



Test Report issued under the responsibility of:






TEST REPORT

IEC 62368-1

Audio/video, information and communication technology equipment

Part 1: Safety requirements

Report Number	E135494-A6007-CB-1
Date of issue.....	2019-10-04 ; Correction 1 : 2020-08-27
Total number of pages	26
Applicant's name	TDK-LAMBDA UK LTD
Address	KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM
Name of Test Laboratory preparing the Report	UL International Polska Sp. z o.o. Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland
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
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Test Item description	: AC-DC Power Supply	
Trade Mark	: TDK Lambda 	
Manufacturer	: TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM	
Model/Type reference	: CUS400M series Unit product code : CUS400M-xxVx/yyyy (see model differences for detail)	
Ratings	: 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)	
Testing procedure and testing location:		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	
Testing location/ address	: UL International Polska Sp. z o.o., Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland	
Tested by (name + signature)	Piotr A. Bizunowicz / Project Handler	
Approved by (name + signature)	Robert Dmitruk / Reviewer	
Testing procedure: CTF Stage 1		
Testing location/ address	:	
Tested by (name + signature)		
Approved by (name + signature)		

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

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):**
None**Testing Location:** None**Summary of compliance with National Differences:****List of countries addressed:** Australia / New Zealand, EU Group and National Differences, Japan, 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 62368-1:2014 + A11:2017

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  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.

TEST ITEM PARTICULARS:	
Classification of use by	Skilled person
Supply Connection	AC Mains
Supply % Tolerance	+10%/-10%
Supply Connection – Type	For building-in: To be determined in End Product
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I Class II
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer’s specified maximum operating ambient (°C)	70, with derating above 50
IP protection class	IPX0
Power Systems	TN TT IT - 230 V L-L
Altitude during operation (m)	5000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	max. 1kg
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..... :	N/A
Date (s) of performance of tests..... :	N/A
GENERAL REMARKS:	
<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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
Manufacturer’s Declaration per sub-clause 4.2.5 of IEC 60335-1:	

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

Name and address of factory (ies) :	1) PANYU TRIO MICROTRONICS CO LTD SHIJI INDUSTRIAL ESTATE DONGYONG NANSHA GUANGZHOU GUANGDONG 511453 CHINA 2) TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM 3) TDK-LAMBDA MALAYSIA SDN BHD LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR BARU JAYA GADING KUANTAN PAHANG 26070MY MALAYSIA
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GENERAL PRODUCT INFORMATION:

Report Summary
 The original report was modified on 2020-08-27 to include the following changes/additions:
 Administrative correction: No tests considered necessary to correct errors in model nomenclature.

Product Description
 Unit is open-type AC/DC Power supply 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"
 yyyy = 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 0.83A 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 0.83A 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 eg. 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 eg. 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 to enclosures 7-01 and 7-02 for output parameters and de-rating information

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

Potting is used for thermal performance only -- spacings and insulation comply with clause 5.4

models tested:

CUS400M-12-UX6 (highest output current)

CUS400M-24-UX5 (highest working voltage, most severe thermal effect)

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

TX3: 130°C

C15: 125°C

C6: 125°C

C7: 125°C

Earthing terminal has been evaluated to comply with both: Protective Bonding (with limited short-circuit test, basic insulation to ES3 parts) and Functional Earthing (with leakage current compliant with ES1, reinforced insulation to ES3 parts)

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of : 70°C with derating above 50°C
- The product is intended for use on the following power systems : TN, TT, IT
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply values : +10%/-10%
- The equipment disconnect device is considered to be : determined in end Use Application
- The product was investigated to the following additional standard : EN 62368-1:2014, AS/NZS 62368.1:2018
- 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,
- Above 50°C the total output power and current ratings are both de-rated to ensure power curves are met. Refer to Enclosures 7-01 for the De-rating curves.

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 : Primary – Earthed Dead Metal: 299 Vrms/ 571 Vpk; Primary-Secondary: 391 Vrms/ 620 Vpk
- The following output circuits are at ES1 energy levels : Option board output, main outputs for models 12V to 36V
- The following output circuits are at ES2 energy levels : main output for 48V model
- The following output circuits are at PS3 energy levels : All outputs
- 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 (N.B. an investigation of the PCB traces has been conducted in Annex R}
- The following input terminals/connectors must be connected to the end-product supply neutral : N
- The following end-product enclosures are required : Fire, Electrical, Mechanical
- 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) : XT1 class 155 (F), TX3 class 155 (F)
- 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 : For option F only: 400W with fan as provided with product.
- The power supply was evaluated to be used at altitudes up to : 5000m

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 circuit	ES3
Secondary circuit	ES1
Secondary circuit for 48V model	ES2 (due to exceeding ES1 limits in SFC / hiccup mode)
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 circuit	PS3, arcing PIS, resistive PIS
Secondary circuit main board (main output and optional fan output)	PS3, resistive PIS
Secondary circuit option board	PS3 declared by client
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
none identified	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)
Fan blades	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)
Parts accessible during servicing	TS3
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)
none identified	n/a