

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2014-10-14 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (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>	AC-DC Power Supply
<b>Model:</b>	DRF960-24-1-xyz where x, y and z can be any alphanumeric character or blank
<b>Rating:</b>	I/P: 200-240 Vac, 50/60 Hz, 5.1-4.3 A O/P: 24-28 Vdc, 40-34.3 A Maximum power 960 W
<b>Applicant Name and Address:</b>	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE 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 / Project handler

Reviewed by: Radoslaw Lukasiewicz / 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**

The product is AC/DC switch mode power supply for building-in and mounting on DIN rail. It has output with adjustable voltage, passive relay signal circuit. Connector X2 may be used for external or remote control of the unit.

**Model Differences**

Suffix '-xyz' is optional and denotes customer-specific variant (like fixed voltage or no LED), and is deemed not safety relevant.

**Technical Considerations**

- Equipment mobility : for building-in
- Connection to the mains : unit for building-in (field wiring terminals used)
- Operating condition : continuous
- Access location : operator accessible
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : 180-264 Vac (+10%, -10%)
- Tested for IT power systems : Yes
- IT testing, phase-phase voltage (V) : 230
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 20
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 6 000
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : 1.62
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: 50 °C with full load, 70 °C with linear de-rating above 50 °C down to 75% of full load
- The product is intended for use on the following power systems: TT, TN, IT
- The equipment disconnect device is considered to be: provided in end product

- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 (which includes all European national differences, including those specified in this test report).
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- LEDs provided in the product are considered low power devices: Yes
- The following scope limitations apply to this test report and additional evaluation and/or tests may be required when submitting this CB Report to a National Certification Body (NCB) to obtain a national mark: - no EMC tests nor evaluation to EMC Directive 2004/108/EC and 2014/30/EU - no evaluation to RoHS Directives 2002/95/EC, 2011/65/EU and (EU) 2016/585 - only English version of markings/instructions provided and reviewed
- The Clearances and Creepage Distances have additionally been assessed for suitability up to 6 000 m elevation: multiplying factor of 1.7 from Table A.2 of IEC 60664-1 was considered.

#### **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: 370 Vrms, 600 Vpk, Primary-Earthed Dead Metal: 404 Vrms, 512 Vpk
- The following secondary output circuits are SELV: all output terminals
- The following secondary output circuits are at hazardous energy levels: power output terminal
- The following output terminals were referenced to earth during performance testing: ,
- 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 XFIL1 pin 2
- 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): T2 (Class F/155 °C); T13 (class B/130 °C); L7, L8 (class F/155 °C)
- 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 housing/chassis (96.1 °C)
- Product tested for intermittent operation and adequate marking shall be provided in end-product if applicable.
- Product provided with Fuse F1, rated 250 Vac, 10A. Adjacent marking or cross-reference may be considered necessary in end-product.

#### **Additional Information**

Product Maximum Normal load defined as full load according to output ratings up to 50 °C ambient and with linear de-rating above 50 °C and up to 70 °C ambient. See Technical Considerations.

Product additionally tested for intermittent operation at the following condition: 60 A for 4 seconds and 22.8 A for 7.4 seconds with rising edge min. 50ms.

External connector provided with 2 jumpers between pins 1-2 (CB OFF) and 5-6 (CNT on).

Overall dimensions [WxHxD] approximately: 110 x 123 x 139 mm.

Load conditions (output voltage and current) when referred as A through F are defined as follows:

A - at ambient = 50 °C, continuous load: 24 Vdc, 40 A

B - at ambient = 50 °C, continuous load: 28 Vdc, 34.3 A

C - at ambient = 70 °, de-rated continuous load: 24 Vdc, 30 A

D - at ambient = 70 °, de-rated continuous load: 28 Vdc, 25.725 A

E - at ambient = 60 °, de-rated continuous load: 24 Vdc, 35 A


F - at ambient 50 °C, Intermittent operation, 4 s high/7.4s low: 24 Vdc, 60/22.8 A

All tests have been conducted on samples with T2 construction employing S-238-HT-006 wire with 3 wrapped layers. Manufacturer has replaced TIW by 3-layer extruded wire type TXXL210/38FXXX-2, Rubadue with same electrical parameters considering tolerances. The overall dimension of T2 has not been changed. Based on test results in his evaluation and details of separate IEC certification of the wire itself and UL certified Insulating System new construction of T2 transformer is deemed not affecting previous test results and therefore all tests are considered representative for revised construction.

#### Additional Standards

The product fulfills the requirements of: N/A

#### 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) 
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
Transformers	T2, T13	N/A	PRI-SELV	3000	4242	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	-	-	-	-	-