

Test Report issued under the responsibility of:



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

Report Number: 1510042STO-001

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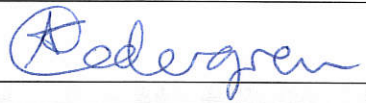
This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.



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

General disclaimer:

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Test item description	DC-DC Converters
Trade Mark	TDK-Lambda
Manufacturer	TDK-Lambda Corporation
Model/Type reference	PAF400F24-**, PAF400F48-**, PAF500F24-**, PAF500F48-** PAF600F24-**, PAF600F48-**, PAF700F48-** (see also "Models" page 3)
Ratings	DC input: 18-36V ⁻⁻⁻⁻ alt. 19-36V ⁻⁻⁻⁻ alt. 20-36V ⁻⁻⁻⁻ alt. 36-76V ⁻⁻⁻⁻ (see also "Models" page 3)

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)		Josef Ismail 
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 General remarks on page 4.		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: (examples) 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	I/P current	O/P current	O/P voltage
PAF400F24-12 (18-36Vdc input)	29A	33.5A	12V
PAF400F24-28 (18-36Vdc input)	29A	14.3A	28V
PAF400F48-12 (36-76Vdc input)	14.5A	33.5A	12V
PAF400F48-28 (36-76Vdc input)	14.5A	14.3A	28V
PAF500F48-3.3 (36-76Vdc input)	18A	80A	3.3V
PAF500F48-5 (36-76Vdc input)	18A	80A	5V
PAF500F48-12 (36-76Vdc input)	18A	42A	12V
PAF500F48-28 (36-76Vdc input)	18A	18A	28V
PAF500F48-12/NTL (36-76Vdc input)	12.5A	19.2A	12V
PAF500F24-12 (19-36Vdc input)	36A	42A	12V
PAF500F24-28 (18-36Vdc input)	36A	18A	28V
PAF600F48-12 (36-76Vdc input)	21A	50A	12V
PAF600F48-28 (36-76Vdc input)	21A	21.5A	28V
PAF600F24-12 (20-36Vdc input)	43A	50A	12V
PAF600F24-28 (19-36Vdc input)	43A	21.5A	28V
PAF700F48-12 (36-76Vdc input)	25A	58.5A	12V
PAF700F48-28 (36-76Vdc input)	25A	25A	28V

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.
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.....	-
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 Reports No. 1017538 dated 10 August 2010 and No. 1218095 dated 20 August 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.</p> <p>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 IEC 60950-1:	
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.....	<p>TDK-Lambda (Malaysia) Sdn. Bhd. PLO33 Locked Bag No. 110 Kawasan Perindustrian Senai 81400 Senai Johor, Darul Takzim, MALAYSIA</p> <p>TDK-Lambda Corporation Nagaoka Technical Center 2704-1 Settaya-machi, Nagaoka, Niigata 940-1195, JAPAN</p> <p>Wuxi TDK-Lambda Electronics Co., Ltd. No.6 Xing Chuang Er lu Wuxi Jiangsu, 214028 CHINA</p>
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)	

General Product Information:

1. As a component part, compliance with the standard will be based upon installation in the final application. This product must be installed within a host equipment and only be accessible to authorised competent personnel.
2. The units have been evaluated for use in a Pollution Degree 2 environment. The PWB in the products is assumed to be material group IIIB unless otherwise stated.
3. 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. The SELV output is classed as an energy hazard and must not be accessible to the operator in the final end product.
4. 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.
5. The input fuse rating used during testing was:- PAF500F24, F50AH, 250V; PAF500F48, F30AH 250V, PAF600F24, F50AH, 250V, PAF700F48, F30AH, 250V. The breaking capacity and voltage rating are subject to the end use application.
6. These products were assessed for basic insulation at working voltage between input and output. All fault testing across the barriers was conducted under all input and output earth combinations. This power supply baseplate shall be properly bonded to earth ground in the end use product as this unit was investigated for Class I construction.
7. Transformers T101 and T102 employ a Class 180(H) insulation system and T1 employs a class F insulation system. It must be ensured that the baseplate temperature does not exceed 100 degrees Celsius for all models except PAF500F48-12/NTL which is rated 85 degrees Celsius maximum. This temperature limit governs the working ambient temperature. The converters were tested with the heatsink mounted below the baseplate of the converters (worst case).
8. PAF600F48 model only. During installation, it must be ensured that the positive input terminal and the positive output terminal are not connected to ground at the same time. Under a fault condition where the basic insulation of the transformer is shorted out, a hazard may occur. Other grounding conditions and fault conditions are acceptable. The handbook must include a statement to this effect.

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