APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Shenzhen Bobotel Technology DEV. Co., Ltd.

Bluetooth speaker
Model No.: VPAS1002-ASST, VPAS1002-BLUE, VPAS1002-PNK, VPAS1002-MNT, VPAS1002-PURP

FCC ID: 2AS3H-VPAS1002

Prepared for	:	Shenzhen Bobotel Technology DEV. Co., Ltd.
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Report No.	:	ATE20190439
Date of Test	:	April 4-8, 2019
Date of Report	:	April 9, 20199

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Description Page

Test Report Certification

Applicant	:	Shenzhen Bobotel Technology DEV. Co., Ltd.
Manufacturer	:	Shenzhen Bobotel Technology DEV. Co., Ltd.
EUT Description	:	Bluetooth speaker
Model No.	:	VPAS1002-ASST, VPAS1002-BLUE, VPAS1002-PNK, VPAS1002-MNT, VPAS1002-PURP
Brand Name	:	VIVITAR

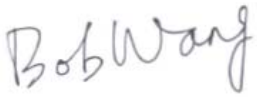
Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247: 2018
ANSI C63.10: 2013

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test :	April 4-8, 2019
Date of Report :	April 9, 20199

Test Engineer : 
(Bob Wang, Engineer)

Prepared by : 
(Bob Wang, Engineer)

Approved & Authorized Signer : 
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

Model Number	:	VPAS1002-ASST, VPAS1002-BLUE, VPAS1002-PNK, VPAS1002-MNT, VPAS1002-PURP (Note: These samples are same except their appearance color is different. So we prepare VPAS1002-ASST for test only.)
Bluetooth version	:	V4.2
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain(Max)	:	-0.58dBi
Antenna type	:	Integral Antenna
Adapter Input Voltage	:	DC 3.7V (Powered by Lithium battery) or DC 5V (Powered by USB port)
Modulation mode	:	GFSK, π/4 DQPSK
Hardware version	:	V2.0
Software version	:	V2.0
Applicant	:	Shenzhen Bobotel Technology DEV. Co., Ltd.
Address	:	130-131 Building, Pinghuan Industry Park, Pingshan Area, Shenzhen, China
Manufacturer	:	Shenzhen Bobotel Technology DEV. Co., Ltd.
Address	:	130-131 Building, Pinghuan Industry Park, Pingshan Area, Shenzhen, China

1.2.Accessory and Auxiliary Equipment

Adapter:	Model:BEK-QC-001 INPUT: 120V~60Hz OUTPUT:5V/1A

1.3.Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISEDC) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.4.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 5, 2019	1 Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 5, 2019	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 5, 2019	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 5, 2019	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 5, 2019	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 5, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 5, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 5, 2019	1 Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 5, 2019	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 5, 2019	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 5, 2019	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 5, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-5m(Frequency range:9KHz-26.5GHz)	NO.3	Jan. 5, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-5m(Frequency range:9KHz-26.5GHz)	NO.4	Jan. 5, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-1m(Frequency range:9KHz-26.5GHz)	NO.5	Jan. 5, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-1m(Frequency range:9KHz-26.5GHz)	NO.6	Jan. 5, 2019	1 Year
Temporary antenna connector	NTGS	14AE	N/A	March 20, 2019	N/A

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: Transmitting mode
Low Channel: 2402MHz
Middle Channel: 2441MHz
High Channel: 2480MHz
Hopping

Note: The equipment under test (EUT) was tested under fully-charged battery.
The Bluetooth has been tested under continuous transmission mode.

3.2.Configuration and peripherals

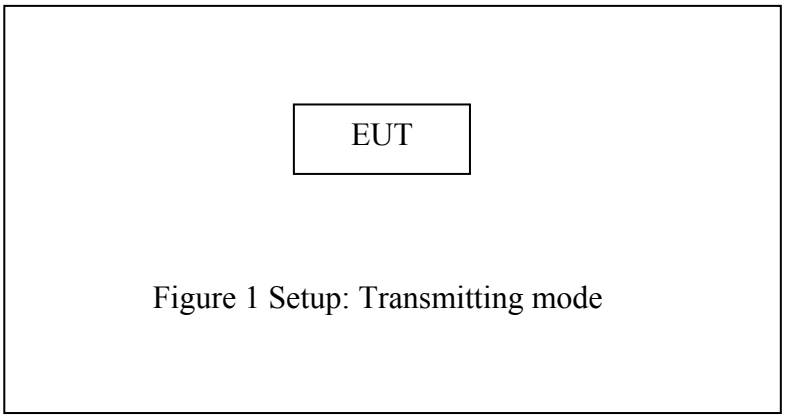


Figure 1 Setup: Transmitting mode

4. FREQUENCY HOPPING SYSTEM REQUIREMENTS

4.1. Standard and Limit

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

4.2. EUT Pseudorandom Frequency Hopping Sequence

Pseudorandom Frequency Hopping Sequence Table as below:
Channel: 08, 24, 40, 56, 34, 51, 72, 09, 01, 64, 22, 33, 41, 32, 47, 65, 73, 53, 69, 06, 17, 04, 20, 36, 52, 38, 66, 70, 78, 68, 76, 21, 29, 10, 26, 49, 00, 58, 44, 59, 75, 13, 03, 14, 11, 35, 43, 37, 50, 61, 77, 55, 71, 02, 23, 07, 27, 39, 54, 46, 48, 15, 63, 62, 67, 25, 31, 12, 28, 19, 60, 42, 57, 74, 16, 05, 18, 30, 45, etc.

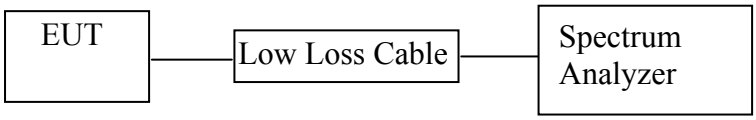
The system receiving have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

5. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.203	Antenna Requirement	Compliant

6. 20DB BANDWIDTH TEST

6.1. Block Diagram of Test Setup



(EUT: Bluetooth speaker)

6.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 5.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

6.5.3. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

6.6.Test Result

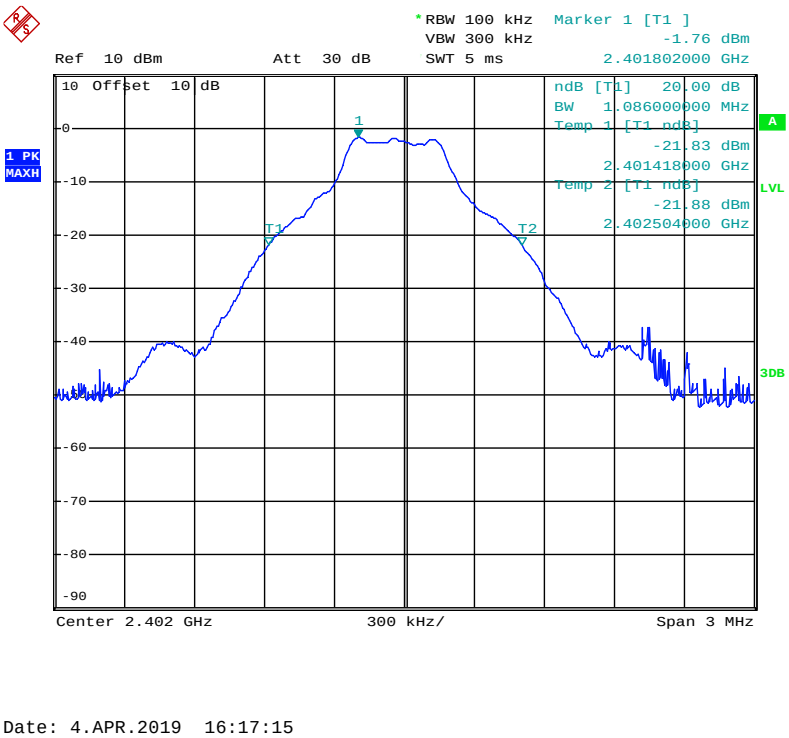
Test Lab: Shielding room
Test Engineer: Bob

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	Π/4-DQPSK 20dB Bandwidth (MHz)	Result
Low	2402	1.086	1.398	Pass
Middle	2441	1.092	1.398	Pass
High	2480	1.086	1.392	Pass

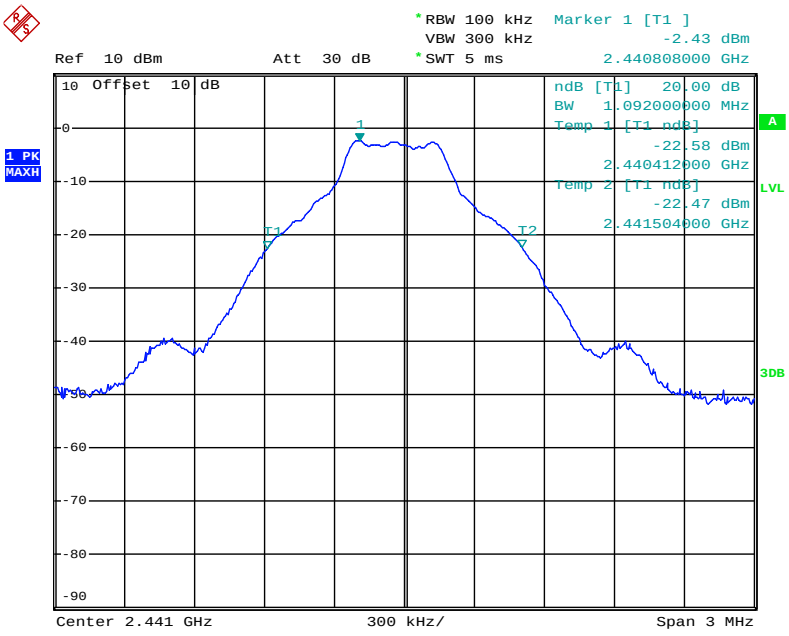
The spectrum analyzer plots are attached as below.

GFSK Mode

Low channel



Middle channel



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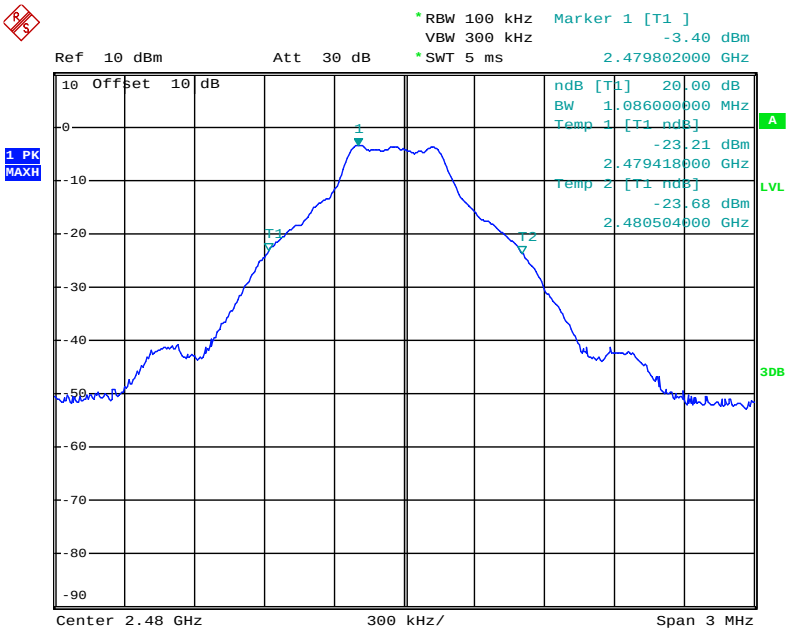
High channel



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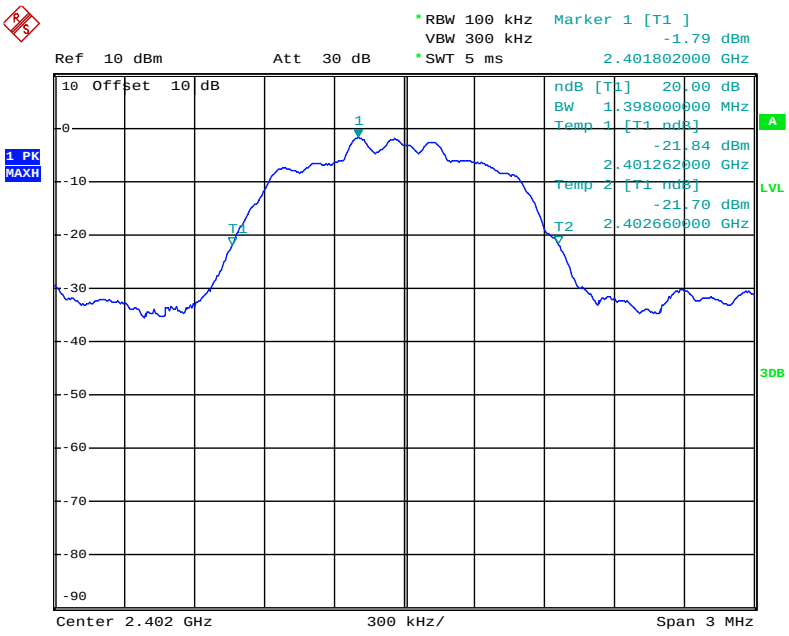
Π/4-DQPSK Mode

Low channel



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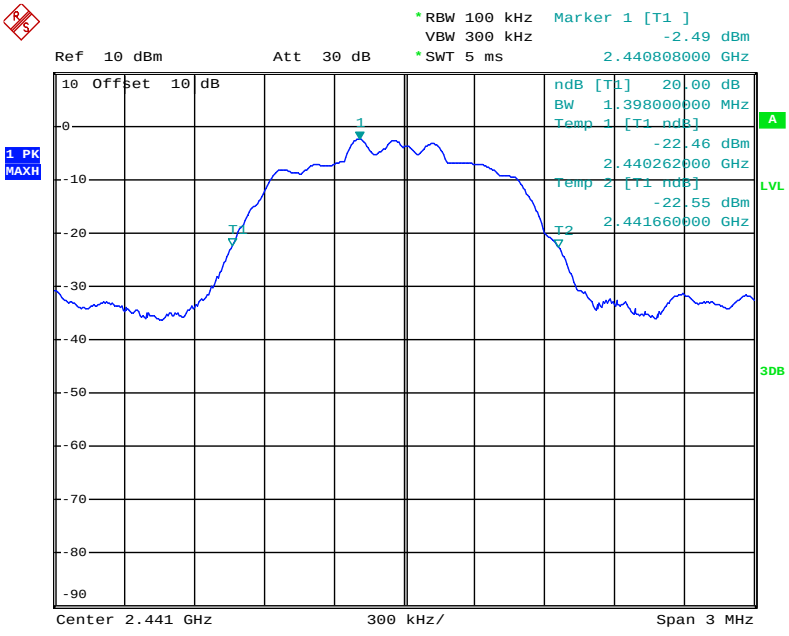
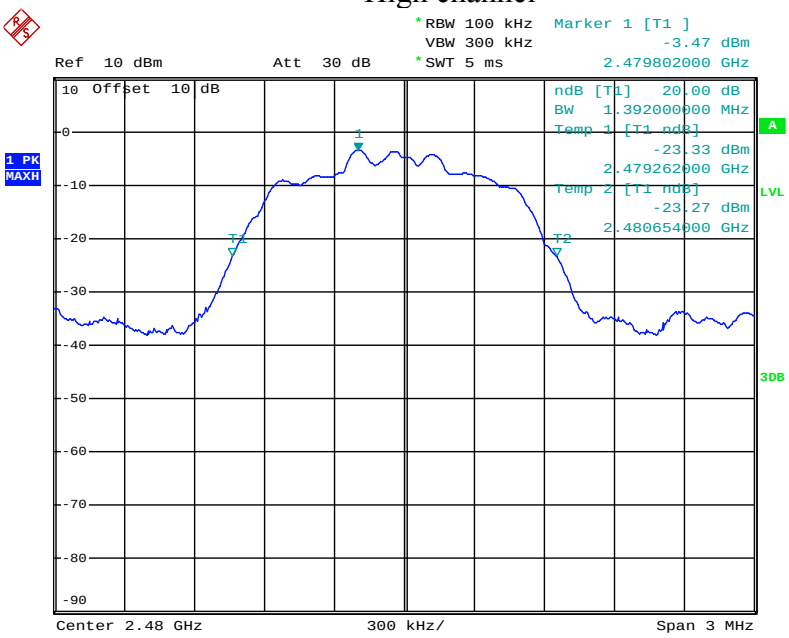
Middle channel



Date: 4.APR.2019 16:24:03

High channel



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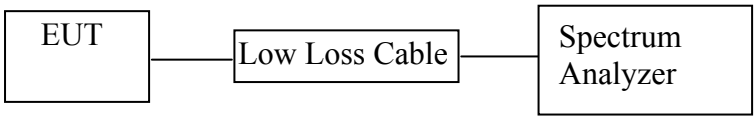
7. CARRIER FREQUENCY SEPARATION TEST

7.1. Block Diagram of Test Setup



(EUT: Bluetooth speaker)

7.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 6.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 2MHz.

7.5.3. Set the adjacent channel of the EUT Maxhold another trace.

7.5.4. Measurement the channel separation

7.6. Test Result

Test Lab: Shielding room
Test Engineer: Bob

GFSK

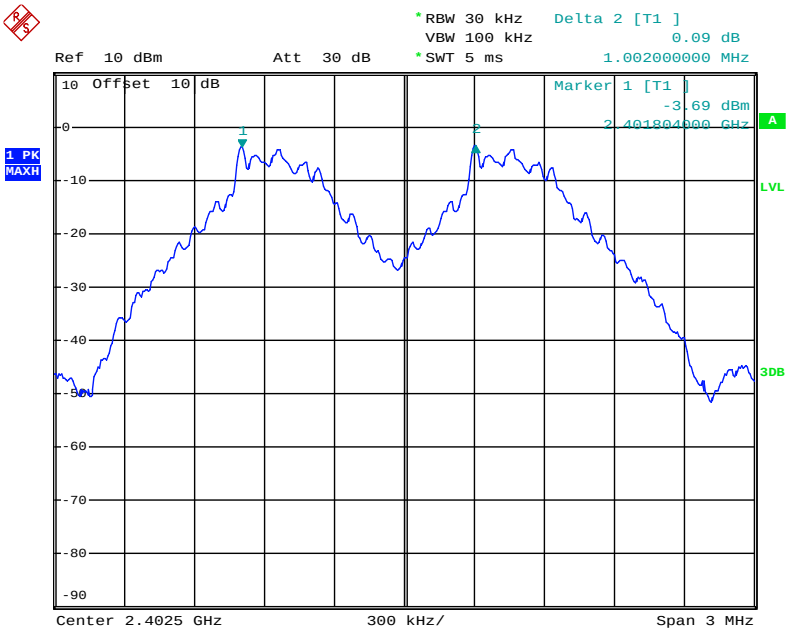
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2480			

Π/4-DQPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2480			

GFSK Mode

Low channel



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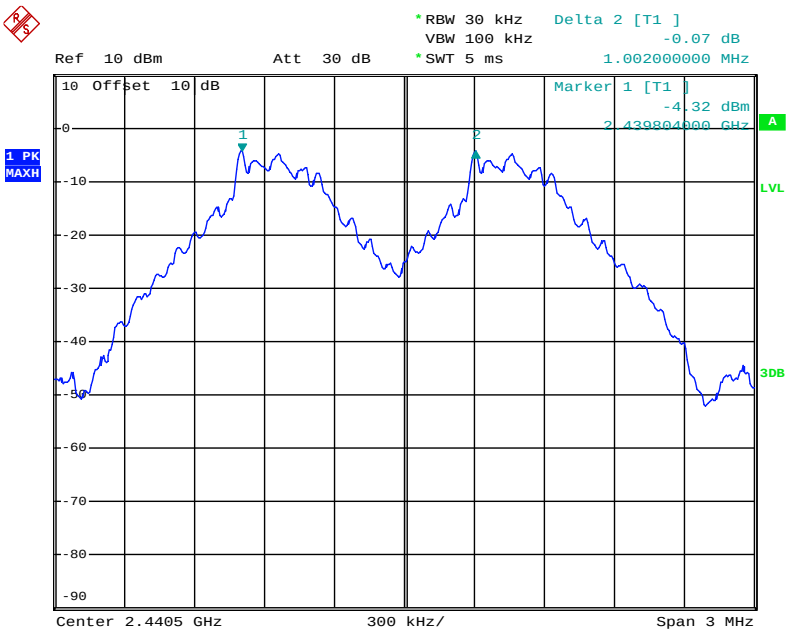
Middle channel



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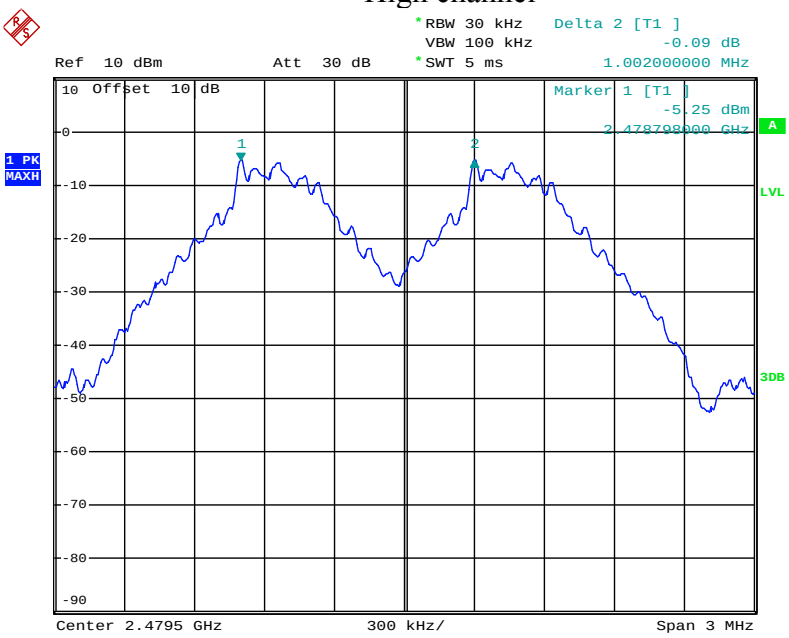
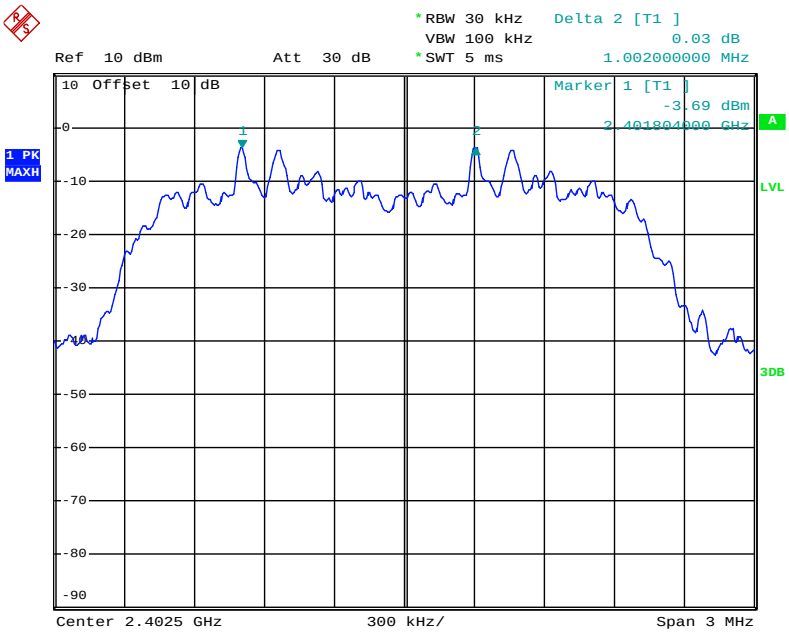
High channel



Date: 4.APR.2019 16:31:05

Π/4-DQPSK Mode

Low channel



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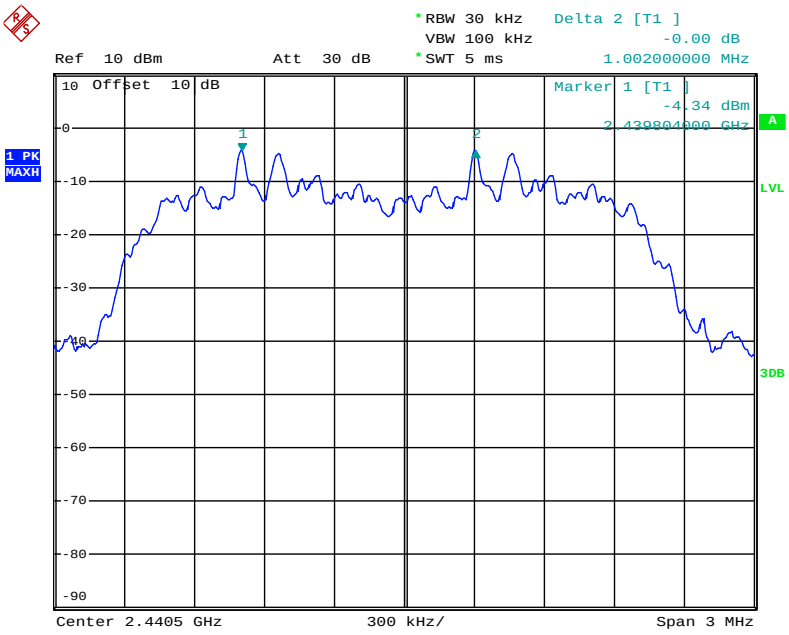
Middle channel



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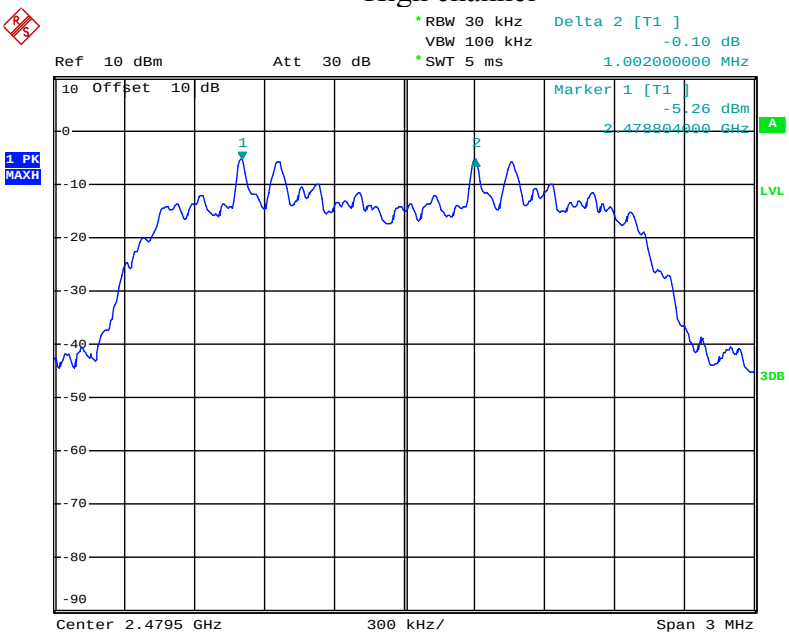
High channel



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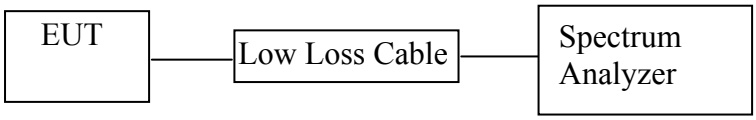
8. NUMBER OF HOPPING FREQUENCY TEST

8.1. Block Diagram of Test Setup



(EUT: Bluetooth speaker)

8.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 7.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz.

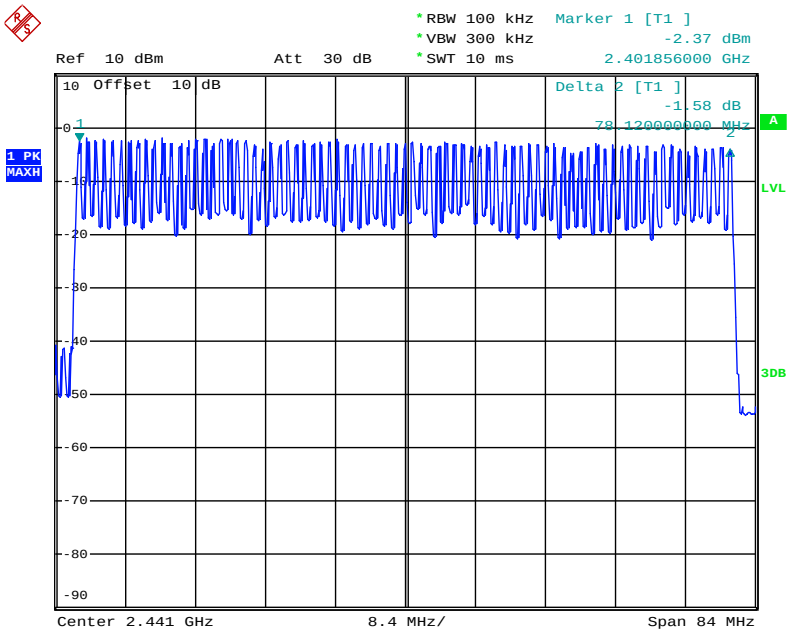
8.5.3. Max hold, view and count how many channel in the band.

8.6.Test Result

Test Lab: Shielding room
Test Engineer: Bob

Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	⩾15

Number of hopping channels(GFSK)



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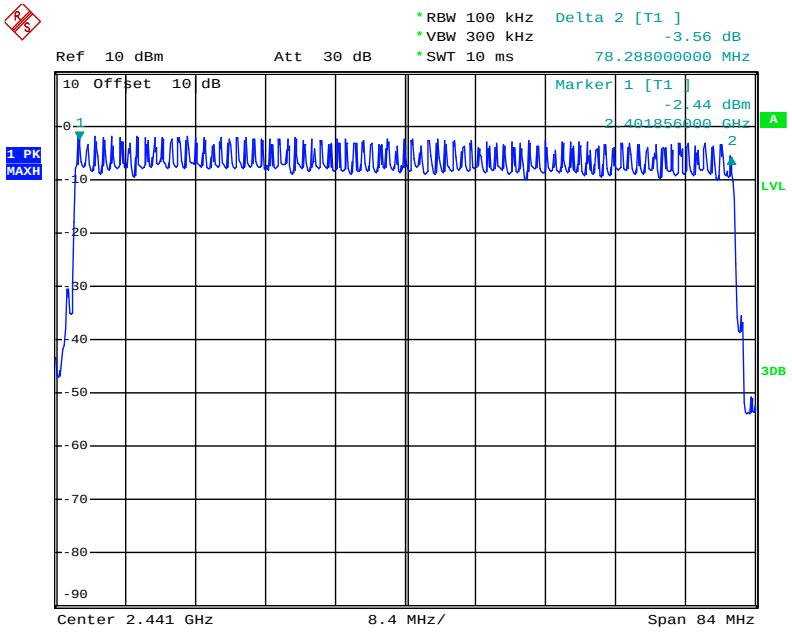
Number of hopping channels(Π/4-DQPSK)



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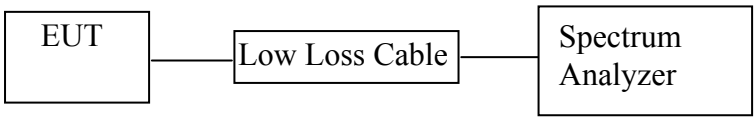
9. DWELL TIME TEST

9.1. Block Diagram of Test Setup



(EUT: Bluetooth speaker)

9.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 8.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set center frequency of spectrum analyzer = operating frequency.

9.5.3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Adjust Sweep=5ms, 10ms, 15ms. Get the pulse time.

9.5.4. Repeat above procedures until all frequency measured were complete.

9.6.Test Result

Test Lab: Shielding room
Test Engineer: Bob

GFSK Mode (Worst case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.40	128.0	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(2*79))×31.6		
DH3	2441	1.68	268.8	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(4*79))×31.6		
DH5	2441	2.94	313.6	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(6*79))×31.6		

Π/4-DQPSK (Worst case)

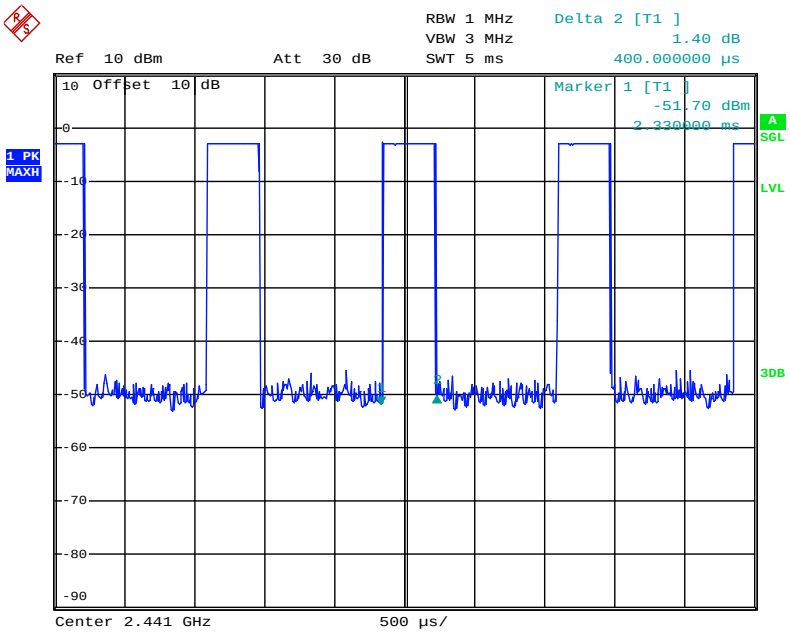
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.41	131.2	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(2*79))×31.6		
DH3	2441	1.68	268.8	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(4*79))×31.6		
DH5	2441	2.94	313.6	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(6*79))×31.6		

Note: We tested GFSK mode and Π/4-DQPSK mode the low, middle and high channel and recorded the worst case data for all test mode.

The spectrum analyzer plots are attached as below.

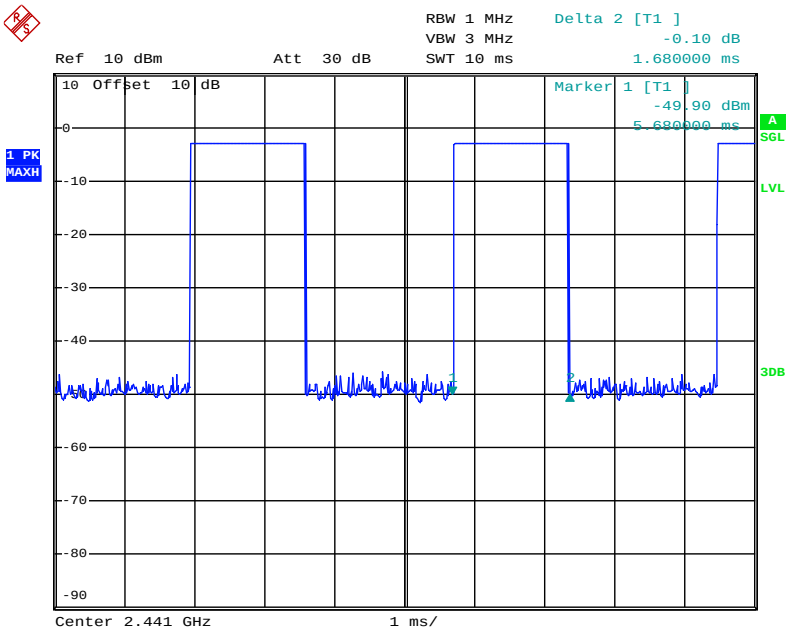
GFSK Mode

DH1 Middle channel



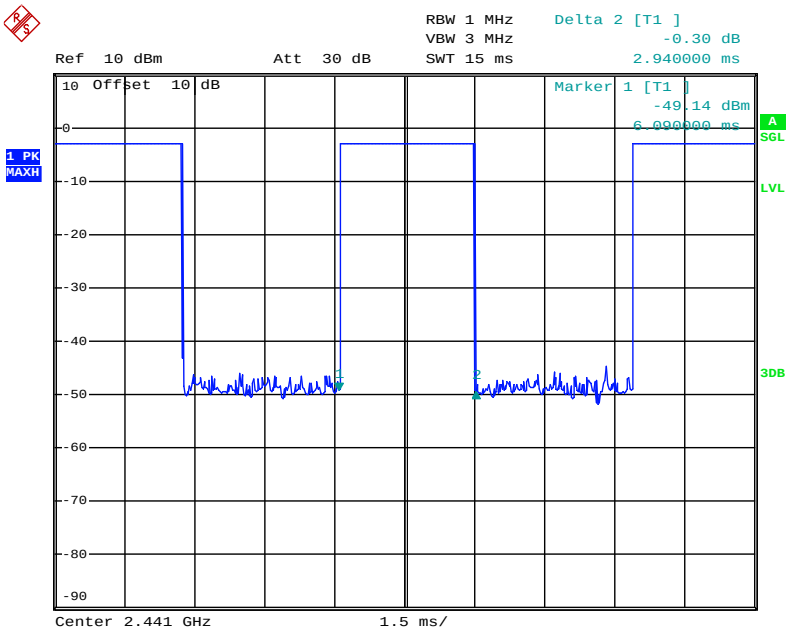
Date: 4.APR.2019 17:02:06

DH3 Middle channel



Date: 4.APR.2019 16:58:12

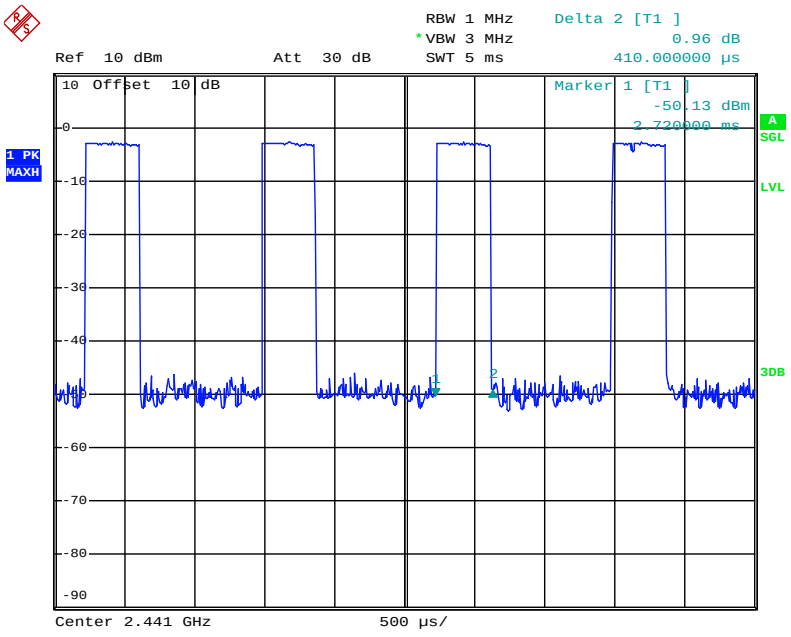
DH5 Middle channel



Date: 4.APR.2019 16:59:58

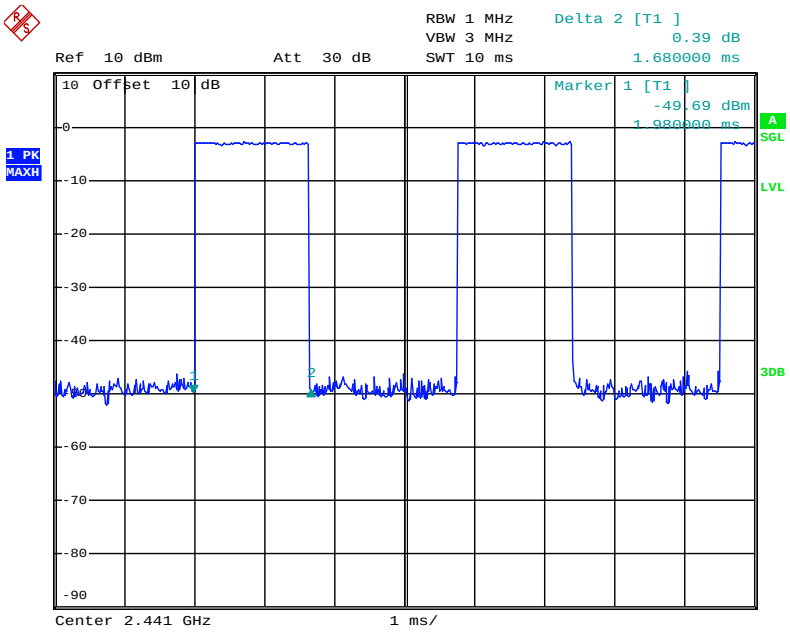
Π/4-DQPSK

2DH1 Middle channel



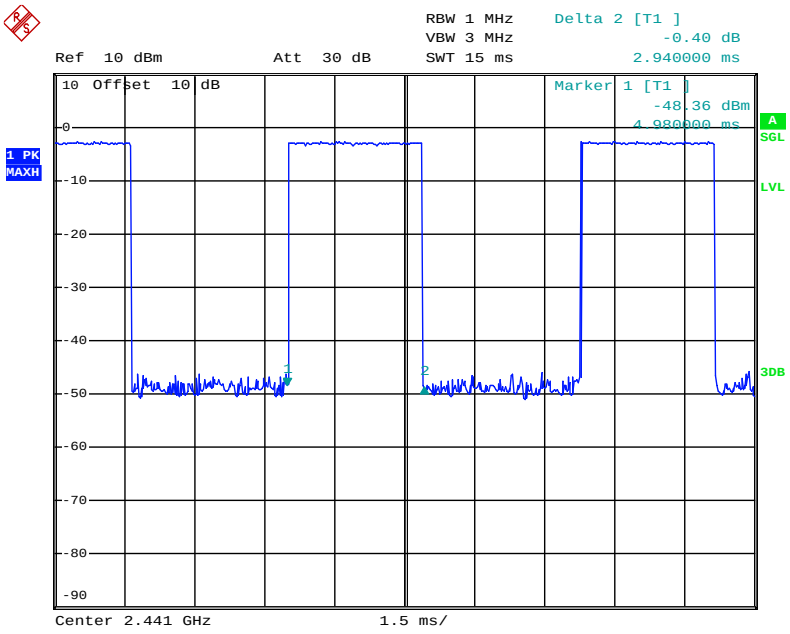
Date: 4.APR.2019 16:50:35

2DH3 Middle channel



Date: 4.APR.2019 17:03:23

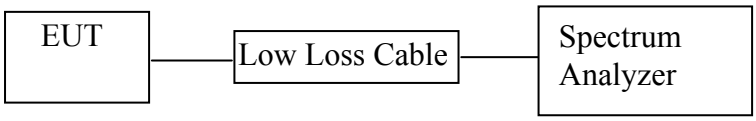
2DH5 Middle channel



Date: 4.APR.2019 16:56:18

10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Block Diagram of Test Setup



(EUT: Bluetooth speaker)

10.2. The Requirement For Section 15.247(b)(1)

Section 15.247(b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

10.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.4. Operating Condition of EUT

10.4.1. Setup the EUT and simulator as shown as Section 9.1.

10.4.2. Turn on the power of all equipment.

10.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

10.5. Test Procedure

10.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

10.5.2. Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz.

10.5.3. Measurement the maximum peak output power.

10.6.Test Result

Test Lab: Shielding room
Test Engineer: Bob

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-1.97/0.0006	21 / 0.125
Middle	2441	-2.64/0.0005	21 / 0.125
High	2480	-3.65/0.0004	21 / 0.125

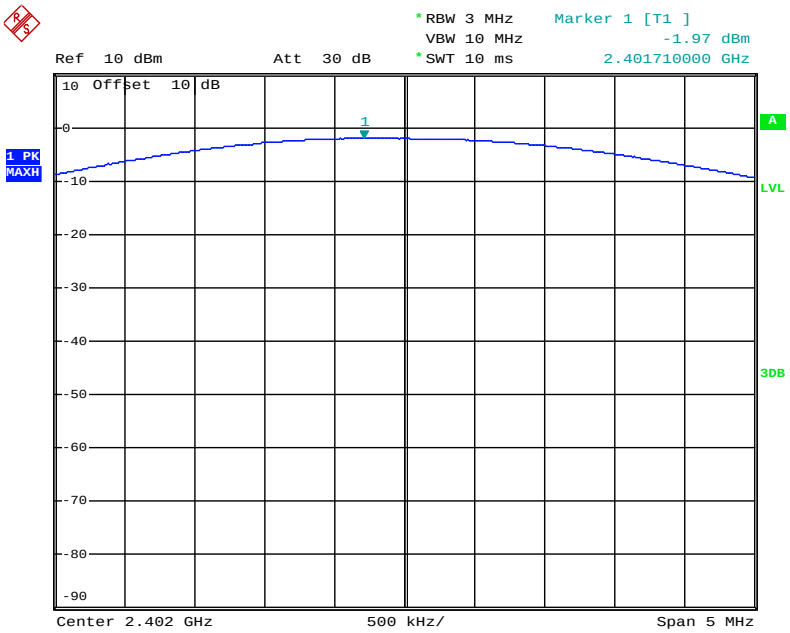
Π/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-1.69/0.0007	21 / 0.125
Middle	2441	-2.27/0.0006	21 / 0.125
High	2480	-3.22/0.0005	21 / 0.125

The spectrum analyzer plots are attached as below.

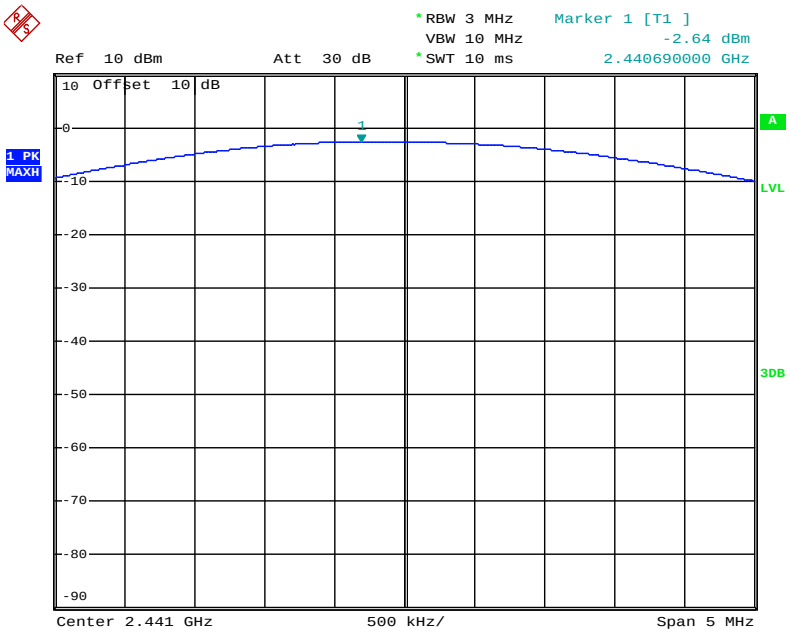
GFSK Mode

Low channel



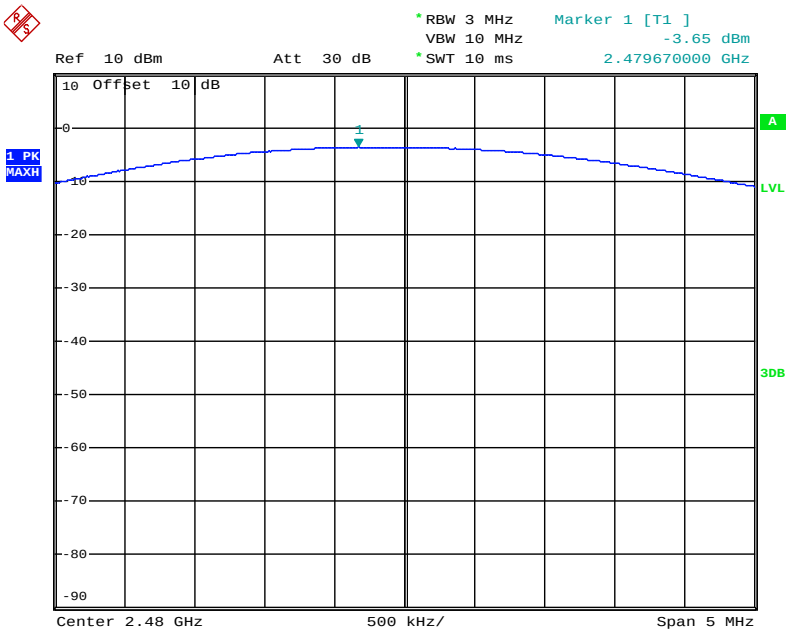
Date: 4.APR.2019 17:06:42

Middle channel



Date: 4.APR.2019 17:09:38

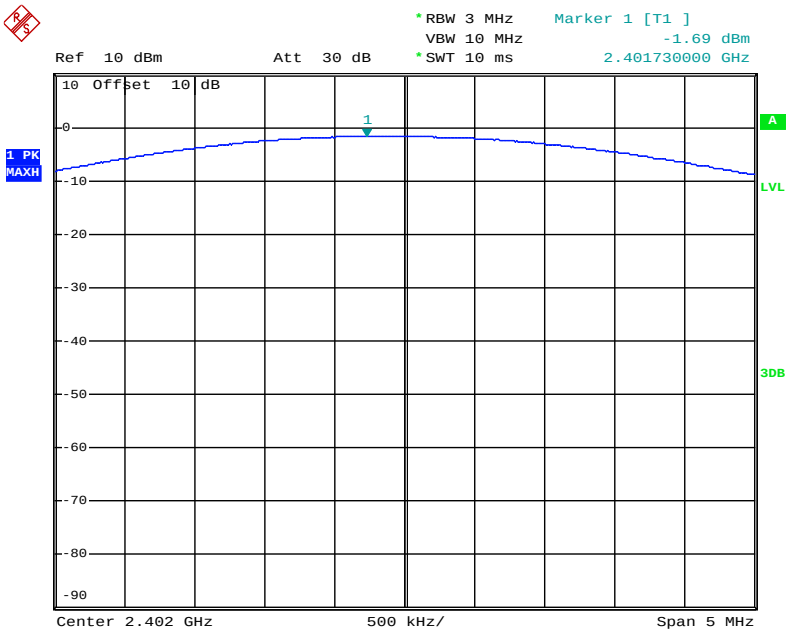
High channel



Date: 4.APR.2019 17:10:14

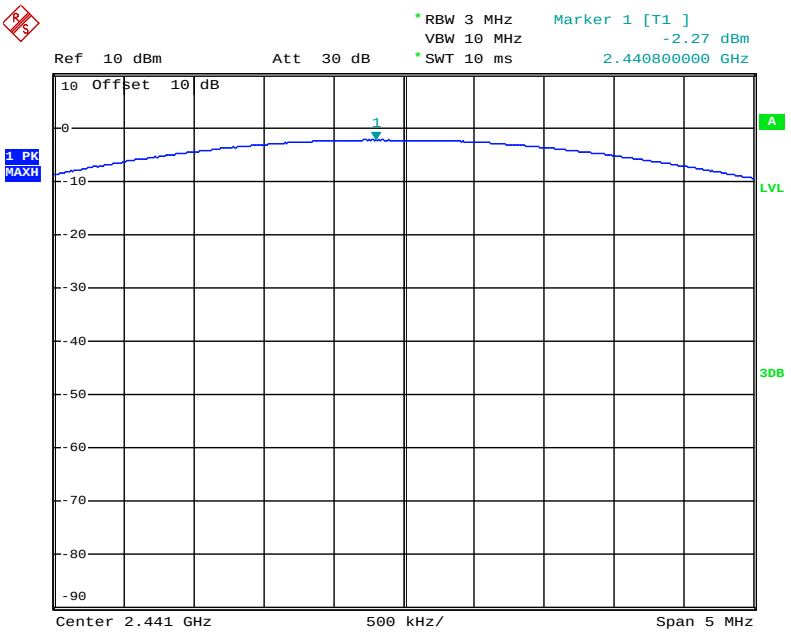
Π/4-DQPSK Mode

Low channel



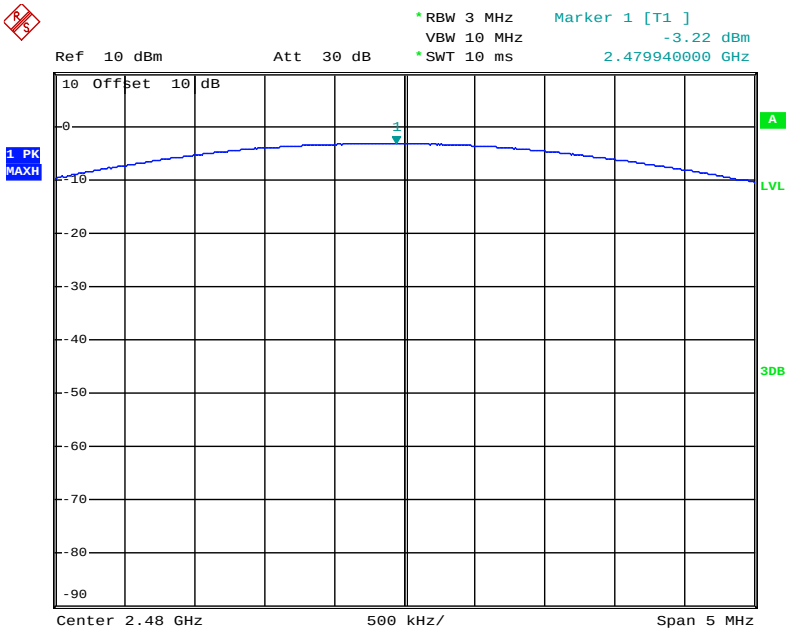
Date: 4.APR.2019 17:11:08

Middle channel



Date: 4.APR.2019 17:12:44

High channel



Date: 4.APR.2019 17:13:28

11.RADIATED EMISSION TEST

11.1.Block Diagram of Test Setup

11.1.1.Block diagram of connection between the EUT and peripherals

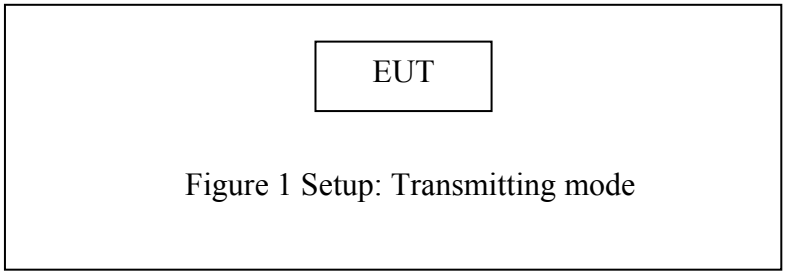
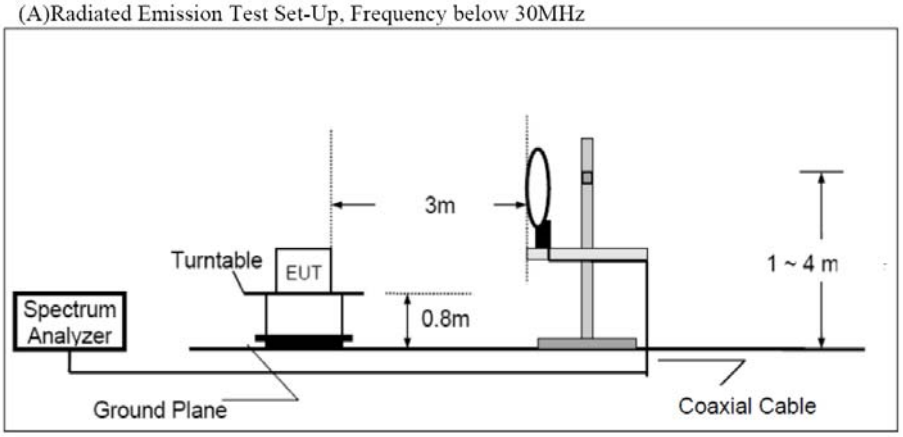


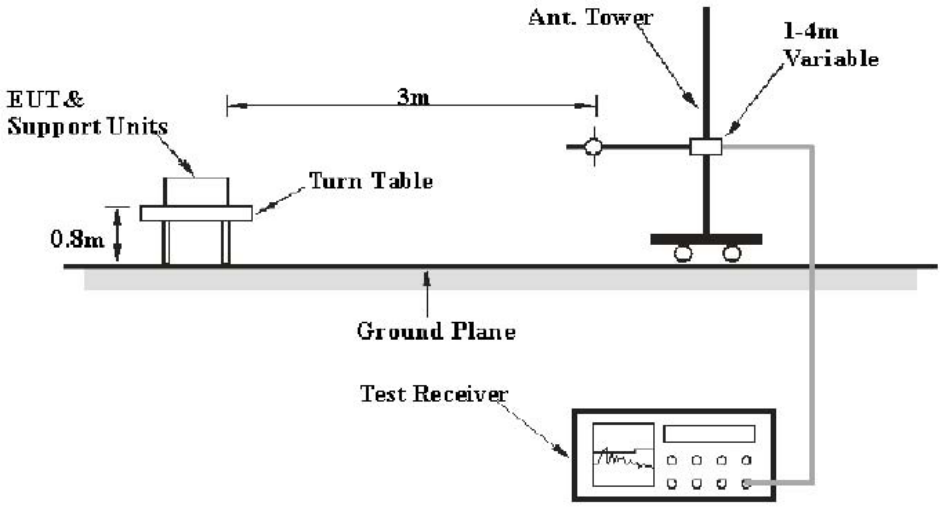
Figure 1 Setup: Transmitting mode

11.1.2.Semi-Anechoic Chamber Test Setup Diagram

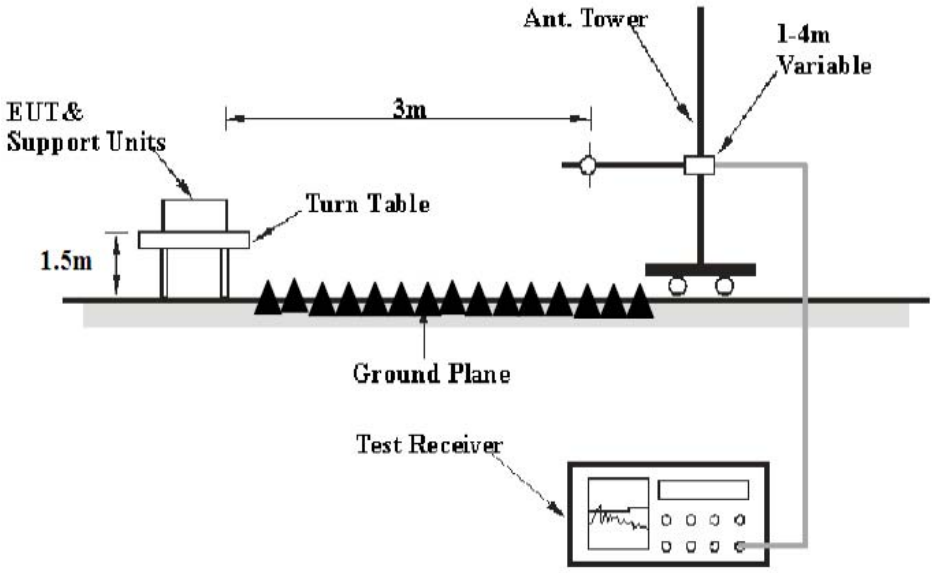
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



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



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



11.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.Restricted bands of operation

11.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

11.4.Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.5. Operating Condition of EUT

11.5.1. Setup the EUT and simulator as shown as Section 10.1.

11.5.2. Turn on the power of all equipment.

11.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

11.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

11.7.Data Sample

Frequency (MHz)	Reading (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
X.XX	48.69	-13.35	35.34	46	-10.66	QP

Frequency(MHz) = Emission frequency in MHz
Reading(dBμv) = Uncorrected Analyzer/Receiver reading
Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain
Result(dBμv/m) = Reading(dBμv) + Factor(dB/m)
Limit (dBμv/m) = Limit stated in standard
Margin (dB) = Result(dBμv/m) - Limit (dBμv/m)
QP = Quasi-peak Reading

Calculation Formula:
Margin(dB) = Result (dBμV/m)–Limit(dBμV/m)
Result(dBμV/m)= Reading(dBμV)+ Factor(dB/m)

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

11.8.The Field Strength of Radiation Emission Measurement Results

PASS.
Test Lab: 3m Anechoic chamber
Test Engineer: Bob

Note: 1.We tested GFSK mode, Π/4-DQPSK Mode and recorded the worst case data (GFSK mode) for all test mode.

2. Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 30MHz and 18 to 26.5GHz.

The spectrum analyzer plots are attached as below.

Below 1GHz

ACCURATE TECHNOLOGY CO., LTD.
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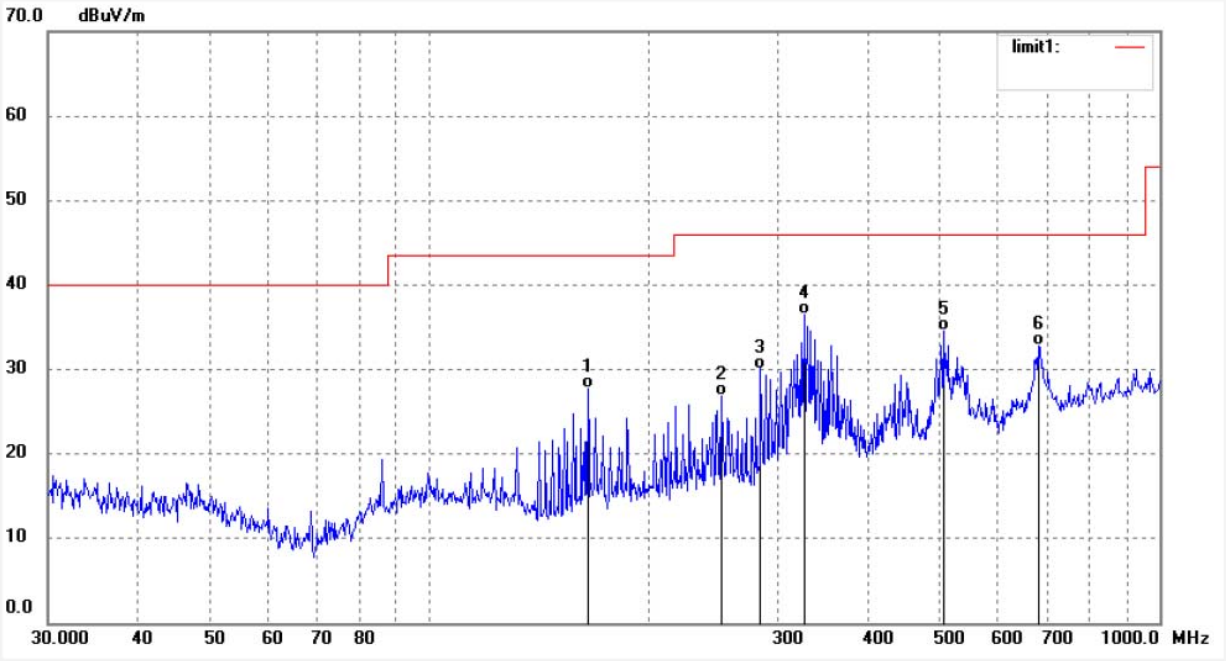
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2018 #1600
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2402MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 10/46/17
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	164.8911	48.65	-20.83	27.82	43.50	-15.68	QP	100	126	
2	251.3676	44.68	-17.82	26.86	46.00	-19.14	QP	100	85	
3	284.2606	47.02	-16.92	30.10	46.00	-15.90	QP	100	149	
4	326.0079	52.24	-15.77	36.47	46.00	-9.53	QP	100	91	
5	505.7891	46.49	-11.94	34.55	46.00	-11.45	QP	100	112	
6	681.8260	42.15	-9.25	32.90	46.00	-13.10	QP	100	302	

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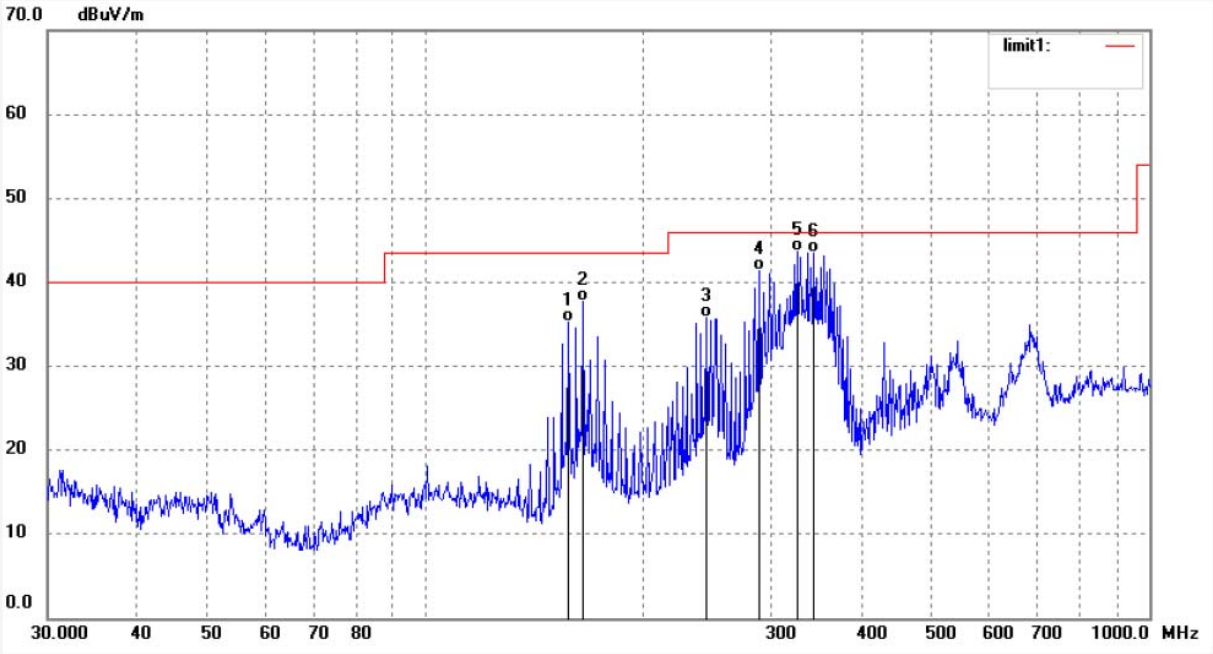
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2018 #1601
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2402MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 10/49/47
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	157.5289	56.36	-21.12	35.24	43.50	-8.26	QP	200	103	
2	164.8911	58.57	-20.83	37.74	43.50	-5.76	QP	200	219	
3	244.4003	53.53	-17.81	35.72	46.00	-10.28	QP	200	220	
4	289.2986	58.20	-16.85	41.35	46.00	-4.65	QP	200	166	
5	326.0079	59.40	-15.77	43.63	46.00	-2.37	QP	200	102	
6	343.6505	58.67	-15.16	43.51	46.00	-2.49	QP	200	330	

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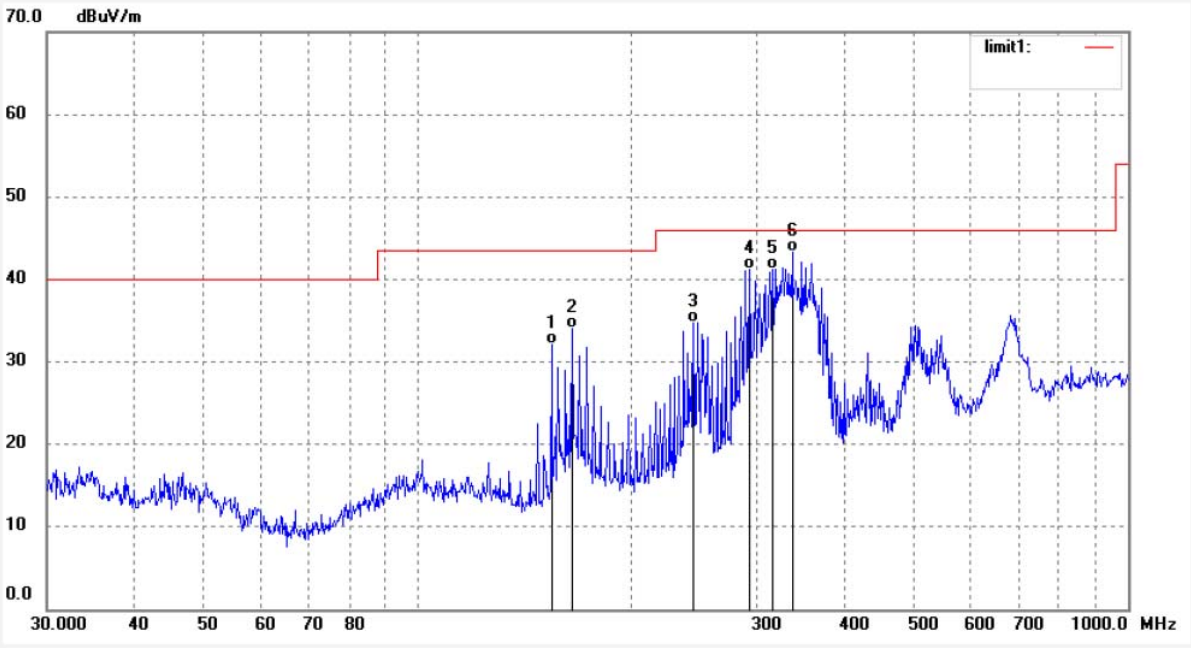
Fax:+86-0755-26503396

Job No.: frank2018 #1602
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2441MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 10/52/31
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	154.2427	53.45	-21.39	32.06	43.50	-11.44	QP	200	201	
2	164.8911	54.88	-20.83	34.05	43.50	-9.45	QP	200	163	
3	244.4003	52.61	-17.81	34.80	46.00	-11.20	QP	200	152	
4	293.3933	57.90	-16.73	41.17	46.00	-4.83	QP	200	59	
5	315.8599	57.40	-16.15	41.25	46.00	-4.75	QP	200	159	
6	336.4816	58.71	-15.45	43.26	46.00	-2.74	QP	200	302	

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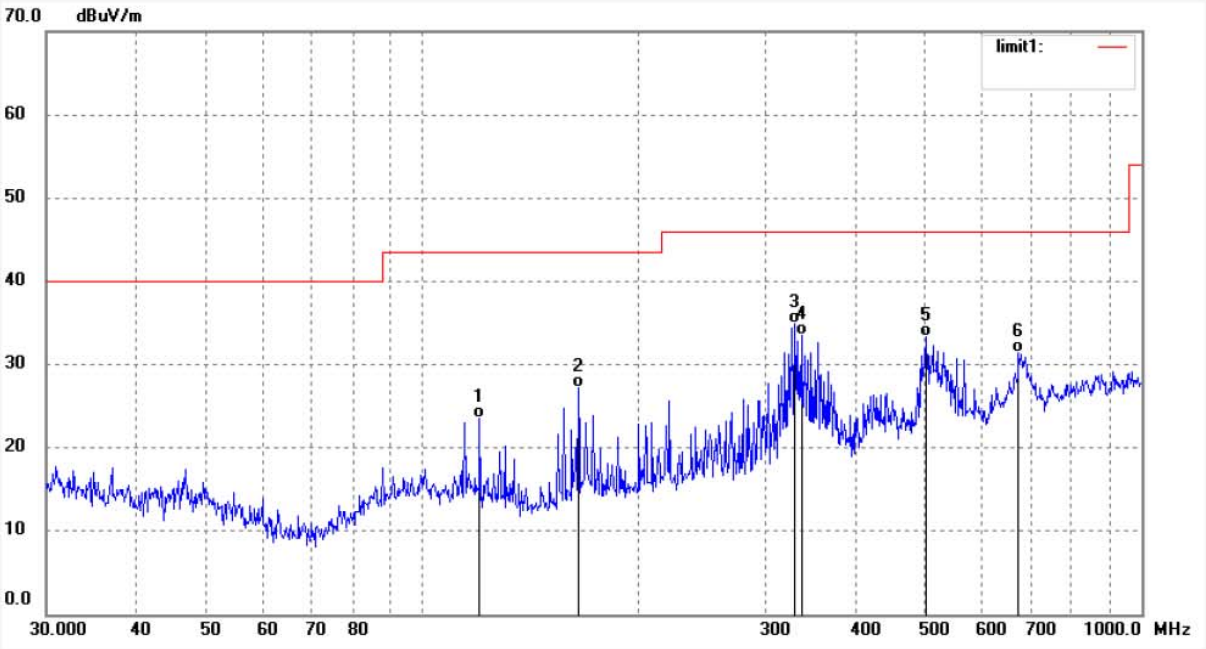
Fax:+86-0755-26503396

Job No.: frank2018 #1603
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2441MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 10/55/28
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	120.1888	43.11	-19.54	23.57	43.50	-19.93	QP	100	132	
2	164.8911	48.01	-20.83	27.18	43.50	-16.32	QP	100	163	
3	329.4624	50.57	-15.63	34.94	46.00	-11.06	QP	100	121	
4	336.4816	48.90	-15.45	33.45	46.00	-12.55	QP	100	94	
5	502.2472	45.38	-12.08	33.30	46.00	-12.70	QP	100	221	
6	674.6767	40.64	-9.30	31.34	46.00	-14.66	QP	100	102	

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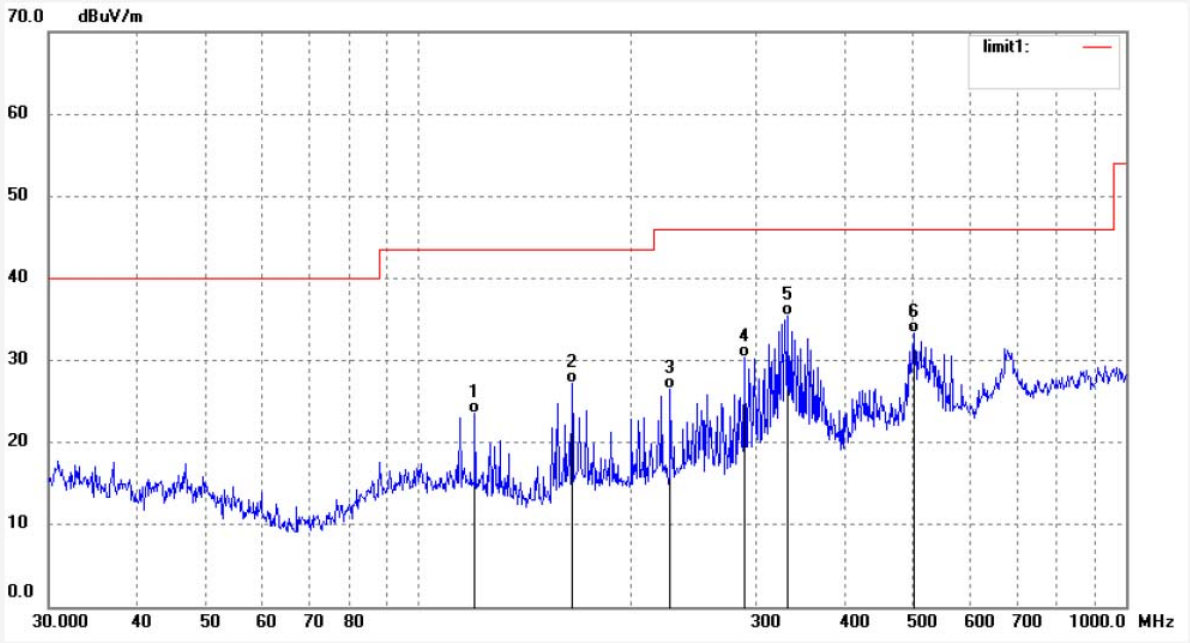
Fax:+86-0755-26503396

Job No.: frank2018 #1604
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2480MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 10/58/40
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	120.1888	43.11	-19.54	23.57	43.50	-19.93	QP	100	120	
2	164.8911	48.01	-20.83	27.18	43.50	-16.32	QP	100	239	
3	227.0164	44.81	-18.25	26.56	46.00	-19.44	QP	100	55	
4	289.2986	47.22	-16.85	30.37	46.00	-15.63	QP	100	169	
5	332.9534	51.00	-15.54	35.46	46.00	-10.54	QP	100	205	
6	502.2472	45.38	-12.08	33.30	46.00	-12.70	QP	100	112	

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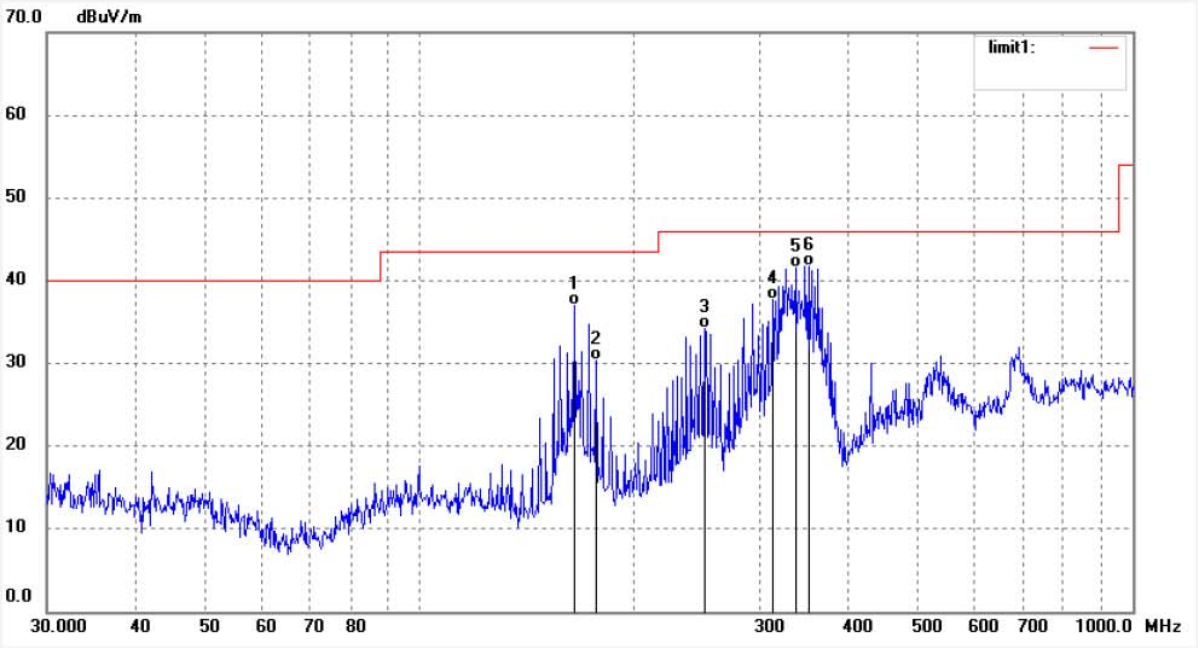
Job No.: frank2018 #1605
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2480MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/00/59
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	164.8911	57.80	-20.83	36.97	43.50	-6.53	QP	200	129	
2	176.8952	50.39	-20.02	30.37	43.50	-13.13	QP	200	34	
3	251.3676	52.11	-17.82	34.29	46.00	-11.71	QP	200	210	
4	312.5482	54.00	-16.23	37.77	46.00	-8.23	QP	200	22	
5	336.4816	57.07	-15.45	41.62	46.00	-4.38	QP	200	168	
6	350.9721	56.79	-14.97	41.82	46.00	-4.18	QP	200	165	

Above 1GHz

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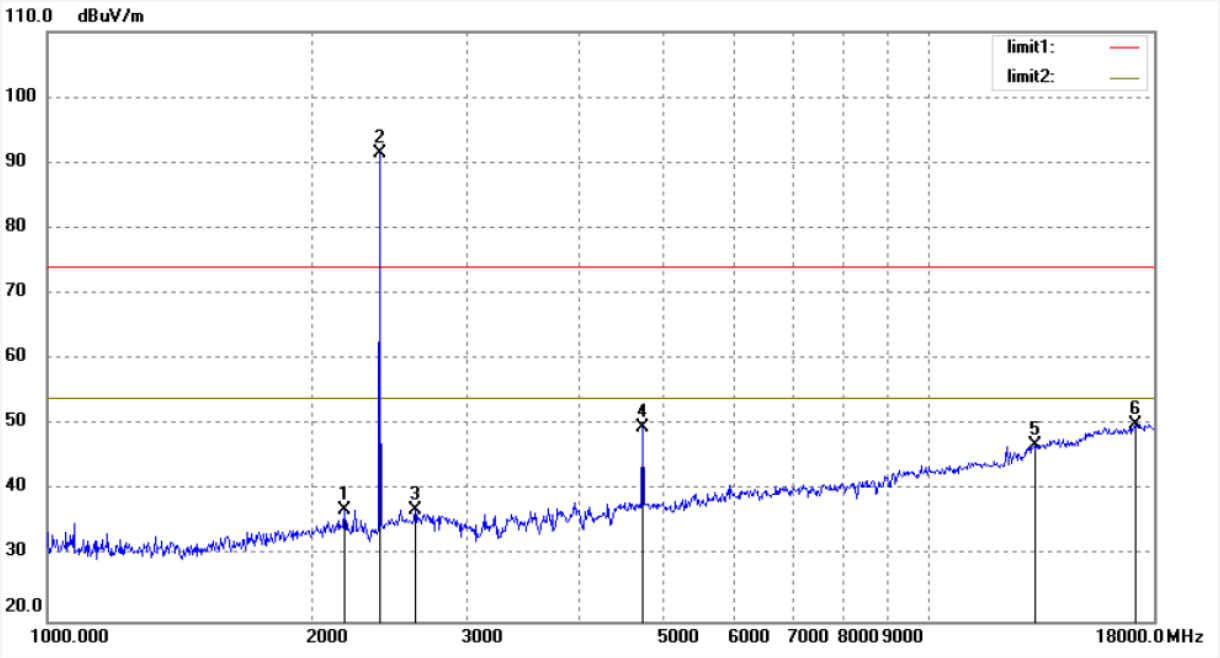
Job No.: frank2018 #1606
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2402MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/04/42
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2175.306	45.48	-8.56	36.92	74.00	-37.08	peak	250	156	
2	2402.000	99.56	-8.03	91.53			peak	250	201	
3	2613.124	44.39	-7.37	37.02	74.00	-36.98	peak	250	221	
4	4804.000	52.08	-2.53	49.55	74.00	-24.45	peak	250	48	
5	13182.917	37.28	9.71	46.99	74.00	-27.01	peak	250	156	
6	17130.989	35.05	15.00	50.05	74.00	-23.95	peak	250	302	

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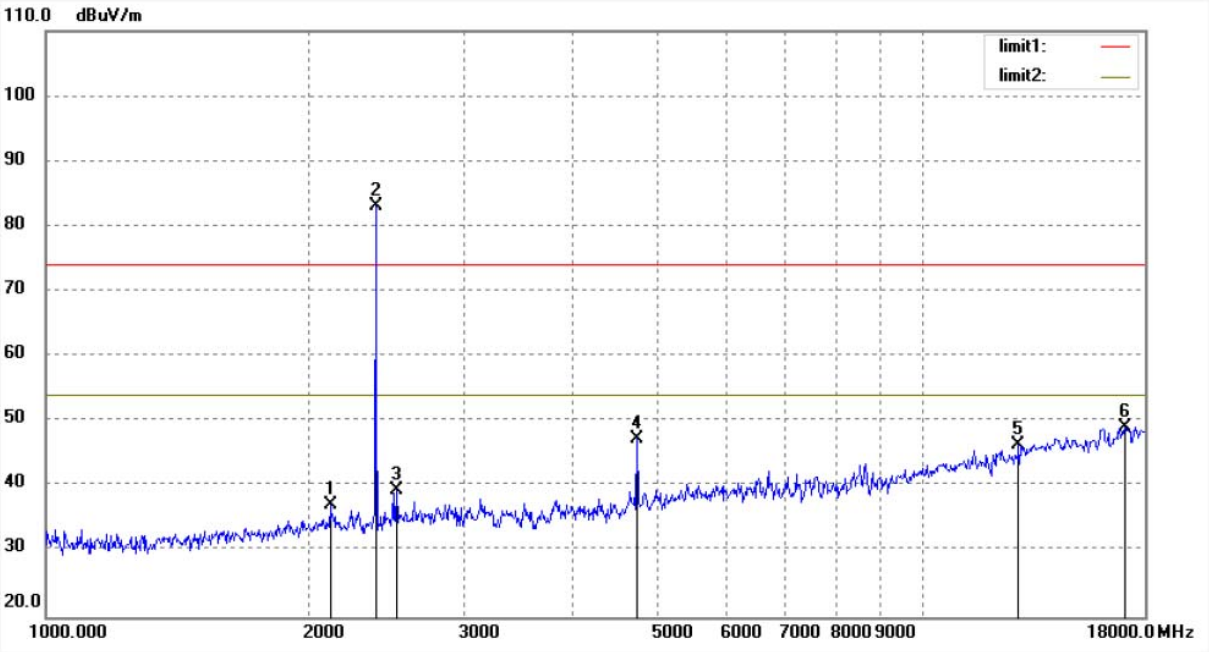
Job No.: frank2018 #1607
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2402MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/07/03
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2112.901	45.88	-8.72	37.16	74.00	-36.84	peak	150	91	
2	2402.000	91.05	-8.03	83.02			peak	150	55	
3	2516.092	47.15	-7.66	39.49	74.00	-34.51	peak	150	201	
4	4804.000	49.88	-2.53	47.35	74.00	-26.65	peak	150	323	
5	12917.030	37.24	9.14	46.38	74.00	-27.62	peak	150	111	
6	17081.198	34.06	14.98	49.04	74.00	-24.96	peak	150	102	

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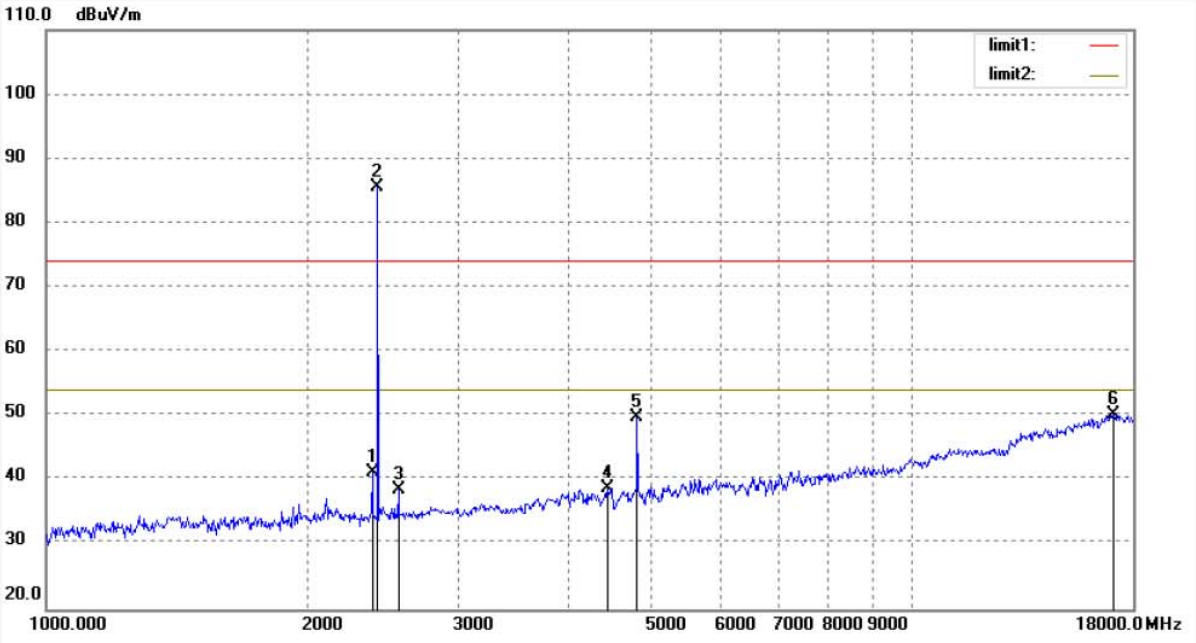
Job No.: frank2018 #1608
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2441MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/10/31
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2380.719	49.20	-8.03	41.17	74.00	-32.83	peak	150	332	
2	2441.000	93.43	-7.93	85.50			peak	150	201	
3	2552.978	46.05	-7.55	38.50	74.00	-35.50	peak	150	156	
4	4451.376	42.02	-3.31	38.71	74.00	-35.29	peak	150	92	
5	4882.000	52.06	-2.25	49.81	74.00	-24.19	peak	150	112	
6	17081.198	35.19	14.98	50.17	74.00	-23.83	peak	150	302	

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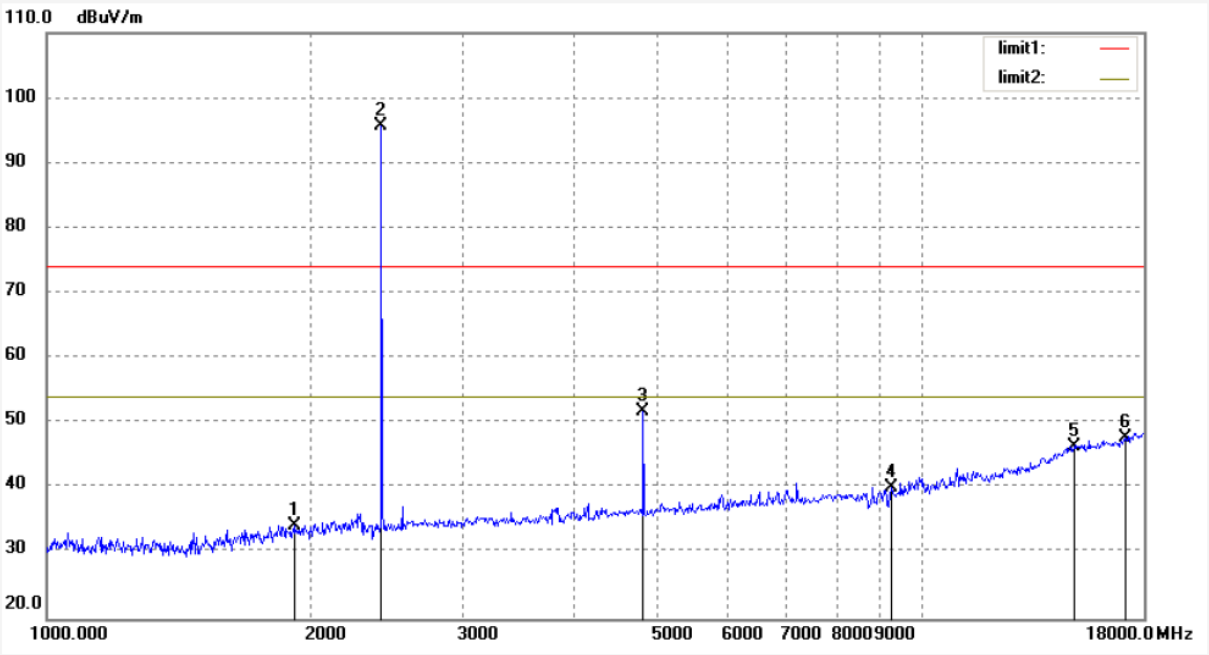
Job No.: frank2018 #1609
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2441MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/13/39
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1924.985	43.77	-9.37	34.40	74.00	-39.60	peak	250	211	
2	2441.000	103.70	-7.93	95.77			peak	250	156	
3	4882.000	54.02	-2.25	51.77	74.00	-22.23	peak	250	48	
4	9242.484	34.97	5.14	40.11	74.00	-33.89	peak	250	95	
5	14984.176	33.14	13.33	46.47	74.00	-27.53	peak	250	132	
6	17180.926	32.72	15.02	47.74	74.00	-26.26	peak	250	102	

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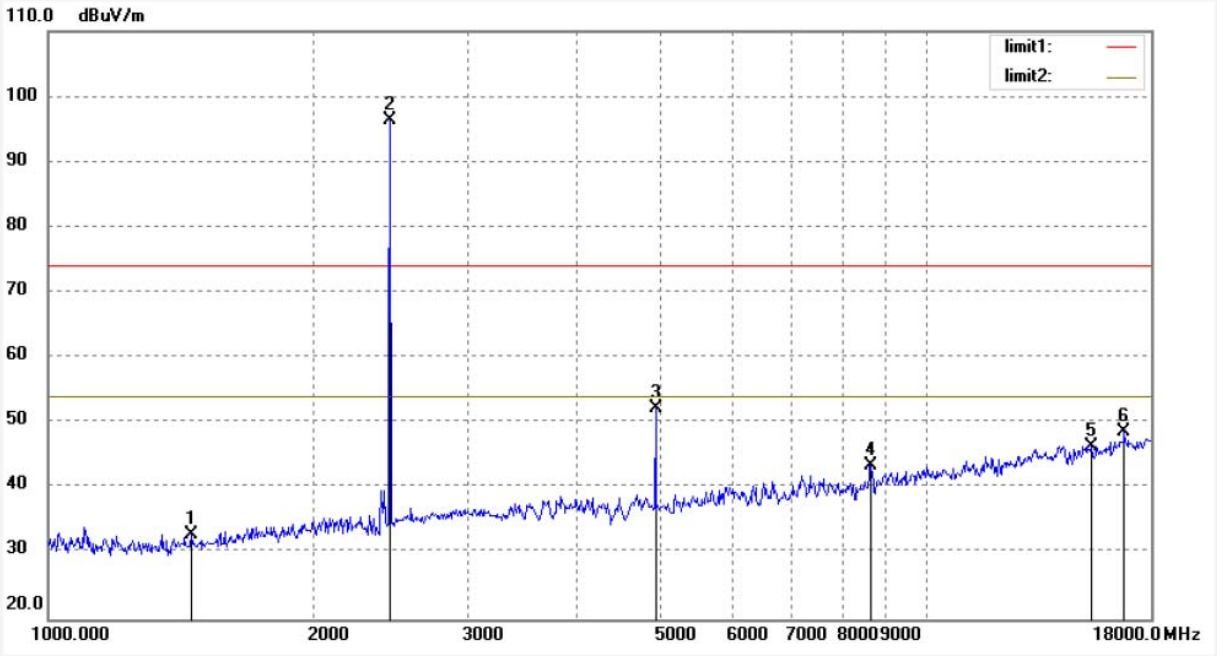
Job No.: frank2018 #1610
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2480MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/15/07
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1455.699	44.42	-11.42	33.00	74.00	-41.00	peak	250	52	
2	2480.000	104.24	-7.84	96.40			peak	250	164	
3	4960.000	54.23	-1.92	52.31	74.00	-21.69	peak	250	55	
4	8643.983	39.11	4.42	43.53	74.00	-30.47	peak	250	195	
5	15381.899	33.72	12.76	46.48	74.00	-27.52	peak	250	211	
6	16785.473	34.43	14.24	48.67	74.00	-25.33	peak	250	103	

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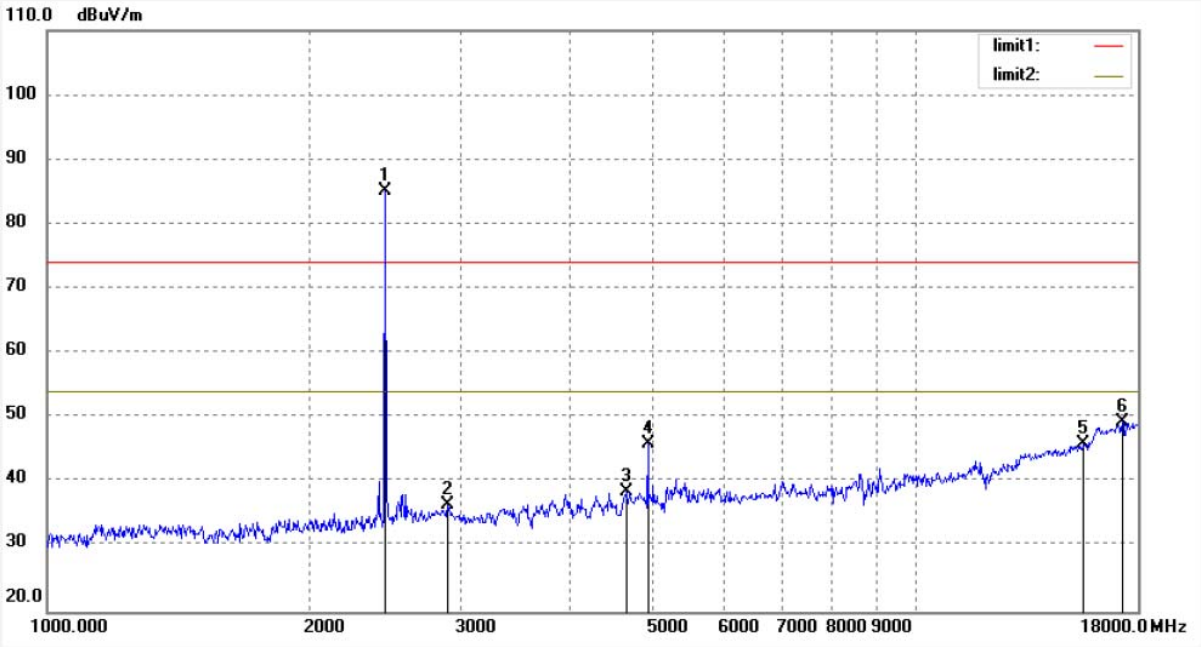
Job No.: frank2018 #1611
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2480MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/18/02
Engineer Signature: Bob
Distance:

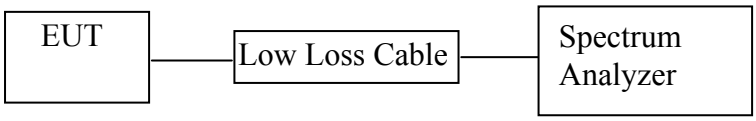
Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	93.01	-7.84	85.17			peak	150	354	
2	2893.372	43.00	-6.52	36.48	74.00	-37.52	peak	150	201	
3	4650.033	41.45	-2.81	38.64	74.00	-35.36	peak	150	223	
4	4960.000	47.94	-1.92	46.02	74.00	-27.98	peak	150	95	
5	15607.400	33.33	12.64	45.97	74.00	-28.03	peak	150	230	
6	17281.236	34.22	15.07	49.29	74.00	-24.71	peak	150	122	

12.BAND EDGE COMPLIANCE TEST

12.1.Block Diagram of Test Setup



(EUT: Bluetooth speaker)

12.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

12.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.4.Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 11.1.

12.4.2.Turn on the power of all equipment.

12.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

12.5.Test Procedure

12.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

12.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

12.5.3.The band edges was measured and recorded.

12.6.Test Result

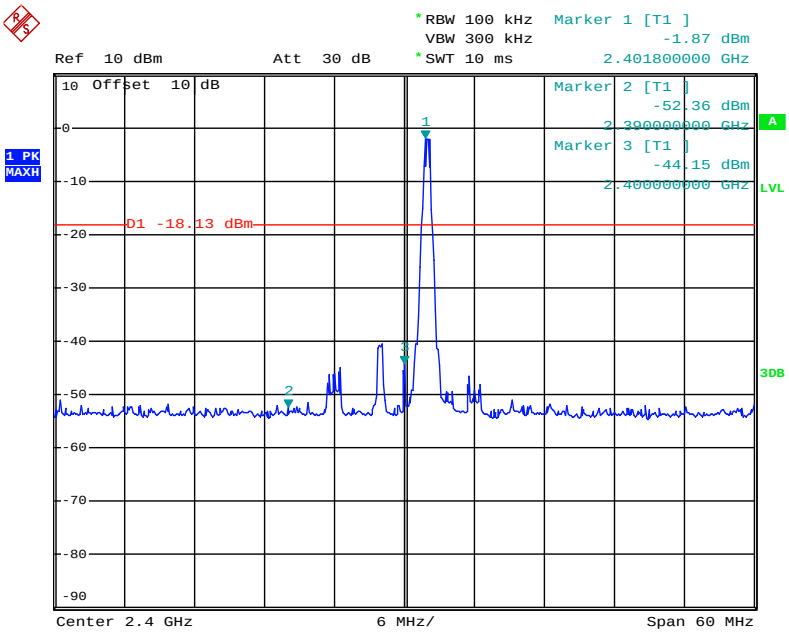
Test Lab: Shielding room
Test Engineer: Bob

Note: Both hopping-on mode and hopping-off mode had been pre-tested, and only the worst case was recorded in the test report.

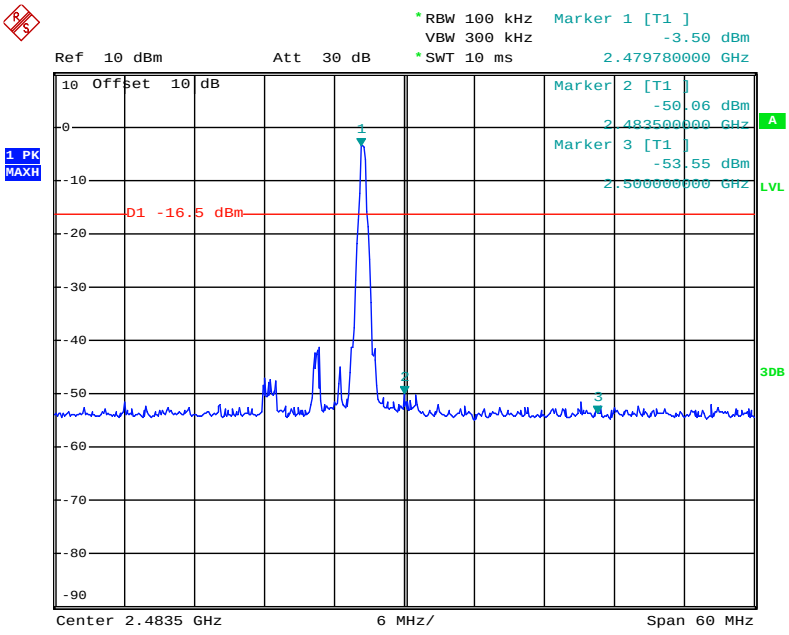
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK Mode		
2400.00	42.28	> 20dBc
2483.50	46.56	> 20dBc
Π/4-DQPSK Mode		
2400.00	41.42	> 20dBc
2483.50	47.48	> 20dBc

The spectrum analyzer plots are attached as below.

GFSK Mode

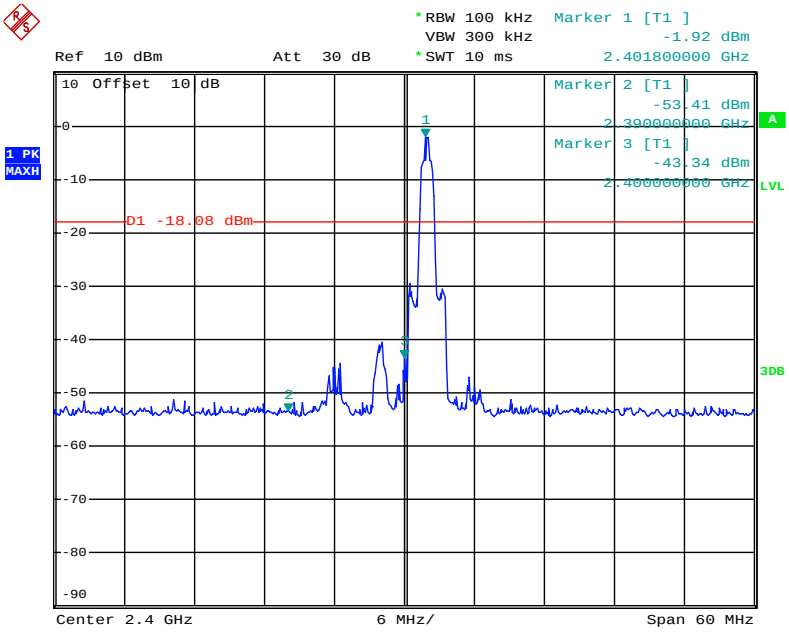


Date: 4.APR.2019 17:16:32



Date: 4.APR.2019 17:19:11

Π/4-DQPSK Mode



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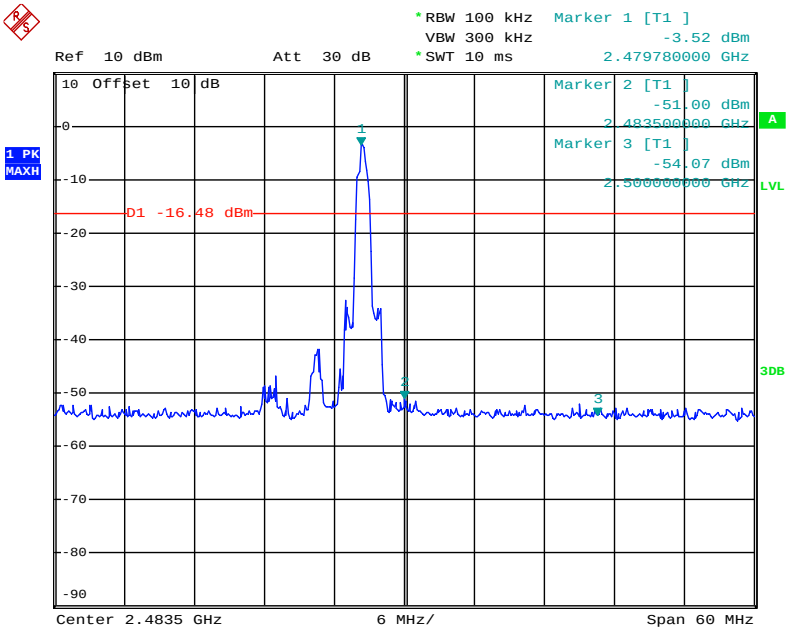

Date: 4.APR.2019 17:20:50

Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

   Result = Reading + Corrected Factor
3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

Let the EUT work in TX (Hopping off, Hopping on) modes measure it.
We select 2402MHz, 2480MHz TX frequency to transmit(Hopping off mode).
We select 2402-2480MHz TX frequency to transmit(Hopping on mode).

During the radiated emission test, the spectrum analyzer was set with the following configurations:
1.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
2.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
3.All modes of operation were investigated and the worst case (GFSK mode) emissions are reported.

Test Lab: 3m Anechoic chamber
Test Engineer: Bob

Non-hopping mode

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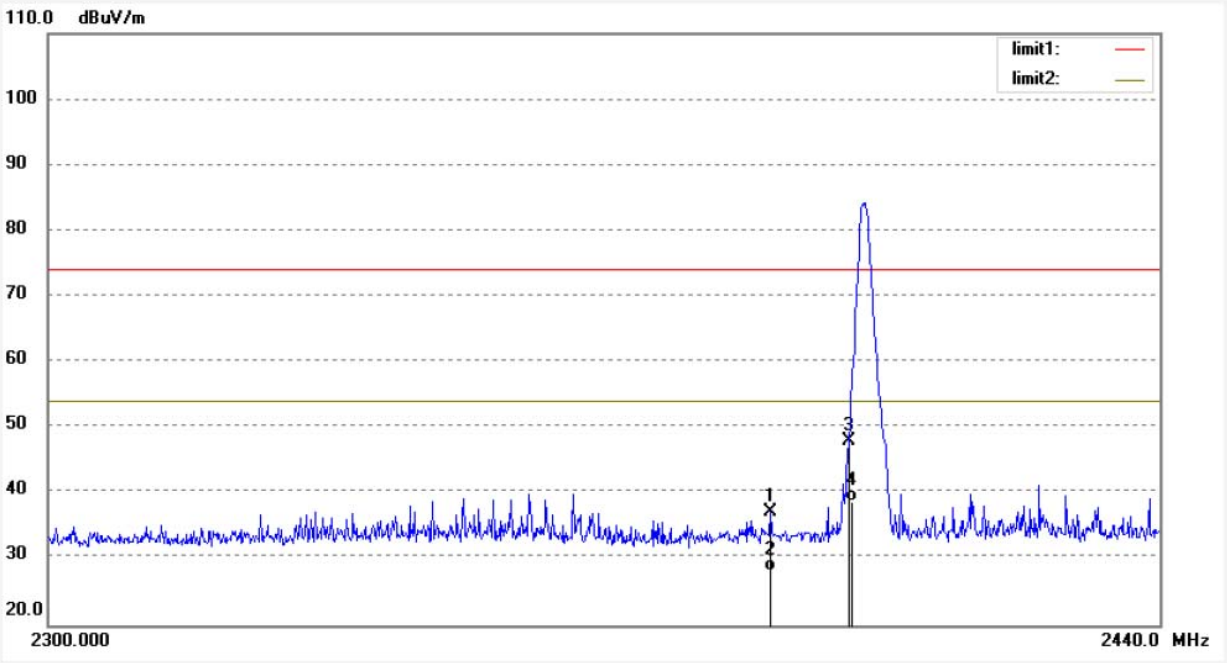
Job No.: frank2018 #1619	Polarization: Vertical
Standard: FCC PK	Power Source: DC 3.7V
Test item: Radiation Test	Date: 19/04/08/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 11/37/34
EUT: Bluetooth speaker	Engineer Signature: Bob
Mode: TX2402MHz(GFSK)	Distance:
Model: VPAS1002-ASST	
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.	

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	45.10	-8.00	37.10	74.00	-36.90	peak	150	302	
2	2390.000	36.12	-8.00	28.12	54.00	-25.88	AVG	150	96	
3	2400.000	56.06	-7.97	48.09	74.00	-25.91	peak	150	55	
4	2400.000	46.78	-7.97	38.81	54.00	-15.19	AVG	150	164	

Note: Average measurement with peak detection at No.2&4

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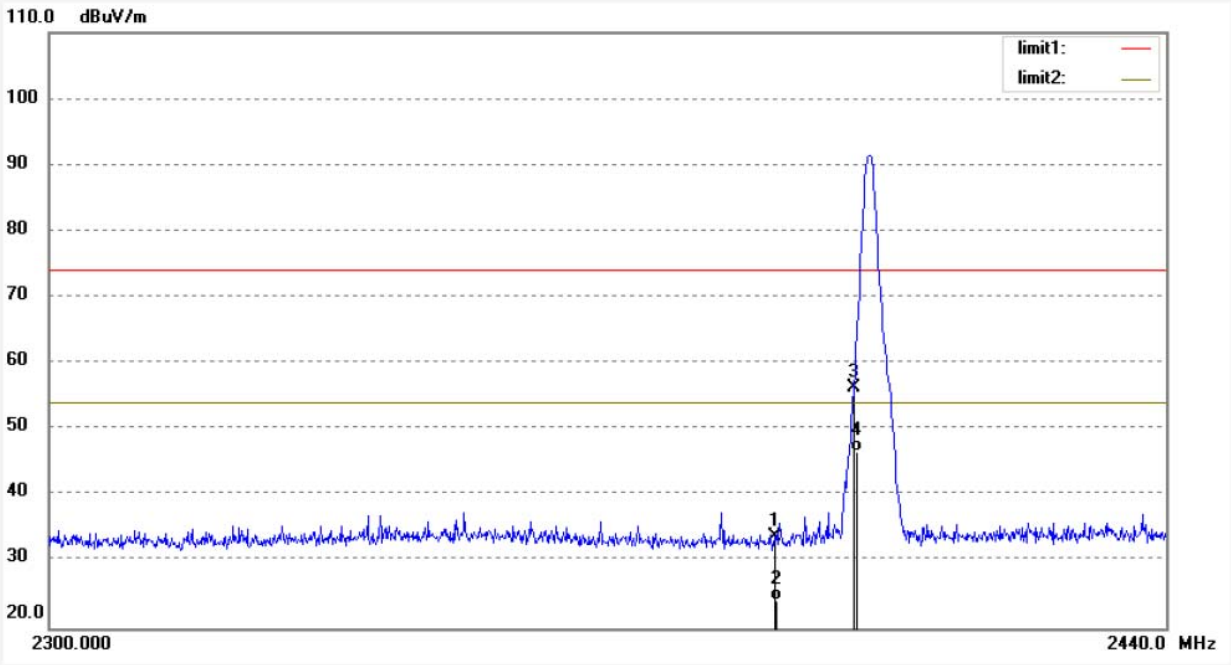
Job No.: frank2018 #1618	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 3.7V
Test item: Radiation Test	Date: 19/04/08/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 11/34/16
EUT: Bluetooth speaker	Engineer Signature: Bob
Mode: TX2402MHz(GFSK)	Distance:
Model: VPAS1002-ASST	
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.	

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.81	-8.00	33.81	74.00	-40.19	peak	250	302	
2	2390.000	32.15	-8.00	24.15	54.00	-29.85	AVG	250	102	
3	2400.000	64.25	-7.97	56.28	74.00	-17.72	peak	250	119	
4	2400.000	54.66	-7.97	46.69	54.00	-7.31	AVG	200	96	

Note: Average measurement with peak detection at No.2&4

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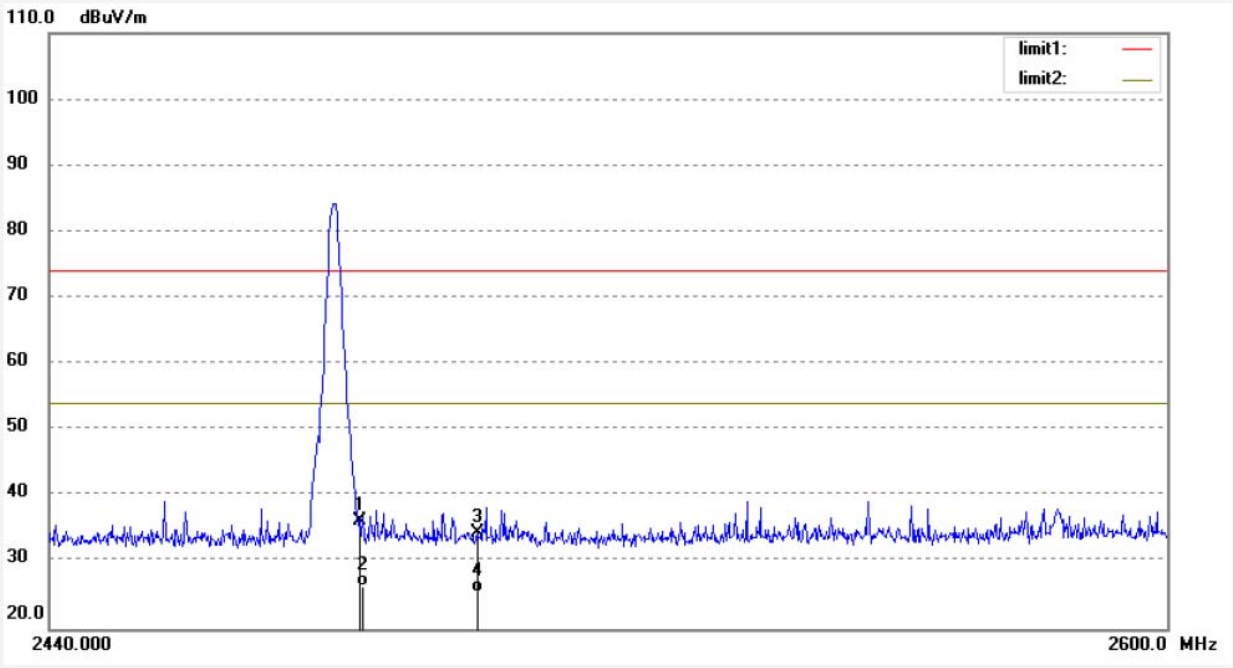
Fax:+86-0755-26503396

Job No.: frank2018 #1628
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2480MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 13/40/04
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	44.10	-7.76	36.34	74.00	-37.66	peak	150	302	
2	2483.500	34.15	-7.76	26.39	54.00	-27.61	AVG	150	194	
3	2500.000	42.27	-7.71	34.56	74.00	-39.44	peak	150	55	
4	2500.000	33.15	-7.71	25.44	54.00	-28.56	AVG	150	164	

Note: Average measurement with peak detection at No.2&4

ACCURATE TECHNOLOGY CO., LTD.
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Site: 1# Chamber
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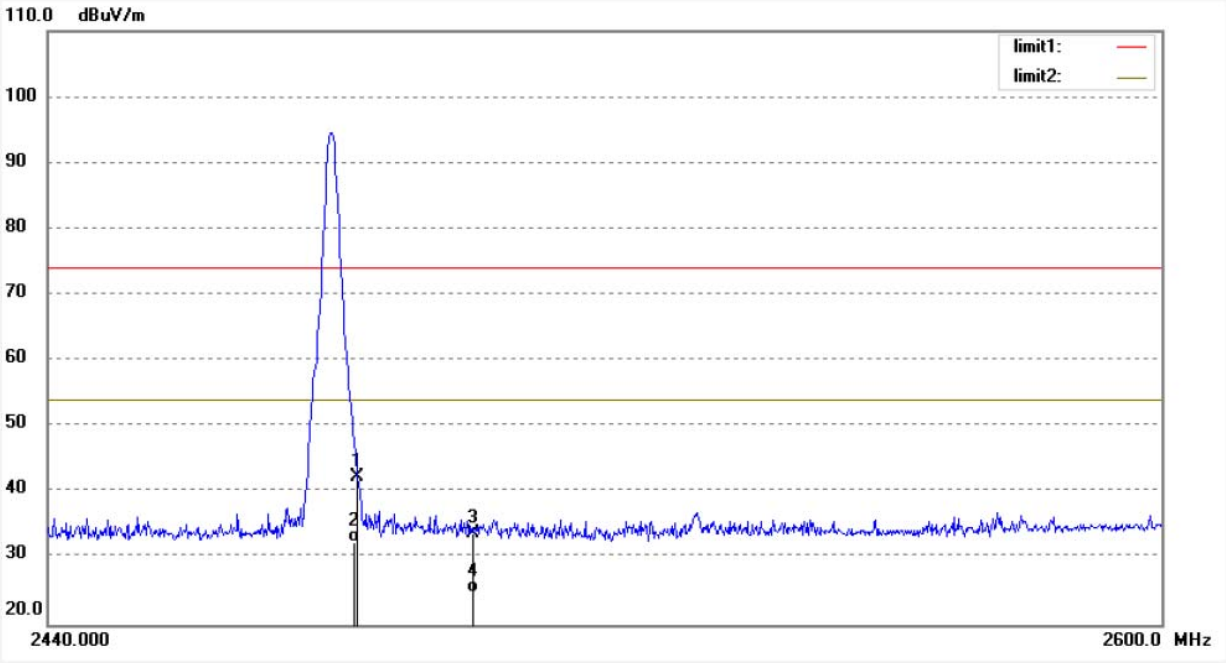
Fax:+86-0755-26503396

Job No.: frank2018 #1629
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: TX2480MHz(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 13/45/27
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	50.17	-7.76	42.41	74.00	-31.59	peak	250	302	
2	2483.500	40.15	-7.76	32.39	54.00	-21.61	AVG	250	119	
3	2500.000	41.63	-7.71	33.92	74.00	-40.08	peak	250	95	
4	2500.000	32.45	-7.71	24.74	54.00	-29.26	AVG	250	177	

Note: Average measurement with peak detection at No.2&4

Hopping mode

ACCURATE TECHNOLOGY CO., LTD.
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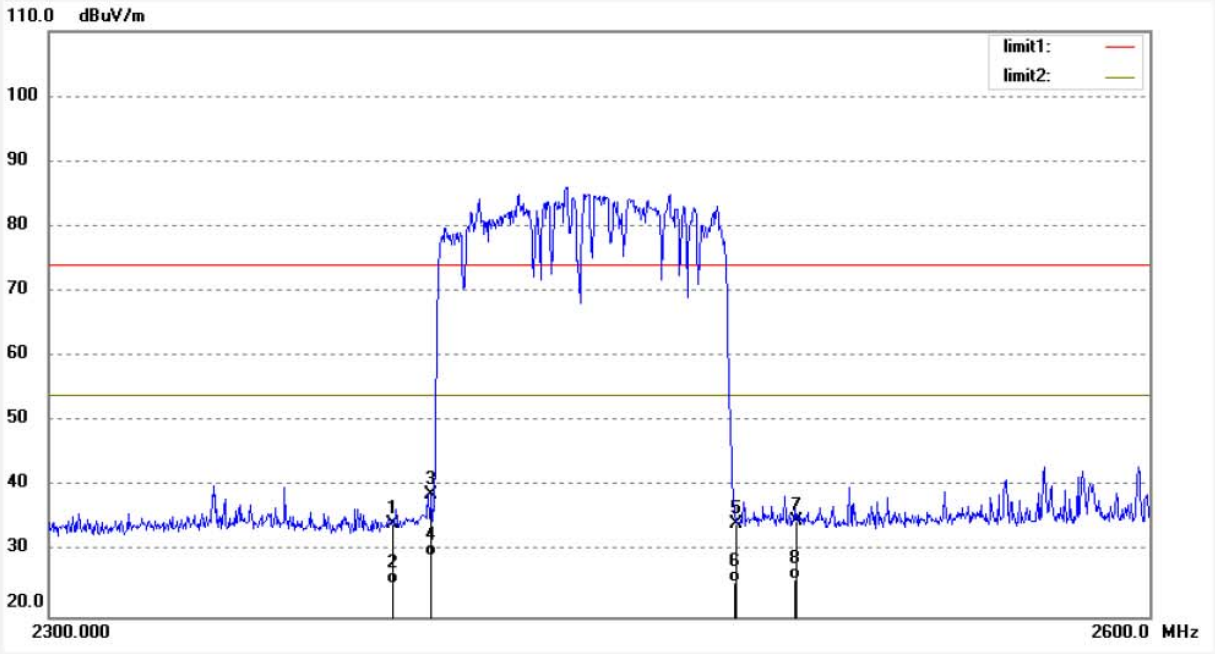
Job No.: frank2018 #1612
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: HOPPING(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/24/43
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	42.27	-8.00	34.27	74.00	-39.73	peak	150	93	
2	2390.000	33.15	-8.00	25.15	54.00	-28.85	AVG	150	223	
3	2400.000	46.78	-7.97	38.81	74.00	-35.19	peak	150	302	
4	2400.000	37.21	-7.97	29.24	54.00	-24.76	AVG	150	212	
5	2483.500	42.03	-7.76	34.27	74.00	-39.73	peak	150	66	
6	2483.500	33.15	-7.76	25.39	54.00	-28.61	AVG	150	202	
7	2500.000	42.47	-7.71	34.76	74.00	-39.24	peak	150	123	
8	2500.000	33.48	-7.71	25.77	54.00	-28.23	AVG	150	102	

Note: Average measurement with peak detection at No.2&4&6&8

ACCURATE TECHNOLOGY CO., LTD.
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Site: 1# Chamber
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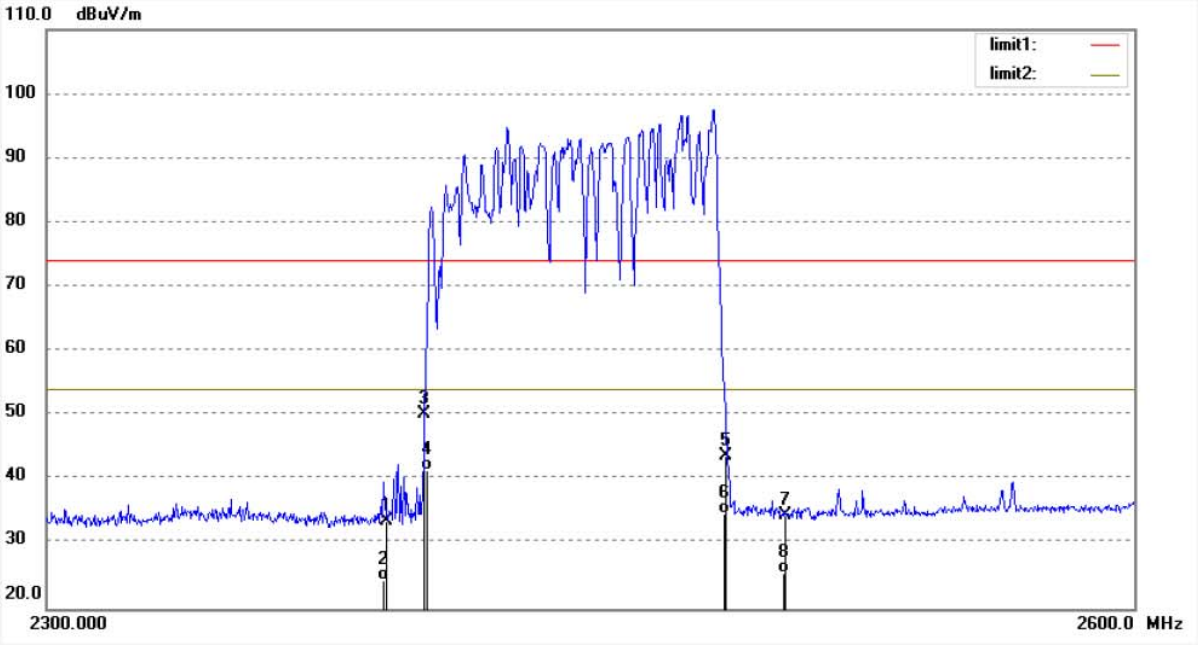
Fax:+86-0755-26503396

Job No.: frank2018 #1613
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth speaker
Mode: HOPPING(GFSK)
Model: VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/04/08/
Time: 11/28/47
Engineer Signature: Bob
Distance:

Note: Report NO.:ATE20190439



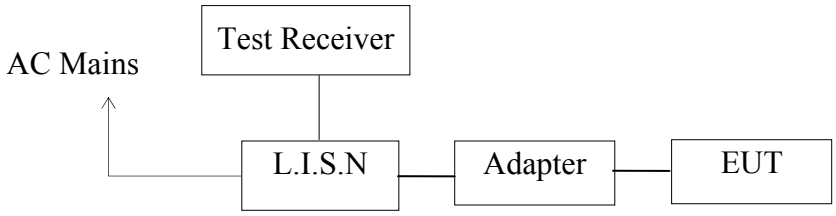
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.57	-8.00	33.57	74.00	-40.43	peak	250	92	
2	2390.000	32.48	-8.00	24.48	54.00	-29.52	AVG	250	110	
3	2400.000	58.17	-7.97	50.20	74.00	-23.80	peak	200	332	
4	2400.000	49.48	-7.97	41.51	54.00	-12.49	AVG	250	120	
5	2483.500	51.60	-7.76	43.84	74.00	-30.16	peak	250	299	
6	2483.500	42.48	-7.76	34.72	54.00	-19.28	AVG	250	66	
7	2500.000	42.28	-7.71	34.57	74.00	-39.43	peak	250	224	
8	2500.000	33.15	-7.71	25.44	54.00	-28.56	AVG	250	103	

Note: Average measurement with peak detection at No.2&4&6&8

13. AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A)

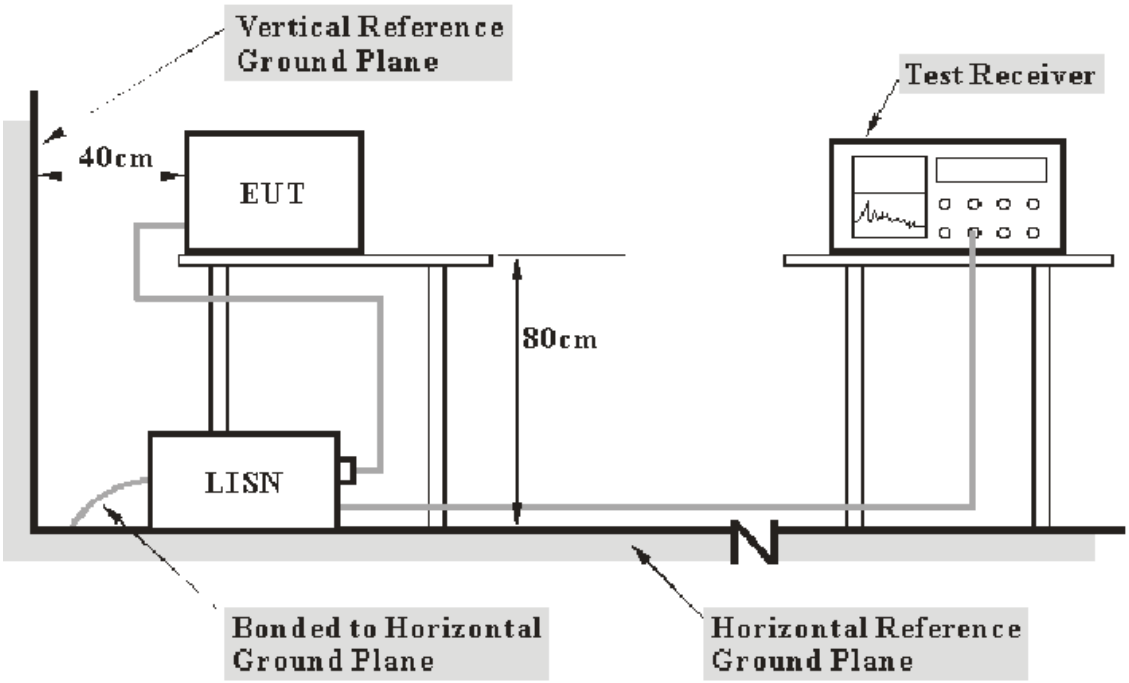
13.1. Block Diagram of Test Setup

13.1.1. Block diagram of connection between the EUT and simulators



(EUT: Bluetooth speaker)

13.1.2. Test System Setup



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

13.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

13.3.Configuration of EUT on Measurement

The 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.

13.4.Operating Condition of EUT

13.4.1.Setup the EUT and simulator as shown as Section 12.1.

13.4.2.Turn on the power of all equipment.

13.4.3.Let the EUT work in test mode and measure it.

13.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and 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 lines 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 ANSI C63.10: 2013 on Conducted Emission Measurement.
The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

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

13.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz
Transducer value(dB) = Insertion loss of LISN + Cable Loss
Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value
Limit (dBμV) = Limit stated in standard
Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:
Margin = Limit (dBμV) - Level (dBμV)

13.7.Power Line Conducted Emission Measurement Results

PASS.
Test Lab: Shielding room
Test Engineer: Bob

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

Maximizing procedure was performed on the six (6) highest emissions of the EUT.
Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

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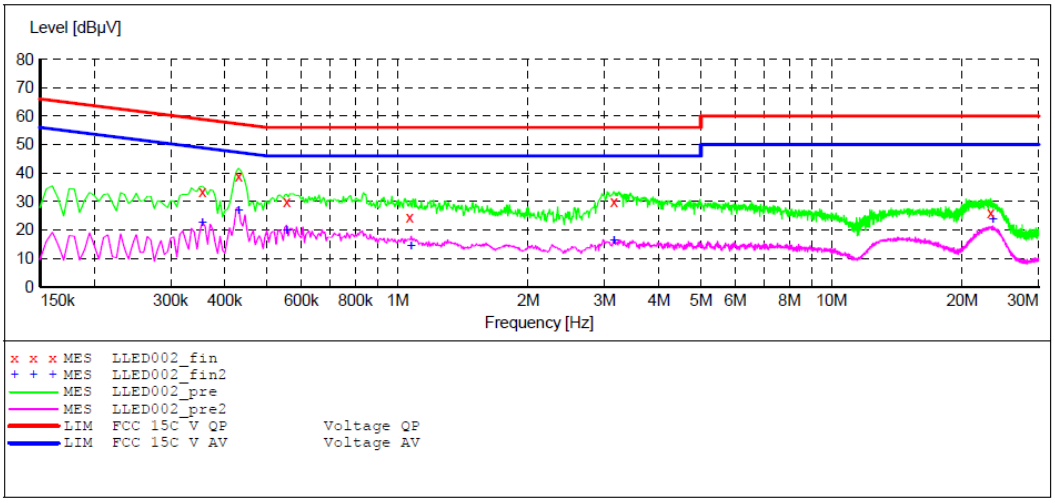
CONDUCTED EMISSION STANDARD FCC PART 15 C

```
EUT:                  Bluetooth Speaker  M/N:VPAS1002-ASST
Manufacturer:         Shenzhen Bobotel Technology DEV. Co., Ltd.
Operating Condition:  BT communication
Test Site:            1#Shielding Room
Operator:             Bob
Test Specification:   N 120V/60Hz
Comment:              Report No.:ATE20190439
Start of Test:        04/08/2019 / 3:18:47PM
```

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "LLED002_fin"

04/08/2019 3:23PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.355000	33.20	10.6	59	25.6	QP	N	GND
0.430000	38.70	10.7	57	18.6	QP	N	GND
0.555000	29.70	10.7	56	26.3	QP	N	GND
1.065000	24.40	10.9	56	31.6	QP	N	GND
3.150000	29.80	11.1	56	26.2	QP	N	GND
23.260000	25.80	11.5	60	34.2	QP	N	GND

MEASUREMENT RESULT: "LLED002_fin2"

04/08/2019 3:23PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.355000	22.60	10.6	49	26.2	AV	N	GND
0.430000	26.90	10.7	47	20.4	AV	N	GND
0.555000	19.60	10.7	46	26.4	AV	N	GND
1.075000	14.40	10.9	46	31.6	AV	N	GND
3.150000	16.10	11.1	46	29.9	AV	N	GND
23.560000	23.70	11.5	50	26.3	AV	N	GND

ACCURATE TECHNOLOGY CO.,LTD

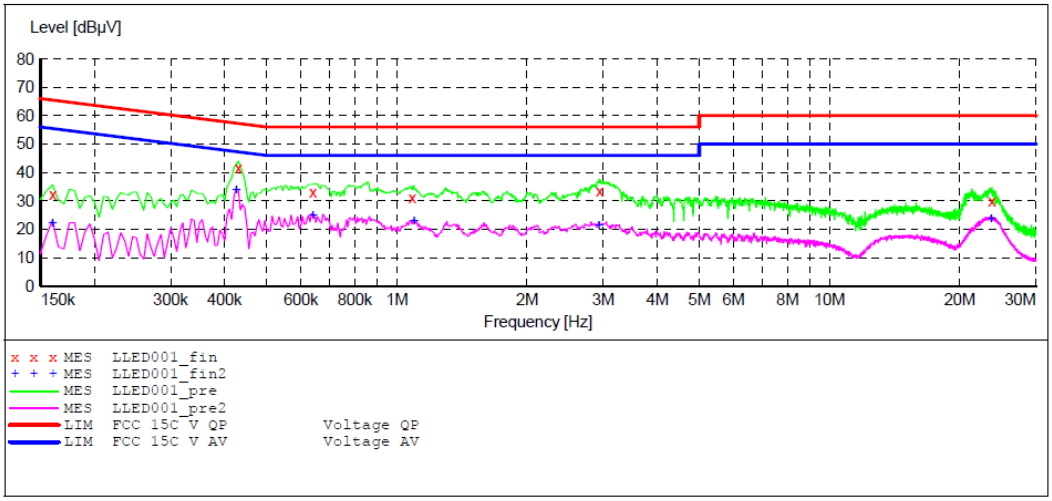
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Bluetooth Speaker M/N:VPAS1002-ASST
Manufacturer: Shenzhen Bobotel Technology DEV. Co., Ltd.
Operating Condition: BT communication
Test Site: 1#Shielding Room
Operator: Bob
Test Specification: L 120V/60Hz
Comment: Report No.:ATE20190439
Start of Test: 04/08/2019 / 3:14:29PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "LLED001_fin"

04/08/2019 3:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.160000	32.30	10.5	66	33.2	QP	L1	GND
0.430000	41.50	10.7	57	15.8	QP	L1	GND
0.640000	33.00	10.8	56	23.0	QP	L1	GND
1.085000	31.20	10.9	56	24.8	QP	L1	GND
2.940000	33.50	11.1	56	22.5	QP	L1	GND
23.755000	30.00	11.5	60	30.0	QP	L1	GND

MEASUREMENT RESULT: "LLED001_fin2"

04/08/2019 3:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.160000	21.90	10.5	56	33.6	AV	L1	GND
0.425000	33.80	10.7	47	13.5	AV	L1	GND
0.640000	24.90	10.8	46	21.1	AV	L1	GND
1.095000	22.70	10.9	46	23.3	AV	L1	GND
2.930000	21.40	11.1	46	24.6	AV	L1	GND
23.635000	23.50	11.5	50	26.5	AV	L1	GND

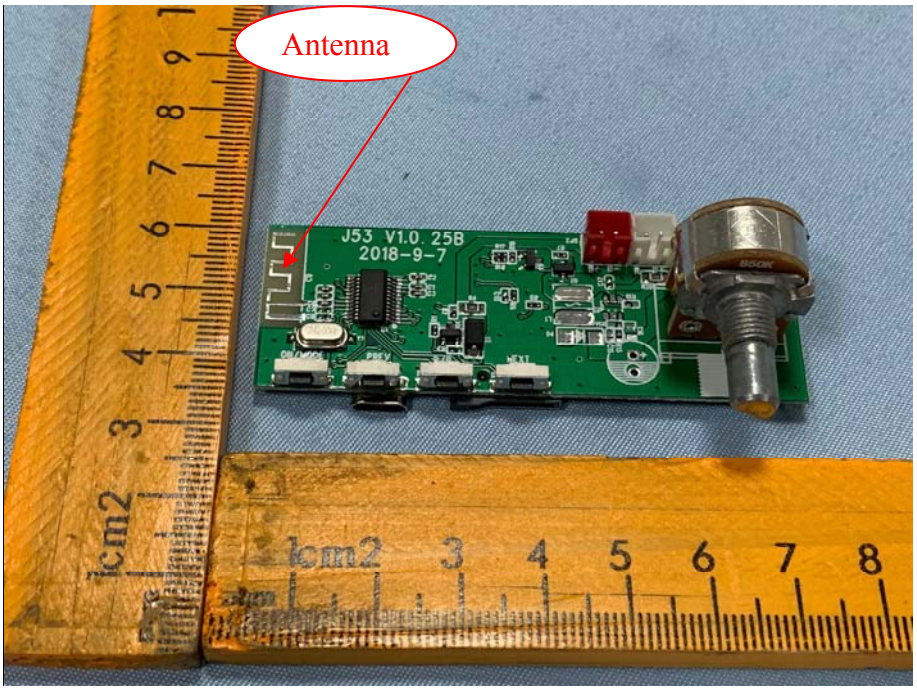
14. ANTENNA REQUIREMENT

14.1. The Requirement

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

14.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is -0.58dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



******* End of Test Report *******