

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
Model:	LCM600Q, LCM600W, LCM600Q-T-401, LCM600L, LCM600U, LCM600W-T-401, LCM600Q-T-405, LCM600Q-T-407, LCM600Q-N, LCM600N, LCM600Q-4-404, LCM600L-N, LCM600Q-T-409, LCM600U-T-404, LCM600W-N, LCM600W-T-N-5-411
Rating:	AC input: 100-240 Vac, 8.5 A Max., 50/60 Hz Models LCM600Q, LCM600Q-T-405, LCM600Q-N, LCM600Q-4-404: DC-outputs: +24 Vdc, 27.0 A Max., 600 W max; +5.0 Vsb, 2.0 A Max.(Optional) Models LCM600W, LCM600W-N & LCM600W-T-401: DC-outputs: +48 Vdc, 13.0 A Max., 600 W max; +5.0 Vsb, 2.0 A Max. (Optional) Model LCM600Q-T-401: DC-outputs: +24 Vdc, 18.75 A Max., 450 W max; +5.0 Vsb, 2.0 A Max. (Optional) Model LCM600L, LCM600L-N: DC-outputs: +12 Vdc, 52.0 A Max., 600 W max; +5.0 Vsb, 2.0 A Max. (Optional) Model LCM600U: DC-outputs: +36 Vdc, 18.0 A Max., 600 W max; +5.0 Vsb, 2.0 A Max. (Optional) Model LCM600Q-T-407: DC-output: +24V, 23.0A max, 500W Max Model LCM600N: DC-outputs: +15 Vdc, 44.0 A Max., 600 W max; +5.0 Vsb, 2.0 A Max (Optional) Model LCM600Q-T-409: DC-outputs: +24 Vdc, 27.0 A Max., 600 W max Model LCM600U-T-404: DC-output: +40 Vdc, 15.0 A Max., 600 W max Model LCM600W-T-N-5-411: DC-outputs: +48 Vdc, 13.0 A Max., 600 W max; +5.0 Vsb, 1.0 A Max.

Output derates at 2.5% per deg C from 50 degC to 70 deg C

Applicant Name and Address:

ASTEC INTERNATIONAL LTD
16TH FL
LU PLAZA
2 WING YIP ST
KWUN TONG KOWLOON HONG KONG

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: Tony Yeung / Project handler

Reviewed by: Brian Wong / Project Reviewer

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 switching power supply, intended for building in as a component used in information technology equipment which employs isolating transformers. Reinforced insulation is provided between primary and secondary. Basic insulation is provided between primary and PE (Protective Earth).

Model Differences

Model LCM600W is identical to model LCM600Q except Output rating, Transformer T801 and PWB Layout.

Model LCM600Q-T-401 is identical to Model LCM600Q except different output rating and alternate Fan.

Model LCM600L is identical to Model LCM600Q, except for output rating, transformer (T801), choke(L302) and insulator.

Model LCM600U is identical to Model LCM600Q, except for output rating, transformer (T801), choke(L302) and insulator.

Model LCM600W-T-401 is identical to Model LCM600W except for model designation and 4 output terminals provided.

Model LCM600Q-T-405 is identical to Model LCM600Q except for model designation.

Model LCM600Q-N is identical to Model LCM600Q except for model designation and Fan.

Model LCM600Q-T-407 is identical to Model LCM600Q except for model designation and Fan filter.

Model LCM600N is identical to Model LCM600Q, except for output rating, transformer (T801), choke(L302) and insulator.

Model LCM600Q-4-404 is identical to Model LCM600Q-N, except for input cable assembly.

Model LCM600L-N is identical to Model LCM600L except for model designation, and fan used and alternate insulator is for use across the whole series.

Model LCM600Q-T-409 is identical to Model LCM600Q except for model designation and it has no +5.0 Vsb output rating. Additional tests were conducted for customer requirement only.

Model LCM600U-T-404 is identical to Model LCM600U except for model designation, output rating, input wiring assembly and PCB layout to meet the new creepage and clearance required by the customer which are higher than the safety requirement.

Model LCM600W-N is identical to Model LCM600W except for model designation and alternate Fan.

Model LCM600W-T-N-5-411 is identical to Model LCM600W except for model designation, 5Vsb output, 5Vsb PWB, Housekeeping PWB, Auxiliary transformer (T607), bridging capacitors, insulator, output choke (L603), base enclosure and cover enclosure specifically for LCM600W-T-N-5-411.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : pluggable A
- Operating condition : continuous
- Access location : N/A
- 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 : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : Rated Input 8.5 A Max.
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 5000m
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : <18
- The creepage and clearance distances have additionally been assessed for suitability up to 5000m.
- The equipment is a component level power supply intended for use in Class I applications
- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: 50 degree C and up to 70 degree C at derated power
- The means of connection to the mains supply is: Pluggable A
- The product is intended for use on the following power systems: TN
- The equipment disconnect device is considered to be: Appliance inlet
- 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). For Models LCM600Q and LCM600Q-4-404: CSA C22.2 NO. 61010-1 SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2008/10/01 UL 61010-1 SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2008/10/28
- The following accessible locations (with circuit/schematic designation) are within a limited current circuit: Sec. pin of C137
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- Model LCM600Q was tested at inhibit mode (fan off/ stop condition) at 50°C ambient temperature.

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 secondary output connector has not been evaluated for field connections.
- The power supply has been evaluated for use in Class 1 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.
- No energy hazard (below 240VA) exists at the PSU outputs in the removed condition.
- Connection to the supply: Pluggable equipment type A. With non-detachable input cord in end system.
- The disconnection from the line should be considered in the end system.

- The equipment was not evaluated for system mounting. When installed in the end system, proper evaluation should be considered.
- For Model LCM600Q: Additional evaluation has been considered for the +24V +/- 20% Output voltage adjustability limited to the following combined conditions: maximum allowed 27A output current and 600W output power.
- For Model LCM600W: Additional evaluation has been considered for the +48V +/- 20% Output voltage adjustability limited to the following combined conditions: maximum allowed 13A output current and 600W output power.
- For Model LCM600L: Additional evaluation has been considered for the +12V +/- 20% Output voltage adjustability limited to the following combined conditions: maximum allowed 52A output current and 600W output power.
- For Model LCM600U: Additional evaluation has been considered for the +36V +/- 20% Output voltage adjustability limited to the following combined conditions: maximum allowed 18A output current and 600W output power
- For Model LCM600N: Additional evaluation has been considered for the +15.0V +30 % - 20% Output voltage adjustability limited to the following combined conditions: maximum allowed 44A output current and 600W output power
- The following secondary output circuits are at hazardous energy levels: +24Vdc (Models LCM600Q, LCM600Q-4-404, LCM600Q-T-401, LCM600Q-T-405, LCM600Q-T-407, LCM600Q-N, LCM600W-T-N-5-411 and LCM600Q-T-409), +48Vdc (Models LCM600W, LCM600W-N and LCM600W-T-401), +12Vdc (Model LCM600L and LCM600L-N), +36Vdc (Model LCM600U), +15Vdc (Model LCM600N), +40Vdc (Model LCM600U-T-404)
- The following secondary output circuits are at non-hazardous energy levels: +5Vsb
- The following Production-Line tests are conducted for this product: Earthing Continuity, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 422.7 Vrms, 689 Vpk Primary-Earthed Dead Metal: 414.9 Vrms, 689 Vpk. For model LCM600U, Primary-SELV: 397.7Vrms, -990 Vpk, Primary-Earthed Dead Metal: 398.0 Vrms, 663 Vpk
- The following secondary output circuits are SELV: +24Vdc (Models LCM600Q, LCM600Q-4-404, LCM600Q-T-401, LCM600Q-T-405, LCM600Q-T-407, LCM600Q-N and LCM600Q-T-409), +48Vdc (Models LCM600W, LCM600W-N, LCM600W-T-N-5-411 and LCM600W-T-401), +12Vdc (Model LCM600L and LCM600L-N), +36Vdc (Model LCM600U), +15Vdc (Model LCM600N), +40Vdc (Model LCM600U-T-404) and +5Vsb (all models except for LCM600Q-T-409 and LCM600U-T-404)
- The maximum investigated branch circuit rating is: 30 A
- The following secondary output circuits are Limited Current Circuits: Sec. pin of C137
- The equipment is suitable for direct connection to: AC mains supply
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The power supply terminals and/or connectors are: Not investigated for field wiring
- 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 magnetic devices (e.g. transformers or inductor) are provided with an OBJ2 insulation system with the indicated rating greater than Class A (105°C): T801, T101, T302 (Class F)