

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:	CPS253-M-XXX, CPS253-MD-XXX, CPS253-M1-XXX, CPS253-M1D-XXX, CPS255-M-XXX, CPS258-M-XXX (where -XXX can be any alphanumeric character, symbol or blank that represents customer identity that do not affect safety)
Rating:	<p>For Model CPS253-M-XXX Input: 100-240Vac, 3A, 50/60Hz DC Output: +12V, 20.83A MAX +12V FAN, 0.5 A MAX Maximum Output Power: 155W Convection Cooling 250W Forced Air Cooling</p> <p>For Model CPS253-MD-XXX Input: 100-240Vac, 3A, 50/60Hz 127Vmin-250Vmax(dc), 3A DC Output: +12V, 20.83A MAX +12V FAN, 0.5 A MAX Maximum Output Power: 155W Convection Cooling 250W Forced Air Cooling</p> <p>For Model CPS253-M1-XXX Input: 100-240Vac, 3A, 50/60Hz DC Output: +12V, 20.83A MAX +12V FAN, 0.5 A MAX +5Vsb, 0.1A MAX Maximum Output Power: 155W Convection Cooling 250W Forced Air Cooling</p> <p>For Model CPS253-M1D-XXX Input: 100-240Vac, 3A, 50/60Hz 127Vmin-250Vmax(dc), 3A DC Output: +12V, 20.83A MAX</p>

+12V FAN, 0.5 A MAX
+5Vsb, 0.1A MAX
Maximum Output Power:
155W Convection Cooling
250W Forced Air Cooling

For Model CPS255-M-XXX
Input:
100-240Vac, 3A, 50/60Hz
DC Output:
+24V, 10.42A MAX
+12V FAN, 0.5 A MAX
Maximum Output Power:
155W Convection Cooling
250W Forced Air Cooling

For Model CPS258-M-XXX
Input:
100-240Vac, 3A, 50/60Hz
DC Output:
+48V, 5.21A MAX
+12V FAN, 0.5 A MAX
Maximum Output Power:
155W Convection Cooling
250W Forced Air Cooling

Applicant Name and Address:

ASTECH INTERNATIONAL LTD
16TH FLOOR, LU PLAZA
2 WING YIP STREET, KWUN TONG,
KOWLOON, HONGKONG

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.

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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: Brian Wong / Senior Project Engineer Reviewed by: Jeffery Chan / Project Engineer

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 an AC/DC switching power supply designed to deliver 155W rated output power during natural convection cooling and 250W during forced air cooling at minimum of 10CFM.

This equipment is intended for use in Class I or Class II application.

Reinforced insulation is provided between primary and secondary circuits and basic insulation is provided between primary circuits and Earth as well as secondary circuit and earth. When the equipment is used as Class II, earth trace is considered dead metal

Model Differences

Model CPS255-M-XXX is identical to Model CPS253-M-XXX except for the following safety controlled parameters:

- 1) Model name and Ratings of DC output;
- 2) Power Transformer (T501) and Resonant Choke (L4).
- 3) Output connector (CPS253-M-XXX with bus bar connector while CPS255-M-XXX with 6 pin output connector same material of input connector)

Model CPS258-M-XXX is identical to Model CPS253-M-XXX and CPS255-M-XXX except for the following safety controlled parameters:

- 1) Model name and Ratings of DC output;
- 2) Power Transformer (T501).

Model CPS253-MD-XXX is identical to Model CPS253-M-XXX except for the following safety controlled parameters:

- 1.) Model name and additional input (DC input).
- 2.) F1, F2 type and manufacturer.

Model CPS253-M1-XXX and CPS253-M1D-XXX is identical to model CPS253-M-XXX and CPS253-MD-XXX except for below safety controlled parameters:

- 1.) Model name and additional output voltage, +5Vsb.
- 2.) Rating of Discharge Resistor (R16, R38, R41).
- 3.) Auxiliary Transformer.

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% for AC input; No tolerance declared for DC input
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : N/A
- Class of equipment : Class I (earthed) / Class II (to be considered in the end system)
- 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 1 kg
- 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 maximum ambient temperature at 155W load with natural convection cooling. Above 50 degree C the power shall be derated at 2.9% / degree C up to 70 degree C for input line voltage of 90-100Vac/ 127Vdc, and it shall be de-rated at 2.5% / degree C for input line voltage 100- 264Vac/ 250Vdc. Below 100 Vac, and up to 50 degree C, derate power at 1% / Vac. The total output power for forced air cooling of minimum 10 CFM shall be 250W at 50 degree C. At ambient above 50 degree C the power shall be derated at 1.9% / degree C up to 70 degree C. Below 100 Vac, and up to 50 degree C, derate power at 1% / Vac.
- The means of connection to the mains supply is: AC / DC Input Terminal
- 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: C91 and C92
- 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 Clearance and Creepage distances have additionally been assessed for suitability up to 5000 meters elevation. Clearance distances are calculated according to IEC60664-1 table A-2 multiplexer factor 1.48.
- The equipment is component level power supply intended for use in Class I or Class II application.
- For Class II application, PE trace is considered floating wherein basic insulation is maintained between primary circuits and PE trace and between secondary circuits and PE trace.
- This equipment is not an electromedical equipment intended to be physically connected to a patient.

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
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: For Model CPS253-M-XXX,, Primary-Earthed Dead Metal: 243.5 Vrms, 620 Vpk, Primary-SELV: 245.5 Vrms, 624 Vpk, , For Model CPS255-M-XXX,, Primary-Earthed Dead Metal: 250.5 Vrms, 636 Vpk, Primary-SELV: 254.1 Vrms, -575 Vpk., , For Model CPS258-M-XXX,, Primary-Earthed Dead Metal: 261.1 Vrms, 678 Vpk , Primary-SELV: 268.8 Vrms, -578 Vpk, , For Model CPS253-MD-XXX, , Primary-Earthed Dead Metal:375.6 Vrms, 681 Vpk , Primary-SELV: 374.5 Vrms, 681 Vpk., , For Model CPS253-M1-XXX,, Primary-Earthed Dead Metal: 368.1Vrms, 726Vpk, Primary-SELV: 367.1Vrms, 764Vpk, , For Model CPS253-M1D-XXX,, Primary-Earthed Dead Metal: 403.6Vrms, 686Vpk, Primary-SELV: 401.5Vrms, 674Vpk
- The following secondary output circuits are SELV: All output covered in this report.
- The following secondary output circuits are at hazardous energy levels: +12V (for Model CPS253-M-XXX, CPS253-MD-XXX, CPS253-M1-XXX and CPS253-M1D-XXX), +24V (for Model CPS255-M-XXX) and +48V (for Model CPS258-M-XXX)
- The following secondary output circuits are at non-hazardous energy levels: +12V Fan (For Model CPS253-M-XXX, CPS253-MD-XXX, CPS255-M-XXX, CPS258-M-XXX) and +5Vsb (For Model CPS253-M1-XXX, CPS253-M1D-XXX.)
- The following secondary output circuits are Limited Current Circuits: Secondary pin of Y1 capacitor.
- 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: Not 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): T501(Class F) designated 155-10C; TX601 (Class F) designated 155-10C
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The maximum continuous power supply output (Watts) relied on forced air cooling from: Minimum of 10 CFM forced air cooling for total output power of 250W at 50 degree C ambient. At above 50 degree the power shall be derated at 1.9%/ degree C up to 70 degree C.
- The equipment is suitable for direct connection to: AC mains supply
- Earthing continuity test should be conducted in the end system if the unit is considered as Class I construction.
- This equipment was not evaluated for the system mounting. When installed in the end system, proper evaluation should be considered.
- The DC input voltage 127Vmin - 250Vmax (dc) is rectified from AC mains supply. Further evaluation must be considered if the unit is directly connected to DC mains supply.
- The 12V, 24V and 48V output voltage can be adjusted to 0%/+10%. The Fan Output may move according to set point. All potentiometers shall be sealed single-turn. Output load setting beyond nominal output voltage shall cause the power supply to be de-rated to 200W maximum power for Forced Air conditions.
- Fan output should be considered part of the 250W output power.
- Models CPS253-MD-XXX and CPS253-M1D-XXX was tested at input 370Vmax (dc) which was considered worst case (marketing requirement only). For creepage and clearance requirement of power supply (basic and reinforced), rated 250Vmax (dc) input voltage was used.