



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-A6030-CB-1
Date of issue	2022-01-19
Total number of pages	60
Name of Testing Laboratory preparing the Report	UL RTP 12 Laboratory Drive, Research Triangle Park , NC, 27709, USA
Applicant's name	TDK-LAMBDA AMERICAS INC
Address	3000 TECHNOLOGY DR, SUITE 100 PLANO TX 75074 UNITED STATES

Test specification:	
Standard	IEC 62368-1: 2018
Test procedure	CB Scheme
Non-standard test method	N/A

TRF template used	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No	IEC62368_1E
Test Report Form(s) Originator	UL(US)
Master TRF	Dated 2021-02-04

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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.


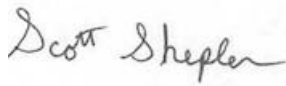
General disclaimer:

The test results presented in this report relate only to the object tested.
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The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

<p>Test Item Description</p>	<p>DC-DC Converter</p>
<p>Trade Mark(s)</p>	<p>TDK</p>
<p>Manufacturer</p>	
<p>Manufacturer</p>	<p>TDK-LAMBDA AMERICAS INC 3000 Technology Dr, Suite 100 Plano TX 75074 UNITED STATES</p>
<p>Model/Type reference</p>	<p>i6A series, (See model matrix)</p>
<p>Model/Type reference</p>	<p>Models i6A24***A%%V-0xx(-R)</p>
<p>Model/Type reference</p>	<p>where 24 represents nominal input voltage, with a 9-40Vdc input *** represents rated output current between 0A - 14A, %%% represents rated output voltage between 0.6Vdc – 28Vdc and 0xx indicates a number or alphanumeric character which affects non safety related features Optional –R indicated RoHS compliance</p>
<p>Model/Type reference</p>	<p>i6A24***A%%V-Nxx(-R)</p>
<p>Model/Type reference</p>	<p>where 24 represents nominal input voltage, with a 9-40Vdc input where *** represents rated output current between 0A - 8A, %%% represents rated output voltage between -0.6Vdc – -30Vdc and Nxx indicates a number or alphanumeric character which affects non safety related features. The “N” indicates the output voltage polarity is inverted with respect to the input voltage polarity. Optional –R indicated RoHS compliance</p>
<p>Model/Type reference</p>	<p>i6A4W***A%%V-0xx(-R)</p>
<p>Model/Type reference</p>	<p>where 4W represents input voltage between 9-55Vdc input *** represents rated output current between 0A - 20A, 4W represents input voltage between 9-55Vdc input %%% represents rated output voltage between 0.6Vdc – 15Vdc and 0xx indicates a number or alphanumeric character which affects non safety related features. Optional –R indicated RoHS compliance</p>
<p>Ratings</p>	<p>Optional:</p>
<p>Ratings</p>	<p>Model i6A24***A%%V-0xx(-R),</p>
<p>Ratings</p>	<p>Input: 9-40Vdc, 15 A</p>
<p>Ratings</p>	<p>Output: 0.6 VDC to 28 VDC, 14 A max, 250W</p>
<p>Ratings</p>	<p>Model i6A24***A%%V-Nxx(-R)</p>

	Input: 9-40Vdc, 15 A Output: 0.6 VDC to -30 VDC, 8 A max, 75W Model i6A4W***A%%V-0xx(-R) Input: 9-55Vdc, 16.5 A Output: 0.6 VDC to 15 VDC, 20 A max, 250W
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Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

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

Testing procedure: CTF Stage 1:

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

Testing procedure: CTF Stage 2:

<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, function, signature)..... :		See previously issued report for Name, Function, and signature / -- 
Witnessed by (name, function, signature) . :		See previously issued report for Name, Function, and signature / -- 
Approved by (name, function, signature) .. :		See previously issued report for Name, Function, and signature / -- 

<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Supervised by (name, function, signature) :		

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

National Differences (29 pages)

Enclosures (29 pages)

Summary of testing:

Tests performed (name of test and test clause):

Testing Location:

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

B.2.5 – INPUT TEST: SINGLE PHASE

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; and UL62368-1, 3rd Ed December 13, 2019; CAN/CSA-C22.2 No. 62368-1, 3rd Ed December 13, 2019; and IEC62368-1:2018, 3rd Ed.

B.1.5, B.2.6, 5.4.1.4, 6.3, 9.3 - NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT

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; and UL62368-1, 3rd Ed December 13, 2019; CAN/CSA-C22.2 No. 62368-1, 3rd Ed December 13, 2019; and IEC62368-1:2018, 3rd Ed.

B.3 - SIMULATED ABNORMAL OPERATING CONDITIONS

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; and UL62368-1, 3rd Ed December 13, 2019; CAN/CSA-C22.2 No. 62368-1, 3rd Ed December 13, 2019; and IEC62368-1:2018, 3rd Ed.

B.4 - SIMULATED SINGLE FAULT CONDITIONS

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; and UL62368-1, 3rd Ed December 13, 2019; CAN/CSA-C22.2 No. 62368-1, 3rd Ed December 13, 2019; and IEC62368-1:2018, 3rd Ed.

Summary of compliance with National Differences (List of countries addressed):

EU Group and National Differences, USA / Canada

The product fulfils the requirements of EN IEC 62368-1:2020+A11:2020

Statement concerning the uncertainty of the measurement systems used for the tests

Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Statement not required by the standard used for type testing

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

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:	
Product group	built-in component
Classification of use by	Instructed person
Supply Connection	not mains connected: ES1
Supply tolerance	None
Supply connection – type	To be considered in end system
Considered current rating of protective device	N/A
Equipment mobility	for building-in
Over voltage category (OVC)	OVC I
Class of equipment	Not Classified
Special installation location	N/A 0
Pollution degree (PD)	PD 2
Manufacturer’s specified Tma (°C)	25
IP protection class	IPX0
Power systems	not AC mains
Altitude during operation (m)	2000 m or less
Altitude of test laboratory (m)	Approximately 105m m
Mass of equipment (kg)	0.02
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, 2017-03-29, 2019-08-20
Date (s) of performance of tests	2015-01-16 to 2015-01-22, 2017-03-29, 2019-08-20
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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer’s Declaration per sub-clause 4.2.5 of IEC60335-1:	

<p>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</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable
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When differences exist; they shall be identified in the General product information section.

<p>Name and address of factory (ies)</p>	<p>TDK-LAMBDA AMERICAS INC 3000 Technology Dr, Suite 100 Plano TX 75074 UNITED STATES</p> <p>TDK-LAMBDA MALAYSIA SDN BHD PLO33 KAWASAN PERINDUSTRIAN SENAI 81400 SENAI JOHOR MALAYSIA</p>
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General product information and other remarks:

Product Description

The i6A product family consists of high density, non-isolated DC-DC power modules intended to be 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.

Model Differences

All models are identical except for minor changes to the components based upon the output voltage rating of the unit.

Additional Information

This report is based on CB report references E220248-A6006-CB-1 and CB Test Certificate Ref. US-34430-UL, respectively which was previously evaluated to UL 62368-1, 2nd Edition, 2014-12-01, CSA C22.2 No. 62368-1-14, 2nd Edition, 2014-12, and IEC 62368-1:2014. Testing conducted in accordance with IEC UL 62368-1, 2nd Edition, 2014-12-01, CSA C22.2 No. 62368-1-14, 2nd Edition, 2014-12, and IEC 62368-1:2014, was deemed equivalent to the test required per UL62368-1, 3rd Ed December 13, 2019; CAN/CSA-C22.2 No. 62368-1, 3rd Ed December 13, 2019; and IEC62368-1:2018, 3rd Ed.

The original test report was generated from VDE CB report references 207721-AS3-1, and amendment CB report references 237556-CI3-1 and CB Test Certificate Ref. DE1-55140, and DE1-55140/A1 respectively which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 + Amendment 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; and UL62368-1, 3rd Ed December 13, 2019; CAN/CSA-C22.2 No. 62368-1, 3rd Ed December 13, 2019; and IEC62368-1:2018, 3rd Ed. All original sample and test dates are noted in the testing portion of this report. Only Electric Strength test (5.4.9) was conducted at UL RTP, 12 Laboratory Dr. RTP NC 27709.

Marking label provided represents all models in series. The label also may include an optional "-R" as a suffix to denote ROHS compliance.

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) : N/A
- Mains supply tolerance (%) or absolute mains supply : No direct connection
- The equipment disconnect device is considered to be : To be considered in end system
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual
- The product was investigated to the following additional standard : EN IEC 62368-1:2020+A11:2020

Engineering Conditions of Acceptability

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

- The following output circuits are at ES1 energy levels : All output
- The following output circuits are at PS3 energy levels : All
- The investigated Pollution Degree is : 2
- The following end-product enclosures are required : Fire, Electrical
- The power supply was evaluated to be used at altitudes up to : "2,000 m"
- The terminals and/or connectors are: Suitable for factory wiring only
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: The PWB is rated 130°C. ,
- The Normal Temperature Test for the Model i6A4W***A%%V-0xx was performed with 500 LFM external cooling. The manufacture's datasheet should be consulted regarding de-rating when less external airflow is provided.