Test Report issued under the responsibility of:

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

Report Reference No ..... :	3229510
Date of issue ..... :	2016-09-09
Total number of pages ..... :	9
CB Testing Laboratory ..... :	UL Japan, Inc.
Address ..... :	4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan
Applicant's name ..... :	TDK-LAMBDA CORP
Address ..... :	NAGAOKA TECHNICAL CENTER 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

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Switching Power Supply
Trade Mark ..... :	TDK·Lambda or TDK·Lambda
Manufacturer ..... :	TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN
Model/Type reference ..... :	HWS600-adefg HWS600-42/DS HWS600-48/PVLNF HWS600P-bdefg HWS600PCN-cdefg Suffixes, a = 3, 5, 12, 15, 24, 48 or 55. b = 24, 36 or 48 c = 24 or 30 d = / or blank. e = PV or blank f = CO, HD or blank g = LLF or blank
Ratings ..... :	Input: AC 100-240 V, 50/60 Hz, 8.2 A for models HWS600- adefg, HWS600-42/DS, HWS600-48/PVLNF 8.7 A for models HWS600P- bdefg, HWS600PCN- cdefg Output: HWS600-3defg DC 3.3V (DC 2.64-3.96V), 120 A (max. 396 W) HWS600-5defg DC 5V (DC 4.0-6.0V), 120 A (max. 600 W) HWS600-12defg DC 12V (DC 9.6-14.4V), 53A (max. 636 W) HWS600-15defg DC 15V (DC 12.0-18.0V), 43A (max. 645 W) HWS600-24defg DC 24V (DC 19.2-28.8V), 27A (max. 648 W) HWS600-48defg DC 48V (DC 38.4-52.8V), 13A (max. 624 W) HWS600-55defg DC 55V (DC 44.0-56.0V), 11A (max. 605 W) HWS600-42/DS DC 42V (DC 38.4 – 46.2V), 13A (max. 646 W) HWS600-48/PVLNF DC 48V (DC 9.6-52.8V), 13A (max. 624W) HWS600P-24 HWS600PCN-24 DC 24V (DC 19.2-28.8V), 25A (max. 600 W) also following peak output applied: peak current 40.5A (max. 972W) for AC 100-170V input, peak current 83A (max.1992W) for AC 170-240V input, max. 5 sec., Max. duty 35% HWS600PCN-30 DC 30V (DC 24.0-36.0V), 20A (max. 600 W) also following peak output applied:

peak current 24.24A (max. 800W) for AC 100-170V input,
peak current 66A (max.1980W) for AC 170-240V input,
max. 5 sec., Max. duty 35%

HWS600P-36 DC 36V (DC 28.8-39.6V), 16.7A (max. 601.2 W)
also following peak output applied:
peak current 27A (max. 972W) for AC 100-170V input,
peak current 55.5A (max.1998W) for AC 170-240V input,
max. 5 sec., Max. duty 35%

HWS600P-48 DC 48V (DC 38.4-52.8V), 12.5A (max. 600 W)
also following peak output applied:
peak current 20A (max. 960W) for AC 100-170V input,
peak current 41.5A (max.1992W) for AC 170-240V input,
max. 5 sec., Max. duty 35%

Testing procedure and testing location:			
[X]	**CB Testing Laboratory**		
	Testing location / address ..... :	UL Japan, Inc. 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan	
[ ]	**Associated CB Test Laboratory**		
	Testing location / address ..... :		
	Tested by (name + signature) ..... :	Ayano Matsumoto, Project Handler	A. Matsumoto
	Approved by (name + signature) ... :	Tetsuo Iwasaki, Reviewer	Tetsuo Iwasaki
[ ]	**Testing Procedure: TMP/CTF Stage 1**		
	Testing location / address ..... :		
	Tested by (name + signature) ..... :		
	Approved by (name + signature) ... :		
[ ]	**Testing Procedure: WMT/CTF Stage 2**		
	Testing location / address ..... :		
	Tested by (name + signature) ..... :		
	Witnessed by (name + signature) .. :		
	Approved by (name + signature) ... :		
[ ]	**Testing Procedure: SMT/CTF Stage 3 or 4**		
	Testing location / address ..... :		
	Tested by (name + signature) ..... :		
	Approved by (name + signature) ... :		
	Supervised by (name + signature) . :		
[ ]	**Testing Procedure: RMT**		
	Testing location / address ..... :		
	Tested by (name + signature) ..... :		
	Approved by (name + signature) ... :		
	Supervised by (name + signature) . :		

List of Attachments

National Differences (0 pages)
Enclosures (0 pages)

Summary Of Testing

No tests were conducted.

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 Original Enclosure titled Marking Plate for copy.

Test item particulars :		
Equipment mobility	:	for building-in
Connection to the mains	:	not directly connected to the mains
Operating condition	:	continuous
Access location	:	restricted access location
Over voltage category (OVC)	:	OVC II
Mains supply tolerance (%) or absolute mains supply values	:	±10%
Tested for IT power systems	:	Yes
IT testing, phase-phase voltage (V)	:	230V (for Norway)
Class of equipment	:	Not classified, Class I construction
Considered current rating of protective device as part of the building installation (A)	:	B/I, Not considered.
Pollution degree (PD)	:	PD 2
IP protection class	:	IPX0
Altitude of operation (m)	:	≤ 2000 m
Altitude of test laboratory (m)	:	< 1000 m
Mass of equipment (kg)	:	1.5kg (approx.)
Possible test case verdicts:		
- 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)
Testing:		
Date(s) of receipt of test item	:	N/A
Date(s) of Performance of tests	:	N/A

General remarks:

"(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.

Manufacturer's Declaration per Sub Clause 4.2.5 of IECEE 02:

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 ..... Yes

When differences exist, they shall be identified in the General Product Information section.

Name and address of Factory(ies):

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

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

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

Wuxi TDK-Lambda Electronics Co Ltd
NO 6
XING CHUANG ER LU
WUXI
JIANGSU 214028 CHINA

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
JIANGSU 215622 CHINA

GENERAL PRODUCT INFORMATION:

Report Summary

This test report is only valid in conjunction with CB Test Report Ref. No. 4786910622-2, dated 2015-08-03, No. 4787335639, dated 2016-03-03 and No. 4787590195, dated 2016-09-06 CB Test Certificate Ref. No. JP-12585-UL, JP-12585-A1-UL and JP-12585-A2-UL for the following correction.

Correction 1:
- Correction of suffix g
  [From] LFF
  [To] LLF

Product Description

The product is a switching power supply intended for building in to an end product.

Model Differences

HWS600 series are identical except for output rating, winding of Transformer T32, and minor components. HWS600P series are identical to HWS600 series except for overcurrent protection circuits, fan speed control circuits, peak output condition, major components (see Table 1.5.1) and minor components (not

safety relevant).
HWS600P series are identical each other except for output rating, winding of Transformer T32, and minor components
HWS600PCN-24 is identical to HWS600P-24 except for model name, PCB type name, input and output terminal.
HWS600PCN-30 is identical to HWS600P-24 except for Transformer T32, type B02311x which is identical to type A23215x except for one (1) turn of both primary and secondary windings and model name.
HWS600-48/PVLNF is identical to HWS600-48/PV except for model name, Fan (lower speed) and output derating curve.

Definition of variable(s):

Variable:	Range of variable:	Content:
a	3, 5, 12, 15, 24, 48, 55	Output voltage of HWS600 series
b	24, 36, 48	Output voltage of HWS600P series
c	24, 30	Output voltage of HWS600PCN series
d	/ or blank.	For all series
e	PV or blank.	Programming voltage setting. Output is 20% of rated voltage at 1Vdc in signal terminal, 120% rated voltage at 6Vdc in signal terminal.
f	CO, HD or blank.	CO: thin coating on solder side of PWB. HD: thin coating on the both sides of PWB and max. operating temperature is 71°C.
g	LLF or blank.	Use Long Life Fan
--	/DS	Only for Model HWS600-42, not safety relevant, use for sales purpose only.

Unless otherwise stated, tests were conducted on models HWS600-5, -12, -24, -48, -55 and HWS600P-24, -36, -48 and HWS600PCN-30 are considered to represent the worst case condition the respective tests.

Additional Information

Abbreviations used in the report.
- built-in application: B/I

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50°C (100% Load), 70°C (50% Load) except for Model HWS600-48/PVLNF. 35°C (100% Load), 60°C (50% Load) for Model HWS600-48/PVLNF
- The product is intended for use on the following power systems: TN
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 (which includes all European national differences, including those specified in this test report).

Engineering Conditions of Acceptability

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: max working voltage: 632 Vpk

- The following secondary output circuits are SELV: All output
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- The maximum investigated branch circuit rating is: 16 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): T31 (Class E), T32 (Class F), T33 (Class E)
- The following end-product enclosures are required: Fire, Electrical

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)