



TEST REPORT

No. I20N03484-BT

for

TCL Communication Ltd.

True Wireless Headphones

Model Name: TW30

with

Hardware Version: 40-00TW309MID6H

Software Version: V1.1.0.12

FCC ID: 2ACCJB145

IC: 9238A-0109

Issued Date: 2021-01-27

Designation Number: CN1210

ISED Assigned Code: 23289

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.

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1. Summary of Test Report

1.1. Test Items

| | |
|---------------------|--------------------------|
| Description | True Wireless Headphones |
| Model Name | TW30 |
| Applicant's name | TCL Communication Ltd. |
| Manufacturer's Name | TCL Communication Ltd. |

1.2. Test Standards

FCC Part15-2019; ANSI C63.10-2013; RSS-247 Issue 2; RSS-Gen Issue 5 A1

1.3. Test Result

Pass

1.4. Testing Location

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

1.5. Project data

| | |
|---------------------|------------|
| Testing Start Date: | 2020-12-15 |
| Testing End Date: | 2021-01-25 |

1.6. Signature

An Ran

(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: TCL Communication Ltd.
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Contact Person: Gong Zhizhou
E-Mail: zhizhou.gong@tcl.com
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person: Gong Zhizhou
E-Mail: zhizhou.gong@tcl.com
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722



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

3.1. About EUT

| | |
|------------------------------|------------------------------|
| Description | True Wireless Headphones |
| Model Name | TW30 |
| Frequency Band | 2400MHz~2483.5MHz |
| Type of Modulation | GFSK/ π /4 DQPSK/8DPSK |
| Number of Channels | 79 |
| Antenna Type | Integrated |
| Antenna Gain | -0.4dBi |
| Power Supply | 3.7V DC by Battery |
| FCC ID | 2ACCJB145 |
| IC | 9238A-0109 |
| Condition of EUT as received | No abnormality in appearance |

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version | Receive Date |
|----------------|-------------|-------------------|-------------------|---------------------|
| UT02aa | / | 40-00TW309MID6H | V1.1.0.12 | 2020-12-25 |
| UT04aa | / | 40-00TW309MID6H | V1.1.0.12 | 2020-12-25 |

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

3.3. Internal Identification of AE used during the test

| AE ID* | Description | AE ID* |
|---------------|--------------------|---------------|
| AE1 | Battery | / |

*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 True Wireless Headphones (the right headphone) with integrated antenna and battery.

It consists of normal options: Charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.



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: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz | 2019 |
| ANSI C63.10 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices | 2013 |
| RSS-247 | Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices | Issue 2 February, 2017 |
| RSS-Gen | Spectrum Management and Telecommunications Radio Standards Specification General Requirements for Compliance of Radio Apparatus | Issue 5 March, 2019 Amendment 1 |

5. Test Results

5.1. Testing Environment

Normal Temperature: 15~35°C

Relative Humidity: 20~75%

5.2. Test Results

| No | Test cases | Sub-clause of Part 15C | Sub-clause of IC | Verdict |
|----|-------------------------------------|------------------------|--|-----------|
| 0 | Antenna Requirement | 15.203 | / | P |
| 1 | Maximum Peak Output Power | 15.247 (b) | RSS-247 section 5.4 | P |
| 2 | Band Edges Compliance | 15.247 (d) | RSS-247 section 5.1 | P |
| 3 | Conducted Spurious Emission | 15.247 (d) | RSS-247 section 5.5/ RSS-Gen section 6.13 | P |
| 4 | Radiated Spurious Emission | 15.247,15.205,15.209 | RSS-247 section 5.5/ RSS-Gen section 6.13 | P |
| 5 | Occupied 20dB bandwidth | 15.247(a) | RSS-247 section 5.1 | / |
| 6 | Time of Occupancy (Dwell Time) | 15.247(a) | RSS-247 section 5.1 | P |
| 7 | Number of Hopping Channel | 15.247(a) | RSS-247 section 5.1 | P |
| 8 | Carrier Frequency Separation | 15.247(a) | RSS-247 section 5.1 | P |
| 9 | AC Power line Conducted Emission | 15.107,15.207 | RSS-Gen section 8.8 | NA |
| 10 | 99% Occupied Bandwidth | / | RSS-Gen section 6.7 | / |

See **ANNEX A** for details.

NA: Because the device can not use Bluetooth function when charging, the conducted continuous disturbance test is not required.

5.3. Statements

SAICT has evaluated the test cases requested by the applicant/matrix as listed in section 5.2 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

6. Test Equipments Utilized

Conducted test system

| No. | Equipment | Model | Serial Number | Manufacturer | Calibration Due date | Calibration Period |
|-----|------------------------|--------|---------------|-----------------|----------------------|--------------------|
| 1 | Vector Signal Analyzer | FSV40 | 100903 | Rohde & Schwarz | 2021-12-30 | 1 year |
| 2 | Bluetooth Tester | CBT32 | 100584 | Rohde & Schwarz | 2021-12-30 | 1 year |
| 3 | Test Receiver | ESCI | 100701 | Rohde & Schwarz | 2021-08-09 | 1 year |
| 4 | LISN | ENV216 | 102067 | Rohde & Schwarz | 2021-07-16 | 1 year |

Radiated emission test system

| NO. | Equipment | Model | Serial Number | Manufacturer | Calibration Due date | Calibration Period |
|-----|-------------------|-------------------|---------------|-----------------|----------------------|--------------------|
| 1 | Loop Antenna | HLA6120 | 35779 | TESEQ | 2022-04-25 | 3 years |
| 2 | BiLog Antenna | 3142E | 00224831 | ETS-Lindgren | 2021-05-17 | 3 years |
| 3 | Horn Antenna | 3117 | 00066577 | ETS-Lindgren | 2022-04-02 | 3 years |
| 4 | Test Receiver | ESR7 | 101676 | Rohde & Schwarz | 2021-11-25 | 1 year |
| 5 | Spectrum Analyser | FSV40 | 101192 | Rohde & Schwarz | 2022-01-13 | 1 year |
| 6 | Chamber | FACT3-2.0 | 1285 | ETS-Lindgren | 2021-07-19 | 2 years |
| 7 | Antenna | QSH-SL-18-26-S-20 | 17013 | Q-par | 2023-01-06 | 3 years |

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. Laboratory Environment

Semi-anechoic chambe

| | |
|-----------------------------------|--|
| Temperature | Min. = 15 °C, Max. = 35 °C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB |
| Electrical insulation | > 2MΩ |
| Ground system resistance | < 4 Ω |
| Normalised site attenuation (NSA) | < ±4 dB, 3 m distance, from 30 to 1000 MHz |

Shielded room

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

Fully-anechoic chamber

| | |
|------------------------------------|---|
| Temperature | Min. = 15 °C, Max. = 35 °C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB |
| Electrical insulation | > 2MΩ |
| Ground system resistance | < 4 Ω |
| Voltage Standing Wave Ratio (VSWR) | ≤ 6 dB, from 1 to 18 GHz, 3 m distance |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 6000 MHz |

8. Measurement Uncertainty

| Test Name | Uncertainty ($k=2$) | |
|---|------------------------------|--------|
| 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 \leq f \leq 1GHz | 1.41dB |
| | 1GHz \leq f \leq 7GHz | 1.92dB |
| | 7GHz \leq f \leq 13GHz | 2.31dB |
| | 13GHz \leq f \leq 26GHz | 2.61dB |
| 5. Transmitter Spurious Emission - Radiated | 9kHz \leq f \leq 30MHz | 1.70dB |
| | 30MHz \leq f \leq 1GHz | 4.90dB |
| | 1GHz \leq f \leq 18GHz | 4.60dB |
| | 18GHz \leq f \leq 40GHz | 4.10dB |
| 6. AC Power line Conducted Emission | 150kHz \leq f \leq 30MHz | 3.00dB |

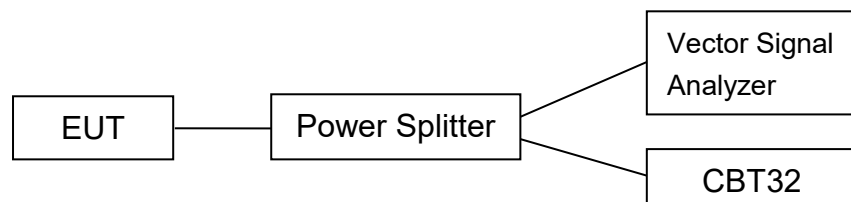
ANNEX A: Detailed Test Results

Test Configuration

The measurement is made according to ANSI C63.10.

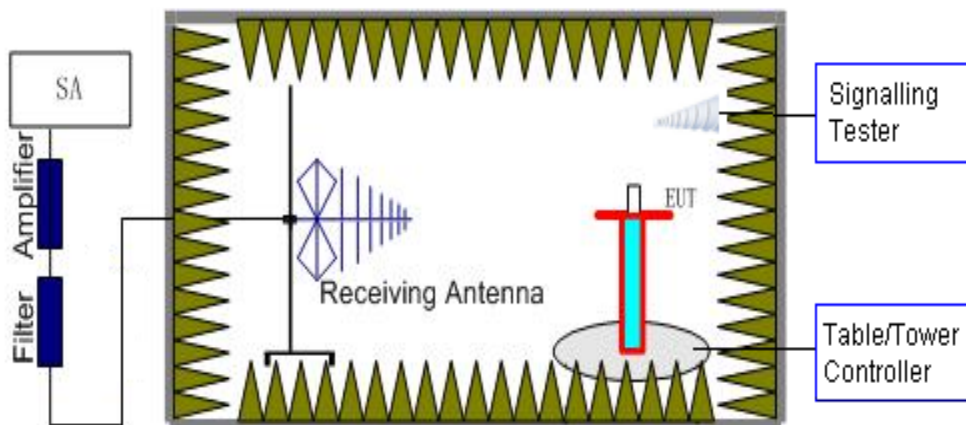
1) Conducted Measurements

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.



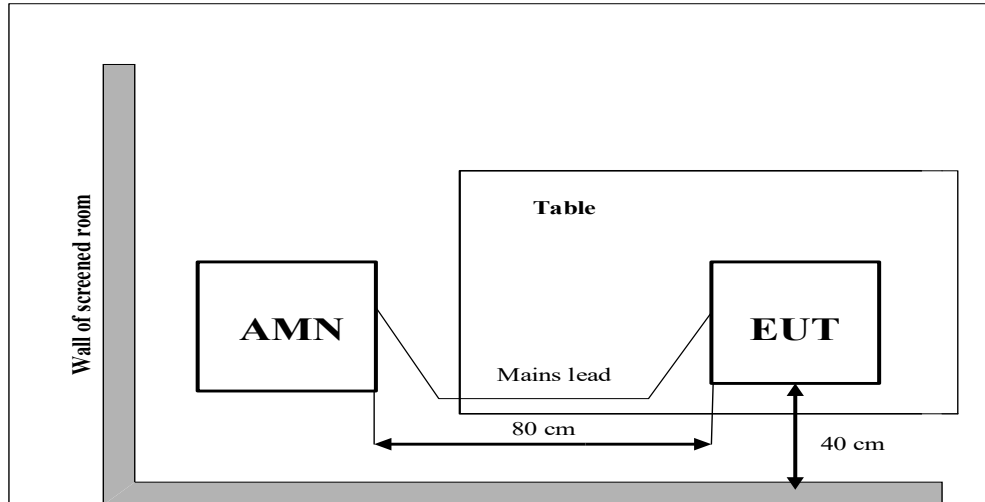
2) Radiated Measurements

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.



3) AC Power line Conducted Emission Measurement

The EUT is working as Bluetooth terminal. A communication link of Bluetooth is set up with a System Simulator (SS). The EUT is commanded to operate at maximum transmitting power.





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 -0.4dBi.
The RF transmitter uses an integrate antenna without connector.**

**A.1 Maximum Peak Output Power****Method of Measurement: See ANSI C63.10-clause 7.8.5.**

Use the following spectrum analyzer settings:

- a) Set Span = 6 MHz.
- b) Set RBW = 3 MHz.
- c) Set VBW = 3 MHz.
- d) Sweep time = auto.
- e) Detector = peak.
- f) Trace = max hold.
- g) Allow trace to stabilize.
- h) Use the marker-to-peak function to set the marker to the peak of the emission.
- i) The indicated level is the peak output power.

Measurement Limit:

| Standard | Limit (dBm) | E.I.R.P Limit (dBm) |
|--|-------------|---------------------|
| FCC CRF Part 15.247(b)(1) & RSS-247 Section 5.4 | < 30 | < 36 |

Measurement Results:

| Mode | Peak Conducted Output Power (dBm) | | |
|---------------|-----------------------------------|----------------|----------------|
| | 2402MHz (Ch0) | 2441MHz (Ch39) | 2480MHz (Ch78) |
| GFSK | 7.44 | 8.18 | 7.14 |
| $\pi/4$ DQPSK | 7.36 | 8.15 | 7.03 |
| 8DPSK | 7.36 | 8.16 | 7.08 |

The E.I.R.P Results are listed below:

| Mode | E.I.R.P (dBm) | | |
|---------------|---------------|----------------|----------------|
| | 2402MHz (Ch0) | 2441MHz (Ch39) | 2480MHz (Ch78) |
| GFSK | 7.04 | 7.78 | 6.74 |
| $\pi/4$ DQPSK | 6.96 | 7.75 | 6.63 |
| 8DPSK | 6.96 | 7.76 | 6.68 |

Note: E.I.R.P value = Conducted values (with conducted samples) + Antenna Gain.

Conclusion: Pass



A.2 Band Edges Compliance

Measurement Limit:

| Standard | Limit (dB) |
|---|------------|
| FCC 47 CFR Part 15.247 (d) & RSS-247 Section 5.1 | > 20 |

Measurement Result:

| Mode | Channel | Hopping | Test Results | Conclusion |
|---------------|---------|---------|--------------|------------|
| GFSK | 0 | ON | Fig.1 | P |
| | 78 | ON | Fig.2 | P |
| $\pi/4$ 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 |
| $\pi/4$ 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

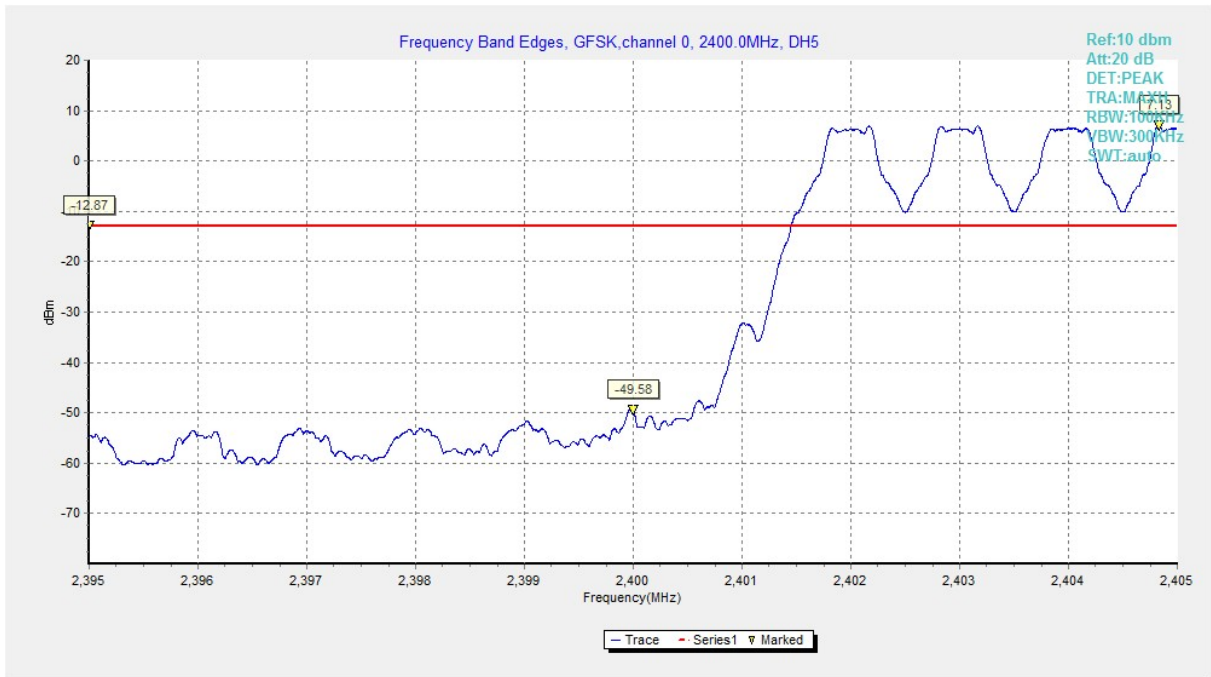


Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)

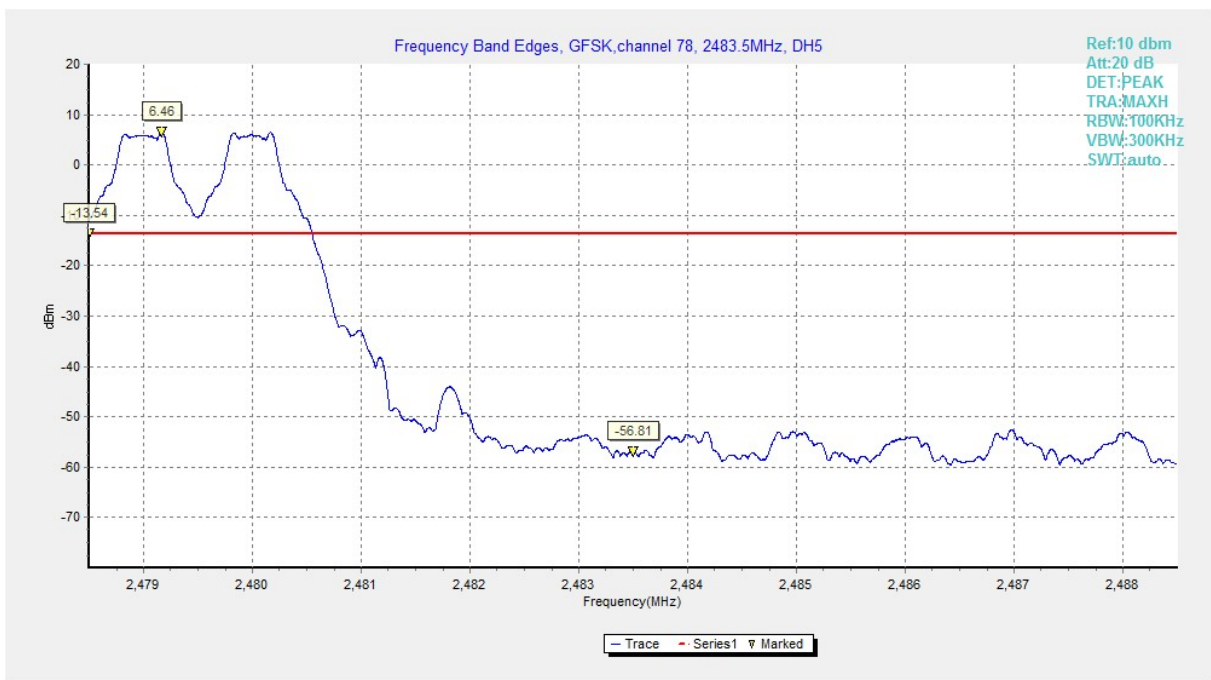


Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)

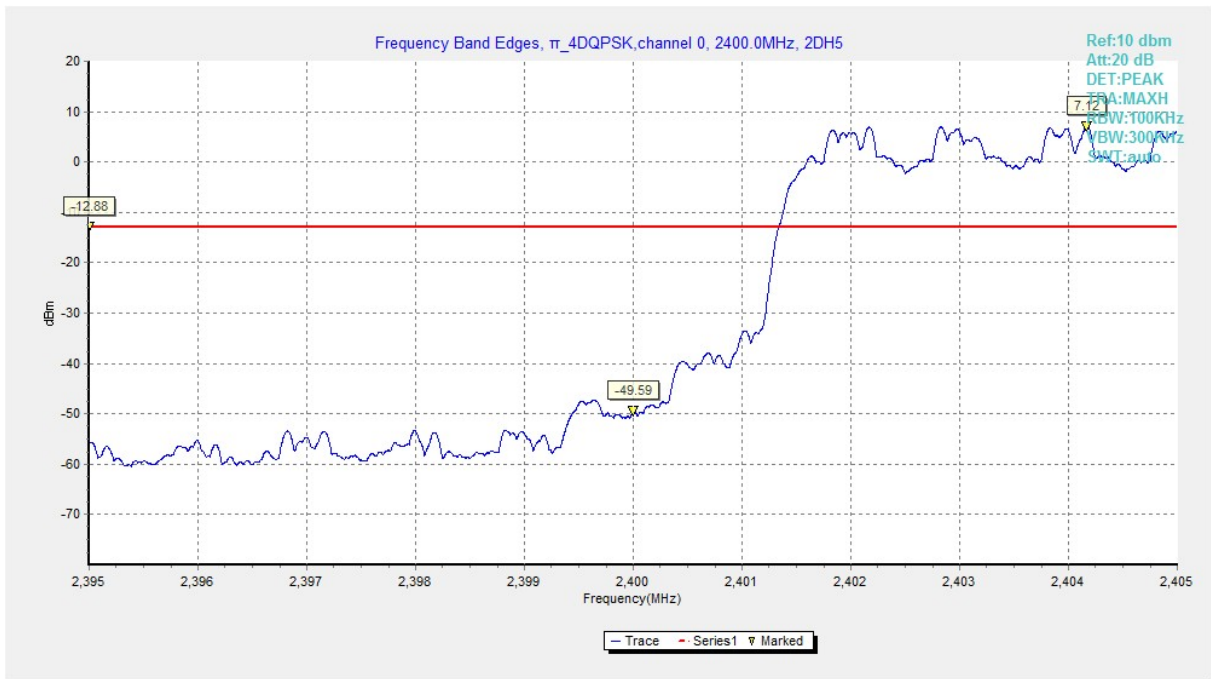


Fig. 3 Band Edges (π /4 DQPSK, Ch 0, Hopping ON)

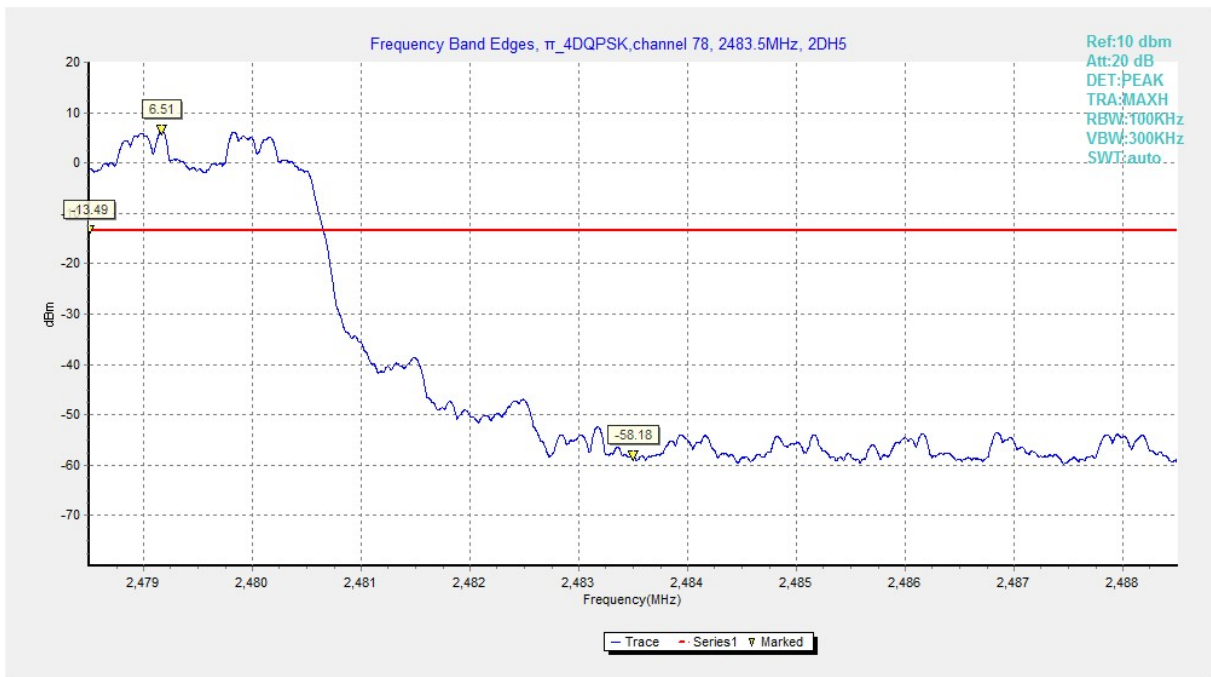


Fig. 4 Band Edges (π /4 DQPSK, Ch 78, Hopping ON)

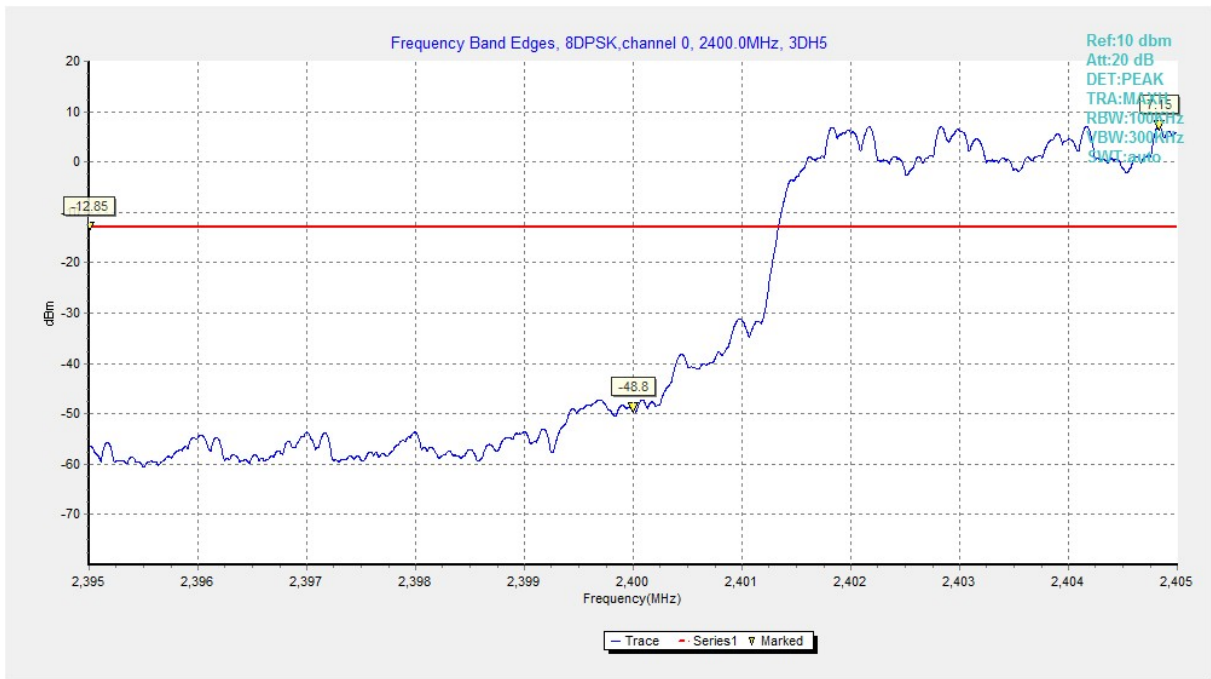


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

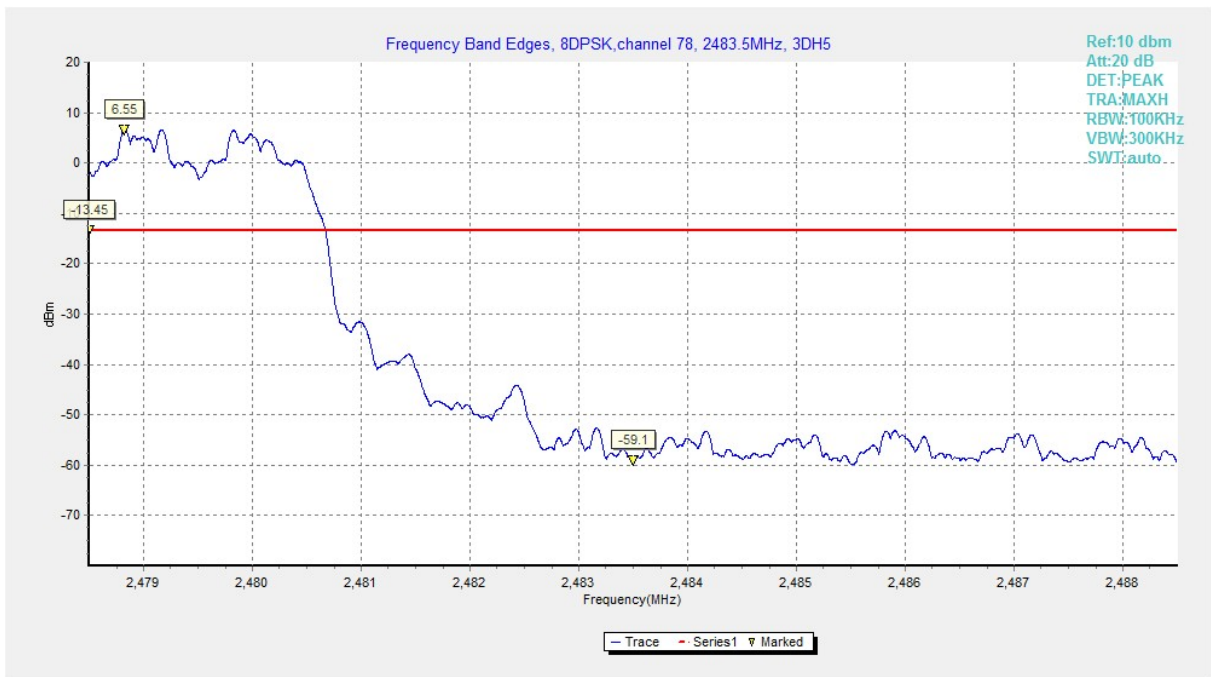


Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)

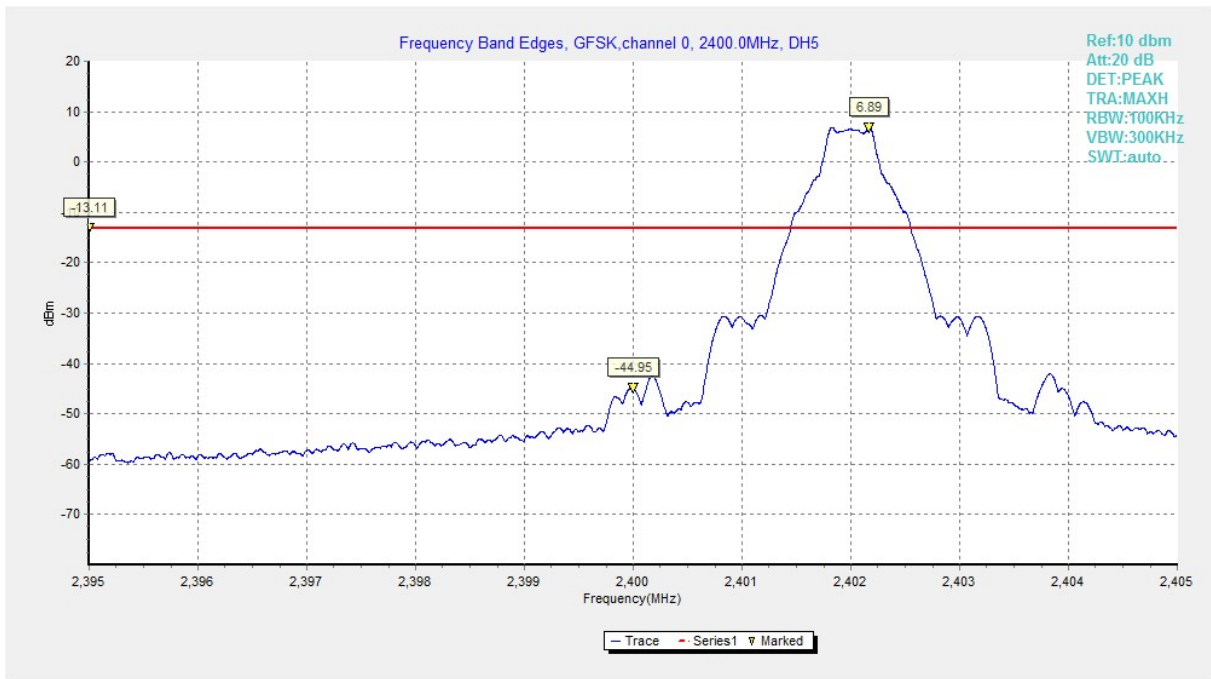


Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)

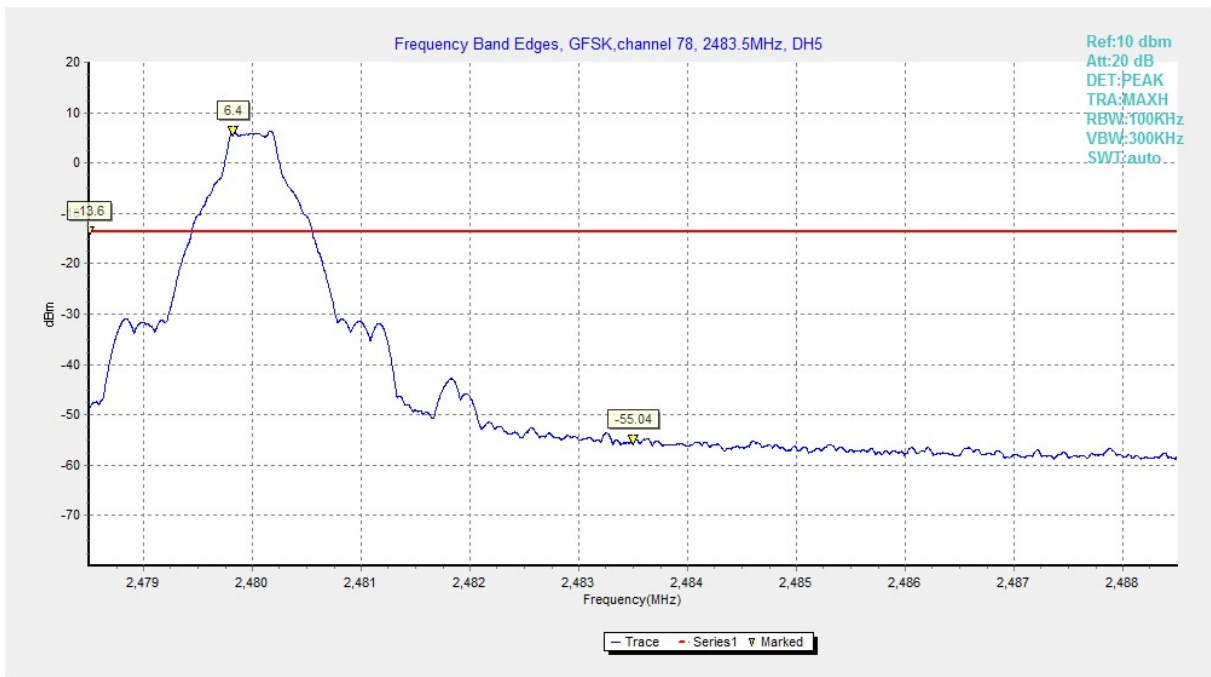


Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)

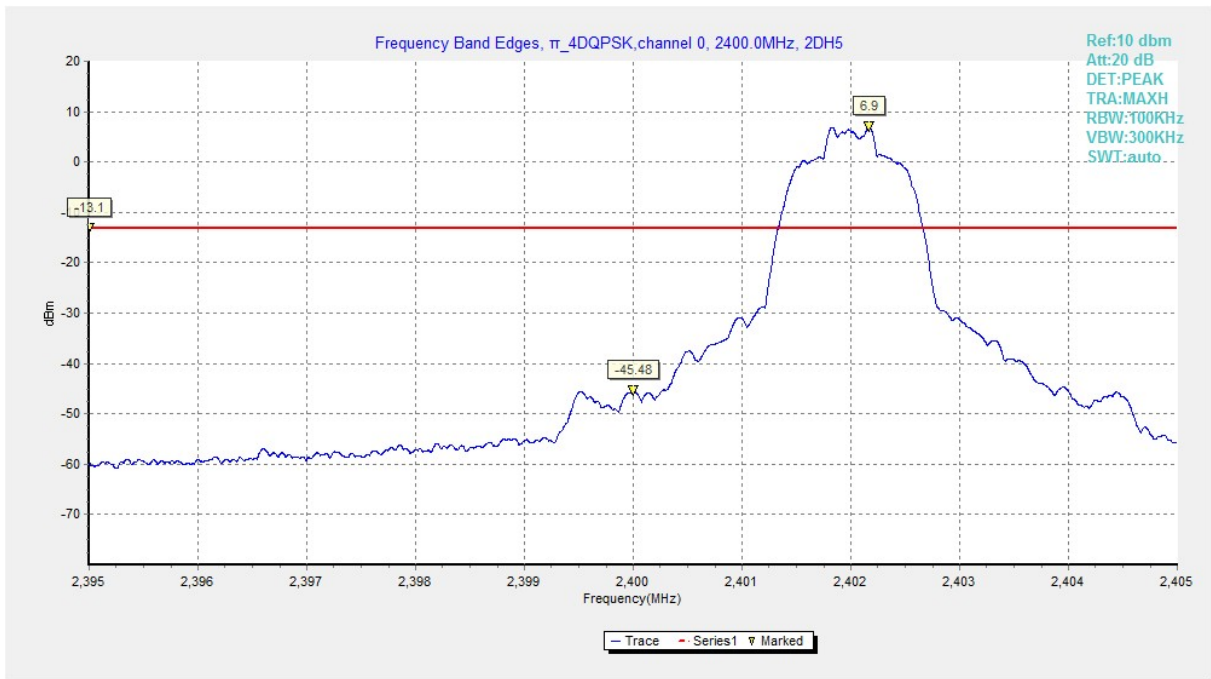


Fig. 9 Band Edges (π /4 DQPSK, Ch 0, Hopping OFF)

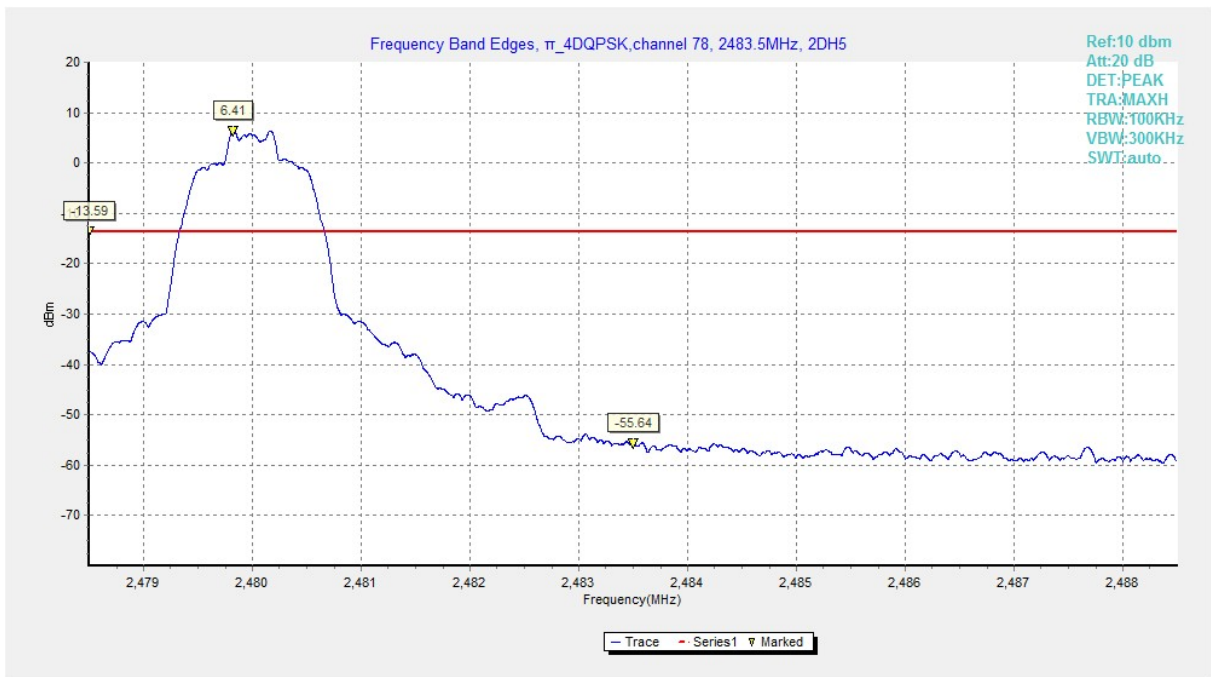


Fig. 10 Band Edges (π /4 DQPSK, Ch 78, Hopping OFF)

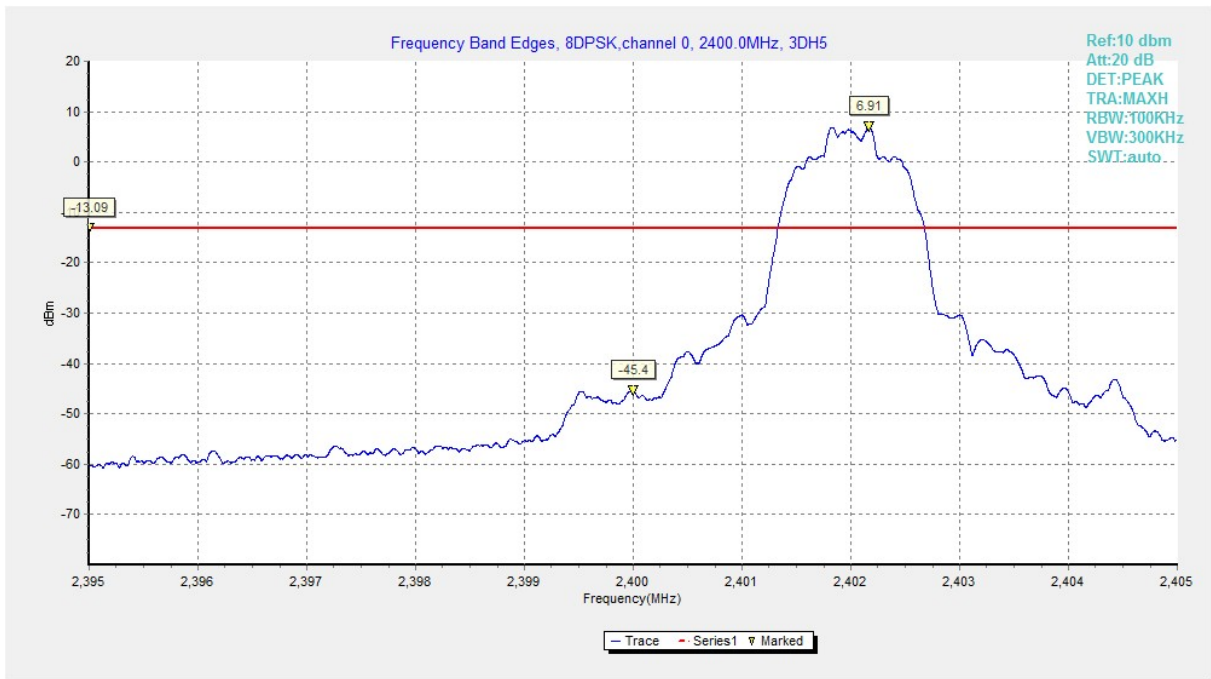


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

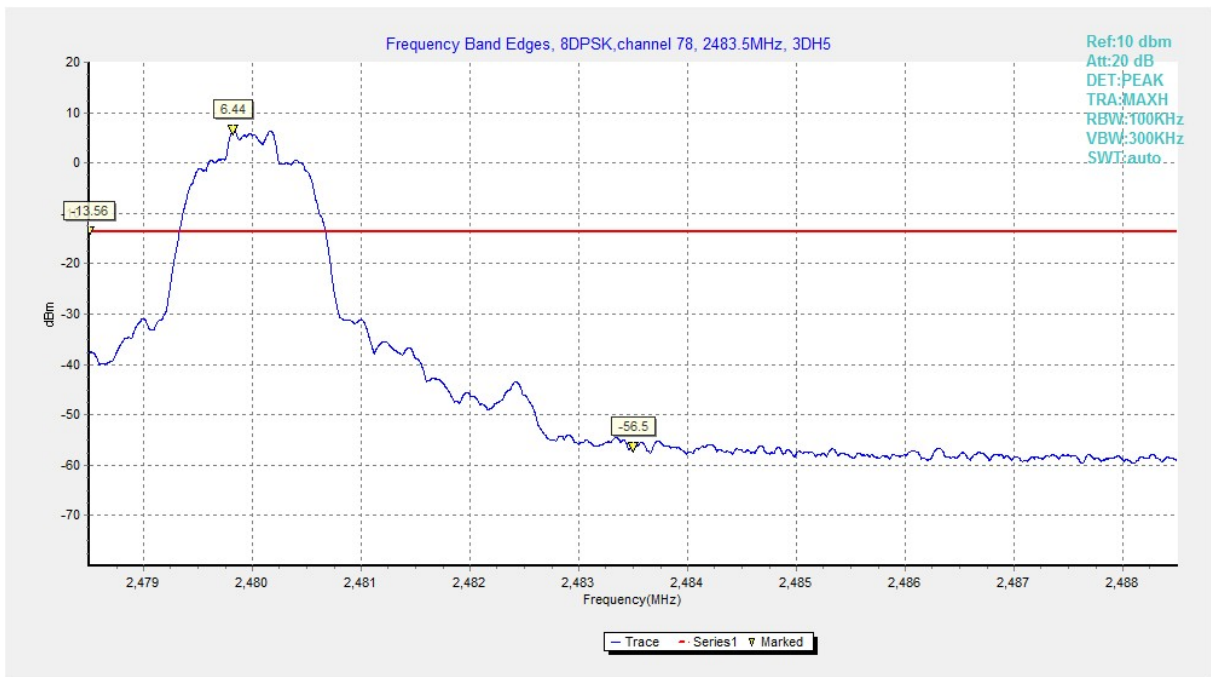


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)



A.3 Conducted Emission

Measurement Limit:

| Standard | Limit |
|---|---|
| FCC 47 CFR Part 15.247 (d) & RSS-247 section 5.5/RSS-Gen section 6.13 | 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 |
| $\pi/4$ 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

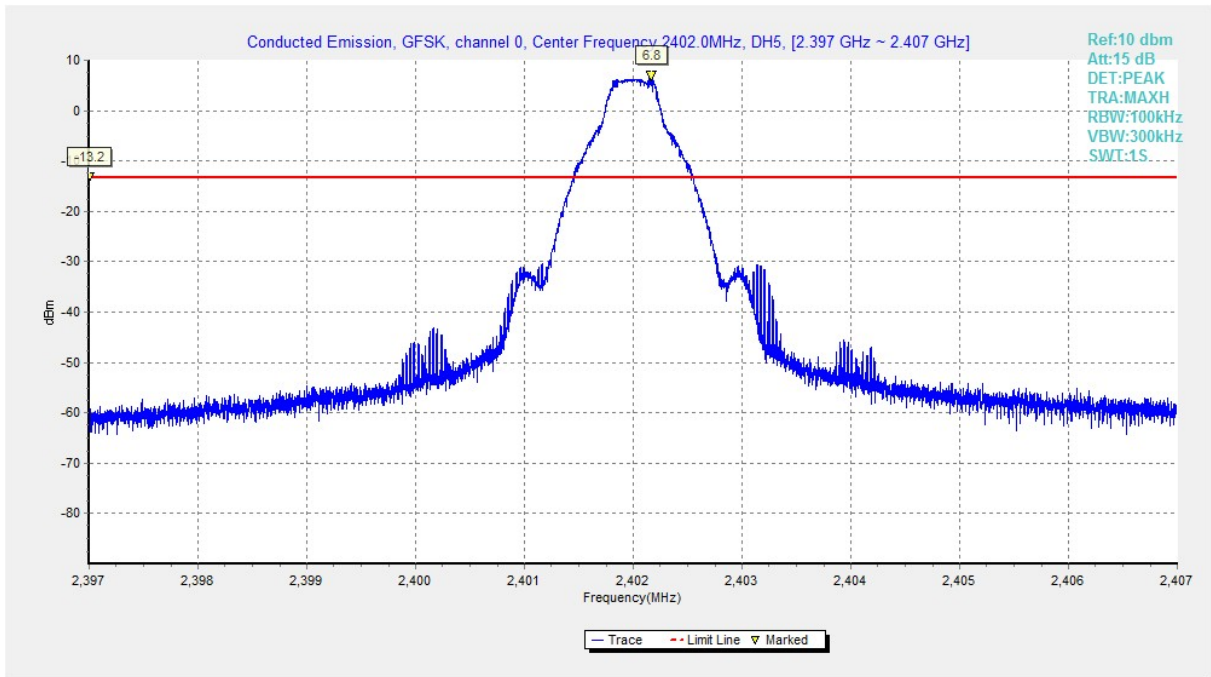


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

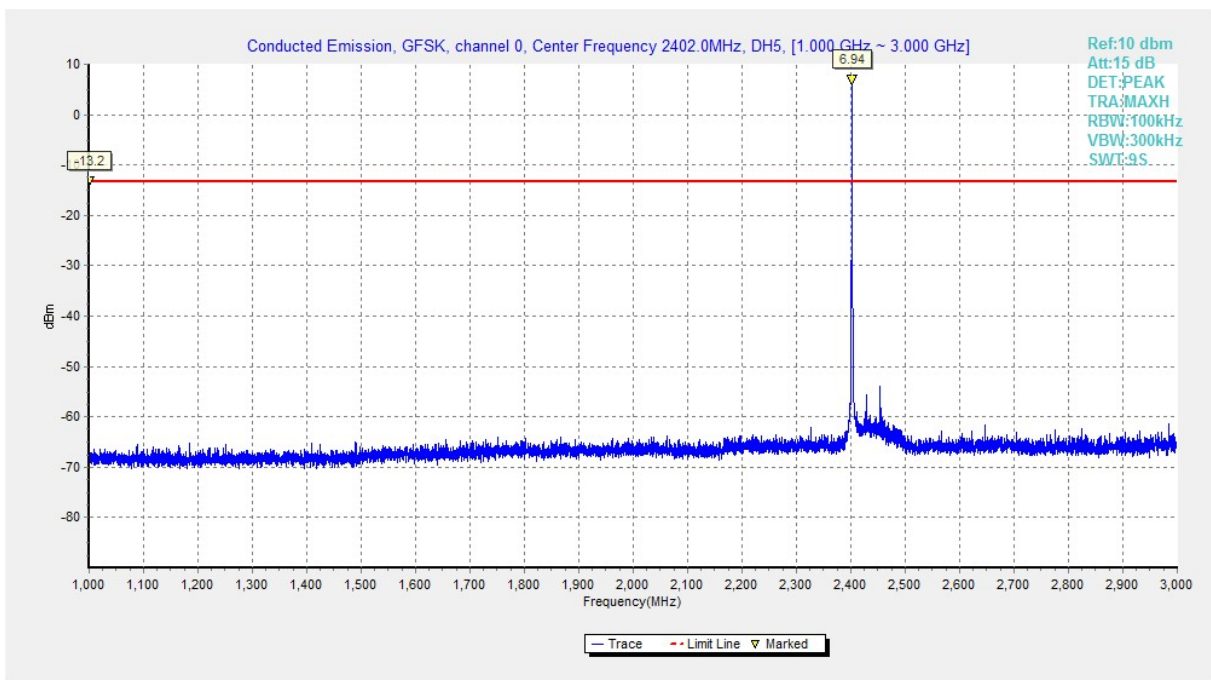


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)

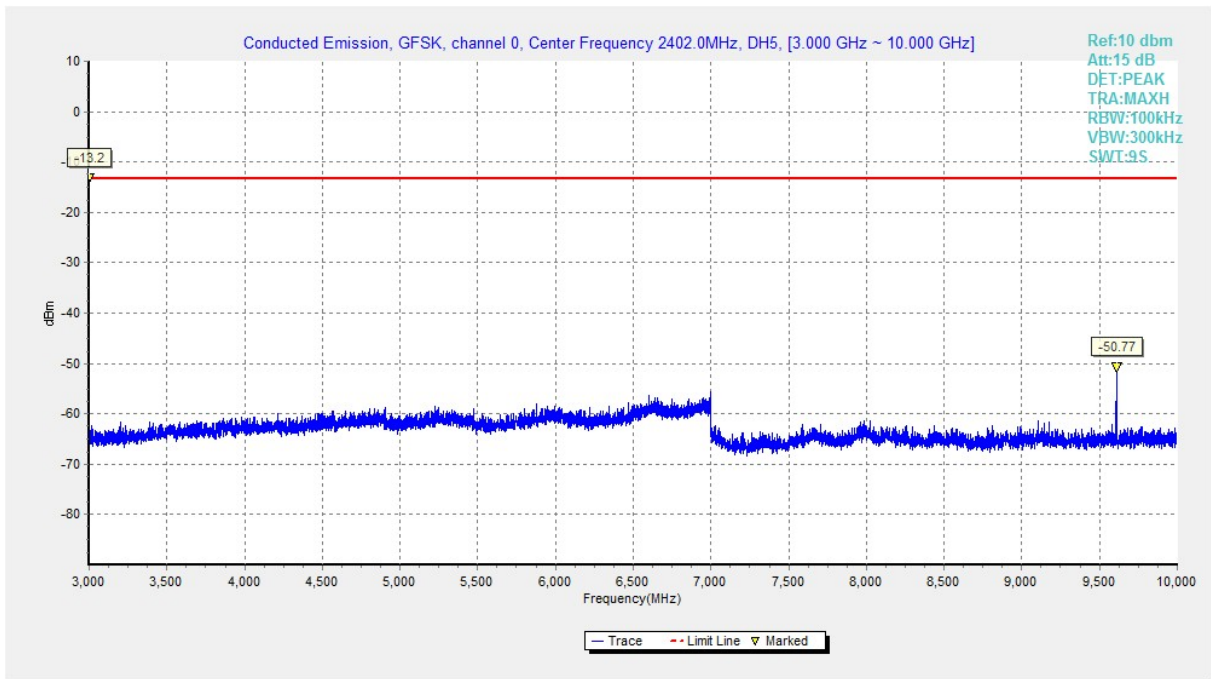


Fig. 15 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10 GHz)

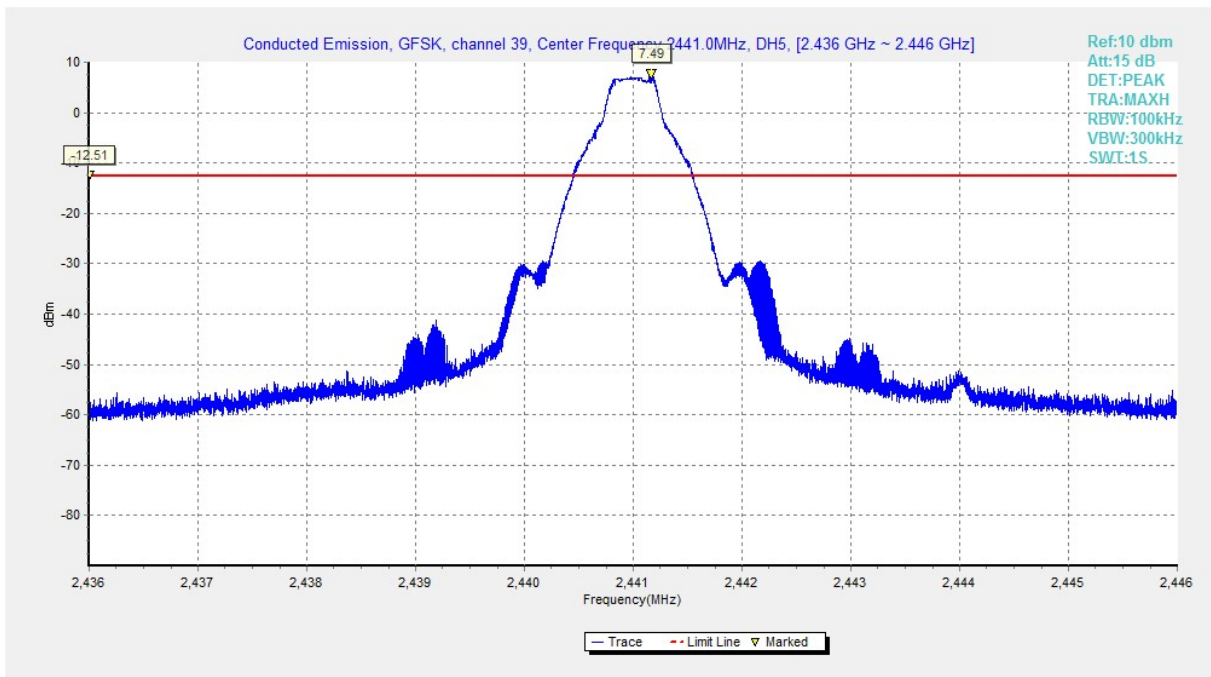


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)

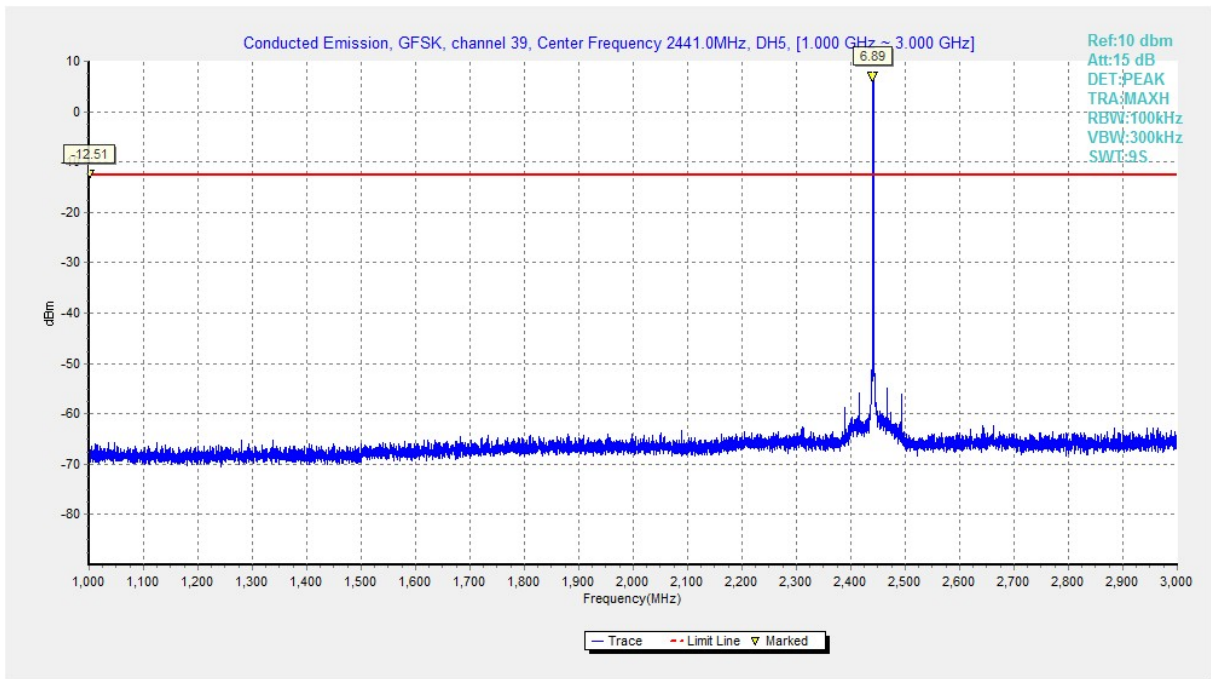


Fig. 17 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3 GHz)

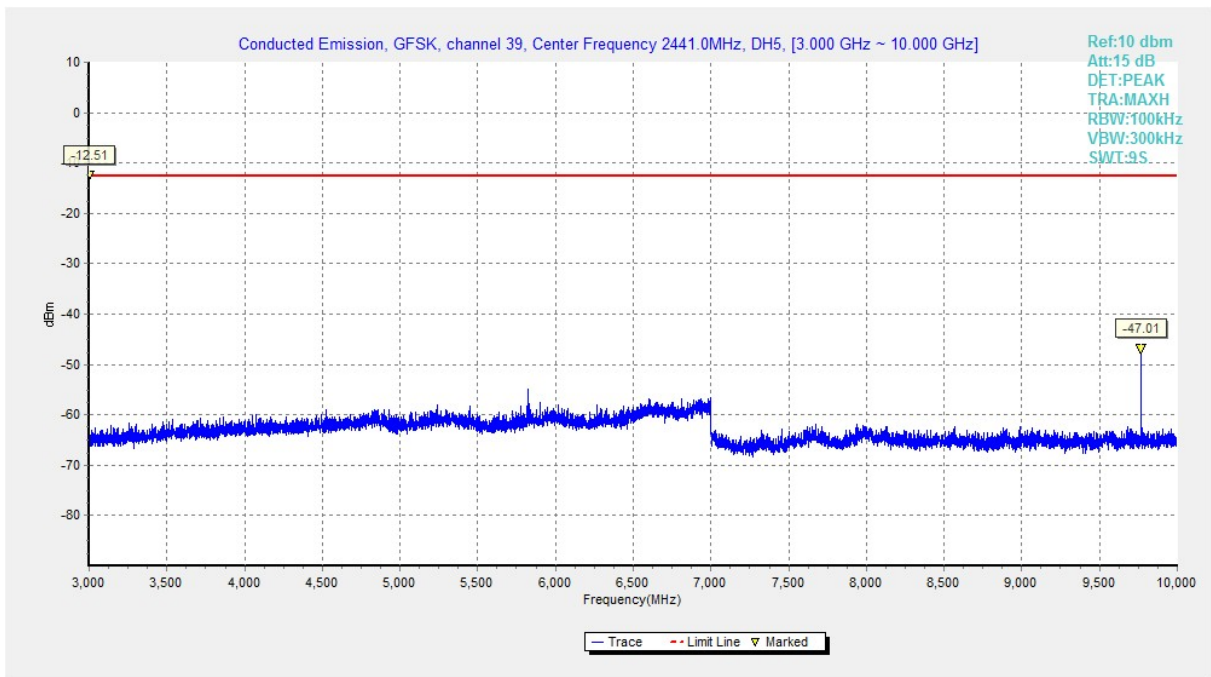


Fig. 18 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10 GHz)

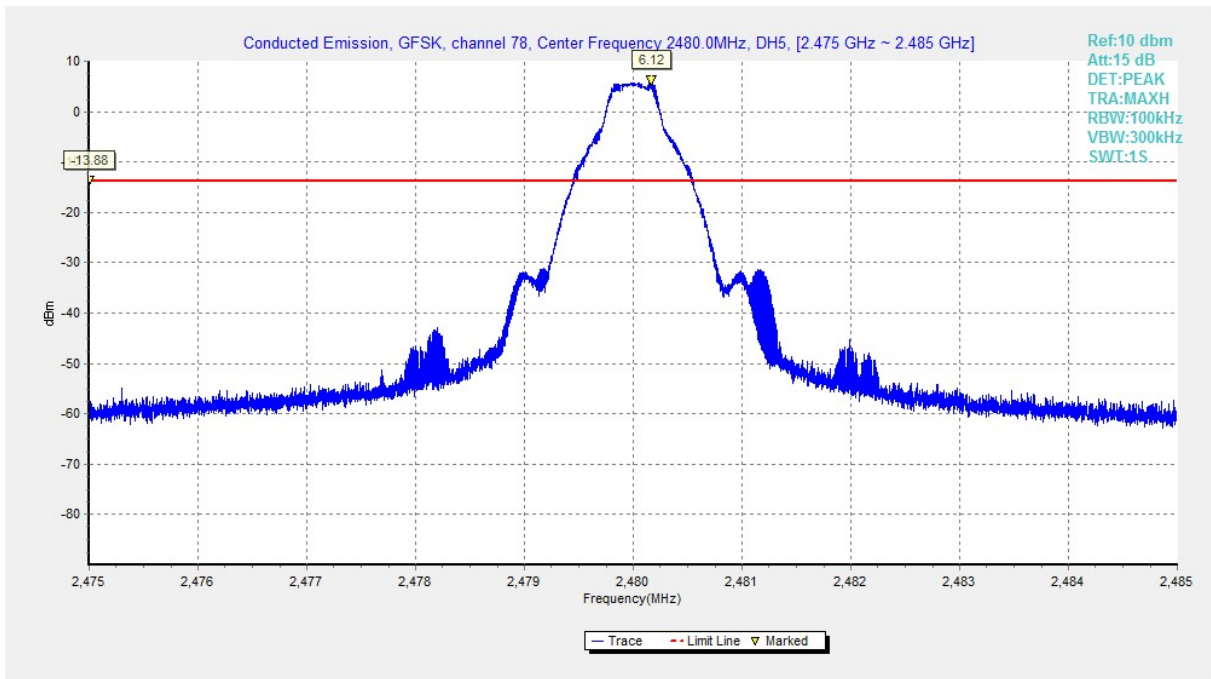


Fig. 19 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

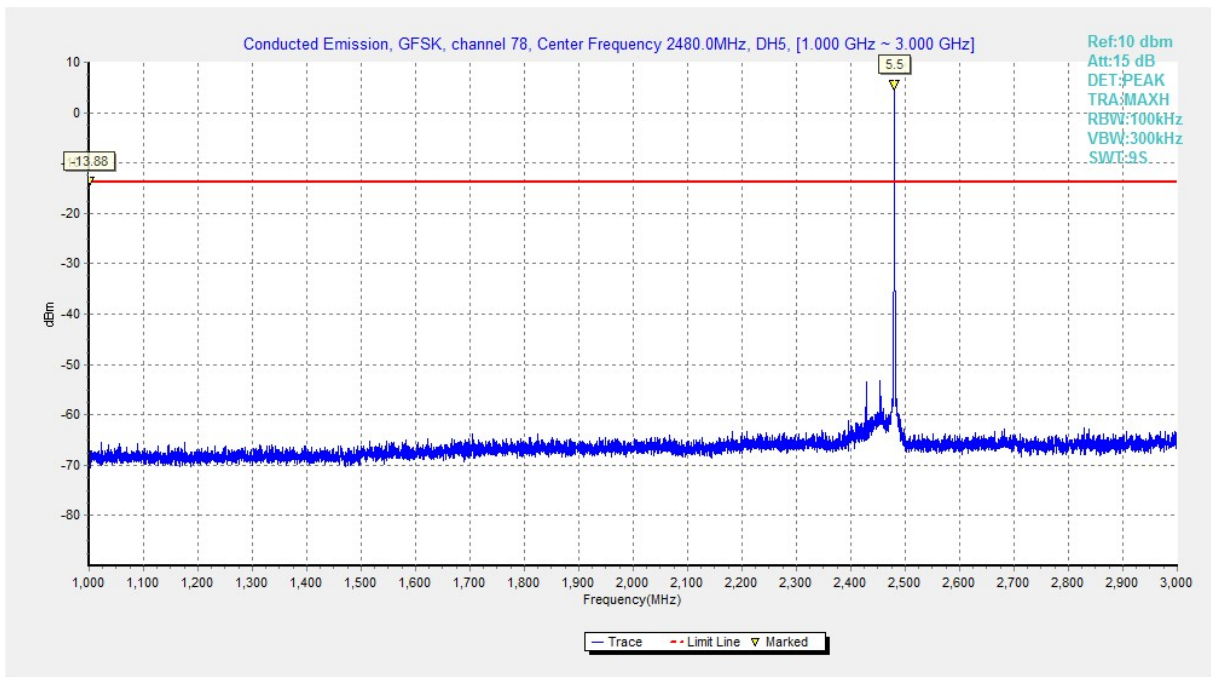


Fig. 20 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3 GHz)

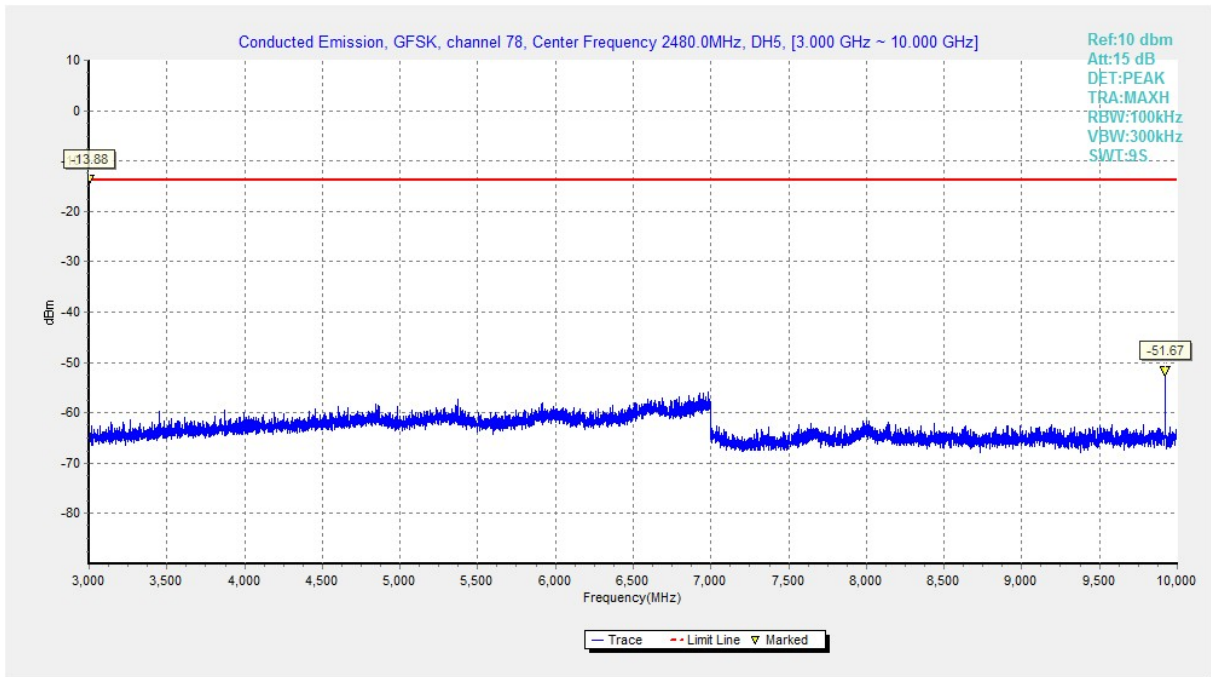


Fig. 21 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10 GHz)

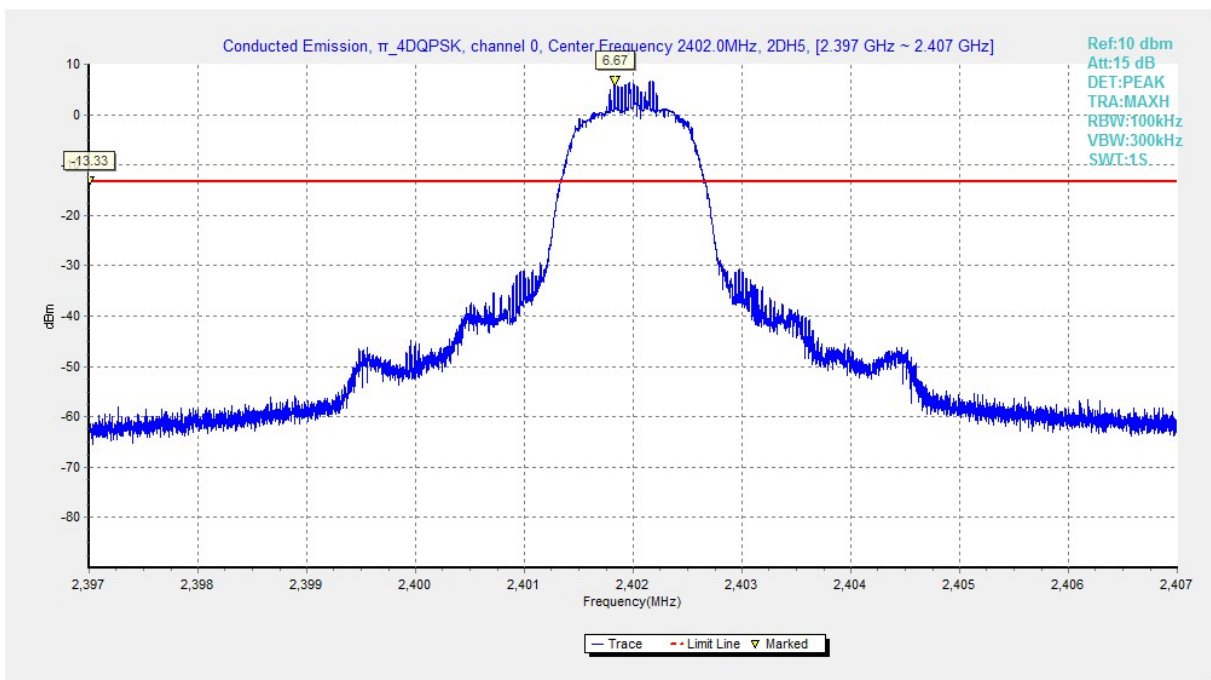


Fig. 22 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch0, 2.402GHz)

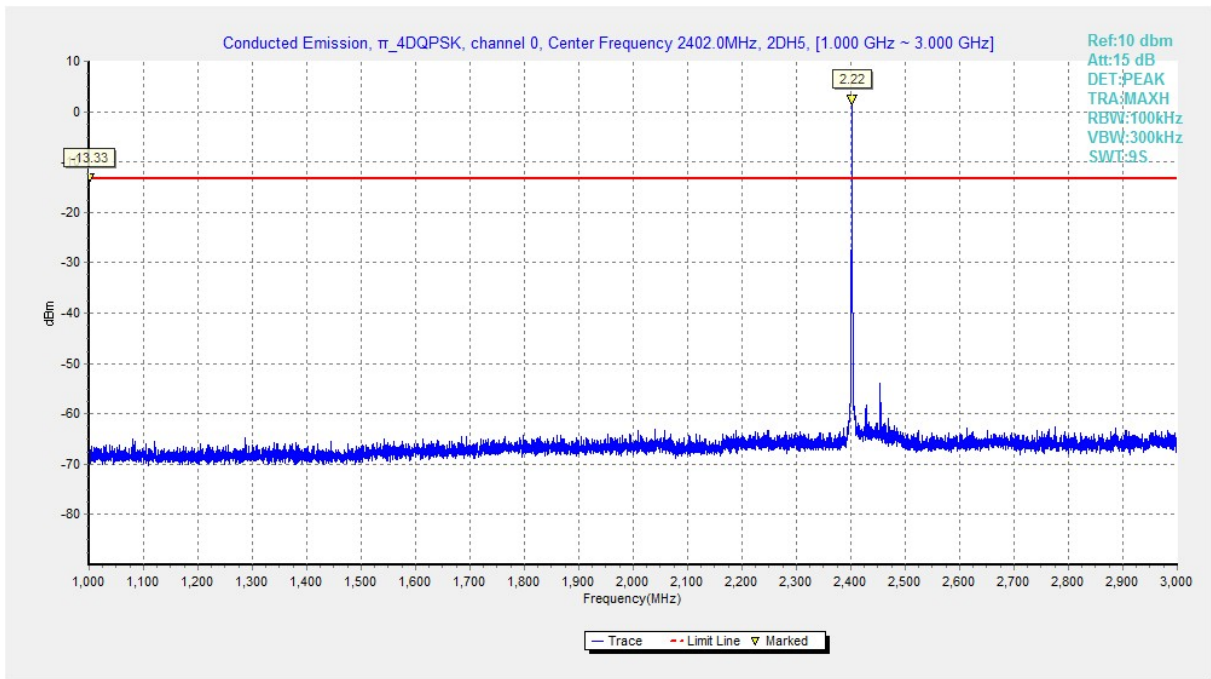


Fig. 23 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch0, 1GHz-3 GHz)

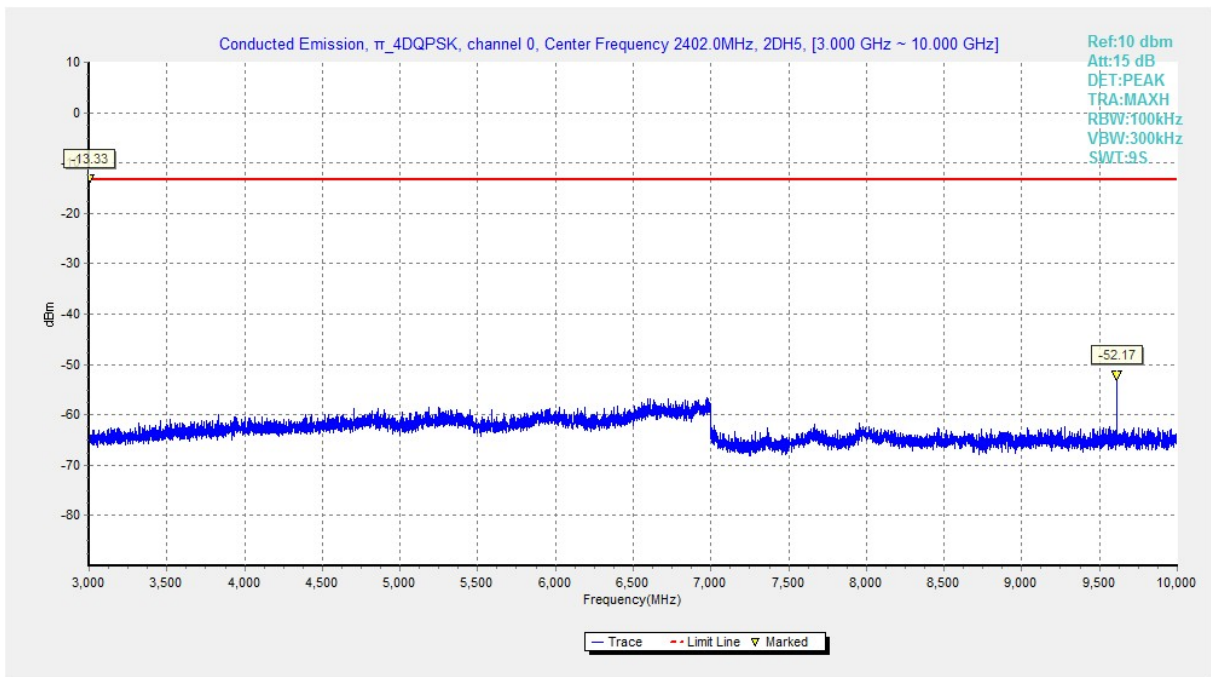


Fig. 24 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch0, 3GHz-10 GHz)

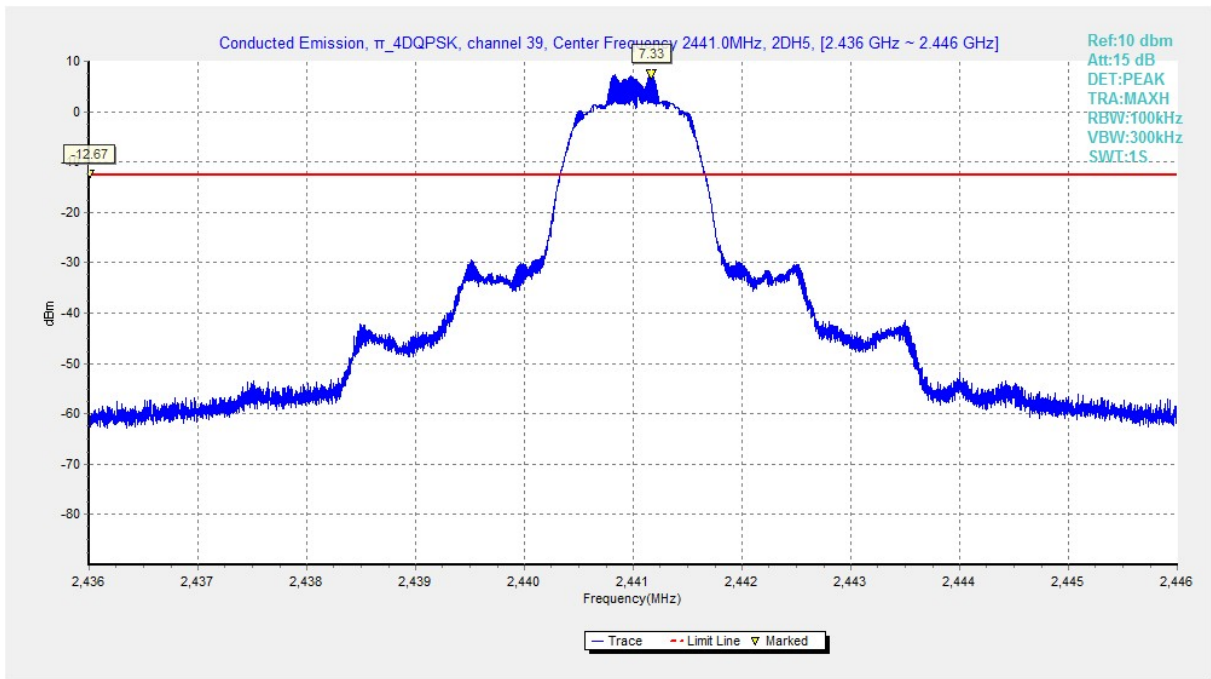


Fig. 25 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 2.441GHz)

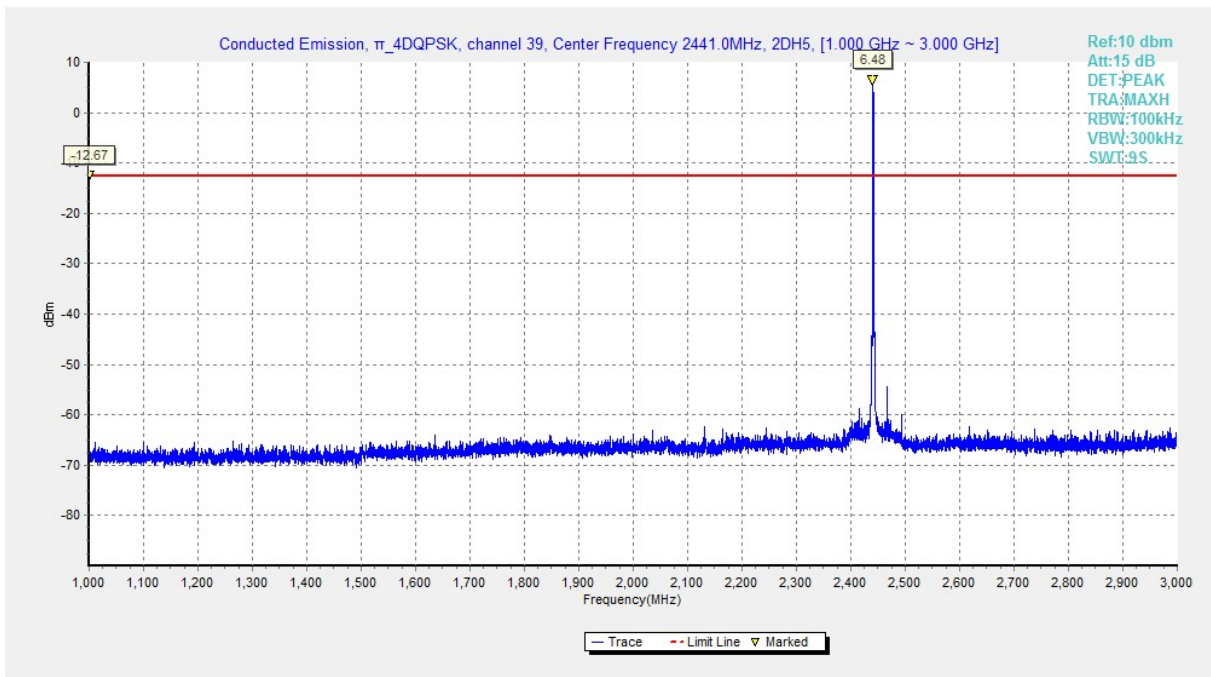


Fig. 26 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 1GHz-3 GHz)

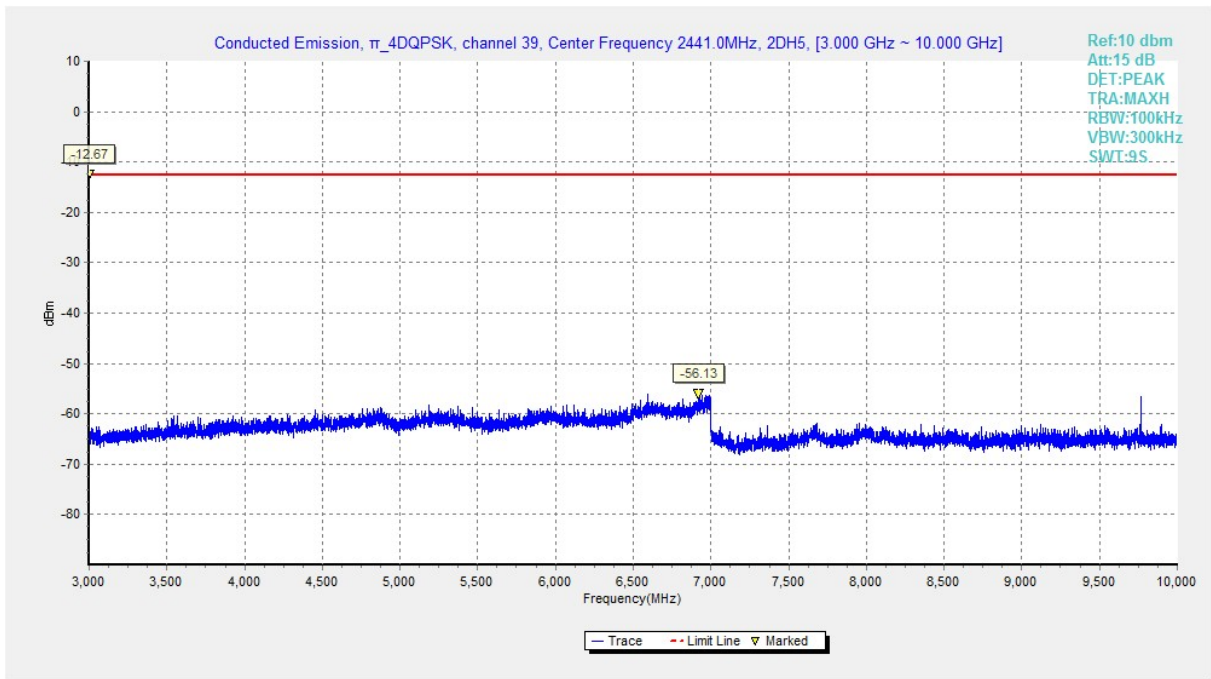


Fig. 27 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 3GHz-10 GHz)

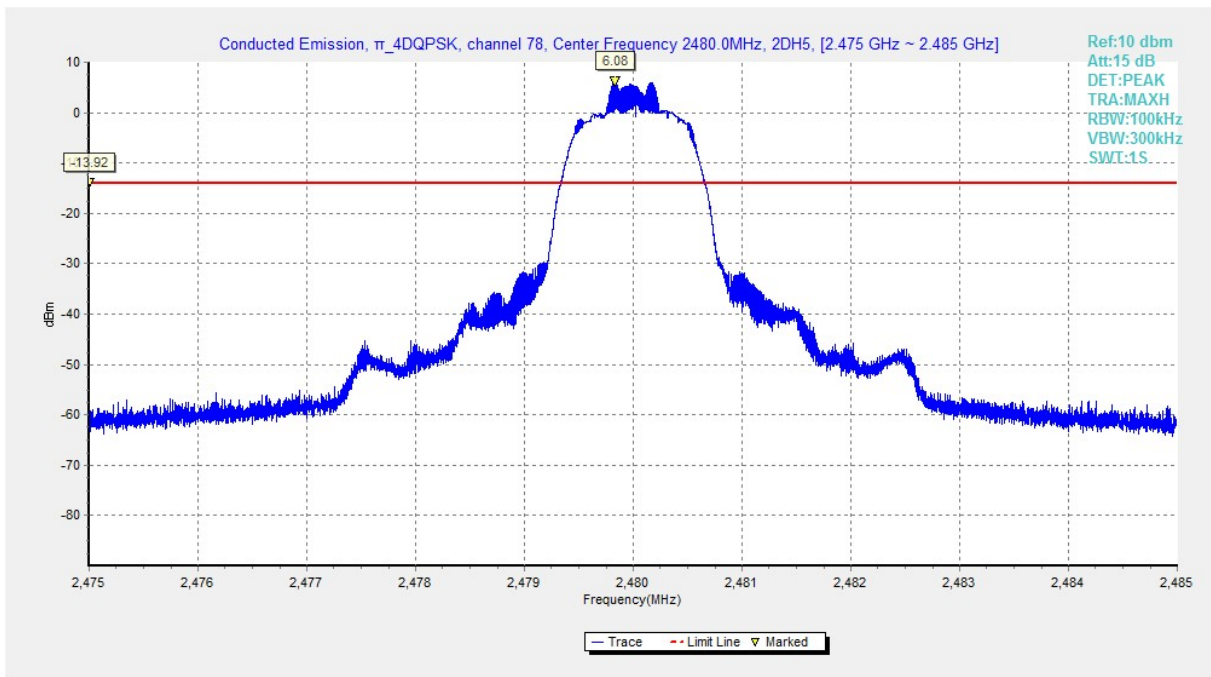


Fig. 28 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch78, 2.480GHz)

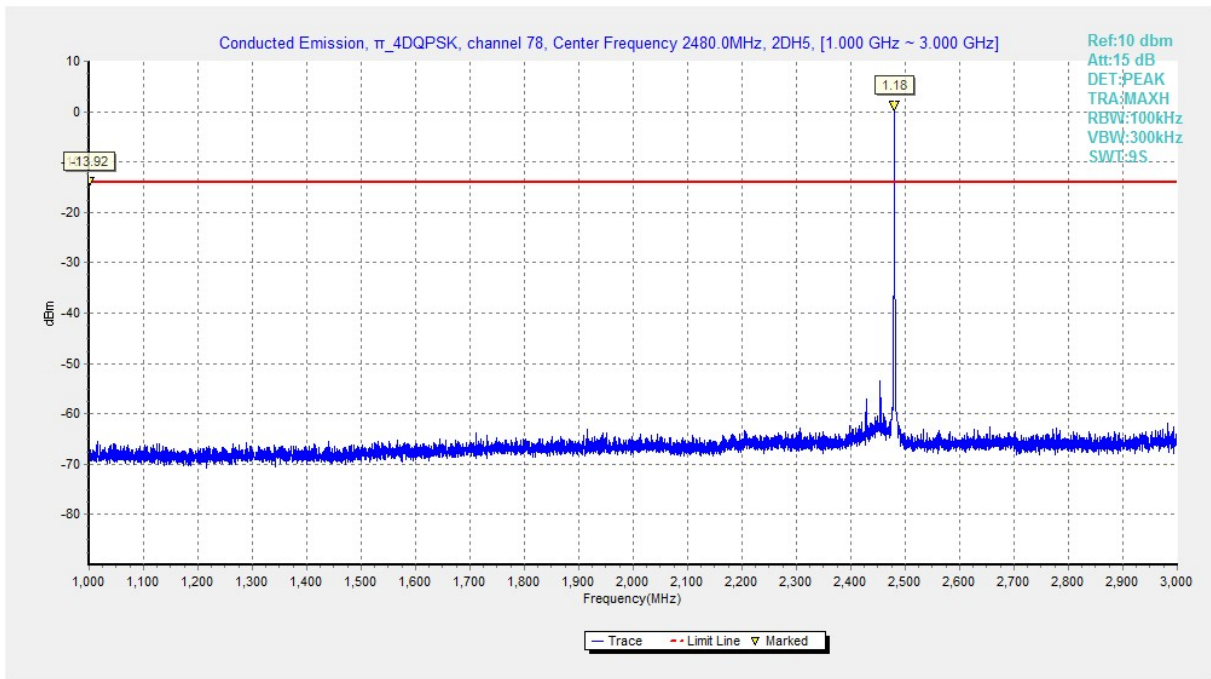


Fig. 29 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch78, 1GHz-3 GHz)

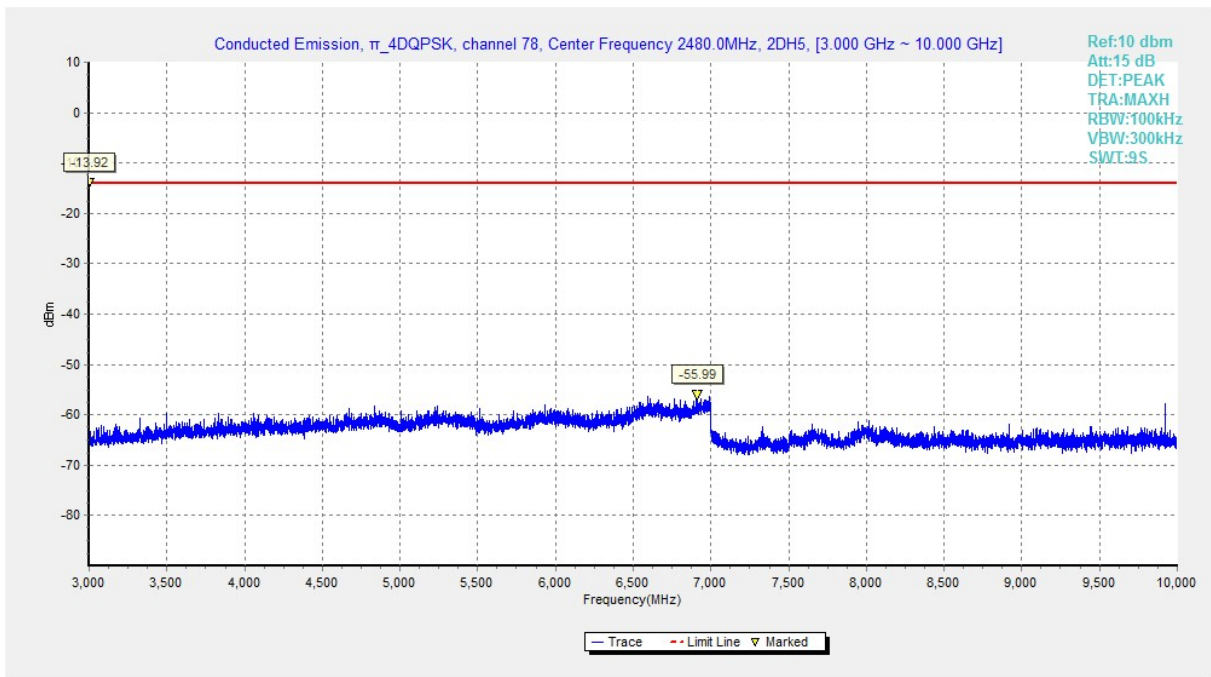


Fig. 30 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch78, 3GHz-10 GHz)

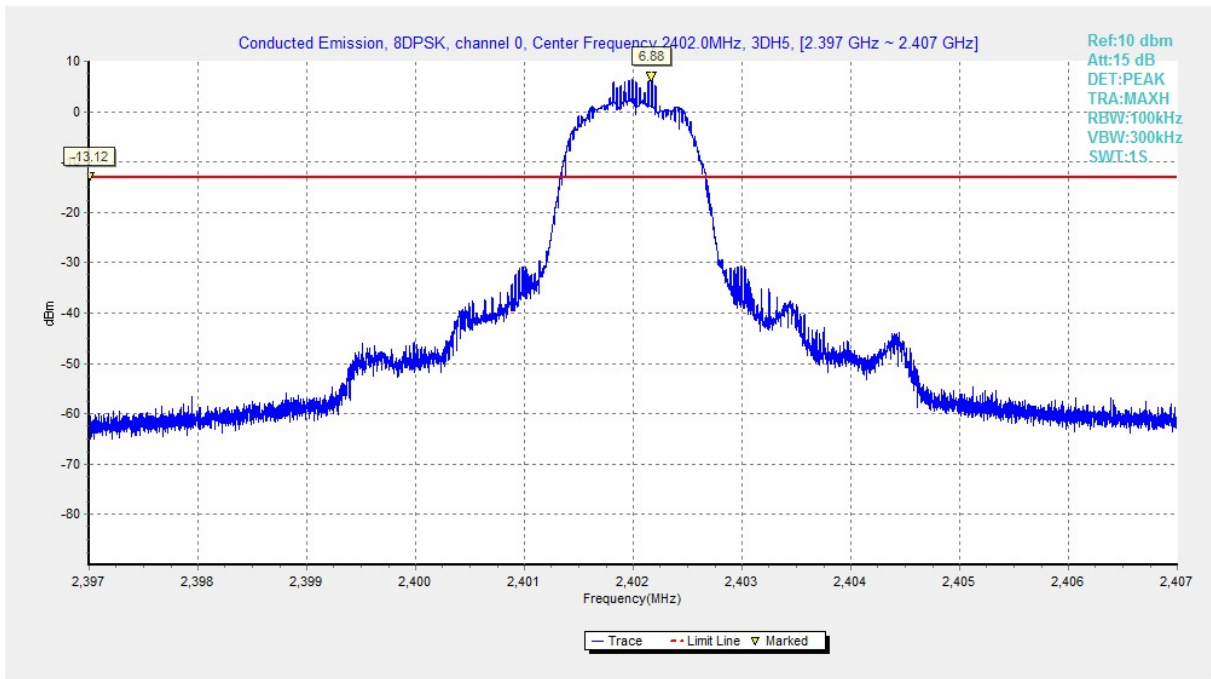


Fig. 31 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)

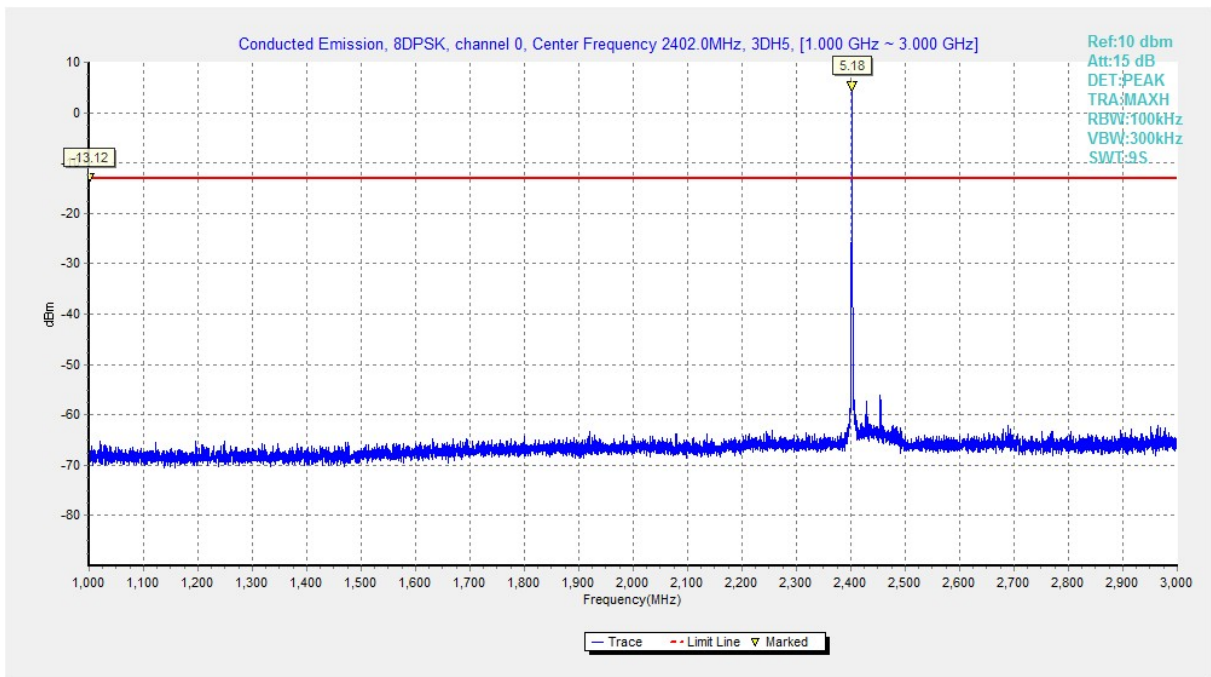


Fig. 32 Conducted Spurious Emission (8DPSK, Ch0, 1GHz-3 GHz)

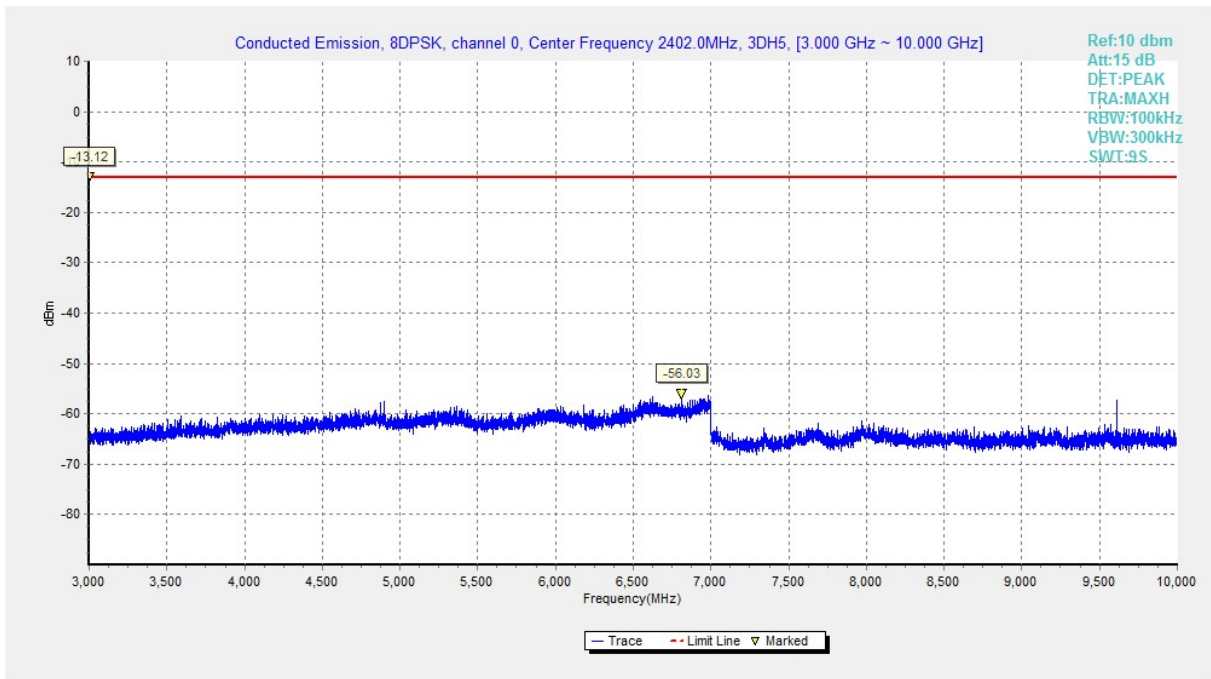


Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10 GHz)

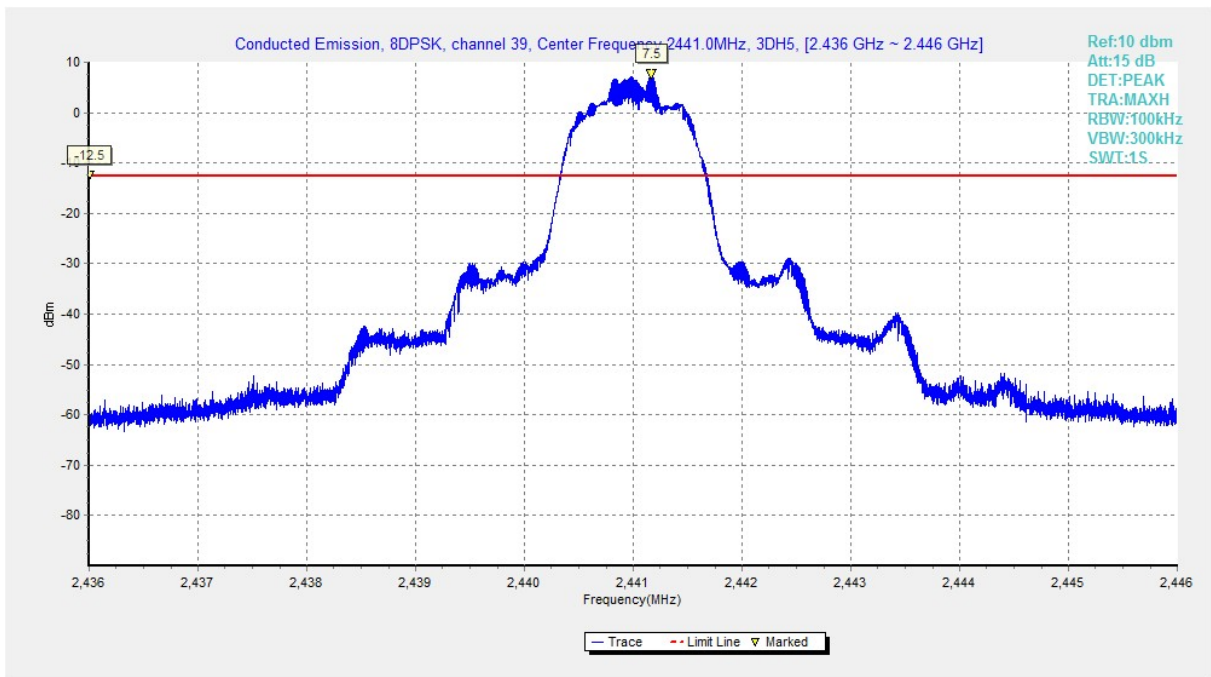


Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

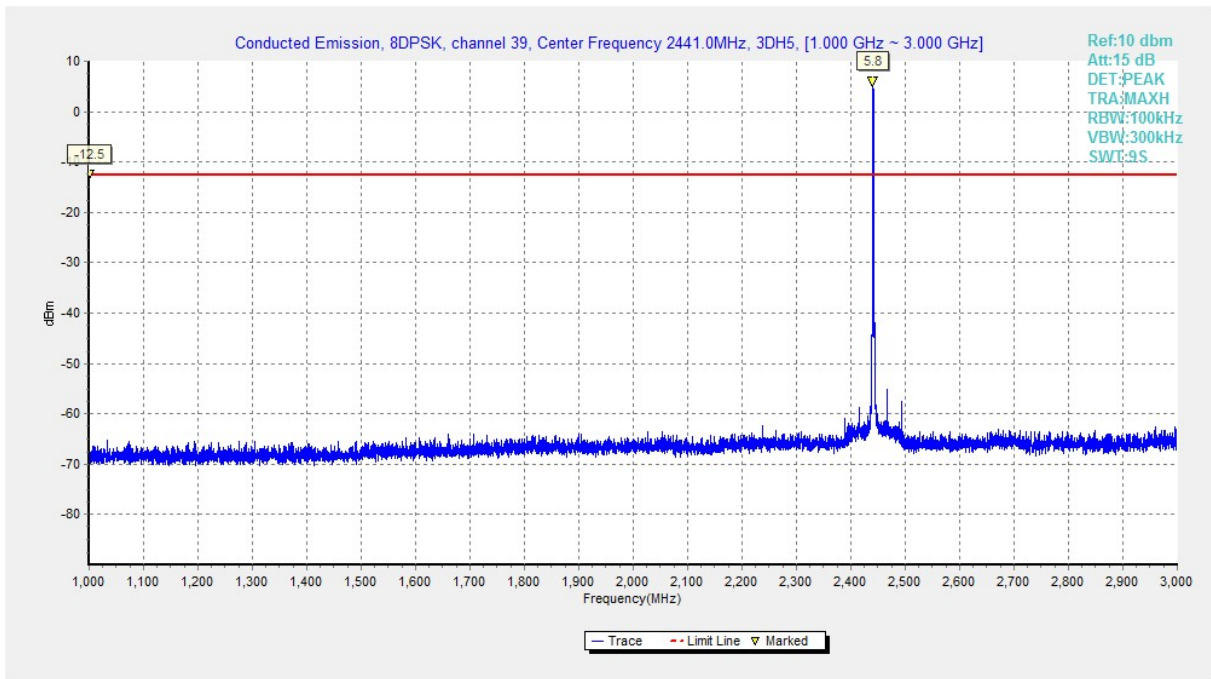


Fig. 35 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3 GHz)

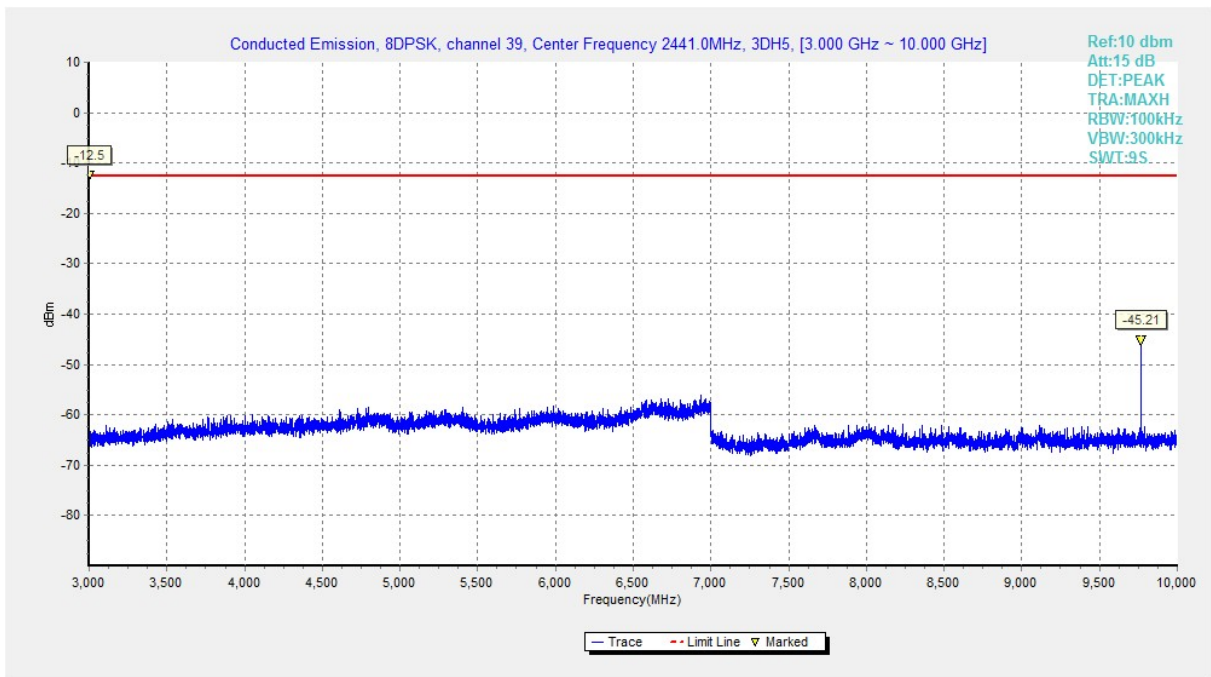


Fig. 36 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10 GHz)