Test Report issued under the responsibility of:

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

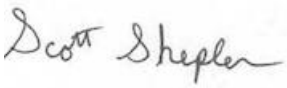
Report Number .....:	E220248-A6010-CB-1
Date of issue.....:	2019-11-25
Total number of pages .....:	59
Applicant's name.....:	**TDK-LAMBDA AMERICAS INC**
Address .....:	**SUITE 100** **3320 MATRIX DR** **RICHARDSON TX 75082** **UNITED STATES**
Name of Test Laboratory preparing the Report .....:	UL RTP 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

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 TDK TDK·Lambda
Manufacturer .....:	TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES
Model/Type reference .....:	GQA24***A%%%V-xxx -R, (PR); -R indicating RoHS compliance, or -(007) for unpotted or (-0P7) for potted. Where: - 24 represents nominal input voltage, with a 18-36 Vdc input, Max Input Current 9 A dc; - *** represents rated output current between 0 A - 2.5 A, *** maybe 1 to 3 digits, note that last digit is preceded by decimal point. - %%% represents rated output voltage, 48 Vdc nominal, Note that the third digit is preceded by a decimal point. Example 120 implies 12.0 Volts. with Max Output Power of 120 W - xxx represents alphanumeric characters which indicates non safety related feature set options - Optional -R indicating RoHS compliance, or (-007) for unpotted, or (-0P7) for potted) GQA2W***A%%%V-xxx-R, (PR); -R indicating RoHS compliance, or -(007) for unpotted or (-0P7) for potted. Where: - 2W represents nominal input voltage, with a 9 36 Vdc input, with a Max Input Current of 23 A - *** represents rated output current between 4.28 A - 28 A; *** maybe 1 to 3 digits, note that last digit is preceded by decimal point. - %%% represents rated output voltage between, 5 Vdc -28 Vdc, with Max Output Power of 150 W. Note that the third digit is preceded by a decimal point. Example 120 implies 12.0 Volts. with Max Output Power of 120 W. - xxx represents alphanumeric characters which indicates non safety related feature set options - Optional -R indicating RoHS compliance, or (-007) for unpotted, or (-0P7) for potted)
Ratings .....:	Optional

	Rated Input: 36 VDC Max, 23 A Max Rated output: 48 VDC Max, 28 A Max, 150 W Max.		
Testing procedure and testing location:			
☒ 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: CTF Stage 1			
Testing location/ address..... :			
Tested by (name + signature).....:			
Approved by (name + signature) .....:			
☒ 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	
☐ Testing procedure: CTF Stage 3			
☐ 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 (66 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**
DETERMINATION OF WORKING VOLTAGE (5.4.1.8)	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.
TESTS FOR SEMICONDUCTOR COMPONENTS AND CEMENTED JOINTS (5.4.7, 5.4.1.5.3)	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.
ELECTRIC STRENGTH TEST (5.4.9)	Testing was conducted per 62368-1. Furthermore tests 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.
INPUT TEST: SINGLE PHASE (B.2.5)	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.
NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6)	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.
SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)	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.

Summary of compliance with National Differences:

List of countries addressed: Australia / New Zealand, EU Group and National Differences, Japan, USA / Canada

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

☒ **The product fulfils the requirements of:** EN 62368-1:2014 + A11:2017

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 ES1
Supply % Tolerance	None
Supply Connection – Type	No direct connection to Mains
Considered current rating of protective device as part of building or equipment installation	N/A, No direct connection to Mains A; N/A
Equipment mobility	for building-in
Over voltage category (OVC)	OVC I
Class of equipment	Not classified
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	25
IP protection class	IPX0
Power Systems	N/A
Altitude during operation (m)	2000 m or less
Altitude of test laboratory (m)	App 105 m
Mass of equipment (kg)	0.088
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..... :	2016-08-01, 2019-11-13
Date (s) of performance of tests..... :	2016-08-01 to 2016-09-05, 2019-11-13
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 ..... :	☒ **Yes** ☐ **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. The product employs a multilayer PWB planar transformer.

Model Differences

The GQA product is available in four mechanical configurations that both use the same transformer core set and output filter inductor core set except for the air gap and number of turns embedded in the pcb. The four mechanical configurations use the same pcb and part set, the difference between them is the physical size of the base plate that is mounted on the unit. One house-keeping transformer is used in GQA platform. The house keep magnetic is used to deliver the drive pulses and bias power across the isolation boundary from secondary to the primary side.

All models are similar except for input rating, output rating, and number of turns for the power transformer.

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

This report is based on VDE CB report 228393-CI3-1, and its amendments 1, and 2, 242708-CI3-1, 242708-TL4-1 and CB Test Certificate Ref. CB: DE1-57533, DE1-57533/A1, and DE1-57533/A2 respectively which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1, and 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 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. Only Electric Strength test (5.4.9) was repeated to 62368-1 on 2019-11-13.

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 (Tma) 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. For building in.
- 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 standards : 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 investigated Pollution Degree is : 2
- The following end-product enclosures are required : Electrical, Fire
- The output circuit is considered PS3
- Heating Test shall be evaluated in end product.
- 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.