FCC REPORT (BLE)

Applicant:	iMushroom Audio Co.,Ltd.
Address of Applicant:	No.21,Nanxing Three Road,Nanfang Industrial Park,Beizha Village,Humen Town,Dongguan,China

Equipment Under Test (EUT)

Product Name:	Music Bluetooth Speaker
Model No.:	B-2-2CH,B-2-2,B-2-2CD,B-2-2B,B-2-2E,B-2-2L,B-2-2F,B-2-2J, B-2-2K,B-2-2Q,B-2-2R,B-2-2Z
FCC ID:	2ABP8-B-2-2CH
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	18 Mar., 2014
Date of Test:	19 Mar., to 31 Mar., 2014
Date of report issued:	01 Apr., 2014
Test Result:	PASS *

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

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*01 Apr.,2014*	*Original*

Prepared by: Sera Xiang ***Date:*** *01 Apr.,2014*

Report Clerk

Reviewed by: Gavin Liu ***Date:*** *01 Apr.,2014*

Project Engineer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	iMushroom Audio Co.,Ltd.
Address of Applicant:	No.21,Nanxing Three Road,Nanfang Industrial Park,Beizha Village,Humen Town,Dongguan,China
Manufacturer/Factory:	iMushroom Audio Co.,Ltd.
Address of Manufacturer/ Factory:	No.21,Nanxing Three Road,Nanfang Industrial Park,Beizha Village,Humen Town,Dongguan,China

5.2 General Description of E.U.T.

Product Name:	Music Bluetooth Speaker
Model No.:	B-2-2CH,B-2-2,B-2-2CD,B-2-2B,B-2-2E,B-2-2L,B-2-2F, B-2-2J,B-2-2K,B-2-2Q,B-2-2R,B-2-2Z
Operation Frequency:	2402-2480 MHz
Channel numbers:	40
Channel separation:	2 MHz
Modulation technology:	GFSK
Data speed :	1Mbps
Antenna Type:	Internal Antenna
Antenna gain:	0 dBi
Power supply:	DC 5V
Remark：	The Model: B-2-2CH,B-2-2,B-2-2CD,B-2-2B,B-2-2E,B-2-2L,B-2-2F, B-2-2J,B-2-2K,B-2-2Q,B-2-2R,B-2-2Z were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name for commercial purpose.

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2442MHz
The Highest channel	2480MHz

5.3 Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Operation mode	Keep the EUT in continuous transmitting with modulation
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.	

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
LENOVO	Notebook	ThinkPad SL510	LR-7Y97D	DoC

5.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in out files. Registration 817957, February 27, 2012.

● **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.6 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No.B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

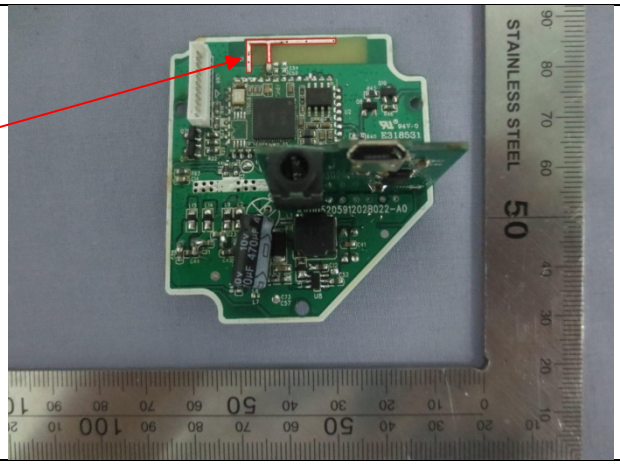
5.7 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	June 09 2013	June 08 2014
2	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CCIS0005	May 25 2013	May 24 2014
3	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	CCIS0006	May 25 2013	May 24 2014
4	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
5	Coaxial Cable	CCIS	N/A	CCIS0016	Feb. 01 2014	Feb. 31 2015
6	Coaxial Cable	CCIS	N/A	CCIS0017	Feb. 01 2014	Feb. 31 2015
7	Coaxial cable	CCIS	N/A	CCIS0018	Feb. 01 2014	Feb. 31 2015
8	Coaxial Cable	CCIS	N/A	CCIS0019	Feb. 01 2014	Feb. 31 2015
9	Coaxial Cable	CCIS	N/A	CCIS0087	Feb. 01 2014	Feb. 31 2015
10	Amplifier(10kHz-1.3GHz)	HP	8447D	CCIS0003	Feb. 01 2014	Feb. 31 2015
11	Amplifier(1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	June 09 2013	June 08 2014
12	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	Feb. 01 2014	Feb. 31 2015
13	Horn Antenna	ETS-LINDGREN	3160	GTS217	Feb. 30 2014	Feb. 29 2015
14	Printer	HP	HP LaserJet P1007	N/A	N/A	N/A
15	Positioning Controller	UC	UC3000	CCIS0015	N/A	N/A
16	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP	CCIS0023	May. 25 2013	May. 24 2014
17	EMI Test Receiver	Rohde & Schwarz	ESPI	CCIS0022	Feb 01 2014	Feb. 31 2015
18	Loop antenna	Laplace instrument	RF300	EMC0701	Aug. 12 2013	Aug. 11 2014
19	Universal radio communication tester	Rhode & Schwarz	CMU200	CCIS0069	May. 25 2013	May. 24 2014
20	Signal Analyzer	Rohde & Schwarz	FSIQ3	CCIS0088	May. 25 2013	May. 24 2014

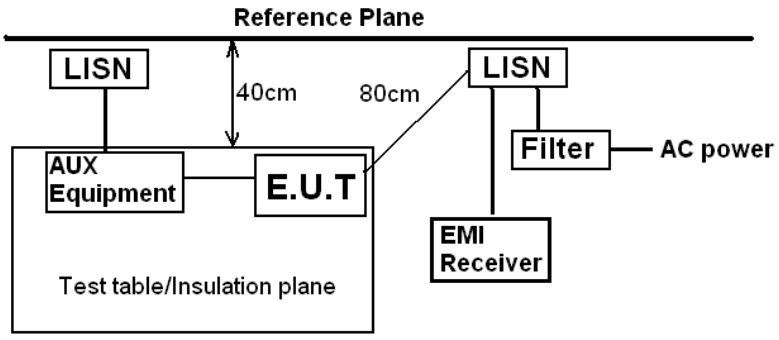
Conducted Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	June 09 2013	June 08 2014
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	May 25 2013	May 24 2014
3	LISN	CHASE	MN2050D	CCIS0074	Feb 01 2014	Feb. 31 2015
4	Coaxial Cable	CCIS	N/A	CCIS0086	Feb. 01 2014	Feb. 31 2015
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

6.1 Antenna requirement:

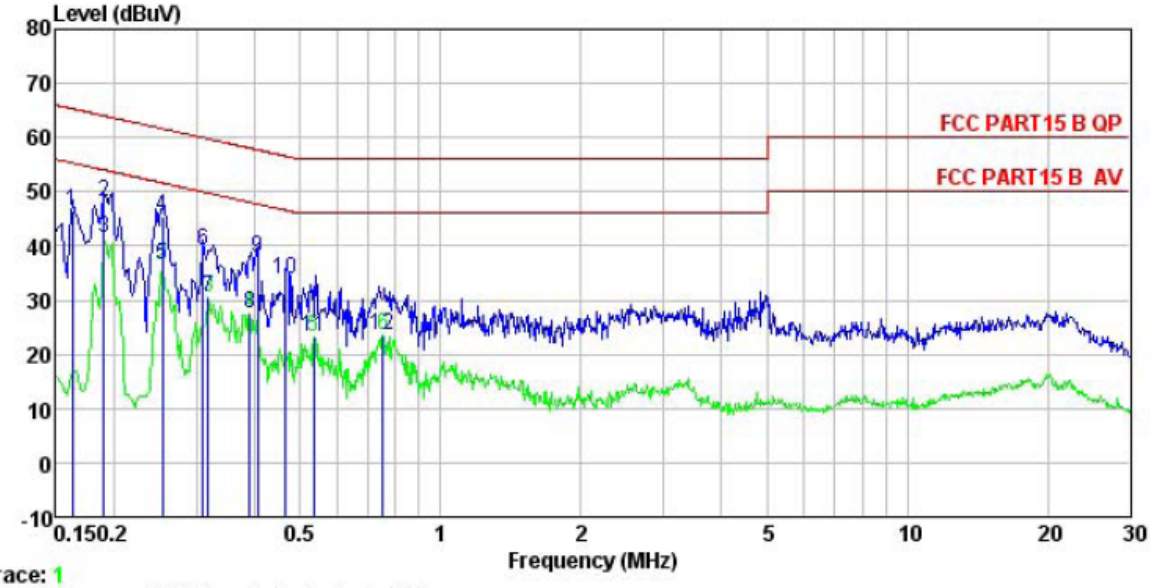
Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: *An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.* *15.247(c) (1)(i) requirement:* *(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.*	
E.U.T Antenna:	
The antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 0 dBi.	
BT ANT 	

6.2 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.4: 2003
Test Frequency Range:	150 kHz to 30 MHz
Class / Severity:	Class B
Receiver setup:	RBW=9kHz, VBW=30kHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test procedure	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Neutral:

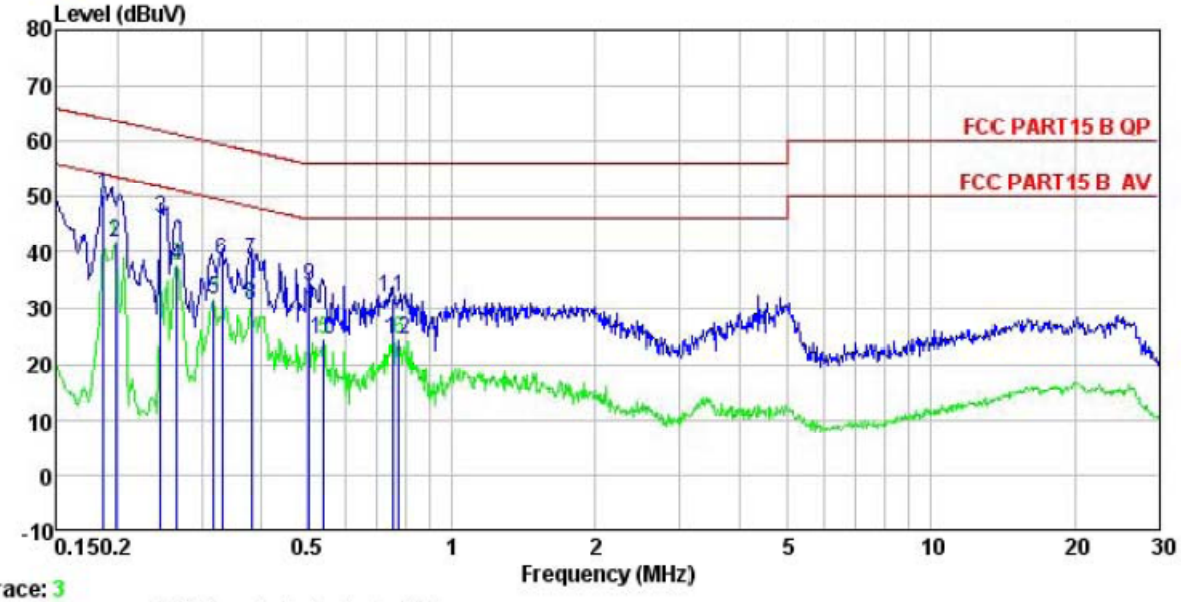


Trace: 1

Site : CCIS Conducted test Site
Condition : FCC PART15 B QP LISN NEUTRAL
EUT : Bluetooth Speaker
Test Mode : Charging & BLE mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 'C Huni:56% Atmos:101KPa
Test Engineer: Garen
Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	35.26	10.26	0.78	46.30	65.34	-19.04	QP
2	0.190	37.03	10.24	0.77	48.04	64.02	-15.98	QP
3	0.190	30.59	10.24	0.77	41.60	54.02	-12.42	Average
4	0.253	34.53	10.24	0.75	45.52	61.64	-16.12	QP
5	0.253	25.56	10.24	0.75	36.55	51.64	-15.09	Average
6	0.310	28.08	10.24	0.74	39.06	59.97	-20.91	QP
7	0.318	19.54	10.24	0.74	30.52	49.75	-19.23	Average
8	0.389	16.51	10.26	0.72	27.49	48.08	-20.59	Average
9	0.406	26.84	10.26	0.72	37.82	57.73	-19.91	QP
10	0.466	22.79	10.27	0.75	33.81	56.58	-22.77	QP
11	0.535	12.05	10.25	0.76	23.06	46.00	-22.94	Average
12	0.751	12.70	10.17	0.79	23.66	46.00	-22.34	Average

Line:



Trace: 3

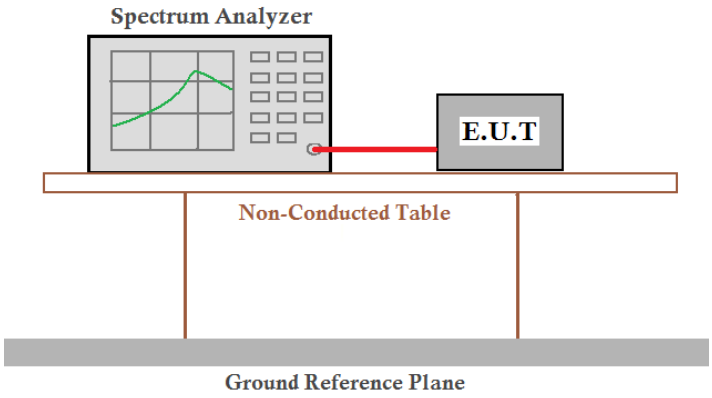
```
Site          : CCIS Conducted test Site
Condition     : FCC PART15 B QP LISN LINE
EUT           : Bluetooth Speaker
Test Mode     : Charging & BLE mode
Power Rating  : AC 120V/60Hz
Environment   : Temp: 23 'C Huni:56%  Atmos:101KPa
Test Engineer: Garen
Remark        :
```

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.186	39.59	10.22	0.77	50.58	64.20	-13.62	QP
2	0.198	30.98	10.21	0.76	41.95	53.71	-11.76	Average
3	0.246	35.30	10.24	0.75	46.29	61.91	-15.62	QP
4	0.266	26.61	10.24	0.75	37.60	51.25	-13.65	Average
5	0.318	20.37	10.26	0.74	31.37	49.75	-18.38	Average
6	0.330	27.39	10.27	0.73	38.39	59.44	-21.05	QP
7	0.381	27.42	10.28	0.72	38.42	58.25	-19.83	QP
8	0.381	19.39	10.28	0.72	30.39	48.25	-17.86	Average
9	0.505	22.73	10.27	0.76	33.76	56.00	-22.24	QP
10	0.541	13.24	10.25	0.76	24.25	46.00	-21.75	Average
11	0.751	20.94	10.19	0.79	31.92	56.00	-24.08	QP
12	0.771	13.30	10.19	0.80	24.29	46.00	-21.71	Average

Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

6.3 Conducted Output Power

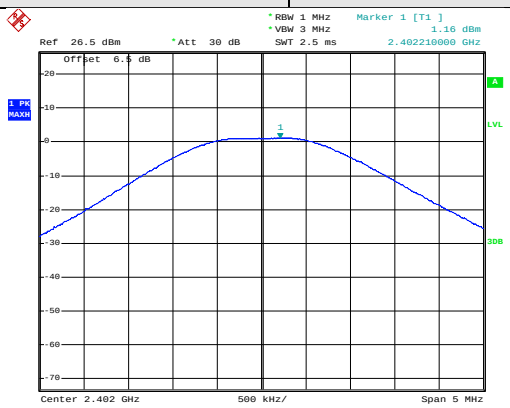
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003 and KDB558074
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	Test method refer to KDB558074 v03r01 (DTS Measure Guidance) section 9.2.2.2

Measurement Data

Test CH	Maximum Conducted Output Power (dBm)	Limit(dBm)	Result
Lowest	1.16	30.00	Pass
Middle	2.84		
Highest	3.92		

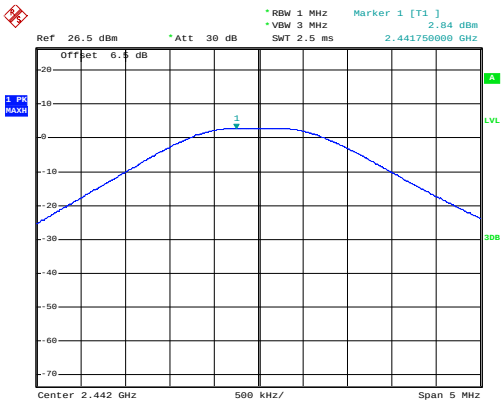
Test plot as follows:

Test mode:	GFSK



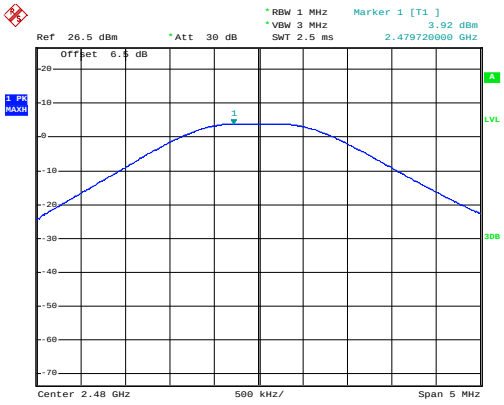
Date: 27.MAR.2014 21:38:21

Lowest channel



Date: 27.MAR.2014 21:37:55

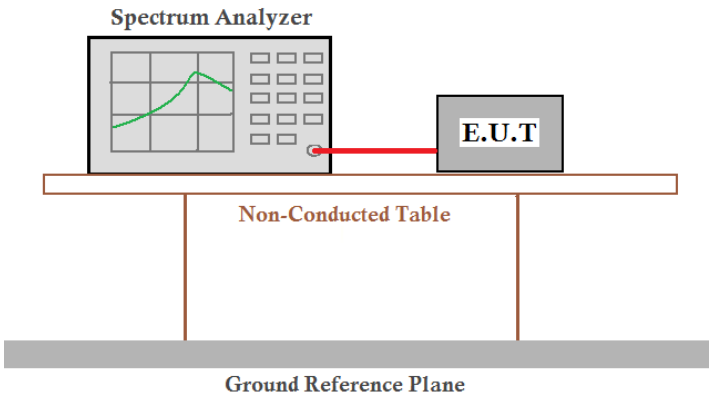
Middle channel



Date: 27.MAR.2014 21:37:11

Highest channel

6.4 Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.4:2003 and KDB558074
Limit:	>500kHz
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

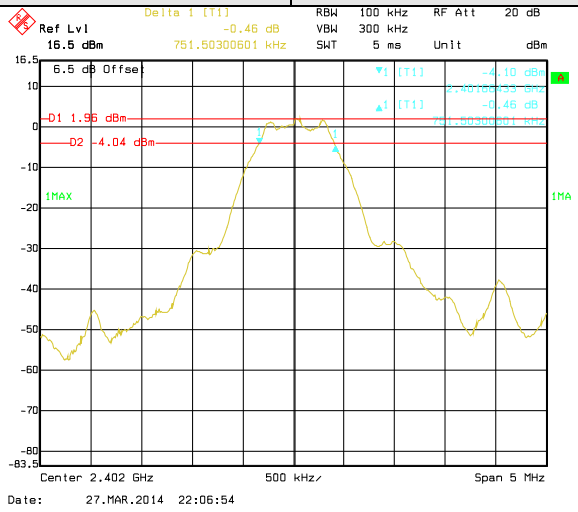
Measurement Data

Test CH	6dB Emission Bandwidth (MHz)	Limit(kHz)	Result
Lowest	0.75	>500	Pass
Middle	0.77		
Highest	0.77		

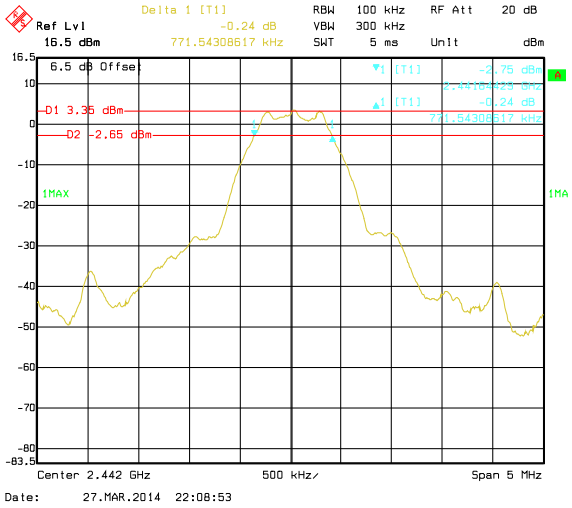
Test CH	99% Occupy Bandwidth (MHz)	Limit(kHz)	Result
Lowest	1.06	N/A	N/A
Middle	1.06		
Highest	1.06		

Test plot as follows:

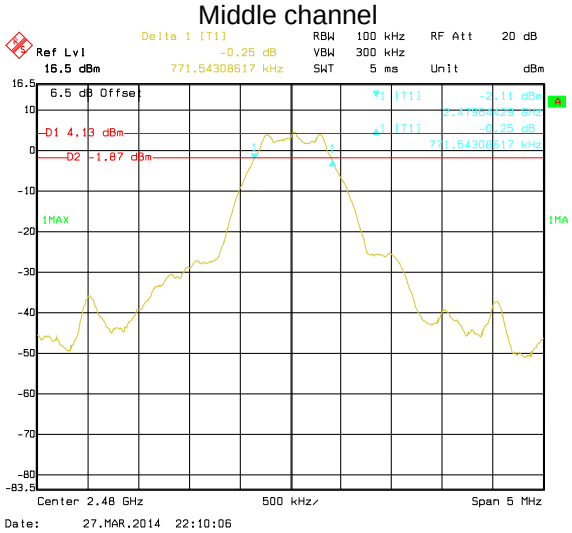
Test mode:6dB EBW	GFSK



Lowest channel

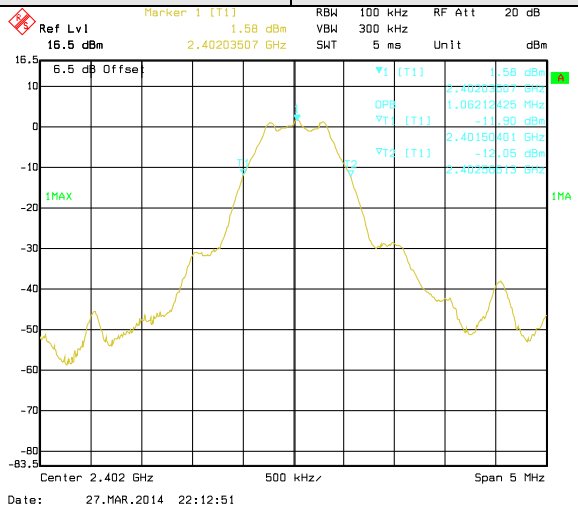


Middle channel

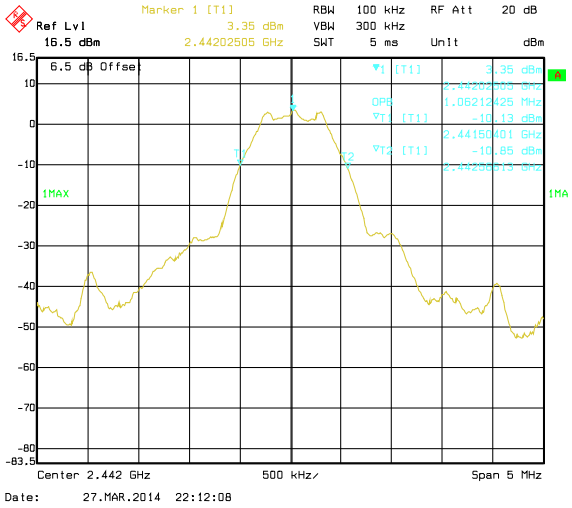


Highest channel

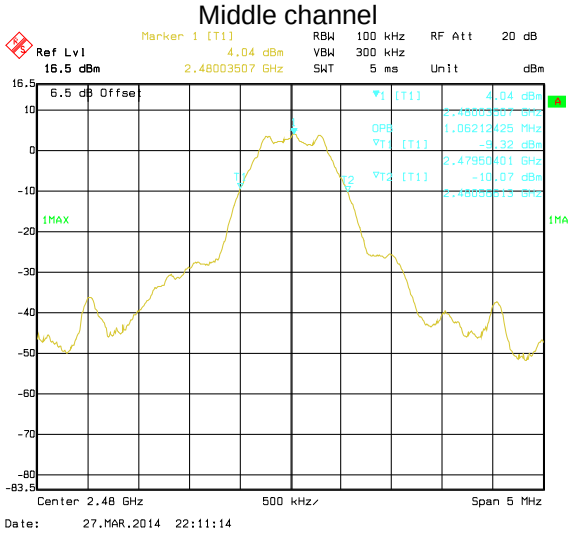
Test mode:99% OBW	GFSK



Lowest channel

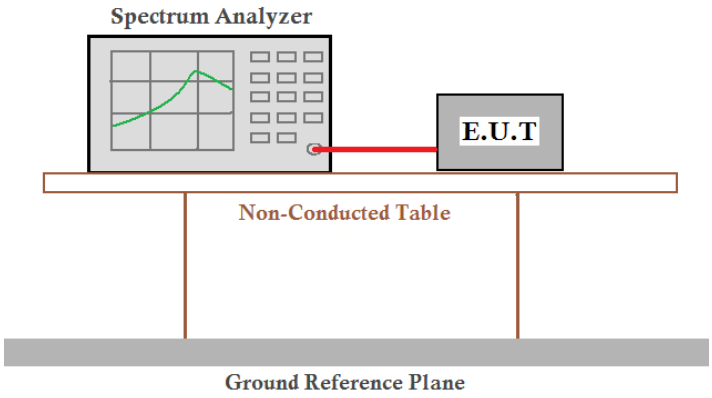


Middle channel



Highest channel

6.5 Power Spectral Density

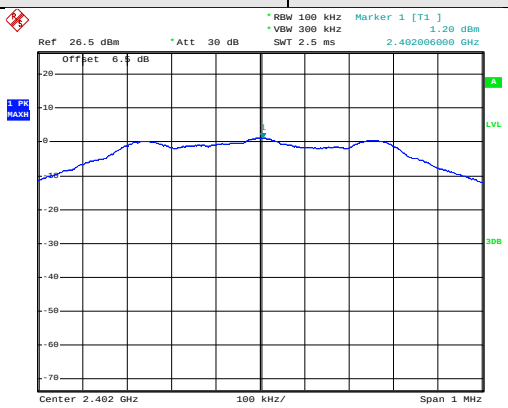
Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.4:2003 and KDB558074
Limit:	8 dBm
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Test CH	Power Spectral Density (dBm)	Limit(dBm)	Result
Lowest	1.20	8.00	Pass
Middle	2.88		
Highest	3.34		

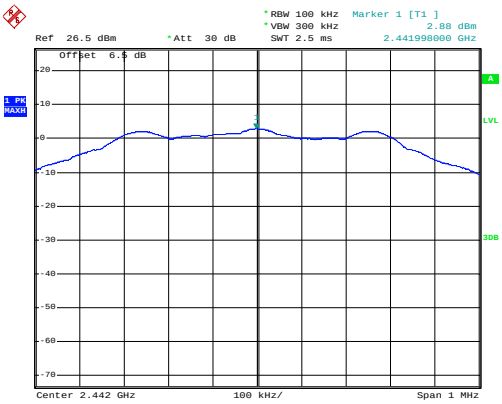
Test plots as follow:

Test mode:	



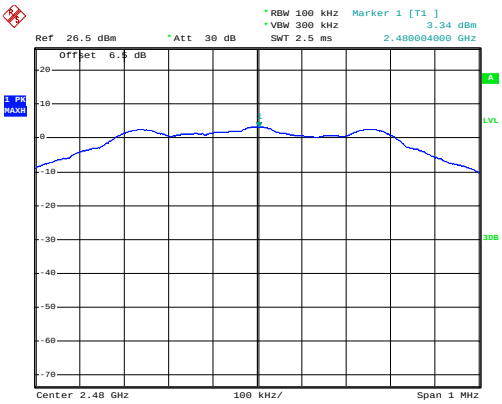
Date: 27.MAR.2014 21:39:32

Lowest channel



Date: 27.MAR.2014 21:40:11

Middle channel

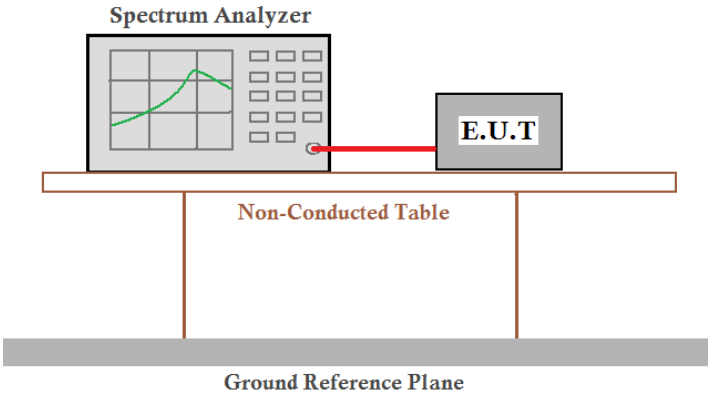


Date: 27.MAR.2014 21:40:55

Highest channel

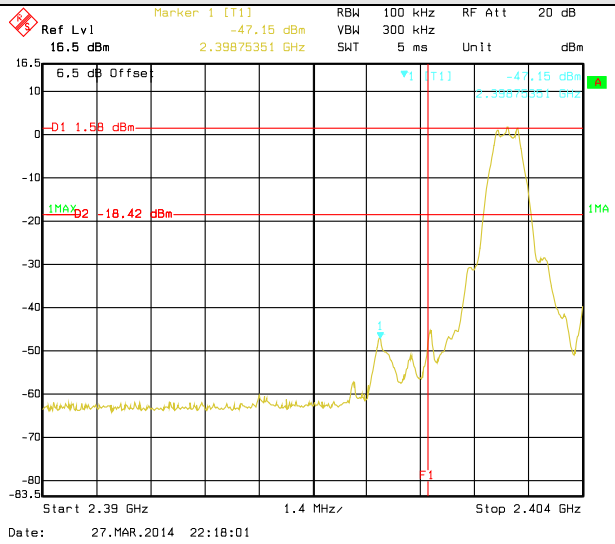
6.6 Band Edge

6.6.1 Conducted Emission Method

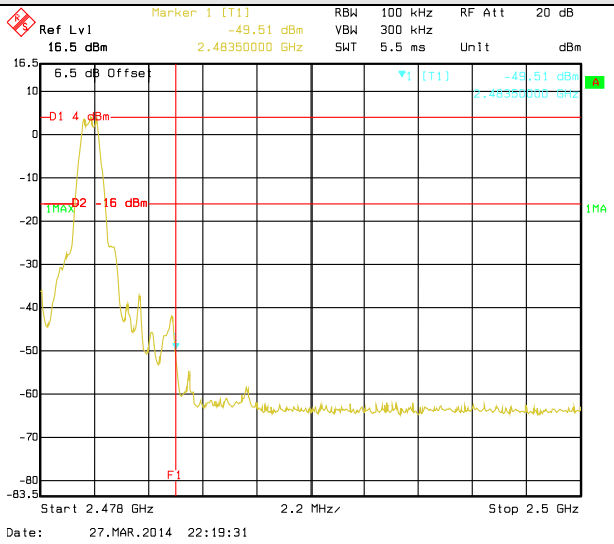
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plots as follow:

Test mode:	

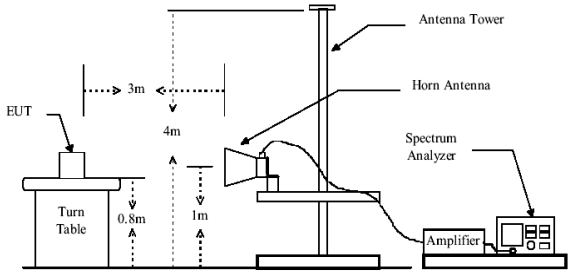


Lowest channel



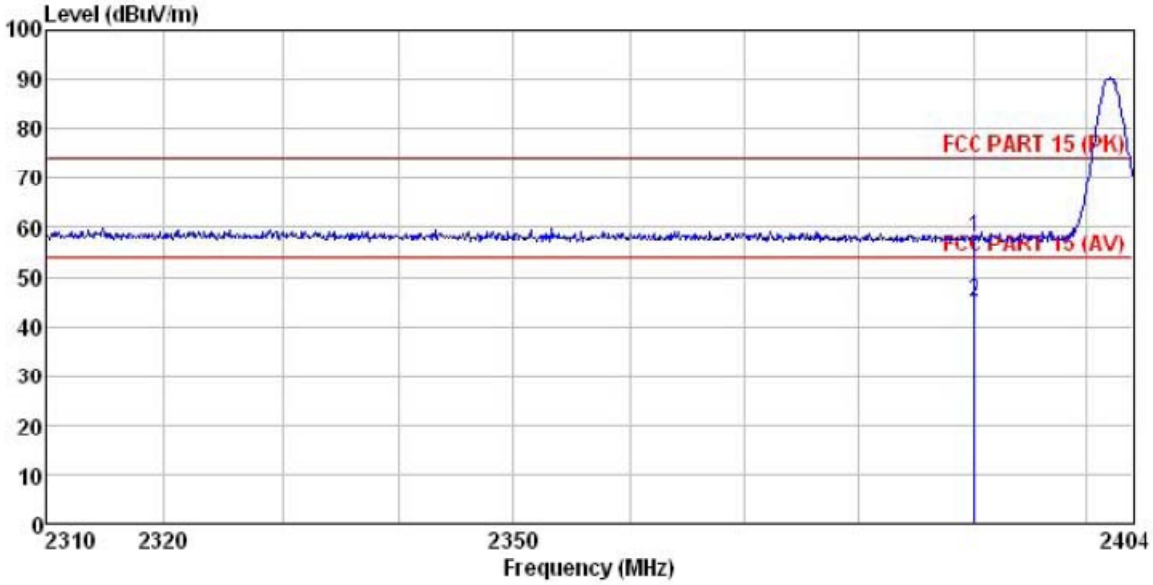
Highest channel

6.6.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2003</td></tr>
<tr><td>Test Frequency Range:</td><td>2.3GHz to 2.5GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.00</td><td>Average Value</td></tr>
<tr><td>74.00</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.7 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td>Passed</td></tr>
</table>

Test channel: Lowest

Horizontal:

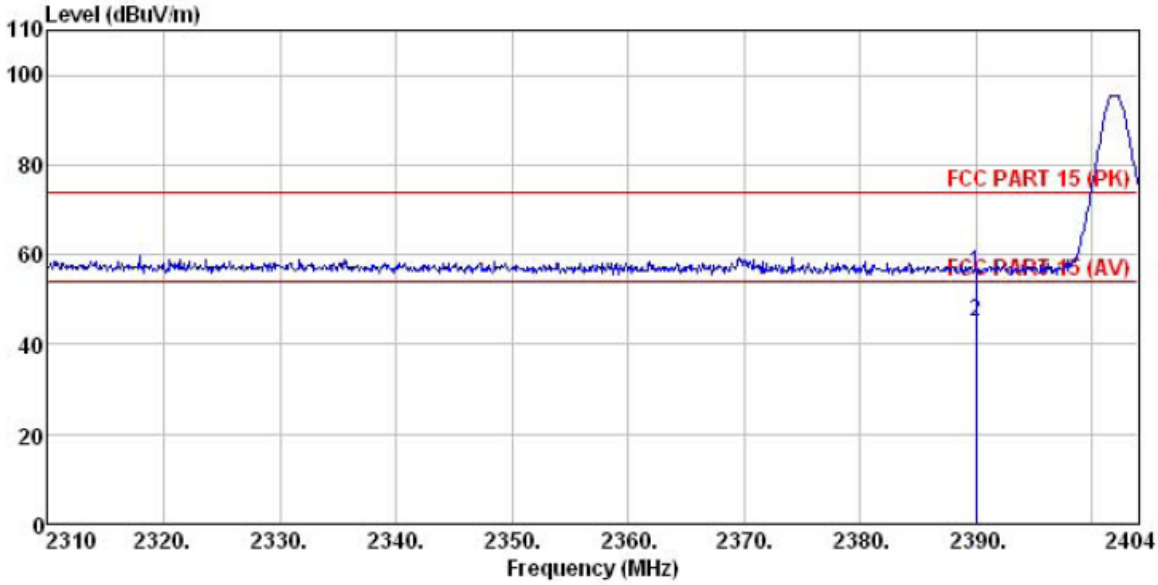


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
EUT : Bluetooth Speaker
Test mode : BT mode BLE-L
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	24.72	27.58	5.67	0.00	57.97	74.00	-16.03	Peak
2	2390.000	11.79	27.58	5.67	0.00	45.04	54.00	-8.96	Average

Test channel: Lowest

Vertical:

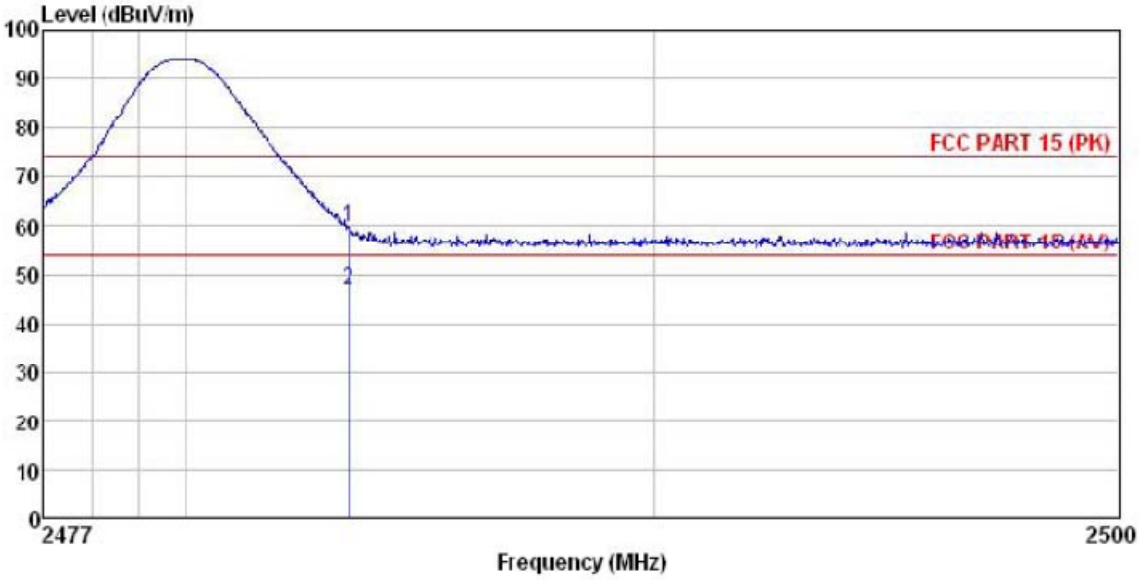


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : Bluetooth Speaker
Test mode : BT mode BLE-L
Power Rating : AC120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	22.73	27.58	5.67	0.00	55.98	74.00	-18.02	Peak
2	2390.000	11.74	27.58	5.67	0.00	44.99	54.00	-9.01	Average

Test channel: Highest

Horizontal:

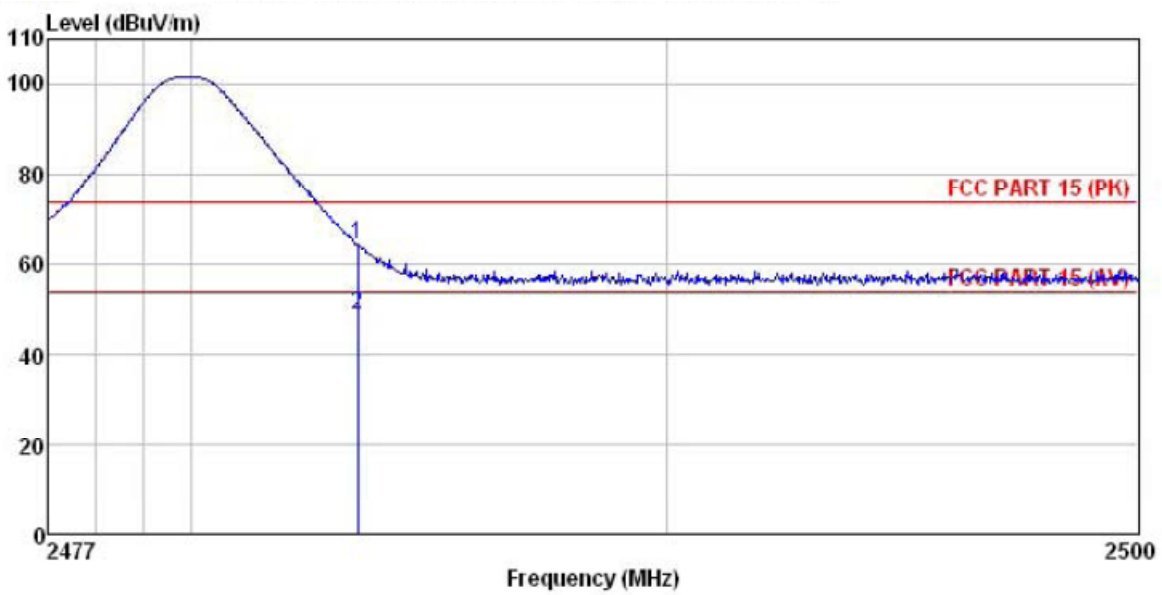


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
EUT : Bluetooth Speaker
Test mode : BT mode BLE-H
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	26.71	27.52	5.70	0.00	59.93	74.00	-14.07	Peak
2	2483.500	13.68	27.52	5.70	0.00	46.90	54.00	-7.10	Average

Test channel: Highest

Vertical:

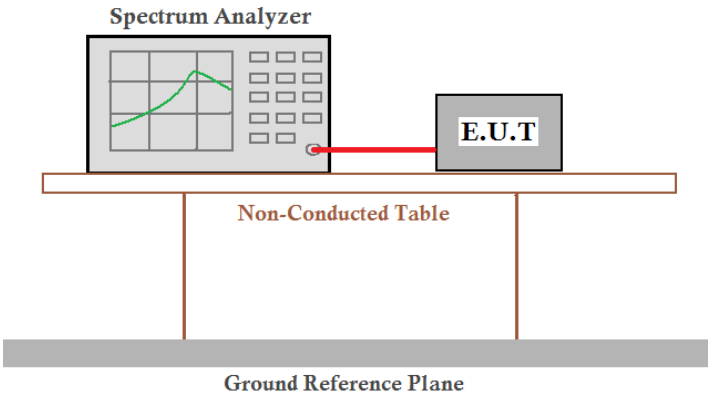


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : Bluetooth Speaker
Test mode : BT mode BLE-H
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	31.16	27.52	5.70	0.00	64.38	74.00	-9.62	Peak
2	2483.500	16.09	27.52	5.70	0.00	49.31	54.00	-4.69	Average

6.7 Spurious Emission

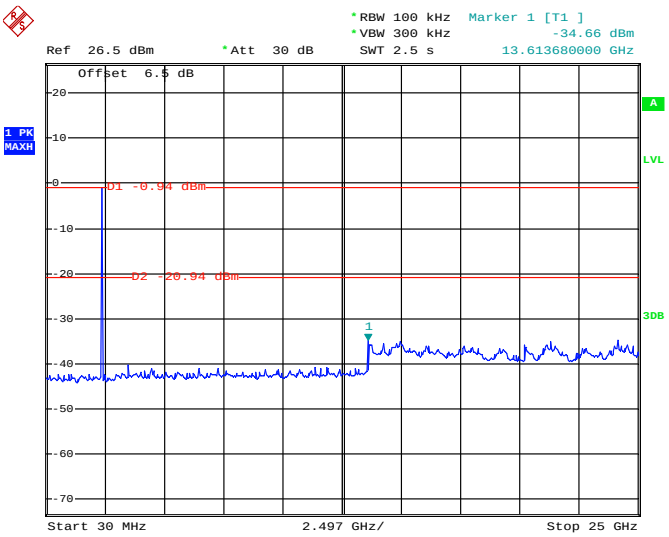
6.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:

Test mode:	

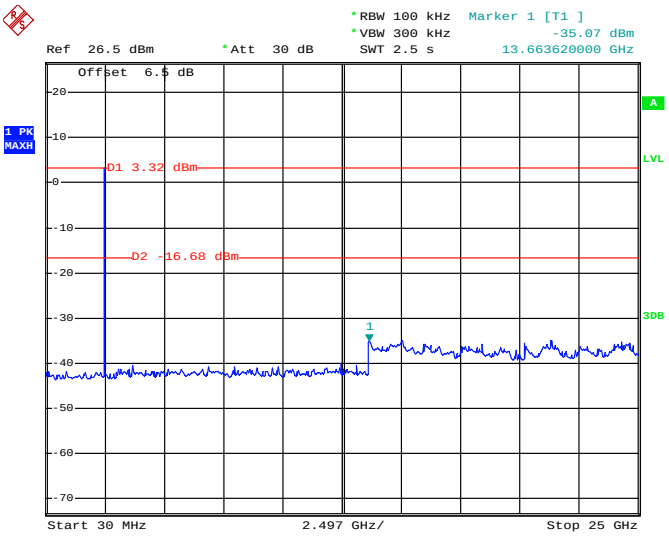
Lowest channel



Date: 27.MAR.2014 21:53:39

30MHz~25GHz

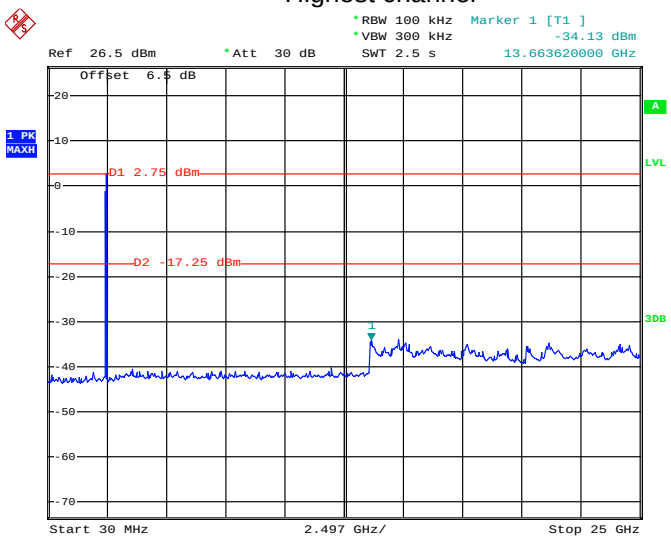
Middle channel



Date: 27.MAR.2014 21:49:23

30MHz~25GHz

Highest channel

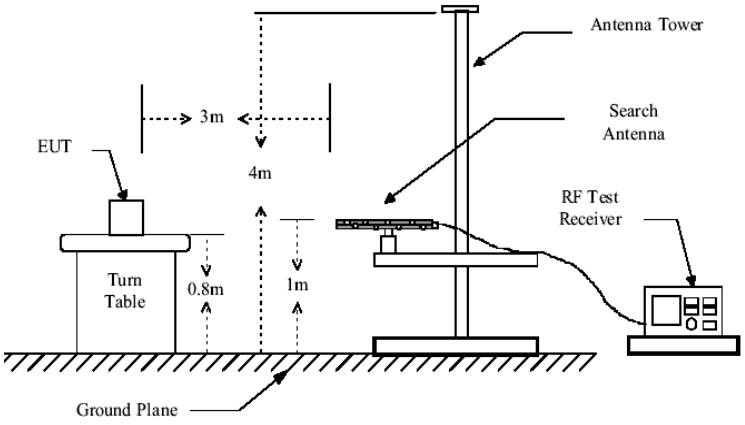
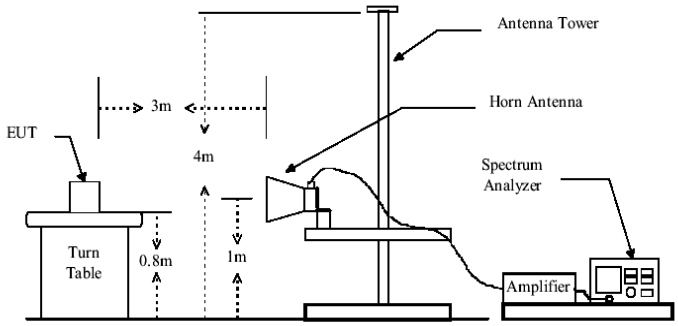


Date: 27.MAR.2014 21:52:18

30MHz~25GHz

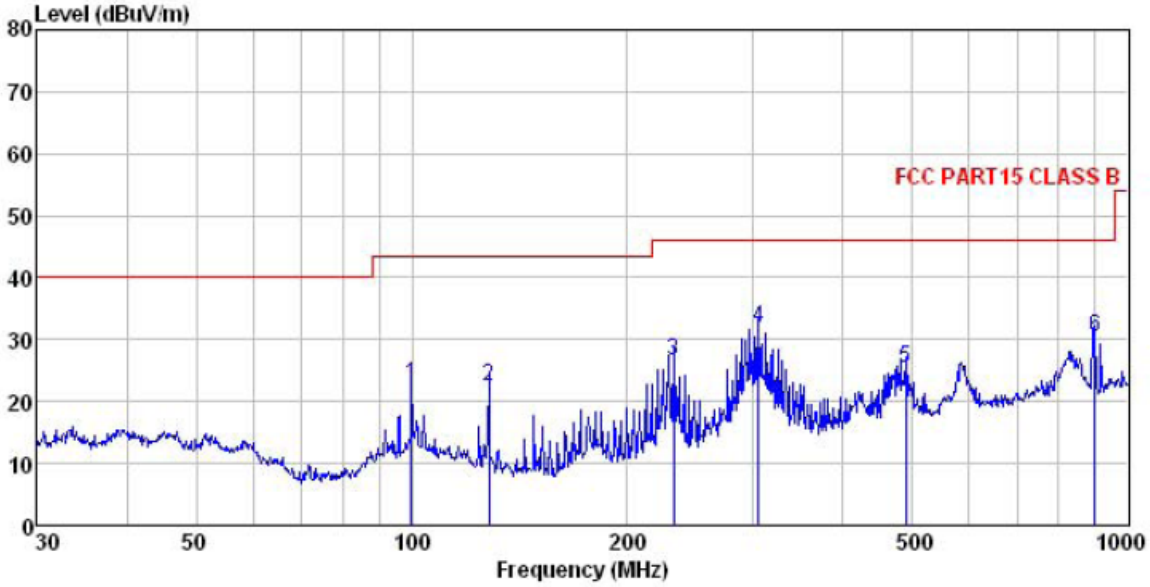
6.7.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2003</td></tr>
<tr><td>Test Frequency Range:</td><td>9KHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>
1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
</td></tr>
</table>

Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report. 3. No emission found from 12.75GHz to 25GHz.

Below 1GHz

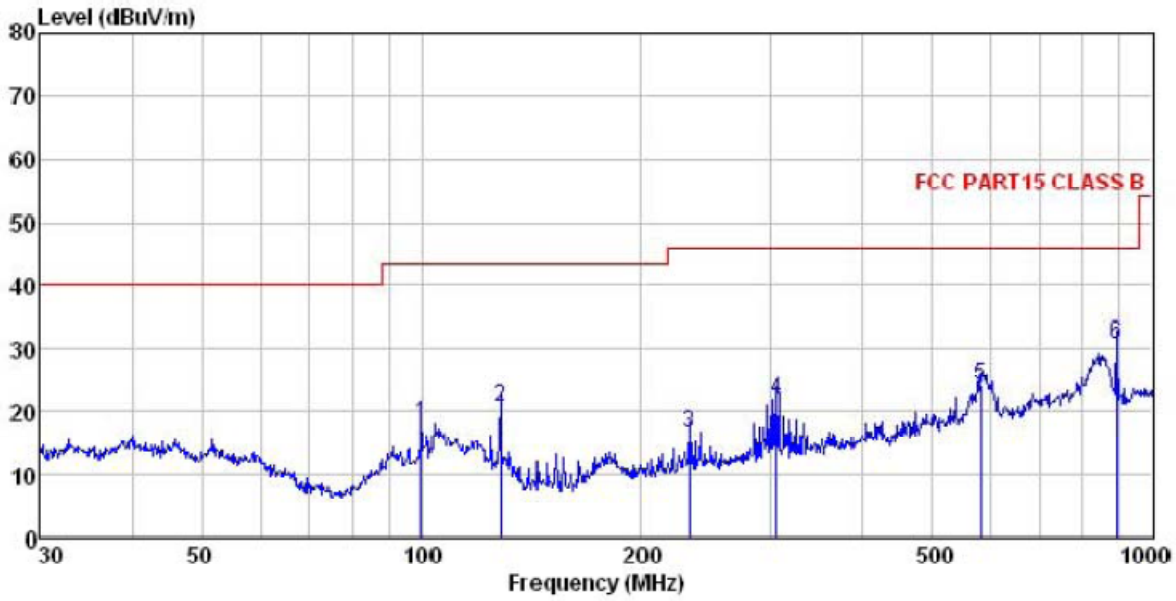
Horizontal:



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
EUT : Bluetooth Speaker
Test mode : BLE mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	99.878	37.69	13.16	1.94	30.09	22.70	43.50	-20.80	QP
2	128.113	40.41	9.22	2.26	29.56	22.33	43.50	-21.17	QP
3	231.718	41.83	11.72	2.83	29.67	26.71	46.00	-19.29	QP
4	304.610	45.16	13.13	2.95	29.45	31.79	46.00	-14.21	QP
5	489.027	35.90	16.33	3.53	30.52	25.24	46.00	-20.76	QP
6	900.147	35.65	21.09	3.71	30.14	30.31	46.00	-15.69	QP

Vertical:



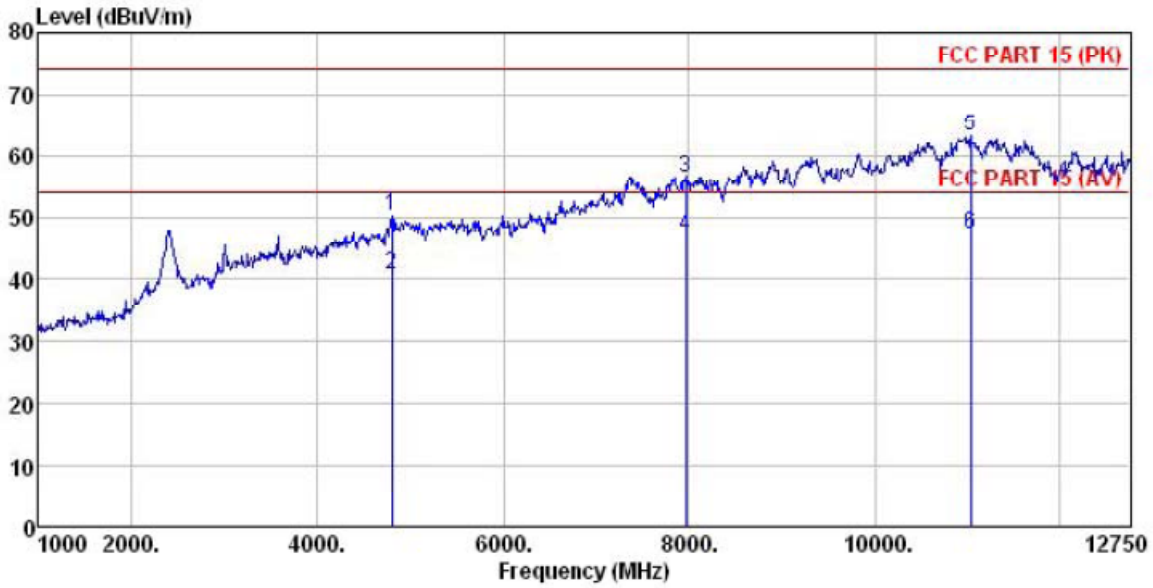
Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
EUT : Bluetooth Speaker
Test mode : BLE mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Garen

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	99.878	32.92	13.16	1.94	30.09	17.93	43.50	-25.57	QP
2	128.113	38.68	9.22	2.26	29.56	20.60	43.50	-22.90	QP
3	231.718	31.50	11.72	2.83	29.67	16.38	46.00	-29.62	QP
4	304.610	35.28	13.13	2.95	29.45	21.91	46.00	-24.09	QP
5	580.703	32.84	18.14	3.92	30.55	24.35	46.00	-21.65	QP
6	890.728	36.16	21.00	3.80	30.17	30.79	46.00	-15.21	QP

Above 1GHz

Test channel: Lowest

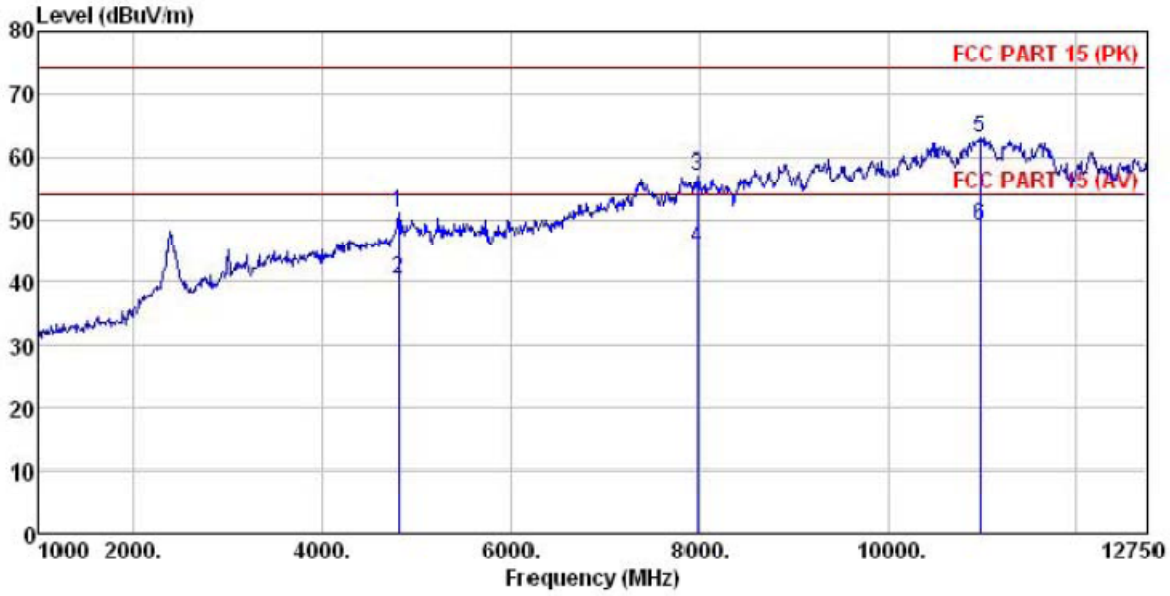
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
EUT : Bluetooth Speaker
Test mode : BLE mode L
Power Rating : AC120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Garen

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4807.000	50.02	31.53	8.90	40.24	50.21	74.00	-23.79	Peak
2	4807.000	40.65	31.53	8.90	40.24	40.84	54.00	-13.16	Average
3	7967.750	49.26	37.17	11.01	40.99	56.45	74.00	-17.55	Peak
4	7967.750	39.63	37.17	11.01	40.99	46.82	54.00	-7.18	Average
5	11046.250	49.52	40.19	13.60	40.18	63.13	74.00	-10.87	Peak
6	11046.250	33.60	40.19	13.60	40.18	47.21	54.00	-6.79	Average

Vertical:

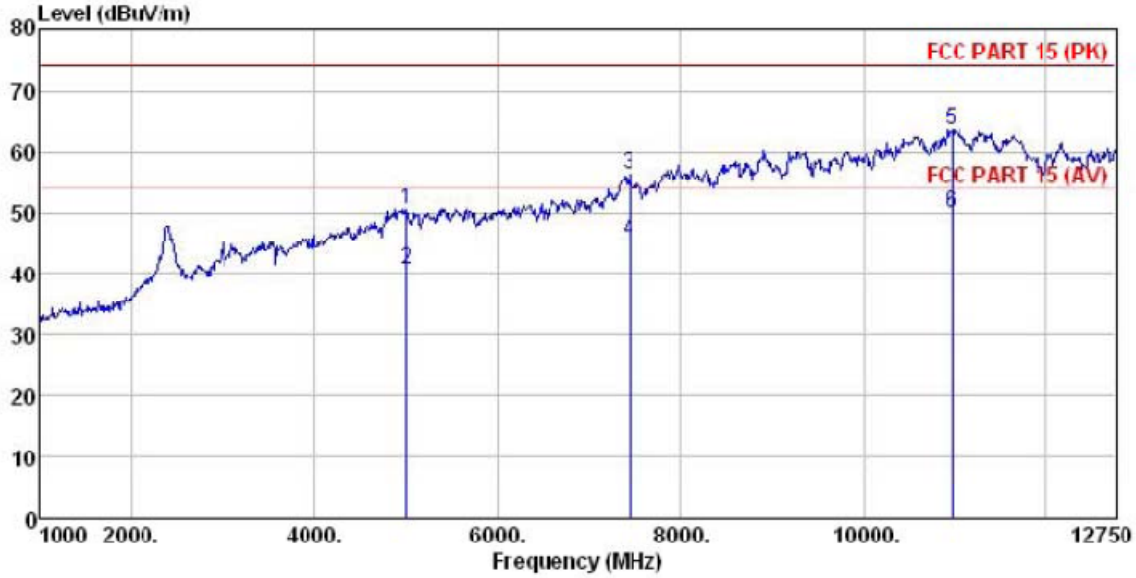


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : Bluetooth Speaker
Test mode : BLE mode L
Power Rating : AC120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4807.000	50.73	31.53	8.90	40.24	50.92	74.00	-23.08	Peak
2	4807.000	40.26	31.53	8.90	40.24	40.45	54.00	-13.55	Average
3	7967.750	49.75	37.17	11.01	40.99	56.94	74.00	-17.06	Peak
4	7967.750	38.25	37.17	11.01	40.99	45.44	54.00	-8.56	Average
5	10987.500	49.12	40.28	13.58	40.12	62.86	74.00	-11.14	Peak
6	10987.500	35.26	40.28	13.58	40.12	49.00	54.00	-5.00	Average

Test channel: Middle

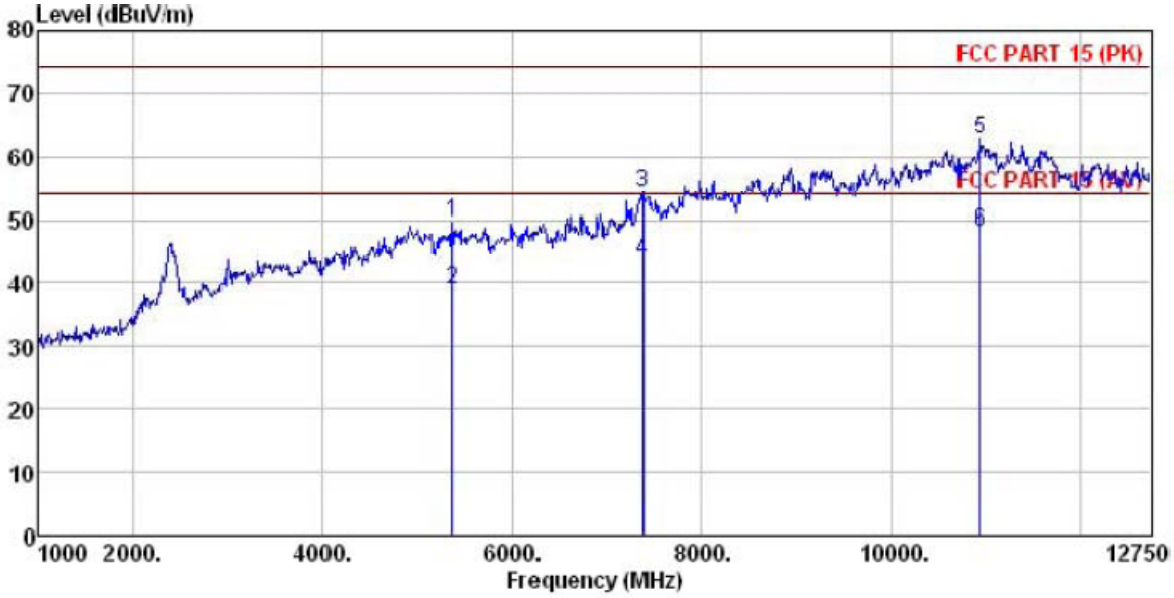
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m EBHA9120(1G18) HORIZONTAL
EUT : Bluetooth Speaker
Test mode : BLE mode M
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	5006.750	49.56	31.85	9.12	39.99	50.54	74.00	-23.46	Peak
2	5006.750	39.66	31.85	9.12	39.99	40.64	54.00	-13.36	Average
3	7439.000	50.01	36.60	10.80	41.05	56.36	74.00	-17.64	Peak
4	7439.000	39.21	36.60	10.80	41.05	45.56	54.00	-8.44	Average
5	10964.000	49.88	40.31	13.60	40.18	63.61	74.00	-10.39	Peak
6	10964.000	36.26	40.31	13.60	40.18	49.99	54.00	-4.01	Average

Vertical:

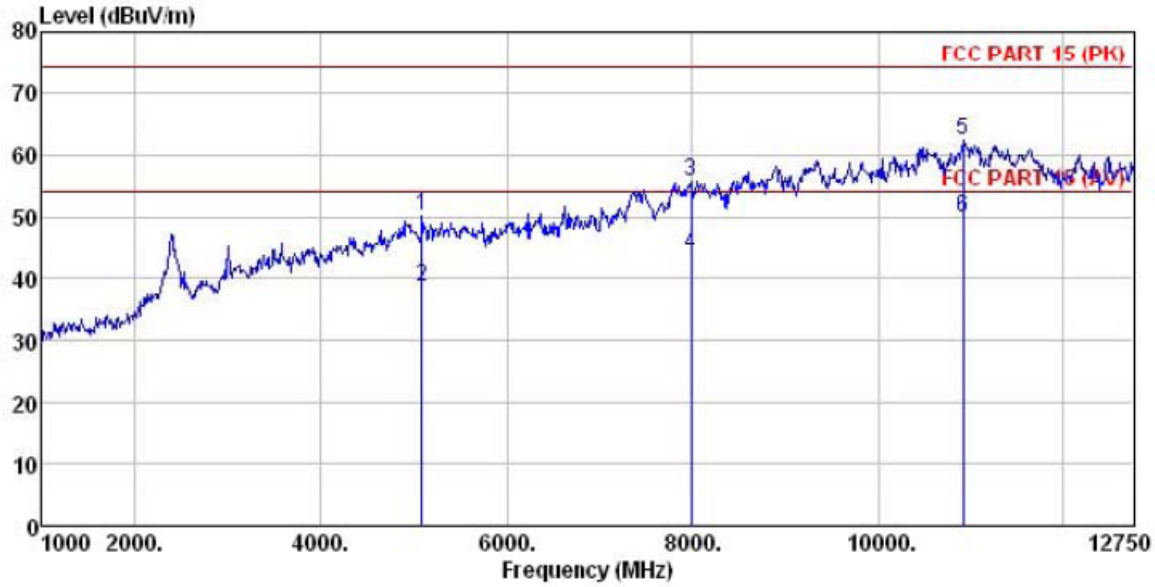


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : Bluetooth Speaker
Test mode : BLE mode M
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	5359.250	48.80	31.81	9.15	40.18	49.58	74.00	-24.42	Peak
2	5359.250	38.32	31.81	9.15	40.18	39.10	54.00	-14.90	Average
3	7380.250	48.15	36.52	10.74	41.11	54.30	74.00	-19.70	Peak
4	7380.250	37.56	36.52	10.74	41.11	43.71	54.00	-10.29	Average
5	10940.500	49.21	40.33	13.61	40.22	62.93	74.00	-11.07	Peak
6	10940.500	34.27	40.33	13.61	40.22	47.99	54.00	-6.01	Average

Test channel: Highest

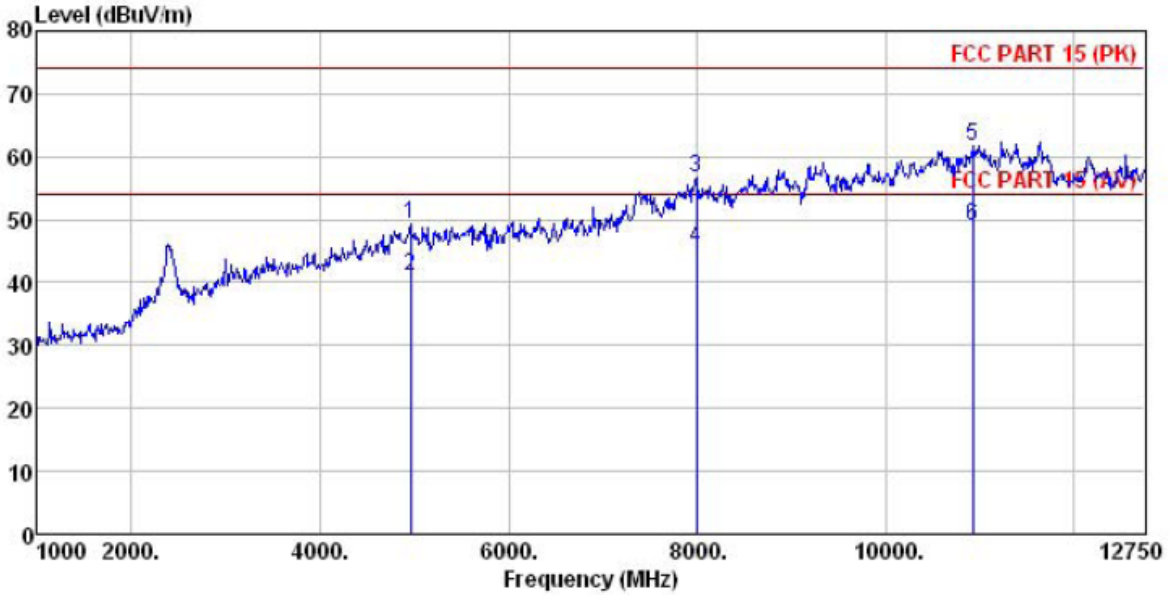
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
EUT : Bluetooth Speaker
Test mode : BLE mode H
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	5089.000	48.98	32.06	9.13	40.04	50.13	74.00	-23.87	Peak
2	5089.000	37.56	32.06	9.13	40.04	38.71	54.00	-15.29	Average
3	7991.250	48.62	37.20	11.01	40.99	55.84	74.00	-18.16	Peak
4	7991.250	36.86	37.20	11.01	40.99	44.08	54.00	-9.92	Average
5	10928.750	48.53	40.31	13.63	40.25	62.22	74.00	-11.78	Peak
6	10928.750	36.25	40.31	13.63	40.25	49.94	54.00	-4.06	Average

Vertical:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : Bluetooth Speaker
Test mode : BLE mode H
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Garen

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4959.750	48.43	31.69	9.08	40.03	49.17	74.00	-24.83	Peak
2	4959.750	40.43	31.69	9.08	40.03	41.17	54.00	-12.83	Average
3	7991.250	49.39	37.20	11.01	40.99	56.61	74.00	-17.39	Peak
4	7991.250	38.27	37.20	11.01	40.99	45.49	54.00	-8.51	Average
5	10928.750	48.07	40.31	13.63	40.25	61.76	74.00	-12.24	Peak
6	10928.750	35.25	40.31	13.63	40.25	48.94	54.00	-5.06	Average