



Test Report issued under  
the responsibility of:



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

**Report Reference No** .....: E122103-A147-CB-3

Date of issue .....: 2016-09-15

Total number of pages .....: 106

**CB Testing Laboratory** .....: UL Japan, Inc.

Address .....: 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan

**Applicant's name** .....: TDK-LAMBDA CORP  
NAGAOKA TECHNICAL CENTER

Address .....: R&D DIV  
2704-1 SETTAYA-MACHI  
NAGAOKA-SHI  
NIIGATA 940-1195 JAPAN

**Test specification:**

Standard .....: IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013

Test procedure .....: CB Scheme

Non-standard test method .....: N/A

**Test Report Form No.** .....: IEC60950\_1F

Test Report Form originator .....: SGS Fimko Ltd

Master TRF .....: Dated 2014-02

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Test item description .....	Switching Power Supply
Trade Mark .....	<b>TDK-Lambda</b>
Manufacturer .....	TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN
Model/Type reference .....	RWS600B-5, RWS600B-12, RWS600B-15, RWS600B-24, RWS600B-36, RWS600B-48, EVS36-16R7, EVS57-10R6 Maybe followed by suffix "abcdefg" (a is /, b is R, c is CO2, d is FG, e is FO, f is H, g is RF or HU only for RWS600B-24; and "abcdefg" may be blank).
Ratings .....	Input: 100-240 Vac, 50-60 Hz, 6.5 A (for Model RWS600B-5) and 7.0 A (for Models RWS600B-12, RWS600B-15, RWS600B-24, RWS600B-36, RWS600B-48, EVS36-16R7, EVS57-10R6)

<b>Testing procedure and testing location:</b>	
<input checked="" type="checkbox"/> <b>CB Testing Laboratory</b>	Testing location / address .....: UL Japan, Inc. 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan
<input type="checkbox"/> <b>Associated CB Test Laboratory</b>	Testing location / address .....:
	Tested by (name + signature) .....: Toshiyuki Suzuki, Project Handler <span style="float: right;"><i>Toshiyuki Suzuki</i></span>
	Approved by (name + signature).....: Tetsuo Iwasaki, Reviewer <span style="float: right;"><i>T. Iwasaki</i></span>
<input type="checkbox"/> <b>Testing Procedure: TMP/CTF Stage 1</b>	Testing location / address .....:
	Tested by (name + signature) .....: _____
	Approved by (name + signature).....: _____
<input type="checkbox"/> <b>Testing Procedure: WMT/CTF Stage 2</b>	Testing location / address .....:
	Tested by (name + signature) .....: _____
	Witnessed by (name + signature) ...: _____
	Approved by (name + signature).....: _____
<input type="checkbox"/> <b>Testing Procedure: SMT/CTF Stage 3 or 4</b>	Testing location / address .....:
	Tested by (name + signature) .....: _____
	Approved by (name + signature).....: _____
	Supervised by (name + signature) ..: _____
<input type="checkbox"/> <b>Testing Procedure: RMT</b>	Testing location / address .....:
	Tested by (name + signature) .....: _____
	Approved by (name + signature).....: _____
	Supervised by (name + signature) ..: _____

<b>List of Attachments</b>	
National Differences (57 pages)	
Enclosures (65 pages)	
<b>Summary Of Testing</b>	
Unless otherwise indicated, all tests were conducted at UL Japan, Inc. 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan.	
<b>Tests performed (name of test and test clause)</b>	<b>Testing location / Comments</b>
Input: Single-Phase (1.6.2)	

Energy Hazard Measurements (2.1.1.5, 2.1.2, 1.2.8.10)

Capacitance Discharge (2.1.1.7)

SELV Reliability Test Including Hazardous Voltage Measurements (2.2.2, 2.2.3, 2.2.4, Part 22 6.1)

Protective Bonding II (2.6.3.4, 2.6.1)

Humidity (2.9.1, 2.9.2, 5.2.2)

Determination of Working Voltage; Working Voltage Measurement (2.10.2)

Thin Sheet Material (2.10.5.9, 2.10.5.10, 2.10.5.6)

Transformer and Wire /Insulation Electric Strength (2.10.5.13)

Heating (4.5.1, 1.4.12, 1.4.13)

Ball Pressure (4.5.5, 4.5)

Touch Current (Single-Phase; TN/TT System) (5.1, Annex D)

Electric Strength (5.2.2)

Component Failure (5.3.1, 5.3.4, 5.3.7)

Abnormal Operation (5.3.1 - 5.3.9)

Transformer Abnormal Operation (5.3.3, 5.3.7b, Annex C.1)

Power Supply Output Short-Circuit/Overload (5.3.7)

Locked-Rotor Overload for DC Motors in Secondary Circuits (Annex B.7)

**Summary of Compliance with National Differences:**

Countries outside the CB Scheme membership may also accept this report.

List of countries addressed: AR, AT, AU, BE, BY, CA, CH, CN, CZ, DE, DK, ES, EU, FI, FR, GB, HU, IL, IN, IT, JP, KR, MY, NL, NO, NZ, PL, SA, SE, SG, SI, SK, UA, US

The product fulfills the requirements of: EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

**Copy of Marking Plate** - Refer to Enclosure titled Marking Plate for copy.

<b>Test item particulars :</b>	
Equipment mobility .....	for building-in
Connection to the mains .....	N/A
Operating condition .....	continuous
Access location .....	N/A (for building-in)
Over voltage category (OVC) .....	OVC II
Mains supply tolerance (%) or absolute mains supply values .....	+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 A
Pollution degree (PD) .....	PD 2
IP protection class .....	IP X0
Altitude of operation (m) .....	Up to 3000 m
Altitude of test laboratory (m) .....	approximately 10 to 20 m
Mass of equipment (kg) .....	approximately 1.6 kg
<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>	
Date(s) of receipt of test item .....	2013-06-28, 2013-07-16, 2013-07-26, 2013-08-26, 2013-08-30, 2013-10-09, 2013-10-17, 2013-10-29, 2014-02-07, 2014-10-08, 2014-10-09, 2015-08-05, 2016-06-17, 2016-09-06
Date(s) of Performance of tests .....	2013-07-20 to 2013-09-20, 2013-10-17 to 2013-10-22, 2013-10-29, 2014-02-18 to 2014-02-25, 2014-10-16, 2014-10-17, 2014-10-22, 2015-08-07 to 2015-08-21, 2016-07-13, 2016-09-08
<b>General remarks:</b>	
<p>"(see Enclosure #)" refers to additional information appended to the report.                  "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a point is used as the decimal separator.</p>	
<b>Manufacturer's Declaration per Sub Clause 4.2.5 of IEC 60950-1:</b>	
The application for obtaining a CB Test Certificate includes more than one factory 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
When differences exist, they shall be identified in the General Product Information section.	

**Name and address of Factory(ies):**

WUXI TDK-LAMBDA ELECTRONICS CO LTD  
NO 6 XING CHUANG ER LU WUXI JIANGSU 214028 CHINA

TDK-LAMBDA MALAYSIA SDN BHD  
PLO33 KAWASAN PERINDUSTRIAN SENAI 81400 SENAI  
MALAYSIA

TDK-LAMBDA MALAYSIA SDN BHD  
LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR  
BARU JAYA GADING 26070 KUANTAN MALAYSIA

TDK-LAMBDA CORP  
2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA-KEN 940-  
1195 JAPAN

SENDAN ELECTRONICS MFG CO LTD  
1010 HABUSHIN NANTO-SHI TOYAMA-KEN 939-1756 JAPAN

ZHANGJIAGANG HUA YANG ELECTRONICS CO LTD  
TONGXIN RD ZHAOFENG ECONOMIC DEVELOPMENT ZONE  
LEYU TOWN ZHANGJIAGANG 215622 JIANGSU CHINA

ALPS LOGISTICS FACILITIES CO LTD  
593-1 NISHI-OHASHI  
TSUKUBA-SHI  
IBARAKI-KEN 305-0831 JAPAN

**GENERAL PRODUCT INFORMATION:****Report Summary**

All applicable tests according to the referenced standard(s) have been carried out.

**Product Description**

The product covered in this Test Report is building-in type switching power supply with a single output circuit.

**Output:**

5 Vdc (4.5 Vdc - 5.7 Vdc), maximum 100 A (maximum 500 W) (for RWS600B-5)  
12 Vdc (10.8 Vdc - 13.8 Vdc), maximum 50 A (maximum 600 W) (for RWS600B-12)  
15 Vdc (13.5 Vdc - 17.2 Vdc), maximum 40 A (maximum 600 W) (for RWS600B-15)  
24 Vdc (21.6 Vdc - 27.6 Vdc), maximum 25 A (maximum 600 W) (for RWS600B-24)  
36 Vdc (32.4 Vdc - 41.4 Vdc), maximum 16.7 A (maximum 601.2 W) (for RWS600B-36)  
36 Vdc (24 Vdc - 36 Vdc), maximum 16.7 A (maximum 601.2 W) (for EVS36-16R7)  
48 Vdc (43.2 Vdc - 52.8 Vdc), maximum 12.5 A (maximum 600 W) (for RWS600B-48)  
57 Vdc (48Vdc - 57 Vdc), maximum 10.6 A (maximum 604.2 W) (for EVS57-10R6)

**Model Differences**

Each model is identical, except for model designation, output rating, and secondary winding and internal construction of Transformer (T2), and secondary components.

Model EVS57-10R6 is identical to model RWS600B-48 except for output voltage, adjustable range of

overcurrent protection, adjustment of overcurrent protection by VR1 which is available for end-product manufacturer, and some minor components.

Model EVS36-16R7 is identical to model RWS600B-36 except for adjustable range of overcurrent protection, adjustment of overcurrent protection by VR1 which is available for end-product manufacturer, and some minor components.

Standard model is Terminal Block model with Chassis and Cover.

And RWS600B Series and EVS Series maybe followed by suffix "abcdefg" (a is /, b is R, c is CO2, d is FG, e is FO, f is H, g is RF or HU only for RWS600B-24; and "abcdefg" may be blank)

1. R: Model with optional ON/OFF control function.
2. CO2: Model with optional thin coating (QMJU2) on both sides of PWB.
3. FG: Model with Low Leakage (the capacitances for Primary - FG reduced).
4. FO: Model with Remote Sensing, Parallel operation, Low output voltage alarm.
5. H: Model of long hold-up time. (employing electrolytic capacitor (C7) with higher capacitance)
6. RF: Model with opposite direction and air flow of Fan and different Output Derating Curve.
7. HU: Over Current Protection is Constant current limit and hiccup with automatic recovery.

#### **Additional Information**

This report is a re-issued report of CB Test Report, Report Reference No. E122103-A147-CB-2 due to the fourth amendment, and including the following modification.

- Change of Output Derating Curve for RWS600B series.

[70°C: 20% Load -> 70°C: 50% Load]

See Enclosure Id. 7-01 for details.

Only Heating tests were deemed necessary for the above modifications.

This product has two types of PWB (Type PZA-088 and Type PZA-088C).

Each PWB is identical, except for location of Thermistor (TH1), and secondary components.

The Clearances and Creepage Distances have additionally been assessed for suitability up to 3000 m elevation.

In this Test Report, CENELEC mark license indicating compliance to EN standard was used to verify component compliance to IEC standard because the standards are technically equivalent.

UL94 Standard has requirements that meet or exceed the relevant IEC requirements.

In addition, following National Differences were considered:

- Russian Federation (RU)\*\*,
- Turkey (TR)\*\*,
- Serbia (RS)\*\*.

Note) \*\*: Only Group Differences.

#### **Technical Considerations**

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: See Enclosure Id. 7-01, 7-05 and 7-06
- The product is intended for use on the following power systems: TN, IT
- 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).

### Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

- The end-product Electric Strength Test is to be based upon a maximum working voltage of: [Model RWS600B-5] Primary - Secondary: 240 Vrms and 450 Vpk / Primary - Ground: 240 Vrms and 450 Vpk , [Model RWS600B-12] Primary - Secondary: 240 Vrms and 452 Vpk / Primary - Ground: 240 Vrms and 452 Vpk , [Model RWS600B-15] Primary - Secondary: 240 Vrms and 456 Vpk / Primary - Ground: 240 Vrms and 420 Vpk , [Model RWS600B-24] Primary - Secondary: 242 Vrms and 466 Vpk / Primary - Ground: 242 Vrms and 466 Vpk , [Model RWS600B-36 and EVS36-16R7] Primary - Secondary: 256 Vrms and 640 Vpk / Primary - Ground: 240 Vrms and 428 Vpk , [Model RWS600B-48] Primary - Secondary: 275 Vrms and 780 Vpk / Primary - Ground: 275 Vrms and 780 Vpk, [Model EVS57-10R6] Primary - Secondary: 277 Vrms and 728 Vpk / Primary - Ground: 240 Vrms and 432 Vpk
- The following secondary output circuits are SELV: Output of Models RWS600B-5, RWS600B-12, RWS600B-15, RWS600B-24, RWS600B-36, EVS36-16R7, and RWS600B-48
- The following secondary output circuits are at hazardous energy levels: Output all models.
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- 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: Not been conducted
- 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): Transformer (T2) (Class F) for Model RWS600B-5, Transformer (T2) (Class B) except for Model RWS600B-5.
- The following end-product enclosures are required: Fire
- Line to Line Capacitor C1 has maximum 1.0uF for capacitance. C1: 1.0uF was used in test. Therefore, consideration shall be given to conducting Capacitance Discharge Test in the end-product with respect to the variation in C1. --
- Line to ground Capacitors C2, C3 has maximum 2200pF for capacitance. Primary to ground Capacitor C8 have maximum 3300pF for capacitance. C2, C3: 2200pF and C8: 3300pF were used in test. Therefore, consideration shall be given in conducting Touch Current Test in the end product application with respect to the variation in C2, C3 and C8. --
- Earth terminal provided on Terminal Block (TB1) has not been evaluated as protective earthing terminal. This component is intended to be connected to a protective earth via earthed parts of end-product. If protective earthing conductor is connected to the earth terminal on Terminal Block (TB1) in the end product, Limited Short-Circuit Test per CSA C22.2 No.04 shall be conducted. (for USA/Canada) --
- Model RWS600B-5 was tested with Output Voltage Range of 4.5 - 5.7 Vdc (maximum 500 W). Model RWS600B-12 was tested with Output Voltage Range of 10.8 - 13.8 Vdc (maximum 600 W). Model RWS600B-15 was tested with Output Voltage Range of 13.5 - 17.2 Vdc (maximum 600 W). Model RWS600B-24 was tested with Output Voltage Range of 21.6 - 27.6 Vdc (maximum 600 W). Model RWS600B-36 was tested with Output Voltage Range of 32.4 - 41.4 Vdc (maximum 601.2 W). Model EVS36-16R7 was tested with Output Voltage of 24 - 36 Vdc (maximum 601.2 W). Model RWS600B-48 was tested with Output Voltage Range of 43.2 - 52.8 Vdc (maximum 600 W). Model EVS57-10R6 was tested with Output Voltage of 48-57 Vdc (maximum 604.2 W). --
- For Model EVS57-10R6; Output circuits are SELV when output voltage was set to the voltage within



the rated output voltage range. Therefore, if necessary, output voltage at the terminal of Model EVS57-10R6 shall be checked in end product. --

Abbreviations used in the report:

- |  |      |                                  |       |
|--|------|----------------------------------|-------|
| - normal condition .....                               | N.C. | - single fault condition .....   | S.F.C |
| - operational insulation .....                         | OP   | - basic insulation .....         | BI    |
| - basic insulation between parts of opposite polarity: | BOP  | - supplementary insulation ..... | SI    |
| - double insulation .....                              | DI   | - reinforced insulation .....    | RI    |

Indicate used abbreviations (if any)