UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) 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:	NTS353-(CEF), NTS355-(CEF), NTS358-(CEF), NTS359-(CEF) and NTS359-R
Rating:	Input Rating: 100-250 Vac, 50/60 Hz 5.4 A Output Rating: For Model NTS353-(CEF) +/- 12 Vdc, 29.17 A +5 VSTBY, 2 A +12 (FAN_OUT), 1 A For Model NTS355-(CEF) +/- 24 Vdc, 14.58 A +5 VSTBY, 2 A +12 (FAN_OUT), 1 A For Model NTS358-(CEF) +/- 48 Vdc, 7.29 A +5 VSTBY, 2 A +12 (FAN_OUT), 1 A For Model NTS359-(CEF) +/- 54.4 Vdc, 6.43 A +5 VSTBY, 2 A +12 (FAN_OUT), 1 A For Model NTS359-R +/- 54.4 Vdc, 6.43 A +5 VSTBY, 2 A +12 (FAN_OUT), 1 A Max. output power for all models: 350 W Output power is derated 2.5 % per degree from 50 deg C to 70 deg C ambient temperature
Applicant Name and Address:	ASTEC INTERNATIONAL LTD 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.

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: Ernest Chueng 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

These equipment have been evaluated for use in Class I equipment.

Model Differences

Models NTS353-(CEF), NTS355-(CEF), NTS358-(CEF) and NTS359-(CEF) are identical power supplies which differ only on output voltage ratings and Power Transformer T1 used.

Model NTS359-R is similar to model NTS359-(CEF) except for reversed fan application.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : pluggable A
- Operating condition : continuous
- Access location : To be considered in 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 (earthed)
- Considered current rating of protective device as part of the building installation (A) : See cover page
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : < 3048
- Altitude of test laboratory (m) : < 3048
- Mass of equipment (kg) : Approximately 2kg
- The Clearances and Creepage distances have additionally been assessed for suitability up to maximum 10,000 ft (3,048 m) elevation. Clearance distance are calculated according to IEC60661-1 table A-2 multiplier factor is 1.15.
- 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 70°C at derated power.
- The means of connection to the mains supply is: Pluggable A
- The product is intended for use on the following power systems: TN
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- The class of laser product is: Class 1 (I)
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- 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).
- The equipment disconnect device is considered to be: Appliance inlet

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 3048m (10,000ft) elevation.
- Refer to General Product Information 2 (additional information) for the maximum allowable output power, voltage and current for the output.
- This power supply has been evaluated for use in Class I equipment as defined in UL 60950-1 and CAN/CSA-C22.2 No. 60950-1, 2nd Edition. Additional evaluation is required if the power supply is to be used in other than Class I equipment.
- The disconnection from the line must be considered in the end system.
- This equipment is classified as Level 5 as defined by UL 60950-1, 2nd Edition and CAN/CSA C22.2 No. 60950-1-07, 2nd Edition.
- This equipment was not evaluated for system mounting. When installed in the end system, proper evaluation should be considered.
- This power supply has been evaluated for use in 25°C and up to 70°C ambient at derated output rating.
- The power supply was not evaluated for end system mounting.
- EMC/EMI compliance has not been investigated and is not part of this report.
- These power supplies contain secondary output exceeding 240VA. When installing in the end system, care must be taken that this secondary main output and the appropriate wires may not be touch.
- The secondary outputs of these power supplies are unearthed non-energy hazard SELV except for +/-12V, +/-24V, +/-48V and +/-54.4V main outputs of NTS353-(CEF), NTS355-(CEF), NTS358-(CEF), NTS359-(CEF) and NTS359-R respectively which are at hazardous energy level. Sub-clause 2.9.4 (Method 1) per UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07, 2nd Edition were used to maintain insulation of SELV from primary circuits.
- Max. output power for all models is 350 W , . , Output power is derated 2.5 % per degree from 50 deg C to 70 deg C ambient temperature
- Model NTS359-R is similar to model NTS359-(CEF) except for reversed fan application.
- The following Production-Line tests are conducted for this product: Earthing Continuity , Electric

Strength

- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 457 Vrms, 584 Vpk , Primary-SELV: 457 Vrms, 584 Vpk
- The following secondary output circuits are SELV: + 12 Vdc, +24 Vdc, +48 Vdc and +54.4 Vdc main outputs from NTS353-(CEF), NTS355-(CEF), NTS358-(CEF), NTS359-(CEF) and NTS359-R respectively and the individual +5Vstby and +12V(Fan_out) outputs.
- 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
- 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, T2, and T4 (Class F) designated 155-10C, Astec International Limited (E94225)
- The following end-product enclosures are required: Mechanical , Fire , Electrical
- The following secondary output circuits are at hazardous energy levels: + 12 Vdc, +24 Vdc, +48 Vdc and +54.4 Vdc main outputs from NTS353-(CEF), NTS355-(CEF), NTS358-(CEF), NTS359-(CEF) and NTS359-R respectively.
- An investigation of the protective bonding terminals has: Been conducted
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The maximum continuous power supply output (Watts) relied on forced air cooling from: Fan (Type MGA4012YB-O28 by Protechnic, rated 12Vdc 0.38A) at 15.39 cfm located on the secondary side. Fan airflow direction is towards the components.
- The equipment is suitable for direct connection to: AC mains supply
- The following secondary output circuits are at non-hazardous energy levels: The individual +5Vstby and +12V(Fan_out) outputs