



Test Report issued under the responsibility of:



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

Report Number: 1510054STO-001
 Date of issue: 29 October 2015
 Total number of pages: 90 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

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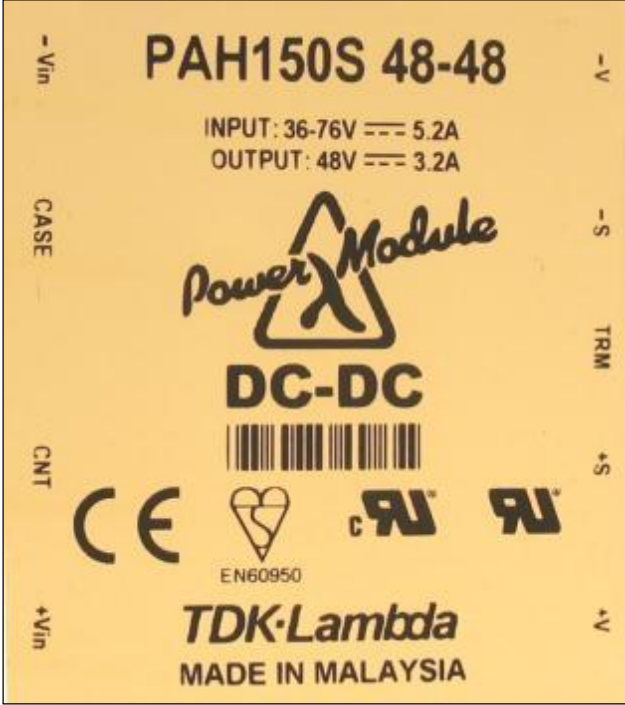
TEST REPORT issued by an Accredited Testing Laboratory. Accredited by Swedac, no 1003, ISO/IEC 17025.

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	PAH150S48-**, PAH200S48-**/** (see also "Models" page 4)
Ratings	DC 36-76V ⁻⁻⁻ , DC 38-72V ⁻⁻⁻ (see also "Models" page 4)

Testing procedure and testing location:		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	Intertek Semko AB
Testing location/ address		Torshamnsgatan 43, P.O. Box 1103, SE-164 22 Kista, SWEDEN
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address		
Tested by (name + signature)		Bedran Nergiz 
Approved by (name + signature).....		Anna Karin Cedergren 
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	
Testing location/ address		
Tested by (name + signature)		
Approved by (name + signature).....		
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2:	
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name + signature)		
Approved by (name + signature).....		
<input type="checkbox"/>	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: <input checked="" type="checkbox"/> 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		Load condition	
	V	A	V	A	Load (%)	Base (°C)
PAH200S48-12	36-76	7	12	16.7	100	80
PAH200S48-12	36-76	7	12	15.03	90	100
PAH200S48-12/TMI	36-76	7	12	16.7	100	80
PAH200S48-15	36-76	7	15	13.4	100	80
PAH200S48-15	36-76	7	15	12.06	90	100
PAH200S48-24	36-76	7	24	8.4	100	80
PAH200S48-24	36-76	7	24	7.56	90	100
PAH200S48-26	36-76	7	26	7.5	100	100
PAH200S48-28	36-76	7	28	7.2	100	80
PAH200S48-28	36-76	7	28	6.48	90	100
PAH200S48-28/TFR	36-76	7	28	7.0	100	100
PAH200S48-56	38-72	7	56	3.58	100	100
PAH150S48-48	36-76	5.2	48	3.2	100	100

Suffix	On/Off Control	Pin Length	OVP	OTP	Stud
-	Negative	5.08	Manual Reset	Auto Reset	With Threads
P	Positive	N/A	N/A	N/A	N/A
2	N/A	2.79	N/A	N/A	N/A
3	N/A	3.68	N/A	N/A	N/A
T	N/A	N/A	N/A	N/A	Without Threads
H	N/A	N/A	N/A	Manual Reset	N/A
V	N/A	N/A	Auto Reset	N/A	N/A
U	N/A	N/A	Auto Reset	N/A	N/A

These suffixes may be used together (e.g. /PV, /HTPV3)
 Suffix U denotes different Input/Output terminal connector.

Test item particulars:	
Equipment mobility.....:	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
Connection to the mains.....:	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input type="checkbox"/> not directly connected to the mains
Operating condition.....:	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
Access location	<input type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> for building into a host equipment
Over voltage category (OVC)	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
Mains supply tolerance (%) or absolute mains supply values	Not applicable, Voltage range 36-76Vdc Max. Voltage range 38-72Vdc Max.
Tested for IT power systems	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
Considered current rating of protective device as part of the building installation (A)	N/A (for building-in)
Pollution degree (PD)	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
IP protection class	IPX0
Altitude during operation (m)	<2000
Altitude of test laboratory (m)	<2000
Mass of equipment (kg)	<0.100
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.....	See "General remarks" below
General remarks:	
<p>"(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. 1218072 dated 3 September 2012, 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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	

Manufacturer's Declaration per sub-clause 4.2.5 of IEC60950-1:																			
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	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> 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: <table border="0"> <tr> <td>- normal conditions</td> <td>N.C.</td> <td>- single fault conditions</td> <td>S.F.C</td> </tr> <tr> <td>- functional insulation</td> <td>OP</td> <td>- basic insulation</td> <td>BI</td> </tr> <tr> <td>- double insulation</td> <td>DI</td> <td>- supplementary insulation</td> <td>SI</td> </tr> <tr> <td>- between parts of opposite polarity</td> <td>BOP</td> <td>- reinforced insulation</td> <td>RI</td> </tr> </table> Indicate used abbreviations (if any)				- 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
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This Test Report replaces previously issued, see table below.

REVISION TABLE

Date	Report ref.	Clause	Modification of the appliance
29 Oct. 2015	1510054STO-001	-	Basic Test Report

General Product Information:

1. The input to the units must be isolated from the mains by reinforced insulation in accordance with EN60950-1 and IEC60950-1 in order to maintain a SELV output. This product must be installed within a host equipment and only be accessible to authorised competent personnel.
2. Consideration shall be given to measuring the temperature on power electronic components, inductors and transformer windings when the power supply is installed in the end use equipment.
The models PAH200S48-12, 15, 24, 28 may have class F or H transformers.
The models PAH200S48-26, 28/TFR and -56 have class H rated transformers.

All temperature tests have been conducted with heat sinks 146 by 86 by 24 mm and 86 by 83 by 24 mm.
Temperature on heat sinks should not exceed 100°C.
3. This power supply shall be properly bonded to earth ground in the end use product as this unit was investigated for Class I construction.
4. Tests were performed with an external Listed input fuse, rated maximum F15AH, 250V for PAH200S48. F10 AH, 250V for PAH150S48-48 Series.
The breaking capacity and voltage rating are subject to the end use application.
5. The input and output connectors are not acceptable for field wiring connections and are only intended for connection to a PWB inside the end use equipment.
6. These products were assessed for basic insulation at working voltage between input and output.
All faults testing across the barriers were conducted under all input and output earth combinations.
7. Subject to the above, all secondary output circuits are SELV. No secondary energy hazard existed for any of the outputs.
8. Throughout this report, tests that have been applied to the PAH200S48-56 can be considered to be applicable for the PAH150S48-48 model as this is a lower powered version of the PAH200S48-56 using the same transformers and PCB.

Testing Environment:

Ambient temperature: 15°C to 30°C

Relative humidity: 25% to 75%

Air pressure: 86 kPa to 106 kPa