



TEST REPORT

No. I21N00721-BT

TCL Communication Ltd.

Tablet PC

Model Name: 9080G

with

Hardware Version: PIO

Software Version: 6A58

FCC ID: 2ACCJB152

Issued Date: 2021-05-08

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.

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A.9 AC POWER LINE CONDUCTED EMISSION 66



1. Summary of Test Report

1.1. Test Items

Description	Tablet PC
Model Name	9080G
Applicant's name	TCL Communication Ltd.
Manufacturer's Name	TCL Communication Ltd.

1.2. Test Standards

FCC Part15-2019; ANSI C63.10-2013

1.3. Test Result

Pass

Please refer to 5.2 Test Results.

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:	2021-03-15
Testing End Date:	2021-03-26

1.6. Signature

Lin Kanfeng
(Prepared this test report)

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(Reviewed this test report)

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

3.1. About EUT

Description	Tablet PC
Model Name	9080G
Frequency Band	2400MHz~2483.5MHz
Type of Modulation	GFSK/π /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	1.3 dBi
Power Supply	3.9V DC by Battery
FCC ID	2ACCJB152
Condition of EUT as received	No abnormality in appearance

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version	Receive Date
UT04aa	353864600001343	PIO	6A58	2021-03-05
UT06aa	353864600001285	PIO	6A58	2021-03-08

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

*UT04aa is used for Conduction test; UT06aa is used for Radiation test and AC Power line Conducted Emission test.

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Battery	CAC5360010C1
AE2	Battery	CAC7800002CA
AE3	Charger	CBA0064BGTC1
AE4	Charger	CBA0064BGTC5
AE1		
	Model	TLp053C1
	Manufacturer	BYD
	Capacity	7800mAh
	Nominal Voltage	3.85v
AE2		
	Model	TLp078AA
	Manufacturer	TIANMAO
	Capacity	7800mAh
	Nominal Voltage	3.85v
AE3		
	Model	QC13US
	Manufacturer	BYD



AE4

Model QC13US

Manufacturer PUAN

*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 Tablet PC with integrated antenna and battery. It consists of normal options: Lithium Battery and 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 2013 Testing of Unlicensed Wireless Devices	

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	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)	I
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** for details.

5.3. Statements

SAICT has evaluated the test cases requested by the applicant/manufacturer 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	Power Sensor	U2021XA	MY55430013	Agilent	2022-01-13	1 year
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	2022-01-01	1 year
2	Test Receiver	ESCI	100701	R&S	2021-08-05	1 year
3	Loop Antenna	HLA6120	35779	TESEQ	2022-05-01	3 year
4	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2024-02-15	3 year
5	Horn Antenna	3117	00066585	ETS-Lindgren	2022-03-04	3 year
6	Test Receiver	ESR7	101675	R&S	2021-07-17	1 year
7	Spectrum Analyzer	FSP 40	100378	R&S	2021-12-11	1 year
8	Chamber	FACT5-2.0	4166	ETS-Lindgren	2021-05-12	3 year
9	Antenna	QSH-SL-1 8-26-S-20	17013	Q-par	2024-01-13	3 year
10	Antenna	QSH-SL-2 6-40-K-20	17014	Q-par	2024-01-19	3 year

Test software

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

EUT is engineering software provided by the customer to control the transmitting signal.

The EUT was programmed to be in continuously transmitting mode.

Anechoic chamber

Fully anechoic chamber by ETS-Lindgren

7. Laboratory Environment

Semi-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
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 (<i>k</i>=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	$30\text{MHz} \leq f < 1\text{GHz}$	1.41dB
	$1\text{GHz} \leq f < 7\text{GHz}$	1.92dB
	$7\text{GHz} \leq f < 13\text{GHz}$	2.31dB
	$13\text{GHz} \leq f \leq 26\text{GHz}$	2.61dB
5. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f < 30\text{MHz}$	1.70dB
	$30\text{MHz} \leq f < 1\text{GHz}$	4.90dB
	$1\text{GHz} \leq f < 18\text{GHz}$	4.60dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	4.10dB
6. AC Power line Conducted Emission	$150\text{kHz} \leq f \leq 30\text{MHz}$	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 1.3dBi. 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.

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)	E.I.R.P Limit (dBm)
FCC CRF Part 15.247 (b)	< 30	< 36

Measurement Results:

Conducted transmitter power

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	9.18	9.30	8.69
$\pi/4$ DQPSK	8.35	8.46	8.47
8DPSK	8.43	8.57	8.58

E.I.R.P

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	10.48	10.60	9.99
$\pi/4$ DQPSK	9.65	9.76	9.77
8DPSK	9.73	9.87	9.88

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

Conclusion: Pass

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.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

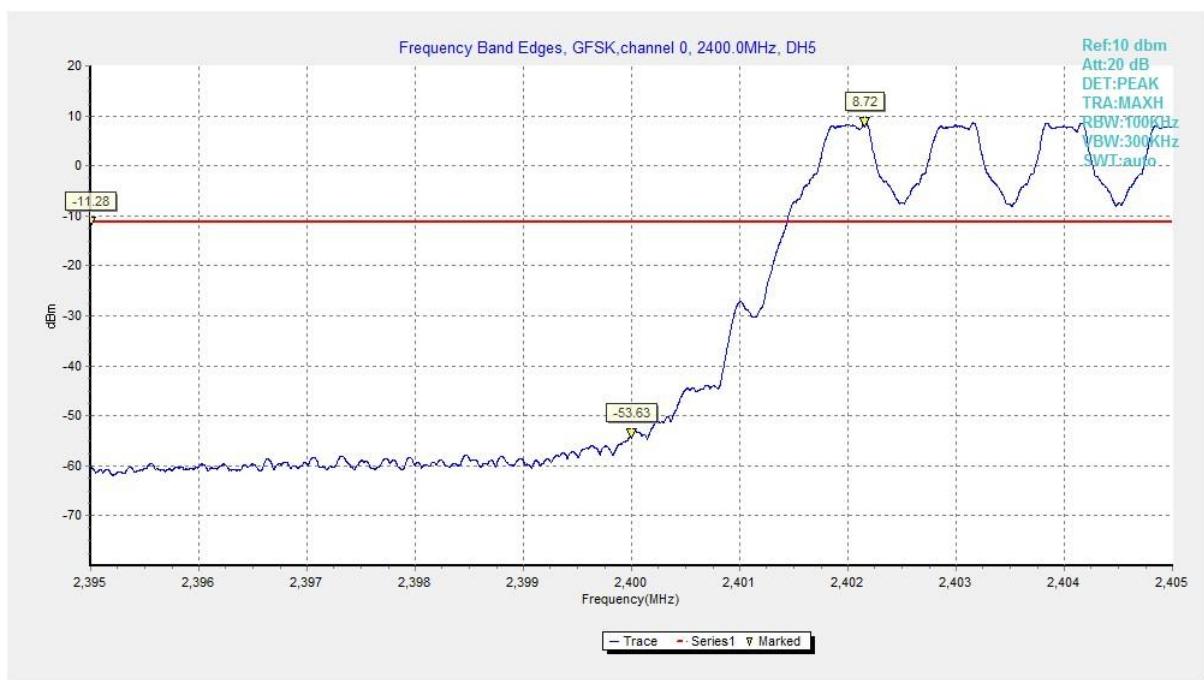


Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)

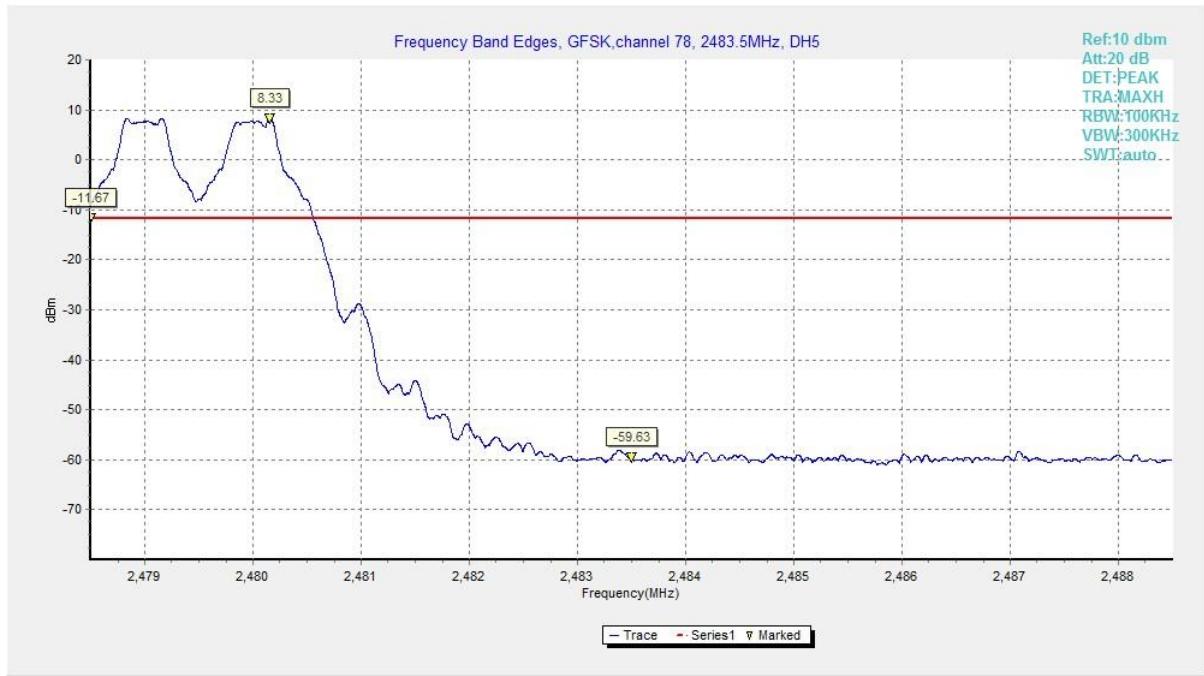


Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)

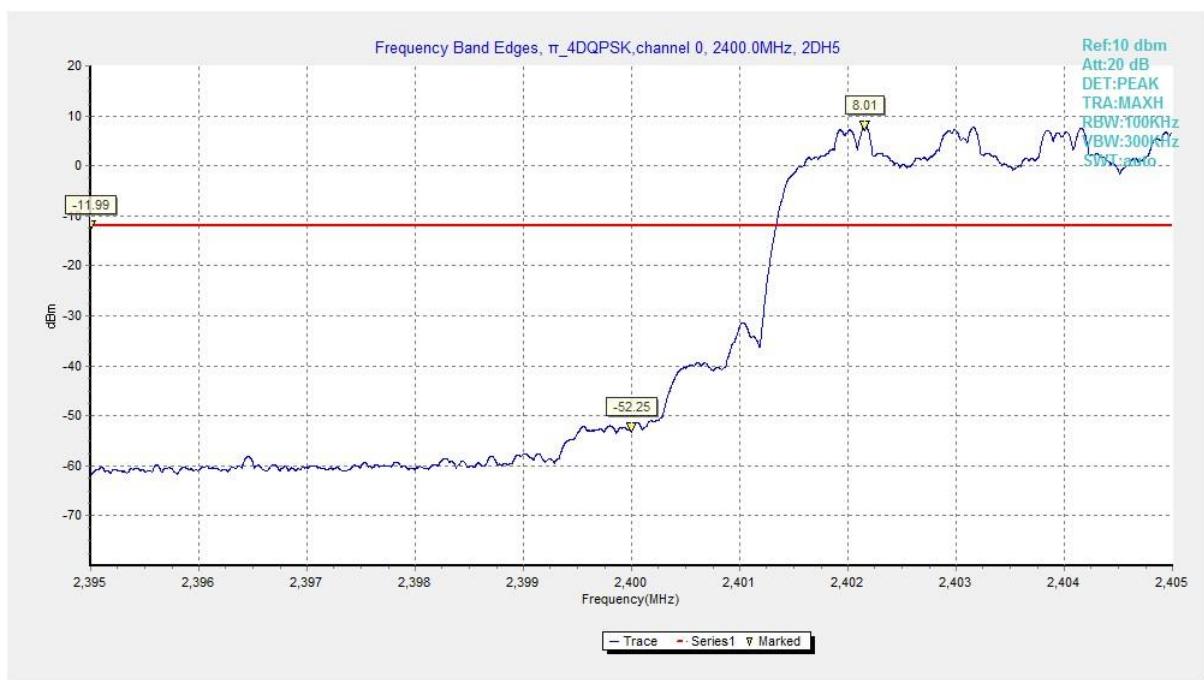


Fig. 3 Band Edges ($\pi/4$ DQPSK, Ch 0, Hopping ON)



Fig. 4 Band Edges ($\pi/4$ DQPSK, Ch 78, Hopping ON)

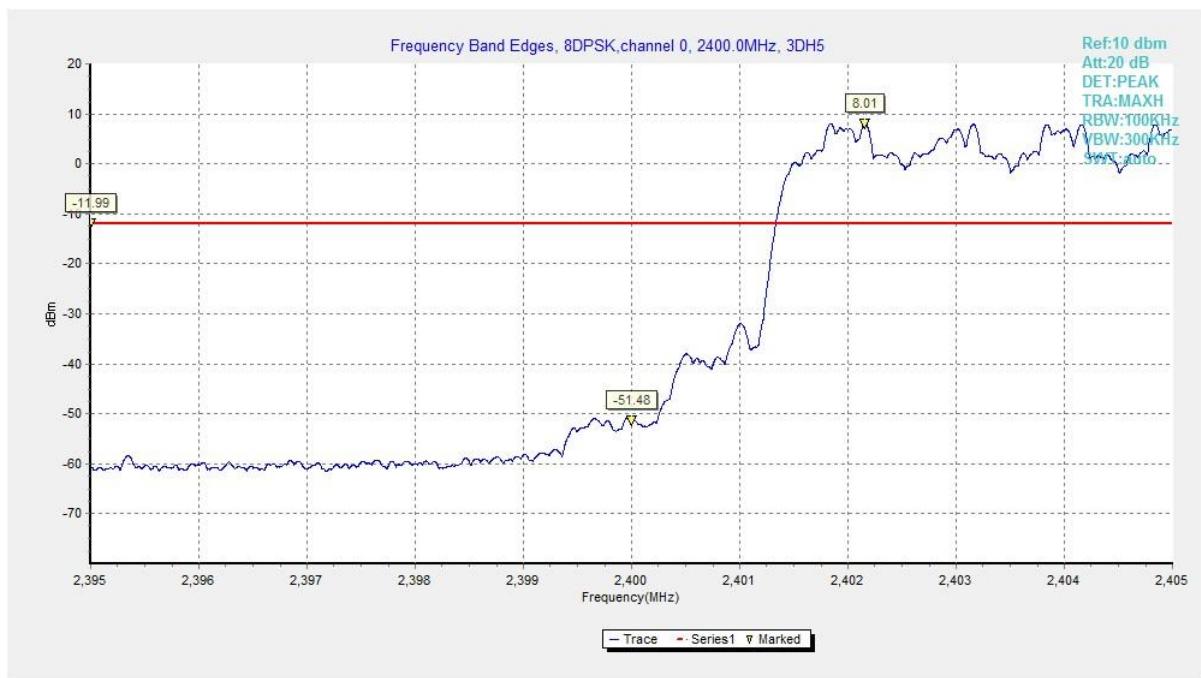


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

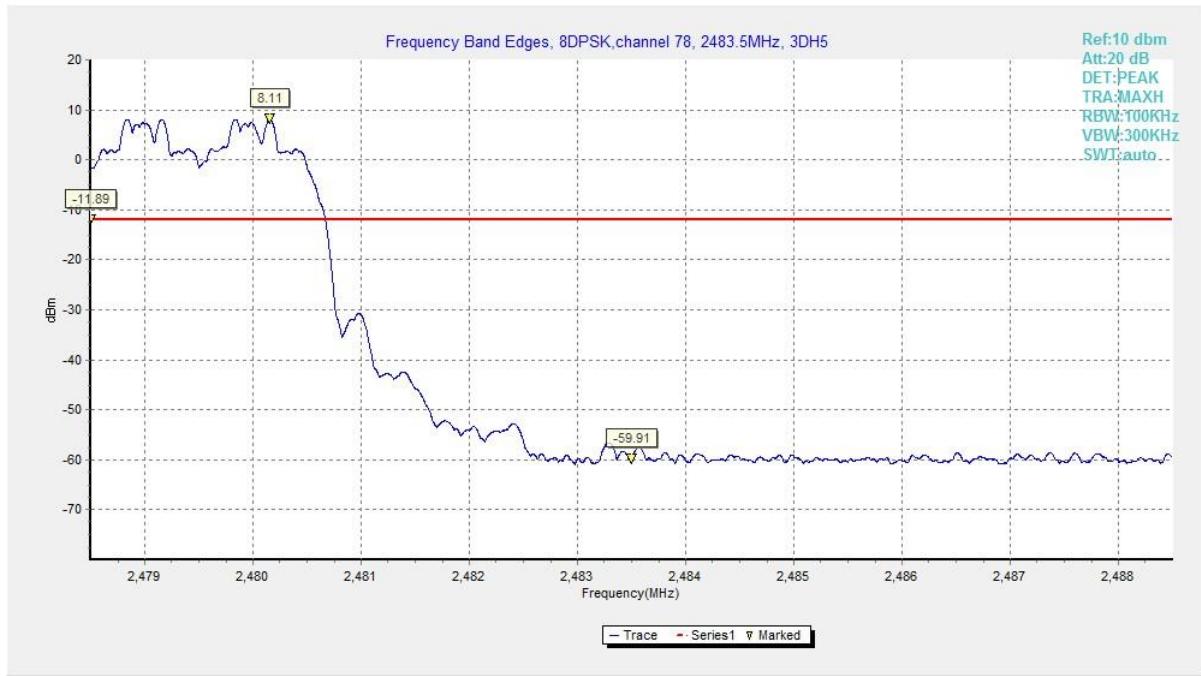


Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)



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

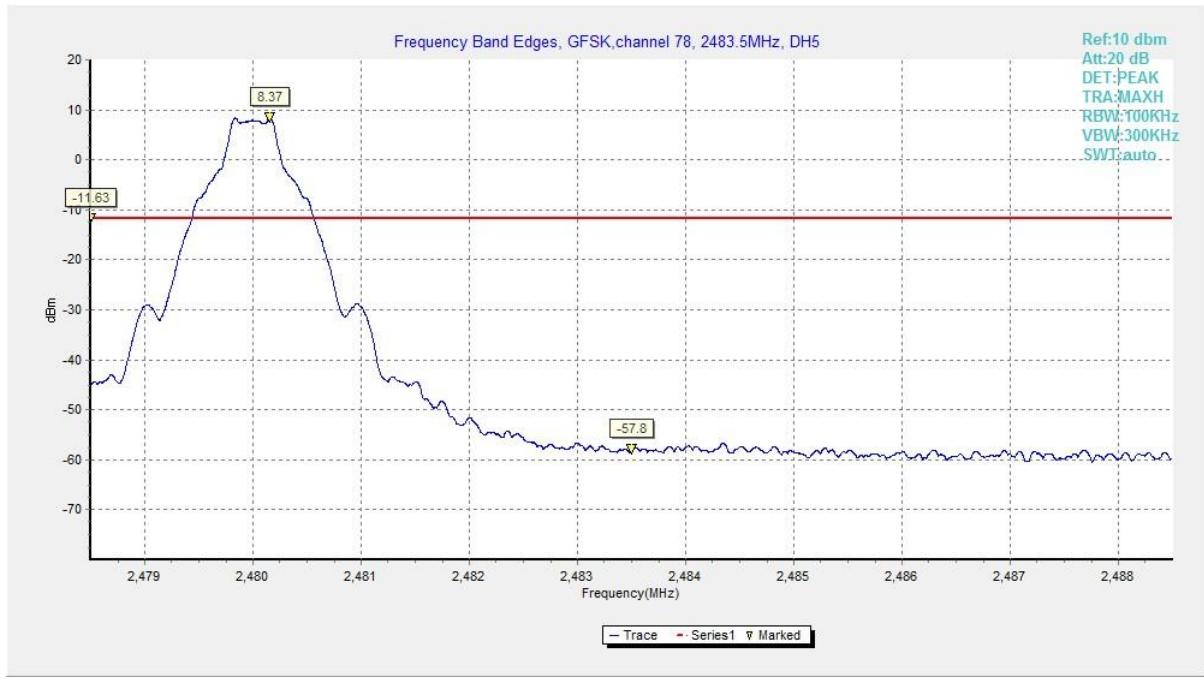


Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)

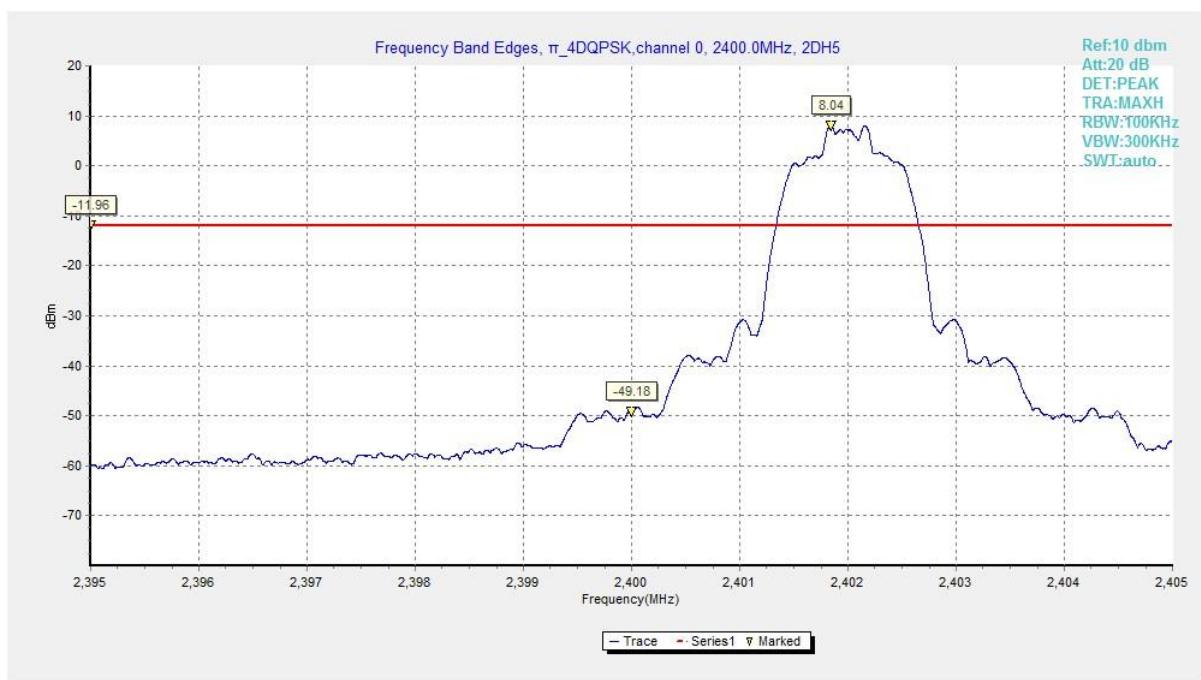


Fig. 9 Band Edges ($\pi/4$ DQPSK, Ch 0, Hopping OFF)



Fig. 10 Band Edges ($\pi/4$ DQPSK, Ch 78, Hopping OFF)

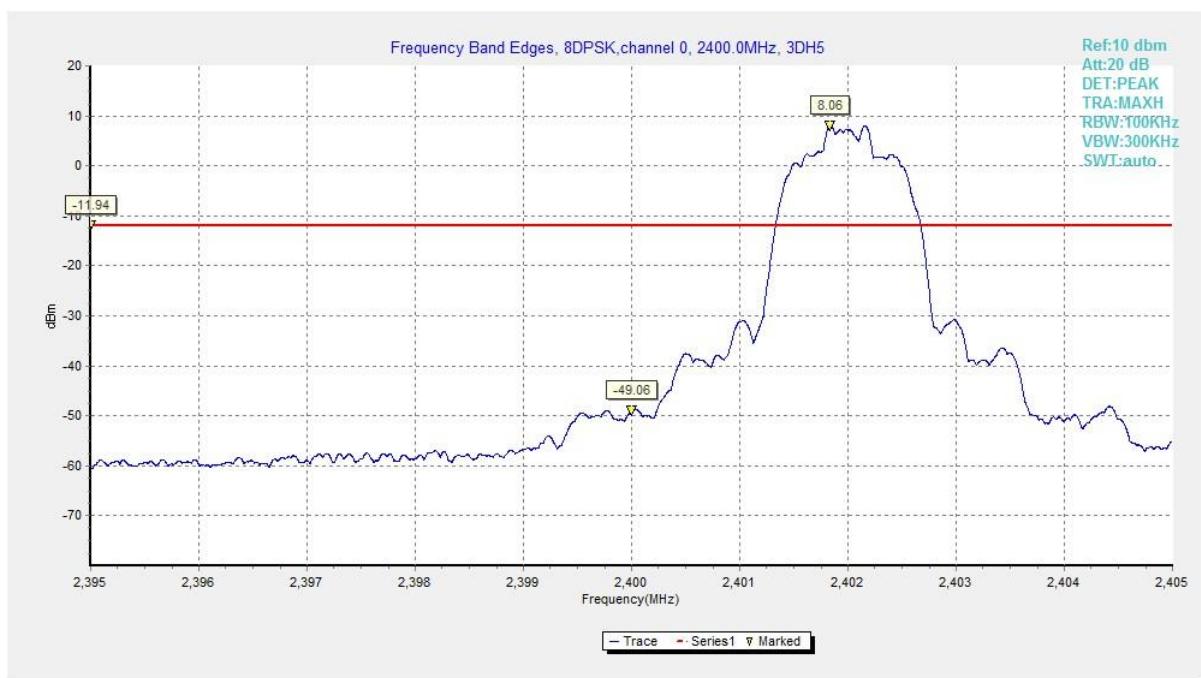


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

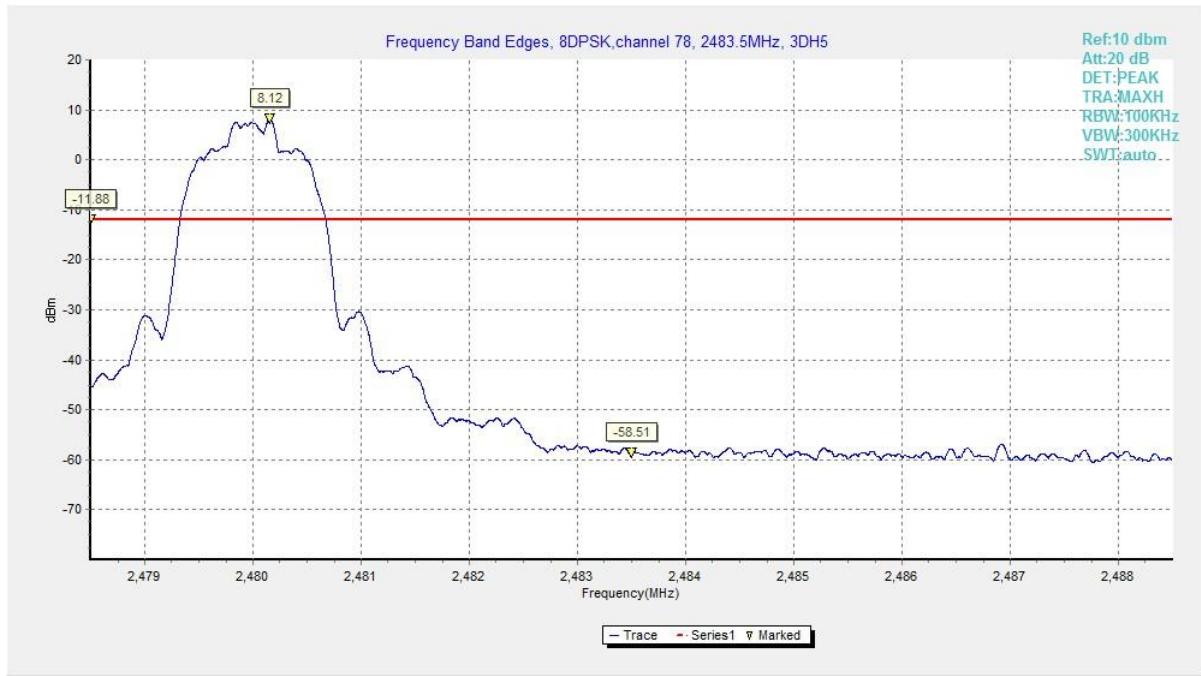


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)

A.3 Conducted Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	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

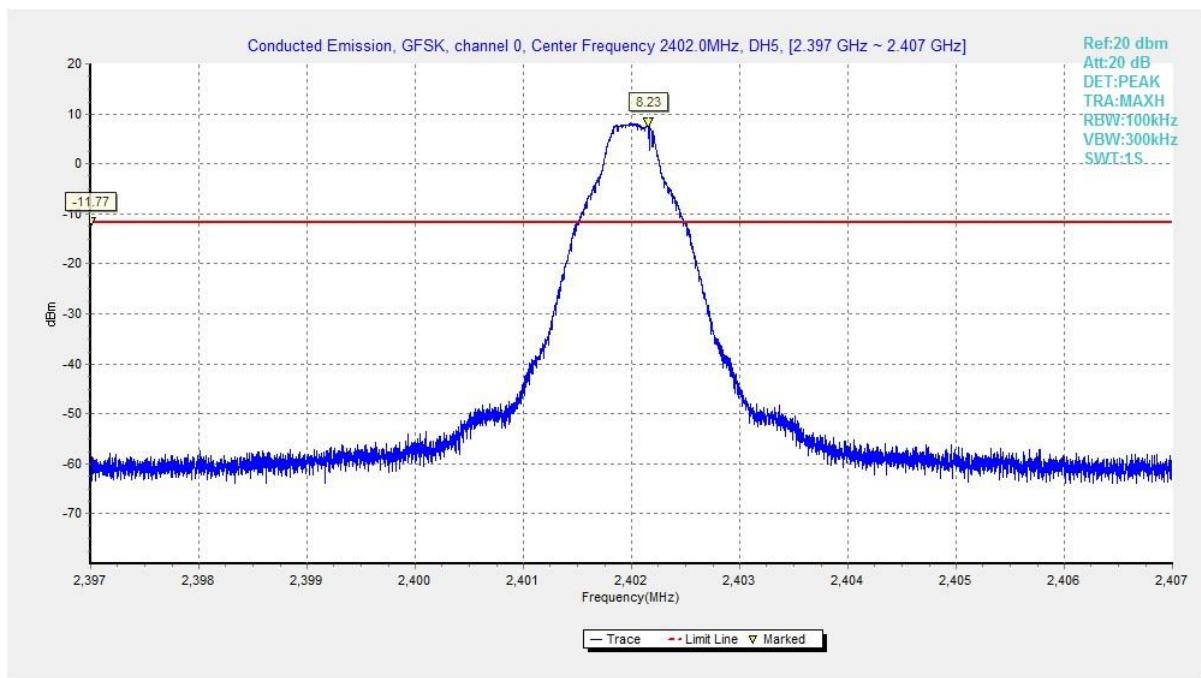


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

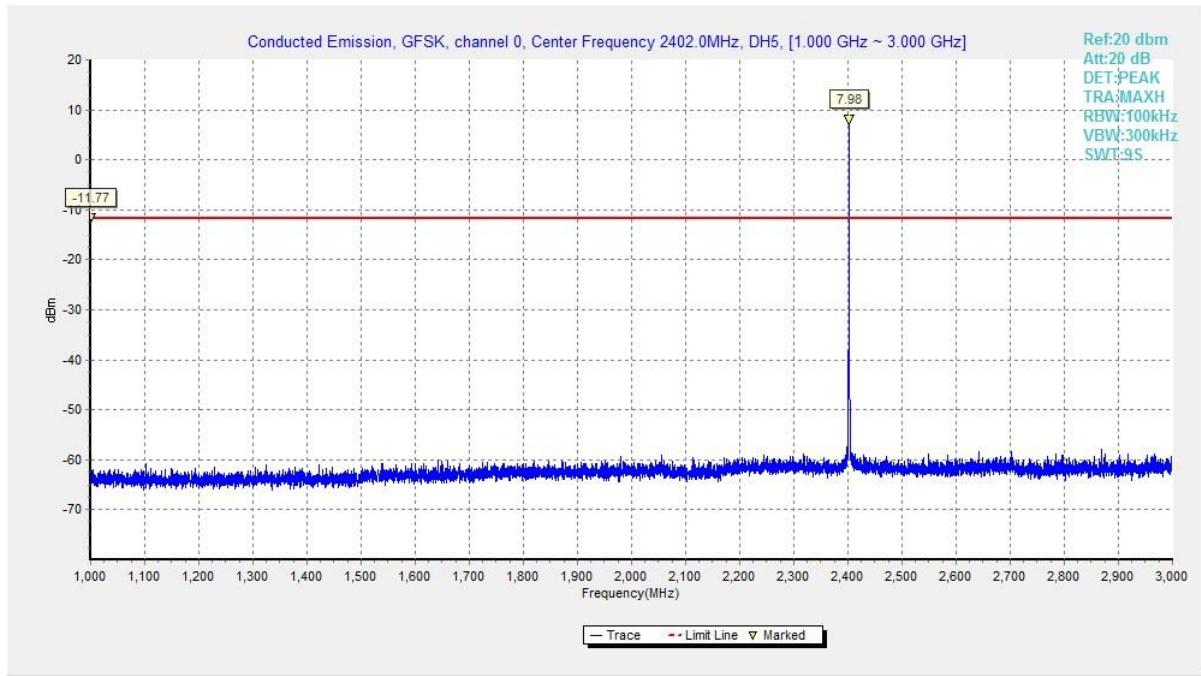


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)

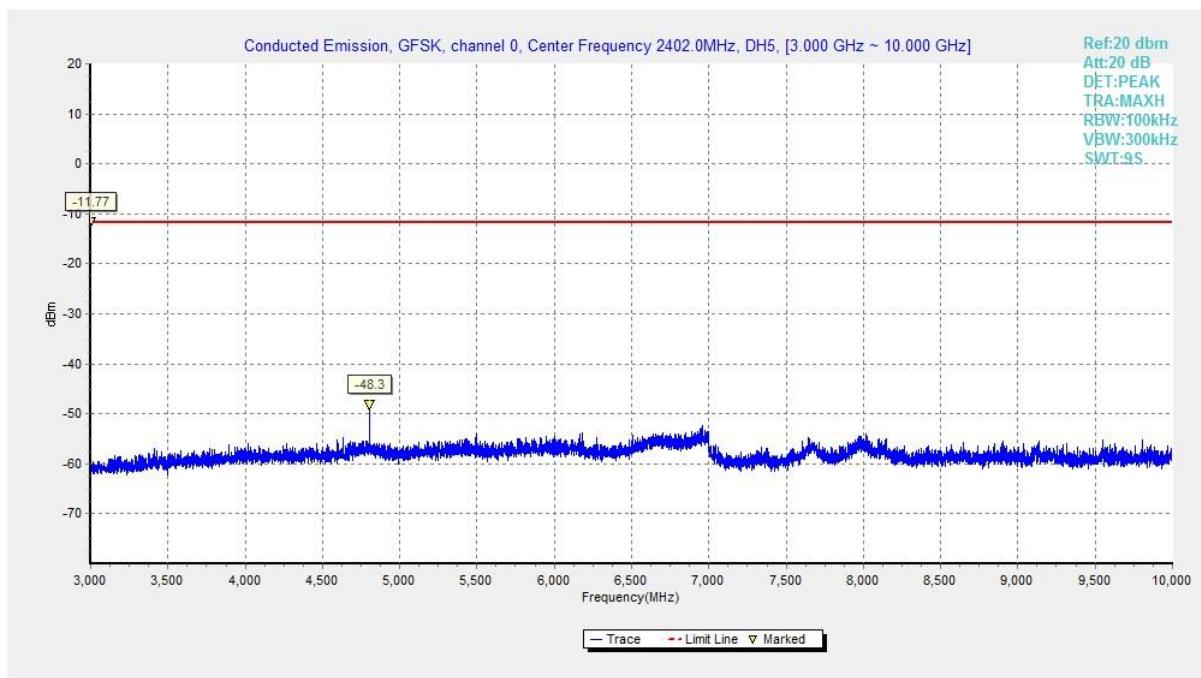


Fig. 15 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10 GHz)

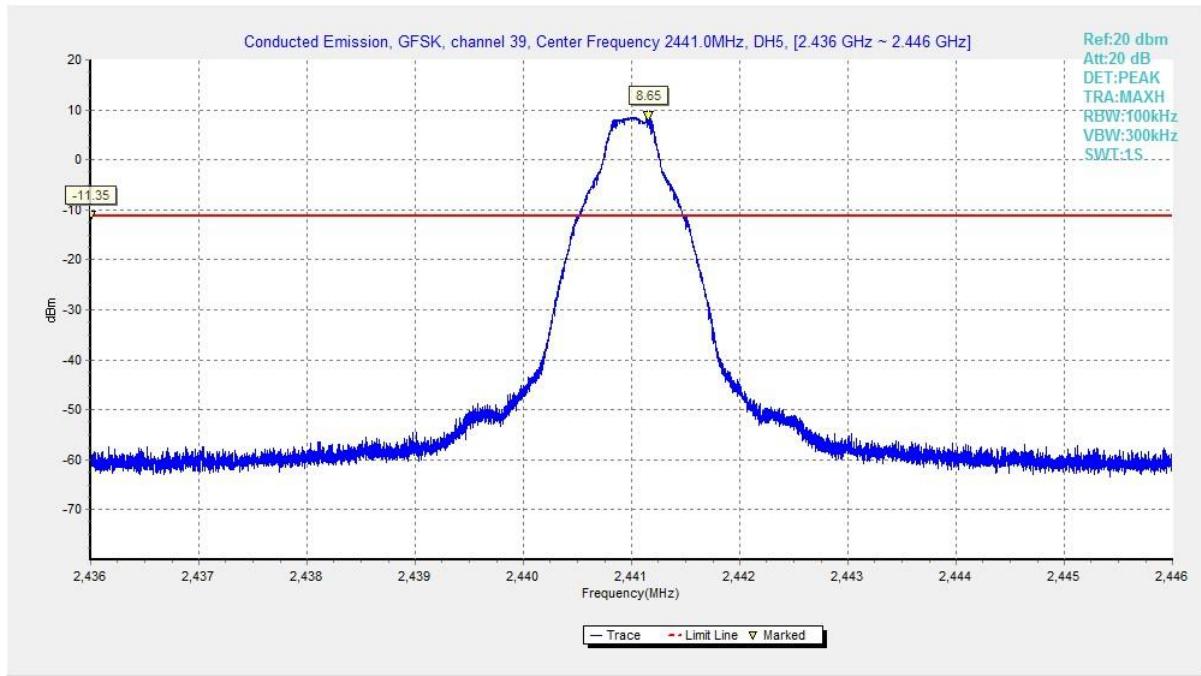


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)

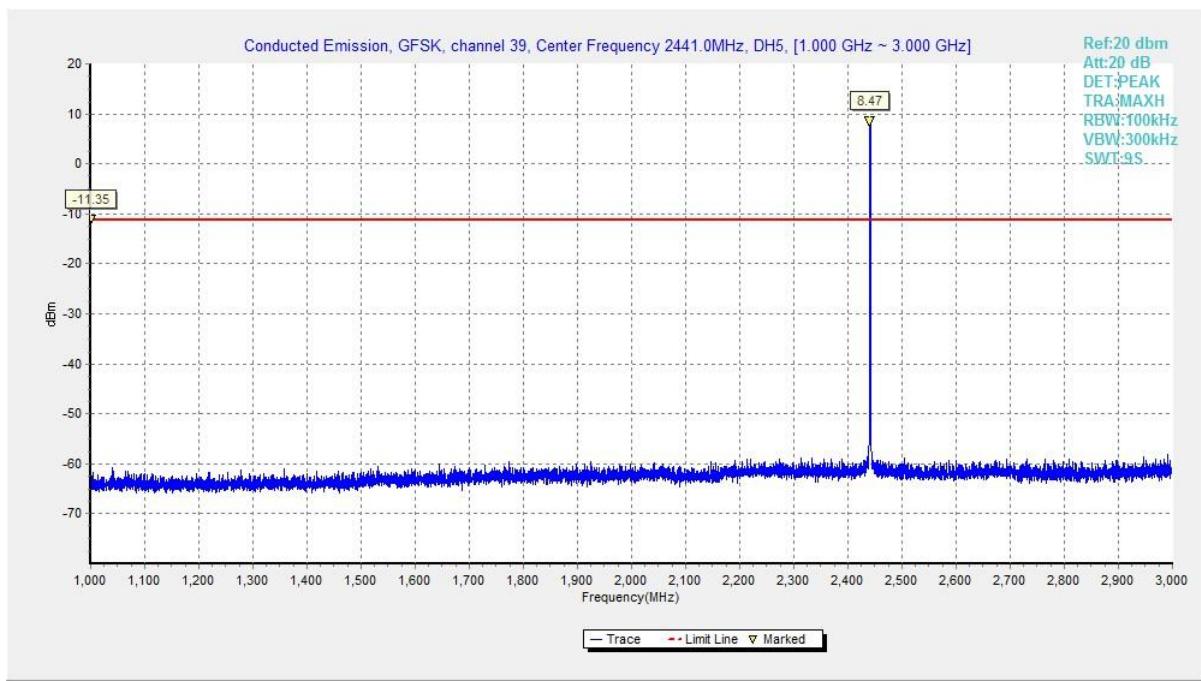


Fig. 17 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3 GHz)

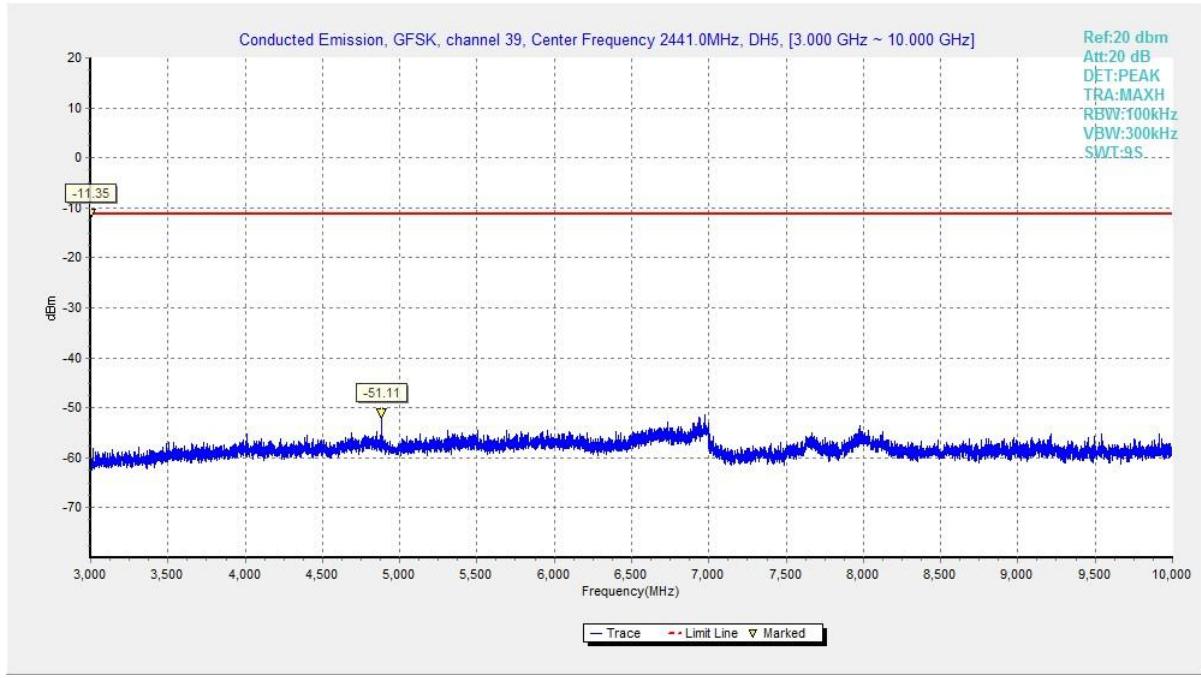


Fig. 18 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10 GHz)

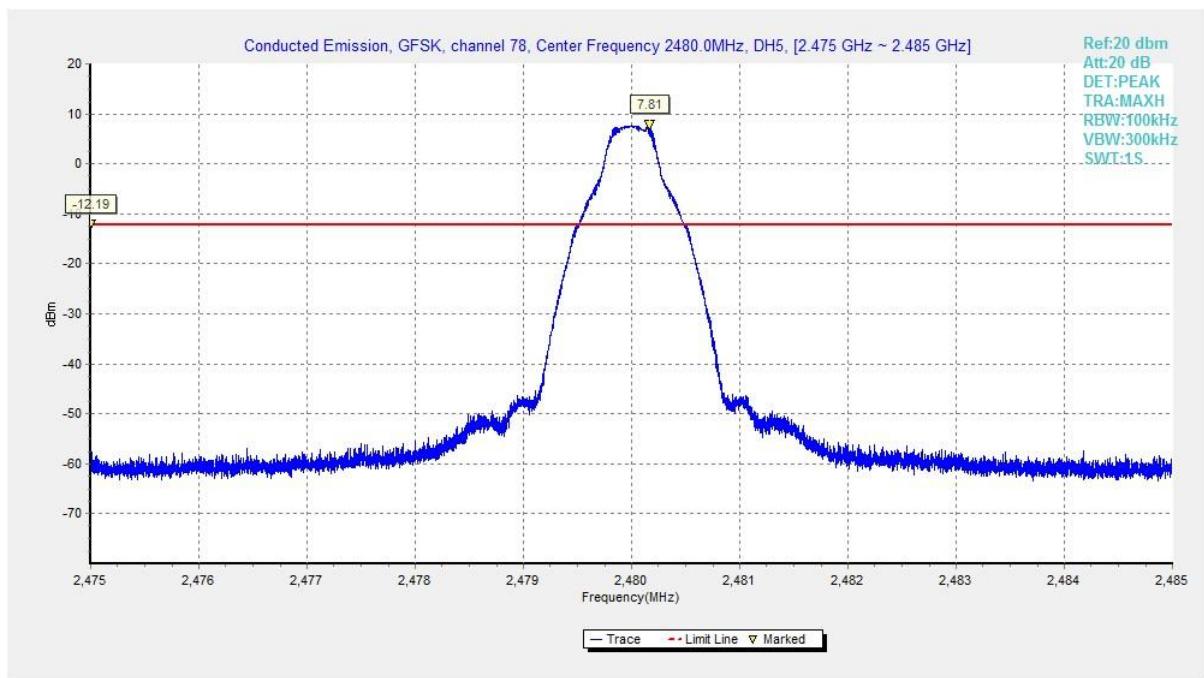


Fig. 19 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

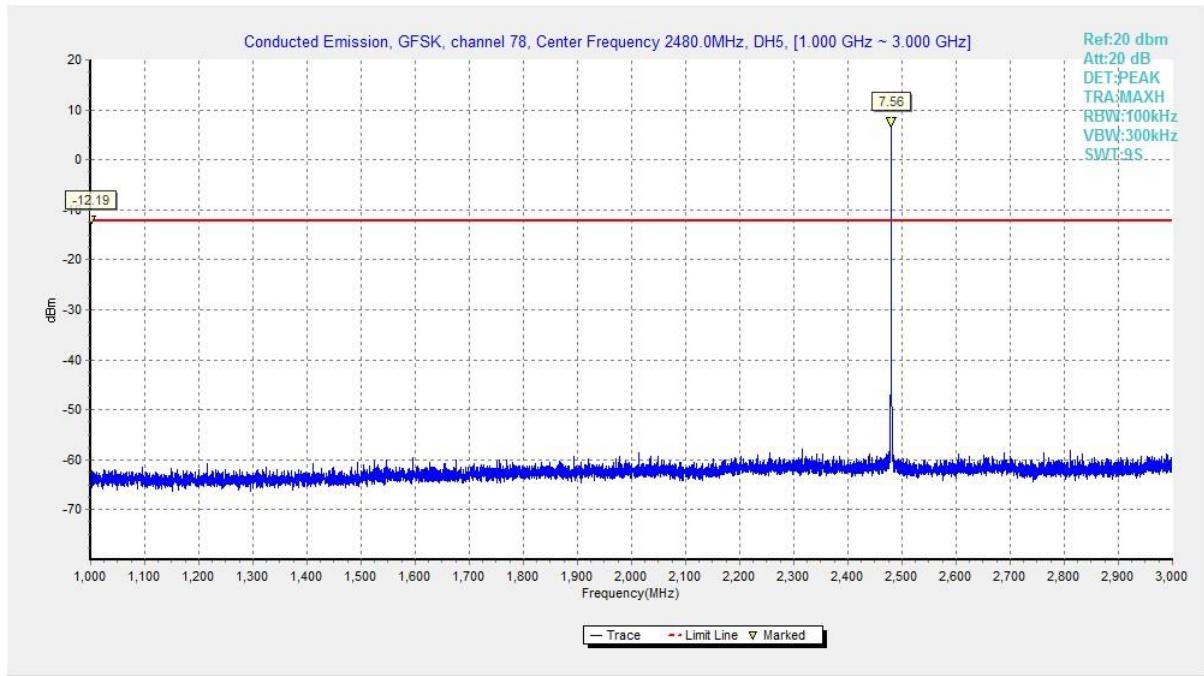


Fig. 20 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3 GHz)

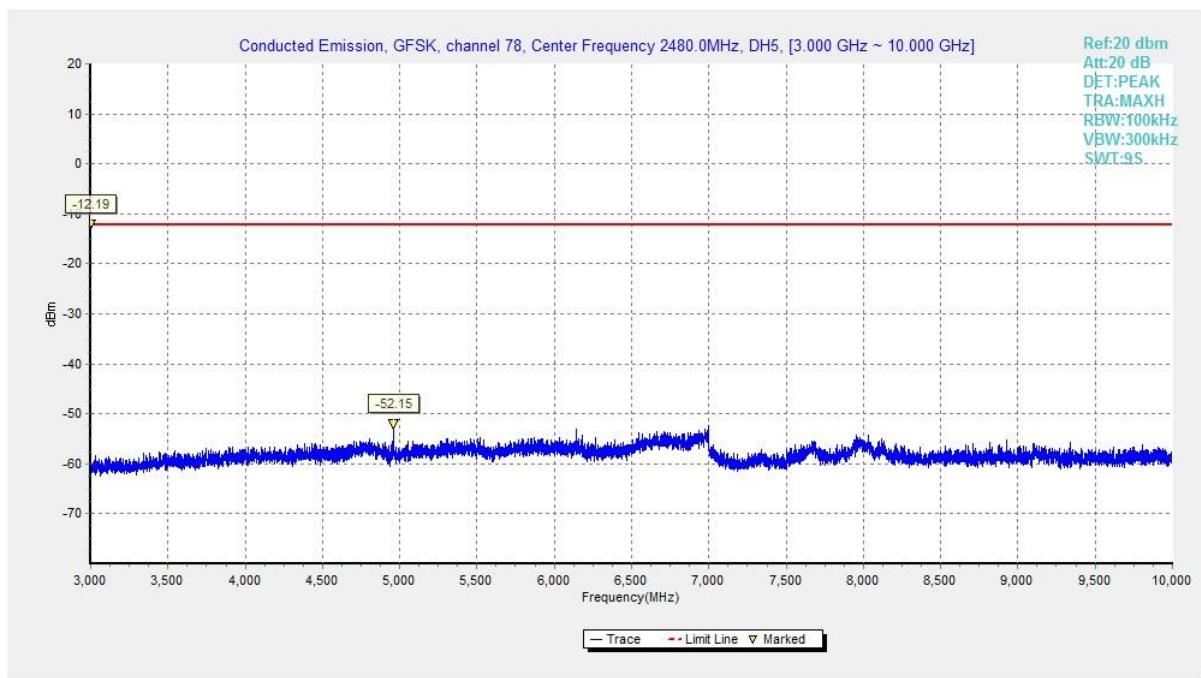


Fig. 21 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10 GHz)

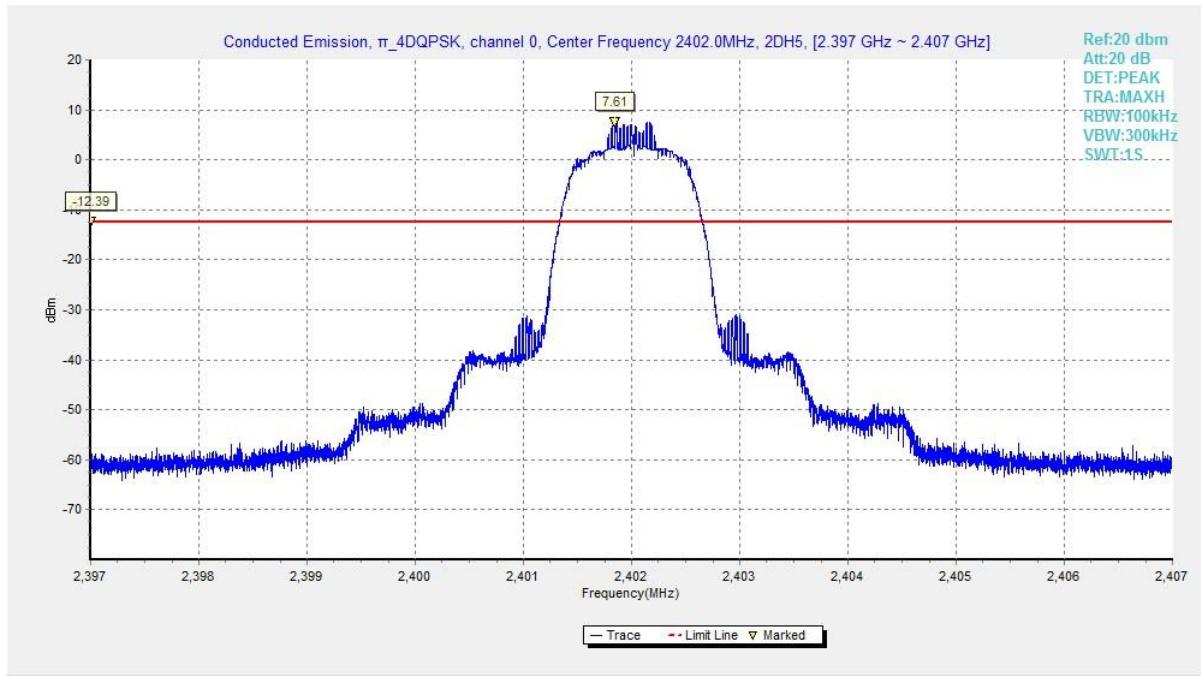


Fig. 22 Conducted Spurious Emission (π/4 DQPSK, Ch0, 2.402GHz)

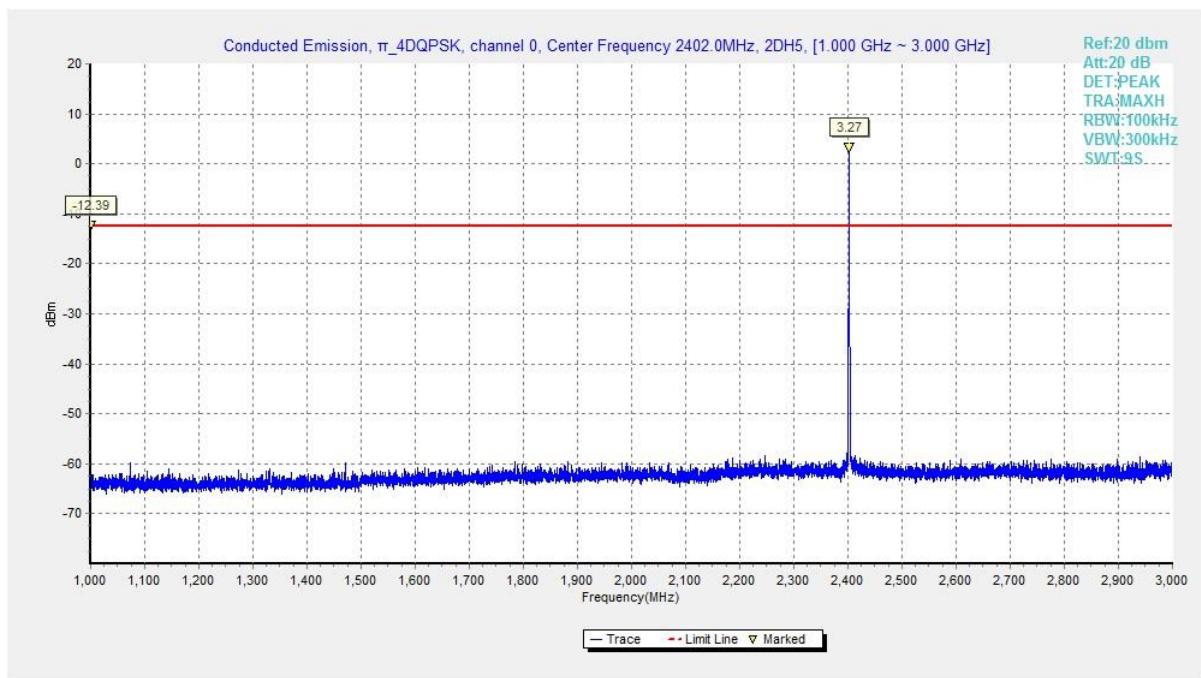


Fig. 23 Conducted Spurious Emission (π /4 DQPSK, Ch0, 1GHz-3 GHz)

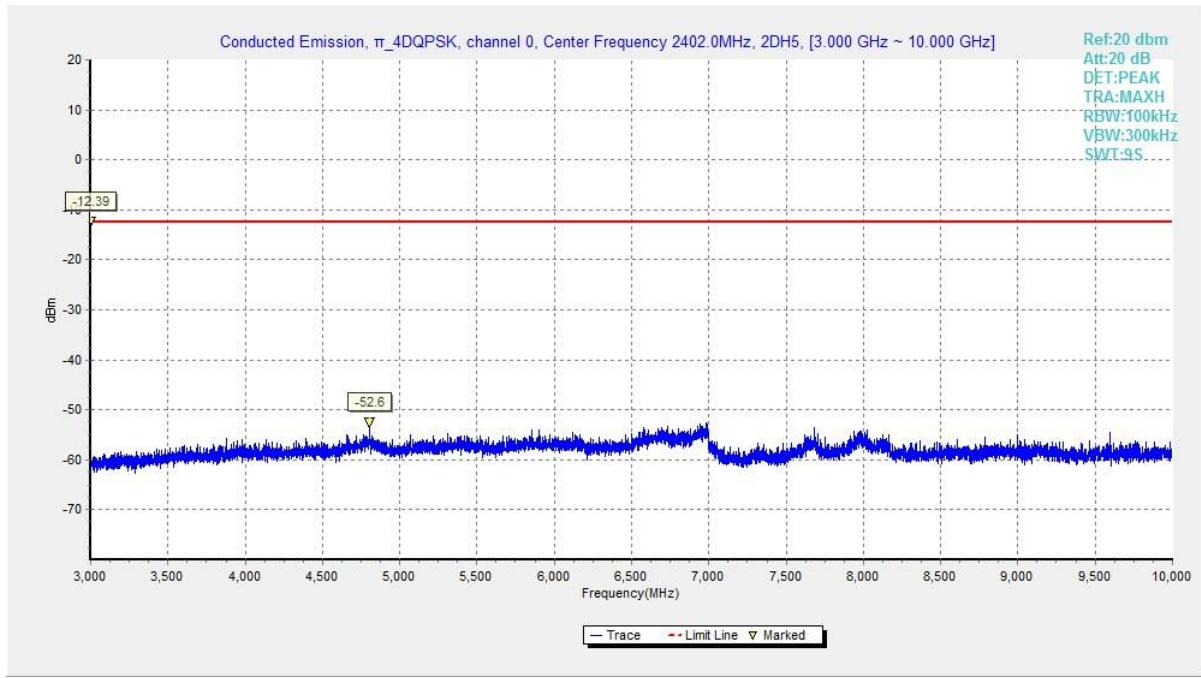


Fig. 24 Conducted Spurious Emission (π /4 DQPSK, Ch0, 3GHz-10 GHz)

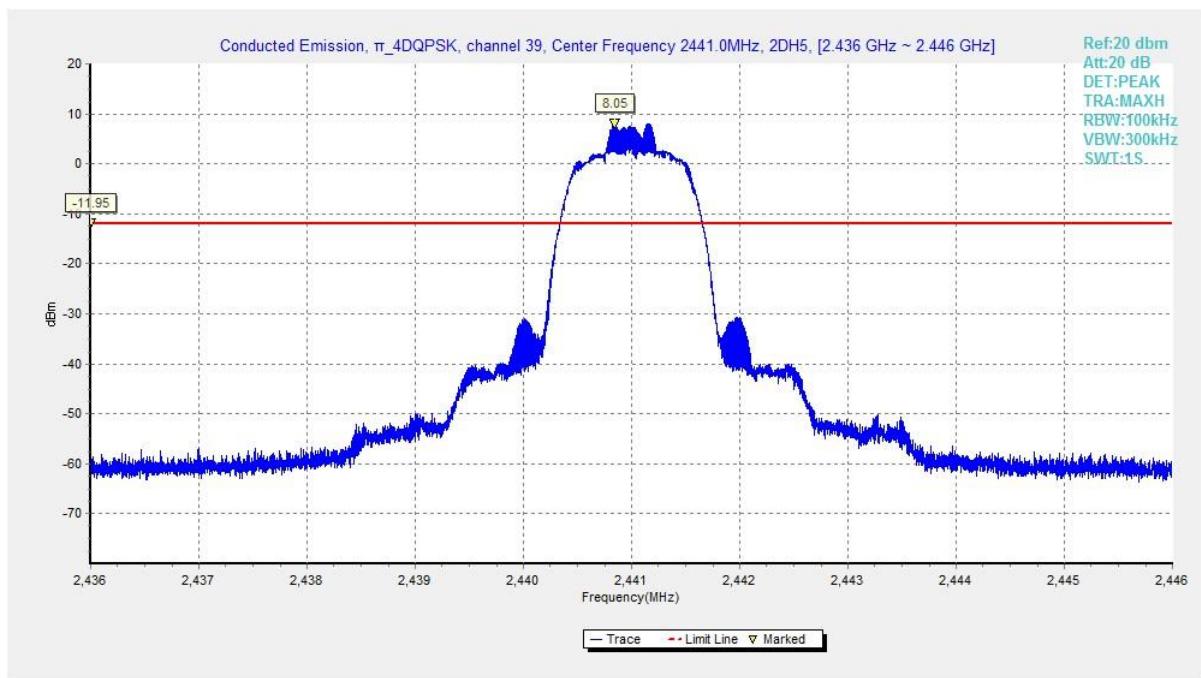


Fig. 25 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 2.441GHz)

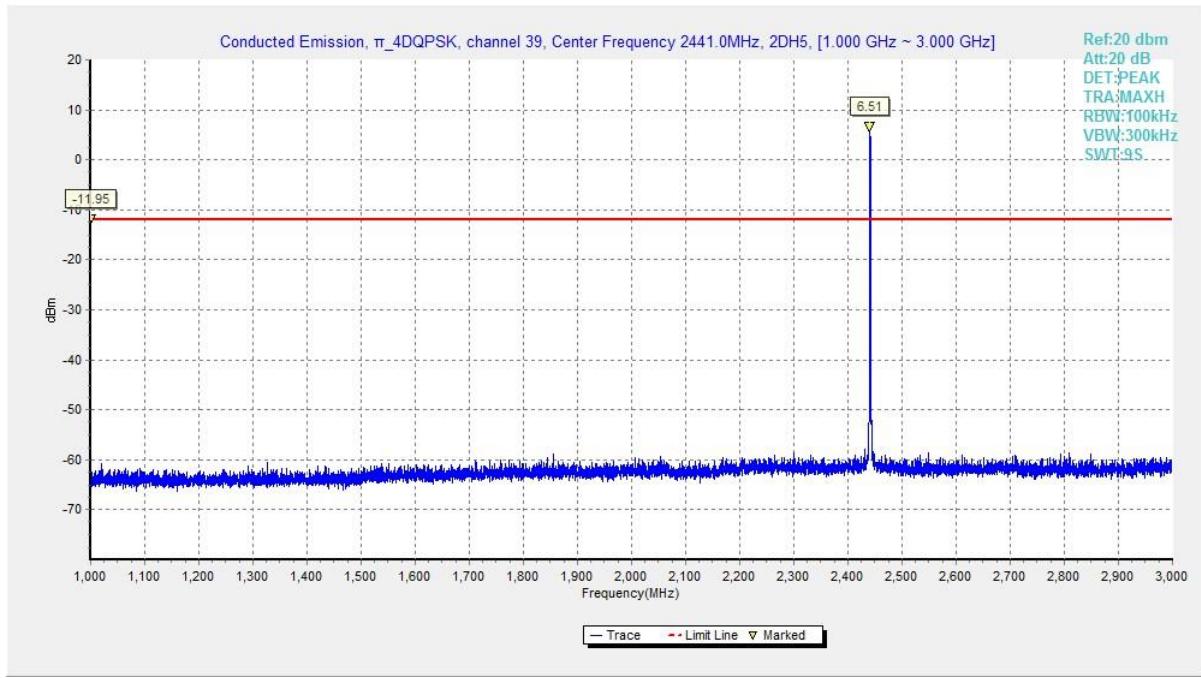


Fig. 26 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 1GHz-3 GHz)

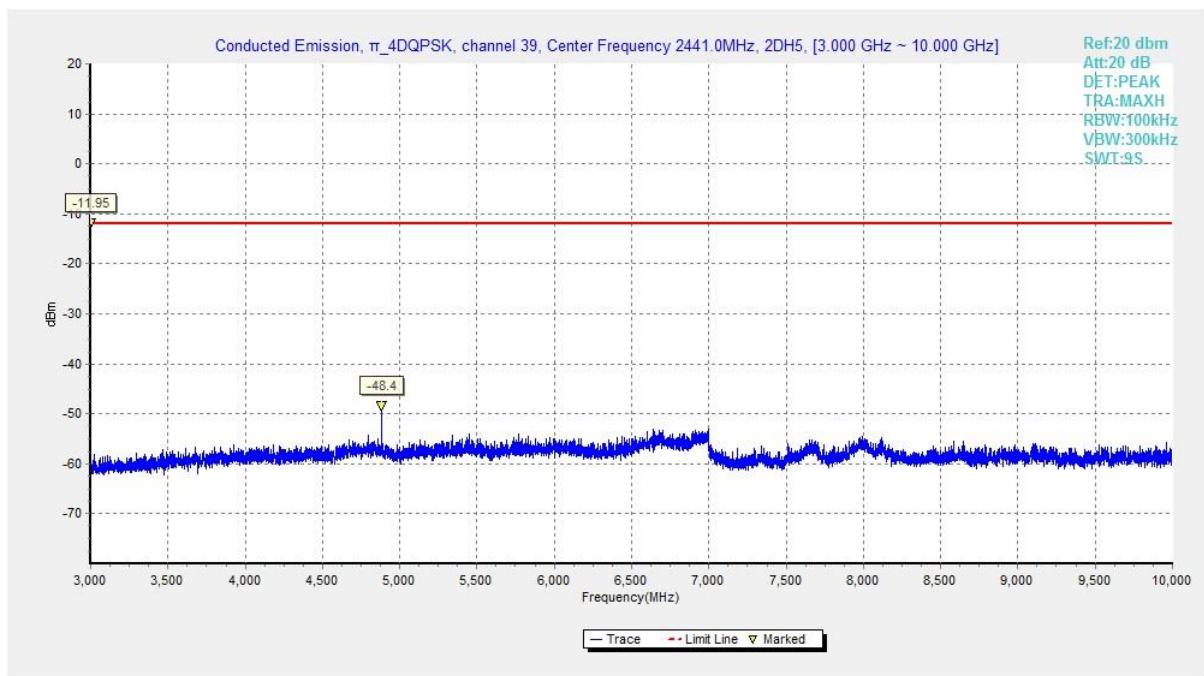


Fig. 27 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 3GHz-10 GHz)

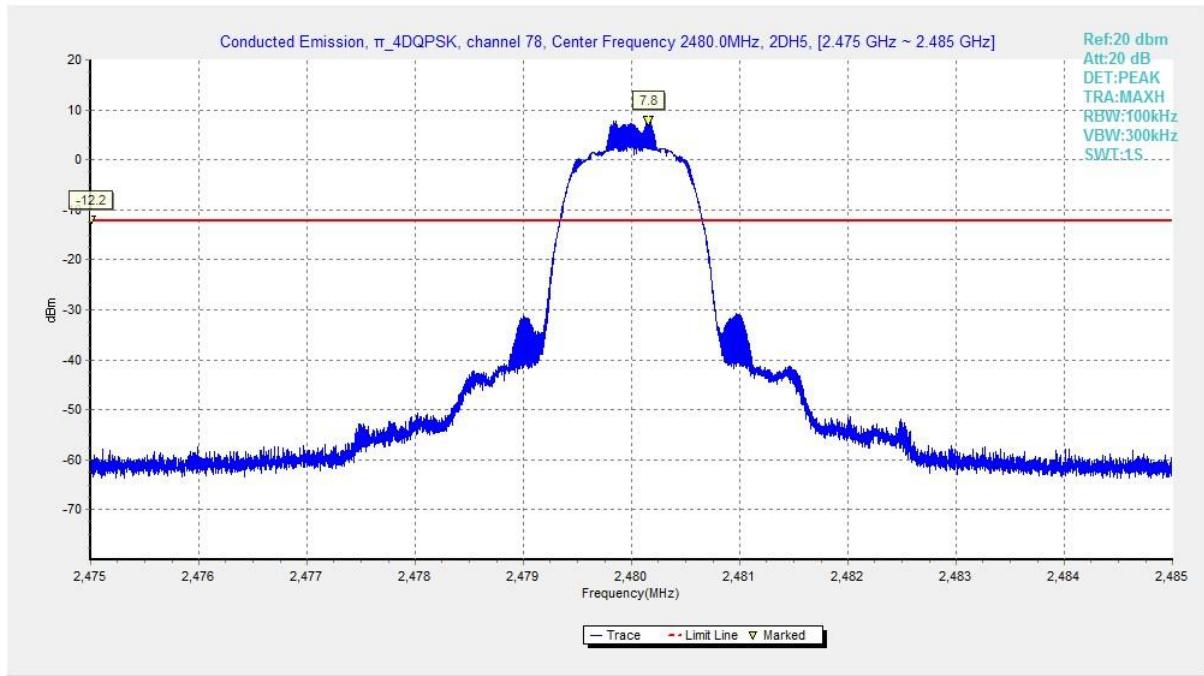


Fig. 28 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch78, 2.480GHz)

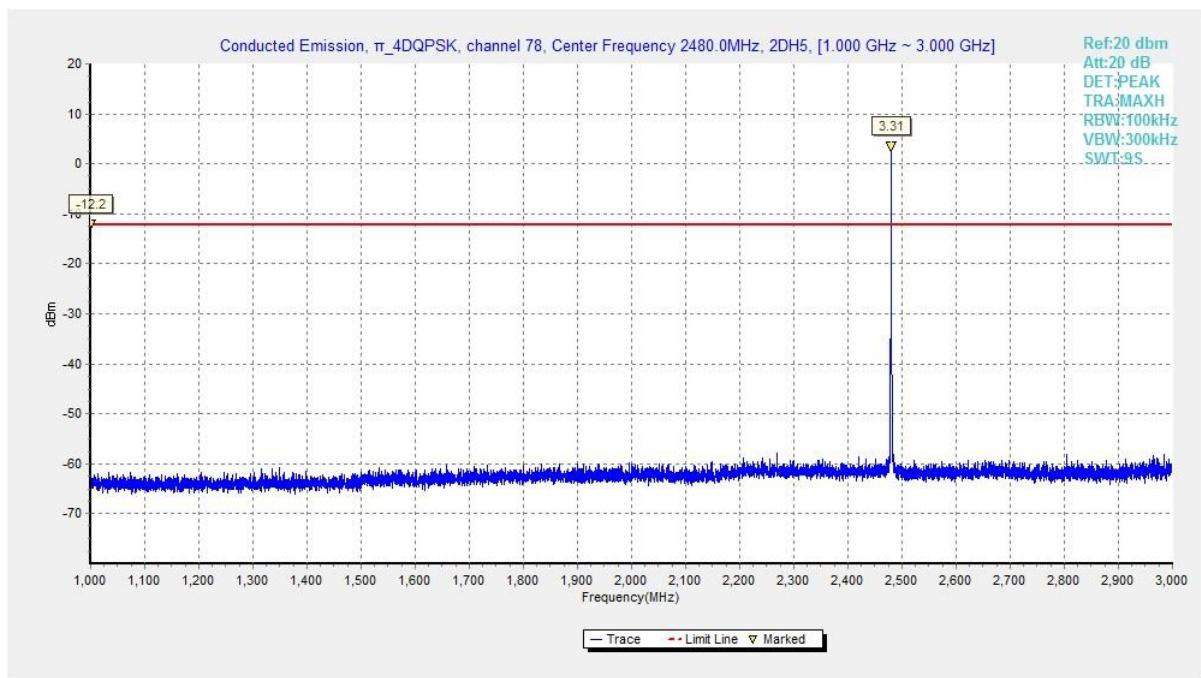


Fig. 29 Conducted Spurious Emission (π /4 DQPSK, Ch78, 1GHz-3 GHz)

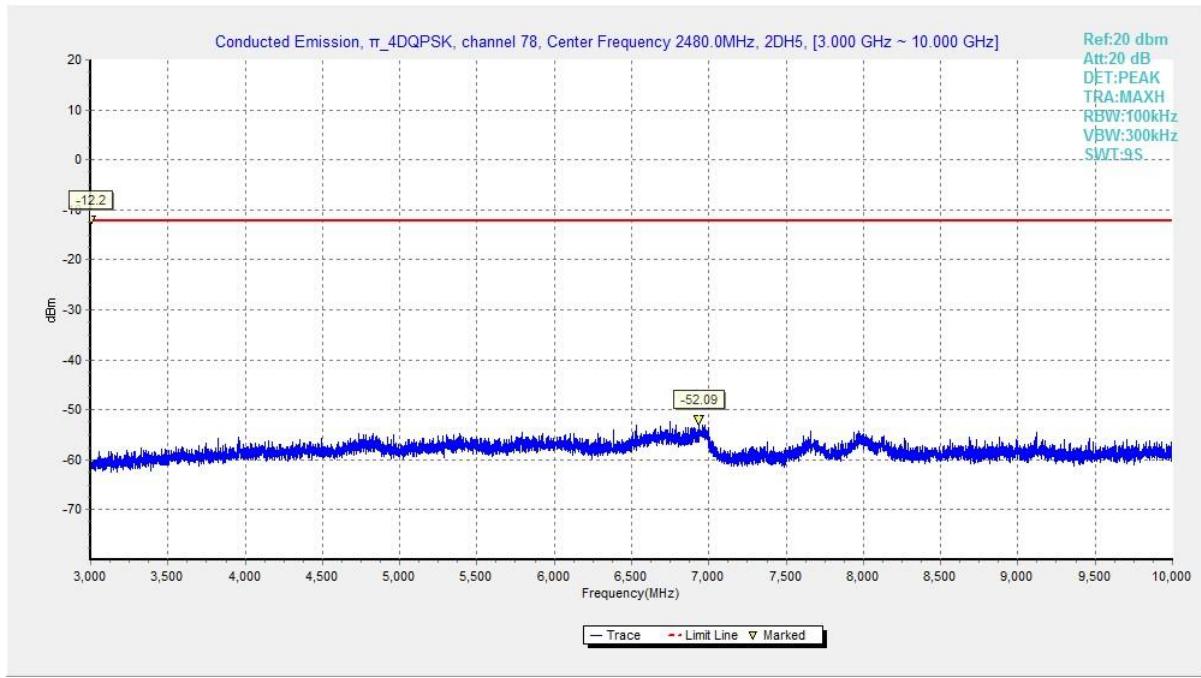


Fig. 30 Conducted Spurious Emission (π /4 DQPSK, Ch78, 3GHz-10 GHz)

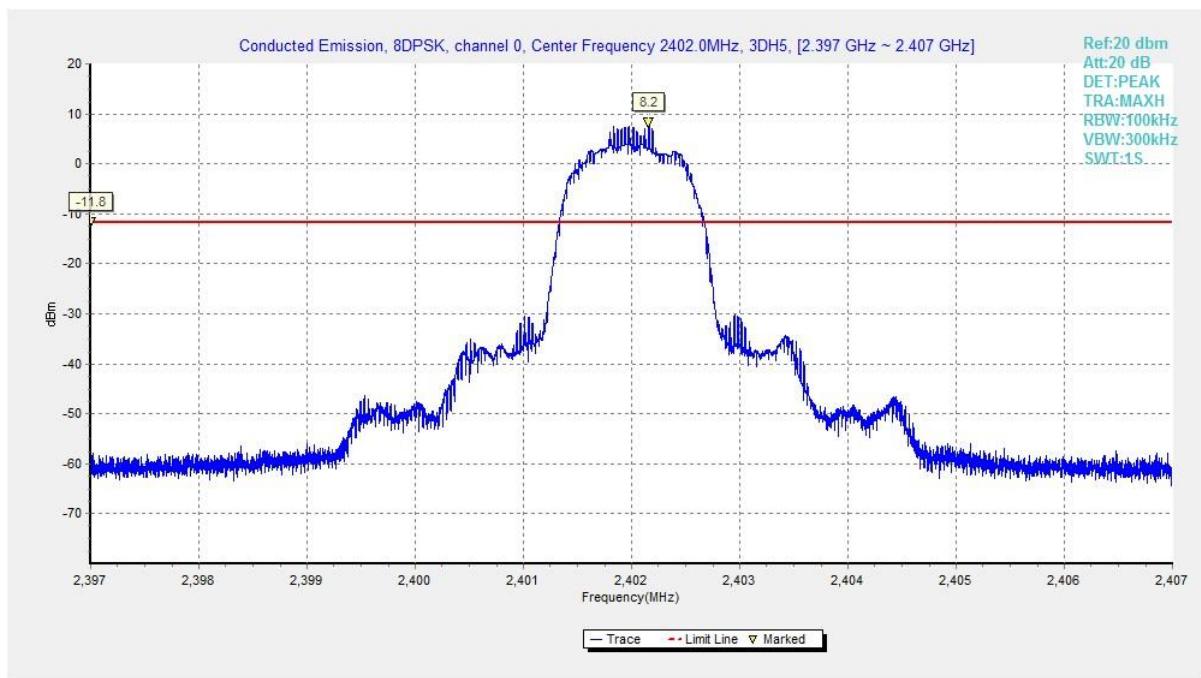


Fig. 31 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)

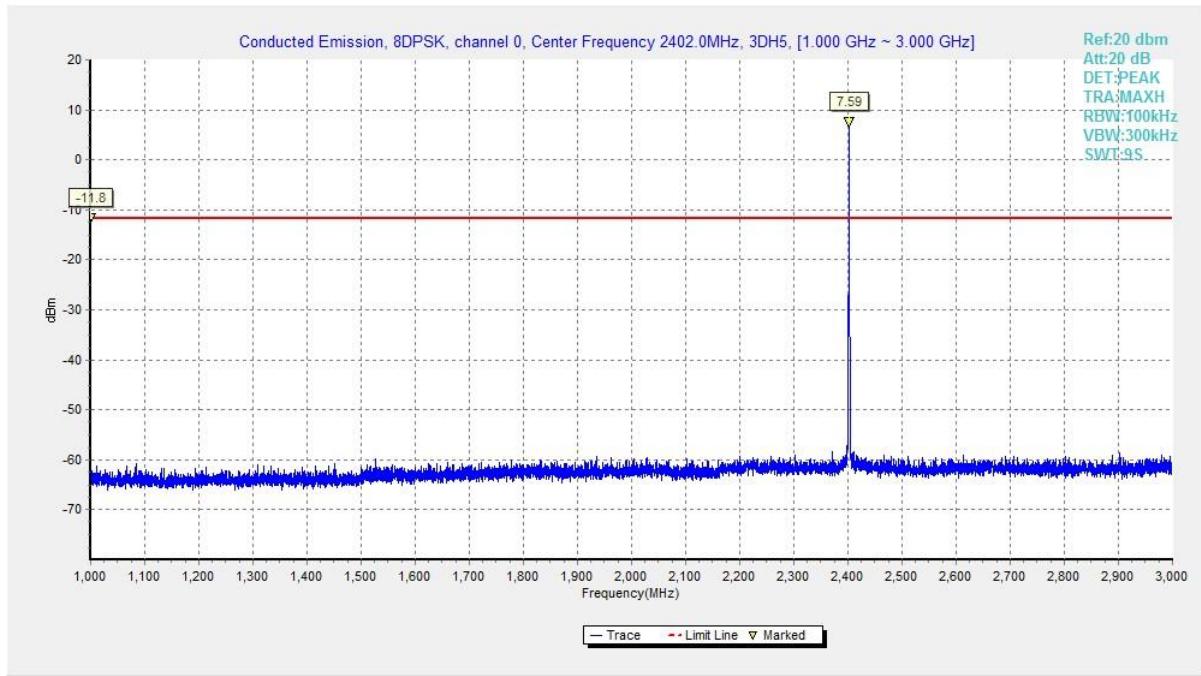


Fig. 32 Conducted Spurious Emission (8DPSK, Ch0, 1GHz-3 GHz)

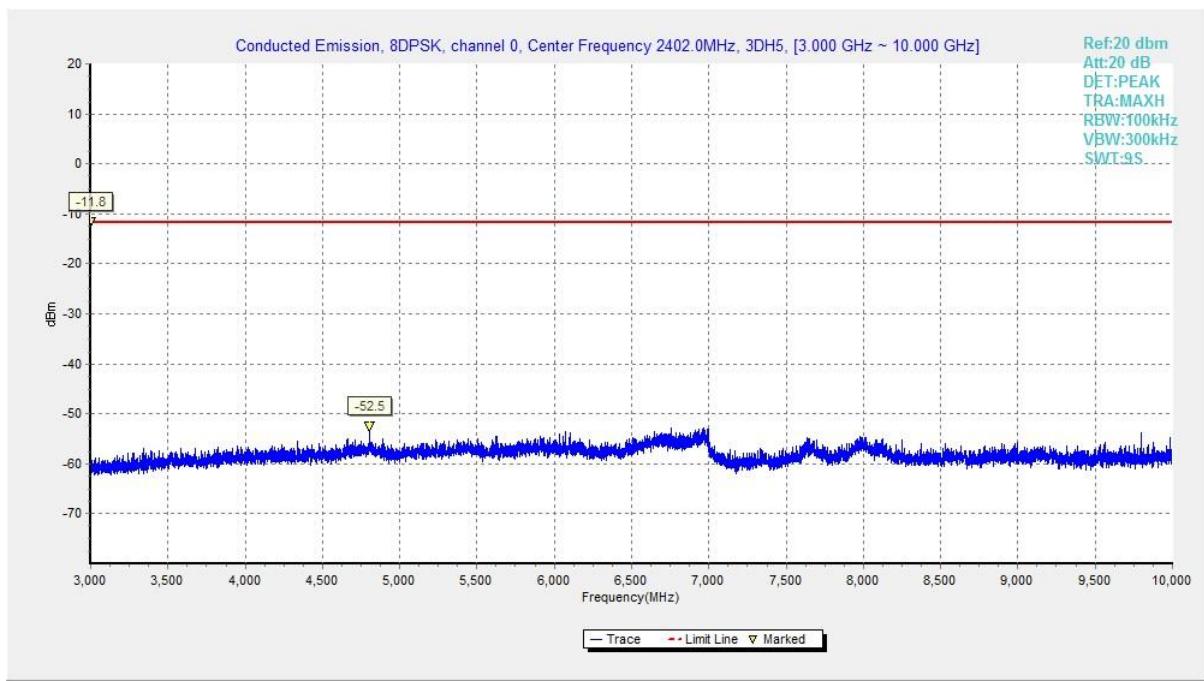


Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10 GHz)

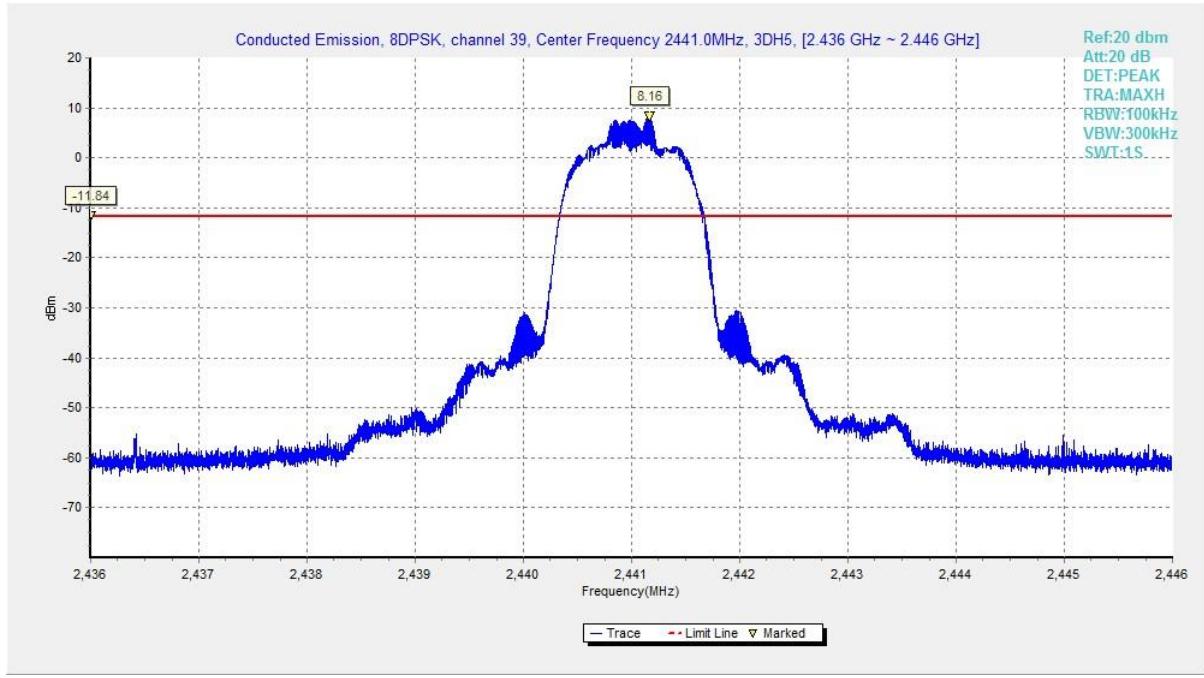


Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

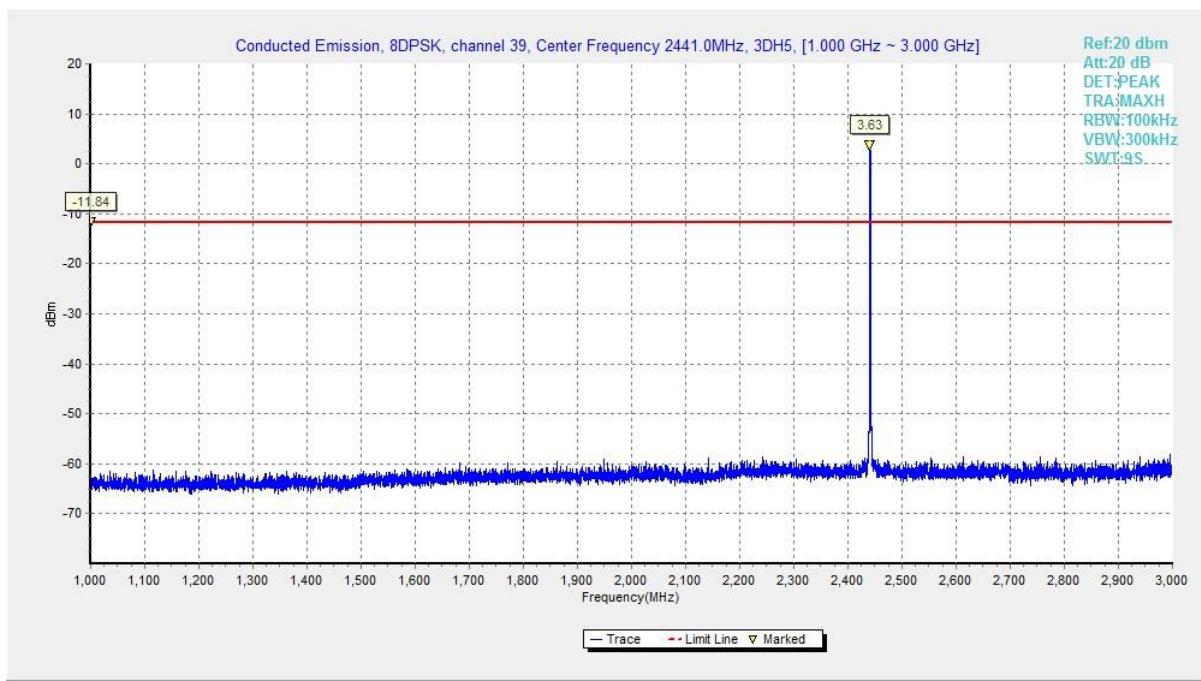


Fig. 35 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3 GHz)

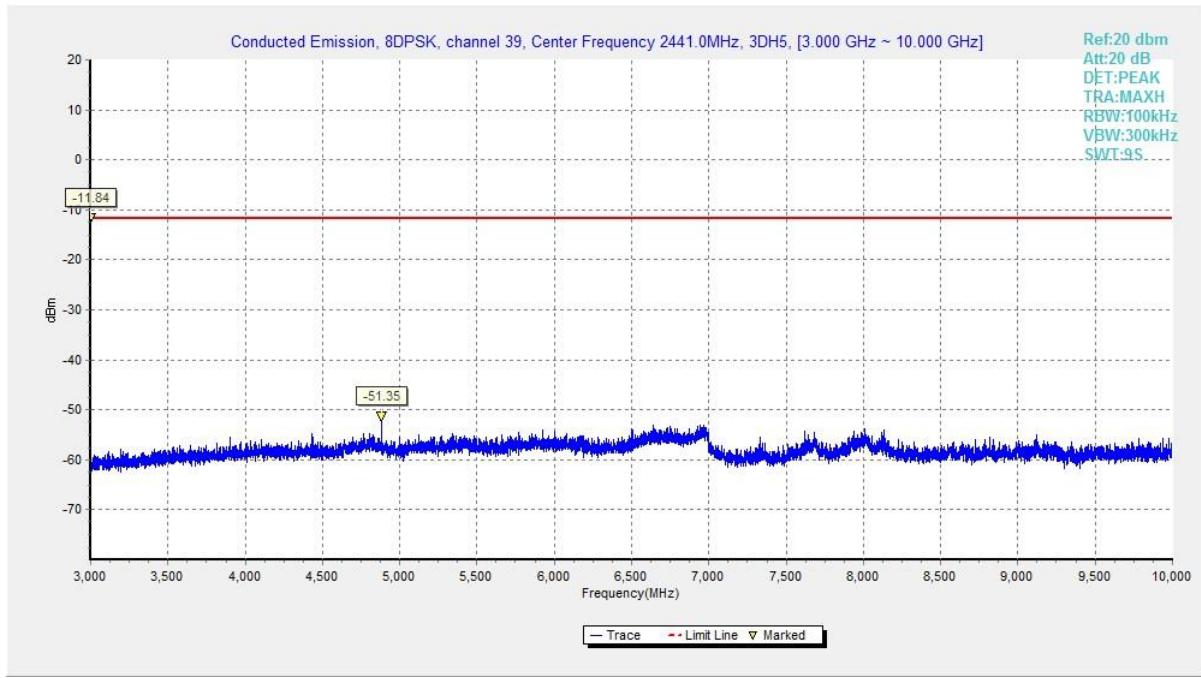


Fig. 36 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10 GHz)

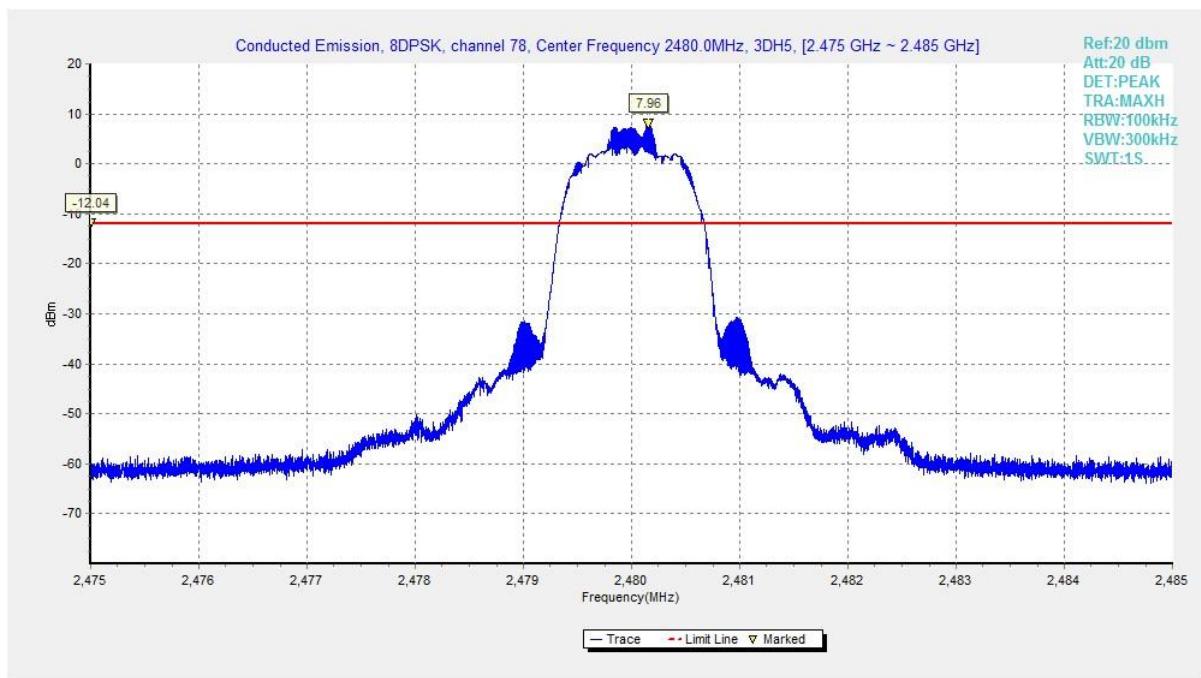


Fig. 37 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)

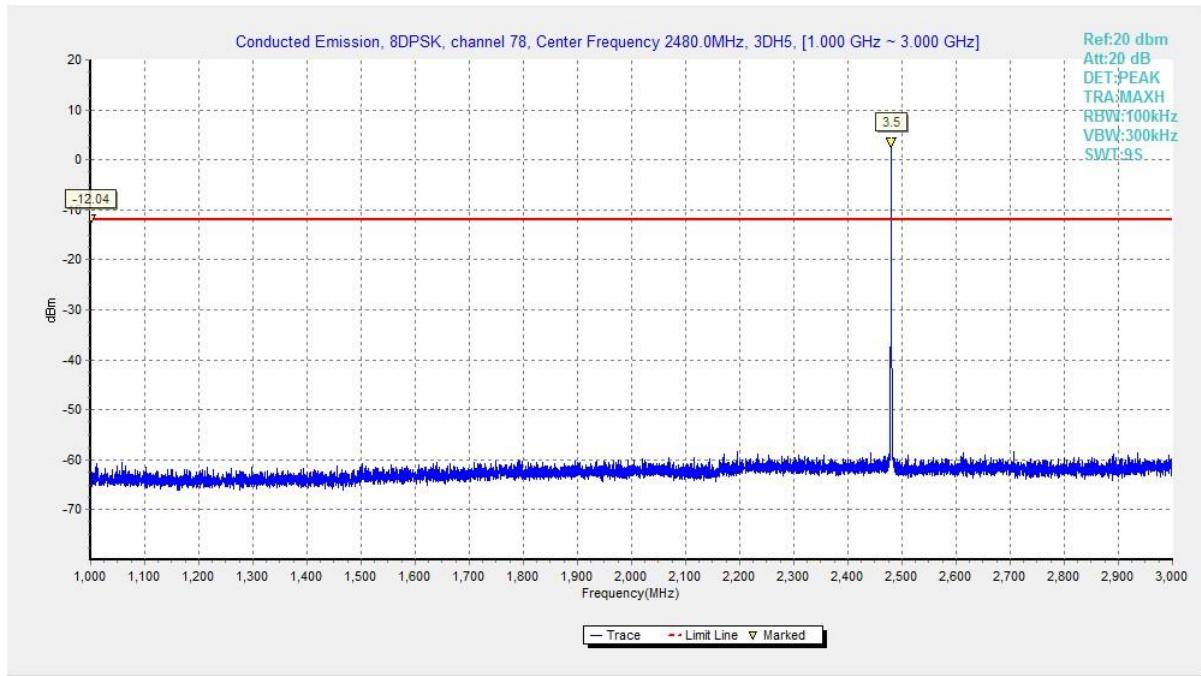


Fig. 38 Conducted Spurious Emission (8DPSK, Ch78, 1GHz-3 GHz)

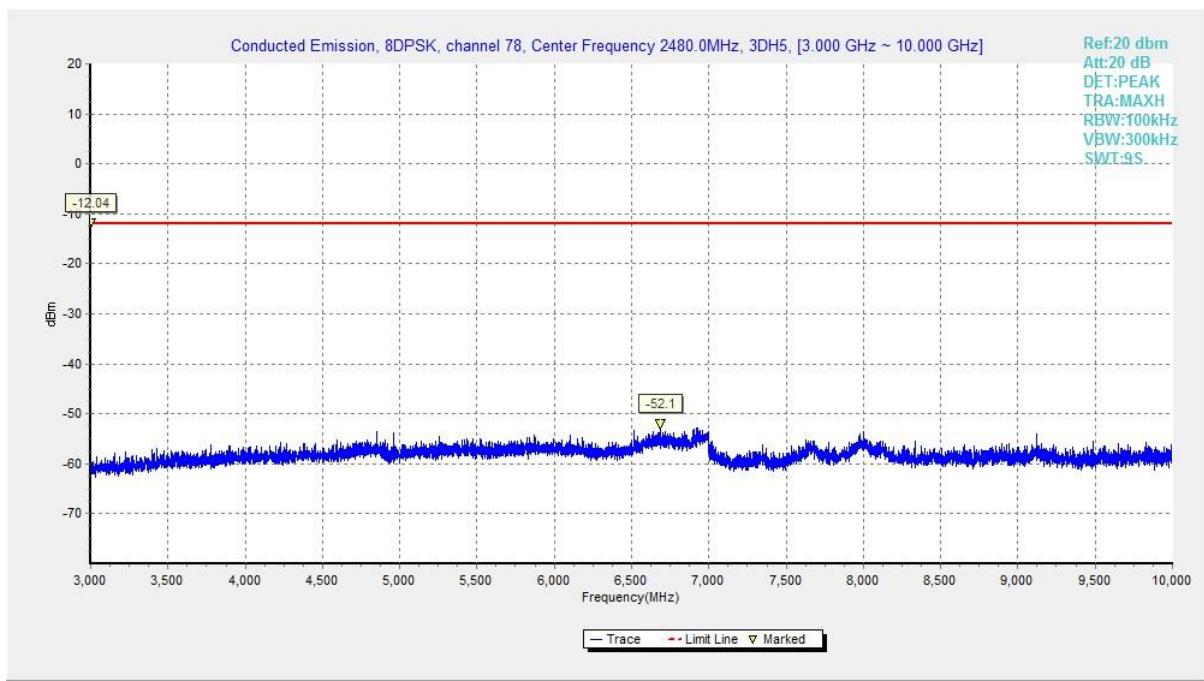


Fig. 39 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10 GHz)

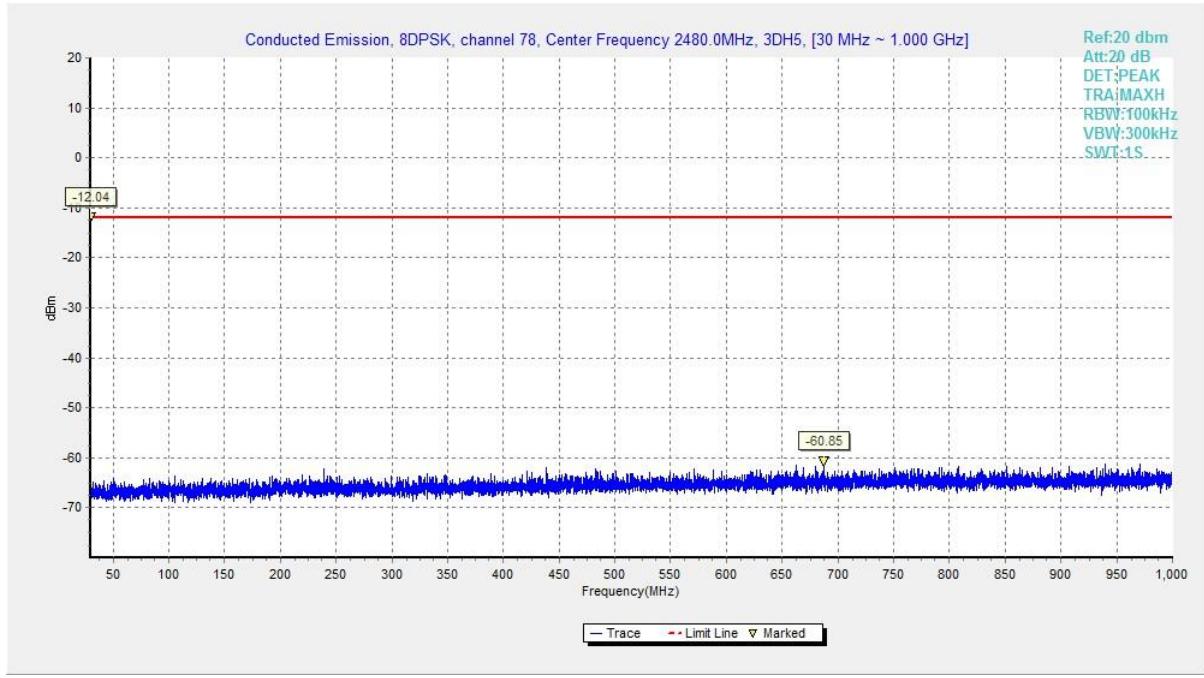


Fig. 40 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)

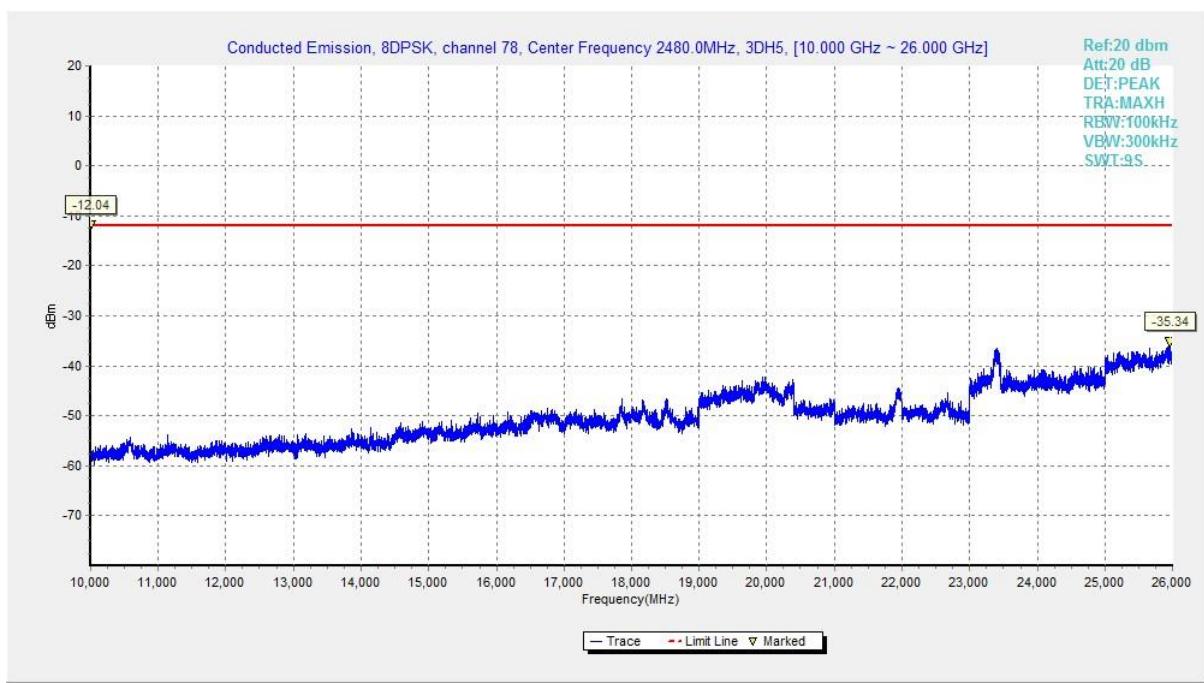


Fig. 41 Conducted Spurious Emission (All channel, 10GHz-26 GHz)

A.4 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 (μ V/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
$\pi/4$ 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 CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
4882.000000	50.15	74.00	23.85	V	13.8
6155.500000	51.32	74.00	22.68	V	18.5
13398.812500	45.58	74.00	28.42	H	12.6
14325.437500	45.63	74.00	28.37	H	12.9
15765.687500	48.61	74.00	25.39	V	14.5
17261.500000	49.42	74.00	24.58	H	16.9

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
4882.500000	38.06	54.00	15.94	V	13.8
6193.500000	40.88	54.00	13.12	V	18.9
13407.125000	35.97	54.00	18.03	V	12.6
14449.250000	36.60	54.00	17.40	V	13.0
15854.937500	38.05	54.00	15.95	H	14.8
17219.500000	39.31	54.00	14.69	H	17.0

$\pi/4$ DQPSK CH78 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
4960.500000	50.13	74.00	23.87	V	13.7
6164.000000	50.46	74.00	23.54	H	18.7
13047.937500	47.33	74.00	26.67	H	12.1
16115.687500	48.12	74.00	25.88	V	14.5
17023.500000	49.03	74.00	24.97	V	16.6
17954.937500	48.19	74.00	25.81	H	16.5

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
4960.500000	42.27	54.00	11.73	V	13.7
6197.500000	40.99	54.00	13.01	V	18.9
13050.562500	35.78	54.00	18.22	H	12.1
16129.250000	36.75	54.00	17.25	H	14.5
17014.312500	37.35	54.00	16.65	H	16.6
17857.375000	36.71	54.00	17.29	V	16.6

8DPSK CH78 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
4960.000000	51.51	74.00	22.49	V	13.7
6214.500000	52.10	74.00	21.90	H	18.7
14913.437500	45.46	74.00	28.54	V	12.7
15745.125000	47.73	74.00	26.27	V	14.4
16556.687500	47.27	74.00	26.73	H	15.4
17479.812500	48.46	74.00	25.54	V	17.0

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
4960.000000	42.88	54.00	11.12	V	13.7
6165.000000	40.80	54.00	13.20	V	18.7
14971.187500	36.20	54.00	17.80	H	12.7
15722.812500	36.75	54.00	17.25	V	14.3
16658.625000	38.01	54.00	15.99	V	15.7
17487.687500	38.44	54.00	15.56	V	17.0

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:

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

See below for test graphs.

Conclusion: Pass

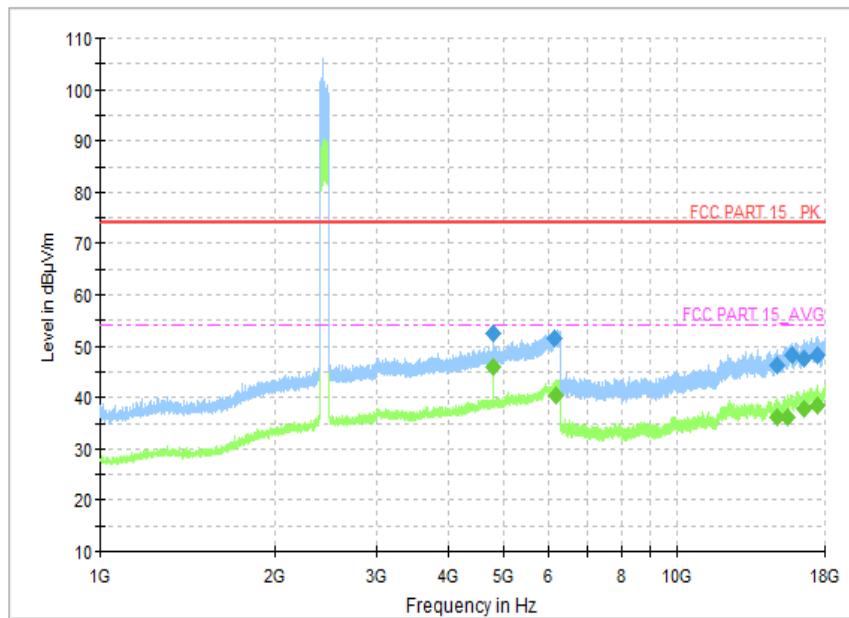


Fig. 42 Radiated Spurious Emission (GFSK, Ch0, 1GHz ~ 18GHz)

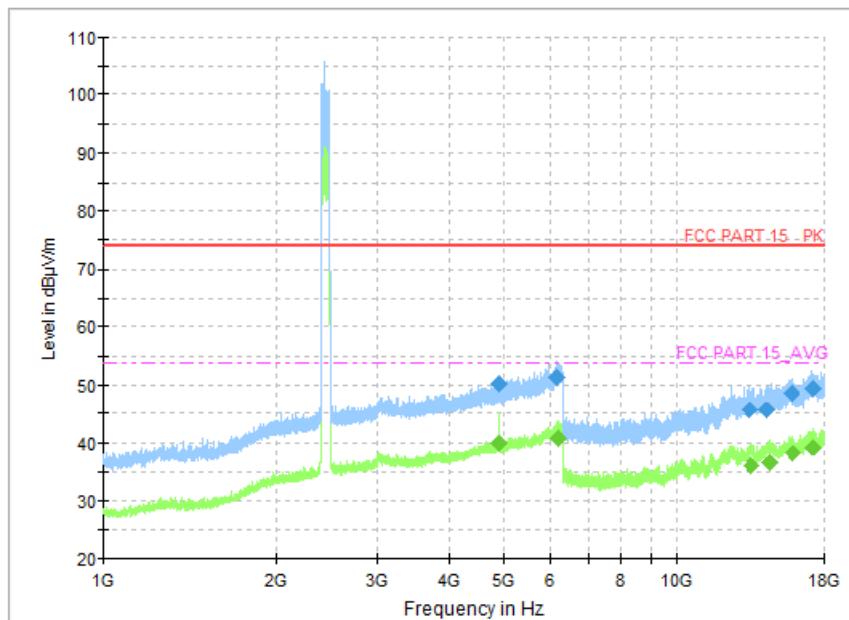


Fig. 43 Radiated Spurious Emission (GFSK, Ch39, 1GHz ~ 18GHz)

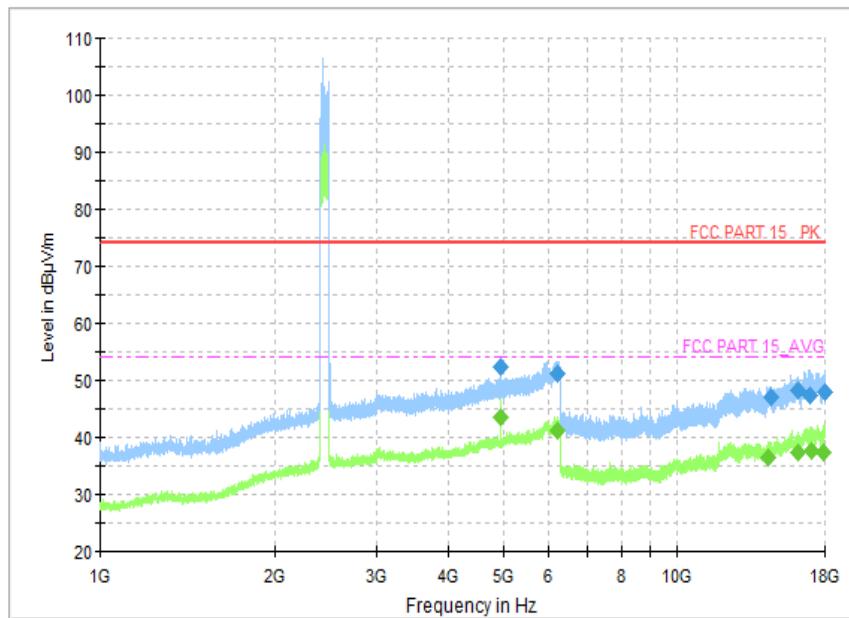


Fig. 44 Radiated Spurious Emission (GFSK, Ch78, 1GHz ~ 18GHz)

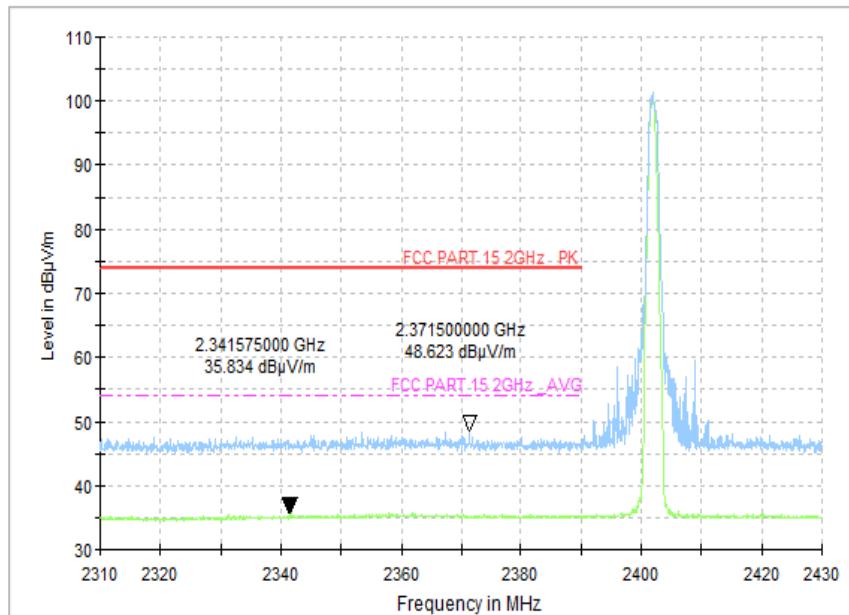


Fig. 45 Radiated Band Edges (GFSK, Ch0, 2380GHz ~ 2450GHz)

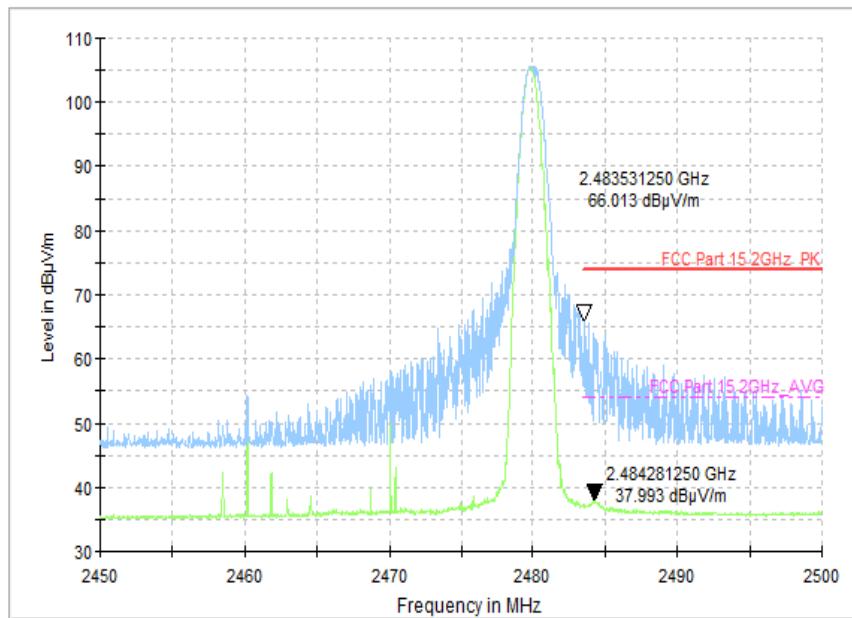


Fig. 46 Radiated Band Edges (GFSK, Ch78, 2450GHz ~ 2500GHz)

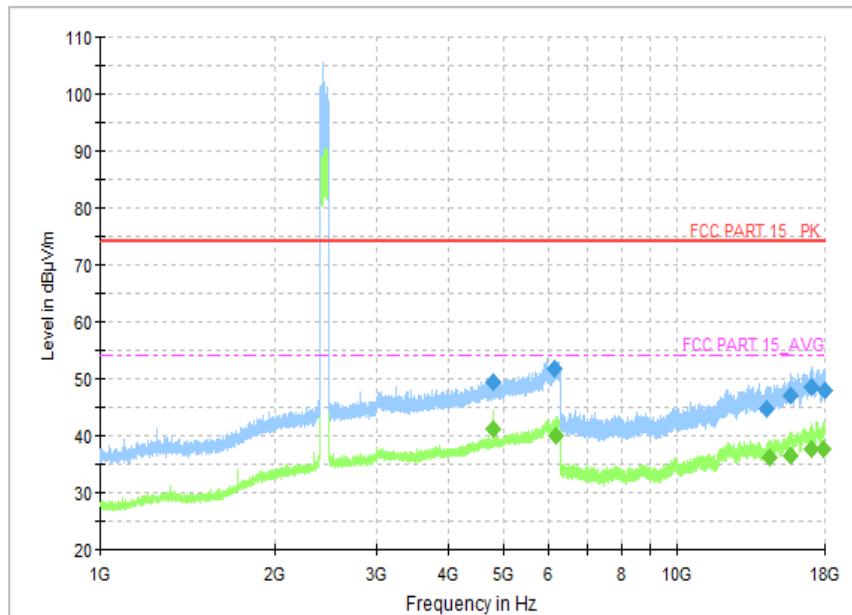


Fig. 47 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch0, 1GHz ~ 18GHz)

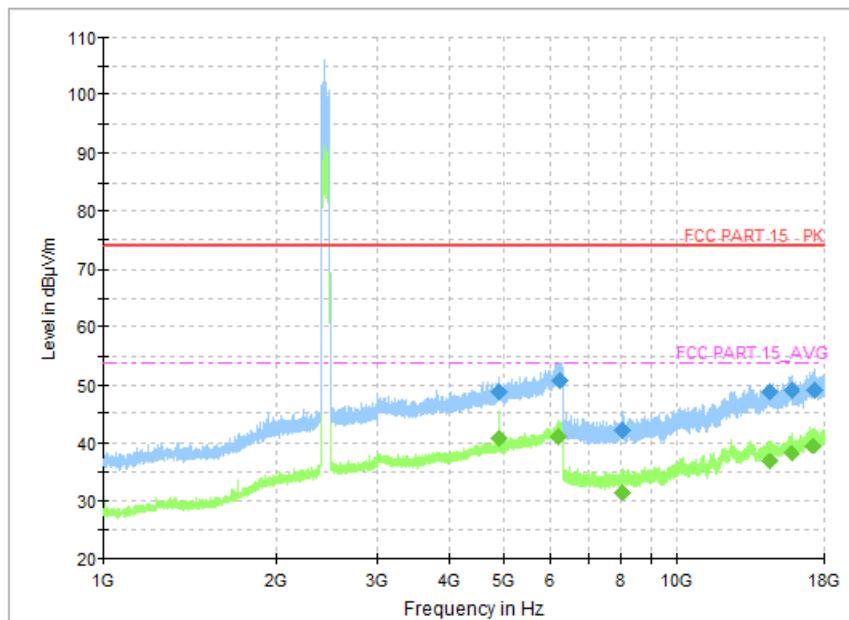


Fig. 48 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch39, 1GHz ~ 18GHz)

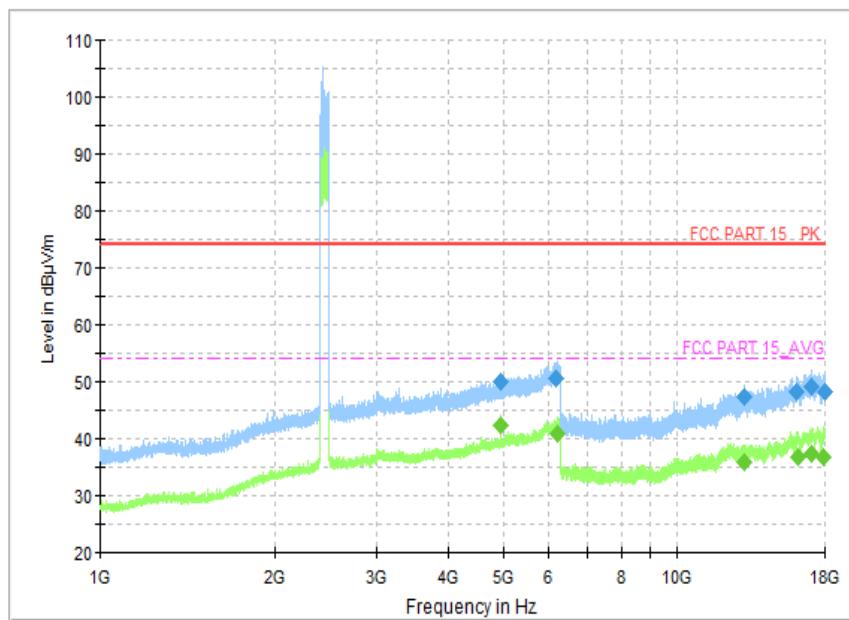


Fig. 49 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch78, 1GHz ~ 18GHz)

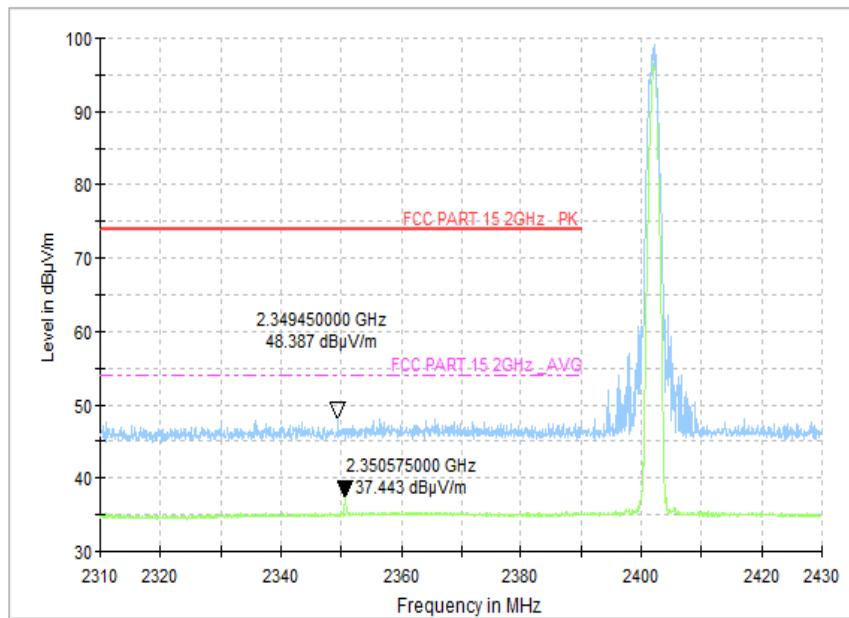


Fig. 50 Radiated Band Edges ($\pi/4$ DQPSK, Ch0, 2380GHz ~ 2450GHz)

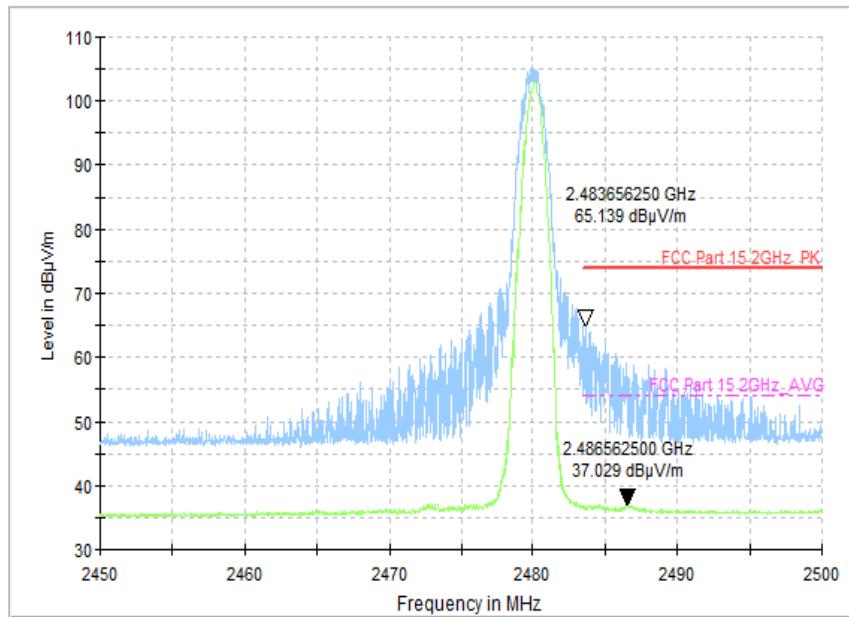


Fig. 51 Radiated Band Edges ($\pi/4$ DQPSK, Ch78, 2450GHz ~ 2500GHz)

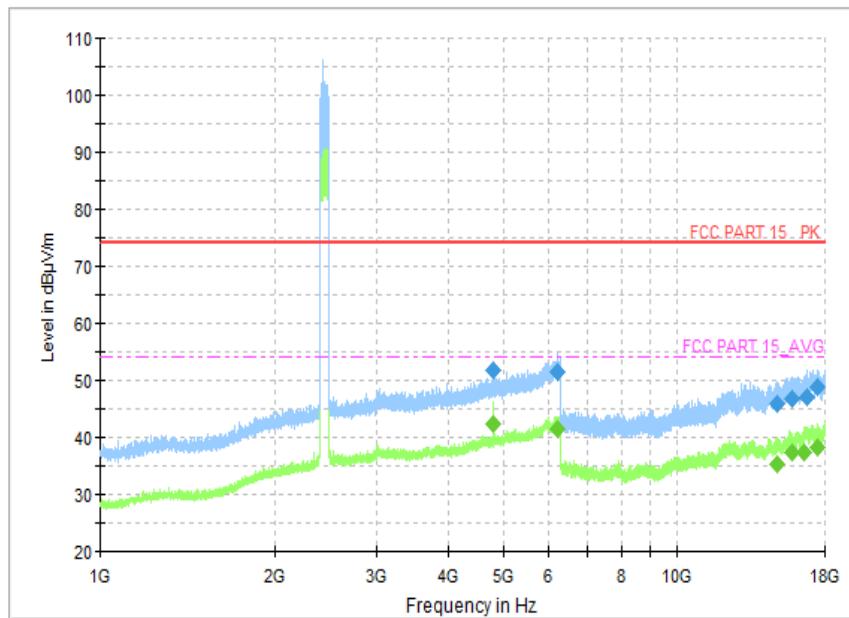


Fig. 52 Radiated Spurious Emission (8DPSK, Ch0, 1GHz ~ 18GHz)

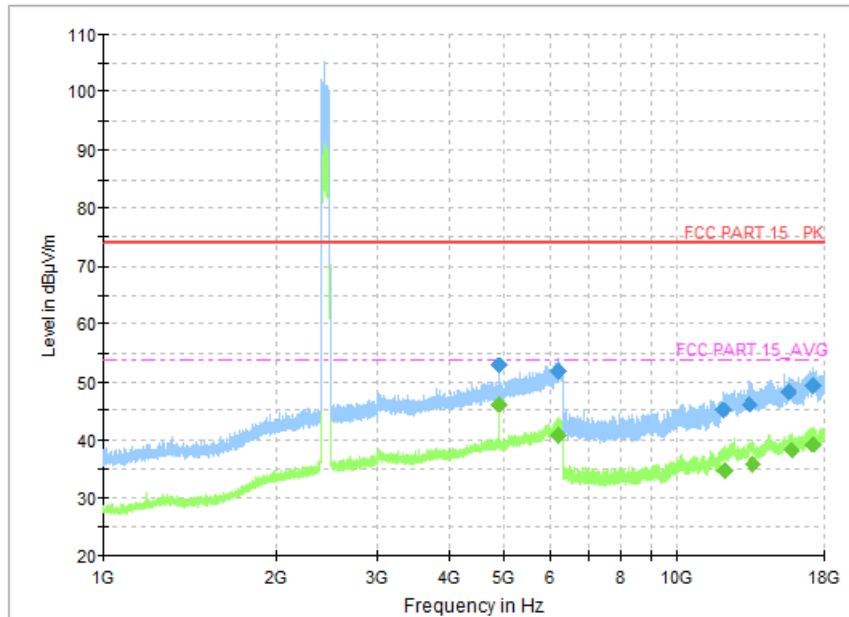


Fig. 53 Radiated Spurious Emission (8DPSK, Ch39, 1GHz ~ 18GHz)

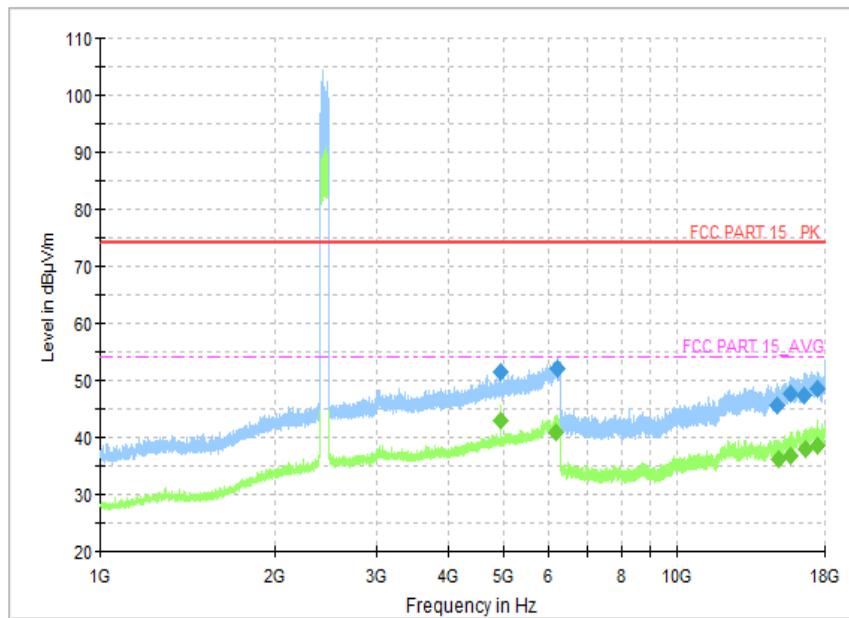


Fig. 54 Radiated Spurious Emission (8DPSK, Ch78, 1GHz ~ 18GHz)

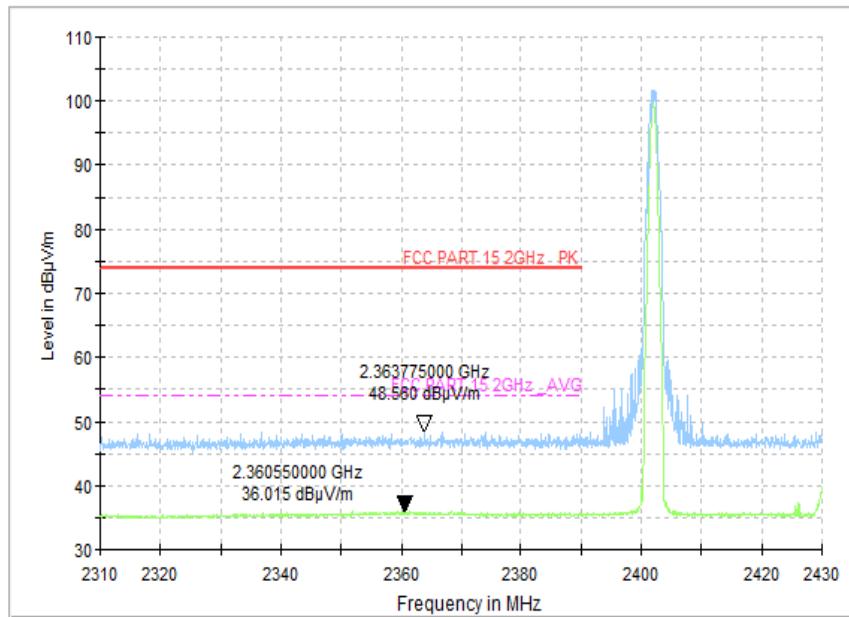


Fig. 55 Radiated Band Edges (8DPSK, Ch0, 2380GHz ~ 2450GHz)

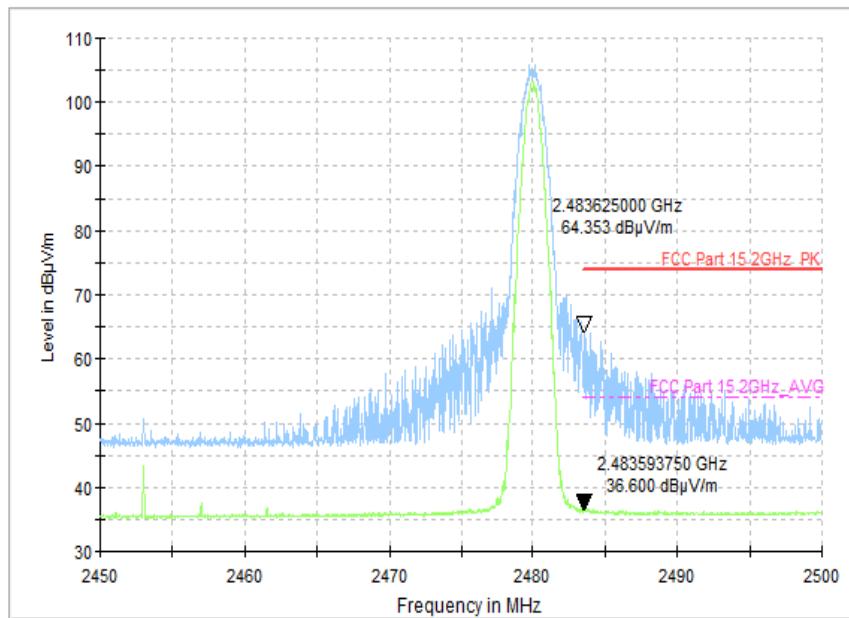


Fig. 56 Radiated Band Edges (8DPSK, Ch78, 2450GHz ~ 2500GHz)

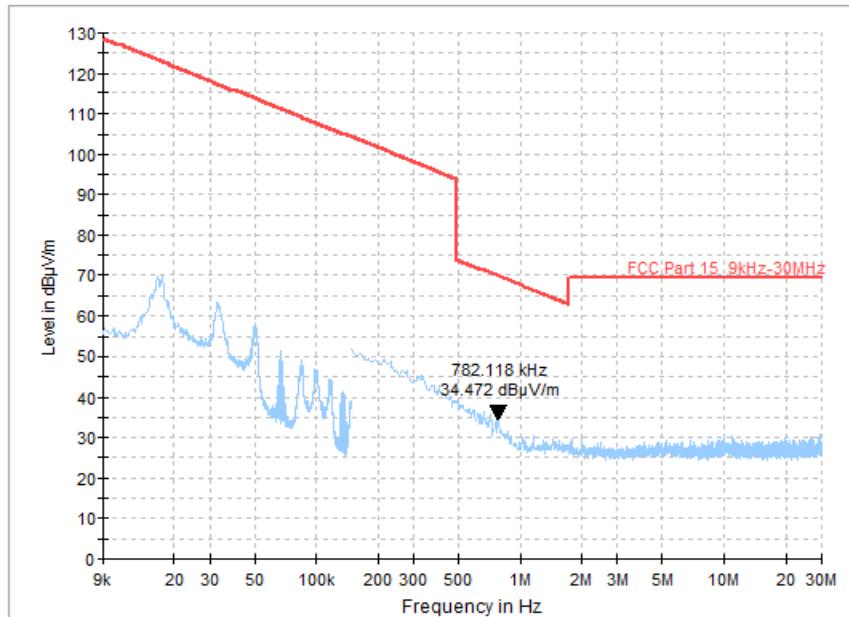


Fig. 57 Radiated Spurious Emission (All Channels, 9kHz ~ 30MHz)

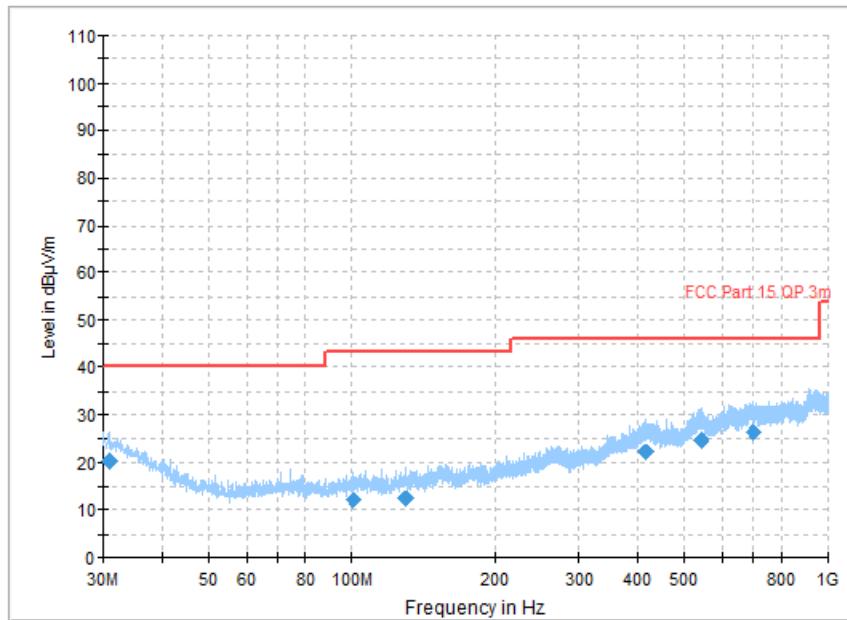


Fig. 58 Radiated Spurious Emission (All Channels, 30MHz ~ 1GHz)

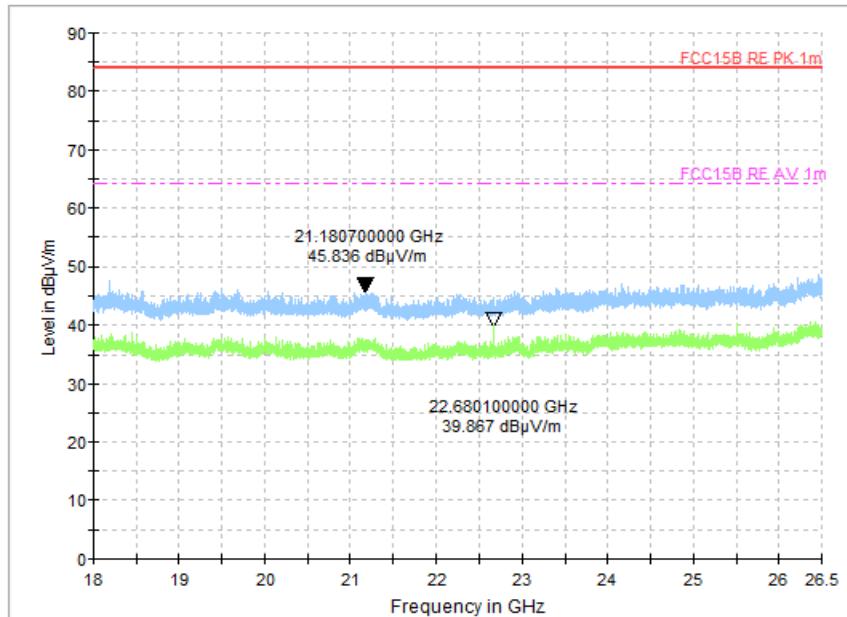


Fig. 59 Radiated Spurious Emission (All Channels, 18GHz ~ 26.5GHz)

A.5 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	1035.00	/
	39	Fig.61	986.25	
	78	Fig.62	951.00	
$\pi/4$ DQPSK	0	Fig.63	1254.00	/
	39	Fig.64	1251.75	
	78	Fig.65	1227.75	
8DPSK	0	Fig.66	1239.00	/
	39	Fig.67	1257.75	
	78	Fig.68	1252.50	

See below for test graphs.

Conclusion: PASS

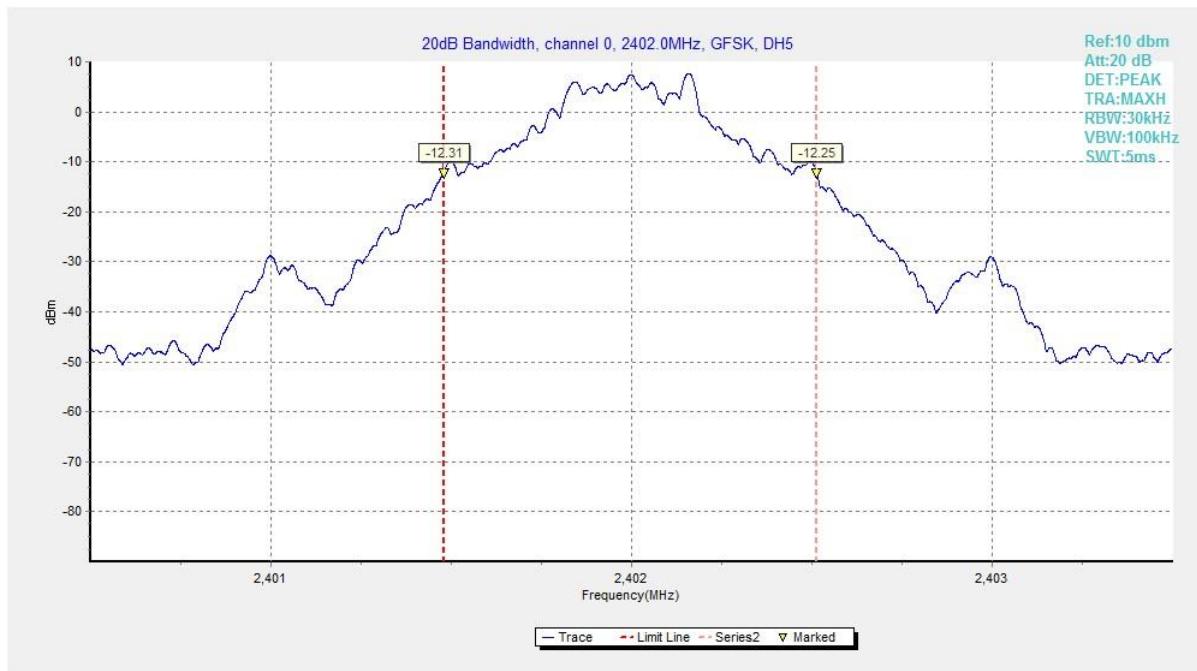


Fig. 60 20dB Bandwidth (GFSK, Ch 0)

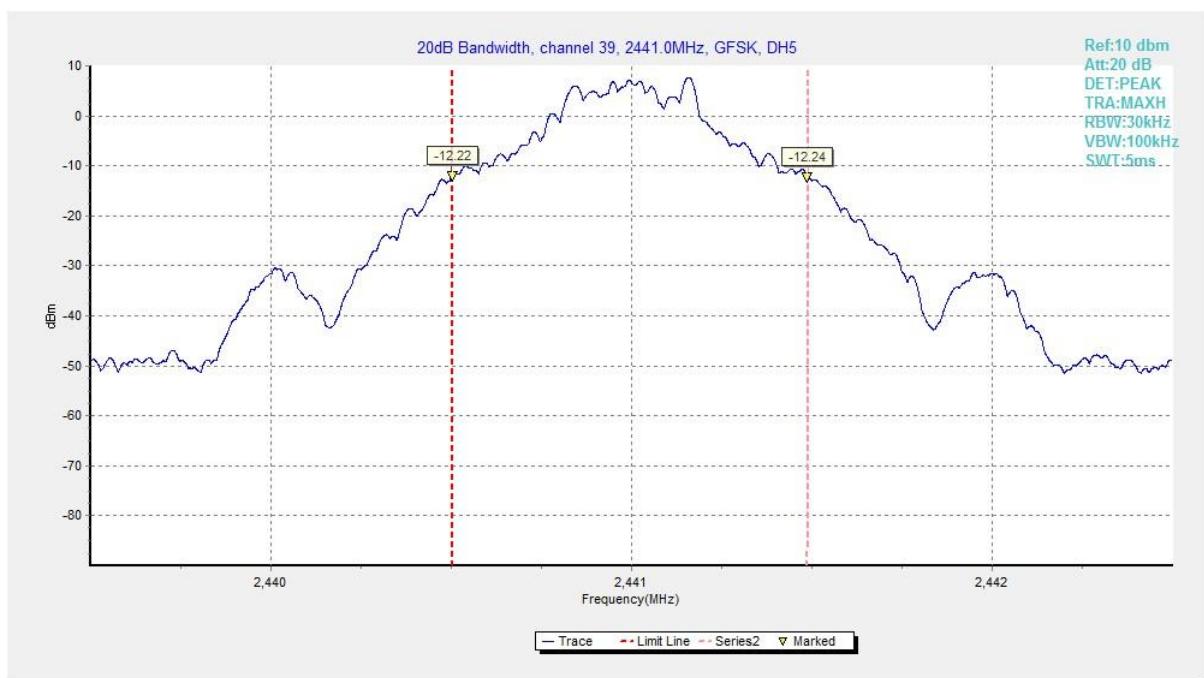


Fig. 61 20dB Bandwidth (GFSK, Ch 39)

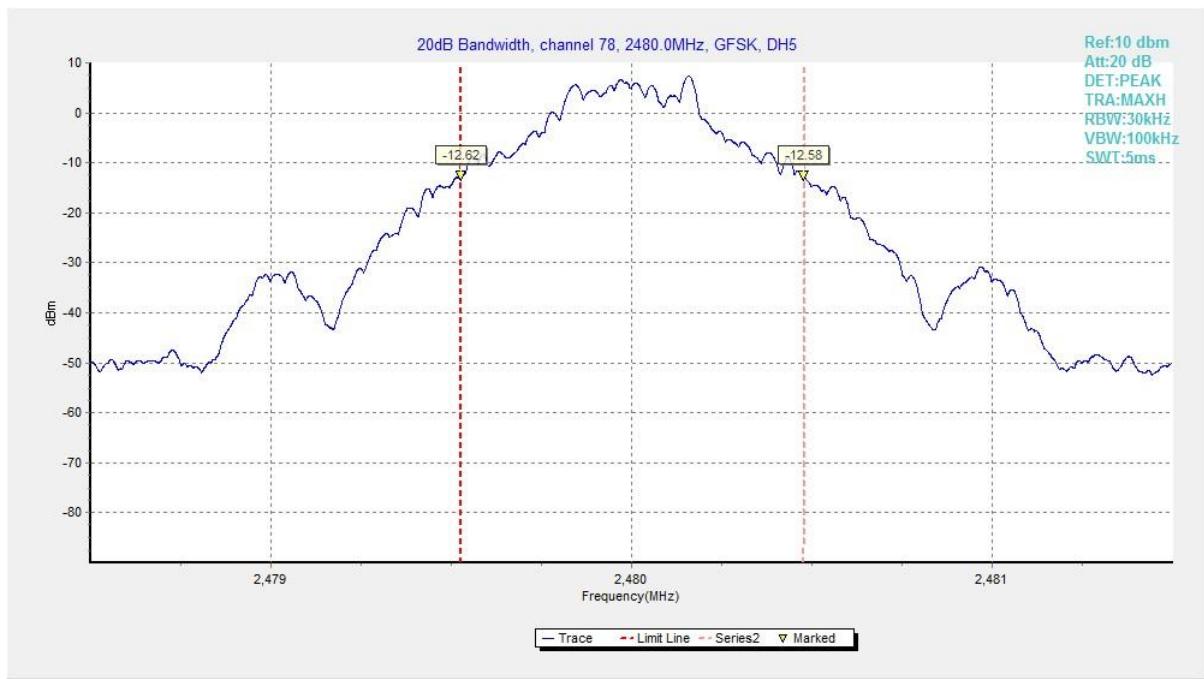
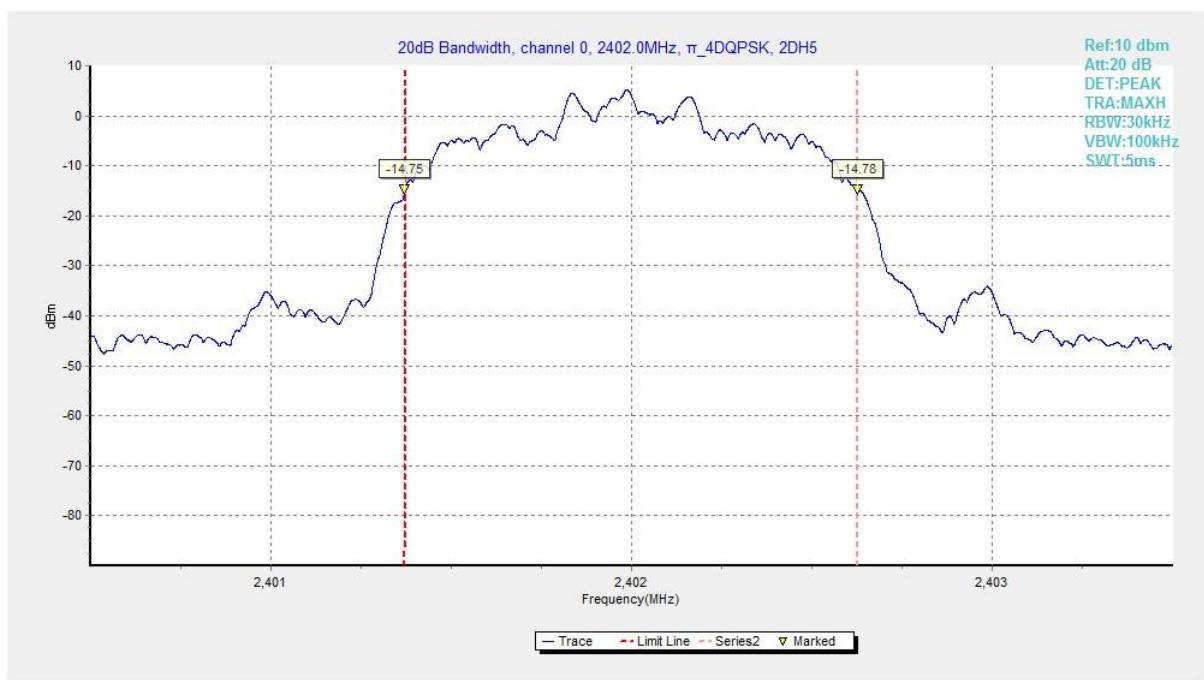
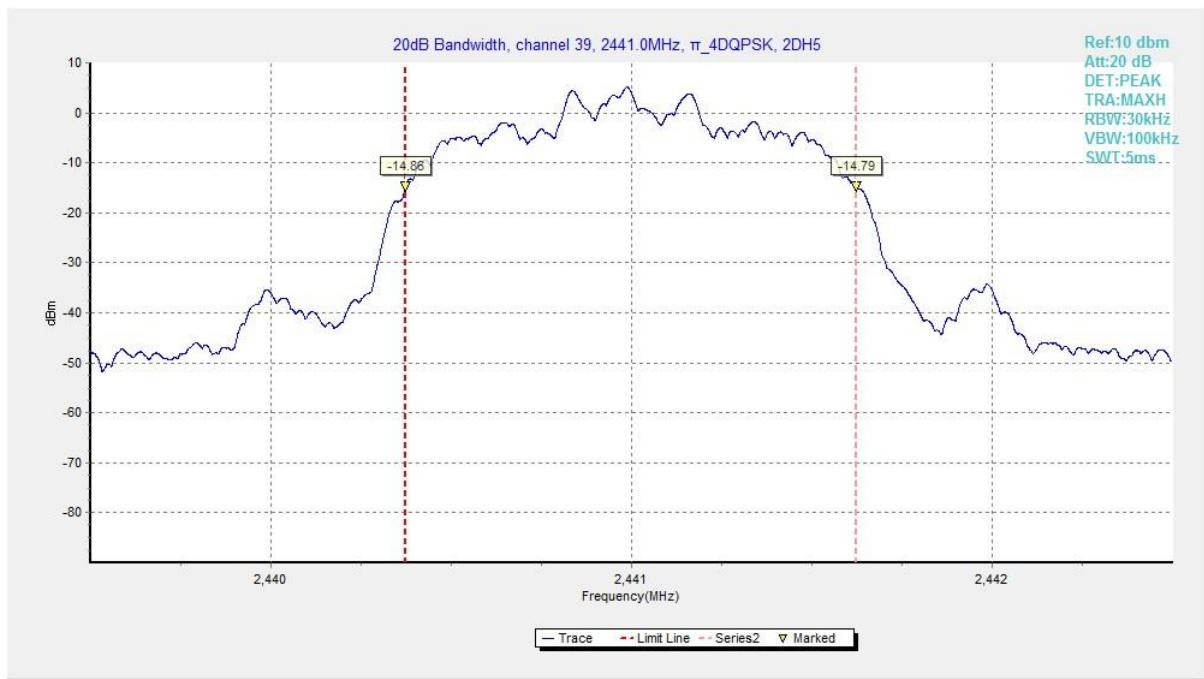


Fig. 62 20dB Bandwidth (GFSK, Ch 78)


 Fig. 63 20dB Bandwidth ($\pi/4$ DQPSK, Ch 0)

 Fig. 64 20dB Bandwidth ($\pi/4$ DQPSK, Ch 39)

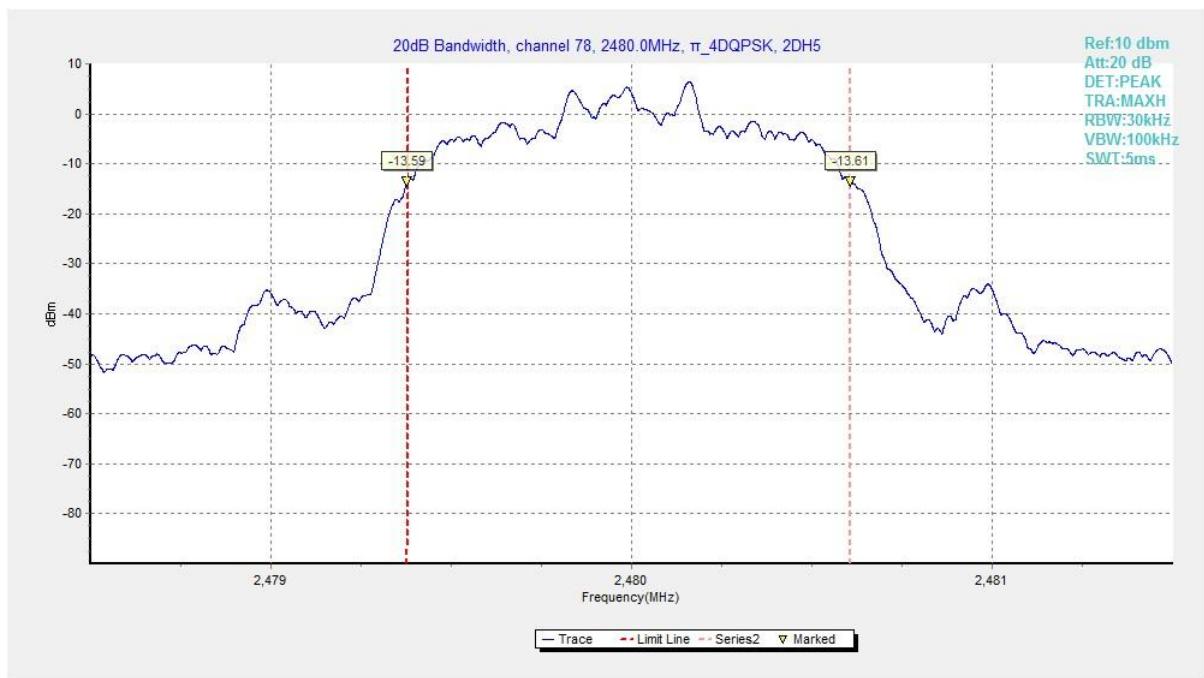
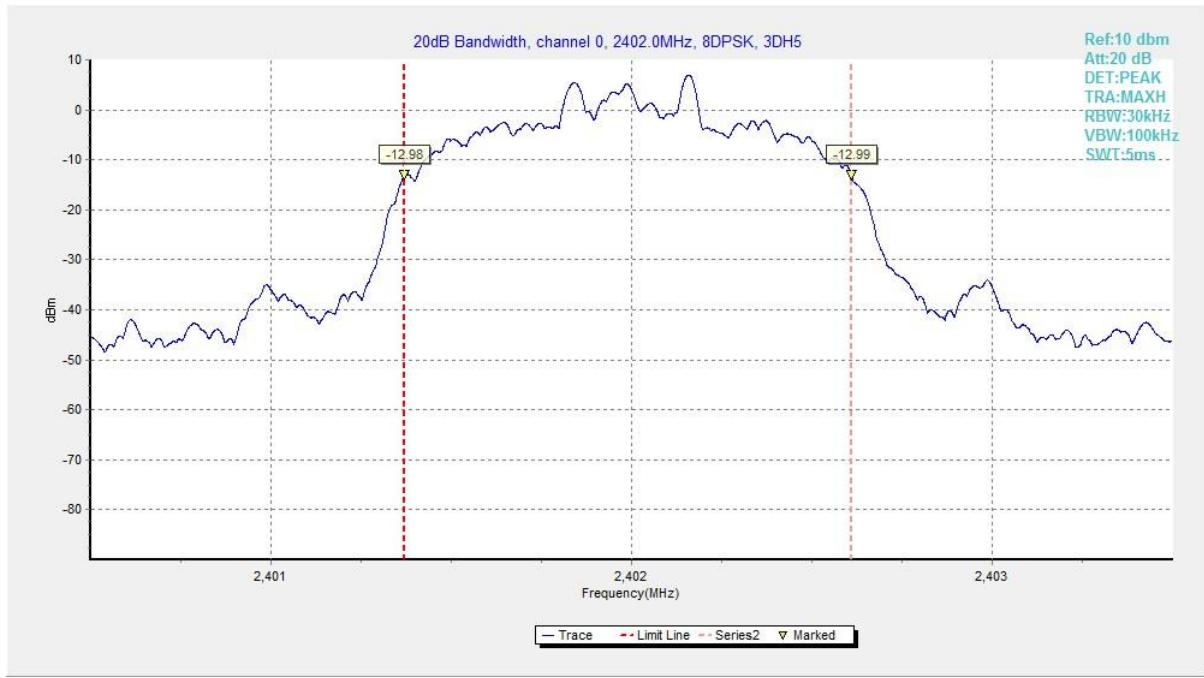

 Fig. 65 20dB Bandwidth ($\pi/4$ DQPSK, Ch 78)


Fig. 66 20dB Bandwidth (8DPSK, Ch 0)

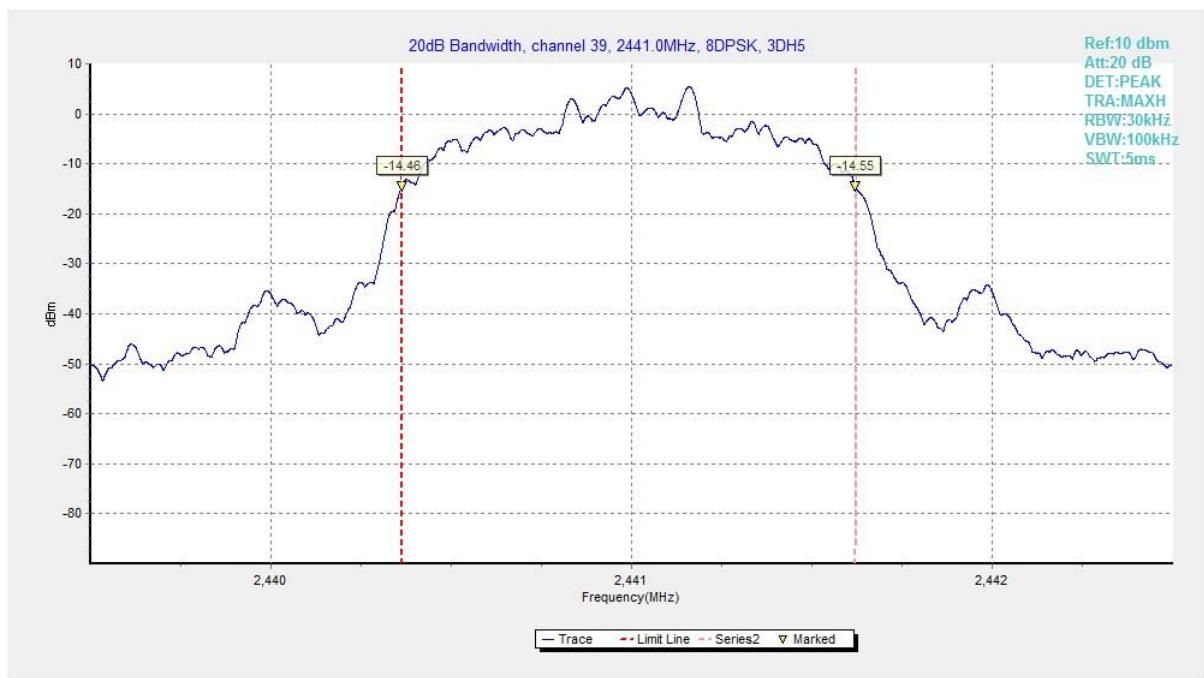


Fig. 67 20dB Bandwidth (8DPSK, Ch 39)

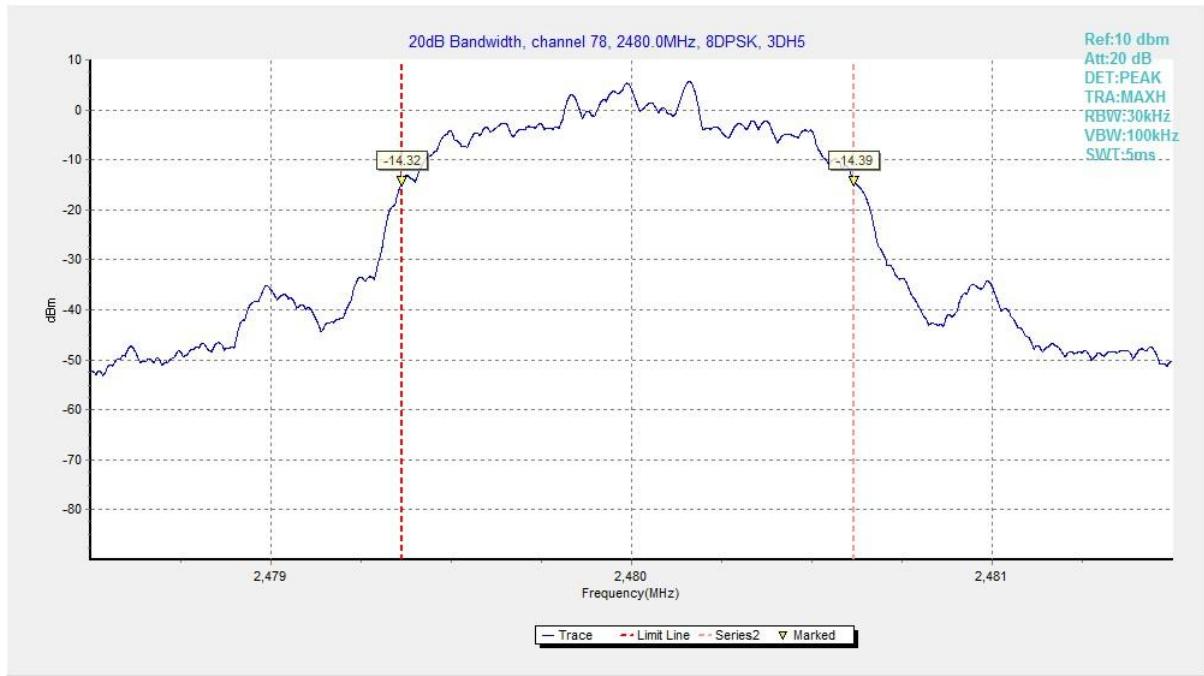


Fig. 68 20dB Bandwidth (8DPSK, Ch 78)

A.6 Time of Occupancy (Dwell Time)

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a)	< 400 ms

Measurement Results:

Mode	Channel	Packet	Dwell Time(ms)		Conclusion
GFSK	39	DH5	Fig.69	201.58	P
			Fig.70		
$\pi/4$ DQPSK	39	2-DH5	Fig.71	149.16	P
			Fig.72		
8DPSK	39	3-DH5	Fig.73	201.51	P
			Fig.74		

See below for test graphs.

Conclusion: Pass

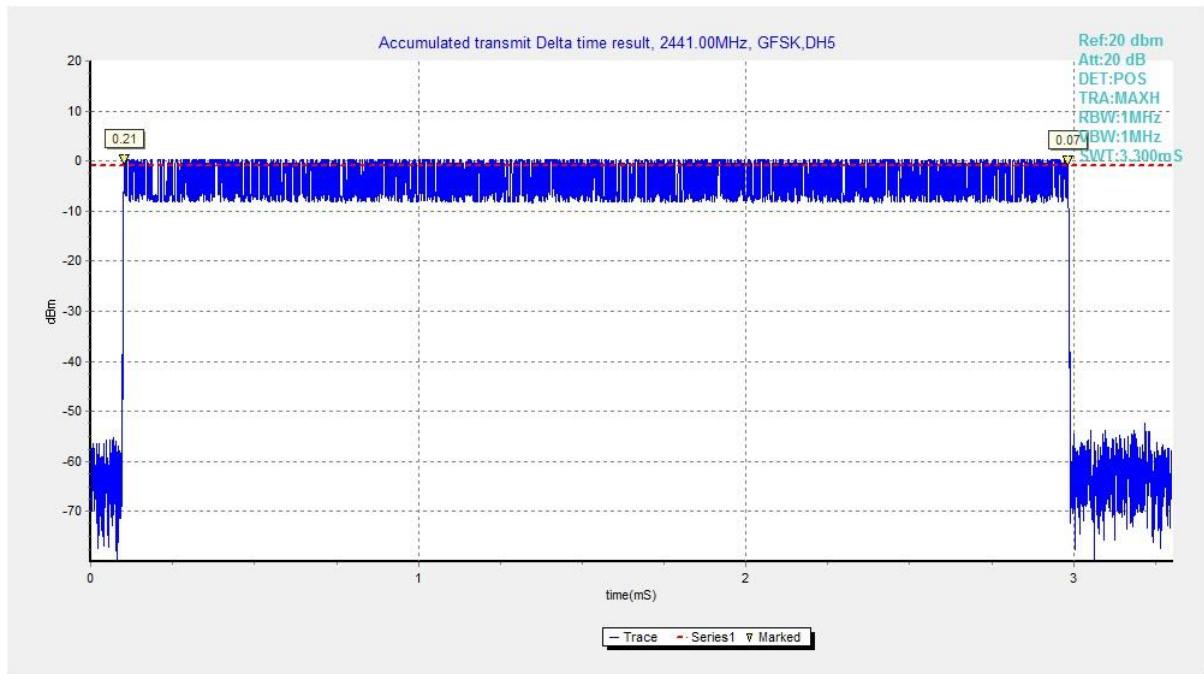


Fig. 69 Time of Occupancy(Dwell Time) (GFSK, Ch39)

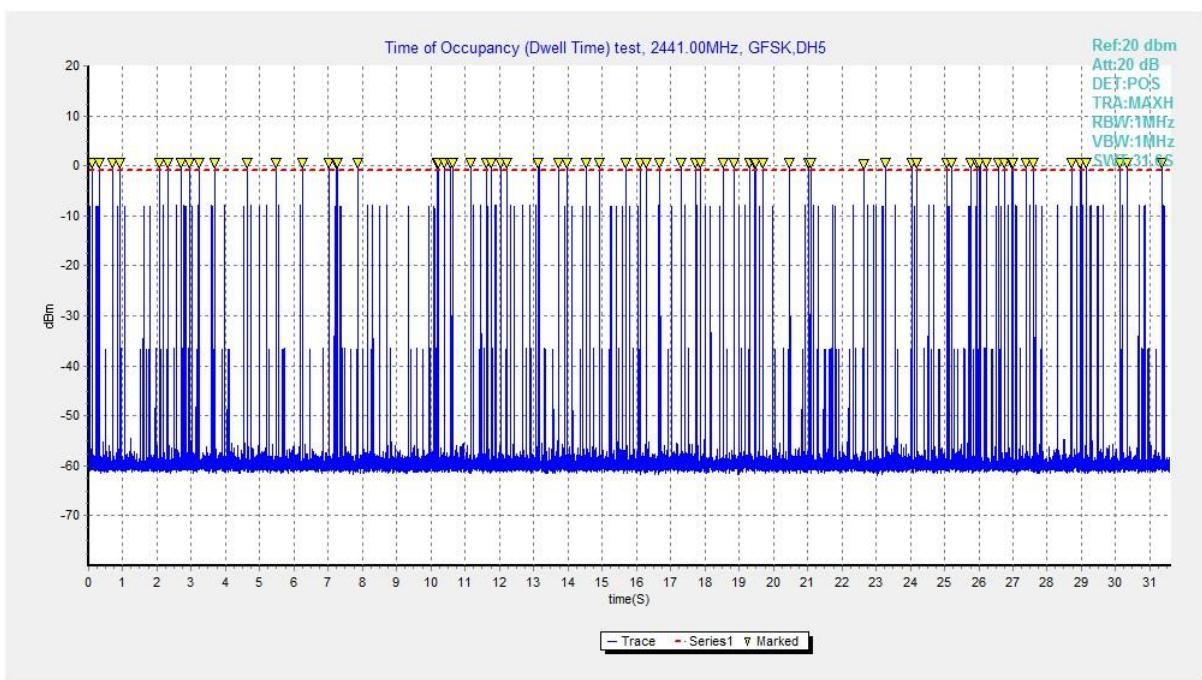


Fig. 70 Time of Occupancy(Dwell Time) (GFSK, Ch39)

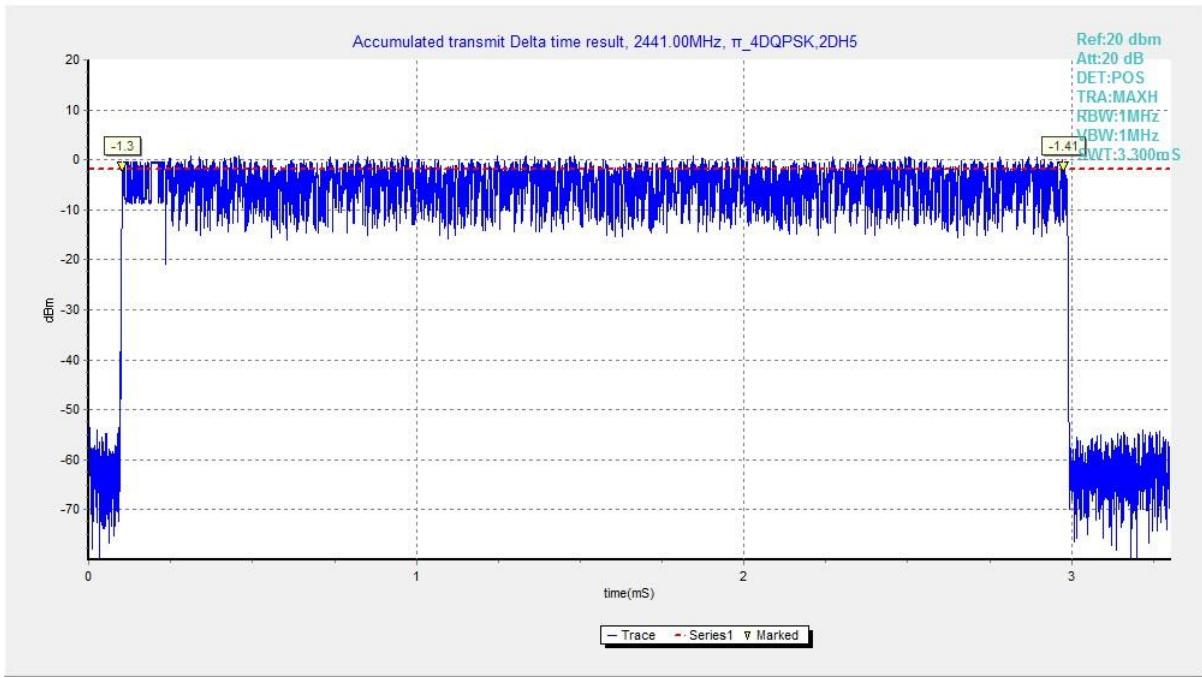


Fig. 71 Time of Occupancy(Dwell Time) ($\pi/4$ DQPSK, Ch39)

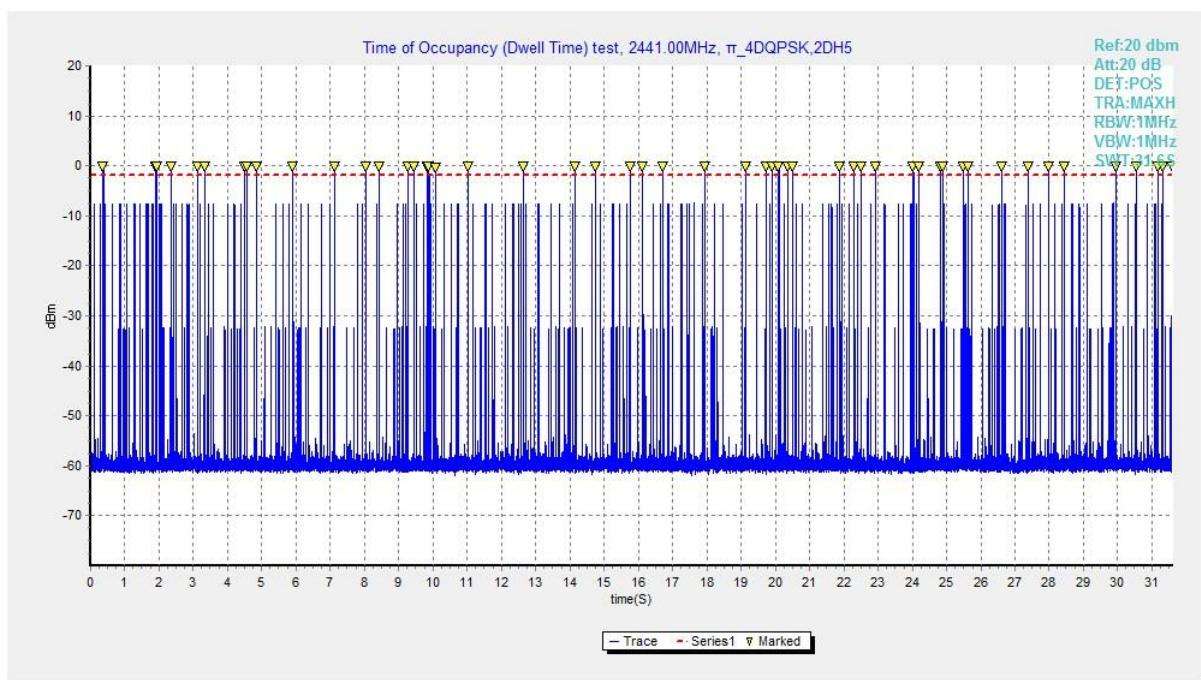


Fig. 72 Time of Occupancy(Dwell Time) ($\pi/4$ DQPSK, Ch39)

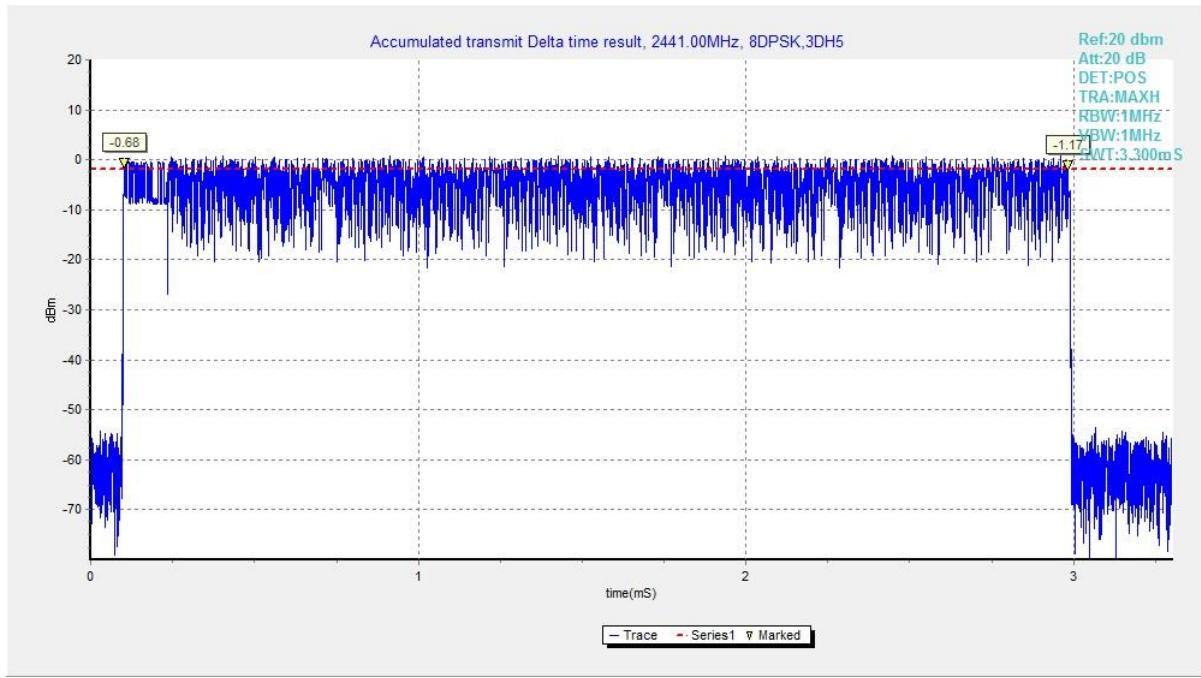


Fig. 73 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

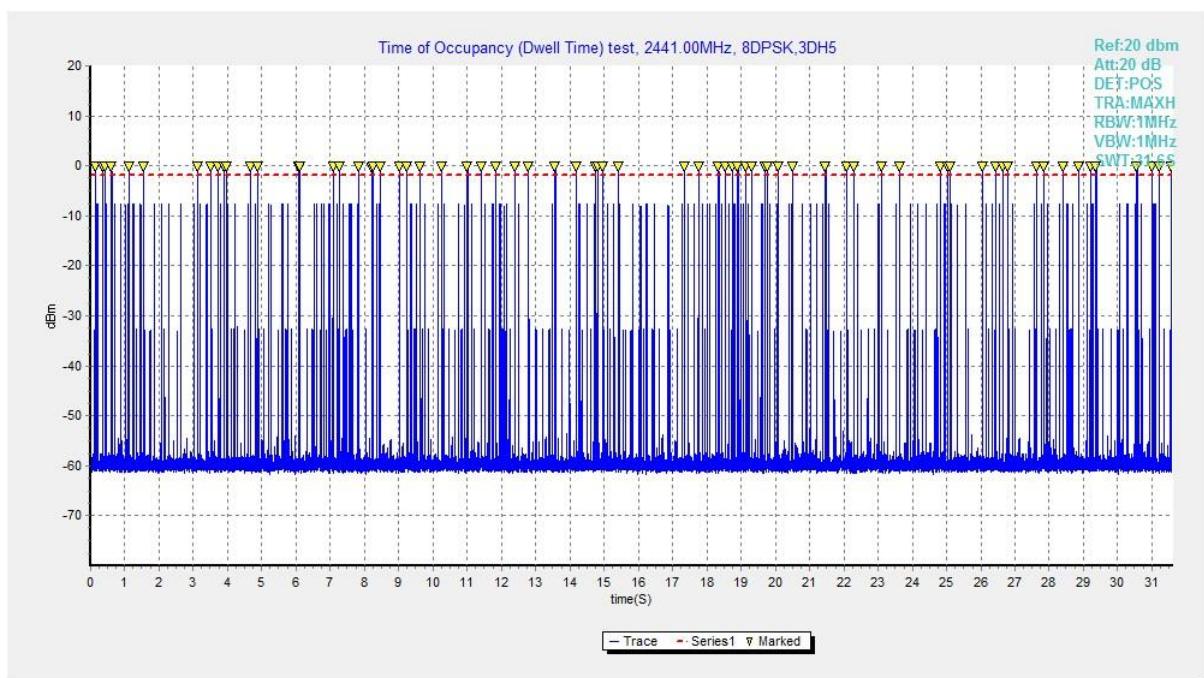


Fig. 74 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

A.7 Number of Hopping Channels

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)	At least 15 non-overlapping channels

Measurement Results:

Mode	Packet	Number of hopping channels	Test result	Conclusion
GFSK	DH5	Fig.75	Fig.76	79
$\pi/4$ DQPSK	2-DH5	Fig.77	Fig.78	79
8DPSK	3-DH5	Fig.79	Fig.80	79

See below for test graphs.

Conclusion: Pass

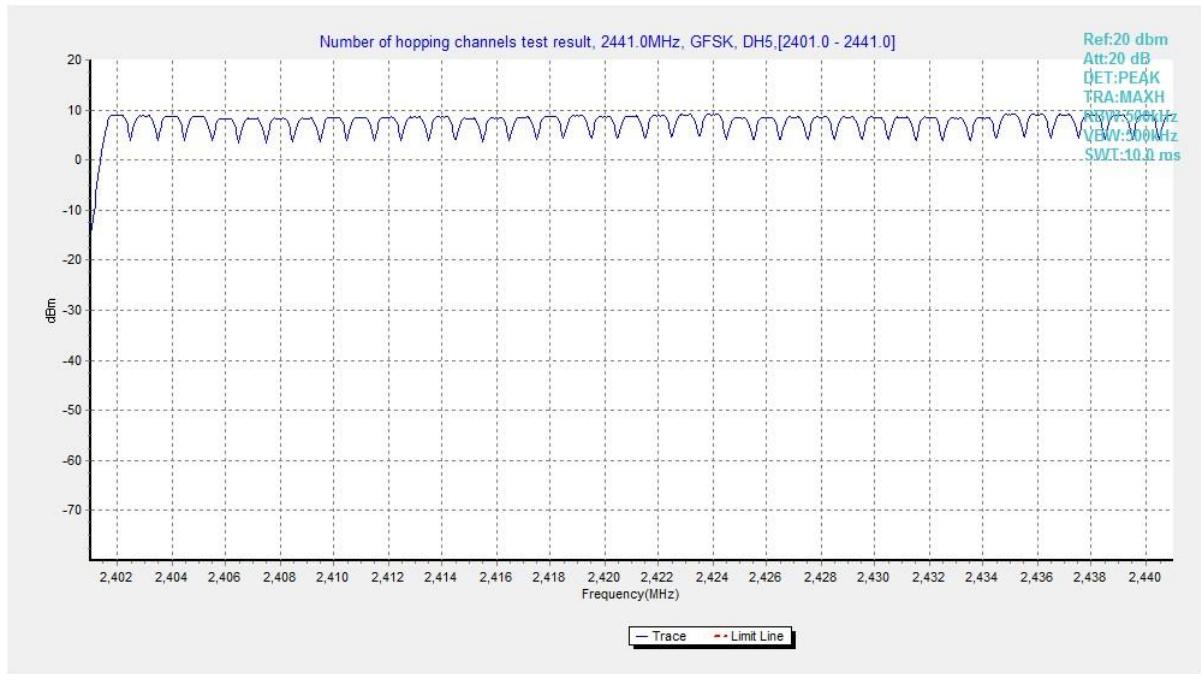


Fig. 75 Hopping channel ch0~39 (GFSK, Ch39)

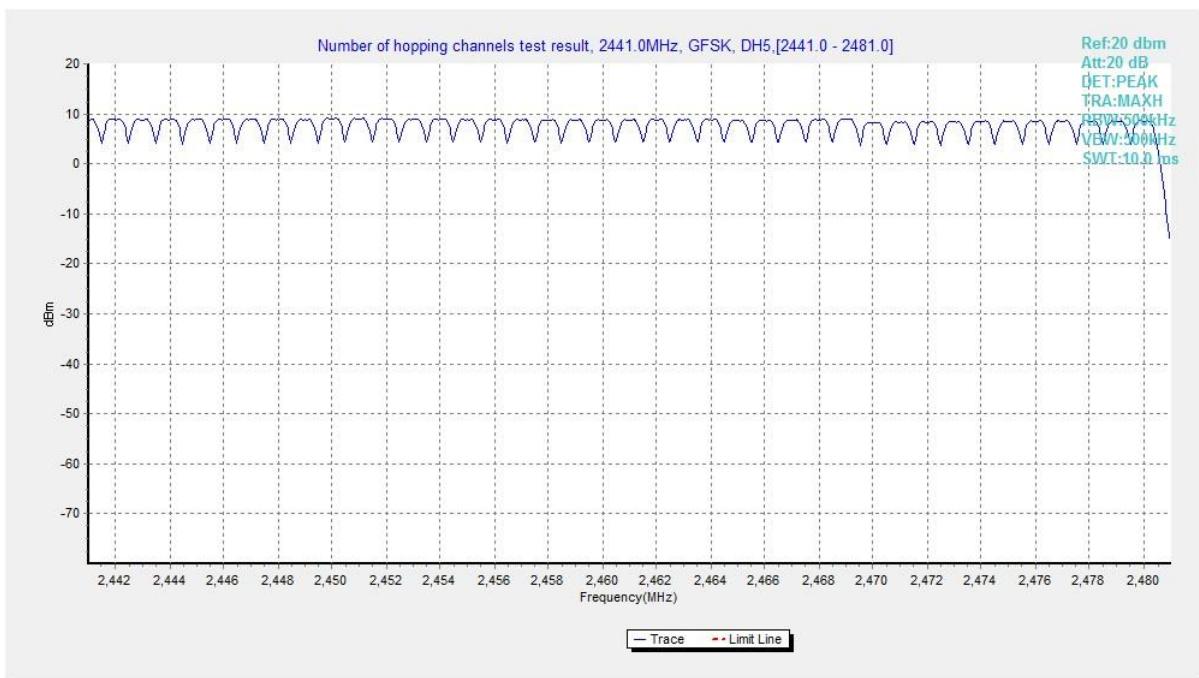


Fig. 76 Hopping channel ch40~78 (GFSK, Ch39)

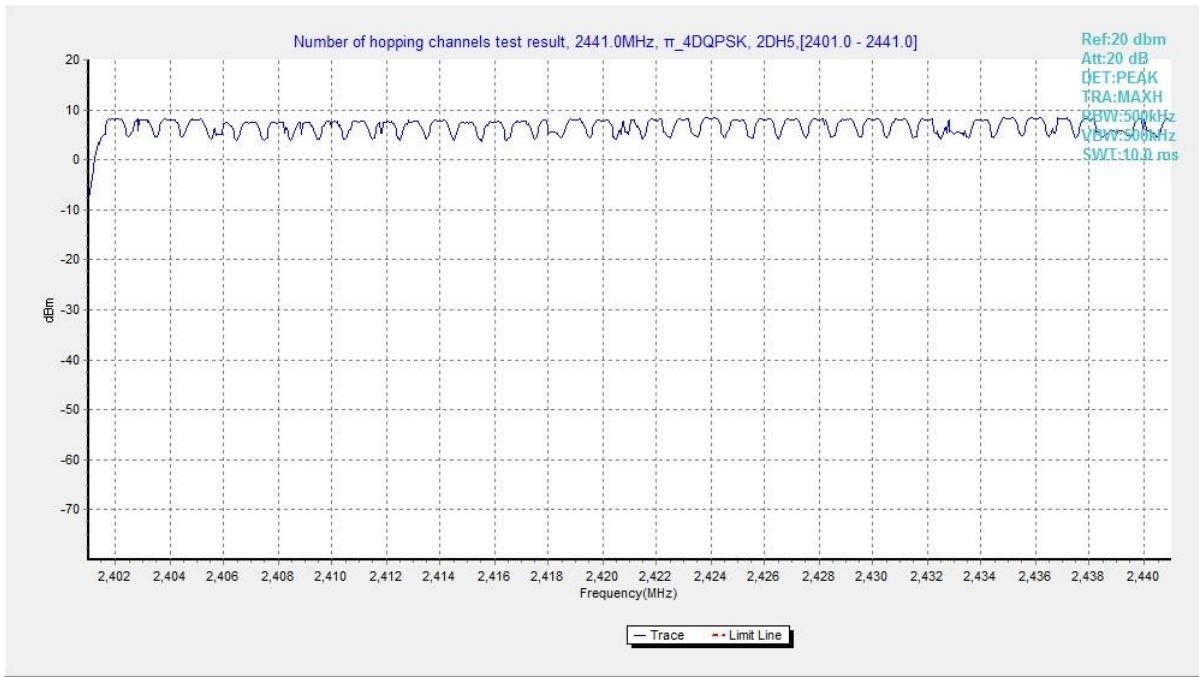


Fig. 77 Hopping channel ch0~39 ($\pi/4$ DQPSK, Ch39)

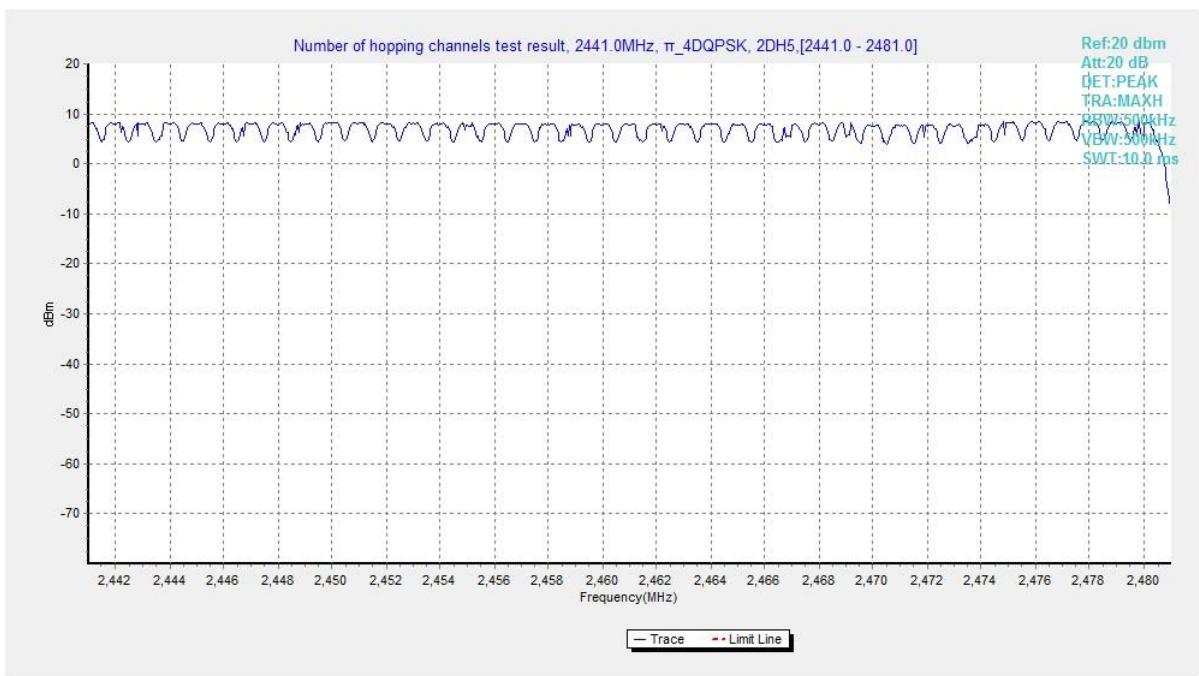


Fig. 78 Hopping channel ch40~78 (π/4 DQPSK, Ch39)

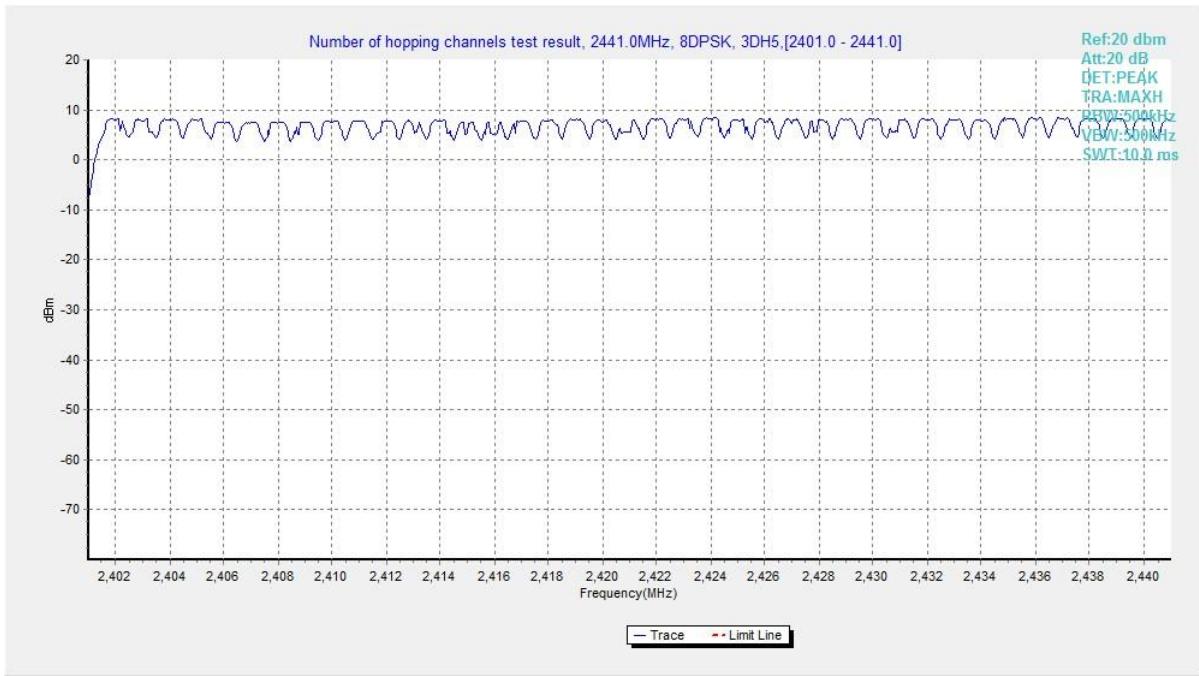


Fig. 79 Hopping channel ch0~39 (8DPSK, Ch39)

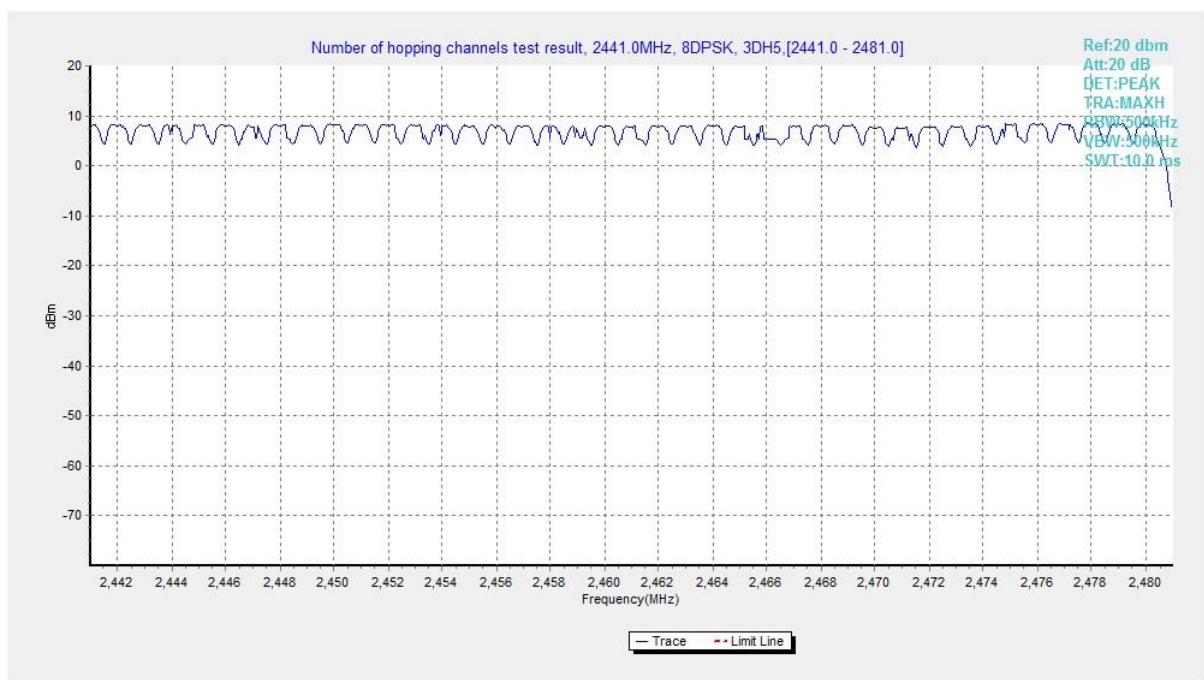


Fig. 80 Hopping channel ch40~78 (8DPSK, Ch39)

A.8 Carrier Frequency Separation

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)	By a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

Measurement Results:

Mode	Channel	Packet	Separation of hopping channels	Test result (MHz)	Conclusion
GFSK	39	DH5	Fig.81	1.01	P
$\pi/4$ DQPSK	39	2-DH5	Fig.82	1.00	P
8DPSK	39	3-DH5	Fig.83	1.00	P

See below for test graphs.

Conclusion: Pass

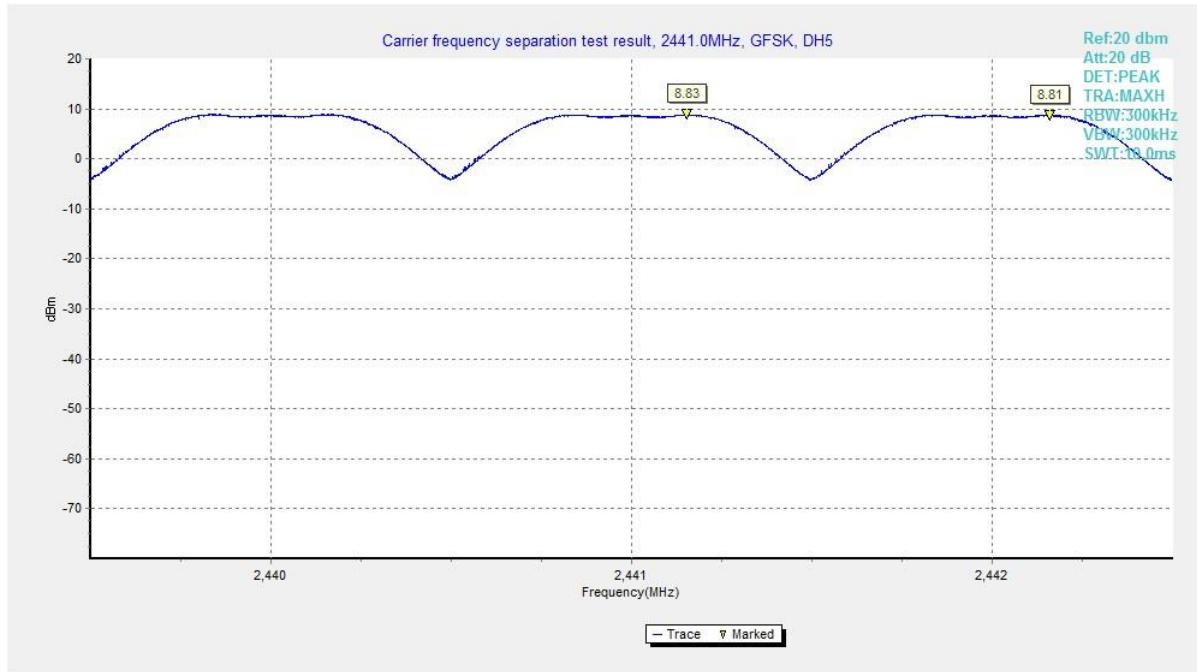


Fig. 81 Carrier Frequency Separation (GFSK, Ch39)

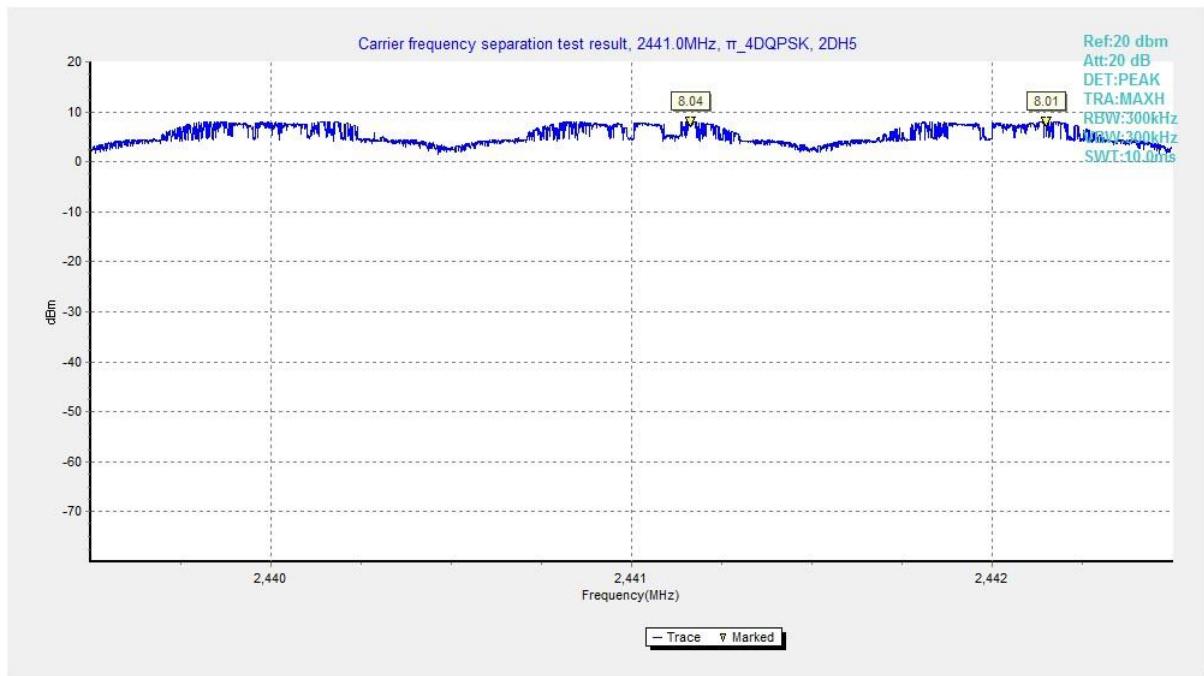


Fig. 82 Carrier Frequency Separation (π /4 DQPSK, Ch39)

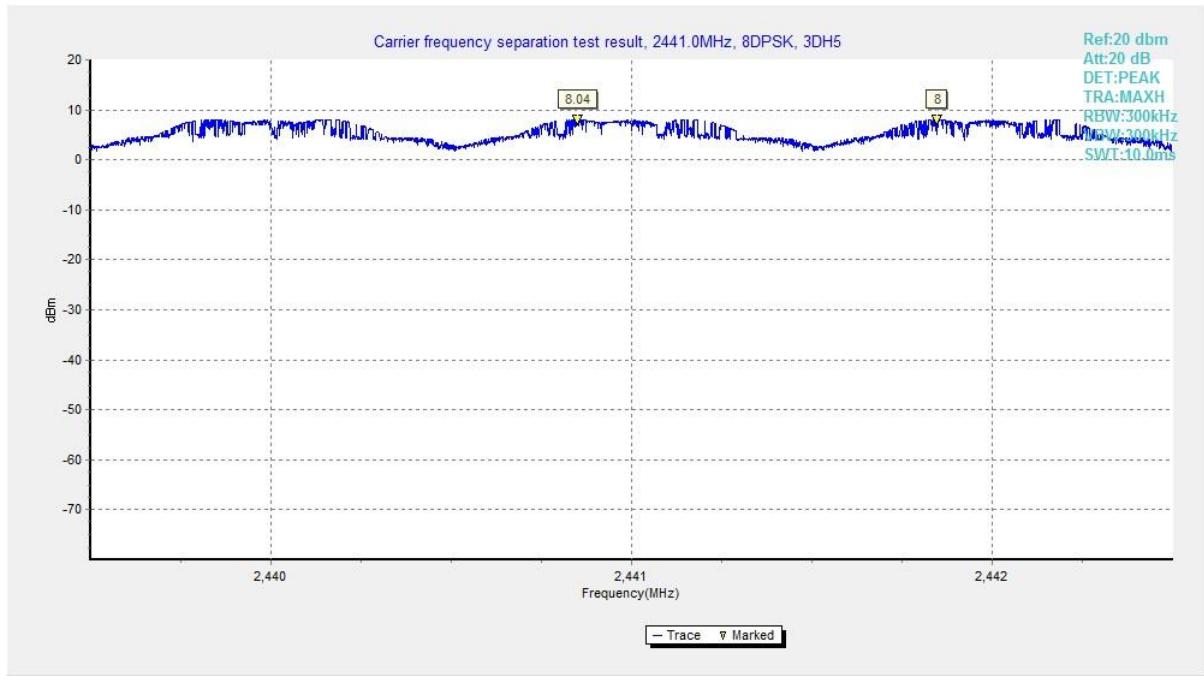


Fig. 83 Carrier Frequency Separation (8DPSK, Ch39)

A.9 AC Power line Conducted Emission

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

BT (Quasi-peak Limit) - AE3

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.84	Fig.85	P
0.5 to 5	56			
5 to 30	60			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

BT (Average Limit) - AE3

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.84	Fig.85	P
0.5 to 5	46			
5 to 30	50			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

BT (Quasi-peak Limit) - AE4

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.86	Fig.87	P
0.5 to 5	56			
5 to 30	60			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

BT (Average Limit) - AE4

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.86	Fig.87	P
0.5 to 5	46			
5 to 30	50			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note: The measurement results include the L1 and N measurements.



No. I21N00721-BT

See below for test graphs.

Conclusion: Pass

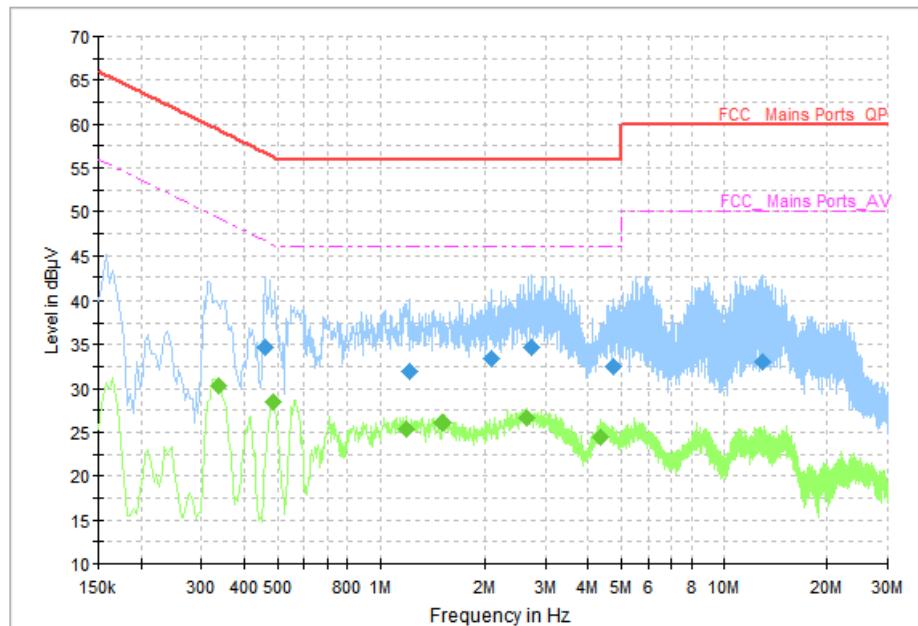


Fig. 84 AC Power line Conducted Emission (Traffic, AE3, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.462000	34.66	56.66	21.99	N	ON	10
1.214000	31.86	56.00	24.14	L1	ON	10
2.094000	33.45	56.00	22.55	N	ON	10
2.722000	34.66	56.00	21.34	N	ON	10
4.742000	32.42	56.00	23.58	N	ON	10
12.914000	32.99	60.00	27.01	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.338000	30.37	49.25	18.89	L1	ON	10
0.486000	28.46	46.24	17.78	L1	ON	10
1.194000	25.35	46.00	20.65	L1	ON	10
1.510000	26.17	46.00	19.83	L1	ON	10
2.646000	26.66	46.00	19.34	L1	ON	10
4.346000	24.49	46.00	21.51	L1	ON	10

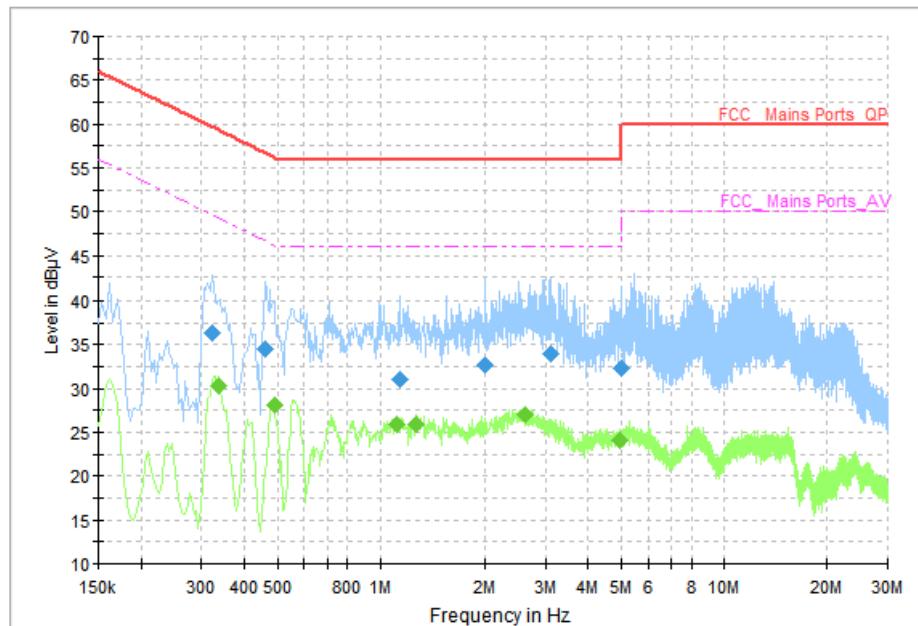


Fig. 85 AC Power line Conducted Emission (Idle, AE3, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.322000	36.32	59.66	23.34	N	ON	10
0.462000	34.52	56.66	22.14	N	ON	10
1.138000	30.99	56.00	25.01	N	ON	10
1.994000	32.73	56.00	23.27	N	ON	10
3.114000	33.89	56.00	22.11	N	ON	10
4.994000	32.40	56.00	23.60	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.338000	30.31	49.25	18.94	L1	ON	10
0.490000	28.06	46.17	18.10	L1	ON	10
1.118000	25.90	46.00	20.10	L1	ON	10
1.270000	25.90	46.00	20.10	L1	ON	10
2.606000	26.95	46.00	19.05	L1	ON	10
4.930000	24.11	46.00	21.89	N	ON	10

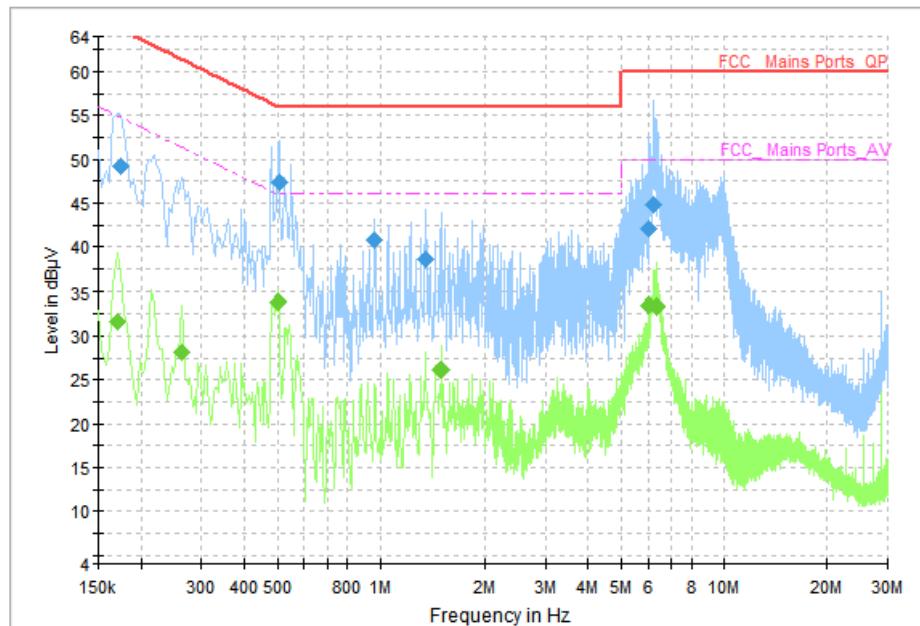


Fig. 86 AC Power line Conducted Emission (Traffic, AE4, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.174000	49.22	64.77	15.55	L1	ON	10
0.506000	47.31	56.00	8.69	N	ON	10
0.962000	40.74	56.00	15.26	N	ON	10
1.358000	38.55	56.00	17.45	N	ON	10
6.042000	42.01	60.00	17.99	N	ON	10
6.218000	44.83	60.00	15.17	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.170000	31.58	54.96	23.38	N	ON	10
0.262000	28.21	51.37	23.15	N	ON	10
0.502000	33.89	46.00	12.11	N	ON	10
1.490000	26.19	46.00	19.81	L1	ON	10
6.042000	33.53	50.00	16.47	N	ON	10
6.346000	33.35	50.00	16.65	N	ON	10

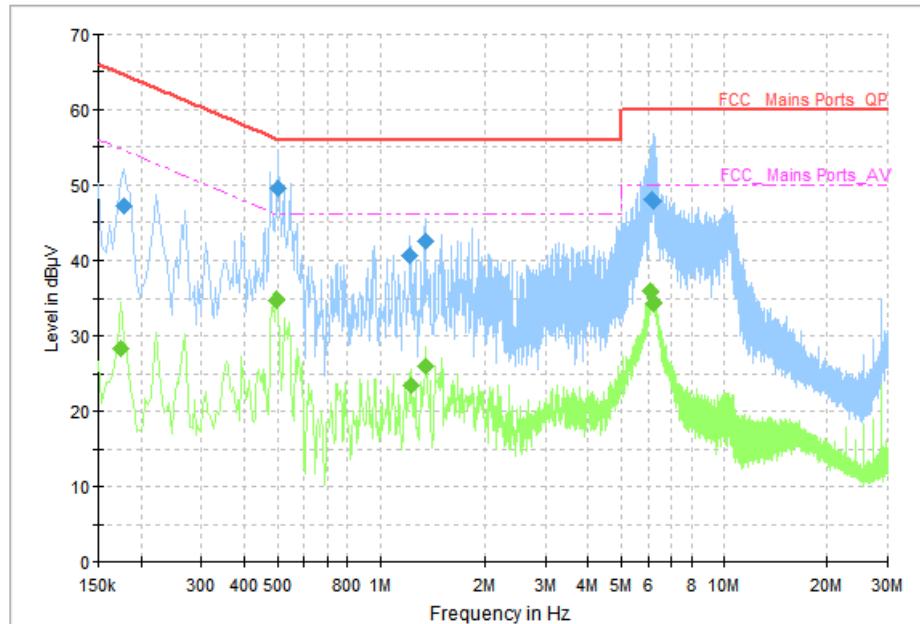


Fig. 87 AC Power line Conducted Emission (Idle, AE4, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.178000	47.08	64.58	17.50	N	ON	10
0.502000	49.47	56.00	6.53	N	ON	10
1.222000	40.56	56.00	15.44	N	ON	10
1.354000	42.55	56.00	13.45	N	ON	10
6.114000	48.12	60.00	11.88	N	ON	10
6.238000	47.85	60.00	12.15	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.174000	28.36	54.77	26.41	N	ON	10
0.498000	34.72	46.03	11.31	N	ON	10
1.226000	23.47	46.00	22.53	L1	ON	10
1.354000	26.05	46.00	19.95	N	ON	10
6.062000	35.83	50.00	14.17	N	ON	10
6.238000	34.39	50.00	15.61	N	ON	10

END OF REPORT