FCC PART 15C
TEST REPORT
No. I19N00514-BT

For

RUGGEAR LIMITED

LTE SMARTPHONE

Model Name: RG655

With

Hardware Version: V1.0

Software Version: RG655_US_1.0.0.0.0_5_20190415

FCC ID: 2ASCH-RG655

Issued Date: 2019-04-26

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
I19N00514-BT	Rev.0	1st edition	2019-04-26

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

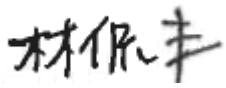
1.2. Testing Environment

Normal Temperature: 15-30℃
Relative Humidity: 35-60%

1.3. Project data

Testing Start Date: 2019-03-14
Testing End Date: 2019-04-19

1.4. Signature



Lin Kanfeng
(Prepared this test report)

Tang Weisheng
(Reviewed this test report)

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(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	RUGGEAR LIMITED
Address /Post:	RM1301,13/F WING TUCK COMM CTR 177-183 WING LOK ST SHEUNG WAN HONG KONG
City:	HONG KONG
Postal Code:	/
Country:	China
Telephone:	0755-86220211

2.2. Manufacturer Information

Company Name:	RUGGEAR LIMITED
Address /Post:	RM1301,13/F WING TUCK COMM CTR 177-183 WING LOK ST SHEUNG WAN HONG KONG
City:	HONG KONG
Postal Code:	/
Country:	China
Telephone:	0755-86220211

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

3.1. About EUT

Description	LTE SMARTPHONE
Model Name	RG655
Market Name	RG655
Frequency Band	2400MHz~2483.5MHz
Type of Modulation	GFSK/ π /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	0.7dBi
Power Supply	3.8V DC by Battery
FCC ID	2ASCH-RG655
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	/	V1.0	RG655_US_1.0.0.0.0_5_20190415	2019-03-14

*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-Polymer Battery	SHENZHEN YJC TECHNOLOGY CO. LTD.
AE2	Charger	HKC0055010-3D	SHENZHEN HUNTKEY ELECTRIC CO., LTD.

*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 LTE 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: 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

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ±4dB, 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 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω

Fully-anechoic chamber

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Voltage Standing Wave Ratio (VSWR)	≤6dB, from 1 to 18 GHz,3m distance

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Cycle	Calibration Due date
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2019-01-17	2020-01-16
2	Bluetooth Tester	CBT32	100584	Rohde & Schwarz	2019-01-03	2020-01-02
3	Power Sensor	U2021XA	MY55430013	Agilent	2019-01-17	2020-01-16
4	Data Acquisiton	U2531A	TW55443507	Agilent	/	/

Radiated emission test system

NO.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	LISN	ESH2-Z5	100196	R&S	2019-01-04	2020-01-03
2	Test Receiver	ESCI	100701	R&S	2018-08-08	2019-08-07
3	Loop Antenna	HLA6120	35779	TESEQ	2016-05-03	2019-05-02
4	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2017-02-18	2020-02-17
5	Horn Antenna	3117	00066585	ETS-Lindgren	2019-03-05	2022-03-04
6	Test Receiver	ESR7	101675	R&S	2018-07-20	2019-07-19
7	Spectrum Analyzer	FSP 40	100378	R&S	2018-12-14	2019-12-13
8	Chamber	FACT5-2.0	4166	ETS-Lindgren	2018-05-13	2021-05-12
9	Antenna	QSH-SL-18-26-S-20	17013	Q-par	2017-01-16	2020-01-15
10	Antenna	QSH-SL-26-40-K-20	17014	Q-par	2017-01-12	2020-01-11

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.

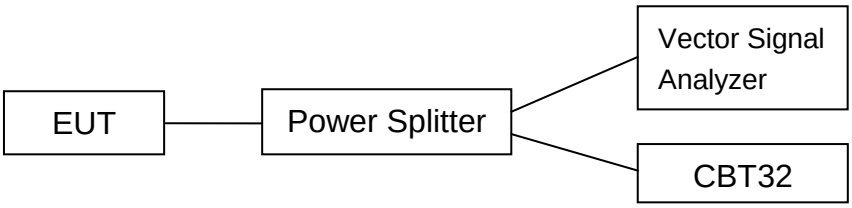
Conclusion: The Directional gains of antenna used for transmitting is 0.7dBi.
The RF transmitter uses an integrate antenna without connector.

A.1 Test Configuration

A.1.1 Conducted Measurements

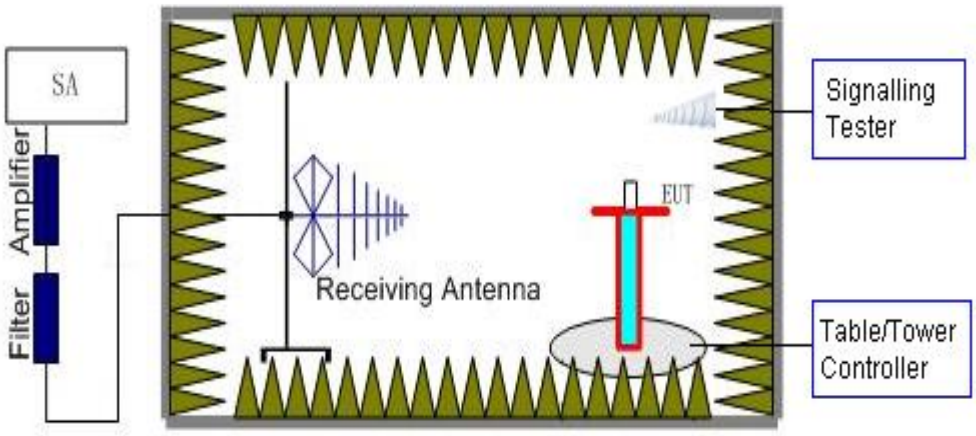
The measurement is made according to ANSI C63.10.

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	9.14	8.70	9.03
π /4 DQPSK	8.73	7.87	8.28
8DPSK	8.35	7.83	8.28

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

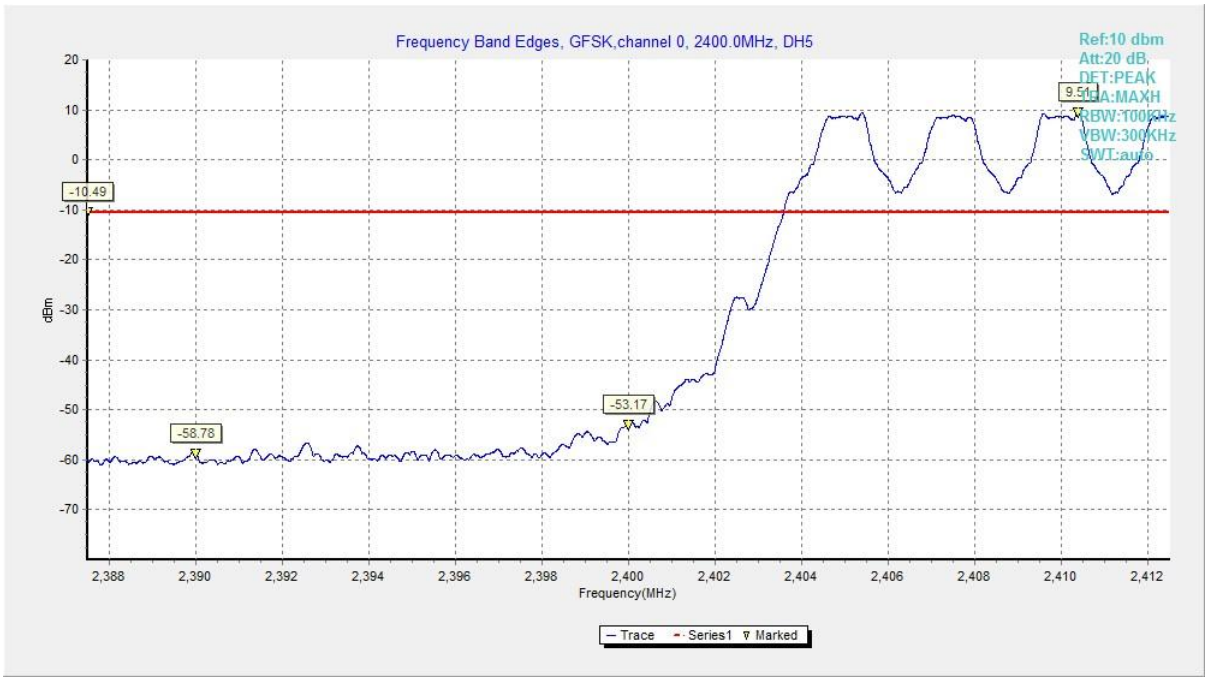


Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)

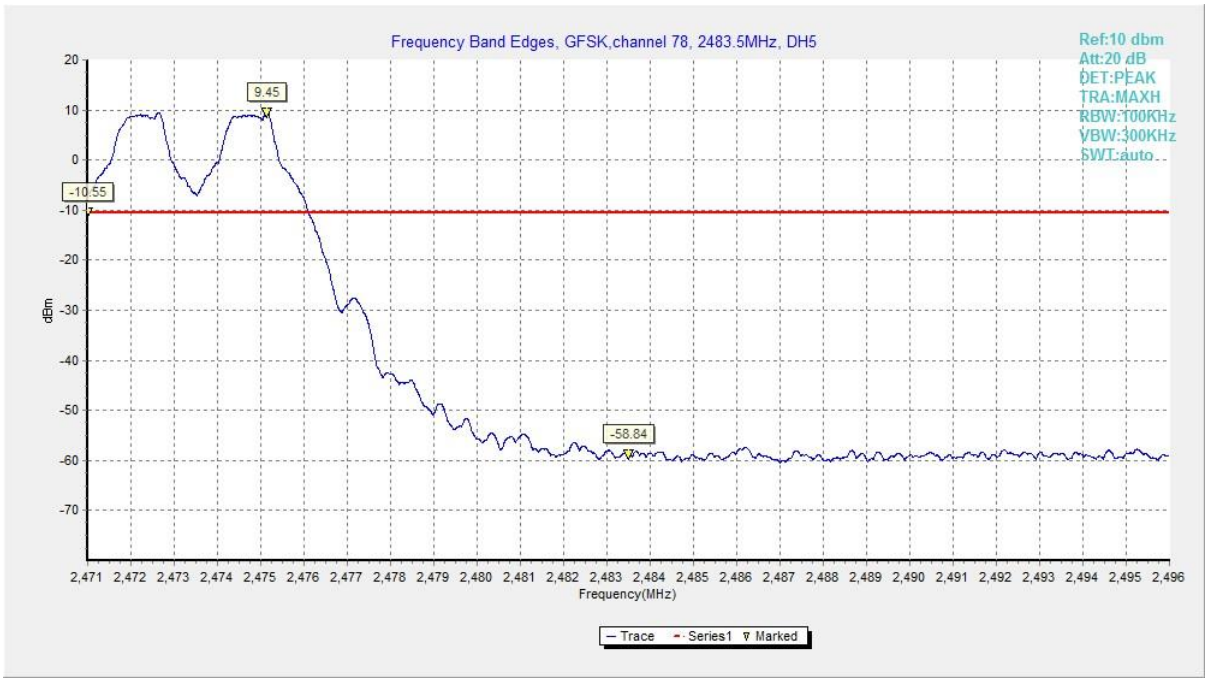


Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)

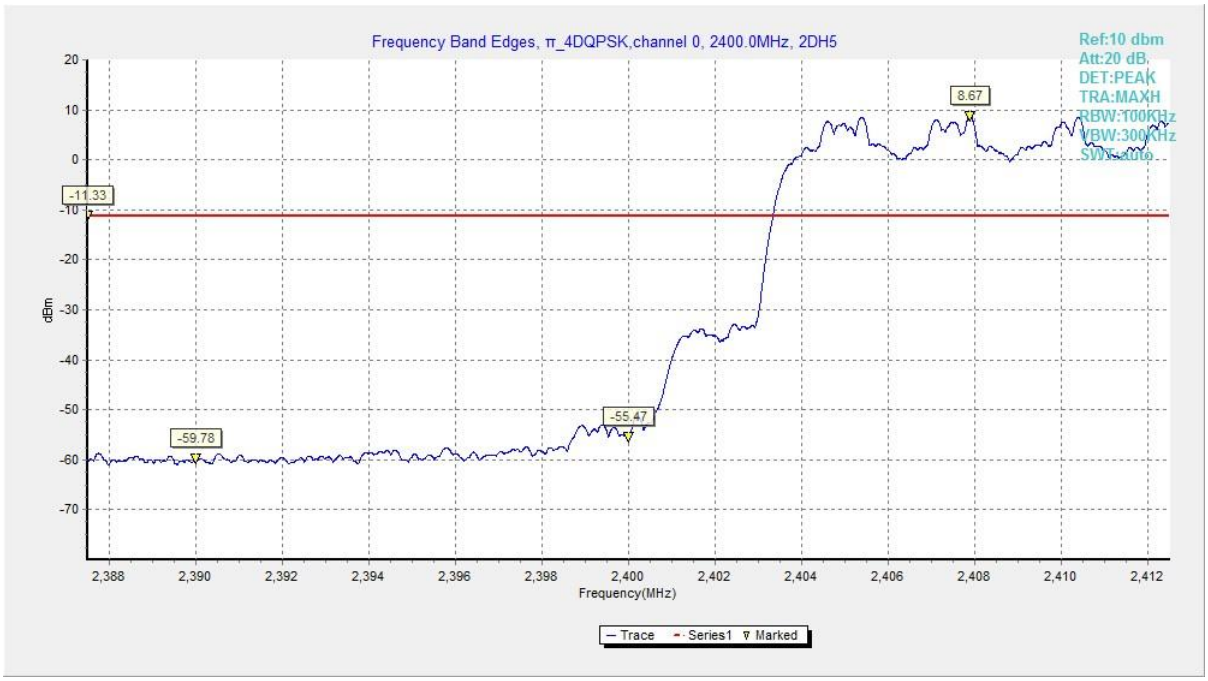


Fig. 3 Band Edges (π /4 DQPSK, Ch 0, Hopping ON)

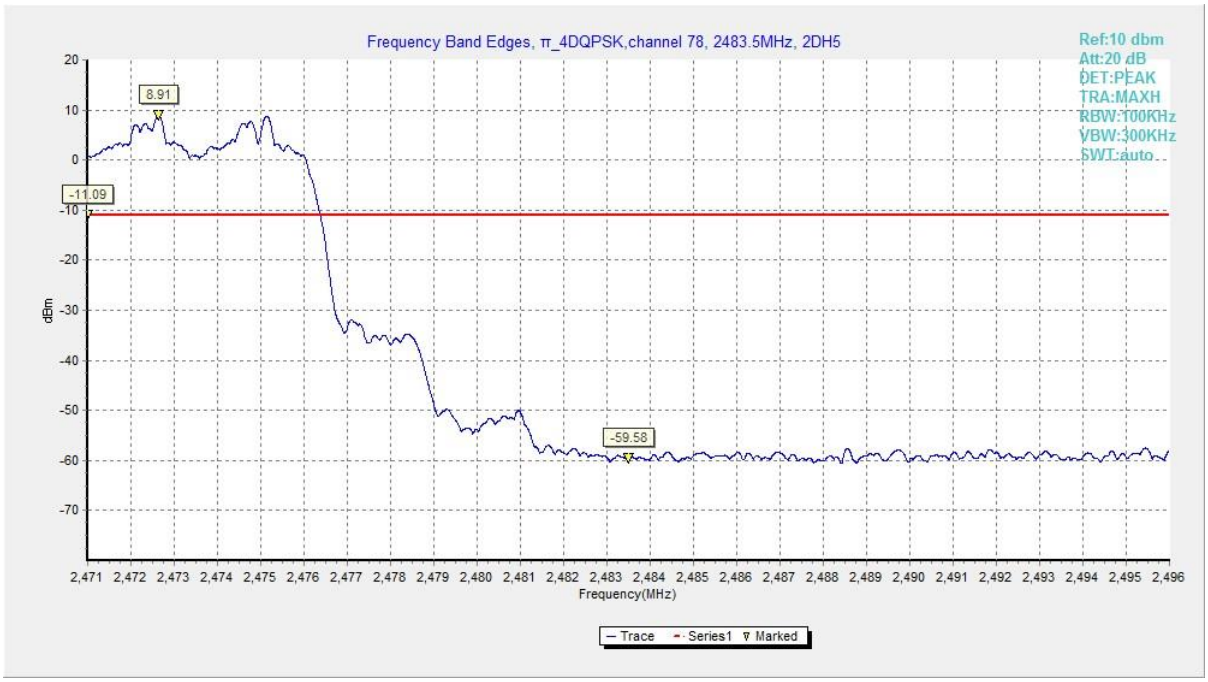


Fig. 4 Band Edges (π /4 DQPSK, Ch 78, Hopping ON)

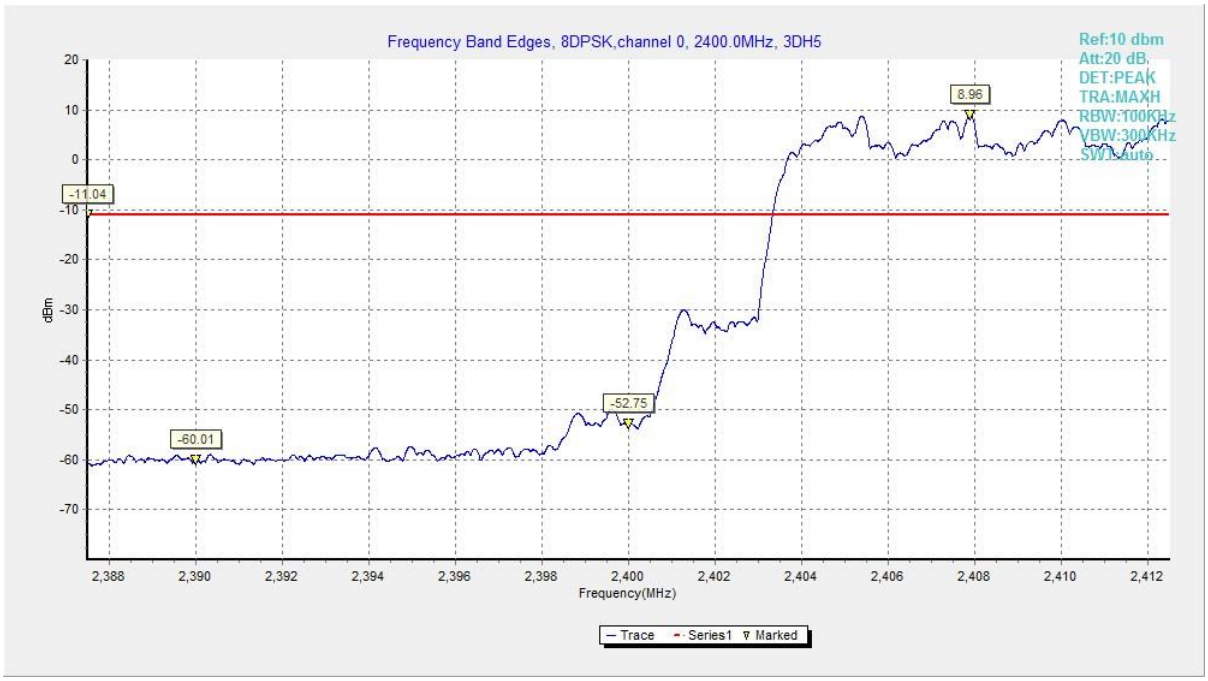


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

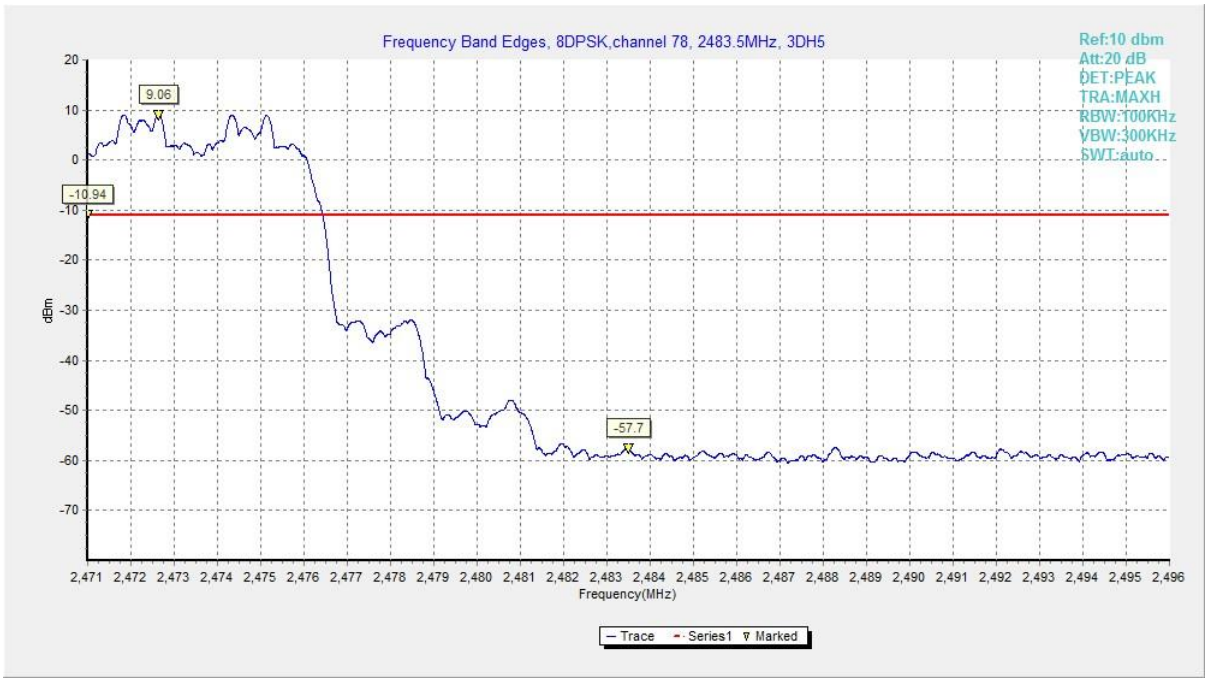


Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)

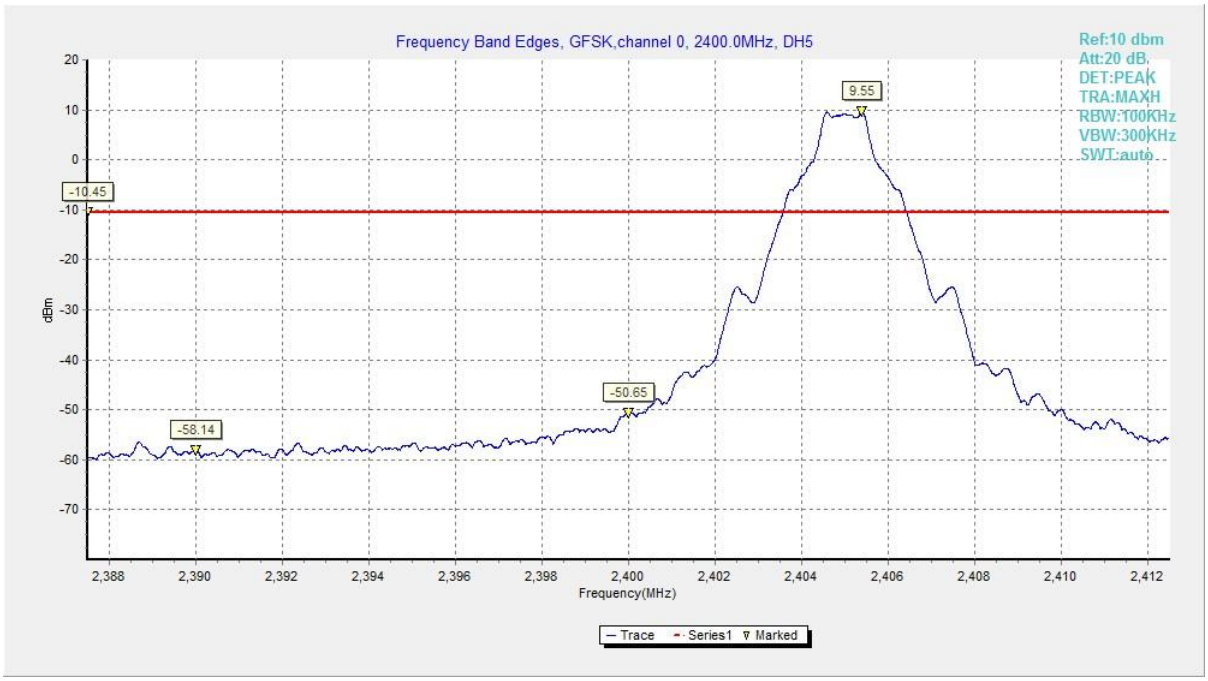


Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)

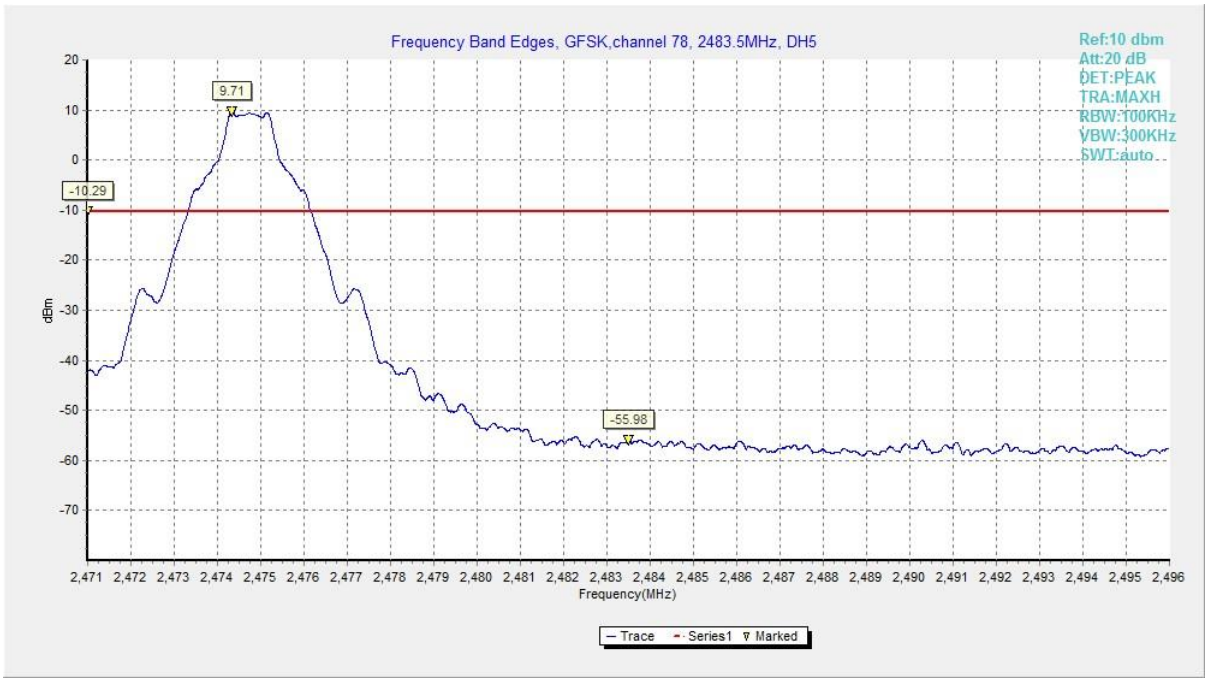


Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)

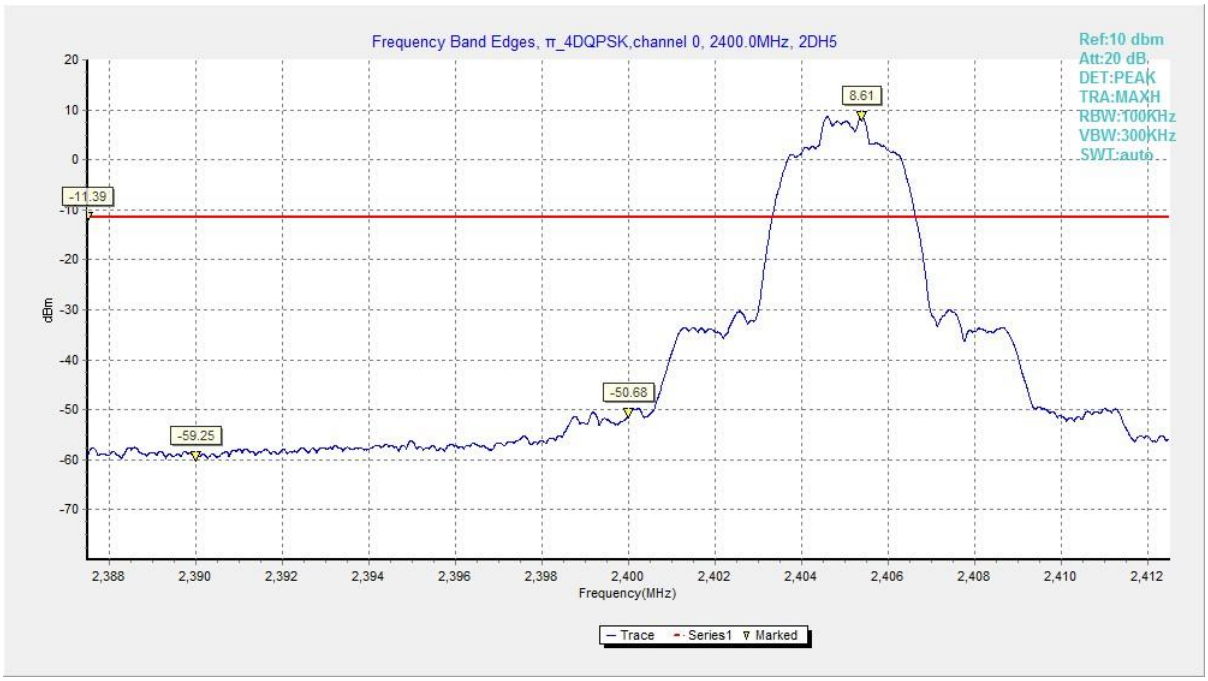


Fig. 9 Band Edges (π /4 DQPSK, Ch 0, Hopping OFF)

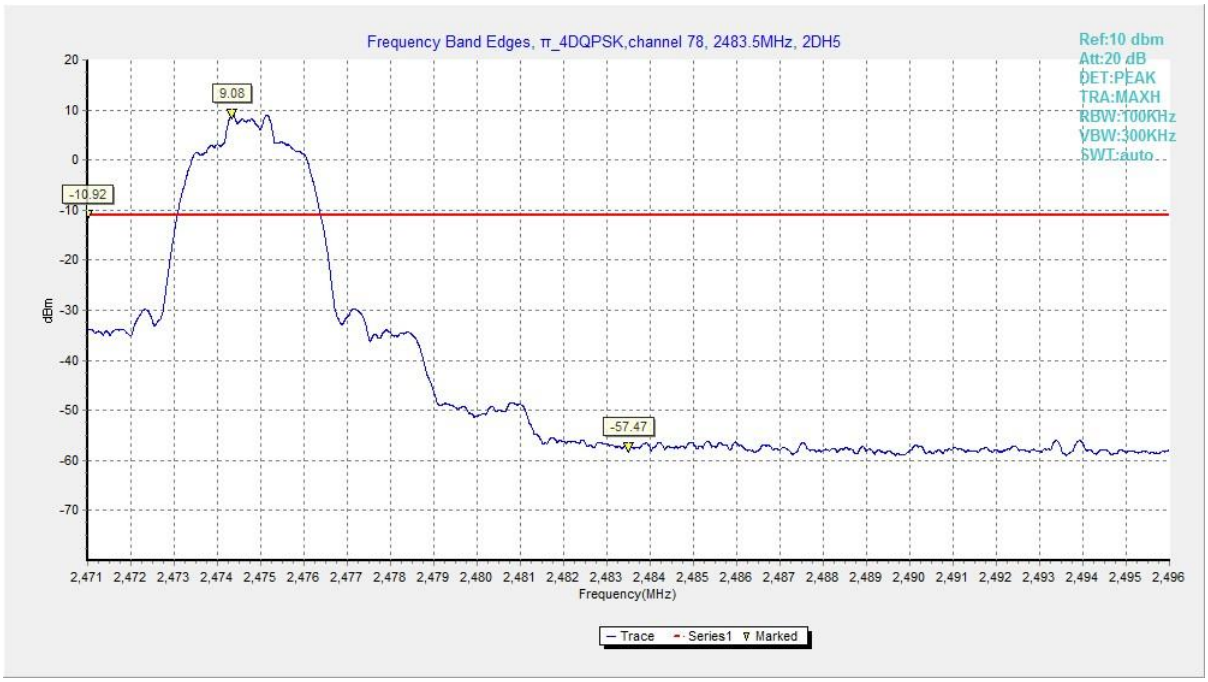


Fig. 10 Band Edges (π /4 DQPSK, Ch 78, Hopping OFF)

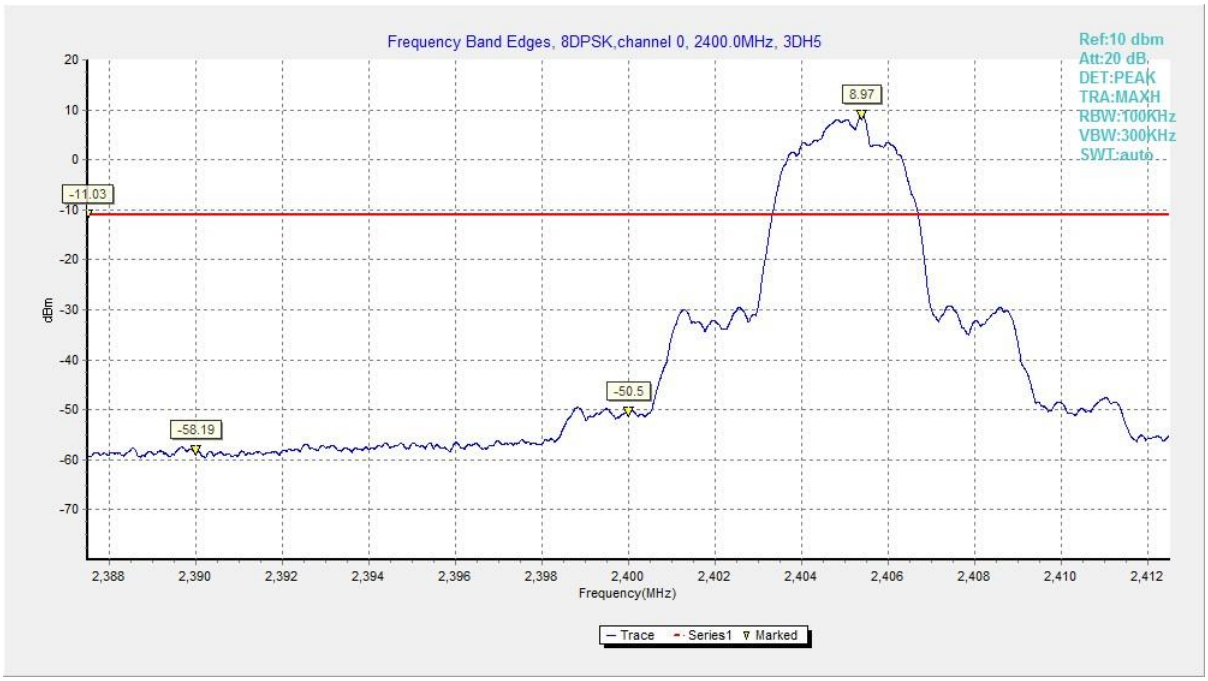


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

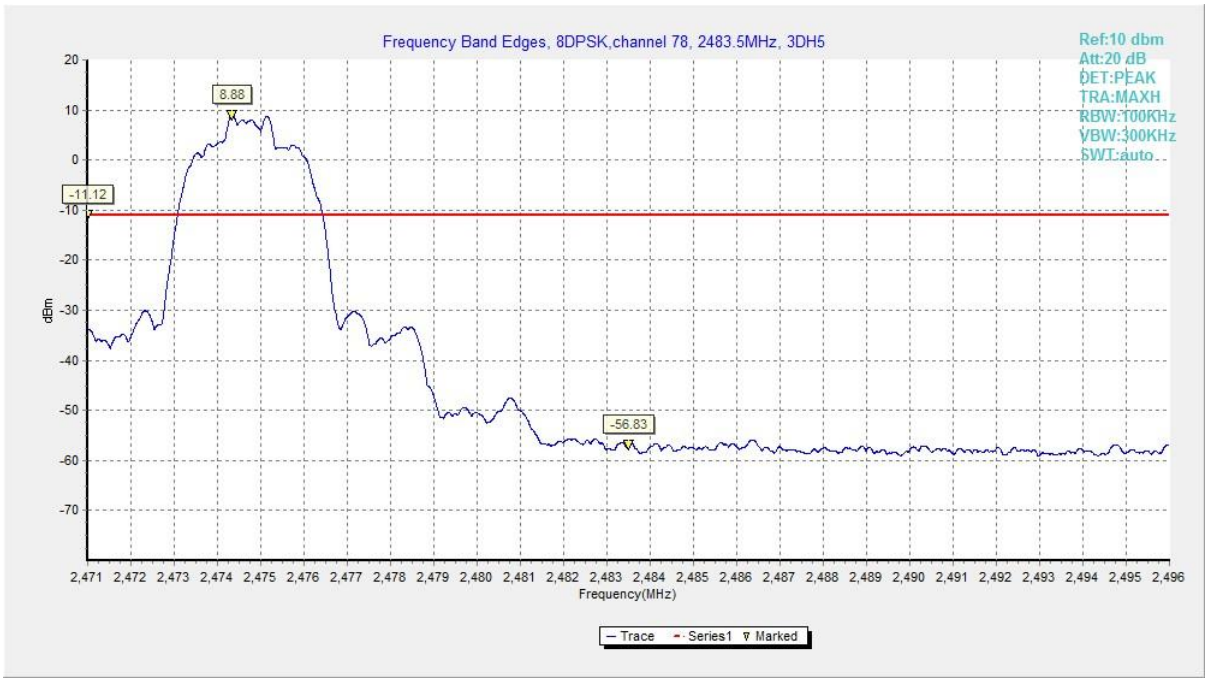


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)

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

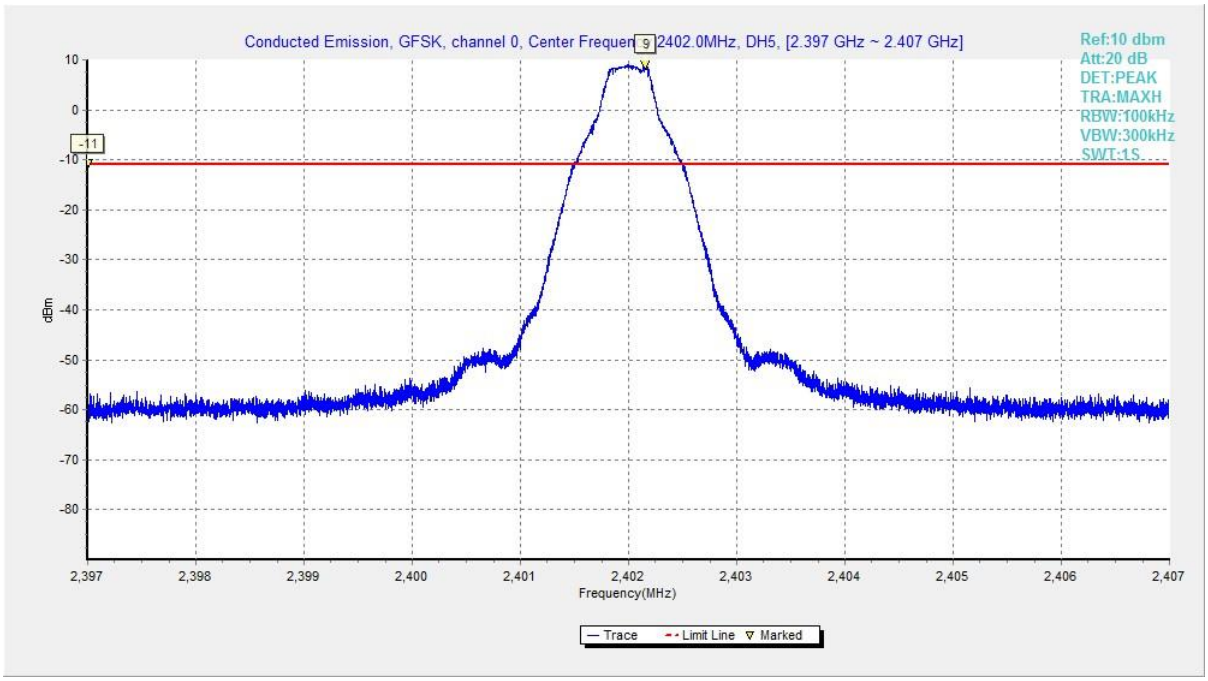


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

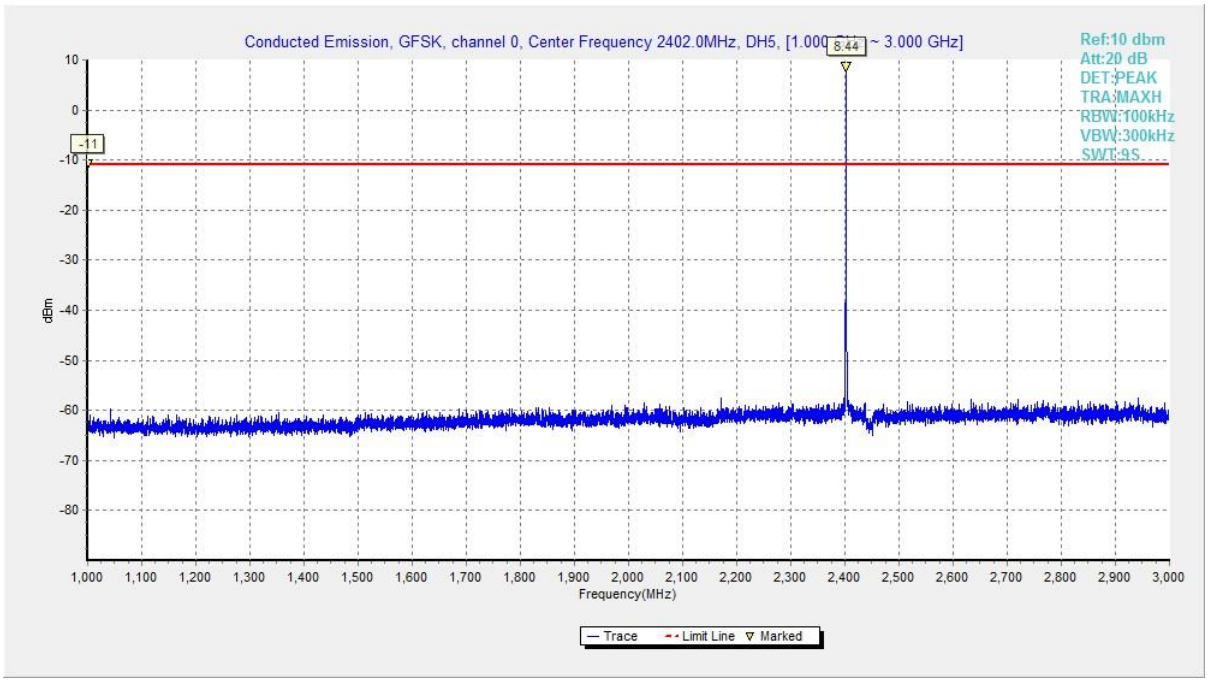


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)

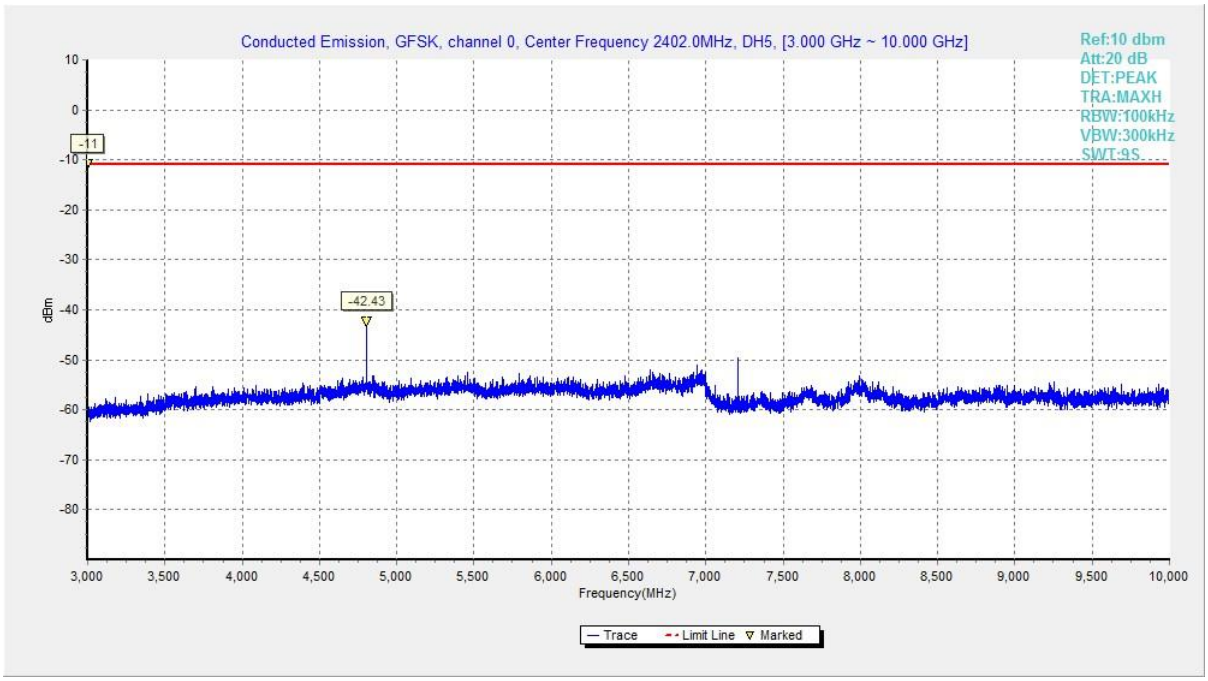


Fig. 15 Conducted Spurious Emission (GFSK, Ch0, 3 GHz-10 GHz)

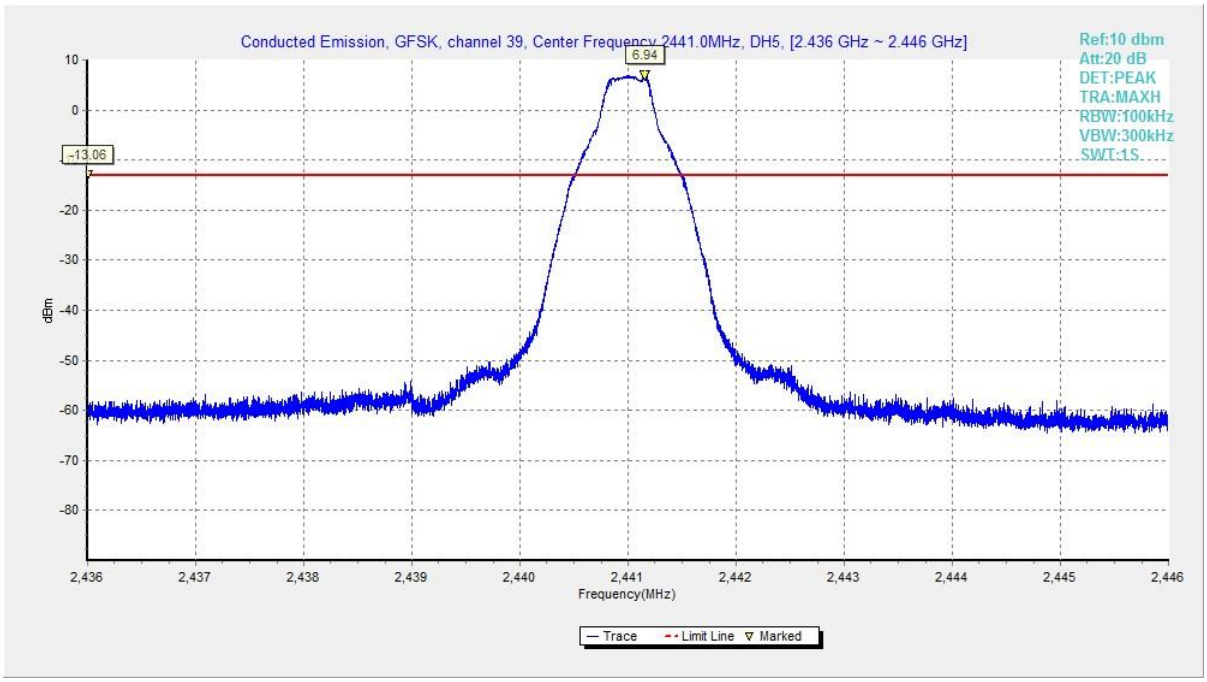


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)

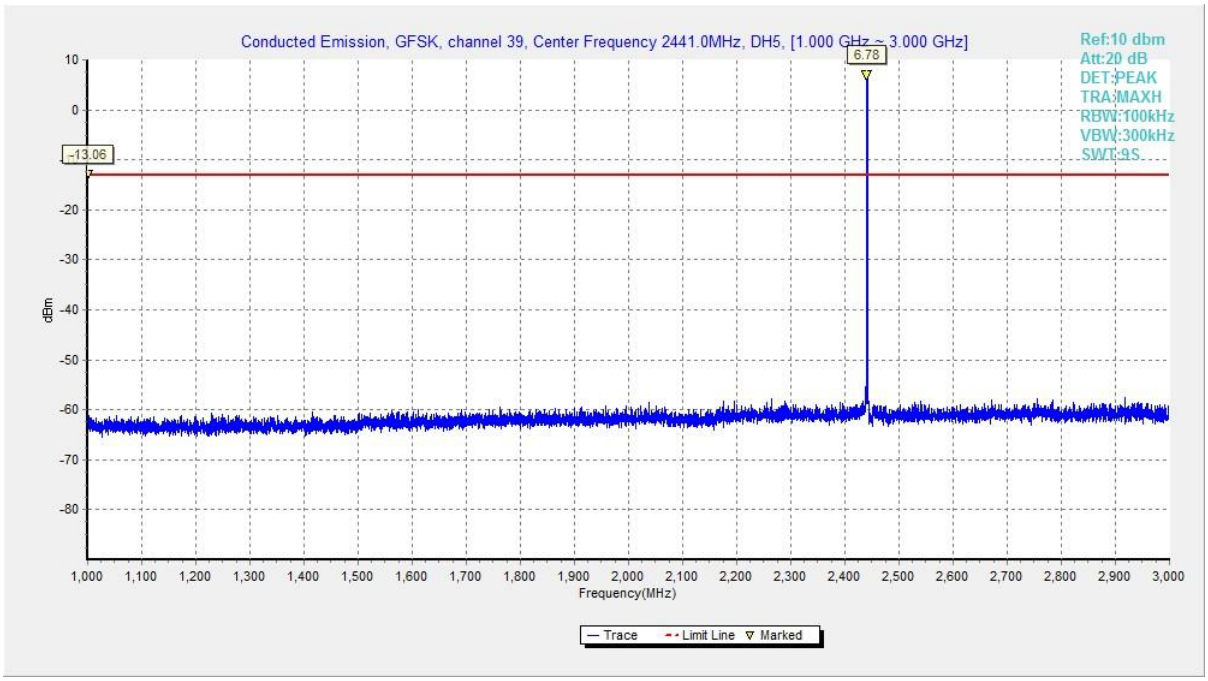


Fig. 17 Conducted Spurious Emission (GFSK, Ch39, 1 GHz-3 GHz)

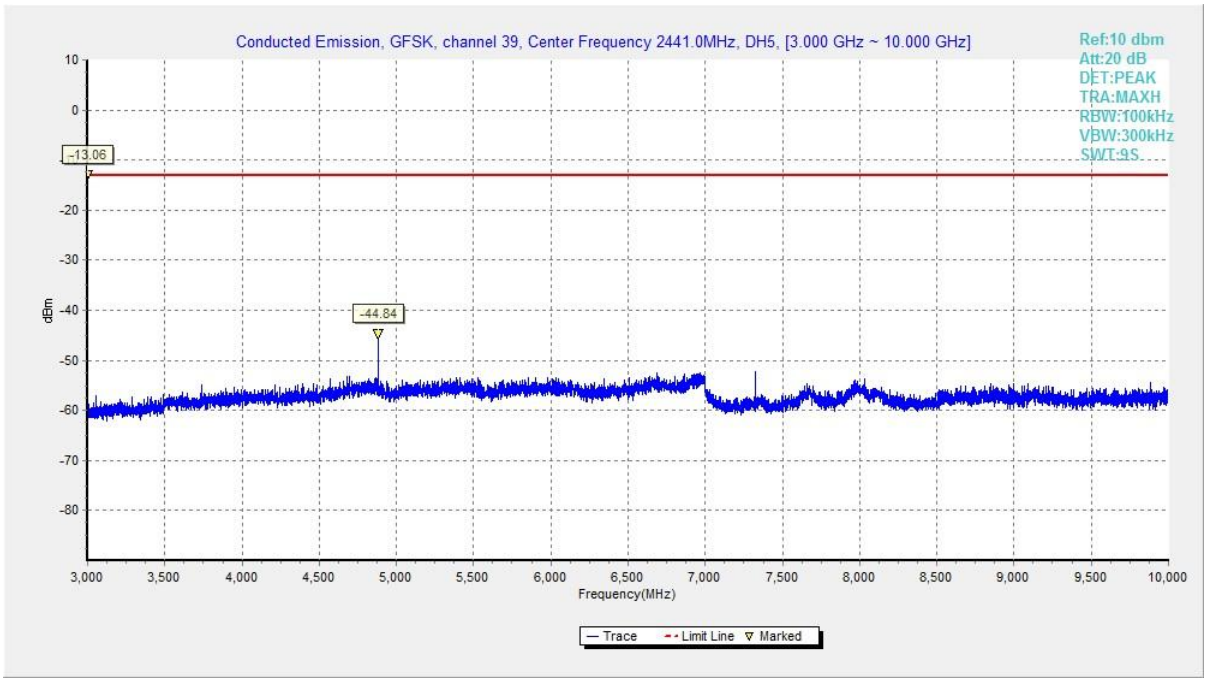


Fig. 18 Conducted Spurious Emission (GFSK, Ch39, 3 GHz-10 GHz)

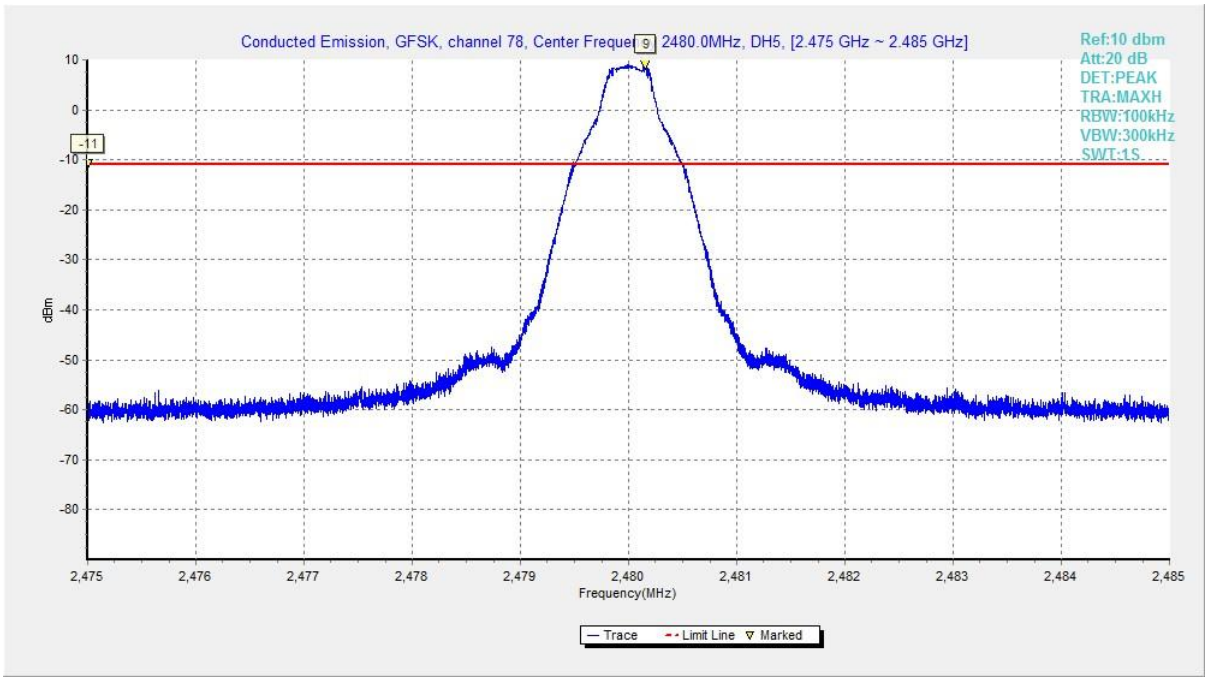


Fig. 19 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

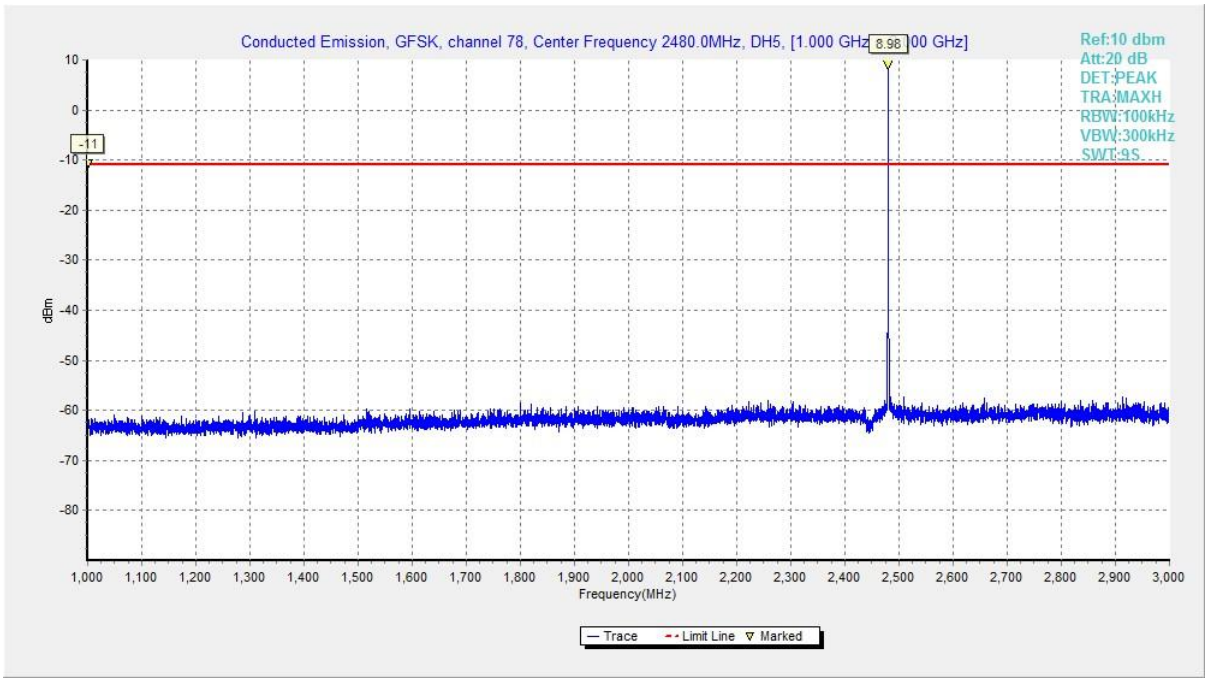


Fig. 20 Conducted Spurious Emission (GFSK, Ch78, 1 GHz-3 GHz)

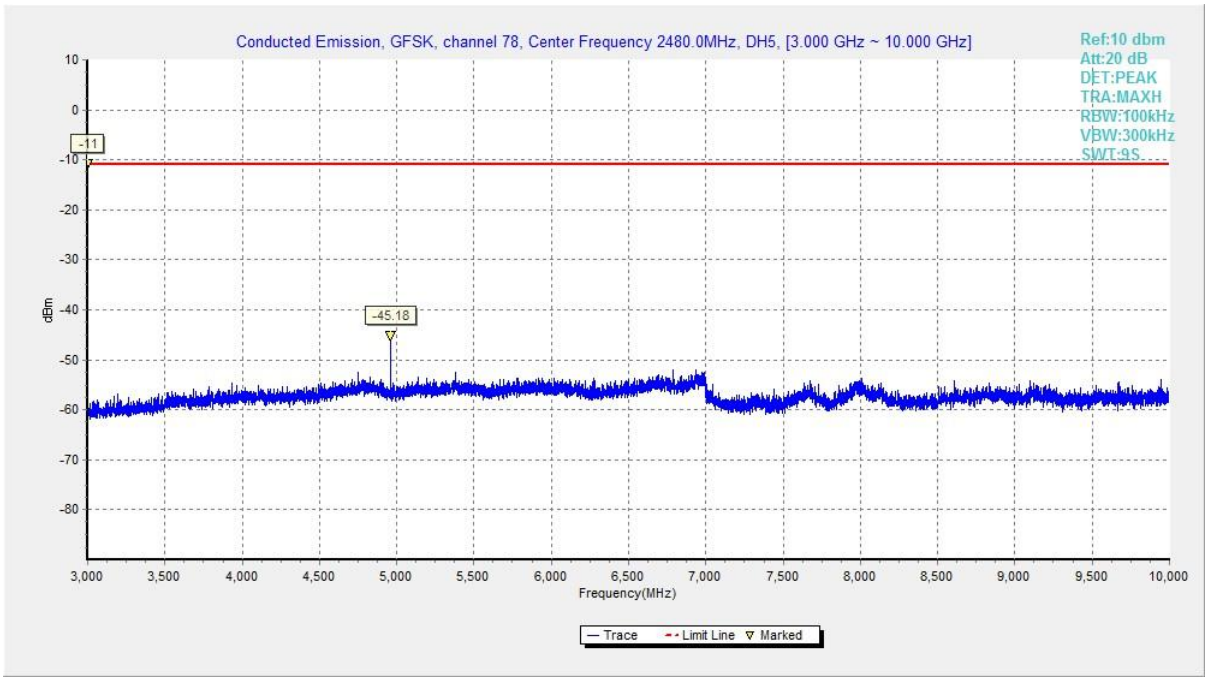


Fig. 21 Conducted Spurious Emission (GFSK, Ch78, 3 GHz-10 GHz)

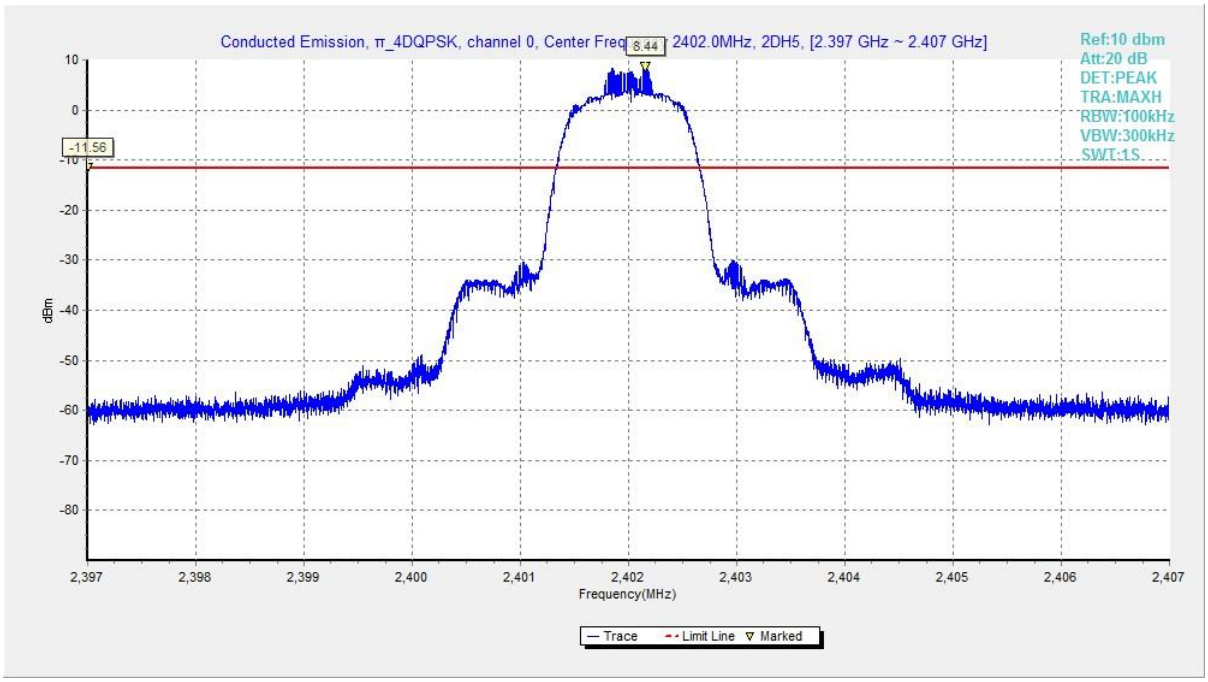


Fig. 22 Conducted Spurious Emission (π /4 DQPSK, Ch0, 2.402GHz)

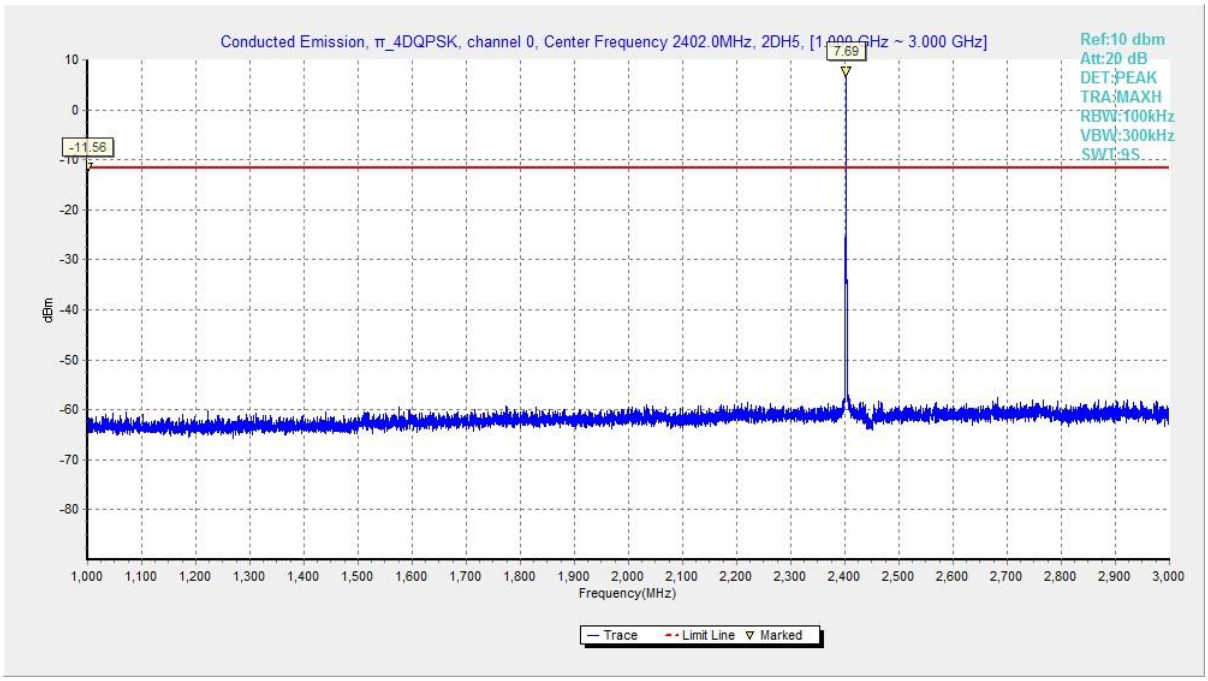


Fig. 23 Conducted Spurious Emission (π /4 DQPSK, Ch0, 1 GHz-3 GHz)

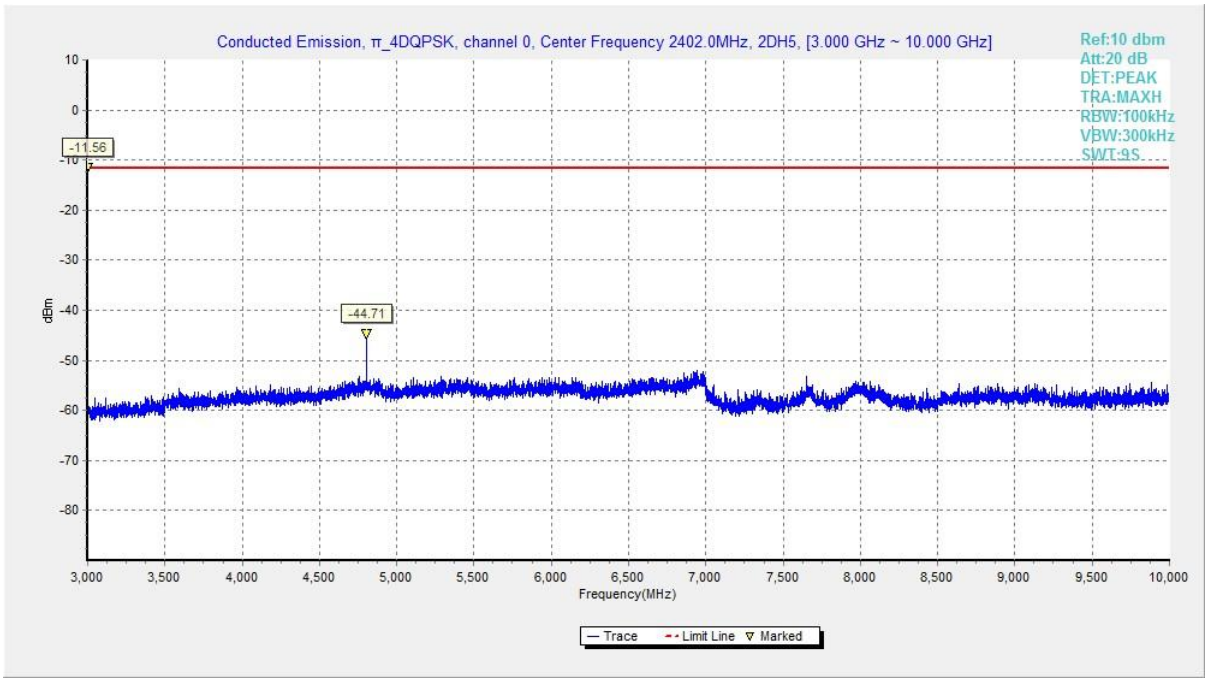


Fig. 24 Conducted Spurious Emission (π /4 DQPSK, Ch0, 3 GHz-10 GHz)

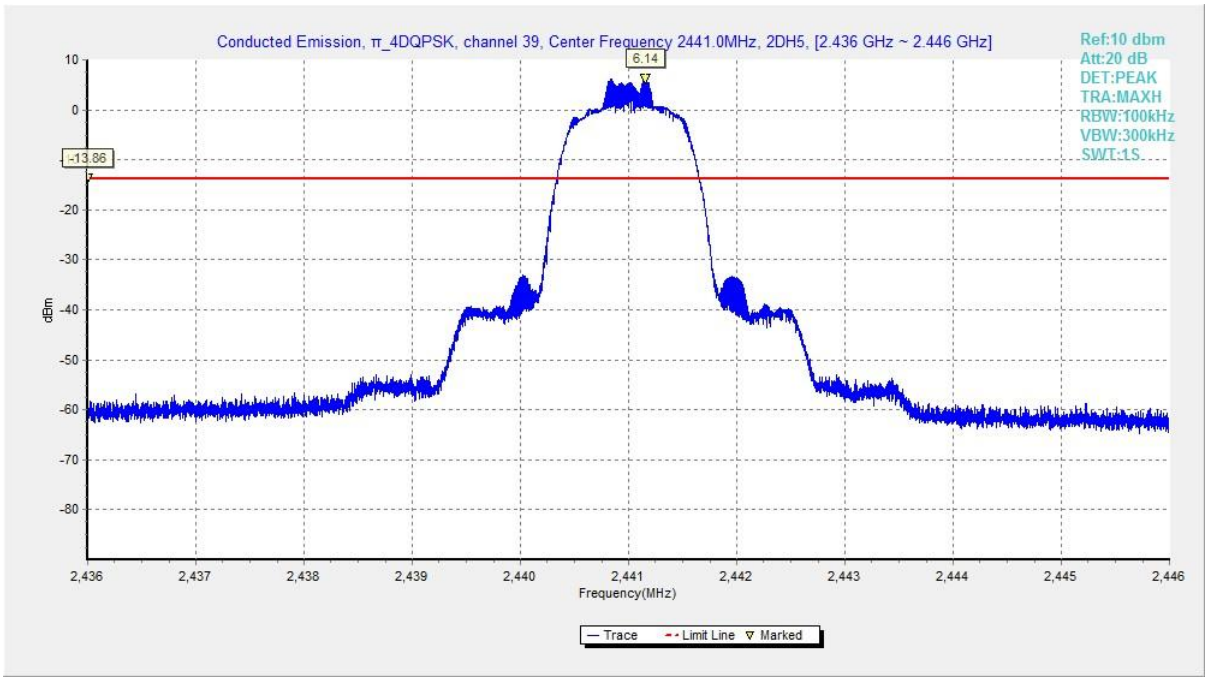


Fig. 25 Conducted Spurious Emission (π /4 DQPSK, Ch39, 2.441GHz)

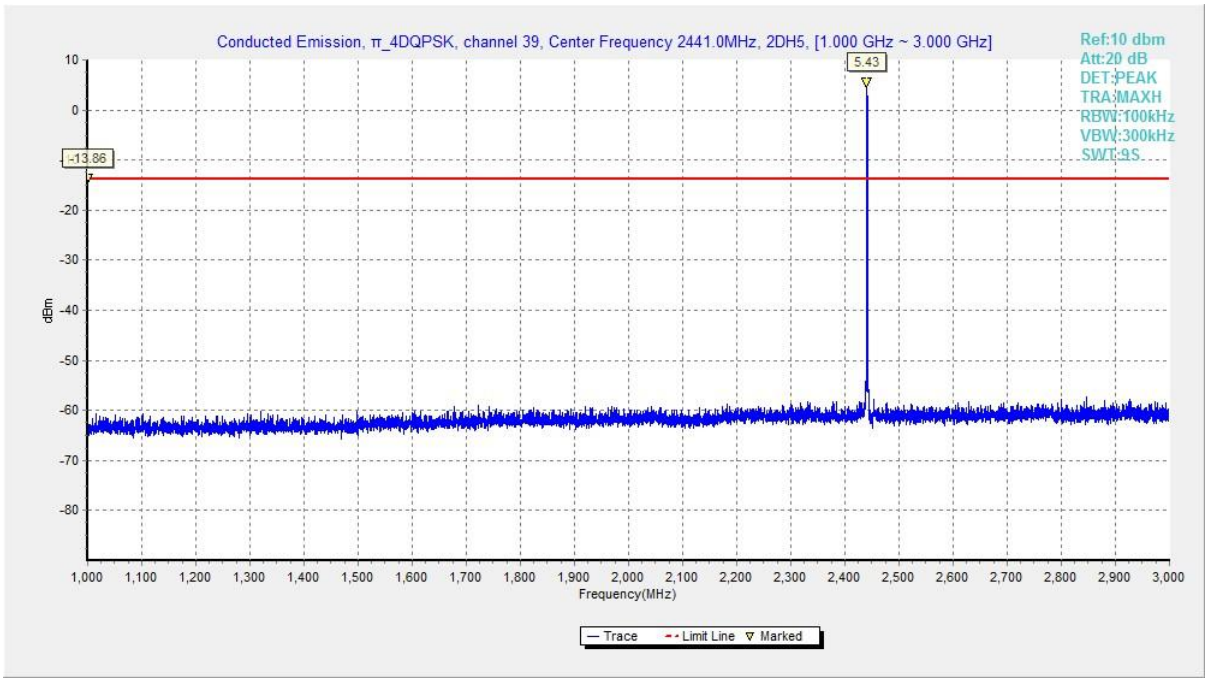


Fig. 26 Conducted Spurious Emission (π /4 DQPSK, Ch39, 1 GHz-3 GHz)

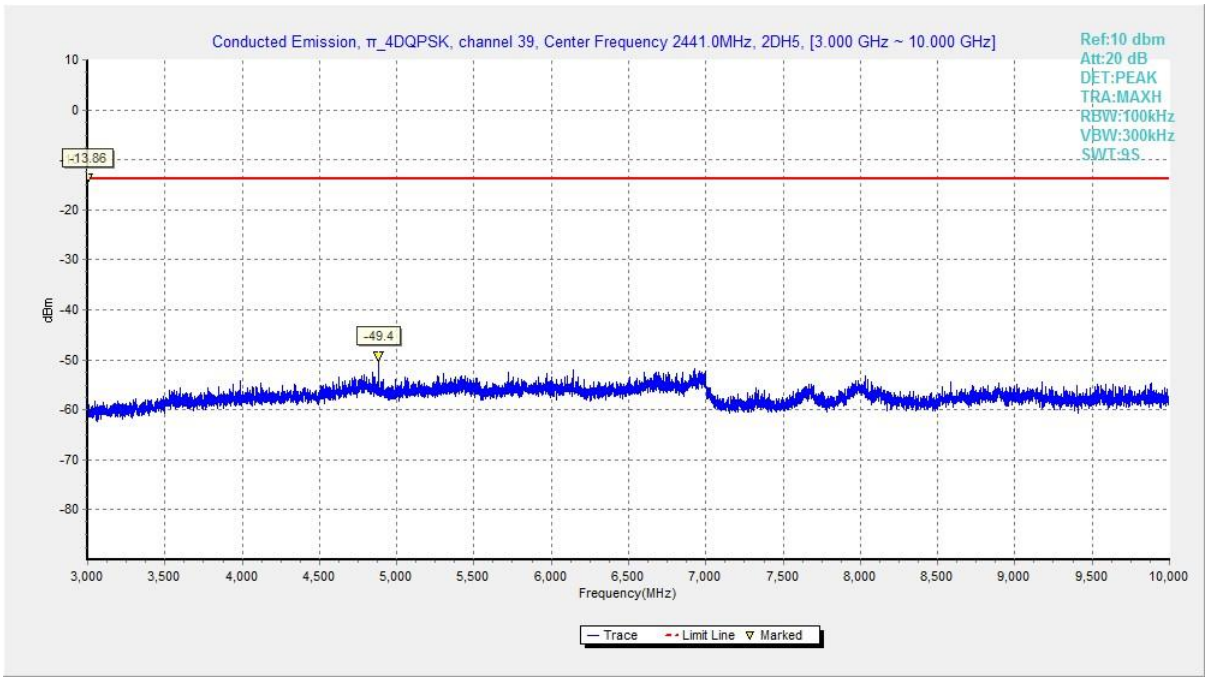


Fig. 27 Conducted Spurious Emission (π /4 DQPSK, Ch39, 3 GHz-10 GHz)

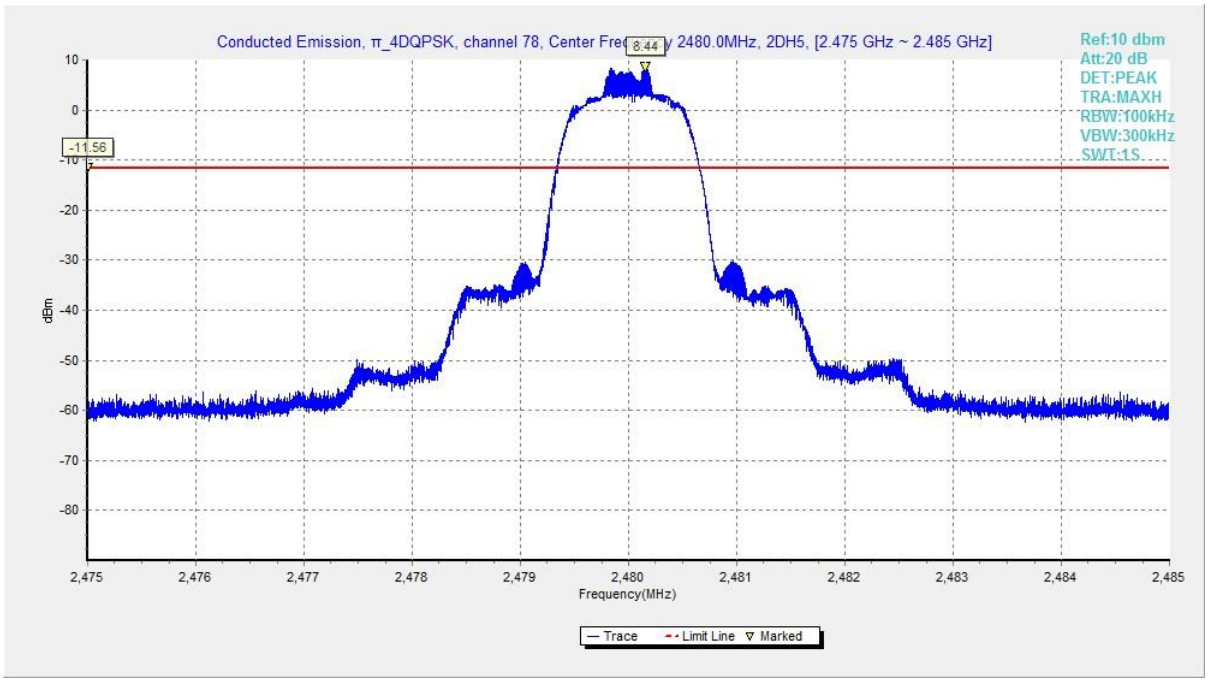


Fig. 28 Conducted Spurious Emission (π /4 DQPSK, Ch78, 2.480GHz)

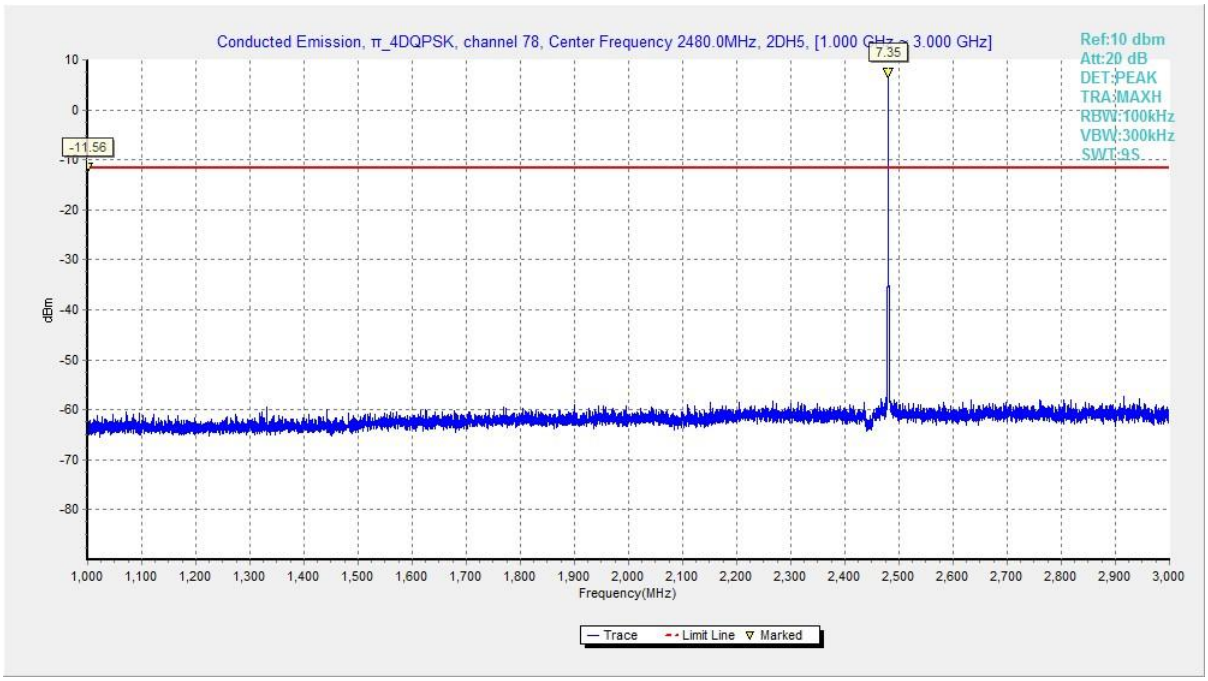


Fig. 29 Conducted Spurious Emission (π /4 DQPSK, Ch78, 1 GHz-3 GHz)

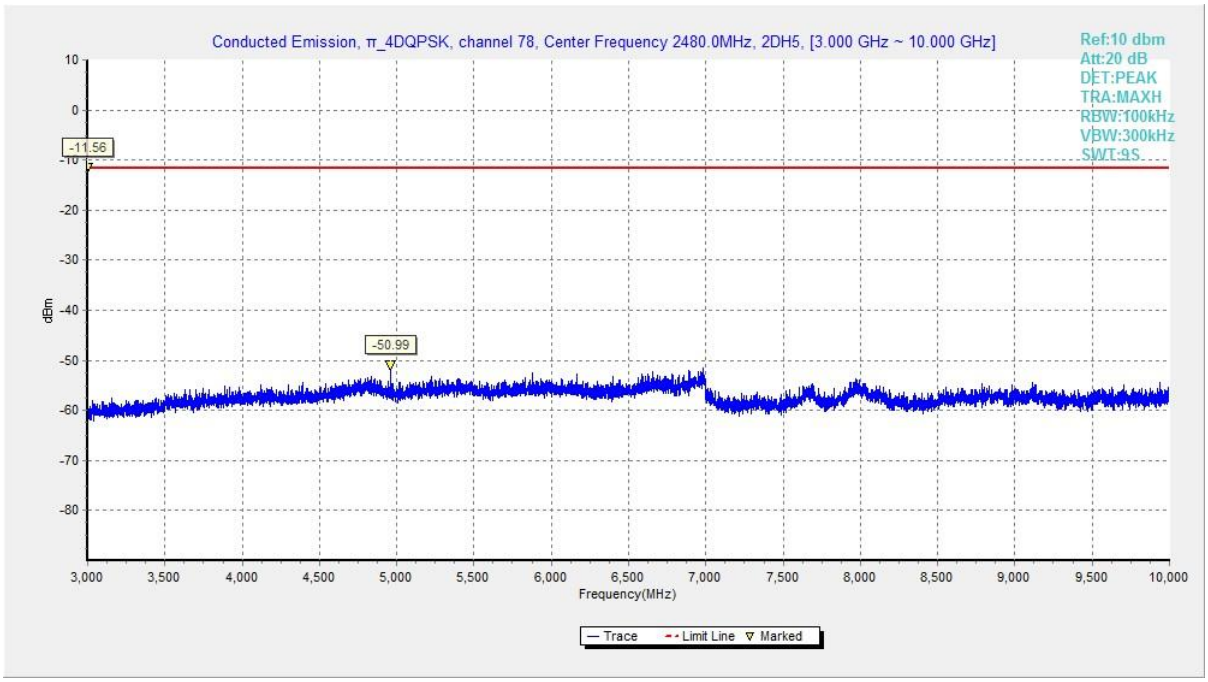


Fig. 30 Conducted Spurious Emission (π /4 DQPSK, Ch78, 3 GHz-10 GHz)

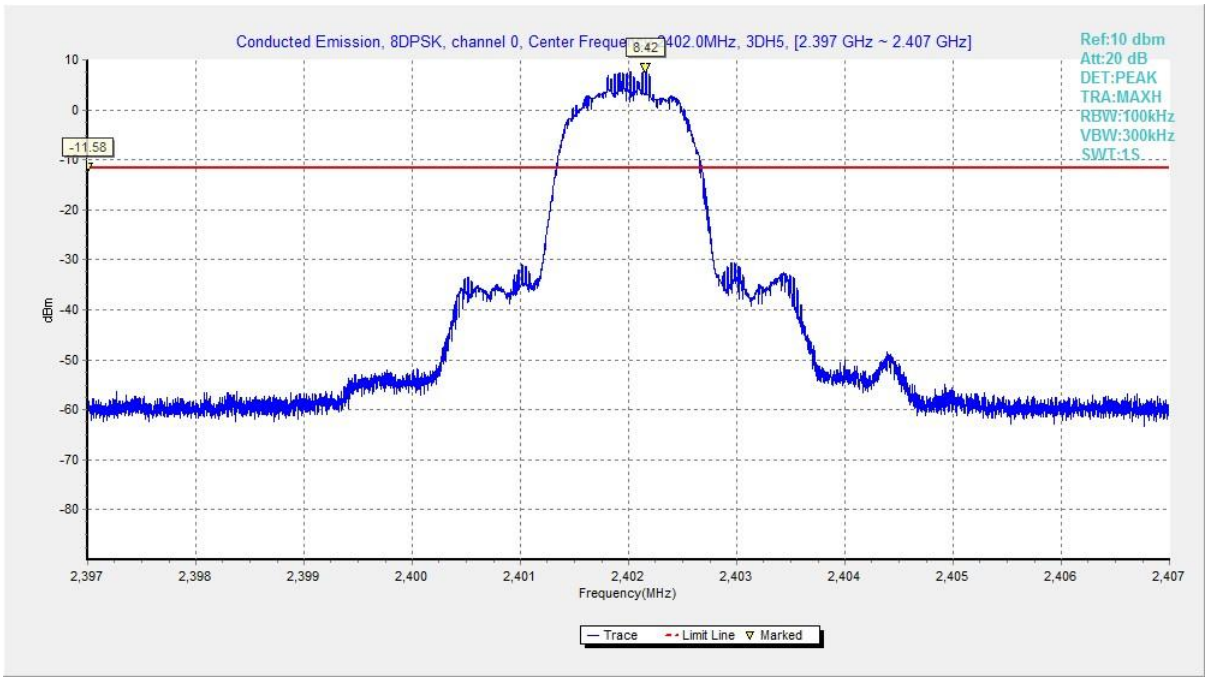


Fig. 31 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)

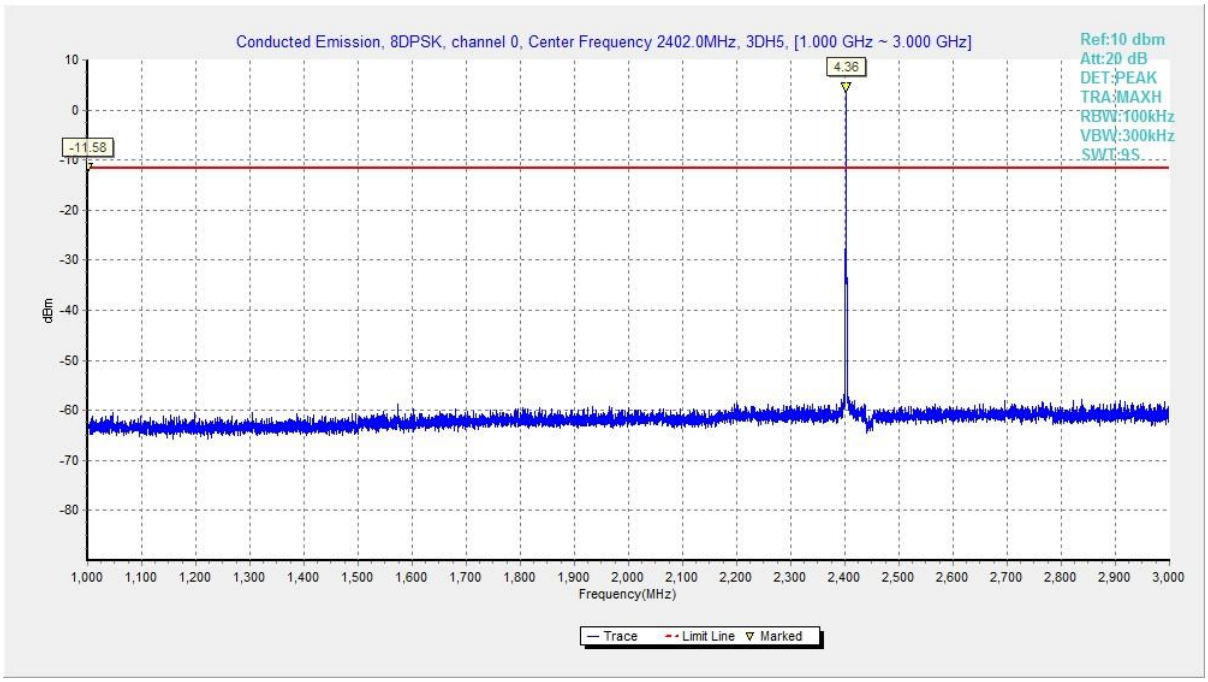


Fig. 32 Conducted Spurious Emission (8DPSK, Ch0, 1 GHz-3 GHz)

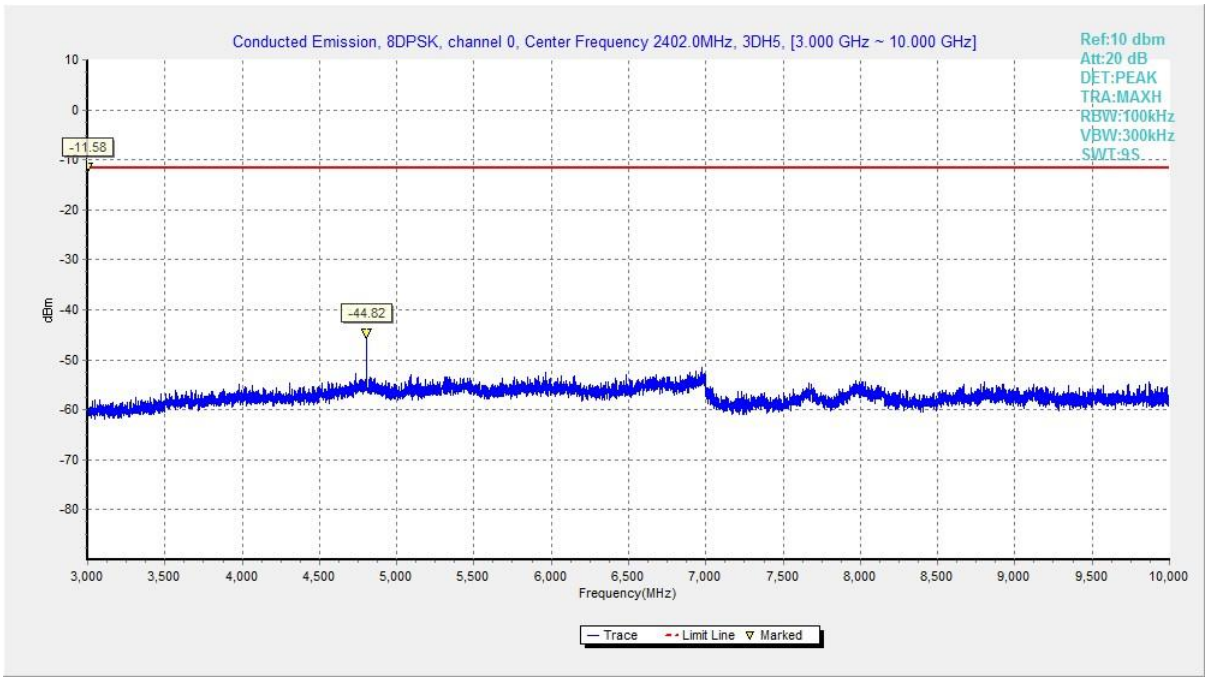


Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3 GHz-10 GHz)

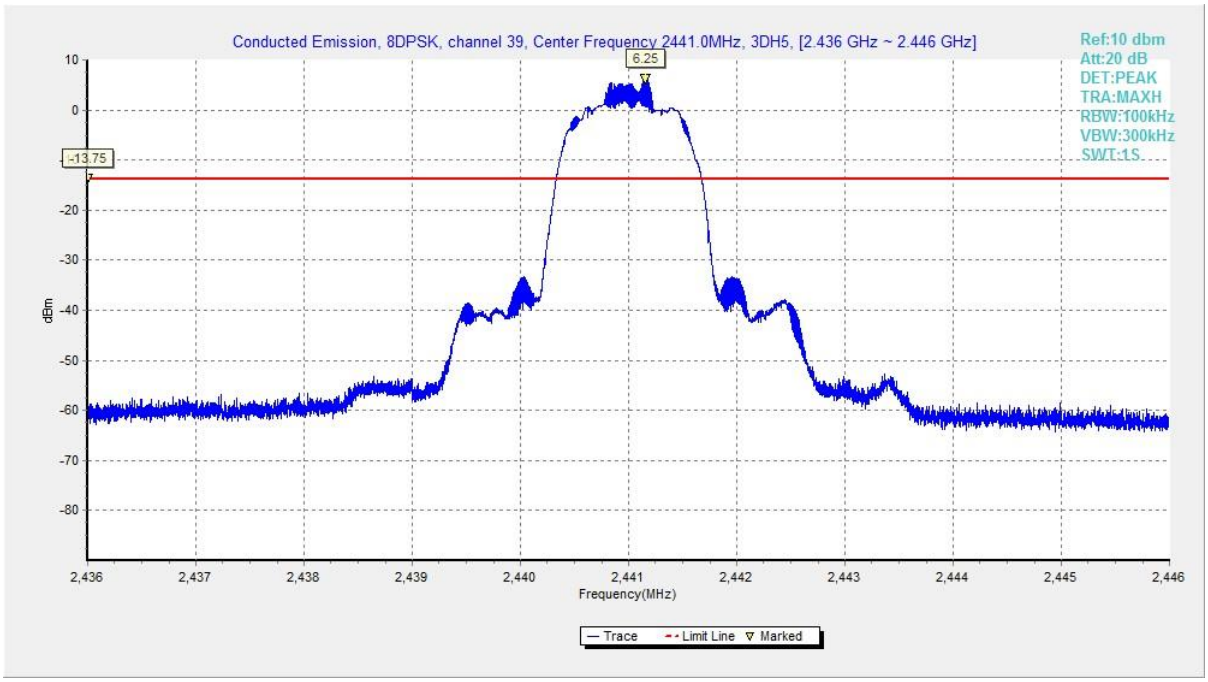


Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

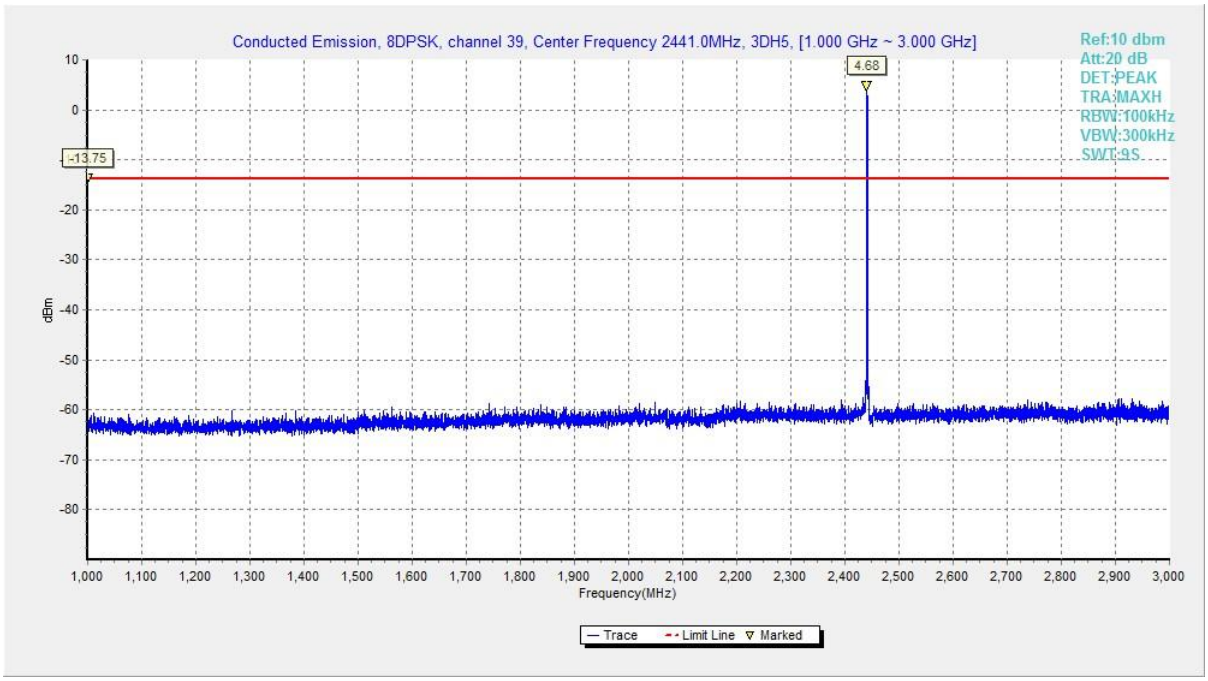


Fig. 35 Conducted Spurious Emission (8DPSK, Ch39, 1 GHz-3 GHz)

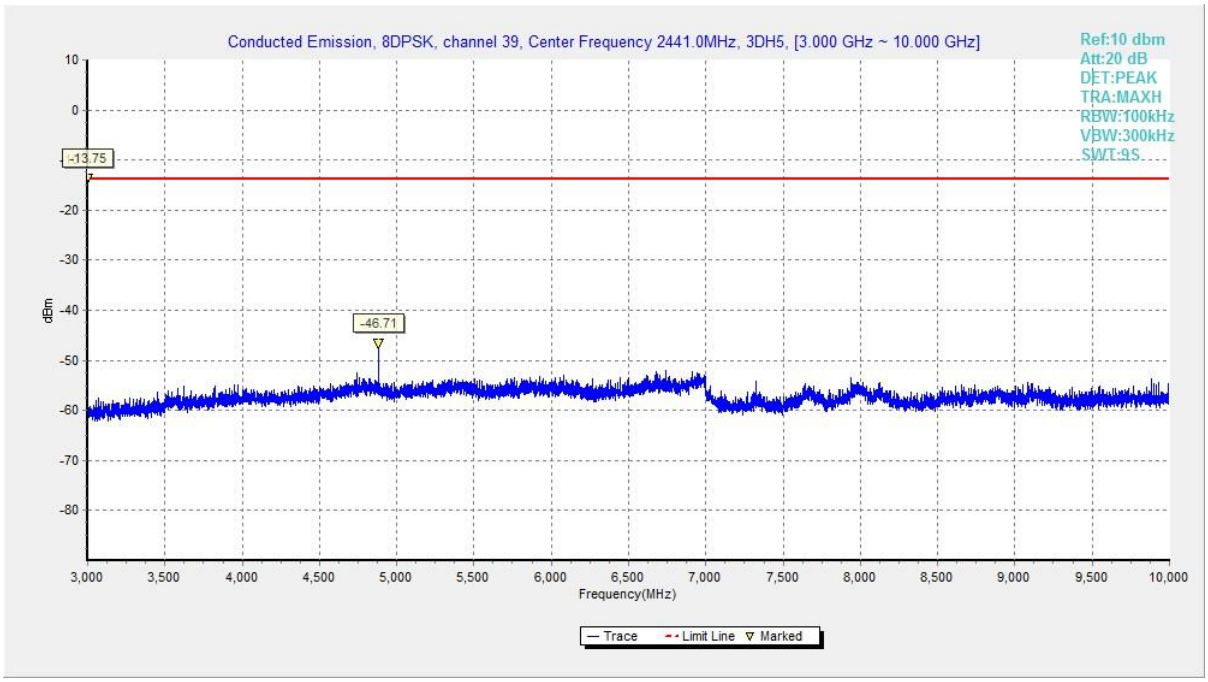


Fig. 36 Conducted Spurious Emission (8DPSK, Ch39, 3 GHz-10 GHz)

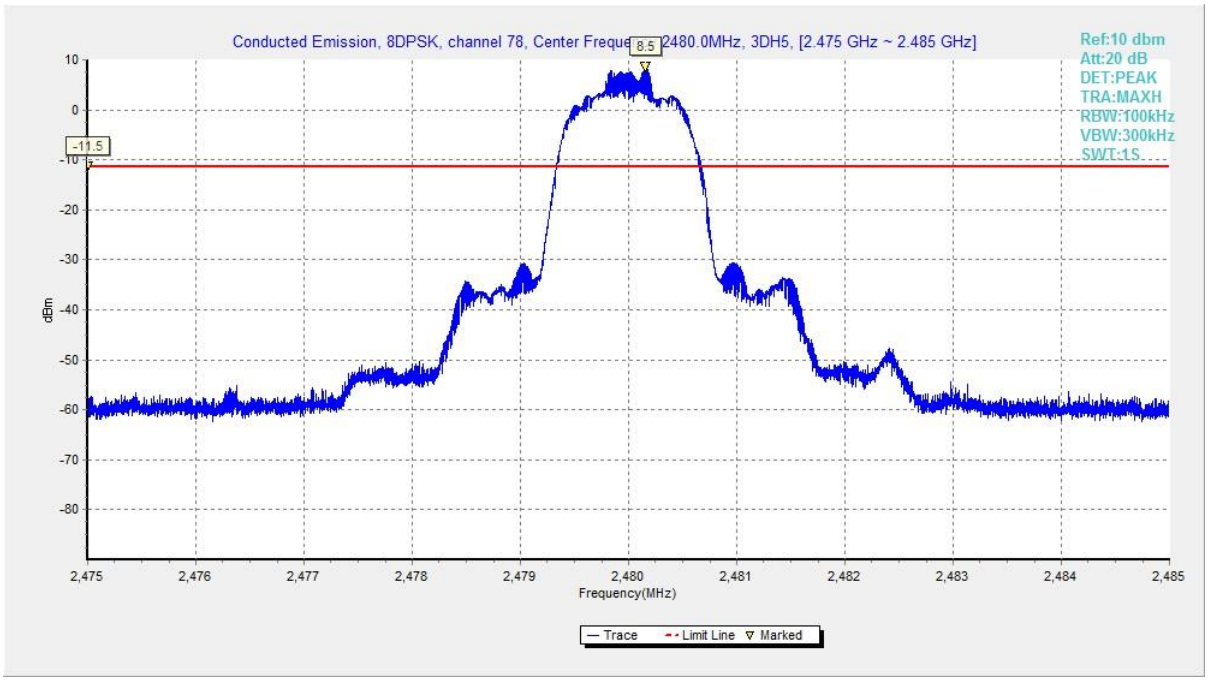


Fig. 37 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)

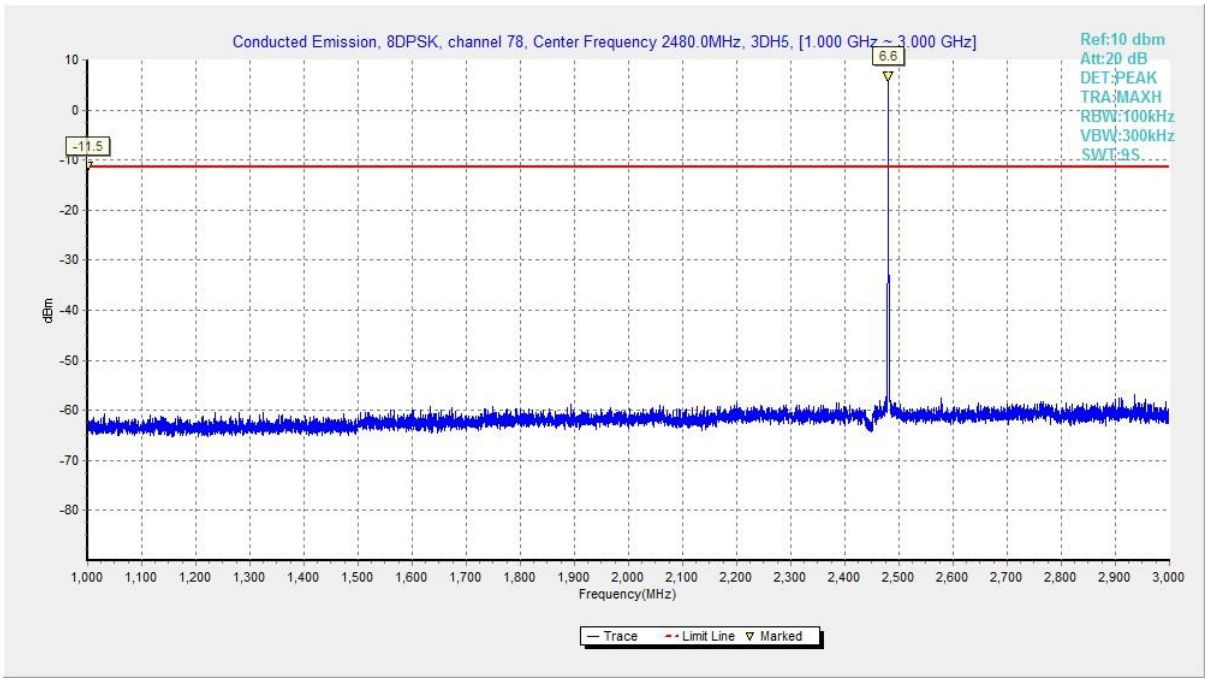


Fig. 38 Conducted Spurious Emission (8DPSK, Ch78, 1 GHz-3 GHz)

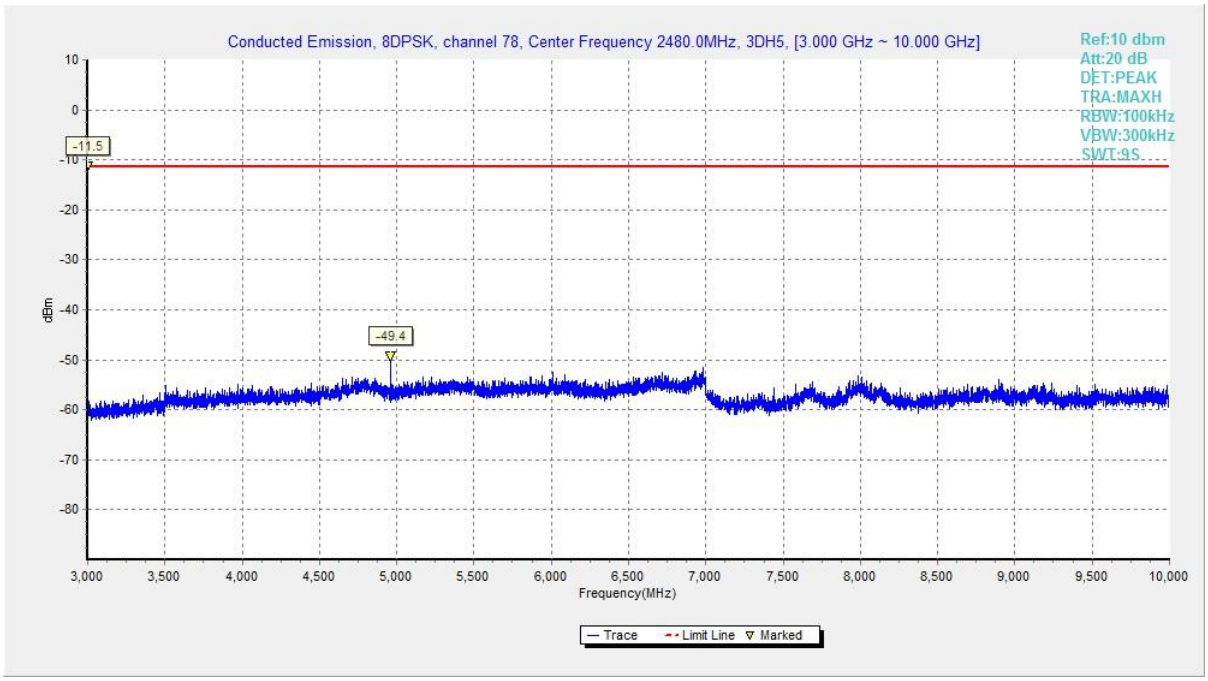


Fig. 39 Conducted Spurious Emission (8DPSK, Ch78, 3 GHz-10 GHz)

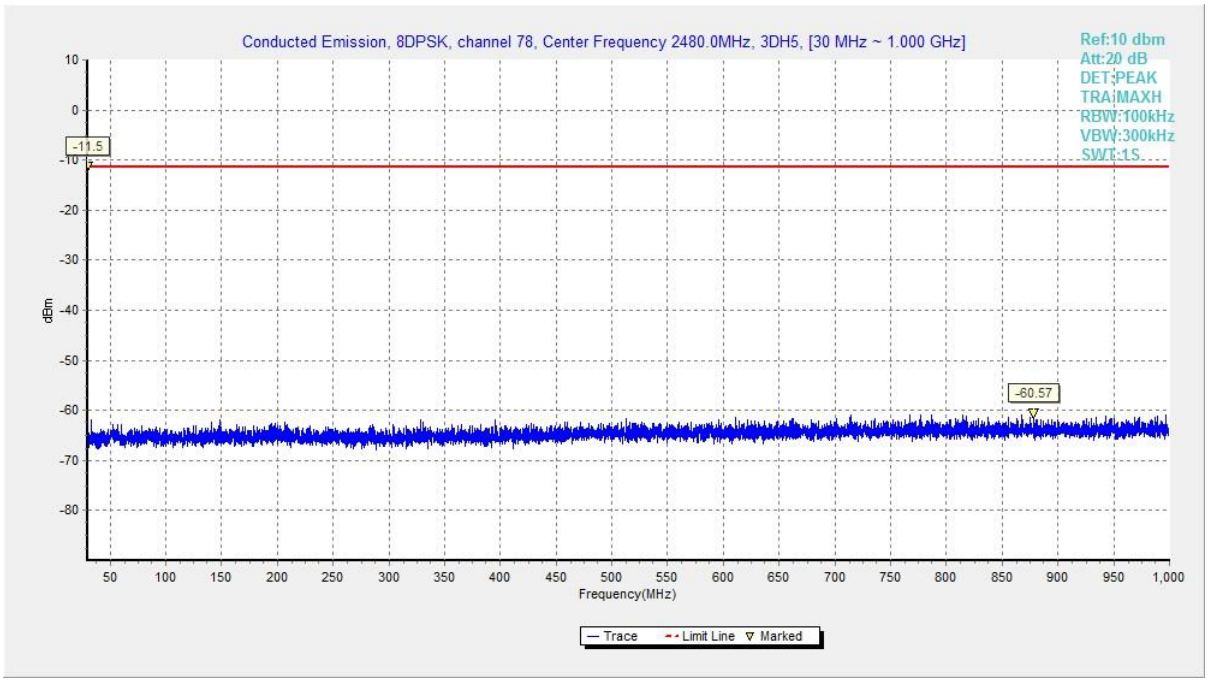


Fig. 40 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)

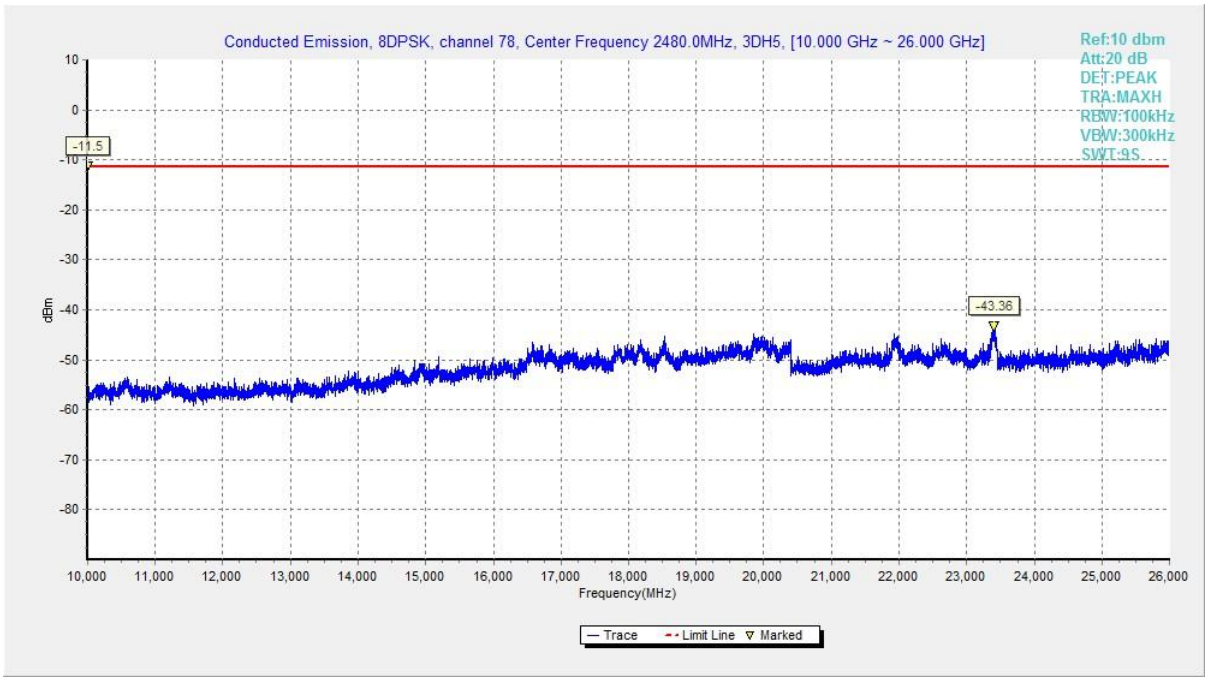


Fig. 41 Conducted Spurious Emission All channel, 10 GHz-26 GHz)

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 ~18 GHz	Fig.42	**P**
	39	1 GHz ~18 GHz	Fig.43	**P**
	78	1 GHz ~18 GHz	Fig.44	**P**
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.45	**P**
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.46	**P**
π /4 DQPSK	0	1 GHz ~18 GHz	Fig.47	**P**
	39	1 GHz ~18 GHz	Fig.48	**P**
	78	1 GHz ~18 GHz	Fig.49	**P**
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.50	**P**
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.51	**P**
8DPSK	0	1 GHz ~18 GHz	Fig.52	**P**
	39	1 GHz ~18 GHz	Fig.53	**P**
	78	1 GHz ~18 GHz	Fig.54	**P**
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.55	**P**
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.56	**P**
/	All channels	9 kHz ~30 MHz	Fig.57	**P**
		30 MHz ~1 GHz	Fig.58	**P**
		18 GHz ~26.5 GHz	Fig.59	**P**

Worst Case Result

GFSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
13966.500000	54.99	74.00	19.01	H	18.1
14665.500000	55.62	74.00	18.38	H	19.0
15564.000000	56.65	74.00	17.35	V	20.6
15596.500000	58.37	74.00	15.63	V	21.0
16586.000000	58.41	74.00	15.59	V	23.1
17902.500000	58.13	74.00	15.87	H	25.0

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
13965.000000	42.72	54.00	11.28	V	18.1
14535.500000	43.63	54.00	10.37	V	19.0
15577.000000	45.07	54.00	8.93	V	20.8
15657.500000	46.35	54.00	7.65	V	21.2
16648.000000	46.59	54.00	7.41	V	22.7
17701.000000	45.98	54.00	8.02	V	23.7

π /4 DQPSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
13963.000000	54.85	74.00	19.16	H	18.1
14655.500000	55.90	74.00	18.10	V	19.0
15561.000000	56.60	74.00	17.40	V	20.6
15681.500000	58.33	74.00	15.67	V	21.3
16647.000000	58.81	74.00	15.19	V	22.7
17203.000000	57.93	74.00	16.07	V	21.9

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
13982.500000	42.76	54.00	11.24	H	18.0
14553.000000	43.57	54.00	10.43	V	19.0
15572.500000	44.95	54.00	9.05	H	20.7
15649.500000	46.51	54.00	7.49	H	21.2
16614.500000	46.57	54.00	7.43	V	23.0
17707.500000	45.77	54.00	8.23	H	23.7

8DPSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
14013.000000	55.05	74.00	18.95	V	17.9
14539.500000	56.38	74.00	17.62	V	19.0
15571.500000	56.37	74.00	17.63	H	20.7
15686.500000	58.69	74.00	15.31	V	21.3
16633.000000	58.61	74.00	15.39	V	22.8
17896.000000	58.03	74.00	15.97	V	24.9

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
13949.500000	42.98	54.00	11.02	H	18.2
14559.500000	43.69	54.00	10.31	H	19.0
15572.500000	45.20	54.00	8.80	V	20.7
15661.000000	46.55	54.00	7.45	H	21.3
16591.000000	46.75	54.00	7.25	H	23.1
17700.000000	46.15	54.00	7.85	H	23.7

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

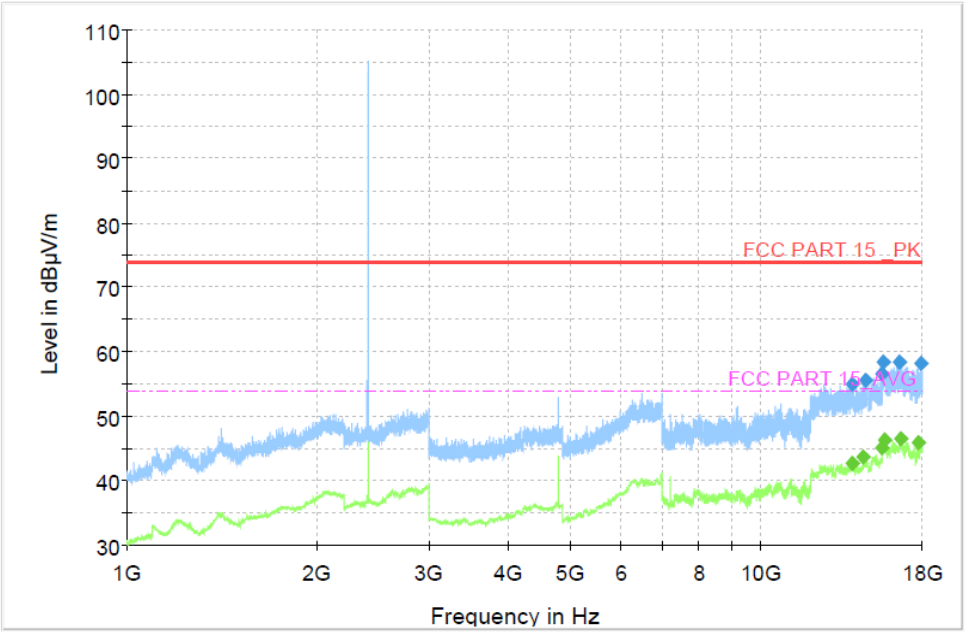


Fig. 42 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~18 GHz)

Fig. 43 Radiated Spurious Emission (GFSK, Ch39, 1 GHz ~18 GHz)

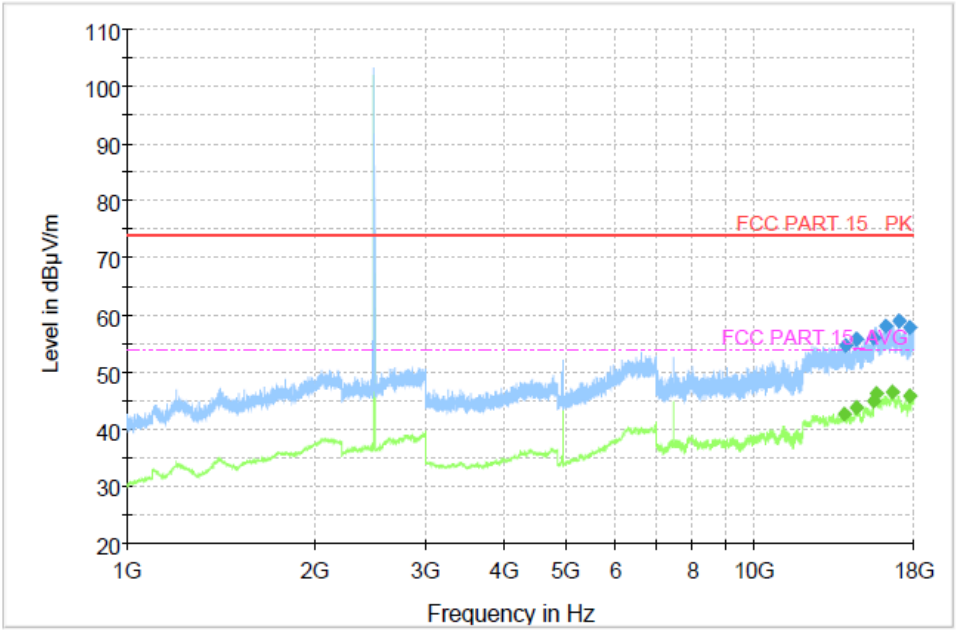


Fig. 44 Radiated Spurious Emission (GFSK, Ch78, 1 GHz ~18 GHz)

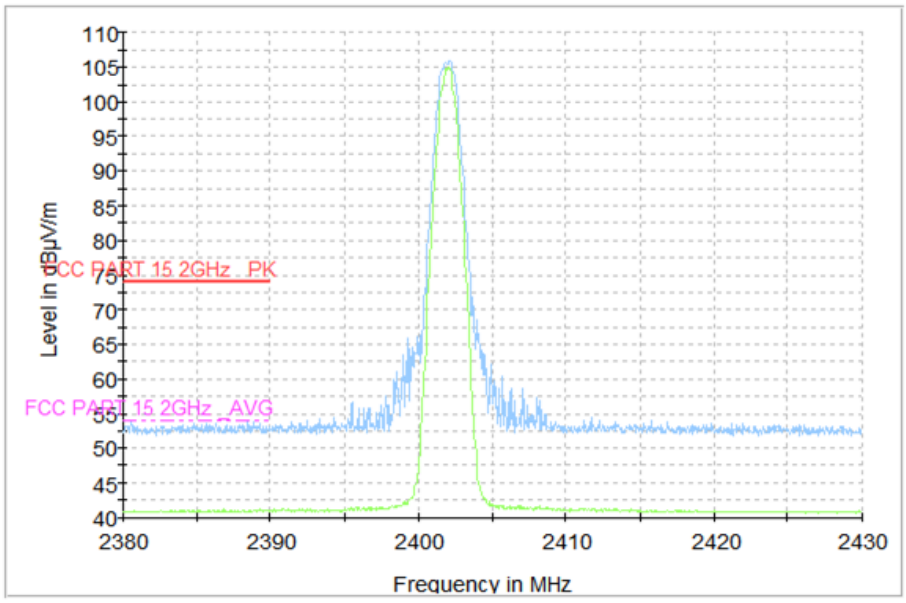


Fig. 45 Radiated Band Edges (GFSK, Ch0, 2380GHz~2450GHz)

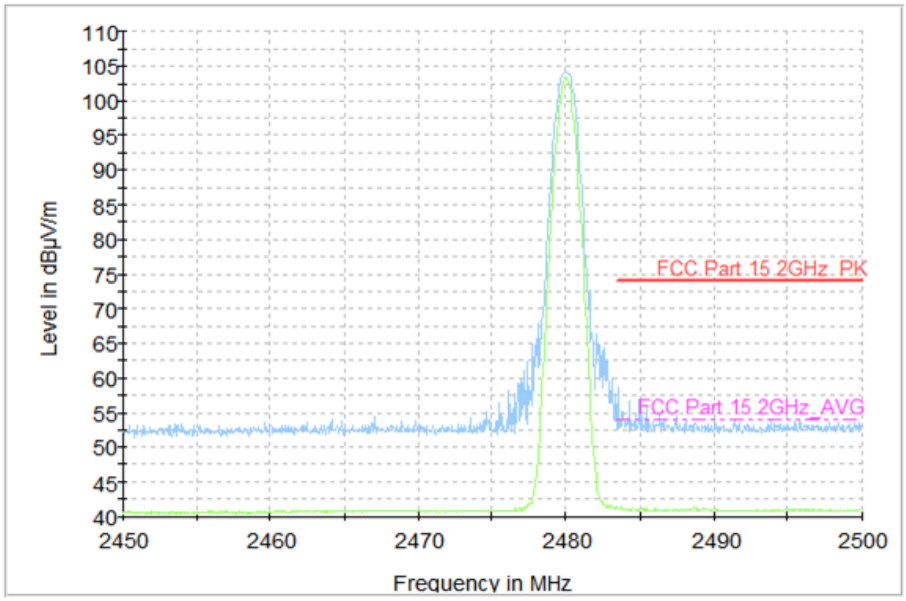


Fig. 46 Radiated Band Edges (GFSK, Ch78, 2450GHz~2500GHz)

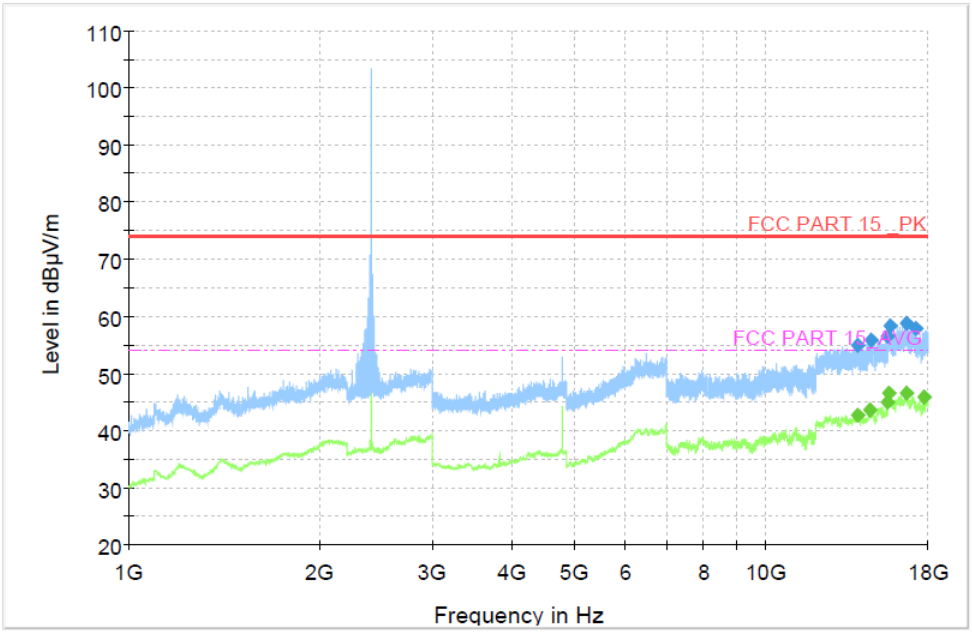


Fig. 47 Radiated Spurious Emission (π /4 DQPSK, Ch0, 1 GHz ~18 GHz)

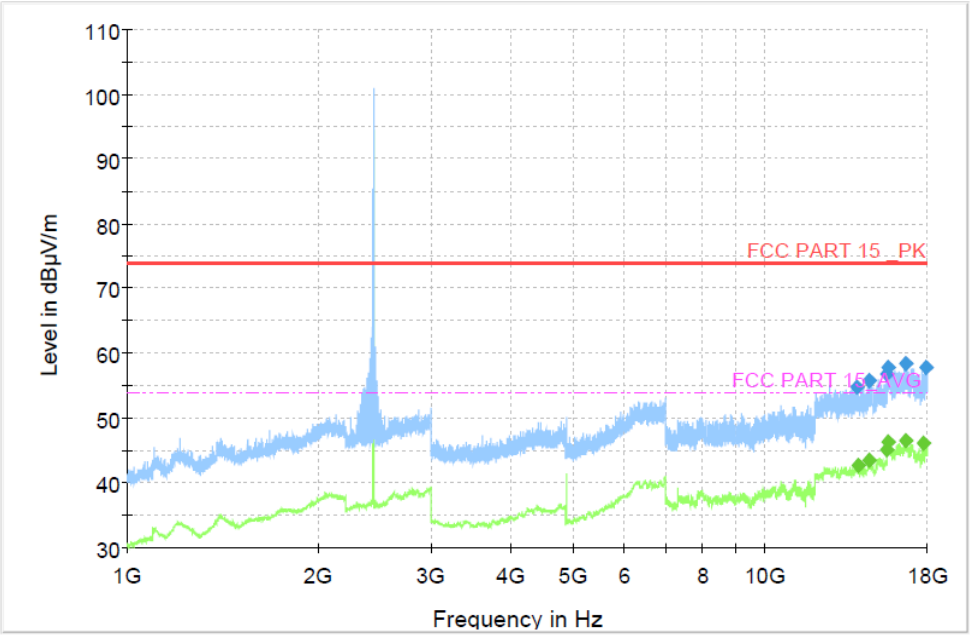


Fig. 48 Radiated Spurious Emission (π /4 DQPSK, Ch39, 1 GHz ~18 GHz)

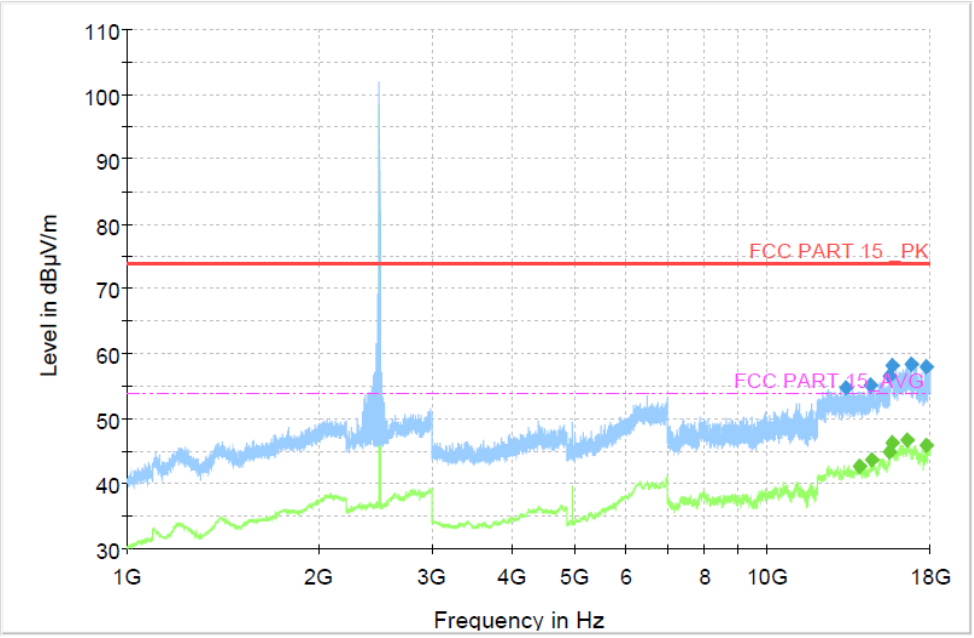


Fig. 49 Radiated Spurious Emission (π /4 DQPSK, Ch78, 1 GHz ~18 GHz)

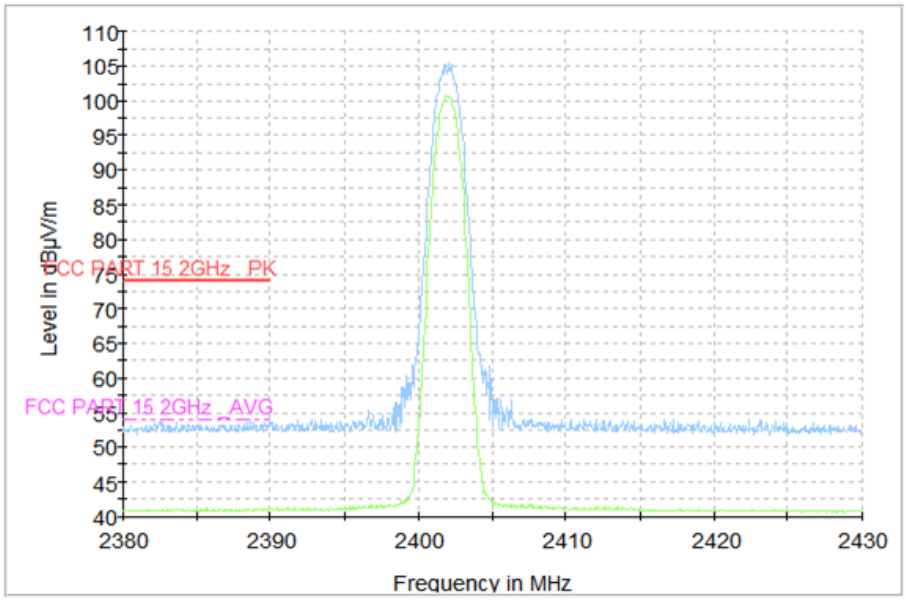


Fig. 50 Radiated Band Edges (π /4 DQPSK, Ch0, 2380GHz~2450GHz)

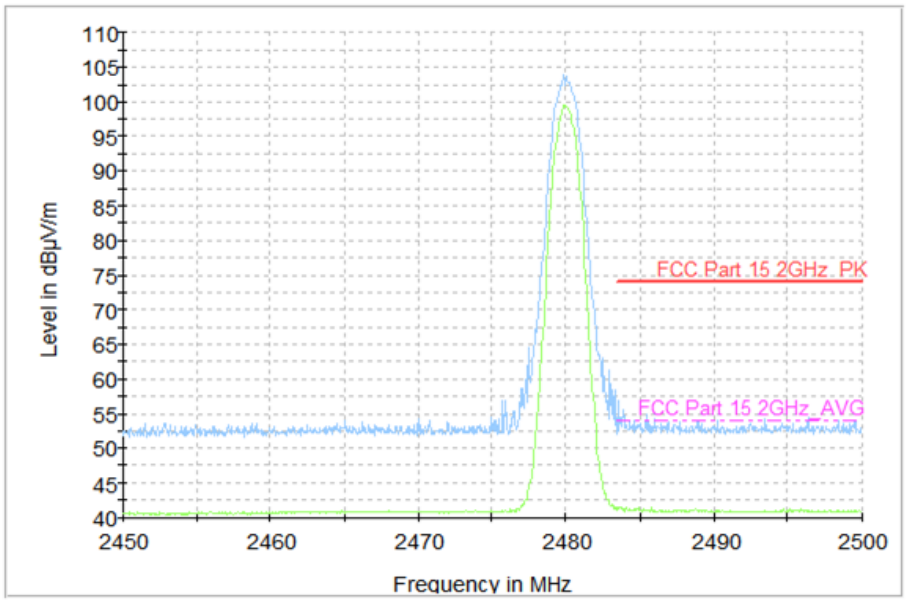


Fig. 51 Radiated Band Edges (π /4 DQPSK, Ch78, 2450GHz~2500GHz)

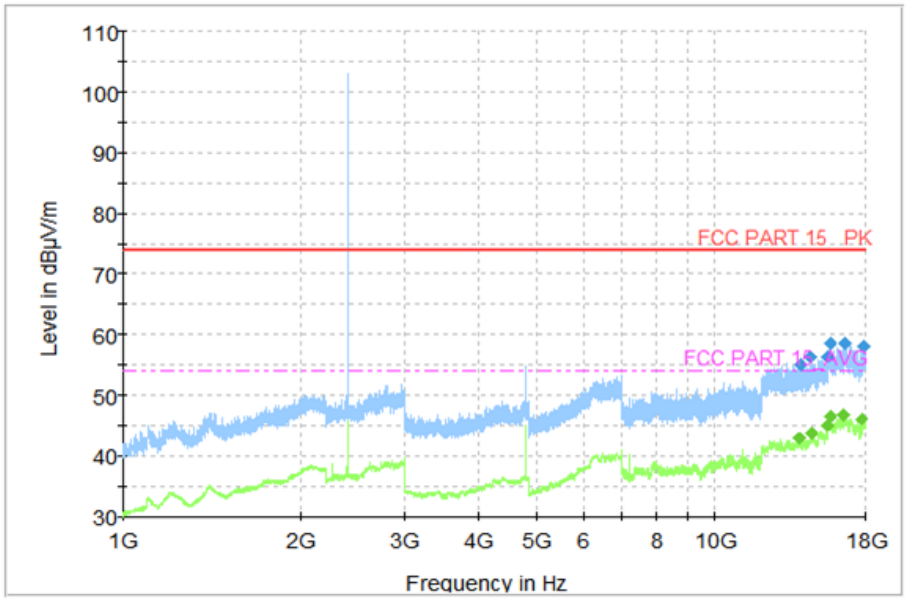


Fig. 52 Radiated Spurious Emission (8DPSK, Ch0, 1 GHz ~18 GHz)

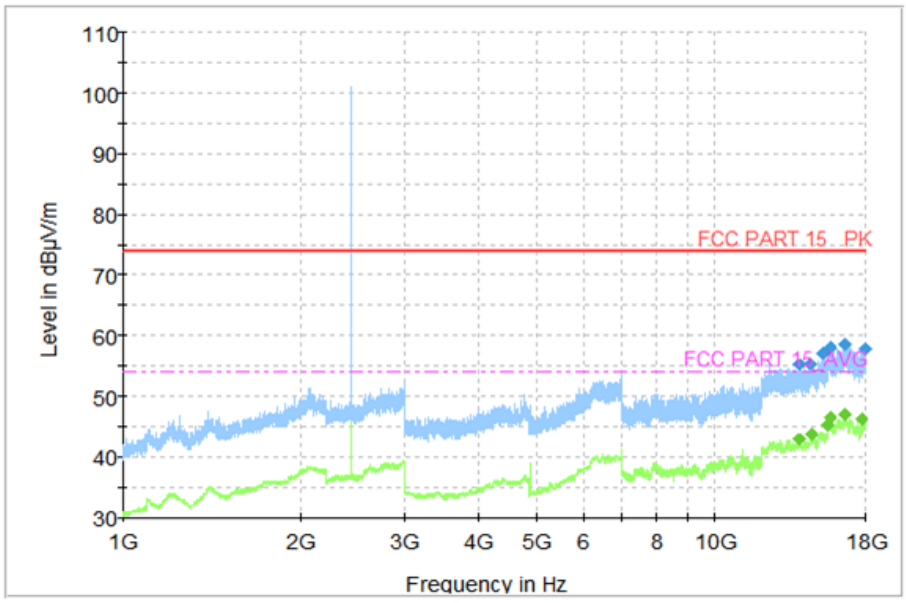


Fig. 53 Radiated Spurious Emission (8DPSK, Ch39, 1 GHz ~18 GHz)

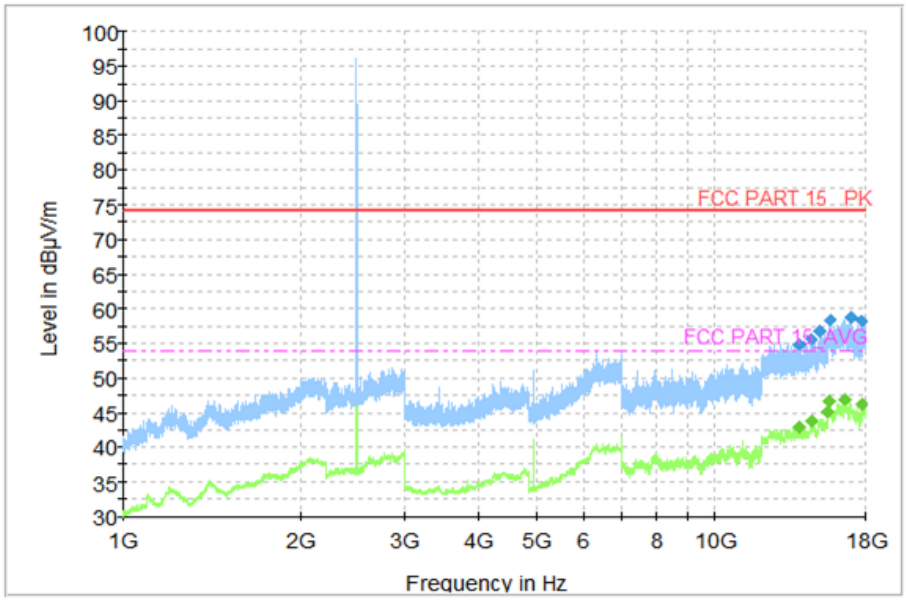


Fig. 54 Radiated Spurious Emission (8DPSK, Ch78, 1 GHz ~18 GHz)

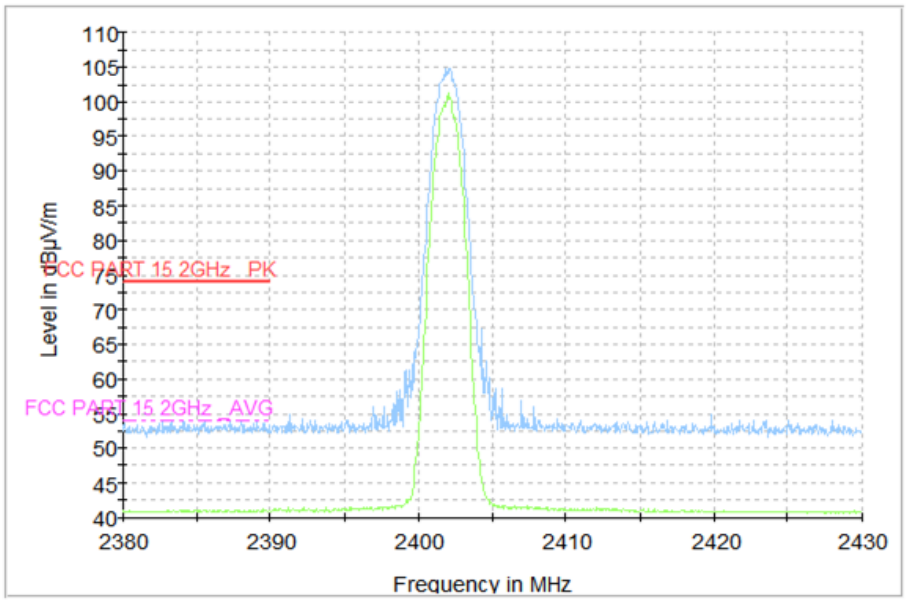


Fig. 55 Radiated Band Edges (8DPSK, Ch0, 2380GHz~2450GHz)

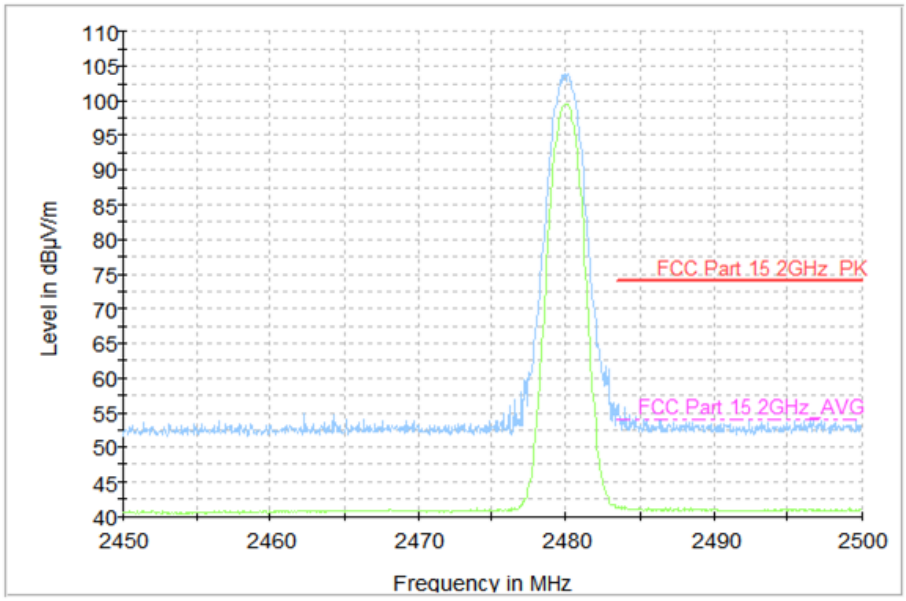


Fig. 56 Radiated Band Edges (8DPSK, Ch78, 2450GHz~2500GHz)

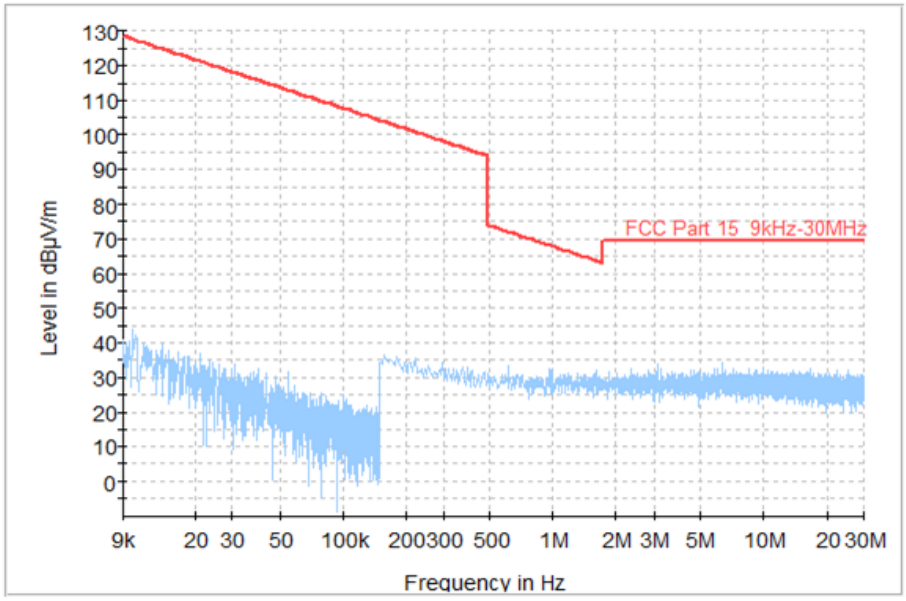


Fig. 57 Radiated Spurious Emission (All Channels, 9 kHz ~30 MHz)

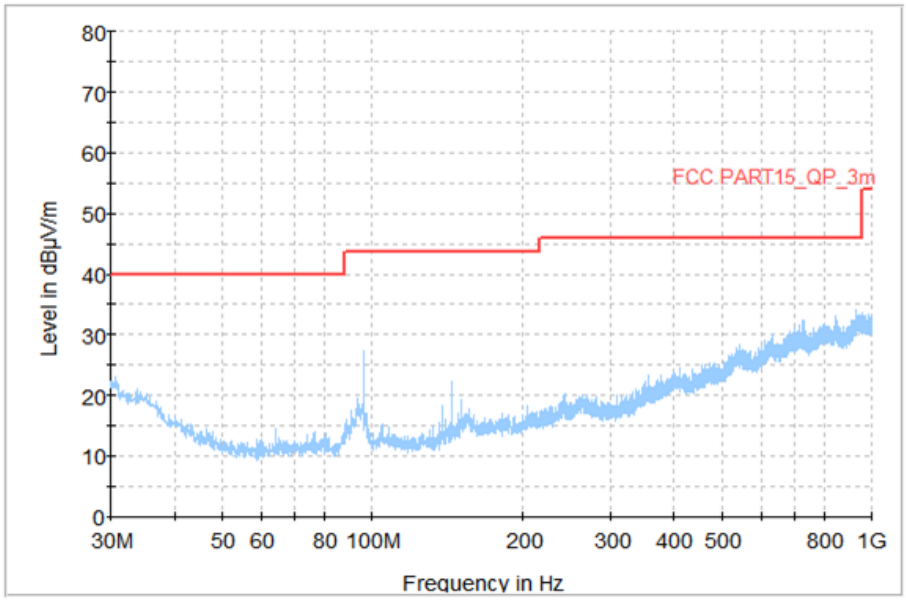


Fig. 58 Radiated Spurious Emission (All Channels, 30 MHz ~1 GHz)

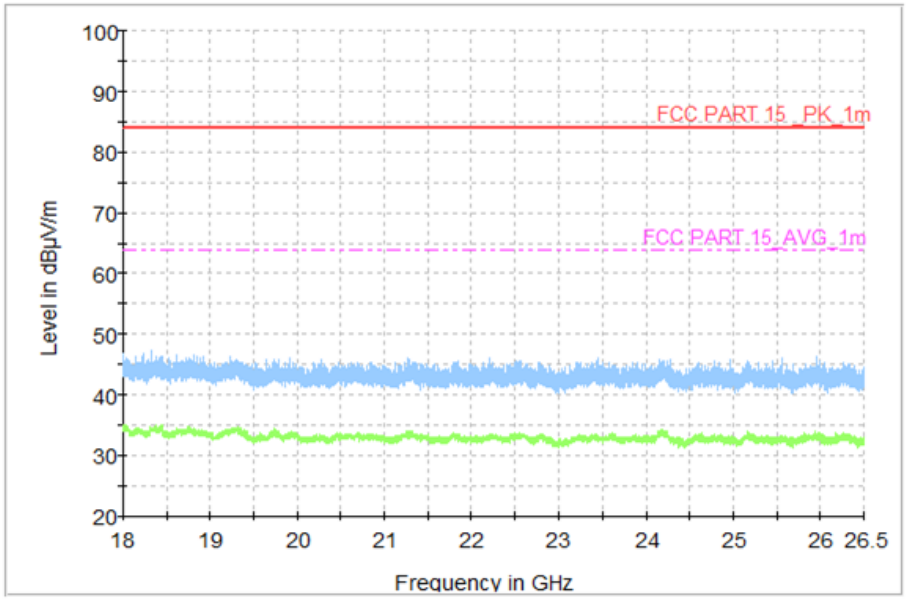


Fig. 59 Radiated Spurious Emission (All Channels, 18 GHz ~26.5 GHz)

A.6 20dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	/

Measurement Result:

Mode	Channel	20dB Bandwidth (KHz)		conclusion
GFSK	0	Fig.60	950.25	/
	39	Fig.61	945.75	
	78	Fig.62	951.75	
π /4 DQPSK	0	Fig.63	1255.50	/
	39	Fig.64	1230.75	
	78	Fig.65	1231.50	
8DPSK	0	Fig.66	1260.75	/
	39	Fig.67	1257.00	
	78	Fig.68	1260.75	

See below for test graphs.

Conclusion: PASS

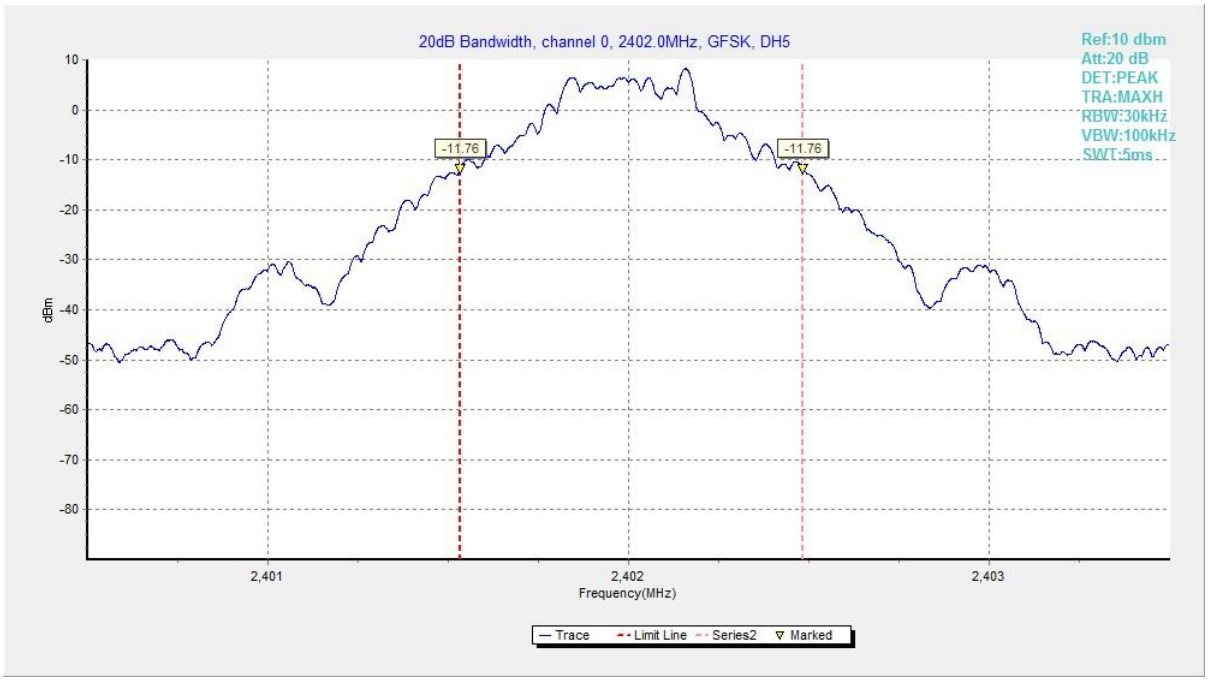


Fig. 60 20dB Bandwidth (GFSK, Ch 0)

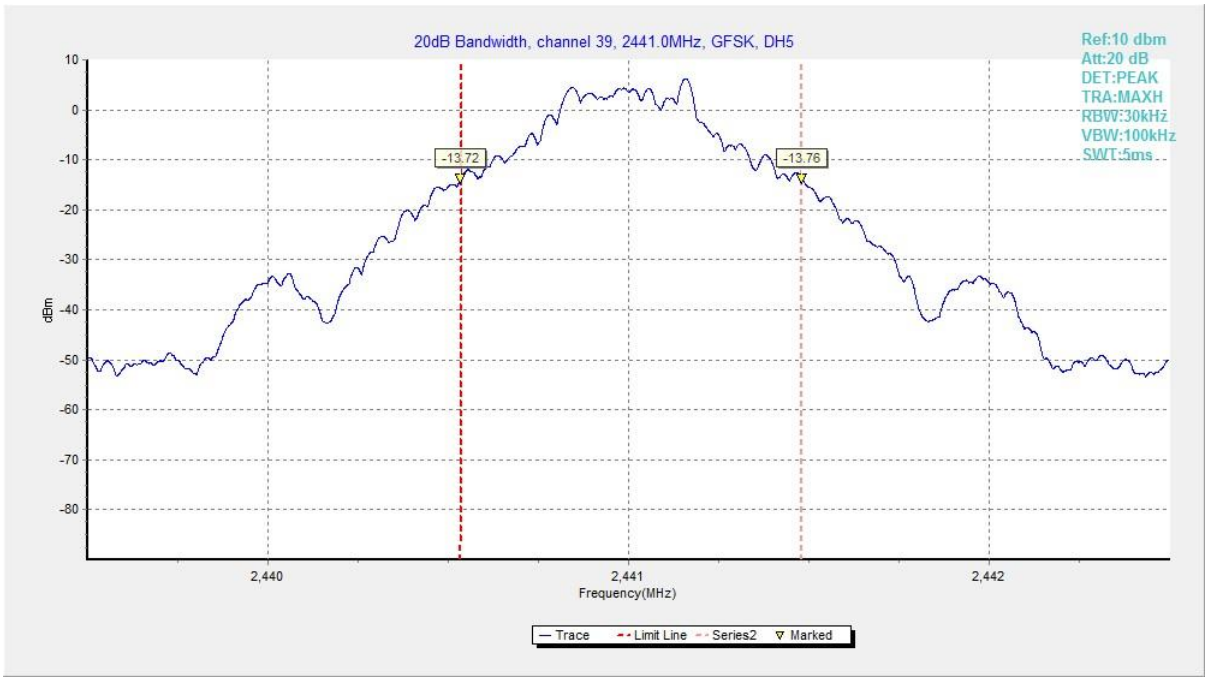


Fig. 61 20dB Bandwidth (GFSK, Ch 39)

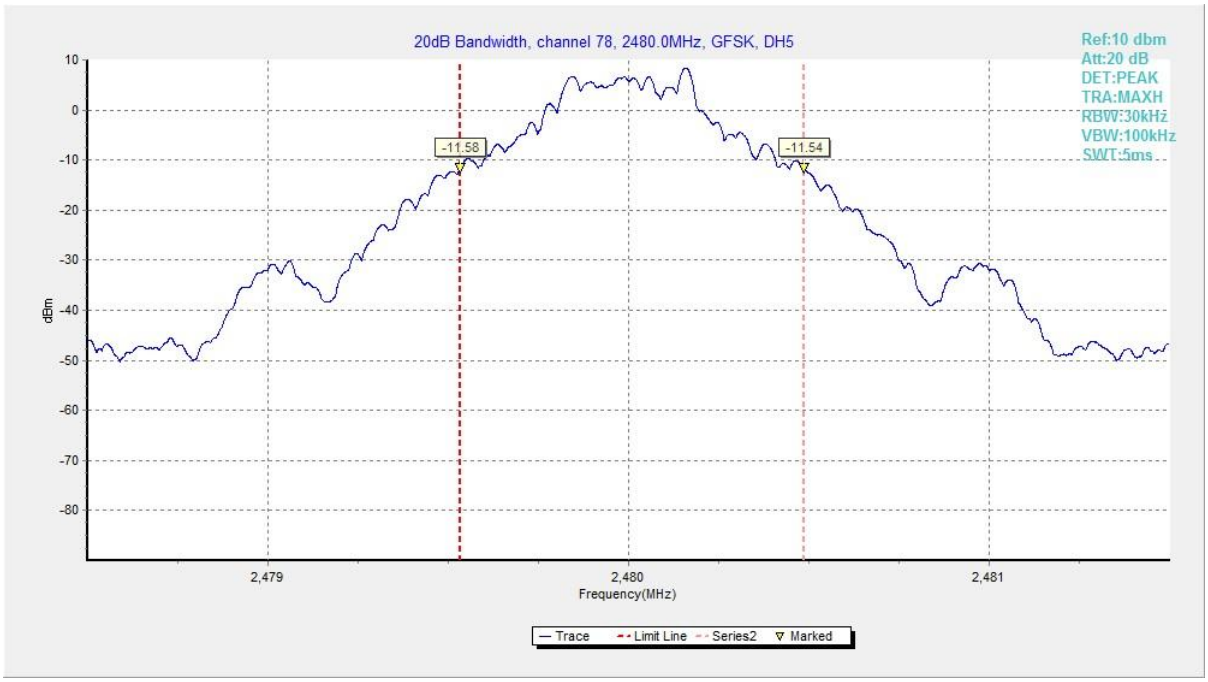


Fig. 62 20dB Bandwidth (GFSK, Ch 78)

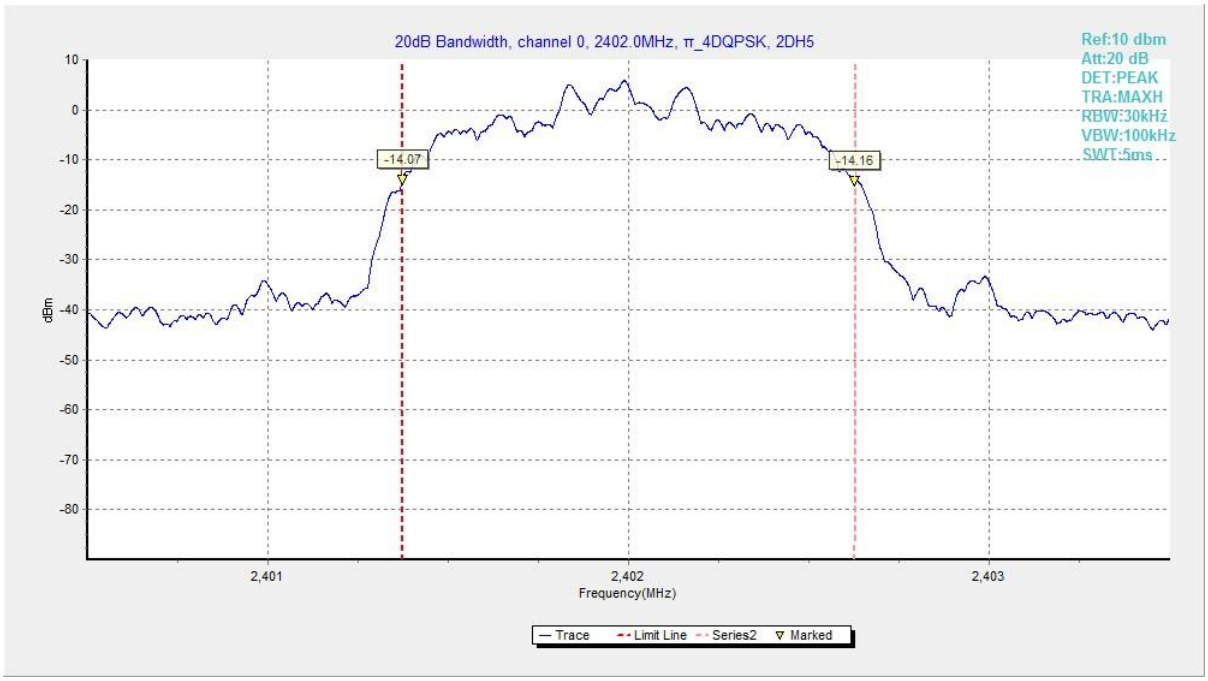


Fig. 63 20dB Bandwidth (π /4 DQPSK, Ch 0)

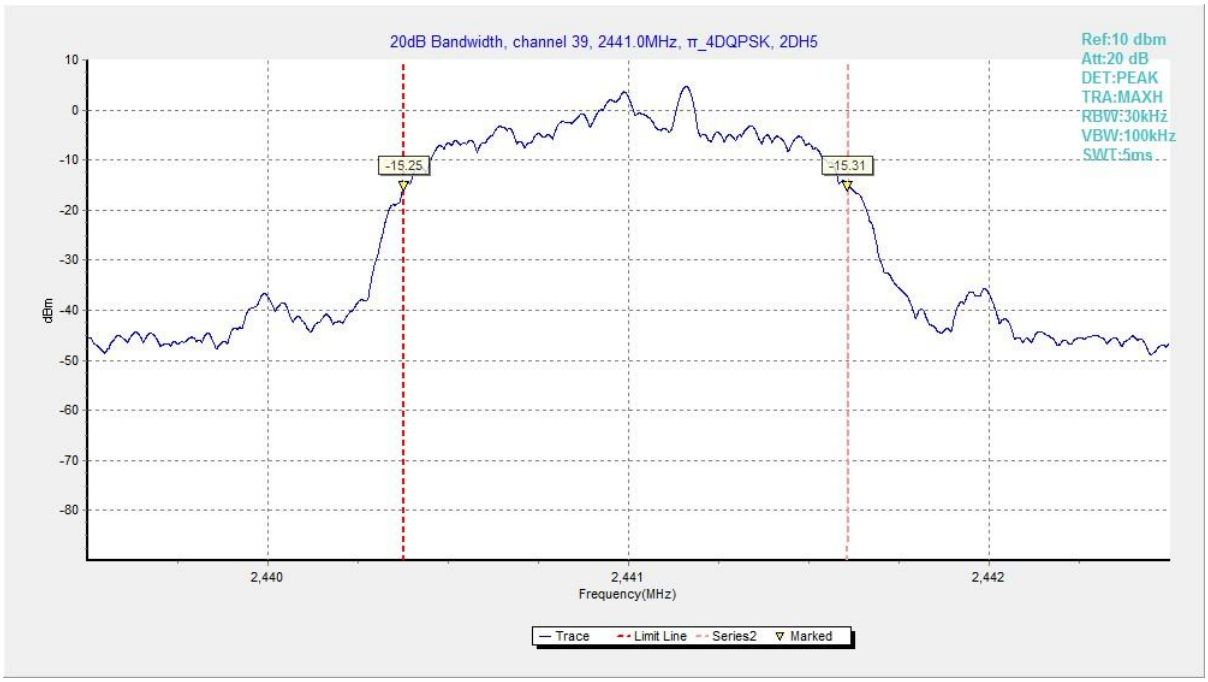


Fig. 64 20dB Bandwidth (π /4 DQPSK, Ch 39)