

## 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>Complementary CCN:</b>	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
<b>Product:</b>	Power Supply
<b>Model:</b>	LCM300Q, LCM300U, LCM300L, LCM300W, LCM300N
<b>Rating:</b>	For LCM300Q: AC Input: 100-240V, 5.0A Max, 50/60Hz DC outputs: +24V, 14.5A Max, 350W Max; +5Vsb, 2.0A Max (optional)  For LCM300U: AC Input: 100-240V, 5.0A Max, 50/60Hz DC outputs: +36V, 9.7A Max, 350W Max; +5Vsb, 2.0A Max (optional)  For LCM300L: AC Input: 100-240V, 5.0A Max, 50/60Hz DC outputs: +12V, 25A Max, 300W Max; +5Vsb, 2.0A Max (optional)  For LCM300W: AC Input: 100-240Vac, 5.0A Max, 50/60Hz DC outputs: +48V, 6.25A Max, 300W Max; +5.0Vsb, 2.0A Max (optional)  For LCM300N: AC Input: 100-240Vac, 5.0A Max, 50/60Hz DC outputs: +15V, 20.0A Max, 300W Max; +5.0Vsb, 2.0A Max (optional)
<b>Applicant Name and Address:</b>	ASTEC INTERNATIONAL LIMITED 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.

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2018-02-01

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Report Reference #

E186249-A267-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.

Prepared by: Suki Kwong

Reviewed by: Patty Li / Paul Wan

### **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 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 LCM300U is identical to model LCM300Q except the output ratings, power transformer (T4) and model designation.

Model LCM300L is identical to model LCM300Q except the output ratings, power transformer (T4), gate drive transformer (T2), PCB layout, and model designation.

Model LCM300W is identical to model LCM300Q except the output ratings, power transformer (T4), gate drive transformer (T2), maximum ambient temperature and model designation.

Model LCM300N is identical to model LCM300L except the output ratings, power transformer (T4), and model designation.

For LCM300Q, DC outputs: +24V, 14.5A Max, 350W Max; +5Vsb, 2.0A (optional)

For LCM300U, DC outputs: +36V, 9.7A Max, 350W Max; +5Vsb, 2.0A (optional)

For LCM300L, DC outputs: +12V, 25A Max, 300W Max; +5Vsb, 2.0A (optional)

For LCM300W, DC outputs: +48V, 6.25A Max, 300W Max; +5Vsb, 2.0A (optional)

For LCM300N, DC outputs: +15V, 20A Max, 300W Max; +5Vsb, 2.0A (optional)

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : to be considered in end system
- Operating condition : continuous
- Access location : operator accessible
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10%
- Tested for IT power systems : Yes (for Norway)
- IT testing, phase-phase voltage (V) : 230
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 20A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 5000 meters
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : <18
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: 45 °C at full load up to 350W (For LCM300Q and LCM300U) or 50 °C at full load up to 300W up to 70 °C at derated output power for the main output (50%).
- The means of connection to the mains supply is: Pluggable B (provided at end system)
- The product is intended for use on the following power systems: TN and IT

- The equipment disconnect device is considered to be: for consideration at end system
- 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), UL 62368-1, 2nd Edition: 2014, CSA C22.2 No.62368-1, 2nd Edition: 2014, IEC 62368-1, 2nd Edition: 2014EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 (which includes all European national differences, including those specified in this test report), UL 62368-1, 2nd Edition: 2014, CSA C22.2 No.62368-1, 2nd Edition: 2014, IEC 62368-1, 2nd Edition: 2014
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- The power supply in this equipment was: Investigated to IEC 60950-1. As part of the investigation of this product, the power supply and its test report were reviewed and found to comply with IEC 60950-1.
- The Clearances and Creepage distances have additionally been assessed for suitability up to 5000m elevation.
- For LCM300Q, Maximum ambient of 50°C at full load for +24V output at 300W Max; and maximum ambient of 45°C at full load for +24V output at 350W Max.
- For LCM300U, Maximum ambient of 50°C at full load for +36V output at 300W Max; and maximum ambient of 45°C at full load for +36V output at 350W Max.
- For LCM300L, Maximum ambient of 50°C at full load for +12V output at 300W Max.
- For LCM300W, Maximum ambient of 50°C at full load for +48V output at 300W Max.
- For LCM300N, Maximum ambient of 50°C at full load for +15V output at 300W Max.

#### **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: 390 Vrms, 727 Vpk, Primary-Earthed Dead Metal: 390 Vrms, 712 Vpk
- The following secondary output circuits are SELV: +24V (for LCM300Q), +36V (for LCM300U), +12V (for LCM300L), +48V (for LCM300W), +5vsb, +15V (for LCM300N)
- The following secondary output circuits are at hazardous energy levels: +24V (for LCM300Q), +36V (for LCM300U), +12V (for LCM300L), +48V (for LCM300W), +15V (for LCM300N)
- The following secondary output circuits are at non-hazardous energy levels: +5Vsb
- The power supply terminals and/or connectors are: Not investigated for field wiring
- 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 magnetic devices (e.g. transformers or inductor) are provided with an OBJ2 insulation system with the indicated rating greater than Class A (105°C): T4, T1 and T2 (ClassF)
- The equipment is suitable for direct connection to: AC mains supply
- 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.
- This equipment was not evaluated for end system mounting. When installed in the end system, the proper evaluation should be considered.
- Compliance to the temperature limits of user touchable parts and surfaces of the power supply shall be considered at the end system.
- For Model LCM300Q: Additional evaluations have been considered for the +24V +/- 20% output voltage adjustability limited to the following combined conditions: maximum allowed 12.5 A output current and 300W output power at 50°C ambient; and maximum allowed 14.5A output current and 350W output power at 45°C ambient. Additional evaluations have also been considered for Reversed Airflow condition with maximum output power of 300W at 50°C ambient.
- For Model LCM300U: Additional evaluations have been considered for the +36V +/- 20% output voltage adjustability limited to the following combined conditions: maximum allowed 8.35 A output current and 300W output power at 50°C ambient; and maximum allowed 9.7A output current and 350W output power at 45°C ambient.
- For Model LCM300L: Additional evaluations have been considered for the +12V +/- 20% output voltage adjustability limited to the following combined conditions: maximum allowed 25 A output current and 300W output power at 50°C ambient. Additional evaluations have also been considered for Reversed Airflow condition with maximum output power of 300 W at 50°C ambient.
- For Model LCM300W: Additional evaluations have been considered for the +48V +/- 20% output voltage adjustability limited to the following combined conditions: maximum allowed 6.25 A output current and 300W output power at 50°C ambient.
- For Model LCM300N: Additional evaluations have been considered for the +15V +/- 20% output voltage adjustability limited to the following combined conditions: maximum allowed 20.0 A output current and 300W output power at 50°C ambient.
- Only Nidec type U40G12BHA is allowed to be used for Reversed fan condition of LCM300Q.