Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number ..... :	**50391186 001**
Date of issue ..... :	2020-08-10
Total number of pages ..... :	77 (excluding attachments, refer to page 3)
Applicant's name..... :	**TDK-Lambda (China) Electronics Co., Ltd.**
Address ..... :	No. 95, Zhujiang Road, Xinwu District, Wuxi 214028 Jiangsu, P.R. China
Test specification:	
Standard..... :	IEC 62368-1:2014 (Second Edition)
Test procedure ..... :	CB Scheme
Non-standard test method..... :	N/A
Test Report Form No..... :	IEC62368_1B
Test Report Form(s) Originator .. :	UL(US)
Master TRF ..... :	2014-03

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test Item description ..... :	Switching Power Supply
Trade Mark ..... :	TDK·Lambda
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	CUS250x-yzz1 (x = blank or LD; y = 3, 4, 5, 12 or 24; z = /CO2, /A or blank; z1 = alphanumeric character, symbol or blank)
Ratings ..... :	See the model list on page 10

Testing procedure and testing location:			
☒	CB Testing Laboratory:	TÜV Rheinland Shanghai Co., Ltd.	
Testing location/ address .....:		No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China	
☐	Associated CB Testing Laboratory:		
Testing location/ address .....:			
Tested by (name + signature) ..... :		Tim Song / Technical Expert	
Approved by (name + signature)..... :		Sunny Sun / Technical Reviewer	
☐	Testing procedure: TMP/CTF Stage 1		
Testing location/ address .....:			
Tested by (name + signature) .....:			
Approved by (name + signature).....:			
☐	Testing procedure: WMT/CTF Stage 2		
Testing location/ address .....:			
Tested by (name + signature) .....:			
Witnessed by (name + signature) .....:			
Approved by (name + signature).....:			
☐	Testing procedure: SMT/CTF Stage 3 or 4		
Testing location/ address .....:			
Tested by (name + signature) .....:			
Approved by (name + signature).....:			
Supervised by (name + signature) .....:			

List of Attachments (including a total number of pages in each attachment):

- ATTACHMENT – Measurement Section (4 pages)
- ATTACHMENT – National Differences (35 pages)
- ATTACHMENT – Photo documentation (5 pages)

Note: Total number of pages in each attachment is indicated in individual attachment.

Summary of testing:

Tests performed (name of test and test clause):

This report is based on original CB report 50178634 001 with certificate ref. no. JPTUV-090645 with following changes:

1. Change Applicant and Manufacturer from TDK-Lambda Corp. Nagaoka Technical Center to TDK-Lambda (China) Electronics Co., Ltd.
2. Add additional new factory TDK-Lambda (China) Electronics Co., Ltd.
3. Update test standard from IEC 60950-1 to IEC 62368-1.

All applicable tests as described in Test Case and Tables were performed.

The maximum specified operation ambient temperature is 70°C. Specified ambient temperature for operation is according to manufacturer's specification. (see chart of convection cooling on following)

Unless otherwise indicated, all tests were conducted on Models CUS250x-4zz1, CUS250x-12zz1 and CUS250x-24zz1 to represent other similar models.

The load conditions used during testing: Maximum normal load according to clause B.2.5 for this equipment is the operation with the maximum specified DC-load with maximum power condition according to the manufacturer specified.

The equipment is operated up to 3000m above sea level as declared by manufacturer. Clearances have been evaluated according to IEC 60664-1 table A.2 with a multiplication factor of 1.14 throughout this report.

The test samples are pre-production without serial numbers.

Testing location:

TÜV Rheinland Shanghai Co. Ltd.

No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China

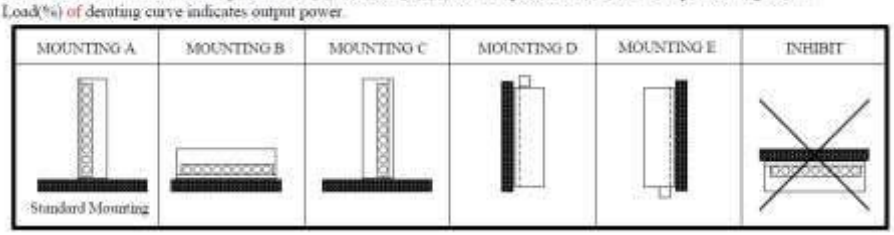
Mouting position:

5. Mounting Directions

5-1. Output Derating according to the Mounting Directions.

Recommended standard mounting method is (A). Method (B)~(E) are also possible. Refer to the output derating below.

Load(%) of derating curve indicates output power.

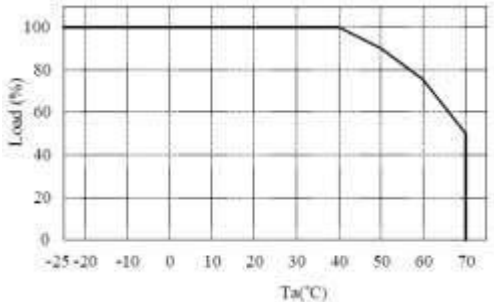


Derating Curve:

5-2. Output Derating vs Ambient temperature

Make sure that the specified temperature range is maintained.

■CONVECTION COOLING

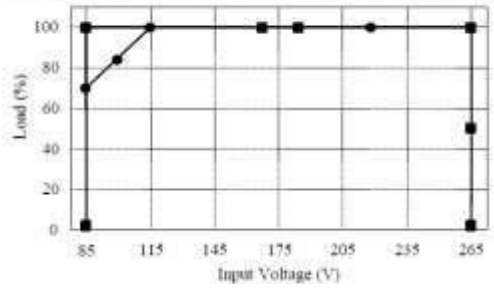


Mounting (A),(B),(C),(D),(E)

Ta [C)	Load (%)
	Mounting (A),(B),(C),(D),(E)
-25~40	100
50	90
60	75
70	50

5-3. Output Derating vs Input Voltage

Output derating is required when the PSU operate below 115VAC input. Refer to table below for details.



-3

-4,5,12,24

Input Voltage	Load(%)	
	-4, 5, 12, 24	-3
85VAC	80	100
115~265VAC	100	100

Summary of compliance with National Differences:

List of countries addressed

EU Group Differences, EU Special National Conditions, AU, CA, DK, JP, NZ, US

Explanation of used codes:

AU = Australia; CA = Canada; DK = Denmark; JP = Japan; NZ = New Zealand; US = United States of America

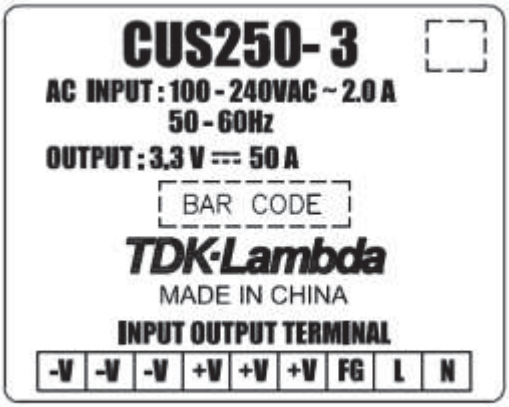
☒ **The product fulfils the requirements of**

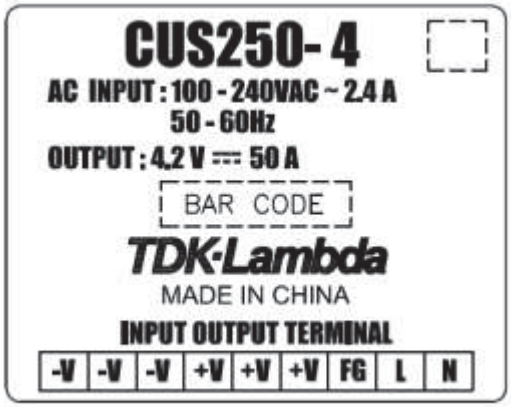
IEC 62368-1:2014 (Second Edition),
EN 62368-1:2014+A11:2017 and
CSA/UL 62368-1:2014

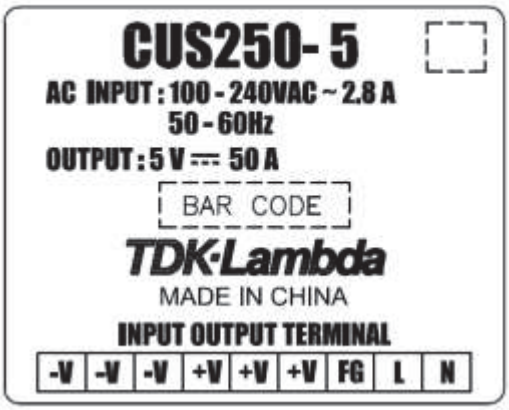
Copy of marking plate

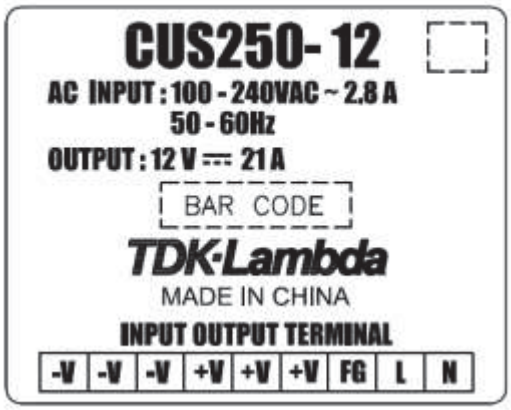
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

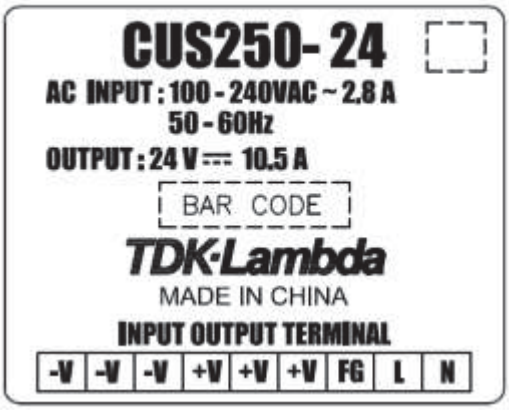
<Representative>

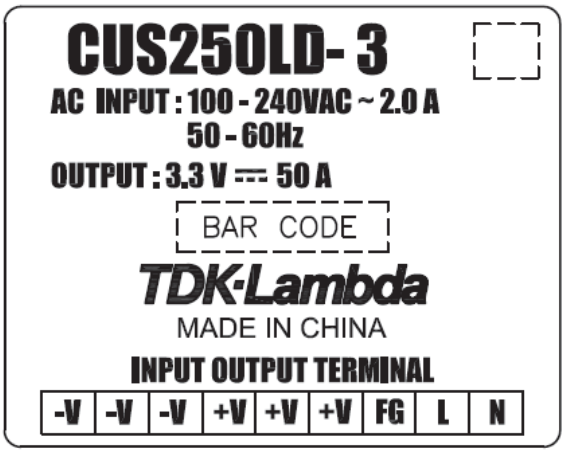


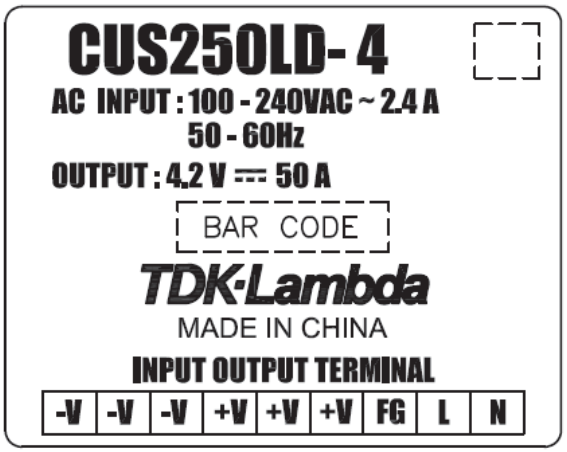


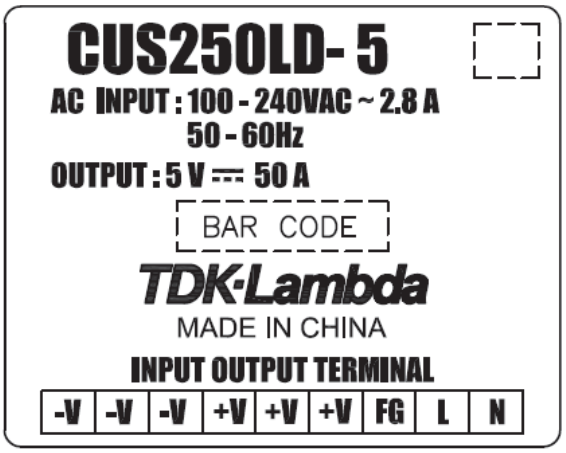


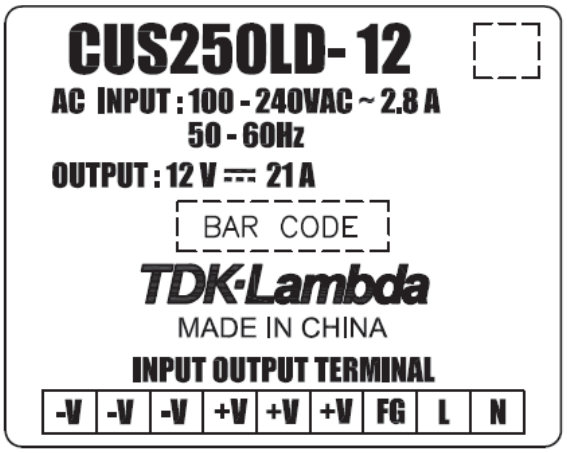


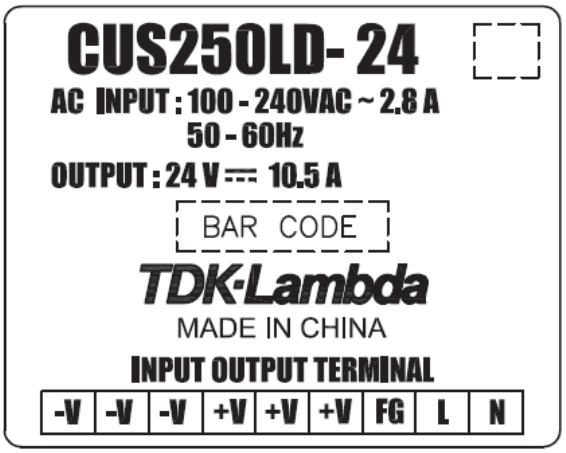


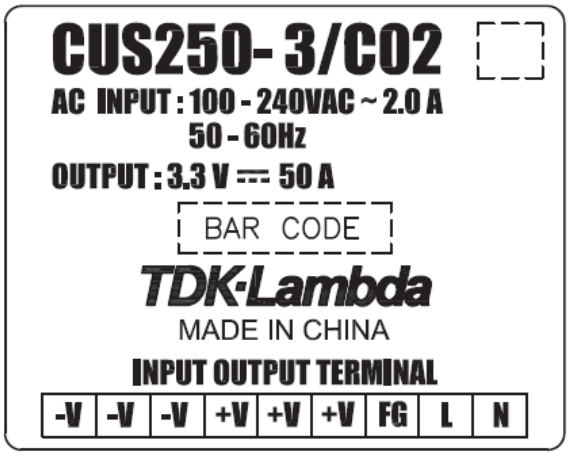

CUS250LD-3
AC INPUT : 100 - 240VAC ~ 2.0 A
50 - 60Hz
OUTPUT : 3.3 V ⎓ 50 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N

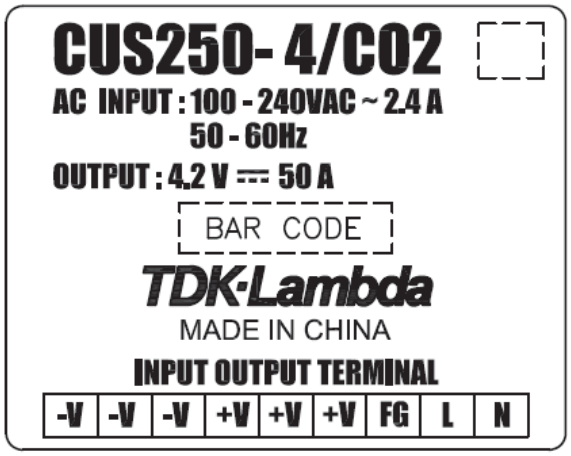

CUS250LD-4
AC INPUT : 100 - 240VAC ~ 2.4 A
50 - 60Hz
OUTPUT : 4.2 V ⎓ 50 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N

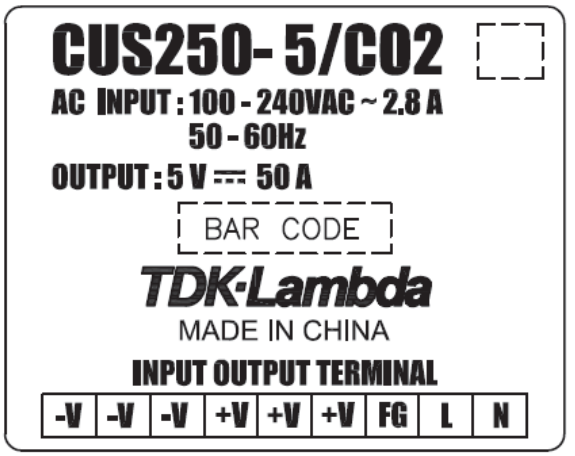

CUS250LD-5
AC INPUT : 100 - 240VAC ~ 2.8 A
50 - 60Hz
OUTPUT : 5 V ⎓ 50 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N

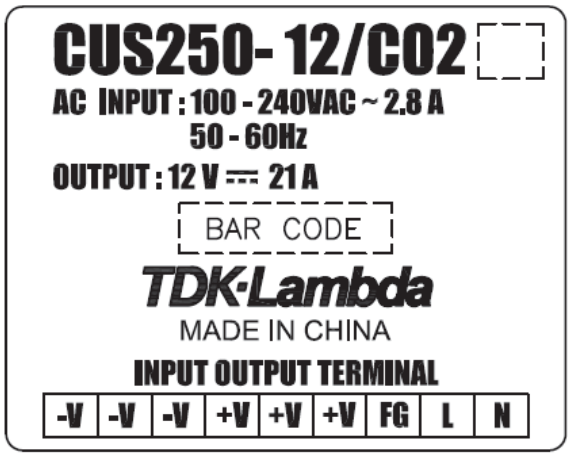

CUS250LD-12
AC INPUT : 100 - 240VAC ~ 2.8 A
50 - 60Hz
OUTPUT : 12 V ⎓ 21 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N

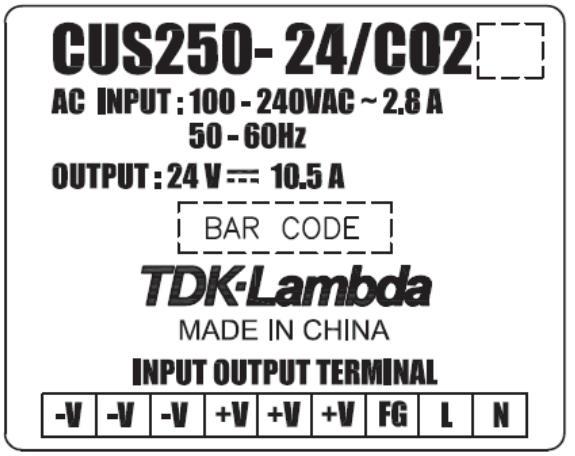

CUS250LD-24
AC INPUT : 100 - 240VAC ~ 2.8 A
50 - 60Hz
OUTPUT : 24 V ⎓ 10.5 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N


CUS250-3/C02
AC INPUT : 100 - 240VAC ~ 2.0 A
50 - 60Hz
OUTPUT : 3.3 V ⎓ 50 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N


CUS250-4/C02
AC INPUT : 100 - 240VAC ~ 2.4 A
50 - 60Hz
OUTPUT : 4.2 V ⎓ 50 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N


CUS250-5/C02
AC INPUT : 100 - 240VAC ~ 2.8 A
50 - 60Hz
OUTPUT : 5 V ⎓ 50 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N


CUS250-12/C02
AC INPUT : 100 - 240VAC ~ 2.8 A
50 - 60Hz
OUTPUT : 12 V ⎓ 21 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N


CUS250-24/C02
AC INPUT : 100 - 240VAC ~ 2.8 A
50 - 60Hz
OUTPUT : 24 V ⎓ 10.5 A
BAR CODE
TDK·Lambda
MADE IN CHINA
INPUT OUTPUT TERMINAL
-V -V -V +V +V +V FG L N

TEST ITEM PARTICULARS:	
Classification of use by..... :	☒ Ordinary person ☒ Instructed person ☒ Skilled person ☐ Children likely to be present
Supply Connection ..... :	☒ AC Mains ☐ DC Mains ☐ External Circuit - not Mains connected - ☐ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance ..... :	☒ +10%/-10% ☐ +20%/-15% ☐ None
Supply Connection – Type ..... :	☒ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☒ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☒ permanent connection ☐ mating connector ☒ other:Terminal block
Considered current rating of protective device as part of building or equipment installation.....:	16 A or 20 A (for US/CSA) Installation location: ☒ building; ☐ equipment
Equipment mobility.....:	☐ movable ☐ hand-held ☐ transportable ☐ stationary ☒ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC) .....:	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV ☐ other: _____
Class of equipment .....:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Access location .....:	☒ restricted access location ☐ N/A
Pollution degree (PD) .....:	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient .....:	70 °C
IP protection class .....:	☒ IPX0 ☐ IP___
Power Systems .....:	☒ TN ☐ TT ☒ IT - 230 V $_{L-L}$
Altitude during operation (m) .....:	☐ 2000 m or less ☒ up to 3000 m
Altitude of test laboratory (m) .....:	☒ 2000 m or less ☐ _____ m
Mass of equipment (kg) .....:	≅0.68kg (with chassis and cover)

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 .....:	2015-03-06 (15077109 001) 2018-06-29 (50178634 001) 2020-05-19 (this report)
Date (s) of performance of tests .....:	2015-03-21 to 2015-04-02 (15077109 001) 2018-08-22 (50178634 001) 2020-06-19 (this report)
GENERAL REMARKS:	
"(See Enclosure #)" refers to additional information appended to the report. **"(See ATTACHMENT #)" refers to additional information appended to the report.** **"(See appended table)" refers to a table appended to the report.** **Throughout this report a ☐ comma / ☒ 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. TDK-Lambda (China) Electronics Co., Ltd. No. 95, Zhujiang Road, Xinwu District, Wuxi 214028 Jiangsu, P.R. China 2. Zhangjiagang Hua Yang Electronics Co., Ltd. Zhao Feng Industrial Zone, Leyu Town Zhangjiagang, 215622 Jiangsu, P.R. China

GENERAL PRODUCT INFORMATION:

General product information:

The EUT is a component type switching mode power supplies intended for the class I construction of information technology equipment.

The equipment employs PCB: CCB156 (primary, PB and secondary circuits)

All models are identical, except of the turns of Transformer and the rating of some components which results in different output ratings. See Model List below for details.

For rating differences between the models see below tables:

Model	I/p voltage (Vac)	Fre. (Hz)	I/p current (A)	Minimal output	Rated output (typical)	Maximum output	Max. O/P Power
CUS250x-3zz1	100-240	50-60	2.0	2.97Vd.c.	3.3Vd.c.	3.63Vd.c.	≅165
				50A	50A	45.45A	
CUS250x-4zz1	100-240	50-60	2.4	3.78Vd.c.	4.2Vd.c.	4.62Vd.c.	≅210
				50A	50A	45.45A	
CUS250x-5zz1	100-240	50-60	2.8	4.5Vd.c.	5Vd.c.	5.5Vd.c.	≅250
				50A	50A	45.45A	
CUS250x-12zz1	100-240	50-60	2.8	10.8Vd.c.	12Vd.c.	13.2Vd.c.	≅252
				21A	21A	19.1A	
CUS250x-24zz1	100-240	50-60	2.8	21.6Vd.c.	24Vd.c.	26.4Vd.c.	≅252
				10.5A	10.5A	9.55A	

Remark:
Operating temp.: up to +70ºC (operating temperature depending on equipment's load, mounting position, for details refer to instruction manual).

Additional Information:

- The product is a component type switching power supply, the overall compliance shall be investigated in the complete end system/equipment, in particular as:
  - Fire enclosure
  - Mechanical enclosure
  - Electrical enclosure
- Some components are **pre-certified**, which have been evaluated according to the relevant requirements of IEC 62368-1, are employed in this product. Their suitability of use has been checked according to clauses 4.1.1 and 4.1.2.
- The product is to be operated up to 3000 m above sea level, the minimum clearances were multiplied by the factor given in Table A.2 of IEC 60664-1: 1.14.
- The label is draft of artwork for marking plates pending approval by National Certification Bodies and it shall not be affixed to products prior to such an approval.

Markings and Instructions

- The installation instruction contains instructions for connection to an IT power distribution system.
- Fuse Identification: F1: AC 250V T6.3AH

The product also marked with:

CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.

Definition of variable(s):

CUS250x-yzz1 (x = blank or LD; y = 3, 4, 5, 12 or 24; z = /CO2, /A or blank; z1 = alphanumeric character, symbol or blank)

Note: Suffix options would be used shown below or used together.		
Variable:	Range of variable:	Content:
x	LD or blank	blank: Standard type of model name; LD: Special type of model name base on the customer requirement.
y	3, 4, 5, 12 or 24	Denotes for different output voltage.
z	/CO2, /A or blank	/CO2 = with coating; /A = with plastic cover blank = not coating
z1	alphanumeric character, symbol or blank	For market purposes, no construction differences and no safety impact.
Additional application considerations – (Considerations used to test a component or sub-assembly) – The equipment is a component intended for incorporation in IT equipment, the overall compliance shall be investigated in the complete end system. The power supply cord set was not evaluated together with the equipment. The suitable certified power supply cord set has to be provided in the country where the equipment is sold.		

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1	
Source of electrical energy	**Corresponding classification (ES)**
Primary circuits	ES3
DC output terminal	ES1
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	**Corresponding classification (PS)**
Primary circuits	PS3
DC output	PS3
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	**Corresponding chemical**
N/A	N/A
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	**Corresponding classification (MS)**
Sharp edges and corners	MS1

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
Equipment mass – mass < 7 kg	MS1
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	**Corresponding classification (TS)**
Metal chassis	The evaluation shall be made during the final system approval
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	**Corresponding classification (RS)**
N/A	N/A

ENERGY SOURCE DIAGRAM

Indicate which energy sources are included in the energy source diagram. Insert diagram below

See “ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE”

☒ **ES** ☒ **PS** ☒ **MS** ☐ **TS** ☐ **RS**

OVERVIEW OF EMPLOYED SAFEGUARDS

Clause	**Possible Hazard**			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary (output circuit assumed to be accessible by ordinary person in end product)	ES3: Primary circuits	--	--	Isolating Transformers, Optocouplers
Ordinary (metal chassis assumed to be direct or indirect accessible by ordinary person in end product)	ES3: Primary circuits	Certified Y-Capacitor	Protectively bonding chassis	N/A
Ordinary	ES1: Output	N/A	N/A	N/A
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Combustible materials	PS3: > 100 Watt circuit (Primary circuits and Secondary circuits)	Equipment safeguards (no ignition occurs and no such temp. attained specified in 6.3.1 a)	Equipment safeguards (e.g. rated V-0 PCB, combustible material rated V-2 min., metal fire barrier or	N/A

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:				
			enclosure; see 6.4.5 and 6.4.6)	
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	MS1: Sharp edge and corners	Rounded edge and corners	N/A	N/A
Ordinary	MS1: Equipment mass – mass < 7 kg	≅0.68kg	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
Supplementary Information: (1) See attached energy source diagram for additional details. (2) “N” – Normal Condition; “A” – Abnormal Condition; “S” Single Fault				