



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-A6041-CB-1
Date of issue.....	2020-04-30
Total number of pages	83

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
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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

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General disclaimer:

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Test Item description	: DIN-rail AC-DC Power Supply	
Trade Mark	: TDK Lambda TDK·Lambda	
Manufacturer	: TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM	
Model/Type reference	: DRF480-24-1-xyz; DRF480-24-1/HL-xyz DRF480-24-1/HLIVS-xyz (Where x, y and z can be any alphanumeric character or blank and is non safety related information.)	
Ratings	: For DRF480-24-1-xyz and DRF480-24-1/HL-xyz INPUT: 100-240Vac, 50/60Hz, max 5.4A; OUTPUT: 24-28Vdc, 20-15.4A, max. power 480W For DRF480-24-1/HLIVS: INPUT: AC 100-240V 50-60Hz, max 5.4A DC 108V-145V, max 5.4A OUTPUT: 24Vdc, 20A, max. power 480W	
Testing procedure and testing location:		
<input checked="" type="checkbox"/>	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)		

<input type="checkbox"/>	Testing procedure: CTF Stage 2	
Testing location/ address..... :		
Tested by (name + signature).....:		
Witnessed by (name + signature).....:		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: CTF Stage 3	
<input type="checkbox"/>	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 (98 pages)

Summary of testing:

Tests performed (name of test and test clause):

STEADY FORCE TEST, 30 N (4.4.4.2, ANNEX T.3)

CLASSIFICATION OF ELECTRICAL ENERGY SOURCES (5.2, 5.7)

TEST FOR HYGROSCOPIC MATERIALS (5.4.1.3)

MAXIMUM OPERATING TEMPERATURE FOR MATERIALS, COMPONENTS AND SYSTEMS (5.4.1.4, Annex B.2)

DETERMINATION OF WORKING VOLTAGE (5.4.1.8)

BALL PRESSURE TEST (5.4.1.10.3)

HUMIDITY CONDITIONING (5.4.8)

ELECTRIC STRENGTH TEST (5.4.9)

SAFEGUARDS AGAINST CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR (5.5.2.2)

PROTECTIVE BONDING CONDUCTORS: LIMITED SHORT CIRCUIT TEST (5.6.4, Annex R)

RESISTANCE OF THE PROTECTIVE BONDING SYSTEM (5.6.6.2)

PROSPECTIVE TOUCH VOLTAGE AND TOUCH CURRENT MEASUREMENT (5.7)

INPUT TEST: SINGLE PHASE (B.2.5)

Testing Location:

CBTL: UL International Polska Sp. z o.o., Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland

Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 for detail.

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SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)	Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 for detail.
SIMULATED SINGLE FAULT CONDITIONS (B.4)	Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 for detail.
TEST FOR THE PERMANENCE OF MARKINGS (ANNEX F.3.10)	Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 for detail.
TRANSFORMER OVERLOAD (ANNEX G.5.3.3)	Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 for detail.
LIMITED SHORT CIRCUIT TEST (ANNEX R.1, 5.6.4.1, 5.6.4.4, 5.6.5.1)	Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 for detail.
STEADY FORCE TEST, 10 N (ANNEX T.2 , 5.4.2.6, 5.4.3.2, G.15.3.6)	Some test results approved from previous investigation to IEC60950-1, see enclosure 7-04 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	+10%/-10%
Supply Connection – Type	Unit for building-in, to be determined in End product
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 (for building-in)
Pollution degree (PD)	PD 2
Manufacturer’s specified maximum operating ambient (°C)	70, with derating above 60
IP protection class	IPX0
Power Systems	TN TT IT - 230 V L-L dc mains
Altitude during operation (m)	3000 m
Altitude of test laboratory (m)	below 2000 m
Mass of equipment (kg)	1.34
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..... :	2020-09-24, 2019-11-27
Date (s) of performance of tests..... :	2020-03-16 to 2020-03-17
GENERAL REMARKS:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
Manufacturer’s Declaration per sub-clause 4.2.5 of IEC60068-2-1:	

<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>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable</p>
<p>When differences exist; they shall be identified in the General product information section.</p>	
<p>Name and address of factory (ies)</p>	<p>TDK-LAMBDA MALAYSIA SDN BHD LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR BARU JAYA GADING 26070 KUANTAN PAHANG MALAYSIA</p>
<p>GENERAL PRODUCT INFORMATION:</p>	
<p>Report Summary</p> <p>All applicable tests according to the referenced standard(s) have been carried out.</p>	
<p>Product Description</p> <p>Device is Switch-mode Power supply module to be mounted on DIN-rail. Input and output have screw terminals.</p>	
<p>Model Differences</p> <p>Model name "DRF480-24-1" may be appended by alphanumeric suffix, which is not safety-relevant.</p> <p>Model DRF480-24-1/HL-xyz is identical to model DRF480-24-1-xyz except model with suffix HL is provided with coating.</p> <p>Model DRF480-24-1/HLIVS-xyz is similar to DRF480-24-1/HL-xyz except it has additional circuitry to limit output voltage and has no output voltage adjustment on front. Also this model can operate on DC input.</p>	
<p>Additional application considerations – (Considerations used to test a component or sub-assembly) -</p> <p>Tested maximum normal load including Duty cycle information.</p> <p>Models DRF480-24-1-xyz and DRF480-24-1/HL-xyz: @ 60°C: 24 Vdc / 20A; Max. output power: 480 W @ 60°C: 28 Vdc / 15.4A; Max. output power: 431.2 W @ 70°C: 24 Vdc / 15A; Max. output power: 360 W @ 70°C: 28 Vdc / 11.6 A; Max. output power: 324.8 W</p> <p>Power supply has been additionally tested with duty cycle defined as peak output current 28A for 4 seconds and resting time 8 seconds at 12 A load, which equals total rms power 455 W.</p> <p>Model DRF480-24-1/HLIVS-xyz: @ 60°C: 24 Vdc / 20A; Max. output power: 480 @ 70°C: 24 Vdc / 15A; Max. output power: 360 W this model is not rated for intermittent operation with temporal overload.</p>	

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of : 70 °C with derating of 2.5%/°C between 60 and 70 °C.
- The product is intended for use on the following power systems : TT, TN, IT, DC mains supply
- The equipment disconnect device is considered to be : part of end product evaluation whether device or installation instructions are provided
- 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 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, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-SELV: 403 Vrms, 560 Vpk, Primary-Earthed Dead Metal: 264 Vrms, 480 Vpk.
- The maximum investigated branch circuit rating is : 20 A
- 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 : terminal block CN1, pin marked with "N"
- The following end-product enclosures are required : Mechanical, Electrical, Fire
- 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 155, T401 class 155
- The Clearances and Creepage Distances have additionally been assessed for suitability up to 3000m elevation.