



FCC AND ISED CERTIFICATION TEST REPORT

FOR

Applicant	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	:	Portable Bluetooth Speaker
Model No.	:	BOOMBOX 2
Trade Mark	:	JBL
FCC ID	:	APIJBLBOOMBOX2
IC	:	6132A-JBLBOOMBOX2
Manufacturer	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

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Dongguan City, Guangdong Province, China, 523808

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REPORT

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Test Report Declare

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Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-247 Issue 2 February 2017.

Test procedure used:

ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&ISED standards.

Report No:	DDT-R19092708-1E5 Rev.03		
Date of Receipt:	Feb. 24, 2021	Date of Test:	Feb. 24, 2021 ~ Mar. 12, 2021

Prepared By:

Sam Li

Sam Li/Engineer

Approved By:



Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Dec. 09, 2019	
Rev.01	Add new power supplier information and new battery supplier information.	May 07, 2020	Bobo Chen
Rev.02	This report added battery cell (SUN-INTE-213) based on the report Rev. 01.	Nov. 11, 2020	Talent Zhang
Rev.03	This report added antenna based on the report Rev. 02	May 28, 2021	Sam Li

1. Summary of Test Results

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	Standard	Results
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10:2013 RSS-247 Issue 2 RSS-Gen Issue 5	Pass
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.10:2013 RSS-247 Issue 2 RSS-Gen Issue 5	Pass
Antenna Requirement	FCC Part 15: 15.203 RSS-Gen Issue 5	Pass

Note: This report added antenna based on the report Rev. 02, this change doesn't influence the RF conducted performance, so only radiated emission and band edge compliance were tested and updated in this report.

2. General Test Information

2.1. Description of EUT

EUT* Name	: Portable Bluetooth Speaker
Model Number	: BOOMBOX 2
EUT function description	: Please reference user manual of this device
Power supply	: DC 24V from external AC Adapter or DC 7.2V built-in battery
Radio Specification	: Bluetooth V5.1
Operation frequency	: 2402 MHz - 2480 MHz
Modulation	: GFSK
Data rate	: 1 Mbps
Antenna Type	: Dedicated FPC antenna, maximum PK gain: 2.18 dBi
Sample Type	: Series production

Note: EUT is the abbreviation of equipment under test.

Channel information					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
AC Adapter	Harman	GHDT24V-4.2 C-DC	Input: AC 100-240V, 50/60Hz, 1.5A Output: DC 24V4.2A	With a magnetic ring
Rechargeable Li-ion Battery	SUNWODA Electronic Co., Ltd.	SUN-INTE-21 3	7.26VDC, 10000mAh, 72.6Wh	Cell Manufacturer: SAMSUNG
AC cable	Harman	N/A	1.2 m long, unshielded, non-magnetic ring	N/A
AC Adapter	Harman	NSA100ED-2 4042000	Input: AC 100-240V, 50/60Hz, 1.5A Output: DC 24V4.2A	With a magnetic ring

Rechargeable Li-ion Battery	SUNWODA Electronic Co., Ltd.	SUN-INTE-26 8	7.2VDC, 10000mAh, 72Wh	N/A
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New battery supplier information:

Description of Accessories	Manufacturer	Model number	Description	Remark
Rechargeable Li-ion Battery	SUNWODA Electronic Co., Ltd.	SUN-INTE-21 3	7.26VDC, 10000mAh, 72.6Wh	Cell Manufacturer: Sanyo

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	Lenovo Beijing Co. Ltd.	ThinkPad	FCC/CE	TP00015A

2.4. Block diagram of EUT configuration for test

EUT

Test software: FCCTool.exe

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table:

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
GFSK	/	CH0	2402
	/	CH19	2440
	/	CH39	2480

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 °C
Humidity range:	40-75%
Pressure range:	86-106 kPa

2.6. Deviations of test standard

No deviation.

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1; CAB identifier: CN0048

2.8. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Frequencies Stability	6.7 × 10 ⁻⁸ (Antenna couple method)
	5.5 × 10 ⁻⁸ (Conducted method)
Conducted spurious emissions	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.40 dB (3.6 GHz ≤ f < 8 GHz)
	1.66 dB (8 GHz ≤ f < 22 GHz)
Uncertainty for radio frequency (RBW < 20 kHz)	3×10 ⁻⁸
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz - 40 GHz)	4.10 dB (1-6 GHz)
	4.40 dB (6 GHz - 18 GHz)
	3.54 dB (18 GHz - 26 GHz)
	4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power line conduction emission test	3.32 dB (150 kHz - 30 MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3. Equipment Used During Test

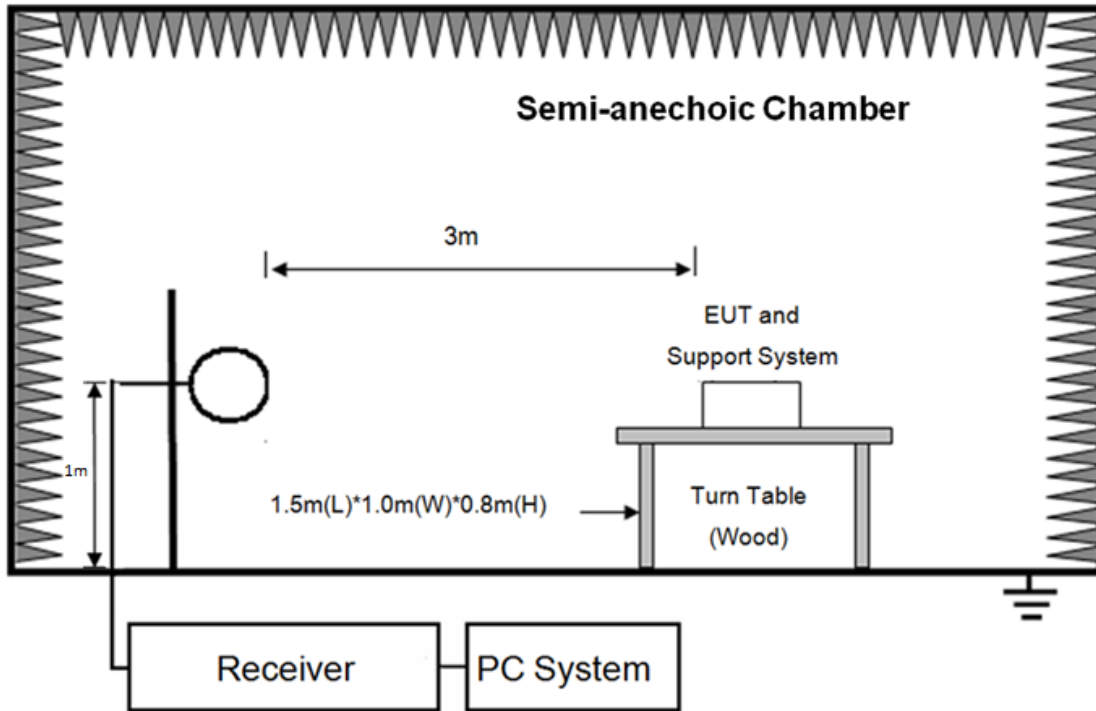
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System 1#)					
Spectrum analyzer	R&S	FSU26	101272	Jul. 01, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
RF Connected Test (Tonscend RF Measurement System 2#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Jul. 01, 2020	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 13, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 18, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 24, 2020	1 Year

RF Cable	N/A	5m+6m+1m	06270619	Sep. 30, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 30, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Radiation 2#chamber					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 13, 2020	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 11, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	1013 03	Sep. 28, 2020	1 Year
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test 1#					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 24, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test 2#					
Test Receiver	R&S	ESPI	101761	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101170	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	KH43101	43101180156 8-12#	Jul. 01, 2020	1 Year
CE Cable 2	HUBSER	N/A	W11.02	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

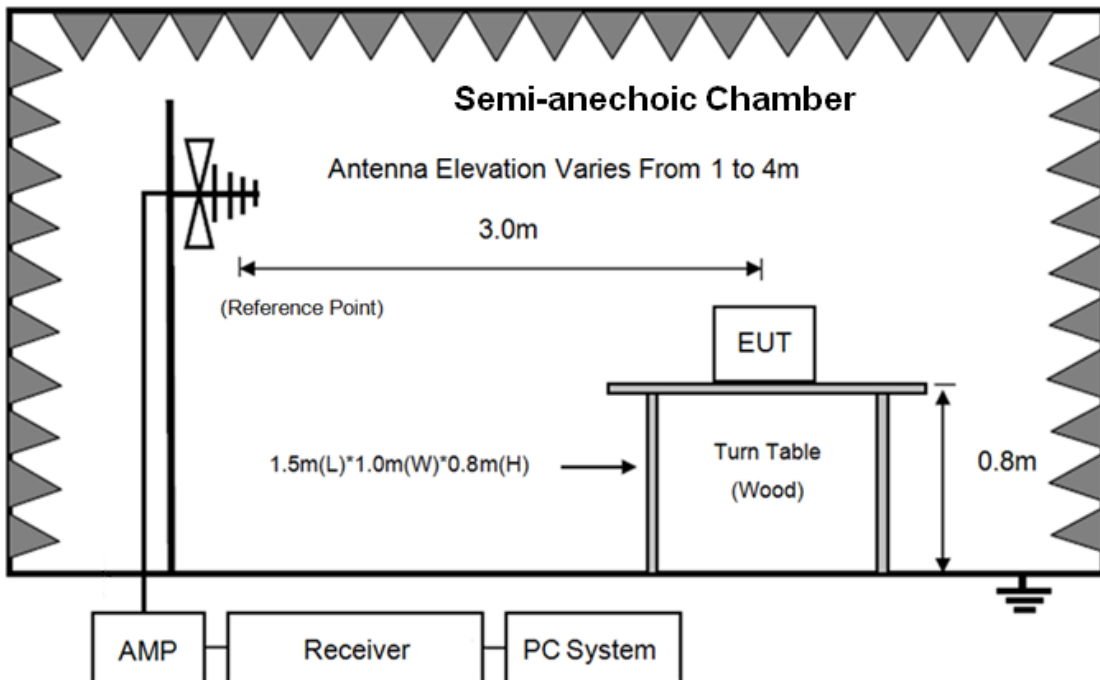
4. Radiated Emission

4.1. Block diagram of test setup

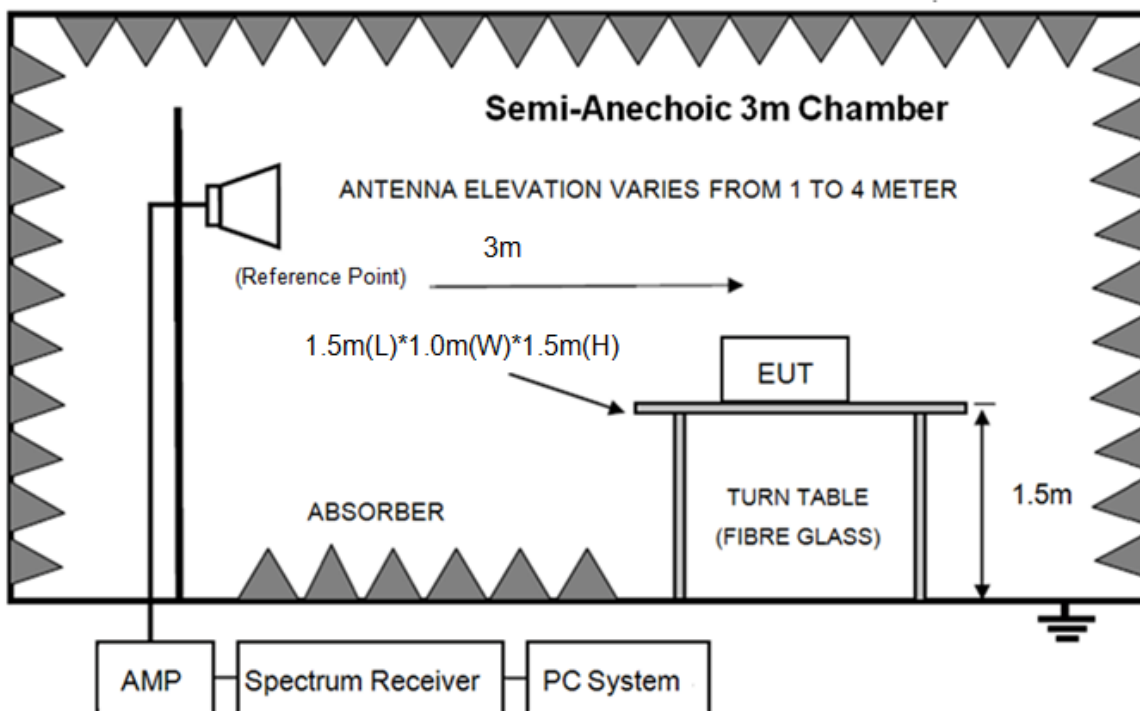
In 3 m Anechoic Chamber Test Setup Diagram for 9 kHz - 30 MHz



In 3 m Anechoic Chamber Test Setup Diagram for 30 MHz - 1 GHz



In 3 m Anechoic Chamber Test Setup Diagram for frequency above 1 GHz



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

4.2. Limit

4.2.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.1772&4.1775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&4.2075	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6

4.2.2 FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30 MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit}_{30\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 40\text{Log}(30\text{m}/3\text{m})$$

4.2.3 Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20 dB below the fundamental emissions or comply with 15.209 limits.

4.3. Test procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1 G and 150 cm above the ground plane inside a semi-anechoic chamber for above 1 G.
- (2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
9 kHz - 30 MHz	Active Loop antenna	3 m
30 MHz - 1 GHz	Trilog Broadband Antenna	3 m
1 GHz - 18 GHz	Double Ridged Horn Antenna (1 GHz - 18 GHz)	3 m
18 GHz - 40 GHz	Horn Antenna (18 GHz - 40 GHz)	1 m

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also is positioned with its plane horizontal at the specified distance from the EUT. The center of the

loop is 1 m above the ground. For measurement above 30 MHz, the Trilog Broadband Antenna or Horn Antenna was located 3 m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9 kHz to 25 GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1 m to 4 m (Except loop antenna, it's fixed 1 m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so below final test was performed with frequency range from 30 MHz to 18 GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission.

Measurements in both horizontal and vertical polarities were made and the data was recorded.

In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(5) The emissions from 9 kHz to 1 GHz were measured based on CISPR QP detector except for the frequency bands 9-90 kHz, 110-490 kHz, for emissions from 9 kHz - 90 kHz, 110 kHz - 490 kHz and above 1 GHz were measured based on average detector, for emissions above 1 GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9 kHz to 1 GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9 kHz - 150 kHz	200 Hz
150 kHz - 30 MHz	9 kHz
30 MHz - 1 GHz	120 kHz

(7) For emissions above 1 GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; RBW is set at 1 MHz, VBW is set at 10 Hz for Average measure (according ANSI C63.10:2013 clause 4.1.4.2.2 procedure for average measure).

(8) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

4.4. Test result

Pass. (See below detailed test result)

All the emissions except fundamental emission from 9 kHz to 25 GHz were comply with 15.209 limit.

Note1: According exploratory test no any obvious emission was detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

Note2: For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with EUT working in GFSK, Tx 2440 MHz mode.

Note3: For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

Radiated Emission test (below 1 GHz) TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#

D:\2021 RE 1# Report data\Q21020220-3E BOOMBOX 2\FCC BELOW1G.EM6

Test Date : 2021-02-27

Tested By : Jacky

EUT : Portable Bluetooth Speaker

Model Number : BOOMBOX 2

Power Supply : Battery

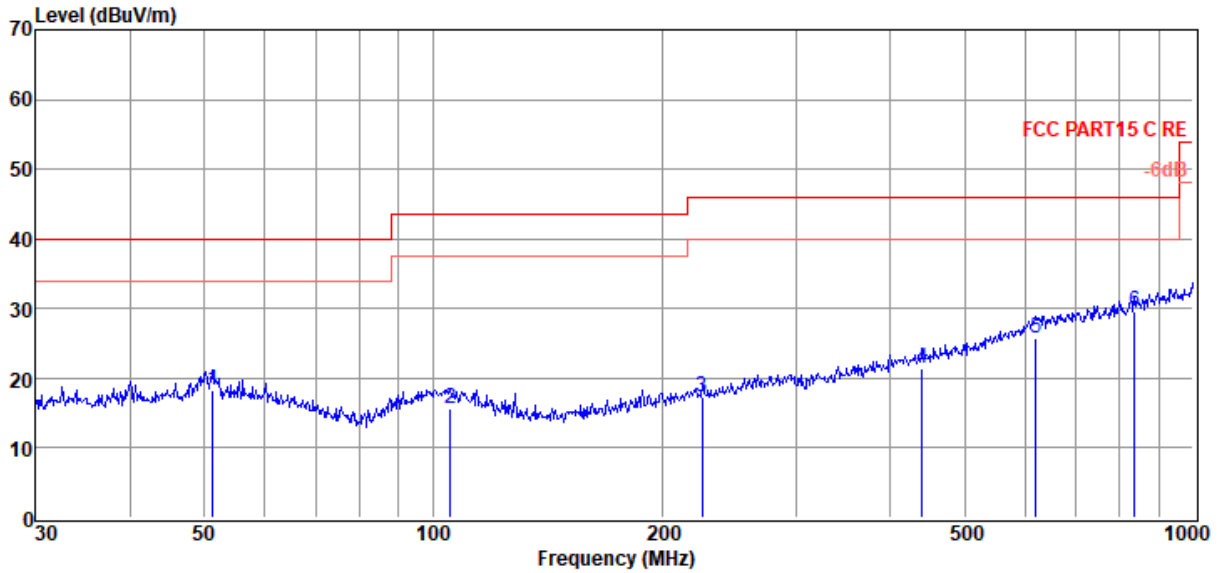
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:45%,Press:101.3kPa

Antenna/Distance : 2020 VULB 9163 1#/3m/VERTICAL

Memo :

Data: 3



Item (Mark)	Freq. (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	51.30	1.11	13.52	3.58	18.21	40.00	-21.79	QP	VERTICAL
2	105.27	-1.05	12.72	3.91	15.58	43.50	-27.92	QP	VERTICAL
3	226.10	1.07	11.84	4.44	17.35	46.00	-28.65	QP	VERTICAL
4	440.20	-0.19	16.44	5.12	21.37	46.00	-24.63	QP	VERTICAL
5	620.71	1.22	19.00	5.61	25.83	46.00	-20.17	QP	VERTICAL
6	836.24	2.28	21.25	6.10	29.63	46.00	-16.37	QP	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#

D:\2021 RE 1# Report data\Q21020220-3E BOOMBOX 2\FCC BELOW1G.EM6

Test Date : 2021-02-27

Tested By : Jacky

EUT : Portable Bluetooth Speaker

Model Number : BOOMBOX 2

Power Supply : Battery

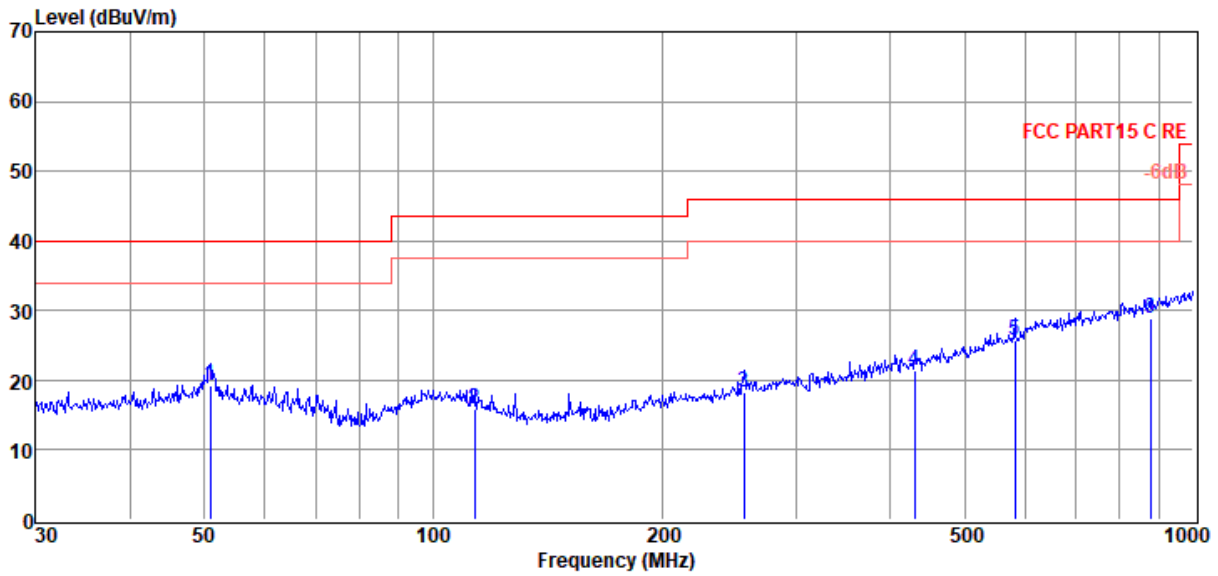
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:45%,Press:101.3kPa

Antenna/Distance : 2020 VULB 9163 1#/3m/HORIZONTAL

Memo :

Data: 4



Item (Mark)	Freq. (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	50.94	2.12	13.57	3.58	19.27	40.00	-20.73	QP	HORIZONTAL
2	113.32	-0.02	11.85	3.95	15.78	43.50	-27.72	QP	HORIZONTAL
3	256.52	1.25	12.49	4.55	18.29	46.00	-27.71	QP	HORIZONTAL
4	429.52	0.03	16.28	5.09	21.40	46.00	-24.60	QP	HORIZONTAL
5	582.74	1.69	18.56	5.52	25.77	46.00	-20.23	QP	HORIZONTAL
6	878.32	0.92	21.75	6.19	28.86	46.00	-17.14	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

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

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Radiated Emission test (above 1 GHz)

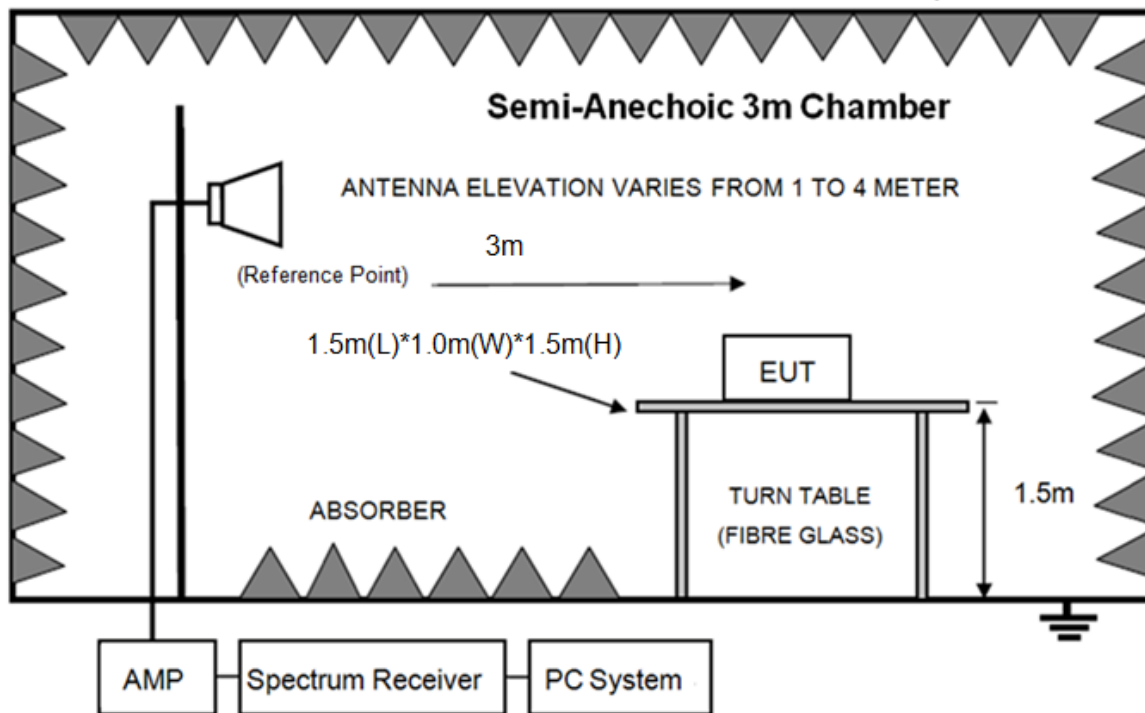
Freq. (MHz)	Read level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector type	Polarization
Tx mode 2402 MHz									
7171.00	46.81	37.10	42.91	7.75	48.75	74.00	-25.25	Peak	HORIZONTAL
8990.00	45.05	38.68	42.59	8.60	49.74	74.00	-24.26	Peak	HORIZONTAL
9670.00	45.81	39.24	42.46	9.12	51.71	74.00	-22.29	Peak	HORIZONTAL
12662.00	45.43	38.92	41.60	10.64	53.39	74.00	-20.61	Peak	HORIZONTAL
17881.00	42.98	45.85	40.01	13.20	62.02	74.00	-11.98	Peak	HORIZONTAL
17881.00	31.88	45.85	40.01	13.20	50.92	54.00	-3.08	Average	HORIZONTAL
5471.00	47.66	32.69	43.26	6.60	43.69	74.00	-30.31	Peak	VERTICAL
8089.00	45.56	37.95	42.78	8.68	49.41	74.00	-24.59	Peak	VERTICAL
10061.00	45.67	39.59	42.40	9.38	52.24	74.00	-21.76	Peak	VERTICAL
12271.00	45.97	38.83	42.01	10.59	53.38	74.00	-20.62	Peak	VERTICAL
17949.00	42.69	46.11	40.00	13.25	62.05	74.00	-11.95	Peak	VERTICAL
17949.00	31.56	46.11	40.00	13.25	50.92	54.00	-3.08	Average	VERTICAL
Tx mode 2440 MHz									
7766.00	46.30	37.67	42.83	8.43	49.57	74.00	-24.43	Peak	HORIZONTAL
9381.00	45.24	39.00	42.51	8.90	50.63	74.00	-23.37	Peak	HORIZONTAL
10809.00	45.59	40.32	42.36	9.32	52.87	74.00	-21.13	Peak	HORIZONTAL
12985.00	44.48	39.57	41.28	10.69	53.46	74.00	-20.54	Peak	HORIZONTAL
17949.00	41.61	46.11	40.00	13.25	60.97	74.00	-13.03	Peak	HORIZONTAL
17949.00	31.60	46.11	40.00	13.25	50.96	54.00	-3.04	Average	HORIZONTAL
5471.00	48.01	32.69	43.26	6.60	44.04	74.00	-29.96	Peak	VERTICAL
7579.00	46.74	37.41	42.86	8.21	49.50	74.00	-24.50	Peak	VERTICAL
10316.00	44.91	39.94	42.38	9.35	51.82	74.00	-22.18	Peak	VERTICAL
13019.00	44.67	39.63	41.24	10.69	53.75	74.00	-20.25	Peak	VERTICAL
17881.00	42.44	45.85	40.01	13.20	61.48	74.00	-12.52	Peak	VERTICAL
17881.00	31.83	45.85	40.01	13.20	50.87	54.00	-3.13	Average	VERTICAL
Tx mode 2480 MHz									
7171.00	46.89	37.10	42.91	7.75	48.83	74.00	-25.17	Peak	HORIZONTAL
8531.00	46.37	37.76	42.68	8.64	50.09	74.00	-23.91	Peak	HORIZONTAL
9925.00	46.05	39.44	42.41	9.32	52.40	74.00	-21.60	Peak	HORIZONTAL
11931.00	45.77	39.18	42.30	10.46	53.11	74.00	-20.89	Peak	HORIZONTAL
18000.00	42.22	46.30	40.00	13.29	61.81	74.00	-12.19	Peak	HORIZONTAL
18000.00	31.37	46.30	40.00	13.29	50.96	54.00	-3.04	Average	HORIZONTAL
5505.00	47.72	32.71	43.25	6.62	43.80	74.00	-30.20	Peak	VERTICAL
7239.00	46.62	37.14	42.90	7.83	48.69	74.00	-25.31	Peak	VERTICAL
10180.00	45.08	39.75	42.39	9.37	51.81	74.00	-22.19	Peak	VERTICAL
12135.00	46.37	38.97	42.15	10.57	53.76	74.00	-20.24	Peak	VERTICAL
17949.00	42.04	46.11	40.00	13.25	61.40	74.00	-12.60	Peak	VERTICAL
17949.00	31.60	46.11	40.00	13.25	50.96	54.00	-3.04	Average	VERTICAL
Result: Pass									

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

5. Band Edge Compliance (Radiated Method)

5.1. Block diagram of test setup



5.2. Limit

All restriction band should comply with 15.209, other emission should be at least 20 dB below the fundamental.

5.3. Test procedure

Same with clause 10.3 except change investigated frequency range from 2310 MHz to 2410 MHz and 2470 MHz to 2500 MHz.

Remark: All restriction band have been tested, and only the worst case is shown in report.

5.4. Test result

Pass. (See below detailed test result)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21020220-3E BOOMBOX
2\FCC ABOVE 1G.EM6

Test Date : 2021-02-28

Tested By : Jacky

EUT : Portable Bluetooth Speaker

Model Number : BOOMBOX 2

Power Supply : Battery

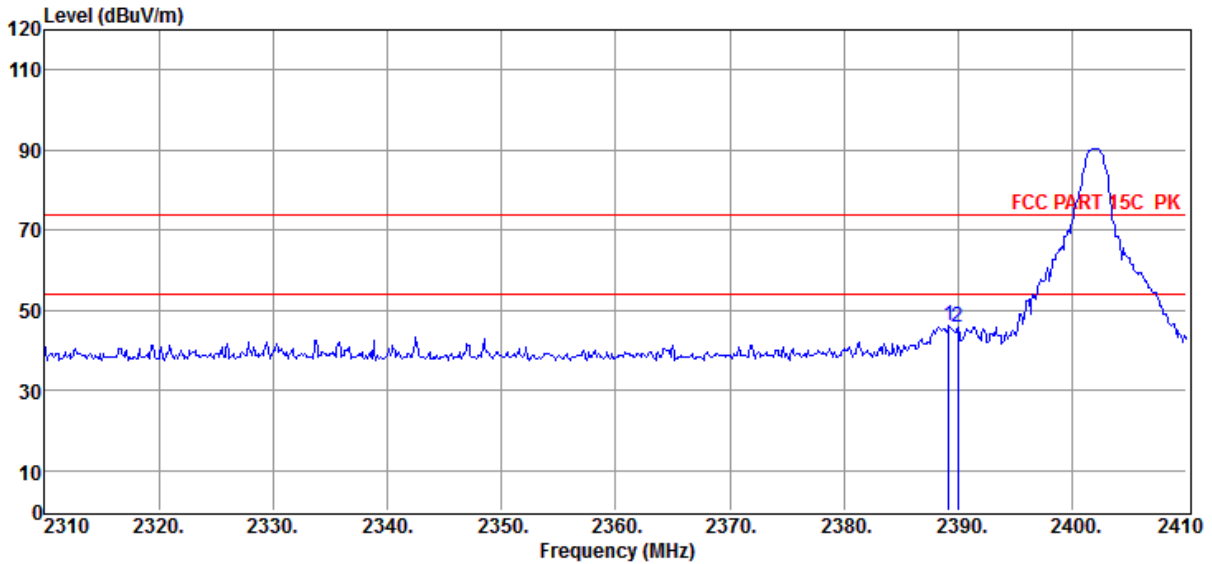
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2019 BBHA9120D/3m/VERTICAL

Memo : BLE 2402

Data: 29



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2389.20	57.78	27.48	43.21	4.03	46.08	74.00	-27.92	Peak	VERTICAL
2	2390.00	57.37	27.48	43.21	4.03	45.67	74.00	-28.33	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

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

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21020220-3E BOOMBOX
2\FCC ABOVE 1G.EM6

Test Date : 2021-02-28

Tested By : Jacky

EUT : Portable Bluetooth Speaker

Model Number : BOOMBOX 2

Power Supply : Battery

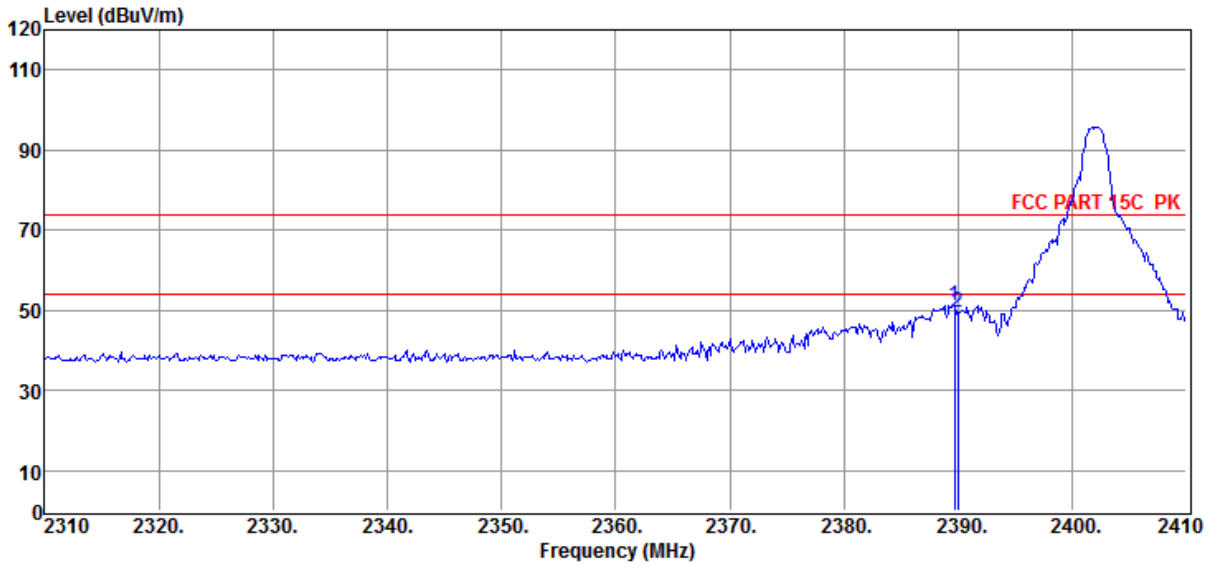
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2019 BBHA9120D/3m/HORIZONTAL

Memo : BLE 2402

Data: 30



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2389.70	62.85	27.48	43.21	4.03	51.15	74.00	-22.85	Peak	HORIZONTAL
2	2390.00	61.16	27.48	43.21	4.03	49.46	74.00	-24.54	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

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

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21020220-3E BOOMBOX
2\FCC ABOVE 1G.EM6

Test Date : 2021-02-28

Tested By : Jacky

EUT : Portable Bluetooth Speaker

Model Number : BOOMBOX 2

Power Supply : Battery

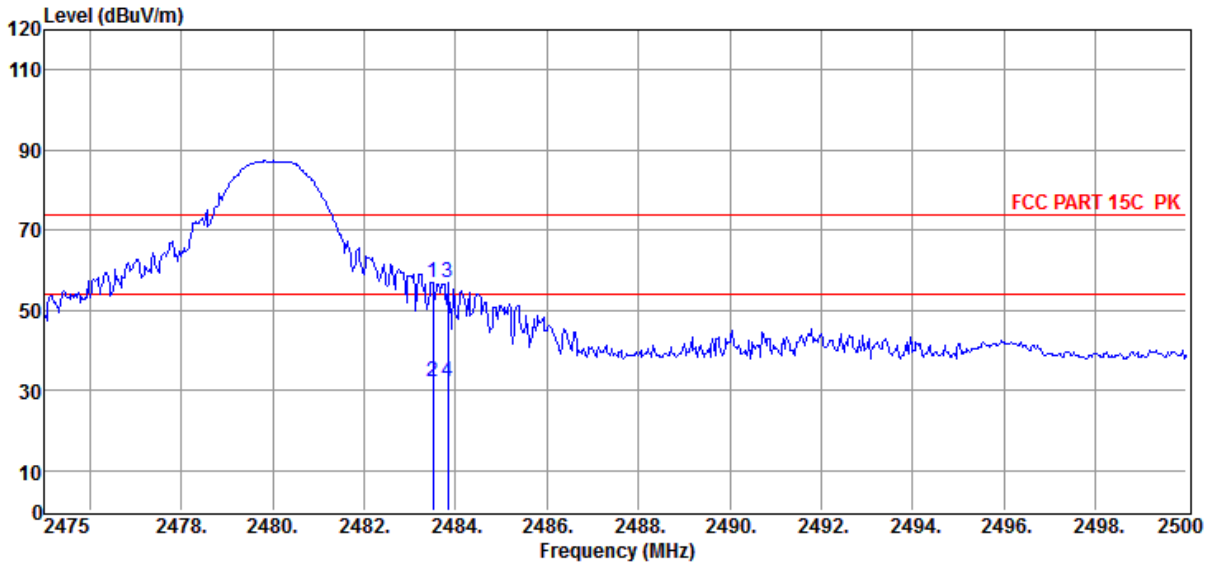
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2019 BBHA9120D/3m/VERTICAL

Memo : BLE 2480

Data: 31



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	68.29	27.67	43.25	4.12	56.83	74.00	-17.17	Peak	VERTICAL
2	2483.50	43.68	27.67	43.25	4.12	32.22	54.00	-21.78	Average	VERTICAL
3	2483.83	68.22	27.67	43.25	4.12	56.76	74.00	-17.24	Peak	VERTICAL
4	2483.83	43.67	27.67	43.25	4.12	32.21	54.00	-21.79	Average	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

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

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#

D:\2021 RE2# Report Data\Q21020220-3E BOOMBOX
2\FCC ABOVE 1G.EM6

Test Date : 2021-02-28

Tested By : Jacky

EUT : Portable Bluetooth Speaker

Model Number : BOOMBOX 2

Power Supply : Battery

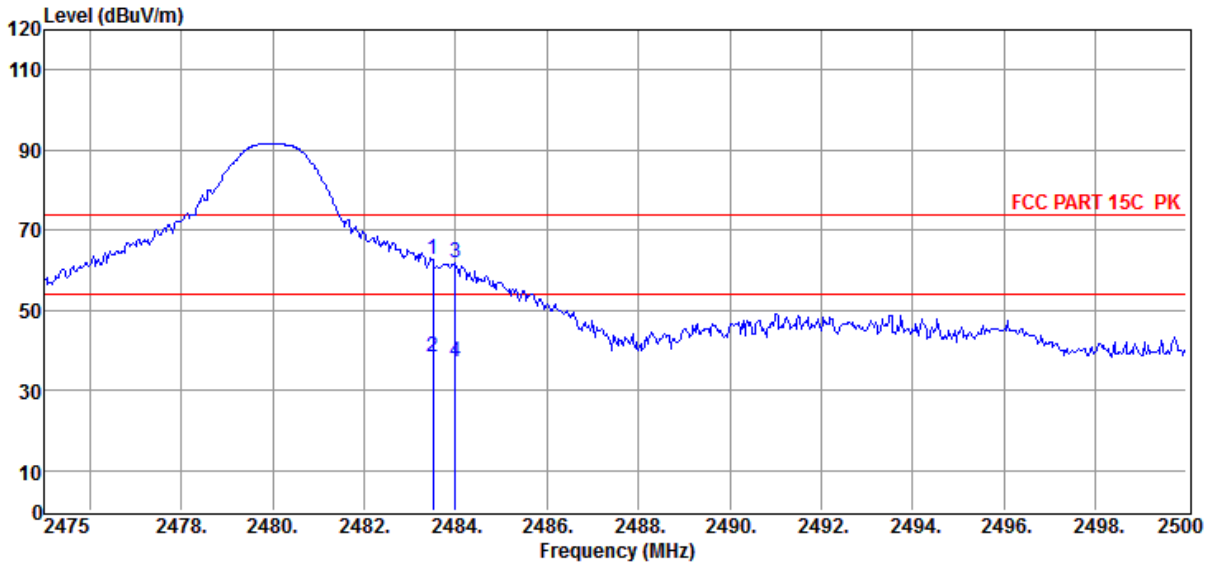
Test Mode : Tx mode

Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa

Antenna/Distance : 2019 BBHA9120D/3m/HORIZONTAL

Memo : BLE 2480

Data: 32



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	73.95	27.67	43.25	4.12	62.49	74.00	-11.51	Peak	HORIZONTAL
2	2483.50	49.97	27.67	43.25	4.12	38.51	54.00	-15.49	Average	HORIZONTAL
3	2484.00	73.12	27.67	43.25	4.12	61.66	74.00	-12.34	Peak	HORIZONTAL
4	2484.00	48.62	27.67	43.25	4.12	37.16	54.00	-16.84	Average	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

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

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

6. Antenna Requirements

6.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2. Result

The antenna used for this product is dedicated FPC antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain is 2.18 dBi.