# UL TEST REPORT AND PROCEDURE

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|---|---|
| **Standard:** | UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements)<br>CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements) |
| **Certification Type:** | Component Recognition |
| **CCN:** | QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment) |
| **Product:** | AC-DC Power Supply |
| **Model:** | DRF120-24-1-xyz, DRF120-24-1/HL-xyz,<br>Where x, y and z can be any alphanumeric character or blank and is non safety related information.<br>HL - designates model provided with coating. |
| **Rating:** | I/P: 100-240 Vac; 1.5 A; 50/60 Hz<br>O/P: 24-28 Vdc; 5-4.3 A<br>Max. power 120W |
| **Applicant Name and Address:** | TDK-LAMBDA UK LTD<br>KINGSLEY AVE<br>ILFRACOMBE<br>EX34 8ES UNITED KINGDOM |

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Prepared by: Grzegorz Goraj Reviewed by: Radoslaw Lukasiewicz

**Supporting Documentation**

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.

ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.

iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

**Product Description**

The product is a switching power supply intended for building-in, mounting on DIN rail, provided with terminal blocks suitable for field wiring. Output voltage can be adjusted from 24V to 28V with total output power max. 120W.

**Model Differences**

DRF120-24-1-xyz, DRF120-24-1/HL-xyz represent family of same construction with no differences affecting safety, model with suffix HL designates version with coating.

**Technical Considerations**

- Equipment mobility : for building-in
- Connection to the mains : n/a (for building-in, terminal block suitable for field wiring)
- Operating condition : continuous
- Access location : n/a (for building-in)
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : 85-264 Vac
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : n/a
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 20 A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0 (IP 20 declared by manufacturer)
- Altitude of operation (m) : up to 3 000 m
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : approx. 0.6 kg
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 70 ℃ with derating of 2.5%/℃ between 60 and 70 ℃.
- The means of connection to the mains supply is: to be evaluated in end product (only field wiring

evaluated)

- The product is intended for use on the following power systems: TT, TN
- 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
- LEDs provided in the product are considered low power devices: Yes

**Engineering Conditions of Acceptability**

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The following Production-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: 427 Vrms, 880 Vpk, Primary-Earthed Dead Metal: 413 Vrms, 850 Vpk
- The following secondary output circuits are SELV: 24-28Vdc and signal outputs
- The following secondary output circuits are at non-hazardous energy levels: 24-28Vdc and signal outputs
- The following output terminals were referenced to earth during performance testing: Neutral CN1-2 input terminal, "+V" (CN301-4) or "-V" (CN301-3) output terminal during Working Voltage Measurements.
- The power supply terminals and/or connectors are: Suitable for field wiring
- 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: pin2 of CN1 terminal block
- 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℃): T101 (155 ℃), T401 (155 ℃)
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: metal chassis (100.1 ℃)
- Power supply has been additionally tested for intermittent operation. See Additional Information in the beginning of this test report. 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.

**Additional Information**

Power supply has been additionally tested with duty cycle defined as peak output power 180 W for 4 seconds and resting time 7.3 seconds at 68.64 W load, which equals total rms power 120 W.

Maximum Normal Load:

A- 60℃: 24 Vdc / 5A; Max. output power: 120 W
B- 60℃: 28 Vdc / 4.3 A; Max. output power: 120 W
C- 70℃: 24 Vdc / 3.75 A; Max. output power: 90 W
D- 65℃: 24 Vdc / 4.37A; Max. output power: 105 W
E- 60℃: 24 Vdc; 7.5 A/4 sec./180 W, 2.86 A/7.43 se c./68.64 W;

**Additional Standards**

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 + A1:2011, UL 60950-1 2nd Ed. Revised 2011-12-19

**Markings and instructions**

| Clause Title | Marking or Instruction Details |
|---|---|
| Power rating - Ratings | Ratings (voltage, frequency/dc, current) |
| Power rating - Company identification | Listee's or Recognized company's name, Trade Name, Trademark or File Number |
| Power rating - Model | Model Number |
| Fuses - Rating | Rated current and voltage and type located on or adjacent to fuse or fuseholder. |
| Terminal for main protective earthing | Provided adjacent to the main protective earthing terminal (60417-5019)  |
| Terminals for external primary power supply conductors | Capital letter "N" located adjacent to a terminal intended exclusively for connection of the primary power neutral conductor |

**Special Instructions to UL Representative**

Inspect the transformer(s) listed in Production-Line Testing Requirements (Electric Strength Test Special Constructions). When the tests are conducted at other location, Inspect test record and specification sheet provided by the component manufacturer. Verify the specification sheet indicates 100% routine test specified in Production-Line Testing Requirements (Electric Strength Test Special Constructions) be conducted at the component manufacturer.

**Production-Line Testing Requirements**

**Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.**

| Model | Component | Removable Parts | Test probe location | V rms | V dc | Test Time, s |
|---|---|---|---|---|---|---|
| all | T401, T101 | n/a | input pins to output pins | 3 000 | 4 242 | 1 |

**Earthing Continuity Test Exemptions - This test is not required for the following models:**

n/a

**Electric Strength Test Exemptions - This test is not required for the following models:**

n/a

**Electric Strength Test Component Exemptions - The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:**

n/a

**Sample and Test Specifics for Follow-Up Tests at UL**

| Model | Component | Material | Test | Sample(s) | Test Specifics |
|---|---|---|---|---|---|
| n/a | -- | -- | -- | -- | -- |