Test Report issued under the responsibility of:

TEST REPORT

IEC 60950-1

Information technology equipment – Safety – Part 1: General requirements

Report Number. .....:	T223-0265/17
Date of issue .....:	2017-06-28
Total number of pages.....	215 pages
Applicant's name.....:	TDK-Lambda UK Ltd.
Address .....:	Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, United Kingdom
Test specification:	
Standard.....:	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
Test procedure.....:	CB Scheme
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC60950_1F
Test Report Form(s) Originator.....:	SGS Fimko Ltd
Master TRF .....:	Dated 2014-02

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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 .....:	DIN Rail Power Supply
Trade Mark .....:	TDK-Lambda
Manufacturer.....:	TDK-Lambda UK Ltd. Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, United Kingdom
Model/Type reference.....:	DRF480-24-1-xyz; DRF480-24-1/HL-xyz; DRF480-24-1/HLIVS (Where x, y and z can be any alphanumeric character or blank and is non safety related information.) HL – designates model provided with coating.
Ratings .....:	DRF480-24-1-xyz and DRF480-24-1/HL-xyz: Input: 100-240 Vac; 5,4 A; 50/60 Hz Output: 24-28 Vdc / 20-15,4 A; Max. output power: 480 W DRF480-24-1/HLIVS: Input: 100-240 Vac / 108-145 Vdc; 5,4 A; 50/60 Hz Output: 24 Vdc; 20 A; Max. output power: 480 W

Testing procedure and testing location:			
☒	**CB Testing Laboratory:**	SIQ Ljubljana SIQ Ljubljana is accredited by Slovenian Accreditation with accreditation number LP-009 in the field of testing	
Testing location/ address.....:		Tržaška c. 2, SI-1000 Ljubljana Slovenia	
☐	**Associated CB Testing Laboratory:**		
Testing location/ address.....:			
Tested by (name + signature).....:		Luka Košir	
Approved by (name + signature).....:		Branko Lamovšek	
☐	**Testing procedure: TMP/CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Approved by (name + signature).....:			
☐	**Testing procedure: WMT/CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name + signature).....:			
Approved by (name + signature).....:			
☐	**Testing procedure: SMT/CTF Stage 3 or 4:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name + signature).....:			
Approved by (name + signature).....:			
Supervised by (name + signature).....:			

List of Attachments:

1. National Differences – Enclosure No. 1 (41 pages)
2. European Group Differences and National Differences according to EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011 – Enclosure No. 1a (21 pages)
3. Pictures – Enclosure No. 2 (8 pages)
4. Schematics, Layouts, Transformer data - Enclosure No. 3 (51 pages)
5. Additional test data – Enclosure No. 4 (7 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
1.6.2 Input Test **1.7.11 Durability** **2.1.1.5 Energy Hazard Measurements** **2.1.1.7 Capacitance Discharge Test** **2.2.2 SELV: Hazard Voltage (Circuit) Measurement Test** **2.2.3 SELV Reliability testing** **2.6 Earthing Test, earth trace test (UL PAG)** **2.9.2 Humidity Test** **2.10.2 Working Voltage measurement on PCB and Transformer** **2.10.3/2.10.4 Clearance and Creepage distance measurement** **2.10.5 Distance Through Insulation measurement** **4.2.2-4.2.4 Steady force test, 10N** **4.5.2 Heating (Temperature) Test** **4.5.5 Resistance to abnormal heat (Ball pressure test)** **5.1 Touch Current and protective conductor current** **5.2 Electric Strength Test** **5.3 Abnormal Operating Tests foreseeable misuse:** **SELV reliability and failure in the voltage regulation** **Functional insulation,** **Component faults** **Overload and short at the outputs , Air holes closed**	**SIQ Ljubljana, Tržaška c. 2, SI-1000 Ljubljana, Slovenia**

Summary of compliance with National Differences

List of countries addressed:

Argentina**, Australia, Austria***, Bahrain**, Belarus**, Belgium***, Brazil**, Bulgaria***, Canada, China, Cyprus***, Colombia**, Croatia**, Czech Republic***, Denmark***, Finland***, France***, Germany***, Greece***, Hungary***, India**, Indonesia**, Iran**, Ireland***, Israel, Italy***, Japan*, Kazakhstan**, Kenya**, Korea, Lybia**, Malaysia**, Mexico**, Netherlands***, New Zealand*, Norway***, Pakistan**, Poland***, Portugal***, Romania***, Russian Federation**, Saudi Arabia**, Serbia**, Singapore**, Slovakia***, Slovenia***, South Africa**, Spain***, Sweden, Switzerland, Thailand**, Turkey***, Ukraine**, United Arab Emirates**, United Kingdom, Uruguay**, USA, Vietnam**

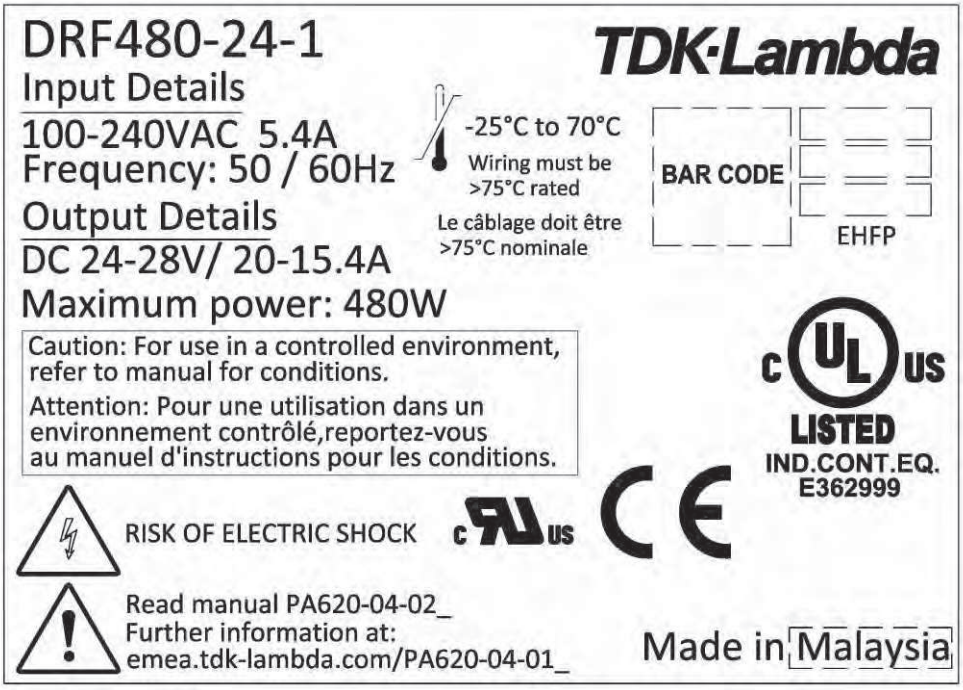
* No national differences to IEC 60950-1:2005 (2nd edition) (+ A1 + A2) declared

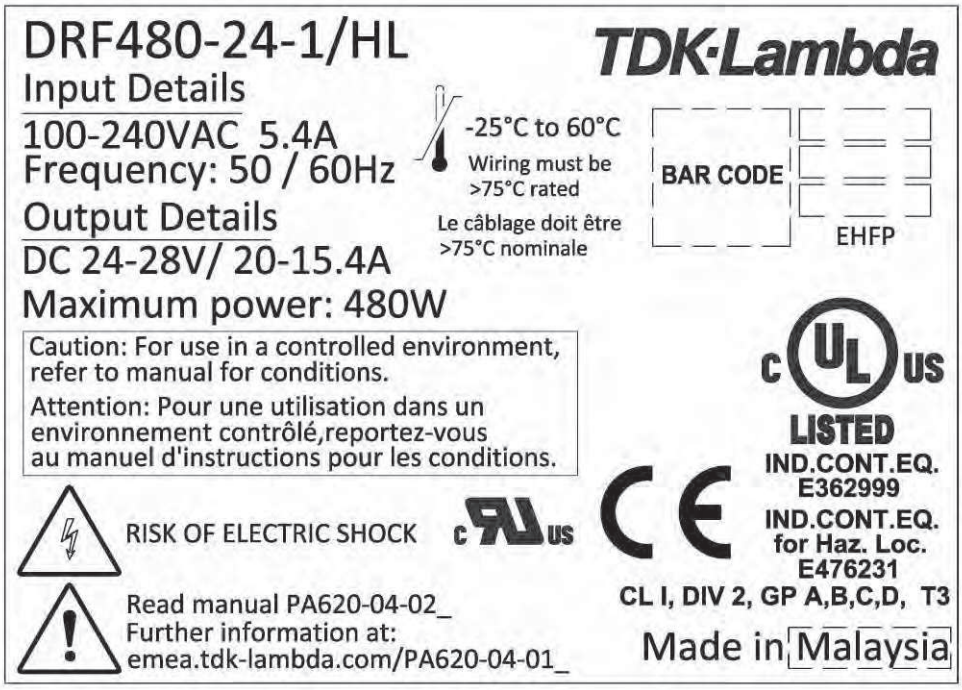
** No national differences to IEC 60950-1:2005 (2nd edition) + A1 + A2 or IEC 60950-1:2001 (1st edition) declared
*** EU group differences

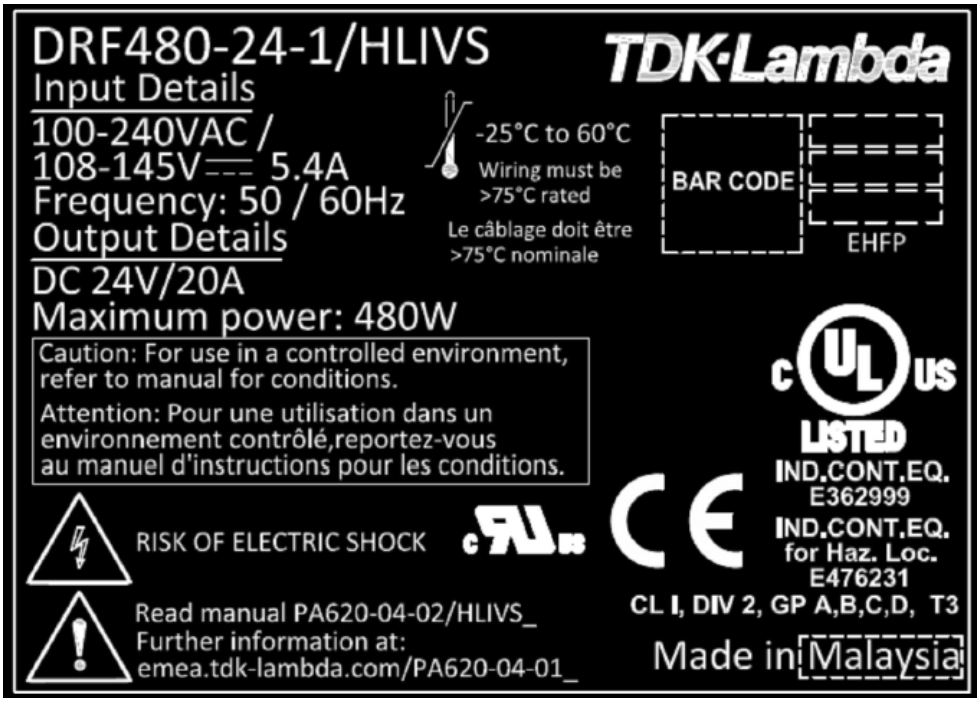
☒ **The product fulfils the requirements of EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011 (see Enclosure No. 1a).**

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.






DRF480-24-1/HLIVS
TDK·Lambda
Input Details
100-240VAC /
108-145V⎓ 5.4A
Frequency: 50 / 60Hz
Output Details
DC 24V/20A
Maximum power: 480W
-25°C to 60°C
Wiring must be >75°C rated
Le câblage doit être >75°C nominale
BAR CODE
EHFP
Caution: For use in a controlled environment, refer to manual for conditions.
Attention: Pour une utilisation dans un environnement contrôlé,reportez-vous au manuel d'instructions pour les conditions.
c UL us
LISTED
IND.CONT.EQ.
E362999
IND.CONT.EQ.
for Haz. Loc.
E476231
CL I, DIV 2, GP A,B,C,D, T3
RISK OF ELECTRIC SHOCK
Read manual PA620-04-02/HLIVS_
Further information at:
emea.tdk-lambda.com/PA620-04-01_
Made in Malaysia

Test item particulars ..... :	
Equipment mobility ..... :	[] movable [] hand-held [] transportable [] stationary [x] for building-in [] direct plug-in
Connection to the mains ..... :	[] pluggable equipment [] type A [] type B [] permanent connection [] detachable power supply cord [] non-detachable power supply cord [x] not directly connected to the mains
Operating condition ..... :	[x] continuous [] rated operating / resting time:
Access location ..... :	[] operator accessible [] restricted access location [x] service access area
Over voltage category (OVC) ..... :	[] OVC I [x] OVC II [] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values ..... :	85-264 Vac For DRF480-24-1/HLIVS also 108-145 Vdc
Tested for IT power systems ..... :	[x] Yes [] No
IT testing, phase-phase voltage (V) ..... :	230 V phase-phase (Norway)
Class of equipment ..... :	[x] Class I [] Class II [] Class III [] Not classified
Considered current rating of protective device as part of the building installation (A) ..... :	16 A (for Europe), 20 A (for Canada and US)
Pollution degree (PD) ..... :	[] PD 1 [x] PD 2 [] PD 3
IP protection class ..... :	IP20
Altitude during operation (m) ..... :	Up to 3000
Altitude of test laboratory (m) ..... :	300
Mass of equipment (kg) ..... :	Approx. 1,23

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 ..... :	2013-05-07
Date(s) of performance of tests ..... :	From 2013-07-12 to 2014-01-13

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 Malaysia SDN. BHD.
Lots 2&3 Kawasan Perindustrian Bandar Baru Jaya Gading, Kuantan MY-26070, Pahang Darul Makmur, Malaysia

General product information:
Information about the Product:
The equipment is a switching power supply (DIN rail type) for the use in Information Technology Equipment. The unit is intended for building-in. The temperature testing was performed in vertical application according manufacturer specification.

Output voltage can be adjusted from 24 V to 28 V (total output power max. 480 W).

Connection to the supply:
Pillar type terminal block for AC input and DC output
The PSU is for use in equipment with permanent connection to the supply.

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

Engineering Considerations:

Maximum operating ambient temperature:
60°C at 100% load (480 W)
70°C at 75% load (360 W)

DRF480-24-1/HLIVS model is identical as DRF480-24-1-xyz. Difference exist in non-adjustable output (24 V only). In addition is provided with OVP (see documentation in enclosure No.3 DRF480-24-1/HLIVS model for details).

Explanation of the test program:

The component was tested according to the standard IEC 60950-1:2005 (2nd Edition) + A1:2009 + A2:2013 and/or EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011 (which includes all European national differences, including those specified in this test report).

Additionally the component was also evaluated according to the standards CSA C22.2 No. 60950-1:2007 + A1:2011 + A2:2014 and UL60950-1:2007 (2nd Edition) + A1:2011 + A2:2014 and fulfils the requirements of these standards.

1. The products were tested to be suitable for connection to 20 A branch circuit. The unit is approved for TN mains and IT mains with 230 Vac phase to phase voltage.

2. Output of the unit is separated from mains by reinforced insulation and rated SELV, hazardous energy level.

3. Disconnect device is end product consideration.

4. Safety Instructions: Built in product, safety instructions are end product considerations. Manufacturer specifications provided.

5. The input and output terminals are suitable for factory and field wiring.

6. The power supply is rated class I. The power supply shall be properly bonded to the main protective bonding termination in the end product. The earth leakage current is below 3,5 mA. An investigation of the protective bonding terminal has been conducted.

7. The Transformers T101 & T401 provide reinforced insulation. These transformers are built up to fulfil the requirement of insulation class F and provide in addition a UR (OBJY2) insulation system (see also list of safety critical components).

8. The equipment has been evaluated for use in a Pollution Degree 2 and overvoltage category II environment and a maximum altitude of 3000 m.

9. A suitable Electrical and Fire enclosure shall be provided in the end equipment.

10. The product was evaluated for a maximum ambient of 60°C at full load and 70°C with derating (60°C to 70°C derate linearly to 75% load). Temperature test was performed in vertical orientation, 20 mm above bench without additional forced air.

11. Approval within the end product: Leakage current measurement should be verified with the unit built into the end product. The temperature should be measured on the following components within the application:

History Sheet:

Date	Report No.	Change/Modification	Rev. No.
2014-08-19	T223-0486/13	Initial report issued.	-
2017-01-17	T223-0530/16	Test report updated to IEC 60950-1:2005 (Second Edition) + A1:2009 + **A2:2013** and EN 60950-1:2006 + A1:2010 + **A2:2013** + A11:2009 + A12:2011 No additional test were considered necessary.	1.0
2017-06-28	T223-0265/17	Administrative update only. List of critical components was updated due to EOL of some components. No additional test were considered necessary.	2.0

Abbreviations used in the report:

- normal conditions	**N.C**.	- single fault conditions	**S.F.C**
- functional insulation	**OP**	- basic insulation	**BI**
- double insulation	**DI**	- supplementary insulation	**SI**
- between parts of opposite polarity	**BOP**	- reinforced insulation	**RI**

Indicate used abbreviations (if any)