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TEST REPORT

Product Name : INVERTER CHARGER
**Model Number : MPS-3500H, MPS-3500HP, MPS-5500H,
MPS-5500HP, HGS-3500, HGP-3500,
HGS-5500, HGP-5500**

Prepared for : GUANGDONG SUNRAY POWER CO., LTD
**Address : Building No. 4, Green Wisdom Manufacturing Industrial
Park, No. 302 Huize Avenue, Dongjiang hi-tech Industrial
Park, Zhongkai high-tech zone, Huizhou**

Prepared by : EMTEK (SHENZHEN) CO., LTD.
**Address : Building 69, Majialong Industry Zone, Nanshan District,
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Report Number : ENS2405150179E00101R
Date(s) of Tests : August 26, 2021 to November 17, 2021
Date of issue : May 17, 2024

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APPENDIX (Photos of EUT) (2 Pages)



TEST REPORT DESCRIPTION

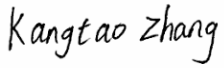
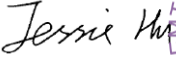

Applicant : GUANGDONG SUNRAY POWER CO., LTD
 Manufacturer : GUANGDONG SUNRAY POWER CO., LTD
 Trade Mark : N/A
 EUT : INVERTER CHARGER
 Model No. : MPS-3500H, MPS-3500HP, MPS-5500H, MPS-5500HP, HGS-3500, HGP-3500, HGS-5500, HGP-5500
 Rating : Input: AC 230V, 50~60Hz, DC 48V, 162A
 Output: 230V, 23.9A

Measurement Procedure Used:

EN 61000-6-3:2007+A1:2011+ AC:2012
 EN 61000-3-12:2011
 EN IEC 61000-3-11:2019
 EN IEC 61000-6-1: 2019
 (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 EN 61000-6-3, EN 61000-3-12, EN IEC 61000-3-11 and EN IEC 61000-6-1 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 : August 26, 2021 to November 17, 2021
 Prepared by : 
 Kangtao Zhang/Editor
 Reviewer : 
 Jessie Hu/Supervisor
 Approved & Authorized Signer : 
 Lisa Wang/Manager

Modified Information

Version	Report No.	Revision Date	Summary
Ver.1.0	ENS2405150179E00101R	/	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 IEC 61000-3-11:2019	--	Pass
IMMUNITY (EN IEC 61000-6-1: 2019)			
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: /			

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : INVERTER CHARGER

Model Number : MPS-3500H, MPS-3500HP, MPS-5500H, MPS-5500HP, HGS-3500, HGP-3500, HGS-5500, HGP-5500
(Note: These models are only different in appearance and power. In order to meet the test requirements, the test model is HGS-5500.)

Testing voltage : AC 230V/50Hz, DC 48V, DC 60V

Applicant : GUANGDONG SUNRAY POWER CO., LTD

Address : Building No. 4, Green Wisdom Manufacturing Industrial Park, No. 302 Huize Avenue, Dongjiang hi-tech Industrial Park, Zhongkai high-tech zone, Huizhou

Manufacturer : GUANGDONG SUNRAY POWER CO., LTD

Address : Building No. 4, Green Wisdom Manufacturing Industrial Park, No. 302 Huize Avenue, Dongjiang hi-tech Industrial Park, Zhongkai high-tech zone, Huizhou

Date of Received : August 26, 2021

Date of Test : August 26, 2021 to November 10, 2021

Note: This report is based on ENS2108260159E00101R change of applicant, manufacturer, address and product name. This change or addition does not affect test results. The original data and records are referred to ENS2108260159E00101R.

2.2. Independent Operation Modes

- A. On
 - A.1: Line mode
 - A.2: Battery mode
 - A.3: PV mode

2.3. Test Manner

Test Items	Test Voltage	Operation Modes	Worst case
Conducted Disturbance at Mains Terminals	AC 230V/50Hz DC 48V,DC 60V	Mode A	Mode A
Radiated emissions at frequencies up to 1 GHz	AC 230V/50Hz DC 48V,DC 60V	Mode A	Mode A
Harmonic Current Emissions	AC 230V/50Hz	Mode A	\
Voltage Fluctuation and Flicker	AC 230V/50Hz	Mode A	\
Electrostatic Discharge	AC 230V/50Hz DC 48V,DC 60V	Mode A	\
Continuous RF electromagnetic field disturbances	AC 230V/50Hz DC 48V,DC 60V	Mode A	\
Electrical fast transients/burst	AC 230V/50Hz	Mode A	\
Surges	AC 230V/50Hz	Mode A	\
Continuous induced RF disturbances	AC 230V/50Hz	Mode A	\
Power frequency magnetic field	AC 230V/50Hz DC 48V,DC 60V	Mode A	\
Voltage dips and interruptions	AC 230V/50Hz	Mode A	\

2.4. 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

2.5. Description of Support Device

N/A

2.6. 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)
Uncertainty for R/S Test	: 2.10dB(80MHz-200MHz) 1.76dB(200MHz-1000MHz)
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
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESCI	101045	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	100107	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	AMN	Schwarzbeck	NNLK 8129	8129203	May 16, 2021	1 Year

3.2. For TELECOM terminals Disturbance Voltage Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESCI	101045	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	AAN	TESEQ	ISN T800	30327	Mar 19, 2021	1 Year
<input checked="" type="checkbox"/>	AAN	TESEQ	ISN T8-CAT6	32186	Mar 19, 2021	1 Year

3.3. 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 15, 2021	1 Year
<input checked="" type="checkbox"/>	Pre-Amplifier	Lunar EM	LNA10M1G-40	J1011130912001	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	Bilog Antenna	Schwarzbeck	VULB9163	659	June 12, 2021	2 Year

3.4. 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 16, 2021	1 Year
<input checked="" type="checkbox"/>	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impedance network	Teseq	INA2197/37A	1305A02873	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impedance network	Teseq	INA 2196/75A	1305A02874	May 16, 2021	1 Year
<input type="checkbox"/>	Profiline 2100 AC Switching Unit	Teseq	NSG 2200-3	A22714	May 16, 2021	1 Year

3.5. 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 15, 2021	1 Year

3.6. 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 15, 2021	1 Year
<input checked="" type="checkbox"/>	50ohm Diode Power Sensor	BOONTON	51011EMC	34236	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 15, 2021	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 15, 2021	1 Year
<input checked="" type="checkbox"/>	50ohm Diode Power Sensor	BOONTON	51011EMC	36164	May 15, 2021	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	10I00037S NO22	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Multi-function interface system	DARE	CTR1009B	12I00250S NO72	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 15, 2021	1 Year
<input checked="" type="checkbox"/>	Power Amplifier	MILMEGA	80RF1000-175	1059345	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	Directional Coupler	MILMEGA	DC6180AM1	0340463	May 15, 2021	1 Year

3.7. 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 16, 2021	1 Year
<input checked="" type="checkbox"/>	Coupling Clamp	HAEFELY	IP-4A	147147	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Three phase CDN	Teseq	CDN 163	202	May 15, 2021	1 Year

3.8. 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 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impulse Module	HAEFELY	PIM 100	174124	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Coupling Decoupling	HAEFELY	PCD 130	172181	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Coupling Module	HAEFELY	PCD122	174354	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impulse Module	HAEFELY	PIM 120	174435	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Coupling Module	HAEFELY	PCD 126A	174387	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impulse Module	HAEFELY	PIM 110	174391	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impulse Module	HAEFELY	PIM 150	178707	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Impulse Module	PMI	PCDN8	190422	May 16, 2021	1 Year

3.9. 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 15, 2021	1 Year
<input type="checkbox"/>	CDN	EMTEST	CDN-M2	510010010010	May 16, 2021	1 Year
<input type="checkbox"/>	CDN	EMTEST	CDN-M3	0900-11	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	EM Injection Clamp	EMTEST	F-2031-23MM	368	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	Attenuator	EMTEST	100W 6dB DC-3G	/	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	Signal Generator	R&S	SMB100A	103041	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	CDN	LUTHI	CDN L-801 M2/M3	2606	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	Three phase CDN	TESEQ	CDN M332S	32655	May 15, 2021	1 Year
<input checked="" type="checkbox"/>	Three phase CDN	TESEQ	CDN M432S	33670	May 15, 2021	1 Year
<input type="checkbox"/>	Three phase CDN	TESEQ	CDN M432-3LNS	34048	May 15, 2021	1 Year
<input type="checkbox"/>	Three phase CDN	TESEQ	CDN M532S	33799	May 15, 2021	1 Year

3.10. For Magnetic Field Immunity Test

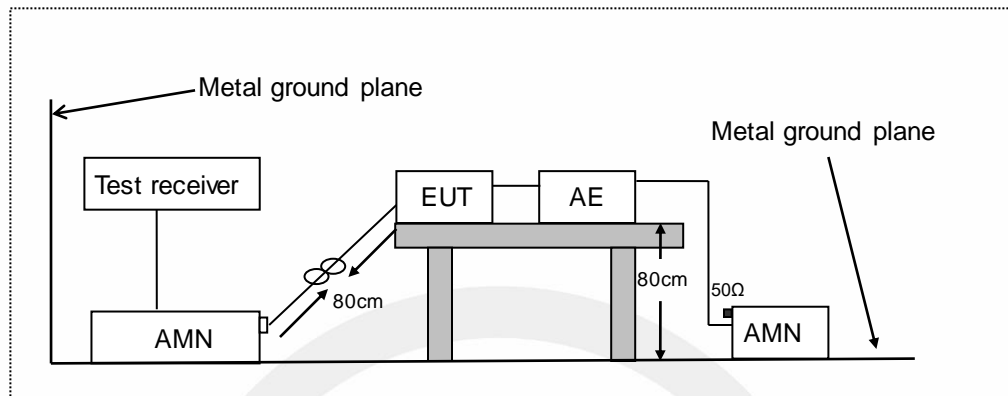
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 15, 2021	1 Year

3.11. 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 1007-45/45K VA	1305A02873	May 16, 2021	1 Year
<input type="checkbox"/>	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	May 16, 2021	1 Year
<input type="checkbox"/>	Impedance network	Teseq	INA2197/37A	1305A02873	May 16, 2021	1 Year
<input type="checkbox"/>	Impedance network	Teseq	INA 2196/75A	1305A02874	May 16, 2021	1 Year
<input checked="" type="checkbox"/>	Profiline 2100 AC Switching Unit	Teseq	NSG 2200-3	A22714	May 16, 2021	1 Year

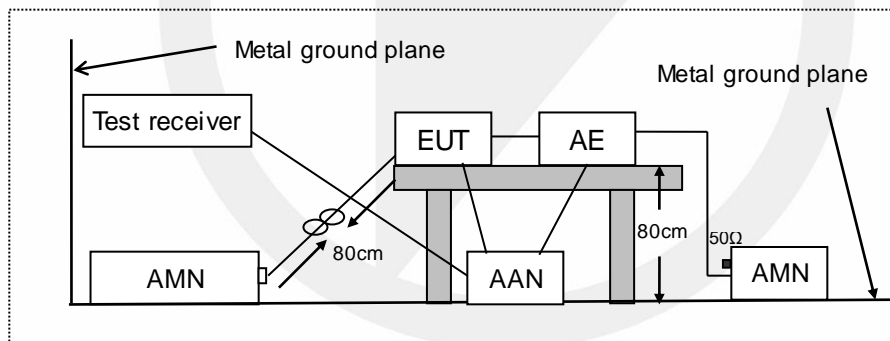
4. POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1. Block Diagram of Test Setup



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

Telecommunications/network port:



AMN: Artificial mains network
AE: Associated equipment
EUT: Equipment under test
AAN: Asymmetric artificial network

4.2. Measuring Standard

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

4.3. Power Line Conducted Emission Limits

AC Mains Port:

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.		

Telecommunications/network port:

Frequency (MHz)	Voltage Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	97.0 ~ 87.0 *	84.0 ~ 74.0 *
0.50 ~ 30.00	87.0	74.0
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 CHARGER
Model Number : HGS-5500

4.5. Test Procedure

The EUT is put on the plane 0.1m 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 (Rohde & Schwarz Test Receiver) is set at 9kHz in 150kHz~30MHz and 200Hz in 9kHz~150kHz.

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

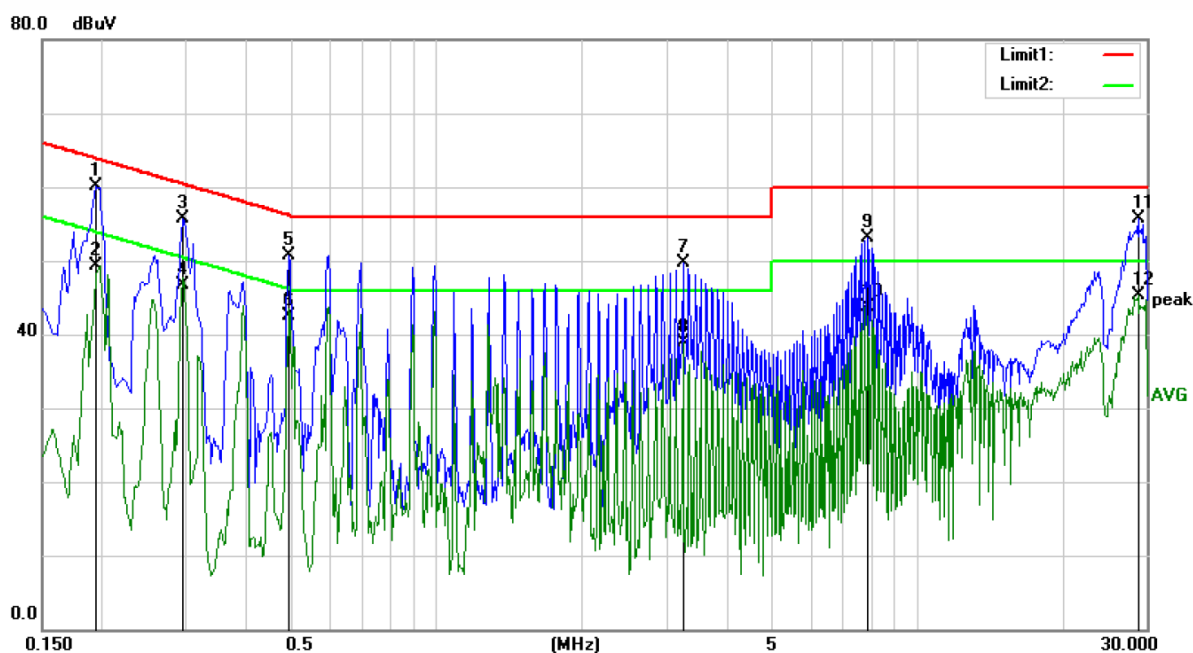
All the modes were tested and the worst mode (AC Charger Mode) refer to the following pages.

4.6. Measuring Results

PASS.

Please reference to the following pages.





Site Conduction #2

Phase: **L1**

Temperature: 26.3

Limit: (CE)EN61000-6-3_QP

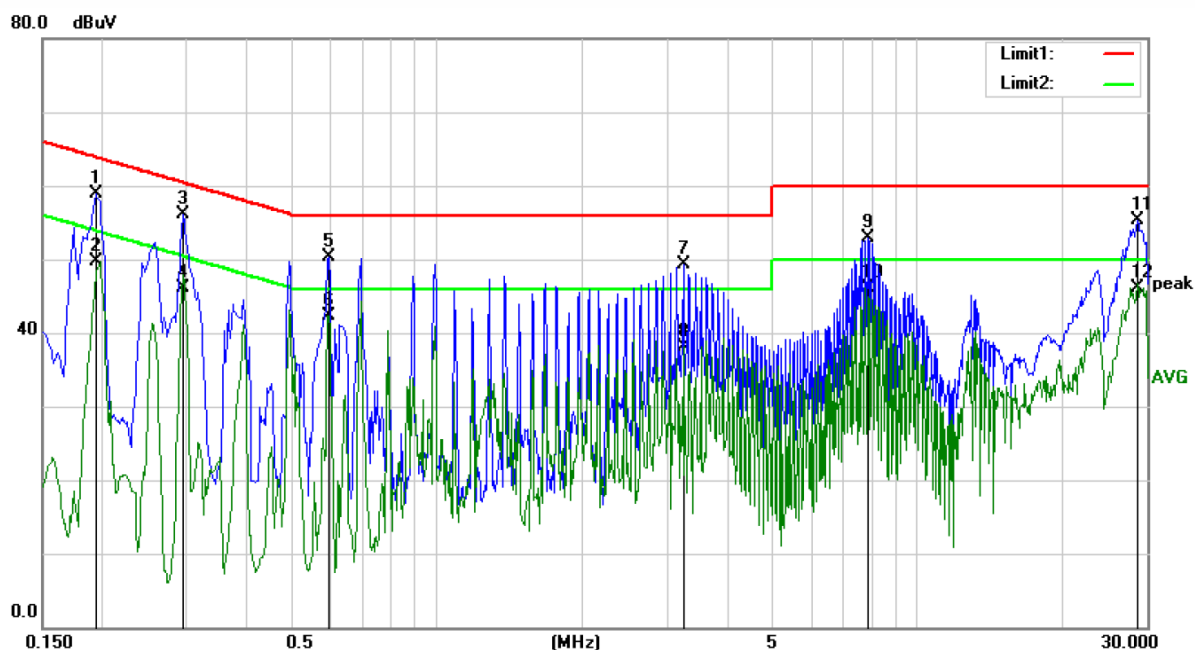
Power: AC 230V/50Hz

Humidity: 44 %

Mode: Line mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1940	49.72	10.43	60.15	63.86	-3.71	QP	
2		0.1940	38.93	10.43	49.36	53.86	-4.50	AVG	
3		0.2940	45.26	10.39	55.65	60.41	-4.76	QP	
4		0.2940	36.32	10.39	46.71	50.41	-3.70	AVG	
5		0.4900	40.30	10.45	50.75	56.17	-5.42	QP	
6	*	0.4900	32.06	10.45	42.51	46.17	-3.66	AVG	
7		3.2460	39.35	10.26	49.61	56.00	-6.39	QP	
8		3.2460	28.61	10.26	38.87	46.00	-7.13	AVG	
9		7.8660	42.76	10.31	53.07	60.00	-6.93	QP	
10		7.8660	33.30	10.31	43.61	50.00	-6.39	AVG	
11		28.8020	45.10	10.66	55.76	60.00	-4.24	QP	
12		28.8020	34.64	10.66	45.30	50.00	-4.70	AVG	



Site Conduction #2

Phase: N

Temperature: 26.3

Limit: (CE)EN61000-6-3_QP

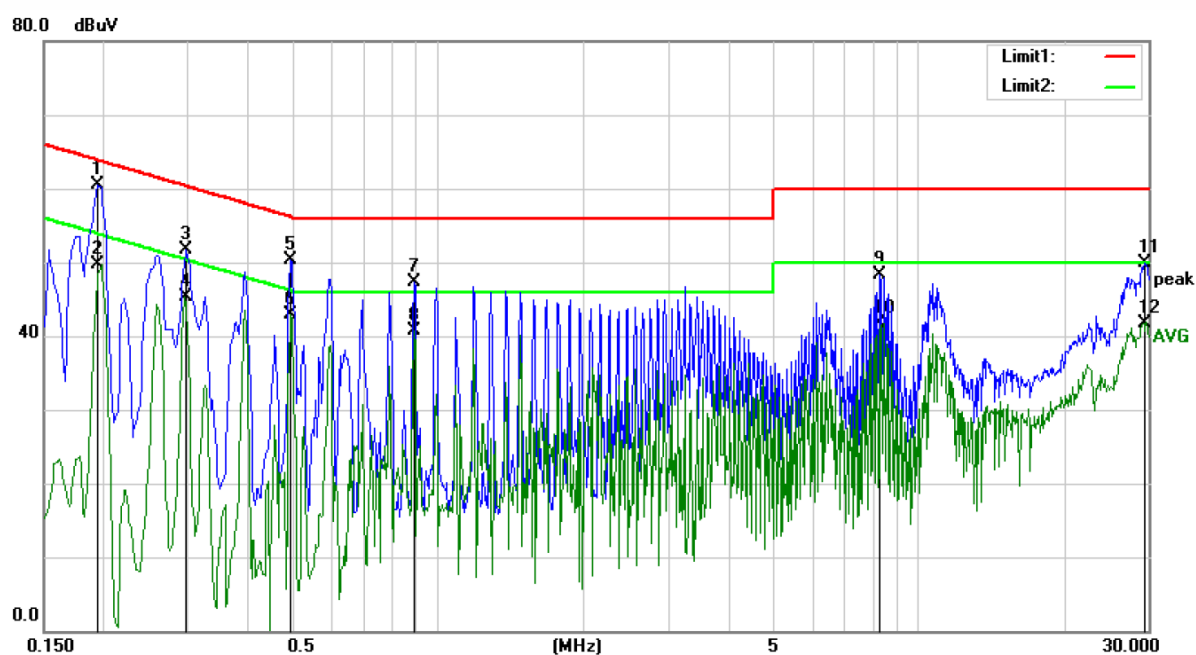
Power: AC 230V/50Hz

Humidity: 44 %

Mode: Line mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1940	48.41	10.43	58.84	63.86	-5.02	QP	
2		0.1940	39.21	10.43	49.64	53.86	-4.22	AVG	
3		0.2940	45.63	10.39	56.02	60.41	-4.39	QP	
4		0.2940	35.62	10.39	46.01	50.41	-4.40	AVG	
5		0.5940	39.82	10.45	50.27	56.00	-5.73	QP	
6	*	0.5940	31.94	10.45	42.39	46.00	-3.61	AVG	
7		3.2460	39.06	10.26	49.32	56.00	-6.68	QP	
8		3.2460	27.79	10.26	38.05	46.00	-7.95	AVG	
9		7.8660	42.62	10.31	52.93	60.00	-7.07	QP	
10		7.8660	35.76	10.31	46.07	50.00	-3.93	AVG	
11		28.6100	44.57	10.66	55.23	60.00	-4.77	QP	
12		28.6100	35.39	10.66	46.05	50.00	-3.95	AVG	



Site Conduction #2

Phase: L1

Temperature: 26.3

Limit: (CE)EN61000-6-3_QP

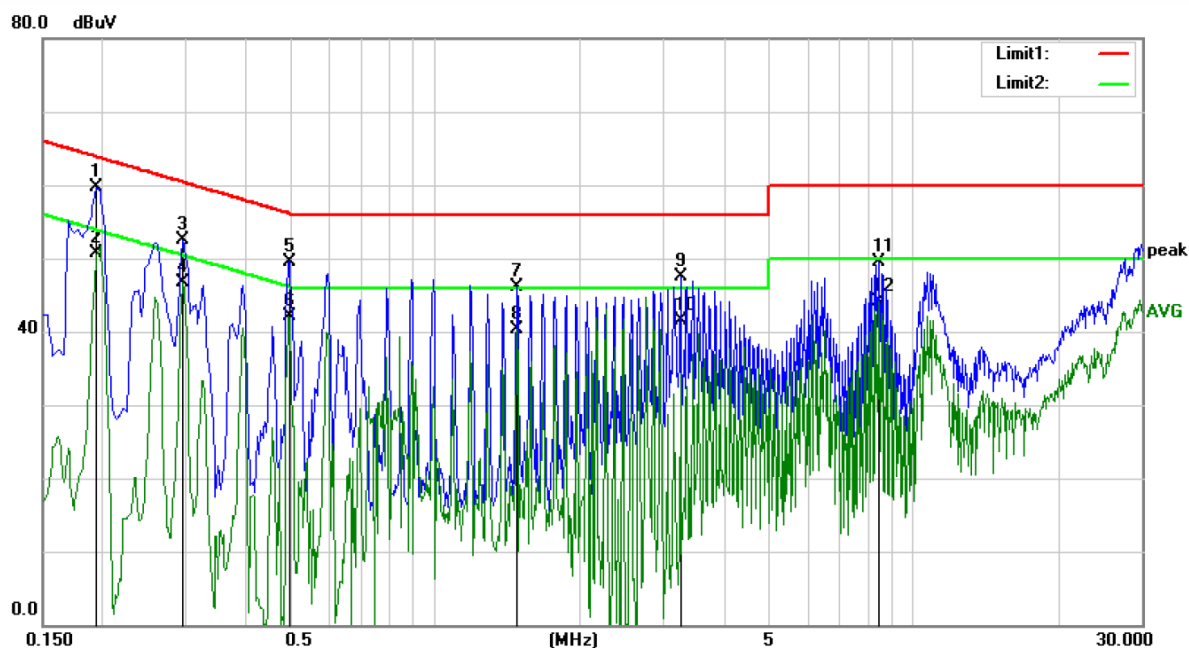
Power: DC 60V

Humidity: 44 %

Mode: PV mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1940	50.00	10.43	60.43	63.86	-3.43	QP	
2		0.1940	39.18	10.43	49.61	53.86	-4.25	AVG	
3		0.2980	41.22	10.39	51.61	60.30	-8.69	QP	
4		0.2980	34.91	10.39	45.30	50.30	-5.00	AVG	
5		0.4900	39.78	10.45	50.23	56.17	-5.94	QP	
6	*	0.4900	32.52	10.45	42.97	46.17	-3.20	AVG	
7		0.8860	37.03	10.31	47.34	56.00	-8.66	QP	
8		0.8860	30.30	10.31	40.61	46.00	-5.39	AVG	
9		8.2620	37.92	10.31	48.23	60.00	-11.77	QP	
10		8.2620	31.49	10.31	41.80	50.00	-8.20	AVG	
11		29.4100	39.28	10.70	49.98	60.00	-10.02	QP	
12		29.4100	30.92	10.70	41.62	50.00	-8.38	AVG	



Site Conduction #2

Phase: **N**

Temperature: 26.3

Limit: (CE)EN61000-6-3_QP

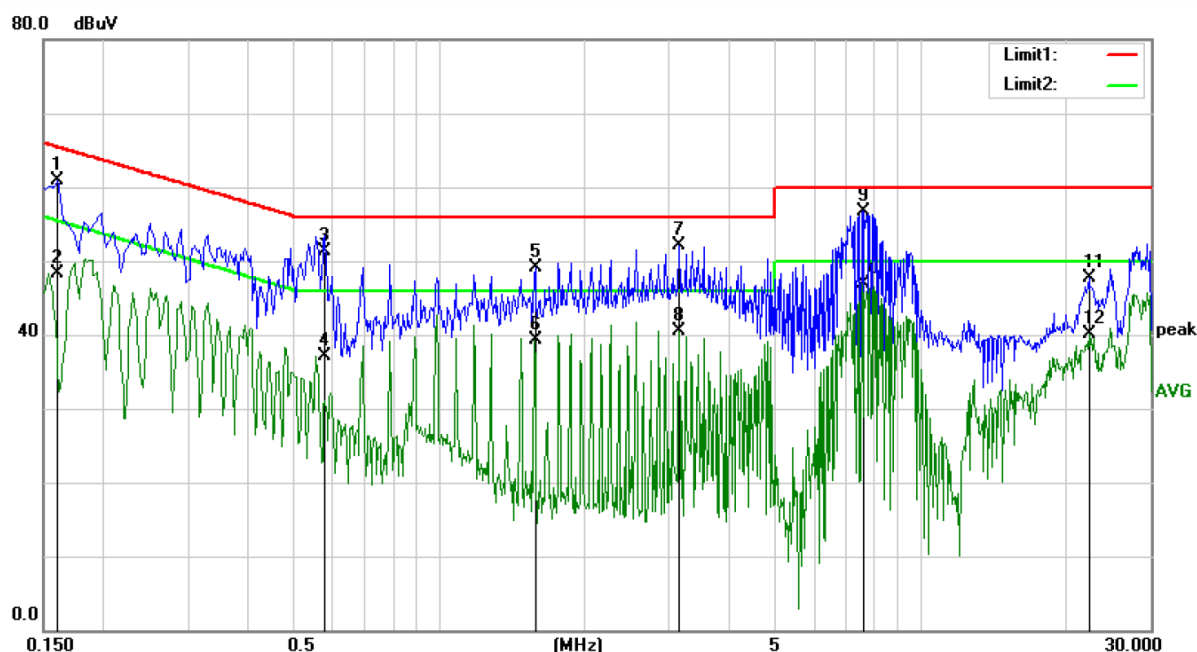
Power: DC 60V

Humidity: 44 %

Mode: PV mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1940	49.36	10.43	59.79	63.86	-4.07	QP	
2	*	0.1940	40.28	10.43	50.71	53.86	-3.15	AVG	
3		0.2940	42.02	10.39	52.41	60.41	-8.00	QP	
4		0.2940	36.23	10.39	46.62	50.41	-3.79	AVG	
5		0.4940	39.15	10.45	49.60	56.10	-6.50	QP	
6		0.4940	31.60	10.45	42.05	46.10	-4.05	AVG	
7		1.4780	35.82	10.23	46.05	56.00	-9.95	QP	
8		1.4780	30.01	10.23	40.24	46.00	-5.76	AVG	
9		3.2500	37.31	10.26	47.57	56.00	-8.43	QP	
10		3.2500	31.34	10.26	41.60	46.00	-4.40	AVG	
11		8.4620	39.13	10.31	49.44	60.00	-10.56	QP	
12		8.4620	33.76	10.31	44.07	50.00	-5.93	AVG	



Site Conduction #2

Limit: (CE)EN61000-6-3_QP

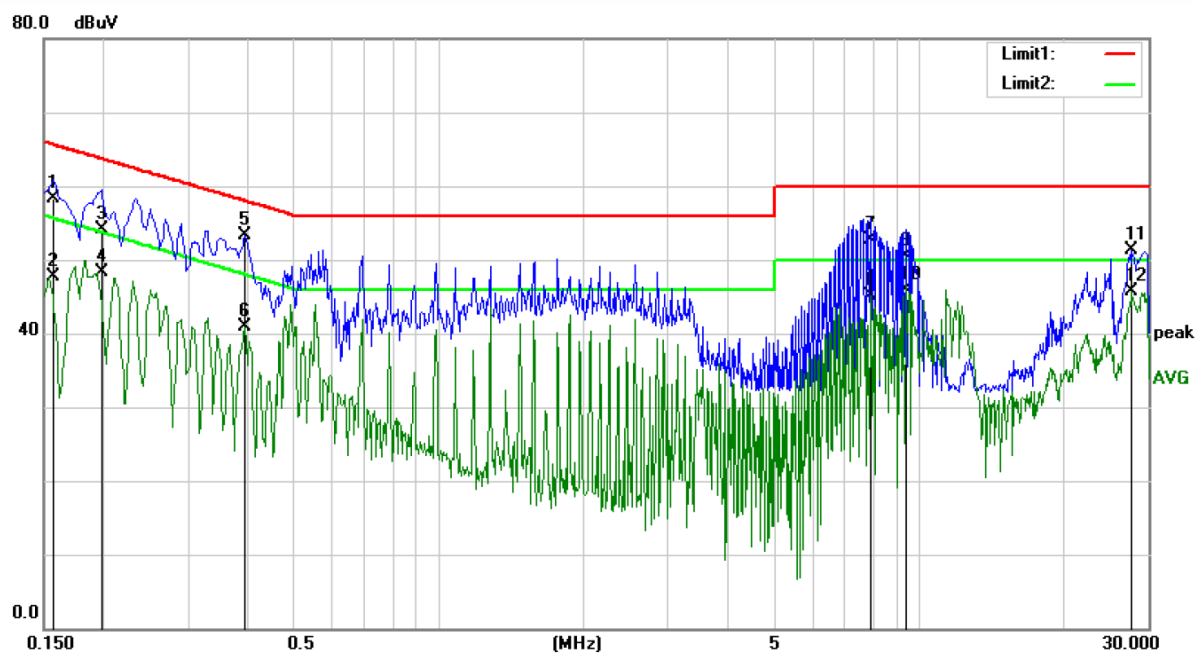
Mode: Battery mode

Note:

Phase: +
Power: DC 48V

Temperature: 26.3
Humidity: 44 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1607	50.35	10.60	60.95	65.43	-4.48	QP	
2		0.1607	37.75	10.60	48.35	55.43	-7.08	AVG	
3		0.5780	40.91	10.45	51.36	56.00	-4.64	QP	
4		0.5780	26.61	10.45	37.06	46.00	-8.94	AVG	
5		1.5780	38.87	10.23	49.10	56.00	-6.90	QP	
6		1.5780	28.99	10.23	39.22	46.00	-6.78	AVG	
7		3.1460	41.81	10.26	52.07	56.00	-3.93	QP	
8		3.1460	30.26	10.26	40.52	46.00	-5.48	AVG	
9		7.6140	46.44	10.30	56.74	60.00	-3.26	QP	
10	*	7.6140	36.61	10.30	46.91	50.00	-3.09	AVG	
11		22.4100	37.24	10.39	47.63	60.00	-12.37	QP	
12		22.4100	29.72	10.39	40.11	50.00	-9.89	AVG	



Site Conduction #2

Phase: -

Temperature: 26.3

Limit: (CE)EN61000-6-3_QP

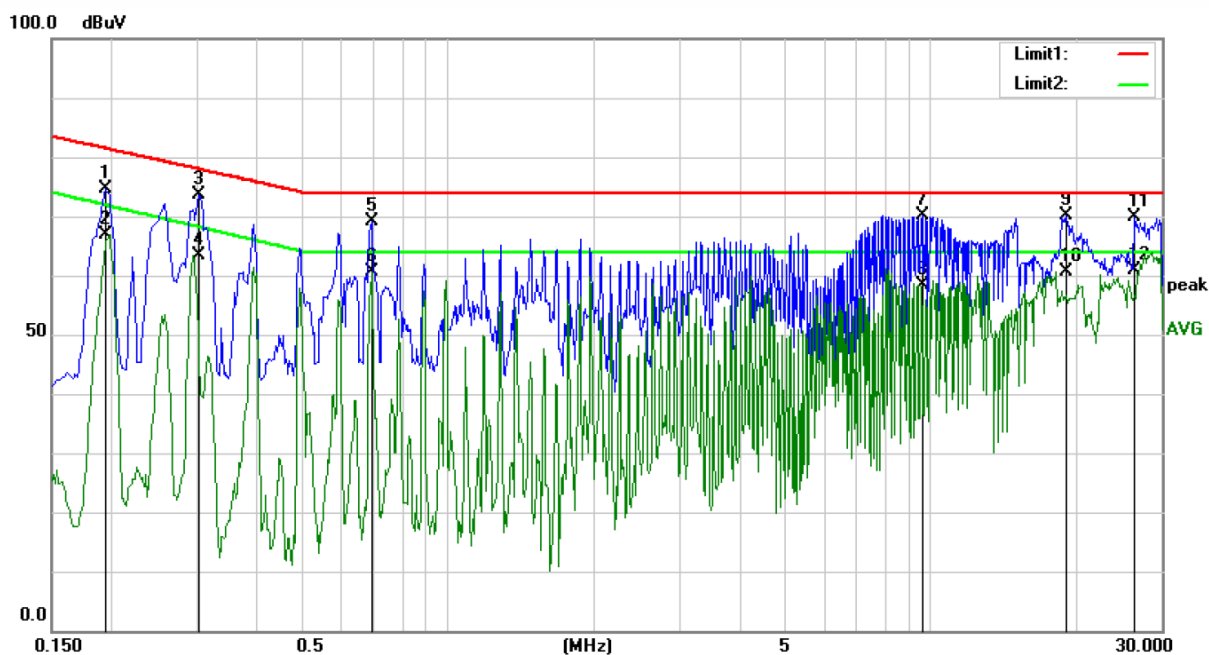
Power: DC 48V

Humidity: 44 %

Mode: Battery mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1580	47.78	10.62	58.40	65.57	-7.17	QP	
2		0.1580	37.15	10.62	47.77	55.57	-7.80	AVG	
3		0.1980	43.79	10.41	54.20	63.69	-9.49	QP	
4		0.1980	37.98	10.41	48.39	53.69	-5.30	AVG	
5		0.3940	42.93	10.44	53.37	57.98	-4.61	QP	
6		0.3940	30.55	10.44	40.99	47.98	-6.99	AVG	
7		7.9700	42.49	10.31	52.80	60.00	-7.20	QP	
8		7.9700	34.80	10.31	45.11	50.00	-4.89	AVG	
9		9.3660	40.29	10.31	50.60	60.00	-9.40	QP	
10	*	9.3660	35.67	10.31	45.98	50.00	-4.02	AVG	
11		27.7180	40.73	10.63	51.36	60.00	-8.64	QP	
12		27.7180	35.17	10.63	45.80	50.00	-4.20	AVG	



Site Conduction #2

Phase: -

Temperature: 26.3

Limit: (CE)EN61000-6-3 TELECOM_QP

Power: DC 48V

Humidity: 44 %

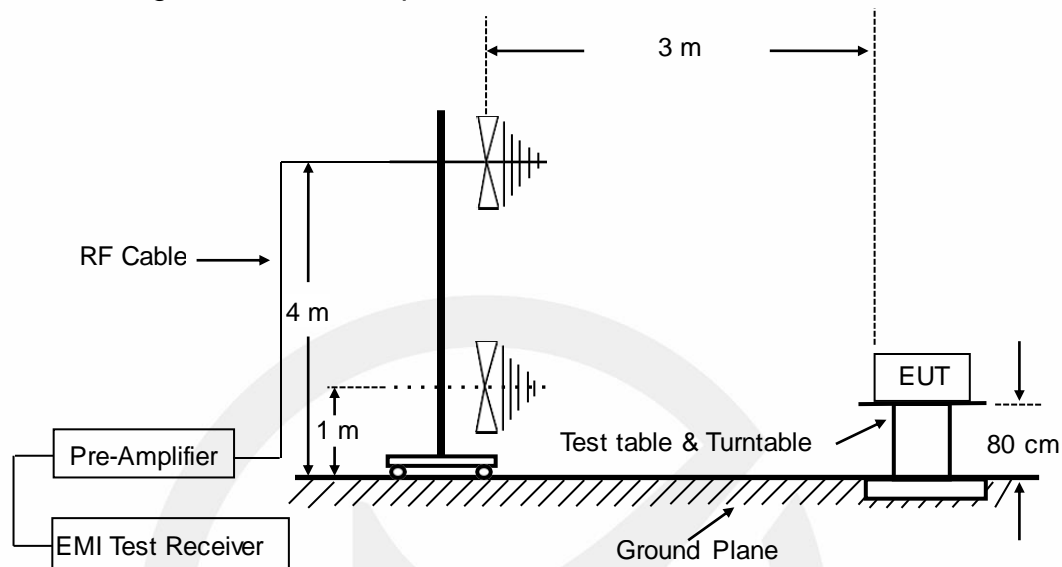
Mode: Battery mode

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1940	65.03	9.63	74.66	81.44	-6.78	QP	
2		0.1940	57.13	9.63	66.76	71.86	-5.10	AVG	
3		0.3020	63.82	9.72	73.54	77.96	-4.42	QP	
4		0.3020	53.70	9.72	63.42	68.19	-4.77	AVG	
5		0.6900	59.82	9.40	69.22	74.00	-4.78	QP	
6		0.6900	51.28	9.40	60.68	64.00	-3.32	AVG	
7		9.6300	60.63	9.60	70.23	74.00	-3.77	QP	
8		9.6300	48.82	9.60	58.42	64.00	-5.58	AVG	
9		19.0700	60.23	9.80	70.03	74.00	-3.97	QP	
10		19.0700	50.76	9.80	60.56	64.00	-3.44	AVG	
11		26.3460	60.01	9.94	69.95	74.00	-4.05	QP	
12	*	26.3460	51.05	9.94	60.99	64.00	-3.01	AVG	

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 CHARGER
Model Number : HGS-5500

5.5. 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.

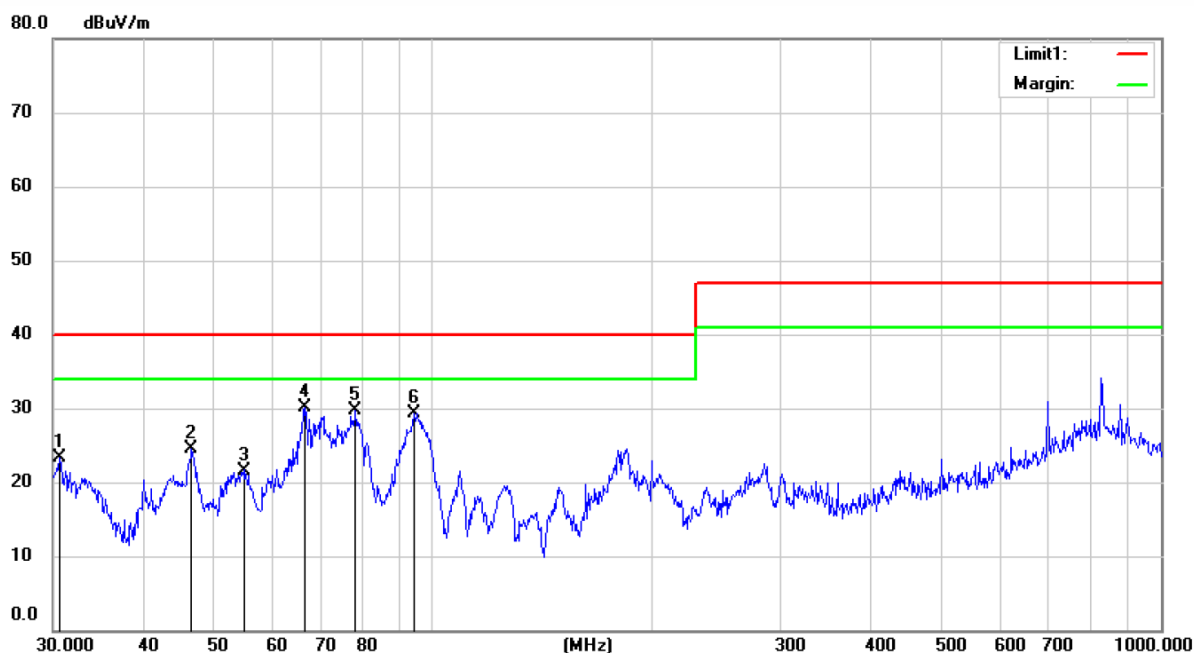
All the modes were tested and the worst mode (AC Charger Mode) refer to the following pages.

5.6. Measuring Results

PASS.

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

Please reference to the following pages.



Site 3m Chamber #3

Polarization: **Horizontal**

Temperature: 20.2 C

Limit: (RE)EN61000-6-3

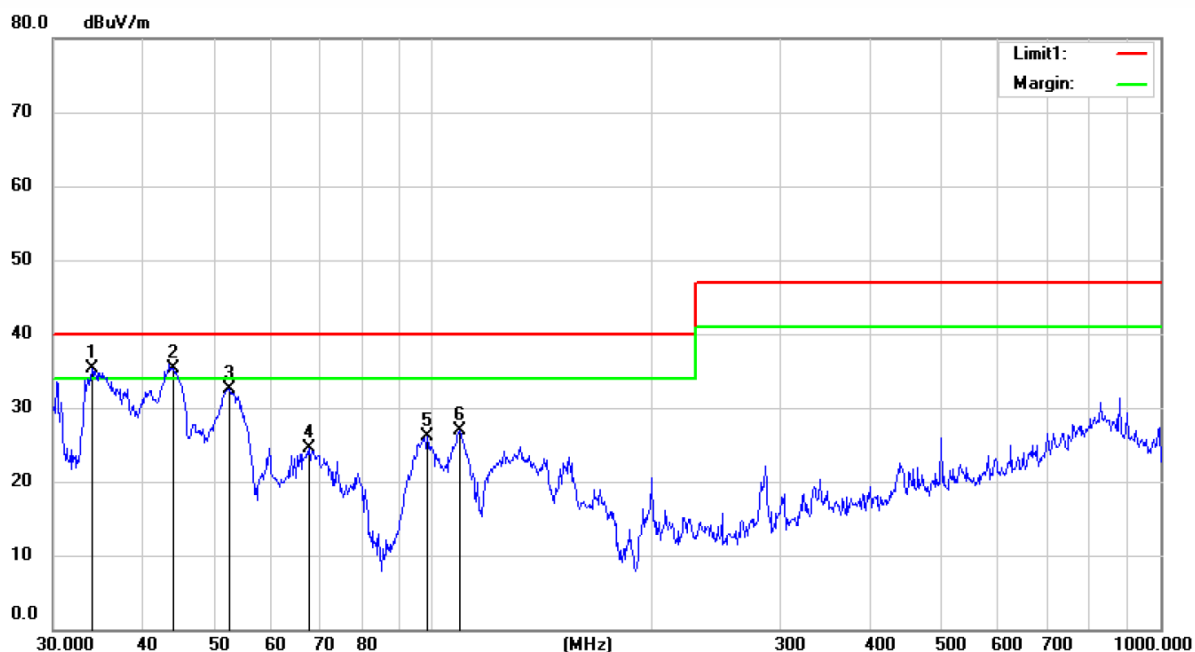
Power: AC 230V/50Hz

Humidity: 64 %

Mode: Line 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		30.6647	40.49	-17.16	23.33	40.00	-16.67	QP		
2		46.6255	39.71	-15.26	24.45	40.00	-15.55	QP		
3		54.8590	36.36	-14.76	21.60	40.00	-18.40	QP		
4	*	66.6448	45.28	-15.20	30.08	40.00	-9.92	QP		
5		78.3445	47.20	-17.52	29.68	40.00	-10.32	QP		
6		94.4284	46.90	-17.63	29.27	40.00	-10.73	QP		



Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 20.2 C

Limit: (RE)EN61000-6-3

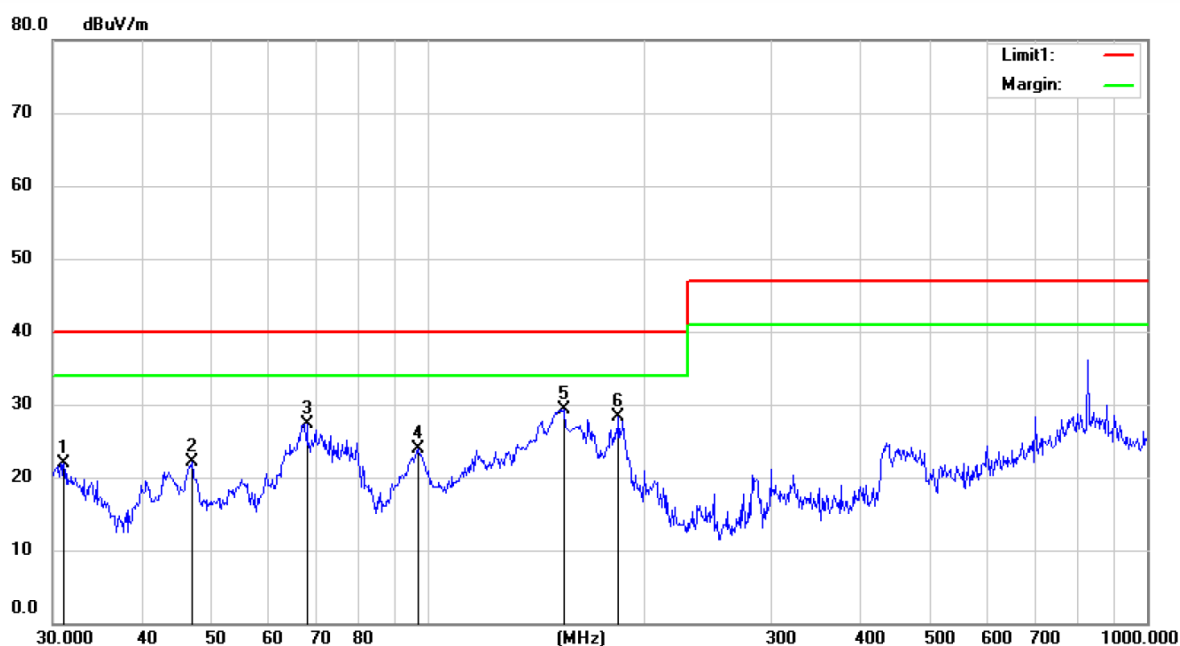
Power: AC 230V/50Hz

Humidity: 64 %

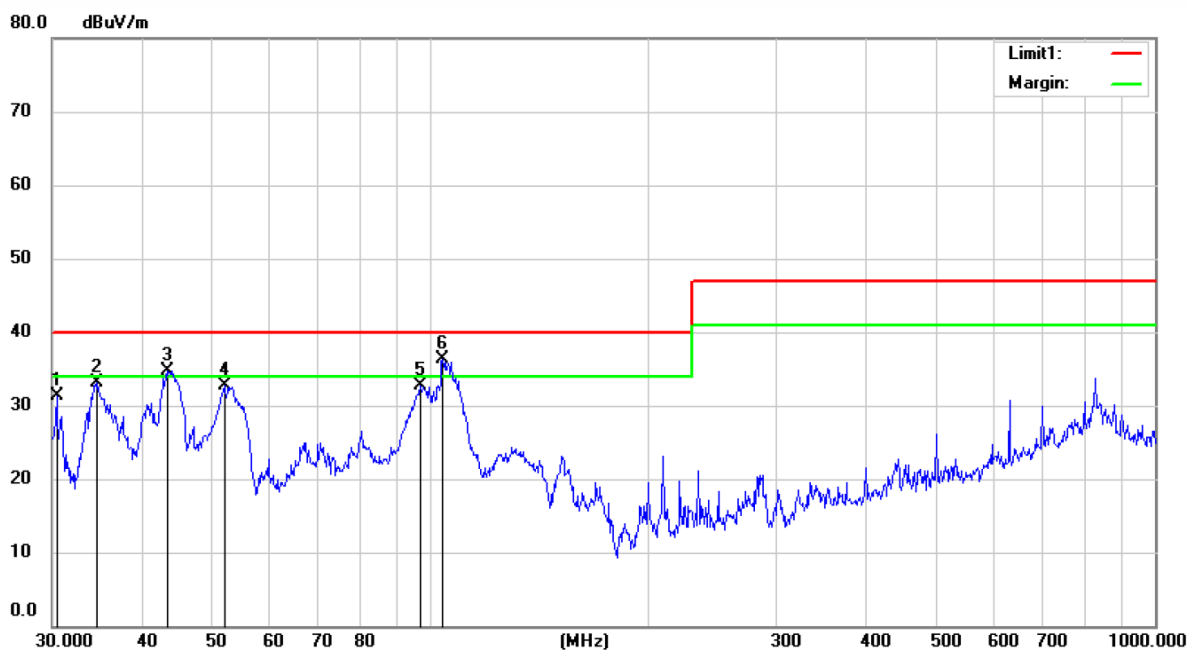
Mode:Line mode

Note:

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	!	33.9620	52.18	-16.84	35.34	40.00	-4.66	QP		
2	*	43.9080	50.84	-15.44	35.40	40.00	-4.60	QP		
3		52.4372	47.20	-14.66	32.54	40.00	-7.46	QP		
4		67.5270	39.97	-15.40	24.57	40.00	-15.43	QP		
5		98.1850	43.81	-17.62	26.19	40.00	-13.81	QP		
6		108.7900	44.46	-17.49	26.97	40.00	-13.03	QP		



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		31.0843	39.12	-17.15	21.97	40.00	-18.03	QP		
2		46.9948	37.48	-15.28	22.20	40.00	-17.80	QP		
3		67.7048	42.83	-15.44	27.39	40.00	-12.61	QP		
4		96.8173	41.55	-17.57	23.98	40.00	-16.02	QP		
5	*	154.3461	46.57	-17.28	29.29	40.00	-10.71	QP		
6		184.4090	45.45	-17.09	28.36	40.00	-11.64	QP		



Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 20.2 C

Limit: (RE)EN61000-6-3

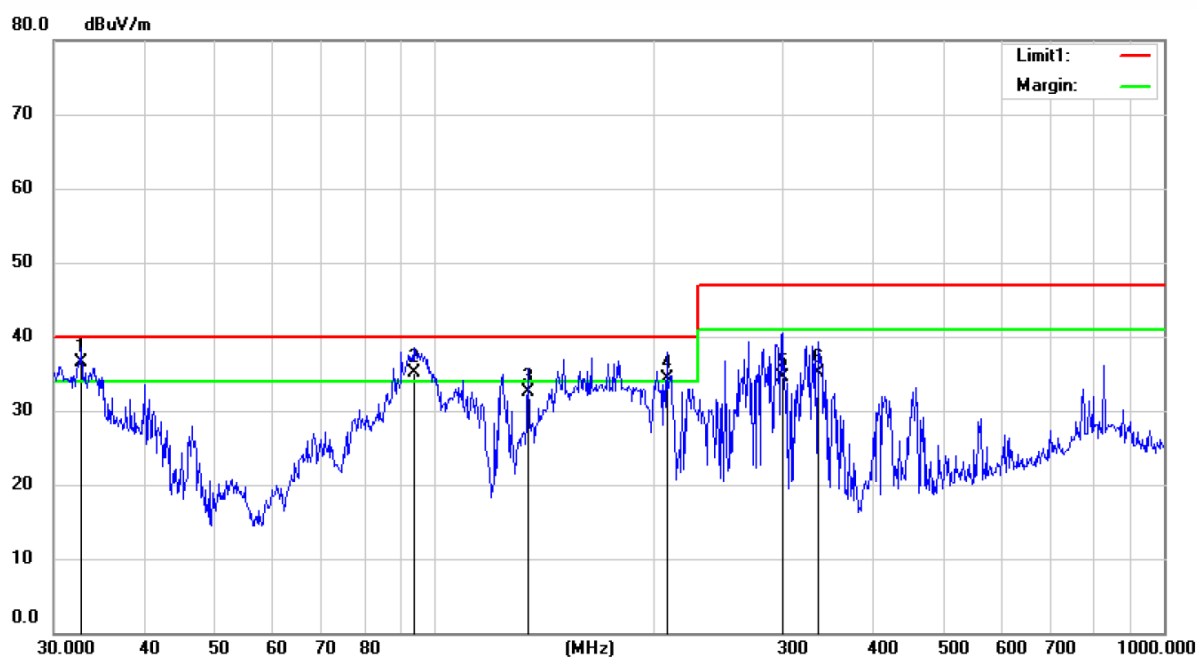
Power: DC 48V

Humidity: 64 %

Mode: Battery mode

Note:

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		30.4771	48.56	-17.17	31.39	40.00	-8.61	QP		
2		34.6690	49.71	-16.63	33.08	40.00	-6.92	QP		
3	!	43.2396	50.31	-15.51	34.80	40.00	-5.20	QP		
4		52.0251	47.28	-14.62	32.66	40.00	-7.34	QP		
5		97.0298	50.22	-17.58	32.64	40.00	-7.36	QP		
6	*	103.8055	53.60	-17.33	36.27	40.00	-3.73	QP		



Site 3m Chamber #3

Polarization: **Horizontal**

Temperature: 20.2 C

Limit: (RE)EN61000-6-3

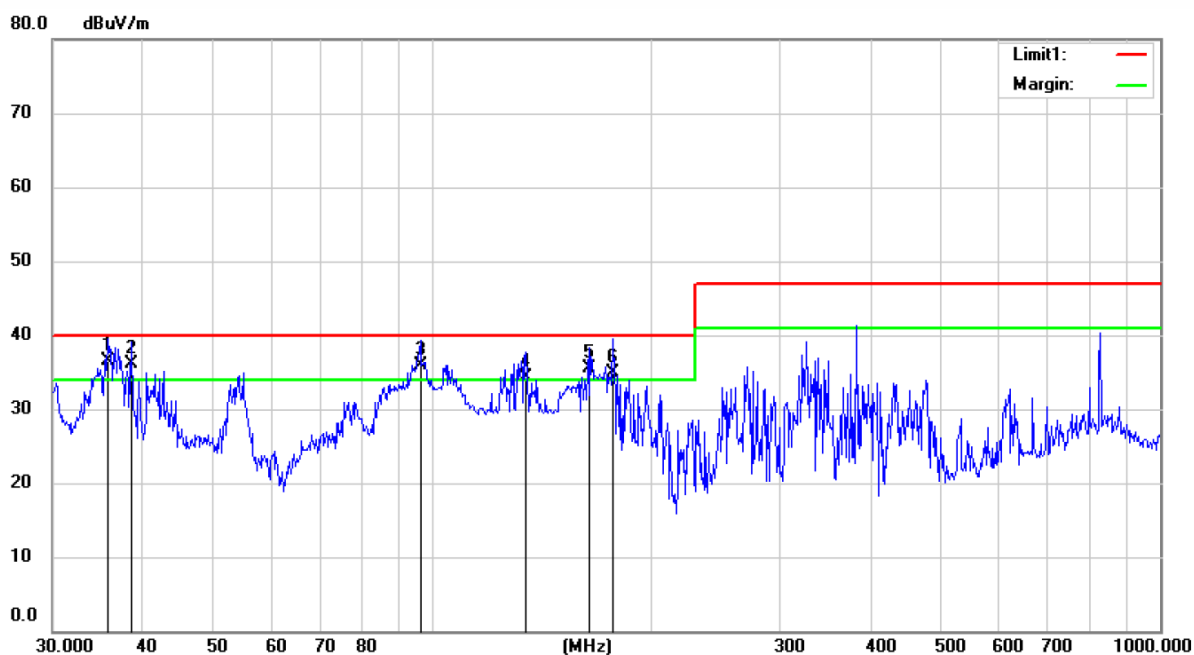
Power: DC 60V

Humidity: 64 %

Mode:PV mode

Note:

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	*	32.8348	53.48	-17.00	36.48	40.00	-3.52	QP		
2	!	93.6452	52.91	-17.77	35.14	40.00	-4.86	QP		
3		134.2056	49.92	-17.44	32.48	40.00	-7.52	QP		
4	!	208.4888	51.22	-16.94	34.28	40.00	-5.72	QP		
5		300.3672	47.41	-12.82	34.59	47.00	-12.41	QP		
6		336.6248	46.74	-11.58	35.16	47.00	-11.84	QP		



Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 20.2 C

Limit: (RE)EN61000-6-3

Power: DC 60V

Humidity: 64 %

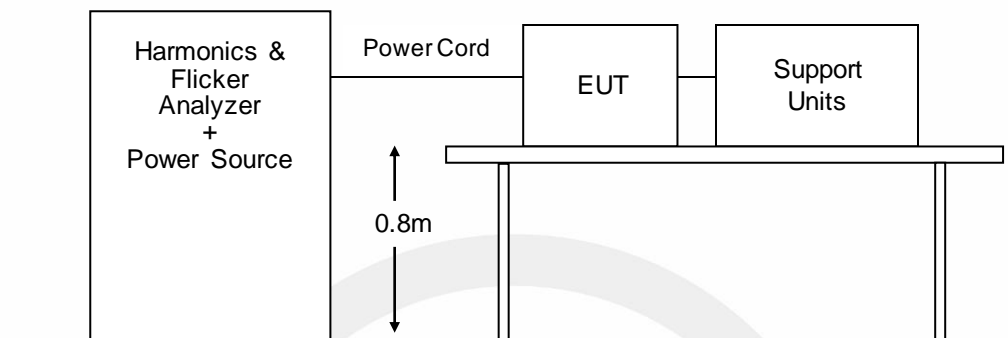
Mode:PV mode

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	35.8275	52.77	-16.28	36.49	40.00	-3.51	QP		
2	!	38.4810	52.10	-15.93	36.17	40.00	-3.83	QP		
3	!	96.3938	53.46	-17.57	35.89	40.00	-4.11	QP		
4	!	134.3234	51.69	-17.44	34.25	40.00	-5.75	QP		
5	!	163.8267	53.01	-17.56	35.45	40.00	-4.55	QP		
6	!	177.0430	52.16	-17.31	34.85	40.00	-5.15	QP		

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup



6.2. Measuring Standard

EN 61000-3-12:2011

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 (Line mode) and measure it.

6.4. Measuring Results

PASS.

Please reference to the following pages.

Harmonics – Per EN/IEC61000-3-12, Ed. 2.0(Run time)

EUT: INVERTER CHARGER (HGS-5500)

Tested by: LTX

Test category: Table:2, Rsce=33, Inter-Harm,

Test Margin: 100

Test date: 2021/9/11

Start time: 1:28:09

End time: 1:30:52

Test duration (min): 2.5

Data file name: WIN2106_H-000260.cts_data

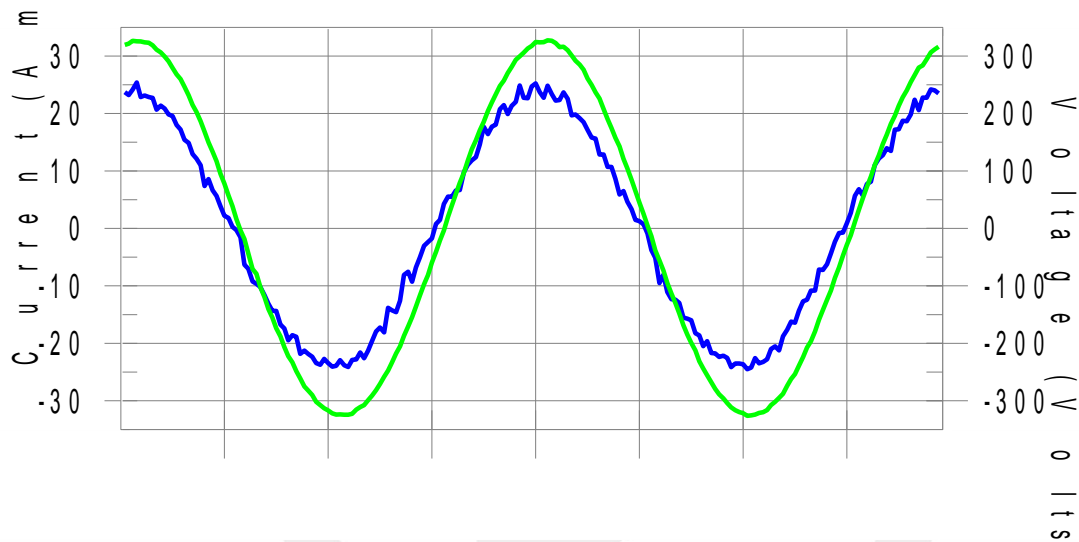
Comment: Line mode

Customer: GUANGDONG SUNRAY POWER CO., LTD

Test Result: Pass

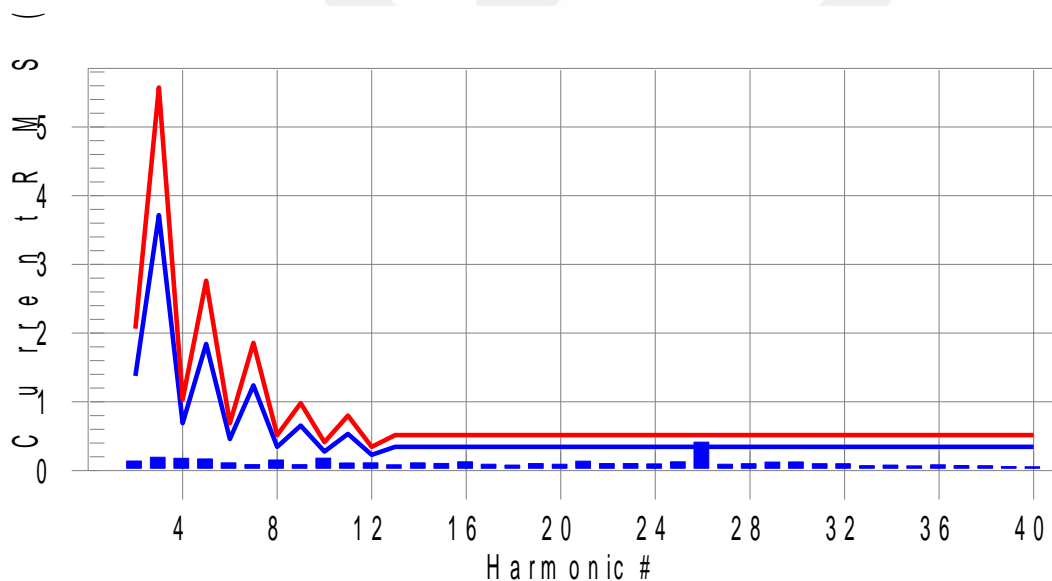
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class 2 limit line

European Limits



Test result: Pass Worst harmonics H10-47.2% of 150% limit, H10-66.1% of 100% limit.

Current Test Result Summary (Run time)

EUT: INVERTER CHARGER (HGS-5500) Tested by: LTX
 Test category: Table:2, Rsce=33, Inter-Harm, Test Margin: 100
 Test date: 2021/9/11 Start time: 1:28:09 End time: 1:30:52
 Test duration (min): 2.5 Data file name: WIN2106_H-000260.cts_data
 Comment: LINE MODE
 Customer: GUANGDONG SUNRAY POWER CO., LTD

Test Result: Pass Measured Iref: 17.206(Amps) Source: Normal
 THC/Iref (%): 2.9 Limit (%): 23.0 PWHC/Iref (%): 12.1 PWHC Limit (%): 23.0

Highest parameter values during test:

V_RMS (Volts): 230.38 Frequency (Hz): 50.00
 I_Peak (Amps): 30.431 I_RMS (Amps): 19.245
 I_Fund (Amps): 17.180(avg) Crest Factor: 1.646
 Power (Watts): 4409 Power Factor: 0.993

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.139	1.376	10.1	0.179	2.065	8.7	Pass
3	0.194	3.716	5.2	0.247	5.575	4.4	Pass
4	0.179	0.688	26.1	0.200	1.032	19.4	Pass
5	0.169	1.841	9.2	0.178	2.762	6.5	Pass
6	0.113	0.459	24.6	0.244	0.688	35.5	Pass
7	0.086	1.239	7.0	0.106	1.858	5.7	Pass
8	0.154	0.344	44.8	0.173	0.516	33.5	Pass
9	0.085	0.654	13.0	0.105	0.981	10.7	Pass
10	0.182	0.275	66.1	0.195	0.413	47.2	Pass
11	0.110	0.533	20.7	0.125	0.800	15.6	Pass
12	0.114	0.229	49.5	0.151	0.344	43.9	Pass
13	0.082	0.344	23.9	0.098	0.516	19.1	Pass
14	0.114	N/A	N/A	0.128	N/A	N/A	N/A
15	0.103	N/A	N/A	0.115	N/A	N/A	N/A
16	0.128	N/A	N/A	0.147	N/A	N/A	N/A
17	0.090	N/A	N/A	0.118	N/A	N/A	N/A
18	0.080	N/A	N/A	0.118	N/A	N/A	N/A
19	0.101	N/A	N/A	0.115	N/A	N/A	N/A
20	0.091	N/A	N/A	0.118	N/A	N/A	N/A
21	0.135	N/A	N/A	0.164	N/A	N/A	N/A
22	0.102	N/A	N/A	0.123	N/A	N/A	N/A
23	0.101	N/A	N/A	0.115	N/A	N/A	N/A
24	0.096	N/A	N/A	0.119	N/A	N/A	N/A
25	0.126	N/A	N/A	0.154	N/A	N/A	N/A
26	0.414	N/A	N/A	0.448	N/A	N/A	N/A
27	0.089	N/A	N/A	0.107	N/A	N/A	N/A
28	0.100	N/A	N/A	0.116	N/A	N/A	N/A
29	0.124	N/A	N/A	0.150	N/A	N/A	N/A
30	0.125	N/A	N/A	0.203	N/A	N/A	N/A
31	0.099	N/A	N/A	0.117	N/A	N/A	N/A
32	0.099	N/A	N/A	0.112	N/A	N/A	N/A
33	0.071	N/A	N/A	0.082	N/A	N/A	N/A
34	0.080	N/A	N/A	0.090	N/A	N/A	N/A
35	0.067	N/A	N/A	0.076	N/A	N/A	N/A
36	0.082	N/A	N/A	0.092	N/A	N/A	N/A
37	0.073	N/A	N/A	0.084	N/A	N/A	N/A
38	0.069	N/A	N/A	0.079	N/A	N/A	N/A
39	0.060	N/A	N/A	0.079	N/A	N/A	N/A
40	0.054	N/A	N/A	0.064	N/A	N/A	N/A

Voltage Source Verification Data (Run time)

EUT: INVERTER CHARGER (HGS-5500) Tested by: LTX
Test category: Table:2, Rsce=33, Inter-Harm, Test Margin: 100
Test date: 2021/9/11 Start time: 1:28:09 End time: 1:30:52
Test duration (min): 2.5 Data file name: WIN2106_H-000260.cts_data
Comment: LINE MODE
Customer: GUANGDONG SUNRAY POWER 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. 2.0 & IEC/EN61000-4-7 Ed. 2.1

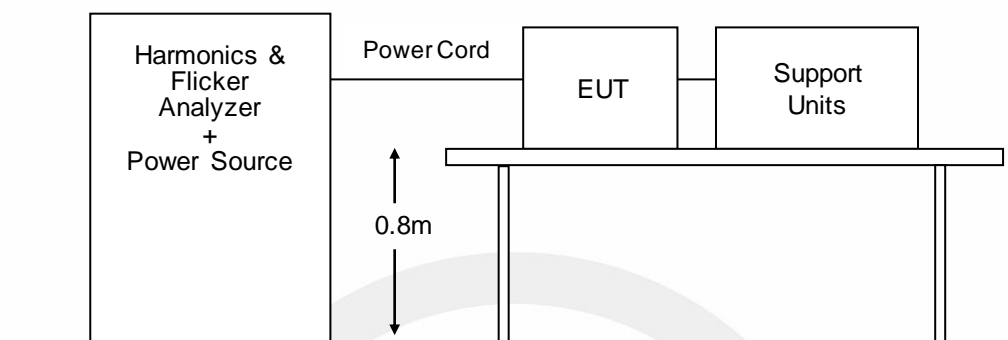
Highest parameter values during test:

Voltage (Vrms):	230.38	Frequency (Hz):	50.00
I_Peak (Amps):	30.431	I_RMS (Amps):	19.245
I_Fund (Amps):	17.180(avg)	Crest Factor:	1.646
Power (Watts):	4409	Power Factor:	0.993

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.097	0.921	10.52	OK
3	0.161	2.879	5.59	OK
4	0.040	0.921	4.35	OK
5	0.097	3.454	2.80	OK
6	0.038	0.921	4.11	OK
7	0.151	2.880	5.26	OK
8	0.054	0.921	5.84	OK
9	0.160	1.382	11.58	OK
10	0.053	0.921	5.74	OK
11	0.158	1.612	9.80	OK
12	0.083	0.691	12.06	OK
13	0.119	1.382	8.58	OK
14	0.103	0.691	14.89	OK
15	0.127	0.691	18.41	OK
16	0.124	0.691	17.96	OK
17	0.149	0.691	21.64	OK
18	0.121	0.691	17.45	OK
19	0.126	0.691	18.20	OK
20	0.136	0.691	19.70	OK
21	0.182	0.691	26.40	OK
22	0.149	0.691	21.62	OK
23	0.124	0.691	18.00	OK
24	0.140	0.691	20.30	OK
25	0.136	0.691	19.64	OK
26	0.189	0.691	27.35	OK
27	0.106	0.691	15.34	OK
28	0.162	0.691	23.48	OK
29	0.091	0.691	13.13	OK
30	0.148	0.691	21.37	OK
31	0.133	0.691	19.24	OK
32	0.166	0.691	24.00	OK
33	0.074	0.691	10.74	OK
34	0.138	0.691	19.97	OK
35	0.073	0.691	10.52	OK
36	0.157	0.691	22.70	OK
37	0.106	0.691	15.35	OK
38	0.131	0.691	18.95	OK
39	0.103	0.691	14.88	OK
40	0.118	0.691	17.14	OK

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Measuring Standard

EN IEC 61000-3-11:2019

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 (Line mode) and measure it.

7.4. Measuring Results

PASS.

Please see the attached page.

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

EUT: INVERTER CHARGER (HGS-5500)

Tested by: LTX

Test category: All parameters

Test Margin: 100

Test date: 2021/9/11

Start time: 1:32:49

End time: 1:43:17

Test duration (min): 10

Data file name: WIN2106_F-000261.cts_data

Comment: LINE MODE

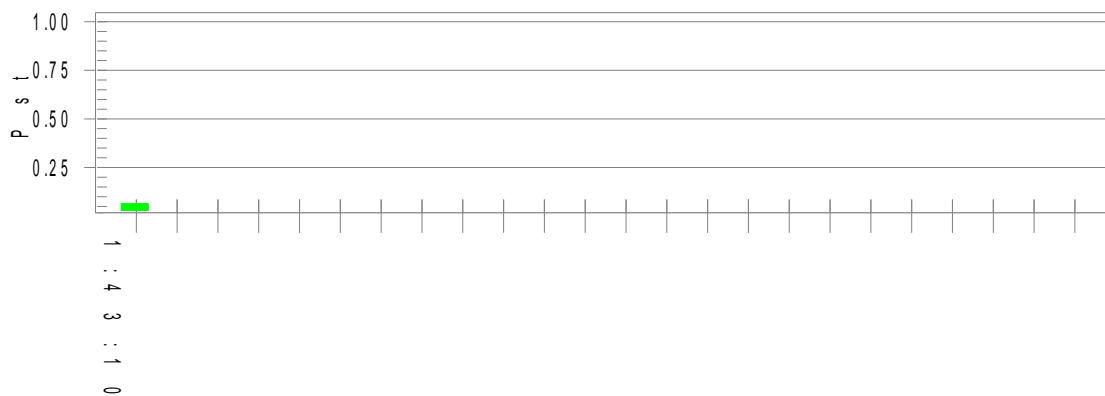
Customer: GUANGDONG SUNRAY POWER CO., LTD

Z-test = (0.400 + j 0.250 Ohm)

Test Result: Pass

Status: Test Completed

Pstj and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 230.81

T-max (mS): 0.0

Highest dc (%): 0.00

Highest dmax (%): 0.15

Highest Pst (10 min. period): 0.064

Highest Plt (2 hr. period): 0.028

Test limit (mS): 500.0

Test limit (%): 3.30

Test limit (%): 4.00

Test limit: 1.000

Test limit: 0.650

Pass

Pass

Pass

Pass

Pass

Calculated dmax(%): 0.150

Calculated dc(%): 0.000

Calculated Pst : 0.064

Calculated Plt : 0.028

The maximum permissible system impedance Zsys:

Z = 24.772 Ohm + j 15.482 Ohm

(24.772 Ohm + 49282 uH)

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:

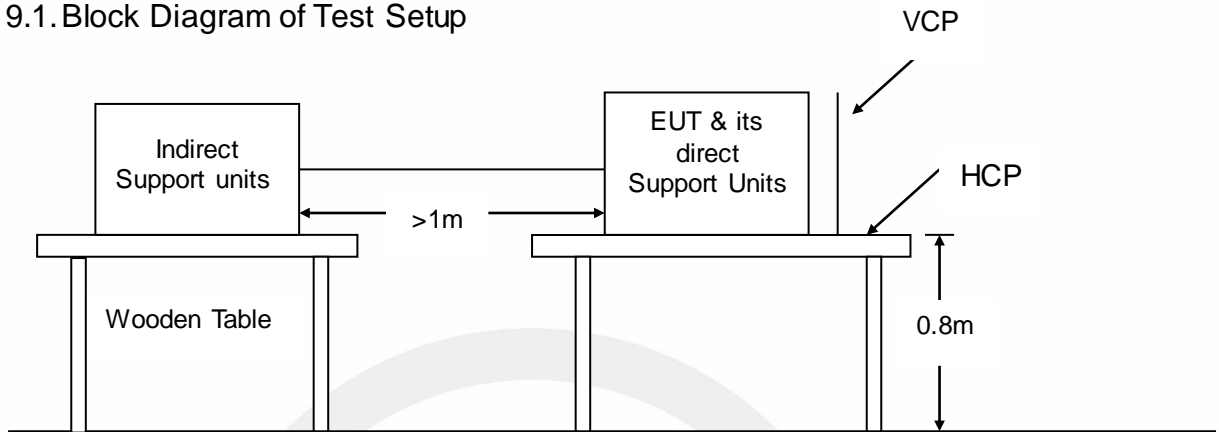
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance.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

Ground Reference Plane

EN IEC 61000-6-1: 2019

(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 (Line mode, Battery mode, PV 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.

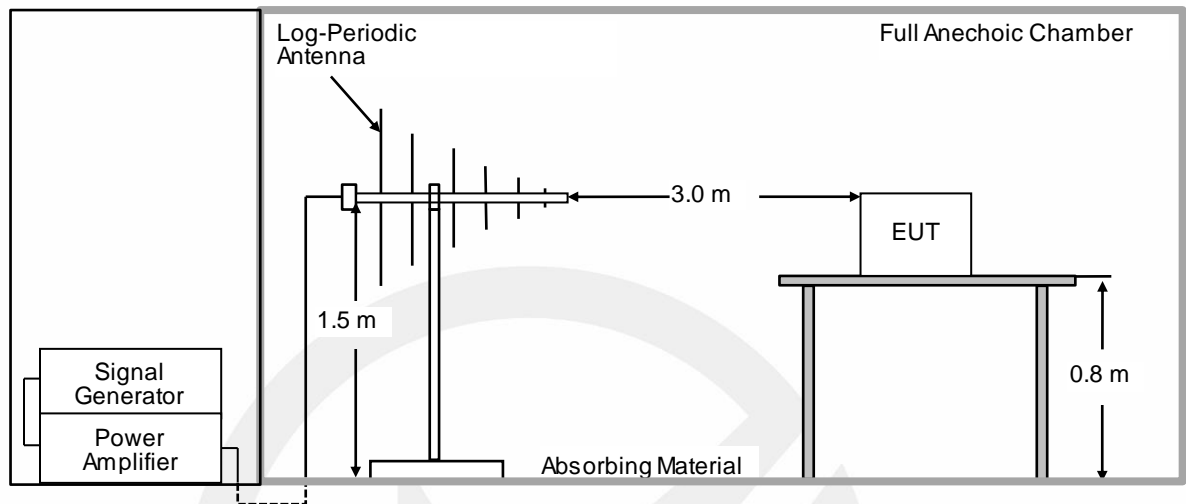
Electrostatic Discharge Test Result

EMTEK (SHENZHEN) CO., LTD.

Applicant	: GUANGDONG SUNRAY POWER CO., LTD		
EUT	: INVERTER CHARGER	Test Date	: 2021-09-10
M/N	: HGS-5500	Temperature	: 25.5°C
Power Supply	: AC 230V/50Hz, DC 48V, DC 60V	Humidity	: 45%
Air discharge	: $\pm 8.0\text{kV}$	Test mode	: Line mode, Battery mode, PV mode
Contact discharge:	$\pm 4.0\text{kV}$	Criterion	: B
Atmospheric Pressure: 101kPa			
Location	Kind A-Air Discharge C-Contact Discharge	Result	
Screen/Slot/Lan	C	A	
Metal/ Screw/Lan	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 IEC 61000-6-1: 2019
(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 (Line mode, Battery mode, PV 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

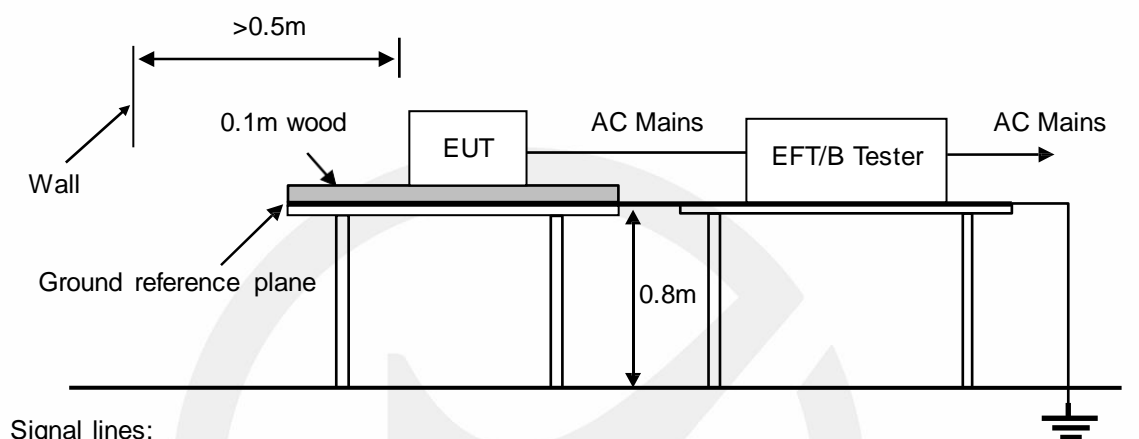
EMTEK (SHENZHEN) CO., LTD.

Applicant : GUANGDONG SUNRAY POWER CO., LTD				
EUT : INVERTER CHARGER		Test Date : 2021-09-10		
M/N : HGS-5500		Temperature : 19.1°C		
Field Strength : 3 V/m		Humidity : 60%		
Power Supply : AC 230V/50Hz, DC 48V, DC 60V		Criterion : A		
Test Mode : Line mode, Battery mode, PV mode		Frequency Range : 80 MHz to 1000 MHz 1400 MHz to 6000 MHz		
Atmospheric Pressure: 101kPa				
Modulation: <input type="checkbox"/> None <input type="checkbox"/>		Pulse <input type="checkbox"/> <input checked="" type="checkbox"/> AM 1kHz 80%		
Frequency Rang 1: 80~ 1000MHz		Frequency Rang 2: 1400~ 6000 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:				

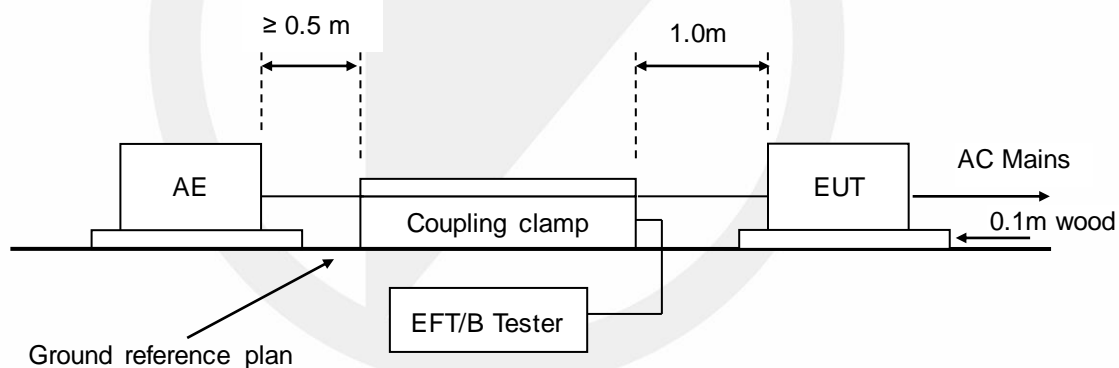
11. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

11.1. Block Diagram of Test Setup

AC Lines:



Signal lines:



11.2. Test Standard

EN IEC 61000-6-1: 2019
(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 (Line 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.

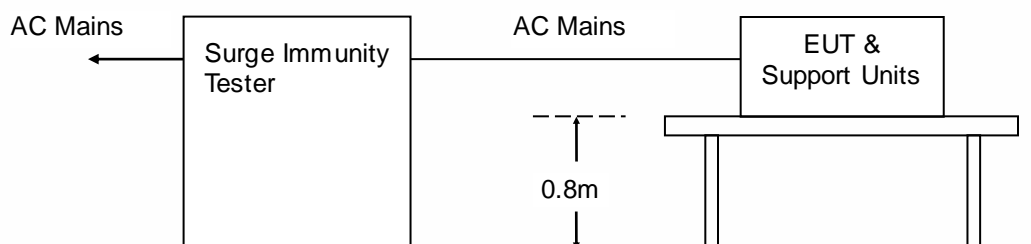
Electrical Fast Transient/Burst Test Results

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>GUANGDONG SUNRAY POWER CO., LTD</u> EUT : <u>INVERTER CHARGER</u> M/N : <u>HGS-5500</u> Input Voltage: <u>AC 230V/50Hz</u> Test Date : <u>2020-09-10</u> Temperature: <u>24.2°C</u> Humidity : <u>45%</u> Atmospheric Pressure : <u>101kPa</u> Criterion : B			
Operation Mode: AC Charger Mode			
Line : <input checked="" type="checkbox"/> AC Mains		Line : <input checked="" type="checkbox"/> Signal <input type="checkbox"/> I/O Cable	
Coupling : <input checked="" type="checkbox"/> Direct		Coupling : <input checked="" 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	1kV	A	A
DC Line			
Note:			

12. SURGE IMMUNITY TEST

12.1. Block Diagram of Test Setup



12.2. Test Standar

EN IEC 61000-6-1: 2019

(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 (Line 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 (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 : GUANGDONG SUNRAY POWER CO., LTD

EUT: INVERTER CHARGER

M/N: HGS-5500

Power Supply: AC 230V/50Hz

Test Mode: Line mode

Test Date: 2021-09-10

Temperature: 24.2℃

Humidity: 45%

Criterion: B

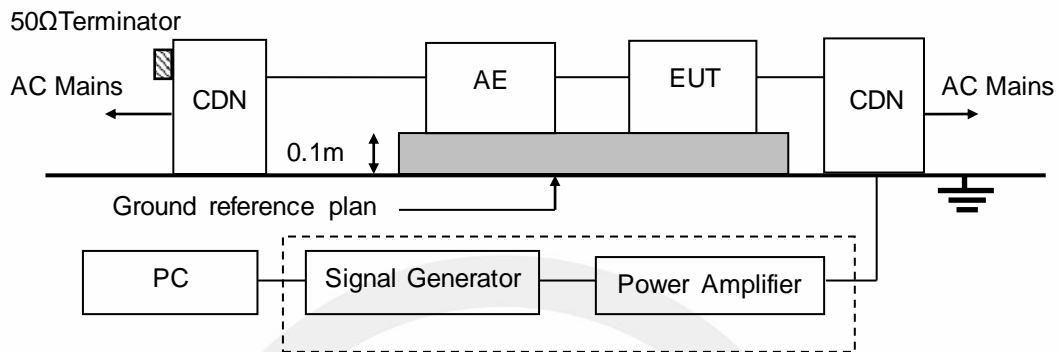
Atmospheric Pressure : 101kPa

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

Remark:

13. INJECTED CURRENTS SUSCEPTIBILITY TEST

13.1. Block Diagram of Test Setup



13.2. Test Standard

EN IEC 61000-6-1: 2019
(IEC 61000-4-6:2013, Severity Level: Level 3, 10V (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 (Line 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.

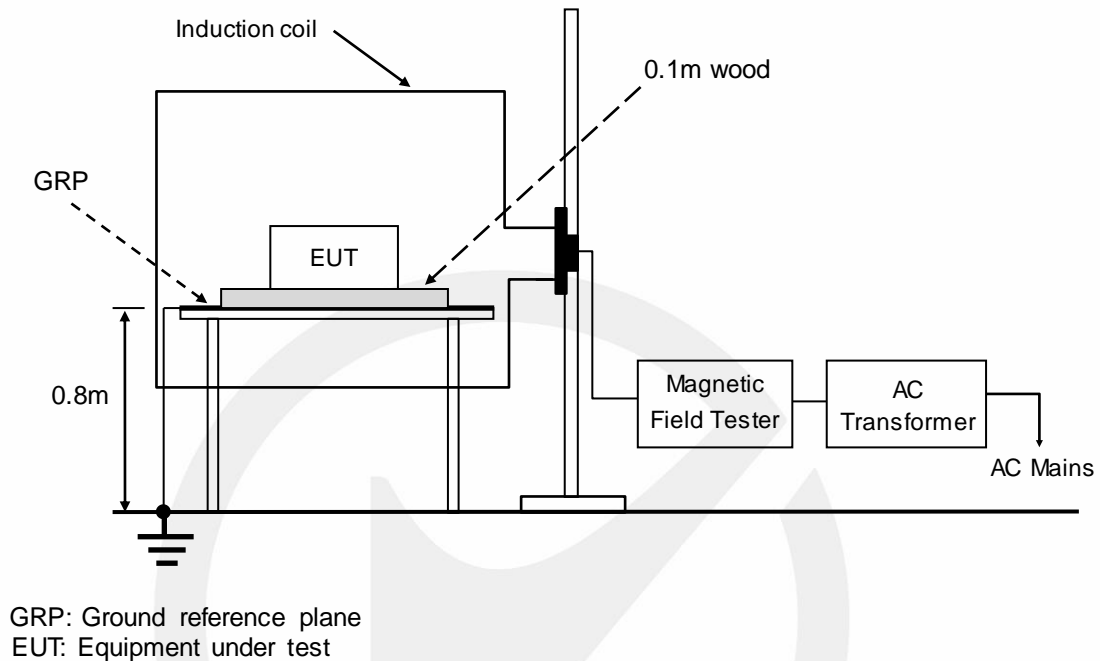
Injected Currents Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

Applicant : <u>GUANGDONG SUNRAY POWER CO., LTD</u>				
EUT : <u>INVERTER CHARGER</u>		Test Date: <u>2021-09-10</u>		
M/N : <u>HGS-5500</u>		Temperature : <u>24.2°C</u>		
Power Supply : <u>AC 230V/50Hz</u>		Humidity : <u>45%</u>		
Test Engineer : <u>LTX</u>		Atmospheric Pressure : <u>101kPa</u>		
Test Mode: <u>Line mode</u>				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	3V	A	A
0.15 ~ 80	Signal Line	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 type="checkbox"/> CDN-M3 (SWITZERLAND EMTEST) <input checked="" type="checkbox"/> CDN-M332 (TESEQ) <input checked="" type="checkbox"/> Injection Clamp (EMTEST F-2031-23MM)		Note:		

14. MAGNETIC FIELD SUSCEPTIBILITY TEST

14.1. Block Diagram of Test Setup



14.2. Test Standard

EN IEC 61000-6-1: 2019
(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 (Line mode, Battery mode, PV 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*0.1m (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.



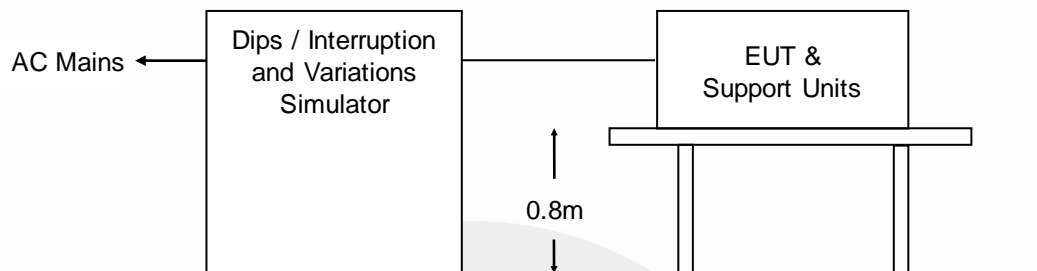
Magnetic Field Immunity Test Result

EMTEK (SHENZHEN) CO., LTD.

Standard: <input checked="" type="checkbox"/> IEC 61000-4-8	Result: <input checked="" type="checkbox"/> PASS / <input type="checkbox"/> FAIL			
<p>Applicant : <u>GUANGDONG SUNRAY POWER CO., LTD</u></p> <p>EUT : <u>INVERTER CHARGER</u></p> <p>M/N : <u>HGS-5500</u></p> <p>Input Voltage : <u>AC 230V/50Hz</u></p> <p>Atmospheric Pressure : <u>101kPa</u></p> <p>Date of Test : <u>2020-09-10</u> Test Engineer: <u>LTX</u></p> <p>Ambient Condition : Temp : <u>24.2°C</u> Humid: <u>45%</u></p> <p>Criterion: A</p>				
Operation Mode: Line mode, Battery mode, PV mode				
Test Level (A/m)	Testing Duration	Coil Orientation	Criterion	Result
3A	5 mins	X	A	A
3A	5 mins	Y	A	A
3A	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 IEC 61000-6-1: 2019 (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
70	30	1
0	100	5
		10
		25
		50
		*

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 (Line 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 : GUANGDONG SUNRAY POWER CO., LTD

EUT : INVERTER CHARGER

M/N : HGS-5500

Power Supply : AC 230V/50Hz

Test Date : 2020-09-10

Temperature : 24.2°C

Humidity : 45%

Test Mode: Line mode

Atmospheric Pressure : 101kPa

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

Note: Dips to 0%, Duration 250P, EUT stopped operation, but it can be resumed by itself after test.

16. PHOTOGRAPHS

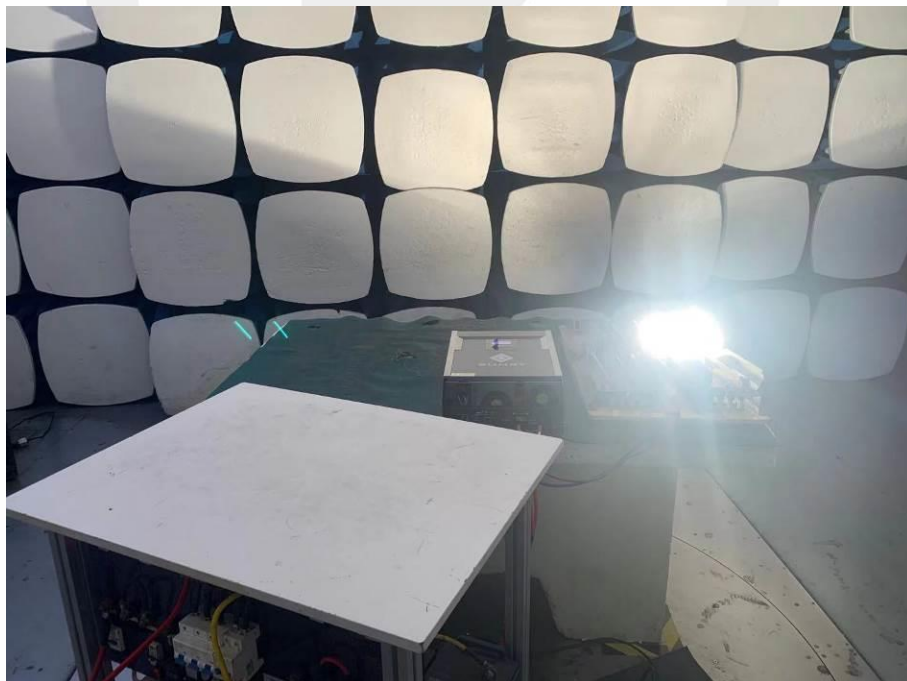
16.1. Photos of Conducted Emission Measurement



16.2.Photos of Asymmetric Mode Conducted Emissions at Wired Network Ports



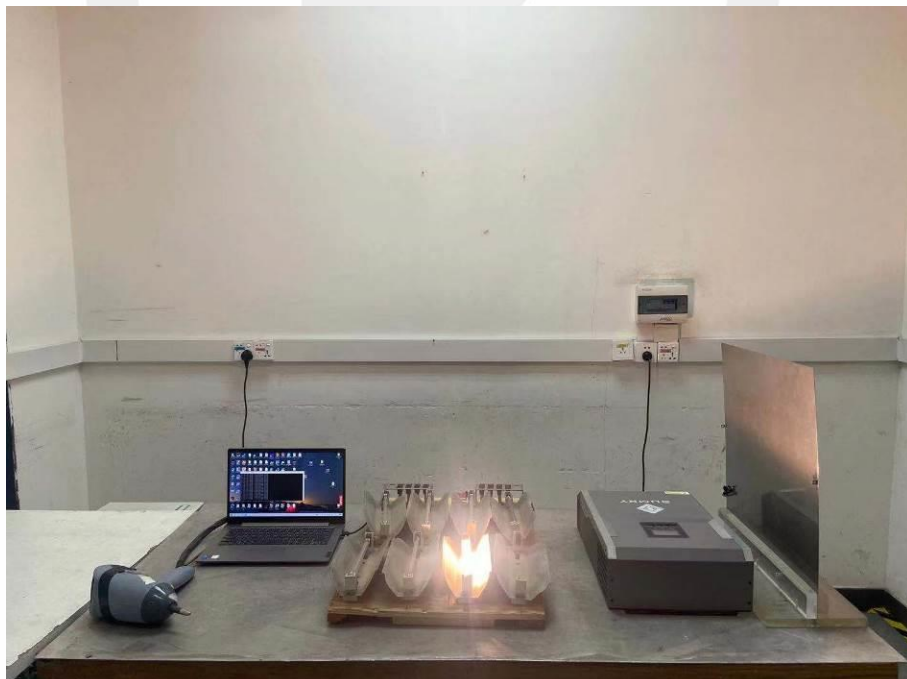
16.3. Photos of Radiation Emission Measurement



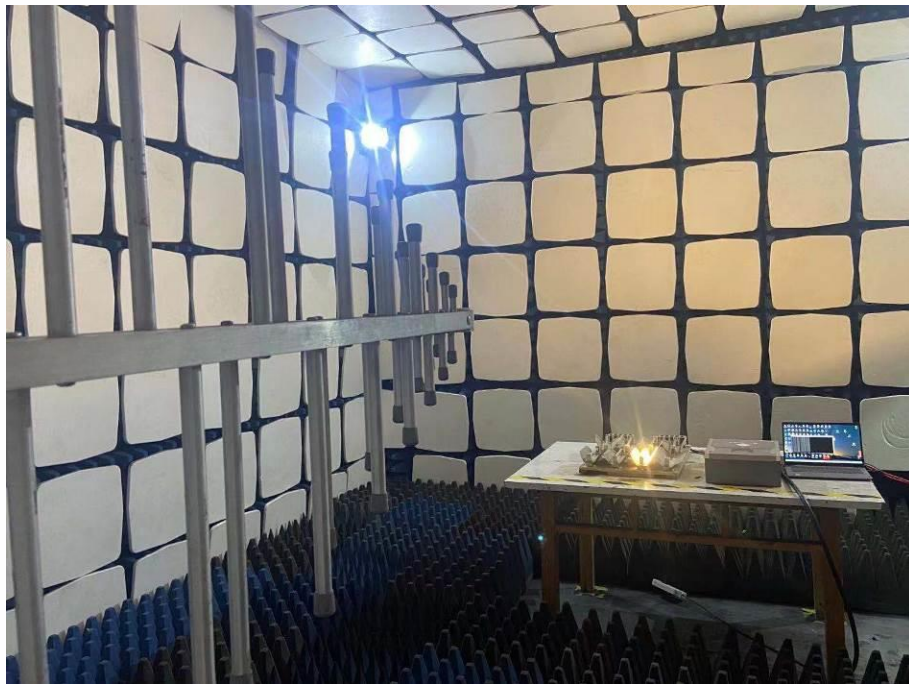
16.4.Photo of Harmonic / Flicker Measurement



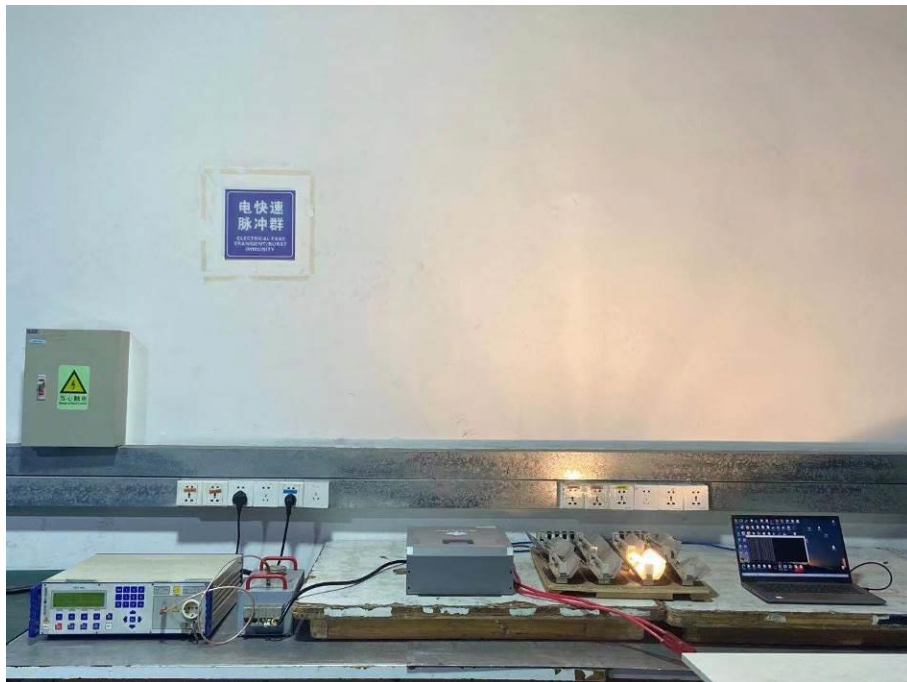
16.5.Photo of Electrostatic Discharge Test



16.6.Photo of RF Field Strength Susceptibility Test



16.7.Photo of Electrical Fast Transient / Burst Test



16.8.Photo of Surge Test



16.9.Photo of Injected Currents Susceptibility Test



16.10.Photo of Magnetic Field Immunity Test



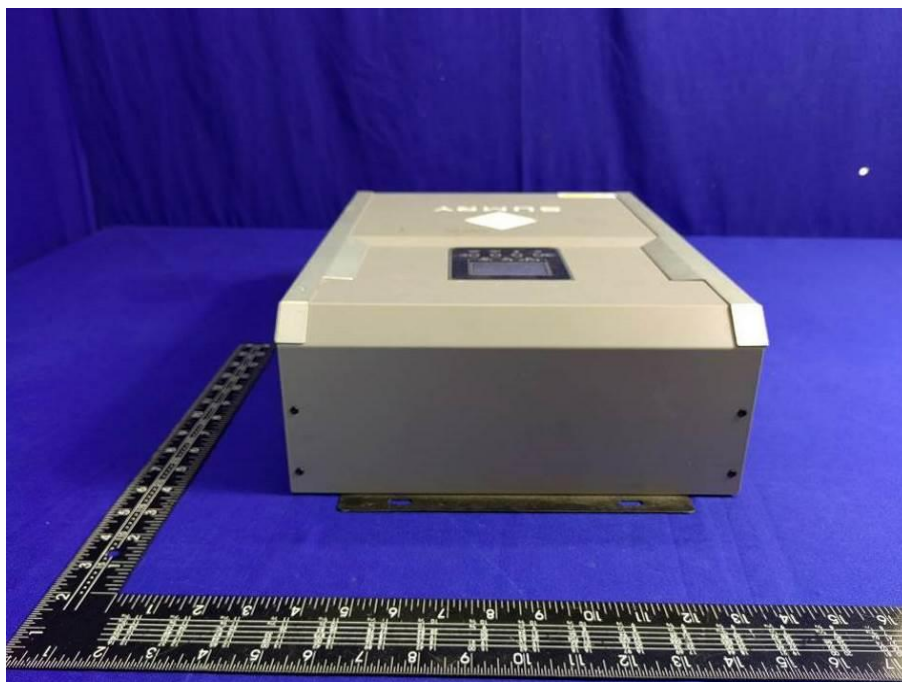
16.11.Photo of Voltage Dips and Interruption Immunity Test





APPENDIX (Photos of EUT)





*** End of Report ***

Statement

- 1 . This report is invalid without the signature of the authorized approver and "special seal for testing".
- 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.
- 5 . The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards or regulations, EMTEK shall not assume any responsibility.
- 6 . Objections shall be raised within 20 days from the date receiving the report.