



Test Report issued under  
the responsibility of:



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

**Report Reference No** .....: E135494-A83-CB-3  
**Date of issue** .....: 2014-11-25  
**Total number of pages** .....: 11

**CB Testing Laboratory** .....: UL International Demko A/S  
**Address** .....: Borupvang 5A, 2750 Ballerup, Denmark

**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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<b>Test item description</b> .....	Switch mode power supply
Trade Mark .....	TDK-LAMBDA
	
Manufacturer .....	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Model/Type reference .....	NV175 Series NV-175 Series NV1-1G000
	(See Model Differences for details)
Ratings .....	NV175 Series; NV-175 Series: 100-240Vac (Nominal), 90-264V (Full Tolerance), 45-440Hz, 3Arms
	NV175 Series; NV-175 Series: 133-318Vdc (Nominal), 120-350Vdc (Full Tolerance), 2.2Adc
	NV1-1G000 only: 88.9-240Vac (Nominal), 80-264V (Full Tolerance), 45-440Hz, 3Arms
	(See Model Differences for details)

<b>Testing procedure and testing location:</b>	
<input checked="" type="checkbox"/> <b>CB Testing Laboratory</b>	
Testing location / address .....	UL International Demko A/S Borupvang 5A, 2750 Ballerup, Denmark
<input type="checkbox"/> <b>Associated CB Test Laboratory</b>	
Testing location / address .....	
Tested by (name + signature) .....	Ermanno Rebecchi 
Approved by (name + signature).....	Dennis Butcher 
<input type="checkbox"/> <b>Testing Procedure: TMP/CTF Stage 1</b>	
Testing location / address .....	
Tested by (name + signature) .....	
Approved by (name + signature).....	
<input type="checkbox"/> <b>Testing Procedure: WMT/CTF Stage 2</b>	
Testing location / address .....	
Tested by (name + signature) .....	
Witnessed by (name + signature) ...	
Approved by (name + signature).....	
<input type="checkbox"/> <b>Testing Procedure: SMT/CTF Stage 3 or 4</b>	
Testing location / address .....	
Tested by (name + signature) .....	
Approved by (name + signature).....	
Supervised by (name + signature) ..	
<input type="checkbox"/> <b>Testing Procedure: RMT</b>	
Testing location / address .....	
Tested by (name + signature) .....	
Approved by (name + signature).....	
Supervised by (name + signature) ..	

<b>List of Attachments</b>
National Differences (0 pages)
Enclosures (0 pages)
<b>Summary of Testing:</b>
No tests were conducted
<b>Summary of Compliance with National Differences:</b>
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 + A2:2014, UL 60950-1 2nd Ed. Revised 2014-10-14, EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

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

<b>Test item particulars :</b>	
Equipment mobility .....	for building-in
Connection to the mains .....	Connection to mains via host equipment
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)
IT testing, phase-phase voltage (V) .....	230V
Class of equipment .....	Class I (earthed)
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) .....	3000m standard, 5000m for -H and -HR models
Altitude of test laboratory (m) .....	64m
Mass of equipment (kg) .....	1kg max.
<b>Possible test case verdicts:</b>	
- 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)
<b>Testing:</b>	
Date(s) of receipt of test item .....	2012-01-20
Date(s) of Performance of tests .....	2012-01-20 to 2012-02-12
<b>General remarks:</b>	
<p>"(see Enclosure #)" refers to additional information appended to the report.                  "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a point is used as the decimal separator.</p>	
<b>Manufacturer's Declaration per Sub Clause 4.2.5 of IEC 60950-1:</b>	
<p>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 .....</p> <p>When differences exist, they shall be identified in the General Product Information section.</p>	
<b>Name and address of Factory(ies):</b>	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 2014-12-18 to include the following changes/additions:  
Correction to insert original test item and performance date.

### Product Description

NV175 or NV-175 series switch mode power supplies for building into host equipment

### Model Differences

NV175 or NV-175 models as described below:

Units may be marked with a Product Code: K1x or Q1x where x may be any number of letters and/or numbers 0 to 9.

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

Unit Configuration Code:

NVx-abcde-f-g-h-ijk

where:

x = 1 for 175

a = Number of Outputs : 1, 2, 3 or 4

b = Channel 1 Output Voltage†: 5, T, F, E or G

c = Channel 2 Output Voltage†: 1, 2, 3, 5, 5L, 7, F or 0

d = Channel 3 Output Voltage†: 3L, 5L, 7, TL, FL, T, F, G followed by Y for negative output or 0

e = Channel 4 Output Voltage†: 3H, 5H, 7, T, F, TH, FH, 0H (fan only channel 4 output) followed by V for variable output followed by P for positive output or 0

f = Global Option : N for 5V version, N1 for 12V version, N2 for 13.5V version, N3 for 5V version with ATX compatibility, N4 for 12V version with ATX compatibility, N5 for 13.5V version with ATX, N6 for 12-13.5V version, N7 for 12-13.5V version with ATX or nothing for no Global Option present

g = U for U chassis, C for U chassis and cover, F for U chassis and cover with fan, I for U chassis and cover with fan and IEC inlet or nothing for Open Frame

h = Blank is the standard upright output connector, R is for the right angle output connector, H is for high altitude, HR is for high altitude with right angle output connector, M is for IEC60601-1, MR is for IEC60601-1 spacings with right angle connector

ijk = Three numbers from 0 to 9 which denotes various output voltages and currents within the specified ranges of each output for a particular unit or blank for standard output settings

† Table1: Output Voltage Cross Reference  
Designation            Output Voltage

0	Omit output
A	1.5
1	1.8
B	2
2	2.7
3	3.3
5	5
7	7
T	12
F	15
E	18
G	24

Output channels and Global Options ratings are in accordance with the following table subject to variations and limitations of use below:

Output Channel	Designation	Vout	Adj. Range	Output Current	
CH1	5	5	5 - 5.5	25A	
	T	12	12 - 15.5	15A	
	F	15	12 - 15.5	15A	
	E	18	16 - 20	10A	
	G	24	24 - 28.5	7.5A	
CH2	1	1.8	0.9 - 3.8	15A	
	2	2.7	2.5 - 3.8	15A	
	3	3.3	2.5 - 3.8	15A	
CH2 (CH1 12V)	5	5	3.3 - 5.5	10A	
CH2 (CH1 15V)	5	5	3.3 - 5.5	10A	
CH2 (CH1 24V)	5L	5	Fixed	2A	
	5	5	3.3 - 5.5	8A	
	7	7	5.5 - 8	5.5A	
	F	15	12-15.5	6A	
	CH3	7	+/-7	7 - 8	5A
T		+/-12	12 - 15	5A	
F		+/-15	12 - 15	5A	
G		+/-24	18 - 24.5	2.5A	
3L		+/-3.3	Fixed	2A	
5L		+/-5	Fixed	2A	
TL		+/-12	Fixed	2A	
FL		+/-15	Fixed	2A	
CH4		3H	+/-3.3	Fixed	2A
		5H	+/-5	Fixed	2A
	7	+/-7	7 - 8	1A	
	T	+/-12	Fixed	1A	
	F	+/-15	Fixed	1A	
	TH	+/-12	Fixed	2A	
	FH	+/-15	Fixed	2A	
	THV	+/-12	12 - 15	2A	
FHV	+/-15	12 - 15	2A		
CH4 (fan output)	OH	-	-	-	
Global Option	N	5	Fixed	2A	
	N1	12	Fixed	1A	
	N2	13.5	Fixed	1A	
	N3	5(ATX)	Fixed	2A	
	N4	12(ATX)	Fixed	1A	

Correction 1 2014-12-18

N5	13.5(ATX)Fixed	1A
N6	12 12-13.5*	1A
N7	12(ATX) 12-13.5*	1A

Channels 1 and 2 combined output currents must not exceed 25A

\*Can only be set at the factory.

Variations and limitations of use:

All NV175 or NV-175 PSUs can output 180W except 5V channel 1 models which can output 175W. These power ratings are for channels 1 to 4. The global option output can be run in addition to the channel 1 to 4 maximum power outputs.

Units with channel 1 T and G outputs (no other channels fitted) have a peak power output of 200W including the global option with the following duty cycles:

In any 5 minutes 30% at 200W followed by 70% at 171W (average 180W)

In any 5 minutes 20% at 200W followed by 80% at 175W (average 180W)

Options -H and -HR meet spacings for 5000m.

Options -M and -MR meet IEC60601-1 Edition 2 Reinforced spacing's with the following limitations (interpolated creepage spacings):

Channel 1 cannot be 5V model (T1 and T2 with foils)

Channel 2 cannot be fitted

Cannot be global option variants

Fan versions:

Channel 1 with G output, 25V maximum with 5V channel 2 maximum output current of 7A.

Channel 1 with G output, 25V maximum with 7V channel 2 maximum output current of 5.5A.

Channel 1 with G output, 5L channel 2 maximum output current 1.8A.

Channel 2 with T and F outputs, channel 2 maximum output current of 9A.

Channel 4 maximum output current of 1.5A

Model NV1-1G000 (with or without global option or -M/-MR option) may also be run with Channel 1 output voltage range 22.5V to 28V with maximum current of 7.5A and maximum power of 180W

Model NV1-1G000 (with or without -M option) may also be run at 80Vac to 264Vac input, output: 24V to 28V at 6.25A maximum current and 150W maximum power.

The products listed in the following table are typical examples:

Model	CH1	CH2	CH3	CH4	Global Option
NV1-453FF	5V/25A	3.3V/15A	15V/5A	15V/1A	-
NV1-4G5FFH-N3	24V/7.5A	5V/8A	15V/5A	15V/2A	5V/2A
NV1-350TT-N	5V/25A	-	12V/5A	12V/1A	5V/2A
NV1-453TT-N1	5V/25A	3.3V/15A	12V/5A	12V/1A	12V/1A
NV1-250T0-N2	5V/25A	-	12V/5A	-	13.5V/1A

Custom Models:

All ratings as per standard models unless otherwise stated.



Model: NS-LAM/NV1-453TTH-N2-H-C (K10035)  
Rated to 4600m altitude  
Input voltage range from 90Vac to 264Vac

Model: NS-LAMF/NV1-4G5TTH-F (K10066)  
5L low current channel 2 fitted.  
Channel 2 rated: 5V, 1.4A

### Additional Information

#### ADDITIONAL INFORMATION

This report to include IEC60950-1 amendment 2:2013, is a reissue of CBTR Ref. No.: E135494-A83-CB-2 dated 2012-10-12 including amendments and corrections with CB Test Certificate Ref. No. DK-28549-A1-UL dated 2012-10-12. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, it has been determined that the product continues to comply with the standard. No testing was deemed necessary.

The original report was modified on 2014-09-30 to include the following changes/additions:

1. Addition/deletion of multilayer PWBs to critical component list.
2. Critical component certificate updates.
3. Change to additional Manufacturers address.
4. Correction/Addition to CCL components. (transformer 33489 left out of previous report by error)
5. Addition of 18V channel 1 with fan output (transformer 230089).
6. Assessed to IEC60950-1 amendment 2:2013.
7. Removal of the DC-DC front end RA-NVDC-01/R14408.

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Cooling for units with customer supplied air (open frame, U and C options)

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.

Circuit Ref.	Description	Max. Temperature (°C)
L3, L7	Common mode choke winding	140
C1, C4	X capacitors	100
C6, C12	Capacitor	105
L2	Boost choke winding	130
C7	Electrolytic capacitor	70 (105)
T1, T2	Transformer winding	130
XU3	Control board optocoupler	100
TX701	Global option transformer	90
L5	Channel 1 Output choke	125

XL401	Channel 2 Output choke	125
XL601	5L channel 2 output choke	125
XU601	5L channel 2 IC	115
XL501 or XL601	Channel 3 and 4 output choke	125
IC1*	Channel 4 Voltage regulator	110
XQ406	Ch2 highside FET (SMA 2 )	115
XV504	Ch3 highside FET (SMA 3)	115
XU601	Ch4 IC (SMA 4)	115
Various	All other electrolytic capacitors	90 (105)

\* 1A channel 4 only

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

### Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: 65°C (power and current de-rated 2.5% per °C from 50°C to 65°C)
- The product is intended for use on the following power systems: IT (Norway only), 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 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
- Multilayer PWB's accepted under CBTR Ref. No.: E349607-A23 dated 2014-07-31 and letter Report, Enclosure 8-06 of this report. --

### Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

- The fans included as part of this component are suitable for use in a user access area: Yes
- Fans: The fan provided in this sub-assembly is provided with a fan guard to reduce the risk of operator contact with the stator.
- The following Production-Line tests are conducted for this product: Electric Strength, Earthing Continuity --
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 444 Vrms, 660 Vpk. , Primary-Earthed Dead Metal: 423 Vrms, 608 Vpk. --
- The following secondary output circuits are SELV: All --
- The following secondary output circuits are at non-hazardous energy levels: All, except channel 1 which may be hazardous energy --
- The power supply terminals and/or connectors are: Not investigated for field wiring --
- The maximum investigated branch circuit rating is: 20A. --
- 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: Been conducted --
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJ2 insulation

system with the indicated rating greater than Class A (105°C): T1, T2, TX701 (Class F) see table 1.5.1 for details of insulation systems used --

- The following end-product enclosures are required: Electrical, Mechanical, Fire --
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: Models without a fan require component temperatures monitored as detailed in the Additional Information. --
- The equipment is suitable for direct connection to: AC mains supply (IEC inlet models only) --
- Fans: The fan provided in this sub-assembly is provided with a fan guard to reduce the risk of operator contact with the rotor., The fan provided in this sub-assembly is not intended for operator access. --
- Orientations: Customer air models: All except horizontal with PWB uppermost. Fan models: All except horizontal with chassis base uppermost and vertical with input uppermost --

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)