UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2019-05-09 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (Information Technology Equipment - Safety - Part 1: General Requirements)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Complementary CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Product:	Power Supply
Model:	VS100E-xyz (x = 3, 5, 12, 15, 24, 48. y = / or blank, z = A, L or blank)
Rating:	Input: AC 100-120V, 50/60 Hz, 1.5A (for Model VS100E-3yz) AC 100-120V, 50/60 Hz, 2.1A (except for Model VS100E-3yz) Output: 3.3Vdc, 20A (for Model VS100E-3yz) 5Vdc, 20A (for Model VS100E-5yz) 12Vdc, 8.5A (for Model VS100E-12yz) 15Vdc, 7.0A (for Model VS100E-15yz) 24Vdc, 4.3A (for Model VS100E-24yz) 48Vdc, 2.2A (for Model VS100E-48yz)
Applicant Name and Address:	TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Prepared By:	Toshiyuki Suzuki / Project Handler	Reviewed By:	Masatomo Takiyama / Reviewer

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.

ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.

iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

This product tested is a built-in type switching power supply for ICT equipment.

Model Differences

All models are identical to each other except for output rating, winding of transformer T1, minor primary and secondary components and variations by model name suffixes.

VS100E-xyz

(x = 3, 5, 12, 15, 24, 48. y = "/" or blank. z = A, L or blank.)

Suffix "x": It denotes output voltage.

Suffix "y": It denotes separator (when provided with any suffix "z").

Suffix "z": It denotes models with "A" = chassis and cover provided, "L" = chassis provided.

Test Item Particulars

Mass of equipment (kg)	Approximately 0.3
Equipment mobility	for building-in
Connection to the mains	not directly connected to the mains
Operating condition	continuous
Access location	N/A
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -10%
Tested for IT power systems	No
IT testing, phase-phase voltage (V)	--
Class of equipment	Class I
Considered current rating of protective device as part of the building installation (A)	20A
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	Up to 4000m
Altitude of test laboratory (m)	less than 2000 meters

Technical Considerations

- 1.2 The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 60°C, output derating 70% load at 70°C. Output derating for suffix /A is different from standard model in accordance with manufacturer's specification. See 6-01.
- 1.5 The equipment disconnect device is considered to be: determined in the end product application.

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The following Production-Line tests are conducted for this product : Electric Strength.
- The following secondary output circuits are SELV : All Output Circuits.
- The following secondary output circuits are at non-hazardous energy levels : All Output Circuits.
- The power supply terminals and/or connectors are : Not investigated for field wiring. The output terminals are not acceptable for field connections and are only intended for connection to mating connectors of internal wiring inside the end-product. The acceptability of these and mating connectors, relative to secureness, insulating materials, and temperature, should be considered.
- 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.
- The following input terminals/connectors must be connected to the end-product supply neutral : Input Connector (CN1) N pin.
- The following end-product enclosures are required : Electrical, Fire.
- The maximum continuous power supply output (Watts) relied on forced air cooling from : Fan at 8.83 cfm. Air flow direction: from input to output.
- This power supply should be installed in compliance with the enclosure, mounting, spacing, casualty, and segregation requirements of the ultimate application.
- This power supply should be located within an overall enclosure so that uninsulated live parts are suitably enclosed.
- The temperature and leakage current test shall be repeated in the end product.
- Line to ground capacitors (C2, C3, and C4) has variation in capacitance. (3300 pF at the maximum) Therefore, consideration shall be given in conducting Touch Current Test in end product application with respect to the variation in those capacitors.
- X-Capacitor (C1) may have variation in capacitance. (1.0 uF at the maximum) Therefore, consideration shall be given in conducting Capacitance Discharge test in end product application with respect to the variation in this capacitor.
- 1.3 The end-product Electric Strength Test shall take into account the a maximum working voltage of: Transformer T1 (Model VS100E-3): 161Vrms, 345Vpk. Transformer T1 (Model VS100E-5): 162Vrms, 332Vpk. Transformer T1 (Model VS100E-12): 167Vrms, 342Vpk. Transformer T1 (Model VS100E-15): 169Vrms, 328Vpk. Transformer T1 (Model VS100E-24): 180Vrms, 346Vpk. Transformer T1 (Model VS100E-48): 213Vrms, 326Vpk.
- The following secondary output circuits are classified to ES1: Output of all models.
- The following secondary output circuits are classified to PS3: Output of all models.
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.

Additional Information

This Test Report was based on the CB Test Certificate and Test Report issued by UL (noted in Test Record) and was submitted under the CB Scheme. The test results and clause verdicts of the CB Test Report were reviewed and found to comply with the applicable UL 60950-1, 2nd Edition, 2014-10-14 (Information Technology Equipment - Safety - Part 1: General Requirements) and CSA-C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (Information Technology Equipment - Safety - Part 1: General Requirements). As a result the clause verdicts and test results for this Test Report were noted as N/A and have referred to the Test Report for the original CB Test Report for details. All test data has been retained in UL's files.

The Power Supply may be applied with conformal coating to prevent moisture and/or dust on one side or both sides of PWB surface.

There are two types of Circuit Diagram and PWB Trace design as below.
- Circuit Diagram; Design No. A241-30-01_ and A241-30-02_.
- PWB Trace; Design No. PZA-056x and PZA-128x.

Unless otherwise noted, all tests were performed on models by A241-30-01_ and PZA-056x. Tests performed on models by A241-30-01_ and PZA-056x were representative because of similarity in construction.

The Clearances and Creepage Distances have additionally been assessed for suitability up to 4000m elevation.

Additional Standards

The product fulfills the requirements of: UL 62368-1, 2nd Edition, 2014-12-01, CAN/CSA C22.2 No. 62368-1-14, 2nd Edition, 2014-12.

Markings and Instructions

Clause Title	Marking or Instruction Details
Power rating - Company identification	Listee’s or Recognized companys name, Trade Name, Trademark or File Number
Power rating - Model	Model Number
Fuses - Rating	Rated current and voltage and type located on or adjacent to fuse or fuseholder.
Fuses - Non-operator access/soldered-in fuses	Unambiguous reference to service documentation for instructions for replacement of fuses replaceable only by service personnel