UL TEST REPORT AND PROCEDURE

Standard:	UL 62368-1, 2nd Ed, 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1-14, 2nd Ed (Audio/video, information and communication technology equipment Part 1: Safety requirements)
Certification Type:	Component Recognition
CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Complementary CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Product:	DC-DC Converter
Model:	PAH450S48-28, PAH450S48-48 (Models may be followed by optional suffix denoting minor variations which are not related to safety aspects : "/" and any alphanumeric characters.)
Rating:	Input: 36-76 Vdc, 16.5 A Output: 28 Vdc, 16 A, 448 W (for Model PAH450S48-28) 48 Vdc, 9.4 A, 451.2 W (for Model PAH450S48-48)
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:	Ippei Fukuda / Project Engineer	Reviewed By:	Tetsuo Iwasaki / Senior Project Engineer

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

The product tested is a built-in type DC-DC Switching Power supply for ICT equipment for use in general office environment.

Model Differences

N/A

Test Item Particulars

Classification of use by	Ordinary person (See OVERVIEW OF EMPLOYED SAFEGUARDS)
Supply Connection	External Circuit - not Mains connected ES2
Supply % Tolerance	+10%/-10%
Supply Connection – Type	Internal connection (for building-in)
Considered current rating of protective device as part of building or equipment installation	N/A
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	The baseplate at or below 100 °C
IP protection class	IP is not classified (for building-in)
Power Systems	TN
Altitude during operation (m)	Up to 3000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	Approximately 0.1 kg

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 output circuits are at ES1 energy levels : Output of Model PAH450S48-28.
- The following output circuits are at ES2 energy levels : Output of Model PAH450S48-48.
- The following output circuits are at PS3 energy levels : Output.
- Proper bonding to the end-product main protective earthing termination is : Required.
- The following end-product enclosures are required : Electrical, Fire.
- Unit intended for building-in and supplied ES1 or ES2 power from the circuit which is isolated from mains circuit by double or reinforced insulation.
- Only functional insulation provided between input/output, input/base plate circuits, which complies with electric strength test at 1500 VDC.
- The end-product Electric Strength Test shall take into account the maximum working voltage of: 95.2 Vrms, 159 Vpk.
- The following magnetic devices (e.g. transformers or inductor) are provided with IEC 60085 (equivalent to UL 1446) insulation system with the indicated rating greater than Class 105 (A): T101 [Class 180 (H)].
- The input and output connectors are not acceptable for the field wiring connections and only intended for connection to a PCB inside the end use equipment.
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.
- This component has been evaluated in 'control of fire spread' method assuming appropriate fire enclosure is provided in end product. Unless the fire enclosure is made of non-combustible or V-0 material, the separation from the PIS shall be considered.
- The following output circuits are SELV: Output of Model PAH450S48-28.

Additional Information

During the tests, an external fuse rated F30A, H 250V was provided.

Additional Standards

The product fulfills the requirements of: IEC 62368-1:2014 / EN 62368-1:2014 + A11:2017, UL 60950-1, 2nd Edition, Revised October 14, 2014, CSA CAN/CSA-C22.2 No. 60950-1 2nd Edition, Revised October 2014.

Markings and Instructions

Clause Title	Marking or Instruction Details
Equipment identification marking – Manufacturer identification	Listees or Recognized companys name, Trade Name, Trademark or File Number
Equipment identification marking – model identification	Model Number
Equipment rating marking – ratings	"Input Ratings (voltage, frequency/dc, current/power)", "Output Ratings (voltage, frequency/dc, current/power)"