

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
<b>Complementary CCN:</b>	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
<b>Product:</b>	Switching Power Supply
<b>Model:</b>	PFE500SA-abcd, PFE300SA-abcd, PFE700SA-48bcd, PFE500SA-28/TVK, PFE500SA-48/ES, PFE500SA-48/TES Suffix: a = 12, 28, 48. b = "/" or blank. c = T or blank. d = G or blank /TVK = No threads in the corner studs and auto-restart for over voltage protection and over temperature protection. /ES = Output / interface voltage is at SELV level. /TES = No threads in the corner studs and Output / interface voltage is at SELV level.
<b>Rating:</b>	Input: AC 100-240V, 50-60Hz, 5A (for PFE500SA-12bcd), 6A (for PFE500SA-28bcd, PFE500SA-48bcd, PFE500SA-28/TVK, PFE500SA-48/ES, PFE500SA-48/TES) 4A (for PFE300SA-abcd) 9.5A (for PFE700SA-48bcd)
<b>Applicant Name and Address:</b>	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.

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Report Reference #

E122103-A157-UL

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: Tetsuo Iwasaki

### 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 Build-in type Switching Power Supply for use in general office environment (host equipment is not specified).

Aluminum baseplate PCB is used for mounting the power components and securing an external heatsink.

Output:

PFE500SA-12: DC 12V (DC 9.6-14.4V), max. 33A, max. 396W  
PFE500SA-28, PFE500SA-28/TVK: DC 28V (DC 22.4-33.6V), max. 18A, max. 504W  
PFE500SA-48: DC 48V (DC 38.4-57.6V), max. 10.5A, max. 504W  
PFE500SA-48/ES, PFE500SA-48/TES: DC 48V (DC 38.4-51.0V), max. 10.5A, max. 504W  
PFE300SA-12: DC 12V (DC 9.6-14.4V), max. 25A, max. 300W  
PFE300SA-28: DC 28V (DC 22.4-33.6V), max. 10.8A, max. 302.4W  
PFE300SA-48: DC 48V (DC 38.4-57.6V), max. 6.3A, max. 302.4W  
PFE700SA-48: DC 51V, max. 14A, max. 714W

### Model Differences

See enclosure 7-02 for details.

Models of PFE700SA-48bcd which all components, materials and constructions are totally identical to previous certified models of PFE500SA-48bcd except for model name, ratings, transformer T303 and marking plate.

Model PFE500SA-28/TVK is totally identical to model PFE500SA-28 except for model name, marking plate, no threads in the corner studs, auto-restart for over voltage protection and over temperature protection (the value of R93).

Models of PFE500SA-48/ES which all components, materials, constructions and output derating curve are totally identical to previous certified models of PFE500SA-48 except for model name, ratings, marking plate and output/ interface voltage is at SELV level.

Models of PFE500SA-48/TES which all components, materials, constructions and output derating curve are totally identical to previous certified models of PFE500SA-48 except for model name, ratings, marking plate, no threads in the corner studs and output/ interface voltage is at SELV level.

### Technical Considerations

- Equipment mobility : for building-in

- Connection to the mains : N/A
- Operating condition : continuous
- Access location : N/A (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) : N/A
- Class of equipment : Not classified, Class I construction
- Considered current rating of protective device as part of the building installation (A) : 20 A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : Up to 3048 meters (10,000ft)
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : 0.2
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: Product can be used in any orientation providing the baseplate PCB temperature does not exceed 85°C (for PFE500SA-12bcd), 100°C (for PFE500SA-28bcd, PFE500SA-28/TVK, PFE500SA-48bcd, PFE500SA-48/ES, PFE500SA-48/TES, PFE300SA-abcd and PFE700SA-48bcd) in host equipment.
- The product is intended for use on the following power systems: TN

#### **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: Primary-Earthed Dead Metal: 338Vrms, 420Vpk, Primary-SELV: 302Vrms, 594Vpk
- The following secondary output circuits are SELV: output of PFE500SA-12bcd, PFE500SA-28bcd, PFE500SA-28/TVK, PFE500SA-48/ES, PFE500SA-48/TES, PFE300SA-12bcd and PFE300SA-28bcd.
- The following secondary output circuits are at hazardous energy levels: All output
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- 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 magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C): T301 (Class 155(H))
- The following end-product enclosures are required: Fire, Electrical
- The product was submitted and evaluated for use at the maximum operating temperature permitted by the manufacturer's specification of: 85°C of baseplate for PFE500SA-12bcd; 100°C of baseplate for PFE500SA-28bcd, PFE500SA-28/TVK, PFE500SA-48bcd, PFE500SA-48/ES, PFE500SA-

48/TES, PFE300SA-abcd and PFE700SA-48bcd. Detailed refer to the instruction manual.

- Test conducted with external R/C fuse, fast-blew type fuse & rated 250Vac, 15A.
- Output PFE500SA-48, PFE300SA-48 and PFE700SA-48bc are not SELV.
- The following output circuits are at ES1 energy levels: Output of Model PFE500SA-12bcd, PFE500SA-28bcd, PFE500SA-28/TVK, PFE500SA-48/ES, PFE500SA-48/TES, PFE300SA-12bcd and PFE300SA-28bcd
- The following output circuits are at ES2 energy levels: Output of Model PFE500SA-48bcd, PFE300SA-48bcd and PFE700SA-48bcd
- Humidity conditioning has been conducted by tropical condition.
- 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.

**Additional Information**

The Clearances and Creepage Distances have additionally been assessed for suitability up to 3048m (10,000ft) 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 - Model	Model Number
Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number
Power rating - Ratings	Ratings (voltage, frequency/dc, current)