



Test Report issued under the responsibility of:



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

Report Number: T223-0492/15
Date of issue: 2016-02-05
Total number of pages: 217 pages

Applicant's name: TDK-Lambda UK Ltd
Address: Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, UK

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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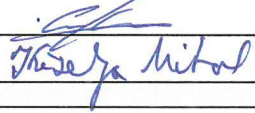
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General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description	AC DC Power Supply series for building in
Trade Mark	TDK-Lambda
Manufacturer	TDK-Lambda UK Ltd Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, UK
Model/Type reference	ZPSAx-y, where “x” stands for the output power (20 W, 40 W, 60 W); where “y” stands for the output voltage 3R3 - 48 and 12/SE
Ratings	Input: ZPSA20-y: 100-240 Vac; 0,5 A; 50-60 Hz ZPSA40-y: 100-240 Vac; 1,2 A; 50-60 Hz ZPSA60-y: 100-240 Vac; 1,4 A; 50-60 Hz Output: Voltage range 3,3-24 Vdc for 20 W Voltage range 3,3-48 Vdc for 40 W or 60 W

Testing procedure and testing location:		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	SIQ Ljubljana Testing Laboratory is accredited by Slovenian Accreditation, Reg. No.: LP-009
Testing location/ address.....:		Tržaška c. 2, SI-1000 Ljubljana Slovenia
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address.....:		
Tested by (name + signature)		Luka Košir
Approved by (name + signature)		Mihal Kiselja 
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	
Testing location/ address.....:		
Tested by (name + signature)		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2:	
Testing location/ address.....:		
Tested by (name + signature)		
Witnessed by (name + signature)		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4:	
Testing location/ address.....:		
Tested by (name + signature)		
Witnessed by (name + signature)		
Approved by (name + signature)		
Supervised by (name + signature)		

List of Attachments:

1. Test Report (113 pages)
2. National Differences – Enclosure No. 1 (41 pages)
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)
4. Pictures – Enclosure No. 2 (5 pages)
5. Schematics, Layouts, Transformer data - Enclosure No. 3 (23 pages)
6. Additional tests for standard IEC/EN61010-1 Model (ZPSA20) – Enclosure No. 4 (9 pages)

Summary of testing:

Tests performed (name of test and test clause):

- 1.6.2 Input Test
- 1.7.11 Durability
- 2.1.1.5 Energy Hazard Measurements
- 2.1.1.7 Capacitance Discharge Test
- 2.1.1.8 Energy hazards – d.c. mains supplies
- 2.2.2 SELV: Hazard Voltage (Circuit) Measurement Test
- 2.2.3 SELV Reliability testing
- 2.4 Limited Current Circuit (Bridging components)
- 2.5 Limited Power Source
- 2.9.2 Humidity Test
- 2.10.2 Working Voltage measurement on PCB and Transformer
- 2.10.3/2.10.4 Clearance and Creepage distance measurement
- 2.10.5 Distance Through Insulation measurement
- 2.10.5.6 Thin Sheet Material (barriers)
- 4.2.2-4.2.4 Steady force test, 10N
- 4.5.2 Heating (Temperature) Test
- 4.5.5 Resistance to abnormal heat (Ball pressure test)
- 5.1 Touch Current and protective conductor current
- 5.2 Electric Strength Test
- 5.3 Abnormal Operating Tests foreseeable misuse:
SELV reliability and failure in the voltage regulation,
Functional insulation, Component faults, Overload and short
and no load at the outputs, Air holes closed, Fan blocked,
Voltage Mismatch,

Testing location:

SIQ Ljubljana, Tržaška c. 2, SI-1000 Ljubljana, Slovenia

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 (2nd edition) (+ A1 + A2) declared

** No national differences to IEC 60950-1:2005 (2nd edition) + A1 + A2 or IEC 60950-1:2001 (1st edition) declared

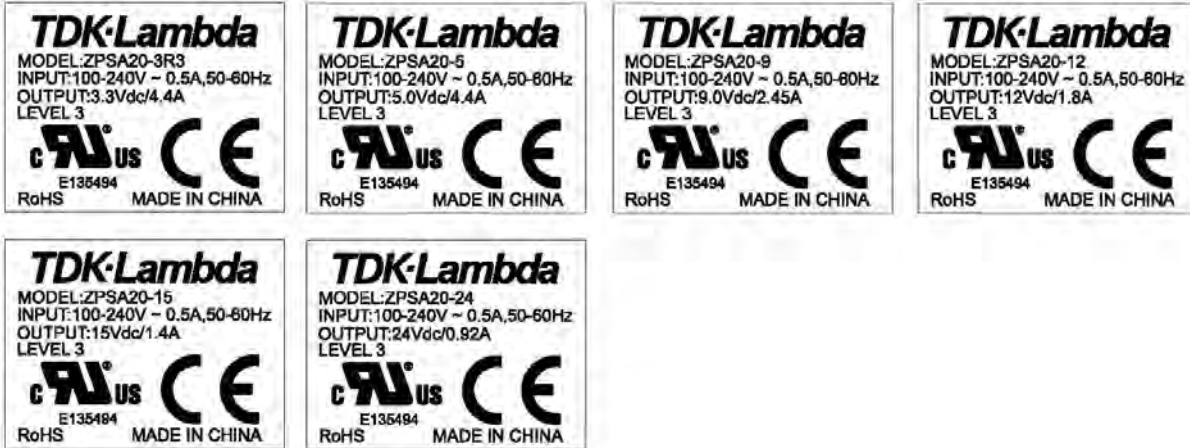
*** EU group differences

The product fulfils the requirements of EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011 (see Enclosure No. 1a).

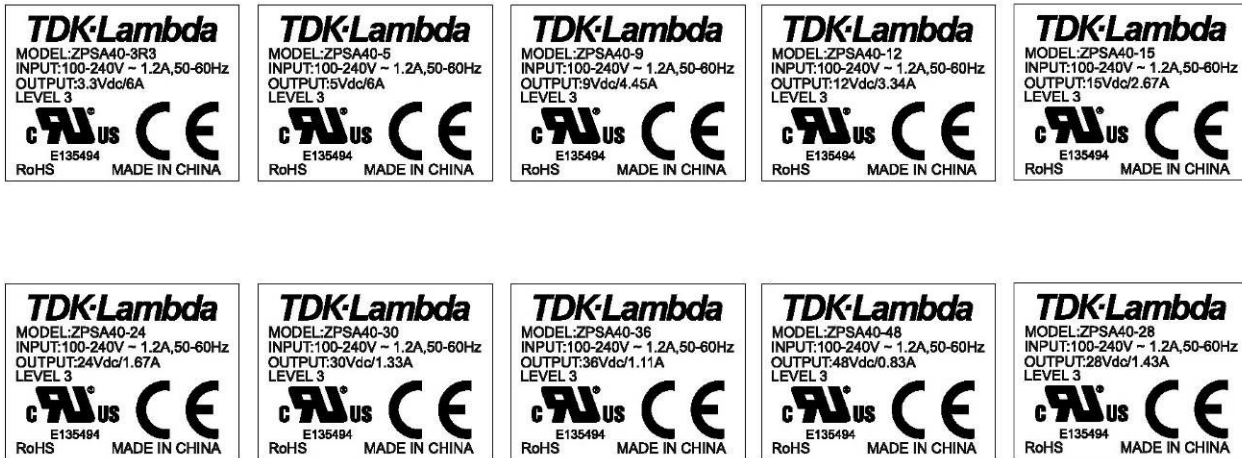
Copy of marking plate

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.

a) ZPSA20 Series:



b) ZPSA40Series:



c) ZPSA60 Series:

TDK-Lambda
 MODEL:ZPSA60-3R3
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:3.3Vdc/8A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-5
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:5Vdc/8A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-9
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:9Vdc/6.67A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-12
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:12Vdc/5A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-15
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:15Vdc/4A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-18
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:18Vdc/3.33A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-24
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:24Vdc/2.5A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-30
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:30Vdc/2A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-36
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:36Vdc/1.67A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-48
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:48Vdc/1.25A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-28
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:28Vdc/2.14A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-13R5
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:13.5Vdc/4.44A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

TDK-Lambda
 MODEL:ZPSA60-5R3
 INPUT:100-240V ~ 1.4A,50-60Hz
 OUTPUT:5.3Vdc/7.5A
 LEVEL 3

 E135494
 RoHS MADE IN CHINA

Test item particulars	
Equipment mobility	<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
Connection to the mains	<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
Operating condition	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
Access location	<input type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> service access area (for building-in)
Over voltage category (OVC)	<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:
Mains supply tolerance (%) or absolute mains supply values	90 – 264Vac
Tested for IT power systems	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
IT testing, phase-phase voltage (V)	230 Vac line to line (Norway only)
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
Considered current rating of protective device as part of the building installation (A)	16A (IEC); 20A (North America)
Pollution degree (PD)	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
IP protection class	IPX0
Altitude during operation (m)	3000m
Altitude of test laboratory (m)	300m
Mass of equipment (kg)	ZPSA20: 72 g ZPSA40, ZPSA60: 130 g

Possible test case verdicts:	
- 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)
Testing..... :	
Date of receipt of test item.....	: 2009-03-24
	2010-03-04 (Rev. No. 1)
	2010-06-01 (Rev. No. 2)
	2013-07-16; 2014-03-13 (Rev. No.4)
Date(s) of performance of tests	: From 2009-03-25 to 2009-04-10
	From 2010-04-06 to 2010-06-14 (Rev. No. 1)
	From 2010-07-26 to 2010-08-06 (Rev. No. 2)
	From 2012-07-09 to 2012-08-08 (Rev. No. 3)
	From 2013-07-06 to 2014-04-02 (Rev. No. 4)
	From 2015-12-01 to 2015-12-03 (Rev. No. 5)
General remarks:	
"(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 IECEE 02:

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) : 1) Cincon Electronics Co., Ltd

No.306, 14F, Hsin Yi Rd. Sec 4, Taipei, Taiwan, R.O.C.

2) Dongguan Cincon Electronics Limited

**No. 1 Jing Xiang Rd.
DongCheng Foreign Trade Industrial Park,
ZhuShan DongCheng District, DongGuan,
GuangDong, CN-523128, P.R. China**

3) Cincon Electronics Factory

**No.8-1 Fu Kung Rd. Fu Hsing Park, Fu Hsing
Hsiang, Chang Hua Hsien, Taiwan, R.O.C.**

General product information:

Information about the Product:

The EUT is component level switch mode power supply with a single output power and with universal input range 100-240Vac. Power supply is open frame construction provided without enclosure. Input and output connectors are provided on the PCB. Power supplies are of class I, and have protective earth terminal provided on the PCB near input connector. Output is provided with green LED indicator for "power good".

The power supply series ZPSA20-x ("x" stands for the voltage) may include any version with an output voltage between 3,3Vdc and 24Vdc. The maximum allowed output current is 4,4A and the maximum allowed output power is 20W. All versions of ZPSA20-x use identical PCB layout, electrical circuits, primary components and transformer construction. The difference of the versions is the ratio of windings of the transformer and the secondary sub-PCB. List of available versions of ZPSA20-x is in the following table.

ZPSA20-y, 20W Series, x=20 for power rating, y=3R3-24 in steps of 0,1

Models	Output voltage	Max. load
ZPSA20-3R3 (*)	3.3V	4.4A
ZPSA20-5	5V	4.4A
ZPSA20-9	9V	2.45A
ZPSA20-12	12V	1.8A
ZPSA20-15	15V	1.4A
ZPSA20-24 (*)	24V	0,92A

(*) Unless other indicated, all tests were performed on above models to represent entire series

The power supply series ZPSA40-x ("x" stands for the voltage) may include any version with an output voltage between 3,3Vdc and 48Vdc. The maximum allowed output current is 6,0A and the maximum allowed output power is 40W. All versions of ZPSA40-x use identical PCB layout, electrical circuits, primary components and transformer construction. The difference of the versions is the ratio of windings of the transformer and the secondary sub-PCB. List of available versions of ZPSA40-x is in the following table.

ZPSA40-y, 40W Series, x=40 for power rating, y=3R3-48 in steps of 0,1

Models	Output voltage	Max. load
ZPSA40-3R3	3,3 Vdc	6,0 A
ZPSA40-5 (*)	5 Vdc	6,0 A
ZPSA40-9	9 Vdc	4,45 A
ZPSA40-12	12 Vdc	3,34 A
ZPSA40-15	15 Vdc	2,67 A
ZPSA40-24	24 Vdc	1,67 A
ZPSA40-28	28 Vdc	1,43 A
ZPSA40-30	30 Vdc	1,33 A
ZPSA40-36	36 Vdc	1,11 A
ZPSA40-48 (*)	48 Vdc	0,834 A

(*) Unless other indicated, all tests were performed on above models to represent entire series

ZPSA60-y, 60W Series, x=60 for power rating, y=3R3-48 and 12/SE in steps of 0,1

Models	Output voltage	Max. load
ZPSA60-3R3	3,3 Vdc	8,0 A
ZPSA60-5 (*)	5 Vdc	8,0 A
ZPSA60-9	9 Vdc	6,67 A
ZPSA60-12	12 Vdc	5,0 A
ZPSA60-12/SE	12 Vdc	5,0 A
ZPSA60-15	15 Vdc	4,0 A
ZPSA60-24	24 Vdc	2,5 A
ZPSA60-28	28 Vdc	2,14 A
ZPSA60-30	30 Vdc	2,0 A
ZPSA60-36	36 Vdc	1,67 A
ZPSA60-48 (*)	48 Vdc	1,25 A

(*) Unless other indicated, all tests were performed on above models to represent entire series

The tests were performed on the version ZPSA60-5, which provides highest output current and on the version ZPSA60-48, which provides highest output voltage and highest output power. This was considered to cover all versions within the range as described above.

The difference between ZPSA20-x and ZPSA40-x, ZPSA60-x is in different layout, electrical circuits, primary components and transformer construction. See list of critical components and Enclosure No. 3 - Schematics, layouts and transformer drawings.

NOMENCLATURE:

ZPSAx-y, where “x” stands for the output power like 20W, 40W, 60W; where “y” stands for the output voltage 3R3 - 48 and 12/SE

Note: ZPSA60-12/SE modify TH1 (see appended table 1.5.1)

Summary of testing:

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 (2nd Edition) + A1:2011 + A2:2014 and fulfils the requirements of these standards.

- 1) The products were tested on a 20 A (USA) and a 16 A (IEC) branch circuit in series. External circuit breaker did not open during the testing. The unit provides internally one fuse in line.
- 2) All secondary output circuits are separated from mains by reinforced insulation and rated SELV non hazardous energy levels.
- 3) Outputs of following models comply with Limited Power Source (LPS) requirements:
ZPSA20-12, ZPSA20-24
- 4) Unit does not provide a disconnect device – End product consideration
- 5) Unit is intended for building-in. No operator access area.
- 6) AC supply voltage is considered as primary circuit.
- 7) Safety Instructions: Built in product, safety instructions are end product considerations
- 8) The input and output terminal are suitable for field wiring. The units could also be provided with pins for soldering to a PCB.
- 9) The PE connection of the power supply shall be done in the end product via screw to PCB of the unit. The unit is considered as class I
- 10) The transformer T1 provides reinforced insulation. This transformer is built up to fulfills the requirement of insulation class B (130 °C) and provide in addition an UR (OBJY2) insulation system (see also list of safety critical components).
- 11) The equipment has been evaluated for use in a Pollution Degree 2 and overvoltage category II environment and a maximum altitude of 2000 m.
- 12) The product was evaluated for a maximum ambient of 70 °C.

The ZPSA20 series products derate linearly from 100% load at 45°C to 37,5% load at 70°C.

The ZPSA40/60-3R3, -5, -9, -12 products derate linearly from 100% load at 40°C to 25% load at 70°C.

The ZPSA40/60-15, -24, -28, -30, -36, -48 products derate linearly from 100% load at 50°C to 50% load at 70°C. See also derating diagram on next page.