



Test Report issued under the responsibility of:



TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number: E220248-A6011-CB-1
Date of issue.....: 2019-11-20
Total number of pages: 62

Applicant's name.....: **TDK-LAMBDA AMERICAS INC**
Address: **SUITE 100**
3320 MATRIX DR
RICHARDSON TX 75082
UNITED STATES

Name of Test Laboratory: UL RTP
preparing the Report: 12 Laboratory Drive, Research Triangle Park , NC, 27709, USA



Test specification:
Standard: IEC 62368-1:2014 (Second Edition)
Test procedure: CB Scheme
Non-standard test method.....: N/A

Test Report Form No.....: IEC62368_1B
Test Report Form(s) Originator: UL(US)
Master TRF.....: 2014-03

Copyright © 2014 Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE), Geneva, Switzerland. All rights reserved.
This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
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.


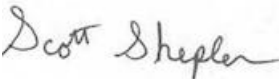
General disclaimer:
The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory.
The authenticity of this Test Report and its contents can be verified by contacting the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



Test Item description	: DC-To-DC Converters
Trade Mark	: TDK or TDK-Lambda  
Manufacturer	: TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES
Model/Type reference	: iEH Series: Model: iEH48***A%%V-xxx or iEH4N***A%%V-xxx where *** represents rated output current between 20A - 40A, (Note that the first digit is always "0"); %%% represents rated output voltage between 9.6V - 12V (Note that the third digit is preceded by a decimal point. Example 120 implies 12.0 Volts.) and xxx represents any alphanumeric characters denoting non-safety related features. It may also be followed by optional '-R' to denote RoHS compliance. Examples: iEH48025A120V-xxx(-R) iEH48020A120V-xxx(-R) iEH4N028A108V-xxx(-R) iEH4N033A096V-xxx(-R) iEH4N031A096V-xxx(-R) iEH4N040A120V-xxx(-R) iEH4N042A108V-xxx(-R) where xxx represents any alphanumeric characters denoting non-safety related features
Ratings	: Optional: Input DC 36 -75 VDC, 10.5 max Output 9.6 - 12.0 VDC max, 42 A max, 480 W max See model list iEH48025A120V-xxx(-R) Input: 36-75Vdc, 9A Output: 12Vdc, 25A, 300W max iEH48028A108V-xxx(-R) Input: 36-75Vdc, 9A Output: 10.8Vdc, 28A, 300W max

	iEH48020A120V-xxx(-R) Input: 36-75Vdc, 7.5A Output: 12Vdc, 20A, 240W max iEH4N028A108V-xxx(-R) Input: 51-55Vdc, 6.5A Output: 10.8Vdc, 28A, 302W max iEH4N033A096V-xxx(-R) Input: 38-55Vdc, 8.5A Output: 9.6Vdc, 33.3A, 320W max iEH4N031A096V-xxx(-R) Input: 38-55Vdc, 8A Output: 9.6Vdc, 31.3A, 300W max iEH4N040A120V-xxx(-R) Input: 49-56Vdc, 10.5A Output: 12Vdc, 40A, 480W IEH4N042A108V-xxx(-R) Input: 49-56Vdc, 9.8A Output: 10.8Vdc, 42A, 454W
--	---

Testing procedure and testing location:

<input checked="" type="checkbox"/>	CB Testing Laboratory:		
Testing location/ address		UL RTP, 12 Laboratory Drive, Research Triangle Park , NC, 27709, USA	
Tested by (name + signature).....		Mengis Tesfay / Project Handler	
Approved by (name + signature)		Scott Shepler / Reviewer	

Testing procedure and testing location:

<input type="checkbox"/>	Testing procedure: CTF Stage 1		
Testing location/ address			
Tested by (name + signature).....			
Approved by (name + signature)			

Testing procedure and testing location:

<input checked="" type="checkbox"/>	Testing procedure: CTF Stage 2		
Testing location/ address		TDK-LAMBDA AMERICAS INC	

		SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES	
Tested by (name + signature).....:		See previously issued VDE CBTR for names, functions, and signatures / --	See previously issued VDE CBTR for names, functions, and signatures
Witnessed by (name + signature).....:		See previously issued VDE CBTR for names, functions, and signatures / --	See previously issued VDE CBTR for names, functions, and signatures
Approved by (name + signature)		See previously issued VDE CBTR for names, functions, and signatures / --	See previously issued VDE CBTR for names, functions, and signatures
<input type="checkbox"/>	Testing procedure: CTF Stage 3		
<input type="checkbox"/>	Testing procedure: CTF Stage 4		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name + signature).....:			
Approved by (name + signature)			
Supervised by (name + signature)			

List of Attachments (including a total number of pages in each attachment):

National Differences (30 pages)

Enclosures (24 pages)

Summary of testing:

Tests performed (name of test and test clause):

DETERMINATION OF WORKING VOLTAGE (5.4.1.8)

TESTS FOR SEMICONDUCTOR COMPONENTS AND CEMENTED JOINTS (5.4.7, 5.4.1.5.3)

HUMIDITY CONDITIONING (5.4.8)

ELECTRIC STRENGTH TEST (5.4.9)

INPUT TEST: SINGLE PHASE (B.2.5)

Testing Location:

**CTF Stage 2: TDK-LAMBDA AMERICAS INC
SUITE 100
3320 MATRIX DR
RICHARDSON TX 75082
UNITED STATES**

Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.

Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.

Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.

Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.

Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1

NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6)	<p>respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.</p> <p>Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.</p>
SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)	<p>Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.</p>
SIMULATED SINGLE FAULT CONDITIONS (B.4)	<p>Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under CB Report 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.</p>
<p>Summary of compliance with National Differences:</p> <p>List of countries addressed: Australia / New Zealand, EU Group and National Differences, Japan, USA / Canada</p> <p>EU Group and National Differences applies to CENELEC member countries: Austria, Belgium, Bulgaria, Belarus, Switzerland, Serbia, Czech Republic, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Sweden, Slovenia, Slovakia, Turkey, Ukraine</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of: EN 62368-1:2014 + A11:2017</p>	

Copy of marking plate:

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.



Note: The above markings are the minimum requirements required by the safety lab. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.

TEST ITEM PARTICULARS:	
Classification of use by	Instructed person
Supply Connection	External Circuit - not Mains connected ES2
Supply % Tolerance	None
Supply Connection – Type	Not connected to Mains. For building in
Considered current rating of protective device as part of building or equipment installation	For building in. 15 A fuse to be provided in an end product. A; equipment
Equipment mobility	for building-in
Over voltage category (OVC)	other: Not connected to Mains
Class of equipment	Not classified
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer’s specified maximum operating ambient (°C)	25 C
IP protection class	IPX0
Power Systems	N/A
Altitude during operation (m)	2000 m or less
Altitude of test laboratory (m)	app 180 m m
Mass of equipment (kg)	0.10
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..... :	2013-03-08, 2015-02-17
Date (s) of performance of tests..... :	2013-03-08 to 2013-04-30, 2015-02-17 to 2015-05-22
GENERAL REMARKS:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</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 IEC60068-2-1:	

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 factory (ies) :	TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES TDK-LAMBDA MALAYSIA SDN BHD PLO33 KAWASAN PERINDUSTRIAN SENAI 81400 SENAI JOHOR MALAYSIA
--	---

GENERAL PRODUCT INFORMATION:

Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

Product Description

The product is a component type DC to DC power module with a planar power transformer. The converter is provided with input terminal pins for factory installation onto a printed wiring board with a connection to a dc source of supply and output terminal pins. These models have been evaluated as having Basic insulation from input to output. The product employs a multilayer PWB planar transformer.

Model Differences

All models within the iEH Series employ identical mechanical configuration, using the same PWB, same transformer winding turns ratio, same transformer core set, and inductor core set. The house-keeping transformers used for the bias supply, current sensing, and gate drive purposes are also the same for all models within the series.

The iEH 480W series (Models iEH4N040A120V-xxx and iEH4N042A108V-xxx) is identical in construction to the iEH 300W/320W series described above, except for the PWB board copper weight, the output inductor used, and the base plate incorporates heat sink pin fins.

Additional application considerations – (Considerations used to test a component or sub-assembly) -

This report is based on VDE CB report references, 2520400-3336-0048/184493, 207809-CI3-5, and 212475-CI3-1 and CB Test Certificate Ref. DE1-52299, DE1-52299/A1 and DE1-52299/A1/M1 respectively which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2.

Testing conducted in accordance with IEC 60950-1:2005 (Second Edition), Am1:2009 + Am2:2013; UL 60950-1, 2nd Edition, 2014-10-14; and CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10, and was deemed equivalent to the test required by IEC62368-1, 2nd Edition, CAN/CSA-C22.2 NO. 62368-1 2nd Ed, Issued December 1, 2014, and UL 62368-1 2nd Ed, Issued December 1, 2014. Testing correlation explanation provided in Enclosure.

All original sample and test dates are noted in the testing portion of this report.

The nameplate included in the report is representative of all models covered under this report.

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of : 25°C
- The product is intended for use on the following power systems : No direct connection
- Considered current rating of protective device as part of the building installation (A) : For building in. 15 A fuse to be provided in an end product.
- Mains supply tolerance (%) or absolute mains supply values : No direct connection
- The equipment disconnect device is considered to be : N/A
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017

Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

- The following product-line tests are conducted for this product : Electric Strength
- The following output circuits are at ES1 energy levels : All
- The following output circuits are at PS3 energy levels : Output Terminal
- The maximum investigated branch circuit rating is : EUT is for building in. 15 A external fuse is to be provided in the end product.
- The investigated Pollution Degree is : 2
- The following end-product enclosures are required : Electrical, Fire
- Heating Test shall be evaluated in end product.
- This component has been evaluated in 'control of fire spread' method assuming appropriate fire enclosure is provided in end product. Unless the fire enclosure is made of non-combustible or V-0 material, the separation from the PIS shall be considered
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.
- Unit intended for building-in and supplied power from secondary circuit which is isolated from primary circuit by double or reinforced insulation.

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.)	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1	
Source of electrical energy	Corresponding classification (ES)
Input (All Models)	ES2
Output (All Models)	ES1
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	Corresponding classification (PS)
Input (All Models)	PS3 (declared)
Output (All Models)	PS3
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	Corresponding chemical
N/A	--
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	Corresponding classification (MS)
N/A	--
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	Corresponding classification (TS)
PWB and Components	TS3 (for building in, to be addressed in the end product)
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	Corresponding classification (RS)
N/A	-

