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CNAS L2291



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TEST REPORT

Product Name : All-in-one solar charge inverter
Model Number : HF4850S80-H, HF4840S80-H, HF4830S80-H, HF4840S60-H, HF4830S60-H, HF4850S100-H, HF4840S100-H, HF4830S100-H, HF4830U60-H, HF4825U60-H, HF4835U80-H, HF4830U80-H, HF4825U80-H, HF2420S40-H, HF2420S60-H, HF2420S80-H, HF2430S40-H, HF2430S60-H, HF2430S80-H, HF2415U60-H, HF2420U60-H, HF2430U60-H, HF4850S80-145, HF4840S60-145, HF4830S60-145, HF4840S80-145, HF4830S80-145, HF4835U80-145, HF4830U60-145, HF4825U60-145, HF4830U80-145, HF4825U80-145, HFP4850S80-145, HFP4850S80-H, HF4850U80-H, HF4835U60-H, HFP4835U80-145, HFP4835U80-H, HFP4850U80-H, MF4850S80-H, MF4830S60-H, MF4835U60-H, MF4850U80-H

Prepared for : SRNE Solar Co., Ltd.
Address : 4-5F, 13A Wutong Island, Neihuan Rd, Xixiang, Bao`an, Shenzhen, Guangdong, China

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Report Number : ES200417034E-3
Date of Test : April 30, 2020 to May 7, 2020
Date of Report : July 01, 2021



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APPENDIX (Photos of EUT) (7 Pages)



TEST REPORT DESCRIPTION

Applicant : SRNE Solar Co., Ltd.
 Manufacturer : SRNE Solar Co., Ltd.
 Trade Mark : SRNE
 EUT : All-in-one solar charge inverter
 Model No. : HF4850S80-H, HF4840S80-H, HF4830S80-H, HF4840S60-H, HF4830S60-H, HF4850S100-H, HF4840S100-H, HF4830S100-H, HF4830U60-H, HF4825U60-H, HF4835U80-H, HF4830U80-H, HF4825U80-H, HF2420S40-H, HF2420S60-H, HF2420S80-H, HF2430S40-H, HF2430S60-H, HF2430S80-H, HF2415U60-H, HF2420U60-H, HF2430U60-H, HF4850S80-145, HF4840S60-145, HF4830S60-145, HF4840S80-145, HF4830S80-145, HF4835U80-145, HF4830U60-145, HF4825U60-145, HF4830U80-145, HF4825U80-145, HFP4850S80-145, HFP4850S80-H, HF4850U80-H, HF4835U60-H, HFP4835U80-145, HFP4835U80-H, HFP4850U80-H, MF4850S80-H, MF4830S60-H, MF4835U60-H, MF4850U80-H
 Input: 230V, 40A, 50/60Hz
 Rating : Output: 230V, 21.8A, 5000W
 Battery Input: 40-60VDC

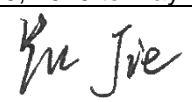
Measurement Procedure Used:

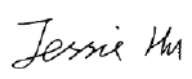
EN 61000-6-3:2007+A1:2011+ AC:2012,
 EN 61000-3-12:2011
 EN 61000-3-11:2000,
 EN 61000-6-1:2007
 (IEC 61000-4-2:2008, IEC 61000-4-3:2006+A1:2007+A2:2010, IEC61000-4-4:2012,
 IEC 61000-4-5:2014, IEC 61000-4-6:2013, IEC 61000-4-8:2009, IEC 61000-4-11:2004)


The device described above is tested by EMTEK (SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (SHENZHEN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN61000-6-3, EN61000-3-12, EN61000-3-11 and EN61000-6-1 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK (SHENZHEN) CO., LTD.

Date of Test : April 30, 2020 to May 7, 2020

Prepared by : 
 Yu Jie/Editor

Reviewer : 
 Jessie Hu/Supervisor

Approved & Authorized Signer : 
 Lisa Wang/Manager



Modified Information

Version	Report No.	Revision Date	Summary
Ver.1.0	ES200417034E-3	/	Original Report



1. SUMMARY OF TEST RESULTS

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted Disturbance at Mains Terminals	EN 61000-6-3:2007+A1:2011 + AC:2012	--	Pass
Radiated Disturbance	EN 61000-6-3:2007+A1:2011 + AC:2012	--	Pass
Harmonic Current Emissions	EN 61000-3-12:2011	Table 2	Pass
Voltage Fluctuation and Flicker	EN 61000-3-11:2000	--	Pass
IMMUNITY (EN 61000-6-1:2007)			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008	B	Pass
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2006+A1:2007 +A2:2010	A	Pass
EFT/B Immunity	IEC61000-4-4:2012	B	Pass
Surge Immunity	IEC 61000-4-5:2014	B	Pass
Conducted RF Immunity	IEC 61000-4-6:2013	A	Pass
Power Frequency Magnetic Field	IEC 61000-4-8:2009	A	Pass
Voltage Dips, >95% Reduction	IEC 61000-4-11:2004	B	Pass
Voltage Dips, 30% Reduction		C	Pass
Voltage Interruptions		C	Pass
Note: N/A is an abbreviation for Not Applicable.			

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT	:	All-in-one solar charge inverter
Model Number	:	HF4850S80-H, HF4840S80-H, HF4830S80-H, HF4840S60-H, HF4830S60-H, HF4850S100-H, HF4840S100-H, HF4830S100-H, HF4830U60-H, HF4825U60-H, HF4835U80-H, HF4830U80-H, HF4825U80-H, HF2420S40-H, HF2420S60-H, HF2420S80-H, HF2430S40-H, HF2430S60-H, HF2430S80-H, HF2415U60-H, HF2420U60-H, HF2430U60-H, HF4850S80-145, HF4840S60-145, HF4830S60-145, HF4840S80-145, HF4830S80-145, HF4835U80-145, HF4830U60-145, HF4825U60-145, HF4830U80-145, HF4825U80-145, HFP4850S80-145, HFP4850S80-H, HF4850U80-H, HF4835U60-H, HFP4835U80-145, HFP4835U80-H, HFP4850U80-H, MF4850S80-H, MF4830S60-H, MF4835U60-H, MF4850U80-H (Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only difference is the model number and power. for trading purpose. We prepare HF4850S80-H for test.)
Test Voltage	:	AC 230V/50Hz, DC 48V
Applicant	:	SRNE Solar Co., Ltd.
Address	:	4-5F, 13A Wutong Island, Neihuan Rd, Xixiang, Bao`an, Shenzhen, Guangdong, China
Manufacturer	:	SRNE Solar Co., Ltd.
Address	:	4-5F, 13A Wutong Island, Neihuan Rd, Xixiang, Bao`an, Shenzhen, Guangdong, China
Factory	:	SRNE Solar Co., Ltd.
Address	:	4-5F, 13A Wutong Island, Neihuan Rd, Xixiang, Bao`an, Shenzhen, Guangdong, China
Date of Received	:	April 30, 2020
Date of Test	:	April 30, 2020 to May 7, 2020

Note: The added models in this report are based on ES200417034E-2. The added models do not affect the test results. Other original data and records refer to ES200417034E-2.

2.2. Description of Test Facility

Site Description

EMC Lab.

: **Accredited by CNAS**

The Certificate Registration Number is L2291.

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

Accredited by FCC

Designation Number: CN1204

Test Firm Registration Number: 882943

Accredited by A2LA

The Certificate Number is 4321.01.

Accredited by Industry Canada

The Conformity Assessment Body Identifier is CN0008

Name of Firm : EMTEK (SHENZHEN) CO., LTD.

Site Location : Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2.3. Description of Support Device

N/A

2.4. Measurement Uncertainty

Test Item	Uncertainty
Conducted Emission Uncertainty	: 3.16dB(9k~150kHz Conduction 2#) 2.90dB(150k-30MHz Conduction 2#)
Radiated Emission Uncertainty (3m 3# Chamber)	: 4.40dB (30M~1GHz Polarize: H) 5.04dB (30M~1GHz Polarize: V)
Uncertainty for Flicker test	: 0.07%
Uncertainty for Harmonic test	: 1.8%
Uncertainty for C/S Test	: 1.45(Using CDN Test) 2.37(Using EM Clamp Test)
Uncertainty for R/S Test	: 2.10dB(80MHz-200MHz) 1.76dB(200MHz-1000MHz)
Uncertainty for test site temperature and humidity	: 0.6°C 4%

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Power Line Conducted Emission Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESCI	101045	May 19, 2019	1Year
<input checked="" type="checkbox"/>	PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	100107	May 18, 2019	1Year
<input checked="" type="checkbox"/>	AMN	Schwarzbeck	NNLK 8129	8129203	May 18, 2019	1Year

3.2. For Radiated Emission Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESU 26	100154	May 19, 2019	1Year
<input checked="" type="checkbox"/>	Pre-Amplifier	Lunar EM	LNA10M1G-40	J1011130912001	May 19, 2019	1Year
<input checked="" type="checkbox"/>	Bilog Antenna	Schwarzbeck	VULB9163	659	Nov 10, 2018	2 Year

3.3. For Harmonic Current / Flicker Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	45KVA AC Power source	Teseq	NSG 1007-45/45KVA	1305A02873	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Impedance network	Teseq	INA2197/37A	1305A02873	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Impedance network	Teseq	INA 2196/75A	1305A02874	May 19, 2019	1 Year
<input type="checkbox"/>	Proflin 2100 AC Switching Unit	Teseq	NSG 2200-3	A22714	May 19, 2019	1 Year

3.4. For Electrostatic Discharge Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	ESD Tester	TESEQ AG	NSG 438A	130	May 19, 2019	1 Year

3.5. For RF Strength Susceptibility Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Power Amplifier	MILMEGA	AS0102-55	1018770	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	50ohm Diode Power Sensor	BOONTON	51011EMC	34236	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	811	N/A	N/A
<input checked="" type="checkbox"/>	Signal Generator	Agilent	N5181A	MY50145187	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	50ohm Diode Power Sensor	BOONTON	51011EMC	36164	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Broad-Band Horn Antenna	SCHWARZBECK	STLP 9149	9149-227	N/A	N/A
<input checked="" type="checkbox"/>	Field Strength Meter	DARE	RSS1006A	10I00037SNO22	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Multi-function interface system	DARE	CTR1009B	12I00250SNO72	N/A	N/A
<input checked="" type="checkbox"/>	Automatic switch group	DARE	RSW1004A	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Power Amplifier	MILMEGA	AS1860-50	1059346	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Power Amplifier	MILMEGA	80RF1000-175	1059345	May 19, 2019	1 Year

3.6. For Electrical Fast Transient / Burst Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Burst Tester	HAEFELY	PEFT4010	080981-16	May 18, 2019	1Year
<input type="checkbox"/>	Coupling Clamp	HAEFELY	IP-4A	147147	May 18, 2019	1Year

3.7. For Surge Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Controller	HAEFELY	Psurge 8000	174031	May 18, 2019	1Year
<input checked="" type="checkbox"/>	Impulse Module	HAEFELY	PIM 100	174124	May 18, 2019	1Year
<input checked="" type="checkbox"/>	Coupling Decoupling	HAEFELY	PCD 130	172181	May 18, 2019	1Year
<input type="checkbox"/>	Coupling Module	HAEFELY	PCD122	174354	May 18, 2019	1Year
<input type="checkbox"/>	Impulse Module	HAEFELY	PIM 120	174435	May 18, 2019	1Year
<input type="checkbox"/>	Coupling Module	HAEFELY	PCD 126A	174387	May 18, 2019	1Year
<input type="checkbox"/>	Impulse Module	HAEFELY	PIM 110	174391	May 18, 2019	1Year

3.8. For Injected Current Susceptibility Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Continuous Wave Simulator	EMTEST	CWS500C	0900-12	May 19, 2019	1Year
<input checked="" type="checkbox"/>	CDN	EMTEST	CDN-M2	510010010010	May 18, 2019	1Year
<input checked="" type="checkbox"/>	CDN	EMTEST	CDN-M3	0900-11	May 18, 2019	1Year
<input type="checkbox"/>	EM Injection Clamp	EMTEST	F-2031-23MM	368	May 18, 2019	1Year
<input checked="" type="checkbox"/>	Attenuator	EMTEST	100W 6dB DC-3G	/	May 18, 2019	1Year
<input checked="" type="checkbox"/>	Signal Generator	R&S	SMB100A	103041	May 19, 2019	1Year
<input checked="" type="checkbox"/>	Power meter	AGILENT	E4418B	MY45102886	May 19, 2019	1 Year

3.9. For Magnetic Field Immunity Test

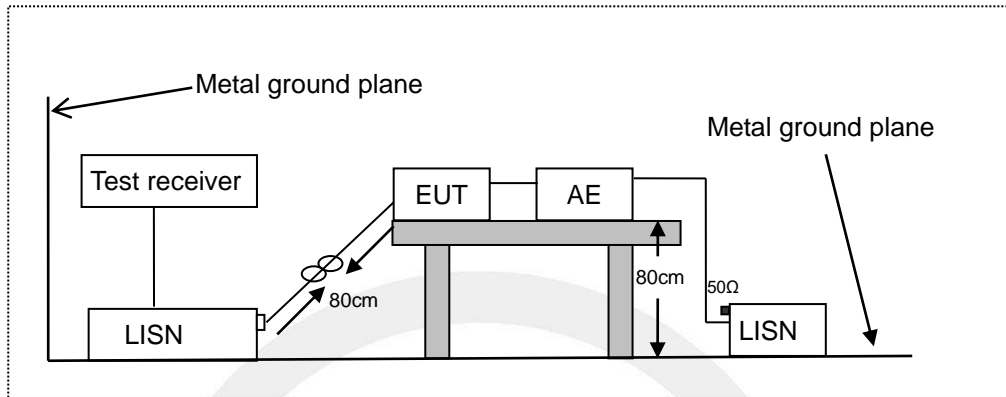
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 19, 2019	1Year

3.10. For Voltage Dips and Interruptions Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	45KVA AC Power source	Teseq	NSG 1007-45/45KVA	1305A02873	May 19, 2019	1 Year
<input type="checkbox"/>	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	May 19, 2019	1 Year
<input type="checkbox"/>	Impedance network	Teseq	INA2197/37A	1305A02873	May 19, 2019	1 Year
<input type="checkbox"/>	Impedance network	Teseq	INA 2196/75A	1305A02874	May 19, 2019	1 Year
<input checked="" type="checkbox"/>	Proflin 2100 AC Switching Unit	Teseq	NSG 2200-3	A22714	May 19, 2019	1 Year

4. POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1. Block Diagram of Test Setup



LISN: Artificial Mains Network
 AE: Associated equipment
 EUT: Equipment under test

4.2. Measuring Standard

EN 61000-6-3:2007+A1:2011+ AC:2012

4.3. Power Line Conducted Emission Limits

Frequency (MHz)	Limit (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.
 NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

4.4. EUT Configuration of Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 61000-6-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

EUT : All-in-one solar charge inverter
 Model Number : HF4850S80-H

4.5. Operating Condition of EUT

- 4.5.1. Setup the EUT as shown on Section 4.1.
- 4.5.2. Turn on the power of all equipment.
- 4.5.3. Let the EUT work in measuring mode (AC mode, Bat mode) and measure it.

4.6. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN61000-6-3 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver) is set at 9kHz in 150kHz~30MHz and 200Hz in 9kHz~150kHz.

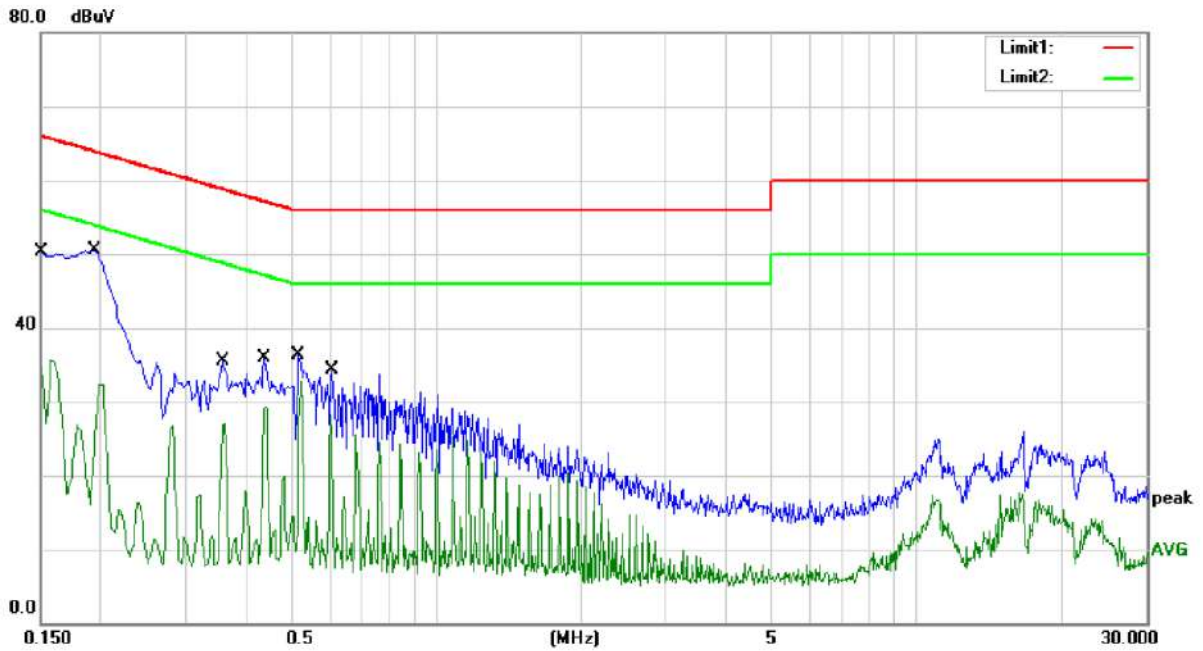
The frequency range from 150kHz to 30MHz is investigated.

All the scanning waveform is put in the following pages.

4.7. Measuring Results

PASS.

Please reference to the following pages.



Site Conduction #2

Phase: **L1**

Temperature: 25.0

Limit: (CE)EN61000-6-3_QP

Power: AC 230V/50Hz

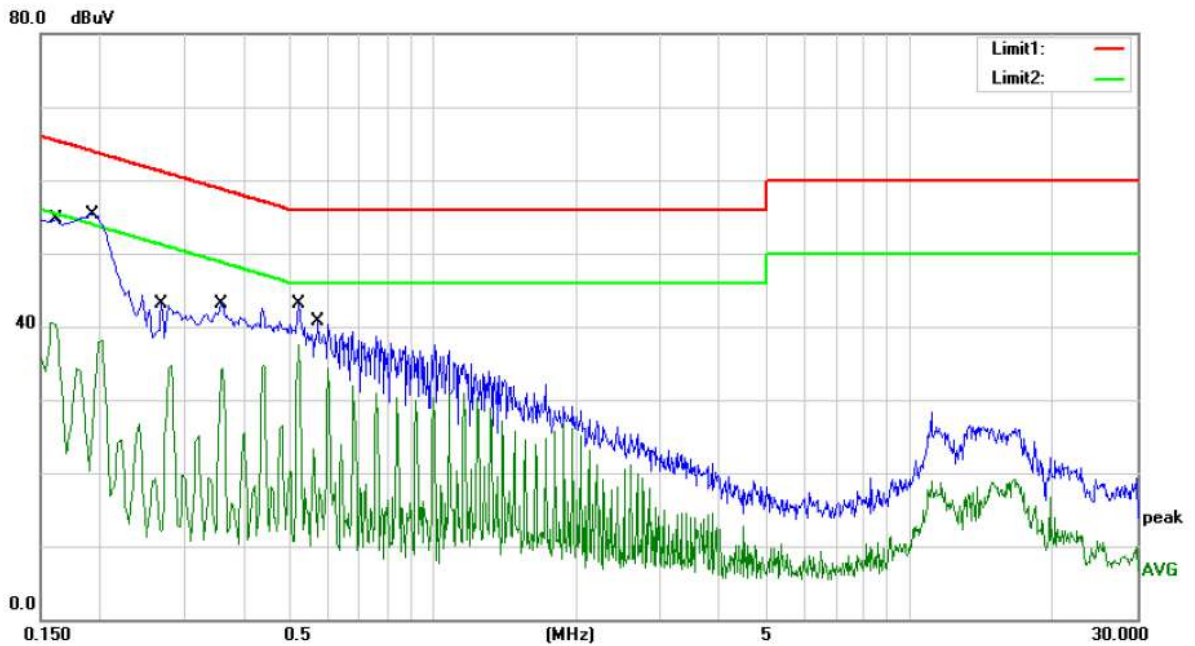
Humidity: 49 %

Mode: AC MODE

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	40.44	9.89	50.33	66.00	-15.67	QP	
2		0.1500	26.70	9.89	36.59	56.00	-19.41	AVG	
3		0.1940	40.68	9.90	50.58	63.86	-13.28	QP	
4		0.1940	22.44	9.90	32.34	53.86	-21.52	AVG	
5		0.3580	25.52	9.91	35.43	58.77	-23.34	QP	
6		0.3580	17.28	9.91	27.19	48.77	-21.58	AVG	
7		0.4380	25.94	9.92	35.86	57.10	-21.24	QP	
8		0.4380	19.31	9.92	29.23	47.10	-17.87	AVG	
9		0.5180	26.32	9.92	36.24	56.00	-19.76	QP	
10	*	0.5180	22.86	9.92	32.78	46.00	-13.22	AVG	
11		0.6060	24.38	9.92	34.30	56.00	-21.70	QP	
12		0.6060	18.47	9.92	28.39	46.00	-17.61	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site Conduction #2

Phase: **N**

Temperature: 25.0

Limit: (CE)EN61000-6-3_QP

Power: AC 230V/50Hz

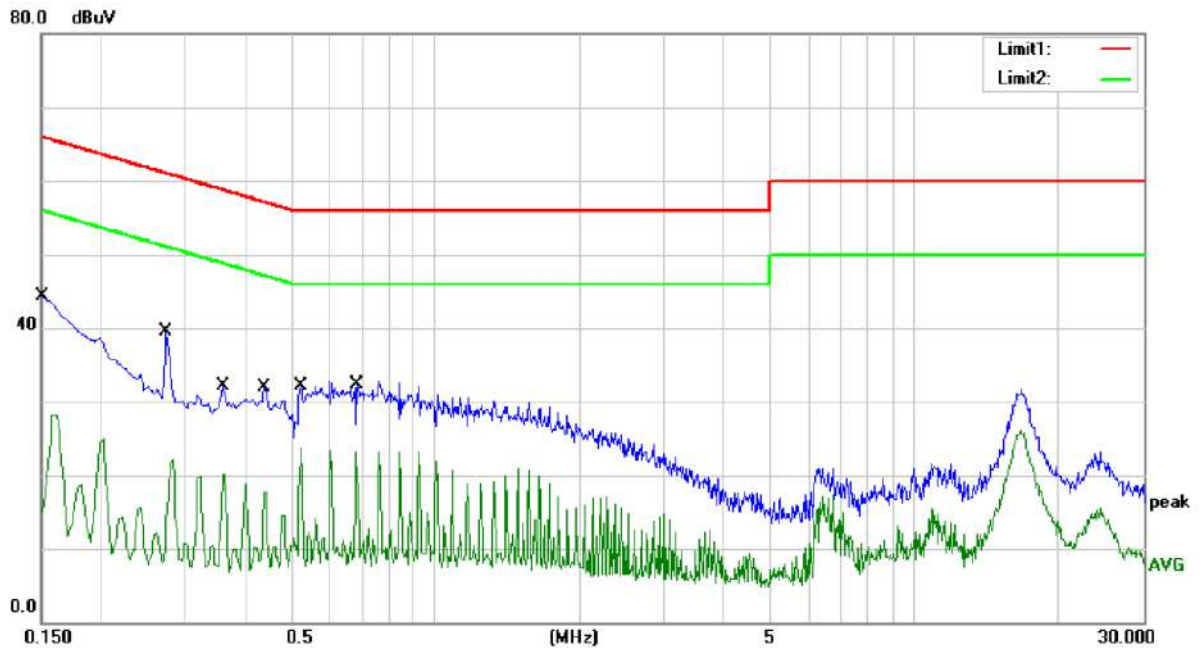
Humidity: 49 %

Mode: AC MODE

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	44.76	9.90	54.66	65.36	-10.70	QP	
2		0.1620	30.55	9.90	40.45	55.36	-14.91	AVG	
3		0.1884	45.32	9.90	55.22	64.11	-8.89	QP	
4		0.1884	28.20	9.90	38.10	54.11	-16.01	AVG	
5		0.2700	33.22	9.91	43.13	61.12	-17.99	QP	
6		0.2700	24.75	9.91	34.66	51.12	-16.46	AVG	
7		0.3580	33.24	9.91	43.15	58.77	-15.62	QP	
8		0.3580	24.46	9.91	34.37	48.77	-14.40	AVG	
9		0.5220	33.16	9.92	43.08	56.00	-12.92	QP	
10	*	0.5220	27.62	9.92	37.54	46.00	-8.46	AVG	
11		0.5740	30.70	9.92	40.62	56.00	-15.38	QP	
12		0.5740	24.37	9.92	34.29	46.00	-11.71	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site Conduction #2

Phase: **L1**

Temperature: 25.0

Limit: (CE)EN61000-6-3 QP

Power: DC 48V

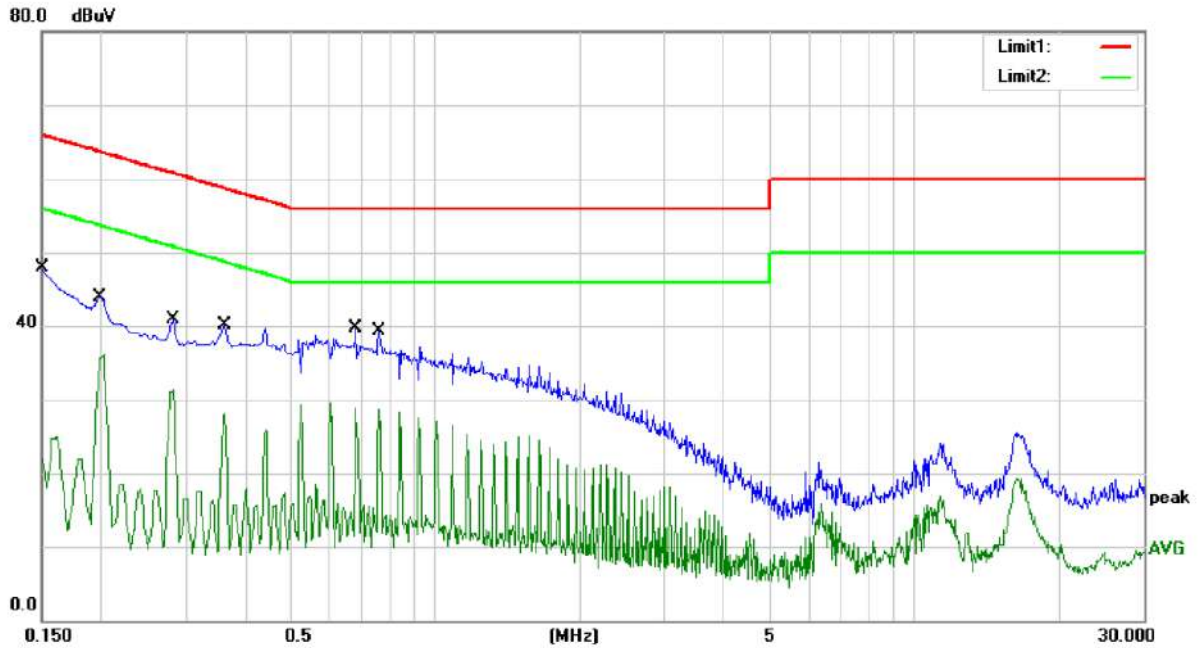
Humidity: 49 %

Mode: BAT MODE

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	34.45	9.89	44.34	66.00	-21.66	QP	
2		0.1500	18.25	9.89	28.14	56.00	-27.86	AVG	
3	*	0.2740	29.65	9.91	39.56	61.00	-21.44	QP	
4		0.2740	12.23	9.91	22.14	51.00	-28.86	AVG	
5		0.3580	22.09	9.91	32.00	58.77	-26.77	QP	
6		0.3580	10.27	9.91	20.18	48.77	-28.59	AVG	
7		0.4380	21.98	9.92	31.90	57.10	-25.20	QP	
8		0.4380	7.82	9.92	17.74	47.10	-29.36	AVG	
9		0.5220	22.09	9.92	32.01	56.00	-23.99	QP	
10		0.5220	13.81	9.92	23.73	46.00	-22.27	AVG	
11		0.6860	22.43	9.92	32.35	56.00	-23.65	QP	
12		0.6860	13.22	9.92	23.14	46.00	-22.86	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site Conduction #2

Phase: **N**

Temperature: 25.0

Limit: (CE)EN61000-6-3_QP

Power: DC 48V

Humidity: 49 %

Mode: BAT MODE

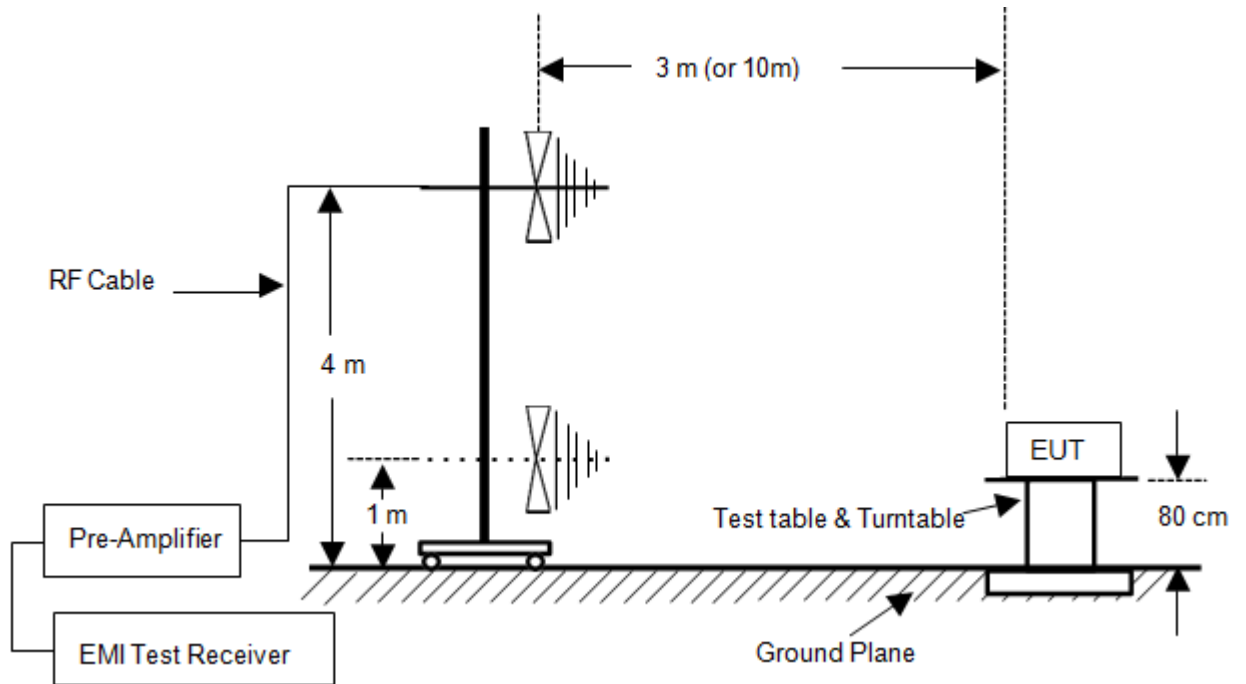
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	37.96	9.89	47.85	66.00	-18.15	QP	
2		0.1500	14.97	9.89	24.86	56.00	-31.14	AVG	
3		0.1980	34.05	9.90	43.95	63.69	-19.74	QP	
4		0.1980	26.13	9.90	36.03	53.69	-17.66	AVG	
5		0.2820	30.97	9.91	40.88	60.76	-19.88	QP	
6		0.2820	21.38	9.91	31.29	50.76	-19.47	AVG	
7		0.3620	30.17	9.91	40.08	58.68	-18.60	QP	
8		0.3620	18.19	9.91	28.10	48.68	-20.58	AVG	
9	*	0.6820	29.73	9.92	39.65	56.00	-16.35	QP	
10		0.6820	19.05	9.92	28.97	46.00	-17.03	AVG	
11		0.7620	29.33	9.92	39.25	56.00	-16.75	QP	
12		0.7620	18.79	9.92	28.71	46.00	-17.29	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:

5. RADIATED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. Measuring Standard

EN 61000-6-3:2007+A1:2011+ AC:2012

5.3. Radiated Emission Limits

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.
 (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

5.4. EUT Configuration of Measurement

The EN 61000-6-3 regulations test method must be used to find the maximum emission during radiated emission measurement.

EUT : All-in-one solar charge inverter
 Model Number : HF4850S80-H

5.5. Operating Condition of EUT

5.5.1. Setup the EUT as shown on Section 5.1.

5.5.2. Turn on the power of all equipment.

5.5.3. Let the EUT work in measuring mode (AC mode, Bat mode) and measure it.

5.6. Test Procedure

The EUT is placed on a turntable which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna that is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver (ESU 26) is set at 120kHz.

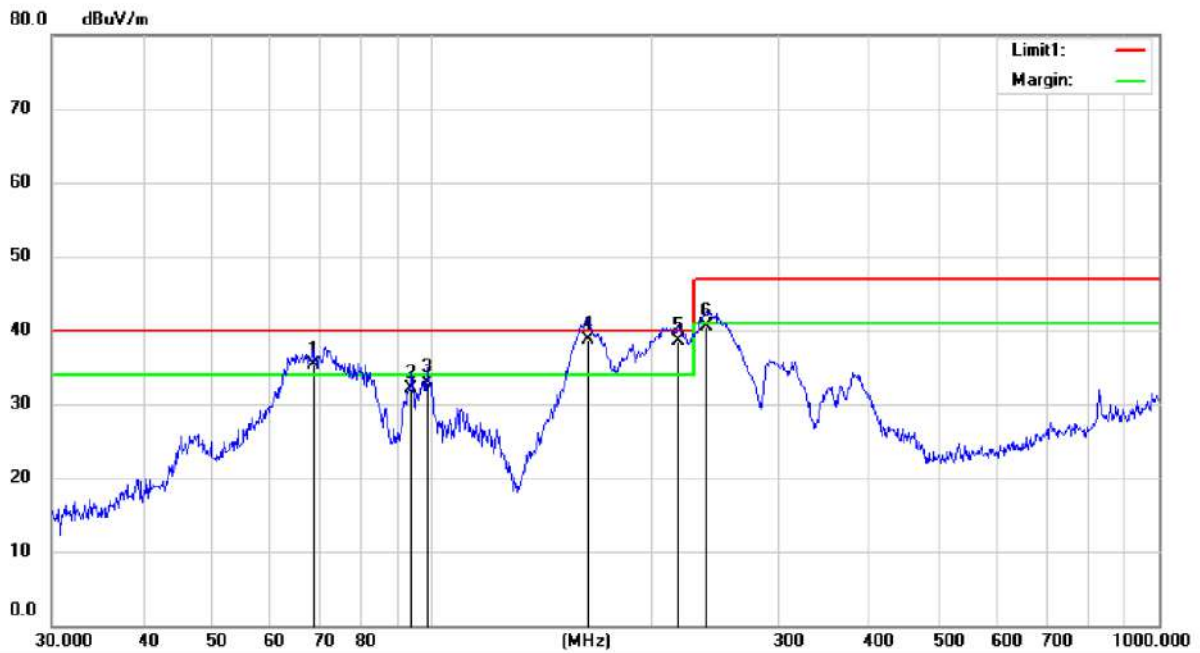
All the scanning waveform is put in the following pages.

5.7. Measuring Results

PASS.

The frequency range from 30MHz to 1000MHz is investigated.

Please reference to the following pages.



Site: 3m Chamber #3
 Limit: (RE)EN61000-6-3
 Mode: AC Mode
 Note:

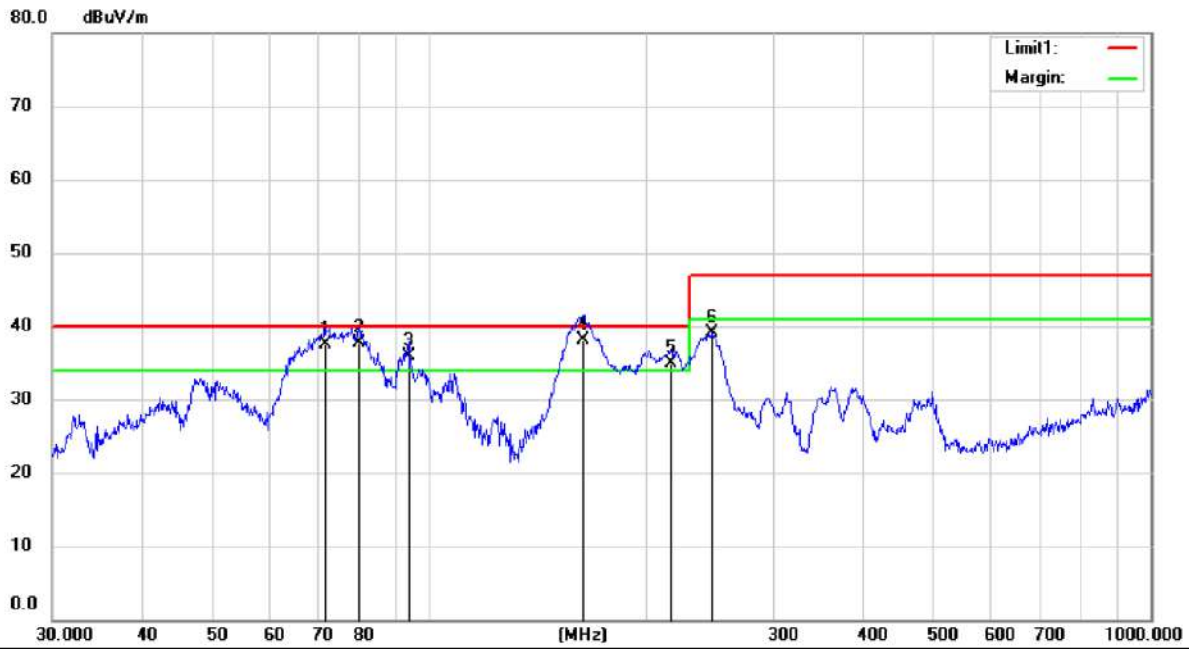
Polarization: **Horizontal**
 Power: AC 230V/50Hz

Temperature: 22.5 C
 Humidity: 45 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Detector	Comment
1	!	68.6310	52.16	-16.86	35.30	40.00	-4.70			QP	
2		93.7681	48.36	-16.16	32.20	40.00	-7.80			QP	
3		98.4865	48.00	-15.10	32.90	40.00	-7.10			QP	
4	*	164.3301	56.00	-17.20	38.80	40.00	-1.20			QP	
5	!	218.3085	51.92	-13.32	38.60	40.00	-1.40			QP	
6		238.3102	53.40	-12.90	40.50	47.00	-6.50			QP	

*:Maximum data x:Over limit !:over margin

Operator: whz



Site 3m Chamber #3 Polarization: **Vertical** Temperature: 22.5 C
 Limit: (RE)EN61000-6-3 Power: AC 230V/50Hz Humidity: 45 %
 Mode: AC Mode
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Detector	Comment
1	!	71.5805	54.75	-17.15	37.60	40.00	-2.40			QP	
2	!	79.8002	56.17	-18.37	37.80	40.00	-2.20			QP	
3	!	93.4402	52.11	-16.21	35.90	40.00	-4.10			QP	
4	*	163.1817	55.41	-17.21	38.20	40.00	-1.80			QP	
5	!	216.0240	48.32	-13.42	34.90	40.00	-5.10			QP	
6		245.9510	51.81	-12.70	39.11	47.00	-7.89			QP	

*:Maximum data x:Over limit !:over margin

Operator: whz

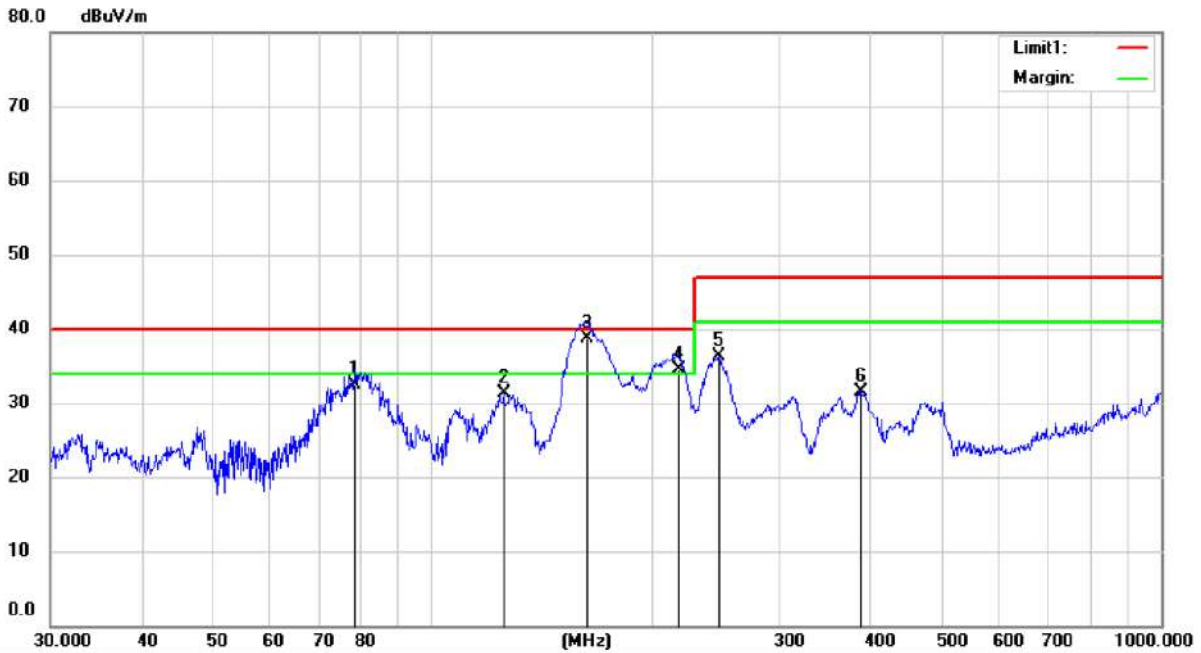


Site 3m Chamber #3 Polarization: **Horizontal** Temperature: 22.5 C
 Limit: (RE)EN61000-6-3 Power: DC 48V Humidity: 45 %
 Mode: Bat Mode
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		77.0504	49.45	-17.92	31.53	40.00	-8.47	QP		
2	!	162.0413	55.13	-17.23	37.90	40.00	-2.10	QP		
3	*	214.5142	51.65	-13.45	38.20	40.00	-1.80	QP		
4		246.8150	53.51	-12.71	40.80	47.00	-6.20	QP		
5		300.3672	48.27	-11.03	37.24	47.00	-9.76	QP		
6		366.8231	44.35	-9.17	35.18	47.00	-11.82	QP		

*:Maximum data x:Over limit !:over margin

Operator: whz



Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 22.5 C

Limit: (RE)EN61000-6-3

Power: DC 48V

Humidity: 45 %

Mode: Bat Mode

Note:

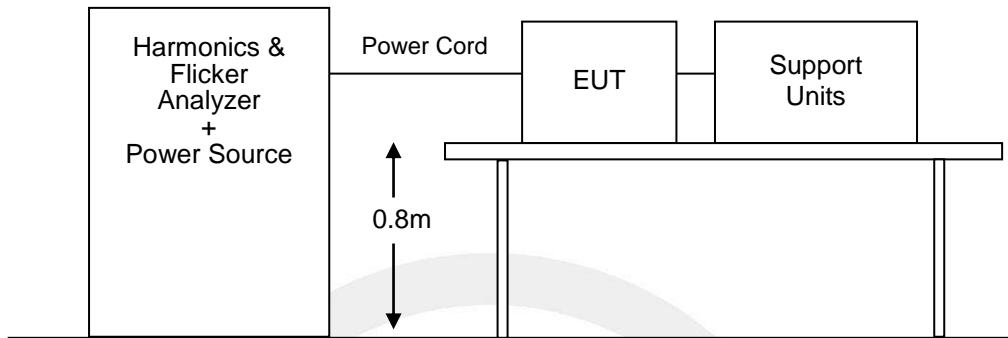
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		78.4133	50.74	-18.14	32.60	40.00	-7.40	QP		
2		125.4457	46.88	-15.63	31.25	40.00	-8.75	QP		
3	*	163.1818	55.91	-17.21	38.70	40.00	-1.30	QP		
4	!	218.3084	47.82	-13.32	34.50	40.00	-5.50	QP		
5		247.6818	49.00	-12.72	36.28	47.00	-10.72	QP		
6		387.9920	40.07	-8.50	31.57	47.00	-15.43	QP		

*:Maximum data x:Over limit !:over margin

Operator: whz

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup



6.2. Measuring Standard

EN 61000-3-12

Harmonic current emissions evaluate the potential for the EUT to cause distortion on the AC power lines. It is applicable to electrical and electronic equipment having an input current $>16\text{ A}$ and $\leq 75\text{ A}$ per phase, and intended to be connected to public low-voltage distribution systems.

Table 2 – Current emission limits for equipment other than balanced three-phase equipment

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} ^a						Admissible harmonic parameters	
	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THC/I_{ref}	$PWHC/I_{ref}$
33	21,6	10,7	7,2	3,8	3,1	2	23	23
66	24	13	8	5	4	3	26	26
120	27	15	10	6	5	4	30	30
250	35	20	13	9	8	6	40	40
≥ 350	41	24	15	12	10	8	47	47

The relative values of even harmonics up to order 12 shall not exceed $16/h\%$. Even harmonics above order 12 are taken into account in THC and $PWHC$ in the same way as odd order harmonics.

Linear interpolation between successive R_{sce} values is permitted.

^a I_{ref} = reference current; I_h = harmonic current component.

6.3. Operation Condition of EUT

6.3.1. Setup the EUT as shown on Section 6.1.

6.3.2. Turn on the power of all equipment.

6.3.3. Let the EUT work in measuring mode (AC mode) and measure it.

6.4. Measuring Results

PASS.

Please see the attached pages.



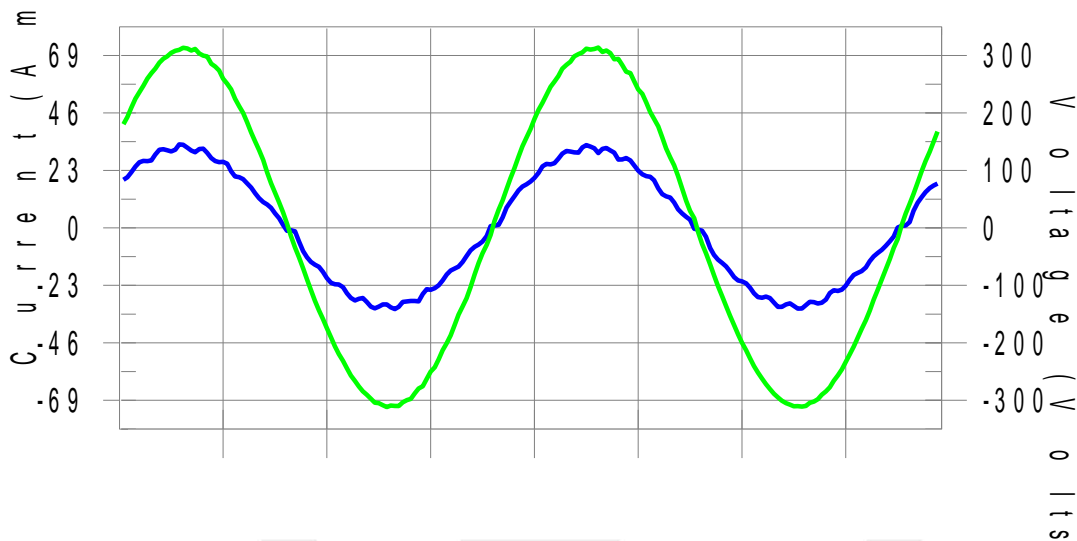
Harmonics – Per EN/IEC61000-3-12(Run time)

EUT: All-in-one solar charge inverter
 Test category: Table:3, R_{sc}=33, Inter-Harm.)
 Test date: 2020/5/7
 Test duration (min): 2.5
 Comment: AC Mode
 Customer: SRNE Solar Co., Ltd.

Tested by: LQZ
 Test Margin: 100
 Start time: 15:16:30
 End time: 15:19:22
 Data file name: WIN2106_H-000447.cts_data

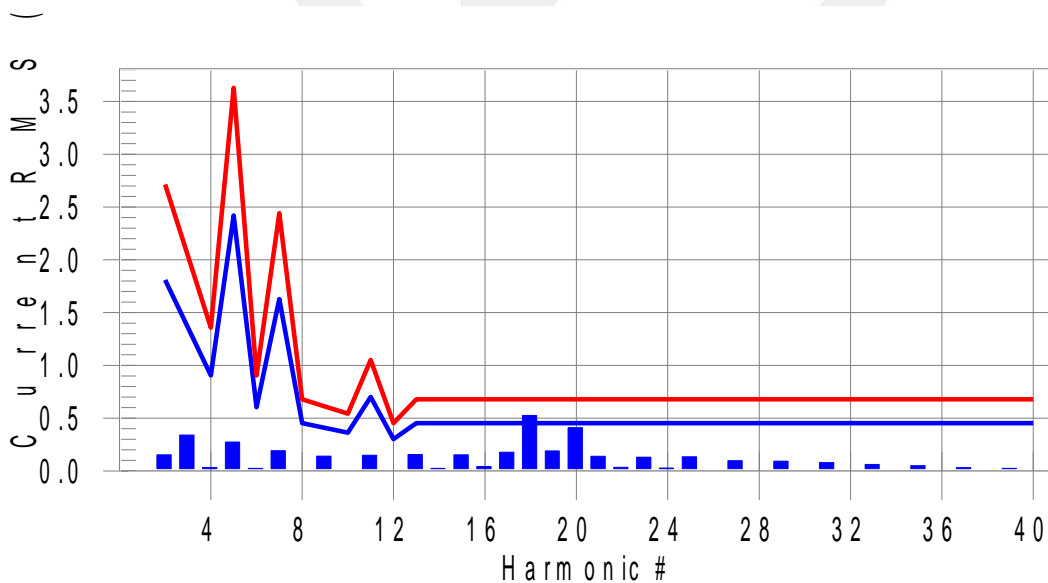
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class 3 limit line

European Limits



Test result: Pass Worst harmonic was #13 with 34.78 % of the limit.

Current Test Result Summary (Run time)

EUT: All-in-one solar charge inverter
 Test category: Table:3, Rsce=33, Inter-Harm,) Tested by: LQZ
 Test date: 2020/5/7 Start time: 15:16:30 Test Margin: 100
 Test duration (min): 2.5 Data file name: WIN2106_H-000447.cts_data End time: 15:19:22
 Comment: AC Mode
 Customer: SRNE Solar Co., Ltd.

Test Result: Pass Measured I-ref: 22.592 Amp rms Source: Normal
 I-THC(%): 4.3 Limit(%): 13.0 PWHC(%): 15.5 PWHC Limit(%): 22.0

Highest parameter values during test:

V_RMS (Volts): 220.29 Frequency(Hz): 50.00
 I_Peak (Amps): 34.735 I_RMS (Amps): 22.688
 I_Fund (Amps): 22.592 Crest Factor: 1.534
 Power (Watts): 4990 Power Factor: 0.999

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.152	1.809	8.4	0.162	2.714	6.0	Pass
3	0.594	N/A	N/A	0.356	N/A	N/A	N/A
4	0.032	0.905	3.6	0.038	1.357	2.8	Pass
5	0.273	2.420	11.3	0.280	3.629	7.7	Pass
6	0.024	0.603	4.0	0.028	0.905	3.1	Pass
7	0.192	1.628	11.8	0.197	2.442	8.1	Pass
8	0.019	0.452	4.3	0.022	0.678	3.3	Pass
9	0.178	N/A	N/A	0.144	N/A	N/A	N/A
10	0.020	0.362	5.6	0.023	0.543	4.2	Pass
11	0.148	0.701	21.1	0.153	1.052	14.6	Pass
12	0.020	0.302	6.6	0.023	0.452	5.2	Pass
13	0.156	0.452	34.6	0.160	0.678	23.6	Pass
14	0.025	N/A	N/A	0.028	N/A	N/A	N/A
15	0.152	N/A	N/A	0.156	N/A	N/A	N/A
16	0.042	N/A	N/A	0.046	N/A	N/A	N/A
17	0.179	N/A	N/A	0.184	N/A	N/A	N/A
18	0.527	N/A	N/A	0.531	N/A	N/A	N/A
19	0.190	N/A	N/A	0.197	N/A	N/A	N/A
20	0.410	N/A	N/A	0.412	N/A	N/A	N/A
21	0.138	N/A	N/A	0.147	N/A	N/A	N/A
22	0.033	N/A	N/A	0.037	N/A	N/A	N/A
23	0.131	N/A	N/A	0.134	N/A	N/A	N/A
24	0.029	N/A	N/A	0.032	N/A	N/A	N/A
25	0.134	N/A	N/A	0.137	N/A	N/A	N/A
26	0.016	N/A	N/A	0.018	N/A	N/A	N/A
27	0.097	N/A	N/A	0.099	N/A	N/A	N/A
28	0.014	N/A	N/A	0.015	N/A	N/A	N/A
29	0.092	N/A	N/A	0.095	N/A	N/A	N/A
30	0.013	N/A	N/A	0.015	N/A	N/A	N/A
31	0.078	N/A	N/A	0.080	N/A	N/A	N/A
32	0.012	N/A	N/A	0.014	N/A	N/A	N/A
33	0.062	N/A	N/A	0.066	N/A	N/A	N/A
34	0.011	N/A	N/A	0.013	N/A	N/A	N/A
35	0.050	N/A	N/A	0.052	N/A	N/A	N/A
36	0.011	N/A	N/A	0.013	N/A	N/A	N/A
37	0.031	N/A	N/A	0.034	N/A	N/A	N/A
38	0.011	N/A	N/A	0.013	N/A	N/A	N/A
39	0.024	N/A	N/A	0.026	N/A	N/A	N/A
40	0.009	N/A	N/A	0.011	N/A	N/A	N/A

Note: Measured I-ref was applied for this test.

Voltage Source Verification Data (Run time)

EUT: All-in-one solar charge inverter
 Test category: Table:3, Rsce=33, Inter-Harm,) Tested by: LQZ
 Test date: 2020/5/7 Start time: 15:16:30 Test Margin: 100
 Test duration (min): 2.5 Data file name: WIN2106_H-000447.cts_data End time: 15:19:22
 Comment: AC Mode
 Customer: SRNE Solar Co., Ltd.

Test Result: Pass Source qualification: Normal
 Measured source distortion is within the requirements of the standards
 Measurements are compliant with IEC/EN61000-3-12 Ed.2 (2011) & IEC/EN61000-4-7

Highest parameter values during test:

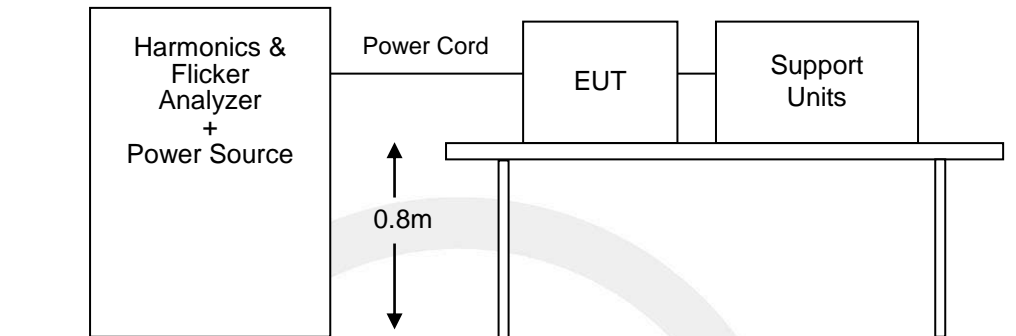
Voltage (Vrms):	220.29	Frequency(Hz):	50.00
I_Peak (Amps):	34.735	I_RMS (Amps):	22.688
I_Fund (Amps):	22.592	Crest Factor:	1.534
Power (Watts):	4990	Power Factor:	0.999

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.276	0.881	31.28	OK
3	0.196	2.753	7.13	OK
4	0.042	0.881	4.82	OK
5	0.139	3.304	4.21	OK
6	0.022	0.881	2.50	OK
7	0.145	2.753	5.25	OK
8	0.022	0.881	2.45	OK
9	0.139	1.321	10.54	OK
10	0.022	0.881	2.50	OK
11	0.094	1.542	6.11	OK
12	0.018	0.661	2.78	OK
13	0.075	1.322	5.65	OK
14	0.018	0.661	2.66	OK
15	0.114	0.661	17.33	OK
16	0.019	0.661	2.87	OK
17	0.149	0.661	22.54	OK
18	0.041	0.661	6.21	OK
19	0.180	0.661	27.18	OK
20	0.032	0.661	4.89	OK
21	0.182	0.661	27.47	OK
22	0.017	0.661	2.62	OK
23	0.182	0.661	27.51	OK
24	0.016	0.661	2.46	OK
25	0.207	0.661	31.30	OK
26	0.019	0.661	2.90	OK
27	0.196	0.661	29.70	OK
28	0.017	0.661	2.62	OK
29	0.190	0.661	28.76	OK
30	0.018	0.661	2.73	OK
31	0.179	0.661	27.13	OK
32	0.021	0.661	3.20	OK
33	0.173	0.661	26.21	OK
34	0.019	0.661	2.87	OK
35	0.154	0.661	23.29	OK
36	0.020	0.661	2.97	OK
37	0.132	0.661	19.99	OK
38	0.023	0.661	3.45	OK
39	0.116	0.661	17.52	OK
40	0.023	0.661	3.43	OK

Minimum Rsce required: Rsce = 23.197
 Phase A = 70.295% of tested Rsce = 33.000, Rsce = 23.197

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Measuring Standard

EN 61000-3-11 Limits

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6. Tests made to prove the compliance with the limits are considered to be type tests.

The following limits apply:

- the value of the short-term flicker indicator, P_{st} shall not be greater than 1,0;
- the value of the long-term flicker indicator, P_{lt} shall not be greater than 0,65;
- the value of $d(t)$ during a voltage change shall not exceed 3,3 % for more than 500 ms;
- the relative steady-state voltage change, d_c , shall not exceed 3,3 %;
- the maximum relative voltage change d_{max} , shall not exceed:

7.3. Test Procedure

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of 8% is achieved during the whole assessment procedure.

7.4. Operation Condition of EUT

- 7.4.1. Me Setup the EUT as shown on Section 7.1.
- 7.4.2. Turn on the power of all equipment.
- 7.4.3. Let the EUT work in measuring mode (AC mode) and measure it.

7.5. Measuring Results

PASS.

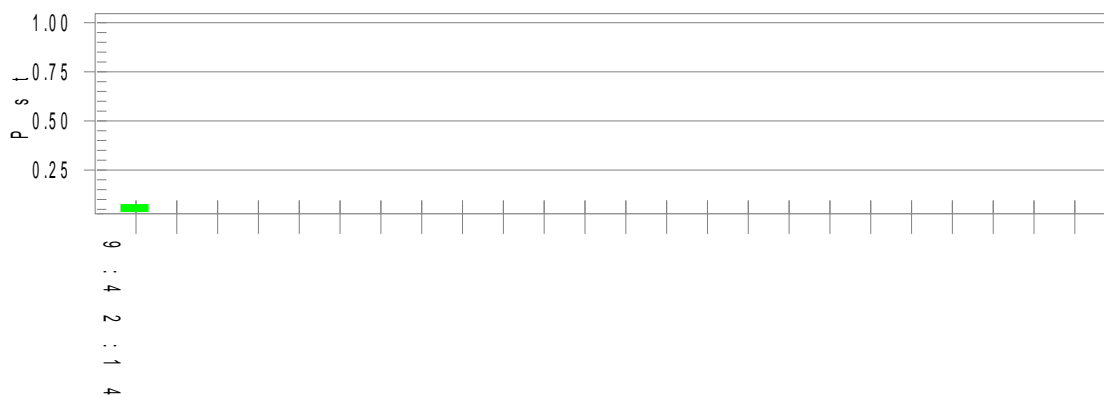
Please see the attached page.

Flicker Test Summary Per EN/IEC61000-3-11, Ed. 1.0(Run time) per EN/IEC61000-3-11IEC61000-3-11 Ed. 1.0 (2000)

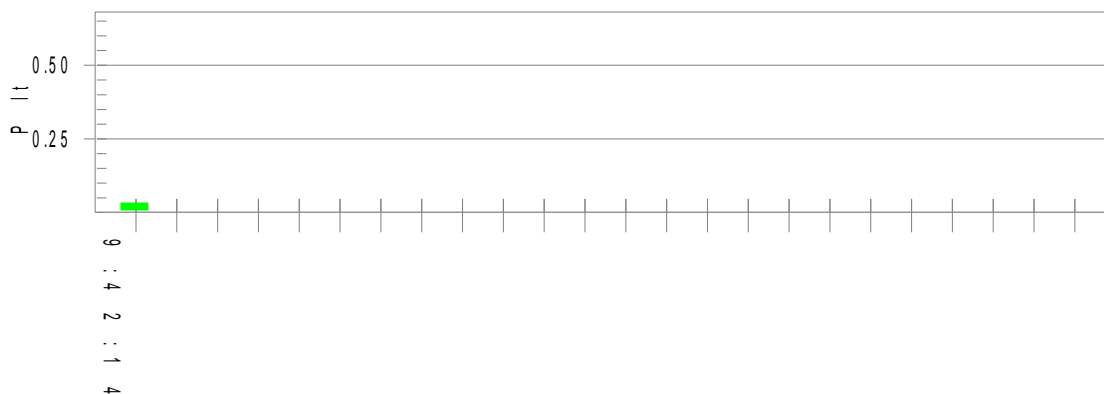
EUT: All-in-one solar charge inverter	Tested by: LQZ
Test category: All parameters	Test Margin: 100
Test date: 2020/5/7	Start time: 9:31:53
Test duration (min): 10	End time: 9:42:20
Comment: AC mode	Data file name: WIN2106_F-000087.cts_data
Customer: SRNE Solar Co., Ltd.	
Z-test = (0.400 + j 0.250 Ohm)	

Test Result: Pass
Status: Test Completed

Pst_i and limit line



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 224.94

T-max (mS):	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.37	Test limit (%):	4.00	Pass

Highest Pst (10 min. period):
Highest Plt (2 hr. period):

0.073 Test limit:
0.032 Test limit:

1.000 Pass
0.650 Pass

Calculated dmax(%): 0.374
Calculated dc(%): 0.000
Calculated Pst : 0.073
Calculated Plt : 0.032

The maximum permissible system impedance Zsys:

Z = 20.076 Ohm + j 12.547 Ohm (20.076 Ohm + 39939 μH)



8. IMMUNITY PERFORMANCE CRITERIA DESCRIPTION

Performance Level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

1. Based on the used product standard
2. Based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Criterion B:

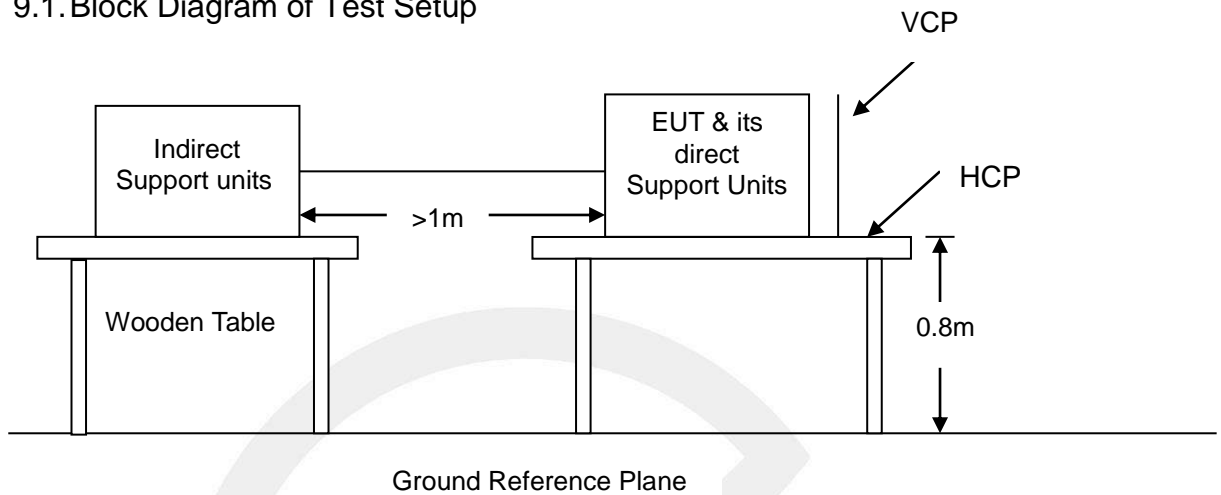
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Criterion C:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

9. ELECTROSTATIC DISCHARGE IMMUNITY TEST

9.1. Block Diagram of Test Setup



9.2. Test Standard

EN 61000-6-1:2007
 (IEC 61000-4-2:2008 Severity Level: 3 / Air Discharge: $\pm 8\text{kV}$
 Level: 2 / Contact Discharge: $\pm 4\text{kV}$)

9.3. Severity Levels and Performance Criterion

9.3.1. Severity level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1	± 2	± 2
2	± 4	± 4
3	± 6	± 8
4	± 8	± 15
X	Special	Special

9.3.2. Performance criterion: B

9.4. Operating Condition of EUT

- 9.4.1. Setup the EUT as shown on Section 9.1.
- 9.4.2. Turn on the power of all equipment.
- 9.4.3. Let the EUT work in test mode (AC mode) and test it.

9.5. Test Procedure

9.5.1. Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.5.2. Contact Discharge:

All procedure shall be the same as Section 9.5.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.5.3. Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.5.4. Indirect discharge for vertical coupling plane

At least 10 singles discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m×0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.6. Test Results

PASS.

Please refer to the following page.

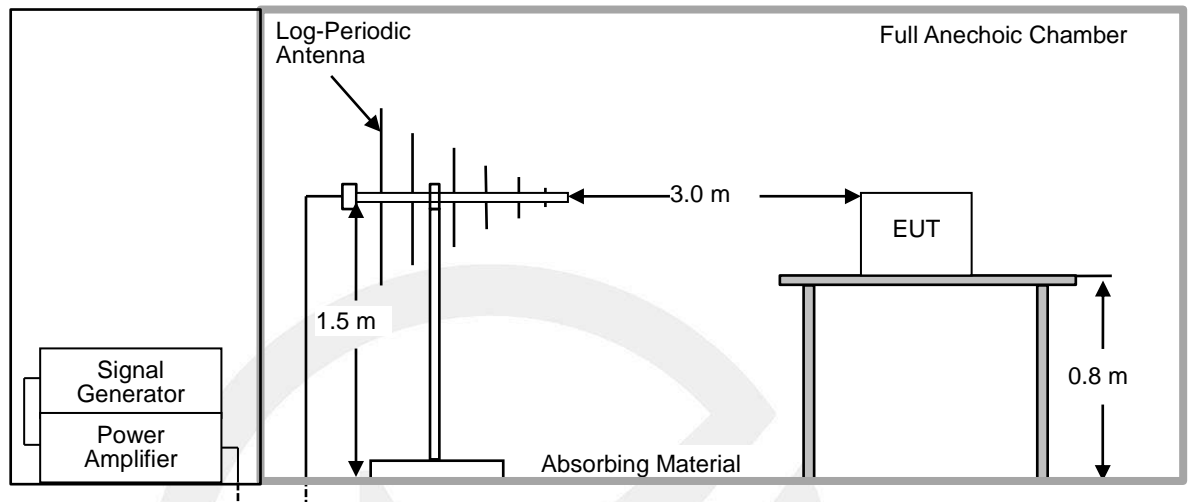
Electrostatic Discharge Test Result

EMTEK (SHENZHEN) CO., LTD.

Applicant	: SRNE Solar Co., Ltd.		
EUT	: All-in-one solar charge inverter	Test Date	: 2020-05-07
M/N	: HF4850S80-H	Temperature	: 25.6°C
Power Supply	: AC 230V/50Hz	Humidity	: 49%
Air discharge	: ± 8.0kV	Test mode	: AC mode
Contact discharge:	± 4.0kV	Criterion	: B
Location	Kind A-Air Discharge C-Contact Discharge	Result	
Metal	C	A	
Screw	C	A	
Slot	A	A	
Screen	A	A	
HCP	C	A	
VCP of front	C	A	
VCP of rear	C	A	
VCP of left	C	A	
VCP of right	C	A	
Note:			

10. RF FIELD STRENGTH SUSCEPTIBILITY TEST

10.1. Block Diagram of Test Setup



10.2. Test Standard

EN 61000-6-1:2007
(IEC 61000-4-3:2006+A1:2007+A2:2010, Severity Level: 1V/m, 3V/m)

10.3. Severity Levels and Performance Criterion

10.3.1. Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

10.3.2. Performance Criterion: A

10.4. Operating Condition of EUT

10.4.1. Me Setup the EUT as shown on Section 10.1.

10.4.2. Turn on the power of all equipment.

10.4.3. Let the EUT work in test mode (AC mode) and test it.

10.5. Test Procedure

The EUT is placed on a table that is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna that is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor it. All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	1V/m (Severity Level 1) 3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-2700MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

10.6. Test Results

PASS.

Please refer to the following pages.

RF Field Strength Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

Applicant : SRNE Solar Co., Ltd.			
EUT : All-in-one solar charge inverter		Test Date : 2020-05-07	
M/N : HF4850S80-H		Temperature : 29.1°C	
Field Strength : 3 V/m		Humidity : 51%	
Power Supply : AC 230V/50Hz		Criterion : A	
Test Mode : AC mode		Frequency Range : 80 MHz to 1000 MHz 1400 MHz to 2000 MHz	
Modulation: <input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM 1kHz 80%			
	Frequency Rang 1: 80~ 1000MHz	Frequency Rang 2: 1400~ 2000 MHz	
Steps	1%		
	Horizontal	Vertical	
	Horizontal	Vertical	
Front	A	A	A
Right	A	A	A
Rear	A	A	A
Left	A	A	A
Test Equipment : 1. Signal Generator : N5181A (Agilent) 2. Power Amplifier : AS0102-55 (MILMEGA) & 80RF1000-175 (MILMEGA) & AS1860-50 (MILMEGA) 3. Log.-Per.Antenna: VULP9118E (SCHWARZBECK) 4. Broad-Band Horn Antenna: STLP 9149 (Schwarzbeck) 5. RF Power Meter. Dual Channel: 4232A (BOONTON) 6. Field Strength Meter: RSS1006A (DARE)			
Note:			

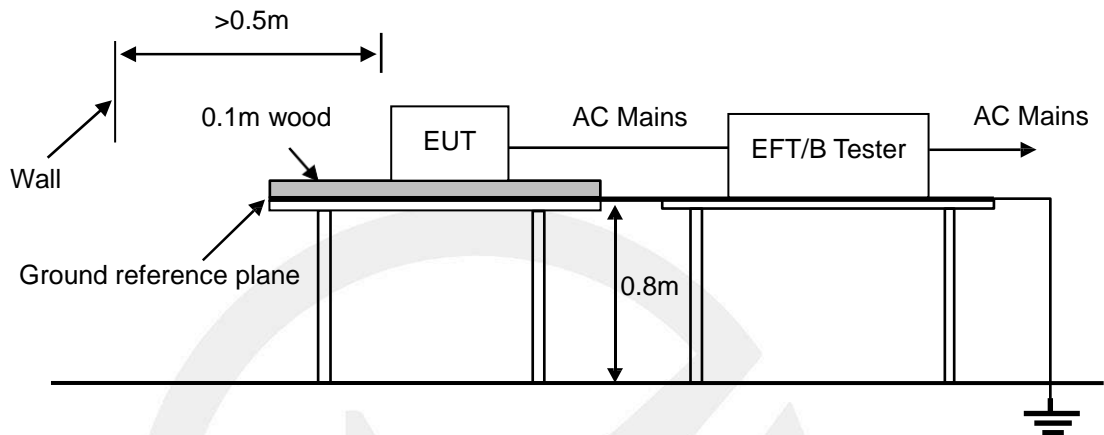
RF Field Strength Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

Applicant	: SRNE Solar Co., Ltd.		
EUT	: All-in-one solar charge inverter	Test Date	: 2020-05-07
M/N	: HF4850S80-H	Temperature	: 29.1°C
Field Strength	: 1 V/m	Humidity	: 51%
Power Supply	: AC 230V/50Hz	Criterion	: A
Test Mode	: AC mode	Frequency Range	: 2000 MHz to 2700 MHz
Modulation: <input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM 1kHz 80%			
Frequency Rang 1:		Frequency Rang 2: N/A	
2000~ 2700 MHz			
Steps	1%		
	Horizontal	Vertical	
Front	A	A	
Right	A	A	
Rear	A	A	
Left	A	A	
Test Equipment : 1. Signal Generator : N5181A (Agilent) 2. Power Amplifier : AS0102-55 (MILMEGA) & 80RF1000-175 (MILMEGA) & AS1860-50 (MILMEGA) 3. Log.-Per.Antenna: VULP9118E (SCHWARZBECK) 4. Broad-Band Horn Antenna: STLP 9149 (Schwarzbeck) 5. RF Power Meter. Dual Channel: 4232A (BOONTON) 6. Field Strength Meter: RSS1006A (DARE)			
Note:			

11. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

11.1. Block Diagram of Test Setup



11.2. Test Standard

EN 61000-6-1:2007
(IEC61000-4-4:2012, Severity Level: 2: 1kV)

11.3. Severity Levels and Performance Criterion

11.3.1. Severity level

Level	Open Circuit Output Test Voltage $\pm 10\%$	
	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

11.3.2. Performance criterion: B

11.4. Operating Condition of EUT

11.4.1. Me Setup the EUT as shown on Section 11.1.

11.4.2. Turn on the power of all equipment.

11.4.3. Let the EUT work in test mode (AC mode) and test it.

11.5. Test Procedure

The EUT is put on the table that is 0.8meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

11.5.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

11.5.2. For signal lines and control lines ports:

No I/O ports. It's unnecessary to test.

11.5.3. For DC output line ports:

It's unnecessary to test.

11.6. Test Results

PASS.

Please refer to the following page.

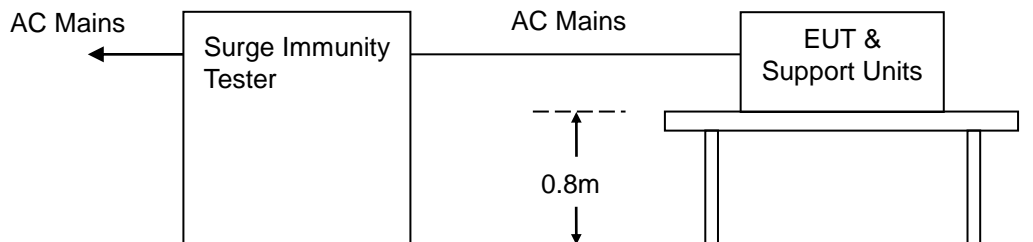
Electrical Fast Transient/Burst Test Results

EMTEK (SHENZHEN) CO., LTD.

Standard: <input checked="" type="checkbox"/> IEC 61000-4-4		Result: <input checked="" type="checkbox"/> PASS / <input type="checkbox"/> FAIL	
Applicant : <u>SRNE Solar Co., Ltd.</u>			
EUT : <u>All-in-one solar charge inverter</u>			
M/N : <u>HF4850S80-H</u>			
Input Voltage: <u>AC 230V/50Hz</u>			
Criterion : B			
Ambient Condition : <u>25.5 °C</u> <u>55% RH</u>			
Operation Mode: AC mode, Bat mode			
Line : <input checked="" type="checkbox"/> AC Mains		Line : <input type="checkbox"/> Signal <input type="checkbox"/> I/O Cable	
Coupling : <input checked="" type="checkbox"/> Direct		Coupling : <input type="checkbox"/> Capacitive	
Test Time : 120s			
Line	Test Voltage	Result(+)	Result(-)
L	1kV	A	A
N	1kV	A	A
PE	1kV	A	A
L、N	1kV	A	A
L、PE	1kV	A	A
N、PE	1kV	A	A
L、N、PE	1kV	A	A
Signal Line			
DC Line			
Note:			

12. SURGE IMMUNITY TEST

12.1. Block Diagram of Test Setup



12.2. Test Standard

EN 61000-6-1:2007

(IEC 61000-4-5:2014, Severity Level: Line to Line: Level 2, 1.0KV; Line to Earth: Level 3, 2.0KV)

12.3. Severity Levels and Performance Criterion

12.3.1. Severity level

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

12.3.2. Performance criterion: B

12.4. Operating Condition of EUT

12.4.1. Me Setup the EUT as shown on Section 12.1.

12.4.2. Turn on the power of all equipment.

12.4.3. Let the EUT work in test mode (AC mode) and test it.

12.5. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 12.1.2.
- 2) For line to line coupling mode, provide a 1.0 kV 1.2/50us voltage surge
For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge
(At open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.6. Test Results

PASS.

Please refer to the following page.



Surge Immunity Test Result

EMTEK (SHENZHEN) CO., LTD.

Applicant : SRNE Solar Co., Ltd.

EUT : All-in-one solar charge inverter

M/N : HF4850S80-H

Power Supply : AC 230V/50Hz

Test Mode : AC mode

Test Date : 2020-05-07

Temperature : 25.5°C

Humidity : 55%

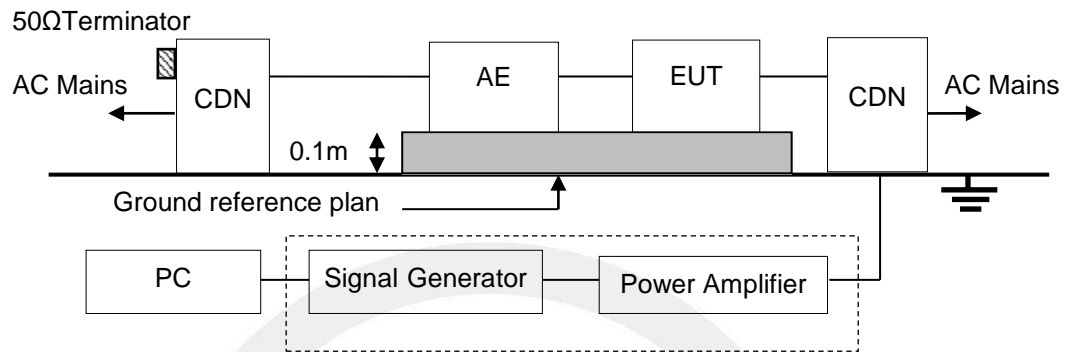
Criterion : B

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (kV)	Result
L-N	+	0°	5	1.0	A
	+	90°	5	1.0	A
	+	180°	5	1.0	A
	+	270°	5	1.0	A
	-	0°	5	1.0	A
	-	90°	5	1.0	A
	-	180°	5	1.0	A
	-	270°	5	1.0	A
L-PE	+	0°	5	2.0	A
	+	90°	5	2.0	A
	+	180°	5	2.0	A
	+	270°	5	2.0	A
	-	0°	5	2.0	A
	-	90°	5	2.0	A
	-	180°	5	2.0	A
	-	270°	5	2.0	A
N-PE	+	0°	5	2.0	A
	+	90°	5	2.0	A
	+	180°	5	2.0	A
	+	270°	5	2.0	A
	-	0°	5	2.0	A
	-	90°	5	2.0	A
	-	180°	5	2.0	A
	-	270°	5	2.0	A

Remark:

13. INJECTED CURRENTS SUSCEPTIBILITY TEST

13.1. Block Diagram of Test Setup



13.2. Test Standard

EN 61000-6-1:2007

(IEC 61000-4-6:2013, Severity Level: Level 2, 3V (r.m.s.), 0.15MHz ~ 80MHz)

13.3. Severity Levels and Performance Criterion

13.3.1. Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

13.3.2. Performance criterion: A

13.4. Operating Condition of EUT

13.4.1. Me Setup the EUT as shown on Section 13.1.

13.4.2. Turn on the power of all equipment.

13.4.3. Let the EUT work in test mode (AC mode) and test it.

13.5. Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 13.1.2.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150kHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

13.6. Test Results

PASS.

Please refer to the following page.

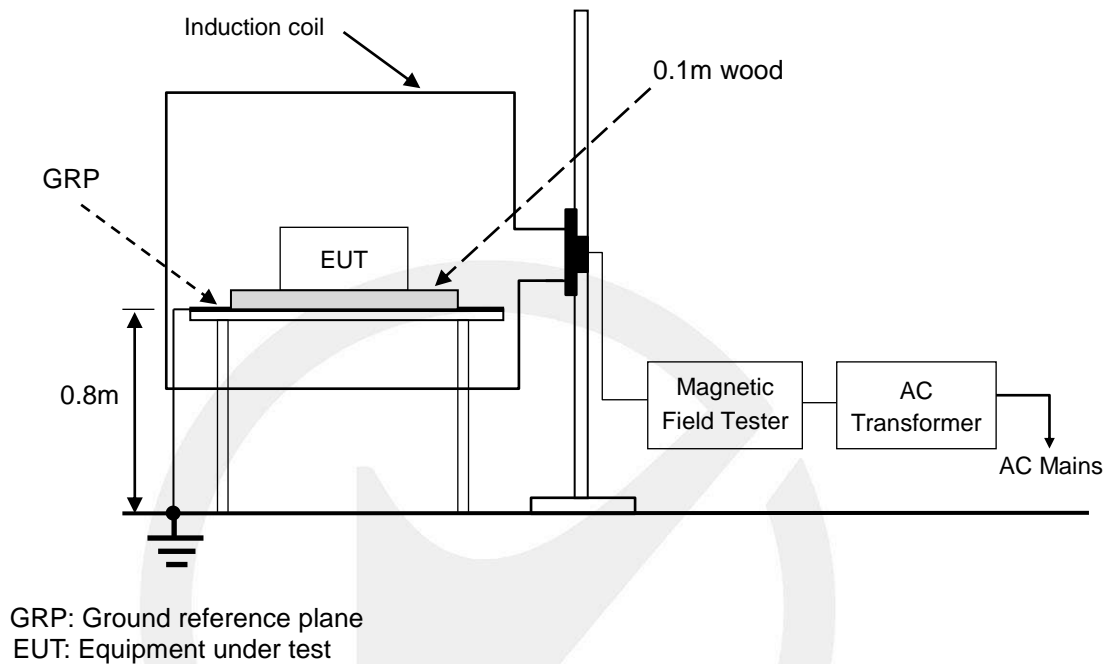
Injected Currents Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

Applicant : <u>SRNE Solar Co., Ltd.</u>				
EUT : <u>All-in-one solar charge inverter</u>			Test Date: <u>2020-05-07</u>	
M/N : <u>HF4850S80-H</u>			Temperature : <u>25.5°C</u>	
Power Supply : <u>AC 230V/50Hz</u>			Humidity : <u>55%</u>	
Test Engineer : <u>LQZ</u>				
Test Mode: <u>AC mode</u>				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	3V	A	A
Test Mode : <u>N/A</u>				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
Remark : 1. Modulation Signal:1kHz 80% AM Measurement Equipment : Simulator: CWS 500C (SWITZERLAND EMTEST) CDN : <input type="checkbox"/> CDN-M2 (SWITZERLAND EMTEST) <input checked="" type="checkbox"/> CDN-M3 (SWITZERLAND EMTEST)			Note:	

14. MAGNETIC FIELD SUSCEPTIBILITY TEST

14.1. Block Diagram of Test Setup



14.2. Test Standard

EN 61000-6-1:2007
(IEC 61000-4-8:2009, Severity Level: Level 2, 3A / m)

14.3. Severity Levels and Performance Criterion

14.3.1. Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

14.3.2. Performance Criterion: A

14.4. Operating Condition of EUT

14.4.1. Me Setup the EUT as shown on Section 14.1.

14.4.2. Turn on the power of all equipment.

14.4.3. Let the EUT work in test mode (AC mode) and test it.

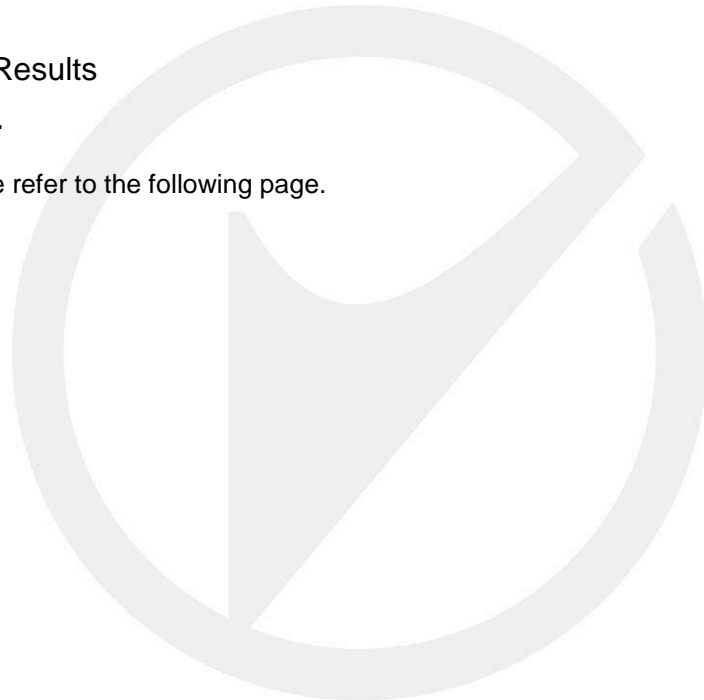
14.5. Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.8m (high) table, this small table is also placed on a larger table, above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

14.6. Test Results

PASS.

Please refer to the following page.



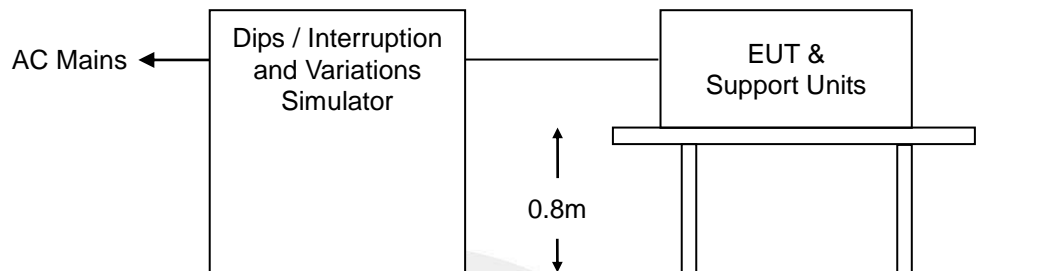
Magnetic Field Immunity Test Result

EMTEK (SHENZHEN) CO., LTD.

Standard: <input checked="" type="checkbox"/> IEC 61000-4-8		Result: <input checked="" type="checkbox"/> PASS / <input type="checkbox"/> FAIL		
Applicant : <u>SRNE Solar Co., Ltd.</u> EUT : <u>All-in-one solar charge inverter</u> M/N : <u>HF4850S80-H</u> Input Voltage : <u>AC 230V/50Hz</u> Date of Test : <u>2020-05-07</u> Test Engineer: <u>LQZ</u> Ambient Condition : Temp : <u>25.5°C</u> Humid: <u>55%</u> Criterion: A				
Operation Mode: AC mode				
Test Level (A/m)	Testing Duration	Coil Orientation	Criterion	Result
3	5 mins	X	A	A
3	5 mins	Y	A	A
3	5 mins	Z	A	A
Operation Mode: N/A				
Test Level (A/m)	Testing Duration	Coil Orientation	Criterion	Result
Test Equipment	Magnetic Field Test: HEAFELY MAG 100.1			
Note:				

15. VOLTAGE DIPS AND INTERRUPTIONS TEST

15.1. Block Diagram of Test Setup



15.2. Test Standard

EN 61000-6-1:2007 (IEC 61000-4-11:2004)

15.3. Severity Levels and Performance Criterion

15.3.1. Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5 1 5
70	30	10 25 50
0	100	*

15.3.2. Performance criterion: B&C

15.4. Operating Condition of EUT

15.4.1. Me Setup the EUT as shown on Section 15.1.

15.4.2. Turn on the power of all equipment.

15.4.3. Let the EUT work in test mode (AC mode) and test it.

15.5. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 15.1.2.
- 2) The interruption is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

15.6.Test Results

PASS.

Please refer to the following page.

Voltage Dips and Interruptions Test Results

EMTEK (SHENZHEN) CO., LTD.

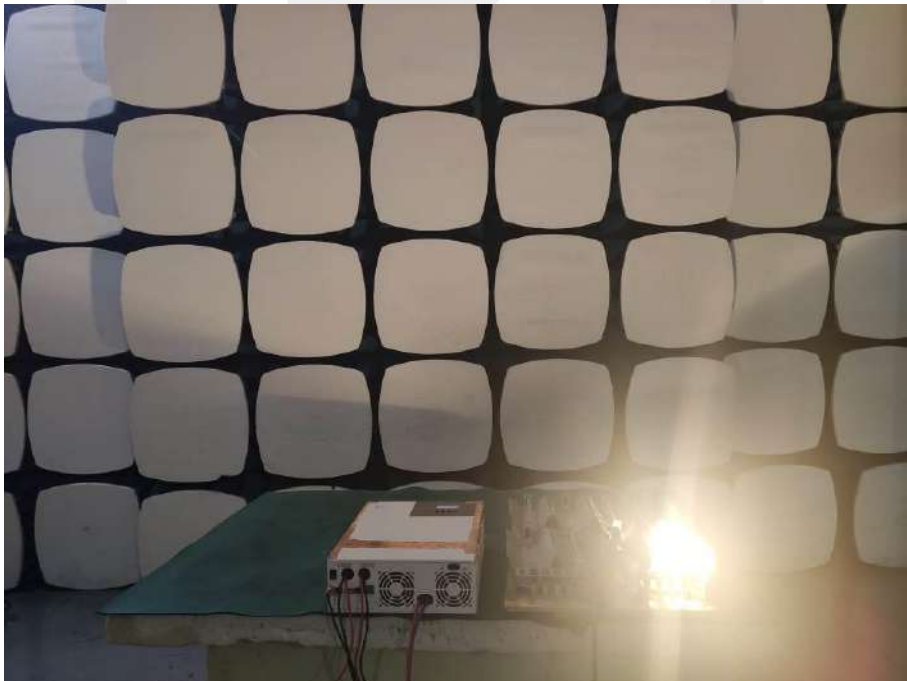
Applicant : <u>SRNE Solar Co., Ltd.</u>				
EUT : <u>All-in-one solar charge inverter</u>			Test Date : <u>2020-05-07</u>	
M/N : <u>HF4850S80-H</u>			Temperature : <u>25.5°C</u>	
Power Supply : <u>AC 230V/50Hz</u>			Humidity : <u>55%</u>	
Test Mode: AC mode				
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion <input type="checkbox"/> A <input checked="" type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D	Result
0	100	0.5P	B	A
0	100	1P	B	A
70	30	25P	C	A
0	100	250P	C	B
Test Mode : <u>N/A</u>				
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D	Result
Note: Dips to 0%, Duration 250P, EUT stopped operation, but it can be resumed by itself after test.				

16. PHOTOGRAPHS

16.1. Photos of Conducted Emission Measurement



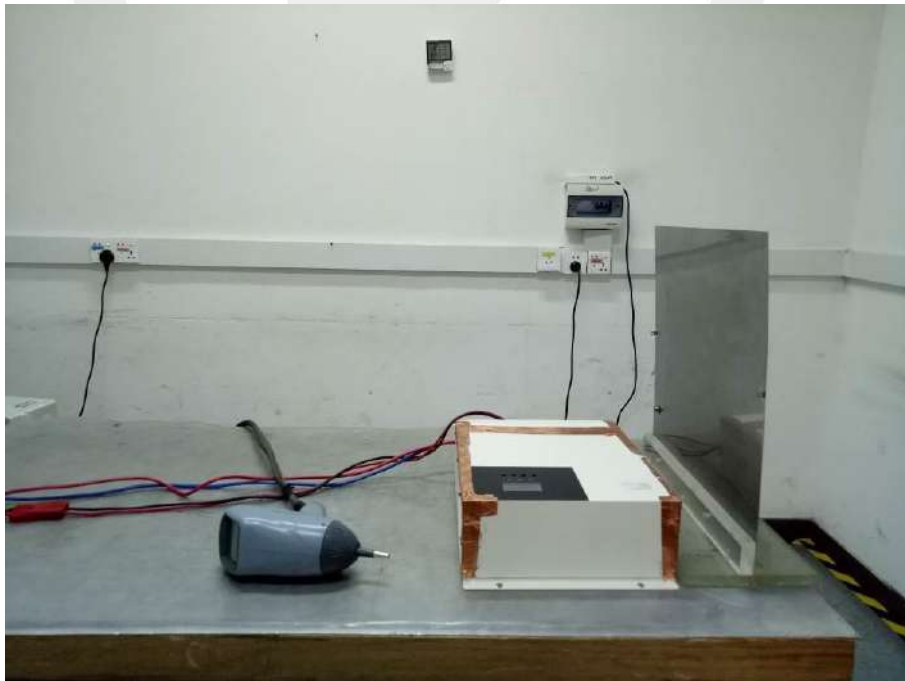
16.2.Photos of Radiation Emission Measurement



16.3. Photo of Harmonic / Flicker Measurement



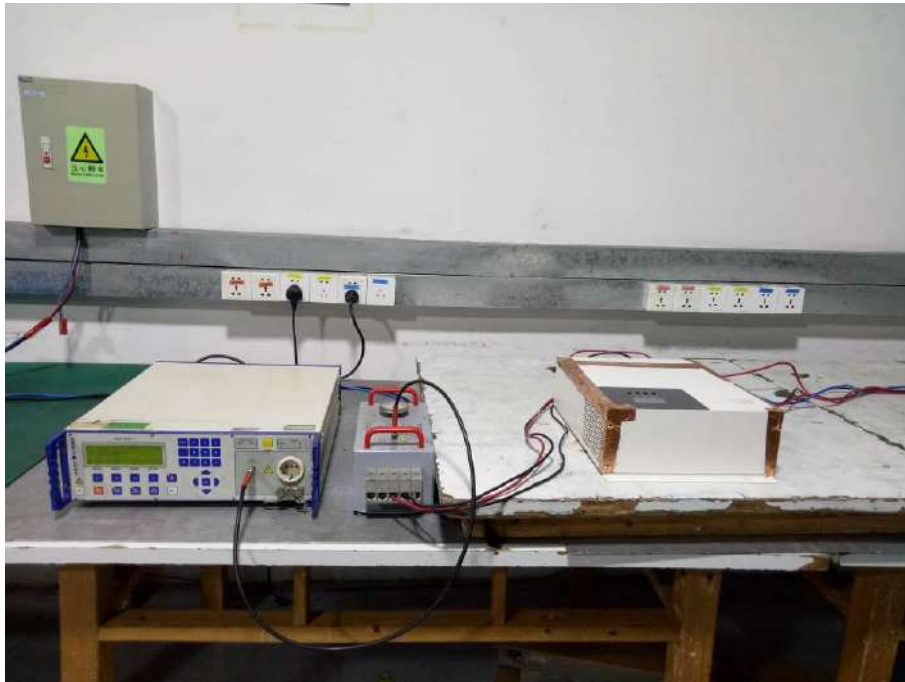
16.4. Photo of Electrostatic Discharge Test



16.5.Photo of RF Field Strength Susceptibility Test



16.6.Photo of Electrical Fast Transient / Burst Test



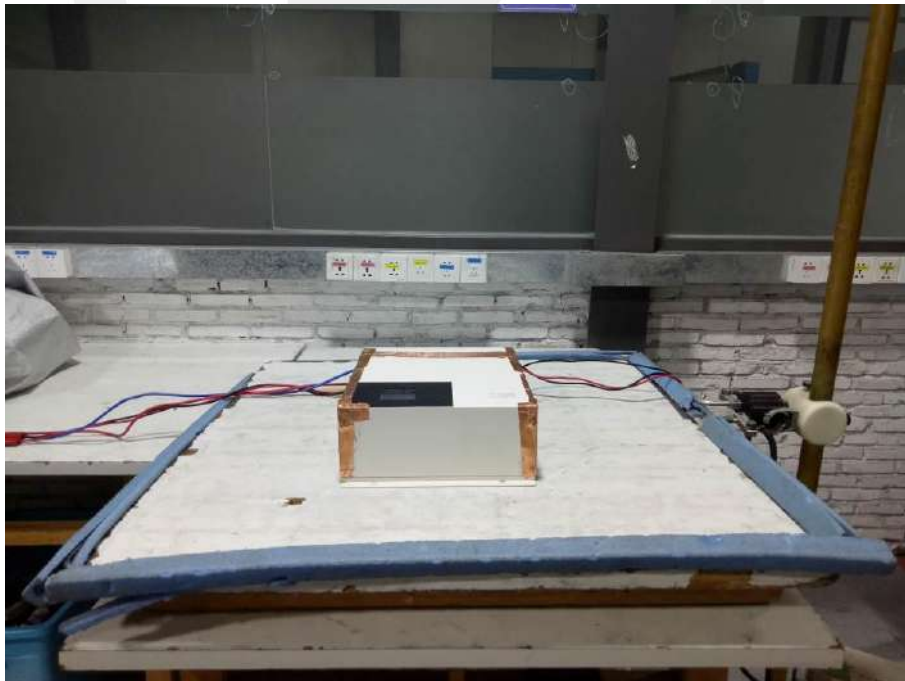
16.7.Photo of Surge Test



16.8. Photo of Injected Currents Susceptibility Test



16.9. Photo of Magnetic Field Immunity Test

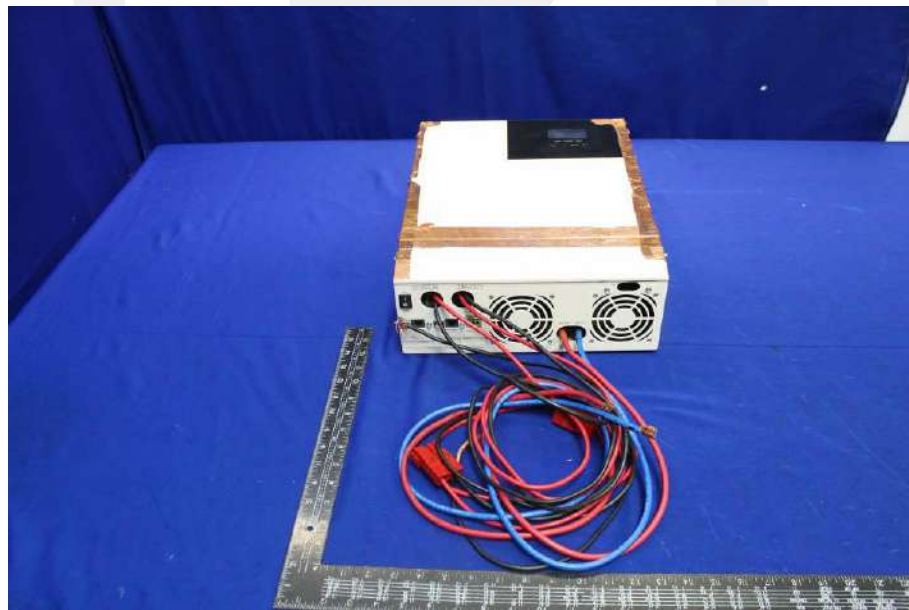
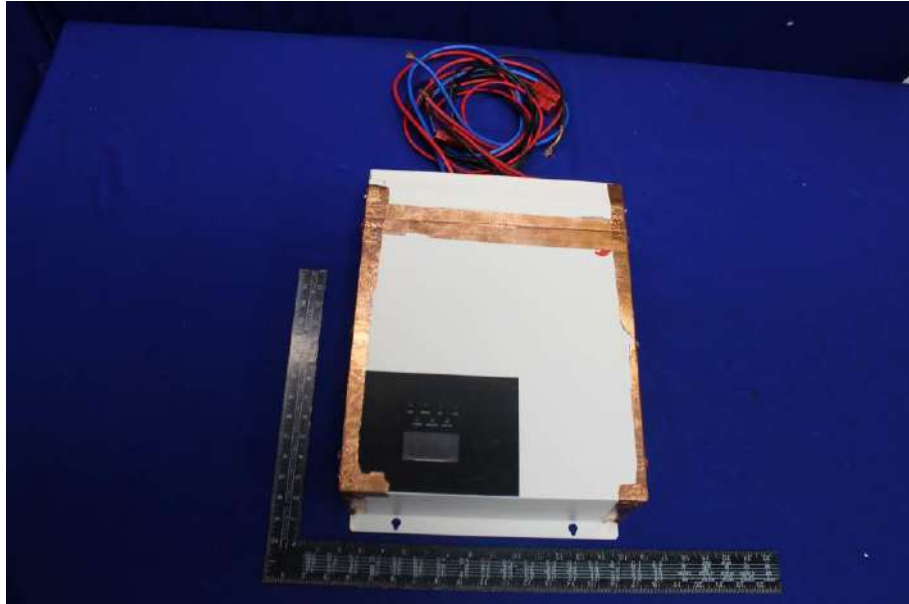


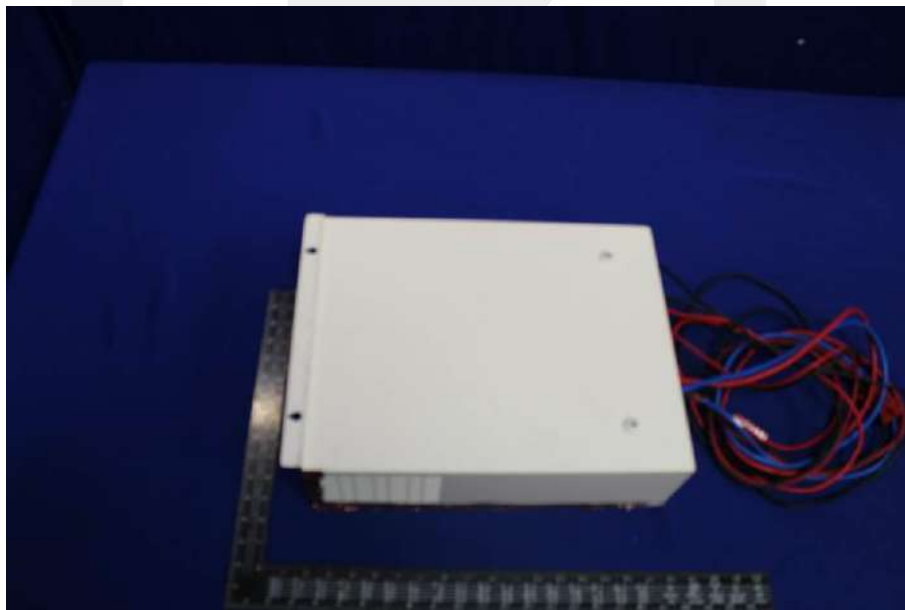
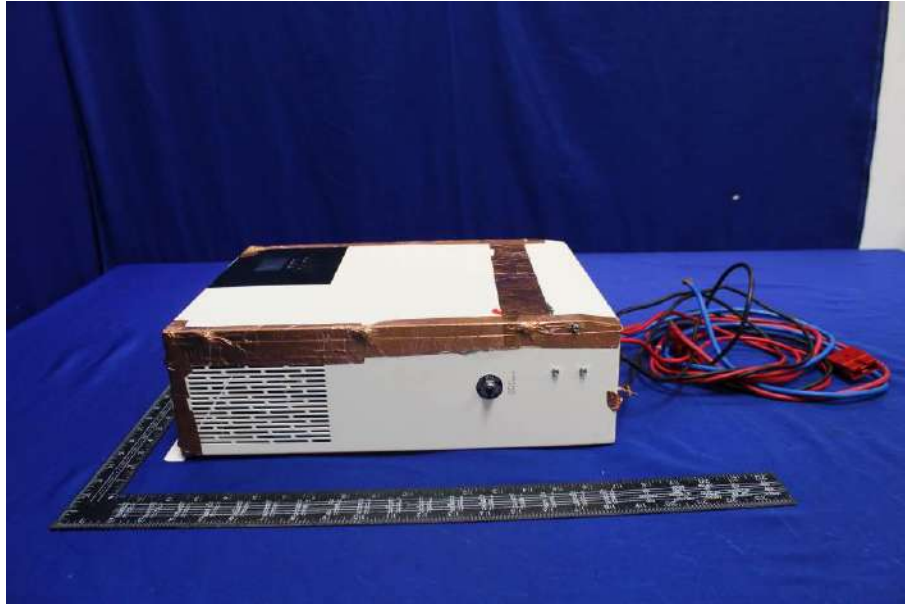
16.10.Photo of Voltage Dips and Interruption Immunity Test

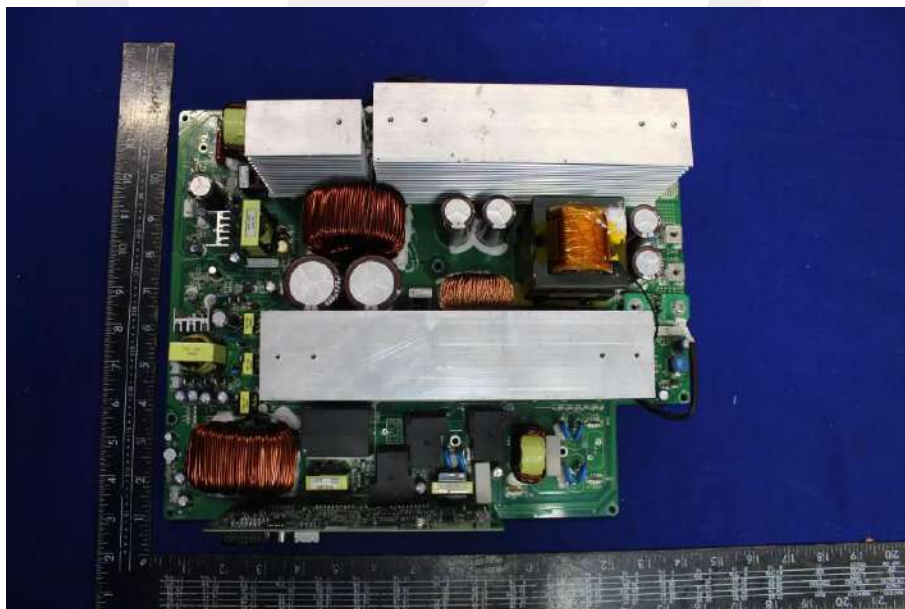
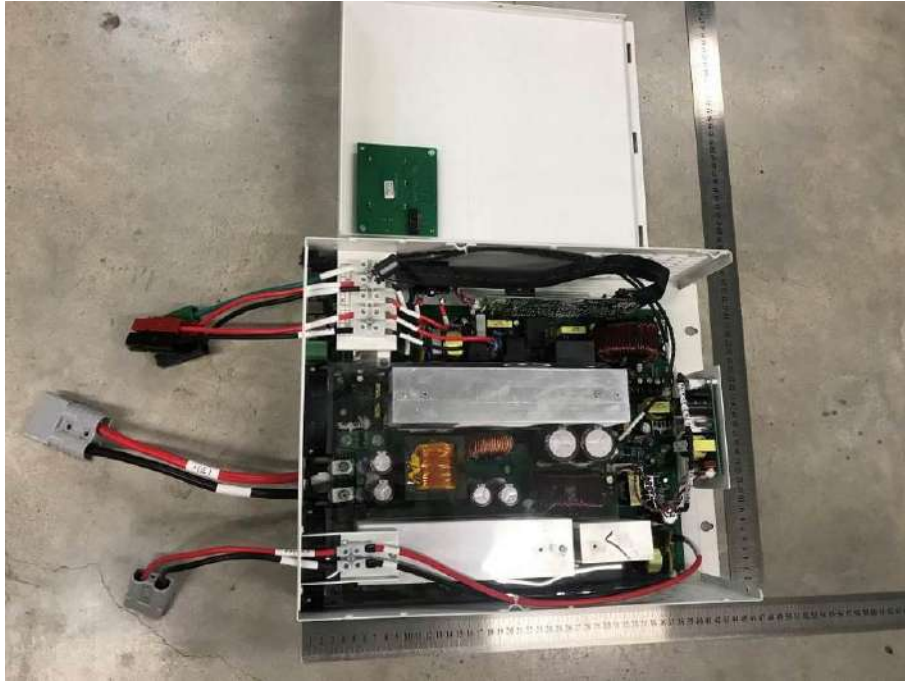


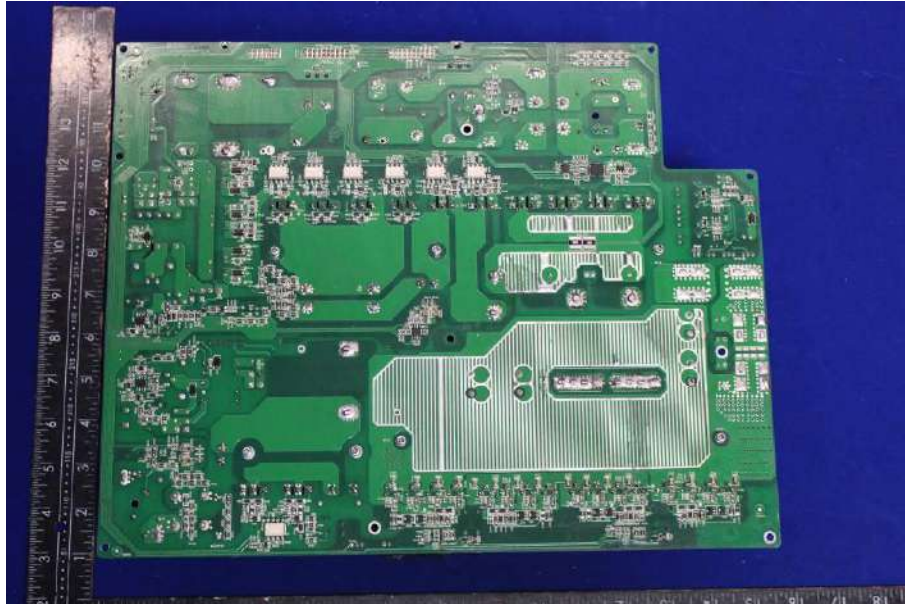


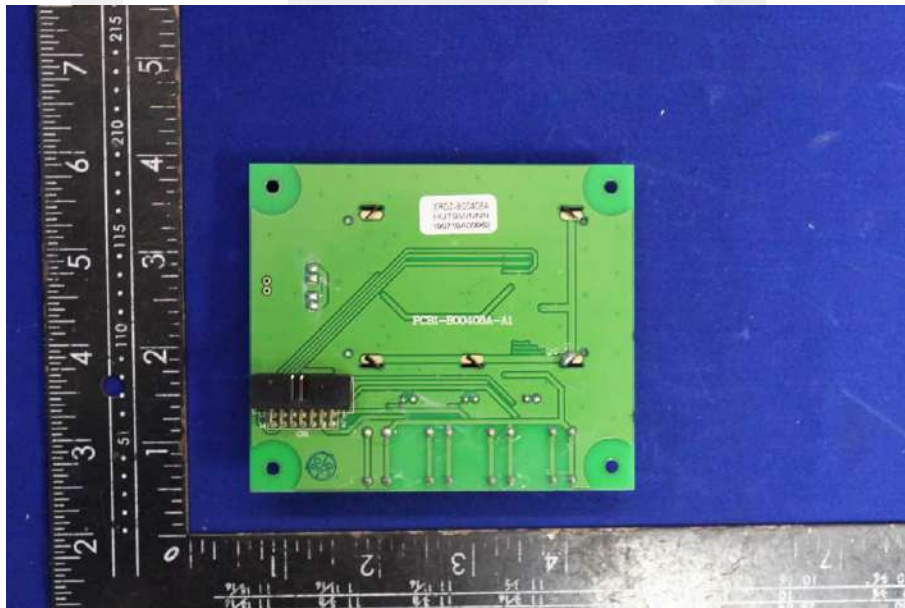
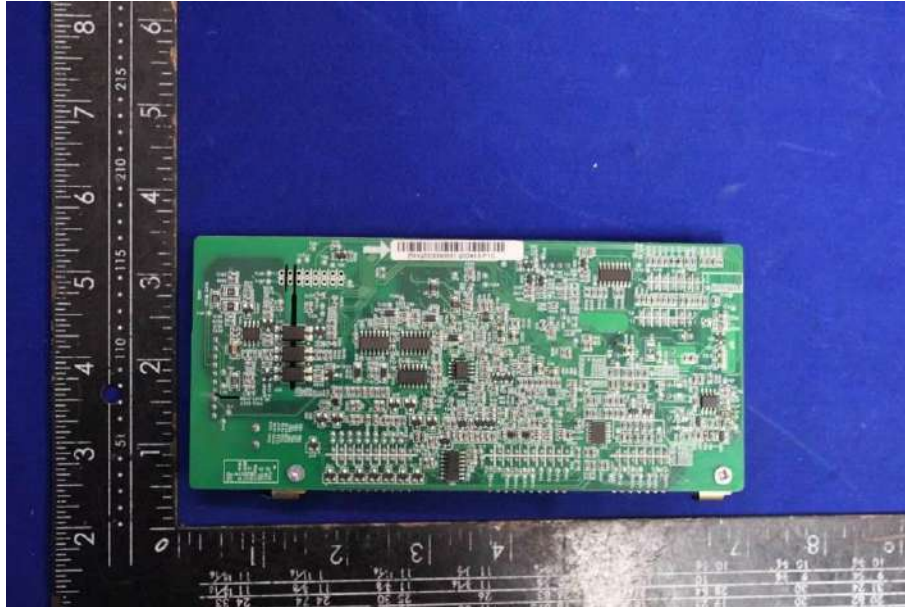
APPENDIX (Photos of EUT)

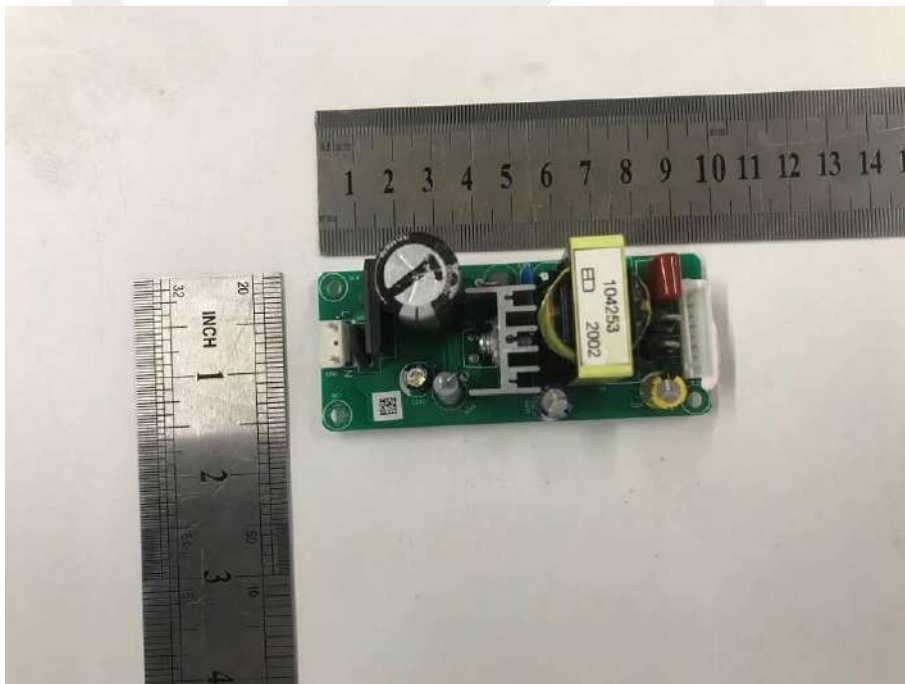
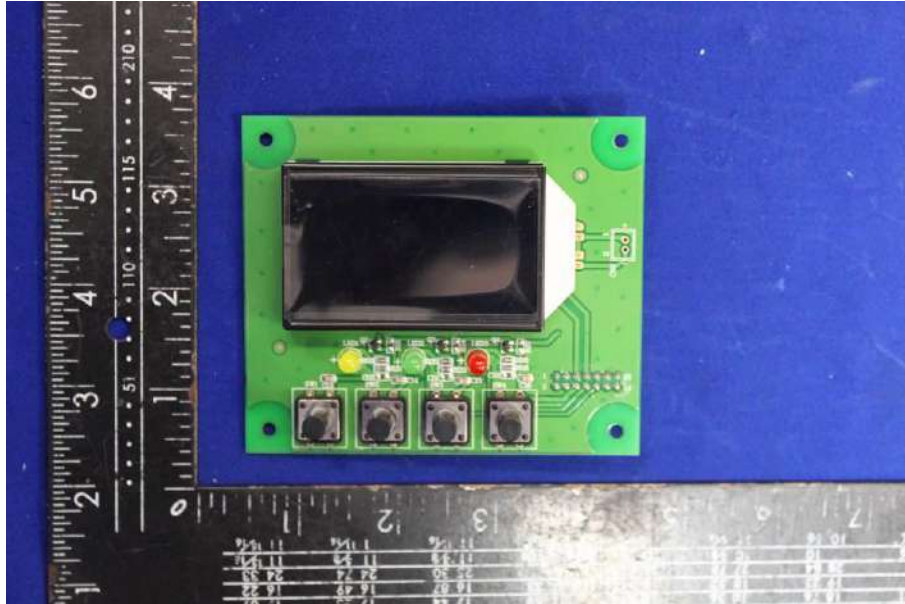


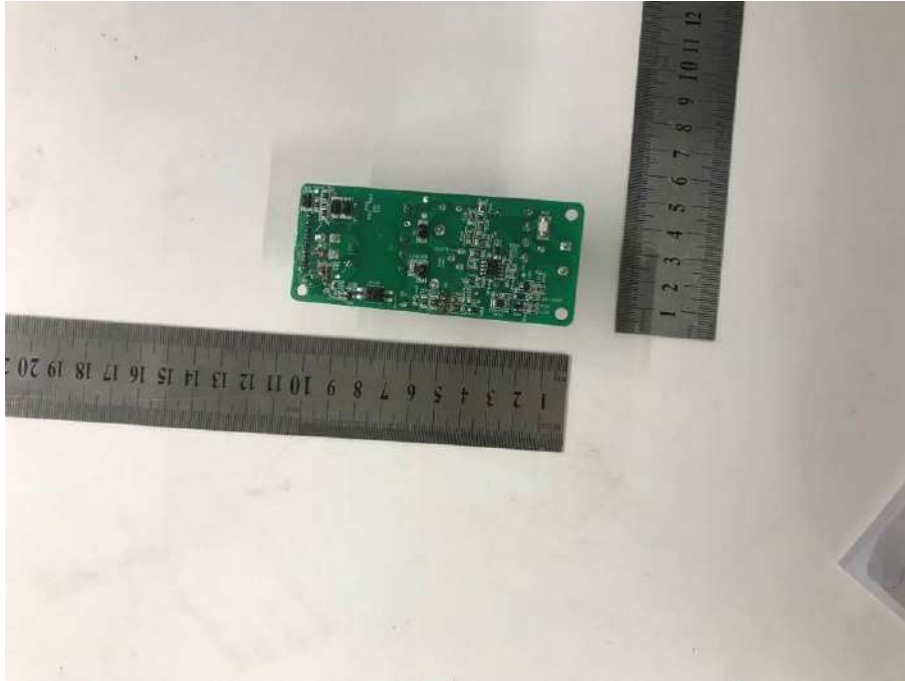












End of Report

Statement

- 1 . This report will be void without authorized signature or special seal for testing report.
- 2 . This report shall not be copied partly without authorization.
- 3 . The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material.
- 4 . The observations or tests with special mark fall outside the scope of accreditation, and are only used for purpose of commission, research, training, internal quality control etc.
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- 6 . Objections shall be raised within 20 days from the date receiving the report.