# Test Report

**Date : 2018-06-11** 
**No. : HMD18050035**

| | | |
|---|---|---|
| **Applicant** | : | Hip Shing Electronics Limited<br>Units 1.2&3,20/F.,New Treasure Centre, 10., Ng Fong Street, San Po Kong, Kowloon, Hong Kong |
| **Supplier / Manufacturer** | : | Dongguan Zhi Cheng Electronic Products Co., Ltd.<br>No.11 Shangbao Road, 188 Industrial Zone, Pingshan, Tangxia, Dongguan, Guangdong, China |
| **Description of Sample(s)** | : | Submitted sample(s) said to be<br>Product: DAB/DAB+/FM Radio with Bluetooth<br>Brand Name: Vitra<br>Model No.: EAMES RADIO<br>FCC ID: BZABAO0518VR |
| **Date Samples Received** | : | 2018-05-24 |
| **Date Tested** | : | 2018-05-29 to 2018-06-07 |
| **Investigation Requested** | : | Perform Electro Magnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 and ANSI C63.10:2013 for FCC Certification. |
| **Conclusions** | : | The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report. |
| **Remarks** | : | Bluetooth FHSS (GFSK / π/4-DQPSK / 8DPSK) |

THE HONG KONG STANDARDS AND TESTING CENTRE LTD

CHEUNG Chi, Kenneth
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

# Test Report



**CONTENT:**

## 1.0 General Details

### 1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong Kong
Telephone: 852 2666 1888
Fax: 852 2664 4353

### 1.2 Equipment Under Test [EUT]

**Description of Sample(s)**

| | |
|---|---|
| Product: | DAB/DAB+/FM Radio with Bluetooth |
| Manufacturer: | Dongguan Zhi Cheng Electronic Products Co., Ltd.<br>No.11 Shangbao Road, 188 Industrial Zone, Pingshan, Tangxia, Dongguan, Guangdong, China |
| Brand Name: | Vitra |
| Model Number: | EAMES RADIO |
| Rating: | Input: 100-240Va.c. 50/60Hz 0.75A;<br>Output: 18Vd.c. 1330Ma 23.94W |

The AC/DC adaptor was provided by the applicant with following details:
Brand name: GPE; Model no.: GPE248-180133-Z

### 1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a DAB/DAB+/FM Radio with Bluetooth. The transmission signal is digital modulated with channel frequency range 2402-2480MHz. The R.F. signal was modulated by IC; the type of modulation used was frequency hopping spread spectrum Modulation.

### 1.3 Date of Order

2018-05-24

### 1.4 Submitted Sample(s):

1 Sample

### 1.5 Test Duration

2018-05-29 to 2018-06-07

### 1.6 Country of Origin

China

### 1.7 RF Module Details

| | |
|---|---|
| Module Model Number: | F-3299 |
| Module FCC ID: | N/A |
| Module Transmission Type: | Bluetooth V4.2 |
| Modulation: | FHSS (GFSK / π/4-DQPSK/ 8DPSK) |
| Data Rates: | 1MBps: GFSK<br>2 MBps: π/4-DQPSK<br>3 MBps: 8DPSK |
| Frequency Range: | 2400-2483.5MHz |
| Carrier Frequencies: | 2402MHz – 2480MHz |

Module Specification (specification provided by manufacturer)

### 1.8 Antenna Details

| | |
|---|---|
| Antenna Type: | Meander Line antenna |
| Antenna Gain: | 2.12dBi |

## 2.0 Technical Details

### 2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 Regulations and ANSI C63.10:2013for FCC Certification.
According FCC KDB 558074 DTS Measurement Guidance, Duty cycle ≧98%.
The device was realized by test software.

### 2.2 Test Standards and Results Summary Tables

**EMISSION**
**Results Summary**

| Test Condition | Test Requirement | Test Method | Class / Severity | Test Result | | |
|---|---|---|---|---|---|---|
| | | | | Pass | Failed | N/A |
| Maximum Peak Conducted Output Power | FCC 47CFR 15.247(b)(1) | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| Radiated Spurious Emissions | FCC 47CFR 15.209 | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| AC Mains Conducted Emissions | FCC 47CFR 15.207 | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| Number of Hopping Frequency | FCC 47CFR 15.247 (b)(1) | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| 20dB Bandwidth | FCC 47CFR 15.247(a)(2) | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| Hopping Channel Separation | FCC 47CFR 15.247(a)(1) | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| Band-edge measurement (Radiated) | FCC 47CFR 15.247(d) | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| Pseudorandom Hopping Algorithm | FCC 47CFR 15.247(a)(1) | N/A | N/A | ☒ | ☐ | ☐ |
| Time of Occupancy (Dwell Time) | FCC 47CFR 15.247(a)(1)(iii) | ANSI C63.10: 2013 | N/A | ☒ | ☐ | ☐ |
| Antenna requirement | FCC 47CFR 15.203 | N/A | N/A | ☒ | ☐ | ☐ |

Note: N/A - Not Applicable

### 2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item.
Investigation has been done on all the possible configurations for searching the worst cases.
The device was realized by test software.
The following table is a list of the test modes shown in this test report.

| Test Items | Mode | Data Rate |
|---|---|---|
| Maximum Peak Conducted Output Power | GFSK / π/4-DQPSK / 8DPSK | 1MBps / 2MBps / 3MBps |
| Hopping Channel Separation | GFSK / π/4-DQPSK / 8DPSK | 1MBps / 2MBps / 3MBps |
| Number of Hopping Frequency | GFSK / π/4-DQPSK / 8DPSK | 1MBps / 2MBps / 3MBps |
| Time of Occupancy(Dwell Time) | 8DPSK (DH1 / DH3 / DH5) | 3MBps |
| Radiated Spurious Emissions | GFSK / π/4-DQPSK / 8DPSK | 1MBps / 2MBps / 3MBps |
| Band-edge compliance of Conducted Emission | GFSK / π/4-DQPSK / 8DPSK | 1MBps / 2MBps / 3MBps |

## 3.0 Test Results

### 3.1 Emission

### 3.1.1 Maximum Peak Conducted Output Power

Ambient temperature 25°C Relative humidity 57%

| | |
|---|---|
| Test Requirement: | FCC 47CFR 15.247(b) (1) |
| Test Method: | ANSI C63.10: 2013 |
| Test Date: | 2018-06-04 |
| Mode of Operation: | Tx mode |

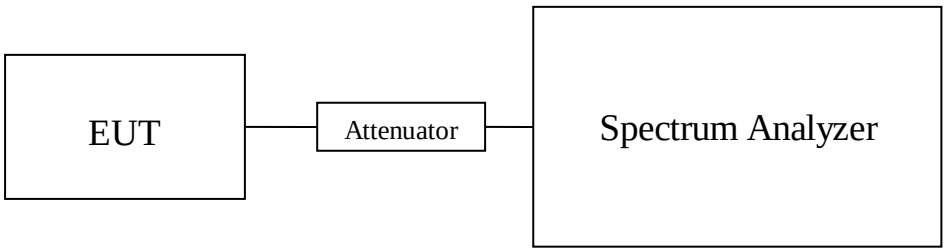
**Test Method:**

A temporary antenna connector was soldered to the RF output. The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

**Spectrum Analyzer Setting:**

RBW = 3 MHz, VBW= 3MHz, Sweep = Auto, Span: Approximately five times the 20 dB bandwidth
Detector = Peak, Trace = Max. hold

**Test Setup:**




Note: a temporary antenna connector was soldered to the RF output.

**Limits for Maximum Peak Conducted Output Power [FCC 47CFR 15.247]:**

| |
|---|
| The maximum peak output power shall not exceeded the following limits:<br>For frequency hopping systems employing at least 75 hopping channels: 1 Watt<br>For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts<br>For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt |

Results of Bluetooth Communication mode (GFSK) (Fundamental Power): Pass

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2402 | 0.000785 |

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2441 | 0.001429 |

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2480 | 0.001820 |

Results of Bluetooth Communication mode (π/4-DQPSK) (Fundamental Power): Pass

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2402 | 0.000358 |

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2441 | 0.000705 |

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2480 | 0.000966 |

Results of Bluetooth Communication mode (8DPSK) (Fundamental Power): Pass

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2402 | 0.000361 |

| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2441 | 0.000710 |

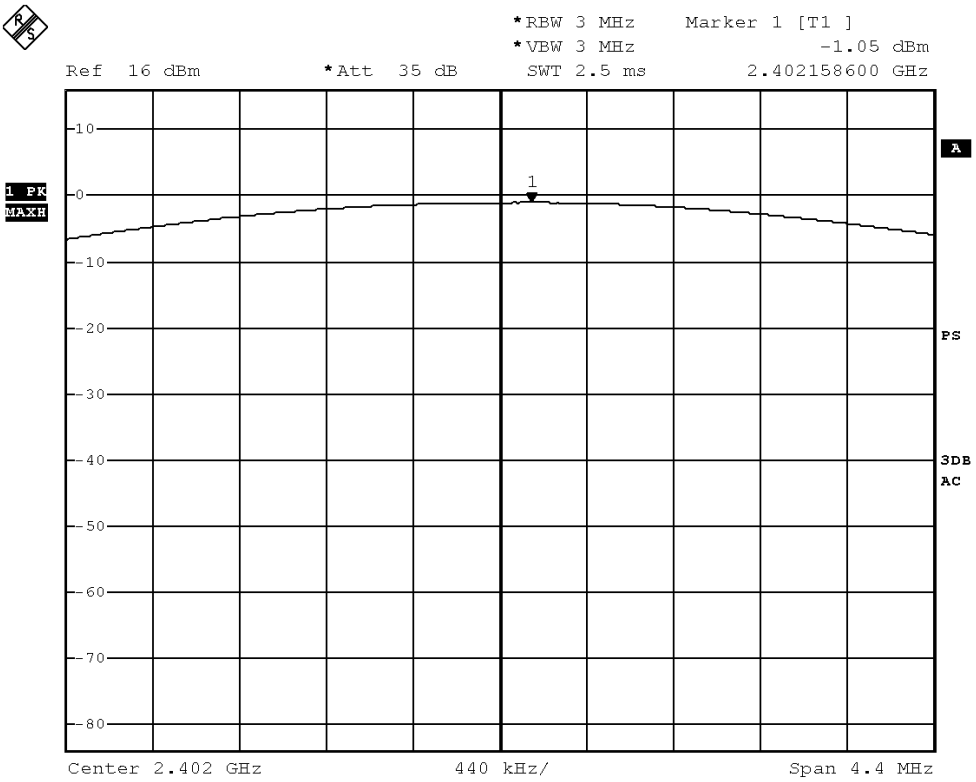
| Transmitter Frequency (MHz) | Maximum conducted output power (Watt) |
|---|---|
| 2480 | 0.000973 |

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB
1GHz to 18GHz 1.7dB

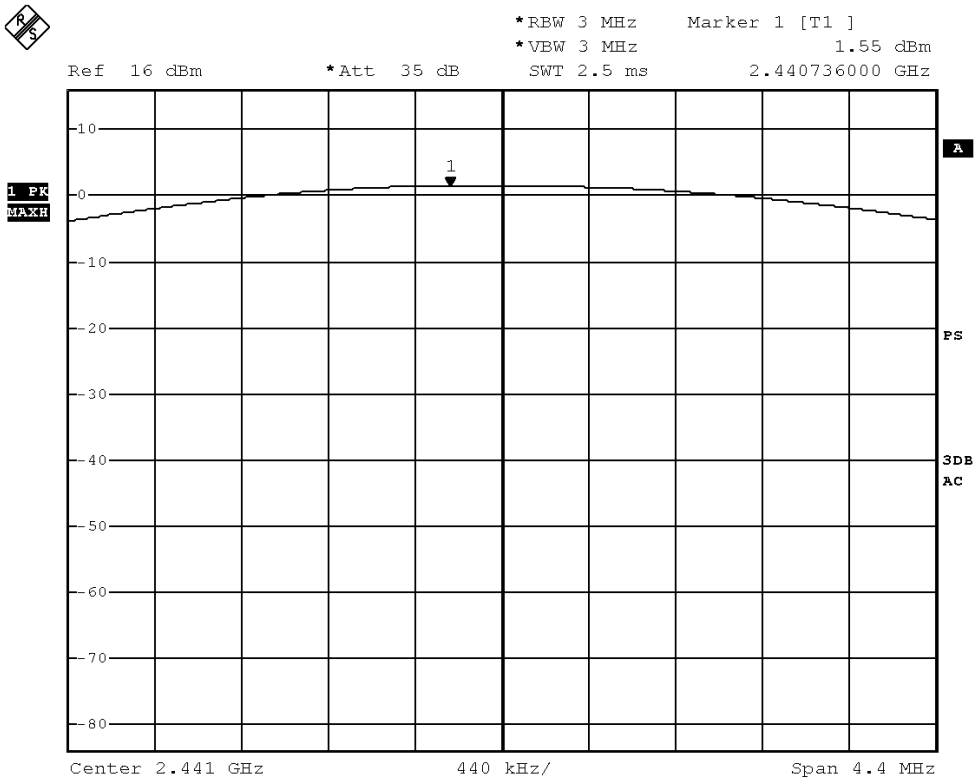
Remark:
1. All test data for each data rate were verified, but only the worst case was reported.
2. The EUT is programmed to transmit signals continuously for all testing.

**Test plot of Maximum Peak Conducted Output Power :**

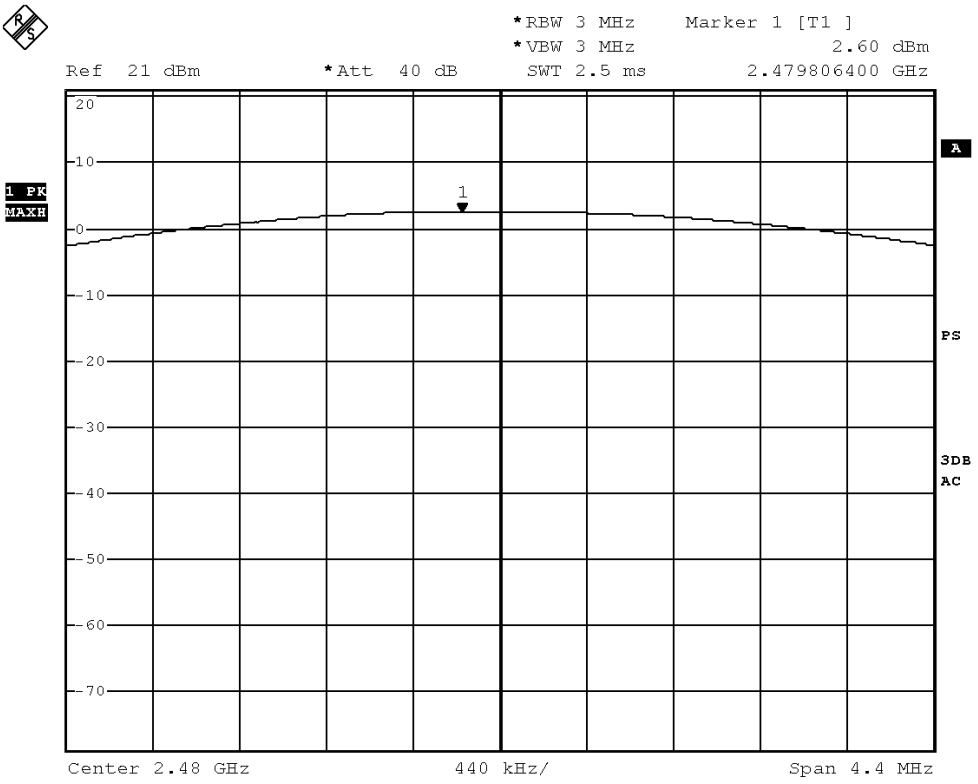
**Bluetooth Communication mode (GFSK, 2402MHz)**



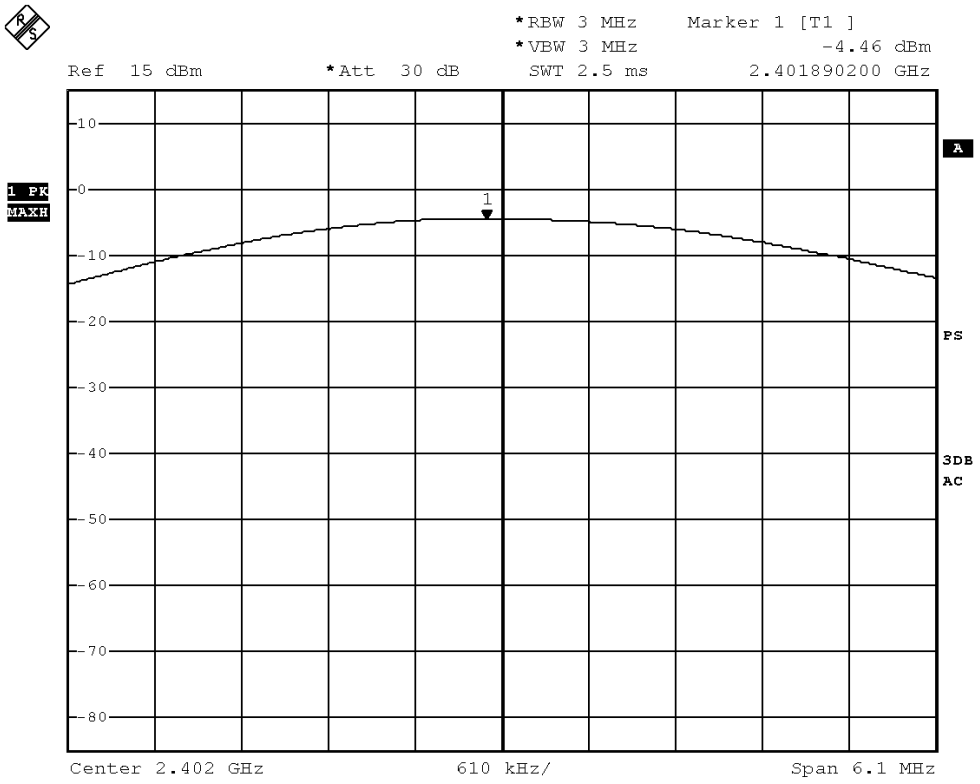
**Bluetooth Communication mode (GFSK, 2441MHz)**



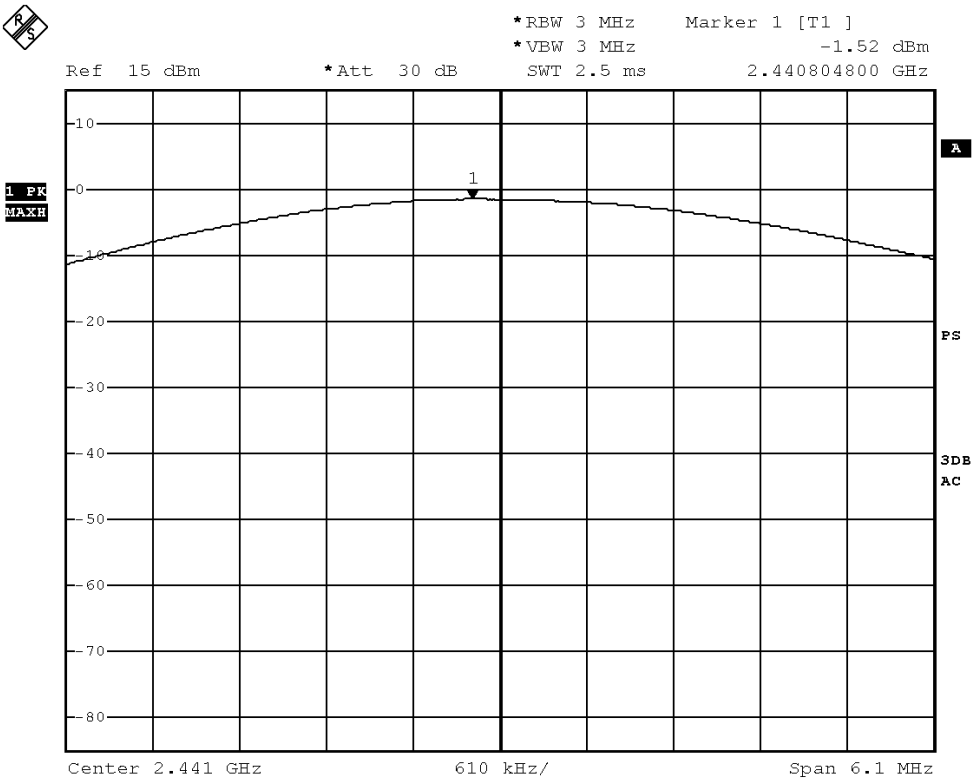
**Bluetooth Communication mode (GFSK, 2480MHz)**



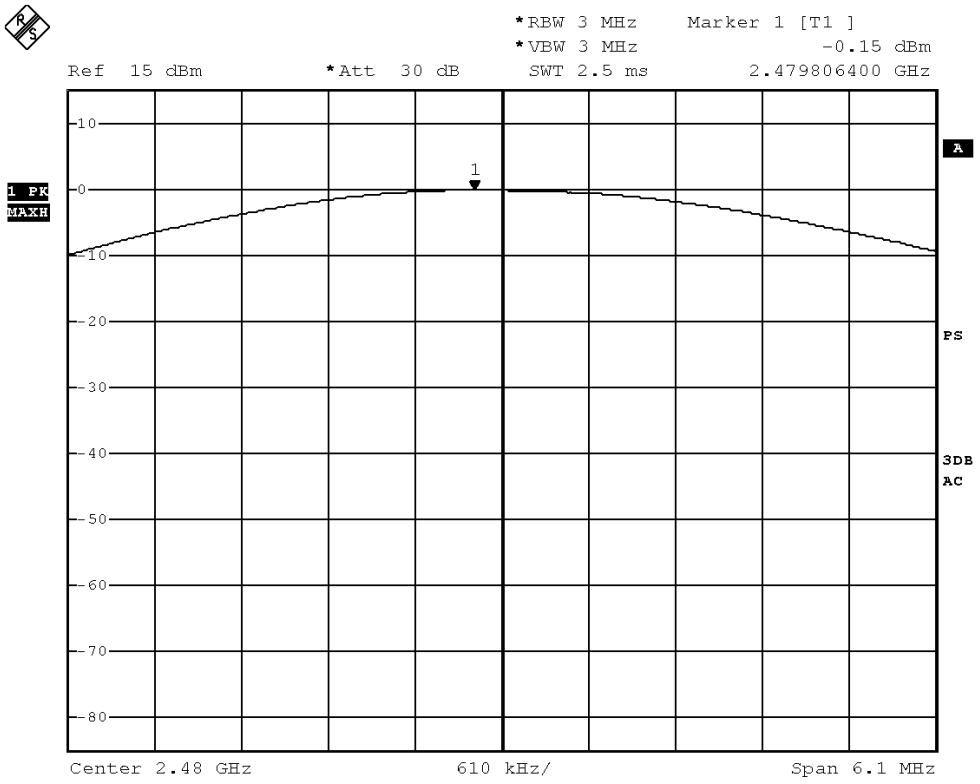
**Bluetooth Communication mode (π/4 DQPSK, 2402MHz)**



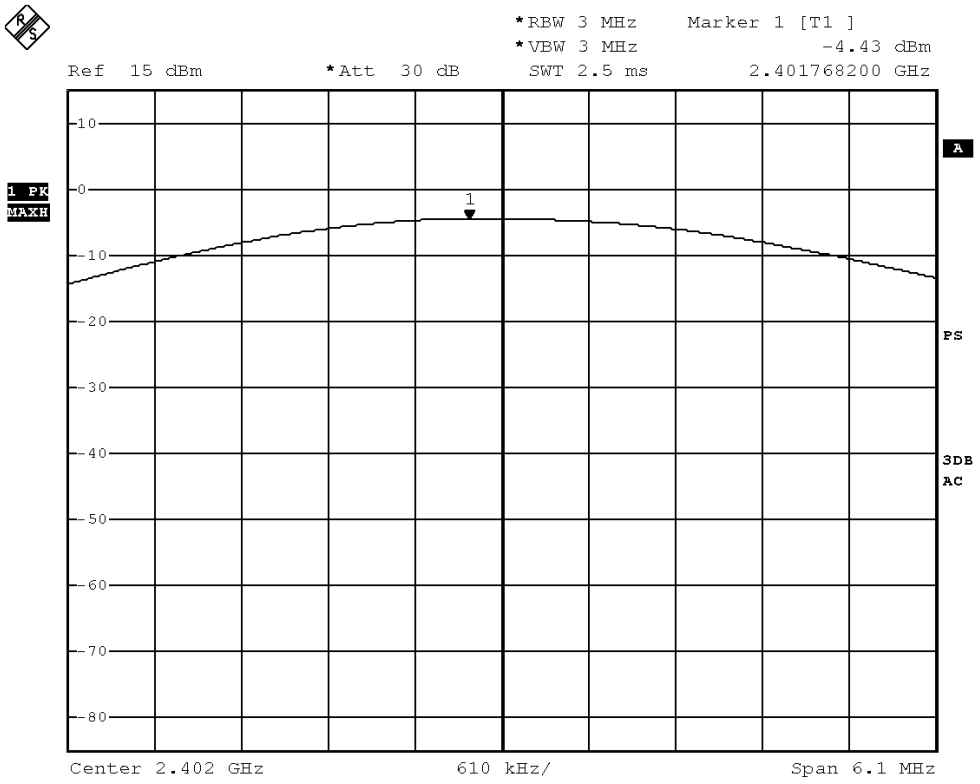
**Bluetooth Communication mode (π/4 DQPSK, 2441MHz)**



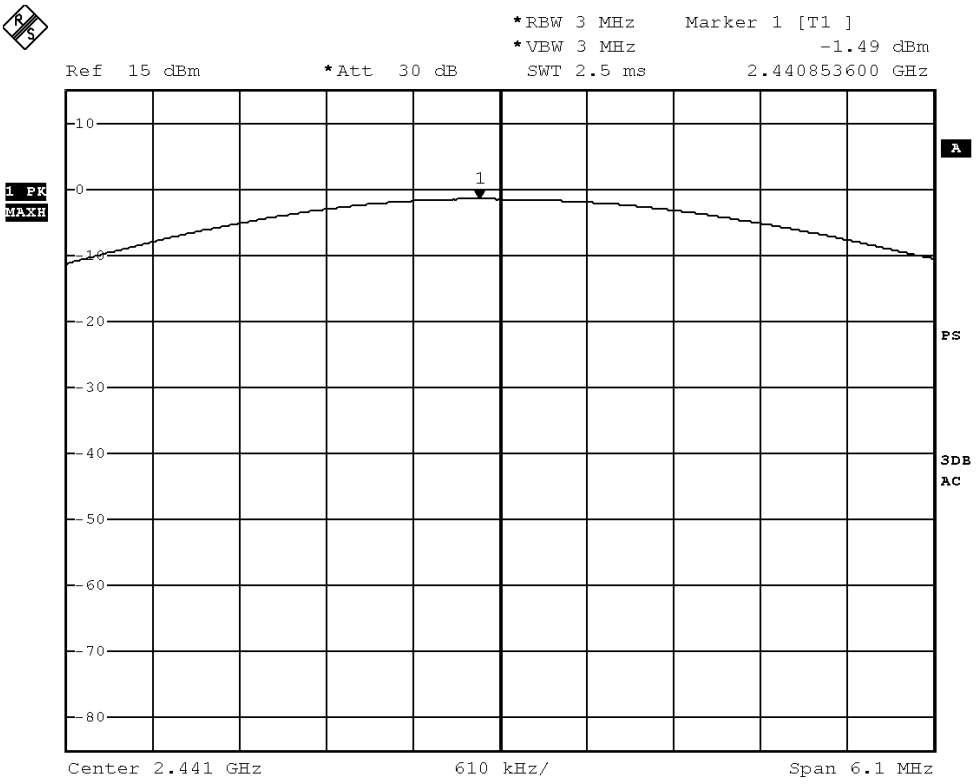
**Bluetooth Communication mode (π/4 DQPSK, 2480MHz)**



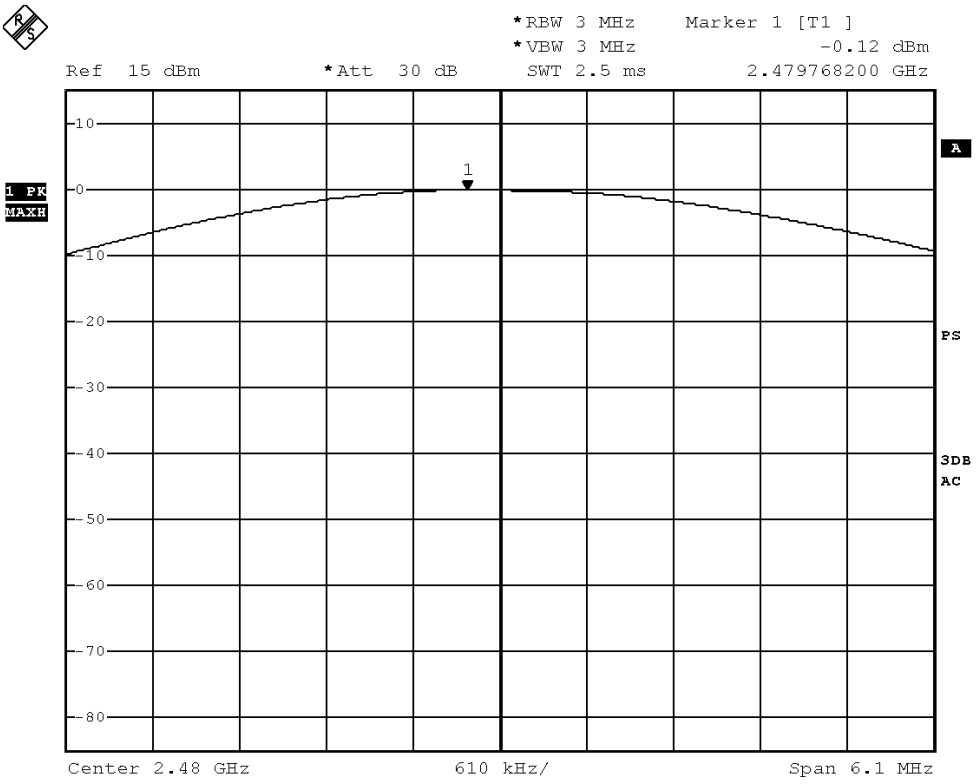
**Bluetooth Communication mode (8DPSK, 2402MHz)**



**Bluetooth Communication mode (8DPSK, 2441MHz)**



**Bluetooth Communication mode (8DPSK, 2480MHz)**



### 3.1.2 Radiated Spurious Emissions

Ambient temperature 25°C Relative humidity 57%

| | |
|---|---|
| Test Requirement: | FCC 47CFR 15.209 |
| Test Method: | ANSI C63.10:2013 |
| Test Date: | 2018-06-04 |
| Mode of Operation: | Tx mode / Bluetooth Communication mode (GFSK) |

**Test Method:**

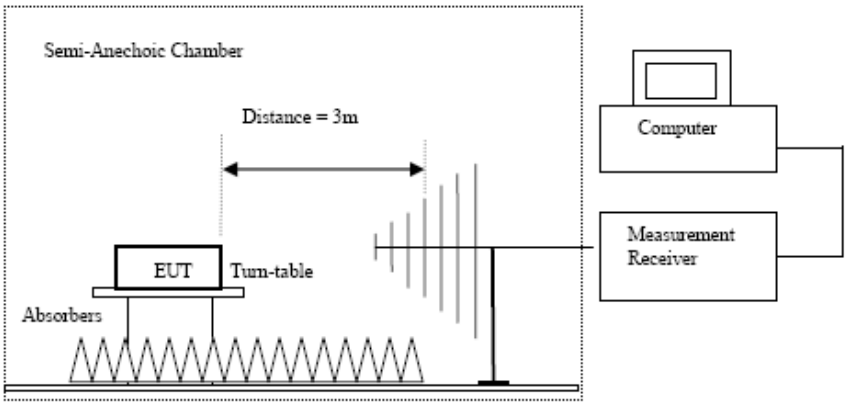
For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

**Spectrum Analyzer Setting:**

| | | |
|---|---|---|
| 9KHz – 30MHz (Pk & Av) | RBW: | 10kHz |
| | VBW: | 30kHz |
| | Sweep: | Auto |
| | Span: | Fully capture the emissions being measured |
| | Trace: | Max. hold |
| 30MHz – 1GHz (QP) | RBW: | 120kHz |
| | VBW: | 120kHz |
| | Sweep: | Auto |
| | Span: | Fully capture the emissions being measured |
| | Trace: | Max. hold |
| Above 1GHz (Pk) | RBW: | 1MHz |
| | VBW: | 1MHz |
| | Sweep: | Auto |
| | Span: | Fully capture the emissions being measured |
| | Trace: | Max. hold |
| Above 1GHz (Av) | RBW: | 1MHz |
| | VBW: | 10Hz |
| | Sweep: | Auto |
| | Span: | Fully capture the emissions being measured |
| | Trace: | Max. hold |

**Test Setup:**




**Ground Plane**

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

**Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:**

| Frequency Range | Quasi-Peak Limits |
|---|---|
| [MHz] | [μV/m] |
| 0.009-0.490 | 2400/F (kHz) |
| 0.490-1.705 | 24000/F (kHz) |
| 1.705-30 | 30 |
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above960 | 500 |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

**Result of Tx mode (2402.0 MHz) (GFSK) (9kHz – 30MHz): Pass**

| **Field Strength of Spurious Emissions Peak Value** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level dBuV | Correction Factor dB/m | Field Strength dBuV/m | Field Strength uV/m | Limit uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2402.0 MHz) (GFSK) (Above 1GHz): Pass**

| **Field Strength of Spurious Emissions Peak Value** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 4804.0 | 16.9 | 41.5 | 58.4 | 74.0 | 15.6 | Vertical |
| 4804.0 | 15.5 | 42.4 | 57.9 | 74.0 | 16.1 | Horizontal |
| 7206.0 | 11.5 | 45.1 | 56.6 | 74.0 | 17.4 | Vertical |
| 7206.0 | 10.8 | 46.2 | 57.0 | 74.0 | 17.0 | Horizontal |
| 9608.0 | 7.6 | 48.0 | 55.6 | 74.0 | 18.4 | Vertical |
| 9608.0 | 7.0 | 48.8 | 55.8 | 74.0 | 18.2 | Horizontal |
| 12010.0 | 4.9 | 51.8 | 56.7 | 74.0 | 17.3 | Vertical |
| 12010.0 | 4.2 | 52.4 | 56.6 | 74.0 | 17.4 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4804.0 | -0.2 | 41.5 | 41.3 | 54.0 | 12.7 | Vertical |
| 4804.0 | -1.9 | 42.4 | 40.5 | 54.0 | 13.5 | Horizontal |
| 7206.0 | -3.3 | 45.1 | 41.8 | 54.0 | 12.2 | Vertical |
| 7206.0 | -4.8 | 46.2 | 41.4 | 54.0 | 12.6 | Horizontal |
| 9608.0 | -8.2 | 48.0 | 39.8 | 54.0 | 14.2 | Vertical |
| 9608.0 | -8.6 | 48.8 | 40.2 | 54.0 | 13.8 | Horizontal |
| 12010.0 | -9.8 | 51.8 | 42.0 | 54.0 | 12.0 | Vertical |
| 12010.0 | -10.3 | 52.4 | 42.1 | 54.0 | 11.9 | Horizontal |

**Result of Tx mode (2441.0 MHz) (GFSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Field Strength<br>uV/m | Limit<br>uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2441.0 MHz) (GFSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4882.0 | 17.8 | 41.6 | 59.4 | 74.0 | 14.6 | Vertical |
| 4882.0 | 15.0 | 42.5 | 57.5 | 74.0 | 16.5 | Horizontal |
| 7323.0 | 3.7 | 53.2 | 56.9 | 74.0 | 17.1 | Vertical |
| 7323.0 | 10.7 | 46.3 | 57.0 | 74.0 | 17.0 | Horizontal |
| 9764.0 | 7.9 | 48.1 | 56.0 | 74.0 | 18.0 | Vertical |
| 9764.0 | 7.5 | 48.9 | 56.4 | 74.0 | 17.6 | Horizontal |
| 12205.0 | 5.1 | 51.6 | 56.7 | 74.0 | 17.3 | Vertical |
| 12205.0 | 3.5 | 52.5 | 56.0 | 74.0 | 18.0 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Measured Level @3m | Correction Factor | Field Strength | Limit @3m | Margin | E-Field Polarity |
| MHz | dBµV | dB/m | dBµV/m | dBµV/m | dB | |
| 4882.0 | 2.2 | 41.6 | 43.8 | 54.0 | 10.2 | Vertical |
| 4882.0 | 0.1 | 42.5 | 42.6 | 54.0 | 11.4 | Horizontal |
| 7323.0 | -4.0 | 45.2 | 41.2 | 54.0 | 12.8 | Vertical |
| 7323.0 | -6.1 | 46.3 | 40.2 | 54.0 | 13.8 | Horizontal |
| 9764.0 | -8.3 | 48.1 | 39.8 | 54.0 | 14.2 | Vertical |
| 9764.0 | -7.5 | 48.9 | 41.4 | 54.0 | 12.6 | Horizontal |
| 12205.0 | -9.6 | 51.6 | 42.0 | 54.0 | 12.0 | Vertical |
| 12205.0 | -11.0 | 52.5 | 41.5 | 54.0 | 12.5 | Horizontal |

**Result of Tx mode (2480.0 MHz) (GFSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Measured Level | Correction Factor | Field Strength | Field Strength | Limit | E-Field Polarity |
| MHz | dBuV | dB/m | dBuV/m | uV/m | uV/m | |
| Emissions detected are more than 20 dB below the FCC Limits | | | | | | |

**Result of Tx mode (2480.0 MHz) (GFSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Measured Level @3m | Correction Factor | Field Strength | Limit @3m | Margin | E-Field Polarity |
| MHz | dBµV | dB/m | dBµV/m | dBµV/m | dB | |
| 4960.0 | 17.4 | 41.4 | 58.8 | 74.0 | 15.2 | Vertical |
| 4960.0 | 15.2 | 42.7 | 57.9 | 74.0 | 16.1 | Horizontal |
| 7440.0 | 12.4 | 45.6 | 58.0 | 74.0 | 16.0 | Vertical |
| 7440.0 | 10.9 | 46.5 | 57.4 | 74.0 | 16.6 | Horizontal |
| 9920.0 | 7.2 | 48.6 | 55.8 | 74.0 | 18.2 | Vertical |
| 9920.0 | 6.3 | 49.7 | 56.0 | 74.0 | 18.0 | Horizontal |
| 12400.0 | 4.6 | 51.7 | 56.3 | 74.0 | 17.7 | Vertical |
| 12400.0 | 3.8 | 52.7 | 56.5 | 74.0 | 17.5 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Measured Level @3m | Correction Factor | Field Strength | Limit @3m | Margin | E-Field Polarity |
| MHz | dBµV | dB/m | dBµV/m | dBµV/m | dB | |
| 4960.0 | 1.9 | 41.4 | 43.3 | 54.0 | 10.7 | Vertical |
| 4960.0 | 0.0 | 42.7 | 42.7 | 54.0 | 11.3 | Horizontal |
| 7440.0 | -3.6 | 45.6 | 42.0 | 54.0 | 12.0 | Vertical |
| 7440.0 | -5.2 | 46.5 | 41.3 | 54.0 | 12.7 | Horizontal |
| 9920.0 | -8.6 | 48.6 | 40.0 | 54.0 | 14.0 | Vertical |
| 9920.0 | -9.4 | 49.7 | 40.3 | 54.0 | 13.7 | Horizontal |
| 12400.0 | -8.8 | 51.7 | 42.9 | 54.0 | 11.1 | Vertical |
| 12400.0 | -11.5 | 52.7 | 41.2 | 54.0 | 12.8 | Horizontal |

**Result of Tx mode (2402.0 MHz) (π/4-DQPSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Measured Level | Correction Factor | Field Strength | Field Strength | Limit | E-Field Polarity |
| MHz | dBuV | dB/m | dBuV/m | uV/m | uV/m | |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2402.0 MHz) (π/4-DQPSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Measured Level @3m | Correction Factor | Field Strength | Limit @3m | Margin | E-Field Polarity |
| MHz | dBµV | dB/m | dBµV/m | dBµV/m | dB | |
| 4804.0 | 16.5 | 41.5 | 58.0 | 74.0 | 16.0 | Vertical |
| 4804.0 | 14.0 | 42.4 | 56.4 | 74.0 | 17.6 | Horizontal |
| 7206.0 | 10.9 | 45.1 | 56.0 | 74.0 | 18.0 | Vertical |
| 7206.0 | 10.2 | 46.2 | 56.4 | 74.0 | 17.6 | Horizontal |
| 9608.0 | 7.3 | 48.0 | 55.3 | 74.0 | 18.7 | Vertical |
| 9608.0 | 6.9 | 48.8 | 55.7 | 74.0 | 18.3 | Horizontal |
| 12010.0 | 4.4 | 51.8 | 56.2 | 74.0 | 17.8 | Vertical |
| 12010.0 | 3.9 | 52.4 | 56.3 | 74.0 | 17.7 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4804.0 | 0.9 | 41.5 | 42.4 | 54.0 | 11.6 | Vertical |
| 4804.0 | -0.6 | 42.4 | 41.8 | 54.0 | 12.2 | Horizontal |
| 7206.0 | -4.0 | 45.1 | 41.1 | 54.0 | 12.9 | Vertical |
| 7206.0 | -4.4 | 46.2 | 41.8 | 54.0 | 12.2 | Horizontal |
| 9608.0 | -8.1 | 48.0 | 39.9 | 54.0 | 14.1 | Vertical |
| 9608.0 | -8.9 | 48.8 | 39.9 | 54.0 | 14.1 | Horizontal |
| 12010.0 | -9.9 | 51.8 | 41.9 | 54.0 | 12.1 | Vertical |
| 12010.0 | -10.5 | 52.4 | 41.9 | 54.0 | 12.1 | Horizontal |

**Result of Tx mode (2441.0 MHz) (π/4-DQPSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Field Strength<br>uV/m | Limit<br>uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2441.0 MHz) (π/4-DQPSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4882.0 | 16.9 | 41.6 | 58.5 | 74.0 | 15.5 | Vertical |
| 4882.0 | 15.9 | 42.5 | 58.4 | 74.0 | 15.6 | Horizontal |
| 7323.0 | 3.4 | 53.2 | 56.6 | 74.0 | 17.4 | Vertical |
| 7323.0 | 10.0 | 46.3 | 56.3 | 74.0 | 17.7 | Horizontal |
| 9764.0 | 7.1 | 48.1 | 55.2 | 74.0 | 18.8 | Vertical |
| 9764.0 | 6.9 | 48.9 | 55.8 | 74.0 | 18.2 | Horizontal |
| 12205.0 | 4.9 | 51.6 | 56.5 | 74.0 | 17.5 | Vertical |
| 12205.0 | 4.4 | 52.5 | 56.9 | 74.0 | 17.1 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Limit @3m<br>dBuV/m | Margin<br>dB | E-Field Polarity |
| 4882.0 | 1.3 | 41.6 | 42.9 | 54.0 | 11.1 | Vertical |
| 4882.0 | -0.3 | 42.5 | 42.2 | 54.0 | 11.8 | Horizontal |
| 7323.0 | -3.7 | 45.2 | 41.5 | 54.0 | 12.5 | Vertical |
| 7323.0 | -5.4 | 46.3 | 40.9 | 54.0 | 13.1 | Horizontal |
| 9764.0 | -8.3 | 48.1 | 39.8 | 54.0 | 14.2 | Vertical |
| 9764.0 | -8.7 | 48.9 | 40.2 | 54.0 | 13.8 | Horizontal |
| 12205.0 | -9.7 | 51.6 | 41.9 | 54.0 | 12.1 | Vertical |
| 12205.0 | -10.5 | 52.5 | 42.0 | 54.0 | 12.0 | Horizontal |

**Result of Tx mode (2480.0 MHz) (π/4-DQPSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Field Strength<br>uV/m | Limit<br>uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2480.0 MHz) (π/4-DQPSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4960.0 | 18.0 | 41.4 | 59.4 | 74.0 | 14.6 | Vertical |
| 4960.0 | 15.6 | 42.7 | 58.3 | 74.0 | 15.7 | Horizontal |
| 7440.0 | 11.3 | 45.6 | 56.9 | 74.0 | 17.1 | Vertical |
| 7440.0 | 10.4 | 46.5 | 56.9 | 74.0 | 17.1 | Horizontal |
| 9920.0 | 6.8 | 48.6 | 55.4 | 74.0 | 18.6 | Vertical |
| 9920.0 | 5.4 | 49.7 | 55.1 | 74.0 | 18.9 | Horizontal |
| 12400.0 | 5.2 | 51.7 | 56.9 | 74.0 | 17.1 | Vertical |
| 12400.0 | 3.5 | 52.7 | 56.2 | 74.0 | 17.8 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4960.0 | 2.1 | 41.4 | 43.5 | 54.0 | 10.5 | Vertical |
| 4960.0 | -0.6 | 42.7 | 42.1 | 54.0 | 11.9 | Horizontal |
| 7440.0 | -6.5 | 45.6 | 39.1 | 54.0 | 14.9 | Vertical |
| 7440.0 | -6.2 | 46.5 | 40.3 | 54.0 | 13.7 | Horizontal |
| 9920.0 | -9.0 | 48.6 | 39.6 | 54.0 | 14.4 | Vertical |
| 9920.0 | -9.6 | 49.7 | 40.1 | 54.0 | 13.9 | Horizontal |
| 12400.0 | -11.2 | 51.7 | 40.5 | 54.0 | 13.5 | Vertical |
| 12400.0 | -12.1 | 52.7 | 40.6 | 54.0 | 13.4 | Horizontal |

**Result of Tx mode (2402.0 MHz) (8DPSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Field Strength<br>uV/m | Limit<br>uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2402.0 MHz) (8DPSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4804.0 | 16.3 | 41.5 | 57.8 | 74.0 | 16.2 | Vertical |
| 4804.0 | 15.1 | 42.4 | 57.5 | 74.0 | 16.5 | Horizontal |
| 7206.0 | 10.6 | 45.1 | 55.7 | 74.0 | 18.3 | Vertical |
| 7206.0 | 9.8 | 46.2 | 56.0 | 74.0 | 18.0 | Horizontal |
| 9608.0 | 7.4 | 48.0 | 55.4 | 74.0 | 18.6 | Vertical |
| 9608.0 | 6.5 | 48.8 | 55.3 | 74.0 | 18.7 | Horizontal |
| 12010.0 | 4.2 | 51.8 | 56.0 | 74.0 | 18.0 | Vertical |
| 12010.0 | 3.8 | 52.4 | 56.2 | 74.0 | 17.8 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4804.0 | -0.4 | 41.5 | 41.1 | 54.0 | 12.9 | Vertical |
| 4804.0 | -0.9 | 42.4 | 41.5 | 54.0 | 12.5 | Horizontal |
| 7206.0 | -4.2 | 45.1 | 40.9 | 54.0 | 13.1 | Vertical |
| 7206.0 | -5.4 | 46.2 | 40.8 | 54.0 | 13.2 | Horizontal |
| 9608.0 | -8.2 | 48.0 | 39.8 | 54.0 | 14.2 | Vertical |
| 9608.0 | -8.4 | 48.8 | 40.4 | 54.0 | 13.6 | Horizontal |
| 12010.0 | -12.4 | 51.8 | 39.4 | 54.0 | 14.6 | Vertical |
| 12010.0 | -12.2 | 52.4 | 40.2 | 54.0 | 13.8 | Horizontal |

**Result of Tx mode (2441.0 MHz) (8DPSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Field Strength<br>uV/m | Limit<br>uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2441.0 MHz) (8DPSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4882.0 | 17.2 | 41.6 | 58.8 | 74.0 | 15.2 | Vertical |
| 4882.0 | 15.3 | 42.5 | 57.8 | 74.0 | 16.2 | Horizontal |
| 7323.0 | 2.5 | 53.2 | 55.7 | 74.0 | 18.3 | Vertical |
| 7323.0 | 9.8 | 46.3 | 56.1 | 74.0 | 17.9 | Horizontal |
| 9764.0 | 7.3 | 48.1 | 55.4 | 74.0 | 18.6 | Vertical |
| 9764.0 | 6.2 | 48.9 | 55.1 | 74.0 | 18.9 | Horizontal |
| 12205.0 | 5.2 | 51.6 | 56.8 | 74.0 | 17.2 | Vertical |
| 12205.0 | 4.0 | 52.5 | 56.5 | 74.0 | 17.5 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4882.0 | 0.6 | 41.6 | 42.2 | 54.0 | 11.8 | Vertical |
| 4882.0 | -0.5 | 42.5 | 42.0 | 54.0 | 12.0 | Horizontal |
| 7323.0 | -5.2 | 45.2 | 40.0 | 54.0 | 14.0 | Vertical |
| 7323.0 | -4.4 | 46.3 | 41.9 | 54.0 | 12.1 | Horizontal |
| 9764.0 | -9.0 | 48.1 | 39.1 | 54.0 | 14.9 | Vertical |
| 9764.0 | -9.7 | 48.9 | 39.2 | 54.0 | 14.8 | Horizontal |
| 12205.0 | -10.2 | 51.6 | 41.4 | 54.0 | 12.6 | Vertical |
| 12205.0 | -11.7 | 52.5 | 40.8 | 54.0 | 13.2 | Horizontal |

**Result of Tx mode (2480.0 MHz) (8DPSK) (9kHz – 30MHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level<br>dBuV | Correction Factor<br>dB/m | Field Strength<br>dBuV/m | Field Strength<br>uV/m | Limit<br>uV/m | E-Field Polarity |
| **Emissions detected are more than 20 dB below the FCC Limits** | | | | | | |

**Result of Tx mode (2480.0 MHz) (8DPSK) (Above 1GHz): Pass**

| Field Strength of Spurious Emissions<br>Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4960.0 | 17.6 | 41.4 | 59.0 | 74.0 | 15.0 | Vertical |
| 4960.0 | 15.6 | 42.7 | 58.3 | 74.0 | 15.7 | Horizontal |
| 7440.0 | 10.9 | 45.6 | 56.5 | 74.0 | 17.5 | Vertical |
| 7440.0 | 10.3 | 46.5 | 56.8 | 74.0 | 17.2 | Horizontal |
| 9920.0 | 7.3 | 48.6 | 55.9 | 74.0 | 18.1 | Vertical |
| 9920.0 | 6 | 49.7 | 55.7 | 74.0 | 18.3 | Horizontal |
| 12400.0 | 4.7 | 51.7 | 56.4 | 74.0 | 17.6 | Vertical |
| 12400.0 | 3.3 | 52.7 | 56.0 | 74.0 | 18.0 | Horizontal |

| Field Strength of Spurious Emissions<br>Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency<br>MHz | Measured Level @3m<br>dBµV | Correction Factor<br>dB/m | Field Strength<br>dBµV/m | Limit @3m<br>dBµV/m | Margin<br>dB | E-Field Polarity |
| 4960.0 | 1.7 | 41.4 | 43.1 | 54.0 | 10.9 | Vertical |
| 4960.0 | -0.4 | 42.7 | 42.3 | 54.0 | 11.7 | Horizontal |
| 7440.0 | -3.8 | 45.6 | 41.8 | 54.0 | 12.2 | Vertical |
| 7440.0 | -5.8 | 46.5 | 40.7 | 54.0 | 13.3 | Horizontal |
| 9920.0 | -8.3 | 48.6 | 40.3 | 54.0 | 13.7 | Vertical |
| 9920.0 | -10.4 | 49.7 | 39.3 | 54.0 | 14.7 | Horizontal |
| 12400.0 | -10.1 | 51.7 | 41.6 | 54.0 | 12.4 | Vertical |
| 12400.0 | -12.2 | 52.7 | 40.5 | 54.0 | 13.5 | Horizontal |

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

* Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (9kHz-30MHz): 2.0dB
(30MHz -1GHz): 4.9dB
(1GHz -6GHz): 4.02dB
(6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

**Radiated Emissions Measurement:**

Ambient temperature 25°C Relative humidity 57%

**Limit：**

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. 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) (see Section 5.205(c)).

**Result： RF Radiated Emissions (Lowest)-GFSK**

| Field Strength of Band-edge Compliance Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2390.0 | 5.2 | 36.8 | 42.0 | 74.0 | 32.0 | Vertical |

| Field Strength of Band-edge Compliance Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2390.0 | 0.8 | 36.8 | 37.6 | 54.0 | 16.4 | Vertical |

**Result： RF Radiated Emissions (Highest) -GFSK**

| Field Strength of Band-edge Compliance Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2483.5 | 24.2 | 36.8 | 61.0 | 74.0 | 13.0 | Vertical |

| Field Strength of Band-edge Compliance Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2483.5 | 9.1 | 36.8 | 45.9 | 54.0 | 8.1 | Vertical |

**Radiated Emissions Measurement:**

Ambient temperature 25°C Relative humidity 57%

**Limit：**

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. 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) (see Section 5.205(c)).

**Result： RF Radiated Emissions (Lowest)- π/4-DQPSK**

| Field Strength of Band-edge Compliance Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2390.0 | 5.2 | 36.8 | 42.0 | 74.0 | 32.0 | Vertical |

| Field Strength of Band-edge Compliance Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2390.0 | 1.0 | 36.8 | 37.8 | 54.0 | 16.2 | Vertical |

**Result： RF Radiated Emissions (Highest) -π/4-DQPSK**

| Field Strength of Band-edge Compliance Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2483.5 | 22.3 | 36.8 | 59.1 | 74.0 | 14.9 | Vertical |

| Field Strength of Band-edge Compliance Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2483.5 | 6.2 | 36.8 | 43.0 | 54.0 | 11.0 | Vertical |

**Radiated Emissions Measurement:**

Ambient temperature 25°C Relative humidity 57%

**Limit：**

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. 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) (see Section 5.205(c)).

**Result： RF Radiated Emissions (Lowest)- 8DPSK**

| Field Strength of Band-edge Compliance Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2390.0 | 4.7 | 36.8 | 41.5 | 74.0 | 32.5 | Vertical |

| Field Strength of Band-edge Compliance Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin Db | E-Field Polarity |
| 2390.0 | 1.4 | 36.8 | 38.2 | 54.0 | 15.8 | Vertical |

**Result： RF Radiated Emissions (Highest) -8DPSK**

| Field Strength of Band-edge Compliance Peak Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin Db | E-Field Polarity |
| 2483.5 | 22.6 | 36.8 | 59.4 | 74.0 | 14.6 | Vertical |

| Field Strength of Band-edge Compliance Average Value | | | | | | |
|---|---|---|---|---|---|---|
| Frequency MHz | Measured Level @3m dBμV | Correction Factor dB/m | Field Strength dBμV/m | Limit @3m dBμV/m | Margin dB | E-Field Polarity |
| 2483.5 | 6.1 | 36.8 | 42.9 | 54.0 | 11.1 | Vertical |

**Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:**

Ambient temperature 25°C Relative humidity 57%

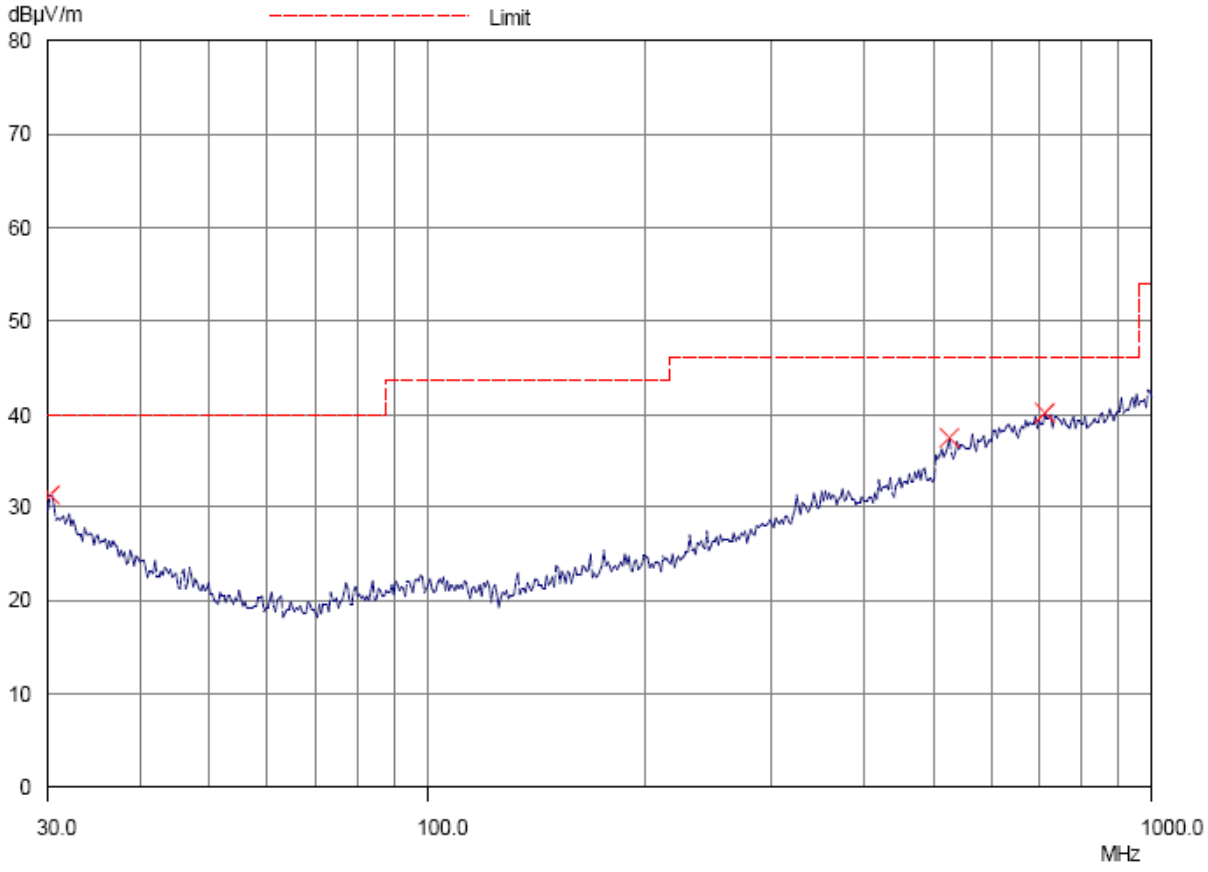
| Frequency Range | Quasi-Peak Limits |
|---|---|
| [MHz] | [μV/m] |
| 0.009-0.490 | 2400/F (kHz) |
| 0.490-1.705 | 24000/F (kHz) |
| 1.705-30 | 30 |
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above960 | 500 |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

**Results of Bluetooth Communication mode (GFSK 2402.0 MHz) (30MHz – 1GHz): Pass**

Please refer to the following table for result details(The data is the worst cases)

Horizontal



**Result of Bluetooth Communication mode (GFSK 2402.0 MHz) (30MHz – 1GHz): Pass**

| Radiated Emissions Quasi-Peak | | | | | |
|---|---|---|---|---|---|
| Emission Frequency MHz | E-Field Polarity | Level @3m dBµV/m | Limit @3m dBµV/m | Level @3m µV/m | Limit @3m µV/m |
| 30.1 | Horizontal | 31.3 | 40.0 | 36.7 | 100 |
| 522.6 | Horizontal | 37.4 | 46.0 | 74.1 | 200 |
| 711.1 | Horizontal | 40.1 | 46.0 | 101.2 | 200 |

**Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:**

Ambient temperature 25°C Relative humidity 57%

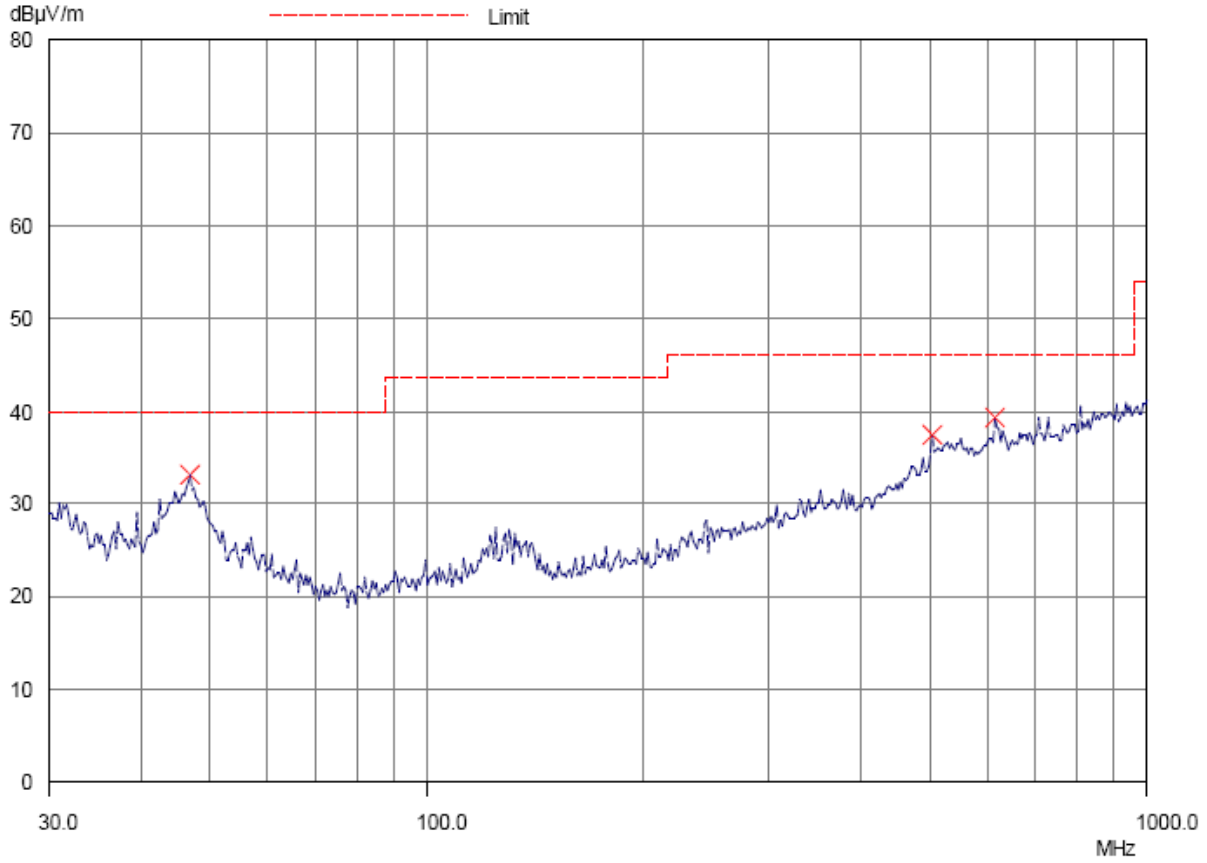
| Frequency Range | Quasi-Peak Limits |
|---|---|
| [MHz] | [μV/m] |
| 0.009-0.490 | 2400/F (kHz) |
| 0.490-1.705 | 24000/F (kHz) |
| 1.705-30 | 30 |
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above960 | 500 |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

**Results of Bluetooth Communication mode (GFSK 2402.0 MHz) (30MHz – 1GHz): Pass**

Please refer to the following table for result details(The data is the worst cases)

Vertical



**Result of Bluetooth Communication mode (GFSK 2402.0 MHz) (30MHz – 1GHz): Pass**

| Radiated Emissions Quasi-Peak | | | | | |
|---|---|---|---|---|---|
| Emission Frequency MHz | E-Field Polarity | Level @3m dBµV/m | Limit @3m dBµV/m | Level @3m µV/m | Limit @3m µV/m |
| 46.9 | Vertical | 33.1 | 40.0 | 45.2 | 100 |
| 502.7 | Vertical | 37.5 | 46.0 | 75.0 | 200 |
| 614.4 | Vertical | 39.2 | 46.0 | 91.2 | 200 |

Remarks:
Calculated measurement uncertainty (30MHz – 1GHz): 4.9dB
Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

### 3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Ambient temperature 25°C Relative humidity 57%

| | |
|---|---|
| Test Requirement: | FCC 47CFR 15.207 |
| Test Method: | ANSI C63.10:2013 |
| Test Date: | 2018-05-29 |
| Mode of Operation: | Bluetooth mode |
| Test Voltage: | 120Va.c. 60Hz |

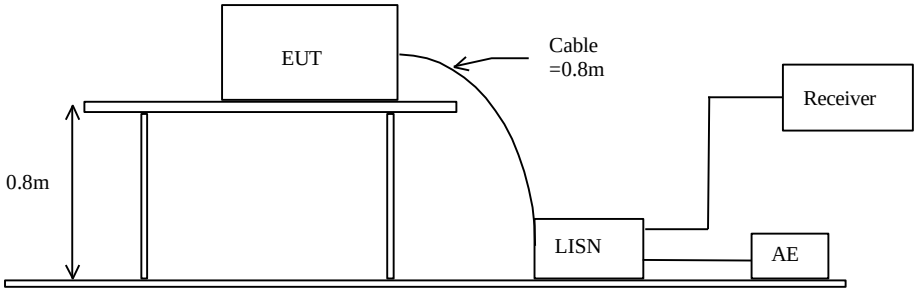
**Test Method:**

The test was performed in accordance with ANSI ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

**Receiver Setting:**

Bandw. = 9 kHz, Meas. Time= 10.0 ms, Step Width = 5.0kHz
Detector = MaxPeak and CISPR AV

## Test Setup:



**Limits for Conducted Emissions (FCC 47 CFR 15.207):**

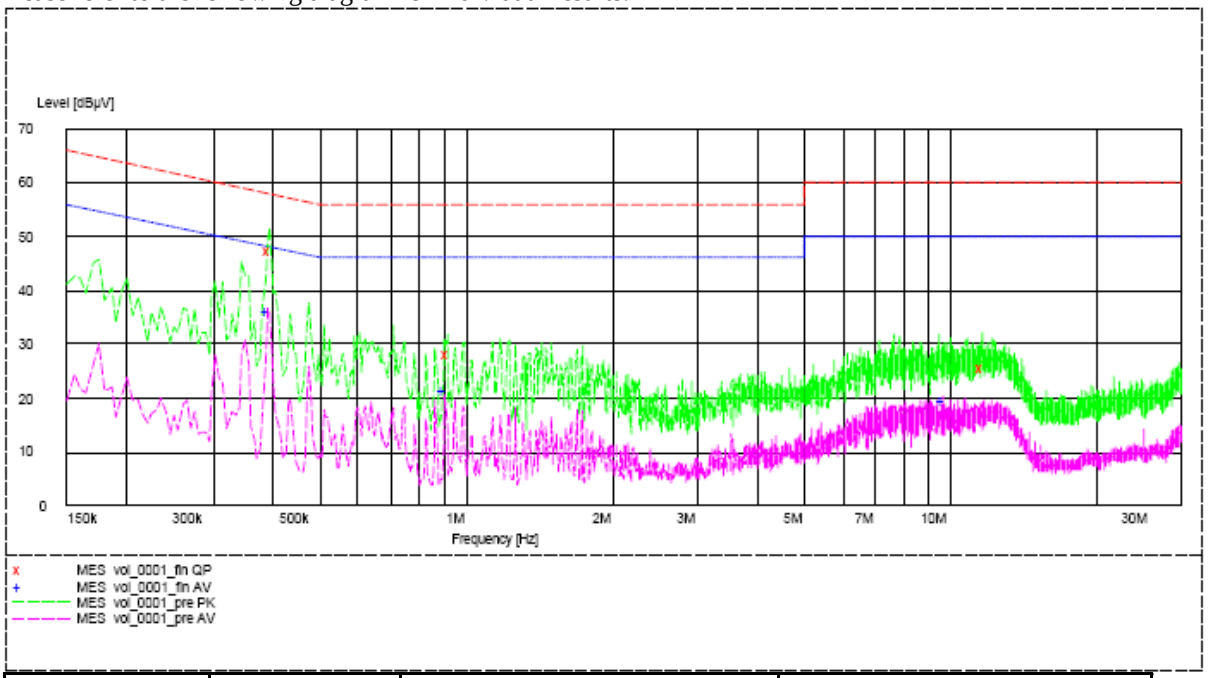
| Frequency Range [MHz] | Quasi-Peak Limits [dBµV] | Average [dBµV] |
|---|---|---|
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

**Results of Bluetooth mode (L): PASS**

Please refer to the following diagram for individual results.

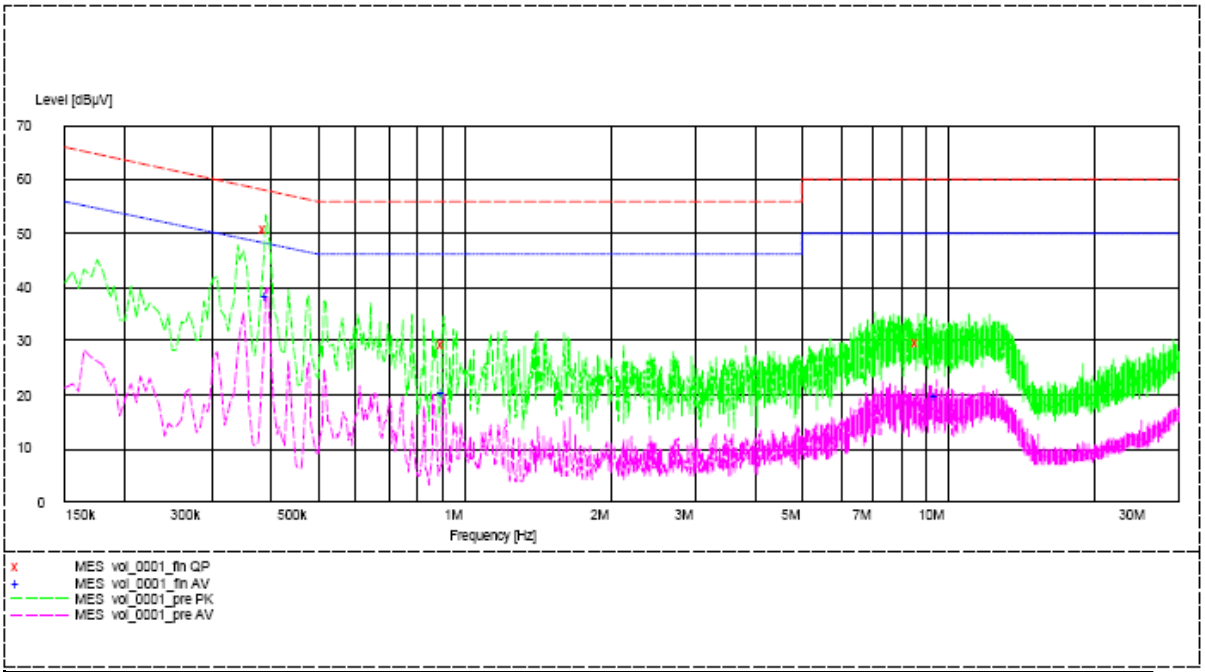



| Conductor Live or Neutral | Frequency MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Average Level dBµV | Average Limit dBµV |
|---|---|---|---|---|---|
| Live | 0.395 | 47.5 | 58.0 | -*- | -*- |
| Live | 0.915 | 28.4 | 56.0 | -*- | -*- |
| Live | 11.610 | 25.6 | 60.0 | -*- | -*- |
| Live | 0.390 | -*- | -*- | 36.2 | 48.0 |
| Live | 0.905 | -*- | -*- | 21.3 | 46.0 |
| Live | 9.670 | -*- | -*- | 19.5 | 50.0 |

| Frequency Range [MHz] | Quasi-Peak Limits [dBµV] | Average [dBµV] |
|---|---|---|
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

* Decreases with the logarithm of the frequency.
Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

**Results of Bluetooth mode (N): PASS**
Please refer to the following diagram for individual results.




| Conductor Live or Neutral | Frequency MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Average Level dBµV | Average Limit dBµV |
|---|---|---|---|---|---|
| Neutral | 0.390 | 51.1 | 58.0 | -*- | -*- |
| Neutral | 0.910 | 29.4 | 56.0 | -*- | -*- |
| Neutral | 8.680 | 29.5 | 60.0 | -*- | -*- |
| Neutral | 0.395 | -*- | -*- | 38.5 | 48.0 |
| Neutral | 0.910 | -*- | -*- | 20.5 | 46.0 |
| Neutral | 9.470 | -*- | -*- | 19.9 | 50.0 |

Remarks:
Calculated measurement uncertainty (0.15MHz – 30MHz): 3.25dB
-*- Emission(s) that is far below the corresponding limit line.

### 3.1.4 Number of Hopping Frequency

Ambient temperature 25°C Relative humidity 57%

**Limit of Number of Hopping Frequency**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels

**Test Method:**

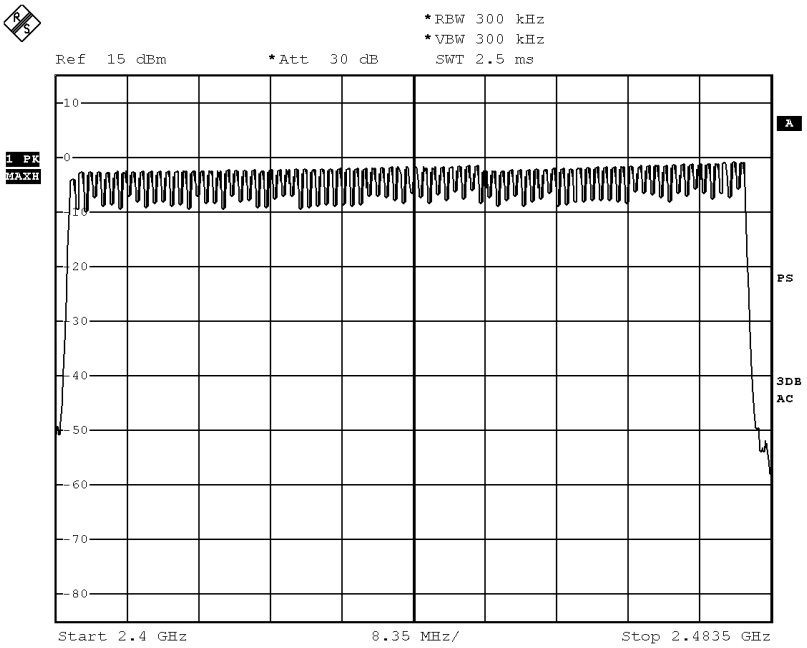
The RF output of the EUT was connected to the spectrum analyzer by a low loss cable.

**Spectrum Analyzer Setting:**

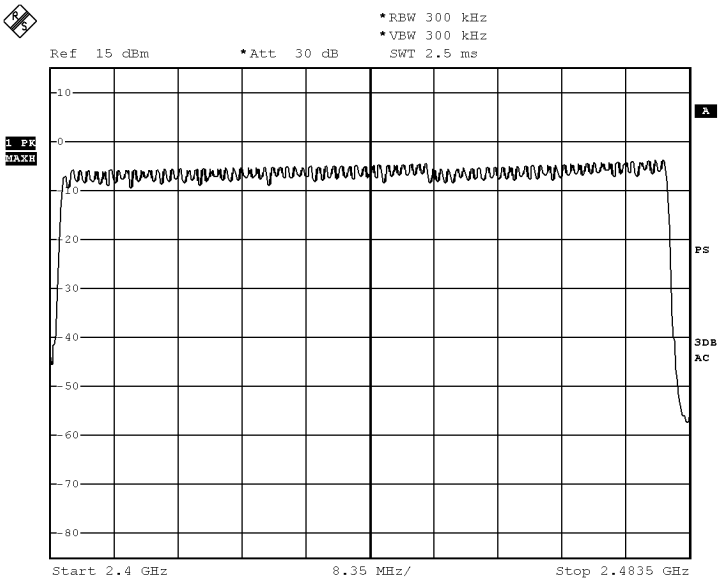
RBW = 300kHz, VBW ≥ RBW, Sweep = Auto, Span = the frequency band of operation
Detector = Peak, Trace = Max. hold

**Test Setup:**
As Test Setup of clause 3.1.1 in this test report.

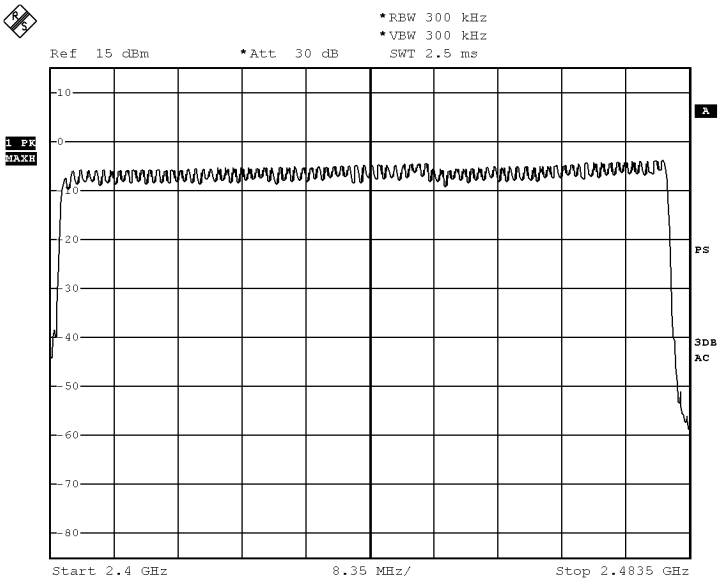
**Measurement Data**:
**GFSK: 79 of 79 Channel**



**π/4-DQPSK: 79 of 79 Channel**




**8DPSK: 79 of 79 Channel**



### 3.1.5 20dB Bandwidth

Ambient temperature 25°C Relative humidity 57%

| | |
|---|---|
| Test Requirement: | FCC 47CFR 15.247(a)(1) |
| Test Method: | ANSI C63.10:2013 |
| Test Date: | 2018-06-05 |
| Mode of Operation: | Tx mode |

**Remark:**
The result has been done on all the possible configurations for searching the worst cases.

**Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

**Spectrum Analyzer Setting:**

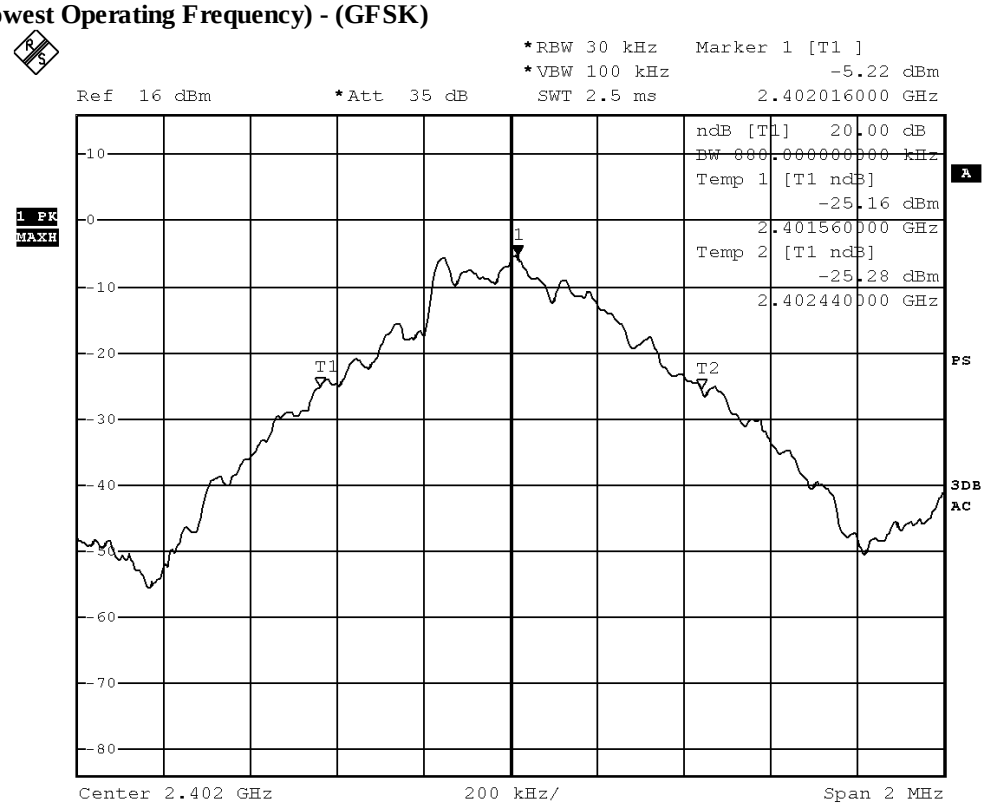
RBW = 30kHz, VBW ≥ RBW, Sweep = Auto, Span = two times and five times the OBW
Detector = Peak, Trace = Max. hold

**Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

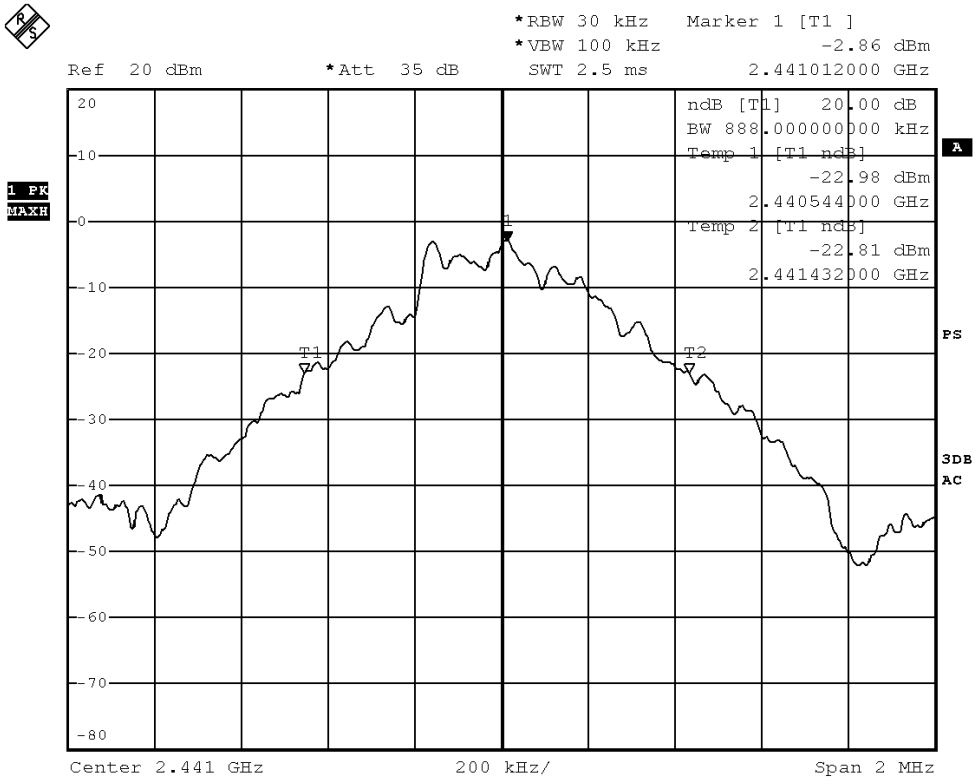
| Fundamental Frequency [MHz] | 20dB Bandwidth [kHz] | FCC Limits [MHz] |
|---|---|---|
| 2402 | 880.0 | Within 2400-2483.5 |

**(Lowest Operating Frequency) - (GFSK)**



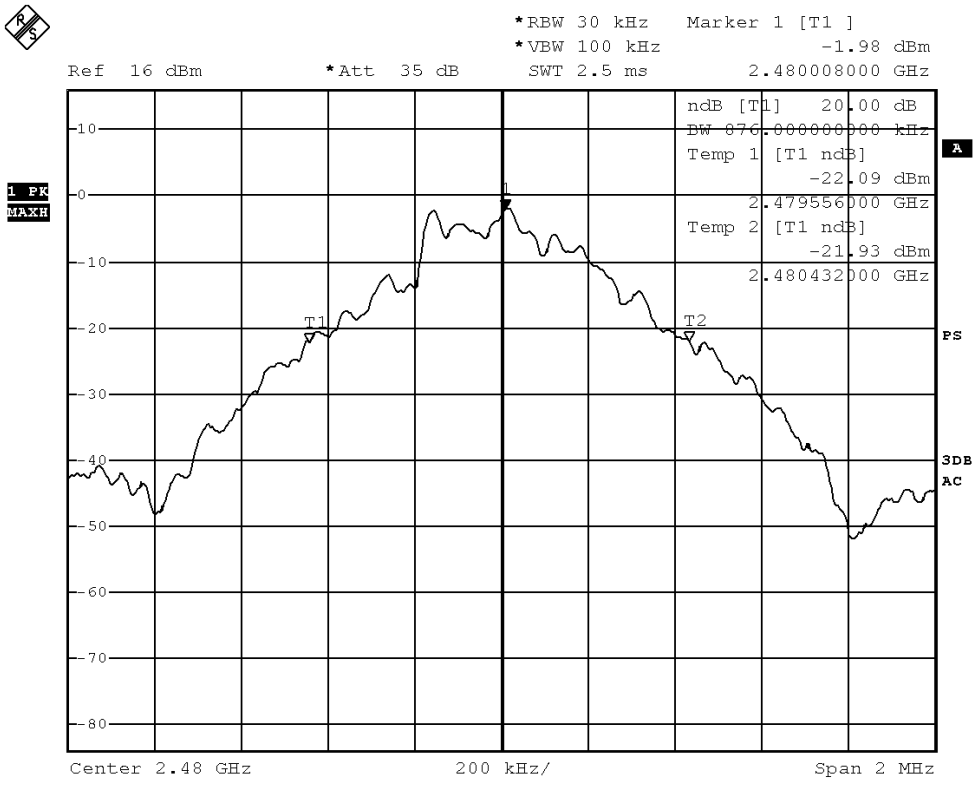
| Fundamental Frequency [MHz] | 20dB Bandwidth [kHz] | FCC Limits [MHz] |
|---|---|---|
| 2441 | 888.0 | Within 2400-2483.5 |

**(Middle Operating Frequency) - (GFSK)**



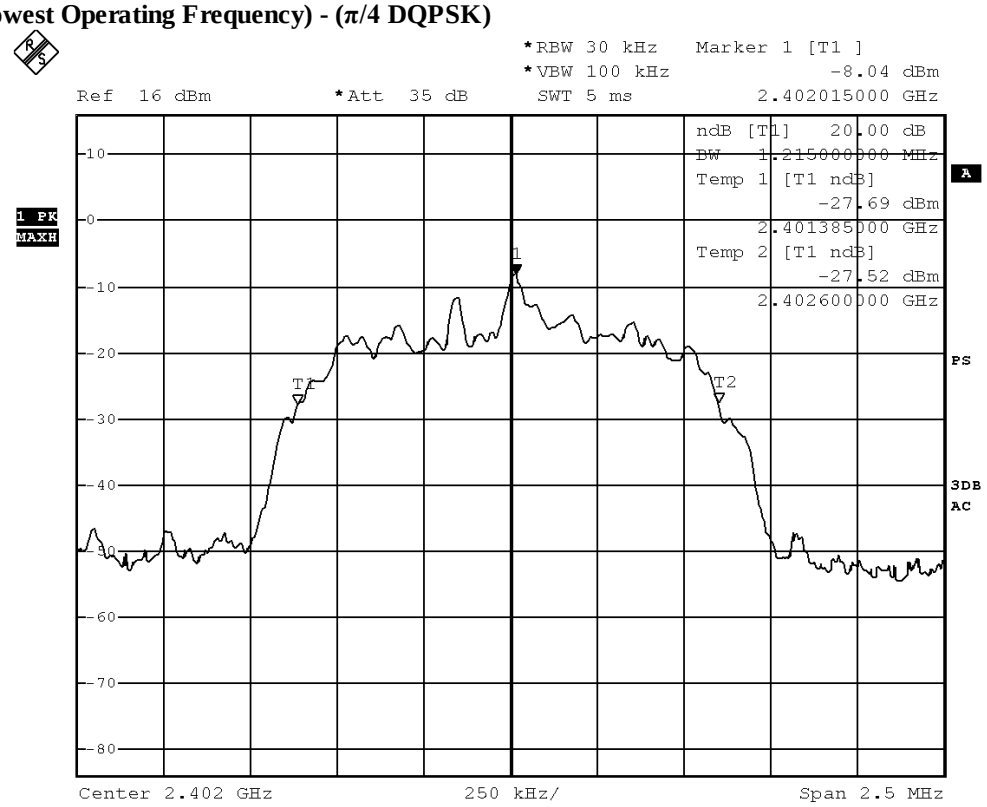
| Fundamental Frequency [MHz] | 20dB Bandwidth [kHz] | FCC Limits [MHz] |
|---|---|---|
| 2480 | 876.0 | Within 2400-2483.5 |

**(Highest Operating Frequency) - (GFSK)**



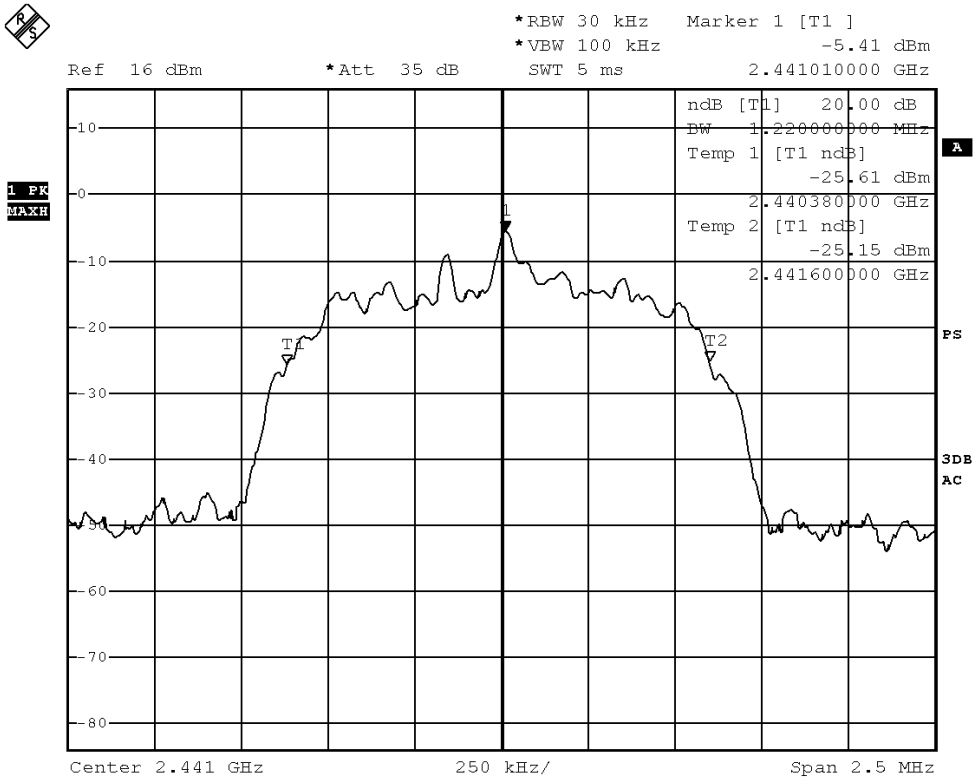
| Fundamental Frequency [MHz] | 20dB Bandwidth [MHz] | FCC Limits [MHz] |
|---|---|---|
| 2402 | 1.215 | Within 2400-2483.5 |

**(Lowest Operating Frequency) - (π/4 DQPSK)**



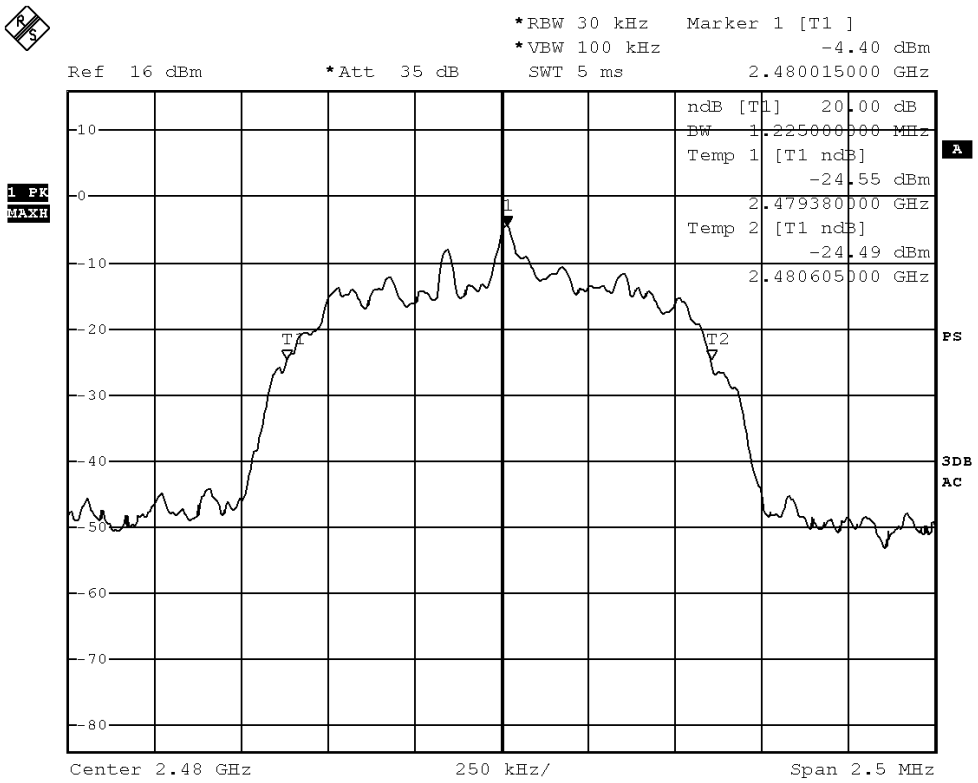
| Fundamental Frequency [MHz] | 20dB Bandwidth [MHz] | FCC Limits [MHz] |
|---|---|---|
| 2441 | 1.220 | Within 2400-2483.5 |

**(Middle Operating Frequency) - (π/4 DQPSK)**



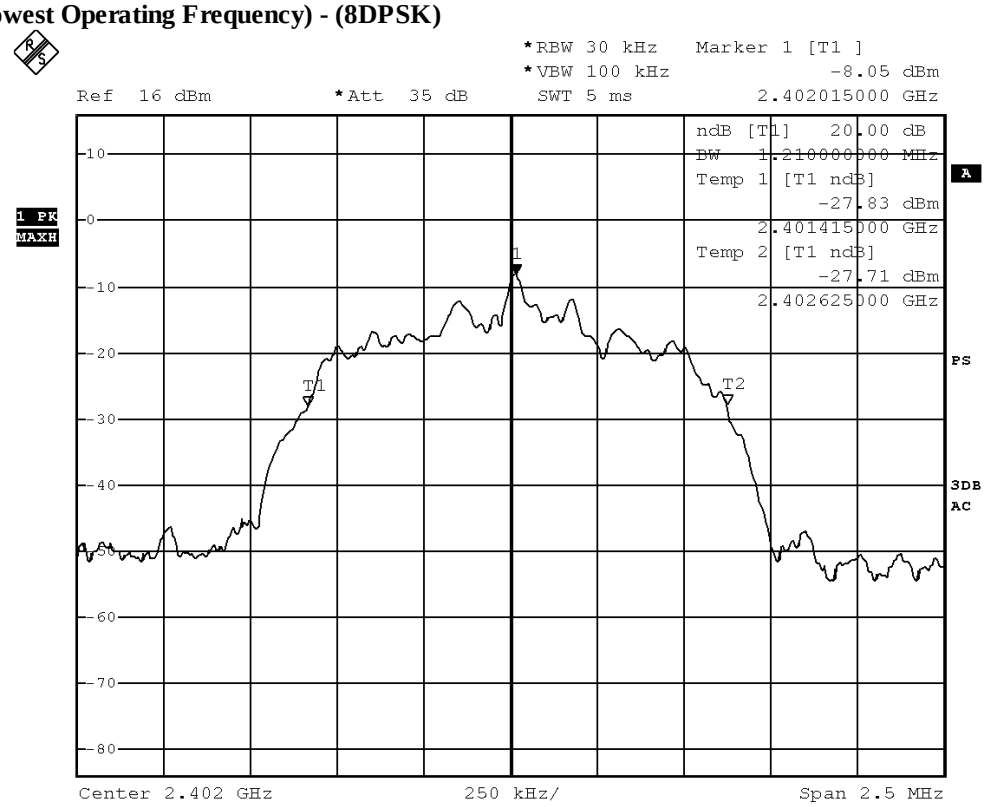
| Fundamental Frequency [MHz] | 20dB Bandwidth [MHz] | FCC Limits [MHz] |
|---|---|---|
| 2480 | 1.225 | Within 2400-2483.5 |

**(Highest Operating Frequency) - (π/4 DQPSK)**



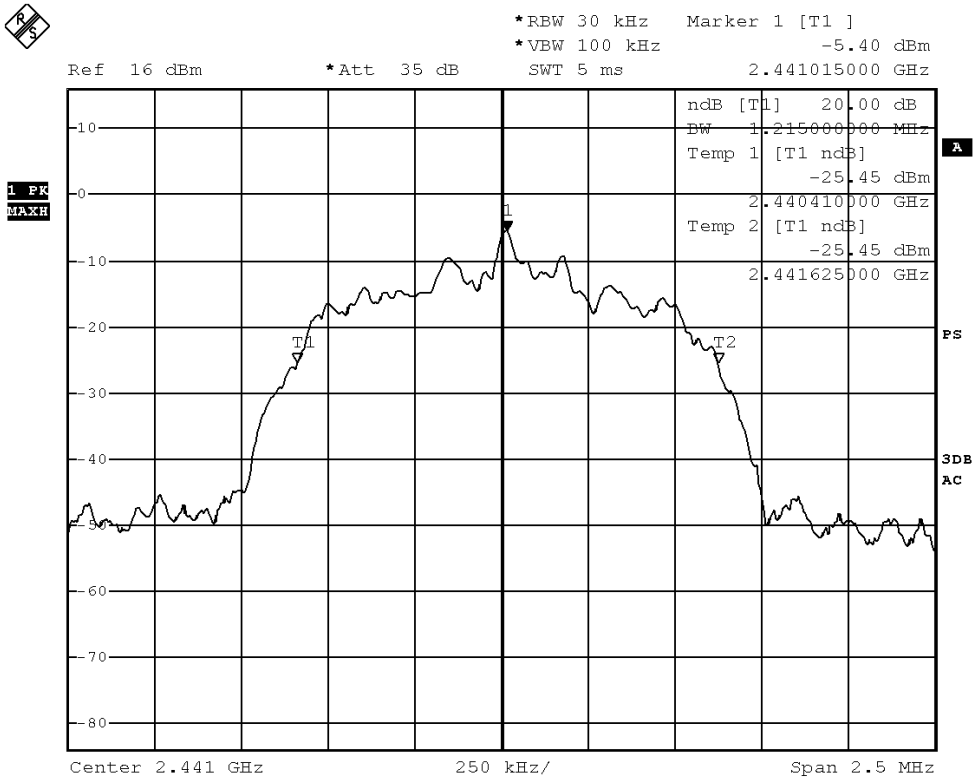
| Fundamental Frequency [MHz] | 20dB Bandwidth [MHz] | FCC Limits [MHz] |
|---|---|---|
| 2402 | 1.210 | Within 2400-2483.5 |

**(Lowest Operating Frequency) - (8DPSK)**



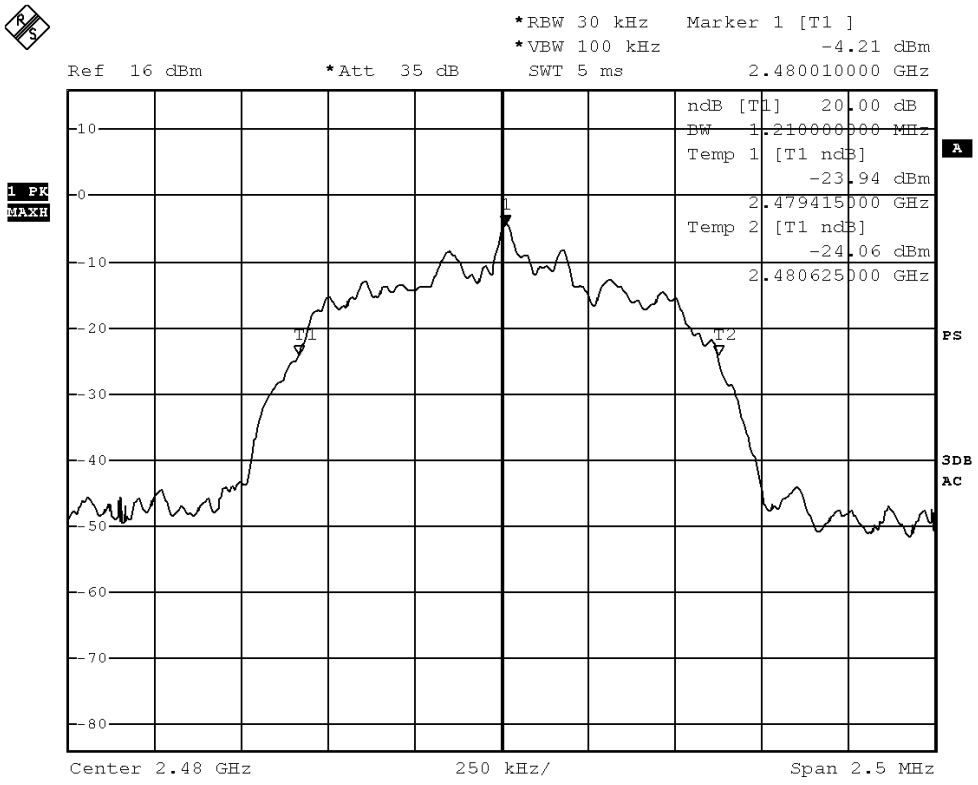
| Fundamental Frequency [MHz] | 20dB Bandwidth [MHz] | FCC Limits [MHz] |
|---|---|---|
| 2441 | 1.215 | Within 2400-2483.5 |

**(Middle Operating Frequency) - (8DPSK)**



| Fundamental Frequency [MHz] | 20dB Bandwidth [MHz] | FCC Limits [MHz] |
|---|---|---|
| 2480 | 1.210 | Within 2400-2483.5 |

**(Highest Operating Frequency) - (8DPSK)**



### 3.1.6 Hopping Channel Separation

Ambient temperature 25°C Relative humidity 57%

**Requirements:**

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.

**Spectrum Analyzer Setting:**

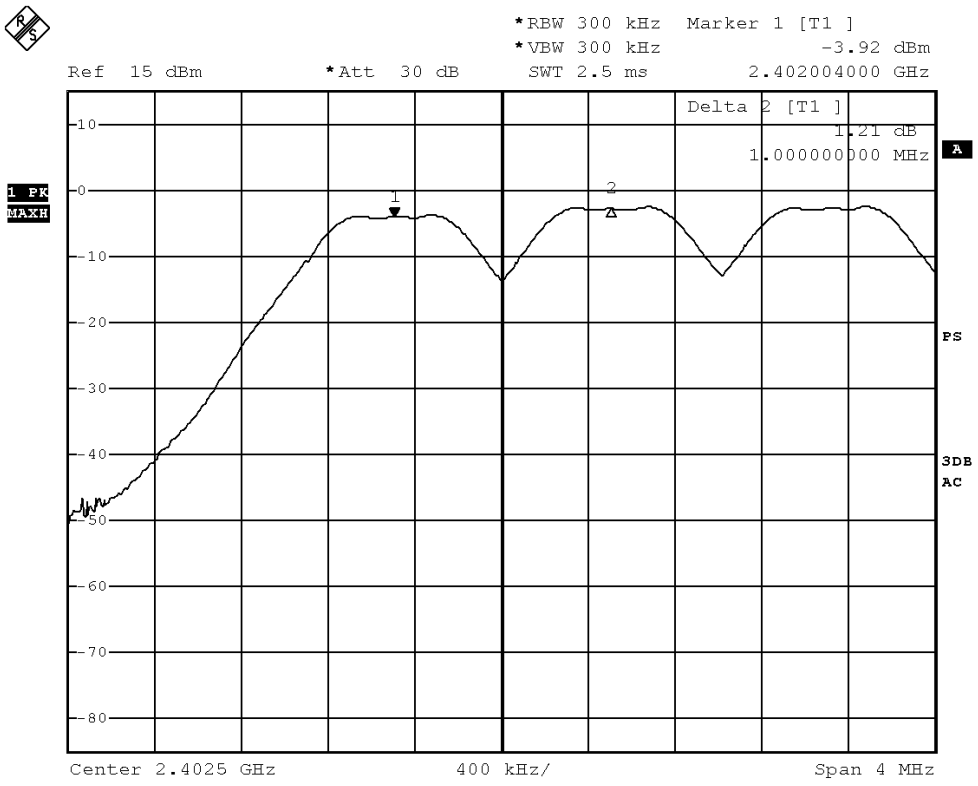
RBW = 300kHz, VBW ≥ RBW, Sweep = Auto,
Span = Wide enough to captur the peaks of two adjacent channels
Detector = Peak, Trace = Max. hold

**Limit:**

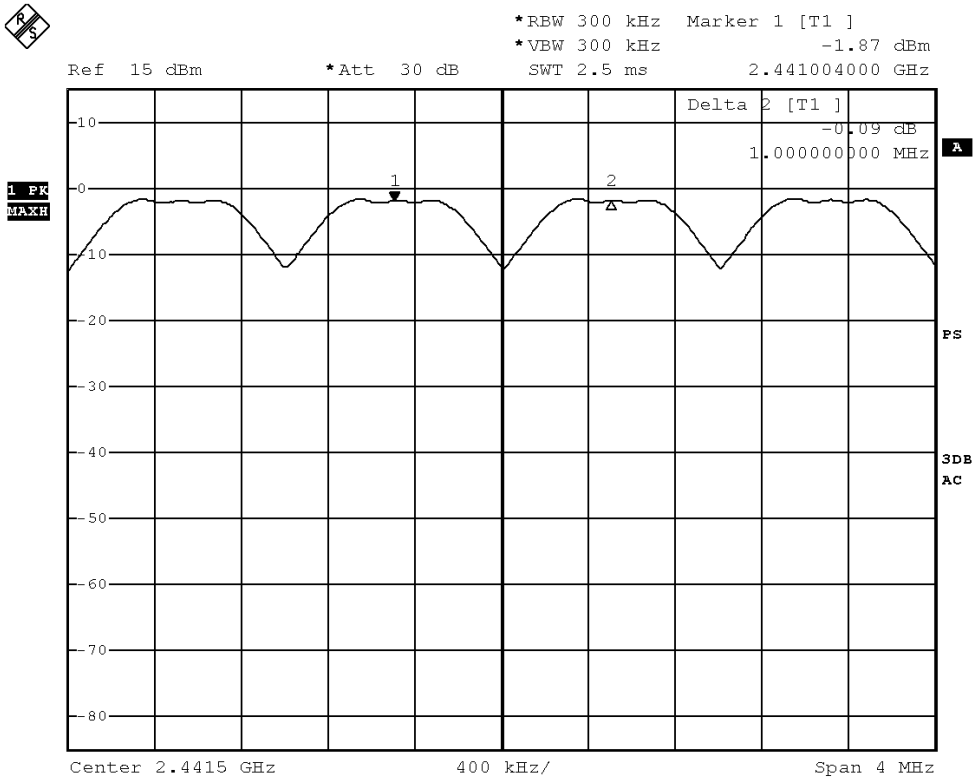
The measured maximum bandwidth * 2/3 = 888.0kHz (GFSK)

The measured maximum bandwidth * 2/3 = 1.225MHz * 2/3 =816.7kHz (π/4 DQPSK)

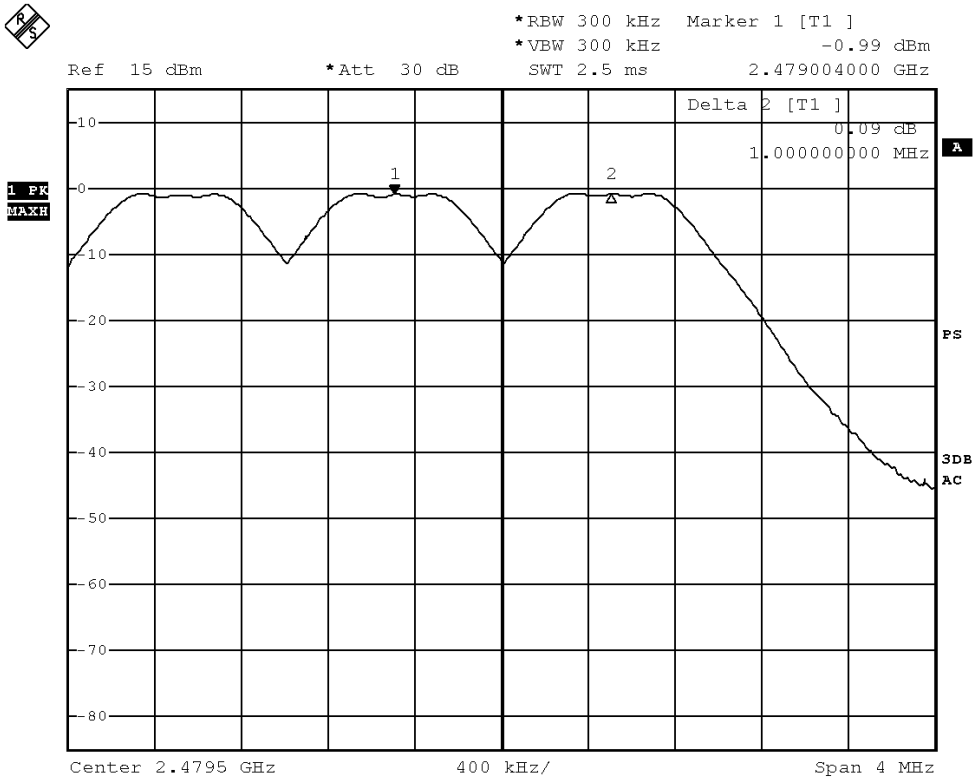
**Channel separation = 1MHz (>888.0kHz) （Lowest） (GFSK)**



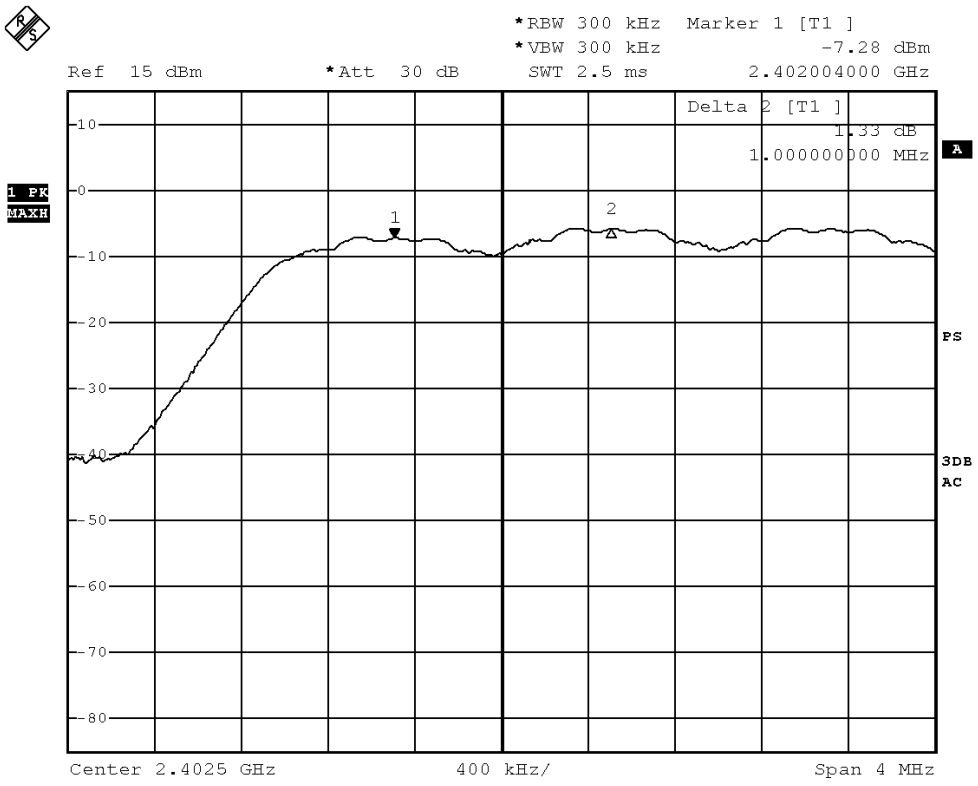
**Channel separation = 1MHz (>888.0kHz) （Mid） (GFSK)**



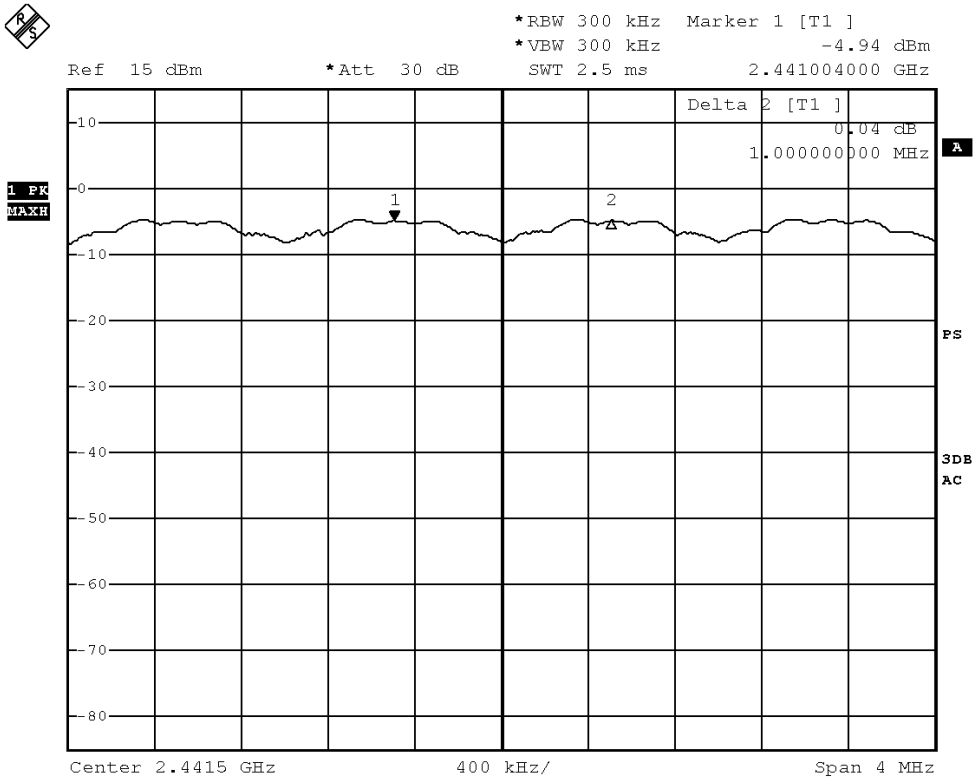
**Channel separation = 1MHz (>888.0kHz) （Highest） (GFSK)**



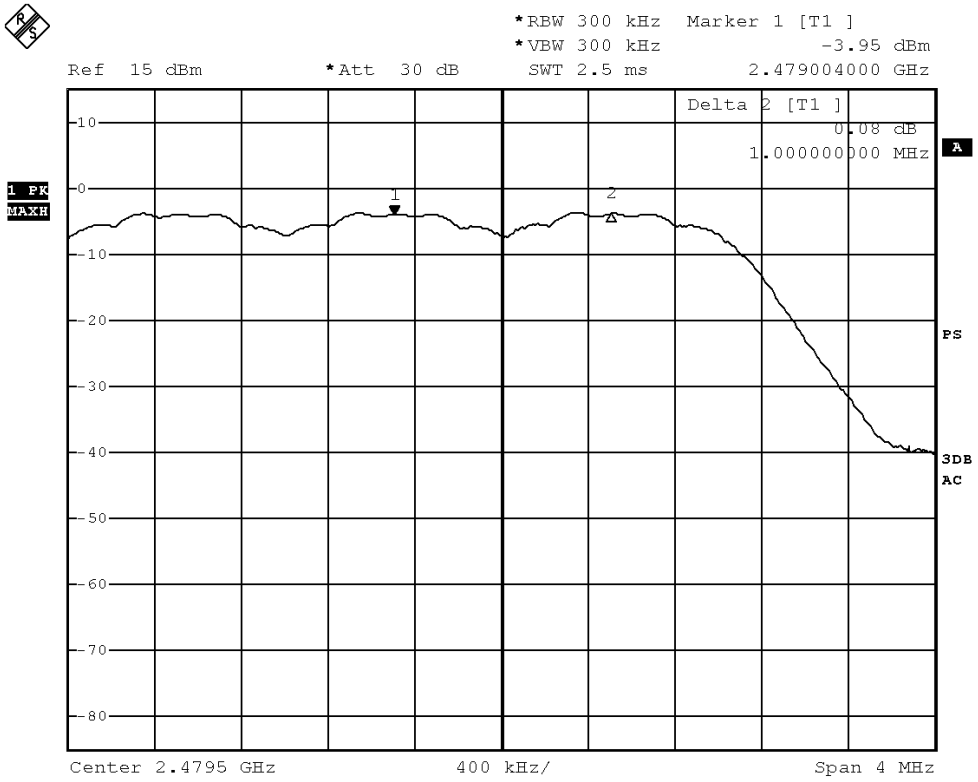
**Channel separation = 1MHz (>816.7kHz) （Lowest） (π/4 DQPSK)**



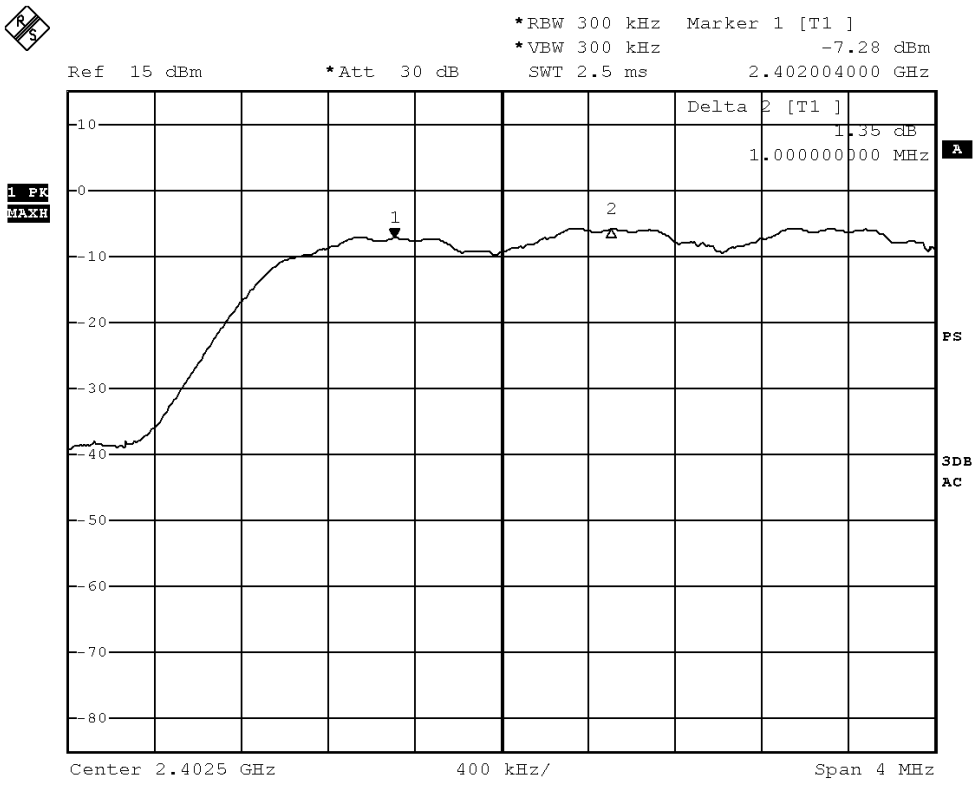
**Channel separation = 1MHz (>816.7kHz) （Mid） (π/4 DQPSK)**



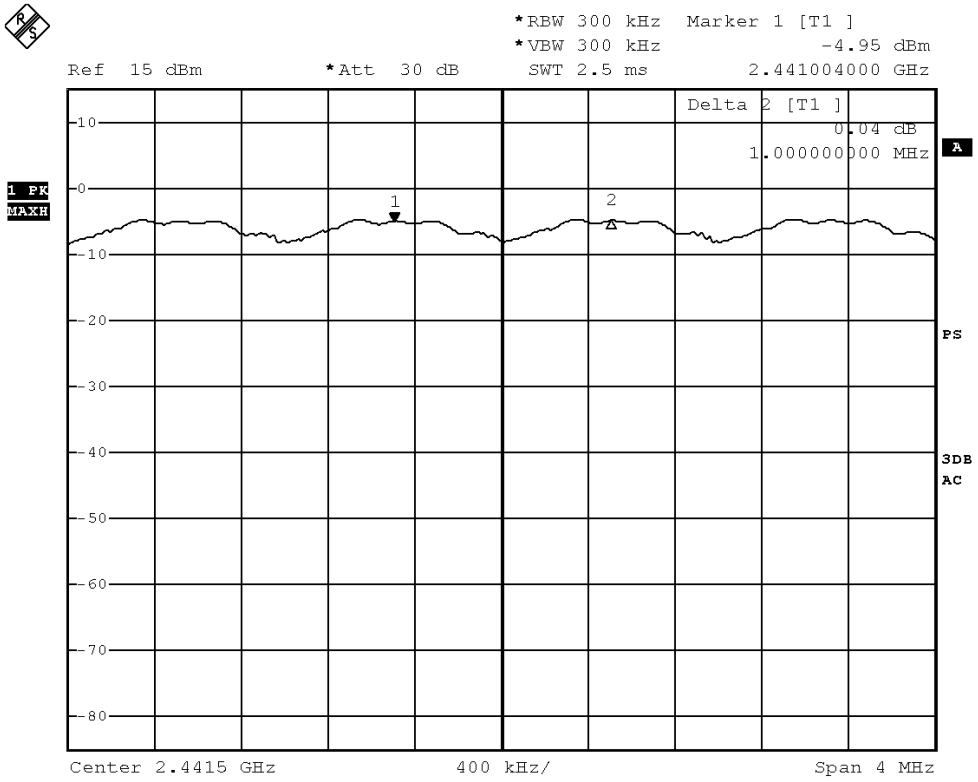
**Channel separation = 1MHz (>816.7kHz) （Highest） (π/4 DQPSK)**



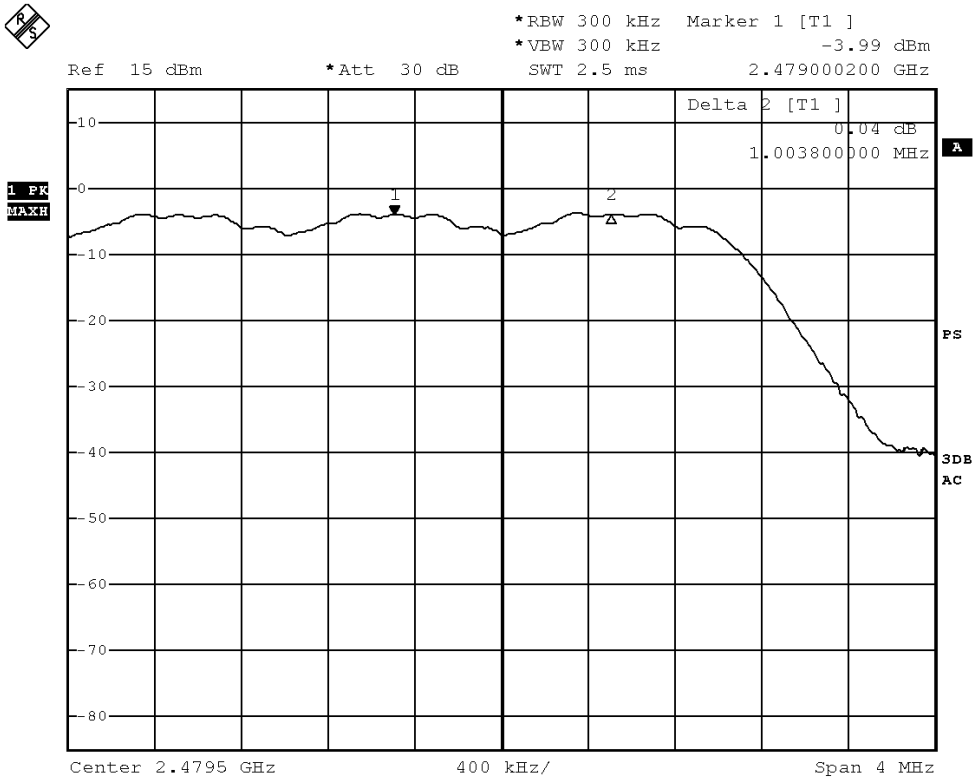
**Channel separation = 1MHz (>816.7kHz) （Lowest） (8DPSK)**



**Channel separation = 1MHz (>816.7kHz) （Mid） (8DPSK)**



**Channel separation = 1MHz (>816.7kHz) （Highest） (8DPSK)**



### 3.1.7 Band-edge Compliance of RF Conducted Emissions Measurement:

Ambient temperature 25°C Relative humidity 57%

**Limit：**
**I**n 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. Attenuation below the general limits specified in Section 15.209(a) is not required.
According to the test method DA 00-705.

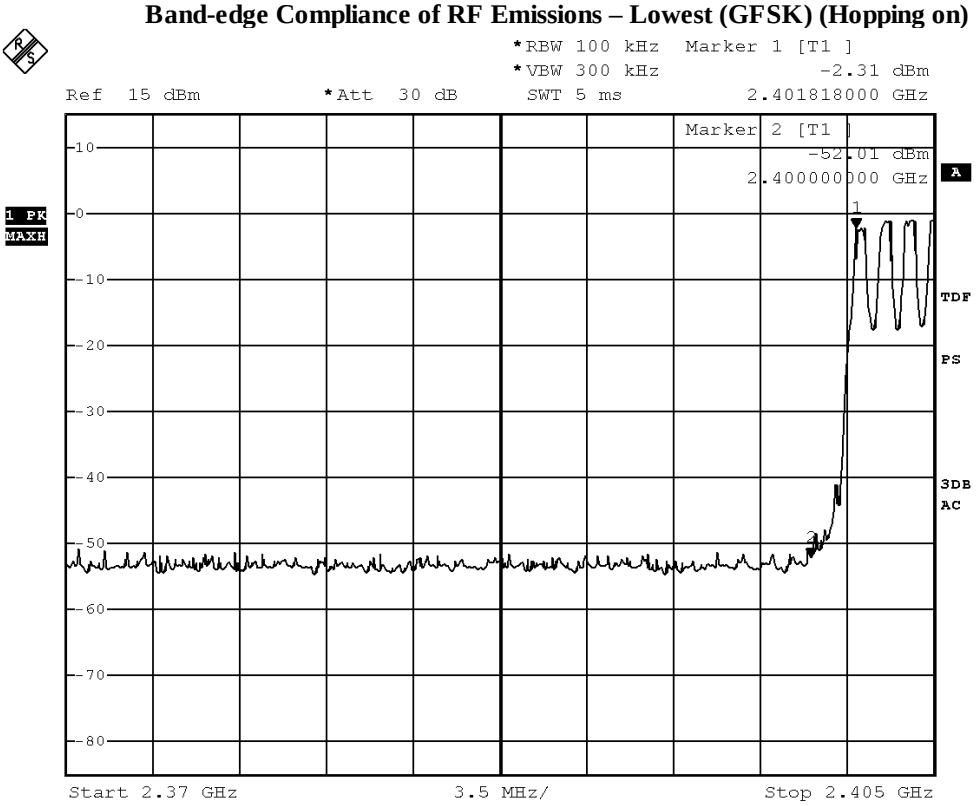
**Spectrum Analyzer Setting:**
RBW = 100kHz, VBW= 300kHz, Sweep = Coupled,
Span = Wide enough to captur the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.
Detector = Peak, Trace = Max. hold

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2400 – Lowest Fundamental (2402) | 49.7 |

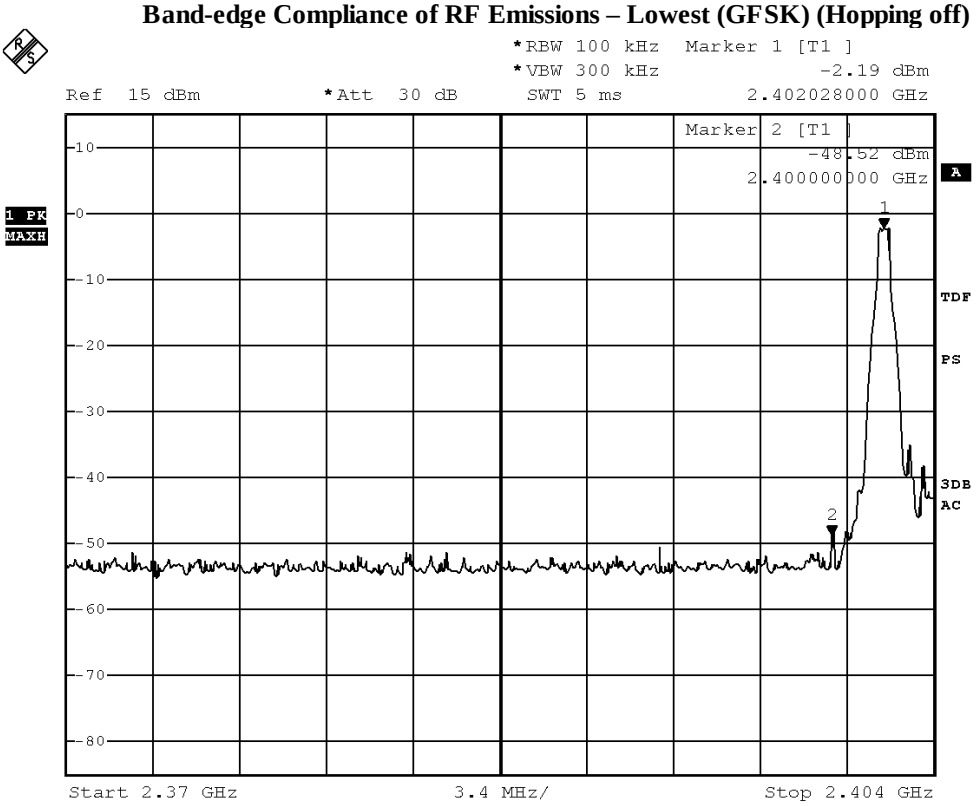
**Band-edge Compliance of RF Emissions – Lowest (GFSK) (Hopping on)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2400 – Lowest Fundamental (2402) | 46.33 |

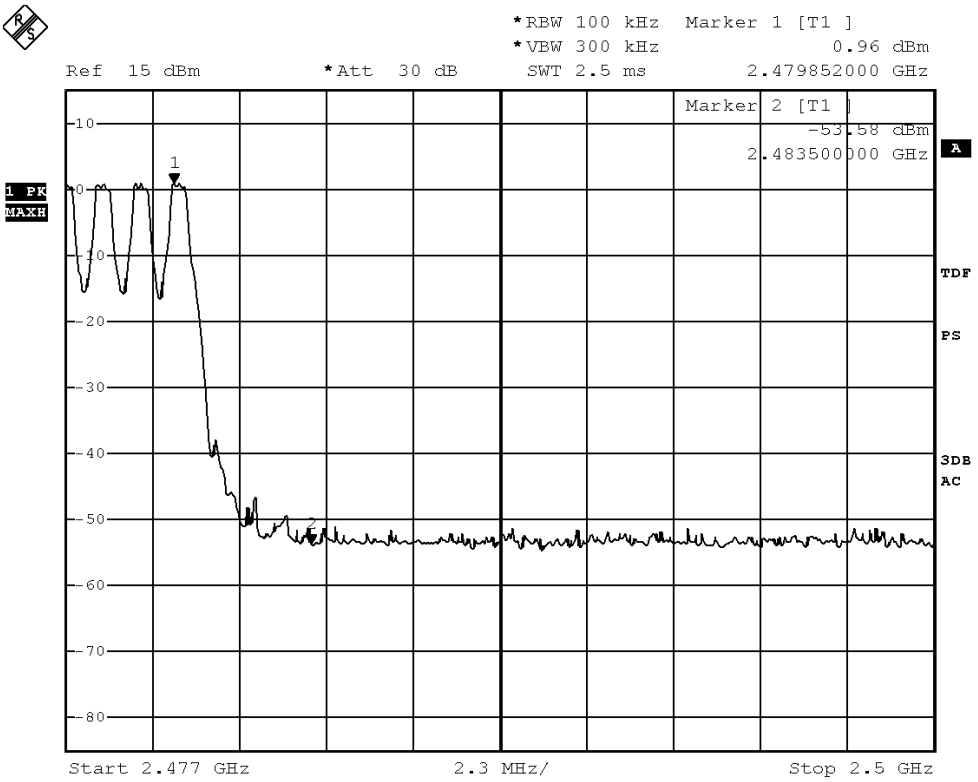
**Band-edge Compliance of RF Emissions – Lowest (GFSK) (Hopping off)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2483.5 - Highest Fundamental (2480) | 54.54 |

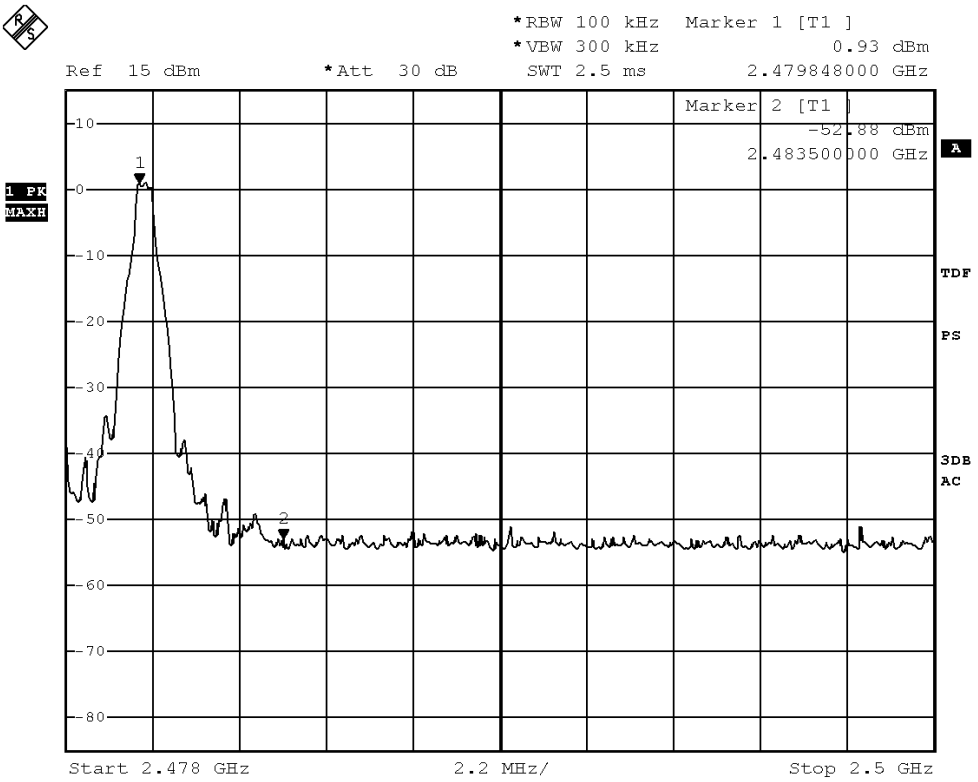
**Band-edge Compliance of RF Emissions – Highest (GFSK) (Hopping on)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2483.5 - Highest Fundamental (2480) | 53.81 |

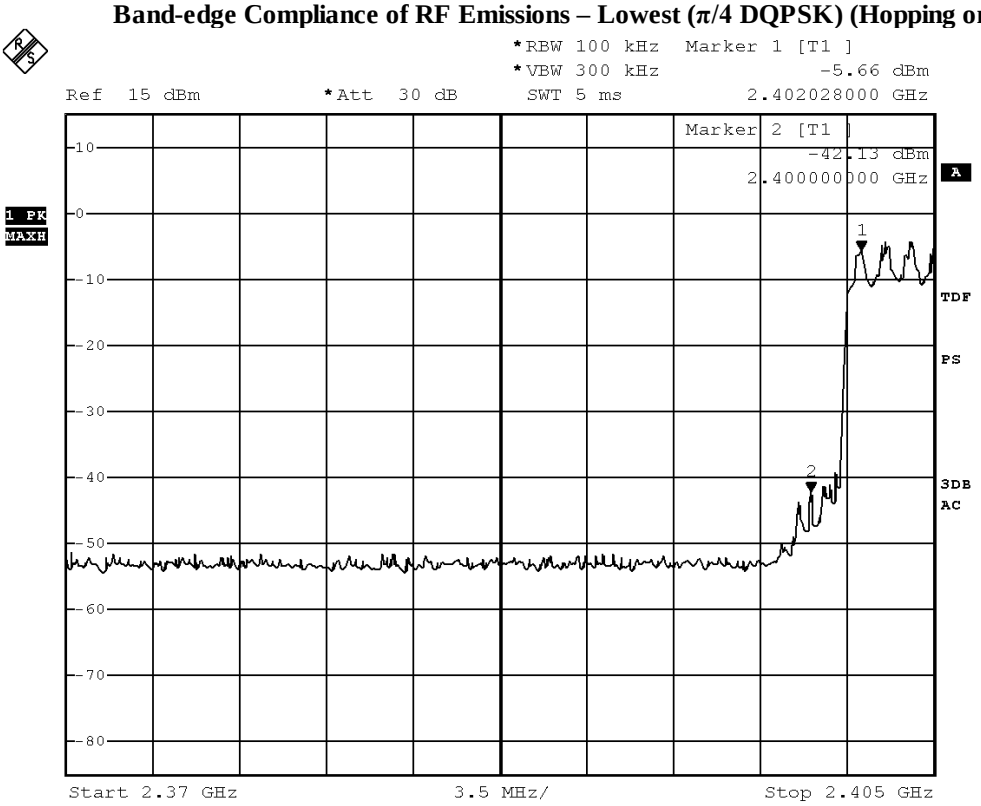
**Band-edge Compliance of RF Emissions – Highest (GFSK) (Hopping off)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2400 – Lowest Fundamental (2402) | 36.47 |

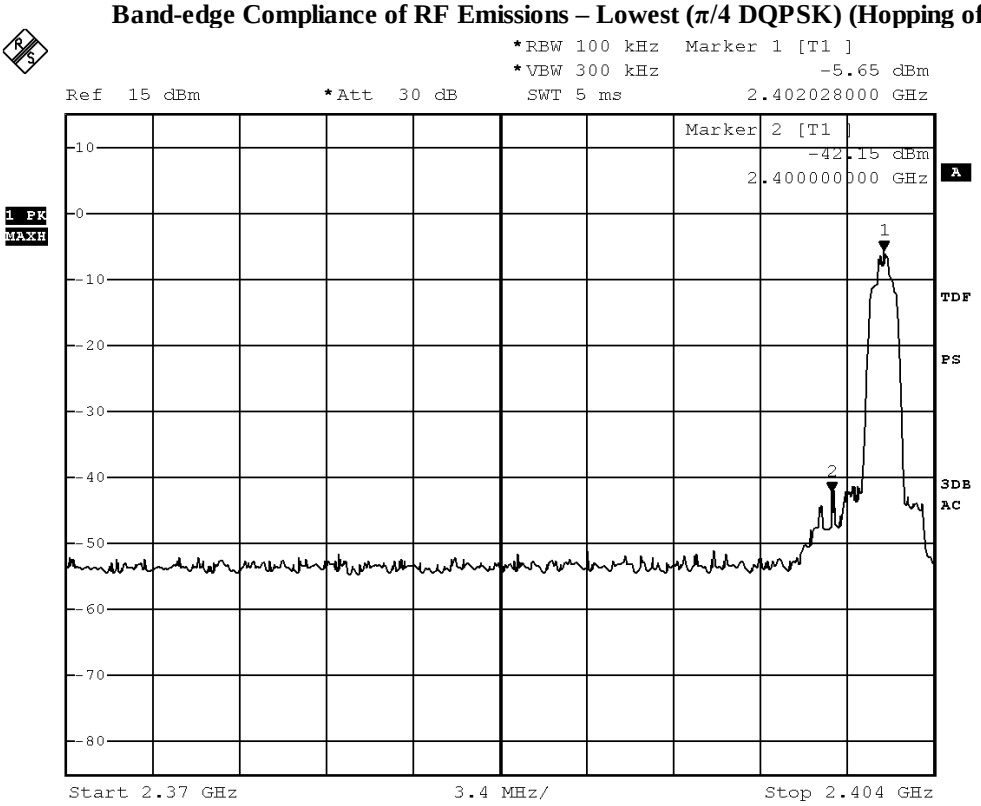
**Band-edge Compliance of RF Emissions – Lowest (π/4 DQPSK) (Hopping on)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2400 – Lowest Fundamental (2402) | 36.50 |

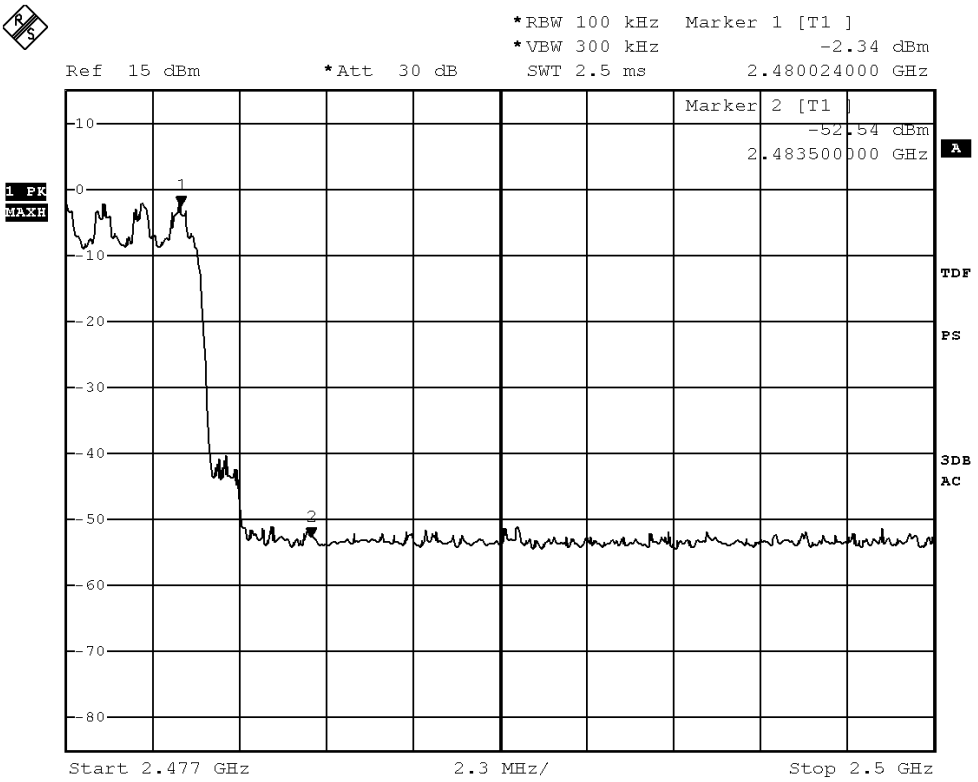
**Band-edge Compliance of RF Emissions – Lowest (π/4 DQPSK) (Hopping off)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2483.5 - Highest Fundamental (2480) | 50.20 |

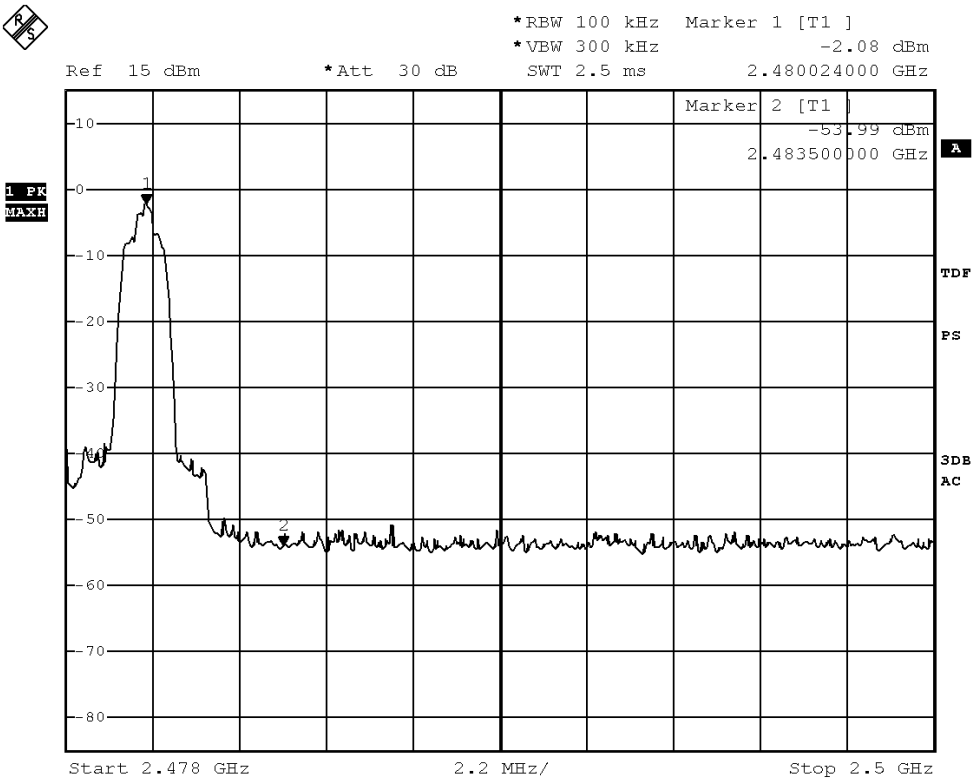
**Band-edge Compliance of RF Emissions – Highest (π/4 DQPSK) (Hopping on)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2483.5 - Highest Fundamental (2480) | 51.91 |

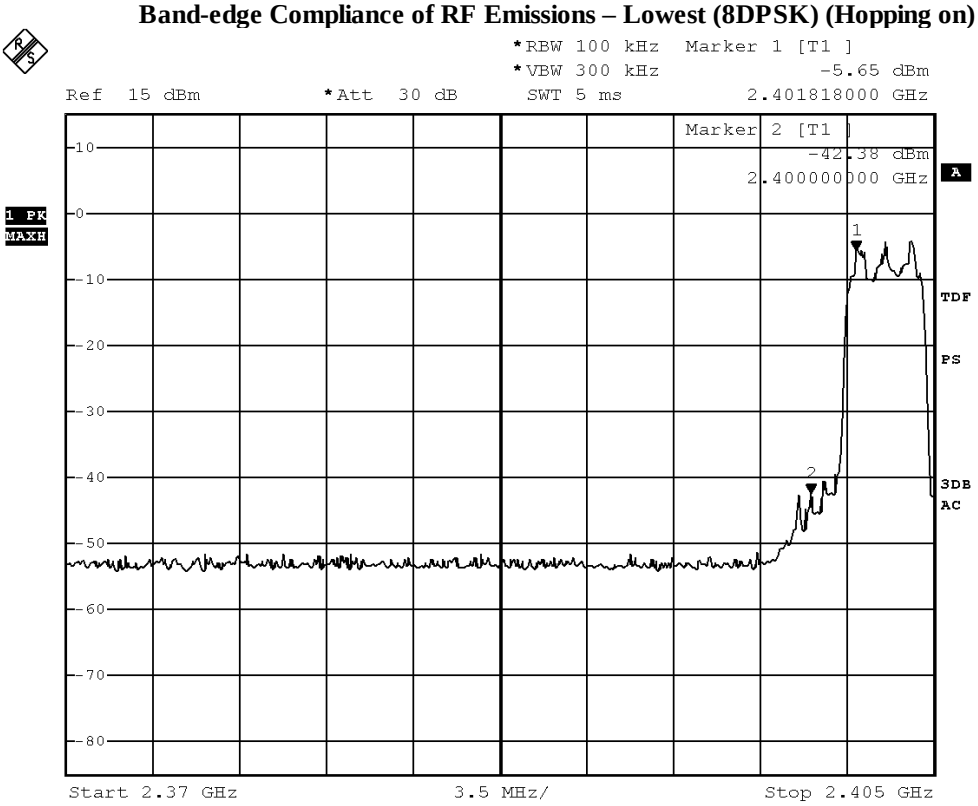
**Band-edge Compliance of RF Emissions – Highest (π/4 DQPSK) (Hopping off)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2400 – Lowest Fundamental (2402) | 36.73 |

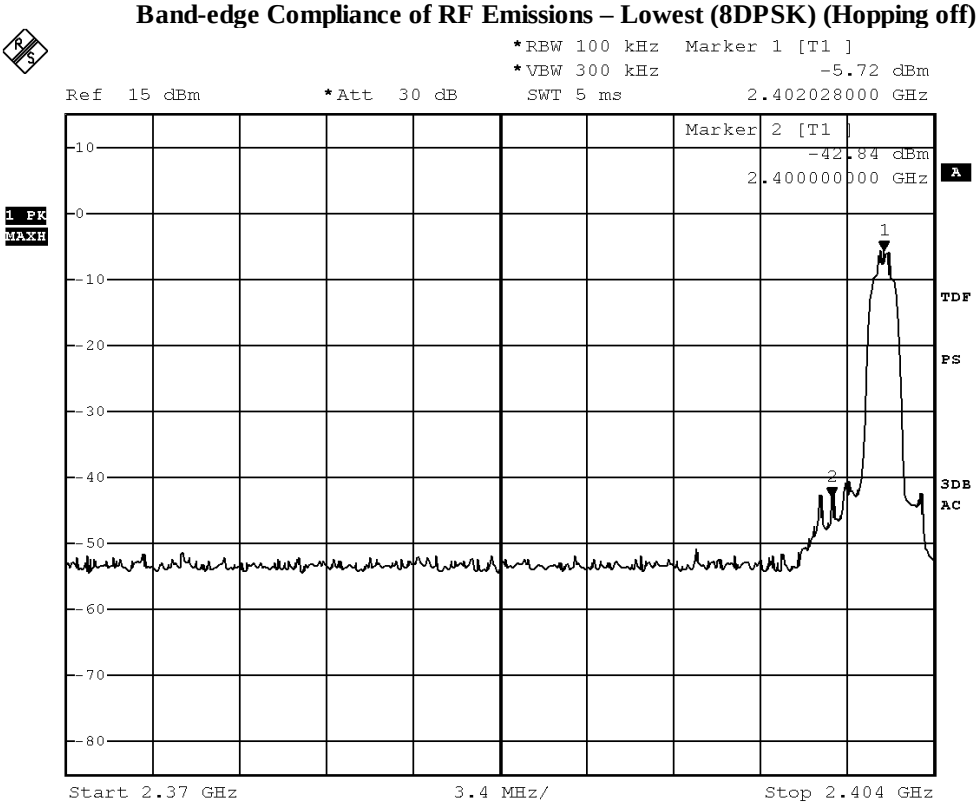
**Band-edge Compliance of RF Emissions – Lowest (8DPSK) (Hopping on)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2400 – Lowest Fundamental (2402) | 37.12 |

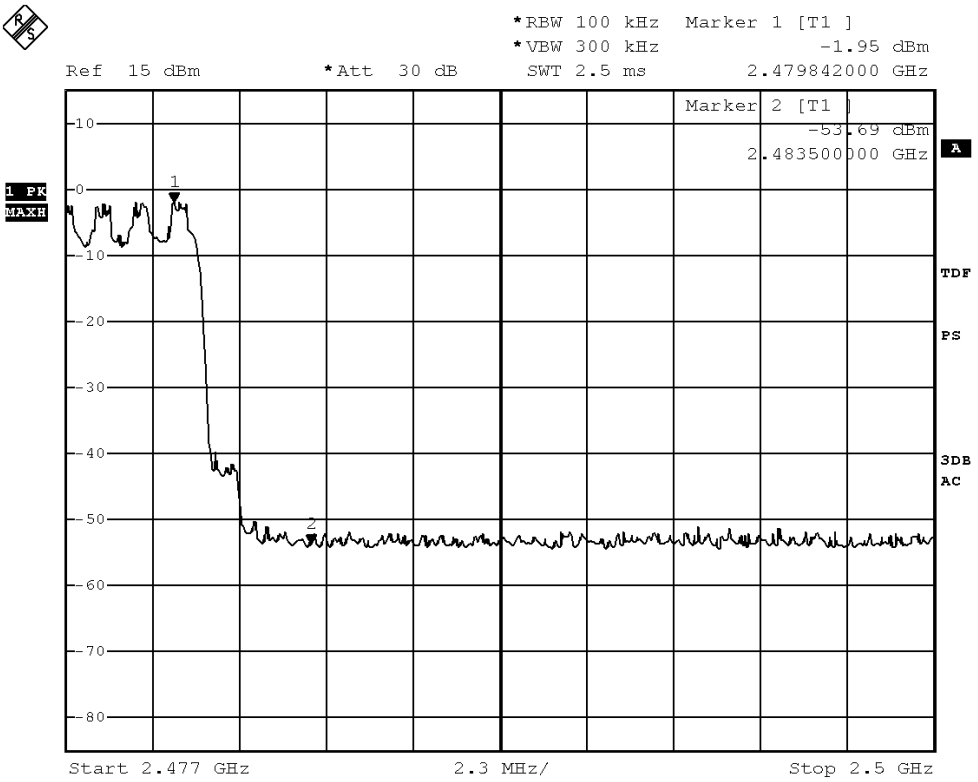
**Band-edge Compliance of RF Emissions – Lowest (8DPSK) (Hopping off)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2483.5 - Highest Fundamental (2480) | 51.74 |

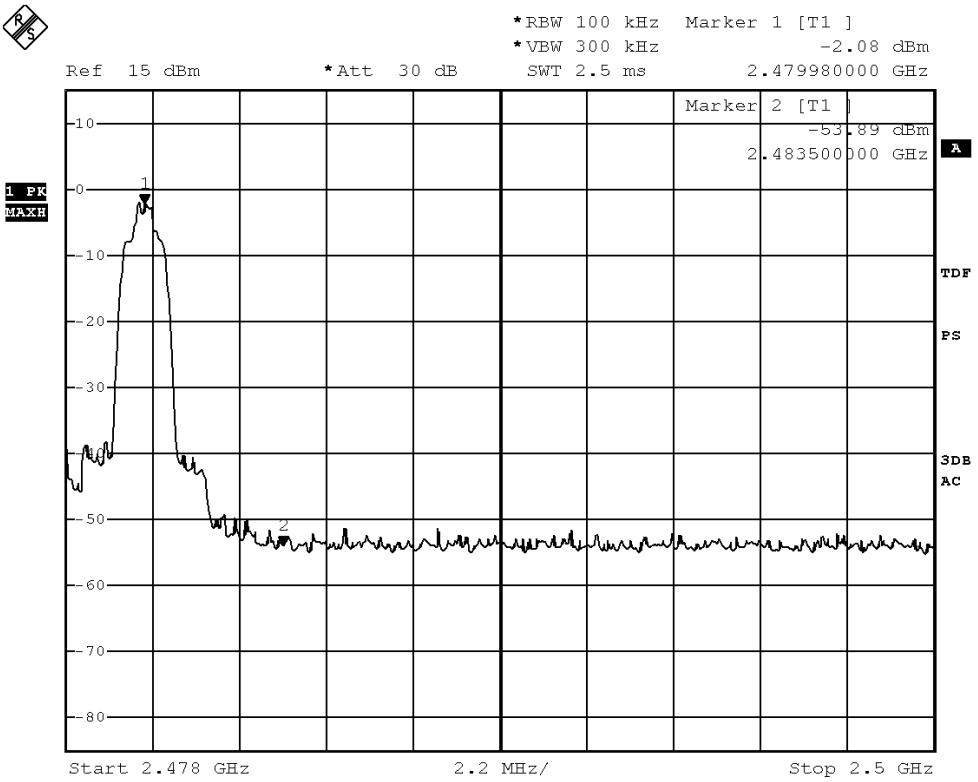
**Band-edge Compliance of RF Emissions – Highest (8DPSK) (Hopping on)**



**Band-edge Compliance of RF Conducted Emissions Measurement:**

| Frequency Range [MHz] | Radiated Emission Attenuated below the Fundamental [dB] |
|---|---|
| 2483.5 - Highest Fundamental (2480) | 51.81 |

**Band-edge Compliance of RF Emissions – Highest (8DPSK) (Hopping off)**

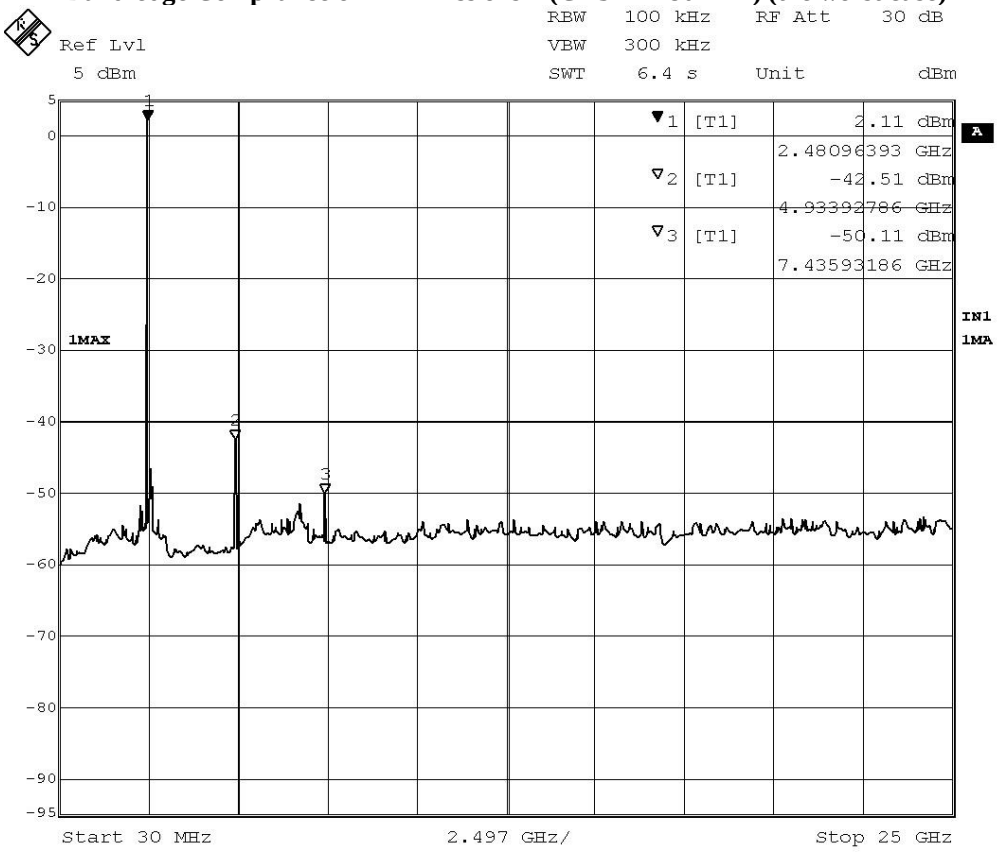


**Band-edge Compliance of RF Conducted Emissions Measurement:**

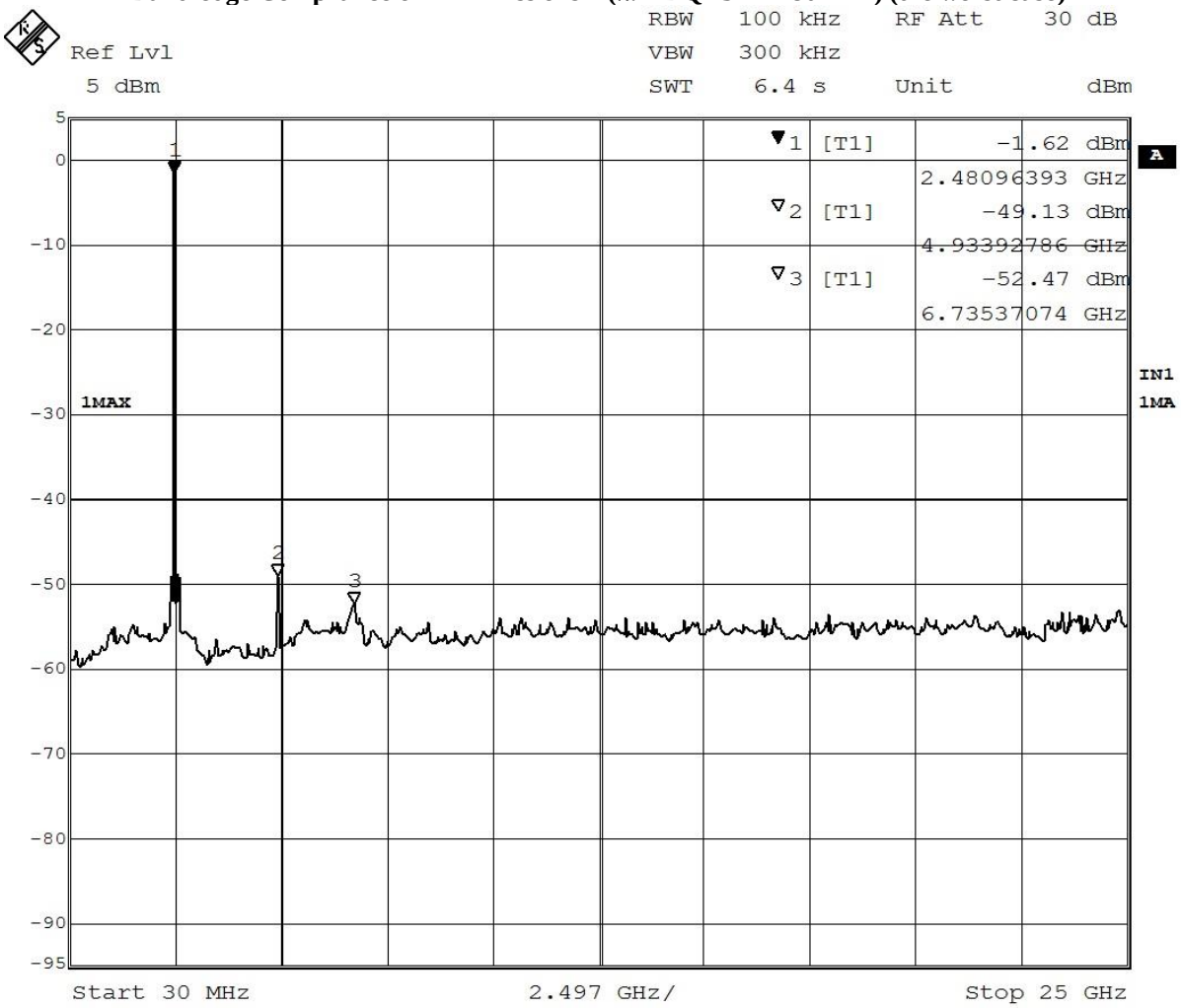
**Limit：**
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

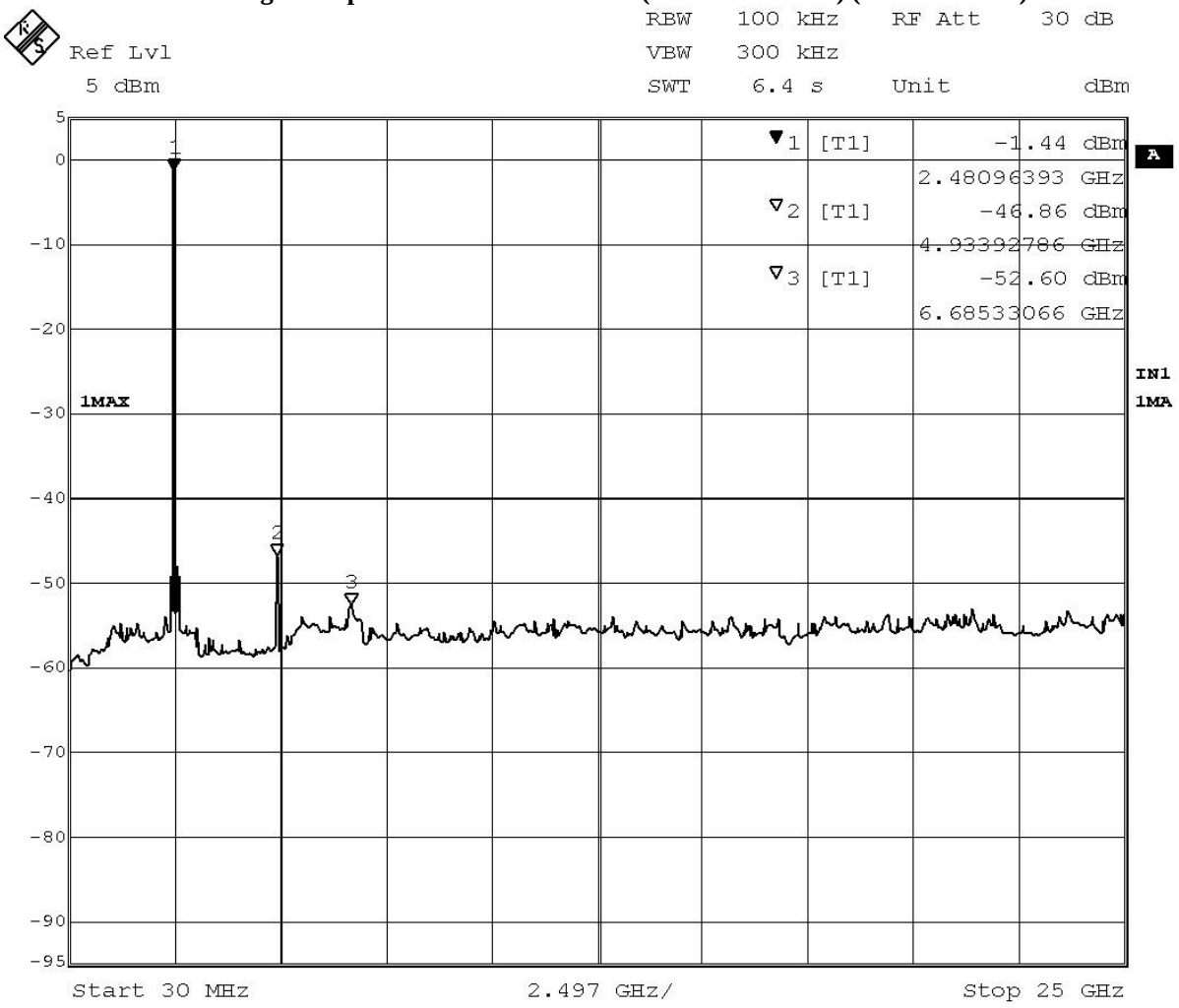
**Band-edge Compliance of RF Emissions – (GFSK 2480MHz) (the worst case)**



**Band-edge Compliance of RF Emissions – (π/4-DQPSK 2480MHz) (the worst case)**



**Band-edge Compliance of RF Emissions – (8DSK 2480MHz) (the worst case)**



**3.1.8 Time of Occupancy (Dwell Time)**

Ambient temperature 25°C Relative humidity 57%

**Requirements:**

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 channel employed.
No requirements for Digital Transmission System.

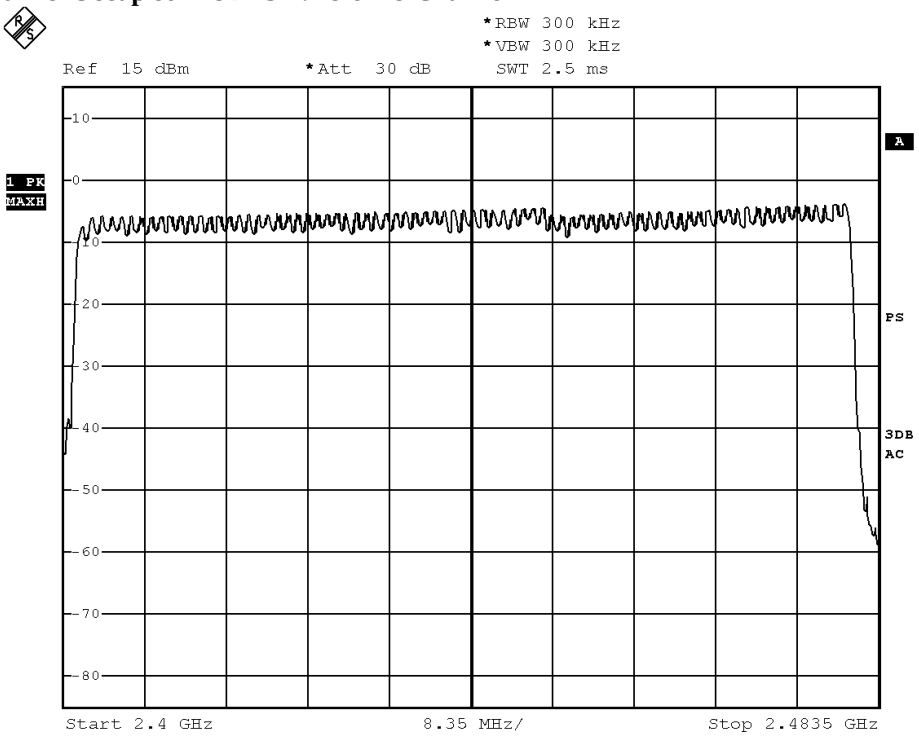
**Spectrum Analyzer Setting:**

RBW = 300kHz, VBW≥RBW,
Sweep = A longer sweep time to show two successive hops on a channel,
Span = Zero, Detector = Peak, Trace = Max. hold

Dwell Time = Pulse Duration * hop rate / number of channel * observation duration
Observed duration: 0.4s x 79 = 31.6s

**Measurement Data**:

**Channel Occupied in 8DPSK: 79 of 79 Channel**



**DH5 Packet:**

DH5 Packet permit maximum 1600/79/6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds

**Fig. A**
**[Pulse duration of Lowest Channel]**

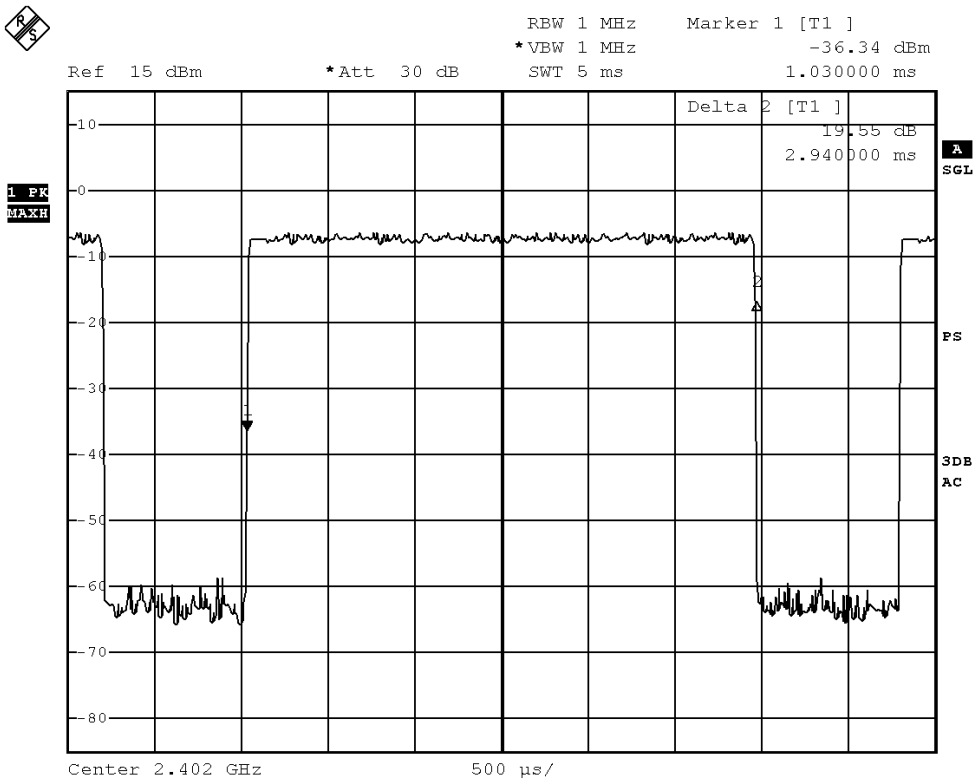


**Fig. B**
**[Pulse duration of Middle Channel]**

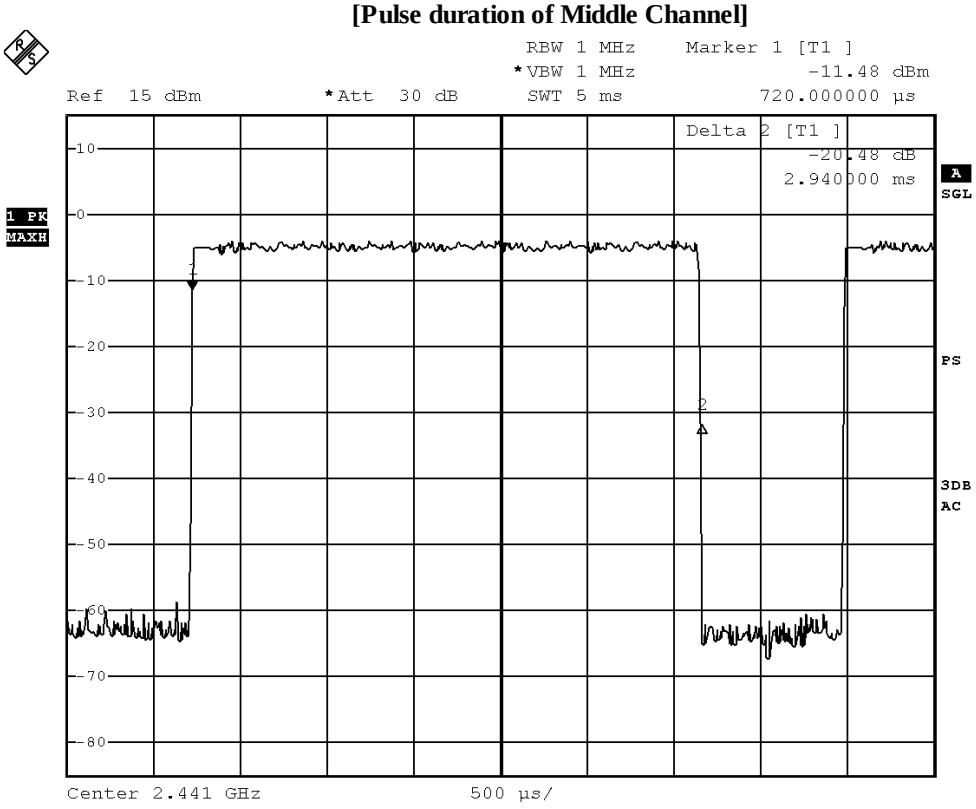
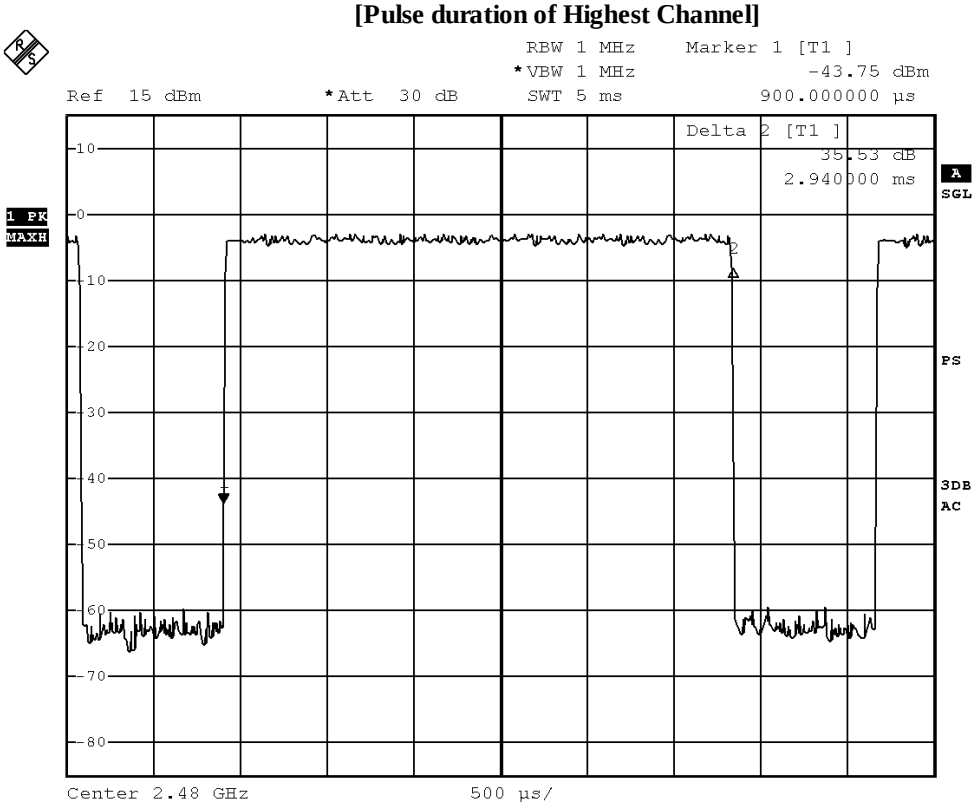


**Fig. C**
**[Pulse duration of Highest Channel]**



**DH3 Packet:**

DH3 Packet permit maximum 1600/79/4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds

**Fig. D**
**[Pulse duration of Lowest Channel]**

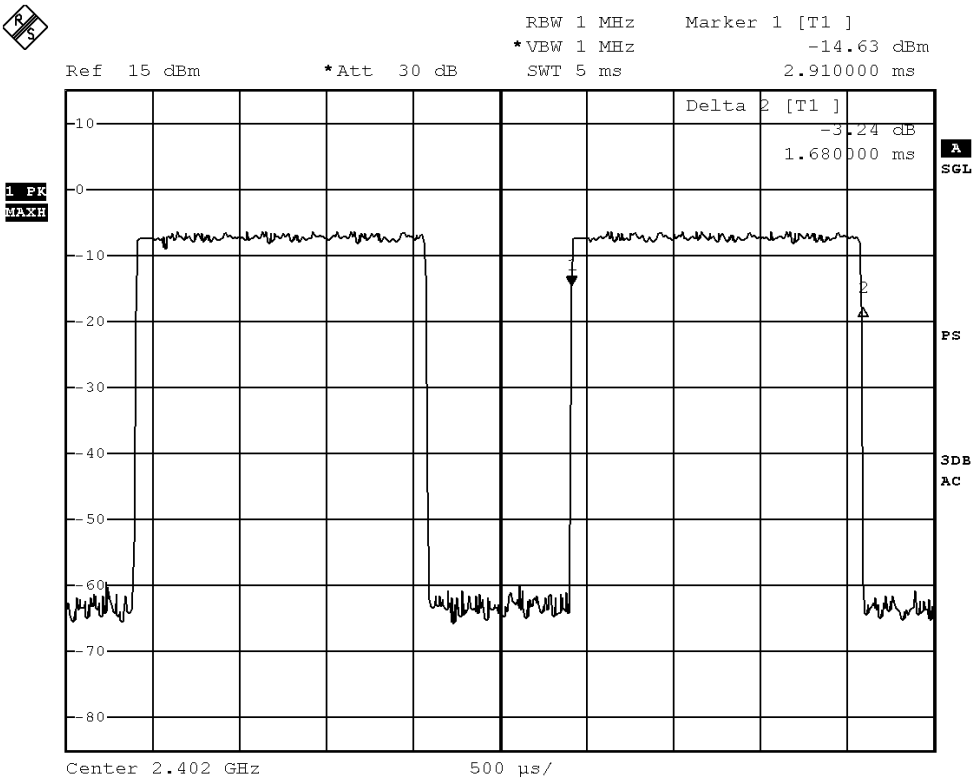


**Fig. E**
**[Pulse duration of Middle Channel]**

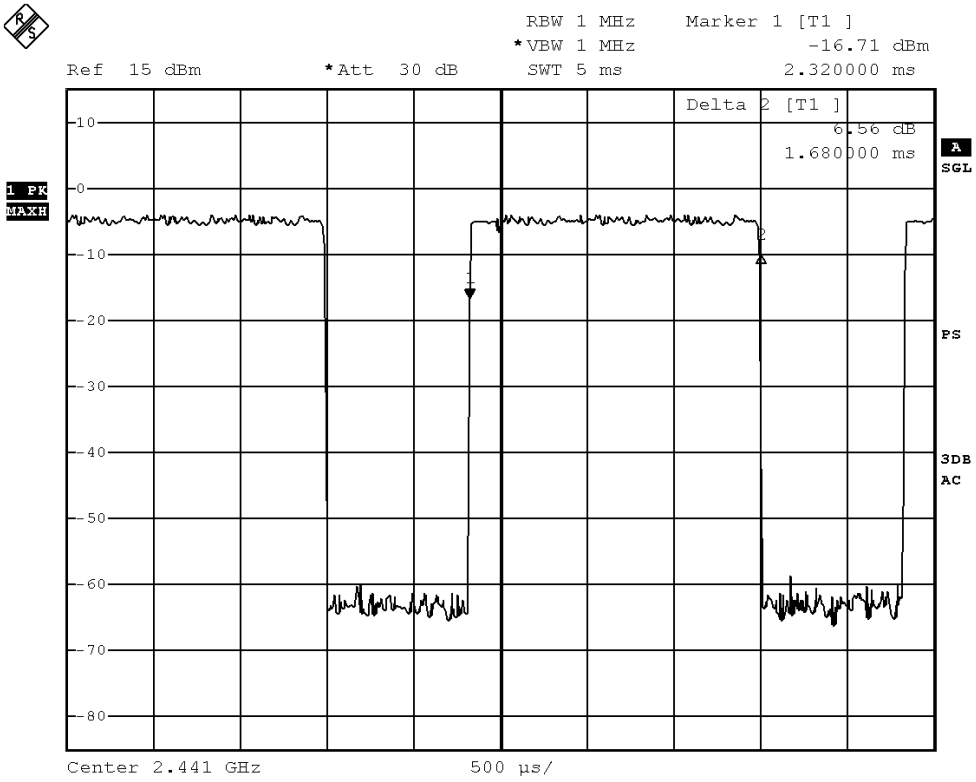
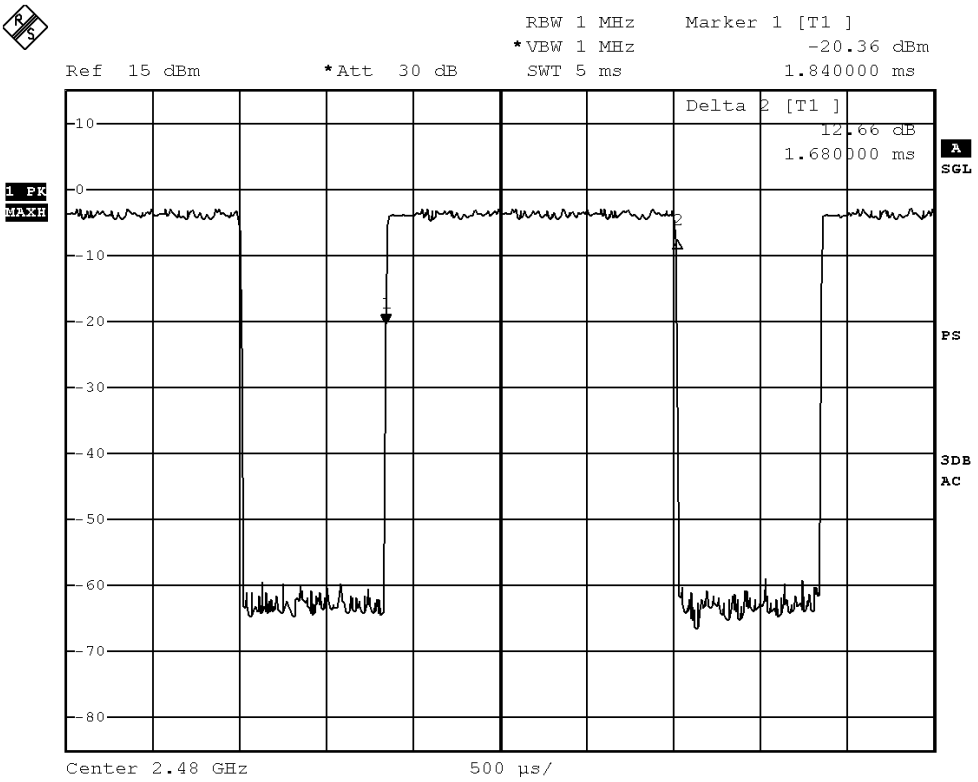


**Fig. F**
**[Pulse duration of Highest Channel]**



**DH1 Packet:**

DH1 Packet permit maximum 1600/79/2 = 10.12 hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds

**Fig. G**
**[Pulse duration of Lowest Channel]**

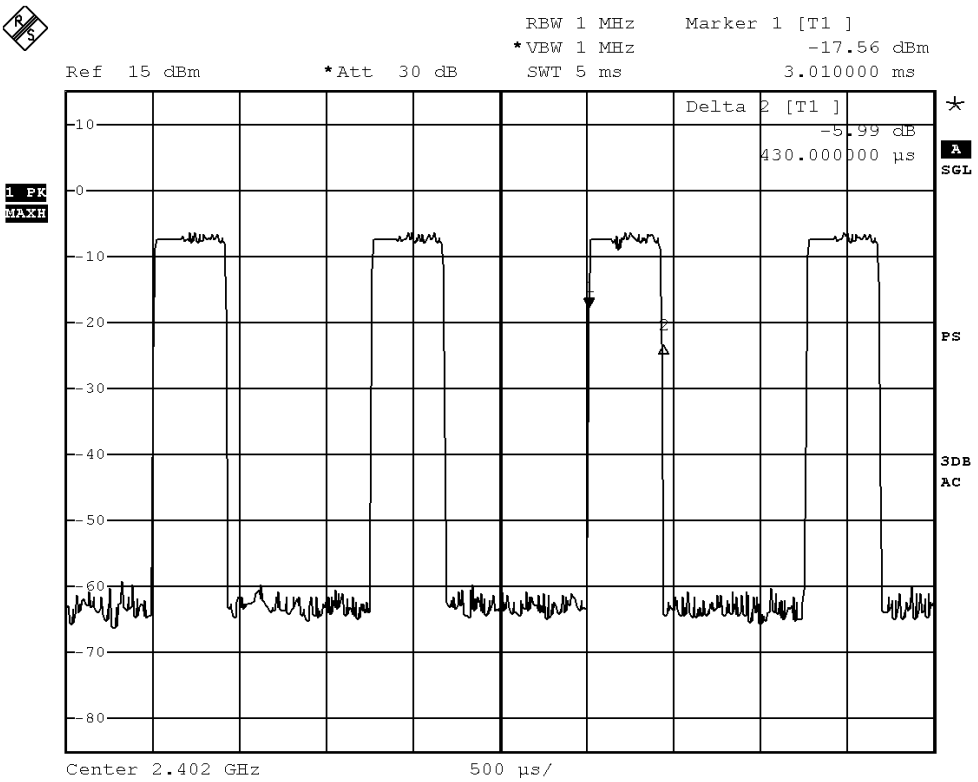


**Fig. H**
**[Pulse duration of Middle Channel]**

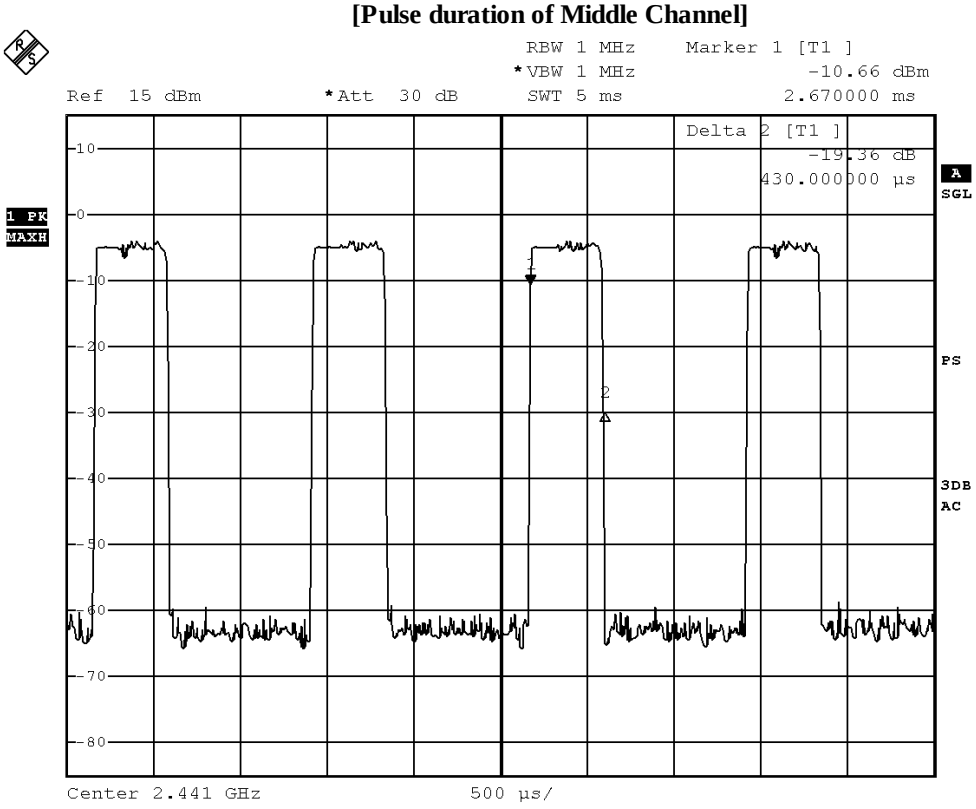
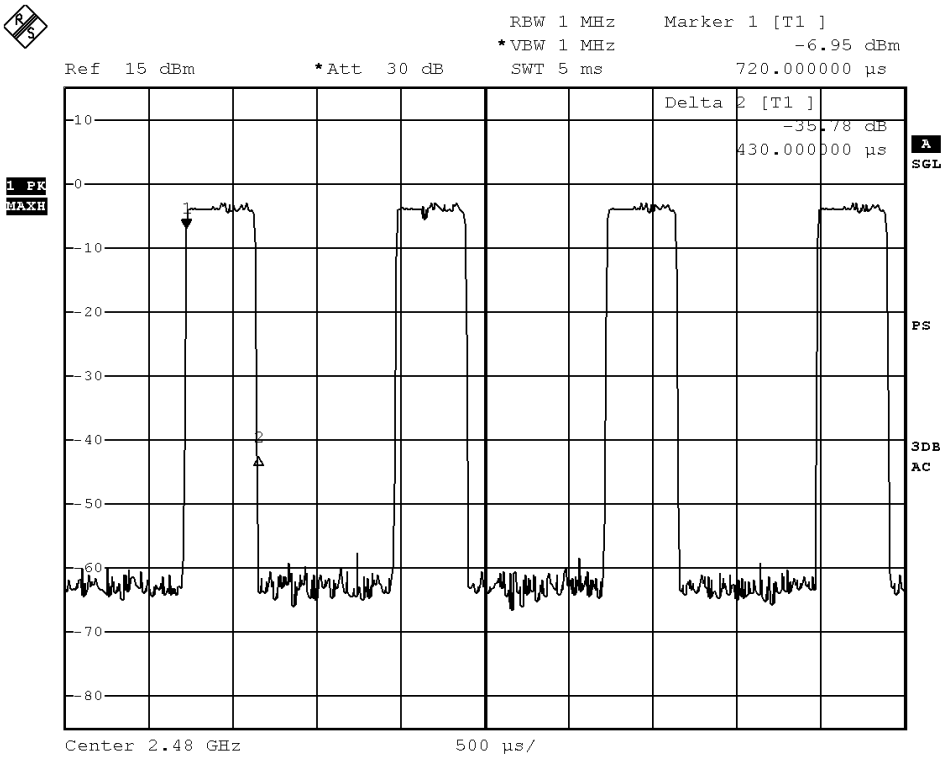


**Fig. I**
**[Pulse duration of Highest Channel]**




**Time of occupancy (Dwell Time)**:

| Data Packet | Frequency (MHz) | Pulse Duration (ms) | Dwell Time (s) | Limits (s) | Test Results |
|---|---|---|---|---|---|
| DH5 | 2402 | 2.940 | 0.313 | 0.400 | Complies |
| DH5 | 2441 | 2.940 | 0.313 | 0.400 | Complies |
| DH5 | 2480 | 2.940 | 0.313 | 0.400 | Complies |
| DH3 | 2402 | 1.680 | 0.269 | 0.400 | Complies |
| DH3 | 2441 | 1.680 | 0.269 | 0.400 | Complies |
| DH3 | 2480 | 1.670 | 0.267 | 0.400 | Complies |
| DH1 | 2402 | 0.430 | 0.138 | 0.400 | Complies |
| DH1 | 2441 | 0.430 | 0.138 | 0.400 | Complies |
| DH1 | 2480 | 0.430 | 0.138 | 0.400 | Complies |

### 3.1.9 Channel Centre Frequency

**Requirements:**
Frequency hopping system in the 2400-2483.5MHz band shall use at least 79 (Channel 1 to 79) non-overlapping channels.

The EUT operates in according with the Bluetooth system specification within the 2400 - 2483.5 MHz frequency band.
RF channels for Bluetooth systems are spaced 1 MHz and are ordered in channel number k. In order to comply with out-of-band regulations, a lower frequency guard band of 2.0 MHz and a higher frequency guard band of 3.5MHz is used.

The operating frequencies of each channel are as follows:

First RF channel start from 2400MHz + 2MHz guard band = 2402MHz
Frequency of RF Channel = 2402+k MHz, k = 1,…,79 (Channel separation = 1MHz)

### 3.1.10 Pseudorandom Hopping Algorithm

Ambient temperature 25°C Relative humidity 57%

**Requirements:**
The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

**EUT Pseudorandom Hopping Algorithm**
The EUT is a Bluetooth device, the Pseudo-random hopping pattern; hopping characteristics and algorithm are based on the Bluetooth specification.

### 3.1.11 Antenna Requirement

Ambient temperature 25°C Relative humidity 57%

**Test Requirements: § 15.203**

**Test Specification:**

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**Test Results:**

This is Meander Line antenna. There is no external antenna, the antenna gain = 2.12dBi. User is unable to remove or changed the Antenna.

## Appendix A

## List of Measurement Equipment

### Radiated Emission

| EQP NO. | DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | LAST CAL | DUE CAL |
|---|---|---|---|---|---|---|
| EM215 | MULTIDEVICE CONTROLLER | EMCO | 2090 | 00024676 | N/A | N/A |
| EM217 | ELECTRIC POWERED TURNTABLE | EMCO | 2088 | 00029144 | N/A | N/A |
| EM218 | ANECHOIC CHAMBER | ETS-LINDGREN | FACT-3 | -- | 2018/01/24 | 2019/01/24 |
| EM356 | ANTENNA POSITIONING TOWER | ETS-LINDGREN | 2171B | 00150346 | N/A | N/A |
| EM354 | BICONILOG ANTENNA | ETS-LINDGREN | 3143B | 00142073 | 2018/03/29 | 2020/03/29 |
| EM229 | EMI TEST RECEIVER | R&S | ESIB40 | 100248 | 2018/06/01 | 2019/06/01 |
| EM276 | BROADBAND HORN ANTENNA | A-INFOMW | JXTXLB-10180-SF | J203109090300 7 | 2018/04/27 | 2020/04/27 |
| EM300 | PYRAMIDAL STANDARD GAIN HORN ANTENNA | ETS-LINDGREN | 3160-09 | 00130130 | 2018/05/13 | 2019/05/13 |
| EM301 | PYRAMIDAL STANDARD GAIN HORN ANTENNA | ETS-LINDGREN | 3160-10 | 00130988 | 2018/05/13 | 2019/05/13 |
| EM302 | PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ) | SEIBERSDORF LABORATORIES | POD 16 | 161806/L | 2018/05/11 | 2020/05/11 |
| EM303 | PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ) | SEIBERSDORF LABORATORIES | POD 618 | 6181908/L | 2018/05/11 | 2020/05/11 |
| EM353 | LOOP ANTENNA | ETS_LINDGREN | 6502 | 00206533 | 2018/04/16 | 2020/04/16 |
| EM045 | POWER METER | ROHDE & SCHWARZ | NRVD | 843246/028 | 2017/10/14 | 2018/10/14 |

### Line Conducted

| EQP NO. | DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | LAST CAL | DUE CAL |
|---|---|---|---|---|---|---|
| EM119 | LISN | R & S | ESH3-Z5 | 0831.5518.52 | 2017/11/29 | 2018/11/29 |
| EM145 | EMI TEST RECEIVER | R & S | ESCS 30 | 830245/021 | 2018/06/01 | 2019/06/01 |
| EM179 | IMPULSE LIMITER | ROHDE & SCHWARZ | ESH3-Z2 | 357-8810.52/54 | 2018/01/11 | 2019/01/11 |
| EM154 | SHIELDING ROOM | SIEMENS MATSUSHITA COMPONENTS | N/A | 803-740-057-99A | 2017/02/02 | 2022/02/02 |
| N/A | MEASUREMENT AND EVALUATION SOFTWARE | ROHDE & SCHWARZ | BSIB-K1 | V1.20 | N/A | N/A |

Remarks:-

CM Corrective Maintenance
N/A Not Applicable
TBD To Be Determined

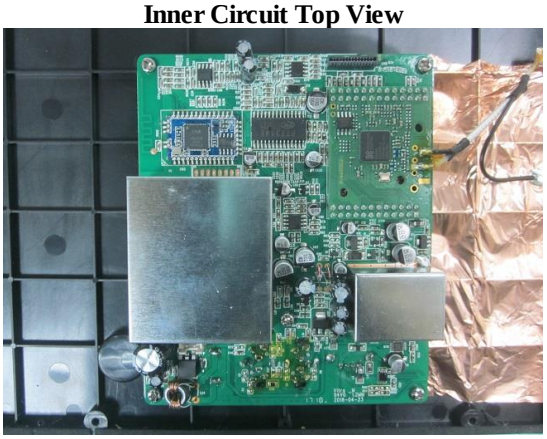
**Appendix B**

**Photographs of EUT**

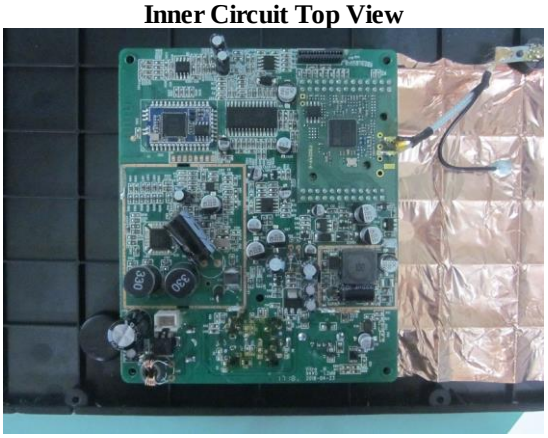
**Front View of the product**

**Rear View of the product**

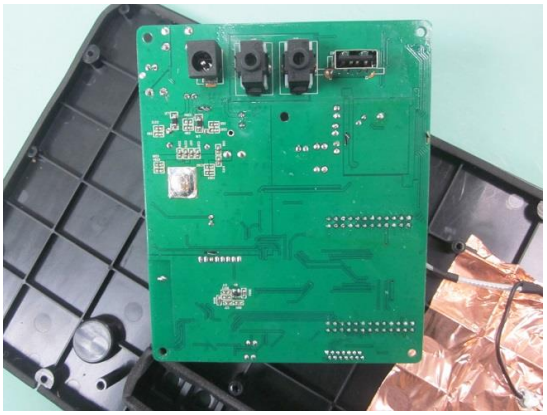
**Inner Circuit Top View**



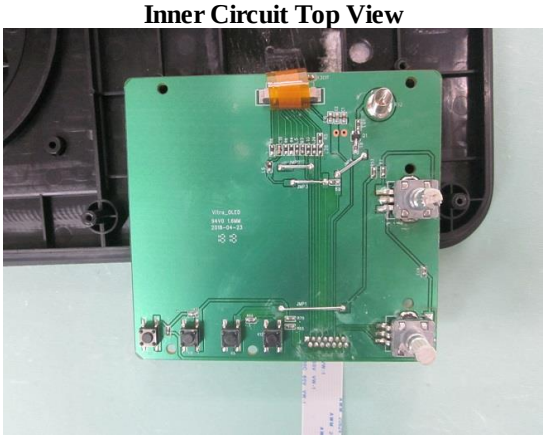
**Inner Circuit Top View**



**Inner Circuit Bottom View**

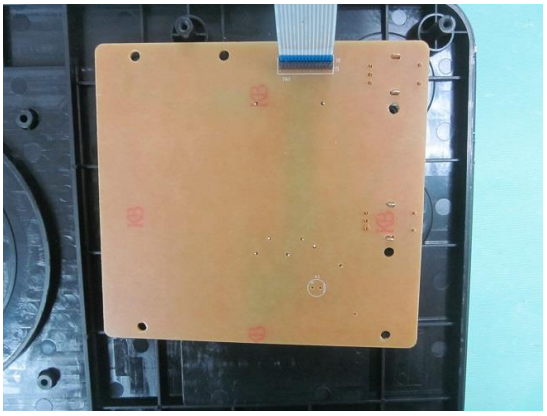


**Inner Circuit Top View**

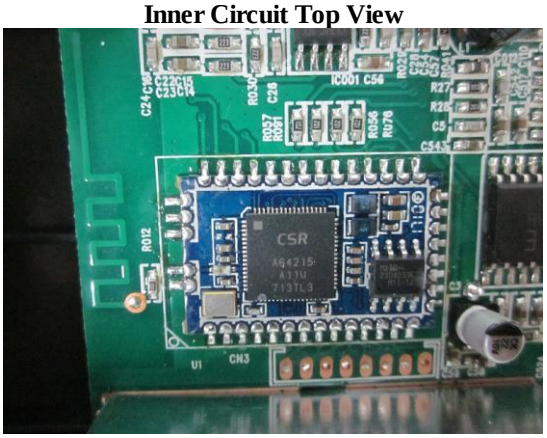


**Photographs of EUT**

**Inner Circuit Bottom View**

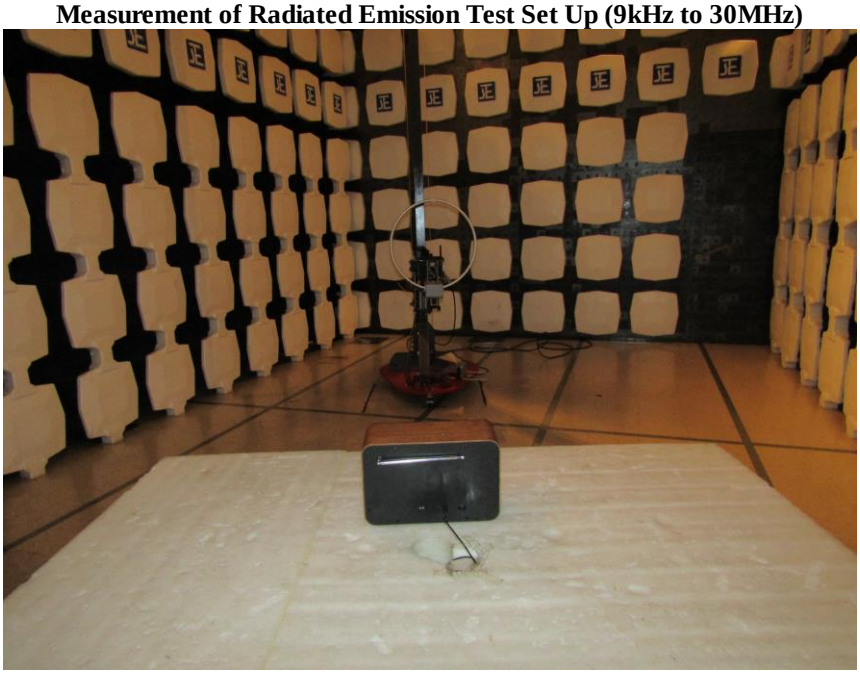


**Inner Circuit Top View**

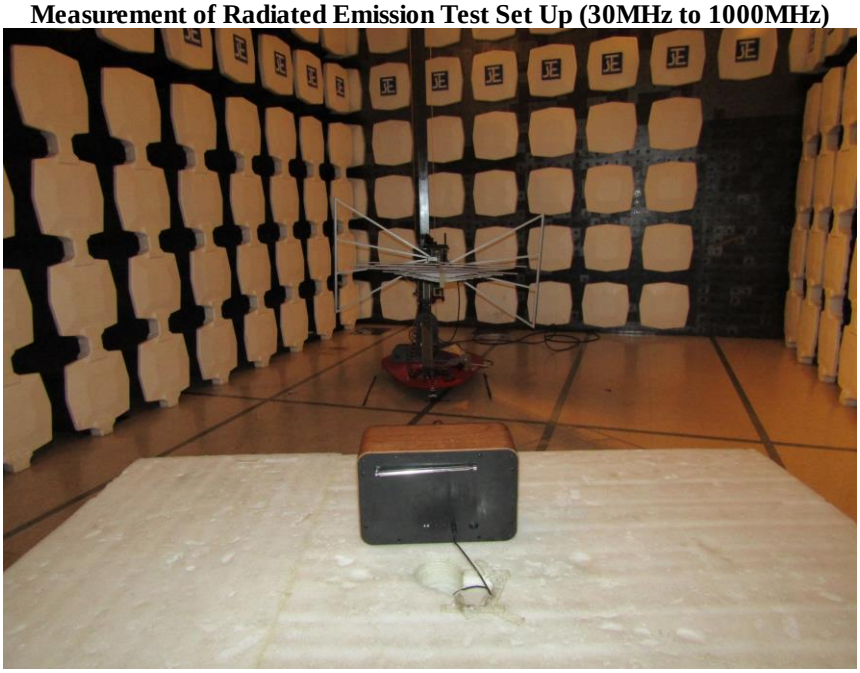


**Photographs of EUT**

**Measurement of Radiated Emission Test Set Up (9kHz to 30MHz)**

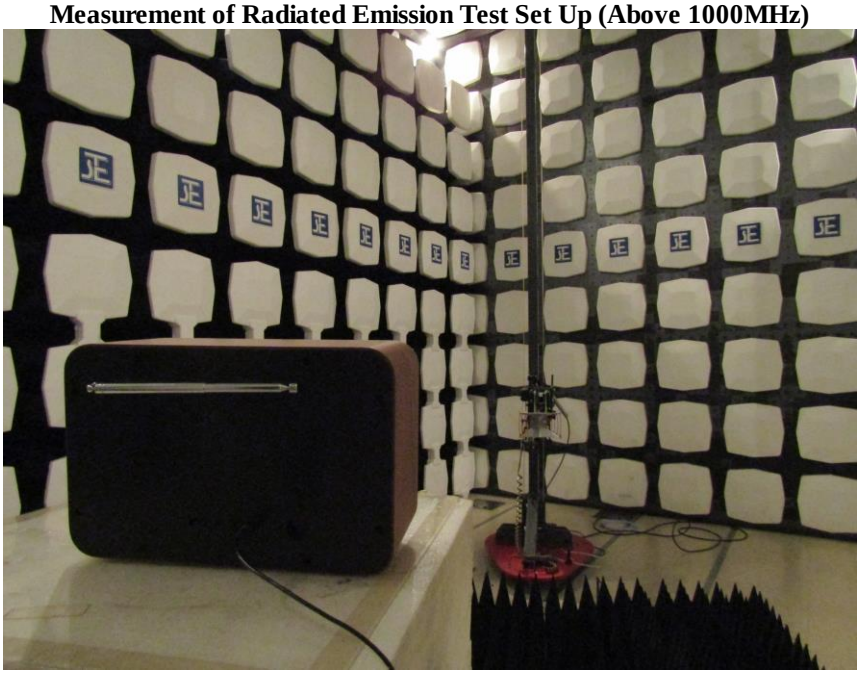


**Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)**

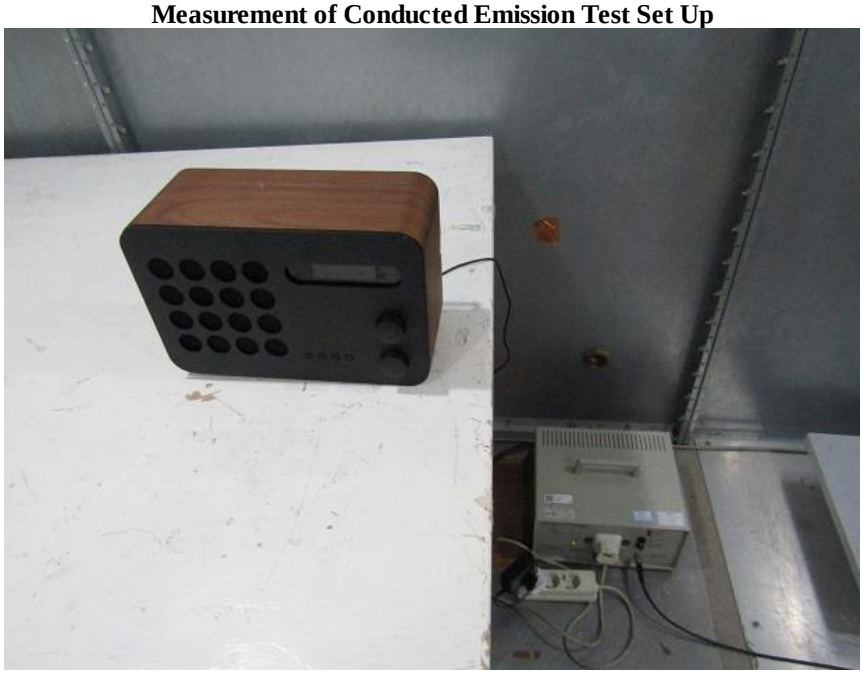


**Photographs of EUT**

**Measurement of Radiated Emission Test Set Up (Above 1000MHz)**



**Measurement of Conducted Emission Test Set Up**



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

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4. The Report refers only to the sample tested and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.

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6. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

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10. Issuance records of the Report are available on the internet at www.stc-group.org. Further enquiry of validity or verification of the Reports should be addressed to the Company.