



Test Report issued under
the responsibility of:



TEST REPORT
IEC 60950-1
Information technology equipment - Safety -
Part 1: General requirements

Report Reference No: E135494-A59-CB-3
Date of issue: 2014-11-24
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CB Testing Laboratory: UL International Polska Sp. z o.o.
Address: Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland

Applicant's name: TDK-LAMBDA UK LTD
KINGSLEY AVE
Address: ILFRACOMBE
DEVON
EX34 8ES UNITED KINGDOM

Test specification:

Standard: IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013
Test procedure: CB Scheme
Non-standard test method: N/A

Test Report Form No.: IEC60950_1F
Test Report Form originator: SGS Fimko Ltd
Master TRF: Dated 2014-02

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Test item description	Switch mode power supply
Trade Mark	TDK-Lambda
	
Manufacturer	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Model/Type reference	NVM175 or NVM-175 models as described (See Model Differences)
Ratings	100-240Vac nom. 45-440Hz, 3A rms max. (See Model Differences)

Testing procedure and testing location:	
<input type="checkbox"/>	CB Testing Laboratory Testing location / address
<input type="checkbox"/>	Associated CB Test Laboratory Testing location / address Tested by (name + signature) Approved by (name + signature).....
<input type="checkbox"/>	Testing Procedure: TMP/CTF Stage 1 Testing location / address Tested by (name + signature) Approved by (name + signature).....
<input type="checkbox"/>	Testing Procedure: WMT/CTF Stage 2 Testing location / address Tested by (name + signature) Witnessed by (name + signature) ... Approved by (name + signature).....
<input checked="" type="checkbox"/>	Testing Procedure: SMT/CTF Stage 3 or 4 Testing location / address TDK-LAMBDA UK LTD, KINGSLEY AVE, ILFRACOMBE, DEVON, EX34 8ES UNITED KINGDOM Tested by (name + signature) Mr N. Marsh, Mr S Hirstwood - Testers Approved by (name + signature)..... Mr. T. Burgess - Approver Supervised by (name + signature) .. Robert Dmitruk (Reviewer)
<input type="checkbox"/>	Testing Procedure: RMT Testing location / address Tested by (name + signature) Approved by (name + signature)..... Supervised by (name + signature) ..

List of Attachments National Differences (0 pages) Enclosures (36 pages)
Summary Of Testing Unless otherwise indicated, all tests were conducted at TDK-LAMBDA UK LTD, KINGSLEY AVE, ILFRACOMBE, DEVON, EX34 8ES UNITED KINGDOM.
Tests performed (name of test and test clause)
Testing location / Comments

Protective Bonding II (2.6.3.4, 2.6.1)

Touch Current (Single-Phase; TN/TT System) (5.1, Annex D)

Electric Strength (5.2.2)

Component Failure (5.3.1, 5.3.4, 5.3.7)

Summary of Compliance with National Differences:

Countries outside the CB Scheme membership may also accept this report.

List of countries addressed: AR, AT, AU, BE, BG, BY, CA, CH, CN, CS, CZ, DE, DK, ES, EU, FI, FR, GB, GR, HU, IE, IL, IN, IT, JP, KR, MY, NL, NO, NZ, PL, PT, RO, SA, SE, SI, SK, UA, US, ZA

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 + A1:2011, UL 60950-1 2nd Ed. Revised 2011-12-19, EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

Copy of Marking Plate - Refer to Enclosure titled Marking Plate for copy.

Test item particulars :

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

Possible test case verdicts:

- test case does not apply to the test object : N / A
- test object does meet the requirement : P(Pass)
- test object does not meet the requirement : F(Fail)

Testing:

Date(s) of receipt of test item	2017-11-06
Date(s) of Performance of tests	2017-11-07 to 2017-12-07

General remarks:

"(see Enclosure #)" refers to additional information appended to the report.
 "(see appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

Manufacturer's Declaration per Sub Clause 4.2.5 of IEC 60950-1:

Yes

The application for obtaining a CB Test Certificate includes more than one factory and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided

When differences exist, they shall be identified in the General Product Information section.

Name and address of Factory(ies): TDK-LAMBDA UK LTD
 KINGSLEY AVE
 ILFRACOMBE
 DEVON
 EX34 8ES UNITED KINGDOM

PANYU TRIO MICROTRONIC CO. LTD.
SHIJI INDUSTRIAL ESTATE
DONGYONG
NANSHA
GUANGZHOU GUANGDONG CHINA

GENERAL PRODUCT INFORMATION:

Report Summary

The original report was modified on 2018-01-31 to include the following changes/additions:
The original report E135494-A59-CB-3 dated 2014-11-24 was modified to include the following changes/additions:

Technical Amendment 1

1. Addition of Non-standard model X50015#, output loom Photograph added to Enclosures.
2. Non-standard Earth connection made via ring tag and screw (X50015#). Photograph added to Enclosures.
3. Critical component certificate reference numbers updated in the CCL.
4. Addition of alternate and corrections to CCL components.
5. Removal of X50001# and X50005# from Model Differences.
6. CBTL changed to UL Polska

Based on previously conducted testing and the review of product construction it has been determined that the product continues to comply with the standard and only limited testing was required.

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

Additional Information

Cooling for units:

The following method must be used for determining the safe operation of PSUs. The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of the standard in question. Consideration should also be given to the requirements of other safety standards. Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

Cooling for unit temperature table:

Circuit Ref.	Description	Max. Temperature (°C)
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L3, L7	Common mode choke winding	115 (155)
C1, C4	X capacitors	100
C6	Capacitor	105
C12	Resonant capacitor	105
T3	Aux trx windings	130
L2	Boost choke winding	120 (155)
C7	Electrolytic capacitor	70 (105)
T1, T2	Transformer winding	130
L1	Primary choke (24V channel 1 only)	140
XU3, XU4, XU106	Opto-couplers on control board	100
U1, U2	Opto-couplers on base board	100
L5	Channel 1 output choke	125 (140)
L4	Standby output choke	85
J2	Input connector	105
J1	Output connector	105
Various	All other electrolytic capacitors	90 (105)

Higher temperature limits (in brackets) may be used but product life may be reduced.

Amendment 1

The original report E135494-A59-CB-3 issued 2014-11-24 was modified to include the following changes/additions:

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2. Non-standard Earth connection made via ring tag and screw (X50015#). Photograph added to Enclosures.
3. Critical component certificate reference numbers updated in the CCL.
4. Addition of alternate and corrections to CCL components.
6. Removal of X50001# and X50005# from Model Differences.

Based on previously conducted testing and the review of product construction it has been determined that the product continues to comply with the standard and only limited testing was required.

Technical Considerations

- 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 (T_{ma}) 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

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 --

Abbreviations used in the report:

- normal condition	N.C.	- single fault condition	S.F.C
- operational insulation	OP	- basic insulation	BI
- basic insulation between parts of opposite polarity:	BOP	- supplementary insulation	SI
- double insulation	DI	- reinforced insulation	RI

Indicate used abbreviations (if any)