Test Report issued under the responsibility of:

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

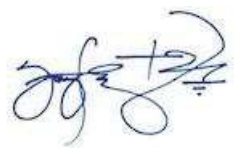
Report Number .....:	E135494-A6007-CB-1
Date of issue.....:	2019-10-04 ; Amendment 2 : 2020-12-11
Total number of pages .....:	20
Applicant's name.....:	**TDK-LAMBDA UK LTD**
Address .....:	**KINGSLEY AVE** **ILFRACOMBE** **EX34 8ES UNITED KINGDOM**
Name of Test Laboratory preparing the Report .....:	UL VS Limited Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom
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 :	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:			
☒	CB Testing Laboratory:		
Testing location/ address ..... :		UL VS Limited, Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom	
Tested by (name + signature).....:		Mark John De Sagun / Project Handler	
Approved by (name + signature) .....:		Dennis Butcher / Reviewer	
☐	Testing procedure: CTF Stage 1		
Testing location/ address..... :			
Tested by (name + signature).....:			

Approved by (name + signature) .....:		
☐ Testing procedure: CTF Stage 2		
Testing location/ address ..... :		
Tested by (name + signature).....:		
Witnessed by (name + signature).....:		
Approved by (name + signature) .....:		
☐ Testing procedure: CTF Stage 3		
☐ 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 (4 pages)

Summary of testing:

Tests performed (name of test and test clause): **None**	**Testing Location: None**

Summary of compliance with National Differences:

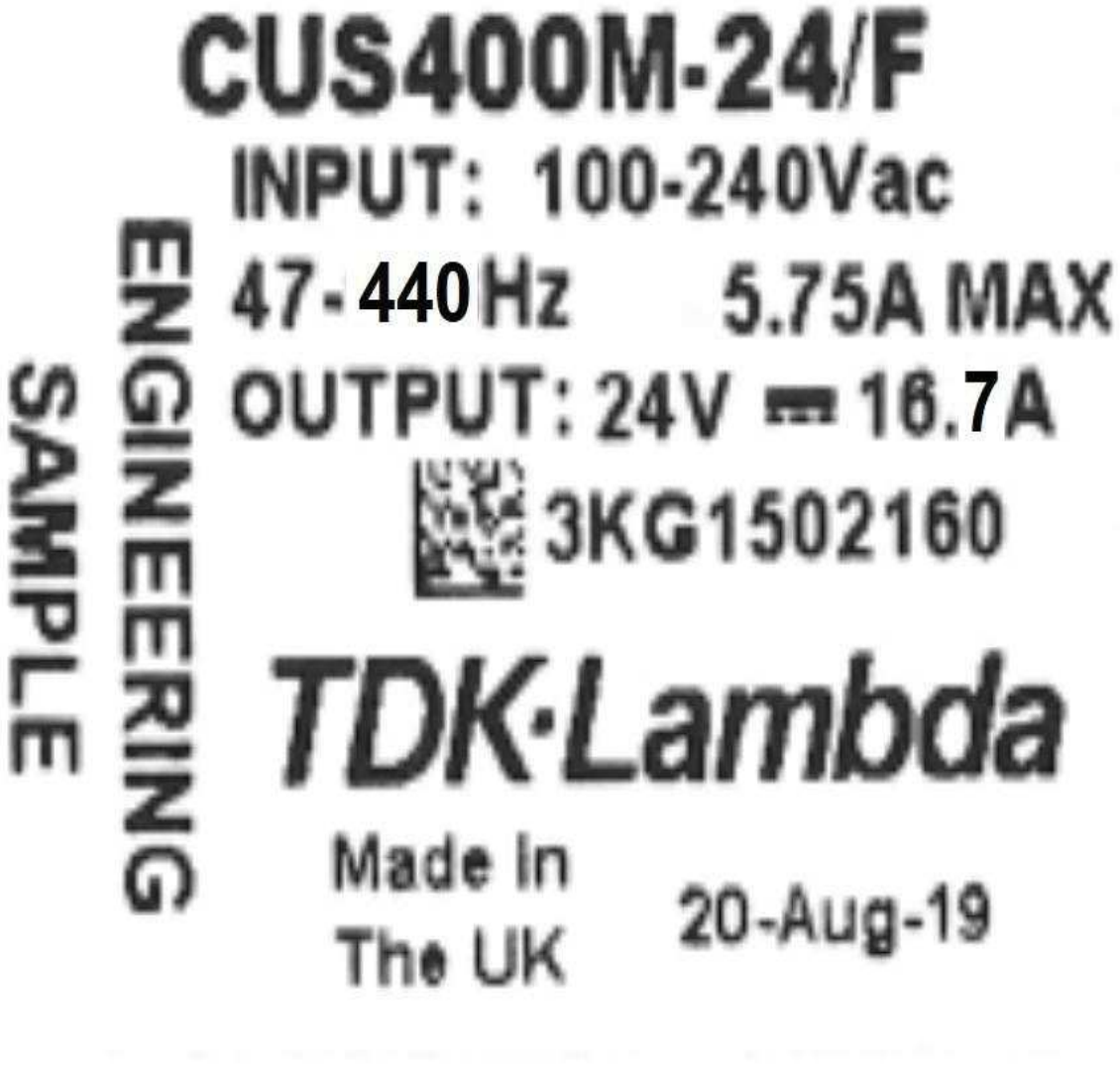
List of countries addressed: Australia / New Zealand, EU Group and National Differences, Japan, USA / Canada

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, CSA CAN/CSA-C22.2 No. 62368-1 2nd Edition, Issued December 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.



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..... :	2019-07-03, 2019-07-12, 2020-05-05, 2020-05-21
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.**	
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) ..... :	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 TRIO-TRONICS (THAILAND) LTD 7/295 MU. 6 MAP YANG PHON SUB-DISTRICT PLUAK DAENG DISTRICT RAYONG PROVINCE THAILAND
GENERAL PRODUCT INFORMATION:	

Report Summary

The original report was modified on 2020-12-11 to include the following changes/additions:
Technical Amendment: This report has been revised due to the following:
1. Revised LoCC table. Added alternate magnetic supplier "Axis Corporation" and alternate J1 input connector.
2. Added enclosure 7-04 for output voltage ranges option.
3. Added "TRIO-TRONICS (THAILAND) LTD" factory.
Based on the previously conducted testing and the review of product technical documentation, it has been determined that the product continues to comply with the standard and all required tests were carried out under the original investigation.

This report should be read in conjunction with CBTR Ref. No: E135494-A6007-CB-1-Original, - Amendment-1, and -Correction-1; CBTC Ref. no: DK-88353-A1-UL issued on 2020-08-27.

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/yyyyy

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 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.

Refer to Enclosure 7-04 for output voltage ranges.

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 leackage current compliant with ES1, reinforced insulation to ES3 parts).

The marking label provided is representative of all models.

The test item receipt dates shown are those of the original/ amendment testing.

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) 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