



EMC TEST REPORT

ETSI EN 301 489-1 V2.2.0 (2017-03)

ETSI EN 301 489-17 V3.2.0 (2017-03)

Prepared for :

Prepared for :

Prepared By : Shenzhen WST Testing Co., Ltd.
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Date of Test: Oct. 23, 2018 ~ Oct. 31, 2018

Date of Report: Oct. 31, 2018

Report Number: WST18N100255-1ER

TEST RESULT CERTIFICATION

Applicant's name

Address

Manufacturer's Name

Address

Product description

Product name True Wireless Stereo Bluetooth Speaker

Model and/or type reference BS-124T

Rating(s) DC 3.7V from built-in battery or DC 5V from Micro USB

Standards ETSI EN 301 489-1 V2.2.0 (2017-03)
ETSI EN 301 489-17 V3.2.0 (2017-03)

This device described above has been tested by WST, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU RED Directive Article 3.1b) requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests Oct. 23, 2018 ~ Oct. 31, 2018

Date of Issue Oct. 31, 2018

Testing Engineer :



(Sam Tan)

Technical Manager :



(John Li)

Authorized Signatory :



(Michael Ling)



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1. TEST SUMMARY

Test procedures according to the technical standards:

ETSI EN 301 489-1 V2.2.0 (2017-03)

ETSI EN 301 489-17 V3.2.0 (2017-03)

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55032	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	
EN61000-3-2	Harmonic Current Emission	Class A or D NOTE (2)	N/A	
EN 61000-3-3	Voltage Fluctuations & Flicker	-----	N/A	
EMC Immunity				
Section EN 55024	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2	Electrostatic Discharge	B	PASS	
EN 61000-4-3	RF electromagnetic field	A	PASS	
EN 61000-4-4	Fast transients	B	N/A	
EN 61000-4-5	Surges	B	N/A	
EN 61000-4-6	Injected Current	A	N/A	
EN 61000-4-8	Power Frequency Magnetic Field	A	N/A	
EN 61000-4-11	Volt. Interruptions Volt. Dips	B / C / C NOTE (3)	N/A	

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) The power consumption of EUT is less than 75W and no Limits apply.
- (3) Voltage dip: 0% reduction – Performance Criteria **B**
Voltage dip: 70% reduction – Performance Criteria **C**
Voltage Interruption: 0% Interruption – Performance Criteria **C**
- (4) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

Shenzhen WST Testing Co., Ltd.

Add.: 87 Guangshen Road, Baocheng 11st Zone, Xin'an Street, Bao'an,
Shenzhen, Guangdong, China

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
C01	ANSI	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
OS01	ANSI	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
OS02	ANSI	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	True Wireless Stereo Bluetooth Speaker
Trade Mark:	N/A
Model Name.	BS-124T
DIFF: :	N/A
Manufacturer	Hudson Electronics(HK) Limited
Manufacturer Address	RM 602, Bldg 11, Phase II, YunGu Innovation Industrial Park, Pingshan First Rd, Xi li Town, Nanshan Dist, SZ, China
Power Source	DC 3.7V from built-in battery or DC 5V from Micro USB
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

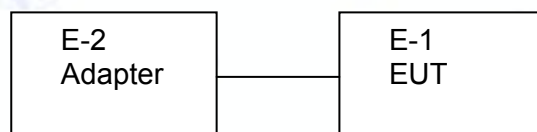
1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.1 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Running
For Conducted Test	
Final Test Mode	Description
Mode 1	Running
For Radiated Test	
Final Test Mode	Description
Mode 1	Running
For EMS Test	
Final Test Mode	Description
Mode 1	Running

2.2 DESCRIPTION OF TEST SETUP



2.3 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

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.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	True Wireless Stereo Bluetooth Speaker	N/A	BS-124T	N/A	N/A	EUT
E-2	Adapter	N/A	N/A	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.4 MEASUREMENT INSTRUMENTS LIST

2.4.1 CONDUCTED EMISSION

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00042991	2018.07.05
2	LISN	EMCO	3816/2	00042990	2018.07.05
3	Pulse Limiter	Electro-Metrics	EM-7600	112644	2018.07.05
4	50Ω Terminator	N/A	N/A	N/A	2018.07.05
5	Test Cable	N/A	C01	N/A	2018.07.05
6	EMI Test Receiver	R&S	ESCI	100082	2018.07.05

2.4.2 RADIATED EMISSION

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3058	2018.07.05
2	Test Cable	N/A	10M_OS02	N/A	2018.07.05
3	Test Cable	N/A	OS02-1/-2/-3	N/A	2018.07.05
4	Pre-Amplifier	Anritsu	MH648A(OS02)	M10061	2018.07.05
5	EMI Test Receiver	R&S	ESCI	100082	2018.07.05
6	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A
7	Turn Table	Chance Most	CMTB-1.5	N/A	N/A

2.4.3 HARMONICS AND FILCK

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Harmonic & Flicker	California	PACS-1	72345	2018.07.05
2	Power Source	California	3001iX	56310	2018.07.05

2.4.4 ESD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Simulator	Thermo	MZ-15/EC	0502184	2018.07.05

2.4.5 RS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Signal Generator	R&S	SMT 06	832080/007	2018.07.05
2	Log-Bicon Antenna	Schwarzbeck	VULB9161	4022	2018.07.05
3	Power Amplifier	AR	150W1000M1	320946	2018.07.05
4	Microwave Horn Antenna	AR	AT4002A	321467	2018.07.05
5	Power Amplifier	AR	25S1G4A	308598	2018.07.05

2.4.6 SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMC Immunity Test System	Thermo	EMCPRO PLUS	0502176	2018.07.05

2.4.7 INJECTION CURRENT

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Signal Generator	IFR	2023A	202301/368	2018.07.05
2	Power Amplifier	AR	75A250AM1	0320709	2018.07.05
3	CDN	FCC	FCC-801-M2	06043	2018.07.05
4	EM Clamp	FCC	F-203I-23MM	504	2018.07.05

2.4.8 POWER FREQUENCY MAGNETIC FIELD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Magnetic Field Test Generator	FCC	F-100-4-8-G-1	04029	2018.07.05

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

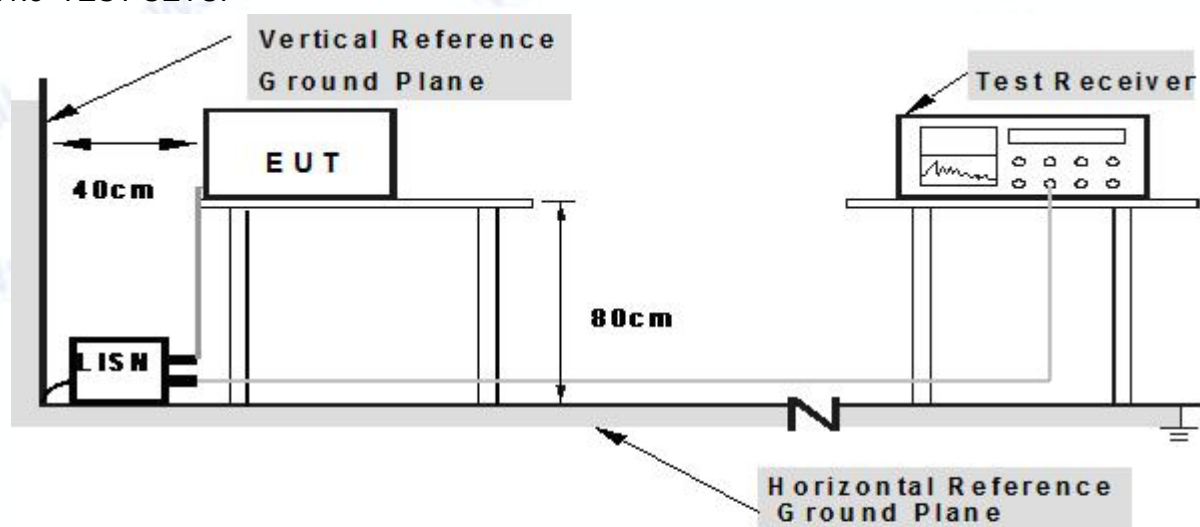
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1.Support units were connected to second LISN.

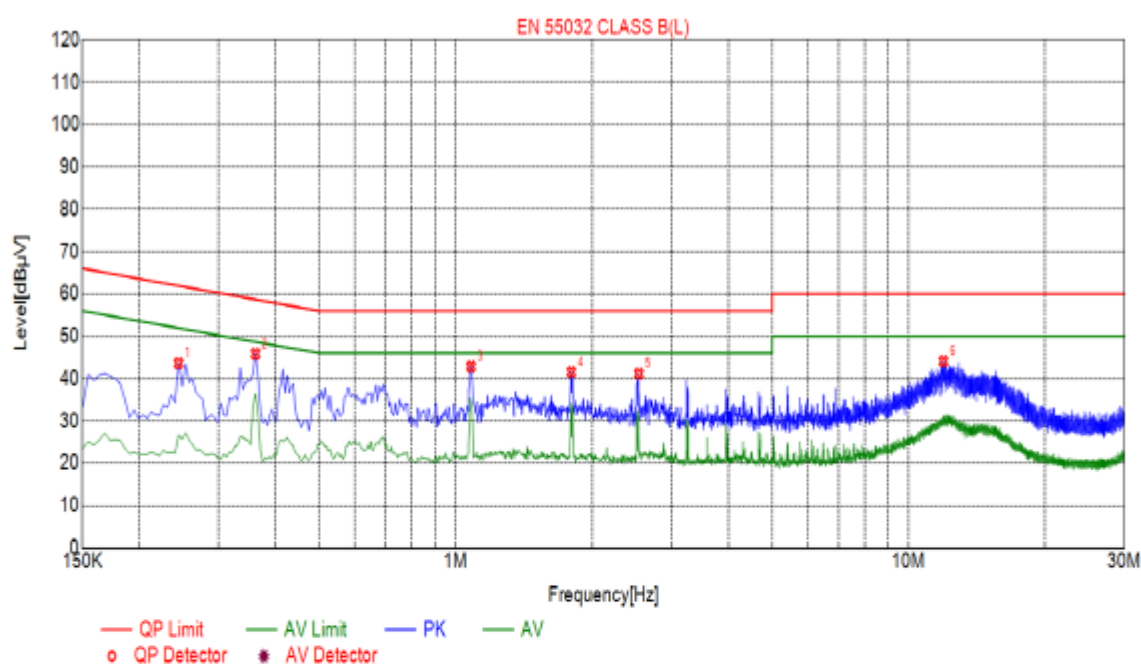
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.2 Unless otherwise a special operating condition is specified in the follows during the testing.

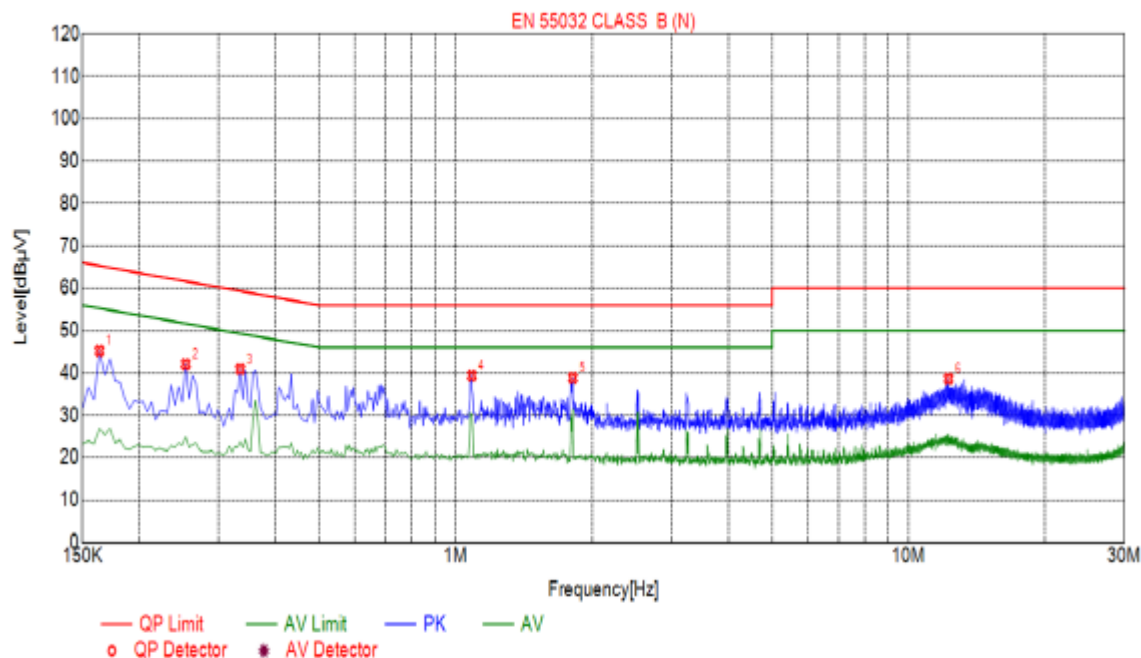
3.1.5 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name. :	BS-124T
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2018-10-25
Test Mode:	Running	Polarization :	N/A



Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.2445	43.66	10.03	61.94	18.28	PK
2	0.3615	45.86	10.04	58.69	12.83	PK
3	1.0815	42.86	10.07	56.00	13.14	PK
4	1.8015	41.57	10.14	56.00	14.43	PK
5	2.5395	41.16	10.20	56.00	14.84	PK
6	11.9490	44.13	9.99	60.00	15.87	PK

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.



Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.1635	45.20	9.98	65.28	20.08	PK
2	0.2535	42.12	10.04	61.64	19.52	PK
3	0.3345	40.87	10.04	59.34	18.47	PK
4	1.0860	39.38	10.07	56.00	16.62	PK
5	1.8150	38.83	10.14	56.00	17.17	PK
6	12.2595	38.64	9.98	60.00	21.36	PK

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 – 230	40	30
230 – 1000	47	37

3.2.2 LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (at 10m) dBuV/m		Class B (at 10m) dBuV/m	
	Peak	Avg	Peak	Avg
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to as following:
CISPR 22/ FCC PART 15B /ICES-003.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

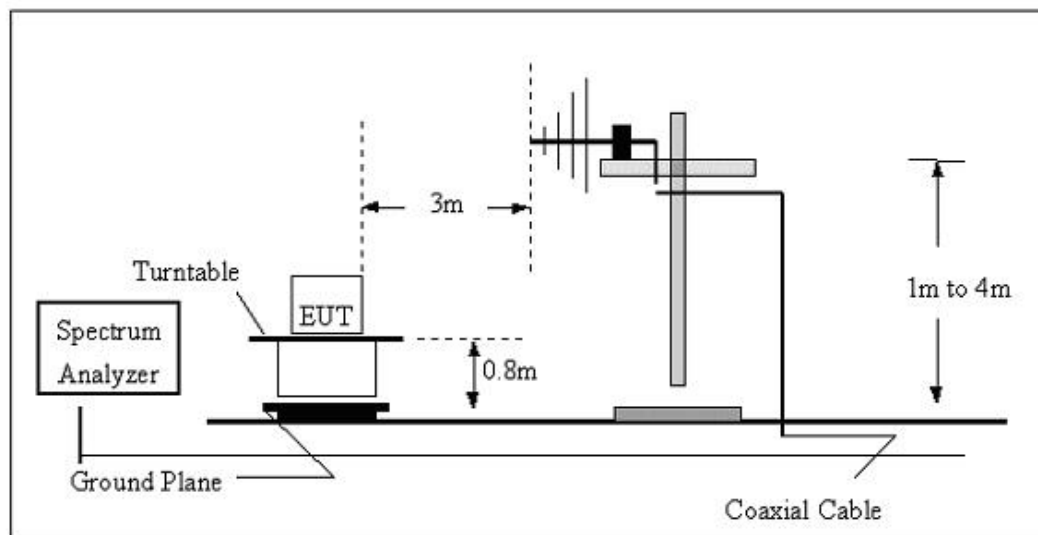
3.2.3 TEST PROCEDURE

- a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.4 TEST SETUP

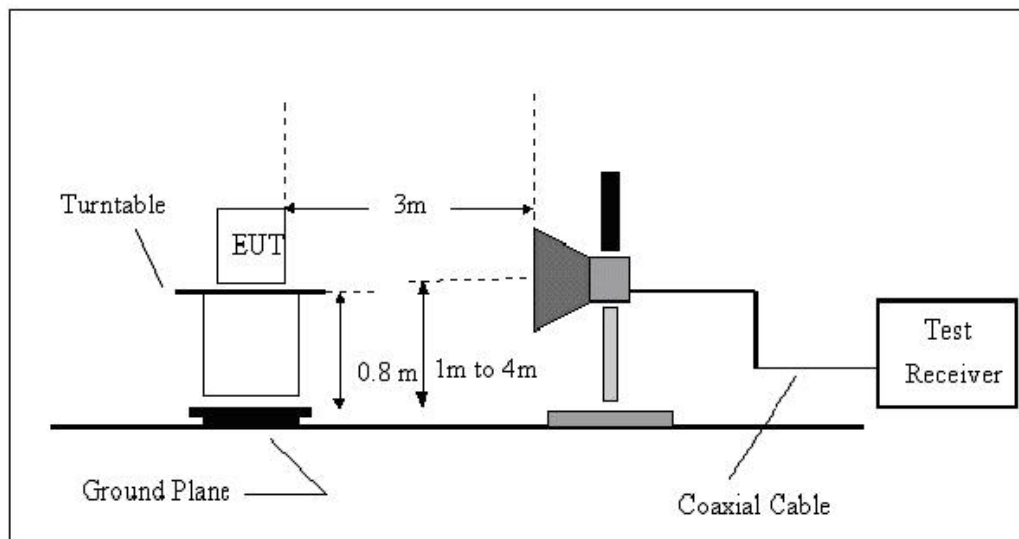
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Above 1GHz

(B) Radiated Emission Test Set-UP Frequency Over 1 GHz

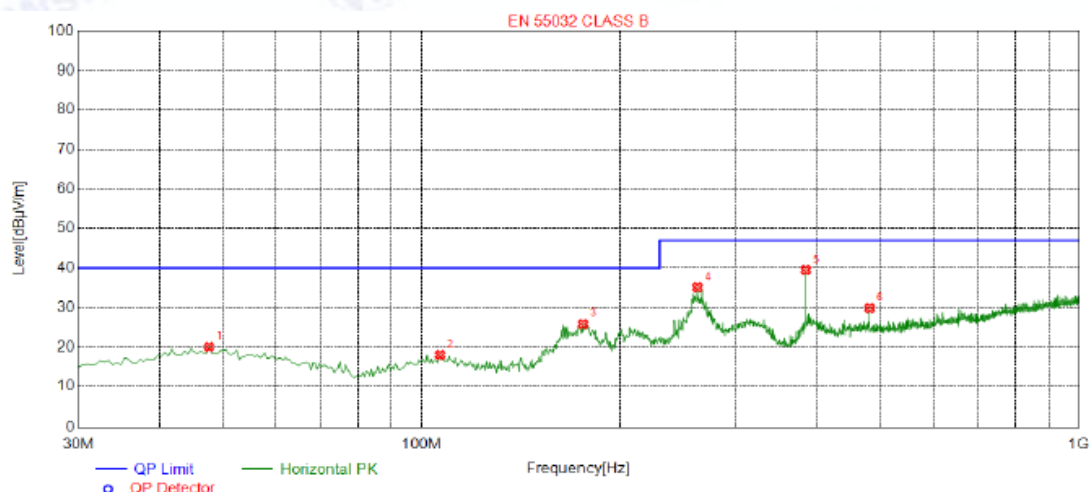


3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.2 Unless otherwise a special operating condition is specified in the follows during the testing.

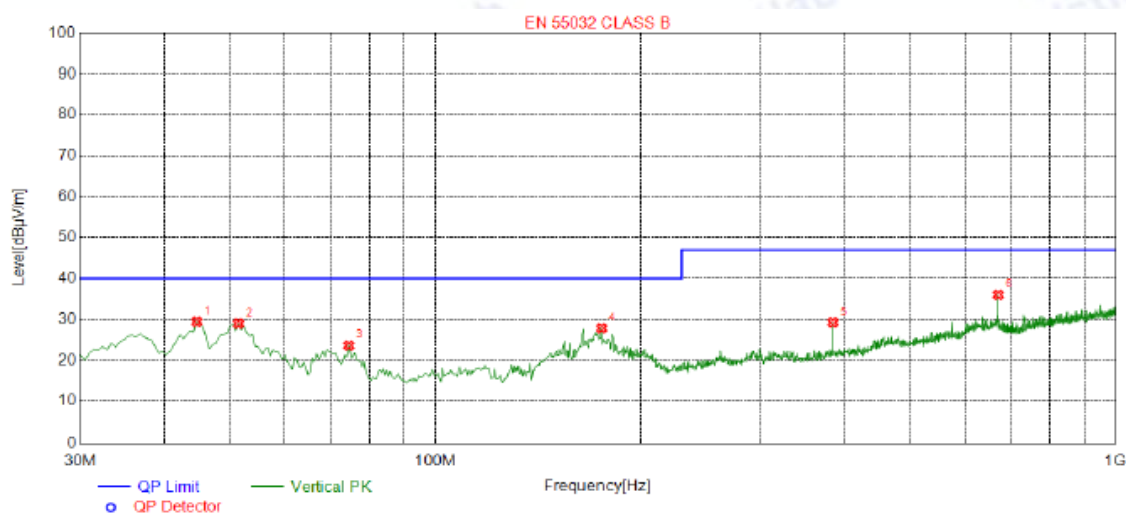
3.2.6 TEST RESULTS (30-1000MHz)

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2018-10-25
Test Mode :	Running	Polarization :	Horizontal
Test Power :	DC 5V From USB		



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	47.4600	20.06	-13.65	40.00	19.94	100	172	Horizontal
2	106.630	18.02	-15.42	40.00	21.98	100	318	Horizontal
3	175.985	25.83	-17.03	40.00	14.17	100	354	Horizontal
4	262.800	35.10	-13.56	47.00	11.90	100	344	Horizontal
5	384.050	39.52	-10.75	47.00	7.48	100	239	Horizontal
6	480.080	29.89	-8.45	47.00	17.11	100	249	Horizontal

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2018-10-25
Test Mode :	Running	Polarization :	Vertical
Test Power :	DC 5V From USB		



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	44.5500	29.44	-13.73	40.00	10.56	100	59	Vertical
2	51.3400	28.98	-13.85	40.00	11.02	100	350	Vertical
3	74.6200	23.62	-18.50	40.00	16.38	100	338	Vertical
4	175.500	27.87	-17.06	40.00	12.13	100	331	Vertical
5	384.050	29.25	-10.75	47.00	17.75	100	19	Vertical
6	672.140	36.03	-4.63	47.00	10.97	100	22	Vertical

3.2.7 TEST RESULTS(1000-6000)

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name:	BS-124T
Temperature:	24 °C	Relative Humidity:	54 %
Pressure:	1010 hPa	Test Date :	2018-10-25
Test Mode :	Running		
Test Power :	DC 5V From USB		

Polarization : Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
541.524	58.82	-11.37	47.45	70	-22.55	peak
1713.554	59.4	-15.38	44.02	70	-25.98	peak
2572.175	57.47	-8.62	48.85	70	-21.15	peak
3793.564	55.9	-6.17	49.73	74	-24.27	peak
4705.648	57.23	-4.52	52.71	74	-21.29	peak
4937.427	56.44	-5.64	50.8	74	-23.2	peak
Remark: 1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Polarization : Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
573.542	58.08	-12.37	45.71	70	-24.29	peak
1983.714	58.66	-10.25	48.41	70	-21.59	peak
2937.782	56.03	-8.49	47.54	70	-22.46	peak
3938.754	57.34	-5.24	52.1	74	-21.9	peak
4517.723	56.35	-5.66	50.69	74	-23.31	peak
5628.846	55.92	-6.93	48.99	74	-25.01	peak
Remark: 1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

3.2.8 HARMONICS CURRENT

3.2.1 LIMITS OF HARMONICS CURRENT

IEC 555-2					
Table - I			Table - II		
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Amperes)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Amperes)
Non Portable Tools or TV Receivers	Odd Harmonics		TV Receivers	Odd Harmonics	
	3	2.30		3	0.80
	5	1.14		5	0.60
	7	0.77		7	0.45
	9	0.40		9	0.30
	11	0.33		11	0.17
	13	0.21		13	0.12
	15≤n≤39	0.15 · 15/n		15≤n≤39	0.10 · 15/n
	Even Harmonics			Even Harmonics	
	2	1.08		2	0.30
	4	0.43		4	0.15
	8	0.30			
8≤n≤40	0.23 · 8/n	DC	0.05		

EN 61000-3-2/IEC 61000-3-2					
Equipment Category	Max. Permissible Harmonic Current (in Amperes)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in A) (mA/w)	
Class A	Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required	Class D	3	2.30	3.4
			5	1.14	1.9
			7	0.77	1.0
			9	0.40	0.5
			11	0.33	0.35
			13 ≤ n ≤ 39	see Table I	3.85/n
			only odd harmonics required		

3.2.1.1 TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b. The classification of EUT is according to section 5 of EN 61000-3-2: 2000. 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. 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.

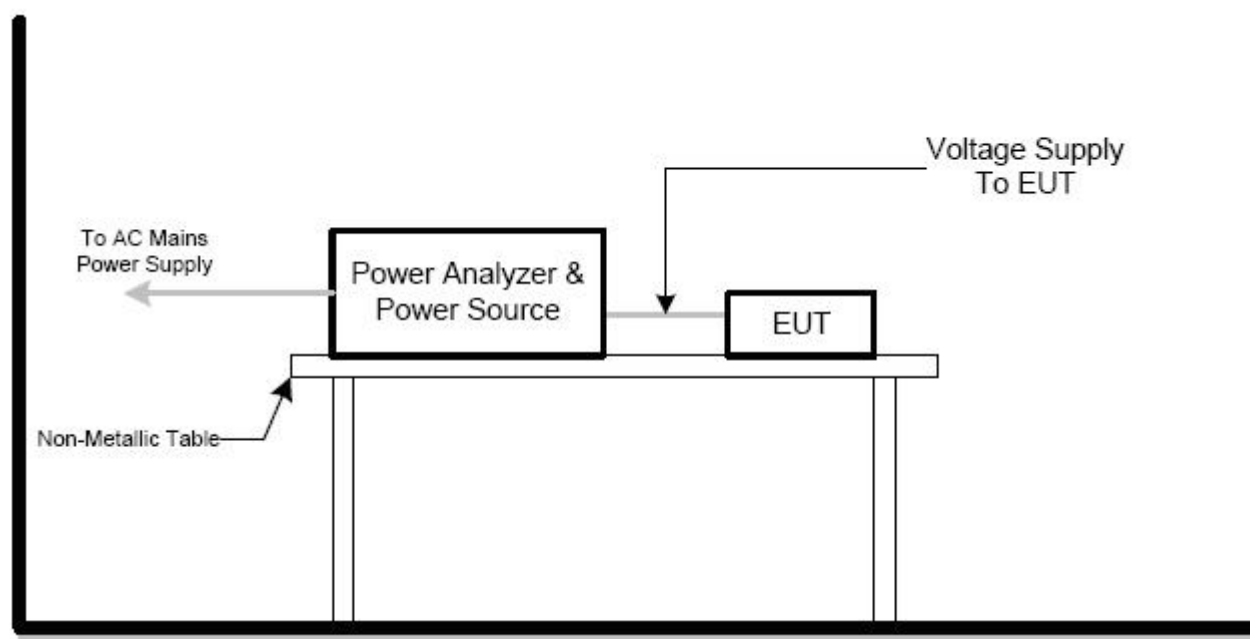
c. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

d. For the actual test configuration, please refer to the related item –EUT Test Photos.

3.2.1.2 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.2 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.1.3 TEST SETUP



3.2.2 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	45%
Pressure:	1010 hPa	Test Date :	N/A
Result:	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) Criteria A: There was no change operated with initial operating during the test.
- 3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 4) Criteria C: The system shut down during the test.

3.2.2.1 VOLTAGE FLUCTUATION AND FLICKERS

3.2.3 LIMITS OF VOLTAGE FLUCTUATION AND FLICKERS

Tests	Limits		Descriptions
	IEC555-3	IEC/EN 61000-3-3	
Pst	≤ 1.0 , Tp= 10 min.	≤ 1.0 , Tp= 10 min.	Short Term Flicker Indicator
Plt	N/A	≤ 0.65 , Tp=2 hr.	Long Term Flicker Indicator
dc	$\leq 3\%$	$\leq 3.3\%$	Relative Steady-State V-Chang
dmax	$\leq 4\%$	$\leq 4\%$	Maximum Relative V-change
d (t)	N/A	$\leq 3.3\%$ for > 500 ms	Relative V-change characteristic

3.2.3.1 TEST PROCEDURE

a. Harmonic Current Test:

Test was performed according to the procedures specified in Clause 5.0 of IEC555-2 and/or Sub-clause 6.2 of IEC/EN 61000-3-2 depend on which standard adopted for compliance measurement.

b. Fluctuation and Flickers Test:

Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

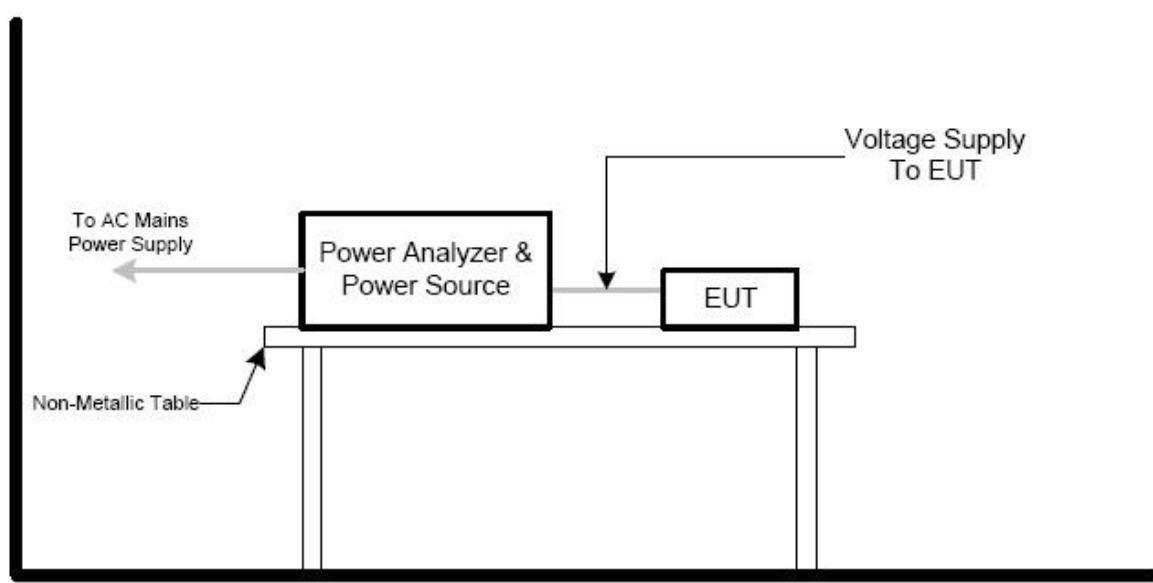
c. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.3.2 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.2 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.3.3 TEST SETUP



3.2.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	45%
Pressure:	1010 hPa	Test Date :	N/A
Test Mode :	N/A		
Result:	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) There was not any unintentional transmission in standby mode

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SERVIRITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION Level	Test Mode Test Ports	Perform. Criteria	Remark
1. ESD IEC/EN 61000-4-2	8KV air discharge 4KV contact discharge	Direct Mode	B	Pass
	4KV HCP discharge 4KV VCP discharge	Indirect Mode	B	Pass
2. RS IEC/EN 61000-4-3	80 MHz to 1000 MHz 1400 MHz to 2700 MHz 3V/m(rms), 1000Hz, 80%, AM modulated	Enclosure	A	Pass
3. EFT/Burst IEC/EN 61000-4-4	1.0KV(peak) 5/50ns Tr/Th 5KHz Repetition Freq.	Power Supply Port	B	N/A
	0.5 KV(peak) 5/50ns Tr/Th 5KHz Repetition Freq.	CTL/Signal Data Line Port	B	N/A
4. Surges IEC/EN 61000-4-5	0.5 KV(5P/5N) 1.2/50(8/20) Tr/Th us	L-N	B	N/A
	1 KV(5P/5N) 1.2/50(8/20) Tr/Th us	L-PE N-PE	B	N/A
5 Injected Current IEC/EN 61000-4-6	0.15 MHz to 80 MHz 3V(rms), 1000Hz 80%, AM Modulated 150Ω source impedance	CTL/Signal Port	A	N/A
	0.15 MHz to 80 MHz 3V(rms), 1000Hz 80%, AM Modulated 150Ω source impedance	AC Power Port	A	N/A
	0.15 MHz to 80 MHz 3V(rms), 1000Hz 80%, AM Modulated 150Ω source impedance	DC Power Port	A	N/A
6. Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 0%	AC Power Port	B	N/A
	Voltage dip 70%		C	
	Interruption 0%		C	

* Remark:

N/A : denotes test is not applicable in this Test Report

(1) : The EUT is a battery operating device and no any other cable connection to PC device.

(2) : Applicable only to cables which according to the manufacturer's specification supports communication on cables lengths greater than 3 m.

(3) : Applicable only to equipment containing devices susceptible to magnetic fields

4.2 GENERAL PERFORMANCE CRITERIA

According to **EN 301489** standard, the general performance criteria as following:

Criterion A	<p>The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.</p> <p>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.</p>
Criterion B	<p>After the test, the equipment 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 equipment is used as intended.</p> <p>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.</p>
Criterion C	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

4.3 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

4.4 ESD TESTING

4.4.1 TEST SPECIFICATION

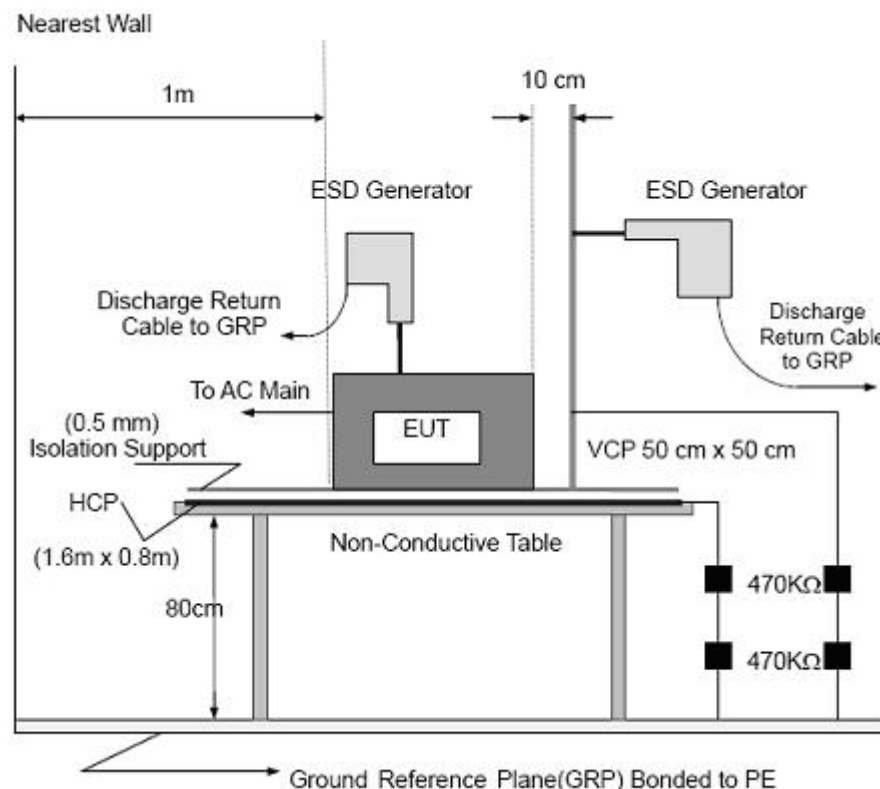
Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance	B
Discharge Voltage:	Air Discharge:2kV/4kV/8kV (Direct) Contact Discharge:2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Mode:	AC Discharge
Discharge Period:	1 second minimum

4.4.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT.
During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.
If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.
Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.
- b. Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.
- c. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.4.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) 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 IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 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 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.4.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	45%
Pressure:	1010 hPa	Test Date :	2018-10-26
Test Power :	DC 5V From USB		

Test Mode: BT Mode

Mode	Air Discharge								Contact Discharge							
	2KV		4KV		8KV		12KV		2KV		4KV		6KV		8KV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
enclosure									A	A	A	A				
slit	A	A	A	A	A	A										
HCP									A	A	A	A				
VCP									A	A	A	A				
Observation	TT,TR								TT,TR							
Criteria	B								B							
Result	A								A							
Judgment	PASS								PASS							

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) Test condition:
Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point. Air discharges: Minimum 10 times (Positive/Negative) at each point.
- 3) Test location(s) in which discharge (Air and contact discharge) to be applied illustrated by photos shown in next page(s)
- 4) The Indirect (HCP/VCP) discharges description of test point as following:
1.left side 2.right side 3.front side 4.rear side
- 5) N/A - denotes test is not applicable in this test report

4.5 RS TESTING

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance	A
Frequency Range:	80 MHz - 1000 MHz; 1800MHz; 2600MHz; 3500MHz; 5000MHz;
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.0 m
Dwell Time:	at least 3 seconds

4.5.2 TEST PROCEDURE

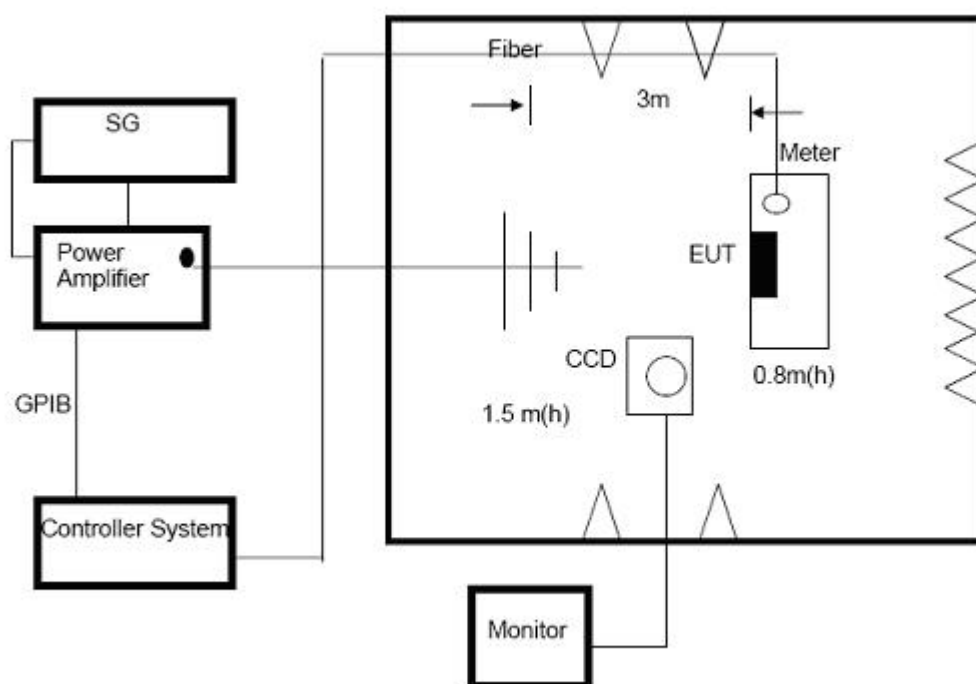
The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

The other condition as following manner:

- The field strength level was 3V/m.
- The frequency range is swept from 80 MHz - 1000 MHz/1800MHz/2600MHz/3500MHz/5000MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.5.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/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/EN 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.

4.5.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Date :	2018-10-26
Test Mode :	Running		
Test Power :	DC 5V From USB		

Test Mode: BT Mode

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform. Criteria	Results	Judgment
80 -1000 MHz; 1800MHz; 2600MHz; 3500MHz; 5000MHz	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	CT,CR	A	A	PASS
			Rear				
			Left				
			Right				
			Rear				
			Left				
			Right				

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) N/A - denotes test is not applicable in this test report.
- 3) Criteria A: There was no change operated with initial operating during the test.
- 4) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 5) Criteria C: The system shut down during the test.

4.6 EFT/BURST TESTING

4.6.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance	B
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:	Not less than 1 min.

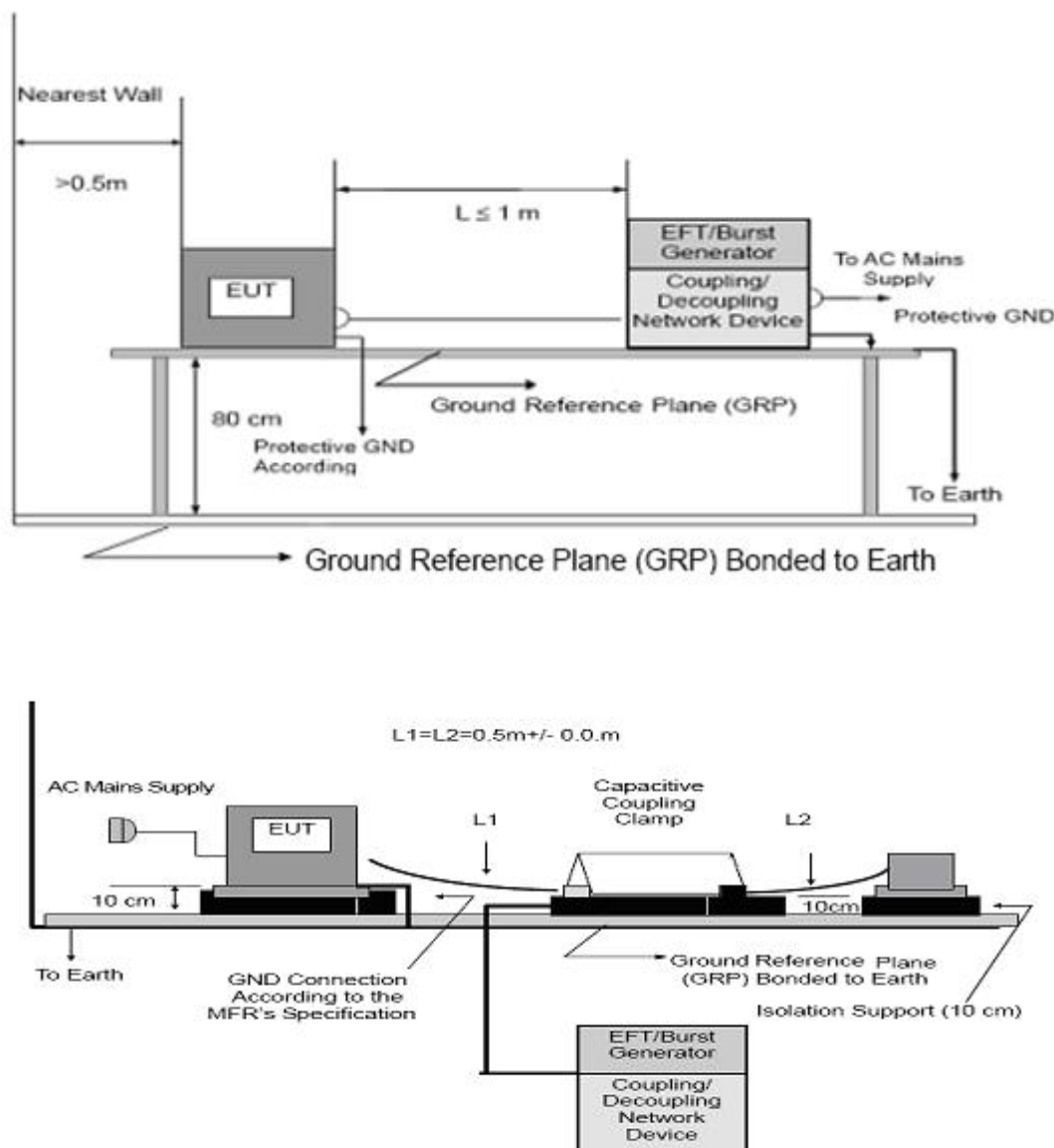
4.6.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

- The length of power cord between the coupling device and the EUT should not exceed 1 meter.
- Both positive and negative polarity discharges were applied.
- The duration time of each test sequential was 1 minute
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.6.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

4.6.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Date :	N/A
Test Result :	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) There was not any unintentional transmission in standby mode

4.7 SURGE TESTING

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Line:0.5 kV, 1 kV, 2 kV
Surge Input/Output:	L1-L2, L1-PE, L2-PE
Generator Source:	2 ohm between networks
Impedance:	12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

4.7.2 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 2meters in length (or shorter).

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

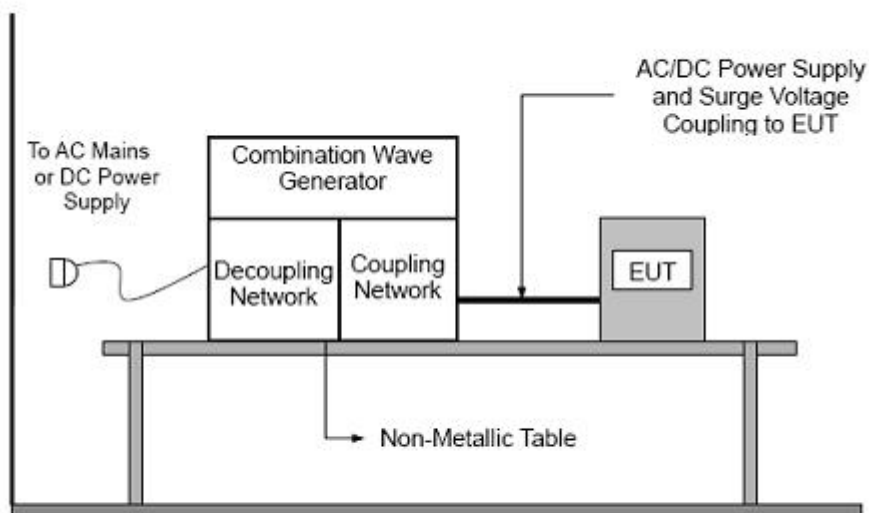
The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

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).

d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.7.3 TEST SETUP



4.7.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Date :	N/A
Test Mode :	N/A		
Test Result :	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) There was not any unintentional transmission in standby mode

4.8 INJECTION CURRENT TESTING

4.8.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 Vr.m.s.
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

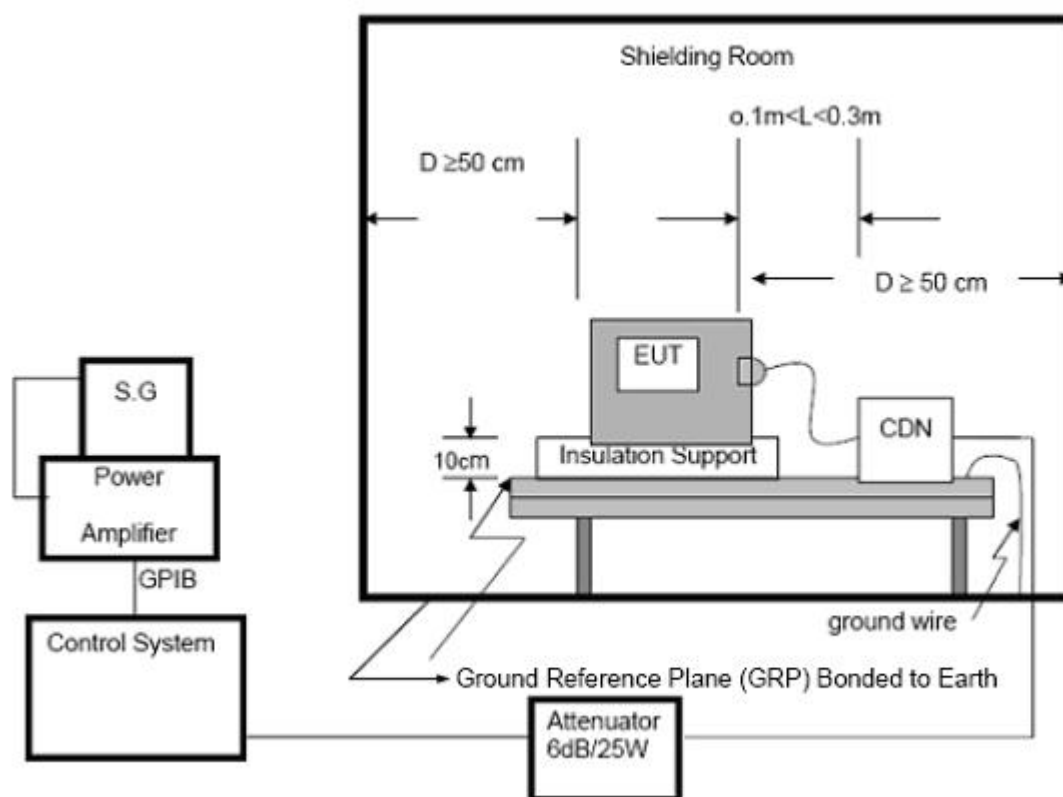
4.8.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

- The field strength level was 3V.
- The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.8.3 TEST SETUP



For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE:

FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. 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.

4.8.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Date :	N/A
Test Mode :	N/A		
Test Power :	N/A		
Test Result :	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) There was not any unintentional transmission in standby mode

4.9 POWER FREQUENCY MAGNETIC FIELD TESTING

4.9.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-8
Required Performance	A
Frequency Range:	50Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

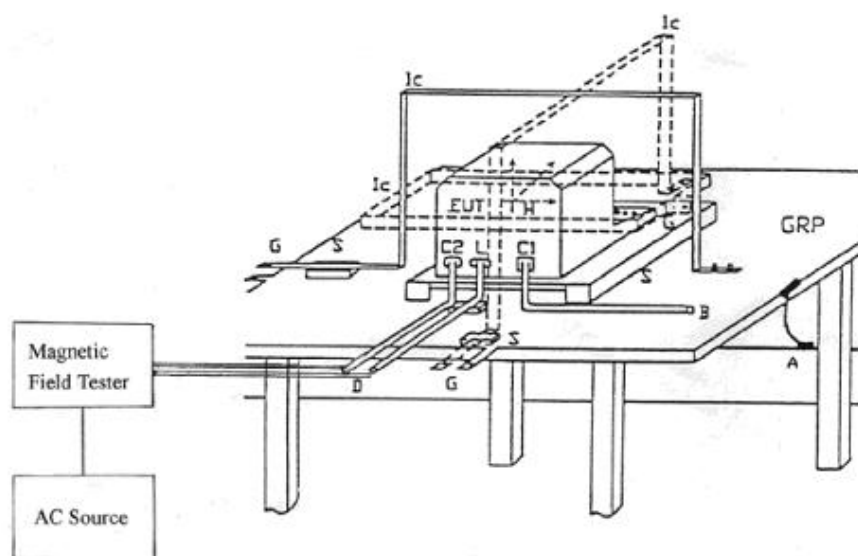
4.9.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.9.3 TEST SETUP



Note:

TABLE-TOP 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.

4.9.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Date :	N/A
Test Mode :	N/A		
Test Result :	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) Criteria A: There was no change operated with initial operating during the test.
- 3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 4) Criteria C: The system shut down during the test.

4.10 VOLTAGE INTERRUPTION/DIPS TESTING

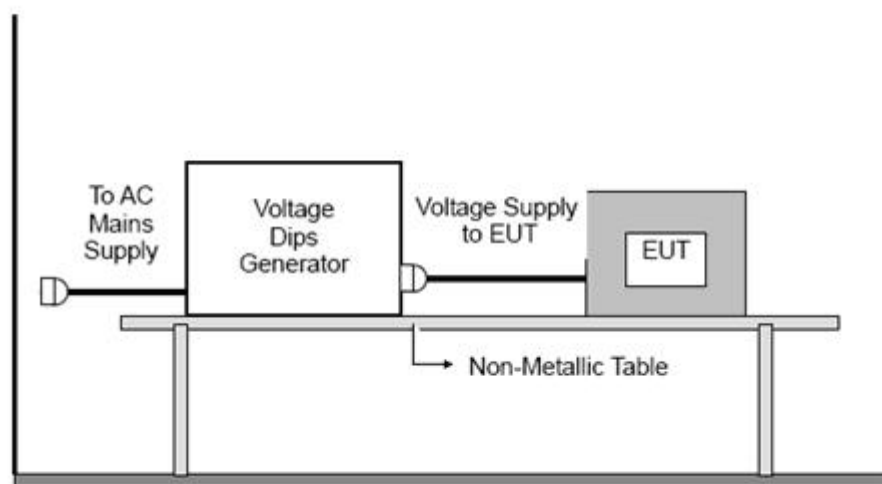
4.10.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance	B (For 0% Voltage Dips) C (For 70% Voltage Dips) C (For 0% Voltage Interruptions)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

4.10.2 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

4.10.3 TEST SETUP



For the actual test configuration, please refer to the related Item –EUT Test Photos.

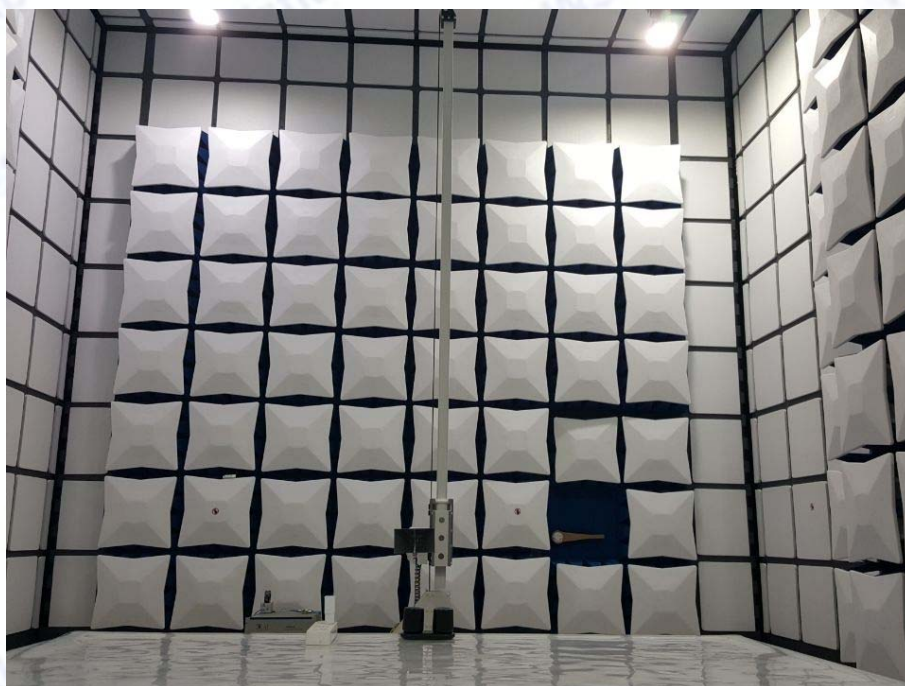
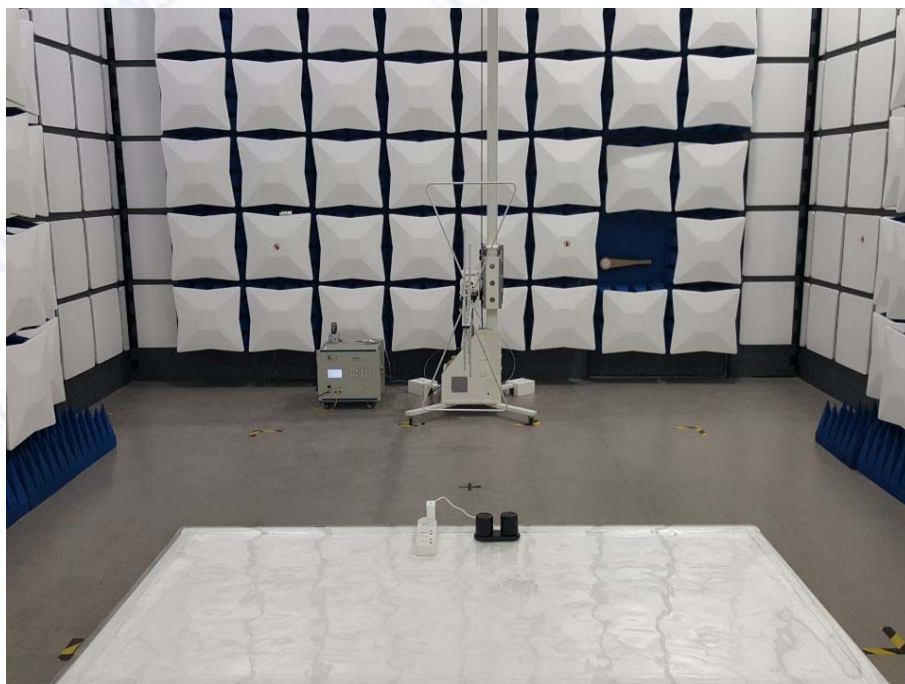
4.10.4 TEST RESULTS

EUT:	True Wireless Stereo Bluetooth Speaker	Model Name :	BS-124T
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Date :	N/A
Test Result :	N/A		

Note:

- 1) N/A - denotes test is not applicable in this test report
- 2) There was not any unintentional transmission in standby mode

5. EUT TEST PHOTO



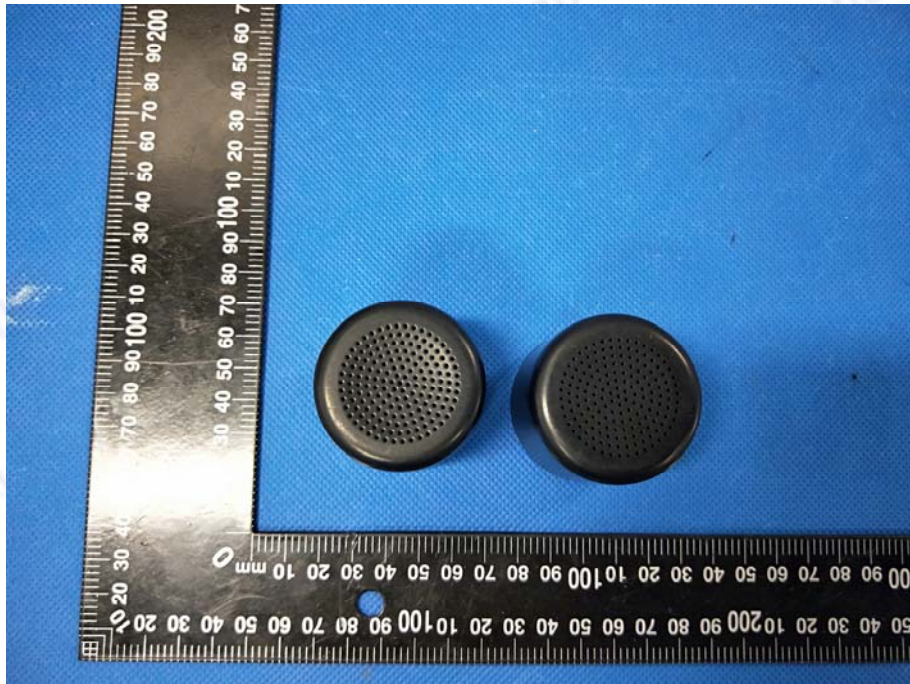


6. PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

External Photos

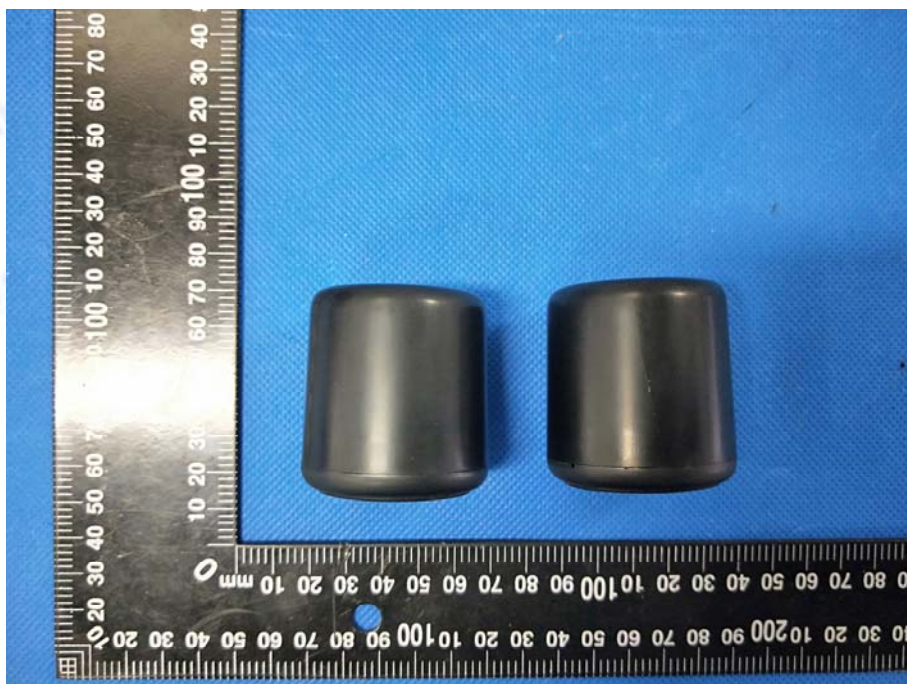
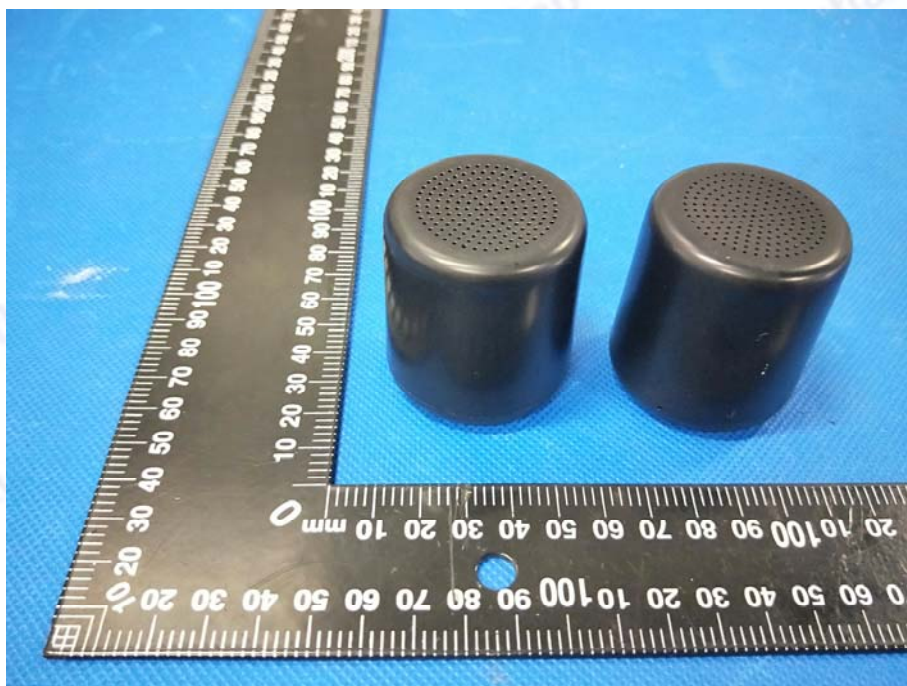


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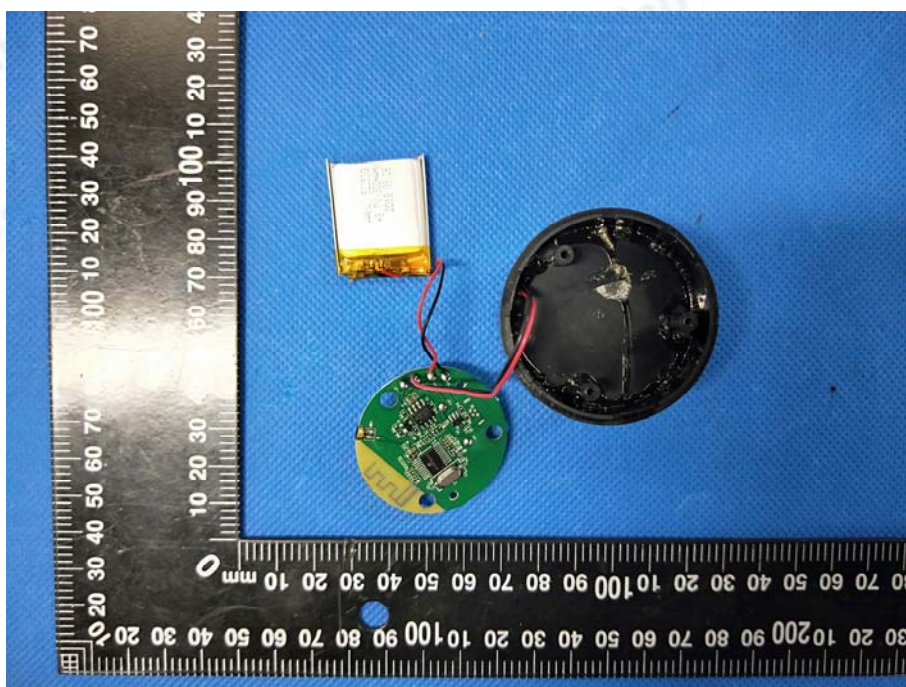
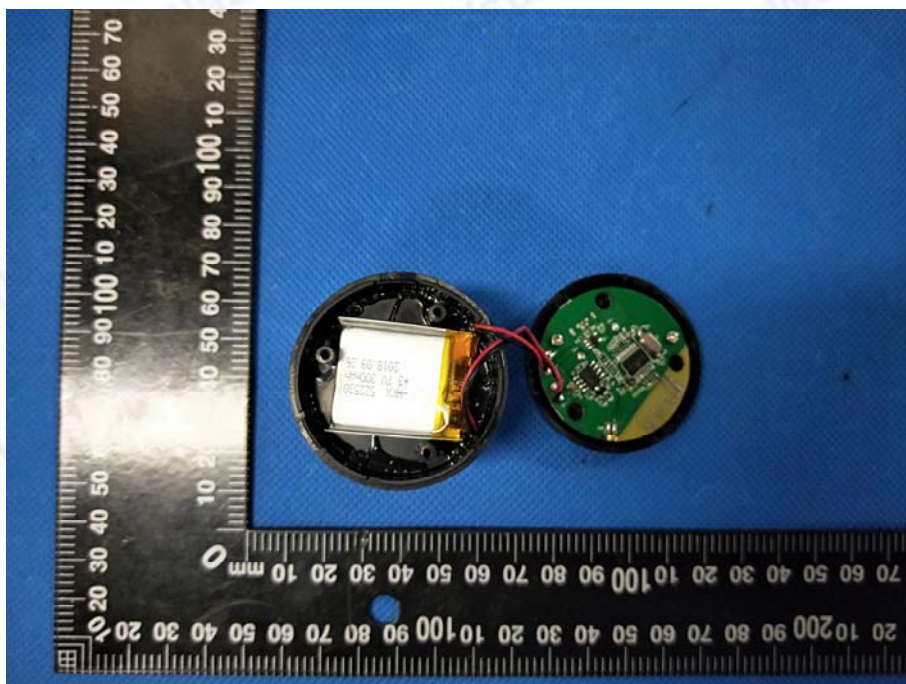


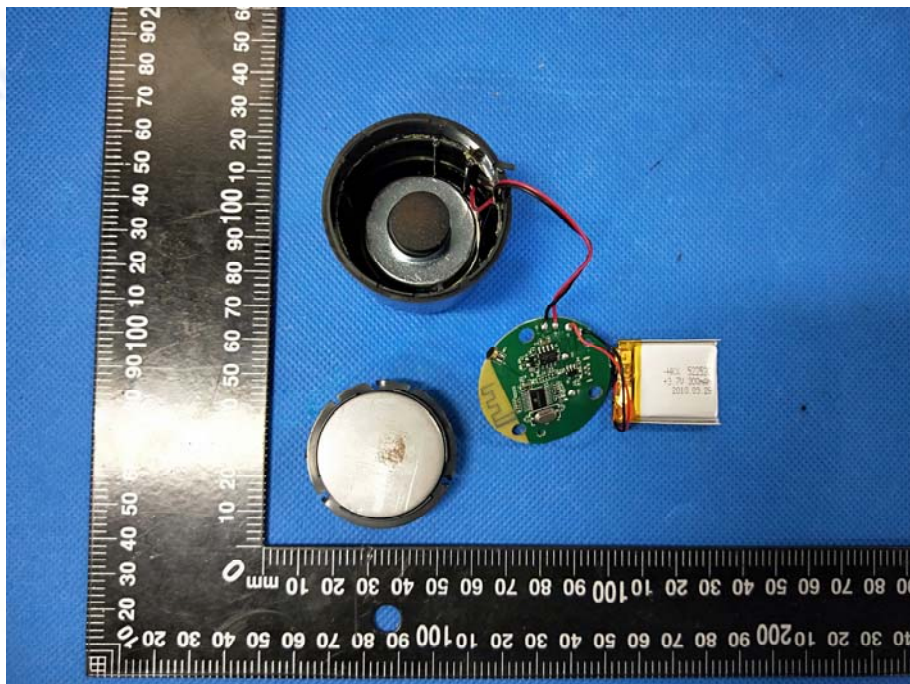
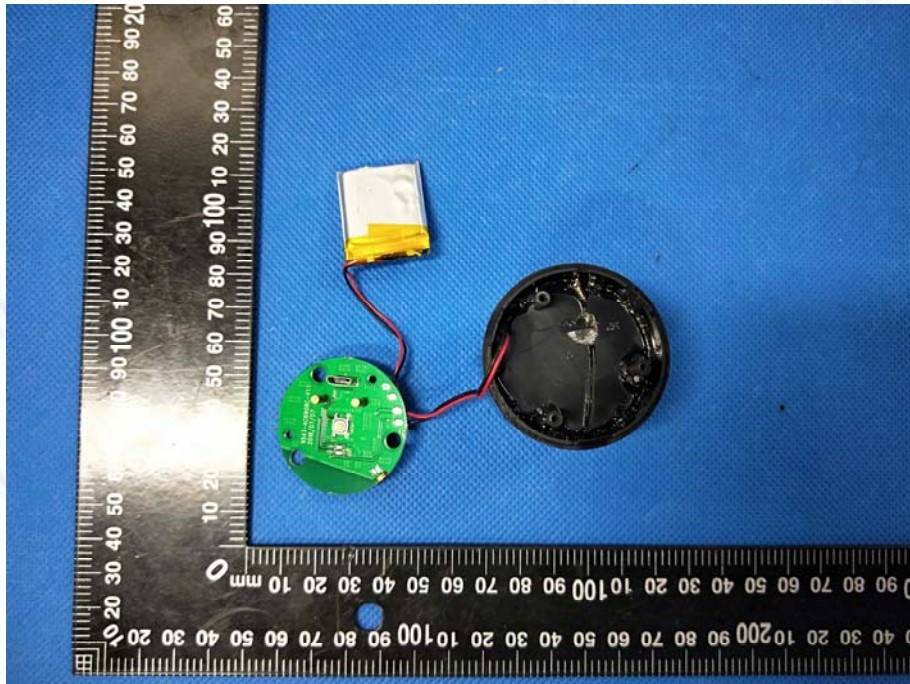
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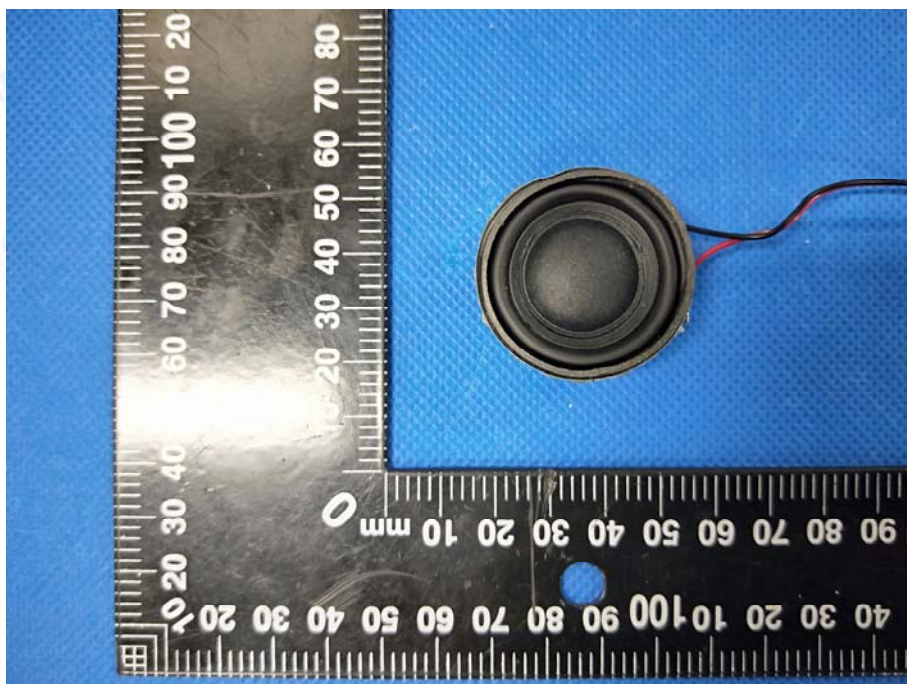
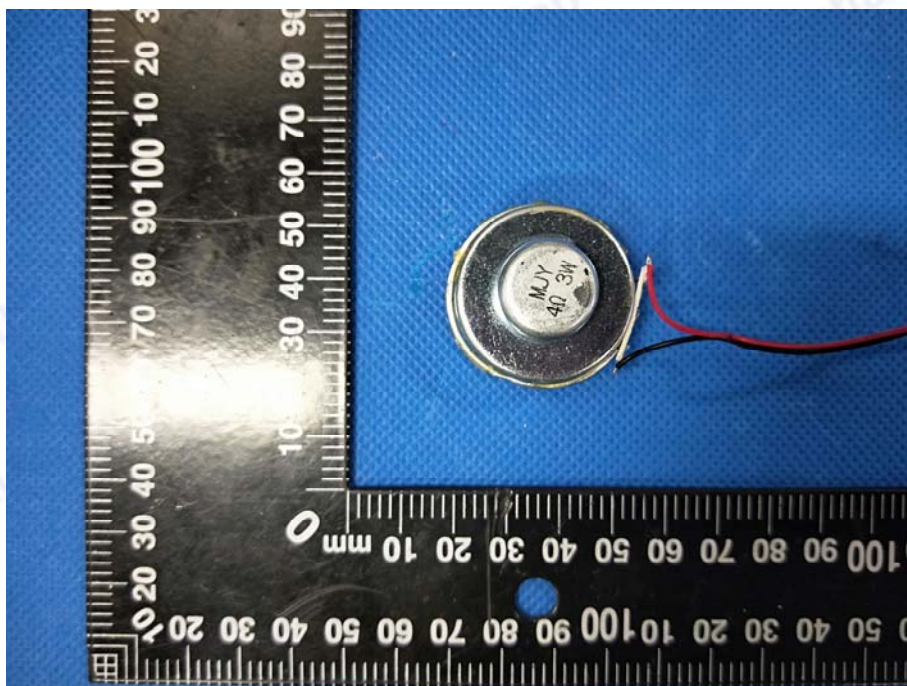


Internal Photos





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.....End of Report.....