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TEST REPORT

Product Name	:	**SOLAR INVERTER**
Model Number	:	**MPS-3500H, MPS-3500HP, MPS-5500H, MPS-5500HP, HGS-3500, HGP-3500, HGS-5500, HGP-5500**

Prepared for	:	Shenzhen Sunray Power Co., Ltd
Address	:	B16, the 1st road, the 1st Industry PARK, Bai hua dong, Guangming new district, Shenzhen city, Guangdong, China
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Report Number	:	ENS2108260159S00201R

TEST REPORT
IEC 61683
Photovoltaic systems –Power conditioners – Procedure for measuring efficiency

Report Reference No. ....:	ENS2108260159S00201R
Compiled by (name + signature) ......:	Peter Zhuang / Engineer
Approved by (name + signature) ......:	William Guo/ Manager
Date of issue.....................................:	December 28, 2021
Total number of pages.......................	29 pages

Testing Laboratory name...............	EMTEK (SHENZHEN) CO., LTD.
Address..	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location/ address.................	Same as above
Applicant's name	Shenzhen Sunray Power Co., Ltd
Address..	B16, the 1st road, the 1st Industry PARK, Bai hua dong, Guangming new district, Shenzhen city, Guangdong, China
Test specification:	
Standard	IEC 61683:1999
Test procedure	IEC report
Non-standard test method………..:	N/A
Test Report Form No......................	IEC61683B
Test Report Form(s) Originator	TÜV SÜD Product Service GmbH
Master TRF......................................	Dated 2017-11-03

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 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	N/A
Manufacturer....................................	Shenzhen Sunray Power Co., Ltd
	B16,the 1st road, the 1st Industry PARK, Bai hua dong, Guangming new district, Shenzhen city, Guangdong, China
Model/Type reference.......................	MPS-3500H, MPS-3500HP, MPS-5500H, MPS-5500HP, HGS-3500, HGP-3500, HGS-5500, HGP-5500
Ratings...	See the rating labels.

Summary of testing: The product has been tested according to standard IEC 61683:1999 and EN 61683:2000.	
List of Attachments (including a total number of pages in each attachment): **Photos (11 pages)**	
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
Class of equipment...:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg)..:	12kg max
IP protection class...:	IP21
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... :	September 01, 2021
Date (s) of performance of tests.................................. :	September 01, 2021 to December 20, 2021

General remarks:

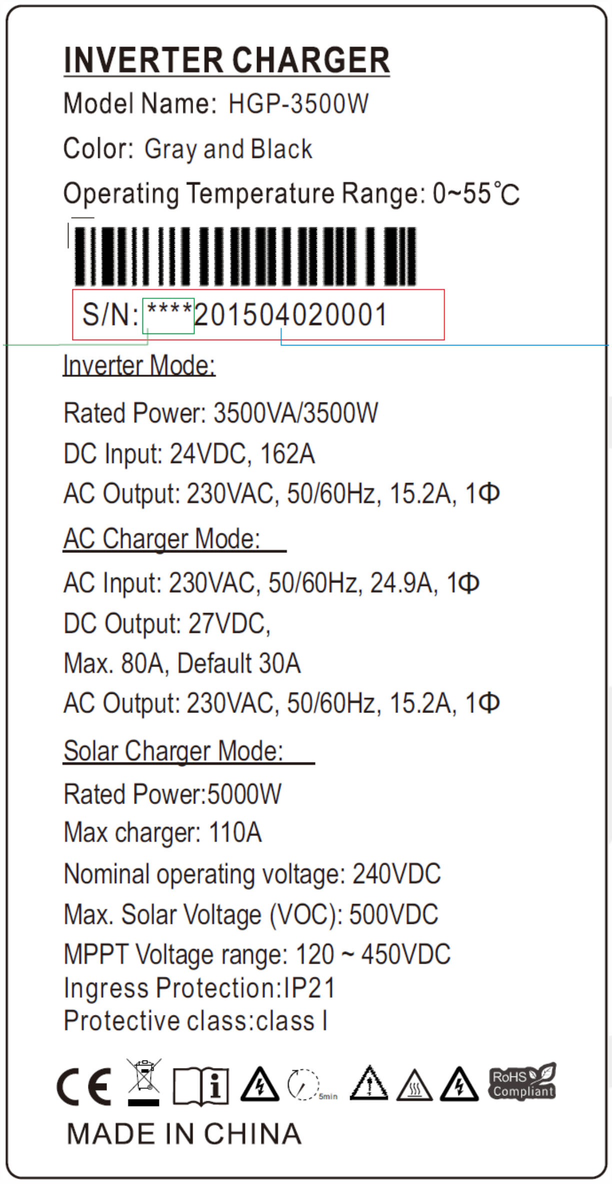
"(see Attachment #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
The tests results presented in this report relate only to the object tested.
This report shall not be reproduced except in full without the written approval of 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.

General product information:

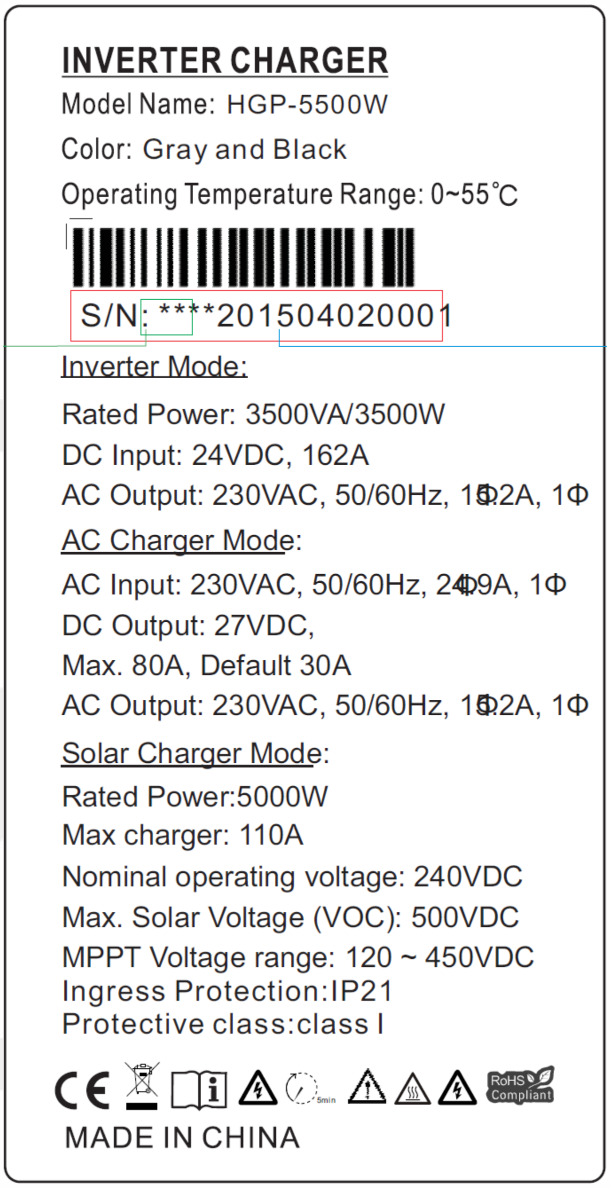
1. Between the charger and PV input there has to be two 250VDC/10A circuit breakers. Between the charger and battery there has to be a 60VDC/150A breaker for model HGS-5500
2. It is manufactured to be mounted on a wall and its degree of protection is IP21.
3. Battery is not provided by manufacturer and is not checked in this report. A battery is only used as component for test.
4. All models have the similar constructions, circuit diagram and PCB layout. Unless otherwise stated, all tests were performed on model HGS-5500 which means the typical model.

Copy of marking plate:

Rating labels:



Shenzhen Sunray Power Co., Ltd



Shenzhen Sunray Power Co., Ltd

INVERTER CHARGER

Model Name: HGS-3500W

Color: Gray and Black

Operating Temperature Range: 0~55℃

S/N: ****201504020001

Inverter Mode:

Rated Power: 3500VA/3500W

DC Input: 24VDC, 162A

AC Output: 230VAC, 50/60Hz, 15.2A, 1Φ

AC Charger Mode:

AC Input: 230VAC, 50/60Hz, 24.9A, 1Φ

DC Output: 27VDC,

Max. 80A, Default 30A

AC Output: 230VAC, 50/60Hz, 15.2A, 1Φ

Solar Charger Mode:

Rated Power:5000W

Max charger: 110A

Nominal operating voltage: 240VDC

Max. Solar Voltage (VOC): 500VDC

MPPT Voltage range: 120 ~ 450VDC

Ingress Protection:IP21

Protective class:class I

CE 5min RoHS Compliant

MADE IN CHINA

Shenzhen Sunray Power Co., Ltd

INVERTER CHARGER

Model Name: HGS-5500W

Color: Gray and Black

Operating Temperature Range: 0~55℃

S/N: ****201504020001

Inverter Mode:

Rated Power: 5500VA/5500W

DC Input: 48VDC, 127A

AC Output: 230VAC, 50/60Hz, 23.9A, 1Φ

AC Charger Mode:

AC Input: 230VAC, 50/60Hz, 38.5A, 1Φ

DC Output: 54VDC,

Max. 80A, Default 30A

AC Output: 230VAC, 50/60Hz, 23.9A, 1Φ

Solar Charger Mode:

Rated Power:6000W

Max charger: 110A

Nominal operating voltage: 240VDC

Max. Solar Voltage (VOC): 500VDC

MPPT Voltage range: 120 ~ 450VDC

Ingress Protection:IP21

Protective class:class I

CE 5min RoHS Compliant

MADE IN CHINA

Shenzhen Sunray Power Co., Ltd

INVERTER CHARGER

Model Name: MPS-3500H

Color: Gray and Black

Operating Temperature Range: 0~55℃

S/N: ****201504020001

Inverter Mode:

Rated Power: 3500VA/3500W

DC Input: 24VDC, 162A

AC Output: 230VAC, 50/60Hz, 15.2A, 1Φ

AC Charger Mode:

AC Input: 230VAC, 50/60Hz, 24.9A, 1Φ

DC Output: 27VDC,

Max. 80A, Default 30A

AC Output: 230VAC, 50/60Hz, 15.2A, 1Φ

Solar Charger Mode:

Rated Power:5000W

Max charger: 110A

Nominal operating voltage: 240VDC

Max. Solar Voltage (VOC): 500VDC

MPPT Voltage range: 120 ~ 450VDC

Ingress Protection:IP21

Protective class:class I

RoHS Compliant

MADE IN CHINA

Shenzhen Sunray Power Co., Ltd

INVERTER CHARGER

Model Name: MPS-5500H

Color: Gray and Black

Operating Temperature Range: 0~55℃

S/N: ****201504020001

Inverter Mode:

Rated Power: 5500VA/5500W

DC Input: 48VDC, 127A

AC Output: 230VAC, 50/60Hz, 23.9A, 1Φ

AC Charger Mode:

AC Input: 230VAC, 50/60Hz, 38.5A, 1Φ

DC Output: 54VDC,

Max. 80A, Default 30A

AC Output: 230VAC, 50/60Hz, 23.9A, 1Φ

Solar Charger Mode:

Rated Power:6000W

Max charger: 110A

Nominal operating voltage: 240VDC

Max. Solar Voltage (VOC): 500VDC

MPPT Voltage range: 120 ~ 450VDC

Ingress Protection:IP21

Protective class:class I

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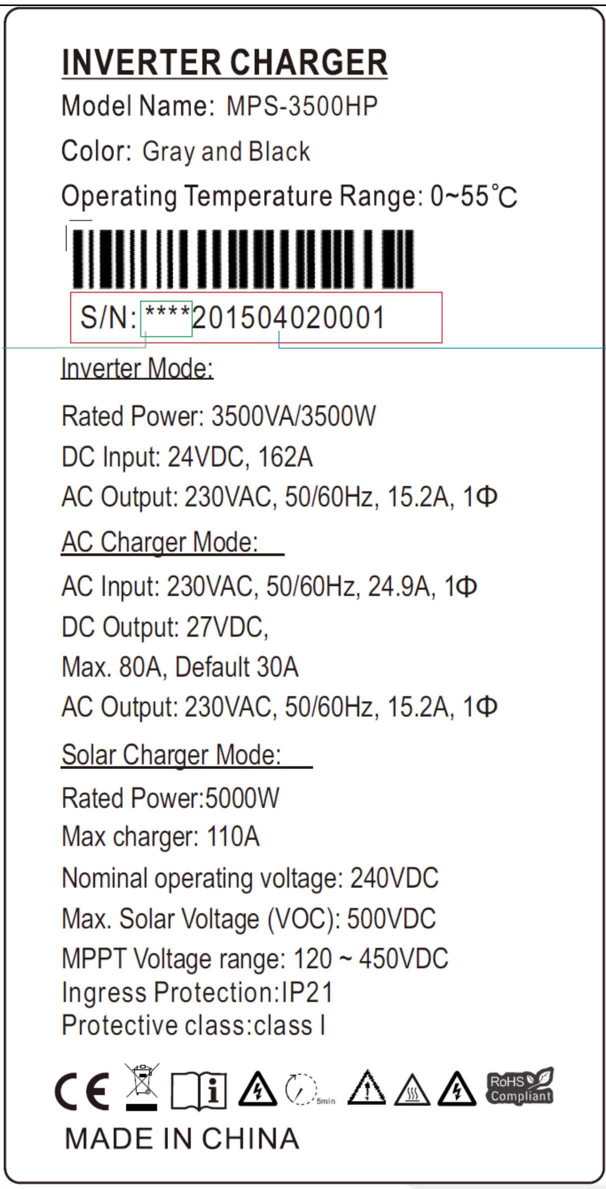

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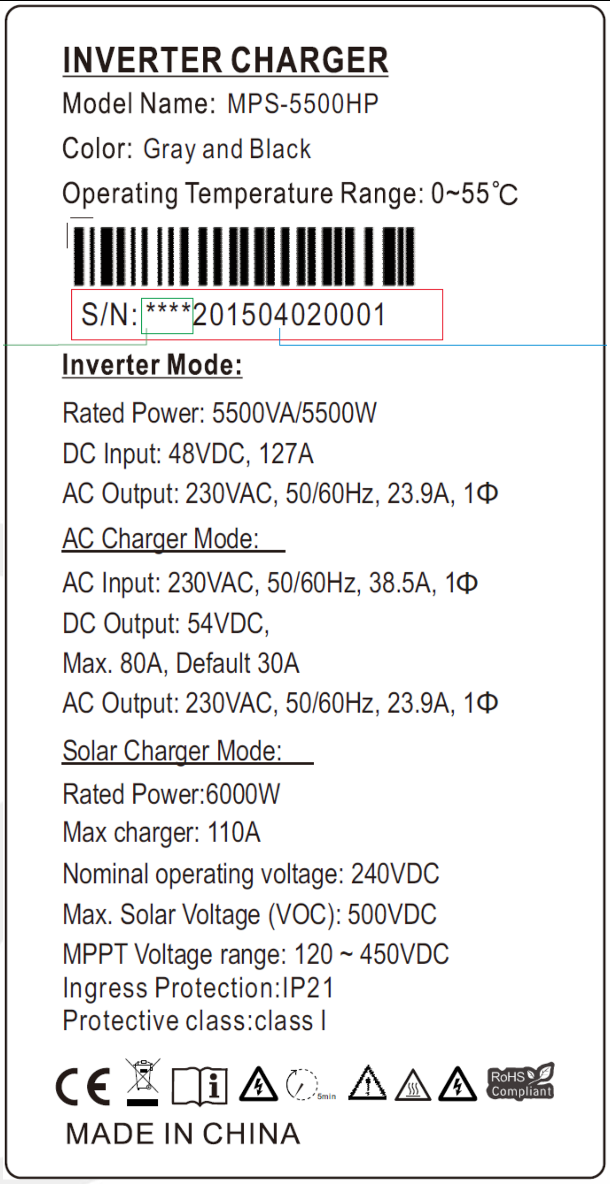

Shenzhen Sunray Power Co., Ltd

IEC 61683			
Clause	Requirement + Test	Result - Remark	Verdict
4	Efficiency measurement conditions		P
	Efficiency shall be measured under the matrix of conditions as described in the following clauses and table 1. Specific conditions may be excluded by mutual agreement when those conditions are outside the manufacturer's allowable operating range. The resulting data shall be presented in tabular form and may also be presented graphically.	(See test data record)	P
4.1	DC power source for testing		P
	For power conditioners operating with fixed input voltage, the d.c. power source shall be 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 shall be utilized.	PV array simulator used.	P
4.2	Temperature	(See test data record)	P
	All measurements are to be made at an ambient temperature of 25 °C ± 2 °C. Other ambient temperatures may be allowed by mutual agreement. However, the temperature used must be clearly stated in all documentation.		P
4.3	Output voltage and frequency		P
	The output voltage and frequency shall be maintained at the manufacturer's stated nominal values.	(See test data record)	P
4.4	Input voltage		P
	Measurements performed in each of the following tests shall be 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.	(See test data record)	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
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. Note that ripple and distortion may not be specified at low power levels, but readings shall be recorded.		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. Stand-alone inverters shall also be measured at a power level of 5 % of rated. The power conditioner test should be conducted with a specified resistive and reactive grid impedance.	(See test data record)	P
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. 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 ± 5) %) equal to (25 ± 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. Repeat the measurements with a fixed non-linear load equivalent to (50 ± 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. The type of non-linear load must be clearly stated in all documentation.		N/A
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 ± 5) %) equal to (50 ± 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. The type of complex load shall be clearly stated in all documentation.		N/A
5	Efficiency calculations		P

IEC 61683			
Clause	Requirement + Test	Result - Remark	Verdict
5.1	Rated output efficiency	(See test data record)	P
	Rated output efficiency shall be calculated from measured data as follows: η_R=(Po / Pi) x100	(See test data record)	P
5.2	Partial output efficiency		P
	Partial output efficiency shall be calculated from measured data as follows: η_{par}=(Pop / Pip) x100	(See test data record)	P
5.3	Energy efficiency		P
	Energy efficiency shall be calculated from measured data as follows: η_E=(Wo / Pi) x100	(See test data record)	P
5.4	Efficiency tolerances		P
	When an efficiency value has been guaranteed, the tolerance of this value shall be within the value at rated conditions indicated in table 2.	(See test data record)	P
6	Efficiency test circuits		P
6.1	Test circuits		P
	Figure 1 shows recommended test circuits for power conditioners which have a single-phase a.c. output or d.c. output. It can as well be regarded as a single-phase representation of a test set-up for multiphase power conditioners.		P
	Figures 1a and 1b shall be applied to stand-alone and utility-interactive power conditioners respectively.		P
	The proposed test circuits in figure 1 are not mandatory, but together with the test descriptions, are intended to establish a base for mutual agreement between user and manufacturer.		P
	The type of power source shall be indicated on all tests and shall adhere to the requirements of 4.1.		P
6.2	Measurement procedure		P
	a) Efficiency is calculated with equation (1) or (2) using measured Pi, Po or Pip, Pop. DC input power Pi, Pip can be measured by wattmeter W1, or determined by multiplying the d.c. voltmeter V1 and d.c. ammeter A1 readings. Output power Po, Pop is measured with wattmeter W2.		P

IEC 61683			
Clause	Requirement + Test	Result - Remark	Verdict
	b) DC input voltage, which is measured by d.c. voltmeter V1, shall be varied in the defined range where the output current, which is measured with a.c. ammeter A2, is varied from low output to the rated output.		P
	c) An average indicating instrument shall be used for the d.c. voltmeter and d.c. ammeter. A true r.m.s. type of indicating instrument shall be used for the a.c. voltmeter and a.c. ammeter. The d.c. wattmeter W1 shall be a d.c. measuring type. The wattmeter W2 shall be an a.c. or d.c. measuring type according to the output.		P
	D)Power factor (PF in per cent) can be measured by a power factor meter PF, or calculated from the readings of V2, A2, W2 and as follows: $PF=(W_2 / (V_2 \times A_2)) \times 100$		P
	e) Each meter may be an analogue type or a digital type. The measurement accuracy shall be better than ±0,5 % of the full-scale value for each power measured. Digital power instruments for W1 and W2 are also recommended.		P
	f) An MPPT dynamically adjusts the input voltage so as to maximize the output power. In principle, the monitoring equipment shall sample all of the electrical parameters, such as input voltage and current, output power and current, within the update period of the MPPT. If the MPPT and input source (PV array or PV array simulator) interact in such a way that the input voltage varies by less than 5 %, then averaging of readings is acceptable. The averaging period shall be 30 s or longer.		P
7	Loss measurement		N/A
7.1	No-load loss		N/A
	No-load loss shall be measured as follows.		N/A
	If the power conditioner is a stand-alone type, the reading of d.c. input voltage, output voltage and frequency is given with meters V1, V2 and F respectively in figure 1a, and shall be adjusted to the rated values.		N/A
	The no-load loss is thus the indicated value of d.c. input wattmeter, W1, when the load is disconnected from the power conditioner.		N/A
	If the power conditioner is a utility-interactive type, the reading of d.c. input voltmeter V1, a.c. output voltmeter V2 and frequency meter F in figure 1b shall be adjusted to meet the specified voltages and frequency.		N/A

IEC 61683			
Clause	Requirement + Test	Result - Remark	Verdict
	No-load loss is thus the indicated value of d.c. input wattmeter, W1, when a.c. wattmeter, W2, indicates a zero value. For the measurement, allow the power conditioner time to transfer to its no-load operating state, if applicable.		N/A
7.2	Standby loss	(See test data record)	P
	Standby loss shall be measured as follows.		P
	If the power conditioner is a utility-interactive type, standby loss is defined as the consumption of utility power when the power conditioner is not operating but is under standby condition. Standby loss is indicated with a.c. wattmeter, W2 in figure 1b at the rated a.c. output voltage.		P
	If the power conditioner is a stand-alone type, standby loss is defined as the consumption from the d.c. source when the power conditioner is not operating but is under standby condition. Standby loss is indicated with d.c. wattmeter, W1 in figure 1a (without a.c. or d.c. output voltage).		P
Annex A	**Power conditioner description**		P
	A power conditioner is defined in IEC 61277.		P
	Some types of photovoltaic system configurations relate to their purpose and size. Figure A.1 shows the generic system configuration proposed in IEC 61277. In figure A.1, the power conditioner (PC) is inside the dotted line. The power conditioner may consist of one or more of the following: d.c. conditioner, d.c./d.c. interface, inverter, a.c./a.c. interface, a.c. utility interface, and a part of master control and monitoring (MCM) subsystem. The power flows are indicated by the arrows. When a PV system has a d.c. storage subsystem, it is assumed that the storage is connected to the input of the power conditioner in parallel with the array (see figures A.2 and A.3).		P
	Under normal conditions, the power conditioner a.c. output voltage and frequency are constant value when the system is connected to the utility grid (in a utility- interactive type) or to the a.c. loads (in a stand-alone type). However, when a.c. loads consist of pumps or blowers with variable speed induction motors, the a.c. voltage and frequency may be variable.		P
	In this standard, systems with a constant a.c. output voltage and frequency as well as systems with a d.c. output are discussed. Figures A.2 and A.3 show the configuration of the PV system and the power conditioner described in this standard.		P

Annex B	**Power efficiency and conversion factor**		P
	There are two types of efficiencies shown in IEC 60146-2; one is a power efficiency, the other is a conversion factor. Power efficiency is defined as the ratio of active output power and active input power. Conversion factor is the ratio between output and input fundamental power levels. The formulae for these two parameters: $\eta_P = (P_{aAC}/P_{aDC}) \times 100 \quad (\%)$ $\eta_C = (P_{fAC}/P_{fDC}) \times 100 \quad (\%)$ η_P is the power efficiency; P_{aAC} is the a.c. active power; P_{aDC} is the d.c. active power; η_C is the conversion factor; P_{fAC} is the a.c. fundamental power; P_{fDC} is the d.c. mean power (mean voltage × mean current).	(See test data record)	P
	Active power Pa is calculated as $P_a = \frac{1}{T}\int_0^T v(t)i(t)dt \text{ or } = \frac{1}{T}\int_0^T p(t)dt$	(See test data record)	P
	The difference between the above two efficiencies is due to the evaluation of the harmonic components. IEC 60146 unifies them into power efficiency. Their differences depend on their voltage and current waveforms as shown in table B.1 and are only meaningful in case 5. Considering the purpose of IEC standards and the illustration in table B.1, the power efficiency is used as the efficiency of power conditioners		P
	As shown in table B.1, case 1 or case 4, the difference between C and P is only 0,1% when the d.c. voltage and current ripple are 10 %pp, or when a.c. 5th r.m.s. voltage content is 2 % and the 5th current content is 5 %. This means that the conversion factor is practically the same as the power efficiency. It shall, however, be noted that in the case of a square wave, as in case 5, the power efficiency shall be used because the difference is large, i.e., ηC/ηP = 0.81.		P
	The integration time (duration of one cycle) T shall be 30s or more and the resultant mean power efficiency value shall be used as the efficiency of the power conditioner.		P
Annex C	**Weighted-average energy efficiency**		P

IEC 61683			
Clause	Requirement + Test	Result - Remark	Verdict
	The energy of a power conditioner depends on both the irradiance profile and the load profile. The energy efficiency of a power conditioner shall be calculated by the ratio of the output to the input energy actually measured over a certain period (such as a month or a year).		P
	For reference, a method of estimating the energy efficiency using a weighted-average energy efficiency is described.		P
	The weighted-average energy efficiency, ηWT , is calculated as the sum of the products of each power level efficiency and related weighting coefficient.		P
	When the system is a utility-interactive type without a storage subsystem, the weighting coefficients depend on a regional irradiance duration curve.		P
	When the system is a stand-alone type with a storage subsystem, the weighting coefficients depend on the load duration curve.		P
	Clauses C.1 and C.2 show the calculation procedures for ηWT for utility-interactive systems and stand-alone systems.		P
C.1	**ηWT of power conditioner for utility-interactive PV systems**		P
	Utility-interactive PV systems, which have no storage and for which reverse-power flow is accepted, are described. In this case, d.c. power generated by the PV array is supplied direct into the power conditioner (PC). Almost all of the input power to the PC is converted to a.c. power. A part of it is dissipated as the PC loss.		P
	The weighted-average energy efficiency, □WT, is an index to evaluate annual energy efficiency in which a weighting coefficient, Ki, is used for each input power level. Here, the irradiance is divided into several discrete levels. By using a duration time Ti, d.c. input power level, PIi, output power level, POi, and PC efficiency, □ i, for each level i, □WT is defined as follows: $\eta_{WT} = \frac{\sum P_{Oi} \cdot T_i}{\sum P_{Ii} \cdot T_i} = \frac{P_{I1} \cdot \eta_1 \cdot T_1 + \cdots + P_{In} \cdot \eta_n \cdot T_n}{P_{I1} \cdot T_1 + \cdots + P_{In} \cdot T_n}$ $= K_1 \cdot \eta_1 + K_2 \cdot \eta_2 + \cdots + K_n \cdot \eta_n$		P

IEC 61683			
Clause	Requirement + Test	Result - Remark	Verdict
	If the irradiance duration curve is given as shown in figure C.1, equation (C.1) can be rewritten as follows: $\eta_{WT} = \frac{1T_1}{T_{WT}}\eta_{1/4} + \frac{2T_2}{T_{WT}}\eta_{2/4} + \frac{3T_3}{T_{WT}}\eta_{3/4} + \frac{4T_4}{T_{WT}}\eta_{4/4} \geq \eta_{ER}$ $T_{WT} = 1T_1 + 2T_2 + 3T_3 + 4T_4$		P
C.2	**ηWT of power conditioner for stand-alone PV systems**	Non stand-alone PV systems.	N/A
	In stand-alone PV systems with a storage subsystem, power generated from the PV array is stored and stabilized by the batteries. DC power is converted into regulated d.c. power or constant-voltage and constant- frequency a.c. power by a power conditioner (PC) and supplied to the load. In this case, some fraction of the generated power is dissipated as a loss in the batteries and power conditioner.		N/A
	The calculation of the weighted-average energy efficiency, ☐WT, for stand-alone PV systems requires weighting coefficients for respective load levels.		N/A
	By using a load duration time Ti, d.c. input power PIi, a.c. output power POi and PC efficiency for respective load level ☐i, ☐WT is defined as follows: $\eta_{WT} = \frac{\sum P_{Oi} \cdot T_i}{\sum P_{Ii} \cdot T_i} = \frac{\sum P_{O1} \cdot T_1 + \cdots + P_{On} \cdot T_n}{P_{I0} \cdot T_0 + P_{O1} \cdot T_1/\eta_1 + P_{On} \cdot T_n/\eta_n}$ $= \frac{1}{K_0 + K_1/\eta_1 + \cdots + K_n/\eta_n}$ $K_0 = P_{I0} \cdot T_0 / \sum (P_{Oi} \cdot T_i)$ $K_i = P_{Oi} \cdot T_i / \sum (P_{Oi} \cdot T_i), \sum K_i = 1$		N/A
	If the load profile and its duration curve are given as shown in figures C.2 and C.3, equation (C.3) can be rewritten as follows: $\eta_{WT} = \frac{1}{K_0 + 1T_1/T_{WT}/\eta_{1/4} + 2T_2/T_{WT}/\eta_{2/4} + 3T_3/T_{WT}/\eta_{3/4} + 4T_4/T_{WT}/\eta_{4/4}} \geq \eta_{ER}$		N/A
Annex D	**Derivation of efficiency tolerance**		P

Power efficiency

Model: HGS-5500

Test condition: Rated input voltage: 120Vdc, Resistive load:

Power level	10%	25%	50%	75%	100%	120%
Input voltage (V)	120.09	121.64	121.88	120.27	121.18	--
Input current (A)	2.61	6.42	12.82	19.48	25.70	--
Input power (kW)	0.31	0.78	1.56	2.34	3.11	--
Output voltage (V)	229.83	229.96	230.13	230.33	230.27	--
Output current (A)	1.24	3.22	6.55	9.85	13.10	--
Output power (kW)	0.29	0.74	1.51	2.27	3.02	--
Efficiency (%)	91.29	94.97	96.51	96.85	96.89	--

b) Test condition: Rated input voltage: 360.0Vdc, Resistive load:

Power level	10%	25%	50%	75%	100%	120%
Input voltage (V)	360.84	360.45	360.40	360.19	360.06	--
Input current (A)	0.87	2.17	4.33	6.49	8.66	--
Input power (kW)	0.31	0.78	1.56	2.34	3.12	--
Output voltage (V)	229.81	229.93	230.10	230.32	230.23	--
Output current (A)	1.30	3.32	6.66	9.90	13.28	--
Output power (kW)	0.30	0.76	1.53	2.28	3.06	--
Efficiency (%)	95.52	97.67	98.13	97.55	98.06	--

c) Test condition: Rated input voltage: 450.0Vdc, Resistive load:

Power level	10%	25%	50%	75%	100%	120%
Input voltage (V)	450.90	450.07	450.71	450.08	450.38	--
Input current (A)	0.69	1.74	3.47	5.21	6.93	--
Input power (kW)	0.31	0.78	1.56	2.34	3.12	--
Output voltage (V)	229.85	229.95	230.16	230.38	230.30	--
Output current (A)	1.29	3.30	6.65	9.97	13.28	--
Output power (kW)	0.30	0.76	1.53	2.30	3.06	--
Efficiency (%)	94.41	96.96	97.89	97.96	97.95	--

7 Loss measurement

7,1 No-load loss

a) manufacturer's minimum rated input voltage: 120Vdc

Input voltage (V)	Input current (mA)	Input power W1 (W)	Output voltage (V)	Frequency (Hz)	Output power W2 (W)
120.73	38	4.59	--	--	0

b) the inverter's nominal voltage or average of its rated input range: 360Vdc

Input voltage (V)	Input current (mA)	Input power W1 (W)	Output voltage (V)	Frequency (Hz)	Output power W2 (W)
361.61	29	10.48	--	--	0

c)90% of the inverter's maximum input voltage: 450Vdc

Input voltage (V)	Input current (mA)	Input power W1 (W)	Output voltage (V)	Frequency (Hz)	Output power W2 (W)
450.51	28	12.6	--	--	0

7.2 Standby loss

Input voltage (V)	Input power W1 (W)	Output voltage (V)	Frequency (Hz)	Output current (A)	Output power W2 (W)
--	--	230.88	50.00	0.525	4.221

picture

Fig. 1 -- Over view 1

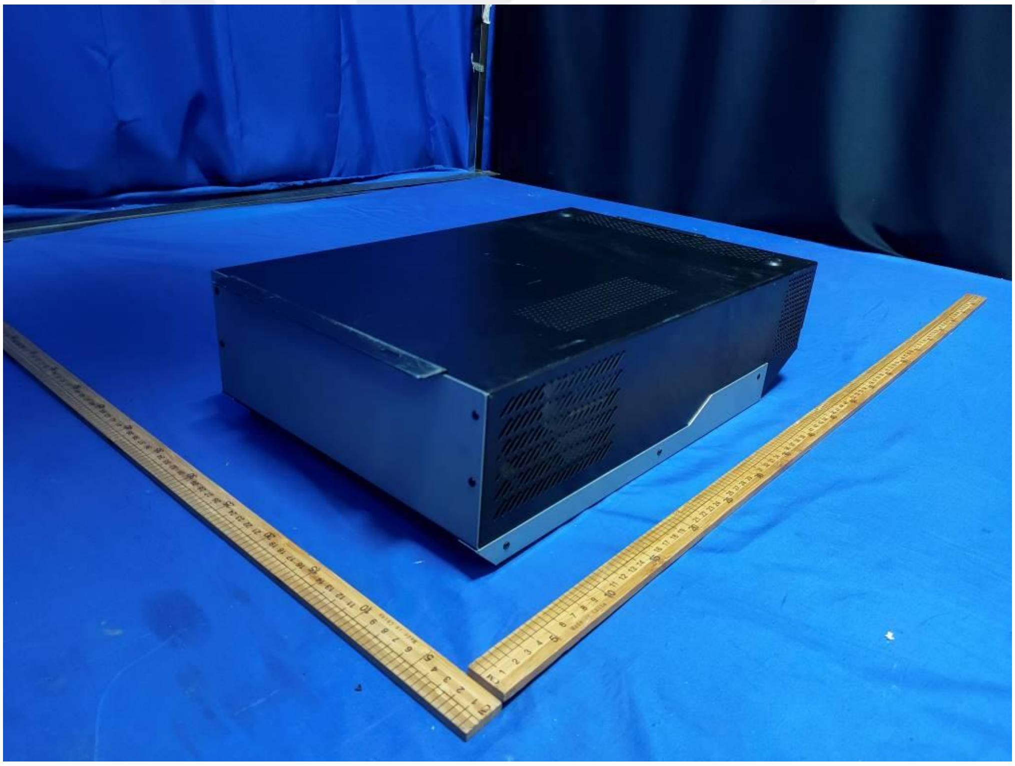

Fig. 2 -- Over view 2

picture

Fig. 3 -- Over view 3

Fig. 4 -- Over view 3

picture

Fig. 5 -- Internal view 1

Fig. 6 -- Internal view 2

picture

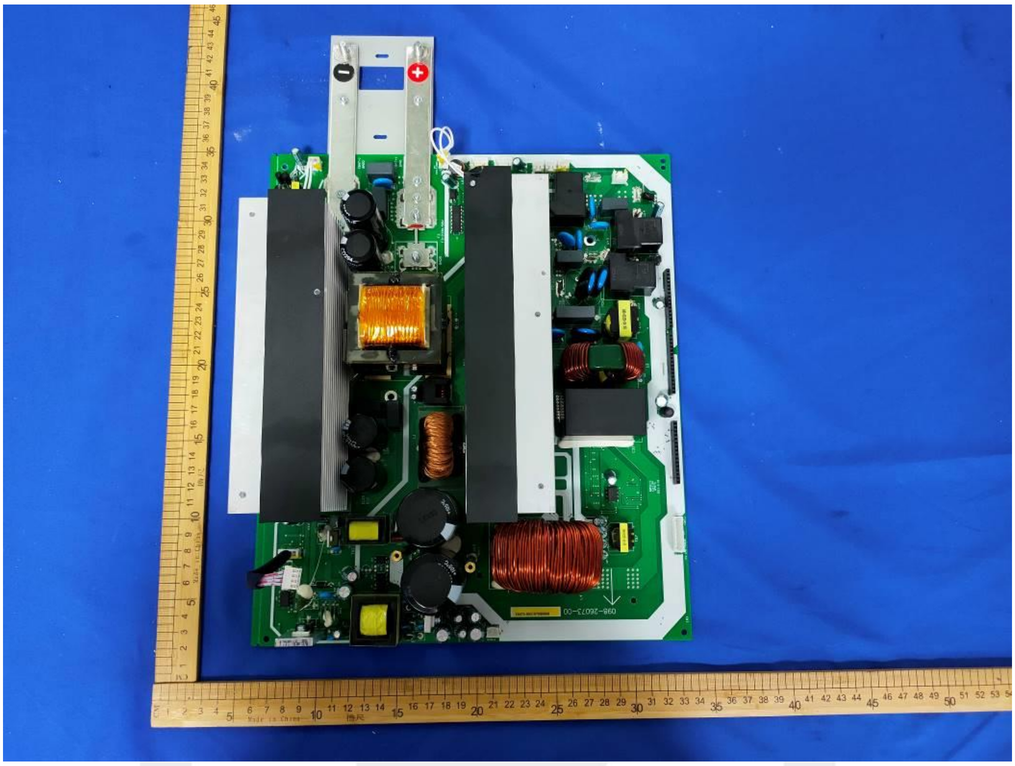

Fig. 7 -- Component side view

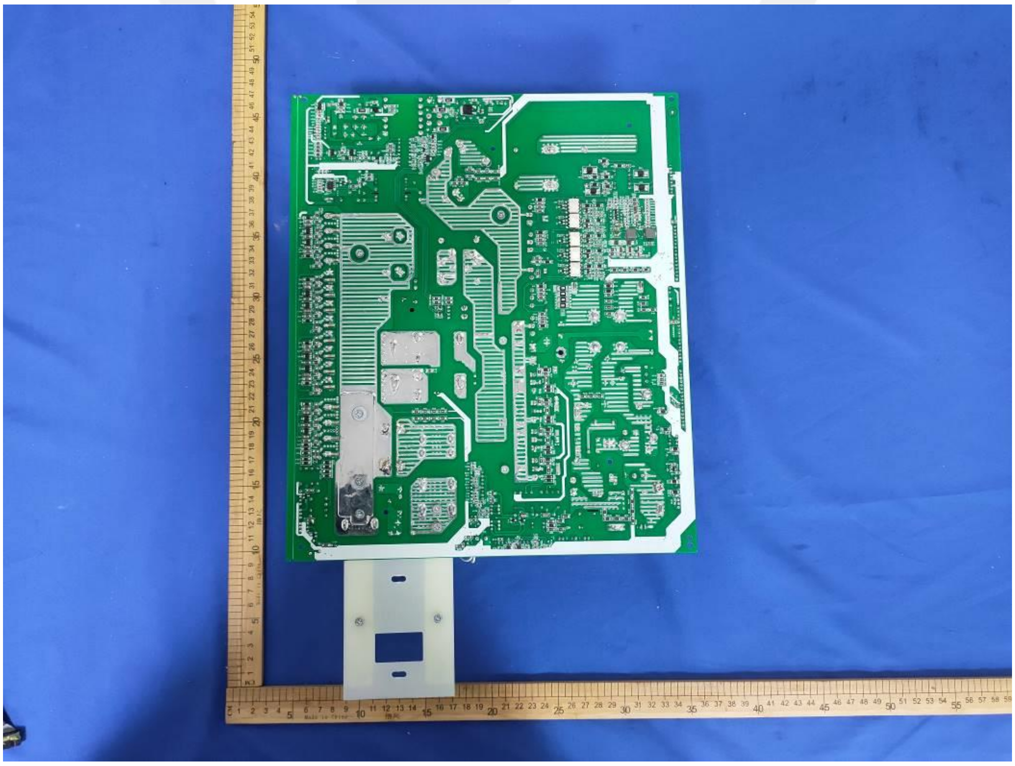

Fig. 8 -- Trace side view

picture

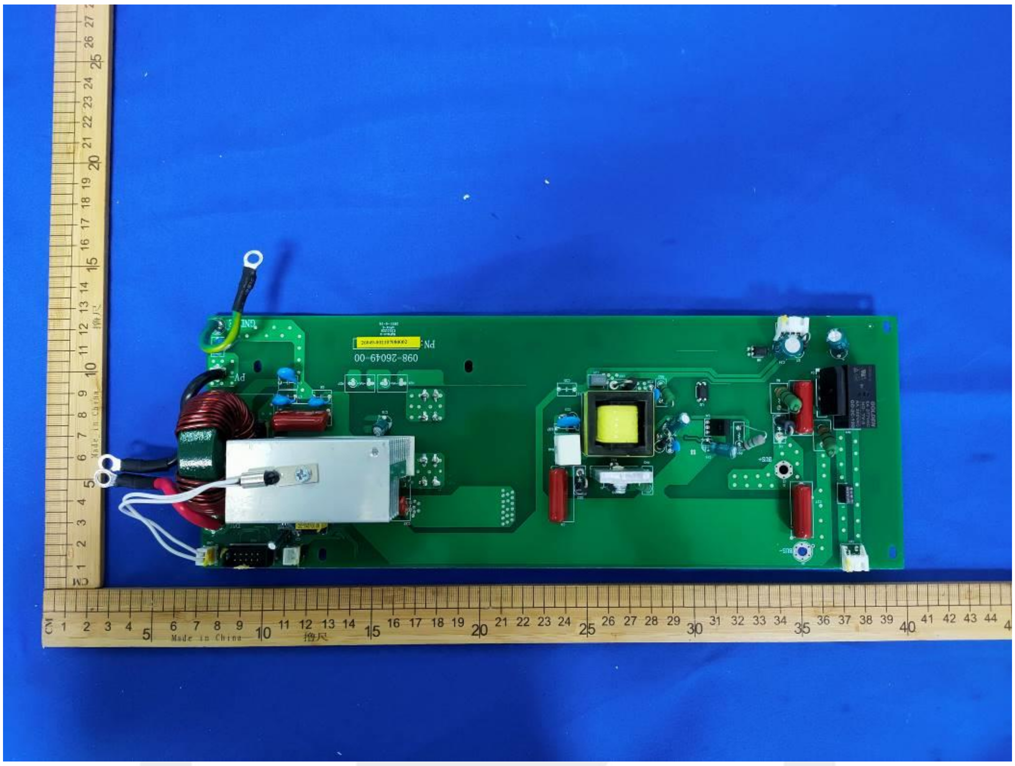

Fig. 9 -- Component side view

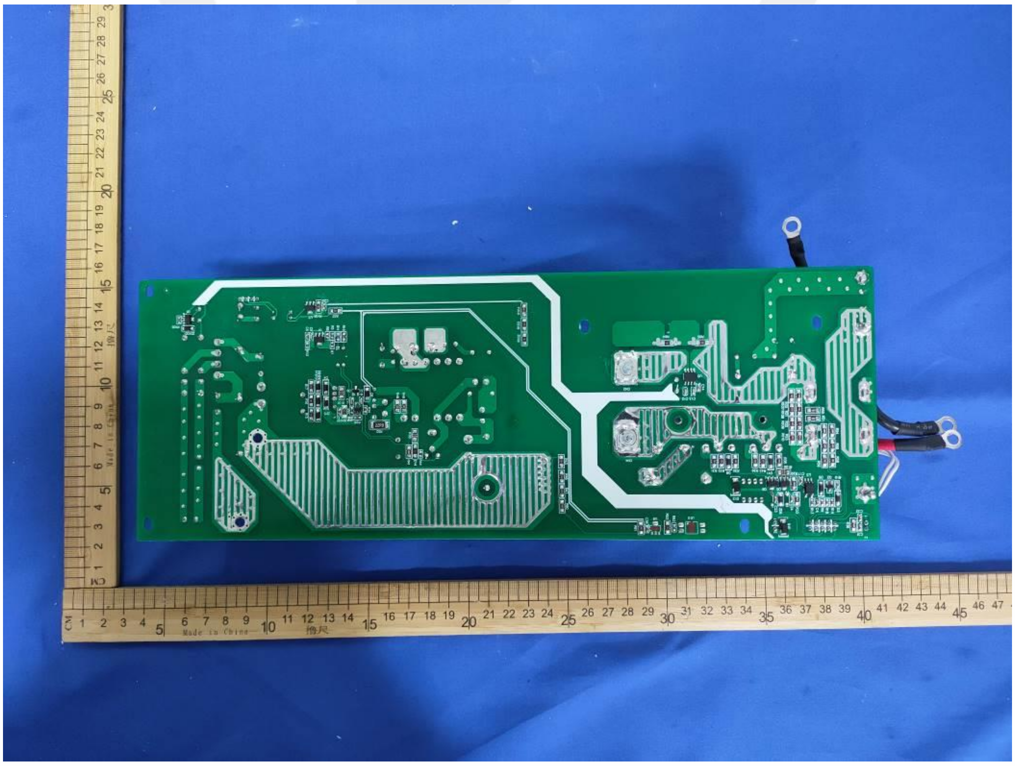

Fig. 10 -- Trace side view

picture

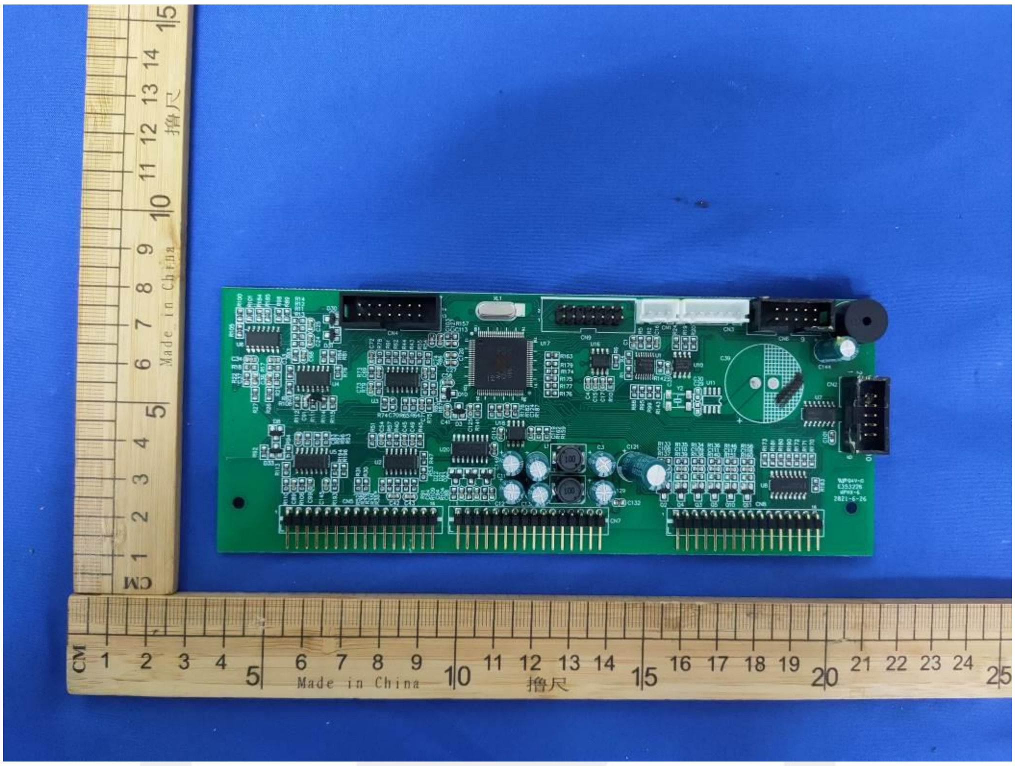

Fig. 11 -- Component side view

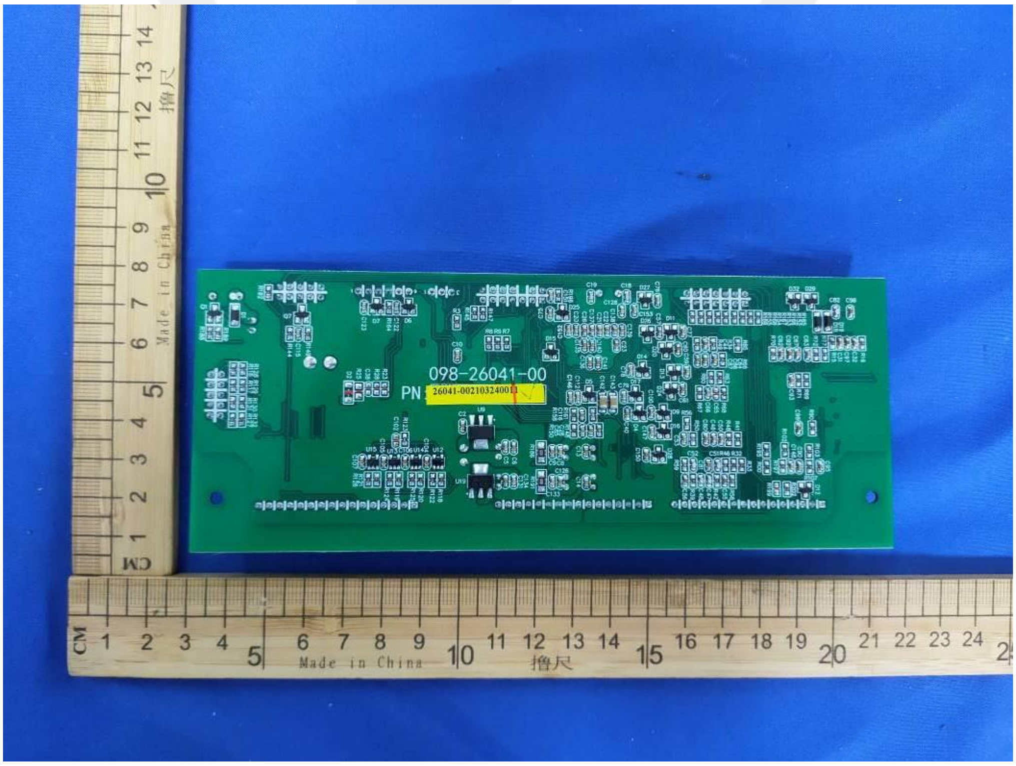

Fig. 12 -- Trace side view

picture

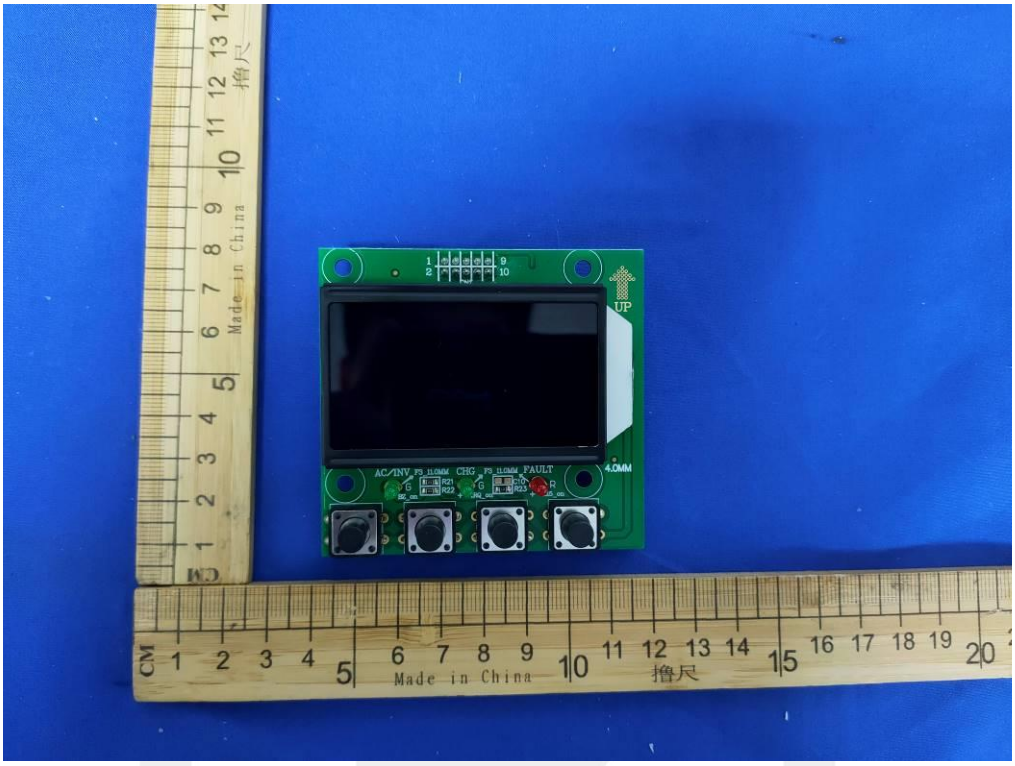

Fig. 13 -- Component side view

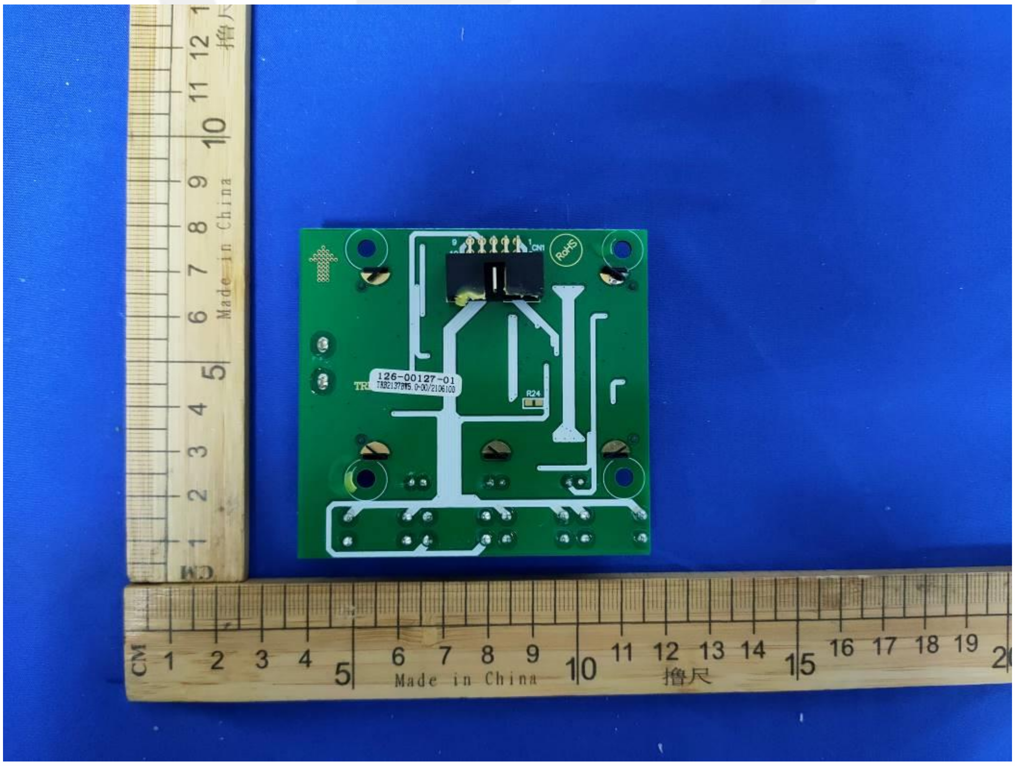

Fig. 14 -- Trace side view

picture

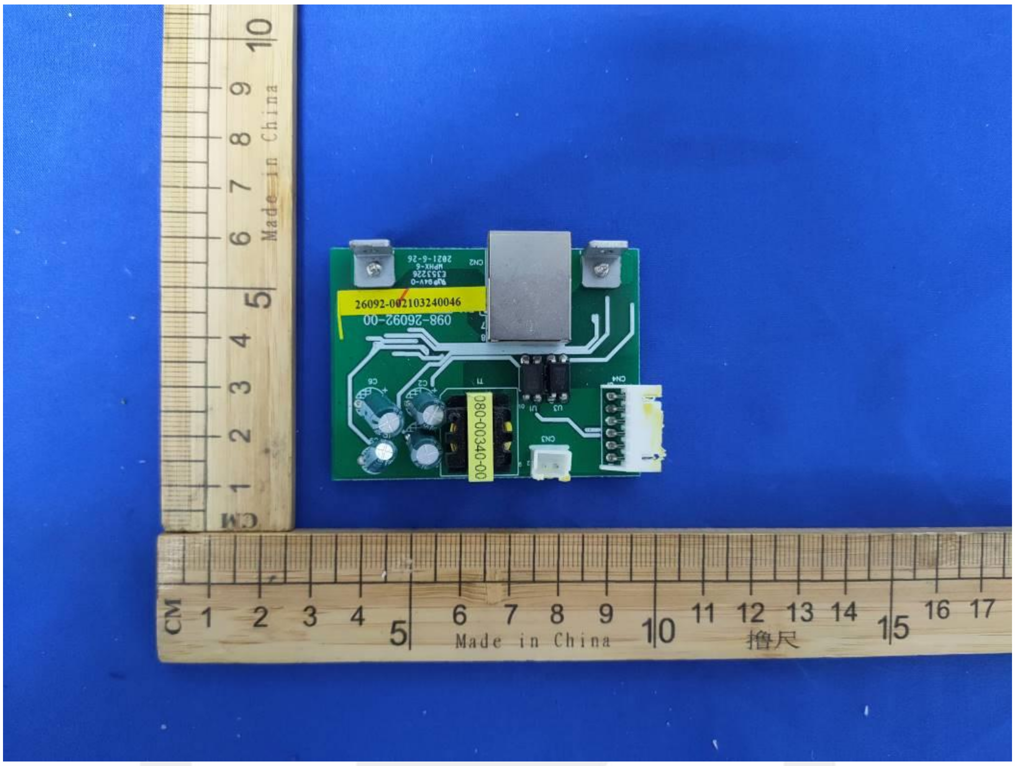

Fig. 15 -- Component side view

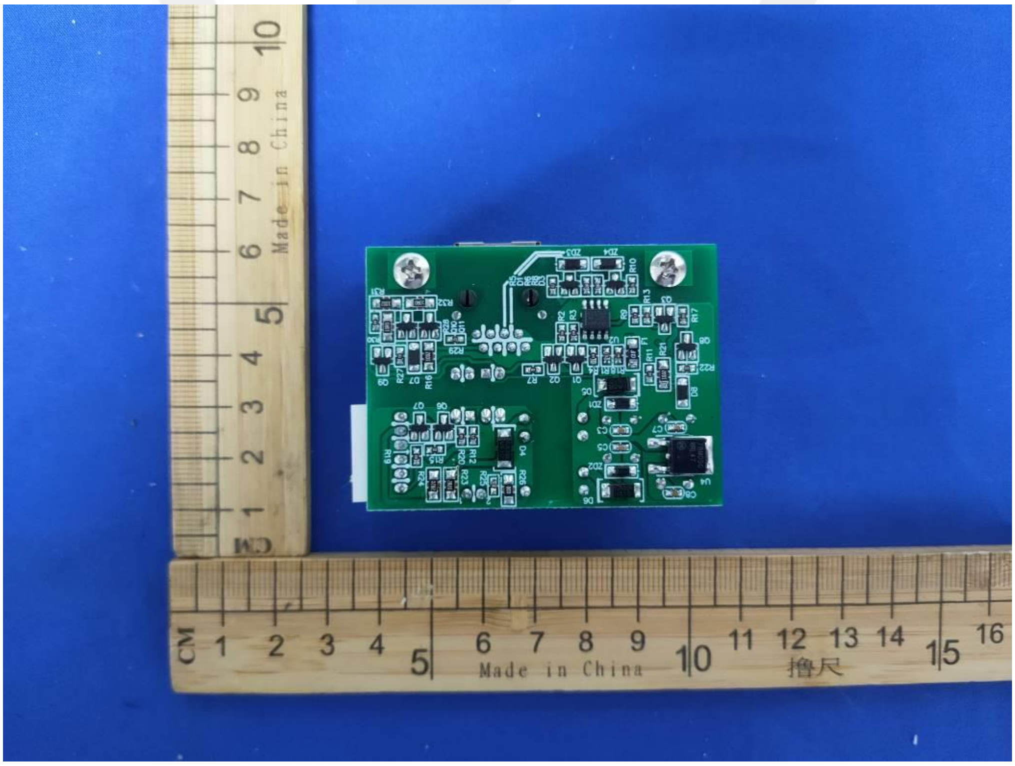

Fig. 16 -- Trace side view

picture

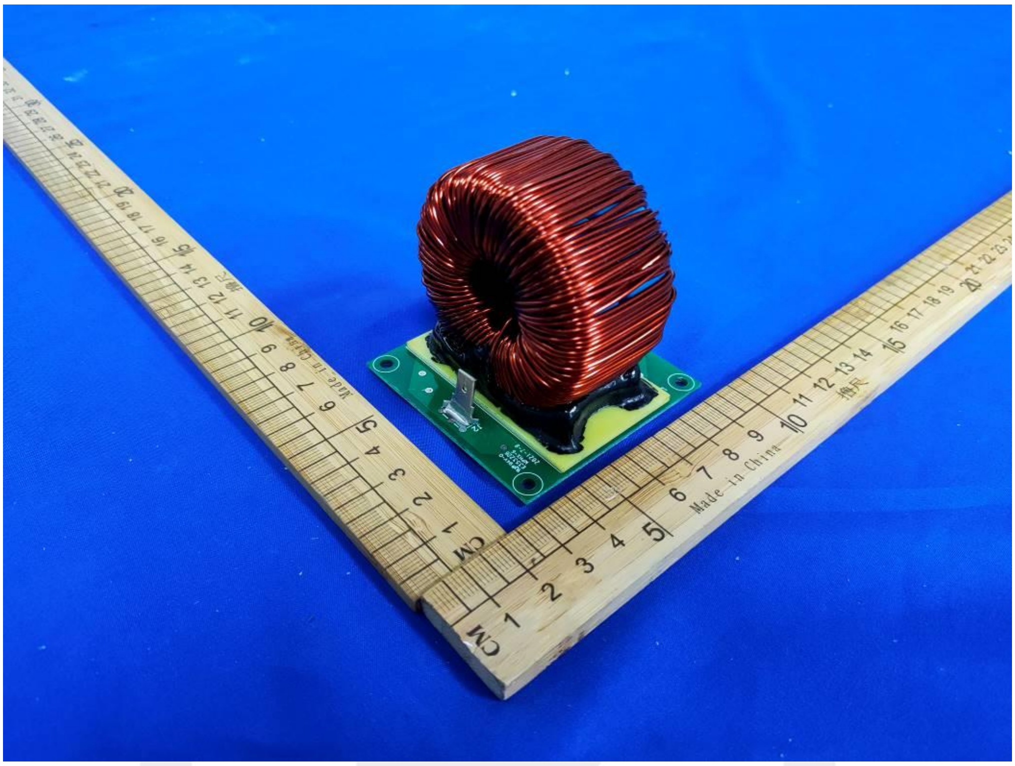

Fig. 17 -- Component side view

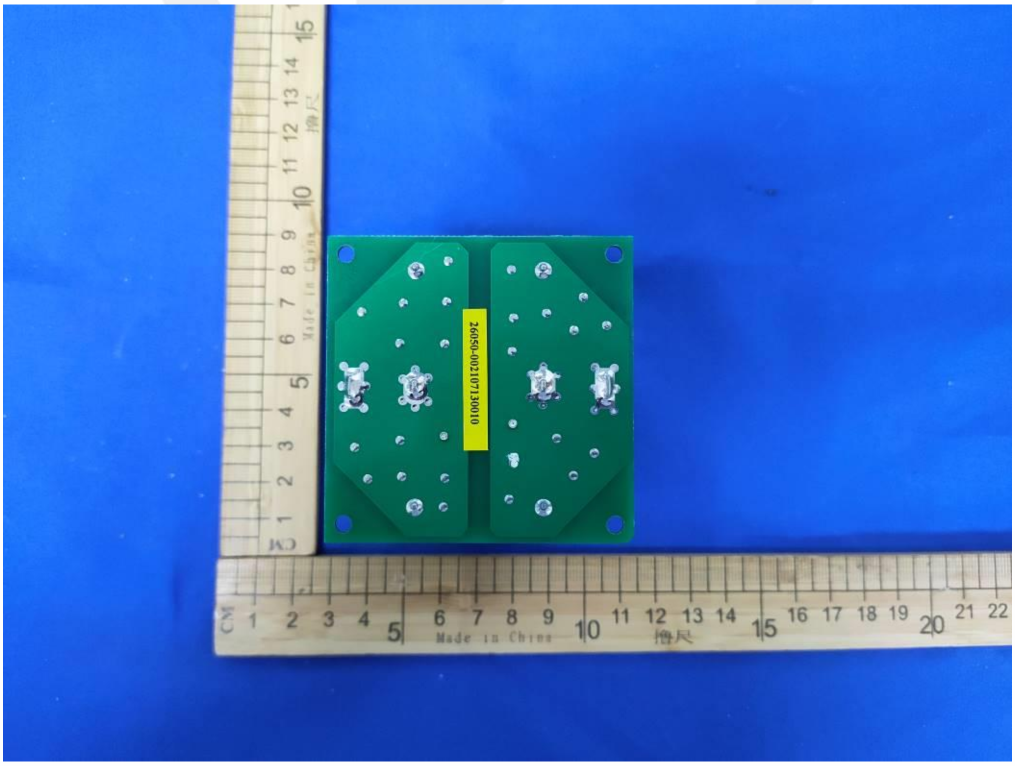

Fig. 18 -- Trace side view

picture

Fig. 19 -- Over view 1

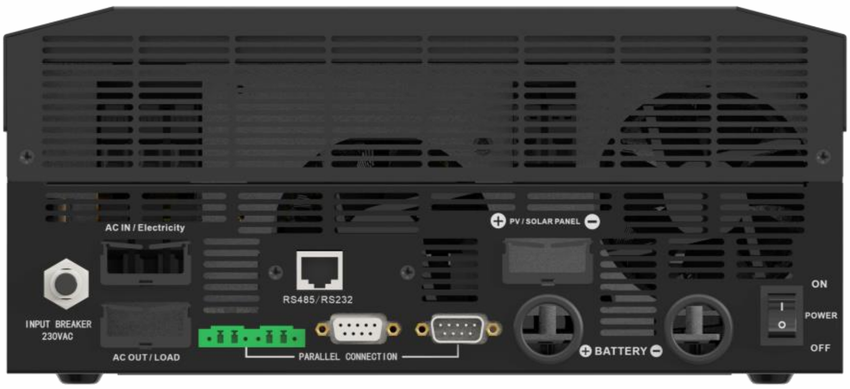

Fig. 20 -- Over view 2

picture

Fig. 21 -- Over view 3

Fig. 22 -- Over view 4

*** End of Report ***

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