Test Report issued under the responsibility of:

VDE

TEST REPORT

IEC 60950-1

Information technology equipment – Safety – Part 1: General requirements

Report Number. .....:	**236820-CI3-1**	**CB: DE1-59169**
Date of issue .....:	**2017-10-24**	
Total number of pages.....	**265**	
Applicant's name.....:	**TDK-Lambda Americas Inc.**	
Address .....:	**3320 Matrix Drive; Suite 100; RICHARDSON TX 75082; USA**	
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.

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 ..... :		Power supply for IT-Equipment / AC/DC-Converter Module
Trade Mark ..... :		TDK or TDK·Lambda
Manufacturer ..... :		TDK-Lambda Americas Inc.; 3320 Matrix Drive; Suite 100; RICHARDSON TX 75082; USA
Model/Type reference ..... :		1) PFH500(X)-48-(XXX)-R, 2) PFH500(X)-28-(XXX)-R, 3) PFH500(X)-12-(XXX)-R (for model matrix refer to appendix 3)
Ratings ..... :		
10003893	Rated voltage……..…..:	Input: AC 100-240 V
10004017	Rated current……..…..:	1) 7 A 2) 8 A 3) 7.5 A
10004029	Rated frequency……..:	50/60 Hz
10003951	Output voltages and currents……..:	1) DC 48 V, 10.5 A (SELV) 2) DC 28 V, 18 A (SELV) 3) DC 12 V, 42 A (SELV) (For details see table in appendix 3)
10004112	Output power……..:	Max. 504 W
10004009	Class……..…..:	For building in into class I or class II appliances
10004092	Max. ambient temperature..:	25 °C
10004336	Overvoltage category…..…..:	II
10004336	Pollution Degree……..…..:	1 (internally) 2 (external)
10006811	Installation conditions……..:	For building in.
10004046	Remark(s)……..……..:	The power modules are not internally fused. An external input line fast-acting fuse with a maximum value of 10 A is required.
Supplementary information: The above listing was introduced only for internal VDE administration process.		

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	VDE Prüf- und Zertifizierungsinstitut GmbH VDE *Testing and Certification Institute* Merianstrasse 28, D-63069 Offenbach, Germany	
Testing location/ address.....		See below	
☐	**Associated CB Testing Laboratory:**		
Testing location/ address.....			
Tested by (name, signature)		(authorization of test report)	
Approved by (name, signature)			
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....			
Tested by (name, signature)		(authorization of test report)	
Approved by (name, signature)			
☒	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....		TDK-Lambda Americas Inc. 3320 Matrix Drive, Suite 100, Richardson, Texas 75082, USA WMT (TDAP under File No. 2520400-9501-0001)	
Tested by (name + signature)		Steve McKitrick	Steven J McKitrick
Witnessed by (name, signature).....		H. Kreuzer (authorization of test report)	H. Kreuzer
Approved by (name, signature)		P. Möbs	Pabil Leil
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....			
Tested by (name, function, signature).....		(authorization of test report)	
Witnessed by (name, signature).....			
Approved by (name, signature)			
Supervised by (name, signature)			

List of Attachments (including a total number of pages in each attachment):	
Appendix No.	Description
1	Photos
2	Test data
3	Model Matrix and Differences
4	Schematics
5	Separation and Main PCB Spacings
6	Transformer T1, Separation and PCB Spacings
7	PFH Assembly Drawing

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
1.5 Components 1.6 Power interface 1.7 Marking and instructions 2.2 SELV circuits 2.9 Electrical insulation 2.10 Clearances, creepage distances and distances through insulation 4.2 Mechanical strength 4.3 Design and construction 4.5 Thermal requirements 4.7 Resistance to fire 5.2 Electric strength 5.3 Abnormal operating and fault conditions	TDK-Lambda Americas Inc. 3320 Matrix Drive, Suite 100, Richardson, Texas 75082, USA WMT (TDAP under File No. 2520400-9501-0001)

Summary of compliance with National Differences: **List of countries addressed**				
The product has been tested according to standard IEC 60950-1:2005 (2nd Edition); am1:2009; am2:2013 / EN 60950-1:2006; A11:2009; A1:2010; A12:2011; A2:2013 and those deviations taken into account of				
☒ CENELEC common modifications		☒ United Kingdom	☐	☐
☒ Finland	☒ Denmark	☒ Ireland	☐	☐
☒ Sweden	☒ Germany	☒ Spain	☐	☐
☒ Norway	☒ Switzerland	☐	☐	☐
☒ **CB Bull. NATIONAL DIFFERENCES IEC 60950-1:2005 (2nd Edition)**				
☒ Switzerland	☒ Finland	☒ Norway	☒ USA	☒ Japan
☒ Germany	☒ United Kingdom	☒ Sweden	☒ Israel	☐
☒ Denmark	☒ Ireland	☒ Group Differences	☒ Australia	☐
☒ Spain	☒ Korea	☒ Canada	☒ New Zealand	☐
☒ **The product fulfils the requirements of** DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013				

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 [] permanent connection [] detachable power supply cord [] non-detachable power supply cord [X] not directly connected to the mains
Operating condition.....:	[X] continuous [] rated operating / resting time:
Access location .....:	[] operator accessible [] restricted access location
Over voltage category (OVC) .....:	[] OVC I [X] OVC II [] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values .....:	N/A
Tested for IT power systems .....:	[] Yes [X] No
IT testing, phase-phase voltage (V) .....:	N/A
Class of equipment .....:	[] Class I [] Class II [] Class III [X] Not classified
Considered current rating of protective device as part of the building installation (A) .....:	N/A
Pollution degree (PD) .....:	[X] PD 1 (internally) [X] PD 2 (external) [] PD 3
IP protection class .....:	IPX0
Altitude during operation (m) .....:	≤ 2000 m
Altitude of test laboratory (m) .....:	app. 180 m
Mass of equipment (kg) .....:	Less than 1 kg

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 of receipt of test item .....:	2017-02-20
Date (s) of performance of tests.....:	2017-03-15 to 2017-07-27

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 ☐ 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 factory (ies) ..... : 30014661

TDK-Lambda Americas Inc.

3320 Matrix Drive, Suite 100, Richardson, Texas 75082, USA

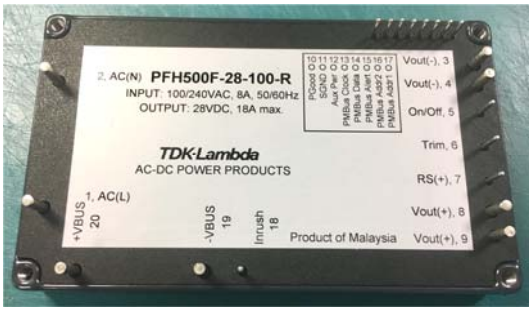
30017287

TDK-Lambda Malaysia Sdn. Bhd.

PLO 33 Kawasan Perindustrian Senai;

Locked Bag No. 110; SENAI, JOHOR 81400; Johor; Malaysia

General product information:



Product Overview:

The PFH product family consists of high density AC-DC power converter modules intended to be purchased and used as a component in an end-user's power system. The input voltage range is from 85Vac – 265Vac (RMS) input. The output voltage range will be between 12V and 48V depending upon the model number.

The PFH product is available in one mechanical configuration using the same transformer core set, the same input PFC (Power Factor Correction) inductor core set, and the same output filter inductor core set with the same geometry except for the air gap and number of turns used in the output inductor. PFH product is a fully vacuum potted power module using Momentive TSE3331 Silicon Rubber Compound with dielectric strength of 26kV/mm.

There are two house-keeping transformers used in PFH platform, AT00175 bias transformer with triple insulation wires, and AT00174 current sensing transformer with molded one (1) primary turn.

There are also two digital controllers responsible for PFC and DC-DC controls. A 4-channel digital isolator with wide body SOIC-16 package is used to deliver the drive pulses and PMBus communication commands to cross the primary to secondary isolation boundary with reinforced isolation. The digital isolator is UL 1577 recognized up to 5kVrms, CSA component notice 5A approval, (IEC 60950-1 reinforced insulation), VDE Certification conformity, and CQC certification approval, GB4943.1.

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)			

Information to test report reference No. :	**236820-CI3-1**
VDE Test- and Certification Institute GmbH Merianstrasse 28 D - 63069 Offenbach	DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013

Test item description:	AC-DC power converter modules		
Made by :	TDK-Lambda Americas Inc.		
Trade mark :	TDK or TDK·Lambda		
Model/type ref. :	PFH series		
Rated :	Refer to page 2		
Commission received from	Steve.Mc Kitrick	Date:	2017-03-17

Modification on the appliance:	
1.	First testing acc. DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013

Test Report History:			
This report may consist of more than one report and is valid only with additional or previous issued reports:			
Date: (jjjj-mm-dd)	VDE-Certificate: CB-Ref. No.:	VDE File No.: Test Report Number	Modifications:
2017-10-24	CB: DE1-59169	2520400-3336-0053/236820 236820-CI3-1	Original Test Report First testing acc. to DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013