FCC Report

Application Purpose	:	Original grant
Applicant Name:	:	SHENZHEN DIVOOM TECHNOLOGY CO., LTD.
FCC ID	:	A8IVOOMBOX-PARTY
Equipment Type	:	Bluetooth speaker
Model Name	:	Voombox-party
Report Number	:	FCC15019859-1
Standard(S)	:	FCC Part 15 Subpart C
Date Of Receipt	:	March 01, 2015
Date Of Issue	:	March 09, 2015

Test By :

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	March 09, 2015	Valid	Original Report

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1. GENERAL INFORMATION

GENERAL DESCRIPTION OF EUT

Test Model	Voombox-party
Derivative Model Name	N/A
Model difference	N/A
Applicant	SHENZHEN DIVOOM TECHNOLOGY CO., LTD.
Address	A3, 2nd Floor, Block A, Zhengxing Building, No. 33 Taizi Road, Shekou, Nanshan District, Shenzhen, Guangdong, China
Manufacturer	SHENZHEN DIVOOM TECHNOLOGY CO., LTD.
Address	A3, 2nd Floor, Block A, Zhengxing Building, No. 33 Taizi Road, Shekou, Nanshan District, Shenzhen, Guangdong, China
Equipment Type	Bluetooth speaker
Brand Name	**DIVOOM**
Hardware version:	F4 1.6T
Software version:	V1.0
Extreme Temp. Tolerance	-10℃ to +50℃
Operating Voltage	DC 3.7V by lithium battery Battery Capacity: 4200mA Battery Voltage: 3.7V Battery Charge Time: 3-4 hours Charge: Via usb cable, 5V-1A
Operating Frequency	2402-2480MHz
Channels	79
Channel Spacing	1MHz
Modulation Type	GFSK, π/4-DQPSK, 8-DPSK
Version	3.0
Antenna Type:	Integral Antenna
Antenna gain:	1.0dBi
Data of receipt	March 01, 2015
Date of test	March 01, 2015 to March 09, 2015
Deviation	None
Condition of Test Sample	Normal

We hereby certify that:

The above equipment was tested by

Building A, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China

The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2009. The sample tested as described in this report is in compliance with the FCC Rules Part15 Subpart C.

The test results of this report relate only to the tested sample identified in this report.

2. TEST DESCRIPTION

2.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±3.2dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(<1G)	±4.7dB
5	All emissions, radiated(>1G)	±4.7dB
6	Temperature	±0.5°C
7	Humidity	±2%

2.2 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	CH00
Mode 2	CH39
Mode 3	CH78
Mode 4	Normal Hopping

For Conducted Emission	
Final Test Mode	Description
Mode 4	Normal Hopping

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2)The data rate was set in 1Mbps, 2 Mbps, 3 Mbps for radiated emission due to the highest RF output power.

(3) Record the worst case of each test item in this report.

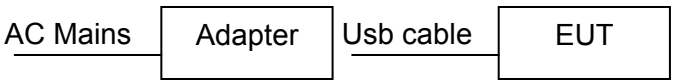
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	4.0		
Test program	Blue test		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	DEF	DEF	DEF
Parameters(2Mbps)	DEF	DEF	DEF
Parameters(3Mbps)	DEF	DEF	DEF

2.4 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted Emission (1)



For Radiated Emission (2)

(EUT: Bluetooth speaker)

2.5 PERIPHERALS EQUIPMENT LIST

Item	Equipment	Model No.	ID or Specification	Remark
1	Usb cable	N/A	N/A	0.6m, Unshielded, Without Core

2.7 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE)

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.	Series No.	Note
1	Adapter	TECNO	A88-501000	N/A	Input: AC100-240V 50/60HZ Output: DC5V 1A

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.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.
(4) The adapter supply by the laboratory.

3. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)” N/A” denotes test is not applicable in this test report.

4. MEASUREMENT INSTRUMENTS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibrated	Calibrated until
ESPI Test Receiver	R&S	ESPI	100379	2014-08-19	2015-08-18
EMI Test Receiver	R&S	ESCI	100005	2014-08-19	2015-08-18
LISN	Mestec	AN3016	04/10040	2014-08-19	2015-08-18
Coaxial cable	Megalon	LMR400	C001	2014-08-19	2015-08-18
System Controller	CT	SC100	011208	2014-08-19	2015-08-18
Bi-log Antenna	Chase	CBL6111C	2576	2014-08-19	2015-08-18
Spectrum analyzer	R&S	FSU26	200409	2014-08-19	2015-08-18
Horn Antenna	SCHWARZBECK	9120D	1141	2014-08-19	2015-08-18
Loop Antenna	EMCO	6502	00042960	2014-08-22	2015-08-21
Pre Amplifier	H.P.	HP8447E	2945A02715	2014-10-13	2015-10-12
Pre-Amplifier	CDSI	PAP-1G18-38	7621	2014-10-13	2015-10-12
8*4*3 Anechoic	SAEMC	L×W×H 8×4×3	A001	2014-08-21	2015-08-20
9*6*6 Anechoic	SAEMC	L×W×H 9×6×6	A002	2014-08-21	2015-08-20
Power meter	Anritsu	ML2487A	6K00003613	2014-08-23	2015-08-22
MXA Signal Analyzer	Aglient	N9020A	54123254	2014-08-19	2015-08-18
Power sensor	Anritsu	MX248XD	95327410	2014-08-19	2015-08-18
RF cable	H+S	SUCOFLEX 102	R002	2014-08-19	2015-08-18
Horn Antenna	SCHWARZBECK	BBHA 9170	1123	2014-08-19	2015-08-18
Antenna connector	muRata	MM9329-2700	R003	2014-08-19	2015-08-18

I/O CABLES (Conducted Setup)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	Antenna	1	SMA-SMT	Shielded	0.2m	To Spectrum Analyzer

5. EMC EMISSION TEST

5.1 CONDUCTED EMISSION MEASUREMENT

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

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

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

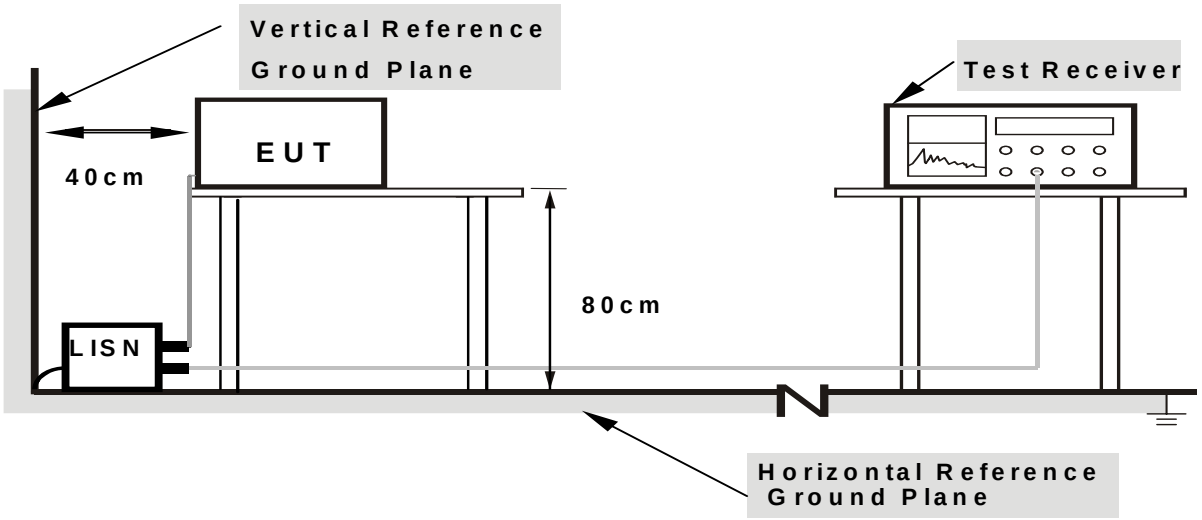
5.1.2 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

5.1.3 DEVIATION FROM TEST STANDARD

No deviation

5.1.4 TEST SETUP



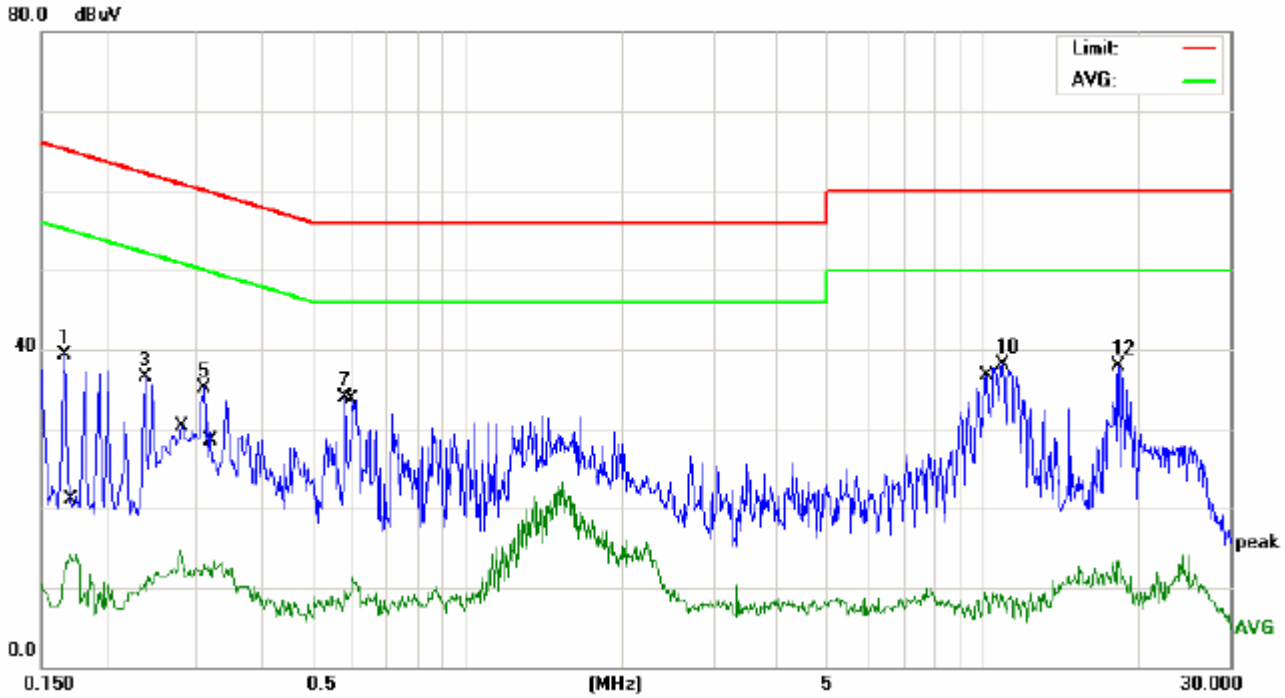
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

5.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

5.1.6 TEST RESULTS

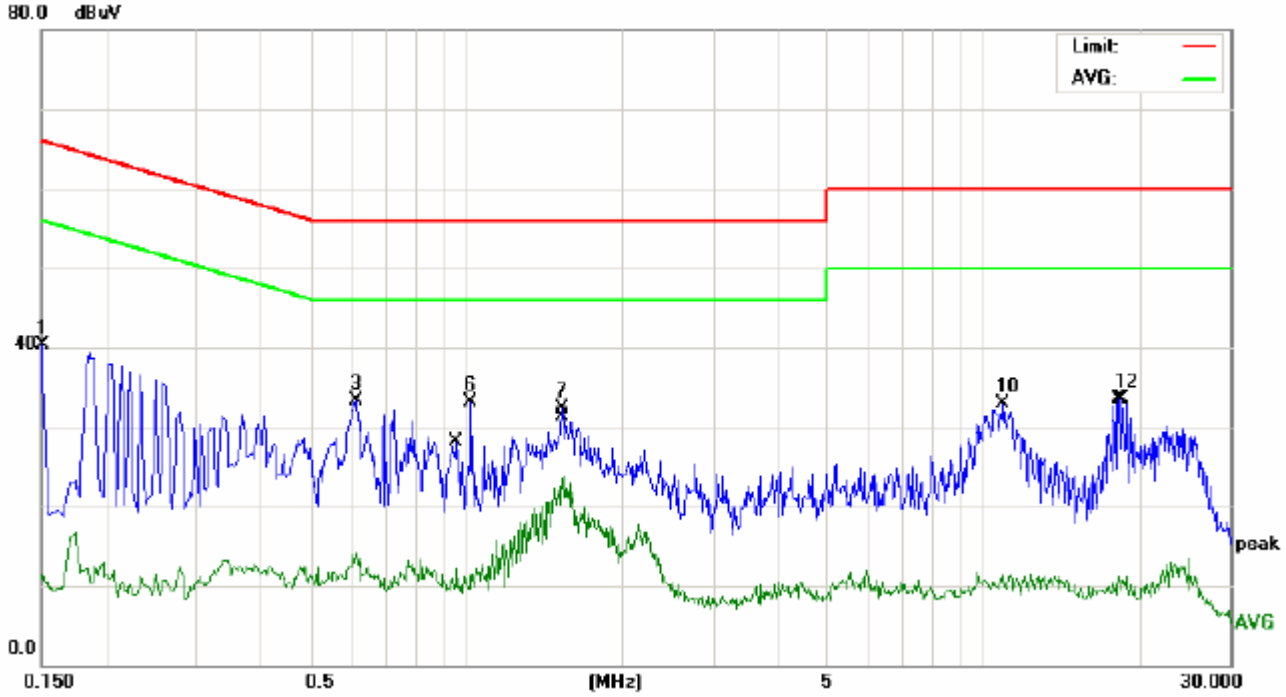
EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	24 ℃	Relative Humidity	54%
Pressure	1010hPa	Phase	L
Test Date	March 09, 2015	Test Mode	Mode 4
Test Voltage	AC120V/60Hz		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1660	28.95	10.40	39.35	65.15	-25.80	peak
2		0.1711	3.88	10.39	14.27	54.90	-40.63	AVG
3		0.2380	26.12	10.43	36.55	62.16	-25.61	peak
4		0.2779	4.06	10.57	14.63	50.88	-36.25	AVG
5		0.3099	24.57	10.63	35.20	59.97	-24.77	peak
6		0.3220	2.76	10.62	13.38	49.65	-36.27	AVG
7		0.5820	23.30	10.65	33.95	56.00	-22.05	peak
8		0.5979	0.79	10.69	11.48	46.00	-34.52	AVG
9		10.1059	-0.87	10.40	9.53	50.00	-40.47	AVG
10	*	10.9138	27.64	10.41	38.05	60.00	-21.95	peak
11		18.2258	2.89	10.48	13.37	50.00	-36.63	AVG
12		18.3217	27.33	10.48	37.81	60.00	-22.19	peak

Remark: All the modes have been investigated, and only worst mode is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	24 ℃	Relative Humidity	54%
Pressure	1010hPa	Phase	N
Test Date	March 09, 2015	Test Mode	Mode 4
Test Voltage	AC120V/60Hz		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1499	29.83	10.45	40.28	66.00	-25.72	peak
2		0.1507	0.98	10.45	11.43	55.96	-44.53	AVG
3		0.6099	22.66	10.72	33.38	56.00	-22.62	peak
4		0.6099	3.43	10.72	14.15	46.00	-31.85	AVG
5		0.9540	1.24	10.84	12.08	46.00	-33.92	AVG
6		1.0180	22.31	10.75	33.06	56.00	-22.94	peak
7		1.5300	21.62	10.73	32.35	56.00	-23.65	peak
8	*	1.5540	12.92	10.73	23.65	46.00	-22.35	AVG
9		10.8658	0.89	10.41	11.30	50.00	-38.70	AVG
10		10.9179	22.43	10.41	32.84	60.00	-27.16	peak
11		18.2739	0.72	10.48	11.20	50.00	-38.80	AVG
12		18.5619	22.96	10.49	33.45	60.00	-26.55	peak

Remark: All the modes have been investigated, and only worst mode is presented in this report.

5.2 RADIATED EMISSION MEASUREMENT

5.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

5.2.2 TEST PROCEDURE

a. The measuring distance of at 3 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 3 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.

Note:

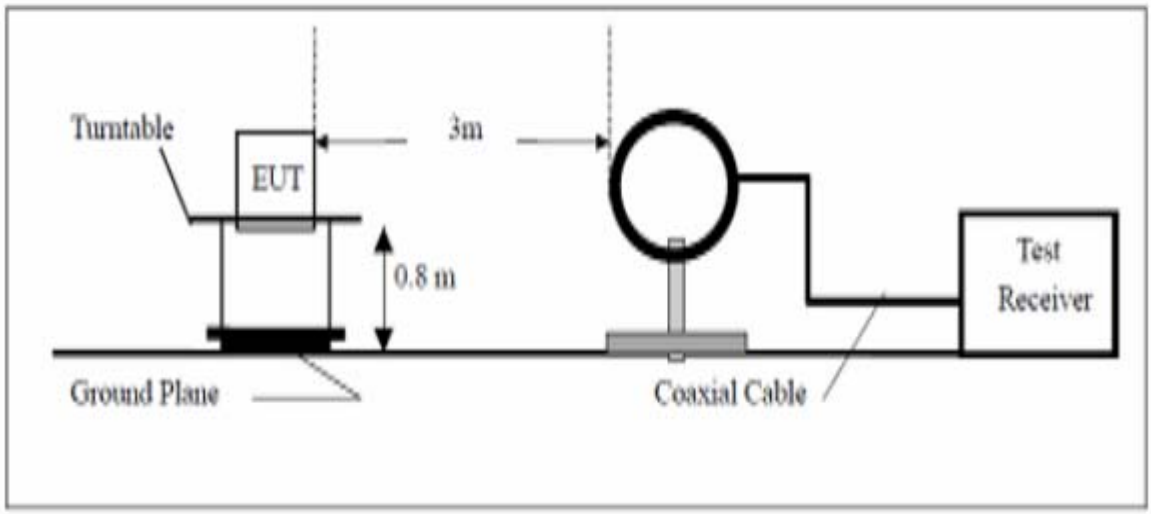
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis.
The worst case emissions were reported

5.2.3 DEVIATION FROM TEST STANDARD

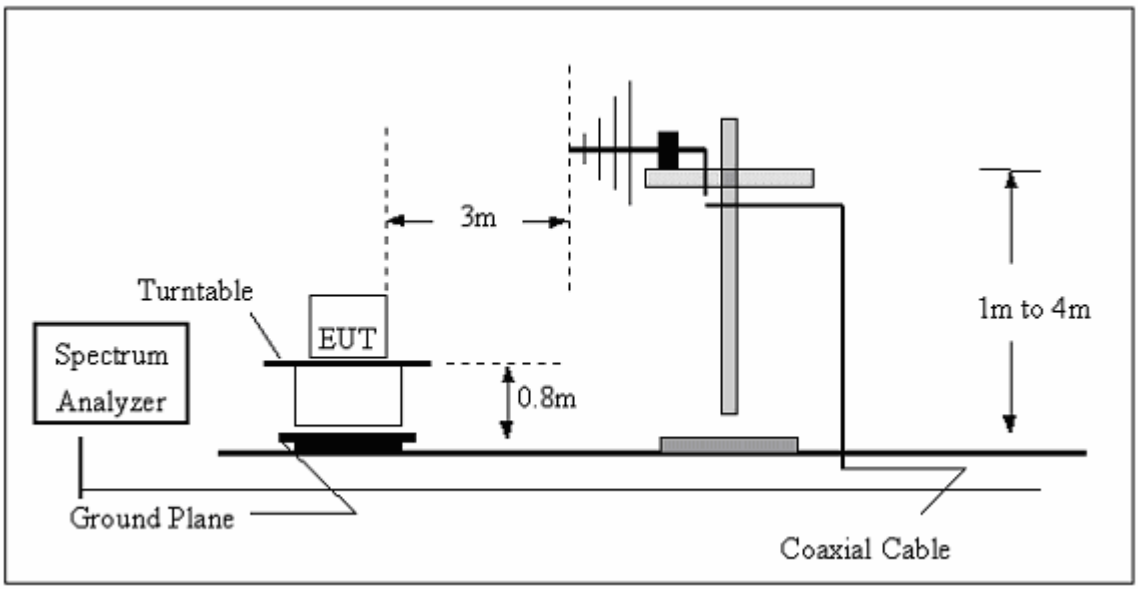
No deviation

5.2.4 TEST SETUP

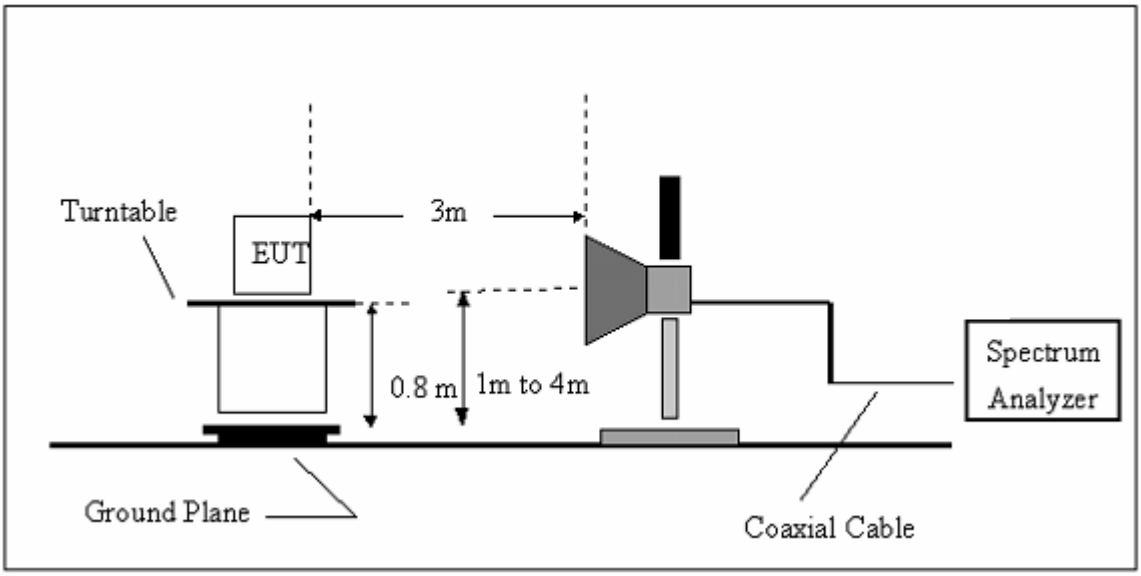
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



5.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.2.5.1 RESULTS (BELOW 30 MHZ)

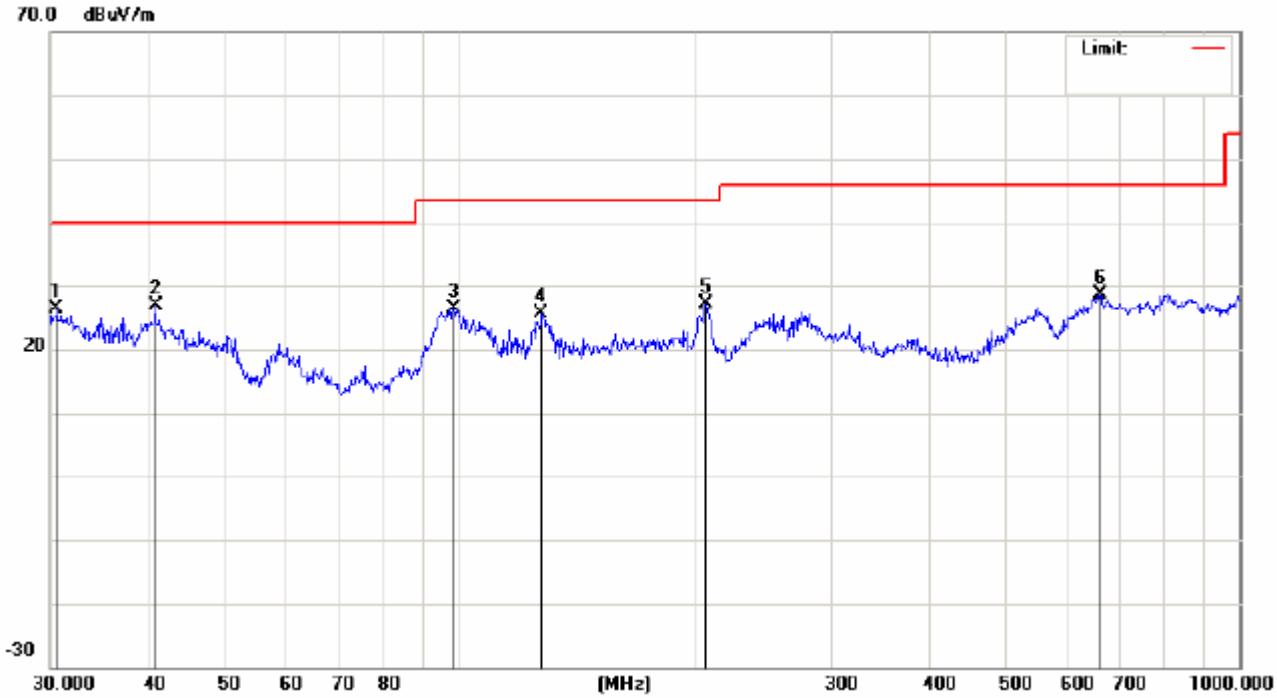
EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Polarization	---
Test Mode	Mode 1/ Mode 2/ Mode 3	Test Date	March 07, 2015

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

NOTE:
No result in this part for margin above 20dB.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

5.2.5.2 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

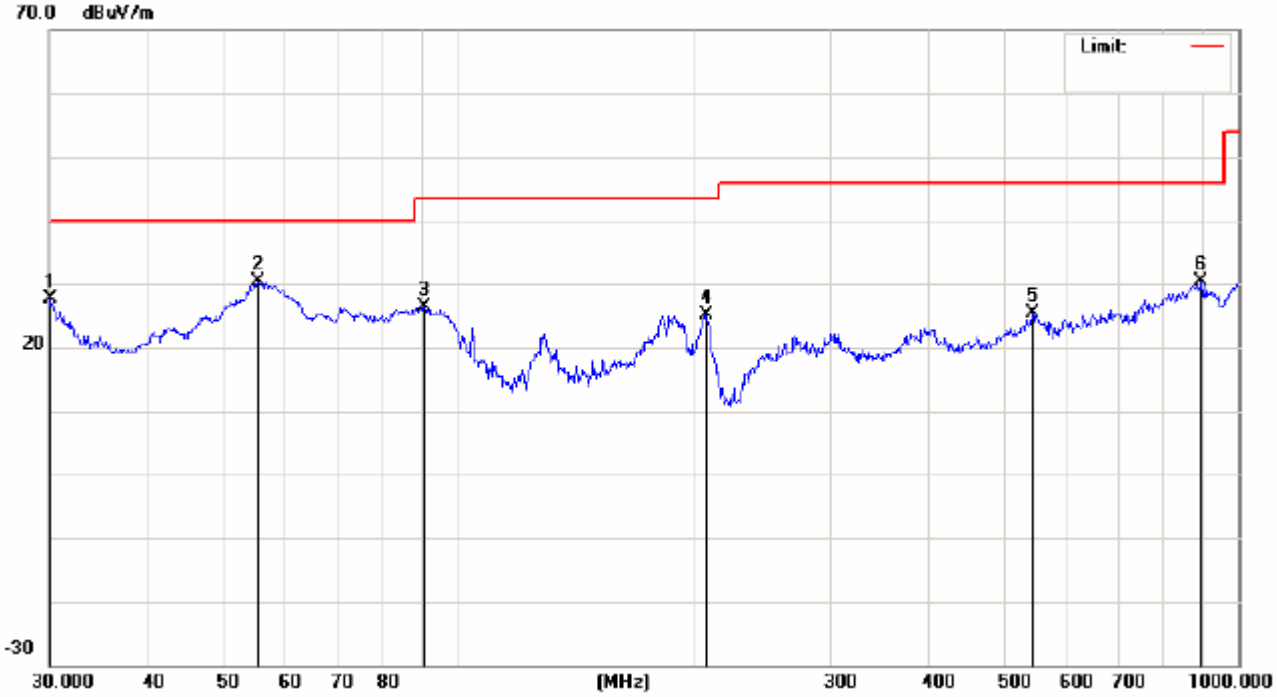
EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Polarization :	Horizontal
Test Mode	Mode 1 with GFSK modulation	Test Date	March 07, 2015



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		30.5305	23.19	3.16	26.35	40.00	-13.65	peak
2	*	40.8445	29.58	-2.60	26.98	40.00	-13.02	peak
3		98.4865	35.59	-9.23	26.36	43.50	-17.14	peak
4		127.6645	31.04	-5.47	25.57	43.50	-17.93	peak
5		207.1226	34.04	-6.89	27.15	43.50	-16.35	peak
6		663.4728	23.12	5.47	28.59	46.00	-17.41	peak

Remark: All the modes have been investigated, the y orientation is worst case, and only worst mode is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Polarization :	Vertical
Test Mode	Mode 1 with GFSK modulation	Test Date	March 07, 2015



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		30.0000	31.10	-3.47	27.63	40.00	-12.37	peak
2	*	55.4147	48.70	-18.40	30.30	40.00	-9.70	peak
3		90.5374	40.52	-14.20	26.32	43.50	-17.18	peak
4		207.8500	31.02	-5.81	25.21	43.50	-18.29	peak
5		545.1825	25.15	0.23	25.38	46.00	-20.62	peak
6		896.9964	24.41	5.89	30.30	46.00	-15.70	peak

Remark: All the modes have been investigated, the y orientation is worst case, and only worst mode is presented in this report

5.2.5.3 TEST RESULTS(1GHZ TO 25GHZ)

Note：***the worst case is 1Mbps(GFSK)mode as result in this part.***

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 1 TX(1Mbps)
Test Date	March 07, 2015		

Freq. (MHz)	Ant. Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4804	V	60.52	39.73	74	54	-13.48	-14.27
7206	V	58.93	39.30	74	54	-15.07	-14.70
4804	H	59.84	40.88	74	54	-14.16	-13.12
7206	H	59.58	40.58	74	54	-14.42	-13.42

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the modes have been investigated, the x orientation is worst case, and only worst mode is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 2 TX(1Mbps)
Test Date	March 07, 2015		

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4882	V	59.71	41.35	74	54	-14.29	-12.65
7323	V	59.42	39.47	74	54	-14.58	-14.53
4882	H	58.13	39.91	74	54	-15.87	-14.09
7323	H	59.17	40.17	74	54	-14.83	-13.83

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the modes have been investigated, the x orientation is worst case, and only worst mode is presented in this report.

EUT	Bluetooth speaker	Model Name	VOOMBOX-PARTY
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 3 TX(1Mbps)
Test Date	March 07, 2015		

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4960	V	60.16	41.65	74	54	-13.84	-12.35
7440	V	59.06	40.35	74	54	-14.94	-13.65
4960	H	59.93	39.60	74	54	-14.07	-14.40
7440	H	58.66	39.66	74	54	-15.34	-14.34

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the modes have been investigated, the x orientation is worst case, and only worst mode is presented in this report.

5.2.5.4 TEST RESULTS (Restricted Bands Requirements)

Test result for 1Mbps Mode:

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2402MHz-1Mbps	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2382	60.45	-8.76	51.69	74	22.31	peak
2382	55.67	-8.76	46.91	54	7.09	AVG
2390	62.74	-8.73	54.01	74	19.99	peak
2390	54.49	-8.73	45.76	54	8.24	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	VOOMBOX-PARTY
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2402MHz-1Mbps	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2376	60.85	-8.77	52.08	74	21.92	peak
2376	53.31	-8.77	44.54	54	9.46	AVG
2390	62.23	-8.73	53.50	74	20.50	peak
2390	58.46	-8.73	49.73	54	4.27	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2480MHz-1Mbps	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	62.03	-8.17	53.86	74	20.14	peak
2483.5	56.77	-8.17	48.60	54	5.40	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2480MHz-1Mbps	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.42	-8.17	53.25	74	20.75	peak
2483.5	56.09	-8.17	47.92	54	6.08	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

Test result for 3Mbps Mode:

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2402MHz-3Mbps	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2387	60.74	-8.74	52.00	74	22.00	peak
2387	55.66	-8.74	46.92	54	7.08	AVG
2390	60.14	-8.73	51.41	74	22.59	peak
2390	54.22	-8.73	45.49	54	8.51	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2402MHz-3Mbps	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2384	64.51	-8.75	55.76	74	18.24	peak
2384	57.09	-8.75	48.34	54	5.66	AVG
2390	63.17	-8.73	54.44	74	19.56	peak
2390	54.34	-8.73	45.61	54	8.39	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2480MHz-3Mbps	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	62.15	-8.17	53.98	74	20.02	peak
2483.5	57.88	-8.17	49.71	54	4.29	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	TX /2480MHz-3Mbps	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.06	-8.17	52.89	74	21.11	peak
2483.5	56.30	-8.17	48.13	54	5.87	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Only worst case is presented in this report.

Test result for hopping mode:

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	Hopping mode	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2381	64.98	-8.76	56.22	74	17.78	peak
2381	54.68	-8.76	45.92	54	8.08	AVG
2390	63.24	-8.73	54.51	74	19.49	peak
2390	58.89	-8.73	50.16	54	3.84	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. The 1Mbps mode is worst case, and only worst case is presented in this report.						

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	Hopping mode	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2378	63.30	-8.77	54.53	74	19.47	peak
2378	56.99	-8.77	48.22	54	5.78	AVG
2390	62.51	-8.71	53.80	74	20.20	peak
2390	54.81	-8.71	46.10	54	7.90	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. The 1Mbps mode is worst case, and only worst case is presented in this report.						

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	Hopping mode	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.43	-8.17	53.26	74	20.74	peak
2483.5	57.37	-8.17	49.20	54	4.80	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
The 1Mbps mode is worst case, and only worst case is presented in this report.

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	20 ℃	Relative Humidity	48%
Pressure	1010 hPa	Test Date	March 07, 2015
Test Mode	Hopping mode	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.55	-8.17	53.38	74	20.62	peak
2483.5	55.34	-8.17	47.17	54	6.83	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
The 1Mbps mode is worst case, and only worst case is presented in this report.

6. NUMBER OF HOPPING CHANNEL

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

6.2 TEST PROCEDURE

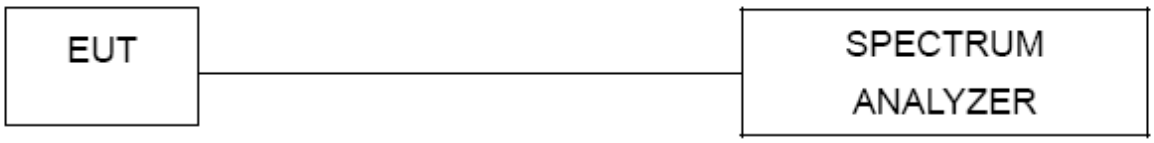
a. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
b. Follow the “Public Notice-DA 00-705” document to perform measurements.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	≥ 1% of the span
VBW	≥RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



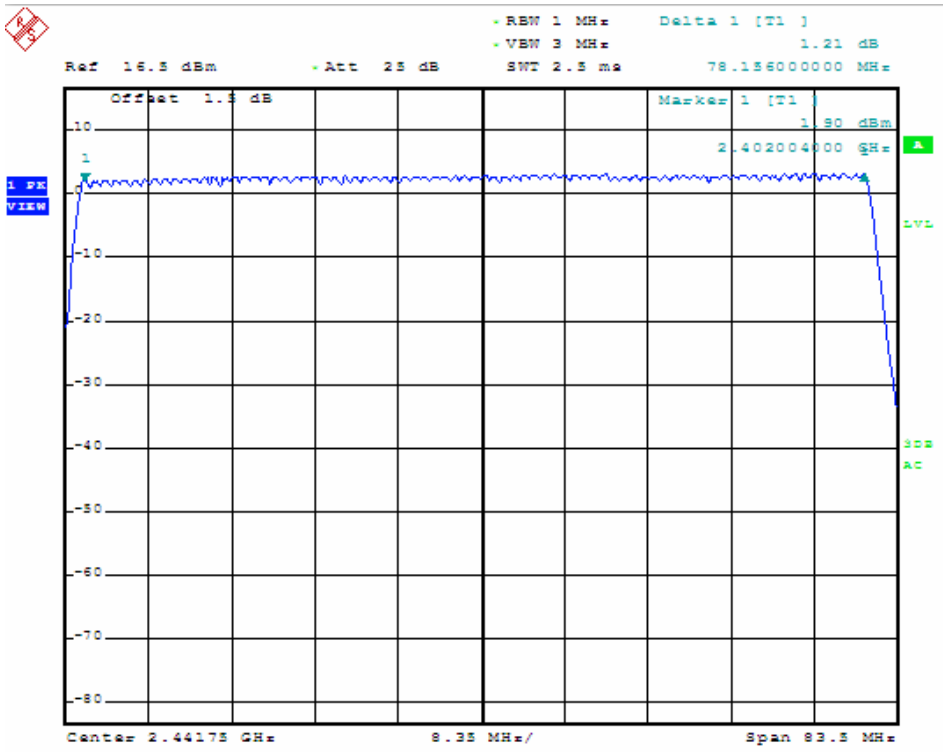
6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1015 hPa	Test Date	March 07, 2015
Test Mode	Hopping Mode	Number of Hopping Channel	79

2400MHz-2483.5MHz



Note: The 1Mbps mode is worst case, and only worst case is presented in this report.

7. AVERAGE TIME OF OCCUPANCY

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

7.2 TEST PROCEDURE

a. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
b. Follow the “Public Notice-DA 00-705” document to perform measurements.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	=zero span, centered on a hopping channel
RBW	= 1MHz
VBW	≥RBW
Detector	Peak
Trace	Max Hold
Sweep Time	=as necessary to capture the entire dwell time per hopping channel

Note: DH1 Dwell time = Pulse time*(1600/2/79)*31.6S
DH3 Dwell time = Pulse time*(1600/4/79)*31.6S
DH5 Dwell time = Pulse time*(1600/6/79)*31.6S

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP

7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

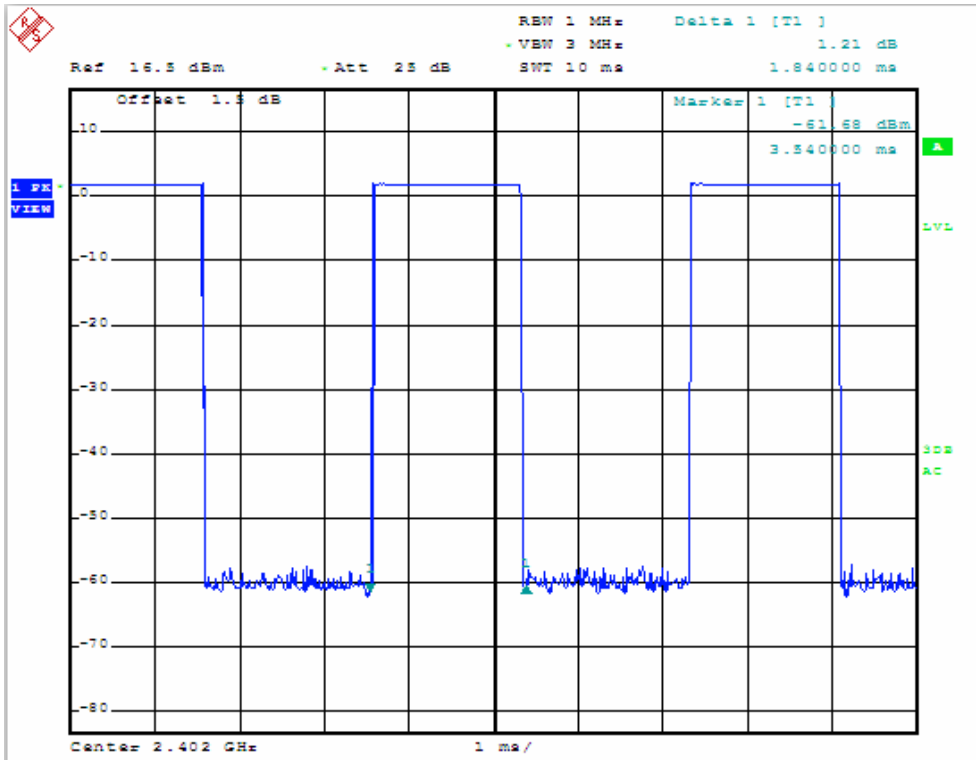
7.6 TEST RESULTS

Note: ***the worst case is DH5-3Mbps as result in this part.***

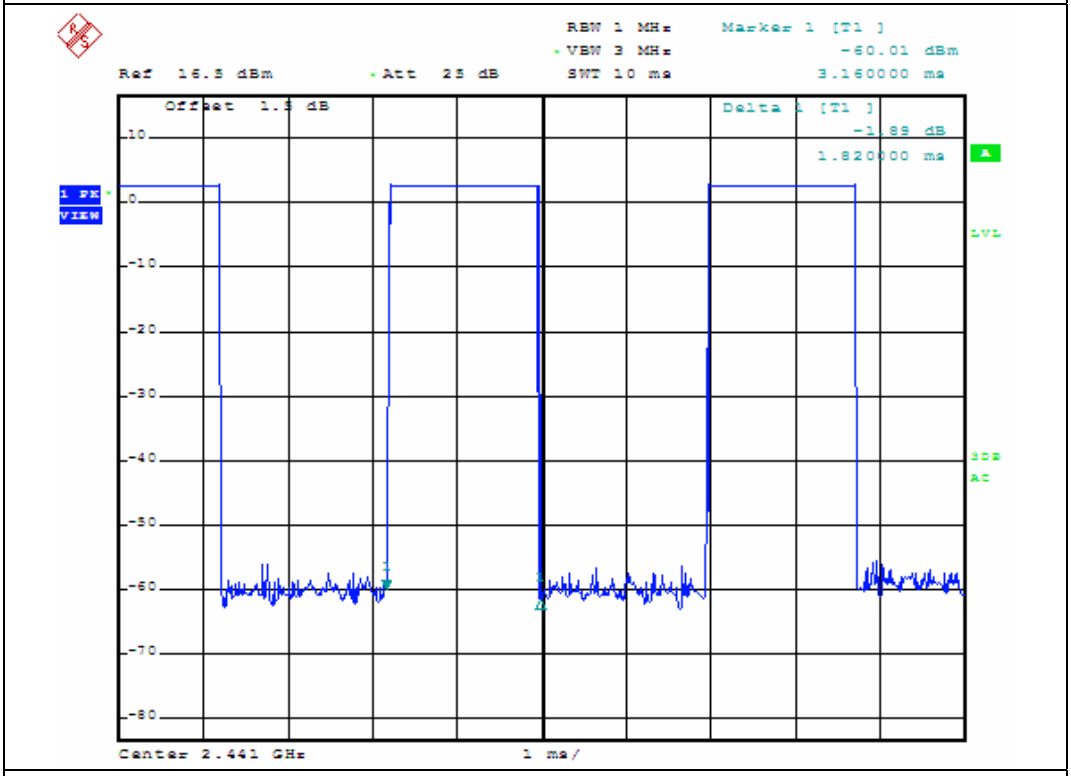
EUT	Bluetooth speaker	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Date	March 07, 2015
Test Mode	DH5-3Mbps		

Data Packet	Frequency	Pulse time(ms)	Dwell Time(S)	Limits（S）
DH5	2402MHz	3.5400	0.378	0.4
DH5	2441MHz	3.1600	0.337	0.4
DH5	2480MHz	3.0200	0.322	0.4

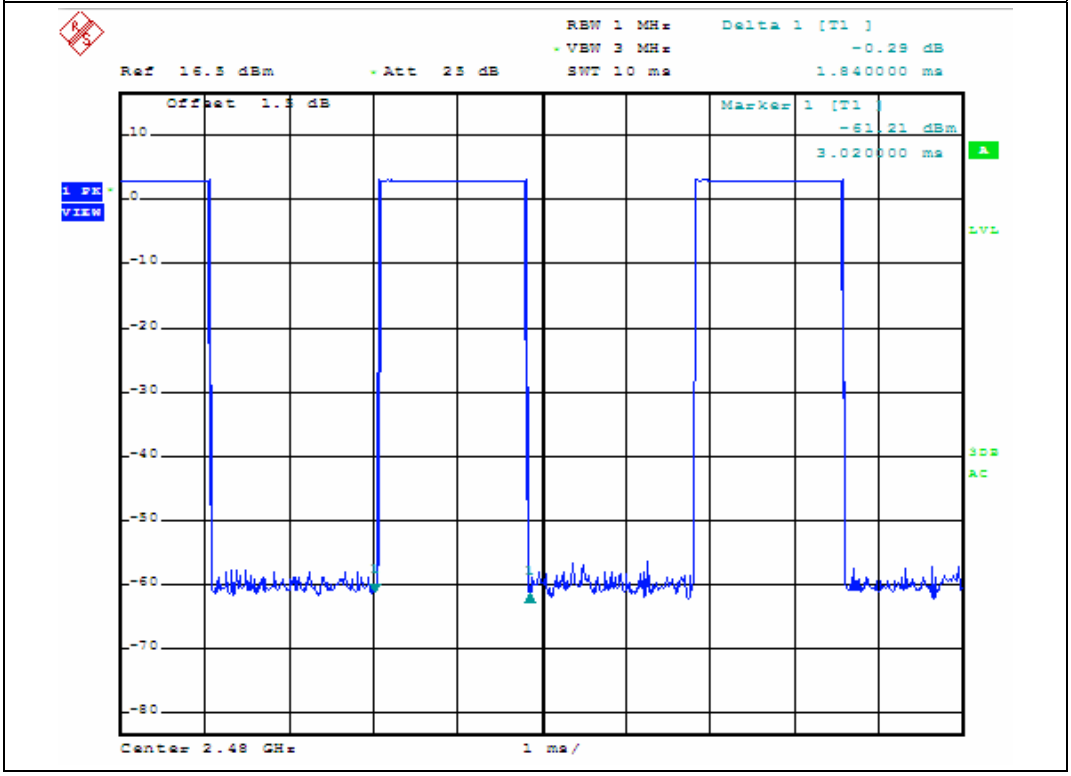
CH00-DH5



CH39-DH5



CH78-DH5



8. HOPPING CHANNEL SEPARATION MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

8.2 TEST PROCEDURE

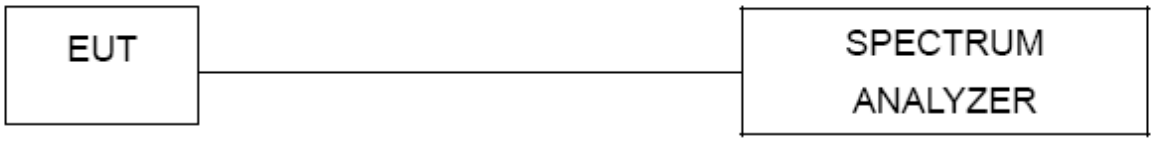
a. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
b. Follow the “Public Notice-DA 00-705” document to perform measurements.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	= wide enough to capture the peaks of two adjacent channels
RBW	Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
VBW	Video (or Average) Bandwidth (VBW) ≥ RBW
Detector	Peak
Trace	Max hold
Sweep Time	Auto

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

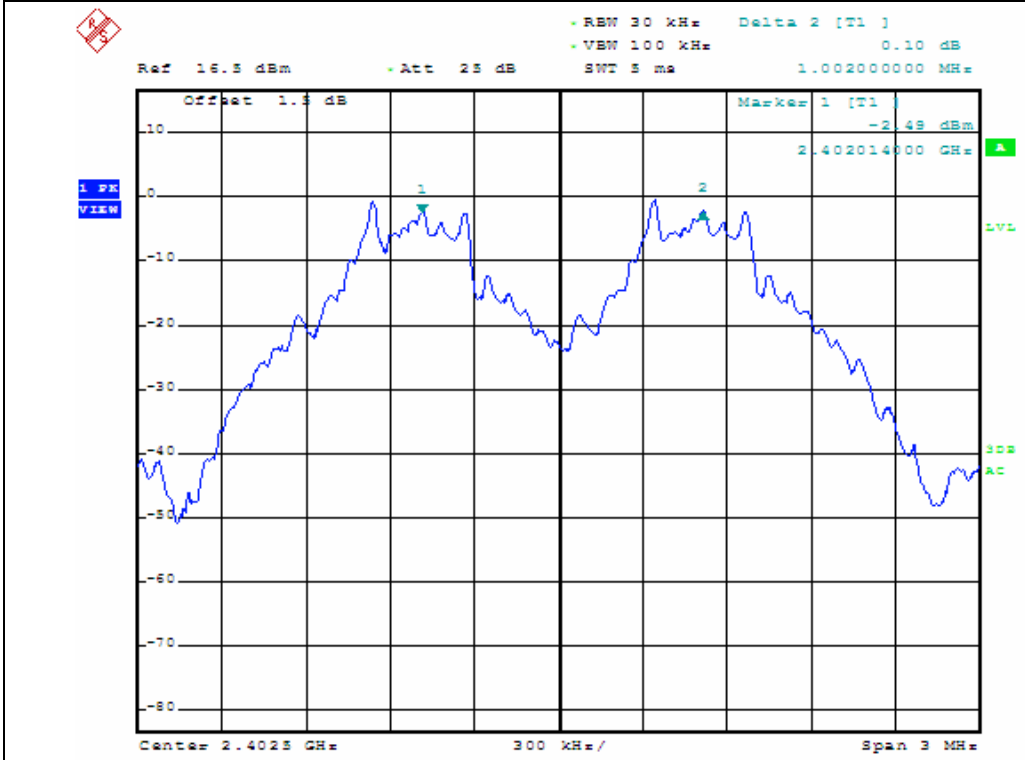
8.6 TEST RESULTS

EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Result	Pass
Test Mode	CH00 / CH39 /CH78 (1Mbps Mode)	Test Date	March 07, 2015

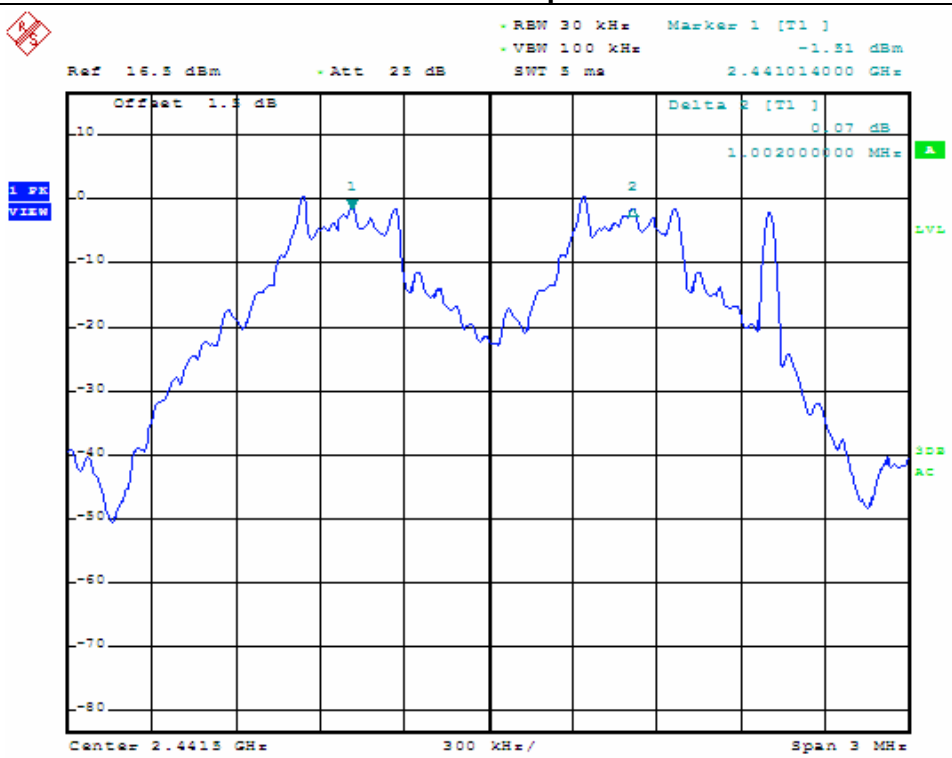
Channel number	Channel frequency （MHz）	Separation Read value (KHz)	Separation limit 2/3 20db down BW(KHz)
00	2402	1002	>568.00
39	2441	1002	>568.00
78	2480	1002	>570.67

Note: 20db bandwidth refer to section 6.1.5

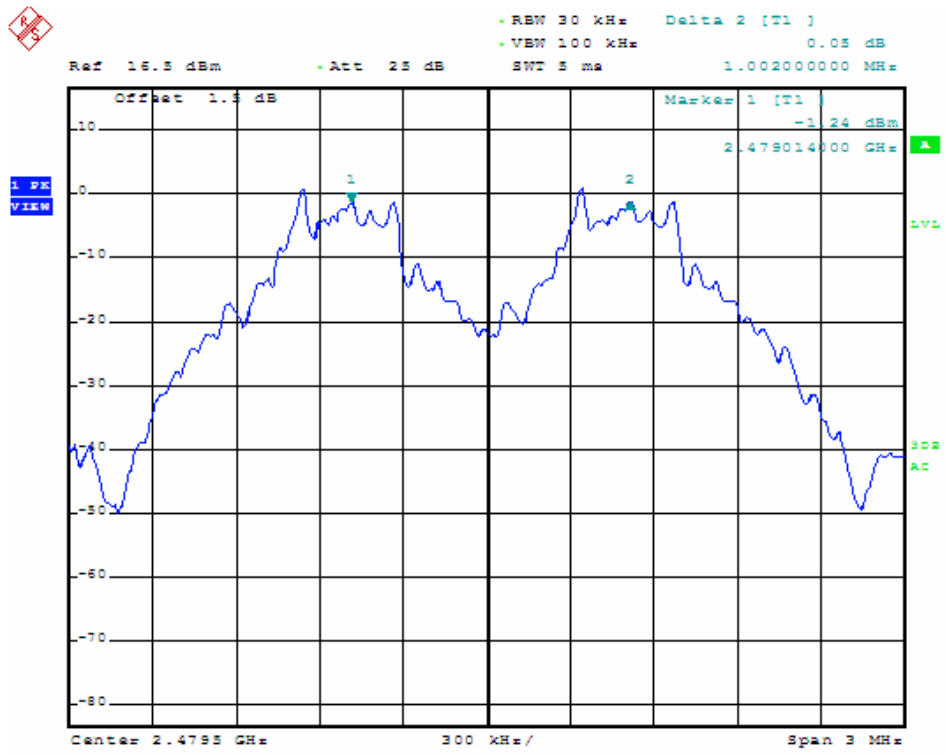
CH00 -1Mbps



CH39 -1Mbps



CH78 -1Mbps

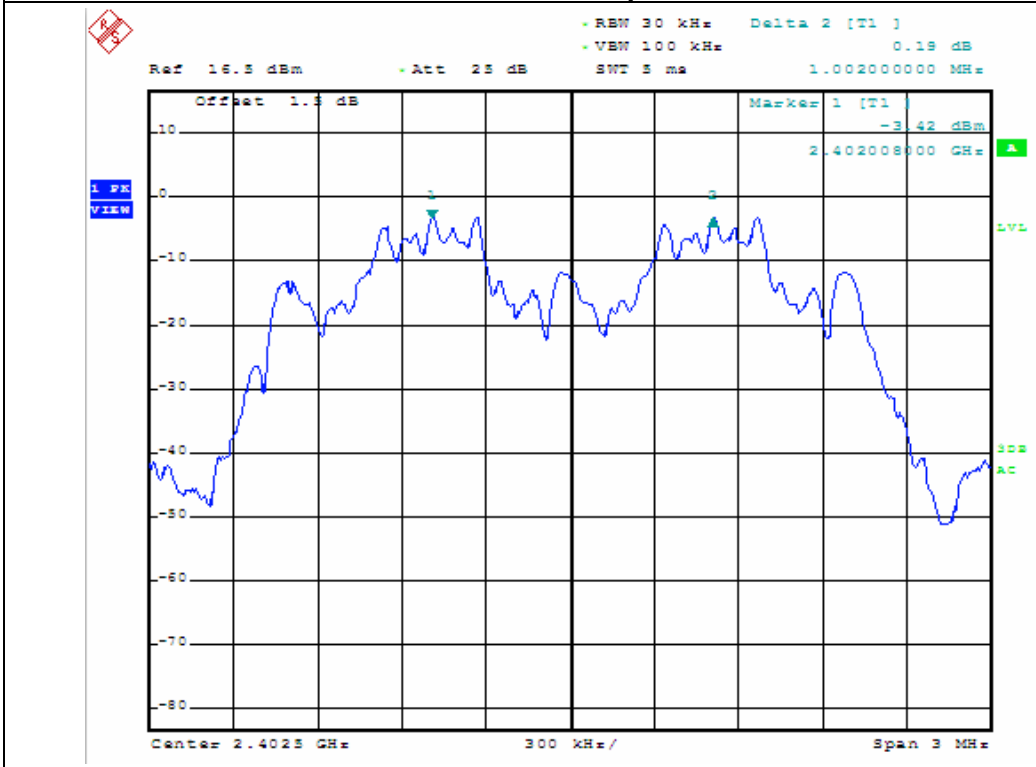


EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Result	Pass
Test Mode	CH00 / CH39 /CH78 (2Mbps Mode)	Test Date	March 07, 2015

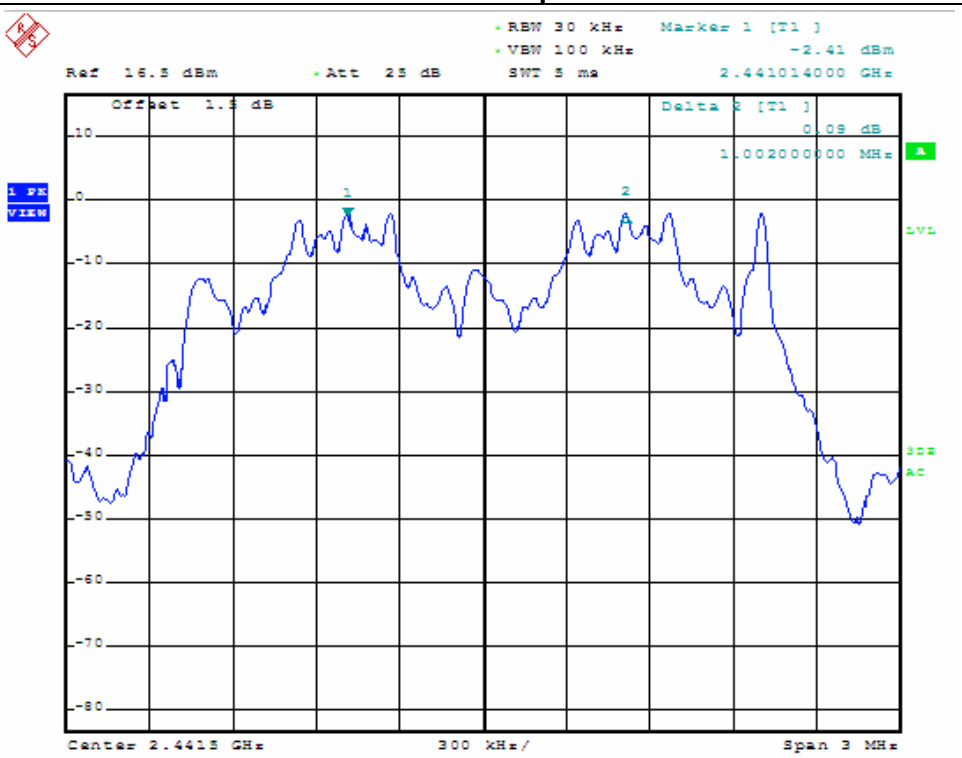
Channel number	Channel frequency （MHz）	Separation Read value (KHz)	Separation limit 2/3 20db down BW(KHz)
00	2402	1002	>749.33
39	2441	1002	>749.33
78	2480	1002	>749.33

Note: 20db bandwidth refer to section 6.1.5

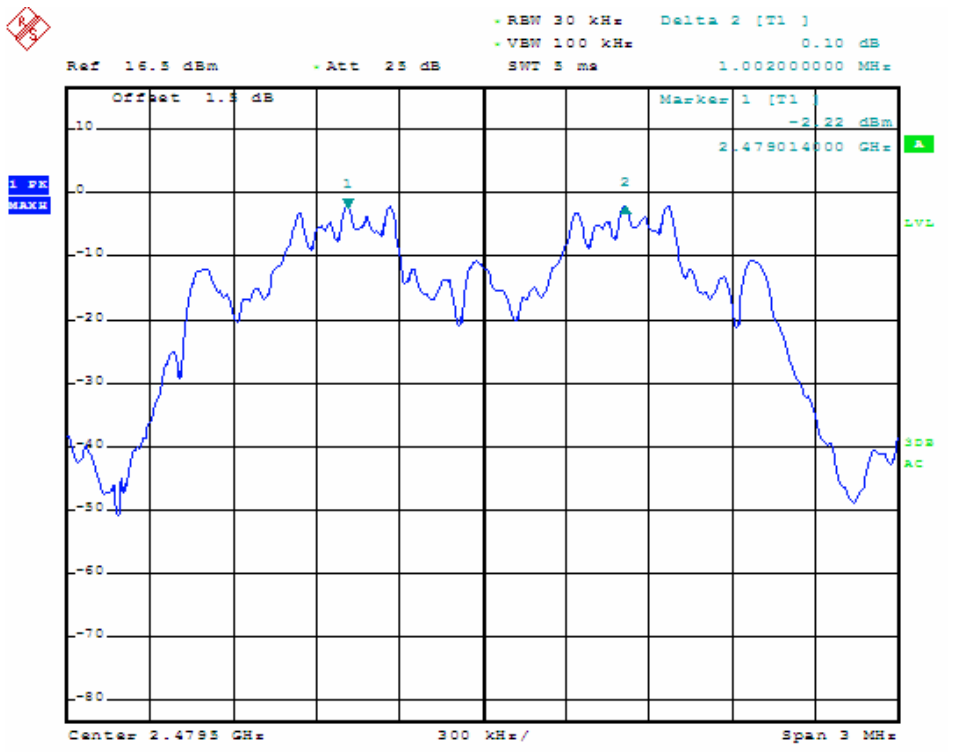
CH00 -2Mbps



CH39 -2Mbps



CH78 -2Mbps

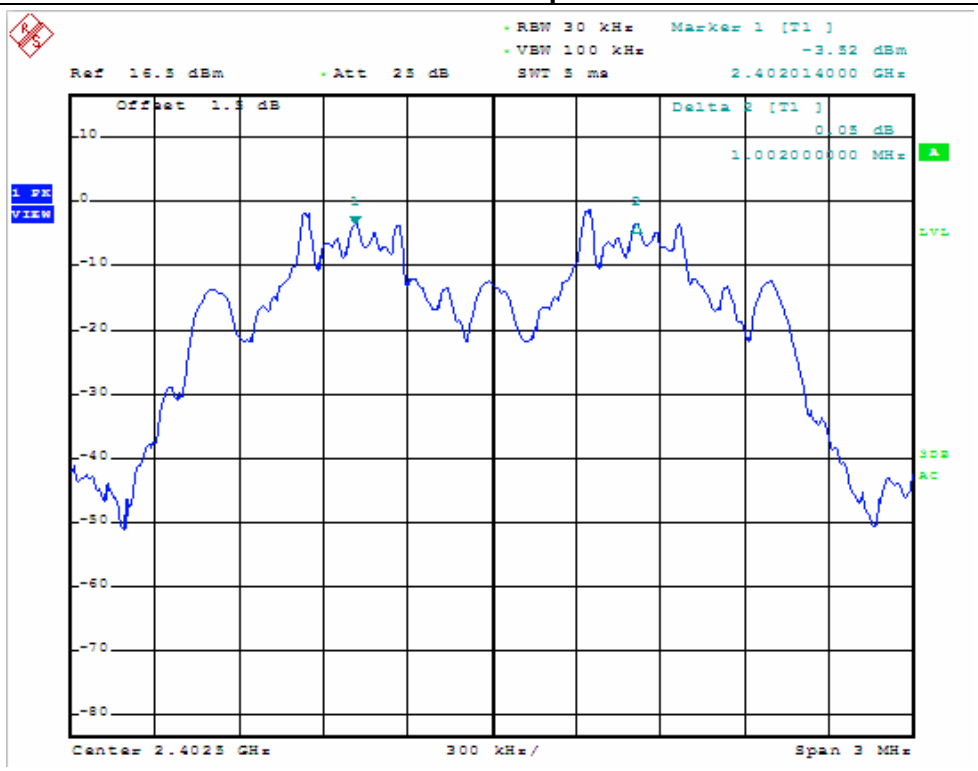


EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Result	Pass
Test Mode	CH00 / CH39 /CH78 (3Mbps Mode)	Test Date	March 07, 2015

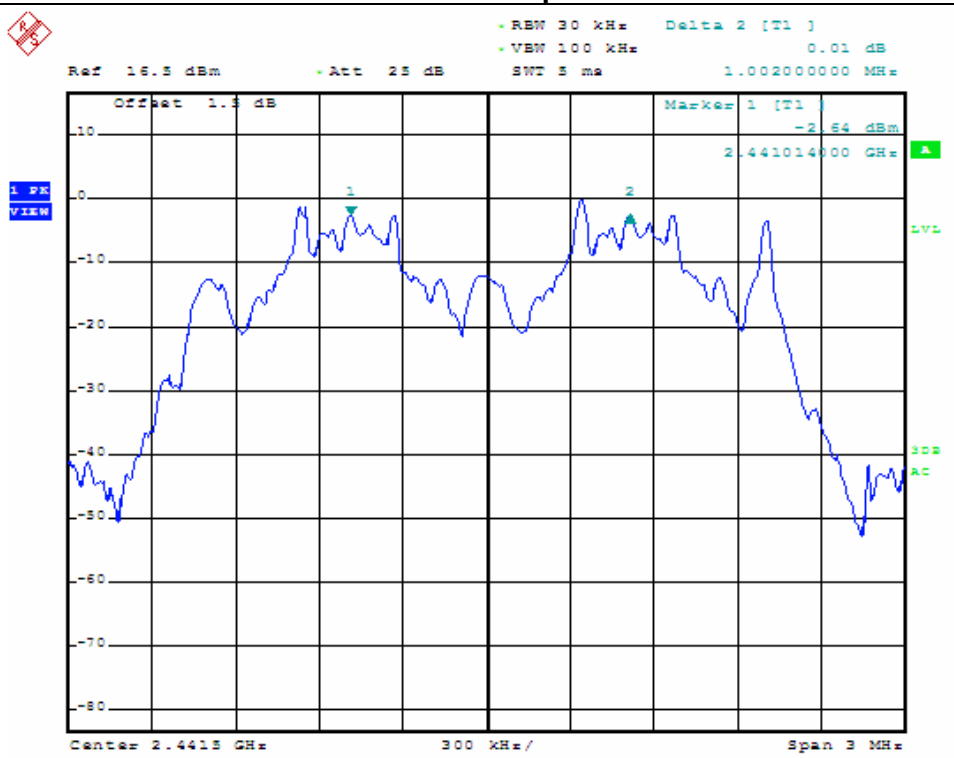
Channel number	Channel frequency （MHz）	Separation Read value (KHz)	Separation limit 2/3 20db down BW(KHz)
00	2402	1002	>770.67
39	2441	1002	>770.67
78	2480	1002	>770.67

Note: 20db bandwidth refer to section 6.1.5

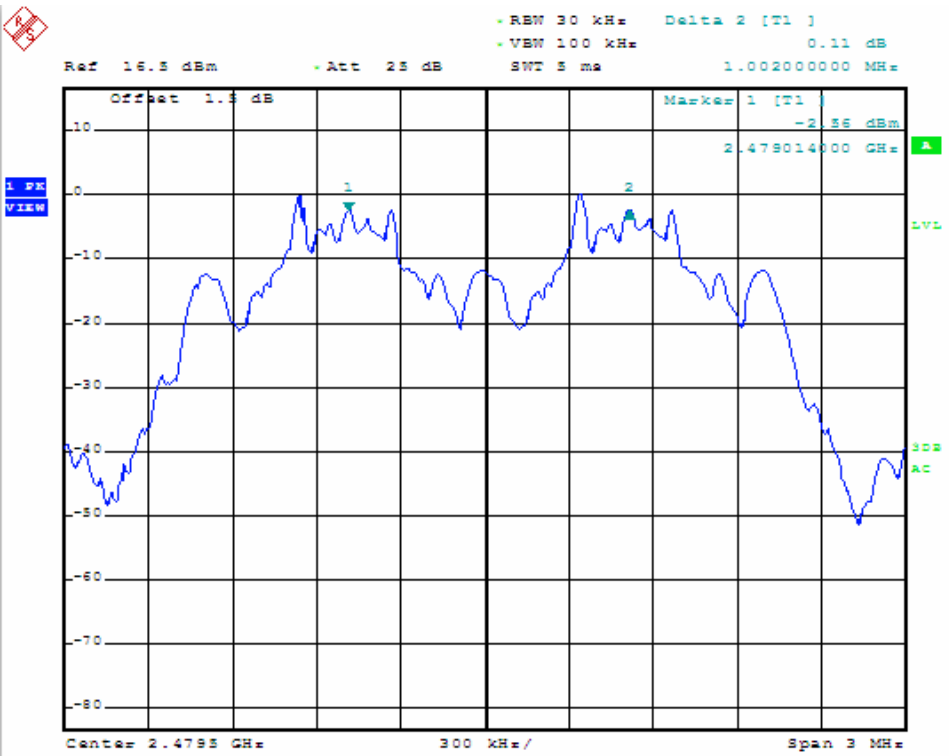
CH00 -3Mbps



CH39 -3Mbps



CH78 -3Mbps



9. BANDWIDTH TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

9.2 TEST PROCEDURE

a. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
b. Follow the “Public Notice-DA 00-705” document to perform measurements.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	=approximately 2 to 3 times the 20 dB bandwidth, centered on hopping channel
RBW	≥ 1% of the 20 dB bandwidth
VBW	≥RBW
Detector	Peak
Trace	Max hold
Sweep Time	Auto

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP

9.5 EUT OPERATION CONDITIONS

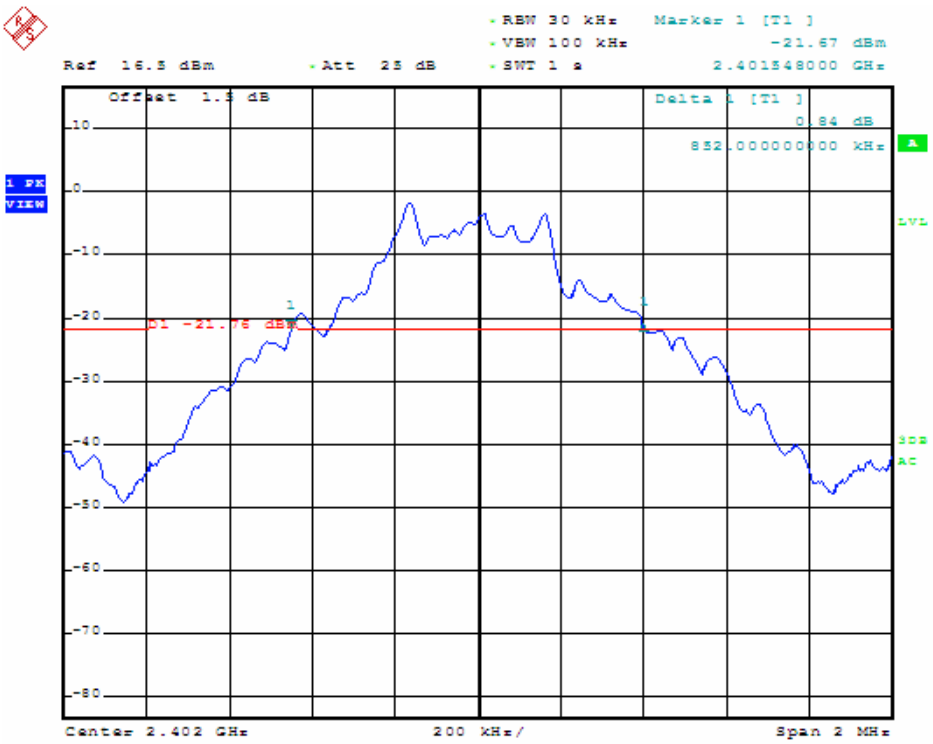
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

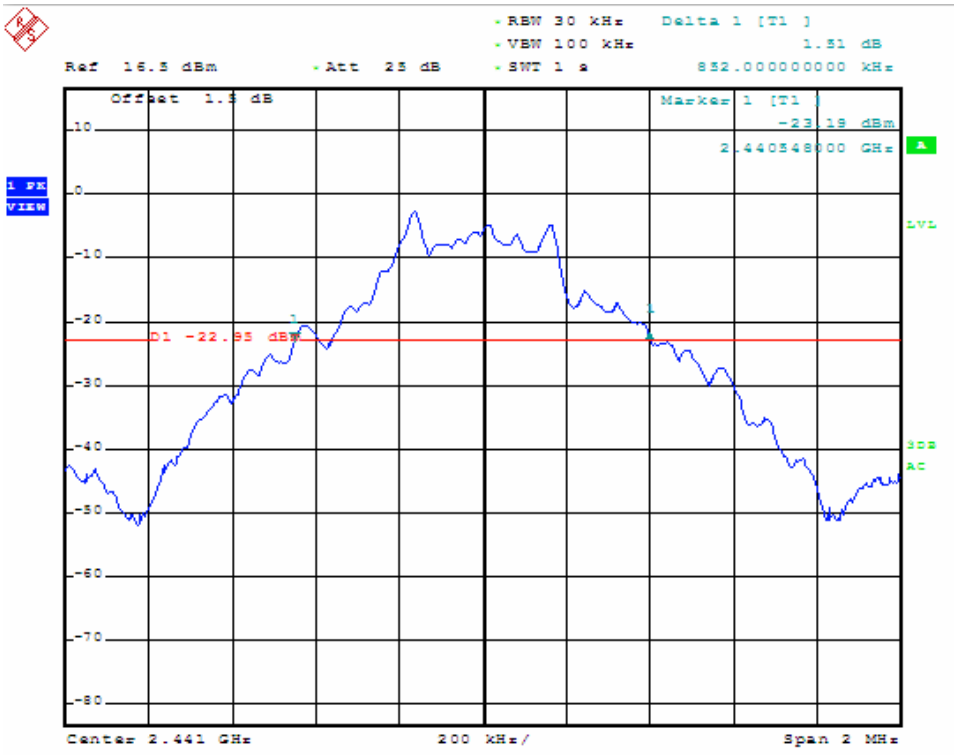
EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Mode	CH00/CH39/C78**(**1Mbps**)**
Test Date	March 07, 2015		

Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	852.0	PASS
2441 MHz	852.0	PASS
2480 MHz	856.0	PASS

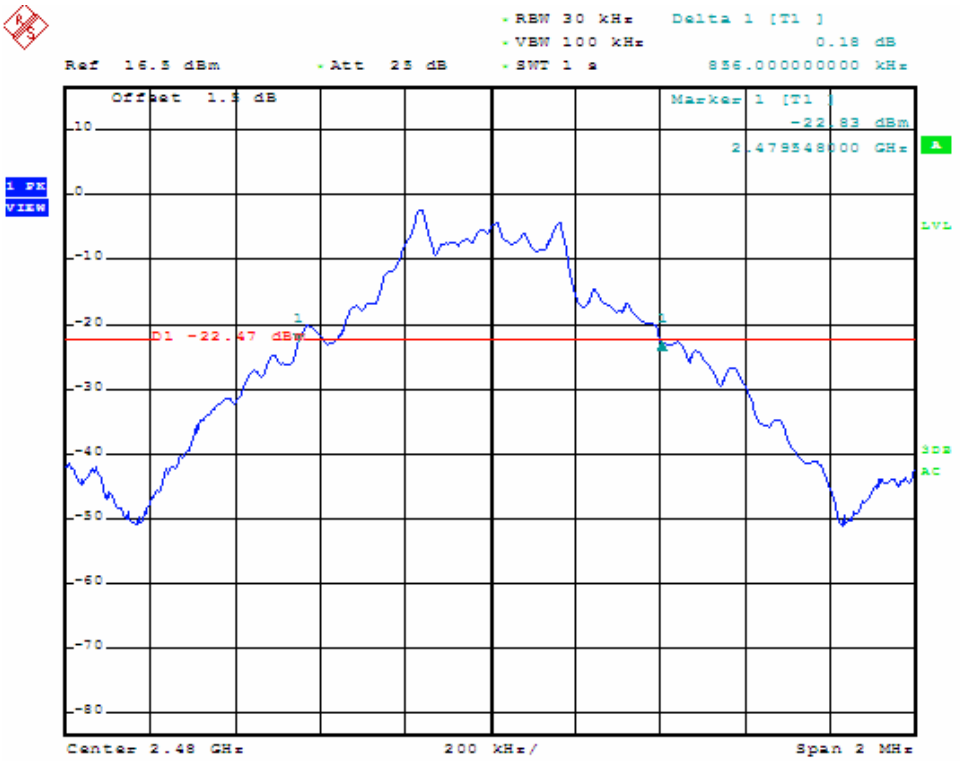
CH00 -1Mbps



CH39 -1Mbps



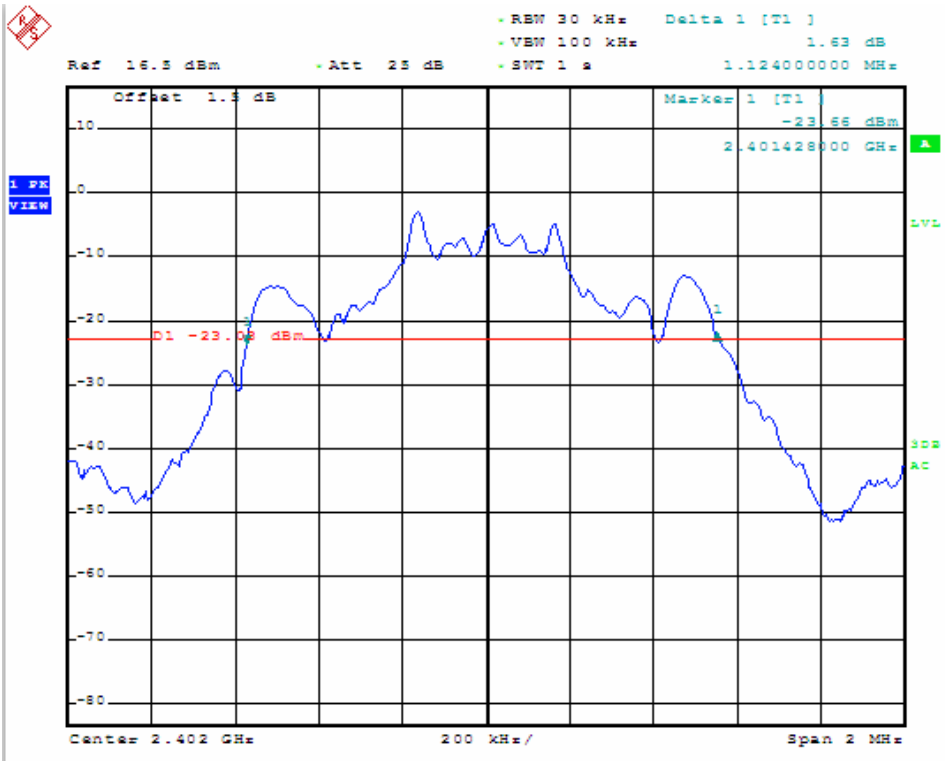
CH78 -1Mbps



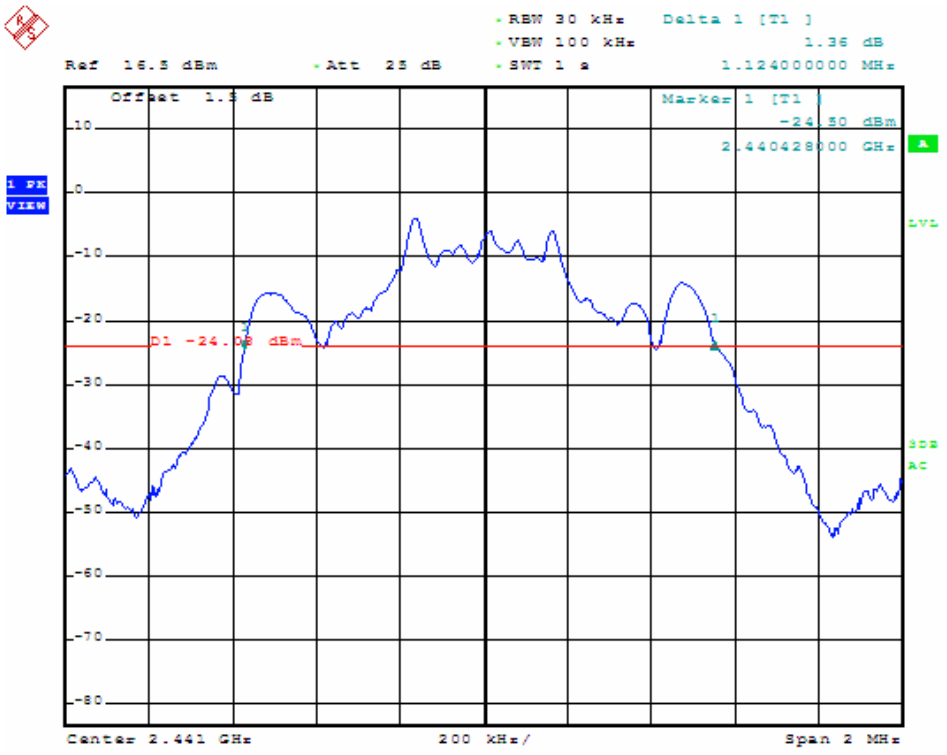
EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Mode	CH00/CH39/C78**(**2Mbps**)**
Test Date	March 07, 2015		

Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	1124	PASS
2441 MHz	1124	PASS
2480 MHz	1124	PASS

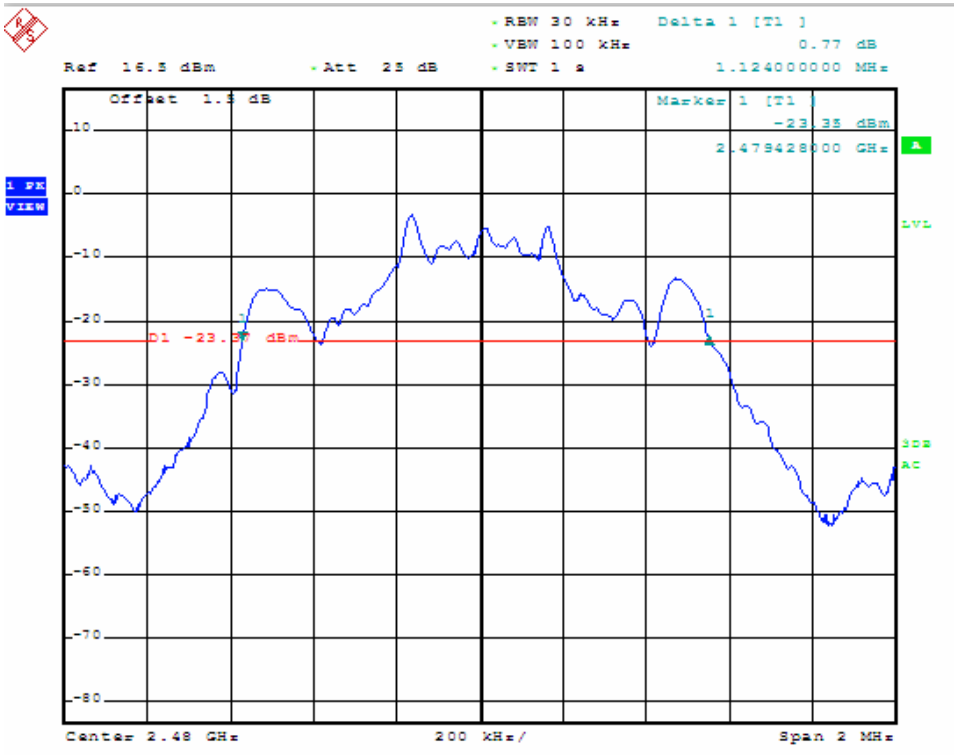
CH00 -2Mbps



CH39 -2Mbps



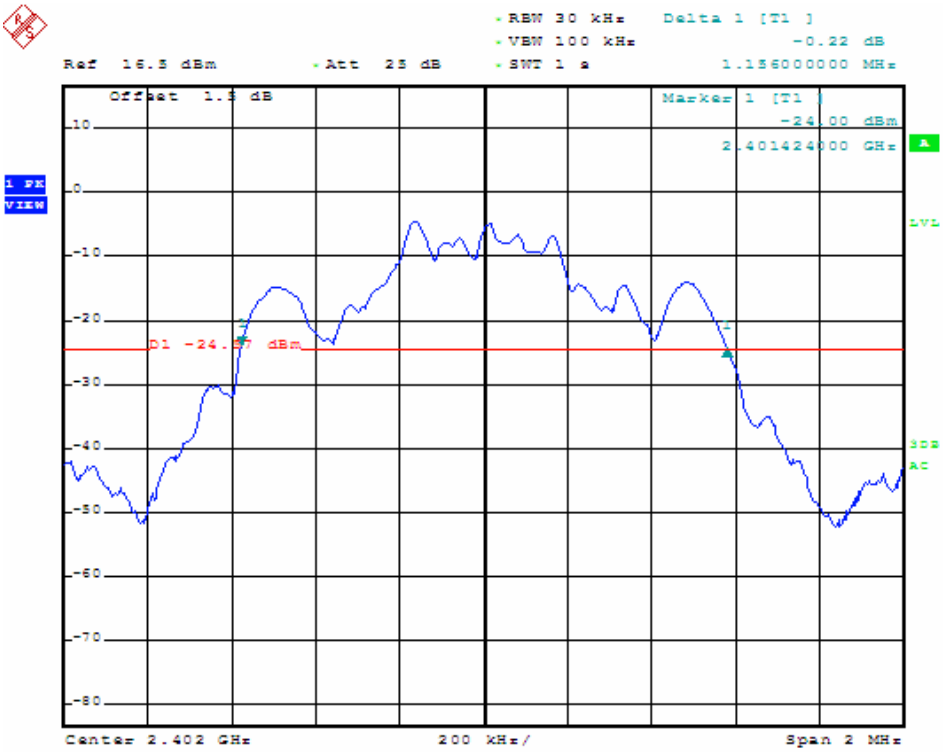
CH78 -2Mbps



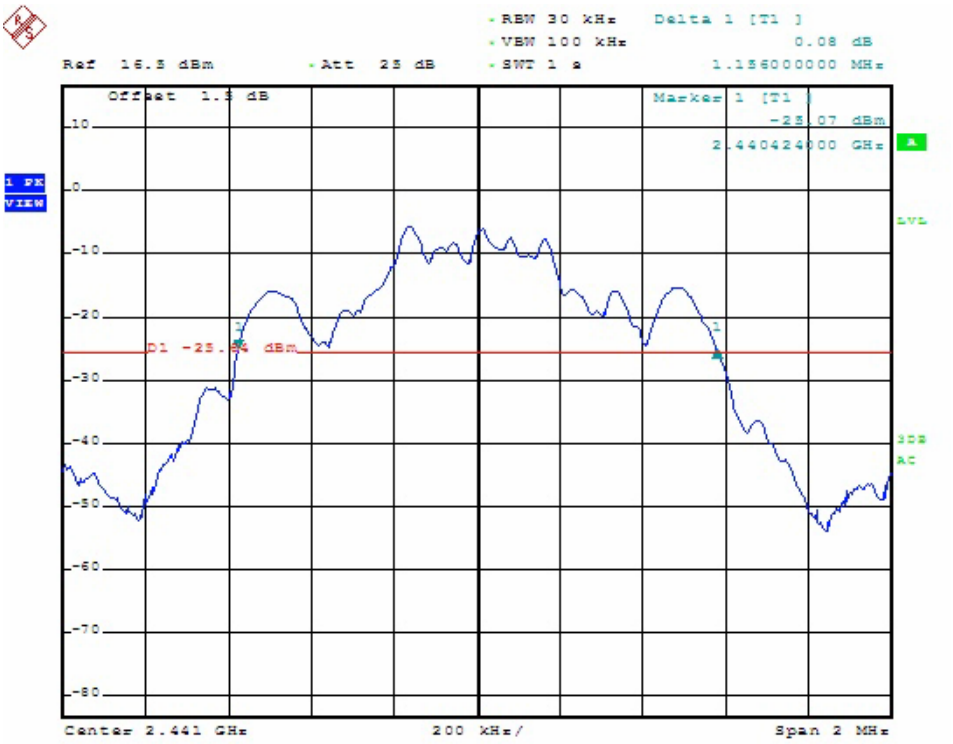
EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Mode	CH00/CH39/C78(3Mbps)
Test Date	March 07, 2015		

Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	1156	PASS
2441 MHz	1156	PASS
2480 MHz	1156	PASS

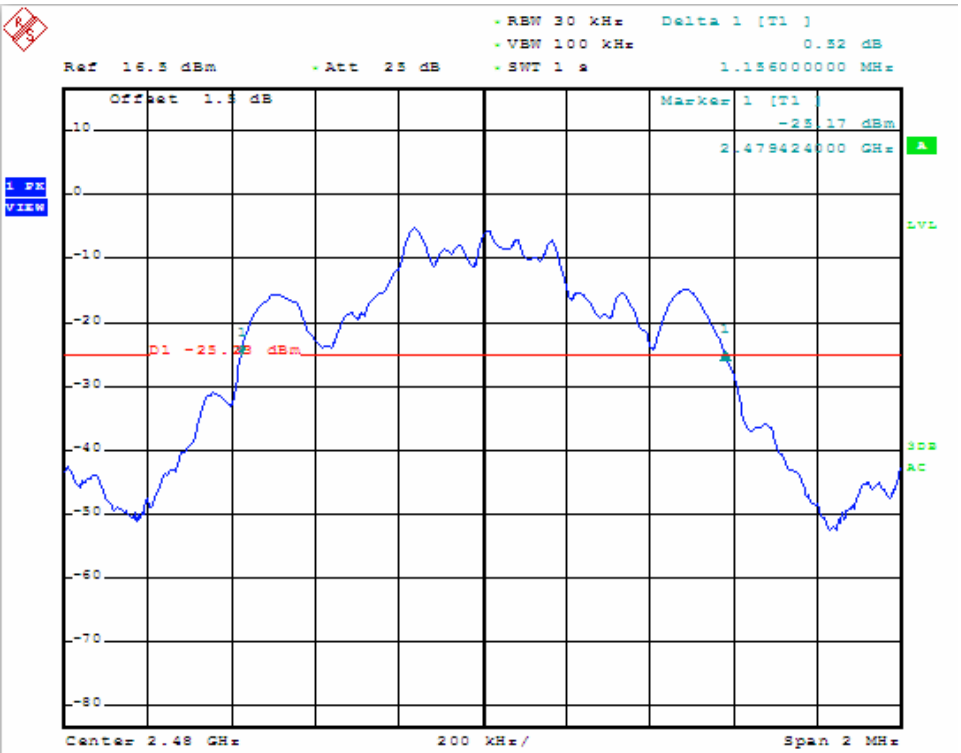
CH00 -3Mbps



CH39 -3Mbps



CH78 -3Mbps



10. PEAK OUTPUT POWER TEST

10.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	0.125 w or 20.96dBm	2400-2483.5	PASS

10.2 TEST PROCEDURE

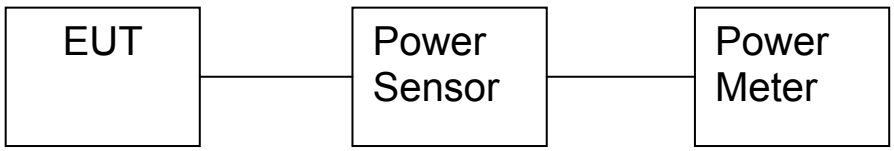
a. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter though a power sensor and antenna output port as show in the block diagram below,

b. Record the result

10.3 DEVIATION FROM STANDARD

No deviation.

10.4 TEST SETUP



10.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

10.6 TEST RESULTS

EUT	BLUETOOTH SPEAKER	Model Name	Voombox-party
Temperature	25 ℃	Relative Humidity	60%
Pressure	1012 hPa	Test Mode	CH00/ CH39 /CH78 (1M/2M/3Mbps Mode)
Test Date	March 07, 2015		

1Mbps				
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT(dBm)	Result
CH00	2402	2.97	20.96	Pass
CH39	2441	2.83	20.96	Pass
CH78	2480	2.68	20.96	Pass
2Mbps				
CH00	2402	2.51	20.96	Pass
CH39	2441	2.32	20.96	Pass
CH78	2480	2.14	20.96	Pass
3Mbps				
CH00	2402	2.48	20.96	Pass
CH39	2441	2.25	20.96	Pass
CH78	2480	2.13	20.96	Pass

11. ANTENNA APPLICATION

11.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247

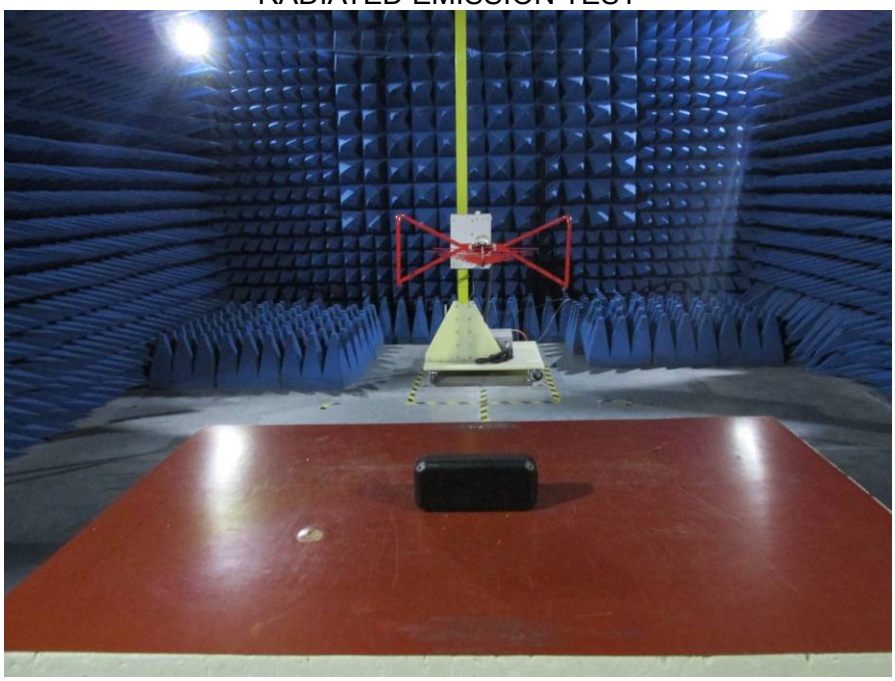
11.2 Result

The EUT's antenna integrated on PCB, The antenna's gain is 1.0dBi and meets the requirement.

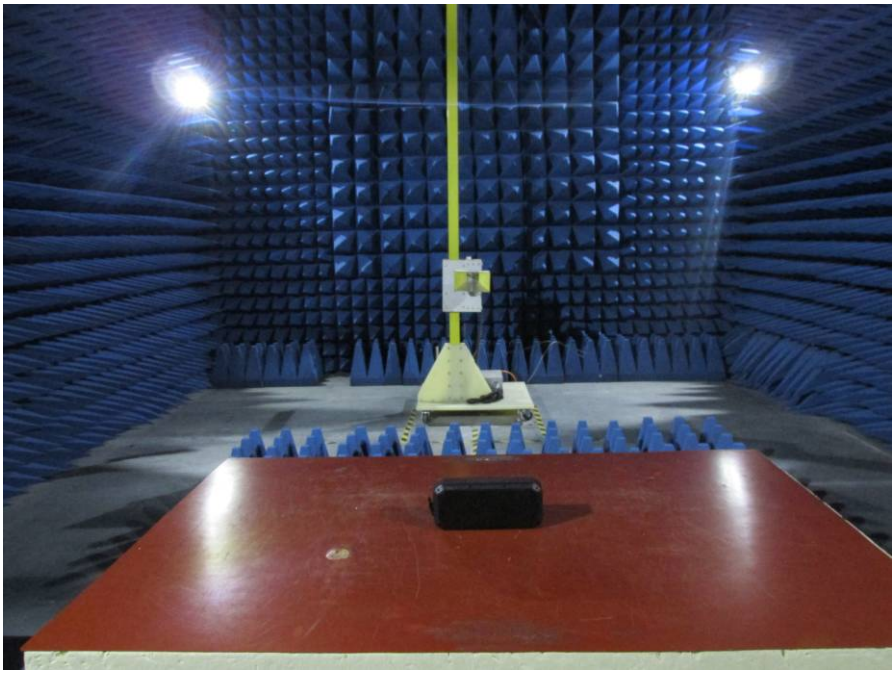
12. EUT TEST PHOTO

CONDUCTED EMISSION TEST

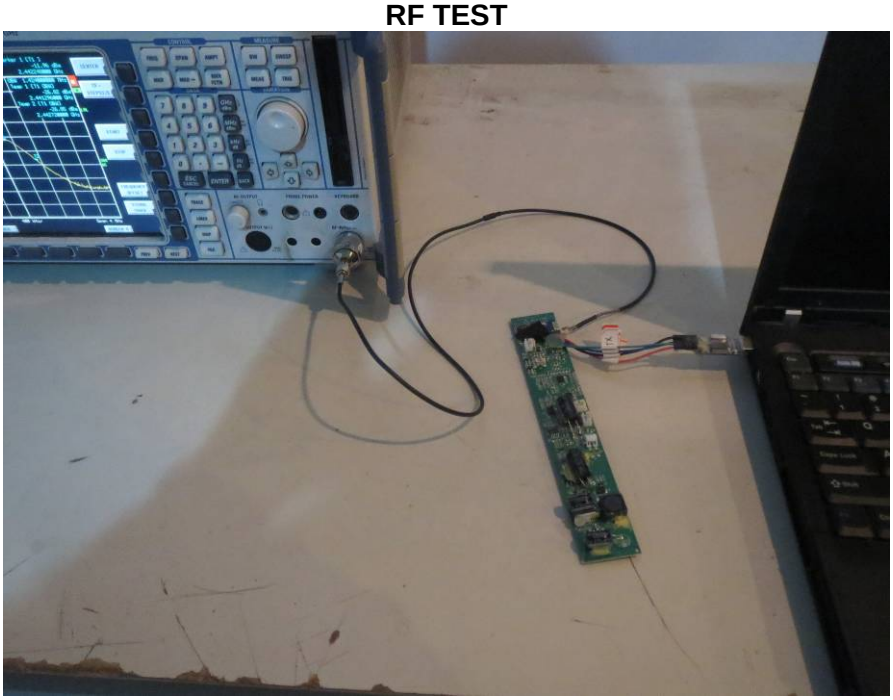
RADIATED EMISSION TEST



RADIATED EMISSION TEST



RF TEST



13. PHOTOGRAPHS OF EUT

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

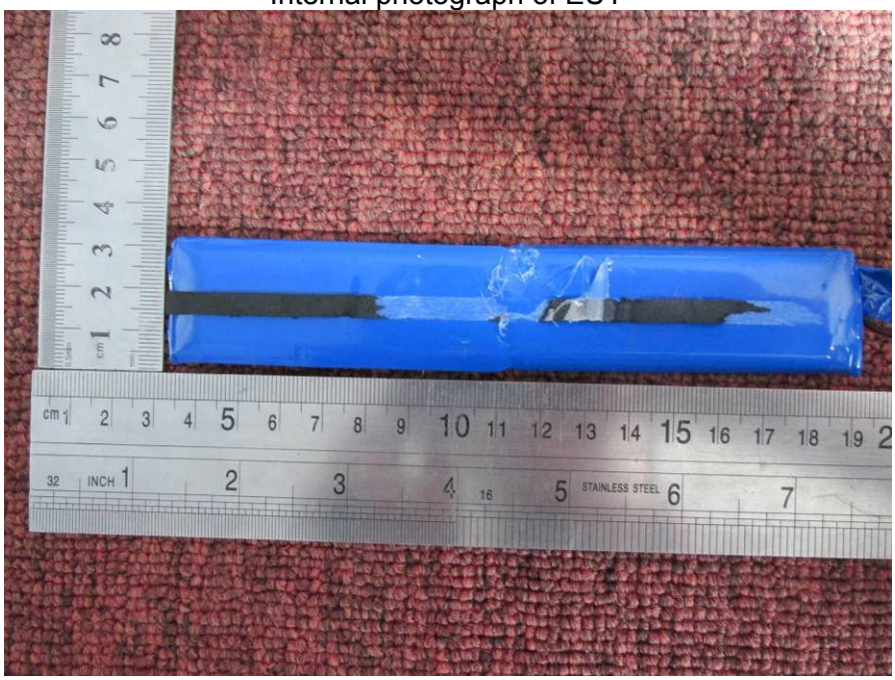
Appearance photograph of EUT

Internal photograph of EUT

Internal photograph of EUT

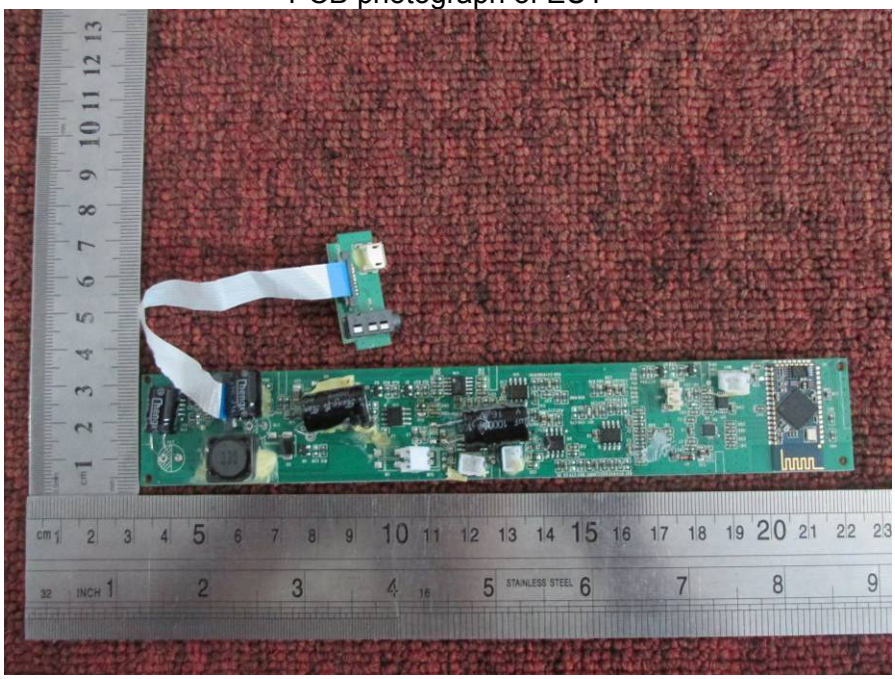
Internal photograph of EUT

Internal photograph of EUT

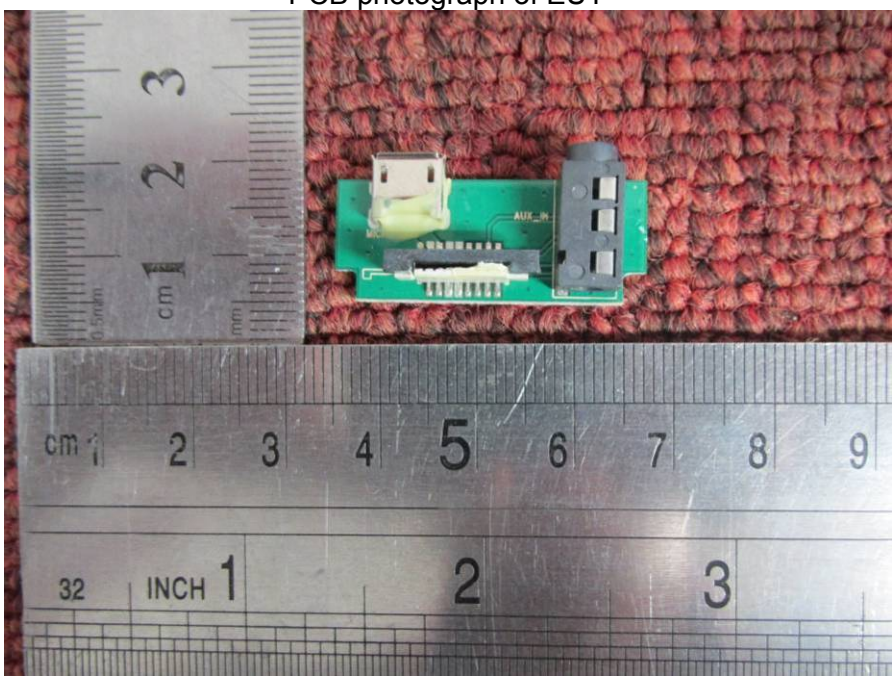


Internal photograph of EUT

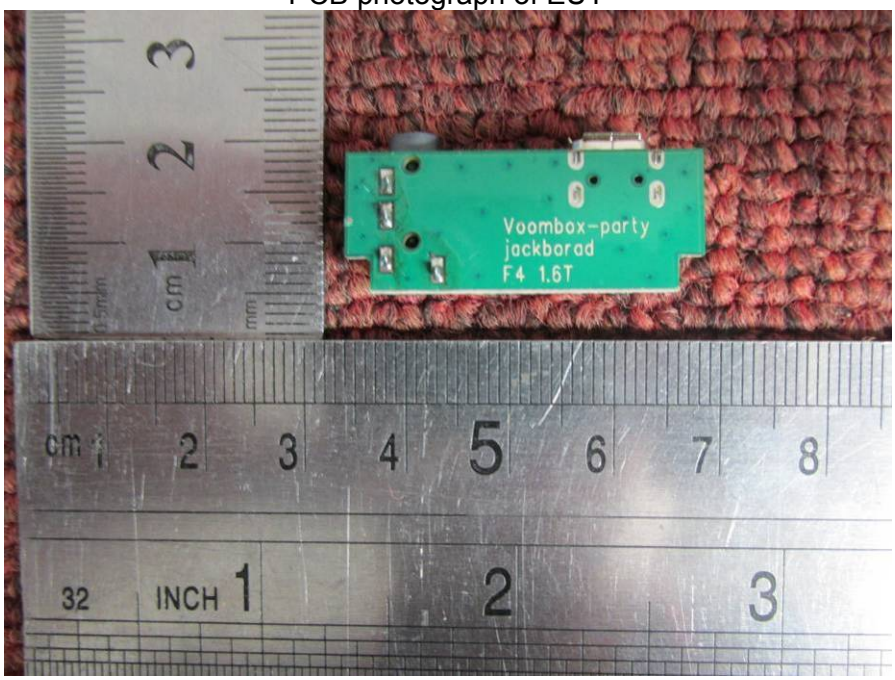
PCB photograph of EUT



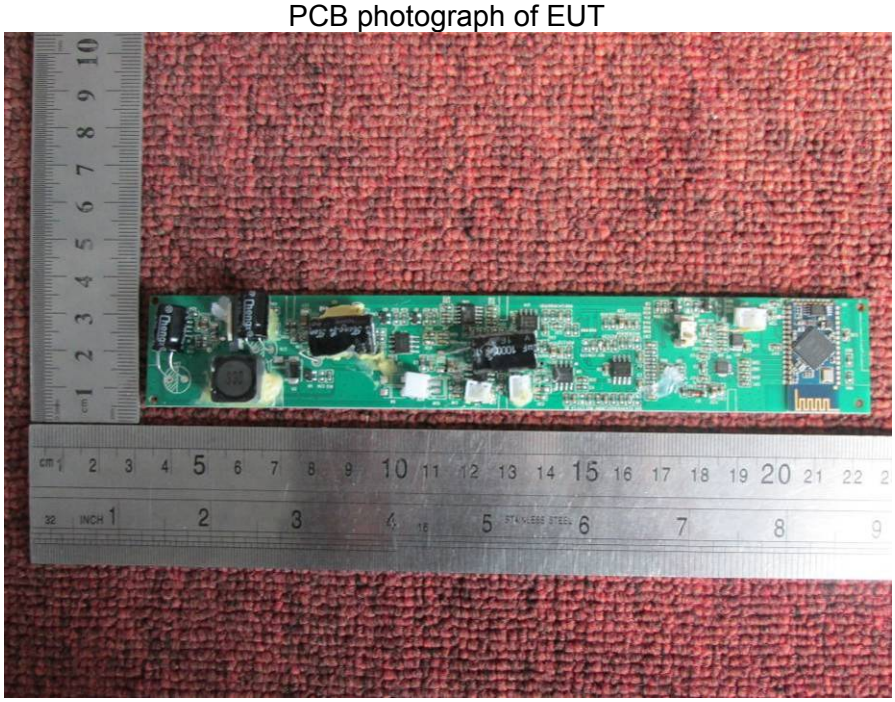
PCB photograph of EUT



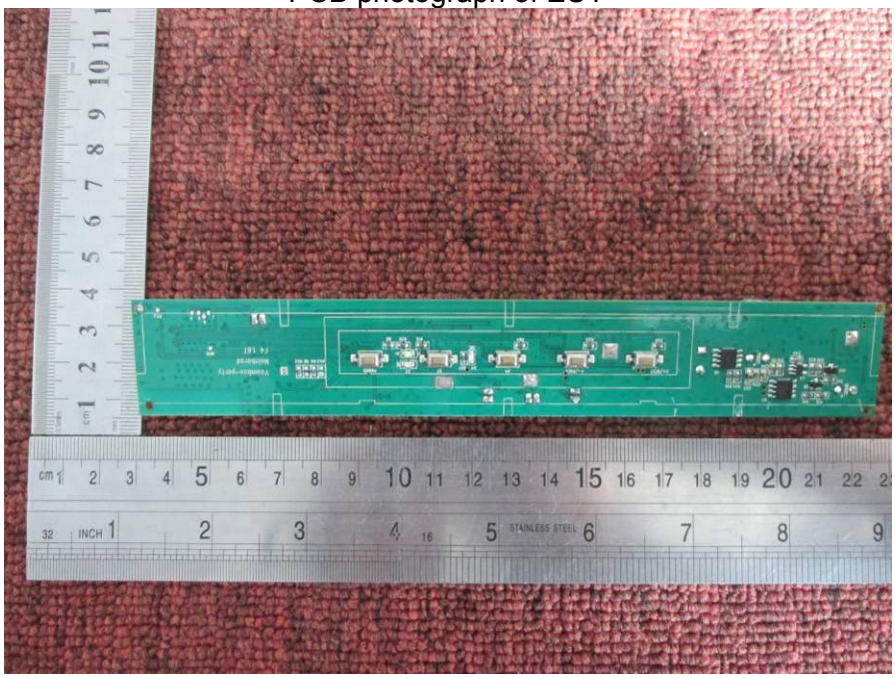
PCB photograph of EUT



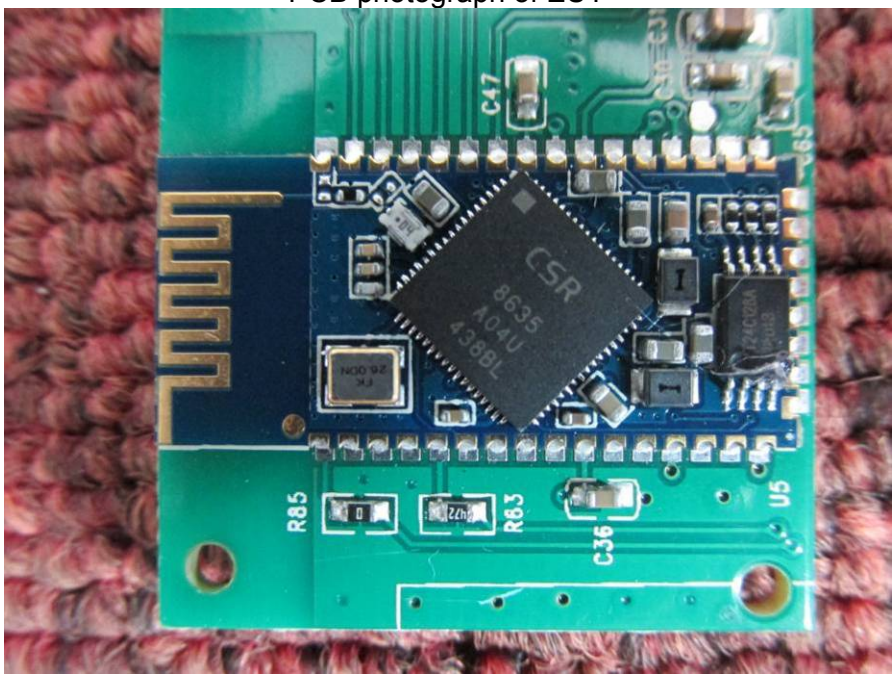
PCB photograph of EUT



PCB photograph of EUT



PCB photograph of EUT



——END OF REPORT——