EMC TEST REPORT
For

SRNE Solar Co.,Ltd

Solar Charge Controller

Model No.: HP2420_ND

Prepared for	:	SRNE Solar Co.,Ltd
Address	:	4-5F, 13A Wutong Island, Neihuan Rd,Xixiang, Bao'an, Shenzhen, Guangdong, China
Prepared by	:	Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
Address	:	B Area, 1-2/F, Building B, Zhongyu Green High-tech Industrial Park, Wenge Road, Heshuikou, Gongming Street, Guangming New District, Shenzhen, Guangdong, China
Tel	:	(+86)755-29871520
Fax	:	(+86)755-29871521
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	August 20, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	August 20, 2018~ August 31, 2018
Date of Report	:	August 31, 2018

EMC TEST REPORT

EN 61326-1: 2013

Electrical equipment for measurement, control and laboratory use EMC requirements Part 1: General requirements

Report Reference No. ..... :	**LCS180820028BE**
Date Of Issue .....:	August 31, 2018
Testing Laboratory Name..... :	**Shenzhen Southern LCS Compliance Testing Laboratory Ltd.**
Address .....:	B Area, 1-2/F, Building B, Zhongyu Green High-tech Industrial Park, Wenge Road, Heshuikou, Gongming Street, Guangming New District, Shenzhen, Guangdong, China
Testing Location/ Procedure .....:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name ..... :	**SRNE Solar Co.,Ltd**
Address .....:	4-5F, 13A Wutong Island, Neihuan Rd,Xixiang, Bao'an, Shenzhen, Guangdong, China
Test Specification:	
Standard .....:	EN 61326-1: 2013
Test Report Form No. .....:	LCSEMC-1.0
TRF Originator .....:	Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2016-08

Test Item Description. ..... :	**Solar Charge Controller**
Trade Mark .....:	SRNE
Model/ Type Reference .....:	HP2420_ND
Ratings .....:	Input:＜55V, 20A Output:＜34V
Result ..... :	**Positive**

Compiled by:	Supervised by:	Approved by:
Kris Mai	Dm Gu	Cherry Chen
Kris Mai / File administrators	Dm Gu/ Technique principal	Cherry Chen / Manager

EMC -- TEST REPORT

Test Report No. : LCS180820028BE	August 31, 2018 Date of issue

Type / Model.....	: HP2420_ND
EUT.....	: Solar Charge Controller
Applicant.....	**: SRNE Solar Co.,Ltd**
Address.....	: 4-5F, 13A Wutong Island, Neihuan Rd,Xixiang, Bao'an, Shenzhen, Guangdong, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: SRNE Solar Co.,Ltd**
Address.....	: 4-5F, 13A Wutong Island, Neihuan Rd,Xixiang, Bao'an, Shenzhen, Guangdong, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: SRNE Solar Co.,Ltd**
Address.....	: 4F, Xinju Road No.10,Shangjiao Village, Chang'an Town, Dongguan City, Guangdong, China
Telephone.....	: /
Fax.....	: /

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	August 31, 2018	Initial Issue	Cherry Chen

TABLE OF CONTENT

Test Report Description Page

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION (EN 61326-1: 2013)			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	CISPR 11: 2016	Class B	N/A
Conducted disturbance at telecommunication port	CISPR 11: 2016	Class B	N/A
Radiated disturbance	CISPR 11: 2016	Class B	PASS
Harmonic current emissions	EN 61000-3-2: 2014	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013	--------	N/A

IMMUNITY (EN 61326-1: 2013)			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A1: 2010	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	N/A
Surge (Input a.c. power ports)	EN 61000-4-5: 2014	B	N/A
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014+A1:2015	A	N/A
Power frequency magnetic field	EN 61000-4-8: 2010	A	N/A
Voltage dips, >95% reduction	EN 61000-4-11: 2004+A1:2017	B	N/A
Voltage dips, 30% reduction		C	N/A
Voltage interruptions		C	N/A
N/A is an abbreviation for Not Applicable.			

1.2.Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

— essential operational modes and states;
— tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
— quality of software execution;
— quality of data display and transmission;
— quality of speech transmission.

1.2.1.Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment 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, then either of these may be driver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.2.Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be driver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3.Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

EUT : Solar Charge Controller

Trade Mark : SRNE

Model Number : HP2420_ND

Power Supply : Input:＜55V, 20A
Output:＜34V

2.2.Description of Test Facility

Site Description
EMC Lab. : TUV RH Registration Number. is UA 50362241 0001.
UL Registration Number. is 100571-492.
NVLAP Registration Number. is 600112-0.

Test Facilities : Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
B Area, 1-2/F, Building B, Zhongyu Green High-tech Industrial Park, Wenge Road, Heshuikou, Gongming Street, Guangming New District, Shenzhen, Guangdong, China

RF Field Strength Susceptibility: Shenzhen LCS Compliance Testing Laboratory Ltd.
1F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue., Bao'an District, Shenzhen, Guangdong, China

2.3.Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.4.Measurement Uncertainty

Test Item	Frequency Range	Expanded uncertainty (Ulab)	Expanded uncertainty (Ucispr)
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.2 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1.Radiated Disturbance (Electric Field)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-07-13
2	EMI Test Receiver	ROHDE & SCHWARZ	ESPI7	101940	2018-06-30
3	Log per Antenna	SCHWARZBECK	VULB9163	5094	2018-06-30
4	EMI Test Software	AUDIX	E3	N/A	2018-06-30
5	Positioning Controller	MF	BK8807-4A-2T	2016-0808-008	2018-06-30

3.2.Electrostatic Discharge

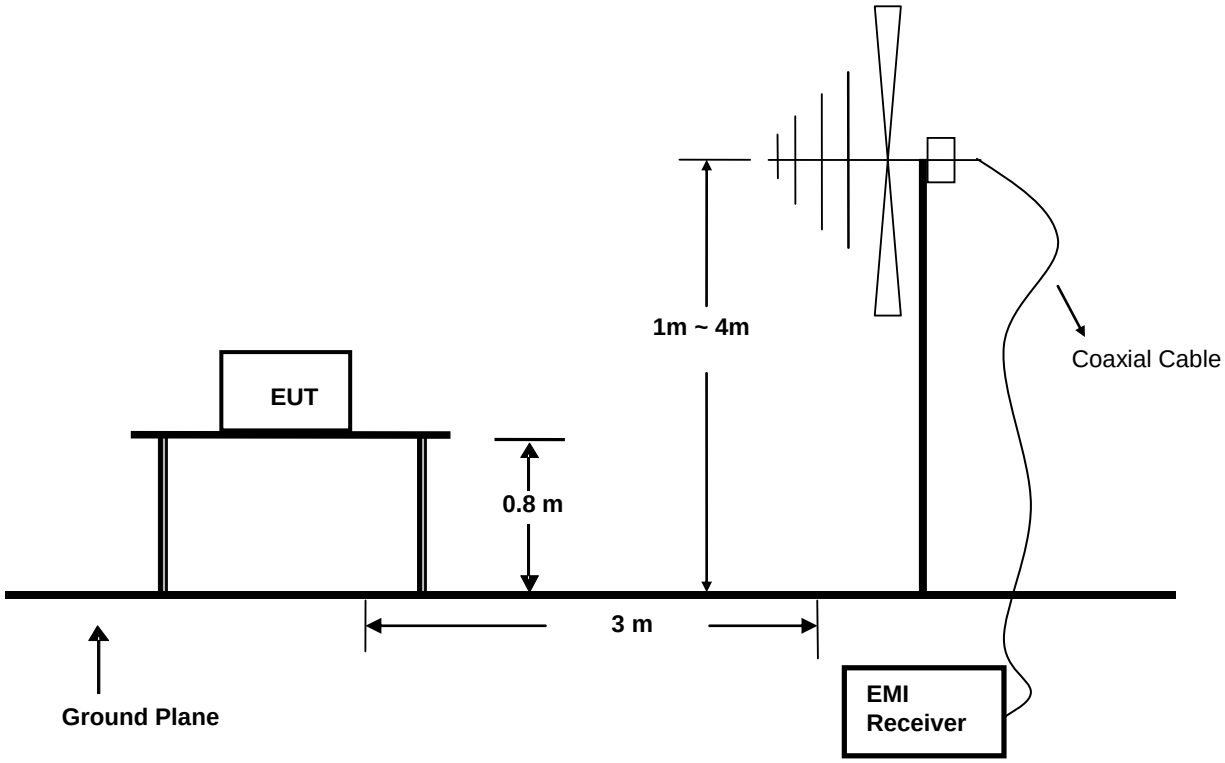
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	KIKUSUI	KC001311	KES4021	2018-06-30

3.3.RF Field Strength Susceptibility

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	RF POWER AMPLIFIER	OPHIR	5225R	1052	2018-03-15
2	RF POWER AMPLIFIER	OPHIR	5273F	1019	2018-03-15
3	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2018-04-28
4	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2018-04-28
5	Signal Generator	Agilent	E4438C	MY42081396	2017-11-18
6	Electric field probe	Narda S.TS./PMM	EP601	611WX70332	2017-11-18
7	Power Meter	Agilent	E4417A	MY41440754	2018-06-16
8	Power Sensor	Agilent	E4412A	MY56737159	2018-06-16

4. RADIATED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



4.2.Measuring Standard

EN 61326-1: 2013 (CISPR 11: 2016)

4.3.Radiated Emission Limits

CISPR 11 Limits:

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/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.

4.4.EUT Configuration on Test

The CISPR 11 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.5.Operating Condition of EUT

4.5.1.Turn on the power.

4.5.2.After that, let the EUT work in test mode (ON) and measure it.

4.6.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, which 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. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver is set at 120kHz.

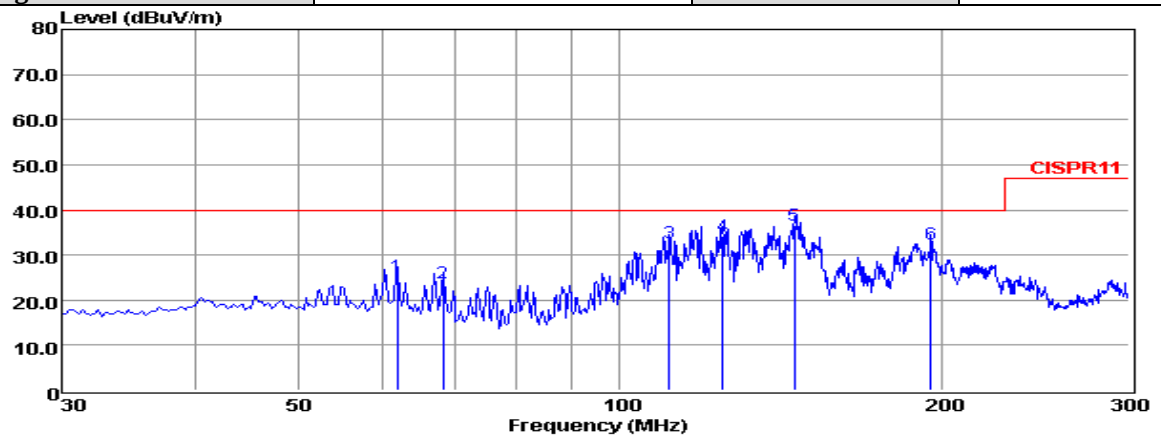
The frequency range from 30MHz to 1000MHz is investigated.

4.7.Test Results

PASS.

The test result please refer to the next page.

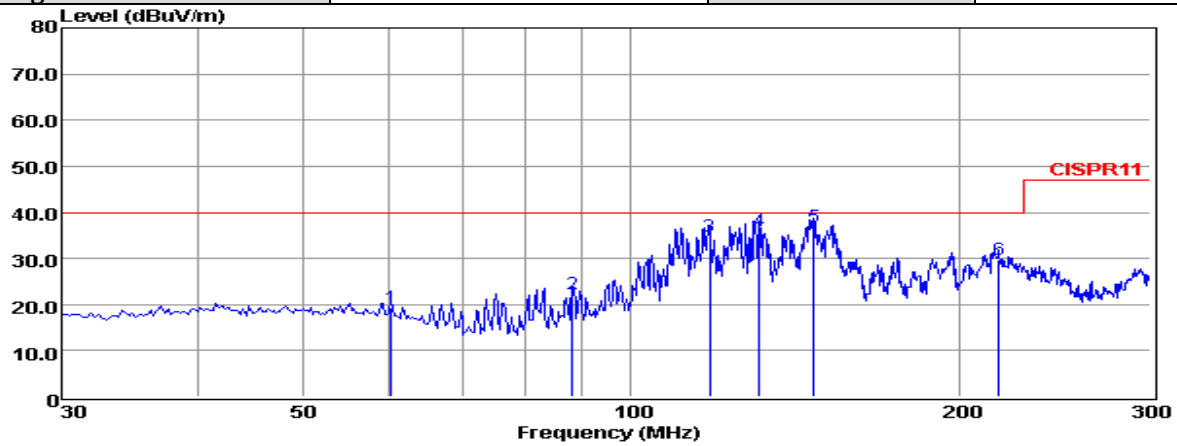
Model No.	HP2420_ND	**Test Mode**	ON
Environmental Conditions	22.7℃, 53% RH	**Detector Function**	Quasi-peak
Pol	Vertical	**Distance**	3m
Test Engineer	FRONT CHEN		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	61.86	12.99	0.48	11.95	25.42	40.00	-14.58	QP
2	68.34	13.94	0.51	9.33	23.78	40.00	-16.22	QP
3	111.27	19.96	0.61	12.03	32.60	40.00	-7.40	QP
4	124.77	23.88	0.71	9.74	34.33	40.00	-5.67	QP
5	145.83	27.60	0.77	8.23	36.60	40.00	-3.40	QP
6	195.78	20.86	0.96	10.57	32.39	40.00	-7.61	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Model No.	HP2420_ND	**Test Mode**	ON
Environmental Conditions	22.7℃, 53% RH	**Detector Function**	Quasi-peak
Pol	Horizontal	**Distance**	3m
Test Engineer	FRONT CHEN		

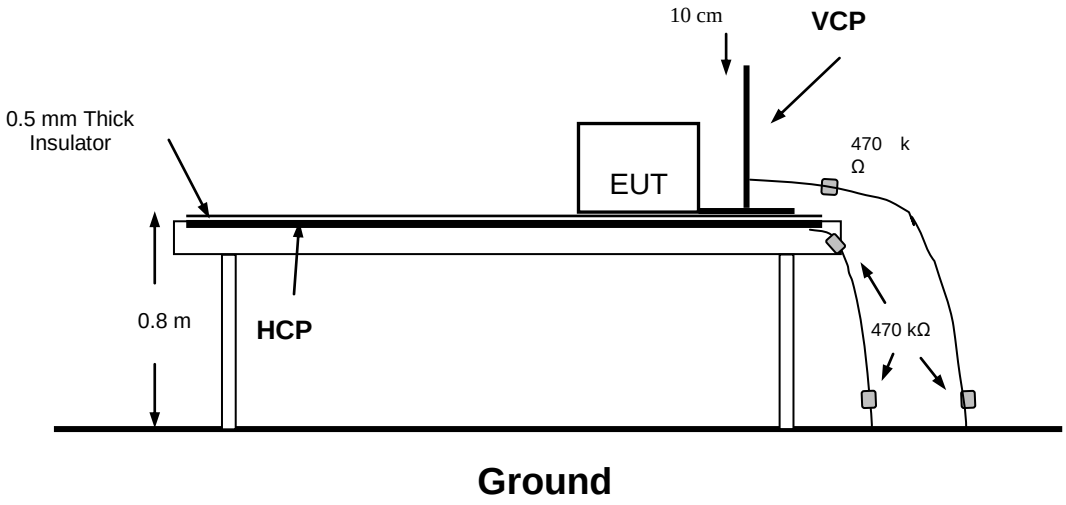


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	60.24	6.29	0.49	12.59	19.37	40.00	-20.63	QP
2	88.32	10.17	0.68	11.37	22.22	40.00	-17.78	QP
3	118.02	23.46	0.64	10.83	34.93	40.00	-5.07	QP
4	131.25	26.41	0.76	8.84	36.01	40.00	-3.99	QP
5	147.18	27.80	0.77	8.24	36.81	40.00	-3.19	QP
6	217.65	17.80	0.88	11.13	29.81	40.00	-10.19	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1.Block Diagram of Test Setup



5.2.Test Standard

EN 61326-1: 2013 (EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge: ±8KV, Level: 2 / Contact Discharge: ±4KV)

5.3.Severity Levels and Performance Criterion

5.3.1.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

5.3.2.Performance Criterion: **B**

5.4.EUT Configuration on Test

The configuration of EUT is listed in Section 3.7.

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 equipments.
5.5.3.Let the EUT work in measuring mode (ON) and measure it.

5.6.Test Procedure

5.6.1.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

5.6.2.Contact Discharge

All the procedure shall be same as Section 5.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

5.6.3.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.

5.6.4.Indirect Discharge For Vertical Coupling Plane

At least 10 single 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 X 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.

5.7.Test Results

PASS.

Please refer to the following pages

Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	SRNE Solar Co.,Ltd		
EUT	Solar Charge Controller	**Temperature**	22.5℃
M/N	HP2420_ND	**Humidity**	56％
Criterion	B	**Pressure**	1021mbar
Test Mode	ON	**Test Engineer**	FRONT CHEN

Air Discharge

Test Points	Test Levels			Results		
	± 2KV	± 4KV	± 8KV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☒	☐	☐A ☒B

Contact Discharge

Test Points	Test Levels		Results		
	± 2 KV	±4 KV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☐	☐A ☒B

Discharge To Horizontal Coupling Plane

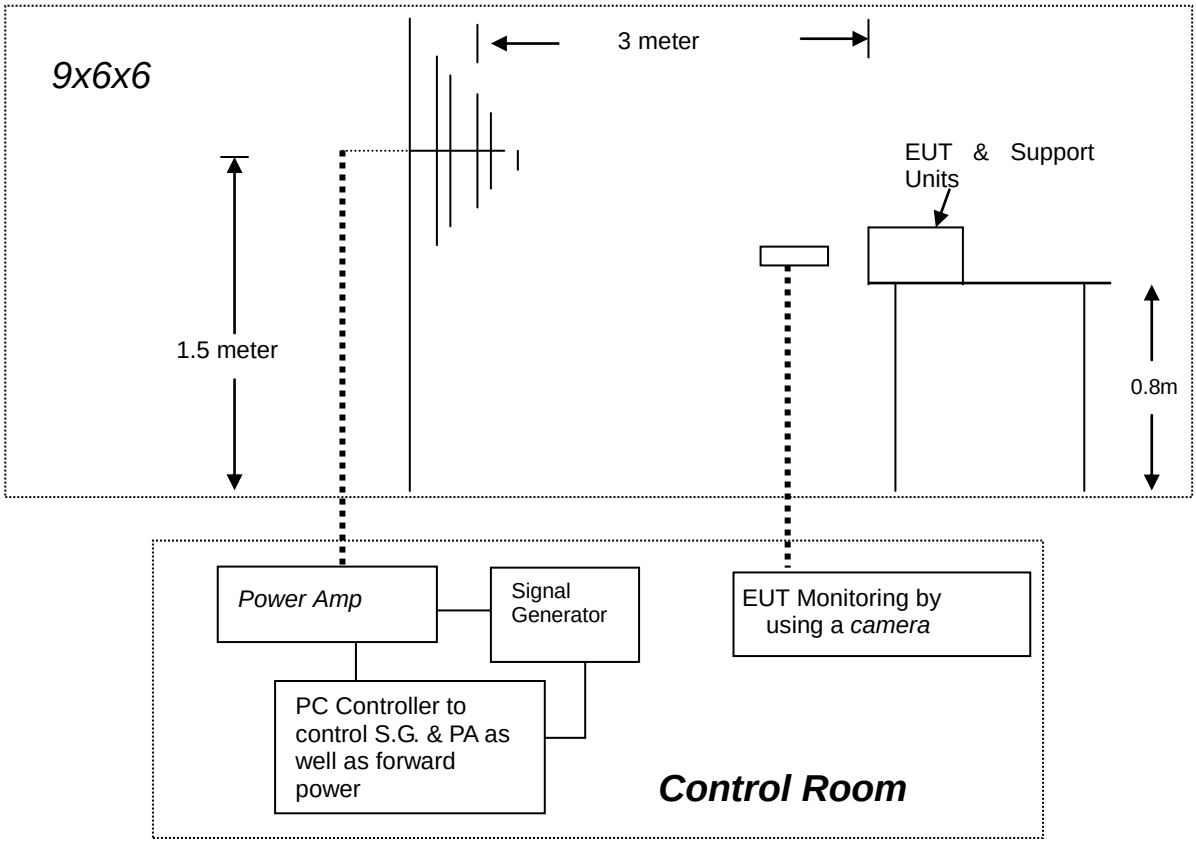
Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

Discharge To Vertical Coupling Plane

Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

6. RF FIELD STRENGTH SUSCEPTIBILITY TEST

6.1.Block Diagram of Test



6.2.Test Standard

EN 61326-1: 2013
(EN 61000-4-3: 2006+A1: 2010 Severity Level 3: 10V / m; Level 2: 3V/m; Level 1: 1V/m)

6.3.Severity Levels and Performance Criterion

6.3.1.Severity Levels

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

6.3.2.Performance Criterion: **A**

6.4.EUT Configuration on Test

The configuration of the EUT is same as Section 3.8.

6.5.Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.4, except the test setup replaced as Section 6.1.

6.6.Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which 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 Recording is used to monitor its screen.
All the scanning conditions are as following:

Condition of Test	Remark
4. Fielded Strength	10V/m (Severity Level 3)
5. Radiated Signal	Unmodulated
6. Scanning Frequency	80-1000MHz
7. Sweep time of radiated	0.0015 Decade/s
8. Dwell Time	3 Sec.
9. Fielded Strength	3V/m (Severity Level 2)
10. Radiated Signal	Unmodulated
11. Scanning Frequency	1.4GHz-2.0GHz
12. Sweep time of radiated	0.0015 Decade/s
13. Dwell Time	3 Sec.
14. Fielded Strength	1V/m (Severity Level 1)
15. Radiated Signal	Unmodulated
16. Scanning Frequency	2.0GHz-2.7GHz
17. Sweep time of radiated	0.0015 Decade/s
18. Dwell Time	3 Sec.

6.7.Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

Standard	☐ IEC 61000-4-3 ☑ EN 61000-4-3		
Applicant	SRNE Solar Co.,Ltd		
EUT	Solar Charge Controller	**Temperature**	23.7℃
M/N	HP2420_ND	**Humidity**	56%
Field Strength	10V/m, 3V/m, 1V/m	**Criterion**	A
Test Mode	ON	**Test Engineer**	FRONT CHEN
Frequency Range	(10V/m)80-1000MHz, (3V/m) 1.4GHz-2GHz, (1V/m)2.0GHz-2.7GHz		
Modulation	☐None ☐ Pulse ☑AM 1KHz 80%		
Steps	1%		

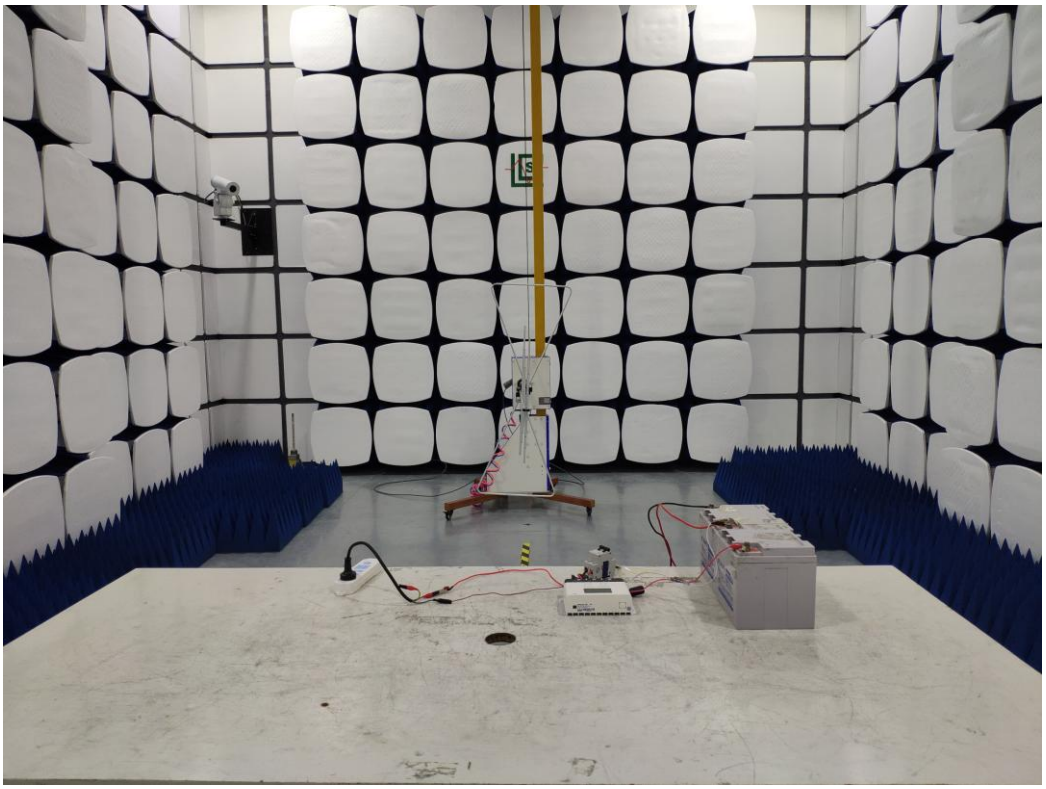
	Horizontal	**Vertical**
Front	PASS	PASS
Right	PASS	PASS
Rear	PASS	PASS
Left	PASS	PASS

Test Equipment:
1. Signal Generator: 2031 (MARCONI)
2. Power Indicator: 500A100 & 100W/1000M1 (A&R)
3. Power Antenna: 3108 (EMCO) & AT1080 (A&R)
4. Field Monitor: FM2000 (A&R)

Note:

7. PHOTOGRAPH

7.1. Photo of Radiated Measurement



7.2. Photo of Electrostatic Discharge Test

8. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Fig. 1

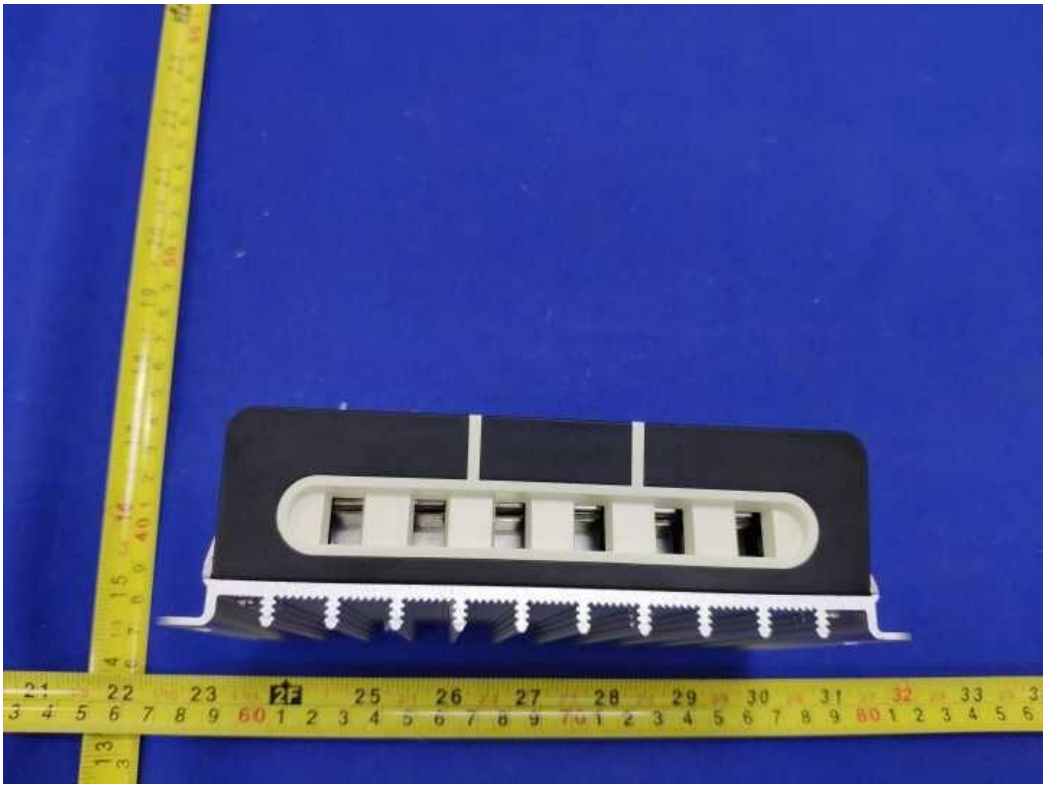


Fig. 2

Fig. 3

----------THE END OF TEST REPORT----------