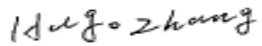



Test Report issued under the responsibility of:



TEST REPORT IEC 61683 Photovoltaic systems – Power conditioners – Procedure for measuring efficiency	
Report Number.....	GZES220400574702
Date of issue	2022-06-23
Total number of pages.....	42
Name of Testing Laboratory preparing the Report	SGS-CSTC Standards Technical Services Co., Ltd. E&E Lab Guangzhou
Address	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China
Applicant's name	AISWEI Technology (Shanghai) Co., Ltd.
Address	Room 905B, 757 Mengzi Road, Huangpu District, 200023 Shanghai, China
Test specification:	
Standard.....	IEC 61683:1999 (First Edition)
Test procedure.....	SGS-CSTC
Non-standard test method.....	N/A
Test Report Form No.	IEC 61683B
Test Report Form(s) Originator....	SGS-CSTC
Master TRF.....	Dated 2017-11
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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:	
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Test item description :	Grid-connected PV Inverter
Trade Mark :	
Manufacturer :	AISWEI Technology (Shanghai) Co., Ltd.
Address :	Room 905B, 757 Mengzi Road, Huangpu District, 200023 Shanghai, China
Model/Type reference :	ASW25K-LT-G3, ASW27K-LT-G3, ASW30K-LT-G3, ASW33K-LT-G3, ASW36K-LT-G3, ASW40K-LT-G3
Ratings :	Refer to the rating on page 6 and 7 of the report
	Serial Number: TA004000S21C0007 (The Equipment parameters were changed by software)
	Master Firmware version: V610-03041-05
	Slave Firmware version: V610-60009-00
	Safety Firmware version: V610-11007-02

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
Testing Laboratory:	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch	
Location/ address :	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China	
Tested by (name, function, signature) :	Hugo Zhang (Project Engineer)	
Approved by (name, function, signature) :	Roger Hu (Technical Reviewer)	

List of Attachments (including a total number of pages in each attachment):		
50 Hz		
Attachment #	Description	Pages
Attachment I	Pictures of the EUT and Electrical Schemes	6 pages
Attachment II	Testing Information	5 pages
Summary of testing:		
<p>Tests performed (name of test and test clause):</p> <p>The equipment has been tested according to the standard: IEC 61683:1999. Testing has been carried out at 50Hz.</p> <p>All applicable tests according to the above specified standard have been carried out.</p> <p>From the result of inspection and tests on the submitted sample, we conclude that it complies with the requirements of the standard.</p> <p>Note: Output voltage is 230Va.c.</p>	<p>Testing location: See page 2</p>	
Summary of compliance with National Differences		
No National Differences are addressed to this test report		

Copy of marking plate(representative):

Model: ASW33K-LT-G3	
Max. input voltage	d.c. 1100V
MPP voltage range	d.c. 180-1000V
Max. input current	d.c. 32A/32A/40A
Isc PV(absolute maximum)	d.c. 48A/48A/60A
Rated grid voltage	3/N/PE-380/400/415V
Rated grid frequency	50/60 Hz
Rated AC output active power	33000W
Rated AC output apparent power	33000VA
Max. AC output apparent power	36300VA ¹⁾
Max. continuous output current	a.c. 52.6A
Adjustable cos(φ)	0.8ind...0.8cap
Operating temperature range	-25...+60°C
Topology	Non-Isolated
Ingress protection	IP 66
Protective class	I
Overvoltage category	II(PV) III(MAINS)

¹⁾ For European market $S_{max}=33000VA$

AISWEI Technology (Shanghai) Co., Ltd.
 Hotline: +86 400 801 9996
 Web: www.solplanet.net
 Add.: Room 905B, 757 Mengzi Road, Huangpu District,
 Shanghai, 200023, China

XXXXXXXXXXXXXXXXXX XX-XX

532-100008-00 Made in China

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. Labels of other models are as the same with **ASW33K-LT-G3**'s except the parameters of rating.
4. As declared by the applicant, the importer (and manufacturer, if it is different)'s name, registered trade name or registered trademark and the postal address will be marked on the products before being place on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

Test item particulars : Three Phase Grid-connected PV Inverter	
Classification of installation and use : Fixed (permanent connection)	
Supply Connection : DC; PV	
..... : AC; Grid connection	
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 : N/A	
Date (s) of performance of tests : From 2022-05-31 to 2022-06-07	
General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.</p>	
<p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 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 :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : AISWEI New Energy Technology (Yangzhong) Co., Ltd. No.588 Gangxing Road, Yangzhong, Jiangsu, China	

General product information:

Product covered by this report is a three-phase transformerless string inverter with three independent MPPTs. It converts the direct current (DC) generated by the photovoltaic (PV) module into a three-phase alternating current (AC) and feeds it into the utility grid.

Equipment Under Testing:

- ASW33K-LT-G3
- ASW25K-LT-G3
- ASW27K-LT-G3
- ASW30K-LT-G3
- ASW36K-LT-G3
- ASW40K-LT-G3

Product Model	ASW25K-LT-G3	ASW27K-LT-G3	ASW30K-LT-G3
Input (DC)			
Max.DC Voltage (V)	1100		
MPPT Voltage Range (V)	180 ~ 1000		
Full load Voltage Range (V)	450 ~ 850		
Initial feed-in voltage (V)	200		
Min. input voltage (V)	160		
Rated input voltage (V)	630		
Max. input current (A)	32/32/32		
Max. short circuit current (A)	48/48/48		
Output (AC)			
Rated active power (W)	25000	27000	30000
Max. apparent power (VA)	27500	29700	33000
Max. Output Current (A)	39.9	43.0	47.8
Nominal Grid Voltage (V)	3/N/PE, 230/400		
Nominal Frequency (Hz)	50		
Power factor	Adjustable 0.80 ind ~ 0.80 cap		
Topology	Transformerless		
Operating temperature range	-25 °C ~ +60 °C		
Degree of protection	IP66		

Product Model	ASW33K-LT-G3	ASW36K-LT-G3	ASW40K-LT-G3
Input (DC)			
Max.DC Voltage (V)	1100		
MPPT Voltage Range (V)	180 ~ 1000		
Full load Voltage Range (V)	450 ~ 850		
Initial feed-in voltage (V)	200		
Min. input voltage (V)	160		
Rated input voltage (V)	630		
Max. input current (A)	32/32/40		
Max. short circuit current (A)	48/48/60		
Output (AC)			
Rated active power (W)	33000	36000	40000
Max. apparent AC power (VA)	36300	39600	44000
Max. Output Current (A)	52.6	57.4	63.8
Nominal Grid Voltage (V)	3/N/PE, 230/400		
Nominal Frequency (Hz)	50		
Power factor	Adjustable 0.80 ind ~ 0.80 cap		
Topology	Transformerless		
Operating temperature range	-25 °C ~ +60 °C		
Degree of protection	IP66		

IEC 61683: 1999			
Clause	Requirement – Test	Measuring result – Remark	Verdict
4	Efficiency measurement conditions		P
	Efficiency is measured under the conditions in the following clauses.		P
	Specific conditions may be excluded by mutual agreement when those conditions are outside the manufacturer's allowable operating range.		P
4.1	DC power source for testing		P
	For power conditioners operating with fixed input voltage, the d.c. power source is a storage battery or constant voltage power source to maintain the input voltage.		N/A
	For power conditioners that employ maximum power point tracking (MPPT) and shunt-type power conditioners, either a photovoltaic array or a photovoltaic array simulator is utilized.		P
4.2	Temperature		P
	All measurements are to be made at an ambient temperature of 25 °C ± 2 °C.		N/A
	Other ambient temperatures may be allowed by mutual agreement. However, the temperature used must be clearly stated in all documentation.	By mutual agreement all measurements at 50 Hz have been carried out at 25°C±5°C	P
4.3	Output voltage and frequency		P
	The output voltage and frequency are maintained at the manufacturer's stated nominal values.	230 V, 50 Hz	P
4.4	Input voltage		P
	Measurements performed in each of the following tests are repeated at three power conditioner input voltages: a) manufacturer's minimum rated input voltage; b) the inverter's nominal voltage or the average of its rated input range; c) 90 % of the inverter's maximum input voltage.		P
	In the case where a power conditioner is to be connected with a battery at its input terminals, only the nominal or rated input voltage may be applied.		N/A

IEC 61683: 1999			
Clause	Requirement – Test	Measuring result – Remark	Verdict
4.5	Ripple and distortion		P
	Record input voltage and current ripple for each measurement. Also record output voltage and current distortion (if a.c.) or ripple (if d.c.). Ensure that these measurements remain within the manufacturer's specified values.		P
4.6	Resistive loads/utility grid		P
	At unity power factor, or at the intrinsic power factor of grid-connected inverters without power factor adjustment, measure the efficiency for power levels of 10 %, 25 %, 50 %, 75 %, 100 % and 120 % of the inverter's rating.		P
	Stand-alone inverters are also measured at a power level of 5 % of rated. The power conditioner test is conducted with a specified resistive and reactive grid impedance.		N/A
4.7	Reactive loads		N/A
	For stand-alone inverters, measure the efficiency with a load which provides a power factor equal to the manufacturer's specified minimum level (or 0,25, whichever is greater) and at power levels of 25 %, 50 % and 100 % of rated VA.		N/A
	Repeat for power factors of 0,5 and 0,75 (do not go below the manufacturer's specified minimum PF) and power levels of 25 %, 50 %, and 100 % of rated VA.		N/A
4.8	Resistive plus non-linear loads		N/A
	For stand-alone inverters, measure the efficiency with a fixed non-linear load (total harmonic distortion (THD) = $(80 \pm 5) \%$) equal to $(25 \pm 5) \%$ of the inverter's rated VA plus sufficient resistive load in parallel to achieve a total load of 25 %, 50 % and 100 % of rated VA.		N/A
	Repeat the measurements with a fixed non-linear load equivalent to $(50 \pm 5) \%$ of the inverter's rated VA plus sufficient resistive load in parallel to achieve a total load of 50% and 100% of rated VA.		N/A
	The type of non-linear load must be clearly stated in all documentation.		N/A

IEC 61683: 1999			
Clause	Requirement – Test	Measuring result – Remark	Verdict
4.9	Complex loads		N/A
	When a non-linear plus a sufficient reactive load condition is specified for stand-alone inverters, measure the efficiency with a fixed non-linear load (THD = $(80 \pm 5) \%$) equal to $(50 \pm 5) \%$ of the inverter's rated VA plus a sufficient reactive load (PF = 0,5) in parallel to achieve a total load of 50 % and 100 % of rated VA.		N/A
	The type of complex load is clearly stated in all documentation.		N/A
5	Efficiency calculations		P
5.1	Rated output efficiency		P
5.2	Partial output efficiency		P
5.3	Energy efficiency		P
5.4	Efficiency tolerances		P
6	Conditions of loading for output ports		P
6.1	Test circuit		P
	Figure 1a is applied to standard-alone power conditioners		N/A
	<p>Figure 1a – Stand-alone type</p>		N/A
	Figure 1b is applied to utility-interactive power conditioners		P
	<p>Figure 1b – Utility-interactive type</p> <p> PS power conditioner PS variable voltage-current d.c. power supply A₁ DC ammeter A₂ AC or d.c. ammeter W₁ DC wattmeter W₂ AC or d.c. wattmeter L load F frequency meter V₁ DC voltmeter V₂ AC or d.c. voltmeter PF power factor meter </p>		P

IEC 61683: 1999			
Clause	Requirement – Test	Measuring result – Remark	Verdict
6.2	Measurement procedure		P
7	Loss measurement		P
7.1	No-load loss		P
7.2	Standby loss		P
Annex A	Power conditioner description		P
Annex B	Power efficiency and conversion factor		P
Annex C	Weighted-average energy efficiency		P
Annex D	Derivation of efficiency tolerance in table 2		P

TABLE		Efficiency recording and efficient calculation sheet							
power conditioner type	Grid-connected								
Model:	ASW25K-LT-G3								
Parameters of power conditioner	Minimum rated input voltage:160 V Nominal voltage: 630 V Maximum input voltage: 1100 V MPPT voltage range: 180 ~ 1000 V MPPT voltage range with full power: 450 ~ 850 V Rated output voltage: 230 V Rated output frequency: 50 Hz Rated output power: 25000 W Note: According to the user manual, the minimum rated input voltage is 160 V, and 90% of the inverter's maximum input voltage is 90%*1100 V=990 V. However, in this range, the inverter can't output full power. So, for this test, 450 V were used instead of 160 V, and 850 V were used instead of 990 V.								
PV input voltage	a) Manufacturer's minimum rated input voltage 450 V (± 6.75 V)								
Temperature (°C)	25 °C \pm 5 °C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	455.8	455.4	455.4	455.2	455.3	/	/	/
Input voltage ripple (V)	/	0.6	1.4	2.3	1.3	1.1	/	/	/
Input current (A)	/	6.1	14.7	28.0	42.2	56.3	/	/	/
Input current ripple (mA)	/	120	64	115	120	93	/	/	/
Input power (Pi) (W)	/	2600	6513	12749	19245	25706	/	/	/
Output power (Po) (W)	/	2459	6278	12360	18667	24893	/	/	/
Output efficiency (%)	/	94.6	96.4	96.9	97.0	96.8	/	/	/
Input energy (Wi) (Wh)	/	93.9	235.2	460.4	694.0	928.2	/	/	/
Output energy (Wo) (Wh)	/	88.8	226.7	446.3	674.0	898.9	/	/	/
Energy efficiency(%)	/	94.6	96.4	96.9	97.1	96.8	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	b) The inverter's nominal voltage 630 V (± 9.45 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	632.1	624.2	623.5	632.2	631.9	/	/	/
Input voltage ripple (V)	/	0.5	1.1	0.3	0.6	0.3	/	/	/
Input current (A)	/	4.4	11.2	20.7	30.6	40.9	/	/	/
Input current ripple (mA)	/	69	92	129	84	94	/	/	/
Input power (Pi) (W)	/	2596	6488	12924	19362	25862	/	/	/
Output power (Po) (W)	/	2518	6325	12667	19001	25339	/	/	/
Output efficiency (%)	/	97.0	97.5	98.0	98.1	98.0	/	/	/
Input energy (Wi) (Wh)	/	93.7	228.0	466.7	699.2	933.9	/	/	/
Output energy (Wo) (Wh)	/	90.9	223.0	457.4	686.1	915.0	/	/	/
Energy efficiency(%)	/	97.0	97.8	98.0	98.1	98.0	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	c) 90% of the inverter's maximum input voltage 850 V (± 12.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	853.0	853.5	855.4	851.7	847.9	/	/	/
Input voltage ripple (V)		0.3	0.3	0.2	0.2	0.3	/	/	/
Input current (A)	/	3.2	7.6	16.4	22.9	30.6	/	/	/
Input current ripple (mA)		98	134	173	110	126	/	/	/
Input power (Pi) (W)	/	2620	6492	13096	19475	25913	/	/	/
Output power (Po) (W)	/	2480	6306	12744	19000	25245	/	/	/
Output efficiency(%)	/	94.7	97.1	97.3	97.6	97.4	/	/	/
Input energy (Wi) (Wh)	/	94.6	234.5	472.9	703.3	935.7	/	/	/
Output energy (Wo) (Wh)	/	89.5	227.7	460.2	686.1	911.6	/	/	/
Energy efficiency(%)	/	94.6	97.1	97.3	97.6	97.4	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

TABLE		Efficiency recording and efficient calculation sheet							
power conditioner type	Grid-connected								
Model:	ASW27K-LT-G3								
Parameters of power conditioner	Minimum rated input voltage:160 V Nominal voltage: 630 V Maximum input voltage: 1100 V MPPT voltage range: 180 ~ 1000 V MPPT voltage range with full power: 450 ~ 850 V Rated output voltage: 230 V Rated output frequency: 50 Hz Rated output power: 27000 W Note: According to the user manual, the minimum rated input voltage is 160 V, and 90% of the inverter's maximum input voltage is 90%*1100 V=990 V. However, in this range, the inverter can't output full power. So, for this test, 450 V were used instead of 160 V, and 850 V were used instead of 990 V.								
PV input voltage	a) Manufacturer's minimum rated input voltage 450 V (±6.75 V)								
Temperature (°C)	25 °C ± 5 °C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	455.1	455.5	455.6	455.2	455.2	/	/	/
Input voltage ripple (V)	/	0.9	0.4	1.0	1.2	0.9	/	/	/
Input current (A)	/	6.6	15.8	30.4	45.7	60.6	/	/	/
Input current ripple (mA)	/	39	123	61	122	175	/	/	/
Input power (Pi) (W)	/	2805	7018	13817	20820	27813	/	/	/
Output power (Po) (W)	/	2660	6768	13402	20201	26929	/	/	/
Output efficiency(%)	/	94.8	96.4	97.0	97.0	96.8	/	/	/
Input energy (Wi) (Wh)	/	101.3	253.4	498.9	751.8	1004.3	/	/	/
Output energy (Wo) (Wh)	/	96.1	244.4	483.9	729.4	972.4	/	/	/
Energy efficiency(%)	/	94.9	96.4	97.0	97.0	96.8	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	b) The inverter's nominal voltage 630 V (± 9.45 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	632.4	630.5	630.4	631.8	631.6	/	/	/
Input voltage ripple (V)	/	0.5	1.4	0.4	0.6	0.7	/	/	/
Input current (A)	/	4.8	12.1	22.1	33.1	44.2	/	/	/
Input current ripple (mA)	/	67	57	99	84	220	/	/	/
Input power (Pi) (W)	/	2805	7080	13953	20922	27939	/	/	/
Output power (Po) (W)	/	2722	6928	13684	20518	27349	/	/	/
Output efficiency(%)	/	97.0	97.9	98.1	98.1	97.9	/	/	/
Input energy (Wi) (Wh)	/	101.3	256.0	504.0	755.5	1008.9	/	/	/
Output energy (Wo) (Wh)	/	98.3	250.0	494.0	740.9	987.6	/	/	/
Energy efficiency(%)	/	97.0	97.7	98.0	98.1	97.9	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	c) 90% of the inverter's maximum input voltage 850 V (± 12.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	853.1	854.1	861.7	844.4	852.1	/	/	/
Input voltage ripple (V)	/	0.3	0.4	0.2	0.4	0.6	/	/	/
Input current (A)	/	3.5	8.2	17.1	24.8	32.9	/	/	/
Input current ripple (mA)	/	55	79	60	139	42	/	/	/
Input power (Pi) (W)	/	2825	7020	14007	21000	28009	/	/	/
Output power (Po) (W)	/	2680	6821	13620	20410	27253	/	/	/
Output efficiency(%)	/	94.9	97.2	97.2	97.2	97.3	/	/	/
Input energy (Wi) (Wh)	/	102.0	253.5	505.8	758.0	1011.4	/	/	/
Output energy (Wo) (Wh)	/	96.8	246.3	491.8	738.0	984.1	/	/	/
Energy efficiency(%)	/	94.9	97.2	97.2	97.4	97.3	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

TABLE		Efficiency recording and efficient calculation sheet							
power conditioner type	Grid-connected								
Model:	ASW30K-LT-G3								
Parameters of power conditioner	Minimum rated input voltage:160 V Nominal voltage: 630 V Maximum input voltage: 1100 V MPPT voltage range: 180 ~ 1000 V MPPT voltage range with full power: 450 ~ 850 V Rated output voltage: 230 V Rated output frequency: 50 Hz Rated output power: 30000 W Note: According to the user manual, the minimum rated input voltage is 160 V, and 90% of the inverter's maximum input voltage is 90%*1100 V=990 V. However, in this range, the inverter can't output full power. So, for this test, 450 V were used instead of 160 V, and 850 V were used instead of 990 V.								
PV input voltage	a) Manufacturer's minimum rated input voltage 450 V (±6.75 V)								
Temperature (°C)	25 °C ± 5 °C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	450.2	453.2	455.4	455.2	455.8	/	/	/
Input voltage ripple (V)	/	0.8	0.5	0.2	1.1	0.6	/	/	/
Input current (A)	/	7.4	17.4	33.9	51.6	66.7	/	/	/
Input current ripple (mA)	/	62	60	74	135	104	/	/	/
Input power (Pi) (W)	/	3101	7674	15378	23167	30436	/	/	/
Output power (Po) (W)	/	2941	7409	14912	22391	29384	/	/	/
Output efficiency(%)	/	94.8	96.5	97.0	96.7	96.5	/	/	/
Input energy (Wi) (Wh)	/	72.9	277.1	555.3	836.0	1099.1	/	/	/
Output energy (Wo) (Wh)	/	69.2	267.5	538.5	808.0	1061.0	/	/	/
Energy efficiency(%)	/	94.9	96.5	97.0	96.7	96.5	/	/	/
Remark: (*)If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	b) The inverter's nominal voltage 630 V (± 9.45 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	632.0	625.1	632.4	631.4	632.1	/	/	/
Input voltage ripple (V)	/	0.5	1.1	0.3	0.6	1.3	/	/	/
Input current (A)	/	5.3	13.4	24.4	36.8	48.4	/	/	/
Input current ripple (mA)	/	137	148	136	184	253	/	/	/
Input power (Pi) (W)	/	3114	7785	15465	23259	30593	/	/	/
Output power (Po) (W)	/	3030	7594	15188	22795	29919	/	/	/
Output efficiency(%)	/	97.3	97.5	98.2	98.0	97.8	/	/	/
Input energy (Wi) (Wh)	/	112.4	280.0	558.4	839.9	1104.7	/	/	/
Output energy (Wo) (Wh)	/	109.4	273.2	548.4	823.1	1080.4	/	/	/
Energy efficiency(%)	/	97.3	97.6	98.2	98.0	97.8	/	/	/
Remark: (*)If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	c) 90% of the inverter's maximum input voltage 850 V (± 12.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	857.3	850.7	849.4	851.4	850.3	/	/	/
Input voltage ripple (V)	/	0.4	0.9	0.3	0.4	1.5	/	/	/
Input current (A)	/	3.9	9.8	18.3	27.4	36.4	/	/	/
Input current ripple (mA)	/	86	144	151	74	143	/	/	/
Input power (Pi) (W)	/	3136	7823	15504	23317	30955	/	/	/
Output power (Po) (W)	/	2989	7604	15125	22718	30095	/	/	/
Output efficiency(%)	/	95.3	97.2	97.6	97.4	97.2	/	/	/
Input energy (Wi) (Wh)	/	113.2	280.0	559.9	842.0	1117.8	/	/	/
Output energy (Wo) (Wh)	/	107.9	272.0	546.2	820.4	1086.7	/	/	/
Energy efficiency(%)	/	95.3	97.1	97.6	97.4	97.2	/	/	/
Remark: (*)If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

TABLE		Efficiency recording and efficient calculation sheet							
power conditioner type	Grid-connected								
Model:	ASW33K-LT-G3								
Parameters of power conditioner	Minimum rated input voltage:160 V Nominal voltage: 630 V Maximum input voltage: 1100 V MPPT voltage range: 180 ~ 1000 V MPPT voltage range with full power: 450 ~ 850 V Rated output voltage: 230 V Rated output frequency: 50 Hz Rated output power: 33000 W Note: According to the user manual, the minimum rated input voltage is 160 V, and 90% of the inverter's maximum input voltage is 90%*1100 V=990 V. However, in this range, the inverter can't output full power. So, for this test, 450 V were used instead of 160 V, and 850 V were used instead of 990 V.								
PV input voltage	a) Manufacturer's minimum rated input voltage 450 V (± 6.75 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	454.0	451.5	452.7	452.1	454.2	/	/	/
Input voltage ripple (V)	/	1.1	1.1	1.6	1.1	1.6	/	/	/
Input current (A)	/	7.7	19.1	38.8	58.1	76.8	/	/	/
Input current ripple (mA)	/	146	121	185	135	112	/	/	/
Input power (Pi) (W)	/	3417	8491	16984	25564	34099	/	/	/
Output power (Po) (W)	/	3240	8187	16420	24732	32930	/	/	/
Output efficiency(%)	/	94.8	96.4	96.7	96.7	96.6	/	/	/
Input energy (Wi) (Wh)	/	123.4	306.6	613.0	926.3	1231.3	/	/	/
Output energy (Wo) (Wh)	/	117.0	295.6	593.0	895.7	1189.1	/	/	/
Energy efficiency(%)	/	94.8	96.4	96.7	96.7	96.6	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	b) The inverter's nominal voltage 630 V (± 9.45 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	632.0	632.2	630.4	630.3	631.0	/	/	/
Input voltage ripple (V)	/	0.6	0.2	0.3	0.3	0.6	/	/	/
Input current (A)	/	5.7	11.2	27.0	40.6	54.2	/	/	/
Input current ripple (mA)	/	42	92	100	200	112	/	/	/
Input power (Pi) (W)	/	3427	8637	17017	25602	34179	/	/	/
Output power (Po) (W)	/	3331	8454	16718	25105	33454	/	/	/
Output efficiency(%)	/	97.2	97.9	98.2	98.1	97.9	/	/	/
Input energy (Wi) (Wh)	/	123.7	312.0	466.7	924.5	1234.2	/	/	/
Output energy (Wo) (Wh)	/	120.3	305.0	457.4	906.6	1208.1	/	/	/
Energy efficiency(%)	/	97.3	97.8	98.0	98.1	97.9	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	c) 90% of the inverter's maximum input voltage 850 V (± 12.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	849.2	846.0	851.0	850.0	850.2	/	/	/
Input voltage ripple (V)	/	0.4	0.1	0.2	0.1	0.4	/	/	/
Input current (A)	/	4.4	11	20.2	30.2	40.3	/	/	/
Input current ripple (mA)	/	81	111	191	232	157	/	/	/
Input power (Pi) (W)	/	3442	8616	17173	25660	34200	/	/	/
Output power (Po) (W)	/	3264	8345	16735	25004	33300	/	/	/
Output efficiency(%)	/	94.8	96.9	97.4	97.4	97.4	/	/	/
Input energy (Wi) (Wh)	/	124.3	311.1	620.2	926.6	935.7	/	/	/
Output energy (Wo) (Wh)	/	117.9	301.4	604.3	902.9	911.6	/	/	/
Energy efficiency(%)	/	94.9	96.9	97.4	97.4	97.4	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

TABLE		Efficiency recording and efficient calculation sheet							
power conditioner type	Grid-connected								
Model:	ASW36K-LT-G3								
Parameters of power conditioner	Minimum rated input voltage:160 V Nominal voltage: 630 V Maximum input voltage: 1100 V MPPT voltage range: 180 ~ 1000 V MPPT voltage range with full power: 450 ~ 850 V Rated output voltage: 230 V Rated output frequency: 50 Hz Rated output power: 36000 W Note: According to the user manual, the minimum rated input voltage is 160 V, and 90% of the inverter's maximum input voltage is 90%*1100 V=990 V. However, in this range, the inverter can't output full power. So, for this test, 450 V were used instead of 160 V, and 850 V were used instead of 990 V.								
PV input voltage	a) Manufacturer's minimum rated input voltage 450 V (± 6.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	455.9	451.2	453.4	452.4	455.2	/	/	/
Input voltage ripple (V)	/	0.8	1.3	2.0	1.4	1.8	/	/	/
Input current (A)	/	8.4	20.7	42.2	63.3	81.8	/	/	/
Input current ripple (mA)	/	47	97	170	213	139	/	/	/
Input power (Pi) (W)	/	3735	9276	18541	27898	37203	/	/	/
Output power (Po) (W)	/	3553	8964	17930	26974	35947	/	/	/
Output efficiency(%)	/	95.1	96.6	96.7	96.7	96.6	/	/	/
Input energy (Wi) (Wh)	/	134.9	335.0	669.6	1007.4	1343.5	/	/	/
Output energy (Wo) (Wh)	/	128.3	323.7	647.5	974.0	1298.1	/	/	/
Energy efficiency(%)	/	95.1	96.6	96.7	96.7	96.6	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	b) The inverter's nominal voltage 630 V (± 9.45 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	627.6	629.9	630.6	630.3	631.8	/	/	/
Input voltage ripple (V)	/	0.8	0.4	0.3	1.0	0.5	/	/	/
Input current (A)	/	6.0	14.9	29.4	44.3	59	/	/	/
Input current ripple (mA)	/	55	100	200	203	141	/	/	/
Input power (Pi) (W)	/	3736	9395	18571	27939	37307	/	/	/
Output power (Po) (W)	/	3639	9227	18241	27386	36477	/	/	/
Output efficiency(%)	/	97.4	98.2	98.2	98.0	97.8	/	/	/
Input energy (Wi) (Wh)	/	134.9	339.3	670.6	1008.9	1347.2	/	/	/
Output energy (Wo) (Wh)	/	131.4	333.2	658.7	988.9	1317.3	/	/	/
Energy efficiency(%)	/	97.4	98.2	98.2	98.0	97.8	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	c) 90% of the inverter's maximum input voltage 850 V (± 12.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	848.1	851.3	854.7	852.3	853.3	/	/	/
Input voltage ripple (V)	/	0.5	1.4	0.3	0.4	0.2	/	/	/
Input current (A)	/	4.8	12.0	21.9	32.8	43.8	/	/	/
Input current ripple (mA)	/	119	135	162	107	121	/	/	/
Input power (Pi) (W)	/	3756	9423	18753	28003	37374	/	/	/
Output power (Po) (W)	/	3581	9133	18275	27266	36312	/	/	/
Output efficiency(%)	/	95.3	96.9	97.4	97.4	97.2	/	/	/
Input energy (Wi) (Wh)	/	135.6	340.3	677.2	1011.2	1349.6	/	/	/
Output energy (Wo) (Wh)	/	129.2	329.8	659.9	984.6	1311.2	/	/	/
Energy efficiency(%)	/	95.3	96.9	97.4	97.4	97.2	/	/	/
Remark: (*) If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

TABLE		Efficiency recording and efficient calculation sheet							
power conditioner type	Grid-connected								
Model:	ASW40K-LT-G3								
Parameters of power conditioner	Minimum rated input voltage:160 V Nominal voltage: 630 V Maximum input voltage: 1100 V MPPT voltage range: 180 ~ 1000 V MPPT voltage range with full power: 450 ~ 850 V Rated output voltage: 230 V Rated output frequency: 50 Hz Rated output power: 40000 W Note: According to the user manual, the minimum rated input voltage is 160 V, and 90% of the inverter's maximum input voltage is 90%*1100 V=990 V. However, in this range, the inverter can't output full power. So, for this test, 450 V were used instead of 160 V, and 850 V were used instead of 990 V.								
PV input voltage	a) Manufacturer's minimum rated input voltage 450 V (± 6.75 V)								
Temperature ($^{\circ}\text{C}$)	25 $^{\circ}\text{C} \pm 5$ $^{\circ}\text{C}$								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	454.9	453	450.6	451.1	453.5	/	/	/
Input voltage ripple (V)	/	0.6	1.5	1.5	2.2	2.2	/	/	/
Input current (A)	/	9.4	24.0	48.4	69.8	91.6	/	/	/
Input current ripple (mA)	/	94	138	92	325	255	/	/	/
Input power (Pi) (W)	/	4164	10225	21190	30901	41386	/	/	/
Output power (Po) (W)	/	3968	9898	20567	29914	39881	/	/	/
Output efficiency(%)	/	95.3	96.8	97.1	96.8	96.4	/	/	/
Input energy (Wi) (Wh)	/	150.4	369.3	728.0	1117.0	1496.0	/	/	/
Output energy (Wo) (Wh)	/	143.3	357.4	706.0	1080.0	1440.0	/	/	/
Energy efficiency(%)	/	95.3	96.8	97.0	96.7	96.3	/	/	/
Remark: (*)If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	b) The inverter's nominal voltage 630 V (± 9.45 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	629.2	632.1	631.4	631.7	636.4	/	/	/
Input voltage ripple (V)	/	0.9	0.2	0.2	0.3	0.8	/	/	/
Input current (A)	/	6.9	17.5	32.7	49.2	63.4	/	/	/
Input current ripple (mA)	/	84	67	171	181	80	/	/	/
Input power (Pi) (W)	/	4169	10422	20665	31065	40983	/	/	/
Output power (Po) (W)	/	4060	10199	20281	30417	40010	/	/	/
Output efficiency(%)	/	97.4	97.9	98.1	97.9	97.6	/	/	/
Input energy (Wi) (Wh)	/	150.5	370.0	746.2	1121.8	1479.9	/	/	/
Output energy (Wo) (Wh)	/	147.0	361.0	732.3	1098.4	1444.8	/	/	/
Energy efficiency(%)	/	97.7	97.6	98.1	97.9	97.6	/	/	/
Remark: (*)If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

PV input voltage	c) 90% of the inverter's maximum input voltage 850 V (± 12.75 V)								
Temperature ($^{\circ}$ C)	25 $^{\circ}$ C \pm 5 $^{\circ}$ C								
Operating period for energy measurement (min)	2								
Percentage of rated output VA	/	10%	25%	50%	75%	100%	120%(*)	/	/
Input voltage (V)	/	856.4	850.4	854.3	851.2	858.7	/	/	/
Input voltage ripple (V)	/	0.6	0.2	0.3	0.3	0.2	/	/	/
Input current (A)	/	5.3	13.4	24.3	36.6	47.8	/	/	/
Input current ripple (mA)	/	37	127	47	134	80	/	/	/
Input power (Pi) (W)	/	4167	10486	20736	31122	41362	/	/	/
Output power (Po) (W)	/	3980	10177	20221	30304	40151	/	/	/
Output efficiency(%)	/	95.5	97.1	97.5	97.4	97.1	/	/	/
Input energy (Wi) (Wh)	/	150.5	378.6	748.7	1123.8	1493.6	/	/	/
Output energy (Wo) (Wh)	/	144.0	367.5	730.2	1094.3	1449.9	/	/	/
Energy efficiency(%)	/	95.7	97.1	97.5	97.4	97.1	/	/	/
Remark: (*)If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived.									

TABLE	No load loss	P
power conditioner type	Utility-interactive	
ASW25K-LT-G3		
Measure input voltage (V)	635.0	
Measured input power (W)	15.9	
ASW27K-LT-G3		
Measure input voltage (V)	635.1	
Measured input power (W)	16.8	
ASW30K-LT-G3		
Measure input voltage (V)	635.0	
Measured input power (W)	16.0	
ASW33K-LT-G3		
Measure input voltage (V)	635.1	
Measured input power (W)	17.1	
ASW36K-LT-G3		
Measure input voltage (V)	635.0	
Measured input power (W)	16.3	
ASW40K-LT-G3		
Measure input voltage (V)	635.1	
Measured input power (W)	15.9	
Remark: No load loss is measured when the power conditioner works at rated input voltage and its load is disconnected.		

TABLE	Standby loss	P
power conditioner type	Utility-interactive	
ASW25K-LT-G3		
Measure input voltage (V)	230.1	
Measured input power (W)	-0.9	
ASW27K-LT-G3		
Measure input voltage (V)	230.1	
Measured input power (W)	-0.9	
ASW30K-LT-G3		
Measure input voltage (V)	230.1	
Measured input power (W)	-0.9	
ASW33K-LT-G3		
Measure input voltage (V)	230.1	
Measured input power (W)	-0.9	
ASW36K-LT-G3		
Measure input voltage (V)	230.1	
Measured input power (W)	-0.9	
ASW40K-LT-G3		
Measure input voltage (V)	230.1	
Measured input power (W)	-0.9	
Remark: Standby loss is measured when the power conditioner works at rated input voltage and in standby mode.		

--- End of test report---

ATTACHMENT I

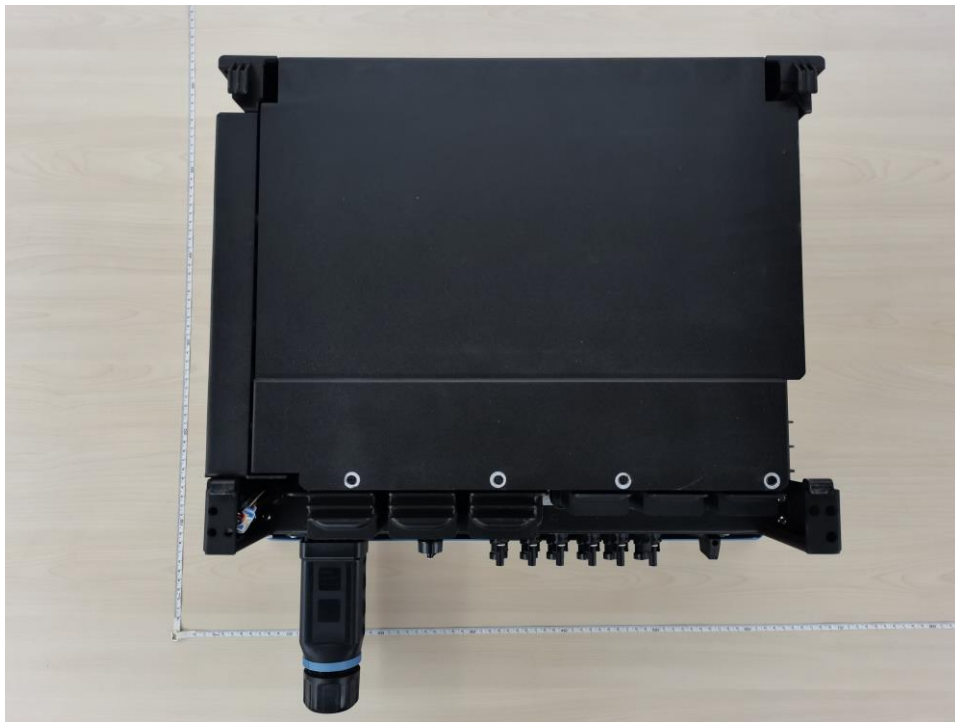
(Pictures of the EUT and Electrical Schemes)

1 PICTURES

Front view



Back Side



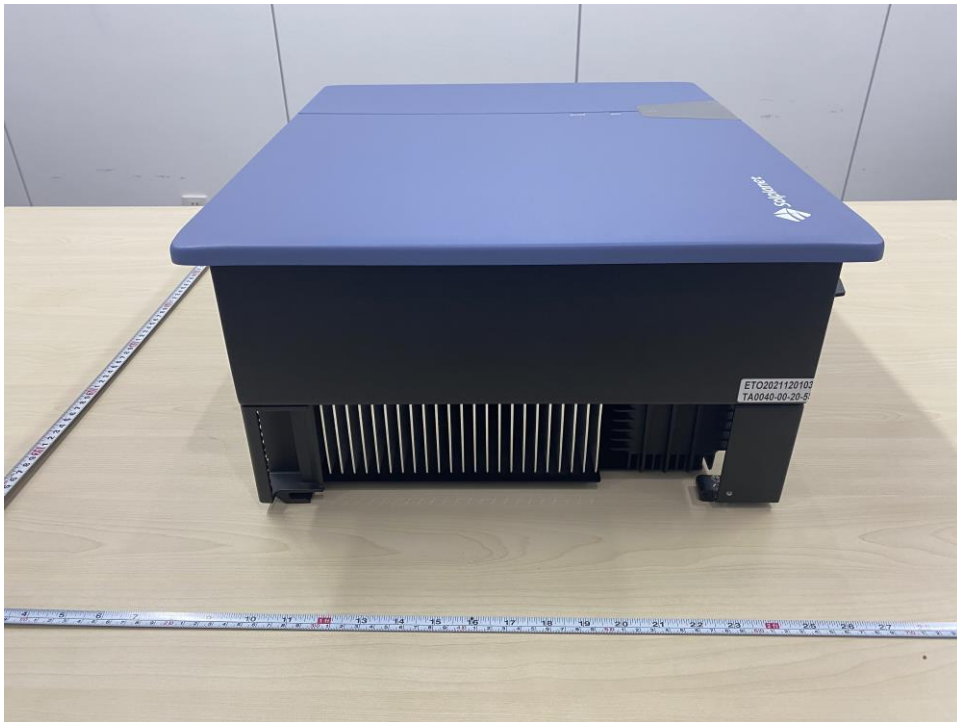
Connection interface



Top Side



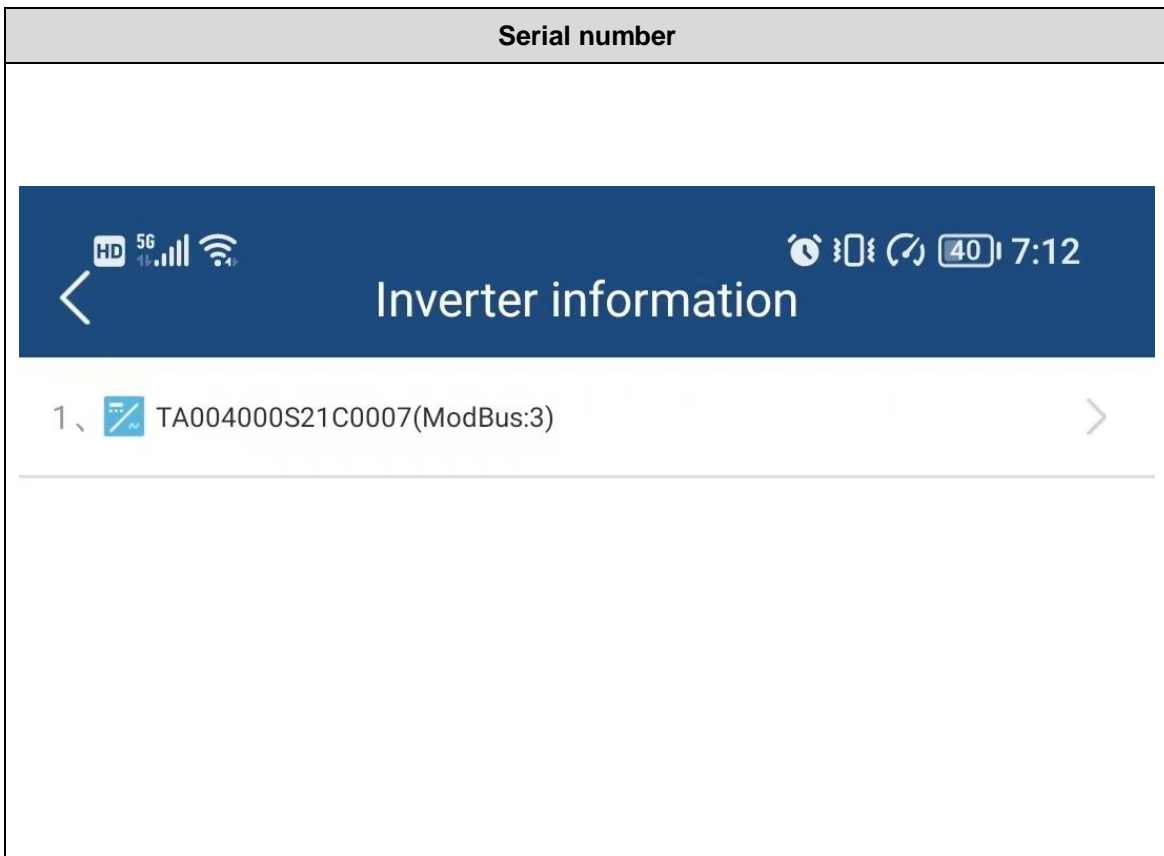
Left Side



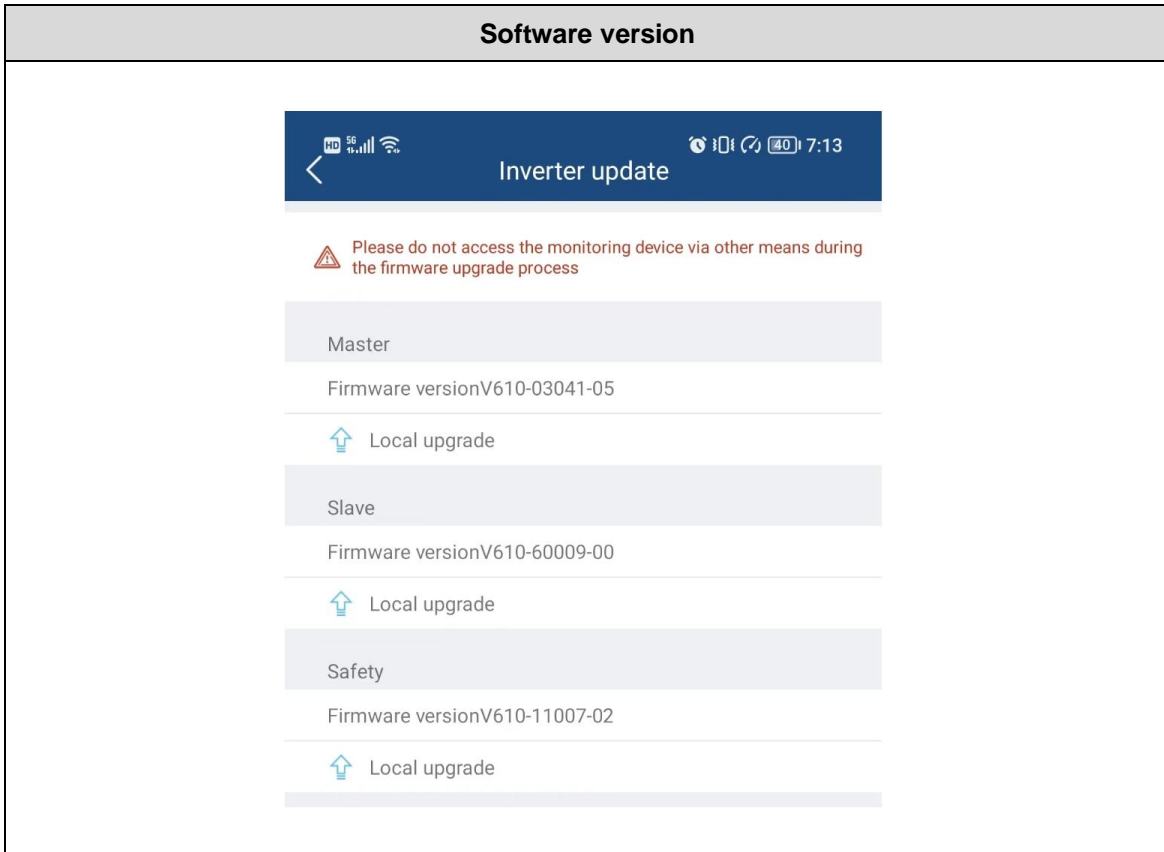
Right side



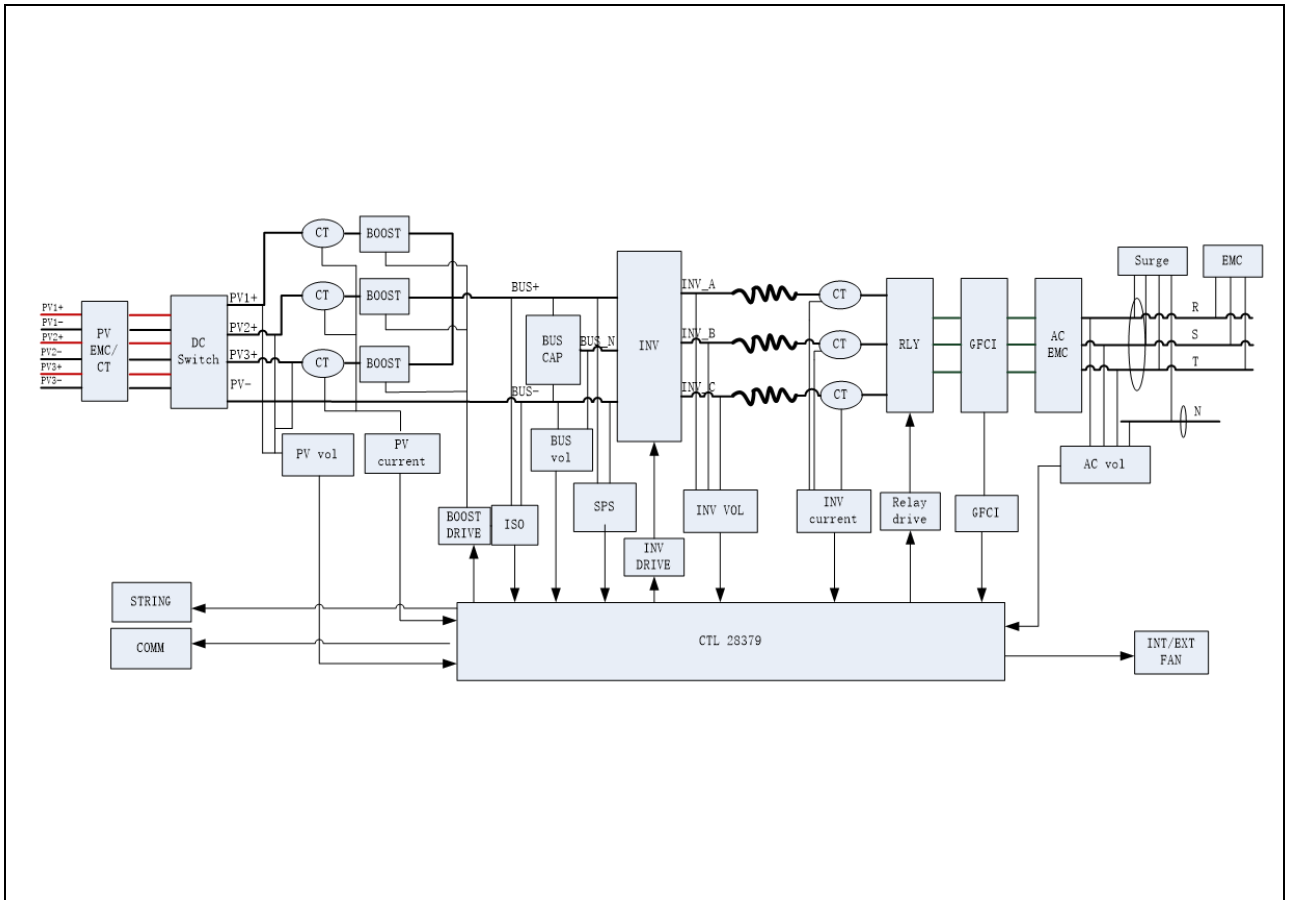
Serial number



Software version



2 ELECTRICAL SCHEMES



ATTACHMENT II

(Testing information)

1 TESTING CIRCUIT

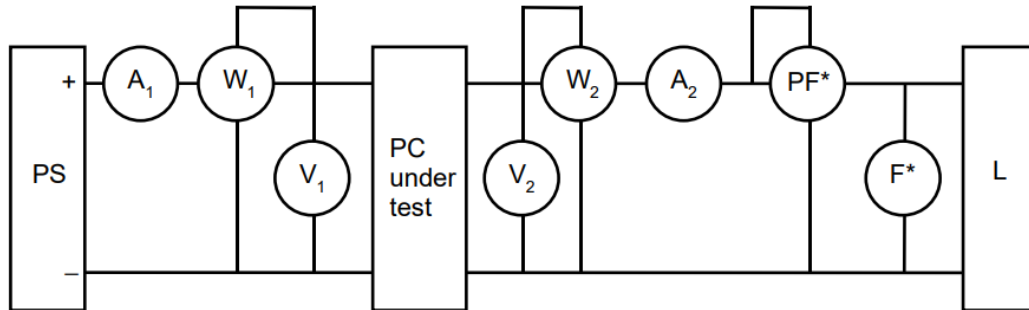


Figure 1a – Stand-alone type

IEC 1566/99

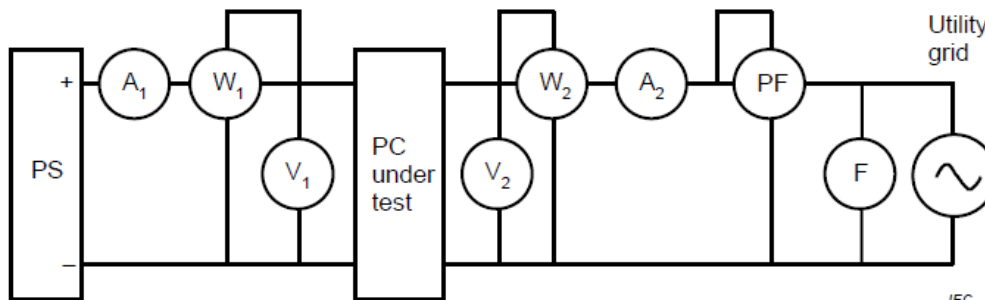


Figure 1b – Utility-interactive type

IEC 1567/99

- | | |
|-----------------------------------------------|-------------------------------------|
| PC power conditioner | L load |
| PS variable voltage-current d.c. power supply | F frequency meter |
| A ₁ DC ammeter | V ₁ DC voltmeter |
| A ₂ AC or d.c. ammeter | V ₂ AC or d.c. voltmeter |
| W ₁ DC wattmeter | PF power factor meter |
| W ₂ AC or d.c. wattmeter | |

Current and voltage clamps have been connected to the inverter input/output for all the tests.

All the tests and checks have been performed in accordance with the reference standard under testing.

2 TESTING EQUIPMENT

From	No.	Equipment Name	Trademark / Model	Equipment No.	Calibration Period
SGS	1	Digital Oscilloscope	Tektronix/ MDO3022	GZE007-41	2021/10/20 to 2022/10/19
	2	Differential probe	Tektronix/ P5210A	GZE007-25	2022/01/20 to 2023/01/19
	3	Current probe	CA/PAC 12	GZE007-31	2021/10/28 to 2022/10/27
	4	Power Analyzer	Yokogawa/ WT3000	GZE006-72	2021/06/30 to 2022/06/29
	5	Temperature & Humidity meter	HUATO/ S520-EX	GZE020-68	2021/08/18 to 2022/08/17

Items	Specifications
1) PV array simulator	
a) Voltage range	0 – 1500 Vdc
b) Current range	0 – 100 A
2) AC Source	
a) Output wiring	Three phase
b) Output capacity	100 kVA
c) Output voltage	0 - 300 Vrms
d) Output frequency	30 - 100 Hz
e) Voltage stability	/
f) Output voltage distortion	/
3) Power Analyzer	
a) Voltage range	0 – 1000 Vdc, 0 – 1000 Va.c.
b) Current range	0 – 50 A
c) Frequency range (accuracy)	0 – 999.99 kHz (0.005%)
d) Measurement items	Voltage (V) Current (A) Active power (W) Reactive power (Var) Volt-ampere (VA) Power factor (PF) Frequency (Hz) Electric energy (Wh)
4) Digital Oscilloscope	
a) Sampling speed	2.5GS/s
b) Recording device	Memory record and USB reading
c) Time accuracy	± 10 ppm
5) AC load	
a) Resistive load	Capacity: 68.33 kW
b) Inductive load	Capacity: 68.33 kVAr
c) Capacitive load	Capacity: 68.33 kVAr

3 MEASUREMENT UNCERTAINTY

Magnitude	Uncertainty
Voltage measurement uncertainty	±1.5 %
Current measurement uncertainty	±2.0 %
Frequency measurement uncertainty	±0.2 %
Time measurement uncertainty	±0.2 %
Power measurement uncertainty	±2.5 %
Phase Angle	±1°
Temperature	±3° C
<p>Note: Measurements uncertainties showed in this table are maximum allowable uncertainties. The measurement uncertainties associated with other parameters measured during the tests are in the laboratory at disposal of the solicitant.</p>	