

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 for building-in
Model:	NPS63-M, NPS65-M, NPS62-M, NPS64-M
Rating:	INPUT: AC 100-250 V, 50/60 Hz, 2.5 A DC 140 V (min.) - 300 V (max.), 2.5 A OUTPUT: Model NPS63-M: DC + 12 V, 5.0 A max Model NPS65-M: DC + 24 V, 2.5 A max. Model NPS62-M: DC + 5 V, 11.0 A max. Model NPS64-M: DC + 15 V, 4.0 A max. MAXIMUM OUTPUT POWER: Models NPS63-M, NPS65-M and NPS64-M: 60 W with 30CFM Forced Air Cooling at 50 deg C maximum ambient 60 W with Convection Cooling at 50 deg C maximum ambient Model NPS62-M: 55W with 30CFM Forced Air Cooling at 50 deg C maximum ambient 55W with Convection Cooling at 50 deg C maximum ambient Output power derates at 2.5% per °C from 50 °C to 80°C ambient temperature
Applicant Name and Address:	ASTEC INTERNATIONAL LTD 16TH FL, LU PLAZA, KWUN TONG, 2 WING YIP ST, 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.

Issue Date: 2010-08-03
2015-05-07

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Report Reference #

E186249-A139-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: Henry Ho

Reviewed by: 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

This equipment has been evaluated for use in Class I or Class II application. When the power supply is used as Class II equipment, all PE traces and components connected to PE on the primary side will be treated as primary part for spacing and insulation considerations.

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

Model Differences

Model NPS62-M is identical to Models NPS63-M and NPS65-M except for model designation, output power rating, power transformer T1, common mode choke L1, switching mosfet Q1, Bulk capacitor C6, and dimension of secondary heatsink (HTSK2).

NPS65-M is identical with NPS63-M except for power transformer T1 and electrical output rating.

NPS64-M is identical with NPS63-M except for common mode choke L1, power transformer T1 and electrical output rating.

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) : -
- Class of equipment : Considered in the end system
- 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) : 4000

- Altitude of test laboratory (m) : <500
- Mass of equipment (kg) : <1.0
- This power supply except Model NPS62-M has been evaluated for use in 50°C maximum ambient temperature at 60 W load with natural convection cooling and 60 W load with 30 CFM Forced Air Cooling. Output power derates at 2.5% per °C from 50 °C to 80°C ambient temperature. Model NPS62-M has been evaluated for use in 50°C maximum ambient temperature at 55 W load with natural convection cooling and 55 W load with 30 CFM Forced Air Cooling. Output power derates at 2.5% per °C from 50 °C to 80°C ambient temperature.
- The Clearances and Creepage distances have additionally been assessed for suitability up to maximum 13,120 ft (4,000 m) elevation. Clearance distance are calculated according to IEC60661-1 table A-2 multiplier factor is 1.29.
- This power supply is component level power supply intended for use in Class I or Class II application. Secondary PE traces are separated from Primary PE traces when used in Class II application.
- 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 (Tma) permitted by the manufacturer's specification of: 50 °C and up to 80°C at derated power.
- 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: +12 Vdc output for NPS63-M, +24 Vdc output for NPS65-M, +5 Vdc output for NPS62-M and +15 Vdc output for NPS64-M
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual

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 clearances and creepage distances have been additionally assessed for suitability up to 4000m elevation.
- Additional UL Recognized Fuse suitable for DC application must be provided in the end system for DC input.
- Refer to General Product Information 2 (additional information) for the maximum allowable output power, voltage and current for the output. See enclosure ID7-01 for ventilation set-up.
- This power supply has been evaluated for use in I or Class II equipment as defined in UL 60950-1 and CAN/CSA-C22.2 No. 60950-1, 2nd Edition. When the power supply is used as Class II equipment, all PE traces and components connected to PE on the primary side will be treated as primary part for spacing and insulation considerations.
- The disconnection from the line must be considered in the end system.
- This equipment is classified as Level 3 as defined by UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07, Second Edition.
- This equipment was not evaluated for system mounting. When installed in the end system, proper evaluation should be considered.
- For use only in or with complete equipment where the acceptability of the combination is determined

by Underwriters Laboratories Inc. When installed in an end-product, consideration must be given to the following:

- The unit is not suitable for direct connection to DC mains supply.
- The DC input voltage 300 Vdc is rectified from AC mains supply. Further evaluation must be considered if the unit is directly connected to DC mains supply.
- Earthing Continuity Test should be conducted in end system if the unit is considered as Class I construction.
- 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: (NPS63-M) Primary-Earthed Dead Metal: 328.8 Vrms, 628 Vpk Primary-SELV: 327.1 Vrms, 645 Vpk (NPS65-M) Primary-Earthed Dead Metal: 338.6 Vrms, 557 Vpk Primary-SELV: 338.6 Vrms, 557 Vpk (NPS62-M) Primary-Earthed Dead Metal: 332.9 Vrms, 610 Vpk Primary-SELV: 332.1 Vrms, 610 Vpk (NPS64-M) Primary-Earthed Dead Metal: 329.0 Vrms, 601 Vpk Primary-SELV: 326.9 Vrms, 628 Vpk
- The following secondary output circuits are SELV: All output covered in this report
- The following secondary output circuits are at non-hazardous energy levels: All output covered in this report
- The following secondary output circuits are Limited Current Circuits: All output covered in this report
- 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 OBJY2 insulation system with the indicated rating greater than Class A (105°C): T1 (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: 30 CFM Forced air cooling at 60 W for Models NPS63-M, NPS64-M and NPS65-M; 30CFM Forced air cooling at 55 W for Model NPS62-M.
- The equipment is suitable for direct connection to: AC mains supply

Additional Information

Model NPS63-M

Loading Condition 1: (60W with 30CFM forced air cooling)
+12 V at 5.0 A

Loading Condition 2: (60W with Natural Convection cooling)
+12 V at 5.0 A

Loading Condition 3: (25% load or 15W with forced air cooling)
+12 V at 1.25 A

Loading Condition 4: (50% load or 30W with forced air cooling)
+12 V at 2.5 A

Loading Condition 5: (75% load or 45W with forced air cooling)
+12 V at 3.75 A