FCC PART 15C
TEST REPORT
No. I19N00570-BT

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

smartphone

cp3705AS

with

Hardware Version: P0

Software Version: 9.0.3705AS.SPRINT.190408.1D

FCC ID: R38YLCP3705AS

Issued Date: 2019-04-28

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19N00570-BT	Rev.0	1st edition	2019-04-28

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: 15-30℃
Relative Humidity: 35-60%

1.3. Project data

Testing Start Date: 2019-03-29
Testing End Date: 2019-04-28

1.4. 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:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen
Contact Person	Yentl Chen
E-Mail	Chenyanting@yulong.com
Telephone:	+86 15927320221
Fax:	/

2.2. Manufacturer Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen
Contact Person	Yentl Chen
E-Mail	Chenyanting@yulong.com
Telephone:	+86 15927320221
Fax:	/

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

3.1. About EUT

Description	smartphone
Model Name	cp3705AS
Market Name	/
Frequency Band	2400MHz~2483.5MHz
Type of Modulation	GFSK/ π /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	-0.52dBi
Power Supply	3.85V DC by Battery
FCC ID	R38YLCP3705AS
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	990013490001984	P0	9.0.3705AS.SPRINT.190408.1D	2019-03-27

*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	Quick Charger 3.0	Q3W18-1U-A	Shenzhen Ruide
AE2	Battery	Li-ion Polymer	Tianjin Lishen
AE3	Battery	Li-ion Polymer	Zhuhai Coslight

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

3.4. General Description

The Equipment Under Test (EUT) are a model of Mobile Phone with integrated antenna.
It consists of normal options: travel charger, USB cable.
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	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 did not exceed following limits along the EMC testing

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, 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 did not exceed following limits along the EMC testing

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. =20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-10000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, 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

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due 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	Test Receiver	ESCI	100702	Rohde & Schwarz	2019-06-20	1 year
4	LISN	ENV216	102067	Rohde & Schwarz	2019-07-18	1 year

Radiated emission test system

NO.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Loop Antenna	HLA6120	35779	TESEQ	2019-05-02	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	2019-11-28	1 year
5	Spectrum Analyser	FSV40	101192	Rohde & Schwarz	2019-05-21	1 year
6	Chamber	FACT3-2.0	1285	ETS-Lindgren	2020-07-20	3 years
7	Antenna	QSH-SL-18-26-S-20	17013	Q-par	2020-01-15	3 years
8	Antenna	QSH-SL-26-40-K-20	17014	Q-par	2020-01-11	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. 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	±1.94dB
	30MHz≤f≤1GHz	±5.12dB
	1GHz≤f≤18GHz	±5.05dB
	18GHz≤f≤40GHz	±4.68dB
6. AC Power line Conducted Emission	150kHz≤f≤30MHz	±3.00dB

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 -0.52dBi.
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)
FCC CRF Part 15.247(b)(1)	< 30

Measurement Results:

	Peak Conducted Output Power（dBm）		
Mode	**Channel**	**Test Results**	
GFSK	**2402MHz(Ch0)**	1.72	Fig.1
	2441MHz(Ch39)	2.13	Fig.2
	2480 MHz(Ch78)	1.38	Fig.3
π/4 DQPSK	**2402MHz(Ch0)**	1.82	Fig.4
	2441MHz(Ch39)	2.18	Fig.5
	2480 MHz(Ch78)	1.44	Fig.6
8DPSK	**2402MHz(Ch0)**	2.21	Fig.7
	2441MHz(Ch39)	2.60	Fig.8
	2480 MHz(Ch78)	1.88	Fig.9

See below for test graphs.

Conclusion: Pass

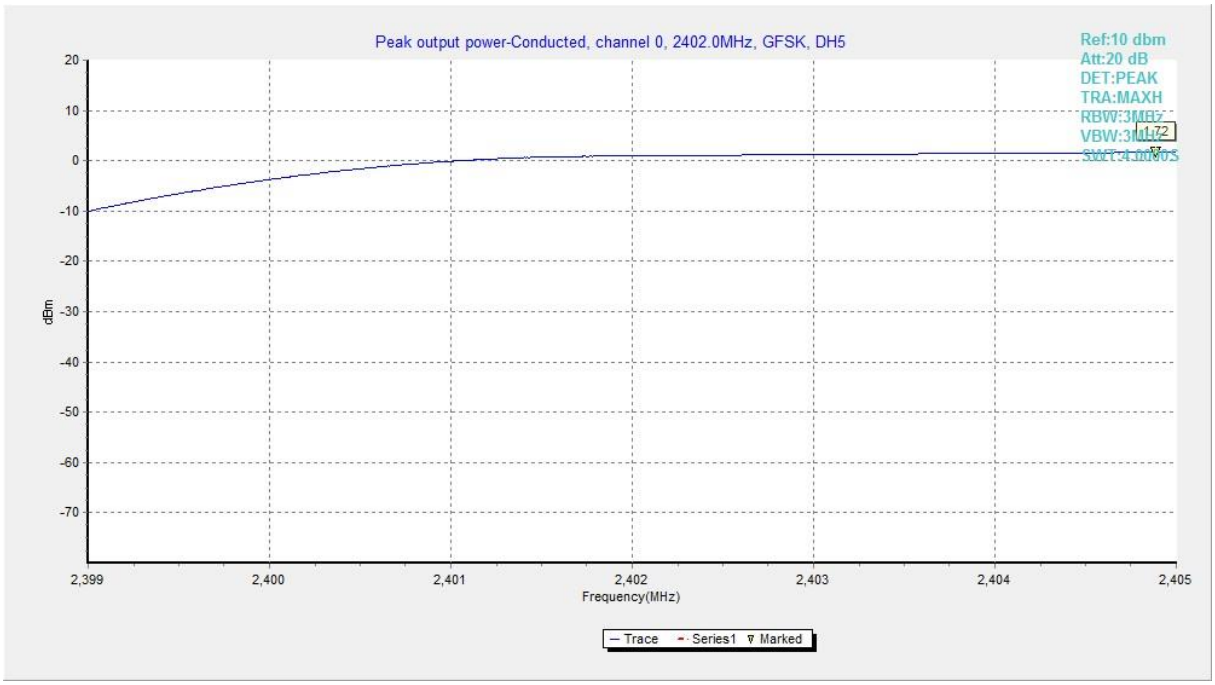

Fig. 1 Maximum Peak Output Power (GFSK, Ch 0)

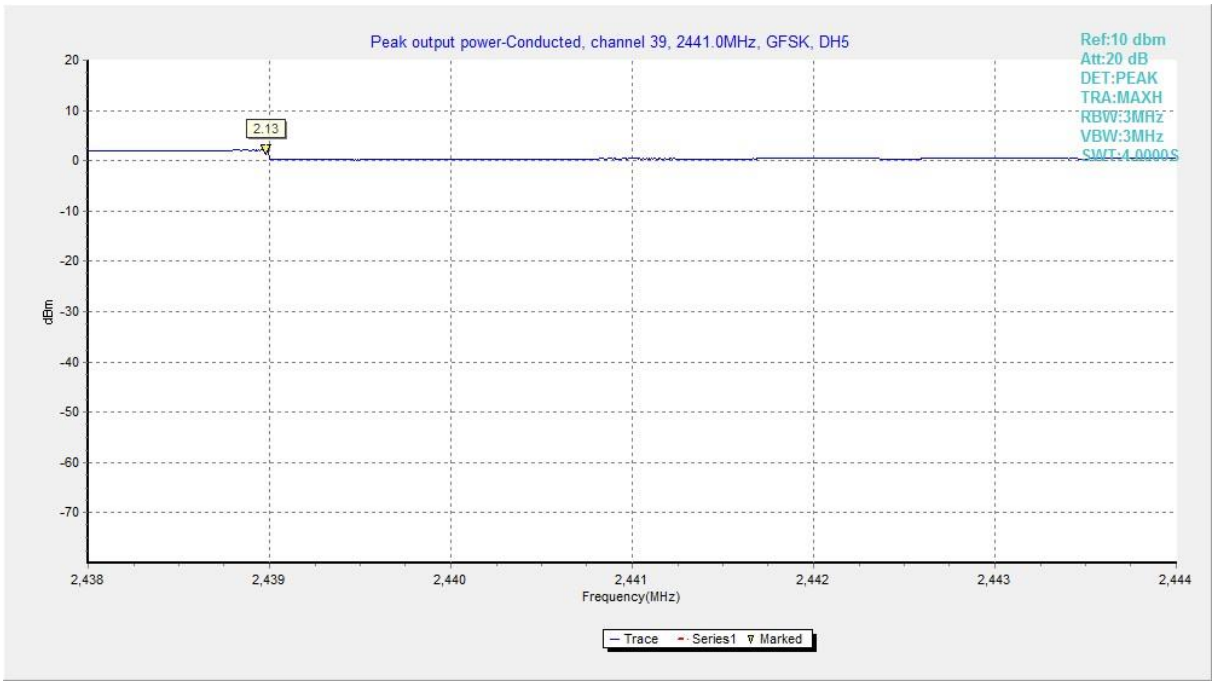

Fig. 2 Maximum Peak Output Power (GFSK, Ch 39)

Fig. 3 Maximum Peak Output Power (GFSK, Ch 78)

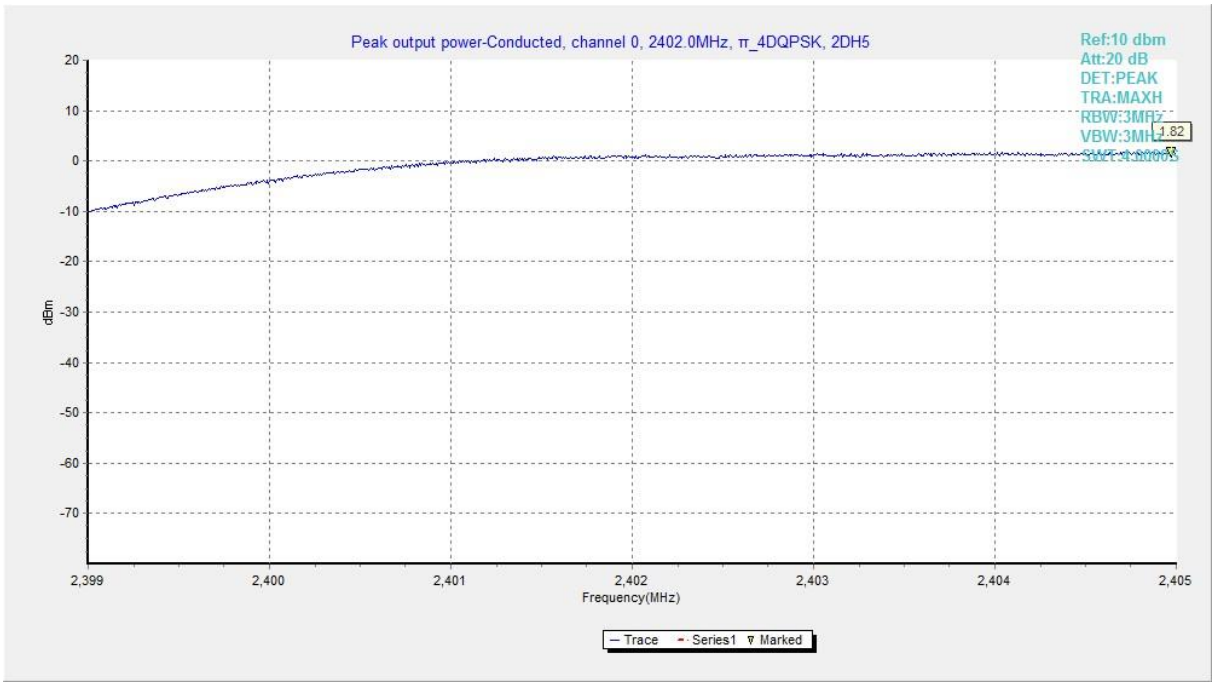

Fig. 4 Maximum Peak Output Power (π /4 DQPSK, Ch 0)

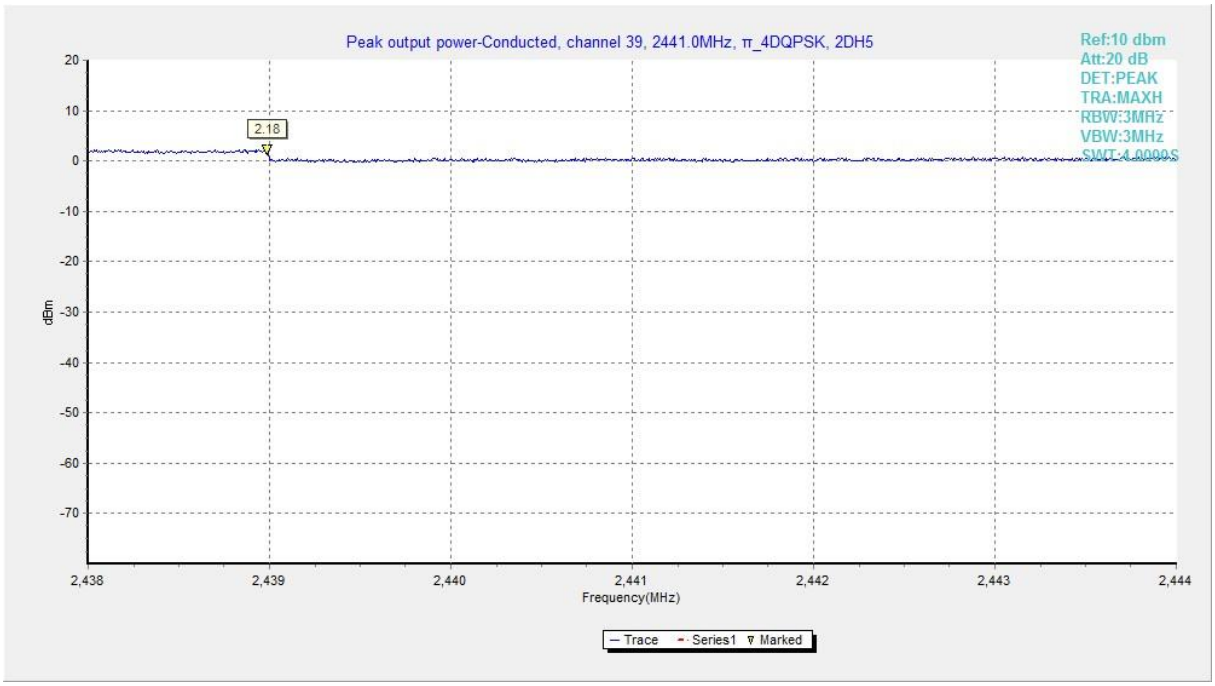

Fig. 5 Maximum Peak Output Power (π /4 DQPSK, Ch 39)

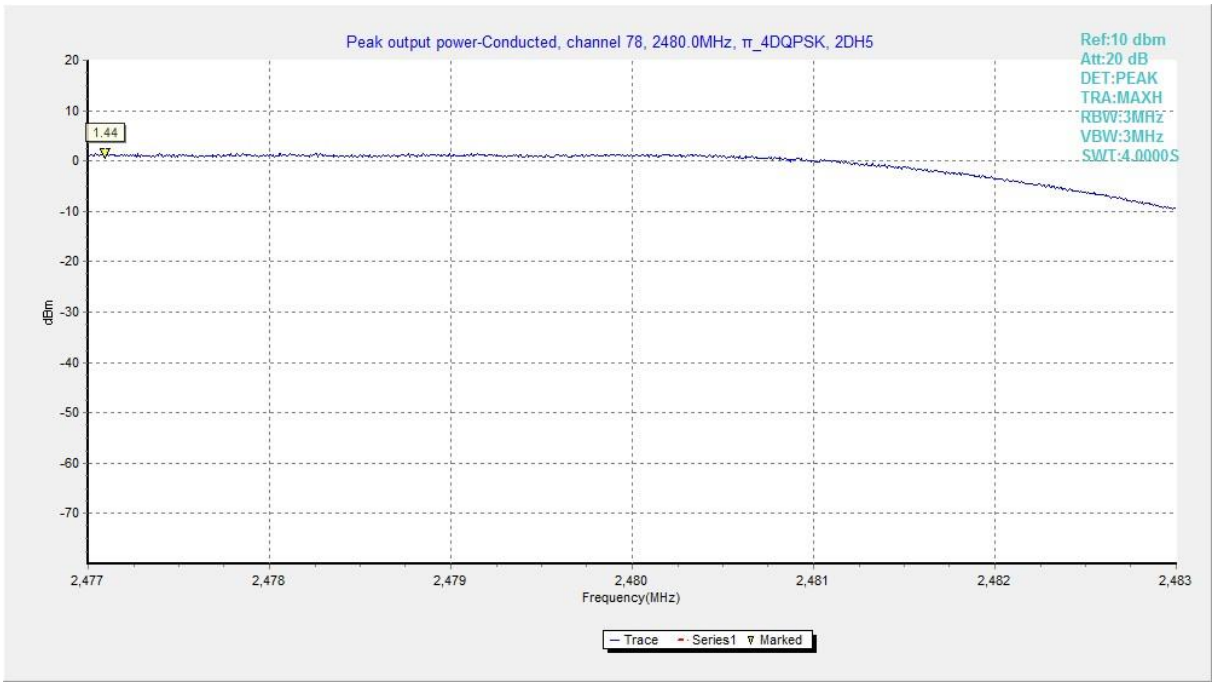

Fig. 6 Maximum Peak Output Power (π /4 DQPSK, Ch 78)

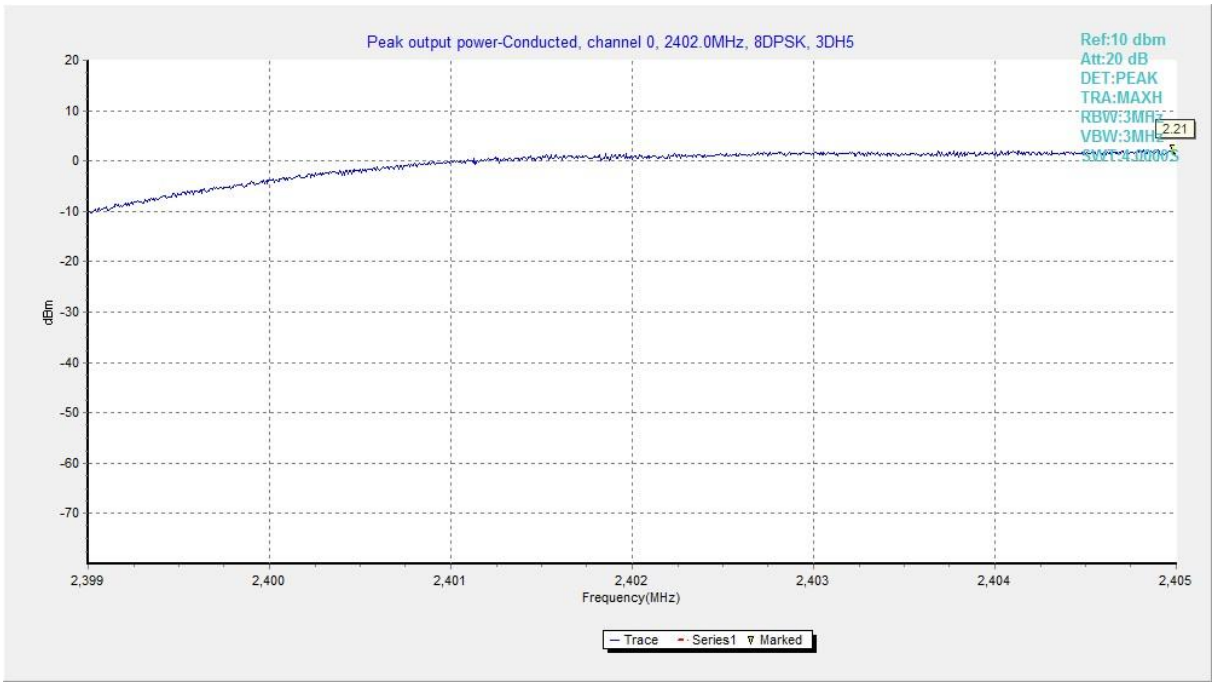

Fig. 7 Maximum Peak Output Power (8DPSK, Ch 0)

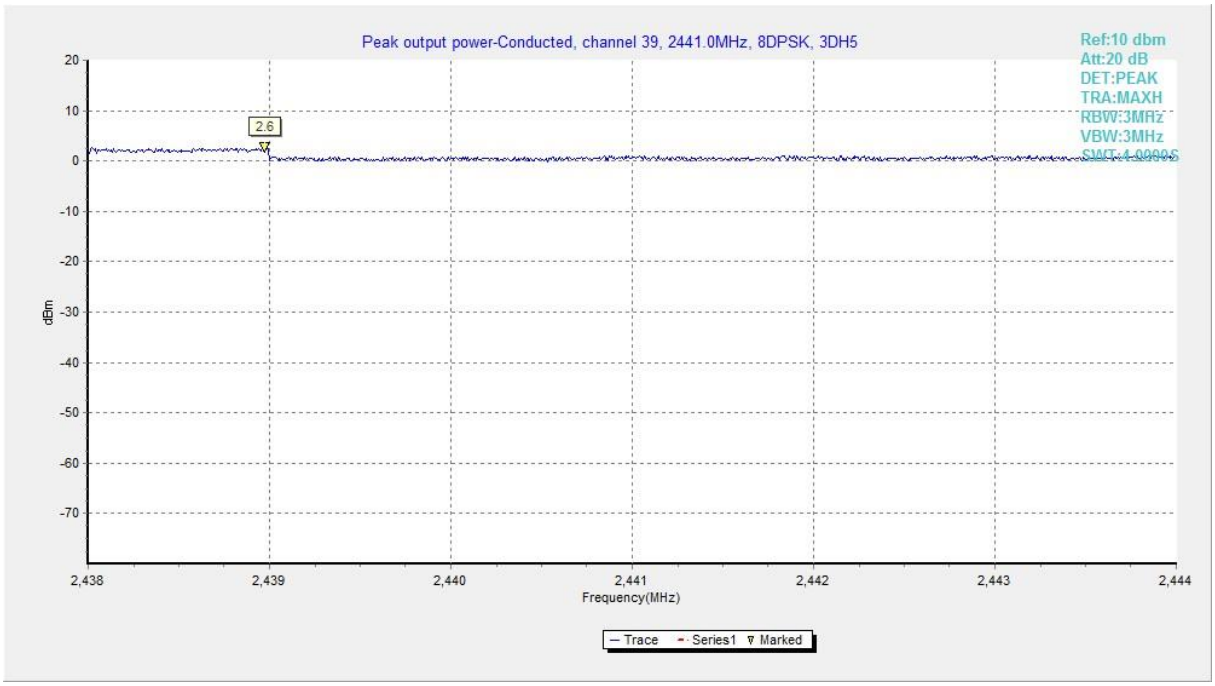

Fig. 8 Maximum Peak Output Power (8DPSK, Ch 39)

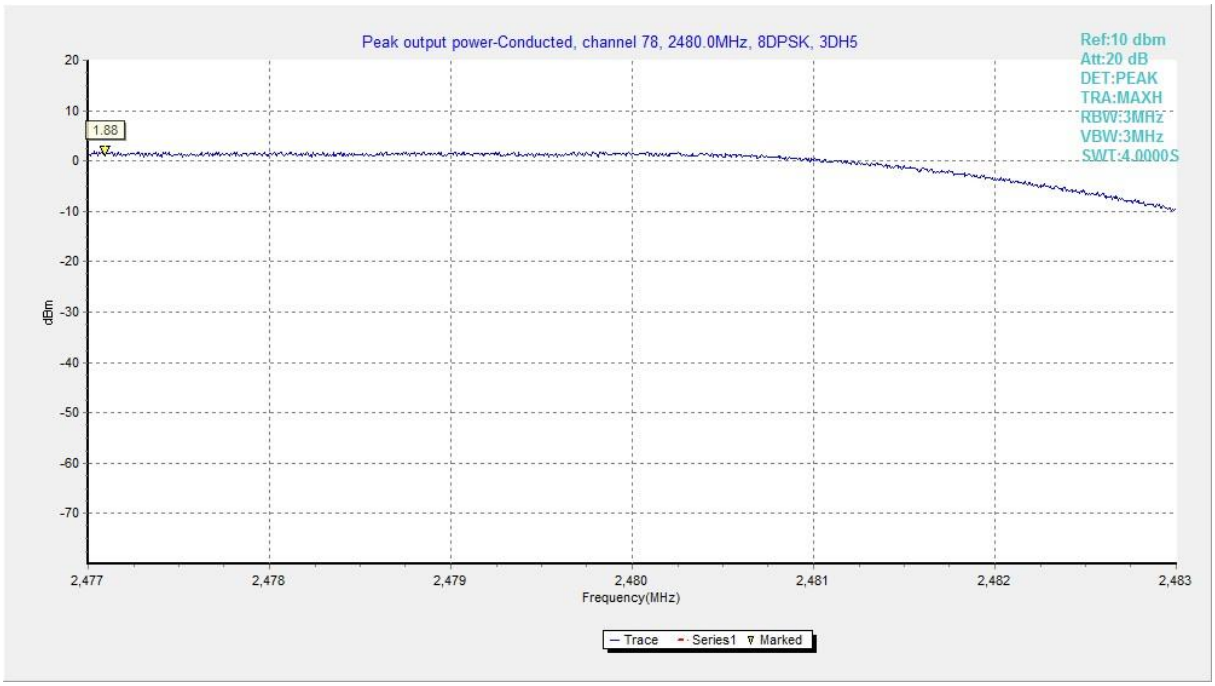

Fig. 9 Maximum Peak Output Power (8DPSK, Ch 78)

A.2 Band Edges Compliance

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	≤ -20

Measurement Result:

Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	ON	Fig.10	**P**
	78	ON	Fig.11	**P**
π /4 DQPSK	0	ON	Fig.12	**P**
	78	ON	Fig.13	**P**
8DPSK	0	ON	Fig.14	**P**
	78	ON	Fig.15	**P**

Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	OFF	Fig.16	**P**
	78	OFF	Fig.17	**P**
π /4 DQPSK	0	OFF	Fig.18	**P**
	78	OFF	Fig.19	**P**
8DPSK	0	OFF	Fig.20	**P**
	78	OFF	Fig.21	**P**

See below for test graphs.

Conclusion: Pass

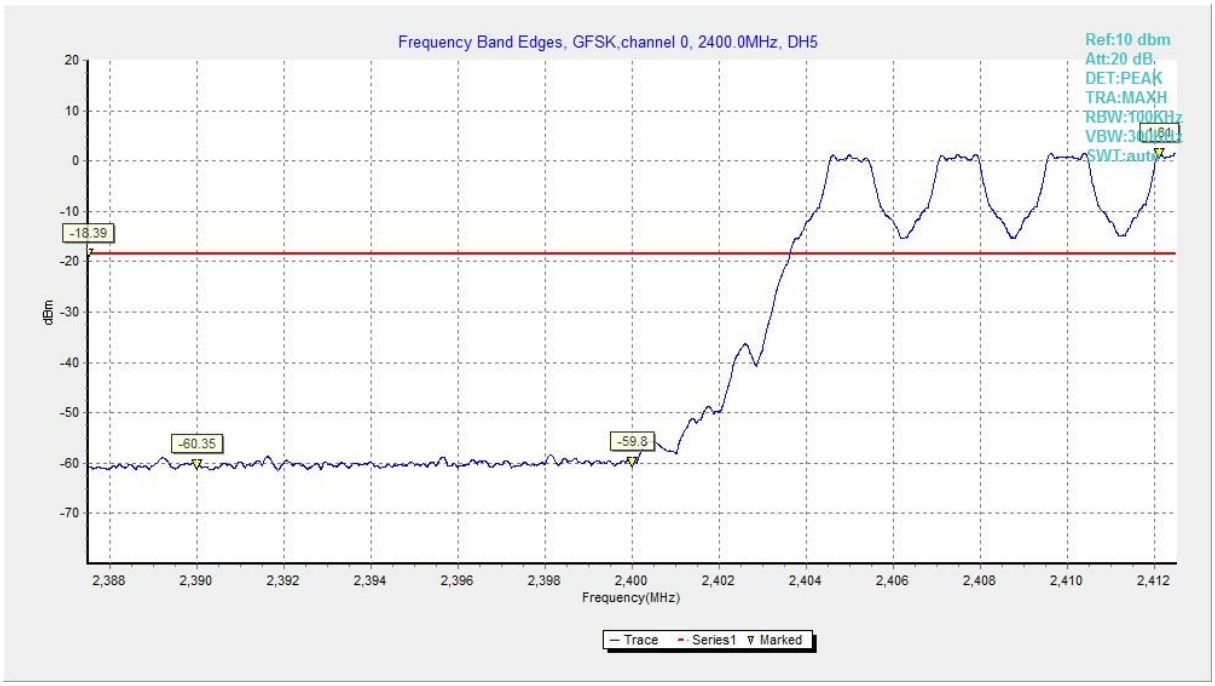

Fig. 10 Band Edges (GFSK, Ch 0, Hopping ON)

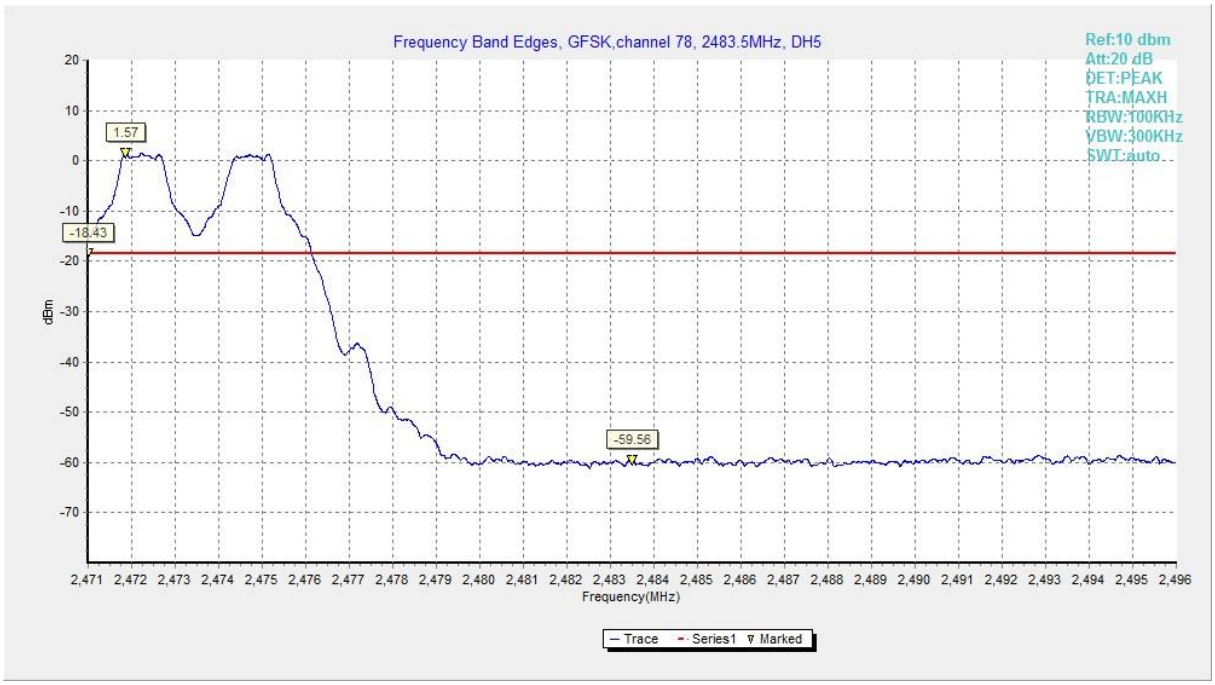

Fig. 11 Band Edges (GFSK, Ch 78, Hopping ON)

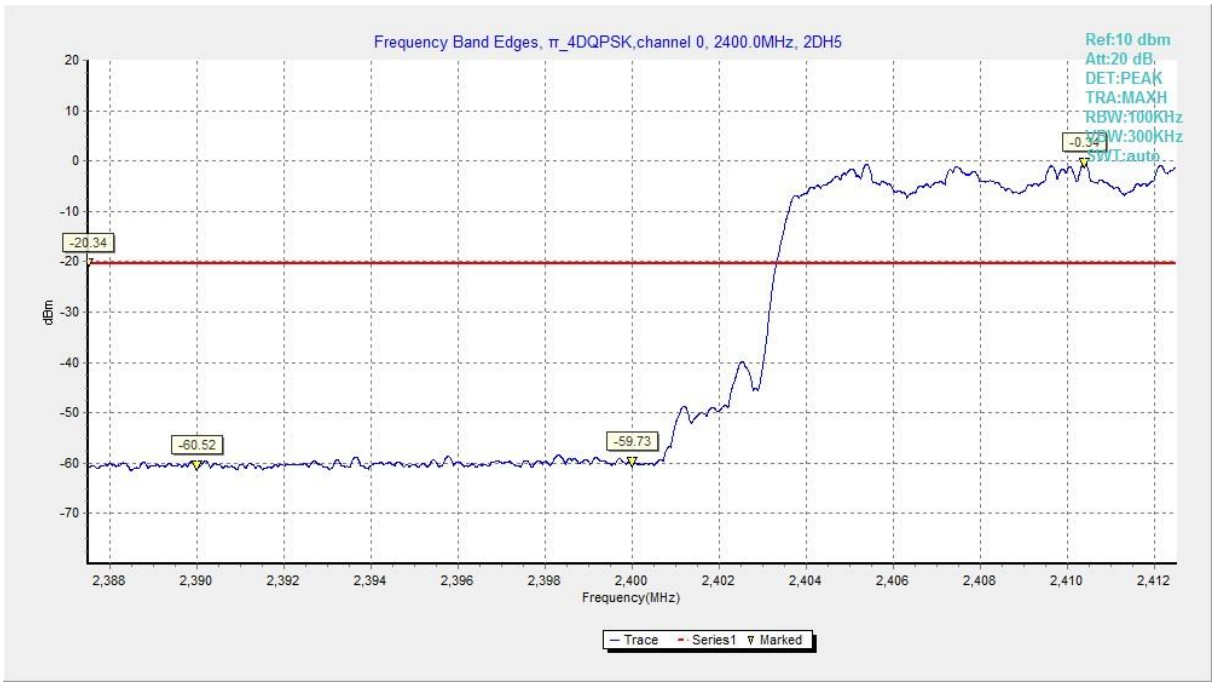

Fig. 12 Band Edges (π /4 DQPSK, Ch 0, Hopping ON)

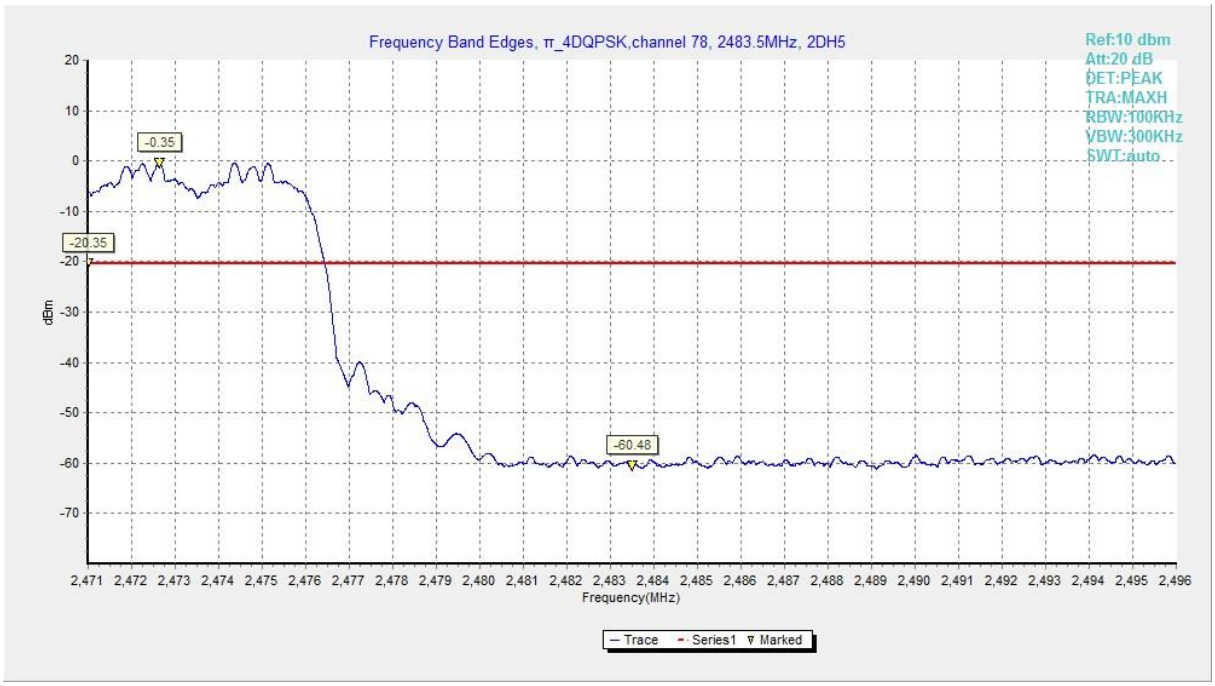

Fig. 13 Band Edges (π /4 DQPSK, Ch 78, Hopping ON)

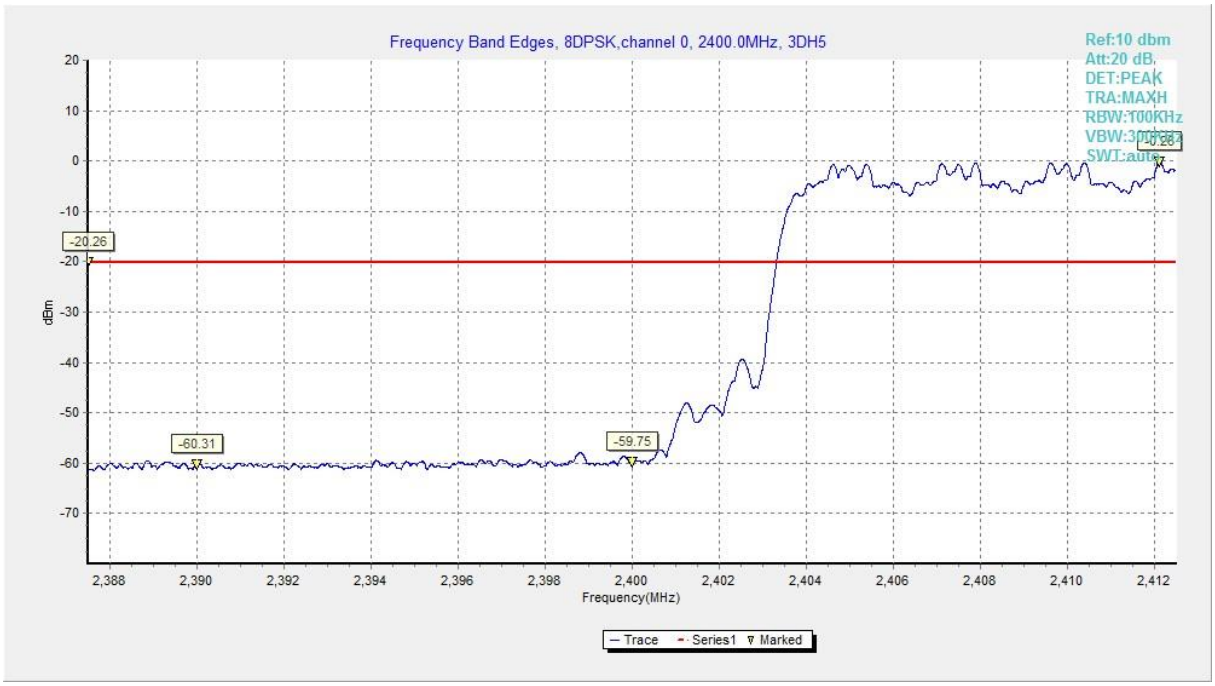

Fig. 14 Band Edges (8DPSK, Ch 0, Hopping ON)

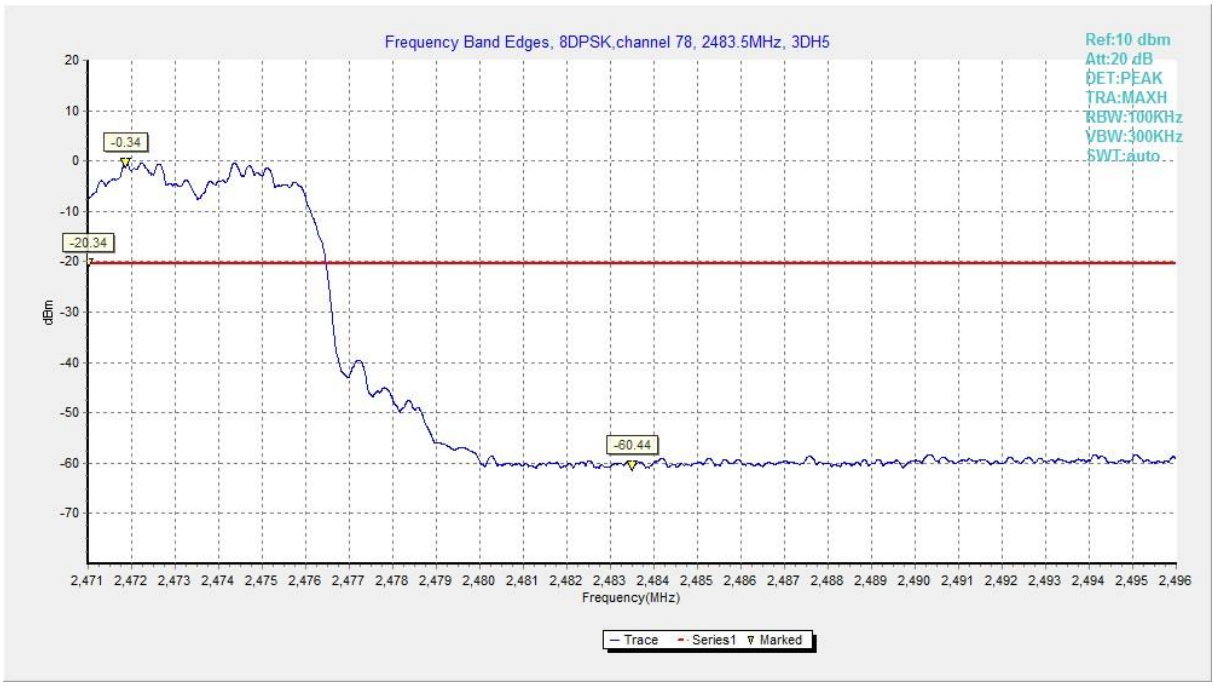

Fig. 15 Band Edges (8DPSK, Ch 78, Hopping ON)

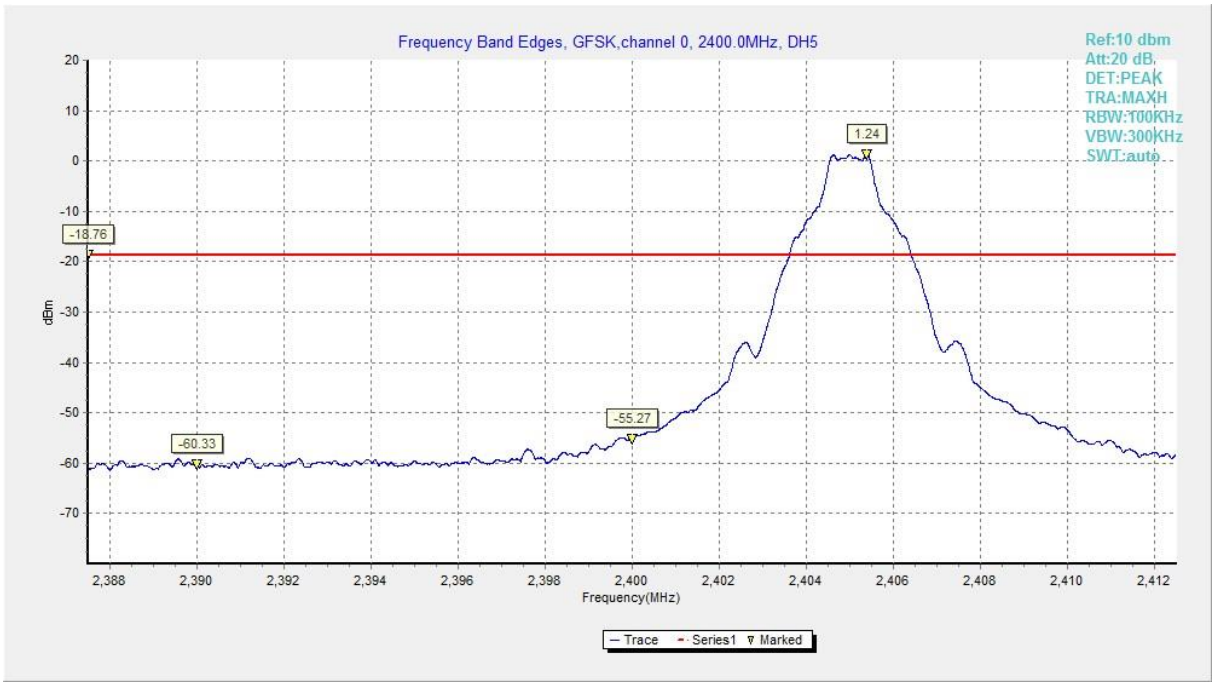

Fig. 16 Band Edges (GFSK, Ch 0, Hopping OFF)

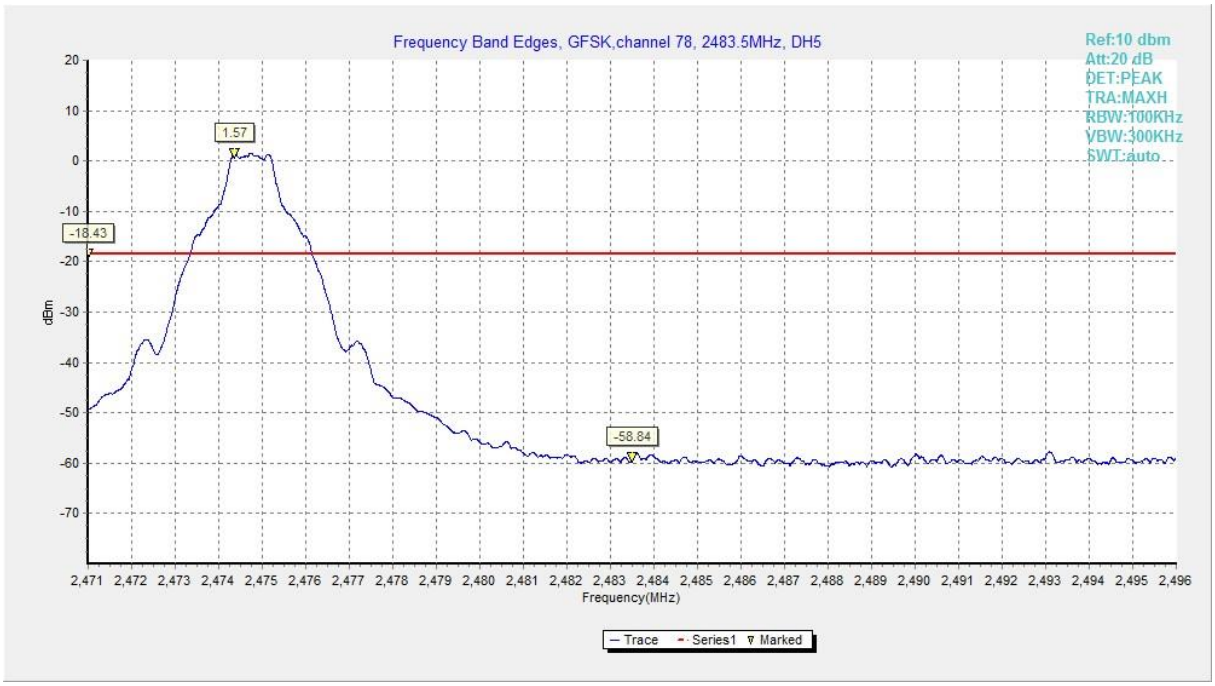

Fig. 17 Band Edges (GFSK, Ch 78, Hopping OFF)

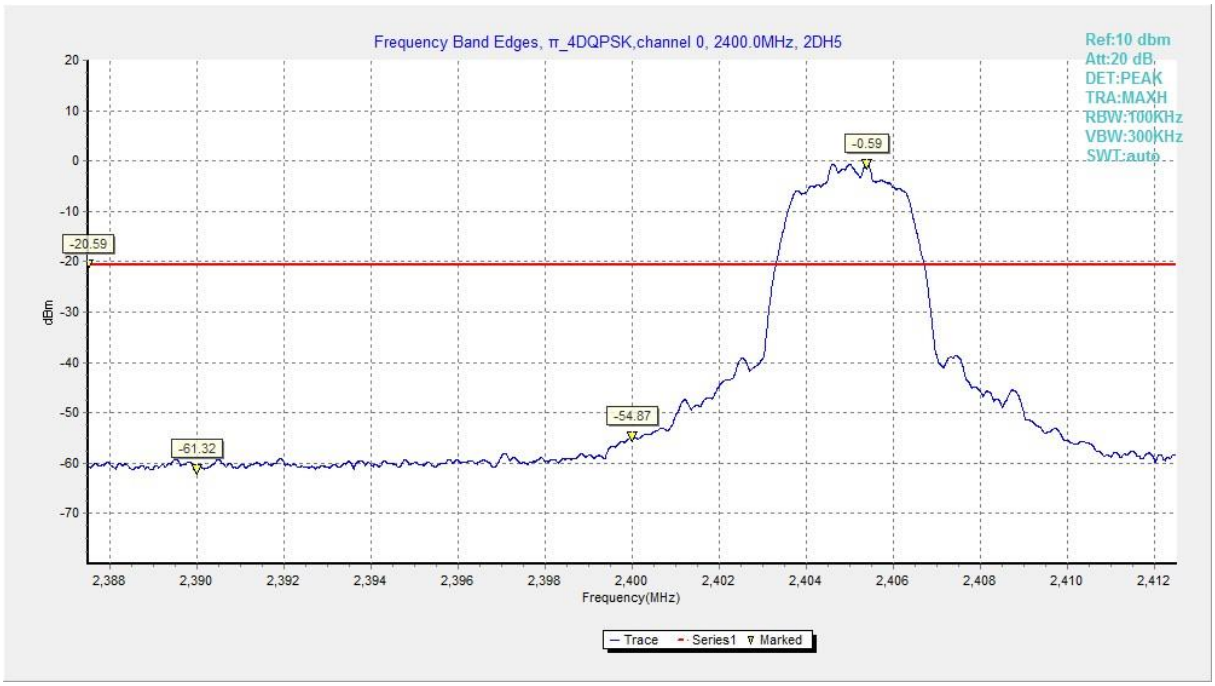

Fig. 18 Band Edges (π /4 DQPSK, Ch 0, Hopping OFF)

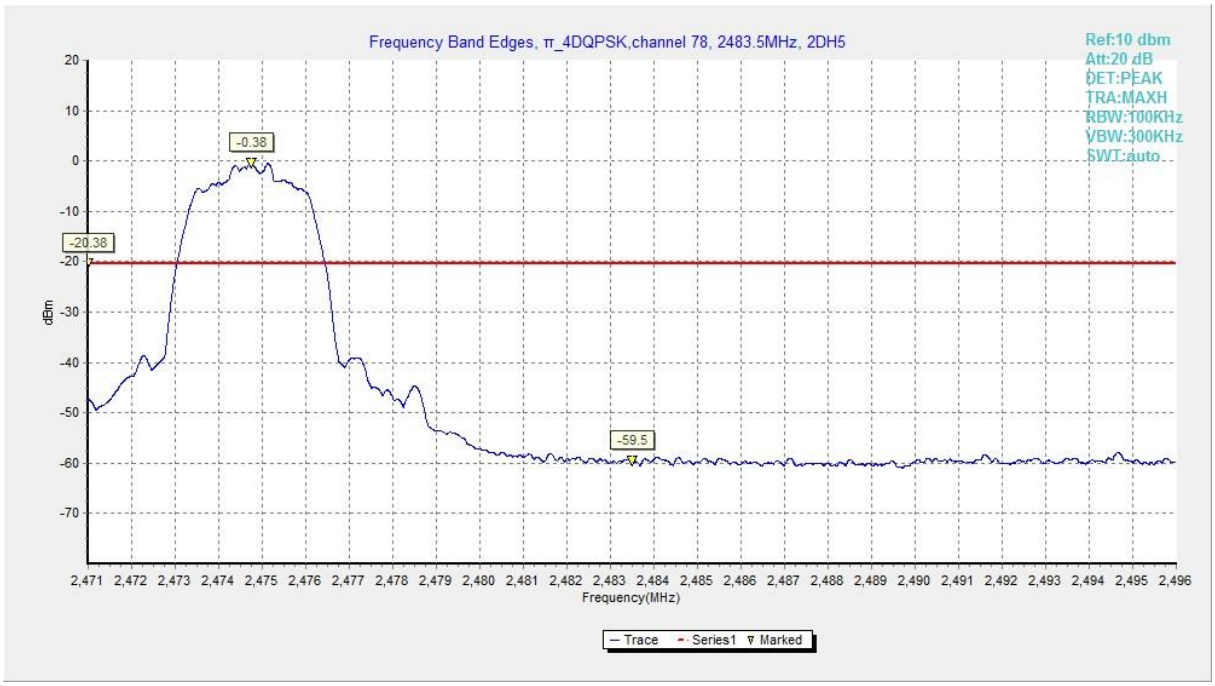

Fig. 19 Band Edges (π /4 DQPSK, Ch 78, Hopping OFF)

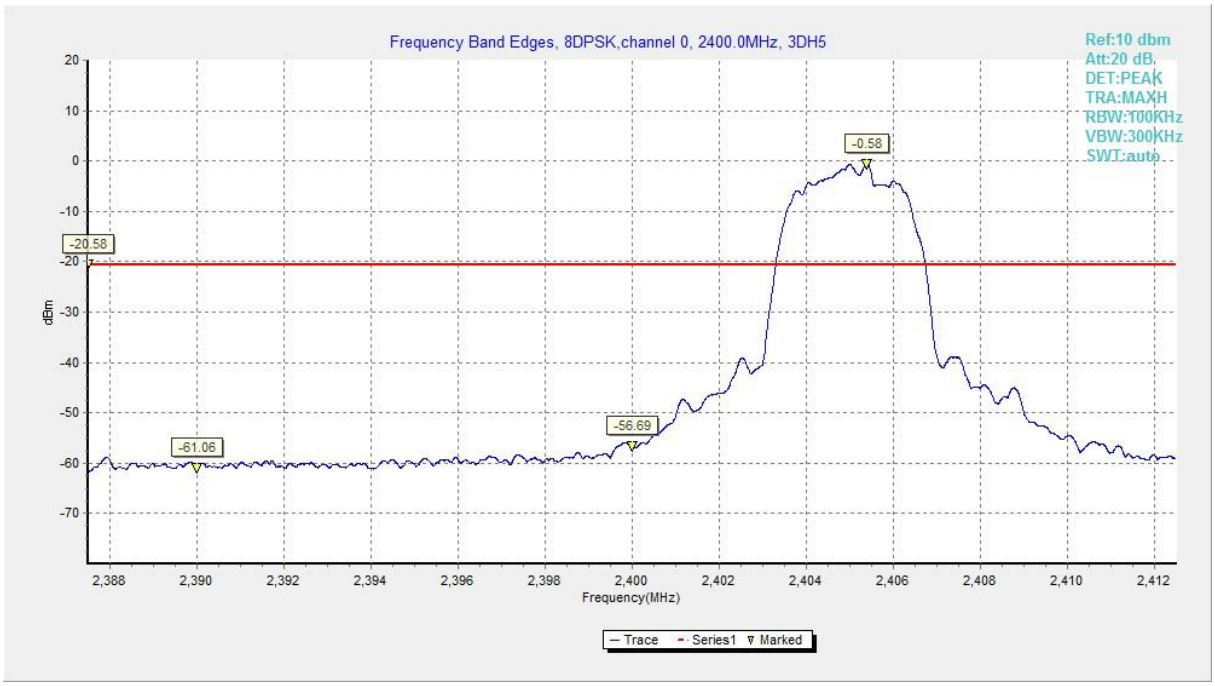

Fig. 20 Band Edges (8DPSK, Ch 0, Hopping OFF)

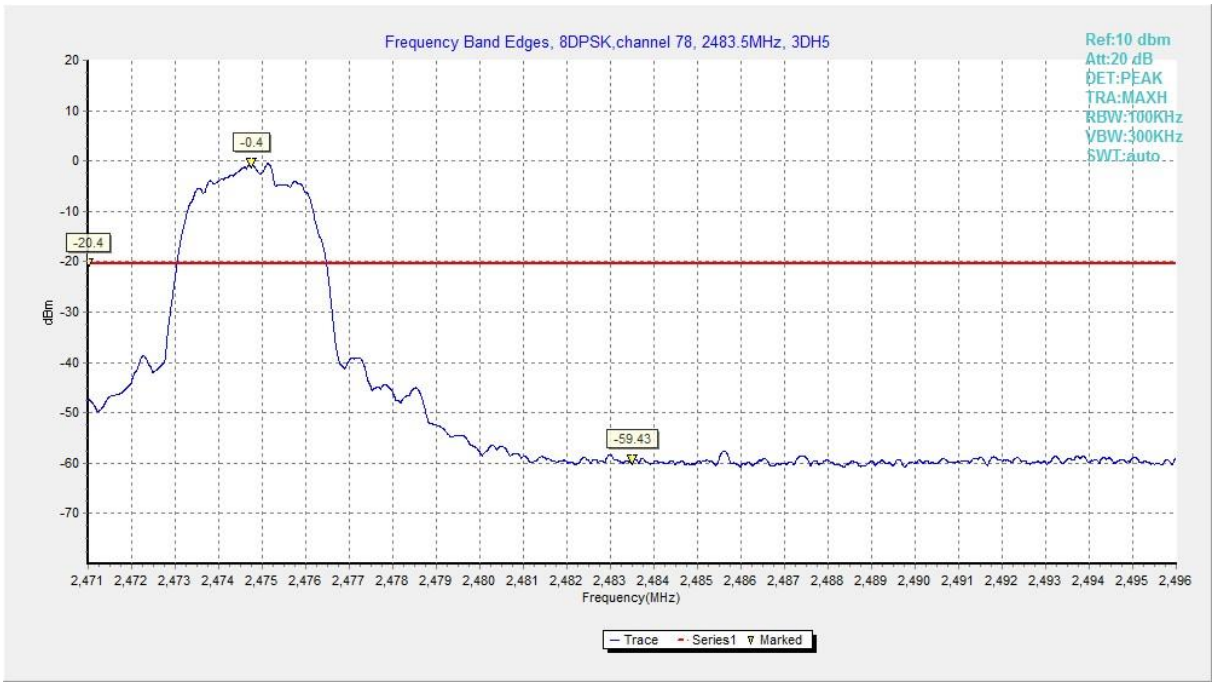

Fig. 21 Band Edges (8DPSK, Ch 78, Hopping OFF)

A.3 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.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**
π /4 DQPSK	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**
8DPSK	0	2.402 GHz	Fig.40	**P**
		1GHz-3GHz	Fig.41	**P**
		3GHz-10GHz	Fig.42	**P**
	39	2.441 GHz	Fig.43	**P**
		1GHz-3GHz	Fig.44	**P**
		3GHz-10GHz	Fig.45	**P**
	78	2.480 GHz	Fig.46	**P**
		1GHz-3GHz	Fig.47	**P**
		3GHz-10GHz	Fig.48	**P**
/	All channels	30 MHz-1GHz	Fig.49	**P**
		10GHz-26GHz	Fig.50	**P**

See below for test graphs.

Conclusion: Pass

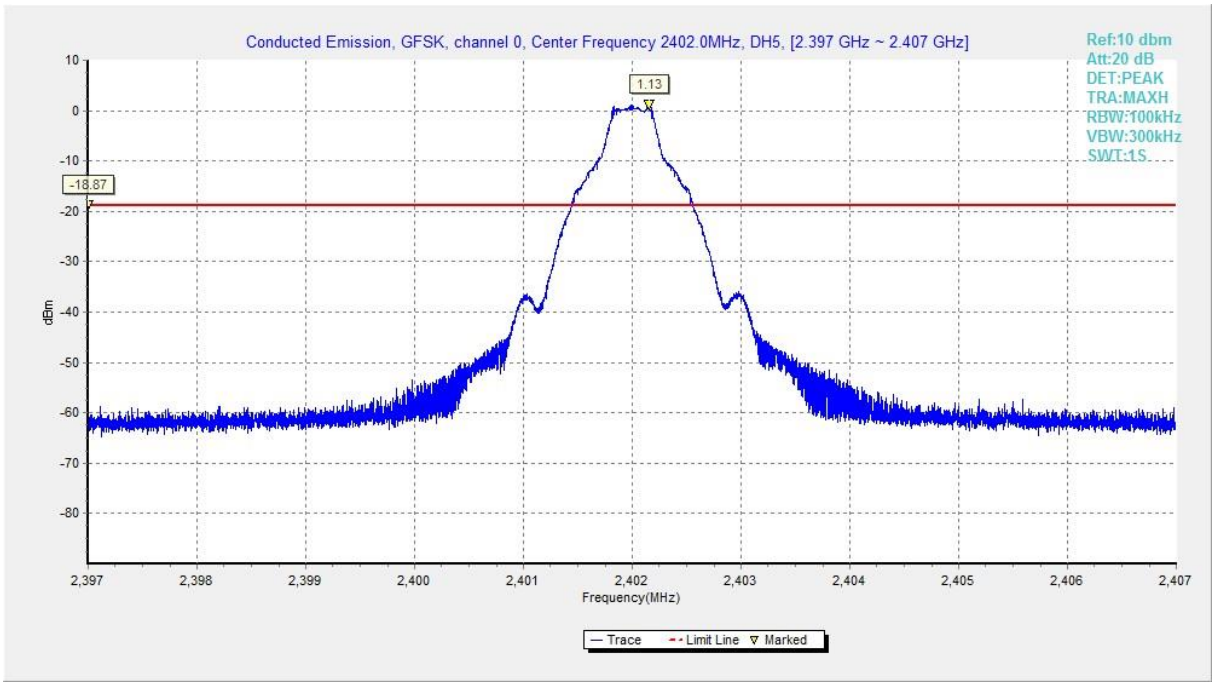

Fig. 22 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

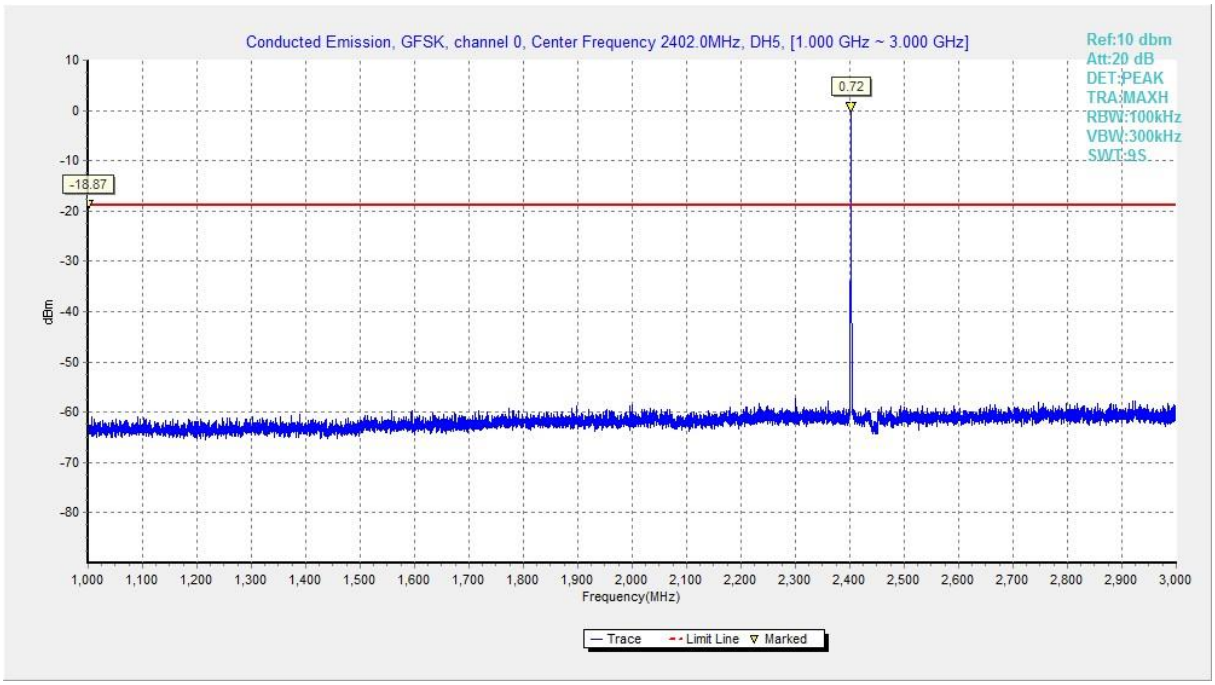

Fig. 23 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)

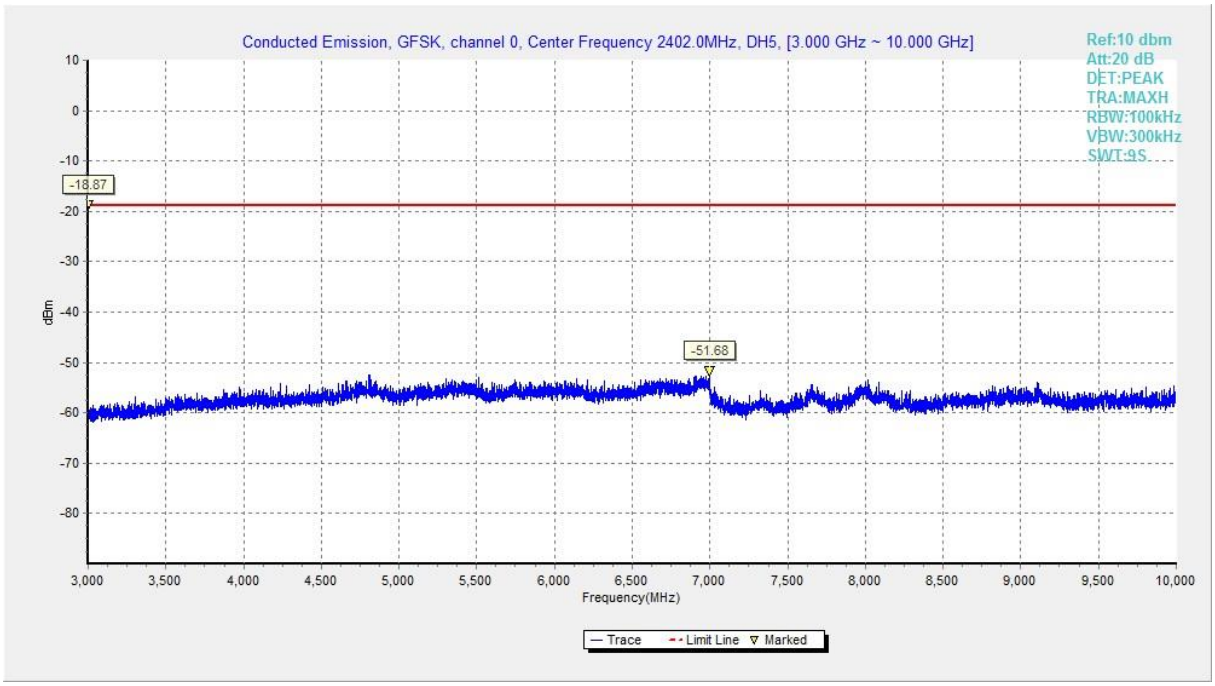

Fig. 24 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10 GHz)

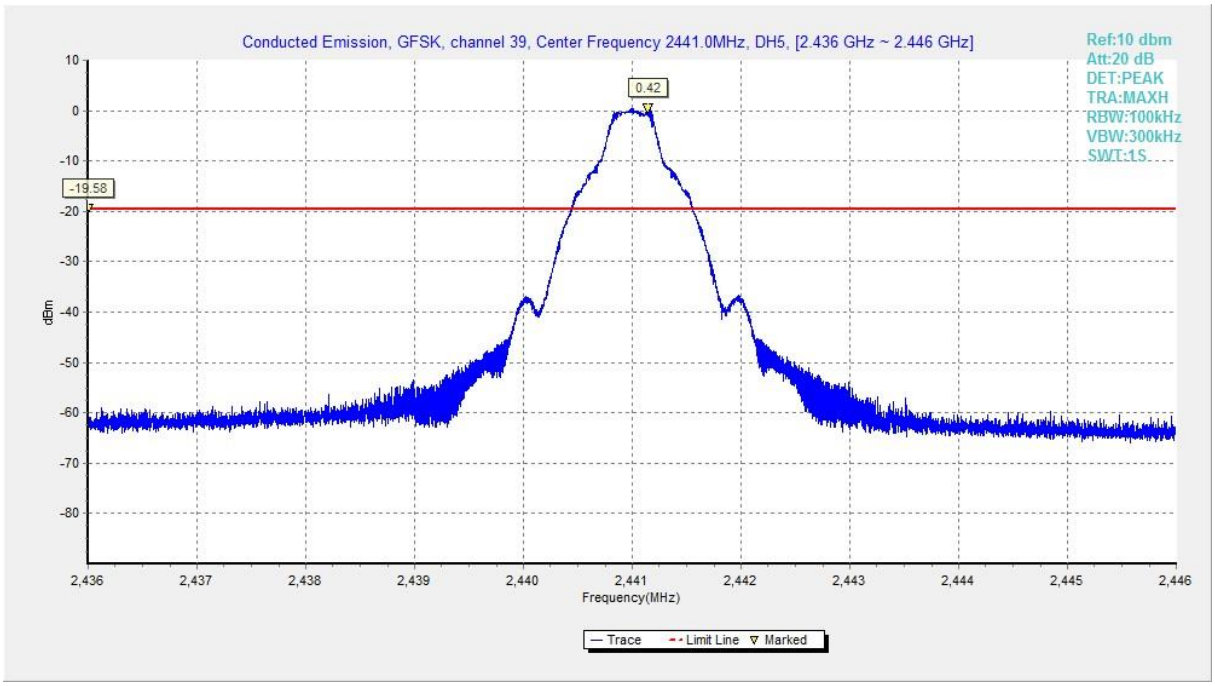

Fig. 25 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)

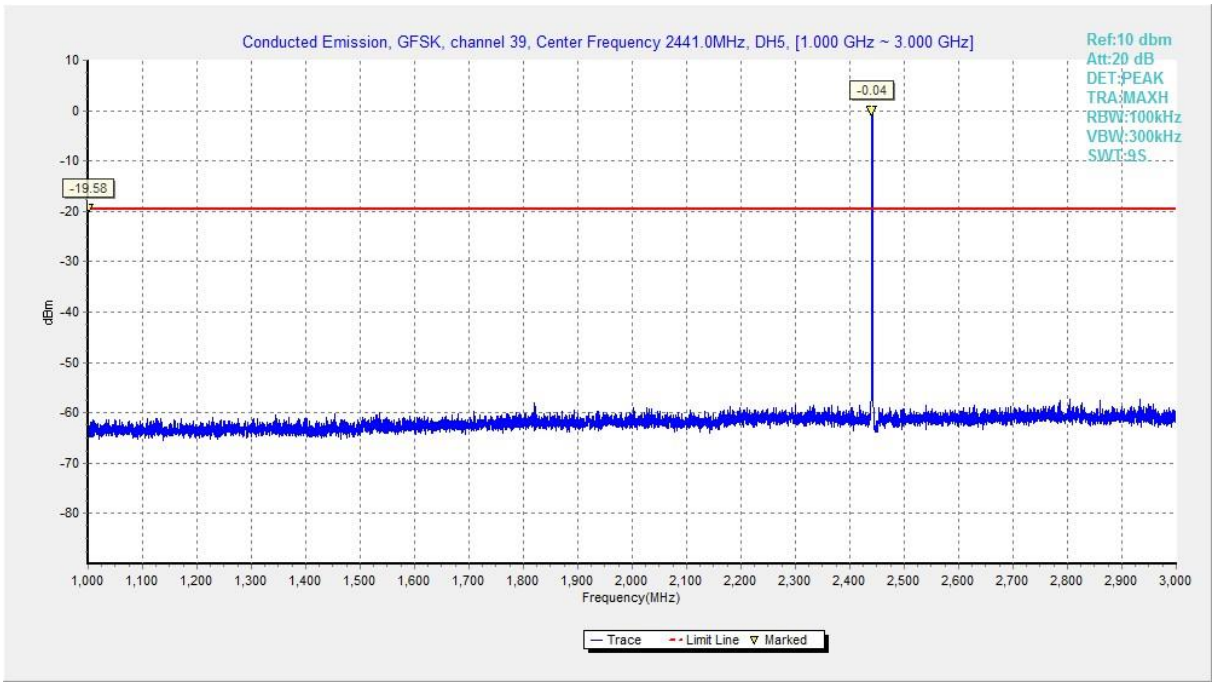

Fig. 26 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3 GHz)

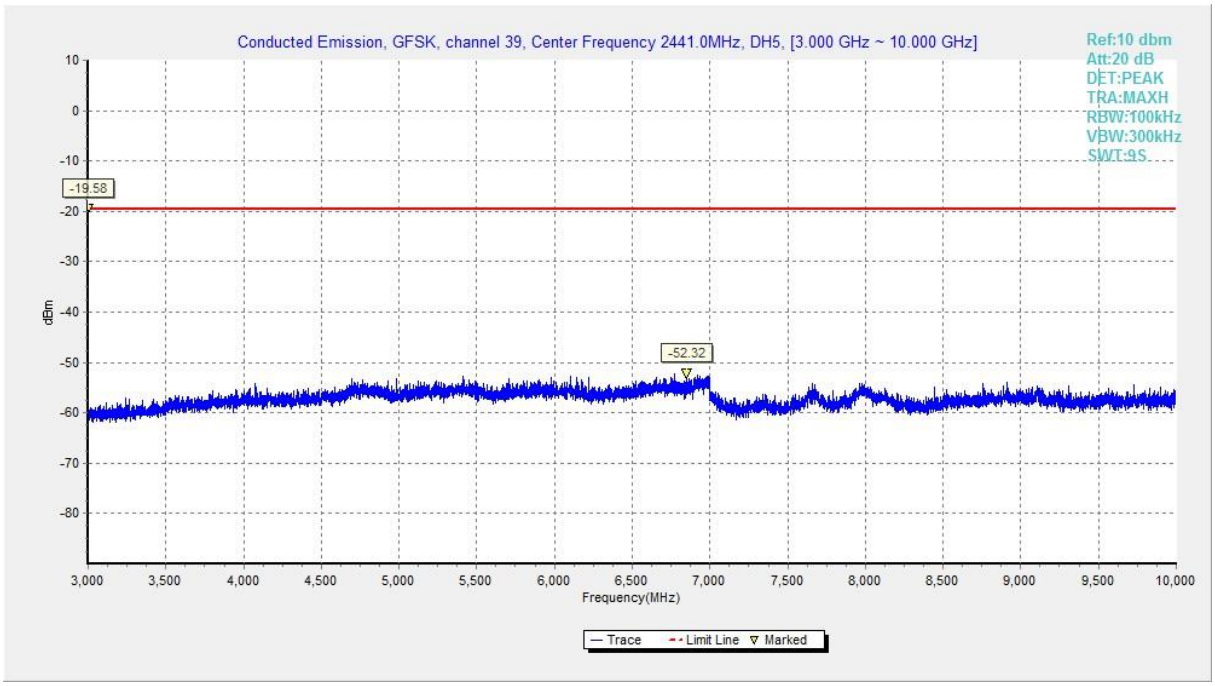

Fig. 27 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10 GHz)

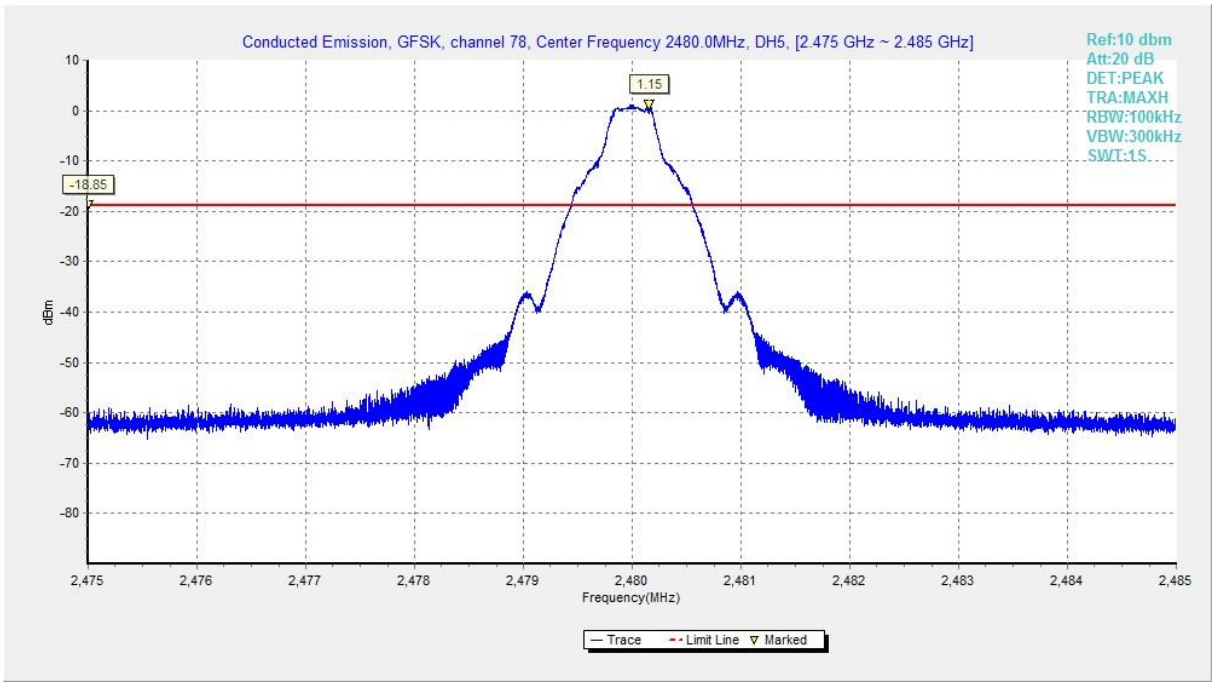

Fig. 28 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

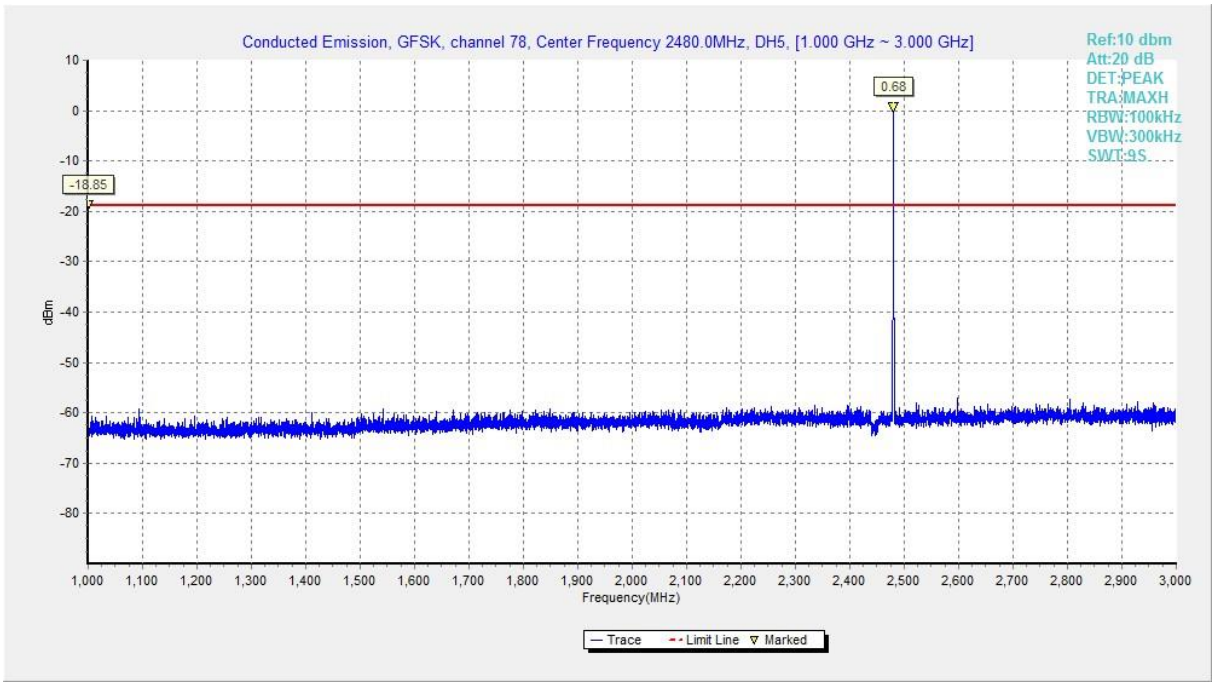

Fig. 29 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3 GHz)

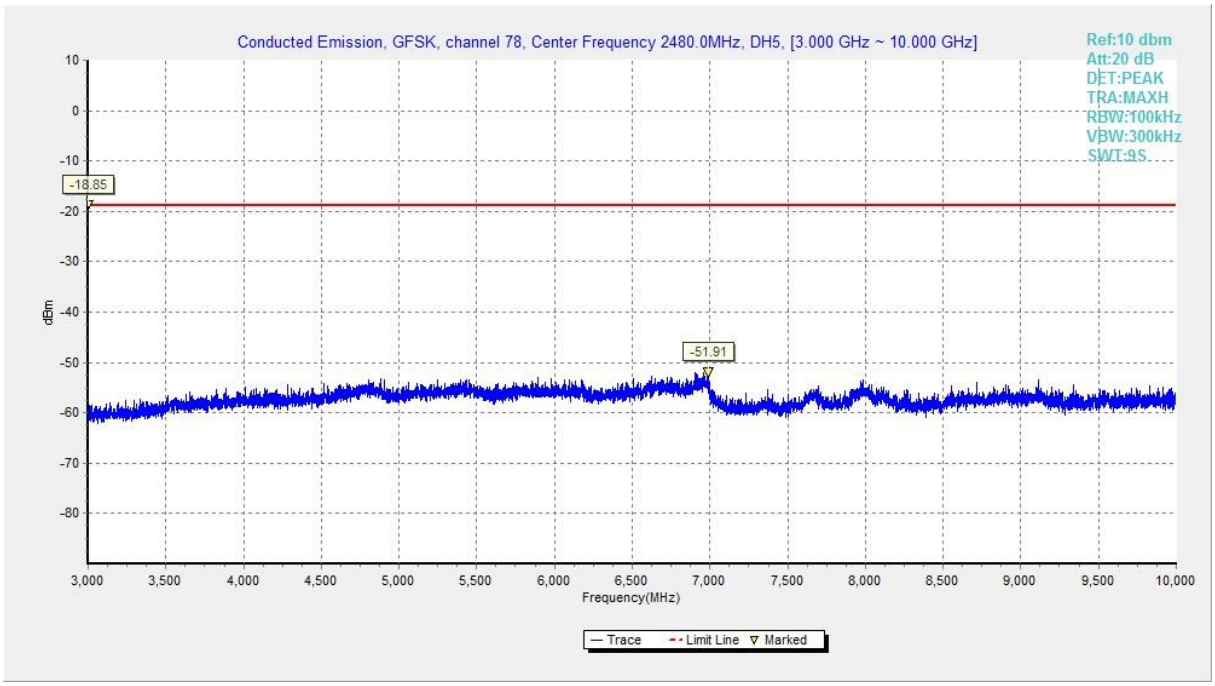

Fig. 30 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10 GHz)

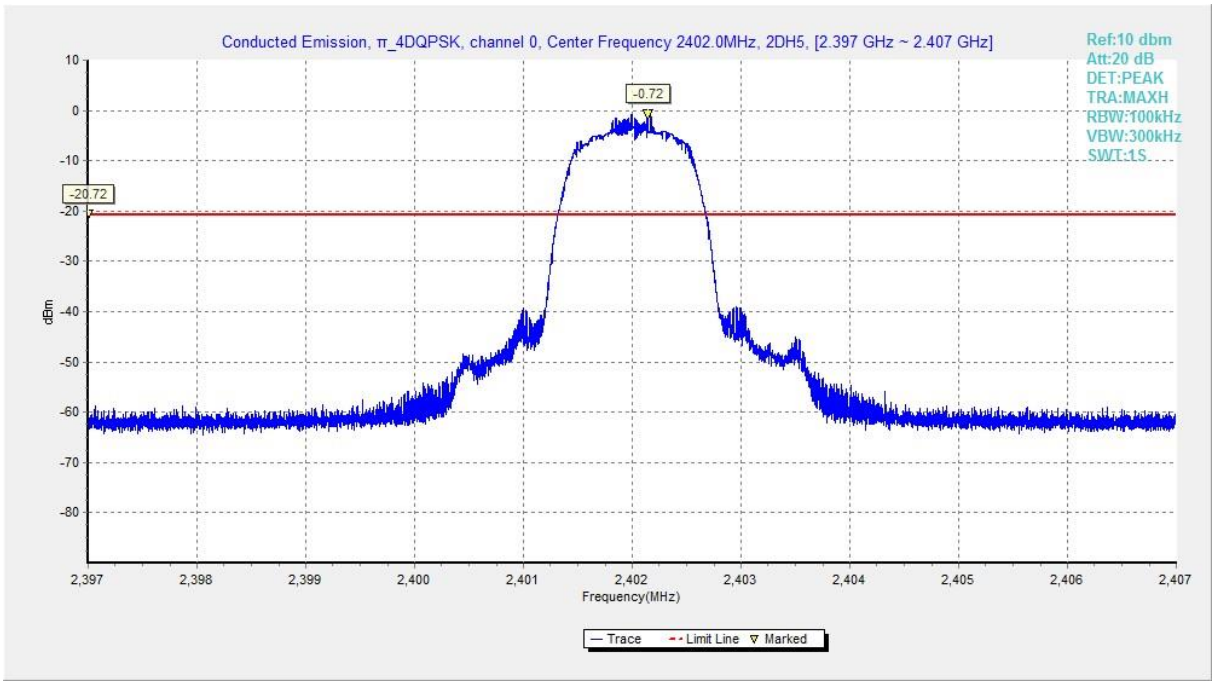

Fig. 31 Conducted Spurious Emission (π /4 DQPSK, Ch0, 2.402GHz)

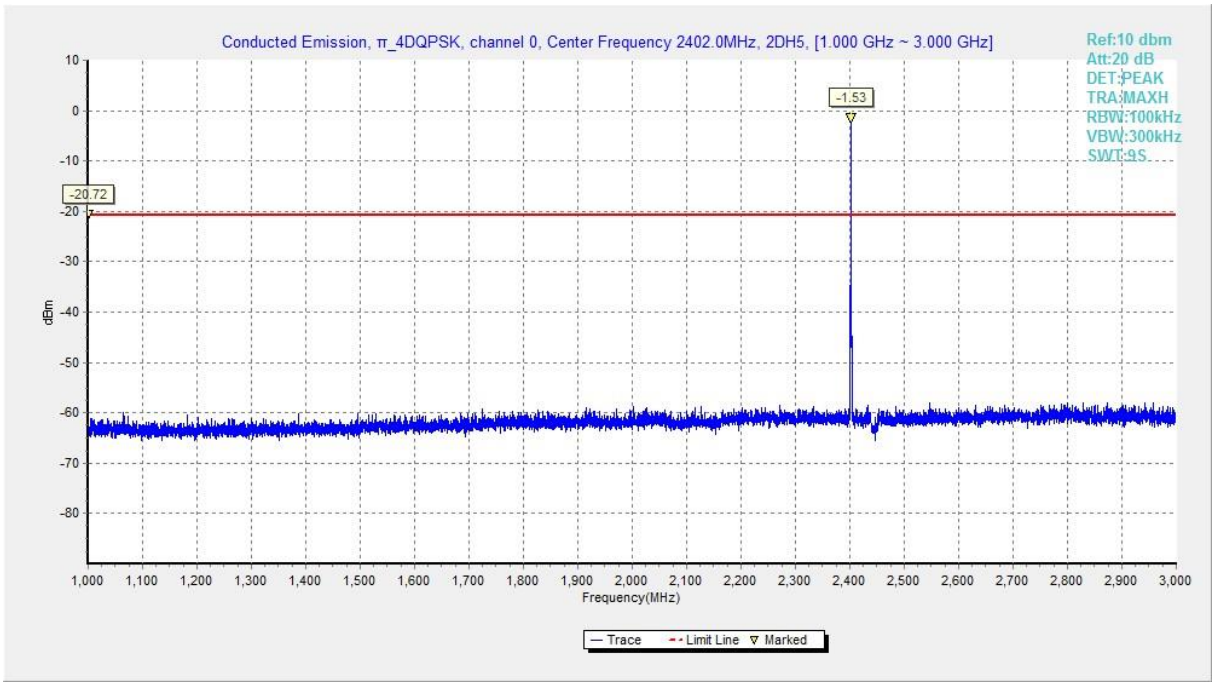

Fig. 32 Conducted Spurious Emission (π /4 DQPSK, Ch0, 1GHz-3 GHz)

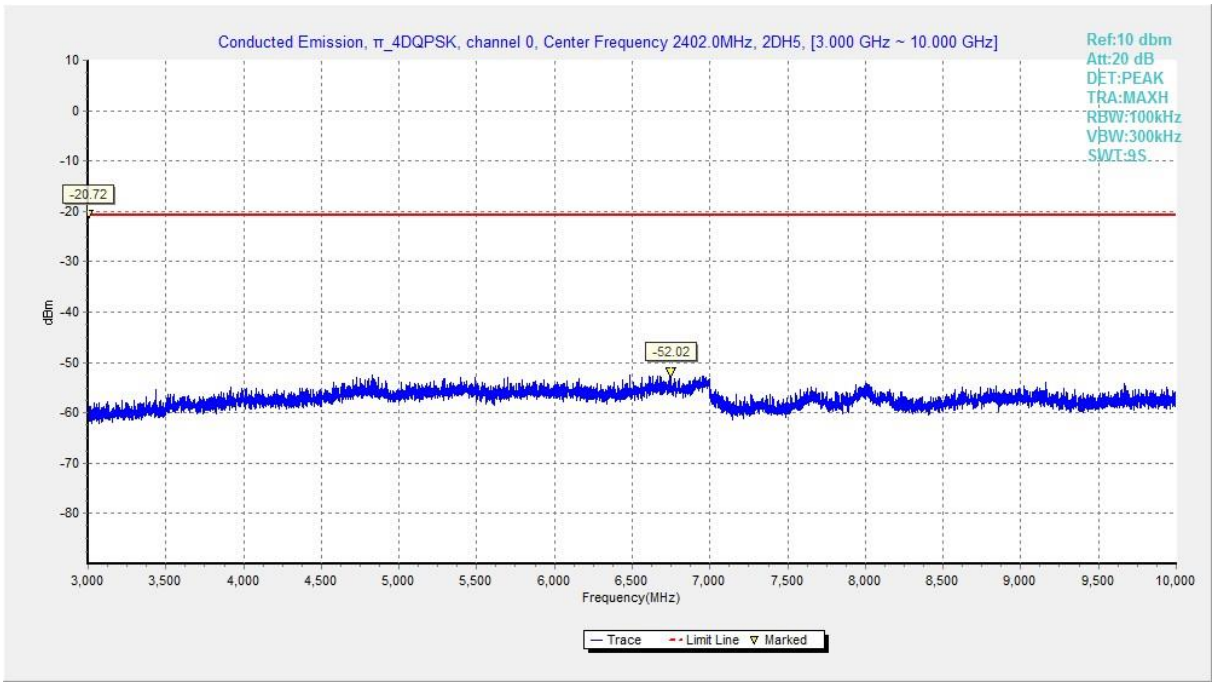

Fig. 33 Conducted Spurious Emission (π /4 DQPSK, Ch0, 3GHz-10 GHz)

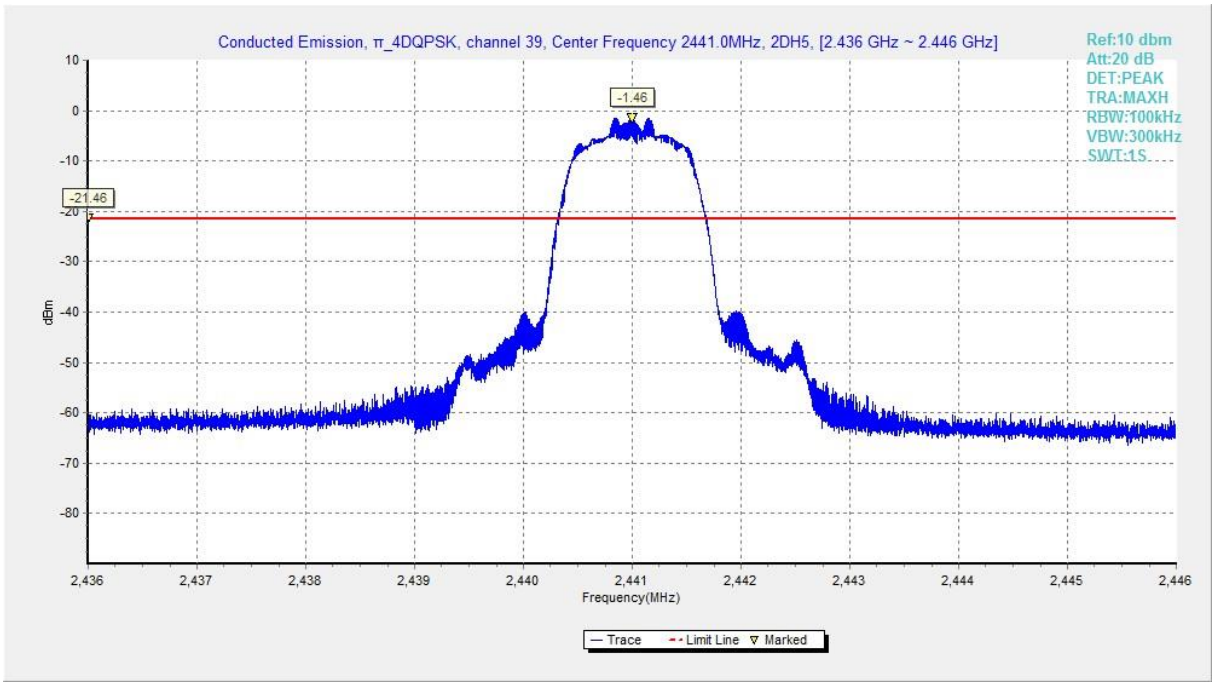

Fig. 34 Conducted Spurious Emission (π /4 DQPSK, Ch39, 2.441GHz)

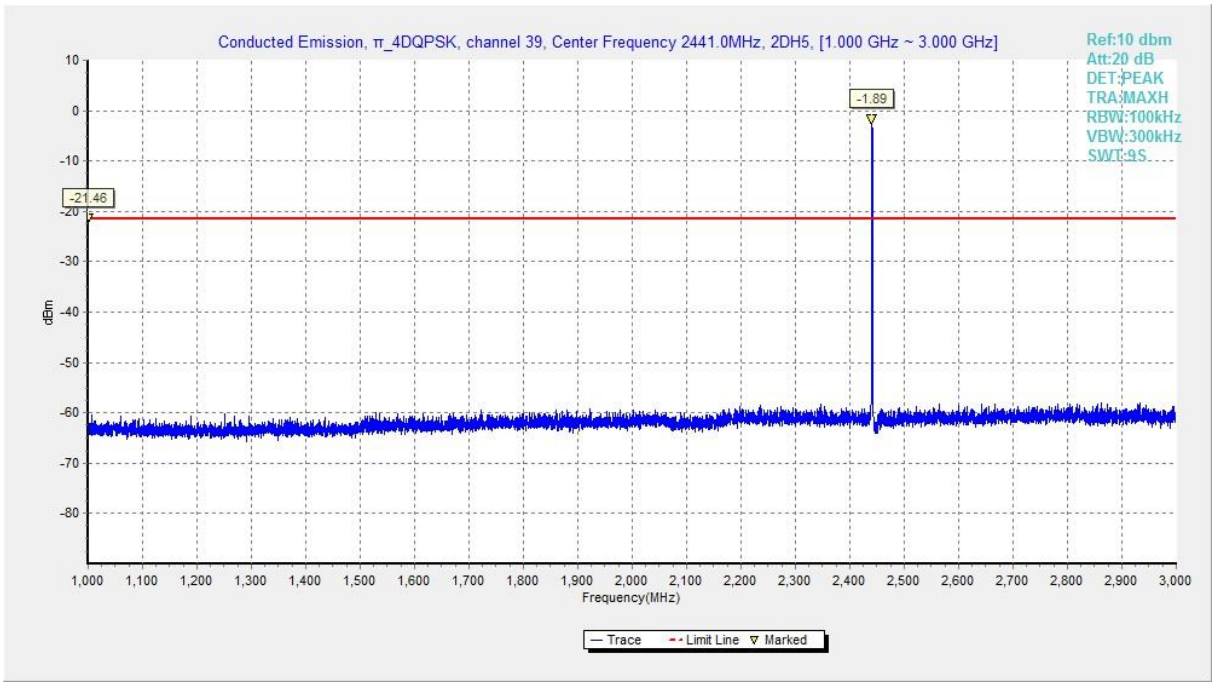

Fig. 35 Conducted Spurious Emission (π /4 DQPSK, Ch39, 1GHz-3 GHz)

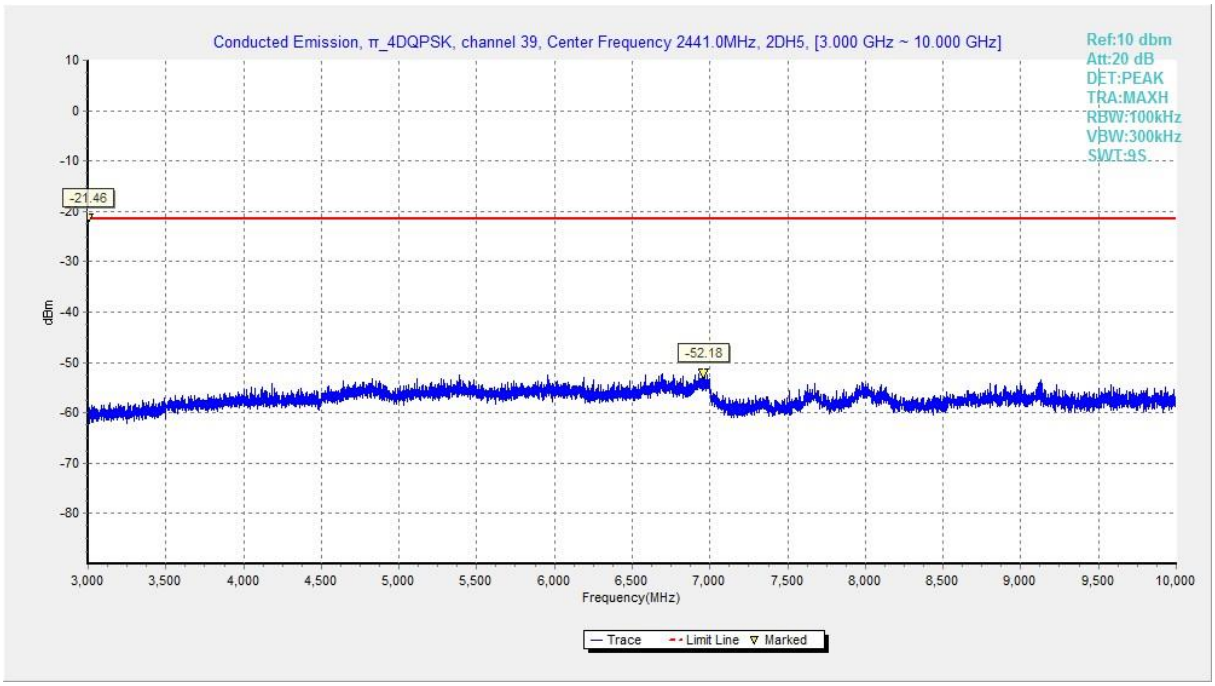

Fig. 36 Conducted Spurious Emission (π /4 DQPSK, Ch39, 3GHz-10 GHz)

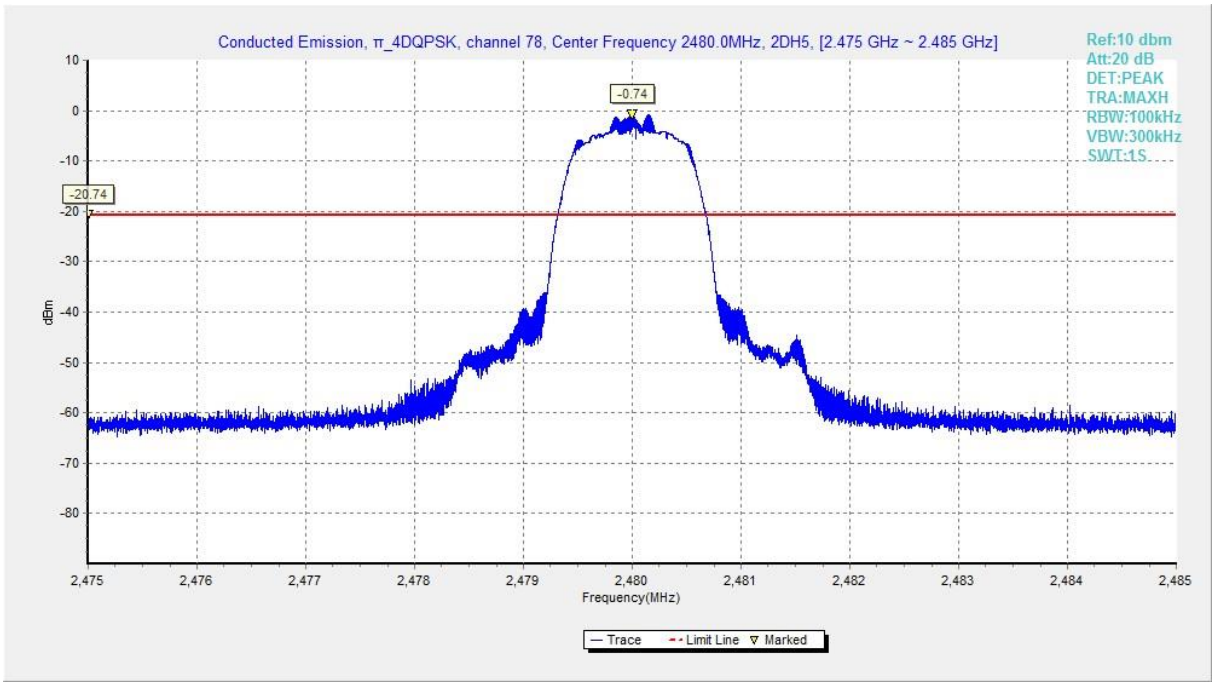

Fig. 37 Conducted Spurious Emission (π /4 DQPSK, Ch78, 2.480GHz)

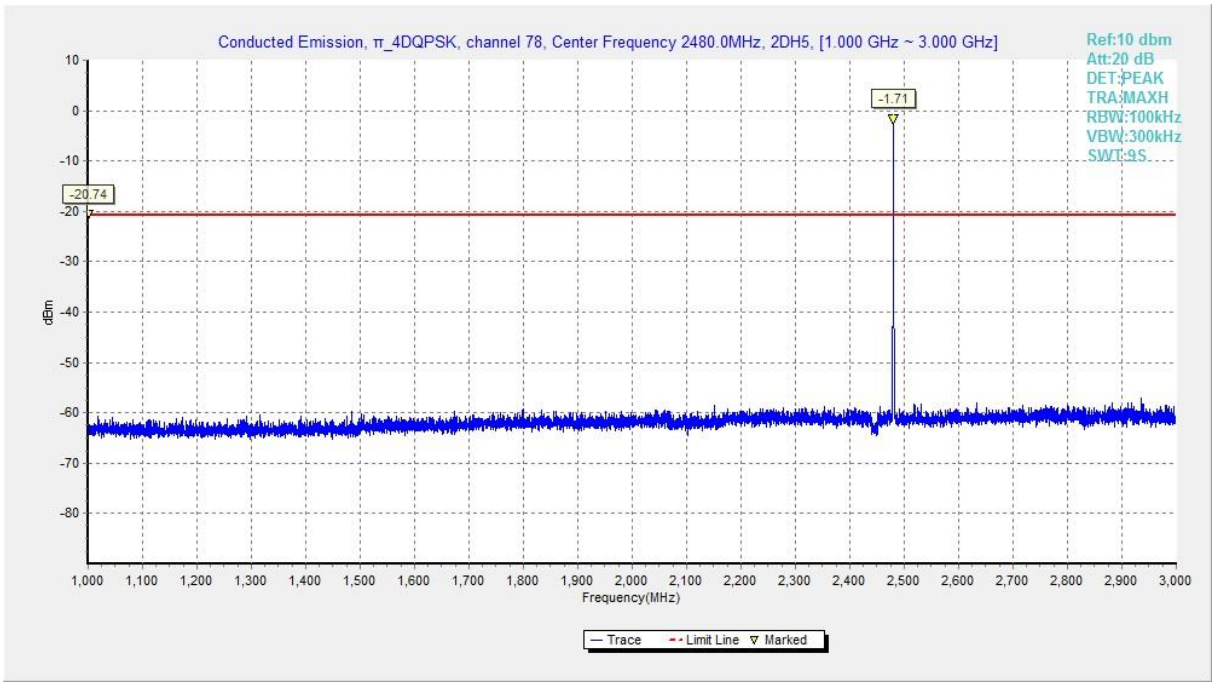

Fig. 38 Conducted Spurious Emission (π /4 DQPSK, Ch78, 1GHz-3 GHz)

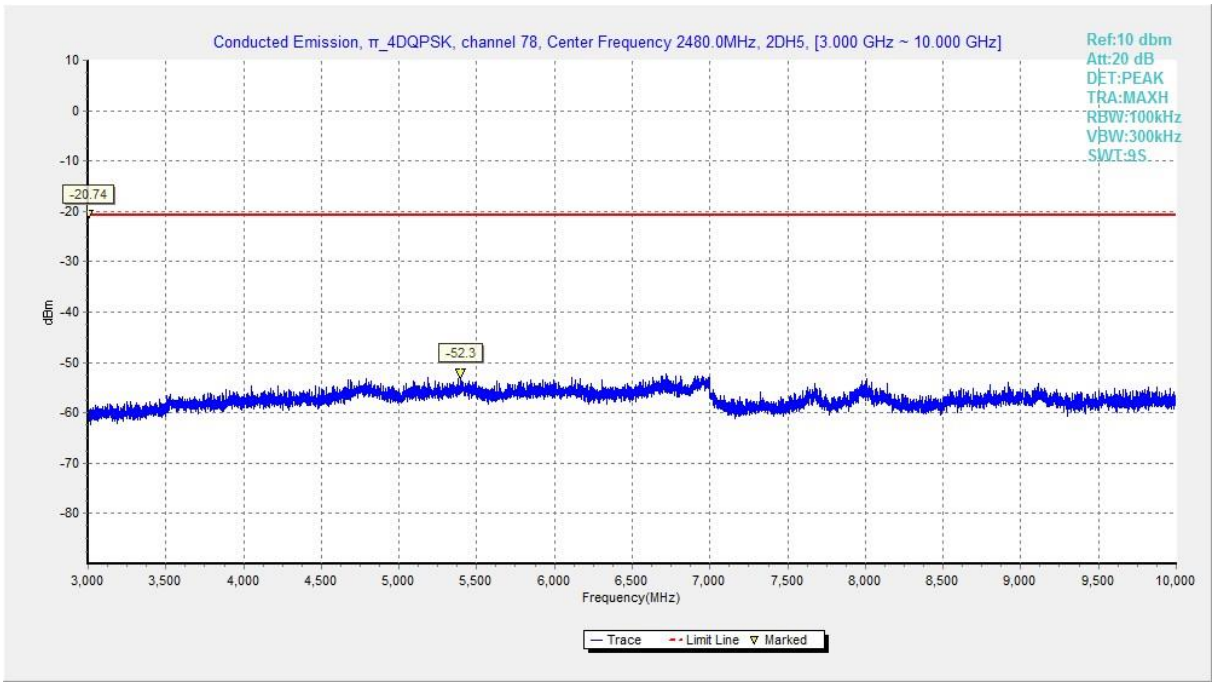

Fig. 39 Conducted Spurious Emission (π /4 DQPSK, Ch78, 3GHz-10 GHz)

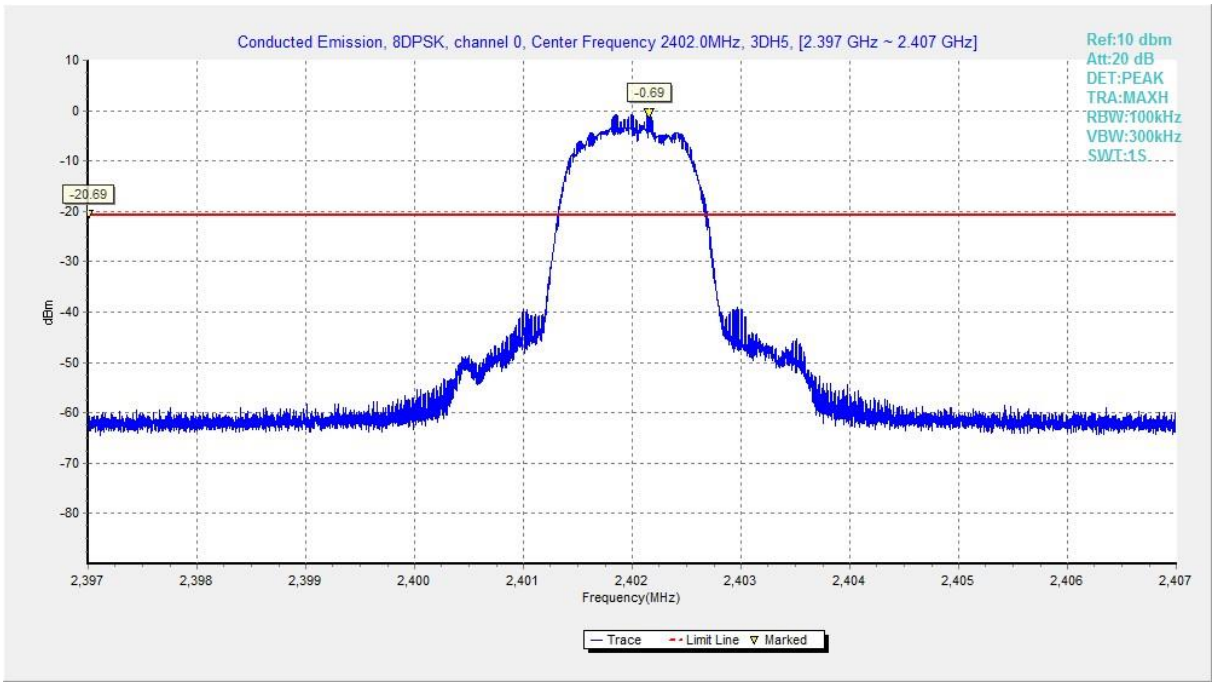

Fig. 40 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)

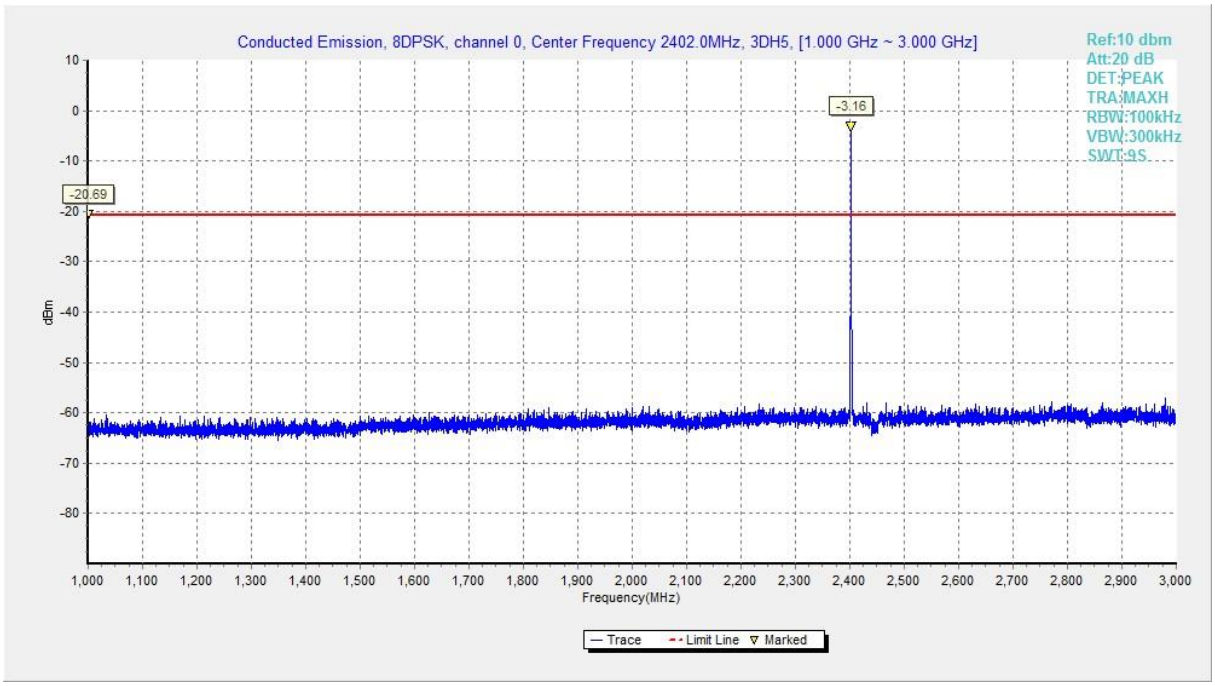

Fig. 41 Conducted Spurious Emission (8DPSK, Ch0, 1GHz-3 GHz)

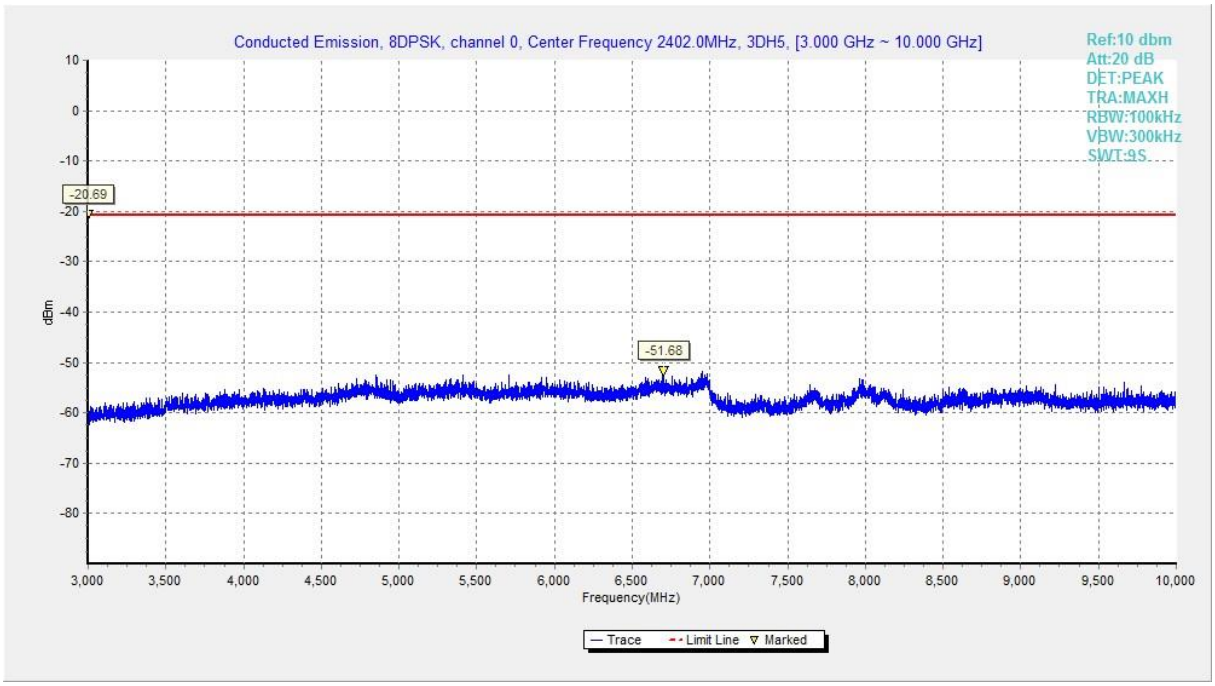

Fig. 42 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10 GHz)

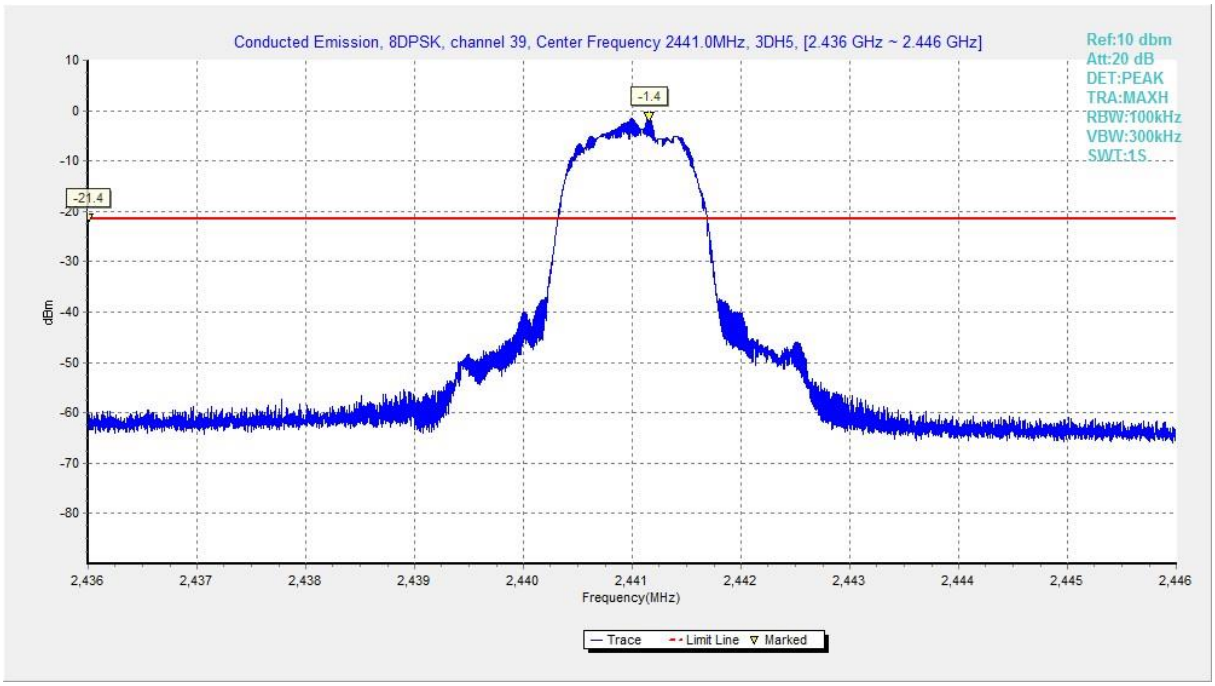

Fig. 43 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

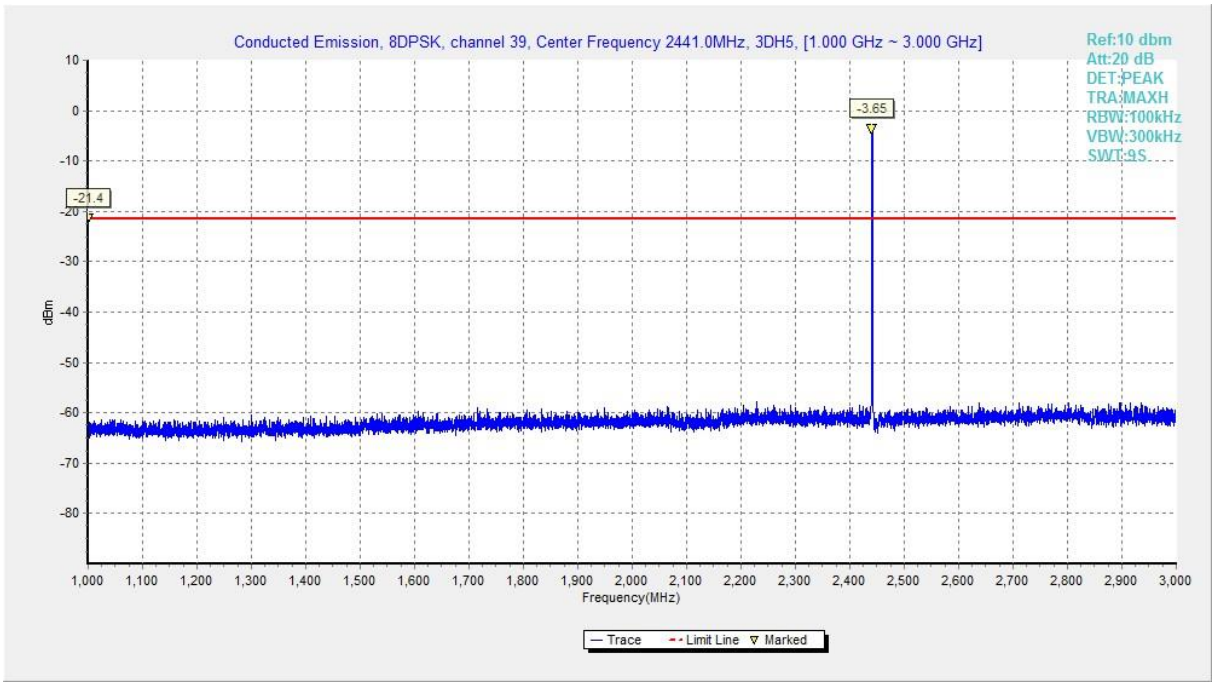

Fig. 44 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3 GHz)

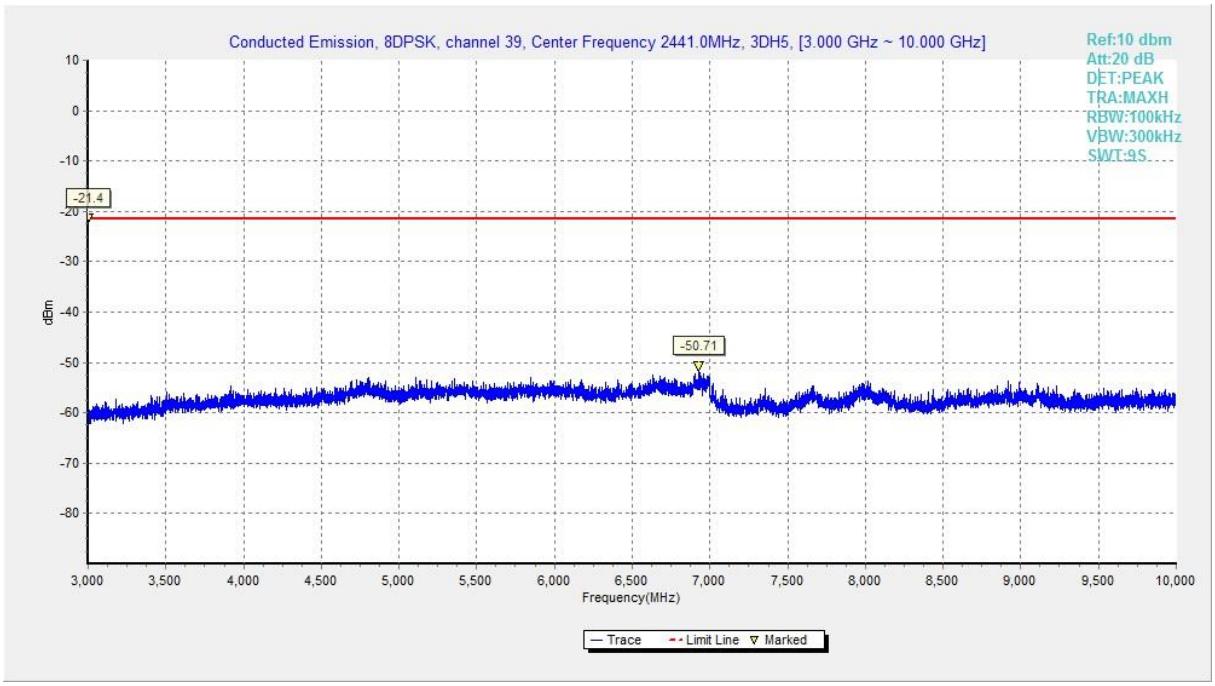

Fig. 45 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10 GHz)

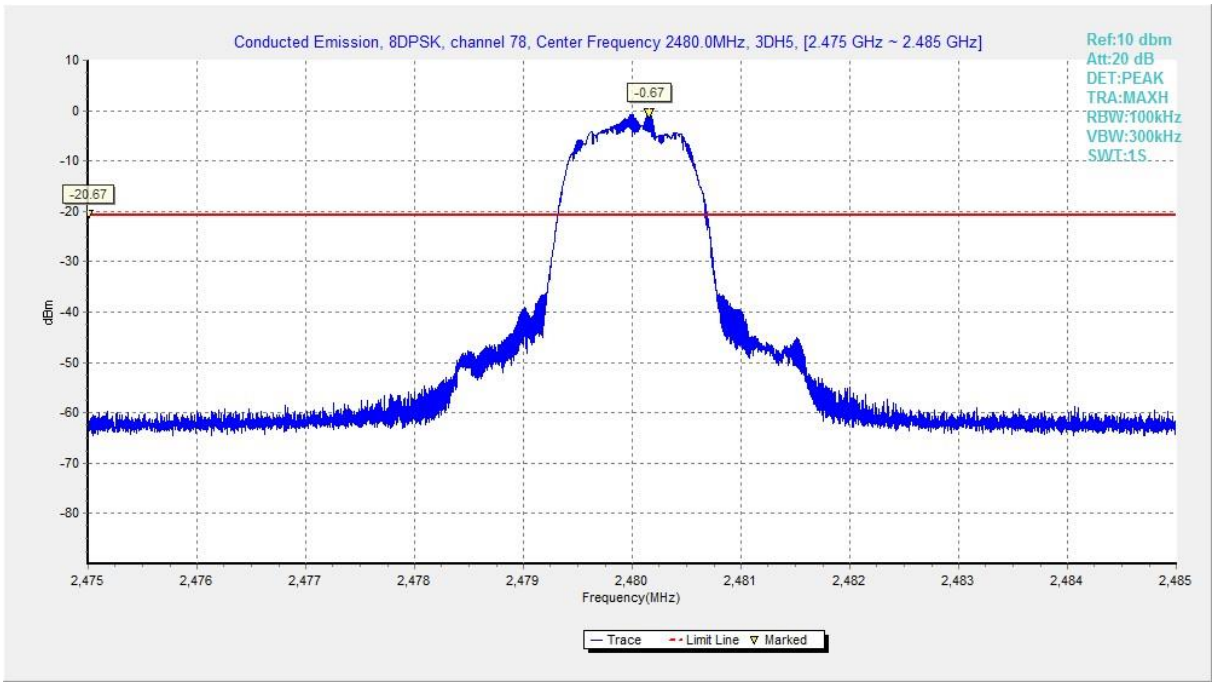

Fig. 46 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)

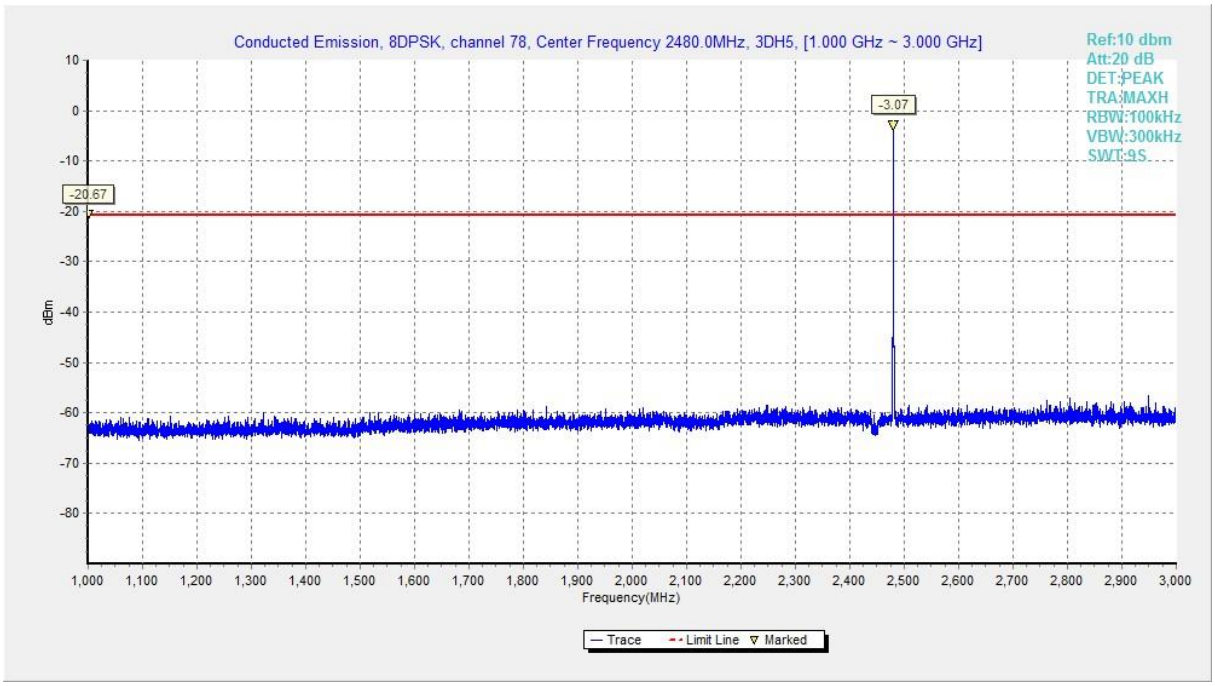

Fig. 47 Conducted Spurious Emission (8DPSK, Ch78, 1GHz-3 GHz)

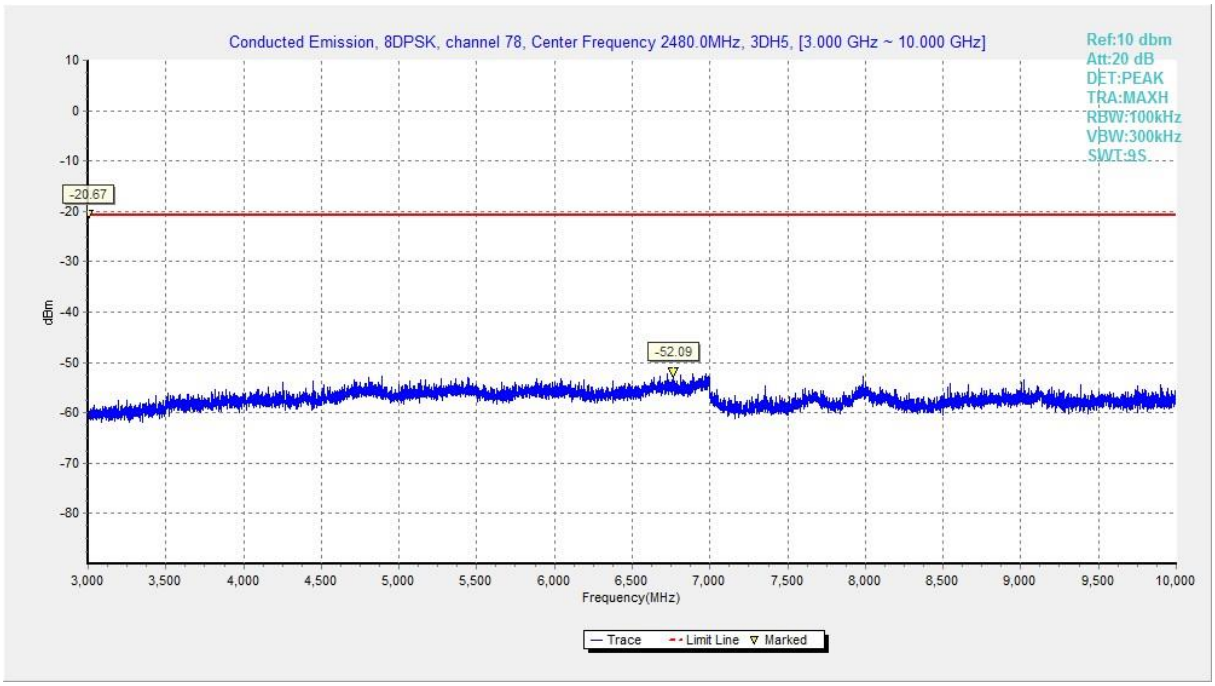

Fig. 48 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10 GHz)

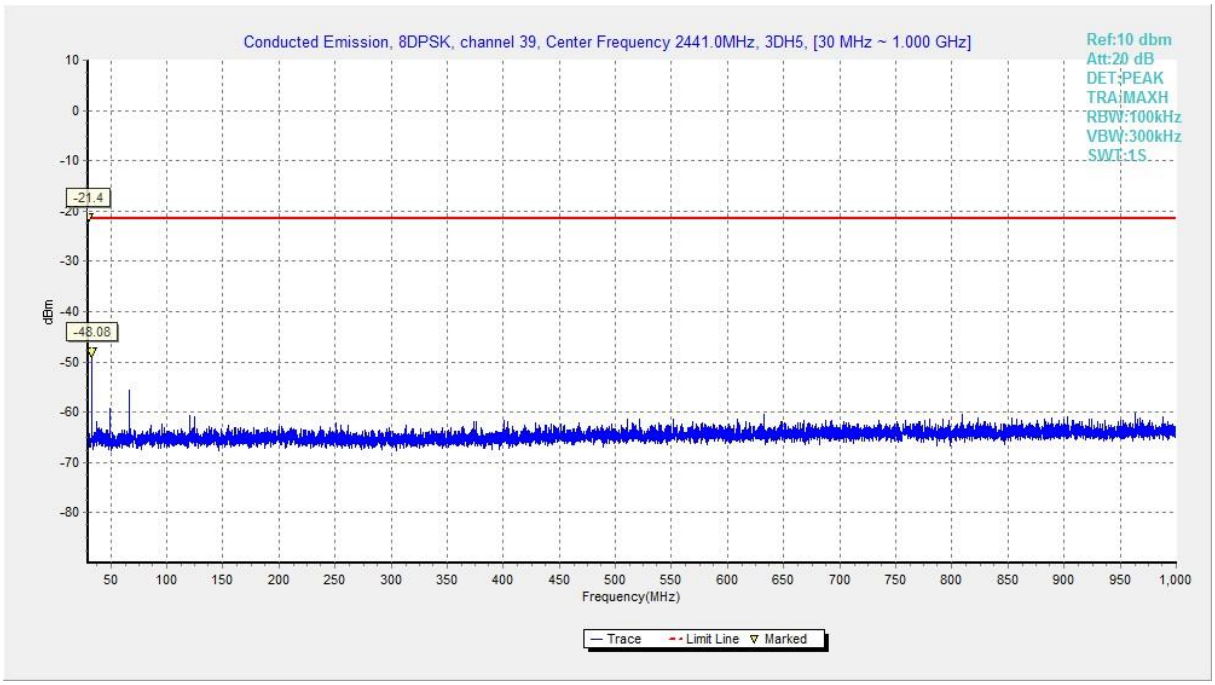

Fig. 49 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)

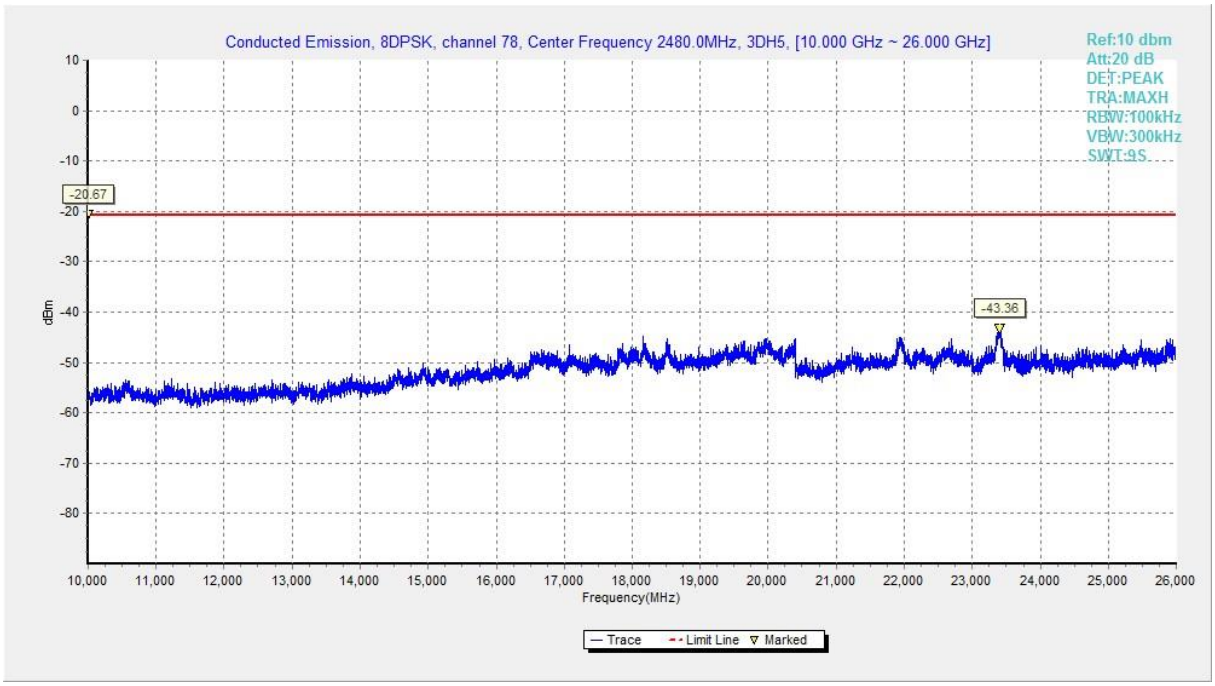

Fig. 50 Conducted Spurious Emission All channel, 10 GHz-26 GHz,)