# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
# INTENTIONAL RADIATOR CERTIFICATION TO
# FCC PART 15 SUBPART C
# REQUIREMENT T

*OF*

15' rechargeable speaker

MODEL No.: PBX4000BAT

Trademark: N/A

FCC ID: 2AIV2-PBX4000BAT

REPORT NO: ES160617017E

ISSUE DATE: June 27, 2016

*Prepared for*

MR DJ INC.

1800E WASHINGTON BLVD LOS ANGELES,CA 90021

*Prepared by*

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# VERIFICATION OF COMPLIANCE

| | | |
|---|---|---|
| Applicant | : | MR DJ INC.<br>1800E WASHINGTON BLVD LOS ANGELES,CA 90021 |
| Manufacturer | : | ZHEJIANG TONOCH ELECTRONICS LIMITED COMPANY<br>No.1111, Jinhai Road,East Cixi Coastal District,Ningbo(315000),China |
| Product Description | : | 15' rechargeable speaker |
| Brand Name | : | N/A |
| Model Number | : | PBX4000BAT |
| File Number | : | ES160617017E |
| Date of Test: | : | May 10, 2016 to June 27 , 2016 |

**We hereby certify that:**

The above equipment was tested by EMTEK (SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

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

Date of Test : May 10, 2016 to June 27 , 2016

Prepared by : Joe Xia

Joe Xia /Editor

Reviewer : Yaping Shen

Yaping Shen /Supervisor

Approve & Authorized Signer :

Lisa Wang/Manager

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# 1. General Information

## 1.1 Product Description

MR DJ INC
Model: PBX4000BAT (referred to as the EUT in this report) The EUT (15' rechargeable speaker) is an short range, lower power Device. It is designed by way of utilizing the GFSK, π/4-DQPSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2402-2480MHz
B). Modulation: GFSK, π/4-DQPSK
C). Number of Channel: 79
D). Channel Space: 1MHz
E). BIT Rate of Transmission: 1Mbps, 2Mbps
F). Antenna Type: PCB antenna
G). Antenna Gain: 3.3dBi
H). AC Supply: INPUT AC 120V, 60Hz
I).DC Supply:DC 12V lead-acid battery

## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for 2AIV2-PBX4000BAT filing to comply with Section 15.247 of the FCC Part 15 Subpart C Rules.

## 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10 -2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4 Special Accessories

Not available for this EUT intended for grant.

## 1.5 Equipment Modifications

Not available for this EUT intended for grant.

## 1.6 Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2013.10.29
The certificate is valid until 2016.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen 2010.5.25
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, April 17, 2014
The Certificate Registration Number is 406365.

Accredited by Industry Canada, November 29, 2012
The Certificate Registration Number is 4480A-4

Name of Firm : EMTEK (SHENZHEN) CO., LTD

Site Location : Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

# 2. System Test Configuration

## 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

## 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

## 2.3 Test Procedure

### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

### 2.3.2 Radiated Emissions

The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this KoolMAX 40-Quart Wheeled Cooler, Bluetooth PA System and Charging Station (EUT) was rotated through three orthogonal axes according to the requirements in section 6.4, section 6.5 and section 6.6 of ANSI C63.10-2013

## 2.4 Limitation

**(1) Channel Separation Test**

FCC Part 15, Subpart C Section 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

| Frequency Range (MHz) | Limit(kHz) |
|---|---|
| 902-928 | >25kHz |
| 2400-2483.5 | >25kHz |
| 5725-5850 | >25kHz |

**(2) 20dB Bandwidth**

| Frequency Range(MHz) | Limit(kHz) | | | |
|---|---|---|---|---|
| Quantity of Hopping Channel | 50 | 25 | 15 | 75 |
| 902-928 | <250 | >250 | NA | NA |
| 2400-2483.5 | NA | NA | >1000 | <1000 |

**(3) Quantity of Hopping Channel**

FCC Part 15, Subpart C Section 15.247

| Frequency Range (MHz) | Limit(Quantity of Hopping Channel) | | | |
|---|---|---|---|---|
| | 20dB bandwidth <250kHz | 20dB bandwidth >250kHz | 20dB bandwidth <1MHz | 20dB bandwidth >1MHz |
| 902-928 | 50 | 25 | NA | NA |
| 2400-2483.5 | NA | NA | 75 | 15 |
| 5725-5850 | NA | NA | 75 | NA |

**(4) Time of Occupancy(Dwell Time)**

FCC Part 15, Subpart C Section 15.247

| Frequency Range (MHz) | LIMIT(rms) | | |
|---|---|---|---|
| | 20dB bandwidth <250kHz(50Channel) | 20dB bandwidth >250kHz(25 Channel) | 20dB bandwidth <1MHz(75Channel) |
| 902-928 | 400(20S) | 400(10S) | NA |
| 2400-2483.5 | NA | NA | 400(30S) |
| 5725-5850 | NA | NA | 400(30S) |

**Note:** The "()"is all channel's average time of occupancy.

**(5) Maximum Peak Output Power**

FCC Part 15, Subpart C Section 15.247

| Frequency Range (MHz) | Quantity of Hopping Channel | LIMIT(W) 50 | 25 | 15 | 75 |
|---|---|---|---|---|---|
| 902-928 | | 1(30dBm) | 0.125(21dBm) | NA | NA |
| 2400-2483.5 | | NA | NA | 0.125(21dBm) | 1(30dBm) |
| 5725-5850 | | NA | NA | NA | 1(30dBm) |

**(6) Band edge**

FCC Part15, Subpart C Section 15.247, In any 100kHz bandwidth outside the frequency band in with the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, 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).

| Operating Frequency Range(MHz) | Spurious emission frequency | Limit Peak power ration to emission(dBc) | Emission level(dBuV/m) |
|---|---|---|---|
| 902-928 | <902 | >20 | NA |
| | >928 | >20 | NA |
| | 960-1240 | NA | 54 |
| 2400-2483.5 | <2400 | >20 | NA |
| | >2483.5-2500 | NA | 54 |
| 5725-5850 | <5350-5460 | NA | 54 |
| | <5725 | >20 | NA |
| | >5850 | >20 | NA |

**(7) Conducted Emission**

| Frequency(MHz) | Quasi-peak | Average |
|---|---|---|
| 0.15-0.5 | 66-56 | 56-46 |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

**Note:**

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

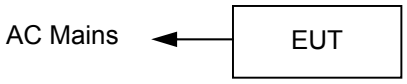
**(8) Radiated Emission**

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

| Frequency (MHz) | Field strength μV/m | Distance(m) | Field strength at 3m dBμV/m |
|---|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 | / |
| 0.490~1.705 | 2400/F(KHz) | 30 | / |
| 1.705~30.0 | 30 | 30 | / |
| 30-88 | 100 | 3 | 40 |
| 88-216 | 150 | 3 | 43.5 |
| 216-960 | 200 | 3 | 46 |
| Above 960 | 500 | 3 | 54 |

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)( dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

## 2.5 Configuration of Tested System



## 2.6 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|---|---|---|---|---|---|---|
| 1. | 15' rechargeable speaker | N/A | PBX4000BAT | 2AIV2-PBX4000BAT | N/A | EUT |
| | | | | | | |

**Note:**
**(1)** Unless otherwise denoted as EUT in『Remark』column, device(s) used in tested system is a support equipment.

## 2.7 Description of Test Modes

The EUT (COOLER SPEAKER) has been tested under normal operating condition. This EUT is a FHSS system. Pre-scanned tests, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test

| Channel | Frequency(MHz) |
|---|---|
| Low channel | 2402 |
| Middle channel | 2441 |
| High channel | 2480 |

# 3. Summary of Test Results

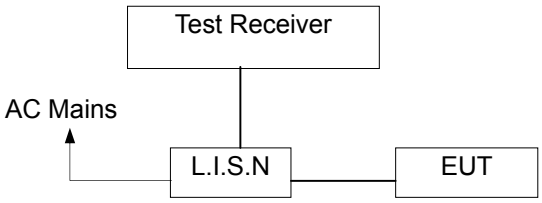
| FCC Rules | Description Of Test | Result |
|---|---|---|
| FCC Part 15.247(a)(1) | Channel Separation Test | Compliant |
| FCC Part 15.247(a)(1) | 20dB Bandwidth | Compliant |
| FCC Part 15.247(a)(1) | Quantity of Hopping Channel | Compliant |
| FCC Part 15.247(a)(1) | Time of Occupancy (Dwell Time) | Compliant |
| FCC Part 15.247(b) | Max Peak Output Power Test | Compliant |
| FCC Part 15.247(d) | Band Edge Test | Compliant |
| FCC Part 15.207 | Conducted Emission | Compliant |
| FCC Part 15.247(d)&15.209 | Radiated Emission | Compliant |
| FCC Part 15.247(d) | Antenna Port Emission | Compliant |
| FCC Part 15.203&15.247(b) | Antenna Requirement | Compliant |

# 4. Conducted Emissions Test

## 4.1 Measurement Procedure

1. The EUT was placed on a table which is 0.1m above ground plane.
2. Maximum procedure was performed on the three highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## 4.2 Test SET-UP (Block Diagram of Configuration)



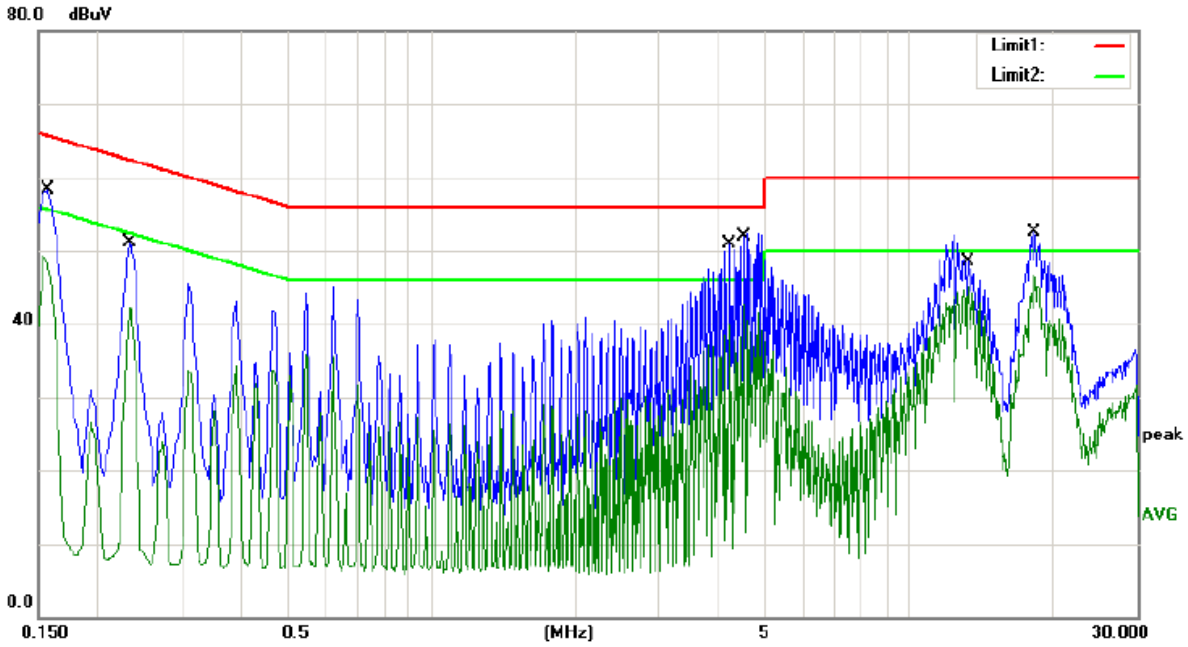

## 4.3 Measurement Equipment Used

| Conducted Emission Test Site | | | | | |
|---|---|---|---|---|---|
| **EQUIPMENT TYPE** | **MFR** | **MODEL NUMBER** | **SERIAL NUMBER** | **LAST CAL.** | **CAL DUE.** |
| Test Receiver | Rohde & Schwarz | ESCS30 | 828985/018 | 05/15/2016 | 05/14/2017 |
| L.I.S.N. | Rohde & Schwarz | ENV216 | 101161 | 05/15/2016 | 05/14/2017 |
| L.I.S.N. | Schwarzbeck | NNLK8129 | 8129203 | 05/15/2016 | 05/14/2017 |
| 50Ω Coaxial Switch | Anritsu | MP59B | M20531 | N/A | N/A |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100006 | 05/15/2016 | 05/14/2017 |

## 4.4 Measurement Equipment Used

Pass.
Please refer to the following data.

Bluetooth Playing




Site site #1 Phase: L1 Temperature: 22

Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 50 %

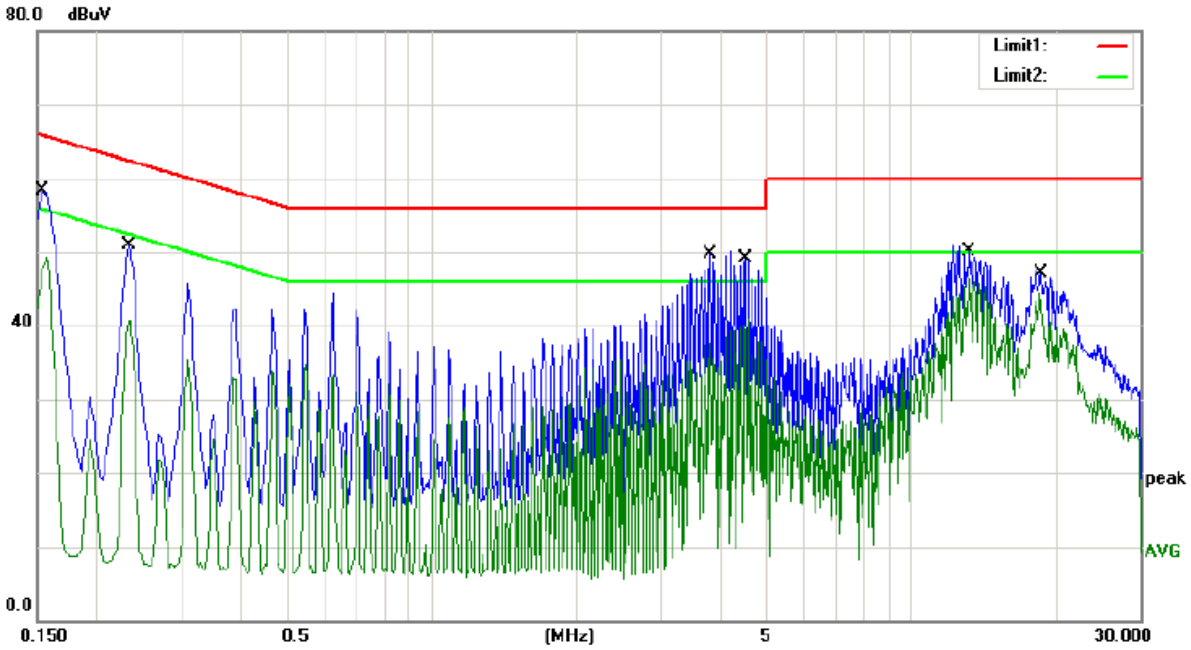
EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode: Bluetooth Playing

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1580 | 47.30 | 11.00 | 58.30 | 65.57 | -7.27 | QP | |
| 2 | | 0.1580 | 36.50 | 11.00 | 47.50 | 55.57 | -8.07 | AVG | |
| 3 | | 0.2340 | 40.10 | 11.00 | 51.10 | 62.31 | -11.21 | QP | |
| 4 | | 0.2340 | 31.20 | 11.00 | 42.20 | 52.31 | -10.11 | AVG | |
| 5 | | 4.2020 | 39.80 | 11.00 | 50.80 | 56.00 | -5.20 | QP | |
| 6 | | 4.2020 | 28.80 | 11.00 | 39.80 | 46.00 | -6.20 | AVG | |
| 7 | | 4.5140 | 40.90 | 11.00 | 51.90 | 56.00 | -4.10 | QP | |
| 8 | * | 4.5140 | 31.80 | 11.00 | 42.80 | 46.00 | -3.20 | AVG | |
| 9 | | 13.3000 | 37.50 | 11.00 | 48.50 | 60.00 | -11.50 | QP | |
| 10 | | 13.3000 | 34.10 | 11.00 | 45.10 | 50.00 | -4.90 | AVG | |
| 11 | | 18.2720 | 41.40 | 11.00 | 52.40 | 60.00 | -7.60 | QP | |
| 12 | | 18.2720 | 35.60 | 11.00 | 46.60 | 50.00 | -3.40 | AVG | |




Site site #1 Phase: N Temperature: 22

Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 50 %

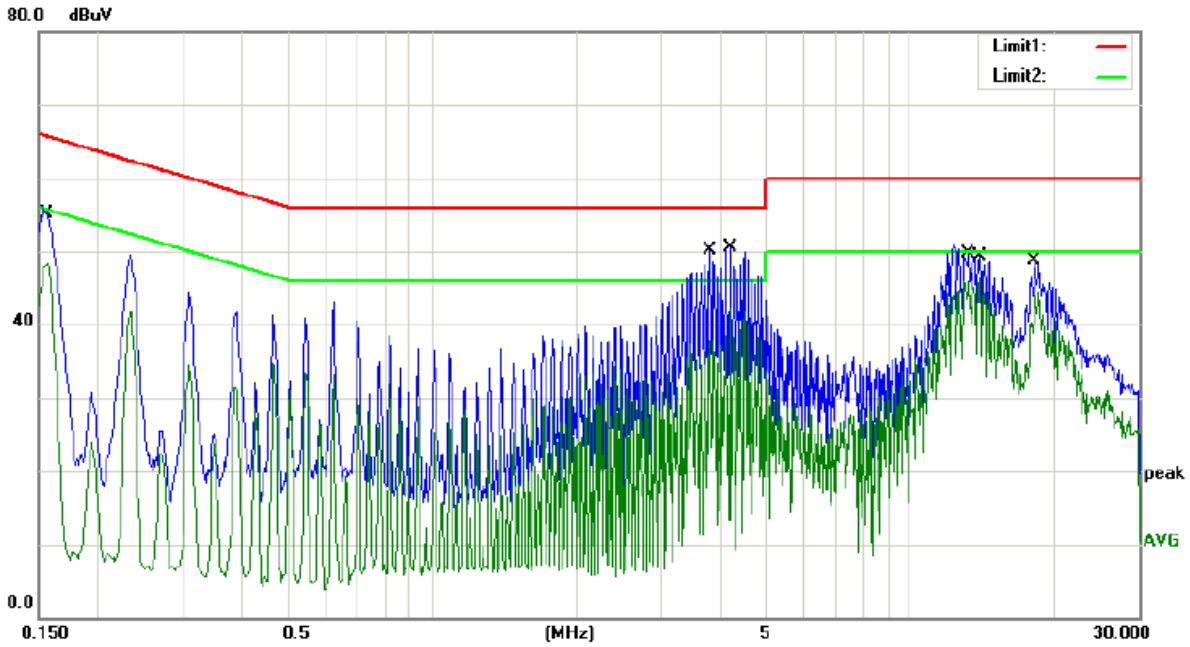
EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode: Bluetooth Playing

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1540 | 47.20 | 11.00 | 58.20 | 65.78 | -7.58 | QP | |
| 2 | | 0.1540 | 36.40 | 11.00 | 47.40 | 55.78 | -8.38 | AVG | |
| 3 | | 0.2340 | 39.90 | 11.00 | 50.90 | 62.31 | -11.41 | QP | |
| 4 | | 0.2340 | 29.70 | 11.00 | 40.70 | 52.31 | -11.61 | AVG | |
| 5 | | 3.8020 | 38.70 | 11.00 | 49.70 | 56.00 | -6.30 | QP | |
| 6 | | 3.8020 | 26.40 | 11.00 | 37.40 | 46.00 | -8.60 | AVG | |
| 7 | | 4.5380 | 19.60 | 11.00 | 30.60 | 56.00 | -25.40 | QP | |
| 8 | | 4.5380 | 29.90 | 11.00 | 40.90 | 46.00 | -5.10 | AVG | |
| 9 | | 13.2560 | 36.90 | 11.00 | 47.90 | 60.00 | -12.10 | QP | |
| 10 | * | 13.2560 | 35.30 | 11.00 | 46.30 | 50.00 | -3.70 | AVG | |
| 11 | | 18.5240 | 36.00 | 11.00 | 47.00 | 60.00 | -13.00 | QP | |
| 12 | | 18.5240 | 33.40 | 11.00 | 44.40 | 50.00 | -5.60 | AVG | |




Site site #1 Phase: *N* Temperature: 22

Limit: (CE)FCC PART 15 class B_QP Power: AC 240V/60Hz Humidity: 50 %

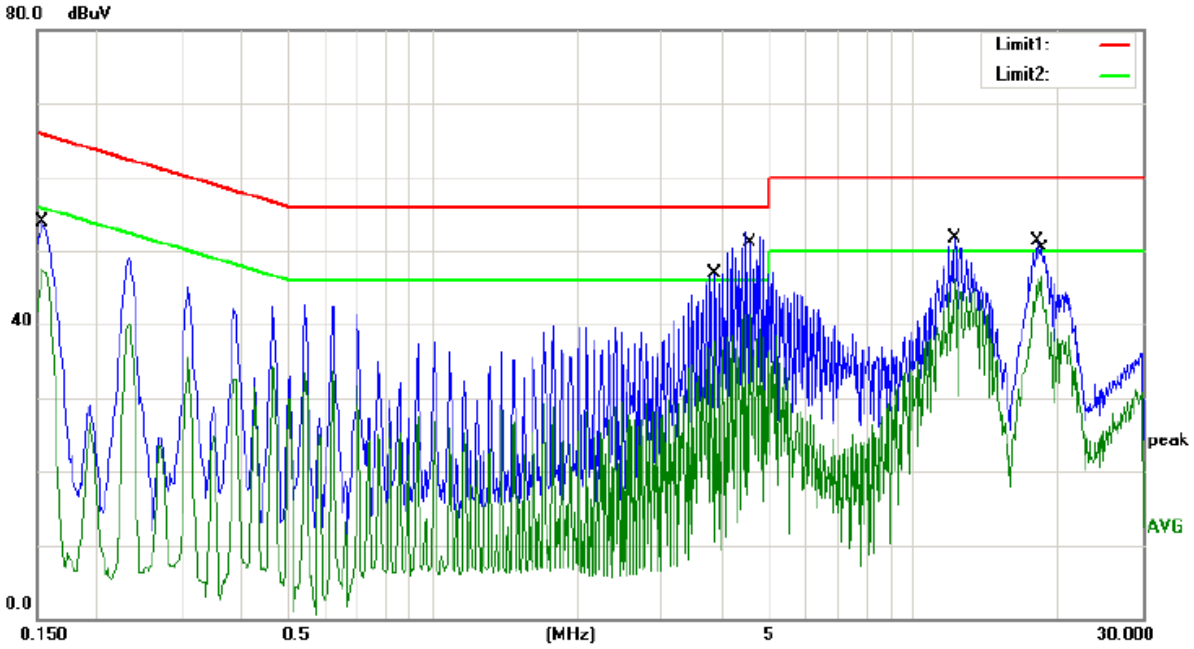
EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode: Bluetooth Playing

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1580 | 43.90 | 11.00 | 54.90 | 65.57 | -10.67 | QP | |
| 2 | | 0.1580 | 37.30 | 11.00 | 48.30 | 55.57 | -7.27 | AVG | |
| 3 | | 3.8020 | 39.00 | 11.00 | 50.00 | 56.00 | -6.00 | QP | |
| 4 | | 3.8020 | 26.90 | 11.00 | 37.90 | 46.00 | -8.10 | AVG | |
| 5 | | 4.1900 | 29.90 | 11.00 | 40.90 | 56.00 | -15.10 | QP | |
| 6 | * | 4.1900 | 31.20 | 11.00 | 42.20 | 46.00 | -3.80 | AVG | |
| 7 | | 13.2640 | 38.70 | 11.00 | 49.70 | 60.00 | -10.30 | QP | |
| 8 | | 13.2640 | 34.90 | 11.00 | 45.90 | 50.00 | -4.10 | AVG | |
| 9 | | 13.9600 | 38.20 | 11.00 | 49.20 | 60.00 | -10.80 | QP | |
| 10 | | 13.9600 | 35.20 | 11.00 | 46.20 | 50.00 | -3.80 | AVG | |
| 11 | | 18.1440 | 37.60 | 11.00 | 48.60 | 60.00 | -11.40 | QP | |
| 12 | | 18.1440 | 33.90 | 11.00 | 44.90 | 50.00 | -5.10 | AVG | |




Site site #1 Phase: *L1* Temperature: 22

Limit: (CE)FCC PART 15 class B_QP Power: AC 240V/60Hz Humidity: 50 %

EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode: Bluetooth Playing

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1540 | 42.70 | 11.00 | 53.70 | 65.78 | -12.08 | QP | |
| 2 | | 0.1540 | 36.50 | 11.00 | 47.50 | 55.78 | -8.28 | AVG | |
| 3 | | 3.8740 | 35.90 | 11.00 | 46.90 | 56.00 | -9.10 | QP | |
| 4 | | 3.8740 | 26.70 | 11.00 | 37.70 | 46.00 | -8.30 | AVG | |
| 5 | | 4.5700 | 38.90 | 11.00 | 49.90 | 56.00 | -6.10 | QP | |
| 6 | | 4.5700 | 30.30 | 11.00 | 41.30 | 46.00 | -4.70 | AVG | |
| 7 | | 12.2320 | 40.70 | 11.00 | 51.70 | 60.00 | -8.30 | QP | |
| 8 | | 12.2320 | 35.10 | 11.00 | 46.10 | 50.00 | -3.90 | AVG | |
| 9 | | 18.1120 | 39.80 | 11.00 | 50.80 | 60.00 | -9.20 | QP | |
| 10 | | 18.1120 | 35.00 | 11.00 | 46.00 | 50.00 | -4.00 | AVG | |
| 11 | | 18.5000 | 39.30 | 11.00 | 50.30 | 60.00 | -9.70 | QP | |
| 12 | * | 18.5000 | 35.50 | 11.00 | 46.50 | 50.00 | -3.50 | AVG | |

# 5. Radiated Emission Test

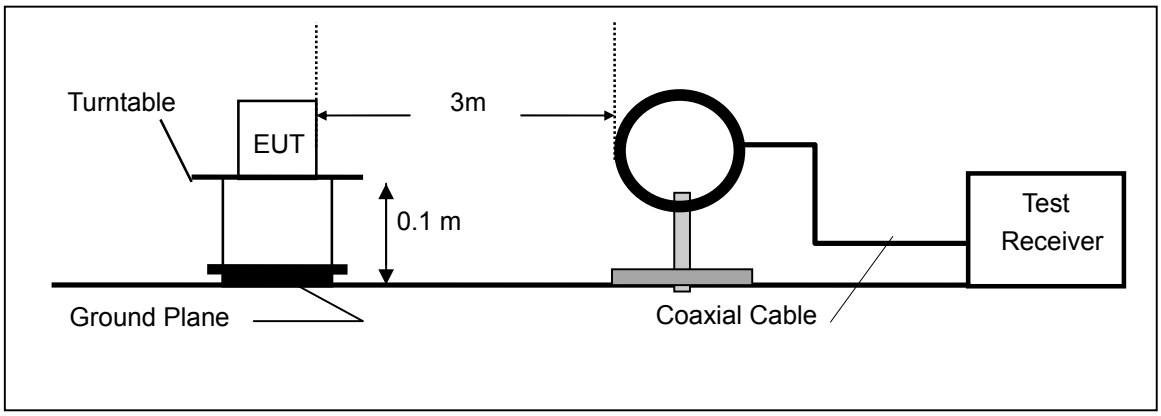
## 5.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.1m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

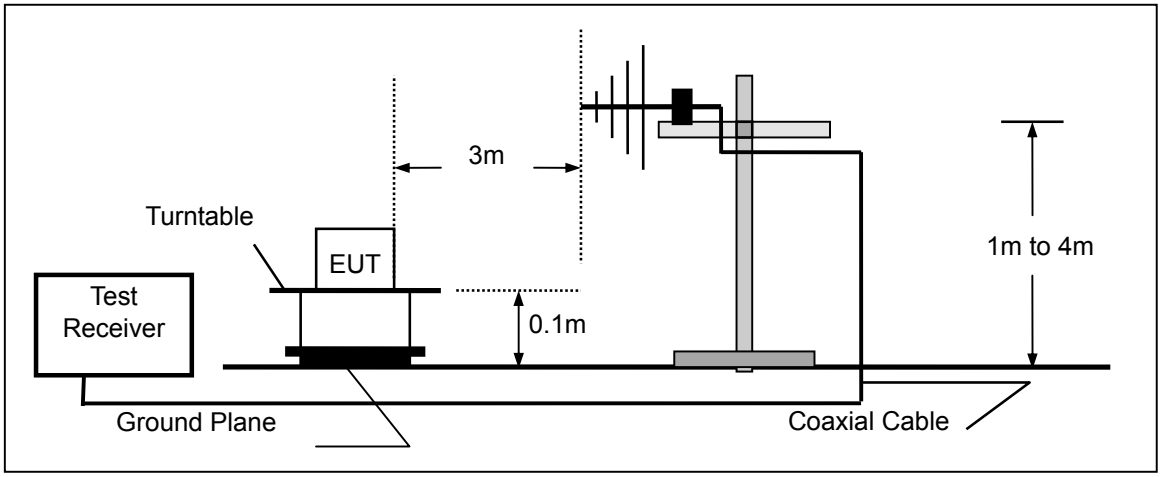
The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector (RBW=100kHz, VBW=300kHz) and all final readings of measurement from Test Receiver are Quasi-Peak values(Quasi Peak detector used with a bandwidth of 120 kHz).
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

## 5.2 Test SET-UP (Block Diagram of Configuration)

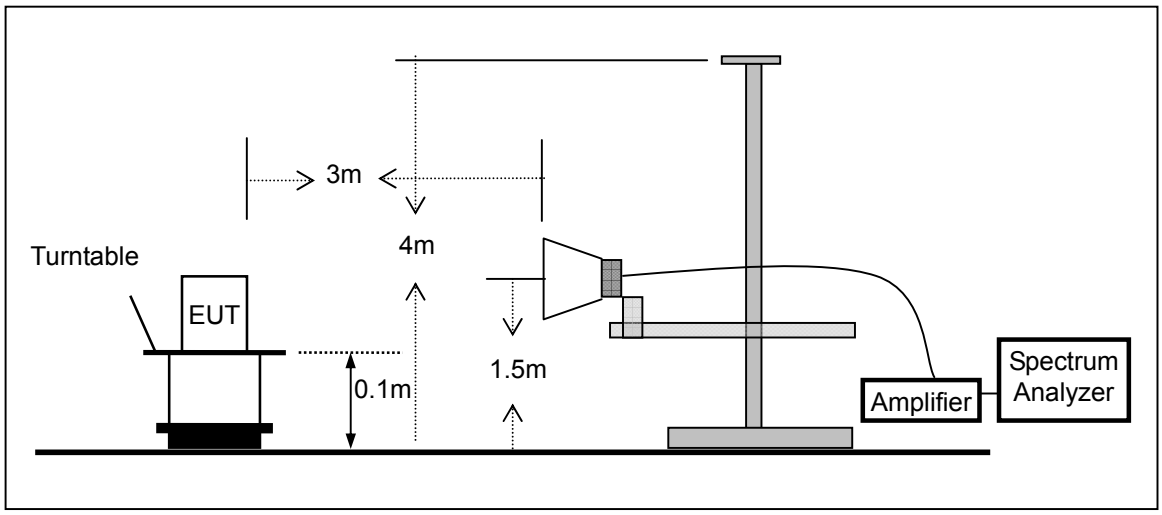
(A) Radiated Emission Test Set-Up, Frequency below 30MHz




(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz




## 5.3 Measurement Equipment Used

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | EMI Test Receiver | Rohde & Schwarz | ESU | 1302.6005.26 | 05/15/2016 | 1 Year |
| 2. | Pre-Amplifier | HP | 8447D | 2944A07999 | 05/15/2016 | 1 Year |
| 3. | Pre-Amplifier | A.H. | PAM-0126 | 1415261 | 05/15/2016 | 1 Year |
| 4. | Bilog Antenna | Schwarzbeck | VULB9163 | 142 | 05/15/2016 | 1 Year |
| 5. | Loop Antenna | Schwarzbeck | FMZB 1519 | 1519-012 | 05/15/2016 | 1 Year |
| 6. | Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170399 | 05/15/2016 | 1 Year |
| 7. | Horn Antenna | Schwarzbeck | BBHA 9120 | D143 | 05/15/2016 | 1 Year |
| 8. | Cable | Schwarzbeck | AK9513 | ACRX1 | 05/15/2016 | 1 Year |
| 9. | Cable | Rosenberger | N/A | FP2RX2 | 05/15/2016 | 1 Year |
| 10. | Cable | Schwarzbeck | AK9513 | CRPX1 | 05/15/2016 | 1 Year |
| 11. | Cable | Schwarzbeck | AK9513 | CRRX2 | 05/15/2016 | 1 Year |

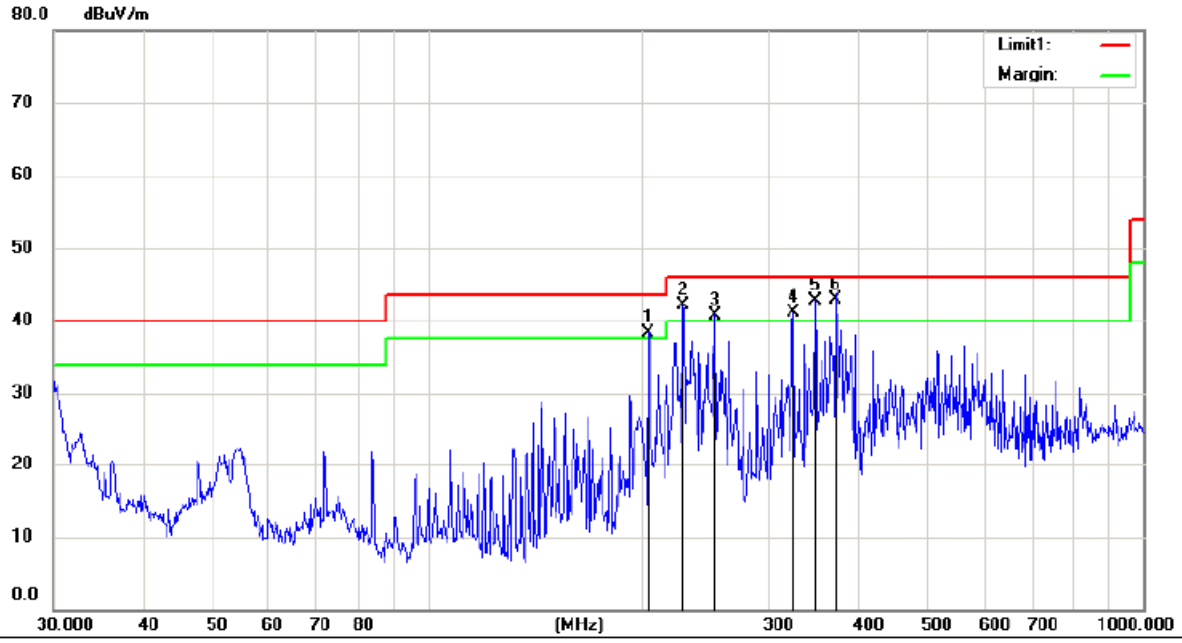
## 5.4 Measurement Result

(For range 9KHz~30MHz, The measured value is really too low to be recorded.)

**Below 1000MHz (30M-1GHz)**

**BT Tx mode:**

*(Bluetooth (GFSK, pi/4-DQPSK) mode have been tested, and the worst result was report as below.)*




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation Power: AC 120V/60Hz Humidity: 52 %

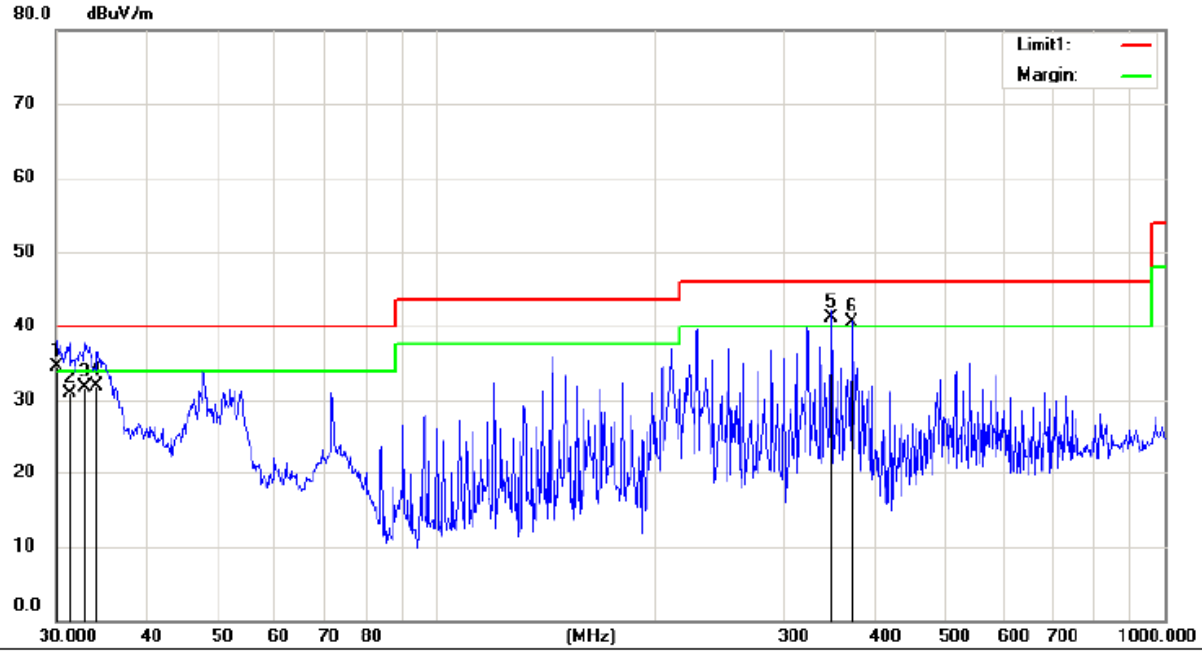
EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode:TX(GFSK,2402MHz)

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | ! | 203.5228 | 60.69 | -22.29 | 38.40 | 43.50 | -5.10 | QP | | | |
| 2 | ! | 227.6906 | 63.70 | -21.60 | 42.10 | 46.00 | -3.90 | QP | | | |
| 3 | ! | 252.0627 | 62.26 | -21.46 | 40.80 | 46.00 | -5.20 | QP | | | |
| 4 | ! | 324.4561 | 59.17 | -18.07 | 41.10 | 46.00 | -4.90 | QP | | | |
| 5 | ! | 348.0274 | 60.94 | -18.14 | 42.80 | 46.00 | -3.20 | QP | | | |
| 6 | * | 372.0045 | 60.26 | -17.36 | 42.90 | 46.00 | -3.10 | QP | | | |




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: FCC Part15 Class B 3M Radiation Power: AC 120V/60Hz Humidity: 52 %

EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode:TX(GFSK,2402MHz)

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | ! | 30.0000 | 58.88 | -24.38 | 34.50 | 40.00 | -5.50 | QP | | | |
| 2 | | 31.2893 | 54.66 | -23.66 | 31.00 | 40.00 | -9.00 | QP | | | |
| 3 | | 32.8637 | 54.66 | -22.86 | 31.80 | 40.00 | -8.20 | QP | | | |
| 4 | | 34.1561 | 54.36 | -22.36 | 32.00 | 40.00 | -8.00 | QP | | | |
| 5 | * | 348.0274 | 59.24 | -18.14 | 41.10 | 46.00 | -4.90 | QP | | | |
| 6 | ! | 372.0045 | 57.96 | -17.36 | 40.60 | 46.00 | -5.40 | QP | | | |

Above 1000MHz:

*Bluetooth (GFSK, pi/4-DQPSK) mode have been tested, and the worst result was report as below*

| | | | |
|---|---|---|---|
| Test Date : | 06/18/2016 | Temperature : | 25 ℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Test By: | KK | | |

| GFSK Mode: Low channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Margin(dB) | |
| (MHz) | (H/V) | PK | AV | PK | AV | PK | AV |
| 4804.000 | V | 57.19 | 47.35 | 74.00 | 54.00 | -16.81 | -6.65 |
| 7534.000 | V | 50.91 | 40.59 | 74.00 | 54.00 | -23.09 | -13.41 |
| 9849.000 | V | 50.60 | 41.28 | 74.00 | 54.00 | -23.40 | -12.72 |
| 12554.000 | V | 53.59 | 41.57 | 74.00 | 54.00 | -20.41 | -12.43 |
| 16142.000 | V | 54.75 | 39.67 | 74.00 | 54.00 | -19.25 | -14.33 |
| 17320.000 | V | 59.38 | 42.81 | 74.00 | 54.00 | -14.62 | -11.19 |
| 4804.000 | H | 62.91 | 46.86 | 74.00 | 54.00 | -11.09 | -7.14 |
| 7985.000 | H | 60.85 | 43.62 | 74.00 | 54.00 | -13.15 | -10.38 |
| 10873.000 | H | 58.43 | 41.91 | 74.00 | 54.00 | -15.57 | -12.09 |
| 12574.000 | H | 59.59 | 41.65 | 74.00 | 54.00 | -14.41 | -12.35 |
| 16559.000 | H | 59.40 | 42.00 | 74.00 | 54.00 | -14.60 | -12.00 |
| 17368.000 | H | 50.47 | 44.51 | 74.00 | 54.00 | -23.53 | -9.49 |

| GFSK Mode: Middle channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Margin(dB) | |
| (MHz) | (H/V) | PK | AV | PK | AV | PK | AV |
| 4882.000 | V | 57.34 | 44.50 | 74.00 | 54.00 | -16.66 | -9.50 |
| 7599.000 | V | 51.18 | 37.18 | 74.00 | 54.00 | -22.82 | -16.82 |
| 10158.000 | V | 52.23 | 42.21 | 74.00 | 54.00 | -21.77 | -11.79 |
| 12410.000 | V | 51.90 | 40.75 | 74.00 | 54.00 | -22.10 | -13.25 |
| 16518.000 | V | 55.30 | 42.35 | 74.00 | 54.00 | -18.70 | -11.65 |
| 17472.000 | V | 51.44 | 42.22 | 74.00 | 54.00 | -22.56 | -11.78 |
| 4882.000 | H | 57.71 | 45.44 | 74.00 | 54.00 | -16.29 | -8.56 |
| 8409.000 | H | 52.96 | 43.19 | 74.00 | 54.00 | -21.04 | -10.81 |
| 9857.000 | H | 51.71 | 38.51 | 74.00 | 54.00 | -22.29 | -15.49 |
| 11203.000 | H | 51.19 | 42.45 | 74.00 | 54.00 | -22.81 | -11.55 |
| 14536.000 | H | 47.29 | 43.60 | 74.00 | 54.00 | -26.71 | -10.40 |
| 17638.000 | H | 51.13 | 40.81 | 74.00 | 54.00 | -22.87 | -13.19 |

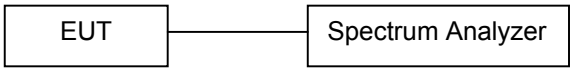
| GFSK Mode: High channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Margin(dB) | |
| (MHz) | (H/V) | PK | AV | PK | AV | PK | AV |
| 4960.000 | V | 57.08 | 45.17 | 74.00 | 54.00 | -16.92 | -8.83 |
| 8752.000 | V | 49.91 | 40.80 | 74.00 | 54.00 | -24.09 | -13.20 |
| 9647.000 | V | 52.19 | 44.10 | 74.00 | 54.00 | -21.81 | -9.90 |
| 11275.000 | V | 52.07 | 38.85 | 74.00 | 54.00 | -21.93 | -15.15 |
| 13856.000 | V | 56.17 | 42.01 | 74.00 | 54.00 | -17.83 | -11.99 |
| 17461.000 | V | 51.66 | 42.11 | 74.00 | 54.00 | -22.34 | -11.89 |
| 4960.000 | H | 57.01 | 46.20 | 74.00 | 54.00 | -16.99 | -7.80 |
| 8148.000 | H | 52.71 | 41.55 | 74.00 | 54.00 | -21.29 | -12.45 |
| 9772.000 | H | 51.49 | 38.77 | 74.00 | 54.00 | -22.51 | -15.23 |
| 13692.000 | H | 51.82 | 39.65 | 74.00 | 54.00 | -22.18 | -14.35 |
| 15279.000 | H | 46.40 | 42.34 | 74.00 | 54.00 | -27.60 | -11.66 |
| 17626.000 | H | 51.14 | 41.01 | 74.00 | 54.00 | -22.86 | -12.99 |

# 6. Channel Separation Test

## 6.1 Measurement Procedure

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

## 6.2 Test SET-UP (Block Diagram of Configuration)




## 6.3 Measurement Equipment Used

| Name of Equipment | Manufacturer | Model | Serial Number | Last Cal. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | ESCI | 101414 | 05/15/2016 | 05/14/2017 |

## 6.4 Measurement Results

The following table is the setting of spectrum analyzer.

| | |
|---|---|
| Attenuation | Auto |
| RB | 100KHz |
| VB | 300KHz |
| Detector | Peak |
| Trace | Max hold |

Refer to attached data chart.

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK | Test Date : | 06/13/2016 |
| Test By: | KK | Temperature : | 24 ℃ |
| Test Result: | PASS | Humidity : | 54 % |

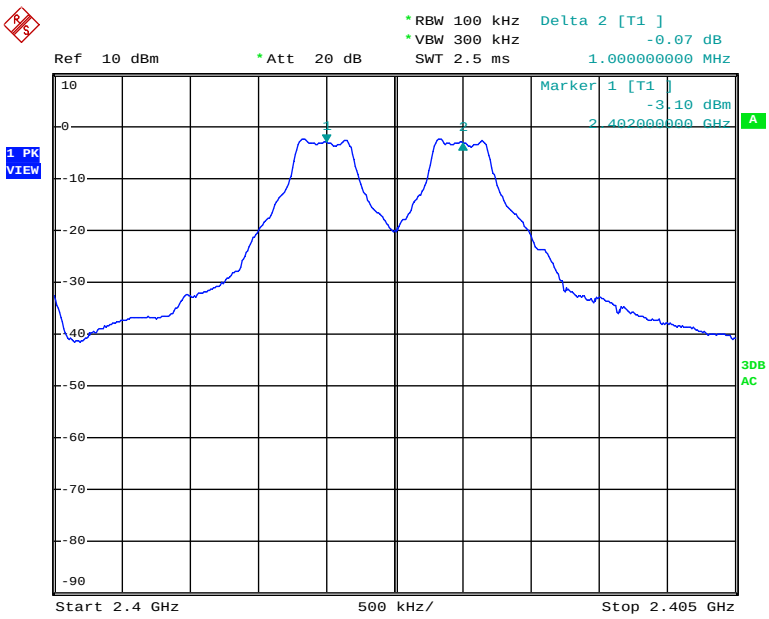
**GFSK Mode:**

| Test Channel | Channel frequency (MHz) | Separation Read Value (kHz) | Separation Limit 20dB Down BW(kHz) |
|---|---|---|---|
| Low Channel | 2402 | 1000.00 | 774 |
| Adjacency Chanel | 2403 | | |
| Middle channel | 2441 | 1000.00 | 828 |
| Adjacency Chanel | 2440 | | |
| High Channel | 2480 | 1000.00 | 834 |
| Adjacency Chanel | 2479 | | |

**π/4-DQPSK Mode**

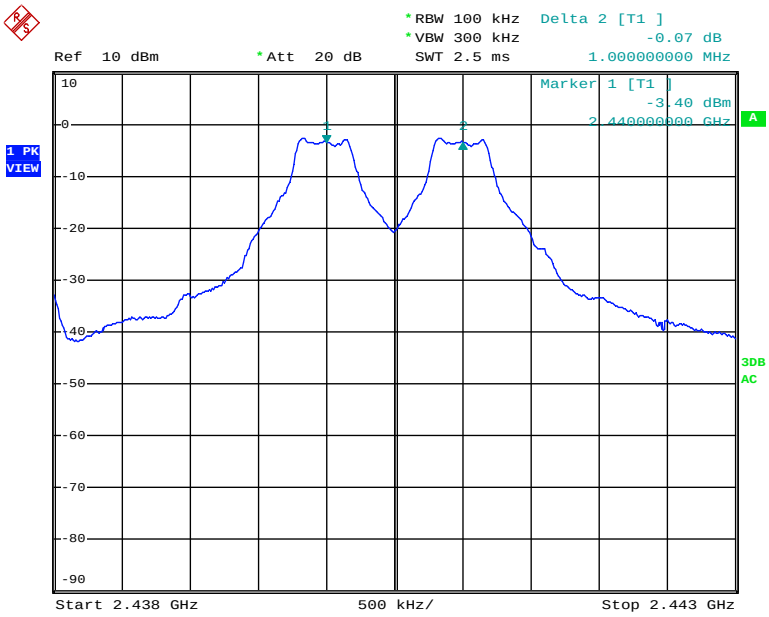
| Test Channel | Channel frequency (MHz) | Separation Read Value (kHz) | Separation Limit 2/3 20dB Down BW(kHz) |
|---|---|---|---|
| Low Channel | 2402 | 1000.00 | 812 |
| Adjacency Chanel | 2403 | | |
| Middle channel | 2441 | 1000.00 | 812 |
| Adjacency Chanel | 2440 | | |
| High Channel | 2480 | 1000.00 | 820 |
| Adjacency Chanel | 2479 | | |

GFSK Mode: Low channel



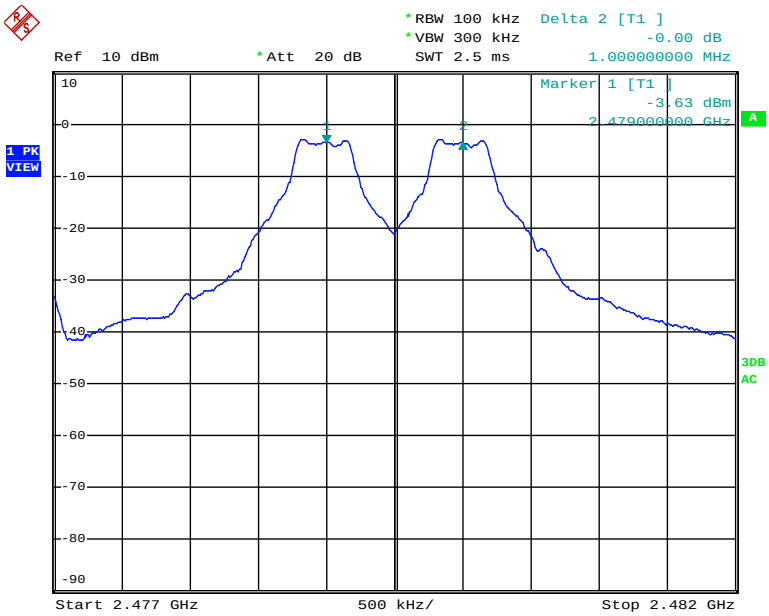

Date: 13.JUN.2016 13:24:56

GFSK Mode: Middle channel



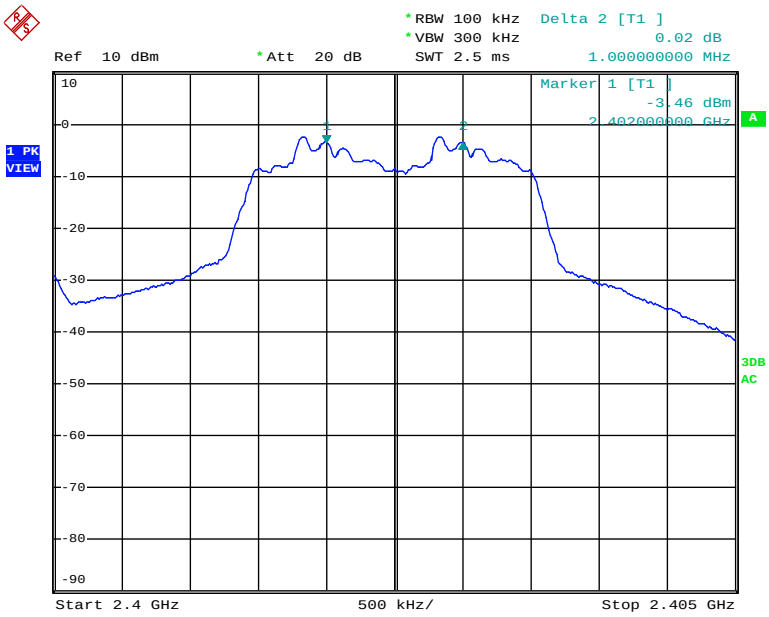

Date: 13.JUN.2016 13:26:06

GFSK Mode: High channel



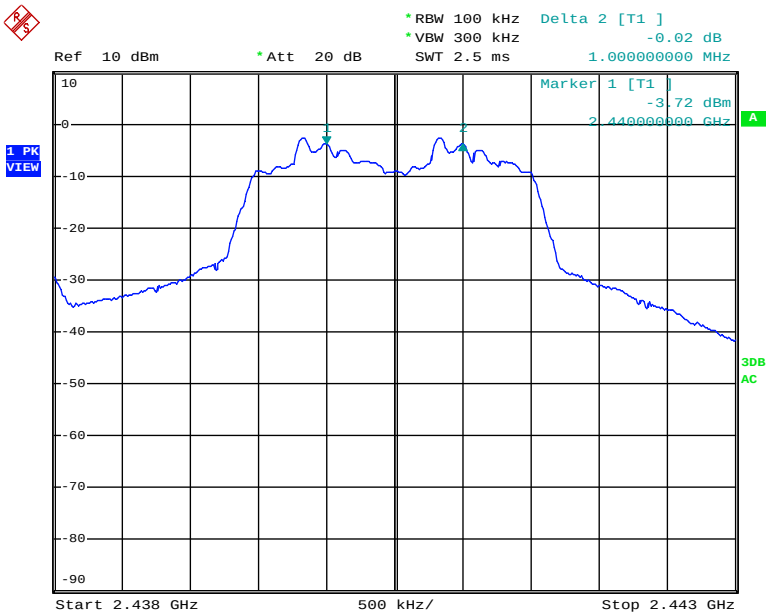

Date: 13.JUN.2016 13:27:15

π/4-DQPSK Mode: Low channel



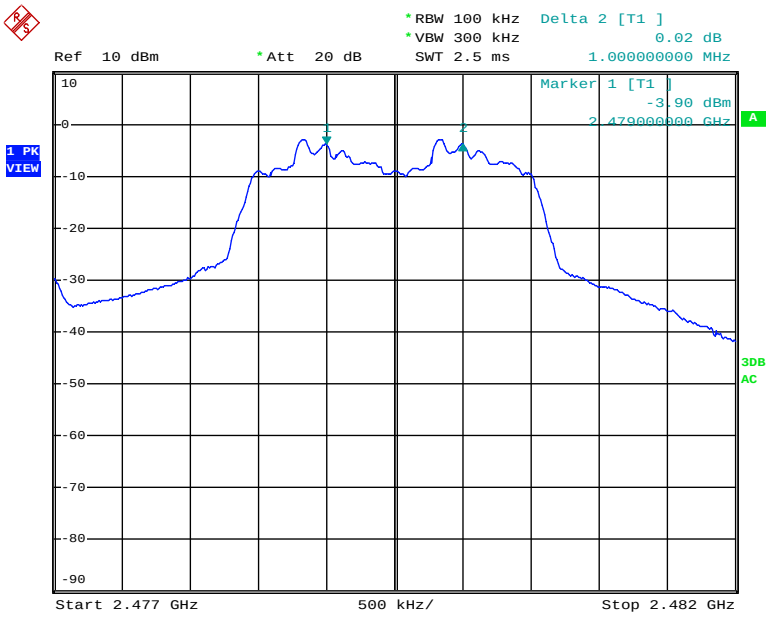

Date: 13.JUN.2016 13:28:38

π/4-DQPSK Mode: Middle channel




Date: 13.JUN.2016 13:29:47

π/4-DQPSK Mode: High channel



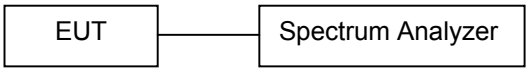

Date: 13.JUN.2016 13:30:47

# 7. Bandwidth Test

## 7.1 Measurement Procedure

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

## 7.2 Test SET-UP (Block Diagram of Configuration)




## 7.3 Measurement Equipment Used

| Name of Equipment | Manufacturer | Model | Serial Number | Last Cal. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | ESCI | 101414 | 05/15/2016 | 05/14/2017 |

## 7.4 Measurement Results

The following table is the setting of spectrum analyzer.

| | |
|---|---|
| Attenuation | Auto |
| SPAN | 3MHz |
| RB | 30KHz |
| VB | 100KHz |
| Detector | Peak |
| Trace | Max hold |

20dB Bandwidth test data Chart:

Refer to attached data chart.

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK | Test Date: | 06/27/2016 |
| Test By: | KK | Temperature: | 24 ℃ |
| Test Result: | N/A | Humidity: | 54 % |

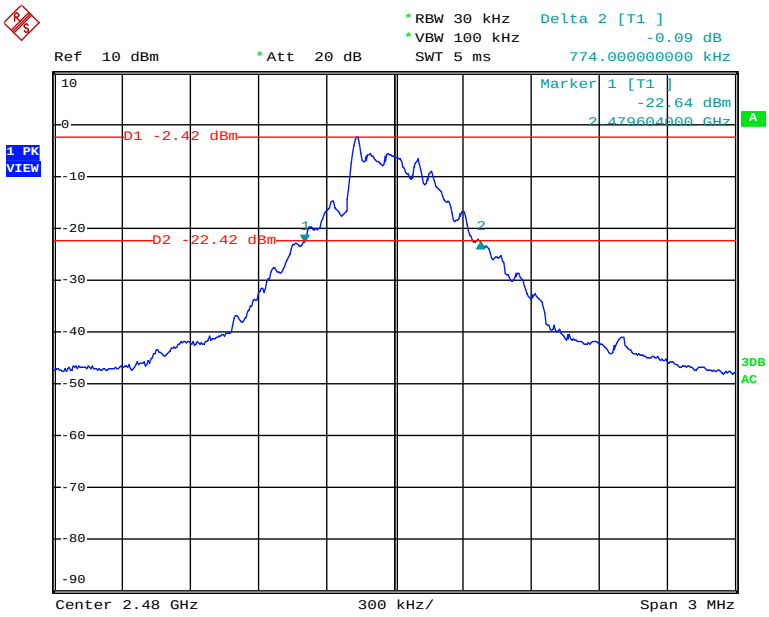
GFSK Mode:

| Channel number | Channel frequency (MHz) | 20dB Down BW(kHz) |
|---|---|---|
| Low channel | 2402 | 774 |
| Middle channel | 2441 | 828 |
| High channel | 2480 | 834 |

π/4-DQPSK Mode:

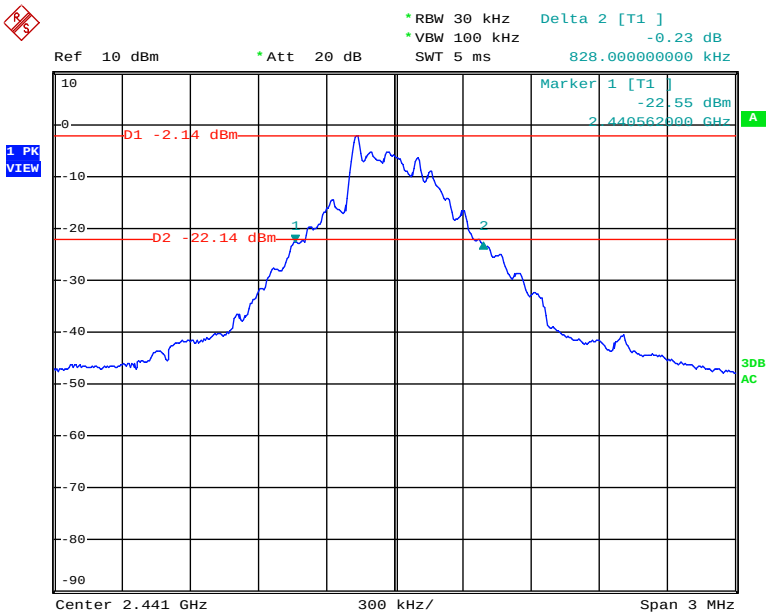
| Channel number | Channel frequency (MHz) | 20dB Down BW(kHz) |
|---|---|---|
| Low channel | 2402 | 1218 |
| Middle channel | 2441 | 1218 |
| High channel | 2480 | 1230 |

GFSK Mode: Low channel



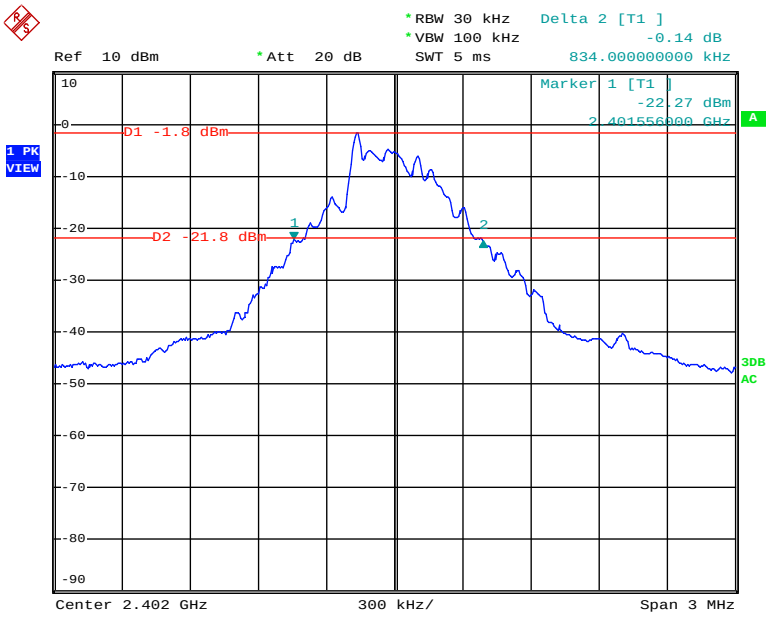

Date: 27.JUN.2016 12:19:54

GFSK Mode: Middle channel



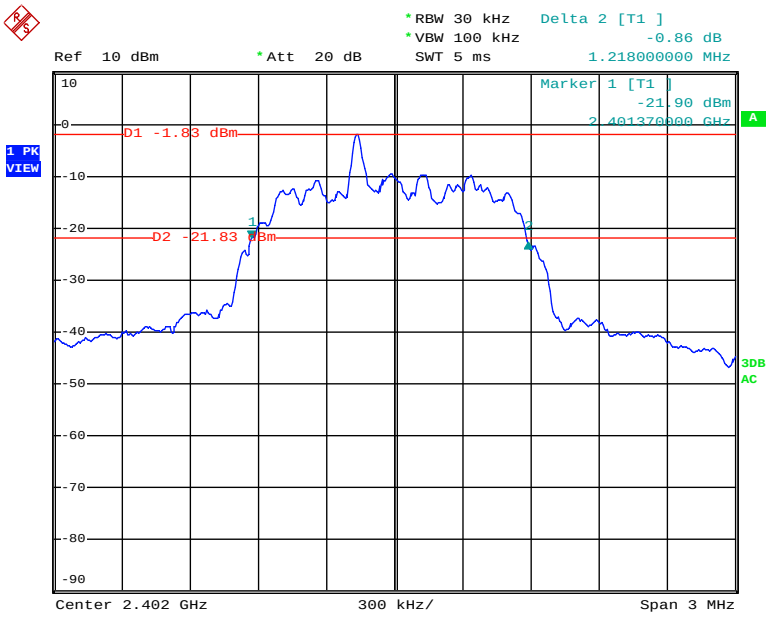

Date: 27.JUN.2016 12:20:45

GFSK Mode: High channel



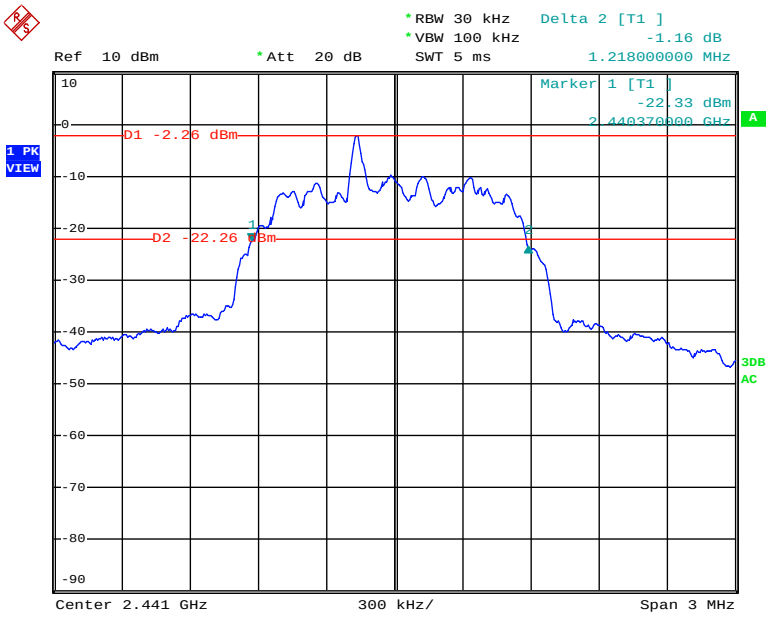

Date: 27.JUN.2016 12:21:38

π /4-DQPSK Mode: Low channel



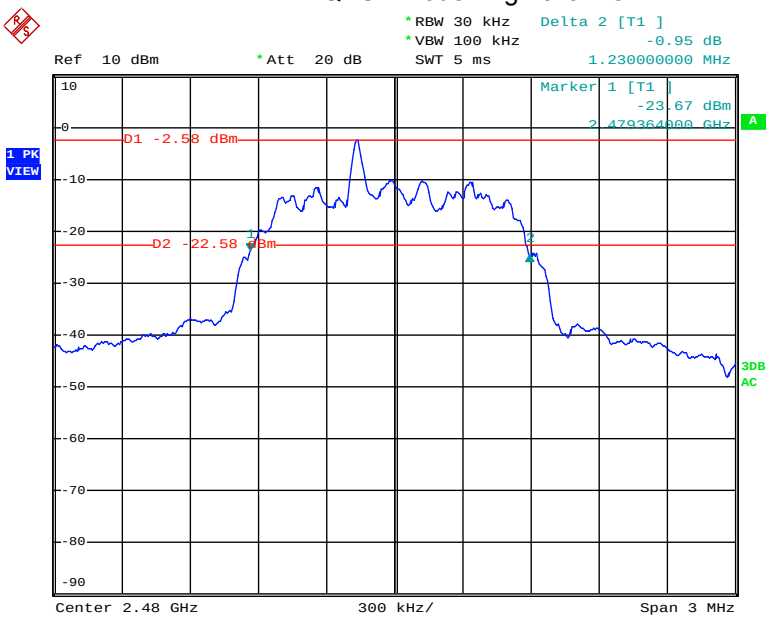

Date: 27.JUN.2016 12:22:24

π /4-DQPSK Mode: Middle channel




Date: 27.JUN.2016 12:23:11

π /4-DQPSK Mode: High channel



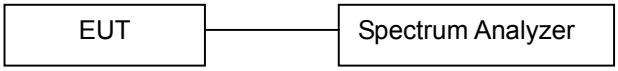

Date: 27.JUN.2016 12:24:01

# 8. Quantity of Hopping Channel Test

## 8.1 Measurement Procedure

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

## 8.2 Test SET-UP (Block Diagram of Configuration)




## 8.3 Measurement Equipment Used

| Name of Equipment | Manufacturer | Model | Serial Number | Last Cal. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | ESCI | 101414 | 05/15/2016 | 05/14/2017 |

## 8.4 Measurement Results

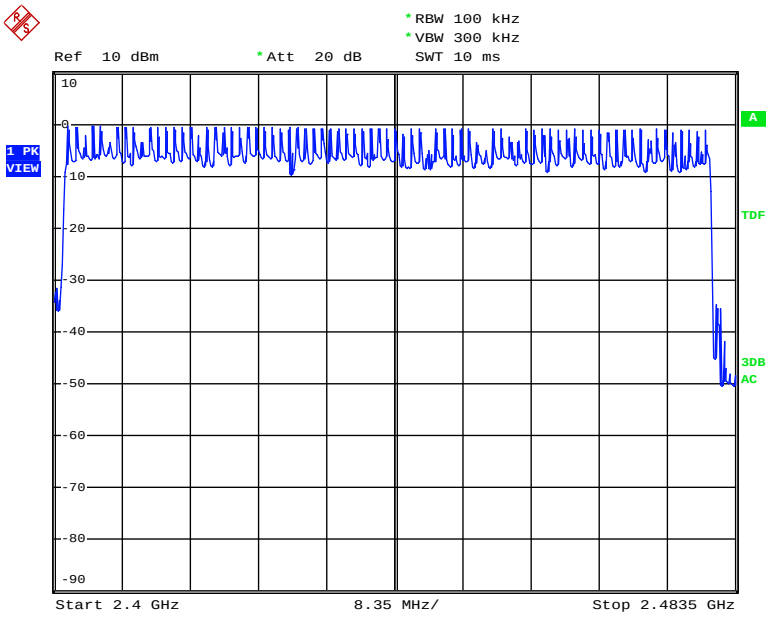
Refer to attached data chart.

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK | Test Date : | 05/27/2016 |
| Test By: | KK | Temperature : | 24 ℃ |
| Test Result: | Pass | Humidity : | 54 % |

GFSK Mode, π/4-DQPSK Mode:

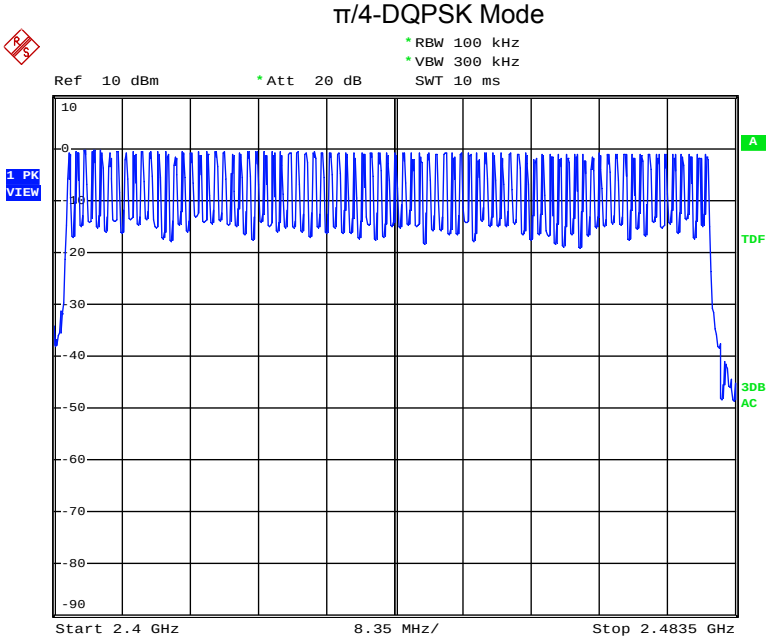
| Hopping Channel Frequency Range | Quantity of Hopping Channel | Quantity of Hopping Channel limit |
|---|---|---|
| 2402-2480 | 79 | >15 |

GFSK Mode




Date: 27.JUN.2016 19:07:10

π/4-DQPSK Mode



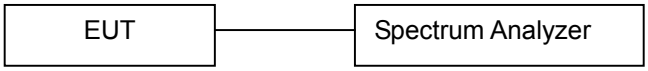

Date: 27.JUN.2016 19:08:57

# 9. Time of Occupancy (Dwell Time) Test

## 9.1 Measurement Procedure

a. Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

## 9.2 Test SET-UP (Block Diagram of Configuration)




## 9.3 Measurement Equipment Used

| Name of Equipment | Manufacturer | Model | Serial Number | Last Cal. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | ESCI | 101414 | 05/15/2016 | 05/14/2017 |

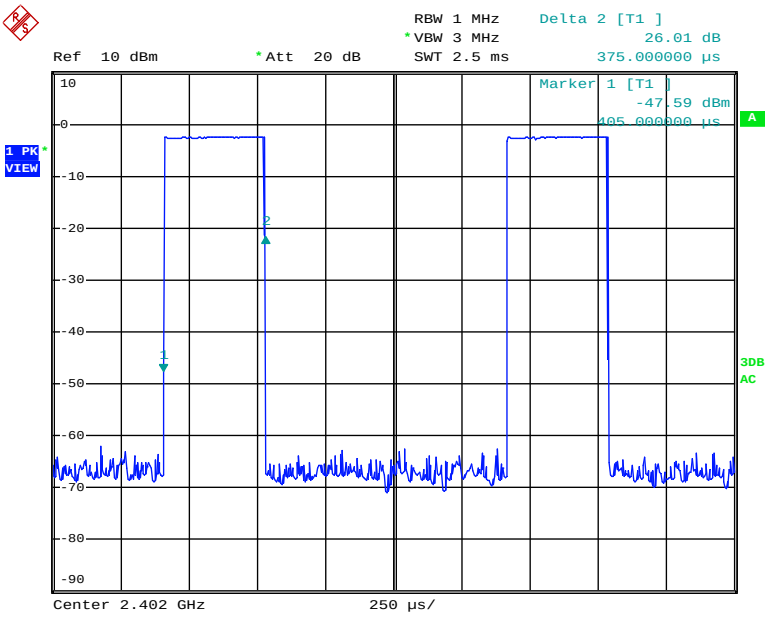
## 9.4 Measurement Results

Refer to attached data chart.

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK | Test Date : | 06/13/2016 |
| Test By: | KK | Temperature : | 24 ℃ |
| Test Result: | PASS | Humidity : | 54 % |

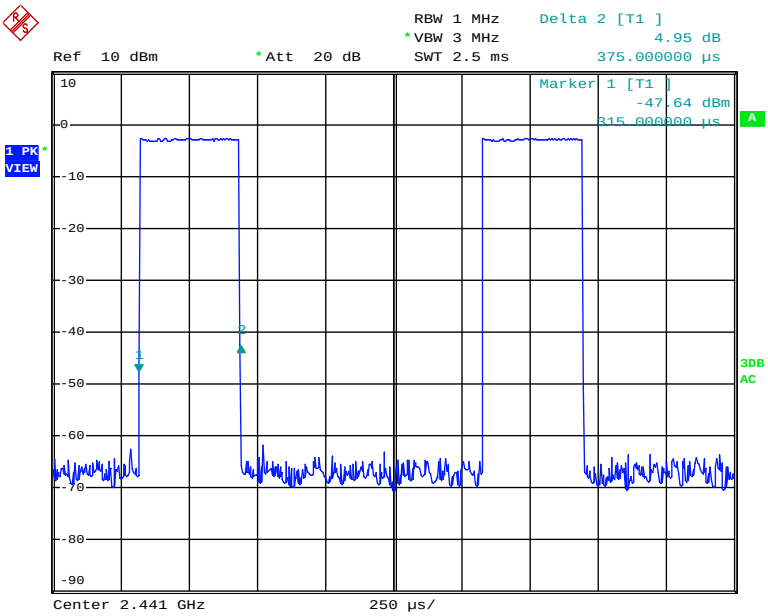
| Mode | Channel | Pulse Width (ms) | Dwell Time (ms) | Limit (ms) | Result |
|---|---|---|---|---|---|
| GFSK Mode | | | | | |
| DH1 | Low channel | 0.375 | 120.0 | 400 | Pass |
| | Middle channel | 0.375 | 120.0 | 400 | Pass |
| | High channel | 0.375 | 120.0 | 400 | Pass |
| | Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second | | | | |
| DH3 | Low channel | 1.623 | 259.7 | 400 | Pass |
| | Middle channel | 1.639 | 262.2 | 400 | Pass |
| | High channel | 1.639 | 262.2 | 400 | Pass |
| | Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second | | | | |
| DH5 | Low channel | 2.883 | 307.5 | 400 | Pass |
| | Middle channel | 2.903 | 309.7 | 400 | Pass |
| | High channel | 2.883 | 307.5 | 400 | Pass |
| | Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second | | | | |
| π/4-DPSK Mode | | | | | |
| 2DH1 | Low channel | 0.384 | 128.9 | 400 | Pass |
| | Middle channel | 0.384 | 128.9 | 400 | Pass |
| | High channel | 0.384 | 128.9 | 400 | Pass |
| | Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second | | | | |
| 2DH3 | Low channel | 1.632 | 261.1 | 400 | Pass |
| | Middle channel | 1.632 | 261.1 | 400 | Pass |
| | High channel | 1.648 | 263.7 | 400 | Pass |
| | Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second | | | | |
| 2DH5 | Low channel | 2.892 | 308.5 | 400 | Pass |
| | Middle channel | 2.892 | 308.5 | 400 | Pass |
| | High channel | 2.912 | 310.6 | 400 | Pass |
| | Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second | | | | |

DH1: Low channel



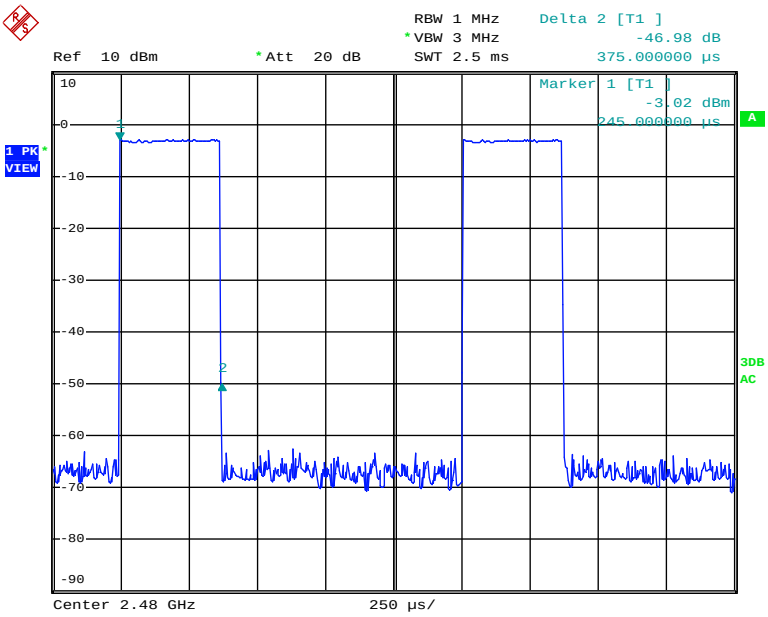

Date: 13.JUN.2016 19:14:50

DH1: Middle channel



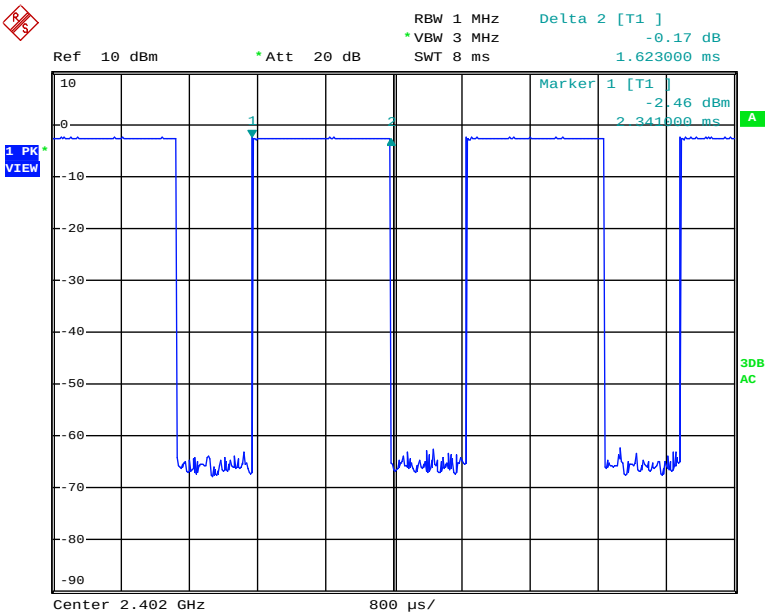

Date: 13.JUN.2016 19:16:15

DH1: High channel



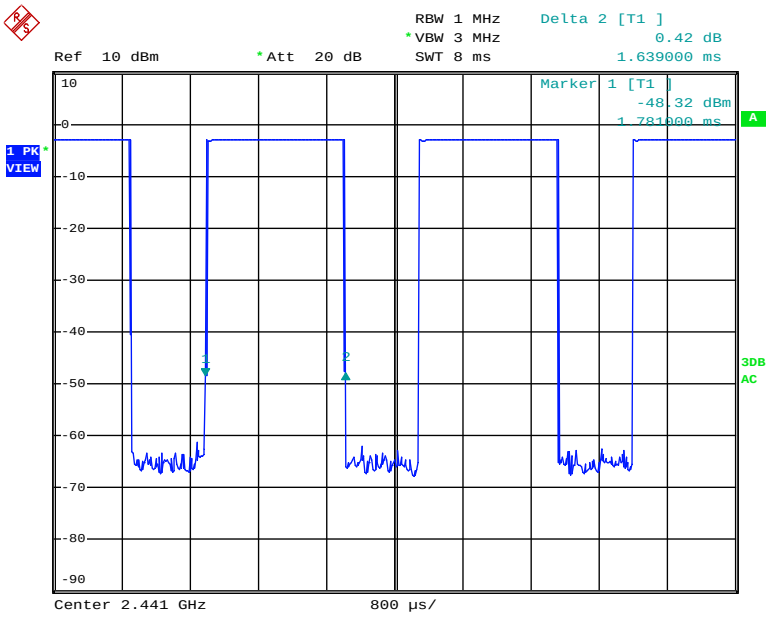

Date: 13.JUN.2016 19:16:35

DH3: Low channel



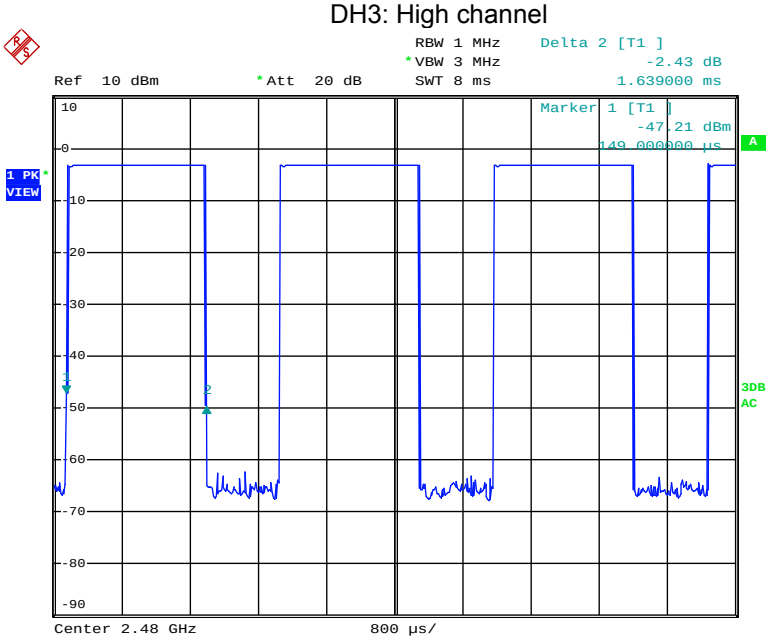

Date: 13.JUN.2016 19:17:53

DH3: Middle channel



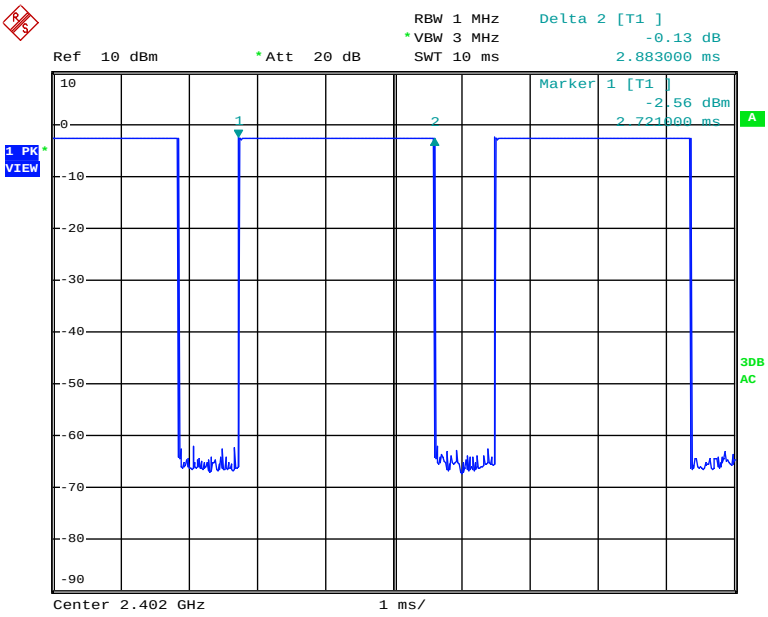

Date: 13.JUN.2016 19:17:31

DH3: High channel



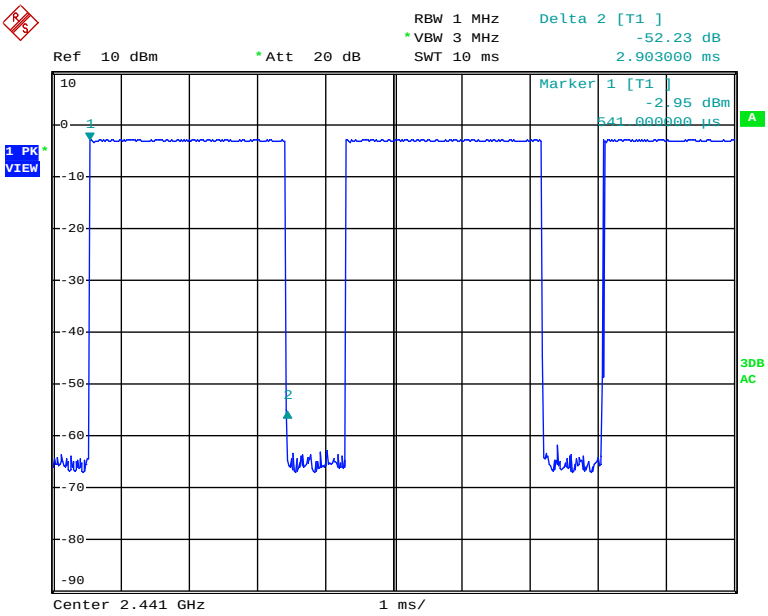

Date: 13.JUN.2016 19:17:05

DH5: Low channel



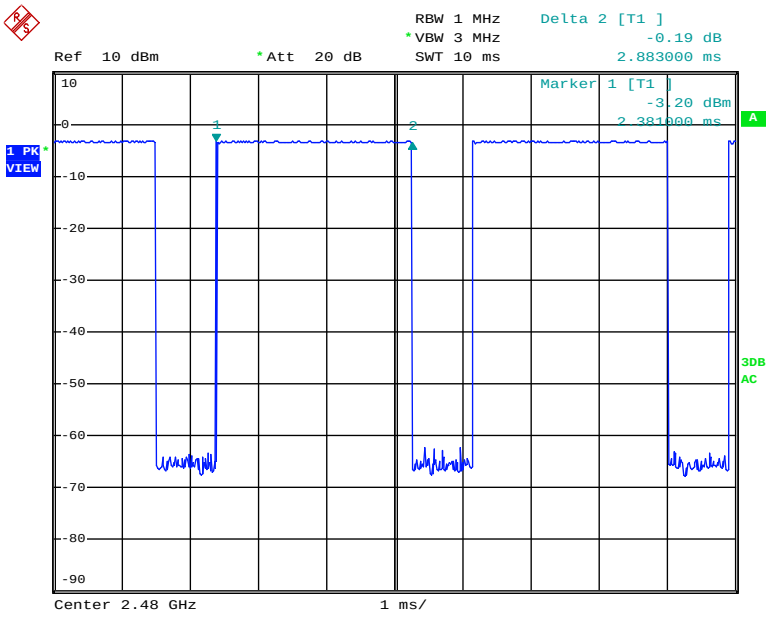

Date: 13.JUN.2016 19:18:17

DH5: Middle channel



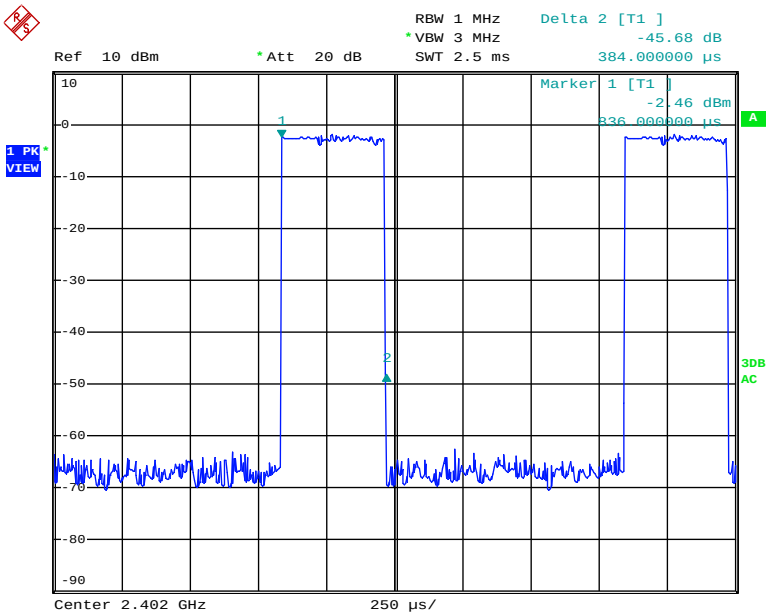

Date: 13.JUN.2016 19:18:55

DH5: High channel



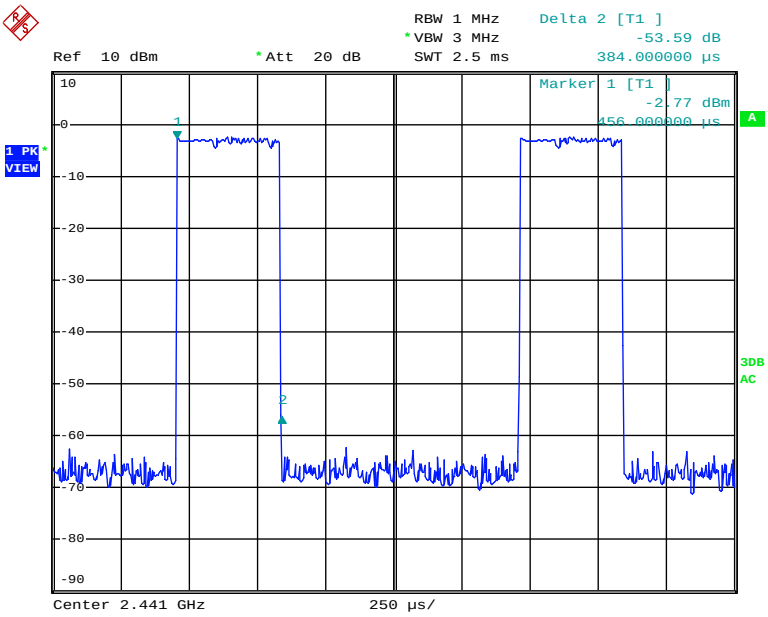

Date: 13.JUN.2016 19:19:18

2DH1: Low channel



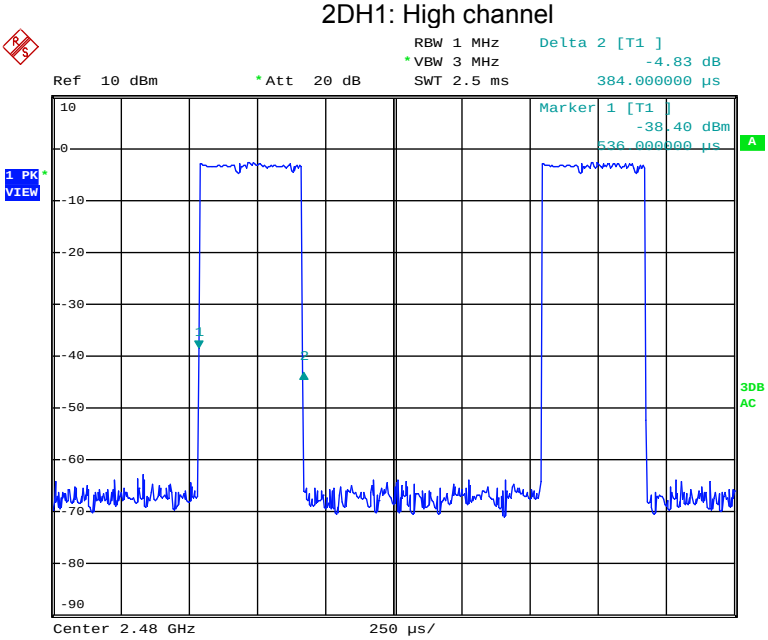

Date: 13.JUN.2016 19:20:00

2DH1: Middle channel



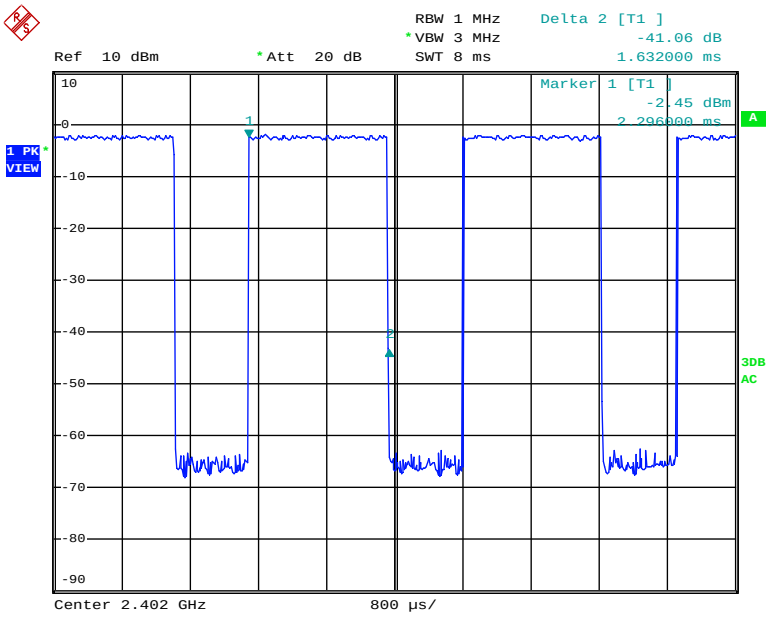

Date: 13.JUN.2016 19:20:23

2DH1: High channel



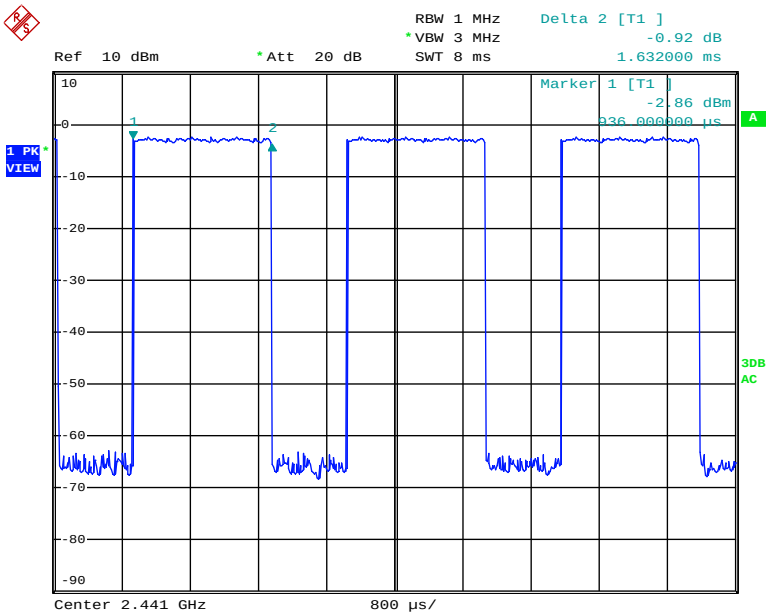

Date: 13.JUN.2016 19:20:58

2DH3: Low channel



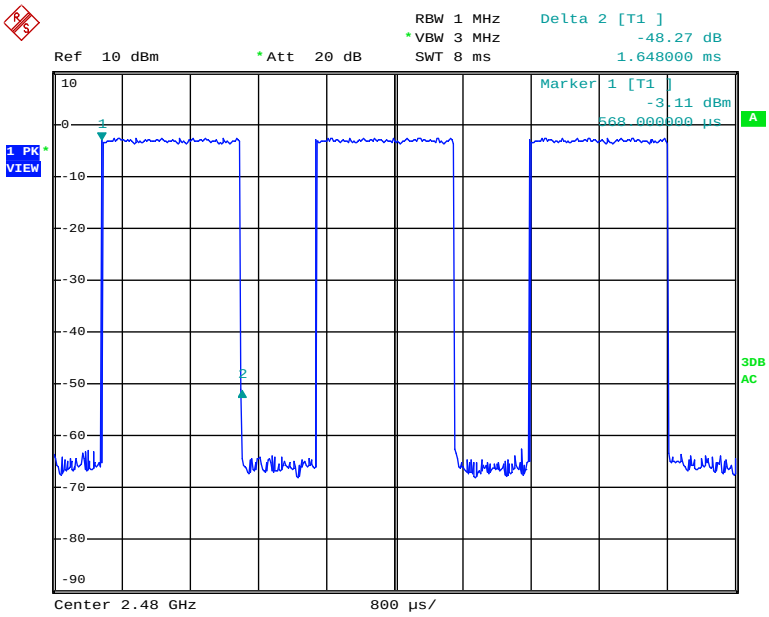

Date: 13.JUN.2016 19:22:06

2DH3: Middle channel



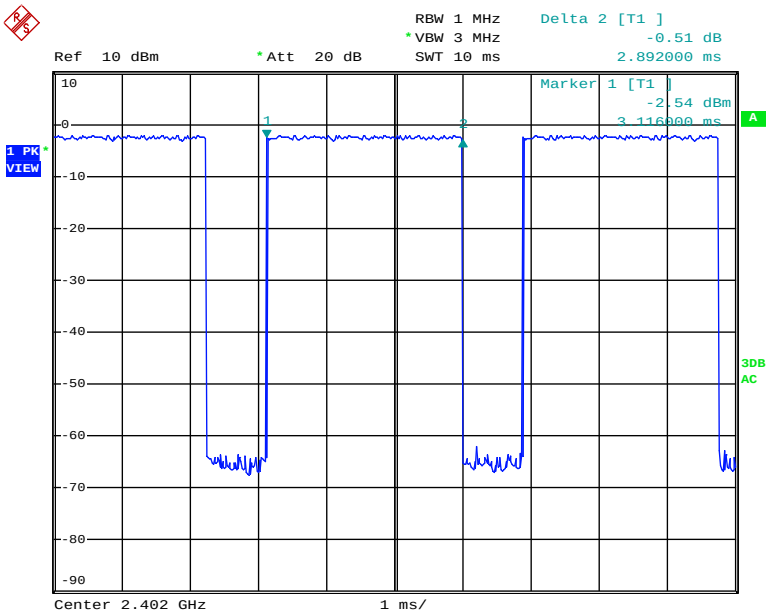

Date: 13.JUN.2016 19:21:43

2DH3: High channel



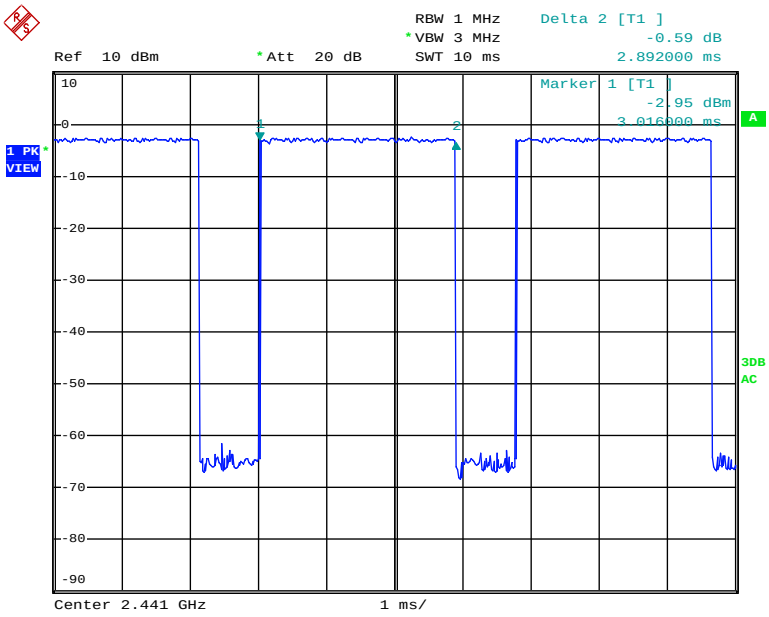

Date: 13.JUN.2016 19:21:19

2DH5: Low channel



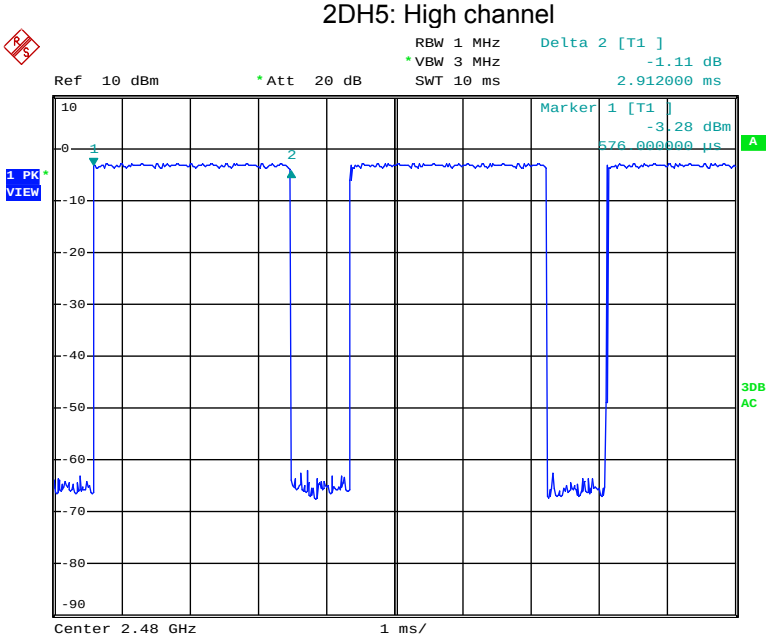

Date: 13.JUN.2016 19:22:25

2DH5: Middle channel




Date: 13.JUN.2016 19:23:06

2DH5: High channel



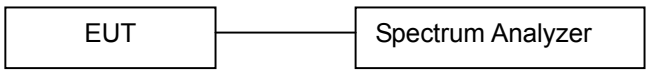

Date: 13.JUN.2016 19:23:42

# 10. Maximum Peak Output Power Test

## 10.1 Measurement Procedure

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

## 10.2 Test SET-UP (Block Diagram of Configuration)




## 10.3 Measurement Equipment Used

| Name of Equipment | Manufacturer | Model | Serial Number | Last Cal. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | ESCI | 101414 | 05/15/2016 | 05/14/2017 |

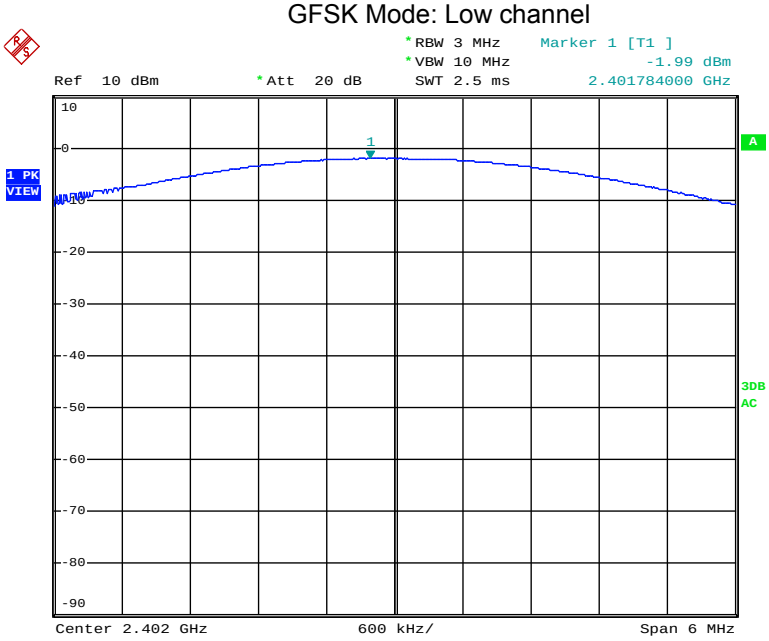
## 10.4 Measurement Results

Refer to attached data chart.

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK | Test Date : | 06/13/2016 |
| Test By: | Kk | Temperature : | 24 ℃ |
| Test Result: | PASS | Humidity : | 54 % |

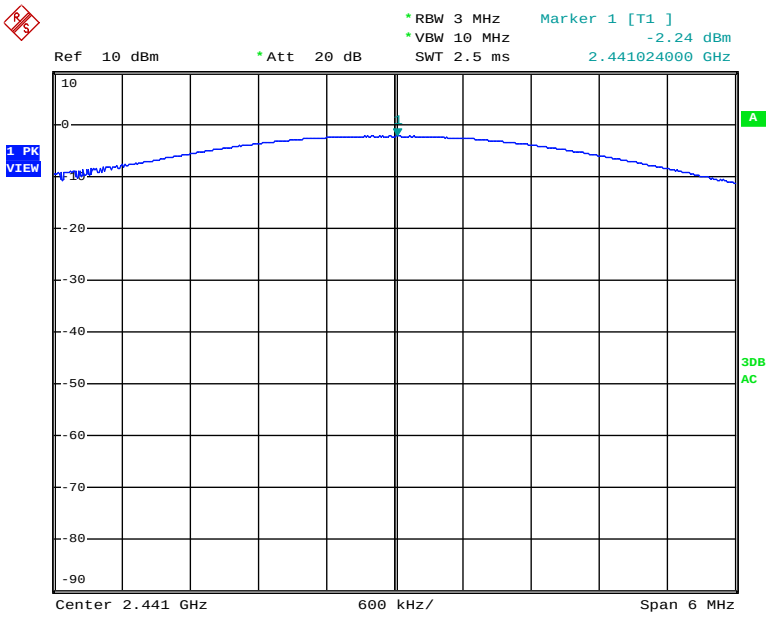
| GFSK Mode | | | | | |
|---|---|---|---|---|---|
| Channel | Channel Frequency (MHz) | Peak Power output(dBm) | Peak Power output(mW) | Peak Power Limit(W) | Pass/Fail |
| Low channel | 2402.00 | -1.99 | 0.632 | 1 | PASS |
| Middle channel | 2441.00 | -2.24 | 0.597 | 1 | PASS |
| High channel | 2480.00 | -2.48 | 0.565 | 1 | PASS |
| π/4-DQPSK Mode | | | | | |
| Channel | Channel Frequency (MHz) | Peak Power output(dBm) | Peak Power output(mW) | Peak Power Limit(mW) | Pass/Fail |
| Low channel | 2402.00 | -1.11 | 0.692 | 125 | PASS |
| Middle channel | 2441.00 | -1.41 | 0.723 | 125 | PASS |
| High channel | 2480.00 | -1.60 | 0.774 | 125 | PASS |

GFSK Mode: Low channel



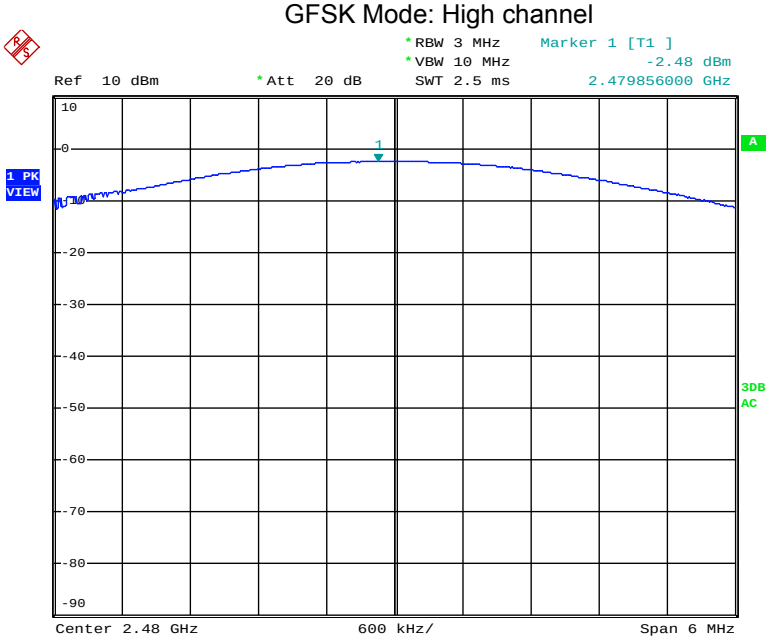

Date: 13.JUN.2016 13:19:29

GFSK Mode: Middle channel



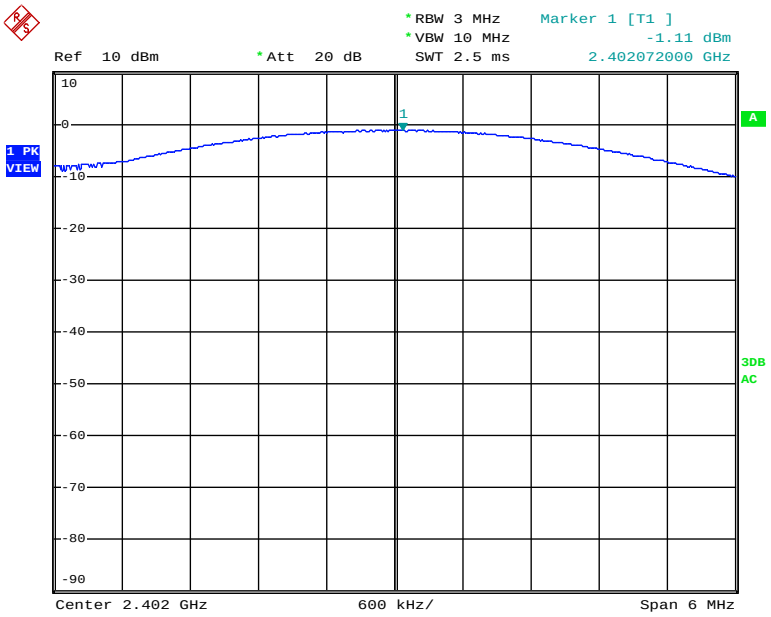

Date: 13.JUN.2016 13:19:53

GFSK Mode: High channel



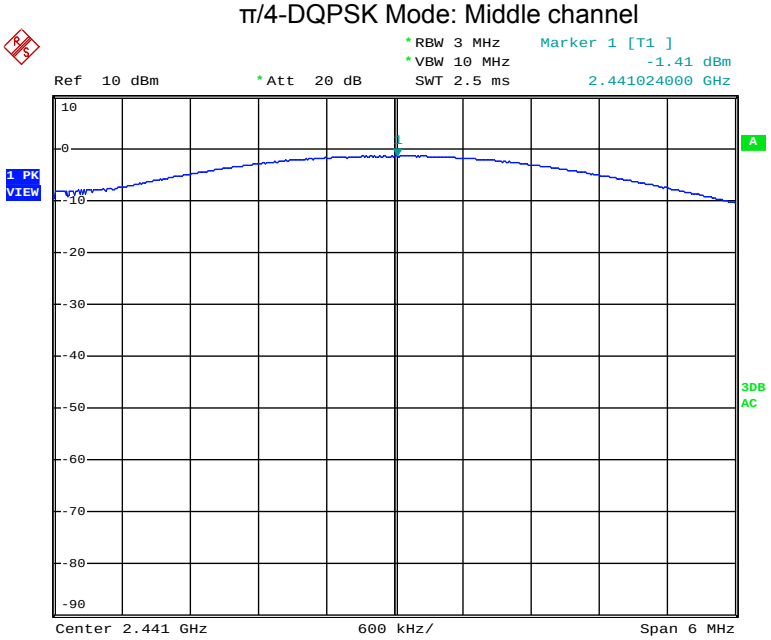

Date: 13.JUN.2016 13:20:14

π/4-DQPSK Mode: Low channel



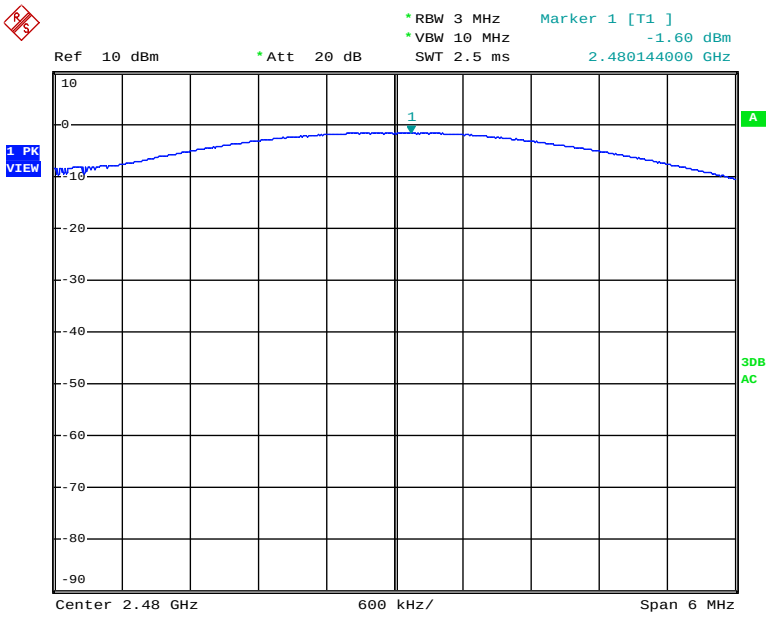

Date: 13.JUN.2016 13:21:40

π/4-DQPSK Mode: Middle channel




Date: 13.JUN.2016 13:21:09

π/4-DQPSK Mode: High channel



# 11. Band Edge Test

## 11.1 Applicable Standard

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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## 11.2 Measurement Procedure

(A) Conducted method:
Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: RBW = 100kHz, VBW = 300kHz.

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

(Peak measurement: Peak detector, RBW=1MHz, VBW=3MHz, Sweep=Auto
Average measurement: Peak detector, RBW=1MHz, VBW=10Hz, Sweep=Auto)

## 11.3 Measurement Equipment Used

Conducted method: Same as 6.3 Channel Separation Measurement.
Radiated method: Same as 5.3 Radiated Emission Measurement.

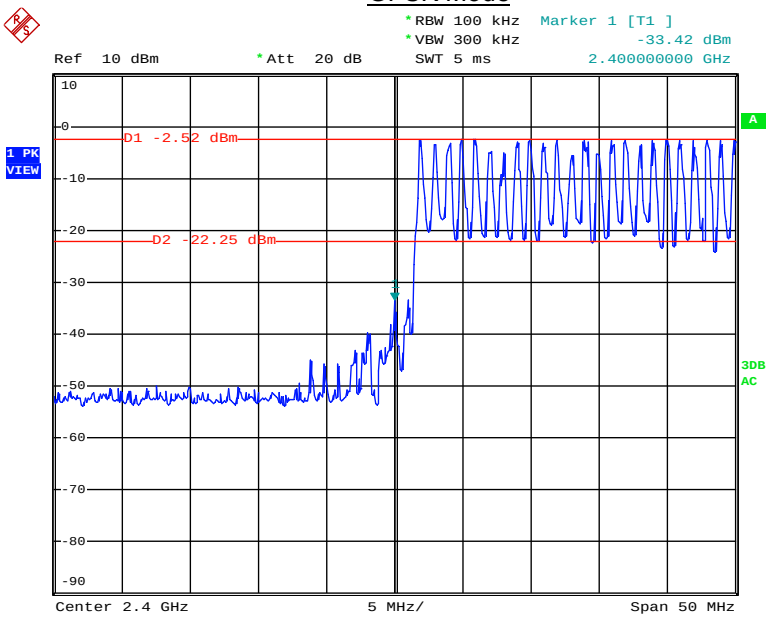
## 11.4 Measurement Results

Pass
Refer to attached data chart.

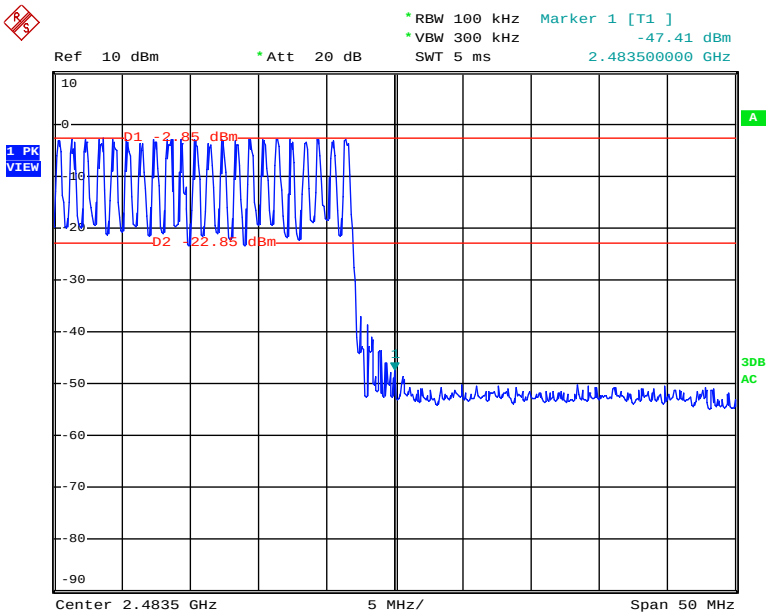
(A) Conducted Measurement

For Hopping Mode:

GFSK Mode

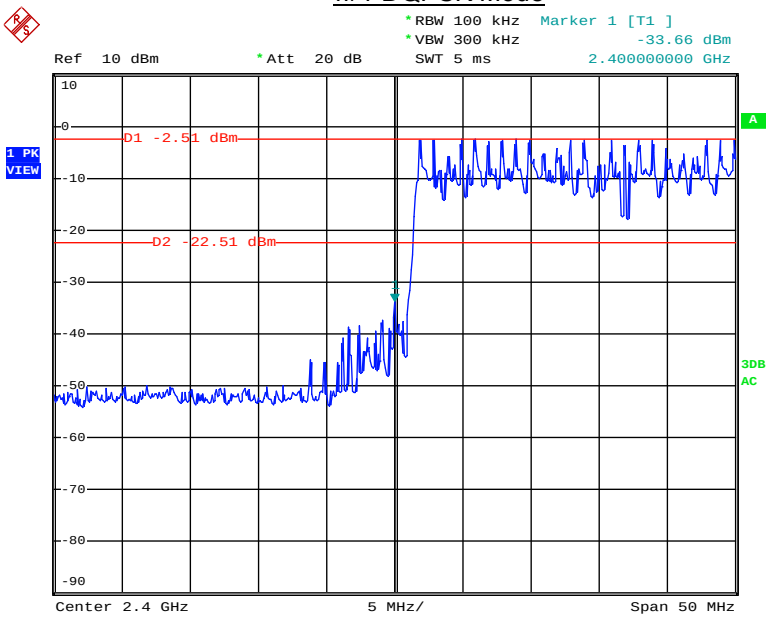



Date: 13.JUN.2016 13:37:30

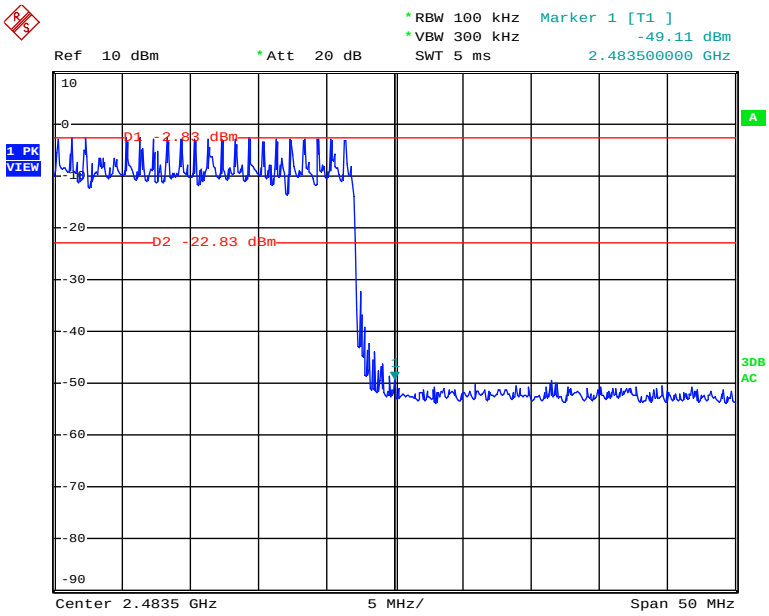



Date: 13.JUN.2016 13:39:03

π/4-DQPSK Mode



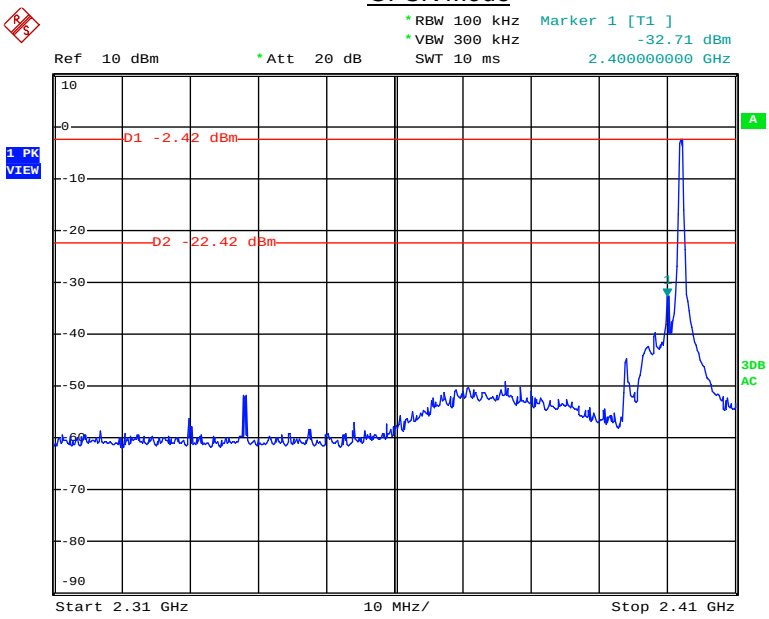

Date: 13.JUN.2016 13:41:46



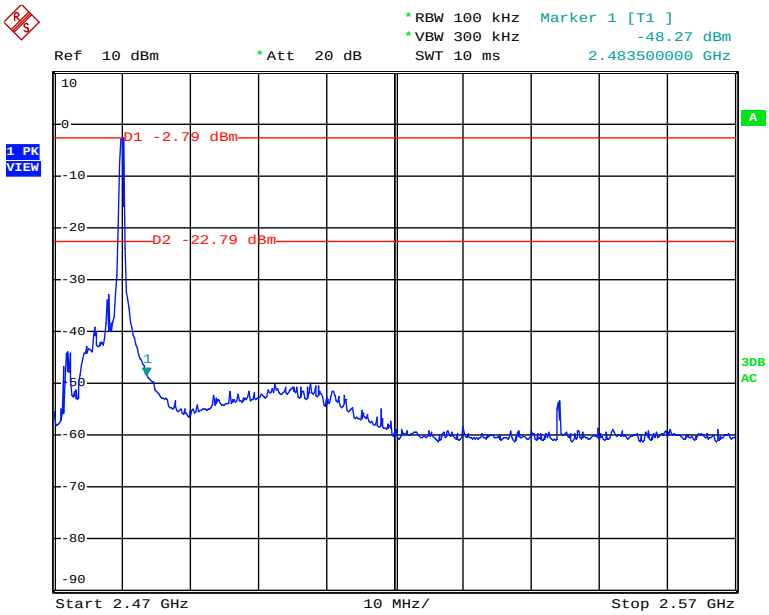

Date: 13.JUN.2016 13:40:23

For Non-Hopping Mode

GFSK Mode

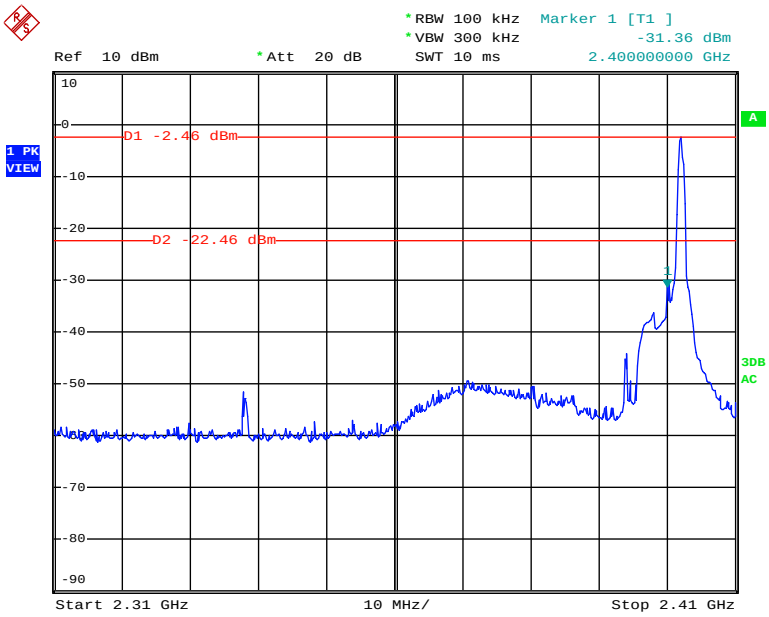



Date: 13.JUN.2016 13:43:17

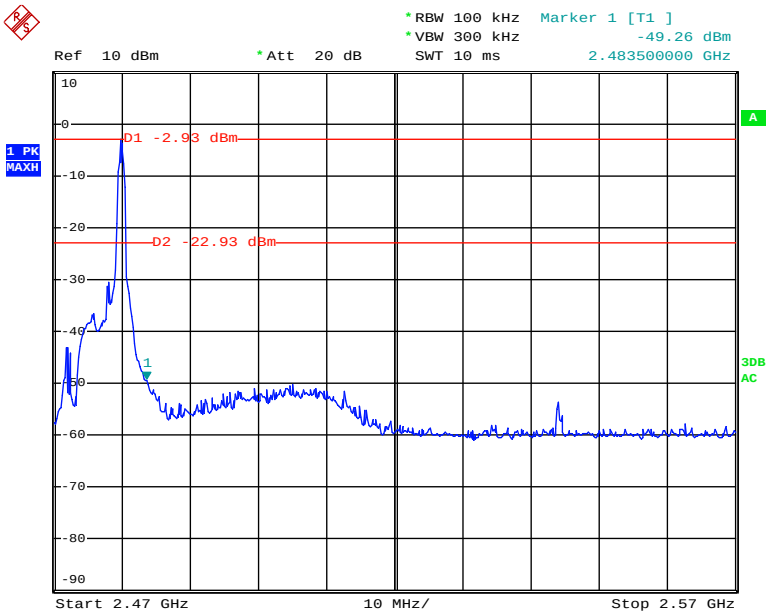



Date: 13.JUN.2016 13:44:50

## π/4-DQPSK Mode




Date: 13.JUN.2016 13:46:05



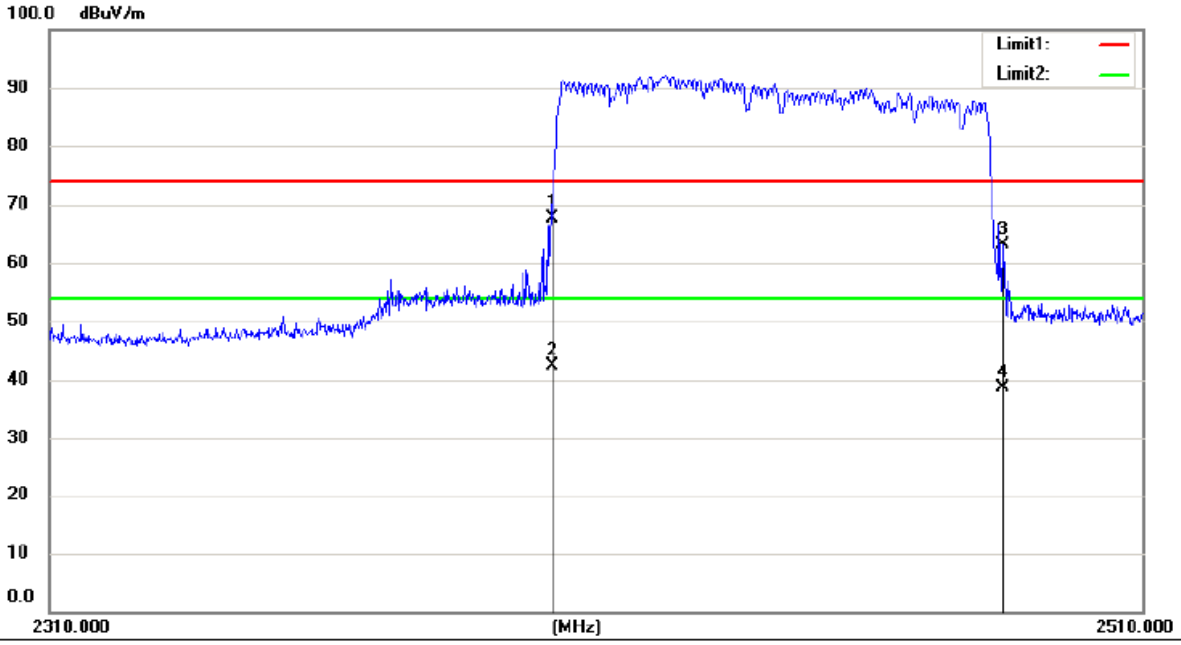

Date: 13.JUN.2016 13:47:27

(B) Radiated Measurement

For Hopping Mode:

GFSK Mode

Vertical:




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

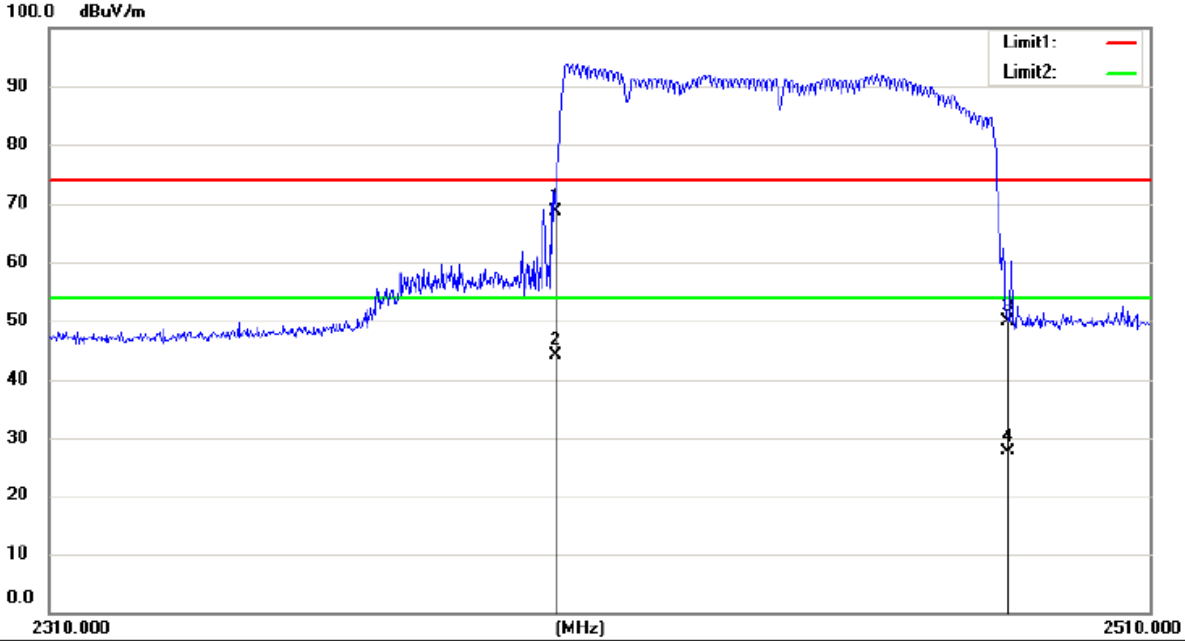
M/N: PBX4000BAT

Mode:GFSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 56.82 | 10.93 | 67.75 | 74.00 | -6.25 | peak | | | |
| 2 | | 2400.000 | 31.37 | 10.93 | 42.30 | 54.00 | -11.70 | AVG | | | |
| 3 | | 2483.500 | 52.20 | 11.00 | 63.20 | 74.00 | -10.80 | peak | | | |
| 4 | | 2483.500 | 27.70 | 11.00 | 38.70 | 54.00 | -15.30 | AVG | | | |

Horizontal:




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

M/N: PBX4000BAT

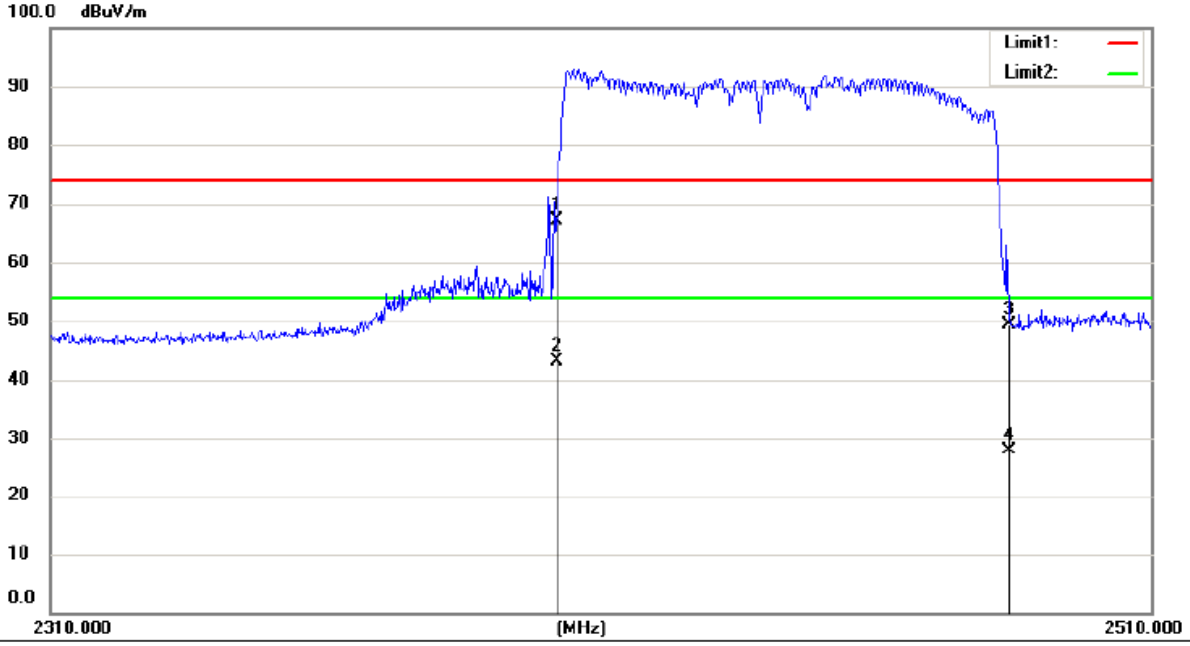
Mode:GFSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 57.68 | 10.93 | 68.61 | 74.00 | -5.39 | peak | | | |
| 2 | | 2400.000 | 33.27 | 10.93 | 44.20 | 54.00 | -9.80 | AVG | | | |
| 3 | | 2483.500 | 38.90 | 11.00 | 49.90 | 74.00 | -24.10 | peak | | | |
| 4 | | 2483.500 | 16.60 | 11.00 | 27.60 | 54.00 | -26.40 | AVG | | | |

π/4-DQPSK Mode

Horizontal:




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

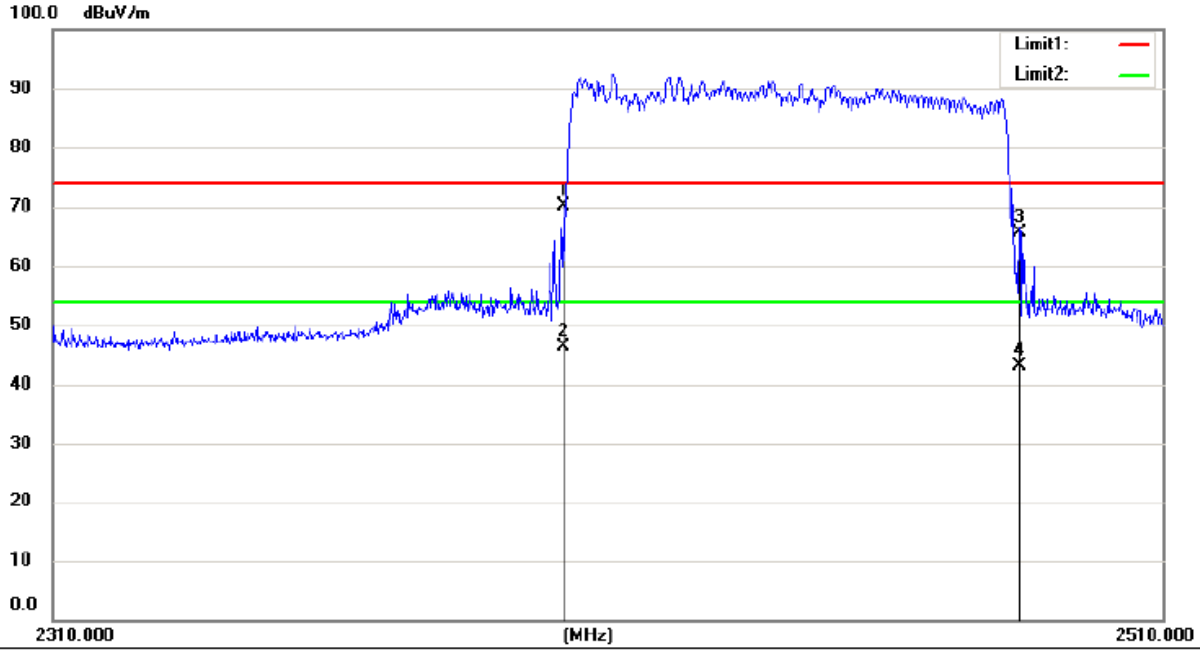
M/N: PBX4000BAT

Mode:π/4 DQPSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 56.12 | 10.93 | 67.05 | 74.00 | -6.95 | peak | | | |
| 2 | | 2400.000 | 32.27 | 10.93 | 43.20 | 54.00 | -10.80 | AVG | | | |
| 3 | | 2483.500 | 38.50 | 11.00 | 49.50 | 74.00 | -24.50 | peak | | | |
| 4 | | 2483.500 | 16.90 | 11.00 | 27.90 | 54.00 | -26.10 | AVG | | | |

Vertical:




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode:π/4 DQPSK

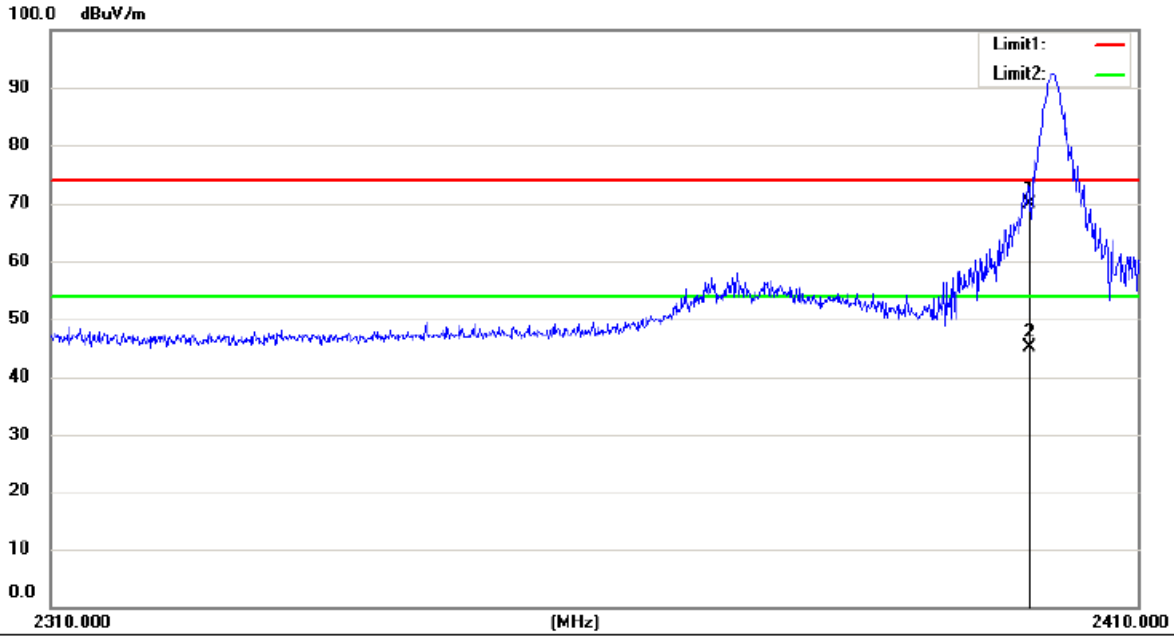
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 59.10 | 10.93 | 70.03 | 74.00 | -3.97 | peak | | | |
| 2 | | 2400.000 | 35.47 | 10.93 | 46.40 | 54.00 | -7.60 | AVG | | | |
| 3 | | 2483.500 | 54.66 | 11.00 | 65.66 | 74.00 | -8.34 | peak | | | |
| 4 | | 2483.500 | 32.20 | 11.00 | 43.20 | 54.00 | -10.80 | AVG | | | |

For Non-Hopping Mode:

GFSK Mode

Low Channel (Vertical):




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

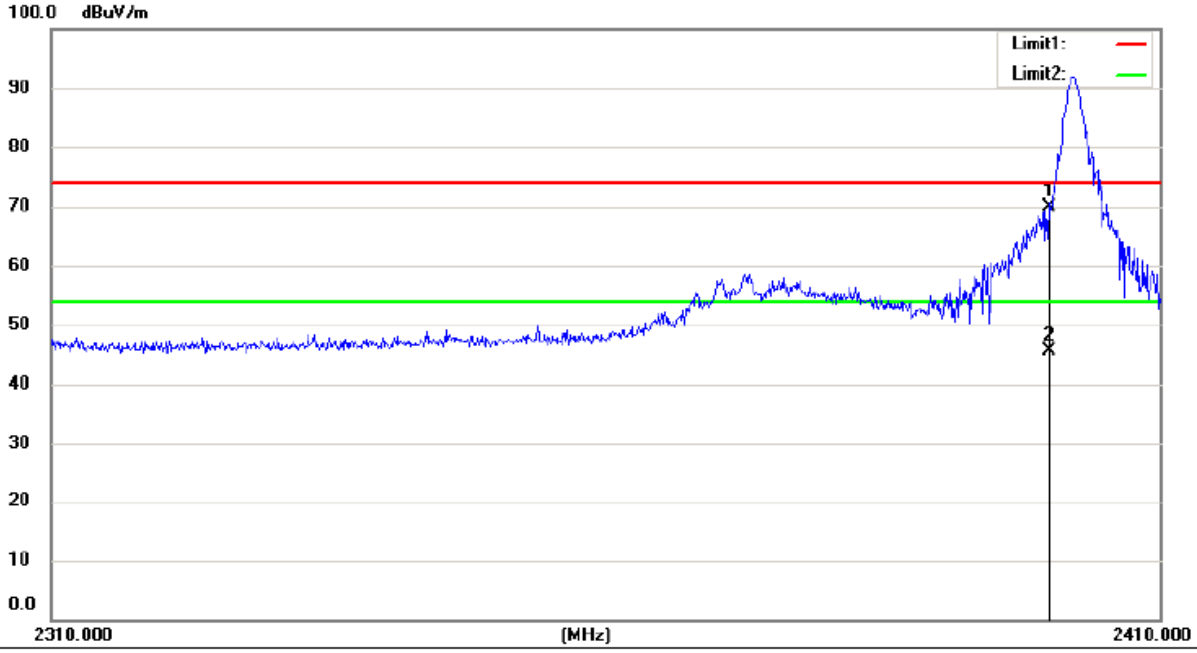
M/N: PBX4000BAT

Mode:GFSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 58.95 | 10.93 | 69.88 | 74.00 | -4.12 | peak | | | |
| 2 | | 2400.000 | 34.27 | 10.93 | 45.20 | 54.00 | -8.80 | AVG | | | |

Low Channel (Horizontal):




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

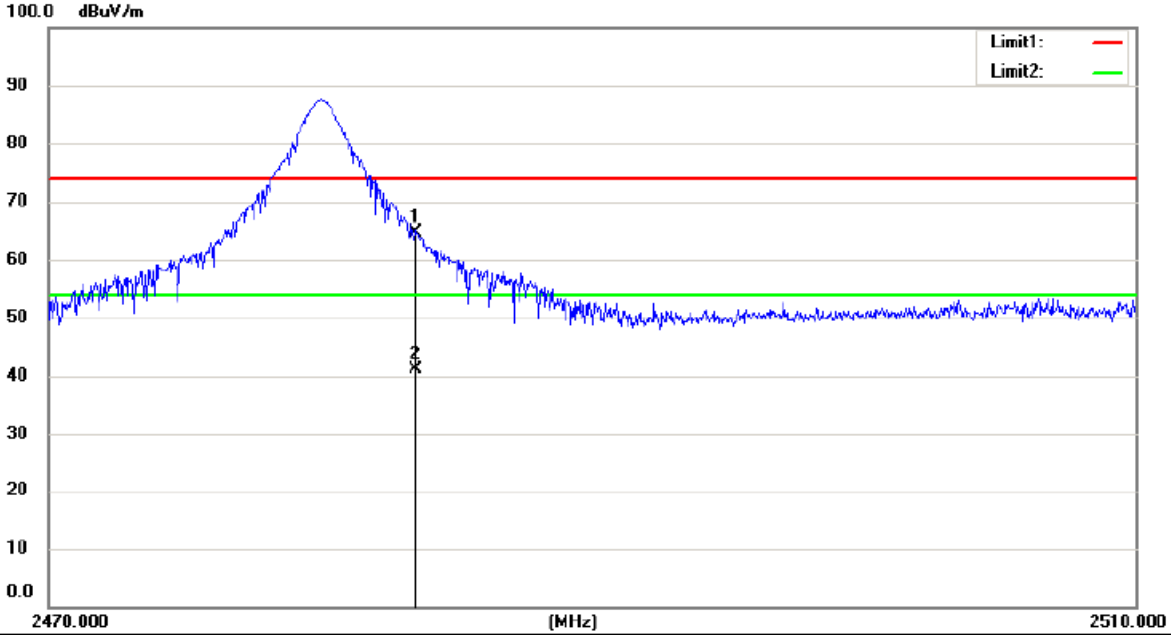
M/N: PBX4000BAT

Mode:GFSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 58.98 | 10.93 | 69.91 | 74.00 | -4.09 | peak | | | |
| 2 | | 2400.000 | 34.67 | 10.93 | 45.60 | 54.00 | -8.40 | AVG | | | |

High Channel (Vertical):




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

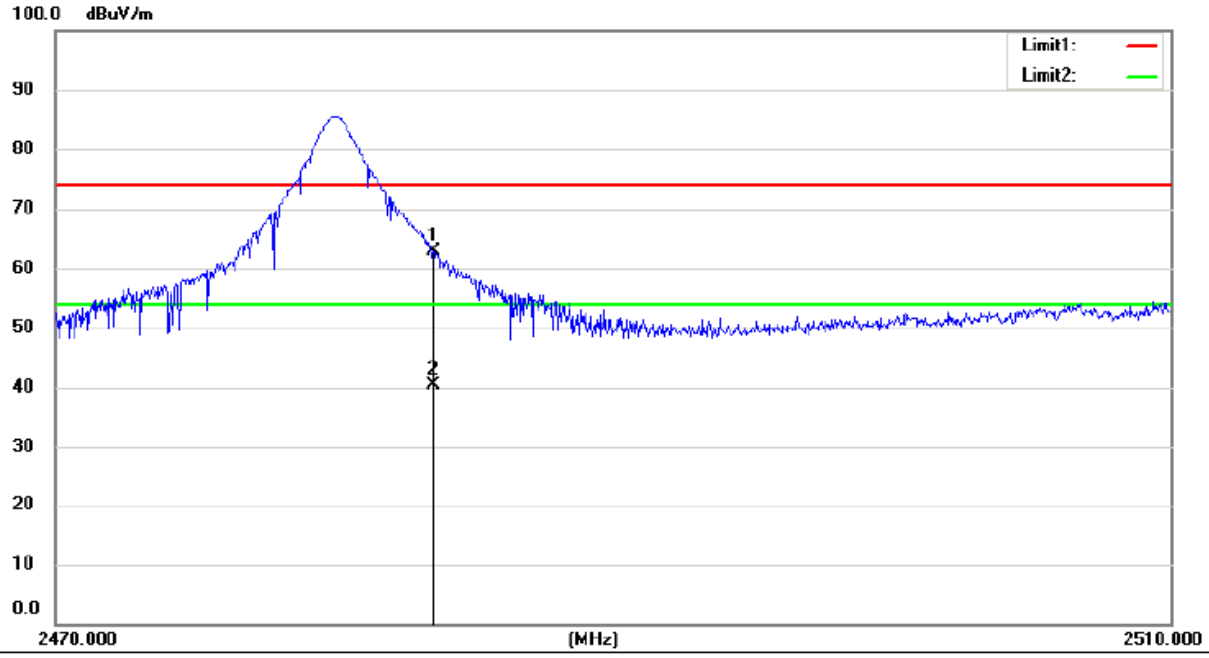
M/N: PBX4000BAT

Mode:GFSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2483.500 | 53.61 | 11.00 | 64.61 | 74.00 | -9.39 | peak | | | |
| 2 | | 2483.500 | 30.20 | 11.00 | 41.20 | 54.00 | -12.80 | AVG | | | |

High Channel (Horizontal):




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

M/N: PBX4000BAT

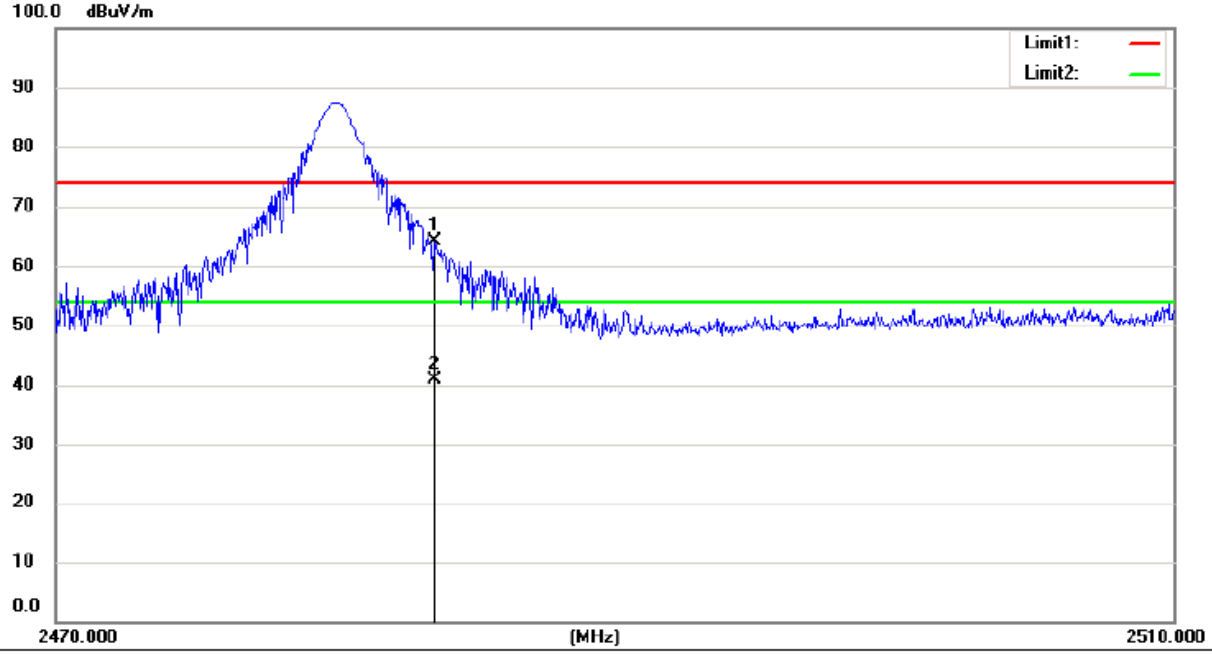
Mode:GFSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2483.500 | 51.99 | 11.00 | 62.99 | 74.00 | -11.01 | peak | | | |
| 2 | | 2483.500 | 29.30 | 11.00 | 40.30 | 54.00 | -13.70 | AVG | | | |

π/4-DQPSK Mode

Low Channel (Vertical):




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

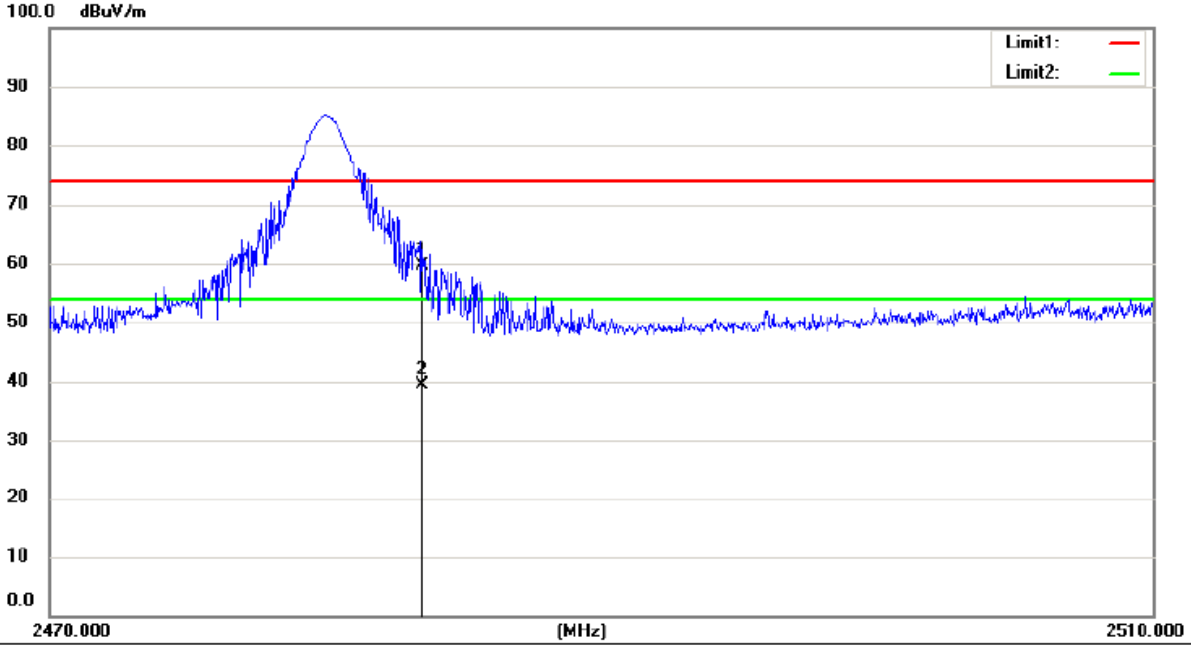
M/N: PBX4000BAT

Mode:π/4 DQPSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2483.500 | 53.06 | 11.00 | 64.06 | 74.00 | -9.94 | peak | | | |
| 2 | | 2483.500 | 29.80 | 11.00 | 40.80 | 54.00 | -13.20 | AVG | | | |

Low Channel (Horizontal):




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

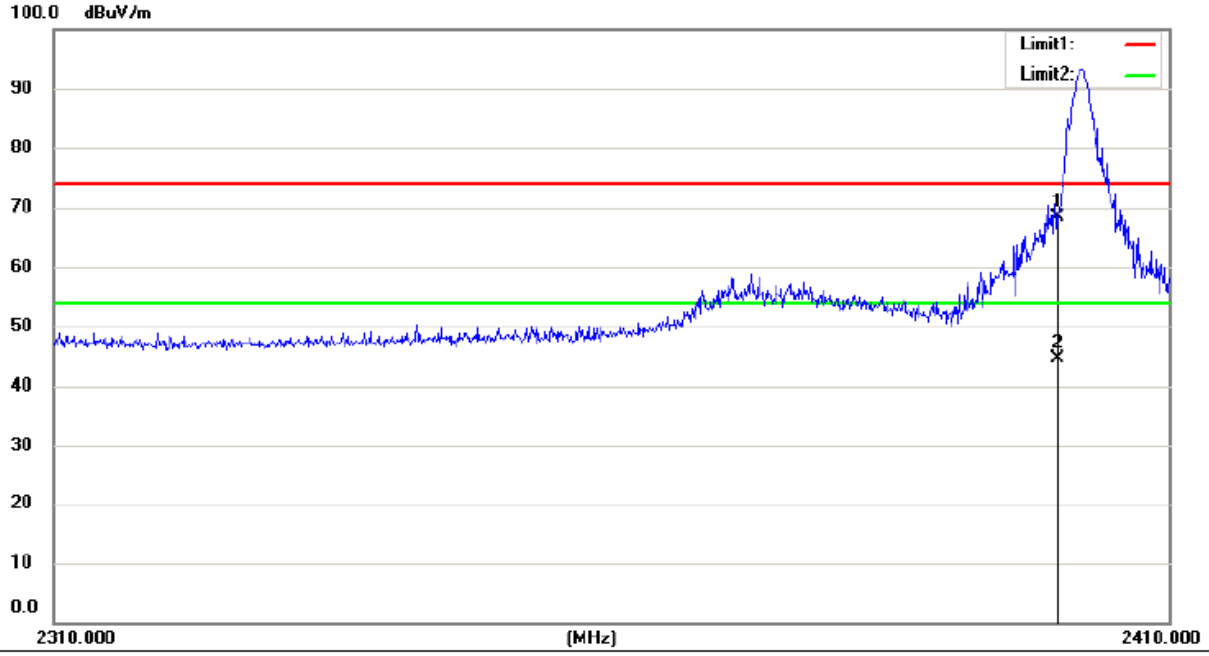
M/N: PBX4000BAT

Mode:π/4 DQPSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2483.500 | 48.61 | 11.00 | 59.61 | 74.00 | -14.39 | peak | | | |
| 2 | | 2483.500 | 28.50 | 11.00 | 39.50 | 54.00 | -14.50 | AVG | | | |

High Channel (Vertical):




Site site #1 Polarization: *Vertical* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

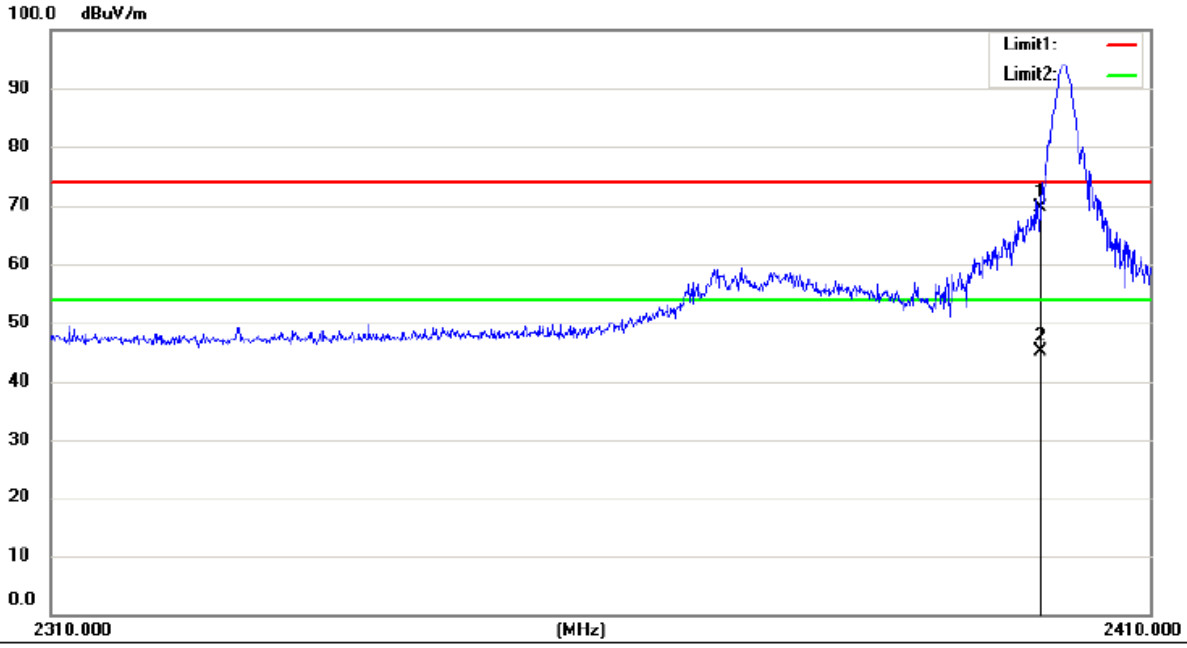
M/N: PBX4000BAT

Mode:π/4 DQPSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 57.39 | 10.93 | 68.32 | 74.00 | -5.68 | peak | | | |
| 2 | | 2400.000 | 33.67 | 10.93 | 44.60 | 54.00 | -9.40 | AVG | | | |

High Channel (Horizontal):




Site site #1 Polarization: *Horizontal* Temperature: 20 C

Limit: (RE)FCC Part15 Class B (1~6GHz)Peak Power: DC 5V Humidity: 52 %

EUT: 15' rechargeable speaker

M/N: PBX4000BAT

Mode:π/4 DQPSK

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 2400.000 | 58.60 | 10.93 | 69.53 | 74.00 | -4.47 | peak | | | |
| 2 | | 2400.000 | 34.17 | 10.93 | 45.10 | 54.00 | -8.90 | AVG | | | |

# 12. Antenna Port Emission

## 12.1 Test Equipment

| Name of Equipment | Manufacturer | Model | Serial Number | Last Cal. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | My53470879 | 05/15/2016 | 05/14/2017 |

## 12.2 Measuring Instruments and setting

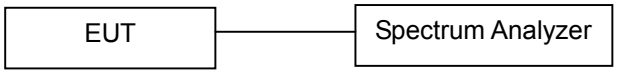
The following table is the setting of spectrum analyzer.

| | |
|---|---|
| Attenuation | Auto |
| RB | 100kHz |
| VB | 300kHz |
| Detector | Peak |
| Trace | Max hold |

## 12.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels, the limit was determined by attenuation 20dB of the RF peak power output.

## 12.4 Block Diagram of Test setup

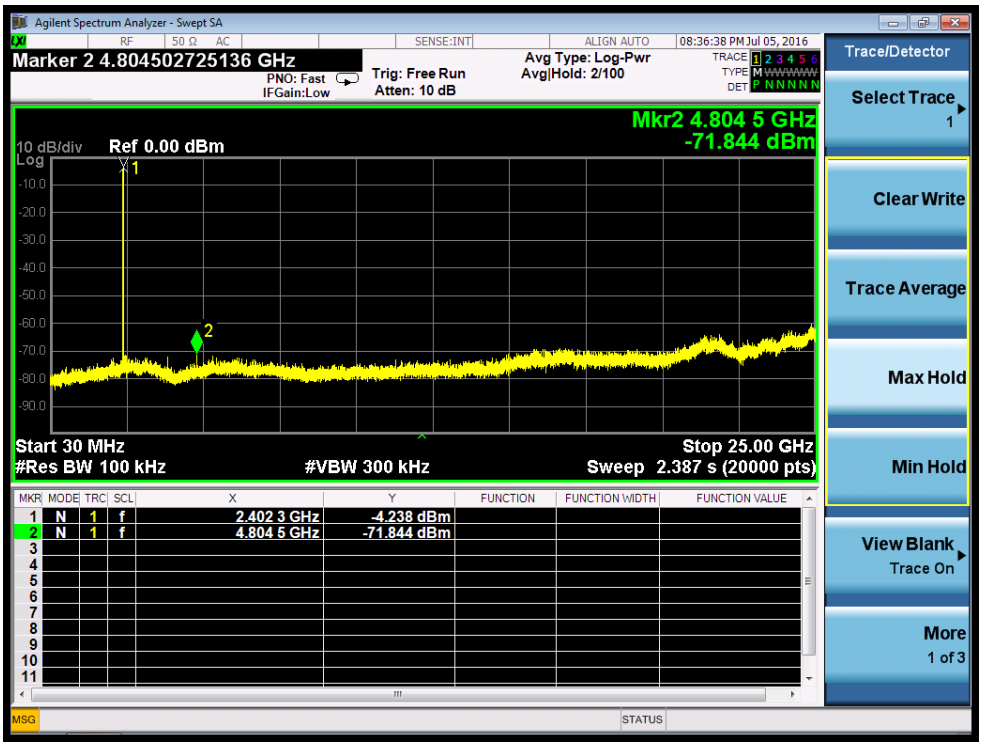



## 12.5 Test Result

PASS.

(Bluetooth (GFSK, pi/4-DQPSK) mode have been tested, and the worst result(GFSK) was report as below.)

GFSK Mode: Low channel




GFSK Mode: Middle channel

GFSK Mode: High channel

# 13. Antenna Application

## 13.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.240.

FCC part 15C section 15.247 requirements:
Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

## 13.2 Result

The EUT's antenna integrated on PCB, The antenna's gain is 3.3dBi and meets the requirement

**---The End---**