....:
	Tested by (name + signature) .....:
	Approved by (name + signature).....:
	Supervised by (name + signature) ..:
<input type="checkbox"/> <b>Testing Procedure: RMT</b>	Testing location / address .....:
	Tested by (name + signature) .....:
	Approved by (name + signature).....:
	Supervised by (name + signature) ..:

<b>List of Attachments</b>	
National Differences (27 pages)	
Enclosures (56 pages)	
<b>Summary Of Testing</b>	
Unless otherwise indicated, all tests were conducted at UL Japan, Inc. 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan.	
<b>Tests performed (name of test and test clause)</b>	<b>Testing location / Comments</b>
Input: Polyphase (1.6.2)	

Energy Hazard Measurements (2.1.1.5, 2.1.2, 1.2.8.10)

Capacitance Discharge (2.1.1.7)

Measurement was not conducted. Time constant was calculated.

SELV Reliability Test Including Hazardous Voltage Measurements (2.2.2, 2.2.3, 2.2.4, Part 22 6.1)

Protective Bonding II (2.6.3.4, 2.6.1)

Humidity (2.9.1, 2.9.2, 5.2.2)

40±2°C, 93±2%, 120hours.

Determination of Working Voltage; Working Voltage Measurement (2.10.2)

Thin Sheet Material (2.10.5.9, 2.10.5.10, 2.10.5.6)

Transformer and Wire /Insulation Electric Strength (2.10.5.13)

Heating (4.5.1, 1.4.12, 1.4.13)

Ball Pressure (4.5.5, 4.5)

Touch Current (Single-Phase; TN/TT System) (5.1, Annex D)

Electric Strength (5.2.2)

Component Failure (5.3.1, 5.3.4, 5.3.7)

Abnormal Operation (5.3.1 - 5.3.9)

Transformer Abnormal Operation (5.3.3, 5.3.7b, Annex C.1)

Power Supply Output Short-Circuit/Overload (5.3.7)

ANNEX C.1-Transformer Abnormal Operation Test was considered representative of this test.

#### Summary of Compliance with National Differences:

Countries outside the CB Scheme membership may also accept this report.

List of countries addressed: CA, DE, DK, EU, FI, GB, KR, SE, SI, US

The product fulfills the requirements of: EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

**Copy of Marking Plate** - Refer to Enclosure titled Marking Plate for copy.

<b>Test item particulars :</b>	
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
Mass of equipment (kg) .....	approximately 0.47 kg
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object .....	N / A
- test object does meet the requirement .....	P(Pass)
- test object does not meet the requirement .....	F(Fail)
<b>Testing:</b>	
Date(s) of receipt of test item .....	2013-05-14, 2013-05-16, 2013-05-23, 2013-06-06, 2013-08-09, 2013-08-21, 2013-09-03, 2014-03-14
Date(s) of Performance of tests .....	2013-06-11 to 2013-06-28, 2013-07-02 to 2013-07-19, 2013-08-22 to 2013-09-09, 2014-03-14 to 2014-04-25
<b>General remarks:</b>	
"(see Enclosure #)" refers to additional information appended to the report.	
"(see appended table)" refers to a table appended to the report.	
Throughout this report a point is used as the decimal separator.	
<b>Manufacturer's Declaration per Sub Clause 4.2.5 of IEC 60950-1:</b>	
The application for obtaining a CB Test Certificate includes more than one factory and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided .....	
When differences exist, they shall be identified in the General Product Information section.	
<b>Name and address of Factory(ies):</b>	WUXI TDK-LAMBDA ELECTRONICS CO LTD NO 6 XING CHUANG ER LU WUXI JIANGSU 214028 CHINA  TDK-LAMBDA MALAYSIA SDN BHD

PLO33 KAWASAN PERINDUSTRIAN SENAI 81400 SENAI  
MALAYSIA

TDK-LAMBDA MALAYSIA SDN BHD  
LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR  
BARU JAYA GADING 26070 KUANTAN MALAYSIA

TDK-LAMBDA CORP  
2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA-KEN 940-  
1195 JAPAN

SENDAN ELECTRONICS MFG CO LTD  
1010 HABUSHIN NANTO-SHI TOYAMA-KEN 939-1756 JAPAN

ZHANGJIAGANG HUA YANG ELECTRONICS CO LTD  
TONGXIN RD ZHAOFENG ECONOMIC DEVELOPMENT ZONE  
LEYU TOWN ZHANGJIAGANG 215622 JIANGSU CHINA

ALPS LOGISTICS FACILITIES CO LTD  
593-1 NISHI-OHASHI  
TSUKUBA-SHI  
IBARAKI-KEN 305-0831 JAPAN

## GENERAL PRODUCT INFORMATION:

### Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

### Product Description

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

#### Output:

3.3 V (2.97-3.96), maximum 16 A (maximum 52.8W) (for HWS80A-3),  
5 V (4.0-6.0V), maximum 16 A (Maximum 80.0W) (for HWS80A-5),  
12 V (9.6-14.4V), maximum 6.7 A (Maximum 80.4W) (for HWS80A-12),  
15 V (12.0-18.0V), maximum 5.4 A (Maximum 81.0W) (for HWS80A-15),  
24 V (19.2-28.8V), maximum 3.4 A (Maximum 81.6W) (for HWS80A-24),  
48 V (38.4-52.8V), maximum 1.7 A (Maximum 81.6W) for HWS80A-48),  
3.3 V (2.97V-3.96V), maximum 20 A (maximum 66W) (for HWS100A-3),  
5 V (4.0V-6.0V), maximum 20 A (maximum 100W) (for HWS100A-5),  
12 V (9.6V-14.4V), maximum 8.5 A (maximum 102W) (for HWS100A-12),  
15 V (12.0V-18.0V), maximum 7.0 A (maximum 105W) (for HWS100A-15),  
24 V (19.2V-28.8V), maximum 4.5 A (maximum 108W) (for HWS100A-24),  
48 V (38.4V-52.8V), maximum 2.1 A (maximum 100.8W) (for HWS100A-48)

### Model Differences

#### HWS100A Series:

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

Standard model is Terminal Block model without cover.

And HWS100A Series maybe followed by suffix "abcde" (a is /, b is HD, c is R, d is A, B or AB, e is FG, DIN; and "abcde" may be blank)

1. HD: Model with optional Thin coating (QMJU2) on both component and solder side of PWB and maximum operating temperature is 71°C.
2. R: Model with optional ON/OFF control function.
3. A: Model with metal cover.
4. B: Model with optional input connector instead of terminal block
5. AB: Model with metal cover and optional input connector instead of terminal block.
6. FG: Model with Low Leakage (the capacitances for Primary - FG reduced).
7. DIN: Model with DinRail Mounting Bracket.

HSW80A Series:

Model HWS80A Series is identical to Model HWS100A series except for model designation, input current rating, output rating, temperature derating, inductors (L1, L2), Diode Bridge (D1) and FET (Q1).

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

Standard model is Terminal Block model without cover.

And HWS80A Series maybe followed by suffix "abcde" (a is /, b is HD, c is R, d is A, B or AB, e is FG, DIN; and "abcde" may be blank)

1. HD: Model with optional Thin coating (QMJU2) on both component and solder side of PWB and maximum operating temperature is 71°C.
2. R: Model with optional ON/OFF control function.
3. A: Model with metal cover.
4. B: Model with optional input connector instead of terminal block
5. AB: Model with metal cover and optional input connector instead of terminal block.
6. FG: Model with Low Leakage (the capacitances for Primary - FG reduced).
7. DIN: Model with DinRail Mounting Bracket.

### **Additional Information**

This report is a re-issued report of CB Test Report Ref. No. E122103-A138-CB-1 (Amendment 1) due to following modification.

- Upgrade Standard.

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

UL94 Standard has requirements that meet or exceed the relevant IEC requirements.

### **Technical Considerations**

- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A12:2010 + A12:2011 + A2:2013 (which includes all European national differences, including those specified in this test report).
- 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 Ids. 7-01 and 7-05. --
- The product is intended for use on the following power systems: TN --

### **Engineering Conditions of Acceptability**

When installed in an end-product, consideration must be given to the following:

- Line to Line Capacitor C1 has maximum 0.68 uF for capacitance. C1: 0.68uF was used in test. Therefore, consideration shall be given in conducting Discharge Test in the end product application with respect to the variation in C1. --
- Lines to ground Capacitors C2, C3 have maximum 2200pF for capacitance. Primary to ground Capacitor C8 has maximum 2200pF for capacitance. C2, C3 and C8: 2200pF 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. (for USA/Canada) --
- Model HWS80A-3 was tested with output Voltage Range of 2.97 - 3.96 Vdc (maximum 52.8 W). , Model HWS80A-5 was tested with output Voltage Range of 4.0 - 6.0 Vdc (maximum 80 W). , , Model HWS80A-12 was tested with output Voltage Range of 9.6 - 14.4 Vdc (maximum 80.4 W). , Model HWS80A-15 was tested with output Voltage Range of 12.0 - 18.0 Vdc (maximum 81.0 W). , Model HWS80A-24 was tested with output Voltage Range of 19.2 - 28.8 Vdc (maximum 81.6 W). , Model HWS80A-48 was tested with output Voltage Range of 38.4 - 52.8 Vdc (maximum 81.6 W). , Model HWS100A-3 was tested with output Voltage Range of 2.97 - 3.96 Vdc (maximum 66 W). , Model HWS100A-5 was tested with output Voltage Range of 4.0 - 6.0 Vdc (maximum 100 W). , Model HWS100A-12 was tested with output Voltage Range of 9.6 - 14.4 Vdc (maximum 102 W). , Model HWS100A-15 was tested with output Voltage Range of 12.0 - 18.0 Vdc (maximum 105 W). , Model HWS100A-24 was tested with output Voltage Range of 19.2 - 28.8 Vdc (maximum 108 W). , Model HWS100A-48 was tested with output Voltage Range of 38.4 - 52.8 Vdc (maximum 100.8 W). , Adjustment was made via Variable Resistor (VR51). --
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: [Model HWS80A-3] Primary - Secondary: 234Vrms, 458Vpk, Primary - Ground: 232Vrms, 454Vpk, [Model HWS80A-5] Primary - Secondary: 241Vrms, 446Vpk, Primary - Ground: 240Vrms, 442Vpk, [Model HWS80A-12] Primary - Secondary: 255Vrms, 456Vpk, Primary - Ground: 252Vrms, 454Vpk, [HWS80A-15] Primary - Secondary: 254Vrms, 456Vpk, Primary - Ground: 249Vrms, 456Vpk, [Model HWS80A-24] Primary - Secondary: 264Vrms, 480Vpk, Primary - Ground: 256Vrms, 470Vpk, [Model HWS80A-48] Primary - Secondary: 284Vrms, 612Vpk, Primary - Ground: 258Vrms, 456Vpk, [Model HWS100A-3] Primary - Secondary: 223Vrms, 412Vpk , Primary - Ground: 219Vrms, 428Vpk , [Model HWS100A-5] Primary - Secondary: 228Vrms, 428Vpk , Primary - Ground: 235Vrms, 432Vpk , [Model HWS100A-12] Primary - Secondary: 238Vrms, 448Vpk , Primary - Ground: 245Vrms, 432Vpk , [Model HWS100A-15] Primary - Secondary: 243Vrms, 412Vpk , Primary - Ground: 234Vrms, 436Vpk , [Model HWS100A-24] Primary - Secondary: 260Vrms, 500Vpk , Primary - Ground: 260Vrms, 434Vpk , [Model HWS100A-48] Primary - Secondary: 285Vrms, 620Vpk , Primary - Ground: 265Vrms, 464Vpk --
- 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): T2 (Class F) --

- The following end-product enclosures are required: Electrical, Fire --

Abbreviations used in the report:

- normal condition .....	N.C.	- single fault condition .....	S.F.C
- operational insulation .....	OP	- basic insulation .....	BI
- basic insulation between parts of opposite polarity:	BOP	- supplementary insulation .....	SI
- double insulation .....	DI	- reinforced insulation .....	RI

Indicate used abbreviations (if any)