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**TEST REPORT
IEC 60335-1
Safety of household and similar electrical appliances**

Report Number: T211-0401/22

Date of issue: 2022-08-03

Total number of pages: 339

**Name of Testing Laboratory
preparing the Report**: SIQ Ljubljana

Applicant's name: TDK-Lambda UK Ltd.

Address: Kingsley Avenue, Ilfracombe, Devon,
EX34 8ES United Kingdom

Test specification:

Standard: IEC 60335-1:2010, COR1:2010, COR2:2010, AMD1:2013,
COR1:2014, AMD2:2016, COR1:2016

Test procedure: Type test

Non-standard test method: N/A

Test Report Form No: IEC60335_1X

Test Report Form(s) Originator: Nemko AS

Master TRF: Dated 2016-10

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Test item description :	AC-DC Switch Mode Power Supply	
Trade Mark :	TDK-Lambda	
Manufacturer	TDK-Lambda UK Ltd., Kingsley Avenue, Ilfracombe, Devon, EX34 8ES United Kingdom	
Model/Type reference	CUS250M series (See model differences on pages 6-8 for details of models and nomenclature)	
Ratings	100-240 Vac; 3,1 A; 47-440 Hz (See model differences on pages 6-8 for details of ratings)	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	SIQ Ljubljana
Testing location/ address :		Mašera-Spasičeva ulica 10, SI-1000 Ljubljana, Slovenia
Tested by (name, function, signature) :		Tibor Kokelj (Service Provider)
Approved by (name, function, signature) ... :		Andrej Perko (Approved Signatory)
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address :		
Tested by (name, function, signature) :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address :		
Tested by (name + signature)		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address :		
Tested by (name, function, signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) ... :		
Supervised by (name, function, signature) :		

<p>List of Attachments (including a total number of pages in each attachment):</p> <p>Attachment No. 1: National Deviations (14 pages)</p> <p>Attachment No. 2: Technical documentation (54 pages),</p> <p>Attachment No. 3: Photos (9 pages),</p> <p>Attachment No. 4: Annex BB extract from IEC/EN 61558-2-16:2009 + A1:2013 (28 pages),</p> <p>Attachment No. 5: Heating tests (124 pages).</p>	
<p>Summary of testing:</p>	
<p>Tests performed (name of test and test clause):</p> <p>All applicable clauses – see test report for details.</p>	<p>Testing location:</p> <p>SIQ Ljubljana, Mašera-Spasičeva ulica 10, SI-1000 Ljubljana, Slovenia</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <p>CENELEC countries</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of IEC 60335-1:2010 + A1:2013 + A2:2016</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A14:2019 + A2:2019 + A15:2021</p>	

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.

CUS250M-12/U

INPUT: 100-240Vac, 47-440Hz 3.1A max

OUTPUT: 12V \approx 20.83A

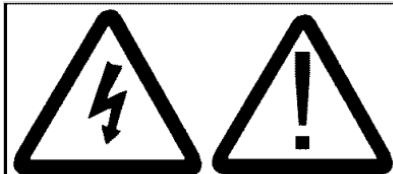
TDK-Lambda



1111111111



Made In The UK 09-Aug-21



**WARNING-This chassis
may be at a hazardous
voltage potential for
Class II installations**

Test item particulars : AC-DC Switch Mode Power Supply	
Classification of installation and use : Not classified; For use in Class I or Class II applications	
Supply Connection : Unit intended for building-in; connection to the mains to be determined in the end equipment. :	
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: (2022-03-28)	
Date (s) of performance of tests: (2022-04-25) – (2022-05-20)	
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..... :	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : 1) TDK Lambda UK Ltd., Kingsley Avenue, Ilfracombe, Devon, EX34 8ES United Kingdom 2) Panyu Trio Microtronics Co., Ltd., Shiji Industrial Estate, Dongyong, Nansha, Guangzhou, Guangdong, 511453, China	
General product information:	
Description of unit: The CUS250M is an AC-DC switch mode power supply designed for building in to end equipment in either a class I or class II configuration. It is available in the following mechanical configurations:	
<ul style="list-style-type: none"> •Standard model with integral metal baseplate, •U channel, •U channel with cover, •U channel, cover and top mounted fan, 	

•M3 inserts for underside mounting

The unit is fitted with two fuses as standard with one fuse in the live line and one in the neutral line. Option E allows for a single fuse to be fitted in the live line.

The unit can be cooled via forced air (top fan and customer air versions), convection or conduction. All variants that are not supplied with a fan are dependent on the end equipment application and therefore testing must be carried out in the end equipment to ensure compliance with the stated component temperatures listed in the “General product information and other remarks” section of this report.

For Class I construction, the power supply needs to be reliably earthed, professionally installed and fixed with suitable metal screws.

For Class II construction no earth connection is required however the power supply needs to be fixed so that it is insulated from any unearthed accessible conductive part by reinforced insulation.

Cooling for units with forced air cooling:

The following method must be used for determining the safe operation of PSUs.

The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating test must be conducted in accordance with the requirements of the standard in question. Consideration should also be given to the requirements of other safety standards.

The requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end-use equipment orientation, the position of doors & covers etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilized

CUS250M forced air cooling temperature table:

Circuit Reference	Description	Max. Temperature (°C)
L1	Common Mode Choke	110
L3	PFC Choke	125
L4	Differential Mode Choke	140
C5	Film Capacitors	105
C6, C104, XC104, XC105, XC400, XC502	Electrolytic Capacitors	85 (105)
C1	X Capacitors	110
C2, C3, C100, C102, C103	Y Capacitors	119 (125)
TX1	Transformer Winding	125
TX300	Transformer Winding	110
XU100, XU301, XU402	Opto-couplers	106 (125)
XD1, XD2, XD3, XD4	Bridge Diodes	130
XQ2	FET	130
J1	Input Connector	105

Higher temperature limits (in brackets) may be used but product life may be reduced.

Description of model differences:

The CUS250M has a maximum rated power of 250W and has two nominal output voltages of 12Vdc and

24Vdc. Output parameters are shown in the table below.

Nomenclature

Unit Product Code: CUS250M-xxVx/yyyyyy

Where: xxVx = Channel 1 output voltage from within the output voltage adjustment range from the “Output Parameters” table below

Where yyyyyy = unit options from the list of standard options below

Case Options

- Blank = Open frame (with integral baseplate)
- U = U channel
- A = U channel with cover
- F = U channel, cover and top mounted fan
- C = M3 inserts for underside mounting

Connector Options:

- Blank = JST connector
- M = Molex type connector

Fuse Options:

- Blank = Dual fuse (standard)
- E = Single fuse in live line

Signal, Standby Options:

- Blank = No options (CH1 and fan supply are standard)
- G = 5V, 0.1A standby supply, remote on/off (enable), DC_OK, AC_Fail
- J = 5V, 0.1A standby supply, remote on/off (inhibit), DC_OK, AC_Fail
- K = Remove fan supply (CH1 only)

Leakage Current Options:

- Blank = Standard leakage (<150µA)
- T = Reduced leakage current (<50µA)

Output Connector Options:

- Blank = Screw terminal
- L* = Custom option *can be any number denoting different connector type

Coating Options:

- Blank = No coating
- P = Protective coating

Example: CUS250M-24V5/UEP = 24.5V with U channel, JST connector, single fuse in the live line, no options, standard leakage and protective coating.

Unit product code may be prefixed with 'K' followed by any standard product code followed by /NNNNL where N is a string of numbers which identifies the non-standard requirement and L is an optional letter, starting with 'A' which is incremented for any customer revision.

Example: KCUS250M-24/0001A

Unit product code may be suffixed by /NNNNL where N is a string of numbers which identifies the non-standard requirement. L is an optional letter, starting with 'A', which is incremented for any customer revision.

Example: CUS250M-24/0001A

Unit product code may be suffixed by SPNN (where NN may be any number of characters indicating non-safety related model differences) (SP represents a sales code).

Example: CUS250M-24/FE/SP01

Input Parameters

Nominal Input Voltage	100 – 240 Vac
Input Voltage Range	85 – 264 Vac
Input Frequency Range	47 – 440 Hz
Maximum Input Current	3.1Arms

All ratings apply for ambient temperatures up to 50°C (see Variations and Limitations below)

Output power is reduced by 1%/V between 100V and 90Vac (225W max at 90Vac)

Output power is reduced by 2%/V between 90V and 85Vac (200W max at 85Vac)

Output Parameters

The model variants listed below may be fan, forced air, conduction or convection cooled. The output parameters are shown in the table below.

CUS250M CH1 Outputs:

Model	Vout Range (V)	Max Iout (A)	Max Pout (W)
12	12 – 13.2	20.83	250
24	24 – 26.4	10.41	250

CUS250M Standby Output:

Model	Vout Fixed (V)	Max Iout (A)	Max Pout (W)
5	5	0.1	0.5

CUS250M Fan Output:

Vout	Max
Fixed (V)	Iout (A)
11.6	0.5

Variations and Limitations:

- Customer forced air cooling max ambient: 85°C (see *Note 1*)
- Convection and conduction/cold plate cooling (U channel with cover, Option A) max ambient: 75°C (see note 1)
- Convection and conduction/cold plate cooling (U channel (U Option) and open frame) max ambient: 80°C (see note 1)
- Fan cooling max ambient: 70°C (F Option) (output power de-rated linearly by 2.5W/°C above 50°C)

Note 1: Maximum output power and current ratings are dependent on the ambient used in the end equipment. Refer to the CUS250M Handbook/Instructional manual.

Conditions of acceptability:

If enclosure of end-appliance is made of plastic material, needle flame needs to be performed.

Leakage current has not been evaluated for frequencies above 63 Hz supply and must be evaluated in the end equipment.