CE EMC
TEST REPORT

for

Product:Lithium ion Battery
Model:SK48V100
Report No.:PNE220801019 01001

Issued for

HOCAN GROUP CO Limited
RM.1902, EASEY COMM. BIDG., 253-261 HENNESSY ROAD, WANCHAI, HONGKONG

Issued by

Guangdong UTL Co., Ltd.
Lianding testing building,No.18 center road of Yayuan Industrial ZoneNancheng District,Dongguan,Guangdong,China.
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1. TEST CERTIFICATION

Product:	Lithium ion Battery
Models:	SK48V100
Trade Mark:	N/A
Applicant :	HOCAN GROUP CO Limited
Address:	RM.1902, EASEY COMM. BIDG., 253-261 HENNESSY ROAD, WANCHAI, HONGKONG
Manufacturer:	Zhuhai Sepicn Electronics and Technology Co.,Ltd
Address:	4Th FL, #16, 1st Jinyuan Rd., Tangjiawan Town, High-Tech Zone, Zhuhai, Guangdong, China (Mainland)
Test Date:	Aug. 10, 2022 to Aug. 17, 2022
Issued Date:	Aug. 23, 2022
Test Voltage:	DC 51.2V
Applicable Standards:	EMC Directive 2014/30/EU EN IEC 61000-6-2:2019 EN IEC 61000-6-4:2019 EN IEC 61000-3-2:2019 EN 61000-3-3:2013+A1:2019

The above equipment has been tested by GuangDong UTL Co., Ltd and found compliance with the requirements in the technical standards mentioned above. The test results presented in this report only relate to the product/system tested. The Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Engineer: Kevin Huang / Engineer

Manager: Andy Huang /Manager

2. TEST SUMMARY

EMISSION			
Standard	**Item**	**Result**	**Remarks**
EN IEC 61000-6-4:2019	Conducted emission (Mains Port)	N/A	N/A
	Radiated emission	PASS	Complied with the limit
EN IEC 61000-3-2:2019	Harmonic current emissions	N/A	N/A
EN 61000-3-3:2013+A1:2019	Voltage fluctuations & flicker	N/A	N/A

IMMUNITY			
Standard	**Item**	**Result**	**Remarks**
EN 61000-4-2:2009	ESD	PASS	Complied with the requirements
EN 61000-4-3:2006+ A1:2008+A2:2010	RS	PASS	Complied with the requirements
EN 61000-4-4:2012	EFT	N/A	N/A
EN 61000-4-5:2014/A1:2017	Surge	N/A	N/A
EN 61000-4-6:2014	CS	N/A	N/A
EN 61000-4-8:2010	PFMF	N/A	N/A
EN IEC 61000-4-11:2020	Voltage dips & voltage variations	N/A	N/A

Note: 1) The test result verdict is decided by the limit of test standard.

2) The information of measurement uncertainty is available upon the customer's request.

3. TEST SITE

3.1. TEST FACILITY

GUANGDONG UTL CO., LTD.

Address: Lianding testing building,No.18 center road of Yayuan Industrial ZoneNancheng District,Dongguan,Guangdong,China.

☆ CNAS Registration No.: CNAS L5998

☆ CBTL Registration No.: CBTL TL459

3.2. LIST OF TEST AND MEASUREMENT INSTRUMENTS

3.2.1. For conducted emission at the mains terminals test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESPI	102090	Aug 18, 2022
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100158	Aug 25, 2022
Limiter	Rohde&Schwarz	ESH3-Z2	100046	Aug 18, 2022
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	102387	Mar 17, 2023

3.2.2. For radiated emission test (30MHz-1GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESR7	101346	Mar 23, 2023
Bilog Antenna	SCHWARZBECK	VULB9168	9168-0872	Aug 28, 2022

3.2.3. For radiated emission test (1GHz above)

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due

EMI Test Receiver	Rohde&Schwarz	ESR7	101346	Mar 23, 2023
Spectrum Analyzer	Rohde&Schwarz	FSVR40	100952	Aug 18, 2022
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1957	Aug 26, 2022
Microwave Broadband Amplifer	SCHWARZBECK	BBV 9718B	00024	Aug 20, 2022

3.2.4. For harmonic current emissions and voltage fluctuations/flicker test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Harmonics / Flicker Test System	Laplace	AC2000A	311349	Mar 23, 2023
AC Power Source	HTEC	HPF 5010	/	Mar 23, 2023

3.2.5. For electrostatic discharge immunity test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
ESD Generator	Prima	ESD61002BG	PR14062751	Aug 20, 2022
ESD Generator	HAEFELY TEST AG	ONYX 16	173835	Aug 20, 2022

3.2.6. For radio frequency electromagnetic field immunity (R/S) test (AIT)

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Signal Generator	Agilent	N517113-50B	MY53050160	Oct. 28, 2022
Amplifier	A&R	150W1000M3	313157	Oct. 28, 2022
Amplifier	A&R	50SIG6M2	0342835	Oct. 28, 2022
Antenna	SCHWARZBECK	STLP9149	9149.222	Oct. 28, 2022
Isotropic Field	A&R	FL7006	0342652	Oct. 28, 2022

Probe				
Log-periodic Antenna	SCHWARZBECK	STLP 9128E	9128E-012	Oct. 28, 2022

3.2.7. For electrical fast transient/burst immunity test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EFT Generator	Prima	EFT61004BG	PR14084174	Aug 18, 2022
EFT Coupling Clamp	Prima	EFT-CLAMP	--	Aug 18, 2022
EFT Generator	HTEC	HCOMPACT 7	190306	Mar 15, 2023

3.2.8. For surge immunity test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Surge Generator	Prima	SUG61005BG	PR14075772	Aug 18, 2022
Surge Generator	HTEC	HCOMPACT 7	190306	Mar 15, 2023
Communication wave lightning strike generator	HTEC	HTSG 70	184702	Mar 15, 2023
Coupling network 8 lines	HTEC	HCN 8	185001	Mar 15, 2023

3.2.9. For injected currents susceptibility test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
C/S Test System	SCHLODER	CDG-6000-25	19901991-0101	Mar 16, 2023
Coupling Decoupling Network	SCHLODER	CDN-M2+3	19901990-0201	Mar 17, 2023
6dB Aattenuator	SCHLODER	CDG 6050-100	3119	Mar 16, 2023

3.2.10. For power frequency magnetic field immunity test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Magnetic Field System	HTEC	HFMG 100	182803	Aug 18, 2022

3.2.11. For voltage dips and short interruptions immunity test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Dips Tester	Prima	DRP61011AG	PR14046273	Aug 18, 2022

4. EUT DESCRIPTION

Product	Lithium ion Battery
Model	SK48V100
Supplied Voltage	DC 51.2V, 100Ah
Power	5120Wh
AC Lines	☐ Shielded ☐ Unshielded, ☐ Detachable ☐ Un-detachable ☒ Not applicable ☐ Length:
DC Lines	☐ Shielded ☐ Unshielded, ☐ Detachable ☐ Un-detachable ☒ Not applicable ☐ Length:
LAN Lines	☐ Shielded ☐ Unshielded, ☐ Detachable ☐ Un-detachable ☒ Not applicable ☐ Length:

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
AC Port	/	☐
DC Port	2	☒

Models Difference:
N/A

5. TEST METHODOLOGY

5.1. TEST MODE

The EUT was tested together with the thereinafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were assessed.

Test Items		Test Mode
Emission	Conducted Emission	N/A
	Radiated Emission	Discharging
	Harmonic current emissions	N/A
	Voltage fluctuations & flicker	N/A
Immunity	ESD	Discharging
	RS	Discharging
	EFT	N/A
	Surge	N/A
	C/S	N/A
	M/S	N/A
	Dips	N/A

5.2. EUT SYSTEM OPERATION

1. Set up EUT with the support equipment.
2. Make sure the EUT work normally during the test.

6. SETUP OF EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF SUPPORT UNITS

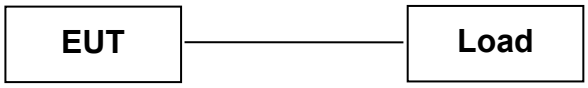
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.2. CONFIGURATION OF SYSTEM UNDER TEST

Discharging:



(EUT:Lithium ion Battery)

7. EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT

7.1.1. LIMITS

FREQUENCY (MHz)	Quasi-peak dB(μV)	Average dB(μV)
0.15 - 0.5	79	66
0.5 - 30.0	73	60

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

2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

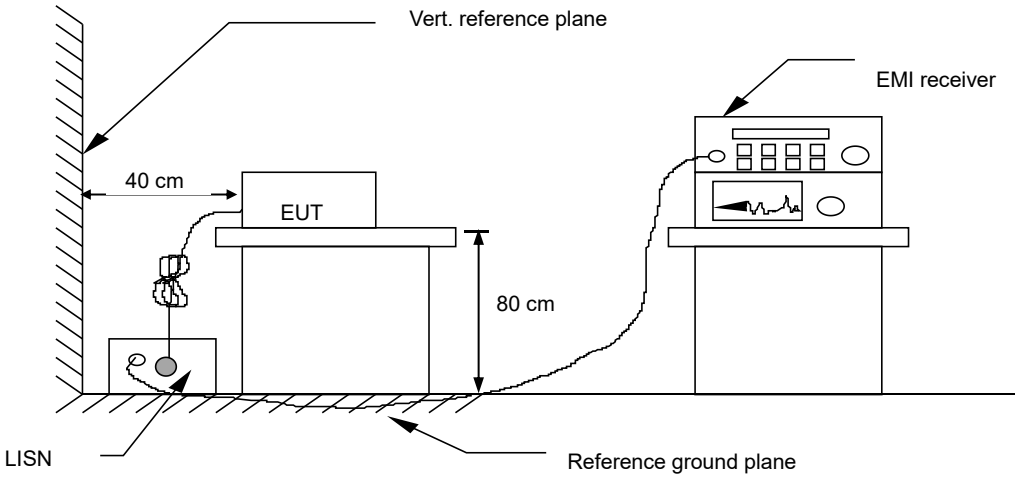
7.1.2. TEST PROCEDURES

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane. When the EUT is floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane. The EUT should be 0.8 m apart from the AMN, where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, Details please refer to test setup photography.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.

A scan was taken on both of the power lines, Line and neutral, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

7.1.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.4. TEST RESULT

N/A

7.2. RADIATED EMISSION MEASUREMENT

7.2.1. LIMITS

FREQUENCY (MHz)	At 3m
	Quasi-peak dB(μV/m)
30 ~ 230	50
230 ~ 1000	57

7.2.2. TEST PROCEDURE

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is floor standing equipment, it is placed on the ground plane which has a 0.1 m non-conductive covering to insulate the EUT from the ground plane.

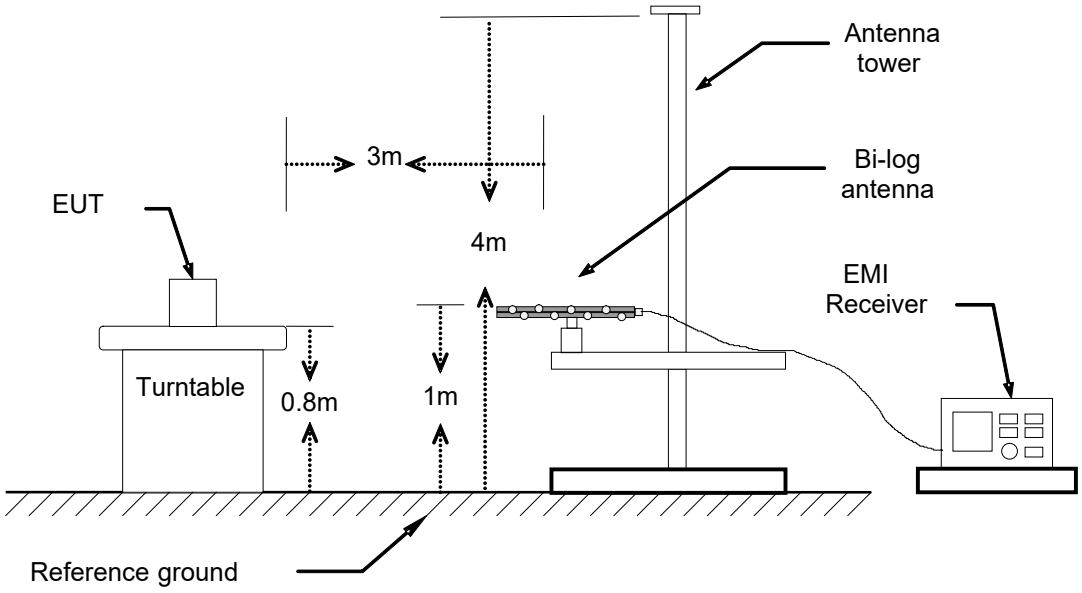
The antenna was placed at 3 meter away from the EUT. The antenna connected to the spectrum analyzer via a cable and at times a pre-amplifier would be used.

The analyzer / receiver quickly scanned from 30 MHz to 1000 MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

During the above scans, the emissions were maximized by cable manipulation. Each modes is measured, recorded at least the six highest emissions. The emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

7.2.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration

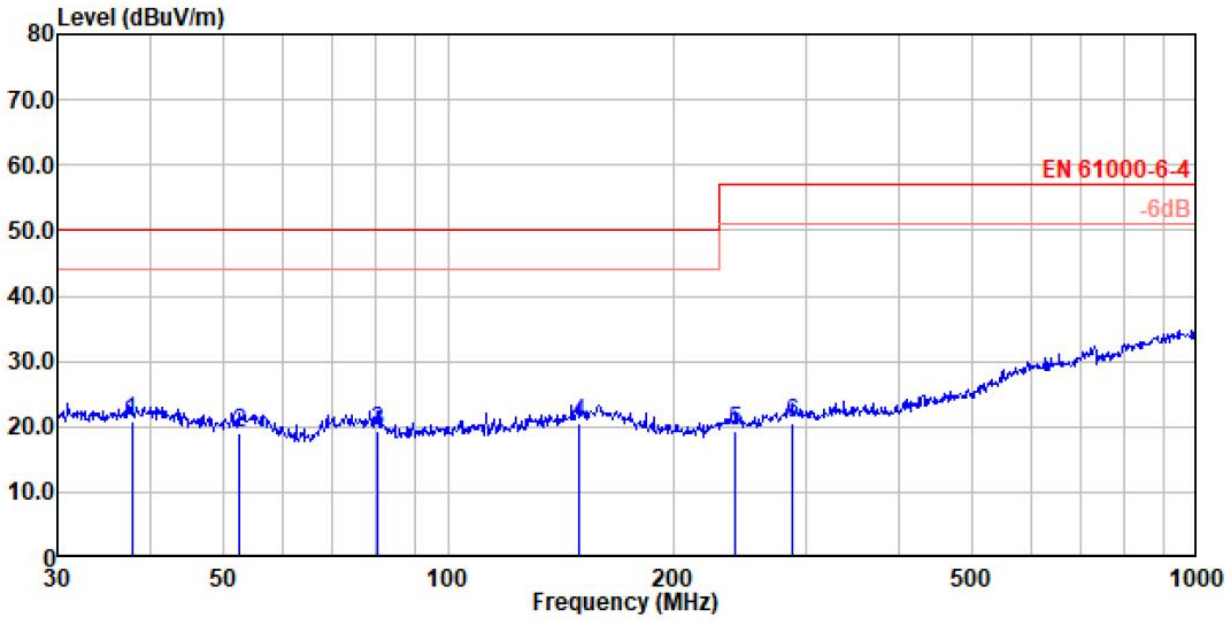
7.2.4. TEST RESULT

Product name	Lithium ion Battery	Antenna Distance	3m
Model	SK48V100	Antenna Pole	Vertical / Horizontal
Test Mode	Discharging	Detector Function	Peak / Quasi-peak
Environmental Conditions	23.5℃, 65 % RH, 101.56 kPa	6 dB Bandwidth	120 kHz
Tested by	Will	Test Result	Pass

Note:
Freq. = Emission frequency in MHz
Reading level (dBμV/m) = Receiver reading
Corr. Factor (dB) = Antenna factor + Cable loss
Measurement (dBμV/m) = Reading level (dBμV/m) + Corr. Factor (dB)
Limit (dBμV/m) = Limit stated in standard
Over Limit (dB) = Measurement (dBμV/m) – Limit (dBμV/m)
QP = Quasi-Peak

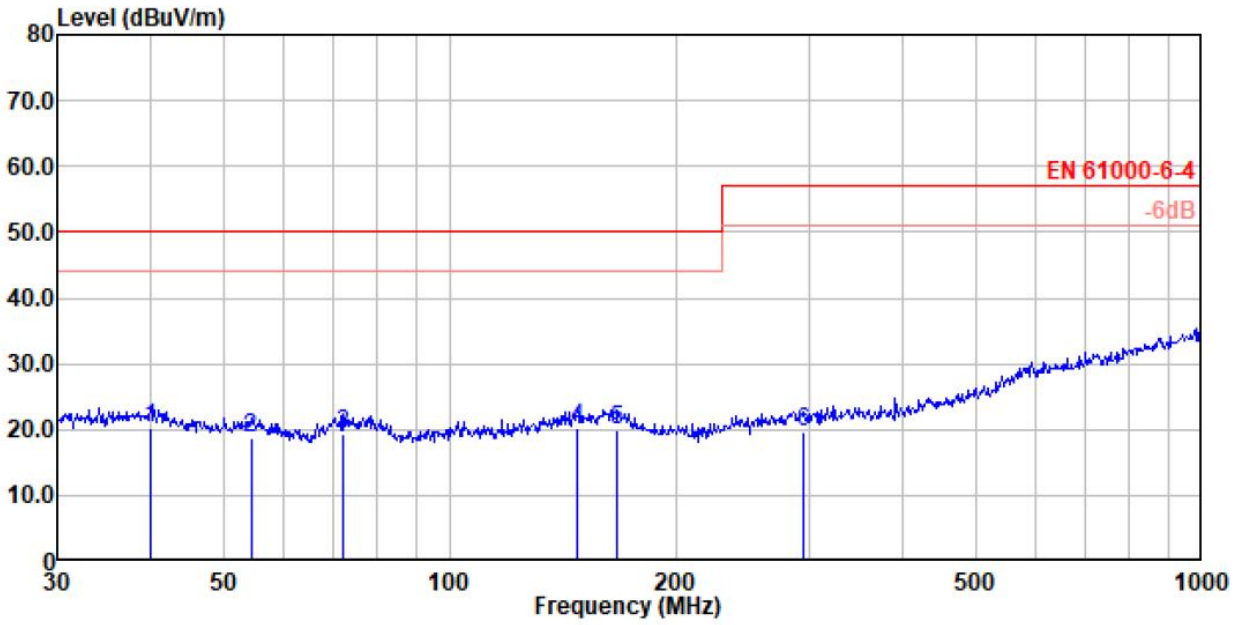
The highest frequency of the internal sources of the EUT was less than 108 MHz, so the measurement was only made up to 1 GHz.

Please refer to the following diagram:
Vertical:



	Freq	Cable Loss	Factor	Level	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dBuV/m	dBuV	dBuV/m	dB	
1	37.680	3.28	16.19	20.81	4.62	50.00	-29.19	QP
2	52.575	1.96	14.75	19.08	4.33	50.00	-30.92	QP
3	80.081	5.29	13.82	19.47	5.65	50.00	-30.53	QP
4	148.963	1.52	14.25	20.54	6.29	50.00	-29.46	QP
5	241.676	2.73	13.23	19.26	6.03	57.00	-37.74	QP
6	287.990	2.67	14.73	20.54	5.81	57.00	-36.46	QP

Horizontal:



	Freq	Cable Loss	Factor	Level	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dBuV/m	dBuV	dBuV/m	dB	
1	39.994	3.19	16.45	20.20	3.75	50.00	-29.80	QP
2	54.261	2.22	14.84	18.70	3.86	50.00	-31.30	QP
3	71.832	3.72	13.94	19.34	5.40	50.00	-30.66	QP
4	147.404	1.52	14.12	20.14	6.02	50.00	-29.86	QP
5	166.651	1.48	14.03	20.06	6.03	50.00	-29.94	QP
6	294.114	2.68	14.91	19.73	4.82	57.00	-37.27	QP

7.3. HARMONICS CURRENT MEASUREMENT

7.3.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limit for Class A equipment	
Harmonics Order N	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≦n≦39	0.15x(15/n)
Even harmonics	
2	1.08
4	0.43
6	0.30
8≦n≦40	0.23x8/n

Limit for Class D equipment		
Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd Harmonics only		
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	0.30	0.21
15≦n≦39 (odd harmonics only)	3.85/n	0.15x(15/n)

Limit for Class C equipment	
Harmonics Order n	Max. permissible harmonics current expressed as a percentage of the input current at the fundamental frequency A
2	2
3	30xF
5	10
7	7
9	5
11≦n<≦39 (odd harmonics only)	3
F is the circuit power factor	

Note: Class A, B, C and D are classified according to item 7.3.2.of this report

7.3.2. TEST PROCEDURES

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce

the maximum harmonic. The classification of EUT is according to section 5 of EN 61000-3-2.

The EUT is classified as follows:

Class A:

Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B:

Portable tools; Arc welding equipment which is not professional equipment.

Class C:

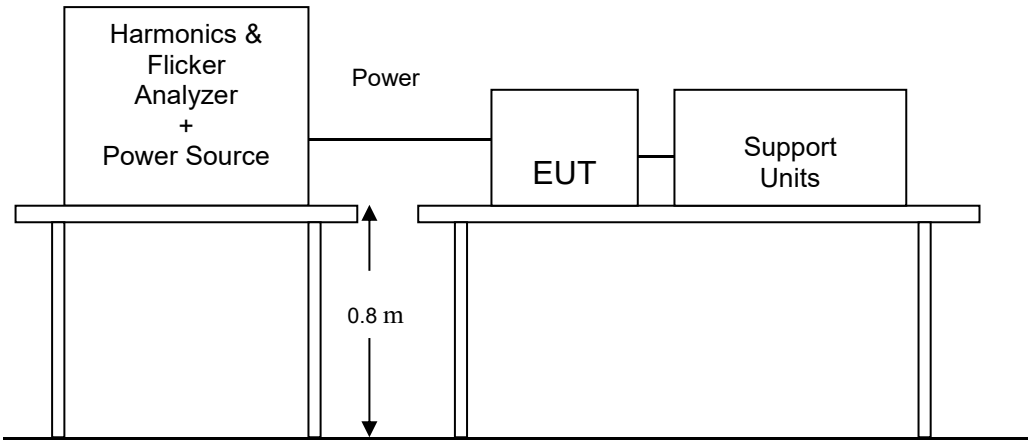
Lighting equipment

Class D:

Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

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 time necessary for the EUT to be exercised.

7.3.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.3.4. TEST RESULT

N/A

7.4. VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

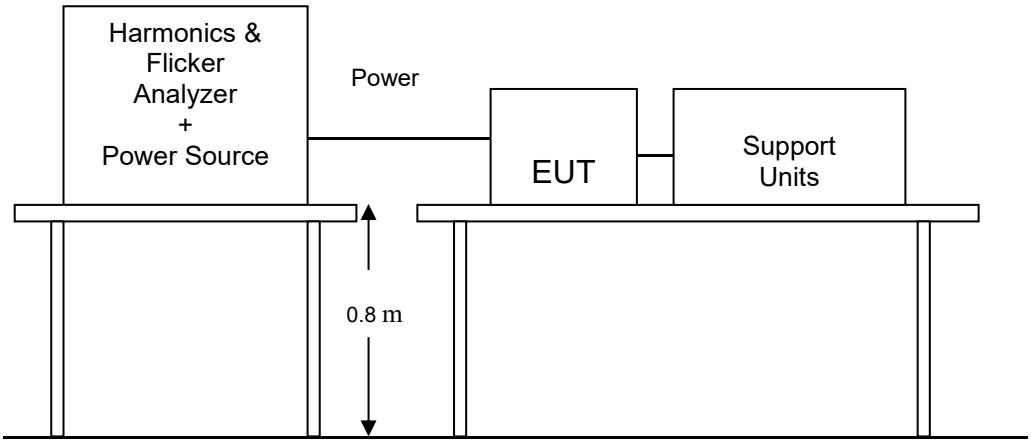
7.4.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

TEST ITEM	LIMIT	REMARK
P_{st}	1.0	P_{st} means short-term flicker indicator.
P_{lt}	0.65	P_{lt} means long-term flicker indicator.
T_{dt} (ms)	500	T_{dt} means maximum time that dt exceeds 3 %.
d_{max} (%)	4/6/7 %	d_{max} means maximum relative voltage change.
dc (%)	3.3 %	dc means relative steady-state voltage change

7.4.2. TEST PROCEDURE

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under Discharging operating conditions.
During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.4.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.4.4. TEST RESULT

N/A

8. IMMUNITY TEST

8.1. GENERAL DESCRIPTION

Product Standard	EN IEC 61000-6-2	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: ±8 kV air discharge, ±4 kV Contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 MHz to 1 GHz, 10V/m, 80% AM (1kHz), 1.4 GHz to 6 GHz, 3 V/m, 80 % AM(1 kHz), Performance Criterion A
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: ±2 kV, Signal line: ±1 kV, Performance Criterion B
	EN 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, 10/700 us Open Circuit Voltage, 5 /320 us Short Circuit Current, AC Power Line: line to line 1 kV, line to earth 2kV Signal line: 1kV, Shielded line and DC line:0.5kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz,10Vrms,Performance Criterion A 80% AM, 1kHz
	EN 61000-4-8	Power frequency magnetic field immunity test 50/60 Hz, 30 A/m Performance Criterion A

	EN IEC 61000-4-11	Voltage Dips: i) 0% reduction for 0.5 period, Performance Criterion B ii) 40% reduction for 10 periods, Performance Criterion C iii) 70% reduction for 25 periods, Performance Criterion C Voltage Interruptions: 0% reduction for 250 periods, Performance Criterion C

8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

Criteria A:	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. 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.
Criteria B:	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. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of 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 by what the user may reasonably expect from the EUT if used as intended.
Criteria C:	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.

8.3. ELECTROSTATIC DISCHARGE (ESD)

8.3.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-2
Discharge Impedance:	330 Ω
Charging Capacity:	150 pF
Discharge Voltage:	Air Discharge: ±8 kV (Direct) Contact Discharge: ± 4 kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	10 (Air discharge for single polarity discharge)
Discharge Mode:	10 (Contact discharge for single polarity discharge)
Performance Criterion:	B

8.3.2. TEST PROCEDURE

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:
50 dischargers (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure, terminals are excluded. In case of a non-conductive enclosure, dischargers shall be applied on the horizontal or vertical coupling planes. Test shall be performed at a maximum repetition rate of one discharge per second.

b) Air discharges at slots and apertures and insulating surfaces:
On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with IEC 61000-4-2:

a) The EUT was located 0.1 m minimum from all side of the HCP (dimensions 1.6 m x 0.8 m).
b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10cm with EUT.

c) The time interval between two successive single discharges was at least 1 second.

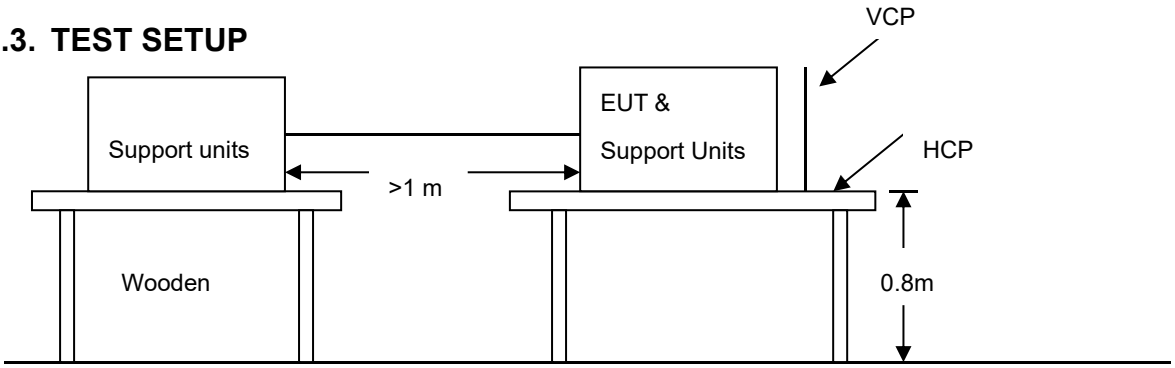
d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each HCP opposite the center point of each unit of the EUT and 0.1 meter from the front of the EUT. The long axis of the discharge electrode was in the plane of the HCP and perpendicular to its front edge during the discharge.

g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane (VCP) in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5 m x 0.5 m) was placed vertically to and 0.1 meter from the EUT.

8.3.3. TEST SETUP



Ground Reference Plane

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:

1) TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the ground reference plane (GRP) . The GRP consisted of a sheet of aluminum at least 0.25 mm thick, and 2.5 meters square connected to the protective grounding system. A horizontal coupling plane (HCP) (1.6 m x 0.8 m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN

61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5 mm

thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

2) FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the ground reference plane by an insulating support of 0.1 meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25 mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

8.3.4. TEST RESULT

Product	Lithium ion Battery	**Environmental Conditions**	20.4℃, 56% RH, 101.32 kPa
Model	SK48V100	**Tested By**	Will
Test mode	Discharging	**Test Result**	Pass

Contact Discharge Mode					
Test Points	**Test Levels**	**Results**			
	± 4 kV	**Pass**	**Fail**	**Observation**	**Performance Criterion**
HCP 2 Points	☒	☒	☐	Note ☐1☒2☐3	B
VCP 2 Points	☒	☒	☐	Note ☐1☒2☐3	B
Positive 1 Point	☒	☒	☐	Note ☐1☒2☐3	B
Negative 1 Point	☒	☒	☐	Note ☐1☒2☐3	B
Screws 4 Points	☒	☒	☐	Note ☐1☒2☐3	B

Note**:** 1) There was no change compared with initial operation during the test.
2) During the test the luminous intensity change, and after the test the luminous intensity can be restored to its initial value within 1 min.
3) During the test, the luminous intensity change and after the test the luminous intensity can return to normal within 30 min.

8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)

8.4.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-3
Frequency Range:	80-1000MHz,1400MHz-6000MHz
Field Strength:	10 V/m, 3 V/m
Modulation:	1 kHz Sine Wave, 80 %, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Performance Criterion:	A

8.4.2. TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-3

a. The testing was performed in a fully-anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.

c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.

d. The field strength levels were 3V/m.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

For Broadcast reception function:

f. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.

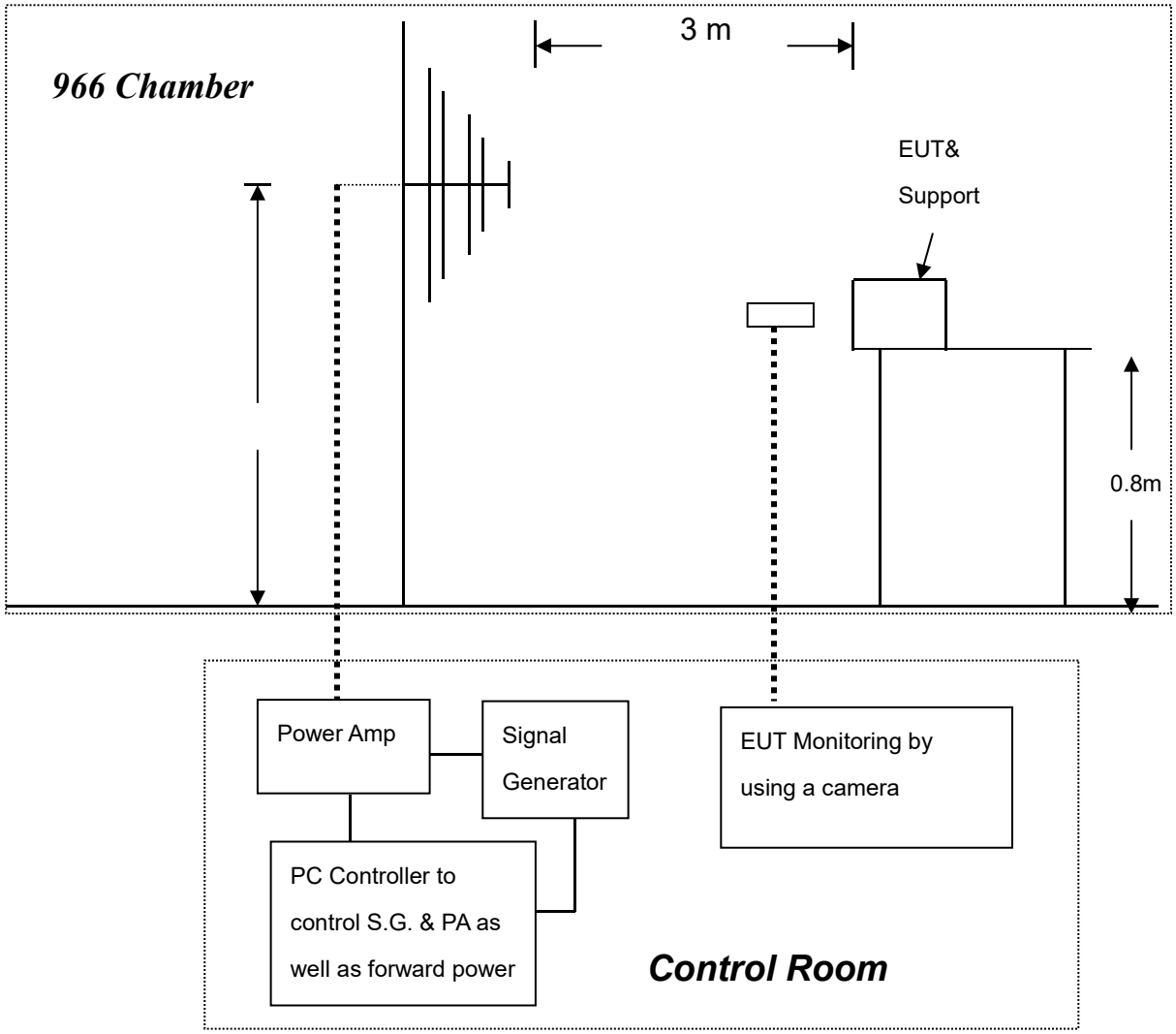
g. **Group 2:** Broadcast reception equipment which is not included in Group 1.

h. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.

i. The broadcast reception function shall be tested in each reception mode for which the

receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

8.4.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

8.4.4. TEST RESULT

Product	Lithium ion Battery	Environmental Conditions	20.4℃, 56 % RH, 101.32 kPa
Model	SK48V100	Tested By	Will
Test mode	Discharging	Test Result	Pass

Position	Test Level	Frequency Range	Modulated Signal	Freq. Step	Dwell Time	Result
Front	10 V/m	80 to 1000 MHz	AM 80%, 1kHz sine wave	1%	3 s	Pass
Right						Pass
Rear						Pass
Left						Pass
Front	3 V/m	1.4GHz-6.0GHz	AM 80%, 1kHz sine wave	1%	3 s	Pass
Right						Pass
Rear						Pass
Left						Pass
Remark: The EUT was operated as intended during and after the test.						

8.5. ELECTRICAL FAST TRANSIENT (EFT)

8.5.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-4
Test Voltage:	Power Line: ±1 kV
	Signal/Control Line: ±0.5 kV
Polarity:	Positive & Negative
Impulse Frequency:	100 kHz : only for single lines of Xdsl equipment
	5 kHz : other
Impulse Wave-shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 mins
Performance Criterion:	B

8.5.2. TEST PROCEDURE

a Both positive and negative polarity discharges were applied.

b The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.

c The duration time of each test sequential was 1 minutes.

d The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

8.5.3. TEST SETUP

The EUT installed in a representative system as described in section 7 of EN 61000-4-4.

For the actual test configuration, please refer to the related item – photographs of the test configuration.

8.5.4. TEST RESULT

N/A

8.6. SURGE IMMUNITY TEST

8.6.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 μs Open Circuit Voltage 8/20 μs Short Circuit Current
Test Voltage:	Power Port ~ Line to line: ±1 kV, Line to ground: ± 2 kV
Surge Input/Output:	Power Line: L-N / L-PE / N-PE
Generator Source Impedance:	2 Ω between networks 12 Ω between network and ground
Polarity:	Positive/Negative
Phase Angle:	0° /90° /180° /270°
Pulse Repetition Rate:	1 time / 60sec
Number of Tests:	5 positive polarity pulses, and 5 negative polarity pulses
Performance Criterion:	B

8.6.2. TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

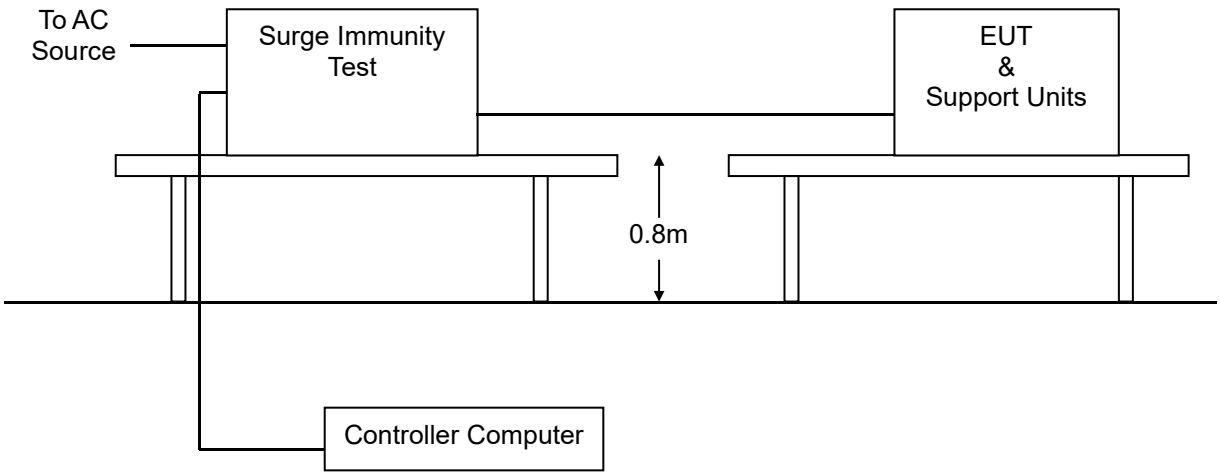
b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

8.6.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.6.4. TEST RESULT

N/A

8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

8.7.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-6
Frequency Range:	0.15 MHz - 80MHz
Field Strength:	10 Vr.m.s
Modulation:	1 kHz Sine Wave, 80 %, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupled cable:	Power Mains, Shielded
Coupling device:	CDN-M3/2 (3 wires/2 wires)
Performance Criterion:	A

8.7.2. TEST PROCEDURE

a. The EUT shall be tested within its intended operating and climatic conditions.

b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.

c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

d. The frequency range is swept from 0.15 MHz - 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.

e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.

f. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

For Broadcast reception function:

a. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.

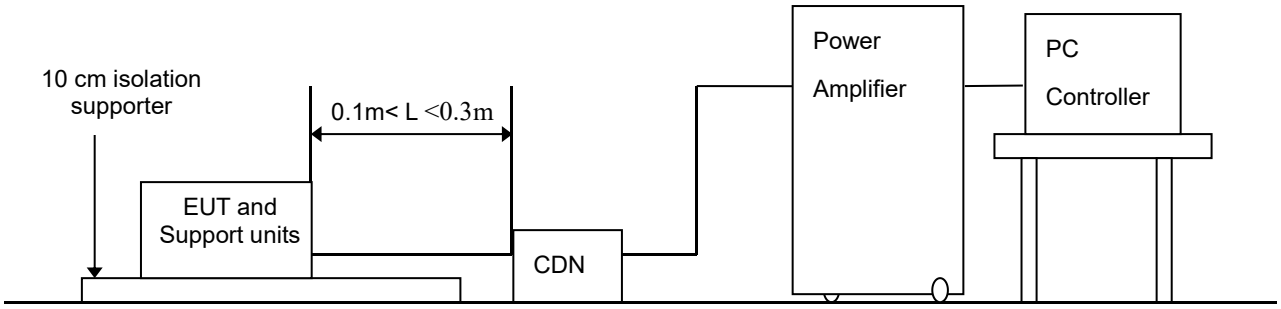
b. **Group 2:** Broadcast reception equipment which is not included in Group 1.

c. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2

equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.

d. The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

8.7.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration

Note: 1) The EUT is setup 0.1 m above Ground Reference Plane

2) All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

8.7.4. TEST RESULT

N/A

8.8. POWER FREQUENCY MAGNETIC FIELD

8.8.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-8
Frequency Range:	50/60 Hz
Field Strength:	30 A/m
Observation Time:	5 minutes
Inductance Coil:	Rectangular type, 1 m x 1 m
Performance Criterion:	A

8.8.2. TEST PROCEDURE

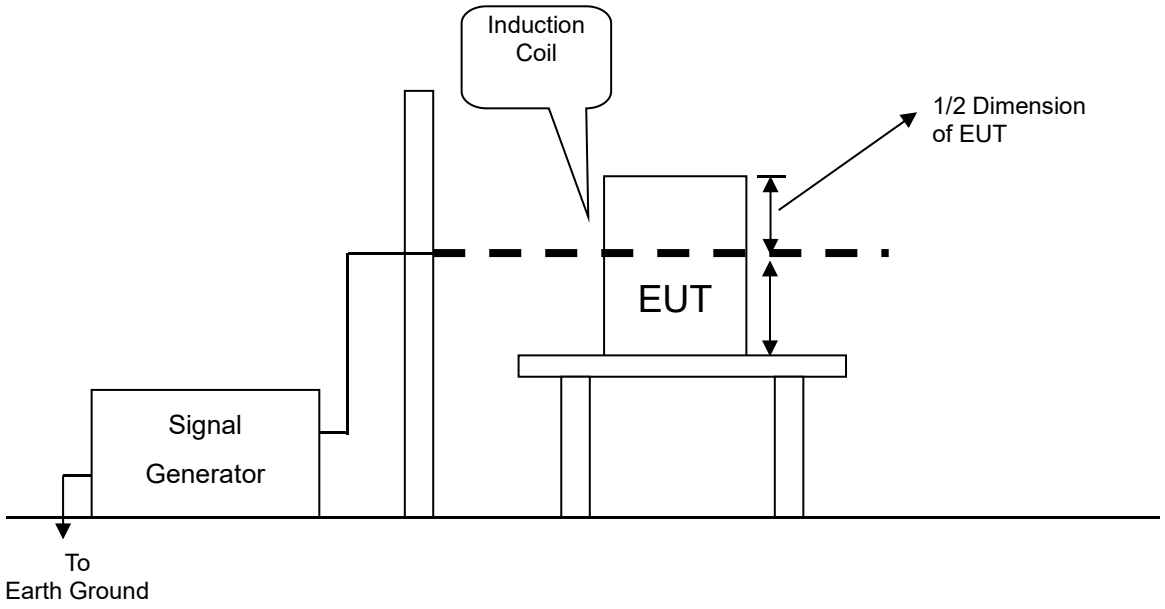
The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1 m-thick insulating support.

The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.

The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

8.8.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration
Note:

TABLETOP EQUIPMENT
The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT
The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

8.8.4. TEST RESULT

N/A

8.9. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

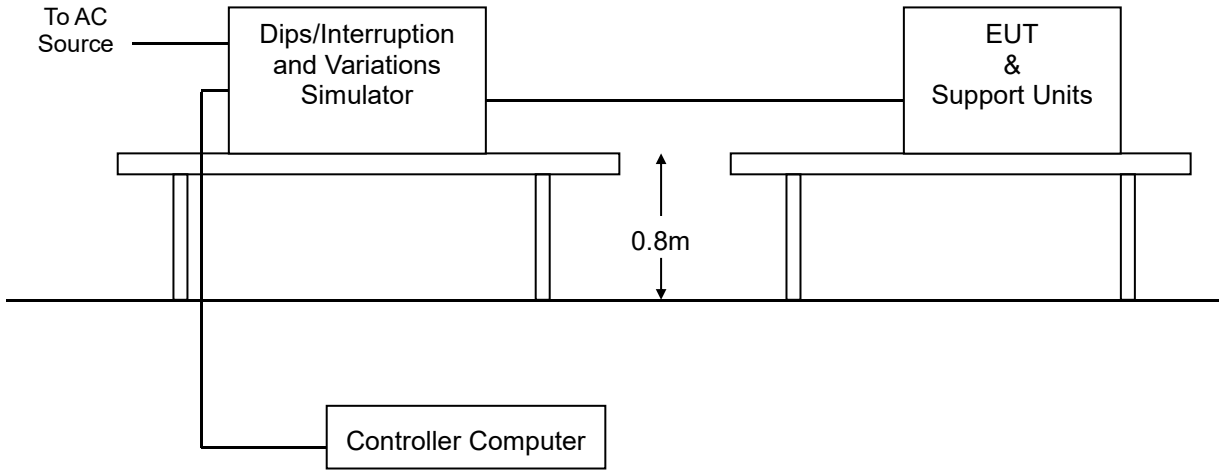
8.9.1. TEST SPECIFICATION

Basic Standard:	EN IEC 61000-4-11
Test Duration Time:	3 test events in sequence
Interval Between Event:	10 seconds
Phase Angle:	0°
Test Cycle:	3 times
Performance Criterion:	0% U_T / 0.5 P, Criterion: B
	40% U_T / 10 P, Criterion: C
	70% U_T / 25 P, Criterion: C
	0% U_T / 250 P, Criterion: C

8.9.2. TEST PROCEDURE

The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
Setting the parameter of tests and then perform the test software of test simulator.
Changes to the voltage level shall occur at 0 degree crossing point in the a.c. voltage waveform.
Record the test result in test record form.

8.9.3. TEST SETUP



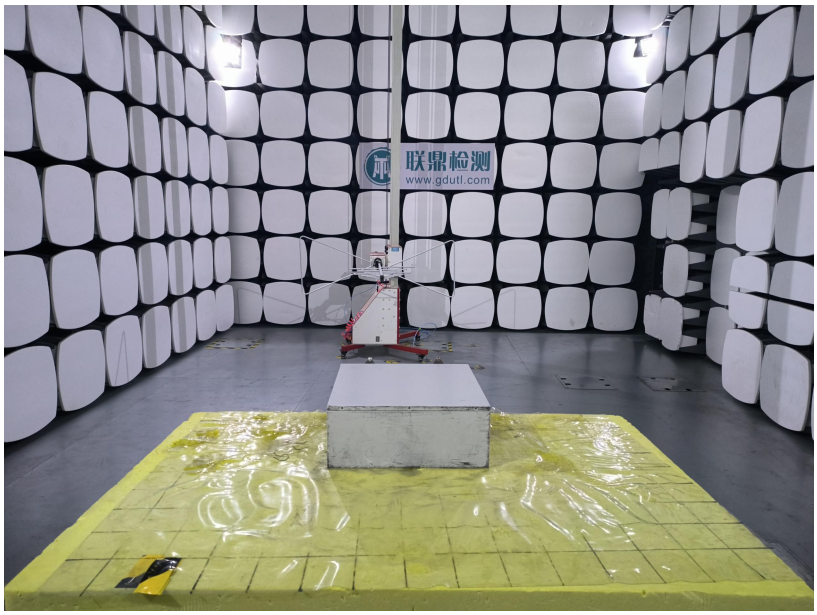
For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.9.4. TEST RESULT

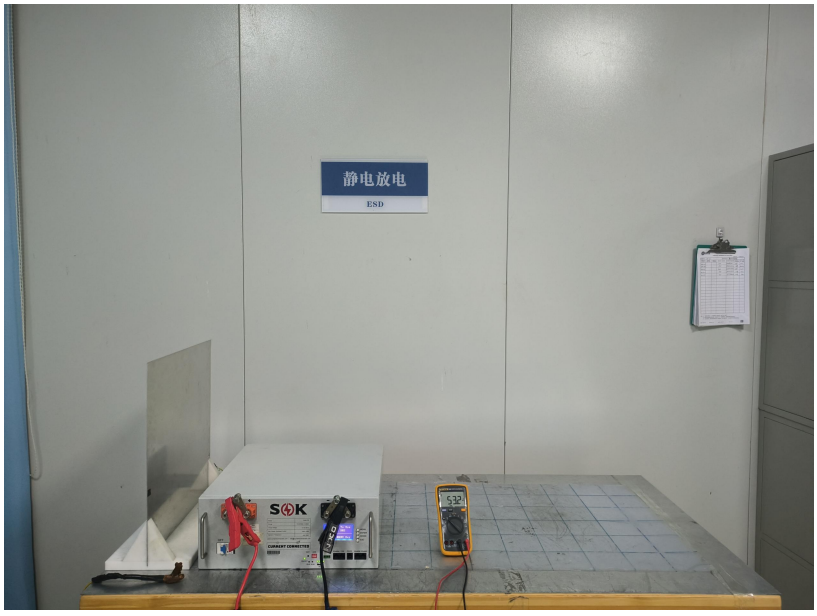
N/A

9. HOTOGRAPHS OF THE TEST CONFIGURATION

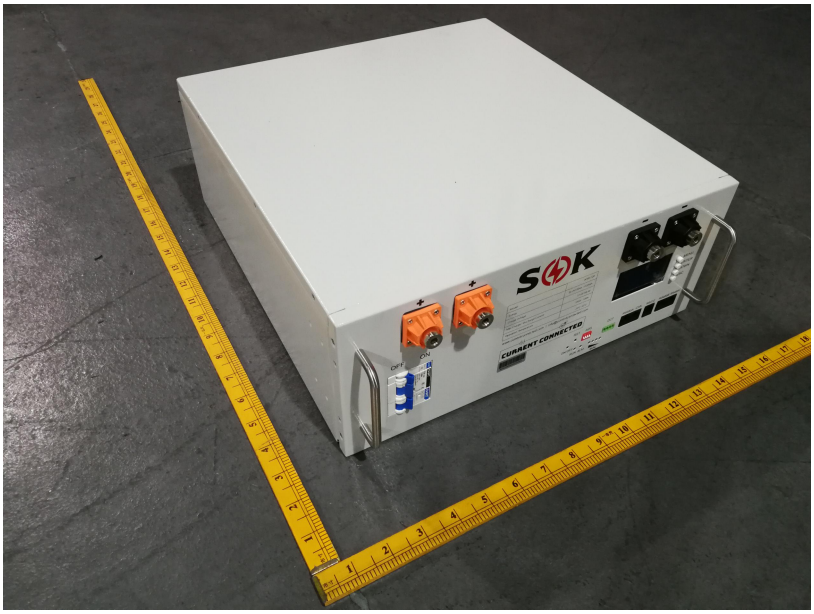
RE



ESD



10. PHOTOGRAPHS OF EUT



— End of report —