TEST REPORT

Report No.....	:	ZHT-221010001E
Product.....	:	Power assisted electric bicycle
Trademark.....	:	HAPPYRUN
Model(s).....	:	HR-G50
Applicant.....	:	Shenzhen Happyrun Intelligent Technology Co.,Ltd.
Address.....	:	3F, Building A, Runfa Tech Park, NO.25, Mudun Road, First Industry Park, Lou Cun, Gongming, Guangming, Shenzhen, China
Manufacturer.....	:	Shenzhen Happyrun Intelligent Technology Co.,Ltd.
Address.....	:	3F, Building A, Runfa Tech Park, NO.25, Mudun Road, First Industry Park, Lou Cun, Gongming, Guangming, Shenzhen, China
Prepared by.....	:	Guangdong Zhonghan Testing Technology Co., Ltd.
Address.....	:	Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Date of Receipt.....	:	Oct. 09, 2022
Date of Test(s).....	:	Oct. 09, 2022 - Oct. 14, 2022
Date of Issue.....	:	Oct. 14, 2022
Test Standard(s).....	:	EN IEC 55014-1:2021 EN IEC 55014-2:2021 EN IEC 61000-3-2:2019 EN 61000-3-3:2013+A1:2019

In the configuration tested, the EUT complied with the standards specified above.

Tested by:	Reviewed by:	Approved by:
Eric Jiang	Baret Wu	Levi Lee
Eric Jiang/ Engineer	Baret Wu/ Director	Levi Lee/ Manager

Note: The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report shall not be reproduced except in full, without prior written approval of ZHT. This document may be altered or revised by ZHT, personnel only, and shall be noted in the revision of the document.

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1. Revision History

Report No.	Issue Date	Description	Approved
ZHT-221010001E	Oct. 13, 2022	Original	Valid

2. Test Summary

Emission			
Requirement - Test	Test Method	Limit	Result
Conducted Emission	EN IEC 55014-1:2021	Class B	PASS
Radiated Emission	EN IEC 55014-1:2021	Class B	PASS
Immunity			
Requirement - Test	Test Method	Performance criteria	Result
Electrostatic discharges	EN 61000-4-2:2009	B	PASS
Electromagnetic field	EN 61000-4-3:2020	A	PASS
Electrical fast transients/burst	EN 61000-4-4:2012	B	PASS
Surges	EN 61000-4-5:2014	B	PASS
Conducted RF	EN 61000-4-6:2014	A	PASS
Voltage dips and Short interruptions	EN 61000-4-11:2020	C & C & C	PASS

Harmonic current emissions	EN IEC 61000-3-2:2019	Class A	PASS
Voltage changes, voltage fluctuations and flicker	EN 61000-3-3:2013+A1:2019	Clause 5	PASS

3. General Information

3.1. Description of EUT

Product:	Power assisted electric bicycle
Model Name:	HR-G50
Model Difference:	/
Rated Power Supply:	Input: AC 100-240V, 50/60Hz, 2A
Normal Testing Voltage:	AC 230V/50Hz, AC 110V/60Hz
DC Line	Short than 3m
I/O Ports	Refer to User Manual
Highest Frequency Generated	Below108 MHz

3.2. Description of Adapter

Product:	Li-ion Charger
Model Name:	JY-546200
Model Difference:	/
Rated Power Supply:	Input: AC 100-240V, 50/60Hz, 2A Output: 54.6V ⎓ 2A
Normal Testing Voltage:	AC 230V/50Hz, AC 110V/60Hz
DC Line	Short than 3m
I/O Ports	Refer to User Manual
Highest Frequency Generated	Below108 MHz

Note:

1. Other Accessory Device List and Details

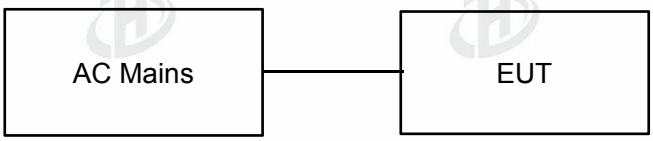
Description	Manufacturer	Model	Note
--	--	--	--

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.3. Test conditions

Temperature: 15-35℃
Relative Humidity: 30-60 %
Atmospheric pressure: 800hPa-1060hPa

3.4. Block diagram of EUT configuration



3.5. Test Mode

Conducted Emission	Charging mode
Radiated Emission	Charging mode, Working mode
Harmonic current emissions	Charging mode
Voltage changes, voltage fluctuations and flicker	Charging mode
Electrostatic discharges	Charging mode, Working mode
Electromagnetic field	Charging mode, Working mode
Electrical fast transients/burst	Charging mode
Surges	Charging mode
Conducted Susceptibility	Charging mode
Voltage dips and Short interruptions	Charging mode

* Only the worst-case data is represented in the report.

3.6. Test Site Environment

Test Item	Required (IEC 60068-1)		Actual
Conducted Emission	Temperature (°C)	15-35	24.7
	Humidity (%RH)	25-75	54.6
	Barometric pressure (mbar)	860-1060	1014
Radiated Emission	Temperature (°C)	15-35	23.6
	Humidity (%RH)	25-75	54.1
	Barometric pressure (mbar)	860-1060	1014
Harmonic Current Emissions	Temperature (°C)	--	23.6
	Humidity (%RH)	--	54.2
	Barometric pressure (mbar)	--	1014
Voltage Fluctuations & Flicker	Temperature (°C)	--	23.6
	Humidity (%RH)	--	54.2
	Barometric pressure (mbar)	--	1014
ESD	Temperature (°C)	15-35	24.2
	Humidity (%RH)	30-60	53.6
	Barometric pressure (mbar)	860-1060	1014
RS	Temperature (°C)	15-35	24.0
	Humidity (%RH)	30-60	54.3
	Barometric pressure (mbar)	860-1060	1014
EFT	Temperature (°C)	15-35	24.0
	Humidity (%RH)	30-60	54.3
	Barometric pressure (mbar)	860-1060	1014
Surge	Temperature (°C)	15-35	24.0
	Humidity (%RH)	10-75	54.3
	Barometric pressure (mbar)	860-1060	1014
CS	Temperature (°C)	--	24.0
	Humidity (%RH)	--	54.3
	Barometric pressure (mbar)	--	1014
Voltage Dips & Voltage Variations	Temperature (°C)	15-35	24.0
	Humidity (%RH)	25-75	54.3
	Barometric pressure (mbar)	860-1060	1014

4. Facilities

4.1. Test Facility

Test address 1：Guangdong Zhonghan Testing Technology Co., Ltd.
Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Test address 2：Eurofins Electrical Testing Service (Shenzhen) Co., Ltd.
1st Floor, Spring Block , MeiShengHuiGu Innovation Park ,
No 83. Dabao Rd, Xin'an Community, Bao'an District,
Shenzhen City, Guangdong Province, China 518133

4.2. Test Instruments

Conducted emissions Test

Equipment	Manufacturer	Model	Last Cal.	Next Cal.
Receiver	R&S	ESCI	Apr. 27, 2022	Apr. 26, 2023
LISN	R&S	ENV216	Apr. 27, 2022	Apr. 26, 2023

Radiated emissions Test (966 chamber)

Equipment	Manufacturer	Model	Last Cal.	Next Cal.
Receiver	R&S	ESPI 7	Apr. 27, 2022	Apr. 26, 2023
Amplifier	Schwarzbeck	BBV 9743 B	Apr. 27, 2022	Apr. 26, 2023
Amplifier	Schwarzbeck	BBV 9718 B	Apr. 27, 2022	Apr. 26, 2023
TRILOG Broadband Antenna	schwarzbeck	VULB9162	Apr. 27, 2022	Apr. 26, 2023
Horn Antenna	schwarzbeck	BBHA9120D	Apr. 27, 2022	Apr. 26, 2023

Harmonic / Flicker Test

Equipment	Manufacturer	Model	Last Cal.	Next Cal.
Power Analyzer	Li	AC2000A	Apr. 27, 2022	Apr. 26, 2023
Power Analyzer	Li	HPHF4010	Apr. 27, 2022	Apr. 26, 2023

Electrostatic discharge immunity Test

Equipment	Manufacturer	Model	Last Cal.	Next Cal.
ESD TEST Generator	HTEC	HESD16	Apr. 27, 2022	Apr. 26, 2023

EFT and Surge and Voltage dips and interruptions Test

Equipment	Manufacturer	Model	Last Cal.	Next Cal.
Surge Generator	HTEC	HCOMPACT5/H V1P6T	Apr. 27, 2022	Apr. 26, 2023
DIPS Generator	HTEC	HCOMPACT5/H V1P6T	Apr. 27, 2022	Apr. 26, 2023
EFT/B Generator	HTEC	HCOMPACT5/H V1P6T	Apr. 27, 2022	Apr. 26, 2023
EFT/B Clamp	HTEC	H3C	Apr. 27, 2022	Apr. 26, 2023

Conducted Susceptibility disturbances Test

Equipment	Manufacturer	Model	Last Cal.	Next Cal.
Signal Generator	Schwarzbeck	CDG 7000-25	Apr. 27, 2022	Apr. 26, 2023
Attenuator	Schwarzbeck	6db	Apr. 27, 2022	Apr. 26, 2023
CDN	Schwarzbeck	CDN M2+M3-16A	Apr. 27, 2022	Apr. 26, 2023

Radio-frequency electromagnetic field

Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
Signal Generator	Agilent	N517113-50B	Nov. 06, 2021	1Year
Amplifier	A&R	50SIG6M1	Oct. 09, 2021	1Year
Log-periodic Antenna	SCHWARZBECK	STLP 9128E	Jan. 19, 2022	1 Year
Isotropic Field Probe	A&R	FL7006	Jul. 01, 2021	1 Year
Microwave log-periodic antenna	SCHWARZBECK	STLP9149	Dec. 15, 2021	1 Year

4.3. Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted Emission (150kHz-30MHz)	2.60
Radiated Emission(30MHz~1GHz)	4.60
Radiated Emission(1GHz~6GHz)	4.30

Decision Rule

☒ Uncertainty is not included

☐ Uncertainty is included

5. Emission

5.1. Conducted Emission

5.1.1. Limit

Disturbance voltage limits for induction cooking appliances

Frequency range	Appliances which are 1000 V rated and without an earth connection		All other appliances	
MHz	dBµV Quasi-peak	dBµV Average	dBµV Quasi-peak	dBµV Average
0,009 to 0,050	122	-	110	-
0,050 to 0,150	Decreasing linearly with logarithm of frequency from 102 to 92	-	Decreasing linearly with logarithm of frequency from 90 to 80	-
0,150 to 0,5	Decreasing linearly with logarithm of frequency from 72 to 62	60 to 52	66 to 56	56 to 46
0,5 to 5	56	46	56	46
5 to 30	60	50	60	50
The lower limit applies at the transition frequencies.				

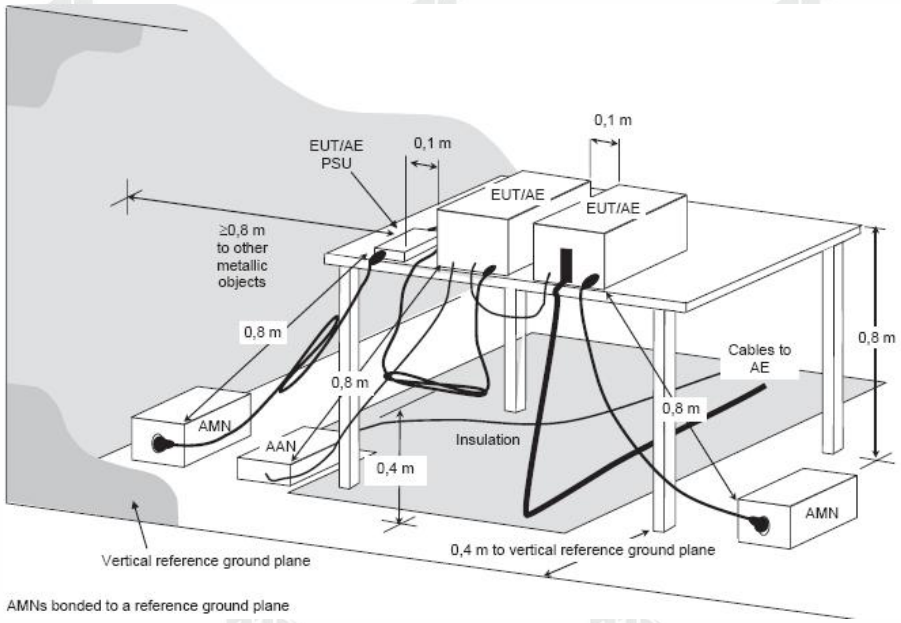
General limits

Frequency range	Mains ports		Associated ports			
	Disturbance voltage		Disturbance voltage		Disturbance current	
MHz	Quasi-peak dBµV	Average dBµV	Quasi-peak dBµV	Average dBµV	Quasi-peak dBµA	Average dBµA
0,15 to 0,50	Decreasing linearly with the logarithm of the frequency from: 66 to 56	59 to 46	80	70	Decreasing linearly with the logarithm of the frequency from: 40 to 30	30 to 20
0,50 to 5	56	46	74	64	30	20
5 to 30	60	50	74	64		
The lower limit applies at the transition frequencies. The test report shall state which test method was used and which limits were applied.						

Limits for mains port of tools

Frequency range	P ≤ 700 W		700 W < P ≤ 1 000 W		P > 1 000 W	
MHz	Quasi-peak dBµV	Average dBµV	Quasi-peak dBµV	Average dBµV	Quasi-peak dBµV	Average dBµV
0,15 to 0,35	Decreasing linearly with the logarithm of the frequency from: 66 to 59	59 to 49	70 to 63	63 to 53	76 to 69	69 to 59
0,35 to 5	59	49	63	53	69	59
5 to 30	64	54	68	58	74	64
The lower limit applies at the transition frequencies. **Key** P = rated power of the motor only.						

5.1.2. Test setup



5.1.3. Test procedure

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

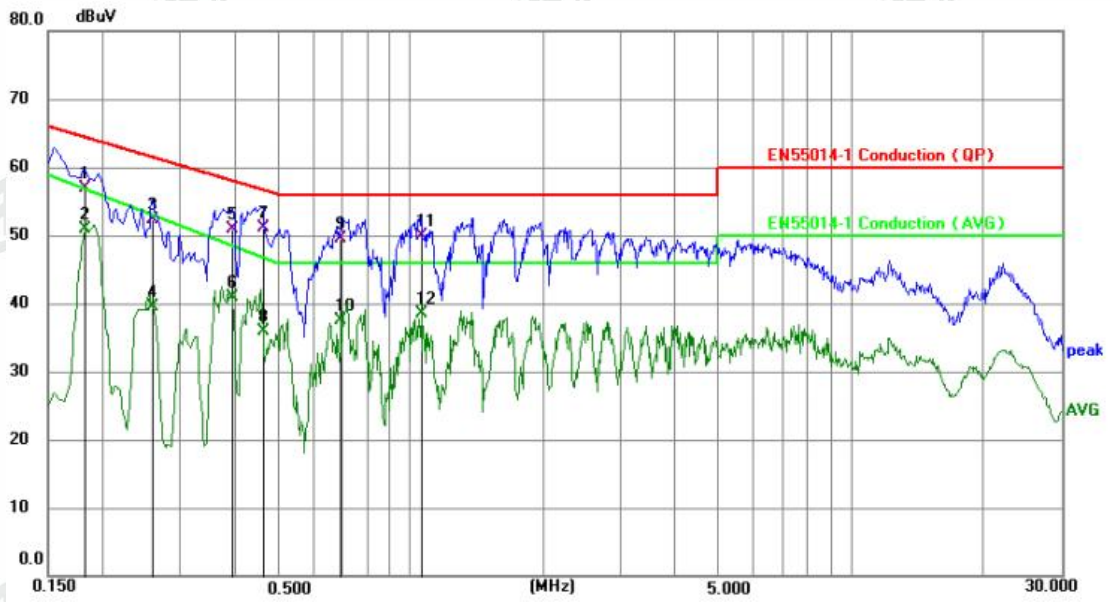
c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak(mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.
Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

5.1.4. Test results

PASS

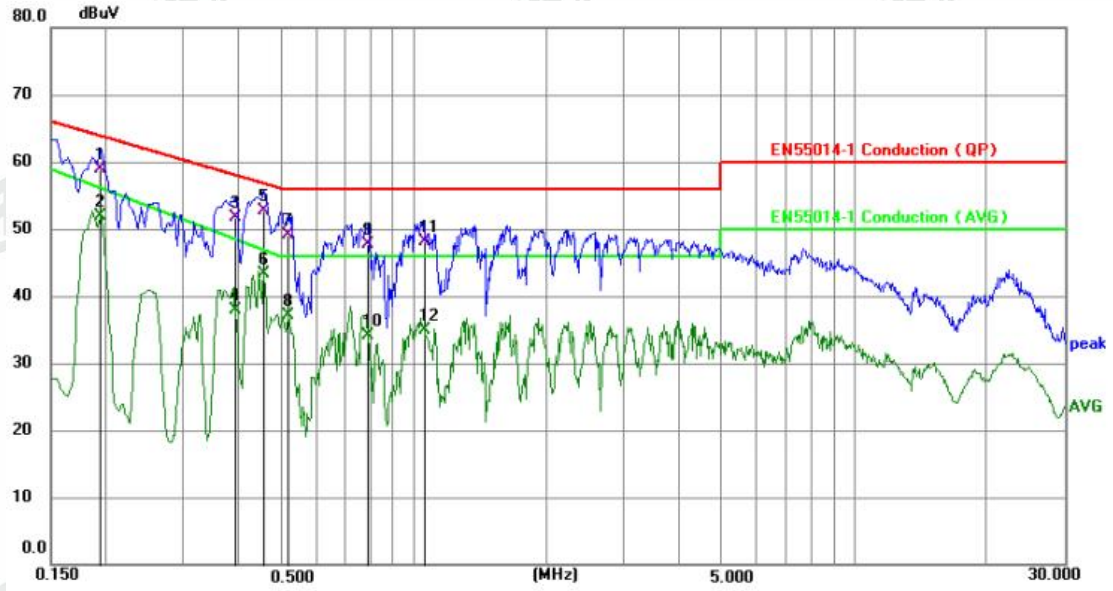
Please refer to the following page.

Phase: Live



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1814	47.04	9.90	56.94	64.42	-7.48	QP	P	
2	0.1814	40.97	9.90	50.87	56.95	-6.08	AVG	P	
3	0.2580	42.44	9.93	52.37	61.50	-9.13	QP	P	
4	0.2580	29.60	9.93	39.53	53.14	-13.61	AVG	P	
5	0.3930	40.85	9.99	50.84	58.00	-7.16	QP	P	
6	0.3930	30.96	9.99	40.95	48.60	-7.65	AVG	P	
7 *	0.4605	41.08	10.01	51.09	56.68	-5.59	QP	P	
8	0.4605	25.86	10.01	35.87	46.89	-11.02	AVG	P	
9	0.6945	39.38	10.04	49.42	56.00	-6.58	QP	P	
10	0.6945	27.50	10.04	37.54	46.00	-8.46	AVG	P	
11	1.0544	39.80	10.06	49.86	56.00	-6.14	QP	P	
12	1.0544	28.53	10.06	38.59	46.00	-7.41	AVG	P	

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1949	49.01	9.91	58.92	63.83	-4.91	QP	P	
2	0.1949	42.09	9.91	52.00	56.17	-4.17	AVG	P	
3	0.3930	41.64	9.99	51.63	58.00	-6.37	QP	P	
4	0.3930	27.96	9.99	37.95	48.60	-10.65	AVG	P	
5	0.4560	42.70	10.01	52.71	56.77	-4.06	QP	P	
6 *	0.4560	33.21	10.01	43.22	46.99	-3.77	AVG	P	
7	0.5190	39.06	10.02	49.08	56.00	-6.92	QP	P	
8	0.5190	27.17	10.02	37.19	46.00	-8.81	AVG	P	
9	0.7842	37.63	10.04	47.67	56.00	-8.33	QP	P	
10	0.7842	24.03	10.04	34.07	46.00	-11.93	AVG	P	
11	1.0544	38.11	10.06	48.17	56.00	-7.83	QP	P	
12	1.0544	24.82	10.06	34.88	46.00	-11.12	AVG	P	

Note: Level=Reading + Factor
Margin=Level – Limit

5.2. Disturbance POWER EMISSION test

5.2.1. Limit

Table A

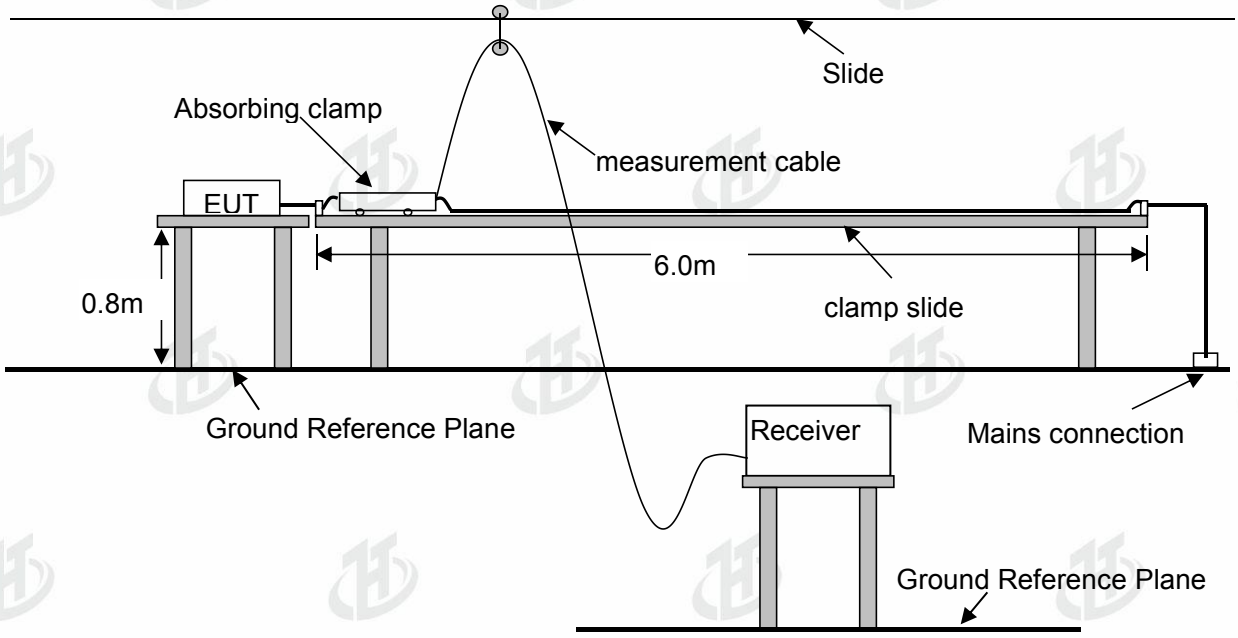
Equipment type	Frequency range (MHz)	Limits(dB(pW))	
		Quasi-peak	Average
Household and similar appliances	30 to 300	45 to 55	35 to 45

Note: 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.

Table B

Equipment type	Frequency range (MHz)	Limits(dB(pW))	
		Quasi-peak	Average
Household and similar appliances	200 to 300	0 to 10 dB	--

5.2.2. Test setup



5.2.3. Test procedure

The E.U.T. was placed on the 0.8 m high table and away from other metallic surface at least 0.8m. It is connected to the power mains through an extension cord of 6m min. The absorber clamp clamps the cord and moves from the far end to the E.U.T. to measure the disturbing energy emitted from the cord.

5.2.4. Test results

Remark:
The radiation method was used for testing, See Chapter 5.3 for details.

5.3. Radiated emissions

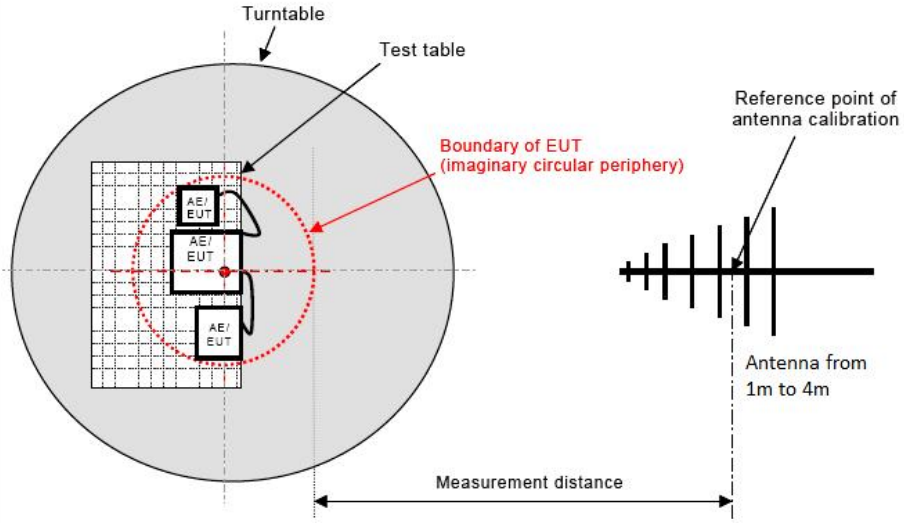
5.3.1. Limit

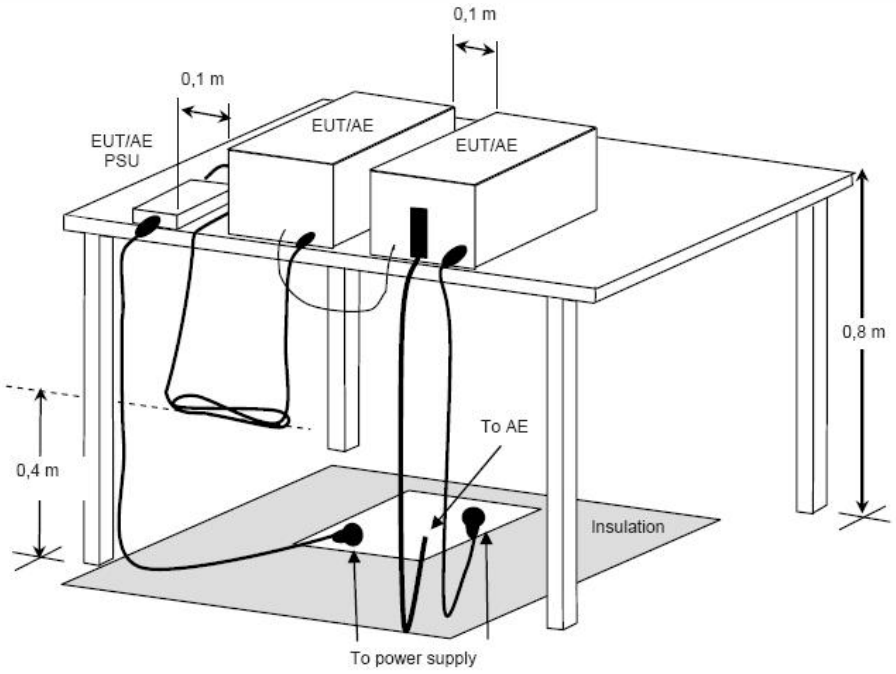
Table 2 - Radiated disturbance limits and testing methods – 30 MHz to 1 000 MHz

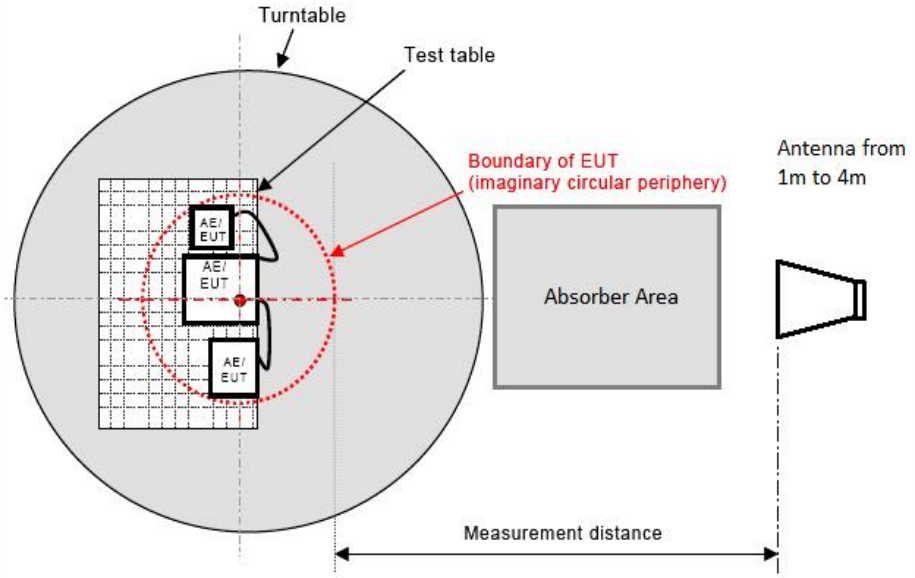
Frequency (MHz)	Quasi-peak limits at 3m dB(μV/m)
30-230	40
230-1000	47

5.3.2. Block diagram of test setup

Measurement distance







5.3.3. Test procedure

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

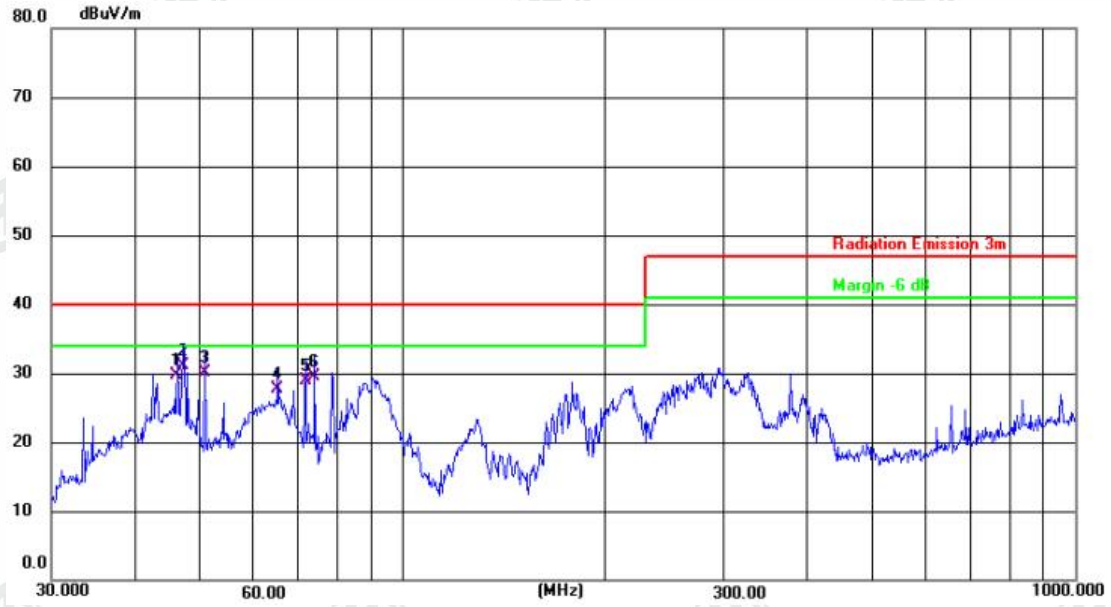
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

5.3.4. Test results

PASS

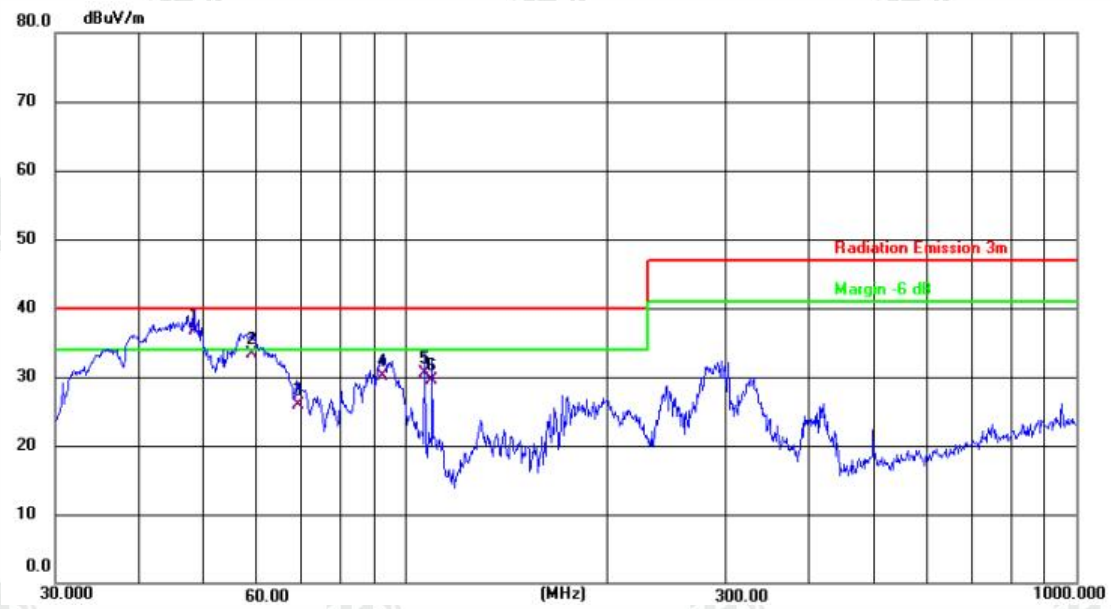
Please refer to the following page.

Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	46.1779	44.53	-14.89	29.64	40.00	-10.36	QP			P	
2 *	47.1598	45.92	-14.79	31.13	40.00	-8.87	QP			P	
3	50.7636	44.73	-14.63	30.10	40.00	-9.90	QP			P	
4	65.1144	45.12	-17.34	27.78	40.00	-12.22	QP			P	
5	71.5805	48.15	-19.19	28.96	40.00	-11.04	QP			P	
6	73.8756	49.11	-19.63	29.48	40.00	-10.52	QP			P	

Polarization: Vertical

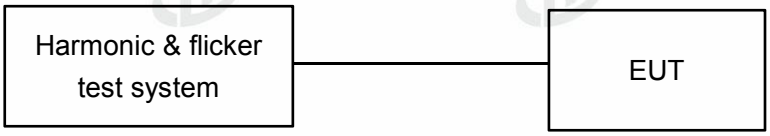


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	48.3316	51.43	-14.69	36.74	40.00	-3.26	QP			P	
2	58.8185	48.94	-15.58	33.36	40.00	-6.64	QP			P	
3	69.1140	44.51	-18.62	25.89	40.00	-14.11	QP			P	
4	92.4624	48.28	-18.11	30.17	40.00	-9.83	QP			P	
5	106.7587	48.00	-17.42	30.58	40.00	-9.42	QP			P	
6	109.4116	47.23	-17.70	29.53	40.00	-10.47	QP			P	

Note: Level=Reading + Factor
Margin=Level – Limit

5.4. Harmonic current emissions

5.4.1. Test Setup



5.4.2. Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and the EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.94 times and 1.06 times shall be performed.

A definition of the normal load or of the conditions for adequate heat discharge can usually be found in the EN publication corresponding to the equipment under test.

Equipment may have several separately controlled circuits. Each circuit is considered as a single piece of equipment if it can be operated independently and separately from the other circuits.

5.4.3. Limit

Class A Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current (A)	Harmonics Order n	Maximum Permissible harmonic current (A)
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	8 ≤ n ≤ 40	0.23 * 8/n
11	0.33		
13	0.21		
15 ≤ n ≤ 39	0.15 * 15/n		

Class B Harmonics Currents

For Class B equipment, the harmonic of the input current shall not exceed the maximum permissible values given in table which is the limit of Class A multiplied by a factor of 1.5.

Class C Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current Expressed as a percentage of the input current at the fundamental (%)
2	2
3	30．λ*
5	10
7	7
9	5
11 ≤ n ≤ 39 (odd harmonics	3
* λ is the circuit power factor	

Class D Harmonics Currents

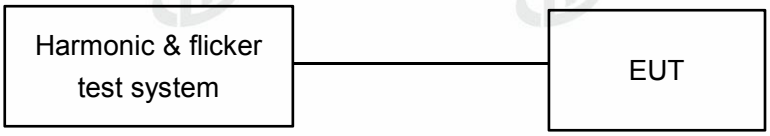
Harmonics Order n	Maximum Permissible harmonic current per watt (mA/W)	Maximum Permissible harmonic current (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
11 ≤ n ≤ 39 (odd harmonics	3.85/n	See limit of Class A

5.4.4. Test Result

PASS

5.5. Voltage changes, voltage fluctuations and flicker

5.5.1. Test Setup



5.5.2. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.94 times and 1.06 times shall be performed. 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 normal 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.

5.5.3. Limit

Test Item	Limit
Pst (Short-term flicker indicator.)	1.0
Plt (Long-term flicker indicator.)	0.65
Td(t)(ms) (Maximum time that d(t) exceeds 3.3%)	500
dmax(%) (Maximum relative voltage change.)	4
dc(%) (Relative steady-state voltage change)	3.3

5.5.4. Test Result

PASS

The EUT is unlikely to produce significant voltage fluctuations or flicker by technical analysis and eval uation. So it is deemed to fulfil the requirements without testing.

6. Immunity

Performance criteria

Performance criterion **A**

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss function is allowed below a performance level specified by the manufacturer, when the equipment 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 equipment if used as intended.

Performance criterion **B**

The equipment shall continue to operate as intended after the test. No degradation of performance or loss function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. 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 specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from equipment if used as intended.

Performance criterion **C**

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

6.1. Electrostatic discharges

6.1.1. Test Specification

Test Port	:	Enclosure port
Discharge Impedance	:	330 ohm / 150 pF
Discharge Mode	:	Single Discharge
Discharge Period	:	one second between each discharge

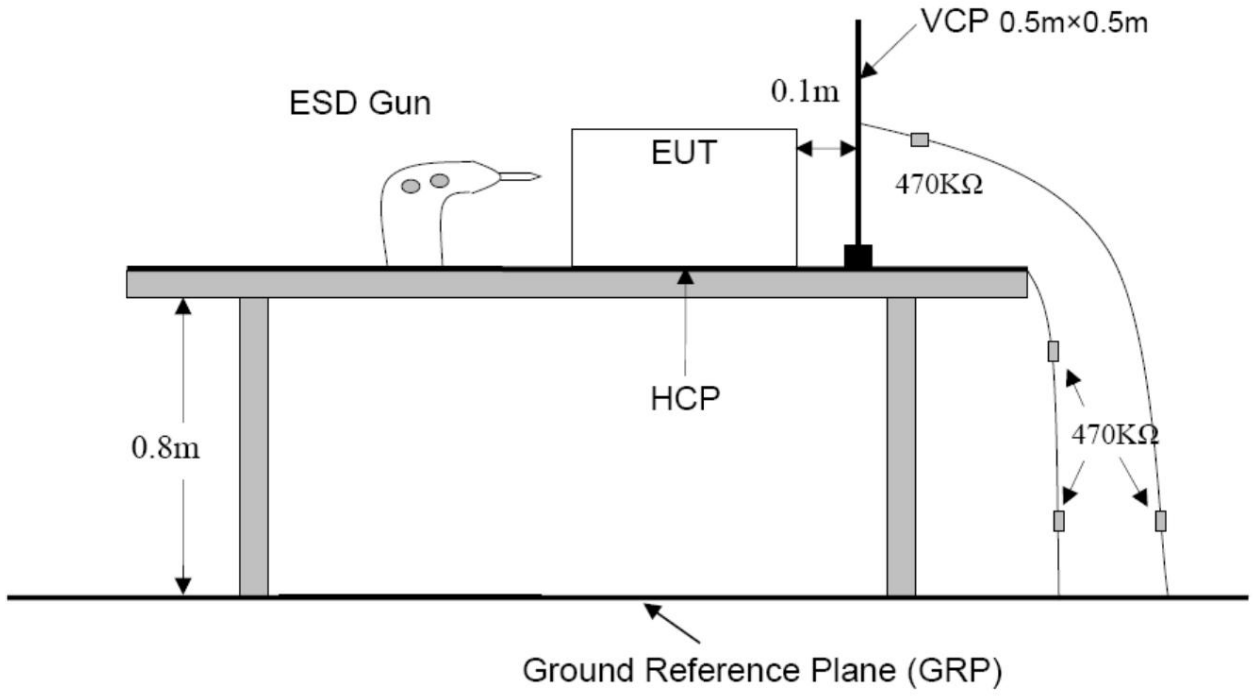
6.1.2. Test Levels and Performance Criterion

Test Standard
EN IEC 55014-2:2021
(EN 61000-4-2: 2009)

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	±2	±2
2.	±4	±4
3.	±6	±8
4.	±8	±15
X	Special	Special

Performance criterion: **B**

6.1.3. Test setup



6.1.4. Test Procedure

Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the E.U.T.. After each discharge, the discharge electrode shall be removed from the E.U.T.. The generator is then re-triggered for a new single discharge and repeated (10 of each polarity) for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

All the procedure shall be same as Section Air Discharge except that the tip of the discharge electrode shall touch the E.U.T..

Indirect discharge for horizontal coupling plane:

At least 10 single discharges(in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit(if applicable) of the E.U.T. and 0.1m from the front of the E.U.T.. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

Indirect discharge for vertical coupling plane:

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the E.U.T.. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the E.U.T. are completely illuminated.

6.1.5. Test Result

PASS

Please refer to the following page.

Test Point	Kind A-Air Discharge C-Contact Discharge	Performance Criterion	Result (Performance Criterion)
Metal	C	☐A ☒B	A
Surface of EUT	A	☐A ☒B	A
Indirect Discharge (HCP)	C	☐A ☒B	A
Indirect Discharge (VCP)	C	☐A ☒B	A

6.2. Radio-frequency electromagnetic field

6.2.1. Test Specification

Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second
Polarization	:	Horizontal & Vertical

6.2.2. Test Levels and Performance Criterion

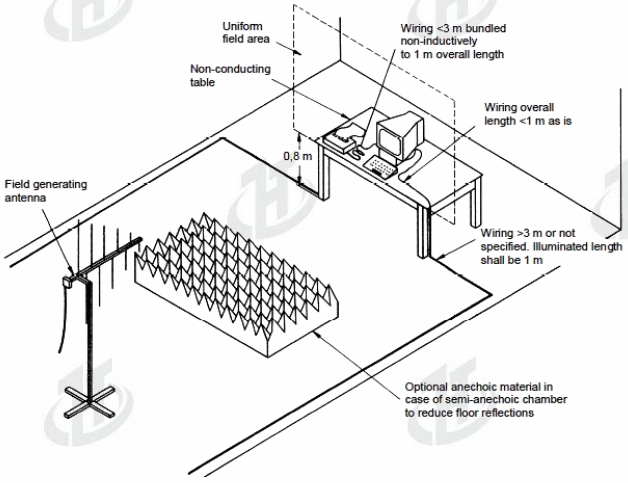
Test Standard
EN IEC 55014-2:2021
(EN 61000-4-3:2020)

Characteristics	Test levels
Frequency range	80 MHz to 1 000 MHz,
Test level	3 V/m (unmodulated)
Modulation	1 kHz, 80 % AM, sine wave

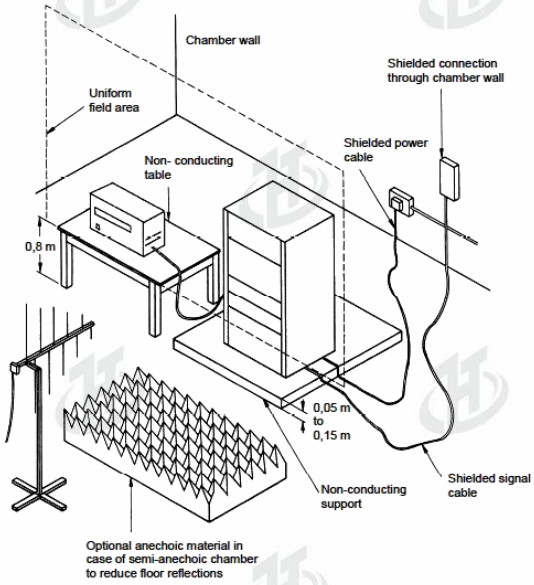
Performance criterion: **A**

6.2.3. Test setup

For table-top equipment



For floor standing equipment



6.2.4. Test Procedure

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

6.2.5. Test Result

PASS

Frequency (MHz)	Polarization	Test level (V/m)	Modulation	Exposed location	Result (Performance Criterion)
80-1 000	H & V	3	1 kHz, 80% AM, 1 % increment	All sides	A

6.3. Electrical fast transients/burst

6.3.1. Test Specification

Test Port	:	input a.c. power port
Impulse Frequency	:	5 kHz
Impulse Wave-shape	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	2 minutes per polarity

6.3.2. Test Levels and Performance Criterion

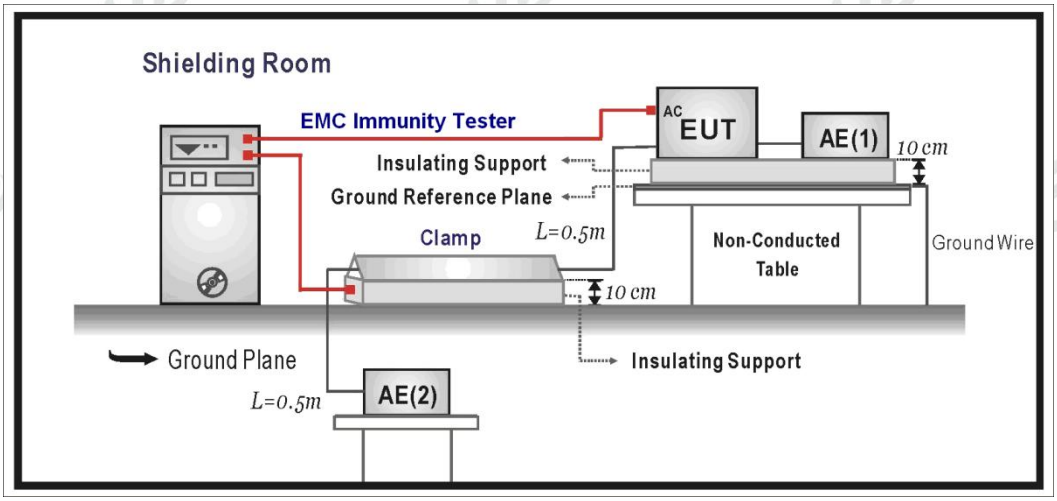
Test Standard
EN IEC 55014-2:2021
(EN 61000-4-4: 2012)

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (Input/Output) Signal data and control ports	
	Voltage peak KV	Repetition rate KHz	Voltage peak KV	Repetition rate KHz
1.	0.5	5 or 100	0.25	5 or 100
2.	1.0	5 or 100	0.5	5 or 100
3.	2.0	5 or 100	1.0	5 or 100
4.	4.0	5 or 100	2.0	5 or 100
X	Special	Special	Special	Special

Note 1 Use of 5 KHz repetition rates is traditional; however, 100 KHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.
Note 2 With some products, there may be no clear distinction, between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.
Note 3 “X” is an open level. The level has to be specified in the dedicated equipment specification.

Performance criterion: **B**

6.3.3. Test setup



6.3.4. Test Procedure

The E.U.T. is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the E.U.T. by at least 0.1m on all sides and the minimum distance between E.U.T. and all other conductive structure, except the ground plane beneath the E.U.T., shall be more than 0.5m.

For input and output AC power ports:

The E.U.T. is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minus.

For signal lines ports:

The E.U.T. is connected to the power mains by using a coupling device which couples the EFT interference signal to Signal lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minus.

For DC ports:

It's unnecessary to test.

6.3.5. Test Result

Test Point	Polarity	Test Level (kV)	Inject Time (Second)	Inject Method	Performance Criterion	Result (Performance Criterion)
L	±	1	60	Direct	☐A ☒B	A
N	±	1	60	Direct	☐A ☒B	A
PE	±	1	60	Direct	☐A ☒B	N/A
L+N	±	1	60	Direct	☐A ☒B	A
L+PE	±	1	60	Direct	☐A ☒B	N/A
N+PE	±	1	60	Direct	☐A ☒B	N/A
L+N+PE	±	1	60	Direct	☐A ☒B	N/A

Note 1: The testing performed is from lowest level up to the highest level as required by standard, but only highest level is shown on the report.

Criterion A: Operate as intended during and after the test

Criterion B: Operate as intended after the test

Criterion C: Loss/Error of function

6.4. Surges

6.4.1. Test Specification

Test Port	:	input a.c. power port
Wave-Shape	:	Open Circuit Voltage - 1.2 / 50 us Short Circuit Current - 8 / 20 us
Pulse Repetition Rate	:	1 pulse / min.
Phase Angle	:	90° / 270°
Test Events	:	5 pulses (positive & negative) for each polarity

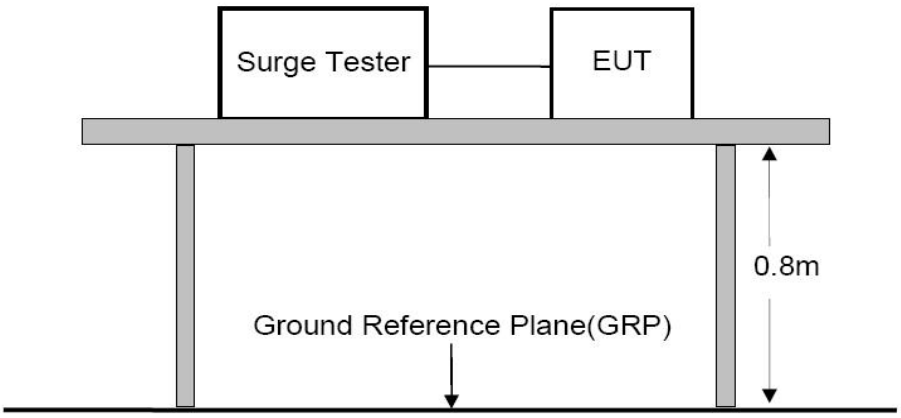
6.4.2. Test Levels and Performance Criterion

Test Standard
EN IEC 55014-2:2021
(EN 61000-4-5: 2014)

Severity Level	Open-Circuit Test VoltageKV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

Performance criterion: **B**

6.4.3. Test setup



6.4.4. Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 12.1.
2. For line to line coupling mode, provide a 1.0KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to E.U.T. selected points.
3. Five positive pulses Line-to-neutral at 90°phase,Five negative pulses Line-to-neutral at 270°phase. with a maximum 1/min repetition rate are conducted during test.
4. Different phase angles are done individually.
5. Record the E.U.T. operating situation during compliance test and decide the E.U.T. immunity criterion for above each test.

6.4.5. Test Result

Angle:		Positive pulses at 90° phase, Negative pulses at 270° phase				
Inject Line	Polarity	Voltage (kV)	Time Interval (Second)	Inject Method	Performance Criterion	Result (Performance Criterion)
L-N	±	1	60	Direct	☐A ☒B	A
L-PE	±	2	60	Direct	☐A ☒B	N/A
N-PE	±	2	60	Direct	☐A ☒B	N/A

Note 1: The testing performed is from lowest level up to the highest level as required by standard, but only highest level is shown on the report.

Criterion A: Operate as intended during and after the test

Criterion B: Operate as intended after the test

Criterion C: Loss/Error of function

6.5. Conducted Susceptibility

6.5.1. Test Specification

Test Port	:	input a.c. power port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second

6.5.2. Test Levels and Performance Criterion

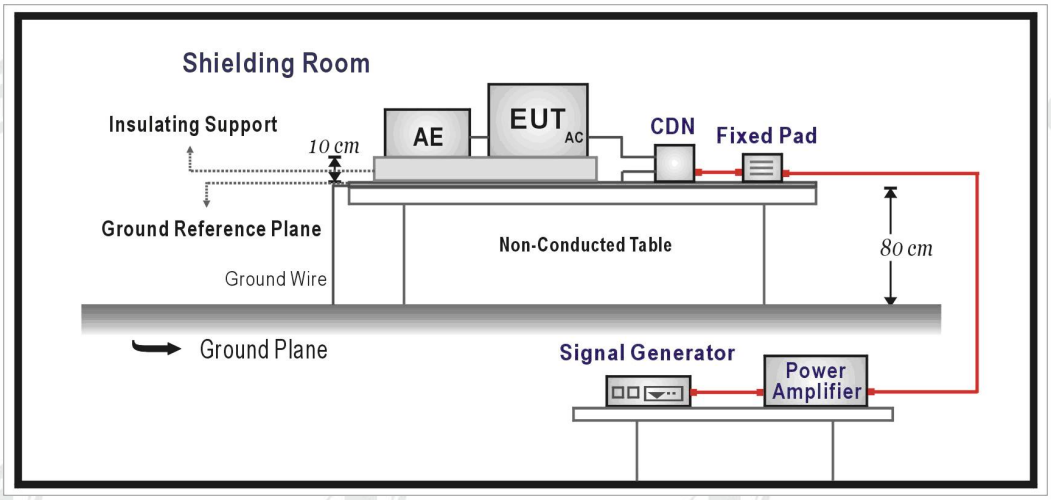
Test Standard
EN IEC 55014-2:2021
(EN 61000-4-6: 2014)

Frequency ranges MHz	Test level V	Modulation	Performance criterion
0,15 to 80	3	80% AM (1kHz)	A

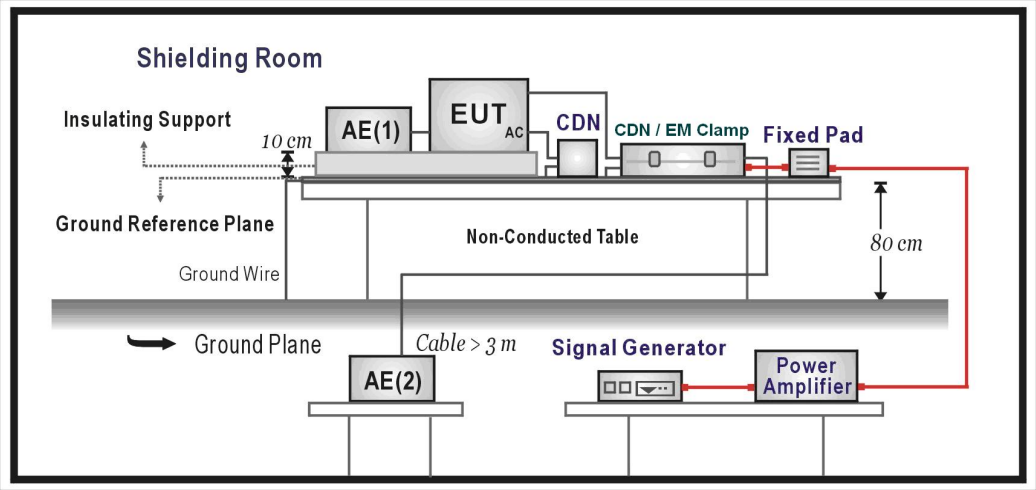
Performance criterion: **A**

6.5.3. Test setup

CDN Method



EM Clamp Method



6.5.4. Test Procedure

1. Set up the E.U.T., CDN and test generators as shown on Section 5.6.1.
2. Let the E.U.T. work in test mode and measure it.
3. The E.U.T. 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 E.U.T.. Cables between CDN and E.U.T. are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4. The disturbance signal described below is injected to E.U.T. through CDN.
5. The E.U.T. operates within its operational mode(s) under intended climatic conditions after power on.
6. The frequency range is swept from 150 KHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7. The rate of sweep shall not exceed 1.5*10-3decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8. Recording the E.U.T. operating situation during compliance testing and decide the E.U.T. immunity criterion.

6.5.5. Test Result

Frequency Band (MHz)	Field Strength (Vrms)	Inject Port	Inject Method	Performance Criterion	Result (Performance Criterion)
0.15 ~ 80	3	AC Mains	CDN-M2	☒A ☐B	A

Note 1: The testing performed is from lowest level up to the highest level as required by standard, but only highest level is shown on the report.

Criterion A: Operate as intended during and after the test

Criterion B: Operate as intended after the test

Criterion C: Loss/Error of function

Note 2: The display quality of a display output was evaluated by using a subjective by direct observation.

6.6. Voltage dips and Short interruptions

6.6.1. Test Specification

Test Port	:	input a.c. power port
Phase Angle	:	0°, 180°
Test cycle	:	3 times

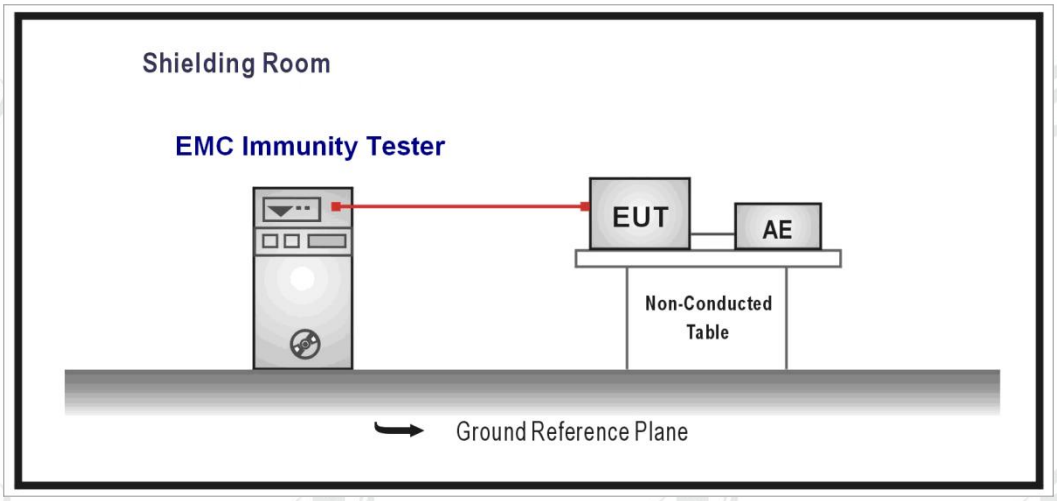
6.6.2. Test Levels and Performance Criterion

Test Standard
EN IEC 55014-2:2021
(EN 61000-4-11: 2020)

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5
40	60	10
70	30	25

Performance criterion: **C, C, C**

6.6.3. Test setup



6.6.4. Test Procedure

The Section of EN 61000-4 defines the immunity test methods and range of preferred test levels for electrical and electronic equipment connected to low-voltage power supply networks for voltage dips. Short interruptions and voltage variations. The standard applies to electrical and electronic equipment having a rated input current not exceeding 16A per phase. It does not apply to electrical and electronic equipment for connection to D.C networks or 400Hz A.C networks. Test for these networks will be covered by future EN standard. A performance criterion is classified as A, B, C, the recommendation is criterion A or B.

The test shall be performed with the EUT connected to the test generator with the shortest power supply cable as specified by EUT manufacturer. If no cable length is specified, it shall be the shortest possible length suitable to the application of the EUT.

The test set-up for the two types of phenomena described in this standard are:

- Voltage dips and short interruptions;

- Voltage variations with gradual transition between the rated voltage and the changed voltage (Option)

Both tests may be implemented with this set-up. Test on the three-phase EUT are accomplished by using three set of equipment mutually synchronized.

The EUT shall be tested for each selected combination of test level and duration with a sequence of three Dip / interruption with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested.

6.6.5. Test Result

Test Voltage (Vac)	Voltage Residual	Test Duration (Periods)	Performance Criterion	Result (Performance Criterion)
230	0	0.5	☐A ☐B ☒C	B
	40	10	☐A ☐B ☒C	C
	70	25	☐A ☐B ☒C	C

Note 1: The testing performed is from lowest level up to the highest level as required by standard, but only highest level is shown on the report.

Criterion A: Operate as intended during and after the test

Criterion B: Operate as intended after the test

Criterion C: Loss/Error of function

Note2: The power is temporary off and can be reset by the operator.

7. Photographs of EUT

EUT Photo 1

EUT Photo 2

EUT Photo 3

EUT Photo 4

EUT Photo 5

EUT Photo 6

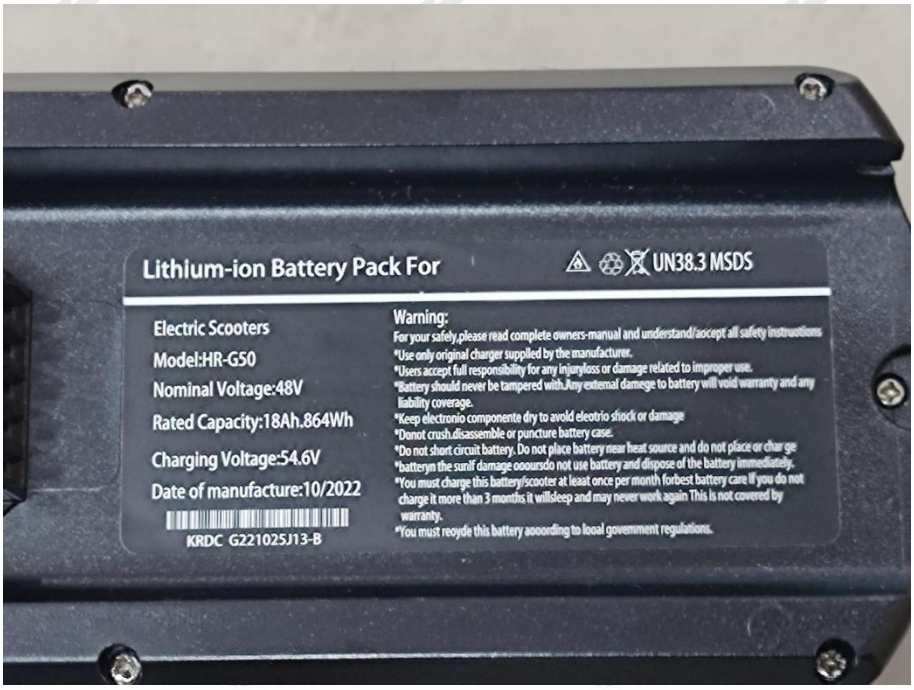
EUT Photo 7

EUT Photo 8

EUT Photo 9

EUT Photo 10

EUT Photo 11


Lithium-ion Battery Pack For
UN38.3 MSDS
Electric Scooters
Model:HR-G50
Nominal Voltage:48V
Rated Capacity:18Ah.864Wh
Charging Voltage:54.6V
Date of manufacture:10/2022
KRDC G221025J13-B
Warning:
For your safely,please read complete owners-manual and understand/aocept all safety instruotions
*Use only original charger suppiled by the manufacturer.
*Users accept full responsibility for any injuryloss or damage related to improper use.
*Battery should never be tampered with.Any extemal damege to battery will void warranty and any liability coverage.
*Keep electronio componente dry to avoid eleotrio shock or damage
*Donot crush,disassemble or puncture battery case.
*Do not short circuit battery. Do not place battery near heat source and do not place or charge
*batteryn the sunif damage ooourso not use battery and dispose of the battery immediately.
*You must charge this battery/scooter at leaat once per month forbest battery care If you do not charge it more than 3 months it willsleep and may never work again This is not covered by warranty.
*You must reoyde this battery aooording to looal government regulations.

8. Test Setup Photographs

CE:

RE:

End of report