

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	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)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
<b>Product:</b>	Switching Power Supply for building-in
<b>Model:</b>	LS75-X /YYYYYY, where X can be 3.3, 5, 12, 15, 24, 36 and 48. And /YYYYYY can be /B, /BCO, /BCO2, /BCOL, /BCO2L, /BM, /BMCO, /BMCO2, /BMCOL, /BMCO2L, /BL, /BML, /CO, /CO2, /COL, /CO2L, /L or blank.
<b>Rating:</b>	Input: 100-240 V ac, 1.6 A, 50/60 Hz.  Output: LS75-3.3: +3.3 V dc (+3 - +3.6 V dc), 15 A max; LS75-5: +5 V dc (+4.75 - +5.5 Vdc), 12 A max; LS75-12: +12 V dc (+10.8 - +13.2 V dc), 6 A max; LS75-15: +15 V dc (+13.5 - +16.5 V dc), 5 A max; LS75-24: +24 V dc (+22 - +27.2 V dc), 3.2 A max; LS75-36: +36 V dc (+32 - +40 V dc), 2.1 A max; LS75-48: +48 V dc (+42 - +54 V dc), 1.6 A max.  (Voltage range indicated in '( )' represents voltage tolerance evaluated)
<b>Applicant Name and Address:</b>	TDK-LAMBDA SINGAPORE PTE LTD #06-01/08 1008 TOA PAYOH NORTH SINGAPORE 318996 SINGAPORE

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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2015-07-30

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Report Reference #

E252373-A7-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: CheeBeng Wai

### 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

Electronic components mounted on PWB and housed with metal enclosure.

### Model Differences

All Models are similar to each other, except the following:-

- a) Output rating;
- b) Layout;
- c) Transformer (T1) secondary winding;
- d) Model designation (refer to Additional information more designation information)

Model LS75-X /YYYYYY, where X can be 3.3, 5, 12, 15, 24, 36 and 48. And /YYYYYY can be /B, /BCO, /BCO2, /BCOL, /BCO2L, /BM, /BMCO, /BMCO2, /BMCOL, /BMCO2L, /BL, /BML, /CO, /CO2, /COL, /CO2L, /L or blank.

- 1) B => Input Connector (CN1) and Output connector (CN2) are from JST;
- 2) BM => Input Connector (CN1) and Output connector (CN2) are from Molex;
- 3) CO => PCB with one (1) side coating;
- 4) CO2 => PCB with two (2) sides coating;
- 5) L => Open frame (Cover removed);
- 6) blank => Input connector and output connector using terminal block TB1;

\*\*Terminal block TB1 can only be used with PWB type A; Input Connector CN1 can only be used with PWB type B.

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : N/A
- Operating condition : continuous
- Access location : N/A
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10% (manufacturer declared)
- Tested for IT power systems : No

- IT testing, phase-phase voltage (V) : NA
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 20
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : less than 2000 meters
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : 0.4kg
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: Models LS75-3.3 and LS75-5:, 45 °C for 100 % load, Mounting Position C., 50 °C for 100 % load, Mounting Position A, B and D., 60 °C for 60 % load (output derating), Mounting Position C., 70 °C for 70 % load (output derating), Mounting Position A, B and D., , Models LS75-12, LS75-15, LS75-24, LS75-36 and LS75-48:, 50 °C for 100 % load, Mounting Position A, B, C and D., 60 °C for 70 % load (output derating), Mounting Position C., 70 °C for 60 % load (output derating), Mounting Position A, B and D.
- The product is intended for use on the following power systems: TN
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A12:2010 + A12:2011 + A2:2013 (which includes all European national differences, including those specified in this test report).
- The following accessible locations (with circuit/schematic designation) are within a limited current circuit: Secondary side of C40.
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure 3-08, point 1 - point 2),
- LEDs provided in the product are considered low power devices: Yes

#### **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, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 240 Vrms, 359 Vpk, Primary-SELV: 267 Vrms, 567 Vpk
- The following secondary output circuits are SELV: All secondary outputs
- The following secondary output circuits are at non-hazardous energy levels: All secondary outputs
- The following secondary output circuits are Limited Current Circuits: Secondary side of C40.
- The following output terminals were referenced to earth during performance testing: T1 (pin 7, 8, 9)
- 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: Been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral: Terminal Block TB1 (pin 2), connector CN1 (pin 2).

- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJ2 insulation system with the indicated rating greater than Class A (105°C): LS75-3.3 & LS75-5: Transformer T1 (Class F), LS75-12, LS75-15, LS75-24, LS75-36 & LS75-48: Transformer T1 (Class B)
- The following end-product enclosures are required: Electrical, Mechanical, Fire
- The following LEDs operate within the exempt group per IEC 62471: All LEDs.
- The power supply is evaluated to 4 mounting positions. Refer to enclosure 4-28 for details.

**Additional Information**

This report is reissued from E252373-A7-CB-3 due to the following:

1) Upgrade standard to IEC 60950-1 2ND EDITION + AMD 1 + AMD 2 INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2013/05/01;

2) Add mounting methods (B), (C), (D), see enclosure diagram 4-28;

3) Add output derating for LS75-3.3 and LS75-5:  
60 °C for 60 % load (output derating), Mounting Position C.  
70 °C for 70 % load (output derating), Mounting Position A, B and D.

4) Add output derating for LS75-12, LS75-15, LS75-24, LS75-36 and LS75-48:  
60 °C for 70 % load (output derating), Mounting Position C.  
70 °C for 60 % load (output derating), Mounting Position A, B and D.

5) Evaluate voltage range as identified by manufacturer for LS75-3.3 (+/- 9.1%), LS75-5 (+10%, -5%), LS75-12 (+/-10%), LS75-15 (+/-10%), LS75-24 (+13.3%, -8.3%), LS75-36 (+/-11.1%) and LS75-48 (+/-12.5%);

6) Add alternate components (PC1, PC2, C1, C2, C3, C4, C5, and TB1);

7) Remove following components from table 1.5.1:  
- Terminal Block TB1, Mfg: PHOENIX MECANO, Type: PMS30950-01  
- X-capacitor C1, C2, Mfg: KEMET ELECTRONICS, Type: R.46 Series  
- X-capacitor C1, C2, Mfg: Hua Jung, Type: MKP Series  
- X-capacitor C1, C2, Mfg: Panasonic, Type: ECQUL

8) Update of transformer T1 specification for LS75-3.3 and LS75-5;

9) Correction of temperature limit for capacitor C6 from 130 °C to 105 °C in table 1.5.1;

10) Remove of models LS75-7, LS75-18, LS75-28, LS75-40 and LS75-56.

This report is a reissue of CB Test Report Ref. No. E252373-A7-CB-3, issued date 2013-03-29 with CB Test Certificate No. DK-31891-UL, issued date 2013-03-29.

Based on previously conducted testing and the review of product construction, only limited tests were deemed necessary.

**Additional Standards**

The product fulfills the requirements of: EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

**Markings and instructions**

Clause Title	Marking or Instruction Details
Power rating - Ratings	Ratings (voltage, frequency/dc, current)

Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number
Power rating - Model	Model Number
Fuses - Operator caution statement	"CAUTION: For continued protection against risk of fire, replace only with same type and rating of fuse".
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
Terminals for external primary power supply conductors	Capital letter "N" located adjacent to a terminal intended exclusively for connection of the primary power neutral conductor
<b>Special Instructions to UL Representative</b> N/A	