



Test Report issued under the responsibility of:



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

Report Number .....: 31781623.001

Date of issue .....: 6/1/2017

Total number of pages.....: 246 pages

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

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**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.

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<b>Test item description .....</b>	Programmable Power Supplies
<b>Trade Mark .....</b>	TDK-Lambda, <b><i>TDK-Lambda</i></b>
<b>Manufacturer.....</b>	Same as applicant
<b>Model/Type reference .....</b>	<u>GENESYS+5000W series</u> a) Gxxx-yyy-z-v-u-w (xxx=010-600; yyy=8.5-500; z=1-3; v=1-3; u=1-2; w=1-2): Ordinary unit.  b) GBxxx-yyy-z-v-u-w (xxx=010-600; yyy=8.5-500; z=1-3; v=1-3; u=1-2; w=1-2): Blank unit  c) GSSxxx-yyy-z-v-u-w (xxx=010-600; yyy=8.5-500; z=1-3; v=1-3; u=1-2; w=1-2): Buster unit  Note: see "General product information" and "Definition of variables" for details
<b>Ratings .....</b>	Input: Option 1: AC 190-240V; 3W + PE, 50/60Hz, 18.5A max.;  Option 2: AC 380-415V; 3W + PE, 50/60Hz, 9.2A max.;  Option 3: AC 380-480V; 3W + PE, 50/60Hz, 9.2A max.;  Output: DC 0-10V/500A to DC 0-600V/8.5A, 5200 Watt max.

<b>Testing procedure and testing location:</b>		
<input type="checkbox"/>	<b>CB Testing Laboratory:</b>	TUV Rheinland of North America, Inc.
<b>Testing location/ address .....</b>		1279 Quarry Lane, Ste. A, Pleasanton, CA 94566
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		
<b>Approved by (name + signature).....</b>		
<hr/>		
<input type="checkbox"/>	<b>Testing procedure: TMP/CTF Stage 1:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		
<b>Approved by (name + signature).....</b>		
<hr/>		
<input type="checkbox"/>	<b>Testing procedure: WMT/CTF Stage 2:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature).....</b>		
<hr/>		
<input checked="" type="checkbox"/>	<b>Testing procedure: SMT/CTF Stage 3 or 4:</b>	
<b>Testing location/ address .....</b>		TDK-Lambda Ltd.56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
<b>Tested by (name + signature).....</b>		Valery Rodionov 
<b>Witnessed by (name + signature) .....</b>		Jameel Armstrong
<b>Approved by (name + signature).....</b>		Rahul Mehta
<b>Supervised by (name + signature).....</b>		

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

- Attachment 1: National Differences (40 pages)
- Attachment 2: Photos (20 pages)
- Attachment 3: Electrical Schematics (18 pages)
- Attachment 4: PCB layouts (37 pages)
- Attachment 5: Magnetics (45 pages)

**Summary of testing:****Tests performed (name of test and test clause):**

Clause 1.6.2. Power Input Measurements  
 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 2.5. Limited Power Test  
 Clause 2.6.3.4. Protective bonding trace earth fault current  
 Clause 2.6.3.4. Earthing test.  
 Clause 2.10.2. Determination of working voltage  
 Clause 2.10.2. Hazardous voltage (circuit) measurement test  
 Clause 2.10.3..9 Measurement of transient levels  
 Clause 4.2. Mechanical strength test  
 Clause 4.3.2. Knob Pull Test  
 Clause 4.4. Hazardous moving parts  
 Clause 4.5.1. Temperature rise measurements  
 Clause 4.5.2, 4.5.5. Ball Pressure Test  
 Clause 5.1. Touch current measurements  
 Clause 5.2. Dielectric strength test  
 Clause 5.3. Abnormal operating and fault Conditions

**Testing location:**

TDK-Lambda Ltd.56 Haharoshet St.,  
 P.O.B. 500 Karmiel Industrial Zone  
 Karmiel 2161401, Israel

**Summary of compliance with National Differences**

The following national differences were considered to IEC 60950-1:2005 (2nd Edition) + Am 1:2009:

List of countries addressed: IL, KR, JP

Explanation of used codes: IL = Israel, KR = Republic of Korea, JP=Japan.

The following national differences were considered to IEC 60950-1:2005 (2nd Edition) + Am 2:2013:

List of countries addressed: EU Group Differences, EU Special National Conditions, CA, US

Explanation of used codes: CA = Canada, 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

Input option 1



Input Option 2



Input option 3



Model identification marking (sample)

1. Ordinary (full panel) unit



2. Blank unit



3. Buster unit



<b>Test item particulars</b> .....	
<b>Equipment mobility</b> .....	<input checked="" type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
<b>Connection to the mains</b> .....	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input checked="" type="checkbox"/> type B <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input type="checkbox"/> not directly connected to the mains (NOTE: Means of connection to the mains is depends to the final installation )
<b>Operating condition</b> .....	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
<b>Access location</b> .....	<input checked="" type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location
<b>Over voltage category (OVC)</b> .....	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
<b>Mains supply tolerance (%) or absolute mains supply values</b> .....	+10%/-10%
<b>Tested for IT power systems</b> .....	<input checked="" type="checkbox"/> Yes ( Norway only) <input type="checkbox"/> No
<b>IT testing, phase-phase voltage (V)</b> .....	230V
<b>Class of equipment</b> .....	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
<b>Considered current rating of protective device as part of the building installation (A)</b> .....	30
<b>Pollution degree (PD)</b> .....	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
<b>IP protection class</b> .....	IP20
<b>Altitude during operation (m)</b> .....	Less than 5000
<b>Altitude of test laboratory (m)</b> .....	Less than 2000
<b>Mass of equipment (kg)</b> .....	7.5 max
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object.....	N/A (or N)
- test object does meet the requirement .....	P (Pass)
- test object does not meet the requirement.....	F (Fail)
<b>Testing</b> .....	
<b>Date of receipt of test item</b> .....	May 1, 2017 (31781623.001)
<b>Date(s) of performance of tests</b> .....	May 1, 2017 to May 9, 2017 (31781623.001)

**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 IEC60950-1:**

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 GENESYS+5000W series is a family of power supplies having rated output from 0-10VDC/0-500A up to 0-600VDC/0-8.5A with total output power 5200 Watt maximum.

The GENESYS+5000W series is separated into three types of front panels and operation modes:

- a) Ordinary (full panel) units: is comes with display, on/off switch and may be operated independently or in parallel with another Ordinary, Blank or Buster unit by manual or remote control mode.
- b) Blank units: is comes without display, with on/off switch, and may be operated independently or in parallel with another Blank or Buster unit by remote control mode only.
- c) Buster units: is comes without on/off switch, display and operated by master unit only ( Ordinary or Blank)

**Engineering Considerations**

- The units are Class I, evaluated for use in Installation Category II and Pollution Degree 2 environments.
- The units are evaluated for use in TN, TT and IT (Norway only) power systems.
- All units may be adjusted by operator to 105% of the rated output voltage or current.
- Units with output rated up to (but not including) 60VDC considered as SELV output units.
- Units with output rated 60VDC and higher considered as Secondary Hazardous voltage output units.
- The units consist of an aluminum box-type frame enclosure with aluminium cover.

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

**Common parts:**

Input board IA764 for input 190-240V or IA765 for inputs 380-415V and 380-480V include:

- Input SELV module IA814 for input 190-240V or IA850 for inputs 380-415V and 380-480V;
- Input control module IA815 for input 190-240V or IA849 for inputs 380-415V and 380-480V;
- Input STBY module IA818 for inputs 380-415V and 380-480V.

Power factor control board (PFC) IA766 for input 190-240V, IA767 for inputs 380-415V and 380-480V.

Three DC/DC converter boards connected in parallel-IA768 for output 10V-30V, IA769 for output 300V or IA851 for output 600V, each board include:

- DC/DC slave module IA771.

Control board IA806.

Output filter board-IA787 for output 10-100V, IA809 for output 150-300V or IA788 for output 400-600V.

Interface board-IA770.

Connect board-IA789.

Display-IA772.

**Optional parts**

GPIO (IEEE) board IA834.

Anybus board IA790.

The power I/O connectors are suitable for factory and field wiring.

The units are suitable for maximum ambient operating temperature 50°C at maximum load with the following derating:.



Units with output 0-10VDC/0-500A: up to  $T_a=40^{\circ}\text{C}$ , or 0-10VDC/0-450A for  $40^{\circ}\text{C}<T_a<50^{\circ}\text{C}$ .  
All units which include GPIB module limited up to  $40^{\circ}\text{C}$ .

The units are suitable for maximum operational altitude up to 3000m with the following derating.  
Units with output 0-10VDC/0-500A: temperature derating is  $2^{\circ}\text{C}/100\text{m}$  or output current derating  $2\%/100\text{m}$ .

CB-Test Report History:

Definition of variable(s): Model configuration code

GENESYS+5000W series

Gxxx-yyy-z-v-u-w – ordinary unit

GBxxx-yyy-z-v-u-w – blank unit

GSSxxx-yyy-z-v-u-w – buster unit

Variable:	Range of variable:	Content:
xxx	010-600	min/max output voltage in VDC
yyy	8.5-500	min/max output current in A
z	1. GPIB (IEEE) 2. AnyBus 3. Blank	1. IEEE card installed; 2. AnyBus module installed 3. Base model.
v	1. 3P208 2. 3P400 3. 3P480	1. Three phase units (option 1): 190-240V, 3 W+GND, 50/60 Hz 2. Three phase units (option 2): 380-415V, 3W+GND, 50/60 Hz 3. Three phase units (option 3): 380-480V, 3W+GND, 50/60 Hz
u	1. Various letters or/and numbers 2. Blank	1. Indicate other options (not safety related) 2. Base model
w	1.CO 2.Blank	1. Conformal coating used on all boards or partially (for environmental protection only). 2. Without conformal coating.

#### Abbreviations used in the report:

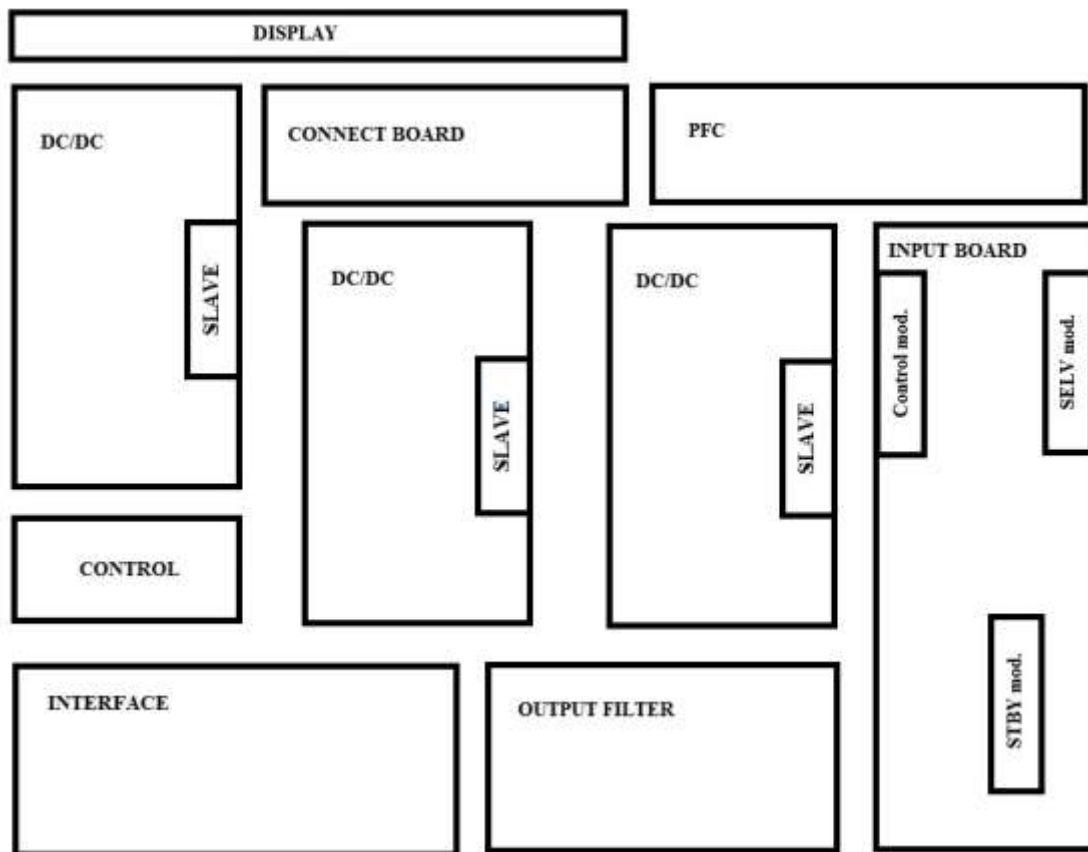
- normal conditions	<b>N.C.</b>	- single fault conditions	<b>S.F.C</b>
- functional insulation	<b>OP</b>	- basic insulation	<b>BI</b>
- double insulation	<b>DI</b>	- supplementary insulation	<b>SI</b>
- between parts of opposite polarity	<b>BOP</b>	- reinforced insulation	<b>RI</b>

#### Indicate used abbreviations (if any)

- primary	PRI
- ground (protective earth)	GND
- safety extra low voltage	SELV
- terminal block	TB
- triple insulated wire	TIW
- restricted access location	RAL
- Internal protection operated (list component)	IP
- Constant temperatures were obtained	CT
-Transformer winding opened	TW
- Components damaged (list damaged components)	CD
- No indication of dielectric breakdown	NB
- Dielectric breakdown (indicate time and location)	YB
- Cheesecloth remained intact	NC
- Cheesecloth charred or flamed	YC

- Tissue paper remained intact	NT
- Tissue paper charred or flamed	YT

Block Diagram (as they are laid out within unit)



## Component's description

## 1. Input boards

The input board is construct of UL Recognized input connector, EMI filter, inrush current protection, diode rectifier, SELV BIAS, FUN BIAS and Main BIAS.

There are two types of input boards:

- 3 phase, for units rated 190-240VAC
- 3 phase, for units rated 380-480VAC

The input board provides the DC voltage for the PFC (Power Factor Control) board

<p>2. Power factor control (PFC) board  The PFC board includes a Power Factor Correction circuit  There are two types of PFC board:</p> <ul style="list-style-type: none"> <li>• For 3 phase units rated 190-240VAC</li> <li>• For 3 phase units rated 380-480VAC</li> </ul> <p>The PFC board provides 380VDC voltage for the DC/DC boards and internal BIASs.</p>
<p>3. Connection board  Distribute power from PFC to DC/DC boards</p>
<p>4. DC/DC boards  The DC/DC board includes a DC/DC converter  There are three types of DC/DC boards:</p> <ul style="list-style-type: none"> <li>• For units having output voltage from 10Vdc up to (and including) 30Vdc</li> <li>• For units having output voltage 300Vdc</li> <li>• For units having output voltage 600Vdc</li> </ul> <p>In each unit there are three DC/DC boards which are assembled in parallel to provide full output power up to 5200W  Each type of the DC/DC board is the same besides the mains transformer construction and winding ratio.</p>
<p>5. Control board  The control board is the same for all models.  The control board includes the control and adjusts circuits for maintenance of functioning of power supply.</p>
<p>6. Output filter board</p> <p>There are three types of the output filter boards:</p> <ul style="list-style-type: none"> <li>• For units having an output voltage from 10Vdc up to (and including) 100Vdc</li> <li>• For units having an output voltage from 150Vdc up to (and including) 300Vdc</li> <li>• For units having an output voltage from 400Vdc up to (and including) 600Vdc</li> </ul> <p>The output filter board 10-100Vdc has bus-bar type of output terminals.  The output filter boards 150-300Vdc and 400-600Vdc has a UL Recognized connector intended for factory and field wiring.</p>
<p>7. Display assembly  The display assembly is same for all models  The display assembly includes a digital display and components for management of the power supply</p>
<p>8. Interface board  Intended to provide external communications (RS232, USB, LAN, remote programming, paralleling, etc.).</p>