

CERTIFICATE OF COMPLIANCE

Certificate Number 20160525-E252373
Report Reference E252373-A19-UL
Issue Date 2016-MAY-25

Issued to: TDK-LAMBDA SINGAPORE PTE LTD
06-01/08, 1008 TOA PAYOH NORTH
SINGAPORE 318996 SINGAPORE

**This is to certify that
representative samples of**

COMPONENT - POWER SUPPLIES, INFORMATION
TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL
BUSINESS EQUIPMENT

Switching Power Supply for building-in
Models: LS35-X /YYYYYY, where X can be 3.3, 5, 7, 12,
15, 18, 24, 28, 36, 40, 48, or 56 and /YYYYYY can be /B,
/BCO, /BCO2, /BCOL, /BCO2L, /BM, /BMCO, /BMCO2,
/BMCOL, /BMCO2L, /BL, /BML, /CO, /CO2, /COL, /CO2L,
/L or blank.

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

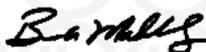
Standard(s) for Safety: UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07 -
Information Technology Equipment - Safety - Part 1:
General Requirements

Additional Information: See the UL Online Certifications Directory at
www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's
Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance
capabilities and are intended for use as components of complete equipment submitted for investigation rather
than for direct separate installation in the field. The final acceptance of the component is dependent upon its
installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.



Bruce Mahrenholz, Assistant Chief Engineer, Global Inspection and Field Services

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please
contact a local UL Customer Service Representative at www.ul.com/contactus



UL TEST REPORT AND PROCEDURE

| | |
|------------------------------------|---|
| 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: | Switching Power Supply for building-in |
| Model: | LS35-X /YYYYYY, where X can be 3.3, 5, 7, 12, 15, 18, 24, 28, 36, 40, 48, or 56 and /YYYYYY can be /B, /BCO, /BCO2, /BCOL, /BCO2L, /BM, /BMCO, /BMCO2, /BMCOL, /BMCO2L, /BL, /BML, /CO, /CO2, /COL, /CO2L, /L or blank. |
| Rating: | Input: 100-240 V ac, 0.8 A, 50/60 Hz Output: LS35-3.3: 3.3 V dc (+2.85 - +3.6 Vdc), 7 Amax; LS35-5: 5 V dc (+4.5 - +5.5 Vdc), 7 Amax; LS35-7: 7 V dc, 5 A; LS35-12: 12 V dc (+10.8 - +13.2 Vdc), 3 Amax; LS35-15: 15 V dc (+13.5 - +16.5 Vdc), 2.4 Amax; LS35-18: 18 V dc, 2 A; LS35-24: 24 V dc (+22 - +27.6 Vdc), 1.5 Amax; LS35-28: 28 V dc, 1.3 A; LS35-36: 36 V dc (+32 - +40 Vdc), 1 Amax; LS35-40: 40 V dc, 0.9 A; LS35-48: 48 V dc (+42 - +54 Vdc), 0.8 Amax; LS35-56: 56 V dc, 0.7 A. |
| Applicant Name and Address: | 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.

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: Chiang Shiau Hui

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) Transformer (T1) Primary and Secondary winding;
- c) Model designation.

LS35-X /YYYYYY, where X can be 3.3, 5, 7, 12, 15, 18, 24, 28, 36, 40, 48, or 56. 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;

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : not directly connected to the mains
- 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) : N/A
- 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) : Up to 2000m
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : 0.26kg
- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: 45 °C for 100 % load (Condition A and B), Mounting Position C; 50 °C for 100 % load (Condition A and B), Mounting Position A, B and D; 65 °C for 50 % load (Condition C and D), Mounting Position C; 70 °C for 50 % load (Condition C and D), 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 + A1:2010 + 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 C36
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace Point A to Point B (refer to Enclosure, Miscellaneous 7-02)
- LEDs provided in the product are considered low power devices: Yes
- Power Supply Unit is evaluated to output derating. Refer to enclosure 4-12 for 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, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 251.024 Vrms, 520.833 Vpk, Primary-Earthed Dead Metal: 237.182 Vrms, 349.365 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 C36
- The following output terminals were referenced to earth during performance testing: T1 Pin 6, 7
- 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: For model LS35-X /YYYYYY, TB1 pin 2 or 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): LS35-3.3, LS35-12, LS35-15, LS35-18, LS35-24, LS35-28, LS35-36, LS35-40: T1 (Class B);, LS35-5, LS35-7, LS35-48; LS35-56: T1 (Class F)
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The following LEDs operate within the exempt group per IEC 62471: All LEDs

- Power Supply Unit is evaluated to 4 mounting positions. Refer to enclosure 4-11 for details.

Additional Information

For CB report only, reissued no. 4:

This report is reissued from original report E252373-A19-CB-3 due to the following:

- 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;
- Remove of Input Connector, CN1 Mfr: Molex Incorporated, Type: 5414 series;
- Remove of X-Capacitors, C3, C4 Mfr: Hua Jung, Type: MKP series;
- Remove of Dummy tape Mfr: Teraoka, Type: 530F;
- Addition of Terminal Block, TB1 Mfr: Tianli Electrical Machinery, Type: T950;
- Addition of X-Capacitors, C3, C4 Mfr: EUROPTRONIC, Type: MPX 2;
- Addition of Y-Capacitors, C1, C2, C5, C6 Mfr: Walsin Technology Corp, Type: AC series;
- Addition of Optocoupler, PC1, PC2 Mfr: Everlight, Type: EL816;
- Evaluate voltage range as identified by manufacturer for LS35-3.3 (+9.09%, -13.64%), LS35-5 (+/- 10%), LS35-12 (+/- 10%), LS35-15 (+/- 10%), LS35-24 (+15%, -8.33%), LS35-36 (+/- 11.11%) and LS35-48 (+/- 12.5%)
- Add mounting methods (B), (C) and (D);
- Add output derating as follow:
For Models LS35-3.3, LS35-5, LS35-12, LS35-15, LS35-24, LS35-36 and LS35-48:
65 °C for 50 % load (Condition C and D), Mounting Position C;
70 °C for 50 % load (Condition C and D), Mounting Positon A, B and D.
- Minor PCB changes to improve clearance creepage distances;
- Additional transformer, T1 winding.
- Change of factory name from TRIO ENGINEERING CO LTD to PANYU TRIO MICROTRONICS CO LTD and factory address from SHIJI INDUSTRIAL ESTATE, DONGYONG, PANYU, GUANGZHOU GUANGDONG CHINA to SHIJI INDUSTRIAL ESTATE DONGYONG NANSHA GUANGZHOU GUANGDONG 511453 CHINA.

This report is a reissue of CBTR Ref. No. E252373-A19-CB-3-Reissue, issued date 2013-01-30 with CB Test Certificate Ref. No. DK-30716, issued date 2013-01-30.

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 - 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 |
| 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 |
| -- | -- | -- | -- | -- | -- | -- |
| <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 | |
| -- | -- | -- | -- | -- | -- | |