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:	Switch mode power supply
Model:	NVM175 or NVM-175 models as described (See Model Differences)
Rating:	100-240Vac nom. 45-440Hz, 3A rms max. (See Model Differences)
Applicant Name and Address:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM

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: Hubert Koszewski (Project Handler) Reviewed by: Robert Dmitruk (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 NVM-175 Series are switched mode power supplies for building into host equipment.

Model Differences

NVM175 or NVM-175 models as described below:

Units may be marked with a Product Code: X5x or NVM1x where x may be any number of characters.

Unit Configuration Code (Description): may be prefixed by NS # followed by / or - (where # may be any number of characters indicating non- safety related model differences).

Unit Configuration Code:
NVMxy-abcdefghijklm

Where:

x = 1 for 175 or 1D (1D for Double insulated or Class II unit)
y = Blank for Y2 capacitors from output to earth (except 1D models)
P for Y1 capacitors from output to earth (except 1D models)
a = Number of Outputs: 1.
b = Channel 1 Output Voltage where: T is for 12V, F is for 15V and G is for 24V.
c = O (for omit).
d = O (for omit).
e = O (for omit).
f = Standby supply:
Blank for no standby and no remote on/off (enable) or '-' followed by
S for 12V version with power good, logic level high enables main output.
S1 for 12V version with power good, logic level low enables main output.
S2 for 12V version with Channel 1 good, logic level high enables main output.
S3 for 12V version with Channel 1 good, logic level low enables main output.
S4 for 12V 0.8A version with power good, logic level low enables main output.
S5 for 5V 0.5A version with power good, logic level low enables main output.
S6 for 5V 0.5A version with power good, logic level high enables main output.
0 for no standby and no remote on/off (enable).
g = Blank for Open Frame or '-' followed by U for U chassis, C for U chassis with cover, K for custom chassis with cover and IEC inlet.
h = Blank for standard upright output connector or '-' followed by R for the right angle output connector, S for

the screw terminal.
i = Blank for standard leakage or '-' followed by L for low leakage, Zx for custom leakage which is less than standard leakage and x is a number between 1 and 9 for different custom leakage current options.
jkl = Blank for standard output setting or '-' followed by three numbers from 0 to 9 which denotes various output voltages and currents within the specified range of channel 1 output for a particular unit.
m = Blank for dual fuse input or -FL for single fuse input in the Live line

Output Parameters

There are three NVM1 standard models with various options, and 3 non-standard models with output parameters shown in the tables below:

Output Channel	Voltage Designation	Vout Nom.	Adjustment Range (V)	Output Current (A)	Maximum Power (W)
Channel 1	T	12	12 - 15.5	15	180
	F	15	12 - 15.5	15	180
	G	24	24 - 28.5	7.5	180
Standby output	S	12	Fixed	0.2	2.4
	S1	12	Fixed	0.2	2.4
	S2	12	Fixed	0.2	2.4
	S3	12	Fixed	0.2	2.4
	S4	12	12 - 13	0.8	10.4
	S5	5	Fixed	0.5	2.5
	S6	5	Fixed	0.5	2.5

Variations and limitations of use:

NVM175 PSUs can output 180W from channel 1 plus 10.4W maximum from the standby output.
Component temperatures must be monitored in the end use application as described in the “COOLING FOR UNIT” section.
All ratings apply for ambient temperatures up to 50°C. From 50 to 70°C the total output power and current ratings are both derated at 2.5% per deg C.

Non- Standard model:

X50015# (where # can be any letter except A, B, C, D, E or F):
Factory fitted output loom
Earth connection made via ring tag and screw

X50007# - NVM1D - 1G-f-g-h-j
may be any letter where this indicates any of the options described in the nomenclature table above for f, g, h and j and where g will always be blank (open frame). D indicates that the product is double insulated (no earth connections). This product has 18-way output connector.
Maximum storage temperature 65°C.

For ambient temperature requirements see Conditions of Acceptability and user manual (Enclosure 6-01).

Input Parameters

Parameter	60601-1

Nominal input voltage	100 - 240 Vac
Input voltage range	90 - 264Vac
Input frequency range	45 - 63Hz
Maximum input current	3A rms

Environmental Specifications:

Description	Operation	Storage & Transportation
Use	Indoor	-
Temperature	0°C - +70°C (See O/P tables for deratings)	-40°C - +85°C
Humidity	5 - 95% RH, non-condensing	5 - 95% RH, non-condensing
Altitude	-200m - 4000m	-200m - 5000m
Pressure	63kPa - 106kPa	54kPa - 106kPa

Orientation	The unit may be mounted on either side, vertical with input lowest and horizontal. (Customer Air versions can be mounted in any orientation).
Material Group	IIIb
Pollution Degree	2
Overvoltage Category	II
Class	I or II (depending on model)
Weight	1 Kg max
IP Rating	IPX0

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : Connection to mains to be determined in end use.
- Operating condition : continuous
- Access location : for building-in
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10%
- Tested for IT power systems : Yes (Norway only)
- IT testing, phase-phase voltage (V) : 230V
- Class of equipment : Class I (earthed) or Class II for 1D models only
- 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) : 5000m
- Altitude of test laboratory (m) : 64m
- Mass of equipment (kg) : Less than 1 kg
- 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).
- Maximum altitude of operation is 5000m for all models. The requirements of IEC60664-1 table A.2 were applied for calculating the required clearances.
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma)

permitted by the manufacturer's specification of: 50°C (full load); 70°C (power and output current decreasing linearly by 2.5%/°C above 50°C). Model X50001x, 60°C (full load); 65°C (power and output current decreasing linearly by 2.5%/°C above 60°C) NVM1D max temp 65°C.

- The product is intended for use on the following power systems: IT (Norway only) TN
- The equipment disconnect device is considered to be: provided by the end equipment
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- The means of connection to the mains supply is: To be determined in the end-use product

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, Earthing Continuity (except NVM1D model)
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 410 Vrms, 697 Vpk Primary-Earthed Dead Metal: 398 Vrms, 662 Vpk
- The following secondary output circuits are SELV: All
- The following secondary output circuits are at non-hazardous energy levels: All
- The following output terminals were referenced to earth during performance testing: All outputs and their return lines individually referenced to earth to obtain maximum working voltage.
- The power supply terminals and/or connectors are: Suitable for factory wiring only
- 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 (except for NVM1D model)
- 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): Transformer T1, T2 and T3 (Class F) - See table 1.5.1 for details of insulation systems used
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: Refer to enclosure Manuals ID 6-01 Cooling for units table.
- An investigation of the protective bonding terminals has: Been conducted