Afore New Energy Technology (Shanghai) Co., Ltd.

TEST REPORT

SCOPE OF WORK:
EMC report

Model:
AF10000W-HC, AF15000W-HC, AF20000W-HC, AF25000W-HC, AF30000W-HC

REPORT NUMBER
2403B0454SHA-001

ISSUE DATE
March 15, 2024

DOCUMENT CONTROL NUMBER
TTRF61000-6-4_V1

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TEST REPORT

Report no. 2403B0454SHA-001

Applicant	:	**Afore New Energy Technology (Shanghai) Co., Ltd.** **Building 7, No.333 Wanfang Rd, Minhang District, Shanghai, China. 201112**
Manufacturer	:	**Afore New Energy Technology (Shanghai) Co., Ltd.** **Building 7, No.333 Wanfang Rd, Minhang District, Shanghai, China. 201112**
Manufacturing site	:	**Dongguan Lithium Valley Energy Co., Ltd.** **Fuzhu 4th Street, Zhangyang community, Zhangmutou town** **Dongguan City, 523637 Guangdong P.R. China**

Summary

The equipment complies with the requirements according to the following standard(s) or Specification:

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

EN IEC 61000-6-2:2019: Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments

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

EN IEC 61000-6-4:2019: Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

PREPARED BY:	**REVIEWED BY:**
Perry Li	John Jiang
Project Engineer	Reviewer

Contents

Revision History

Report No.	Version	Description	Issued Date
2403B0454SHA-001	Rev. 01	Initial issue of report	March 15, 2024

Measurement result summary

TEST ITEM	TEST RESULT	NOTE
Conducted emission	NA	
Radiated emission	Pass	
Harmonic current	NA	
Voltage fluctuations and flicker	NA	
Electrostatic discharge	Pass	
Radio frequency electromagnetic field	Pass	
Fast transients	NA	
Surges	NA	
Radio frequency, common mode	NA	
Voltage dips	NA	
Power frequency magnetic field	Pass	

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name	:	Lithium-ion Rechargeable Battery System
Type/Model	:	AF10000W-HC, AF15000W-HC, AF20000W-HC, AF25000W-HC, AF30000W-HC
Description of EUT	:	All models in the series are stacked with a single module of the model AF5000W-HC and the same control box, just the number of modules stacked differently. All test data are derived from 230801115SHA-001 report except for different model name and brand name.
Rating	:	10.24kWh 102.4V 100Ah (For AF10000W-HC) 15.36kWh 153.6V 100Ah (For AF15000W-HC) 20.48kWh 204.8V 100Ah (For AF20000W-HC) 25.60kWh 256V 100Ah (For AF25000W-HC) 30.72kWh 307.2V 100Ah (For AF30000W-HC)
Trade mark	:	Afore
EUT type	:	☐ Table-top ☒ Floor standing
Sample received date	:	August 29, 2023
Date of test	:	August 29, 2023~ August 31, 2023

1.2 Description of Test Facility

Name	:	Intertek Testing Services Shanghai
Address	:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone	:	86 21 61278200
Telefax	:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations	:	CNAS Accreditation Lab Registration No. CNAS L0139 FCC Accredited Lab Designation Number: CN0175 IC Registration Lab CAB identifier.: CN0051 VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252 A2LA Accreditation Lab Certificate Number: 3309.02

Subcontractor:

☒Name	:	Shenzhen CTL Testing Technical Services Co., Ltd.
Address	:	No. 101, Building 1, Phase 1, Longbang Industrial Park, No. 8 Tianyuan Road, Shutianpu Community, Matian Street, Guangming District, Shenzhen, China
CNAS	:	L14175
Telephone	:	0755-21380337

2 TEST SPECIFICATIONS

2.1 Normative references

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

EN IEC 61000-6-2:2019: Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments

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

EN IEC 61000-6-4:2019: Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency.

2.3 Test peripherals used

Item No	Description	Band and Model	S/No

2.4 Record of climatic conditions

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)
Conducted emission	NA	NA	NA
Radiated emission	26	60	NA
Harmonic current	NA	NA	NA
Voltage fluctuations and flicker	NA	NA	NA
Electrostatic discharge	22	50	101
Radio frequency electromagnetic field	23	47	NA
Fast transients	NA	NA	NA
Surges	NA	NA	NA
Radio frequency, common mode	NA	NA	NA
Voltage dips	NA	NA	NA
Power frequency magnetic field	25	50	NA

Notes: NA =Not Applicable

2.5 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Ultra-broadband Antenna	SCHWARZBECK	VULB 9168	01096	2023/09/10
☒	EMI Test Receiver	ROHDE & SCHWARZ	ESR	102392	2024/08/07
☒	EMI Test Receiver	Agilent	N9020A	/	2024/08/07
☒	Amplifier	Emtrace	RP01A	02617	2024/08/06
☒	Amplifier	Emtrace	RP01A	02917	2024/08/06
ESD					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	ESD Simulator	AMETEK CTS	esd NX30.1	11905	2023/09/06
Radiated Immunity					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Signal Generator	Agilent	N5181A	MY47420649	2024/08/09
☒	Power Amplifier	Micotop	MPA-1000-6000-75	MPA2006215	2024/08/06
☒	Power Amplifier	Micotop	MPA-80-1000-1000-A	MPA2007228	2024/08/06
☒	Power Amplifier	Micotop	MPA-80-1000-1000-B	MPA2007229	2024/08/06
☒	Power Amplifier	Micotop	MPA-80-1000-1000	MPA2007227	2024/08/06
☒	Power Amplifier	Micotop	MPA-80-1000-1000-C	MPA2007230	2024/08/06
☒	Power Amplifier	Micotop	MPA-80-1000-1000-D	MPA2007231	2024/08/06
☒	Power Amplifier	Micotop	MPA-80-1000-1000-E	MPA2007232	2024/08/06
☒	Power Meter	Agilent	E4419B	GB43312510	2024/08/09
☒	Test Antenna-Bi-Log	Schwarzbeck	STLP 9128 E special	3142	2023/09/10
☒	Horn Antenna	Schwarzbeck	BBHA 9120 J	00270	2023/09/10
☒	Power transmitter	KEYSIGHT	E9301A	MY41069009	2024/08/09
☒	Power transmitter	KEYSIGHT	E9301A	MY41069011	2024/08/09
Power Frequency Magnetic Field Susceptibility					
Used	Equipment	Manufacturer	Type	Internal no.	Due date

☒	Magnetic field generator	PMI	MAG100	/	2024/08/07

2.6 Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted emission using a VP	-	-
Conducted emission at mains ports	-	-
	-	-
Continuous disturbance voltage at telecom ports	-	-
Continuous disturbance current at telecom ports	-	-
Mains terminal discontinuous disturbance voltage/click	-	-
Continuous disturbance power	-	-
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.64 dB
Radiated Emissions above 1 GHz	-	-
	-	-
Harmonic current emission	-	-
Voltage fluctuations and flicker	-	-
ESD	-	6.65%
Radiated susceptibility	-	2.38%
EFT test at main terminal	-	-
EFT test at signal/telecom terminal	-	-
Surge test at main terminal	-	-
Surge test at signal/telecom terminal	-	-
Injected current test at main terminal	-	-
Injected current test at unshielded signal terminal	-	-
Injected current test at shielded signal terminal	-	-
Voltage dips and interruption	-	-

3 Conducted emission

Test result: NA

3.1 Limits

3.1.1 Limits at the AC mains ports

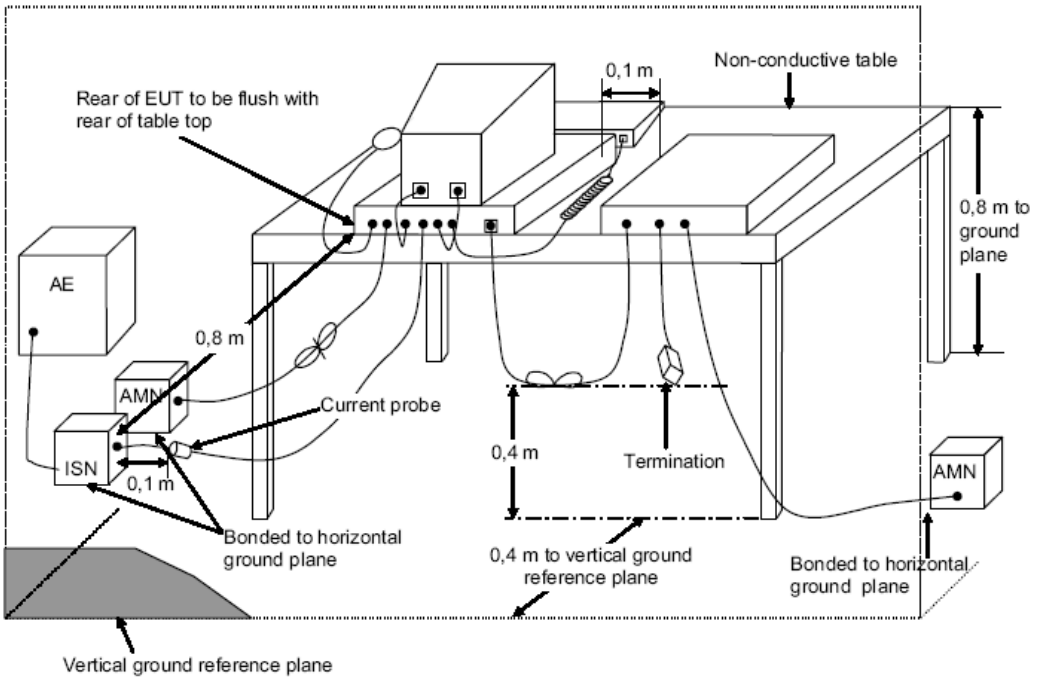
Frequency range (MHz)	Limits (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66-56*	56-46*
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.1.2 Limits at the DC mains ports

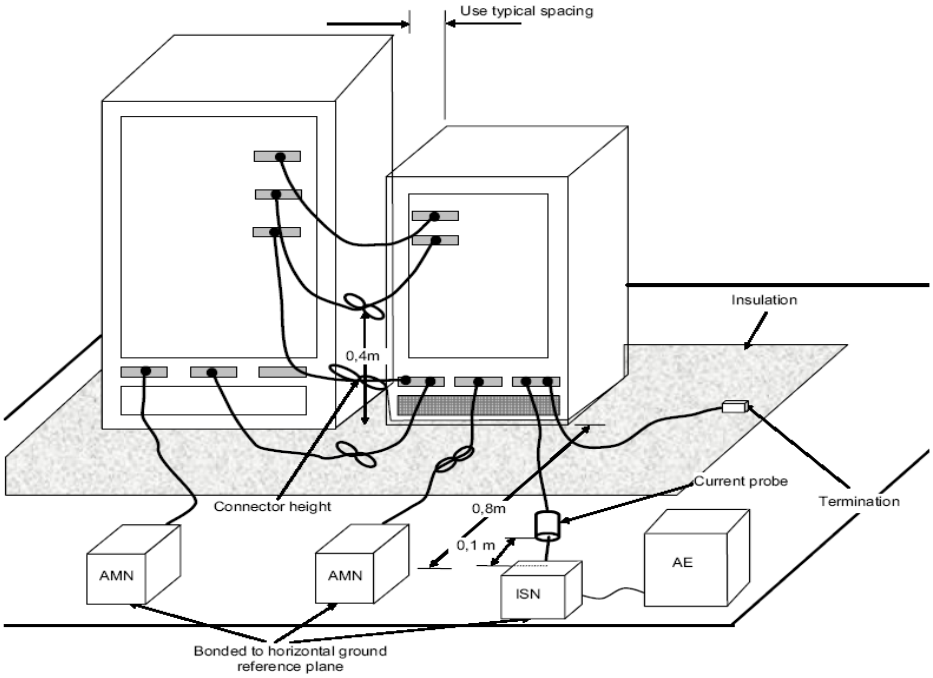
Frequency range (MHz)	Limits (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: 1. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.2 Test setup

☐ For table top equipment



☐ For floor standing equipment



3.3 Test Procedure

Measurement was performed in shielded room, and instruments used were following CISPR 16-1-2 clause 4.3.
Detailed test procedure was following CISPR 16-2-1 clause 7.4
EUT arrangement and operation conditions were according to CISPR 16-2-1 clause 7.4.
Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

3.4 Test Result

Remark: 1. Factor = LISN Factor + Cable Loss + Attenuator, the value was added to Original Receiver Reading by the software automatically.
2. Level = Reading + Factor
3. Margin = Limit - Level
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB, Attenuator = 10.00dB
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Factor = 10.00 + 2.00 + 10.00 = 22.00dB;
Level = 10dBuV + 22.00dB = 32.00dBuV;
Margin = 66.00dBuV – 32.00dBuV = 34.00dB.

4 Radiated emission

Test result: PASS

4.1 Limits

4.1.1 Limits for requirement below 1GHz

Frequency range (MHz)	Limit in dBuV/m (Quasi-peak) Of measurement distance 3m	Limit in dBuV/m (Quasi-peak) Of measurement distance 10m
30-230	40	30
230-1000	47	37

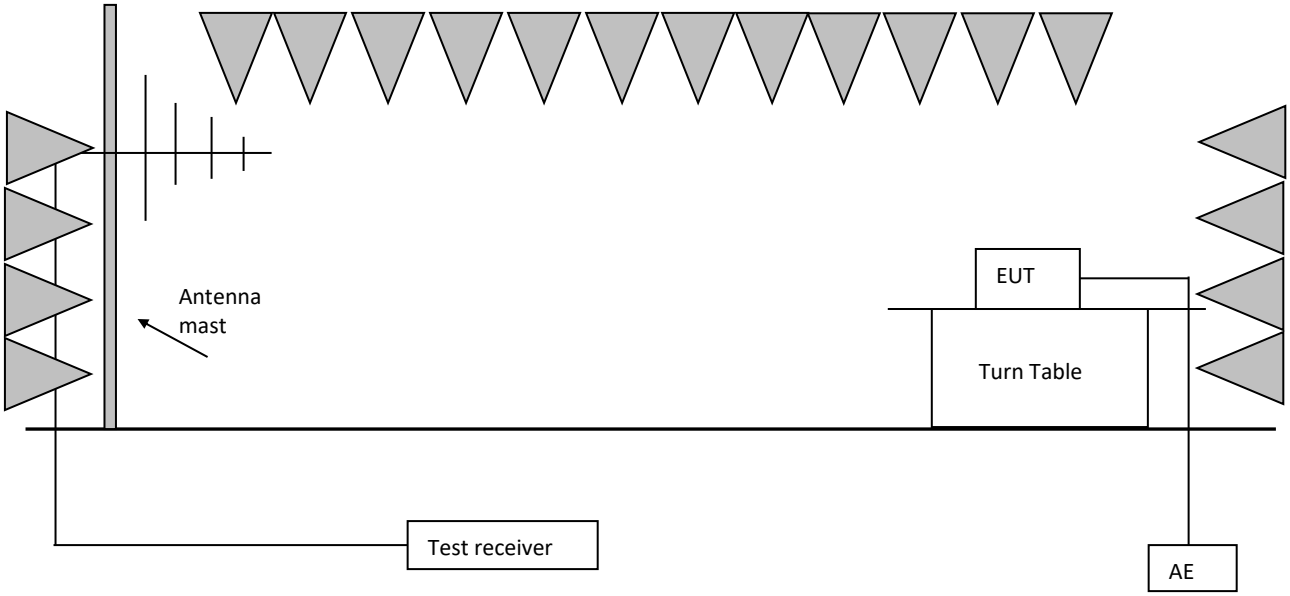
Note:
1. for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.
2. The gray rows are selected items.
3. If the internal emission source is operating at a frequency below 9kHz then measurements need only to be performed up to 230MHz.

4.1.2 Limits for requirement above 1GHz

Frequency range (GHz)	Average limit in dBuV/m Of measurement distance 3m	Peak limit in dBuV/m Of measurement distance 3m
1-3	50	70
3-6	54	74

Note:
1. for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

4.2 Block diagram of test set up

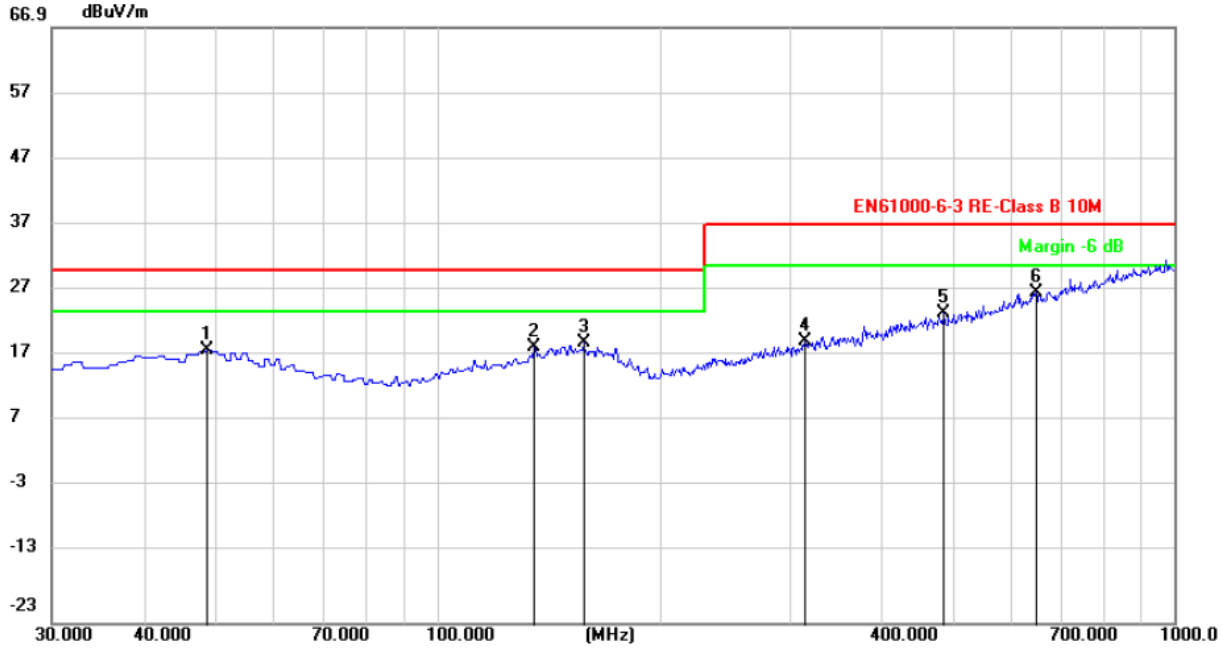


4.3 Test Procedure

The measurement was applied in a 10m semi-anechoic chamber.
Measurement was performed according to CISPR 16-2-3.
Setting of EUT is according to CISPR 16-2-3.
The bandwidth setting on Test Receiver was 120 kHz.
The frequency range from 30MHz to 1000MHz was checked.

4.4 Test Result

For charging mode:



Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Polar
48.67	33.32	-15.05	18.27	30.00	11.73	QP	Hor
135.51	32.42	-13.82	18.60	30.00	11.40	QP	Hor
158.04	32.04	-12.65	19.39	30.00	10.61	QP	Hor
315.18	32.34	-12.71	19.63	37.00	17.37	QP	Hor
485.90	32.71	-8.90	23.81	37.00	13.19	QP	Hor
647.89	32.49	-5.52	26.97	37.00	10.03	QP	Hor

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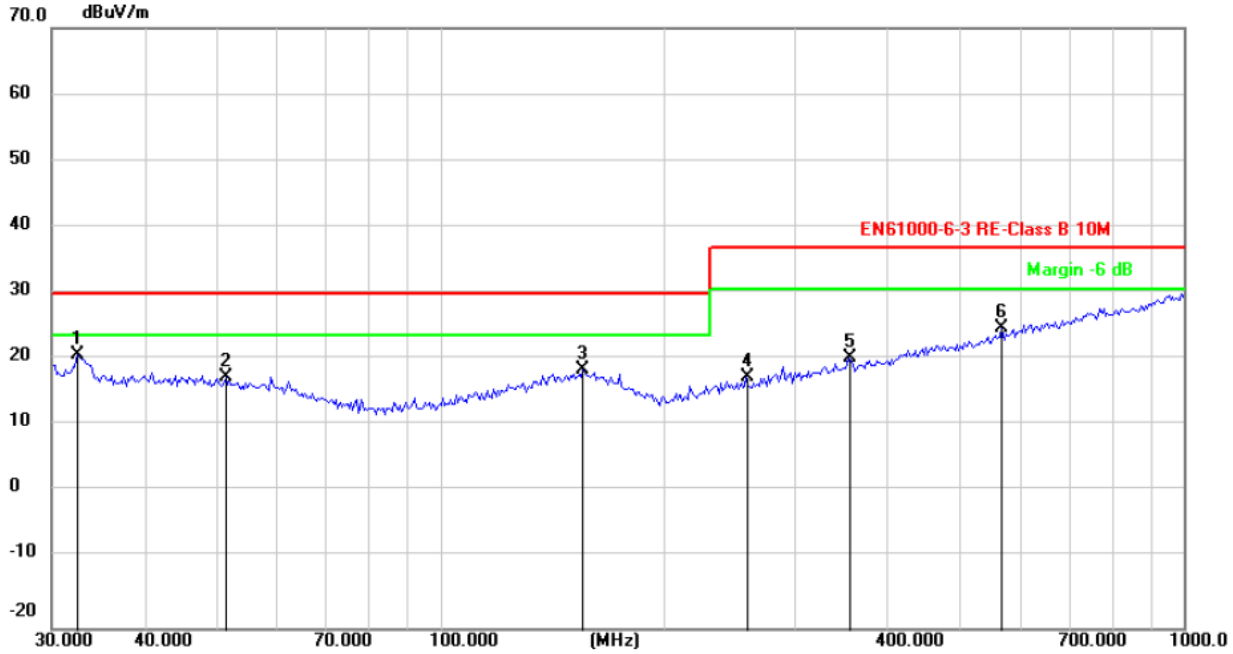
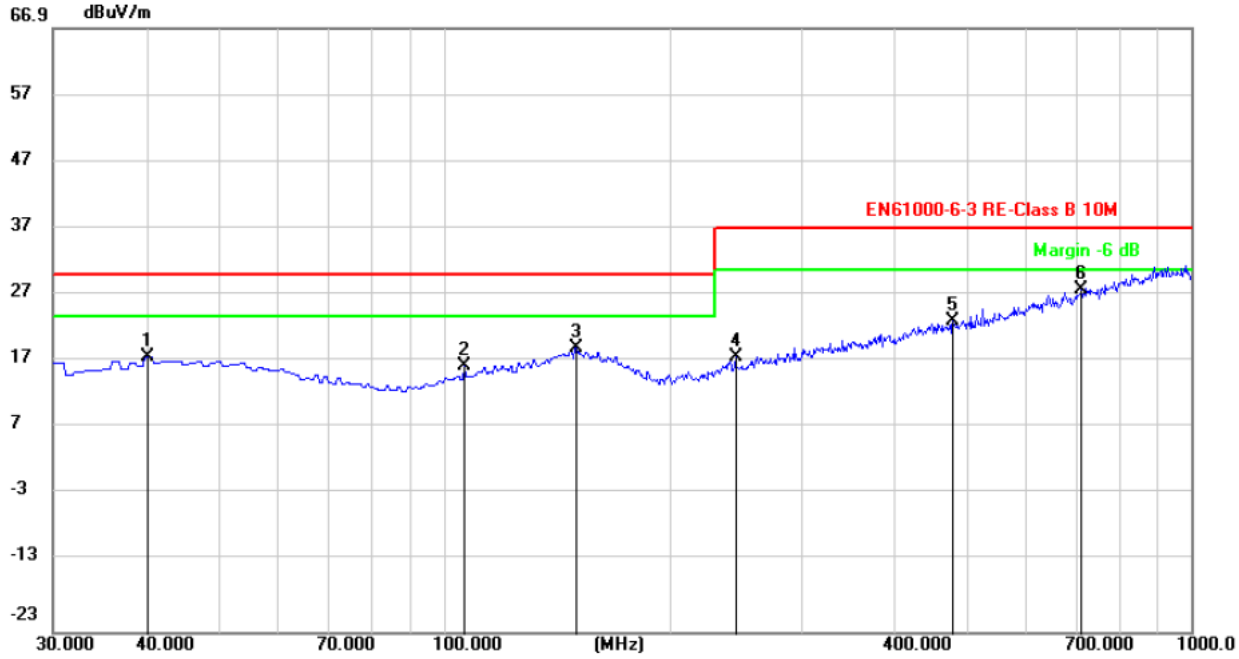
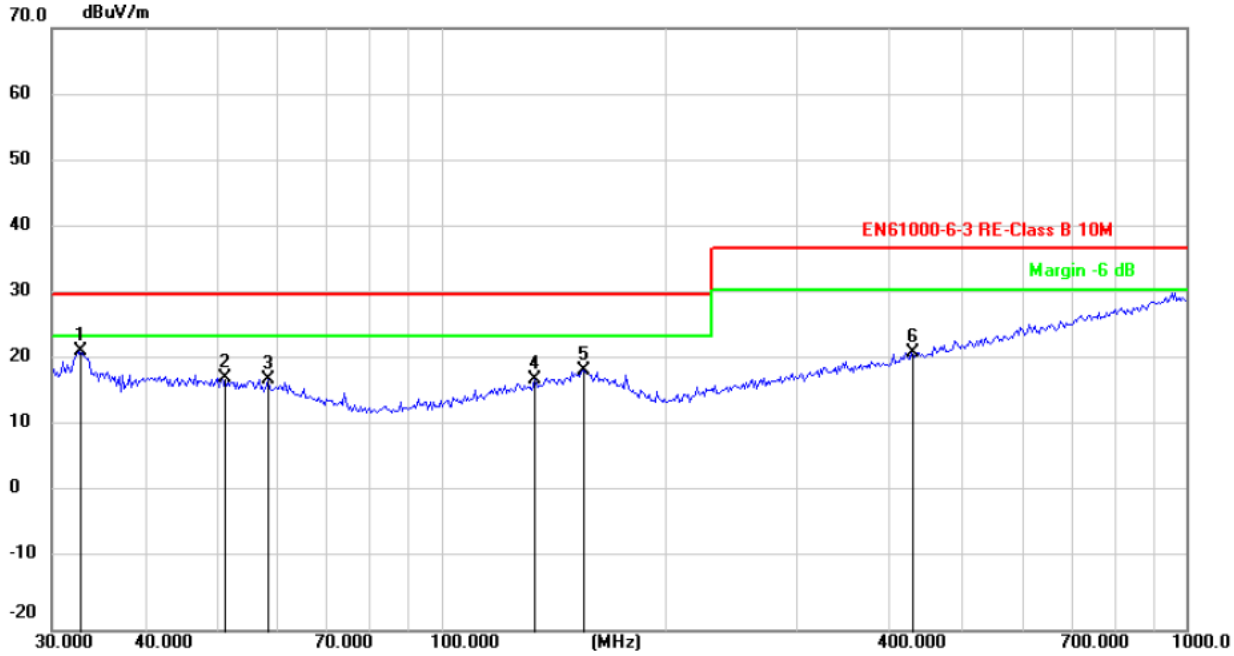


Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Polar
32.46	37.22	-16.20	21.02	30.00	8.98	QP	Ver
51.45	33.42	-15.75	17.67	30.00	12.33	QP	Ver
155.66	32.29	-13.48	18.81	30.00	11.19	QP	Ver
258.13	33.01	-15.31	17.70	37.00	19.30	QP	Ver
353.59	33.47	-12.79	20.68	37.00	16.32	QP	Ver
570.10	33.47	-8.34	25.13	37.00	11.87	QP	Ver

For discharging mode:



Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Polar
40.13	32.63	-14.71	17.92	30.00	12.08	QP	Hor
106.39	32.79	-16.22	16.57	30.00	13.43	QP	Hor
150.01	31.95	-12.71	19.24	30.00	10.76	QP	Hor
245.34	32.80	-14.74	18.06	37.00	18.94	QP	Hor
480.08	32.28	-8.98	23.30	37.00	13.70	QP	Hor
712.88	32.60	-4.49	28.11	37.00	8.89	QP	Hor

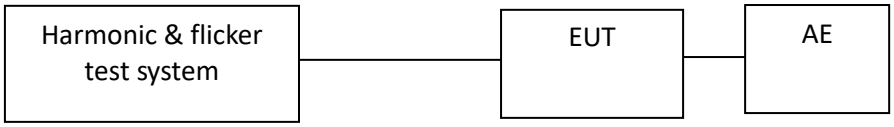


Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Polar
32.64	37.97	-16.19	21.78	30.00	8.22	QP	Ver
50.88	33.59	-15.73	17.86	30.00	12.14	QP	Ver
58.55	33.69	-16.19	17.50	30.00	12.50	QP	Ver
133.75	32.36	-14.76	17.60	30.00	12.40	QP	Ver
154.79	32.46	-13.48	18.98	30.00	11.02	QP	Ver
428.04	32.63	-10.98	21.65	37.00	15.35	QP	Ver

5 Harmonic current

Test result: NA

5.1 Test Setup



5.2 Test Procedure

Harmonics of the fundamental current were measured up to 40 order harmonics using a digital power meter with an analogue output and frequency analyzer which was integrated in the harmonic & flicker test system. The measurements were carried out under steady conditions.

☐ Measuring instrumentation according to IEC 61000-4-7:2002+A1:2008

☐ This product is not defined as lighting equipment, and has rated power less than 75W, therefore, no limit applies according to IEC 61000-3-2:2018

☐ The EUT is kitchen machines as listed in the scope of IEC 60335-2-14, therefore, is deemed to conform to the harmonic current limits of this standard without further testing.

5.3 Test limit

5.3.1 Limits for equipment with input current ≤16A per phase

Harmonic order n	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
$15 \le n \le 39$	$0,15 \frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \le n \le 40$	$0,23 \frac{8}{n}$

5.3.2 Limits for equipment with input current >16A and ≤75A per phase

☐Current emission limits for professional equipment with I_{1max} ≤ 75 A other than balanced three-phase equipment

Minimal R_{sce}	Admissible individual harmonic current I_n/I_1 [a] %						Admissible harmonic current distortion factors %	
	I_3	I_5	I_7	I_9	I_{11}	I_{13}	*THD*	*PWHD*
33	21,6	10,7	7,2	3,8	3,1	2	23	23
66	24	13	8	5	4	3	26	26
120	27	15	10	6	5	4	30	30
250	35	20	13	9	8	6	40	40
≥ 350	41	24	15	12	10	8	47	47
NOTE 1 The relative values of even harmonics up to order 12 must not exceed 16/n %. Even harmonics above order 12 are taken into account in *THD* and *PWHD* in the same way as odd order harmonics. NOTE 2 Linear interpolation between successive R_{sce} values are permitted.								
[a] I_1 = reference fundamental current; I_n = harmonic current component.								

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☐Current emission limits for professional balanced three-phase equipment with I_{1max} ≤ 75 A

Minimal R_{sce}	Admissible individual harmonic current I_n/I_1 [a] %				Admissible harmonic current distortion factors %	
	I_5	I_7	I_{11}	I_{13}	*THD*	*PWHD*
33	10,7	7,2	3,1	2	13	22
66	14	9	5	3	16	25
120	19	12	7	4	22	28
250	31	20	12	7	37	38
≥ 350	40	25	15	10	48	46
NOTE 1 The relative values of even harmonics up to order 12 must not exceed 16/n %. Even harmonics above order 12 are taken into account in *THD* and *PWHD* in the same way as odd order harmonics. NOTE 2 Linear interpolation between successive R_{sce} values are permitted.						
[a] I_1 = reference fundamental current; I_n = harmonic current component.						

☐Current emission limits for professional balanced three-phase equipment with I_{1max} ≤ 75 A under specified conditions

Minimal R_{sce}	Admissible individual harmonic current I_n/I_1 [a] %				Admissible harmonic current distortion factors %	
	I_5	I_7	I_{11}	I_{13}	*THD*	*PWHD*
33	10,7	7,2	3,1	2	13	22
≥ 120	40	25	15	10	48	46
NOTE 1 The relative values of even harmonics up to order 12 must not exceed 16/n %. Even harmonics above order 12 are taken into account in *THD* and *PWHD* in the same way as odd order harmonics. NOTE 2 Linear interpolation between successive R_{sce} values are permitted.						
[a] I_1 = reference fundamental current; I_n = harmonic current component.						

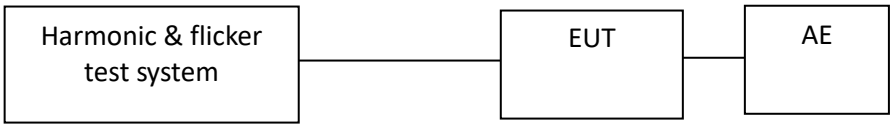
5.4 Test Result

None

6 Voltage fluctuations and flicker

Test result: NA

6.1 Test Setup



6.2 Test Procedure

6.2.1 Definition

Flicker: impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

Pst: Short-term flicker severity.

Plt: long-term flicker severity.

dc: maximum steady state voltage change during an observation period.

dmax: maximum absolute voltage change during an observation period.

d(t): time function of the relative r.m.s. voltage change evaluated as a single value for each successive half period between zero-crossings of the source voltage, except during time interval in which the voltage is a steady-state condition for at least 1s.

6.2.2 Test condition

The EUT was set to produce the most unfavorable sequence of voltage changes according to Annex A of IEC 61000-3-3:2013+A1:2017.

6.2.3 Test protocol

The tested object operated under the operating condition specified in IEC 61000-3-3: 2013+A1: 2017
The following limits apply

- the value of Pst shall not be greater than 1,0.
- the value of Plt shall not be greater than 0,65.
- Tmax, the accumulated time value of d(t) with a deviation exceeding 3,3 % during a single voltage change at the EUT terminals, shall not exceed 500ms.
- the maximum relative steady-state voltage change, dc, shall not exceed 3,3 %.
- the maximum relative voltage change dmax, shall not exceed:

☐ 4% without additional conditions.
☐ 6% for equipment which is:
- switched manually, or
- switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

☐ 7% for equipment which is:
- attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

☐ for manual switch, dmax is measured in accordance with Annex B of standard, average dmax is calculated from 24 times measurement.
☒ Tests need not be made on equipment which is unlikely to produce significant voltage fluctuations. So it is deemed to fulfil the requirements without testing.

6.3 Test Result

None

Immunity Test

Performance criteria

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

Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonable expect from the apparatus if used as intended.

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

7 Electrostatic Discharge (ESD)

Test result **Pass**

7.1 Severity Level and Performance Criterion

7.1.1 Test level

Contact discharge		Air discharge	
Level	Test voltage (kV)	Level	Test voltage (Kv)
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	X	Special

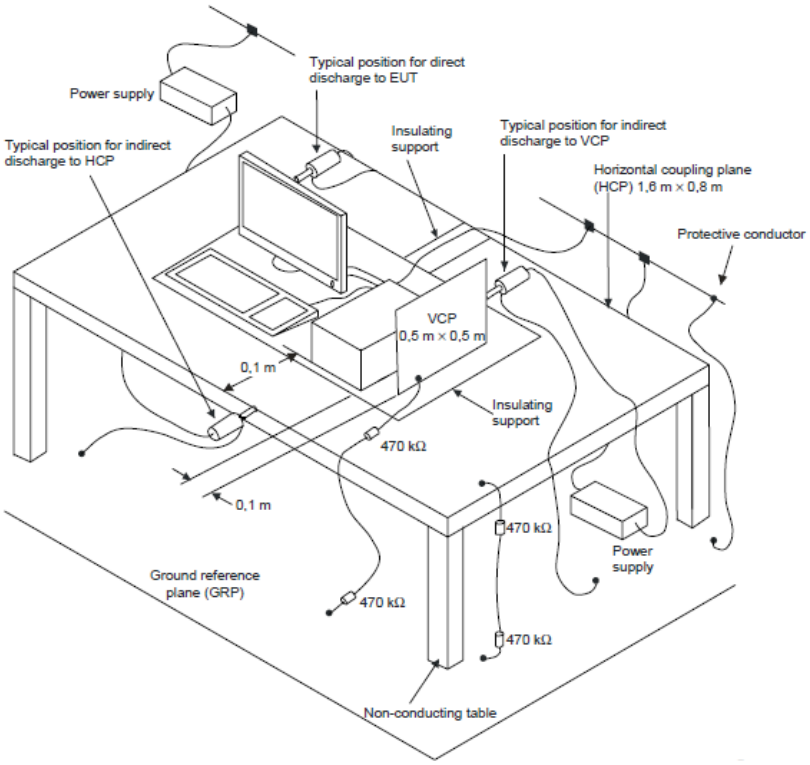
Notes: 1. “X” is an open level. The level has to be specified in the dedicated equipment specification. If higher voltages than those shown are specified, special test equipment may be needed.
2. The gray rows were the selected test level.

7.1.2 Performance Criterion

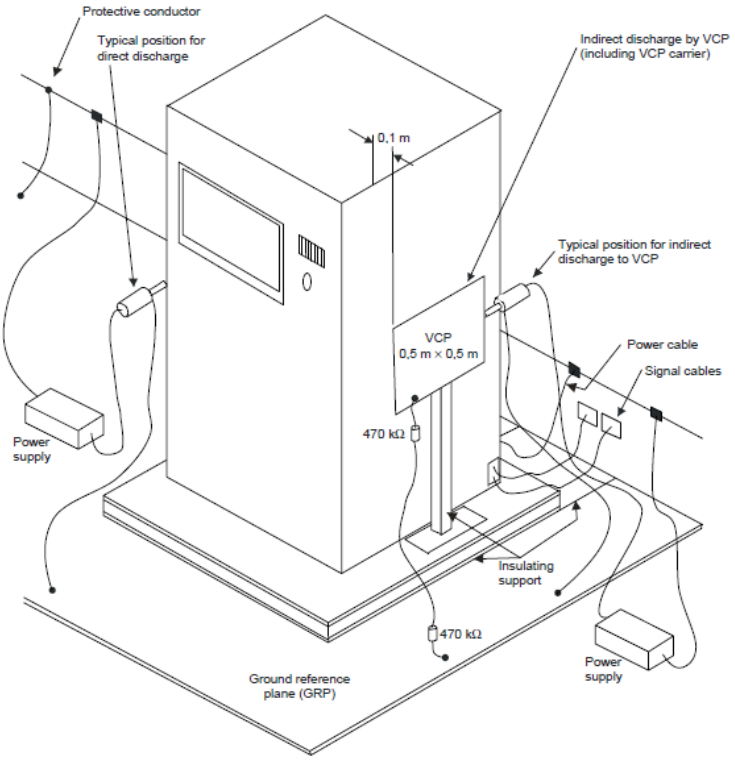
Criterion B

7.2 Test Setup

☐ For table-top equipment



☒ For floor standing equipment



7.3 Test Procedure

Measurement was performed in shielded room.
Measurement procedure was applied according to IEC 61000-4-2 clause 8.
The test method and equipment was specified by IEC 61000-4-2.

7.4 Test Result

Direct discharges were applied at the following selected points:

Test level [kV]	Air/ Contact	Polarity (+/-)	Pass/Fail/NA	Comment
2/4	Contact	+/-	Pass	Accessible metal parts of the EUT
2/4	Contact	+/-	Pass	All touchable screws of enclosure
2/4/8	Air	+/-	Pass	Air gap of the switch, button
2/4/8	Air	+/-	Pass	Slots around the EUT

Indirect contact discharges were applied to the VCP and the HCP at the following selected points:

For table-top equipment

Test level [kV]	Position	Description	Point	Pass/Fail/NA
2/4	HCP front	0,1m from the front of the EUT	Edge of centre on HCP	NA
2/4	HCP back	0,1m from the back of the EUT	Edge of centre on HCP	NA
2/4	HCP right	0,1m from the right side of the EUT	Edge of centre on HCP	NA
2/4	HCP left	0,1m from the left side of the EUT	Edge of centre on HCP	NA
2/4	VCP front	0,1m from the front of the EUT	Edge of centre on VCP	NA
2/4	VCP back	0,1m from the back of the EUT	Edge of centre on VCP	NA
2/4	VCP right	0,1m from the right of the EUT	Edge of centre on VCP	NA
2/4	VCP left	0,1m from the left of the EUT	Edge of centre on VCP	NA

For floor standing equipment

Test level [kV]	Position	Description	Point	Pass/Fail/NA
2/4	CP front	0,1m from the front of the EUT	Edge of centre on VCP	Pass
2/4	CP back	0,1m from the back of the EUT	Edge of centre on VCP	Pass
2/4	CP right	0,1m from the right of the EUT	Edge of centre on VCP	Pass
2/4	CP left	0,1m from the left of the EUT	Edge of centre on VCP	Pass

Observation: All the functions were operated as normal after the test.
Conclusion: The EUT can meet the requirement of Performance Criterion B.

8 Radio frequency electromagnetic field

Test result **Pass**

8.1 Severity Level and Performance Criterion

8.1.1 Test level

Level	Test field strength V/m
1	1
2	3
3	10
X	Special

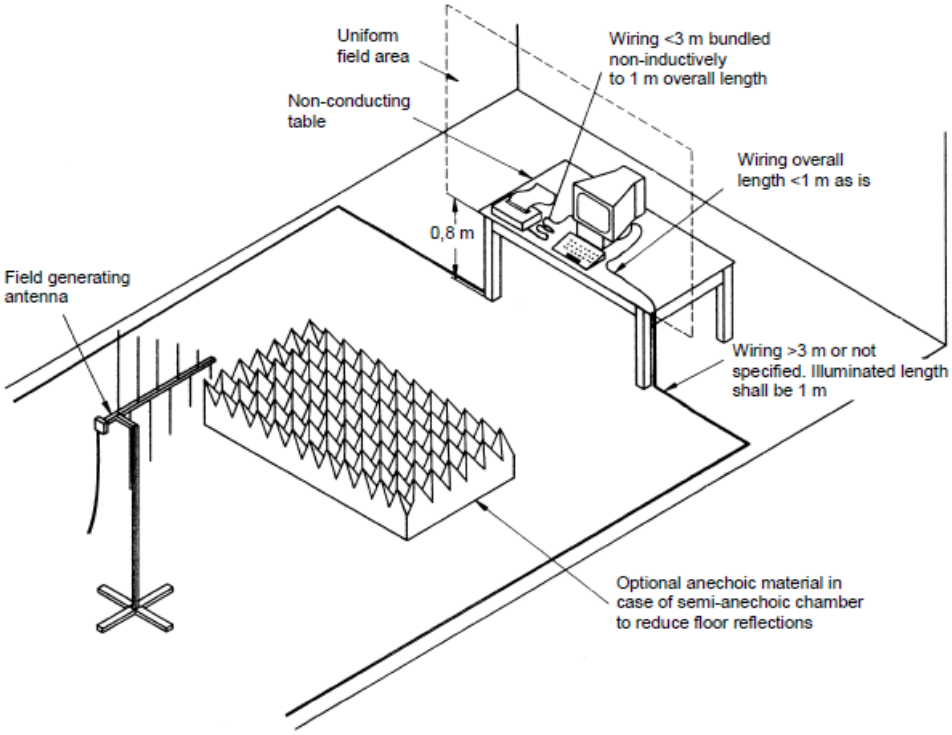
Note: 1. X is an open test level. This level may be given in the product specification.
2. The gray row is the selected test level.

8.1.2 Performance Criterion

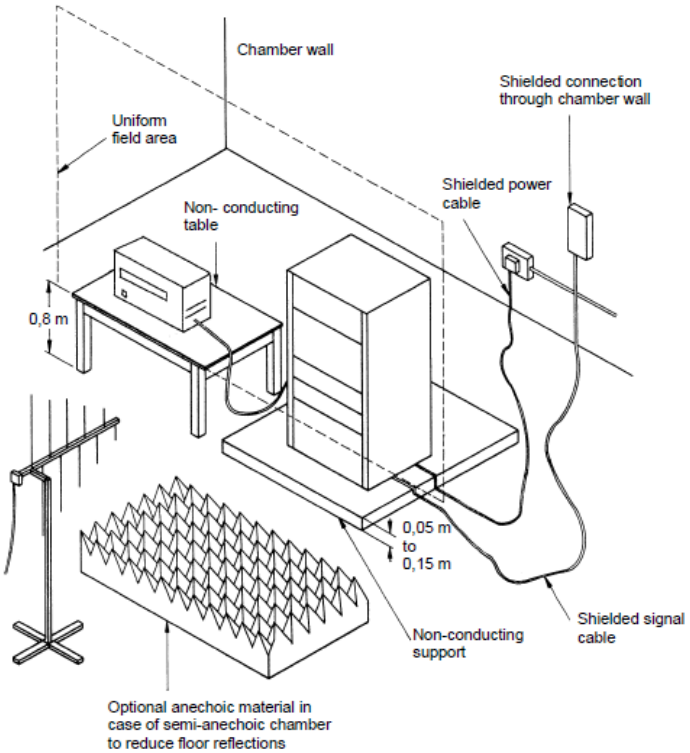
Criterion A

8.2 Test Setup

☐ For table-top equipment



☒ For floor standing equipment



8.3 Test Procedure

Measurement was performed in full-anechoic chamber.
Measurement procedure was applied according to IEC 61000-4-3 clause 8.
The test method and equipment was specified by IEC 61000-4-3.

8.4 Test Result

Test no.	Frequency (MHz)	Polarization	Test level (V/m)	Modulation	Exposed location	Pass/Fail/NA
1	80-1000	H & V	10	1 kHz, 80% AM 1 % increment	around	Pass
2	1400-6000	H & V	3	1 kHz, 80% AM 1 % increment	around	Pass

Observation: All the functions were operated as normal during and after test.
Conclusion: The EUT can meet the requirement of Performance Criterion A

9 Fast transients, common mode

Test result **NA**

9.1 Severity Level and Performance Criterion

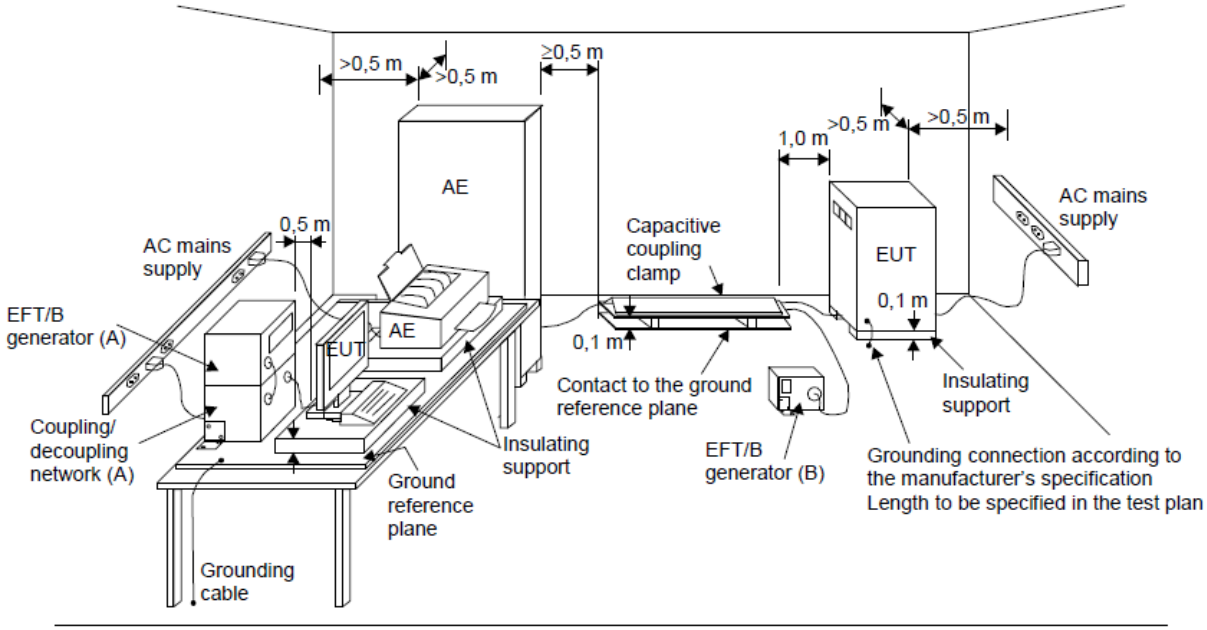
9.1.1 Test level

Open circuit output test voltage and repetition rate of the impulses				
Level	AC power ports		Signal ports, DC power ports	
	Voltage peak (kV)	Repetition rate (kHz)	Voltage peak (kV)	Repetition rate (kHz)
1	0.5	5	0.25	5/100
2	1	5	0.5	5/100
3	2	5	1	5/100
4	4	2.5	2	5/100
X	Special	Special	Special	Special
Notes: 1. "X" is an open level. The level has to be specified in the dedicated equipment specification. 2. The gray rows were the selected test level.				

9.1.2 Performance Criterion

Criterion B

9.2 Test Setup



(A) location for supply line coupling

(B) location for signal lines coupling

9.3 Test Procedure

Measurement was performed in shielded room.
Measurement procedure was applied according to IEC 61000-4-4 clause 8.
The test method and equipment was specified by IEC 61000-4-4.

9.4 Test Result

Test No.	Level (kV)	Polarity (+/-)	Line for test	Pass/Fail/NA
1	2	+/-	AC power ports	
2	1	+/-	DC power ports	
3	1	+/-	Signal ports	

Observation:
Conclusion:

10 Surges

Test result **NA**

10.1 Severity Level and Performance Criterion

10.1.1 Test level

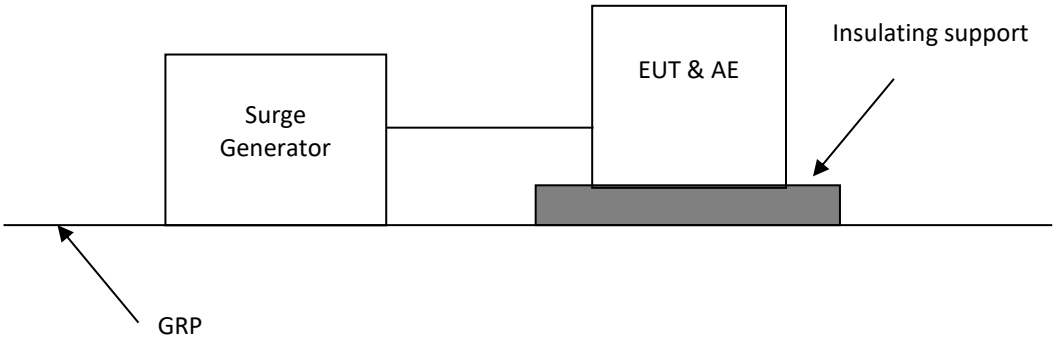
Level	Open-circuit test voltage (kV)
1	0.5
2	1.0
3	2.0
4	4.0
X*	Special

Notes: 1."X" is an open class. This level can be specified in the product specification
2. The gray rows are the selected level.

10.1.2 Performance Criterion

Criterion B

10.2 Test Setup



10.3 Test Procedure

Measurement was performed in shielded room.
Measurement procedure was applied according to IEC 61000-4-5 clause 8.
The test method and equipment was specified by IEC 61000-4-5.

10.4 Test Result

Test No.	Level [kV]	Polarity +/-	Line for test	Pass/Fail/NA
1	0.5/1	+/-	AC power ports (line to line)	
2	0.5/1/2	+/-	AC power ports (line to earth)	
3	0.5	+/-	DC power ports	
4	0.5/1	+/-	Signal ports	

Observation:
Conclusion:

11 Radio frequency, common mode

Test result **NA**

11.1 Severity Level and Performance Criterion

11.1.1 Test level

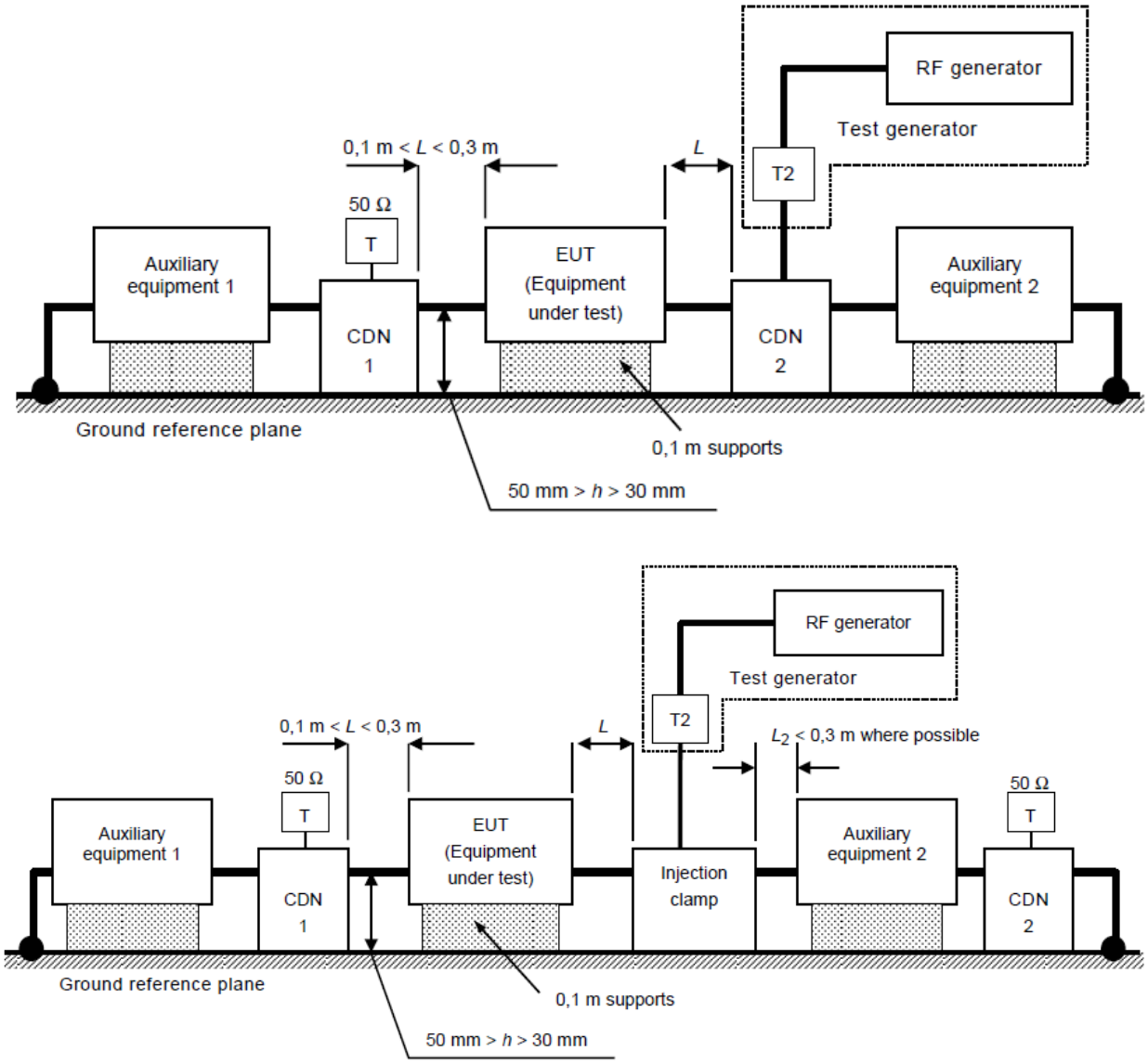
Frequency range 150kHz – 80MHz		
Level	Voltage level U0 (dBuV)	U0 (V)
1	120	1
2	130	3
3	140	10
X	Special	Special

Notes: 1. “X” is an open level
2. The gray row is the selected test level.

11.1.2 Performance Criterion

Criterion A

11.2 Block Diagram of Test Setup



T	termination 50 Ω
T2	power attenuator (6 dB)
CDN	coupling and decoupling network

11.3 Test Procedure

Measurement was performed in shielded room.
Measurement procedure was applied according to IEC 61000-4-6 clause 8.
The test method and equipment was specified by IEC 61000-4-6.

11.4 Test Result

Test No.	Frequency (MHz)	Level (V)	Modulation	Injected point	Pass/Fail/NA
1	0.15~80	10	80%, 1 kHz, AM	AC power ports	
2	0.15~80	10	80%, 1 kHz, AM	DC power ports	
3	0.15~80	10	80%, 1 kHz, AM	Signal ports	

Observation:
Conclusion:

12 Voltage dips

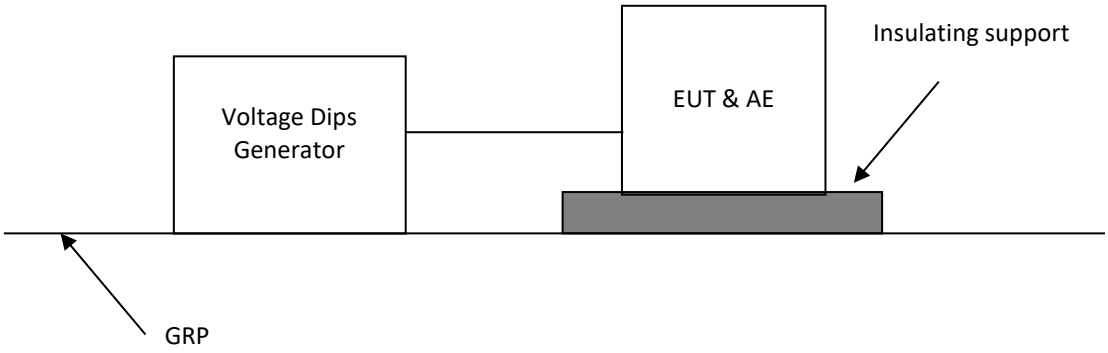
Test result **NA**

12.1 Severity Level and Performance Criterion

12.1.1 Test level

Test level Reduction (%)	Voltage level in % of rated Ut	Duration (cycles)	Performance criterion
100	0	1	B
		250 (at 50Hz) 300 (at 60Hz)	C
60	40	10 (at 50Hz) 12 (at 60Hz)	C
30	70	25 (at 50Hz) 30 (at 60Hz)	C
Notes: The gray rows are selected test level.			

12.2 Test Setup



12.3 Test Procedure

Measurement was performed in shielded room.
Measurement procedure was applied according to IEC 61000-4-11 clause 8.
The test method and equipment was specified by IEC 61000-4-11.

12.4 Test Result

Test no.	Test level % U_T	Voltage dip and short interruptions % U_T	Duration (in periods)	Pass/ Fail	Comment
1	70	30%	25 cycles at 50Hz		
			30 cycles at 60Hz		
2	40	60%	10 cycles at 50Hz		
			12 cycles at 60Hz		
3	0	100%	1 cycle		
4	0	100%	250 cycles at 50Hz		
			300 cycles at 60Hz		
Note: “NA” means not applicable.					

Observation:
Conclusion:

13 Power Frequency Magnetic field

Test result **Pass**

☐ **Test does not apply. Device under test does not contain magnetically sensitive components or circuitry.**

13.1 Severity Level and Performance Criterion

13.1.1 Test level

Level	Magnetic field strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

Note: 1. X is an open test level; this level may be given in the product specification.
2. The gray row is the selected test level.

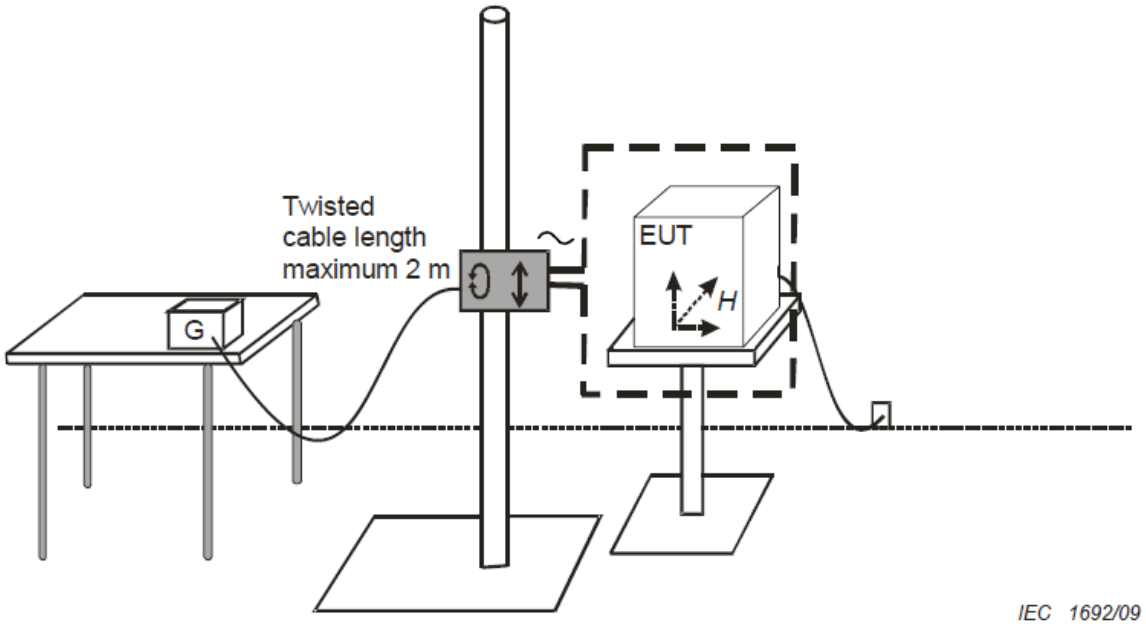
13.1.2 Performance Criterion

Performance criterion A

TEST REPORT

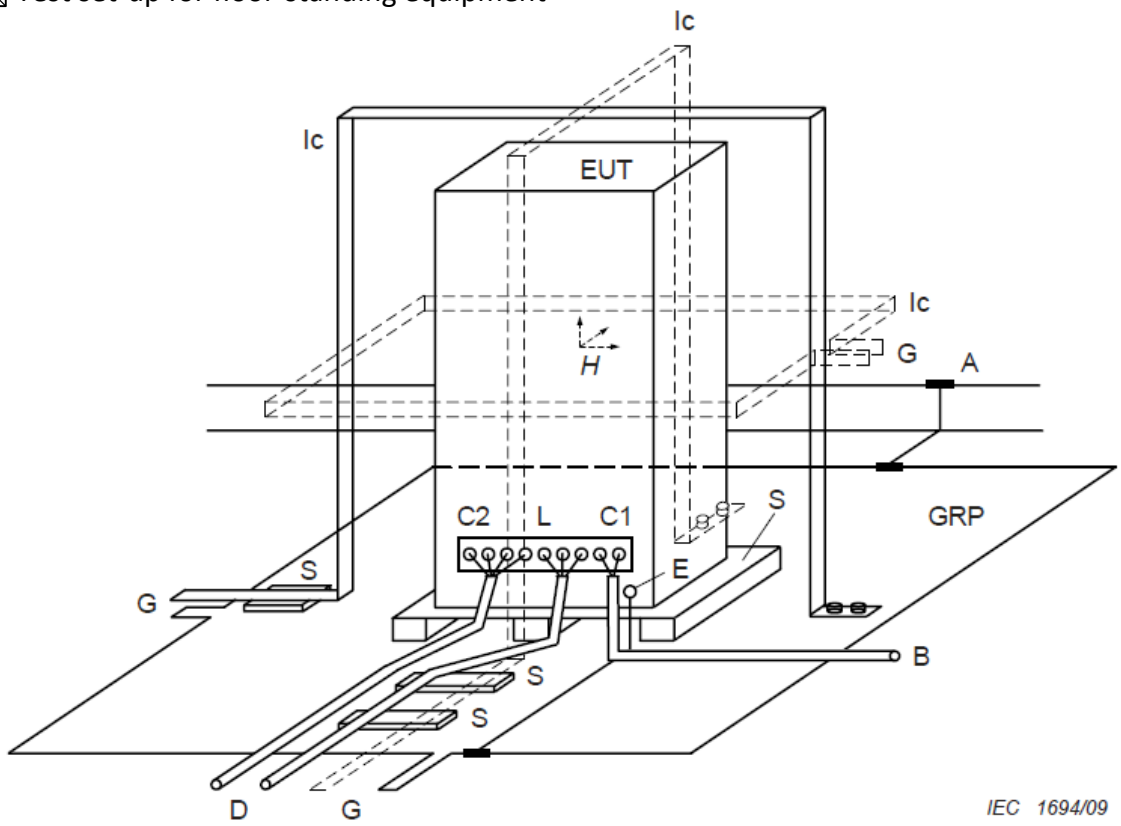
13.2 Diagram of Test Setup

☐ Test set-up for table-top equipment



IEC 1692/09

☒ Test set-up for floor-standing equipment



IEC 1694/09

13.3 Test Setup and Test Procedure

Measurement was performed in shielded room.
Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-8.
The test method and equipment was specified by IEC 61000-4-8 with the modifications by clause 8 of IEC 61000-6-1.

13.4 Test Protocol

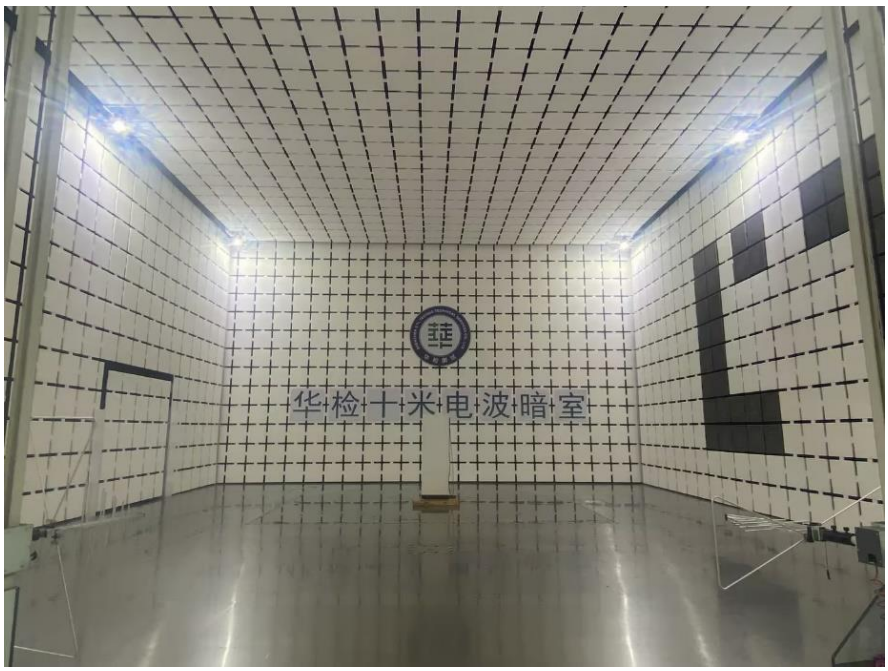
Test No.	Level A/m	Axis	Result	Comment
1	30	X	Pass	-
2	30	Y	Pass	-
3	30	Z	Pass	-

Observation: All the functions were operated as normal during and after test.
Conclusion: The EUT can meet the requirement of Performance Criterion A

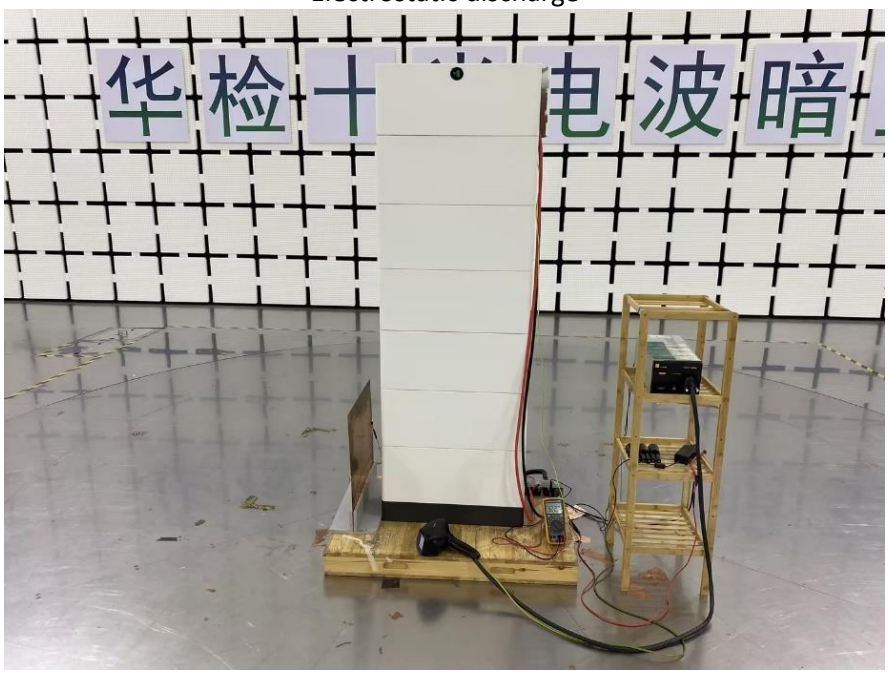
TEST REPORT

Appendix I: Photograph of Test setup

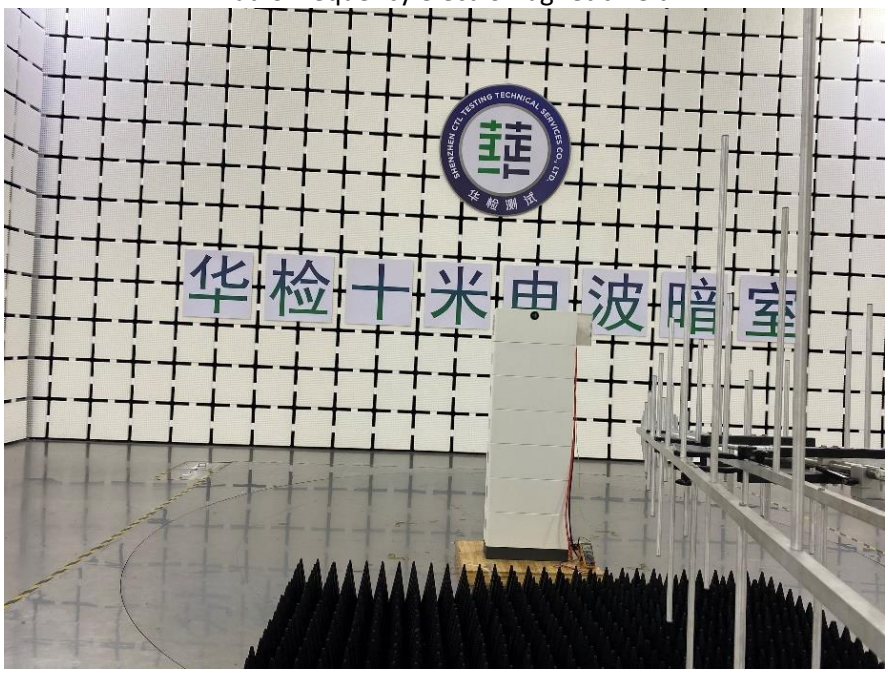
Radiation emission

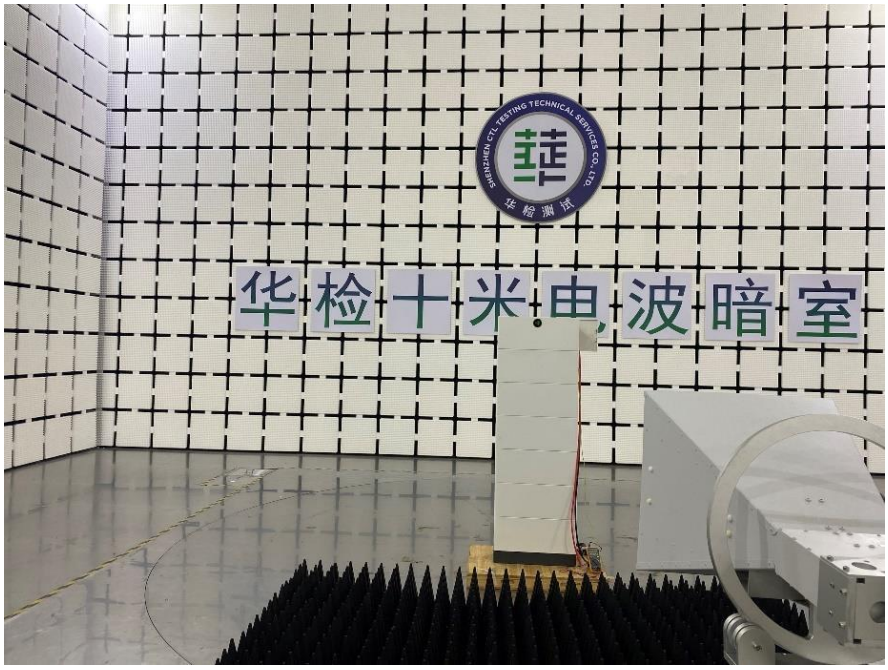


Electrostatic discharge

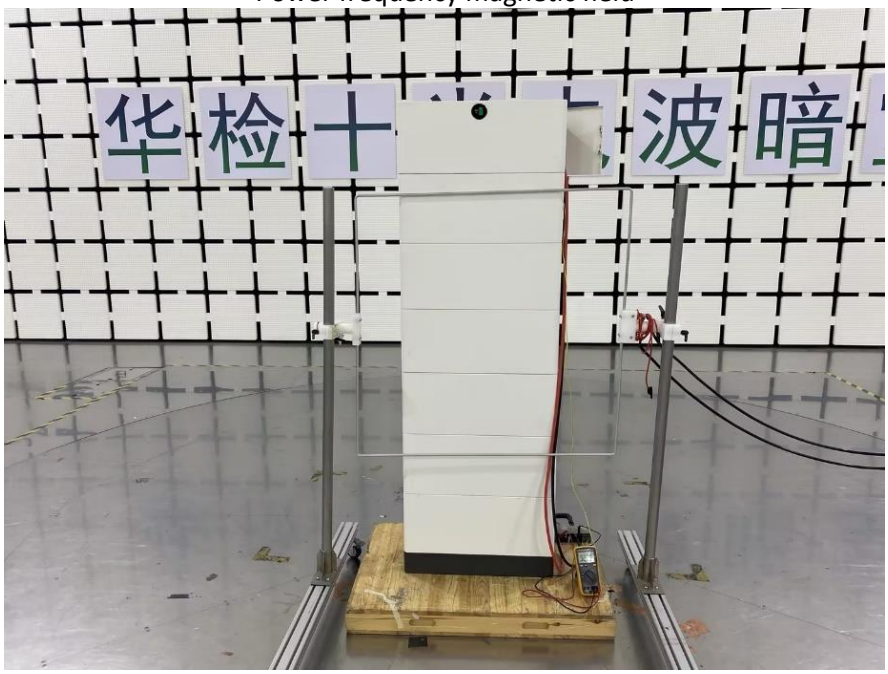


Radio frequency electromagnetic field





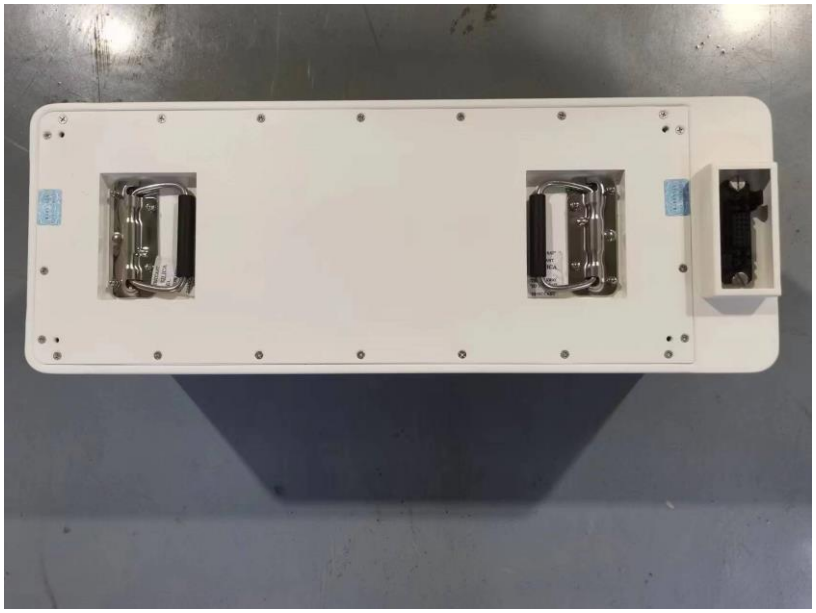
Power frequency magnetic field



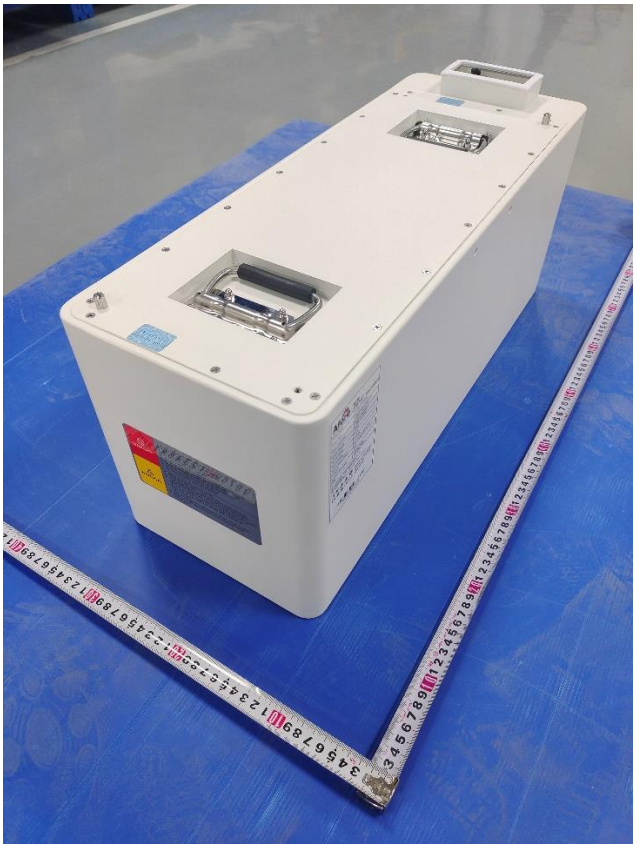
Appendix II: Photograph of equipment under test

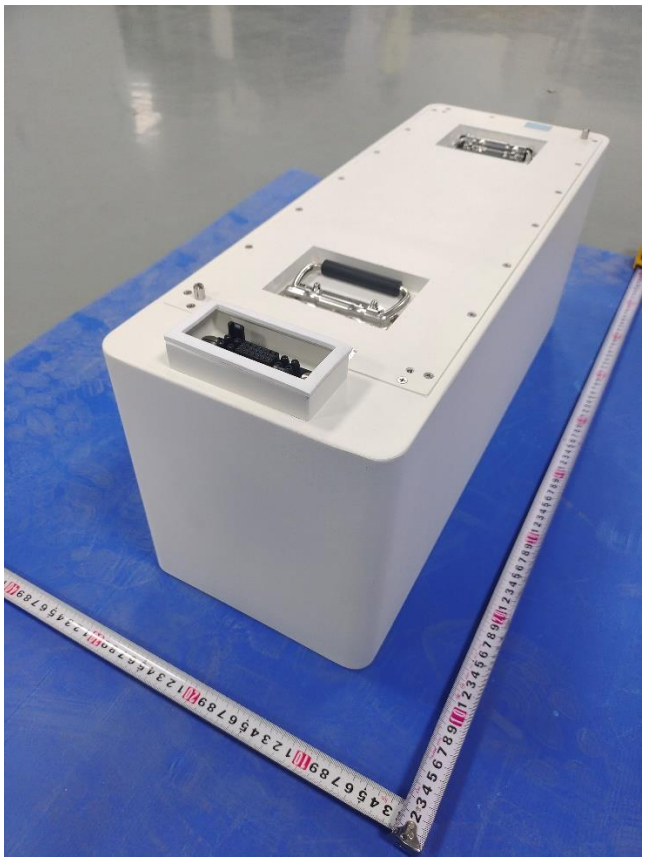
Overall View

Module

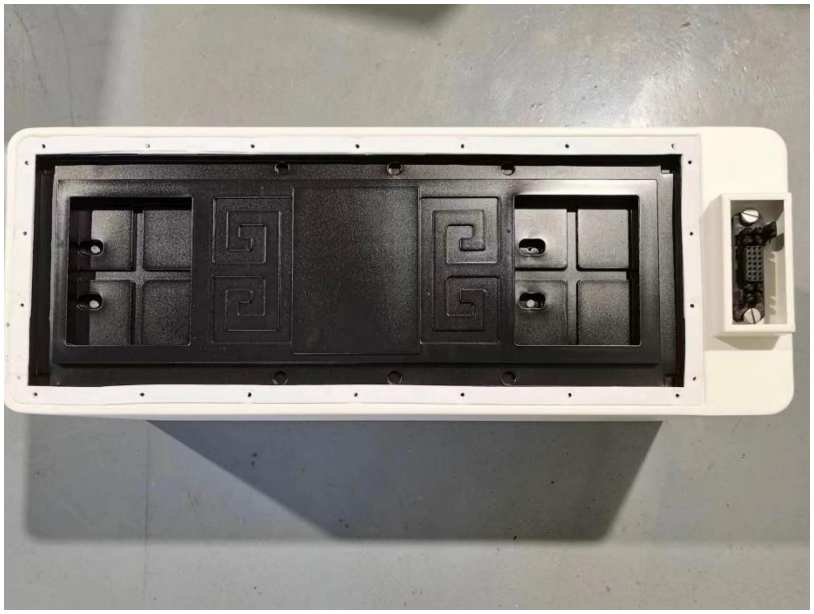


Module

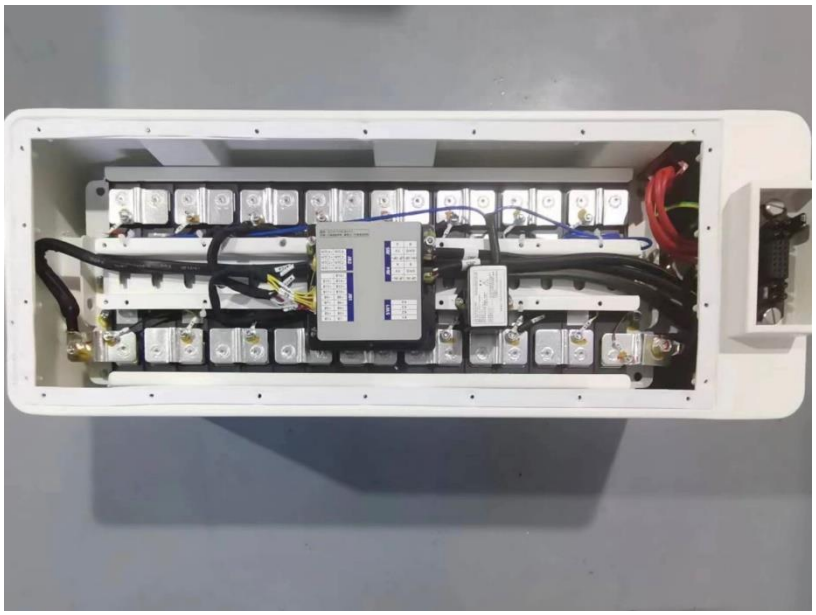




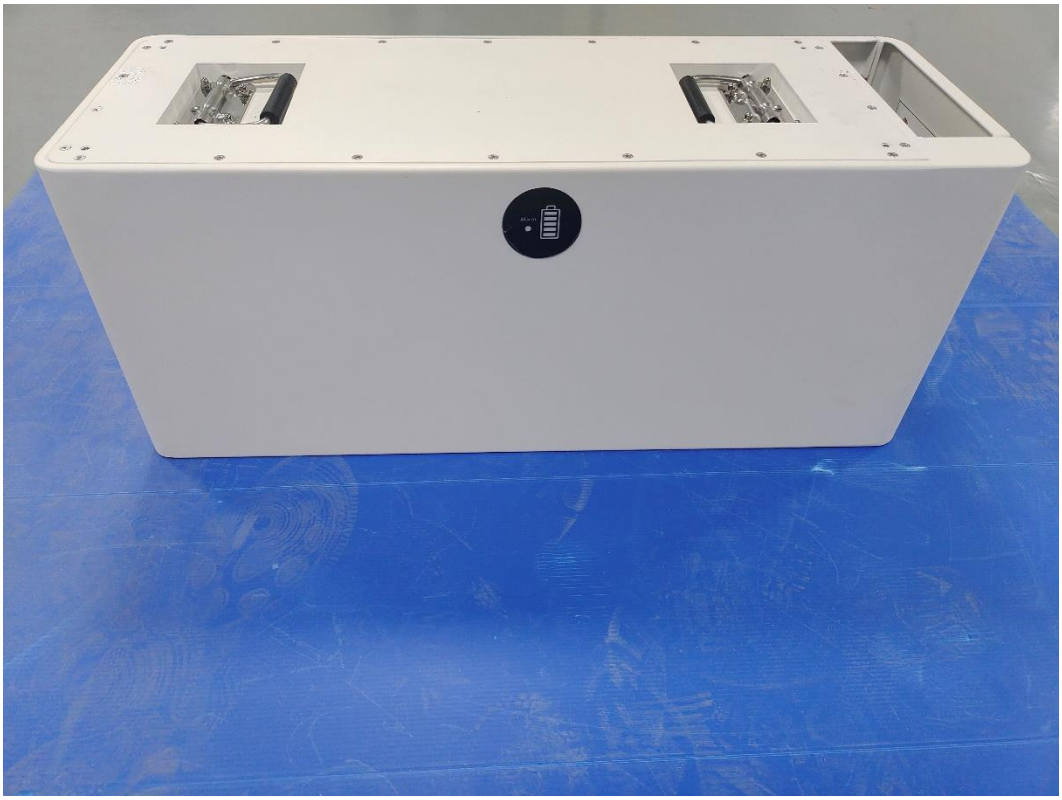
Internal view of module



Internal view of module



Control box



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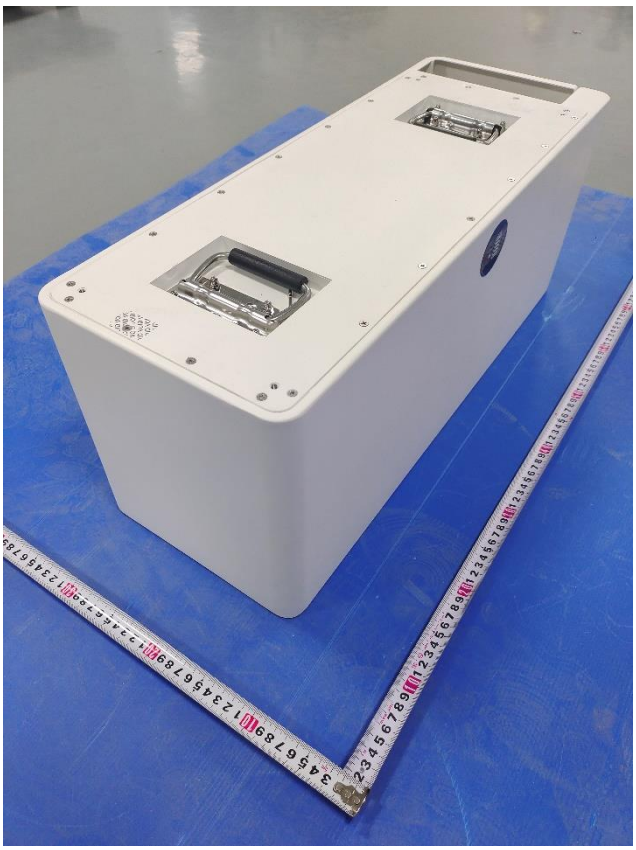

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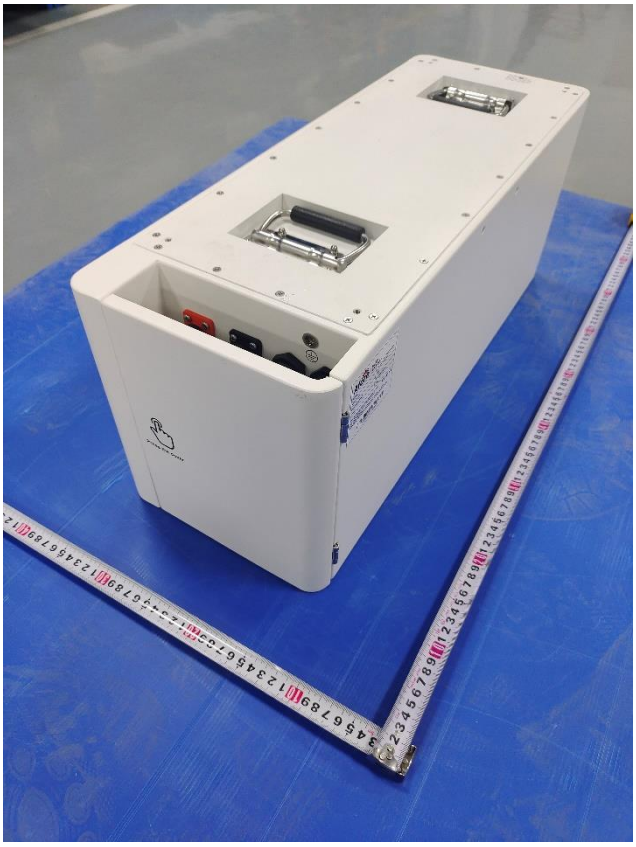
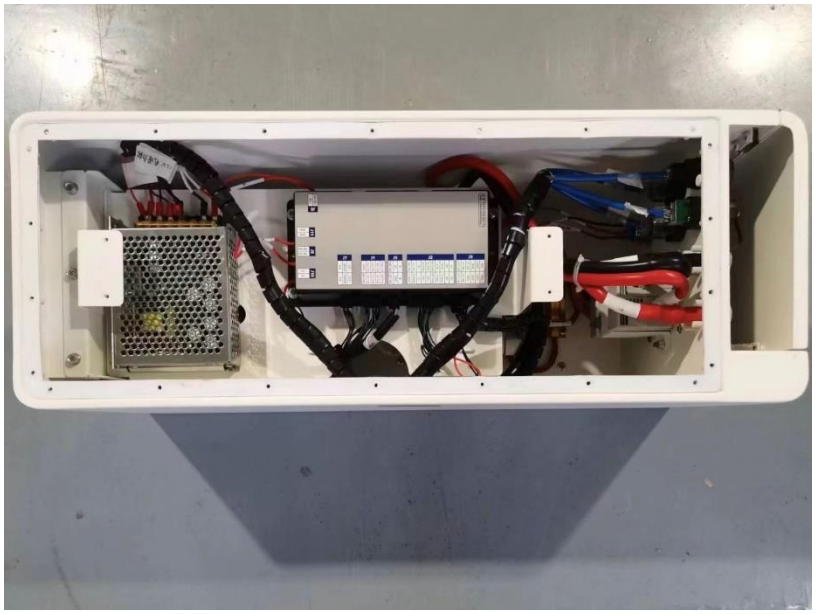


Control box

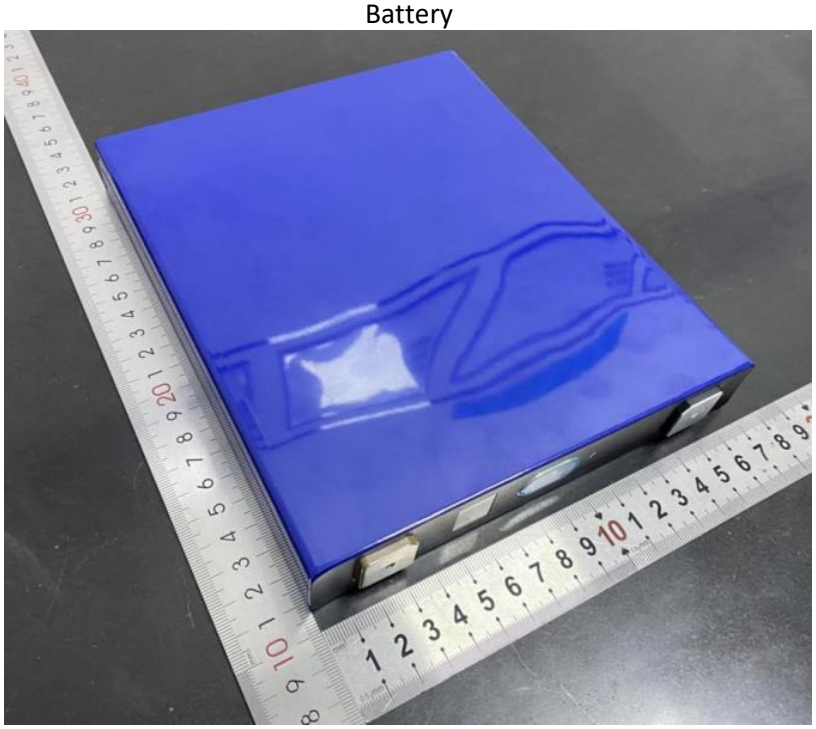
Internal view of control box

Internal view of control box

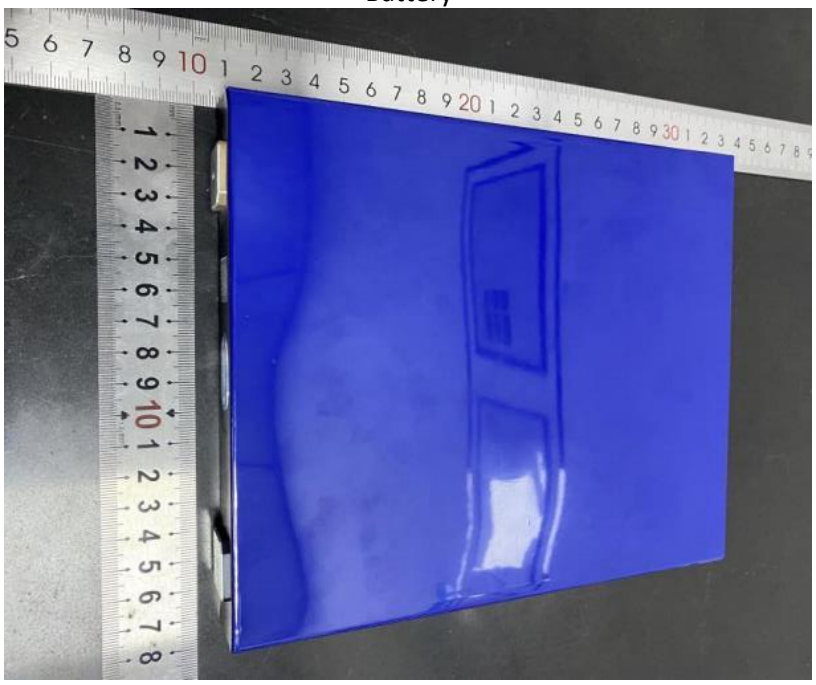
Internal view of control box



Battery



Battery



END of the report