

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of

SHENZHEN AVATARCONTROLS CO., LTD.

Bluetooth Speaker
Model No.: AFCS01

FCC ID: 2ANJP-AFCS01

Prepared for : SHENZHEN AVATARCONTROLS CO., LTD.
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Report No. : ATE20172265
Date of Test : Nov. 21-Nov. 28, 2017
Date of Report : Nov. 30, 2017

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Test Report Certification

Applicant : SHENZHEN AVATARCONTROLS CO., LTD.
Manufacturer : SHENZHEN JILONGCHANG ELECTRONICS CO., LTD
EUT Description : Bluetooth Speaker
Model No. : AFCS01
Trade Name :



Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247: 2017
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 : Nov. 21-Nov. 28, 2017
Date of Report : Nov. 30, 2017

Prepared by :
(Star Yang, Engineer)

Approved & Authorized Signer :
(Sean Liu, Manager)



1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Model Number	:	AFCS01
Bluetooth version	:	V 4.0 This report is for BT classic mode
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain(Max)	:	1.9dBi
Antenna type	:	PCB Antenna
Adapter Input Voltage	:	DC 3.7V (Powered by battery) or DC 5V (Powered by USB port)
Modulation mode	:	GFSK, $\pi/4$ DQPSK, 8DPSK
Applicant	:	SHENZHEN AVATARCONTROLS CO., LTD.
Address	:	Room 1008, Weixing building, Keyuan Road Nanshan district, Shenzhen, Guangdong, China, 518000
Manufacturer	:	SHENZHEN JILONGCHANG ELECTRONICS CO., LTD
Address	:	No.134 Gangzai Street, Furong Industrial Park, Shajing Town, Bao'an District, Shenzhen, Guangdong, China

1.2. Accessory and Auxiliary Equipment

AC/DC Power Adapter: (provided by laboratory)	:	Model: TEKA006-0501500UKU
		Input: 100-240V~50/60Hz 0.3A
		Output: DC 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 (ISED) 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. 07, 2017	1 Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 07, 2017	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 07, 2017	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 07, 2017	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 13, 2017	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 13, 2017	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 13, 2017	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 13, 2017	1 Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 07, 2017	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 07, 2017	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 07, 2017	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 07, 2017	1 Year

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: Transmitting mode

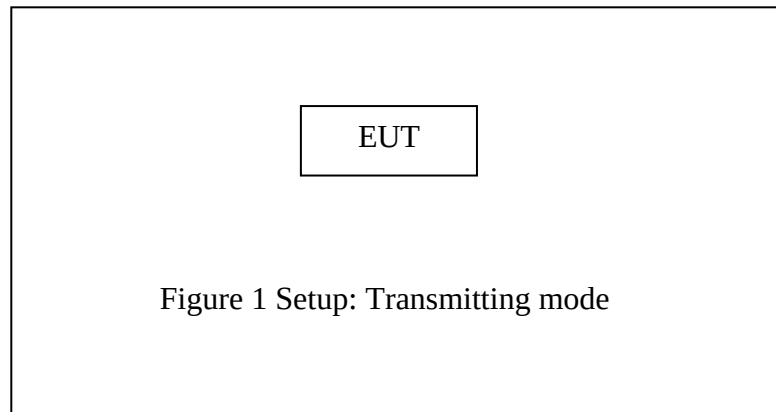
Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Hopping

3.2.Configuration and peripherals

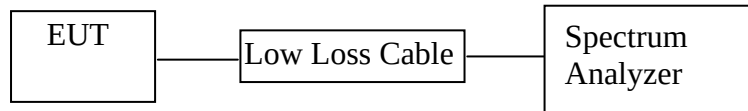


4. TEST PROCEDURES AND RESULTS

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

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



(EUT: Bluetooth Speaker)

5.2. 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.

5.3. 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.

5.4. Operating Condition of EUT

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

5.4.2. Turn on the power of all equipment.

5.4.3. 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.

5.5. Test Procedure

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

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

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

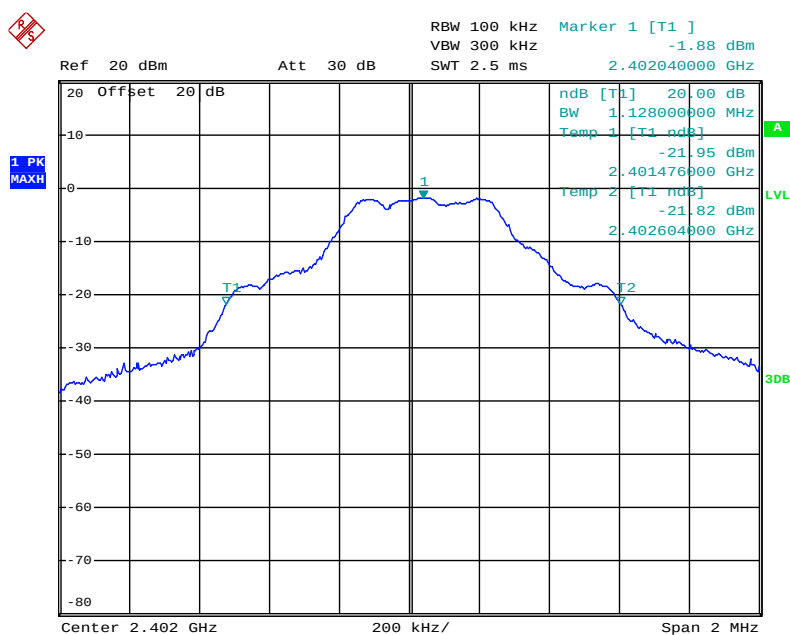
5.6. Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	Π/4-DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	1.128	1.312	1.360	Pass
Middle	2441	1.128	1.316	1.364	Pass
High	2480	1.136	1.324	1.352	Pass

The spectrum analyzer plots are attached as below.

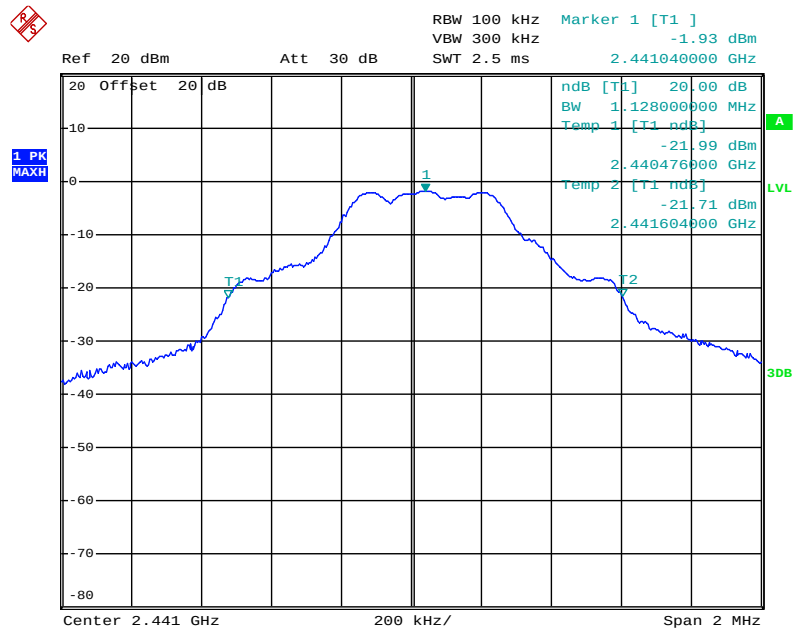
GFSK Mode

Low channel



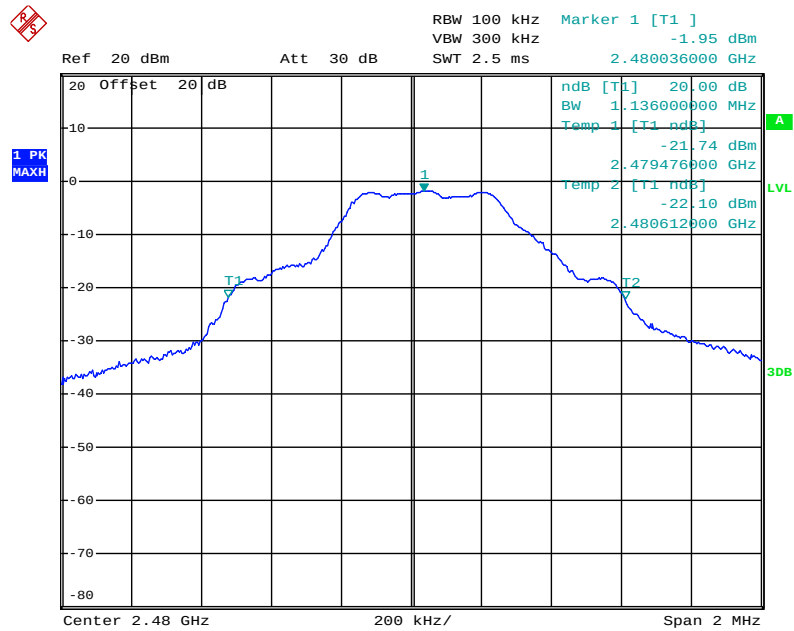
Date: 28.NOV.2017 15:11:40

Middle channel



Date: 28.NOV.2017 15:13:51

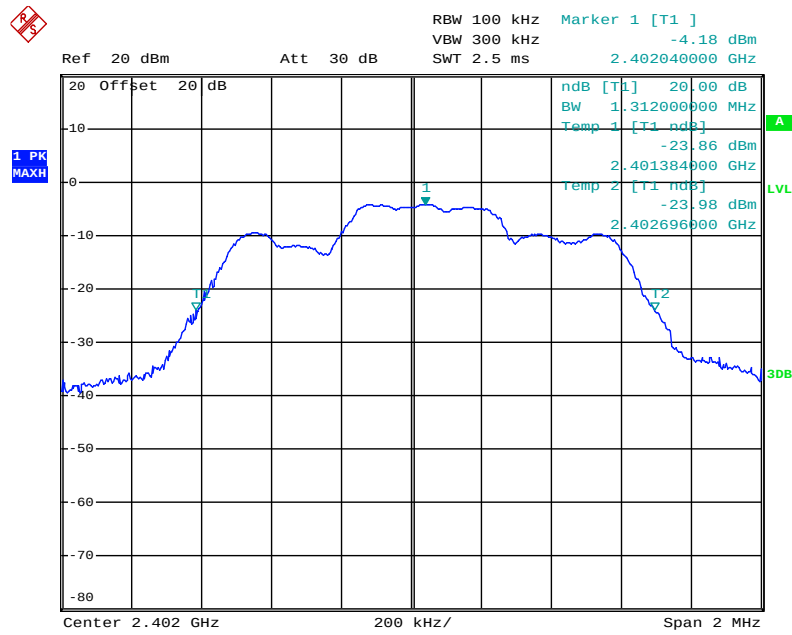
High channel



Date: 28.NOV.2017 15:15:07

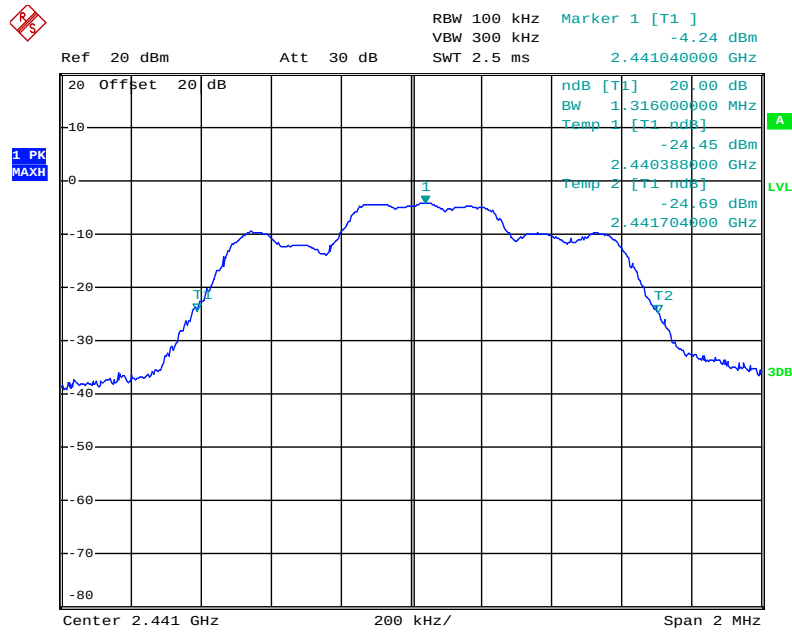
Π/4-DQPSK Mode

Low channel



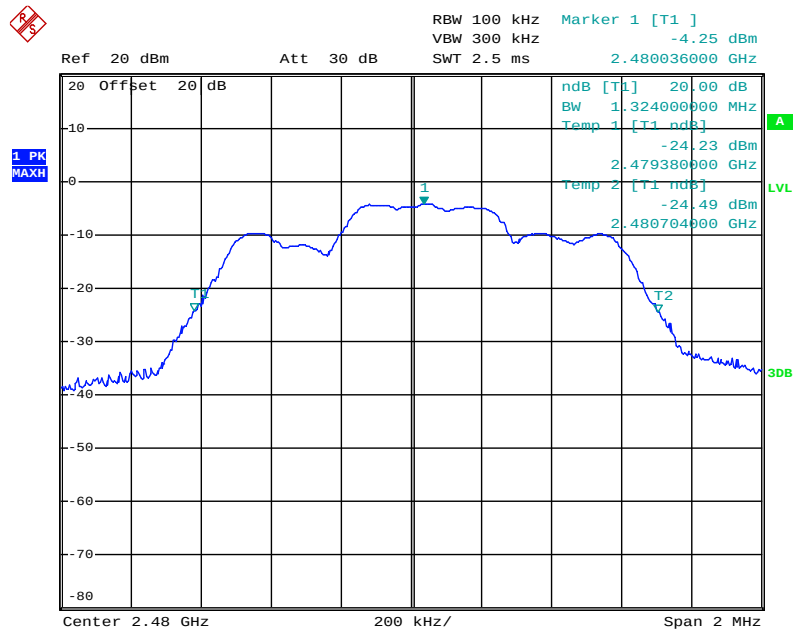
Date: 28.NOV.2017 15:19:43

Middle channel



Date: 28.NOV.2017 15:18:13

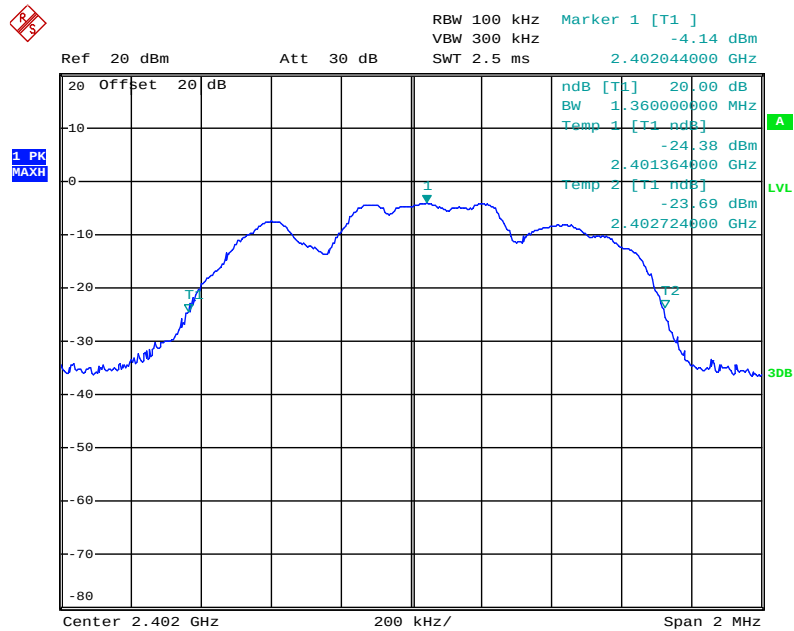
High channel



Date: 28.NOV.2017 15:17:09

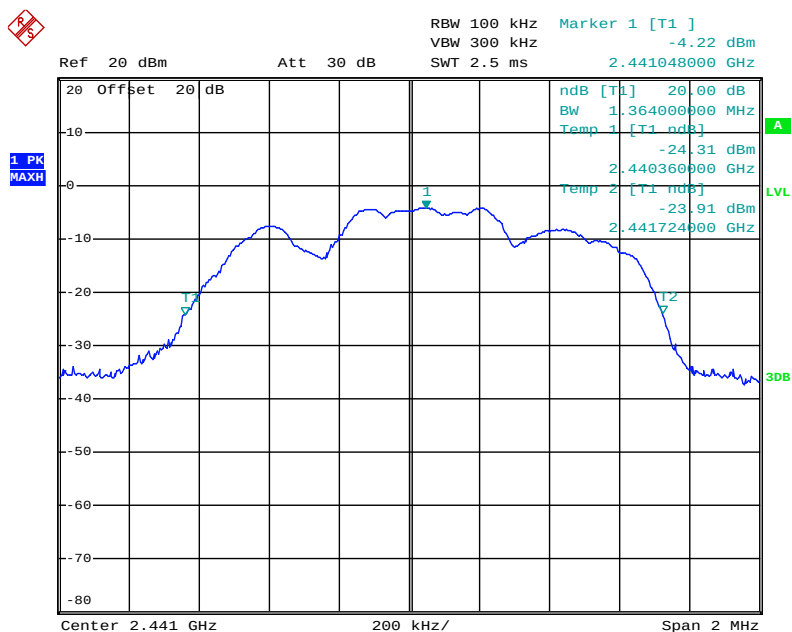
8DPSK Mode

Low channel



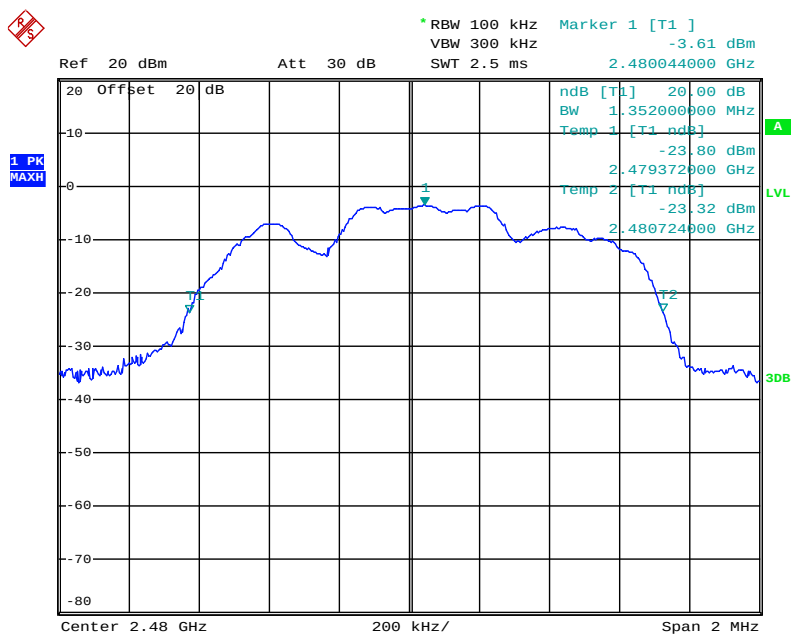
Date: 28.NOV.2017 15:21:03

Middle channel



Date: 28.NOV.2017 15:22:02

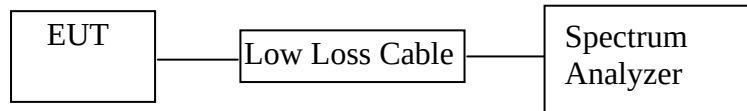
High channel



Date: 28.NOV.2017 15:33:25

6. CARRIER FREQUENCY SEPARATION 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. 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.

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 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. 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.

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 30 kHz and VBW to 100 kHz. Adjust Span to 2MHz.

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

6.5.4. Measurement the channel separation

6.6. Test Result

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	1.008	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2480			

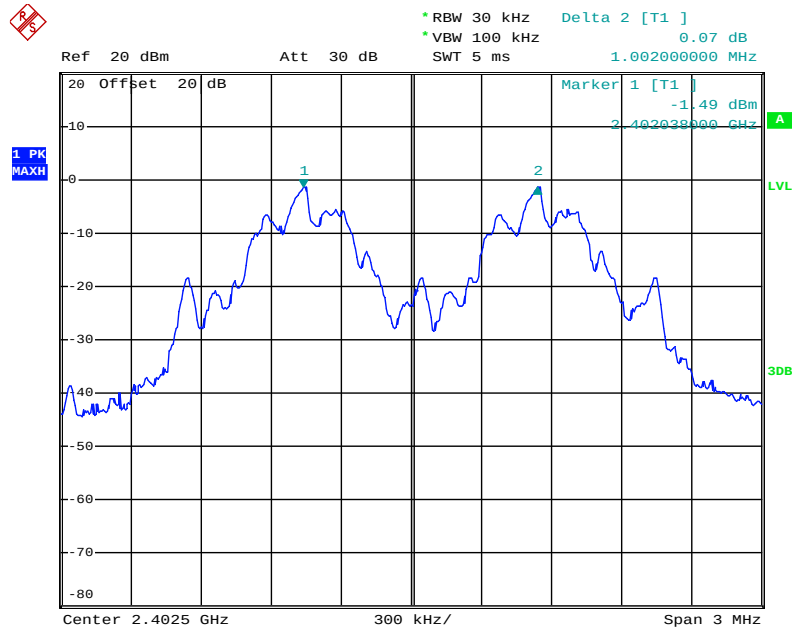
8DPSK

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			

The spectrum analyzer plots are attached as below.

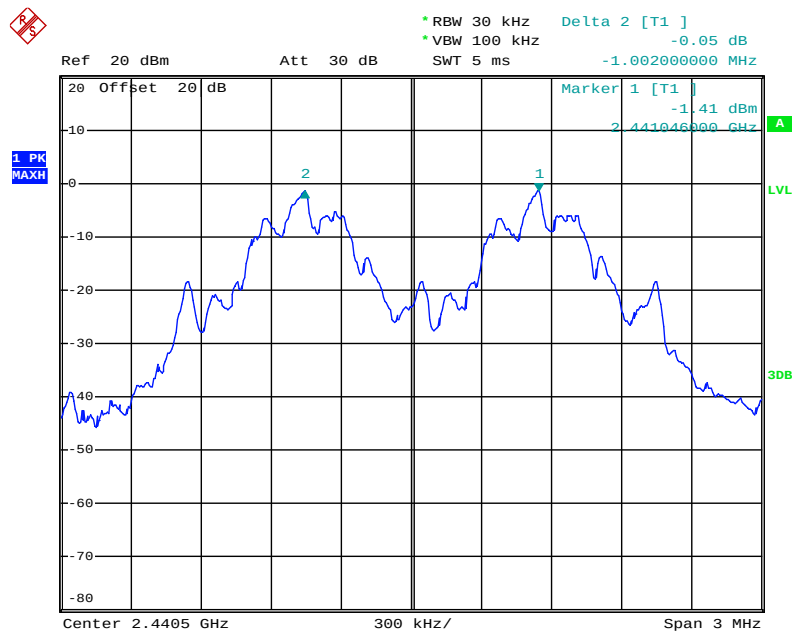
GFSK Mode

Low channel



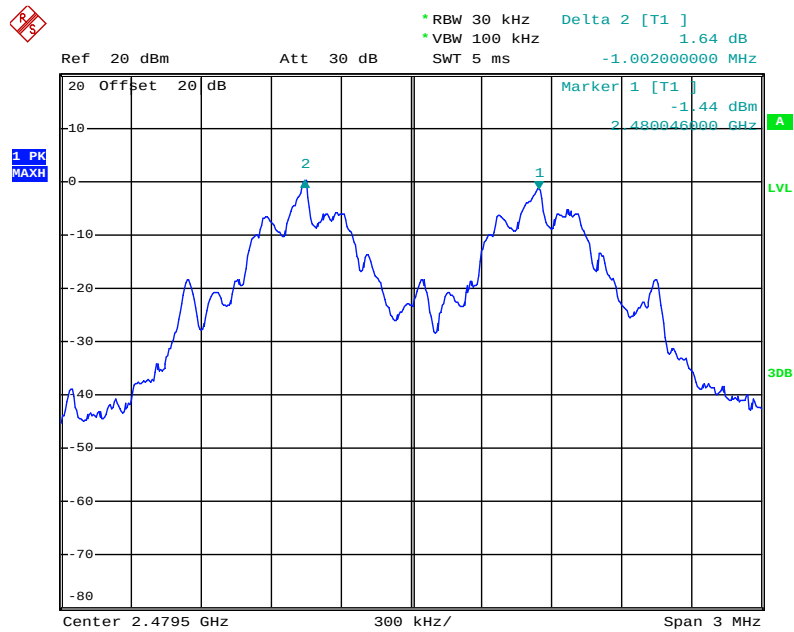
Date: 28.NOV.2017 16:00:28

Middle channel



Date: 28.NOV.2017 16:01:30

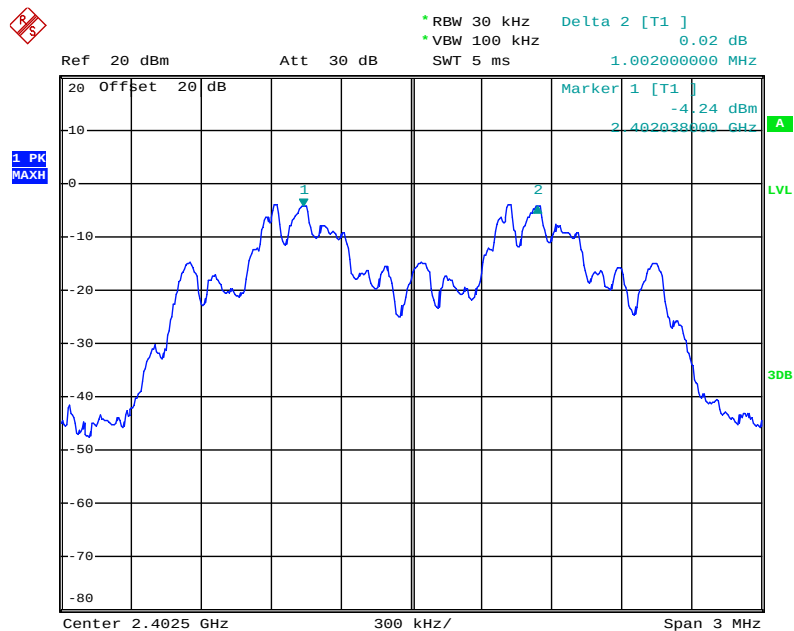
High channel



Date: 28.NOV.2017 16:02:38

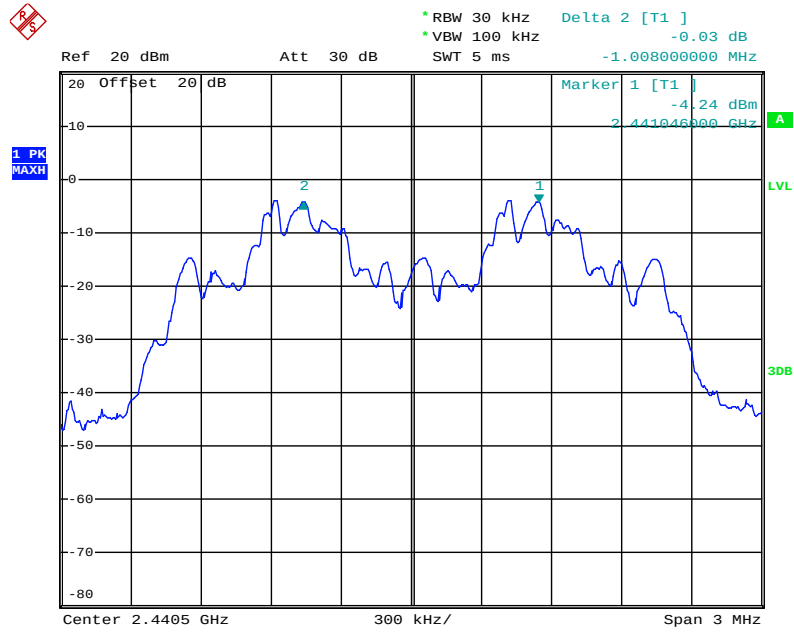
Π/4-DQPSK Mode

Low channel



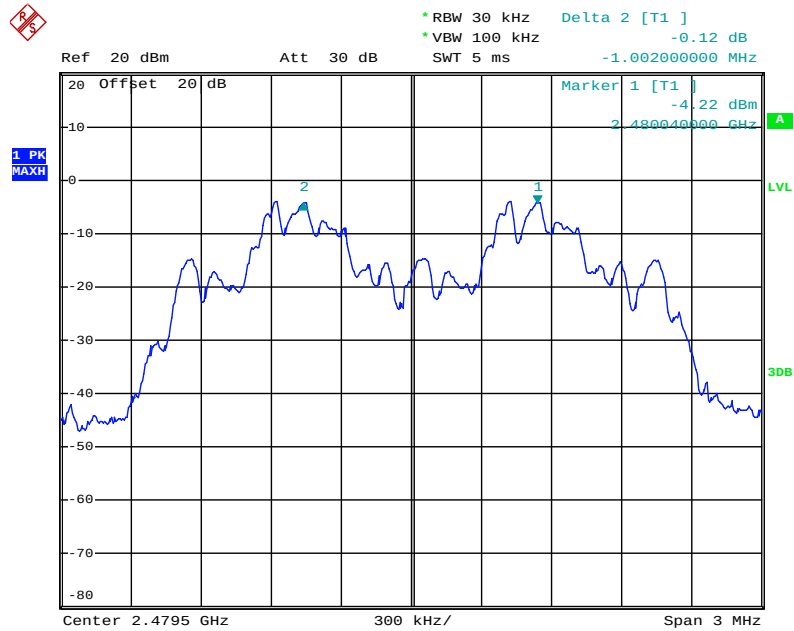
Date: 28.NOV.2017 15:59:14

Middle channel



Date: 28.NOV.2017 15:58:07

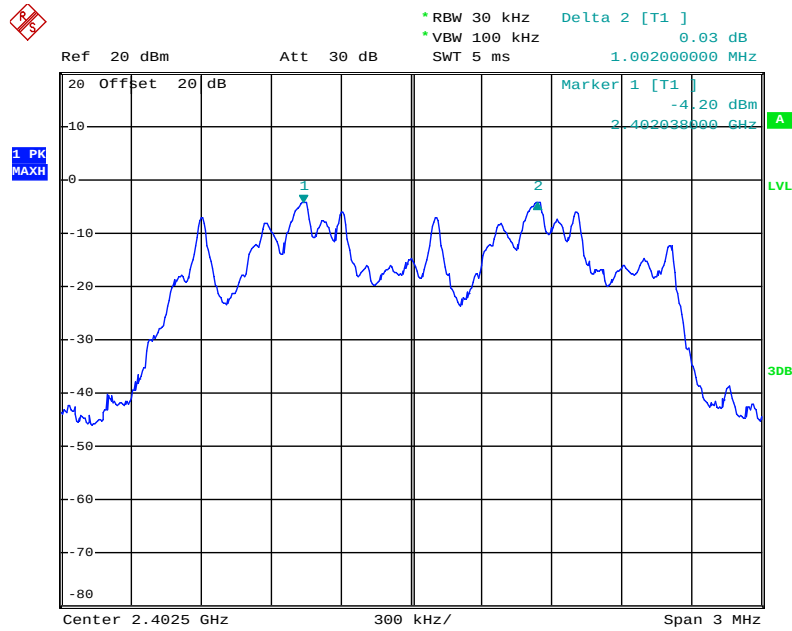
High channel



Date: 28.NOV.2017 15:56:02

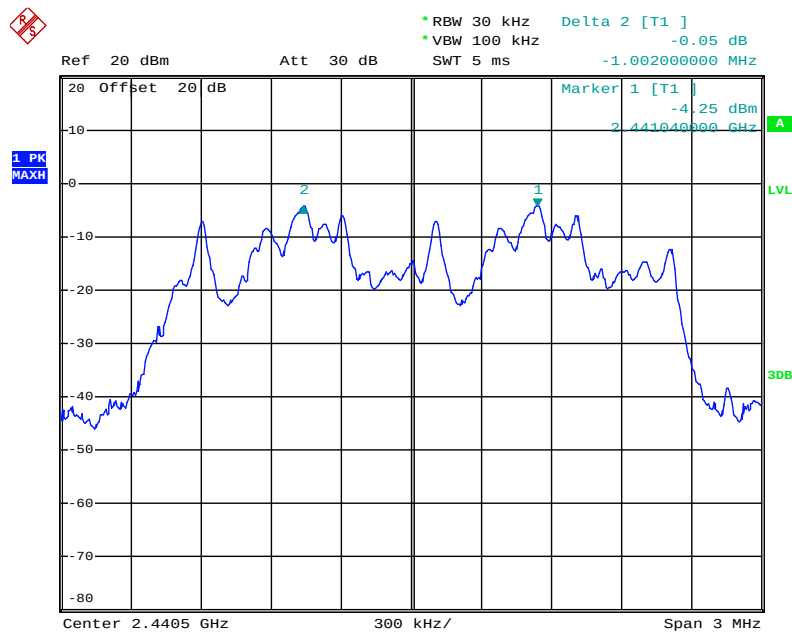
8DPSK Mode

Low channel



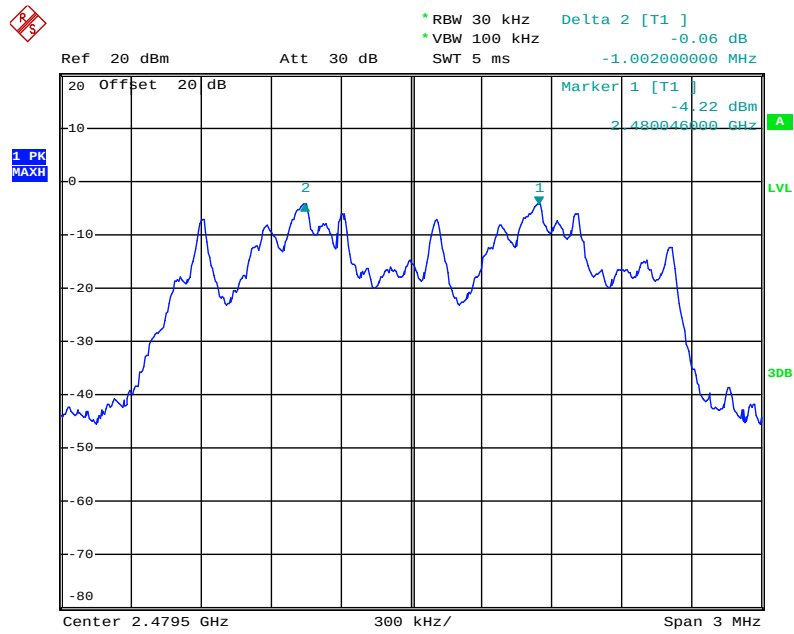
Date: 28.NOV.2017 15:51:32

Middle channel



Date: 28.NOV.2017 15:53:16

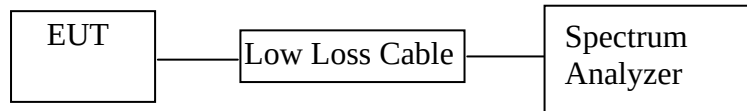
High channel



Date: 28.NOV.2017 15:54:18

7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



(EUT: Bluetooth Speaker)

7.2. 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.

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 7.1.

7.4.2. Turn on the power of all equipment.

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

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

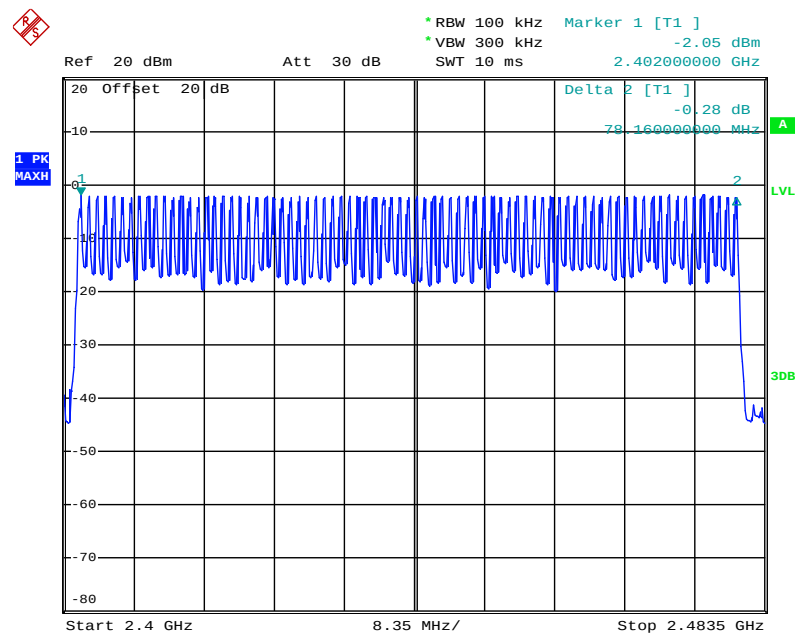
7.5.3. Max hold, view and count how many channel in the band.

7.6.Test Result

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

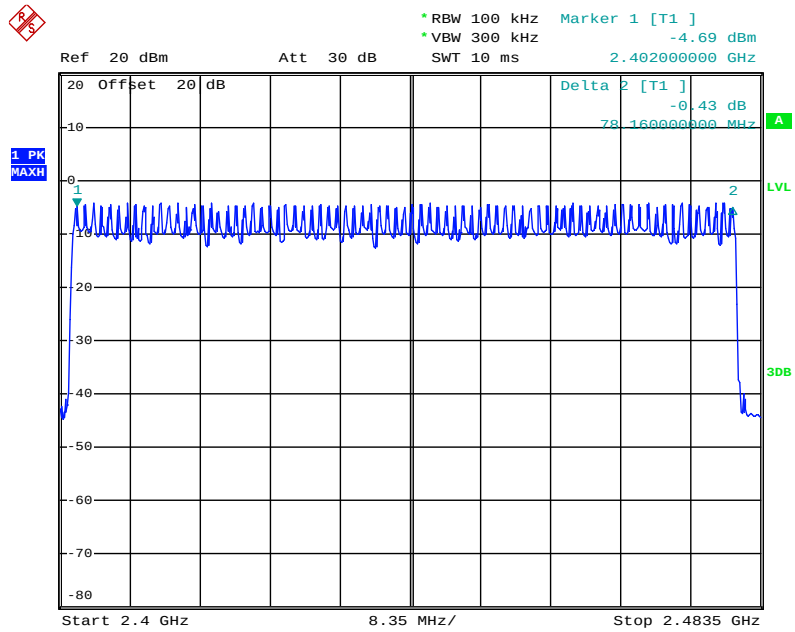
The spectrum analyzer plots are attached as below.

Number of hopping channels(GFSK)



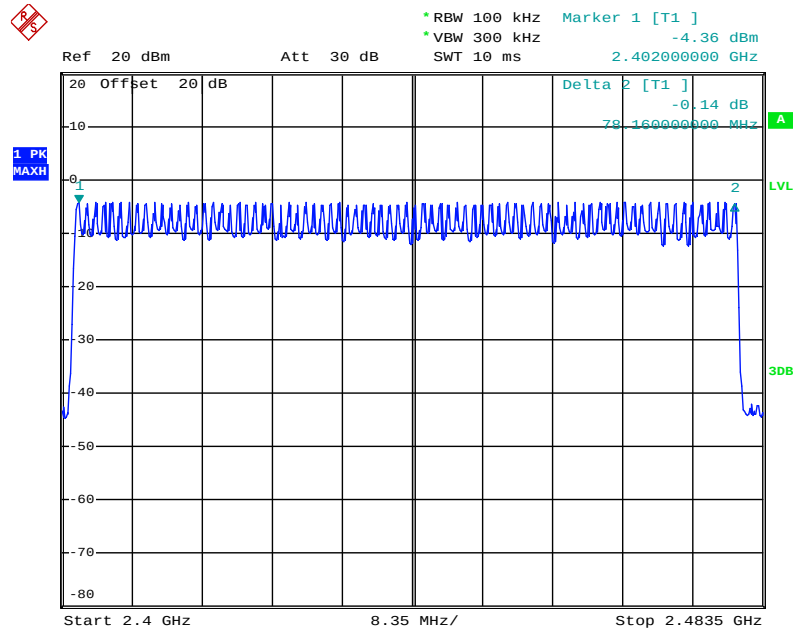
Date: 28.NOV.2017 15:39:39

Number of hopping channels($\Pi/4$ -DQPSK)



Date: 28.NOV.2017 15:37:33

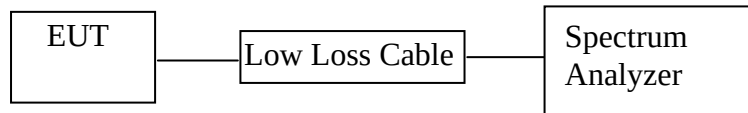
Number of hopping channels(8DPSK)



Date: 28.NOV.2017 15:35:17

8. DWELL TIME 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. 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.

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 8.1.

8.4.2. Turn on the power of all equipment.

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

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 center frequency of spectrum analyzer = operating frequency.

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

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

8.6. Test Result

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.530	169.60	400
	2441	0.530	169.60	400
	2480	0.530	169.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2402	1.790	286.40	400
	2441	1.790	286.40	400
	2480	1.790	286.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2402	3.050	325.33	400
	2441	3.050	325.33	400
	2480	3.050	325.33	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

II/4-DQPSK

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.530	169.60	400
	2441	0.530	169.60	400
	2480	0.530	169.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2402	1.810	289.60	400
	2441	1.810	289.60	400
	2480	1.810	289.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2402	3.070	327.47	400
	2441	3.070	327.47	400
	2480	3.100	330.67	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

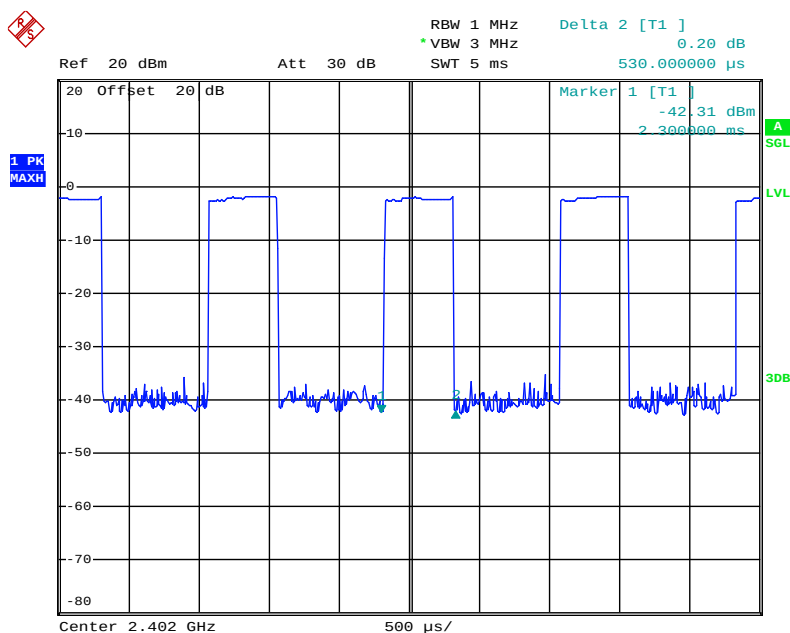
8DPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.530	169.60	400
	2441	0.530	169.60	400
	2480	0.530	169.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2402	1.790	286.40	400
	2441	1.810	289.60	400
	2480	1.810	289.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2402	3.080	328.53	400
	2441	3.050	325.33	400
	2480	3.080	328.53	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

The spectrum analyzer plots are attached as below.

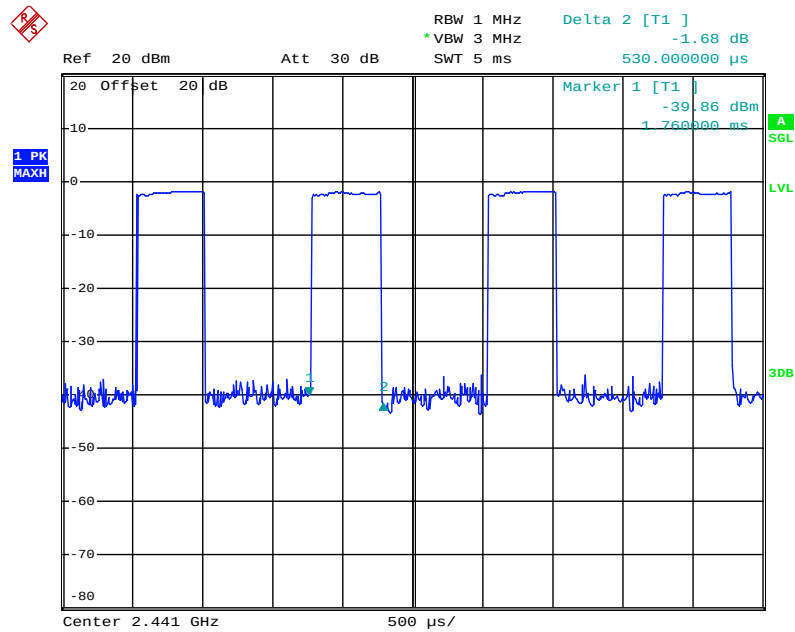
GFSK Mode

DH1 Low channel



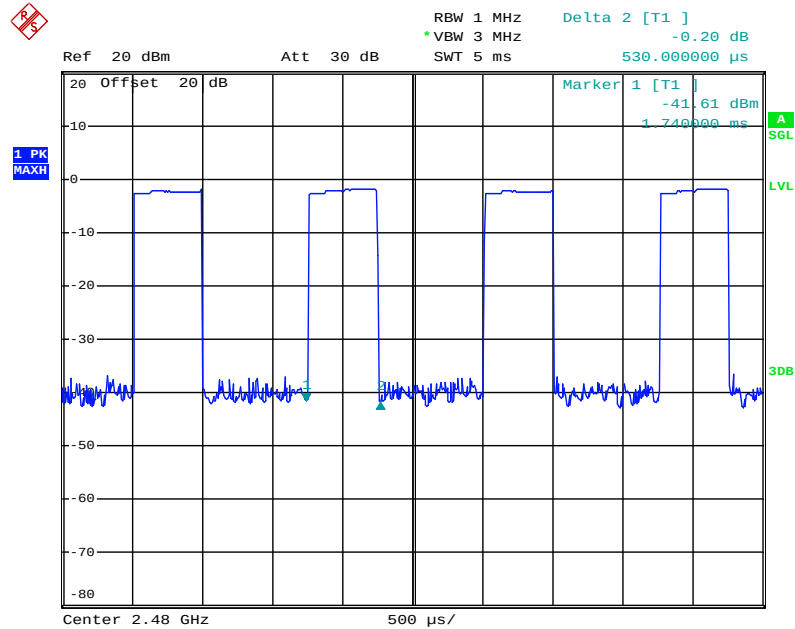
Date: 28.NOV.2017 16:04:10

DH1 Middle channel



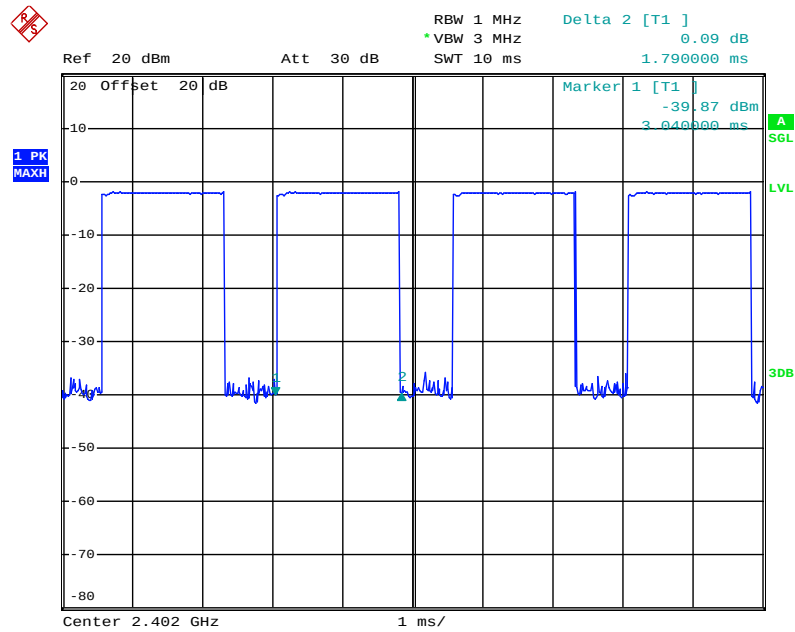
Date: 28.NOV.2017 16:05:26

DH1 High channel



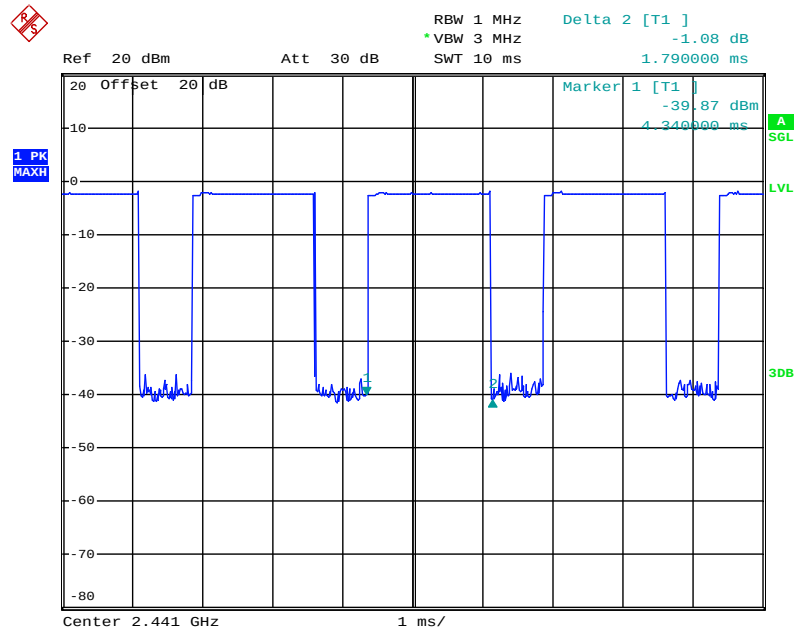
Date: 28.NOV.2017 16:05:57

DH3 Low channel



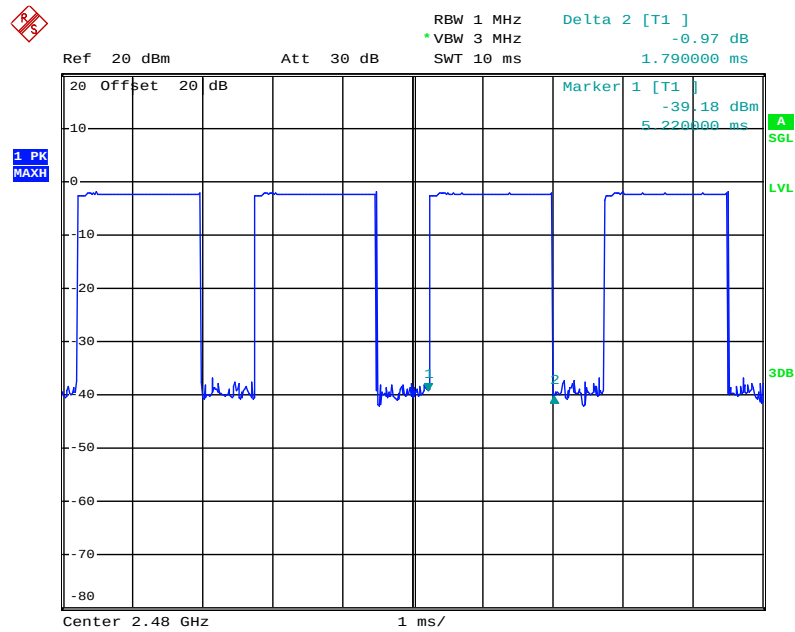
Date: 28.NOV.2017 16:09:37

DH3 Middle channel



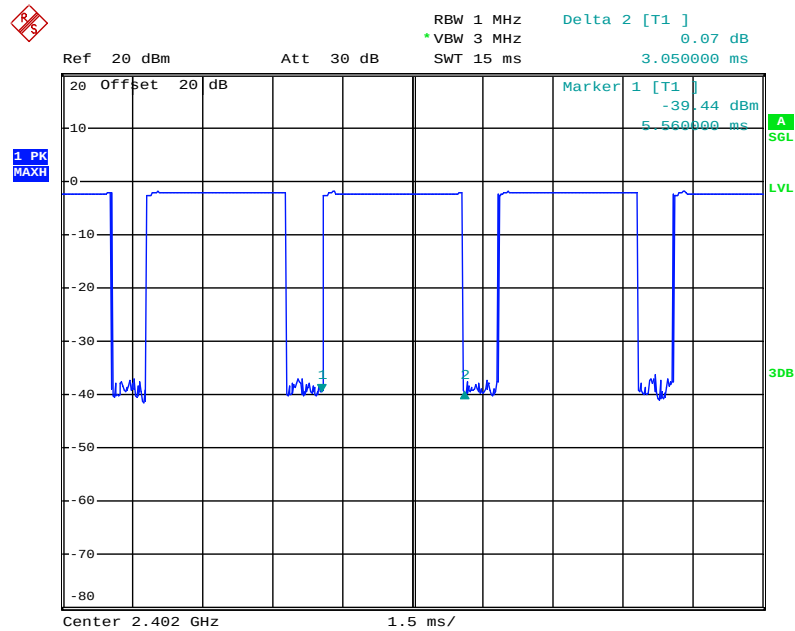
Date: 28.NOV.2017 16:07:51

DH3 High channel



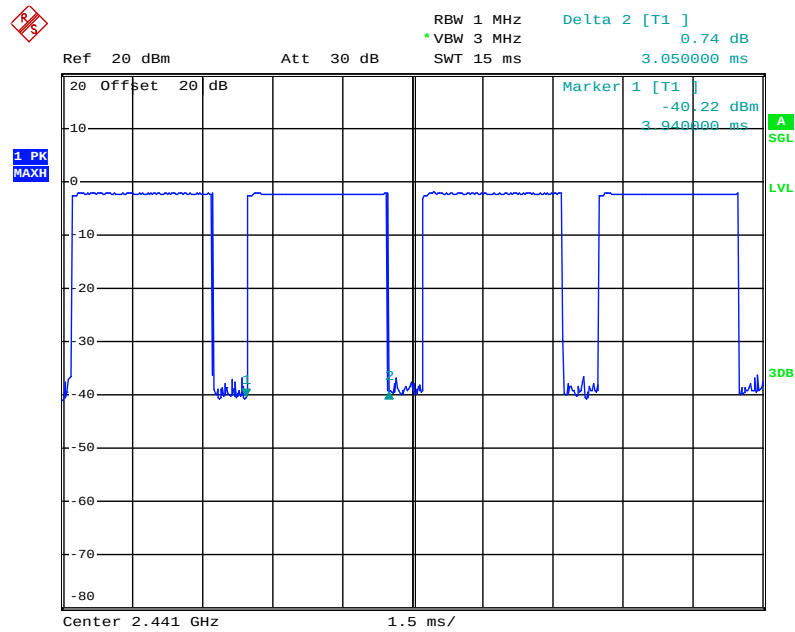
Date: 28.NOV.2017 16:06:35

DH5 Low channel



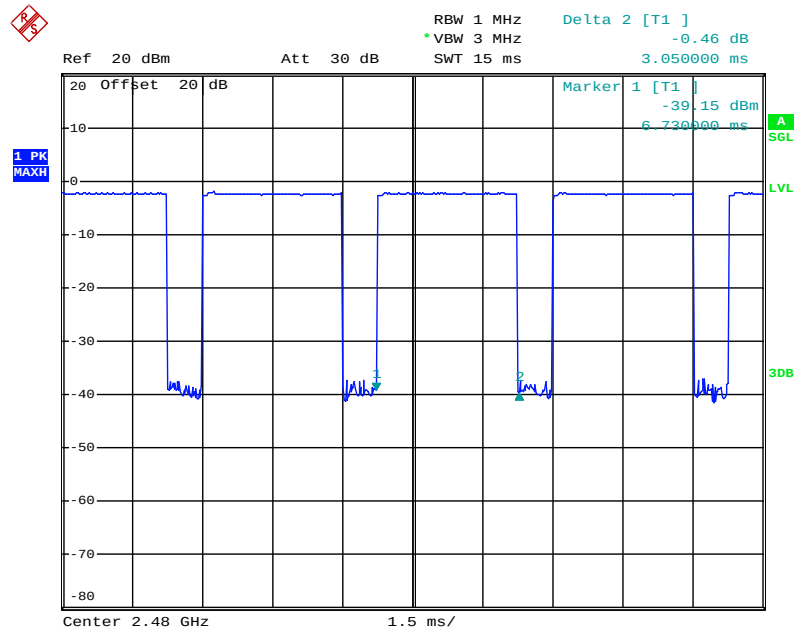
Date: 28.NOV.2017 16:10:33

DH5 Middle channel



Date: 28.NOV.2017 16:11:13

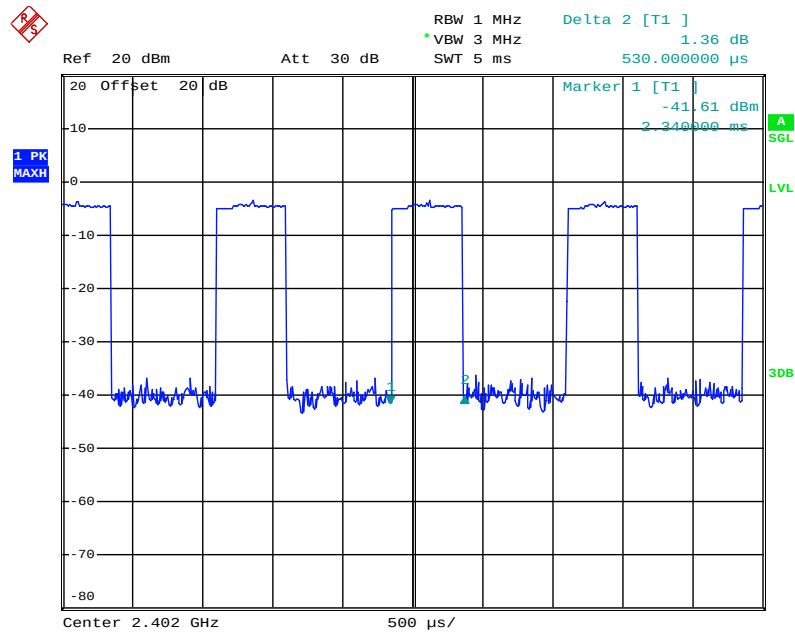
DH5 High channel



Date: 28.NOV.2017 16:12:12

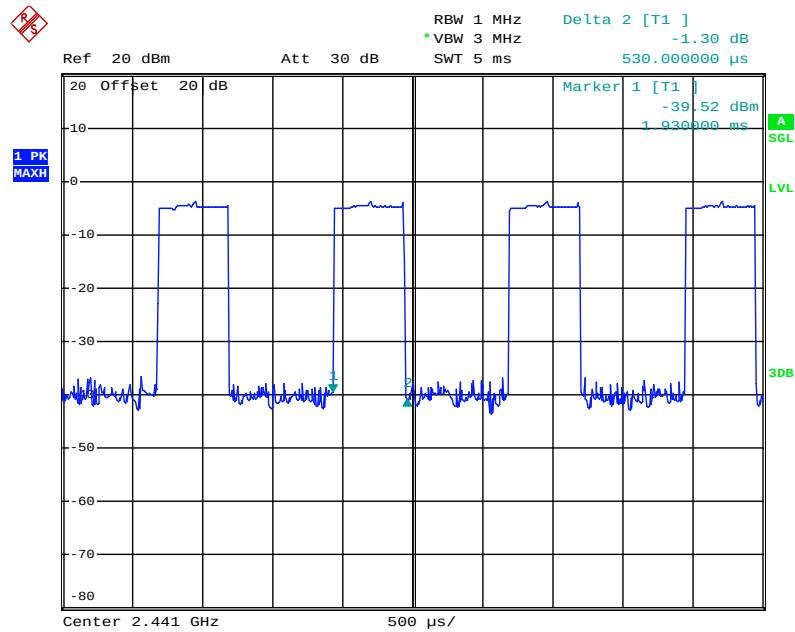
$\Pi/4$ -DQPSK

2DH1 Low channel



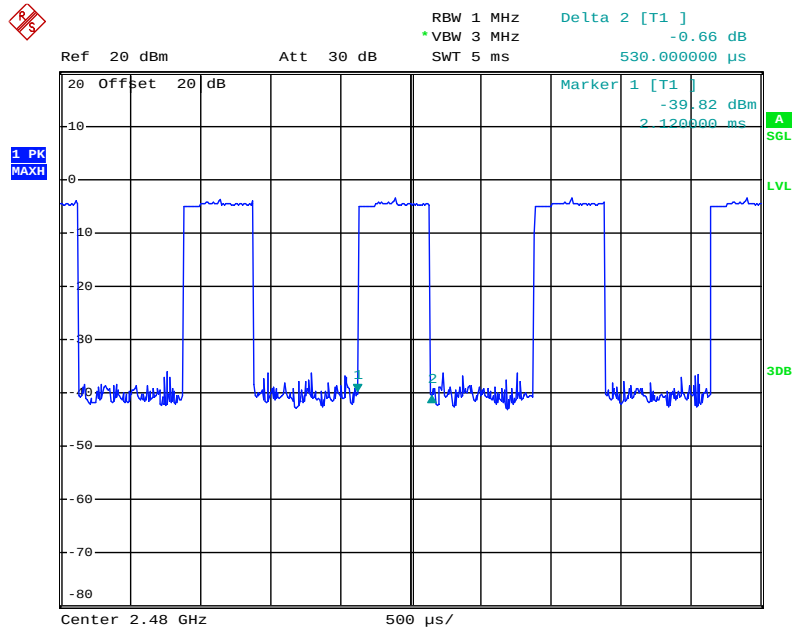
Date: 28.NOV.2017 16:14:57

2DH1 Middle channel



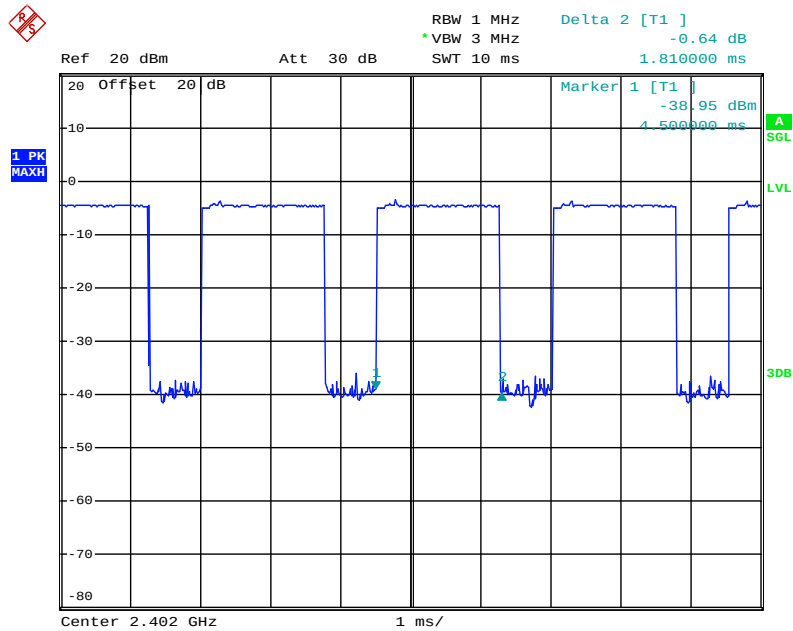
Date: 28.NOV.2017 16:14:20

2DH1 High channel



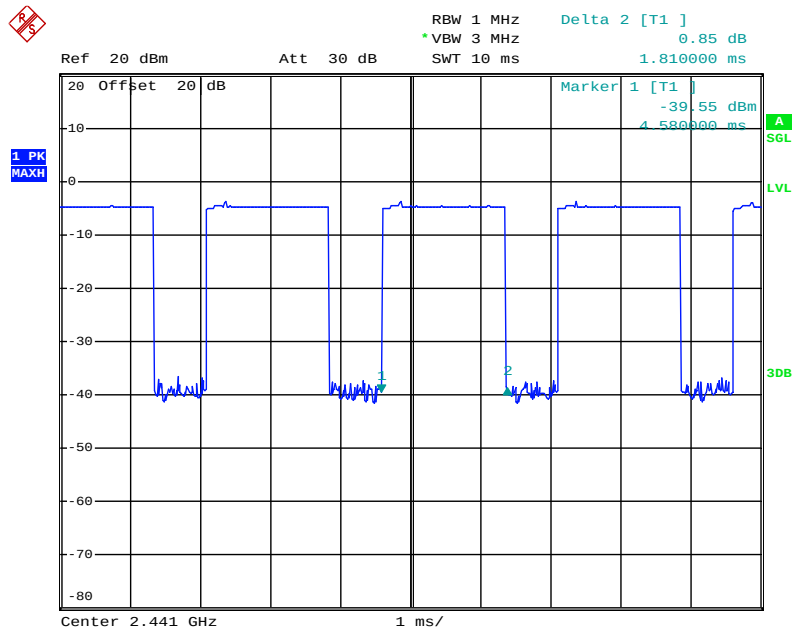
Date: 28.NOV.2017 16:13:23

2DH3 Low channel



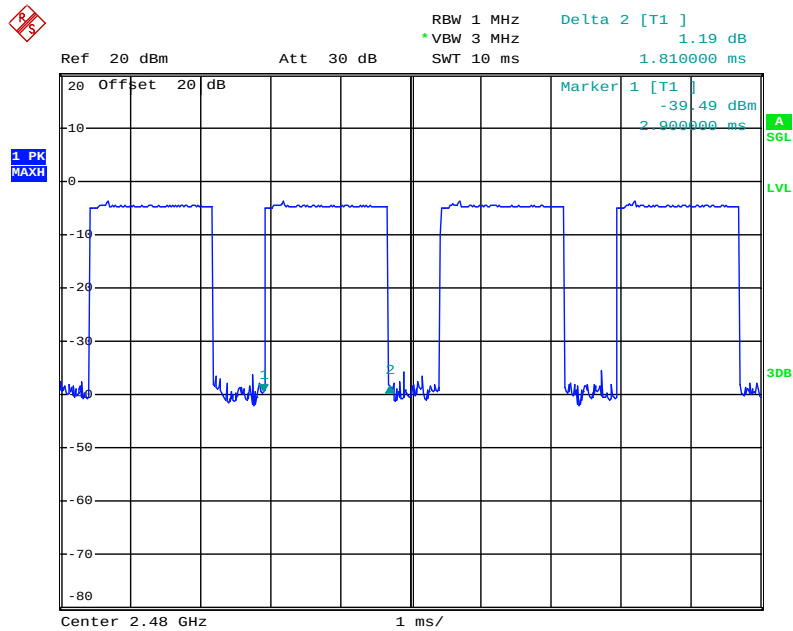
Date: 28.NOV.2017 16:15:37

2DH3 Middle channel



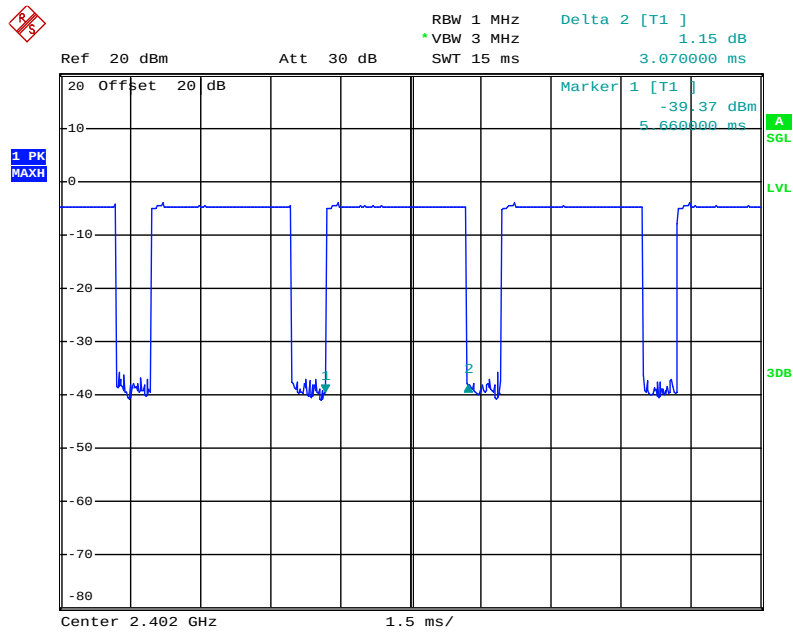
Date: 28.NOV.2017 16:16:04

2DH3 High channel



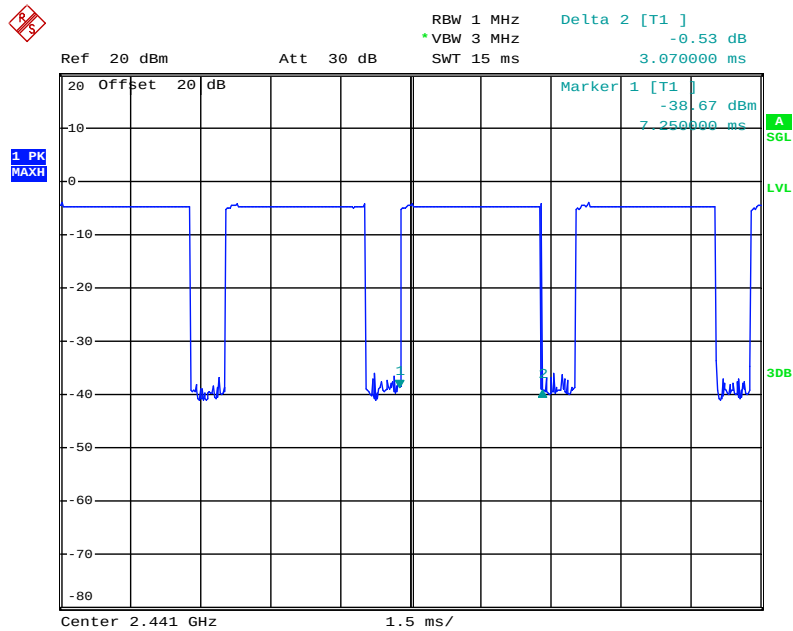
Date: 28.NOV.2017 16:17:01

2DH5 Low channel



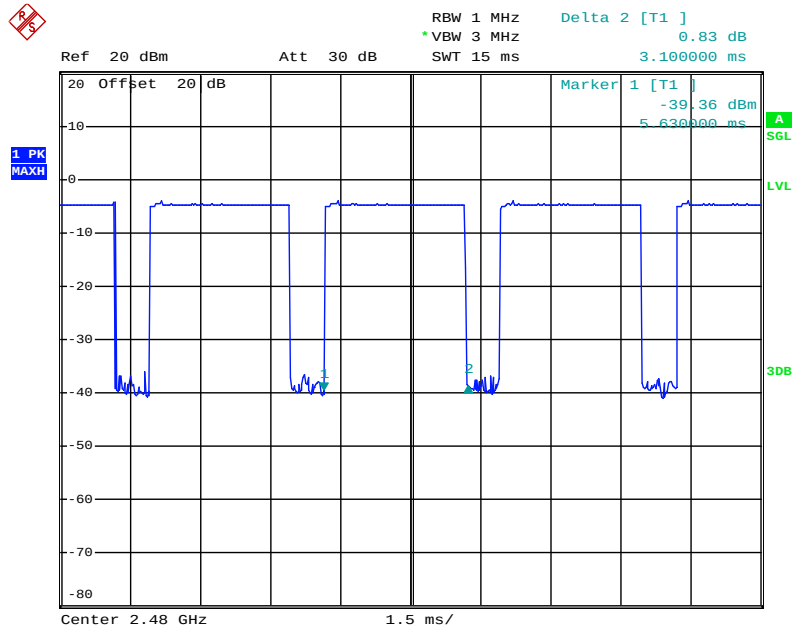
Date: 28.NOV.2017 16:19:52

2DH5 Middle channel



Date: 28.NOV.2017 16:18:51

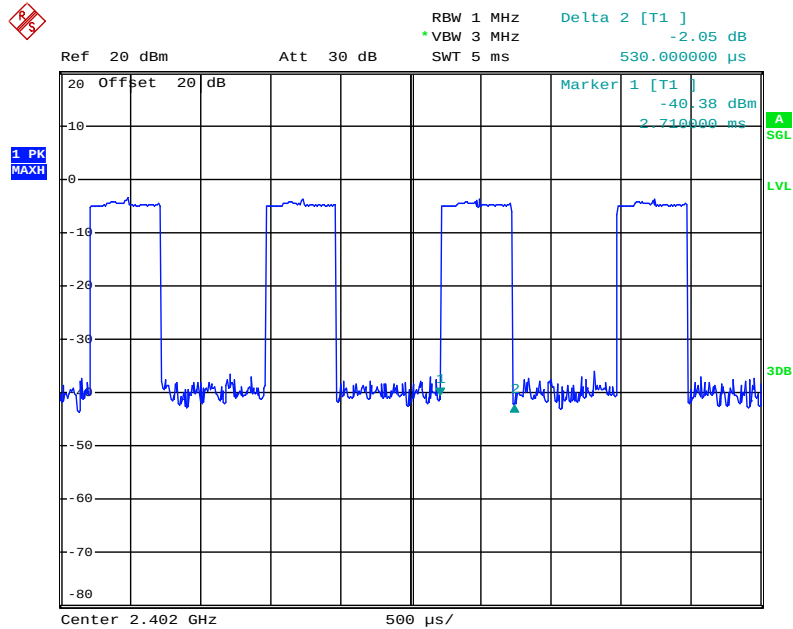
2DH5 High channel



Date: 28.NOV.2017 16:18:05

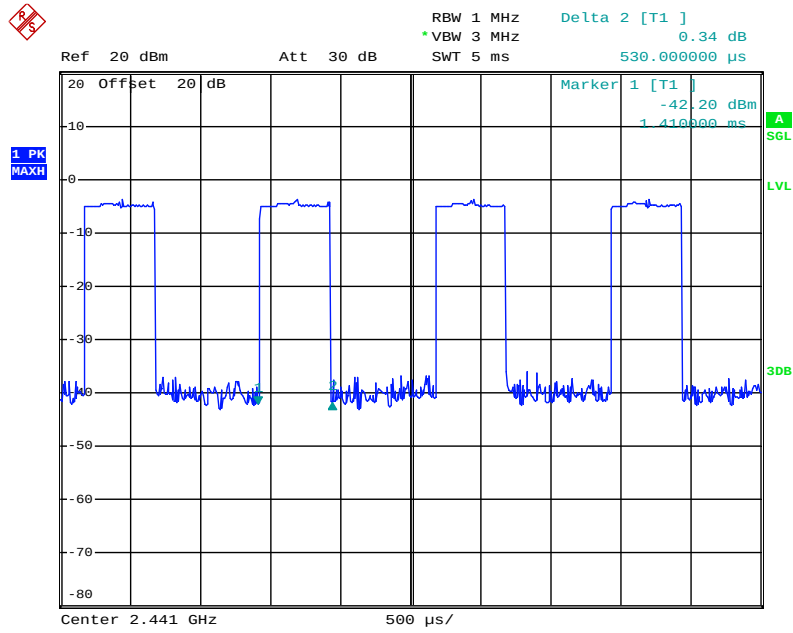
8DPSK Mode

3DH1 Low channel



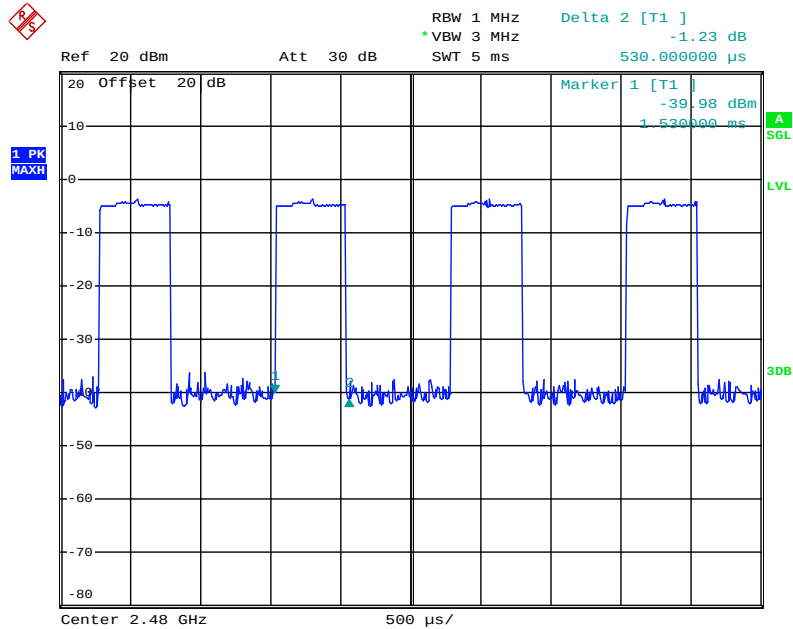
Date: 28.NOV.2017 16:21:50

3DH1 Middle channel



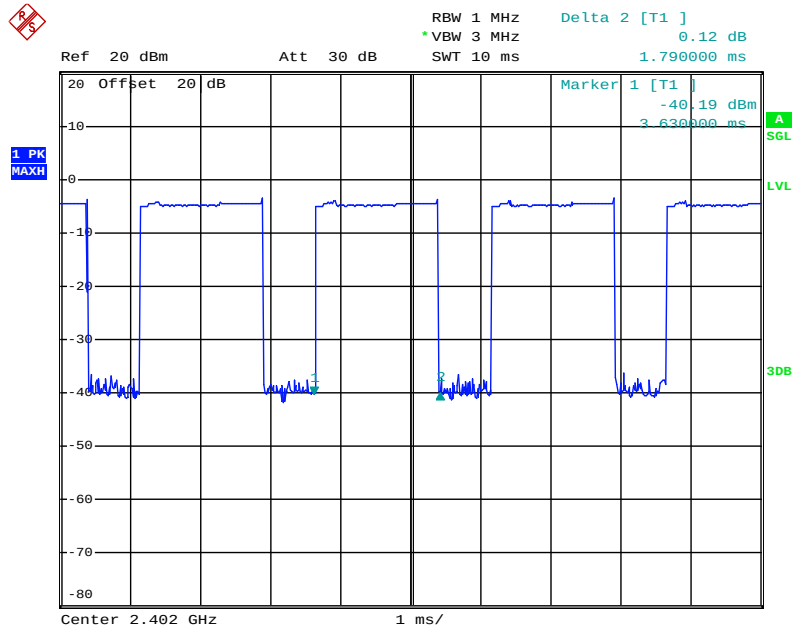
Date: 28.NOV.2017 16:22:45

3DH1 High channel



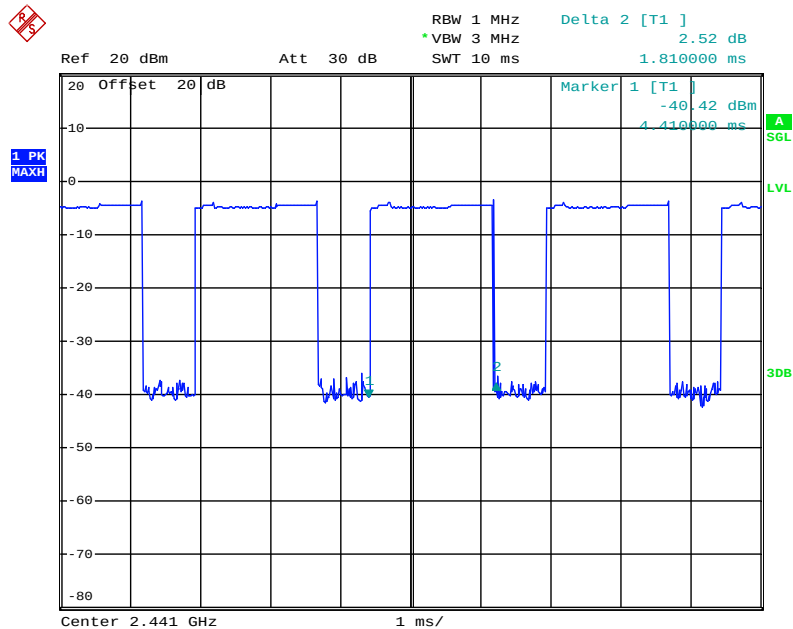
Date: 28.NOV.2017 16:24:41

3DH3 Low channel



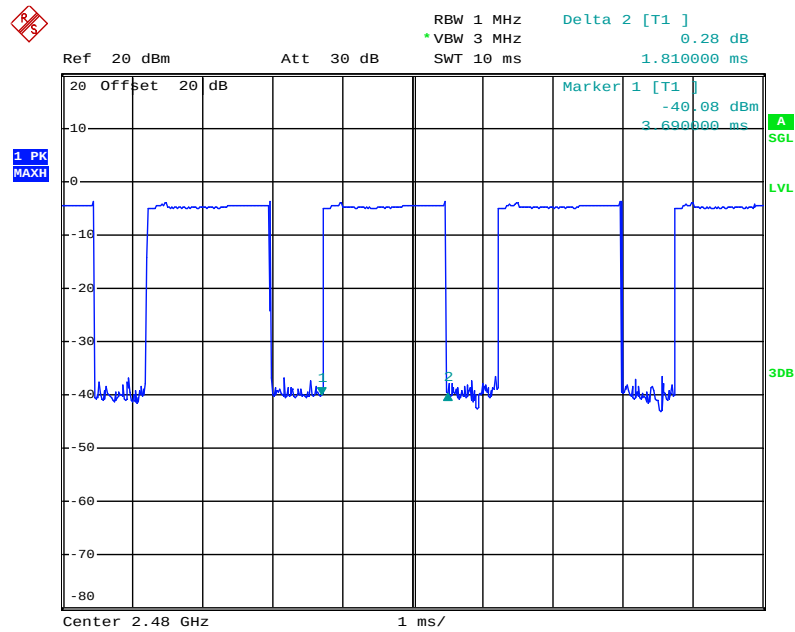
Date: 28.NOV.2017 16:27:29

3DH3 Middle channel



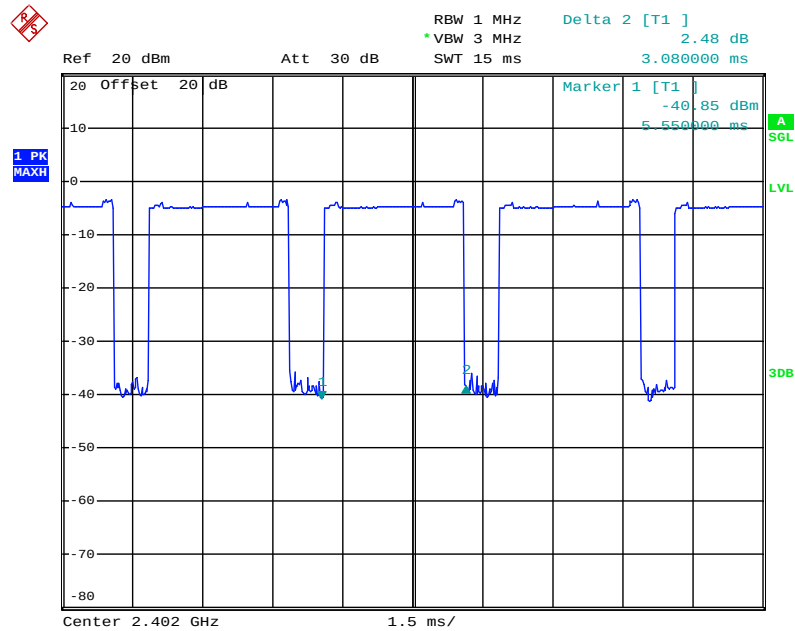
Date: 28.NOV.2017 16:26:34

3DH3 High channel



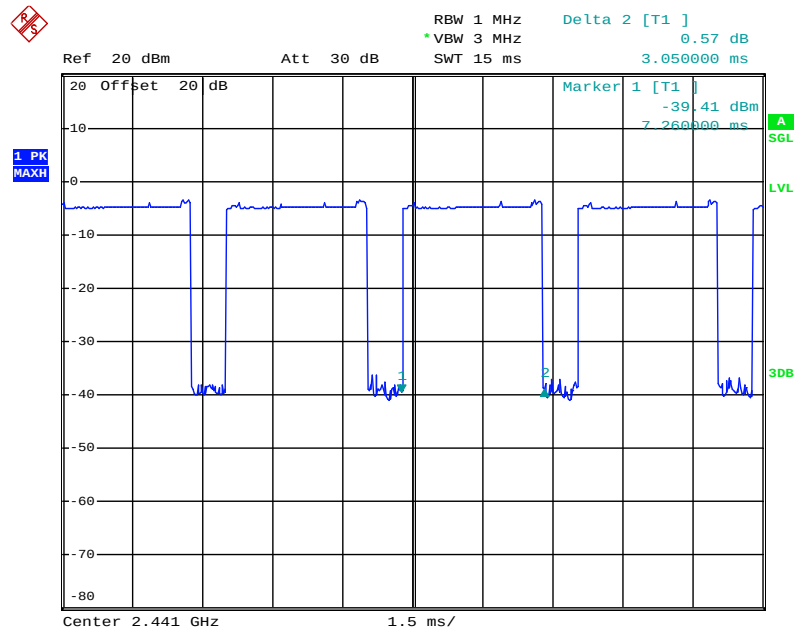
Date: 28.NOV.2017 16:25:32

3DH5 Low channel



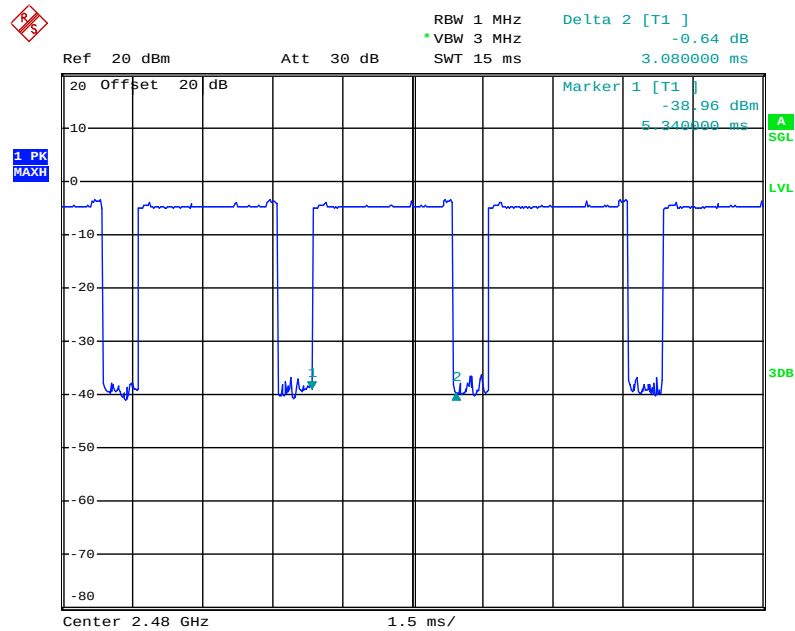
Date: 28.NOV.2017 16:28:43

3DH5 Middle channel



Date: 28.NOV.2017 16:29:27

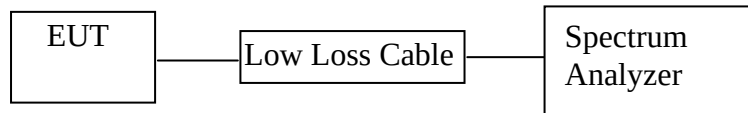
3DH5 High channel



Date: 28.NOV.2017 16:30:13

9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



(EUT: Bluetooth Speaker)

9.2. 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.

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 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. 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.

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 RBW of spectrum analyzer to 3MHz and VBW to 3MHz.

9.5.3. Measurement the maximum peak output power.

9.6. Test Result

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-0.91/0.0008	21 / 0.125
Middle	2441	-1.36/0.0007	21 / 0.125
High	2480	-0.84/0.0008	21 / 0.125

II/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-2.45/0.0006	21 / 0.125
Middle	2441	-1.75/0.0007	21 / 0.125
High	2480	-1.69/0.0007	21 / 0.125

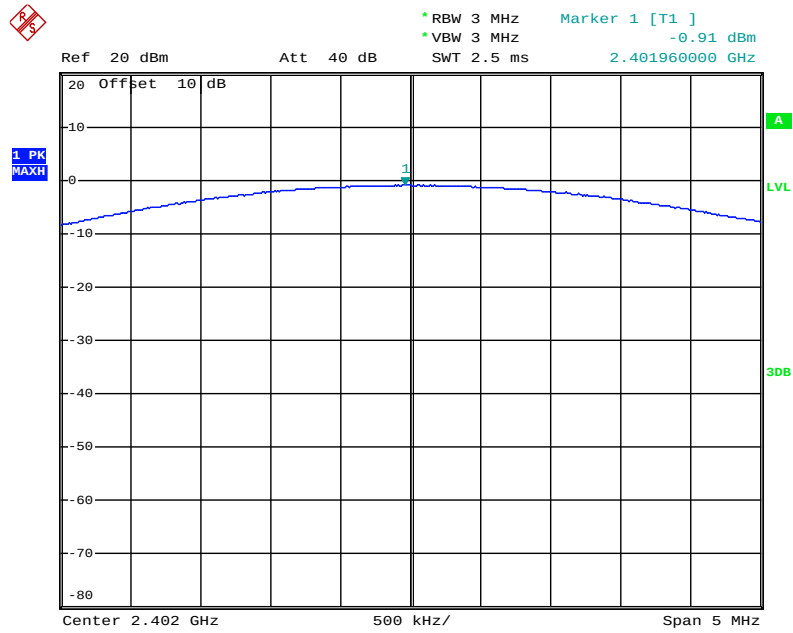
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-2.05/0.0006	21 / 0.125
Middle	2441	-2.16/0.0006	21 / 0.125
High	2480	-2.57/0.0006	21 / 0.125

The spectrum analyzer plots are attached as below.

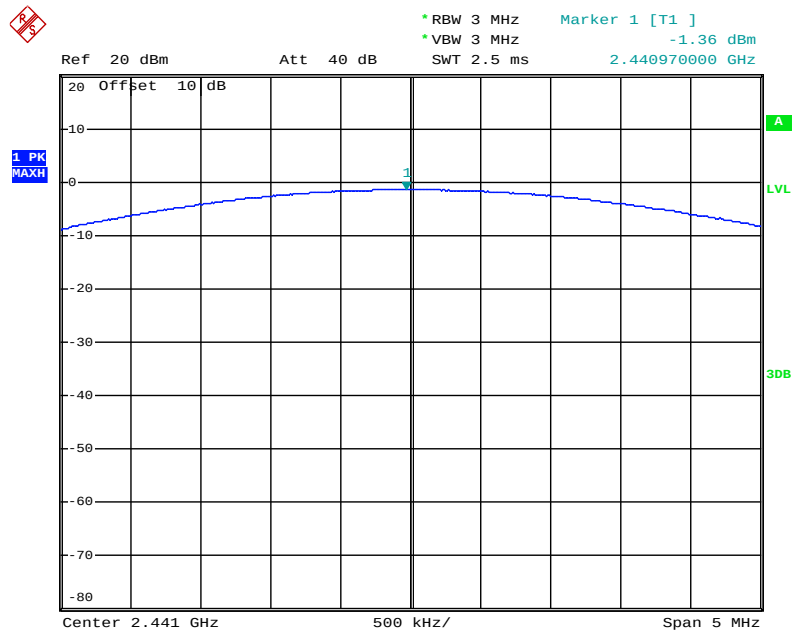
GFSK Mode

Low channel



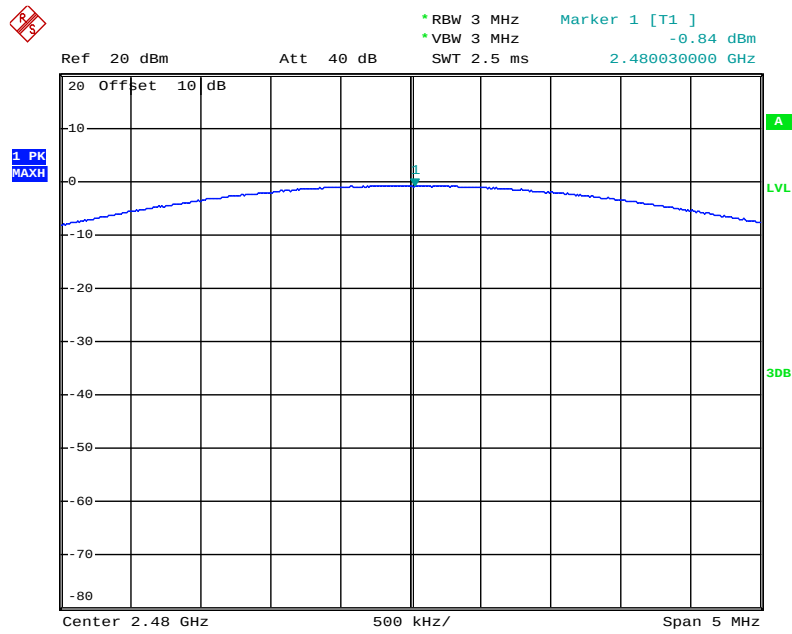
Date: 28.NOV.2017 10:34:51

Middle channel



Date: 28.NOV.2017 10:35:55

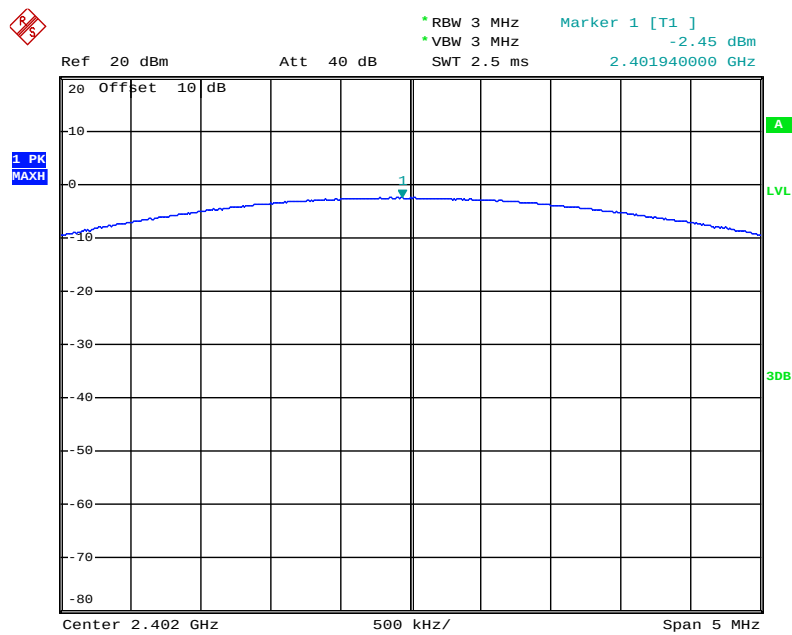
High channel



Date: 28.NOV.2017 10:36:54

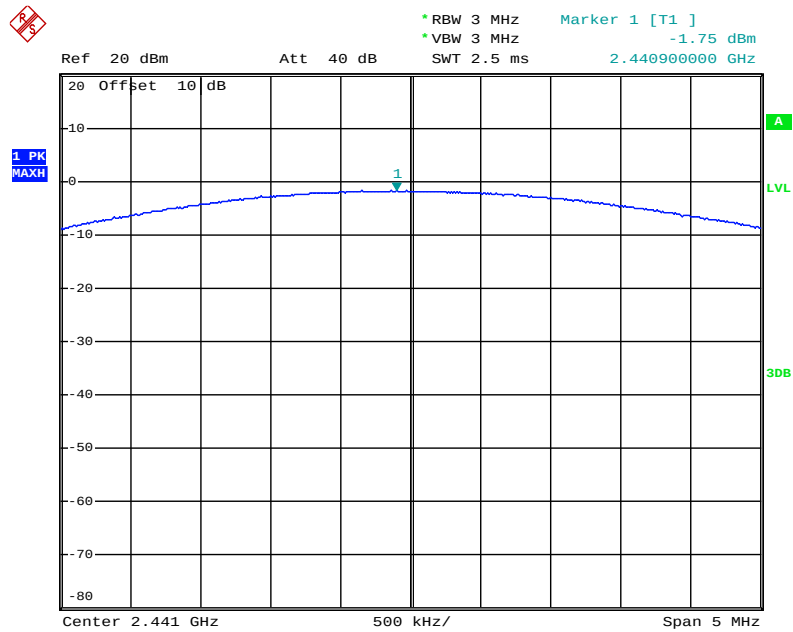
Π/4-DQPSK Mode

Low channel



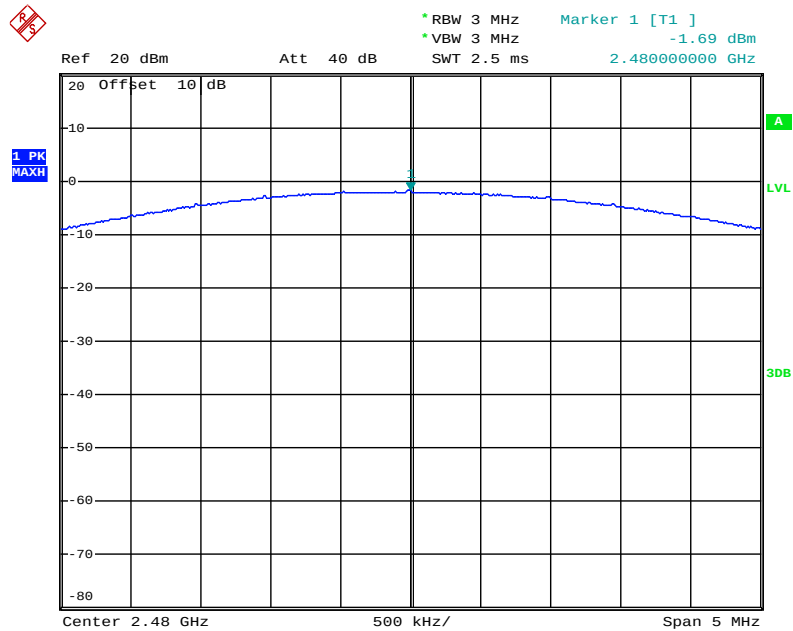
Date: 28.NOV.2017 10:41:55

Middle channel



Date: 28.NOV.2017 10:39:48

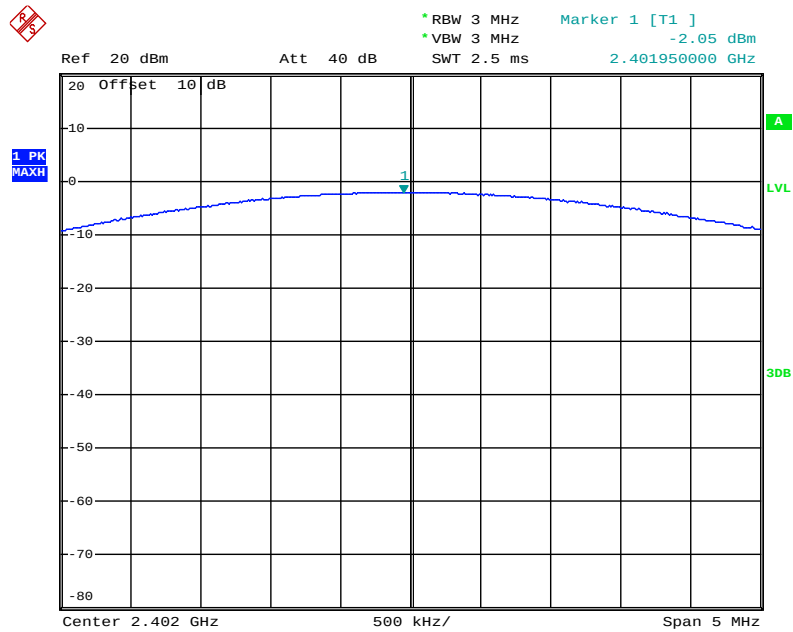
High channel



Date: 28.NOV.2017 10:38:13

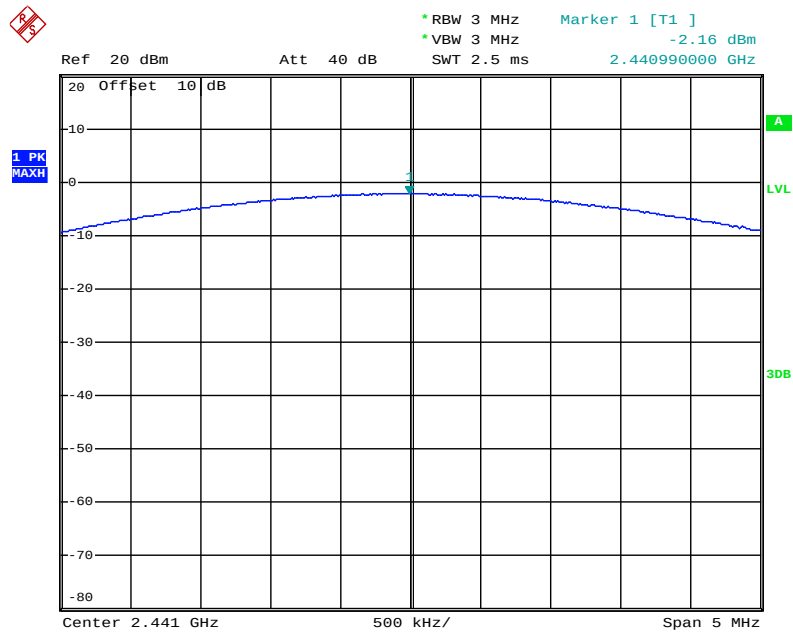
8DPSK Mode

Low channel



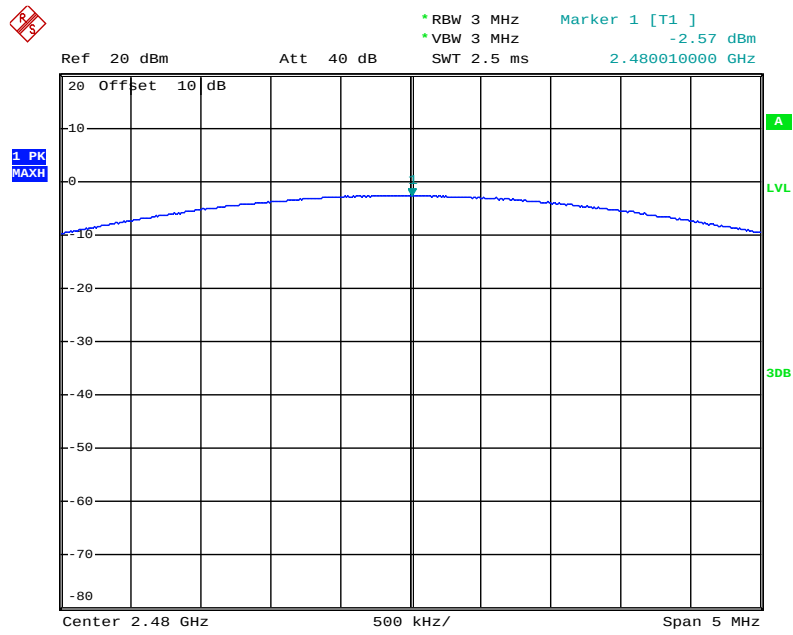
Date: 28.NOV.2017 10:43:07

Middle channel



Date: 28.NOV.2017 10:44:32

High channel

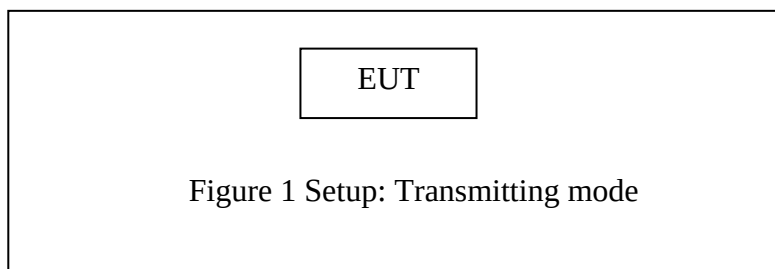


Date: 28.NOV.2017 10:45:57

10.RADIATED EMISSION TEST

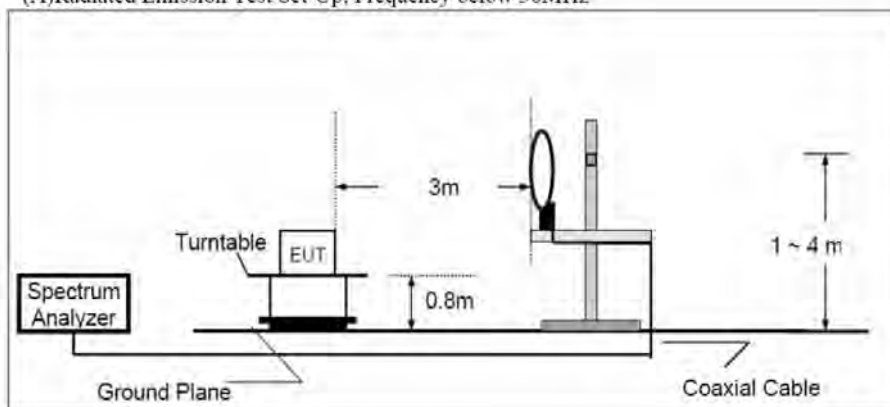
10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

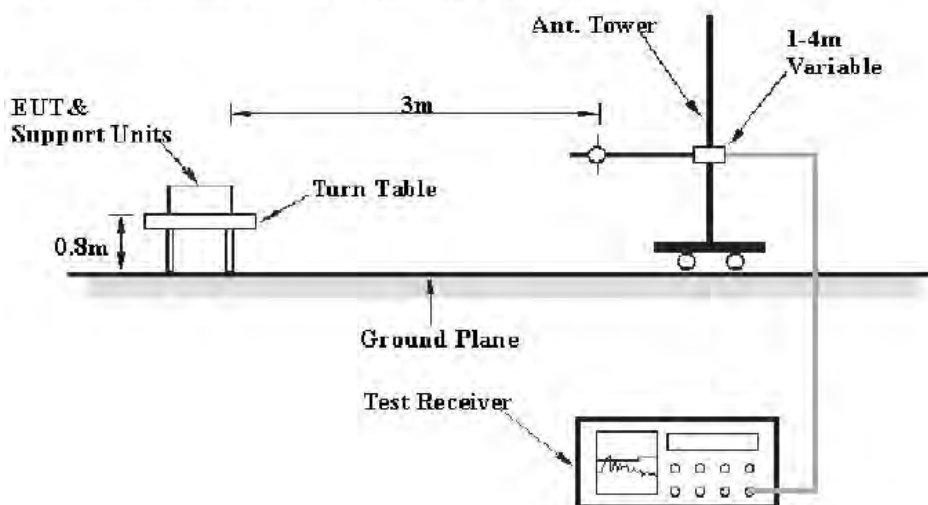


10.1.2.Semi-Anechoic Chamber Test Setup Diagram

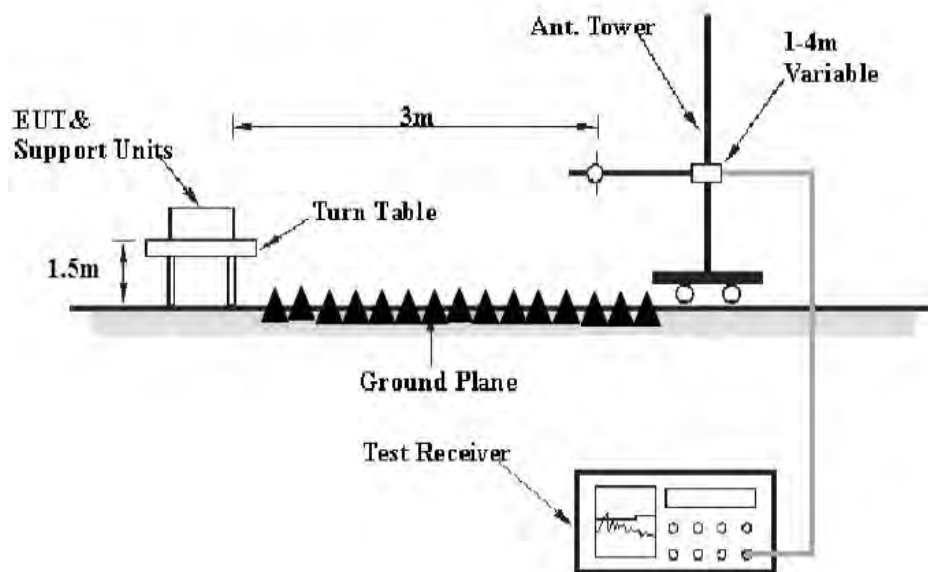
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



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



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



10.2.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).

10.3.Restricted bands of operation

10.3.1.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			

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

²Above 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 Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.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.

10.5. Operating Condition of EUT

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

10.5.2. Turn on the power of all equipment.

10.5.3. 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.

10.6. 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. The EUT was tested in 3 orthogonal planes.

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.

10.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	28.66	-15.19	13.47	40.0	-26.53	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ 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.

10.8.The Field Strength of Radiation Emission Measurement Results

PASS.

Note: 1.We tested GFSK mode, $\Pi/4$ -DQPSK Mode & 8QPSK mode and recorded the worst case data (GFSK mode) for all test mode.

2. The test frequency is from 30MHz to 25GHz, The 18-25GHz emissions are not reported, because the levels are too low against the limit.

The spectrum analyzer plots are attached as below.

Below 1GHz



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

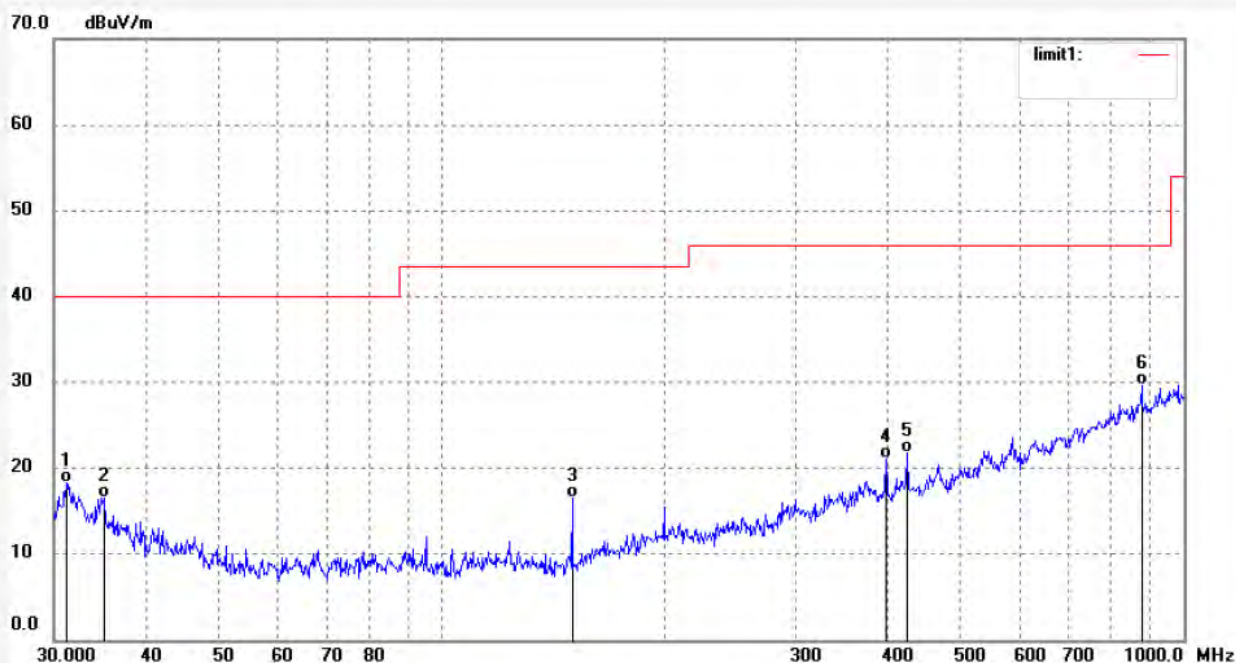
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1180
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:41:58
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.1822	38.79	-20.49	18.30	40.00	-21.70	QP			
2	35.1388	38.12	-21.51	16.61	40.00	-23.39	QP			
3	149.9676	44.56	-28.05	16.51	43.50	-26.99	QP			
4	396.8992	39.43	-18.36	21.07	46.00	-24.93	QP			
5	424.2998	39.78	-17.94	21.84	46.00	-24.16	QP			
6	878.0931	37.15	-7.56	29.59	46.00	-16.41	QP			



ACCURATE TECHNOLOGY CO., LTD.

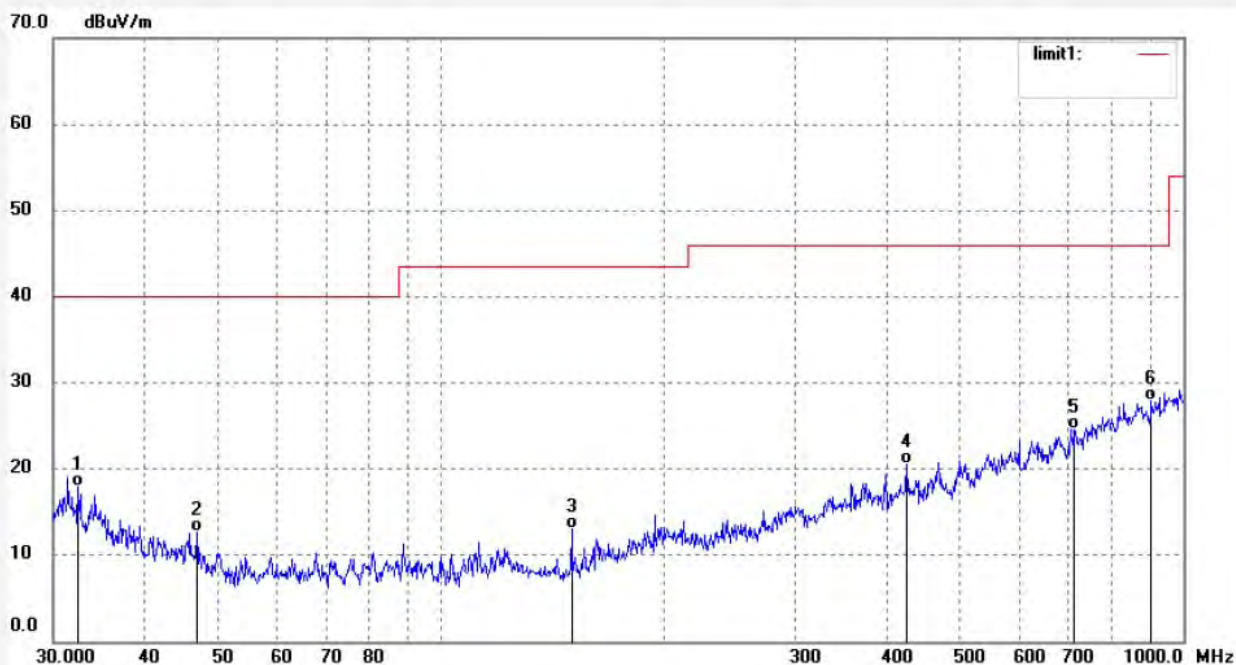
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1181
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:42:42
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	32.4109	38.73	-20.81	17.92	40.00	-22.08	QP			
2	46.8721	37.71	-25.08	12.63	40.00	-27.37	QP			
3	149.9676	41.17	-28.05	13.12	43.50	-30.38	QP			
4	424.2999	38.43	-17.94	20.49	46.00	-25.51	QP			
5	713.6917	35.68	-11.16	24.52	46.00	-21.48	QP			
6	906.3041	34.97	-7.08	27.89	46.00	-18.11	QP			



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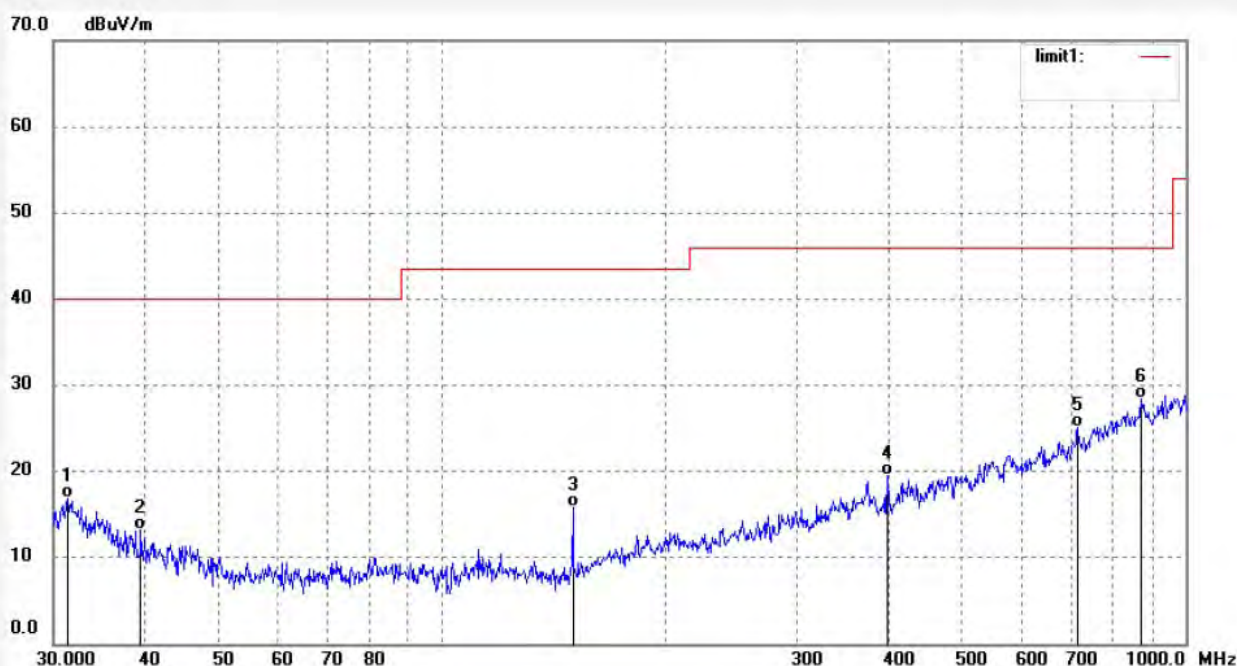
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1183
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2441MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:44:28
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.2918	37.49	-20.53	16.96	40.00	-23.04	QP			
2	39.3203	36.45	-23.30	13.15	40.00	-26.85	QP			
3	149.9676	43.87	-28.05	15.82	43.50	-27.68	QP			
4	396.8992	37.93	-18.36	19.57	46.00	-26.43	QP			
5	716.2038	36.24	-11.09	25.15	46.00	-20.85	QP			
6	871.9442	36.06	-7.67	28.39	46.00	-17.61	QP			



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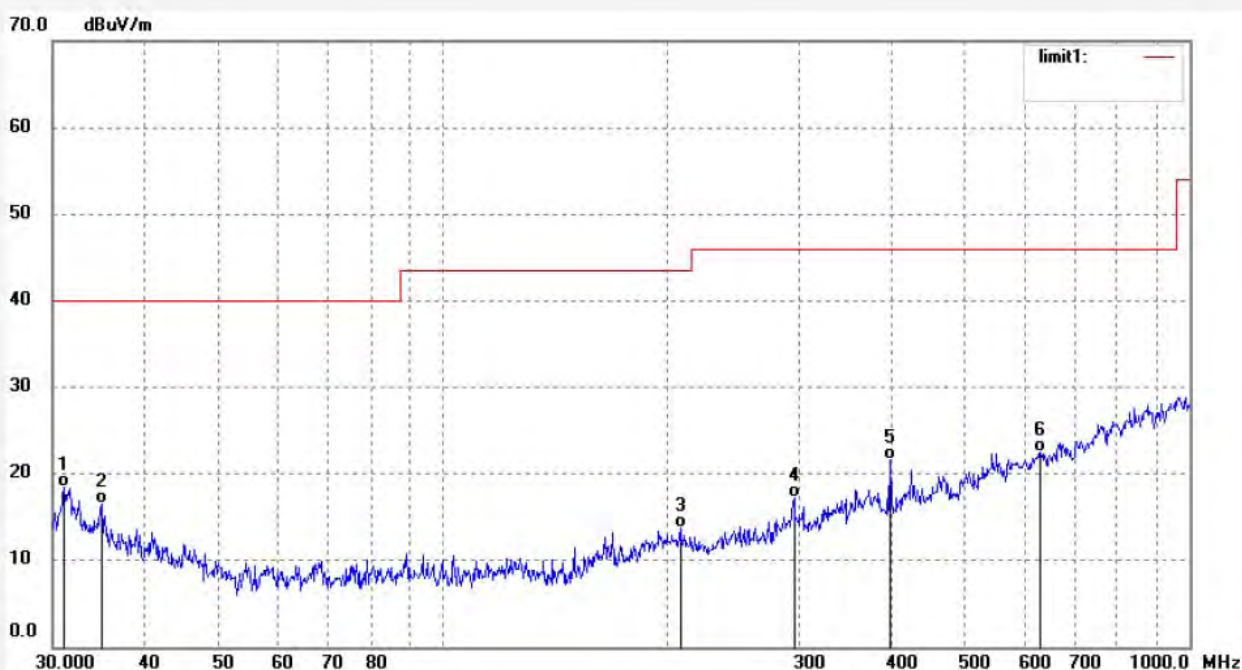
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1182
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2441MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:43:49
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.0728	38.85	-20.47	18.38	40.00	-21.62	QP			
2	34.8928	38.02	-21.42	16.60	40.00	-23.40	QP			
3	207.9260	37.91	-24.14	13.77	43.50	-29.73	QP			
4	295.4623	38.68	-21.39	17.29	46.00	-28.71	QP			
5	396.8992	40.01	-18.36	21.65	46.00	-24.35	QP			
6	631.1070	35.50	-13.03	22.47	46.00	-23.53	QP			



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Site: 1# Chamber

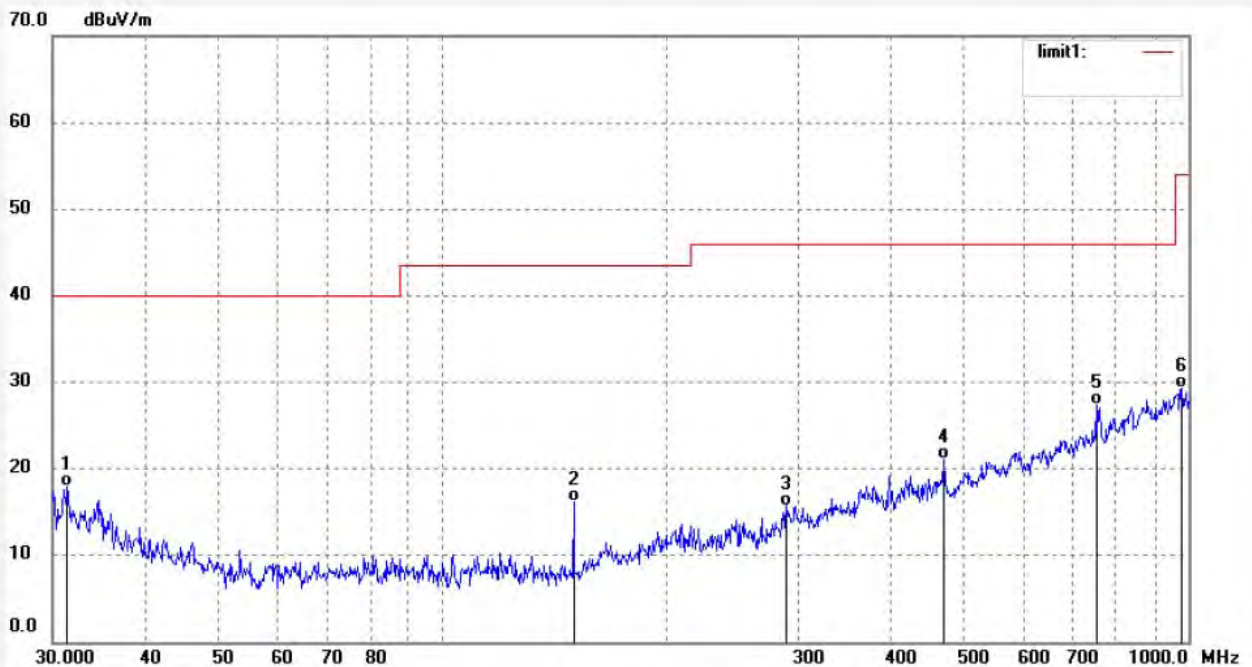
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1184
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:45:18
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.4021	38.45	-20.55	17.90	40.00	-22.10	QP			
2	149.9676	44.32	-28.05	16.27	43.50	-27.23	QP			
3	289.2987	37.45	-21.70	15.75	46.00	-30.25	QP			
4	469.8129	37.88	-16.77	21.11	46.00	-24.89	QP			
5	752.3148	37.74	-10.28	27.46	46.00	-18.54	QP			
6	979.1392	34.87	-5.58	29.29	54.00	-24.71	QP			



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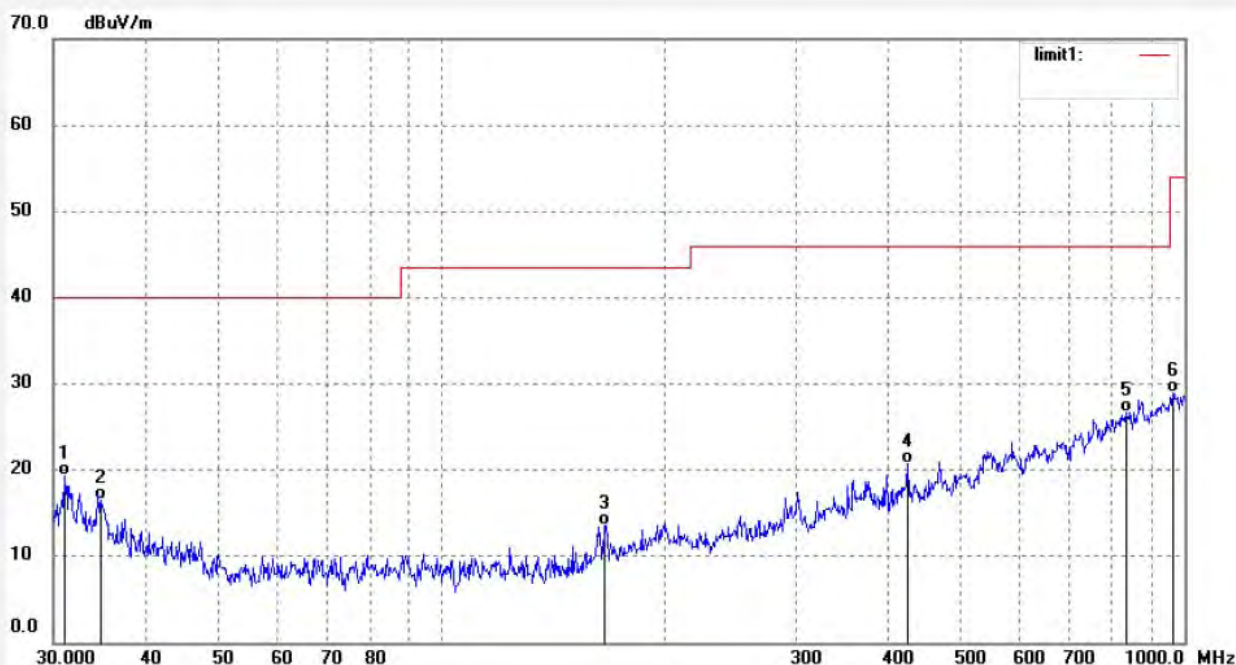
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1185
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:46:09
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.0728	39.75	-20.47	19.28	40.00	-20.72	QP			
2	34.7704	37.94	-21.39	16.55	40.00	-23.45	QP			
3	166.0540	40.06	-26.42	13.64	43.50	-29.86	QP			
4	424.2998	38.60	-17.94	20.66	46.00	-25.34	QP			
5	835.9447	35.05	-8.28	26.77	46.00	-19.23	QP			
6	965.4741	34.84	-5.91	28.93	54.00	-25.07	QP			

Above 1GHz



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Job No.: STAR2017 #1187

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: TX 2402MHz (GFSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Horizontal

Power Source: DC 3.7V

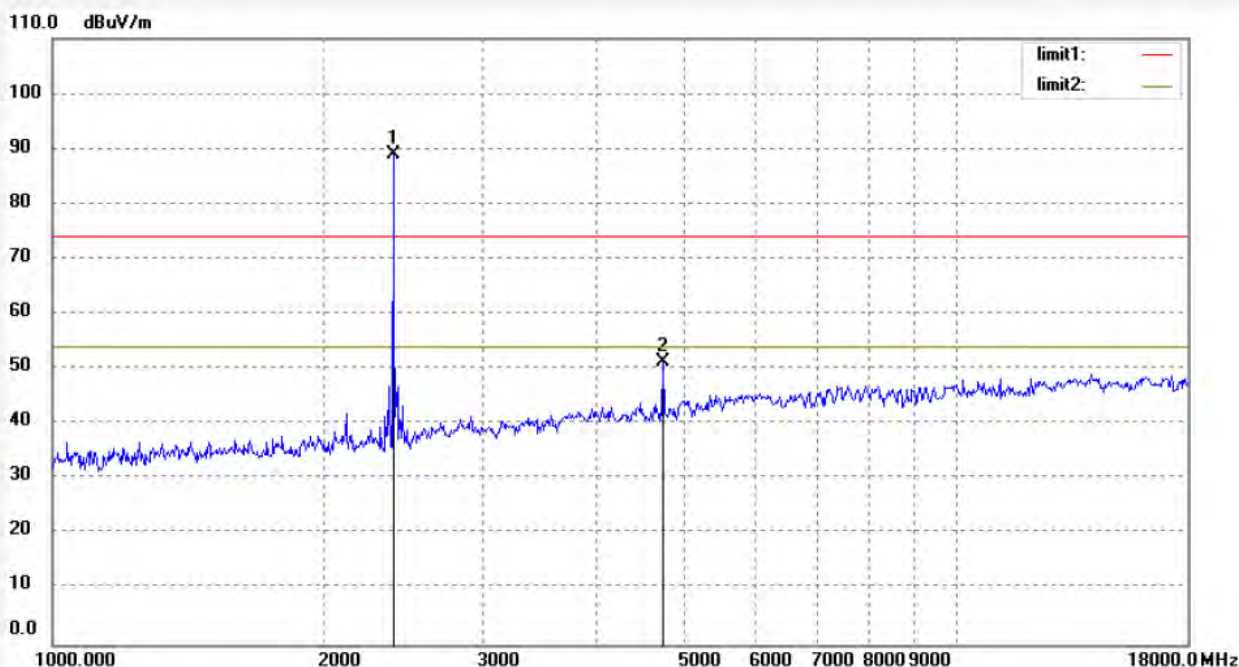
Date: 2017/11/28

Time: 14:54:33

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.019	93.02	-4.01	89.01			peak			
2	4804.057	47.92	3.46	51.38	74.00	-22.62	peak			



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Job No.: STAR2017 #1186

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: TX 2402MHz (GFSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Vertical

Power Source: DC 3.7V

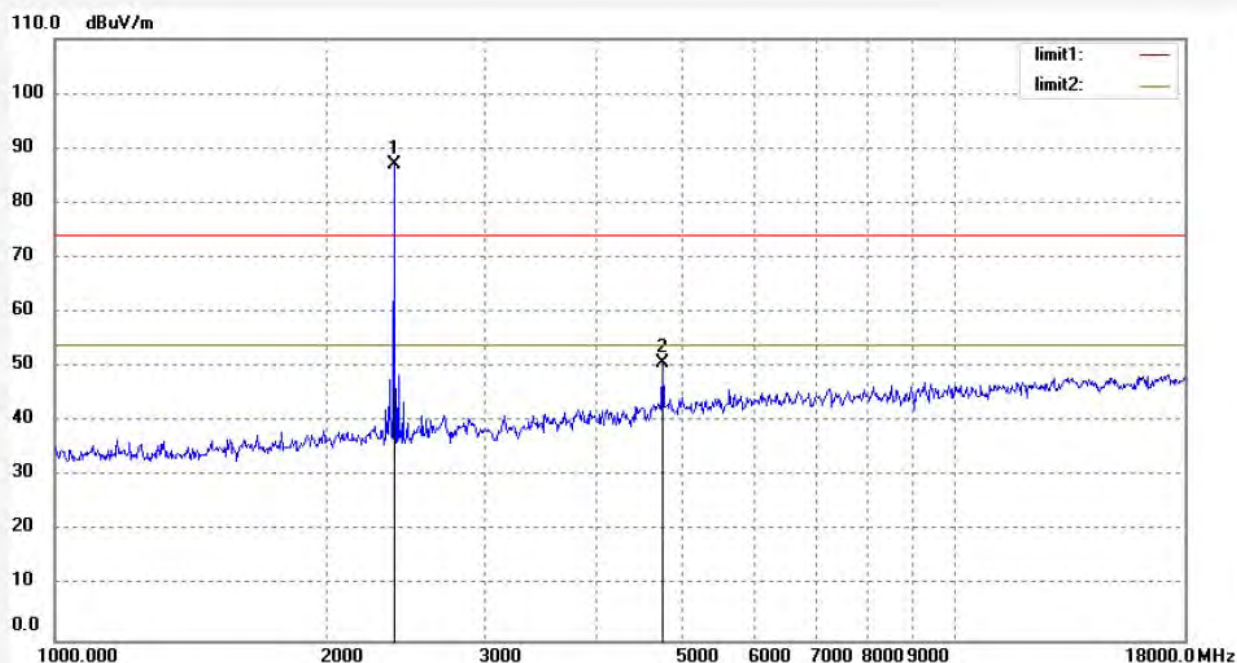
Date: 2017/11/28

Time: 14:52:25

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.019	91.16	-4.01	87.15			peak			
2	4804.157	47.25	3.46	50.71	74.00	-23.29	peak			



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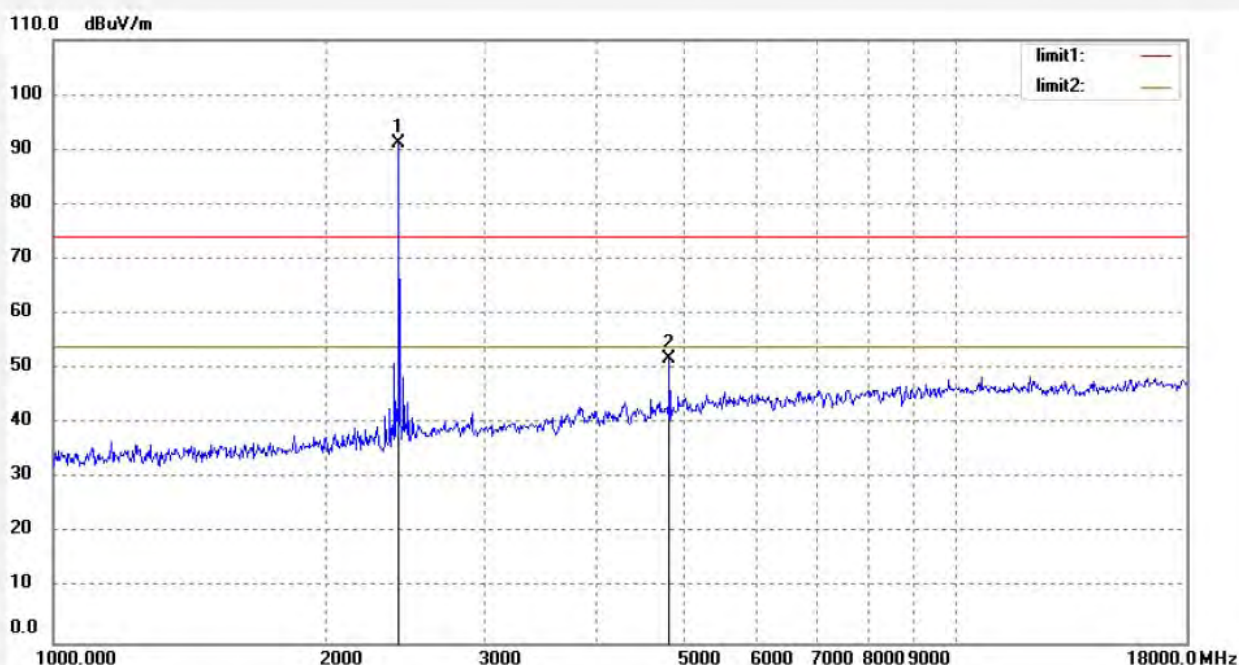
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2017 #1188
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2441MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:56:17
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.121	95.02	-3.83	91.19			peak			
2	4882.324	48.01	3.82	51.83	74.00	-22.17	peak			



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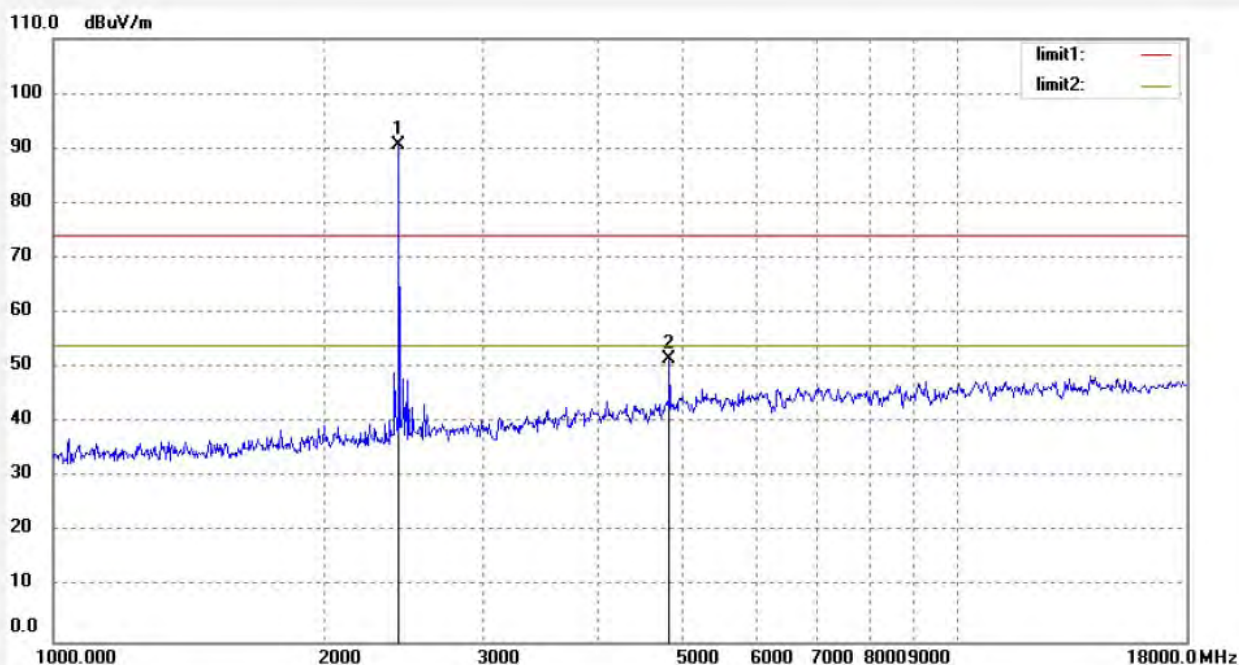
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1189
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2441MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:57:51
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.021	94.56	-3.83	90.73			peak			
2	4882.024	47.72	3.82	51.54	74.00	-22.46	peak			



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Job No.: STAR2017 #1191

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: TX 2480MHz (GFSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Horizontal

Power Source: DC 3.7V

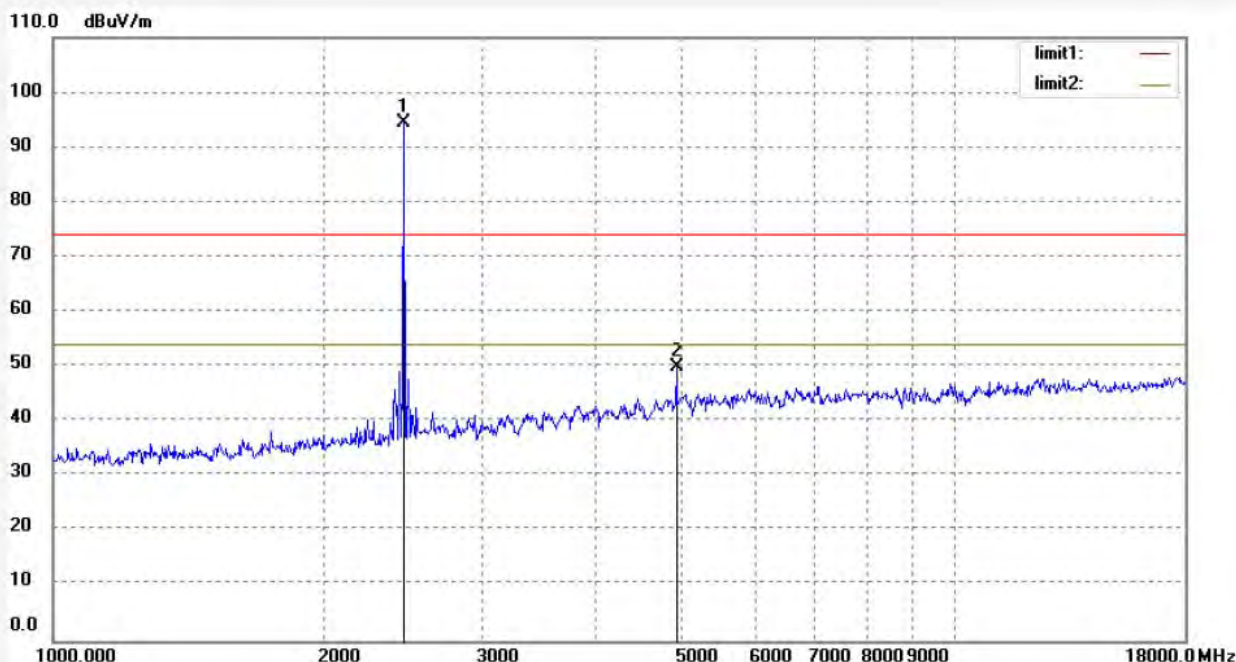
Date: 2017/11/28

Time: 15:01:09

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.034	98.24	-3.67	94.57			peak			
2	4960.444	45.68	4.25	49.93	74.00	-24.07	peak			



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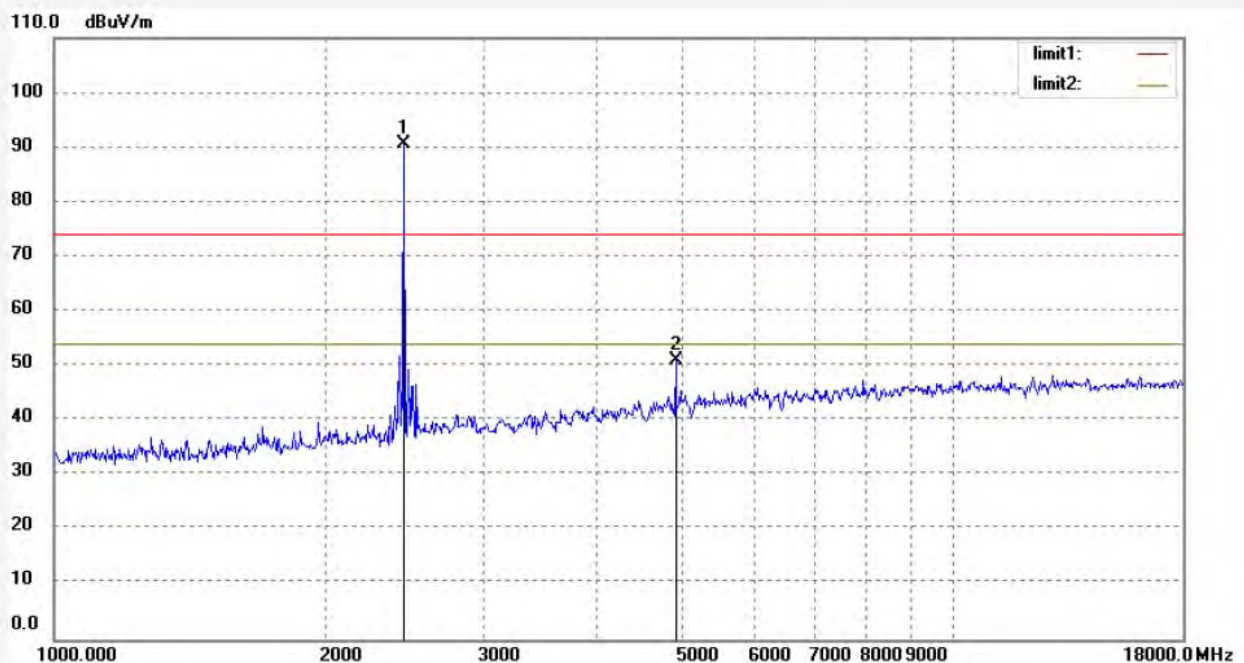
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2017 #1190
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 14:59:28
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.034	94.42	-3.67	90.75			peak			
2	4960.444	46.90	4.25	51.15	74.00	-22.85	peak			

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: Bluetooth Speaker)

11.2.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).

11.3.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.

11.4.Operating Condition of EUT

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

11.4.2.Turn on the power of all equipment.

11.4.3.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.

11.5. Test Procedure

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

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

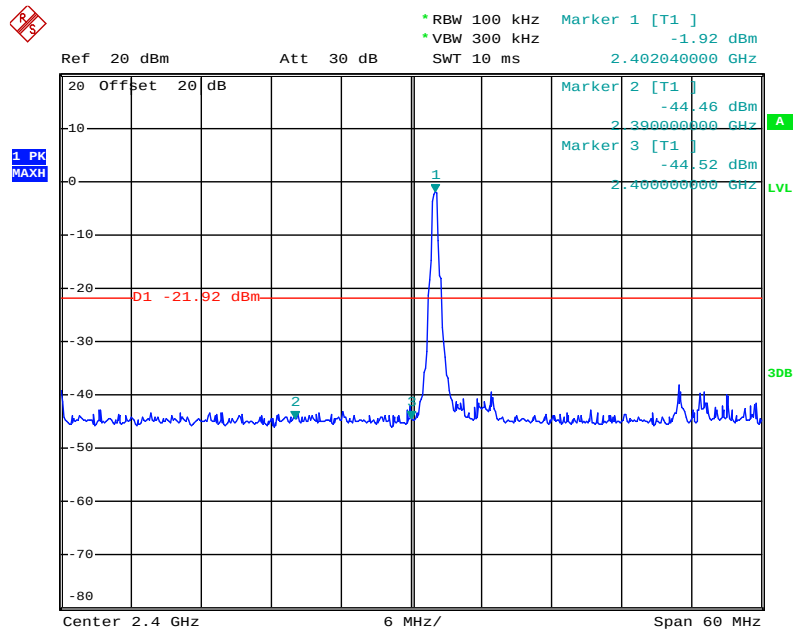
11.5.3. The band edges was measured and recorded.

11.6. Test Result

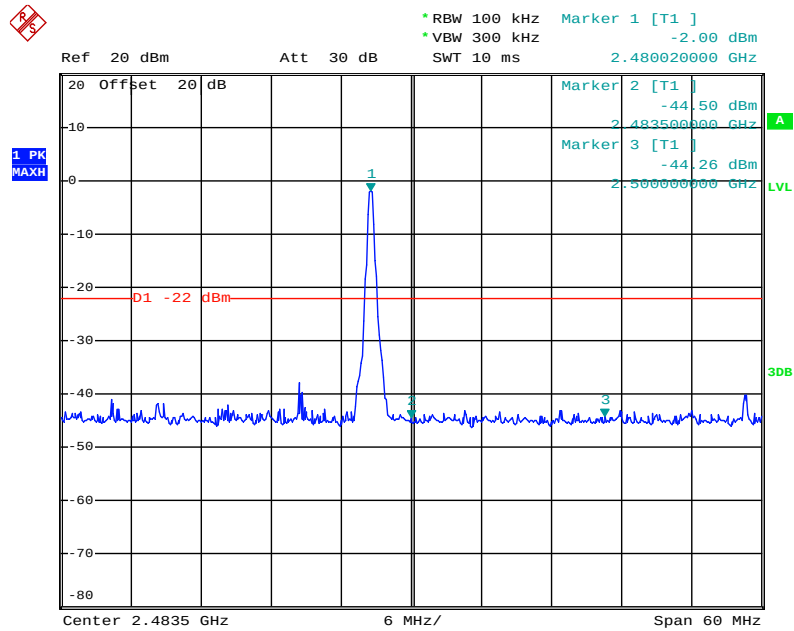
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK Mode		
2400.00	42.60	> 20dBc
2483.50	42.50	> 20dBc
Π/4-DQPSK Mode		
2400.00	40.40	> 20dBc
2483.50	40.52	> 20dBc
8DPSK Mode		
2400.00	39.58	> 20dBc
2483.50	40.80	> 20dBc

The spectrum analyzer plots are attached as below.

GFSK Mode

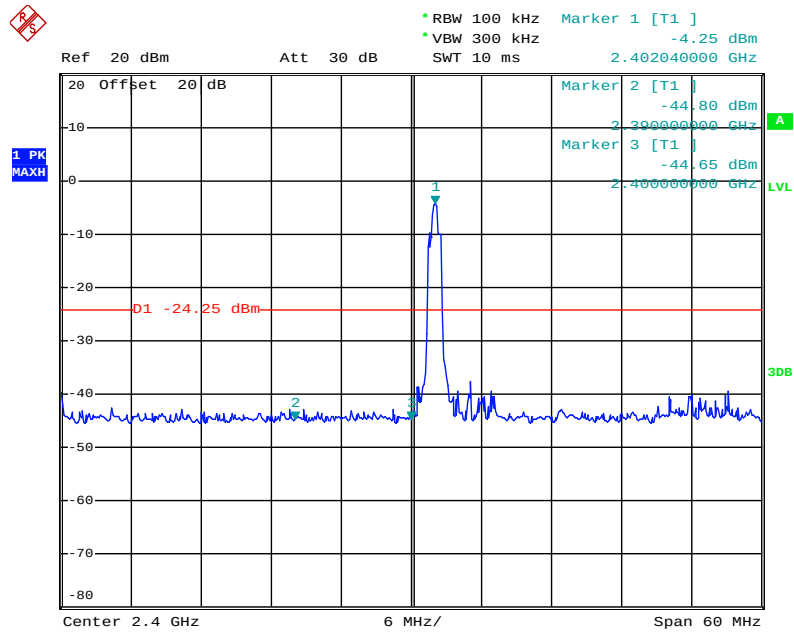


Date: 28.NOV.2017 15:43:51

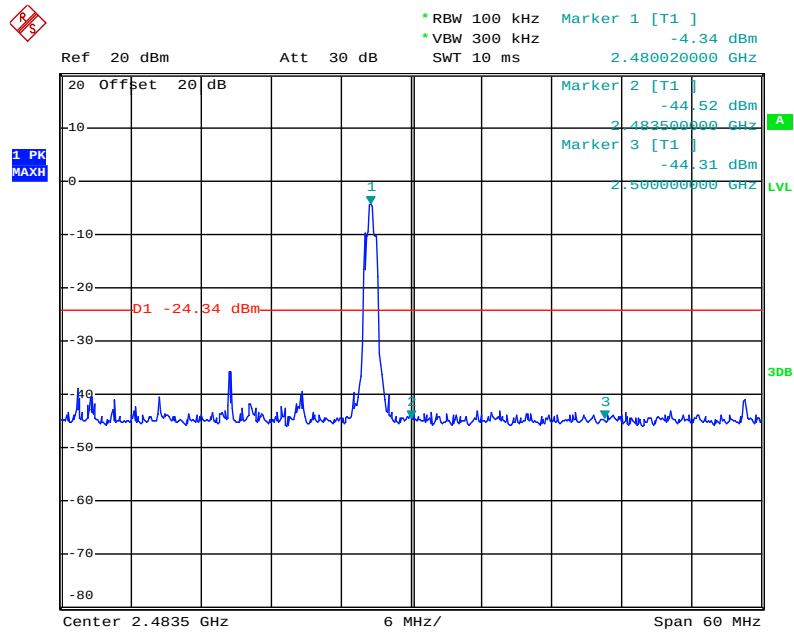


Date: 28.NOV.2017 15:42:57

$\Pi/4$ -DQPSK Mode

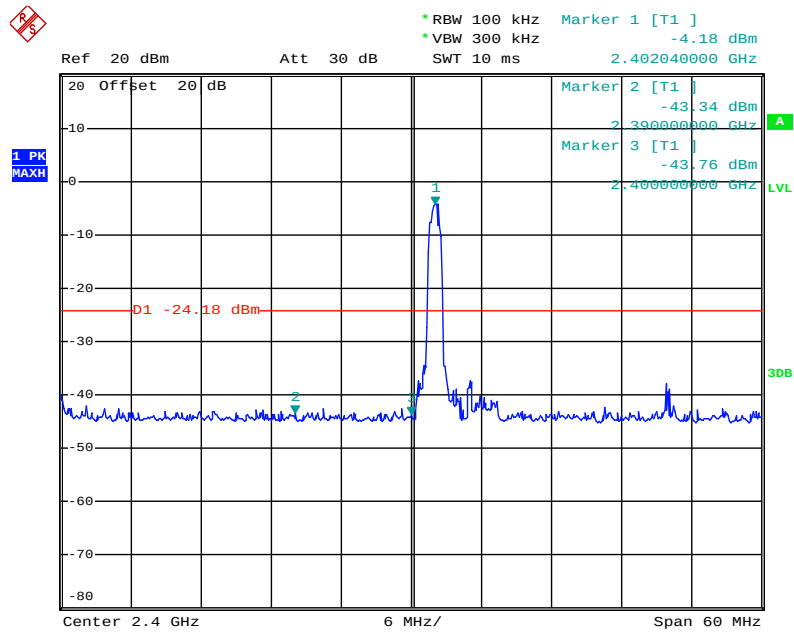


Date: 28.NOV.2017 15:44:46

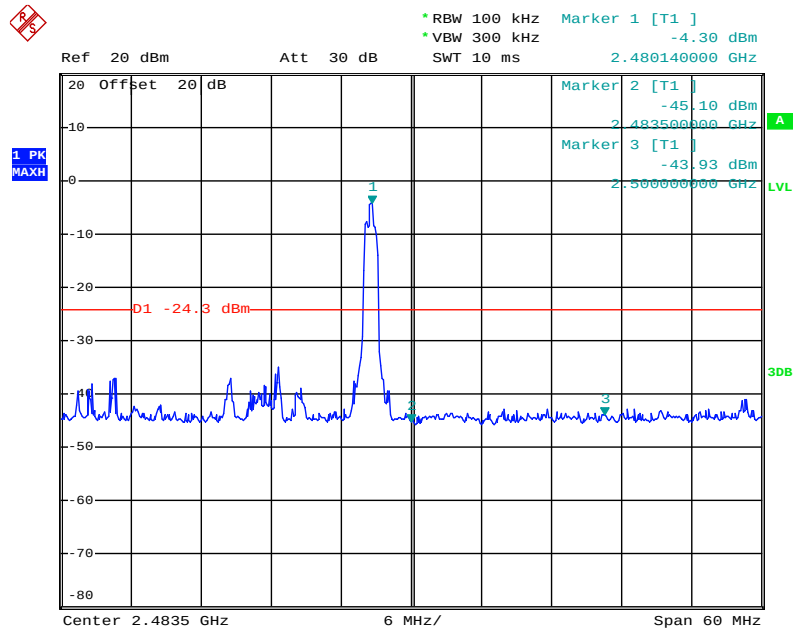


Date: 28.NOV.2017 15:46:18

8DPSK Mode



Date: 28.NOV.2017 15:48:46



Date: 28.NOV.2017 15:47:19

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 emissions are reported.

The spectrum analyzer plots are attached as below.



Non-hopping mode ACCURATE TECHNOLOGY CO., LTD.

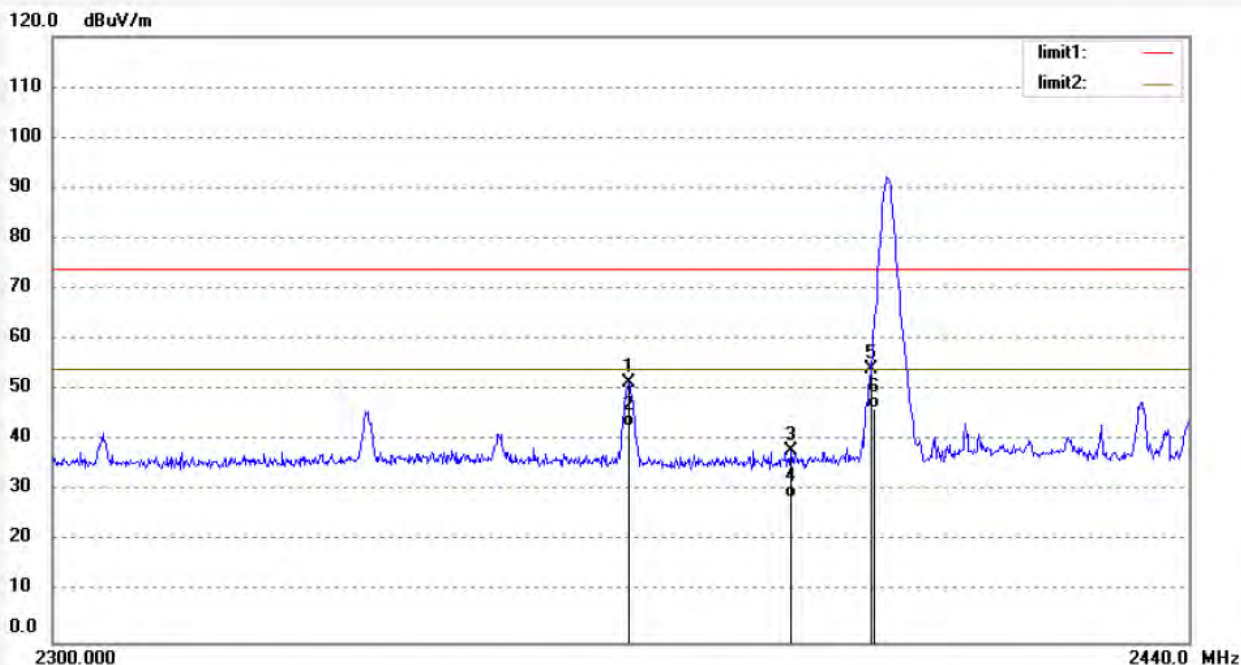
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1192
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:07:47
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2369.948	55.43	-4.06	51.37	74.00	-22.63	peak			
2	2369.948	46.77	-4.06	42.71	54.00	-11.29	AVG			
3	2390.000	41.86	-3.96	37.90	74.00	-36.10	peak			
4	2390.000	32.54	-3.96	28.58	54.00	-25.42	AVG			
5	2400.000	58.11	-3.91	54.20	74.00	-19.80	peak			
6	2400.000	50.16	-3.91	46.25	54.00	-7.75	AVG			

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



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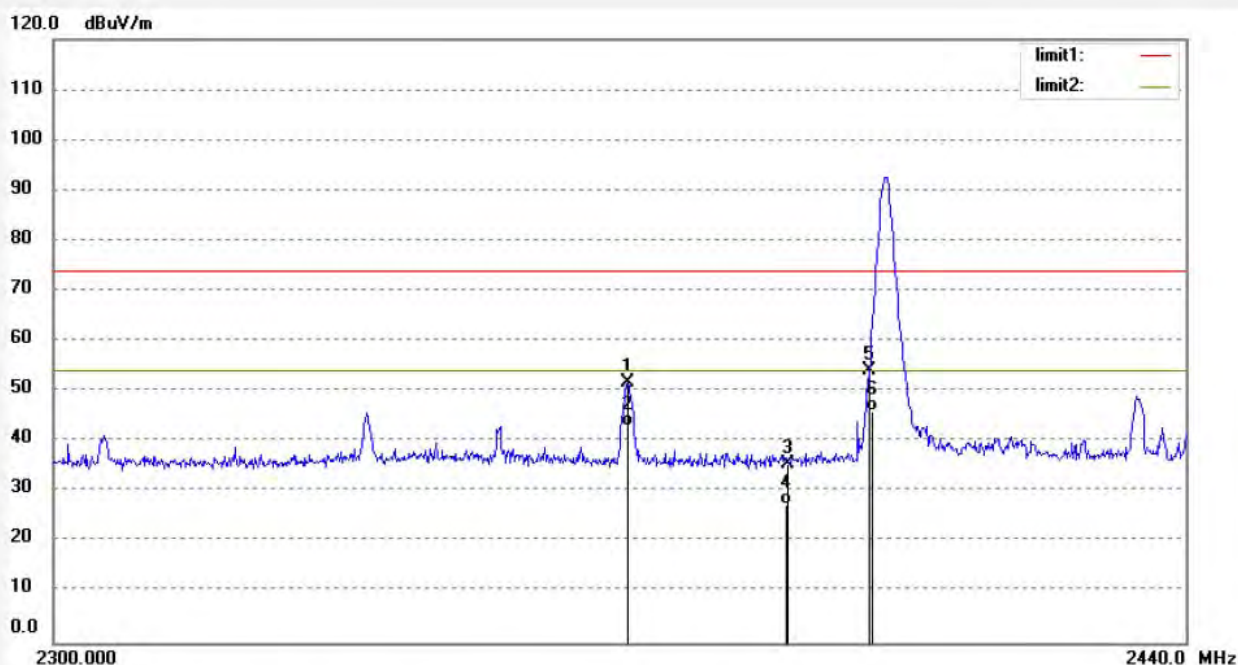
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1193
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:09:18
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2369.948	55.68	-4.06	51.62	74.00	-22.38	peak			
2	2369.948	46.99	-4.06	42.93	54.00	-11.07	AVG			
3	2390.000	39.57	-3.96	35.61	74.00	-38.39	peak			
4	2390.000	31.47	-3.96	27.51	54.00	-26.49	AVG			
5	2400.000	58.05	-3.91	54.14	74.00	-19.86	peak			
6	2400.000	50.00	-3.91	46.09	54.00	-7.91	AVG			

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



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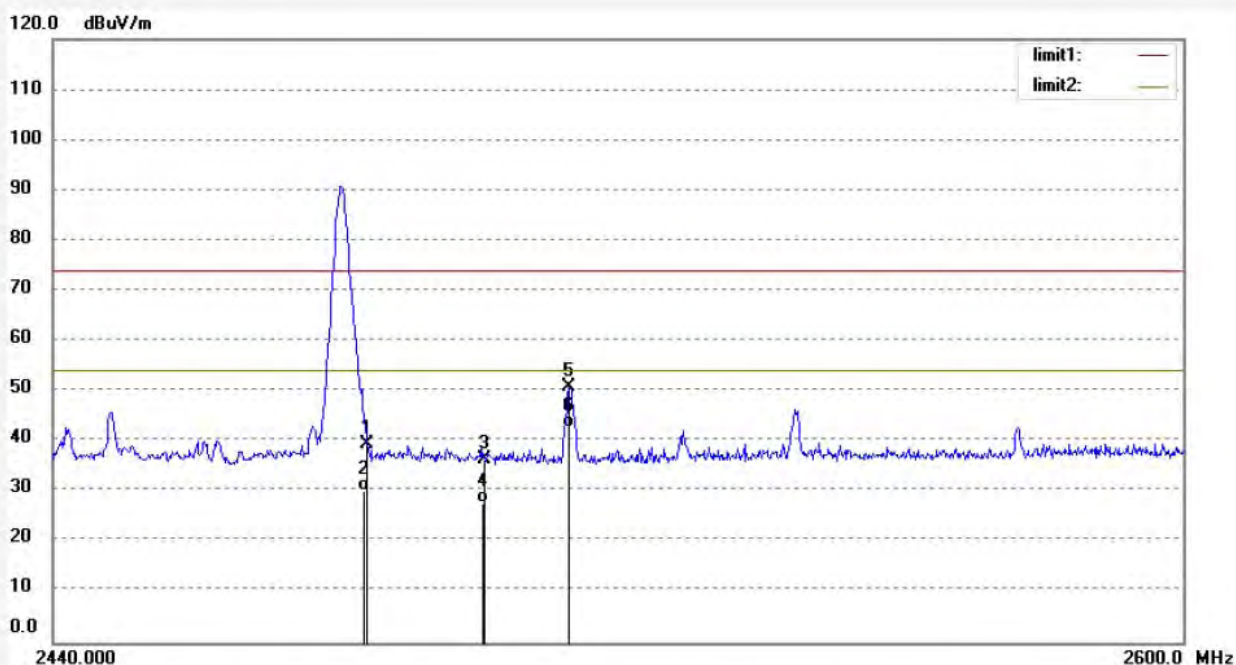
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1195
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:12:33
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	42.94	-3.50	39.44	74.00	-34.56	peak			
2	2483.500	33.51	-3.50	30.01	54.00	-23.99	AVG			
3	2500.000	39.84	-3.42	36.42	74.00	-37.58	peak			
4	2500.000	31.25	-3.42	27.83	54.00	-26.17	AVG			
5	2511.847	54.21	-3.36	50.85	74.00	-23.15	peak			
6	2511.847	46.00	-3.36	42.64	54.00	-11.36	AVG			

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



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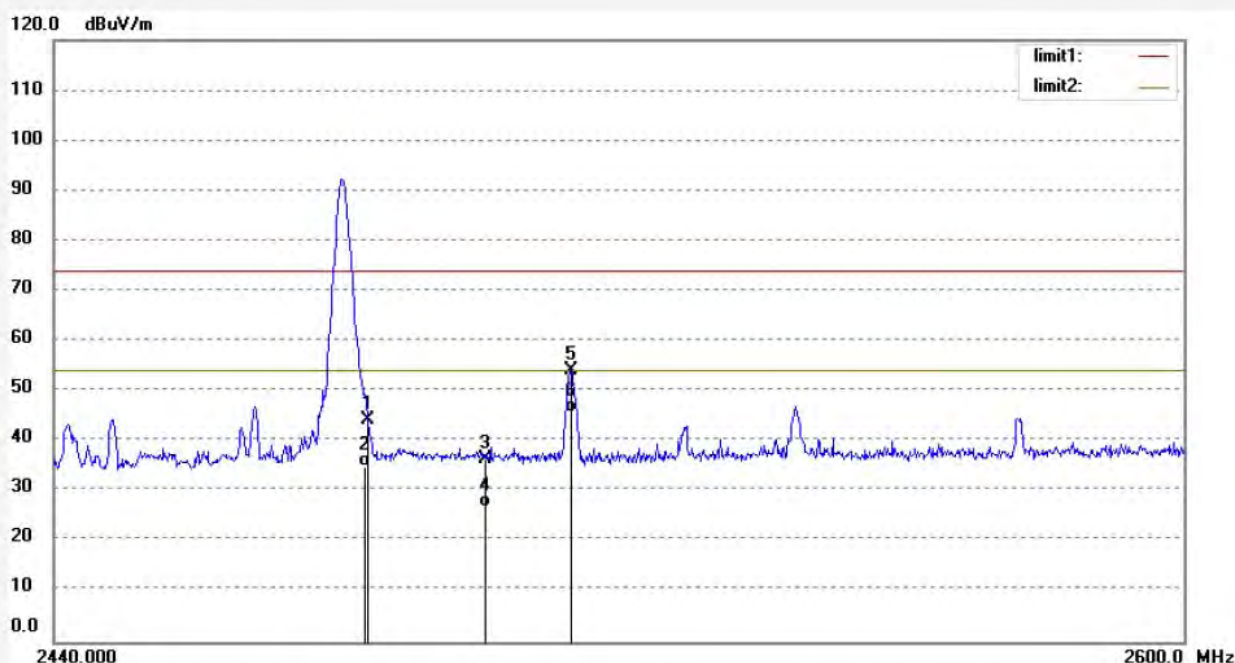
F1,Bldg.A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1194
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:11:05
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	47.83	-3.50	44.33	74.00	-29.67	peak			
2	2483.500	38.56	-3.50	35.06	54.00	-18.94	AVG			
3	2500.000	39.86	-3.42	36.44	74.00	-37.56	peak			
4	2500.000	30.25	-3.42	26.83	54.00	-27.17	AVG			
5	2512.006	57.51	-3.36	54.15	74.00	-19.85	peak			
6	2512.006	49.14	-3.36	45.78	54.00	-8.22	AVG			

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



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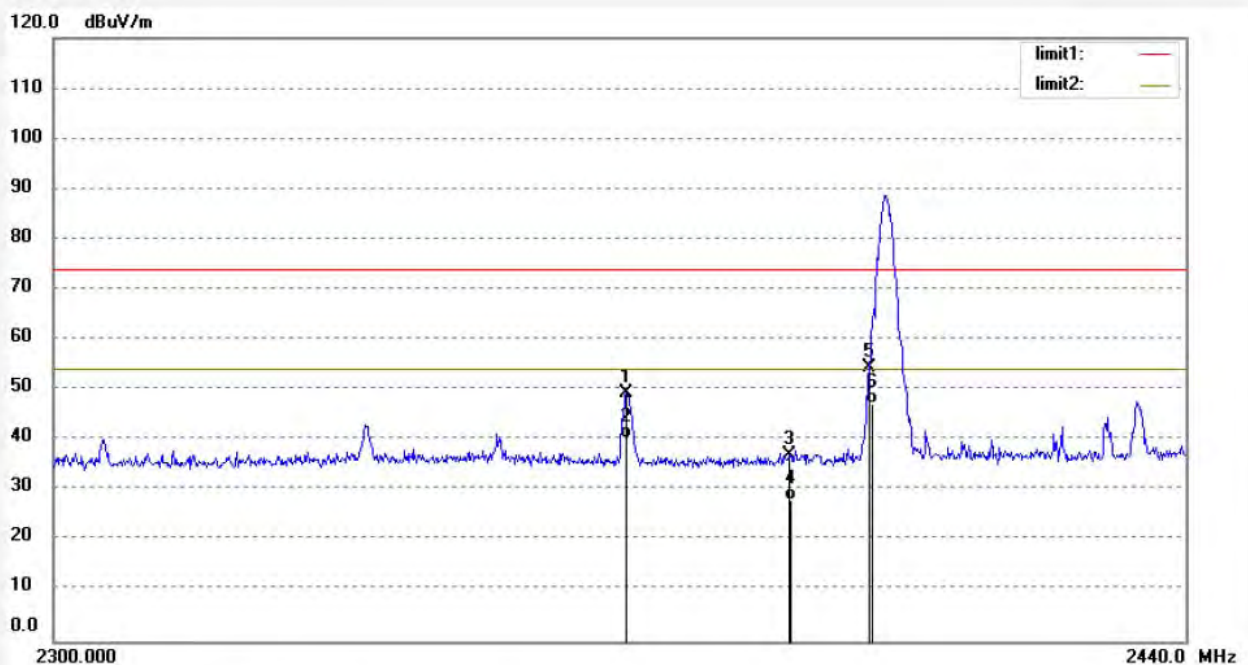
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1199
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (Π/4-DQPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:19:50
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2369.808	53.37	-4.06	49.31	74.00	-24.69	peak			
2	2369.808	44.55	-4.06	40.49	54.00	-13.51	AVG			
3	2390.000	40.88	-3.96	36.92	74.00	-37.08	peak			
4	2390.000	32.05	-3.96	28.09	54.00	-25.91	AVG			
5	2400.000	58.37	-3.91	54.46	74.00	-19.54	peak			
6	2400.000	51.10	-3.91	47.19	54.00	-6.81	AVG			

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



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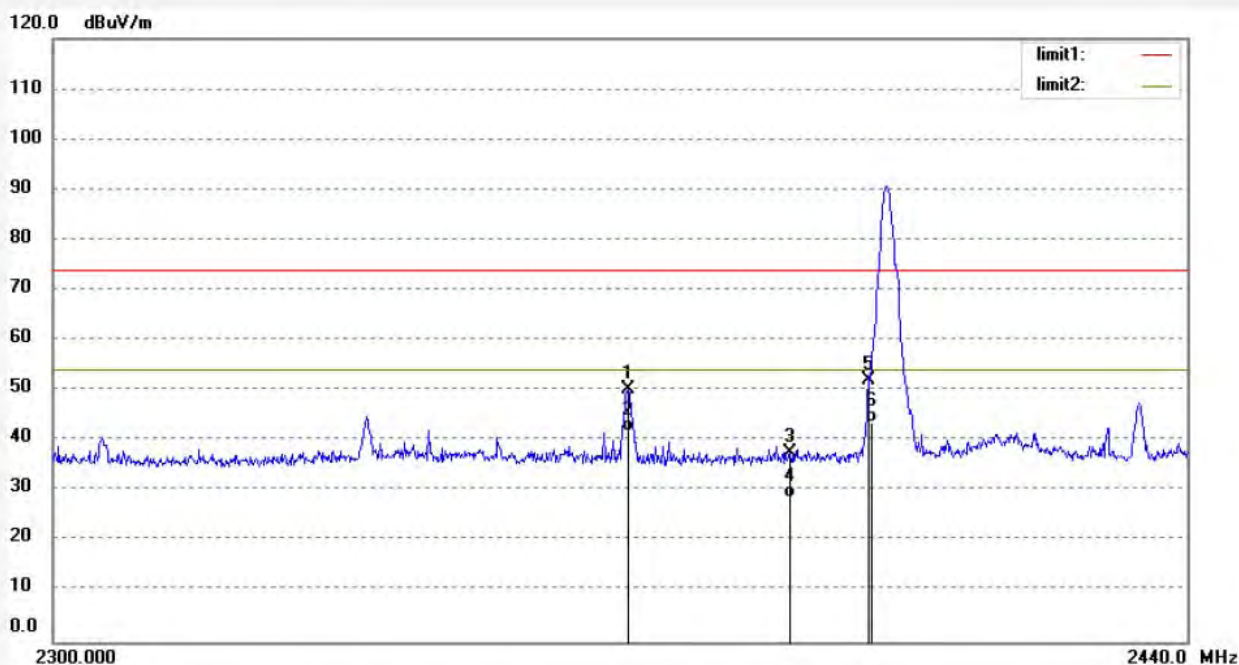
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1198
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (π/4-DQPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:18:24
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2369.948	54.42	-4.06	50.36	74.00	-23.64	peak			
2	2369.948	45.80	-4.06	41.74	54.00	-12.26	AVG			
3	2390.000	41.73	-3.96	37.77	74.00	-36.23	peak			
4	2390.000	32.62	-3.96	28.66	54.00	-25.34	AVG			
5	2400.000	56.08	-3.91	52.17	74.00	-21.83	peak			
6	2400.000	47.59	-3.91	43.68	54.00	-10.32	AVG			

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



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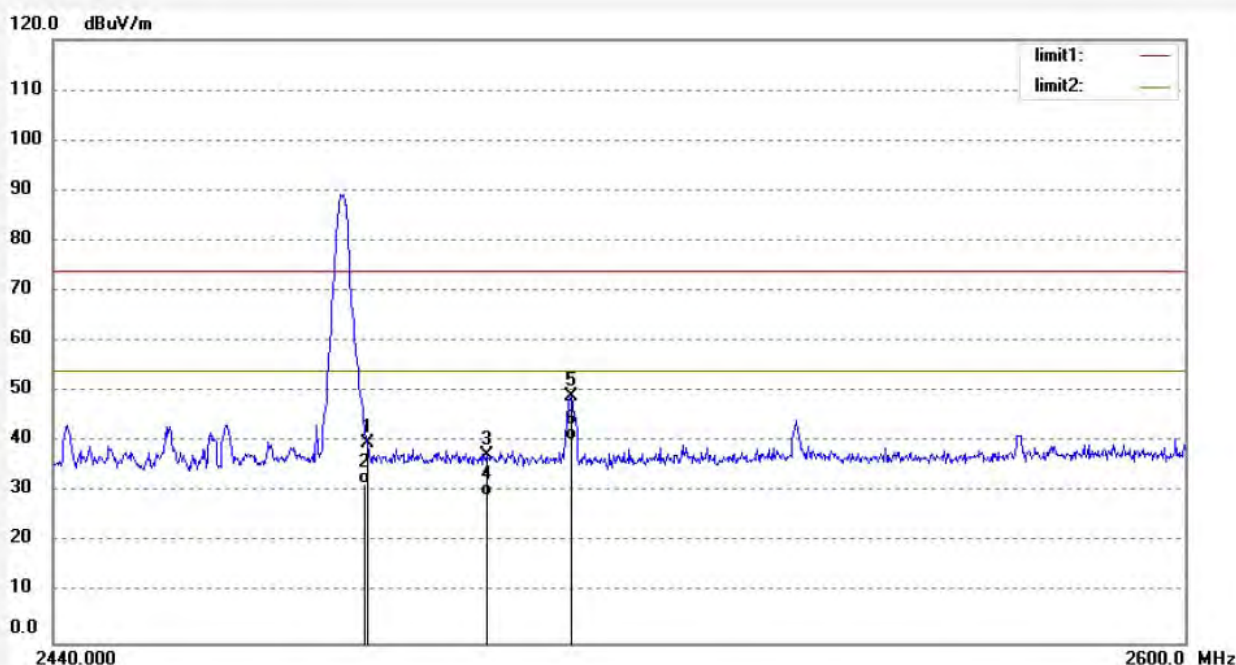
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1196
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (π/4-DQPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:14:31
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	43.13	-3.50	39.63	74.00	-34.37	peak			
2	2483.500	35.06	-3.50	31.56	54.00	-22.44	AVG			
3	2500.000	40.66	-3.42	37.24	74.00	-36.76	peak			
4	2500.000	32.68	-3.42	29.26	54.00	-24.74	AVG			
5	2512.006	52.31	-3.36	48.95	74.00	-25.05	peak			
6	2512.006	43.71	-3.36	40.35	54.00	-13.65	AVG			

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



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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1197

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: TX 2480MHz (π/4-DQPSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Vertical

Power Source: DC 3.7V

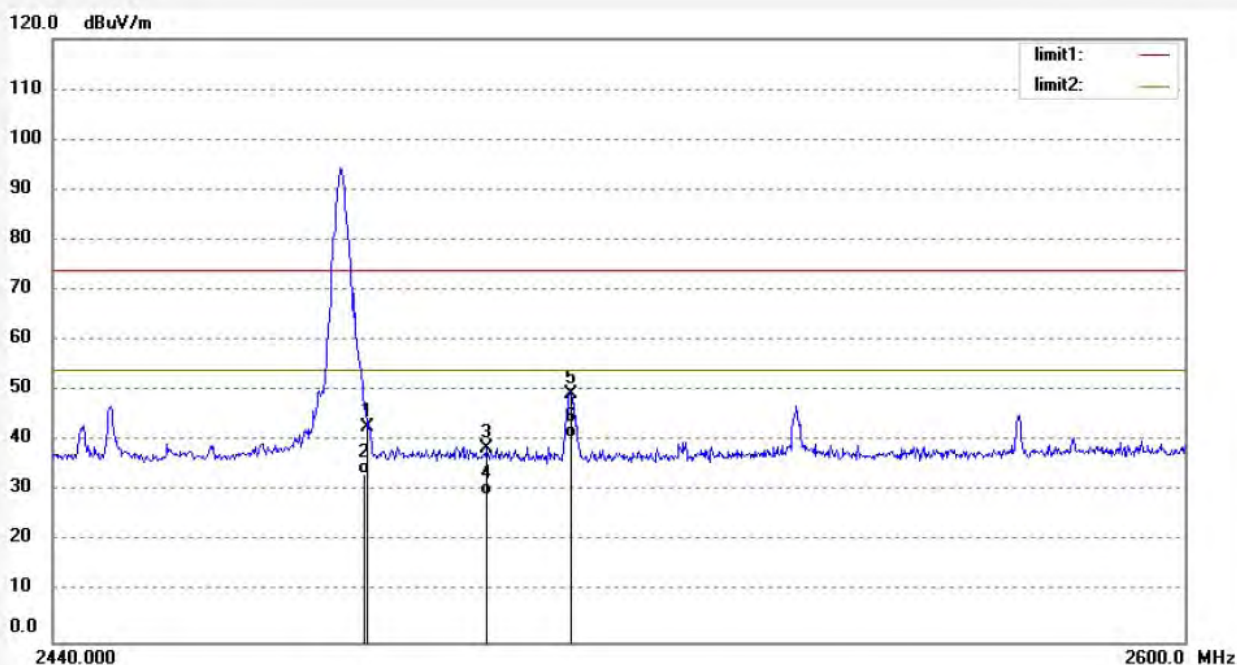
Date: 2017/11/28

Time: 15:16:24

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



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	46.33	-3.50	42.83	74.00	-31.17	peak			
2	2483.500	37.00	-3.50	33.50	54.00	-20.50	AVG			
3	2500.000	41.86	-3.42	38.44	74.00	-35.56	peak			
4	2500.000	32.59	-3.42	29.17	54.00	-24.83	AVG			
5	2512.006	52.84	-3.36	49.48	74.00	-24.52	peak			
6	2512.006	44.00	-3.36	40.64	54.00	-13.36	AVG			

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



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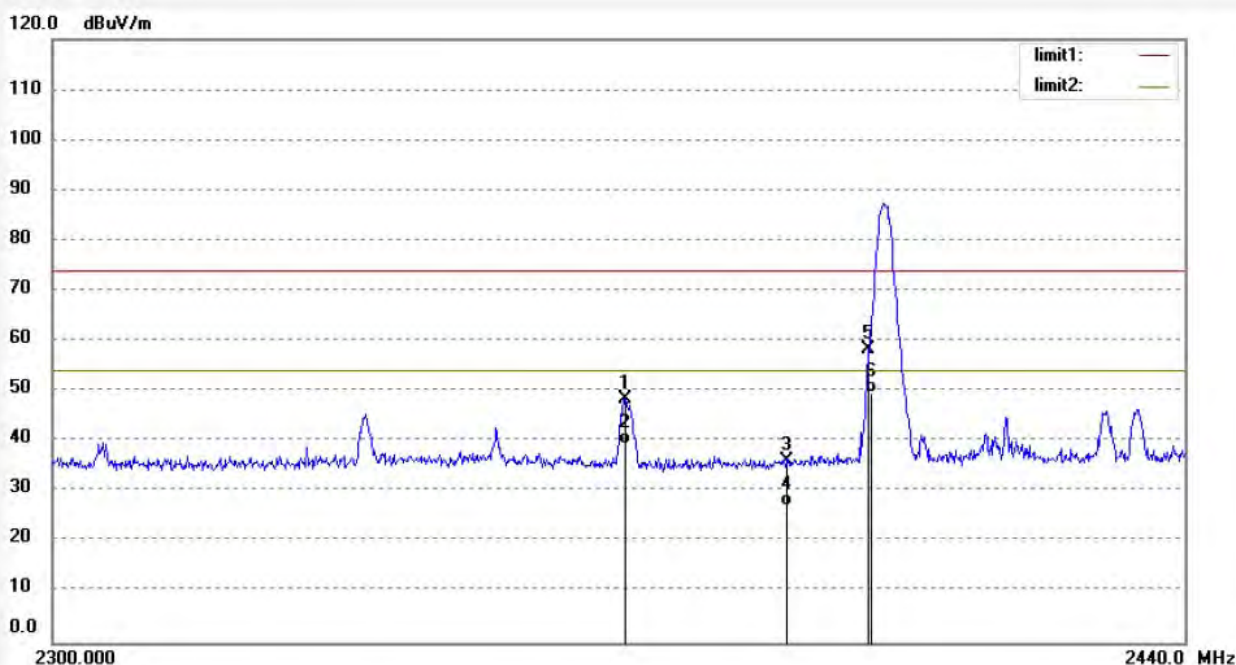
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1200
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (8DPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:21:52
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2369.808	52.65	-4.06	48.59	74.00	-25.41	peak			
2	2369.808	43.58	-4.06	39.52	54.00	-14.48	AVG			
3	2390.000	40.15	-3.96	36.19	74.00	-37.81	peak			
4	2390.000	31.25	-3.96	27.29	54.00	-26.71	AVG			
5	2400.000	62.25	-3.91	58.34	74.00	-15.66	peak			
6	2400.000	53.70	-3.91	49.79	54.00	-4.21	AVG			

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



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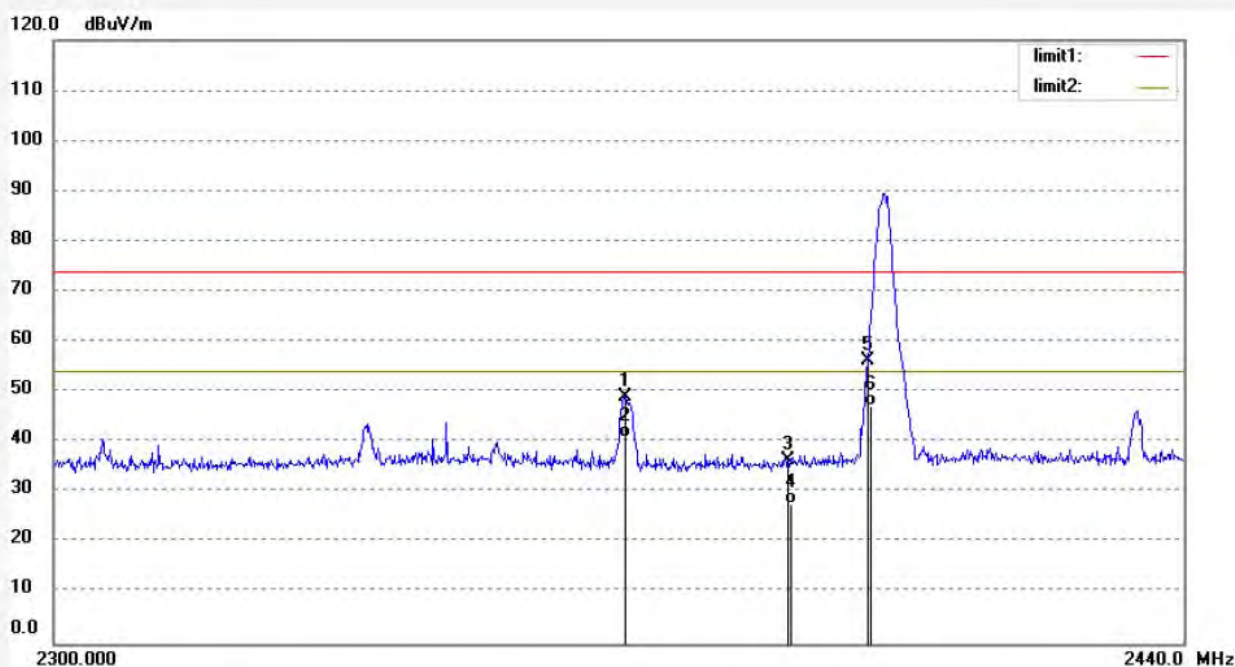
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1201
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2402MHz (8DPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:23:04
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2369.808	53.25	-4.06	49.19	74.00	-24.81	peak			
2	2369.808	45.08	-4.06	41.02	54.00	-12.98	AVG			
3	2390.000	40.44	-3.96	36.48	74.00	-37.52	peak			
4	2390.000	31.69	-3.96	27.73	54.00	-26.27	AVG			
5	2400.000	60.18	-3.91	56.27	74.00	-17.73	peak			
6	2400.000	51.25	-3.91	47.34	54.00	-6.66	AVG			

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



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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1203

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: TX 2480MHz (8DPSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Horizontal

Power Source: DC 3.7V

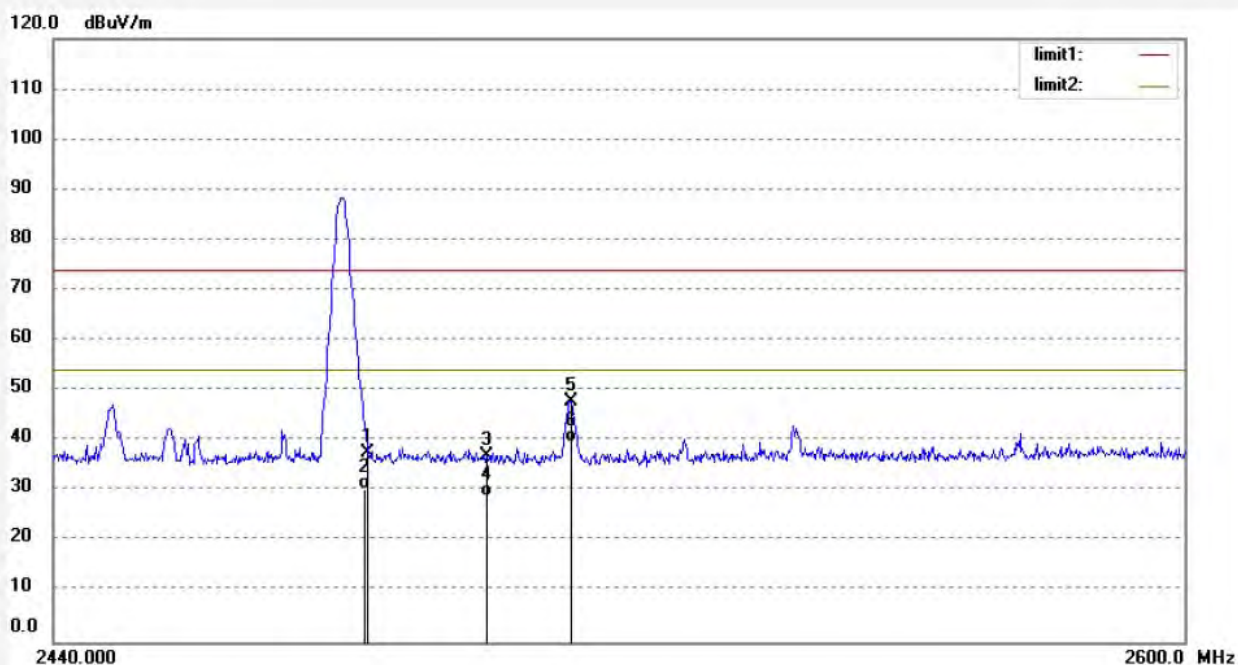
Date: 2017/11/28

Time: 15:26:01

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



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	41.09	-3.50	37.59	74.00	-36.41	peak			
2	2483.500	33.81	-3.50	30.31	54.00	-23.69	AVG			
3	2500.000	40.33	-3.42	36.91	74.00	-37.09	peak			
4	2500.000	32.42	-3.42	29.00	54.00	-25.00	AVG			
5	2512.006	51.20	-3.36	47.84	74.00	-26.16	peak			
6	2512.006	43.09	-3.36	39.73	54.00	-14.27	AVG			

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



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Site: 1# Chamber

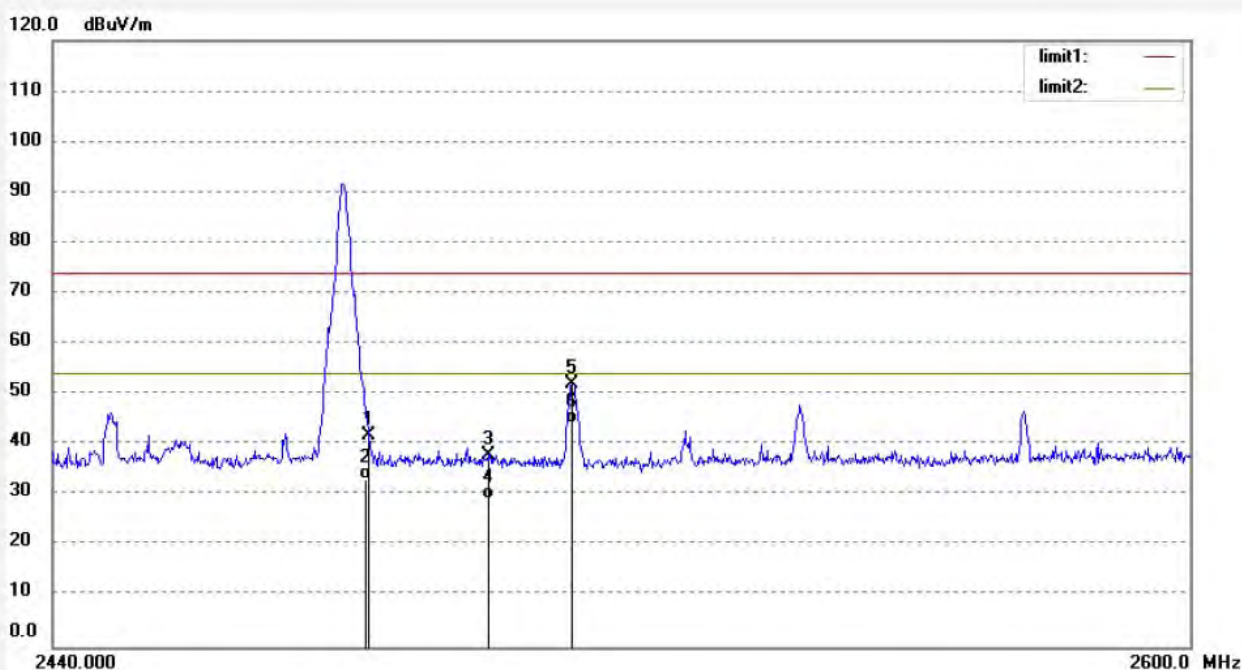
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1202
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: TX 2480MHz (8DPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:24:33
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	45.36	-3.50	41.86	74.00	-32.14	peak			
2	2483.500	36.58	-3.50	33.08	54.00	-20.92	AVG			
3	2500.000	41.49	-3.42	38.07	74.00	-35.93	peak			
4	2500.000	32.64	-3.42	29.22	54.00	-24.78	AVG			
5	2511.847	55.45	-3.36	52.09	74.00	-21.91	peak			
6	2511.847	47.66	-3.36	44.30	54.00	-9.70	AVG			

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

Hopping mode



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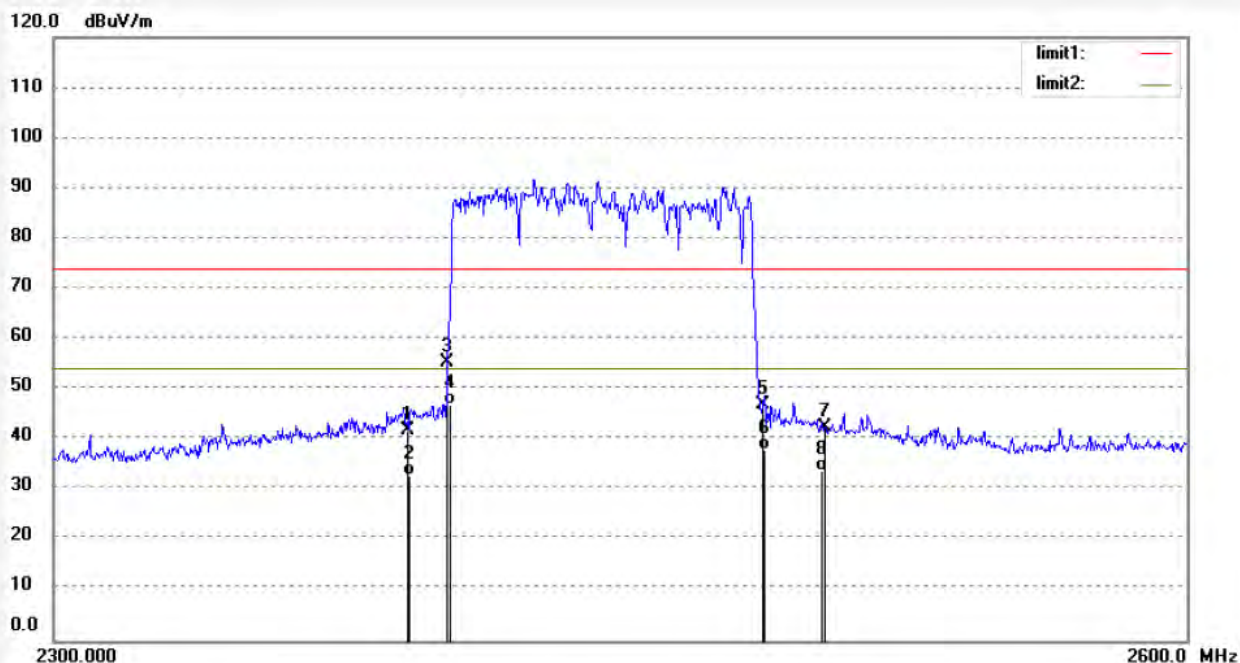
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1204
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: Hopping (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:33:09
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	45.79	-3.96	41.83	74.00	-32.17	peak			
2	2390.000	36.84	-3.96	32.88	54.00	-21.12	AVG			
3	2400.000	59.30	-3.91	55.39	74.00	-18.61	peak			
4	2400.000	51.00	-3.91	47.09	54.00	-6.91	AVG			
5	2483.500	50.50	-3.50	47.00	74.00	-27.00	peak			
6	2483.500	41.56	-3.50	38.06	54.00	-15.94	AVG			
7	2500.000	45.99	-3.42	42.57	74.00	-31.43	peak			
8	2500.000	37.22	-3.42	33.80	54.00	-20.20	AVG			

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



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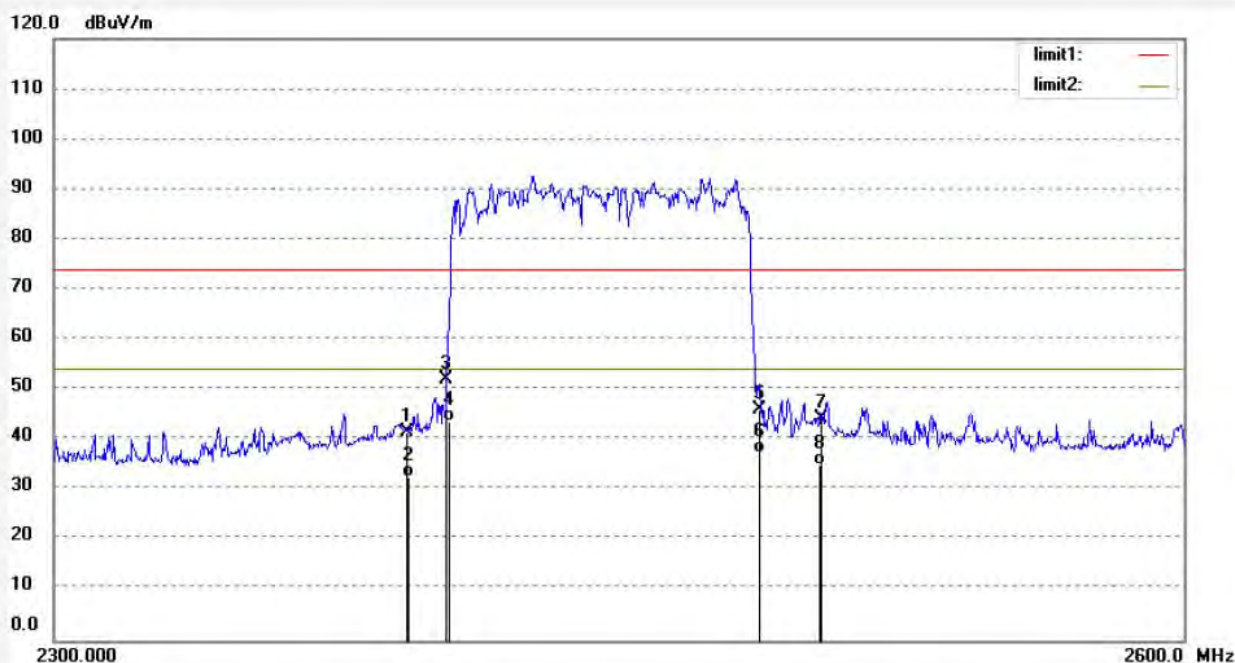
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1205
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: Hopping (GFSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:37:47
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	45.44	-3.96	41.48	74.00	-32.52	peak			
2	2390.000	36.57	-3.96	32.61	54.00	-21.39	AVG			
3	2400.000	56.08	-3.91	52.17	74.00	-21.83	peak			
4	2400.000	47.58	-3.91	43.67	54.00	-10.33	AVG			
5	2483.500	49.47	-3.50	45.97	74.00	-28.03	peak			
6	2483.500	40.83	-3.50	37.33	54.00	-16.67	AVG			
7	2500.000	47.58	-3.42	44.16	74.00	-29.84	peak			
8	2500.000	38.44	-3.42	35.02	54.00	-18.98	AVG			

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



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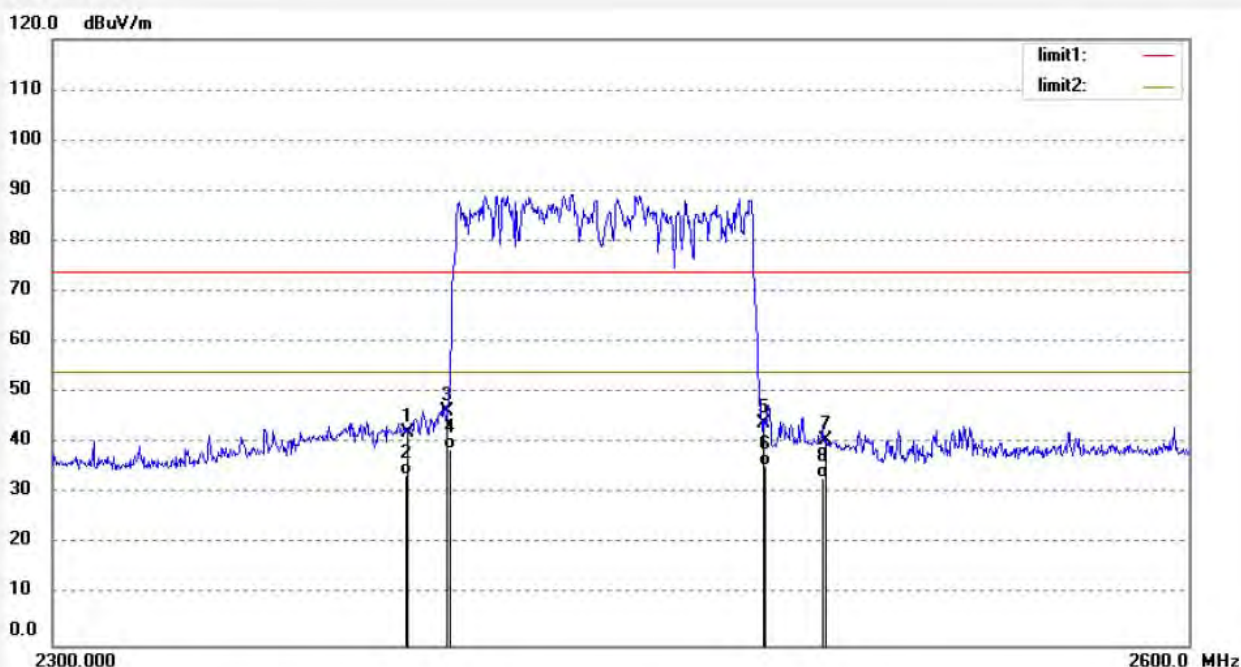
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1207
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: Hopping ($\pi/4$ -DQPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:46:31
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	45.98	-3.96	42.02	74.00	-31.98	peak			
2	2390.000	37.56	-3.96	33.60	54.00	-20.40	AVG			
3	2400.000	50.28	-3.91	46.37	74.00	-27.63	peak			
4	2400.000	42.75	-3.91	38.84	54.00	-15.16	AVG			
5	2483.500	47.35	-3.50	43.85	74.00	-30.15	peak			
6	2483.500	38.93	-3.50	35.43	54.00	-18.57	AVG			
7	2500.000	44.01	-3.42	40.59	74.00	-33.41	peak			
8	2500.000	36.55	-3.42	33.13	54.00	-20.87	AVG			

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



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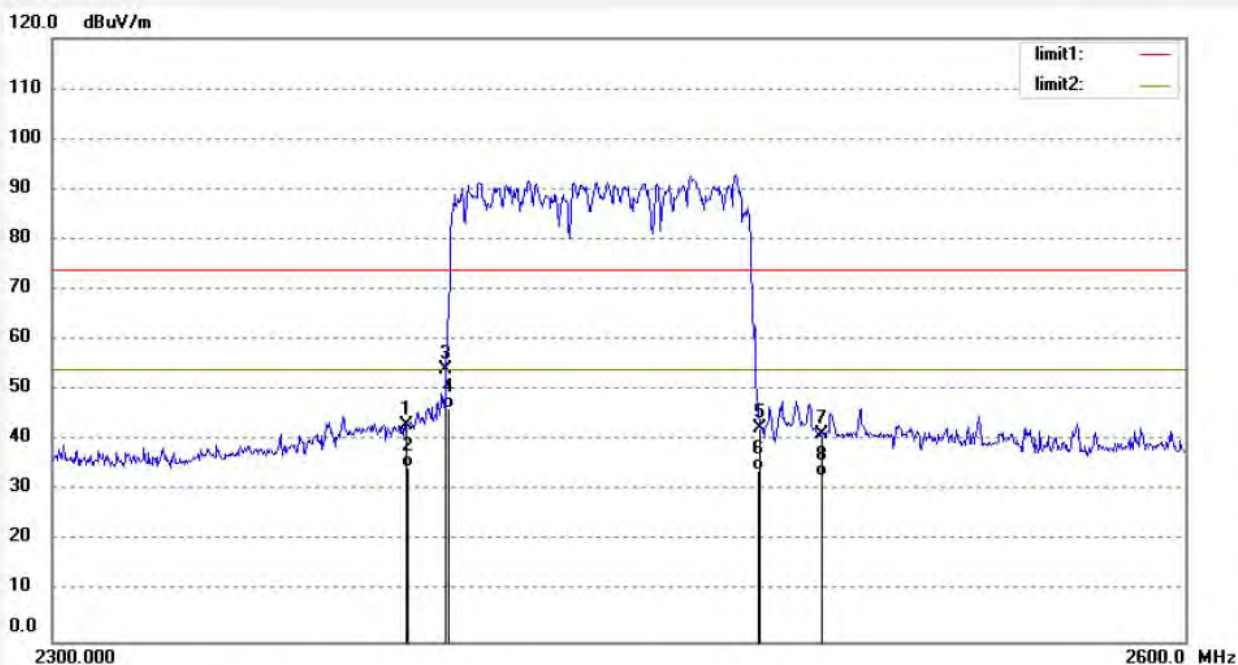
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2017 #1206
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: bluetooth speaker
Mode: Hopping (π/4-DQPSK)
Model: AFCS01
Manufacturer: AVATAR

Polarization: Vertical
Power Source: DC 3.7V
Date: 2017/11/28
Time: 15:41:56
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172265



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	46.90	-3.96	42.94	74.00	-31.06	peak			
2	2390.000	38.54	-3.96	34.58	54.00	-19.42	AVG			
3	2400.000	58.09	-3.91	54.18	74.00	-19.82	peak			
4	2400.000	50.14	-3.91	46.23	54.00	-7.77	AVG			
5	2483.500	46.01	-3.50	42.51	74.00	-31.49	peak			
6	2483.500	37.65	-3.50	34.15	54.00	-19.85	AVG			
7	2500.000	44.77	-3.42	41.35	74.00	-32.65	peak			
8	2500.000	36.24	-3.42	32.82	54.00	-21.18	AVG			

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



ACCURATE TECHNOLOGY CO., LTD.

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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1208

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: Hopping (8DPSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Horizontal

Power Source: DC 3.7V

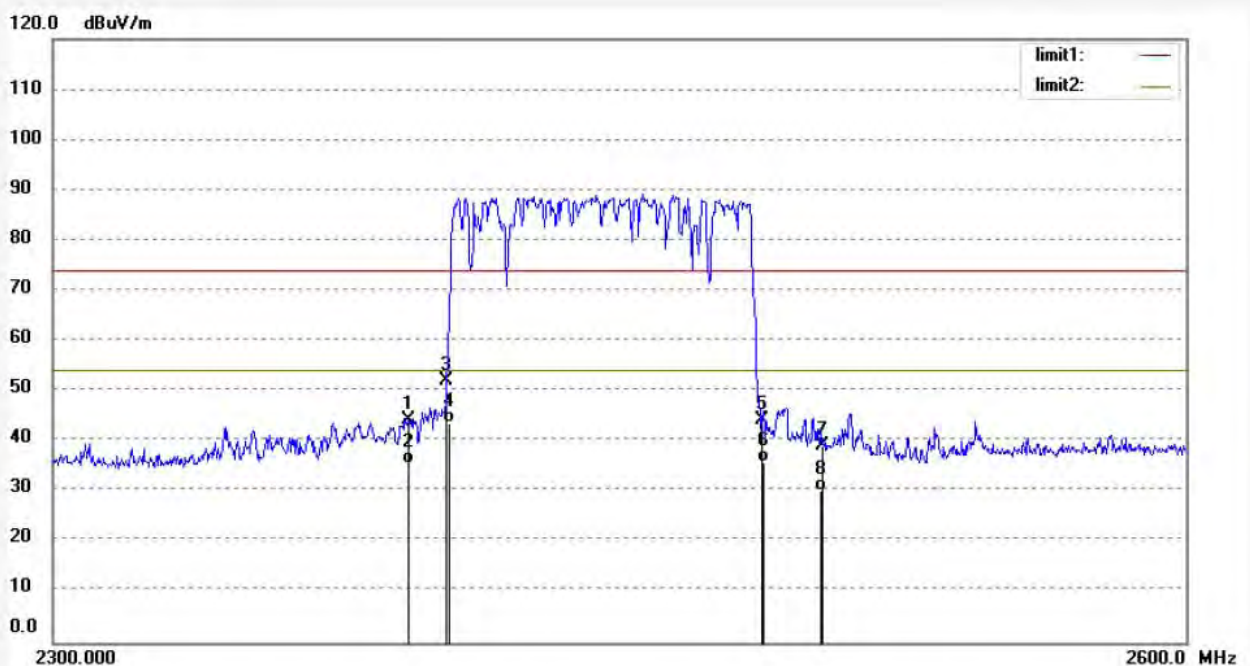
Date: 2017/11/28

Time: 15:49:54

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



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	48.10	-3.96	44.14	74.00	-29.86	peak			
2	2390.000	39.52	-3.96	35.56	54.00	-18.44	AVG			
3	2400.000	56.00	-3.91	52.09	74.00	-21.91	peak			
4	2400.000	47.54	-3.91	43.63	54.00	-10.37	AVG			
5	2483.500	47.88	-3.50	44.38	74.00	-29.62	peak			
6	2483.500	39.50	-3.50	36.00	54.00	-18.00	AVG			
7	2500.000	42.57	-3.42	39.15	74.00	-34.85	peak			
8	2500.000	33.69	-3.42	30.27	54.00	-23.73	AVG			

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



ACCURATE TECHNOLOGY CO., LTD.

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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2017 #1209

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: bluetooth speaker

Mode: Hopping (8DPSK)

Model: AFCS01

Manufacturer: AVATAR

Polarization: Vertical

Power Source: DC 3.7V

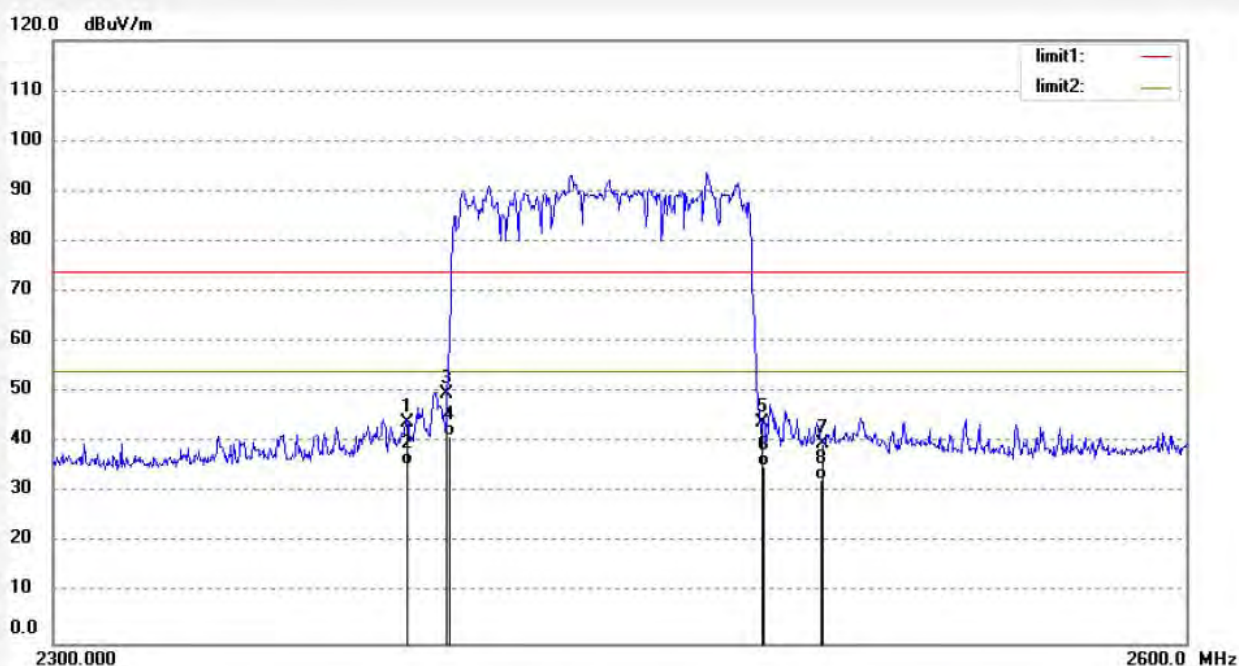
Date: 2017/11/28

Time: 15:53:13

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172265



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	48.06	-3.96	44.10	74.00	-29.90	peak			
2	2390.000	39.62	-3.96	35.66	54.00	-18.34	AVG			
3	2400.000	53.71	-3.91	49.80	74.00	-24.20	peak			
4	2400.000	45.25	-3.91	41.34	54.00	-12.66	AVG			
5	2483.500	47.48	-3.50	43.98	74.00	-30.02	peak			
6	2483.500	38.77	-3.50	35.27	54.00	-18.73	AVG			
7	2500.000	43.12	-3.42	39.70	74.00	-34.30	peak			
8	2500.000	35.95	-3.42	32.53	54.00	-21.47	AVG			

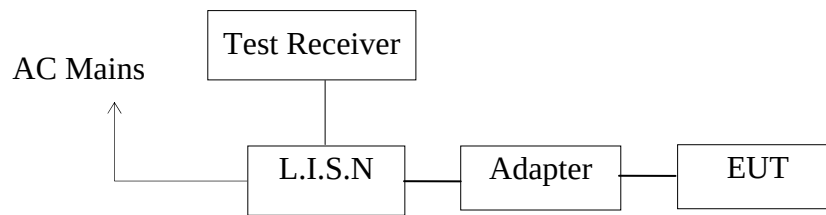
Note: Average measurement with peak detection at No.2&4&6&8

12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART

15 SECTION 15.207(A)

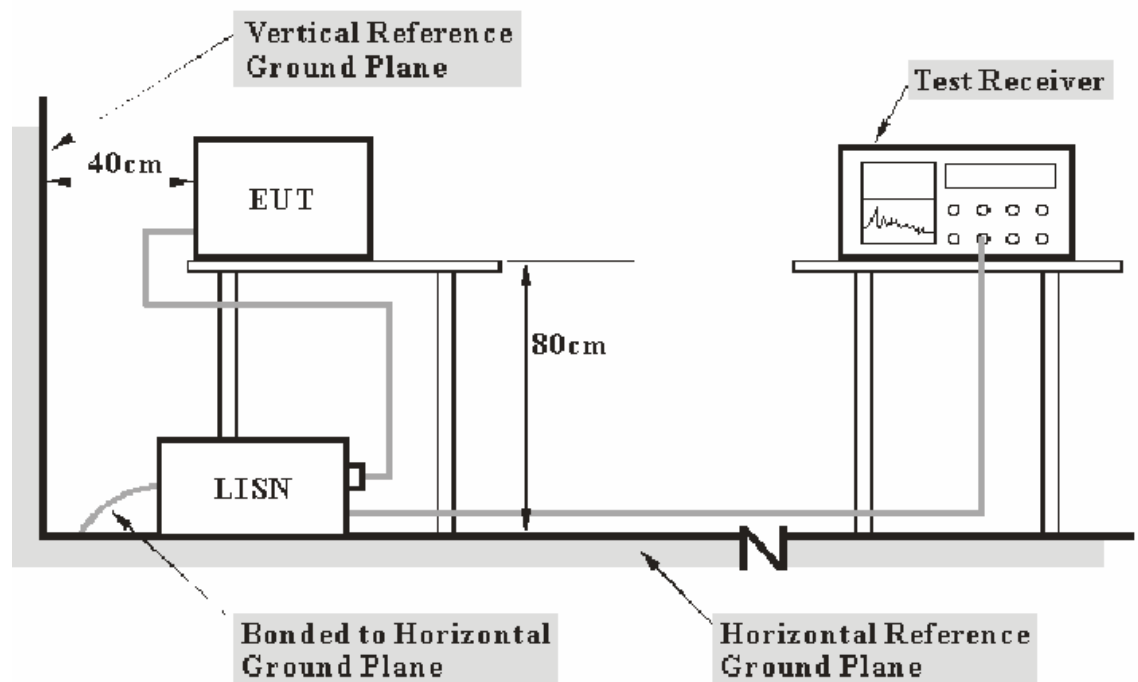
12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators



(EUT: Bluetooth Speaker)

12.1.2.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.

12.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μ V)	
	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.		

12.3.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.

12.4.Operating Condition of EUT

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

12.4.2.Turn on the power of all equipment.

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

12.5.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.

12.6.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	10.6	25.3	17.0	59.0	49.0	33.4	31.7	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)

12.7.Power Line Conducted Emission Measurement Results

PASS.

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.

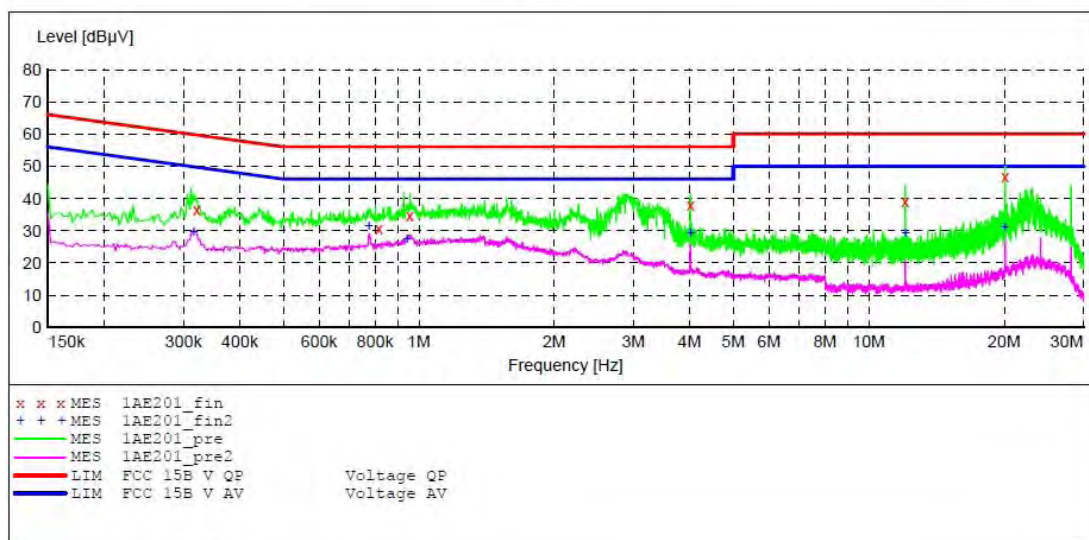
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: bluetooth speaker M/N:AFCS01
 Manufacturer: JILONGCHANG
 Operating Condition: Charging
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 240V/60Hz
 Comment: Report NO.:ATE20172265
 Start of Test: 2017-11-21 / 16:57:44

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB STD VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "1AE201_fin"

2017-11-21 17:01

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.321000	36.40	10.9	60	23.3	QP	N	GND
0.816000	30.80	11.1	56	25.2	QP	N	GND
0.955500	34.50	11.1	56	21.5	QP	N	GND
4.015500	38.00	11.4	56	18.0	QP	N	GND
12.048000	39.10	11.6	60	20.9	QP	N	GND
20.085000	46.70	11.7	60	13.3	QP	N	GND

MEASUREMENT RESULT: "1AE201_fin2"

2017-11-21 17:01

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.316500	29.90	10.9	50	19.9	AV	N	GND
0.775500	31.60	11.1	46	14.4	AV	N	GND
0.942000	27.80	11.1	46	18.2	AV	N	GND
4.015500	29.60	11.4	46	16.4	AV	N	GND
12.052500	29.60	11.6	50	20.4	AV	N	GND
20.089500	31.40	11.7	50	18.6	AV	N	GND

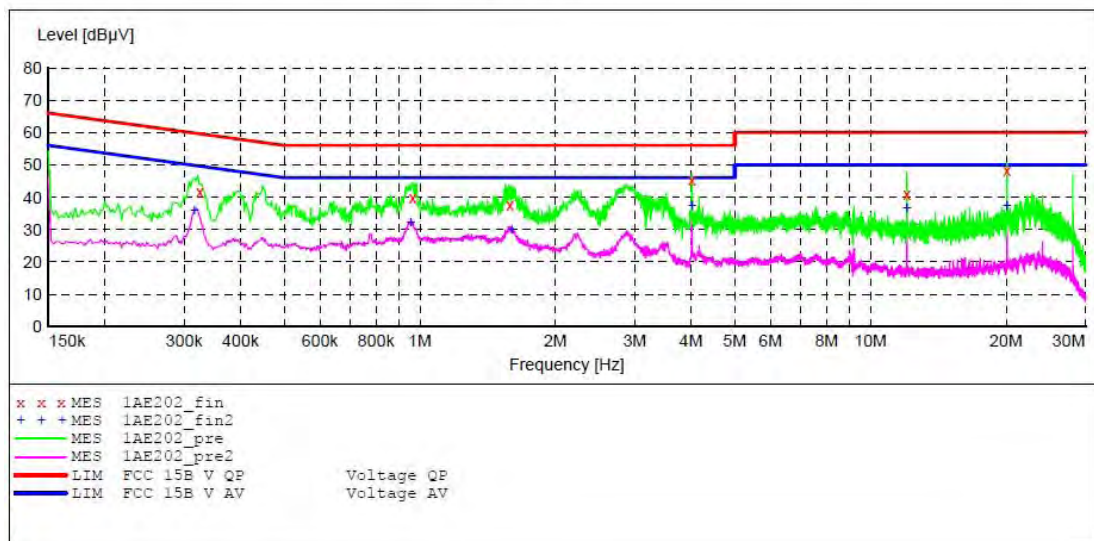
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: bluetooth speaker M/N:AFCS01
Manufacturer: JILONGCHANG
Operating Condition: Charging
Test Site: 1#Shielding Room
Operator: star
Test Specification: L 240V/60Hz
Comment: Report NO.:ATE20172265
Start of Test: 2017-11-21 / 17:02:14

SCAN TABLE: "V 150K-30MHz fin"

Short Description: SUB STD VTERM2 1.70
Start Stop Step Detector Meas. IF Transducer
Frequency Frequency Width Time Bandw.
150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
Average



MEASUREMENT RESULT: "1AE202_fin"

2017-11-21 17:05

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.325500	41.60	10.9	60	18.0	QP	L1	GND
0.964500	40.00	11.1	56	16.0	QP	L1	GND
1.585500	37.80	11.2	56	18.2	QP	L1	GND
4.015500	45.20	11.4	56	10.8	QP	L1	GND
12.057000	40.90	11.6	60	19.1	QP	L1	GND
20.080500	48.20	11.7	60	11.8	QP	L1	GND

MEASUREMENT RESULT: "1AE202_fin2"

2017-11-21 17:05

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.316500	36.10	10.9	50	13.7	AV	L1	GND
0.955500	32.60	11.1	46	13.4	AV	L1	GND
1.599000	30.30	11.2	46	15.7	AV	L1	GND
4.015500	37.50	11.4	46	8.5	AV	L1	GND
12.048000	36.80	11.6	50	13.2	AV	L1	GND
20.085000	37.70	11.7	50	12.3	AV	L1	GND

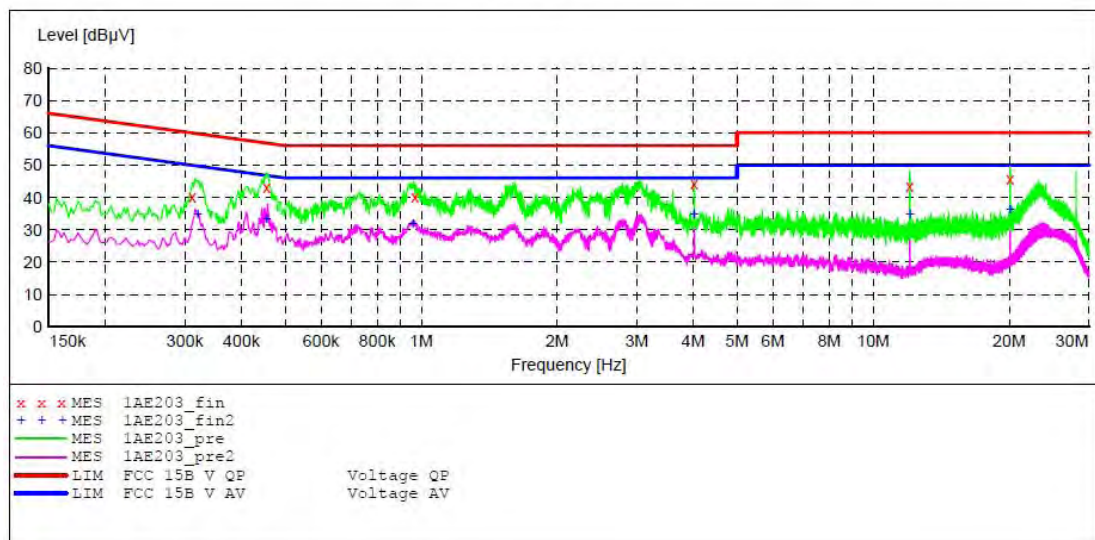
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: bluetooth speaker M/N:AFCS01
 Manufacturer: JILONGCHANG
 Operating Condition: Charging
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20172265
 Start of Test: 2017-11-21 / 17:07:44

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "1AE203_fin"

2017-11-21 17:10

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.312000	40.10	10.9	60	19.8	QP	N	GND
0.456000	43.10	11.0	57	13.7	QP	N	GND
0.969000	40.20	11.1	56	15.8	QP	N	GND
4.015500	44.10	11.4	56	11.9	QP	N	GND
12.048000	43.50	11.6	60	16.5	QP	N	GND
20.089500	45.60	11.7	60	14.4	QP	N	GND

MEASUREMENT RESULT: "1AE203_fin2"

2017-11-21 17:10

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.321000	35.20	10.9	50	14.5	AV	N	GND
0.456000	33.70	11.0	47	13.1	AV	N	GND
0.960000	32.10	11.1	46	13.9	AV	N	GND
4.015500	35.20	11.4	46	10.8	AV	N	GND
12.052500	35.00	11.6	50	15.0	AV	N	GND
20.080500	36.40	11.7	50	13.6	AV	N	GND

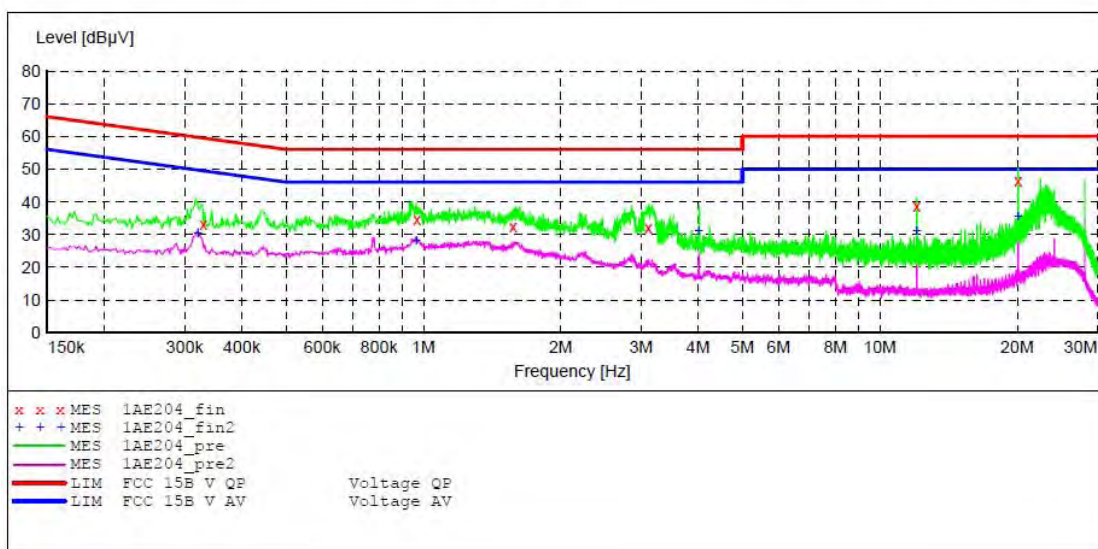
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: bluetooth speaker M/N:AFCS01
 Manufacturer: JILONGCHANG
 Operating Condition: Charging
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20172265
 Start of Test: 2017-11-21 / 17:11:05

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "1AE204_fin"

2017-11-21 17:14

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.330000	33.20	10.9	60	26.3	QP	L1	GND
0.969000	34.60	11.1	56	21.4	QP	L1	GND
1.572000	32.30	11.2	56	23.7	QP	L1	GND
3.111000	32.10	11.3	56	23.9	QP	L1	GND
12.048000	38.70	11.6	60	21.3	QP	L1	GND
20.076000	46.50	11.7	60	13.5	QP	L1	GND

MEASUREMENT RESULT: "1AE204_fin2"

2017-11-21 17:14

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.321000	30.60	10.9	50	19.1	AV	L1	GND
0.964500	28.50	11.1	46	17.5	AV	L1	GND
4.015500	31.30	11.4	46	14.7	AV	L1	GND
12.043500	31.50	11.6	50	18.5	AV	L1	GND
20.076000	35.60	11.7	50	14.4	AV	L1	GND

13.ANTENNA REQUIREMENT

13.1.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.

13.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is 1.9dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



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