

UL TEST REPORT AND PROCEDURE

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| Standard: | UL 60950-1, 2nd Edition, 2014-10-14 (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) |
| 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, 170 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.

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Reviewed by: Walid Beytoughan

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

N/A

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : provided in the end system
- Operating condition : continuous
- Access location : For building in
- 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 (earthed)
- Considered current rating of protective device as part of the building installation (A) : provided in the end system
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : up to 4000 m
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : Less than 4
- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) 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.

- The product is intended for use on the following power systems: TT, TN
- 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 Production-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: 377 Vrms, 504 Vpk
- The following secondary output circuits are SELV: All
- The following secondary output circuits are at hazardous energy levels: All
- The power supply terminals and/or connectors are: Not investigated for field wiring
- 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, PE Test must be carefully considered in the end system. ,
- The following end-product enclosures are required: Fire, Electrical
- The power supply has been evaluated for use in Class I equipment as defined in UL 60950-1 Second Edition and CAN/CSA C22.2 No. 60950-1-07. An additional evaluation shall be made if the power supply is intended for use in other than Class 1 equipment.
- 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 equipment contains output (+19.2-29 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 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.
- Power supply chassis is to be reliably bonded to protective earthing in the end system before the equipment is energized.
- The power supply was evaluated for creepage and clearances up to 4000 m.

Additional Information

N/A

Additional Standards

The product fulfills the requirements of: N/A

Markings and instructions

| Clause Title | Marking or Instruction Details |
|---|--|
| Power rating - Company identification | Listee's or Recognized company's name, Trade Name, Trademark or File Number |
| Power rating - Model | Model Number |
| Power rating - Ratings | Ratings (voltage, frequency/dc, current) |
| Fuses - Non-operator access/soldered-in fuses | Unambiguous reference to service documentation for instructions for replacement of fuses replaceable only by service personnel |
| Special Instructions to UL Representative N/A | |

| Production-Line Testing Requirements | | | | | | |
|---|-----------|-----------------|---------------------|-----------|----------------|--------------|
| <u>Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.</u> | | | | | | |
| Model | Component | Removable Parts | Test probe location | V rms | V dc | Test Time, s |
| All Models | - | - | Pri - chassis | 250 0 | 3500 | 1 |
| All Models | T5 | - | Pri - Sec | 300 0 | 4200 | 1 |
| <u>Earthing Continuity Test Exemptions - This test is not required for the following models:</u> | | | | | | |
| - | | | | | | |
| <u>Electric Strength Test Exemptions - This test is not required for the following models:</u> | | | | | | |
| - | | | | | | |
| <u>Electric Strength Test Component Exemptions - The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:</u> | | | | | | |
| - | | | | | | |
| <u>Sample and Test Specifics for Follow-Up Tests at UL</u> | | | | | | |
| Model | Component | Material | Test | Sample(s) | Test Specifics | |
| - | - | - | - | - | - | |