# UL TEST REPORT AND PROCEDURE

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| **Standard:** | UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements)<br>CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (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:** | NPS42-M, NPS43-M, NPS44-M, NPS45-M and NPS48-M |
| **Rating:** | Input: AC 100-250 V, 50/60 Hz, 2.5 A<br>DC 140 V (MIN) - 300 V (MAX), 2.5 A<br><br>Output: DC +12V, 5.0 A MAX (For NPS43-M)<br>DC +15V, 4.0 A MAX (For NPS44-M)<br>DC +24V, 2.5 A MAX (For NPS45-M)<br>DC +48V, 1.25 A MAX (For NPS48-M)<br><br>Maximum Output Power (For NPS43-M, NPS44-M, NPS45-M and NPS48-M):<br>45 W Convection Cooling at 50degC maximum ambient<br>60 W Forced Air Cooling at 50degC maximum ambient<br>50 W Convection Cooling at 40degC maximum ambient<br>Output derates 2.5% per degree from 50degC to 80degC ambient temperature<br><br>Output: DC +5 V, 11 A MAX (For NPS42-M)<br><br>Maximum Output Power (For NPS42-M):<br>40W Convection Cooling at 50degC maximum ambient<br>55W Forced Air Cooling at 50degC maximum ambient<br>45W Convection Cooling at 40degC maximum ambient<br>Output derates 2.5% per degree from 50degC to 80degC ambient temperature |
| **Applicant Name and Address:** | ASTEC INTERNATIONAL LTD<br>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.

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: Brian Wong

**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 have been evaluated for use in Class I or Class II application.

**Model Differences**

Models NPS42-M, NPS43-M, NPS44-M, NPS45-M and NPS48-M are identical to each other except for output rating and Transformer (T1).

Models NPS42-M, NPS42-M-401 are identical to each other except the model NPS42M-401 adding VDR1, revise the Mainboard layout and delete Y-cap C8.

**Technical Considerations**

- Equipment mobility : for building-in
- Connection to the mains : To be considered in end system
- Operating condition : continuous
- Access location : Equipment is for building-in. Must be checked 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 : Class I (earth)/ Class II (To be considered in end system)
- Considered current rating of protective device as part of the building installation (A) : 2.5
- Pollution degree (PD) : PD 2 and PD 3 (Refer to Conditions of Acceptability)
- IP protection class : IP X0
- Altitude of operation (m) : 4000
- Altitude of test laboratory (m) : <2000
- Mass of equipment (kg) : <1.0
- This power supply has been evaluated for use in 50 degree C maximum ambient temperature at 45 W load with natural convection cooling and at 60 W load with 30 CFM cooling. Output power derates 2.5% per degree from 50 degree C to 80 degree C ambient temperature.
- This power supply has been evaluated for use in 40 degree C ambient at 50 W load (For NPS43-M, NPS44-M, NPS-45-M and NPS-48-M).
- This power supply has been evaluated for use in 40 degree C ambient at 45 W load (For NPS42-M, NPS42-M-401).
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer’s specification of: 50°C
- The product is intended for use on the following power systems: TN
- The means of connection to the mains supply is: AC/DC Input Terminal
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- The following accessible locations (with circuit/schematic designation) are within a limited current circuit: +12 Vdc output (For NPS43-M); +15 Vdc output (For NPS44-M); +24 Vdc (For NPS45-M); +48 Vdc (For NPS48-M), +5 Vdc output (For NPS42-M, NPS42-M-401)
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009+A1:2010+A12:2011 (which includes all European national differences, including those

specified in this test report).

**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 additionally been 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 output
- This power supply has been evaluated for use in Class I or Class II equipment as defined in UL 60950-1 and CAN/CSA-C22.2 No. 60950-1, Second 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.
- This model is for also pollution degree 3 environment except for DC input ratings.
- The following secondary output circuits are SELV: +5 Vdc output (For NPS42-M, NPS42-M-401), +12 Vdc output (For NPS43-M); +15 Vdc output (For NPS44-M); +24 Vdc (For NPS45-M); +48 Vdc (For NPS48-M)
- The following secondary output circuits are Limited Current Circuits: +5 Vdc output (For NPS42-M, NPS42-M-401), +12 Vdc output (For NPS43-M); +15 Vdc output (For NPS44-M); +24 Vdc (For NPS45-M); +48 Vdc (For NPS48-M)
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The investigated Pollution Degree is: 2
- The equipment is suitable for direct connection to: AC mains supply ,
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: (For NPS42-M, NPS42-M-401) Primary-SELV: 337.1 Vrms, 645 Vpk Primary-Earthed Dead Metal: 336.6 Vrms, 636 Vpk (For NPS43-M) Primary-SELV: 340.6 Vrms, 566 Vpk Primary-Earthed Dead Metal: 339.3 Vrms, 548 Vpk; (For NPS44-M) Primary-SELV: 342.7Vrms, 539 Vpk, Primary-Earthed Dead Metal: 341.0 Vrms, 521 Vpk; (For NPS45-M) Primary-SELV: 348.6 Vrms, 539 Vpk, Primary-Earthed Dead Metal: 344.7 Vrms, 521 Vpk; (For NPS48-M) Primary-SELV: 341.5 Vrms, 689 Vpk, Primary-Earthed Dead Metal: 334.4 Vrms, 504 Vpk
- The following secondary output circuits are at non-hazardous energy levels: +5 Vdc output (For NPS42-M, NPS42-M-401), +12 Vdc output (For NPS43-M); +15 Vdc output (For NPS44-M); +24 Vdc (For NPS45-M); +48 Vdc (For NPS48-M)
- The maximum investigated branch circuit rating is: 20 A
- 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)
- The following Production-Line tests are conducted for this product: Electric Strength
- 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 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 60W (See enclosure ID 7-01 for details)