



EMC TEST REPORT

For

Dongguan Lia New Energy Manufacturing Co., Ltd.

LiFePO4 Battery Module

Test Model: AL-Horizontal 30

Additional Model No.: Please Refer To Page 9

Prepared for : Dongguan Lia New Energy Manufacturing Co., Ltd.
6th Floor, Building B, Guancheng Sanliang Industrial
Address : Zone, Xingguang Village, Huangjiang Town, Dongguan,
China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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: June 16, 2026

Number of tested samples : 1
Serial number : Prototype
Date of Test : June 16, 2026-June 23, 2026
Date of Report : June 25, 2026



**TEST REPORT****Report No.** : LCSA05126065E**Date of Issue** : June 25, 2026**Testing Laboratory Name** : Shenzhen LCS Compliance Testing Laboratory Ltd.**Address** : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China**Testing Location/ Procedure** : Full application of Harmonised standards ■
Partial application of Harmonised standards □
Other standard testing method □**Applicant's Name** : Dongguan Lia New Energy Manufacturing Co., Ltd.**Address** : 6th Floor, Building B, Guancheng Sanliang Industrial Zone, Xingguang Village, Huangjiang Town, Dongguan, China**Test Specification****Standard** : EN IEC 61000-6-3:2021
EN IEC 61000-6-1:2019**Test Report Form No.** : LCSEMC-1.0**TRF Originator** : Shenzhen LCS Compliance Testing Laboratory Ltd.**Master TRF** : Dated 2011-03**Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.**

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Test Item Description : LiFePO4 Battery Module**Trade Mark** : N/A**Test Model** : AL-Horizontal 30**Result** : Pass**Compiled by:****Supervised by:****Approved by:**

Coco Song / File Administrator

Jelly Li / Technique principal

Gavin Liang / Manager



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TEST REPORT

Test Report No.: LCSA05126065EJune 25, 2026
Date of issue**Test Model..... : AL-Horizontal 30****EUT..... : LiFePO4 Battery Module****Applicant..... : Dongguan Lia New Energy Manufacturing Co., Ltd.****Address..... : 6th Floor, Building B, Guancheng Sanliang Industrial Zone,
Xingguang Village, Huangjiang Town, Dongguan, China****Telephone..... : /****Fax..... : /****Manufacturer..... : Dongguan Lia New Energy Manufacturing Co., Ltd.****Address..... : 6th Floor, Building B, Guancheng Sanliang Industrial Zone,
Xingguang Village, Huangjiang Town, Dongguan, China****Telephone..... : /****Fax..... : /****Factory..... : Dongguan Lia New Energy Manufacturing Co., Ltd.****Address..... : 6th Floor, Building B, Guancheng Sanliang Industrial Zone,
Xingguang Village, Huangjiang Town, Dongguan, China****Telephone..... : /****Fax..... : /****Test Result****Pass**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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Revision History

Report Version	Issue Date	Revision Content	Revised By
000	June 25, 2026	Initial Issue	/





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1. TEST STANDARDS

EN IEC 61000-6-3:2021:Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments

EN IEC 61000-6-1:2019:Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments





2. SUMMARY OF STANDARDS AND RESULTS

2.1 Description of Standards and Results

EMISSION (EMI)			
Description of Test Item	Standard	Result	Memo
AC Power Port Conducted Emission	EN IEC 61000-6-3:2021	PASS	/
DC Power Port Conducted Emission	EN IEC 61000-6-3:2021	PASS	/
Radiated Emissions(30-1000MHz)	EN IEC 61000-6-3:2021	PASS	/
Harmonic Current Emissions Test	EN IEC 61000-6-3:2021	PASS	/
Voltage Fluctuations& Flicker Test	EN IEC 61000-6-3:2021	PASS	/
IMMUNITY(EMS)			
Description of Test Item	Standard	Result	Memo
Electrostatic Discharge Test	EN IEC 61000-6-1:2019	PASS	/
Continuous Radio Frequency Disturbances Test	EN IEC 61000-6-1:2019	PASS	/
Electrical Fast Transients(EFT) Test	EN IEC 61000-6-1:2019	PASS	/
Surge Test	EN IEC 61000-6-1:2019	PASS	/
Continuous Conducted Disturbances Test	EN IEC 61000-6-1:2019	PASS	/
Power-Frequency Magnetic Fields	EN IEC 61000-6-1:2019	N/A	Applicable only to equipment containing devices intrinsically susceptible to magnetic fields
Voltage Dips and Interruptions Test	EN IEC 61000-6-1:2019	PASS	/





2.2 Description of Test Modes

No	Title	Description
Mode 1	Working(AC input to Battery charging & AC OFF Grid)(AC 230V/50Hz)	/
Mode 2	Working(PV input to Battery charging)(DC 500V)	/
Mode 3	Working(PV input to AC OFF Grid)(DC 500V)	/
Mode 4	Working(Battery discharge to AC OFF Grid)(DC 51.2V)	/

2.3 Description of Performance Criteria

Performance criteria A

The EUT 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 EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria B

The EUT 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 EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but 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 equipment if used as intended.

Performance criteria C

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





3. GENERAL INFORMATION

3.1 Description of Device (EUT)

EUT	: LiFePO4 Battery Module
Test Model	: AL-Horizontal 30 Rated Voltage: 51.2V Nominal Capacity: 300AH Battery Energy: 15360Wh Rated Output Power: 15360Wh Inverter Mode: Rated Power: 12000VA/12000W DC Input:48VDC,220A AC Output: 230VAC,50/60Hz,52A AC Charger Mode: AC Input: 230VAC,50/60Hz,52A
Power Supply	: DC Output: 50VDC Max.Charge Current(AC):160A, Default 60A Max.Charge Current(PV+AC):160A AC Output: 230VAC,50/60Hz,52A Solar Charger Mode: Max.PV Array Power: 7500W*2 Min.Solar Voltage: 80VDC Max.Solar Voltage(VOC):500VDC Max.Solar Current: 22.5A*2 Max.MPPT Charge Current: 160A
Highest Internal Frequency	: ≤108MHz
Additional Model	: AL-Horizontal 10, AL-Horizontal 15, AL-Horizontal 20, AL-Horizontal 40, AL-Horizontal 45, AL-Horizontal 50, AL-Horizontal 60, AL-Horizontal 75, AL-Horizontal 90
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested.

3.2 Support equipment List

Equipment	Manufacturer	Model	Serial Number	Description
/	/	/	/	/

3.3 Description of Test Facility

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

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.



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CAB identifier is CN0071.

CNAS Registration Number is L4595.





3.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emission (150kHz to 30MHz)	± 2.35 dB
Radiated Emission (30MHz to 1000MHz)	± 3.48 dB
Harmonic current emission Voltage Fluctuations & Flicker	$\pm 0.510\%$
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	





4. MEASURING DEVICES AND TEST EQUIPMENT

AC Power Port Conducted Emission

Equipment	Manufacturer	Model No	Serial No.	Due Date
EMI Test Receiver	R&S	ESR3	102312	2026-12-21
Artificial Mains	R&S	ENV216	101288	2027-05-05
Pulse Limiter	R&S	ESH3-Z2	102750-NB	2027-05-05
EMI Test Software	Farad	EZ	/	/

DC Power Port Conducted Emission

Equipment	Manufacturer	Model No	Serial No.	Due Date
EMI Test Receiver	R&S	ESR3	102312	2026-12-21
Artificial Mains	R&S	ENV216	101288	2027-05-05
Pulse Limiter	R&S	ESH3-Z2	102750-NB	2027-05-05
EMI Test Software	Farad	EZ	/	/

Radiated Emissions(30-1000MHz)

Equipment	Manufacturer	Model No	Serial No.	Due Date
EMI Test Software	Farad	EZ	/	/
EMI Test Software	AUDIX	E3	/	/
By-log Antenna	SchwarzBECK	VULB9163	01565	2027-07-12
Horn Antenna	ETS	3117	EABF-018	2027-04-10
EMI Test Receiver	R&S	ESR3	102311	2027-05-05
Broadband Preamplifier	/	BBV9745	00317	2026-11-06
EMI Test Receiver	R&S	ESC17	101173	2026-10-10
By-log Antenna	SchwarzBECK	VULB9163	01143	2027-07-19

Harmonic Current Emissions Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD1411116	2026-12-21
HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFM-4000	P624486CD1411124	2026-12-21

Voltage Fluctuations& Flicker Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD1411116	2026-12-21
HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFM-4000	P624486CD1411124	2026-12-21



**Electrostatic Discharge Test**

Equipment	Manufacturer	Model No	Serial No.	Due Date
ESD Simulator	emtest	ESD NX30.1	111969	2027-05-18

Continuous Radio Frequency Disturbances Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
Vector signal generator	Agilent	N5181A	MY50143169	2026-09-26
RF POWER AMPLIFIER	OPHIR	5225R	1052	2027-05-05
RF POWER AMPLIFIER	YEAH TECH	YEAH TECH	25090001	2026-09-26
Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2026-07-13
Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2027-07-19
RS Electric field probe	narda	EP 601	611WX80208	2027-05-05
Power Sensor	Agilent	E9301H	MY41495234	2026-09-26
Power Sensor	Agilent	E9301H	MY41495616	2026-09-26
Power Meter	Agilent	E4419B	MY45104493	2026-09-26

Electrical Fast Transients(EFT) Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2027-05-05

Surge Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2027-05-05

Continuous Conducted Disturbances Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
Simulator	Frankonia	CIT-10/75	A126A1195	2027-05-05
CDN	Frankonia	CDN-M2+M3	A2210177	2027-05-05
6dB Attenuator	/	DAM25W	1172040	2027-05-05

Voltage Dips and Interruptions Test

Equipment	Manufacturer	Model No	Serial No.	Due Date
Three phase power supply fault simulator	HTEC	HPFS 2003P	234711	2027-01-05
Programmable AC fault power supply	HTEC	HV3P200T	234710	2027-01-05





5. EMISSION TEST RESULTS (EMI)

5.1 AC Power Port Conducted Emission

5.1.1 Limits

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150 kHz ~ 500 kHz	66 ~ 56*	56 ~ 46*
500 kHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50

Notes:

1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

5.1.2 Test procedure

- (1) The EUT placement requires reference to the test block diagram and is placed on a non-metallic table.
- (2) Setup the EUT and assistant equipment as shown above block diagram and equipment list.
- (3) The EUT's power was connected to the power mains through a line impedance stabilization network (L.I.S.N). which this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted disturbance. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN IEC 61000-6-3:2021 on conducted disturbance emission test.
- (4) The bandwidth of test receiver is set at 9 kHz.
- (5) The frequency range from 150 kHz to 30 MHz is checked.
- (6)Note: Pre-scan all modes and recorded the worst case results in this report.

Margin= Reading level + Correct factor – Limit

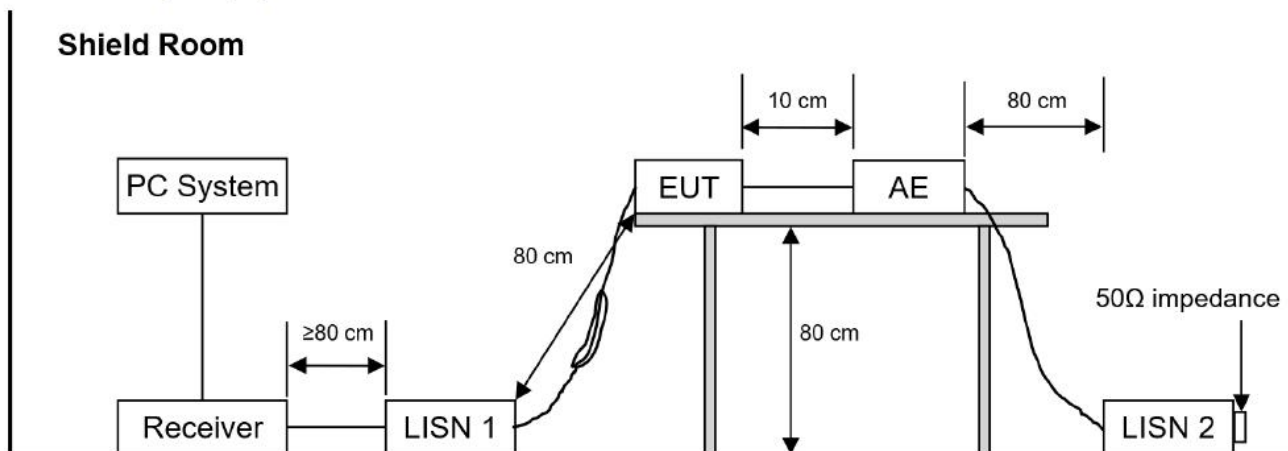
Correct Factor=Lish Factor+Cable Factor+Insertion loss of Pulse Limitter



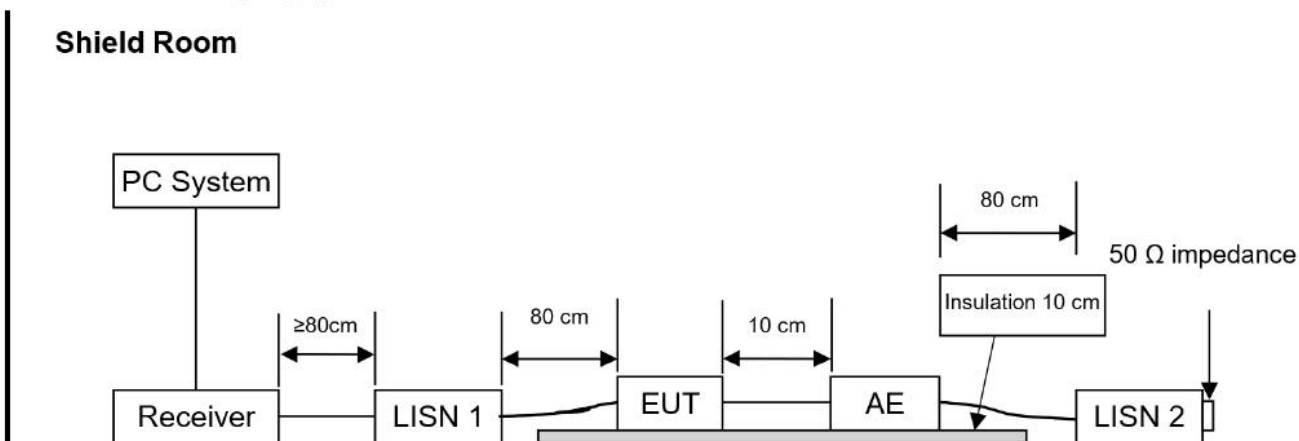


5.1.3 Test Setup Diagram

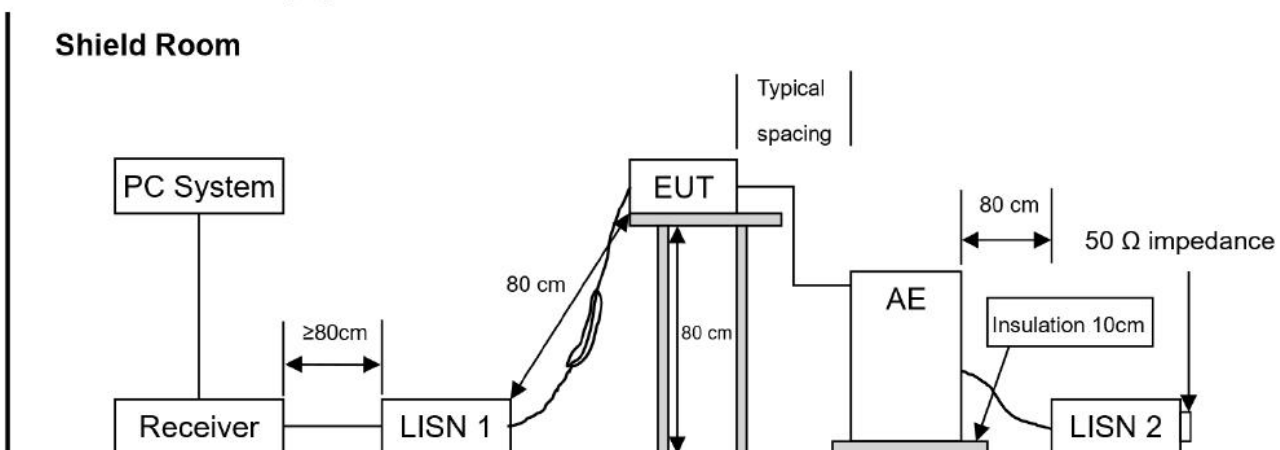
For table-top equipment



For floor standing equipment



For combinations equipment



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5.1.4 E.U.T. Operation

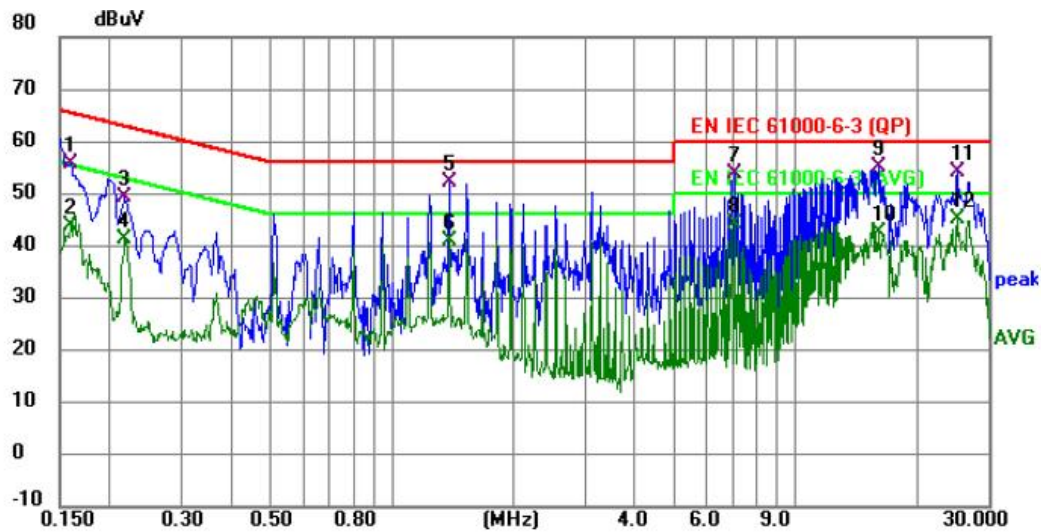
Operating Environment:			
Temperature:	24.2° C	Humidity:	54.9%RH
Test Engineer	CX Wang		
Mode 1	Working(AC input to Battery charging & AC OFF Grid)	Voltage	AC 230V/50Hz





5.1.5 Test data

Mode 1 / Line: Line

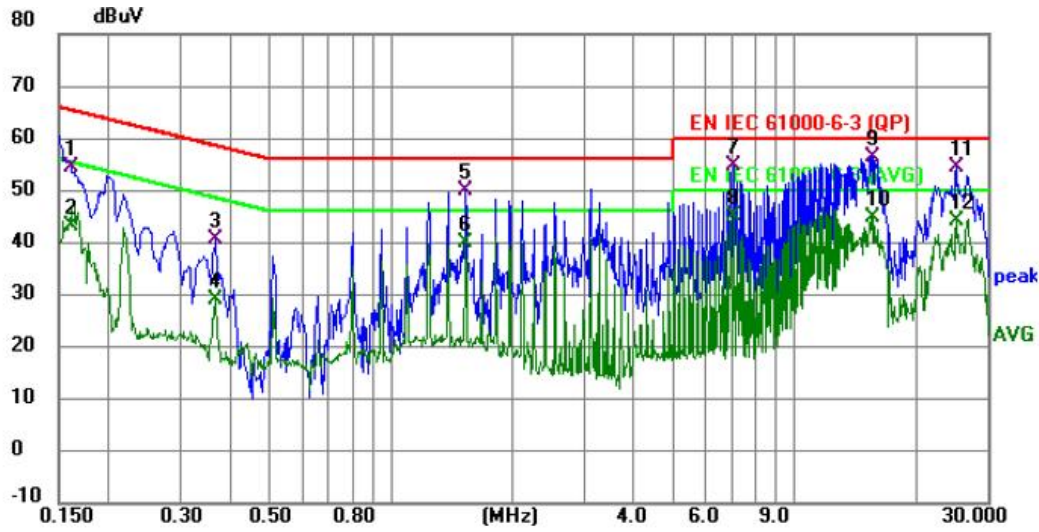


No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1597	45.58	10.07	55.65	65.48	-9.83	QP	
2	0.1597	33.81	10.07	43.88	55.48	-11.60	AVG	
3	0.2174	39.14	10.07	49.21	62.92	-13.71	QP	
4	0.2174	31.10	10.07	41.17	52.92	-11.75	AVG	
5 *	1.3871	42.12	9.98	52.10	56.00	-3.90	QP	
6	1.3871	30.99	9.98	40.97	46.00	-5.03	AVG	
7	7.0754	43.95	9.97	53.92	60.00	-6.08	QP	
8	7.0754	34.06	9.97	44.03	50.00	-5.97	AVG	
9	15.9720	45.13	10.12	55.25	60.00	-4.75	QP	
10	15.9720	32.42	10.12	42.54	50.00	-7.46	AVG	
11	25.1700	43.80	10.18	53.98	60.00	-6.02	QP	
12	25.1700	35.00	10.18	45.18	50.00	-4.82	AVG	





Mode 1 / Line: Neutral



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
		MHz	Level	Factor	ment				
			dBuV	dB	dBuV	dBuV	dB		
1		0.1615	44.23	10.08	54.31	65.39	-11.08	QP	
2		0.1615	33.26	10.08	43.34	55.39	-12.05	AVG	
3		0.3660	30.57	9.92	40.49	58.59	-18.10	QP	
4		0.3660	19.17	9.92	29.09	48.59	-19.50	AVG	
5		1.5315	39.94	10.00	49.94	56.00	-6.06	QP	
6		1.5315	30.13	10.00	40.13	46.00	-5.87	AVG	
7		7.0754	44.95	9.97	54.92	60.00	-5.08	QP	
8		7.0754	35.06	9.97	45.03	50.00	-4.97	AVG	
9 *		15.6795	46.27	10.10	56.37	60.00	-3.63	QP	
10		15.6795	34.67	10.10	44.77	50.00	-5.23	AVG	
11		25.1700	44.30	10.18	54.48	60.00	-5.52	QP	
12		25.1700	34.00	10.18	44.18	50.00	-5.82	AVG	





5.2 DC Power Port Conducted Emission

5.2.1 Limits

Frequency	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150 kHz ~ 500 kHz	79	73
500 kHz ~ 5 MHz	66	60

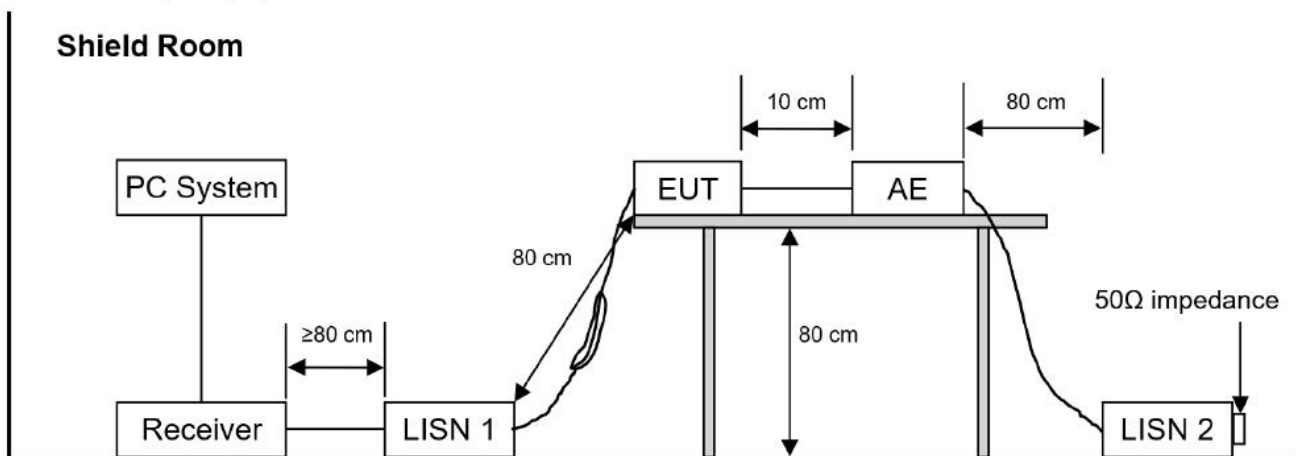
Notes:
1. The lower limit shall apply at the transition frequencies.

5.2.2 Test procedure

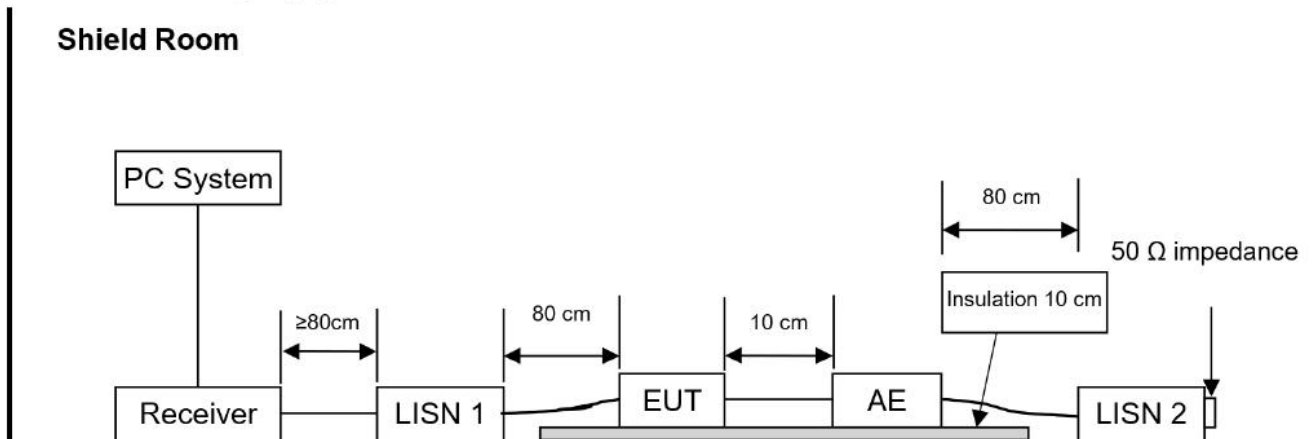
- (1) The EUT placement requires reference to the test block diagram and is placed on a non-metallic table.
- (2) Setup the EUT and assistant equipment as shown above block diagram and equipment list.
- (3) The EUT's power was connected to the power mains through a line impedance stabilization network (L.I.S.N). which this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted disturbance. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN IEC 61000-6-3:2021 on conducted disturbance emission test.
- (4) The bandwidth of test receiver is set at 9 kHz.
- (5) The frequency range from 150 kHz to 30 MHz is checked.

5.2.3 Test Setup Diagram

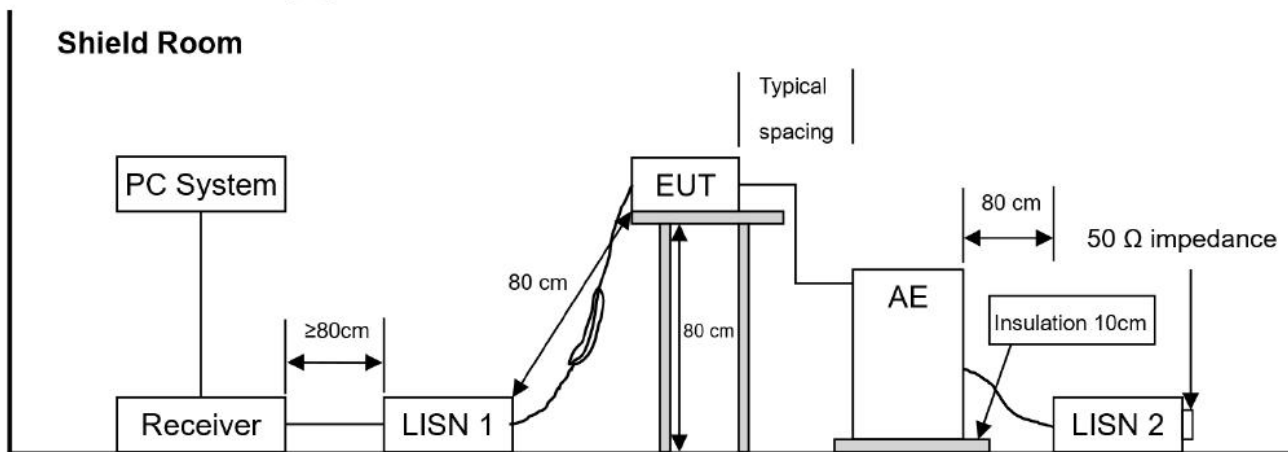
For table-top equipment



For floor standing equipment



For combinations equipment





5.2.4 E.U.T. Operation

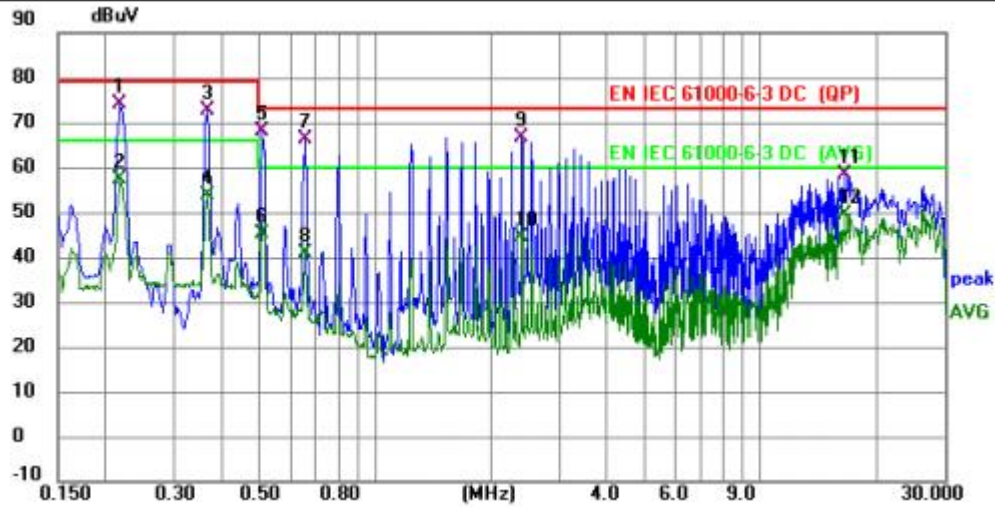
Operating Environment:			
Temperature:	24.2° C	Humidity:	54.9%RH
Test Engineer	CX Wang		
Mode 2	Working(PV input to Battery charging)	Voltage	DC 500V
Mode 3	Working(PV input to AC OFF Grid)	Voltage	DC 500V





5.2.5 Test data

Mode 2 / +

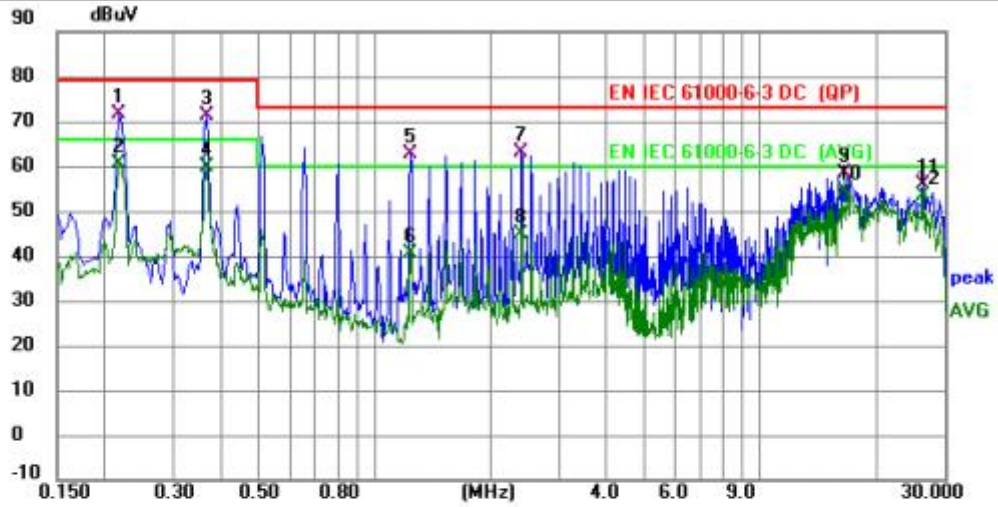


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1 *	0.2174	45.10	29.04	74.14	79.00	-4.86	QP	
2	0.2174	28.17	29.04	57.21	66.00	-8.79	AVG	
3	0.3660	44.01	28.75	72.76	79.00	-6.24	QP	
4	0.3660	24.99	28.75	53.74	66.00	-12.26	AVG	
5	0.5100	39.57	28.51	68.08	73.00	-4.92	QP	
6	0.5100	16.59	28.51	45.10	60.00	-14.90	AVG	
7	0.6582	37.52	28.64	66.16	73.00	-6.84	QP	
8	0.6582	12.42	28.64	41.06	60.00	-18.94	AVG	
9	2.4045	37.69	28.80	66.49	73.00	-6.51	QP	
10	2.4045	15.60	28.80	44.40	60.00	-15.60	AVG	
11	16.6290	28.43	30.14	58.57	73.00	-14.43	QP	
12	16.6290	19.37	30.14	49.51	60.00	-10.49	AVG	





Mode 2 / -

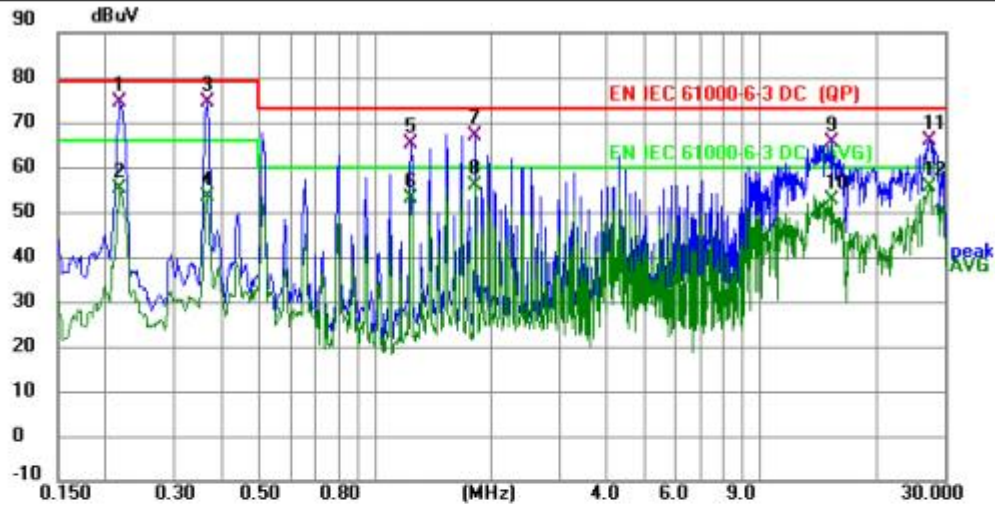


No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.2174	42.60	29.04	71.64	79.00	-7.36	QP	
2 *	0.2174	31.67	29.04	60.71	66.00	-5.29	AVG	
3	0.3660	42.51	28.75	71.26	79.00	-7.74	QP	
4	0.3660	30.98	28.75	59.73	66.00	-6.27	AVG	
5	1.2390	34.05	28.77	62.82	73.00	-10.18	QP	
6	1.2390	11.92	28.77	40.69	60.00	-19.31	AVG	
7	2.4045	34.19	28.80	62.99	73.00	-10.01	QP	
8	2.4045	16.10	28.80	44.90	60.00	-15.10	AVG	
9	16.6290	28.43	30.14	58.57	73.00	-14.43	QP	
10	16.6290	24.37	30.14	54.51	60.00	-5.49	AVG	
11	26.3262	24.29	31.70	55.99	73.00	-17.01	QP	
12	26.3262	21.80	31.70	53.50	60.00	-6.50	AVG	





Mode 3 / +

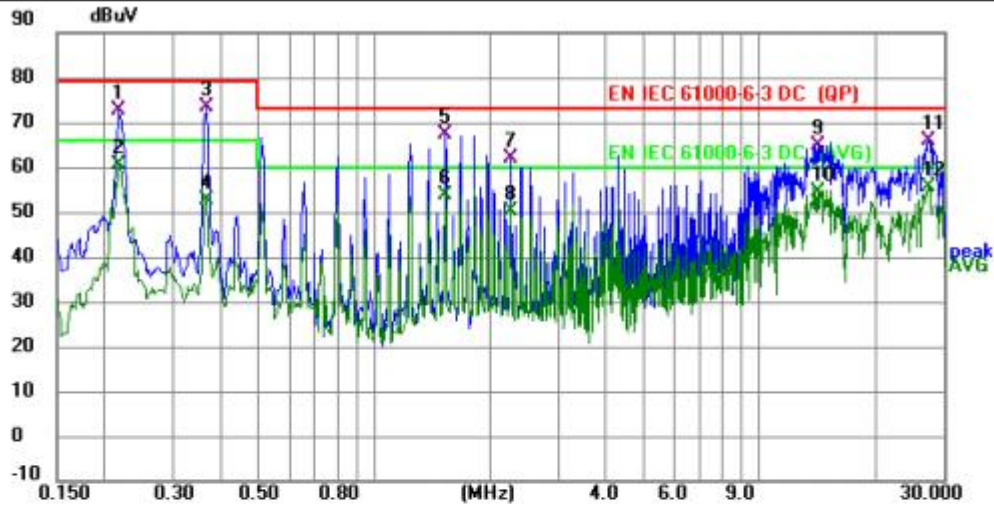


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1		0.2174	44.18	30.38	74.56	79.00	-4.44	QP	
2		0.2174	24.73	30.38	55.11	66.00	-10.89	AVG	
3		0.3660	43.94	30.45	74.39	79.00	-4.61	QP	
4		0.3660	22.89	30.45	53.34	66.00	-12.66	AVG	
5		1.2390	34.38	30.73	65.11	73.00	-7.89	QP	
6		1.2390	22.26	30.73	52.99	60.00	-7.01	AVG	
7		1.8240	35.80	31.07	66.87	73.00	-6.13	QP	
8	*	1.8240	24.72	31.07	55.79	60.00	-4.21	AVG	
9		15.3150	33.47	32.01	65.48	73.00	-7.52	QP	
10		15.3150	20.74	32.01	52.75	60.00	-7.25	AVG	
11		27.4965	33.99	32.00	65.99	73.00	-7.01	QP	
12		27.4965	23.70	32.00	55.70	60.00	-4.30	AVG	





Mode 3 / -



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
		MHz	dBuV	Factor	ment	dBuV	dB		
1		0.2174	42.18	30.38	72.56	79.00	-6.44	QP	
2		0.2174	30.23	30.38	60.61	66.00	-5.39	AVG	
3		0.3660	42.94	30.45	73.39	79.00	-5.61	QP	
4		0.3660	22.39	30.45	52.84	66.00	-13.16	AVG	
5		1.5315	36.19	31.05	67.24	73.00	-5.76	QP	
6		1.5315	22.56	31.05	53.61	60.00	-6.39	AVG	
7		2.2604	30.78	31.20	61.98	73.00	-11.02	QP	
8		2.2604	19.12	31.20	50.32	60.00	-9.68	AVG	
9		14.1493	33.03	31.96	64.99	73.00	-8.01	QP	
10		14.1493	22.52	31.96	54.48	60.00	-5.52	AVG	
11		27.4965	33.99	32.00	65.99	73.00	-7.01	QP	
12	*	27.4965	23.70	32.00	55.70	60.00	-4.30	AVG	





5.3 Radiated Emissions(30-1000MHz)

5.3.1 Limits

Frequency	Field Strengths Limits at 10m measuring distance dB(μV)/m	Field Strengths Limits at 3m measuring distance dB(μV)/m
30 MHz to 230 MHz	30	40
230 MHz to 1 GHz	37	47
30 MHz to 1 GHz	Fundamental 50	Fundamental 60
30 MHz to 300 MHz	Harmonics 42	Harmonics 52
300 MHz to 1 GHz	Harmonics 46	Harmonics 56

Note:
(1) The smaller limit shall apply at the cross point between two frequency bands.
(2) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

5.3.2 Test procedure

- (1) The EUT was placed on a non-metallic table (Refer to the 'Block diagram of test setup'). above the ground plane inside an anechoic chamber.
- (2) Test antenna center was located 3m or 10m from the EUT and assistant equipment boundary (imaginary circular periphery) on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN IEC 61000-6-3 on radiated emission test.
- (3) Spectrum frequency from 30 MHz to 1 GHz was investigated.
- (4) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN IEC 61000-6-3 on Radiated Emission test.
- (5) For emissions from 30 MHz to 1 GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.
- (6)Note:..Pre-Scan all mode, Thus record worse case mode result in this report.

Margin= Reading level + Correct factor - Limit

Correct Factor=Antenna Factor+Cable Factor- Pre-amplifier Factor

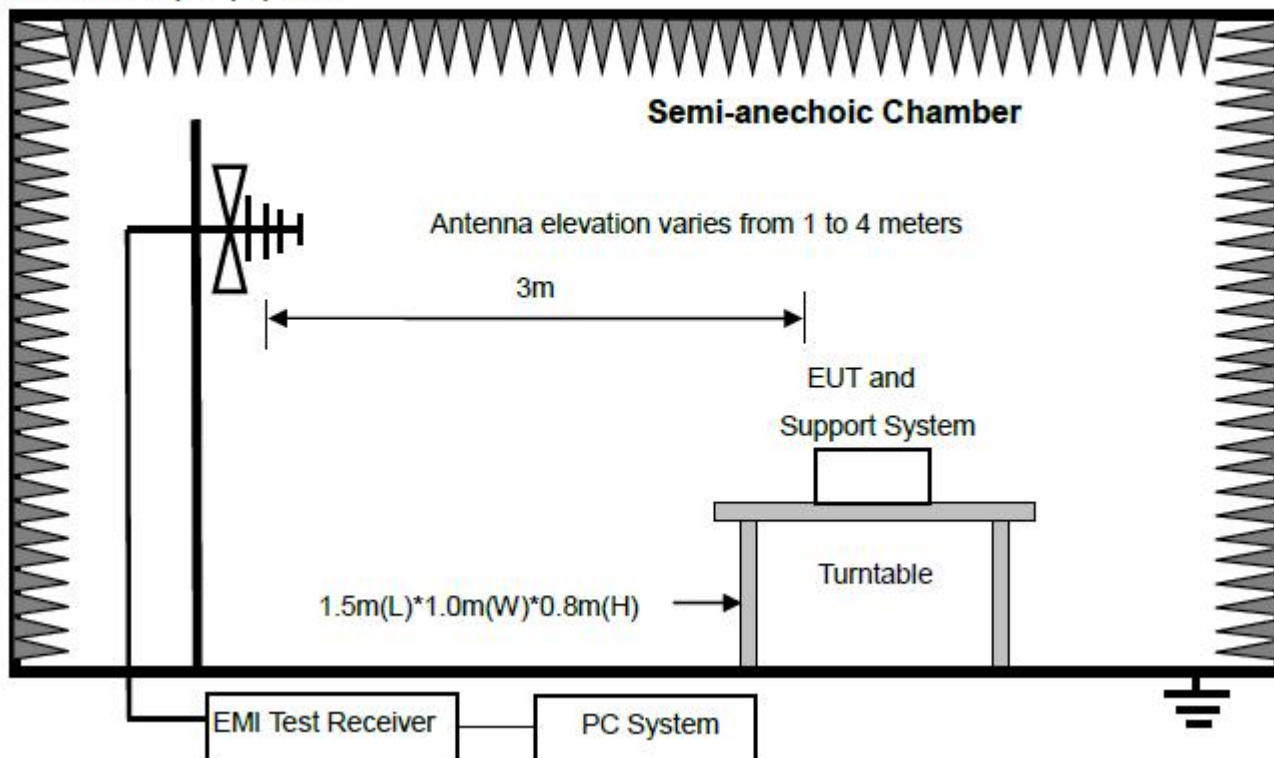




5.3.3 Test Setup Diagram

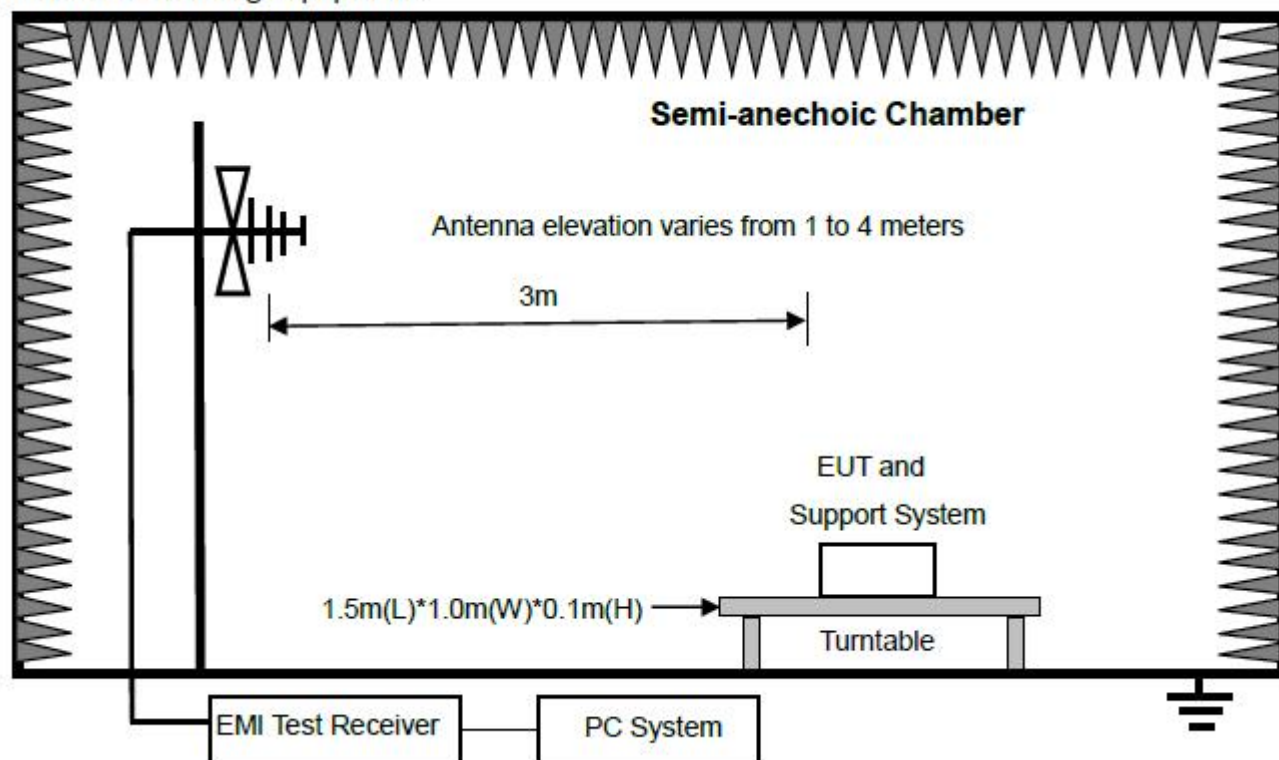
Below 1 GHz

For table-top equipment

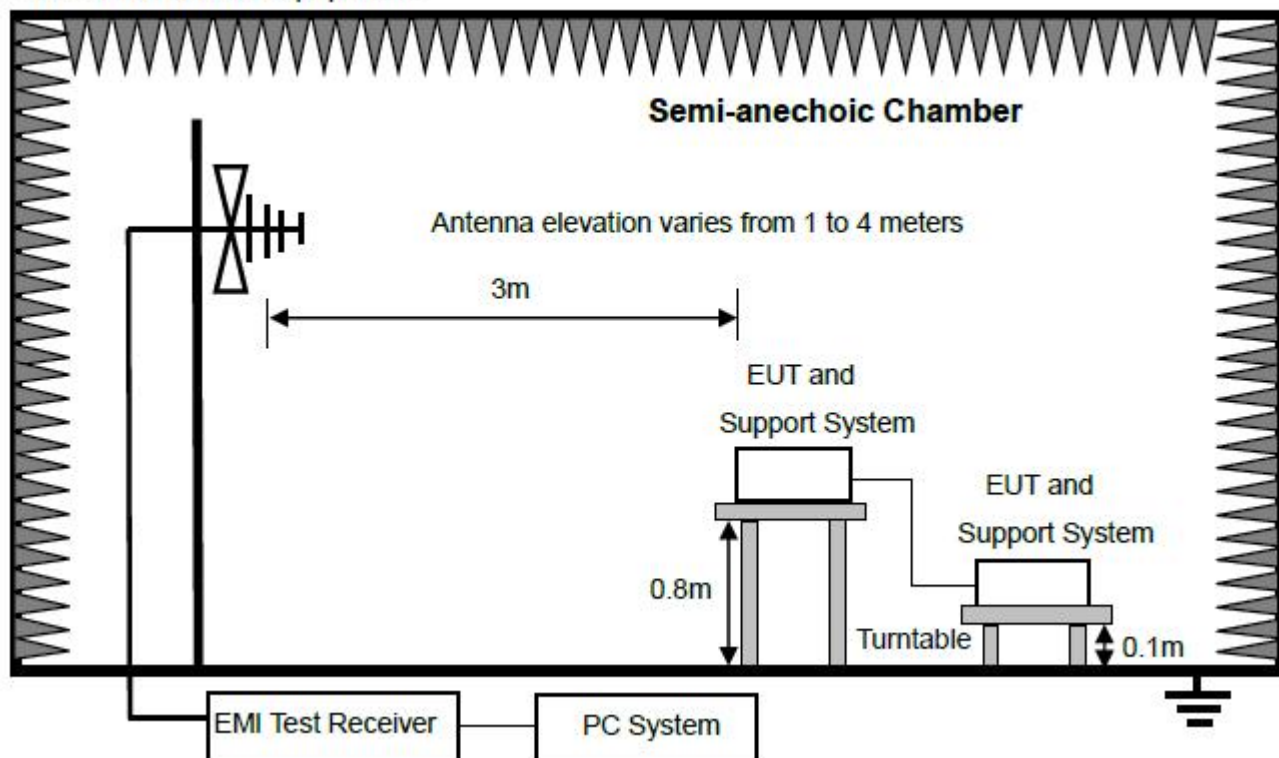




For floor standing equipment



For combinations equipment





5.3.4 E.U.T. Operation

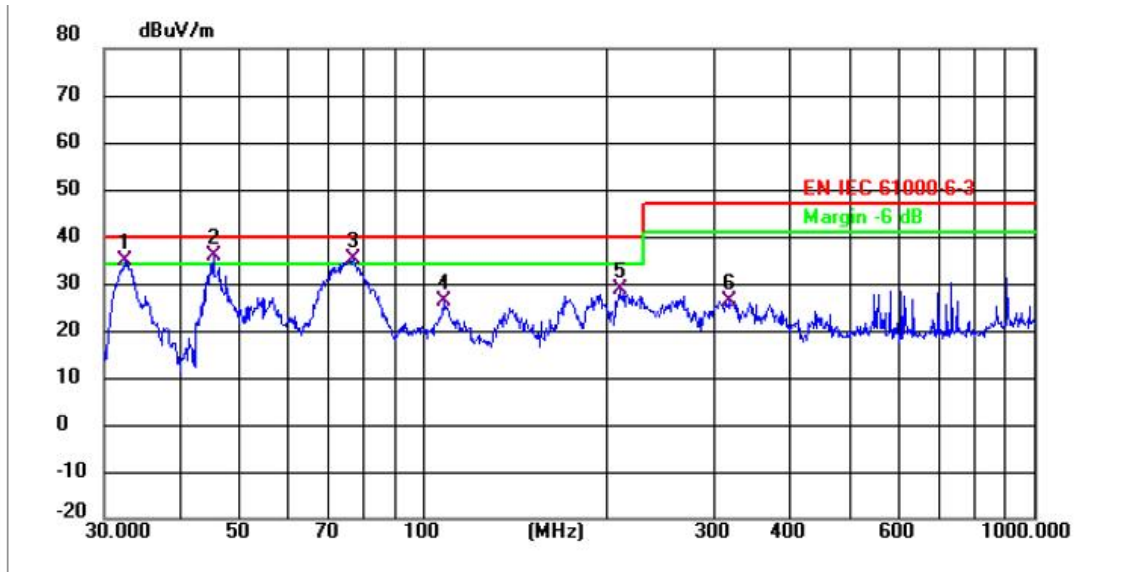
Operating Environment:			
Temperature:	26.0° C	Humidity:	54.0%RH
Test Engineer	CX Wang		
Mode 1	Working(AC input to Battery charging & AC OFF Grid)	Voltage	AC 230V/50Hz
Mode 2	Working(PV input to Battery charging)	Voltage	DC 500V
Mode 3	Working(PV input to AC OFF Grid)	Voltage	DC 500V
Mode 4	Working(Battery discharge to AC OFF Grid)	Voltage	DC 51.2V





5.3.5 Test data

Mode 1 / Polarization: Vertical

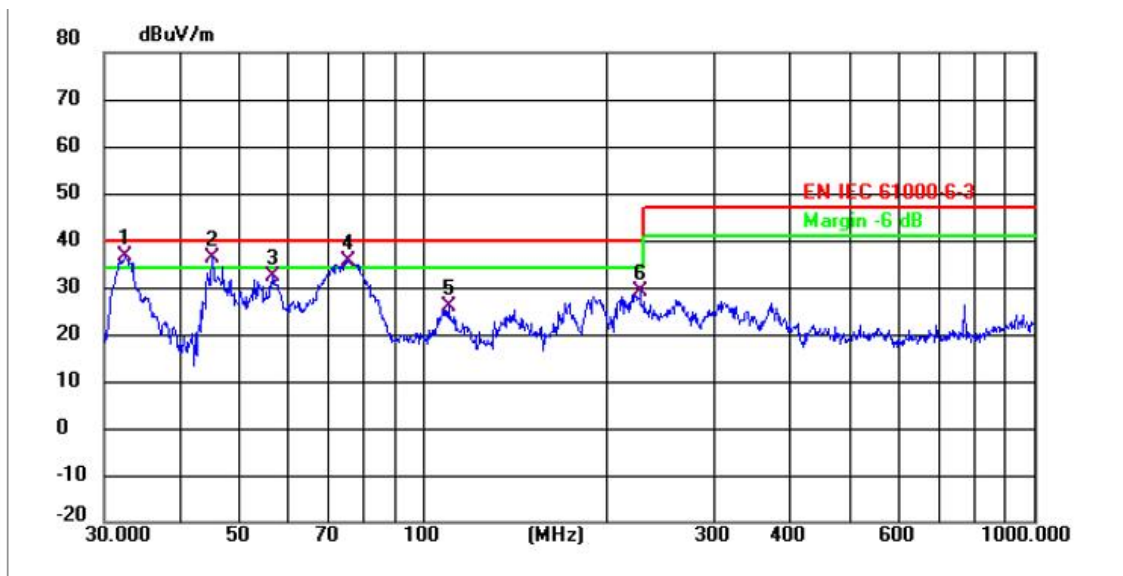


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 !	32.4060	53.42	-18.54	34.88	40.00	-5.12	QP	P	
2 *	45.3753	52.70	-16.68	36.02	40.00	-3.98	QP	P	
3 !	76.7806	56.03	-20.95	35.08	40.00	-4.92	QP	P	
4	107.8876	43.90	-17.48	26.42	40.00	-13.58	QP	P	
5	209.3130	47.47	-18.87	28.60	40.00	-11.40	QP	P	
6	316.5890	42.55	-16.21	26.34	47.00	-20.66	QP	P	





Mode 1 / Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	32.5197	55.32	-18.55	36.77	40.00	-3.23	QP	P	
2 !	45.2165	53.03	-16.71	36.32	40.00	-3.68	QP	P	
3	56.7916	49.35	-17.19	32.16	40.00	-7.84	QP	P	
4 !	75.4462	56.56	-20.87	35.69	40.00	-4.31	QP	P	
5	109.7960	42.86	-17.14	25.72	40.00	-14.28	QP	P	
6	226.0994	47.32	-18.05	29.27	40.00	-10.73	QP	P	



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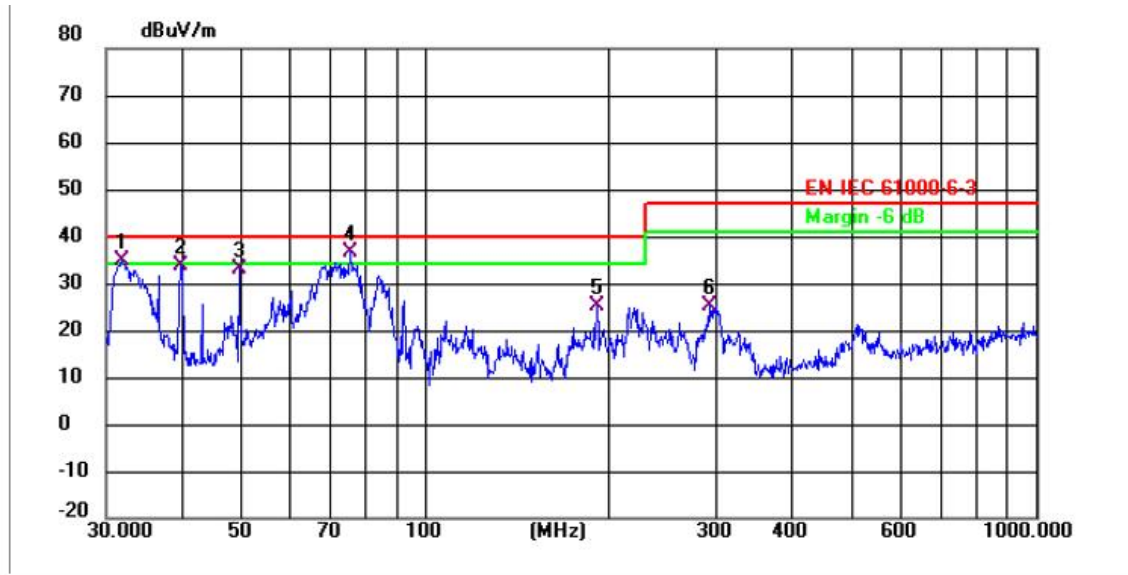
Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Mode 2 / Polarization: Vertical

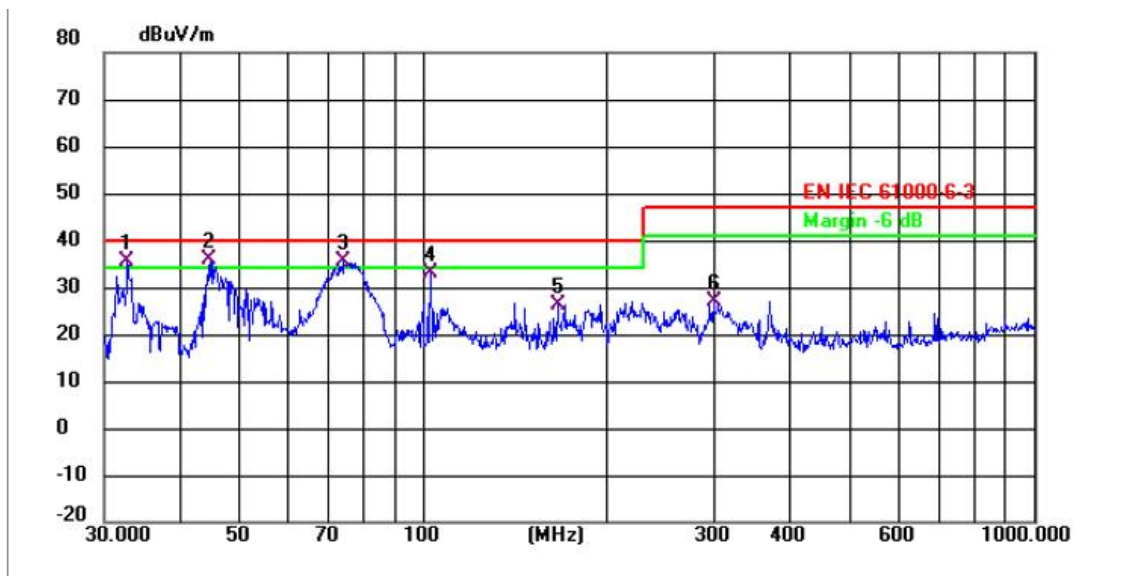


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 !	31.8427	53.34	-18.43	34.91	40.00	-5.09	QP	P	
2	39.8541	51.08	-17.45	33.63	40.00	-6.37	QP	P	
3	49.5328	49.42	-16.43	32.99	40.00	-7.01	QP	P	
4 *	75.4462	57.42	-20.87	36.55	40.00	-3.45	QP	P	
5	191.0738	45.07	-20.05	25.02	40.00	-14.98	QP	P	
6	291.0360	41.83	-16.72	25.11	47.00	-21.89	QP	P	





Mode 2 / Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 !	32.7486	54.02	-18.59	35.43	40.00	-4.57	QP	P	
2 *	44.7433	52.49	-16.75	35.74	40.00	-4.26	QP	P	
3 !	74.1350	56.19	-20.76	35.43	40.00	-4.57	QP	P	
4	102.7192	51.34	-18.14	33.20	40.00	-6.80	QP	P	
5	166.0680	47.04	-20.74	26.30	40.00	-13.70	QP	P	
6	299.3158	43.12	-16.15	26.97	47.00	-20.03	QP	P	



Shenzhen LCS Compliance Testing Laboratory Ltd.

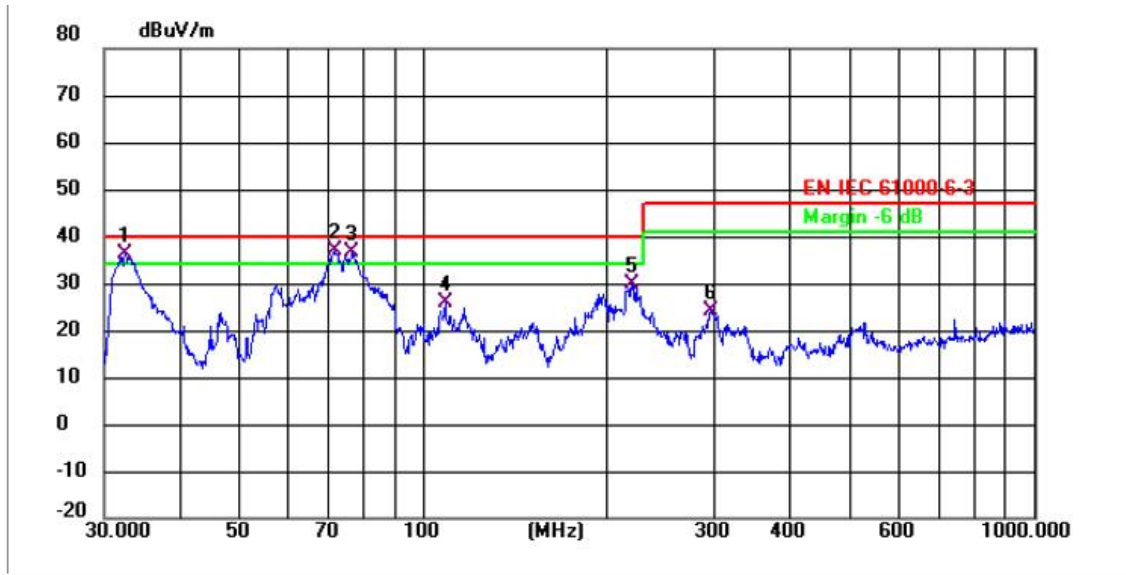
Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Mode 3 / Polarization: Vertical

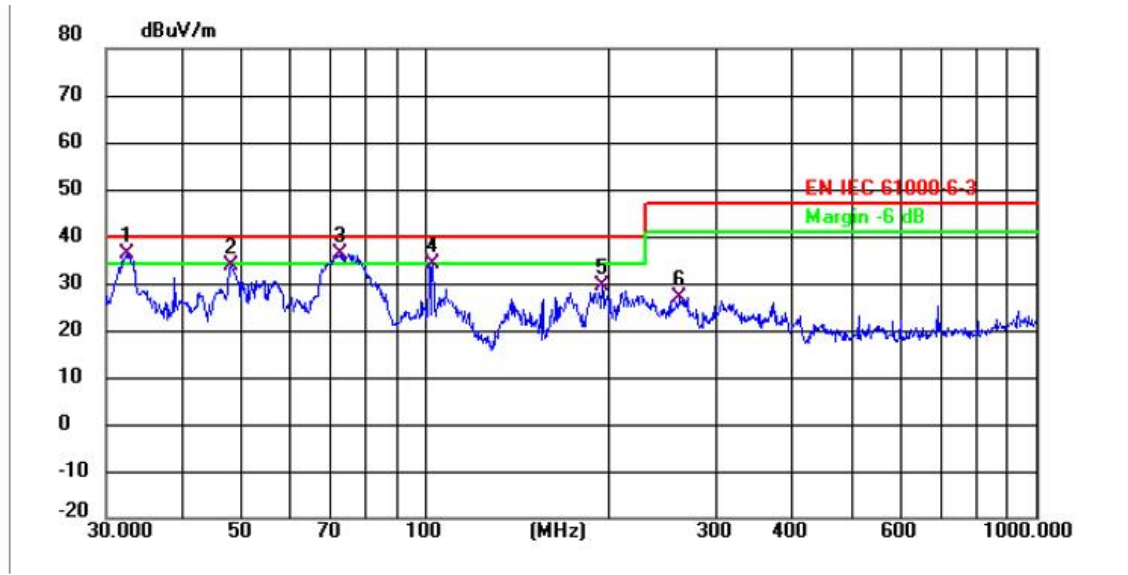


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 !	32.5197	54.77	-18.55	36.22	40.00	-3.78	QP	P	
2 *	71.5805	57.54	-20.63	36.91	40.00	-3.09	QP	P	
3 !	76.5119	57.43	-20.92	36.51	40.00	-3.49	QP	P	
4	108.6470	43.22	-17.21	26.01	40.00	-13.99	QP	P	
5	219.0751	48.09	-18.26	29.83	40.00	-10.17	QP	P	
6	296.1836	40.54	-16.27	24.27	47.00	-22.73	QP	P	





Mode 3 / Polarization: Horizontal

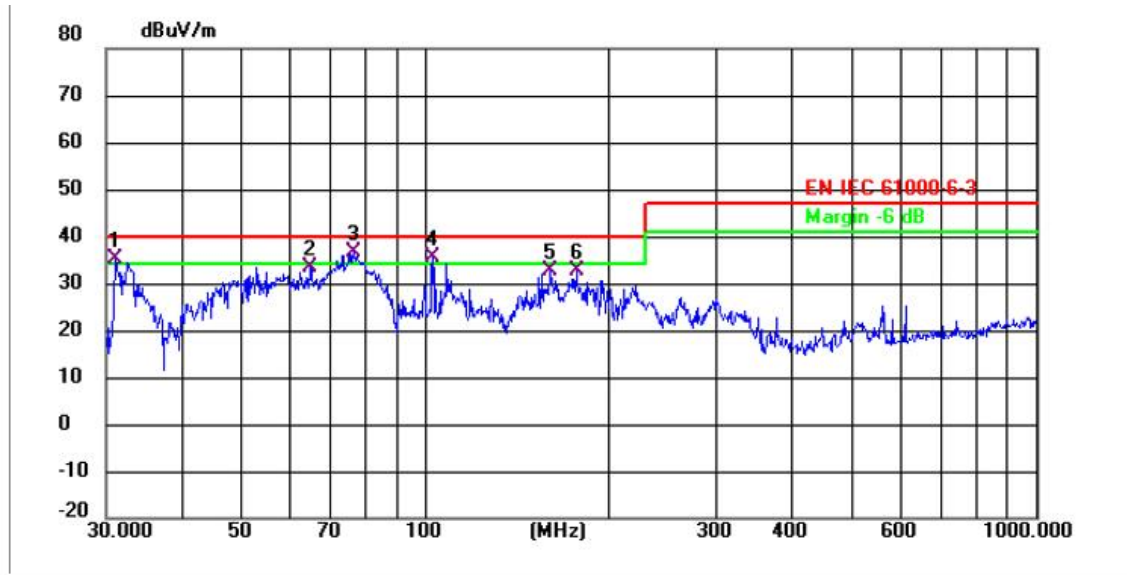


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	32.4060	54.74	-18.54	36.20	40.00	-3.80	QP	P	
2	47.9940	49.79	-16.21	33.58	40.00	-6.42	QP	P	
3 !	72.5913	56.73	-20.58	36.15	40.00	-3.85	QP	P	
4 !	102.7192	52.42	-18.14	34.28	40.00	-5.72	QP	P	
5	195.1363	49.08	-19.64	29.44	40.00	-10.56	QP	P	
6	261.0581	44.52	-17.45	27.07	47.00	-19.93	QP	P	





Mode 4 / Polarization: Vertical

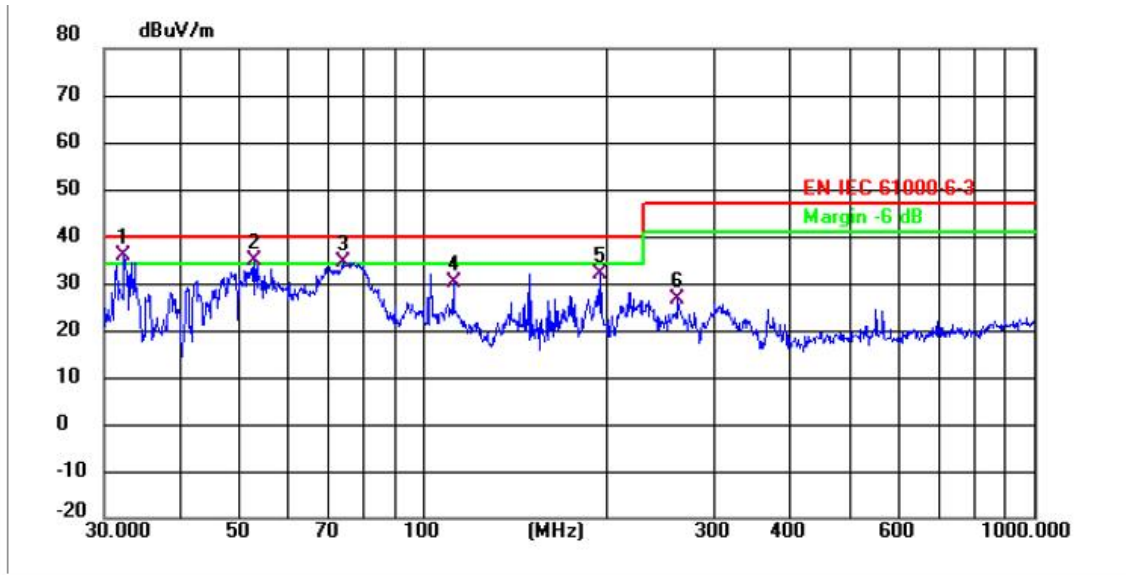


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 !	31.0703	53.40	-18.28	35.12	40.00	-4.88	QP	P	
2	64.8863	52.51	-18.99	33.52	40.00	-6.48	QP	P	
3 *	76.5119	57.58	-20.92	36.66	40.00	-3.34	QP	P	
4 !	102.7192	53.70	-18.14	35.56	40.00	-4.44	QP	P	
5	160.3454	53.83	-21.02	32.81	40.00	-7.19	QP	P	
6	176.8875	53.59	-20.84	32.75	40.00	-7.25	QP	P	





Mode 4 / Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	32.2924	54.50	-18.52	35.98	40.00	-4.02	QP	P	
2 !	52.9453	50.82	-16.10	34.72	40.00	-5.28	QP	P	
3 !	73.8756	55.34	-20.73	34.61	40.00	-5.39	QP	P	
4	111.7380	48.08	-17.79	30.29	40.00	-9.71	QP	P	
5	195.1363	51.45	-19.64	31.81	40.00	-8.19	QP	P	
6	261.0581	43.93	-17.45	26.48	47.00	-20.52	QP	P	





5.4 Harmonic Current Emissions Test

5.4.1 Limits

Limit for Class A equipment		
Harmonic order(h)	Maximum permissible harmonic current (A)	
Odd harmonics		
3	2.30	
5	1.14	
7	0.77	
9	0.40	
11	0.33	
13	0.21	
15≤h≤39	0.15*15/h	
Even harmonics		
2	1.08	
4	0.43	
6	0.30	
8≤h≤40	0.23*8/h	
Limit for Class B equipment		
The harmonics of the input current shall not exceed the values given in Class A limits multiplied by a factor of 1,5.		
Limit for Class C equipment		
Harmonic order(h)	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %	
2	2	
3	27	
5	10	
7	7	
9	5	
11≤h≤39 (odd harmonic only)	3	
Limit for Class D equipment		
Harmonic order(h)	Maximum permissible harmonic current per watt (mA/W)	Maximum permissible harmonic current (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33





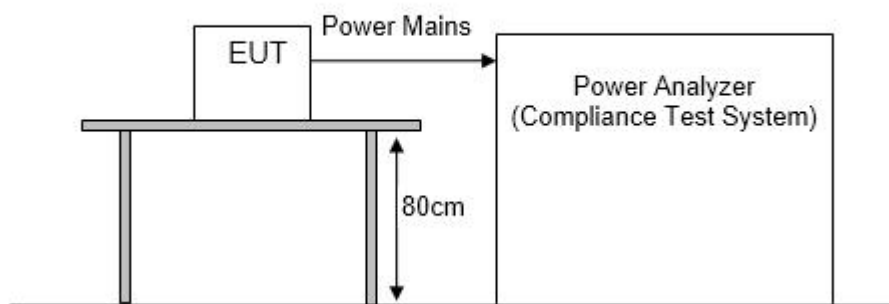
$13 \leq h \leq 39$ (odd harmonic only)	$3.85/h$	$0.15 \cdot 15/h$
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5.4.2 Test procedure

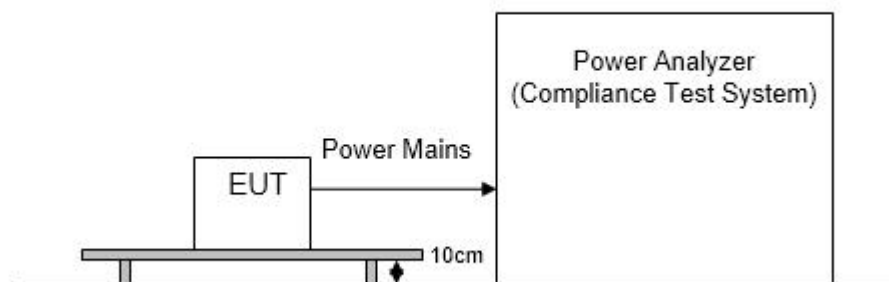
The EUT is placed on top of a wooden table (according to the standard height requirements, refer to the test layout) the maximum, harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

5.4.3 Test Setup Diagram

Table-top device



Floor-standing device





5.4.4 E.U.T. Operation

Operating Environment:			
Temperature:	24.8° C	Humidity:	55.7%RH
Test Engineer	CX Wang		
Mode 1	Working(AC input to Battery charging & AC OFF Grid)	Voltage	AC 230V/50Hz





5.4.5 Test data

Mode 1

Test Name	Test Result	Limit Usage	Info
Supply Frequency Test (61000-3-12) [L1]	OK		50.00 Hz (50.00 Hz $\pm$ 0.5 %)
Supply Utrms Test (61000-3-12) [L1]	OK		229.541 V (230.000 V $\pm$ 2 %)
Supply Voltage Harmonic Distortion Test (61000-3-12) [L1]	OK		
Frequency groups up to 9 kHz (61000-4-7) [L1]	OK		
Iref within 10 % Test (61000-3-12) [L1]	OK		40.500 A < 47.424 A < 49.500 A
Table 2 Harmonic Current Test (61000-3-12) [L1]	OK		
Rsce Min Test	OK		Rsce min 33, EUT connectable at any point in supply system.
Rsce Test	OK		Rsce 33.00 $\geq$ Rsce min limit 33
H2 Test	OK		
100 % Average Test	OK	0.1 %	0.003 A $\leq$ 3.600 A
150 % Smoothed Test	OK	0.1 %	0.003 A $\leq$ 5.400 A
H3 Test	OK		
100 % Average Test	OK	1.8 %	0.172 A $\leq$ 9.720 A
150 % Smoothed Test	OK	1.2 %	0.172 A $\leq$ 14.580 A
H4 Test	OK		
100 % Average Test	OK	0.2 %	0.004 A $\leq$ 1.800 A
150 % Smoothed Test	OK	0.2 %	0.005 A $\leq$ 2.700 A
H5 Test	OK		
100 % Average Test	OK	2.3 %	0.111 A $\leq$ 4.815 A
150 % Smoothed Test	OK	1.6 %	0.111 A $\leq$ 7.222 A
H6 Test	OK		
100 % Average Test	OK	0.4 %	0.005 A $\leq$ 1.200 A
150 % Smoothed Test	OK	0.3 %	0.005 A $\leq$ 1.800 A
H7 Test	OK		
100 % Average Test	OK	1.6 %	0.052 A $\leq$ 3.240 A
150 % Smoothed Test	OK	1.1 %	0.051 A $\leq$ 4.860 A
H8 Test	OK		
100 % Average Test	OK	0.5 %	0.005 A $\leq$ 0.900 A
150 % Smoothed Test	OK	0.4 %	0.005 A $\leq$ 1.350 A
H9 Test	OK		
100 % Average Test	OK	2.2 %	0.030 A $\leq$ 1.350 A
150 % Smoothed Test	OK	1.6 %	0.030 A $\leq$ 2.025 A
H10 Test	OK		
100 % Average Test	OK	0.4 %	0.003 A $\leq$ 0.720 A
150 % Smoothed Test	OK	0.3 %	0.003 A $\leq$ 1.080 A
H11 Test	OK		
100 % Average Test	OK	1.5 %	0.021 A $\leq$ 1.395 A
150 % Smoothed Test	OK	1.1 %	0.021 A $\leq$ 2.092 A
H12 Test	OK		
100 % Average Test	OK	0.3 %	0.002 A $\leq$ 0.600 A





150 % Smoothed Test	OK	0.2 %	0.002 A ≤ 0.900 A
H13 Test	OK		
100 % Average Test	OK	2.2 %	0.019 A ≤ 0.900 A
150 % Smoothed Test	OK	1.5 %	0.019 A ≤ 1.350 A
THC Test	OK	2.2 %	THC ok (0.223 A ≤ 10.350 A)
PWHC Test	OK	2.6 %	PWHC ok (0.266 A ≤ 10.350 A)





5.5 Voltage Fluctuations& Flicker Test

5.5.1 Limits

Voltage fluctuations & flicker Limit

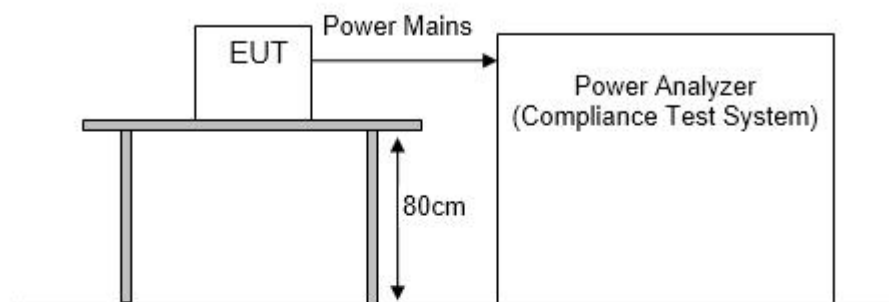
Test Item	Limit	Note
Pst	1.0	Pst means Short-term flicker indicator
Plt	0.65	Plt means long-term flicker indicator
Tdt	0.5	Tdt means maximum time that dt exceeds 3.3%
dmax (%)	4%	dmax means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change.

5.5.2 Test procedure

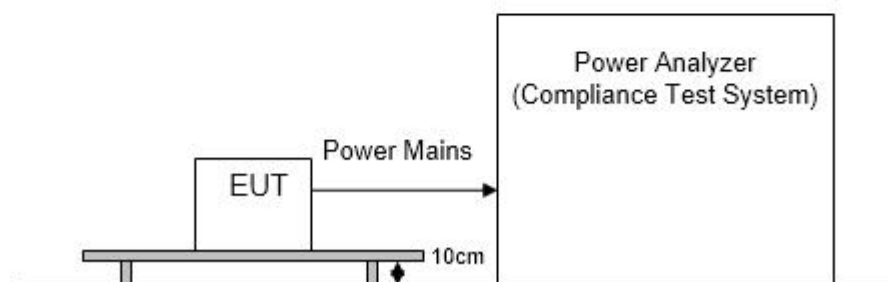
The EUT is placed on top of a wooden table (according to the standard height requirements, refer to the test layout), the most unfavorable sequence of voltage changes under normal conditions during the flick measurement; the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

5.5.3 Test Setup Diagram

Table-top device



Floor-standing device





5.5.4 E.U.T. Operation

Operating Environment:			
Temperature:	24.8° C	Humidity:	55.7%RH
Test Engineer	CX Wang		
Mode 1	Working(AC input to Battery charging & AC OFF Grid)	Voltage	AC 230V/50Hz





5.5.5 Test data

Mode 1

Test Name	Test Result	Limit Usage	Info
dc Test [L1]	OK	0.3 %	$0.0 \% \leq 3.3 \%$
dmax Test [L1]	OK	0.0 %	$0.00 \% \leq 4.00 \%$
Pst Test [L1]	OK	4.9 %	$0.049 \leq 1.000$
Plt Test [L1]	OK	7.5 %	$0.049 \leq 0.650$
tmax Test [L1]	OK		





6. IMMUNITY TEST RESULTS (EMS)

6.1 Electrostatic Discharge Test

6.1.1 Limits

Test Level		Performance Criteria
Air Discharge	±2kV, ±4kV and ±8kV	B
Contact Discharge	±4kV	
Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.		

6.1.2 Test procedure

Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed.

Contact Discharge:

All the procedure was same as air discharge. Except that the generator was re-triggered for a new single discharge. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

Indirect discharge for horizontal coupling plane:

At least 20 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane:

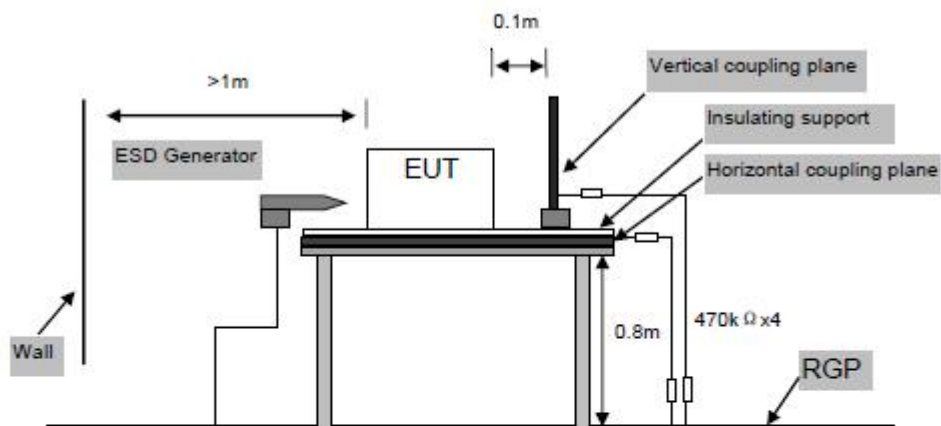
At least 20 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.



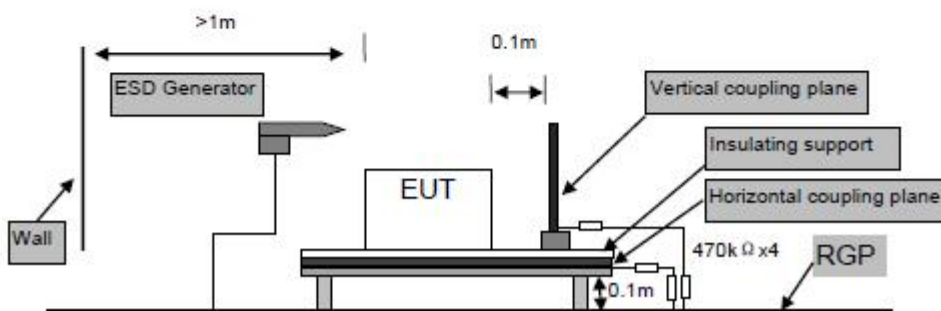


6.1.3 Test Setup Diagram

Table-top equipment



Floor-standing equipment



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6.1.4 Test data

Operating Environment:					
Test Site:	ELECTROSTATIC DISCHARGE IMMUNITY TEST (0KV-30KV)		Test Engineer	CX Wang	
Temperature:	23.9° C		Humidity:	53.5%RH	
Memo:	/				
Sample No.: A260512103008			Mode 1: Working(AC input to Battery charging & AC OFF Grid)		
Test voltage: AC 230V/50Hz			Memo:		
Measure parameters: 20 times at each point for contact discharge; 20 times at each point for air discharge. 1 second interval for each discharge.					
Type of discharge	Test level	Test point	Required	Observation	Result
Contact to EUT	±4kV	Front, Back, Left, Right, Top, Bottom	B	B	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left, Right, Top, Bottom	B	B	Pass
Observation description: A: Normal performance within limits specified by the manufacturer requestor or purchaser. B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.					
Sample No.: A260512103008			Mode 2: Working(PV input to Battery charging)		
Test voltage: DC 500V			Memo:		
Measure parameters: 20 times at each point for contact discharge; 20 times at each point for air discharge. 1 second interval for each discharge.					
Type of discharge	Test level	Test point	Required	Observation	Result
Contact to EUT	±4kV	Front, Back, Left, Right, Top, Bottom	B	B	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left, Right, Top, Bottom	B	B	Pass
Observation description: A: Normal performance within limits specified by the manufacturer requestor or purchaser. B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.					





Sample No.: A260512103008			Mode 3: Working(PV input to AC OFF Grid)		
Test voltage: DC 500V			Memo:		
Measure parameters: 20 times at each point for contact discharge; 20 times at each point for air discharge. 1 second interval for each discharge.					
Type of discharge	Test level	Test point	Required	Observation	Result
Contact to EUT	±4kV	Front, Back, Left Right, Top, Bottom	B	B	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left Right, Top, Bottom	B	B	Pass
Observation description: A: Normal performance within limits specified by the manufacturer requestor or purchaser. B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.					

Sample No.: A260512103008			Mode 4: Working(Battery discharge to AC OFF Grid)		
Test voltage: DC 51.2V			Memo:		
Measure parameters: 20 times at each point for contact discharge; 20 times at each point for air discharge. 1 second interval for each discharge.					
Type of discharge	Test level	Test point	Required	Observation	Result
Contact to EUT	±4kV	Front, Back, Left Right, Top, Bottom	B	B	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left Right, Top, Bottom	B	B	Pass
Observation description: A: Normal performance within limits specified by the manufacturer requestor or purchaser. B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.					





6.2 Continuous Radio Frequency Disturbances Test

6.2.1 Limits

Swept frequency test		Performance Criteria
Frequency (MHz)	80 to 2700	Immunity pass criteria
Field Strength	3V/m rms voltage level of the unmodulated signal	
Modulation	AM modulated to a depth of 80% by a sine wave of 1 kHz	
Step Size	1% increments	
Dwell time	1 Sec.	
Performance criteria A description for other devices: During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended.		

6.2.2 Test procedure

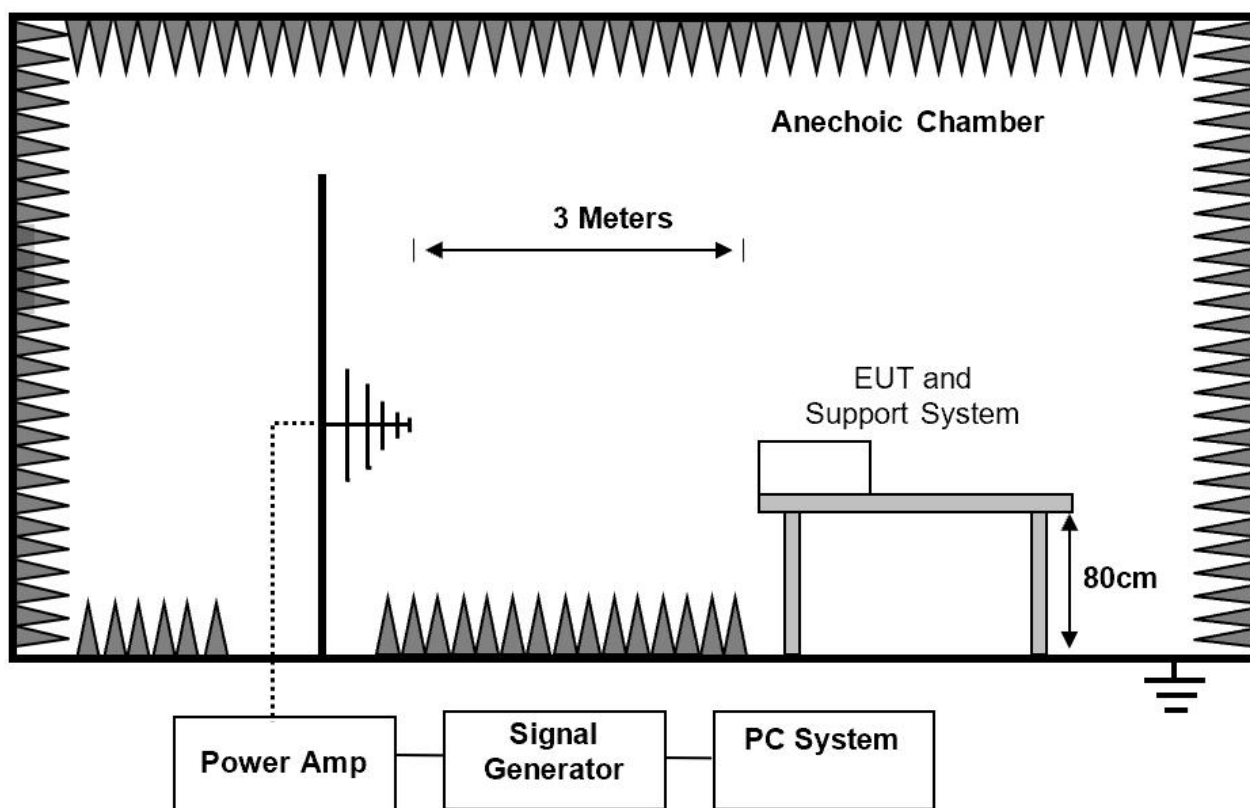
The field sensor is placed on the EUT table (Ground clearance height reference "block diagram of test setup") which is 3 meters away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength around the EUT table from frequency range specified and records the signal generator's output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 3 meters away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator's output level to measure the EUT from frequency range specified and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.





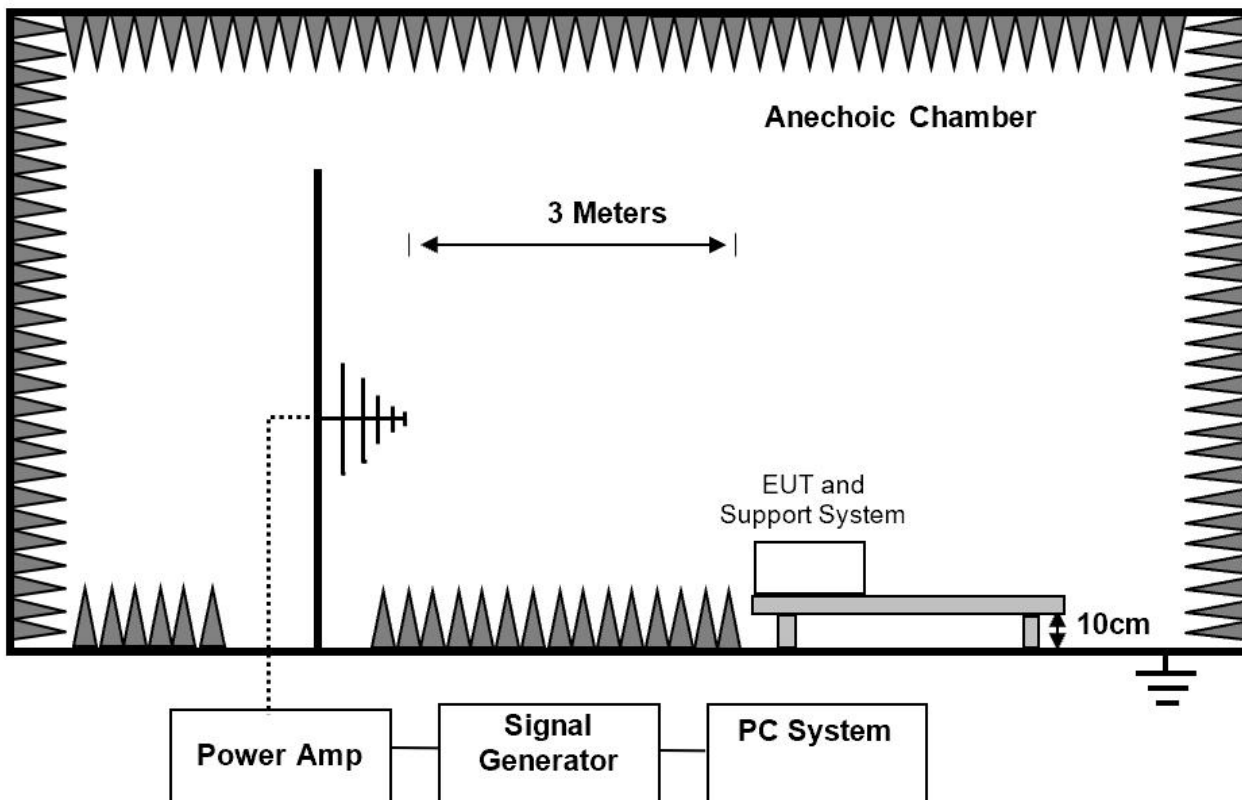
6.2.3 Test Setup Diagram

Table-top device





Floor-standing device





6.2.4 Test data

Operating Environment:								
Test Site:	RF FIELD STRENGTH SUSCEPTIBILITY TEST (UP TO 10V/m)			Test Engineer	CX Wang			
Temperature:	24.8° C			Humidity:	52.0%RH			
Memo:	/							
Sample No.: A260512103008				Mode 1: Working(AC input to Battery charging & AC OFF Grid)				
Test voltage: AC 230V/50Hz				Memo:				
Test steps: 1%, Dwell time 1s, 1kHz 80% AM modulation								
Test frequency	Level	EUT position	Antenna polarization	Required	Observation	Result		
80MHz to 1000MHz	3V/m	Front	H	A	A	Pass		
			V	A	A	Pass		
		Left	H	A	A	Pass		
			V	A	A	Pass		
		Rear	H	A	A	Pass		
			V	A	A	Pass		
		Right	H	A	A	Pass		
			V	A	A	Pass		
		1.4GHz to 6GHz	3V/m	Front	H	A	A	Pass
					V	A	A	Pass
Left	H			A	A	Pass		
	V			A	A	Pass		
Rear	H			A	A	Pass		
	V			A	A	Pass		
Right	H			A	A	Pass		
	V			A	A	Pass		
Observation description: A: Normal performance within limits specified by the manufacturer requestor or purchaser.								
Sample No.: A260512103008				Mode 2: Working(PV input to Battery charging)				
Test voltage: DC 500V				Memo:				
Test steps: 1%, Dwell time 1s, 1kHz 80% AM modulation								
Test frequency	Level	EUT position	Antenna polarization	Required	Observation	Result		
80MHz to 1000MHz	3V/m	Front	H	A	A	Pass		
			V	A	A	Pass		
		Left	H	A	A	Pass		
			V	A	A	Pass		
		Rear	H	A	A	Pass		
			V	A	A	Pass		





1.4GHz to 6GHz	3V/m	Right	V	A	A	Pass
			H	A	A	Pass
		Front	V	A	A	Pass
			H	A	A	Pass
		Left	V	A	A	Pass
			H	A	A	Pass
		Rear	V	A	A	Pass
			H	A	A	Pass
		Right	V	A	A	Pass
			H	A	A	Pass
		Right	V	A	A	Pass
			H	A	A	Pass

Observation description:

A: Normal performance within limits specified by the manufacturer requestor or purchaser.

Sample No.: A260512103008			Mode 3: Working(PV input to AC OFF Grid)			
Test voltage: DC 500V			Memo:			
Test steps: 1%, Dwell time 1s, 1kHz 80% AM modulation						
Test frequency	Level	EUT position	Antenna polarization	Required	Observation	Result
80MHz to 1000MHz	3V/m	Front	H	A	A	Pass
			V	A	A	Pass
		Left	H	A	A	Pass
			V	A	A	Pass
		Rear	H	A	A	Pass
			V	A	A	Pass
		Right	H	A	A	Pass
			V	A	A	Pass
1.4GHz to 6GHz	3V/m	Front	H	A	A	Pass
			V	A	A	Pass
		Left	H	A	A	Pass
			V	A	A	Pass
		Rear	H	A	A	Pass
			V	A	A	Pass
		Right	H	A	A	Pass
			V	A	A	Pass
Observation description:						
A: Normal performance within limits specified by the manufacturer requestor or purchaser.						

Observation description:

A: Normal performance within limits specified by the manufacturer requestor or purchaser.

Sample No.: A260512103008

Mode 4: Working(Battery discharge to AC OFF Grid)



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Test voltage: DC 51.2V			Memo:			
Test steps: 1%, Dwell time 1s, 1kHz 80% AM modulation						
Test frequency	Level	EUT position	Antenna polarization	Required	Observation	Result
80MHz to 1000MHz	3V/m	Front	H	A	A	Pass
			V	A	A	Pass
		Left	H	A	A	Pass
			V	A	A	Pass
		Rear	H	A	A	Pass
			V	A	A	Pass
		Right	H	A	A	Pass
			V	A	A	Pass
1.4GHz to 6GHz	3V/m	Front	H	A	A	Pass
			V	A	A	Pass
		Left	H	A	A	Pass
			V	A	A	Pass
		Rear	H	A	A	Pass
			V	A	A	Pass
		Right	H	A	A	Pass
			V	A	A	Pass
Observation description:						
A: Normal performance within limits specified by the manufacturer requestor or purchaser.						





6.3 Electrical Fast Transients(EFT) Test

6.3.1 Limits

Test Level			Performance Criteria
Test voltage	±1kVfor AC mains port	±0.5kV for dc input or signal port	B
Repetition Frequency	5kHz	5kHz	
Burst Duration	15ms	15ms	
Burst Period	300ms	300ms	
Inject Time(s)	120s	120s	
Inject Method	Direct for AC mains port	Capacitive coupling clamp or CDN	
Inject Line	AC mains	Analogue/digital data ports, and DC network power ports	
Note: This test shall be additionally performed on analogue/digital data ports, and DC network power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m.			
Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.			

6.3.2 Test procedure

The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support $0.1\text{m} \pm 0.01\text{m}$ thick. The ground reference plane was $1\text{m} \times 1\text{m}$ metallic sheet with 0.65mm minimum thickness. This reference ground plane was 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 was more than 0.5m . All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

For DC input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC or DC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can't less than 2mins.

For analogue/digital data ports:

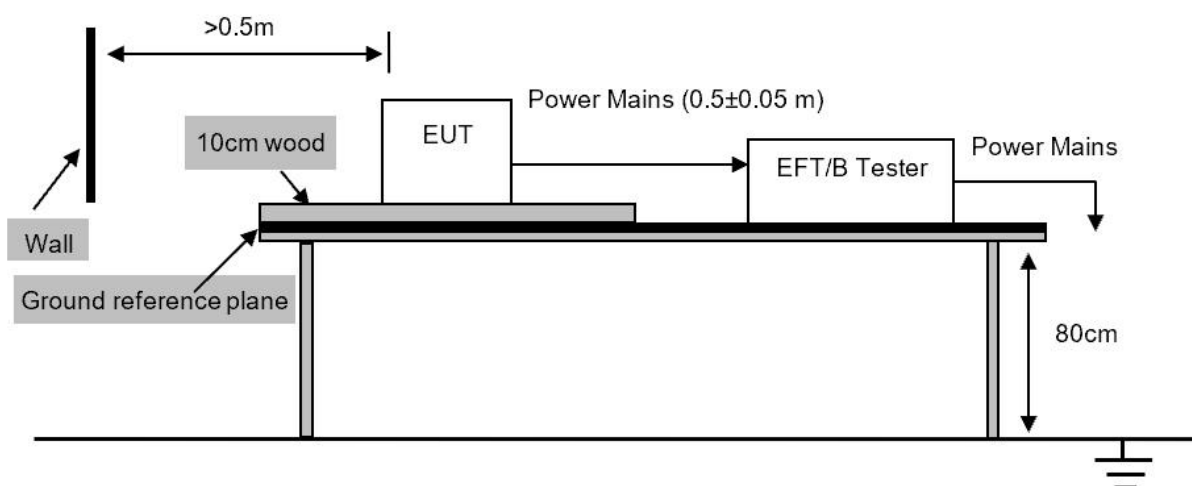
The capacitive coupling clamp was connected to the power by using a coupling device that couples the EFT interference signal to capacitive coupling clamp. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can't less than 2mins.



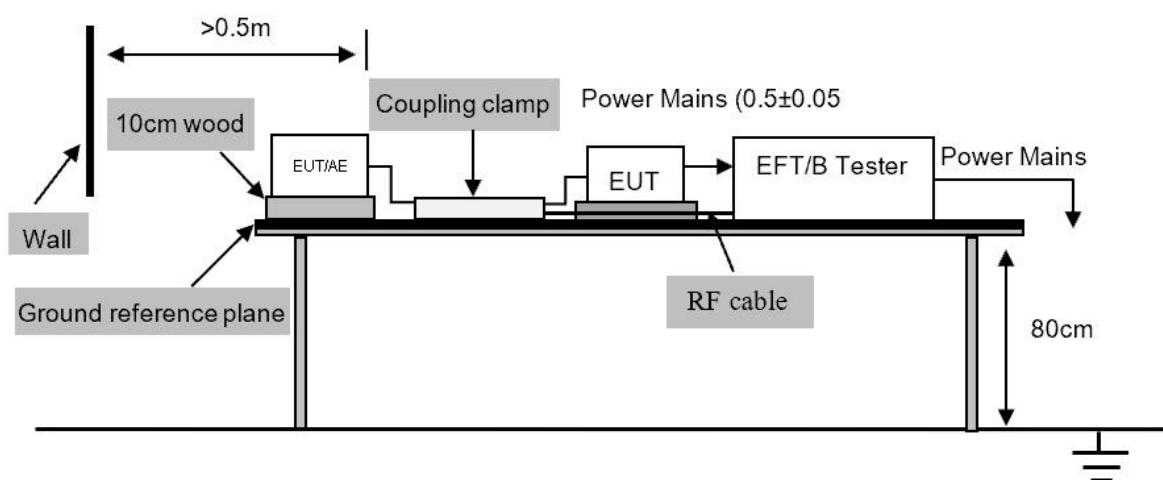


6.3.3 Test Setup Diagram

For power port (Note: if the DC network power cable may be lengths greater than 3 m, the requirement is applicable).



For analogue/digital data ports, if the cables may be longer than 3 m.





6.3.4 Test data

Operating Environment:						
Test Site:	ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (UP TO 4KV)			Test Engineer	CX Wang	
Temperature:	23.6° C			Humidity:	52.2%RH	
Memo:	/					
Sample No.: A260512103008				Mode 1: Working(AC input to Battery charging & AC OFF Grid)		
Test voltage: AC 230V/50Hz				Memo:		
Test burst parameters: Burst period 300ms, Durations 15ms, Repetition frequency 5kHz						
Port/Coupling	Line	Test voltage	Test time(s)	Required	Observation	Result
AC Mains/ Direct	L	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
	N	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
	L-N	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
	PE-L, PE-N, PE-L-N	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
Observation description: B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.						





6.4 Surge Test

6.4.1 Limits

Test level for AC mains ports		Performance Criterion
Line to Line	1 kV 1.2/50(8/20) μ s	B
Line to Ground	2 kV 1.2/50(8/20) μ s	B
Note: In telecommunications centre 1 kV line to ground and 0,5 kV line to line shall be used.		
Wired network port (outdoor)		Performance Criterion
Line to Ground	1 kV 10/700(5/320) μ s (symmetrically)	B
Line to Ground or Shield to Ground	1 kV 1.2/50(8/20) μ s (non-symmetrically)	B
Line to Line	0.5 kV 1.2/50(8/20) μ s (non-symmetrically)	B
Wired network port (indoor)		Performance Criterion
Line to Ground or Shield to Ground	0.5 kV 1.2/50(8/20) μ s (longer than 30m)	B
Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.		

6.4.2 Test procedure

For line-to- nature coupling mode, provide a 1 kV 1.2/50 us voltage surge (at pen-circuit condition) and 8/20 us current surge to EUT selected points.

For line-to- ground coupling mode, provide a 2 kV 1.2/50 us voltage surge (at pen-circuit condition) and 8/20 us current surge to EUT selected points.

At least 5 positive and 5 negative (polarity) tests with a maximum 1-minute repetition rate are applied during test.

Different phase angles are done individually.

For other surge test, each line of internet port to ground coupling mode, provide a combination wave specified above table.

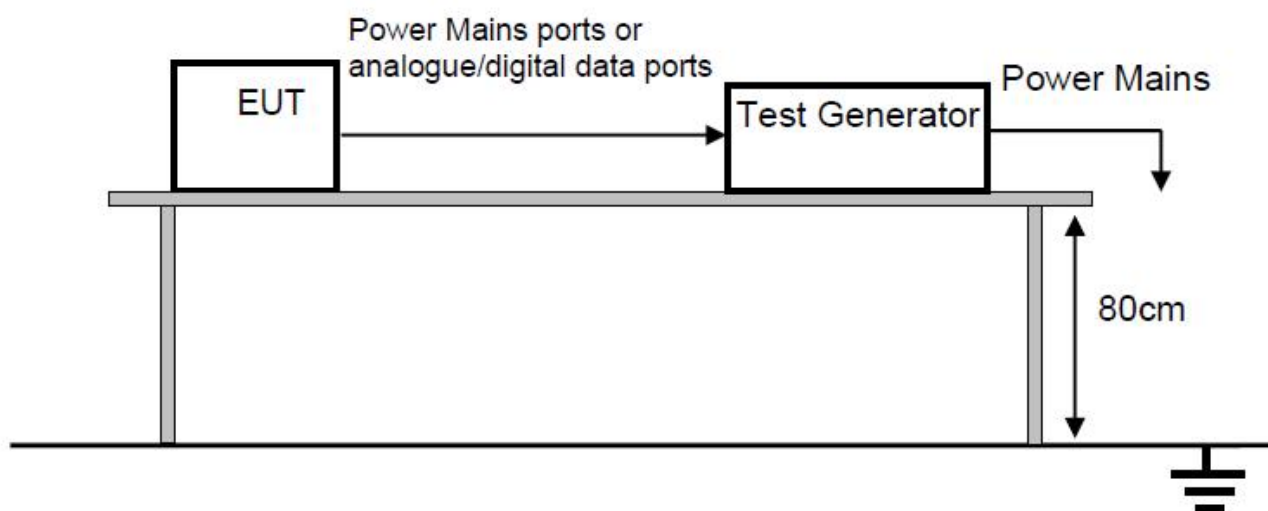
At least 5 positive and 5 negative (polarity) tests with a maximum 1-minute repetition rate are applied during test.

Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.





6.4.3 Test Setup Diagram





6.4.4 Test data

Operating Environment:					
Test Site:	Surges IMMUNITY TEST		Test Engineer	CX Wang	
Temperature:	23.6° C		Humidity:	52.1%RH	
Memo:	/				
Sample No.: A260512103008			Mode 1: Working(AC input to Battery charging & AC OFF Grid)		
Test voltage: AC 230V/50Hz			Memo:		
Test wave parameters: Wave type: 1.2/50us-8/20us; Voltage phase: 0°, 90°, 180°, 270°; Pulse times: 5 times at each polarity; Pulse interval: 60s					
Line/Port	Internal impedance	Test voltage	Required	Observation	Result
L-N	2Ω	+1kV	B	B	Pass
	2Ω	-1kV	B	B	Pass
PE-L,PE-N,PE-L-N	12Ω	+2kV	B	B	Pass
	12Ω	-2kV	B	B	Pass
Observation description: B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.					





6.5 Continuous Conducted Disturbances Test

6.5.1 Limits

Test Level		Performance Criteria
Frequency	0.15MHz to 80MHz	A
Field Strength	3V measured unmodulated	
Modulation	AM modulated to a depth of 80% by a sinusoidal audio signal of ☒ 1 kHz / ☐ 400 Hz (see note1)	
Step Size	1% increments	
Dwell time	>0.5 Sec.	
Note 1: If the wanted signal is modulated at 1 kHz, then the test signal of 400 Hz shall be used. Note 2: This test shall be additionally performed on signal ports, wired network ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m. Note 3: Performance criteria A description: During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended.		

6.5.2 Test procedure

The EUT are placed on an insulating support 0.1m 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).

The disturbance signal described below is injected to EUT through CDN.

The EUT operates within its operational mode(s) under intended climatic conditions after power on.

Use the frequency range specified by the standard, interference signal level, and interference signal for testing.

The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

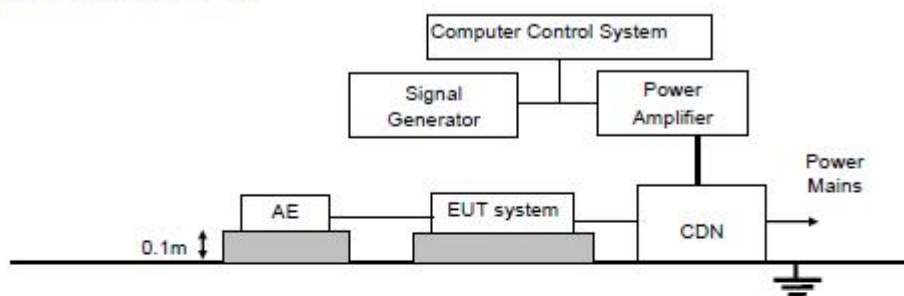
Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.



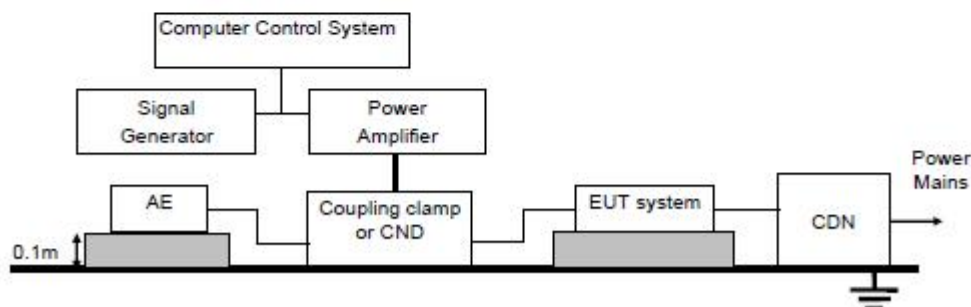


6.5.3 Test Setup Diagram

For power port (Note: if the DC network power cable may be lengths greater than 3 m, the requirement is applicable).



For analogue/digital data ports, if the cables may be longer than 3 m.





6.5.4 Test data

Operating Environment:					
Test Site:	INJECTED CURRENTS SUSCEPTIBILITY TEST (150kHz-230MHz)		Test Engineer	CX Wang	
Temperature:	23.6° C		Humidity:	52.2%RH	
Memo:	/				
Sample No.: A260512103008			Mode 1: Working(AC input to Battery charging & AC OFF Grid)		
Test voltage: AC 230V/50Hz			Memo:		
Test steps: 1%, Dwell time 1s, 1kHz 80% AM modulation					
Test frequency	Injected Position	Strength	Required	Observation	Result
0.15MHz to 80MHz	AC Port	3V	A	A	Pass
Observation Description: A: Normal performance within limits specified by the manufacturer requestor or purchaser.					





6.6 Voltage Dips and Interruptions Test

6.6.1 Limits

Test Level %UT	Duration (in period)	Performance Criterion
0	0.5	B
0	1	B
70	25 for 50Hz/30 for 60Hz	C
0	250 for 50Hz/300 for 60Hz	C

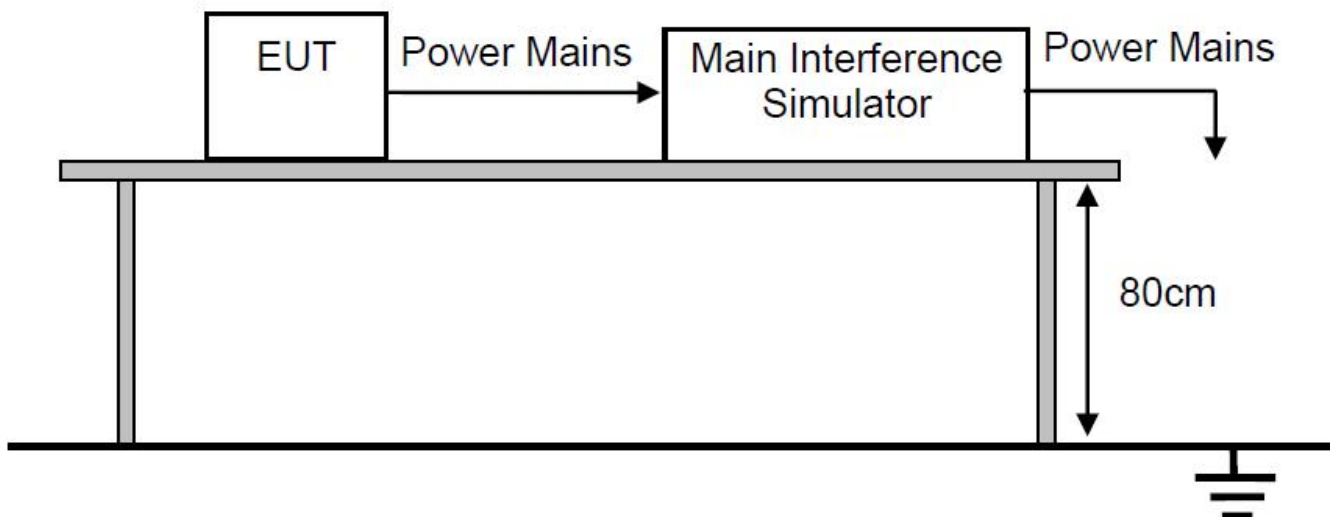
Performance criteria B description: During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended.

Performance criteria C description: During and after testing, a temporary loss of function is allowed, provided the function is self recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

6.6.2 Test procedure

The EUT and test generator were setup as shown. The interruptions are introduced at selected phase angles with specified duration. Record any degradation of performance.

6.6.3 Test Setup Diagram





6.6.4 Test data

Operating Environment:					
Test Site:	VOLTAGE DIPS AND INTERRUPTIONS TEST		Test Engineer	CX Wang	
Temperature:	23.6° C		Humidity:	52.2%RH	
Memo:	/				
Sample No.: A260512103008			Mode 1: Working(AC input to Battery charging & AC OFF Grid)		
Test voltage: AC 230V/50Hz			Memo:		
Voltage Dips & Short Interruptions %UT	Duration (in period)	Phase Angle	Required	Observation	Result
0	0.5P	0° to 360°	B	B	Pass
0	1P	0° to 360°	B	B	Pass
70	25P	0° to 360°	C	C	Pass
0	250P	0° to 360°	C	C	Pass
Observation description: B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention. C: Temporary loss of function or degradation of performance, the correction of which requires operator intervention.					





7. TEST SETUP PHOTOS

AC Power Port Conducted Emission



DC Power Port Conducted Emission





Radiated Emissions(30-1000MHz)



Harmonic Current Emissions Test





Voltage Fluctuations& Flicker Test



Electrostatic Discharge Test





Continuous Radio Frequency Disturbances Test



Electrical Fast Transients(EFT) Test





Surge Test



Continuous Conducted Disturbances Test





Voltage Dips and Interruptions Test





8. EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)



Fig. 1



Fig. 2





Fig. 3



Fig. 4





Fig. 5

Li-ion battery series	
Name	LiFeP04 Battery module
Model	AL-Horizontal 15KW.H-Z
Battery Type	LiFeP04 Battery (Grade A)
Nominal Voltage	51.2V
Rated Capacity	300Ah
Storage Capacity	15.36kWh
Voltage Range	40~58.4V
Max. Charging Current	100A
Max. Discharging Current	200A
Parallel capability	Up to 4units
communication	RS485,CAN, RS232
Cycle Life	≥10000 75%DOD25℃
Recommend Charging Temperature	0℃~50℃
Recommend Discharging temperature	-15℃~50℃
IP Rating	IP21
Weight	Kg

Fig. 6



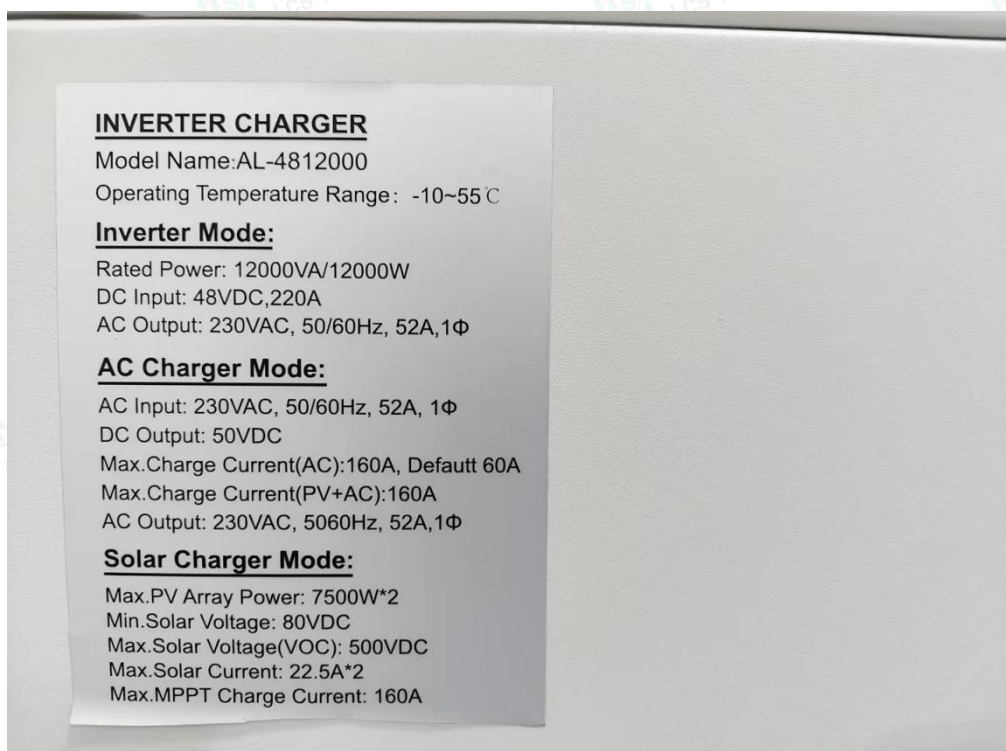


Fig. 7

-----End Report-----

