



Test Report issued under the responsibility of:



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

Report Number .....: E135494-A116-CB-1
Date of issue .....: 2019-11-06 ; Correction 1 : 2020-08-27
Total number of pages..... 26

Name of Testing Laboratory UL International Polska Sp. z o.o.
preparing the Report .....: Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland

Applicant's name .....: TDK-LAMBDA UK LTD
Address .....: KINGSLEY AVE
ILFRACOMBE
EX34 8ES UNITED KINGDOM

Test specification:

Standard.....: IEC 60950-1:2005, AMD1:2009, AMD2:2013
Test procedure .....: CB Scheme
Non-standard test method .....: N/A

Test Report Form No. ....: IEC60950\_1G
Test Report Form(s) Originator ....: SGS Fimko Ltd
Master TRF.....: Dated 2019-07-02

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<b>Test item description</b> ..... :	Power supply
<b>Trade Mark</b> ..... :	TDK Lambda <b>TDK-Lambda</b>
<b>Manufacturer</b> ..... :	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM
<b>Model/Type reference</b> ..... :	CUS400M series Unit product code : CUS400M-xxVx/yyyy (see model differences for detail)
<b>Ratings</b> ..... :	INPUT: 100-240Vac, 47-440Hz, max 5.75A  Output: CUS400M-12: 12Vdc 33.33A CUS400M-15: 15Vdc 26.67A CUS400M-19: 19Vdc 21.05A CUS400M-24: 24Vdc 16.67A CUS400M-28: 28Vdc 14.29A CUS400M-36: 36Vdc 11.11A CUS400M-48: 48Vdc 8.33A (max 400W forced air cooling max 250W natural convection)  Standby options: board X2, X5: 5Vdc 2A board X3, X6: 12Vdc 0.83A (max 10W)

**Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):**

<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	
<b>Testing location/ address</b> ..... :	UL International Polska Sp. z o.o., Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland	
<b>Tested by (name, function, signature)</b> ..... :	Piotr A. Bizunowicz / Project Handler	
<b>Approved by (name, function, signature)</b> .... :	Robert Dmitruk / Reviewer	

**Testing procedure: CTF Stage 1:**

<b>Testing location/ address.....:</b>		
<b>Tested by (name, function, signature).....:</b>		
<b>Approved by (name, function, signature)....:</b>		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	
<b>Testing location/ address.....:</b>		
<b>Tested by (name + signature) .....</b>		
<b>Witnessed by (name, function, signature) .:</b>		
<b>Approved by (name, function, signature)....:</b>		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	
<b>Testing location/ address.....:</b>		
<b>Tested by (name, function, signature).....:</b>		
<b>Witnessed by (name, function, signature) .:</b>		
<b>Approved by (name, function, signature)....:</b>		
<b>Supervised by (name, function, signature) :</b>		

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

National Differences (0 pages)

Enclosures (0 pages)

**Summary of testing:****Tests performed (name of test and test clause):**

STEADY FORCE TEST, 250 N (4.4.4.2, ANNEX T.5)

DROP TEST (4.4.4.3, ANNEX T.7)

STRESS RELIEF – ALTERNATE TEST PER IEC 60695-10-3 (4.4.4.7, ANNEX T.8)

MAXIMUM OPERATING TEMPERATURE FOR MATERIALS, COMPONENTS AND SYSTEMS (5.4.1.4, 6.2, 9.2.5 ANNEX B.2)

WALL OR CEILING MOUNTING TESTS (8.7)

SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)

SIMULATED SINGLE FAULT CONDITIONS (B.4)

PROTECTION CIRCUITS FOR BATTERIES (ANNEX M.3.2)

STEADY FORCE TEST, 10 N (ANNEX T.2 , 5.4.2.6, 5.4.3.2, G.15.3.6)


**Testing Location:****CBTL: UL International Polska Sp. z o.o., Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland****Summary of compliance with National Differences:****List of countries addressed:** Argentina, Australia / New Zealand, China, EU Group and National Differences, Israel, Japan, Korea, Singapore, USA, Canada

EU Group and National Differences applies to CENELEC member countries: Austria , Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom

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

**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.

**CUS400M-24/F**  
**INPUT: 100-240Vac**  
**47-440 Hz 5.75A MAX**  
**OUTPUT: 24V  $\Rightarrow$  16.7A**  
 **3KG1502160**  
**TDK-Lambda**  
**Made in The UK**      **20-Aug-19**

**SAMPLE ENGINEERING**

Note: The above markings are the minimum requirements required by the safety lab. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.

<b>Test item particulars .....</b>	
Equipment mobility	for building-in
Connection to the mains	to be determined in End Use Application (pluggable A assumed)
Operating condition	continuous
Access location	operator accessible
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) Class II (double insulated)
Considered current rating of protective device as part of the building installation (A)	20
Pollution degree (PD)	2
IP protection class	IP X0
Altitude of operation (m)	up to 5000
Altitude of test laboratory (m)	less than 2000 meters
Mass of equipment (kg)	max 1.3

<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 of receipt of test item .....	N/A
Date (s) of performance of tests .....	N/A

**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  comma /  point is used as the decimal separator.

<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC60950-1:</b>	
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"/> <b>Yes</b> <input type="checkbox"/> <b>Not applicable</b>

**When differences exist; they shall be identified in the General product information section.**

**Name and address of factory (ies) .....**

TDK-LAMBDA UK LTD  
KINGSLEY AVE  
ILFRACOMBE  
EX34 8ES UNITED KINGDOM

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

PANYU TRIO MICROTRONICS CO LTD  
SHIJI INDUSTRIAL ESTATE  
DONGYONG  
NANSHA  
GUANGZHOU  
GUANGDONG 511453 CHINA

**General product information:**

**Report Summary**

The original report was modified on 2020-08-27 to include the following changes/additions:

Administrative correction: correcting several typo errors.

**Product Description**

Device is an open-type AC-DC power source for building-in.

**Model Differences**

Unit Nomenclature for CUS400M range  
Unit product code : CUS400M-xxVx/yyyy

Where:

xxVx = Channel 1 output voltage from within the output voltage adjustment range from the "Output Voltage Range"

yyyyy = unit options from list of standard unit options below, or non-safety related model differences

List of Standard Unit Options (yyyyy)

Case Options:

Blank = open frame with potted baseplate

B = with metal baseplate

C = with M3 threaded inserts for underside mounting

U = with U Chassis

A = with U chassis and cover

F = with U chassis and top fan

Connector options:

Blank = JST connector

M = with Molex type connector

Fuse Options:

Blank = Dual fused

E = with single fuse in live line (dual fuse is standard), not available for DC input

Signal, standby options

X2 = option board 2: 5V 2.0A standby supply, remote on/off (enable), dc good, ac fail, remote sense

X3 = option board 3: 12V 1.0A standby supply, remote on/off (enable), dc good, ac fail, remote sense

X5 = option board 5: 5V 2.0A standby supply, remote on/off (inhibit), dc good, ac fail, remote sense

X6 = option board 6: 12V 1.0A standby supply, remote on/off (inhibit), dc good, ac fail, remote sense

Leakage current options:

S = Industrial Leakage <3.5mA for Class I, 60950-1 and 62368-1 only

blank = standard leakage <250µA

R = Reduced Leakage <150µA

T = Reduced Leakage <50µA

Examples:

CUS400M-24 open pcb with baseplate with dual fuses and standard features, 24V

CUS400M-24V5 as above with output set to 24.5V

CUS400M-12/U U chassis, 12V

CUS400M-15V25/FE U chassis, cover and fan, single fuse, 15.25V

Unit Product Code may be prefixed by K, and/or SP followed by / or -

For units with non-safety related changes e.g. Reduced OVP, current limit etc.

Unit product code is followed by "-NNNNL", where N is a string of numbers which identifies the unique requirement. And L is an optional letter, starting with "A", which is incremented for any customer revision.

Example: CUS400M-24/FE-0001A

For non-standard units:

Prefix with "K-". Follow by basic model type e.g. CUS400M. Followed 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: KCUS400M-24-0001A



Refer also to de-rating curves and voltage adjustment options described in enclosure 7-01

#### **Additional application considerations – (Considerations used to test a component or sub-assembly) –**

Following components may require attention when unit is used in End Product with custom cooling or outside ratings:

L6: 120°C

L7: 120°C

TX1: 130°C

C15: 125°C

C6: 125°C

C7:125°C

#### **Technical Considerations**

- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of : 70°C with derating above 50°C
- The means of connection to the mains supply is : to be determined in End Product (assessed as Pluggable A, considered worst case)
- The product is intended for use on the following power systems : TT, TN
- The equipment disconnect device is considered to be : determined in end product (considered single-pole disconnection, as worst case)
- 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 accessible locations (with circuit/schematic designation) are within a limited current circuit : main output
- The following circuit locations (with circuit/schematic designation) were investigated as a limited power source (LPS) : Option board output
- The following were investigated as part of the protective earthing/bonding : Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual, including French language for Canada
- The following scope limitations apply to this test report and are confirmed by Applicant to be covered separately. Additional evaluation and/or tests may be required when submitting this CB Report to a National Certification Body (NCB) to obtain a national mark:
  - 1) no EMC tests nor evaluation to EMC Directive 2004/108/EC and 2014/30/EU,
  - 2) no evaluation to RoHS Directives 2002/95/EC, 2011/65/EU and (EU) 2016/585,
  - 3) no evaluation to Council Recommendation 1999/519/EC nor 2006/25/EC,
  - 4) only English version of markings and instructions provided and reviewed.

#### **Engineering Conditions of Acceptability**

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 - Earthed Dead Metal: 299 Vrms/ 571 Vpk; Primary-Secondary: 391 Vrms/ 620 Vpk
- The following secondary output circuits are SELV : all outputs
- The following secondary output circuits are at hazardous energy levels : main output
- The following secondary output circuits are at non-hazardous energy levels : option board output
- The following output terminals were referenced to earth during performance testing : Main output (-), aux output (-)
- 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
- The following input terminals/connectors must be connected to the end-product supply neutral : marked "N"
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : TX1 class 155 (F), TX3 class 155 (F)
- The following end-product enclosures are required : Mechanical (hot parts), 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 : see Additional Information
- The maximum continuous power supply output (Watts) relied on forced air cooling from : The maximum continuous power supply output (Watts) relied on forced air cooling from : For option F only: 400W with fan as provided with product.
- The equipment is suitable for direct connection to : AC mains supply

**Abbreviations used in the report:**

- normal conditions	<b>N.C.</b>	- single fault conditions	<b>S.F.C</b>
- functional insulation	<b>OP</b>	- basic insulation	<b>BI</b>
- double insulation	<b>DI</b>	- supplementary insulation	<b>SI</b>
- between parts of opposite polarity	<b>BOP</b>	- reinforced insulation	<b>RI</b>

**Indicate used abbreviations (if any)**