

## 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>	GWS500-XX/YYYYYYYYYYYYYY, where XX can be 5, 7.5 and Y options can be any combination of /L, /RL, /CO, /CO2, /ME, /FG, /T, /BAT, /F, /LPV or blank.  GWS500-XX/YYYYYYYYYYYYYY, where XX can be 12, 24, 36, 48 and Y options can be any combination of /L, /RL, /CO, /CO2, /ME, /FG, /T, /BAT, /F, /3K, /LPV or blank.
<b>Rating:</b>	Input: 100-240 Vac, 6 A, 50/60 Hz  For Model GWS500-XX/YYYYYYYYYYYYYY except Model GWS500-XX/BATYYYYYYYYYY and GWS500-XX/LBATYYYYYYYYYY Output: GWS500-5: 5 V dc, 80 A; GWS500-7.5: 7.5 V dc, 67.2 A; GWS500-12: 12 V dc (+10.8 - +13.2 Vdc), 42 Amax; GWS500-24: 24 V dc (+22 - +28.8 Vdc), 21 Amax; GWS500-36: 36 V dc (+32 - +40 Vdc), 14 Amax; GWS500-48: 48 V dc (+36 - +57.6 Vdc), 10.5 Amax.  For Model GWS500-XX/BATYYYYYYYYYY: GWS500-24/BAT: 21-29 V dc, 17.6 A GWS500-36/BAT: 32-40 V dc, 12.7 A GWS500-48/BAT: 42-58 V dc, 8.8 A  For Model GWS500-XX/LBATYYYYYYYYYY: GWS500-24/LBAT: 21-29 V dc, 17.6 A GWS500-36/LBAT: 32-40 V dc, 12.7 A GWS500-48/LBAT: 42-58 V dc, 8.8 A
<b>Applicant Name and Address:</b>	TDK-LAMBDA SINGAPORE PTE LTD #06-01/08 1008 TOA PAYOH NORTH SINGAPORE 318996 SINGAPORE

Issue Date: 2011-07-28  
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Report Reference #

E252373-A32-UL

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: 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, with two built-in fans and housed with metal enclosure.

### Model Differences

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

- Ratings
- Transformer (T1) Secondary winding except GWS500-7.5.  
(GWS500-7.5 employing different transformer Primary and Secondary winding)
- Model designation

Options:

- /F Full cover with built-in fan removed
- /L No cover
- /RL Reverse logic
- /CO Lacquer coating on single side
- /CO2 Lacquer coating on double side
- /ME, /FG Low leakage current
- /T OTP auto-restart
- /BAT Battery Charger
- /3K For used up to 3000 m altitude
- /LPV Represent client information

Models GWS500-XX/BATYYYYYYYYYYY are similar to Models GWS500-XX/YYYYYYYYYYYYYYY except for output ratings.

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : not directly connected to the mains
- Operating condition : continuous
- Access location : operator accessible
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10% (manufacturer declared)
- Tested for IT power systems : Yes
- IT testing, phase-phase voltage (V) : 230 V for Norway
- 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) : Models GWS500-5 and GWS500-7.5 evaluated up to 2000 m; For all other models evaluated up to 3000 m.
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : Open frame: 0.89 kg, With Top Chassis: 0.98 kg
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: 50 °C for 100 % load (Condition A and B), Mounting Position A and B.; 70 °C for 50 % load (Condition C and D), Mounting Position A and B.,
- The product is intended for use on the following power systems: TT, IT (For Norway only), 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: Bridging capacitor C311
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace, point A to point B; point A to point C (refer to Enclosure 7-04 for details),
- 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-SELV: 336.56 Vrms, 583 Vpk, Primary-Earthed Dead Metal: 242.64 Vrms, 368 Vpk,
- The following secondary output circuits are SELV: GWS500-5, GWS500-7.5, GWS500-12, GWS500-24, GWS500-36, GWS500-48, GWS500-24/BAT, GWS500-36/BAT, GWS500-48/BAT, +5VSB,
- The following secondary output circuits are at hazardous energy levels: GWS500-5, GWS500-7.5, GWS500-12, GWS500-24, GWS500-36, GWS500-48, GWS500-24/BAT, GWS500-36/BAT, GWS500-48/BAT,
- The following secondary output circuits are at non-hazardous energy levels: +5VSB
- The following secondary output circuits are Limited Current Circuits: Secondary side of C311,
- The following output terminals were referenced to earth during performance testing: T1 pin 17, T301 pin 8,
- 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: TB1 Neutral (pin 6),
- 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): T1 (Class F), T301 (Class F),
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The maximum continuous power supply output (Watts) relied on forced air cooling from: Two fans at 7 cfm each placed 5cm from unit applied to Bulk capacitor C14 side (Opposite terminal block) blowing outwards (for models without built-in fan)., ,
- The following LEDs operate within the exempt group per IEC 62471: All LEDs
- The fans included as part of this component are suitable for use in a user access area: No
- Fans: The fan provided in this sub-assembly is not intended for operator access.
- Power Supply Unit only evaluated to 2 mounting positions. Refer to enclosure 4-16 for details.
- Capacitance Discharge Test performed in worst condition. C3 & C6 - 0.68 uF, R1, R2 & R3 - 200K ohm
- Touch Current Test performed at worst condition. C1 & C2 - 100 pF, C4, C5, C7 & C8 - 2200 pF

**Additional Information**

For CB report, reissued no. 3

This report is reissued from E252373-A32-CB-2 due to the following:

- 1) Upgrade standard to IEC 60950-1 (2nd edition including amendment 1 and amendment 2): Information Technology Equipment - Safety - Part 1: General Requirements - Edition 2 - Revision Date: 2013/05/01;
- 2) Adding of alternate transformer T301;
- 3) Minor PCB changes to improve for 3000m altitude;
- 4) Evaluate altitude to 3000m for Models GWS500-12, GWS500-24, GWS500-36 and GWS500-48;
- 5) Evaluate voltage range as identified by manufacturer for GWS500-12 (+/- 10%), GWS500-24 (+20%, - 8.3%), GWS500-36 (+/- 11.1%) and GWS500-48 (+20%, -25%);
- 6) Add output derating for Models GWS500-12, GWS500-24, GWS500-36 and GWS500-48 at 70 °C for 50 % load (Condition C and D), Mounting A and B;
- 7) Add mounting method (B);
- 8) 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 reissued from CBTR Ref. No. E252373-A32-CB-2-Reissue, issued date 2013-01-30, with CB Test Certificate Ref. No. DK-30722-UL, issued on 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.
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**

Inspect the transformer(s) listed in Production-Line Testing Requirements per AA1.1-(C). When the tests are