

FCC TEST REPORT  
for  
Matrix Audio Limited

Portable Stereo and Bluetooth Speaker  
Model No.: Qube<sup>2</sup>

Prepared for : Matrix Audio Limited  
Address : 130 Don Park Road Unit 3 Markham, Ontario L3R1C3 Canada

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Report Number : 201309897F  
Date of Test : Sep. 25~ Oct. 17, 2013  
Date of Report : Oct. 17, 2013

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APPENDIX I (External Photos) (2 Pages)

APPENDIX II (Internal Photos) (2 Pages)

## TEST REPORT

Applicant : Matrix Audio Limited  
Manufacturer : Matrix Audio Limited  
EUT : Portable Stereo and Bluetooth Speaker  
Model No. : Qube<sup>2</sup>  
Serial No. : N/A  
Trade Mark : MA matrixaudio  
Rating : DC 5V, 500mA

Measurement Procedure Used:

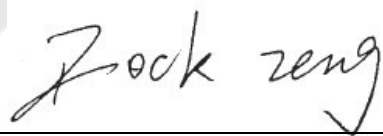
FCC Part15 Subpart C, Paragraph 15.207, 15.247 & 15.209

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

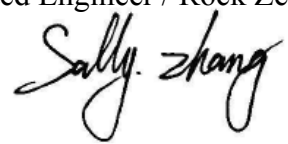
This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Sep. 25~ Oct. 17, 2013

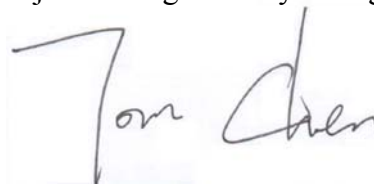
Prepared by :

  
(Tested Engineer / Rock Zeng )

Reviewer :

  
(Project Manager / Sally Zhang )

Approved & Authorized Signer :

  
(Manager / Tom Chen)

## 1. GENERAL INFORMATION

### 1.1 Description of Device (EUT)

EUT : Portable Stereo and Bluetooth Speaker

Model Number : Qube<sup>2</sup>

Test Power Supply : DC 5V Via USB Port (With DC 3.7V Battery inside)

Frequency : 2402~2480MHz

Antenna Specification : PIFI Antenna:-0.5 dBi

Modulation : GFSK,  $\pi/4$ DQPSK, 8DPSK

Applicant : Matrix Audio Limited  
Address : 130 Don Park Road Unit 3 Markham, Ontario L3R1C3 Canada

Manufacturer : Matrix Audio Limited  
Address : 130 Don Park Road Unit 3 Markham, Ontario L3R1C3 Canada

Date of receiver : Sep. 25, 2013

Date of Test : Sep. 25~ Oct. 17, 2013

## 1.2 Auxiliary Equipment Used during Test

Adapter : Power Supply  
Model: CW0502000  
Input: 100-240V~, 50-60Hz, 0.4A Max  
Output: 5V $\overline{\text{---}}$ , 500mA

## 1.3 Description of Test Facility

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

### **CNAS - LAB Code: L3503**

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

### **FCC-Registration No.: 752021**

Shenzhen Anbotek Compliance Laboratory Limited, 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 our files. Registration 752021, July 10, 2013.

### **IC-Registration No.: 8058A-1**

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, Feb. 22, 2013.

### **Test Location**

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. At 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

## 1.4 Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3dB  
Conduction Uncertainty : Uc = 3.4dB

## 2. Test Procedure

**GENERAL:** This report shall NOT be reproduced except in full without the written approval of Shenzhen Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2009 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

**Example:**

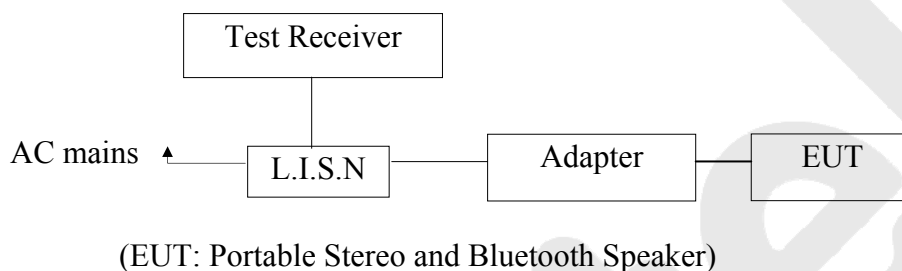
Freq (MHz) METER READING + ACF = FS  
20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

**ANSI STANDARD C63.4-2009 10.1.7 MEASUREMENT PROCEDURES:** The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

### 3. Conducted Emission

#### 3.1 Block Diagram of Test Setup

##### 3.1.1. Block diagram of connection between the EUT and simulators



#### 3.2 Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.  
2. The lower limit shall apply at the transition frequencies.

#### 3.3 Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT : Portable Stereo and Bluetooth Speaker  
Model Number : Qube<sup>2</sup>  
Applicant : Matrix Audio Limited

#### 3.4 Operating Condition of EUT

3.4.1. Setup the EUT and simulator as shown as Section 3.1.

3.4.2. Turn on the power of all equipment.

3.4.3. Let the EUT work in test mode (Charging) and measure it.



### 3.5 Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

#### Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 23, 2013	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2013	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 23, 2013	1 Year

### 3.6 Power Line Conducted Emission Measurement Results

**PASS.**

The frequency range from 150KHz to 30 MHz is investigated.

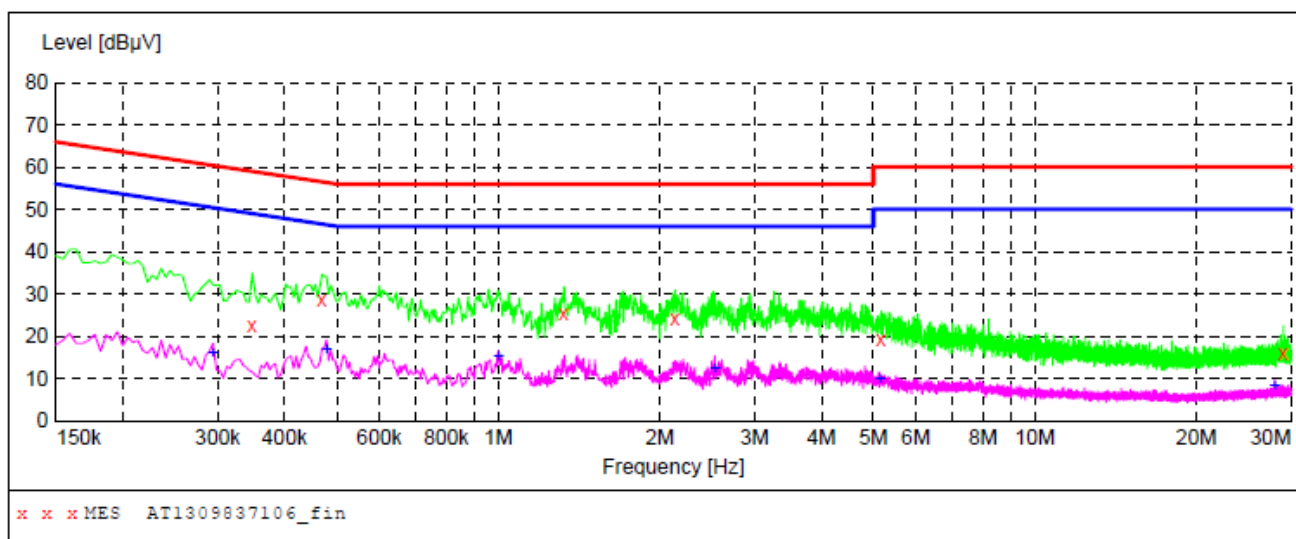
Please refer the following pages.

## CONDUCTED EMISSION TEST DATA

EUT: Portable Stereo and Bluetooth Speaker M/N: Qube<sup>2</sup>  
Operating Condition: Charging  
Test Site: 1# Shielded Room  
Operator: Finley Li  
Test Specification: AC 120V/60Hz  
Comment: Live Line  
Tem:25°C Hum:50%

### SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



### MEASUREMENT RESULT: "AT1309837106\_fin"

9/25/2013 3:43PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.348000	22.60	20.1	59	36.4	QP	L1	GND
0.469500	28.70	20.1	57	27.8	QP	L1	GND
1.324000	25.20	20.2	56	30.8	QP	L1	GND
2.134000	24.30	20.3	56	31.7	QP	L1	GND
5.171500	19.30	20.5	60	40.7	QP	L1	GND
28.999000	15.80	20.9	60	44.2	QP	L1	GND

### MEASUREMENT RESULT: "AT1309837106\_fin2"

9/25/2013 3:43PM

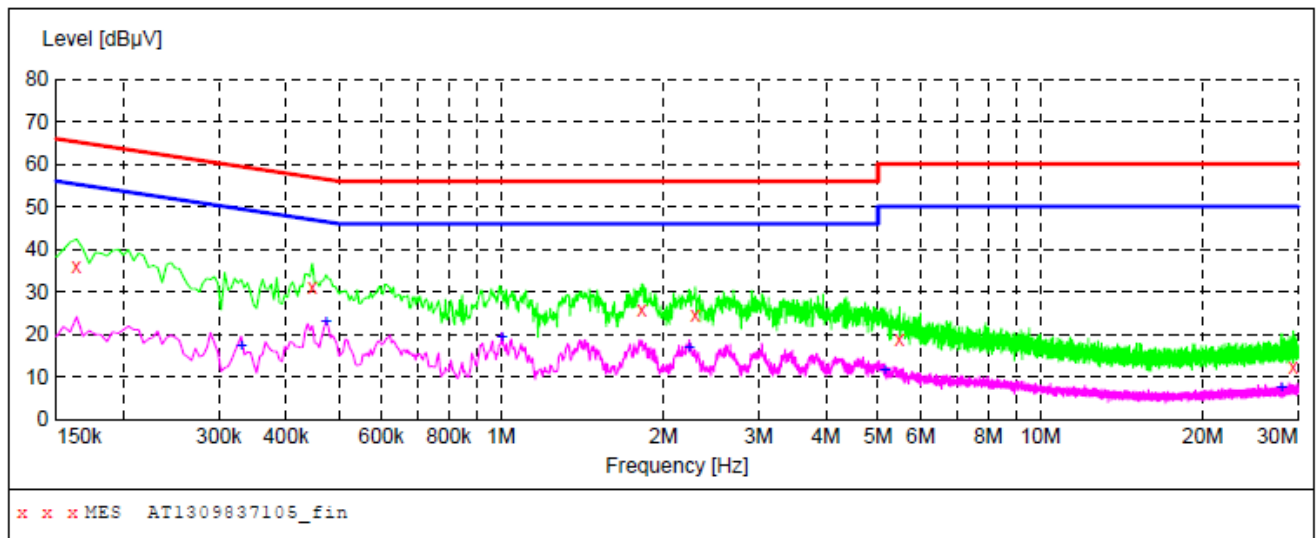
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.294000	16.00	20.1	50	34.4	AV	L1	GND
0.478500	16.90	20.1	46	29.5	AV	L1	GND
1.000000	15.40	20.2	46	30.6	AV	L1	GND
2.530000	12.20	20.4	46	33.8	AV	L1	GND
5.135500	9.70	20.5	50	40.3	AV	L1	GND
27.977500	8.40	20.9	50	41.6	AV	L1	GND

## CONDUCTED EMISSION TEST DATA

EUT: Portable Stereo and Bluetooth Speaker M/N: Qube<sup>2</sup>  
Operating Condition: Charging  
Test Site: 1# Shielded Room  
Operator: Finley Li  
Test Specification: AC 120V/60Hz  
Comment: Neutral Line  
Tem:25°C Hum:50%

### SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



### MEASUREMENT RESULT: "AT1309837105\_fin"

9/25/2013 3:40PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.163500	35.90	20.1	65	29.4	QP	N	GND
0.447000	31.30	20.1	57	25.6	QP	N	GND
1.823500	26.00	20.3	56	30.0	QP	N	GND
2.291500	24.50	20.3	56	31.5	QP	N	GND
5.482000	19.00	20.5	60	41.0	QP	N	GND
29.422000	12.50	20.9	60	47.5	QP	N	GND

### MEASUREMENT RESULT: "AT1309837105\_fin2"

9/25/2013 3:40PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.330000	17.30	20.1	50	32.2	AV	N	GND
0.474000	23.10	20.1	46	23.3	AV	N	GND
1.004500	19.10	20.2	46	26.9	AV	N	GND
2.233000	16.80	20.3	46	29.2	AV	N	GND
5.144500	11.40	20.5	50	38.6	AV	N	GND
27.977500	7.60	20.9	50	42.4	AV	N	GND

## 4. Radiation Interference

### 4.1 Requirements (15.247, 15.209):

FIELD STRENGTH of Fundamental: 902-928 MHz 2.4-2.4835 GHz 94 dBμV/m @3m	FIELD STRENGTH of Harmonics   54 dBμV/m @3m	S15.209 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz ABOVE 960 MHz	40 dBuV/m @3M 43.5 46 54dBuV/m
---	---	--	---

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

### 4.2 Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9\*6\*6 Chamber.  
The test results are listed in Section 4.3.

#### Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 09, 2013	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 09, 2013	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 23, 2013	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Aug. 09, 2013	3 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	3 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

#### 4.3 Test Results

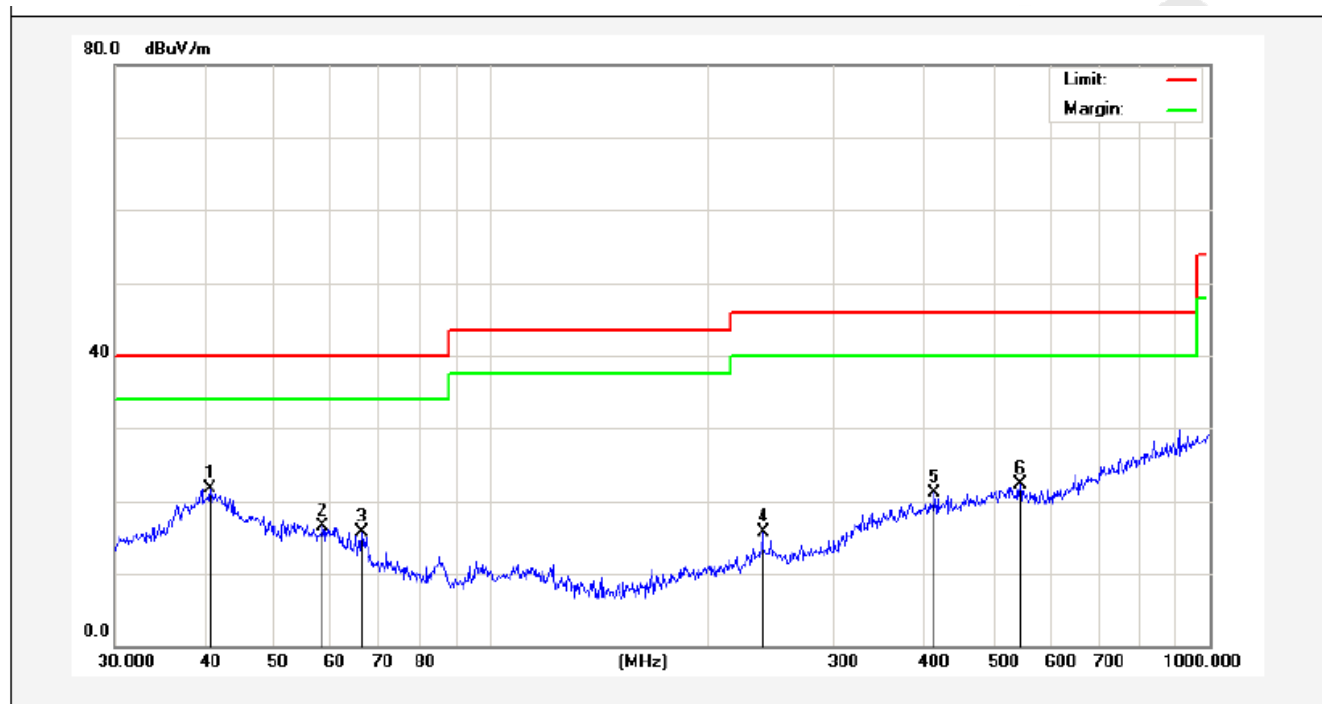
PASS.

Please refer the following pages.

Anbotek

<b>Job No.:</b>	AT1309837F	<b>Polarization:</b>	Horizontal
<b>Standard:</b>	(RE)FCC PART 15C _3m	<b>Power Source:</b>	DC 3.7V
<b>Test item:</b>	Radiation Test (30~1000MHz)	<b>Date:</b>	2013/09/25
<b>Temp.(C)/Hum.(%RH):</b>	24.3( C)/55%RH	<b>Time:</b>	15:02:33
<b>EUT:</b>	Portable Stereo and Bluetooth Speaker	<b>Test By:</b>	Jimly Chen
<b>Model:</b>	Qube <sup>2</sup>	<b>Distance:</b>	3m

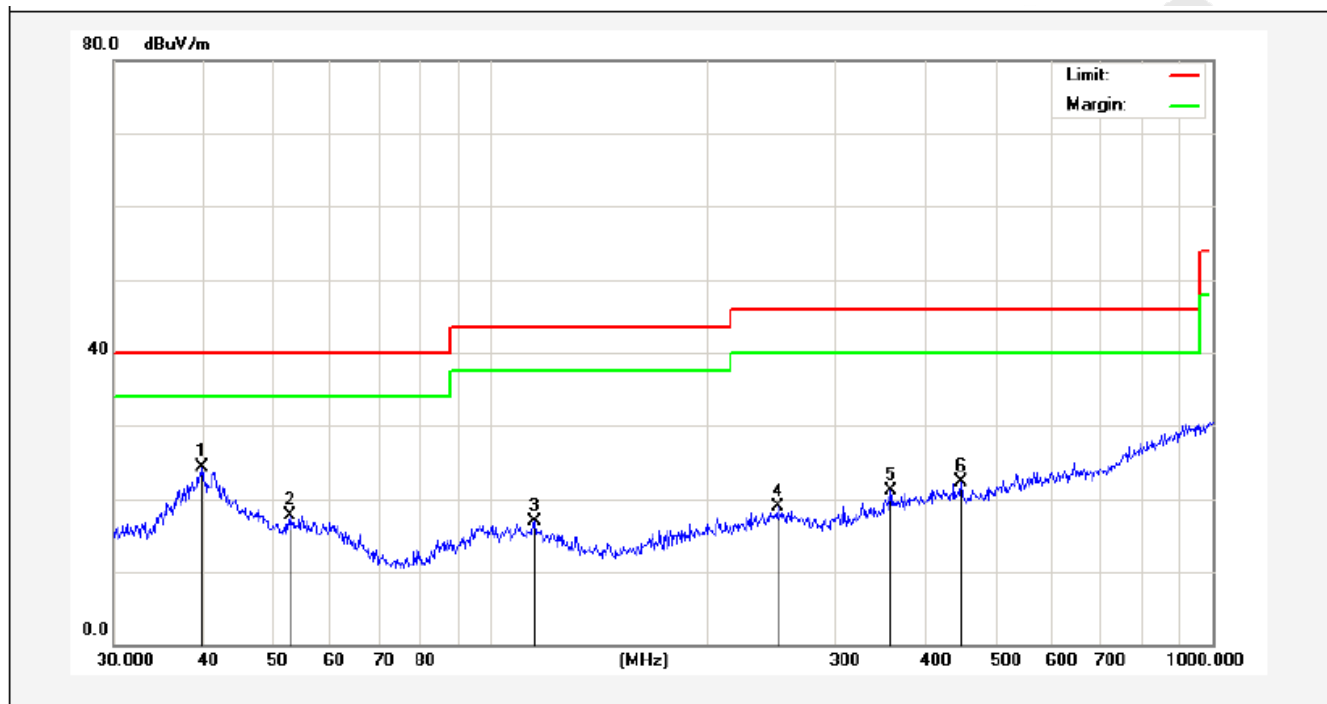
**Note:** BT Mode



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.7014	32.30	-10.64	21.66	40.00	-18.34	peak			
2	58.4074	31.76	-15.26	16.50	40.00	-23.50	peak			
3	66.2661	33.74	-18.01	15.73	40.00	-24.27	peak			
4	239.1473	33.95	-18.17	15.78	46.00	-30.22	peak			
5	414.7223	33.53	-12.52	21.01	46.00	-24.99	peak			
6	545.1825	33.33	-11.08	22.25	46.00	-23.75	peak			

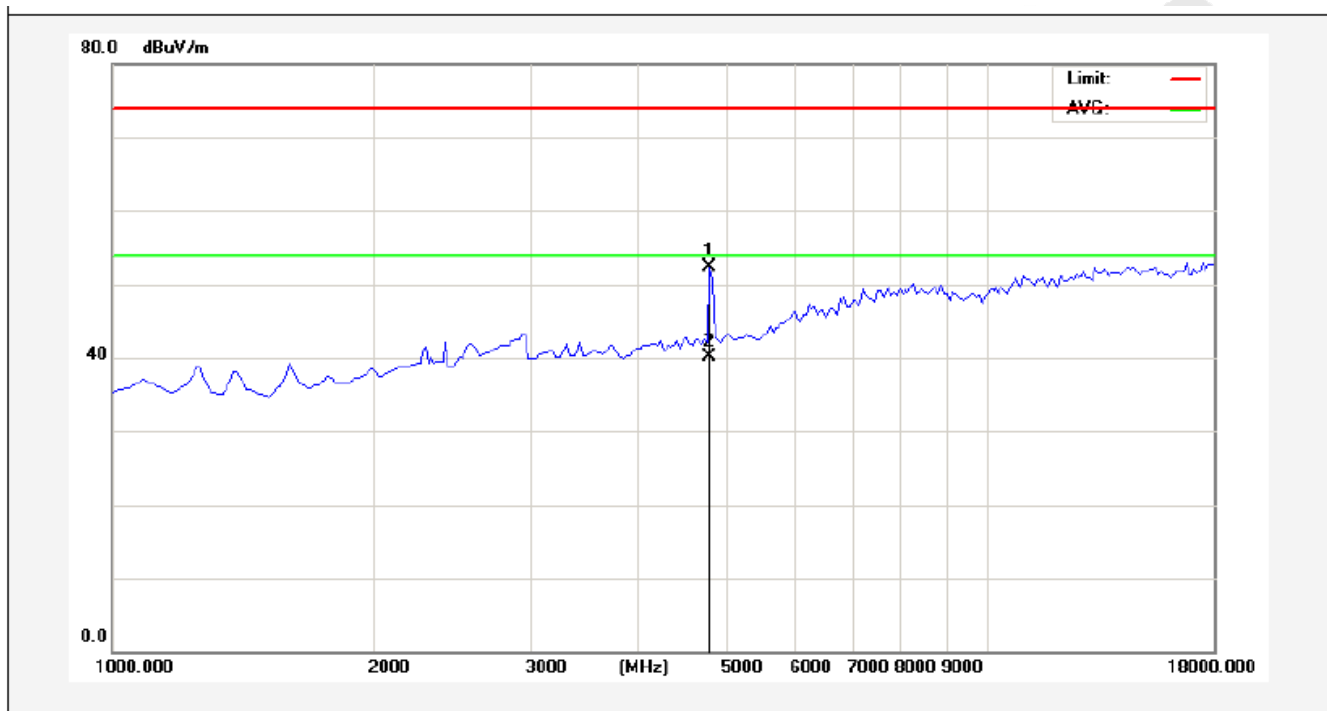
<b>Job No.:</b>	AT1309837F	<b>Polarization:</b>	Vertical
<b>Standard:</b>	(RE)FCC PART 15C _3m	<b>Power Source:</b>	DC 3.7V
<b>Test item:</b>	Radiation Test (30~1000MHz)	<b>Date:</b>	2013/09/25
<b>Temp.(C)/Hum.(%RH):</b>	24.3( C)/55%RH	<b>Time:</b>	15:05:57
<b>EUT:</b>	Portable Stereo and Bluetooth Speaker	<b>Test By:</b>	Jimly Chen
<b>Model:</b>	Qube <sup>2</sup>	<b>Distance:</b>	3m

**Note:** BT Mode



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.8542	34.86	-10.49	24.37	40.00	-15.63	peak			
2	52.7600	32.43	-14.77	17.66	40.00	-22.34	peak			
3	114.9169	32.94	-15.97	16.97	43.50	-26.53	peak			
4	249.4250	32.96	-14.05	18.91	46.00	-27.09	peak			
5	357.9287	33.84	-12.73	21.11	46.00	-24.89	peak			
6	447.9822	33.83	-11.57	22.26	46.00	-23.74	peak			

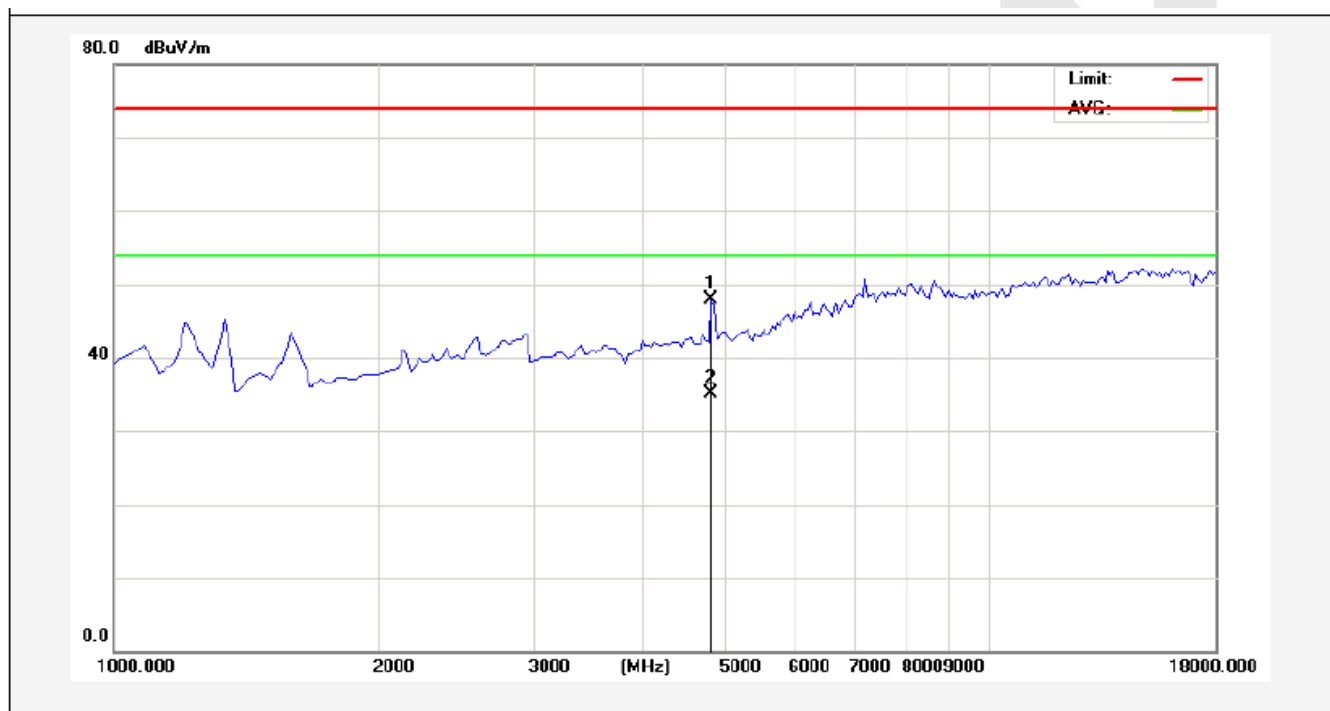
<b>Job No.:</b>	<b>AT1309837F</b>	<b>Polarization:</b>	<b>Horizontal</b>
<b>Standard:</b>	<b>(RE)FCC PART 15C_Class B_3m</b>	<b>Power Source:</b>	<b>DC 3.7V</b>
<b>Test item:</b>	<b>Radiation Test (Above 1GHz)</b>	<b>Date:</b>	<b>2013/09/25</b>
<b>Temp.(C)/Hum.(%RH):</b>	<b>24.3( C)/55%RH</b>	<b>Time:</b>	<b>15:14:14</b>
<b>EUT:</b>	<b>Portable Stereo and Bluetooth Speaker</b>	<b>Test By:</b>	<b>Jimly Chen</b>
<b>Model:</b>	<b>Qube<sup>2</sup></b>	<b>Distance:</b>	<b>3m</b>
<b>Note:</b>	<b>2402 MHz</b>		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	48.90	3.34	52.24	74.00	-21.76	peak			
2	4825.000	36.77	3.34	40.11	54.00	-13.89	AVG			

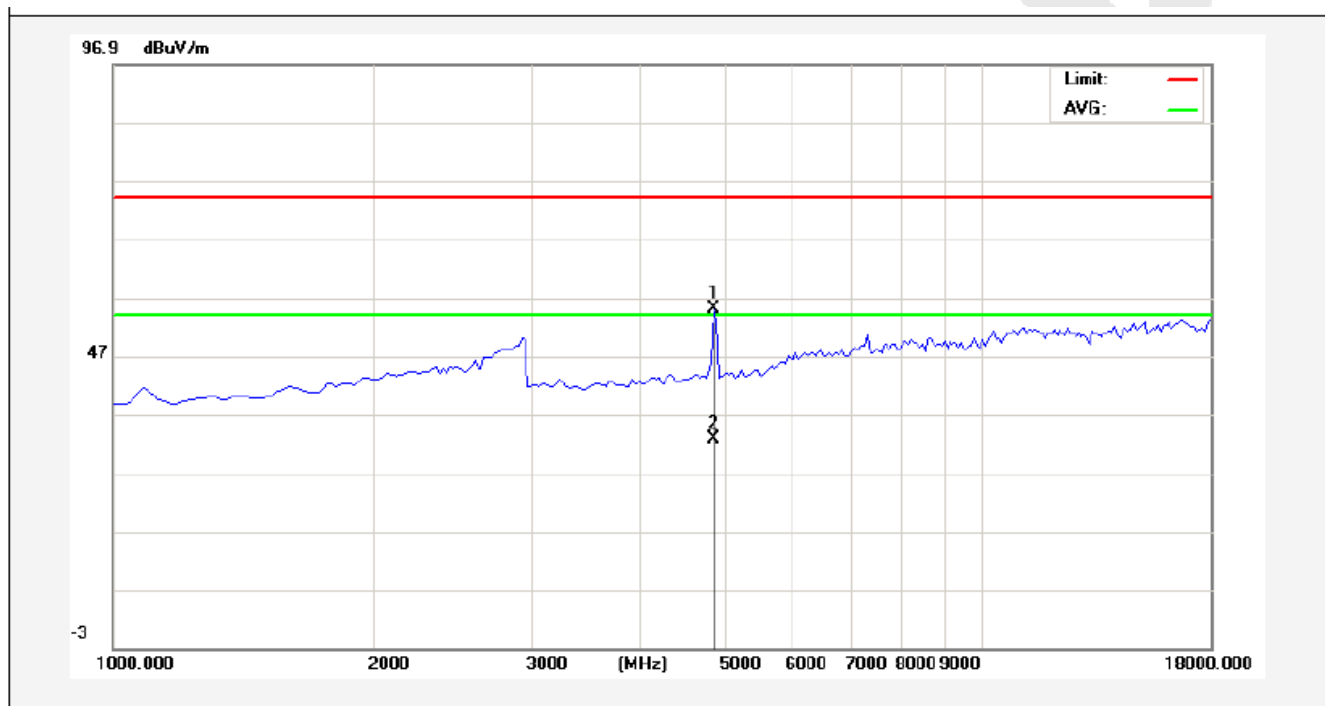


<b>Job No.:</b>	<b>AT1309837F</b>	<b>Polarization:</b>	<b>Vertical</b>
<b>Standard:</b>	<b>(RE)FCC PART 15C_Class B_3m</b>	<b>Power Source:</b>	<b>DC 3.7V</b>
<b>Test item:</b>	<b>Radiation Test (Above 1GHz)</b>	<b>Date:</b>	<b>2013/09/25</b>
<b>Temp.(C)/Hum.(%RH):</b>	<b>24.3( C)/55%RH</b>	<b>Time:</b>	<b>15:17:57</b>
<b>EUT:</b>	<b>Portable Stereo and Bluetooth Speaker</b>	<b>Test By:</b>	<b>Jimly Chen</b>
<b>Model:</b>	<b>Qube<sup>2</sup></b>	<b>Distance:</b>	<b>3m</b>
<b>Note:</b>	<b>2402 MHz</b>		



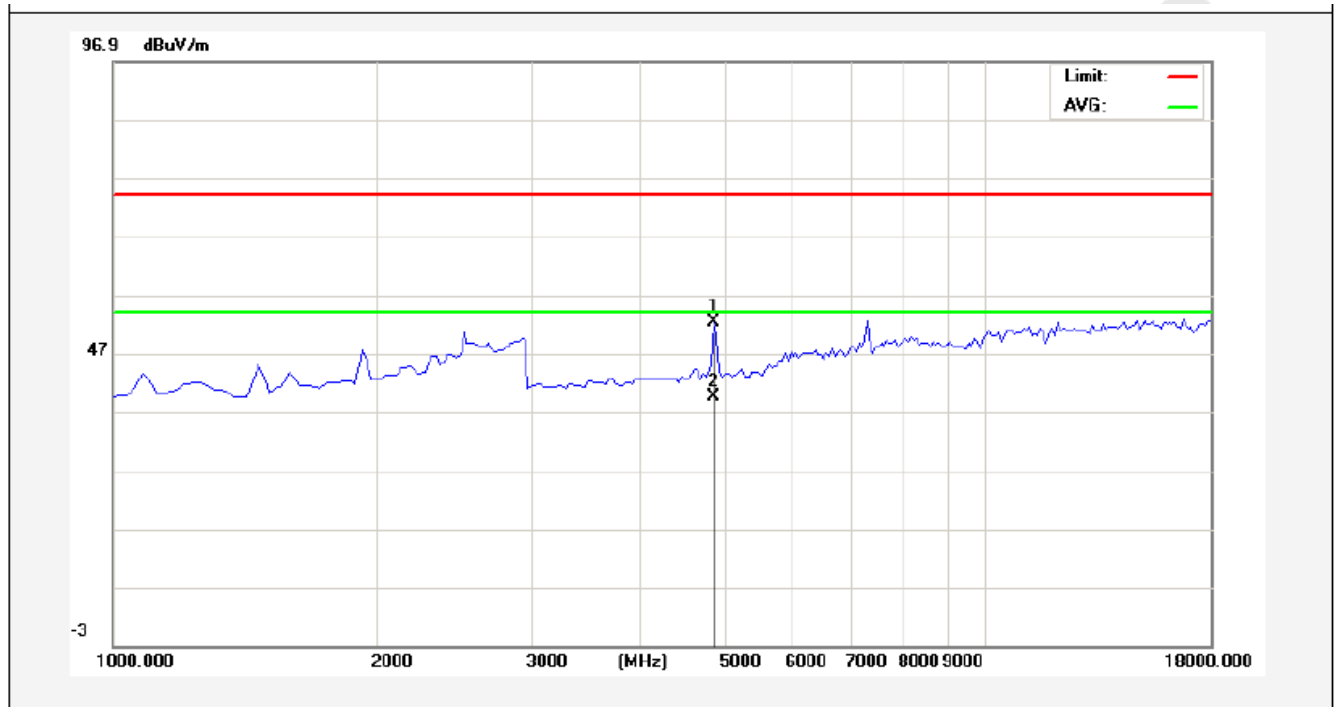
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	44.62	3.34	47.96	74.00	-26.04	peak			
2	4825.000	31.69	3.34	35.03	54.00	-18.97	AVG			

<b>Job No.:</b>	<b>AT1309837F</b>	<b>Polarziation:</b>	<b>Horizontal</b>
<b>Standard:</b>	<b>(RE)FCC PART 15C_Class B_3m</b>	<b>Power Source:</b>	<b>DC 3.7V</b>
<b>Test item:</b>	<b>Radiation Test (Above 1GHz)</b>	<b>Date:</b>	<b>2013/09/25</b>
<b>Temp.(C)/Hum.(%RH):</b>	<b>24.3( C)/55%RH</b>	<b>Time:</b>	<b>15:20:35</b>
<b>EUT:</b>	<b>Portable Stereo and Bluetooth Speaker</b>	<b>Test By:</b>	<b>Jimly Chen</b>
<b>Model:</b>	<b>Qube<sup>2</sup></b>	<b>Distance:</b>	<b>3m</b>
<b>Note:</b>	<b>2441 MHz</b>		



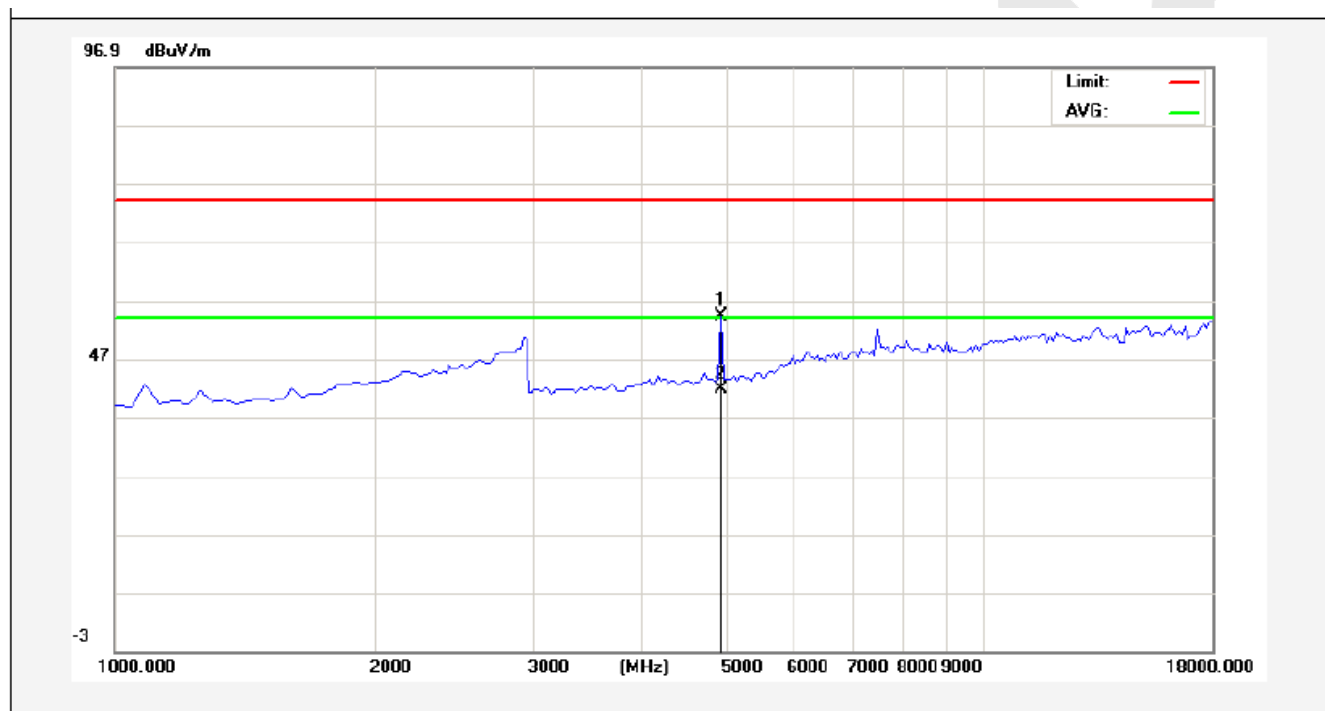
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	51.60	3.41	55.01	74.00	-18.99	peak			
2	4867.500	29.41	3.41	32.82	54.00	-21.18	AVG			

<b>Job No.:</b>	AT1309837F	<b>Polarization:</b>	Vertical
<b>Standard:</b>	(RE)FCC PART 15C_Class B_3m	<b>Power Source:</b>	DC 3.7V
<b>Test item:</b>	Radiation Test (Above 1GHz)	<b>Date:</b>	2013/09/25
<b>Temp.(C)/Hum.(%RH):</b>	24.3( C)/55%RH	<b>Time:</b>	15:23:07
<b>EUT:</b>	Portable Stereo and Bluetooth Speaker	<b>Test By:</b>	Jimly Chen
<b>Model:</b>	Qube <sup>2</sup>	<b>Distance:</b>	3m
<b>Note:</b>	2441 MHz		



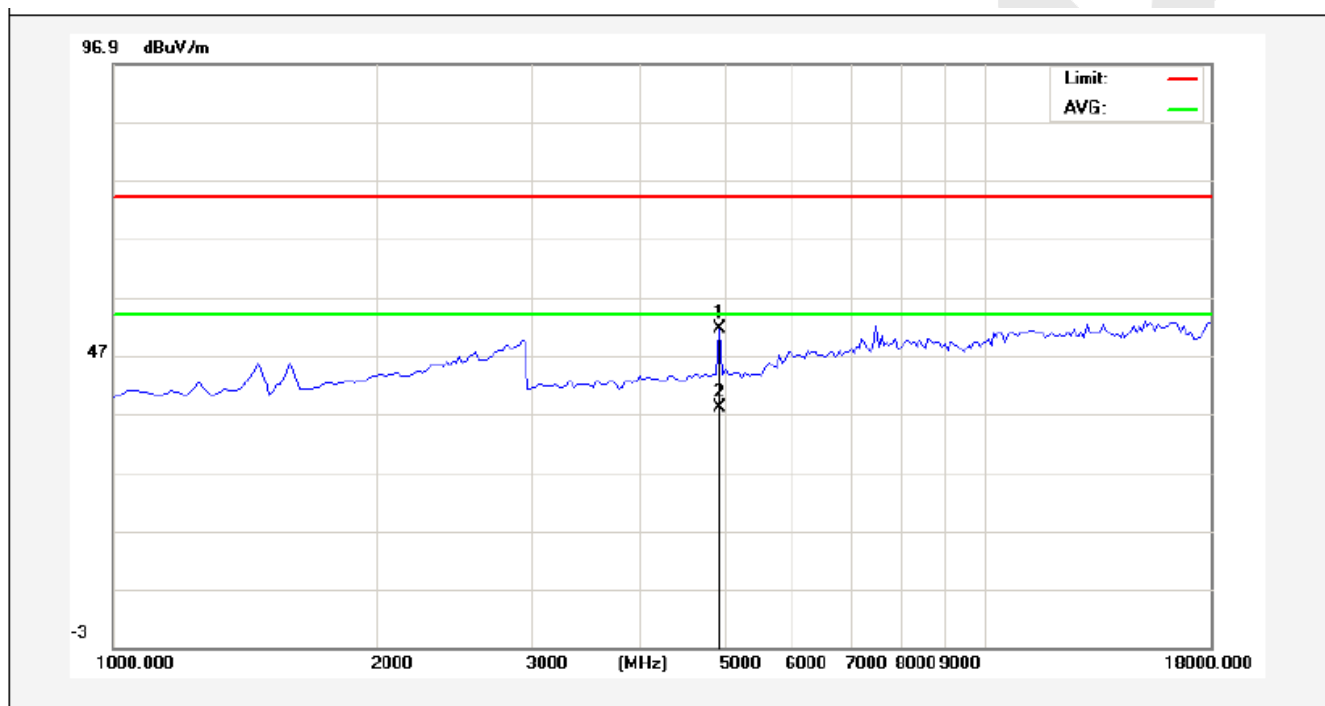
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	48.97	3.41	52.38	74.00	-21.62	peak			
2	4867.500	36.21	3.41	39.62	54.00	-14.38	AVG			

<b>Job No.:</b>	<b>AT1309837F</b>	<b>Polarization:</b>	<b>Horizontal</b>
<b>Standard:</b>	<b>(RE)FCC PART 15C_Class B_3m</b>	<b>Power Source:</b>	<b>DC 3.7V</b>
<b>Test item:</b>	<b>Radiation Test (Above 1GHz)</b>	<b>Date:</b>	<b>2013/09/25</b>
<b>Temp.(C)/Hum.(%RH):</b>	<b>24.3( C)/55%RH</b>	<b>Time:</b>	<b>15:27:54</b>
<b>EUT:</b>	<b>Portable Stereo and Bluetooth Speaker</b>	<b>Test By:</b>	<b>Jimly Chen</b>
<b>Model:</b>	<b>Qube<sup>2</sup></b>	<b>Distance:</b>	<b>3m</b>
<b>Note:</b>	<b>2480 MHz</b>		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4952.500	50.74	3.57	54.31	74.00	-19.69	peak			
2	4952.500	38.26	3.57	41.83	54.00	-12.17	AVG			

<b>Job No.:</b>	<b>AT1309837F</b>	<b>Polarziation:</b>	<b>Vertical</b>
<b>Standard:</b>	<b>(RE)FCC PART 15C_Class B_3m</b>	<b>Power Source:</b>	<b>DC 3.7V</b>
<b>Test item:</b>	<b>Radiation Test (Above 1GHz)</b>	<b>Date:</b>	<b>2013/09/25</b>
<b>Temp.(C)/Hum.(%RH):</b>	<b>24.3( C)/55%RH</b>	<b>Time:</b>	<b>15:30:12</b>
<b>EUT:</b>	<b>Portable Stereo and Bluetooth Speaker</b>	<b>Test By:</b>	<b>Jimly Chen</b>
<b>Model:</b>	<b>Qube<sup>2</sup></b>	<b>Distance:</b>	<b>3m</b>
<b>Note:</b>	<b>2480 MHz</b>		



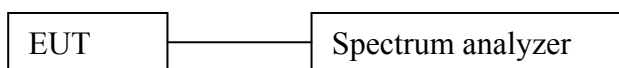
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4952.500	47.94	3.57	51.51	74.00	-22.49	peak			
2	4952.500	34.39	3.57	37.96	54.00	-16.04	AVG			

## 5. CHANNEL SEPARATION TEST

### 5.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 5.2 Test SET-UP



### 5.3 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 09, 2013	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 09, 2013	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 23, 2013	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Aug. 09, 2013	3 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	3 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

## 5.4 Test Results

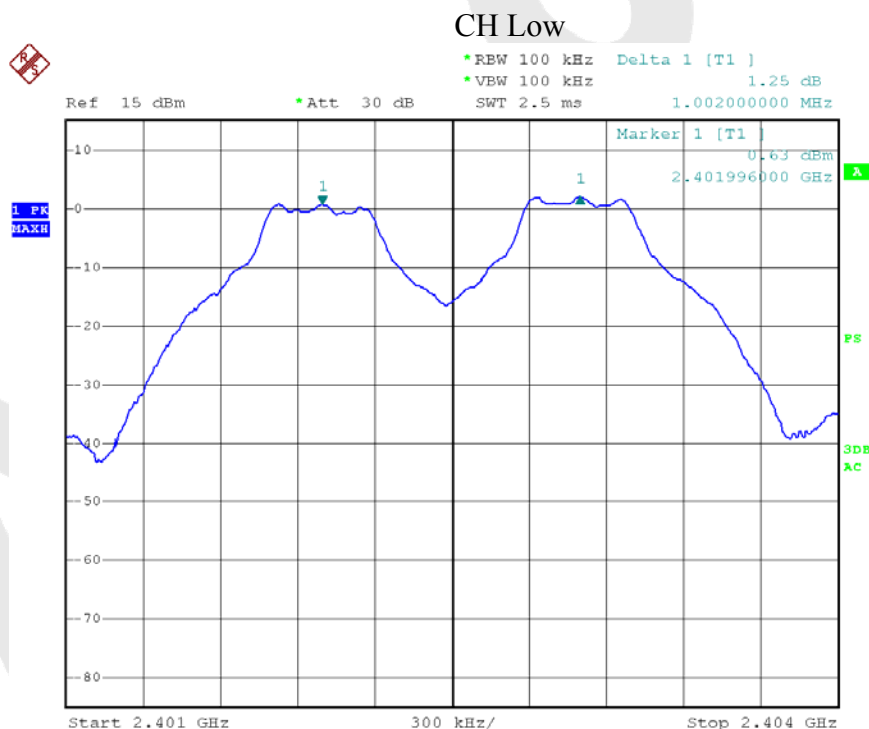
Product : Portable Stereo and Bluetooth Speaker      Test Mode : CH Low ~ CH High  
Test Item : Frequency Separation      Temperature : 24℃  
Test Voltage : DC 3.7V      Humidity : 55%RH  
Test Result : PASS

Channel	Frequency (MHz)	Separation Read Value (kHz)	Limit (kHz)	Modulation Mode
Low	2401	1002	882	GFSK
Mid	2441	1002	876	GFSK
High	2480	1002	870	GFSK
Low	2401	1012	820	$\pi/4$ DQPSK
Mid	2441	1002	844	$\pi/4$ DQPSK
High	2480	1002	844	$\pi/4$ DQPSK
Low	2401	1012	820	8DPSK
Mid	2441	1002	844	8DPSK
High	2480	1002	844	8DPSK

Remark:

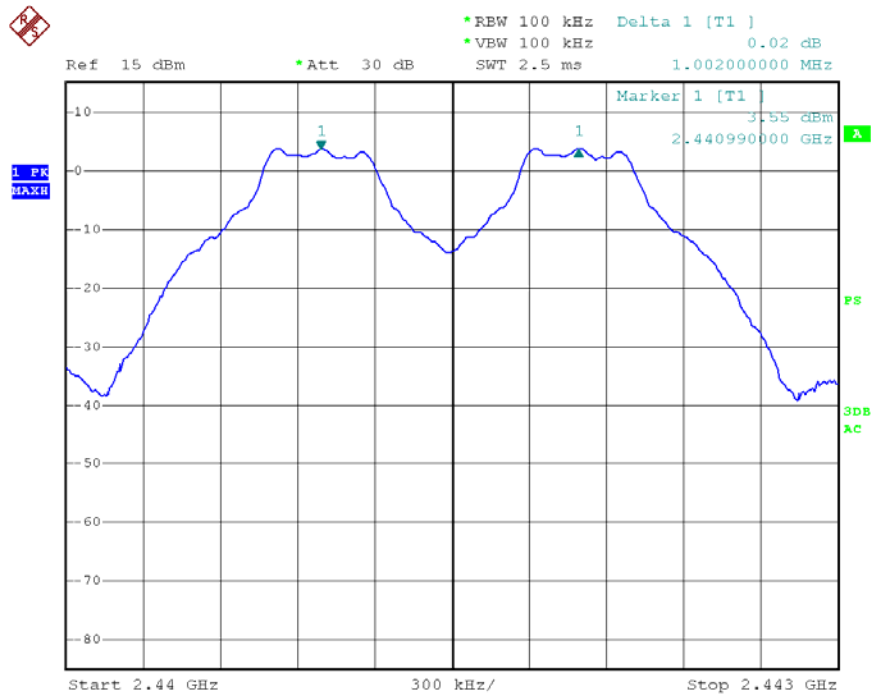
1. The limit of modulation ( $\pi/4$ DQPSK, 8DPSK ) is 2/3 of 20dB BW;

Modulation Mode: GFSK



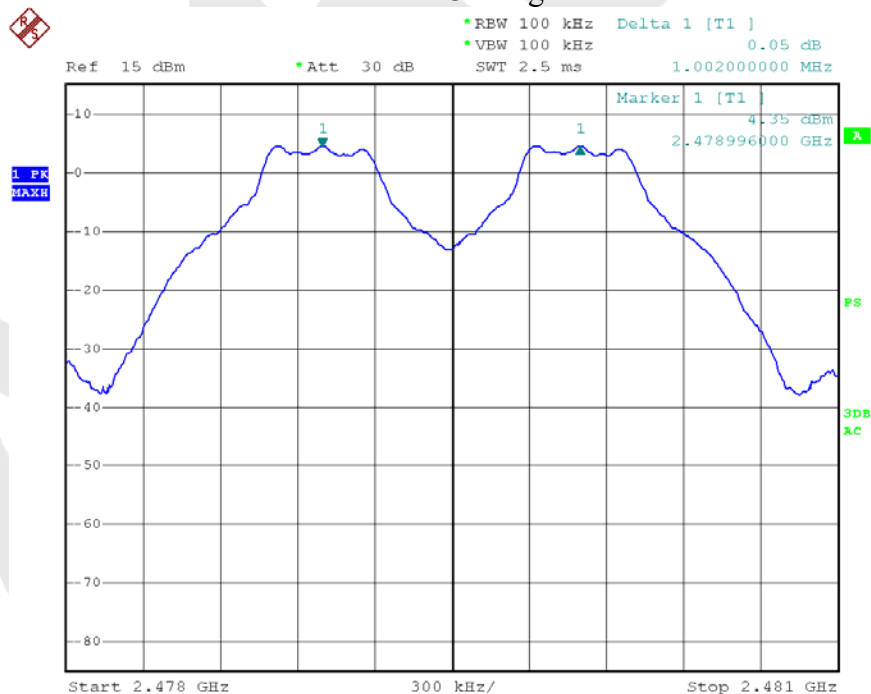
Date: 12.OCT.2013 16:45:57

### CH Mid



Date: 12.OCT.2013 16:47:05

### CH High

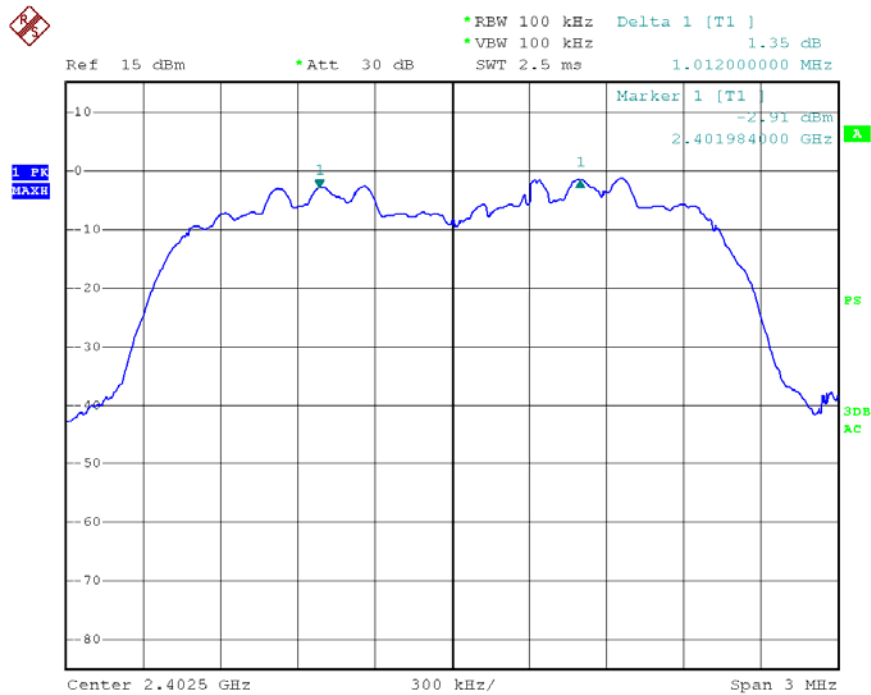


Date: 12.OCT.2013 16:48:22



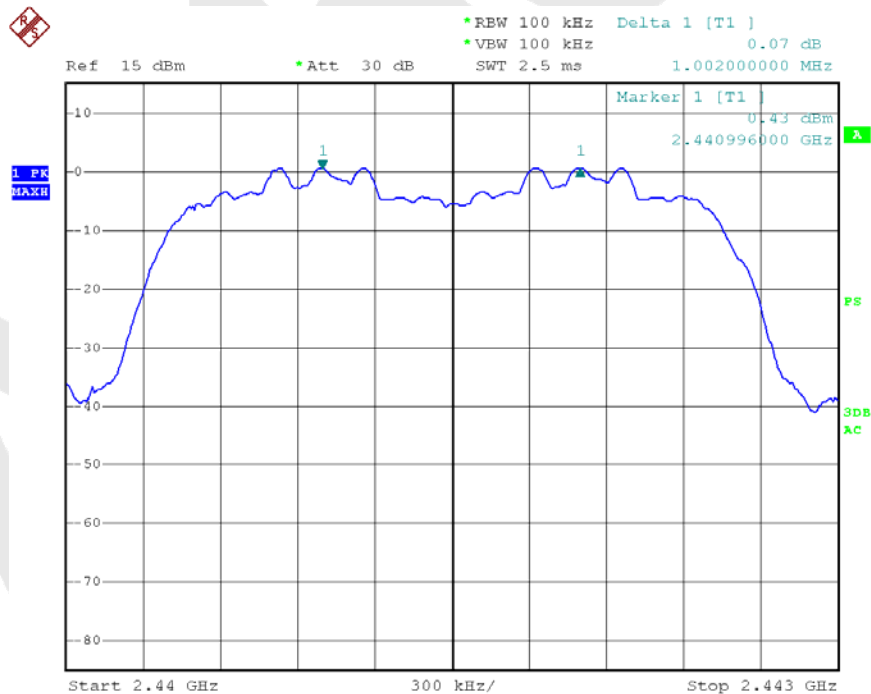
Modulation Mode:  $\pi/4$ DQPSK & 8DPSK

### CH Low

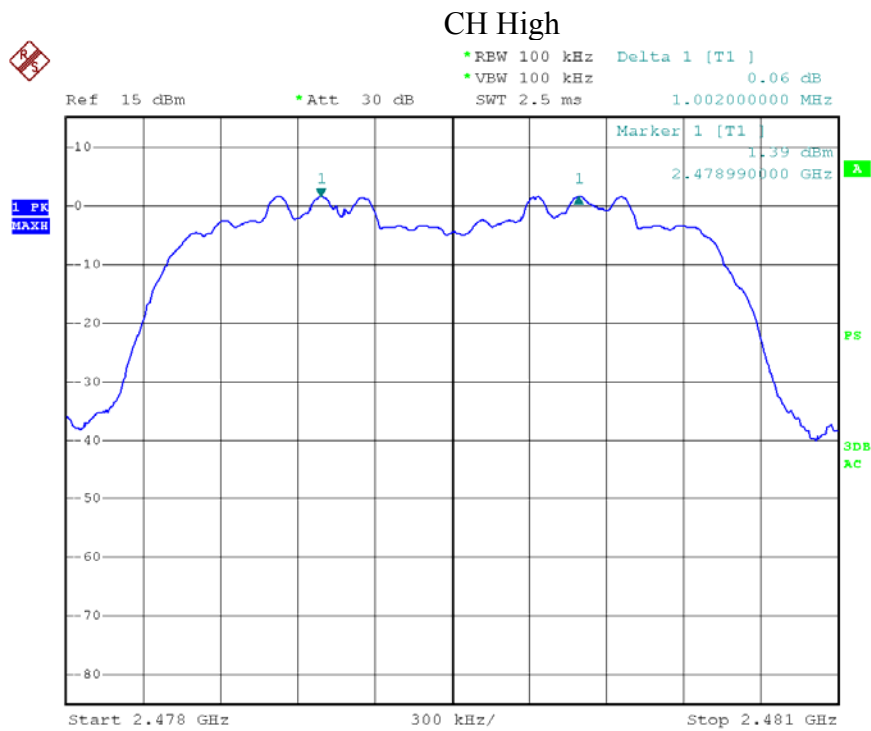


Date: 12.OCT.2013 16:52:27

### CH Mid



Date: 14.OCT.2013 09:47:33



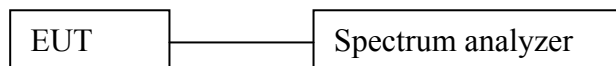
Date: 14.OCT.2013 09:48:37

## 6. 20DB BANDWIDTH TEST

### 6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 6.2 Test SET-UP



### 6.3 Test Equipment

Same as the equipment listed in 5.3.

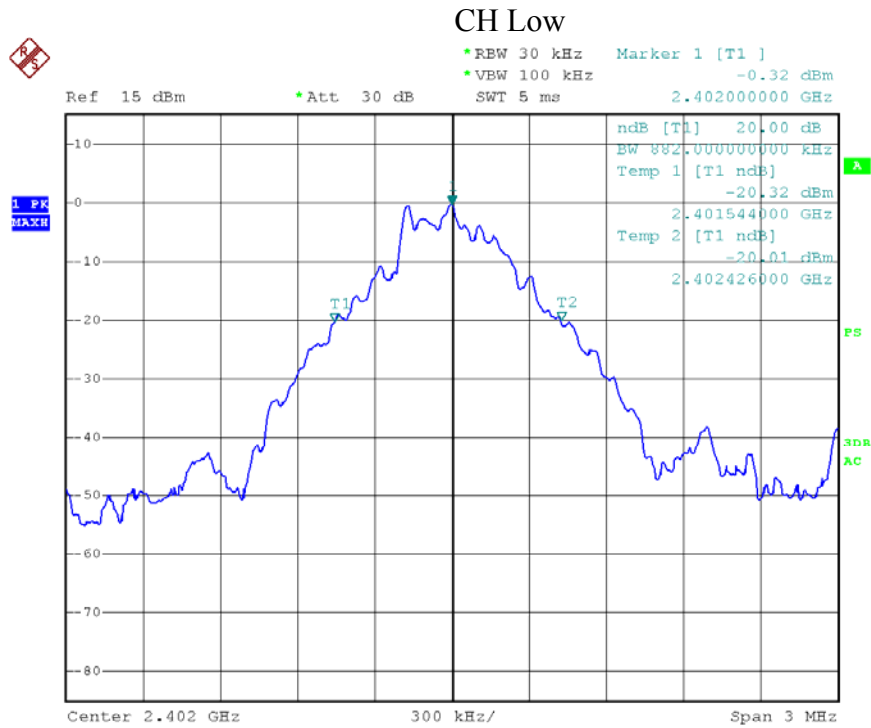
### 6.4 Test Results

Product	: Portable Stereo and Bluetooth Speaker	Test Mode	: CH Low ~ CH High
Test Item	: 20dB BW	Temperature	: 24℃
Test Voltage	: DC 3.7V	Humidity	: 55%RH
Test Result	: PASS		

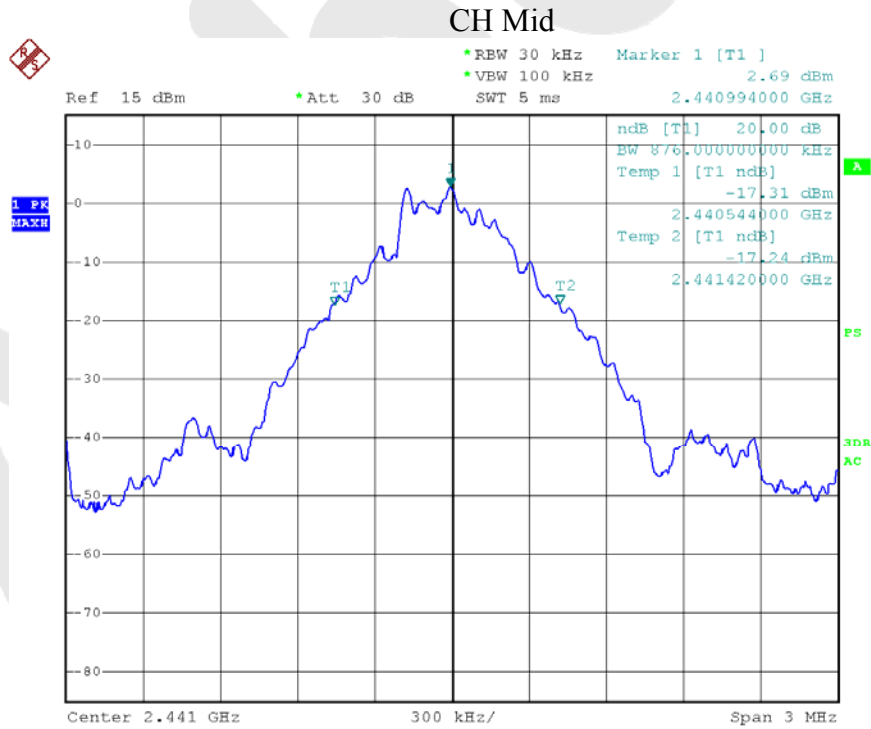
Channel	Frequency (MHz)	20dB Down BW(kHz)	Modulation Mode
Low	2401	882	GFSK
Mid	2441	876	GFSK
High	2480	870	GFSK
Low	2401	1230	$\pi/4$ DQPSK
Mid	2441	1266	$\pi/4$ DQPSK
High	2480	1266	$\pi/4$ DQPSK
Low	2401	1230	8DPSK
Mid	2441	1266	8DPSK
High	2480	1266	8DPSK

Remark: The results of modulations  $\pi/4$ DQPSK and 8DPSK are the same.

Modulation Mode: GFSK

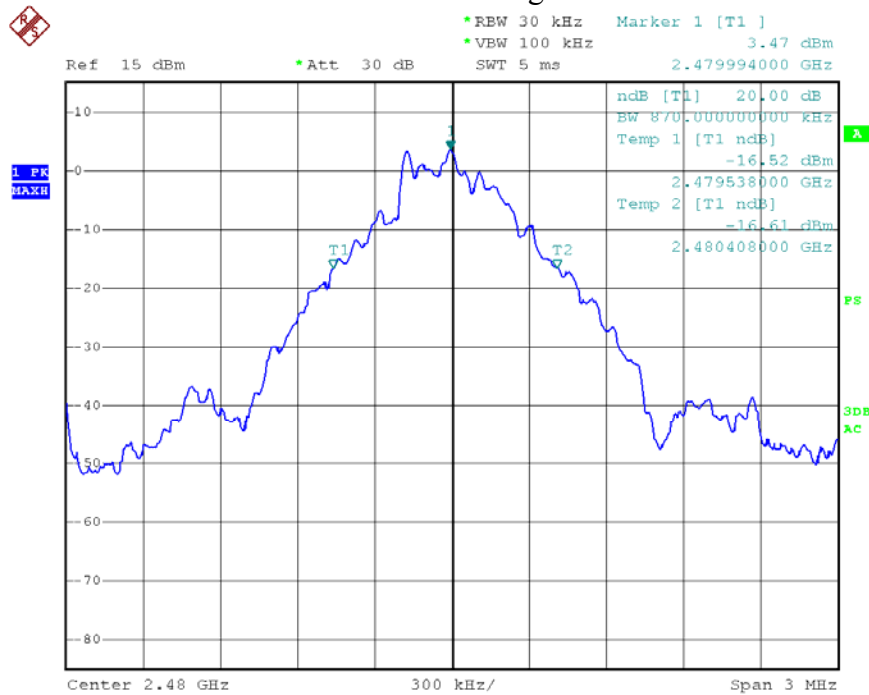


Date: 12.OCT.2013 16:29:15



Date: 12.OCT.2013 16:29:37

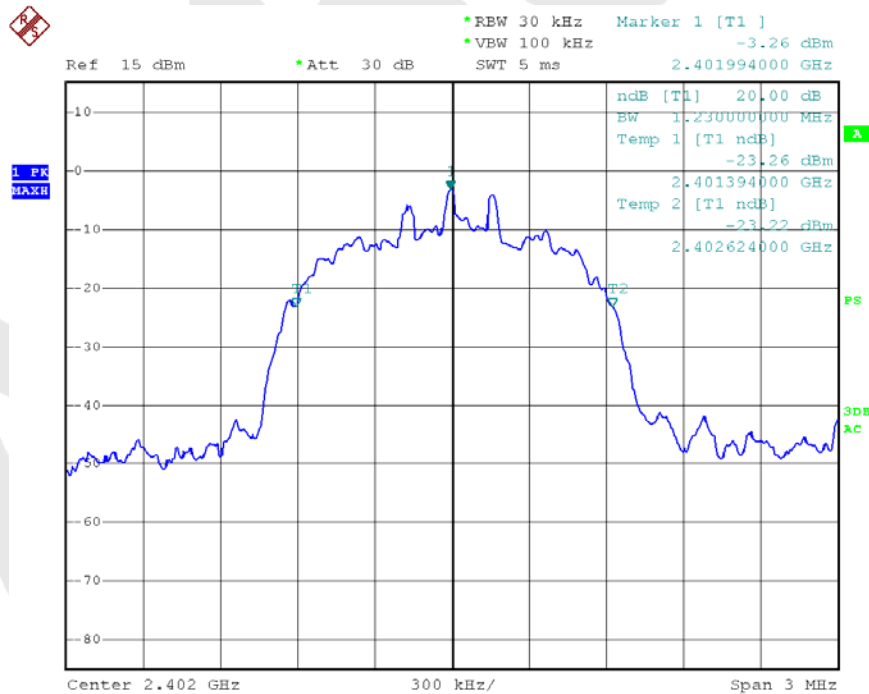
### CH High



Date: 12.OCT.2013 16:30:01

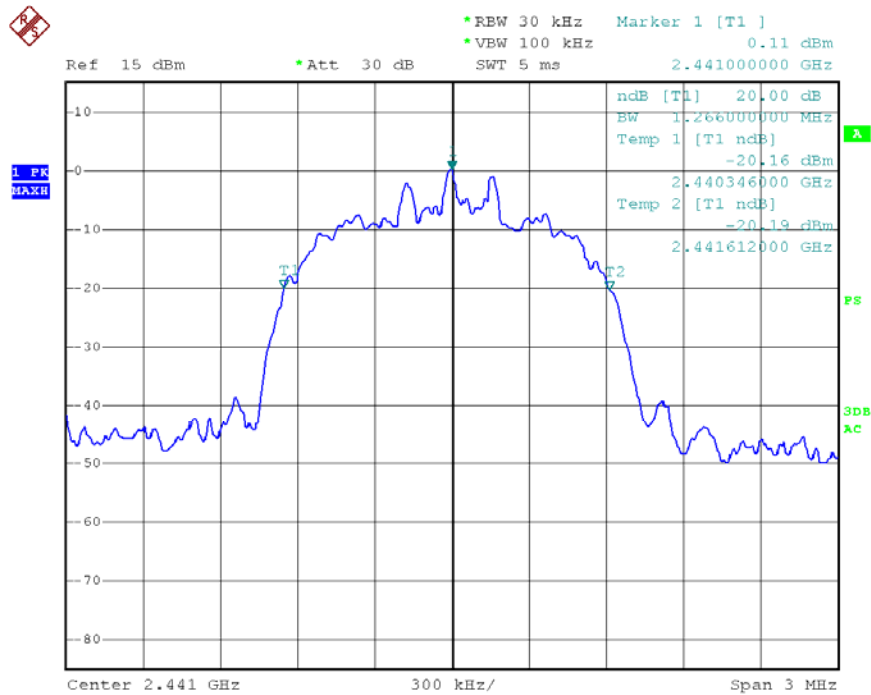
Modulation Mode:  $\pi$ /4DQPSK & 8DPSK

### CH Low



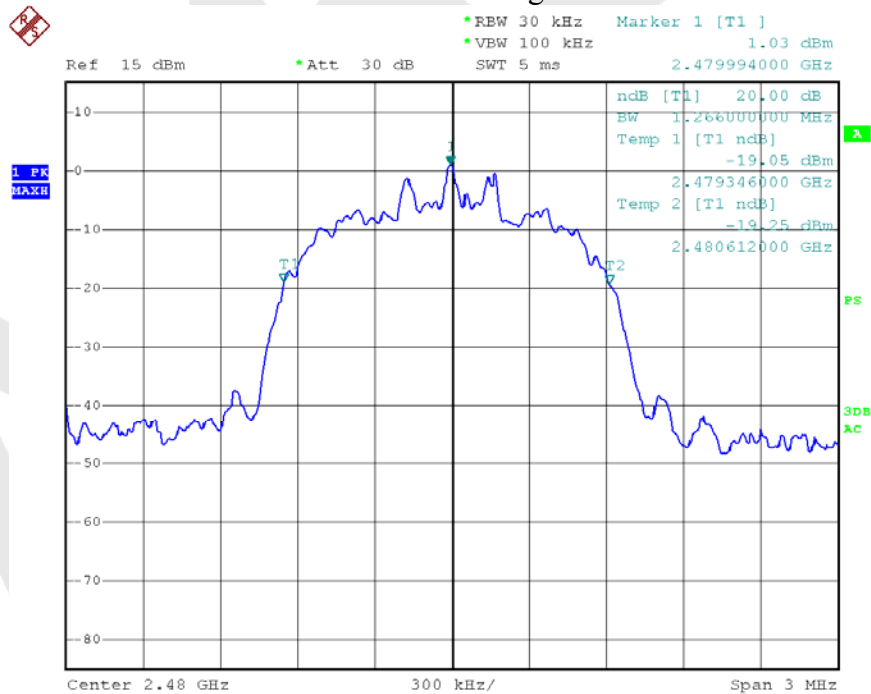
Date: 12.OCT.2013 16:30:59

### CH Mid



Date: 12.OCT.2013 16:31:24

### CH High



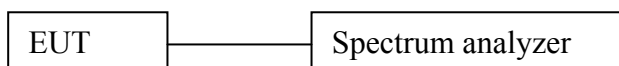
Date: 12.OCT.2013 16:31:47

## 7. QUANTITY OF HOPPING CHANNEL TEST

### 7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 7.2 Test SET-UP



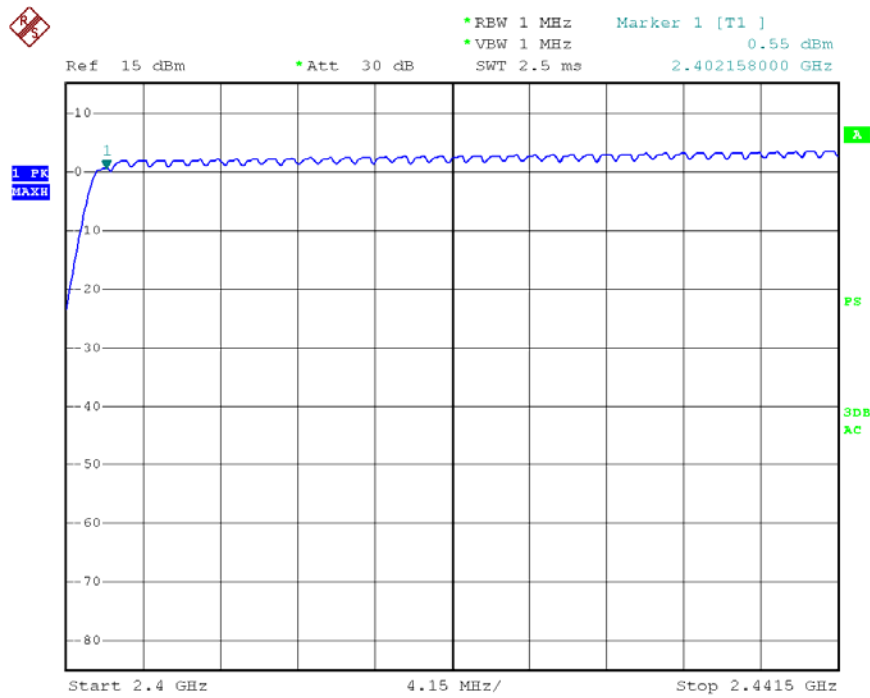
### 7.3 Test Equipment

Same as the equipment listed in 5.3.

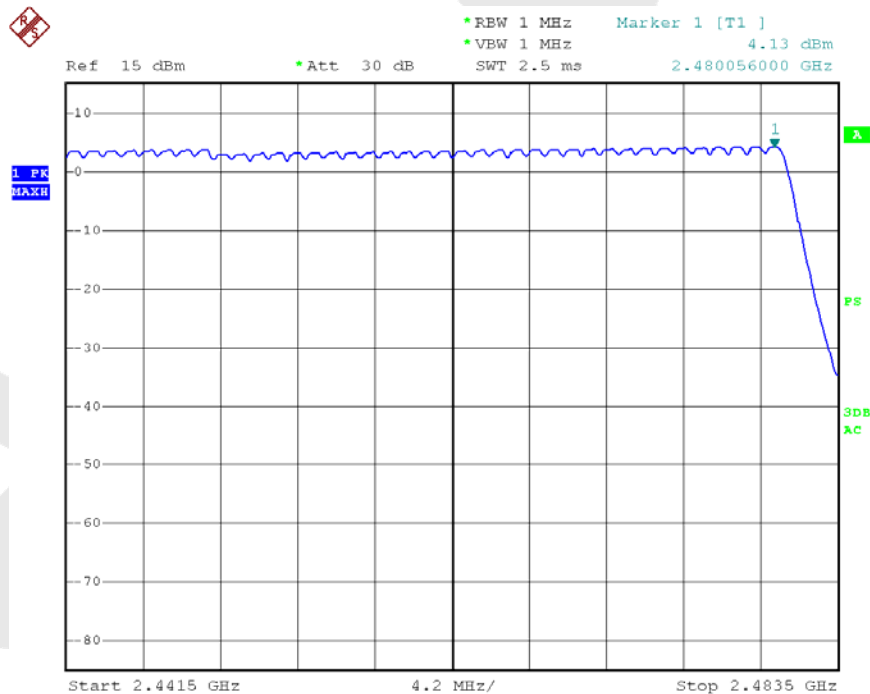
### 7.4 Test Results

Product	: Portable Stereo and Bluetooth Speaker	Test Mode	: CH Low ~ CH High
Test Item	: Number of Hopping Frequency	Temperature	: 24℃
Test Voltage	: DC 3.7V	Humidity	: 55%RH
Test Result	: PASS		

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel
2402-2480	79	> 15



Date: 12.OCT.2013 17:07:47



Date: 12.OCT.2013 17:09:09

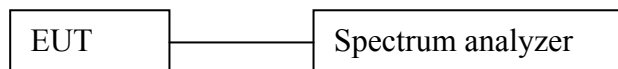


## 8. DWELL TIME TEST

### 8.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 8.2 Test SET-UP



### 8.3 Test Equipment

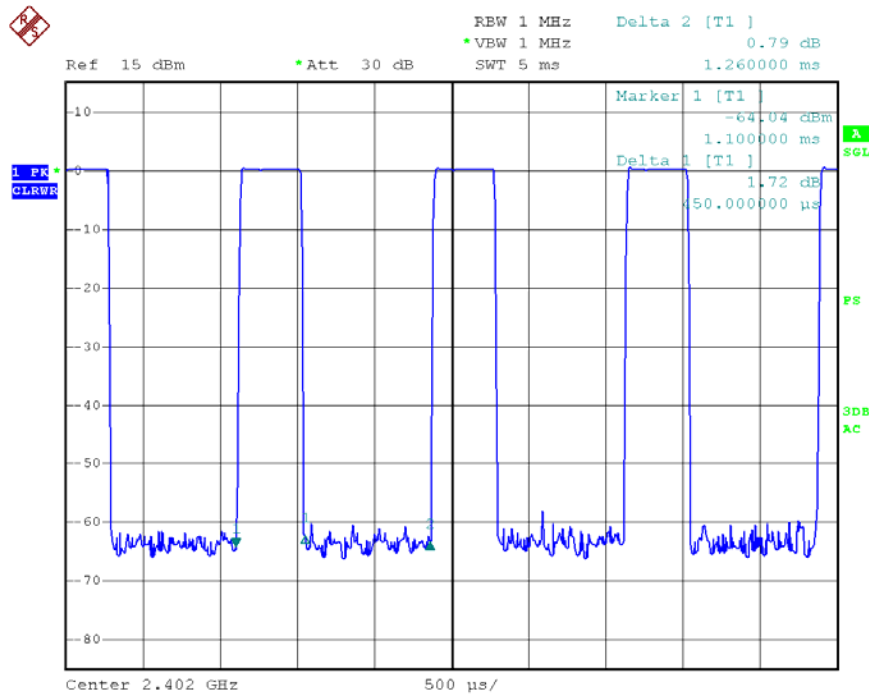
Same as the equipment listed in 5.3.

### 8.4 Test Results

Product	: Portable Stereo and Bluetooth Speaker	Test Mode	: CH Low ~ CH High
Test Item	: Time of Occupancy	Temperature	: 24°C
Test Voltage	: DC 3.7V	Humidity	: 55%RH
Test Result	: PASS		

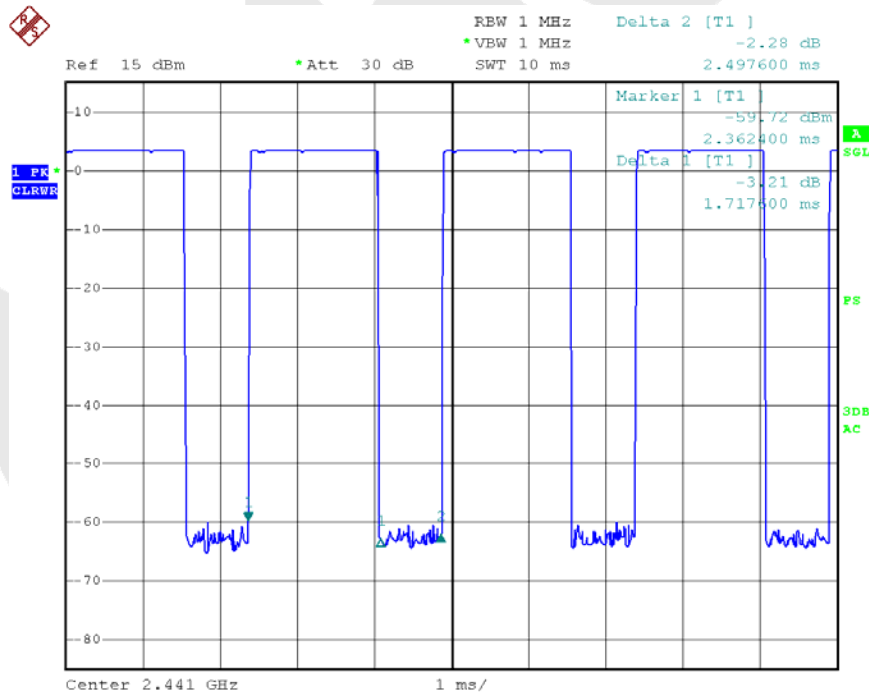
Package Type	Pulse width (ms)	Time slot length(ms)	Dwell time (ms)	Limit (s)
DH1	0.450	time slot length *1600/2 /79 * 31.6	144.000	0.4
DH3	1.7176	time slot length *1600/4 /79 * 31.6	247.916	0.4
DH5	2.9776	time slot length *1600/6 /79 * 31.6	317.611	0.4

DH1



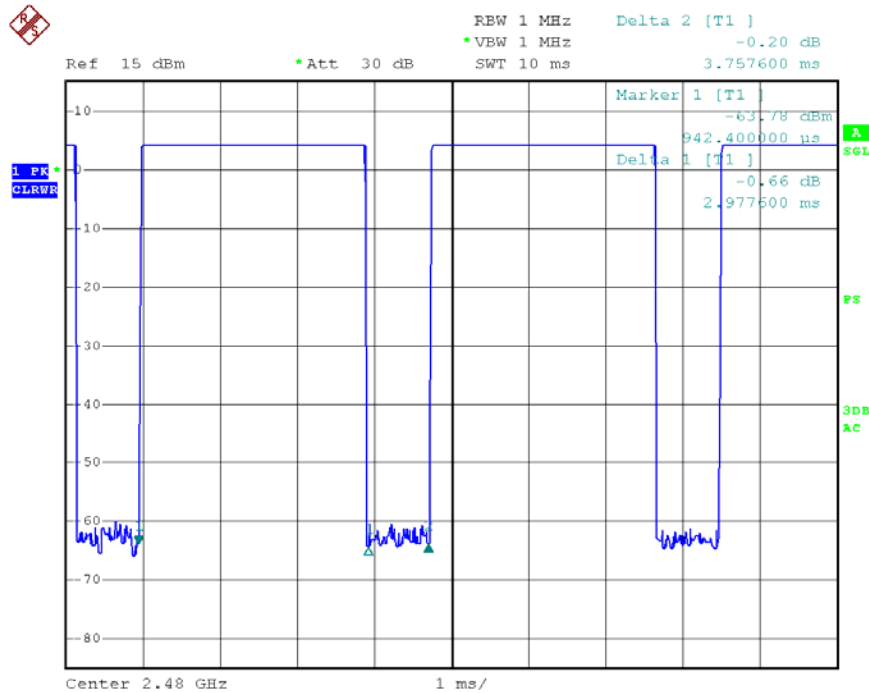
Date: 14.OCT.2013 09:52:50

DH3



Date: 14.OCT.2013 14:26:40

DH5



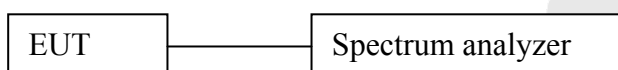
Date: 14.OCT.2013 14:28:14

## 9. MAXIMUM PEAK OUTPUT POWER TEST

### 9.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

### 9.2 Test SET-UP



### 9.3 Test Equipment

Same as the equipment listed in 5.3.

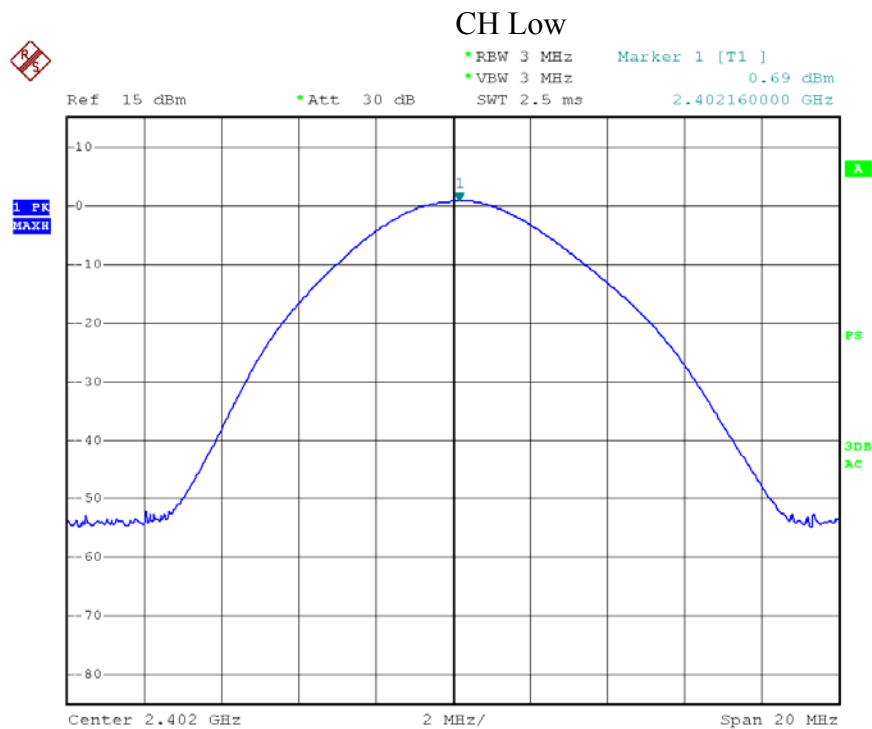
### 9.4 Test Results

Product	: Portable Stereo and Bluetooth Speaker	Test Mode	: CH Low ~ CH High
Test Item	: Max. peak output power	Temperature	: 24°C
Test Voltage	: DC 3.7V	Humidity	: 55%RH
Test Result	: PASS		

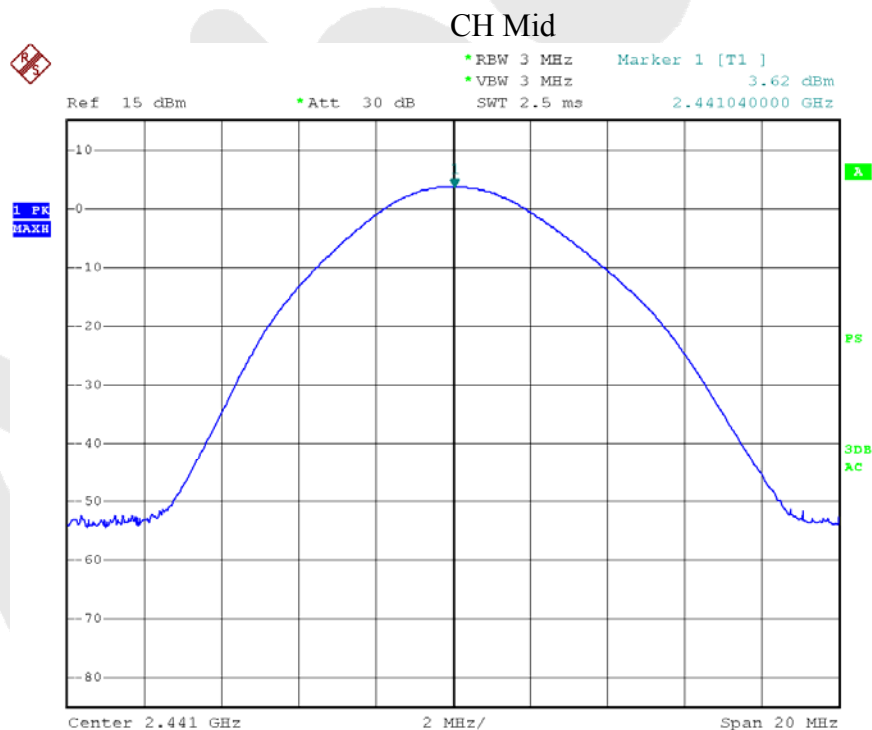
Channel Frequency (MHz)	Peak Power output(mW)	Peak Power output(dBm)	Peak Power Limit(mW)	Results	Modulation
2402	1.18	0.69	125	PASS	GFSK
2441	2.30	3.62	125	PASS	GFSK
2480	<b>2.77</b>	<b>4.42</b>	125	PASS	GFSK
2402	0.81	-0.91	125	PASS	$\pi$ /4DQPSK
2441	1.79	2.51	125	PASS	$\pi$ /4DQPSK
2480	2.16	3.35	125	PASS	$\pi$ /4DQPSK
2402	0.81	-0.91	125	PASS	8DPSK
2441	1.79	2.51	125	PASS	8DPSK
2480	2.16	3.35	125	PASS	8DPSK

Remark: The results of modulations  $\pi$ /4DQPSK and 8DPSK are the same.

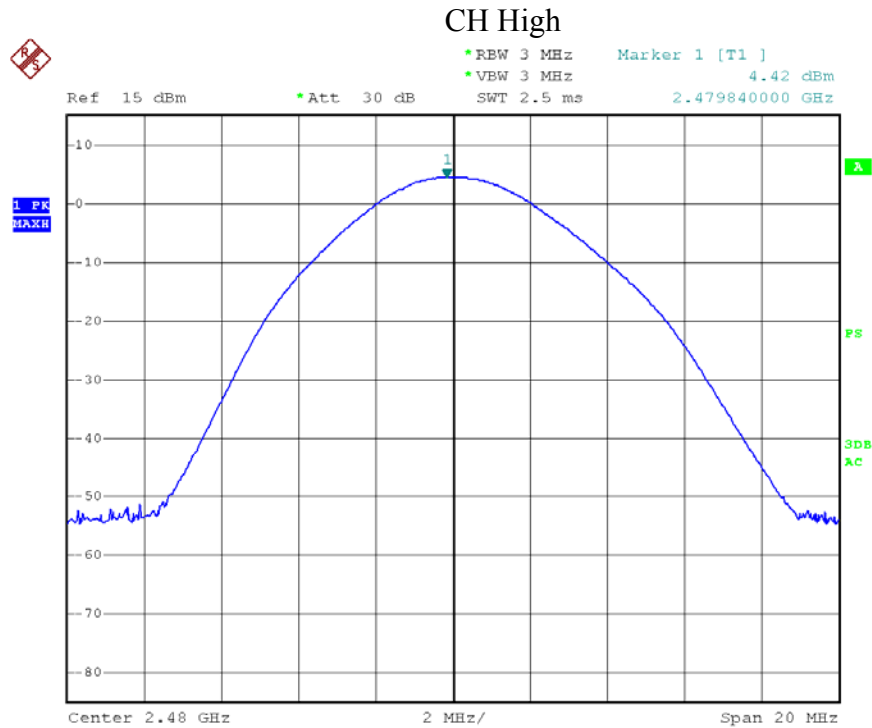
Modulation Mode: GFSK



Date: 12.OCT.2013 16:17:51

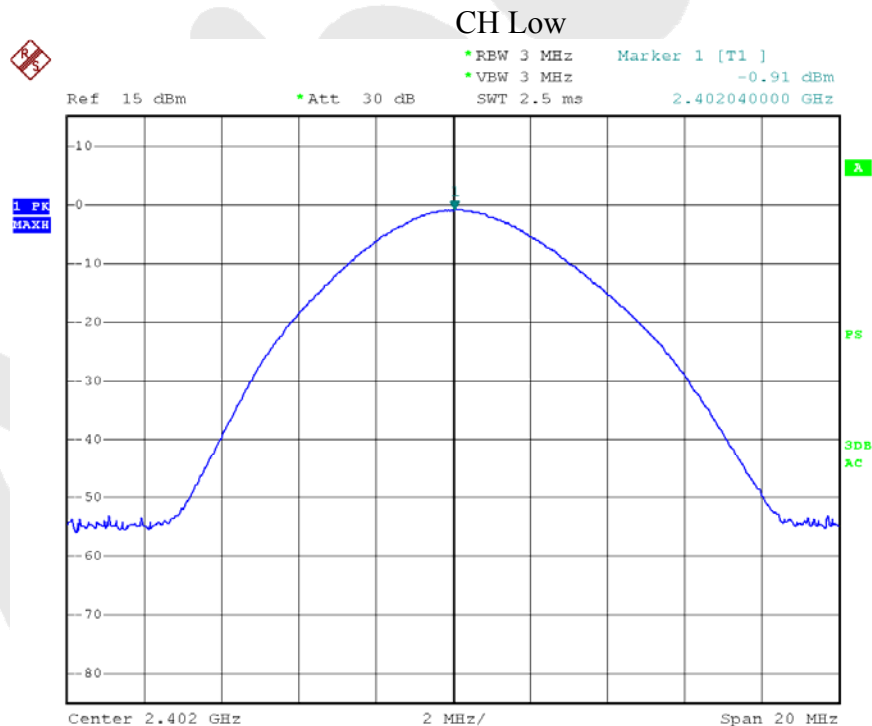


Date: 12.OCT.2013 16:18:13

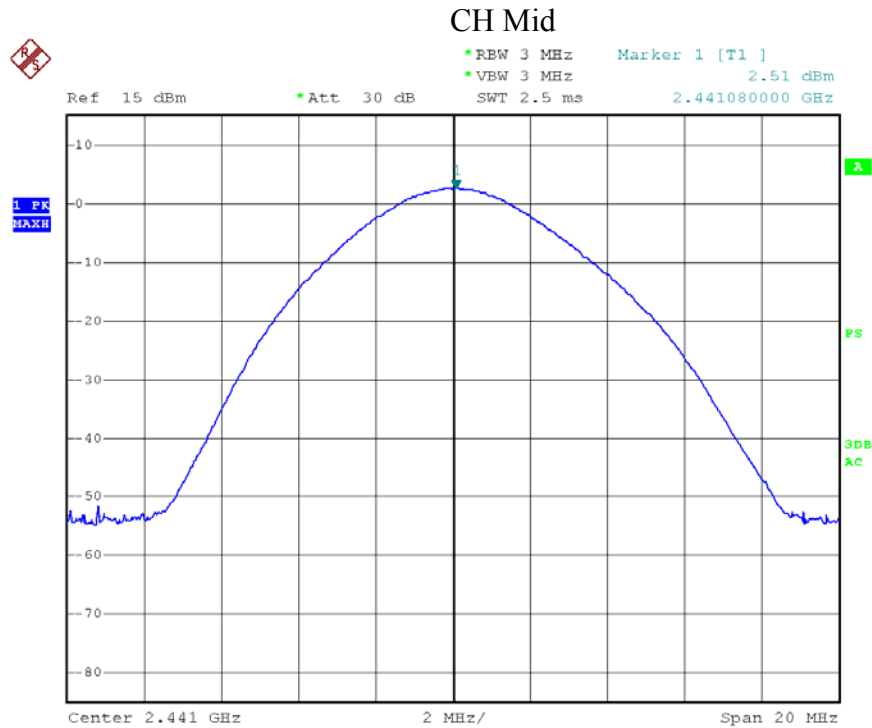


Date: 12.OCT.2013 16:20:01

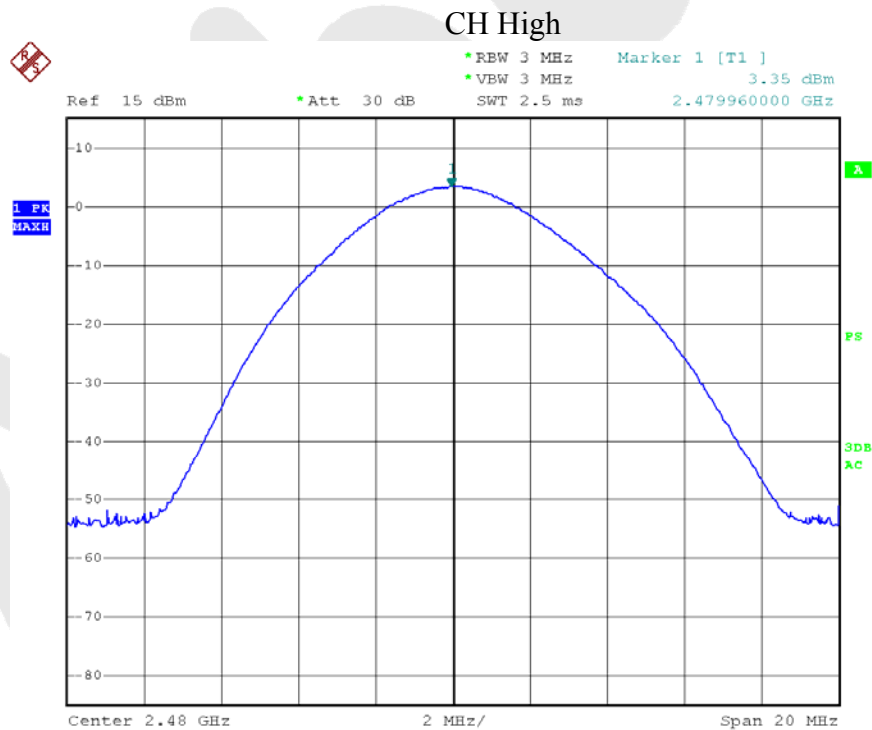
Modulation Mode:  $\pi/4$ DQPSK & 8DPSK



Date: 12.OCT.2013 16:27:18



Date: 12.OCT.2013 16:27:41



Date: 12.OCT.2013 16:28:00

## 10. BAND EDGE TEST

### 10.1 Measurement Procedure

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

### 10.2 Test SET-UP

Same as the radiated emission test.

### 10.3 Test Equipment

Same as the equipment listed in 5.3.

### 10.4 Test Results

Pass.

Please refer the following data.



Product	: Portable Stereo and Bluetooth Speaker	Test Mode	: CH Low ~ CH High
Test Item	: Band edge	Temperature	: 24℃
Test Voltage	: DC 3.7V	Humidity	: 55%RH
Test Result	: PASS		

1. Conducted Test

Frequency (MHz)	Peak Power Output(dBm)	Emission read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)	Modulation
<2400	0.84	-55.00	55.84	>20dBc	GFSK
	-2.82	-56.37	53.55	>20dBc	$\pi$ /4DQPSK
	-2.82	-56.37	53.55	>20dBc	8DPSK
>2483.5	4.50	-55.81	60.31	>20dBc	GFSK
	1.43	-55.13	56.56	>20dBc	$\pi$ /4DQPSK
	1.43	-55.13	56.56	>20dBc	8DPSK

2. Radiated emission Test

Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Modulation
		PK	AV	PK	AV	
<2400	V	54.31	36.57	74.00	54.00	GFSK
	V	55.19	39.18	74.00	54.00	$\pi$ /4DQPSK
	V	52.40	35.85	74.00	54.00	8DPSK
>2483.5	V	51.53	38.12	74.00	54.00	GFSK
	V	53.14	36.77	74.00	54.00	$\pi$ /4DQPSK
	V	46.79	38.36	74.00	54.00	8DPSK

## 11. ANTENNA APPLICATION

### 11.1 Antenna requirement

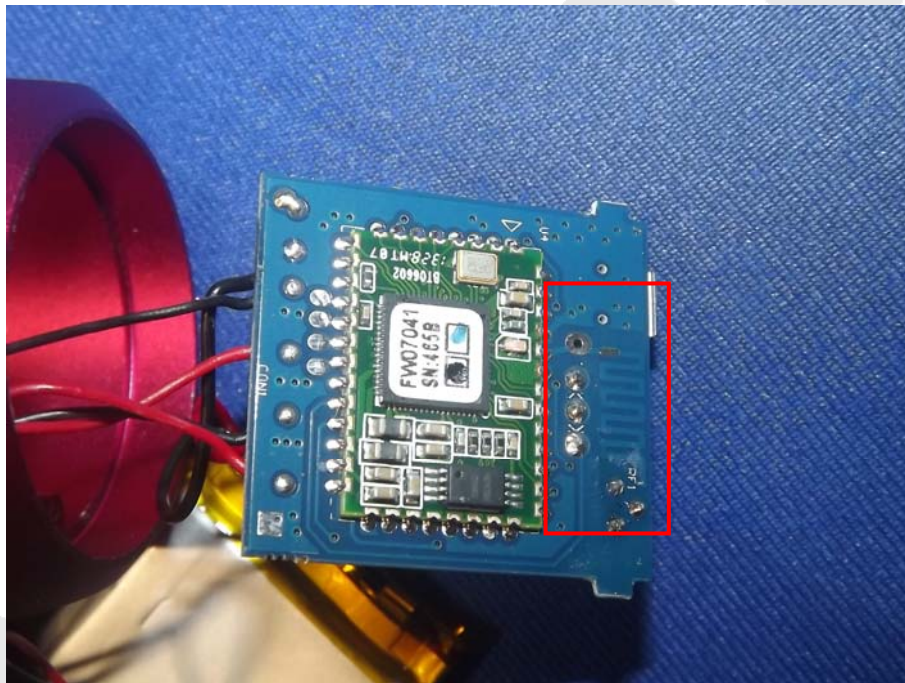
The EUT's antenna is met the requirement of FCC part 15C section 15.203 and 15.247.

FCC part 15C section 15.247 requirements:

Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

### 11.2 Result

The EUT's antenna used a chip antenna and integrated on PCB, The antenna's gain is -0.5dBi and meets the requirement.

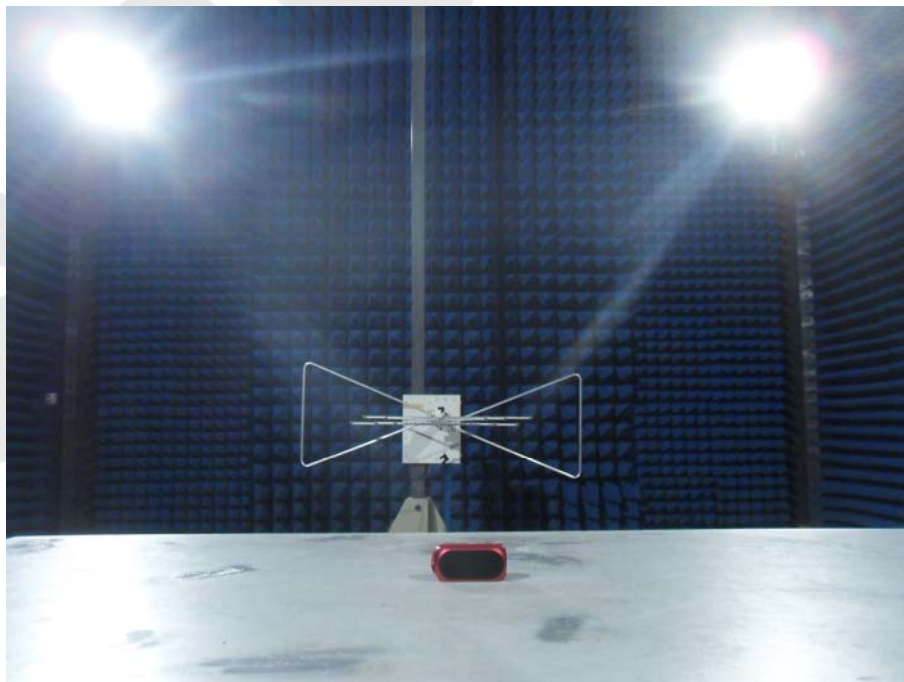


## 12. PHOTOGRAPH

### 12.1 Photo of Power Line Conducted Emission Measurement



### 12.2 Photo of Radiation Emission Test



## APPENDIX I (External Photos)

Figure 1  
The EUT-Front View



Figure 2  
The EUT-Back View

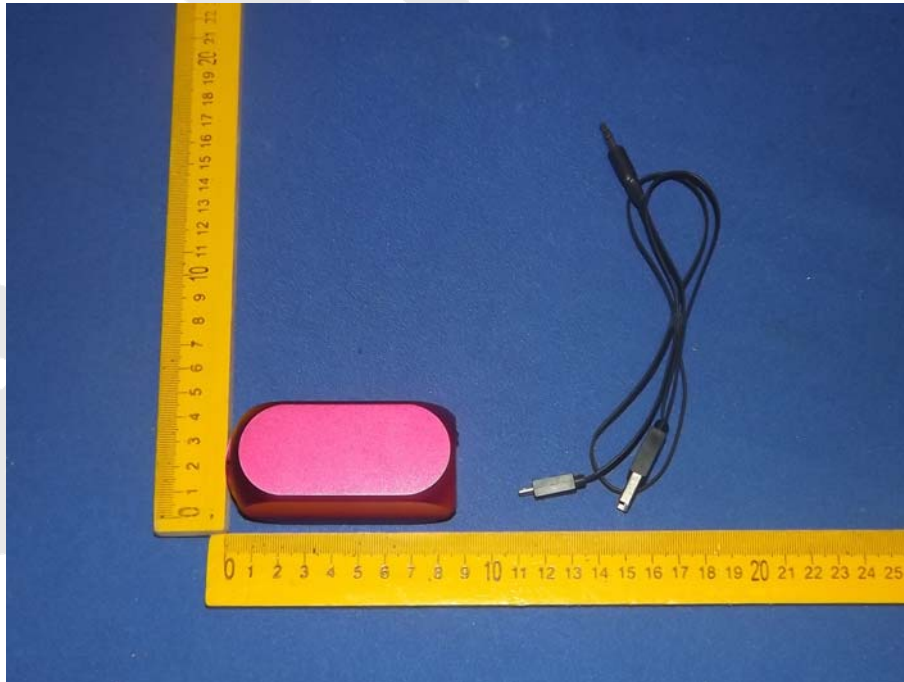




Figure 3  
The EUT-Port View



## APPENDIX II (Internal Photos)

Figure 4

The EUT-Inside View



Figure 5

PCB of the EUT-Front View

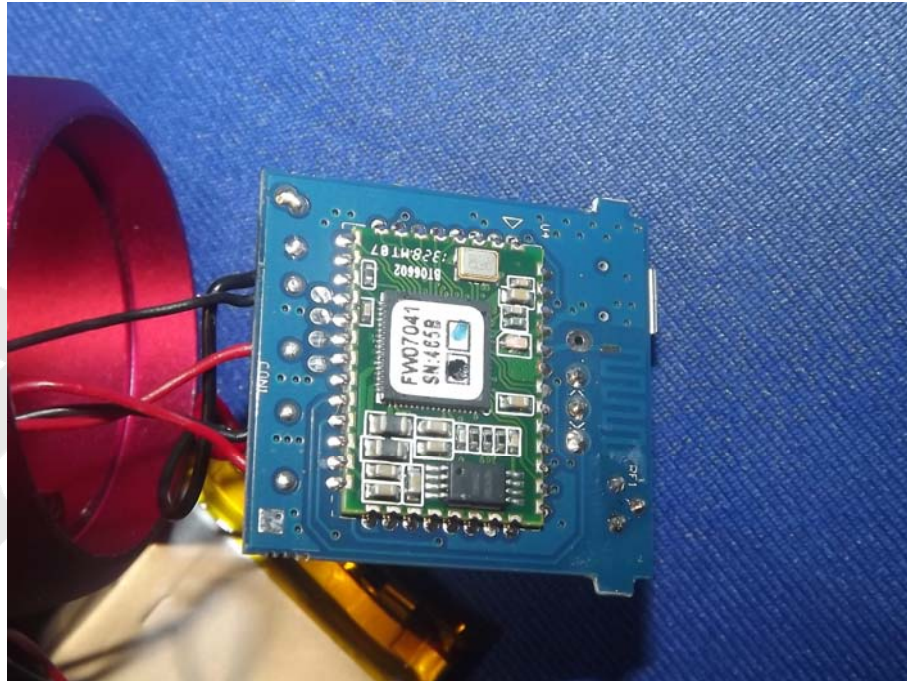


Figure 6  
PCB of the EUT-Back View

