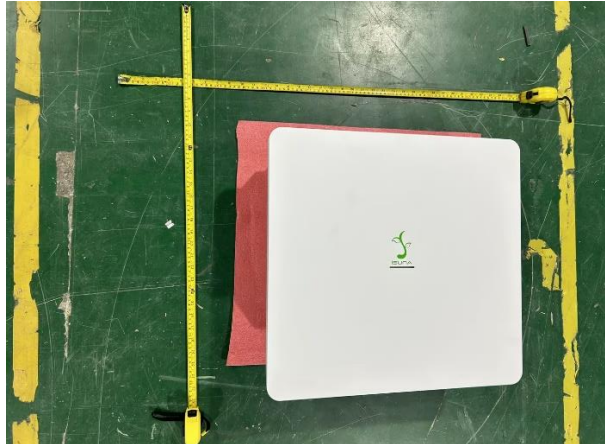


Prüfbericht-Nr.: Test report no.:	CN236RAT 001	Auftrags-Nr.: Order no.:	244495829	Seite 1 von 10 Page 1 of 10
Kunden-Referenz-Nr.: Client reference no.:	2064060	Auftragsdatum: Order date:	2023-02-23	
Auftraggeber: Client:	Shenzhen Sinexcel Isuna Energy Technology Co., Ltd Room 301, Building 6, BaiWangXin High-tech Industrial Park, Nanshan District, Shenzhen, 518055 Guangdong P.R. China			
Prüfgegenstand: Test item:	Hybrid Inverter			
Bezeichnung / Typ-Nr.: Identification / Type no.:	Isuna 3000S, Isuna 3600S			
Auftrags-Inhalt: Order content:	AK Certification			
Prüfgrundlage: Test specification:	G98/1-7/10.22			
Wareneingangsdatum: Date of sample receipt:	2023-02-23			
Prüfmuster-Nr.: Test sample no.:	A003594937-001			
Prüfzeitraum: Testing period:	2023-02-23 – 2023-11-03			
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:			genehmigt von: authorized by:	
Datum: Date:	Cici Li / Theo Tang 2023-11-03		Ausstellungsdatum: Issue date:	Allen Hu 2023-11-03
Stellung / Position:	Bewährung/Trainee Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt 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				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

Prüfbericht-Nr.: CN236RAT 001
Test report no.:

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
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. <i>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.</i>		
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: go.tuv.com/digital-signature <i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following website: go.tuv.com/digital-signature</i>		
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. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>		
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen 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 bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>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.</i>		

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Liste der verwendeten Prüfmittel
List of used test equipment

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.

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Produktbeschreibung Product description

Copy of marking plate

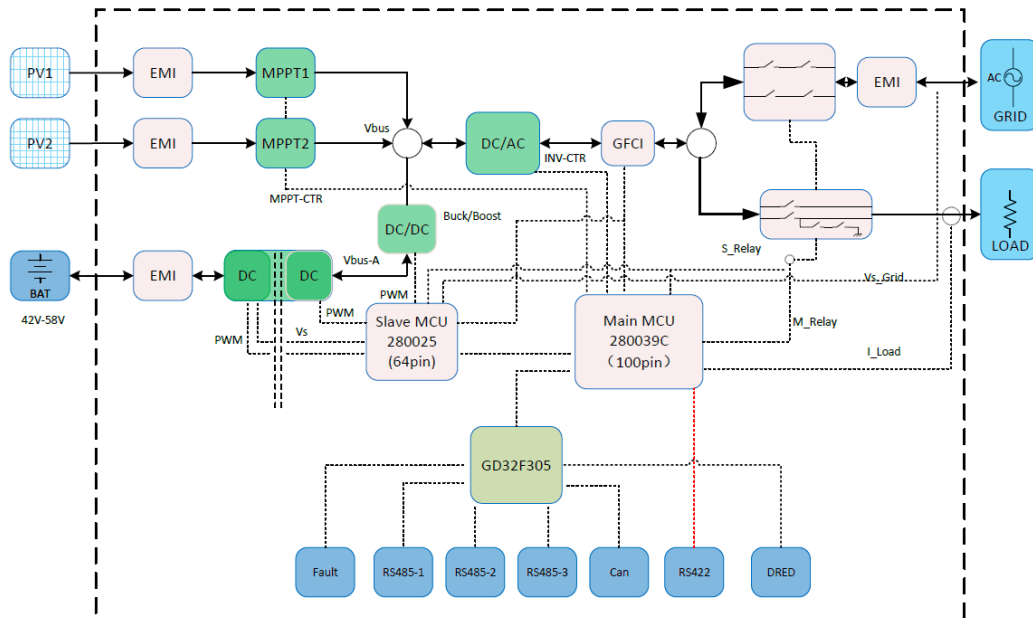
Hybrid Inverter Model name: Isuna 3000S PV Port Operating Voltage 80 to 550d.c.V Max. Input Voltage 600d.c.V Max. Input Current 2×13d.c.A Short-Circuit Current 2×18d.c.A Battery Port Voltage Range 42 to 58d.c.V Max. Charge Current 75d.c.A Max. Discharge Current 75d.c.A AC Input / Output Port Nom. Voltage L/N/PE ~230a.c.V Nom. Frequency 50Hz Max. Input Current 16.4a.c.A Max. Input Apparent Power 3.6kVA Max. Output Current 13.6a.c.A Max. Output Apparent Power 3kVA Back-up Output Port Nom. Voltage L/N/PE~230a.c.V Nom. Frequency 50Hz Max. Output Current 13.6a.c.A Max. Output Apparent Power 3kVA General Data Power factor -0.8 to 0.8 Protective Class I Ingress Protection IP65 Operating Temperature -25 to 60 °C Derating Temperature >40 °C  Manufacturer: Shenzhen Shenzhou Isuna Energy Technology Co., Ltd. Address: Room 301, Building 6, BaWangXin High-Tech Industrial Park, Nanshan District, Shenzhen City, China SN: Made In China	Hybrid Inverter Model name: Isuna 3600S PV Port Operating Voltage 80 to 550d.c.V Max. Input Voltage 600d.c.V Max. Input Current 2×13d.c.A Short-Circuit Current 2×18d.c.A Battery Port Voltage Range 42 to 58d.c.V Max. Charge Current 85d.c.A Max. Discharge Current 85d.c.A AC Input / Output Port Nom. Voltage L/N/PE ~230a.c.V Nom. Frequency 50Hz Max. Input Current 22.7a.c.A Max. Input Apparent Power 5kVA Max. Output Current 16.4a.c.A Max. Output Apparent Power 3.6kVA Back-up Output Port Nom. Voltage L/N/PE~230a.c.V Nom. Frequency 50Hz Max. Output Current 16.4a.c.A Max. Output Apparent Power 3.6kVA General Data Power factor -0.8 to 0.8 Protective Class I Ingress Protection IP65 Operating Temperature -25 to 60 °C Derating Temperature >40 °C  Manufacturer: Shenzhen Shenzhou Isuna Energy Technology Co., Ltd. Address: Room 301, Building 6, BaWangXin High-Tech Industrial Park, Nanshan District, Shenzhen City, China SN: Made In China
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Produktbeschreibung Product description

General product information:

Brief description:

The equipment Isuna 3000S, Isuna 3600S are hybrid inverters designed to work with PV panels up to 600Vd.c and batteries up to 58Vd.c. It is responsible for converting the direct current generated by photovoltaic panels and batteries into single -phase 230 V, 50 Hz alternative current for feeding into the electrical power distribution grid or the backup load. The Hybrid inverter can operate when it is connected to the electrical power distribution line or as a stand alone unit. The inverter can't work in bypass mode. If AC load needs to be connected to the grid, an external single-pole double-throw switch is required to ensure the AC grid and load are separated from the inverter as mentioned in user manual. The models Isuna 3000S, Isuna 3600S, same family products identical to each other, except for software settings for different output power and current.



Block diagram

Protective function in PCE:

1. PV array insulation resistance detecting
2. Residual current monitoring
3. Over and under grid voltage / frequency protection
4. Anti-islanding protection
5. DC injection current protection
6. Over current protection
7. Over temperature protection and auto derating function
8. Relay self-checking function
9. RCMU self-checking function
10. Relays used in series as grid auto-disconnection devices for redundant NS protection
11. Short-circuit protection relies on external circuit breaks which are specified in the installation manual

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Produktbeschreibung
Product description

Model list:

Model		Isuna 3000S	Isuna 3600S
DC input side	V _{MAX} Input [Vd.c.]	600	
	MPPT Voltage Range [Vd.c.]	80-550	
	MPPT Full Power Voltage Range[Vd.c.]	350-500	
	Isc PV[Ad.c.]	18	
	Maximum DC Input Current [Ad.c.]	13	
	Start PV Voltage [Vd.c.]	95	
	Overvoltage Category (OVC)	II	
Battery	Rated Input Voltage [Vd.c.]	51.2	
	Input Voltage Range [Vd.c.]	42-58	
	Max. battery charge current [Ad.c.]	75	85
	Max. battery discharge current [Ad.c.]	75	85
	Battery Type	Li-Ion	
AC output (grid side)	Rated Output Voltage Ur [Va.c.]	L/N/PE 230	
	Rated Output Frequency F _{NETZ} [Hz]	50	
	Rated Output Power P _E [kW]	3000	3600
	Max. Output Power P _E [kW]	3000	3600
	Rated. Output Current I _r [Aa.c.]	13.6	16.4
	Max. Output Current I _{max} [Aa.c.]	13.6	16.4
	Power Factor cosφ [λ]	-0.8 to 0.8	
	Overvoltage Category (OVC)	III	
put (loa	Rated Output Voltage Ur [Va.c.]	L/N/PE 230	

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Produktbeschreibung
Product description

	Rated Output Frequency F _{NETZ} [Hz]	50	
	Rated Output Apparent Power[kVA]	3000	3600
	Max. Output Apparent Power[kVA]	3000	3600
	Rated. Output Current I _r [Aa.c.]	13.6	16.4
	Max. Output Current I _{max} [Aa.c.]	13.6	16.4
	Overvoltage Category (OVC)	III	

Grid input	Rated Input Voltage [Va.c.]	L/N/PE 230	
	Rated Input Frequency [Hz]	50	
	Max input apparent power [kVA]	3600	5000
	Max. input current [Aa.c.]	16.4	22.7
	Overvoltage Category (OVC)	III	
Enclosure Protection (IP)		IP65	
Operating Temperature Range [°C]		-25 to +60 (> 40 derating)	
Humidity (%)		0-100%	
Pollution degree (PD)		PD 3(PD 2 inside)	
Altitude [m]		4000	
Weight [kg]		21	
Dimension [W*H*D (mm)]		500*470*180	
Cooling Type		Natural heat dissipation	
Type of inverter		non isolated (between PV side and AC side)	
Firmware version		A00	
Notes:			

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Produktbeschreibung
Product description

Throughout the test report following abbreviations may be used:

- input	i/p	- Test repeated, similar result(3 times)	TRSR
- output	o/p	- No indication of dielectric breakdown	NB
- short-circuited	s-c	- Cheesecloth remained intact	NC
- overloaded	o-l	- Tissue paper remained intact	NT
- open-circuited	o-c	- No hazards	NH
- normal conditions	N.C.	- The PCE can recover to operate automatically after removing the abnormal condition	RO
- single fault conditions	SFC	- functional insulation	FI
- between parts of opposite polarity	BOP	- basic insulation	BI
- internal protection operated	IPO	- supplementary insulation	SI
- Component damage (list damaged component)	CD	- double insulation	DI
- No component damaged	NCD	- reinforced insulation	RI

Indicate used abbreviations (if any)

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Absatz <i>Clause</i>	Anforderungen - Prüfungen <i>Requirements - Tests</i>	Messergebnisse - Bemerkungen <i>Measuring results - Remarks</i>	Bewertung <i>Evaluation</i>
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
10	Protection	Considered, see appended test table for detail.	P
11	Type A Power Generating Module Technical Requirements	Considered, see appended test table for detail.	P

ANLAGE zum Prüfbericht-Nr.: CN236RAT 001
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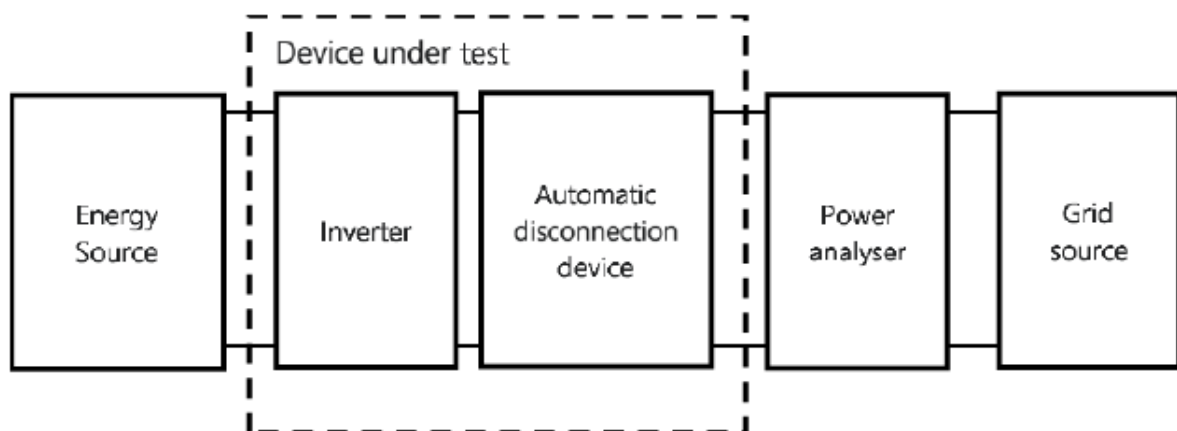
ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

See attachment for test data.

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

Project Engineer:	Cici Li / Theo Tang	Reviewer:	Allen Hu
Signature:	<i>Cici Li Theo Tang</i>	Signature:	<i>Allen Hu</i>

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

Test bench:

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

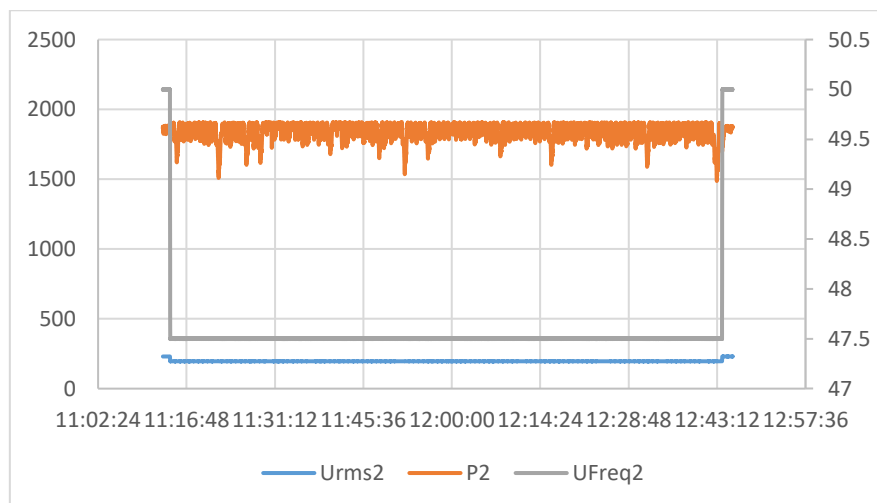
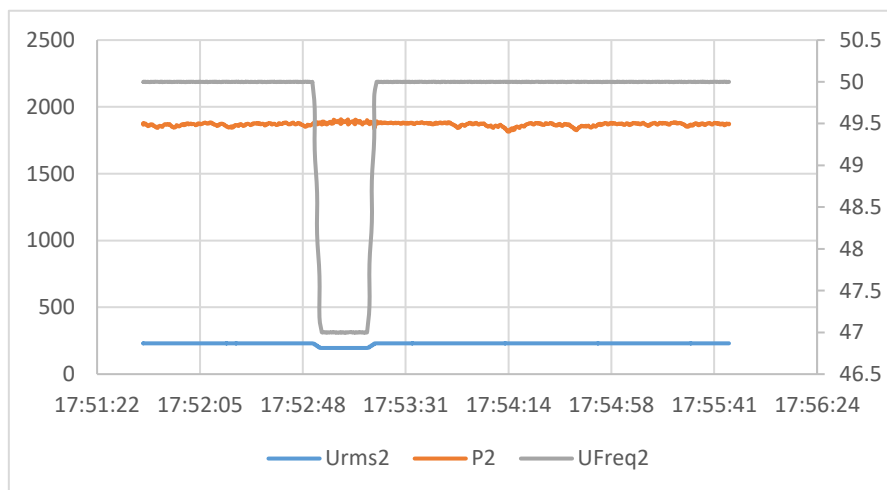
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1	TABLE: Normal operating range (Operation range)				P
Test Conditions				Measurements	Limitation
U/Un	f [Hz]	cosφ	t [s]		
85%(195.5 V)	47.0	1.00	20	No disconnect	No disconnect
85%(195.5 V)	47.5	1.00	5400	No disconnect	No disconnect
110%(253 V)	51.5	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

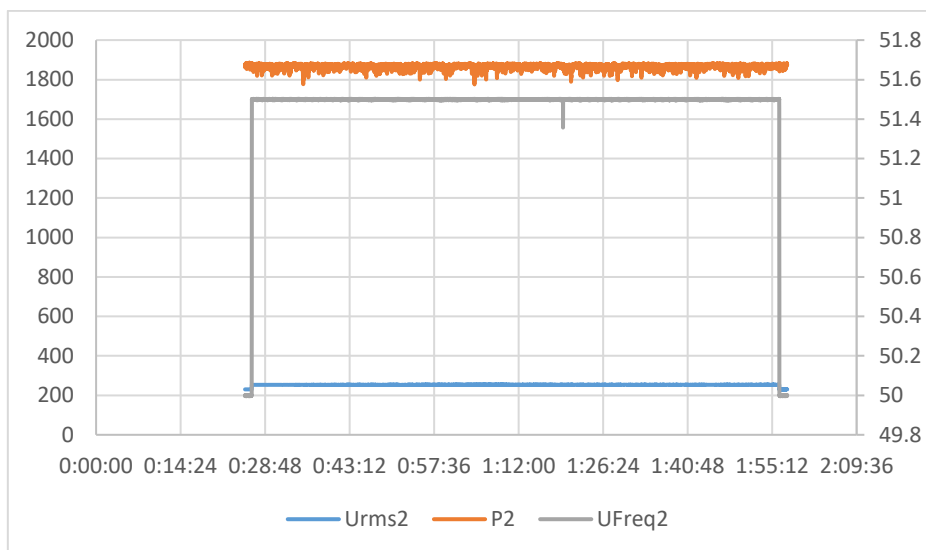
Note(s):

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

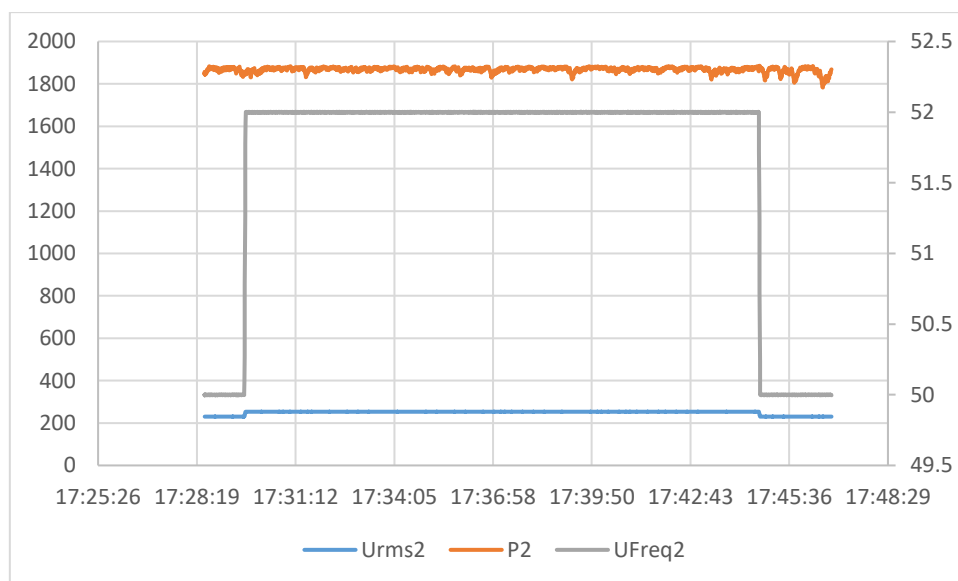


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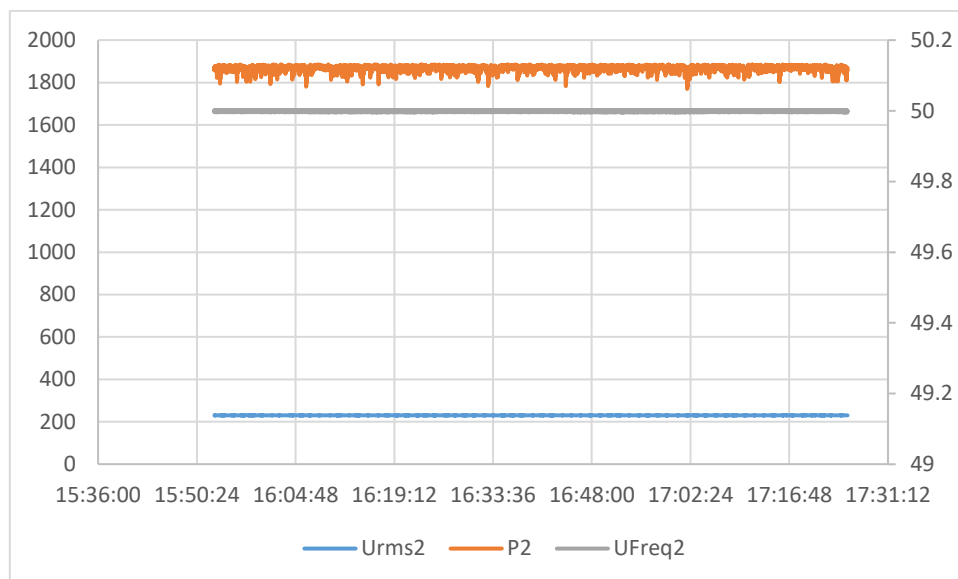
110%Un51.5Hz



110%Un52Hz

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100%Un50Hz

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2.1	TABLE: Harmonics current (THDi)		P
P/Pn[%]	50	100	Limit
Order No.	Measurement		
	[A]	[A]	Ih [A]
1	7.9943	15.9479	--
3	0.0464	0.0977	2.300
4	0.0092	0.0146	0.430
5	0.1072	0.0798	1.140
6	0.0074	0.0055	0.300
7	0.0961	0.0632	0.770
8	0.0048	0.0050	0.230
9	0.0447	0.0486	0.400
10	0.0034	0.0036	0.184
11	0.0214	0.0247	0.330
12	0.0025	0.0017	0.153
13	0.0110	0.0123	0.210
14	0.0012	0.0008	0.131
15	0.0046	0.0052	0.150
16	0.0004	0.0006	0.115
17	0.0021	0.0028	0.132
18	0.0003	0.0003	0.102
19	0.0011	0.0015	0.118
20	0.0002	0.0002	0.092
21	0.0007	0.0008	0.107(0.160)
22	0.0002	0.0002	0.084
23	0.0004	0.0006	0.098(0.147)
24	0.0001	0.0002	0.077
25	0.0002	0.0004	0.090(0.135)
26	0.0001	0.0001	0.071
27	0.0002	0.0003	0.083(0.124)
28	0.0001	0.0001	0.066
29	0.0001	0.0002	0.078(0.117)
30	0.0001	0.0001	0.061
31	0.0001	0.0002	0.073(0.109)
32	0.0001	0.0001	0.058
33	0.0001	0.0001	0.068(0.102)
34	0.0001	0.0001	0.054
35	0.0001	0.0001	0.064(0.096)
36	0.0001	0.0001	0.051
37	0.0001	0.0001	0.061(0.091)
38	0.0001	0.0001	0.048
39	0.0001	0.0001	0.058(0.087)
40	0.0001	0.0001	0.046

Note(s): The worst case of the three phases shall be chosen. 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.

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3.1	TABLE: Power Quality – Voltage fluctuations and Flicker:						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	3.327	0.058	490	3.027	2.895	0.0	0.483	0.481
Z _{ref} Normalised to standard impedance	3.327	0.058	490	3.027	2.895	0.0	0.483	0.481
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 chosen.

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

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	702.88	-63.17	0.9960	216.34	3.26	>0.95
	1.00	1.0	705.06	-53.56	0.9971	230.14	3.07	>0.95
	1.00	1.1	712.12	67.08	0.9956	253.13	2.83	>0.95
50%	1.00	0.94	1809.73	-44.55	0.9997	216.57	8.36	>0.95
	1.00	1.0	1809.73	-50.97	0.9996	230.35	7.86	>0.95
	1.00	1.1	1808.22	72.61	0.9992	253.34	7.14	>0.95
75%	1.00	0.94	2684.81	45.29	0.9998	216.77	12.39	>0.95
	1.00	1.0	2689.08	69.08	0.9997	230.55	11.67	>0.95
	1.00	1.1	2687.15	102.23	0.9993	253.51	10.61	>0.95
100%	1.00	0.94	3609.77	71.04	0.9998	216.99	16.64	>0.95
	1.00	1.0	3611.55	81.51	0.9997	230.75	15.66	>0.95
	1.00	1.1	3618.78	111.96	0.9995	253.69	14.27	>0.95
Note(s):								

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6	TABLE: Protection-Frequency tests (OF/UF)		P
Condition	Setting [Hz]	Measurement	Limitation
		Trip value [Hz]	
F>>	52.0	52.04	± 0.1% of f_n
F<	47.5	47.49	
F<<	47	46.96	
Condition	Setting [ms]	Measurement	Limitation [ms]
		Time delay	
F>>	500	536	500-600
F<	20000	20100	20000-20100
F<<	500	534	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):			

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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:	L1:	L1:		76.4	500	
	L2: 3.312	L2: 3.68	L2: 4.048	1.17			
	L3:	L3:	L3:				
P _R : -10% Q _C : +5%	L1:	L1:	L1:		278	500	
	L2: 3.312	L2: 3.68	L2: 3.864	1.14			
	L3:	L3:	L3:				
P _R : -10% Q _C : 0%	L1:	L1:	L1:		75.4	500	
	L2: 3.312	L2: 3.68	L2: 3.68	1.11			
	L3:	L3:	L3:				
P _R : -10% Q _C : -5%	L1:	L1:	L1:		92.8	500	
	L2: 3.312	L2: 3.68	L2: 3.496	1.08			
	L3:	L3:	L3:				
P _R : -10% Q _C : -10%	L1:	L1:	L1:		452	500	
	L2: 3.312	L2: 3.68	L2: 3.312	1.05			
	L3:	L3:	L3:				
P _R : -5% Q _C : +10%	L1:	L1:	L1:		76.8	500	
	L2: 3.496	L2: 3.68	L2: 4.048	1.10			
	L3:	L3:	L3:				
P _R : -5% Q _C : -10%	L1:	L1:	L1:		57.8	500	
	L2: 3.496	L2: 3.68	L2: 3.312	1.00			
	L3:	L3:	L3:				
P _R : 0% Q _C : +10%	L1:	L1:	L1:		75.8	500	
	L2: 3.68	L2: 3.68	L2: 4.048	1.05			
	L3:	L3:	L3:				
P _R : -5% Q _C : +5%	L1:	L1:	L1:		237	500	
	L2: 3.496	L2: 3.68	L2: 3.864	1.08			
	L3:	L3:	L3:				
P _R : -5% Q _C : 0%	L1:	L1:	L1:		87.8	500	
	L2: 3.496	L2: 3.68	L2: 3.68	1.05			
	L3:	L3:	L3:				
P _R : -5% Q _C : -5%	L1:	L1:	L1:		67.2	500	
	L2: 3.496	L2: 3.68	L2: 3.496	1.03			

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	L3:	L3:	L3:			
P _R : 0% Q _C : +5%	L1:	L1:	L1:		70.4	500
	L2: 3.68	L2: 3.68	L2: 3.864	1.02		
	L3:	L3:	L3:			
P _R : 0% Q _C : 0%	L1:	L1:	L1:		84.2	500
	L2: 3.68	L2: 3.68	L2: 3.68	1.00		
	L3:	L3:	L3:			
P _R : 0% Q _C : -5%	L1:	L1:	L1:		65.8	500
	L2: 3.68	L2: 3.68	L2: 3.496	0.97		
	L3:	L3:	L3:			
P _R : +5% Q _C : +5%	L1:	L1:	L1:		299	500
	L2: 3.864	L2: 3.68	L2: 3.864	0.98		
	L3:	L3:	L3:			
P _R : +5% Q _C : 0%	L1:	L1:	L1:		151	500
	L2: 3.864	L2: 3.68	L2: 3.68	0.95		
	L3:	L3:	L3:			
P _R : +5% Q _C : -5%	L1:	L1:	L1:		66.8	500
	L2: 3.864	L2: 3.68	L2: 3.496	0.93		
	L3:	L3:	L3:			
P _R : 0% Q _C : -10%	L1:	L1:	L1:		91.4	500
	L2: 3.68	L2: 3.68	L2: 3.312	0.95		
	L3:	L3:	L3:			
P _R : +5% Q _C : +10%	L1:	L1:	L1:		72	500
	L2: 3.864	L2: 3.68	L2: 4.048	1.00		
	L3:	L3:	L3:			
P _R : +5% Q _C : -10%	L1:	L1:	L1:		167	500
	L2: 3.864	L2: 3.68	L2: 3.312	0.90		
	L3:	L3:	L3:			
P _R : +10% Q _C : +10%	L1:	L1:	L1:		72.2	500
	L2: 4.048	L2: 3.68	L2: 4.048	0.95		
	L3:	L3:	L3:			
P _R : +10% Q _C : +5%	L1:	L1:	L1:		64.2	500
	L2: 4.048	L2: 3.68	L2: 3.864	0.93		
	L3:	L3:	L3:			
P _R : +10% Q _C : 0%	L1:	L1:	L1:		66.2	500
	L2: 4.048	L2: 3.68	L2: 3.68	0.91		

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	L3:	L3:	L3:			
P _R : +10% Q _C : -5%	L1:	L1:	L1:		43.4	500
	L2: 4.048	L2: 3.68	L2: 3.496	0.89		
	L3:	L3:	L3:			
P _R : +10% Q _C : -10%	L1:	L1:	L1:		95.4	500
	L2: 4.048	L2: 3.68	L2: 3.312	0.86		
	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:	L1:	L1:		122.5	500
	L2: 2.43	L2: 2.43	L2: 2.3	0.97		
	L3:	L3:	L3:			
P _R : 0% Q _C : -4%	L1:	L1:	L1:		207	500
	L2: 2.43	L2: 2.43	L2: 2.33	0.98		
	L3:	L3:	L3:			
P _R : 0% Q _C : -3%	L1:	L1:	L1:		84.4	500
	L2: 2.43	L2: 2.43	L2: 2.36	0.99		
	L3:	L3:	L3:			
P _R : 0% Q _C : -2%	L1:	L1:	L1:		65.4	500
	L2: 2.43	L2: 2.43	L2: 2.38	0.99		
	L3:	L3:	L3:			
P _R : 0% Q _C : -1%	L1:	L1:	L1:		64.6	500
	L2: 2.43	L2: 2.43	L2: 2.41	1.00		
	L3:	L3:	L3:			
P _R : 0% Q _C : 0%	L1:	L1:	L1:		69.4	500
	L2: 2.43	L2: 2.43	L2: 2.43	1.00		
	L3:	L3:	L3:			
P _R : 0% Q _C : +1%	L1:	L1:	L1:		55.4	500
	L2: 2.43	L2: 2.43	L2: 2.45	1.00		
	L3:	L3:	L3:			
P _R : 0% Q _C : +2%	L1:	L1:	L1:		58	500
	L2: 2.43	L2: 2.43	L2: 2.49	1.01		
	L3:	L3:	L3:			

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P _R : 0% Q _C : +3%	L1:	L1:	L1:		56.2	500
	L2: 2.43	L2: 2.43	L2: 2.5	1.01		
	L3:	L3:	L3:			
P _R : 0% Q _C : +4%	L1:	L1:	L1:		58.2	500
	L2: 2.43	L2: 2.43	L2: 2.53	1.02		
	L3:	L3:	L3:			
P _R : 0% Q _C : +5%	L1:	L1:	L1:		56.8	500
	L2: 2.43	L2: 2.43	L2: 2.55	1.02		
	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:	L1:	L1:		201	500
	L2: 1.214	L2: 1.214	L2: 1.153	0.97		
	L3:	L3:	L3:			
P _R : 0% Q _C : -4%	L1:	L1:	L1:		58.6	500
	L2: 1.214	L2: 1.214	L2: 1.165	0.98		
	L3:	L3:	L3:			
P _R : 0% Q _C : -3%	L1:	L1:	L1:		452	500
	L2: 1.214	L2: 1.214	L2: 1.178	0.99		
	L3:	L3:	L3:			
P _R : 0% Q _C : -2%	L1:	L1:	L1:		105.4	500
	L2: 1.214	L2: 1.214	L2: 1.189	0.99		
	L3:	L3:	L3:			
P _R : 0% Q _C : -1%	L1:	L1:	L1:		66	500
	L2: 1.214	L2: 1.214	L2: 1.202	1.00		
	L3:	L3:	L3:			
P _R : 0% Q _C : 0%	L1:	L1:	L1:		62	500
	L2: 1.214	L2: 1.214	L2: 1.214	1.00		
	L3:	L3:	L3:			
P _R : 0% Q _C : +1%	L1:	L1:	L1:		334	500
	L2: 1.214	L2: 1.214	L2: 1.226	1.00		
	L3:	L3:	L3:			
	L1:	L1:	L1:		57	

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P _R : 0% Q _C : +2%	L2: 1.214	L2: 1.214	L2: 1.238	1.01		500
	L3:	L3:	L3:			
P _R : 0% Q _C : +3%	L1:	L1:	L1:		54.6	500
	L2: 1.214	L2: 1.214	L2: 1.250	1.01		
	L3:	L3:	L3:			
P _R : 0% Q _C : +4%	L1:	L1:	L1:		58.8	500
	L2: 1.214	L2: 1.214	L2: 1.263	1.02		
	L3:	L3:	L3:			
P _R : 0% Q _C : +5%	L1:	L1:	L1:		57.6	500
	L2: 1.214	L2: 1.214	L2: 1.275	1.02		
	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

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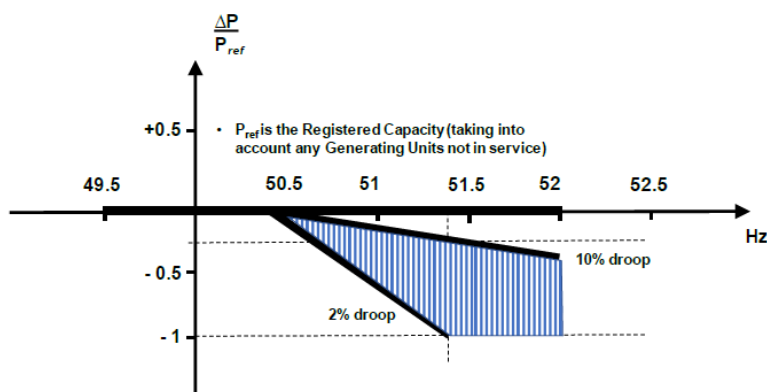
9.1	TABLE: Limitest frequency sensitive mode-over frequency (LFSM-O)								P		
Test No. 1											
Test Conditions	Measurements						Target value	Δ	Limitation		
f [Hz]	P/Pn [%]	f [Hz]	T _{rise} [s]	T _{settling} [s]	T _v [s]	Droop	P/Pn	Δ P/Pn [%]	Droop	T _{rise} [s]	T _v [s]
a) 50	100.08	50.00	--	--	--	--	100%	0.08	8.5 %≤Droop ≤12.8%	≤10	≤2
b) 50.45	99.22	50.45	0.7	0.9	0.1	11.55	99%	0.22			
c) 50.7	93.40	50.70	0.9	1.3	0.1	8.97	94%	-0.6			
d) 51.15	82.96	51.15	1.6	2.0	0.1	8.76	85%	-2.04			
e) 50.7	93.34	50.70	1.3	1.2	0.1	8.89	94%	-0.66			
f) 50.45	99.09	50.45	1.6	1.8	0.1	10.10	99%	0.99			
g) 50	99.90	50.00	1.0	1.3	0.1	--	100%	-0.1			

Test No. 2

Test Conditions	Measurements						Target value	Δ	Limitation		
f [Hz]	P/Pn [%]	f [Hz]	T _{rise} [s]	T _{settling} [s]	T _v [s]	Droop	P/Pn	Δ P/Pn [%]	Droop p	T _{rise} [s]	T _v [s]
a) 50	50.30	50.00	--	--	--	--	50%	0.3	8.5 % ≤ Droop ≤ 12.8 %	≤ 10	≤ 2
b) 50.45	49.17	50.45	1.3	2.1	0.1	8.87	49%	0.17			
c) 50.7	43.52	50.70	1.6	2.2	0.1	8.85	44%	-0.48			
d) 51.15	32.85	51.15	1.5	1.7	0.1	8.59	35%	-2.15			
e) 50.7	43.59	50.70	1.4	1.6	0.1	8.93	44%	-0.41			
f) 50.45	49.22	50.45	1.5	2.1	0.1	9.24	49%	0.22			
g) 50	50.32	50.00	0.6	1.5	0.1	--	50%	0.32			

Note(s):

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

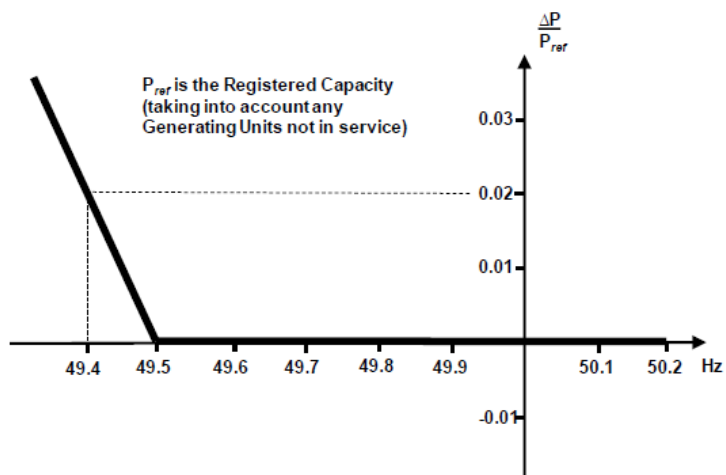


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9.2	TABLE: Power output when under-frequency			P
Test Conditions	Measurements		Target value	Limitation
f [Hz]	P/P _n [%]	f [Hz]	P/P _n	P/P _n
a) 50	100.08	50.00	100%	≥ 100%
b) 49.6	100.03	49.60	100%	≥ 100%
c) 47.6	99.97	47.60	100%	≥ 96.2%

Note(s): P(f) curve setting for test: f₁: 49.5Hz; f_{stop}: 49.5Hz (Deactivated); Droop: 10%



10	TABLE: Protection-Reconnection timer (Reconnection)			P
Condition	Measurement		Limitation	
	Delay time [s]	Power Gradient [per minute]	Delay time [s]	Power Gradient
Reconnection:				
1.12Un	26.2	--	20	--
0.82Un	25.4	--		
47.6Hz	30.4	--		
51.9Hz	26.8	--		
No reconnection:				
1.16Un	No reconnection	--	No reconnection	--
0.78Un	No reconnection	--		
47.4Hz	No reconnection	--		
52.1Hz	No reconnection	--		
Note(s):				

12	TABLE: Logic interface (input port).	P
Confirm that an input port is provided and can be used to shut down the module.		P

1	Battery DC input port (BAT+/-)	5	PV DC input port (PV+/-)
2	WIFI/4G/Bluetooth	6	Explosion-proof ventilation device
3	Multifunctional communication interface	7	Grid-connected AC wiring port
4	PV DC input switch	8	Load wiring port

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DRM0 interface

PIN	Definition	Function	Remarks
1	DRM0+	When DRM0+ and DRM0- are shorted, the inverter will be off the grid within 5s. <u>Note: In normal cases, the two interfaces should remain disconnected.</u>	DRM0 logical interface
2	/		
3	/		
4	/		
5	/		
6	DRM0-		
7	OP-	Normally open dry contact signal ($\leq 1A$)	External dry contact interface
8	OP+		

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
Confirm that the Power Generating Module has been designed to comply with cyber security requirements, as detailed in 9.1.7. The manufacturer has provided the declaration document that the products meet the requirements. In accordance with the provisions of the relevant specific protocol PDPP_A_001, In reference with General Data Protection Regulation (EU) 2016/679.		P

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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

PHOTO DOCUMENTATION

CN236RAT 001 attachment 2

for

Hybrid Inverter

Isuna 3000S, Isuna 3600S

**Shenzhen Sinexcel isuna Energy
Technology Co., Ltd**



This documentation consists of 10 pages (excluding this cover page)

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S



Figure 1 overall view



Figure 2 Top view

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S

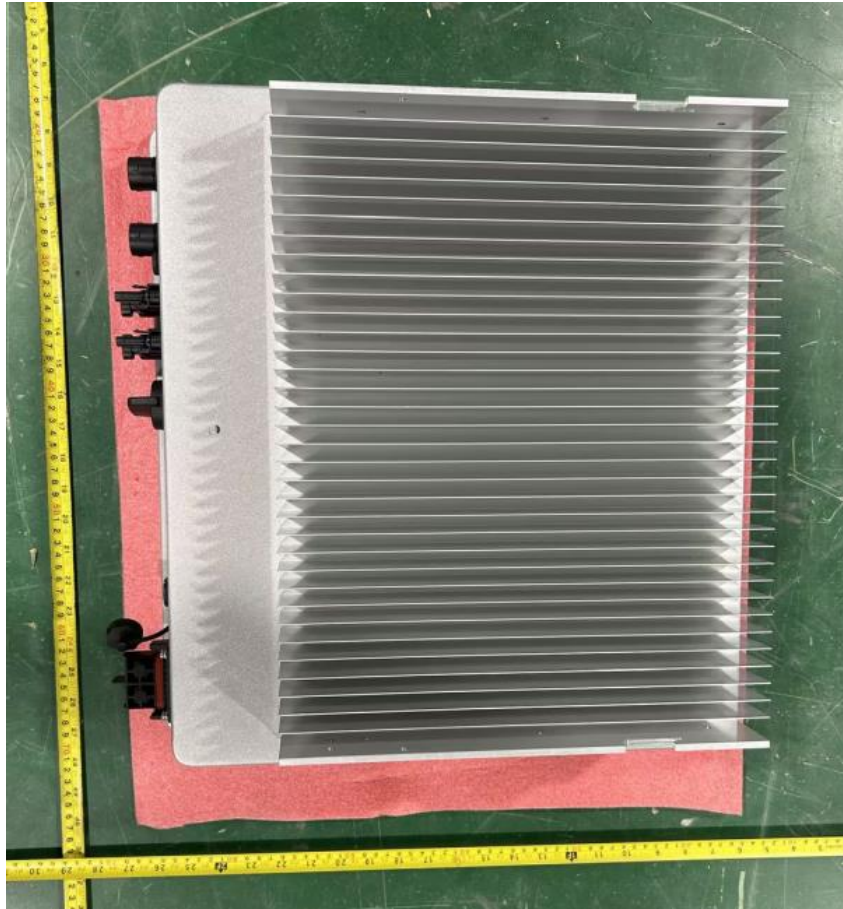


Figure 3 Rear view

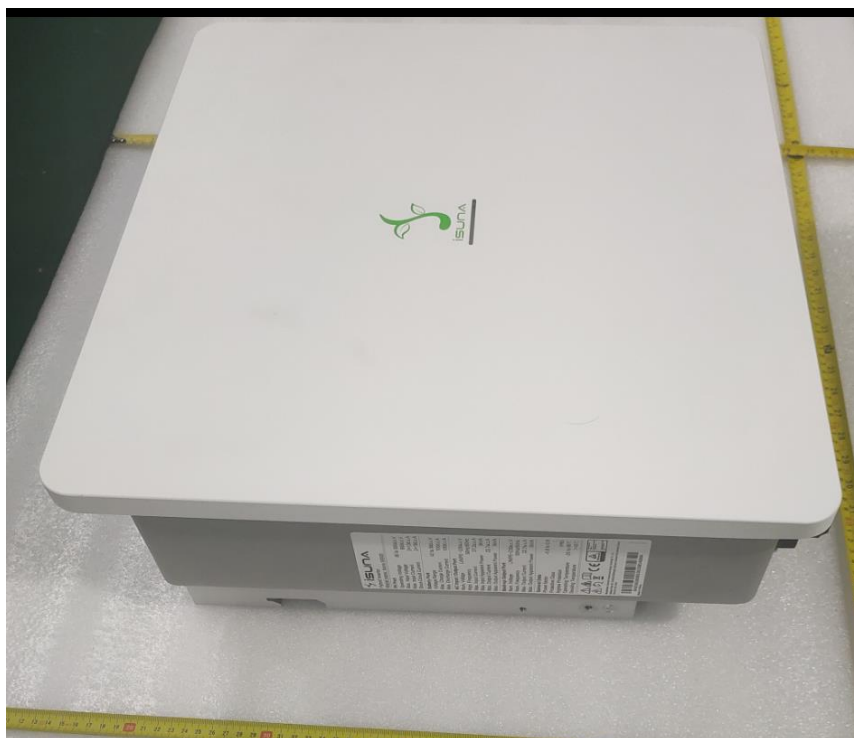


Figure 4 Left side view

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S

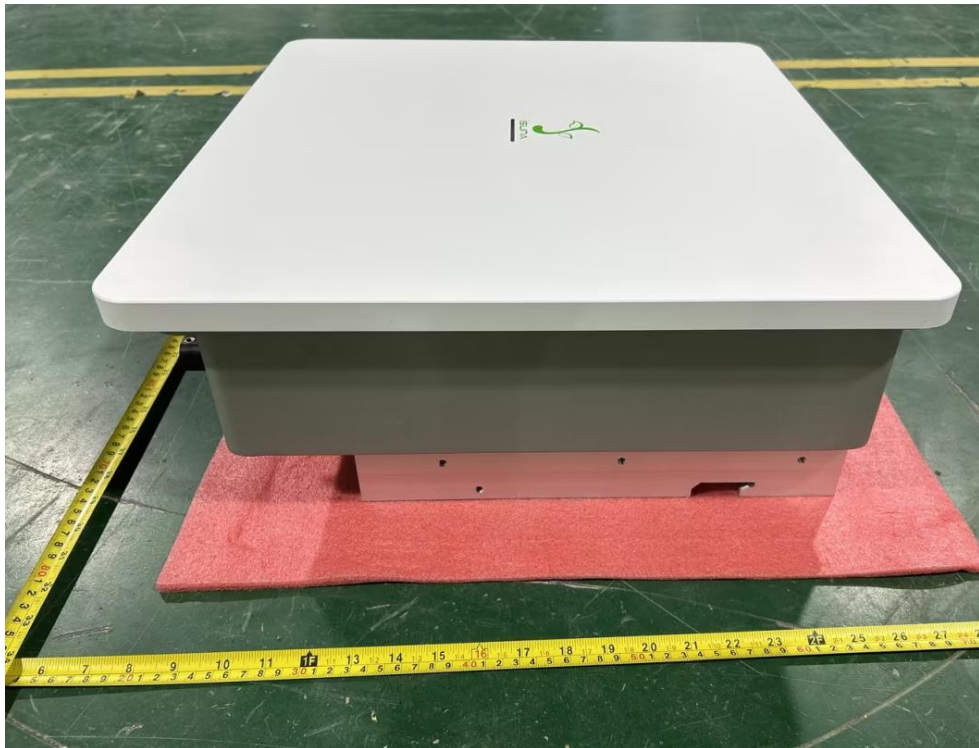


Figure 5 Right side view



Figure 6 Bottom view

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S

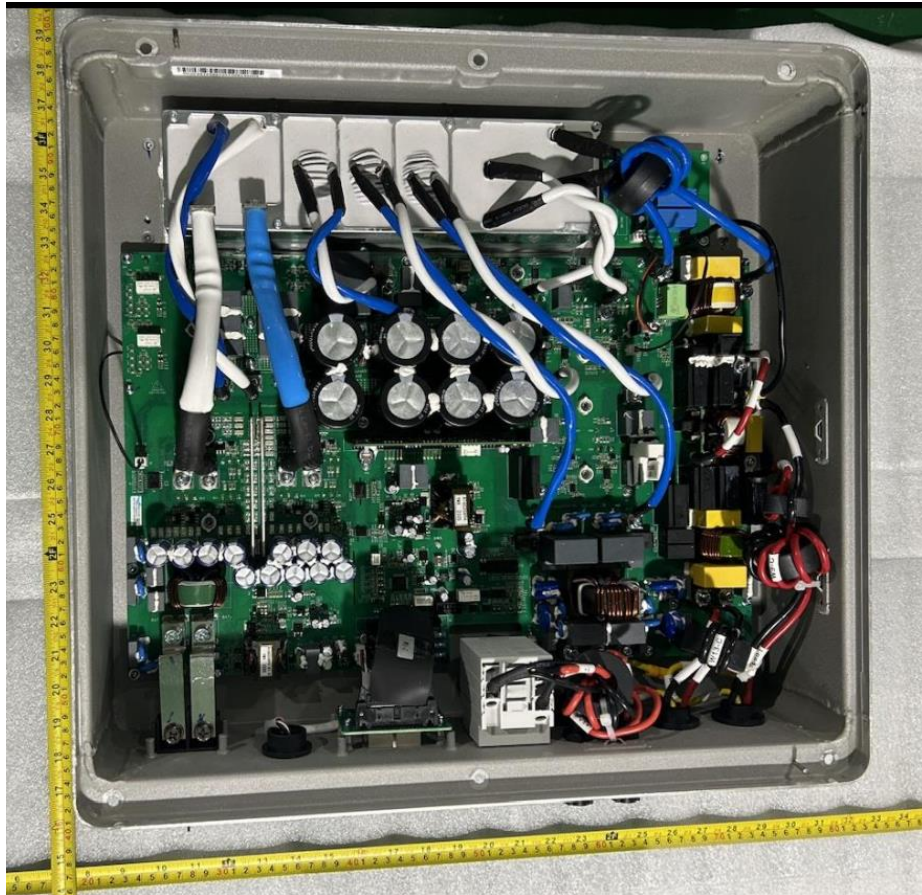


Figure 7 internal view

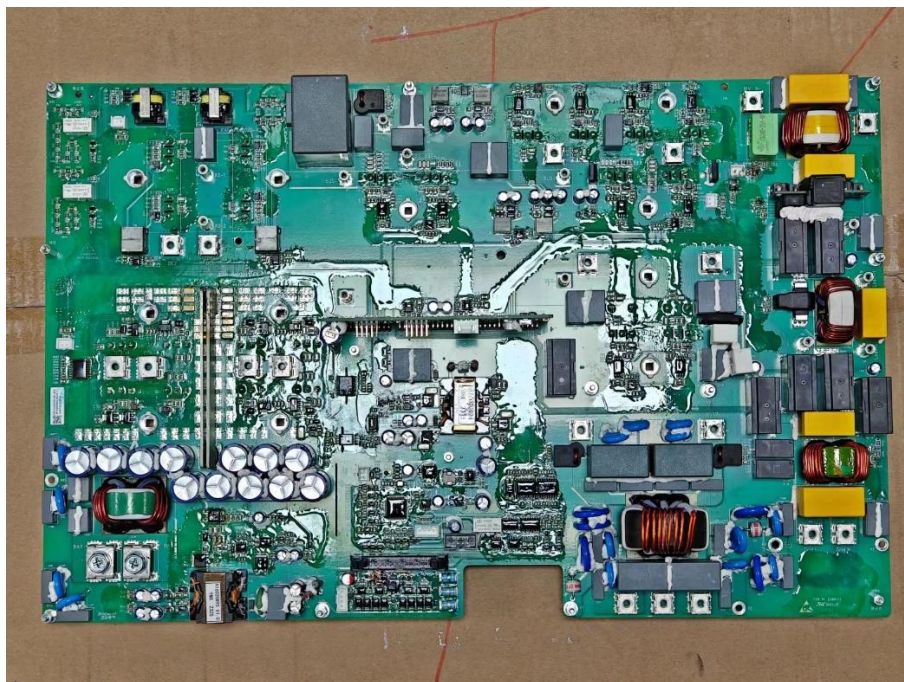


Figure 8 Component side of main power board

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Model: Isuna 3000S, Isuna 3600S

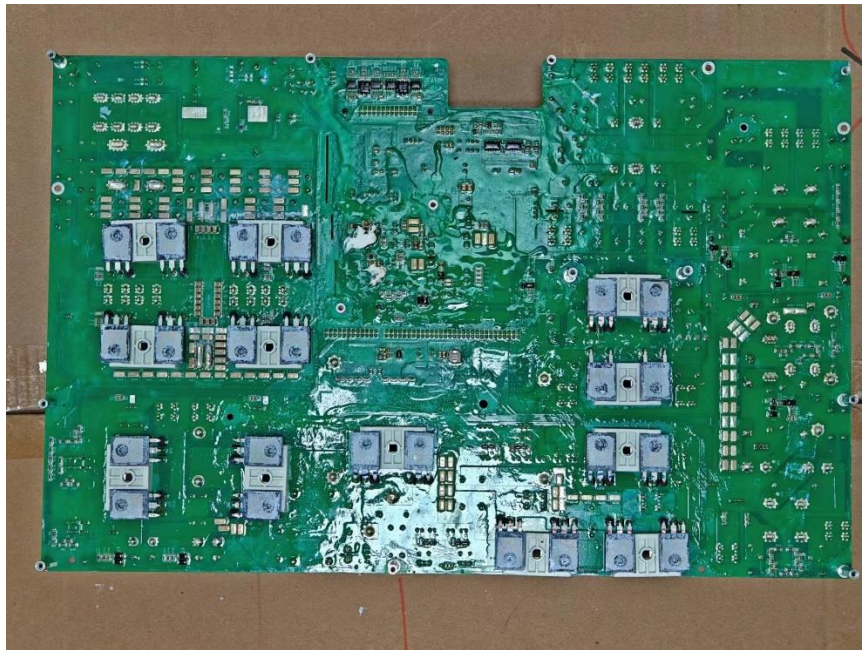


Figure 9 Trace side of main power board

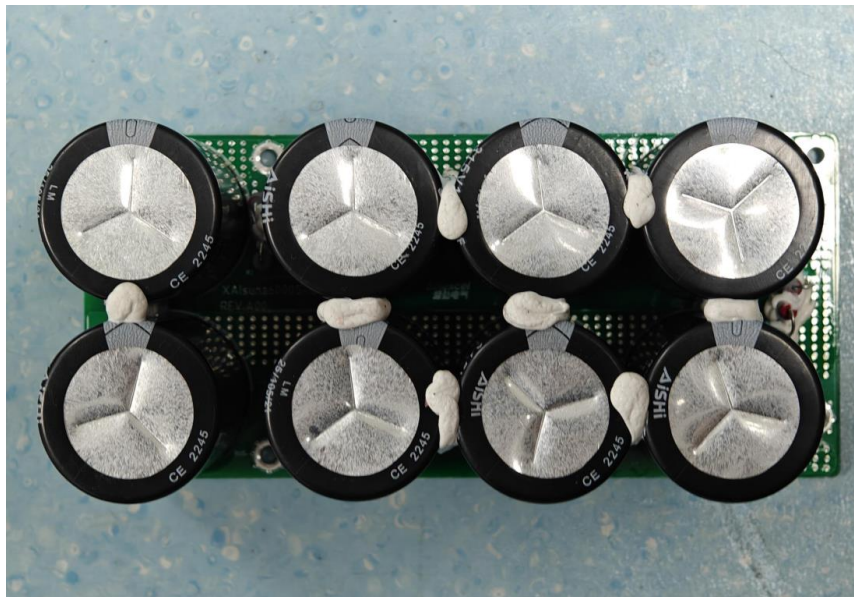


Figure 10 Component side of BUS. capacitor board

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Model: Isuna 3000S, Isuna 3600S



Figure 11 Trace side of BUS. capacitor board

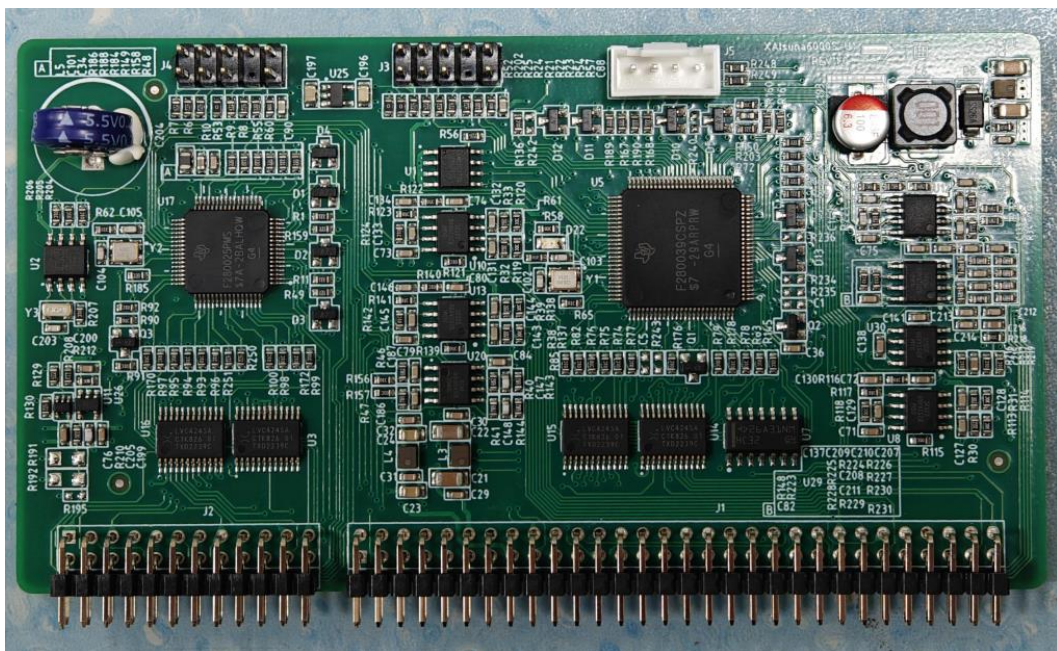


Figure 12 Component side of Control board

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Model: Isuna 3000S, Isuna 3600S

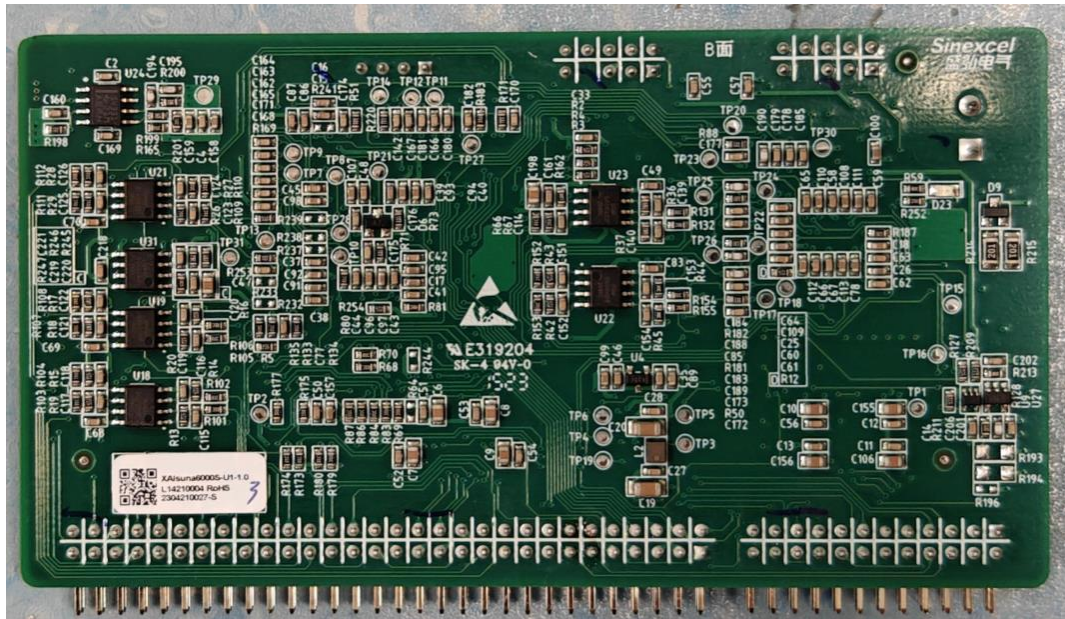


Figure 12 Trace side of Control board

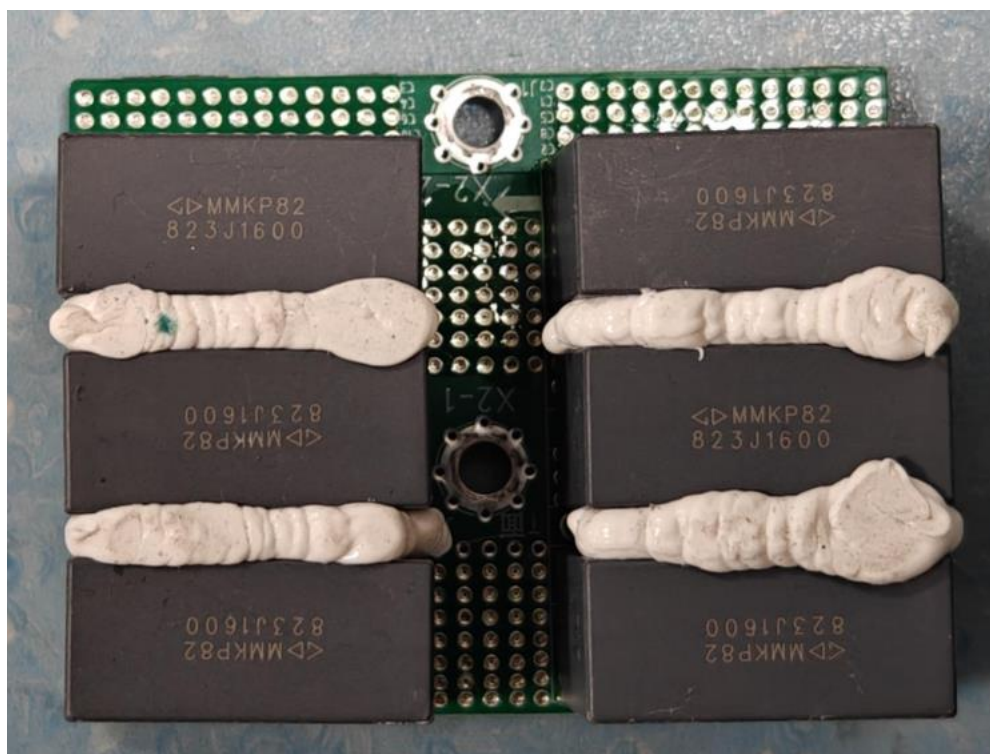


Figure 14 Component side of resonant capacitor board

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S

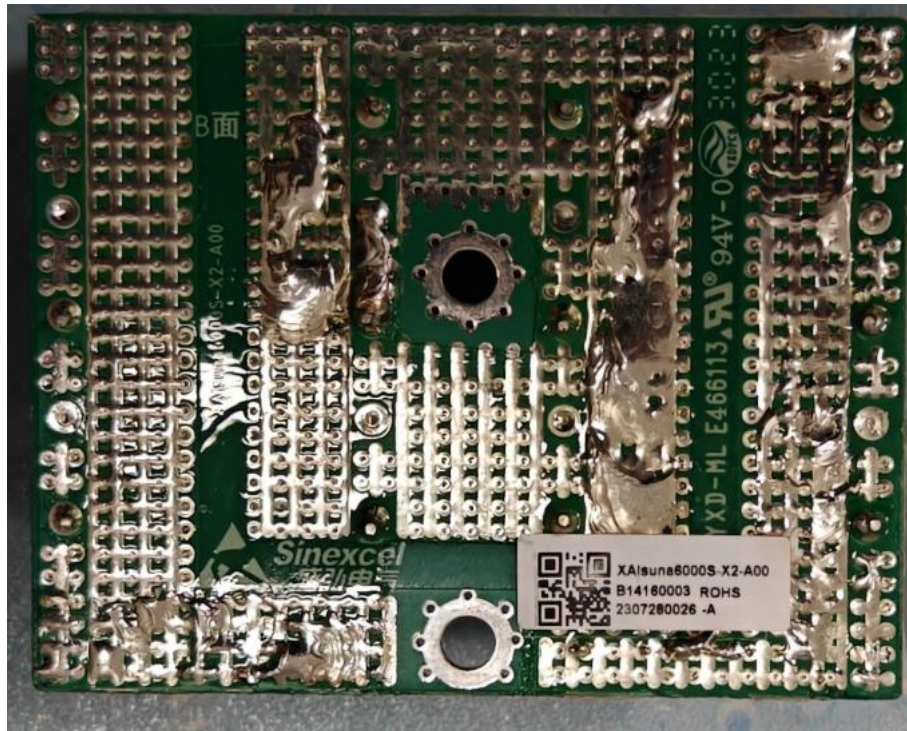


Figure 15 Trace side of resonant capacitor board

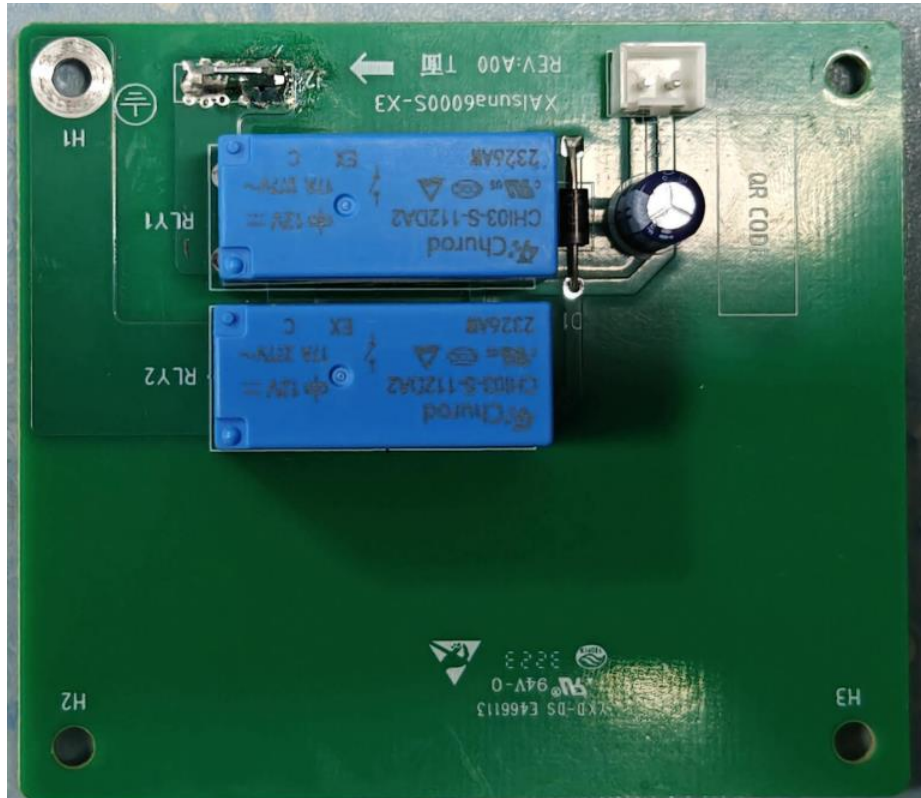


Figure 16 Component side of PE relay board

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S

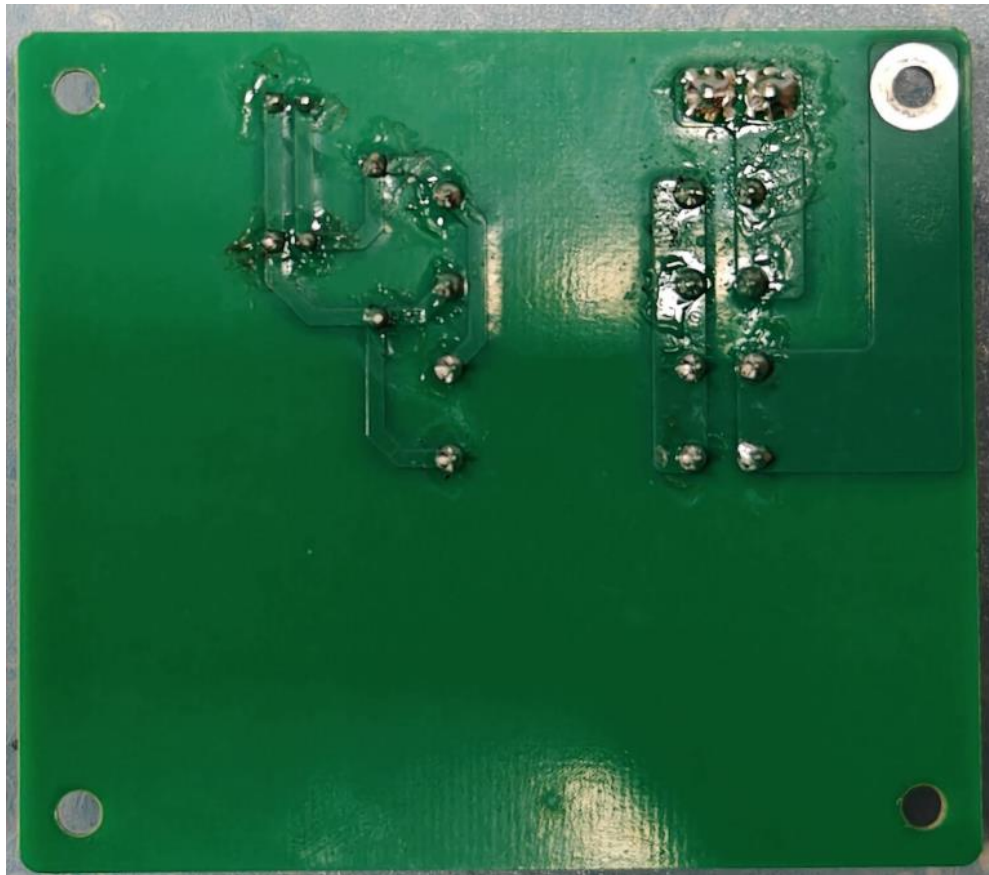


Figure 17 Trace side of PE relay board



Figure 18 Top of Communication interface board

Report Number: CN236RAT 001

Model: Isuna 3000S, Isuna 3600S

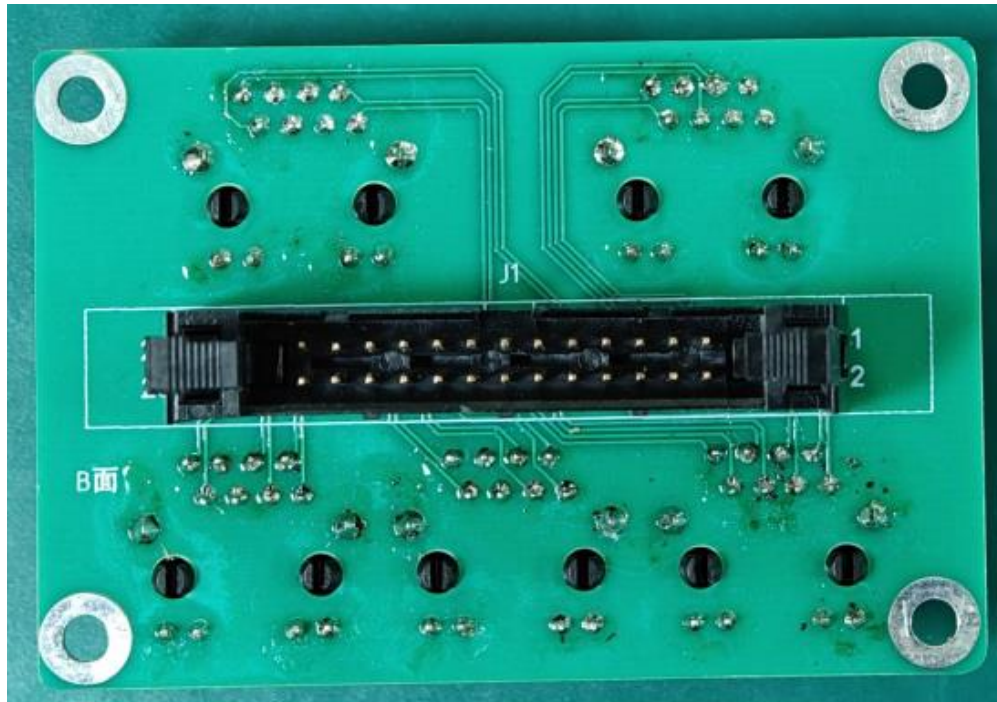


Figure 19 Bottom of Communication interface board



Figure 20 internal view of Transformer T17 and inductors L21~25