



Test Report issued under the responsibility of:



**TEST REPORT**  
**IEC 60950-1**  
**Information technology equipment – Safety –**  
**Part 1: General requirements**

Report Number. ....: T223-0035/16

Date of issue .....: 2016-02-01

Total number of pages..... 191 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

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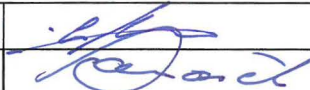
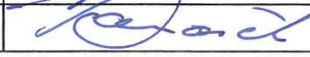
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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**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.

<b>Test item description .....</b>	DIN Rail Power Supply	
<b>Trade Mark .....</b>	TDK-Lambda	
<b>Manufacturer.....</b>	TDK-Lambda UK Ltd. Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, United Kingdom	
<b>Model/Type reference.....</b>	DRF120-24-1-xyz; DRF120-24-1/HL-xyz (Where x, y and z can be any alphanumeric character or blank and is non safety related information.) HL – designates model provided with coating.	
<b>Ratings .....</b>	Input: 100-240 Vac; 1,5 A; 50/60 Hz Output: 24-28 Vdc / 5-4,3 A; Max. output power: 120 W	
<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	SIQ Ljubljana <small>Testing Laboratory is accredited by Slovenian Accreditation, Reg. No.: LP-009</small>
<b>Testing location/ address .....</b>		Tržaška c. 2, SI-1000 Ljubljana Slovenia
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		Luka Košir 
<b>Approved by (name + signature).....</b>		Branko Lamovšek 
<input type="checkbox"/>	<b>Testing procedure: TMP/CTF Stage 1:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		
<b>Approved by (name + signature).....</b>		
<input type="checkbox"/>	<b>Testing procedure: WMT/CTF Stage 2:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature).....</b>		
<input type="checkbox"/>	<b>Testing procedure: SMT/CTF Stage 3 or 4:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature).....</b>		
<b>Supervised by (name + signature).....</b>		

<p><b>List of Attachments:</b></p> <ol style="list-style-type: none"> <li>1. Test Report (83 pages)</li> <li>2. National Differences – Enclosure No. 1 (41 pages)</li> <li>3. 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)</li> <li>4. Pictures – Enclosure No. 2 (7 pages)</li> <li>5. Schematics, Layouts, Transformer data - Enclosure No. 3 (34 pages)</li> <li>6. Additional test performed by manufacturer request – Enclosure No. 4 (5 pages)</li> </ol>	
<p><b>Summary of testing:</b></p>	
<p><b>Tests performed (name of test and test clause):</b></p> <p>1.6.2      <b>Input Test</b></p> <p>1.7.11      <b>Durability</b></p> <p>2.1.1.5      <b>Energy Hazard Measurements</b></p> <p>2.1.1.7      <b>Capacitance Discharge Test</b></p> <p>2.2.2      <b>SELV: Hazard Voltage (Circuit) Measurement Test</b></p> <p>2.2.3      <b>SELV Reliability testing</b></p> <p>2.6      <b>Earthing Test, earth trace test (UL PAG)</b></p> <p>2.9.2      <b>Humidity Test</b></p> <p>2.10.2      <b>Working Voltage measurement on PCB and Transformer</b></p> <p>2.10.3/2.10.4 <b>Clearance and Creepage distance measurement</b></p> <p>2.10.5      <b>Distance Through Insulation measurement</b></p> <p>4.2.2-4.2.4 <b>Steady force test, 10N</b></p> <p>4.5.2      <b>Heating (Temperature) Test</b></p> <p>4.5.5      <b>Resistance to abnormal heat (Ball pressure test)</b></p> <p>5.1      <b>Touch Current and protective conductor current</b></p> <p>5.2      <b>Electric Strength Test</b></p> <p>5.3      <b>Abnormal Operating Tests foreseeable misuse:</b></p> <p><b>SELV reliability and failure in the voltage regulation, Functional insulation, Component faults, Overload and short at the outputs, Air holes closed</b></p>	<p><b>Testing location:</b></p> <p><b>SIQ Ljubljana, Tržaška c. 2, SI-1000 Ljubljana, Slovenia</b></p>

**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 (2<sup>nd</sup> edition) (+ A1 + A2) declared

\*\* No national differences to IEC 60950-1:2005 (2<sup>nd</sup> edition) + A1 + A2 or IEC 60950-1:2001 (1<sup>st</sup> 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.

**DRF120-24-1**

**Input Details**  
**100-240VAC 1.5A**  
**Frequency: 50 / 60Hz**

**Output Details**  
**DC 24-28V/5-4.3A**

**Maximum power: 120W**

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.

**TDK-Lambda**

-25°C to 60°C  
 Wiring must be >75°C rated  
 Le câblage doit être >75°C nominale

BAR CODE

EHFP

**LISTED**  
 IND.CONT.EQ. E362999  
 IND.CONT.EQ. for Haz. Loc. E476231

CL I, DIV 2, GP A,B,C,D, T4

Made in Malaysia

**RISK OF ELECTRIC SHOCK**

Read manual PA618-04-02\_ Further information at: [emea.tdk-lambda.com/PA618-04-01\\_](http://emea.tdk-lambda.com/PA618-04-01_)

**DRF120-24-1/HL**

**Input Details**  
**100-240VAC 1.5A**  
**Frequency: 50 / 60Hz**

**Output Details**  
**DC 24-28V/5-4.3A**

**Maximum power: 120W**

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.

**TDK-Lambda**

-25°C to 60°C  
 Wiring must be >75°C rated  
 Le câblage doit être >75°C nominale

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<b>Test item particulars</b> .....	
<b>Equipment mobility</b> .....	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
<b>Connection to the mains</b> .....	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input checked="" type="checkbox"/> not directly connected to the mains
<b>Operating condition</b> .....	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
<b>Access location</b> .....	<input type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> service access area
<b>Over voltage category (OVC)</b> .....	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
<b>Mains supply tolerance (%) or absolute mains supply values</b> .....	85-264 Vac
<b>Tested for IT power systems</b> .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>IT testing, phase-phase voltage (V)</b> .....	230 V phase-phase (Norway)
<b>Class of equipment</b> .....	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
<b>Considered current rating of protective device as part of the building installation (A)</b> .....	16 A (for Europe), 20 A (for Canada and US)
<b>Pollution degree (PD)</b> .....	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
<b>IP protection class</b> .....	IP20
<b>Altitude during operation (m)</b> .....	Up to 3000
<b>Altitude of test laboratory (m)</b> .....	300
<b>Mass of equipment (kg)</b> .....	Approx. 0,61

<b>Possible test case verdicts:</b>	
- 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)

<b>Testing</b> .....	
<b>Date of receipt of test item</b> .....	2013-06-18
<b>Date(s) of performance of tests</b> .....	From 2013-06-21 to 2013-10-09

<b>General remarks:</b>	
"(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 <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.	

**Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60950-1:**

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. 120 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 does not represents a hazardous energy level (< 240 VA).

**Engineering Considerations:**

Maximum operating ambient temperature:  
 60°C at 100% load (120 W)  
 70°C at 75% load (90 W)

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.

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 (2<sup>nd</sup> 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 star connections 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 non hazardous energy level (< 240 VA).
3. Disconnect device is end product consideration.

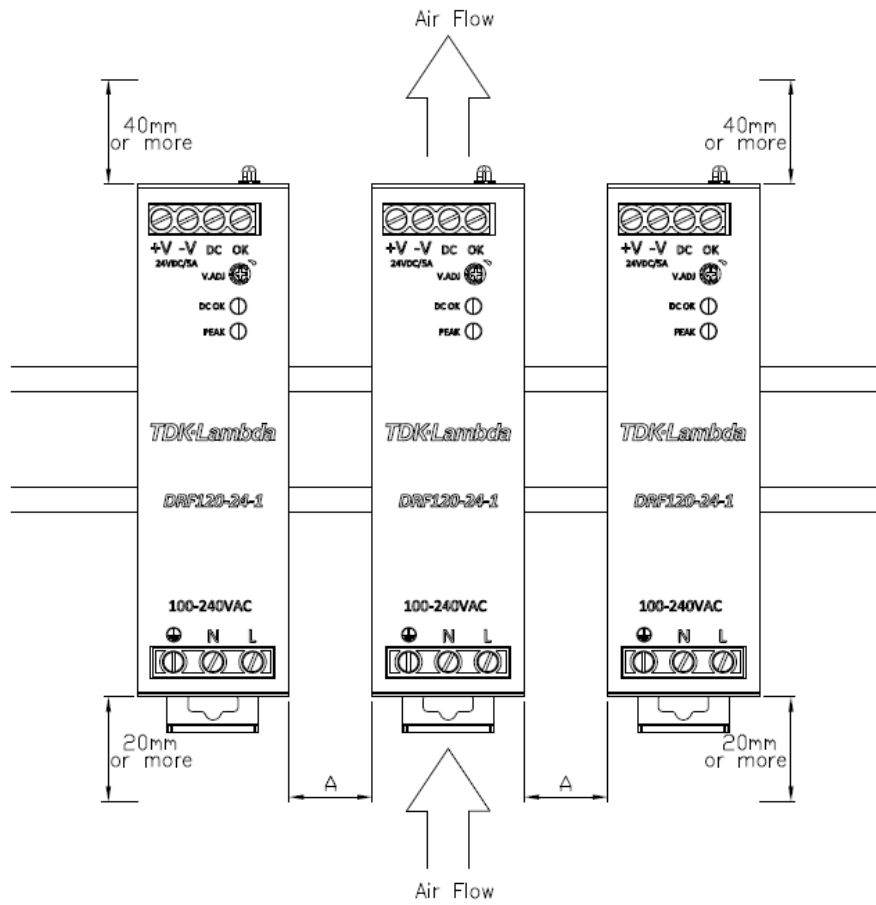
4. Safety Instructions: Built in product, safety instructions are end product considerations
5. The input and output terminals are suitable for factory and field wiring.
6. The power supply is rated class I. The power supply shall be properly bonded to the main protective bonding termination in the end 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.

History Sheet:

Date	Report No.	Change/Modification	Rev. No.
2014-08-19	T223-0425/13	Initial report issued.	-
2016-02-01	T223-0035/16	Test report updated to IEC 60950-1:2005 (Second Edition) + A1:2009 + <b>A2:2013</b> and EN 60950-1:2006 + A1:2010 + <b>A2:2013</b> + A11:2009 + A12:2011 List of critical components and documentation (minor changes on the secondary side) was updated. No additional tests were considered necessary.	1.0



**Following mounting position was used during testing**



**Installation clearances:**

40mm on top, 20mm on the bottom, A=5mm on the left and right side are recommended when loaded permanently with full power. In case the adjacent device is a heat source, A=15mm clearance is recommended.

**Abbreviations used in the report:**

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

**Indicate used abbreviations (if any)**