

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
<b>Product:</b>	DIN-rail AC-DC Power Supply
<b>Model:</b>	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.)
<b>Rating:</b>	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
<b>Applicant Name and Address:</b>	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON 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: Piotr A. Bizunowicz, Project Handler    Reviewed by: Oliver Frohberg, Reviewer

### 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

Device is Switch-mode Power supply module to be mounted on DIN-rail.  
Input and output have screw terminals.

### Model Differences

Model name "DRF480-24-1" may be appended by alphanumeric suffix, which is not safety-relevant.

Model DRF480-24-1/HL-xyz is identical to model DRF480-24-1-xyz except model with suffix HL is provided with coating.

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.

### 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 : 85V-264Vac; 108-145Vdc for model /HLIVS
- 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) : 20A
- Pollution degree (PD) : PD 2
- IP protection class : IPX0, (IP20 declared by manufacturer)
- Altitude of operation (m) : up to 3000m
- Altitude of test laboratory (m) : below 2000m
- Mass of equipment (kg) : 1.34
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>)

permitted by the manufacturer's specification of: 70 °C with derating of 2.5%/°C between 60 and 70 °C.

- 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: 403 Vrms, 560 Vpk, Primary-Earthed Dead Metal: 264 Vrms, 480 Vpk.
- The following secondary output circuits are SELV: 24-28Vdc and signal outputs ,
- The following secondary output circuits are at hazardous energy levels: 24Vdc-28Vdc
- The following output terminals were referenced to earth during performance testing: 24Vdc negative
- 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: terminal block CN1, pin marked with "N"
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJ2 insulation system with the indicated rating greater than Class A (105°C): T101 class 155, T401 class 155,
- The following end-product enclosures are required: Mechanical, Electrical, Fire
- The Clearances and Creepage Distances have additionally been assessed for suitability up to 3000m elevation.

#### **Additional Information**

Tested maximum normal load including Duty cycle information.

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


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.

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.

**Additional Standards**

The product fulfills the requirements of: -

**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
Terminal for main protective earthing	Provided adjacent to the main protective earthing terminal (60417-5019) 

**Special Instructions to UL Representative**

Inspect the transformer(s) listed in Production-Line Testing Requirements (Electric Strength Test Special Constructions) per BD1.1. 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.