

APPLICATION CERTIFICATION

On Behalf of
Microlab Electronics Co.,Ltd.

PORTABLE BLUETOOTH SPEAKER

Model No.: MD215

FCC ID: OR8-MD215

Prepared for : Microlab Electronics Co.,Ltd.
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Date of Report : Nov 10,2014

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Test Report Certification

Applicant : Microlab Electronics Co.,Ltd.
Manufacturer : Microlab Electronics Co.,Ltd.
EUT Description : PORTABLE BLUETOOTH SPEAKER
(A) MODEL NO.: MD215
(B) POWER SUPPLY: DC 3.7V (Battery)or DC5V(USB)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.4- 2009

The device described above is tested by 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 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 ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Oct 22-Nov 10,2014

Date of Report : Nov 10,2014

Prepared by :



(Eric Zhang, Engineer)

Approved & Authorized Signer :



(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	PORTABLE BLUETOOTH SPEAKER
Model Number	:	MD215
Frequency Band	:	2402MHz-2480MHz
Number of Channels	:	79
Bluetooth Version	:	2.1+EDR
Modulation type	:	GFSK, $\Pi/4$ -DQPSK, 8DPSK
Antenna Gain	:	0dBi
Antenna type	:	PCB Antenna
Power Supply	:	DC 3.7V (Battery) or DC 5V(USB)
Applicant	:	Microlab Electronics Co.,Ltd.
Address	:	South Baozi Road, Shenzhen Microlab Industrial Park, Shenzhen, China
Manufacturer	:	Microlab Electronics Co.,Ltd.
Address	:	South Baozi Road, Shenzhen Microlab Industrial Park, Shenzhen, China
Date of sample received	:	Oct 22, 2014
Date of Test	:	Oct 22-Nov 10,2014

1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC
The Registration Number is 752051

Listed by Industry Canada
The Registration Number is 5077A-2

Accredited by China National Accreditation Committee
for Laboratories
The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

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

1.3. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

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. 11, 2014	Jan. 10, 2015
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 11, 2014	Jan. 10, 2015
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 11, 2014	Jan. 10, 2015
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 11, 2014	Jan. 10, 2015
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2014	Jan. 14, 2015
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 15, 2014	Jan. 14, 2015
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 11, 2014	Jan. 10, 2015
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 11, 2014	Jan. 10, 2015

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

EUT

(EUT: PORTABLE BLUETOOTH SPEAKER)

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: PORTABLE 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 30 kHz and VBW to 100 kHz.

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

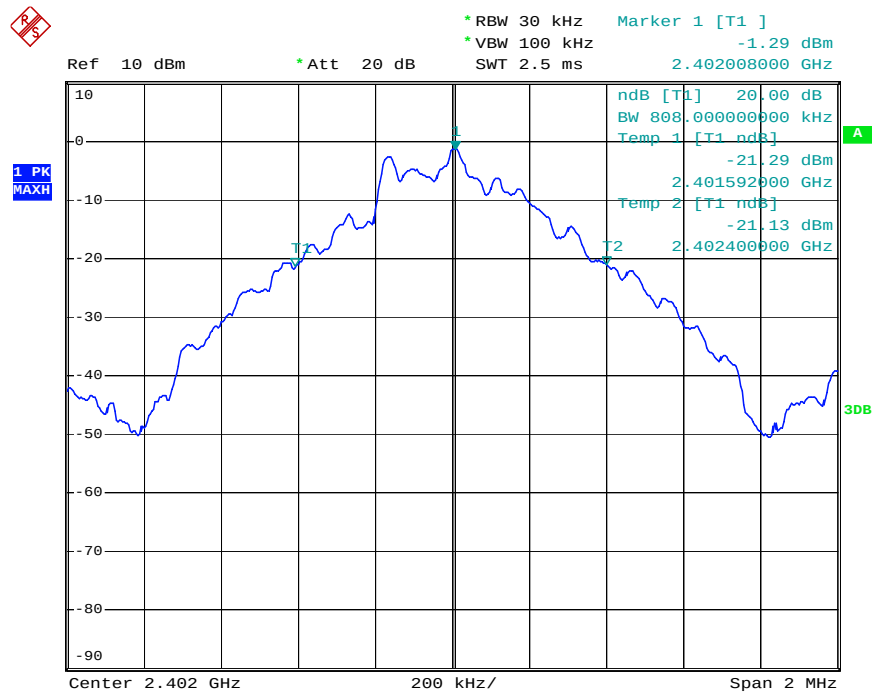
5.6. Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	$\Pi/4$ -DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	0.808	1.228	1.152	Pass
Middle	2441	0.808	1.224	1.152	Pass
High	2480	0.844	1.224	1.148	Pass

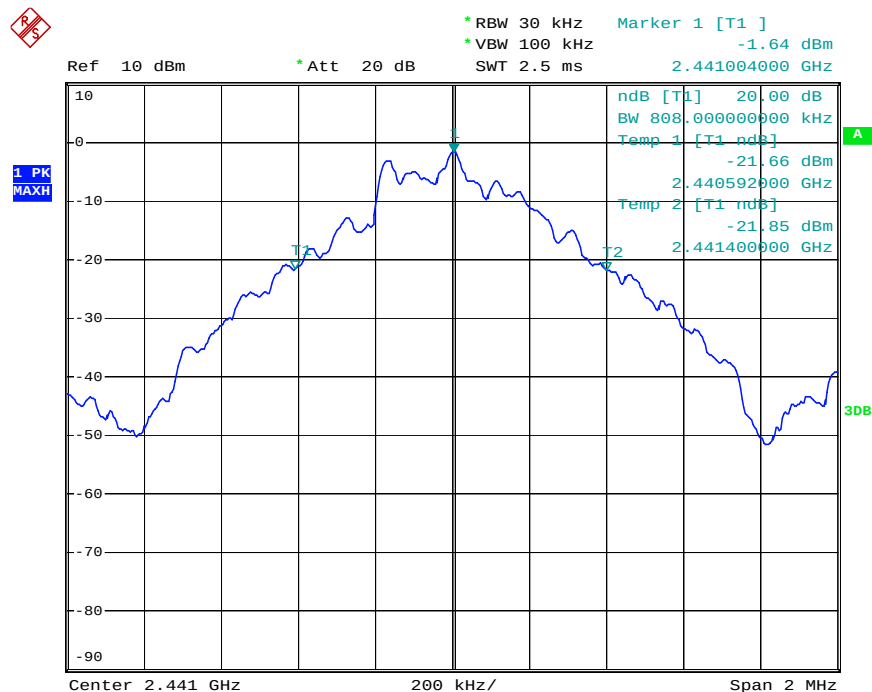
The spectrum analyzer plots are attached as below.

GFSK Mode

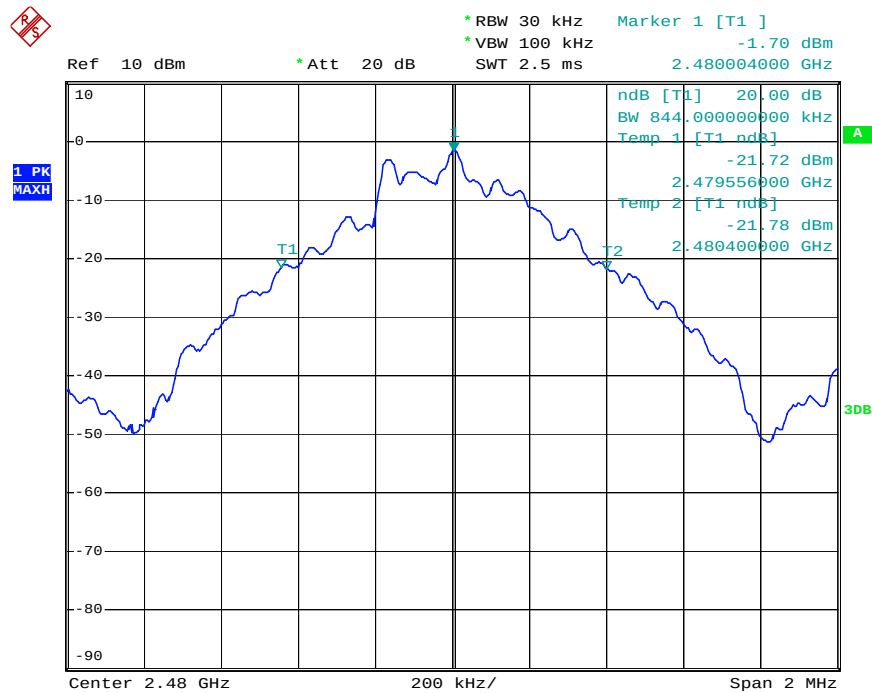
Low channel



Middle channel

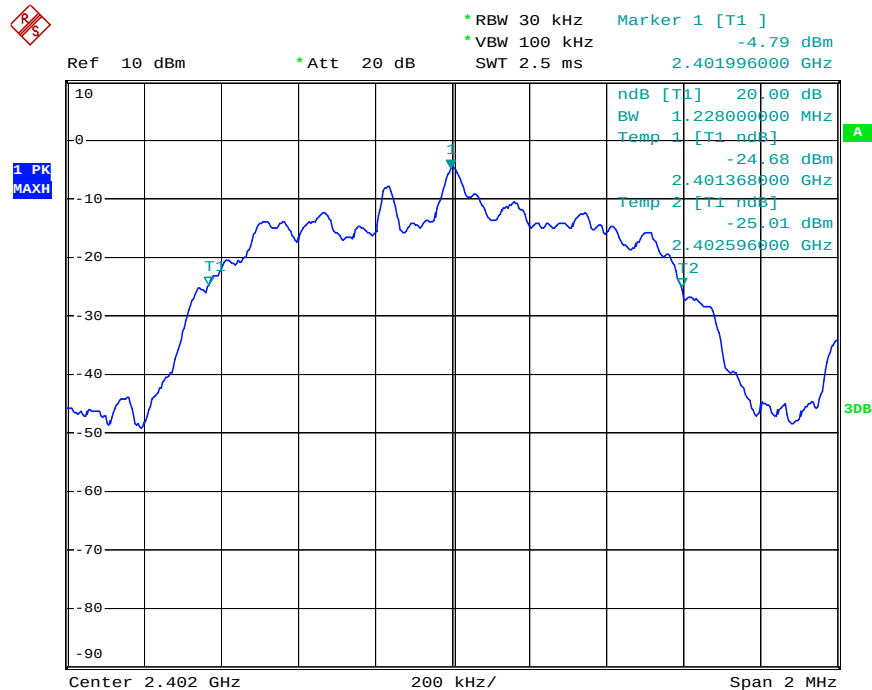


High channel

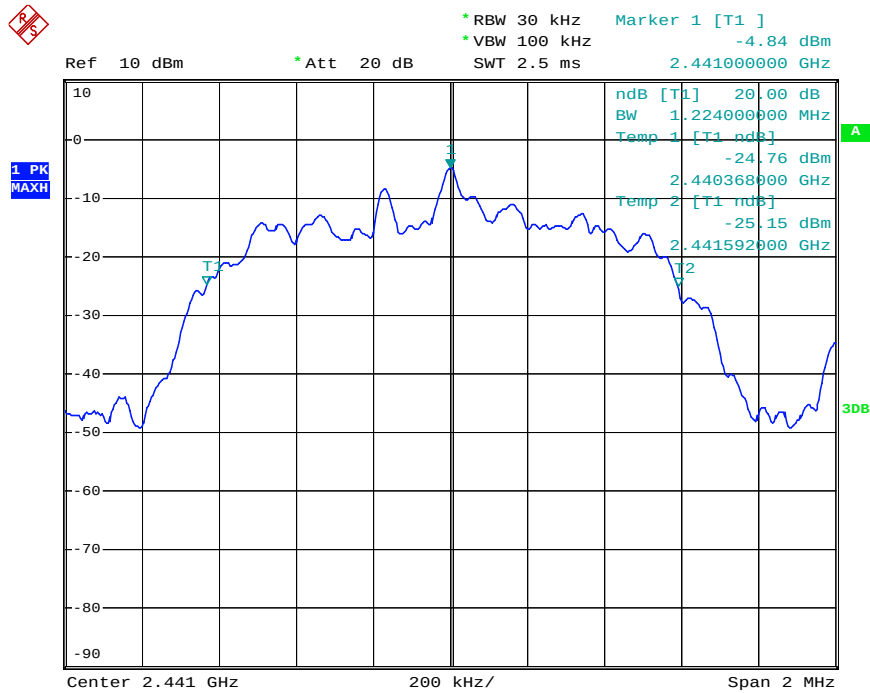


Π/4-DQPSK Mode

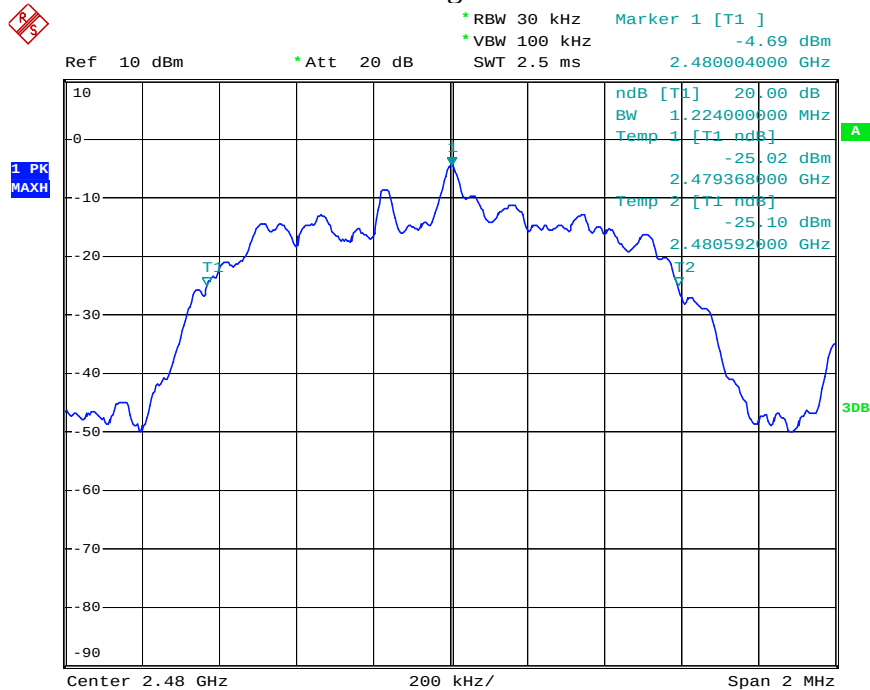
Low channel



Middle channel

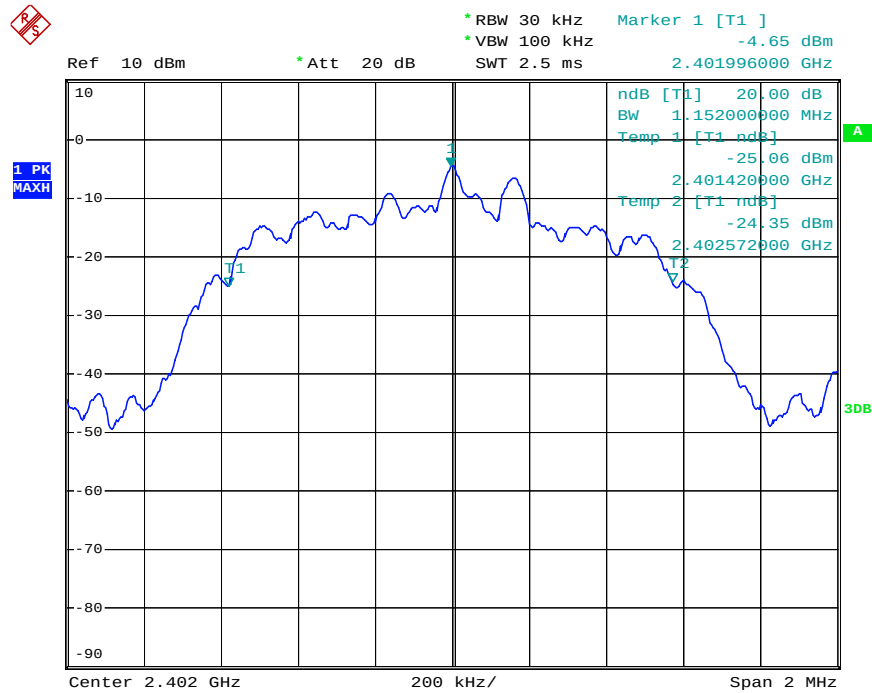


High channel

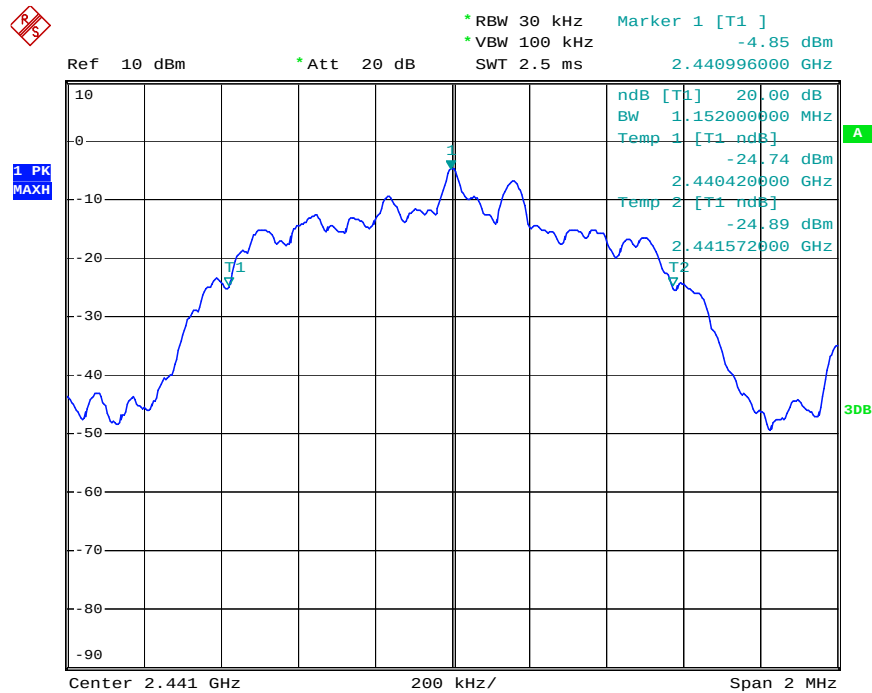


8DPSK Mode

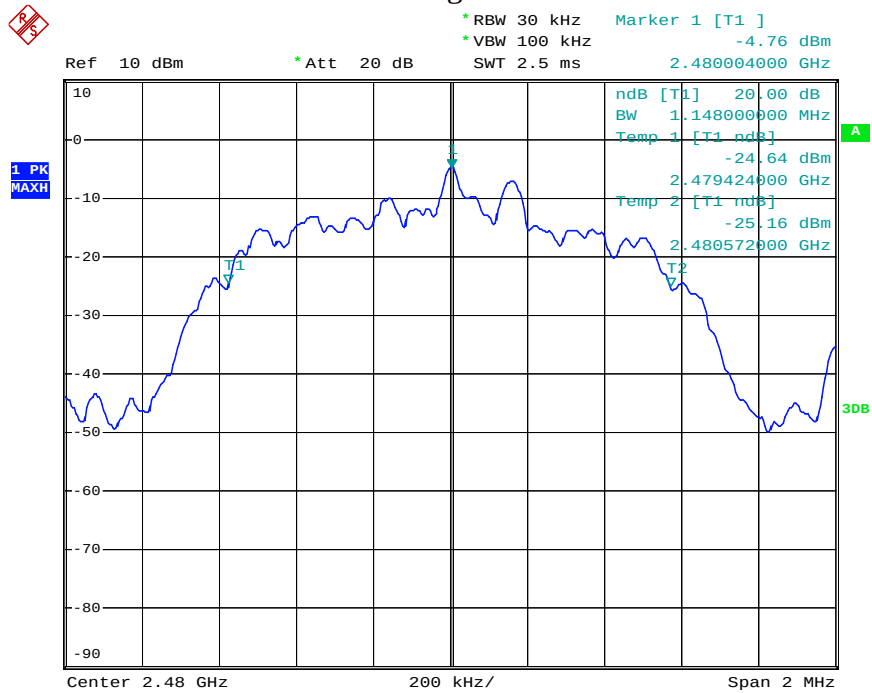
Low channel



Middle channel



High channel



6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



(EUT: PORTABLE 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 3 MHz.

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	1.000	25KHz or 20dB bandwidth	PASS
	2403			
Middle	2440	1.000	25KHz or 20dB bandwidth	PASS
	2441			
High	2479	1.000	25KHz or 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			

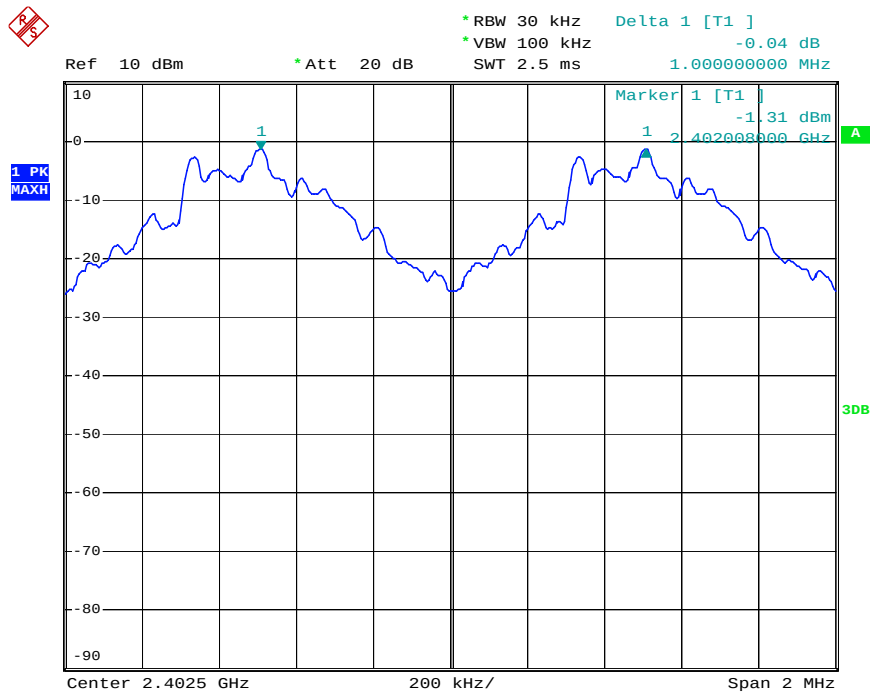
8DPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.000	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.004	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2480			

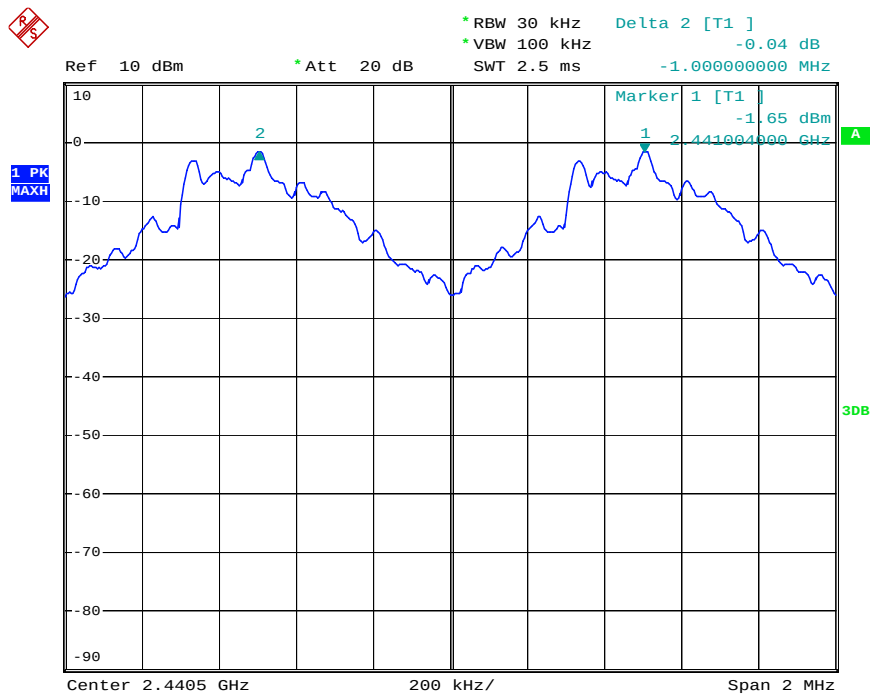
The spectrum analyzer plots are attached as below.

GFSK Mode

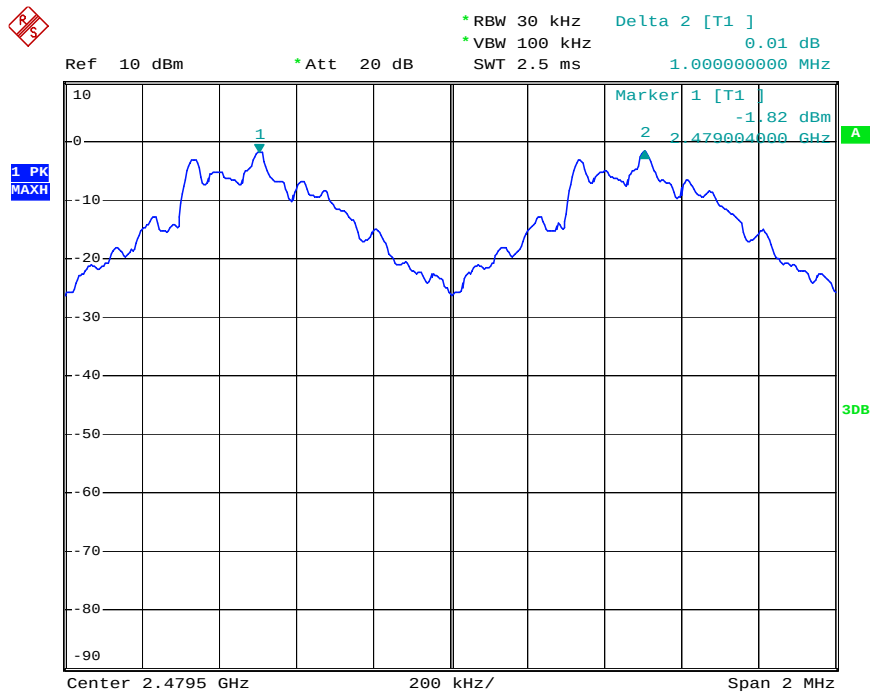
Low channel



Middle channel

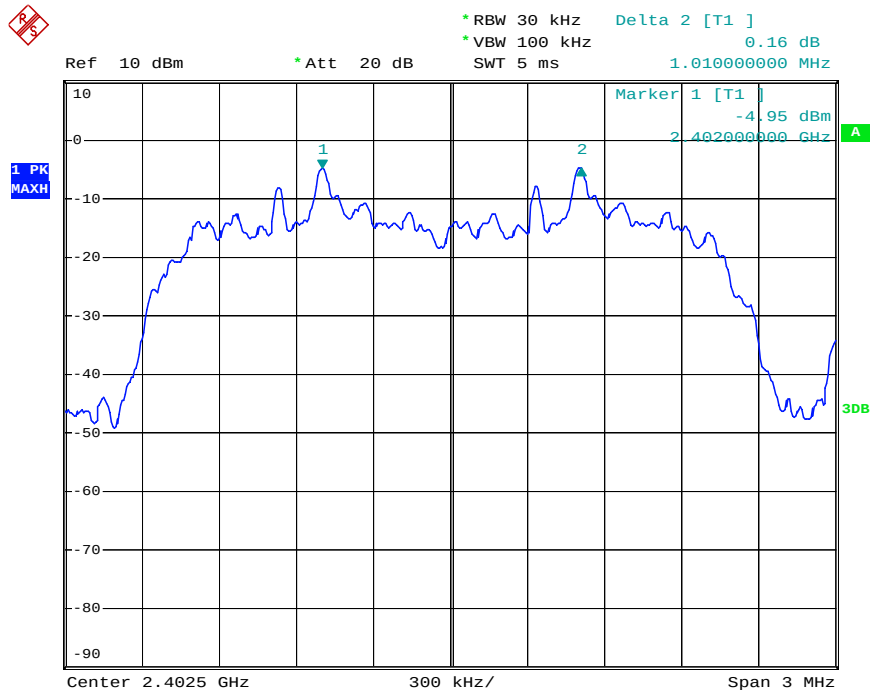


High channel

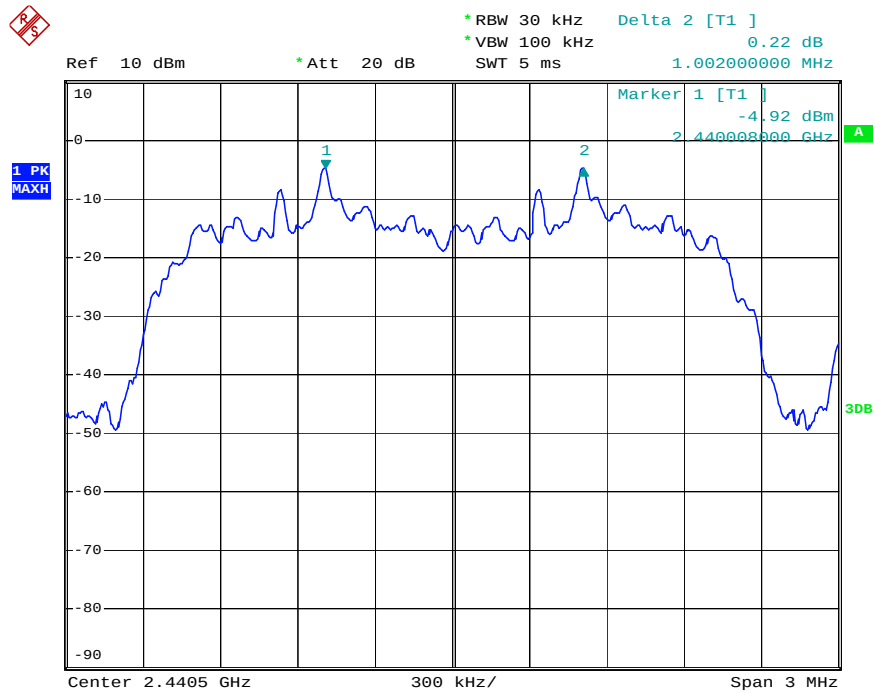


$\Pi/4$ -DQPSK Mode

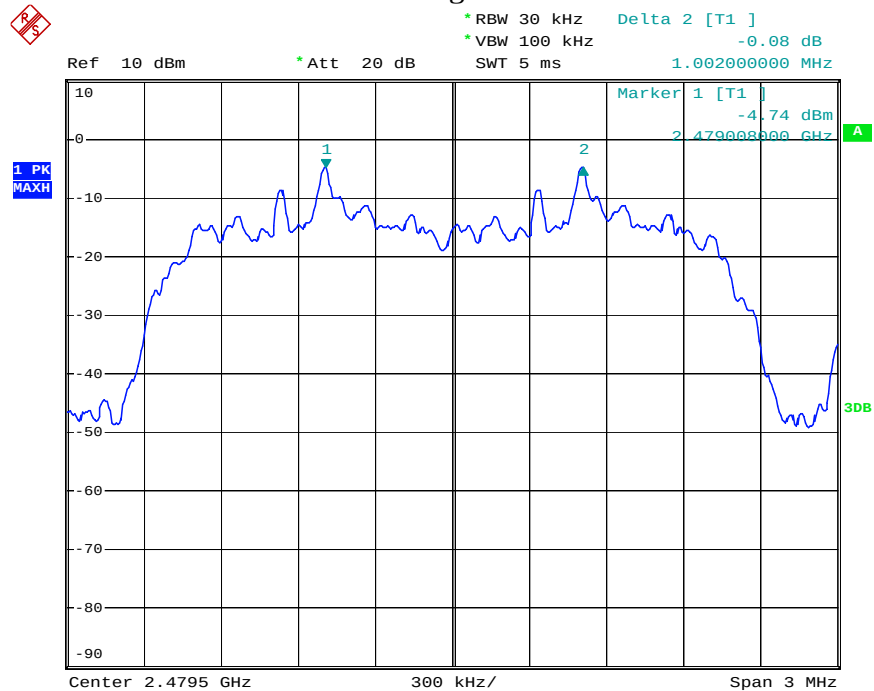
Low channel



Middle channel

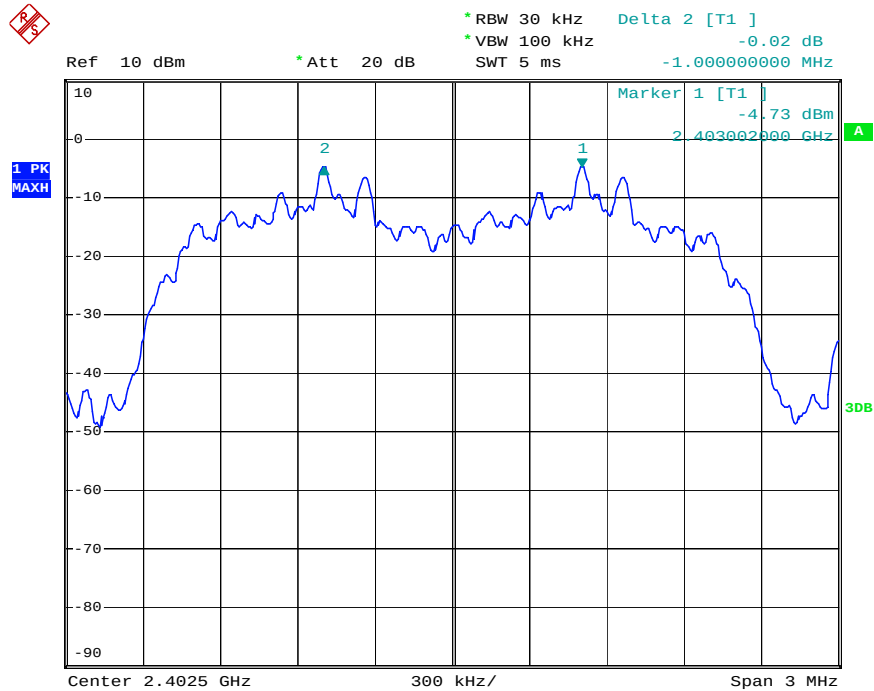


High channel

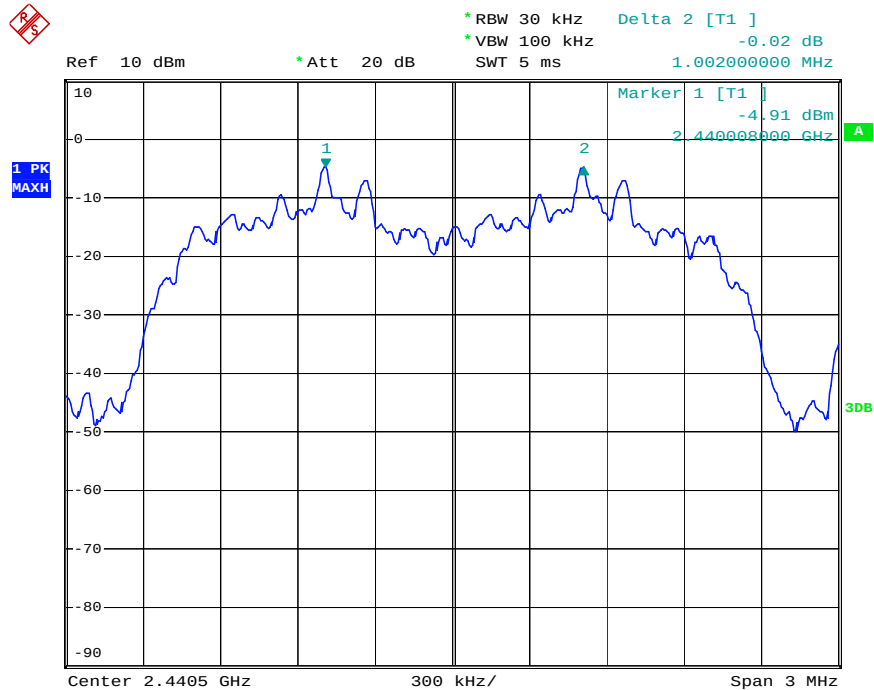


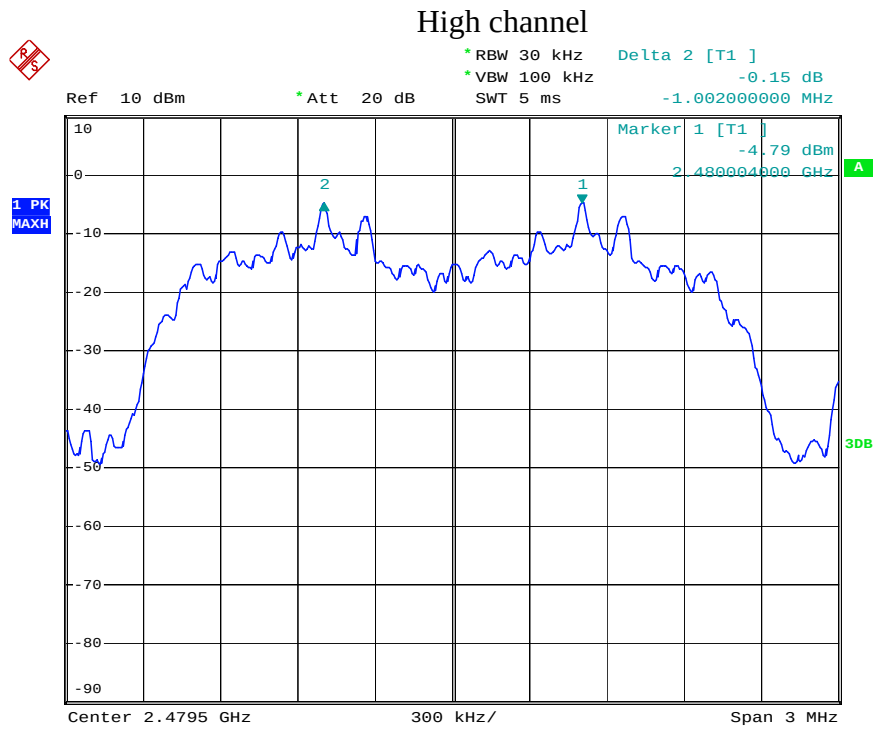
8DPSK Mode

Low channel



Middle channel





7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



(EUT: PORTABLE 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 Span=83.5MHz, RBW=100 kHz, VBW=300 kHz.

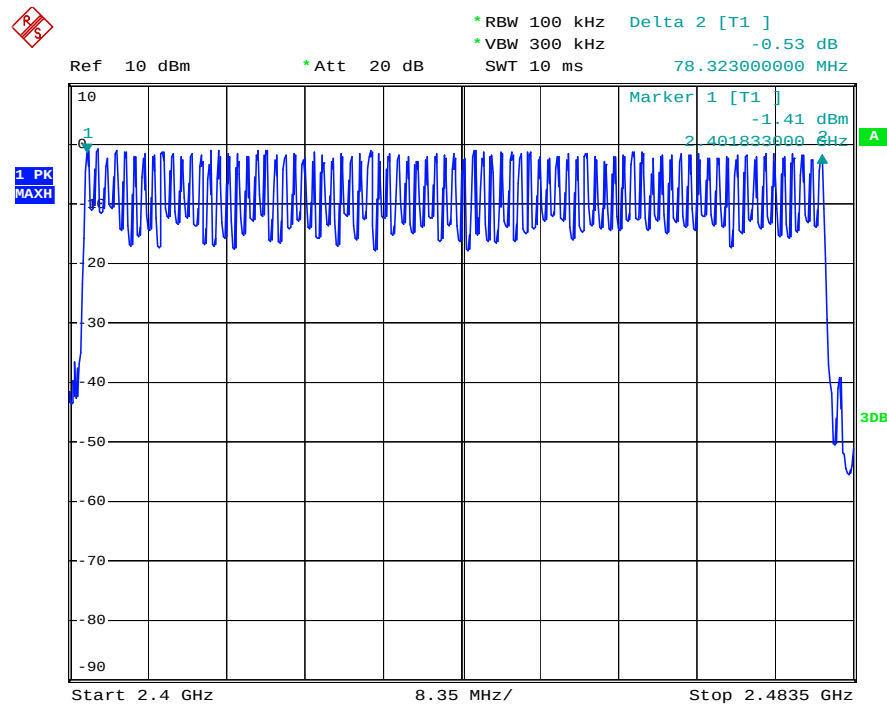
7.5.3. Max hold, view and count how many channel in the band.

7.6. Test Result

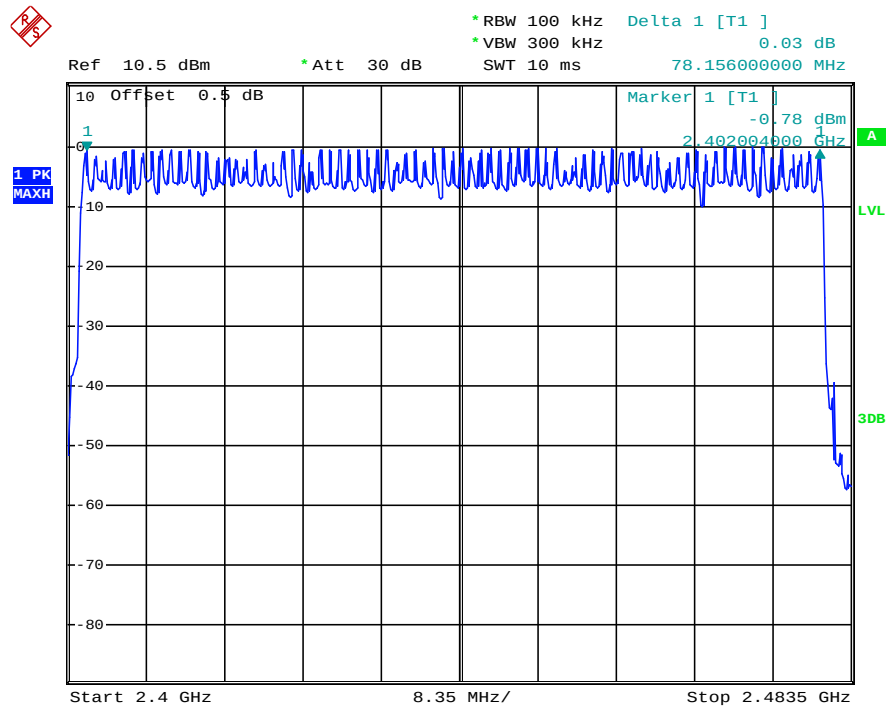
Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	≥ 15

The spectrum analyzer plots are attached as below.

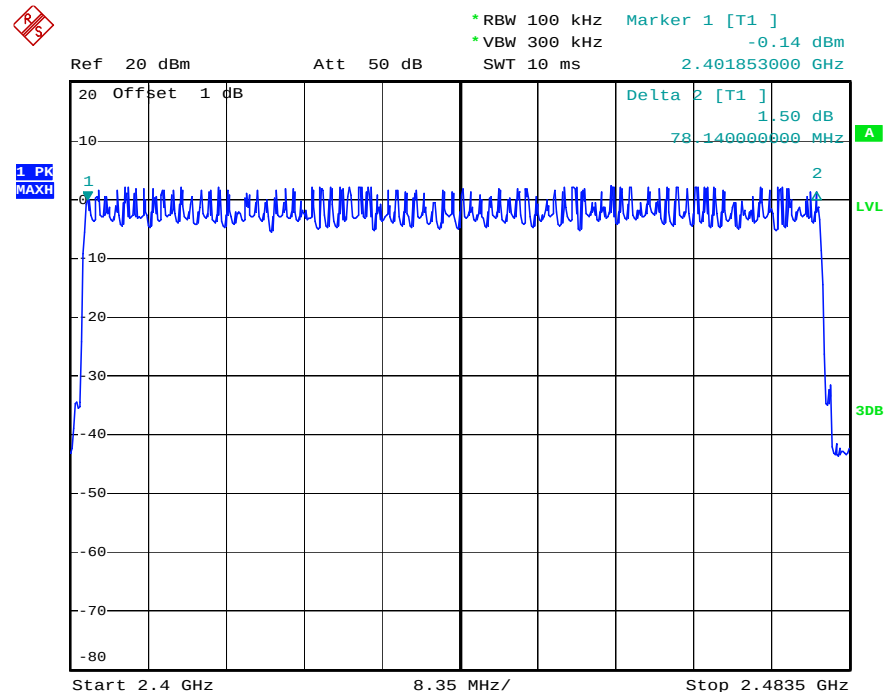
Number of hopping channels(GFSK)



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



Number of hopping channels(8DPSK)



8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



(EUT: PORTABLE 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.

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	0.440	140.80	400
	2441	0.440	140.80	400
	2480	0.440	140.80	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	1.720	275.20	400
	2441	1.720	275.20	400
	2480	1.720	275.20	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	3.010	321.07	400
	2441	3.010	321.07	400
	2480	3.010	321.07	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

Π/4-DQPSK

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.460	147.20	400
	2441	0.460	147.20	400
	2480	0.460	147.20	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	1.740	278.40	400
	2441	1.740	278.40	400
	2480	1.740	278.40	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	3.000	320.00	400
	2441	3.000	320.00	400
	2480	3.000	320.00	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

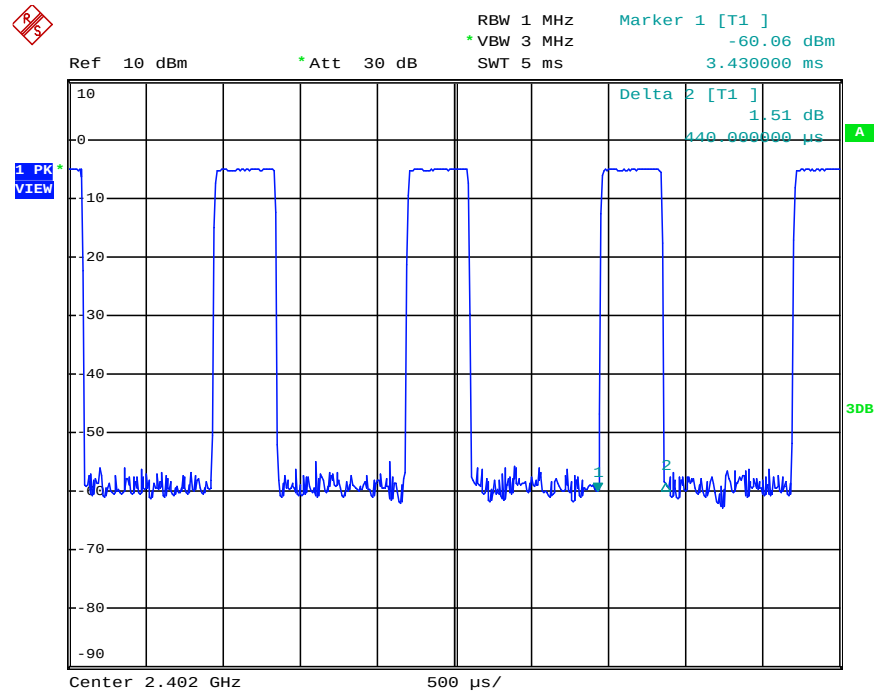
8DPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.440	140.80	400
	2441	0.430	137.60	400
	2480	0.440	140.80	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	1.720	275.20	400
	2441	1.700	272.00	400
	2480	1.720	275.20	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	2.970	316.80	400
	2441	2.920	311.47	400
	2480	2.940	313.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

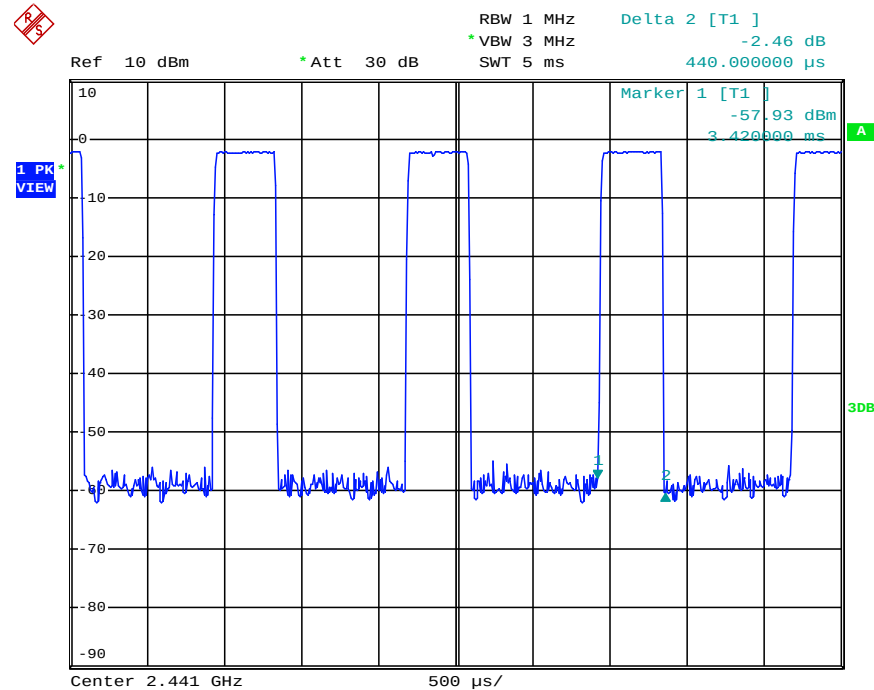
The spectrum analyzer plots are attached as below.

Mode 1: GFSK Link Mode

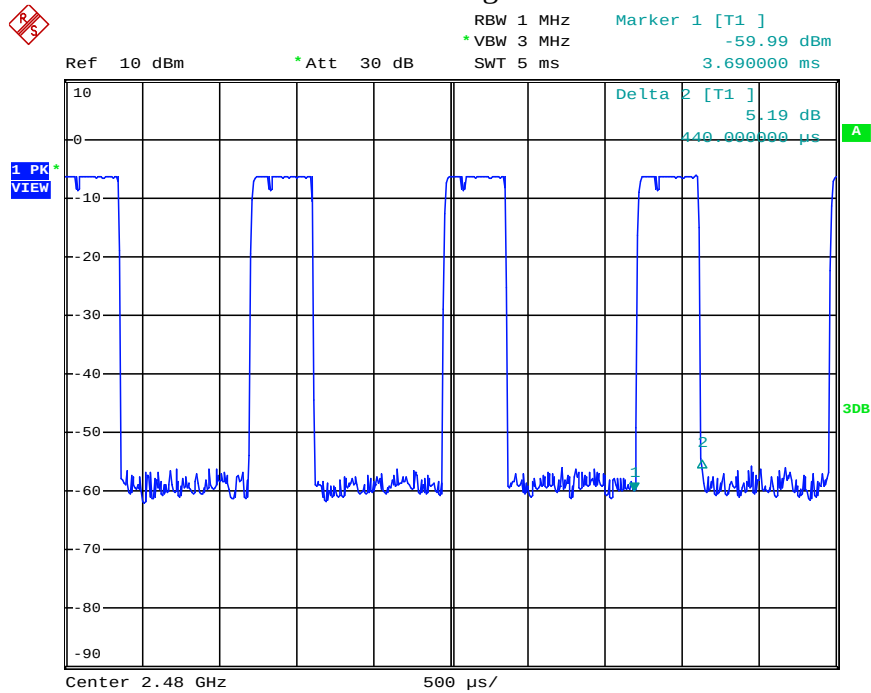
DH1 Low channel



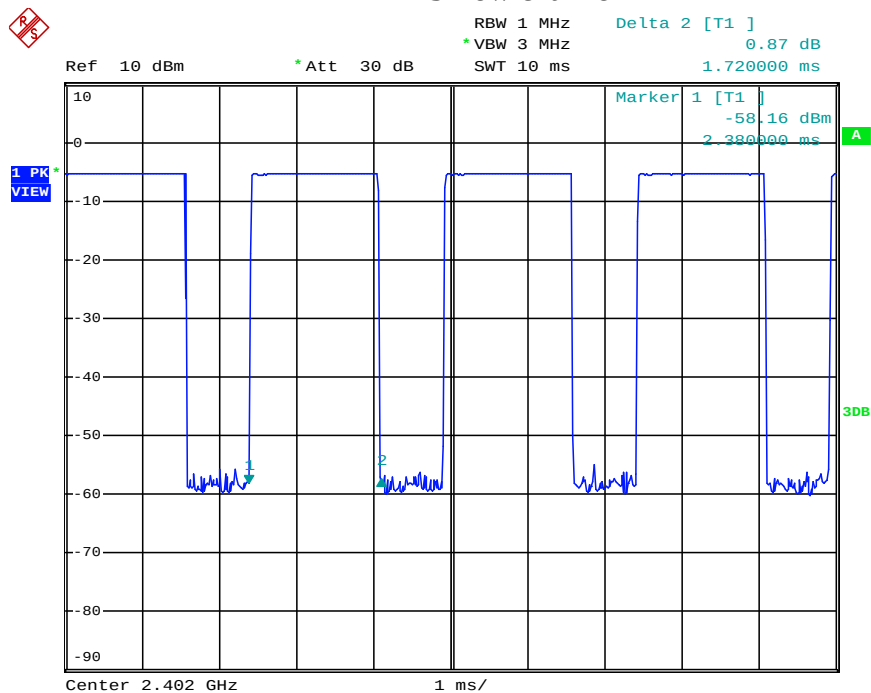
DH1 Middle channel



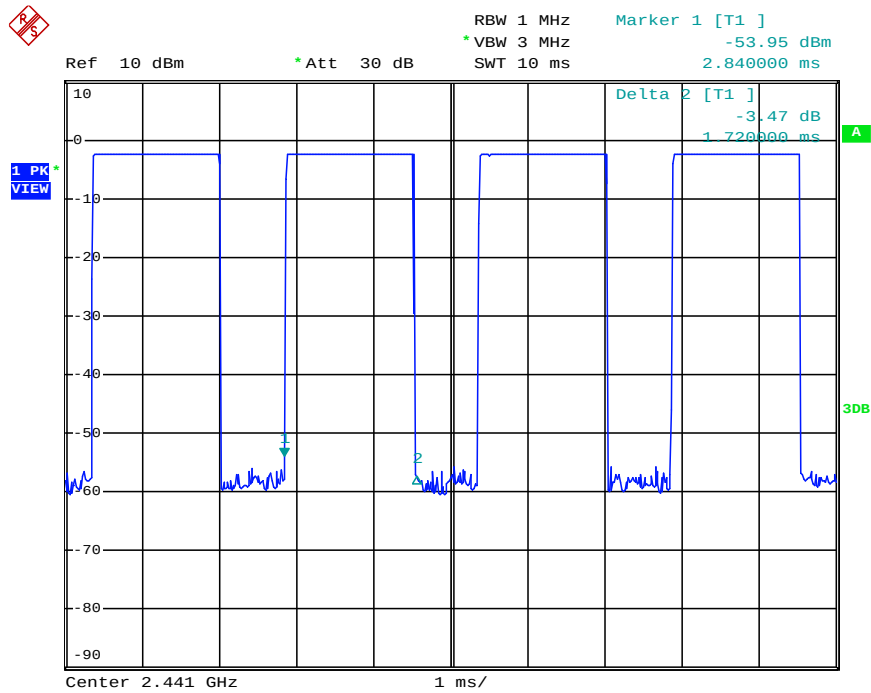
DH1 High channel



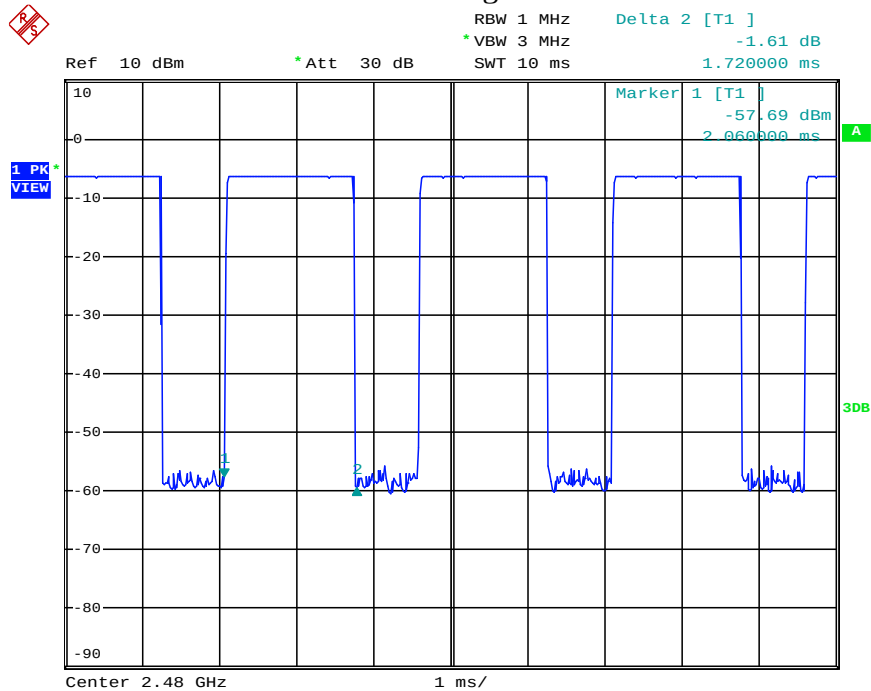
DH3 Low channel



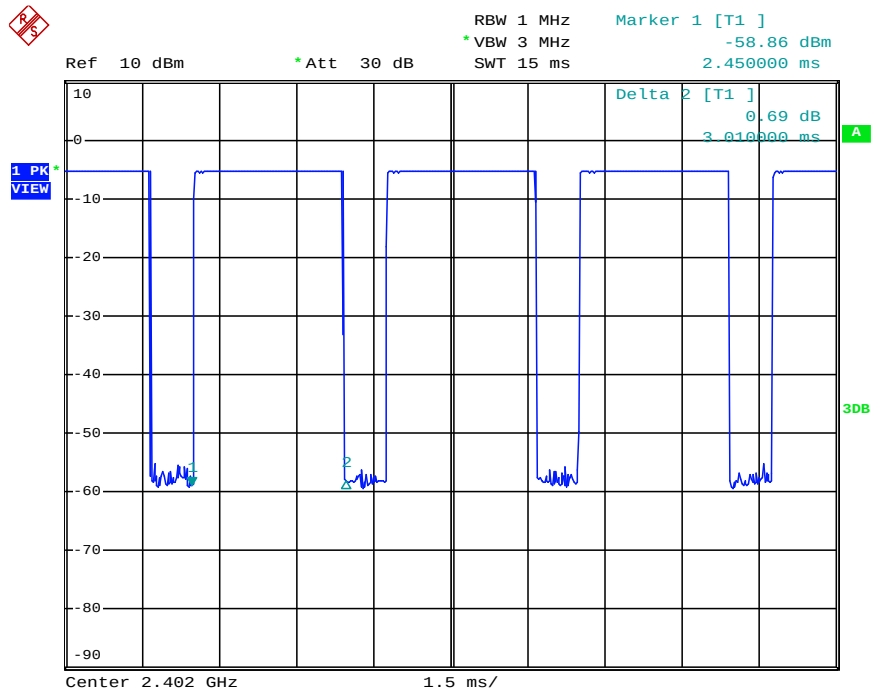
DH3 Middle channel



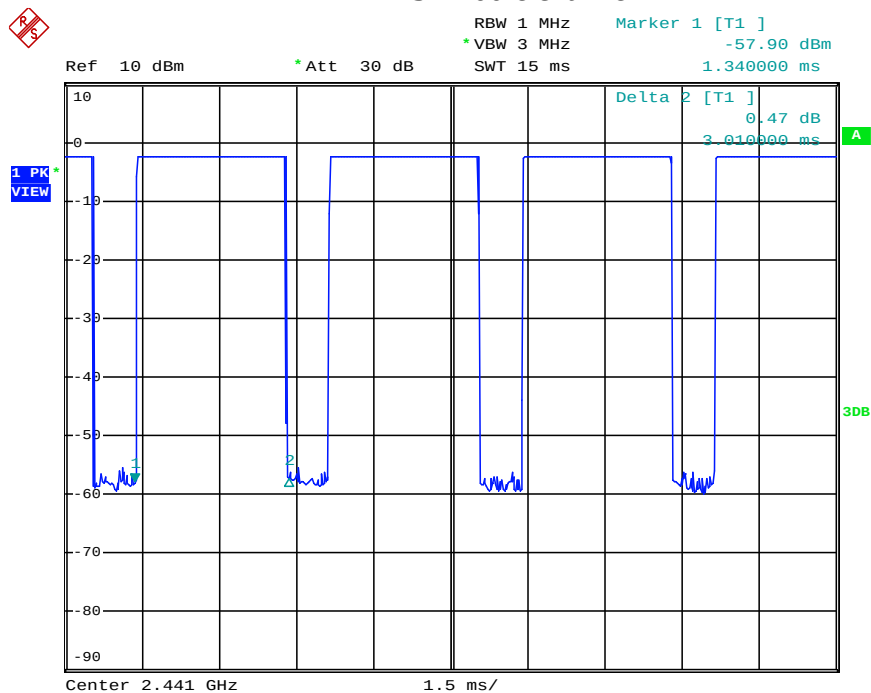
DH3 High channel

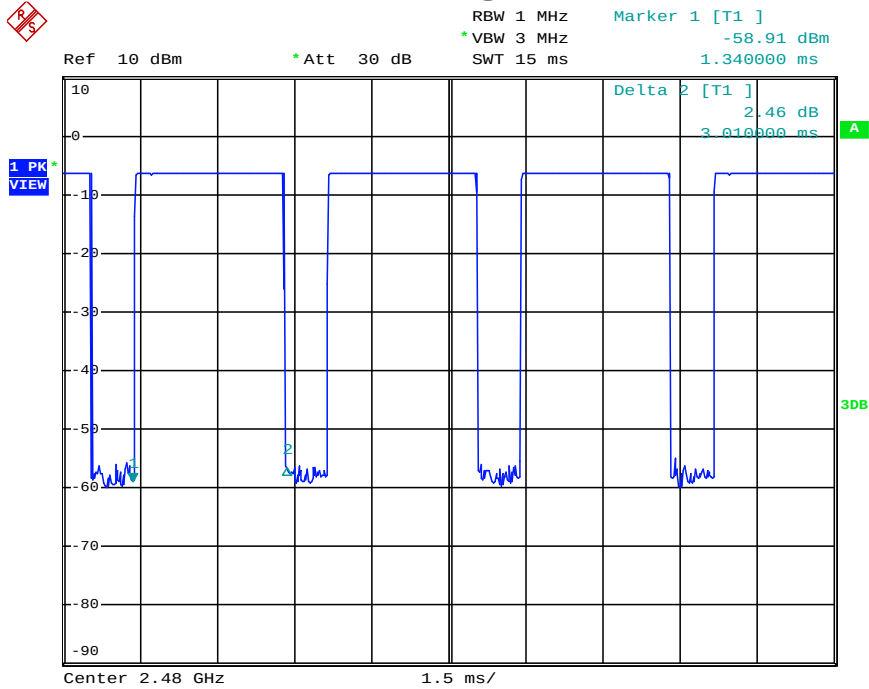


DH5 Low channel

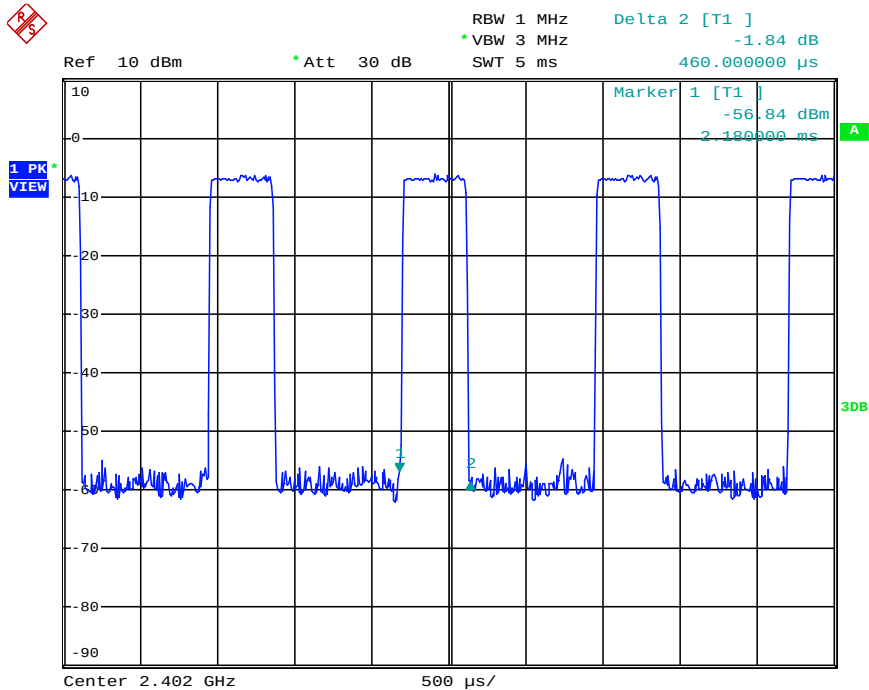


DH5 Middle channel

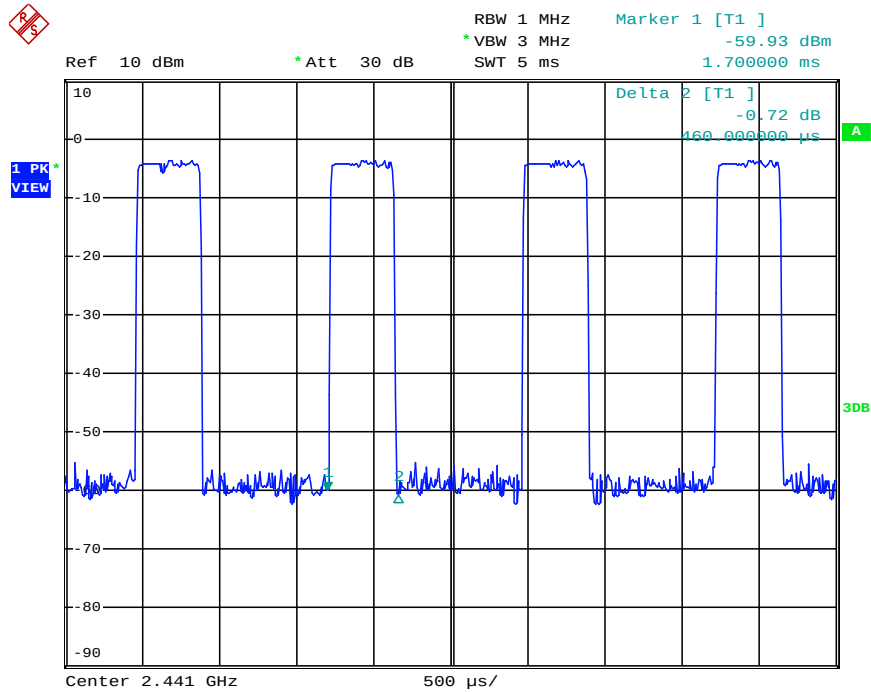




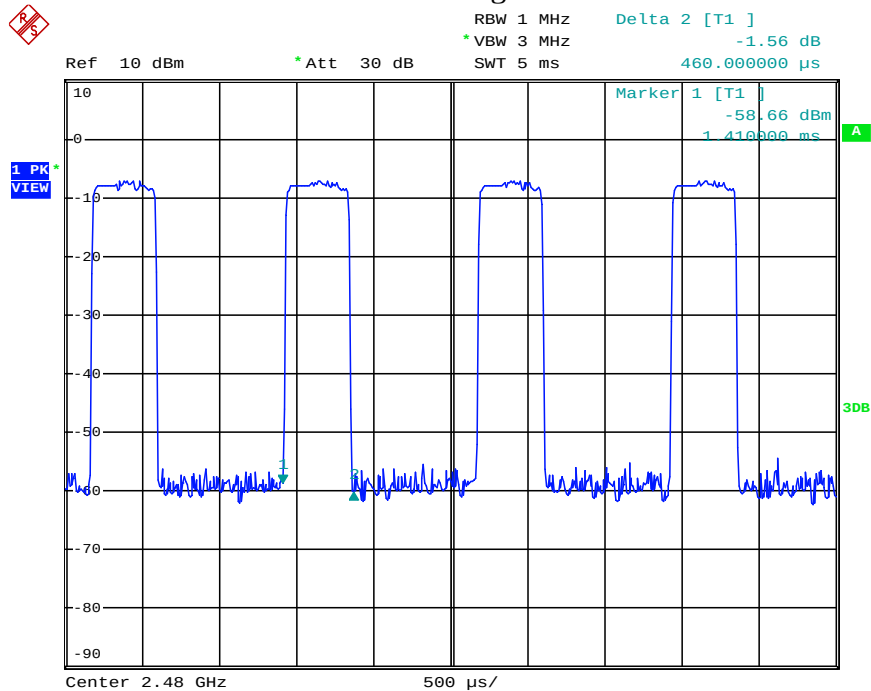
Mode 2: $\pi/4$ DQPSK Link Mode



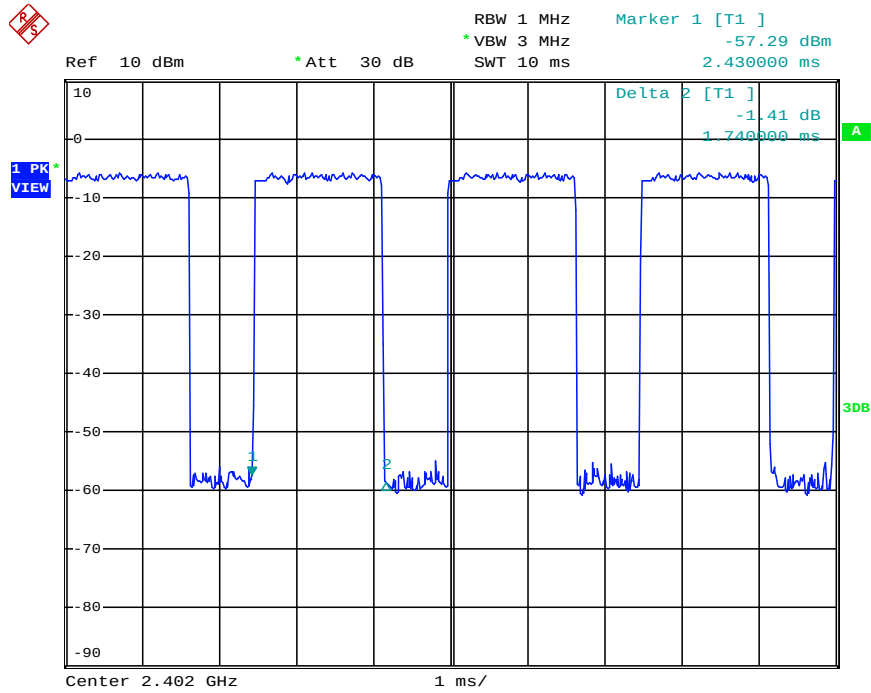
2DH1 Middle channel



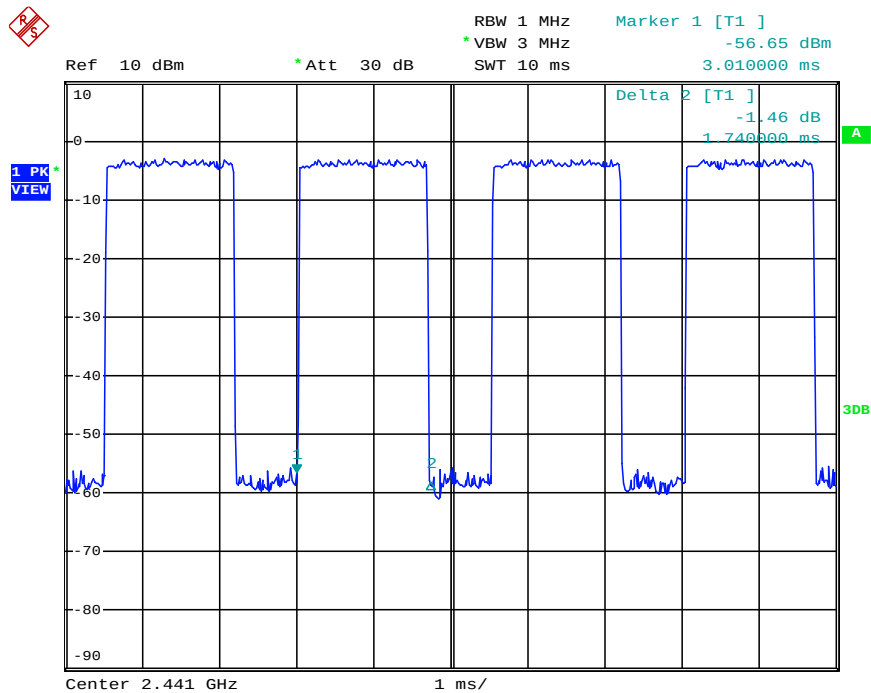
2DH1 High channel



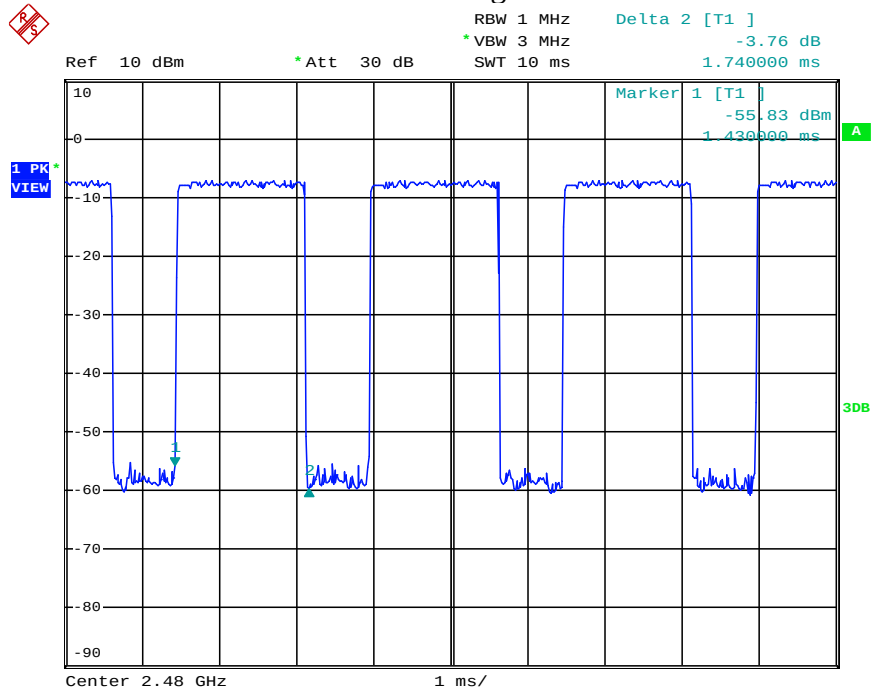
2DH3 Low channel



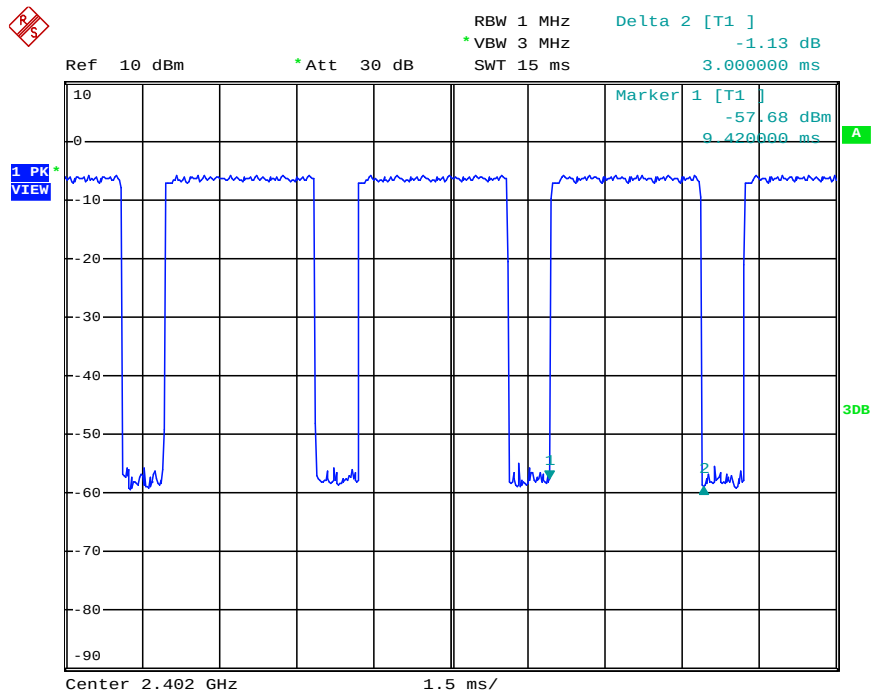
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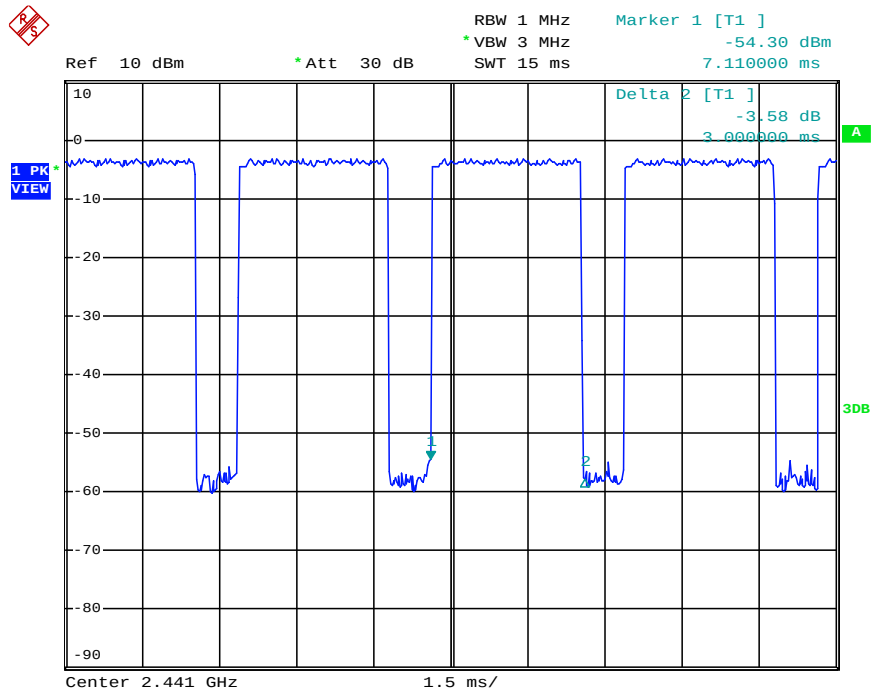
2DH3 High channel



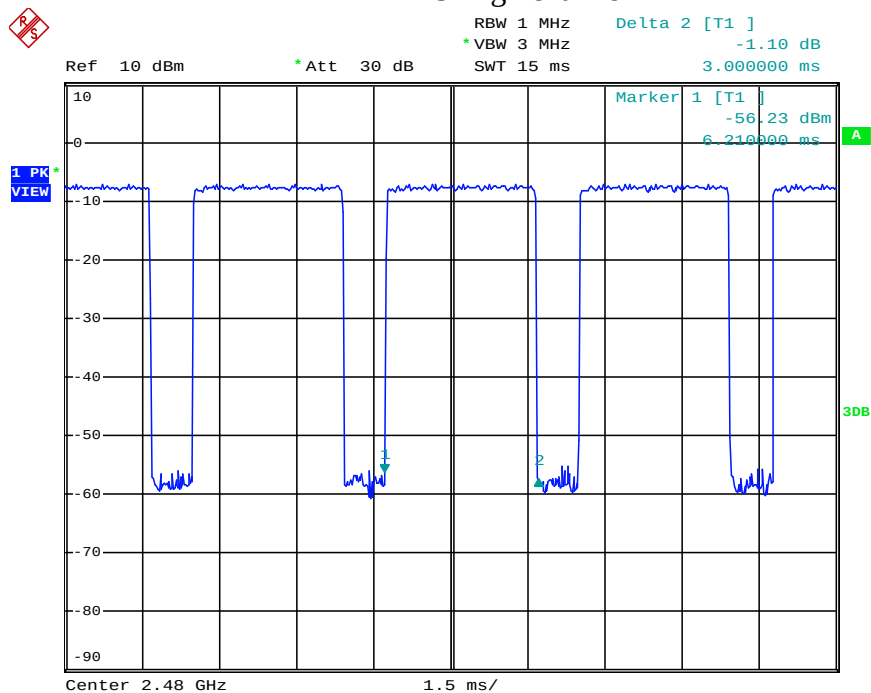
2DH5 Low channel



2DH5 Middle channel

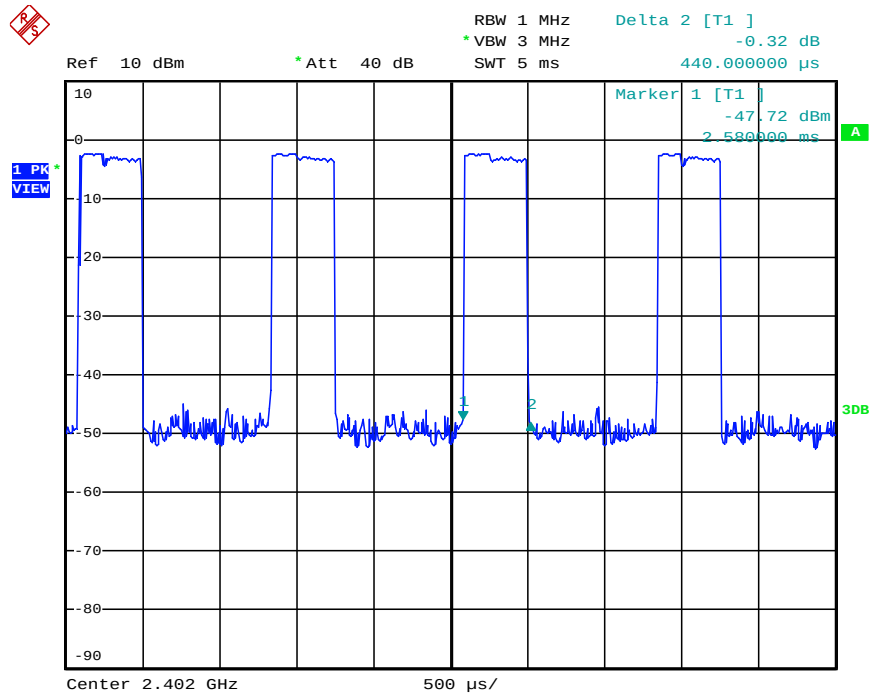


2DH5 High channel

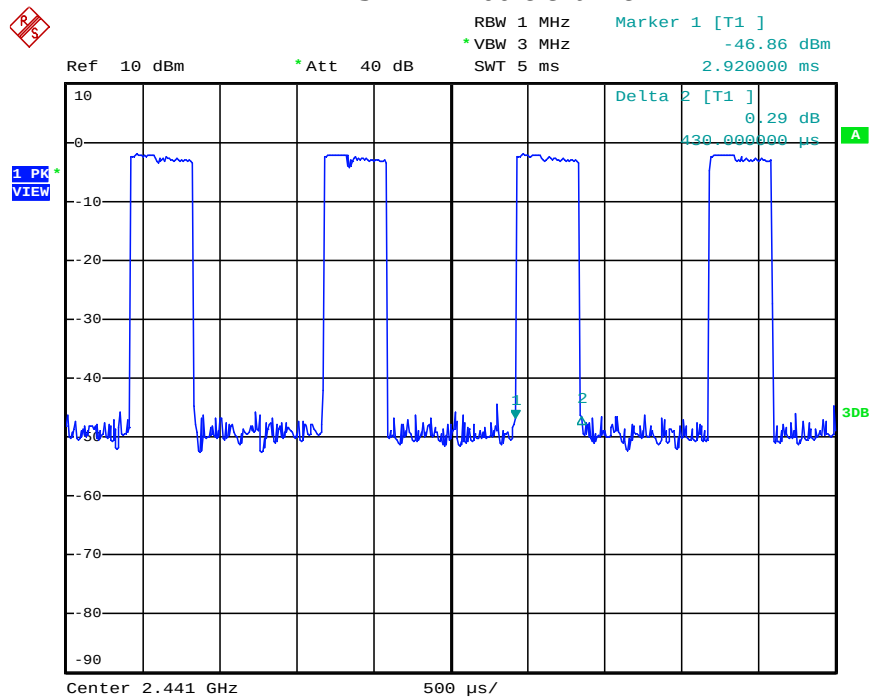


Mode 3: 8DPSK Link Mode

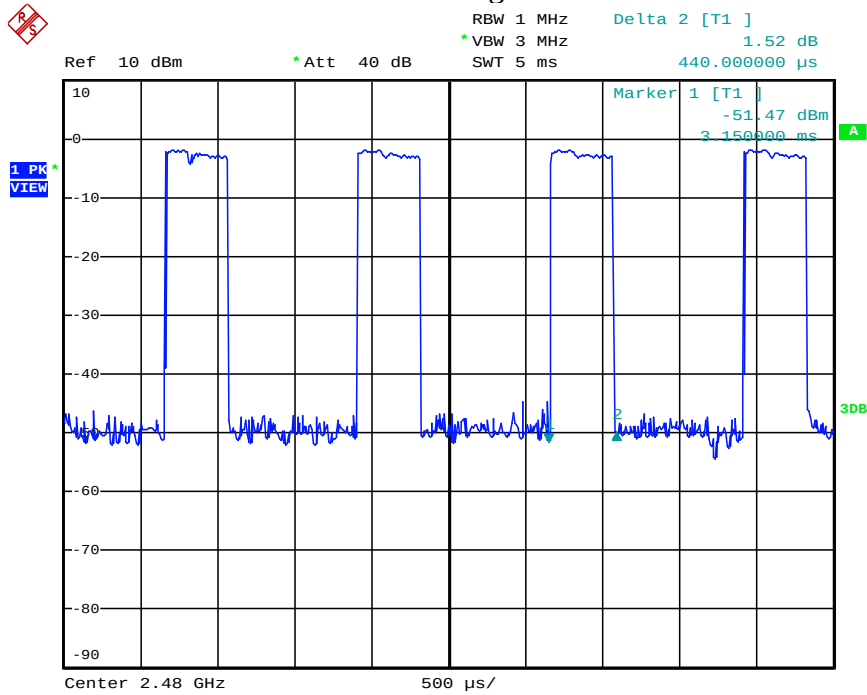
3DH1 Low channel



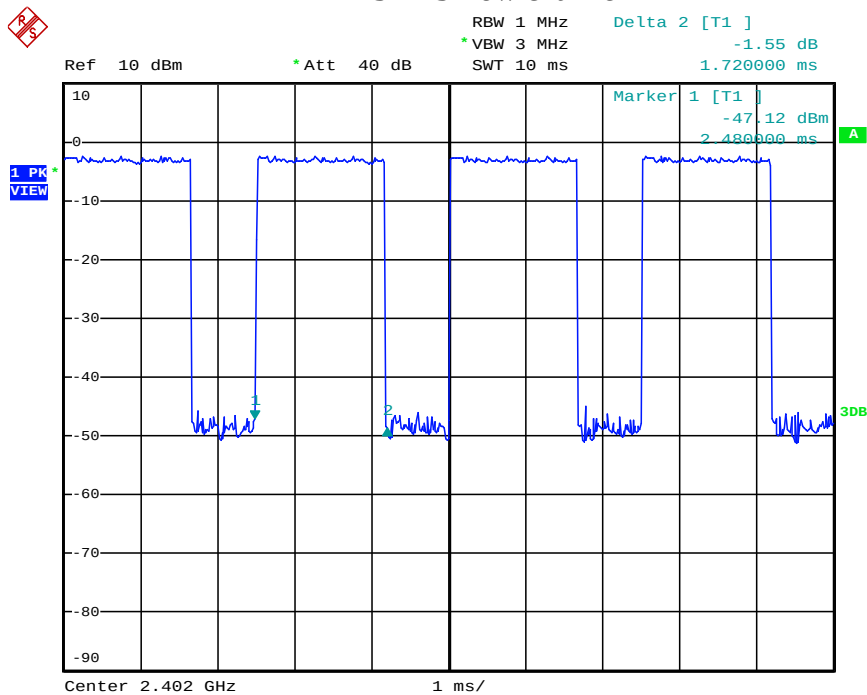
3DH1 Middle channel



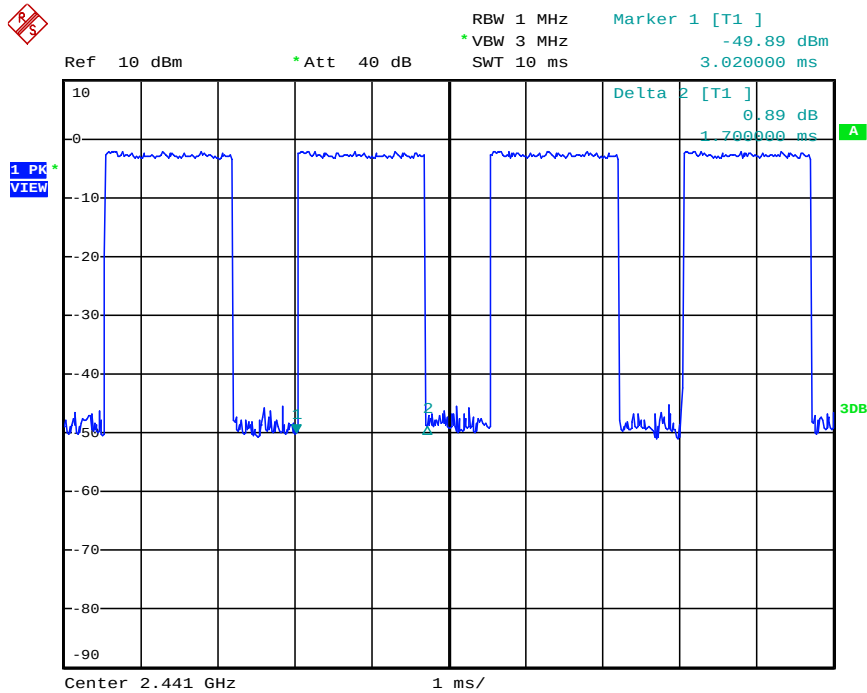
3DH1 High channel



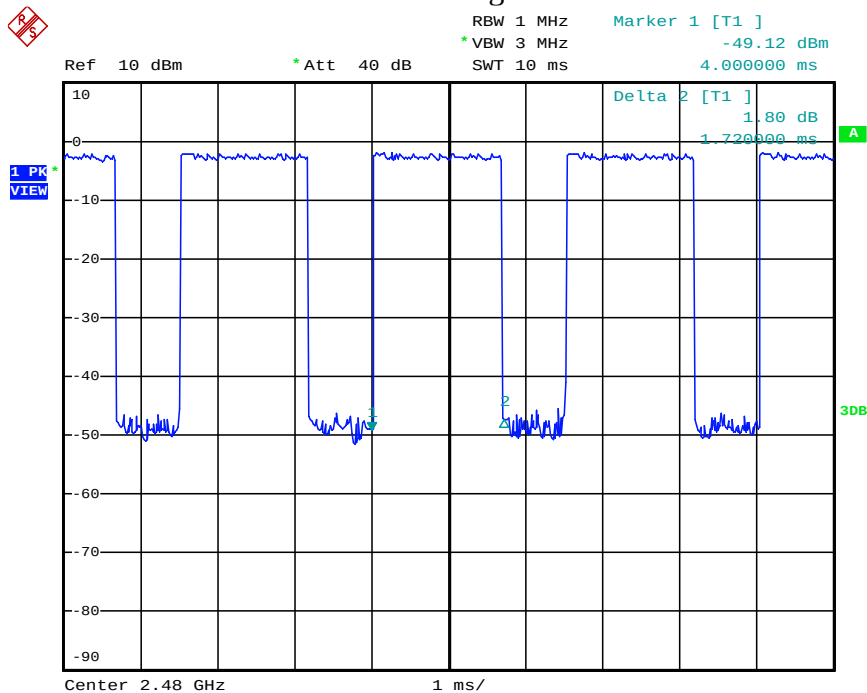
3DH3 Low channel



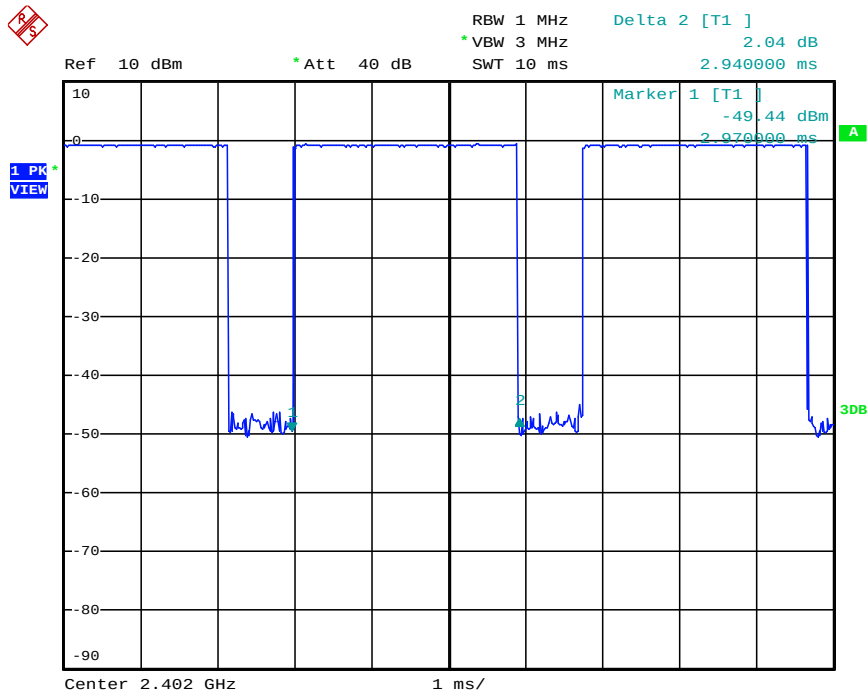
3DH3 Middle channel



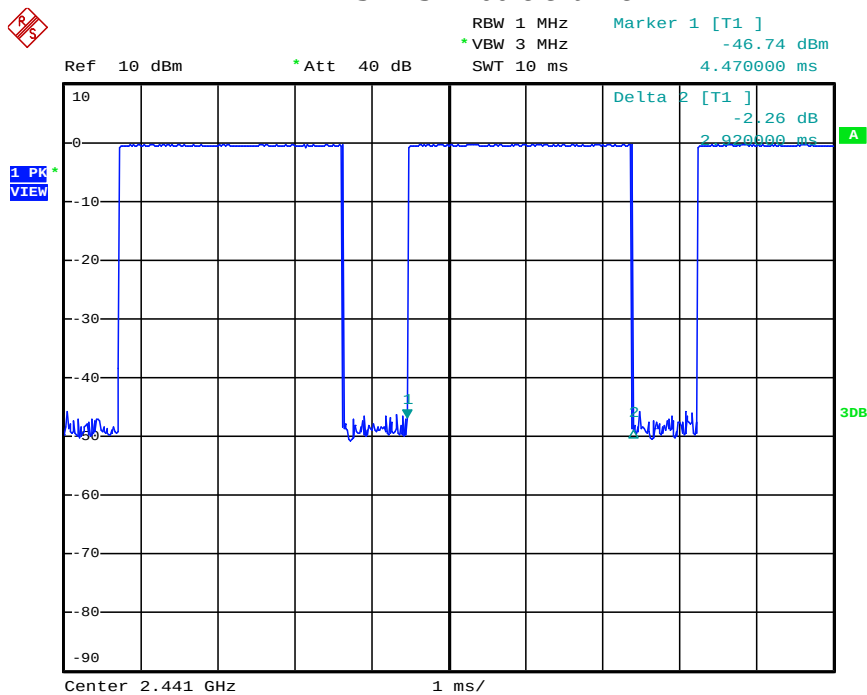
3DH3 High channel



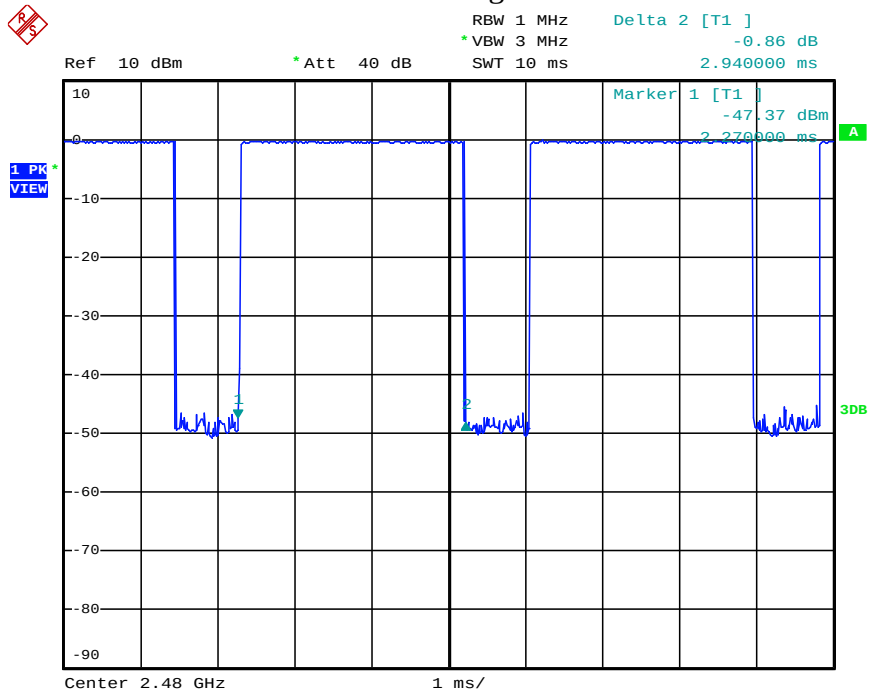
3DH5 Low channel



3DH5 Middle channel



3DH5 High channel



9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



(EUT: PORTABLE 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 1MHz and VBW to 3MHz for GFSK mode

9.5.3. Set RBW of spectrum analyzer to 3MHz and VBW to 3MHz for other mode

9.5.4. Measurement the maximum peak output power.

9.6. Test Result

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)	Limits dBm / W
Low	2402	-0.66	0.86	30/1.0
Middle	2441	-0.19	0.96	30/1.0
High	2480	0.03	1.01	30/1.0

II/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)	Limits dBm / W
Low	2402	-2.24	0.60	21 / 0.125
Middle	2441	-1.59	0.69	21 / 0.125
High	2480	-1.66	0.68	21 / 0.125

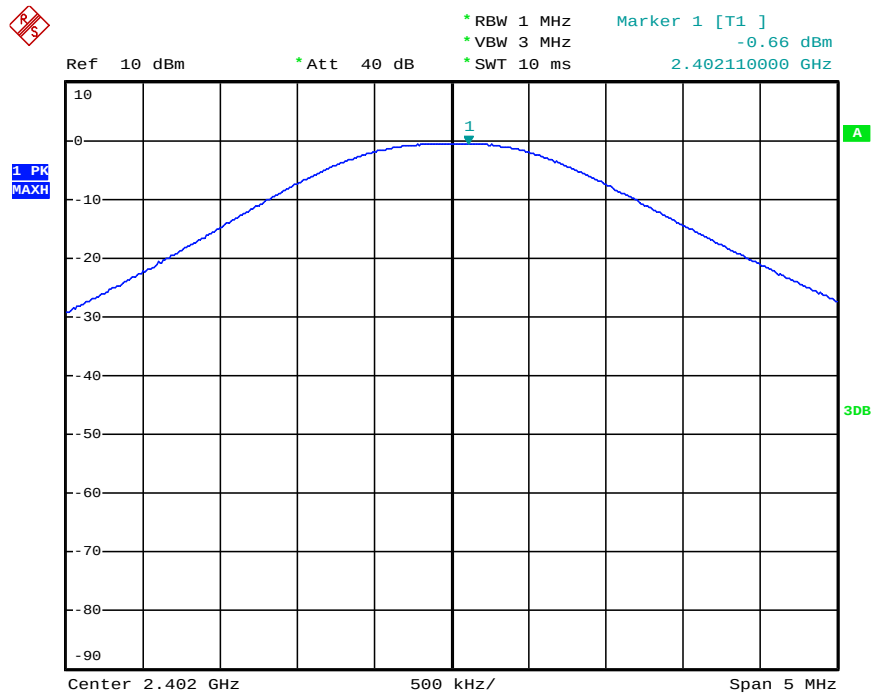
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)	Limits dBm / W
Low	2402	-1.93	0.64	21 / 0.125
Middle	2441	-1.75	0.67	21 / 0.125
High	2480	-1.44	0.72	21 / 0.125

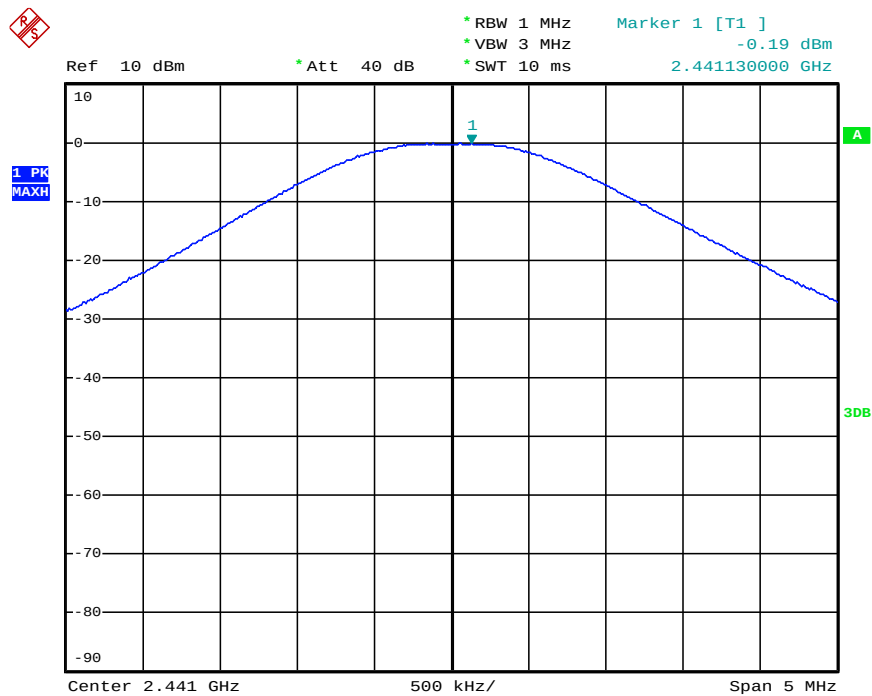
The spectrum analyzer plots are attached as below.

GFSK Mode

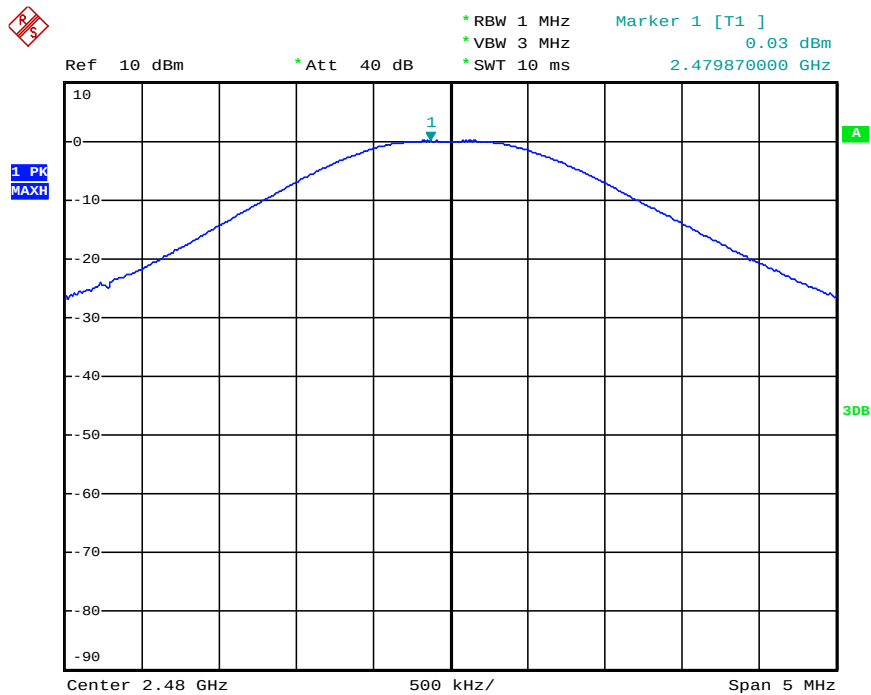
Low channel



Middle channel

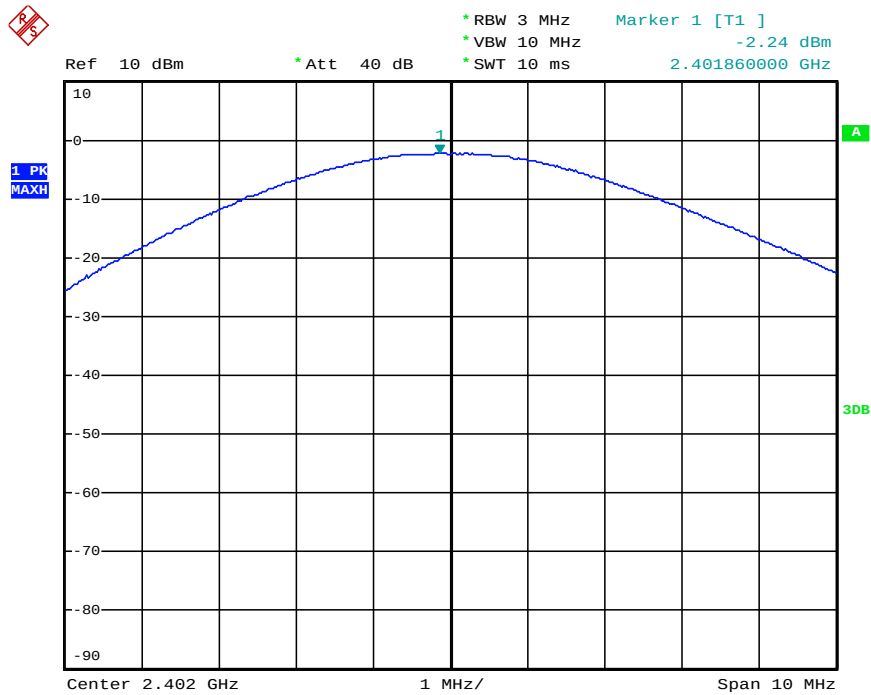


High channel

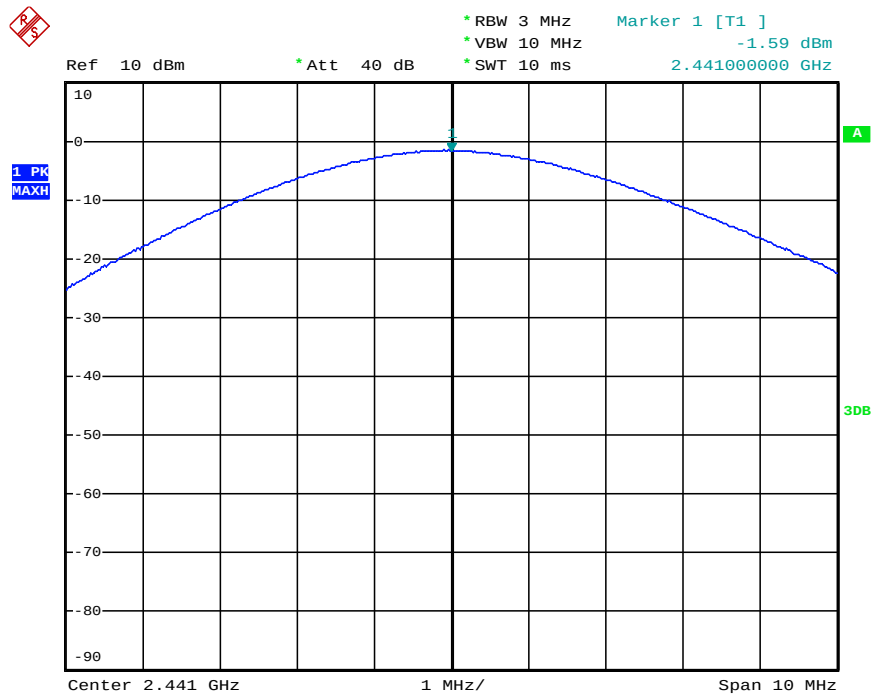


II/4-DQPSK Mode

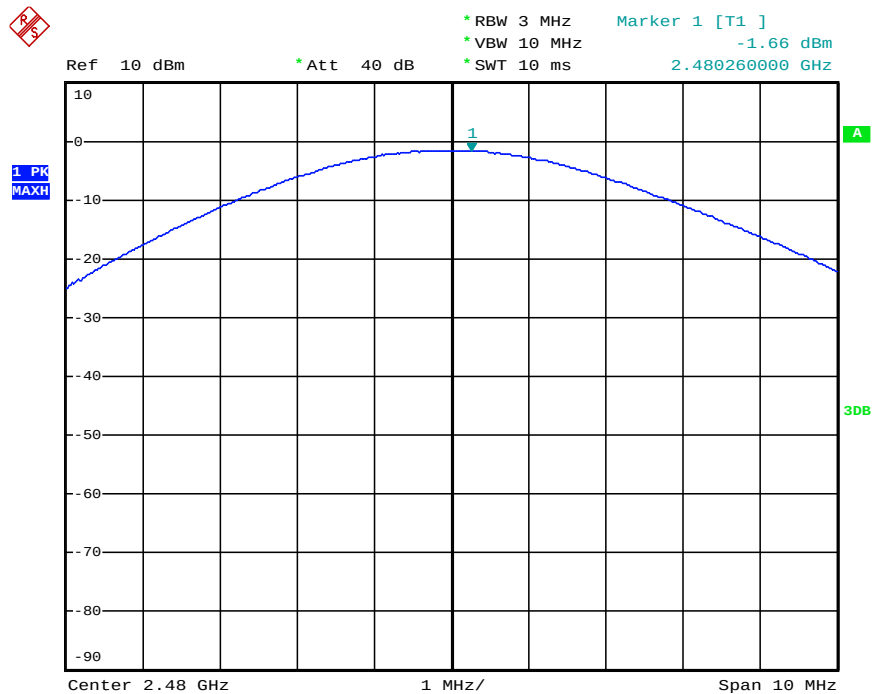
Low channel



Middle channel

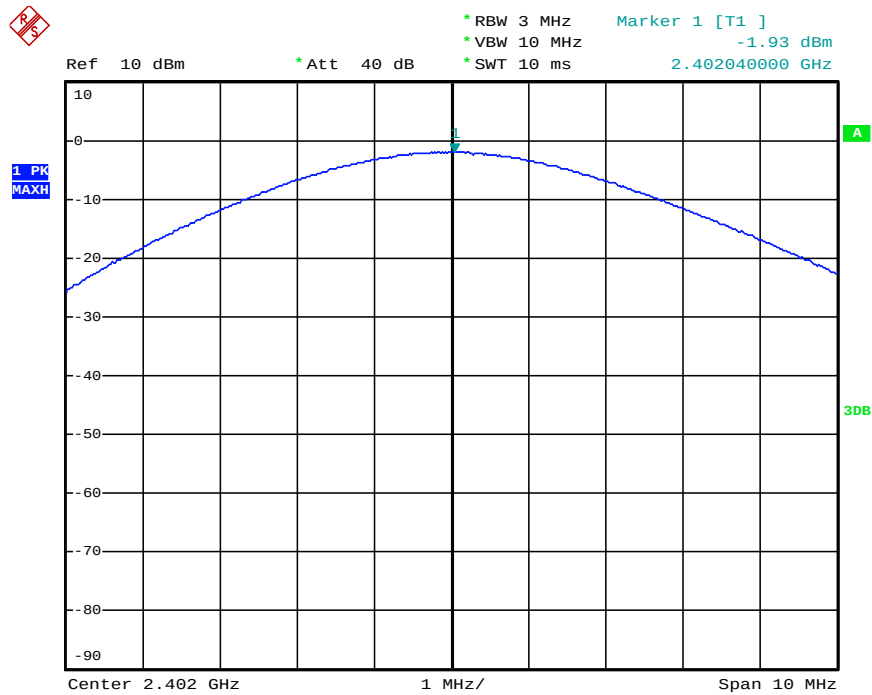


High channel

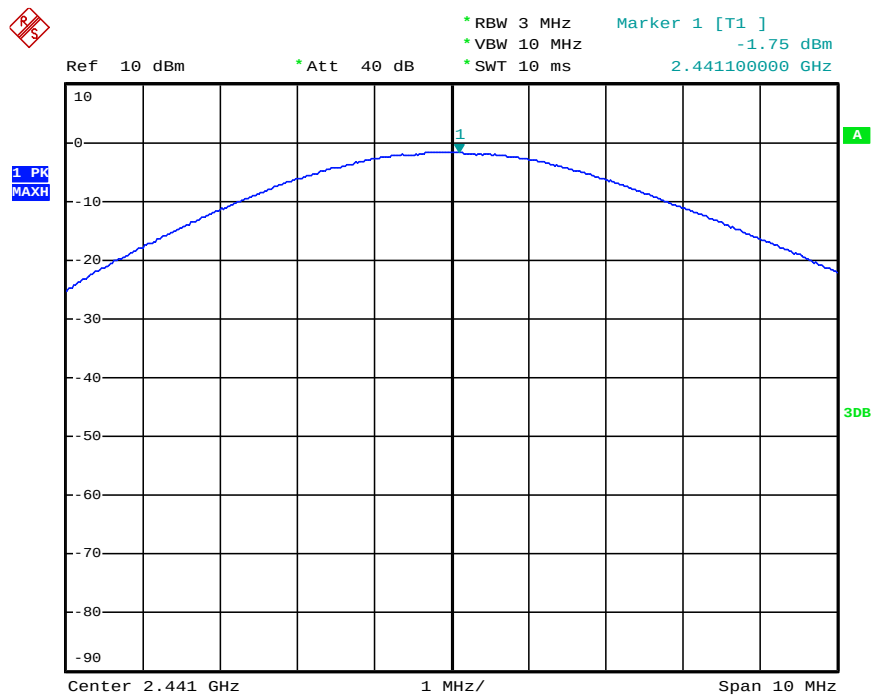


8DPSK Mode

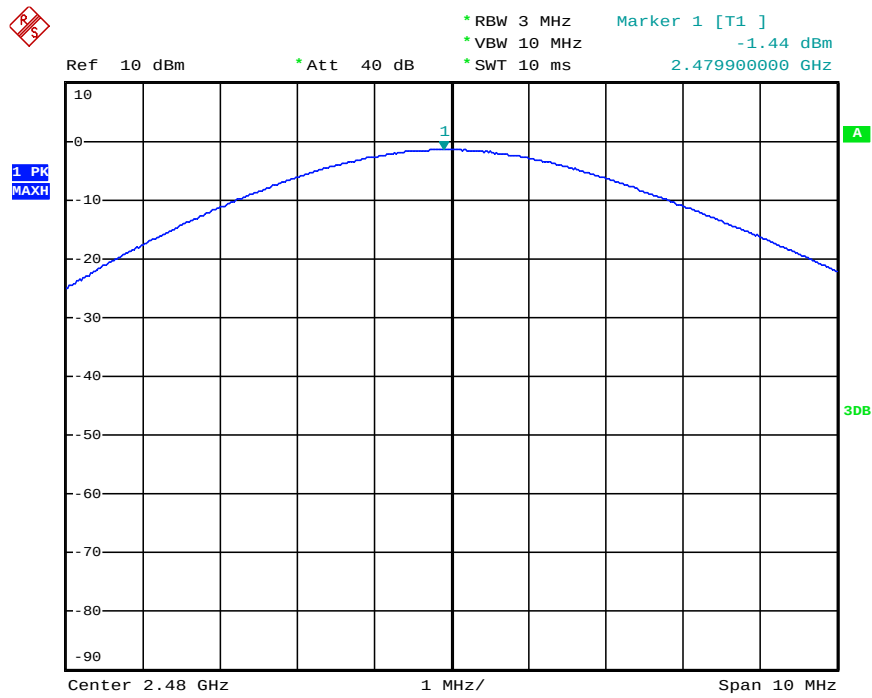
Low channel



Middle channel



High channel



10. RADIATED EMISSION TEST

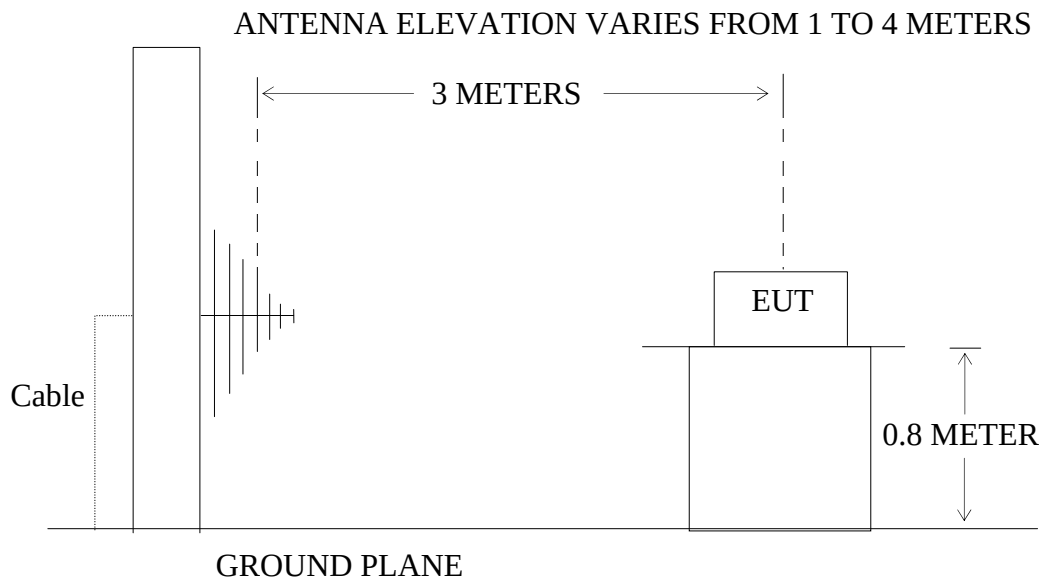
10.1. Block Diagram of Test Setup

10.1.1. Block diagram of connection between the EUT and simulators



(EUT: PORTABLE BLUETOOTH SPEAKER)

10.1.2. Anechoic Chamber Test Setup Diagram



(EUT: PORTABLE BLUETOOTH SPEAKER)

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 are 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. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. 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 bilog 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 interface cables must be manipulated according to ANSI C63.4- 2009 on radiated emission measurement.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

RBW (120 kHz), VBW (300 kHz) for QP detector below 1GHz

Peak detector above 1GHz

RBW (1 MHz), VBW (3MHz) for Peak measurement

RBW (1 MHz), VBW (10Hz) for AV measurement

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

10.6.The Field Strength of Radiation Emission Measurement Results

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

2. The 18-25GHz emissions are not reported, because the levels are too low against the limit.



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Job No.: WCARRY #318

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

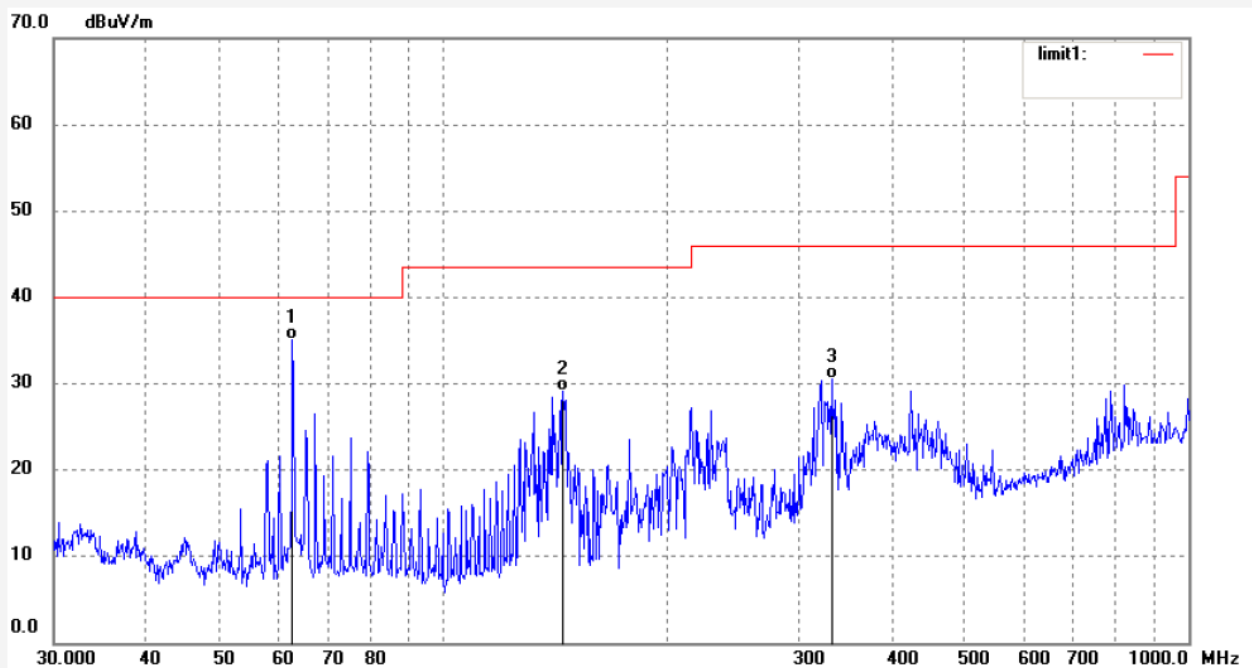
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Time: 20:18:29

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.7432	56.26	-21.14	35.12	40.00	-4.88	QP			
2	144.7898	52.81	-23.69	29.12	43.50	-14.38	QP			
3	331.7857	47.44	-16.90	30.54	46.00	-15.46	QP			

Job No.: WCARRY #317

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

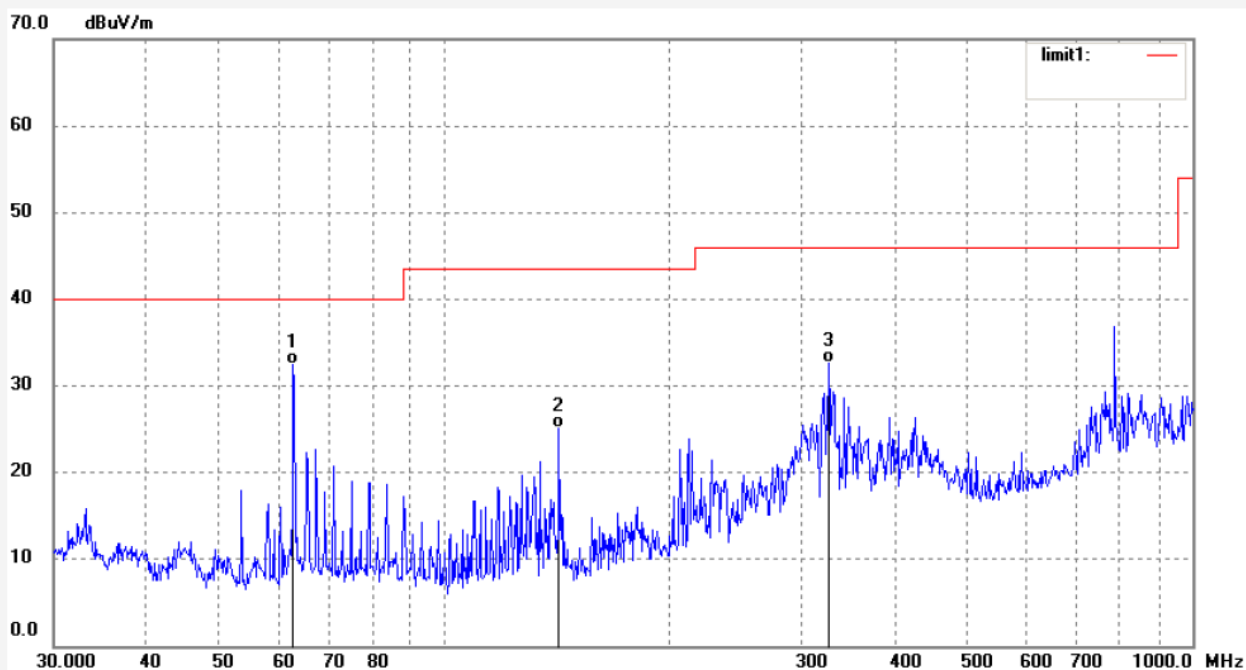
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Time: 20:17:12

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.7432	53.65	-21.14	32.51	40.00	-7.49	QP			
2	142.2684	48.66	-23.58	25.08	43.50	-18.42	QP			
3	326.0079	49.80	-17.15	32.65	46.00	-13.35	QP			

Job No.: WCARRY #316

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2441MHz

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

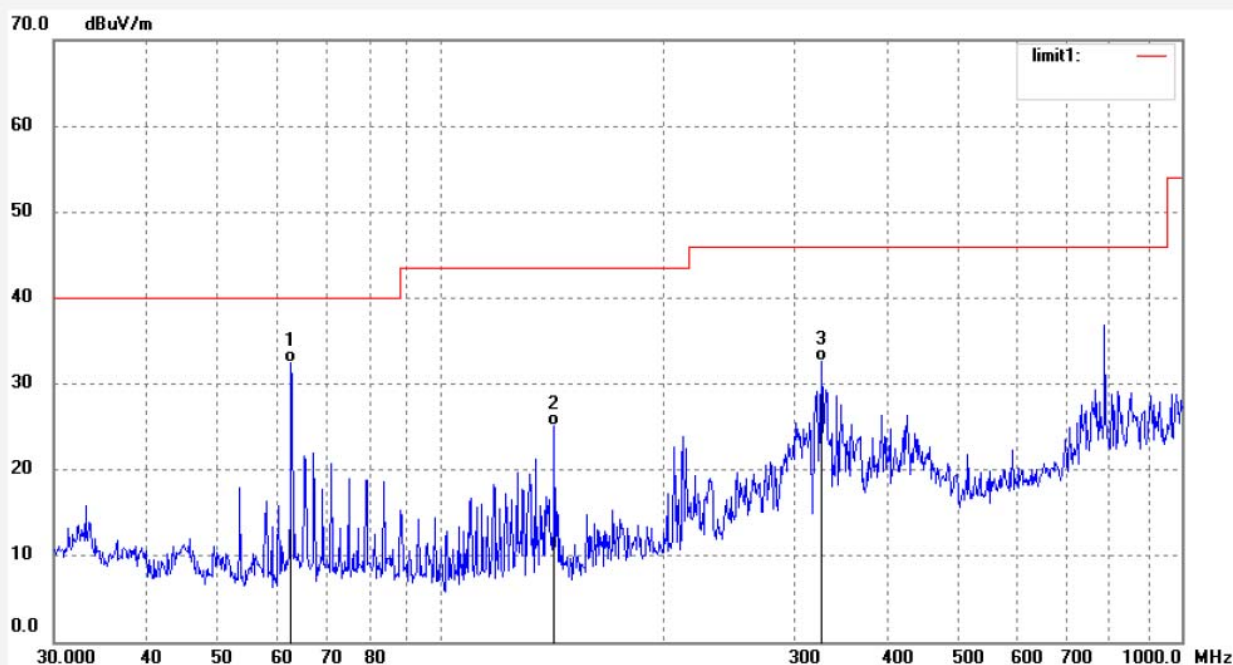
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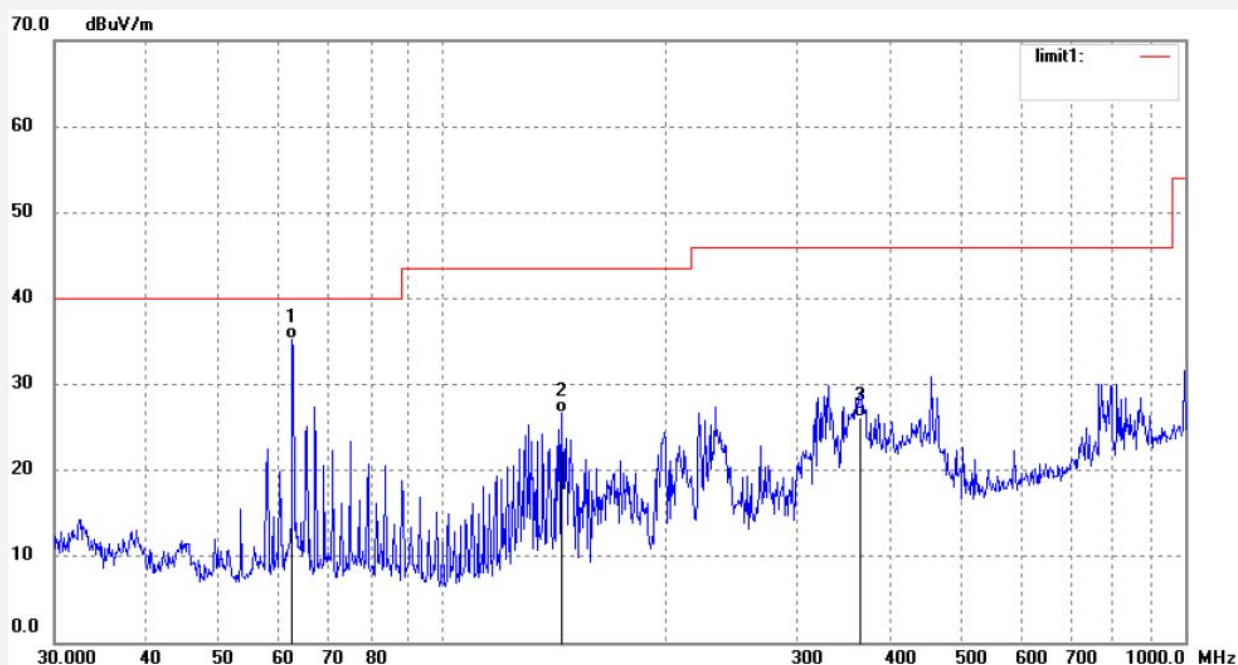


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.7432	53.65	-21.14	32.51	40.00	-7.49	QP			
2	142.2684	48.66	-23.58	25.08	43.50	-18.42	QP			
3	326.0079	49.80	-17.15	32.65	46.00	-13.35	QP			

Job No.: WCARRY #315
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2441MHz
Model: MD215
Manufacturer: Microlab

Polarization: Horizontal
Power Source: DC 5V
Date: 2014/11/05
Time: 20:15:57
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067

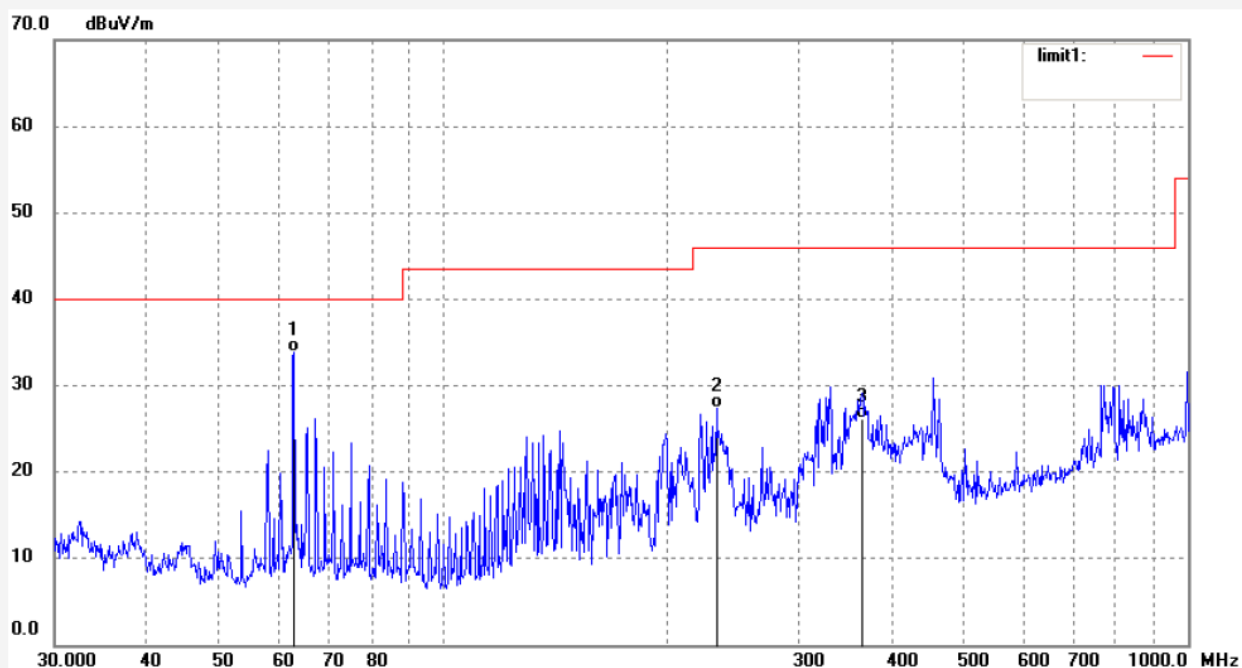


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.7432	56.32	-21.14	35.18	40.00	-4.82	QP			
2	144.7898	50.44	-23.69	26.75	43.50	-16.75	QP			
3	364.8025	42.02	-15.88	26.14	46.00	-19.86	QP			

Job No.: WCARRY #314
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2480MHz
Model: MD215
Manufacturer: Microlab

Polarization: Horizontal
Power Source: DC 5V
Date: 2014/11/05
Time: 20:15:46
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.9639	54.96	-21.15	33.81	40.00	-6.19	QP			
2	232.6690	47.16	-19.84	27.32	46.00	-18.68	QP			
3	364.8025	42.02	-15.88	26.14	46.00	-19.86	QP			

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Job No.: WCARRY #313

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2480MHz

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

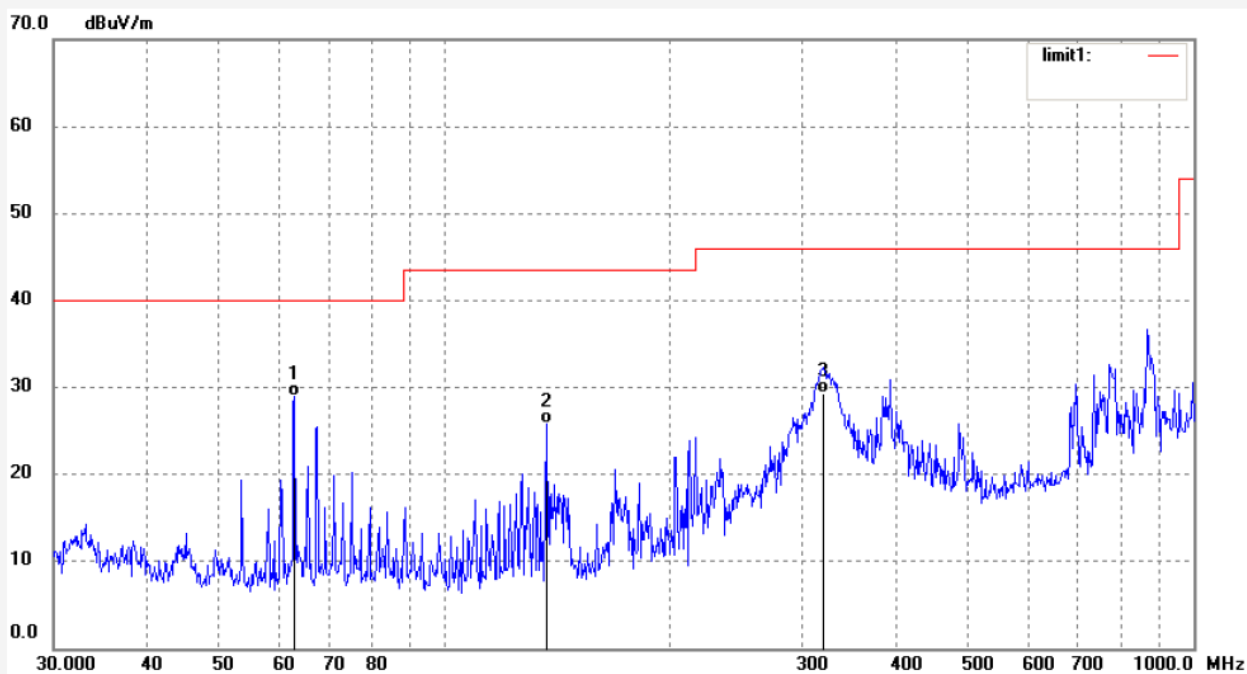
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Time: 20:14:37

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.9639	50.04	-21.15	28.89	40.00	-11.11	QP			
2	136.8746	49.09	-23.35	25.74	43.50	-17.76	QP			
3	320.3306	46.71	-17.38	29.33	46.00	-16.67	QP			

Job No.: WCARRY #295

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

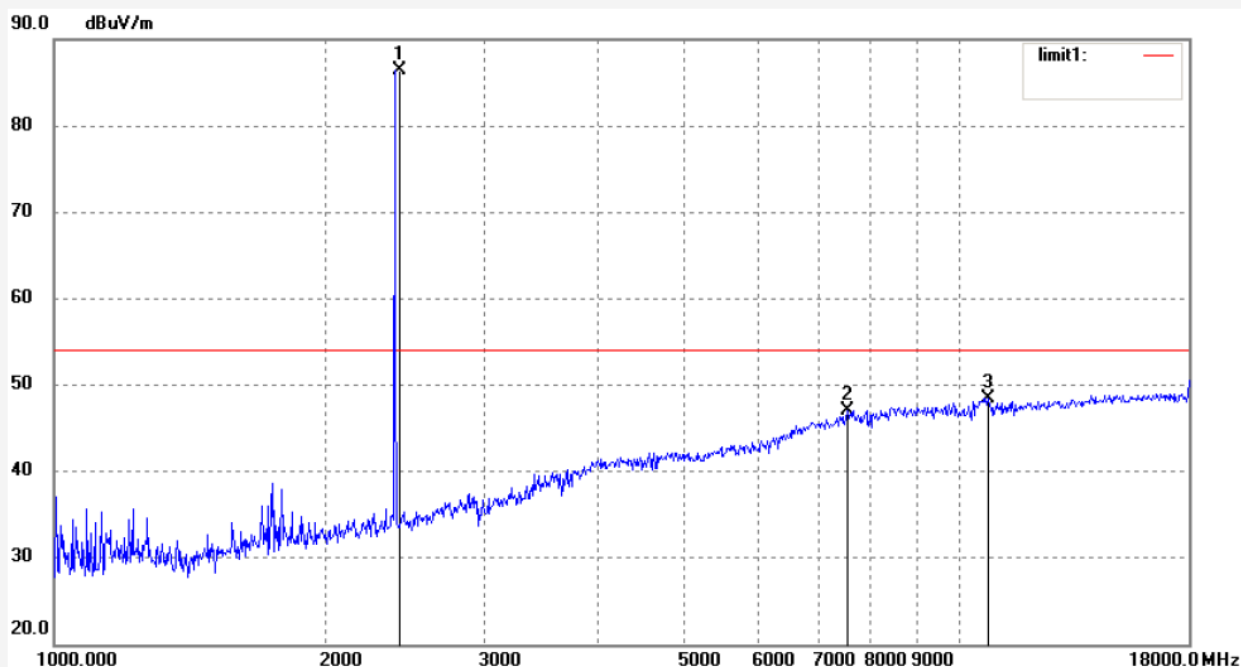
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Time: 9/18/37

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	92.69	-6.27	86.42	54.00	32.42	peak			
2	7560.741	42.38	4.74	47.12	54.00	-6.88	peak			
3	10784.181	41.62	6.74	48.36	54.00	-5.64	peak			



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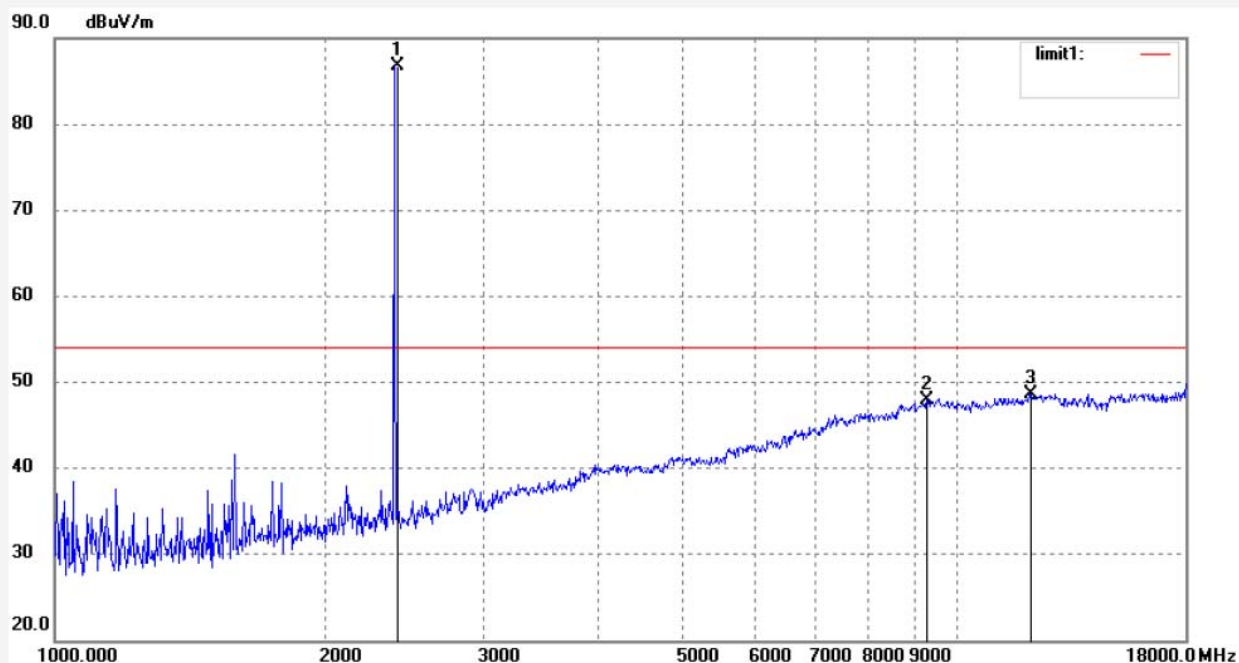
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Site: 1# Chamber
Tel:+86-0755-26503290
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Job No.: WCARRY #296
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2402MHz
Model: MD215
Manufacturer: Microlab

Polarization: Vertical
Power Source: DC 5V
Date: 14/11/05/
Time: 9/20/05
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	92.96	-6.27	86.69	54.00	32.69	peak			
2	9296.446	41.03	6.89	47.92	54.00	-6.08	peak			
3	12115.797	40.45	8.20	48.65	54.00	-5.35	peak			

Job No.: WCARRY #297

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2441MHz

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

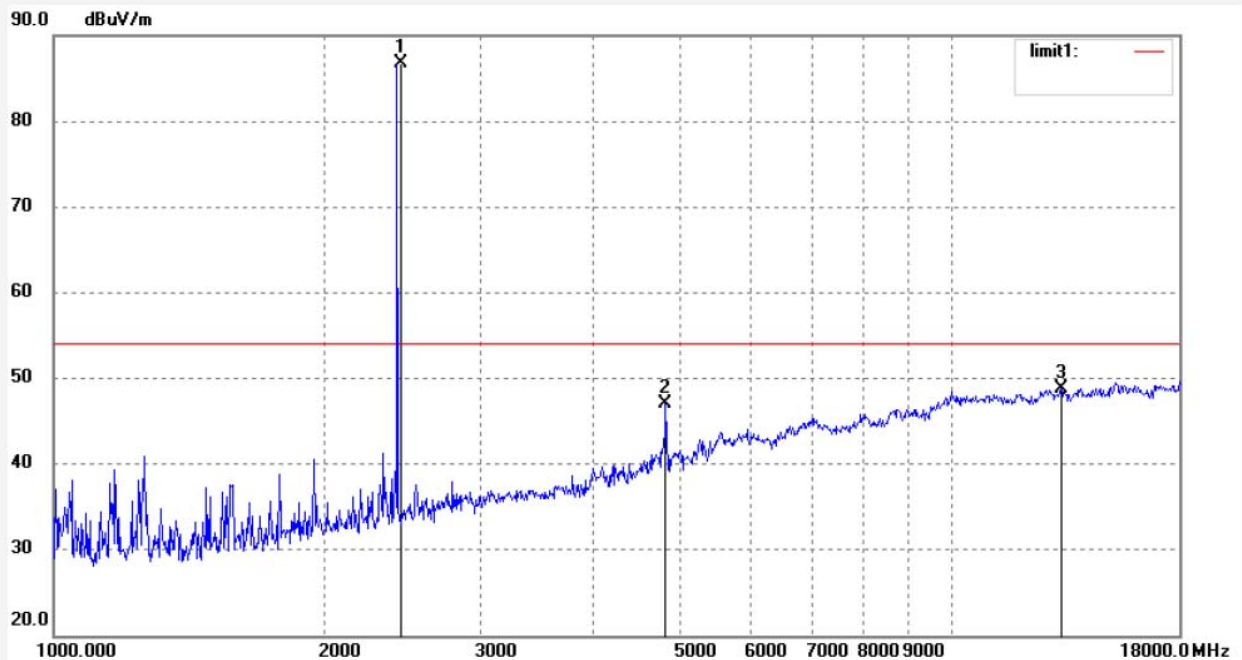
Date: 14/11/05/

Time: 9/21/29

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067

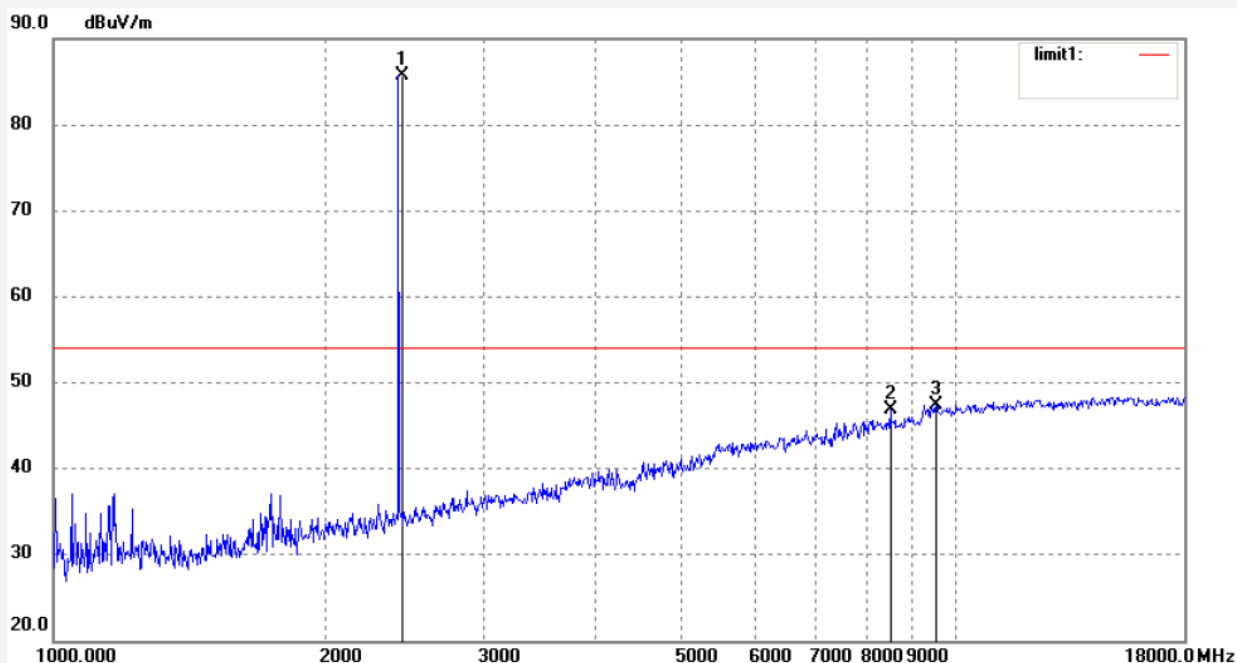


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.000	92.94	-6.16	86.78	54.00	32.78	peak			
2	4815.324	47.11	-0.15	46.96	54.00	-7.04	peak			
3	13298.538	38.54	10.28	48.82	54.00	-5.18	peak			

Job No.: WCARRY #298
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2441MHz
Model: MD215
Manufacturer: Microlab

Polarization: Horizontal
Power Source: DC 5V
Date: 14/11/05/
Time: 9/22/53
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.000	91.81	-6.16	85.65	54.00	31.65	peak			
2	8494.331	40.59	6.19	46.78	54.00	-7.22	peak			
3	9543.201	40.30	7.14	47.44	54.00	-6.56	peak			

Job No.: WCARRY #299

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2480MHz

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

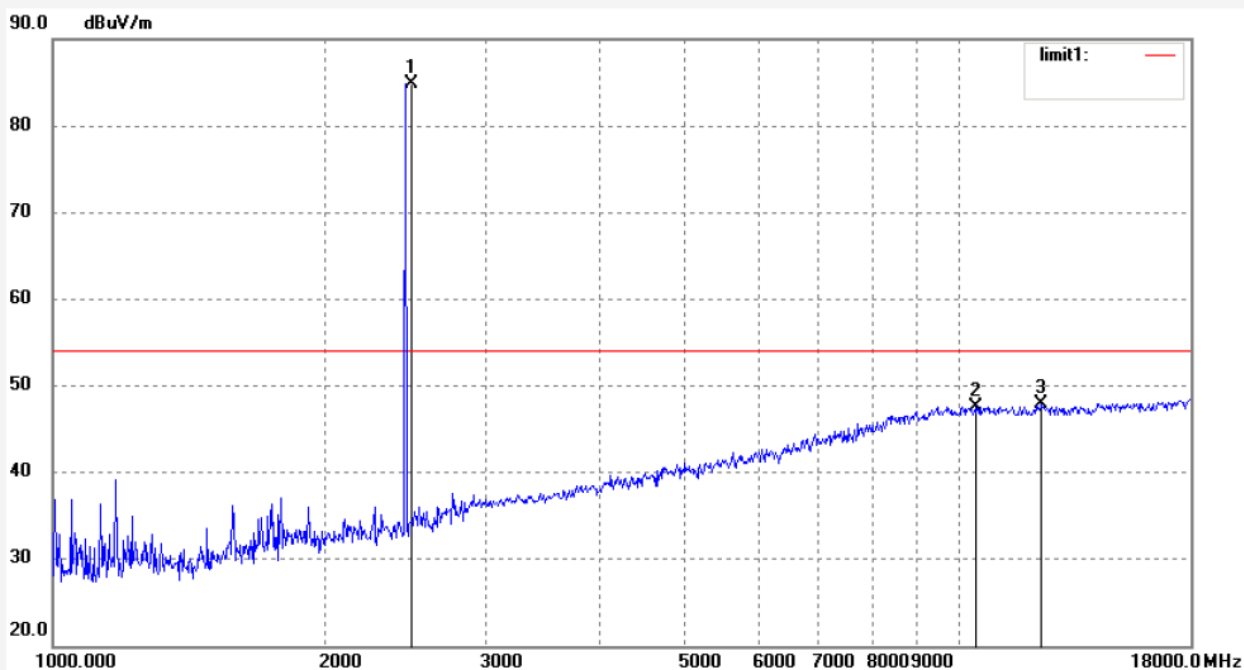
Date: 14/11/05/

Time: 9/24/04

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



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	90.83	-6.05	84.78	54.00	30.78	peak			
2	10444.360	40.90	6.69	47.59	54.00	-6.41	peak			
3	12329.252	39.35	8.55	47.90	54.00	-6.10	peak			

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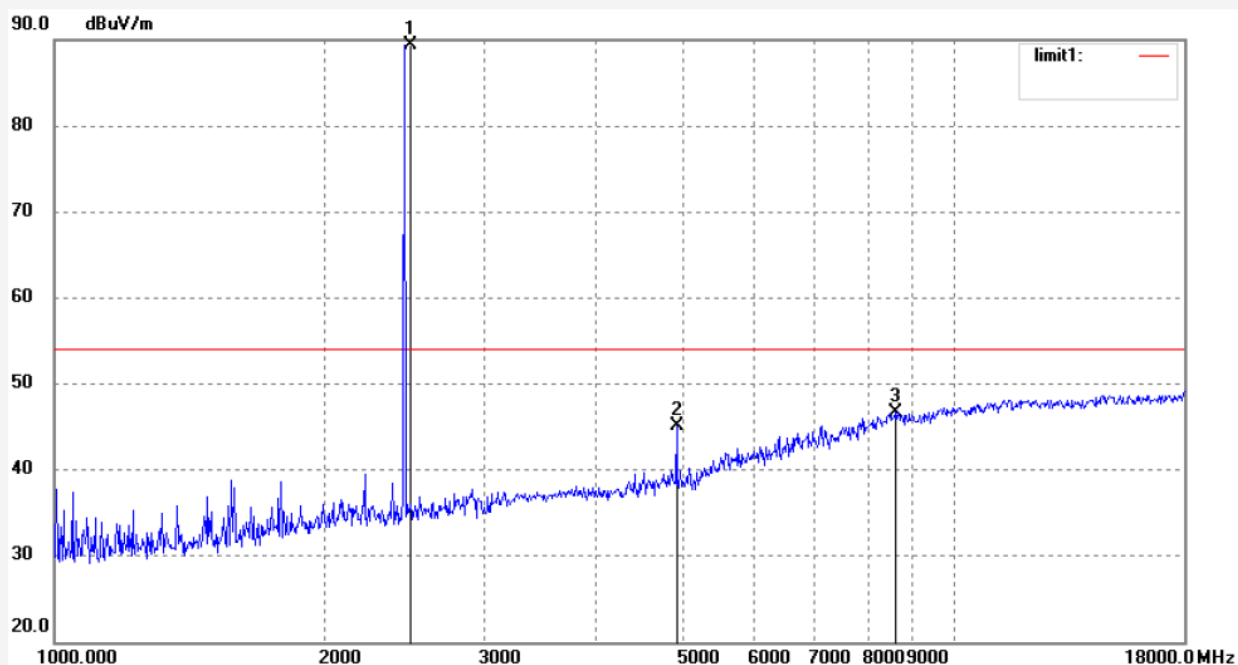
Tel:+86-0755-26503290

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Job No.: WCARRY #300
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2480MHz
Model: MD215
Manufacturer: Microlab

Polarization: Vertical
Power Source: DC 5V
Date: 14/11/05/
Time: 9/25/48
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



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	95.50	-6.05	89.45	54.00	35.45	peak			
2	4914.444	44.89	0.20	45.09	54.00	-8.91	peak			
3	8593.809	40.39	6.26	46.65	54.00	-7.35	peak			

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: PORTABLE 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.

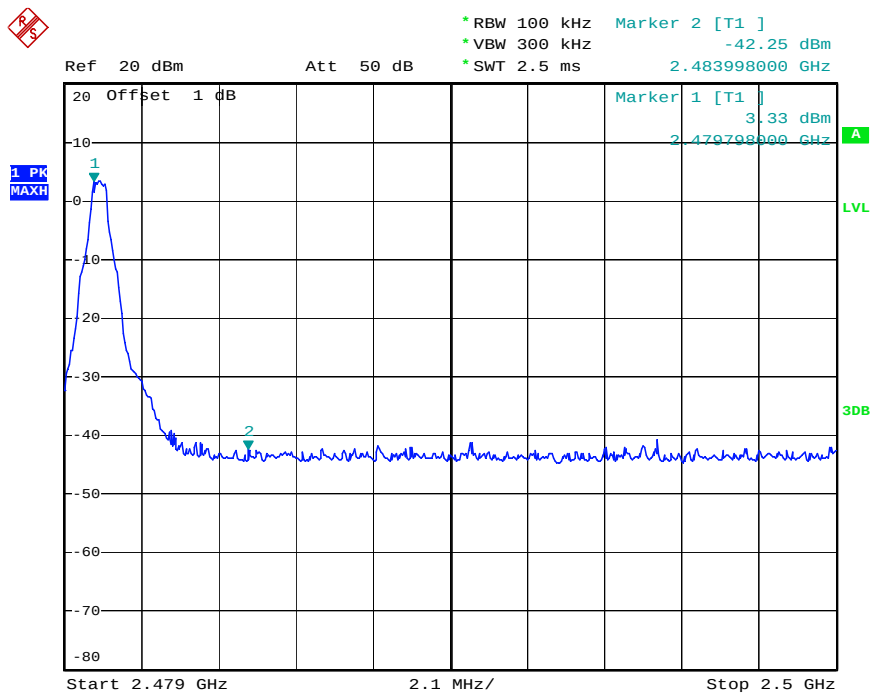
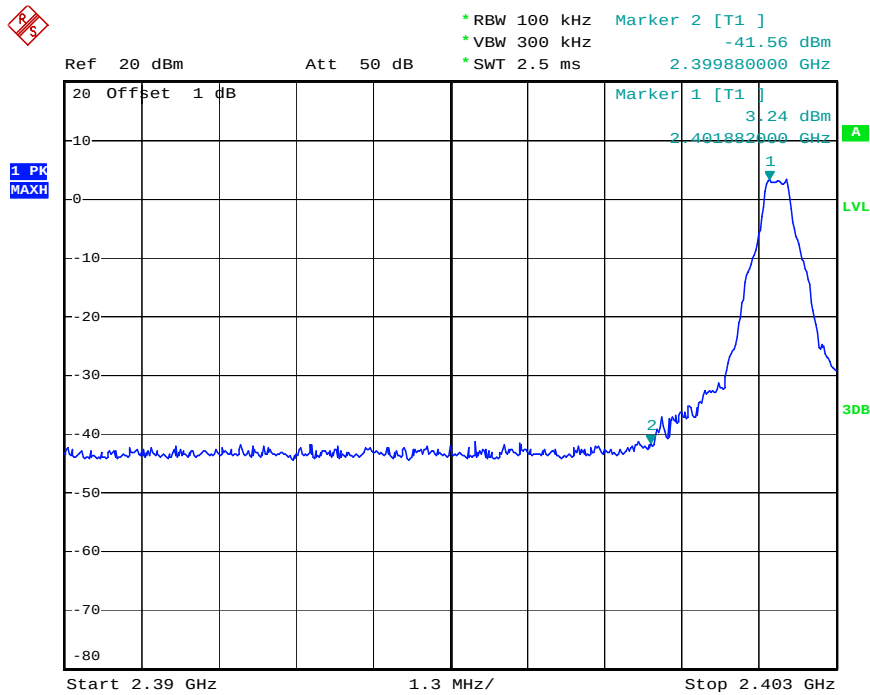
11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3. The band edges were measured and recorded.

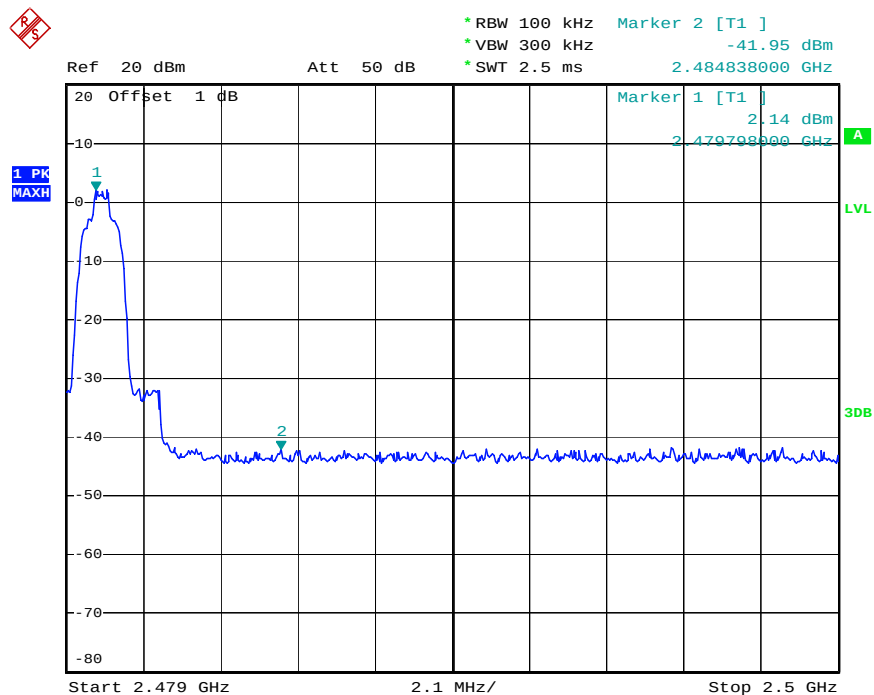
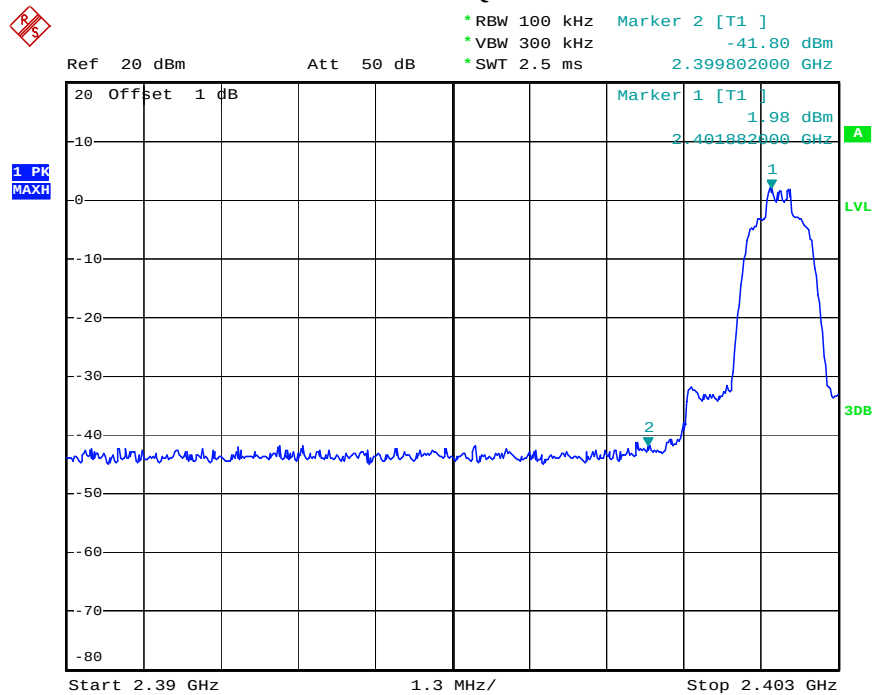
11.6. Test Result

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK		
2399.880	44.80	> 20dBc
2483.998	45.58	> 20dBc
Π/4-DQPSK Mode		
2399.802	43.79	> 20dBc
2484.838	44.09	> 20dBc
8QPSK		
2399.750	43.26	> 20dBc
2483.788	44.32	> 20dBc

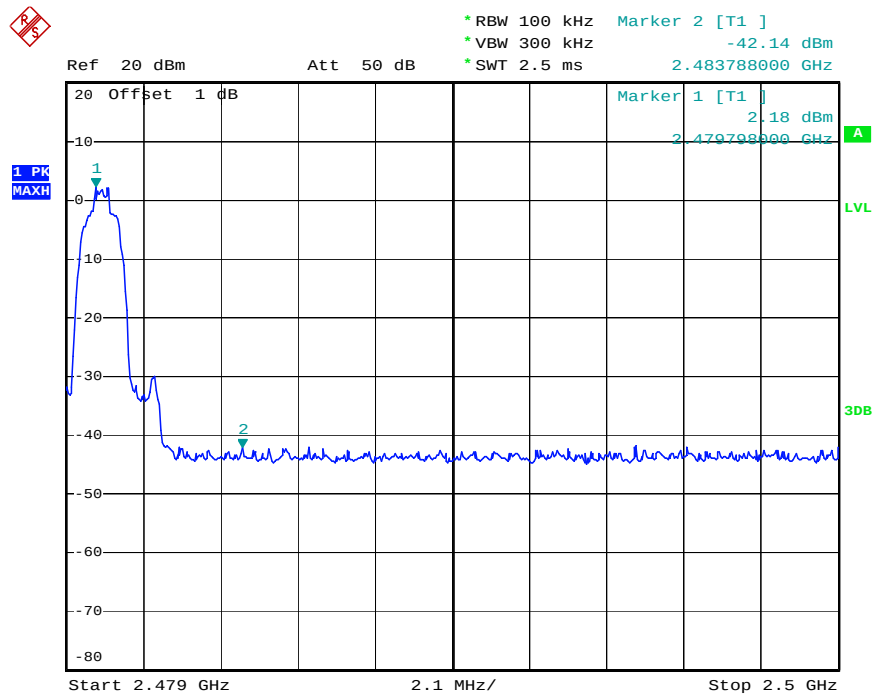
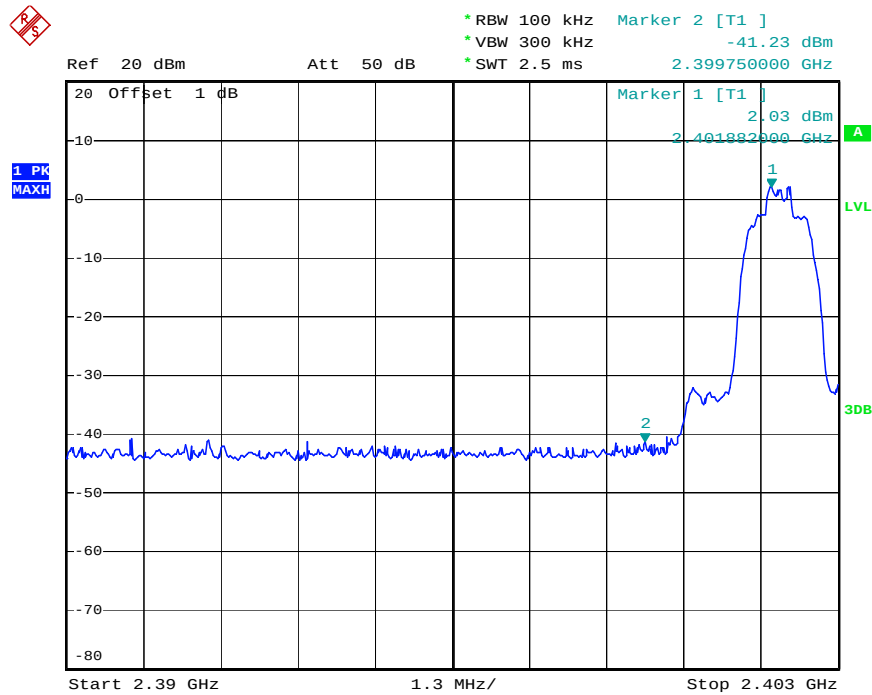
GFSK



Π/4-DQPSK Mode



8DPSK



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.

Non-hopping mode



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Job No.: WCARRY #301

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz(GFSK)

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

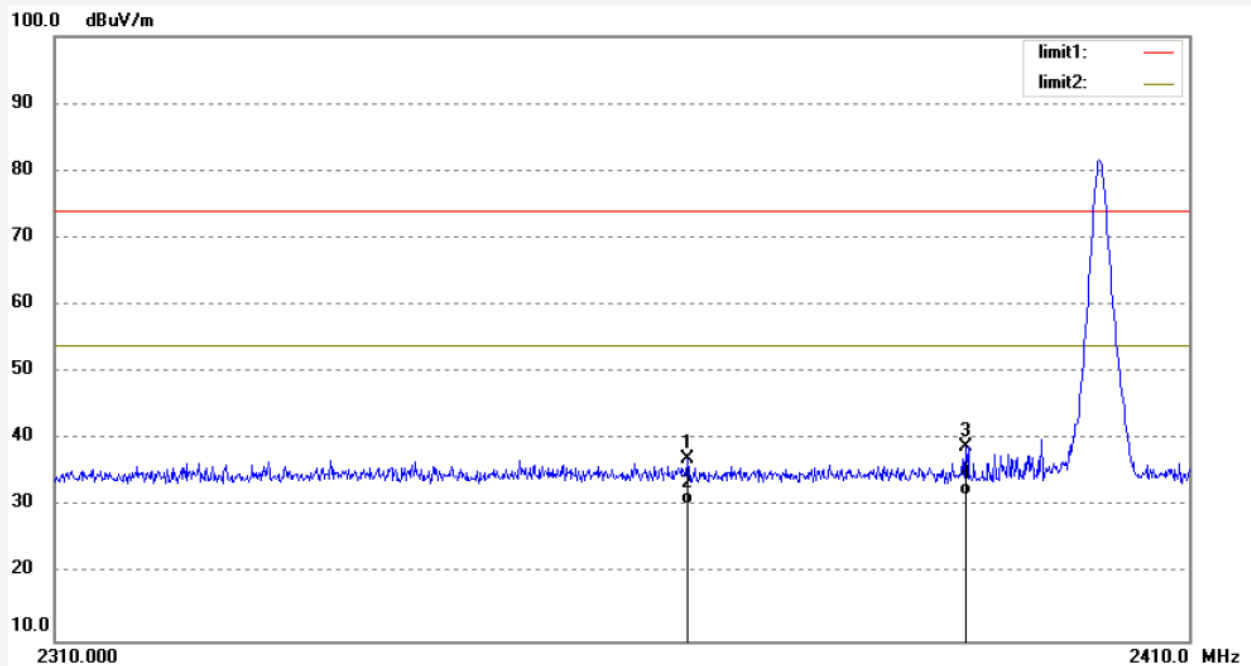
Date: 2014/11/05

Time: 19:53:05

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2365.289	43.44	-6.37	37.07	74.00	-36.93	peak			
2	2365.289	36.82	-6.37	30.45	54.00	-23.55	AVG			
3	2390.000	45.26	-6.31	38.95	74.00	-35.05	peak			
4	2390.000	38.11	-6.31	31.80	54.00	-22.20	AVG			

Job No.: WCARRY #302

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz(GFSK)

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

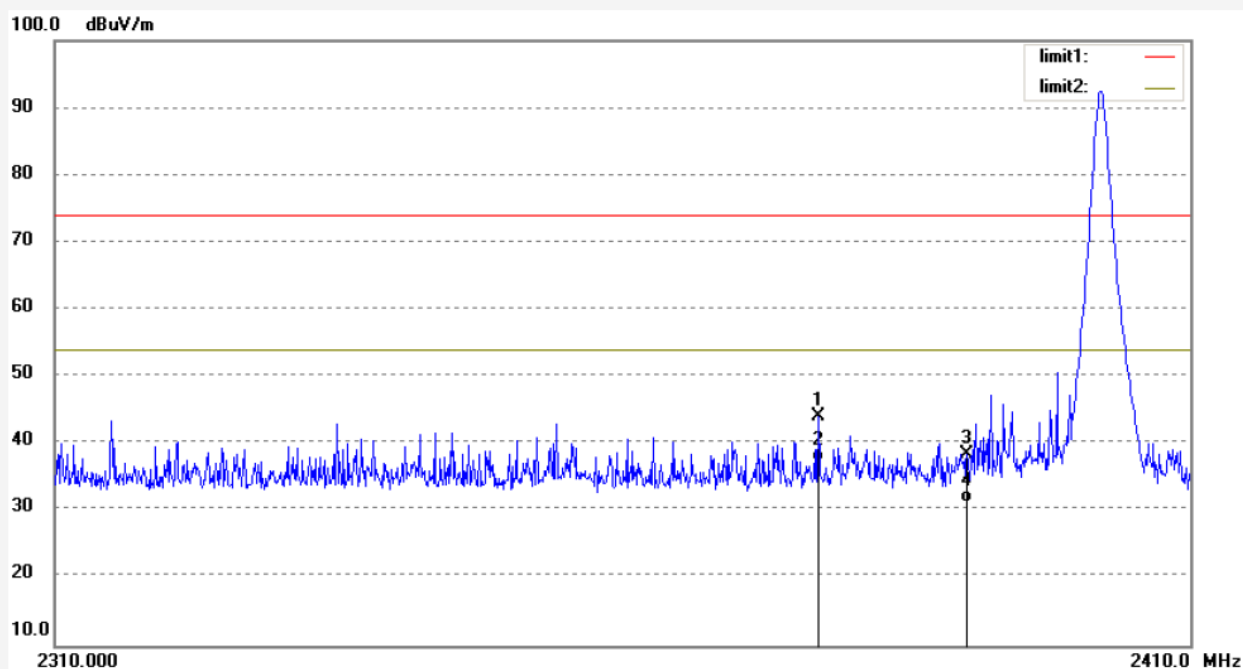
Date: 2014/11/05

Time: 19:54:30

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2376.767	50.41	-6.34	44.07	74.00	-29.93	peak			
2	2376.767	43.62	-6.34	37.28	54.00	-16.72	AVG			
3	2390.000	44.75	-6.31	38.44	74.00	-35.56	peak			
4	2390.000	37.48	-6.31	31.17	54.00	-22.83	AVG			



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Job No.: WCARRY #312

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2480MHz(GFSK)

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

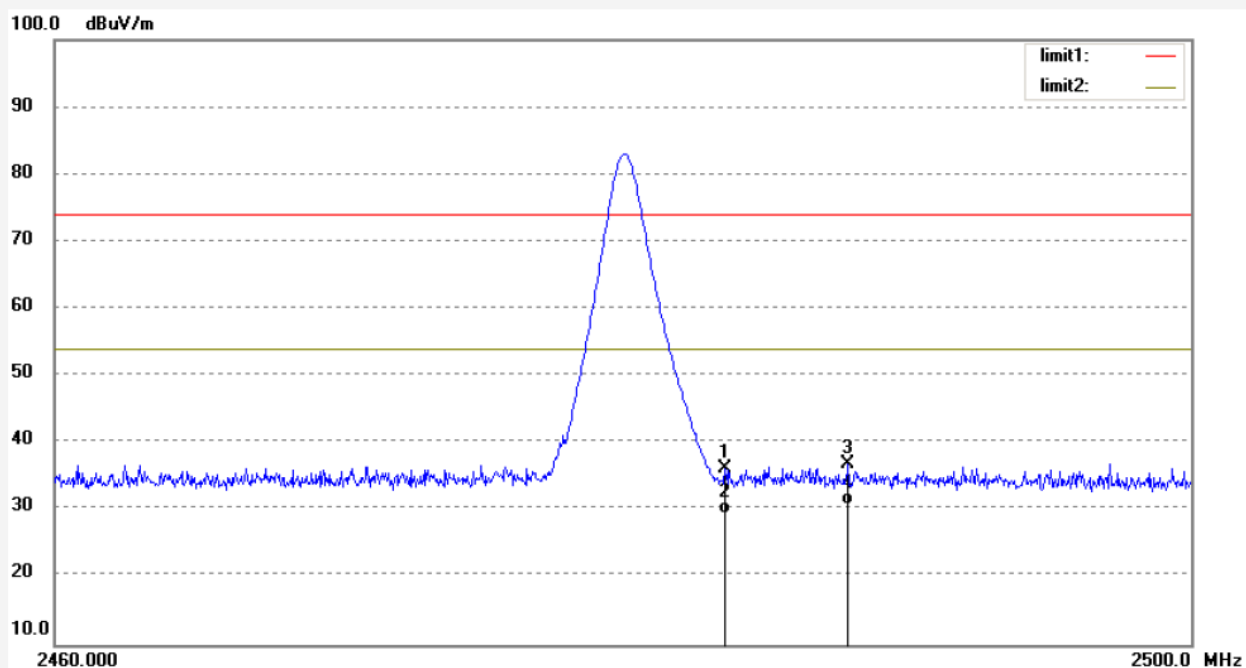
Date: 2014/11/05

Time: 20:09:50

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



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	42.35	-6.04	36.31	74.00	-37.69	peak			
2	2483.500	35.49	-6.04	29.45	54.00	-24.55	AVG			
3	2487.868	43.02	-6.03	36.99	74.00	-37.01	peak			
4	2487.868	36.84	-6.03	30.81	54.00	-23.19	AVG			

Job No.: WCARRY #311

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2480MHz(GFSK)

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

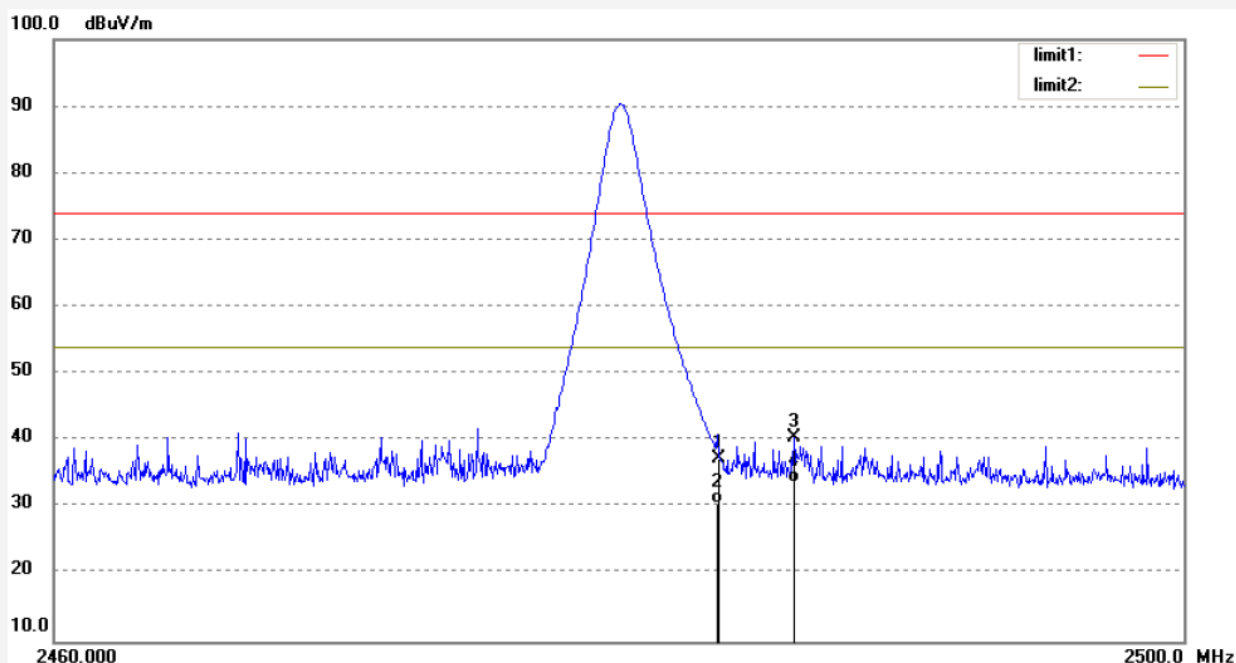
Date: 2014/11/05

Time: 20:08:38

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067

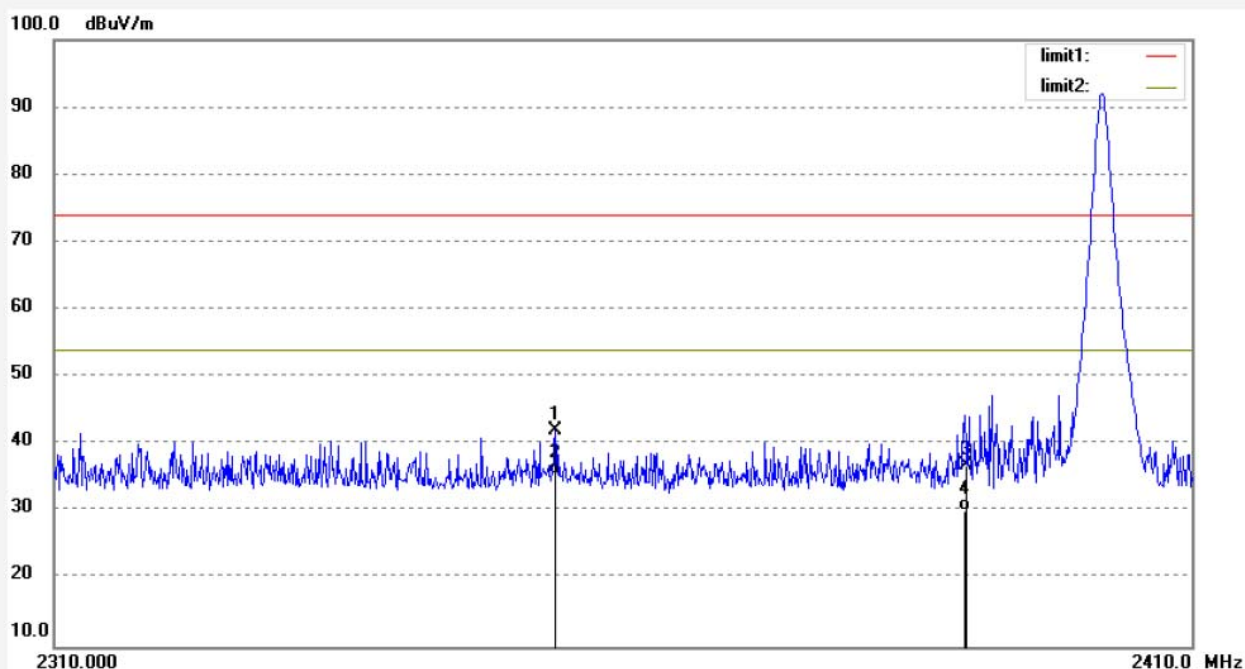


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	43.41	-6.04	37.37	74.00	-36.63	peak			
2	2483.500	36.53	-6.04	30.49	54.00	-23.51	AVG			
3	2486.140	46.62	-6.04	40.58	74.00	-33.42	peak			
4	2486.140	39.69	-6.04	33.65	54.00	-20.35	AVG			

Job No.: WCARRY #303
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2402MHz(PI/4DQPSK)
Model: MD215
Manufacturer: Microlab

Polarization: Vertical
Power Source: DC 5V
Date: 2014/11/05
Time: 19:56:03
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2353.566	48.47	-6.41	42.06	74.00	-31.94	peak			
2	2353.566	41.85	-6.41	35.44	54.00	-18.56	AVG			
3	2390.000	43.17	-6.31	36.86	74.00	-37.14	peak			
4	2390.000	36.52	-6.31	30.21	54.00	-23.79	AVG			

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Job No.: WCARRY #304

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz(PI/4DQPSK)

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

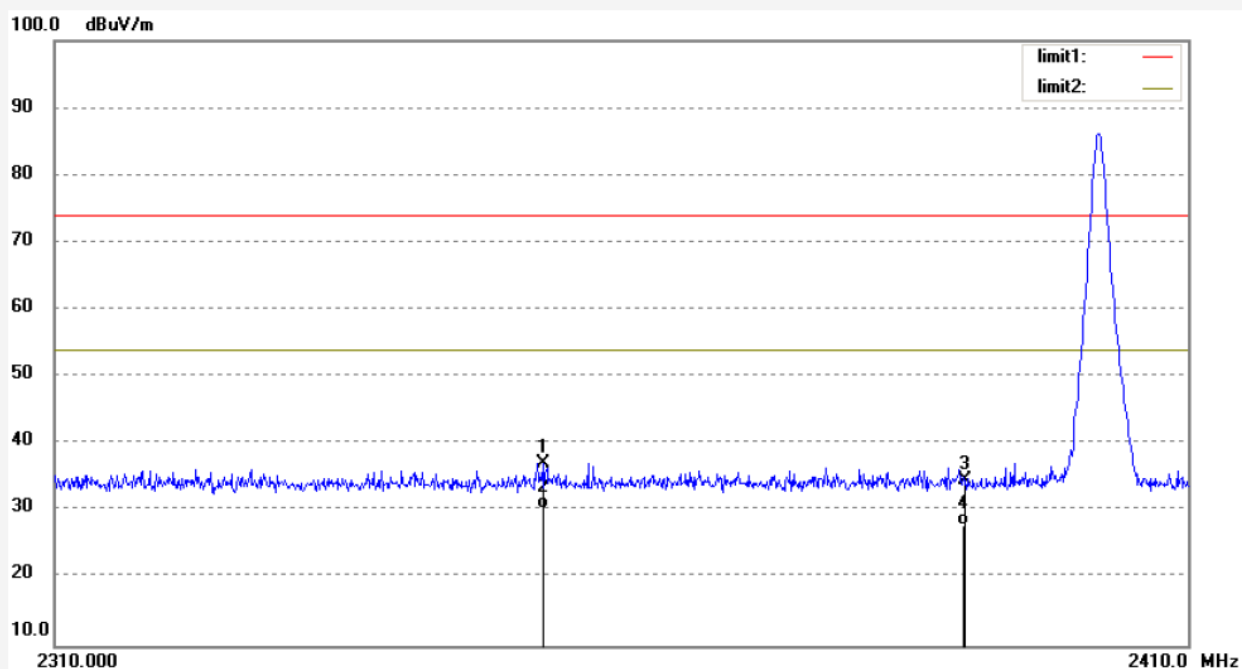
Date: 2014/11/05

Time: 19:57:57

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2352.567	43.54	-6.41	37.13	74.00	-36.87	peak			
2	2352.567	36.76	-6.41	30.35	54.00	-23.65	AVG			
3	2390.000	41.03	-6.31	34.72	74.00	-39.28	peak			
4	2390.000	34.18	-6.31	27.87	54.00	-26.13	AVG			

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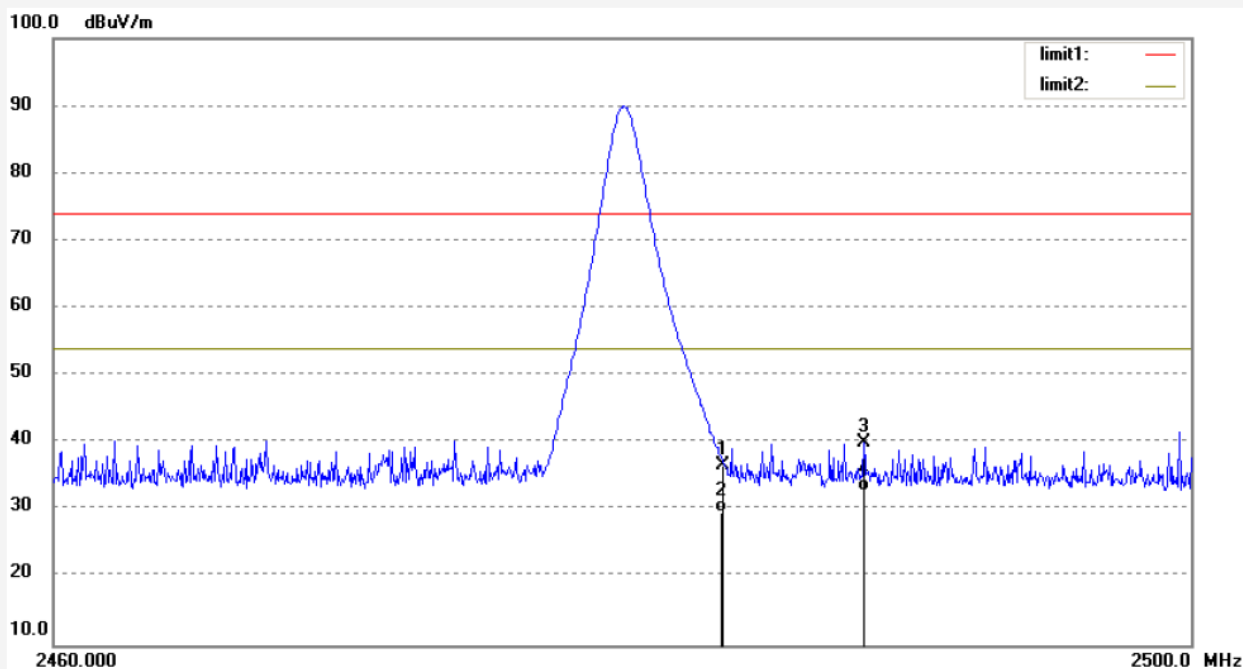
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: WCARRY #310
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2480MHz(PI/4DQPSK)
Model: MD215
Manufacturer: Microlab

Polarization: Vertical
Power Source: DC 5V
Date: 2014/11/05
Time: 20:07:24
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



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	42.69	-6.04	36.65	74.00	-37.35	peak			
2	2483.500	35.84	-6.04	29.80	54.00	-24.20	AVG			
3	2488.431	45.96	-6.03	39.93	74.00	-34.07	peak			
4	2488.431	38.85	-6.03	32.82	54.00	-21.18	AVG			

Job No.: WCARRY #309

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2480MHz(PI/4DQPSK)

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

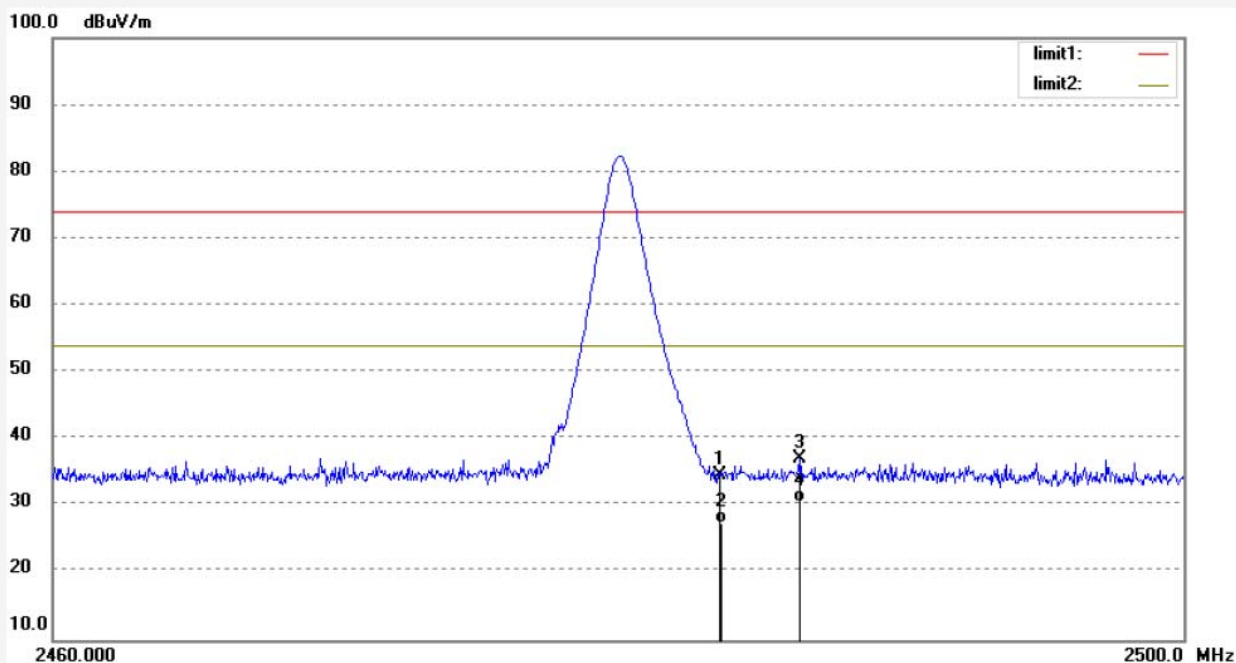
Date: 2014/11/05

Time: 20:06:16

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



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	40.71	-6.04	34.67	74.00	-39.33	peak			
2	2483.500	33.49	-6.04	27.45	54.00	-26.55	AVG			
3	2486.340	43.12	-6.04	37.08	74.00	-36.92	peak			
4	2486.340	36.59	-6.04	30.55	54.00	-23.45	AVG			

Job No.: WCARRY #305

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz(8DPSK)

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

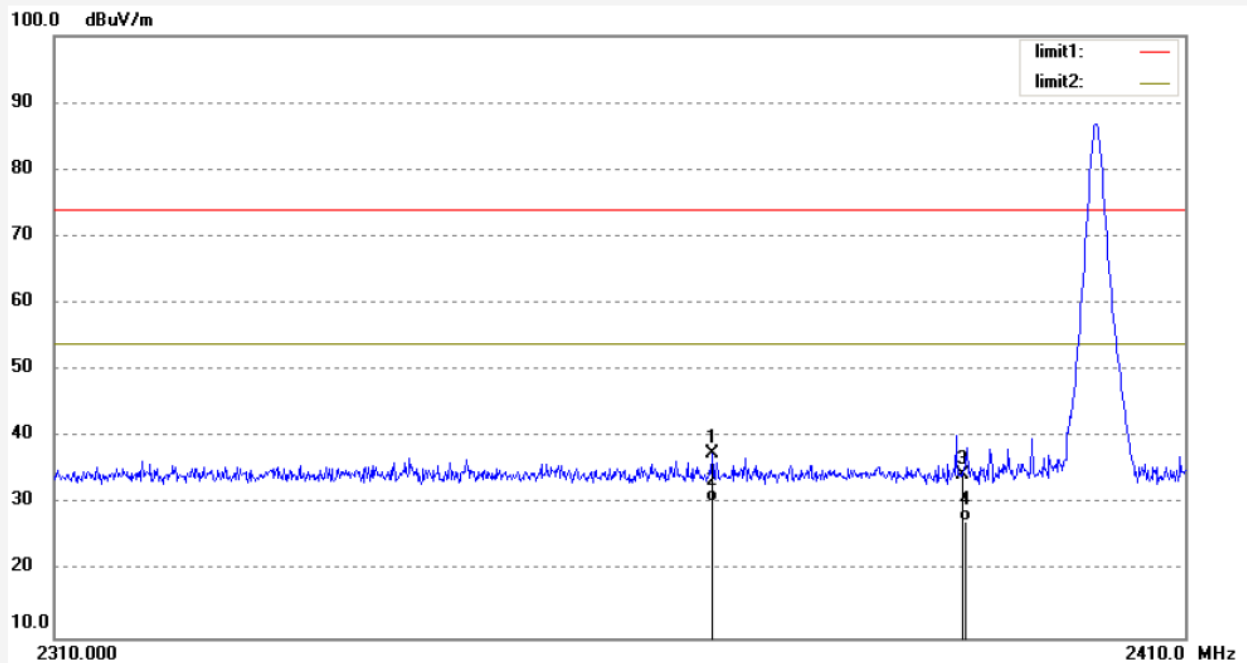
Date: 2014/11/05

Time: 19:59:18

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2367.700	43.85	-6.36	37.49	74.00	-36.51	peak			
2	2367.700	36.67	-6.36	30.31	54.00	-23.69	AVG			
3	2390.000	40.76	-6.31	34.45	74.00	-39.55	peak			
4	2390.000	33.84	-6.31	27.53	54.00	-26.47	AVG			

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Job No.: WCARRY #306

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2402MHz(8DPSK)

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

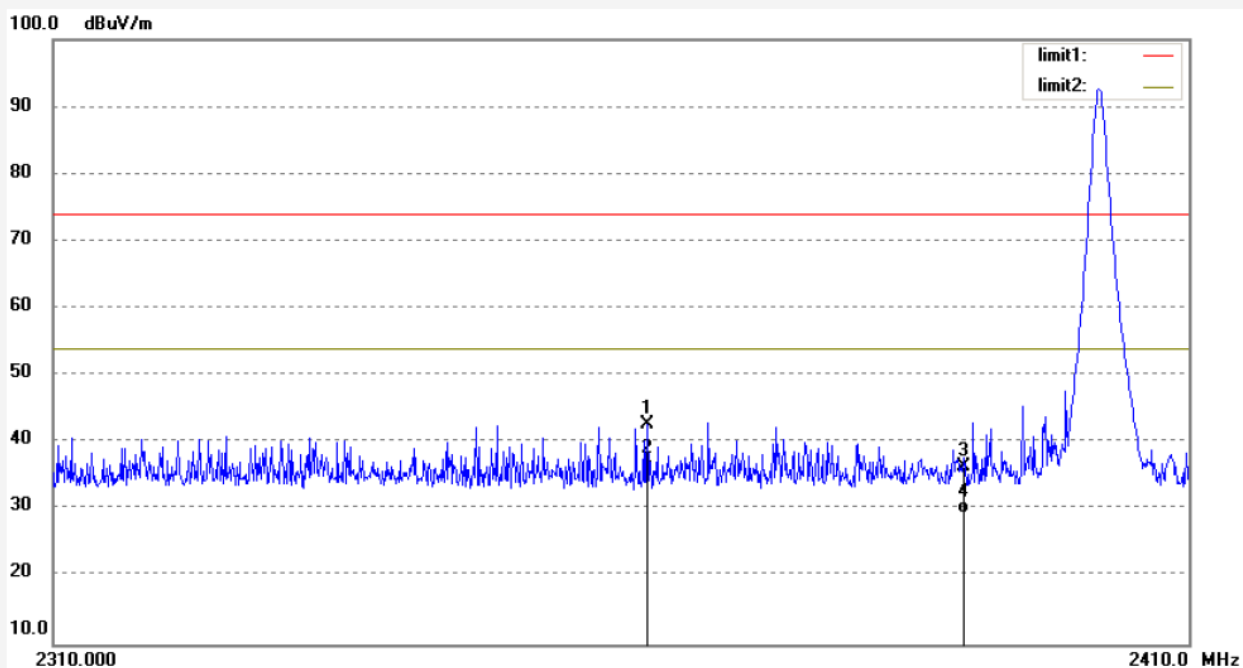
Date: 2014/11/05

Time: 20:01:18

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2361.776	49.02	-6.39	42.63	74.00	-31.37	peak			
2	2361.776	42.38	-6.39	35.99	54.00	-18.01	AVG			
3	2390.000	42.85	-6.31	36.54	74.00	-37.46	peak			
4	2390.000	35.73	-6.31	29.42	54.00	-24.58	AVG			

Job No.: WCARRY #308

Standard: FCC PK

Test item: Radiation Test

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

EUT: Portable bluetooth speaker

Mode: TX 2480MHz(8DPSK)

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

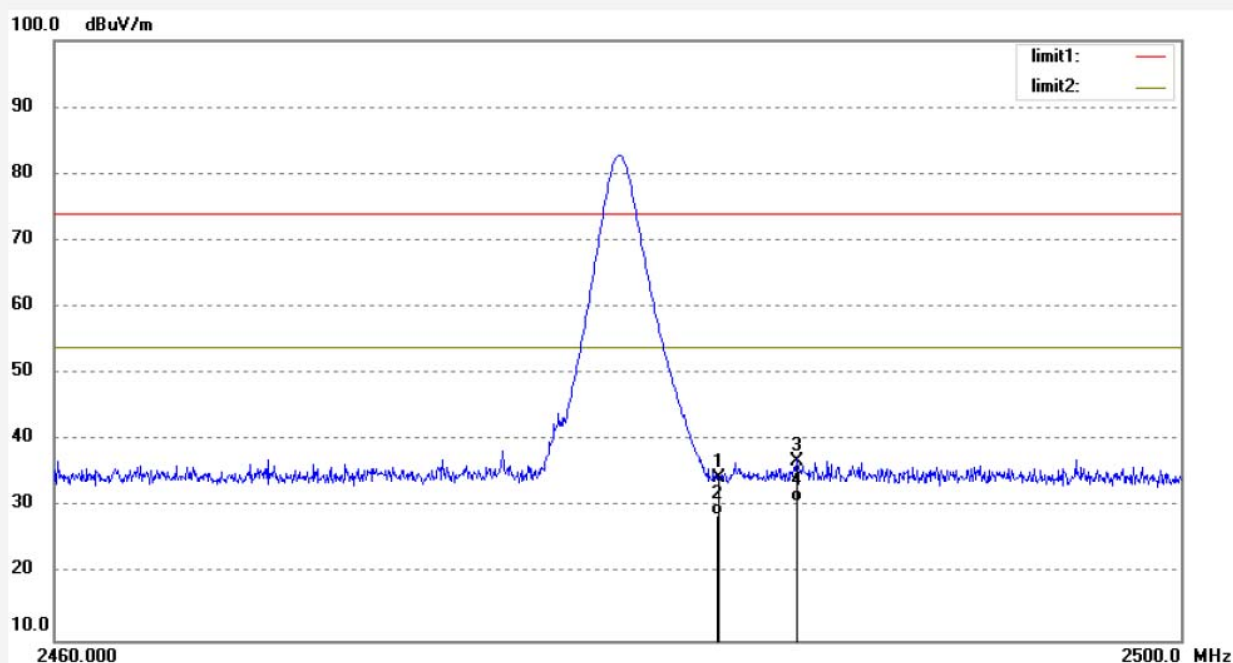
Date: 2014/11/05

Time: 20:04:46

Engineer Signature: Carry

Distance: 3m

Note: Report NO.:ATE20142067

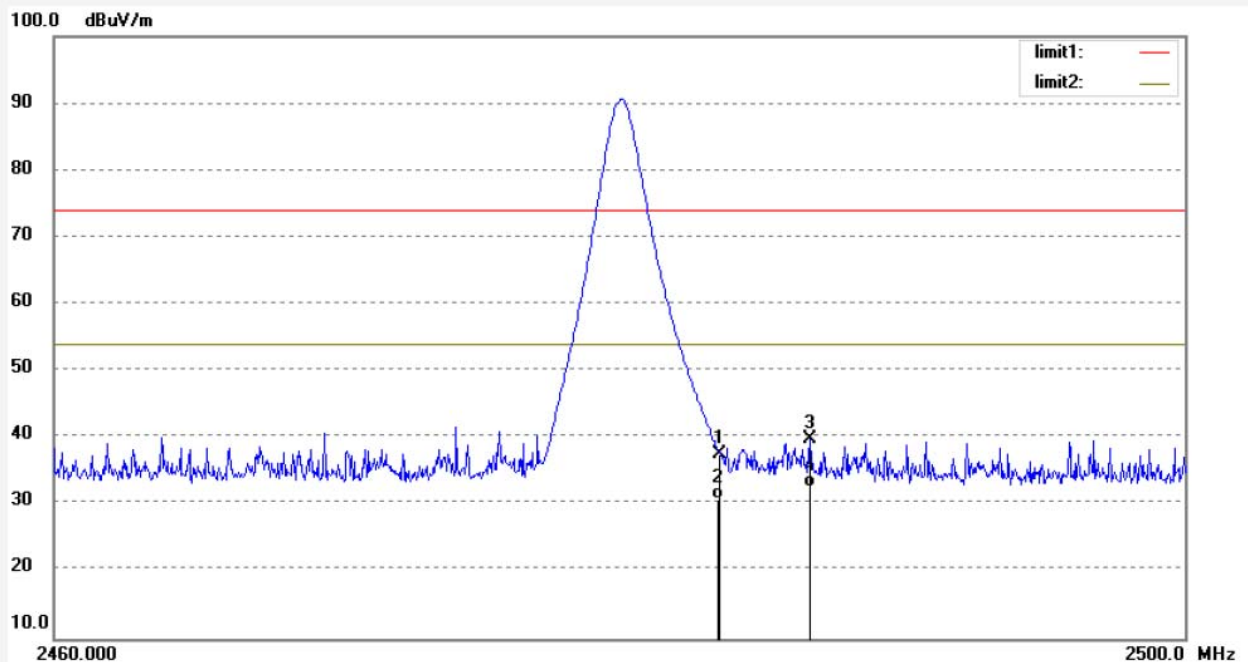


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	40.36	-6.04	34.32	74.00	-39.68	peak			
2	2483.500	34.84	-6.04	28.80	54.00	-25.20	AVG			
3	2486.300	43.04	-6.04	37.00	74.00	-37.00	peak			
4	2486.300	36.94	-6.04	30.90	54.00	-23.10	AVG			

Job No.: WCARRY #307
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Portable bluetooth speaker
Mode: TX 2480MHz(8DPSK)
Model: MD215
Manufacturer: Microlab

Polarization: Vertical
Power Source: DC 5V
Date: 2014/11/05
Time: 20:03:18
Engineer Signature: Carry
Distance: 3m

Note: Report NO.:ATE20142067



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	43.56	-6.04	37.52	74.00	-36.48	peak			
2	2483.500	36.84	-6.04	30.80	54.00	-23.20	AVG			
3	2486.662	45.78	-6.03	39.75	74.00	-34.25	peak			
4	2486.662	38.65	-6.03	32.62	54.00	-21.38	AVG			

Hopping mode



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Job No.: CARRY #467

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Portable Bluetooth Speaker

Mode: TX GFSK

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

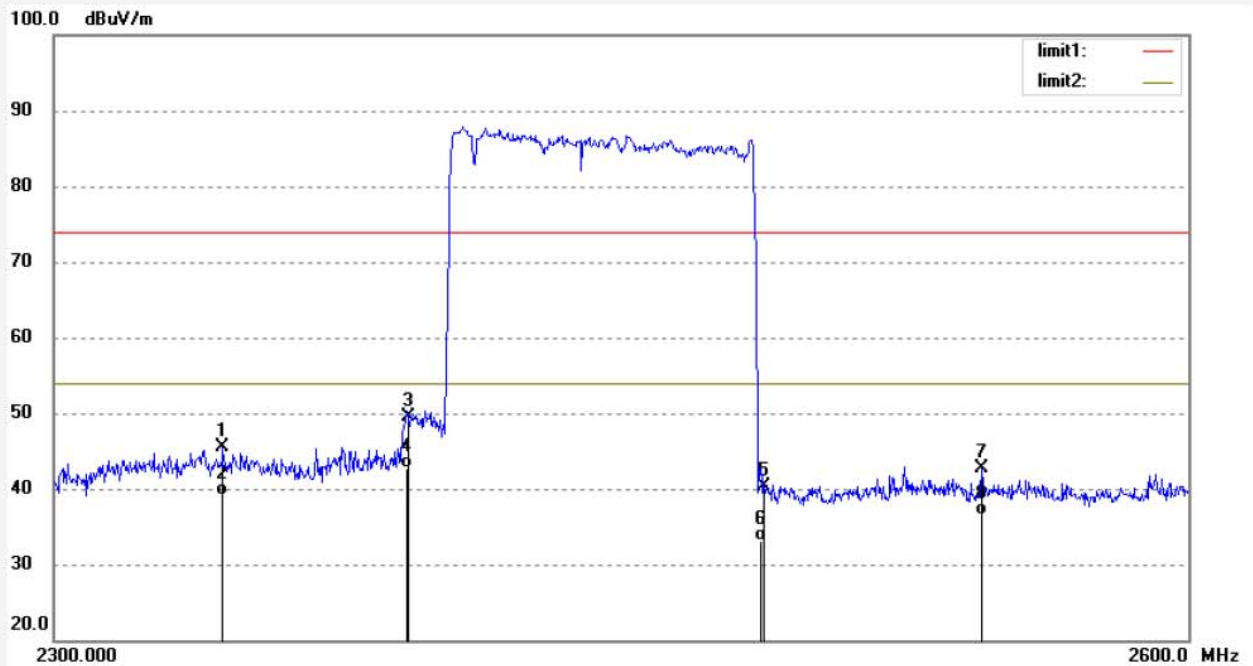
Date: 14/11/08/

Time: 9/38/03

Engineer Signature: Carry

Distance: 3m

Note: Report NO.: ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2342.600	53.36	-7.79	45.57	74.00	-28.43	peak			
2	2342.600	46.82	-7.79	39.03	54.00	-14.97	AVG			
3	2390.000	57.07	-7.53	49.54	74.00	-24.46	peak			
4	2390.000	50.24	-7.53	42.71	54.00	-11.29	AVG			
5	2483.500	47.60	-7.37	40.23	74.00	-33.77	peak			
6	2483.500	40.38	-7.37	33.01	54.00	-20.99	AVG			
7	2542.700	49.74	-7.02	42.72	74.00	-31.28	peak			
8	2542.700	43.48	-7.02	36.46	54.00	-17.54	AVG			

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Job No.: CARRY #468

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Portable Bluetooth Speaker

Mode: TX GFSK

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

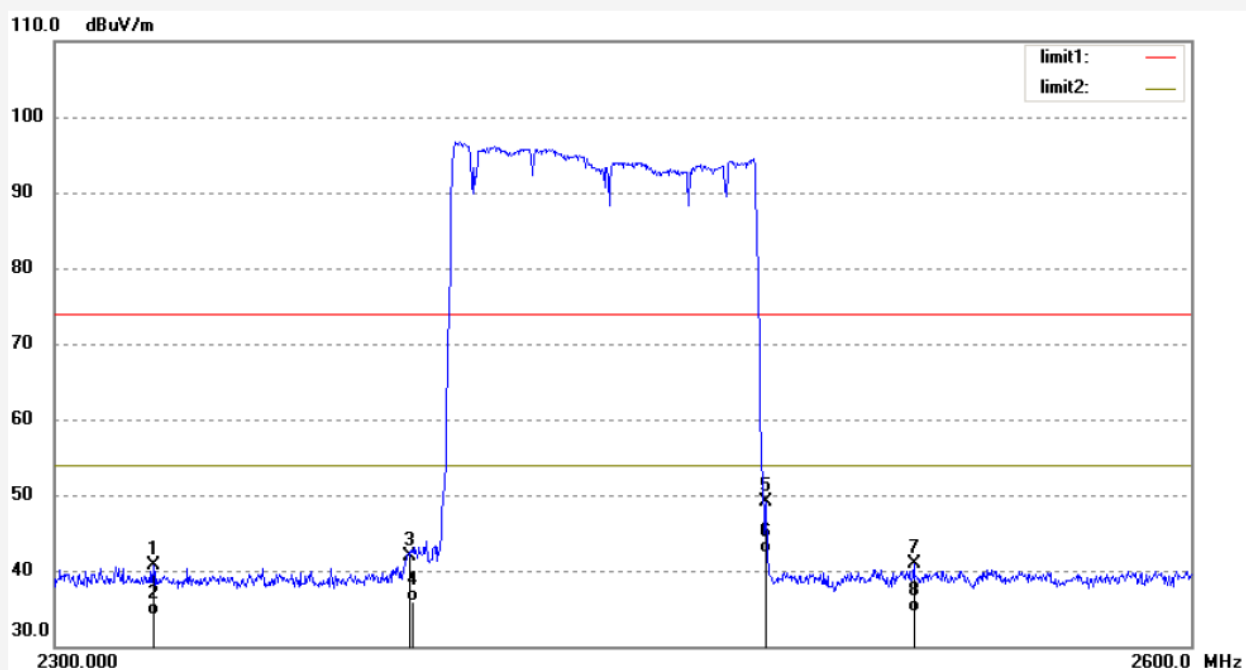
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Time: 9/39/56

Engineer Signature: Carry

Distance: 3m

Note: Report NO.: ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2324.900	48.48	-7.81	40.67	74.00	-33.33	peak			
2	2324.900	41.82	-7.81	34.01	54.00	-19.99	AVG			
3	2390.000	49.40	-7.53	41.87	74.00	-32.13	peak			
4	2390.000	43.39	-7.53	35.86	54.00	-18.14	AVG			
5	2483.500	56.46	-7.37	49.09	74.00	-24.91	peak			
6	2483.500	49.62	-7.37	42.25	54.00	-11.75	AVG			
7	2523.500	48.00	-7.19	40.81	74.00	-33.19	peak			
8	2523.500	41.72	-7.19	34.53	54.00	-19.47	AVG			

Job No.: CARRY #469

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Portable Bluetooth Speaker

Mode: TX PI/4DQPSK

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

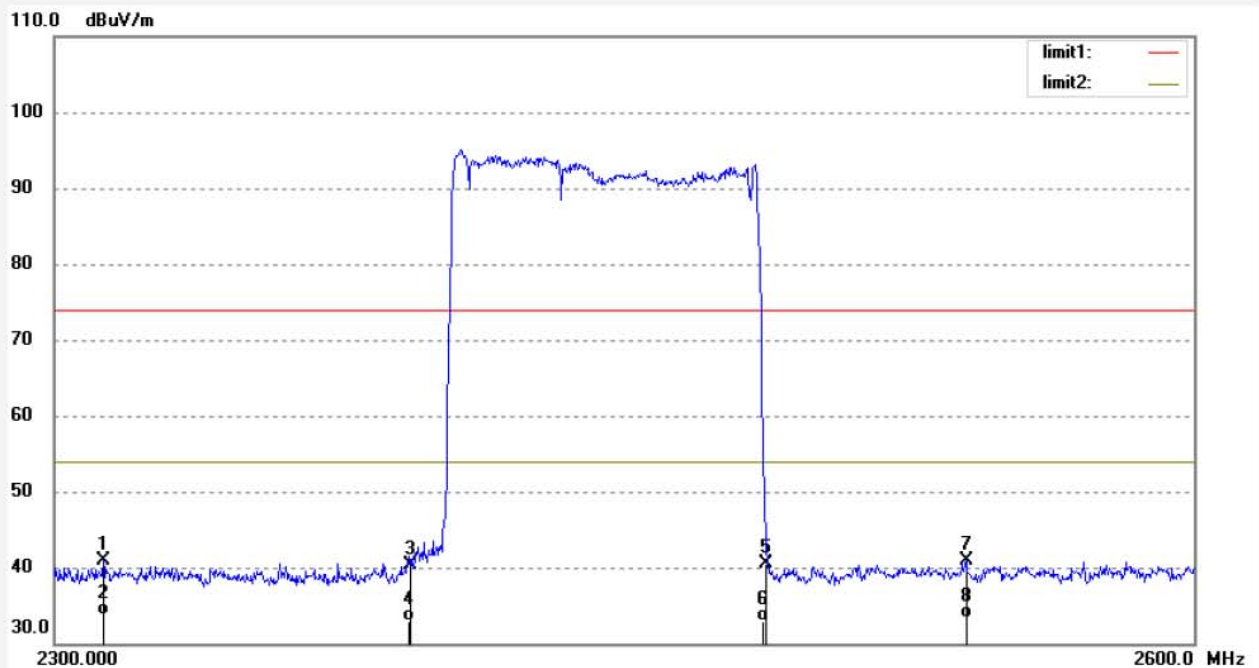
Date: 14/11/08/

Time: 9/42/36

Engineer Signature: Carry

Distance: 3m

Note: Report NO.: ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2312.300	48.80	-7.82	40.98	74.00	-33.02	peak			
2	2312.300	41.62	-7.82	33.80	54.00	-20.20	AVG			
3	2390.000	47.85	-7.53	40.32	74.00	-33.68	peak			
4	2390.000	40.48	-7.53	32.95	54.00	-21.05	AVG			
5	2483.500	47.88	-7.37	40.51	74.00	-33.49	peak			
6	2483.500	40.37	-7.37	33.00	54.00	-21.00	AVG			
7	2537.300	47.94	-7.08	40.86	74.00	-33.14	peak			
8	2537.300	40.48	-7.08	33.40	54.00	-20.60	AVG			

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Job No.: CARRY #470

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Portable Bluetooth Speaker

Mode: TX PI/4DQPSK

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

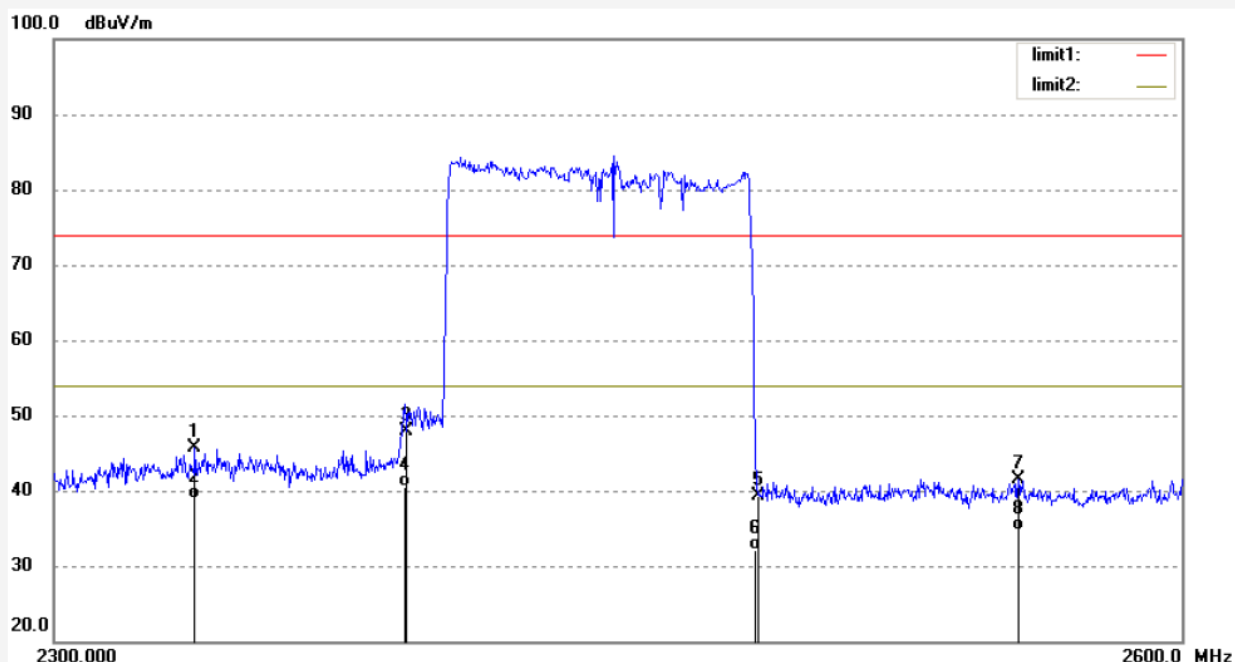
Date: 14/11/08/

Time: 9/44/51

Engineer Signature: Carry

Distance: 3m

Note: Report NO.: ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2335.700	53.57	-7.80	45.77	74.00	-28.23	peak			
2	2335.700	46.72	-7.80	38.92	54.00	-15.08	AVG			
3	2390.000	55.46	-7.53	47.93	74.00	-26.07	peak			
4	2390.000	48.08	-7.53	40.55	54.00	-13.45	AVG			
5	2483.500	46.68	-7.37	39.31	74.00	-34.69	peak			
6	2483.500	39.48	-7.37	32.11	54.00	-21.89	AVG			
7	2554.400	48.49	-6.94	41.55	74.00	-32.45	peak			
8	2554.400	41.68	-6.94	34.74	54.00	-19.26	AVG			

Job No.: CARRY #471

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Portable Bluetooth Speaker

Mode: TX 8DPSK

Model: MD215

Manufacturer: Microlab

Polarization: Vertical

Power Source: DC 5V

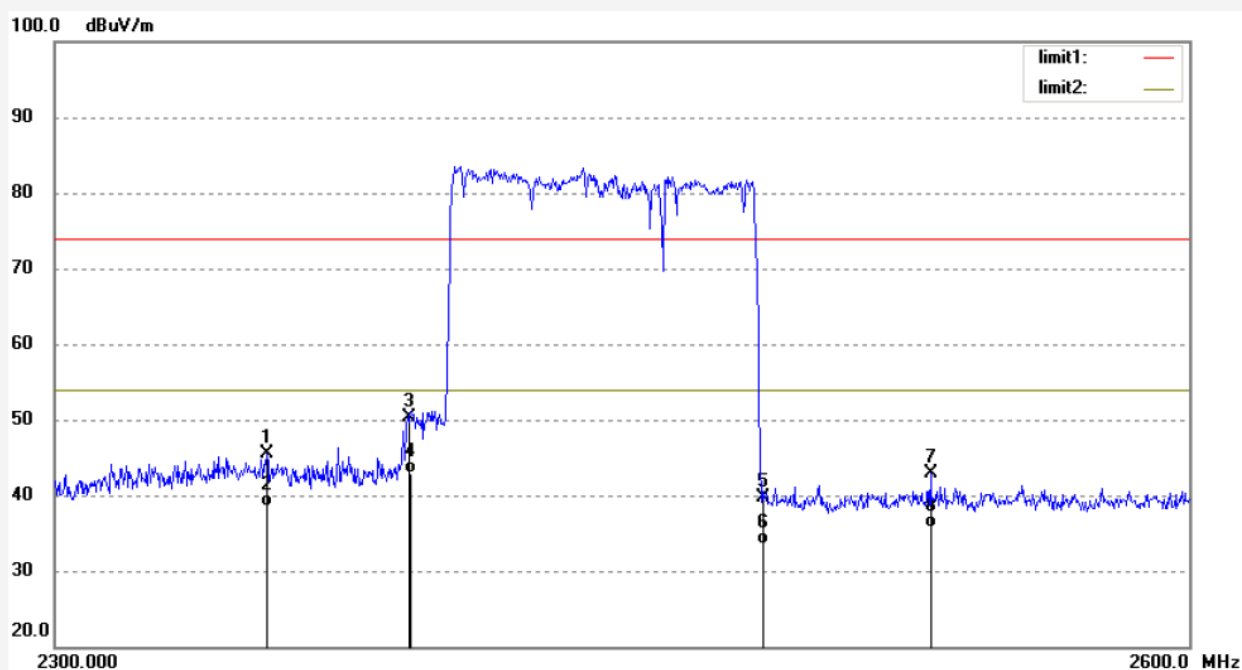
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Time: 9/46/46

Engineer Signature: Carry

Distance: 3m

Note: Report NO.: ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2353.400	53.36	-7.77	45.59	74.00	-28.41	peak			
2	2353.400	46.22	-7.77	38.45	54.00	-15.55	AVG			
3	2390.000	57.92	-7.53	50.39	74.00	-23.61	peak			
4	2390.000	50.37	-7.53	42.84	54.00	-11.16	AVG			
5	2483.500	47.00	-7.37	39.63	74.00	-34.37	peak			
6	2483.500	40.89	-7.37	33.52	54.00	-20.48	AVG			
7	2528.600	49.96	-7.15	42.81	74.00	-31.19	peak			
8	2528.600	42.84	-7.15	35.69	54.00	-18.31	AVG			

Job No.: CARRY #472

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Portable Bluetooth Speaker

Mode: TX 8DPSK

Model: MD215

Manufacturer: Microlab

Polarization: Horizontal

Power Source: DC 5V

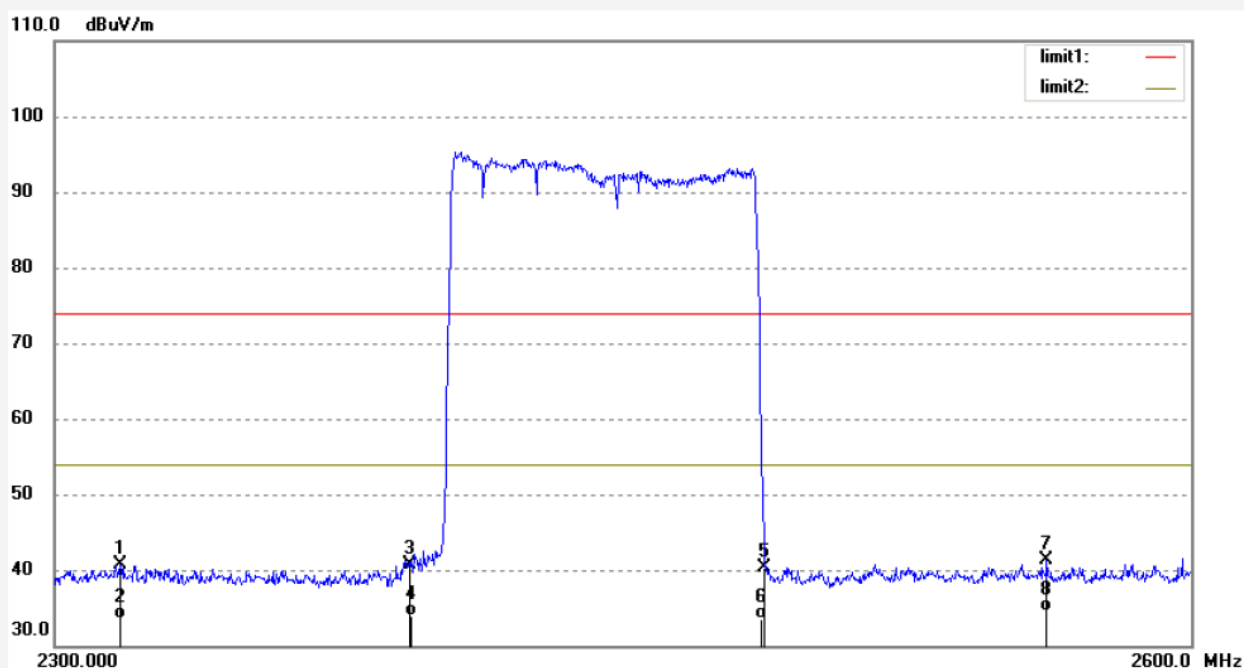
Date: 14/11/08/

Time: 9/49/29

Engineer Signature: Carry

Distance: 3m

Note: Report NO.: ATE20142067



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2316.500	48.50	-7.82	40.68	74.00	-33.32	peak			
2	2316.500	41.28	-7.82	33.46	54.00	-20.54	AVG			
3	2390.000	48.17	-7.53	40.64	74.00	-33.36	peak			
4	2390.000	41.51	-7.53	33.98	54.00	-20.02	AVG			
5	2483.500	47.65	-7.37	40.28	74.00	-33.72	peak			
6	2483.500	40.84	-7.37	33.47	54.00	-20.53	AVG			
7	2560.100	48.25	-6.91	41.34	74.00	-32.66	peak			
8	2560.100	41.38	-6.91	34.47	54.00	-19.53	AVG			

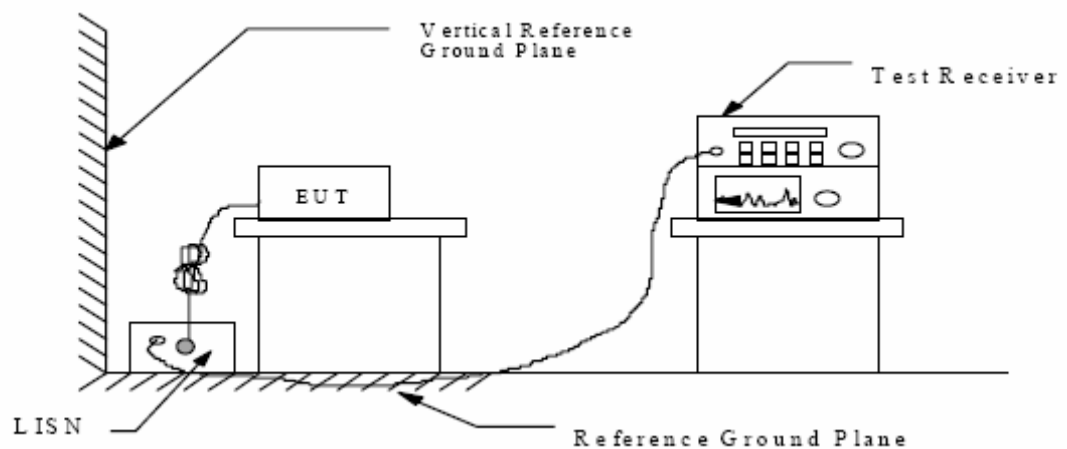
12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART

15 SECTION 15.207(A)

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators

12.1.2.Shielding Room Test Setup Diagram



(EUT: PORTABLE BLUETOOTH SPEAKER)

12.2.The Emission Limit

12.2.1.Conducted Emission Measurement Limits According to Section 15.207(a)

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

* Decreases with the logarithm of the frequency.

12.3.Configuration of EUT on Measurement

The equipment are installed on the Conducted 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 (Operation) mode 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 C63.4- 2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

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

12.6.Power Line Conducted Emission Measurement Results

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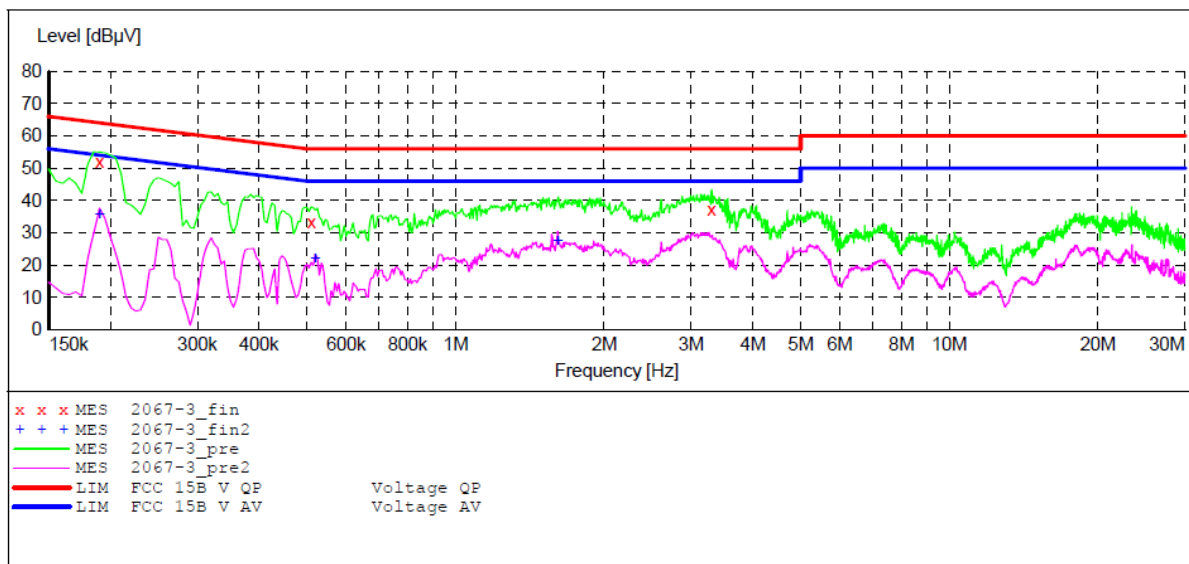
CONDUCTED EMISSION STANDARD FCC PART15B

EUT: Portable Bluetooth Speaker M/N:MD215
 Manufacturer: Microlab
 Operating Condition: BT
 Test Site: 1#Shielding Room
 Operator: Carry
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20142067
 Start of Test: 11/5/2014 / 9:57:49AM

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

Short Description: _SUB_STD_VTERM2 1.70

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



MEASUREMENT RESULT: "2067-3_fin"

11/5/2014 10:00AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.190000	51.90	10.5	64	12.1	QP	L1	GND
0.510000	33.40	10.7	56	22.6	QP	L1	GND
3.300000	37.00	11.1	56	19.0	QP	L1	GND

MEASUREMENT RESULT: "2067-3_fin2"

11/5/2014 10:00AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.190000	35.50	10.5	54	18.5	AV	L1	GND
0.520000	22.10	10.7	46	23.9	AV	L1	GND
1.610000	27.40	10.9	46	18.6	AV	L1	GND

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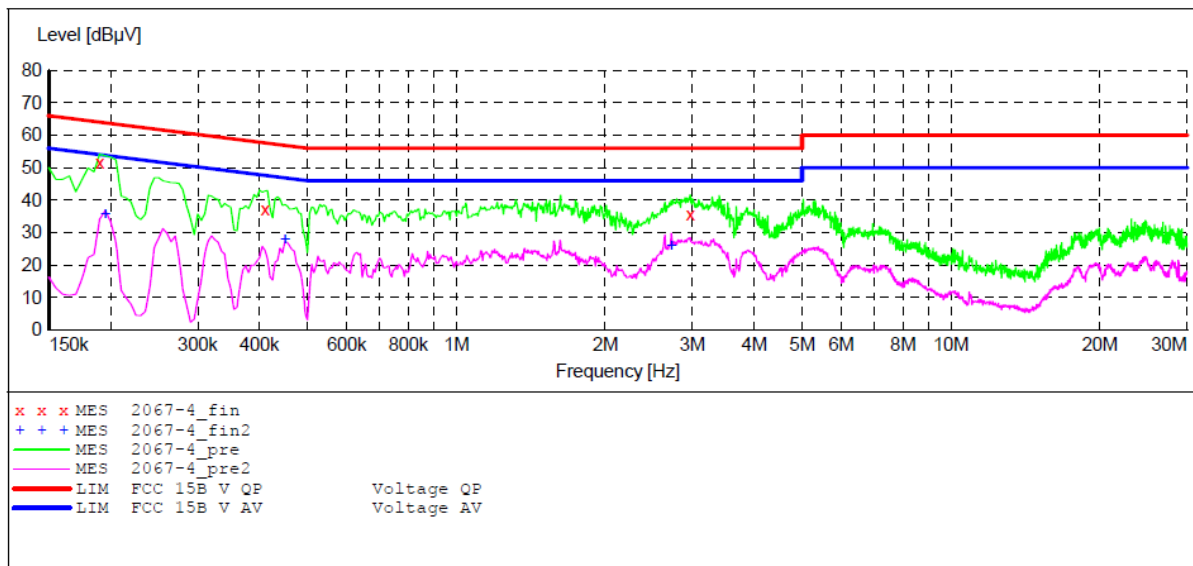
CONDUCTED EMISSION STANDARD FCC PART15B

EUT: Portable Bluetooth Speaker M/N:MD215
 Manufacturer: Microlab
 Operating Condition: BT
 Test Site: 1#Shielding Room
 Operator: Carry
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20142067
 Start of Test: 11/5/2014 / 10:01:10AM

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

Short Description: _SUB_STD_VTERM2 1.70

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



MEASUREMENT RESULT: "2067-4_fin"

11/5/2014 10:04AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.190000	51.50	10.5	64	12.5	QP	N	GND
0.410000	37.30	10.7	58	20.3	QP	N	GND
2.970000	35.70	11.1	56	20.3	QP	N	GND

MEASUREMENT RESULT: "2067-4_fin2"

11/5/2014 10:04AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.195000	35.50	10.5	54	18.3	AV	N	GND
0.450000	27.80	10.7	47	19.1	AV	N	GND
2.720000	25.80	11.0	46	20.2	AV	N	GND

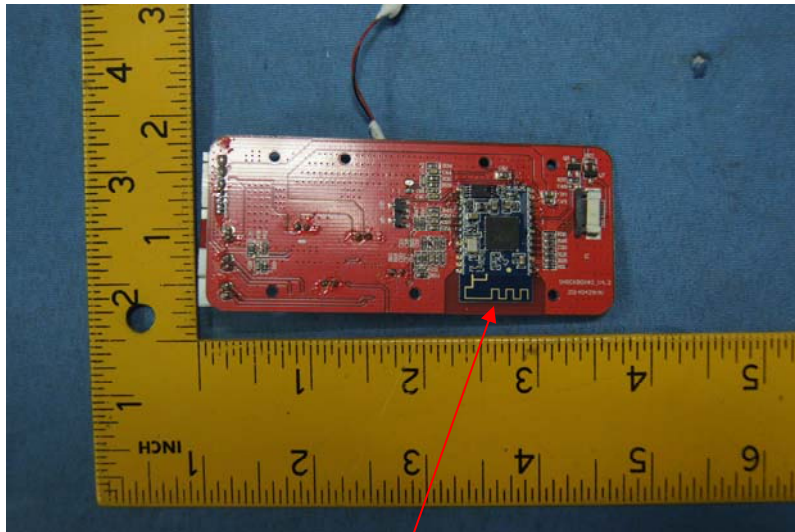
13.ANTENNA REQUIREMENT

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

The antenna is PCB antenna, no consideration of replacement. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna