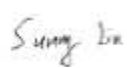
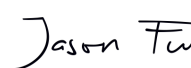



<b>TEST REPORT</b> <b>Testing for the verification of compliance of GRID connected POWER CONVERSION SYSTEM with:</b> <b>Short Duration Undervoltage response test : 28 July 2020</b>	
Report Reference No.....	200902099GZU-002
Date of issue .....	14 Sep 2020
Total number of pages.....	19 pages
Testing Laboratory .....	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address.....	Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Testing location/ address.....	Same as above
Tested by (name + signature).....	Sunny Lin Engineer 
Approved by (+ signature).....	Jason Fu Technical Team Leader 
Applicant's name .....	Shenzhen SOFAR SOLAR Co., Ltd.
Address.....	401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
<b>Test specification:</b>	
Standard .....	Short Duration Undervoltage response test: 28 July 2020
Test procedure.....	Type approval
Non-standard test method.....	N/A
Test Report Form No. ....	VDRT_a
Test Report Form(s) Originator ....	Intertek Guangzhou
Master TRF .....	Dated 2020-09
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Test item description .....	AC-coupled Storage Converter
Trade Mark.....	
Manufacturer.....	Same as Applicant
Model/Type reference.....	ME 3000SP

**Ratings :**

Battery Type: Lead-acid, Lithium-ion

Battery Voltage Range: 42-58Vdc

Max. Charging Current: 60A

Max. Discharging Current: 60A

Max. Charging &amp; Discharging Power: 3000VA

Nominal Grid Voltage: 230Vac

Nominal output Voltage (stand-alone): 230Vac

Max. output Current: 13A

Nominal Grid frequency: 50Hz

Power factor: 1 (adjustable +/-0.8)

Ingress protection: IP65

Operating Temperature Range: -25°C - 60°C

Protective Class: Class I

Software Version: V1.00

**Summary of testing:**

**Tests performed (name of test and test clause):**

All applicable tests

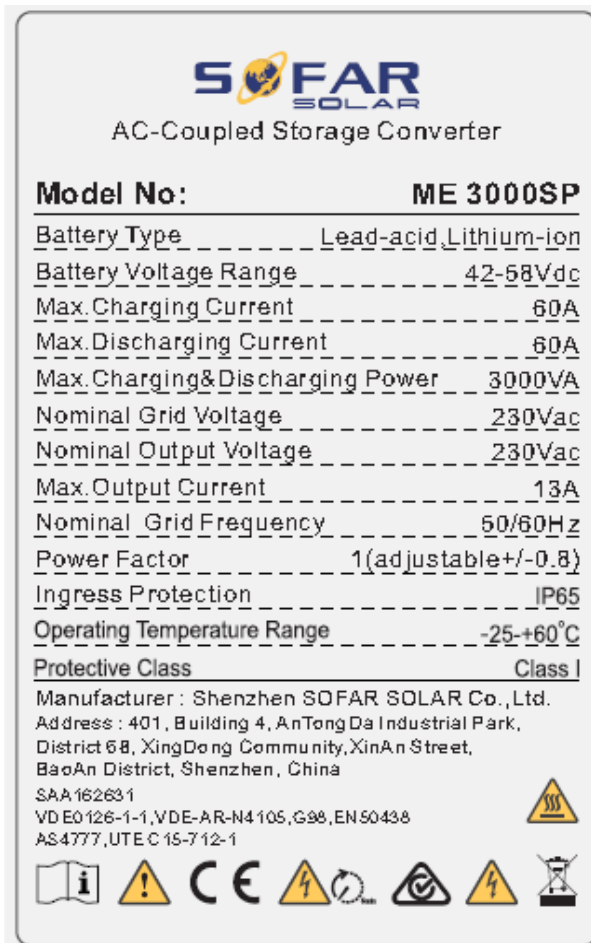
For certification testing for compliance with AS/NZS 4777.2:2015 refer to report No. 161008062GZU-005, dated 18 Nov 2016, issued by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

**Testing location:**

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Room 02, &  
101/E201/E301/E401/E501/E601/E701/E801 of  
Room 01 1-8/F., No. 7-2. Caipin Road, Science  
City, GETDD, Guangzhou, Guangdong, China

**Copy of marking plate**



**Note:**

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

<b>Test item particulars</b> .....:		
Temperature range .....	-25°C - 60°C	
AC Overvoltage category .....	<input type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input checked="" type="checkbox"/> OVC III <input type="checkbox"/> OVC IV	
DC Overvoltage category .....	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV	
IP protection class .....	IP 65	
<b>Possible test case verdicts:</b>		
- 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)
<b>Testing</b> .....:		
Date of receipt of test item.....	: 04 Sep 2020	
Date (s) of performance of tests.....	: 04 Sep 2020 – 11 Sep 2020	
<b>General remarks:</b>		
<p>The test 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 Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>When determining for test conclusion, measurement uncertainty of tests has been considered. This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.</p> <p>Throughout this report a point is used as the decimal separator.</p>		

**General product information:**

The equipment under test is single phase energy storage inverter. They are responsible for converting the direct current generated by battery into single-phase 230V, 50 Hz. It is basic insulation between grid and battery. Two mechanical disconnection device (relay) and high frequency isolated transformer are provided between grid and battery on line and neutral conductor

The inverters intended to operate at ambient temperature  $-25^{\circ}\text{C}$  -  $+60^{\circ}\text{C}$ , which will be specified in the user manual, however, the inverters will output full power when operated at  $45^{\circ}\text{C}$ , if operated at higher than  $45^{\circ}\text{C}$  temperature, the output power would be derate.

The equipment have three working mode. Charge mode, Discharge mode, Stand-alone mode :

Charge mode: The AC voltage from mains charges the battery provided in the final system.

Discharge mode: The inverter converts the energy from the battery to 230Va.c.,50 Hz voltage and connected to AC mains. In this mode the inverter works as grid connected inverter.

Stand-alone mode: The inverter converter the energy from the battery to 230Va.c.,50 Hz voltage and feed the general load. In this mode the inverter worked as stand-alone inverter.

Version of software: V1.00

Version of hardware: V1.00

Short Duration Undervoltage response test			
Clause	Requirement – Test	Result – Remark	Verdict
1	General test and reporting requirements		P
1.1	General		P
1.2	Test condition		P
1.3	Inverter setup		P
1.4	Grid source		P
2	Test procedure		P
2.1	General		P
2.2	Undervoltage(V<) disconnection test in response to event duration exceeding trip delay time		P
2.3	Undervoltage(V<) withstand test in response to event duration of less than trip delay time		P
2.4	Criterial for acceptance		P

**1.1 Customer Equipment**

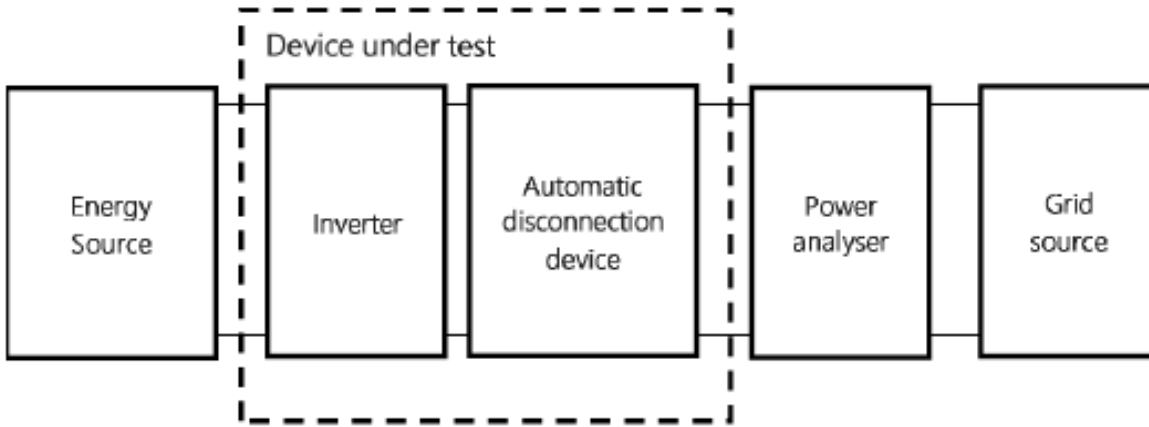
Equipment	Manufacturer	Type	Serial No.
AC-coupled Storage Converter	Shenzhen SOFAR SOLAR Co., Ltd.	ME 3000SP	0803404922

**1.2 Intertek Equipment**

Asset	Description	Manufacturer	Model	Cal Date	Cal Due
SA200-16	Precision Power Analyzer	YOKOGAWA	WT3000	11 Aug 2020	10 Aug 2021
SA200-52	AC power source	Chroma	61860	/	/
SA050-33	Scope recorder	YOKOGAWA	DL 850E	31 Oct 2019	30 Oct 2020
SA050-33-01	AC Current Probe	Chauvin Arnoux	C173	14 Jan 2020	13 Jan 2021
SA050-33-02	AC Current Probe	Chauvin Arnoux	C173	14 Jan 2020	13 Jan 2021
SA050-33-03	AC Current Probe	Chauvin Arnoux	C173	14 Jan 2020	13 Jan 2021
SA200-18	TopCon series DC power supply	REGATRON	TC.P.32.1000.400.PV.HMI	07 Aug 2020	06 Aug 2021

**2. Test set up & Test Conditions**

Below is the simplified construction of the test set up used in all tests of this report.



Test Conditions		
Condition	Value	Comments
the average r.m.s. current on each phase is within $\pm 5\%$ of the intended test point;	50% $\pm 5\%$ $I_n$	--
the average r.m.s. voltage on each phase is within $\pm 1\%$ of the grid test voltage	See test result	--
For three-phase supply, the angle between the fundamental voltages of each pair of phases shall be maintained at $120 \pm 1.5^\circ$ .	N/A	Single phase
For three-phase supply, the average r.m.s. voltages between each pair of phases shall be maintained within $\pm 1\%$ .	N/A	Single phase
The grid test voltage shall be 230 V a.c. phase to neutral, $50 \pm 0.1$ Hz	230V, 50Hz	--
AC source used for test	See equipment list	simulated test grid
The impedance of the test point should not cause a voltage rise greater than 0.5 % of the grid test voltage at the rated current output of the device under test.	Voltage at no load condition: 230.11V Voltage at full load condition: 230.75V	--
Note 1: These test conditions have been used in all the test performed in Sections 3.1 to 3.2 of this report.		



**2.1. Voltage harmonic for Test bench**

The real grid or a simulated test grid should be free from harmonic distortion which could interfere with testing. The voltage harmonic distortions of the real or simulated test grid shall be less than the limits specified in the table below.

Harmonic order number	Limit based on percentage of fundamental
3	0.9 %
5	0.4 %
7	0.3 %
9	0.2 %
Even harmonics 2-10	0.2 %
11-50	0.1 %
Total harmonic distortion (to the 50th harmonic)	5 %

Nr./ Order	Phase A $U_n(\%)$	Phase B $U_n(\%)$	Phase C $U_n(\%)$	Limited (%)
2	0.0080	0.0220	0.0110	0.2
3	0.0150	0.0170	0.0150	0.9
4	0.0030	0.0010	0.0010	0.2
5	0.0190	0.0200	0.0190	0.4
6	0.0020	0.0030	0.0020	0.2
7	0.0090	0.0120	0.0080	0.3
8	0.0020	0.0010	0.0020	0.2
9	0.0060	0.0050	0.0040	0.2
10	0.0030	0.0010	0.0050	0.2
11	0.0010	0.0010	0.0030	0.1
12	0.0020	0.0020	0.0020	0.1
13	0.0010	0.0030	0.0010	0.1
14	0.0020	0.0050	0.0010	0.1
15	0.0030	0.0030	0.0040	0.1
16	0.0030	0.0010	0.0040	0.1
17	0.0000	0.0010	0.0020	0.1
18	0.0030	0.0010	0.0030	0.1
19	0.0010	0.0020	0.0010	0.1
20	0.0010	0.0010	0.0020	0.1
21	0.0020	0.0030	0.0030	0.1
22	0.0020	0.0020	0.0030	0.1
23	0.0030	0.0030	0.0030	0.1
24	0.0020	0.0010	0.0010	0.1
25	0.0020	0.0020	0.0010	0.1
26	0.0010	0.0010	0.0020	0.1
27	0.0030	0.0030	0.0040	0.1
28	0.0020	0.0020	0.0020	0.1
29	0.0030	0.0010	0.0040	0.1
30	0.0020	0.0020	0.0020	0.1
31	0.0020	0.0020	0.0020	0.1
32	0.0040	0.0020	0.0030	0.1

33	0.0030	0.0020	0.0010	0.1
34	0.0020	0.0010	0.0010	0.1
35	0.0030	0.0020	0.0030	0.1
36	0.0010	0.0010	0.0010	0.1
37	0.0030	0.0020	0.0030	0.1
38	0.0030	0.0020	0.0020	0.1
39	0.0030	0.0010	0.0000	0.1
40	0.0050	0.0010	0.0020	0.1
41	0.0030	0.0030	0.0010	0.1
42	0.0010	0.0030	0.0020	0.1
43	0.0020	0.0010	0.0040	0.1
44	0.0020	0.0020	0.0020	0.1
45	0.0000	0.0010	0.0020	0.1
46	0.0130	0.0050	0.0040	0.1
47	0.0010	0.0010	0.0020	0.1
48	0.0100	0.0070	0.0050	0.1
49	0.0020	0.0000	0.0020	0.1
50	0.0020	0.0010	0.0020	0.1
THD (%)	0.052	0.059	0.054	5

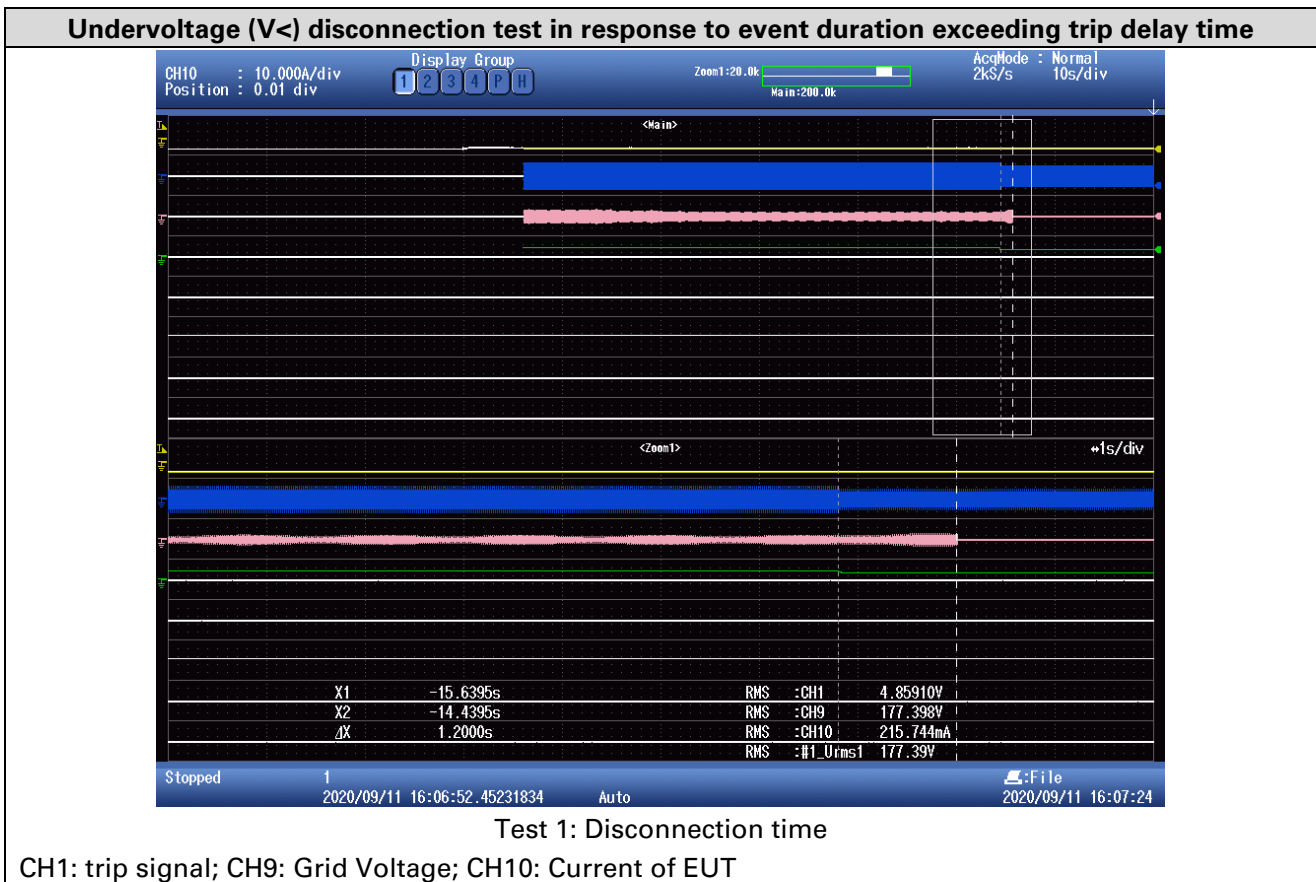
**3. Test result**

**3.1 Undervoltage(V<) disconnection test in response to event duration exceeding trip delay time**

Grid source voltage		230.0V			Test at 50 ±5% rated output current (A):			6.83		
Test step	Grid source voltage Setting (V)	Grid source voltage measured (V)			Disconnection time (s) (*) 1s<t<2s			Reconnection time (s) t >60s		
		Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3
a)	177.5	177.40	177.55	177.47	1.20	1.24	1.19	--	--	--
b)	230	230.05	230.10	230.16	--	--	--	80.24	80.13	78.00

Note:  
(\* ) The disconnection time recorded shall be greater than the trip delay time of AS4777.2:2015 of 1 s and less than the disconnection time of AS4777.2:2015 of 2 s

	Voltage drop time measured	Voltage drop time Limited
230V→177.5	1.0ms	2ms

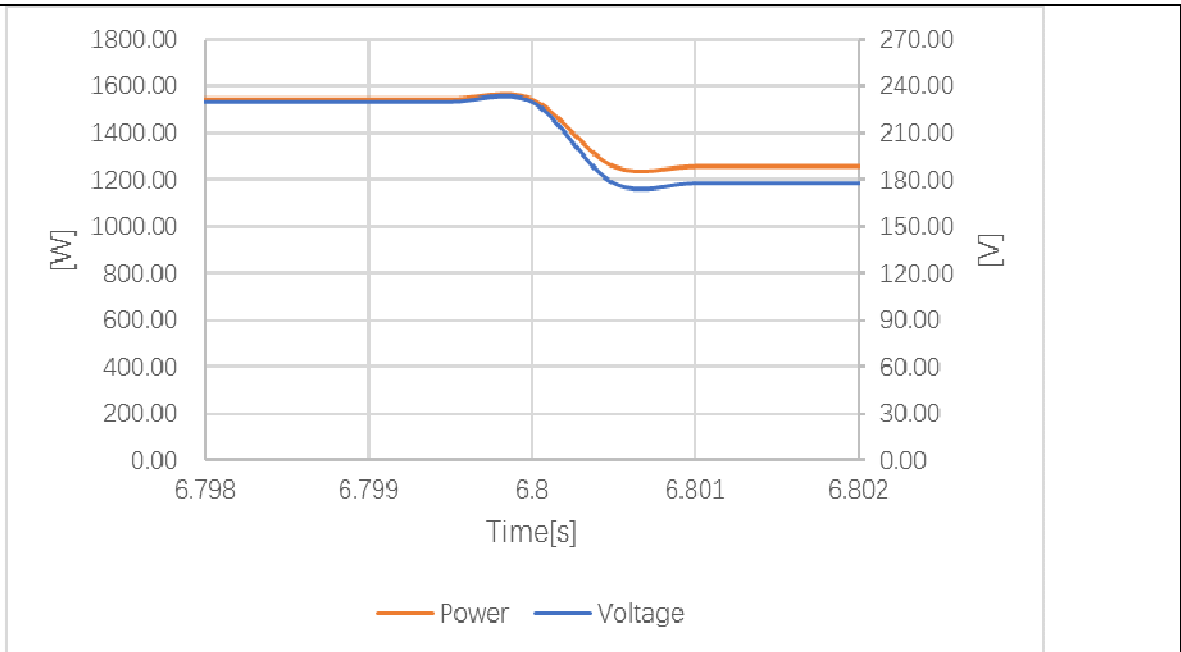




Test 2



Test 3



Voltage drop time



Test 1: Reconnection time

CH1: trip signal; CH9: Grid Voltage; CH10: Current of EUT



Test 2



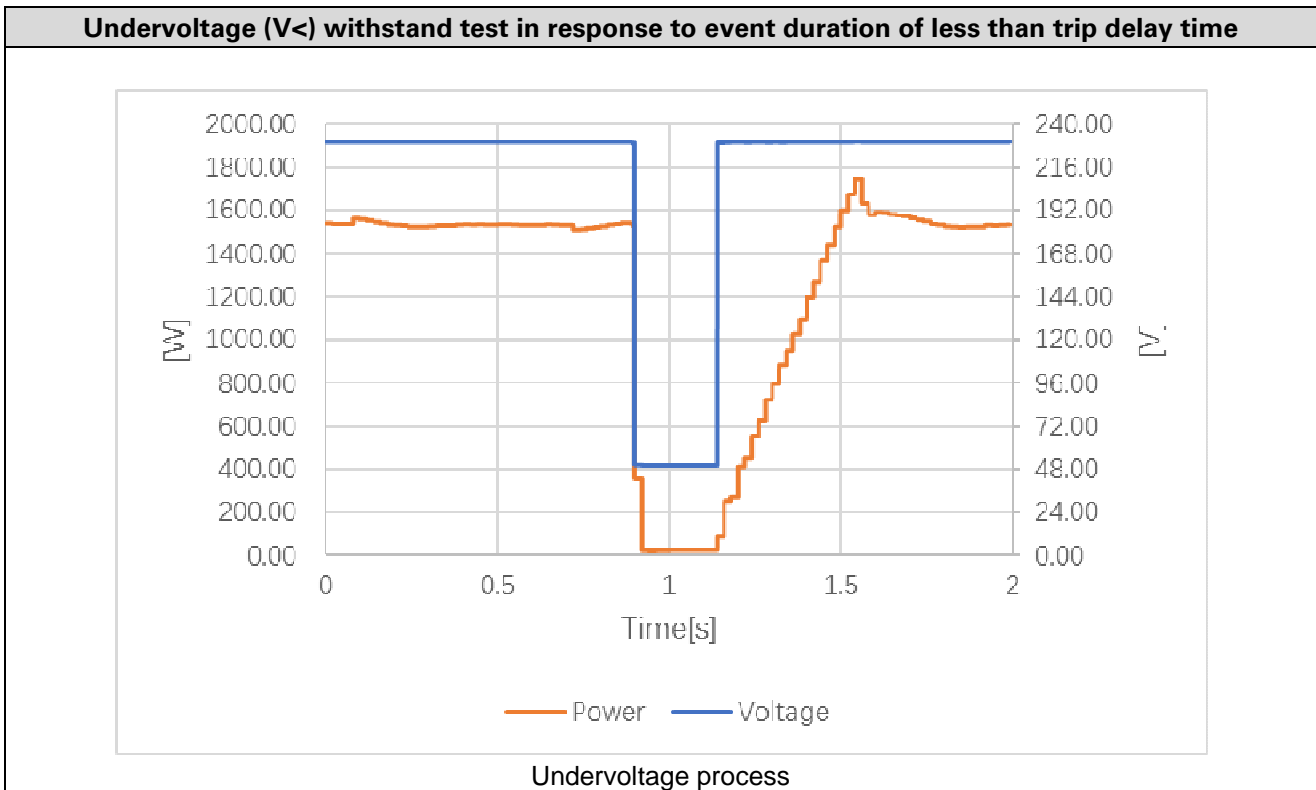
Test 3

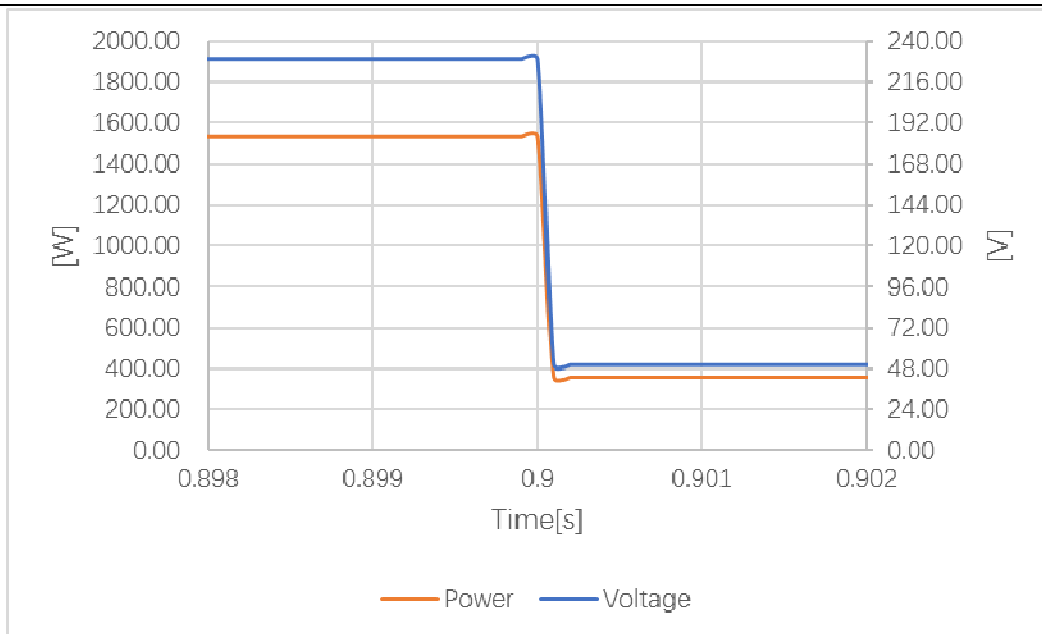
**3.2 Undervoltage (V<) withstand test in response to event duration of less than trip delay time**

Grid source voltage		230V			Test at 50 ±5% rated output current (A):			6.85		
Test step	Grid source voltage Setting (V)	Grid source voltage measured (V)			Remain time duration (220ms) Time measured (ms)			Power recovery time measured (ms)		
		Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3
a)	230	230.21	230.13	230.13	--	--	--	--	--	--
b)	50	50.42	50.46	50.38	240	240	240	--	--	--
c)	230	230.21	230.32	230.30	--	--	--	340.0	340.0	340.0

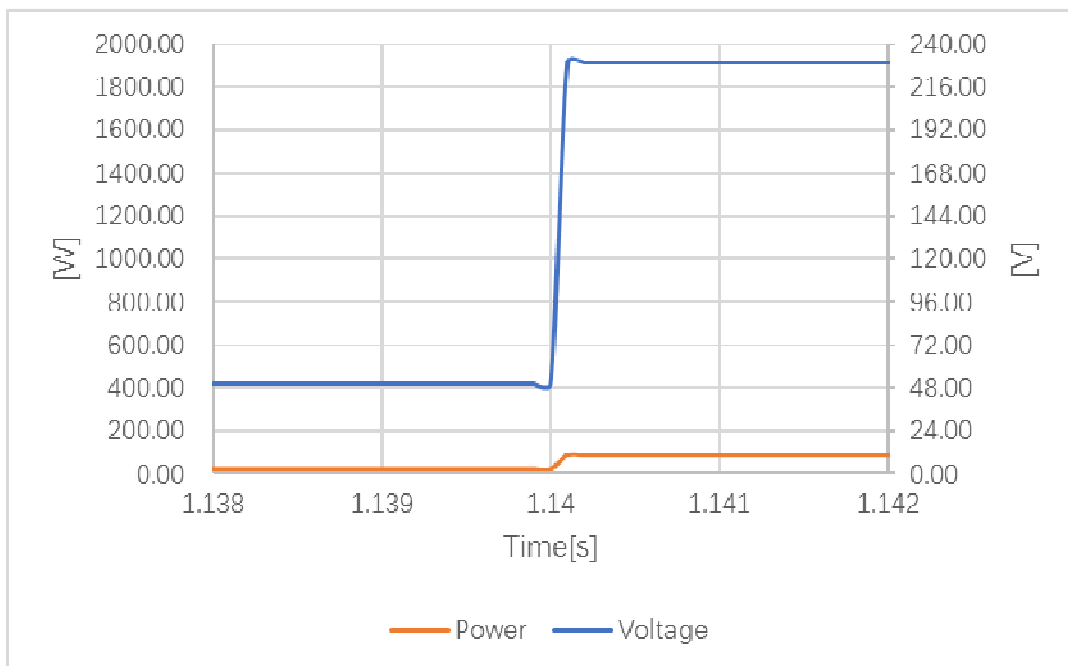
Test step	Voltage drop time measured	Voltage drop time Limited
a)→b)	0.5ms	2ms
b)→c)	0.5ms	2ms

Test Number	Power measured	
	Before voltage drop	Power recovery
Test 1	1541.70W	1535.40W
Test 2	1552.10W	1545.80W
Test 3	1552.10W	1547.90W



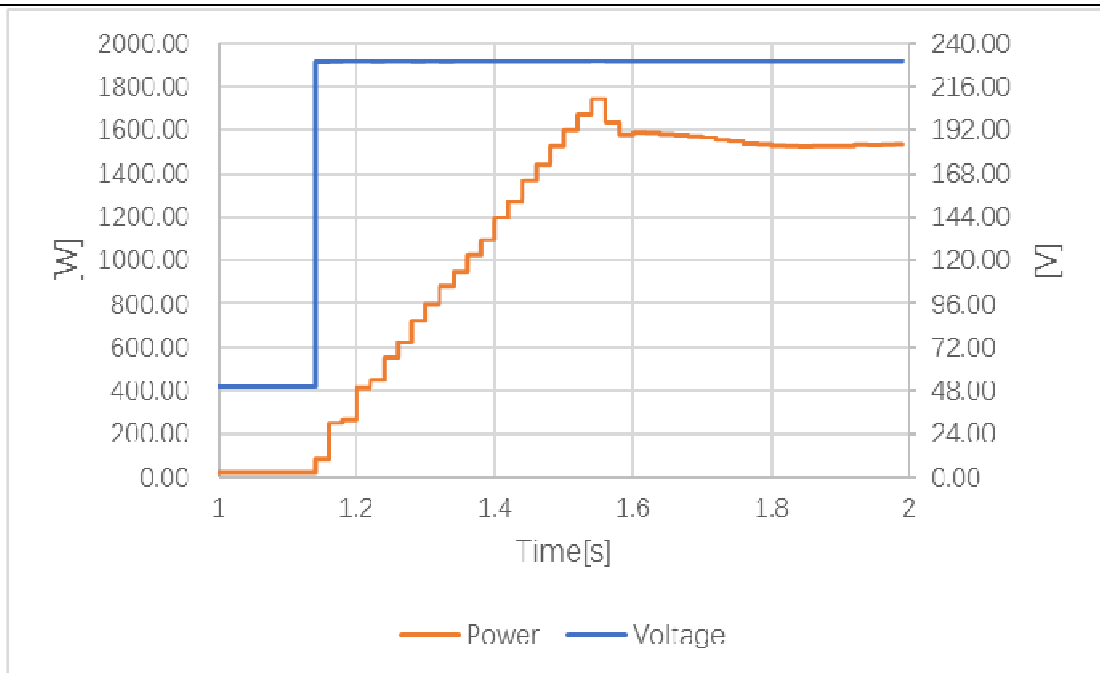


Voltage drop

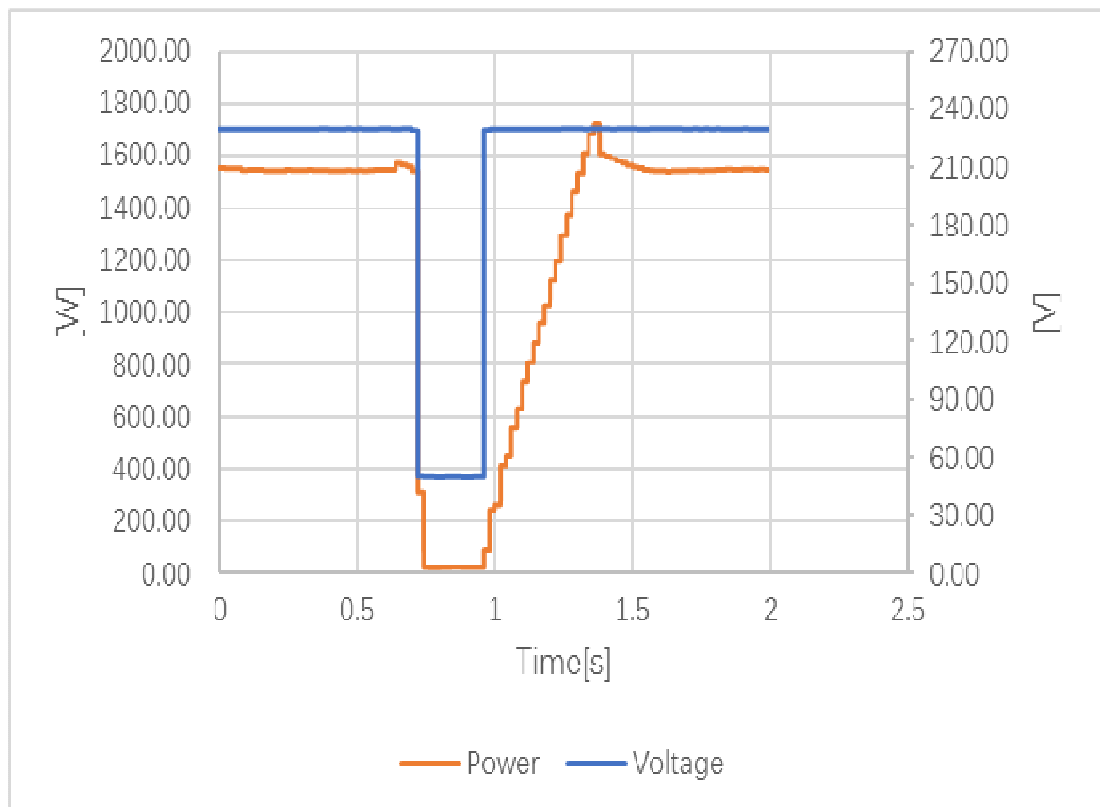


Voltage recovery

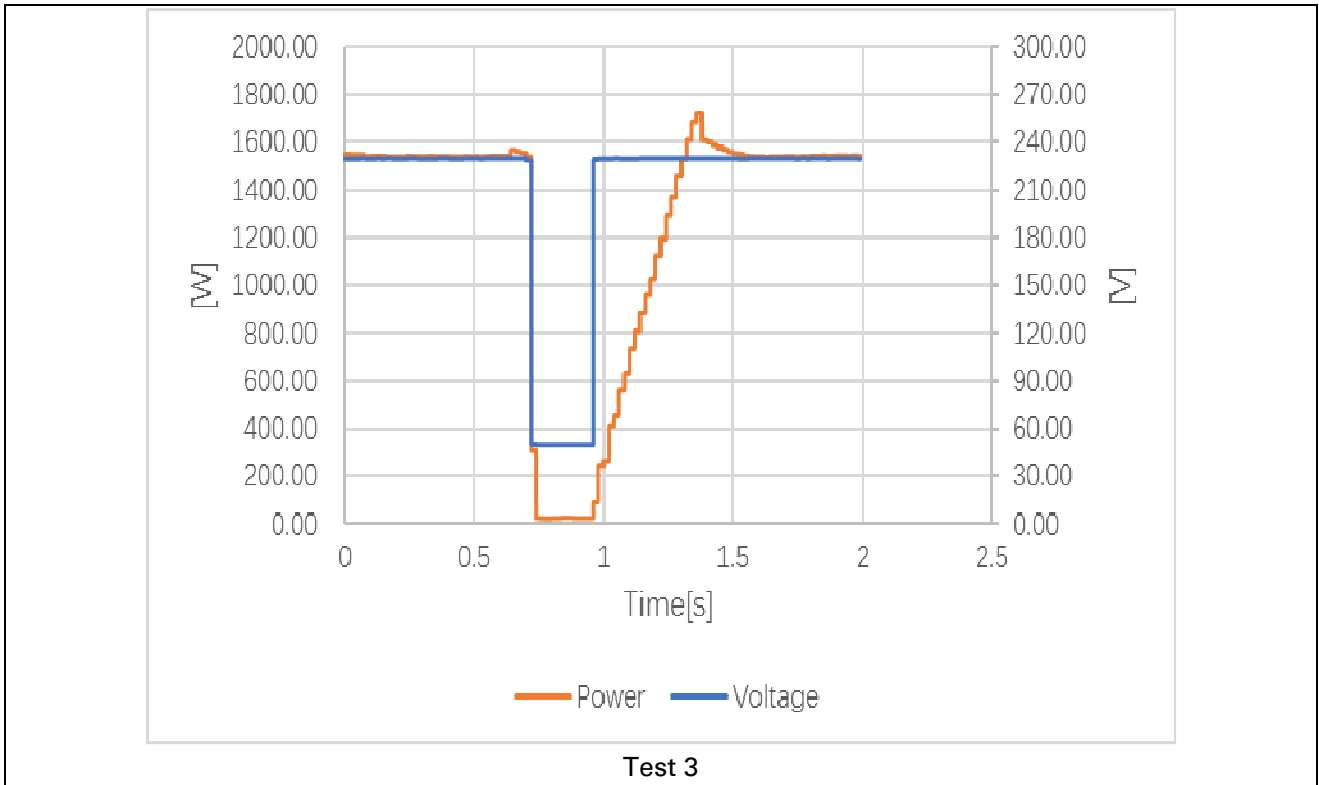




Power recovery



Test 2



Photos



Front view of inverter



Rear view

(End of Report)