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 .....:	E135494-A6043-CB-2
Date of issue .....:	2022-12-28
Total number of pages .....:	96
Name of Testing Laboratory preparing the Report .....:	UL VS Limited Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom
Applicant's name .....:	**TDK-LAMBDA UK LTD**
Address .....:	**KINGSLEY AVE** **ILFRACOMBE** **EX34 8ES UNITED KINGDOM**
Test specification:	
Standard .....:	IEC 62368-1: 2018
Test procedure .....:	CB Scheme
Non-standard test method .....:	N/A
TRF template used .....:	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No. .....:	IEC62368_1E
Test Report Form(s) Originator ...:	UL(US)
Master TRF .....:	Dated 2022-04-14

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Test Item Description .....:	AC-DC Power Supply
Trade Mark(s) .....:	TDK-Lambda
Manufacturer.....:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM
Model/Type reference .....:	DRB480-24-1-xyz DRB480-48-1-xyz where x, y, z may be any letter or digit or blank, considered non safety relevant information, see model differences
Ratings .....:	INPUT: 100-240VAC, 5.4A, 50/60Hz OUTPUT: DRB480-24-1-xyz: 24-26.4Vdc, 20-18.2A (max 480W) DRB480-48-1-xyz: 48-52.8 Vdc, 10-9.09A (max 480W)

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**		
Testing location/ address .....:		UL VS Limited, Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom	
Tested by (name, function, signature).....:		Hubert Koszewski / Project Handler	
Approved by (name, function, signature) ..:		Jan J. Jensen / Reviewer	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address .....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature) ..:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address .....:			

Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
☐ **Testing procedure: CTF Stage 3:**		
☐ **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 (28 pages)
Enclosures (73 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing Location:** **CBTL: UL VS Limited, Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom**
4.4.3.2, T.3 – STEADY FORCE TEST, 30 N FOR SAFEGUARD THAT ACTS AS FIRE ENCLOSURE/BARRIER ONLY	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
5.2.2.1-5.2.2.6 – CLASSIFICATION OF ELECTRICAL ENERGY SOURCES	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
5.4.1.8 – DETERMINATION OF WORKING VOLTAGE	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
5.4.9.1 – ELECTRIC STRENGTH TEST – TYPE TESTING OF SOLID INSULATION	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
5.5.2.2 – CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
5.7.5 – TOUCH CURRENT MEASUREMENT – EARTHED ACCESSIBLE CONDUCTIVE PARTS – SINGLE-PHASE EQUIPMENT ON TN OR TT SYSTEM	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
6.2.2.2, 6.2.2.3 – POWER MEASUREMENTS	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
B.2.5 – INPUT TEST: SINGLE PHASE	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
B.2.6, 5.4.1.4, 6.3, 9.3, B.1.5 – NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
B.3 – SIMULATED ABNORMAL OPERATING CONDITIONS	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
B.4 – SIMULATED SINGLE FAULT CONDITIONS	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
F.3.10 – TEST FOR THE PERMANENCE OF MARKINGS	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.
G.5.3.3 – TRANSFORMER OVERLOAD	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.

R.1-R.4 - LIMITED SHORT CIRCUIT TEST	Conducted in Report E135494-A109 . Test performed according to IEC/UL 60950-1 2nd ed. Compliance criteria equivalent to UL/IEC 62368-1 3rd ed no additional evaluation required.
T.2, 5.4.2.6, 5.4.3.2, G.15.2.6 – STEADY FORCE TEST, 10 N	Conducted in original investigation. Test performed according to IEC/UL 62368-1 2nd ed. Compliance criteria equivalent to 3rd ed no additional evaluation required.

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, CSA/UL 62368-1:2019

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

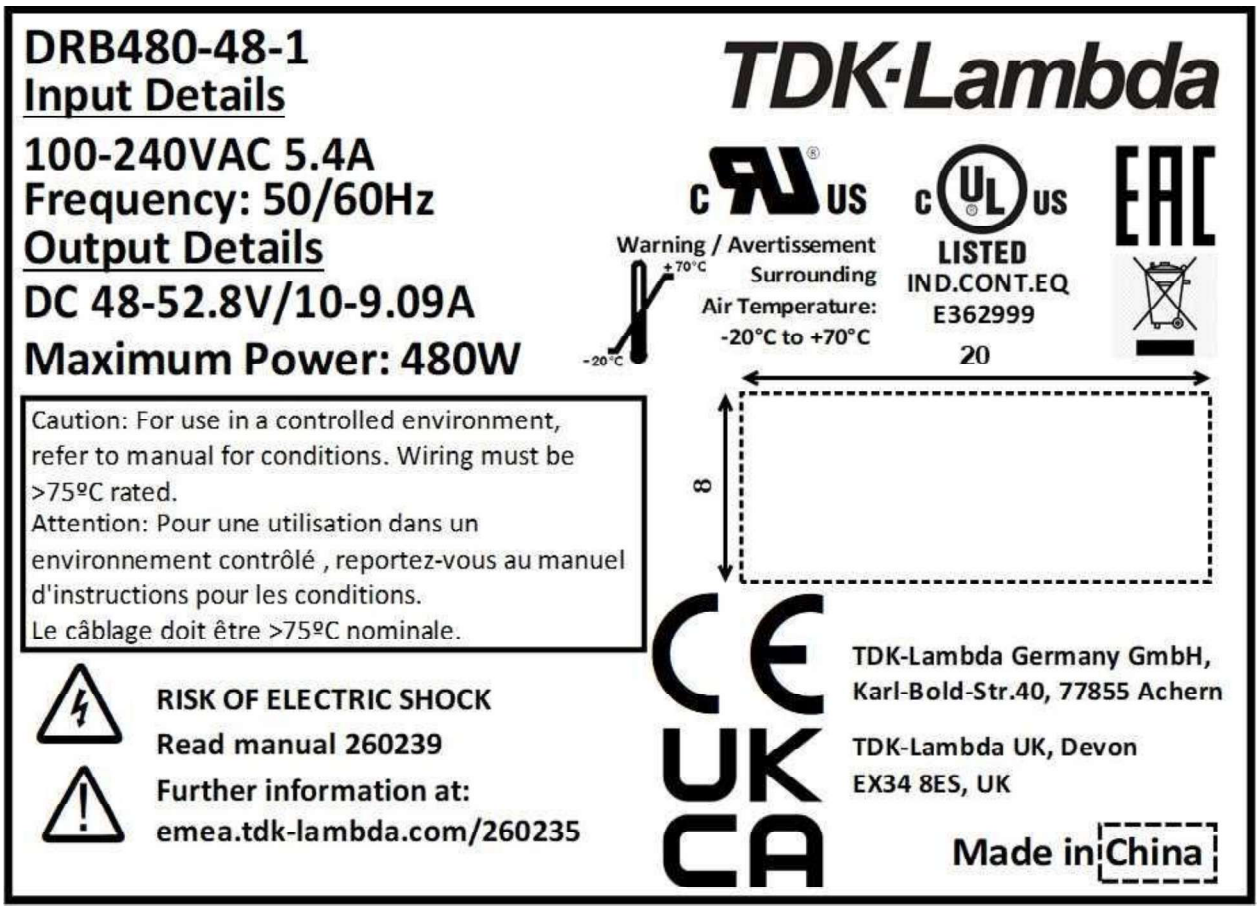
Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE. IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

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

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	Skilled person
Supply Connection	AC Mains
Supply tolerance	+10%/-10%
Supply connection – type	mating connector
Considered current rating of protective device	20 A; Location: building
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Special installation location	N/A 0
Pollution degree (PD)	PD 2
Manufacturer's specified Tma (°C)	50 (at 480W max. output power); 70 (derate linearly down to 300W)
IP protection class	IPX0
Power systems	TN TT
Altitude during operation (m)	3000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	1.18
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 .....:	2020-06-09
Date (s) of performance of tests .....:	2020-07-03 to 2020-07-07
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) ..... : PANYU TRIO MICROTRONICS CO LTD
SHIJI INDUSTRIAL ESTATE
DONGYONG
NANSHA
GUANGZHOU
GUANGDONG 511453 CHINA

General product information and other remarks:

Product Description

Device is AC/DC switch mode power supply for building-in on DIN rail.

Model Differences

suffix '-xyz' is optional and denotes customer-specific variant (like fixed voltage or no LED), and is deemed not safety relevant.

Model DRB480-48-1 is mechanically and electrically identical to model DRB480-24-1, except for:

-different output ratings

-different transformer TX1, output choke L5

-different FET on ASSY1

-passive elements in SELV circuit to accommodate different output ratings

-changed PWB layouts -- the safety relevant part (spacings, PE path) remain unchanged,

Primary side of all models is strictly identical.

- May be prefixed by SP followed by / or – (SP represents a sales code)

Additional Information

DERATING INFORMATION:

Max. Output power: 480W up to 50°C, derate linearly down to 300W at 70°C. See manual.

Marking label is representative of entire variants.

Reissue 1:

This report is a reissue of CBTR Ref. No.: E135494-A6043-CB-1 issued 2020-07-20 with Amendment 1 dated 2022-11-29 and CB Test Certificate Ref. DK-100174-UL with the following changes:

- test report updated to the latest edition of the standard IEC 62368-1:2018

Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 50°C (full load), 70°C (with derating)
- The product is intended for use on the following power systems : TT, TN
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply : +10%/-10%
- The equipment disconnect device is considered to be : to be determined in End Product
- The following were investigated as part of the protective earthing/bonding : Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- 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
- Capacitors are rated for 230V due to the IT power system used in Norway. Further evaluation may be required in the end use product.
- Multilayer PWB's accepted under CBTR Ref. No. E349607-A23 dated 2014-07-31 and letter report, see enclosure 8-08 of this report. See enclosure 7-03 for rationale for waived tests.

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 : Earthing Continuity, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-Earthed Dead Metal: 326 Vrms, 584 Vpk, Primary-SELV: 264 Vrms, 550 Vpk
- The following output circuits are at ES1 energy levels : Output of DRB480-24 series
- The following output circuits are at ES2 energy levels : Output of DRB480-48 series
- The following output circuits are at PS3 energy levels : All outputs
- The maximum investigated branch circuit rating is : 20A
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required
- An investigation of the protective bonding terminals has : Been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral : J7-2
- The following end-product enclosures are required : Mechanical, Fire, Electrical
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : Transformer T1 (class 155°C), Coil L4 (class 155°C), Coli L1 (class 155°C)
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : metal housing (85.8°C) - additional requirements for accessibility to be evaluated in end product.
- The power supply was evaluated to be used at altitudes up to : 3000 m