

Test Report issued under the responsibility of:



TEST REPORT

IEC 62368-1

Audio/video, information and communication technology equipment Part 1: Safety requirements

Tart T. Galety requirements					
Report Number:	50283317 001				
Date of issue:	2019-09-26				
Total number of pages:	139 (excluding attachments, refer to page 3)				
Applicant's name:	WUXI TDK-LAMBDA ELECTRONICS CO LTD				
Address:	Lot 115 High-Tech Zone Wuxi 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				
	m for Conformity Testing and Certification of Electrotechnical E), Geneva, Switzerland. All rights reserved.				
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	t Report unless signed by an approved CB Testing Laboratory and ssued by an NCB in accordance with IECEE 02.				
General disclaimer:					
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Test Item description:	Switching Power Supply				
Trade Mark:	TDK-Lambda				
Manufacturer:	Same as applicant				
Model/Type reference::	CUS600My-zxxxxxx , CME600Ay-zxxxxxx (y = blank; z = 12, 19, 24, 28, 32, 36 or 48; xxxxxxx =/ADJ, /T, /J, /M, /C, /C2, /SF, /G, /EF, other alphanumeric character, symbol or blank) Refer to page 12 for definition of variables				

AC input: 100-240V, 50-60Hz, 4.5A or 7.0A

DC output: See the model list on pages 9-11 for details

Ratings:

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)	Johnson Ma/ Technical Expert		
Approved by (name + signature):	Sunny Sun/ Technical Reviewer		
Testing procedure: TMP/CTF Stage 1	N/A		
Testing location/ address:			
Tested by (name + signature):			
Approved by (name + signature):			
Testing procedure: WMT/CTF Stage 2	N/A		
Testing location/ address:			
Tested by (name + signature)			
Witnessed by (name + signature)			
Approved by (name + signature):			
Testing procedure: SMT/CTF Stage 3 or 4	N/A		
Testing location/ address:			
Tested by (name + signature)			
Approved by (name + signature)			
Supervised by (name + signature):			

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List of Attachments (including a total number of pages in each attachment):					
- ATTACHMENT - National Differences (31 pages)					
- ATTACHMENT - Technical documentation (35 pages)					
- ATTACHMENT - Photo documentation (12 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):	Testing location:				
All applicable tests as described in Test Case and	TÜV Rheinland Shanghai Co. Ltd.				
Measurement Sections were performed on	No.177, 178, Lane 777 West Guangzhong				
models CUS600M-12, CUS600M-19, CUS600M-28,	Road, Jing'an District, Shanghai, China				
CUS600M-32 and CUS600M-48 to represent others.					
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					
and Forced air cooling on following).					
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 5000m above sea level as					
declared by manufacturer. Clearances have been					
evaluated according to IEC 60664-1 table A.2 with a					
multiplication factor of 1.48 throughout this report.					
The test samples are pre-production without serial					
numbers.					
Uncertainty:					
When determining for test conclusion, measurement					
uncertainty of tests has been considered. The determination of the test conclusion is based on IEC					
Guide 115 in consideration of measurement uncertainty.					
MOUNTING DIRECTIONS					
MOUNTING A MOUNTING B MOUNTING	C MOUNTING D MOUNTING E				
(STANDARD MOUNTING) CN1	CN1				
CN1(INPUT)					
Not possible					
Not possible					

Derating Curve:

Convection cooling condition:

Condition A: Main output is derating according the following, standby mode power is no load.



Condition B: Main output and standby mode power is derating according the following.



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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				
	mating connector in other: Terminal block				
Considered current rating of protective device as	16 A or 20 A (for US/CSA)				
part of building or equipment installation	Installation location: \square building; \square equipment				
Equipment mobility	movable hand-held transportable				
	☐ mand-neid ☐ transportable ☐ stationary ⊠ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted				
Over voltage category (OVC):					
	OVC IV other:				
Class of equipment:	□ Class I □ Class II □ Class III □ Class III				
Access location:	⊠ restricted access location □ N/A				
Pollution degree (PD)	□ PD 1				
Manufacturer's specified maxium operating ambient					
	Up to 70 °C				
IP protection class	⊠ IPX0 □ IP				
Power Systems	⊠ TN □ TT				
Altitude during operation (m)	☐ 2000 m or less ⊠ up to 5000 m				
Altitude of test laboratory (m)	⊠ 2000 m or less □ m				
Mass of equipment (kg)	<7				

POSSIBLE TES	ST CASE VI	ERDICT	S:					
- test case does	not apply to	o the tes	t object	:	N/A			
- test object doe	est object does meet the requirement		P (Pass)					
- test object doe	s not meet	the requ	irement	:	F (F	ail)		
TESTING:								
Date of receipt of	of test item .			:	201	9-06-01		
Date (s) of perfo	ormance of t	ests		:	201	9-06-01 to 2019-08	-19	
GENERAL REM	MARKS:							
"(See ATTACH "(See appende	"(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	S Declaratio	on per si	ub-clause 4	4.2.5 of	IEC	EE 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								
When differend	ces exist; th	ney shal	ll be identif	ied in t	the G	Seneral product inf	ormation section	on.
Name and address of factory (ies):				 Wuxi TDK-Lambda Electronics Co., Ltd. No. 6 Xing Chuang Er Lu Wuxi, Jiangsu 214028, P. R. China Zhangjiagang Hua Yang Electronics Co., Ltd. Zhao Feng Industrial Zone, Leyu Town, Zhangjiagang, Jiangsu 215622, P. R. China 				
GENERAL PRODUCT INFORMATION:								
General produ	General product information:							
The PSU is a component type switching mode power supplies intended for the earthed construction or non- earthed construction of medical equipment.								
• For earthed construction (Class I), the PSU need to be reliably earthed and professionally installed and fixed with metal screws.								
 For non-earthed construction (Class II), no earthing connection is required. The PSU need to be fixed so, that it is insulated from any unearthed accessible conductive part by reinforced insulation. Model CME600Ay-zxxxxxxx is identical to model CUS600My-zxxxxxxx except for model name. 								
All models are identical, except for the optional chassis, cover, 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:								
Series Model	l/p voltage (Vac)	Freq (Hz)	I/p current (A)	Out Char	nnel	Minimal output	Rated output (typical)	Maximum output
Convection cooling condition								

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					10.8Vdc	12Vdc	12.9Vdc							
CUS600M y -				Main	10.	8Vdc – 12.9Vdc								
12xxxxxxx		50-		output	Normal Rating: 33.4A, 400.8W Max.		3W Max.							
CME600Ay-	100-240	60	4.5		Peak Rating: 5	50A, 600W Max.	(Dynamic)							
12xxxxxxx				Standby		5Vdc (Rated)								
				power (Optional)		2A (Rated)								
					17.1Vdc	19Vdc	20.5Vdc							
CUS600My-				Main	17.	1Vdc – 20.5Vdc								
19xxxxxxx		50-		output	Normal Rati	ng: 21.1A, 400.9	W Max.							
CME600Ay-	100-240	60	4.5		Peak Rating: 31	.6A, 600.4W Ma	x. (Dynamic)							
19xxxxxx				Standby		5Vdc (Rated)								
				power (Optional)		2A (Rated)								
					21.6Vdc	24Vdc	25.9Vdc							
CUS600My-				Main	21.6	6Vdc – 25.9Vdc,								
24 xxxxxx		50-		output	Normal Rati	ng: 16.7A, 400.8	3W Max.							
CME600Ay-	100-240	60	4.5		Peak Rating: 2	25A, 600W Max.	(Dynamic)							
24 xxxxxx	•			Standby		5Vdc (Rated)								
				power (Optional)		2A (Rated)								
				Main	25.2Vdc	28Vdc	30.2Vdc							
					25.2	2Vdc – 30.2Vdc,								
CUS600My- 28xxxxxx	50-		output	Normal Rati	ing: 14.3A, 400.4	W Max.								
CME600Ay-	100-240	60	4.5	j	Peak Rating: 2 ²	1.5A, 602W Max	. (Dynamic)							
28xxxxxx				Standby		5Vdc (Rated)								
				power (Optional)		2A (Rated)								
					28.8Vdc	32Vdc	34.5Vdc							
CUS600My-				Main	28.8	8Vdc – 34.5Vdc,								
32 xxxxxxx		50-	4.5	4.5	output	Normal Rating: 12.5A, 400W Max.		W Max.						
CME600Ay-	100-240	60				Peak Rating: 18	.8A, 601.6W Ma	x. (Dynamic)						
32xxxxxxx				Standby		5Vdc (Rated)								
												power (Optional)		2A (Rated)
					32.4Vdc	36Vdc	38.8Vdc							
		240 50- 60 4.5		Main output		4Vdc – 38.8Vdc,								
CUS600M y -						ing: 11.1A, 399.6								
36 xxxxxx	100-240		4.5		Peak Rating: 16	-								
CME600Ay- 36xxxxxxx	-		4.5	Standby	5	5 Vdc (Rated)								
304444444				Standby power		2 A (Rated)								
									(Optional)		_ / (((((())))))			
	100-240		4.5		43.2 Vdc	48 Vdc	51.8 Vdc							

CUS600My- 48xxxxxx CME600Ay-		50- 60		Main output Standby	Normal Rat Peak Rating: 12	2Vdc – 51.8Vdc ing: 8.4A, 403.2 .6A, 604.8W Ma 5 Vdc (Rated)	2W Max,				
48xxxxxx				power (Optional)		2A (Rated)					
Ford	ced air coo	ling cor	ndition (air	flow: air velo	ocity 2.7m/s & air		-				
CUS600My-				Main output	10.8Vdc 50A	12Vdc 50A	12.9Vdc 46.6A				
	100-240	50- 60	7.0	Standby		5Vdc (Rated)	40.07				
CME600Ay- 12xxxxxxx		00		power (Optional)		2A (Rated)					
				Main	17.1Vdc	19Vdc	20.5Vdc				
CUS600My- 19xxxxxxx		50-		output	31.6A	31.6A	29.3A				
CME600Ay-	100-240	60	7.0	Standby	Ę	5Vdc (Rated)	•				
19 xxxxxx				power (Optional)		2A (Rated)					
CURCOOM				Main	21.6Vdc	24Vdc	25.9Vdc				
CUS600My- 24xxxxxxx		50-		output	25A	25A	23.2A				
CME600A y -	100-240	60	7.0	Standby power (Optional)	5Vdc (Rated)						
24 xxxxxxx						2A (Rated)					
CUS600My-				Main	25.2Vdc	28Vdc	30.2Vdc				
28 xxxxxx	400.040	50	50-)-		output	21.5A	21.5A	20.0A		
CME600A y -	100-240	60	7.0	Standby	5Vdc (Rated)						
28 xxxxxx				power (Optional)	2A (Rated)						
CUSCOM				Main	28.8Vdc	32Vdc	34.5Vdc				
CUS600My- 32xxxxxxx		50-		output	18.8A	18.8A	17.5A				
CME600A y -	100-240	60 7.0	7.0	70	7.0	powe	Standby	5Vdc (Rated)			
32xxxxxxx											
CUS600My-				Main	32.4Vdc	36Vdc	38.8Vdc				
36 xxxxxx		50-		output	16.7A	16.7A	15.5A				
CME600A y -	100-240	60	7.0	Standby	5Vdc (Rated)						
36 xxxxxxx	36 xxxxxx		power (Optional)		2A (Rated)						
CUSEOOMy	CUS600My- 48xxxxxxx 100 040 50-		Main	43.2Vdc	48Vdc	51.8Vdc					
48 xxxxxx			output	12.6A	12.6A	11.7A					
CME600A y -	100-240	60	7.0	Standby	5Vdc (Rated)						
48 xxxxxx				power (Optional)		2A (Rated)					
Remark:											

Operating temp.: up to +70°C (operating temperature depending on equipment's load, mounting position, for details refer to instruction manual). / EF the standby current (2A) is including the fan current (0.3A).

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 <u>5000</u> m above sea level, the minimum clearances were multiplied by the factor given in Table A.2 of IEC 60664-1: 1.48.
- 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.
- The input circuit includes one fuse (F1A) in the Line conductor and the other fuse (F1B) is optional in neutral conductor. Consideration shall be given in the end-use product regarding addition of the second fuse having the same or better characteristics in order to comply with fusing requirements of Clause 8.11.5 of the standard.
- The metal enclosure of Class II equipment should be evaluated by end system.
- Recommend by manufacturer as below:

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. Test 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.

Circuit Ref.	Description	Max. Temperature (°C)
CN1	Input Connector	105
C1	X Capacitor	100
L2	Common Mode Choke Winding	130
C5,C52	Y Capacitor	125
BD1	Bridge Diode	150
L4	Boost Choke Winding	155
C6	Boost Capacitor	105
Q1	Boost FET	150
T1	Main Transformer Winding	130
T2	Standby Transformer Winding	130
PC103,PC106	Opto-Coupler	110
C51A,C51B,51C, C51D,C51E,C51F	Electrolytic Capacitors	105 (12V,32V,36V,48V) 125 (19V,24V,28V)
C61	Electrolytic Capacitor	105

Note:

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PSU = Power Supply Unit

Markings and Instructions

- The installation instruction is provided in English, information regarding:
- Electrical specification
- Maximum operating temperature
- Fuse Identification (See <u>subclause F.3.5.3</u>): F1A/F1B : T1.6A 250Vac

Definition of variable(s):

(**y** = blank; **z** = 12, 19, 24, 28, 32, 36 or 48; **xxxxxxx** =/ADJ, /T, /J, /M, /C, /C2, /SF, /G, /EF, other alphanumeric character, symbol or blank)

Range of variable: blank	Content:
blank	
	-
12, 19, 24, 28, 32, 36 or 48	Denoting output voltage from 12 Vdc to 48 Vdc.
blank	Denoting for Standard model
/ADJ	Denoting output adjustable
Л	Denoting terminal block connector
/J	Denoting JST connector
/M	Denoting molex connector
/C	Denoting single side PWB coating
/C2	Denoting double side PWB coating
/SF	Denoting single fuse
/G	Denoting low earth leakage current
/EF	Denoting end fan
other alphanumeric character, symbol	Used for market purposes, no construction differences and no safety impact.
	blank /ADJ /T /J /M /C /C2 /SF /G /EF other alphanumeric

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

The equipment is a component intended for incorporation in audio/video, information and communication technology equipment, the overall compliance shall be investigated in the complete audio/video, information and communication technology equipment.

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 CLASSIFI	CATION 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):						
classification)	(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 (before transformer T1/T2)	ES3					
Secondary circuits (After transformer T1, before Q201/Q202)	ES2					
Secondary circuits (After Q201/Q202)	ES1					
Secondary circuits (After T2)	ES1					
Electrically-caused fire (Clause 6):						
(Note: List sub-assembly or circuit designation and con Example: Battery pack (maximum 85 watts):	rresponding energy source classification) PS2					
Source of power or PIS	Corresponding classification (PS)					
All primary and secondary circuits except CN61 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	ce 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)					
N/A	N/A					
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						
ource of thermal energy Corresponding classification (TS)						
To be determinied by end-product use	To be determinied by end-product use					
Radiation (Clause 10) (Note: List the types of radiation present in the product Example: DVD – Class 1 Laser Product	and the corresponding energy source classification.) RS1					
Type of radiation Corresponding classification (RS)						
V/A N/A						