Test Report

CE RED EMC

For

Product:Wireless Speaker

Model: MO2648

Report No.: RKEYS250806042

Issued for

Mid Ocean Brands B.V.

Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong

Issued by

Guangdong KEYS Testing Technology Co.,Ltd.

Address: Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China

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1. TEST CERTIFICATION

Product:	Wireless Speaker
Trade mark:	N/A
Model:	MO2648
Additional Model(s)	N/A
Applicant :	Mid Ocean Brands B.V.
Address:	Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong
Manufacturer:	117486
Address:	N/A
Sample Received Date:	Aug.06, 2025
Test Date:	Aug.06, 2025 to Aug.11, 2025
Power supply:	Type-C Input : DC 5V, 1A Battery : DC 3.7V, 300mAh
Applicable Standards:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015/A1:2020 EN 55035:2017/A11:2020
Remark:	N/A

The above equipment has been tested by Guangdong KEYS Testing Technology 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.

Prepared by:

Evan Fang / Engineer

Approved by:

Bruce Zhang / Manager

2. TEST SUMMARY

EMISSION			
Standard	**Item**	**Result**	**Remarks**
ETSI EN 301 489-1 V2.2.3 (2019-11)	Conducted emission (Mains Port)	PASS	Complied with limit
	Radiated emission	PASS	Complied with limit
EN IEC 61000-3-2:2019+A1:2021	Harmonic current emissions	N/A	Not Applicable
EN 61000-3-3:2013+A2:2021	Voltage fluctuations & flicker	N/A	Not Applicable

IMMUNITY			
Standard	**Item**	**Result**	**Remarks**
EN 61000-4-2:2009	ESD	PASS	Complied with the requirements
EN IEC 61000-4-3:2006+A2: 2010	RS	PASS	Complied with the requirements
EN 61000-4-4:2012	EFT	N/A	Not Applicable
EN 61000-4-5:2014 +A1:2017	Surge	N/A	Not Applicable
EN IEC 61000-4-6:2014	CS	N/A	Not Applicable
EN IEC 61000-4-11:2004	Voltage dips & voltage variations	N/A	Not Applicable

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

2)Not Applicable: The EUT is powered by DC.

3. TEST SITE

3.1. TEST FACILITY

Guangdong KEYS Testing Technology Co., Ltd.

Address:Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China

3.2. MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Temperature	±1°C
Humidity	±5%
DC and Low Frequency Voltages	±3%
Conducted Emission(150KHz-30MHz)	±3.60dB
Radiated Emission(30MHz-1GHz)	±4.76dB
Radiated Emission (1GHz-18GHz)	±4.44dB

Note 1: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.3. LIST OF TEST AND MEASUREMENT INSTRUMENTS

3.3.1. ☒ For conducted emission at the mains terminals test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	KEYS-EL-203	1166.5950.03-101 142	Mar. 03, 2025	1 Year
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	KEYS-EL-201	0357.8810.54-101 857-hz	Mar. 03, 2025	1 Year
LISN	Rohde&Schwarz	ENV216	KEYS-EL-202	3560.6550.12-103 020-YU	Mar. 03, 2025	1 Year
Test software	Tonscend	JS32-CE Version 5.0.0				

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

Name of Equipment	Manufacturer	Model	Equipment No..	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI7	KEYS-EL-205	1166.5950.03-100633	Mar. 03, 2025	1 Year
Logarithmic periodic antenna	Schwarzbeck	VULB9168	KEYS-EL-209	01145	Mar. 06, 2025	3 Year
Preamplifier	HP	8447F	KEYS-EL-210	1-18-53G22	Mar. 03, 2025	1 Year
3m Anechoic Chamber	Taihe MaoRui	9*6*6	KEYS-EL-234	/	Oct. 09, 2024	5 Year
Test software	Tonscend	JS32-RE Version 5.0.0				

3.3.3. ☒ For radiated emission test (1GHz above)

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI 7	KEYS-EL-205	1166.5950.03-100633	Mar. 03, 2025	1 Year
Horn antenna	Schwarzbeck	BBHA9120D	KEYS-EL-239	03083	Mar. 06, 2025	3 Year
Preamplifier	/	1-18-53G22	KEYS-EL-240	2501020026	Mar. 03, 2025	1 Year
Test software	Tonscend	JS32-RE Version 5.0.0				

3.3.4. ☐ For harmonic current emissions and voltage fluctuations/flicker test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
AC Power Source	California instruments	5001i-400	KEYS-EL-248	55979	May 17, 2025	1 Year
Harmonic and Flicker Analyzer	California instruments	PACS-1	KEYS-EL-249	72145	May 17, 2025	1 Year
Test software	California Instruments	CTS 4 Version 4.32.0				

3.3.5. ☒ For electrostatic discharge immunity test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
ESD Tester	PRIMA	ESD6100 2TB	KEYS-EL-215	PR9240625 796	Mar. 05, 2025	1 Year

3.3.6. ☒ For radio frequency electromagnetic field immunity (R/S) test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
Amplifier	Micotop	MPA-80-10 00-250	KEYS-EL-258	MAP25030 96	May 17, 2025	1 Year
Amplifier	Micotop	MPA-1000- 6000-100	KEYS-EL-259	MPA25030 98	May 19, 2025	1 Year
Power Meter	Agilent	E4417A	KEYS-EL-260	GB412933	May 17, 2025	1 Year
Power Sensor	Agilent	E9304A	KEYS-EL-261	MY552000	May 17, 2025	1 Year
Power Sensor	Agilent	E9304A	KEYS-EL-262	MY552000	May 17, 2025	1 Year
Signal Generator	ROHDE&SCH WARZ	SMB100A	KEYS-EL-263	102913	May 17, 2025	1 Year
Log-Per-Broad band Antenna	SKET	STLP 9129 PLUS	KEYS-EL-264	/	May 19, 2025	3 Year
Audio Analyzer	ROHDE&SCH WARZ	UPP200	KEYS-EL-267	120175	May 17, 2025	1 Year

3.3.7. ☐ For electrical fast transient/burst immunity test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
Fast Transient Burst Simulator	PRIMA	EFT61004TA	KEYS-EL-218	PR9240743972	Mar. 03, 2025	1 Year
Clamp	PRIMA	PEFT-C105	KEYS-EL-219	PEFT-1170	Mar. 03, 2025	1 Year

3.3.8. ☐ For surge immunity test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
Lighting Surge Generator	PRIMA	SUG61005TB-2216	KEYS-EL-217	PR200854619	Mar. 03, 2025	1 Year
Coupling/Decoupling Network	PRIMA	SUG-CDN-108	KEYS-EL-216	PR924105429	Mar. 03, 2025	1 Year

3.3.9. ☐ For injected currents susceptibility test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
CS Test system	TESEQ	NSG4070	KEYS-EL-255	30608	May 17, 2025	1 Year
6dB Attenuator	TESEQ	ATN6075	KEYS-EL-256	30783	May 17, 2025	1 Year
CDN	TESEQ	CDN M016	KEYS-EL-254	33518	May 17, 2025	1 Year
EM-Clamp	TESEQ	KEMZ 801A	KEYS-EL-257	33425	May 17, 2025	1 Year

3.3.10. ☐ For power frequency magnetic field immunity test

Name of Equipment	Manufacturer	Model	Equipment NO.	Serial No.	Last Cal.	Cal. Interval
POWER FREQUENCY MAGNETIC FIELD GENERATION	EVERFINE	EMS61000-8K	KEYS-EL-273	608002	May 16, 2025	1 Year

3.3.11. ☐ For voltage dips and short interruptions immunity test

Name of Equipment	Manufacturer	Model	Equipment No.	Serial No.	Last Cal.	Cal. Interval
Cycle Sag Simulator	PRIMA	DRP61011TB	KEYS-EL-220	PR924086817	Mar. 03, 2025	1 Year

Note:

The test equipment corresponds to the test items. (The selected checkbox indicates that the equipment has been used during testing, while the unselected one indicates that the equipment has not been used.)

4. EUT DESCRIPTION

Product	Wireless Speaker
Model	MO2648
RF Specification	Bluetooth
Supplied Voltage	Type-C Input : DC 5V, 1A Battery :DC 3.7V, 300mAh

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
AC Port	1	☐
DC Port	1	☒

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.

Test Mode 1	EUT + Bluetooth Link
Test Mode 2	idle

The following test mode(s) were assessed.

Test Items		Test Mode
Emission	Conducted Emission	Mode 1
	Radiated Emission	Mode 1
	Radiated Emission above 1HGz	Mode 1
	Harmonic current emissions	N/A
	Voltage fluctuations & flicker	N/A
Immunity	ESD	Mode 1
	RS	Mode 1
	EFT	N/A
	Surge	N/A
	C/S	N/A
	Dips	N/A

Note:Only the worse mode was record in this report.

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

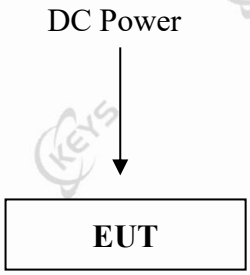
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model	Manufacturer.
1.	Adapter	/	Xiaomi

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



(EUT: Wireless Speaker)

7. EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT

7.1.1. LIMIT

FREQUENCY (MHz)	Class A		Class B	
	Quasi-peak dB(μV)	Average dB(μV)	Quasi-peak dB(μV)	Average dB(μV)
0.15 - 0.5	79	66	66-56	56-46
0.5 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

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 MHz to 0.5 MHz

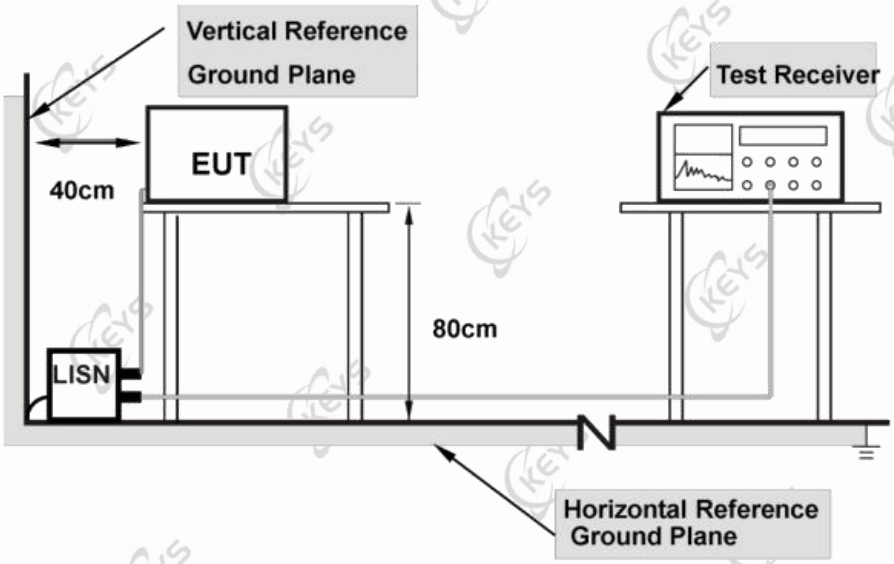
7.1.2. TEST PROCEDURE

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 0.8 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 9 kHz to 30 MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.

A scanning was taken on the power lines, Line and neutral, recording at least 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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs(AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

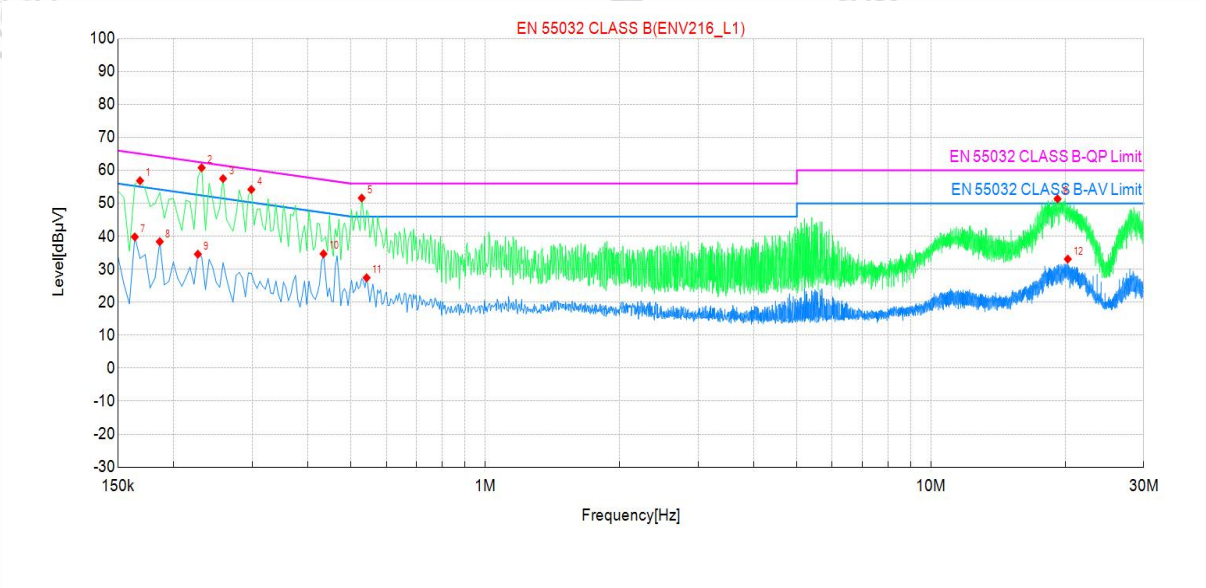
7.1.4. TEST RESULT

Product name	Wireless Speaker	Tested By	Joy Jiang
Model	MO2648	Detector Function	Quasi-peak/AV
Test Mode	Mode 1	6 dB Bandwidth	9 kHz
Environmental Conditions	24.3°C,53% RH, 101.1 kPa	Test Result	Pass

Note:
L = Line Line, N = Neutral Line
Freq. = Emission frequency in MHz
Reading level (dBμV) = Receiver reading
Corr. Factor (dB) = attenuator + Cable loss
Level (dBμV) = Reading level (dBμV) + Corr. Factor (dB)
Limit (dBμV) = Limit stated in standard
Over Limit (dB) = Level (dBμV) – Limit (dBμV)
QP = Quasi-Peak
AV = Average

Please refer to the following diagram:

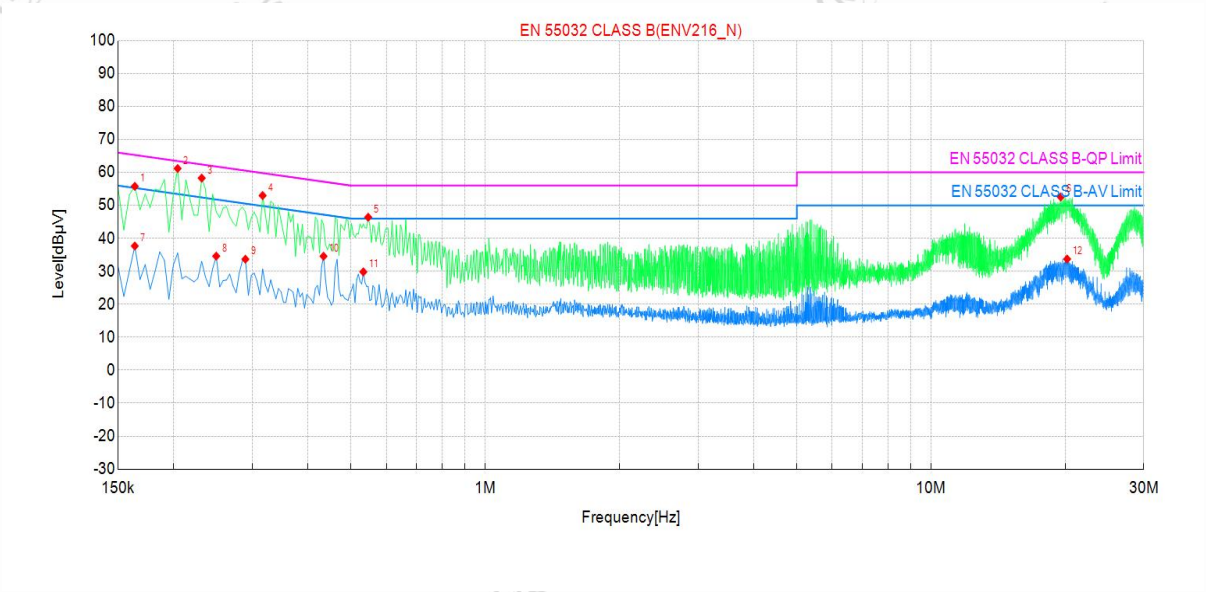
Line:



Suspected Data List									
NO.	Frequency [MHz]	Reading [dBµV]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Phase	Detector	Verdict
1	0.168000	36.87	56.87	20.00	65.06	8.19	L1	QP	PASS
2	0.231000	40.81	60.81	20.00	62.41	1.60	L1	QP	PASS
3	0.258000	37.52	57.52	20.00	61.50	3.98	L1	QP	PASS
4	0.298500	34.20	54.20	20.00	60.28	6.08	L1	QP	PASS
5	0.528000	31.61	51.61	20.00	56.00	4.39	L1	QP	PASS
6	19.225500	31.39	51.39	20.00	60.00	8.61	L1	QP	PASS
7	0.163500	19.84	39.84	20.00	55.28	15.44	L1	AV	PASS
8	0.186000	18.38	38.38	20.00	54.21	15.83	L1	AV	PASS
9	0.226500	14.59	34.59	20.00	52.58	17.99	L1	AV	PASS
10	0.433500	14.71	34.71	20.00	47.19	12.48	L1	AV	PASS
11	0.541500	7.44	27.44	20.00	46.00	18.56	L1	AV	PASS
12	20.269500	13.10	33.10	20.00	50.00	16.90	L1	AV	PASS

Note:(1)Level=Reading+Factor
(2)Margin=Limit-Level

Neutral:



Suspected Data List									
NO.	Frequency [MHz]	Reading [dBµV]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Phase	Detector	Verdict
1	0.163500	35.78	55.78	20.00	65.28	9.50	N	QP	PASS
2	0.204000	41.19	61.19	20.00	63.45	2.26	N	QP	PASS
3	0.231000	38.27	58.27	20.00	62.41	4.14	N	QP	PASS
4	0.316500	32.98	52.98	20.00	59.80	6.82	N	QP	PASS
5	0.546000	26.40	46.40	20.00	56.00	9.60	N	QP	PASS
6	19.549500	32.57	52.57	20.00	60.00	7.43	N	QP	PASS
7	0.163500	17.67	37.67	20.00	55.28	17.61	N	AV	PASS
8	0.249000	14.60	34.60	20.00	51.79	17.19	N	AV	PASS
9	0.289500	13.67	33.67	20.00	50.54	16.87	N	AV	PASS
10	0.433500	14.58	34.58	20.00	47.19	12.61	N	AV	PASS
11	0.532500	9.83	29.83	20.00	46.00	16.17	N	AV	PASS
12	20.197500	13.73	33.73	20.00	50.00	16.27	N	AV	PASS

Note:(1)Level=Reading+Factor
(2)Margin=Limit-Level

7.2. RADIATED EMISSION MEASUREMENT

7.2.1. LIMITS

FREQUENCY (MHz)	Distance m	Quasi Peak dB(μV/m)
30~230	3	40
230~1000	3	47

Note: 1) The lower limit shall apply at the transition frequencies.
2) Emission level (dBμV/m) = 20 log Emission level (μV/m).

7.2.2. TEST PROCEDURE

a. The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. 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 antenna is a broadband antenna, and its height is varied from 1 to 4 meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization 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 the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode when the test frequency is below 1GHz.

Note:

1.The resolution bandwidth of test receiver/spectrum analyzer is 120khz for quasi-peak detection(QP) at frequency below 1GHz.

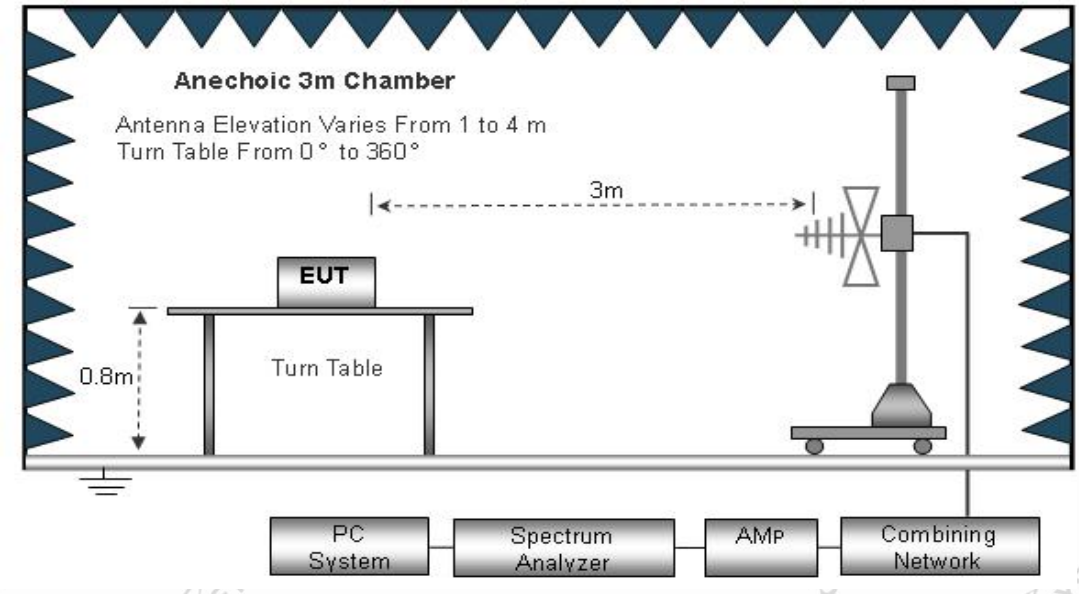
2.Emission level(dBμV/m)=Raw Value(dBμV)+Correction Factor(dB/m)

3.Correction Factor(dB/m)=Antenna Factor(dB/m)+ Correction Factor(dB)(if the raw value not contains the amplifier);

4. Correction Factor(dB/m)=Antenna Factor(dB/m)+ Correction Factor(dB)-Amplifer Gain(dB)(if the raw value contains the amplifier).

5.Margin value=Emission level-Limit value.

7.2.3. TEST SETUP



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

Test distance define

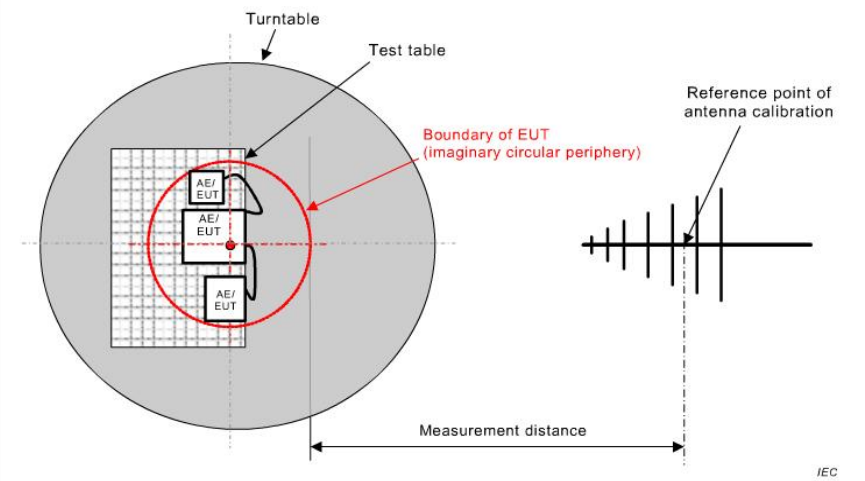
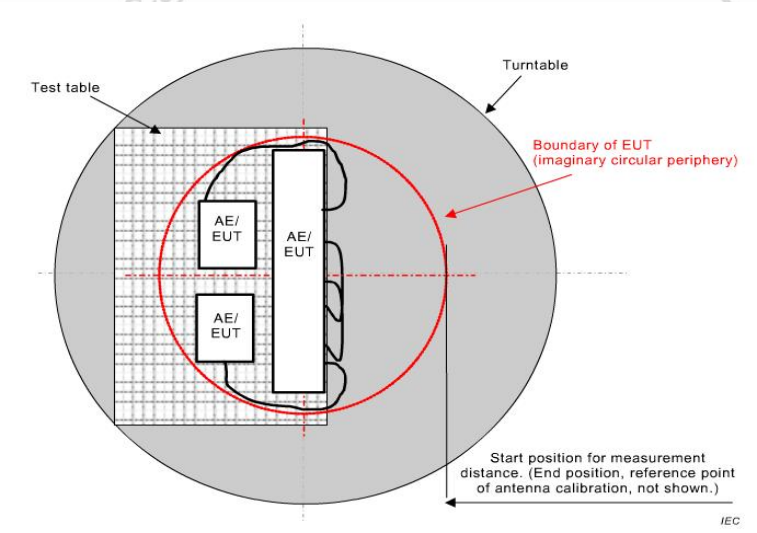


Figure C.1 – Measurement distance

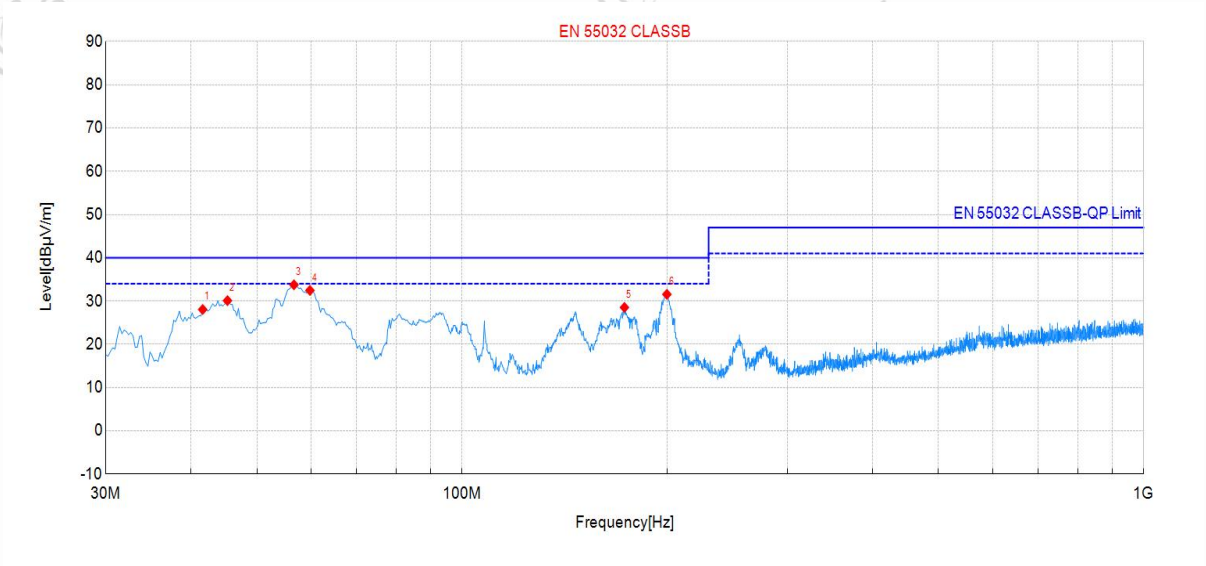


7.2.4. TEST RESULT

Product name	Wireless Speaker	Tested By	Joy Jiang
Model	MO2648	Detector Function	Quasi-peak
Test Mode	Mode 1	RBW	120kHz
Environmental Conditions	24.3℃, 52% RH, 101.1 kPa	Test Result	Pass

Please refer to the following diagram:

Vertical:

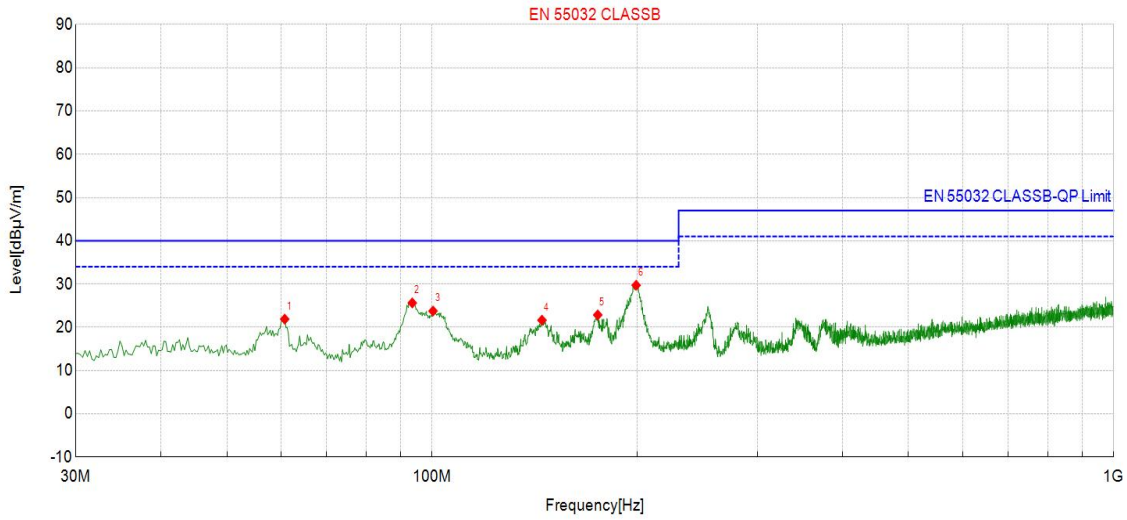


Suspected Data List											
NO.	Frequency [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	41.64	45.09	28.05	-17.04	40.00	11.95	100	165	PK	Vert	PASS
2	45.28	47.22	30.10	-17.12	40.00	9.90	100	136	PK	Vert	PASS
3	56.68	51.53	33.76	-17.77	40.00	6.24	100	212	PK	Vert	PASS
4	59.83	50.49	32.47	-18.02	40.00	7.53	100	146	PK	Vert	PASS
5	173.08	46.15	28.53	-17.62	40.00	11.47	100	72	PK	Vert	PASS
6	199.75	51.53	31.56	-19.97	40.00	8.44	100	54	PK	Vert	PASS

Note:(1)Level=Reading+Factor
(2)Margin=Limit-Level

Please refer to the following diagram:

Horizontal::



Suspected Data List											
NO.	Frequency [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	60.80	40.05	21.89	-18.16	40.00	18.11	100	277	PK	Hori	PASS
2	93.54	45.95	25.64	-20.31	40.00	14.36	100	353	PK	Hori	PASS
3	100.33	43.63	23.76	-19.87	40.00	16.24	100	4	PK	Hori	PASS
4	144.95	37.92	21.65	-16.27	40.00	18.35	100	19	PK	Hori	PASS
5	175.02	40.71	22.86	-17.85	40.00	17.14	100	104	PK	Hori	PASS
6	199.27	49.66	29.73	-19.93	40.00	10.27	100	104	PK	Hori	PASS

Note:(1)Level=Reading+Factor

(2)Margin=Limit-Level

7.3. RADIATED EMISSION MEASUREMENT(ABOVE 1GHz)

7.3.1. LIMITS

FREQUENCY (MHz)	Distance m	Peak dB(μV/m)	Average dB(μV/m)
1000~3000	3	50	54
3000~ 6000	3	70	74

Note: 1) The lower limit shall apply at the transition frequencies.
2) Emission level (dBμV/m) = 20 log Emission level (μV/m).

7.3.2. TEST PROCEDURE

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

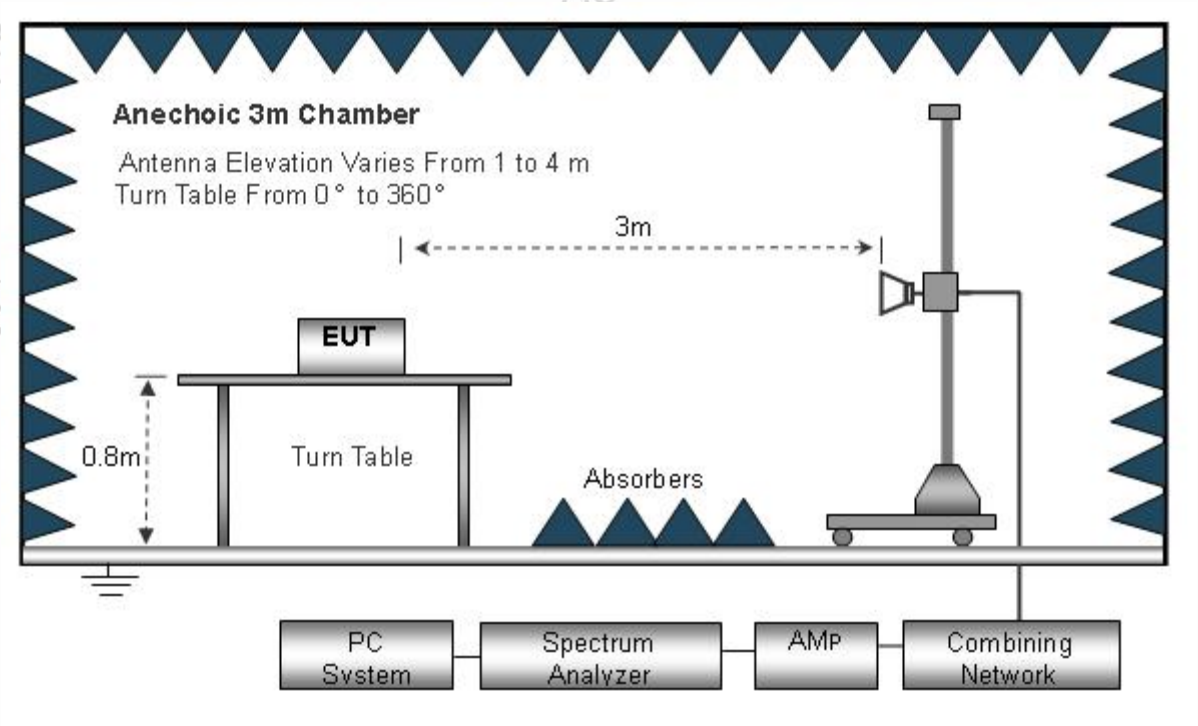
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from 1 to 4 meter above the ground ,the height of adjustment depends on the EUT height and the antenna 3dB bandwidth both,to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.The boresight should be used during the test above 1GHz.

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

e. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode when the test frequency is above1GHz.

7.3.3. TEST SETUP



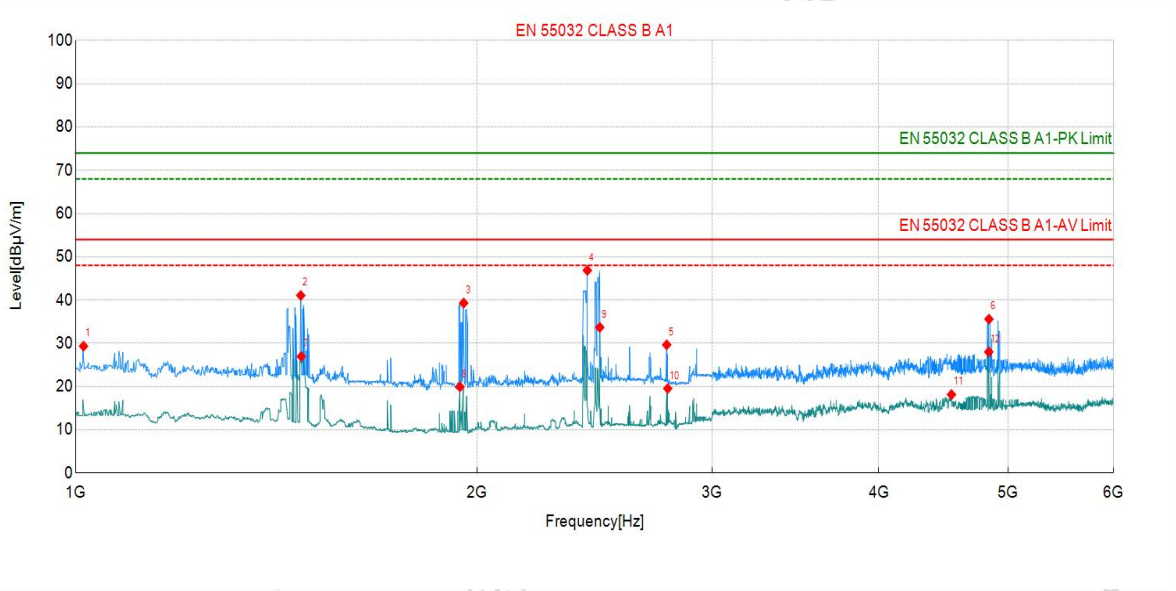
Note: For the actual test configuration, please refer to the related item – Photographs of the Test Configuration

7.3.4. TEST RESULT

Product name	Wireless Speaker	Tested By	Joy Jiang
Model	MO2648	Detector Function	Peak/AV
Test Mode	Mode 1	RBW	1MHz
Environmental Conditions	24.3℃, 52% RH, 101.1 kPa	Test Result	Pass

Please refer to the following diagram:

Vertical:

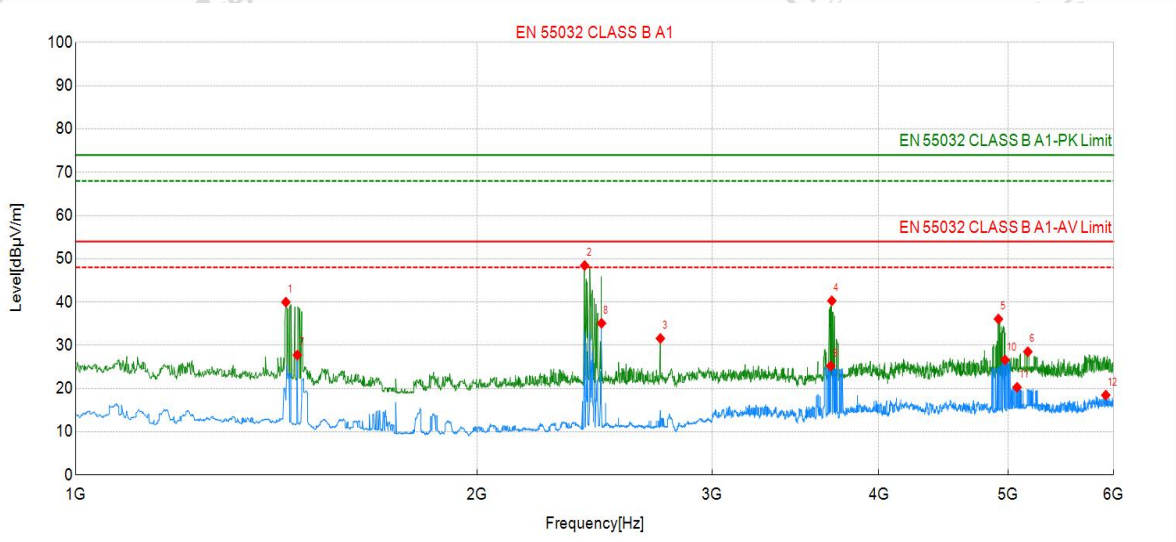


Suspected Data List											
NO.	Frequency [MHz]	Reading [dBµV]	Level [dBµV]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1013.75	61.56	29.34	-32.22	74.00	44.66	100	102	PK	Vert	PASS
2	1475.00	75.64	41.07	-34.57	74.00	32.93	100	341	PK	Vert	PASS
3	1953.75	76.33	39.31	-37.02	74.00	34.69	100	40	PK	Vert	PASS
4	2418.75	83.37	46.86	-36.51	74.00	27.14	100	195	PK	Vert	PASS
5	2773.75	65.53	29.65	-35.88	74.00	44.35	100	290	PK	Vert	PASS
6	4837.50	70.12	35.60	-34.52	74.00	38.40	100	310	PK	Vert	PASS
7	1476.25	61.52	26.95	-34.57	54.00	27.05	100	246	AV	Vert	PASS
8	1941.25	56.90	19.94	-36.96	54.00	34.06	100	51	AV	Vert	PASS
9	2471.25	70.09	33.68	-36.41	54.00	20.32	100	51	AV	Vert	PASS
10	2778.75	55.41	19.55	-35.86	54.00	34.45	100	1	AV	Vert	PASS
11	4535.00	52.83	18.14	-34.69	54.00	35.86	100	352	AV	Vert	PASS
12	4836.25	62.53	28.01	-34.52	54.00	25.99	100	310	AV	Vert	PASS

Note:(1)Level=Reading+Factor
(2)Margin=Limit-Level

Please refer to the following diagram:

Horizontal::



Suspected Data List											
NO.	Frequency [MHz]	Reading [dBµV]	Level [dBµV]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1437.50	74.36	39.98	-34.38	74.00	34.02	100	143	PK	Hori	PASS
2	2407.50	84.98	48.45	-36.53	74.00	25.55	100	258	PK	Hori	PASS
3	2743.75	67.50	31.58	-35.92	74.00	42.42	100	299	PK	Hori	PASS
4	3688.75	75.42	40.29	-35.13	74.00	33.71	100	360	PK	Hori	PASS
5	4917.50	70.55	36.07	-34.48	74.00	37.93	100	358	PK	Hori	PASS
6	5173.75	62.89	28.50	-34.39	74.00	45.50	100	112	PK	Hori	PASS
7	1466.25	62.27	27.74	-34.53	54.00	26.26	100	330	AV	Hori	PASS
8	2478.75	71.50	35.10	-36.40	54.00	18.90	100	353	AV	Hori	PASS
9	3681.25	60.34	25.21	-35.13	54.00	28.79	100	174	AV	Hori	PASS
10	4973.75	61.09	26.63	-34.46	54.00	27.37	100	289	AV	Hori	PASS
11	5078.75	54.69	20.28	-34.41	54.00	33.72	100	356	AV	Hori	PASS
12	5918.75	52.64	18.48	-34.16	54.00	35.52	100	359	AV	Hori	PASS

Note:(1)Level=Reading+Factor
(2)Margin=Limit-Level

7.4. HARMONICS CURRENT MEASUREMENT

7.4.1. 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 7.4.2.of this report

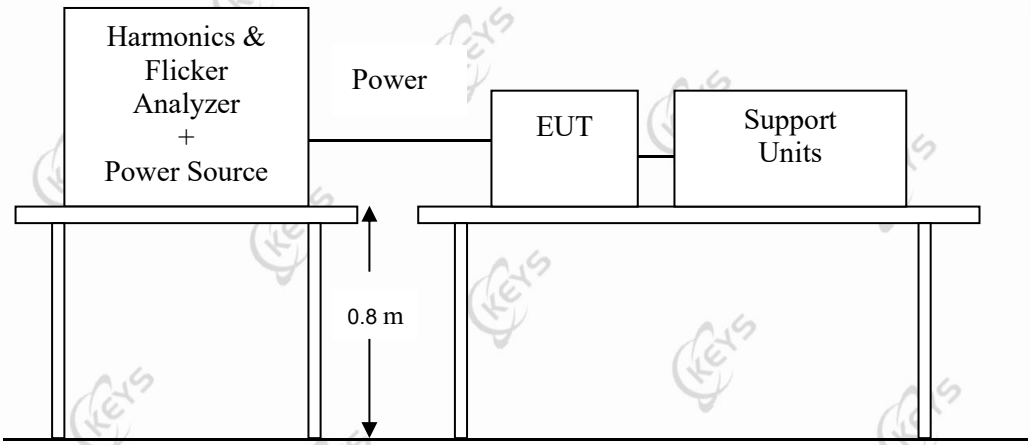
7.4.2. TEST PROCEDURE

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

7.4.3. 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

7.5. VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

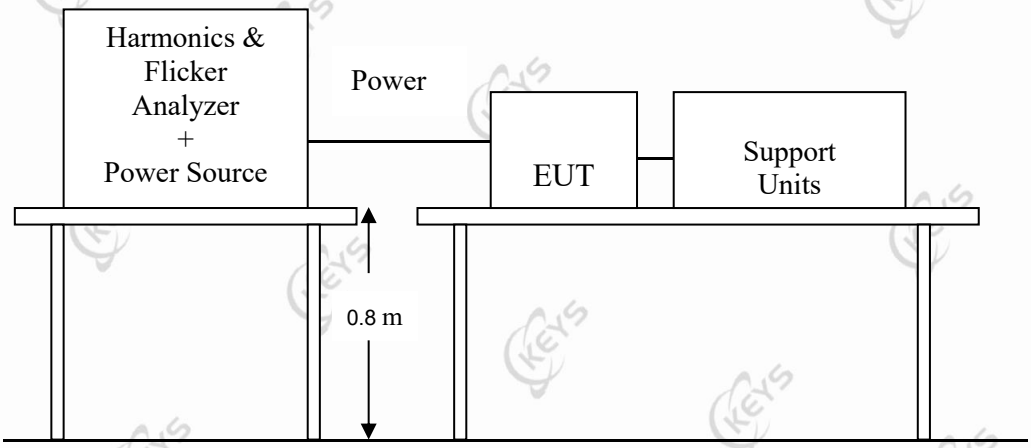
7.5.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

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

7.5.2. 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 lighting 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.

7.5.3. TEST SETUP



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

7.5.4. TEST RESULT

N/A

8. IMMUNITY TEST

PERFORMANCE CRITERIA DESCRIPTION

EN 301 489-1 V2.2.3 Clause 6 requirements:

Performance criteria for continuous phenomena

During the test, the equipment shall:

• continue to operate as intended;

• not unintentionally transmit;

• not unintentionally change its operating state;

• not unintentionally change critical stored data

Performance criteria for transient phenomena

For all ports and transient phenomena with the exception described below, the following applies:

• The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.

• After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

• For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

• For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

EN 301 489-17 V3.2.4 Clause 6 requirements:

6 General performance criteria

6.1The performance criteria are:

• performance criteria A for immunity tests with phenomena of a continuous nature;

• performance criteria B for immunity tests with phenomena of a transient nature;

• performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

6.2 Performance table

6.2.1 Performance criteria overview

Criteria	During test	After test (i.e. as a result of the application of the test)
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

6.2.2 Minimum performance level

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

6.3 Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

6.4 Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

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.

8.1. ELECTROSTATIC DISCHARGE (ESD)

8.1.1. TEST SPECIFICATION

Test Standard:	EN 301 489-1/-17	EN55035
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) 10 (Contact discharge for single polarity discharge)	
Discharge Mode:	1 time/s	
Performance Criterion:	B	

8.1.2. TEST PROCEDURE

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:
20 dischargers (10 with positive and10 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 EN 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.

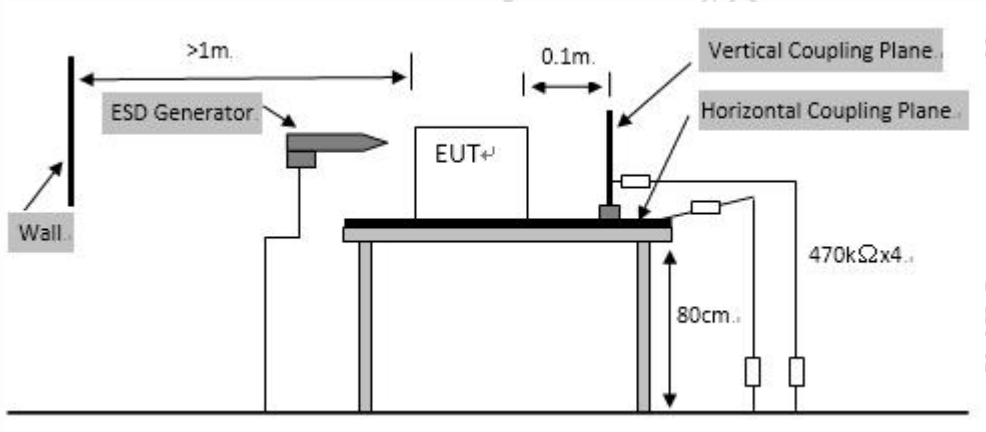
d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

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.

8.1.3. TEST SETUP



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.

8.1.4. TEST RESULT

Product	Wireless Speaker	Environmental Conditions	24.1℃, 55% RH, 101.14 kPa
Model	MO2648	Tested By	Joy Jiang
Test mode	Mode 1	Test Result	Pass

Discharge Type	Level (kV)	Test Point	Observation	Performance Criterion
Contact Discharge	± 4	1	Note ☐1☒2☐3	B
Direct Air Discharge	± 8	2	Note ☐1☒2☐3	B
Indirect Discharge (HCP)	± 4	3	Note ☐1☒2☐3	B
Indirect Discharge (VCP)	± 4	3	Note ☐1☒2☐3	B
Test point: 1. All insulated enclosure and seams. 2.All accessible metal parts of the enclosure 3.All side				

Note:
1) No degradation in performance of the EUT was observed.
2) During the test, Loss of functionality, after the experiment, the function can automatically return to normal.
3) Loss of functionality, but self-recoverable by user, without loss of information or settings.

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

8.2.1. TEST SPECIFICATION

Test Standard:	EN 301 489-1/-17	EN55035
Basic Standard:	EN IEC 61000-4-3	
Frequency Range:	80 ~6GHz	80 MHz ~ 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
Field Strength:	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	

8.2.2. TEST PROCEDURE

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

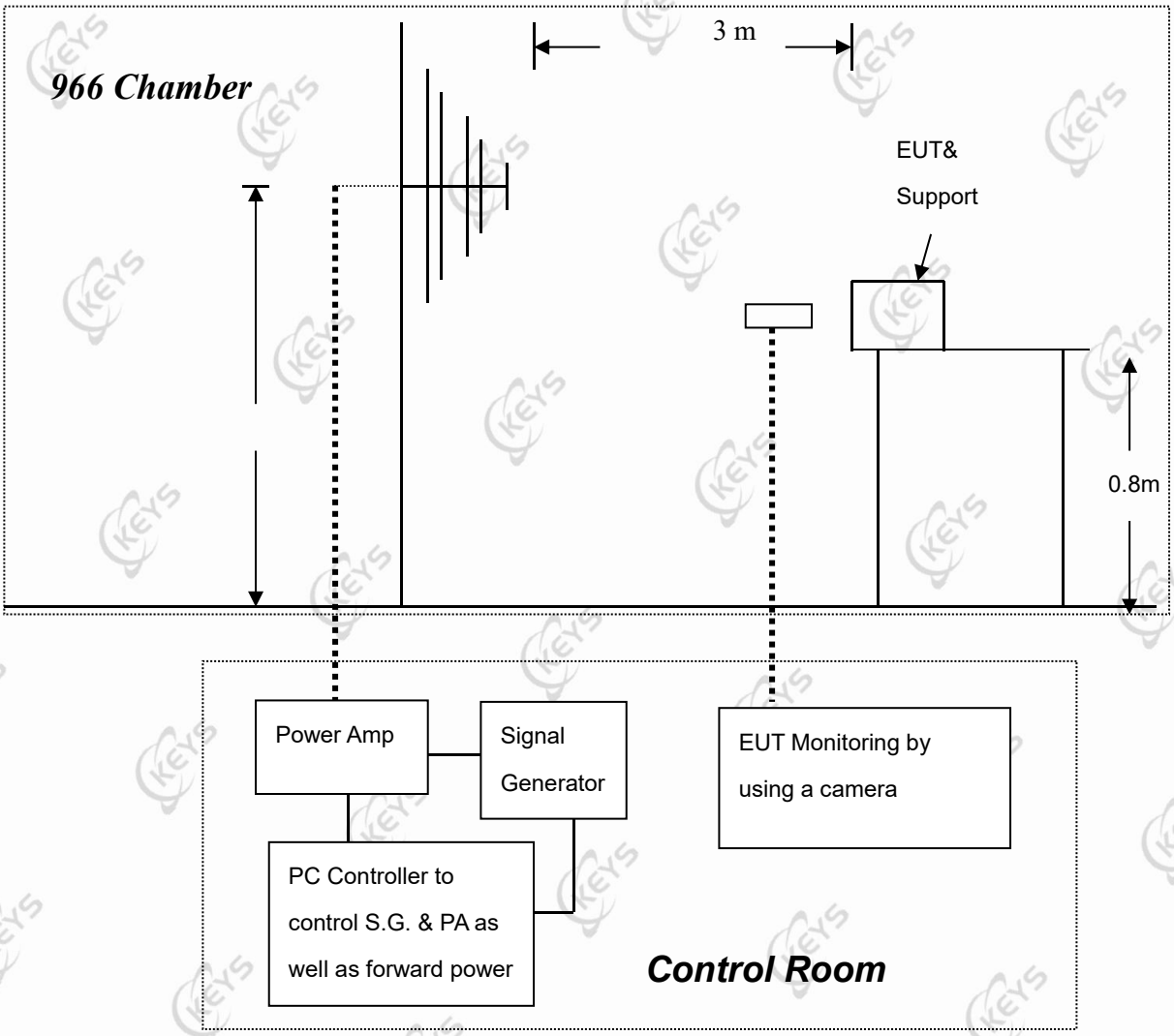
a) The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

b) The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1 kHz sine-wave. The rate of sweep did not exceed 1.5 x 10^{-3} decade/s, where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value.

c) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

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

8.2.3. 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.

8.2.4. TEST RESULT

Product	Wireless Speaker	Environmental Conditions	24.1℃, 51% RH, 101.12 kPa
Model	MO2648	Tested By	Joy Jiang
Test mode	Mode 1	Test Result	Pass

Frequency (MHz)	Polarity	Position	Field Strength (V/m)	Observation	Performance Criterion
80 ~6GHz	V&H	Front	3	Note ☒1 ☐2 ☐3	A
	V&H	Rear	3	Note ☒1 ☐2 ☐3	A
	V&H	Left	3	Note ☒1 ☐2 ☐3	A
	V&H	Right	3	Note ☒1 ☐2 ☐3	A

Note:
1) No degradation in performance of the EUT was observed.
2) During the test, Loss of functionality, after the experiment, the function can automatically return to normal.
3) Loss of functionality, but self-recoverable by user, without loss of information or settings.

8.3. ELECTRICAL FAST TRANSIENT (EFT)

8.3.1. TEST SPECIFICATION

Test Standard:	EN 301 489-1/-17	EN55035
Basic Standard:	EN 61000-4-4	
Test Voltage:	Power Line: ±1 kV Signal/Control Line: ±0.5 kV	
Polarity:	Positive & Negative	
Impulse Frequency:	5 kHz	
Impulse Wave-shape:	5/50 ns	
Burst Duration:	15 ms	
Burst Period:	300 ms	
Test Duration:	2 mins	
Performance Criterion:	B	

8.3.2. TEST PROCEDURE

EUT is placed on a 0.1 m tall wooden table.

EUT operate at normal mode, the transient/burst was 5/50 ns in accordance with BS EN 61000-4-4, both positive and negative polarity burst waveform were applied.

The duration time of each test line was 2 minutes.

8.3.3. 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.

8.3.4. TESTRESULT

N/A

8.4. SURGE IMMUNITY TEST

8.4.1. TEST SPECIFICATION

Test Standard:	EN 301 489-1/-17	EN55035
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 / min	
Number of Tests:	5 positive polarity pulses, and 5 negative polarity pulses	
Performance Criterion:	B	

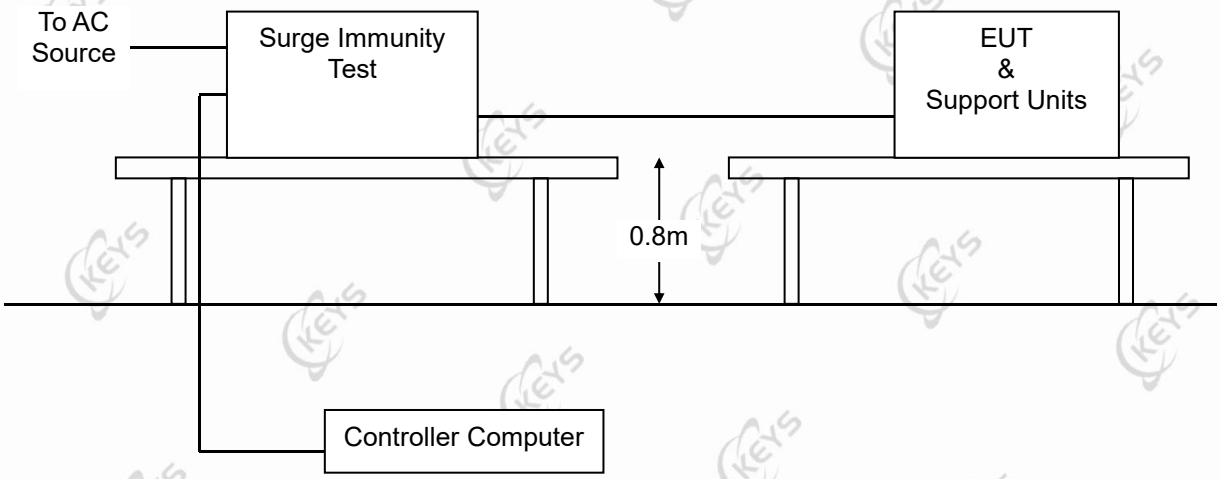
8.4.2. TEST PROCEDURE

EUT is placed on a 0.8 m tall wooden table.

EUT operate at normal mode, two types of combination wave generator (1.2/50 us open-circuit voltage and 8/20 us short-circuit current) are applied to the EUT power supply terminals via the capacitive coupling network.

The power cord between the EUT and the coupling/decoupling network shall not exceed 2 m in length.

8.4.3. TEST SETUP



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

8.4.4. TEST RESULT

N/A

8.5. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

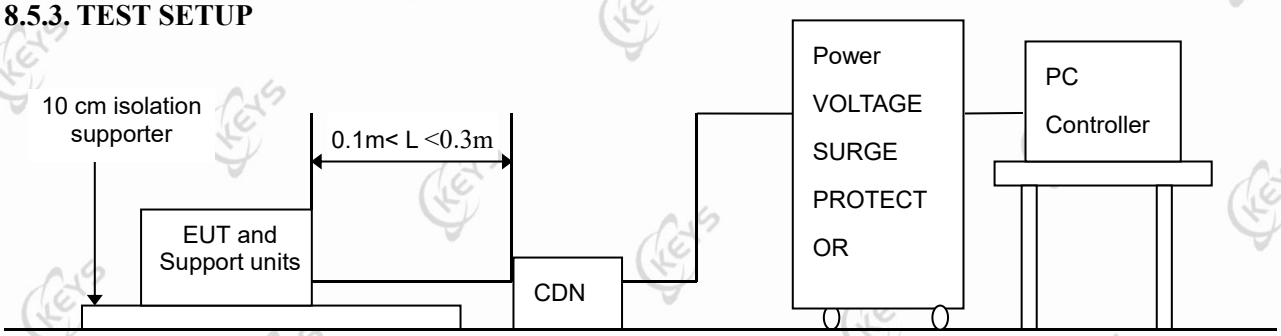
8.5.1. TEST SPECIFICATION

Test Standard:	EN 301 489-1/-17 EN55035
Basic Standard:	EN 61000-4-6
Frequency Range:	0.15MHz-10MHz: 3V, 10MHz-30MHz: 3V to 1V 30MHz-80MHz: 1V
Field Strength:	3 V
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

8.5.2. TEST PROCEDURE

The EUT shall be tested within its intended operating and climatic conditions.
The test shall 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 Ω load resistor.
The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5 x 10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value the dwell time of the amplitude modulated carrier at each frequency was 0.5 s.

8.5.3. 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.

8.5.4. TEST RESULT

N/A

8.6. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

8.6.1. TEST SPECIFICATION

Test Standard:	EN 301 489-1/-17	EN55035
Basic Standard:	EN 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:	voltage dip: 0 % residual voltage for 0,5 cycle; voltage dip: B 0 % residual voltage for 1 cycle; voltage dip: B 70 % residual voltage for 25 cycles (at 50 Hz);B Voltage interruption: 0 % residual voltage for 250 cycles (at 50 Hz): C	

8.6.2. TEST PROCEDURE

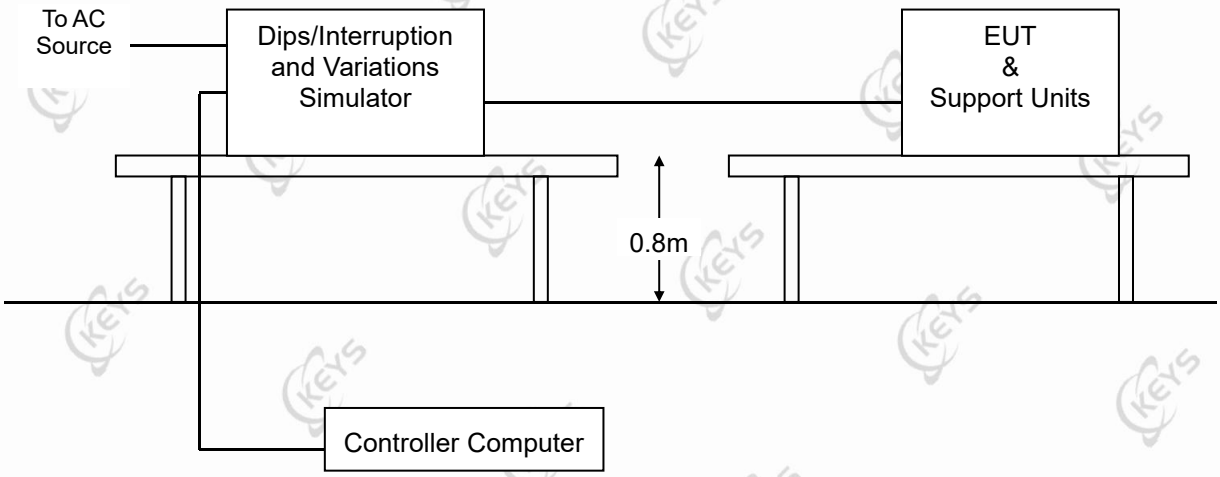
The EUT and support units were located on a wooden table, 0.8 m away from ground floor.

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.

8.6.3. TEST SETUP



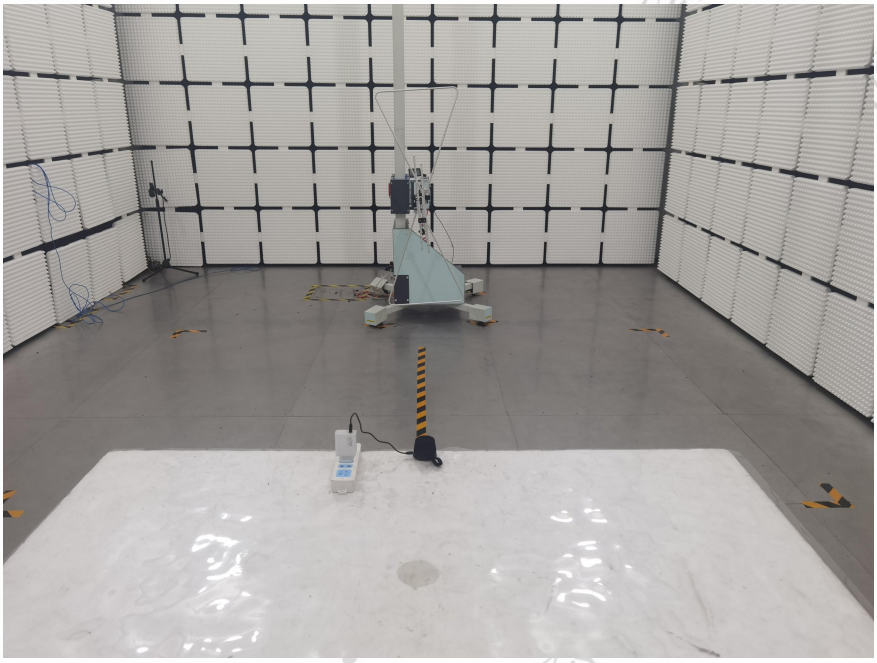
For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.6.4. TEST RESULT

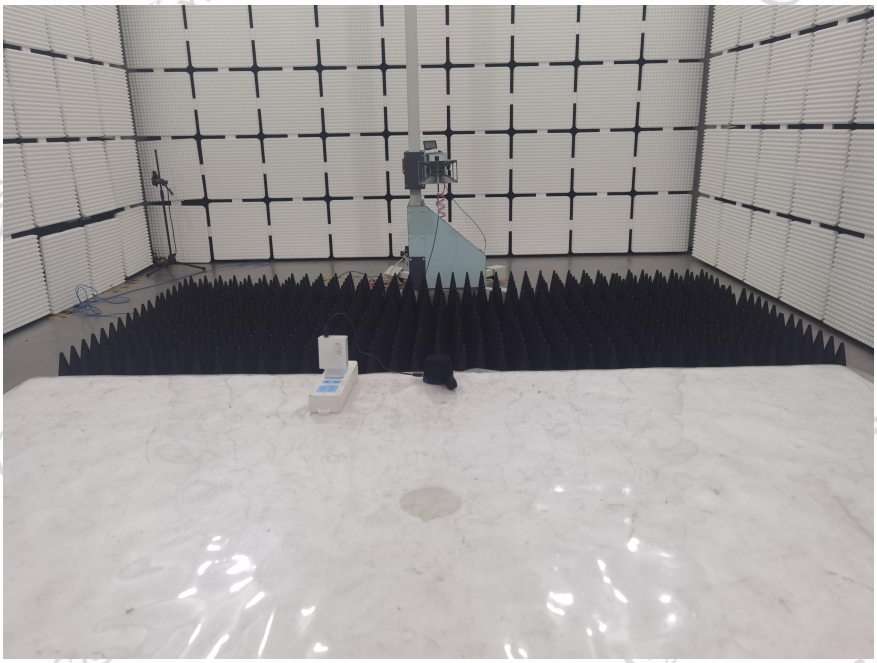
N/A

9. PHOTOGRAPHS OF THE TEST CONFIGURATION

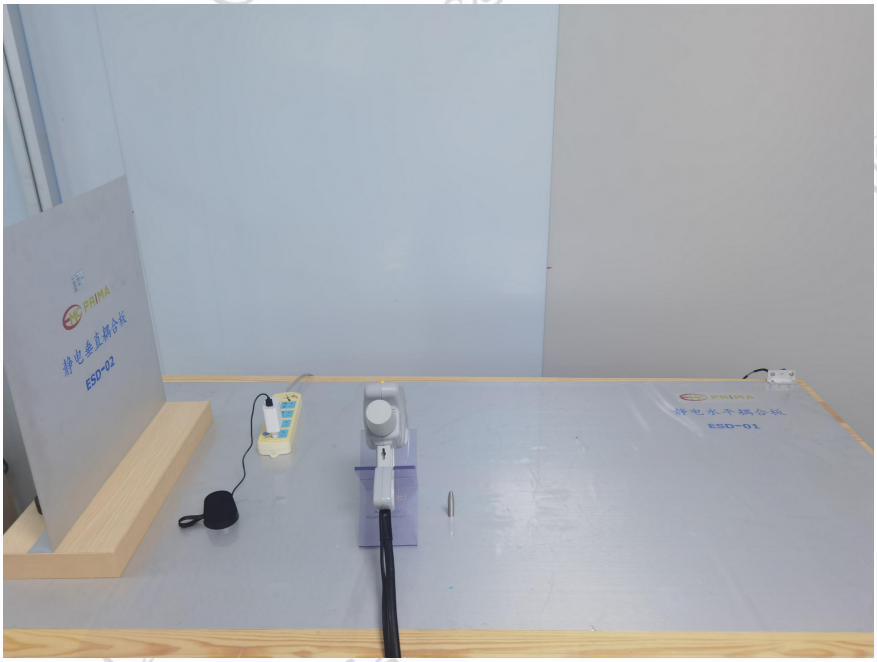
RADIATED EMISSION TEST



RADIATED EMISSION TEST(above 1HGz)

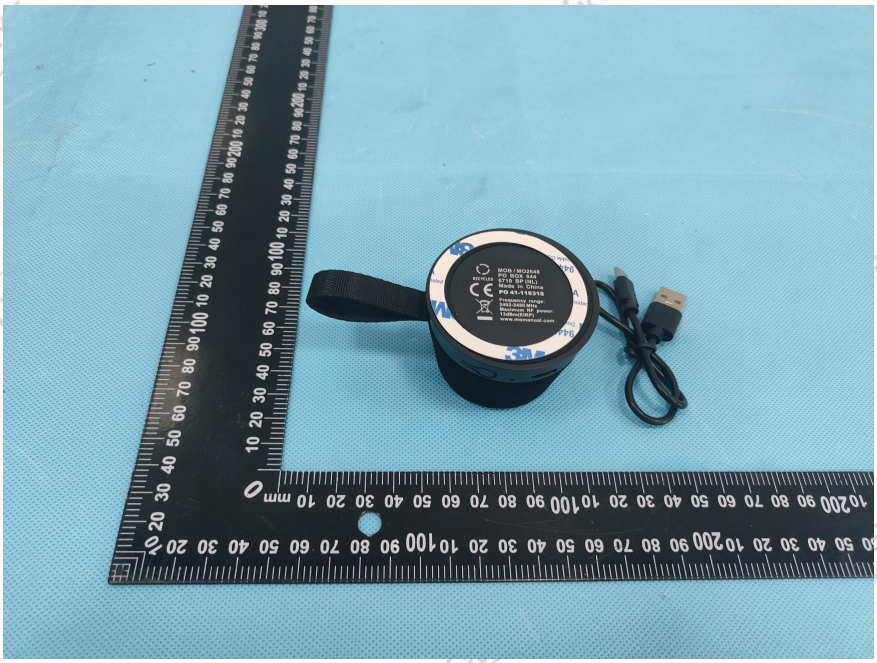


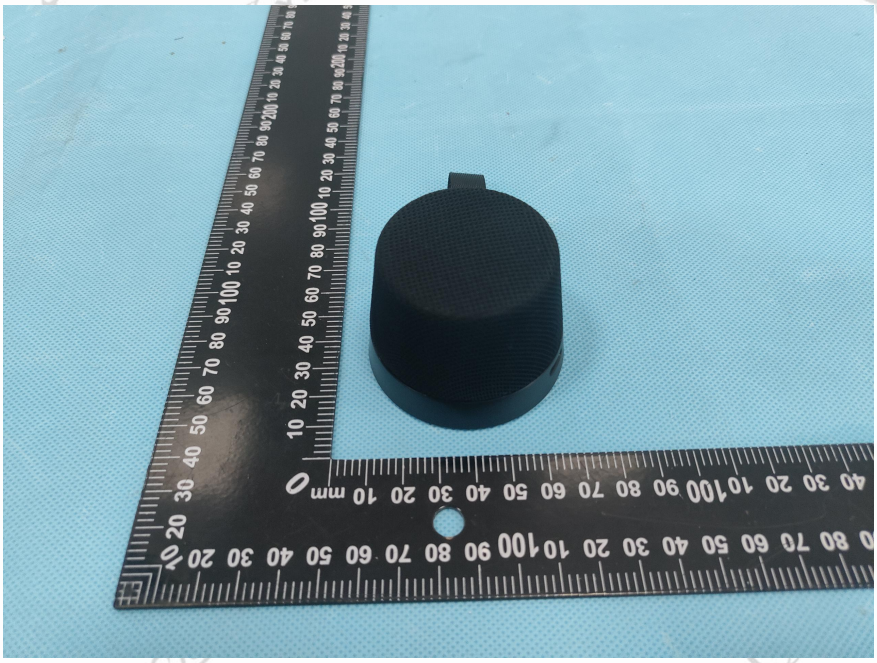
ESD TEST

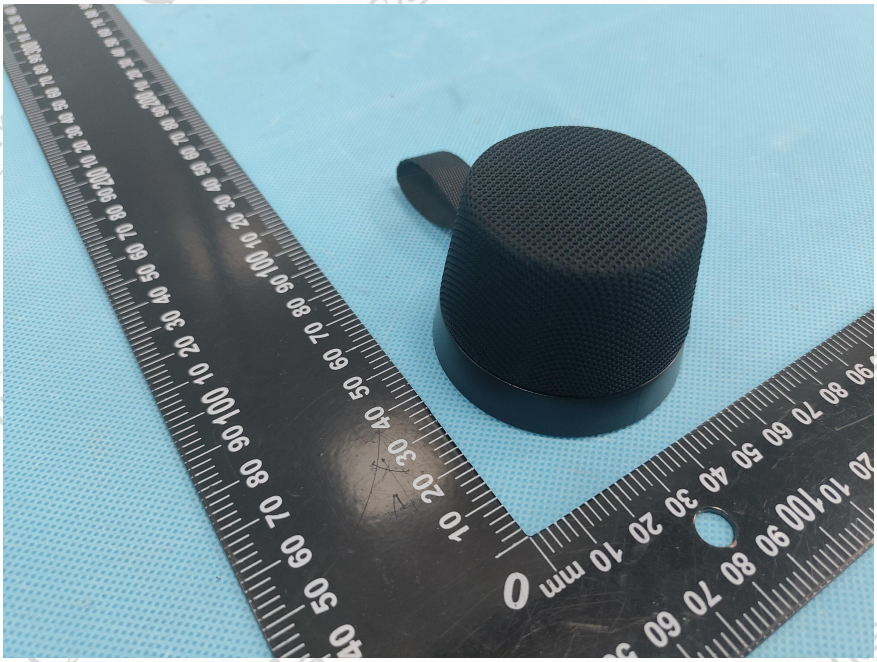


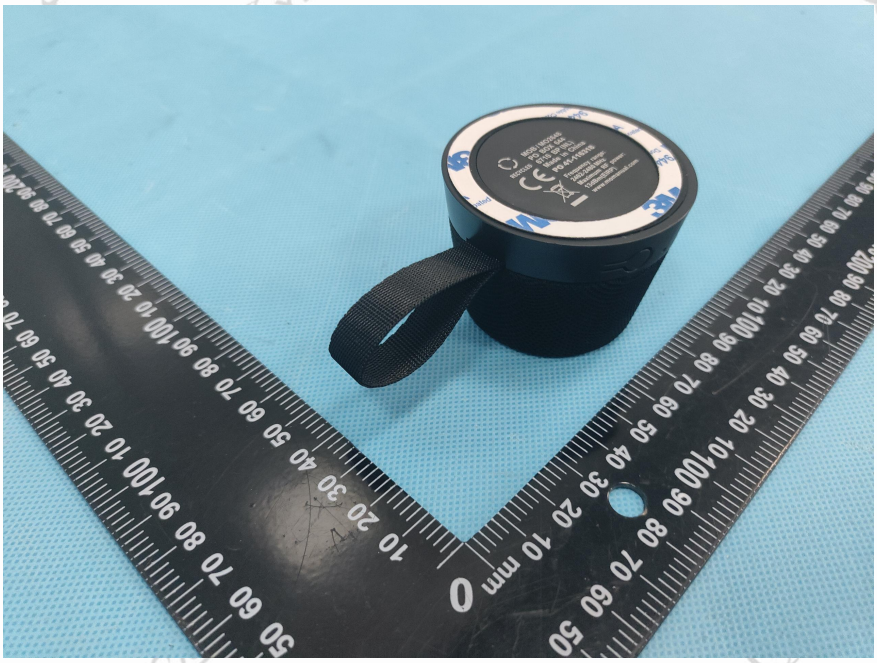
CONDUCTION TEST

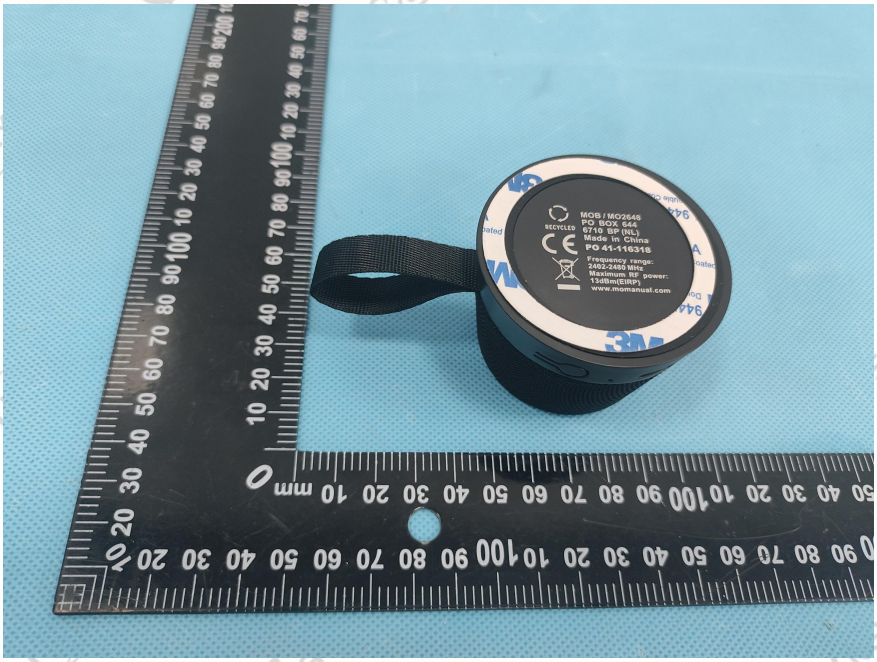
10. PHOTOGRAPHS OF EUT

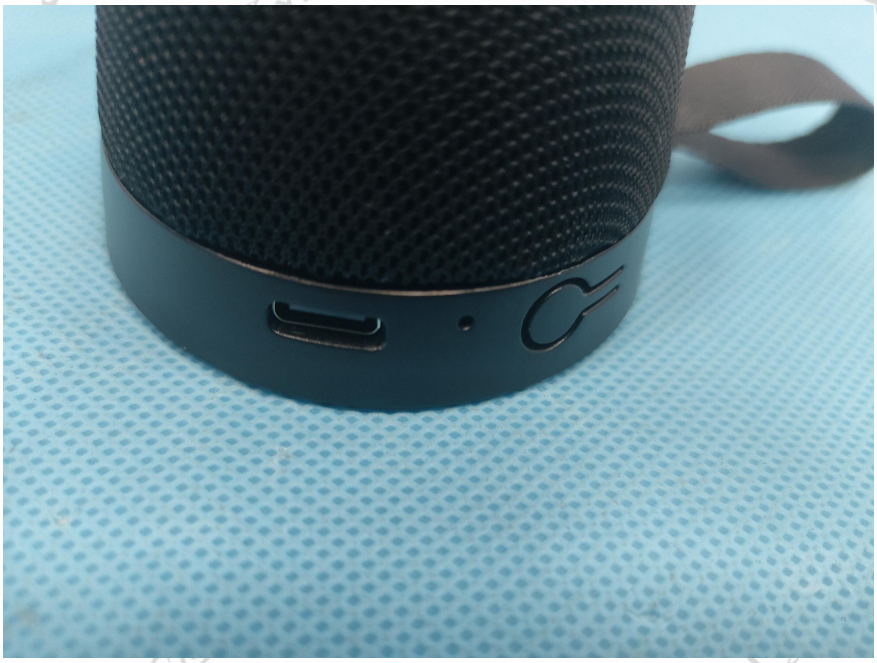


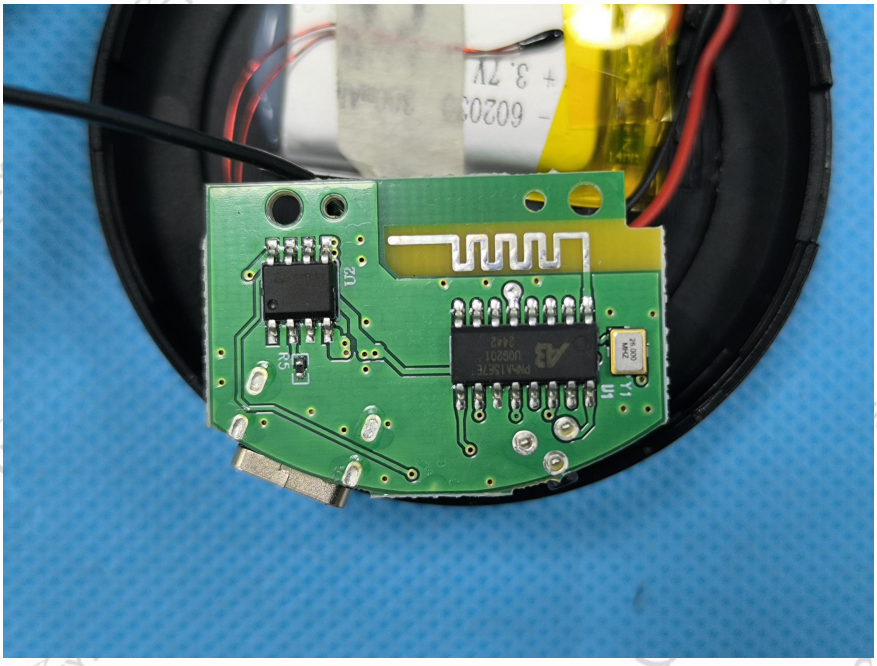


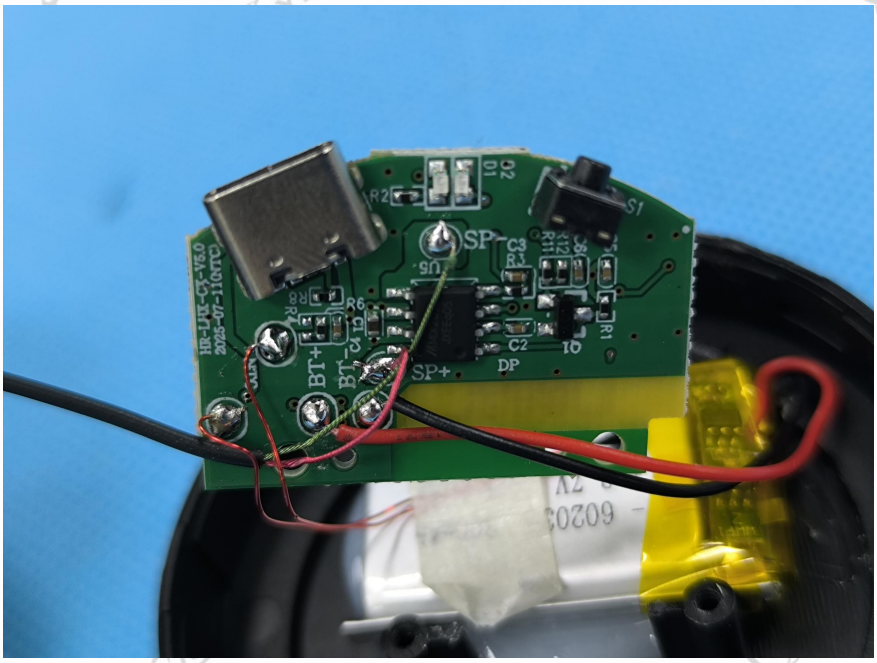


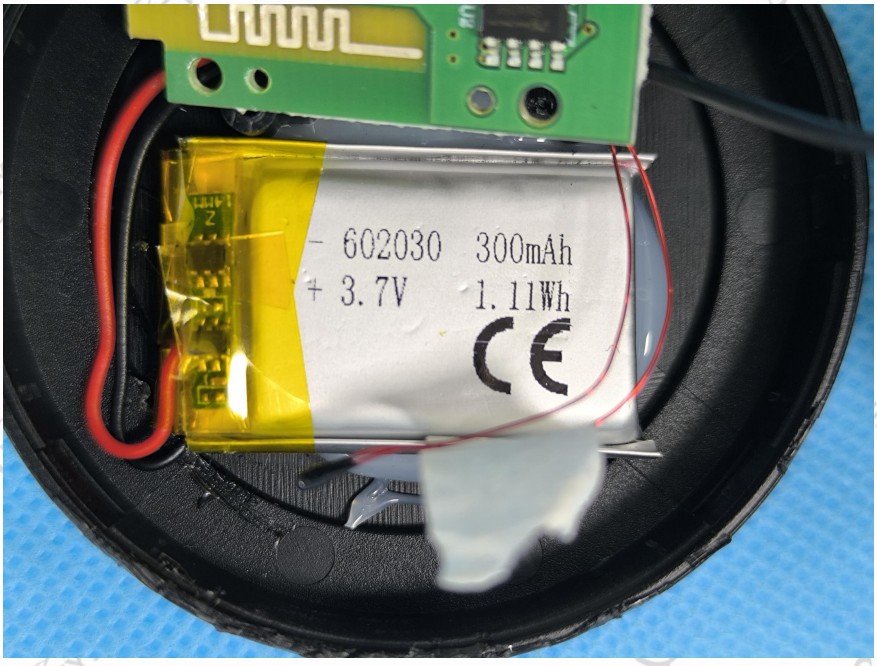












*** End of Report ***