# FCC PART 15C
# TEST REPORT
# No. I19N00846-BT

**For**

**Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd**

**smartphone**

**Model Name: cp3648A**

**With**

**Hardware Version: P1**

**Software Version: 9.0.002.P1.190609.cp3648A**

**FCC ID: R38YLCP3648A**

**Issued Date: 2019-07-03**

**Designation Number: CN1210**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

**Test Laboratory:**

Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518026.

Tel: +86(0)755-33322000, Fax: +86(0)755-33322001

Email: yewu@caict.ac.cn, website: www.cszit.com

# REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| I19N00846-BT | Rev.0 | 1st edition | 2019-07-03 |

# CONTENTS

# 1. Test Laboratory

## 1.1. Testing Location

Location: Shenzhen Academy of Information and Communications Technology
Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong Province ,China
Postal Code: 518026
Telephone: +86(0)755-33322000
Fax: +86(0)755-33322001

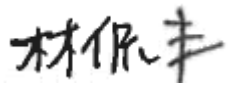
## 1.2. Testing Environment

Normal Temperature: 15-35℃
Relative Humidity: 20-75%

## 1.3. Project data

Testing Start Date: 2019-05-30
Testing End Date: 2019-06-25

## 1.4. Signature



**Lin Kanfeng**
**(Prepared this test report)**

**Tang Weisheng**
**(Reviewed this test report)**

**Zhang Bojun**
**(Approved this test report)**

# 2. Client Information

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd |
| Address /Post: | Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen |
| Contact: | Yentl Chen |
| Email: | chenyanting@yulong.com |
| Tel.: | +86 15927320221 |
| Fax: | / |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd |
| Address /Post: | Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen |
| Contact: | Yentl Chen |
| Email: | chenyanting@yulong.com |
| Tel.: | +86 15927320221 |
| Fax: | / |

# 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

## 3.1. About EUT

| | |
|---|---|
| Description | smartphone |
| Model Name | cp3648A |
| Market Name | / |
| Frequency Band | 2400MHz~2483.5MHz |
| Type of Modulation | GFSK/π/4 DQPSK/8DPSK |
| Number of Channels | 79 |
| Antenna Type | Integrated |
| Antenna Gain | -0.51dBi |
| Power Supply | 3.85V DC by Battery |
| FCC ID | R38YLCP3648A |
| Condition of EUT as received | No abnormality in appearance |

Note: Components list, please refer to documents of the manufacturer.

## 3.2. Internal Identification of EUT

| EUT ID* | IMEI | HW Version | SW Version | Receive Date |
|---|---|---|---|---|
| EUT1 | 990013500007328 | P1 | 9.0.002.P1.190609.cp3648A | 2019-05-30 |

*EUT ID: is used to identify the test sample in the lab internally.

## 3.3. Internal Identification of AE

| AE ID* | Description | Mode | Manufacturer |
|---|---|---|---|
| AE1 | Battery | Li-ion Polymer | Tianjin Lishen |
| AE2 | Battery | Li-ion Polymer | Zhuhai Coslight |
| AE3 | Charger | RD0501000-USBA-18MG | Shenzhen Ruide |
| AE4 | Charger | 618045 | Shenzhen Kosun |

*AE ID: is used to identify the test sample in the lab internally.

## 3.4. General Description

The Equipment under Test (EUT) is a model of smartphone with integrated antenna and battery.
It consists of normal options: travel charger, USB cable and Phone.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the client.
The Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:
1) The hopping sequence is pseudorandom
2) All channels are used equally on average
3) The receiver input bandwidth equals the transmit bandwidth
4) The receiver hops in sequence with the transmit signal
In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection / hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

# 4. Reference Documents

## 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

## 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference | Title | Version |
|---|---|---|
| FCC Part 15 | FCC CFR 47, Part 15, Subpart C:<br>15.205 Restricted bands of operation;<br>15.209 Radiated emission limits, general requirements;<br>15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz | 2017 |
| ANSI C63.10 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices | 2013 |

# 5. Test Results

## 5.1. Summary of Test Results

| No | Test cases | Sub-clause of Part 15C | Verdict |
|---|---|---|---|
| 0 | Antenna Requirement | 15.203 | **P** |
| 1 | Maximum Peak Output Power | 15.247(b) | **P** |
| 2 | Band Edges Compliance | 15.247(d) | **P** |
| 3 | Conducted Spurious Emission | 15.247(d) | **P** |
| 4 | Radiated Spurious Emission | 15.247,15.205,15.209 | **P** |
| 5 | Occupied 20dB bandwidth | 15.247(a) | **P** |
| 6 | Time of Occupancy (Dwell Time) | 15.247(a) | **P** |
| 7 | Number of Hopping Channel | 15.247(a) | **P** |
| 8 | Carrier Frequency Separation | 15.247(a) | **P** |
| 9 | AC Power line Conducted Emission | 15.107,15.207 | **P** |

See **ANNEX A and below** for details.

## 5.2. Statements

SAICT has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

## 5.3. Terms used in the result table

Terms used in Verdict column

| | |
|---|---|
| P | Pass |
| NA | Not Available |
| F | Fail |

Abbreviations

| | |
|---|---|
| AC | Alternating Current |
| AFH | Adaptive Frequency Hopping |
| BW | Band Width |
| E.I.R.P. | equivalent isotropic radiated power |
| ISM | Industrial, Scientific and Medical |
| R&TTE | Radio and Telecommunications Terminal Equipment |
| RF | Radio Frequency |
| Tx | Transmitter |

## 5.4. Laboratory Environment

**Semi-anechoic chamber**

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014 MHz - 1 MHz, > 60 dB;<br>1 MHz - 1000 MHz, > 90 dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |
| Normalised site attenuation (NSA) | < ±4 dB, 3m/10m distance, from 30 to 1000 MHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 3000 MHz |

**Shielded room**

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014 MHz - 1 MHz, > 60 dB;<br>1 MHz - 1000 MHz, > 90 dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |

**Fully-anechoic chamber**

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014 MHz - 1MHz, > 60dB;<br>1 MHz - 1000 MHz, > 90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |
| Voltage Standing Wave Ratio (VSWR) | ≤ 6 dB, from 1 to 18 GHz, 3m distance |

## 6. Test Facilities Utilized

### Conducted test system

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Date | Calibration Period |
|---|---|---|---|---|---|---|
| 1 | Vector Signal Analyzer | FSV40 | 100903 | Rohde & Schwarz | 2020-01-16 | 1 year |
| 2 | Bluetooth Tester | CBT32 | 100584 | Rohde & Schwarz | 2020-01-02 | 1 year |
| 3 | Power Sensor | U2021XA | MY55430013 | Agilent | 2020-01-16 | 1 year |
| 4 | Data Acquisiton | U2531A | TW55443507 | Agilent | / | / |

### Radiated emission test system

| NO. | Equipment | Model | Serial Number | Manufacturer | Calibration Date | Calibration Period |
|---|---|---|---|---|---|---|
| 1 | LISN | ESH2-Z5 | 100196 | R&S | 2020-01-03 | 1 year |
| 2 | Test Receiver | ESCI | 100701 | R&S | 2019-08-07 | 1 year |
| 3 | Loop Antenna | HLA6120 | 35779 | TESEQ | 2022-05-01 | 3 year |
| 4 | BiLog Antenna | VULB9163 | 9163 329 | Schwarzbeck | 2020-02-17 | 3 year |
| 5 | Horn Antenna | 3117 | 00066585 | ETS-Lindgren | 2022-03-04 | 3 year |
| 6 | Test Receiver | ESR7 | 101675 | R&S | 2019-07-19 | 1 year |
| 7 | Spectrum Analyzer | FSP 40 | 100378 | R&S | 2019-12-13 | 1 year |
| 8 | Chamber | FACT5-2.0 | 4166 | ETS-Lindgren | 2021-05-12 | 3 year |
| 9 | Antenna | QSH-SL-18-26-S-20 | 17013 | Q-par | 2020-01-15 | 3 year |
| 10 | Antenna | QSH-SL-26-40-K-20 | 17014 | Q-par | 2020-01-11 | 3 year |

### Test software

| No. | Equipment | Manufacturer | Version |
|---|---|---|---|
| 1 | TechMgr Software | CAICT | 2.1.1 |
| 2 | EMC32 | Rohde & Schwarz | 8.53.0 |
| 3 | EMC32 | Rohde & Schwarz | 10.01.00 |

EUT is engineering software provided by the customer to control the transmitting signal.
The EUT was programmed to be in continuously transmitting mode.

### Anechoic chamber

Fully anechoic chamber by ETS-Lindgren

## 7. Measurement Uncertainty

| Test Name | Uncertainty | |
|---|---|---|
| 1. RF Output Power - Conducted | ±1.32dB | |
| 2. Time of Occupancy - Conducted | ±0.58ms | |
| 3.Occupied channel bandwidth - Conducted | ±66Hz | |
| 4. Transmitter Spurious Emission - Conducted | 30MHz≤f≤1GHz | ±1.41dB |
| | 1GHz≤f≤7GHz | ±1.92dB |
| | 7GHz≤f≤13GHz | ±2.31dB |
| | 13GHz≤f≤26GHz | ±2.61dB |
| 5. Transmitter Spurious Emission - Radiated | 9kHz≤f≤30MHz | ±1.84dB |
| | 30MHz≤f≤1GHz | ±4.90dB |
| | 1GHz≤f≤18GHz | ±5.12dB |
| | 18GHz≤f≤40GHz | ±4.66dB |
| 6. AC Power line Conducted Emission | 150kHz≤f≤30MHz | ±3.10dB |

# ANNEX A: Detailed Test Results

## A.0 Antenna requirement

**Measurement Limit:**

| Standard | Requirement |
|---|---|
| FCC CRF Part 15.203 | An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. |

Conclusion: The Directional gains of antenna used for transmitting is -0.51dBi. The RF transmitter uses an integrate antenna without connector.

## A.1 Test Configuration

### A.1.1 Conducted Measurements

The measurement is made according to ANSI C63.10.

1). Connect the EUT to the test system correctly.

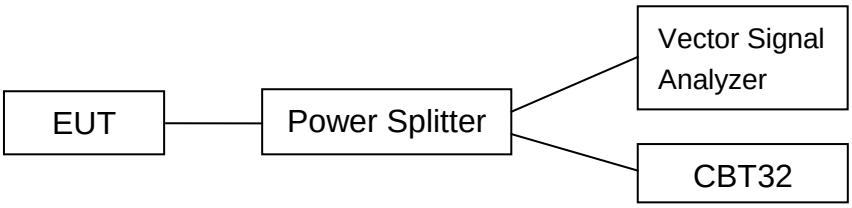
2). Set the EUT to the required work mode.

3). Set the EUT to the required channel.

4). Set the EUT hopping mode (hopping on or hopping off).

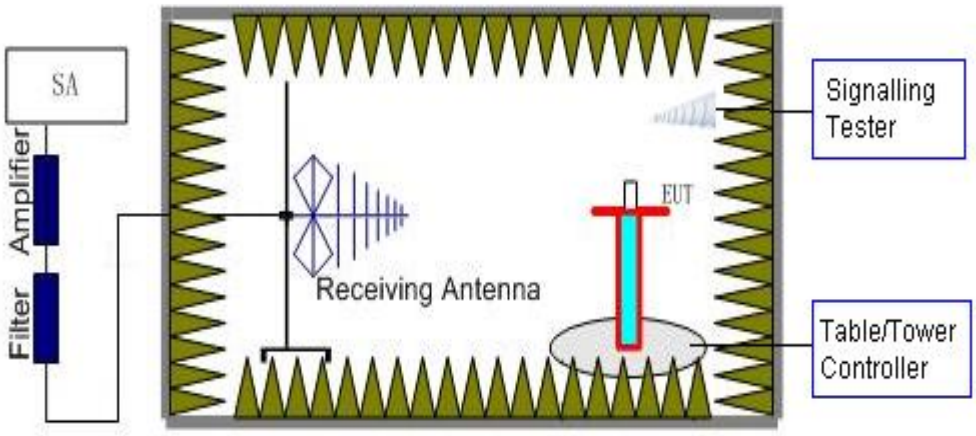
5). Set the spectrum analyzer to start measurement.

6). Record the values.




### A.1.2 Radiated Measurements

**Test setup:** EUT was placed on a 1.5 meter high non-conductive table at a 3 meter test distance from the receive antenna. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiving antenna polarization.



## A.2 Maximum Peak Output Power

**Method of Measurement: See ANSI C63.10-clause 7.8.5.**

A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

**Measurement Limit:**

| Standard | Limit (dBm) |
|---|---|
| FCC CRF Part 15.247(b)(1) | < 21 |

**Measurement Results:**

| Mode | Peak Conducted Output Power (dBm) | | |
|---|---|---|---|
| | 2402MHz (Ch0) | 2441MHz (Ch39) | 2480 MHz (Ch78) |
| GFSK | 3.43 | 4.15 | 4.13 |
| π /4 DQPSK | 2.57 | 3.28 | 3.23 |
| 8DPSK | 2.57 | 3.32 | 3.28 |

**Conclusion: Pass**

## A.3 Band Edges Compliance

**Measurement Limit:**

| Standard | Limit (dB) |
|---|---|
| FCC 47 CFR Part 15.247 (d) | > 20 |

**Measurement Result:**

| Mode | Channel | Hopping | Test Results | Conclusion |
|---|---|---|---|---|
| GFSK | 0 | ON | Fig.1 | **P** |
| | 78 | ON | Fig.2 | **P** |
| π /4 DQPSK | 0 | ON | Fig.3 | **P** |
| | 78 | ON | Fig.4 | **P** |
| 8DPSK | 0 | ON | Fig.5 | **P** |
| | 78 | ON | Fig.6 | **P** |

| Mode | Channel | Hopping | Test Results | Conclusion |
|---|---|---|---|---|
| GFSK | 0 | OFF | Fig.7 | **P** |
| | 78 | OFF | Fig.8 | **P** |
| π /4 DQPSK | 0 | OFF | Fig.9 | **P** |
| | 78 | OFF | Fig.10 | **P** |
| 8DPSK | 0 | OFF | Fig.11 | **P** |
| | 78 | OFF | Fig.12 | **P** |

**See below for test graphs.**
**Conclusion: Pass**

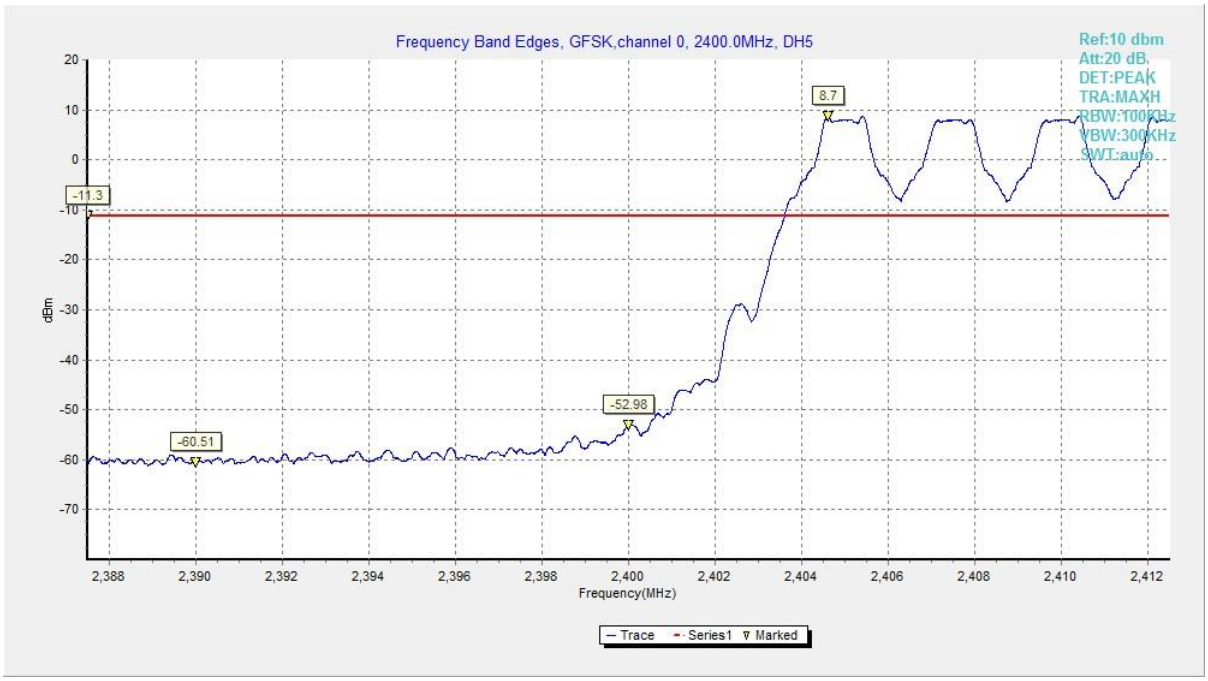



**Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)**

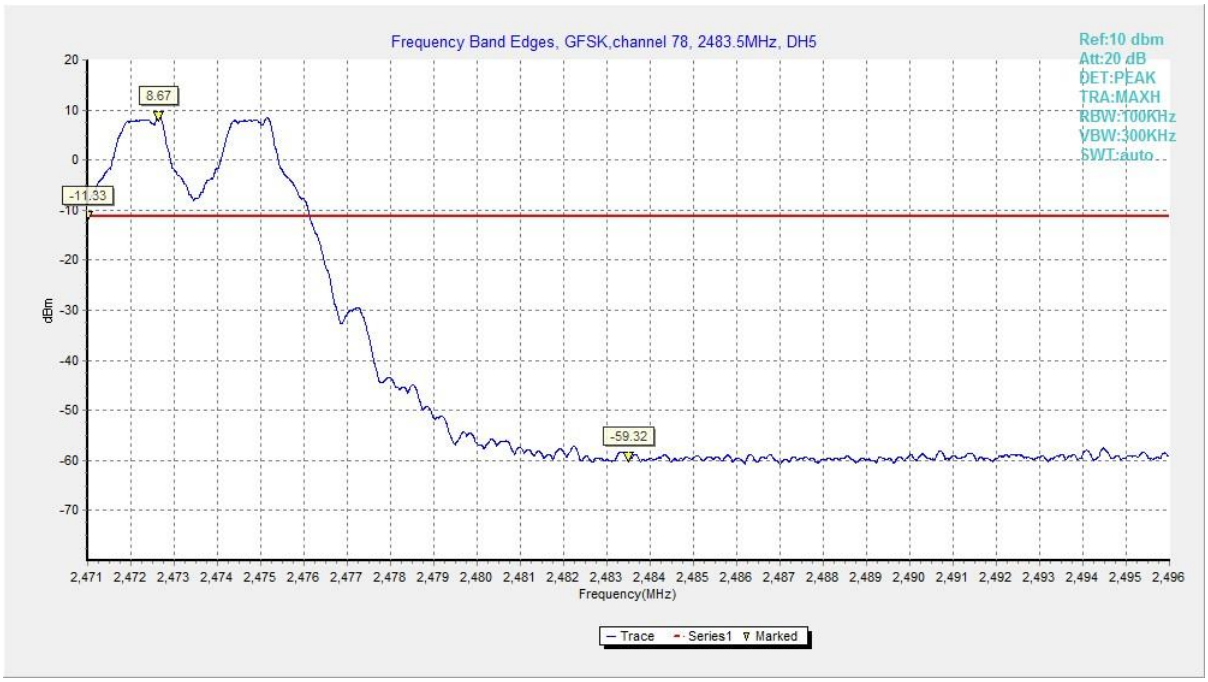



**Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)**

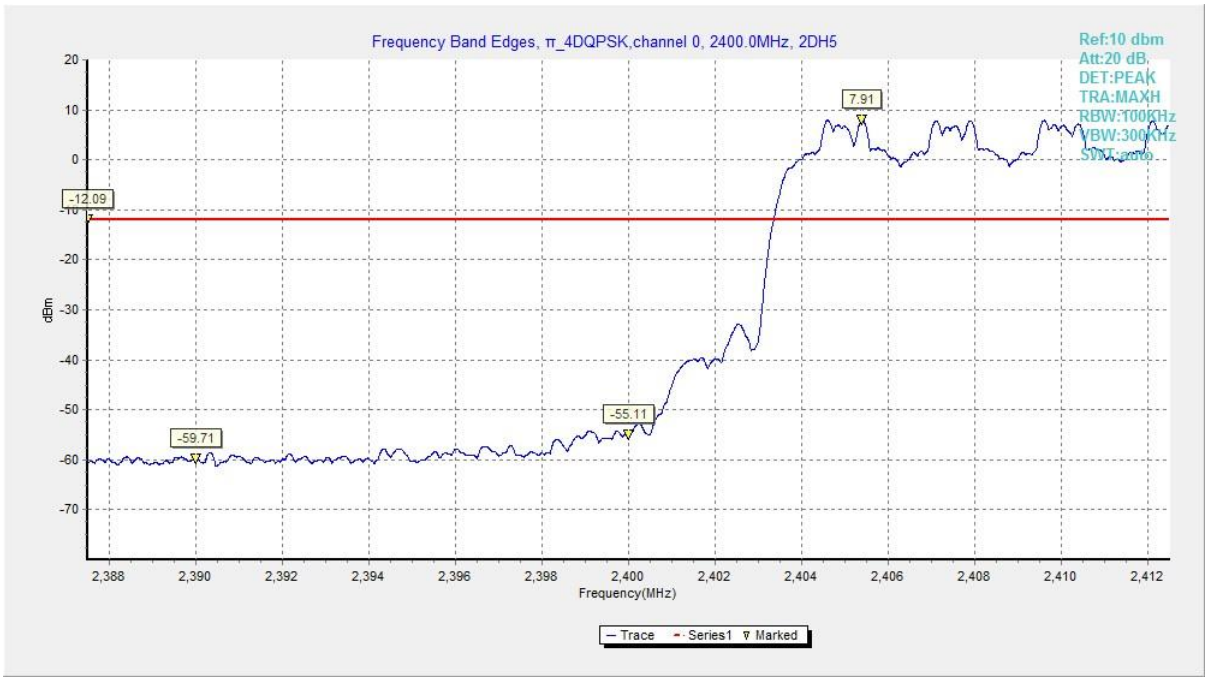



**Fig. 3 Band Edges (π /4 DQPSK, Ch 0, Hopping ON)**

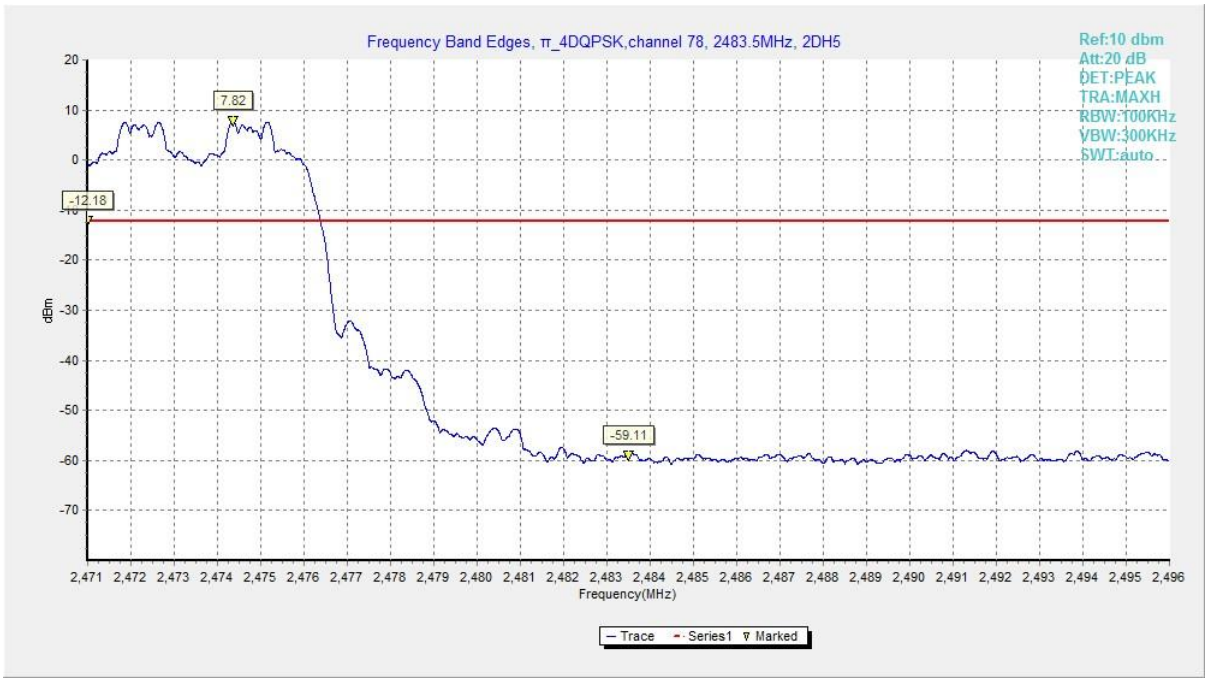



**Fig. 4 Band Edges (π /4 DQPSK, Ch 78, Hopping ON)**

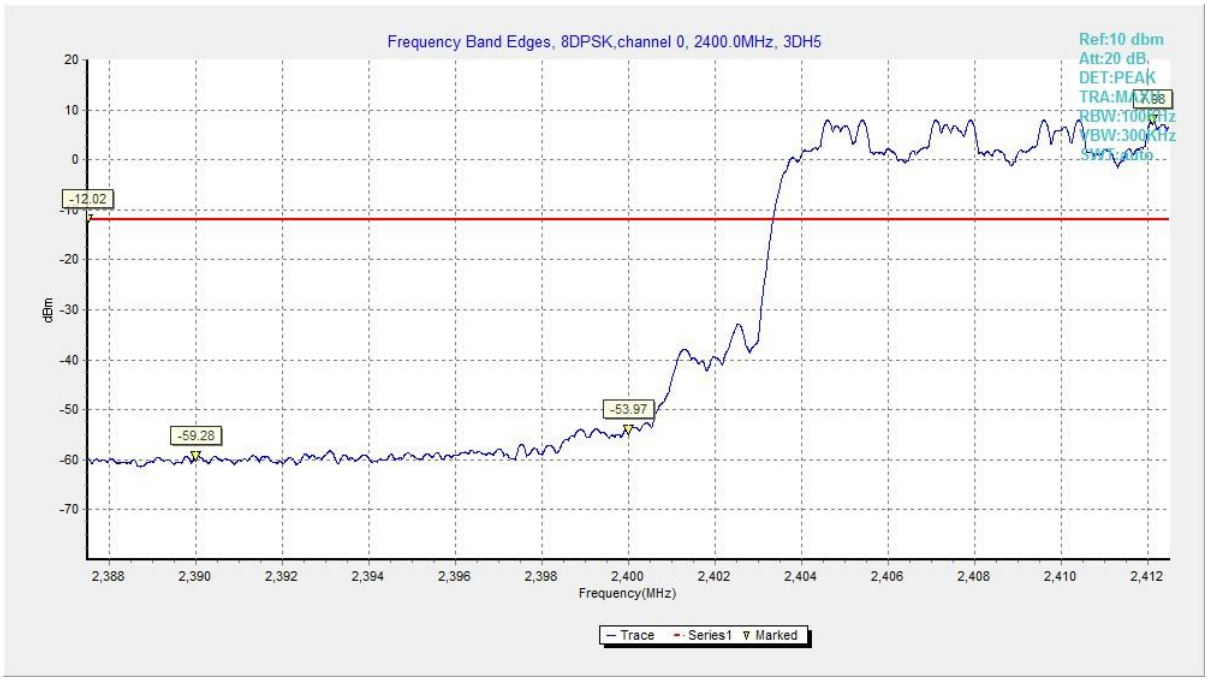



**Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)**

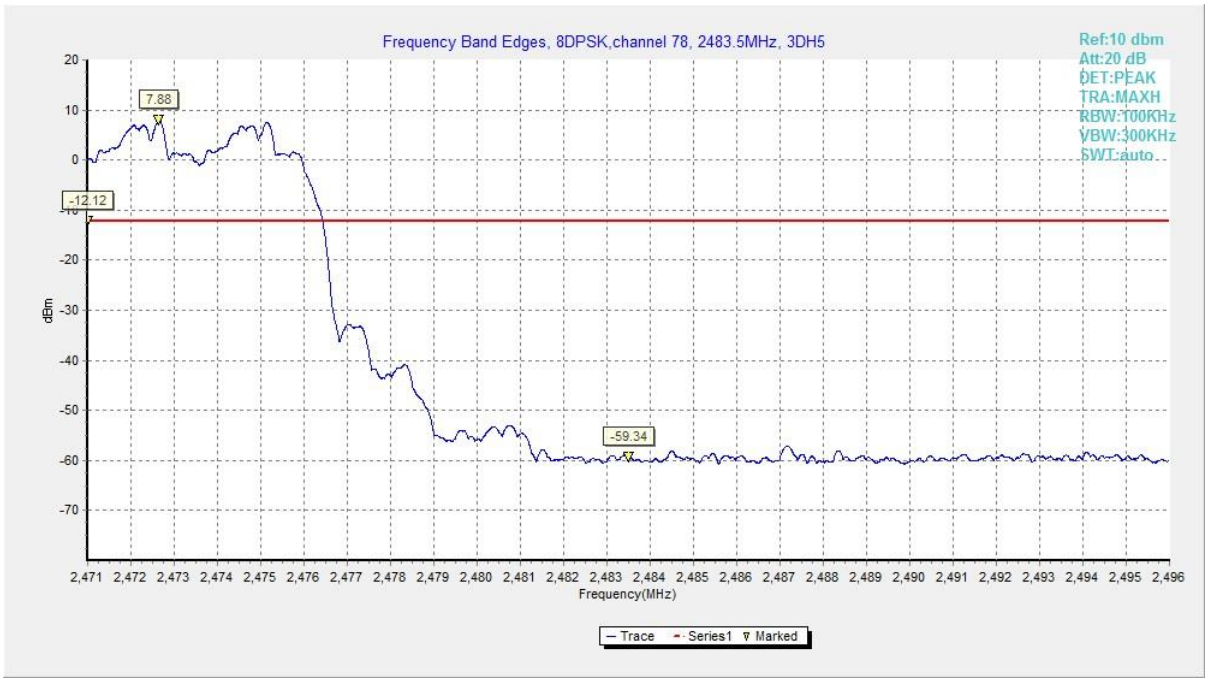



**Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)**

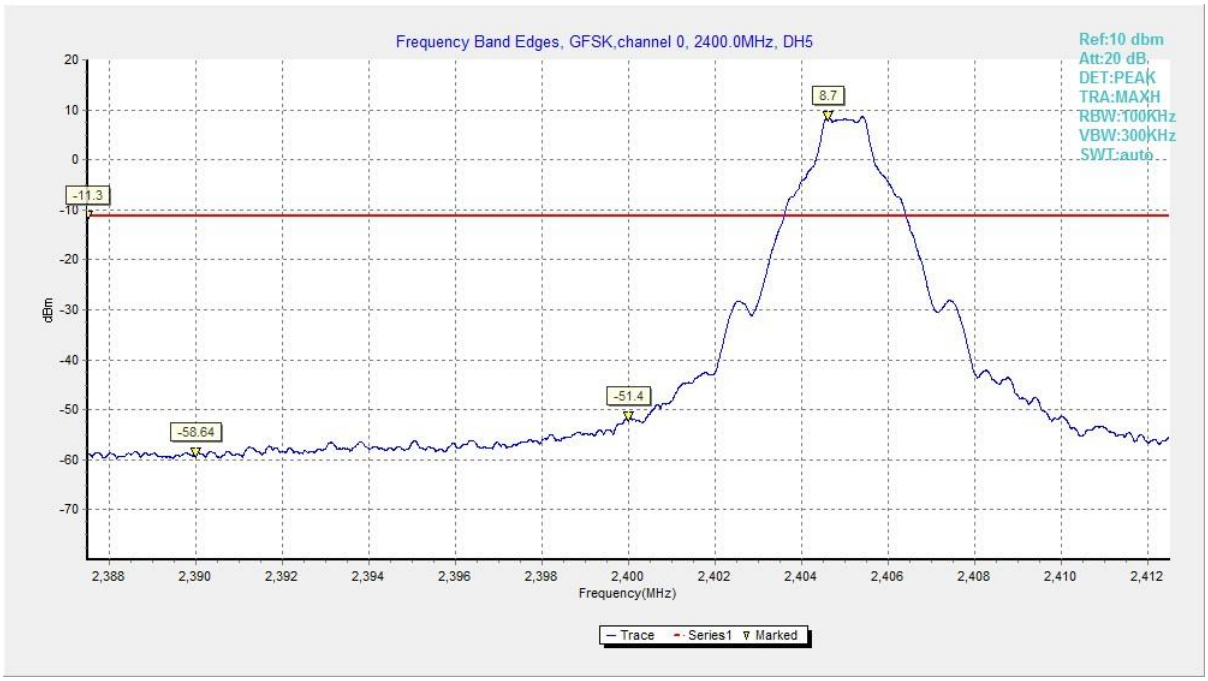



**Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)**

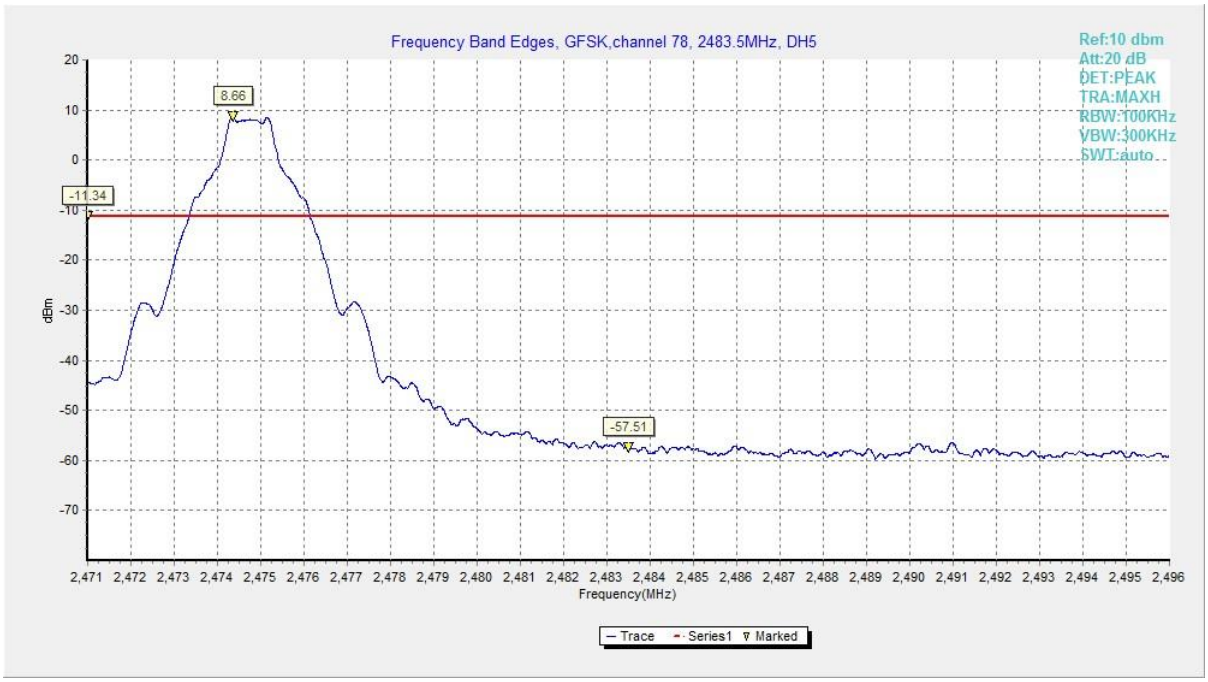



**Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)**

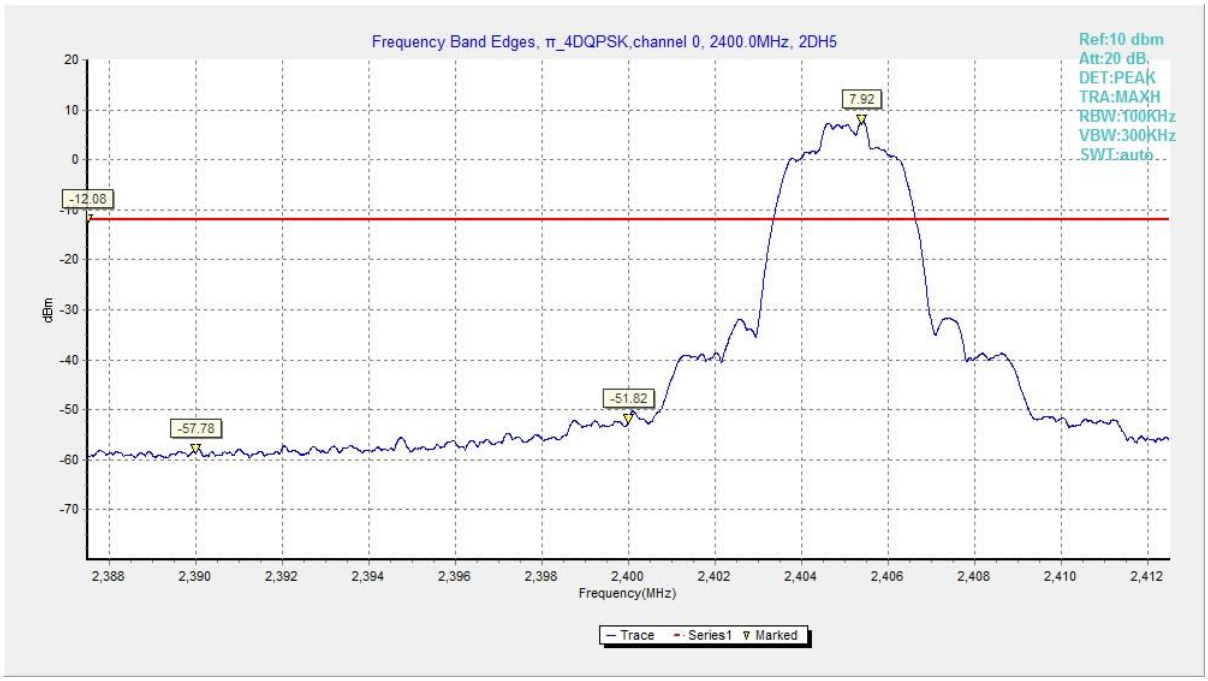



**Fig. 9 Band Edges (π /4 DQPSK, Ch 0, Hopping OFF)**

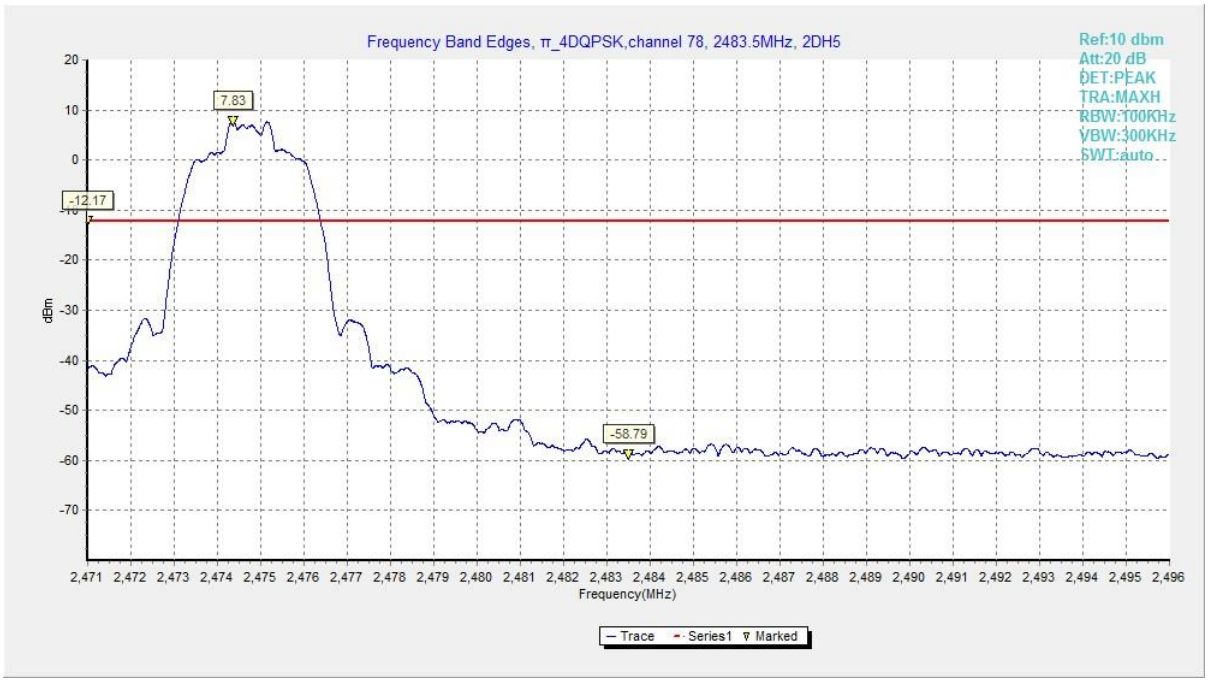



**Fig. 10 Band Edges (π /4 DQPSK, Ch 78, Hopping OFF)**

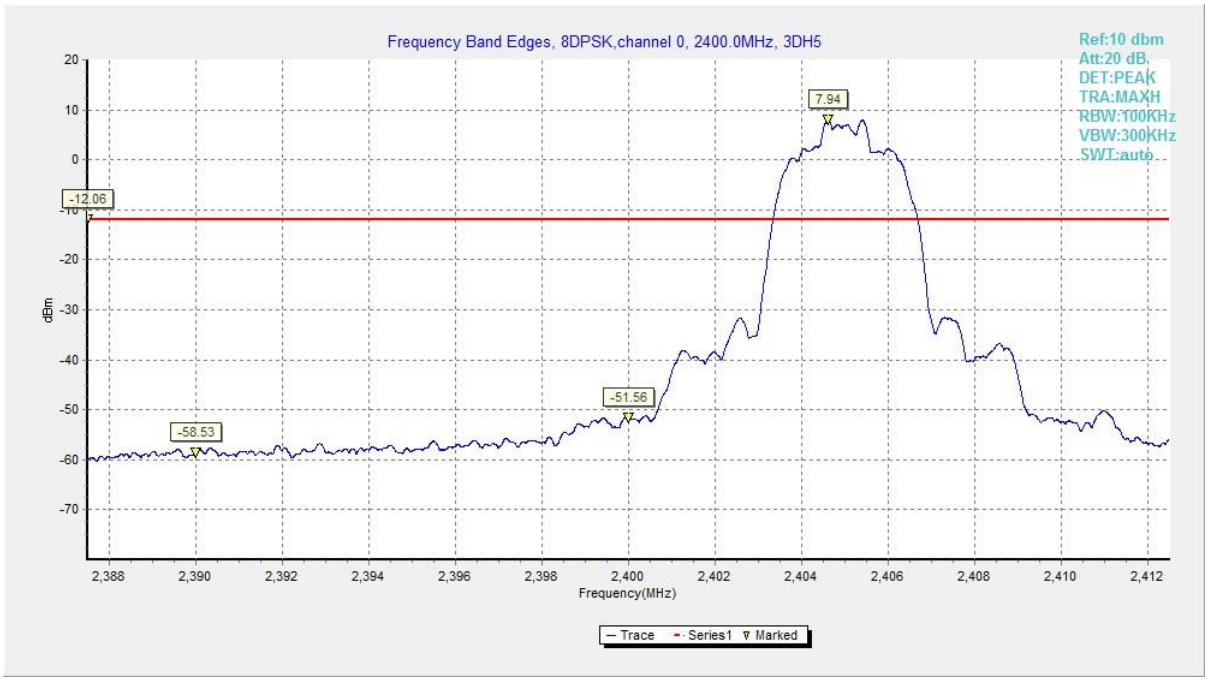



**Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)**

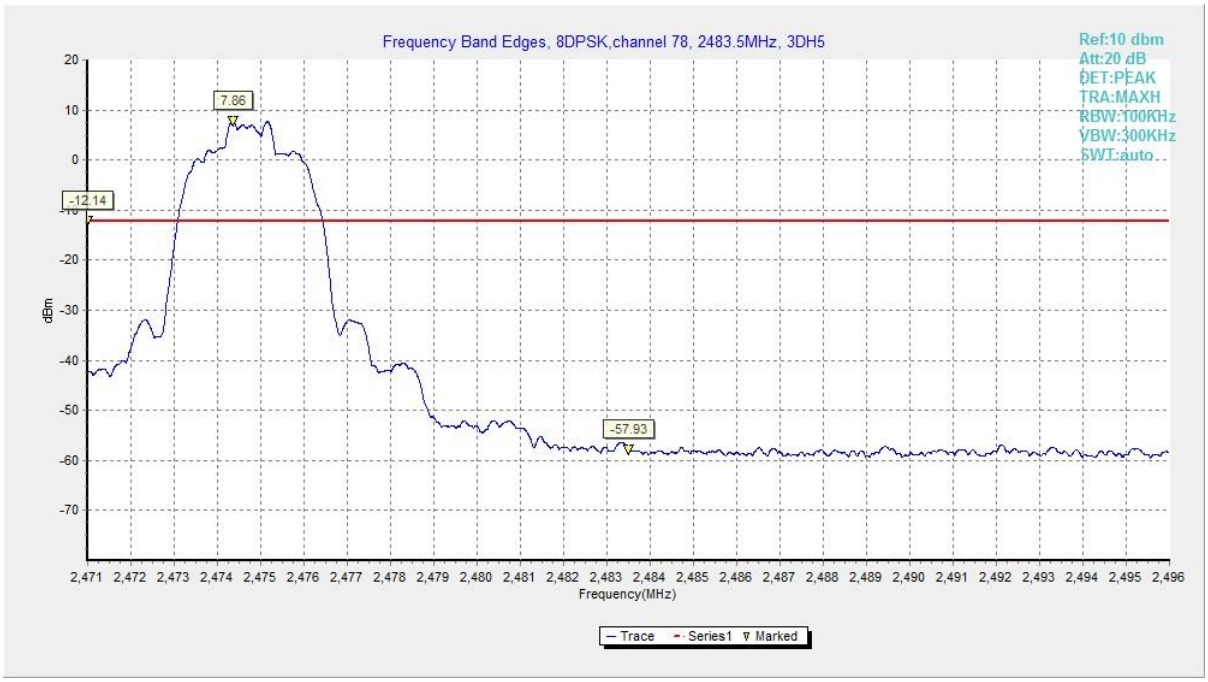



**Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)**

## A.4 Conducted Emission

**Measurement Limit:**

| Standard | Limit |
|---|---|
| FCC 47 CFR Part 15.247 (d) | 20dB below peak output power in 100 kHz bandwidth |

**Measurement Results:**

| MODE | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| GFSK | 0 | 2.402 GHz | Fig.13 | P |
| | | 1GHz-3GHz | Fig.14 | P |
| | | 3GHz-10GHz | Fig.15 | P |
| | 39 | 2.441 GHz | Fig.16 | P |
| | | 1GHz-3GHz | Fig.17 | P |
| | | 3GHz-10GHz | Fig.18 | P |
| | 78 | 2.480 GHz | Fig.19 | P |
| | | 1GHz-3GHz | Fig.20 | P |
| | | 3GHz-10GHz | Fig.21 | P |
| π/4 DQPSK | 0 | 2.402 GHz | Fig.22 | P |
| | | 1GHz-3GHz | Fig.23 | P |
| | | 3GHz-10GHz | Fig.24 | P |
| | 39 | 2.441 GHz | Fig.25 | P |
| | | 1GHz-3Ghz | Fig.26 | P |
| | | 3GHz-10GHz | Fig.27 | P |
| | 78 | 2.480 GHz | Fig.28 | P |
| | | 1GHz-3Ghz | Fig.29 | P |
| | | 3GHz-10GHz | Fig.30 | P |
| 8DPSK | 0 | 2.402 GHz | Fig.31 | P |
| | | 1GHz-3GHz | Fig.32 | P |
| | | 3GHz-10GHz | Fig.33 | P |
| | 39 | 2.441 GHz | Fig.34 | P |
| | | 1GHz-3GHz | Fig.35 | P |
| | | 3GHz-10GHz | Fig.36 | P |
| | 78 | 2.480 GHz | Fig.37 | P |
| | | 1GHz-3GHz | Fig.38 | P |
| | | 3GHz-10GHz | Fig.39 | P |
| / | All channels | 30 MHz-1GHz | Fig.40 | P |
| | | 10GHz-26GHz | Fig.41 | P |

**See below for test graphs.**
**Conclusion: Pass**

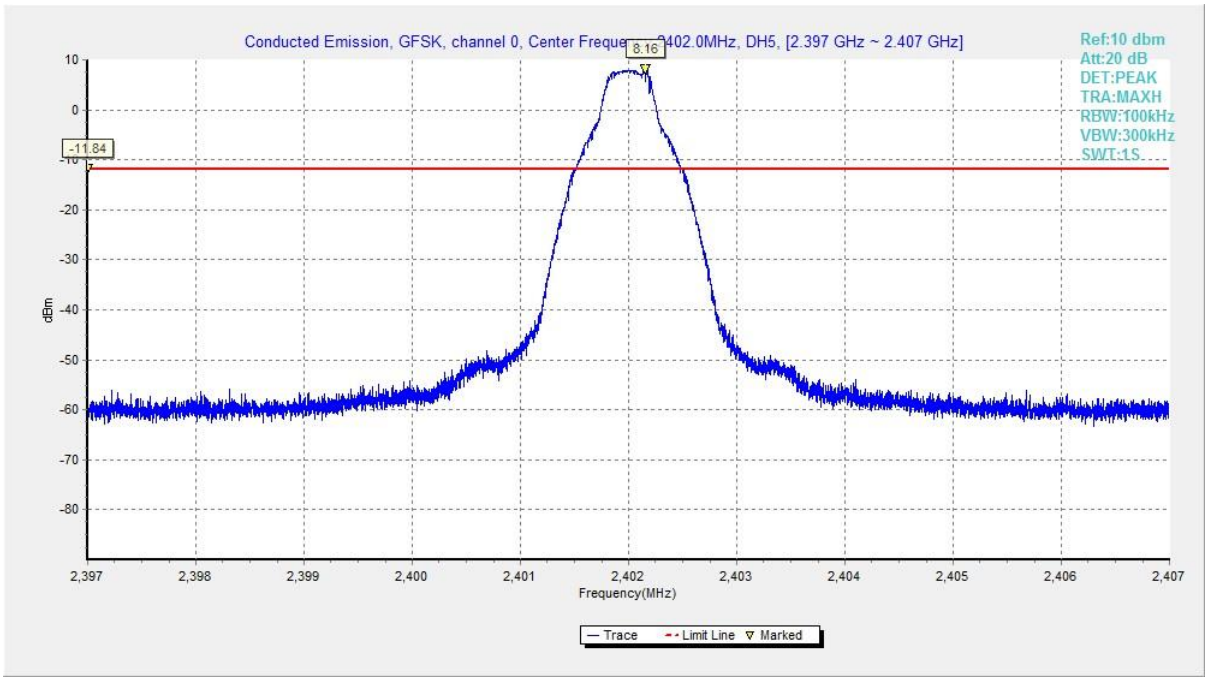



**Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)**

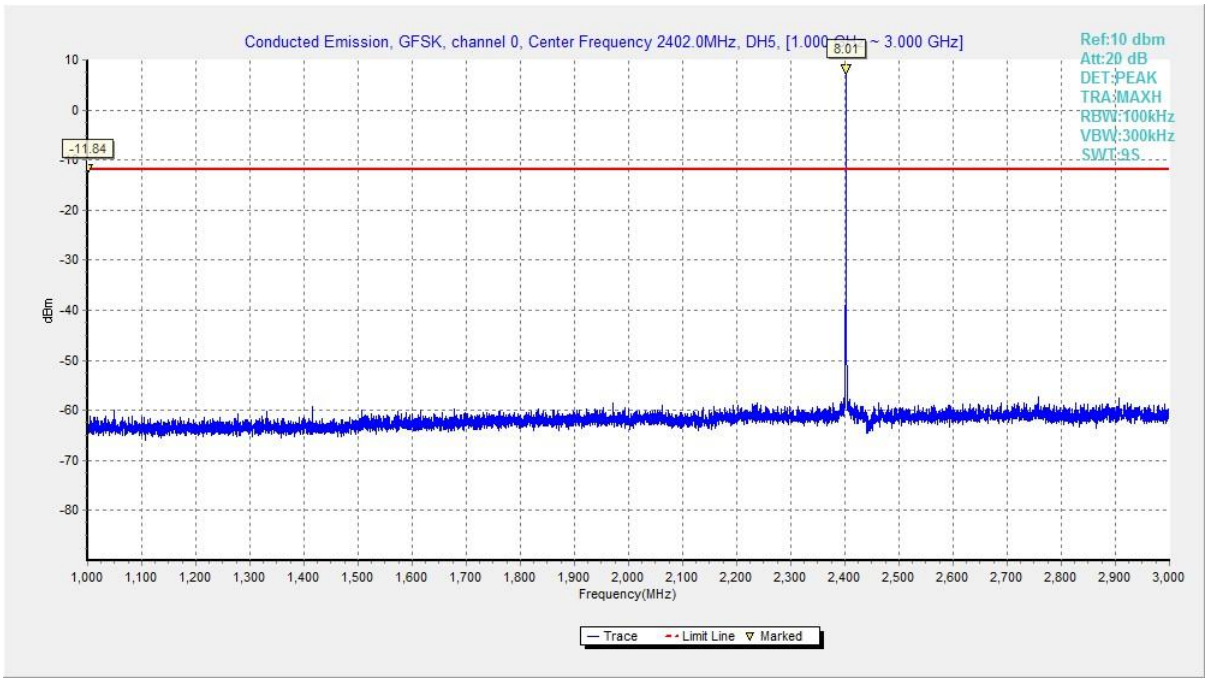



**Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)**

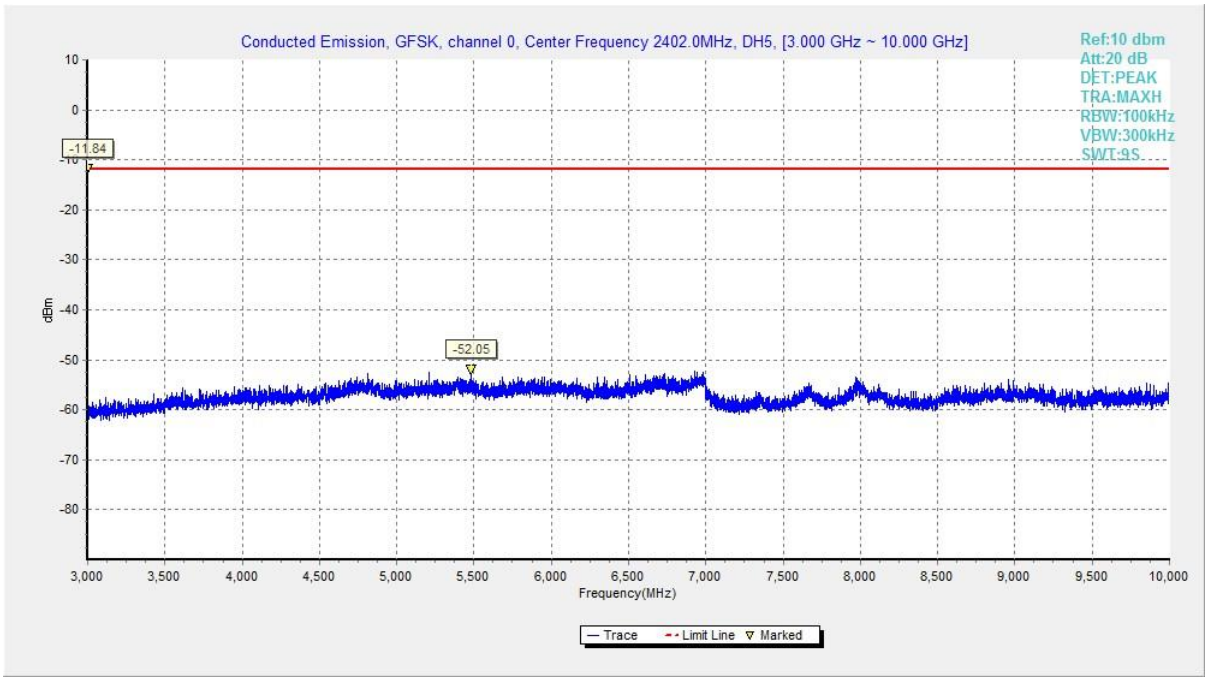



**Fig. 15 Conducted Spurious Emission (GFSK, Ch0, 3 GHz-10 GHz)**

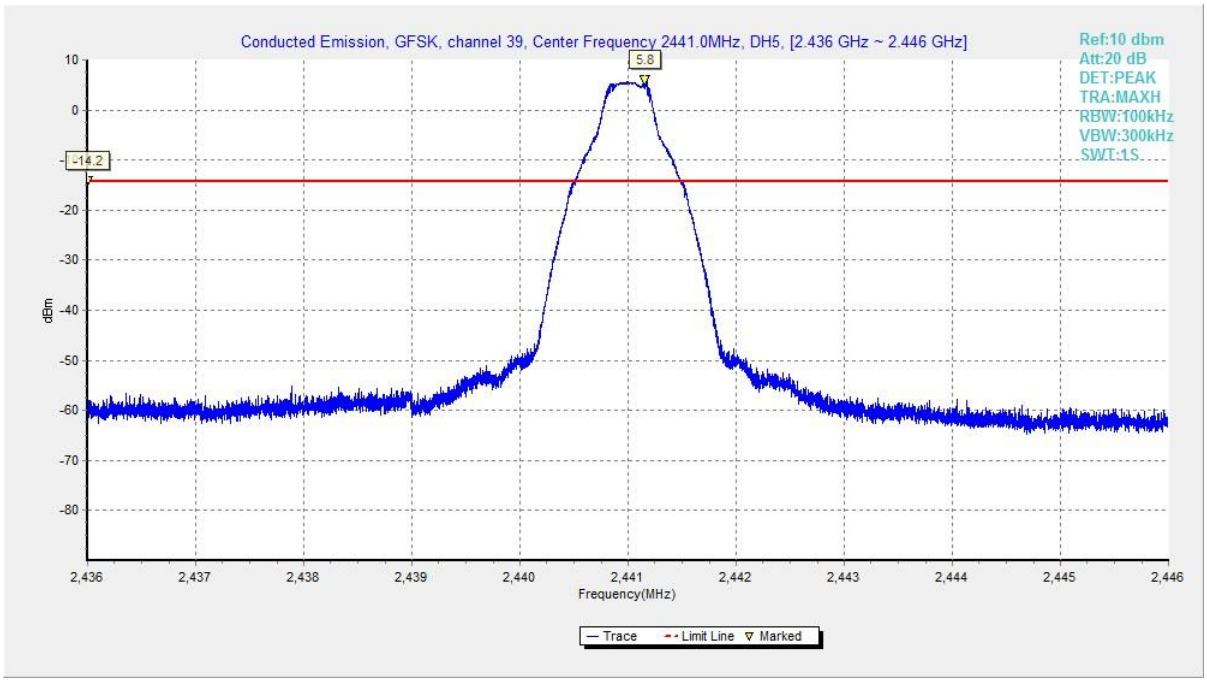



**Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)**

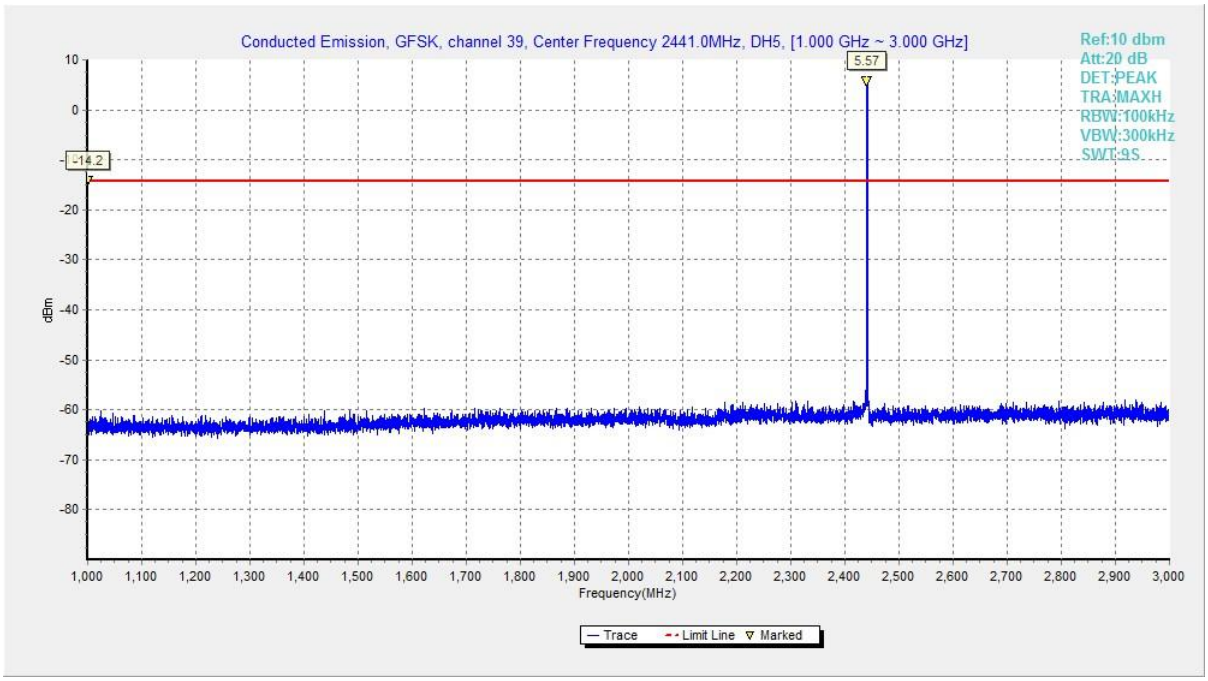



**Fig. 17 Conducted Spurious Emission (GFSK, Ch39, 1 GHz-3 GHz)**

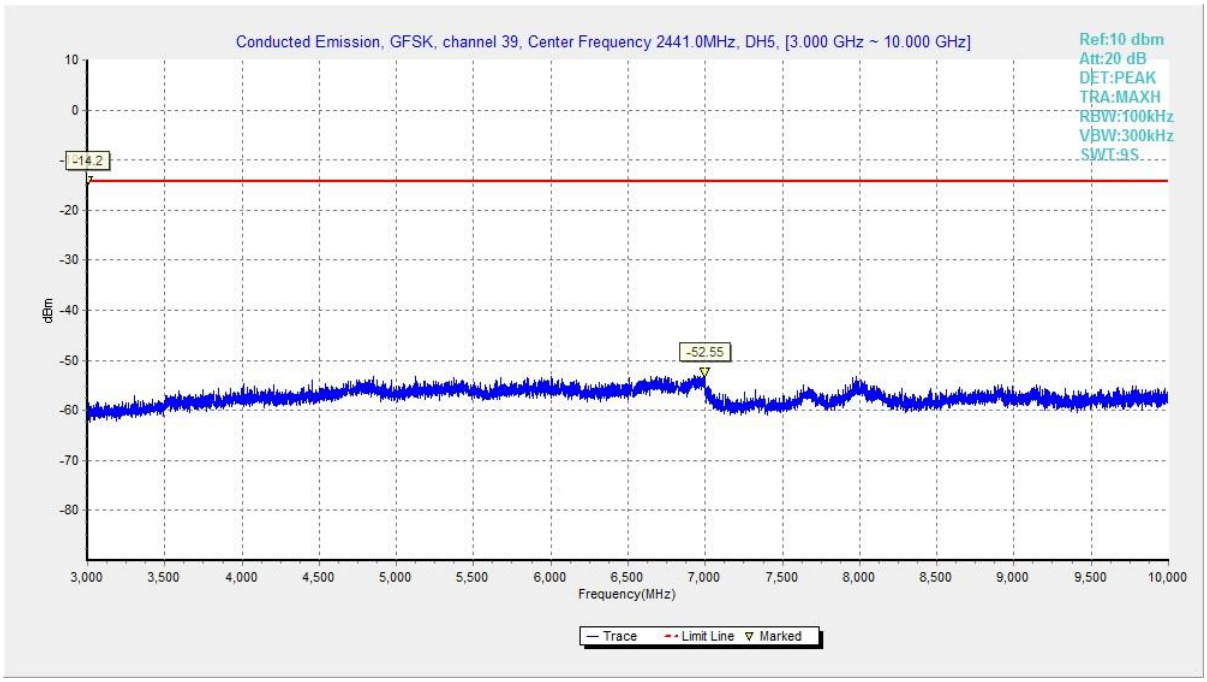



**Fig. 18 Conducted Spurious Emission (GFSK, Ch39, 3 GHz-10 GHz)**

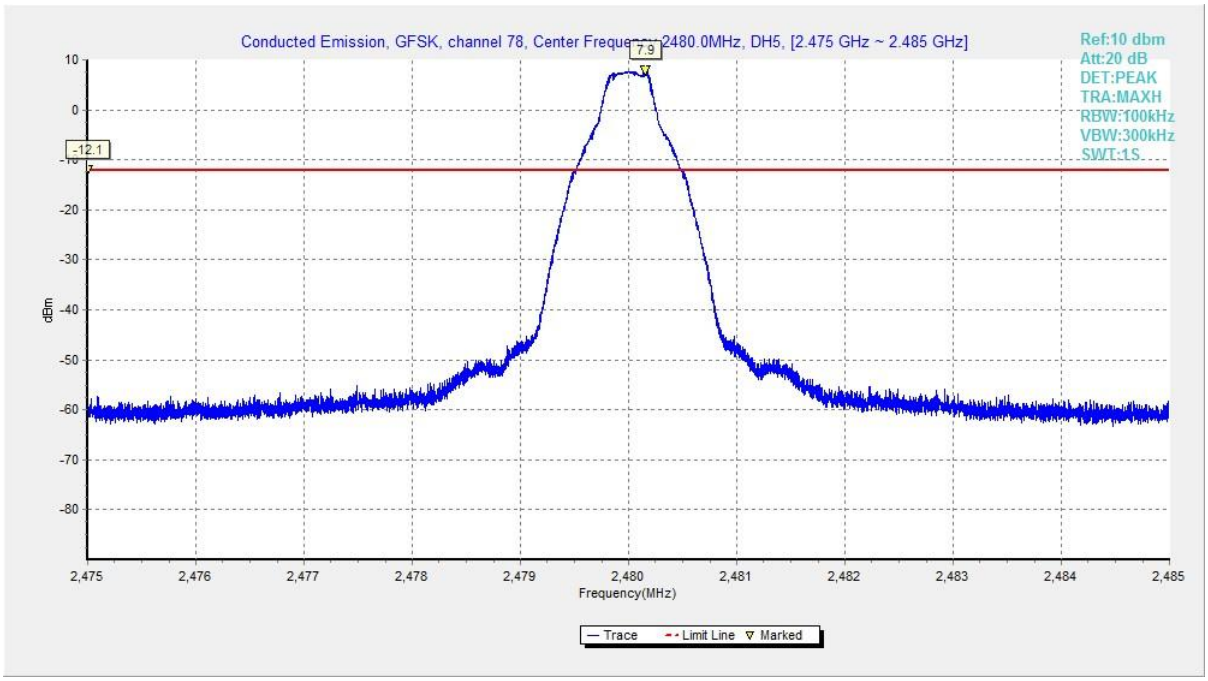



**Fig. 19 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)**

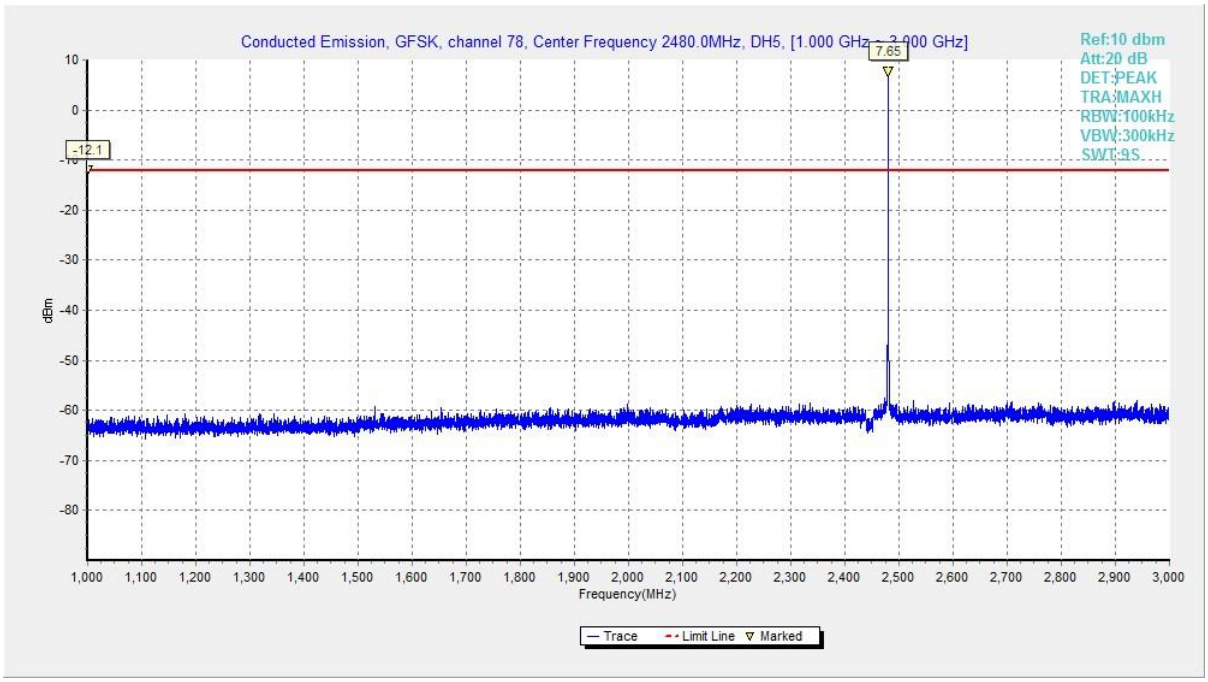



**Fig. 20 Conducted Spurious Emission (GFSK, Ch78, 1 GHz-3 GHz)**

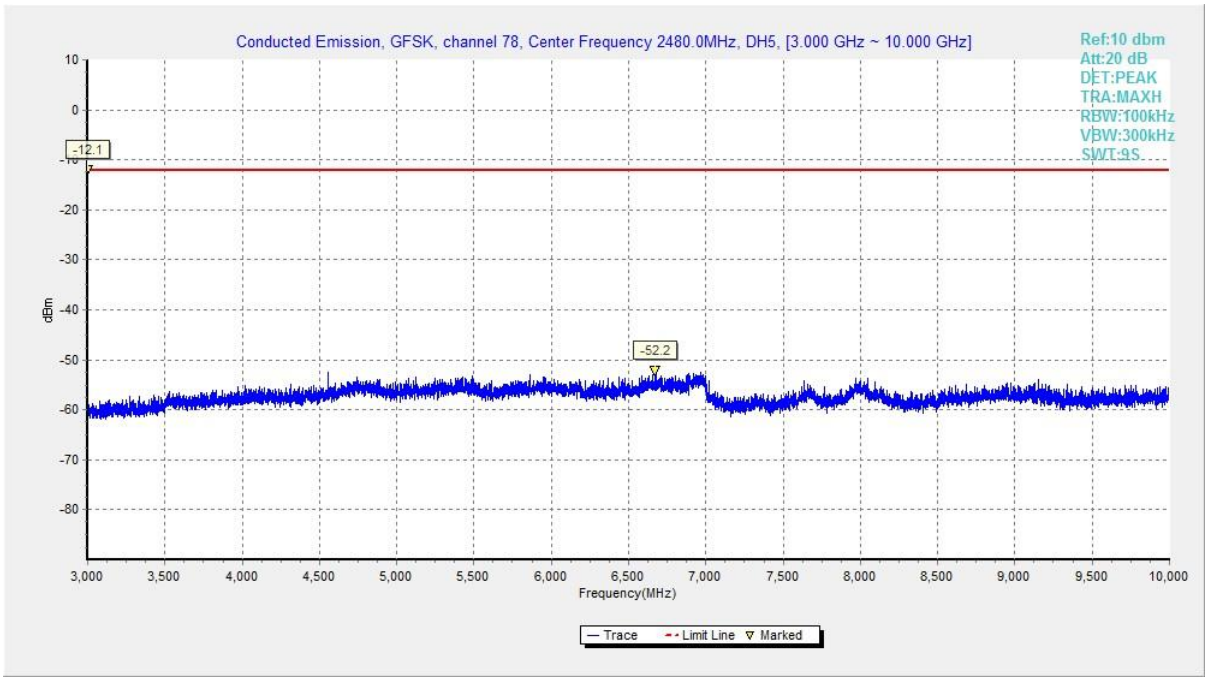



**Fig. 21 Conducted Spurious Emission (GFSK, Ch78, 3 GHz-10 GHz)**

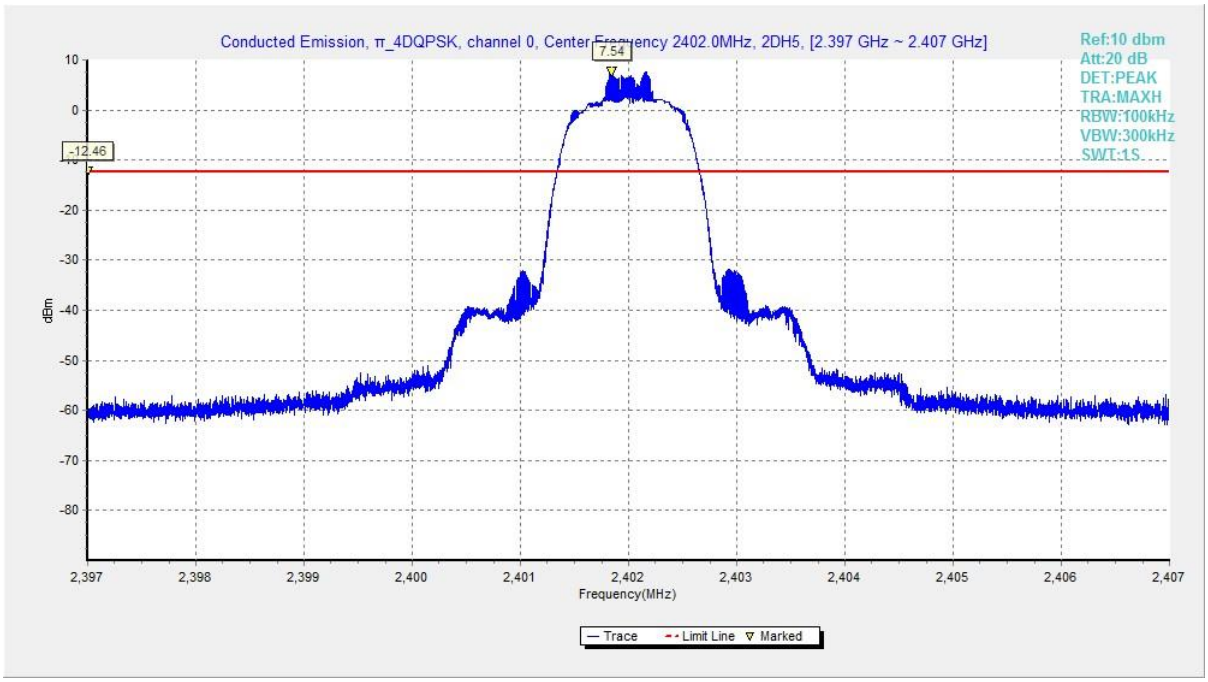



**Fig. 22 Conducted Spurious Emission (π /4 DQPSK, Ch0, 2.402GHz)**

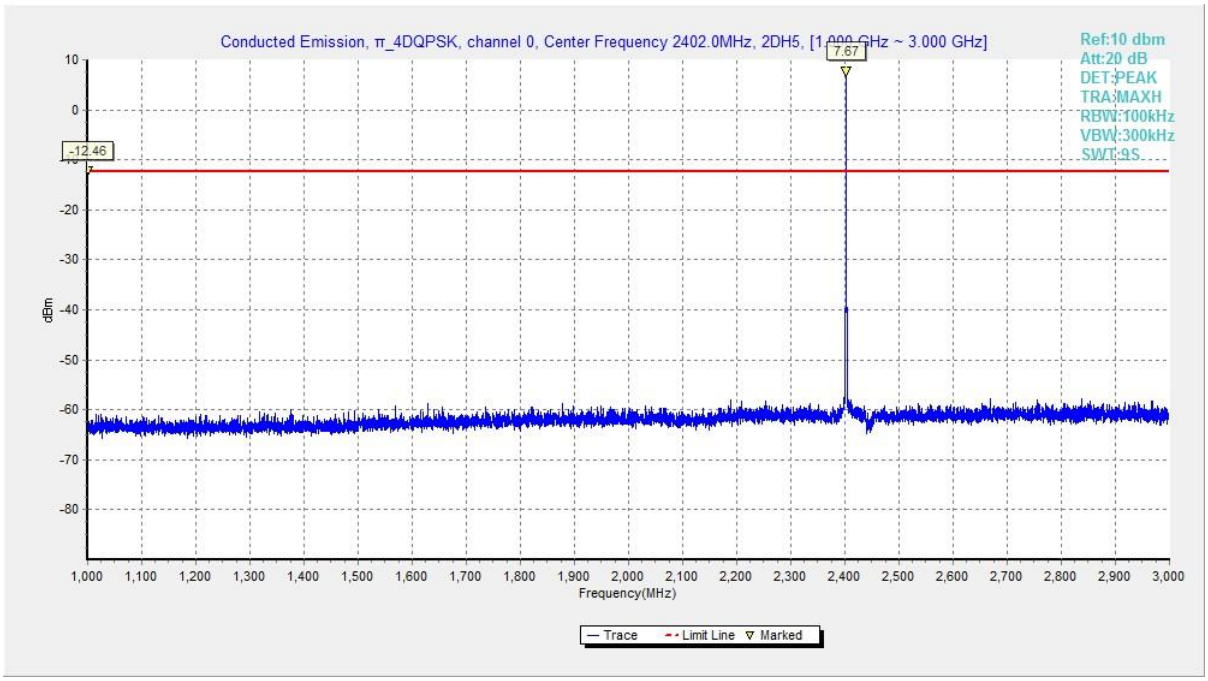



**Fig. 23 Conducted Spurious Emission (π /4 DQPSK, Ch0, 1 GHz-3 GHz)**

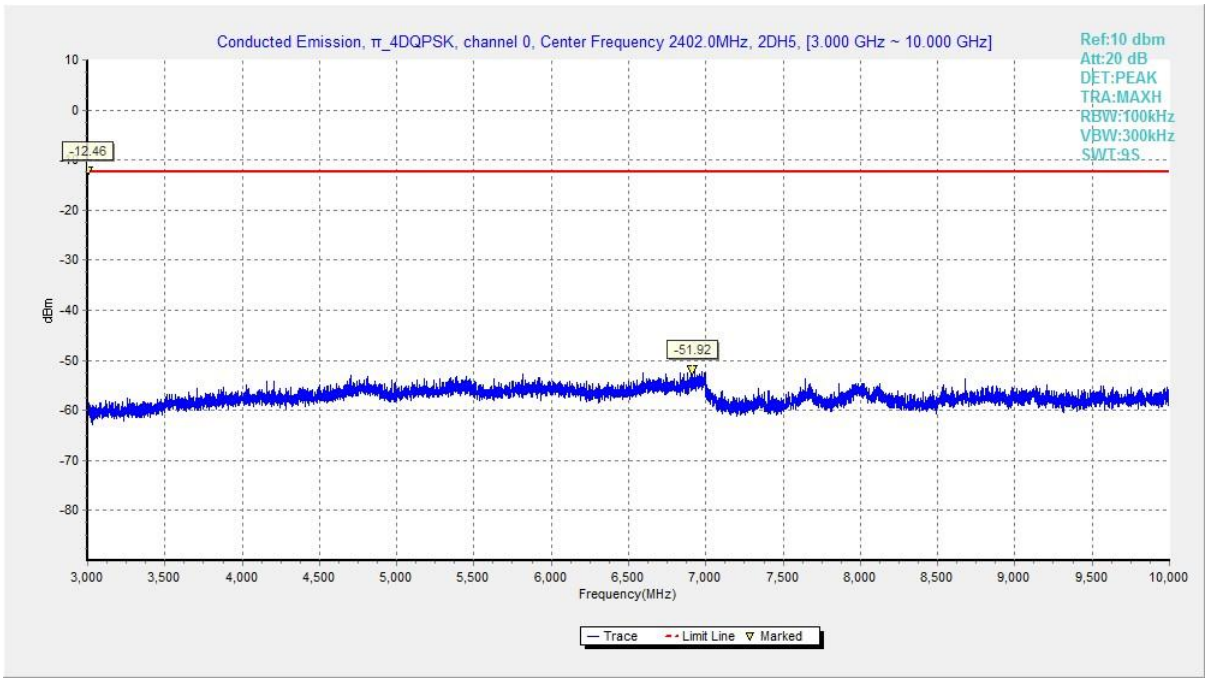



**Fig. 24 Conducted Spurious Emission (π /4 DQPSK, Ch0, 3 GHz-10 GHz)**

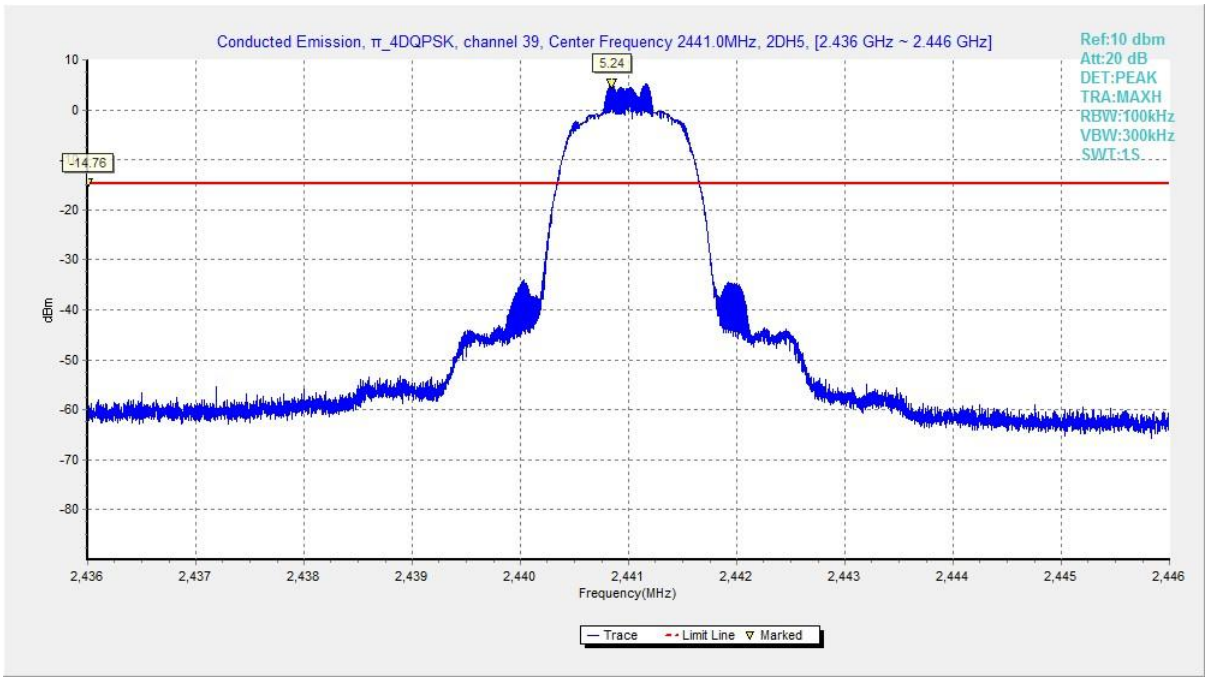



**Fig. 25 Conducted Spurious Emission (π /4 DQPSK, Ch39, 2.441GHz)**

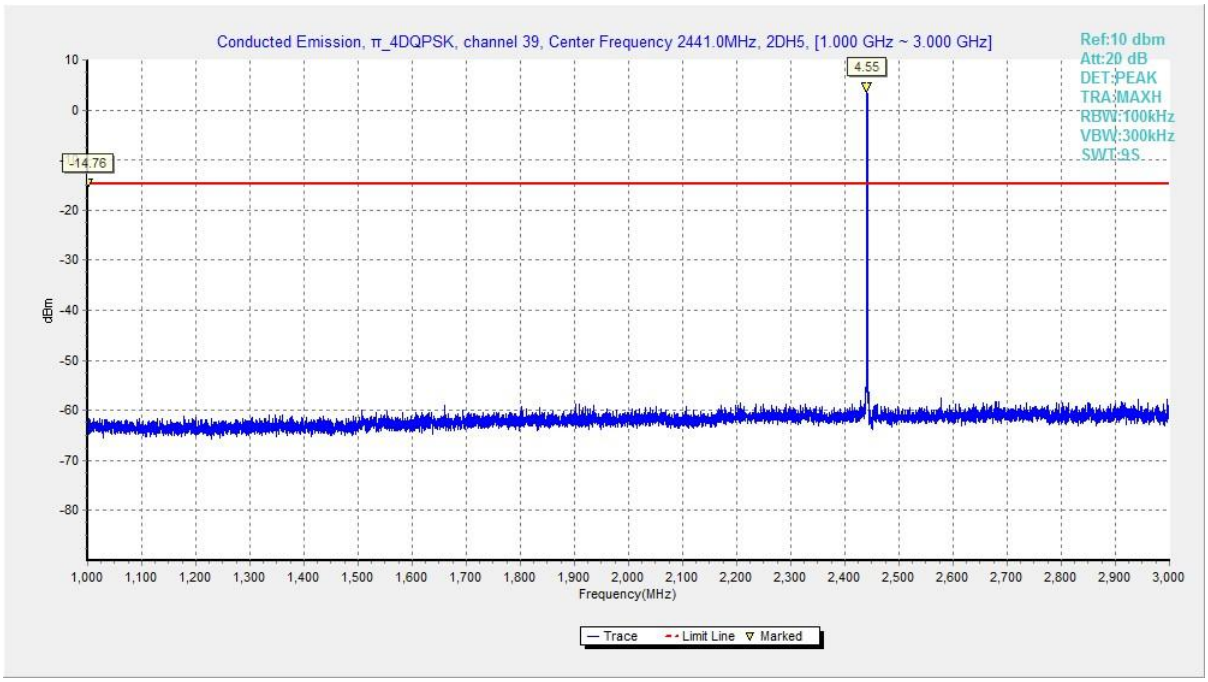



**Fig. 26 Conducted Spurious Emission (π /4 DQPSK, Ch39, 1 GHz-3 GHz)**

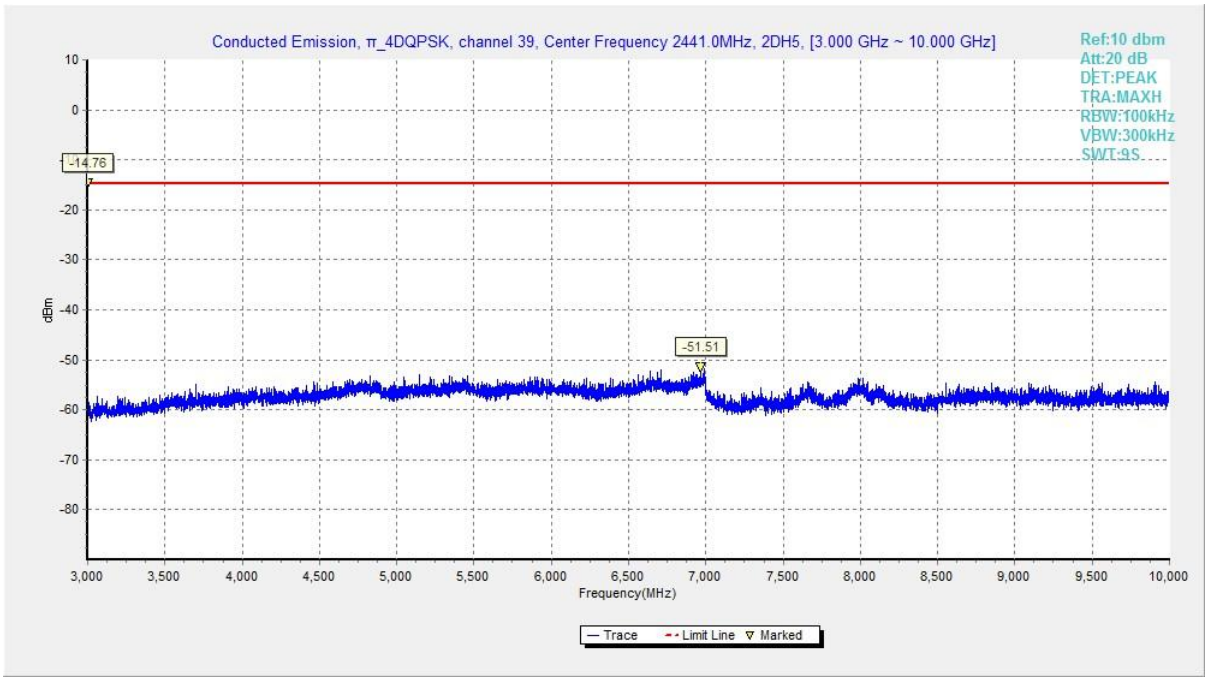



**Fig. 27 Conducted Spurious Emission (π /4 DQPSK, Ch39, 3 GHz-10 GHz)**

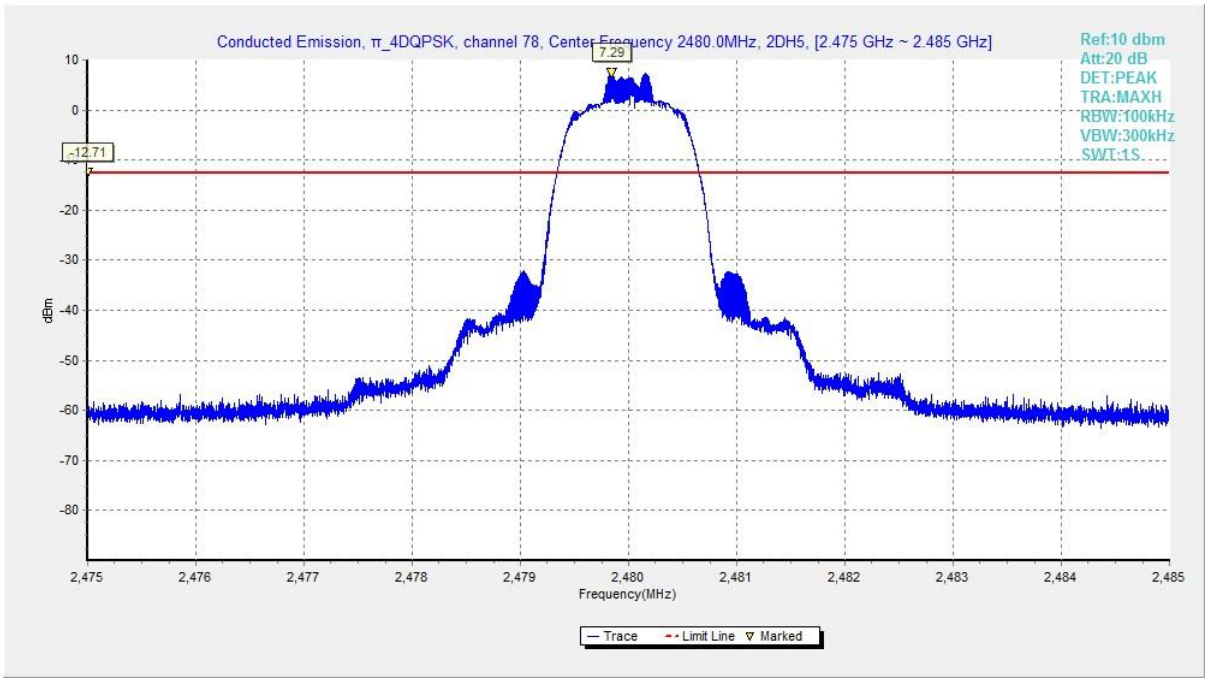



**Fig. 28 Conducted Spurious Emission (π /4 DQPSK, Ch78, 2.480GHz)**

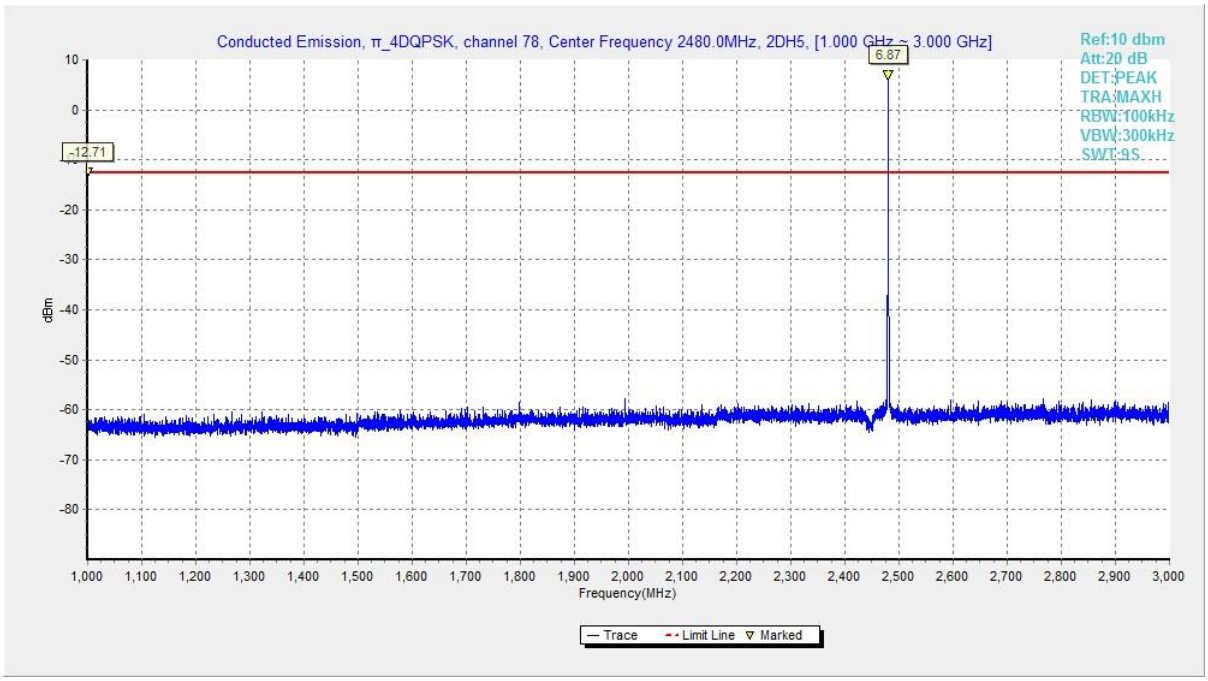



**Fig. 29 Conducted Spurious Emission (π /4 DQPSK, Ch78, 1 GHz-3 GHz)**

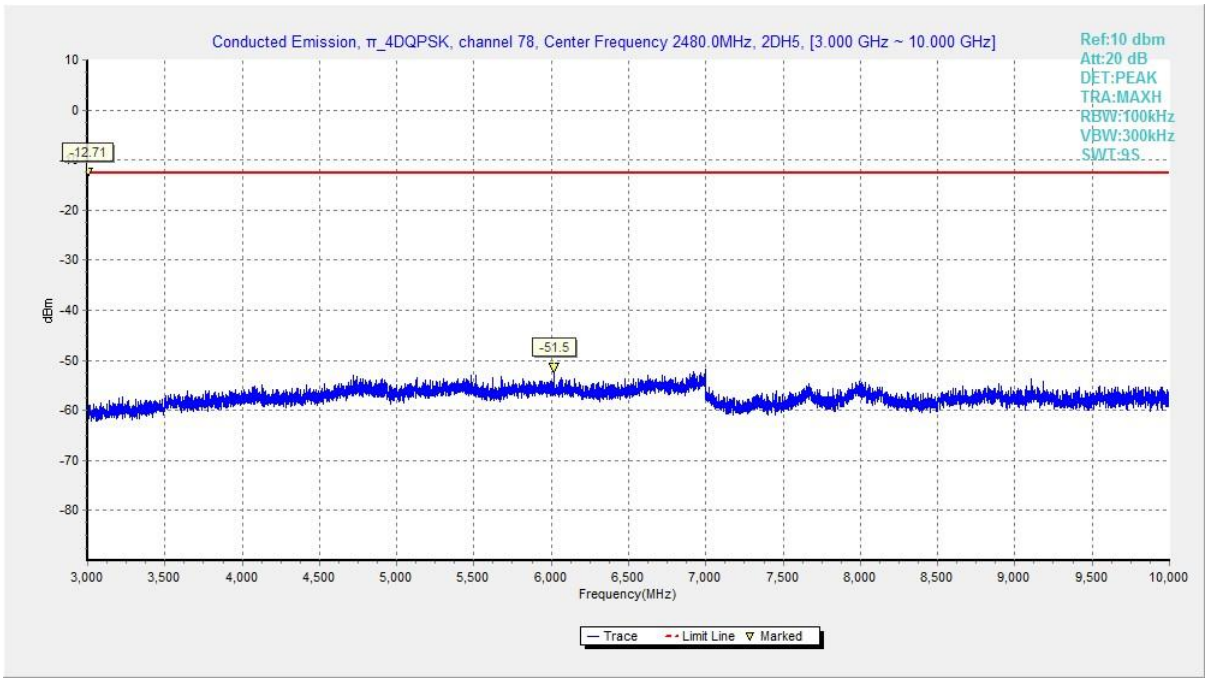



**Fig. 30 Conducted Spurious Emission (π /4 DQPSK, Ch78, 3 GHz-10 GHz)**

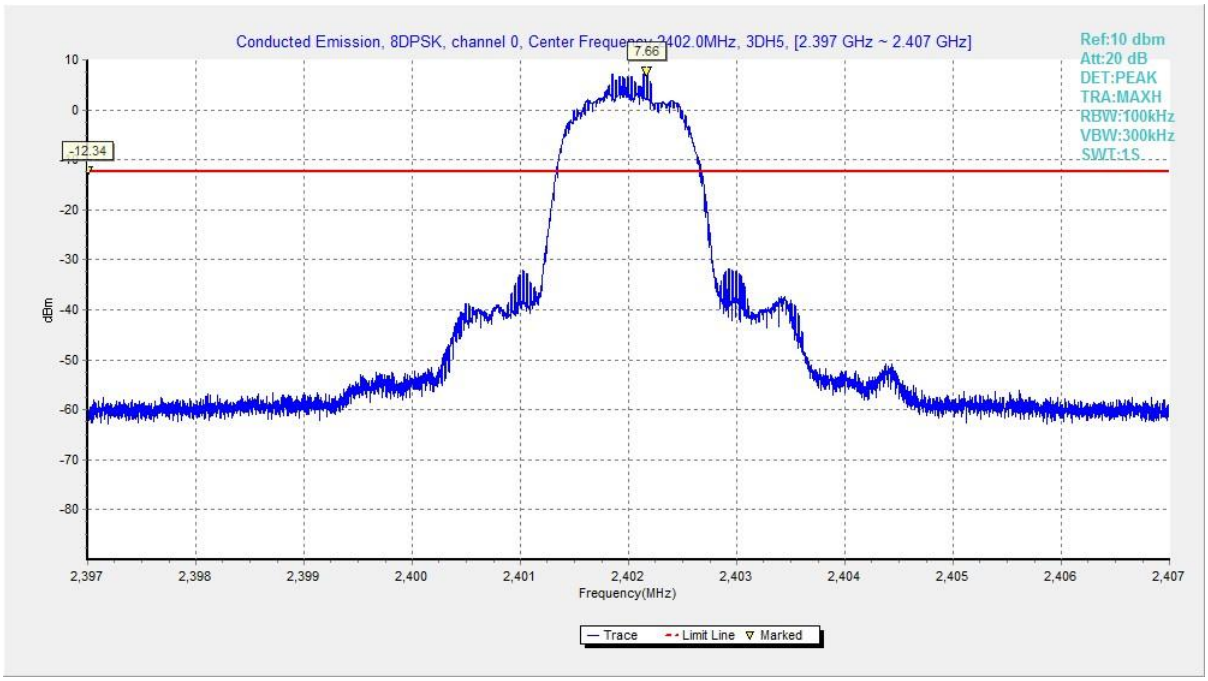



**Fig. 31 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)**

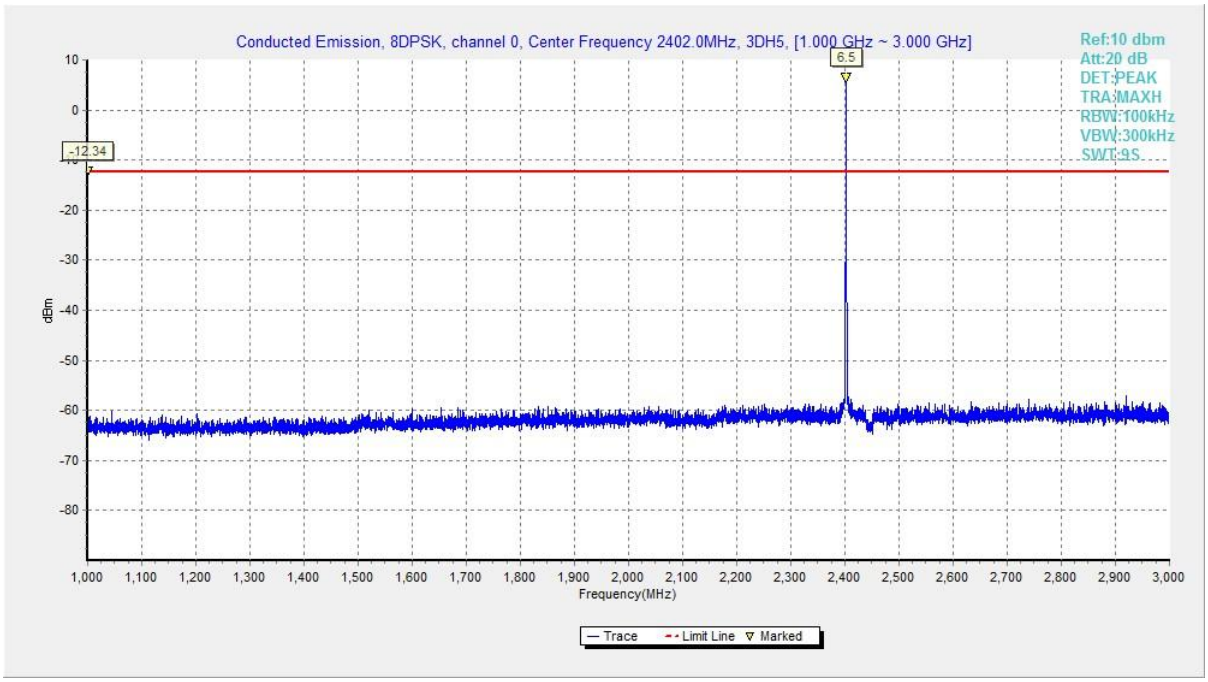



**Fig. 32 Conducted Spurious Emission (8DPSK, Ch0, 1 GHz-3 GHz)**

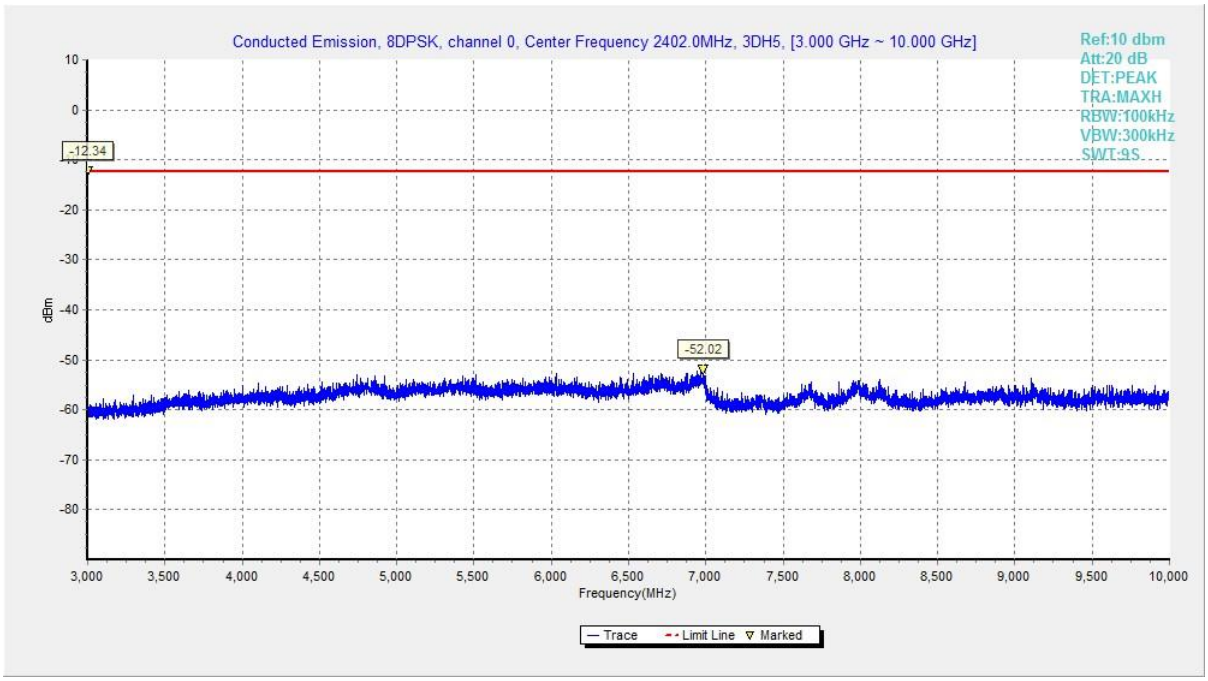



**Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3 GHz-10 GHz)**

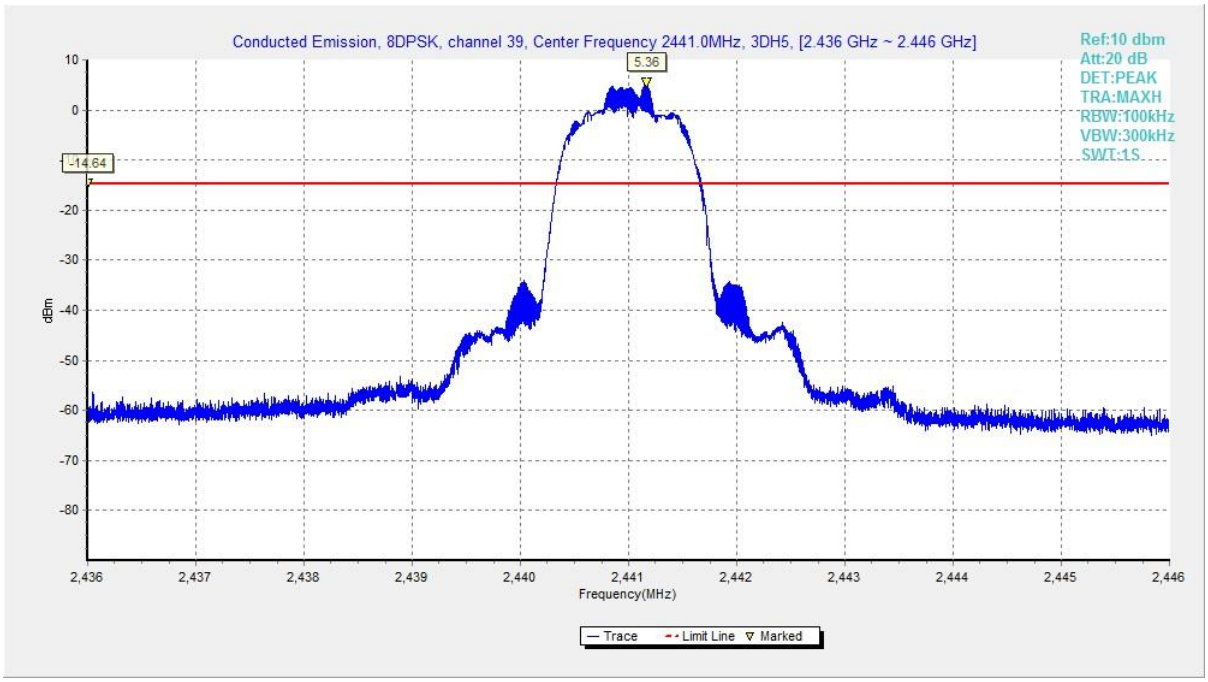



**Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)**

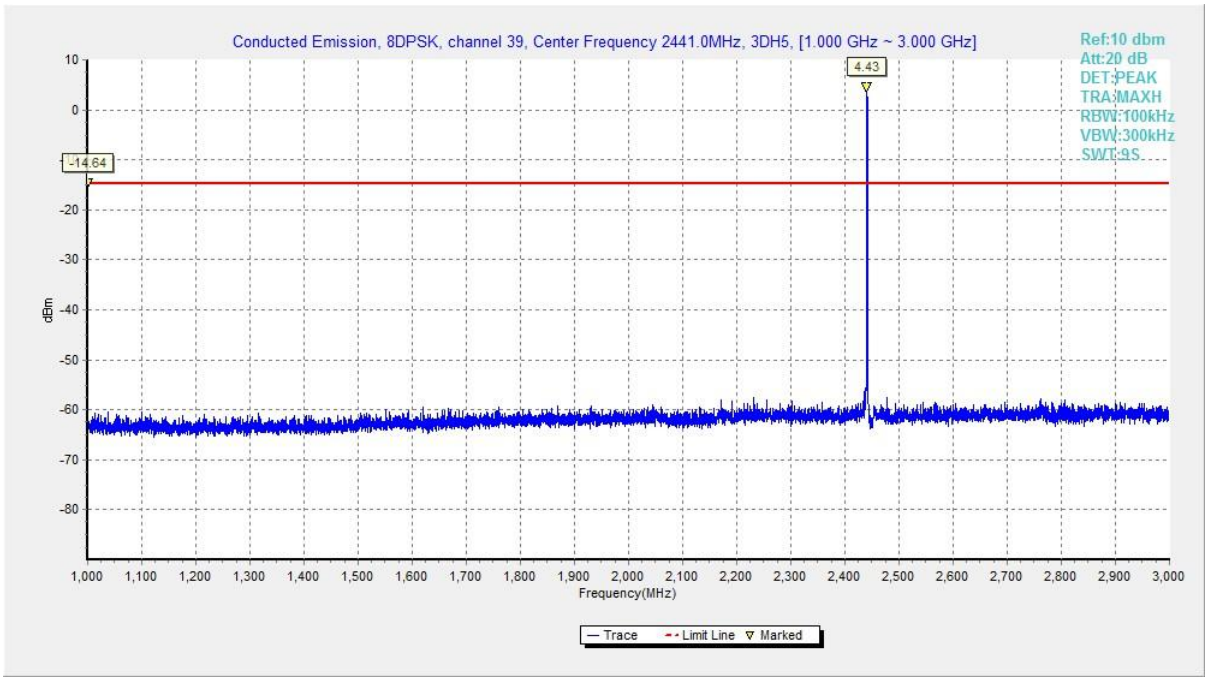



**Fig. 35 Conducted Spurious Emission (8DPSK, Ch39, 1 GHz-3 GHz)**

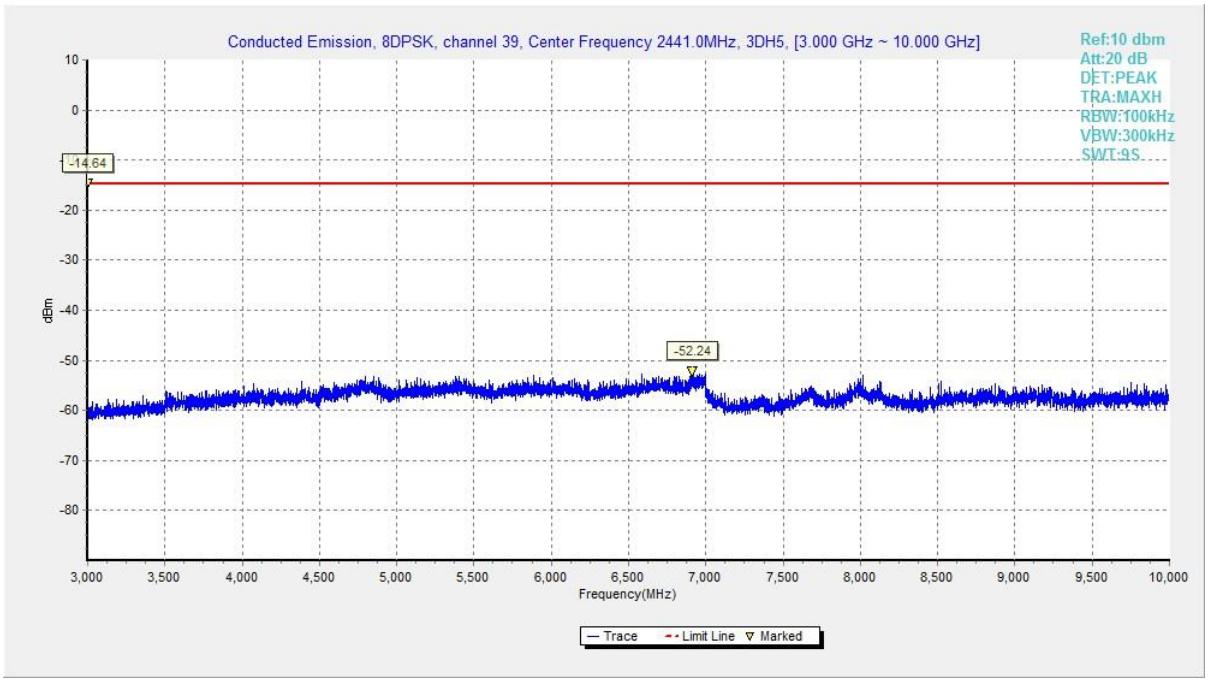



**Fig. 36 Conducted Spurious Emission (8DPSK, Ch39, 3 GHz-10 GHz)**

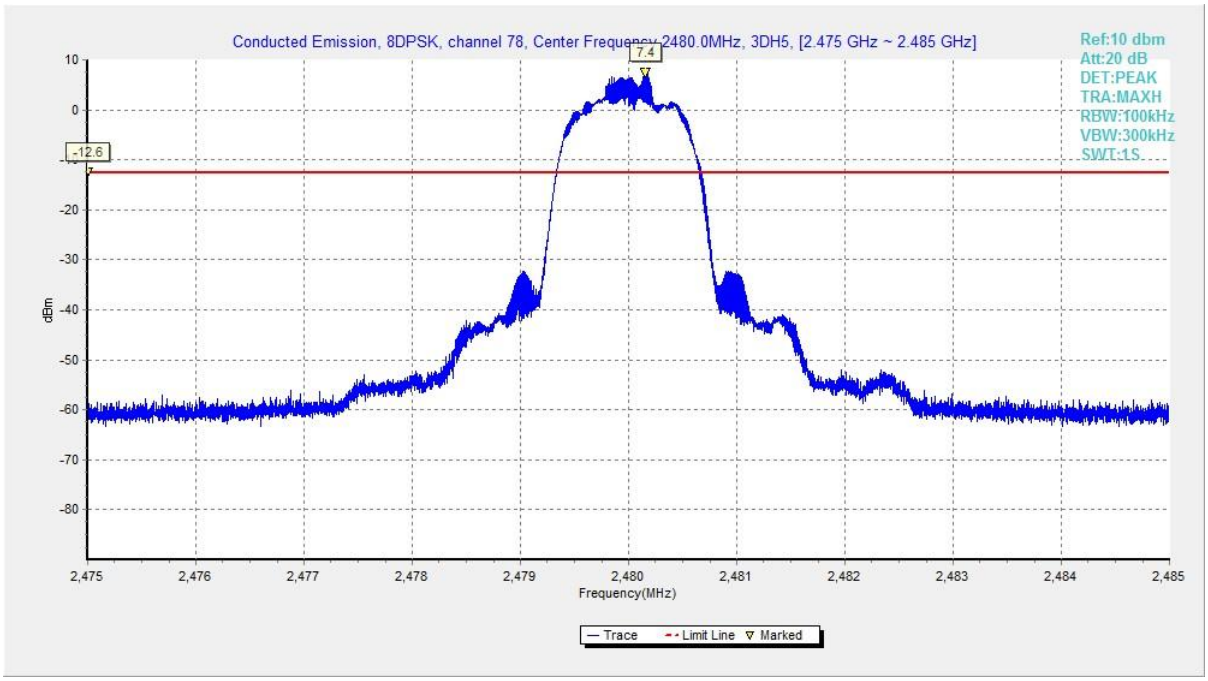



**Fig. 37 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)**

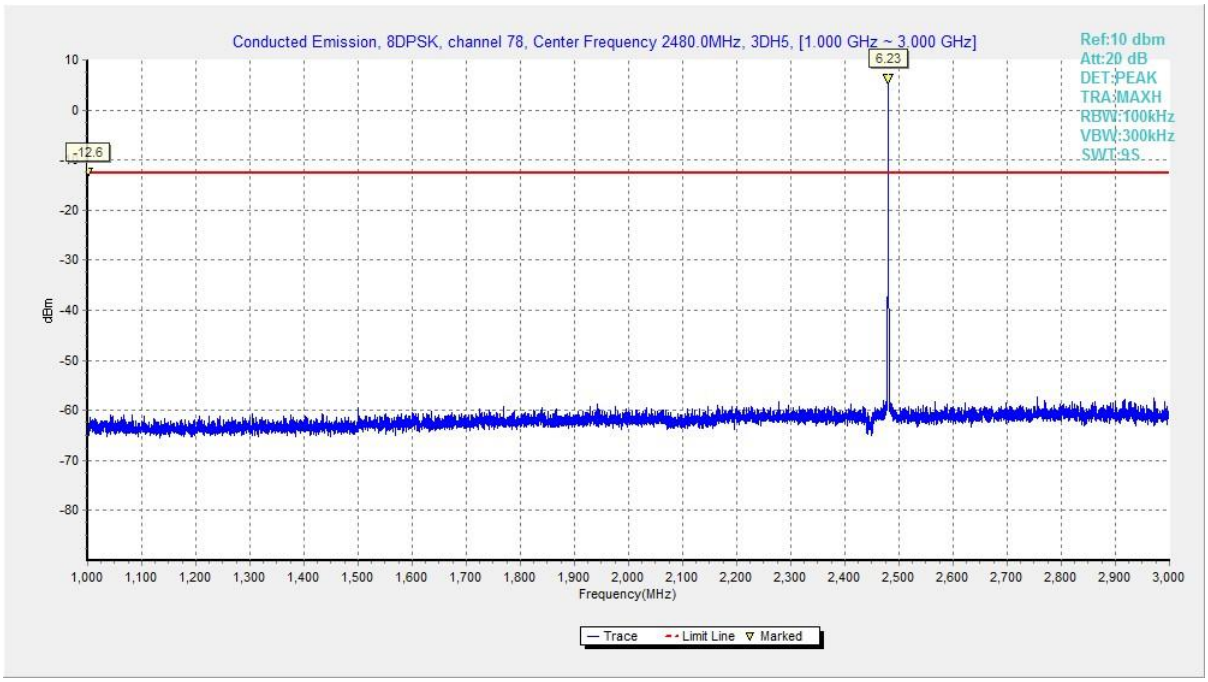



**Fig. 38 Conducted Spurious Emission (8DPSK, Ch78, 1 GHz-3 GHz)**

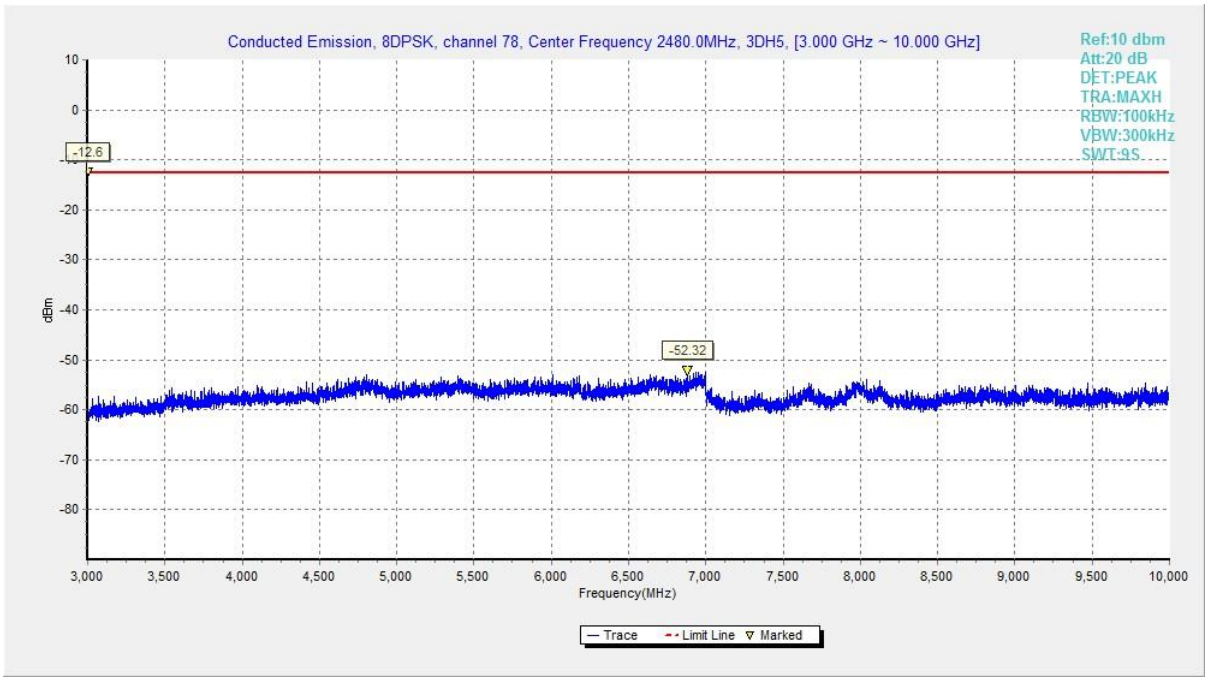



**Fig. 39 Conducted Spurious Emission (8DPSK, Ch78, 3 GHz-10 GHz)**

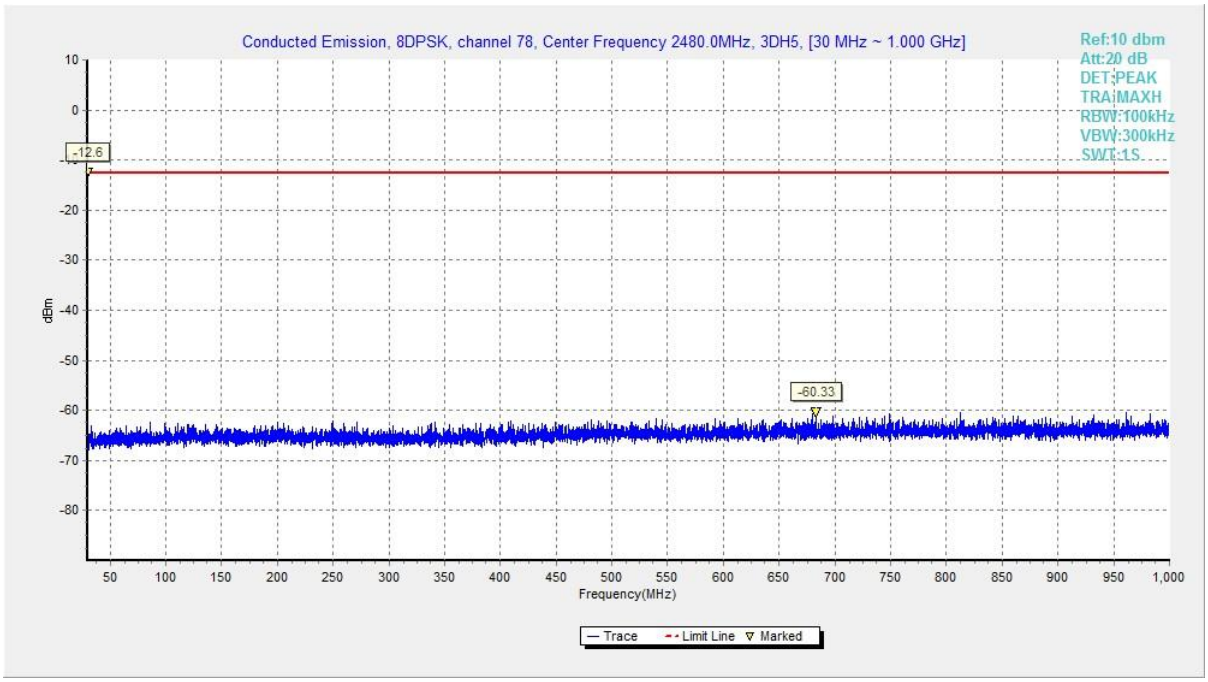



**Fig. 40 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)**

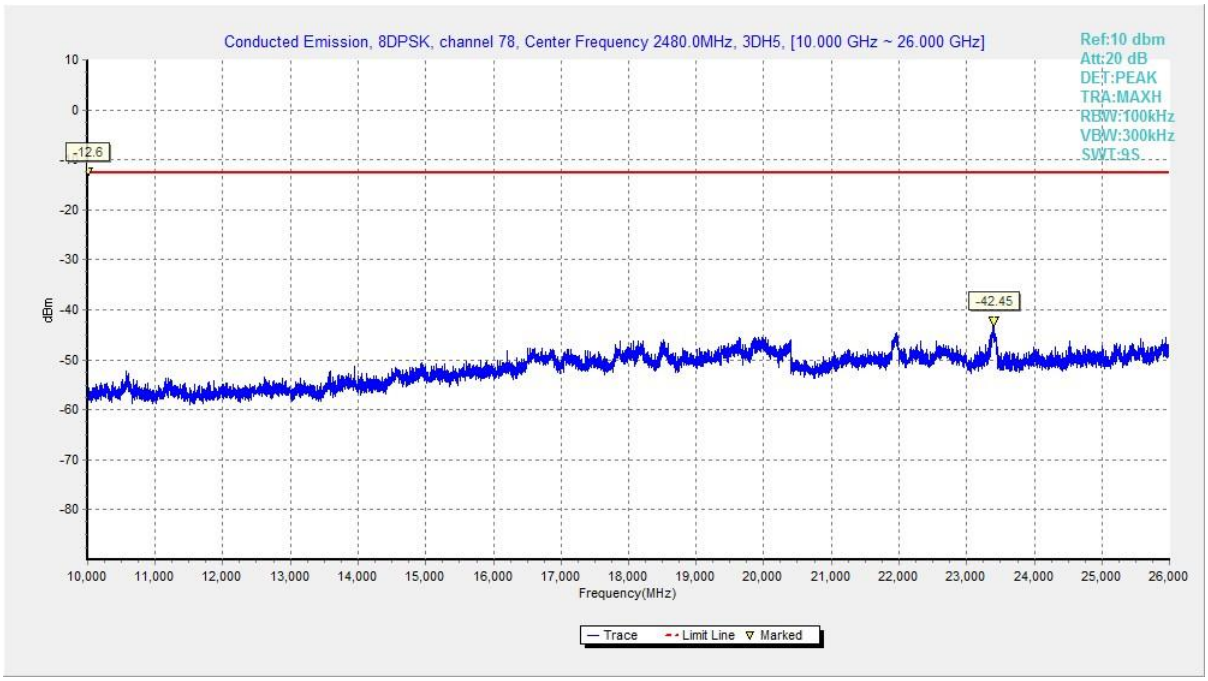



**Fig. 41 Conducted Spurious Emission All channel, 10 GHz-26 GHz)**

## A.5 Radiated Emission

**Measurement Limit:**

| Standard | Limit |
|---|---|
| FCC 47 CFR Part 15.247, 15.205, 15.209 | 20dB below peak output power |

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)).

**Limit in restricted band:**

| Frequency of emission (MHz) | Field strength(μV/m) | Measurement distance(meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

**Test Condition:**

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

| Frequency of emission (MHz) | RBW/VBW | Sweep Time(s) |
|---|---|---|
| 30-1000 | 120kHz/300kHz | 5 |
| 1000-4000 | 1MHz/3MHz | 15 |
| 4000-18000 | 1MHz/3MHz | 40 |
| 18000-26500 | 1MHz/3MHz | 20 |

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.

**Measurement Results:**

| Mode | Channel | Frequency Range | Test Results | Conclusion |
|---|---|---|---|---|
| GFSK | 0 | 1 GHz ~ 3 GHz | Fig.42 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.43 | **P** |
| | 39 | 1 GHz ~ 3 GHz | Fig.44 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.45 | **P** |
| | 78 | 1 GHz ~ 3 GHz | Fig.46 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.47 | **P** |
| | Restricted Band(CH0) | 2.38 GHz ~ 2.45 GHz | Fig.48 | **P** |
| | Restricted Band (CH78) | 2.45 GHz ~ 2.5 GHz | Fig.49 | **P** |
| π /4 DQPSK | 0 | 1 GHz ~ 3 GHz | Fig.50 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.51 | **P** |
| | 39 | 1 GHz ~ 3 GHz | Fig.52 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.53 | **P** |
| | 78 | 1 GHz ~ 3 GHz | Fig.54 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.55 | **P** |
| | Restricted Band (CH0) | 2.38 GHz ~ 2.45 GHz | Fig.56 | **P** |
| | Restricted Band (CH78) | 2.45 GHz ~ 2.5 GHz | Fig.57 | **P** |
| 8DPSK | 0 | 1 GHz ~ 3 GHz | Fig.58 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.59 | **P** |
| | 39 | 1 GHz ~ 3 GHz | Fig.60 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.61 | **P** |
| | 78 | 1 GHz ~ 3 GHz | Fig.62 | **P** |
| | | 3 GHz ~ 18 GHz | Fig.63 | **P** |
| | Restricted Band (CH0) | 2.38 GHz ~ 2.45 GHz | Fig.64 | **P** |
| | Restricted Band (CH78) | 2.45 GHz ~ 2.5 GHz | Fig.65 | **P** |
| / | All channels | 9 kHz ~ 30 MHz | Fig.66 | **P** |
| | | 30 MHz ~ 1 GHz | Fig.67 | **P** |
| | | 18 GHz ~ 26.5 GHz | Fig.68 | **P** |

**Worst Case Result**

**GFSK CH39 (3-18GHz)**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 10486.000000 | 44.18 | 74.00 | 29.82 | H | 6.6 |
| 11584.500000 | 44.74 | 74.00 | 29.26 | H | 8.0 |
| 12719.000000 | 46.48 | 74.00 | 27.52 | H | 9.9 |
| 14413.500000 | 48.43 | 74.00 | 25.57 | V | 12.7 |
| 16893.500000 | 50.34 | 74.00 | 23.66 | V | 16.3 |
| 17818.500000 | 50.73 | 74.00 | 23.27 | H | 17.4 |

| Frequency (MHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 10486.000000 | 31.72 | 54.00 | 22.28 | H | 6.6 |
| 11584.500000 | 32.42 | 54.00 | 21.58 | H | 8.0 |
| 12719.000000 | 33.77 | 54.00 | 20.23 | H | 9.9 |
| 14413.500000 | 35.31 | 54.00 | 18.69 | V | 12.7 |
| 16893.500000 | 37.50 | 54.00 | 16.50 | V | 16.3 |
| 17818.500000 | 37.53 | 54.00 | 16.47 | H | 17.4 |

**π /4 DQPSK CH39 (3-18GHz)**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 10819.000000 | 44.62 | 74.00 | 29.38 | H | 7.3 |
| 12107.500000 | 46.05 | 74.00 | 27.95 | H | 9.5 |
| 12694.000000 | 45.96 | 74.00 | 28.04 | H | 10.0 |
| 14333.000000 | 47.84 | 74.00 | 26.16 | H | 12.7 |
| 16145.000000 | 49.19 | 74.00 | 24.81 | V | 15.3 |
| 17888.500000 | 51.16 | 74.00 | 22.84 | V | 17.7 |

| Frequency (MHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 10819.000000 | 31.88 | 54.00 | 22.12 | H | 7.3 |
| 12107.500000 | 33.77 | 54.00 | 20.23 | H | 9.5 |
| 12694.000000 | 33.57 | 54.00 | 20.43 | H | 10.0 |
| 14333.000000 | 34.81 | 54.00 | 19.19 | H | 12.7 |
| 16145.000000 | 36.54 | 54.00 | 17.46 | V | 15.3 |
| 17888.500000 | 38.47 | 54.00 | 15.53 | V | 17.7 |

**8DPSK CH39 (3-18GHz)**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 10551.500000 | 45.01 | 74.00 | 28.99 | V | 6.8 |
| 12102.500000 | 46.63 | 74.00 | 27.37 | H | 9.5 |
| 12864.500000 | 46.24 | 74.00 | 27.76 | H | 9.9 |
| 14387.000000 | 47.24 | 74.00 | 26.76 | V | 12.7 |
| 16412.500000 | 49.65 | 74.00 | 24.35 | V | 15.6 |
| 17846.000000 | 50.63 | 74.00 | 23.37 | H | 17.6 |

| Frequency (MHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol | Corr. (dB) |
|---|---|---|---|---|---|
| 10551.500000 | 31.92 | 54.00 | 22.08 | V | 6.8 |
| 12102.500000 | 33.85 | 54.00 | 20.15 | H | 9.5 |
| 12864.500000 | 33.40 | 54.00 | 20.60 | H | 9.9 |
| 14387.000000 | 34.91 | 54.00 | 19.09 | V | 12.7 |
| 16412.500000 | 36.72 | 54.00 | 17.28 | V | 15.6 |
| 17846.000000 | 37.78 | 54.00 | 16.22 | H | 17.6 |

**Note:**

A "reference path loss" is established and the $A_{Rpl}$ is the attenuation of “reference path loss”, and Antenna Factor, the gain of the preamplifier, the cable loss. $P_{Mea}$ is the field strength recorded from the instrument.

The measurement results are obtained as described below:

Result = $P_{Mea}$ + Cable Loss + Antenna Factor - Gain of the preamplifier

**See below for test graphs.**

**Conclusion: Pass**

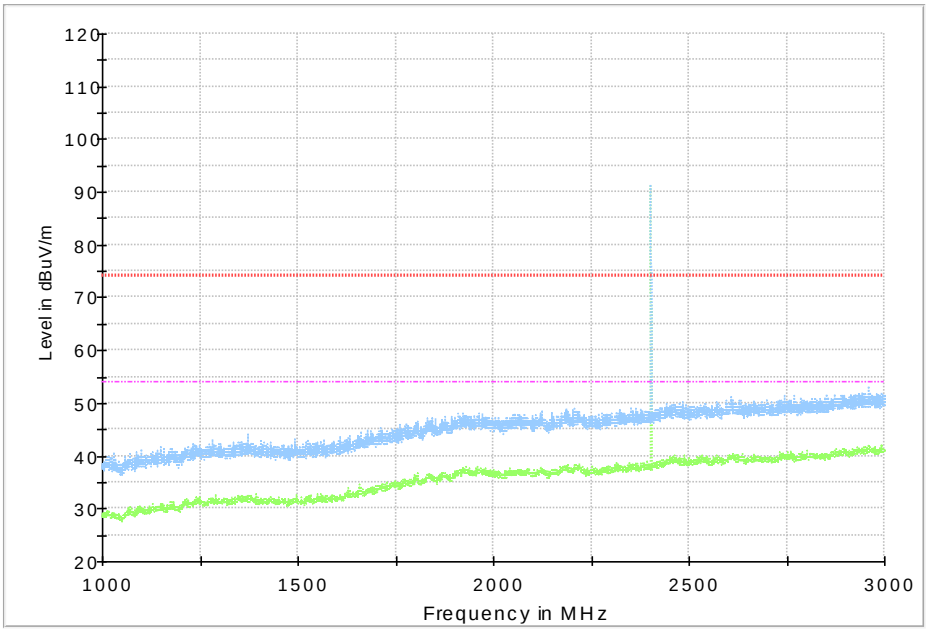



**Fig. 42 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~ 3 GHz)**

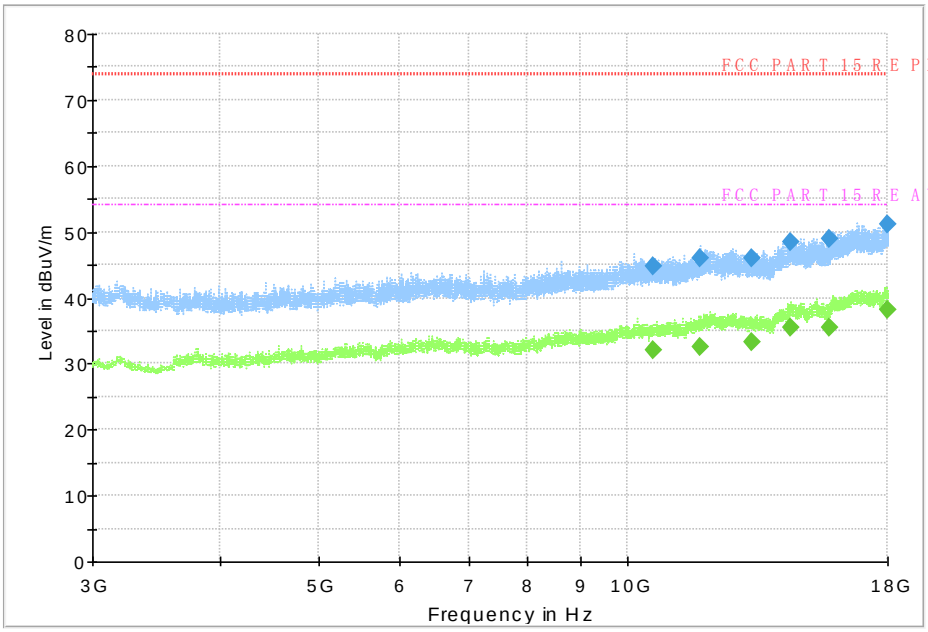



**Fig. 43 Radiated Spurious Emission (GFSK, Ch0, 3 GHz ~ 18 GHz)**

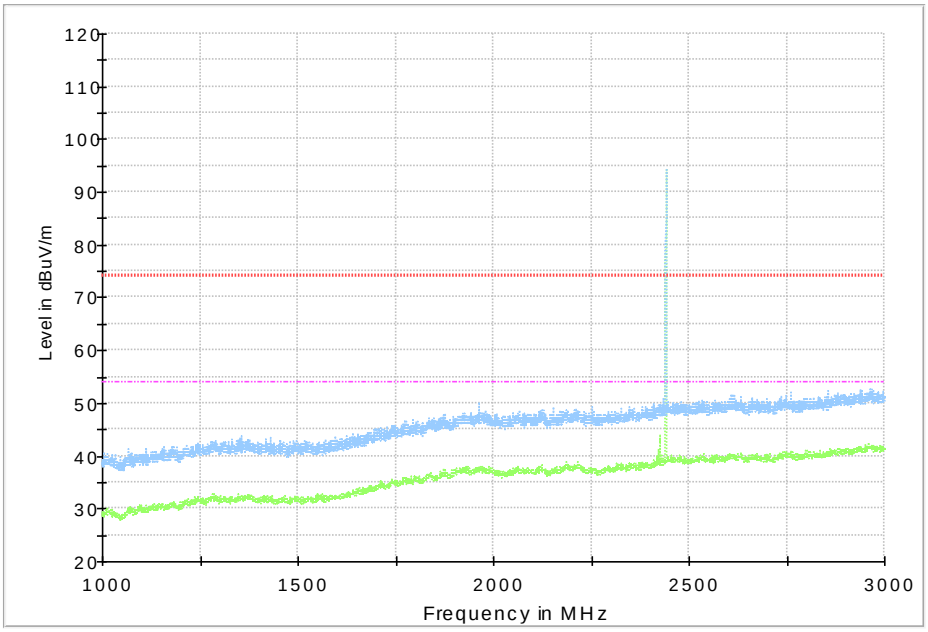



**Fig. 44 Radiated Spurious Emission (GFSK, Ch39, 1 GHz ~ 3 GHz)**

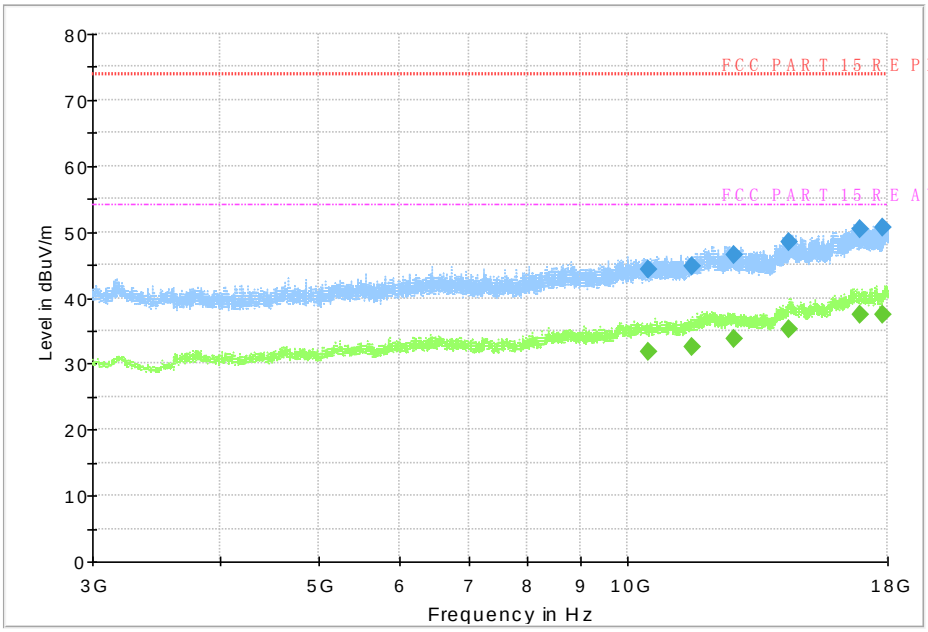



**Fig. 45 Radiated Spurious Emission (GFSK, Ch39, 3 GHz ~ 18 GHz)**

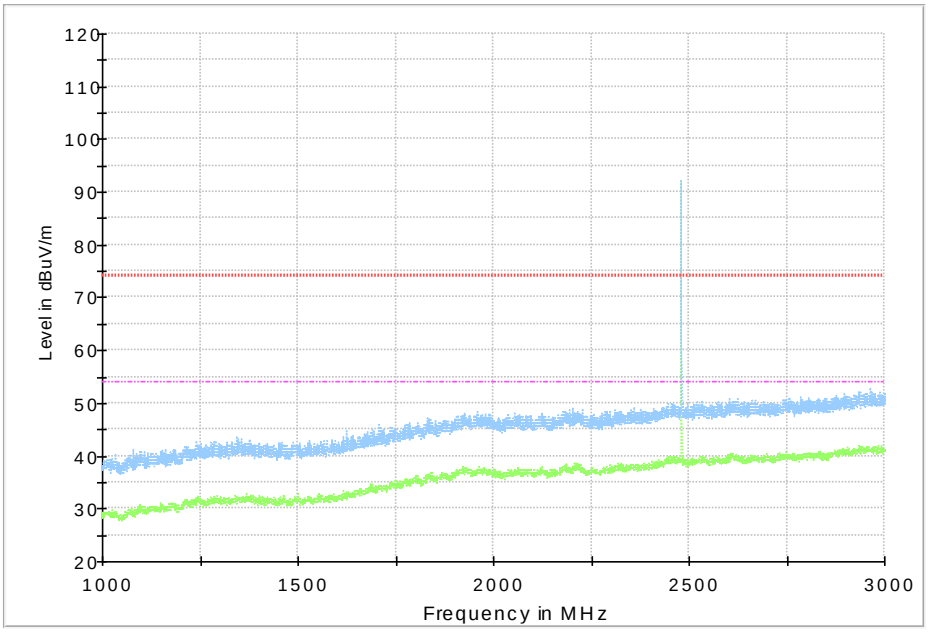



**Fig. 46 Radiated Spurious Emission (GFSK, Ch78, 1 GHz ~ 3 GHz)**

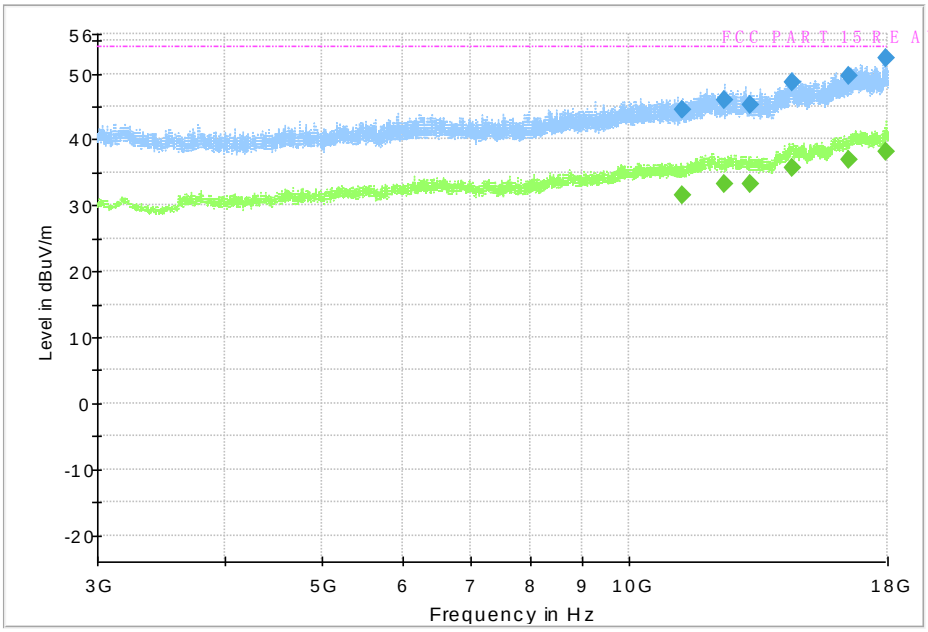



**Fig. 47 Radiated Spurious Emission (GFSK, Ch78, 3 GHz ~ 18 GHz)**

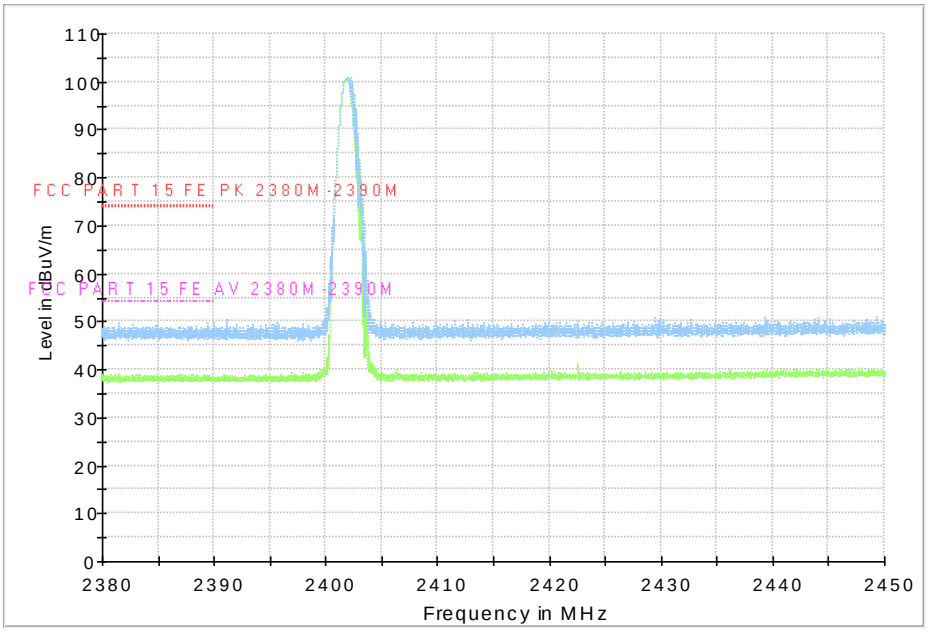



**Fig. 48 Radiated Band Edges (GFSK, Ch0, 2380GHz ~ 2450GHz)**

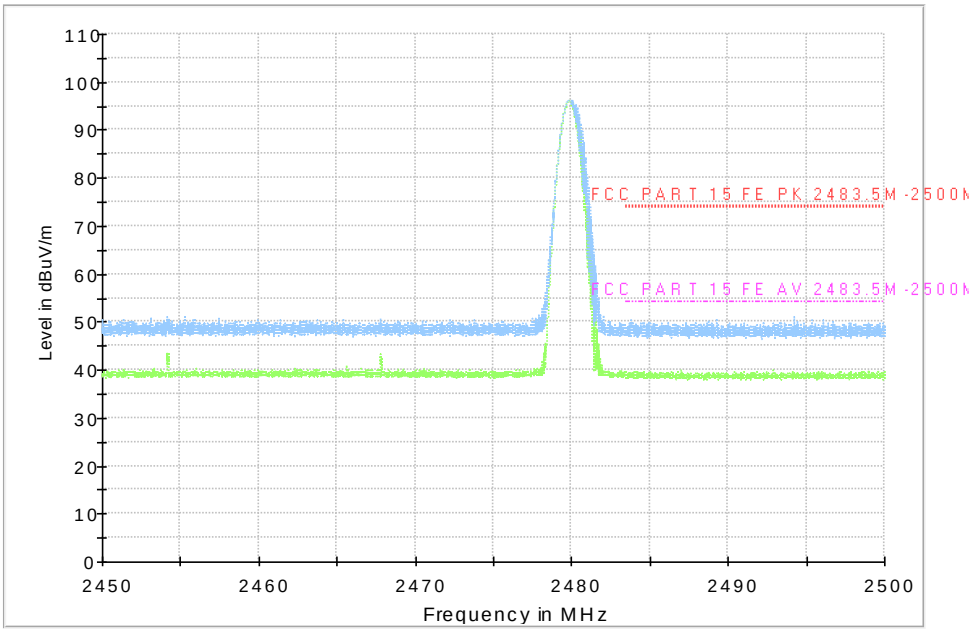



**Fig. 49 Radiated Band Edges (GFSK, Ch78, 2450GHz ~ 2500GHz)**

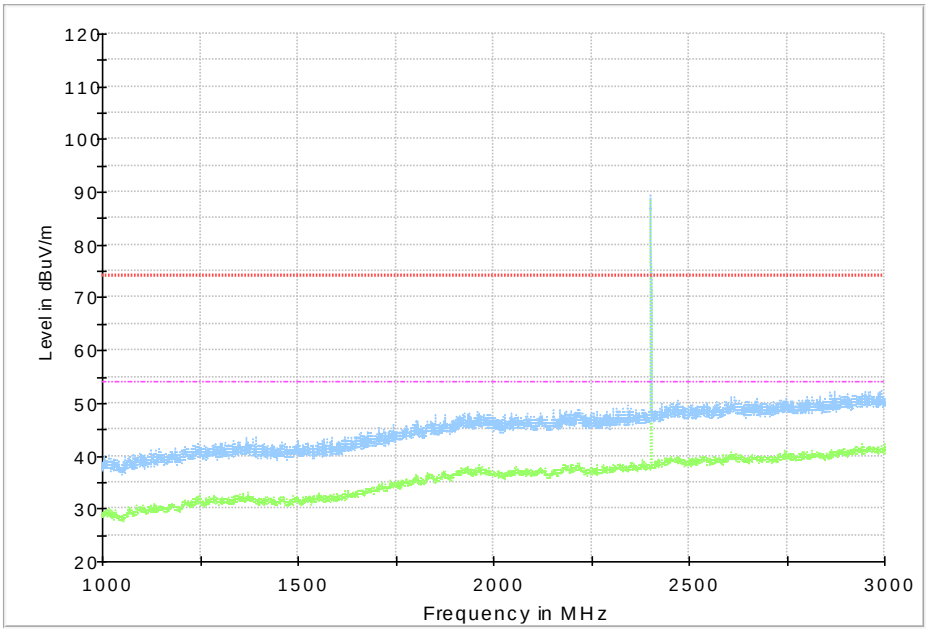



**Fig. 50 Radiated Spurious Emission (π /4 DQPSK, Ch0, 1 GHz ~ 3 GHz)**

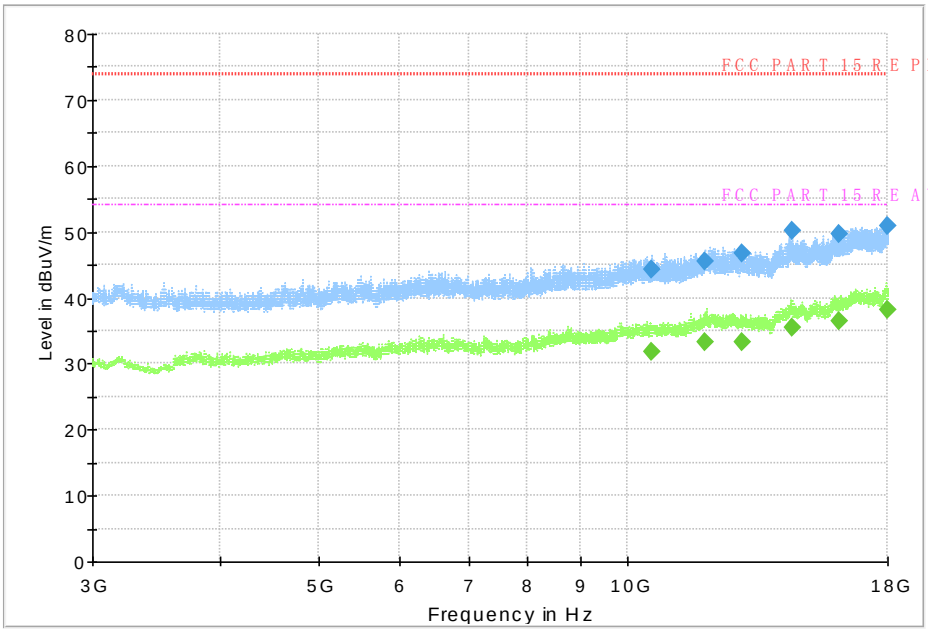



**Fig. 51 Radiated Spurious Emission (π /4 DQPSK, Ch0, 3 GHz ~ 18 GHz)**

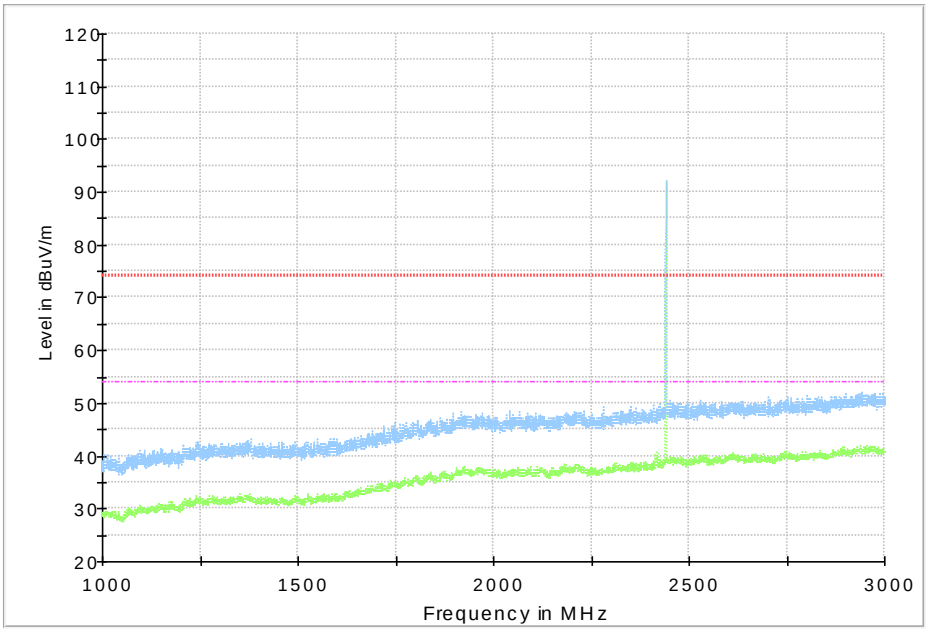



**Fig. 52 Radiated Spurious Emission (π /4 DQPSK, Ch39, 1 GHz ~ 3 GHz)**

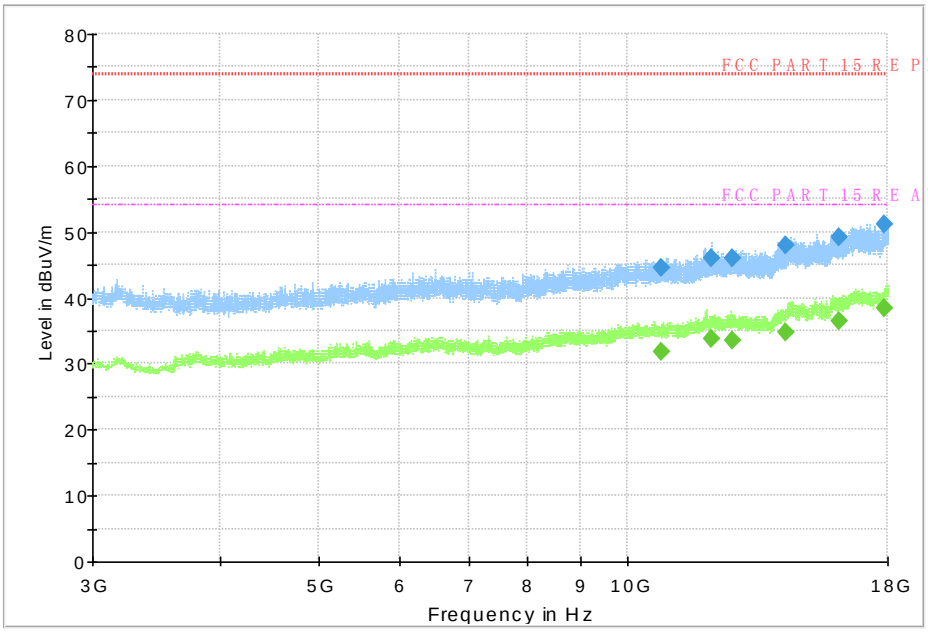



**Fig. 53 Radiated Spurious Emission (π /4 DQPSK, Ch39, 3 GHz ~ 18 GHz)**

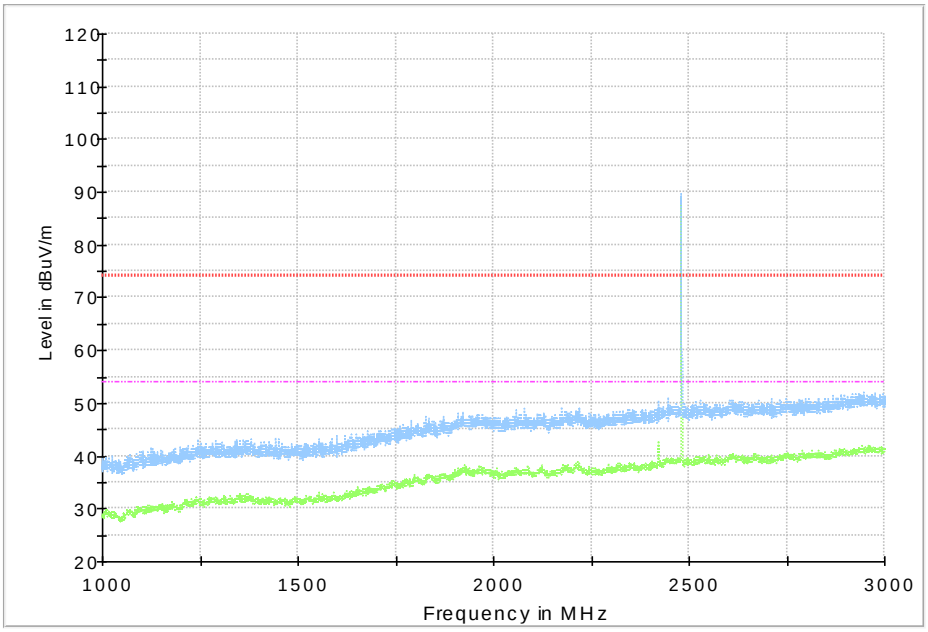



**Fig. 54 Radiated Spurious Emission (π /4 DQPSK, Ch78, 1 GHz ~ 3 GHz)**

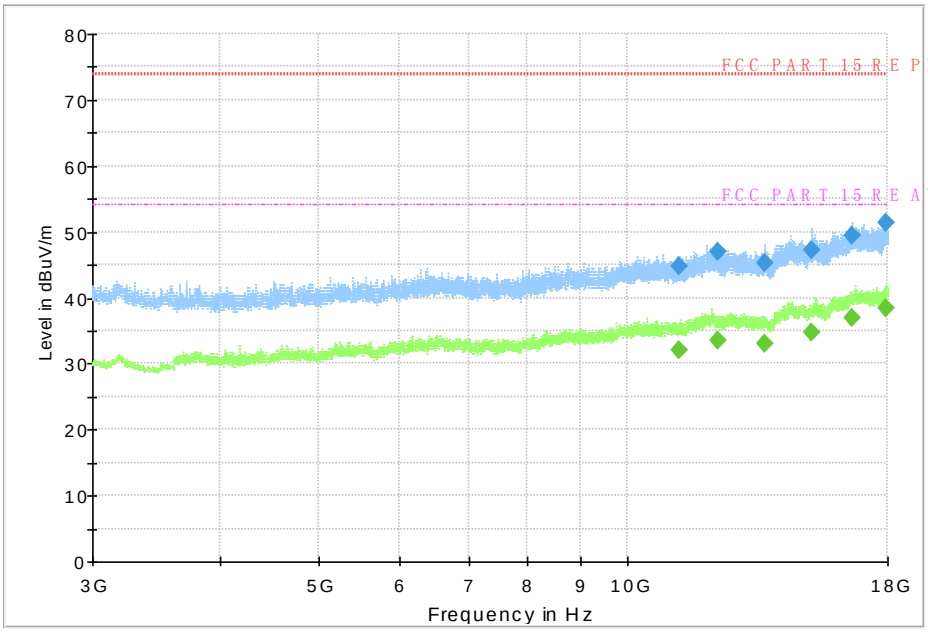



**Fig. 55 Radiated Spurious Emission (π /4 DQPSK, Ch78, 3 GHz ~ 18 GHz)**

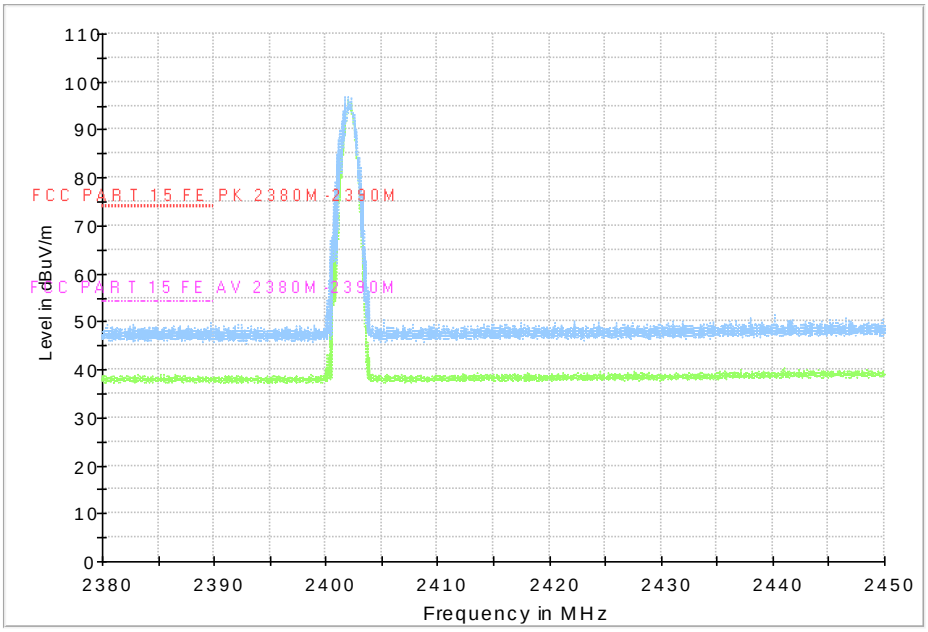



**Fig. 56 Radiated Band Edges (π /4 DQPSK, Ch0, 2380GHz ~ 2450GHz)**

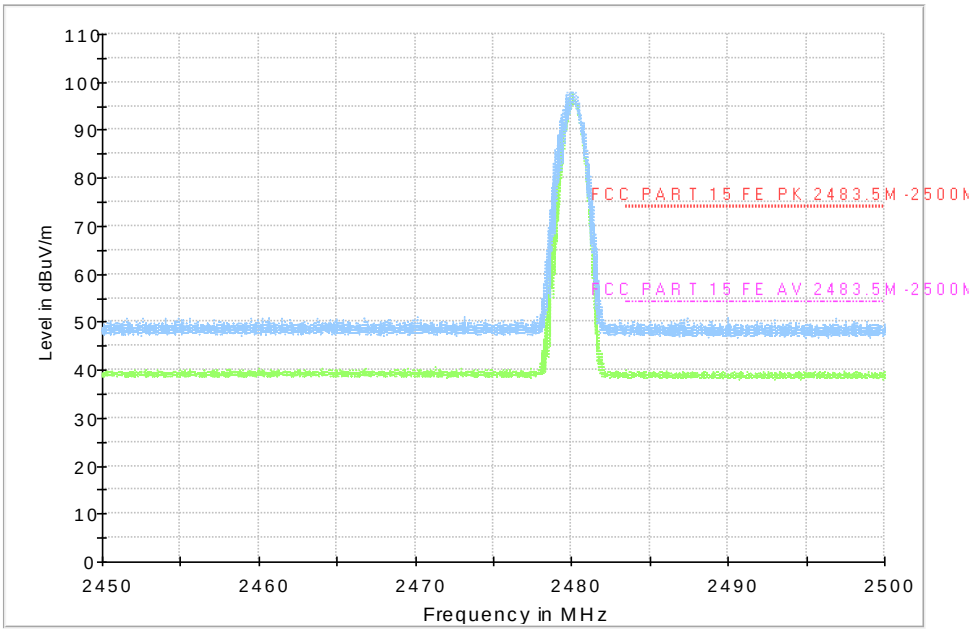



**Fig. 57 Radiated Band Edges (π /4 DQPSK, Ch78, 2450GHz ~ 2500GHz)**

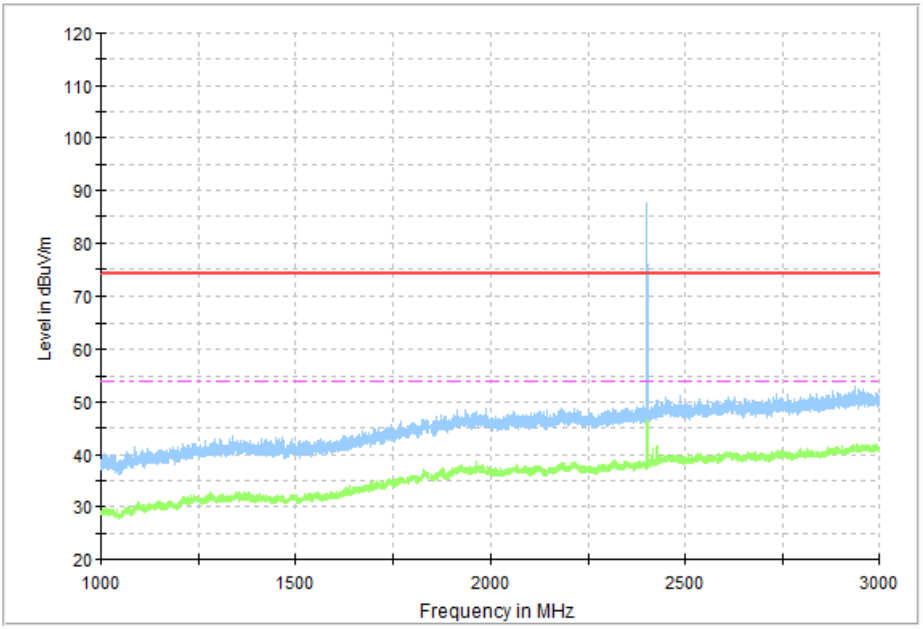



**Fig. 58 Radiated Spurious Emission (8DPSK, Ch0, 1 GHz ~ 3 GHz)**

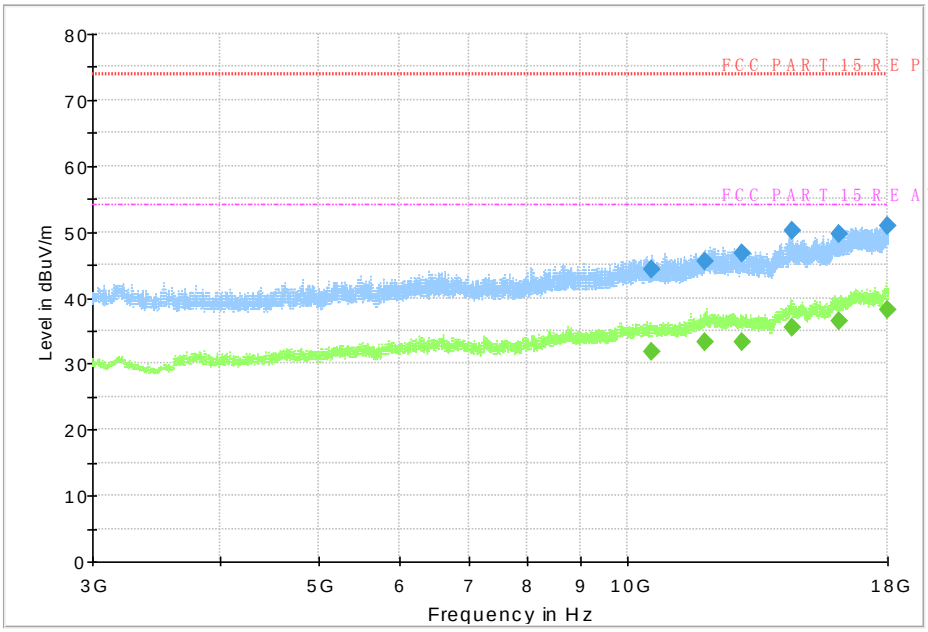



**Fig. 59 Radiated Spurious Emission (8DPSK, Ch0, 3 GHz ~ 18 GHz)**

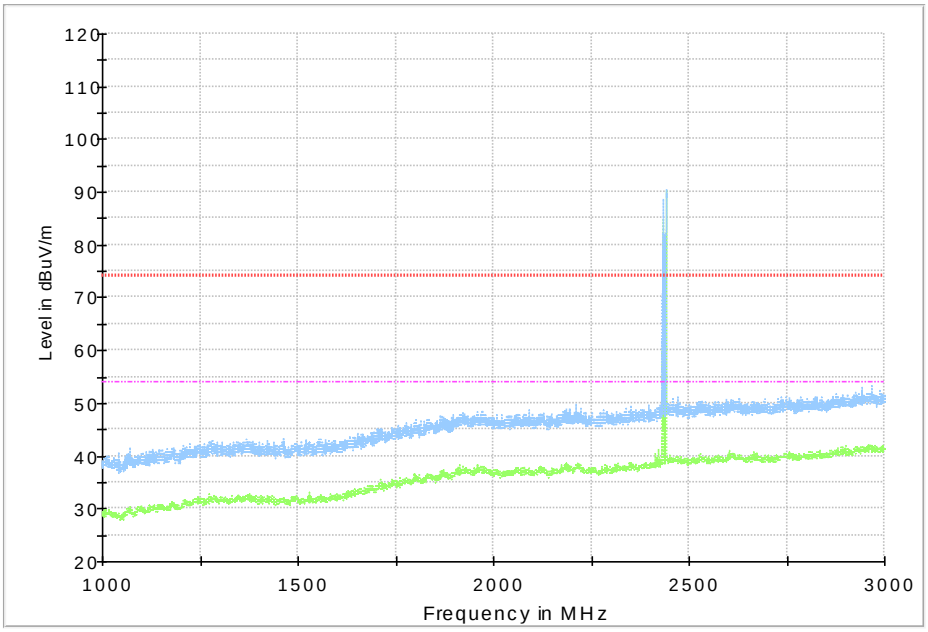



**Fig. 60 Radiated Spurious Emission (8DPSK, Ch39, 1 GHz ~ 3 GHz)**

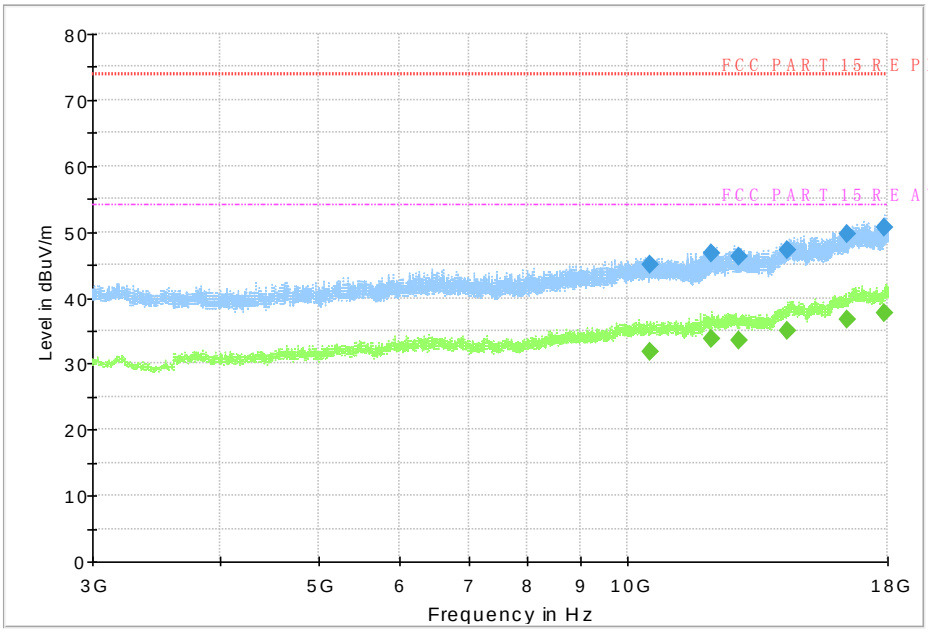



**Fig. 61 Radiated Spurious Emission (8DPSK, Ch39, 3 GHz ~ 18 GHz)**

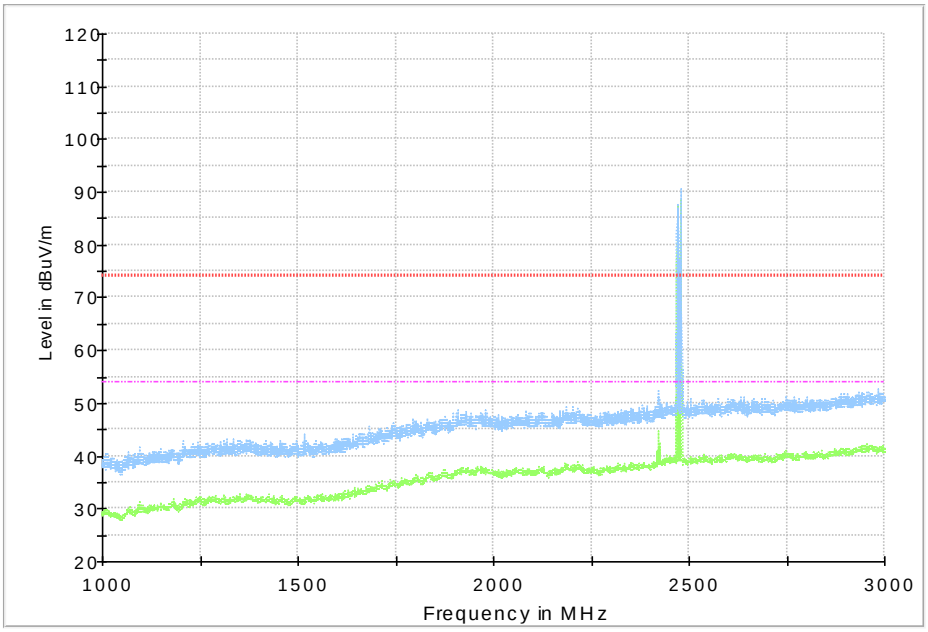



**Fig. 62 Radiated Spurious Emission (8DPSK, Ch78, 1 GHz ~ 3 GHz)**

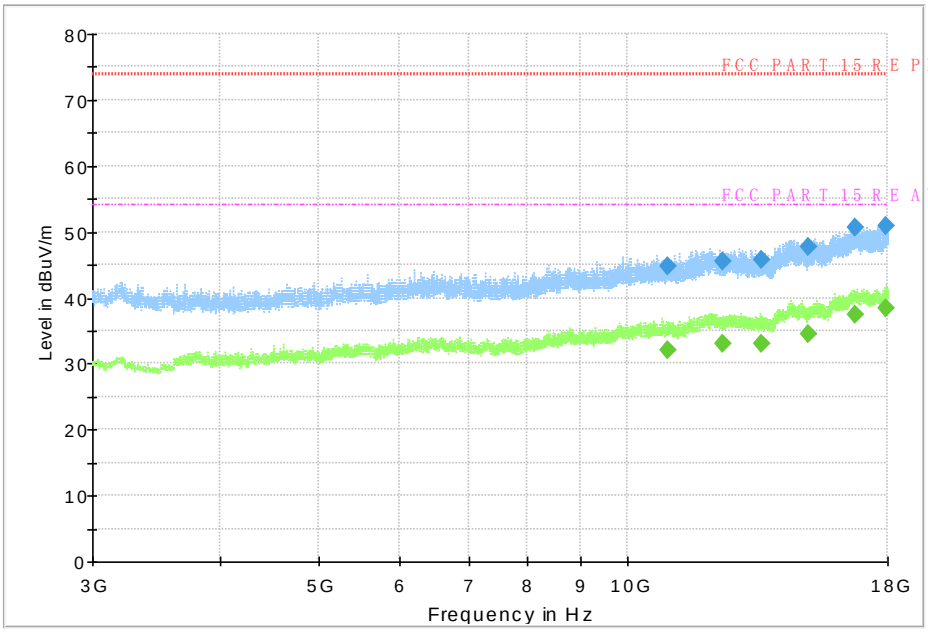



**Fig. 63 Radiated Spurious Emission (8DPSK, Ch78, 3 GHz ~ 18 GHz)**