Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 61010-1
Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 1: General requirements

Report Number.....:	CN23Q59S 001
Date of issue.....:	2024-03-12
Total number of pages.....:	134 total (103 (trf) + 31 (attachments))
Name of Testing Laboratory preparing the Report.....:	TÜV Rheinland (China) Ltd.
Applicant's name.....:	TDK-Lambda Ltd.
Address.....:	56 Haharoshet St., P.O.B. 500, Karmiel Industrial Zone, 2161401 Karmiel, Israel
Test specification:	
Standard.....:	IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016
Test procedure.....:	CB Scheme
Non-standard test method.....:	N/A
TRF template used.....:	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No.....:	IEC61010_1P
Test Report Form(s) Originator....:	VDE Prüf- und Zertifizierungsinstitut GmbH
Master TRF.....:	2021-04-12

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE 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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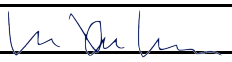
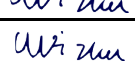
Test item description..... :	Scalable Power System
Trade Mark ..... :	TDK-Lambda, TDK·Lambda
Manufacturer ..... :	Same as applicant
Model/Type reference..... :	1) GSPS/GBSPS 90kW Series: GSPSx-y-z-3P480/uuuuuu/w GSPSx-y-z-3P480-uuuuuu/w GBSPSx-y-z-3P480/uuuuuu/w GBSPSx-y-z-3P480-uuuuuu/w Where – x=20-1500 y=60-4500 z="GPIB (IEEE)", "MDBS", "ECAT", "IS420", Blank u=A-Z, 0-9, Blank w="CO", Blank 2) GSPS/GBSPS 45kW Series: GSPS1000-45-z-3P480/uuuuuu/w GSPS1000-45-z-3P480-uuuuuu/w GSPS1500-30-z-3P480/uuuuuu/w GSPS1500-30-z-3P480-uuuuuu/w GBSPS1000-45-z-3P480/uuuuuu/w GBSPS1000-45-z-3P480-uuuuuu/w GBSPS1500-30-z-3P480/uuuuuu/w GBSPS1500-30-z-3P480-uuuuuu/w Where – z="GPIB (IEEE)", "MDBS", "ECAT", "IS420", Blank u=A-Z, 0-9, Blank w="CO", Blank 3) GSPS/GBSPS 67.5kW Series: GSPS1000-67.5-z-3P480/uuuuuu/w GSPS1000-67.5-z-3P480-uuuuuu/w GSPS1500-45-z-3P480/uuuuuu/w GSPS1500-45-z-3P480-uuuuuu/w GBSPS1000-67.5-z-3P480/uuuuuu/w GBSPS1000-67.5-z-3P480-uuuuuu/w GBSPS1500-45-z-3P480/uuuuuu/w GBSPS1500-45-z-3P480-uuuuuu/w Where – z="GPIB (IEEE)", "MDBS", "ECAT", "IS420", Blank u=A-Z, 0-9, Blank w="CO", Blank
Ratings..... :	1) GSPS/GBSPS 90kW Series: Input 380-480 Vac, 3W+PE, 50/60 Hz, 162A. Output d.c. only: 20V-1500V, 60A-4500A (depending on the model).

	2) GSPS/GBSPS 45kW Series: Input 380-480 Vac, 3W+PE, 50/60 Hz, 81A. Output d.c. only, model 1000V-45A, and model 1500V-30A 3) GSPS/GBSPS 67.5kW Series: Input 380-480 Vac, 3W+PE, 50/60 Hz, 121.5A. Output d.c. only, model 1000V-67.5A, and model 1500V-45A

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☐	**CB Testing Laboratory:**		
Testing location/ address.....:			
Tested by (name, function, signature) ....:			
Approved by (name, function, signature):			
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature) ....:			
Approved by (name, function, signature):			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature):			
Approved by (name, function, signature):			
☒	**Testing procedure: CTF Stage 3:**	TDK-Lambda Ltd.	
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:		9 HaYotsrim St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2165235, Israel	
Tested by (name, function, signature) ....:		Elias Jiries, PS Group Leader	
Witnessed by (name, function, signature):		Xuhua Liu, PE	
Approved by (name, function, signature):		Will Zhou, Authorizer	
Supervised by (name, function, signature):		Will Zhou, Authorizer	

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

Document No.	Documents included / attached to this report (description)	Page No.
Att. 1	EU Group Differences National Differences (CENELEC)	1
Att. 2	Japan National Differences (JIS)	4
Att. 3	Schematics	2
Att. 4	Wire Harness	10
Att. 5	Photos	14

Documents referenced by this report (available on request):

Document Name or No.	Documents description	Page No.

Summary of testing:

Refer to general product information and other remarks.
The G+ 7500W is a certified product and many tests were conducted as part of that product certification process. Tests such as working voltage (insulation coordination), voltage test, single-faults, and many more tests were conducted and referenced by this document to verify compliance with the standard. The tests that are done on the GSPS/GBSPS 90kW can be seen under section “Tests performed” below, while the tests done on the G+ 7500W project can be seen under its own official CB test report prepared by TUV.

Clause	Comment

Test Report History:
This report may consist of more than one report and is only valid with additional or previous issued reports:

Report Ref. No.	Item
CN23Q59S 001	The initial CB test report of this project.

Tests performed (name of test and test clause):	**Testing location:**
CN23Q59S 001 5.1.3 c) MAINS supply (Input test) 5.3 Durability of markings 6.2 Determination of ACCESSIBLE parts 6.3.1 Values in NORMAL CONDITION 6.5.2 PROTECTIVE BONDING 6.7 Insulation requirements (Cl/Cr measurements) 6.8 Dielectric strength (Hipot/Voltage test) 7.4 Mechanical stability test 8.2 ENCLOSURE rigidity and static test 8.2.2 Impact test 10 Temperature test 10.5.2 Resistance to heat of non-metallic ENCLOSURES 10.5.3 Ball-pressure test	56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel

Summary of compliance with National Differences (List of countries addressed):

The following national differences were considered to IEC 61010-1:2010 (3rd Edition) + Am 1: 2016:

List of countries addressed: EUROPEAN GROUP DIFFERENCES, Japan.

☒ **The product fulfils the requirements of** EN 61010-1:2010+AMD1:2019

Statement concerning the uncertainty of the measurement systems used for the tests
(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

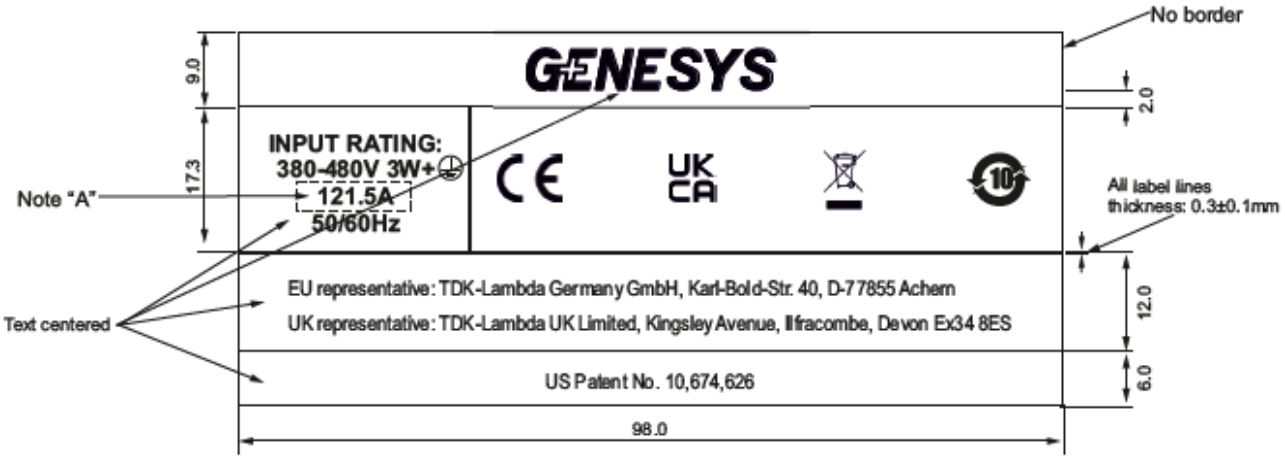
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

☒ **Statement not required by the standard used for type testing**

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

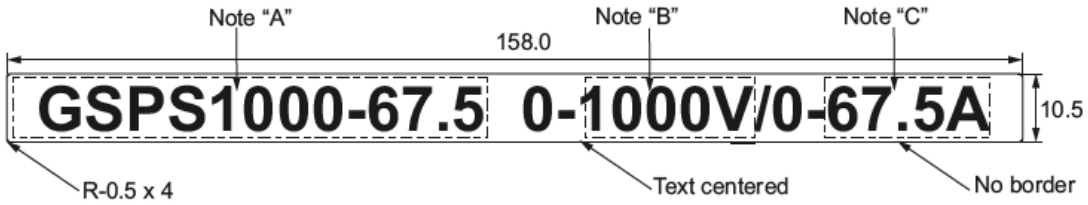
Copy of marking plate:

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.

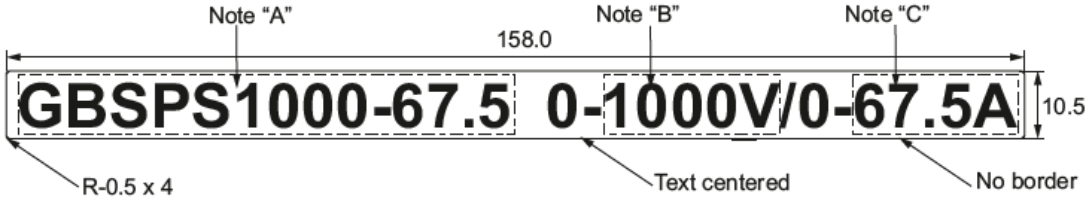


Model identification marking

GSPS TOP FRONT PANEL LABEL:



GBSPS TOP FRONT PANEL LABEL:



Test item particulars:	
Type of item ..... :	~~Measurement / Control~~ / Laboratory
Description of equipment function..... :	Programmable AC/DC power supplies
Connection to MAINS supply..... :	Permanent / ~~Detachable cord set~~ / Non detachable cord set / ~~None / Battery operated~~ NOTE: means of connection to the MAINS depends on the final installation.
Overvoltage category ..... :	II / ~~III / IV~~
POLLUTION DEGREE ..... :	2
Means of protection ..... :	Class I (PE connected) / ~~Class II (isolated)~~
Environmental conditions..... :	~~Normal~~ / Extended (Specify): Same as normal, except altitude is up to 3000m, and rated working temperature 0-50ºC
For use in wet locations..... :	~~Yes~~ / No
Equipment mobility ..... :	~~Portable~~ / ~~Hand-held~~ / Floor standing / Fixed / ~~Built-in~~
Operating conditions ..... :	Continuous / ~~Short-time~~ / ~~Intermittent~~
Overall size of equipment (W x D x H)..... :	553[mm]x902[mm]x1028[mm] (with castors)
Mass of equipment (kg)..... :	GSPS/GBSPS 90kW ~ 200kg GSPS/GBSPS 45kW ~ 153kg GSPS/GBSPS 67.5kW ~ 177kg
Marked degree of protection to IEC 60529 ..... :	IPX0
Possible test case verdicts:	
- Test case does not apply to the test object ..... :	N/A (Not Applicable)
- Test object does meet the requirement..... :	P (Pass)
- Test object does not meet the requirement ..... :	F (Fail)
Testing:	
Date of receipt of test item..... :	19 Nov 2023
Date (s) of performance of tests..... :	19 Nov 2023 to 21 Dec 2023
General remarks:	
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 testing laboratory. "(see ENCLOSURE #)" refers to additional information appended to the report. "(see Form A.xx)" refers to a Table appended to the report. Bottom lines for measurement Tables Forms A.xx are optional if used as record. **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 and other remarks:
Description of unit:

This is a high-power power system comprised of multiple GENESYS+ 7500W series power supplies (which is an approved and certified product for EN/IEC 61010-1 so no additional testing was needed for those specific units) connected in parallel in order to generate the announced DC output power.

The power system (hereafter referred to as GSPS/GBSPS 90kW/45kW/67.5kW) has its own dedicated enclosure where all units and assemblies can be found, and where an operator have no access to without a tool.

The GSPS/GBSPS through the GENESTS+ 7500W series incorporates many protection measures, including OCP, OVP, and OTP, and implemented using multiple means such as pure hardware means using components like input fuse, transformers, passive components (failing safely) etc., and other means such as regulatory networks that trigger safe fail in both normal operation and single-fault conditions.

The GSPS/GBSPS 90kW/45kW/67.5kW also comes with a circuit breaker of its own, accessible to the operator from the front panel, underneath the section area where all operating knobs and buttons are found.

The GSPS/GBSPS can have a myriad of variants and different models as stated in this document, main differences are the input and output power (90kW/45kW/67.5kW), and output voltage and current.

All the requirements of GSPS series are valid for the GBSPS series unless specified otherwise (including critical components list). The only difference is the front panel being blank.

The GSPS/GBSPS series is evaluated for the maximum altitude of 3000m.
Operating: 10000ft (3000m), output current derating 2%/100m or Ta derating 1ºC/100m above 2000m.
Non-operating: 40000ft (12000m).

All units which include GPIB (IEEE) module are limited up to Tma=40ºC.

Description of model differences:

The GSPS/GBSPS series include several systems with each having different models.
All the systems are 3-phase (3W+PE).
All the systems input rating is nominal 480VAC.
All the systems generate DC power output.
The systems differ from one to another by:
-Number of GSPLs power supplies connected in parallel (hence different input and output power rating).
-The models used in each system (each output power rating can be reached by connecting in parallel a number of unanimous 7.5K G+ power supplies, so that the total output power is the required amount, while the Voltage/Current ratio may change from a model to another, the output power for each 7.5K G+ power supply totals to 7500W since there is a variety of 7.5k G+ models as shown on page 2).
-The GSPS/GBSPS models that were chosen to represent all the models are:

- GSPS 90kW 1500V-60A (highest voltage output, consists of 12 x 7.5K G+ 1500V-5A)
- GSPS 90kW 20V-4500A (highest current output, consists of 12 x 7.5K G+ 20V-375A)

Explaining the variables in the model and type configurations:

Variable	Applicable value	Description
x	20-1500	Min/Max DC output voltage
y	60-4500	Min/Max DC output current
z	1) GPIB (IEEE) 2) MDBS 3) ECAT 4) IS420 5) Blank	1. IEEE card installed. 2. AnyBus module installed with MDBS option. 3. AnyBus module installed with ECAT option. 4. Isolated Analog Programming option 4~20 mA. 5.Base model.
u	1. Various letters and/or numbers 2. Blank	1. Indicates other options not related to safety. 2. Base model.
w	1. CO 2. Blank	1. Conformal coating used on all boards or used partially (for environmental protection only). 2. Without conformal coating.

Description of special features:
(HV circuits, high pressure systems etc.) N/A