UL TEST REPORT AND PROCEDURE

Standard:	UL 62368-1, 3rd Ed, Issued: 2019-12-13 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1:19, 3rd Ed, Issued: 2019-12-13 (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:	N/A
Product:	Power Supply
Model:	TPS4000-24-XXX, TPS4000-48-XXX, TPS4000-12-XXX where "X" is any alphanumeric character or blank, denoting minor cosmetic changes or for marketing purposes, not affecting safety.
Rating:	AC input: 3-Phase, 400-480 Vac (3W+PE), 50-60 Hz, 8 A per phase DC output: 19.2 - 29.0 Vdc, 170 A max. Output power is 4080 W max. 24 - 58 Vdc, 85 A max. Output power is 4080 W max. 4 - 18 Vdc, 170 A max. Output power is 4080 W max.
Applicant Name and Address:	TDK-LAMBDA AMERICAS INC 401 MILE OF CARS WAY, SUITE 325 NATIONAL CITY CA 91950 UNITED STATES

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: Chris Starke / Project Handler Reviewed By: Gregory Ray / 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

The equipment is a Class I, 3-phase power supply intended for building-in as a component used in information technology equipment.

The equipment provides basic and reinforced insulation between Primary and Protective Earth (PE) and Primary and Secondary Circuits respectively.

Model Differences

TPS4000-12-XXX and TPS4000-24-XXX are identical to TPS4000-48-XXX except for an alternate version of the Main Transformer (T303, T305) on the output board.

Test Item Particulars

Product group	built-in component
Classification of use by	Instructed person
Supply Connection	AC Mains
Supply tolerance	+10%/-10%
Supply connection – type	provided in the end system
Considered current rating of protective device	provided in the end system A;
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Special installation location	for building-in
Pollution degree (PD)	PD 2
Manufacturer’s specified Tma (°C)	50°C, 60°C or 70°C depending on loading conditions and orientation of power supply. See output rating table, 7-01 and 7-03.
IP protection class	IPX0
Power systems	IT - 400-480 V L-L
Altitude during operation (m)	up to 4000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	Less than 4

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 50°C, 60°C or 70°C depending on loading conditions and orientation of power supply. See output rating table, 7-01 and 7-03.
- The product is intended for use on the following power systems : IT
- The equipment disconnect device is considered to be : to be considered in the end product
- The following are the output loading conditions used in the entire testing of the power supply.
- Refer to MISCELLANEOUS output rating attachment for more details.

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 product-line tests are conducted for this product : Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Dielectric Test values conducted at 4000Vpk for basic and 6000Vpk for reinforced.
- The following output circuits are at ES1 energy levels : All
- The following output circuits are at PS3 energy levels : All
- The maximum investigated branch circuit rating is : Considered at the end system.
- 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 and should be considered in end system, Protective Earthing Test must be carefully considered in the end system.
- The following end-product enclosures are required : Fire, Electrical, Mechanical
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : Class 130(B): T301; Class 155(F): L9, L11, L12, T5, T300, T302, T303, T305
- The equipment is suitable for direct connection to : AC mains supply shall be determined in the end product.
- The power supply was evaluated to be used at altitudes up to : 4,000 m
- The equipment contains output (+4-58 Vdc) exceeding 240VA. When installing into the end system, care shall be taken that the output busbars and the appropriate wires of equipment may not be touched.
- Suitable enclosure, grounding connection and disconnection device shall be provided by the end system. the power supply has not been evaluated as the main bonding/ earthing for end product.
- The equipment was not evaluated for end system mounting. When installed in the end system, proper evaluation should be considered that all relevant standards must be fulfilled.
- The power supply has been evaluated for use in Class I equipment as defined in UL 62368-1 Third Edition and CAN/CSA C22.2 No. 62368-1-19. An additional evaluation shall be made if the power supply is intended for use in other than Class 1 equipment.
- Power supply chassis is to be reliably bonded to protective earthing in the end system before the equipment is energized.
- The input wires of the power supply provide basic insulation only. When installing into the end system, care shall be taken that these wires must be properly isolated from the secondary output busbars of this equipment.
- The power supply terminals and/or connectors are: Not investigated for field wiring.
- Prospective Touch Current and Voltage testing to be conducted in the end-product evaluation.
- The power supplies in this report have been subject to Capacitance Discharge testing. Additional testing should not be needed if directly connected to mains e.g. using an appliance inlet, wiring terminals, etc.

Additional Information

N/A

Additional Standards

The product fulfills the requirements of: UL 62368-1 3rd Edition, Issued December 13, 2019, CAN/CSA C22.2 No. 62368-1:19, 3rd Edition

Markings and Instructions

Clause Title	Marking or Instruction Details
Equipment identification marking – Manufacturer identification	Listee's or Recognized Company's 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)
Fuses – replaceable by skilled person	(component ID:(F5, F6) , Ratings (8A, 420V) and (symbol of required characteristics) located on or adjacent to fuse or fuseholder or in service manual. (component ID: (F1, F2, F3), Ratings (10A, 600V) and (symbol of required characteristics) located on or adjacent to fuse or fuseholder or in service manual.

Special Instructions to UL Representative

N/A