

EMC TEST REPORT For

Shen Zhen Sunray Power Co. Ltd

Inverter with charger

Model No.: 8048E, 10048E, 12048E

Prepared for : Shen Zhen Sunray Power Co. Ltd
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Date of Test : January 11, 2019 to June 26, 2019
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APPENDIX (Photos of EUT)

TEST REPORT DESCRIPTION

Applicant : Shen Zhen Sunray Power Co. Ltd
 Manufacturer : Shen Zhen Sunray Power Co. Ltd
 Trade Mark : N/A
 EUT : Inverter with charger
 Model No. : 8048E, 10048E, 12048E
 Power Supply : Input: AC 230V, 72A, 50~60Hz
 Output: AC 200-240V, 60A, 6000W

Measurement Procedure Used:

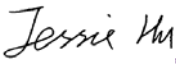
EN 61000-6-3:2007+A1:2011+ AC:2012,
 EN 61000-3-11: 2000,
 EN 61000-3-12: 2011,
 EN 61000-6-1:2007
 (IEC 61000-4-2:2008, IEC 61000-4-3:2006+A1:2007+A2:2010, IEC61000-4-4:2012,
 IEC 61000-4-5:2014, IEC 61000-4-6:2013, IEC 61000-4-8:2009, IEC 61000-4-11:2004)

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, EN61000-3-11, EN61000-3-12 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 : January 11, 2019 to June 26, 2019

Prepared by : 
 Winmy Huang/Editor

Reviewer : 
 Jessie Hu /Supervisor

Approved & Authorized Signer : 
 Lisa Wang/Manager



Modified Information

Version	Report No.	Revision Date	Summary
Ver.1.0	ES190111007E	/	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
Voltage Fluctuation and Flicker	EN 61000-3-11: 2000	Section 5	Pass
Harmonic Current Emissions	EN 61000-3-12: 2011	Table 2	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	: Inverter with charger
Model Number	: 8048E, 10048E, 12048E (Note: Three models are identical in circuitry and electrical, mechanical and physical construction; the only difference is the power derating. We prepare 8048E, 12048E for emission test, 12048E for immunity test)
Test Voltage	: AC 230V/50Hz, DC 48V
Applicant	: Shen Zhen Sunray Power Co. Ltd
Address	: B16, the 1 st road, the 1 st Industry Park, Bai hua dong, Guangming new district, Shenzhen city, Guangdong, China
Manufacturer	: Shen Zhen Sunray Power Co. Ltd
Address	: B16, the 1 st road, the 1 st Industry Park, Bai hua dong, Guangming new district, Shenzhen city, Guangdong, China
Date of Received	: January 11, 2019
Date of Test	: January 11, 2019 to June 26, 2019

2.2. Description of Test Facility

Site Description EMC Lab.	: Accredited by CNAS, 2018.11.30 The certificate is valid until 2022.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017) The Certificate Registration Number is L2291 Accredited by TUV Rheinland Shenzhen 2018.3.30 The Laboratory has been assessed according to the requirements ISO/IEC 17025 Accredited by FCC, August 09, 2018 Designation Number: CN1204 Test Firm Registration Number: 882943 Accredited by A2LA, August 08, 2018 The Certificate Registration Number is 4321.01 Accredited by Industry Canada, November 09, 2018 The Certificate Registration Number is CN0008
Name of Firm	: EMTEK (SHENZHEN) CO., LTD.
Site Location	: Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2.3. Description of Support Device

N/A : 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 Chamber)	: 3.78dB (30M~1GHz Polarize: H) 4.27dB (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)
Uncertainty for R/S Test	: 2.10dB(80MHz-200MHz)
Uncertainty for test site temperature and humidity	: 0.6℃ 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
☒	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 20, 2019	1 Year
☒	L.I.S.N.	Schwarzbeck	NNLK8129	8129-203	May 19, 2019	1 Year
☒	50Ω Coaxial Switch	Anritsu	MP59B	M20531	May 20, 2019	1 Year
☒	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 19, 2019	1 Year

3.2. For Radiated Emission Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	EMI Test Receiver	Rohde & Schwarz	ESCI	101414	May 19, 2019	1 Year
☒	Pre-Amplifier	LUNAR-EM	LNA30M3G-25	J10100000071	May 19, 2019	1 Year
☒	Bilog Antenna	Schwarzbeck	VULB9163	660	May 20, 2019	1 Year
☒	Cable	H+B	NmSm-05-C15052	N/A	May 20, 2019	1 Year
☒	Cable	H+B	NmSm-2-C15201	N/A	May 20, 2019	1 Year
☒	Cable	H+B	NmNm-7-C15702	N/A	May 20, 2019	1 Year

3.3. For Harmonic Current / Flicker Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	45KVA AC Power source	Teseq	NSG 1007-45/45KVA	1305A02873	May 19, 2019	1 Year
☒	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	May 19, 2019	1 Year
☒	Three phase impedance network	Teseq/Germany	INA2197/37A	1305A02873	N/A	N/A
☒	Three phase impedance network	Teseq/Germany	INA 2196/75A	1305A02874	N/A	N/A
☐	Proflin 2100 AC Switching Unit	Teseq/Germany	NSG2200-3	A22714	N/A	N/A

3.4. For Electrostatic Discharge Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	ESD Tester	TESEQ AG	NSG 438A	130	May 20, 2019	1 Year
☒	Impulse Module	TESEQ AG	INA 4380-150pF/3 30Ohm	403-550/1712	May 20, 2019	1 Year

3.5. For RF Strength Susceptibility Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	Signal Generator	Agilent	N5181A	MY50145187	May 19, 2019	1 Year
☒	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 20, 2019	1 Year
☒	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 20, 2019	1 Year
☒	Field Strength Meter	DARE	RSS1006A	10I00037S O22	May 20, 2019	1 Year
☒	50ohm Diode Power Sensor	BOONTON	51011EMC	36164	May 20, 2019	1 Year
☒	Power Amplifier	MILMEGA	80RF1000-175	1059345	May 19, 2019	1 Year
☒	Power Amplifier	MILMEGA	AS0102-55	1018770	May 19, 2019	1 Year
☒	Power Amplifier	MILMEGA	AS1860-50	1059346	May 19, 2019	1 Year
☒	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	811	May 20, 2019	1 Year
☒	Broad-Band Horn Antenna	SCHWARZBECK	STLP 9149	9149-227	May 20, 2019	1 Year
☒	Multi-function interface system	DARE	CTR1009B	12I00250S NO72	N/A	N/A
☒	Automatic switch group	DARE	RSW1004A	N/A	N/A	N/A

3.6. For Electrical Fast Transient / Burst Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	Burst Tester	HAEFELY	PEFT4010	080981-16	May 20, 2019	1 Year
☐	Coupling Clamp	HAEFELY	IP-4A	147147	May 20, 2019	1 Year

3.7. For Surge Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	Surge Controller	HAEFELY	Psurge 8000	174031	May 20, 2019	1 Year
☒	Impulse Module	HAEFELY	PIM 100	174124	May 20, 2019	1 Year
☒	Coupling Decoupling Filter	HAEFELY	PCD 130	172181	May 20, 2019	1 Year
☐	Coupling Module	HAEFELY	PCD122	174354	May 20, 2019	1 Year
☐	Surge Impulse Module	HAEFELY	PIM 120	174435	May 20, 2019	1 Year
☐	Coupling Module	HAEFELY	PCD 126A	174387	May 20, 2019	1 Year
☐	Impulse Module	HAEFELY	PIM 110	174391	May 20, 2019	1 Year

3.8. For Injected Current Susceptibility Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	Simulator	EMTEST	CWS500C	0900-12	May 20, 2019	1 Year
☒	CDN	EMTEST	CDN-M2	5100100100	May 20, 2019	1 Year
☐	CDN	EMTEST	CDN-M3	0900-11	May 20, 2019	1 Year
☐	Injection Clamp	EMTEST	F-2031-23MM	368	May 20, 2019	1 Year
☒	Attenuator	EMTEST	ATT6	0010222A	May 20, 2019	1 Year

3.9. For Magnetic Field Immunity Test

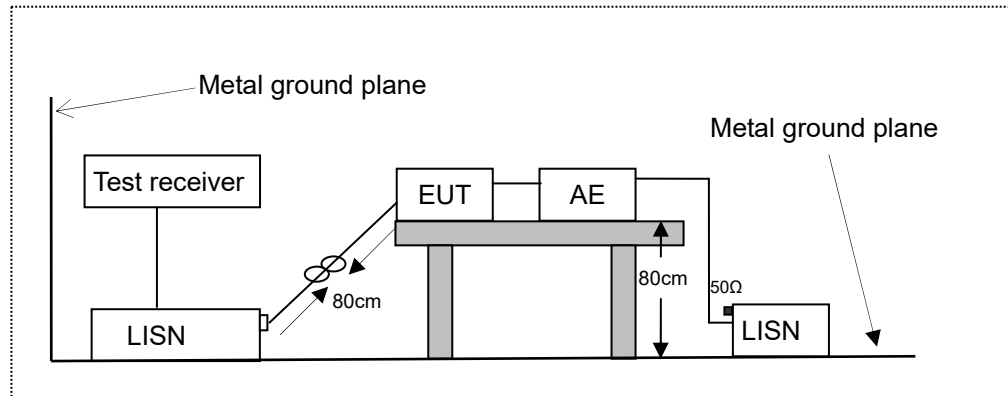
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 19, 2019	1 Year

3.10. For Voltage Dips and Interruptions Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☒	45KVA AC Power source	Teseq	NSG 1007-45/45K VA	1305A02873	May 19, 2019	1 Year
☐	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	May 19, 2019	1 Year
☐	Three phase impedance network	Teseq/Germany	INA2197/37A	1305A02873	N/A	N/A
☐	Three phase impedance network	Teseq/Germany	INA 2196/75A	1305A02874	N/A	N/A
☒	Proflin 2100 AC Switching Unit	Teseq/Germany	NSG2200-3	A22714	N/A	N/A

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 : Inverter with charger
Model Number : 8048E, 12048E

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) 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.

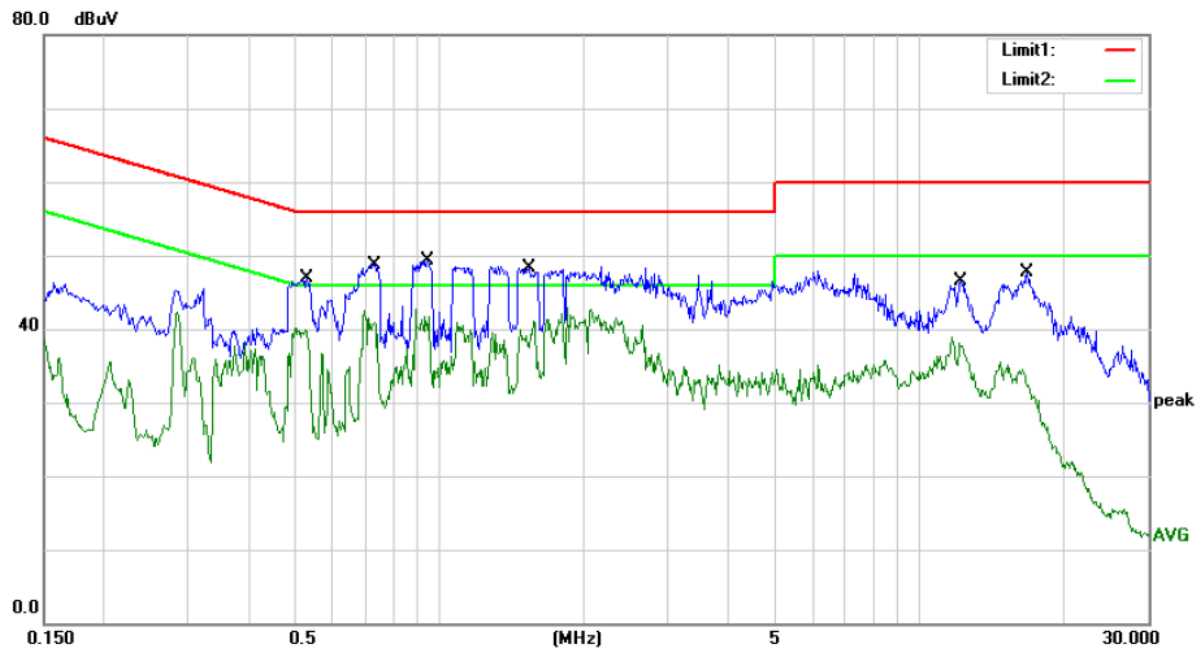
The frequency range from 150kHz to 30MHz is investigated.

All the scanning waveform is put in the following pages.

4.7. Measuring Results

PASS.

All of the mode were tested, the data of the worst case are recorded in the following pages.



Site Conduction #2

Phase: **L1**

Temperature: 24.9

Limit: (CE)EN61000-6-3_QP

Power: AC 230V/50Hz

Humidity: 54 %

EUT:

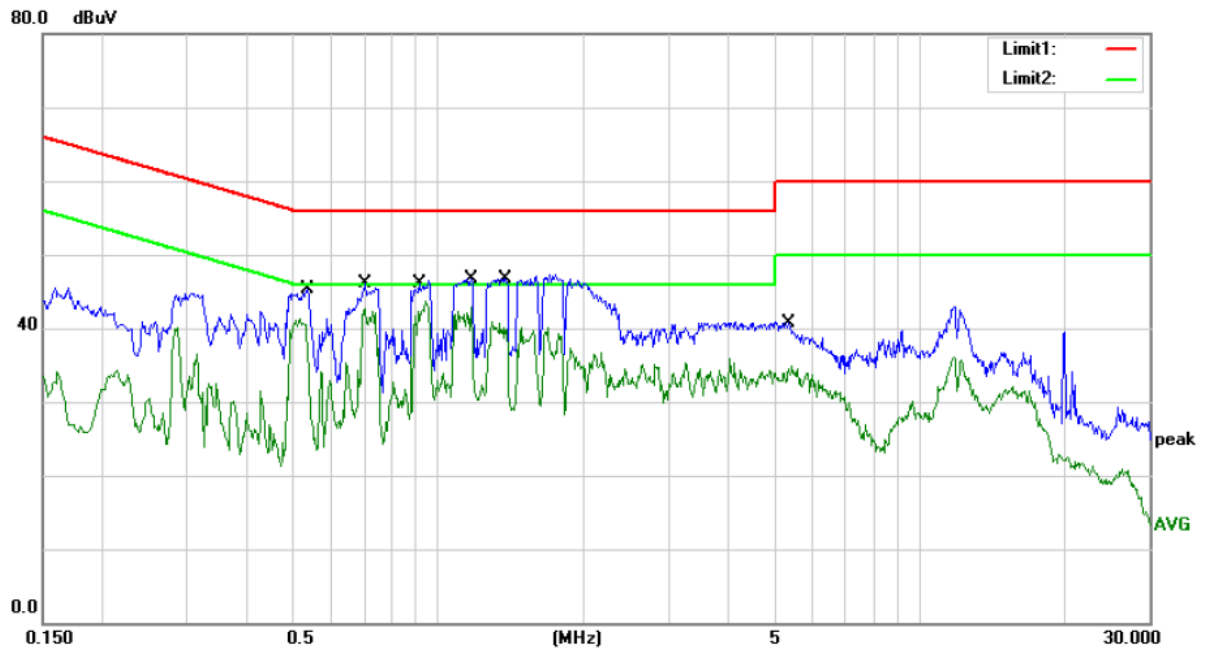
M/N: RP12048E

Mode: AC mode

Note: Charging&Inverter all-in-one Machine

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.5300	36.90	9.92	46.82	56.00	-9.18	QP	
2		0.5300	30.14	9.92	40.06	46.00	-5.94	AVG	
3		0.7340	38.82	9.94	48.76	56.00	-7.24	QP	
4		0.7340	32.65	9.94	42.59	46.00	-3.41	AVG	
5		0.9460	39.31	9.96	49.27	56.00	-6.73	QP	
6		0.9460	31.65	9.96	41.61	46.00	-4.39	AVG	
7		1.5420	38.43	9.97	48.40	56.00	-7.60	QP	
8	*	1.5420	32.92	9.97	42.89	46.00	-3.11	AVG	
9		12.2100	36.50	10.09	46.59	60.00	-13.41	QP	
10		12.2100	28.73	10.09	38.82	50.00	-11.18	AVG	
11		16.7940	37.56	10.13	47.69	60.00	-12.31	QP	
12		16.7940	23.85	10.13	33.98	50.00	-16.02	AVG	

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



Site Conduction #2

Phase: **N**

Temperature: 24.9

Limit: (CE)EN61000-6-3_QP

Power: AC 230V/50Hz

Humidity: 54 %

EUT:

M/N: RP12048E

Mode: AC mode

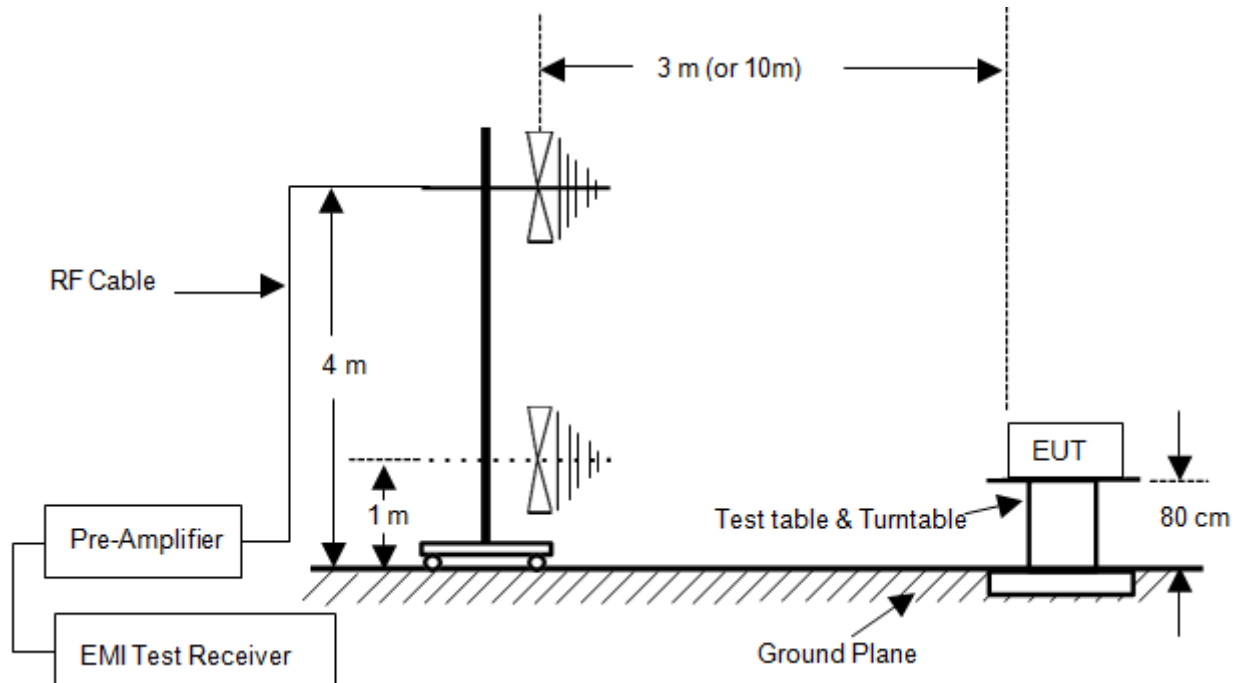
Note: Charging&Inverter all-in-one Machine

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.5340	35.42	9.92	45.34	56.00	-10.66	QP	
2		0.5340	31.30	9.92	41.22	46.00	-4.78	AVG	
3		0.7020	36.19	9.94	46.13	56.00	-9.87	QP	
4		0.7020	31.90	9.94	41.84	46.00	-4.16	AVG	
5		0.9100	36.20	9.95	46.15	56.00	-9.85	QP	
6		0.9100	31.81	9.95	41.76	46.00	-4.24	AVG	
7		1.1660	36.71	9.96	46.67	56.00	-9.33	QP	
8	*	1.1660	32.84	9.96	42.80	46.00	-3.20	AVG	
9		1.3780	36.81	9.96	46.77	56.00	-9.23	QP	
10		1.3780	31.02	9.96	40.98	46.00	-5.02	AVG	
11		5.3460	30.64	10.01	40.65	60.00	-19.35	QP	
12		5.3460	24.83	10.01	34.84	50.00	-15.16	AVG	

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

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 : Inverter with charger
Model Number : 8048E, 12048E

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 (Inverter Mode, AC 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.

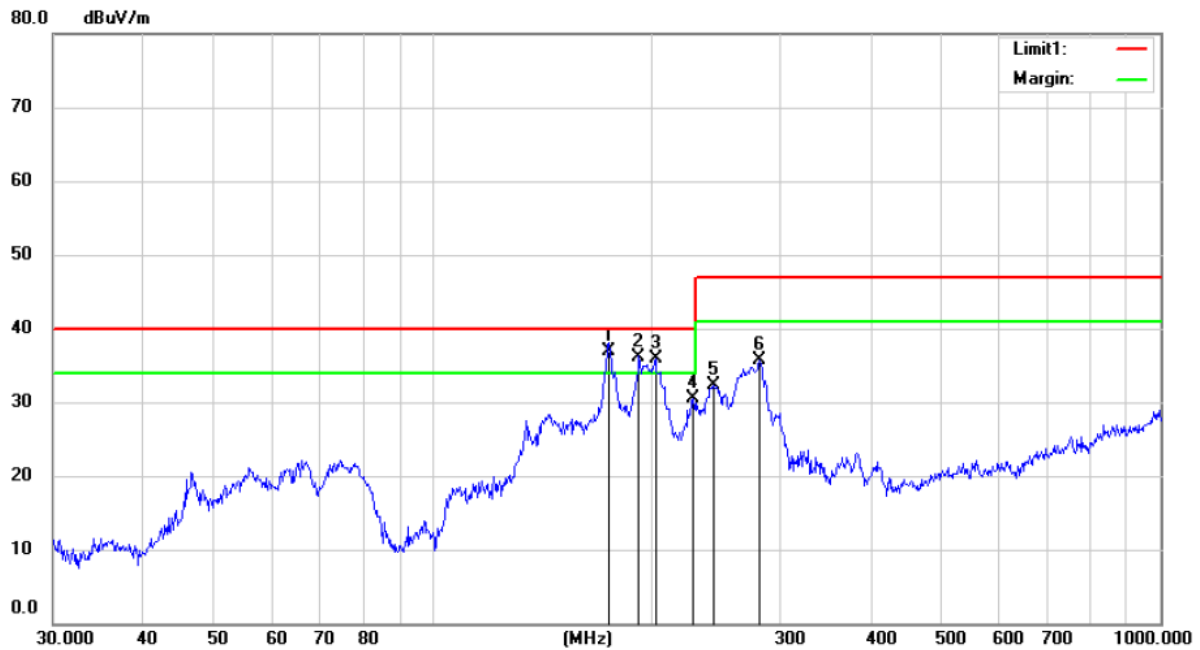
The bandwidth of the Receiver (ESCI) is set at 120kHz.

5.7. Measuring Results

PASS.

All of the mode were tested, the data of the worst case are recorded in the following pages.

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

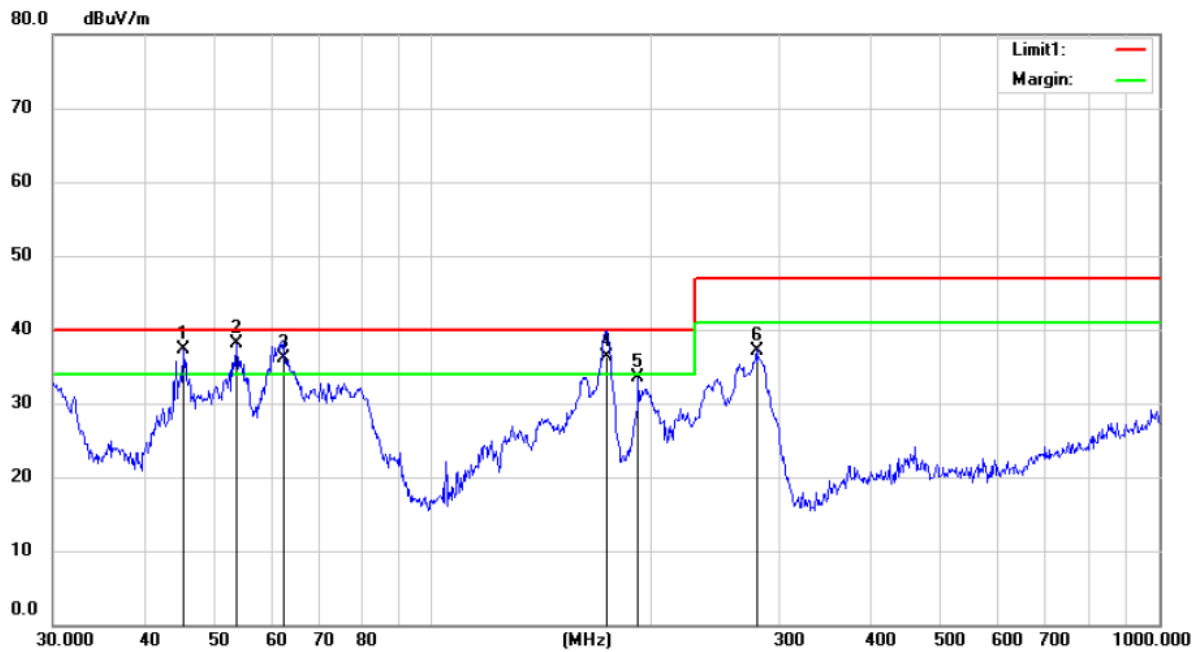


Site: 3m Chamber #3 Polarization: **Horizontal** Temperature: 25.1 C
 Limit: (RE)EN61000-6-3 Power: AC 230V/50Hz Humidity: 38 %
 EUT:
 M/N: RP12048E
 Mode: AC mode
 Note: Charging&Inverter all-in-one Machine

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	*	174.4240	70.26	-33.26	37.00	40.00	-3.00	QP		
2	!	192.0141	67.13	-30.93	36.20	40.00	-3.80	QP		
3	!	202.6681	65.82	-29.93	35.89	40.00	-4.11	QP		
4		228.0901	60.38	-29.83	30.55	40.00	-9.45	QP		
5		243.8897	61.86	-29.46	32.40	47.00	-14.60	QP		
6		281.0074	63.62	-27.97	35.65	47.00	-11.35	QP		

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

Operator: ZL

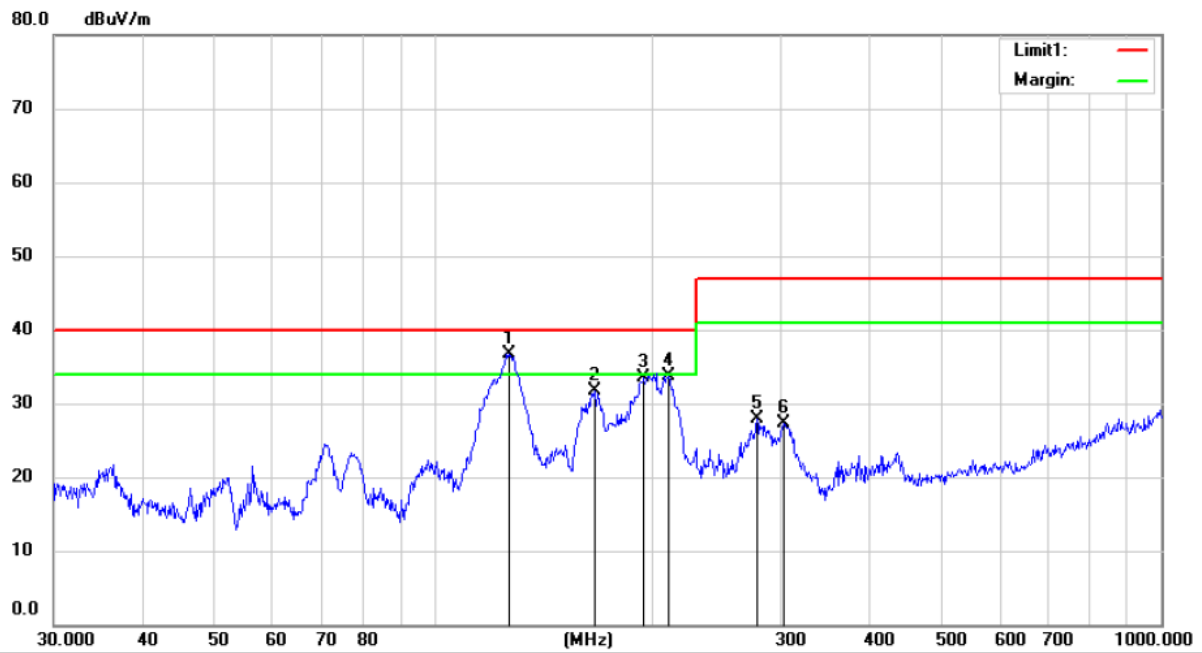


Site 3m Chamber #3 Polarization: **Vertical** Temperature: 25.1 C
 Limit: (RE)EN61000-6-3 Power: AC 230V/50Hz Humidity: 38 %
 EUT:
 M/N: RP12048E
 Mode:AC mode
 Note: Charging&Inverter all-in-one Machine

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	!	45.4870	67.31	-30.07	37.24	40.00	-2.76	peak		
2	*	53.7497	68.46	-30.36	38.10	40.00	-1.90	peak		
3	!	62.3220	68.98	-32.78	36.20	40.00	-3.80	QP		
4	!	173.7526	69.73	-33.33	36.40	40.00	-3.60	QP		
5		192.0141	64.45	-30.93	33.52	40.00	-6.48	QP		
6		279.5332	65.21	-28.01	37.20	47.00	-9.80	QP		

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

Operator: ZL

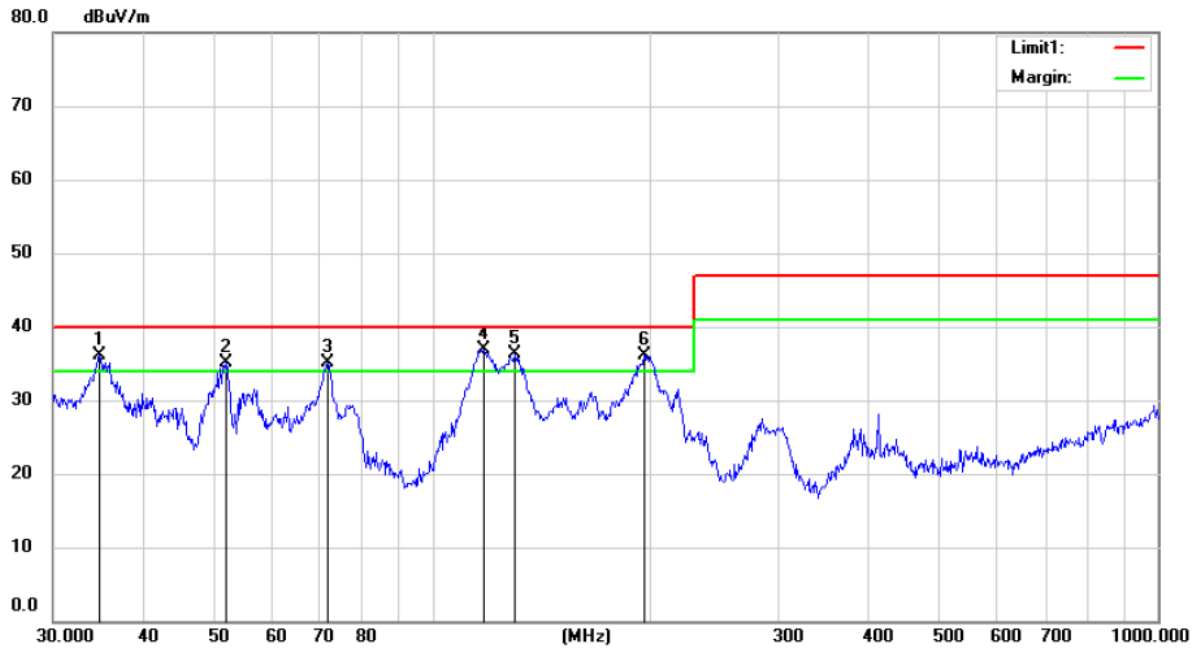


Site 3m Chamber #3 Polarization: **Horizontal** Temperature: 25.1 C
 Limit: (RE)EN61000-6-3 Power: DC 48V Humidity: 38 %
 EUT:
 M/N: RP12048E
 Mode: Inverter mode
 Note: Charging&Inverter all-in-one Machine

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	*	126.8168	69.15	-32.41	36.74	40.00	-3.26	QP		
2		167.0610	65.54	-33.82	31.72	40.00	-8.28	QP		
3		194.9997	64.22	-30.67	33.55	40.00	-6.45	QP		
4		210.1955	63.87	-30.11	33.76	40.00	-6.24	QP		
5		278.9458	55.89	-28.04	27.85	47.00	-19.15	QP		
6		302.9057	54.95	-27.69	27.26	47.00	-19.74	QP		

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

Operator: ZL



Site 3m Chamber #3 Polarization: **Vertical** Temperature: 25.1 C
 Limit: (RE)EN61000-6-3 Power: DC 48V Humidity: 38 %
 EUT:
 M/N: RP12048E
 Mode: Inverter mode
 Note: Charging&Inverter all-in-one Machine

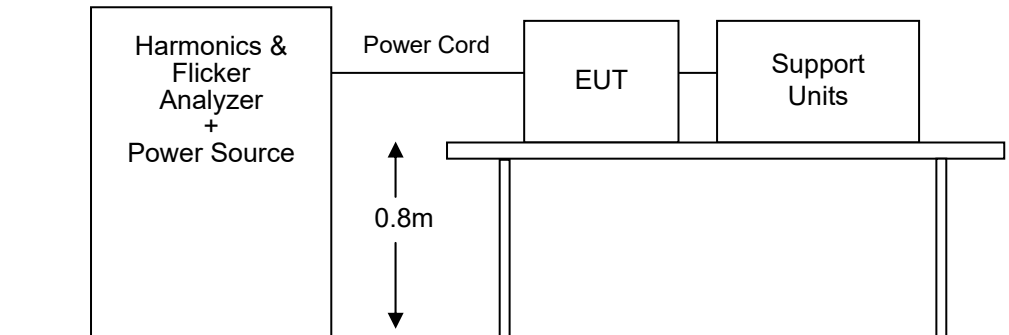
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	!	34.7968	68.25	-32.19	36.06	40.00	-3.94	QP		
2	!	52.0800	65.13	-29.94	35.19	40.00	-4.81	QP		
3	!	71.9075	68.81	-33.76	35.05	40.00	-4.95	QP		
4	*	117.8965	68.56	-31.64	36.92	40.00	-3.08	QP		
5	!	130.3332	69.26	-32.87	36.39	40.00	-3.61	QP		
6	!	196.0281	66.61	-30.46	36.15	40.00	-3.85	QP		

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

Operator: ZL

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup



6.2. Measuring Standard

EN 61000-3-12: 2011 Table 2

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 page.

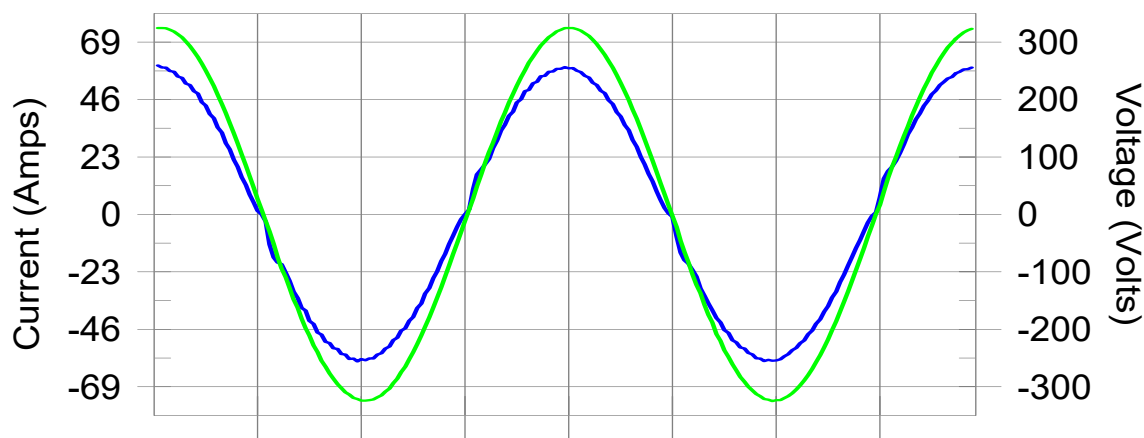
Harmonics – Per EN/IEC61000-3-12(Run time)

EUT: Inverter with charger Tested by: LZY
 Test category: Table:2, Rsce=33, Inter-Harm, Test Margin: 100
 Test date: 2019/6/17 Start time: 20:02:44 End time: 20:05:36
 Test duration (min): 2.5 Data file name: WIN2106_H-000332.cts_data
 Comment: AC MODE
 Customer: Sunray

Test Result: Pass

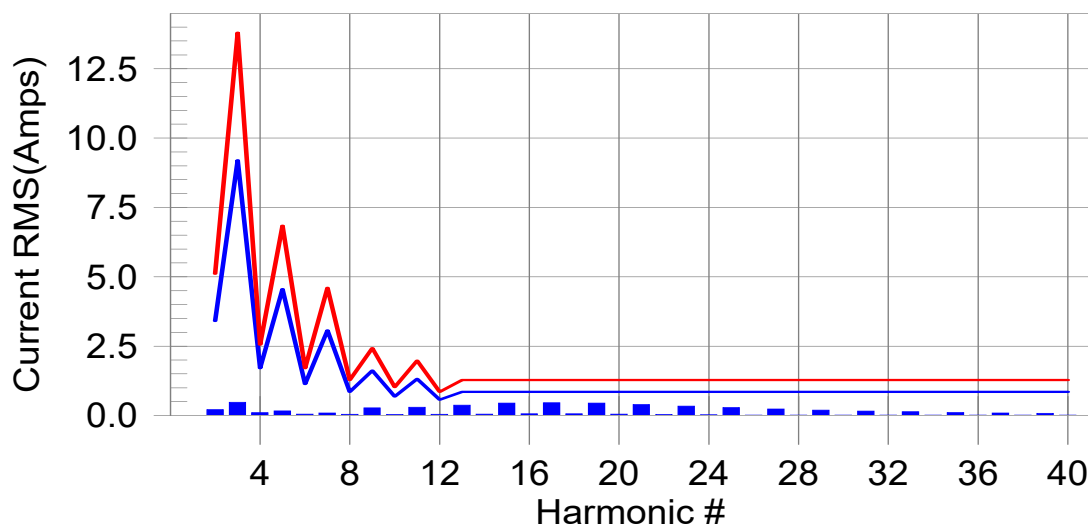
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class 2 limit line

European Limits



Test result: Pass

Worst harmonic was #13 with 43.60 % of the limit.

Current Test Result Summary (Run time)

EUT: Inverter with charger Tested by: LZY
 Test category: Table:2, Rsce=33, Inter-Harm, Test Margin: 100
 Test date: 2019/6/17 Start time: 20:02:44 End time: 20:05:36
 Test duration (min): 2.5 Data file name: WIN2106_H-000332.cts_data
 Comment: AC MODE
 Customer: Sunray

Test Result: Pass Measured I-ref: 42.574 Amp rms Source: Normal
 I-THC(%): 3.1 Limit(%): 23.0 PWHC(%): 11.4 PWHC Limit(%): 23.0

Highest parameter values during test:

V_RMS (Volts): 229.46	Frequency(Hz): 50.00
I_Peak (Amps): 62.201	I_RMS (Amps): 42.995
I_Fund (Amps): 42.574	Crest Factor: 1.448
Power (Watts): 9835	Power Factor: 0.997

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.213	3.408	6.2	0.252	5.112	4.9	Pass
3	0.479	9.201	5.2	0.519	13.801	3.8	Pass
4	0.102	1.704	6.0	0.118	2.556	4.6	Pass
5	0.168	4.558	3.7	0.178	6.837	2.6	Pass
6	0.046	1.136	4.0	0.057	1.704	3.3	Pass
7	0.090	3.067	2.9	0.097	4.600	2.1	Pass
8	0.043	0.852	5.1	0.049	1.278	3.8	Pass
9	0.276	1.619	17.1	0.287	2.428	11.8	Pass
10	0.039	0.682	5.7	0.044	1.022	4.3	Pass
11	0.300	1.320	22.7	0.309	1.981	15.6	Pass
12	0.042	0.568	7.4	0.045	0.852	5.3	Pass
13	0.371	0.852	43.6	0.378	1.278	29.6	Pass
14	0.053	N/A	N/A	0.067	N/A	N/A	N/A
15	0.448	N/A	N/A	0.460	N/A	N/A	N/A
16	0.062	N/A	N/A	0.069	N/A	N/A	N/A
17	0.461	N/A	N/A	0.468	N/A	N/A	N/A
18	0.061	N/A	N/A	0.066	N/A	N/A	N/A
19	0.447	N/A	N/A	0.455	N/A	N/A	N/A
20	0.050	N/A	N/A	0.058	N/A	N/A	N/A
21	0.395	N/A	N/A	0.402	N/A	N/A	N/A
22	0.039	N/A	N/A	0.049	N/A	N/A	N/A
23	0.340	N/A	N/A	0.346	N/A	N/A	N/A
24	0.029	N/A	N/A	0.035	N/A	N/A	N/A
25	0.283	N/A	N/A	0.288	N/A	N/A	N/A
26	0.020	N/A	N/A	0.024	N/A	N/A	N/A
27	0.233	N/A	N/A	0.237	N/A	N/A	N/A
28	0.017	N/A	N/A	0.019	N/A	N/A	N/A
29	0.194	N/A	N/A	0.203	N/A	N/A	N/A
30	0.018	N/A	N/A	0.020	N/A	N/A	N/A
31	0.160	N/A	N/A	0.164	N/A	N/A	N/A
32	0.016	N/A	N/A	0.020	N/A	N/A	N/A
33	0.136	N/A	N/A	0.139	N/A	N/A	N/A
34	0.013	N/A	N/A	0.014	N/A	N/A	N/A
35	0.111	N/A	N/A	0.113	N/A	N/A	N/A
36	0.015	N/A	N/A	0.017	N/A	N/A	N/A
37	0.089	N/A	N/A	0.091	N/A	N/A	N/A
38	0.013	N/A	N/A	0.016	N/A	N/A	N/A
39	0.075	N/A	N/A	0.077	N/A	N/A	N/A
40	0.014	N/A	N/A	0.017	N/A	N/A	N/A

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

Voltage Source Verification Data (Run time)

EUT: Inverter with charger Tested by: LZY
 Test category: Table:2, Rsce=33, Inter-Harm, Test Margin: 100
 Test date: 2019/6/17 Start time: 20:02:44 End time: 20:05:36
 Test duration (min): 2.5 Data file name: WIN2106_H-000332.cts_data
 Comment: AC MODE
 Customer: Sunray

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:

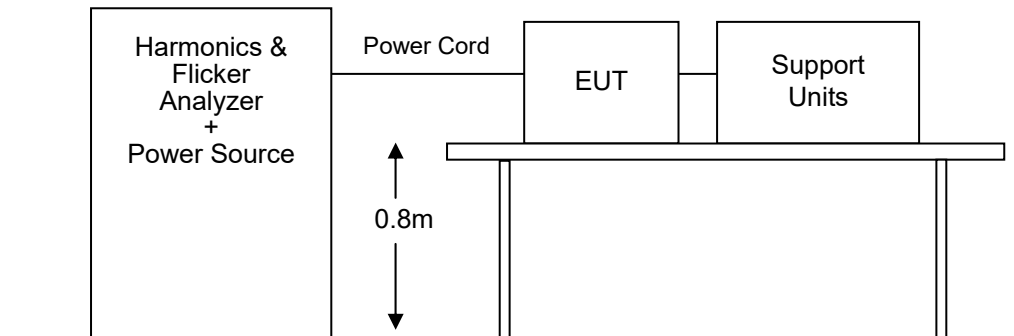
Voltage (Vrms): 229.46	Frequency(Hz): 50.00
I_Peak (Amps): 62.201	I_RMS (Amps): 42.995
I_Fund (Amps): 42.574	Crest Factor: 1.448
Power (Watts): 9835	Power Factor: 0.997

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.102	0.918	11.12	OK
3	0.228	2.867	7.94	OK
4	0.045	0.917	4.95	OK
5	0.128	3.440	3.71	OK
6	0.018	0.918	2.00	OK
7	0.147	2.867	5.14	OK
8	0.030	0.917	3.31	OK
9	0.270	1.376	19.59	OK
10	0.031	0.917	3.40	OK
11	0.293	1.606	18.24	OK
12	0.029	0.688	4.20	OK
13	0.333	1.376	24.19	OK
14	0.045	0.688	6.57	OK
15	0.389	0.688	56.51	OK
16	0.037	0.688	5.40	OK
17	0.400	0.688	58.10	OK
18	0.038	0.688	5.52	OK
19	0.373	0.688	54.23	OK
20	0.034	0.688	5.00	OK
21	0.322	0.688	46.85	OK
22	0.038	0.688	5.57	OK
23	0.276	0.688	40.06	OK
24	0.043	0.688	6.22	OK
25	0.228	0.688	33.11	OK
26	0.031	0.688	4.46	OK
27	0.191	0.688	27.81	OK
28	0.027	0.688	3.95	OK
29	0.167	0.688	24.32	OK
30	0.022	0.688	3.23	OK
31	0.140	0.688	20.30	OK
32	0.024	0.688	3.43	OK
33	0.124	0.688	18.02	OK
34	0.020	0.688	2.85	OK
35	0.105	0.688	15.27	OK
36	0.016	0.688	2.38	OK
37	0.096	0.688	13.96	OK
38	0.019	0.688	2.76	OK
39	0.091	0.688	13.16	OK
40	0.020	0.688	2.96	OK

Minimum Rsce required: Rsce = 16.317
 Phase A = 49.4% of tested Rsce = 33.000, Rsce = 16.317

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Measuring Standard

EN 61000-3-11: 2000 Section 5

7.3. Operation Condition of EUT

7.3.1. Me Setup the EUT as shown on Section 7.1.

7.3.2. Turn on the power of all equipment.

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

7.4. Measuring Results

PASS.

Please see the attached page.

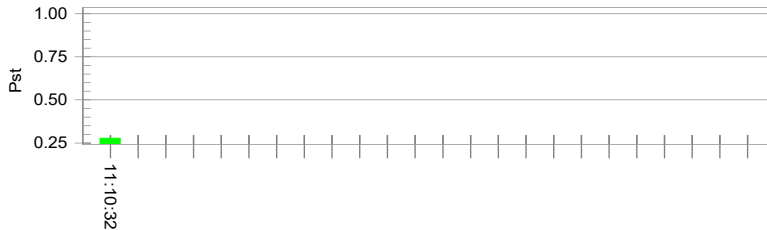
Flicker Test Summary (Run time) per EN/IEC61000-3-11

EUT: Inverter with charger
Test category: All parameters
Test date: 2019/6/16
Test duration (min): 10
Comment: AC MODE
Customer: Sunray
Z-test = (0.400 + j 0.250 Ohm)

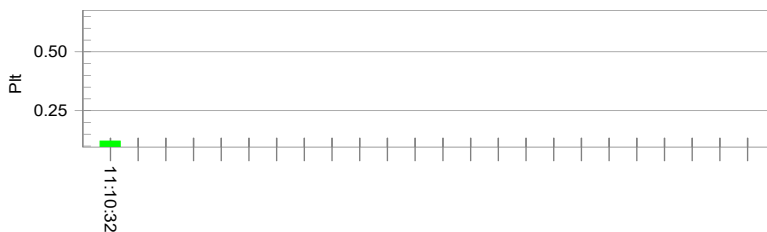
Tested by: LZY
Test Margin: 100
Start time: 11:00:02
End time: 11:10:33
Data file name: WIN2106_F-000474.cts_data

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): 237.47

T-max (mS):	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	-0.54	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.65	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.278	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.121	Test limit:	0.650	Pass

Calculated dmax(%): 0.631
Calculated dc(%): -0.539
Calculated Pst : 0.278
Calculated Plt : 0.121

The maximum permissible system impedance Z_{sys}:

Z = 2.728 Ohm + j 1.705 Ohm (2.728 Ohm + 5428 ?H)

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:

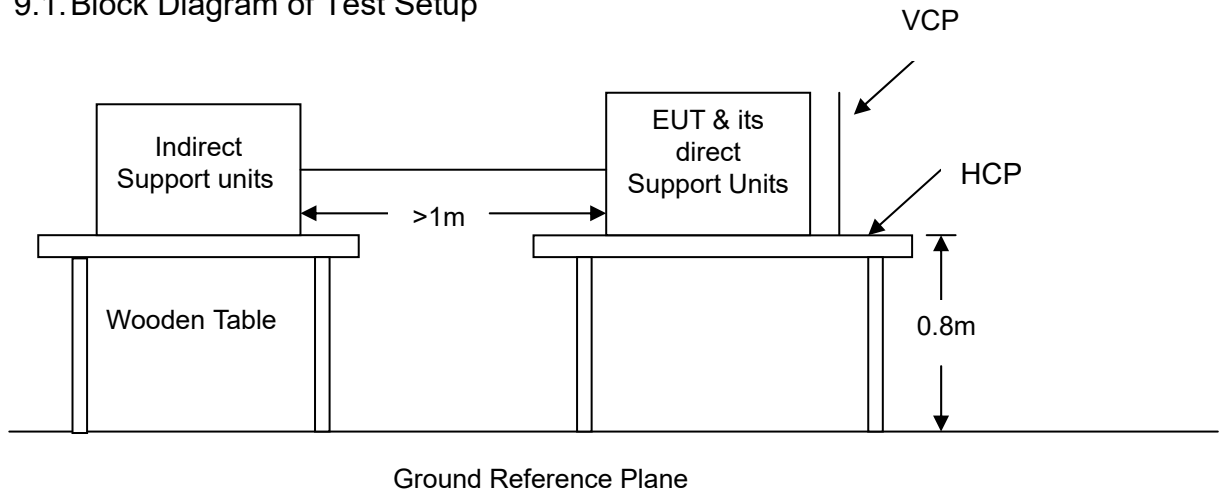
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. 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 (Inverter 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.

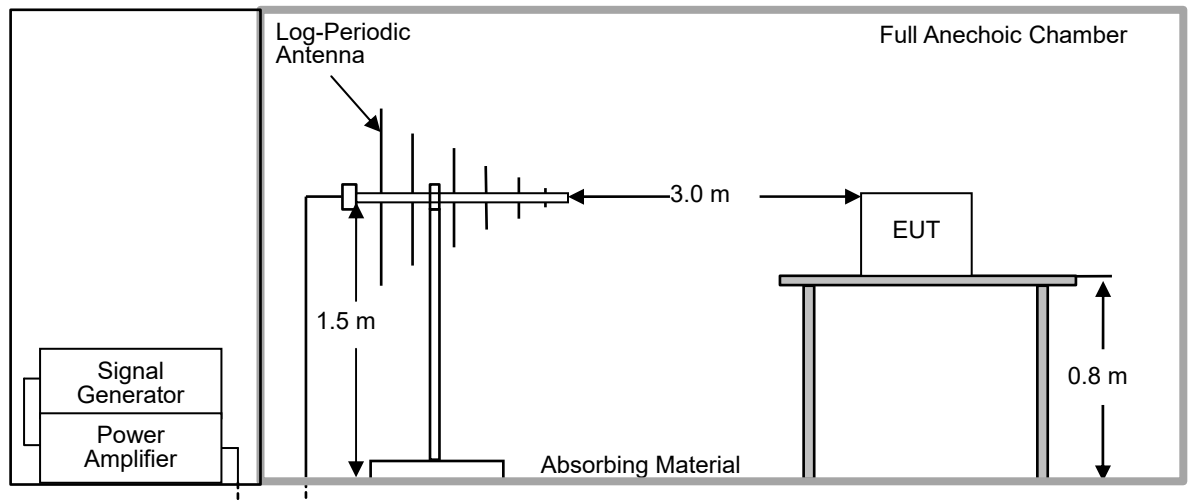
Electrostatic Discharge Test Result

EMTEK (SHENZHEN) CO., LTD.

Applicant	Shen Zhen Sunray Power Co. Ltd	
EUT	Inverter with charger	Test Date : June 15, 2019
M/N	12048E	Temperature : 24.9°C
Power Supply	AC 230V/50Hz, DC 48V	Humidity : 48%
Air discharge	± 8.0kV	Test ode : Inverter Mode, AC Mode
Contact discharge:	± 4.0kV	Criterion : B
Location	Kind A-Air Discharge C-Contact Discharge	Result
Screw	C	A
Metal	C	A
Button	A	A
Screen	A	A
Slot	A	A
USB	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 (Inverter 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	: Shen Zhen Sunray Power Co. Ltd			
EUT	: Inverter with charger		Test Date	: June 15, 2019
M/N	: 12048E		Temperature	: 26.5°C
Field Strength	: 3 V/m		Humidity	: 47%
Power Supply	: AC 230V/50Hz, DC 48V		Criterion	: A
Test Mode	: Inverter Mode, AC Mode		Frequency Range	: 80 MHz to 1000 MHz 1400 MHz to 2000 MHz
Modulation: ☐ None ☐ Pulse ☒ AM 1kHz 80%				
	Frequency Rang 1: 80~ 1000MHz		Frequency Rang 2: 1400~ 2000 MHz	
Steps	1%			
	Horizontal	Vertical	Horizontal	Vertical
Front	A	A	A	A
Right	A	A	A	A
Rear	A	A	A	A
Left	A	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:				

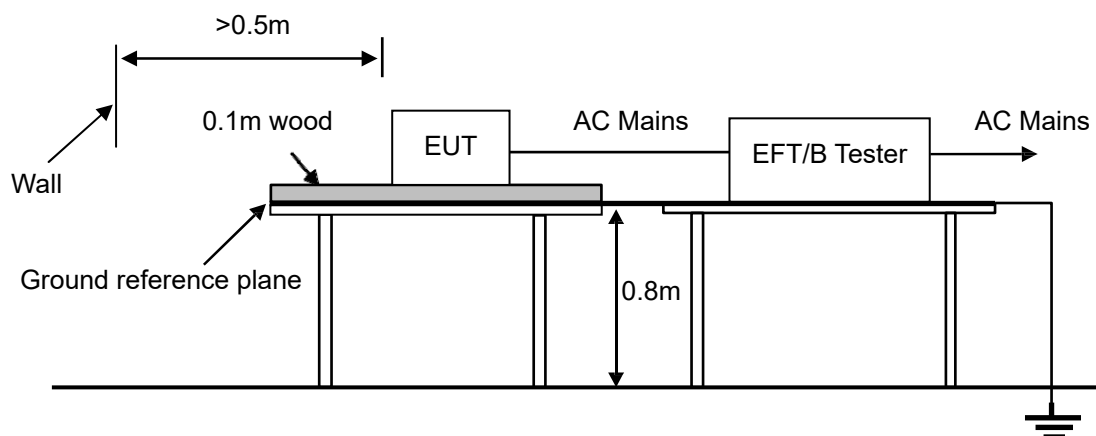
RF Field Strength Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

Applicant : Shen Zhen Sunray Power Co. Ltd				
EUT : Inverter with charger		Test Date : June 15, 2019		
M/N : 12048E		Temperature : 26.5°C		
Field Strength : 3 V/m		Humidity : 47%		
Power Supply : AC 230V/50Hz, DC 48V		Criterion : A		
Test Mode : Inverter Mode, AC Mode		Frequency Range : 2000 MHz to 2700 MHz		
Modulation: ☐ None ☐ Pulse ☒ AM 1kHz 80%				
Frequency Rang 1: 2000~ 2700 MHz		Frequency Rang 2: N/A		
Steps	1%			
	Horizontal	Vertical	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

Open Circuit Output Test Voltage $\pm 10\%$		
Level	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.

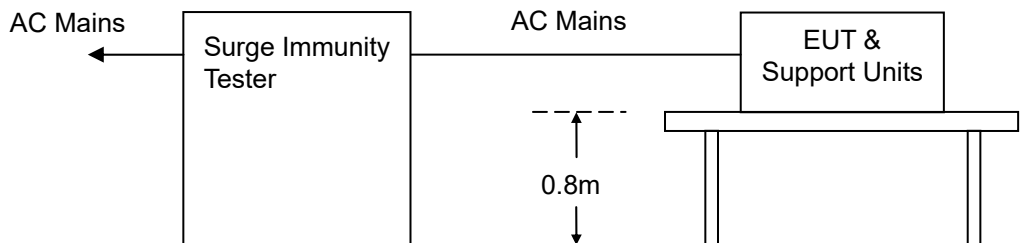
Electrical Fast Transient/Burst Test Results

EMTEK (SHENZHEN) CO., LTD.

Standard: ☒ IEC 61000-4-4		Result: ☒ PASS / ☐ FAIL	
Applicant : <u>Shen Zhen Sunray Power Co. Ltd</u>			
EUT : <u>Inverter with charger</u>			
M/N : <u>12048E</u>			
Input Voltage: <u>AC 230V/50Hz</u>			
Criterion : B			
Ambient Condition : <u>25.7 °C</u> <u>49% RH</u>			
Operation Mode: AC Mode			
Line : ☒ AC Mains ☐ DC Mains		Line : ☐ Signal ☐ I/O Cable	
Coupling : ☒ Direct		Coupling : ☐ 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: 1.0KV, Line to GND: 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) 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.

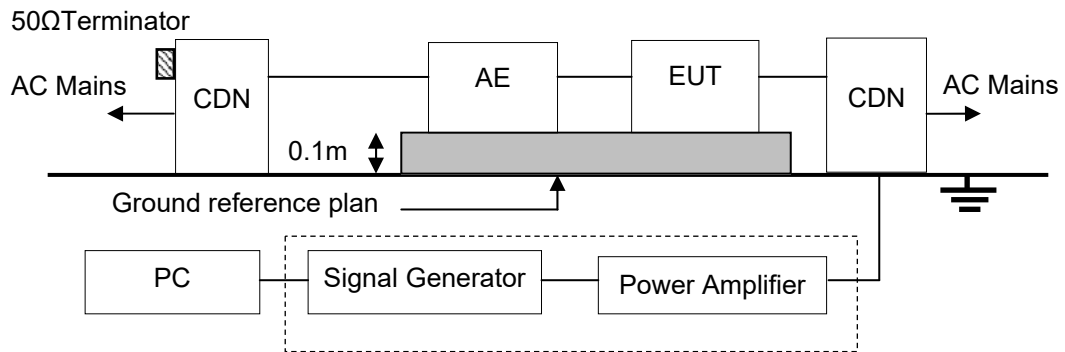
EMTEK (SHENZHEN) CO., LTD.

Criterion : $\overline{B}$

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 $1.5 \cdot 10^{-3}$ 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.

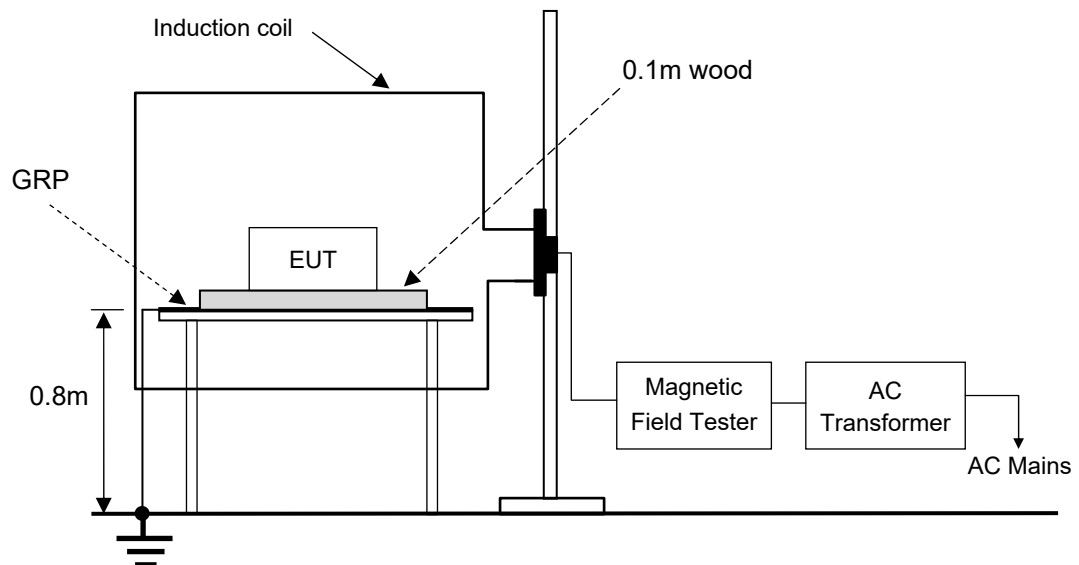
Injected Currents Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

Applicant : <u>Shen Zhen Sunray Power Co. Ltd</u>				
EUT : <u>Inverter with charger</u>		Test Date: <u>June 15, 2019</u>		
M/N : <u>12048E</u>		Temperature : <u>25.7°C</u>		
Power Supply : <u>AC 230V/50Hz</u>		Humidity : <u>49%</u>		
Test Engineer : <u>LZY</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 : ☐ CDN-M2 (SWITZERLAND EMTEST) ☒ CDN-M3 (SWITZERLAND EMTEST)		Note:		

14. MAGNETIC FIELD SUSCEPTIBILITY TEST

14.1. Block Diagram of Test Setup



GRP: Ground reference plane
EUT: Equipment under test

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 (Inverter 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.

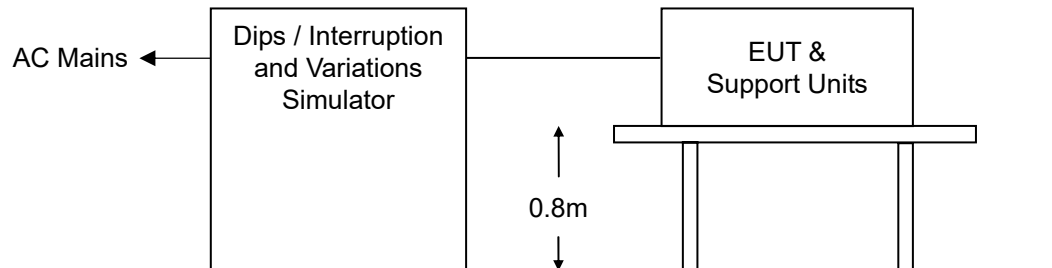
Magnetic Field Immunity Test Result

EMTEK (SHENZHEN) CO., LTD.

Standard: ☒ IEC 61000-4-8	Result: ☒ PASS / ☐ FAIL			
Applicant : <u>Shen Zhen Sunray Power Co. Ltd</u> EUT : <u>Inverter with charger</u> M/N : <u>12048E</u> Input Voltage : <u>AC 230V/50Hz, DC 48V</u> Date of Test : <u>June 15, 2019</u> Test Engineer: <u>LZY</u> Ambient Condition : Temp : <u>25.7°C</u> Humid: <u>49%</u> Criterion: A				
Operation Mode: Inverter 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 : Shen Zhen Sunray Power Co. Ltd

EUT : Inverter with charger

M/N : 12048E

Power Supply : AC 230V/50Hz

Test Date : June 15, 2019

Temperature : 25.7°C

Humidity : 49%

Test Mode: AC Mode

Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion ☐ A ☒ B ☒ C ☐ 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 : N/A

Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion ☐ A ☐ B ☐ C ☐ 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



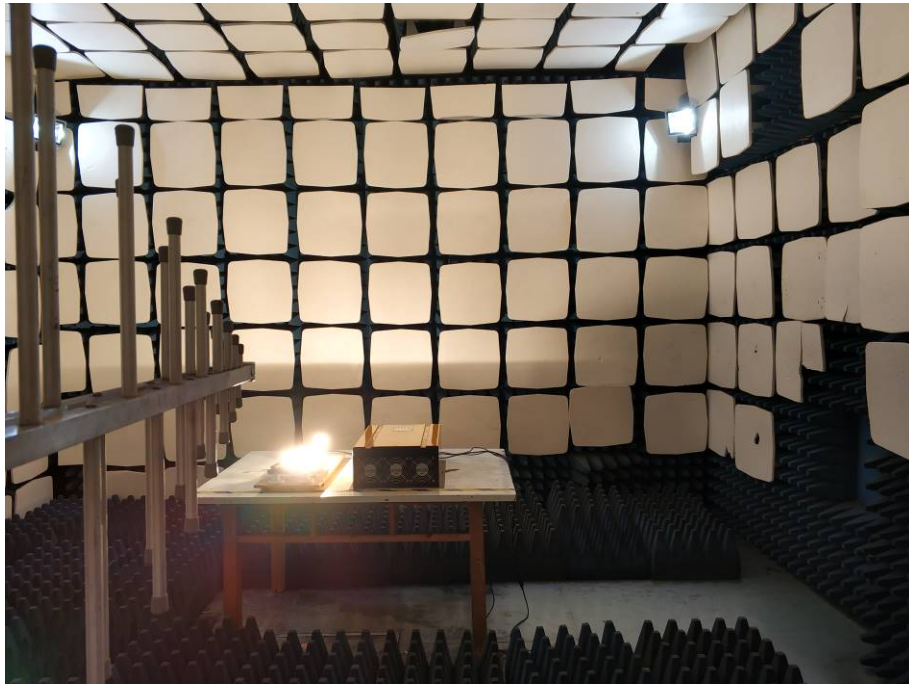
16.3.Photo of Harmonic / Flicker Measurement



16.4.Photo of Electrostatic Discharge Test



16.5.Photo of RF Field Strength Susceptibility Test



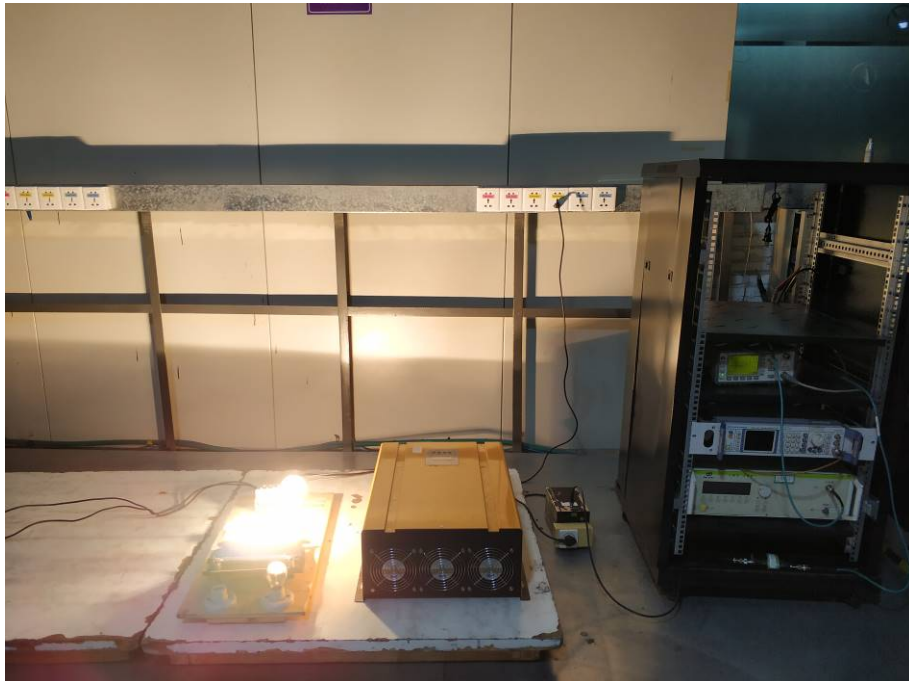
16.6.Photo of Electrical Fast Transient / Burst Test



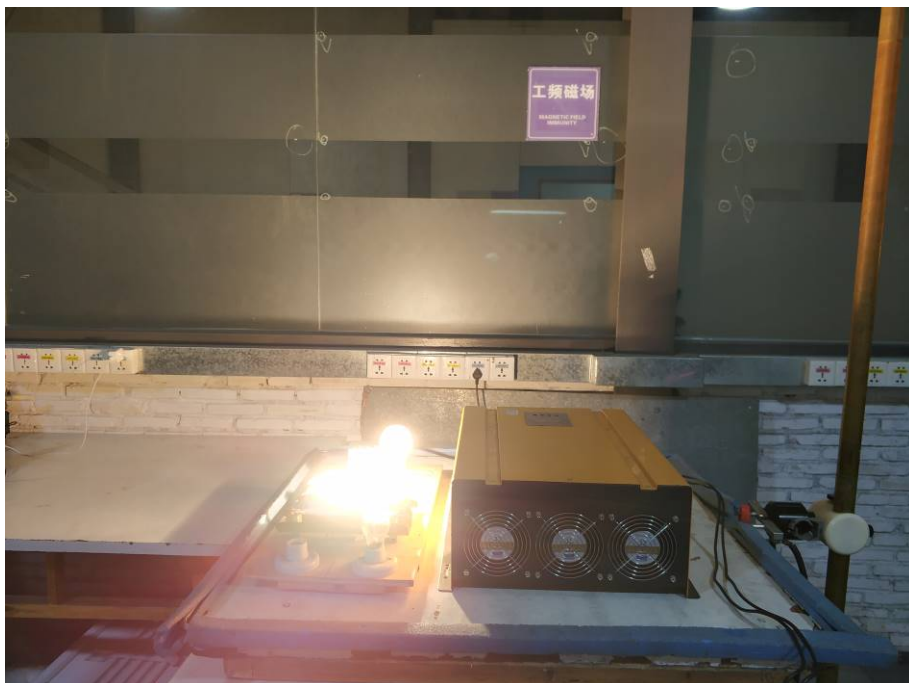
16.7.Photo of Surge Test



16.8.Photo of Injected Currents Susceptibility Test



16.9.Photo of Magnetic Field Immunity Test



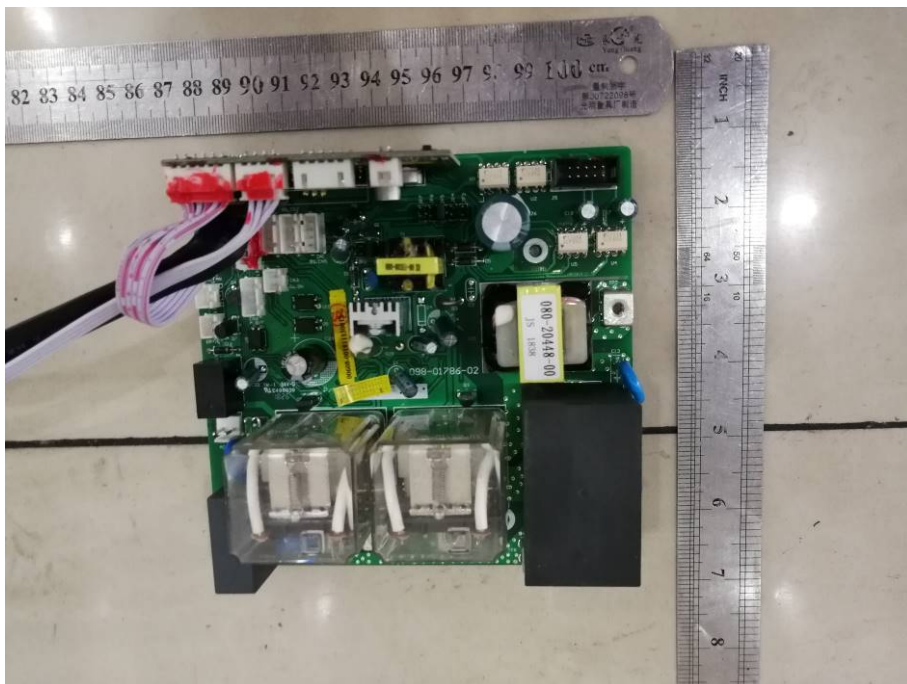
16.10.Photo of Voltage Dips and Interruption Immunity Test

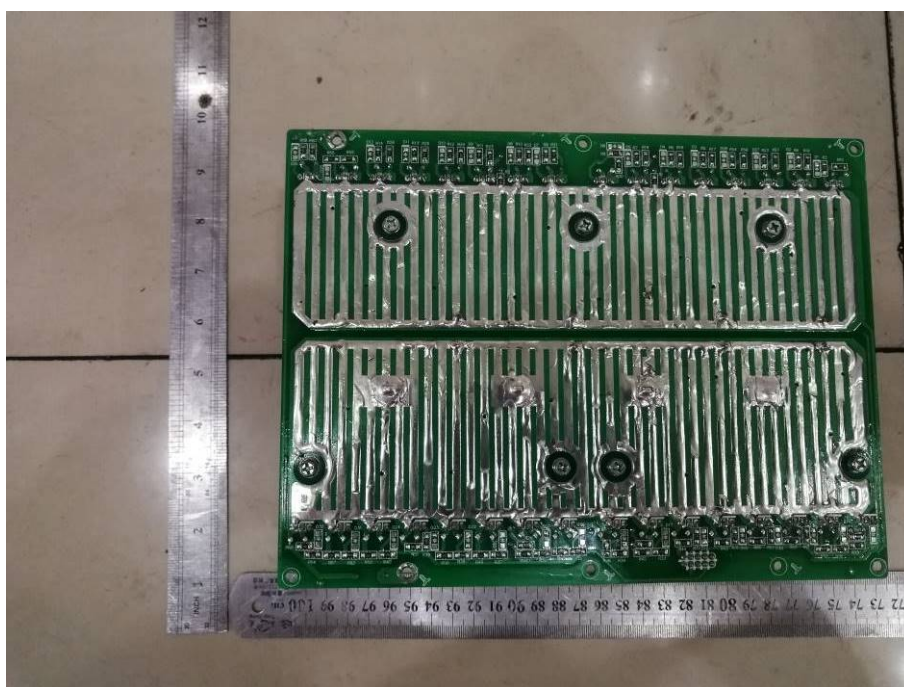
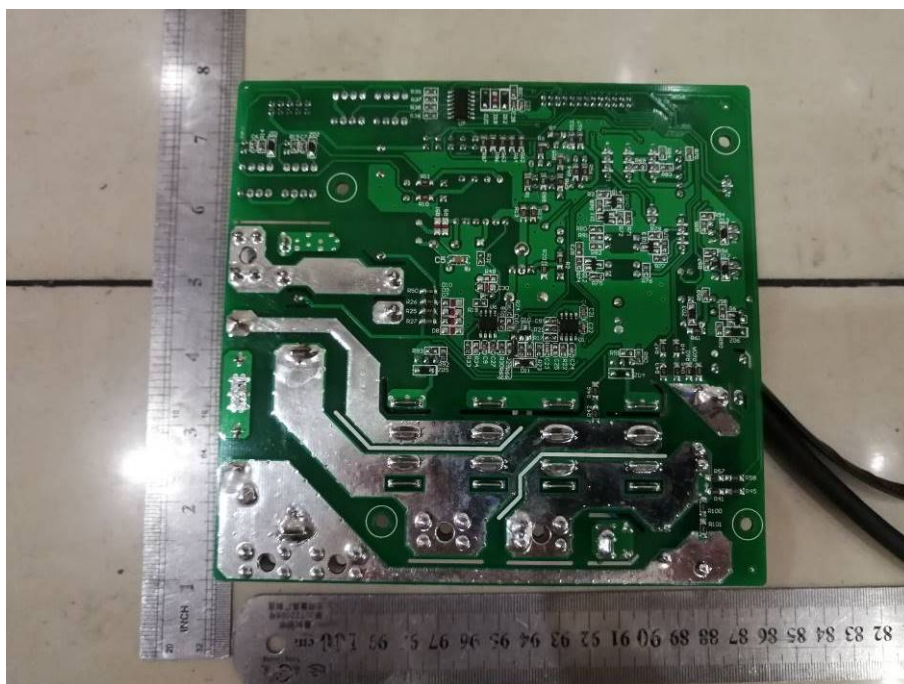


APPENDIX (Photos of EUT)









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