

Test Report issued under the responsibility of:



IEC 60601-1 Medical electrical equipment Part 1: General requirements for basic safety and essential performance	
Report Reference No.:	E349607-D1000-2/A3/C1-UL
Date of issue	2017-07-24; 2017-12-18(A1); 2018-03-09(C1); 2018-05-21 (A2); 2020-08-19 (A3)
Total number of pages	351
Testing Laboratory	UL International Polska Sp. z o.o.
Address	Aleja Krakowska 81 05-090 Sekocin Nowy, POLAND
Applicant's name	TDK-Lambda UK Ltd
Address	Kingsley Avenue Ilfracombe, Devon, EX34 8ES UNITED KINGDOM
Test specification:	
Standard	IEC 60601-1:2005, COR1:2006, COR2:2007, AMD1:2012 (or IEC 60601-1:2012 reprint)
Test procedure	UL Certification
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC60601_1P
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 UL testing laboratory. The authenticity of this Test Report and its contents can be verified by contacting UL.	

Test item description:	Switch Mode Power Supply	
Trade Mark:	TDK-Lambda	
Manufacturer:	Same as Applicant	
Model/Type reference:	XMS350 or XMS-350 and XMS500, XMS-500, XMS500P, XMS-500P, XMS500A, XMS500AP series switch mode power supplies	
Ratings:	XMS350, XMS-350: 100-240Vac nom., 47-63Hz, 5.3A rms max. XMS500, XMS-500, XMS500A, XMS500P, XMS-500P, XMS500AP: 100-240Vac nom., 47-63Hz, 7A rms max. (see report Model Differences for details of nomenclature)	
Testing procedure and testing location:		
<input checked="" type="checkbox"/> UL/DAP Testing Laboratory:		
Testing location/ address:	UL International Polska Sp. z o.o. Aleja Krakowska 81 05-090 Sekocin Nowy, POLAND	
Tested by (name, function, signature):	Maciej Gryczan (Project Handler)	
Approved by (name, function, signature):	Mona Nielsen (Reviewer)	
[] Testing procedure: WMT:		
Testing location/ address:		
Tested by (name, function, signature):		
Approved by (name, function, signature):		

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

Refer to Appendix A of this report. All attachments are included within this report.

Summary of testing

Tests performed (name of test and test clause):

Testing location:

Refer to the Test List in Appendix D of this report if testing was performed as part of this evaluation.

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 owners of these marks.

Refer to the enclosure(s) titled Marking Label in the Enclosures section in Appendix A of this report for a copy.

GENERAL INFORMATION	
Test item particulars(see also Clause 6):	
Classification of Installation and Use:	For building-in
Device type (component/sub-assembly/ equipment/ system):	Component Switch Mode Power Supply
Intended use (Including type of patient, application location):	To supply regulated power
Mode of Operation:	Continuous
Supply Connection:	To be determined in the end-product
Accessories and detachable parts included:	None
Other Options Include:	None
Testing	
Date of receipt of test item(s)	2015-06-24 to 2015-08-27, 2015-07-17 to 2015-12-17, 2016-04-21, 2016-04-27, 2016-04-21 to 2016-12-02, 2017-10-18, 2017-04-04, 2018-05-25, 2018-05-30, 2020-04-27, 2020-04-28, 2020-05-19, 2020-06-17
Dates tests performed	2015-07-01 to 2015-09-21, 2015-11-10 to 2015-12-17, 2016-04-26 to 2016-05-16, 2016-09-27 to 2016-12-09, 2017-04-07 to 2017-04-27, 2017-10-19 to 2017-11-06, 2018-04-25 to 2018-05-03, 2020-04-28 to 2020-07-07
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement.....	Pass (P)
- test object was not evaluated for the requirement	N/E
- test object does not meet the requirement.....	Fail (F)
Abbreviations used in the report:	
- normal condition: N.C.	- single fault condition: S.F.C.
- means of Operator protection: MOOP	- means of Patient protection: MOPP

General remarks:

"(See Attachment #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

The tests results presented in this report relate only to the object tested.

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List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

Throughout this report a point is used as the decimal separator.

GENERAL PRODUCT INFORMATION:**Report Summary**

This report was modified to include the addition of XMS500A models, verification of 85V input rating, the addition of an alternate fuse (Conquer UBM-A010) and the addition of an alternate factory address

Refer to the Report Modifications for any modifications made to this report.

Product Description

XMS350 or XMS500 series switch mode power supplies
(See Model Differences for details of nomenclature)

The series consists of two power outputs, a 350W and 500W, these use the same topology with some component variations.

The XMS series switch mode power supply consists of:

1. Input filter, consisting of the input fuse(s), X and Y capacitors, common mode chokes up to the bridge and series choke after the bridge.
2. PFC (boost circuit), consisting of the boost choke and associated switching FETs/circuitry.
3. Forward converter, consisting of the main transformer and switching FETs/circuitry supplying channel 1 and fan supply outputs.
4. Standby circuit, consisting of the standby transformer and switching IC/circuitry supplying the standby output.
5. Secondary circuits (SELV), consisting of channel 1 output, standby output, fan supply, power OK and inhibit/enable.

Model Differences

XMS350 or XMS500 series (may also be marked as XMS-350 or XMS-500) as described below:

Units may be marked with a Product Code: Xy where y may be any number of characters.

Unit Configuration Code (Description): may be prefixed with NS # or K # followed by / or - (where # may be any number of characters indicating non-safety related model differences).

Unit Configuration Code (Description): may be prefixed by SP followed by / or – (SP represents a sales code)

Unit Configuration (Description)

XMSxy-a-bc-defghijklm

where:

x = 350 for 350W model

500 for 500W model

500A for enhanced 500W model (less than 1W inhibited)

500P for 576W peak power models (36, 40V and 48V output models only)

500AP for enhanced 500W model with 576W peak power (36V, 40V, 48V output models only)

y = Blank for Class I

D for Class II

a = Channel 1 Output Voltage (see Ch1 in the table below, adjustment range column).

b = Standby Output Voltage: see standby voltage in table below

N for no supply

5 for 5 volt

12 for 12 volt

c = Standby Output Current†:

C for 0.5A

M for 1.0A

H for 2.0A

N for no supply or 0 amps output

d = Fan Supply†:

N for no fan supply (customer cooling)

N1 for 24V fan supply (customer cooling)

N2 for 12V variable supply

N3 for 12V fixed supply

KF for non-standard top fan

TF for top-fan

e = U for non-standard U chassis

P for perforated frame

N for Open Frame

C for custom chassis/covers for non-standard models

S for standard U chassis

B for standard U chassis with perforated cover

f = Touch (Enclosure) current:

B for <100uA

T for <75uA

g = Earth leakage current:

D for Class II (no Earth)

L for <300uA

R for <150uA

T for <100uA

h = E or In for inhibit

T or En for enable

i = A for AC OK option

N for no AC OK option

P for Power Good Option (XMS500A or XMS500AP models only)

j = Blank for dual fuses fitted

FL for single fuse fitted in the Live line

klm = Blank for standard output settings

May be three numbers from 0 to 9 (preceded by -) which denotes various output voltage/current settings within the specified ranges of each output for a particular unit. (may define non-safety related parameters/feature, e.g. reduced primary current limit, reduced OVP)

Input Parameters

Nominal input voltage 100 - 240 Vac

Input voltage range 85 - 264 Vac

TRF No. IEC60601_1P

Input frequency range 47 - 63 Hz
Maximum input current 7A (5.3A*) rms

* Input for 350W models.

All ratings apply for ambient temperatures up to 50°C.

At 85Vac input the following deratings apply to all XMS500 TF models: 500W output power at 40°C ambient or 400W output power at 50°C ambient

Output Parameters

†Output ratings are in accordance with the following table:

Standard models:

Output Channel	Voltage Designation	Vout nom.(V)	Adjustment Range (V)	Output Current (A)	Output Power (W)
CH1 (500W)	12	12	11.6 - 13.2	41.6	500
	24	24	23.8 - 25.2	20.8	500
	36	36	36	13.8(16*)	500(576*)
	40	40	38 - 42	12.5(15.16*)	500(576*)
	48	48	47-50	10.4(12*)	500(576*)
Standby Option	5	5	5 - 5.5	0.5	2.75
	5	5	5 - 5.5	2.0	11.0
	12	12	12-13.2	1	13.2
Fan Supply	N	-	-	-	-
	N1	24	Fixed	0.2	4.8
	N2	12	6-12	-	3.0
	N3	12	Fixed	0.25	3.0
CH1 (350W)	24	24	23.8 - 25.2	14.6	350
Standby Option	N	10	5 - 15	0	0
Fan Supply	N	-	-	-	-
	N1	24	Fixed	0.2	4.8

*576W peak power up to 2 minutes with 500Wrms power using the following formula:

$$500Wrms = ((\text{peakpower}^2 \times T1 + \text{reducedpower}^2 \times T2) / (T1 + T2))^{1/2}$$

Where T1 = peakpower time on in seconds

T2 = reducedpower time on in seconds

Non-Standard Models:

X00011# XMS350-24-NN-N1CBLEN Customer specific chassis

X00023# XMS500D-24.5-5C-KFCBDEN Customer specific top fan/chassis model

X00073# XMS500-24-NN-NCBRInA Customer specific chassis/cover

Where # can be any letter denoting non-safety related changes.

Output Limitations:

All outputs are SELV

Channel 1 is hazardous energy

Additional Information

Cooling for units with customer supplied air (all models except –TF and KF fan supply)