EMC TEST REPORT

For

Dongguan Lia New Energy Manufacturing Co., Ltd.

LiFePO4 Battery Module

Test Model: AL-MovableAll-In-One7.68

Additional Model No.: Please Refer To Page 9

Prepared for	:	Dongguan Lia New Energy Manufacturing Co., Ltd.
Address	:	6th Floor, Building B, Guancheng Sanliang Industrial Zone, Xingguang Village, Huangjiang Town, Dongguan, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	May 25, 2026
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	May 25, 2026-May 28, 2026
Date of Report	:	May 29, 2026

TEST REPORT

Report No.	:	**LCSA05126068E**
Date of Issue	:	May 29, 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	:	TRF-4-E-001 A/0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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Test Item Description	:	**LiFePO4 Battery Module**
Trade Mark	:	N/A
Test Model	:	AL-MovableAll-In-One7.68
Result	:	**Pass**

Compiled by:	Supervised by:	Approved:
Coco Song	Jelly Li	Gavin Liang
Coco Song / File Administrator	Jelly Li / Technique principal	Gavin Liang / Manager

TEST REPORT

Test Report No.: LCSA05126068E	May 29, 2026 Date of issue

Test Model	:	**AL-MovableAll-In-One7.68**
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.

Revision History

Report Version	Issue Date	Revision Content	Revised By
000	May 29, 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 IN+AC OUT)(AC 230V/50Hz)	/
Mode 2	Working(Battery OUT)(DC 25.6V)	/
Mode 3	Working(PV IN +AC OUT)(DC 500V)	/

2.3 Description of Performance Criteria

Performance Criteria

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

Performance 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 (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after the test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B/C
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 (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after the test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.
C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.
Performance criterion C may be applied to toys not using score or data entered by the user.

Performance criterion C
Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

3. GENERAL INFORMATION

3.1 Description of Device (EUT)

EUT	: LiFePO4 Battery Module
Test Model	: AL-MovableAll-In-One7.68
Power Supply	: Input: 230VAC, 3.6KW, 50/60Hz Output: 220/230VAC±5%, 50/60Hz, 5400VA Maximum PV input power: 5000W Maximum PV open-circuit voltage: 500VDC MPPT voltage range: 40VDC~450VDC Rated capacity: 300Ah Rated voltage: 25.6V Battery energy: 7680Wh Rated output power: 3600W
Highest Internal Frequency	: ≤108MHz
Classification of Equipment	: /
Additional Model	: AL-MovableAll-In-One10.24, AL-MovableAll-In-One15.36, AL-MovableAll-In-One16, AL-MovableAll-In-One18, AL-MovableAll-In-One32
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.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

3.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emission (9kHz to 150kHz)	± 2.63 dB
Conducted Emission (150kHz to 30MHz)	± 2.35 dB
Power Disturbance (30MHz to 300MHz)	± 2.90dB
Voltage Fluctuations & Flicker	± 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 Software	Farad	EZ	/	/
EMI Test Receiver	R&S	ESR3	102312	2026-12-21
DC AMN	SCHWARZBECK	PVDC 8301	8301-00112	2026-12-21
Three-phase artificial power supply network	SCHWARZBECK	NNLK 8129	8129-00407	2026-12-21
Pulse Limiter	R&S	ESH3-Z2	102750-NB	2027-05-05
Gigabit network impedance-stabilized network	SCHWARZBECK	NTFM 8158	00510	2026-12-21

DC Power Port Conducted Emission				
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Due Date**
EMI Test Software	Farad	EZ	/	/
EMI Test Receiver	R&S	ESR3	102312	2026-12-21
DC AMN	SCHWARZBECK	PVDC 8301	8301-00112	2026-12-21
Three-phase artificial power supply network	SCHWARZBECK	NNLK 8129	8129-00407	2026-12-21
Pulse Limiter	R&S	ESH3-Z2	102750-NB	2027-05-05
Gigabit network impedance-stabilized network	SCHWARZBECK	NTFM 8158	00510	2026-12-21

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	ESCI7	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**
Harmonic scintillation analyzer	Schlöder	LMG 641 (Zes Zimmer)	/	2026-12-21
Three-phase scintillation impedance device	HTEC	FI-75L	235210	2026-12-21

Three phase programmable purification power supply	Chroma	61860	618603800687	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**
Electric fast pulse group generator	HTEC	HEFT 51	234401	2026-12-21
Three-phase coupled decoupling network	HTEC	HCOUPLER 200E	234712	2026-12-21

Surge Test				
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Due Date**
Combination wave lightning surge generator	HTEC	HOV 10K	234803	2026-12-21
Combination wave lightning surge generator	HTEC	H2M 450	234804	2026-12-21
Three-phase coupled decoupling network	HTEC	HCOUPLER 200S	234709	2026-12-21

Continuous Conducted Disturbances Test				
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Due Date**
Integrated anti-interference machine	HTEC	HCS 75	234403	2026-12-21
Single phase coupled decoupling network (AC 32A)	HTEC	HCDN M2+M3-32	234716	2026-12-21
Three phase coupled decoupling network	Schloeder	CDN M4-100A HV	12229-1	2026-12-21
Three phase coupled decoupling network	Schloeder	CDN-M5-100A-HV	12230-1	2026-12-21
Independent ground wire CDN	SCHLODER	CDN-L1	12227-1	2026-12-21
Coaxial attenuator	/	CDG 7006-100W	220308040	2026-12-21
High voltage DC coupling decoupling network (200A)	FCC	FCC-801-M2-200A-1	199364	2026-12-21

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.

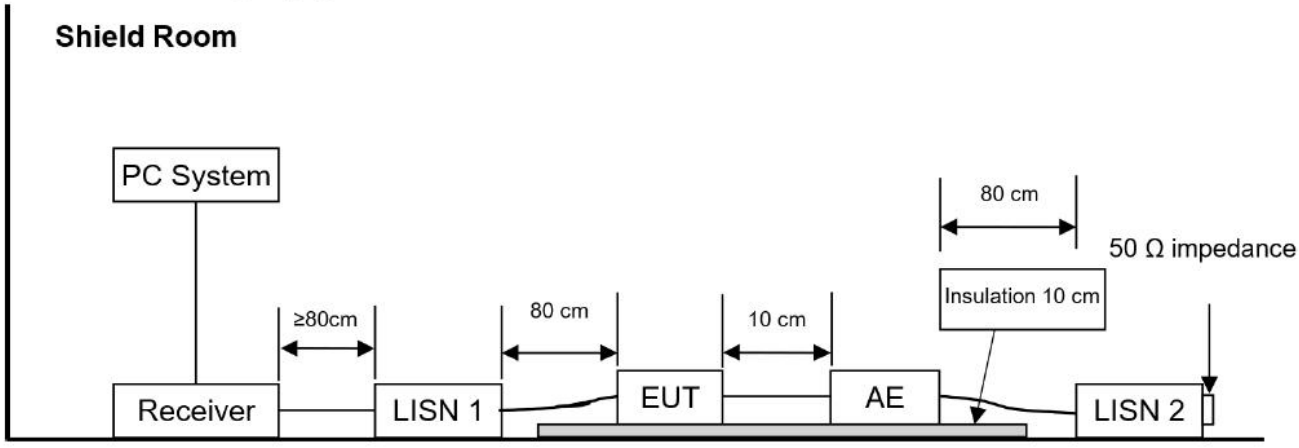
***Note: 1) Pre-scan all modes and recorded the worst case results in this report.

2) Margin= Reading level + Correct factor–Limit

Correct Factor=Lisn Factor+Cable Factor+Insertion loss of Pulse Limiter

5.1.3 Test Setup Diagram

For floor standing equipment

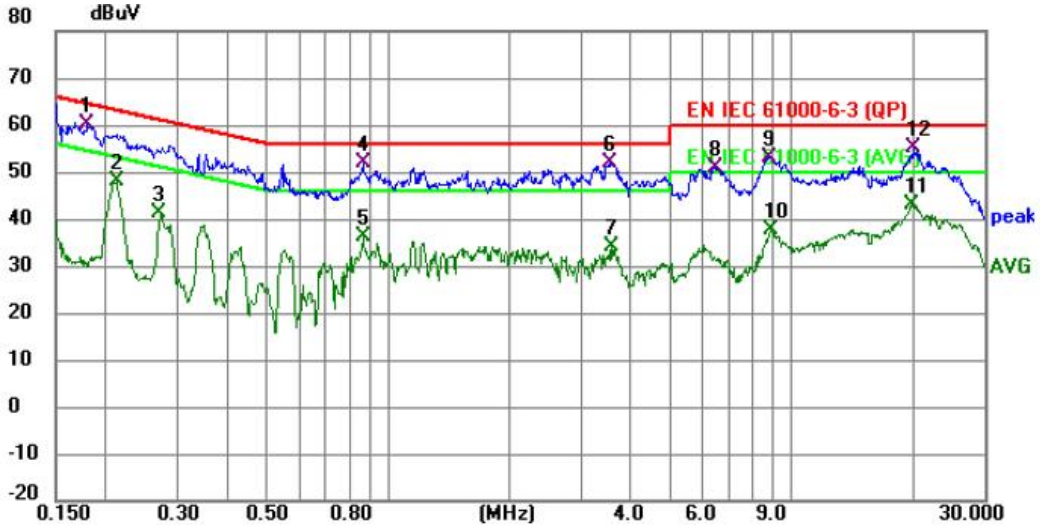


5.1.4 E.U.T. Operation

Operating Environment:			
Temperature:	23.3° C	Humidity:	53.7%RH
Test Engineer	KL Zheng		
Mode 1	Working(AC IN+AC OUT)	Voltage	AC 230V/50Hz

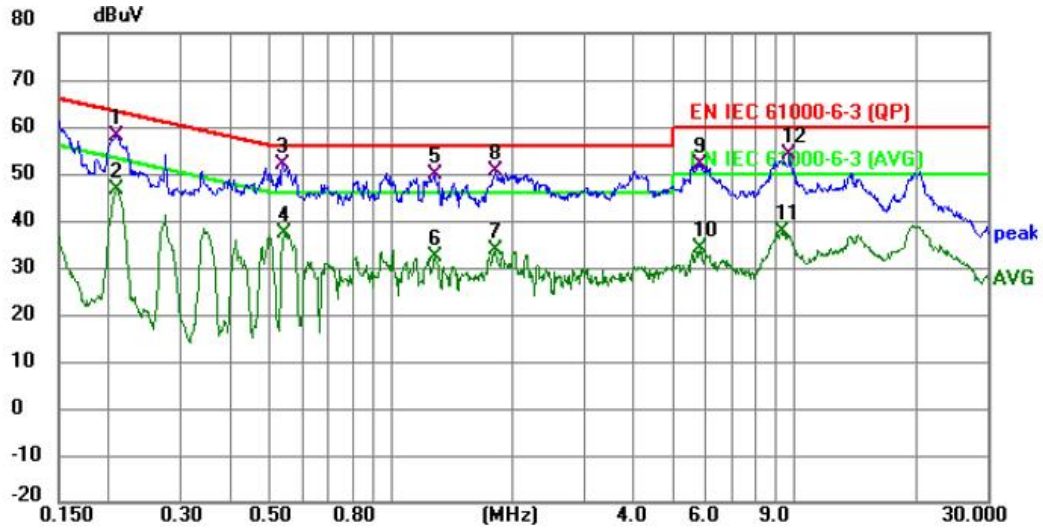
5.1.5 Test data

Mode 1 / Line: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1796	49.97	10.07	60.04	64.50	-4.46	QP	
2		0.2127	37.88	10.06	47.94	53.10	-5.16	AVG	
3		0.2714	31.03	10.05	41.08	51.07	-9.99	AVG	
4		0.8700	41.97	9.99	51.96	56.00	-4.04	QP	
5		0.8700	26.11	9.99	36.10	46.00	-9.90	AVG	
6	*	3.5610	41.99	10.02	52.01	56.00	-3.99	QP	
7		3.5655	24.14	10.02	34.16	46.00	-11.84	AVG	
8		6.4770	41.06	10.01	51.07	60.00	-8.93	QP	
9		8.7900	43.01	10.04	53.05	60.00	-6.95	QP	
10		8.8665	27.51	10.04	37.55	50.00	-12.45	AVG	
11		19.8552	32.51	10.42	42.93	50.00	-7.07	AVG	
12		20.0805	44.83	10.42	55.25	60.00	-4.75	QP	

Mode 1 / Line: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2084	48.13	10.07	58.20	63.27	-5.07	QP	
2		0.2084	36.68	10.07	46.75	53.27	-6.52	AVG	
3	*	0.5370	42.17	9.80	51.97	56.00	-4.03	QP	
4		0.5433	27.45	9.80	37.25	46.00	-8.75	AVG	
5		1.2882	39.66	9.99	49.65	56.00	-6.35	QP	
6		1.2882	22.37	9.99	32.36	46.00	-13.64	AVG	
7		1.8104	23.80	9.99	33.79	46.00	-12.21	AVG	
8		1.8192	40.59	9.99	50.58	56.00	-5.42	QP	
9		5.8513	41.93	9.97	51.90	60.00	-8.10	QP	
10		5.8513	24.03	9.97	34.00	50.00	-16.00	AVG	
11		9.3390	27.65	9.98	37.63	50.00	-12.37	AVG	
12		9.7080	44.21	9.98	54.19	60.00	-5.81	QP	

5.2 DC Power Port Conducted Emission

5.2.1 Limits

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
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.

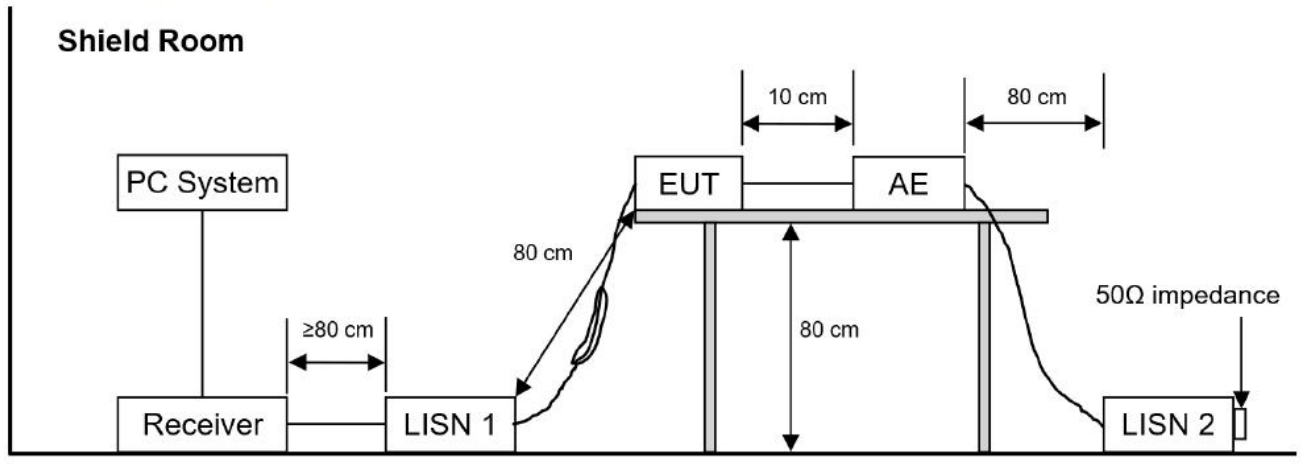
(3) The EUT's power was connected to the power mains through a line impedance stabilization network (L.I.S.N). which this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted 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.

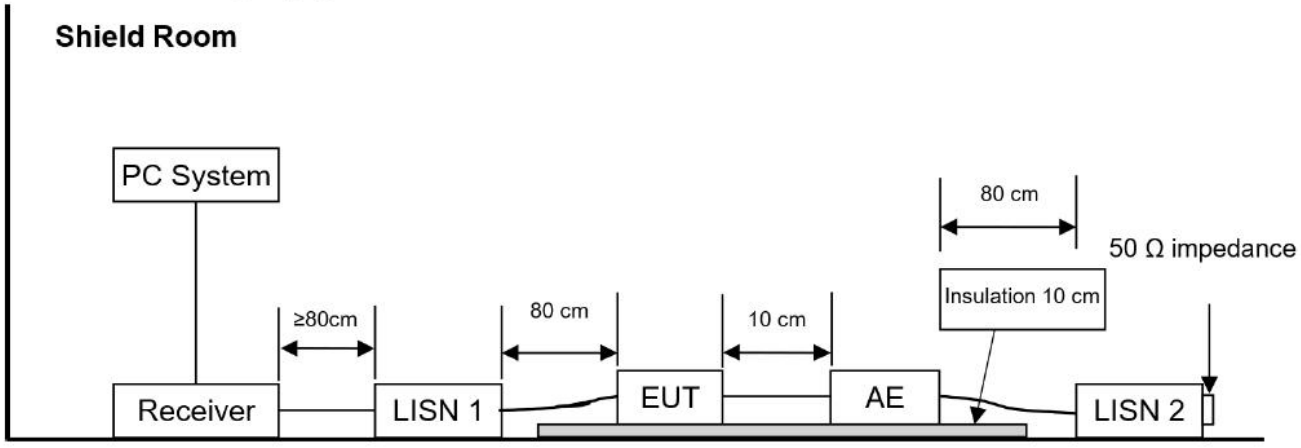
(5) The frequency range from 150 kHz to 30 MHz is checked.

5.2.3 Test Setup Diagram

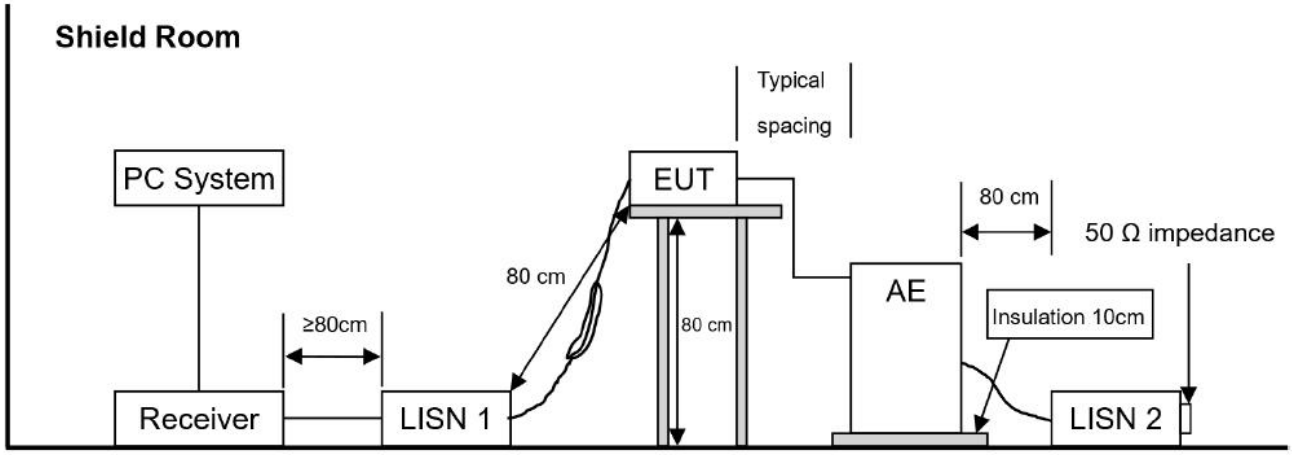
For table-top equipment



For floor standing equipment



For combinations equipment

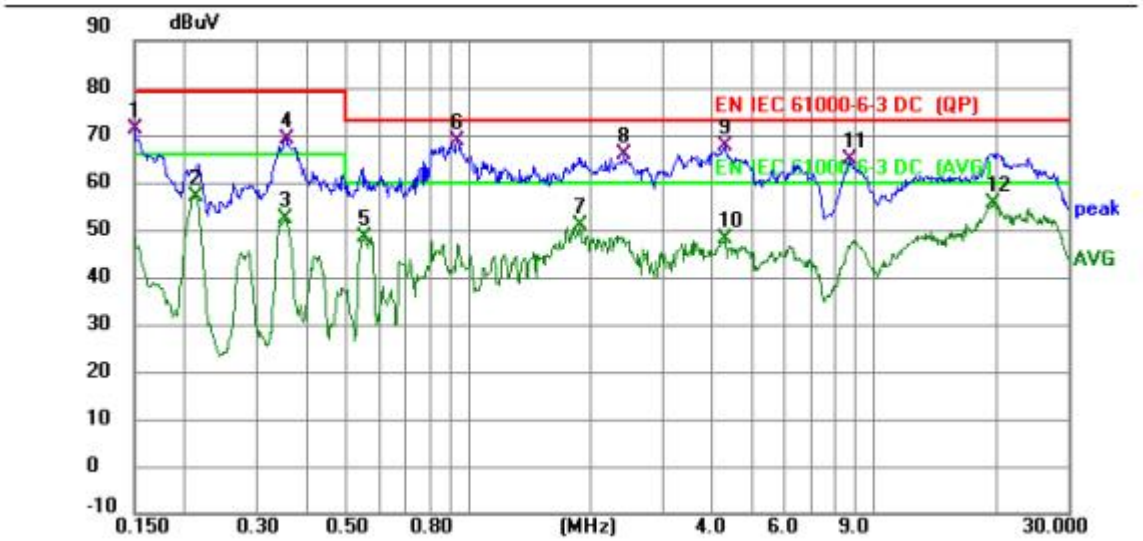


5.2.4 E.U.T. Operation

Operating Environment:			
Temperature:	23.3° C	Humidity:	53.7%RH
Test Engineer	KL Zheng		
Mode 3	Working(PV IN +AC OUT)	Voltage	DC 500V

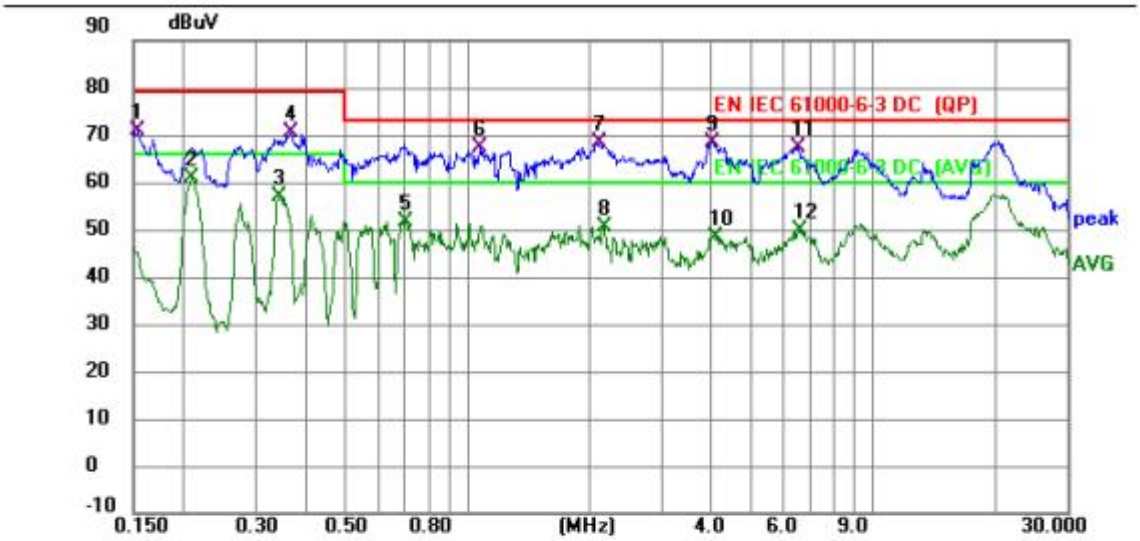
5.2.5 Test data

Mode 3 +



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	61.31	10.05	71.36	79.00	-7.64	QP	
2		0.2130	46.89	10.06	56.95	66.00	-9.05	AVG	
3		0.3523	42.44	9.92	52.36	66.00	-13.64	AVG	
4		0.3557	59.33	9.92	69.25	79.00	-9.75	QP	
5		0.5550	38.67	9.80	48.47	60.00	-11.53	AVG	
6	*	0.9375	58.64	9.99	68.63	73.00	-4.37	QP	
7		1.8870	40.83	10.03	50.86	60.00	-9.14	AVG	
8		2.4315	55.75	10.04	65.79	73.00	-7.21	QP	
9		4.2854	57.50	10.03	67.53	73.00	-5.47	QP	
10		4.2945	37.95	10.03	47.98	60.00	-12.02	AVG	
11		8.7270	54.76	10.04	64.80	73.00	-8.20	QP	
12		19.6305	45.13	10.41	55.54	60.00	-4.46	AVG	

Mode 3 -



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1544	60.72	10.07	70.79	79.00	-8.21	QP	
2		0.2084	50.68	10.07	60.75	66.00	-5.25	AVG	
3		0.3435	46.92	9.95	56.87	66.00	-9.13	AVG	
4		0.3653	60.69	9.92	70.61	79.00	-8.39	QP	
5		0.7035	41.75	9.92	51.67	60.00	-8.33	AVG	
6		1.0725	57.18	9.99	67.17	73.00	-5.83	QP	
7		2.1120	58.25	10.00	68.25	73.00	-4.75	QP	
8		2.1750	40.54	10.00	50.54	60.00	-9.46	AVG	
9	*	4.0109	58.55	10.01	68.56	73.00	-4.44	QP	
10		4.0875	38.48	10.01	48.49	60.00	-11.51	AVG	
11		6.5533	57.39	9.97	67.36	73.00	-5.64	QP	
12		6.5625	40.03	9.97	50.00	60.00	-10.00	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.

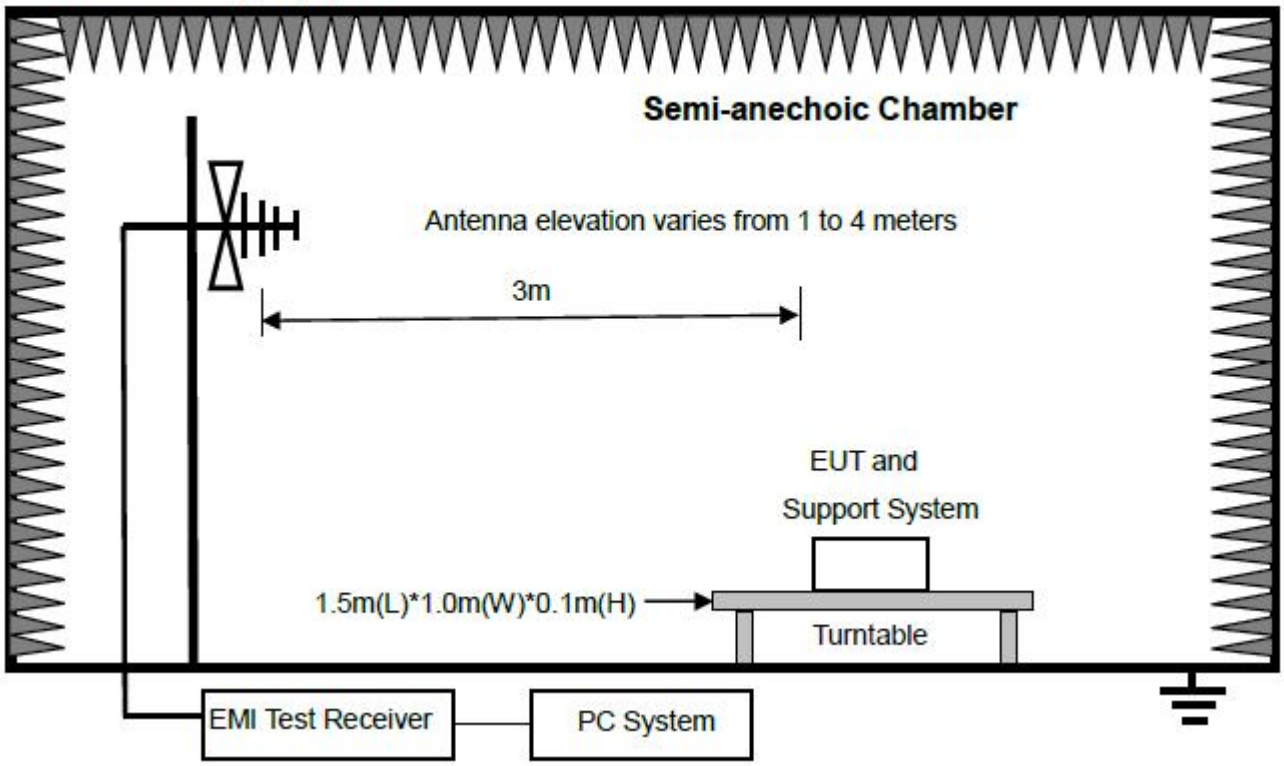
Note:1).Pre-Scan all mode, Thus record worse case mode result in this report.

2) Margin= Reading level + Correct factor – Limit

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

5.3.3 Test Setup Diagram

For floor standing equipment

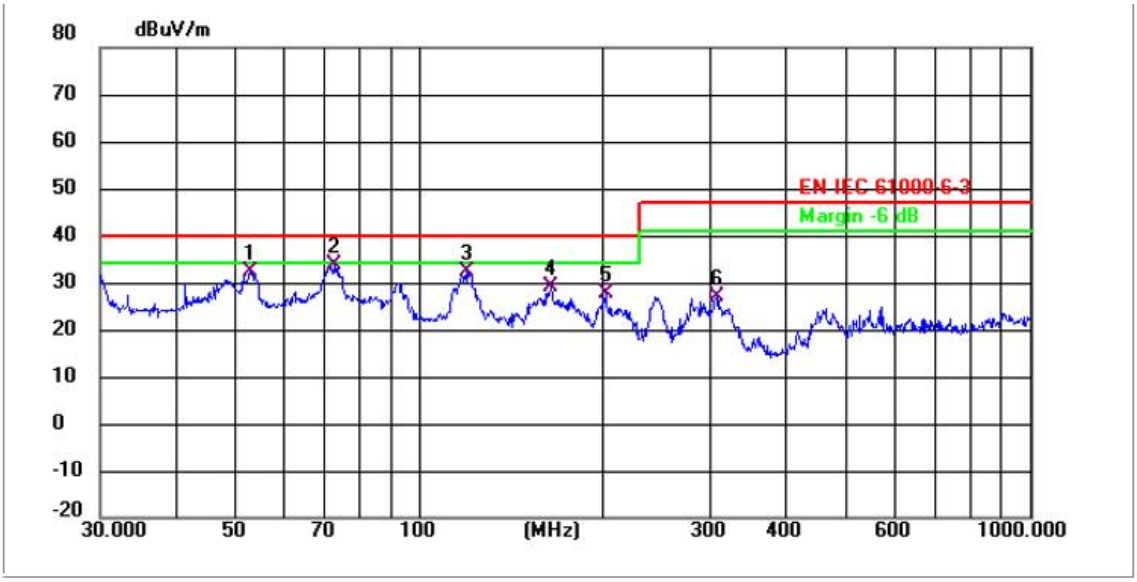


5.3.4 E.U.T. Operation

Operating Environment:			
Temperature:	26° C	Humidity:	54%RH
Test Engineer	KL Zheng		
Mode 1	Working(AC IN+AC OUT)	Voltage	AC 230V/50Hz
Mode 2	Working(Battery OUT)	Voltage	DC 25.6V
Mode 3	Working(PV IN +AC OUT)	Voltage	DC 500V

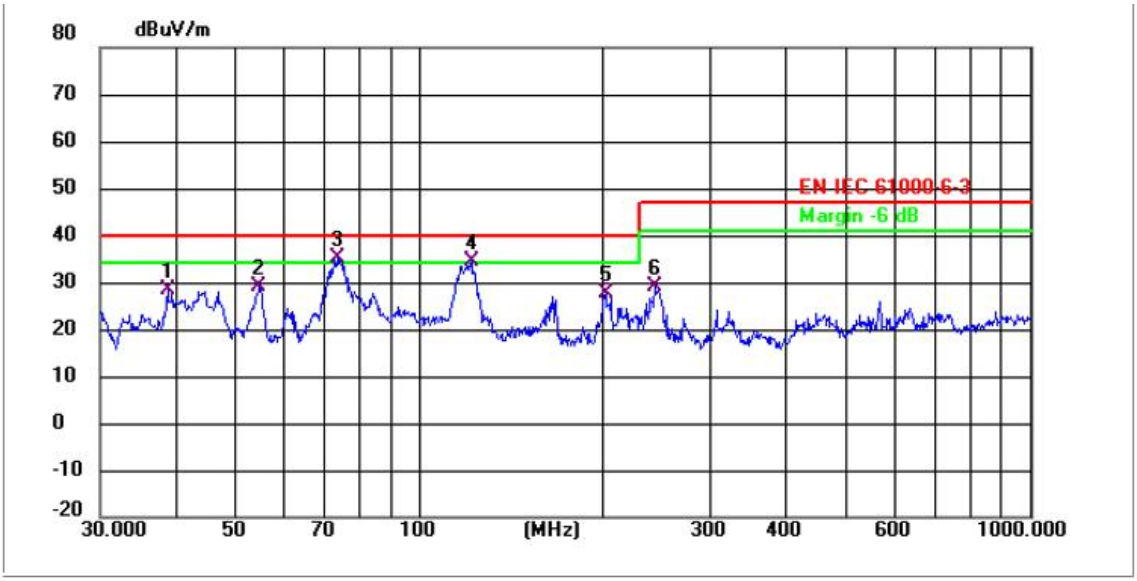
5.3.5 Test data

Mode 1 / Polarization: Vertical



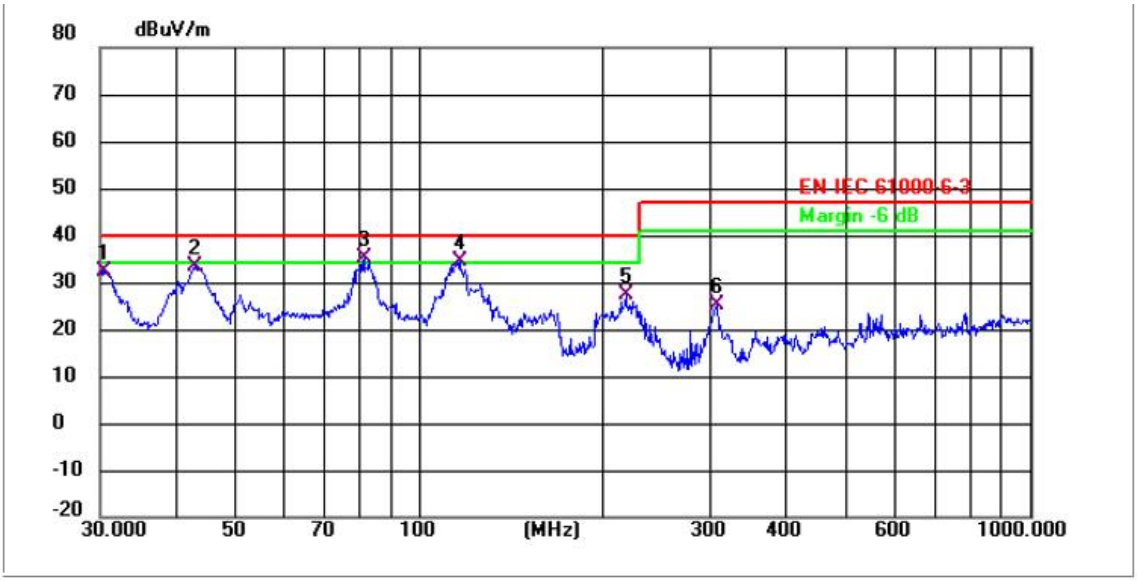
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	52.7600	48.36	-16.15	32.21	40.00	-7.79	QP	P	
2 *	72.3375	54.20	-20.61	33.59	40.00	-6.41	QP	P	
3	119.8555	51.96	-19.70	32.26	40.00	-7.74	QP	P	
4	163.7550	49.99	-20.87	29.12	40.00	-10.88	QP	P	
5	202.1004	47.04	-19.20	27.84	40.00	-12.16	QP	P	
6	305.6800	42.80	-15.86	26.94	47.00	-20.06	QP	P	

Mode 1 / Polarization: Horizontal



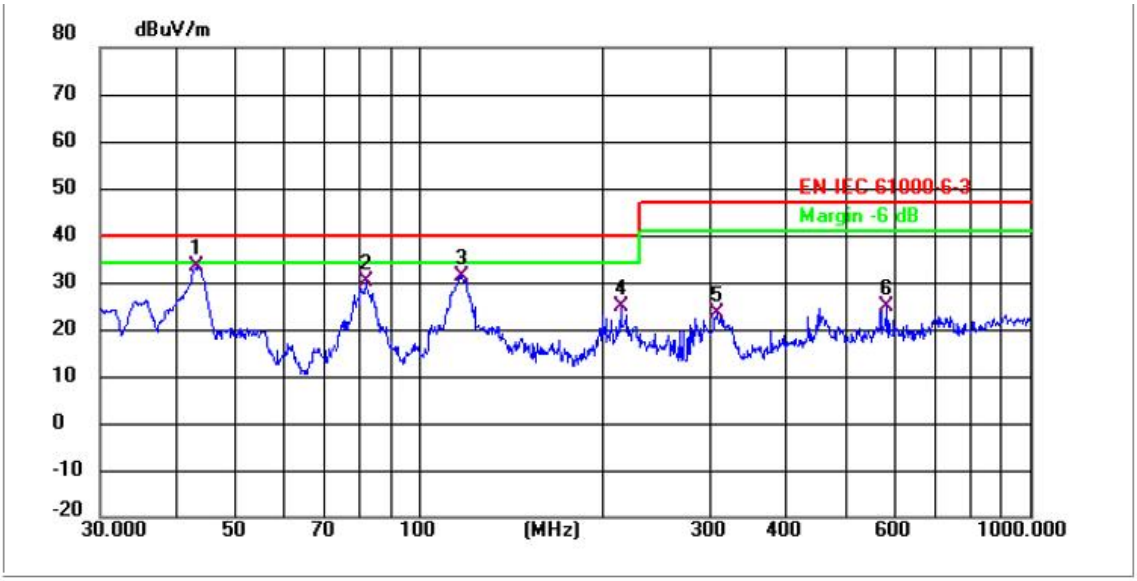
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	38.7516	46.20	-17.69	28.51	40.00	-11.49	QP	P	
2	54.6428	45.77	-16.51	29.26	40.00	-10.74	QP	P	
3 *	73.3593	55.73	-20.62	35.11	40.00	-4.89	QP	P	
4 !	121.5485	54.85	-20.24	34.61	40.00	-5.39	QP	P	
5	202.1004	46.79	-19.20	27.59	40.00	-12.41	QP	P	
6	242.5252	46.72	-17.49	29.23	47.00	-17.77	QP	P	

Mode 2 / Polarization: Vertical



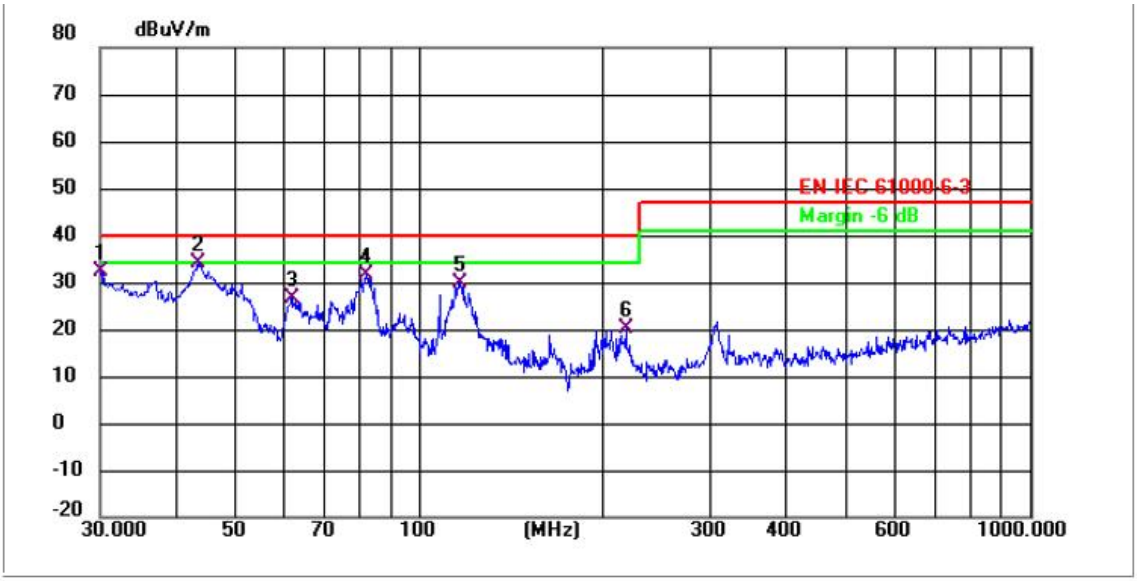
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	30.4237	50.44	-18.23	32.21	40.00	-7.79	QP	P	
2	42.8997	50.23	-17.00	33.23	40.00	-6.77	QP	P	
3 *	81.2116	56.29	-20.99	35.30	40.00	-4.70	QP	P	
4 !	116.5400	53.27	-18.67	34.60	40.00	-5.40	QP	P	
5	217.5441	45.69	-18.28	27.41	40.00	-12.59	QP	P	
6	305.6800	41.00	-15.86	25.14	47.00	-21.86	QP	P	

Mode 2 / Polarization: Horizontal



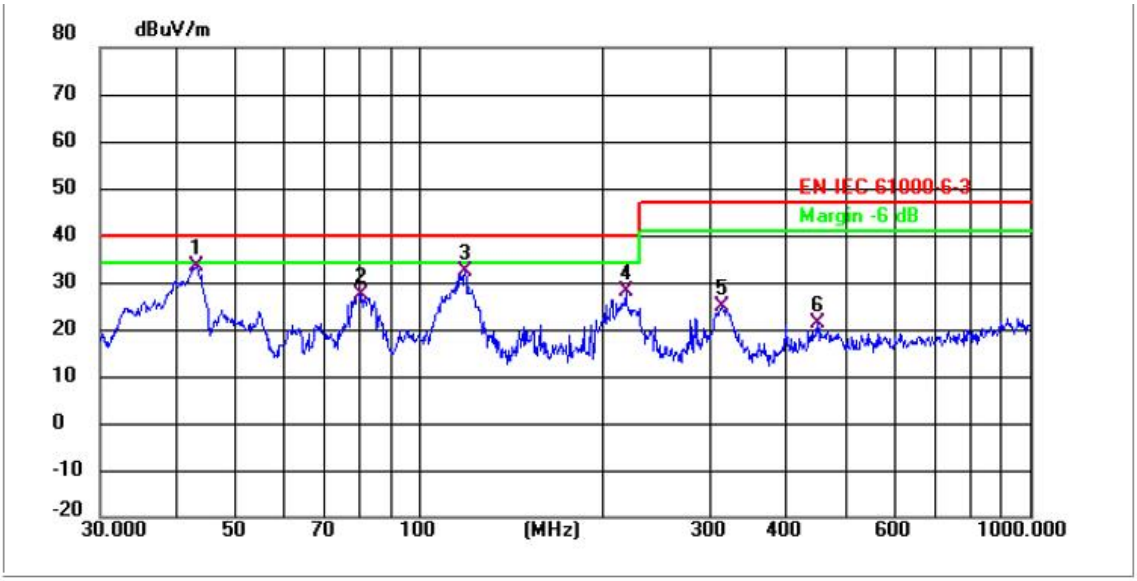
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	43.2014	50.48	-16.94	33.54	40.00	-6.46	QP	P	
2	81.7831	51.14	-20.94	30.20	40.00	-9.80	QP	P	
3	117.3602	50.15	-18.90	31.25	40.00	-8.75	QP	P	
4	213.7632	43.21	-18.45	24.76	40.00	-15.24	QP	P	
5	306.7536	39.39	-15.94	23.45	47.00	-23.55	QP	P	
6	580.7024	35.95	-11.10	24.85	47.00	-22.15	QP	P	

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	30.1052	50.48	-18.20	32.28	40.00	-7.72	QP	P	
2 *	43.3534	50.85	-16.91	33.94	40.00	-6.06	QP	P	
3	61.9950	45.16	-18.55	26.61	40.00	-13.39	QP	P	
4	82.0704	52.64	-20.91	31.73	40.00	-8.27	QP	P	
5	116.9493	48.40	-18.75	29.65	40.00	-10.35	QP	P	
6	217.5442	38.62	-18.28	20.34	40.00	-19.66	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 *	43.0505	50.42	-16.97	33.45	40.00	-6.55	QP	P	
2	80.3619	48.68	-21.19	27.49	40.00	-12.51	QP	P	
3	118.6014	51.70	-19.29	32.41	40.00	-7.59	QP	P	
4	217.5443	46.44	-18.28	28.16	40.00	-11.84	QP	P	
5	313.2760	41.00	-16.32	24.68	47.00	-22.32	QP	P	
6	447.9822	34.55	-13.38	21.17	47.00	-25.83	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

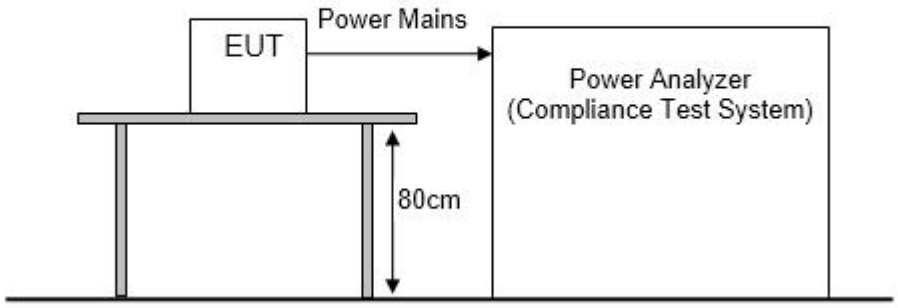
13≤h≤39 (odd harmonic only)	3.85/n	0.15*15/h

5.4.2 Test procedure

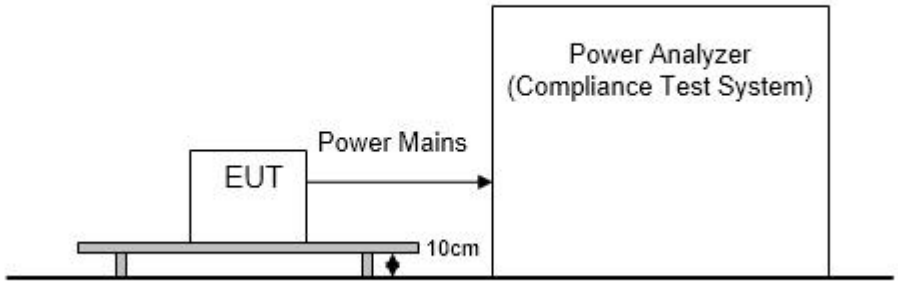
The EUT is placed on top of a wooden table (according to the standard height requirements, refer to the test layout) the maximum, harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current 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:	21.5° C	Humidity:	52.9%RH
Test Engineer	KL Zheng		
Mode 1	Working(AC IN+AC OUT)	Voltage	AC 230V/50Hz

5.4.5 Test data

Mode 1

Ha	Result	100% Avg	150% Smo
2	OK	Disregarded	Disregarded
		0.609 A ≤ 32.595 A	0.599 A ≤ 32.595 A
3	OK	Disregarded	Disregarded
		1.926 A ≤ 32.595 A	2.110 A ≤ 32.595 A
4	OK	Disregarded	Disregarded
		0.297 A ≤ 32.595 A	0.289 A ≤ 32.595 A
5	OK	Disregarded	Disregarded
		0.385 A ≤ 32.595 A	0.325 A ≤ 32.595 A
6	OK	Disregarded	Disregarded
		0.225 A ≤ 32.595 A	0.227 A ≤ 32.595 A
7	OK	Disregarded	Disregarded
		0.884 A ≤ 32.595 A	0.904 A ≤ 32.595 A
8	OK	Disregarded	Disregarded
		0.263 A ≤ 32.595 A	0.252 A ≤ 32.595 A
9	OK	Disregarded	Disregarded
		0.609 A ≤ 32.595 A	0.597 A ≤ 32.595 A
10	OK	Disregarded	Disregarded
		0.156 A ≤ 32.595 A	0.148 A ≤ 32.595 A
11	OK	Disregarded	Disregarded
		0.617 A ≤ 32.595 A	0.613 A ≤ 32.595 A
12	OK	Disregarded	Disregarded
		0.163 A ≤ 32.595 A	0.179 A ≤ 32.595 A
13	OK	Disregarded	Disregarded
		0.565 A ≤ 32.595 A	0.581 A ≤ 32.595 A
14	OK	Disregarded	Disregarded
		0.178 A ≤ 32.595 A	0.178 A ≤ 32.595 A
15	OK	Disregarded	Disregarded
		0.302 A ≤ 32.595 A	0.301 A ≤ 32.595 A
16	OK	Disregarded	Disregarded
		0.184 A ≤ 32.595 A	0.187 A ≤ 32.595 A
17	OK	Disregarded	Disregarded
		0.527 A ≤ 32.595 A	0.535 A ≤ 32.595 A
18	OK	Disregarded	Disregarded
		0.204 A ≤ 32.595 A	0.213 A ≤ 32.595 A
19	OK	Disregarded	Disregarded
		0.574 A ≤ 32.595 A	0.590 A ≤ 32.595 A
20	OK	Disregarded	Disregarded
		0.183 A ≤ 32.595 A	0.180 A ≤ 32.595 A
21	OK	Disregarded	Disregarded
		0.280 A ≤ 32.595 A	0.267 A ≤ 32.595 A
22	OK	Disregarded	Disregarded
		0.184 A ≤ 32.595 A	0.176 A ≤ 32.595 A
23	OK	Disregarded	Disregarded
		0.403 A ≤ 32.595 A	0.402 A ≤ 32.595 A
24	OK	Disregarded	Disregarded
		0.193 A ≤ 32.595 A	0.198 A ≤ 32.595 A
25	OK	Disregarded	Disregarded
		0.480 A ≤ 32.595 A	0.501 A ≤ 32.595 A
26	OK	Disregarded	Disregarded
		0.280 A ≤ 32.595 A	0.281 A ≤ 32.595 A
27	OK	Disregarded	Disregarded

		0.267 A ≤ 32.595 A	0.266 A ≤ 32.595 A
28	OK	Disregarded	Disregarded
		0.270 A ≤ 32.595 A	0.271 A ≤ 32.595 A
29	OK	Disregarded	Disregarded
		0.355 A ≤ 32.595 A	0.344 A ≤ 32.595 A
30	OK	Disregarded	Disregarded
		0.191 A ≤ 32.595 A	0.193 A ≤ 32.595 A
31	OK	Disregarded	Disregarded
		0.403 A ≤ 32.595 A	0.415 A ≤ 32.595 A
32	OK	Disregarded	Disregarded
		0.190 A ≤ 32.595 A	0.186 A ≤ 32.595 A
33	OK	Disregarded	Disregarded
		0.314 A ≤ 32.595 A	0.317 A ≤ 32.595 A
34	OK	Disregarded	Disregarded
		0.200 A ≤ 32.595 A	0.194 A ≤ 32.595 A
35	OK	Disregarded	Disregarded
		0.314 A ≤ 32.595 A	0.305 A ≤ 32.595 A
36	OK	Disregarded	Disregarded
		0.201 A ≤ 32.595 A	0.201 A ≤ 32.595 A
37	OK	Disregarded	Disregarded
		0.332 A ≤ 32.595 A	0.342 A ≤ 32.595 A
38	OK	Disregarded	Disregarded
		0.196 A ≤ 32.595 A	0.195 A ≤ 32.595 A
39	OK	Disregarded	Disregarded
		0.304 A ≤ 32.595 A	0.300 A ≤ 32.595 A
40	OK	Disregarded	Disregarded
		0.199 A ≤ 32.595 A	0.206 A ≤ 32.595 A

5.5 Voltage Fluctuations& Flicker Test

5.5.1 Limits

Voltage fluctuations & flicker Limit

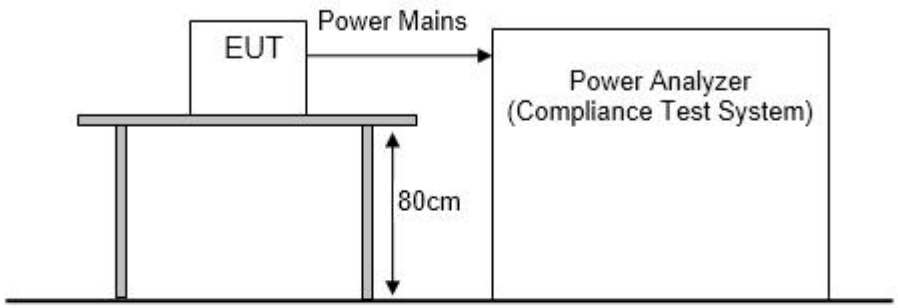
Test Item	Limit	Note
Pst	1.0	Pst means Short-term flicker indicator
Plt	0.65	Plt means long-term flicker indicator
Tdt	0.5	Tdt means maximum time that dt exceeds 3.3%
dmax (%)	4%	dmax means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change.

5.5.2 Test procedure

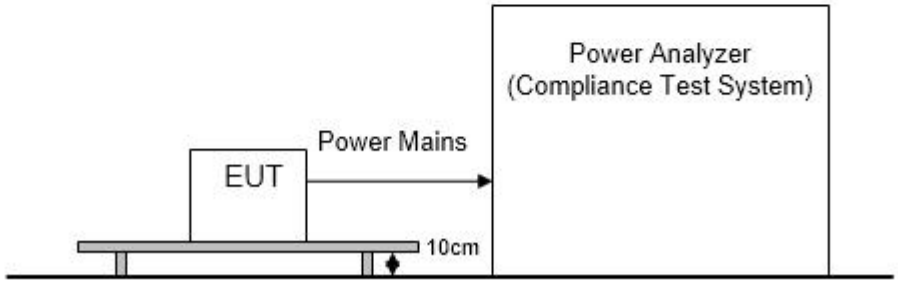
The EUT is placed on top of a wooden table (according to the standard height requirements, refer to the test layout), the most unfavorable sequence of voltage changes under normal conditions during the flick measurement; the measure time shall include that part of whole operation changes. The observation 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:	25.6° C	Humidity:	55.3%RH
Test Engineer	KL Zheng		
Mode 1	Working(AC IN+AC OUT)	Voltage	AC 230V/50Hz

5.5.5 Test data

Mode 1

Test Name	Test Result	Limit Usage		Info
dc Test [L1]	OK		0.7 %	0.0 % ≤ 3.3 %
dmax Test [L1]	OK		0.0 %	0.00 % ≤ 4.00 %
Pst Test [L1]	OK		5.4 %	0.054 ≤ 1.000
Plt Test [L1]	OK		8.3 %	0.054 ≤ 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:

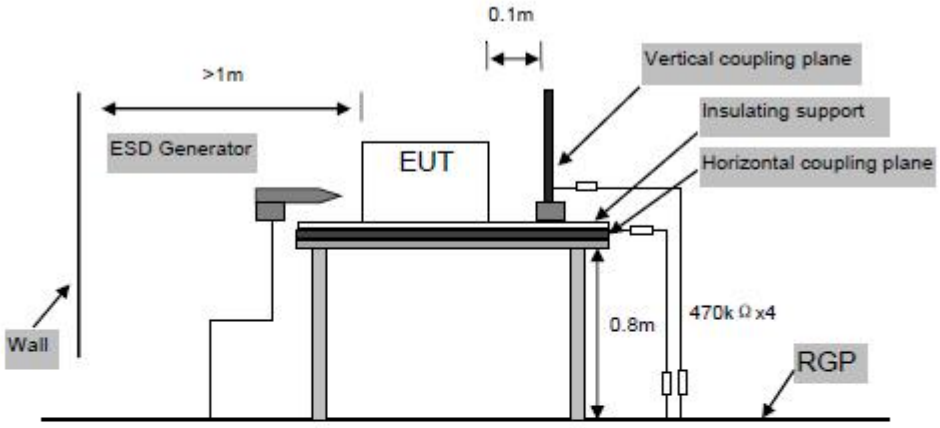
At least 20 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane:

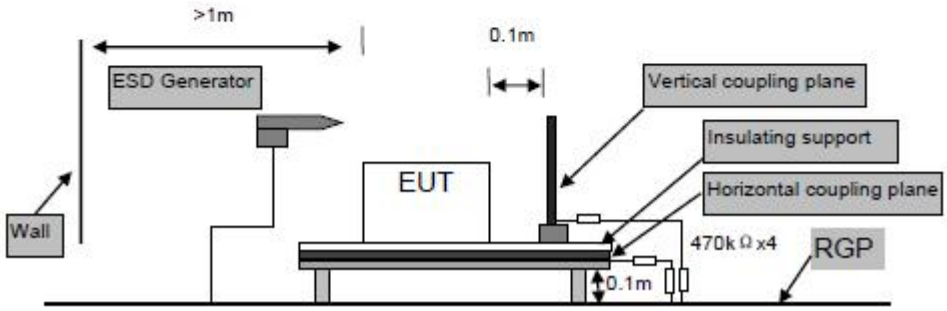
At least 20 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different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

6.1.3 Test Setup Diagram

Table-top equipment



Floor-standing equipment



6.1.4 Test data

Operating Environment:			
Test Site:	ELECTROSTATIC DISCHARG IMMUNITY TEST （0KV-30KV）	Test Engineer	KL Zheng
Temperature:	23.6° C	Humidity:	52.2%RH
Memo:	/		

Sample No.: A260512103002	Mode 1: Working(AC IN+AC OUT)
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	A	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left Right, Top, Bottom	B	A	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.: A260512103002	Mode 3: Working(PV IN +AC OUT)
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	A	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left Right, Top, Bottom	B	A	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.: A260512103002	Mode 2: Working(Battery OUT)
Test voltage: DC 25.6V	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	A	Pass
Contact to coupling planes	±4kV	Coupling planes	B	A	Pass
Air	±2 kV /±4 kV /±8kV	Front, Back, Left Right, Top, Bottom	B	A	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

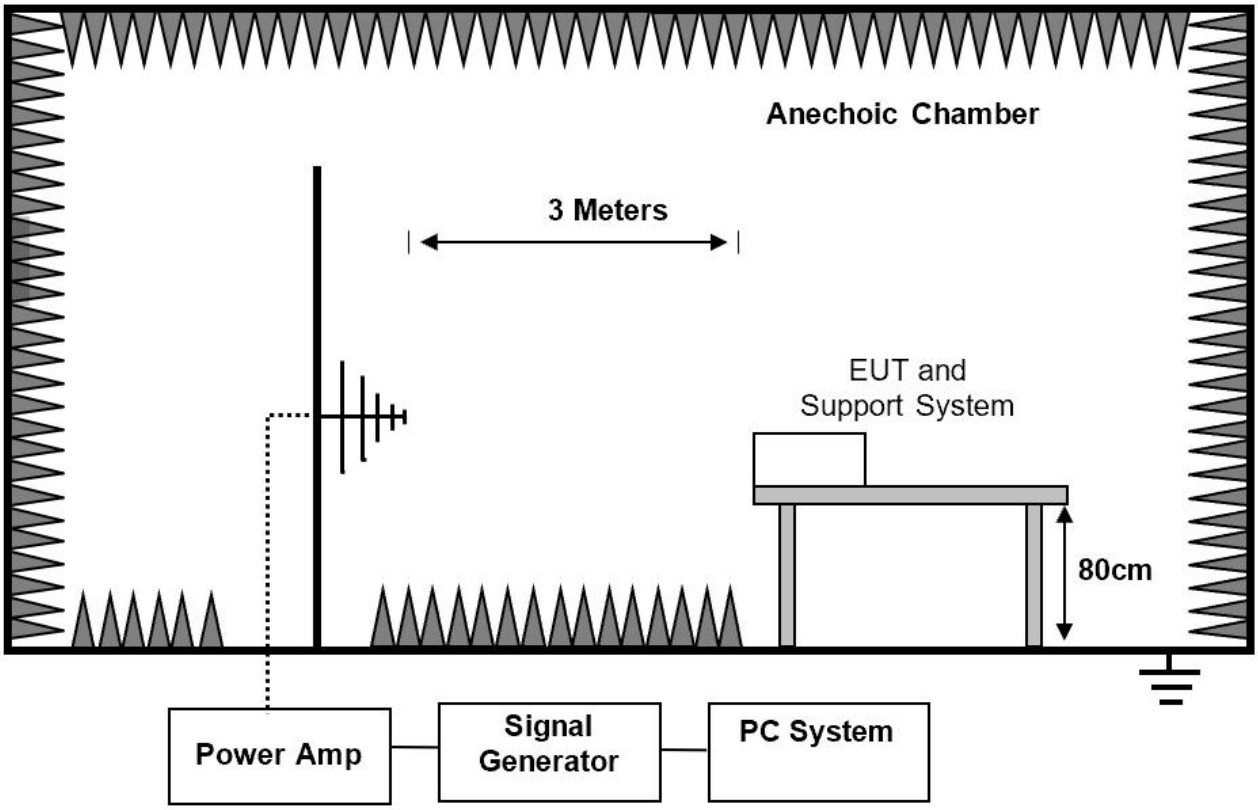
Swept frequency test		Performance Criteria
Frequency (MHz)	80 to 1000; 1400 to 6000	A
Field Strength	3V/m rms voltage level of the unmodulated signal	
Modulation	AM modulated to a depth of 80% by a sine wave of ☒1 kHz	
Step Size	1% increments	
Dwell time	1 Sec.	
Performance criteria A description for 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

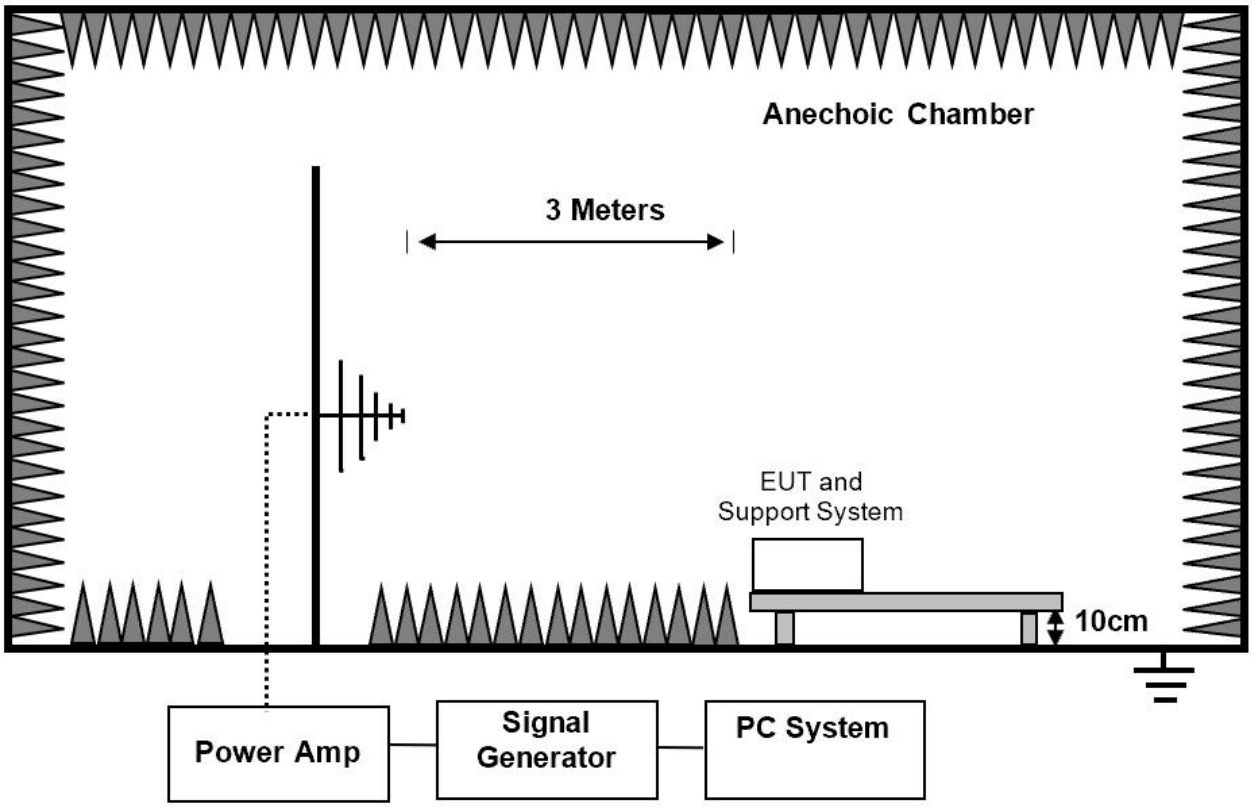
The field sensor is placed on the EUT table (Ground clearance height reference "block diagram of test setup") which is 3 meters away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength around the EUT table from frequency 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	KL Zheng
Temperature:	24.3° C	Humidity:	56.1%RH
Memo:	/		

Sample No.: A260512103002	Mode 1: Working(AC IN+AC OUT)
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.: A260512103002	Mode 2: Working(Battery OUT)
Test voltage: DC 25.6V	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.: A260512103002	Mode 3: Working(PV IN +AC OUT)
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.						

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 0.1m ± 0.01m thick. The ground reference plane was 1m*1m 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:

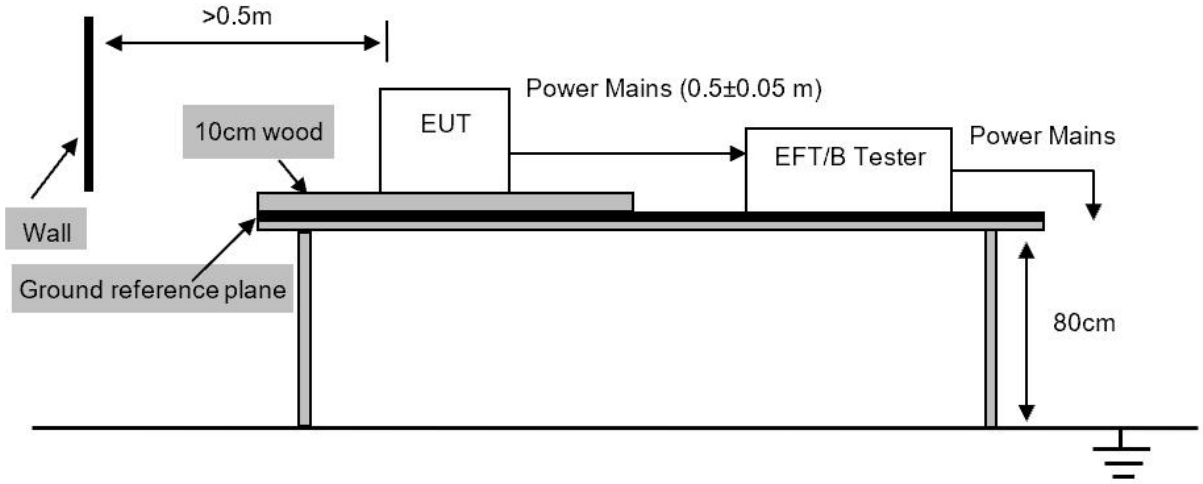
The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC or DC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 2mins.

For analogue/digital data ports:

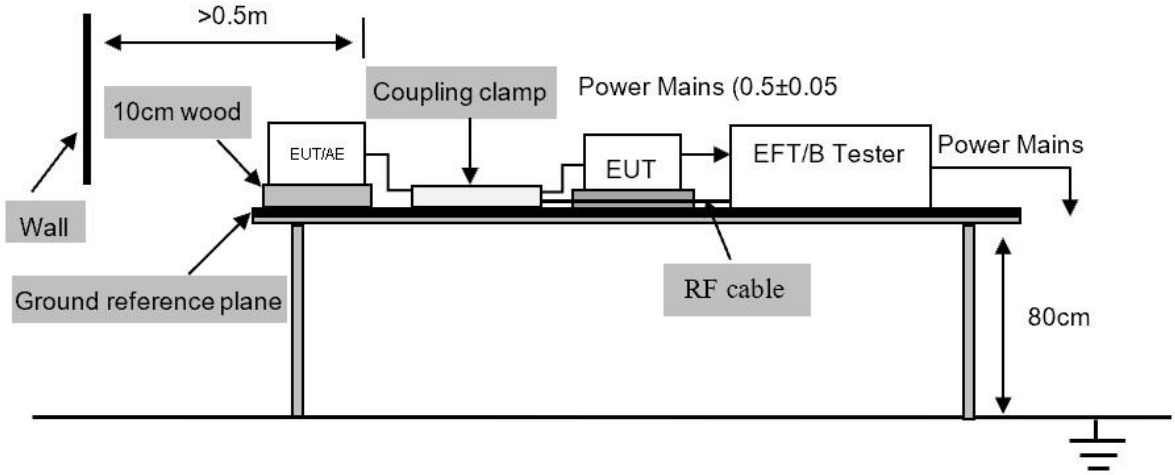
The capacitive coupling clamp was connected to the power by using a coupling device that couples the EFT interference signal to capacitive coupling clamp. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 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:	High Power ELECTICAL FAST TRANSIENT/BURST IMMUNITY TEST（UP TO 4KV)	Test Engineer	KL Zheng
Temperature:	22.3° C	Humidity:	52.3%RH
Memo:	/		

Sample No.: A260512103002	Mode 1: Working(AC IN+AC OUT)
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-N	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
	PE-L	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
	PE-N	+1kV	120	B	B	Pass
		-1kV	120	B	B	Pass
	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) μs	B
Line to Ground	2 kV 1.2/50(8/20) μs	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) μs (symmetrically)	B
Line to Ground or Shield to Ground	1 kV 1.2/50(8/20) μs (non-symmetrically)	B
Line to Line	0.5 kV 1.2/50(8/20) μs (non-symmetrically)	B
Wired network port (indoor)		Performance Criterion
Line to Ground or Shield to Ground	0.5 kV 1.2/50(8/20) μs (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.

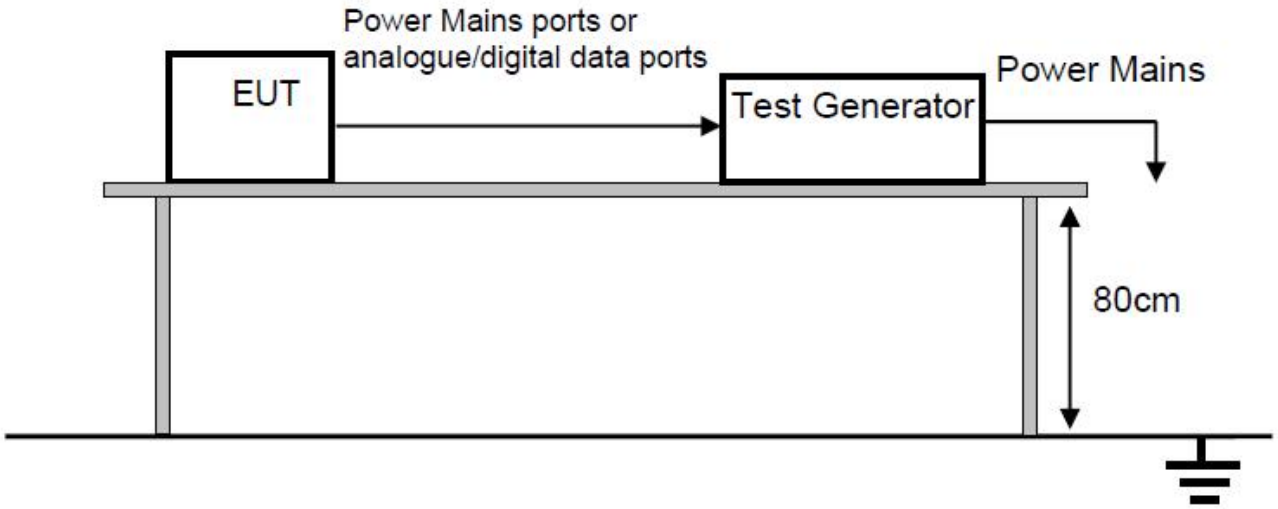
Different phase angles are done individually.

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:	High Power Surges IMMUNITY TEST	Test Engineer	KL Zheng
Temperature:	23.3° C	Humidity:	52.3%RH
Memo:	/		

Sample No.: A260512103002	Mode 1: Working(AC IN+AC OUT)
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
L-PE	12Ω	+2kV	B	B	Pass
	12Ω	-2kV	B	B	Pass
N-PE	12Ω	+2kV	B	B	Pass
	12Ω	-2kV	B	B	Pass
L-N-PE	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.

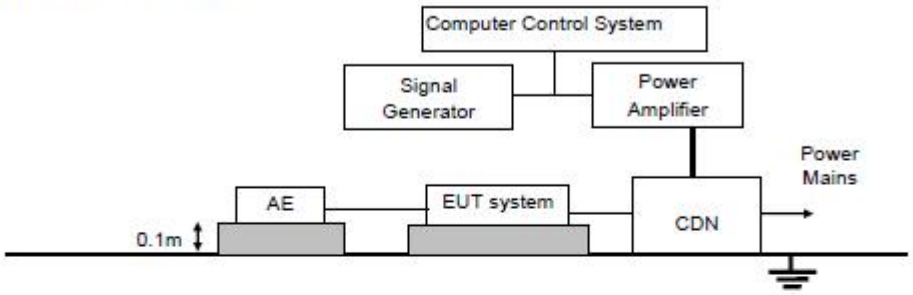
Use the frequency range specified by the standard, interference signal level, and interference signal for testing.

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

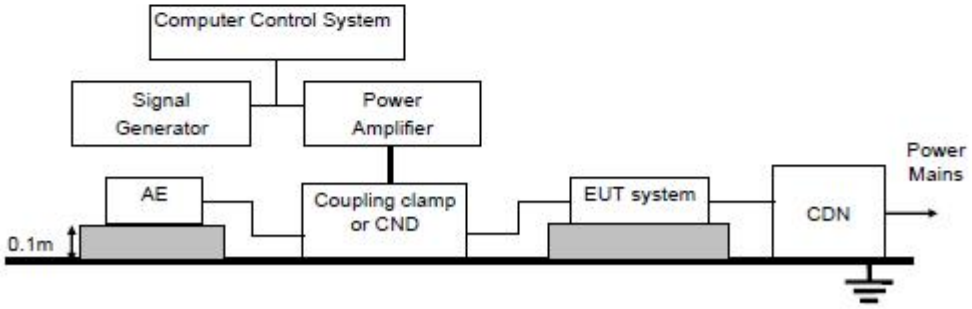
Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

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:	High Power INJECTED CURRENTS SUSCEPTIBILITY TEST （150kHz-230MHz）	Test Engineer	KL Zheng
Temperature:	23.3° C	Humidity:	52.3%RH
Memo:	/		

Sample No.: A260512103002	Mode 1: Working(AC IN+AC OUT)
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

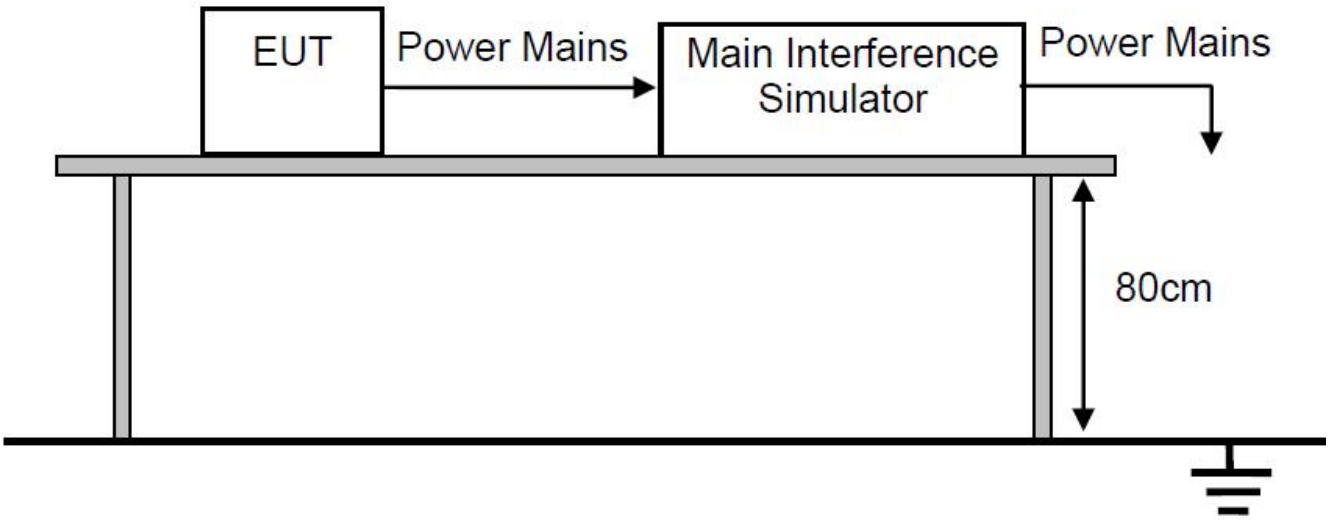
Test Level %UT	Duration (in period)	Performance Criterion
0	0.5	B
0	1	B
70	25 for 50Hz/30 for 60Hz	C
0	250 for 50Hz/300 for 60Hz	C

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	KL Zheng
Temperature:	23.6° C	Humidity:	52.2%RH
Memo:	/		

Sample No.: A260512103002	Mode 1: Working(AC IN+AC OUT)
Test voltage: AC 230V/50Hz	Memo:

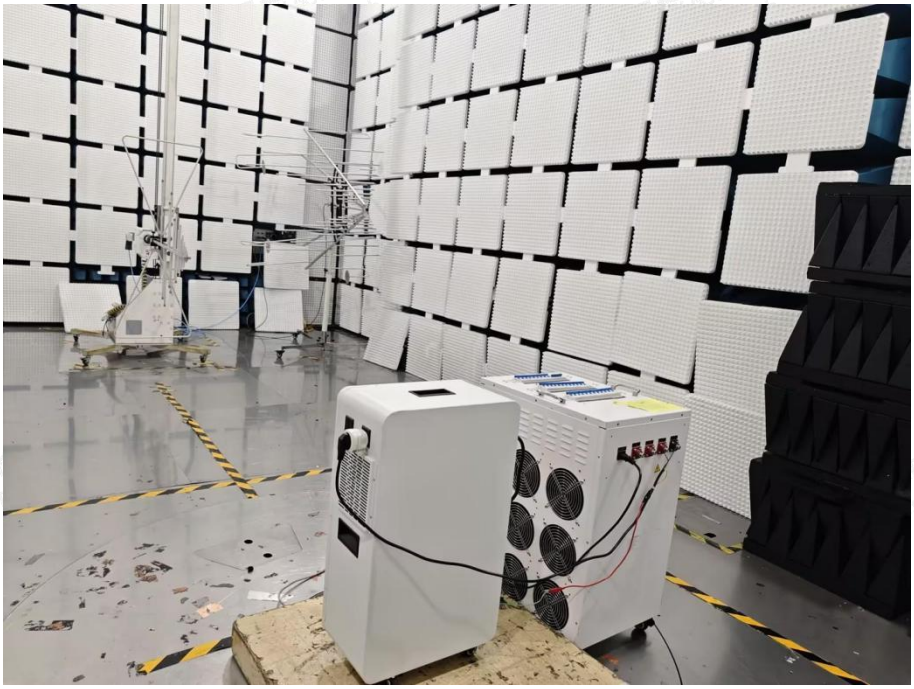
Voltage Dips & Short Interruptions %U_T	Duration (in period)	Phase Angle	Required	Observation	Result
0	0.5P	0° to 360°	B	B	Pass
0	1P	0° to 360°	B	B	Pass
70	25P	0° to 360°	C	C	Pass
0	250P	0° to 360°	C	C	Pass

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

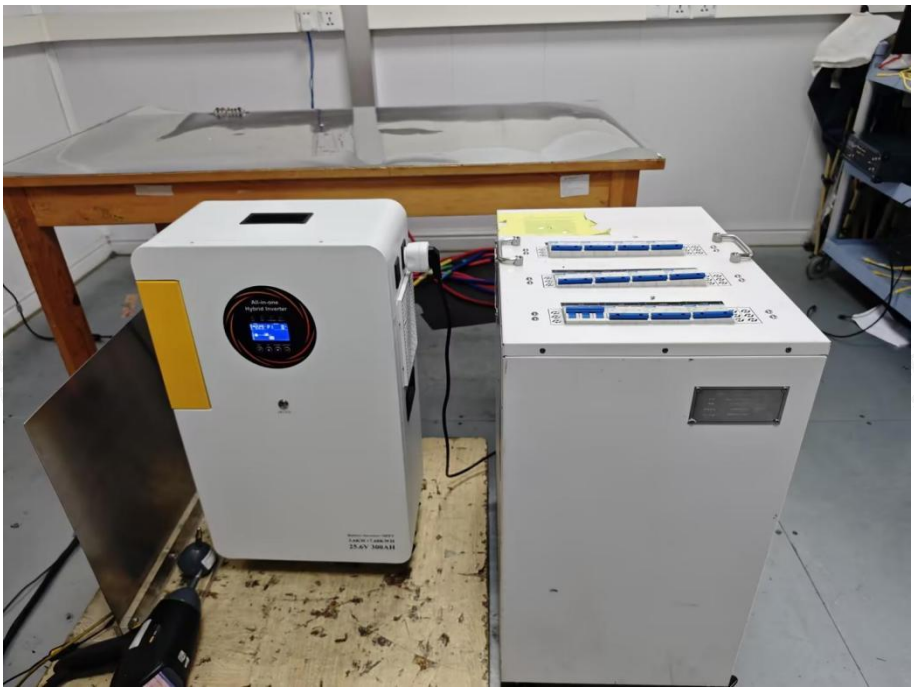
Radiated Emissions(30-1000MHz)



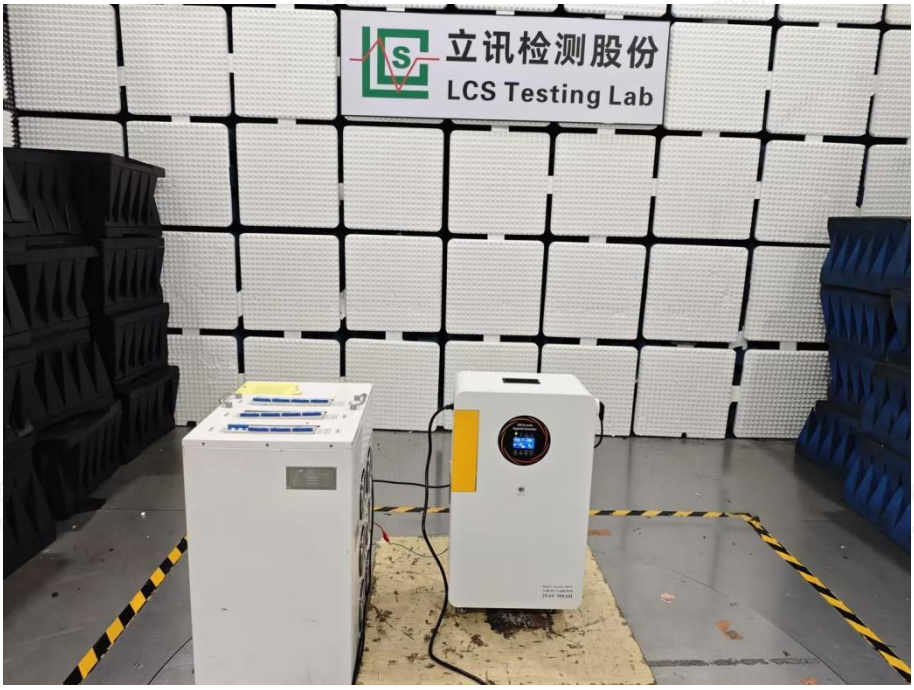
Harmonic Current Emissions Test

Voltage Fluctuations& Flicker Test

Electrostatic Discharge Test



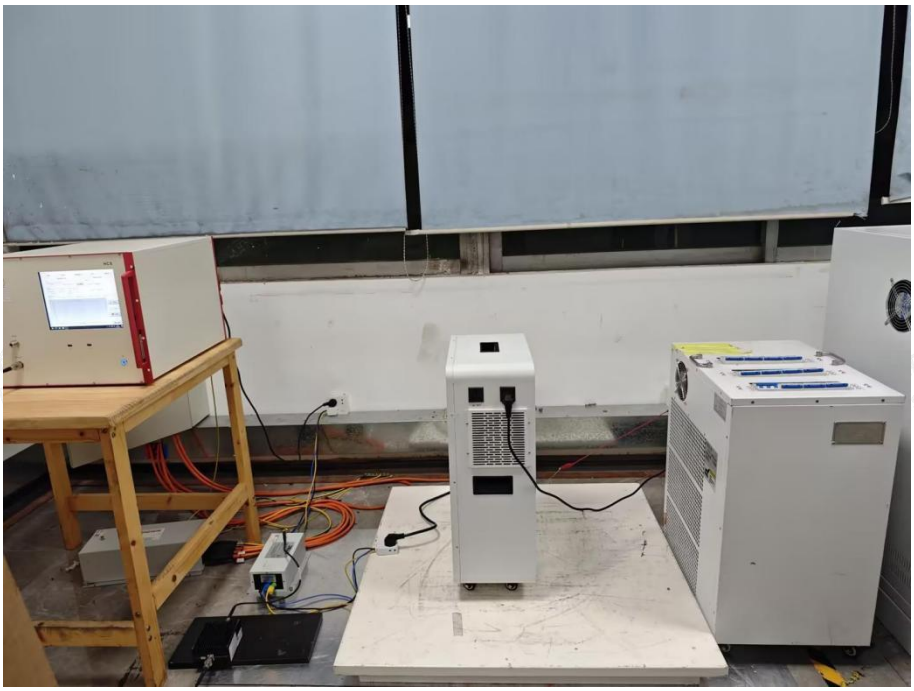
Continuous Radio Frequency Disturbances Test



Electrical Fast Transients(EFT) Test

Surge Test

Continuous Conducted Disturbances Test



Voltage Dips and Interruptions Test

8. EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)

Fig. 1

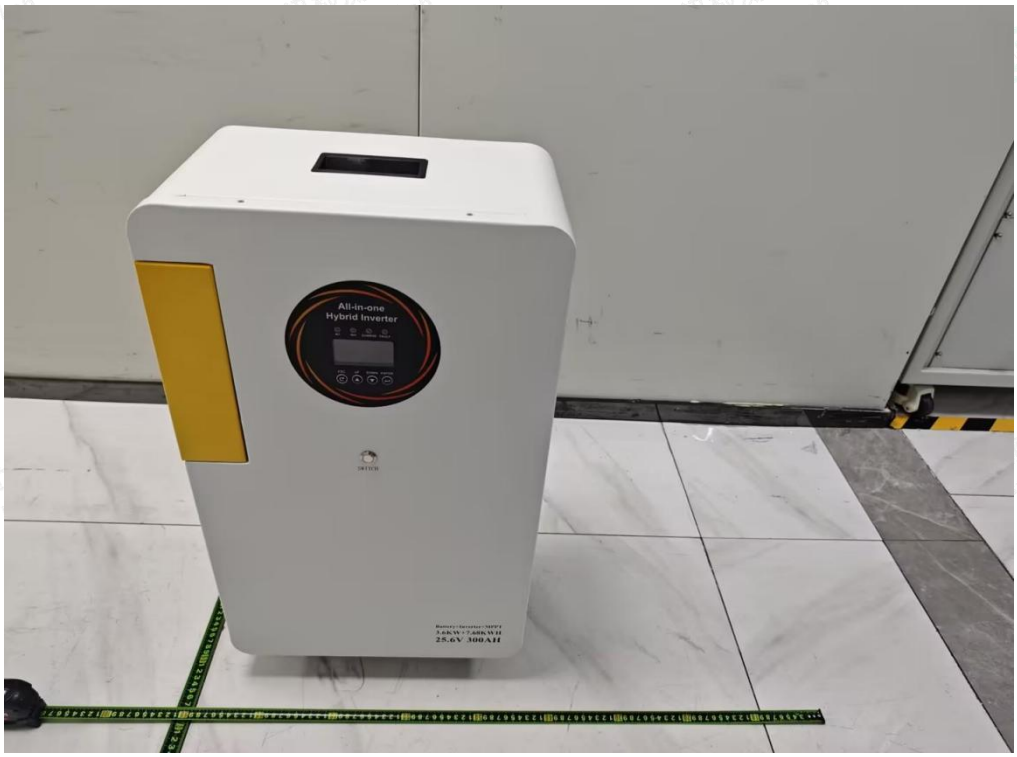


Fig. 2

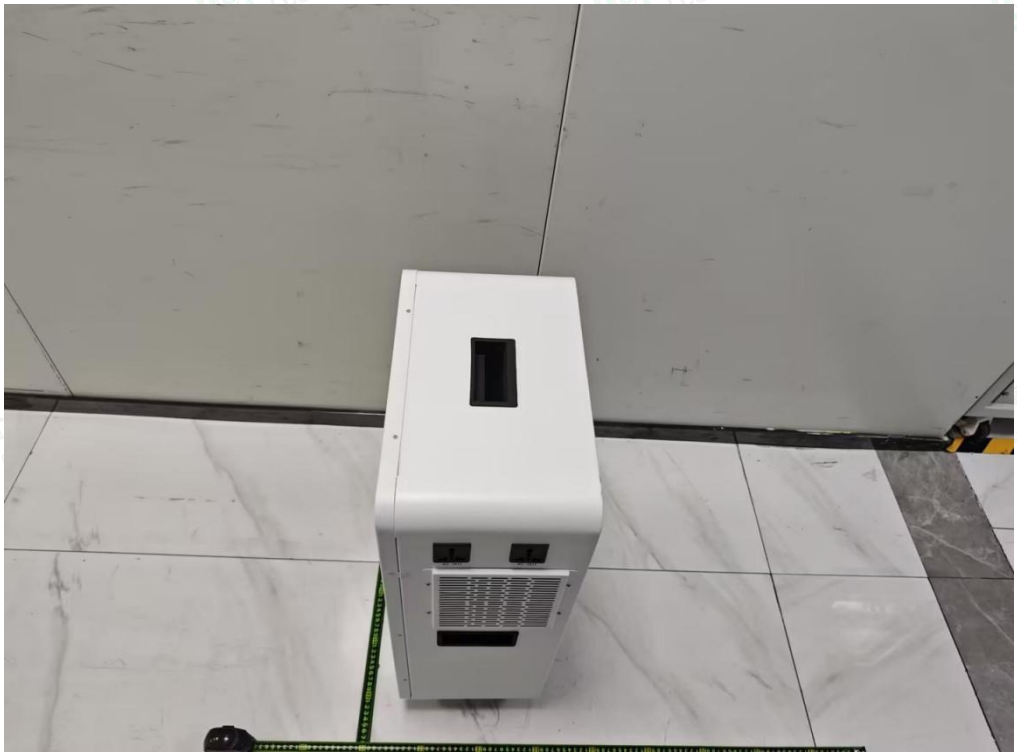


Fig. 3

Fig. 4

Fig. 5

Fig. 6

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