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.....:	E309264-D1002-1-UL
Date of issue.....:	2015-07-21
Total number of pages.....:	156
Testing Laboratory.....:	UL Japan, Inc.
Address.....:	4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan
Applicant's name .....:	TDK-LAMBDA CORP
Address.....:	NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA, 940-1195 JAPAN
Test specification:	
Standard .....:	IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1: 2012 reprint)
Test procedure.....:	UL Certification
Non-standard test method……..:	N/A
Test Report Form No.....:	IEC60601_1J

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:	Power Supply
Trade Mark:	Refer to Marking Label enclosure
Manufacturer:	Same as Applicant
Model/Type reference:	HWS100-**/ME or /MEA where ** stands for: 5, 12, 15, 24, 48
Ratings:	HWS100-5/ME or /MEA Input: 100-230 VAC 1.5A 50/60Hz Output: 5V 20A (4-6V) HWS100-12/ME or /MEA Input: 100-230 VAC 1.5A 50/60Hz Output: 12V 8.5A (9.6-14.4V) HWS100-15/ME or /MEA Input: 100-230 VAC 1.5A 50/60Hz Output: 15V 7A (12-18V) HWS100-24/ME or /MEA Input: 100-230 VAC 1.5A 50/60Hz Output: 24V 4.5A (19.2-28.8V) HWS100-48/ME or /MEA Input: 100-230 VAC 1.5A 50/60Hz Output: 48V 2.1A (38.4-52.8V) Outputs: See Enclosure "Miscellaneous"

Testing procedure and testing location:		
[X] UL Testing Laboratory:		
Testing location/ address:	UL Japan, Inc. 4383-326 Asama-cho, Ise-shi, Mie, 516-0021, Japan	
Tested by (name + signature):	Toshinori Mori	

Approved by (name + signature):	Tsutomu Abe	
[ ] Testing procedure: WMT:		
Testing location/ address:		
Tested by (name + signature):		
Witnessed by (name + signature):		
Approved by (name + 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.*
Summary of compliance with National Differences List of countries addressed: Austria, USA, Canada, United Kingdom, Sweden

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 Plate in the Enclosures section in Appendix A of this report for a copy.

GENERAL INFORMATION	
Test item particulars:	
Classification of Installation and Use:	Built-in
Device Type:	Component
Intended Use Statement:	To supply regulated power, no patient connection
Mode of Operation:	Continuous
Supply Connection:	None
Accessories and detachable parts included:	None
Other Options Include:	None
Testing	
Date of receipt of test item(s) .....:	2015-05-13 to 2015-06-05
Dates tests performed .....:	2015-06-09 to 2015-06-11
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. This report shall not be reproduced except in full without the written approval of the testing laboratory. 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.	
The application for obtaining a UL Certification includes more than one factory location .....:	Yes
When differences exist; they shall be identified in the General product information section.	

Name and address of factory (ies) .....:	TDK-LAMBDA CORP 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA-KEN, 940-1195 JAPAN WUXI TDK-LAMBDA ELECTRONICS CO LTD NO 6 XING CHUANG ER LU WUXI JIANGSU, 214028 CHINA TDK-LAMBDA MALAYSIA SDN BHD PLO33 KAWASAN PERINDUSTRIAN SENAI SENAI JOHOR, 81400 MALAYSIA TDK-LAMBDA MALAYSIA SDN BHD LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR BARU JAYA GADING KUANTAN PAHANG, 26070

GENERAL PRODUCT INFORMATION:

Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

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

Product Description

Component Power Supply.

No Applied Part

Model Differences

All Models have the same components except the transformers which have different ratings.

Model ME is without frame and Model MEA has the addition of a honeycomb frame

Additional Information

The product has been previously evaluated by UL according to CB scheme to IEC 60601-1:2005 + CORR.1: 2006 + CORR.2: 2007, CB Test Report Ref. No. E309264-A26-CB-1 and Amendment 1. Tests conducted per mentioned above edition of the standard were reviewed and considered representative of the corresponding tests required by IEC 60601-1: 2005 + CORR. 1:2006 + CORR. 2:2007 + AM1:2012 as follows.

4.11 Power Input

8.5.4 Working Voltage Measurements

8.6.4a Impedance and Current Carrying Capability

8.8.4.1 Ball Pressure

11 Temperature

13 Abnormal Operation Testing

15.5.1.2 Transformer Short Circuit

15.5.1.3 Transformer Overload

Additional tests were conducted for verification, and to fill a gap between 3rd edition without Amendment 1 and 3rd edition with Amendment 1.

CB Test certificates for components are included in Licenses Enclosure. In accordance with the current rules of CB Scheme, CB Test certificate is effective for 3 years. Recognizing NCB may challenge the CBTC when certificates are more than 3 years.

When submitting this Test Report to other Certification Body, the manufacturer is responsible for providing any additional information that the Body may need in order to issue its Mark, including testing for compliance with the applicable collateral standards.

Technical Considerations

- The product was investigated to the following additional standards:

  EN 60601-1:2006/A1:2013, ANSI/AAMI ES60601-1:2005/(R)2012, CSA CAN/CSA-C22.2 NO. 60601-1:14, BS EN 60601:2006 A1, SS-EN 60601-1:2006+A11:2011+A1:2013+AC1:2014

  Additional: N/A
- The following additional investigations were conducted: N/A
- The product was not investigated to the following standards or clauses: Biocompatibility (ISO 10993-1), Clause 14, Programmable Electronic Systems, Electromagnetic Compatibility (IEC 60601-1-2), Risk Management
- The following accessories were investigated for use with the product: N/A
- No Other Considerations.

Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

Considerations to the applied parts requirement, to be conducted as end-product.

Consideration should be given to measuring the temperature on power electronic components and transformer windings when the power supply is installed in the end-use equipment. The end-use product shall ensure that the power supply is used within its ratings.

The output circuits have not been evaluated for direct patient connection (Type B, BF or CF)

The input/output terminals are not acceptable for field connections, they are only intended for factory wiring inside the end-use product.

The component shall be installed in compliance with the enclosure, mounting, marking, spacing, and separation requirements of the end use application.

Power supply provides the following MOOP (means of operator protection): 2MOOP based upon a working voltage 274 Vrms, 556 Vpk between Primary to Secondary, 1MOOP based upon a working voltage 274 Vrms, 556 Vpk between Primary and Earth

Temperature, Leakage Current, Protective Earthing, Dielectric Voltage Withstand, and Interruption of the Power Supply tests should be considered as part of the end product evaluation.

Proper bonding to the end-product main protective earthing termination is required.

The product was tested for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification. See Enclosure "12 HWS100ME Derating curve" and "13 HWS100MEA Derating curve" for additional details regarding output derating depends on the product orientation.

Transformer (T2) employ a Class F (155°C) insulation system.

The products were tested on a 20 A branch circuit. If used on a branch circuit greater than this, additional testing may be necessary.

Additional fusing may be required in the end product to meet the requirement of Cl. 8.11.5, Mains fuses

and Over Current Release. The product is only provided and tested with a single fuse.

The end-product evaluation shall ensure that the requirements related to Accompanying Documents, Clause 7.9 are met.

The product is suitable for use in the presence of a flammable anesthetics mixture with air or oxygen or with nitrous oxide: No

The Clearances have additionally been assessed for suitability up to 3000 m elevation.

The risk management requirements of the standard were not addressed.

The investigated Pollution Degree is : 2