Test Report issued under the responsibility of:

VDE

TEST REPORT

IEC 60950-1

Information technology equipment – Safety – Part 1: General requirements

Report Number. .....:	**207721-AS3-1**	**CB/DE1-55140**
Date of issue .....:	**2015-01-22**	
Total number of pages.....	**226**	

Applicant's name.....:	TDK-Lambda Americas Inc.
Address .....:	3320 Matrix Drive, Richardson, TX, 75082

Test specification:

Standard .....:	DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2014 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
Test procedure .....:	VDE ÜG, 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 ..... :		Component DC DC Converter for use with IT Equipment
Trade Mark ..... :		TDK and/or INNOVETA and/or TDK·Lambda
Manufacturer ..... :		TDK-Lambda Americas Inc. 3320 Matrix Drive, Richardson, TX, 75082
Model/Type reference ..... :		**i6A series, (See model matrix)**
10004095	Structure of type name…..:	See Model matrix, appendix 3
10004560	Type differences……...:	See model Matrix, appendix 3
Ratings ..... :		
10003893	Rated voltage……..……:	DC 9 – 55 V Input (SELV)
10004017	Rated current……..……:	Max. 16,5 A
10004112	Rated power……..……:	Max. Output Power 250 W
10004029	Rated frequency……..……:	DC
10003951	Output voltages and currents……..……:	max. DC 3,3V - 28 or -3.3 - -30V max. 20 A, 250 W (SELV) See model Matrix, appendix 3
	Max. baseplate temperature..:	130C at Q5 tab
Supplementary information: The above listing was introduced only for internal VDE administration process.		

Testing procedure and testing location:			
☐	**CB Testing Laboratory:**	VDE Prüf- und Zertifizierungsinstitut GmbH VDE *Testing and Certification Institute*	
Testing location/ address.....:		Section AS3 Merianstrasse 28, D-63069 Offenbach, Germany	
☐	**Associated CB Testing Laboratory:**		
Testing location/ address.....:			
Tested by (name + signature).....:		(authorization of test report)	
Approved by (name + signature).....:			
☐	**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.....:		TDK-Lambda Americas Inc. 3320 Matrix Drive, Suite 100, Richardson, Texas 75082, USA WMT (TDAP, VDE File No. 2520400-9501-0001)	
Tested by (name + signature).....:		Steve McKitrick	Steven T McKitrick
Witnessed by (name + signature).....:		Günter Straube	G. Straube
Approved by (name + signature).....:		Patrick Möbs	Patrick Möbs
☐	**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).....:			

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

Appendix No.	Description	Page(s)
1	Picture	122
2	Schematics and Layout	123 - 133
3	Model Matrix	134 -135
4	Test Results	136 -226

Summary of testing:

Tests performed (name of test and test clause):

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
3.1 General
4.3 Design and construction
4.4 Protection against hazardous moving parts
4.5 Thermal requirements
4.7 Resistance to fire
5.2 Electric strength
5.3 Abnormal operating and fault conditions

Testing location:

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 / EN 60950-1:2006/A11:2009/A1:2010/A12:2011 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	☐
☒ Germany	☒ United Kingdom	☒ Sweden	☐ Israel	☐
☒ Denmark	☒ Ireland	☒ Group Differences	☐ Australia	☐
☒ Spain	☐ Korea	☒ Canada	☐ New Zealand	☐
For national and cenelec differences refer to main test report ☒ **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+A2:2014 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 .....:	
Tested for IT power systems .....:	[] Yes [x] No
IT testing, phase-phase voltage (V) .....:	
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) .....:	
Pollution degree (PD) .....:	[] PD 1 [x] PD 2 [] PD 3
IP protection class .....:	IPX0
Altitude during operation (m) .....:	≤ 2000 m
Altitude of test laboratory (m) .....:	app. 180m
Mass of equipment (kg) .....:	<18kg

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 .....:	2015-01-06
Date (s) of performance of tests.....:	2015-01-16 to 2015-01-22

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 see VDE construction form 131 ..... :	☒ **Yes** ☐ **Not applicable (one factory)**

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:

The label includes: Optional "-R" appended to product code to indicate ROHS compliance. eg. iCGXXXXXXXXXX-### -R Series

The i6A product family consists of high density, non-isolated DC-DC power modules intended to be purchased and used as a component in an end-user's power system. The modules will be offered in multiple input voltage and output voltage ranges. The input ranges from 9 – 55Vdc input. The output voltage will be adjustable between -30 V to 30V. The rated output power will be 250W or less.

i6A Product Family Similarities:

The design intention is that the modules within a platform consist of a family of units with similar form, fit and function with the exception of the output voltage and current. The major differences between the modules will be as follows.

The PWB may be changed though the difference in the layout is minimal. The power output inductor is the same structure, but the number of turns will be modified depending upon the output voltage or current of the specific power module.

The semiconductors such as power switches may be different devices depending upon the specific voltage and current stresses in the various power module designs. The power devices may have heat sink applied or omitted.
The input and output filter capacitors may be different values depending upon the specific voltage and current stresses in the various power module designs.
Control circuits will have value changes to scale the typical circuit parameters such as output voltage and output current limit set point as required for the different designs.
Other control circuits such as the feedback compensation may have value changes as required for each specific design.

Testing Plan:

Our intention is to obtain approve for the power module series by testing highest output voltage and highest power module i6A24014A033V-0xx samples.

We would like to obtain approval to the following standards: UL60950 (US & Canada), VDE0805, CB scheme (IEC950), CE mark (EN60950).

Manufacturing:

The i6A product family will be manufactured by TDK-Lambda (M) Sdn. Bhd. PLO 33, Kawasan Perindustrian Senai, Locked Bag No. 110, 81400 Senai, Johor, Malaysia and/or TDK Lambda Americas – Dallas Technical Center, 3320 Matrix Drive, Suite 100, Richardson, TX 75082.

The facilities are **UL, CSA and VDE** approved manufacturing facility with **ISO9002** certified.

Unit was tested with a 30 A external fuse.
The DC-DC Converters are not internally fused. An external input line fuse is required

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. :	
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+A2:2014 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013

Test item description:	Component DC-DC Converters for building-in in IT-equipment
Made by :	TDK-Lambda Americas Inc. 3320 Matrix Drive, Richardson, TX, 75082
Trade mark :	TDK and/or INNOVETA and/or TDK·Lambda
Model/type ref. :	I6A series, (See model matrix)
Rated :	Input: DC 9-55V, max 16,5 A, Output: 3.3 – 30V, 20 A, max 250W (See model matrix) Appendix 3

Commission received from	Steve.Mc Kitrick	Date:	2015-01-16

Modification on the appliance:

1.	Testing to: DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2014 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.:	Test Report Number	Modifications:
2015-01-16	**CB/DE1-55140**	2520400-3336-0049/207721	Original Test Report Testing to: DIN EN 60950-1 (VDE 0805-1):2014-08 EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2014 IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013