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-A6025-CB-1
Date of issue.....:	2020-04-30
Total number of pages .....:	82
Applicant's name.....:	**TDK-LAMBDA UK LTD**
Address .....:	**KINGSLEY AVE** **ILFRACOMBE** **EX34 8ES UNITED KINGDOM**
Name of Test Laboratory preparing the Report .....:	UL International Polska Sp. z o.o. Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland
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.
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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.

Test Item description :	AC-DC Power Supply
Trade Mark .....:	TDK Lambda
Manufacturer .....:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM
Model/Type reference .....:	DRF240-24-1/xyz; DRF240-24-1/HL-xyz DRF240-24-1/HLIVS-xyz DRF240-24-1/HLSLC-xyz (where x, y and z can be ST, BAT or any alphanumeric character or blank and is non safety related information); /HL - designates model provided with coating. /HLIVS - designates models with DC HV input /HLSLC - customized model without front cover
Ratings .....:	Input: 100-240 Vac; 2.7 A max.; 50/60 Hz Output: 24-28 Vdc / 10-8.6A, 240 W max /HLIVS model only: Additional input ratings: 108-145Vdc Output: 22.5-24.5Vdc 10-9.4A 240 W max /HLSLC model only: Output: 25.6 - 30Vdc 8A max 240W

Testing procedure and testing location:			
☒	CB Testing Laboratory:		
Testing location/ address ..... :		UL International Polska Sp. z o.o., Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland	
Tested by (name + signature).....:		Piotr A. Bizunowicz / Project Handler	
Approved by (name + signature).....:		Hubert Koszewski / 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 ..... :		
Tested by (name + signature).....:		
Witnessed by (name + signature).....:		
Approved by (name + signature) .....:		
☐ 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 (46 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing Location:** **CBTL: UL International Polska Sp. z o.o., Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland**
STEADY FORCE TEST, 30 N (4.4.4.2, ANNEX T.3)	See enclosure 7-07 for detail
CLASSIFICATION OF ELECTRICAL ENERGY SOURCES (5.2, 5.7)	See enclosure 7-07 for detail
TEST FOR HYGROSCOPIC MATERIALS (5.4.1.3)	See enclosure 7-07 for detail
MAXIMUM OPERATING TEMPERATURE FOR MATERIALS, COMPONENTS AND SYSTEMS (5.4.1.4, 6.2, 9.2.5 ANNEX B.2)	See enclosure 7-07 for detail
DETERMINATION OF WORKING VOLTAGE (5.4.1.8)	See enclosure 7-07 for detail
BALL PRESSURE TEST (5.4.1.10.3)	See enclosure 7-07 for detail
HUMIDITY CONDITIONING (5.4.8)	See enclosure 7-07 for detail
ELECTRIC STRENGTH TEST (5.4.9)	See enclosure 7-07 for detail
SAFEGUARDS AGAINST CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR (5.5.2.2)	See enclosure 7-07 for detail
PROTECTIVE BONDING CONDUCTORS: LIMITED SHORT CIRCUIT TEST (5.6.4, Annex R)	See enclosure 7-07 for detail
RESISTANCE OF THE PROTECTIVE BONDING SYSTEM (5.6.6.2)	See enclosure 7-07 for detail
PROSPECTIVE TOUCH VOLTAGE AND TOUCH CURRENT MEASUREMENT (5.7)	See enclosure 7-07 for detail
NORMAL OPERATING CONDITIONS TEMPERATURE TEST (6.3)	See enclosure 7-07 for detail
INPUT TEST: SINGLE PHASE (B.2.5)	See enclosure 7-07 for detail
SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)	See enclosure 7-07 for detail
SIMULATED SINGLE FAULT CONDITIONS (B.4)	See enclosure 7-07 for detail
TEST FOR THE PERMANENCE OF MARKINGS (ANNEX F.3.10)	See enclosure 7-07 for detail
TRANSFORMER OVERLOAD (ANNEX G.5.3.3)	See enclosure 7-07 for detail
LIMITED SHORT CIRCUIT TEST (ANNEX R.1, 5.6.4.1, 5.6.4.4, 5.6.5.1)	See enclosure 7-07 for detail
STEADY FORCE TEST, 10 N (ANNEX T.2 , 5.4.2.6, 5.4.3.2, G.15.3.6)	See enclosure 7-07 for detail

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, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom

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

Copy of Marking Plate - Refer to Enclosure titled Marking Plate for copy.

TEST ITEM PARTICULARS:	
Classification of use by	Skilled person, Instructed person
Supply Connection	AC Mains DC Mains --
Supply % Tolerance	85-264Vac, (108-145Vdc /HLIVS model only)
Supply Connection – Type	n/a (for building-in, terminal block suitable for field wiring)
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	70
IP protection class	IP X0, (IP20 declared by manufacturer)
Power Systems	TN TT IT - 230 V L-L
Altitude during operation (m)	up to 3000 m
Altitude of test laboratory (m)	less than 2000 m
Mass of equipment (kg)	approx. 0.86 kg
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..... :	2019-09-24, 2019-11-27, 2020-03-10
Date (s) of performance of tests..... :	2020-03-16 to 2020-03-17
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 MALAYSIA SDN BHD LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR BARU JAYA GADING 26070 KUANTAN PAHANG 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 switching power supply (DIN rail type) for use in Information Technology Equipment, provided with terminal blocks suitable for field wiring. The unit is intended for building-in. The temperature testing was performed in vertical application according to manufacturer specification.

Output voltage can be adjusted from 24V to 28V (total output power max. 240W).

Circuit characteristics:

The equipment contains primary circuit and secondary (SELV) circuit and represents hazardous energy level.

Model Differences

Models DRF240-24-1/xyz and DRF240-24-1/HL-xyz are identical except model with suffix HL is provided with coating.

Models with suffix ST & BAT are identical and differ from standard model by Overcurrent Protection Circuit (the same PWB, different values of components in secondary circuit). The OCP for DRF240-24-1/ST or DRF240-24-1/BAT is reduced to rated output load condition (8.6A to 10A max.). Additionally OCP shutdown function is removed.

Model /HLIVS is similar to model /HL, except input fuse, extended INPUT rating to include DC range, minor changes in SELV circuit.

Model /HLSLC is identical to HL, except for it does not have front cover

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

Maximum Normal Load:

@ 60°C: 24 Vdc / 10 A; Max. output power: 240 W

@ 60°C: 28 Vdc / 8.6 A; Max. output power: 240 W

@ 70°C: 24 Vdc / 7.5 A; Max. output power: 180 W

@ 70°C: 28 Vdc / 6.45 A; Max. output power: 180 W

Power supply has been additionally tested with duty cycle defined as peak output current 12.86A for 4 seconds and resting time 7.43 seconds at 4.91A load, which equals total rms power 240 W.

This report is based on previously conducted testing (as listed below) and the review of product construction of original report E135494-A94-UL last revised 2017-02-10.

Refer to Section “Test performed (name of test and test clause)” and enclosure 7-07 covering all applicable performance tests and rationale for waived tests.

Technical Considerations

- 1.2 The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer’s specification of: 60 °C (full load 240W) and 70°C (with derating 75%, load 180W).
- 1.3 The means of connection to the mains supply is: to be evaluated in end product (only field wiring evaluated).
- 1.4 The product is intended for use on the following power systems: TT, TN, IT
- 1.5 The equipment disconnect device is considered to be: part of end product evaluation whether device or installation instructions are provided.
- 1.11 The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- 1.13 The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- 1.21 LEDs provided in the product are considered low power narrowband devices (exempt group).
- The following scope limitations apply to this test report and are confirmed by Applicant to be covered separately. Additional evaluation and/or tests may be required when submitting this CB Report to a National Certification Body (NCB) to obtain a national mark:
  1) no EMC tests nor evaluation to EMC Directive 2004/108/EC and 2014/30/EU,
  2) no evaluation to RoHS Directives 2002/95/EC, 2011/65/EU and (EU) 2016/585,
  3) no evaluation to Council Recommendation 1999/519/EC nor 2006/25/EC,
  4) only English version of markings and instructions provided and reviewed,
  5) no evaluation to Directive 96/29/Euratom.

Engineering Conditions of Acceptability

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

- Power supply has been additionally tested for intermittent operation. See Additional Information in the beginning of this test report and Enclosure 7-04 for details. Additional duty cycle marking to be evaluated in end product
- The Clearances and Creepage Distances have additionally been assessed for suitability up to 3 000 m elevation.
- 1.2 The following Production-Line tests are conducted for this product: Electric Strength
  Earthing Continuity
- 1.3 The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Secondary: 318.9 Vrms, 527 Vpk
  Primary-Earthed Dead Metal: 310.6 Vrms, 416 Vpk
- 1.5 The following secondary output circuits are ES1: DC output and signal outputs
- 1.6 The following secondary output circuits are PS3 (hazardous energy levels): DC Output
- 1.7 The following secondary output circuits are PS2 (non-hazardous energy levels): signal outputs
- 1.10 The following output terminals were referenced to earth during performance testing: Secondary "-" (minus) during Working Voltage Measurement test
- 1.11 The power supply terminals and/or connectors are: Suitable for field wiring

- 1.12 The maximum investigated branch circuit rating is: 20 A
- 1.13 The investigated Pollution Degree is: 2
- 1.15 Proper bonding to the end-product main protective earthing termination is: Required
- 1.16 An investigation of the protective bonding terminals has: Been conducted
- 1.17 The following input terminals/connectors must be connected to the end-product supply neutral: terminal block CN1, pin marked with "N"
- 1.18 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): T101 (Class F), T401 (Class F)
- 1.19 The following end-product enclosures are required: Mechanical, Fire, Electrical