TEST REPORT
IEC 62109-1
Safety of Power Converter for use in Photovoltaic Power Systems
Part 1: General requirements

Report

Report Reference No. ..... :	130918053GZU-004
Date of issue ..... :	10 Jan., 2014, Revision 1: 27 Oct., 2016
Total number of pages ..... :	9 pages
Testing Laboratory ..... :	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address ..... :	Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
Applicant's name ..... :	Shenzhen SOFARSOLAR Co., Ltd.
Address ..... :	5L,Fourth Building,Antongda Industrial Park,Liuxian Avenue No.1,Xinan Street,Baoan District,Shenzhen,China.

Test specification:

Standard ..... :	IEC/EN 62109-1:2010 (First Edition)
Test procedure ..... :	LVD
Non-standard test method……..:	N/A
Test Report Form No. ..... :	TTRF_IEC62109_1A
TRF Originator ..... :	Intertek Guangzhou
Master TRF ..... :	Dated 2011-03

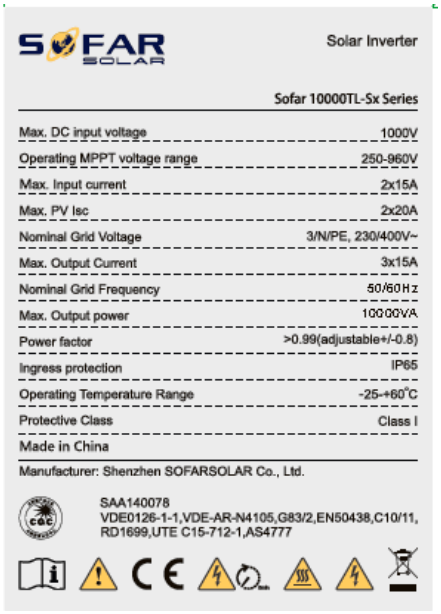
This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

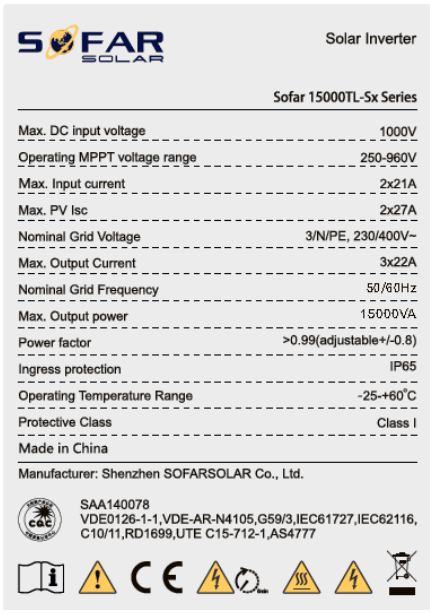
Test item description	:	Solar Inverter
Trade Mark	:	
Manufacturer	:	Same as applicant
Model/Type reference	:	Sofar 20000TL-Sx Series, Sofar 17000TL-Sx Series , Sofar 15000TL-Sx Series , Sofar 10000TL-Sx Series (x=0-6)
Ratings	:	Maximum d.c. input voltage: 1000 V Input voltage rang: 250-960 V Max. input current: 2×24 A (for Sofar 20000TL-Sx Series); 2×21 A (for Sofar 17000TL-Sx Series, Sofar 15000TL-Sx Series); 2×15 A (for Sofar 10000TL-Sx Series) Max. PV Isc: 2×30 A (for Sofar 20000TL-Sx Series); 2×27 A (for Sofar 17000TL-Sx Series, Sofar 15000TL-Sx Series); 2×20 A (for Sofar 10000TL-Sx Series) Nominal output voltage: 3/N/PE230V/400V Max. output current: 3×29 A (for Sofar 20000TL-Sx Series); 3×25 A (for Sofar 17000TL-Sx Series); 3×22 A (for Sofar 15000TL-Sx Series); 3×15 A (for Sofar 10000TL-Sx Series) Nominal frequency: 50 Hz Max. output power: 20000 VA (for Sofar 20000TL-Sx Series); 17000 VA (for Sofar 17000TL-Sx Series); 15000 VA (for Sofar 15000TL-Sx Series); 10000 VA (for Sofar 10000TL-Sx Series) Ingress protection: IP65 Operating temperature range: -25～60℃

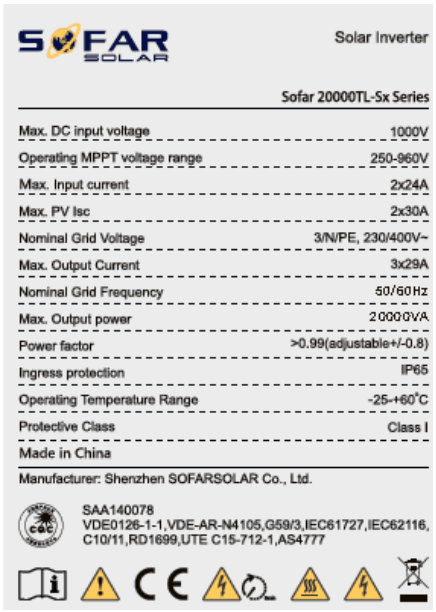
Testing procedure and testing location:	
☒ **Testing Laboratory**:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Testing location/ address ..... :	Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
☐ **Associated Laboratory:**	
Testing location/ address ..... :	N/A
Tested by (name + signature)..... :	Jason Fu
Approved by (+ signature) ..... :	Tommy Zhong
☐ Testing procedure: TMP	
Testing location/ address ..... :	N/A
Tested by (name + signature)..... :	N/A
Approved by (+ signature) ..... :	N/A
☐ Testing procedure: WMT	
Testing location/ address ..... :	N/A
Tested by (name + signature)..... :	N/A
Witnessed by (+ signature)..... :	N/A
Approved by (+ signature) ..... :	N/A
☐ Testing procedure: SMT	
Testing location/ address ..... :	N/A
Tested by (name + signature)..... :	N/A
Approved by (+ signature) ..... :	N/A
Supervised by (+ signature)..... :	N/A
☐ Testing procedure: RMT	
Testing location/ address ..... :	N/A
Tested by (name + signature)..... :	N/A
Approved by (+ signature) ..... :	N/A
Supervised by (+ signature)..... :	N/A

Summary of testing:	
Tests performed (name of test and test clause): No tests required	Testing location: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
Summary of compliance with National Differences: N/A	

Copy of marking plate:







Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation
3. The labels of the other models are same as above except the model name and ratings.

Test item particulars ..... :	
Equipment mobility ..... :	☐ movable ☐ hand-held ☐ stationary ☒ fixed ☐ transportable ☐ for building-in
Connection to the mains..... :	☐ pluggable equipment ☐ direct plug-in ☒ permanent connection ☐ for building-in
Enviromental category..... :	☒ outdoor ☐ indoor unconditional ☐ indoor conditional
Over voltage category Mains ..... :	☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV
Over voltage category PV ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%)..... :	-90 / +110 %
Tested for power systems ..... :	TN systems
IT testing, phase-phase voltage (V) ..... :	N/A
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg)..... :	46
Pollution degree ..... :	Outside PD3; Inside PD2
IP protection class..... :	IP 65

Testing	
Date of receipt of test item(s)..... :	09 Oct., 2016
Dates tests performed..... :	09 Oct., 2016 - 26 Oct.,2016

Possible test case verdicts:	
– test case does not apply to the test object ..... :	N/A
– test object does meet the requirement ..... :	Pass (P)
– test object was not evaluated for the require-ment..... :	N/E
– test object does not meet the requirement ..... :	Fail (F)

General remarks:

"(see Attachment #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
The tests 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 testing laboratory.
List of test equipment must be kept on file and available for review.
Additional test data and/or information provided in the attachments to this report.
Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

Revision 1: This report is based on original report 130918053GZU-004, dated 10 Jan., 2014 with below modified information:

1) **Change the address of applicant to "5L,Fourth Building,Antongda Industrial Park,Liuxian Avenue No.1,Xinan Street,Baoan District,Shenzhen,China "**
2) **Change the model to "Sofar 20000TL-Sx Series, Sofar 17000TL-Sx Series , Sofar 15000TL-Sx Series , Sofar 10000TL-Sx Series (x=0-6) "**
3) **Change the name of factory to "Shenzhen SOFARSOLAR Co., Ltd."**
4) **Change the address of factory to "5L,Fourth Building,Antongda Industrial Park,Liuxian Avenue No.1,Xinan Street,Baoan District,Shenzhen,China."**
5) **Updated the marking correspond to model.**

This report shall be used together with the report 130918053GZU-004, 130918053GZU-005 and 130918053GZU-005 Revision 1: 27 Oct., 2016.

Manufacturer's Declaration per sub-clause 6.2.5 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) ..... :

Shenzhen SOFARSOLAR Co., Ltd.

5L,Fourth Building,Antongda Industrial Park,Liuxian Avenue No.1,Xinan Street,Baoan District,Shenzhen,China.

General product information:

Product covered by this report is grid-connected PV inverter for indoor or outdoor installation. The connection to the DC input and AC output are through connectors. The structure of the unit complied with the IP 65 requirement.

The inverters intended to operate at ambient temperature -25℃ - +60℃ and 250-960 Vdc input, which will be specified in the user manual, The inverters will output full power when operated at 45℃. If operated at higher than 45℃ temperature, the output power derating.

For all models, if the DC input voltage is higher than 850 Vdc the output power will be derating.

For model Sofar 20000TL-Sx Series, if the DC input voltage is lower than 430 Vdc, the output power will be derating.

For model Sofar 17000TL-Sx Series, if the DC input voltage is lower than 420 Vdc, the output power will be derating.

For model Sofar 15000TL-Sx Series, if the DC input voltage is lower than 370 Vdc, the output power will be derating.

For model Sofar 10000TL-Sx Series, if the DC input voltage is lower than 350 Vdc, the output power will be derating.

For all models, if the AC output voltage is lower than 230 Vac the output current will be limited to not higher than rated output current.

All the models have identical mechanical and electrical construction except some components and some parameter of the software architecture in order to control the max output power. And refer to the following table for detail.

Model	DC Cable Gland	PV connector	DC inside connector	Fuse PCB+ String detection board	DC surge arrester	DC switch	AC switch	AC surge arrester
Sofar 20000TL-S0 Sofar 17000TL-S0 Sofar 15000TL-S0 Sofar 10000TL-S0	√		√					
Sofar 20000TL-S1 Sofar 17000TL-S1 Sofar 15000TL-S1 Sofar 10000TL-S1	√		√			√		
Sofar 20000TL-S2 Sofar 17000TL-S2 Sofar 15000TL-S2 Sofar 10000TL-S2		√	√			√		
Sofar 20000TL-S3 Sofar 17000TL-S3 Sofar 15000TL-S3 Sofar 10000TL-S3		√		√		√		
Sofar 20000TL-S4 Sofar 17000TL-S4 Sofar 15000TL-S4 Sofar 10000TL-S4		√		√	√	√		

Sofar 20000TL-S5 Sofar 17000TL-S5 Sofar 15000TL-S5 Sofar 10000TL-S5		√		√	√	√		√
Sofar 20000TL-S6 Sofar 17000TL-S6 Sofar 15000TL-S6 Sofar 10000TL-S6		√		√	√	√	√	√
√ denote incorporating this component								

	Sofar 20000TL-Sx Series	Sofar 17000TL-Sx Series	Sofar 15000TL-Sx Series	Sofar 10000TL-Sx Series
PV connector (pair)	2×2	2×2	2×2	2×2
Boost chock	1800 μH	2100 μH	2100 μH	3000 μH
Boost IGBT (Q19, Q20, Q28, Q29)	2×2 parallel	2×2 parallel	2×2 parallel	2×1
Boost diode (D19, D20, D24, D25)	2×2 parallel	2×2 parallel	2×2 parallel	2×1
Input current sampling resistor (REA79, REA71, REA81, REA73)	15 kΩ	15 kΩ	15 kΩ	10 kΩ
Bus capacitor (CD1, CD2, CD3, CD4, CD5, CD6, CD7, CD8, CD39, CD40)	10 units	8 units	6 units	4 units
Boost capacitor (CA129, CA131, CA145, CA148)	4 units	4 units	3 units	2 units
Inverter chock	730 μH	850 μH	960 μH	1460 μH
IGBT module (QD1, QD2, QD3)	10-FZ12NMA080SH01-M260F DS_F3L80R12W1H3_B11	10-FZ12NMA080SH01-M260F DS_F3L80R12W1H3_B11	10-FZ12NMA080SH01-M260F DS_F3L80R12W1H3_B11 10-FZ12NMA040SH-M267F	10-FZ12NMA080SH01-M260F DS_F3L80R12W1H3_B11 10-FZ12NMA040SH-M267F
Input current sampling resistor (RB46, RB52, RB79, RB81, RB95, RB58)	2,7 kΩ	2,7 kΩ	2,7 kΩ	1,5 kΩ

(End of the report)