Prüfbericht-Nr.: *Test report no.:*	**CN23SLPB 001**	**Auftrags-Nr.:** *Order no.*:	244517757	**Seite 1 von 9** *Page 1 of 9*
Kunden-Referenz-Nr.: *Client reference no.:*	2177511	**Auftragsdatum:** *Order date:*	2023.05.24	
Auftraggeber: *Client:*	Ginlong technologies Co., Ltd. No.57 Jintong Road, Binhai, (seafront) industrial Park, Xiangshan, Ningbo, zhejiang, 315712, P.R. China			
Prüfgegenstand: *Test item:*	Grid Connected PV Inverter			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	S6-GR1P2.5K-S, S6-GR1P3K-S, S6-GR1P3.6K-S			
Auftrags-Inhalt: *Order content*:	AK certificate			
Prüfgrundlage: *Test specification:*	G98/1-7/10.22			

Wareneingangsdatum: *Date of sample receipt:*	2023.05.24
Prüfmuster-Nr.: *Test sample no:*	A003492951-001
Prüfzeitraum: *Testing period:*	2023.05.24– 2023.06.08
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shanghai) Co., Ltd.
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shanghai) Co., Ltd.
Prüfergebnis*: *Test result*:*	Pass

geprüft von: *tested by:*	Eva Wu	**genehmigt von:** *authorized by:*	Jingge Pan
Datum: *Date:*	Eva Wu 2023.06.12	**Ausstellungsdatum:** *Issue date:*	Jingge Pan 2023.06.12
Stellung / *Position:*	Engineer	**Stellung** / *Position:*	Reviewer

Sonstiges /
Other:

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* *Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TUV Rheinland (Shanghai) Co., Ltd. No.177, 178, Lane 777 West Guangzhong Road, Jing'an District,Shanghai, China
Mail: service-gc@tuv.com · Web: www.tuv.com

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.*

Liste der verwendeten Prüfmittel
List of used test equipment

Pa

Equip.	Description	Model	Manufacturer
9017073	Power Analyser(DEWETRON)	DEWE2-PA7	Austria, DEWETRON
9017074	Current Sensor(For WT3000)	IT 200-S	LEM
9017075	Current Sensor(For WT3000)	IT 200-S	LEM
9017076	Current Sensor(For WT3000)	IT 200-S	LEM
9017077	Current Sensor(For WT3000)	IT 200-S	LEM
9017078	Programmable AC Source(61860)	61860	Chroma ATE INC.
9017080	Oscilloscope	MDO3024	Tektronix
G1819265	ScopeCoder	DL850	JAPAN, Yokogawa
G1819266	Power Analyser(WT3000)	WT3000	JAPAN, Yokogawa
G1819268	Anti-islanding test detection devices	ACLT-4830H	QUNLING Energy Resources
G1819277	PV array simulator	62150H-1000S	Chroma Co.
G1819278	PV array simulator	62150H-1000S	Chroma Co.
G1819279	PV array simulator	62150H-1000S	Chroma Co.
G1819280	PV array simulator	62150H-1000S	Chroma Co.

Produktbeschreibung
Product description

Copy of marking plate:

solis

Model:	S6-GR1P2.5K-S
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-550V
Max.input current d.c.	2X16A
Isc PV(absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	2500W
Max.AC output active power	2500W
Max.AC output apparent power	2500VA
Max.continuous output current a.c.	11.4A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N:
11021222A310004

CE UK CA

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park,
Xiangshan,Ningbo,Zhejiang,315712,P.R.China
www.solisinverters.com Made in China

solis

Model:	S6-GR1P3K-S
Max.input voltage d.c.	550V
Mppt voltage range d.c.	90-550V
Max.input current d.c.	2X16A
Isc PV(absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	3000W
Max.AC output active power	3000W
Max.AC output apparent power	3000VA
Max.continuous output current a.c.	13.6A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N:
11021222A310006

CE UK CA

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park,
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www.solisinverters.com Made in China

Produktbeschreibung
Product description

solis

Model:	**S6-GR1P3.6K-S**
Max.input voltage d.c.	550V
Mppt voltage range d.c.	90-550V
Max.input current d.c.	2X16A
Isc PV(absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	3600W
Max.AC output active power	3600W
Max.AC output apparent power	3600VA
Max.continuous output current a.c.	16A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N:
11021222A310015

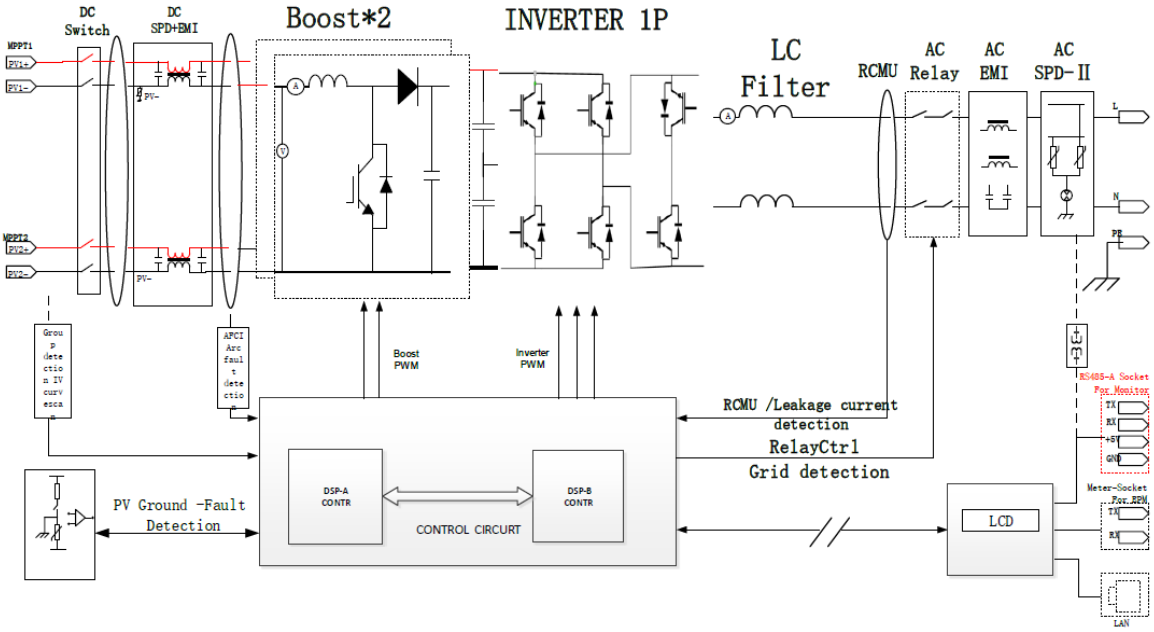
CE UKCA

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park,
Xiangshan,Ningbo,Zhejiang,315712,P.R.China
www.solisinverters.com Made in China

Produktbeschreibung
Product description

Brief description:

The PCEs under S6-GR1P2.5K-S, S6-GR1P3K-S, and S6-GR1P3.6K-S are three-phase grid connected inverter for solar power generation. The Grid-connected PV Inverter utilize the advanced power conversion technology IGBT to convert the DC power normally from the photovoltaic array to stable three-phase AC power and then feed the power to the utility grid.



Block Diagram

Interface relays disconnect the equipment from utility in case any one of following grid faults occurred:

1. PV array insulation resistance fault
2. Residual current fault
3. Over & under grid voltage
4. Over & under grid frequecny
5. Islanding operation
6. Over DC injection current

Model Difference:

All models are technical equivalent on hard and software, except for MPPT numbers, electrical ratings and model name.

The product was tested on:
Software version: A1

Unless otherwise specified, all tests were performed on S6-GR1P3.6K-S to represent other family models.
All tests were performed under 230V, 50Hz grid condition.

Test condition:
Temperature: 25°C Relative humidity: 65%

Produktbeschreibung
Product description

Model List:

MODELS LIST		S6-GR1P2.5K-S	S6-GR1P3K-S	S6-GR1P3.6K-S
PV INPUT	$V_{MAX\ PV}$ [Vdc]	550		
	MPP Voltage Range V_{MPP} [Vdc]	50-550	90-550	
	MPP Full Power Voltage Range [Vdc]	114-400	141-500	169-500
	$I_{SC\ PV}$ [A]	22/22		
	Max. Input Current I_{MAX} [A]	16/16		
	Overvoltage Category (OVC)	II		
AC OUTPUT	Rated Output Voltage Un [Vac]	1/N/PE, 220/230		
	Rated Output Frequency Fn [Hz]	50/60		
	Grid frequency range[Hz]	45-55/55-65		
	Rated Output Power P_n [W]	2500	3000	3600
	Max. Active Power P_{Emax} [W]	2500	3000	3600
	Max. Output Current I_{max} [A]	11.4	13.6	16.0
	Power Factor Range cosφ [λ]	> 0.99 (0.8 leading - 0.8 lagging)		
	Overvoltage Category (OVC)	III		
General Data	Operation Temperature (℃)	-25°C to +60°C		
	Enclosure Protection (IP)	IP66		
	Protective class	I		
	Dimensions (W*H*D)[mm]	330*371*161		
	Weight [kg]	8.2	8.3	
	Firmware version	A1		

Absatz *Clause*	Anforderungen - Prüfungen *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
9.1	Frequency withstand		P
9.2	Rate of Change of Frequency		P
9.3	Limited Frequency Sensitive Mode –Overfrequency		P
9.4	Active Power Output		P
9.5	Power Factor		P
9.6	Automatic Connection		P
10	Interface Protection		P
11	Quality of Supply		P
12	Short Circuit Current Contribution		P

ANLAGE zum Prüfbericht-Nr.: CN23SLPB 001
APPENDIX to Test Report No.:

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

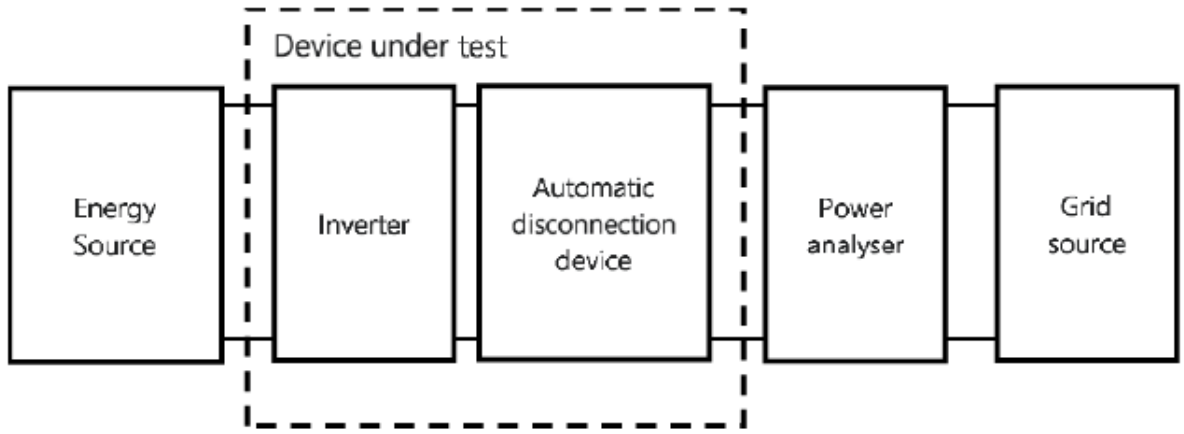
See following pages.

Prüfbericht-Nr.: CN23SLPB 001 *Test report no.*:			Seite 1 von 16 *Page 1 of 16*
Absatz *Clause*	**G98/1-7/10.22** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung Evaluation

Project Engineer:	Eva Wu	Reviewer:	Jingge Pan
Signature:	Eva Wu	Signature:	Jingge Pan

Testing Location:	
Name:	TÜV Rheinland (Shanghai) Co., Ltd.
Address:	No.177, 178, Lane 777 West Guangzhong Road, Jing'an District,Shanghai, China

Test bench:



Absatz *Clause*	**G98/1-7/10.22** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung Evaluation

Clause	Test items	Remark
1	Normal operating range (Operation range)	See appended table for detail.
2.1	Harmonics current (THDi)	See appended table for detail.
3.1	Voltage fluctuations (Flicker)	See appended table for detail.
4	DC Injection (Idc)	See appended table for detail.
5	Power factor	See appended table for detail.
6	Protection-Frequency tests (OF/UF)	See appended table for detail.
7	Protection-Frequency tests (OV/UV)	See appended table for detail.
8.1	Protection-Loss of mains test (Anti-islanding)	See appended table for detail.
8.2	Vector shift stability test	See appended table for detail.
8.3	RoCoF stability test (RoCoF)	See appended table for detail.
9.1	Limited Frequency Sensitive Mode-Over frequency test (LFSM-O)	See appended table for detail.
9.2	Power output when under-frequency	See appended table for detail.
10	Protection-Reconnection timer (Reconnection)	See appended table for detail.
11	Fault level contribution	See appended table for detail.
12	Logic interface (input port)	Equipped.
13	Self-Monitoring solid state switching	See appended table for detail
14	Cyber security	See appended table for detail

1	TABLE: Normal operating range (Operation range)				P
Test Conditions				Measurements	Limitation
U/Un	f [Hz]	cosφ	t [s]		
85%(195.5 V)	47.0	1.00	20	No disconnect	No disconnect
85%(195.5 V)	47.5	1.00	5400	No disconnect	No disconnect
110%(253 V)	51.5	1.00	5400	No disconnect	No disconnect
110%(253 V)	52.0	1.00	900	No disconnect	No disconnect
100%(230 V)	50.0	1.00	5400	No disconnect	No disconnect
RoCoF-frequency change rate 1Hz/s				No disconnect	No disconnect

Note(s):

***** Function of interface protection and activating active power response to over/under frequency and voltage shall be disable.

2.1	TABLE: Harmonics current (THDi)		P
P/Pn[%]	50	100	Limit
Order No.	Measurement [A]	[A]	Ih [A]
1	8.28	15.94	--
2	0.048	0.095	1.080
3	0.116	0.202	2.300
4	0.008	0.014	0.430
5	0.101	0.188	1.140
6	0.004	0.018	0.300
7	0.083	0.135	0.770
8	0.007	0.006	0.230
9	0.058	0.098	0.400
10	0.003	0.011	0.184
11	0.048	0.081	0.330
12	0.006	0.004	0.153
13	0.034	0.060	0.210
14	0.003	0.010	0.131
15	0.029	0.054	0.150
16	0.001	0.002	0.115
17	0.019	0.047	0.132
18	0.006	0.003	0.102
19	0.019	0.037	0.118
20	0.003	0.012	0.092
21	0.013	0.032	0.107(0.160)
22	0.003	0.010	0.084
23	0.007	0.030	0.098(0.147)
24	0.008	0.004	0.077
25	0.011	0.019	0.090(0.135)
26	0.002	0.016	0.071
27	0.008	0.024	0.083(0.124)
28	0.006	0.003	0.066
29	0.003	0.023	0.078(0.117)
30	0.007	0.007	0.061
31	0.004	0.015	0.073(0.109)
32	0.007	0.004	0.058
33	0.007	0.014	0.068(0.102)
34	0.005	0.003	0.054
35	0.006	0.012	0.064(0.096)
36	0.005	0.007	0.051
37	0.005	0.012	0.061(0.091)
38	0.002	0.002	0.048
39	0.005	0.011	0.058(0.087)
40	0.003	0.004	0.046

Note(s): The worst case of the three phases shall be choosed. And the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.

3.1	TABLE: Power Quality – Voltage fluctuations and Flicker: (model 3.6K)							P
	Starting			Stopping			Running	
	dmax[%]	dc[%]	d(t)[ms]	dmax[%]	dc[%]	d(t)[ms]	P_{st}	P_{lt} 2 hours
Measured value at test impedance	0.731	0.083	0.0	0.702	0.062	0.0	0.181	0.182
Z_{ref} Normalised to standard impedance	0.731	0.083	0.0	0.702	0.062	0.0	0.181	0.182
Z_{max} Normalised to required maximum impedance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limitation	4.0%	3.3%	500ms	4.0%	3.3%	500ms	1.0	0.65
Test impedance Z_{test}	R	0.4^		Ω	XI	0.25^		Ω
Z_{ref} Normalised value	R	0.24* 0.4^		Ω	XI	0.15* 0.25^		Ω
Z_{max} Normalised value	R	N/A		Ω	XI	N/A		Ω

Note(s):

*Applies to three phase and split single phase Micro-generators. Delete as appropriate.

^ Applies to single phase Micro-generators and Micro-generators using two phases on a three phase system. Delete as appropriate.

The worst value of the three phases has been choosed.

Since the nominal current of product In>75A, the following extra flicker table 3.2 has been also impelmented per BS EN 61400-21, as the requirement of EREC P28, clause 8.8.

4	TABLE: Power quality – DC injection:			P
Test power level	20%	50%	75%	100%
Recorded DC value in Amps	0.02118	0.02322	0.02834	0.03025
as % of rated AC current	0.135%	0.148%	0.181%	0.193%
Limit	0.25%	0.25%	0.25%	0.25%
Note(s):				

5	TABLE: Power Factor							P
Test Conditions			Measurements					Limit
P/Pn	cosφ	U/Un	P [W]	Q [Var]	cosφ	U [V]	I [A]	cosφ
20%	1.00	0.94	768.37	31.57	0.9952	216.59	3.54	>0.95
	1.00	1.0	773.49	32.38	0.9965	230.23	3.36	>0.95
	1.00	1.1	762.64	32.69	0.9961	253.48	3.01	>0.95
50%	1.00	0.94	1862.46	33.31	0.9995	216.43	8.61	>0.95
	1.00	1.0	1859.39	33.73	0.9998	230.59	8.06	>0.95
	1.00	1.1	1872.41	33.91	0.9996	253.69	7.38	>0.95
75%	1.00	0.94	2784.59	34.27	0.9996	216.37	12.87	>0.95
	1.00	1.0	2761.81	34.16	0.9998	230.34	11.99	>0.95
	1.00	1.1	2767.28	34.97	0.9997	253.51	10.92	>0.95
100%	1.00	0.94	3592.51	46.58	0.9995	216.62	16.58	>0.95
	1.00	1.0	3643.24	46.46	0.9997	230.58	15.80	>0.95
	1.00	1.1	3692.77	46.77	0.9998	253.37	14.57	>0.95
Note(s):								

6	TABLE: Protection-Frequency tests (OF/UF)		P
Condition	Setting [Hz]	Measurement	Limitation
		Trip value [Hz]	
F>>	52.0	52.02	± 0.1% of f_n
F<	47.5	47.51	
F<<	47	47.02	
Condition	Setting [ms]	Measurement	Limitation [ms]
		Time delay	
F>>	500	518.0	500-600
F<	20000	20020	20000-20100
F<<	500	522	500-600
Condition		Measurement	limitation
F [Hz]	t [s]		
47.7	30	No trip	No trip
47.2	19.5	No trip	No trip
46.8	0.45	No trip	No trip
51.8	120	No trip	No trip
52.2	0.45	No trip	No trip
Note(s):			

7	TABLE: Protection – Voltage tests (OV/UV)					P
Condition	Setting [U/Un]	Measurement				Limitation
		Trip value [V]				
		L1	L2	L3	L123	
U>>	1.19 (273.7 V)	274.1	N/A	N/A	N/A	± 1% of U_n
U>	1.14 (262.2 V)	262.5	N/A	N/A	N/A	
U<<	0.80(184 V)	184	N/A	N/A	N/A	
Condition	Setting [ms]	Measurement				Limitation
		Time delay				
		L1	L2	L3	L123	
U>>	500	528	N/A	N/A	N/A	500-600
U>	1000	1024	N/A	N/A	N/A	1000-1100
U<<	2500	2523	N/A	N/A	N/A	2500-2600
Condition		Measurement				limitation

U/Un	time [s]		
0.82	5	No trip	No trip
0.78	2.45	No trip	No trip
1.12	5	No trip	No trip
1.17	0.95	No trip	No trip
1.20	0.45	No trip	No trip
Note(s):*: settings for product connect with a non-standard transformer			

8.1	TABLE: Protection-Loss of mains test					P
Power 100%						
Input : Vdc						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: -10% Q_C: +10%	L1: 3027	L1: 3602	L1: 3602	1.19	324	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -10% Q_C: +5%	L1: 3027	L1: 3569	L1: 3569	1.10	329	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -10% Q_C: 0%	L1: 3027	L1: 3546	L1: 3546	1.08	336	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -10% Q_C: -5%	L1: 3027	L1: 3489	L1: 3489	1.03	325	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -10% Q_C: -10%	L1: 3027	L1: 3495	L1: 3495	1.17	330	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -5% Q_C: +10%	L1: 3027	L1: 3423	L1: 3423	1.18	330	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -5% Q_C: -10%	L1: 3027	L1: 3486	L1: 3486	1.11	341	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +10%	L1: 3027	L1: 3596	L1: 3896	1.09	341	500
	L2:	L2:	L2:			

	L3:	L3:	L3:			
P_R: -5% Q_C: +5%	L1: 3027	L1: 3526	L1: 3526	1.07	346	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -5% Q_C: 0%	L1: 3027	L1: 3515	L1: 3515	1.01	337	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: -5% Q_C: -5%	L1: 3027	L1: 3579	L1: 3579	1.16	326	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +5%	L1: 3027	L1: 3489	L1: 3489	1.05	318	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: 0%	L1: 3027	L1: 3428	L1: 3428	1.05	287	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -5%	L1: 3027	L1: 3402	L1: 3402	1.12	286	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +5% Q_C: +5%	L1: 3027	L1: 3423	L1: 3423	1.15	302	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +5% Q_C: 0%	L1: 3027	L1: 3452	L1: 3452	1.13	286	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +5% Q_C: -5%	L1: 3027	L1: 3423	L1: 3423	1.08	298	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -10%	L1: 3027	L1: 3456	L1: 3456	1.06	289	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +5% Q_C: +10%	L1: 3027	L1: 3526	L1: 3526	1.02	287	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +5% Q_C: -10%	L1: 3027	L1: 3601	L1: 3601	1.24	297	500
	L2:	L2:	L2:			

	L3:	L3:	L3:			
P_R: +10% Q_C: +10%	L1: 3027	L1: 3523	L1: 3523	1.25	316	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +10% Q_C: +5%	L1: 3027	L1: 3568	L1: 3568	1.24	326	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +10% Q_C: 0%	L1: 3027	L1: 3576	L1: 3576	1.32	326	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +10% Q_C: -5%	L1: 3027	L1: 3574	L1: 3574	1.03	301	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: +10% Q_C: -10%	L1: 3027	L1: 3549	L1: 3549	1.01	313	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			

Power 66%						
Input : Vdc						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1: 1997	L1: 2315	L1: 2315	1.12	306	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -4%	L1: 1997	L1: 2374	L1: 2374	1.19	313	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -3%	L1: 1997	L1: 2365	L1: 2365	1.05	298	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -2%	L1: 1997	L1: 2341	L1: 2341	1.13	301	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -1%	L1: 1997	L1: 2365	L1: 2365	1.08	304	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			

P_R: 0% Q_C: 0%	L1: 1997	L1: 2342	L1: 2342	1.05	312	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +1%	L1: 1997	L1: 2345	L1: 2345	1.08	289	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +2%	L1: 1997	L1: 2279	L1: 2279	1.15	302	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +3%	L1: 1997	L1: 2285	L1: 2285	1.26	312	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +4%	L1: 1997	L1: 2341	L1: 2341	1.01	296	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +5%	L1: 1997	L1: 2315	L1: 2315	1.17	303	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			

Power 33%						
Input : Vdc						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1: 999	L1: 1185	L1: 1185	1.02	312	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -4%	L1: 999	L1: 1145	L1: 1145	1.03	335	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -3%	L1: 999	L1: 1164	L1: 1164	1.23	341	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: -2%	L1: 999	L1: 1124	L1: 1124	1.31	334	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
	L1: 999	L1: 1149	L1: 1149	1.18	323	

P_R: 0% Q_C: -1%	L2:	L2:	L2:			500
	L3:	L3:	L3:			
P_R: 0% Q_C: 0%	L1: 999	L1: 1143	L1: 1143	1.05	305	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +1%	L1: 999	L1: 1136	L1: 1136	1.05	317	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +2%	L1: 999	L1: 1156	L1: 1156	1.15	323	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +3%	L1: 999	L1: 1145	L1: 1145	1.23	326	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +4%	L1: 999	L1: 1178	L1: 1178	1.45	313	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
P_R: 0% Q_C: +5%	L1: 999	L1: 1165	L1: 1165	1.05	336	500
	L2:	L2:	L2:			
	L3:	L3:	L3:			
Note(s):						

8.2	TABLE: Loss of Mains Protection, Vector Shift Stability test:			P
	Start Frequency	Change	Measurement	Limit
Positive Vector Shift	49.5Hz	+50degree	No trip	No trip
Negative Vector Shift	50.5Hz	-50degree	No trip	No trip

8.3	TABLE: Loss of Mains Protection, RoCoF Stability test:			P
Ramp range	Test frequency ramp	Test Duration	Measurement	Limit
49.0 Hz to 51.0 Hz	+ 0.95 Hz/s	2.1 s	No trip	No trip
51.0 Hz to 49.0 Hz	- 0.95 Hz/s	2.1 s	No trip	No trip

9.1	TABLE: Limitest frequency sensitive mode-over frequency (LFSM-O)							P

Test No. 1

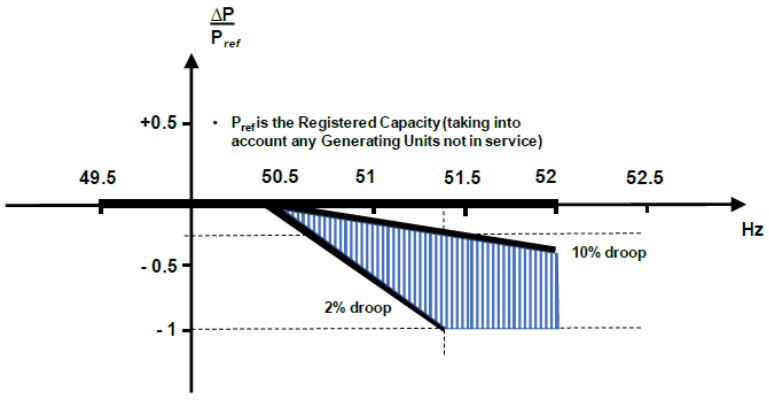
Test Conditions	Measurements						Target value	Δ	Limitation		
f [Hz]	P/Pn [%]	f [Hz]	T_{rise} [s]	$T_{settling}$ [s]	Tv [s]	Droop	P/Pn	Δ P/Pn [%]	Droop	T_{rise} [s]	Tv [s]
a) 50	98.70%	50.00	--	--	--	--	100%	0.3	8.5 %≤Droop ≤12.8%	≤10	≤2
b) 50.45	98.01%	50.45	4.2	5.0	0.4	--	99%	0.7			
c) 50.7	93.15%	50.70	3.6	4.4	0.6	8.74%	94%	0.7			
d) 51.15	84.36%	51.15	4.0	4.8	0.4	9.59%	85%	0.7			
e) 50.7	93.16%	50.70	4.2	5.6	0.4	8.74%	94%	0.8			
f) 50.45	98.05%	50.45	3.2	4.4	0.4	--	99%	0.7			
g) 50	98.75%	50.00	0.6	0.8	0.4	--	100%	0.3			

Test No. 2

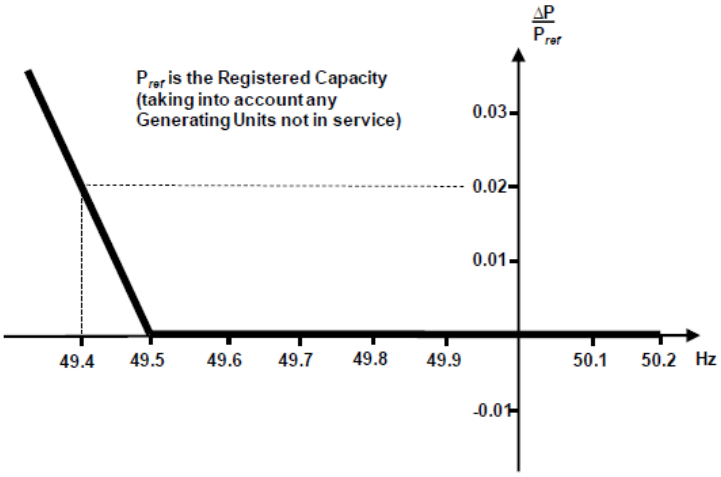
Test Conditions	Measurements						Target value	Δ	Limitation		
f [Hz]	P/Pn [%]	f [Hz]	T_{rise} [s]	$T_{settling}$ [s]	Tv [s]	Droop	P/Pn	Δ P/Pn [%]	Droop	T_{rise} [s]	Tv [s]
a) 50	50.33%	50.00	--	--	--	--	50%	0.2	8.5 %≤Droop ≤12.8%	≤10	≤2
b) 50.45	49.96%	50.45	3.8	4.8	0.4	--	49%	0.3			
c) 50.7	45.06%	50.70	1.6	3.2	0.4	12.13%	44%	2.9			
d) 51.15	36.29%	51.15	2.2	2.2	0.4	10.94%	35%	7.6			
e) 50.7	45.06%	50.70	1.8	2.0	0.4	12.13%	44%	2.9			
f) 50.45	49.95%	50.45	2.8	3.2	0.4	--	49%	0.3			
g) 50	50.36%	50.00	0.6	1.0	0.4	--	50%	0.1			

Note(s):

P(f) curve setting for test: f1: 50.4Hz; fstop: 50.4Hz (Deactivated); Droop: 10%



9.2	TABLE: Power output when under-frequency			P
Test Conditions	Measurements		Target value	Limitation
f [Hz]	P/Pn [%]	f [Hz]	P/Pn	P/Pn
a) 50	100.22	50	100%	≥ 100%
b) 49.6	100.17	49.55	100%	≥ 100%
c) 47.6	100.31	47.55	100%	≥ 96.2%
Note(s): P(f) curve setting for test: f1: 49.5Hz; fstop: 49.5Hz (Deactivated); Droop: 10%				



10	TABLE: Protection-Reconnection timer (Reconnection)			P
Condition	Measurement		Limitation	
	Delay time [s]	Power Gradient [per mimute]	Delay time [s]	Power Gradient
Reonnection:				
1.12Un	21.24S	--	20	--
0.82Un	22.52s	--		
47.6Hz	21.02s	--		
51.9Hz	22.58s	--		
No reconnection:				
1.16Un	No reconnection	--	No reconnection	--
0.78Un	No reconnection	--		
47.4Hz	No reconnection	--		
52.1Hz	No reconnection	--		
Note(s): For “1.12Un”, “0.82Un”, “47.6Hz”, “51.9Hz” are the reconnection value.				

11	TABLE: Fault level contribution		P
Test Condition	Measurement		
	U [V]	I [A]	
20ms after fault	51.7	19.91	
100ms after fault	50.9	0	
250ms after fault	50.6	0	
500ms after fault	48.7	0	
Trip time [ms]	62		

12	TABLE: Logic interface (input port).	P
Confirm that an input port is provided and can be used to shut down the module.		P
Detail description of logic interface: Logic interface marked “DRM” on inverter which can be operated by a simple switch or contactor. When the switch is closed the inverter can operated normally. When the switch is opened, the inverter will reduce it’s output power to zero within 5s. The signal from the inverter that is being switched is DC about 10 V.		

13	TABLE: Self-Monitoring solid state switching	N/A
It has been verified that in the event of the solid state switching device failing to disconnect the Power Park Module, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.		N/A

14	TABLE: Cyber security	P
In accordance with the provisions of the relevant specific protocol PDPP_A_001, In reference with General Data Protection Regulation (EU) 2016/679.		P

Revision History:

Date YYYY-MM-DD	Contents of modification (latest on top)	Prepared by	Approved by
2020-09-17	Originated and released into QM system	Tobias Yang	Weichun Li

TÜVRheinland®

PHOTO DOCUMENTATION

CN23SLPB 001

for

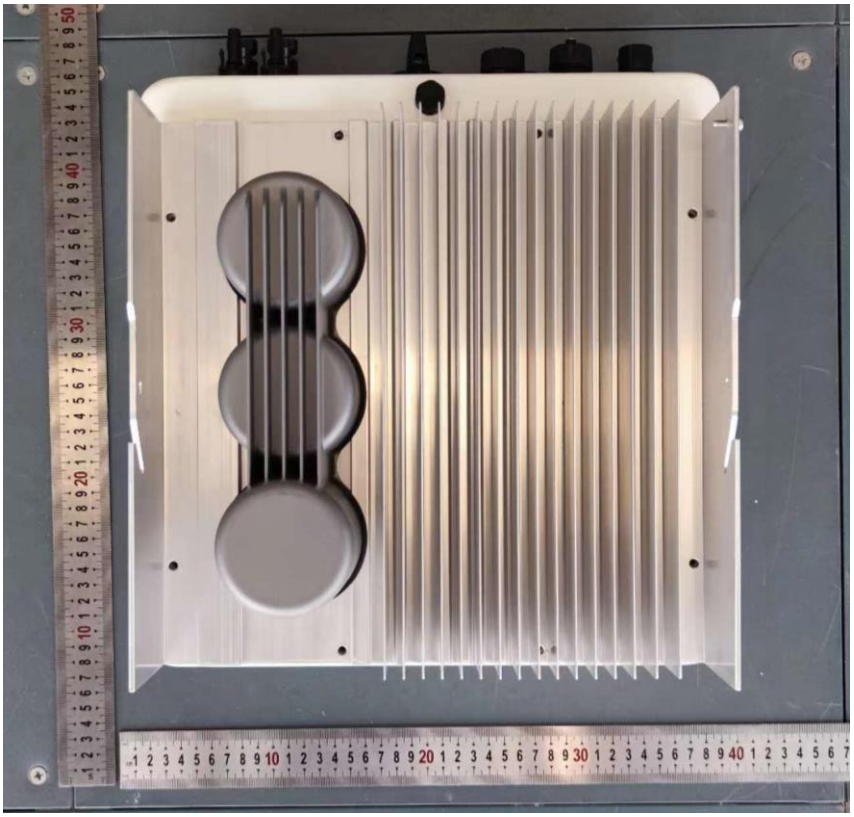
Hybrid Grid-Connected PV Inverter

S6-GR1P2.5K-S, S6-GR1P3K-S, S6-GR1P3.6K-S

Ginlong technologies Co., Ltd.

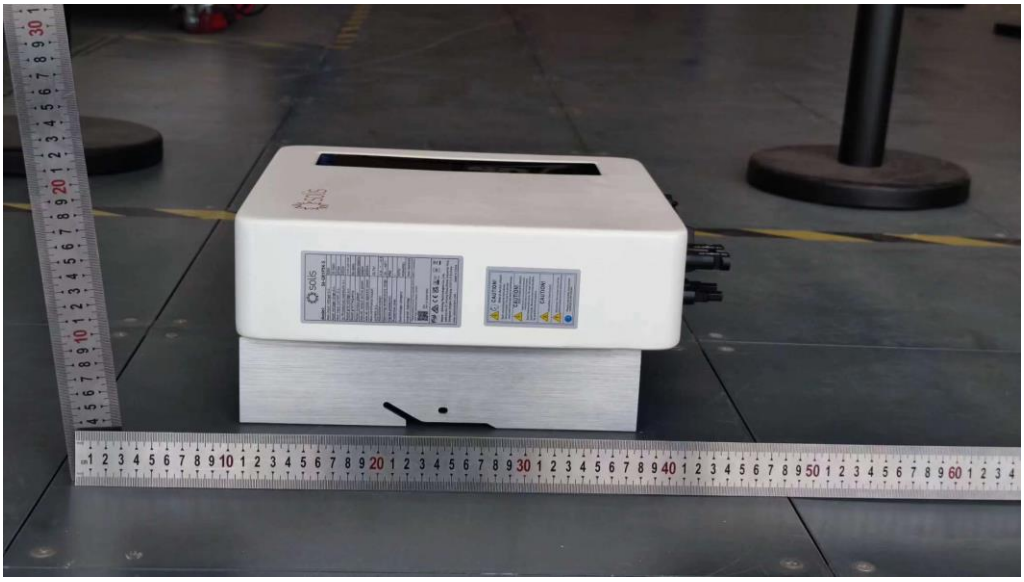
This documentation consists of 5 pages (excluding this cover page)

Overall view

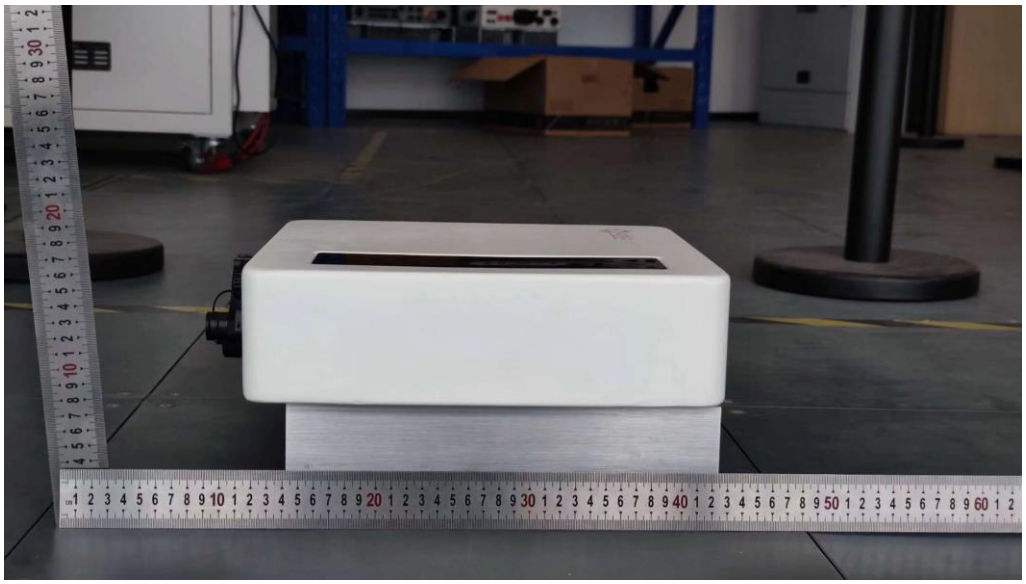


Back view

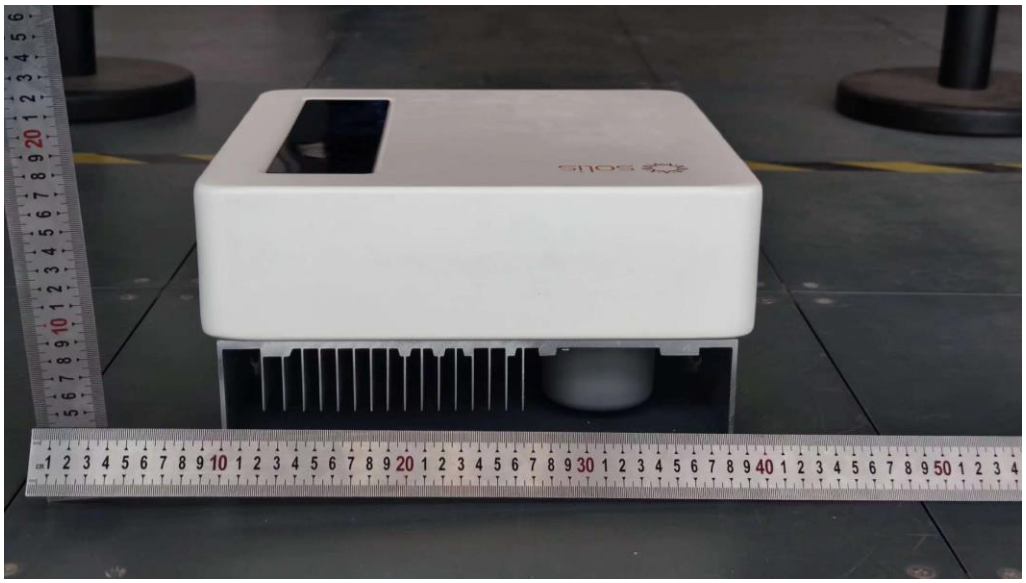
Bottom view



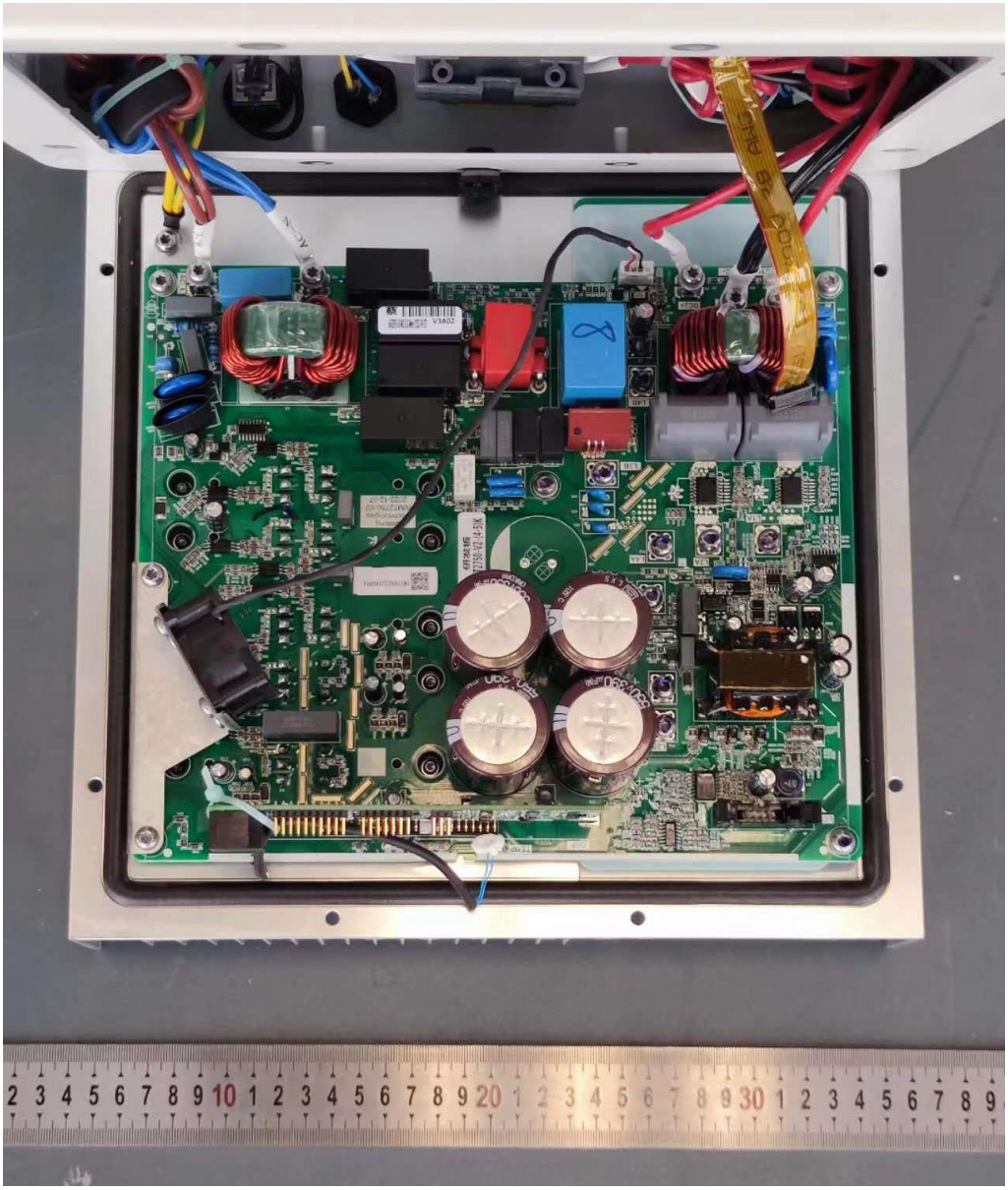
Side view 1



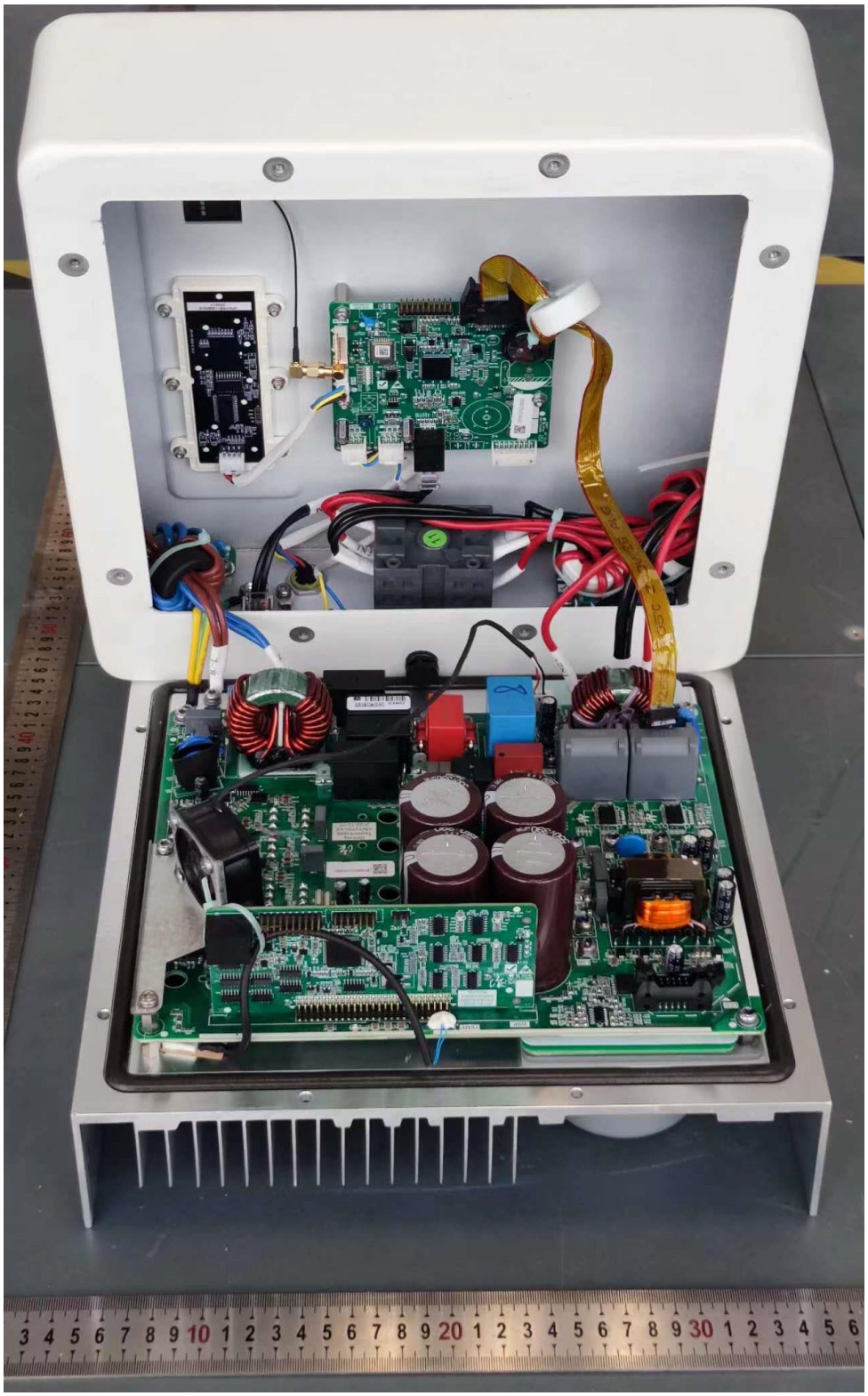
Side view 2



Side view 3



Internal view1



Internal view 2