Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT

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

Report Number. .....:	30881382.010
Date of issue .....:	12th November, 2015
Total number of pages.....:	87 + Attachments
Applicant's name.....:	TDK-Lambda Ltd.
Address .....:	56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
Test specification:	
Standard.....:	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
Test procedure .....:	CB Scheme
Non-standard test method .....:	N/A
Test Report Form No. .....:	IEC60950_1F
Test Report Form(s) Originator ....:	SGS Fimko Ltd
Master TRF.....:	Dated 2014-02

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Programmable Power Supply
Trade Mark ..... :	TDK-Lambda, TDK·Lambda
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	1. GEN2400W series: GENwww-xxx-yyyy-zzzzz-u-CO (See definition of variables) 2. GEN20-120/R
Ratings ..... :	1. GEN2400W series Input: Option 1: Single phase: ~190-240V; 50/60Hz, 15.5A; Option 2: Three phase: ~190-240V; 3wire+PE, 50/60Hz, 9A; Outputs: Main output: 600VDC max., 300A max., 2400W max. Auxiliary output 1: 5VDC/0.2A Auxiliary output 2: 15VDC/0.2A 2. GEN20-120/R Input: Single phase ~190-240V, 50/60Hz, 15.5A Outputs: Main output: 0-20VDC/0-96A Auxiliary output 1: 5VDC/0.2A Auxiliary output 2: 15VDC/0.2A

Testing procedure and testing location:			
☒	**CB Testing Laboratory:**	TÜV Rheinland of North America, Inc.	
Testing location/ address ..... :		1279 Quarry Lane, Ste. A, Pleasanton, CA 94566	
☐	**Associated CB Testing Laboratory:**		
Testing location/ address ..... :			
Tested by (name + signature) ..... :		Duy Nguyen	Digitally signed by Duy Nguyen DN: cn=Duy Nguyen, o=TUV Rheinland, ou=TUV Rheinland of North America, Inc., email=dnguyen@us.tuv.com, c=US Date: 2015.11.24 15:02:26 -08'00'
Approved by (name + signature) ..... :		Daniel Ruth	druth@amer.tuv.com cn=druth@amer.tuv.com 2015.12.01 14:40:07 -08'00'
☐	**Testing procedure: TMP/CTF Stage 1:**		
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Approved by (name + signature) ..... :			
☐	**Testing procedure: WMT/CTF Stage 2:**		
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
☐	**Testing procedure: SMT/CTF Stage 3 or 4:**		
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
Supervised by (name + signature)..... :			

List of Attachments (including a total number of pages in each attachment):

-Attachment 1: Photographs of Test Sample (6 pages)
-Attachment 2: National Differences (12 pages)

Summary of testing:

Tests performed (name of test and test clause):

30881382.001

Clause 1.6.2	Power Input Measurements
Clause 1.7.11	Durability of Marking Test
Clause 2.1.1.1	Accessibility to Energized parts
Clause 2.1.1.7	Capacitor discharge test
Clause 2.2	SELV circuits – voltage measurements (normal and fault conditions)
Clause 2.6.3.4	Protective earthing trace earth fault current; Earthing test
Clause 2.10.2	Determination of working voltage
Clause 4.2	Mechanical strength test
Clause 4.4	Hazardous moving parts
Clause 4.5	Temperature rise measurements
Clause 5.1	Touch current measurements
Clause 5.2	Dielectric strength test
Clause 5.3	Abnormal operating and fault Conditions

30881382.004, .008-No testing

30881382.010
testing during original evaluation according to report number 30881382.001 no further testing was deemed necessary for this upgrade of standard

Testing location:

TÜV Rheinland of North America, Inc.
1279 Quarry Lane, Ste. A, Pleasanton, CA 94566

Summary of compliance with National Differences

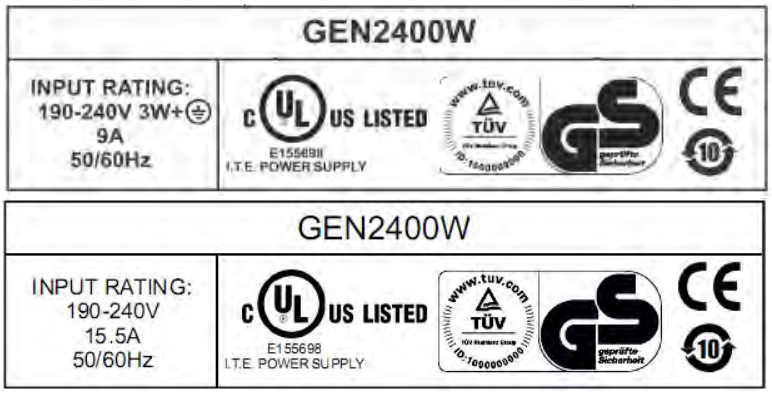
List of countries addressed: AT, DK, IT, SE, GB, US

Explanation of used codes: AT = Austria, DK = Denmark, IT = Italy, SE = Sweden, GB = United Kingdom, US = United States of America

☒ The product fulfils the requirements of IEC 60950-1:2005 + Am 1:2009 + Am 2:2013 and EN60950-1:2006+A11+A1+A12+A2

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Additional Information underneath the main label for all models:

EU representative: TDK-Lambda UK Limited
Kingsley Avenue, Ilfracombe, Devon EX34 8ES, UK

Test item particulars.....:	
Equipment mobility.....:	[x] movable [] hand-held [] transportable [] stationary [] for building-in [] direct plug-in
Connection to the mains.....:	[] pluggable equipment [] type A [] type B [] permanent connection [] detachable power supply cord [] non-detachable power supply cord [] not directly connected to the mains *(*) **NOTE: Connection to the mains is depends to the final installation***
Operating condition.....:	[x] continuous [] rated operating / resting time:
Access location .....:	[x] operator accessible (only front panel) [x] restricted access location (rear side)
Over voltage category (OVC) .....:	[] OVC I [x] OVC II [] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values .....:	+10/-10
Tested for IT power systems .....:	[x] Yes (Norway only) [] No
IT testing, phase-phase voltage (V) .....:	230VAC
Class of equipment .....:	[x] Class I [] Class II [] Class III [] Not classified
Considered current rating of protective device as part of the building installation (A) .....:	30A
Pollution degree (PD) .....:	[] PD 1 [x] PD 2 [] PD 3
IP protection class .....:	Not rated
Altitude during operation (m) .....:	3000 max.
Altitude of test laboratory (m) .....:	<2000
Mass of equipment (kg) .....:	9.5
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 of receipt of test item .....:	May 9th, 2008 *[date of receipt of test item during original testing according to report number 30881382.001]* N/A-30881382.004, .008, .010
Date(s) of performance of tests.....:	May 13th, 2008 *[date of performance of testing during original evaluation according to report number 30881382.001, no further testing was deemed necessary for this upgrade of standard]* *N/A-30881382.004, .008, .010*

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 ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location 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 ..... :

☐ **Yes**
☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) ..... : TDK-Lambda Ltd.
56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel

General product information:

The GEN2400W series is a family of power supplies having rated output from 0-8VDC/0-300A up to 0-600VDC/0-4A with total output power 2400 Watt maximum or less.

Units evaluated for use in TN, TT and IT (Norway only) power systems.
Units are Class I, evaluated for use in Installation Category II and Pollution Degree 2 environments.
Units have Hazardous Energy Level output and intended to be installed in RAL.
Units may be adjusted by operator to 105% of the rated output voltage.
Units with output rated up to (but not including) 60VDC considered as SELV output units.
Units with output rated 60VDC and more considered as Secondary Hazardous voltage output units.
Units consist of a steel box-type frame enclosure and steel cover.

The following common parts installed (or may be installed-optional parts) inside of enclosure:

Common parts:

- Input board with soldered input connector (for 1 phase input-IA663, for 3 phase input-IA664)
- Power factor control (PFC) board IA660
- BIAS board (IA667)
- Two DC/DC converter boards connected in parallel (IA661 for output 8V-100V or IA662 for output 150V-600V)
- Control board(IA668)
- Output filter assembly(IA665 for output 8-100V or IA666 for output 150-600V)
- Display assembly (IA621)
- Fans assembly (IA670 with three fans)

Optional parts:

- Isolated Analog Control board (IA631)
- IEEE board (IA630)
- LAN board (IA672)

The input power connectors are UL Recognized for factory and field wiring.

The units are suitable for maximum ambient operating temperature 50ºC at maximum load.
The units are suitable for maximum operational altitude up to 3000m.

GEN20-120/R
Model GEN20-120/R is fully same with the basic model GEN2400W series except for:
- the cooling air-flow direction is reversed and is from rear side to front side;
- the maximum output current is limited to 96A

All other electrical and environmental parameters are kept same with the basic model from GEN2400W series.

Definition of variable(s):

Model configuration code: GENwww-xxx-yyyy-zzzzz-u-CO

Variable:	Range of variable:	Content:
1. www	008 - 600	min./max. output voltage in VDC
2. xxx	004 – 300	min./max. output current in A
3. yyyy	1. LAN 2. MD 3. IEEE 4. IEMD 5. IS420 6. IS510 7. 1744~1749 8. blank	Optional suffix, not safety related 1. LAN card installed; 2. software enabled multi drop; 3. IEEE card installed; 4. IEEE card installed and multi drop; 5. Isolated Analog Module (current control) installed; 6. Isolated Analog Module (voltage control) installed; 7. Indicates logo/labelling change or removal, not affecting safety. 8. Basic model.
4. zzzzz	1. 1P230 2. 3P208	Input supply voltage options 1. Single phase: ~190-240V, 50/60Hz, 15.5A. 2. Three phase: ~190-240V, 50/60Hz, 9A, 3wire+PE.
5. u	1. U 2. blank	1. For North America market 2. Basic model
6. CO	1. CO 2. blank	1. Conformal coating used (for environmental protection only) 2. without conformal coating

Abbreviations used in the report:

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

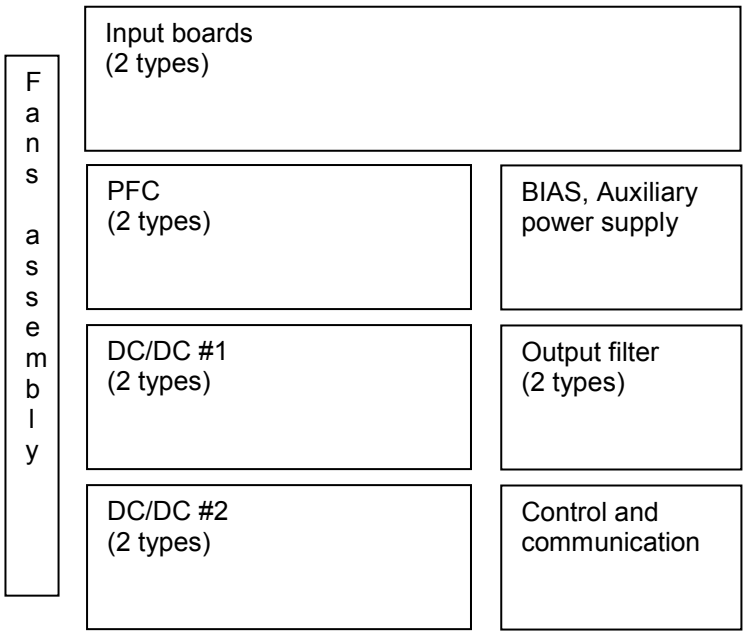
Indicate used abbreviations (if any)

- primary	PRI
- ground (protective earth)	GND
- SELV circuit	SELV
- terminal block	TB
- Triple Insulated Wire	TIW

Test Report History:

30881382.001	Original CB Report
30881382.004	New CB report for an upgrade of standard to list IEC 60950-1:2005
30881382.008	New CB report / this report for an upgrade of standard to list IEC 60950-1:2005+A1 and EN 60950-1:2006+A11+A1+A12
30881382.010	New CB report / this report covers: - an upgrade of standard to list EC 60950-1:2005+A2 and EN 60950-1:2006+A2; - revision of Critical Components List; - adding suffix –CO for models in which conformal coating used. - adding a table for definition of variable(s)

Block Diagram (modules as they are laid out within unit)



Component's description

1. Input boards

The input board are constructed of UL Recognized input connector intended for factory and field wiring connection and EMI filter.

There are two types of input boards:

- 3 phase, for units rated 190-240VAC
- 1 phase, for units rated 190-240VAC

Input board provide the AC voltage for PFC (Power Factor Control) board

2. Power factor control (PFC) board

The PFC board includes AC/DC rectification and Power Factor Correction circuits

The PFC board provides 380VDC voltage for DC/DC boards and BIAS board

3. DC/DC boards

The DC/DC board includes DC/DC converter

There are two types of DC/DC board:

- For units having output voltage from 8VDC up to (and including) 100VDC
- For units having output voltage from 150VDC up to (and including) 600VDC

In each unit two DC/DC boards are assembled in parallel to provide full output power 24000W (Each board 1200W)

Each type of the DC/DC converter is the same besides the mains transformer construction and winding ratio.

4. BIAS

The BIAS board is same for all models.

The BIAS board includes auxiliary switching power supply providing DC voltage for internal circuits and two auxiliary outputs (5VDC and 15VDC)

BIAS power supply provides three output circuits. One output is connected to SELV control (RS232) circuits and 5VDC of auxiliary output.

The other two outputs are connected to control circuits and 15VDC auxiliary output. Control circuits and 15VDC auxiliary output are regarded as SELV for units up to 40V output and Secondary Hazardous for all

other power supply models. Bias board provides reinforced insulation between the SELV output and the other two output which may be connected to Hazardous circuits in the non SELV output models
5. Control board The control board is same for all models. The control board includes control and adjusts circuits for maintenance of functioning of PFC and DC/DC. The control board provides reinforced insulation between RS232/RS485 I/O circuits and the different power supply modules.
6. Output filter assembly The output filter assembly includes output filter and output current sense (shunt) There are two types of output filter assembly: • For units having output voltage from 8VDC up to (and including) 100VDC • For units having output voltage from150VDC up to (and including) 600VDC The first type of output filter assembly has bus-bar type of output terminals. The second type of output filter assembly has separately certified connector intended for field wiring connection.
7. Display assembly The display assembly is same for all models The display assembly include digital display and components for management of the power supply
8. Fans assembly The fans assembly is same for all units The fans assembly consists of fans distribution board also used as bracket and three same fans and