

## 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:** QQQQ2, QQQQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)

**Product:** Switching Power Supply

**Model:** LCC600-28H-XX, LCC600-28U-XX,  
LCC600-28H-4XXX, LCC600-28H-9XXX,  
LCC600-28U-4XXX, LCC600-28U-9XXX

LCC600-48U-XX, LCC600-48H-XX,  
LCC600-48U-4XXX, LCC600-48U-9XXX,  
LCC600-48H-4XXX, LCC600-48H-9XXX

LCC600-36U-XX, LCC600-36H-XX,  
LCC600-36U-4XXX, LCC600-36U-9XXX,  
LCC600-36H-4XXX, LCC600-36H-9XXX

LCC600-12U-XX,  
LCC600-12U-4XXX, LCC600-12U-9XXX  
LCC600-12H-XX,  
LCC600-12H-4XXX, LCC600-12H-9XXX

LCC600-12U-XX-YY,  
LCC600-12U-4XXX-YY, LCC600-12U-9XXX-YY

where

- XX can be 4P or 9P.
- XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety.
- YY can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety.

**Rating:** For Model LCC600-28H-XX (where XX can be 4P or 9P), Model LCC600-28H-4XXX, LCC600-28H-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:  
200-277Vac, 5A Max, 50/60Hz

DC Output:  
+28V, 25A Max  
+5Vsb, 1.5A Max

Max. Total Output Power: 600W

For Model LCC600-28U-XX (where XX can be 4P or 9P), Model LCC600-28U-4XXX, LCC600-28U-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:

100-240Vac, 8A Max, 50/60Hz

DC Output:

+28V, 25A Max

+5Vsb, 1.5A Max

Max. Total Output Power: 600W

For Model LCC600-48U-XX (where XX can be 4P or 9P), Model LCC600-48U-4XXX, LCC600-48U-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:

100-240Vac, 8A Max, 50/60Hz

DC Output:

+48V, 12.5A Max

+5Vsb, 1.5A Max

Max. Total Output Power: 600W

For Model LCC600-48H-XX (where XX can be 4P or 9P), Model LCC600-48H-4XXX, LCC600-48H-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:

200-277Vac, 5A Max, 50/60Hz

DC Output:

+48V, 12.5A Max

+5Vsb, 1.5A Max

Max. Total Output Power: 600W

For Model LCC600-36U-XX (where XX can be 4P or 9P), Model LCC600-36U-4XXX, LCC600-36U-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:

100-240Vac, 8A Max, 50/60Hz

DC Output:

+36V, 16.7A Max

+5Vsb, 1.5A Max

Max. Total Output Power: 600W

For Model LCC600-36H-XX (where XX can be 4P or 9P), Model LCC600-36H-4XXX, LCC600-36H-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:

200-277Vac, 5A Max, 50/60Hz

DC Output:  
+36V,16.7A Max  
+5Vsb ,1.5A Max

Max. Total Output Power: 600W

For Model LCC600-12U-XX (where XX can be 4P or 9P), Model LCC600-12U-4XXX, LCC600-12U-9XXX (Where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:  
100-240Vac, 8A Max, 50/60Hz  
DC Output:  
+12V,50A Max  
+5Vsb ,1.5A Max

Max. Total Output Power: 600W

For Model LCC600-12H-XX (where XX can be 4P or 9P), Model LCC600-12H-4XXX, LCC600-12H-9XXX (where XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:  
200-277Vac, 5A Max, 50/60Hz  
DC Output:  
+12V, 50A Max  
+5Vsb, 1.5A Max

Max. Total Output Power: 600W

For Model LCC600-12U-XX-YY (where XX can be 4P or 9P and YY can be any alphanumeric character symbol or blank that represents customer identity that do not affect safety), Model LCC600-12U-4XXX-YY, LCC600-12U-9XXX-YY(Where XXX and YY can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)

AC Input:  
100-240Vac, 8A Max, 50/60Hz  
DC Output:  
+12V,50A Max  
+5Vsb ,1.5A Max

**Applicant Name and Address:**

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

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2017-10-17

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Report Reference #

E186249-A288-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.

Prepared by: Paul Wan / Project Handler

Reviewed by: Steve Chiu / 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 Class I AC/DC switching power supply partially potted designed to deliver 600W rated output power, intended for building in as a component used in information technology equipment.

Reinforced insulation is provided between primary circuit to secondary circuit and basic insulation is provided on primary circuit to Earth.

### **Model Differences**

LCC600-28H-9P and LCC600-28H-4P is exactly similar in terms of electrical construction, they only differ on model name, cover enclosure dimension, input and output connection.

Model LCC600-28H-XX is identical to Model LCC600-28U-XX except for the following safety controlled parameters.

1. Model name.
2. Ratings of AC input, Fuse (F101, F102), Y-capacitors (C105, C106, C115), bulk capacitor (C114, C116), and bridging capacitor (C508, C509).
3. Power transformer (T204), common mode choke (L101) and Gate drive transformer (T301).

Model LCC600-28H-XX and LCC600-28U-XX is identical to Model LCC600-48U-XX except for the following safety controlled parameters.

1. Model name.
2. Ratings of AC Input, Ratings of DC Output, Input connector
3. Power transformer(T204)

Model LCC600-28H-XX, LCC600-28U-XX and LCC600-48U-XX is identical to Model LCC600-48H-XX except for the following safety controlled parameters.

1. Model name.
2. Ratings of AC Input, Fuse (F101, F102), Y-capacitors (C101, C102, C105, C106, C115), and bridging cap (C509)
3. Power transformer(T204)

Model LCC600-28H-XX, LCC600-28U-XX, LCC600-48U-XX and LCC600-48H-XX is identical to Model LCC600-36U-XX except for the following safety controlled parameters.

1. Model name.
2. Ratings of DC output ,Power transformer(T204) for the secondary winding turns different.
3. LCC600, 9P version has two input connector option. (alternate construction)  
Input Connector (J101)  
Input cord with input connector (Optional)

Model LCC600-28H-XX, LCC600-28U-XX, LCC600-48U-XX and LCC600-48H-XX and LCC600-36U-XX is identical to Model LCC600-36H-XX except for the following safety controlled parameters.

1. Model name.
2. Ratings of DC output
3. Power transformer (T204) and Add alternate Insulator barrier on all models.

Model LCC600-28H-XX, LCC600-28U-XX, LCC600-48U-XX and LCC600-48H-XX, LCC600-36U-XX and LCC600-36H-XX is identical to Model LCC600-12U-XX except for the following safety controlled parameters.

1. Model name.
2. Ratings of DC output, Y-capacitors (C115, C105, C106), Power transformer (T204), and Auxiliary Transformer (T501).
3. Insulators, Heatsink101, Heatsink102, PFC Choke (L103), PWB and Output cord.
4. Add alternate model names applicable for all LCC600 models.

Models LCC600-28H-XX, LCC600-28U-XX, LCC600-48U-XX and LCC600-48H-XX, LCC600-36U-XX, LCC600-36H-XX and LCC600-12U-XX is identical to Model LCC600-12H-XX except for the following safety controlled parameters.

1. Different rated output rating;
2. Employ different Power Transformer (T204), Type 801-007604-XXXX.

LCC600-28U-4P is identical to LCC600-28U-4XXX except for model name.  
LCC600-28U-9P is identical to LCC600-28U-9XXX except for model name.  
LCC600-28H-4P is identical to LCC600-28H-4XXX except for model name.  
LCC600-28H-9P is identical to LCC600-28H-9XXX except for model name.  
LCC600-48U-4P is identical to LCC600-48U-4XXX except for model name.  
LCC600-48U-9P is identical to LCC600-48U-9XXX except for model name.  
LCC600-48H-4P is identical to LCC600-48H-4XXX except for model name.  
LCC600-48H-9P is identical to LCC600-48H-9XXX except for model name.  
LCC600-36U-4P is identical to LCC600-36U-4XXX except for model name.  
LCC600-36U-9P is identical to LCC600-36U-9XXX except for model name.  
LCC600-36H-4P is identical to LCC600-36H-4XXX except for model name.  
LCC600-36H-9P is identical to LCC600-36H-9XXX except for model name.  
LCC600-12U-4P is identical to LCC600-12U-4XXX except for model name.  
LCC600-12U-9P is identical to LCC600-12U-9XXX except for model name.  
LCC600-12H-4P is identical to LCC600-12H-4XXX except for model name.  
LCC600-12H-9P is identical to LCC600-12H-9XXX except for model name.

Model LCC600-12U-XX is identical to LCC600-12U-4P-YY, LCC600-12U-9P-YY, LCC600-12U-4XXX-YY, LCC600-12U-9XXX-YY (where XXX and YY can be alphanumeric character, symbol or blank which refer to customer and not safety critical) except for capacitor C115

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : To be considered in the end system
- Operating condition : continuous
- Access location : To be considered in the end system
- 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) : 20
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 5000
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : less than 2kg
- The Clearances and Creepage distances have additionally been assessed for suitability up to 5000 meters elevation. Clearance distance are calculated according to IEC60664-1 table A-2 multiplier factor is 1.48.

- This equipment is not an electromedical equipment intended to be physically connected to a patient.
- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: Maximum baseplate temperature of 85°C
- The means of connection to the mains supply is: Pluggable A
- 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 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.
- Branch circuit fuse is considered as follows: UL listed JDDZ/7, rating 20A/600V
- Connection to mains in end system should be permanently connected.

#### **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:

- This equipment was not evaluated for system mounting. When installed in end system, proper evaluation should be considered.
- This equipment has a secondary output (+28V) For LCC600-28H-XX, LCC600-28U-XX, (+48V) For LCC600-48U-XX and LCC600-48H-XX and (36V) For Model LCC600-36U-XX and LCC600-36H-XX and (+12V) for Model LCC600-12U-XX, LCC600-12H-XX and LCC600-12U-XX-YY exceeding 240VA. When installing into the end system, proper evaluation should be considered that all relevant standard must be fulfilled.
- Additional evaluation has been considered on the +28V output with output voltage trimming range from minimum +24V output to maximum +30V output but limited to 600 W output power. For +48V output with output voltage trimming range from minimum +44V (limited to 550 W output power) output to maximum +54 output, but limited to 600 W. For +36V output with output voltage trimming range from minimum +32V (limited to 535 W output power) output to maximum +38 output, but limited to 600 W. For +36V output with output voltage trimming range from minimum +32V (limited to 535 W output power) output to maximum +38V output limited to 600 W and +40Vdc which is limited to 400 W. For +12V output with output voltage trimming maximum +15V, but limited to 600W output power.
- Refer to General Product information 2 (additional information) for the maximum allowable output power, voltage and current. See Enclosure 7-08 to get more information of the Derating power and allowable baseplate temperature for Model LCC600-48U-XX, Model LCC600-36U-XX, LCC600-12U-XX and LCC600-12U-XX-YY.
- The following Production-Line tests are conducted for this product: Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: For Model LCC600-28H-XX: , Primary-SELV: 377.6Vrms, 689Vpk, Primary-Earthed Dead Metal: 377.3Vrms, 689Vpk, , For Model LCC600-28U-XX: , Primary-SELV: 377.0Vrms, 663Vpk, Primary-Earthed Dead Metal: 377.0Vrms, 663Vpk, For Model LCC600-48U-XX: Primary –SELV: 391.0Vrms, 681Vpk, Primary-Earthed Dead Metal: 390.0Vrms, 696Vpk, For Model LCC600-48H-XX: Primary –SELV: 381.0Vrms, 712Vpk, Primary-Earthed Dead Metal: 381.0Vrms, 712Vpk, For Model LCC600-36U-XX: Primary –SELV: 382.8Vrms, 660Vpk, Primary-Earthed Dead Metal: 378.0Vrms, 654Vpk



and For Model LCC600-36H-XX: Primary –SELV: 381Vrms,727 Vpk, Primary-Earthed Dead Metal: 382Vrms, 727Vpk, For Model LCC600-12U-XX and LCC600-12U-XX-YY: Primary –SELV: 389Vrms,641 Vpk, Primary-Earthed Dead Metal: 389Vrms, 627Vpk and For Model LCC600-12H-XX: Primary –SELV: 384.2Vrms, 668Vpk, Primary-Earthed Dead Metal: 383.8Vrms, 666Vpk. .

- The following secondary output circuits are SELV: All output covered in this report
- The following secondary output circuits are at hazardous energy levels: +28V (For LCC600-28H-XX and LCC600-28U-XX), +48V( For LCC600-48U-XX and LCC600-48H-XX), +36V (For Model LCC600-36U-XX and LCC600-36H-XX) and +12V (For Model LCC600-12U-XX, LCC600-12H-XX and LCC600-12U-XX-YY).
- The following secondary output circuits are at non-hazardous energy levels: +5Vsb
- The following secondary output circuits are Limited Current Circuits: For Model LCC600-28H-XX, LCC600-48H-XX, LCC600-36H-XX and LCC600-12H-XX: Secondary pin of bridging Y1 capacitor (C509), For Model LCC600-28U-XX and LCC600-48U-XX, LCC600-36U-XX, LCC600-12U-XX and LCC600-12U-XX-YY: Secondary pin of bridging Y1 capacitor connected in series(C508, C509)
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The maximum investigated branch circuit rating is: 20 A For Model LCC600-28H-XX, Model LCC600-48H-XX, Model LCC600-36H-XX, LCC600-12U-XX, LCC600-12U-XX-YY, LCC600-12H-XX and 30 A For LCC600-28U-XX, LCC600-48U-XX and LCC600-36U-XX.
- 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: Not been conducted
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C): T204 (Class F) designated 155-10C; T301 (Class F) designated 155-10C; T501 (Class F) designated 155-10C
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The equipment is suitable for direct connection to: AC mains supply

#### **Additional Information**

DC output loading at Maximum output power: 600W

For Model LCC600-28H-XX,LCC600-28H-4XXX,LCC600-28H-9XXX, LCC600-28U-XX,LCC600-28U-4XXX and LCC600-28U-9XXX

Loading 1

+28V, 21.43A

+5Vsb, 0A

Loading 2:

+28V, 21.17A

+5Vsb, 1.5A

Loading 3:

+24V, 25A

+5Vsb, 0A

Loading 4:

+24V, 24.69A

+5Vsb, 1.5A

Loading 5:

+30V, 20A

+5Vsb, 0A

Loading 6: