Test Report issued under the responsibility of:

TEST REPORT

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

Report Number. .....:	1510045STO-001
Date of issue .....:	25 September 2015
Total number of pages.....	106 pages
Applicant's name.....:	TDK-Lambda Corporation
Address .....:	2704-1 Settaya-machi, Nagaoka-shi, Niigata, 940-1195 JAPAN
Test specification:	
Standard .....:	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
Test procedure .....:	CB Scheme
Non-standard test method .....:	N/A
Test Report Form No.....:	IEC60950_1F
Test Report Form(s) Originator ....:	SGS Fimko Ltd
Master TRF.....:	Dated 2014-02

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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.

TEST REPORT issued by an Accredited Testing Laboratory. Accredited by Swedac, no 1003, ISO/IEC 17025.

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 .....:	DC-DC converters
Trade Mark .....:	**TDK-Lambda**
Manufacturer.....:	TDK-Lambda Corporation
Model/Type reference .....:	PH300S280-**/***, PH600S280-**/*** (see also "*Models*" page 4)
Ratings .....:	200–400V⎓ (see also "*Models*" page 4)

Testing procedure and testing location:			
☒	**CB Testing Laboratory:**	**Intertek Semko AB**	
Testing location/ address ..... :		Torshamnsgatan 43, P.O. Box 1103, SE-164 22 Kista, SWEDEN	
☐	**Associated CB Testing Laboratory:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :		Bedran Nergiz	
Approved by (name + signature) ..... :		Anna Karin Cedergren	
☐	**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)..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
Supervised by (name + signature)..... :			

Summary of testing:	
Tests performed (name of test and test clause): See test report	**Testing location:** See page 2

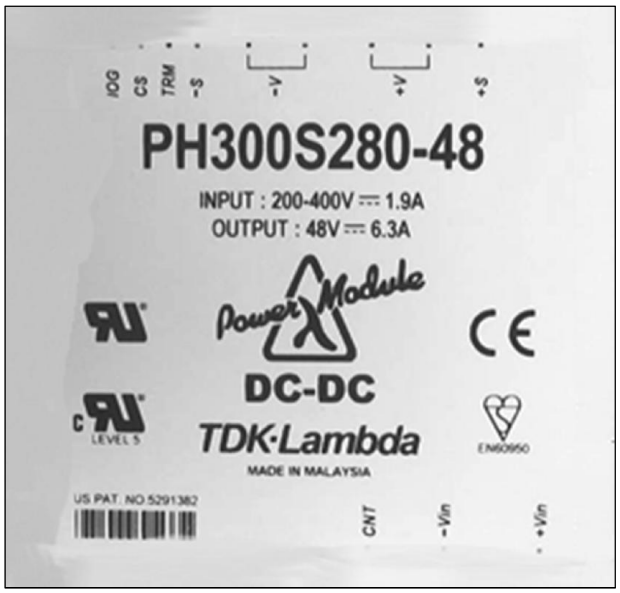
Summary of compliance with National Differences:

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

Group- and national differences for the CENELEC countries have been considered during the testing.

Copy of marking plate: (example)

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Models included within the scope of this report				
Model	Input, DC		Output, DC	
-	V	A_{max}	V	A_{max}
PH300S280-3.3	200-400	1.9	3.3	50
PH300S280-5	200-400	1.9	5	50
PH300S280-12	200-400	1.9	12	25
PH300S280-15	200-400	1.9	15	20
PH300S280-24	200-400	1.9	24	12.5
PH300S280-28	200-400	1.9	28	10.8
PH300S280-48	200-400	1.9	48	6.3
PH300S280-48/HKM	200-400	1.9	48	6.3
PH300S280-48/EM	200-400	1.9	48	7.9
PH600S280-3.3	200-400	3.8	3.3	100
PH600S280-5	200-400	3.8	5	100
PH600S280-12	200-400	3.8	12	50
PH600S280-12/WE	200-400	3.8	12	50
PH600S280-15	200-400	3.8	15	40
PH600S280-15/WE	200-400	3.8	15	40
PH600S280-24	200-400	3.8	24	25
PH600S280-24/WE	200-400	3.8	24	25
PH600S280-28	200-400	3.8	28	21.5
PH600S280-28/WE	200-400	3.8	28	21.5
PH600S280-28/33	200-400	3.8	33	18.24
PH600S280-48	200-400	3.8	48	12.5
PH600S280-48/WE	200-400	3.8	48	12.5
PH600S280-48/EM	200-400	3.8	48	12.5
PH600S280-48/HKM	200-400	3.8	48	12.5
All models may also be marked with /PI after the output voltage marking. The /PI difference being that the corner studs are not threaded and for the standard models the studs are threaded. All models may include suffix /T, corner studs are not threaded with an inside diameter of 0.1mm less than standard model.				

Test item particulars.....:	
Equipment mobility.....:	[] movable [] hand-held [] transportable [] stationary [x] for building-in [] direct plug-in
Connection to the mains.....:	[] pluggable equipment [] type A [] type B [x] permanent connection [] detachable power supply cord [] non-detachable power supply cord [] not directly connected to the mains
Operating condition.....:	[x] continuous [] rated operating / resting time:
Access location .....:	[] operator accessible [] restricted access location [x] for building into a host equipment
Over voltage category (OVC) .....:	[] OVC I [x] OVC II [] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values .....:	Not applicable, Voltage range 200-400Vdc.
Tested for IT power systems .....:	[] Yes [x] No
IT testing, phase-phase voltage (V) .....:	N/A
Class of equipment .....:	[x] Class I [] Class II [] Class III [] Not classified
Considered current rating of protective device as part of the building installation (A) .....:	16
Pollution degree (PD) .....:	[] PD 1 [x] PD 2 [] PD 3
IP protection class .....:	IPX0
Altitude during operation (m) .....:	<2000
Altitude of test laboratory (m) .....:	<2000
Mass of equipment (kg) .....:	<0.250
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.....:	See "*General remarks*" below
Date of receipt of test item.....:	-
Date (s) of performance of tests.....:	-
General remarks:	

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

The test results and all data in this report are derived from previously issued Test Report No. 1017226 dated 4 August 2010, and Test Report No. 1218111 dated 23 August 2012, and Test Report No.1109903 dated 4 February 2011 issued by Intertek Semko AB. A new report has been issued due to update of the standard IEC 60950-1, to include Am 2: 2013.

No additional test has been conducted.

Throughout this report a ☐ comma / ☒ 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 location 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 ☐ Not applicable
When differences exist; they shall be identified in the "*General product information"* section.	
Name and address of factories..... :	TDK-Lambda (Malaysia) Sdn. Bhd. PLO33 Locked Bag No. 110 Kawasan Perindustrian Senai 81400 Senai Johor, Darul Takzim, **MALAYSIA** TDK-Lambda Corporation Nagaoka Technical Center 2704-1 Settaya-machi, Nagaoka, Niigata 940-1195 **JAPAN** Wuxi TDK-Lambda Electronics Co., Ltd. No.6 Xing Chuang Er lu Wuxi Jiangsu, 214028 **CHINA**

Abbreviations used in the report:

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

Indicate used abbreviations (if any)

This Test Report replaces previously issued, see table below.

REVISION TABLE

Date	Report ref.	Clause	Modification of the appliance
25 Sept. 2015	1510045STO-001	-	Basic Test Report

General Product Information:

a) Test results in this report are based on the previously issued test reports from BSI with ref. Nos. 249/4925050/1 of 5. Based on reports from SET Laboratory with report number SMTN0137. A new test report has been issued due to the upgrade of test standard and some minor editorial modifications.

b) These products shall be installed in accordance with the requirements of IEC 60950-1, EN 60950-1 for the end use application. The DC to DC converters were tested with the heat sink mounted below the baseplate of the converters (worst case).

c) The DC to DC converter baseplate shall be properly bonded to earth ground in the end use product as this unit was investigated for Class I construction. T101/T102 use triple insulated wire with an insulation class for the transformers of Class H.

d) These products must be installed in a restricted access location accessible to authorised competent personnel only. These products were assessed for Reinforced insulation between input and output assuming a 250Vac mains supply. These converters may have a mains derived DC supply attached to the input and provide a SELV output. All outputs are an energy hazard except for PH300S280-3.3 unit. To maintain the SELV output under fault conditions, the output must be connected to earth in the final application.

e) The operation of these DC to DC converters is subject to the end customer maintaining the baseplate at or below the following values during operation.
PH300S280-3.3, -5:- 100°C at 100% load
PH300S280-12, 15, 24, 28, 48:- 90°C at 100% load, 100°C at 83% load.
PH300S280-48/EM: - 65°C at 100% load, 100°C at 70% load.
PH600S280 series: - 85°C 100% load, 100°C at 80% load.

In accordance with the instructions, the baseplate temperature measurement point is as follows:-
PH300S280 series: - Centre of the baseplate.
PH600S280 series: - 30mm from the input end, along the centre line.

f) The DC to DC converters have not been assessed for an IT power system.

g) The input and output connectors are not acceptable for field wiring connections and are only intended for connection to a PCB inside the end use equipment.

h) The recommended input fuse ratings within the instructions were as follows:-
PH300S280-* = F5AH, 250V
PH600S280-* = F10AH, 250V
The breaking capacity and voltage rating are subject to the end use application.

Testing Environment:

- An ambient temperature in the range 15°C to 30°C
- A relative humidity in the range 25% to 75%
- An air pressure in the range 86 kPa to 106 kPa