



# TEST REPORT

No. I21N02633-BT

**IDEMIA Identity and Security France**

**ID Screen US**

**Model Name: MPH-MB003C**

**with**

**Hardware Version: V01(M32N)**

**Software Version: IDEMIA\_WM28\_V01\_210803**

**FCC ID: ZBW-MPHMB003C**

**Issued Date: 2021-09-22**

**Designation Number: CN1210**

**Note:**

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

**Test Laboratory:**

**Shenzhen Academy of Information and Communications Technology**

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000.

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

Email: yewu@caict.ac.cn, website: [www.cszit.com](http://www.cszit.com)



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## 1. Summary of Test Report

### 1.1. Test Items

Description	ID Screen US
Model Name	MPH-MB003C
Applicant's name	IDEMIA Identity and Security France
Manufacturer's Name	IDEMIA Identity and Security France

### 1.2. Test Standards

FCC Part15-2019; ANSI C63.10-2013

### 1.3. Test Result

**Pass**

### 1.4. Testing Location

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

### 1.5. Project data

Testing Start Date:	2020-04-16
Testing End Date:	2020-05-27

### 1.6. Signature

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Lin Kanfeng  
(Prepared this test report)

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An Ran  
(Reviewed this test report)

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Zhang Bojun  
(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: IDEMIA Identity and Security France  
Address: IDEMIA Identity and Security France 2 place Samuel de Champlain  
92400 Courbevoie FRANCE  
Contact Person: Christophe SUEUR  
E-Mail: christophe.sueur@idemia.com  
Telephone: +33130201434  
Fax: /

### **2.2. Manufacturer Information**

Company Name: IDEMIA Identity and Security France  
Address: IDEMIA Identity and Security France 2 place Samuel de Champlain  
92400 Courbevoie FRANCE  
Contact Person: Christophe SUEUR  
E-Mail: christophe.sueur@idemia.com  
Telephone: +33130201434  
Fax: /



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

#### **3.1. About EUT**

Description	ID Screen US
Model Name	MPH-MB003C
Brand Name	IDEMIA
Frequency Band	2400MHz~2483.5MHz
Type of Modulation	GFSK/π /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	-1.0dBi
Power Supply	3.85V DC by Battery
FCC ID	ZBW-MPHMB003C
Condition of EUT as received	No abnormality in appearance

#### **3.2. Internal Identification of EUT used during the test**

<b>EUT ID*</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>	<b>Receive Date</b>
UT07aa	354520110003828	V01 (M16N)	V01	2020-04-21
UT01aa	354520110005740	V01 (M16N)	V01	2020-04-16

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

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>AE ID*</b>
AE1	Battery	/
AE2	Charger	Aa01a,Aa02a
AE3	Data Cable	Ca01a,Ca02a Cb01a,Cb02a

##### **AE1**

Model	MPH-MB003A(178177093)
Manufacturer	Zhongshan Tianmao Battery Co., Ltd.
Capacity	5000mAh19.25Wh
Nominal Voltage	3.85V

##### **AE2**

Model	S008ACM0500200
Manufacturer	Ten Pao Electronics (Huizhou) Co., Ltd.

##### **AE3**

Model	JWUB1454-M01
Manufacturer	HUIZHOU JUWEI ELECTRONICS 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 ID Screen US with integrated antenna and battery. It consists of normal options: Lithium Battery, Charger and USB Cable. Manual and specifications of the EUT were provided to fulfil the test.



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Samples undergoing test were selected by the client.

According to the customer's description, MPH-MB003C is a variant product of MPH-MB003A/MPH-MB003B. All results were from the initial model. The initial model report number is I20N00956-BT.



## **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.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz	2019
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013



## 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	<b>P</b>
1	Maximum Peak Output Power	15.247 (b)	<b>P</b>
2	Band Edges Compliance	15.247 (d)	<b>P</b>
3	Conducted Spurious Emission	15.247 (d)	<b>P</b>
4	Radiated Spurious Emission	15.247,15.205,15.209	<b>P</b>
5	Occupied 20dB bandwidth	15.247(a)	/
6	Time of Occupancy(Dwell Time)	15.247(a)	<b>P</b>
7	Number of Hopping Channel	15.247(a)	<b>P</b>
8	Carrier Frequency Separation	15.247(a)	<b>P</b>
9	AC Power line Conducted Emission	15.107,15.207	<b>P</b>

See **ANNEX A** for details.

### 5.3. Statements

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

## 6. Test Equipments Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2021-12-30	1 year
2	Bluetooth Tester	CBT32	100584	Rohde & Schwarz	2021-12-30	1 year
3	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	2022-08-04	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	2022-07-16	1 year
7	Spectrum Analyzer	FSP 40	100378	R&S	2021-12-11	1 year
8	Chamber	FACT5-2.0	4166	ETS-Lindgren	2024-05-11	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 ( $k=2$ )	
1. RF Output Power - Conducted	1.32dB	
2. Time of Occupancy - Conducted	0.58ms	
3. Occupied channel bandwidth - Conducted	66Hz	
4 Transmitter Spurious Emission - Conducted	$30\text{MHz} \leq f \leq 1\text{GHz}$	1.41dB
	$1\text{GHz} \leq f \leq 7\text{GHz}$	1.92dB
	$7\text{GHz} \leq f \leq 13\text{GHz}$	2.31dB
	$13\text{GHz} \leq f \leq 26\text{GHz}$	2.61dB
5. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f \leq 30\text{MHz}$	1.70dB
	$30\text{MHz} \leq f \leq 1\text{GHz}$	4.90dB
	$1\text{GHz} \leq f \leq 18\text{GHz}$	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 -1.0dBi.  
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:**

Mode	Peak output power (dBm)		
	2402 MHz (Ch0)	2441 MHz (Ch39)	2480 MHz (Ch78)
GFSK	8.31	9.71	9.28
$\pi/4$ DQPSK	7.49	8.85	8.47
8DPSK	7.50	8.89	8.49

**Conclusion: Pass**



### A.2 Band Edges Compliance

**Measurement Limit:**

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

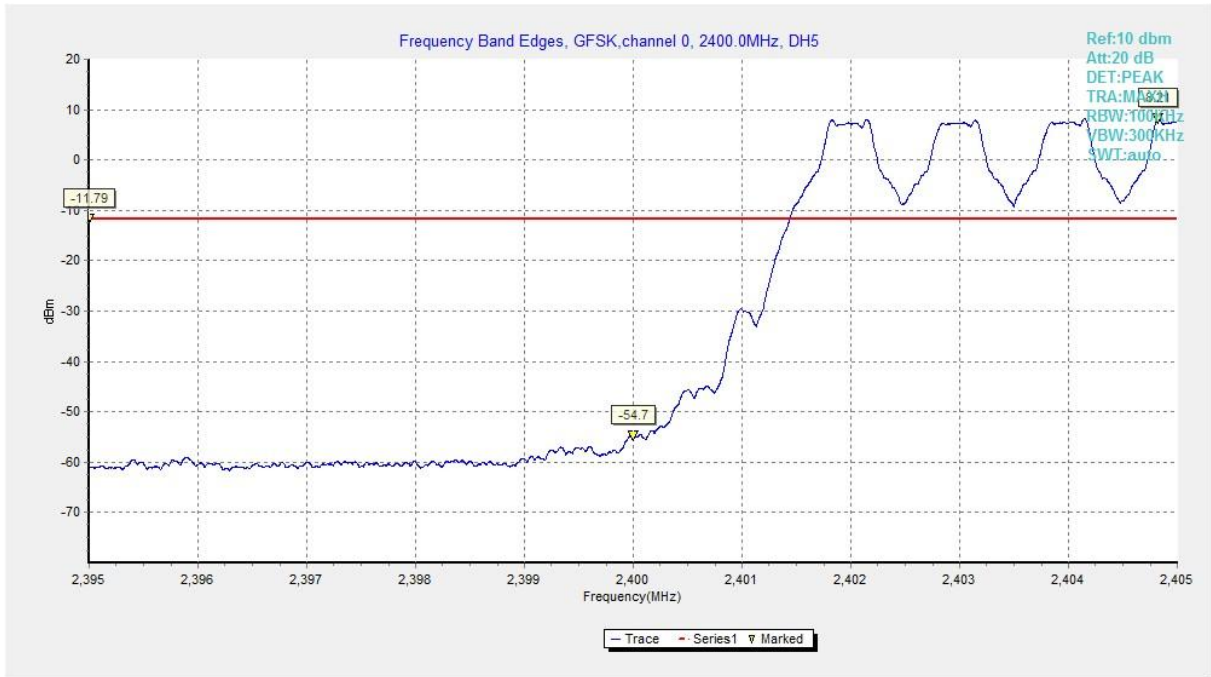
**Measurement Result:**

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

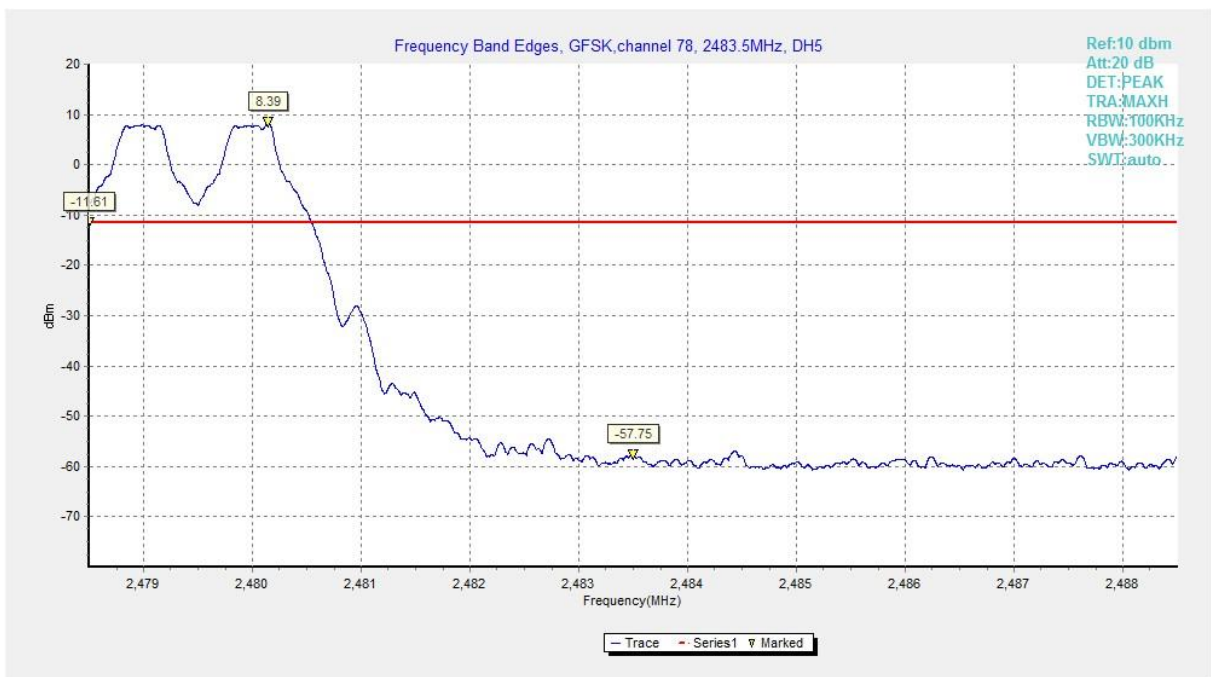
Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	OFF	Fig.7	P
	78	OFF	Fig.8	P
$\pi/4$ DQPSK	0	OFF	Fig.9	P
	78	OFF	Fig.10	P
8DPSK	0	OFF	Fig.11	P
	78	OFF	Fig.12	P

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)**



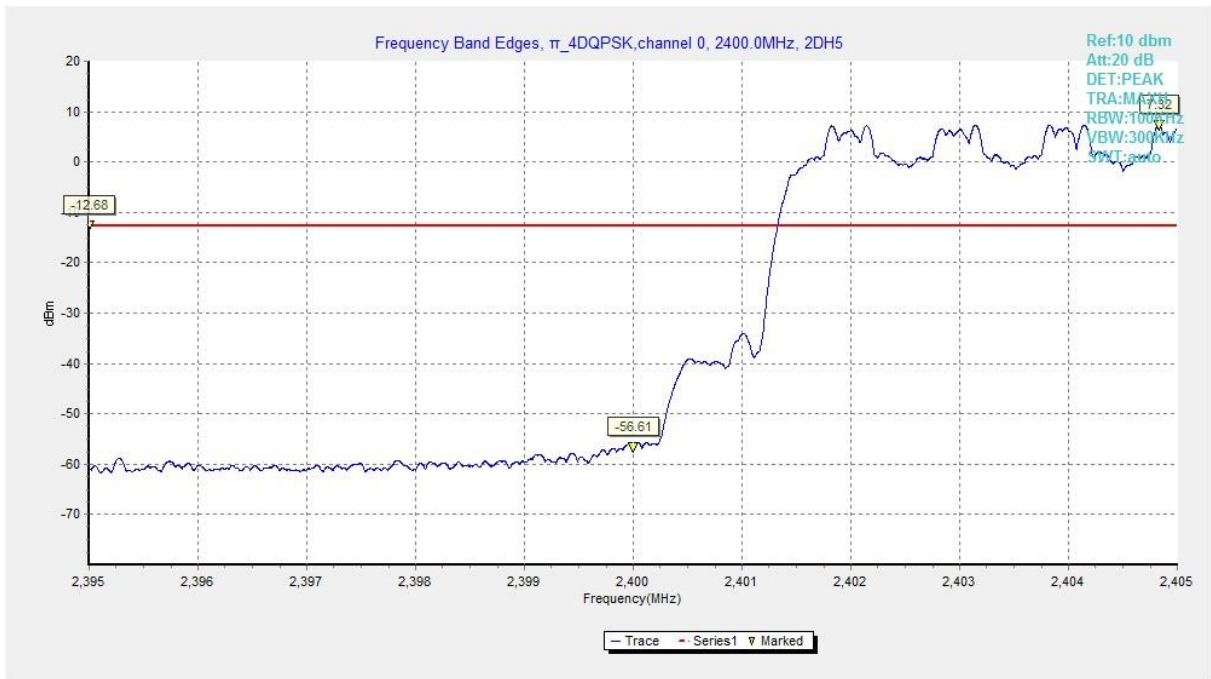


Fig. 3 Band Edges ( $\pi$ /4 DQPSK, Ch 0, Hopping ON)

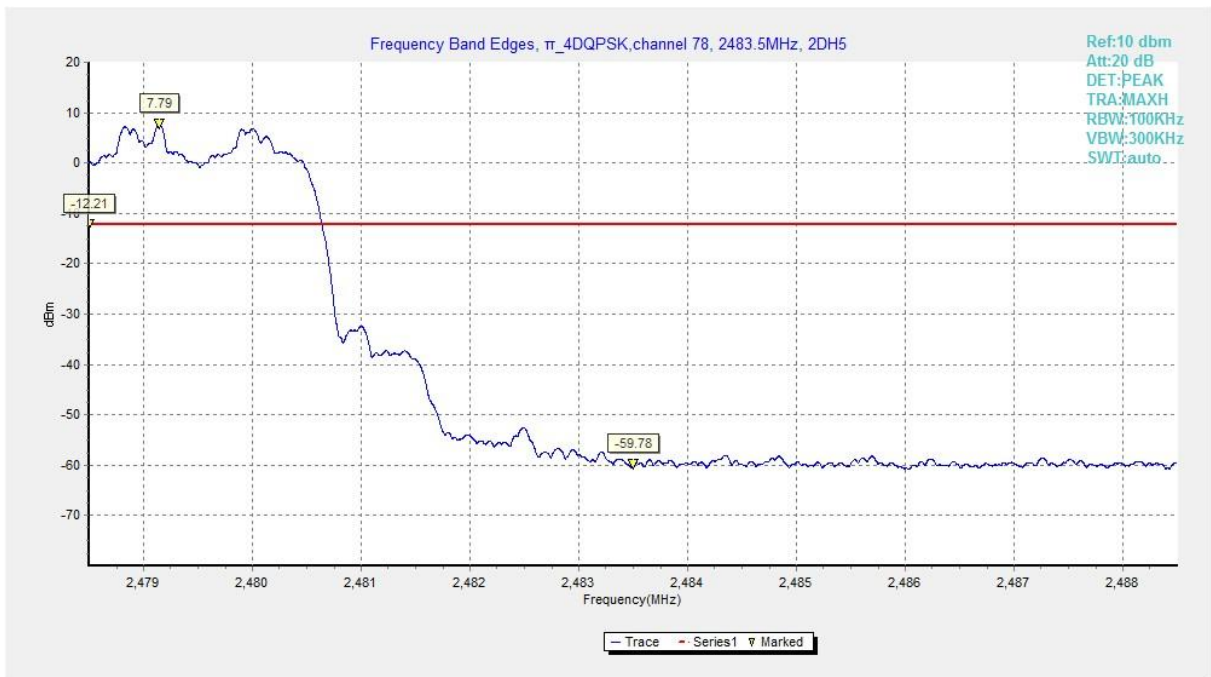


Fig. 4 Band Edges ( $\pi$ /4 DQPSK, Ch 78, Hopping ON)

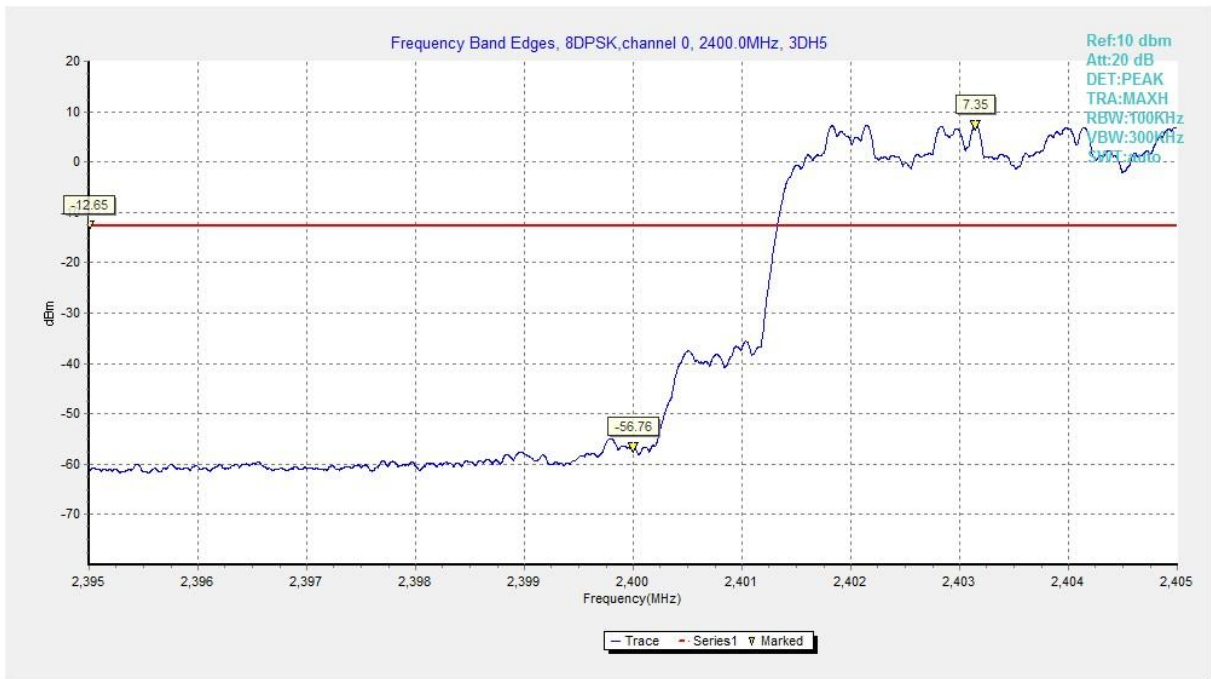


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

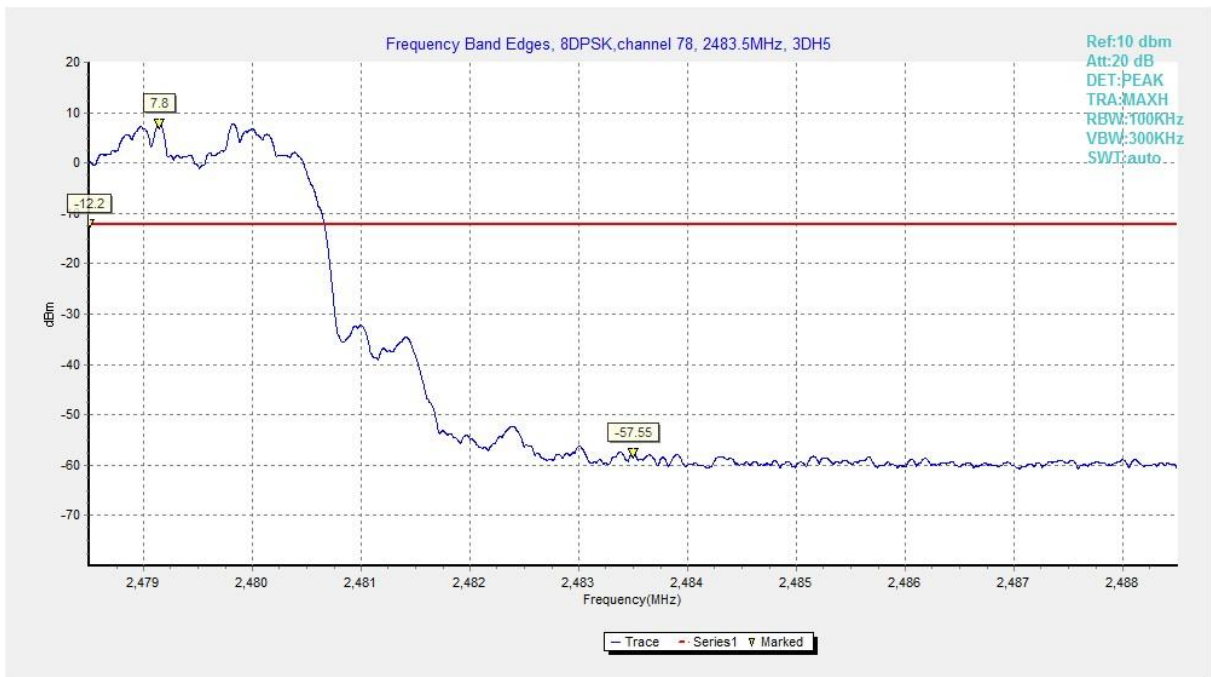
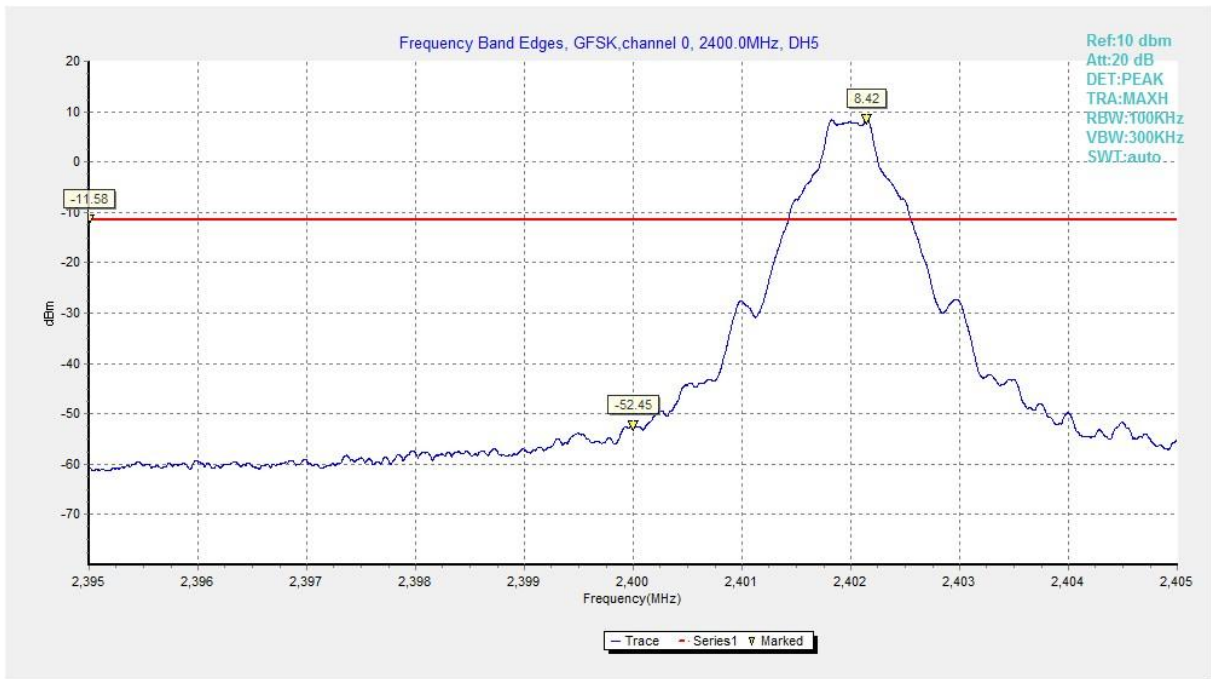
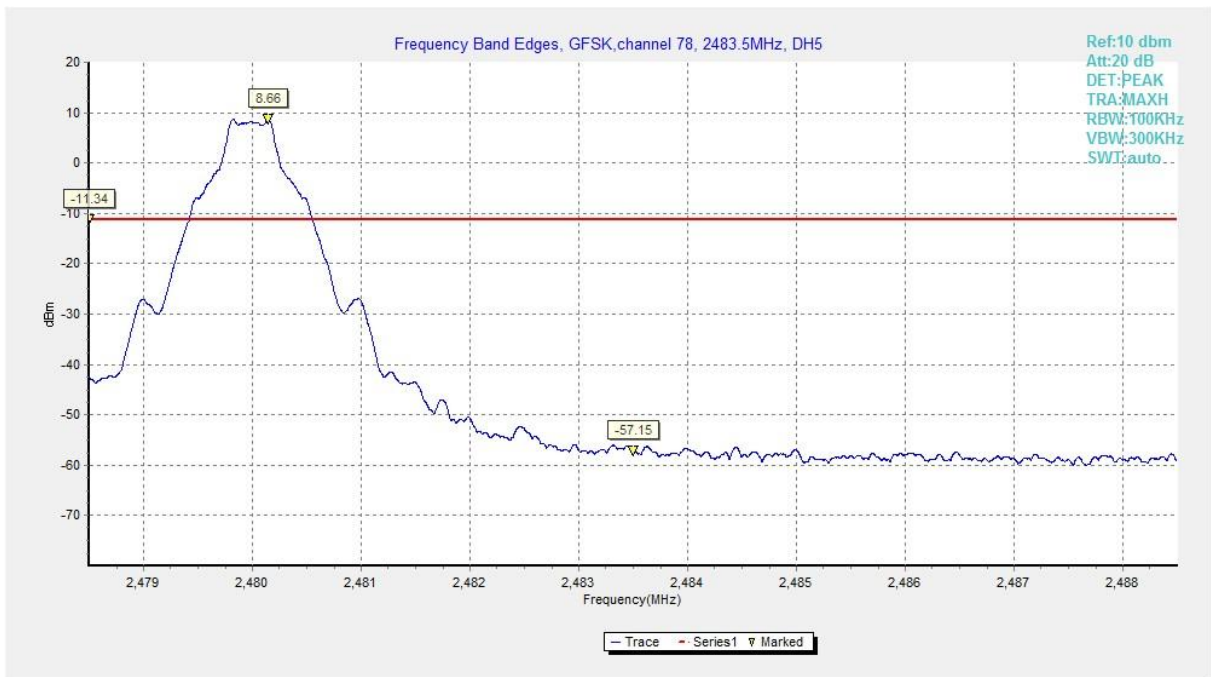


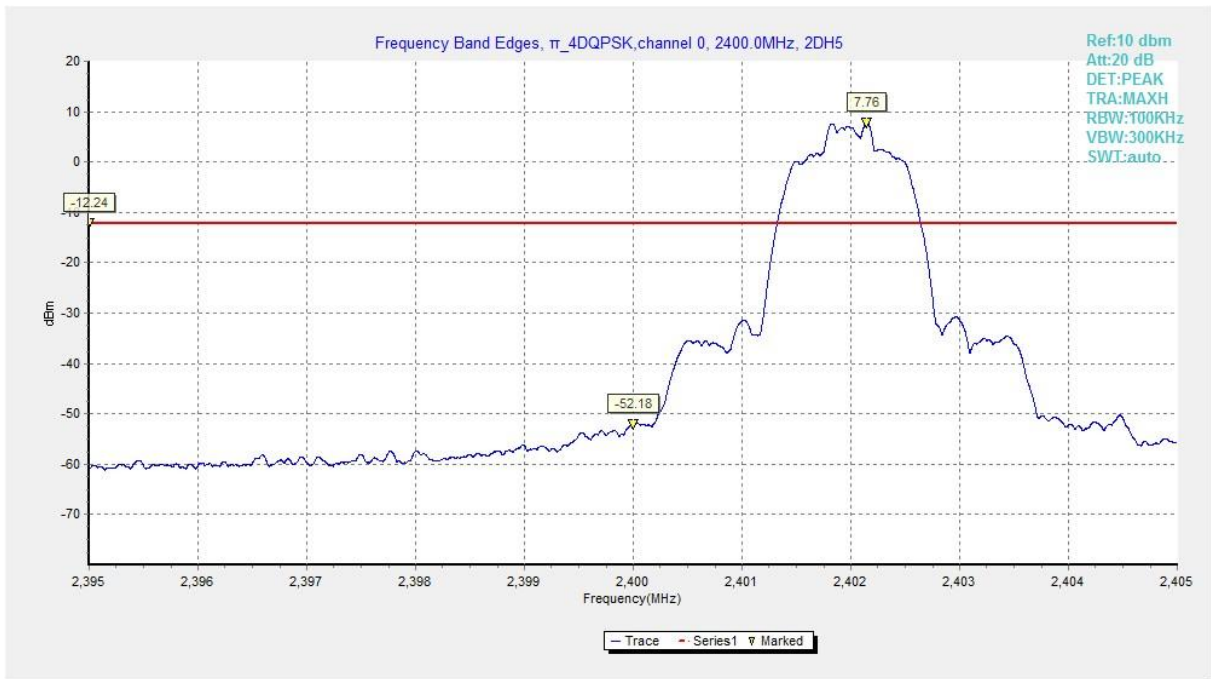
Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)



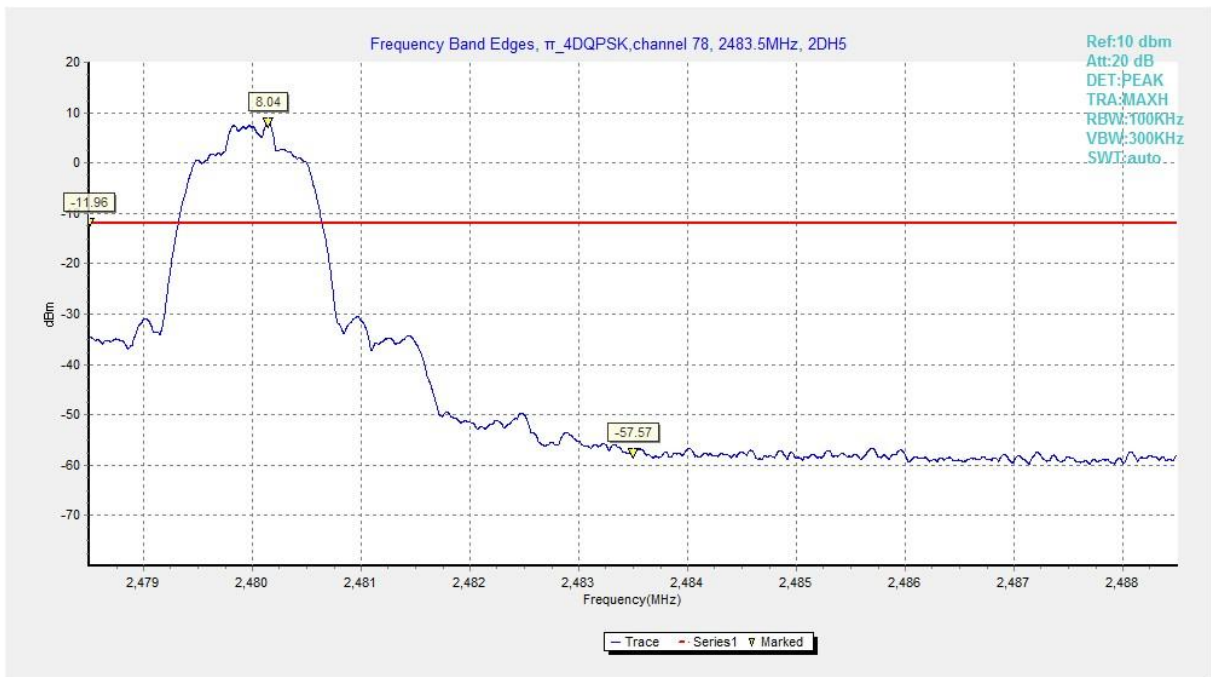
**Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)**



**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)**

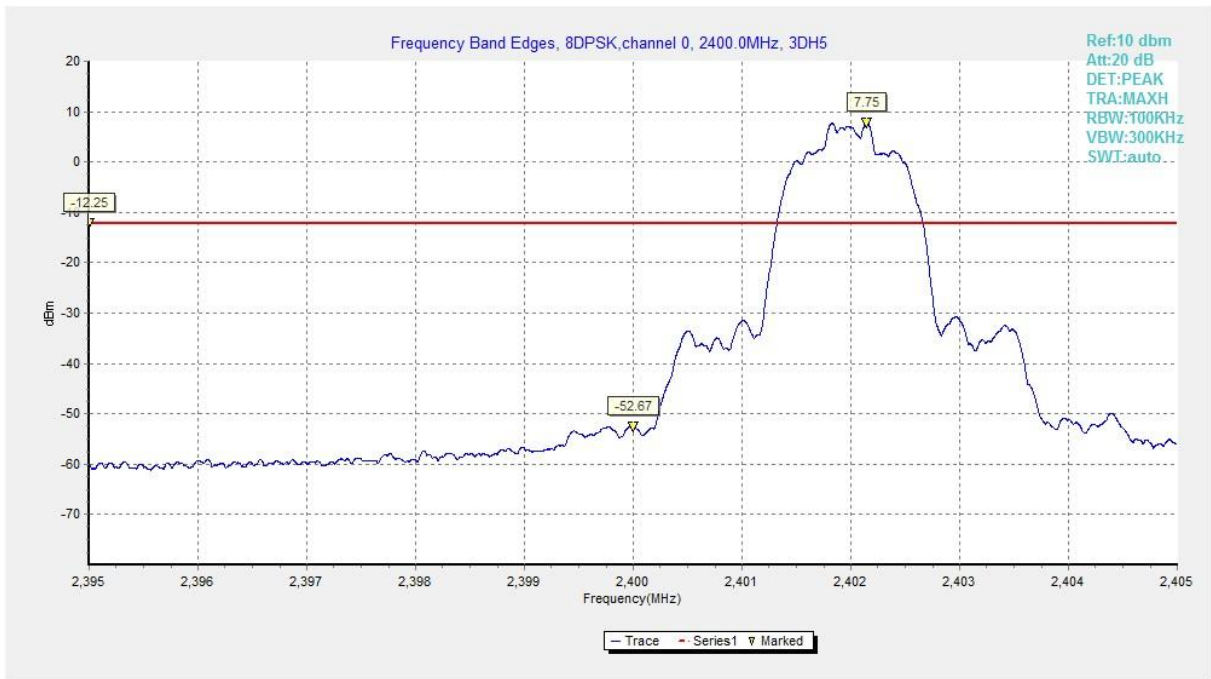


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

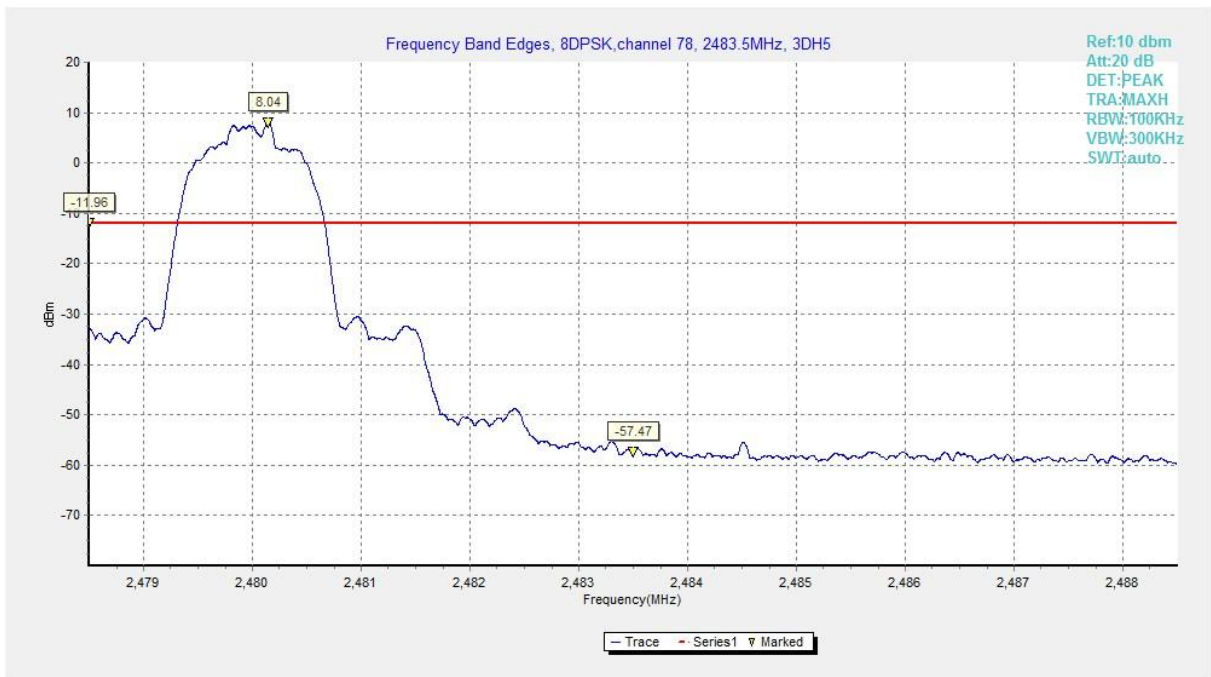


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)





### 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**

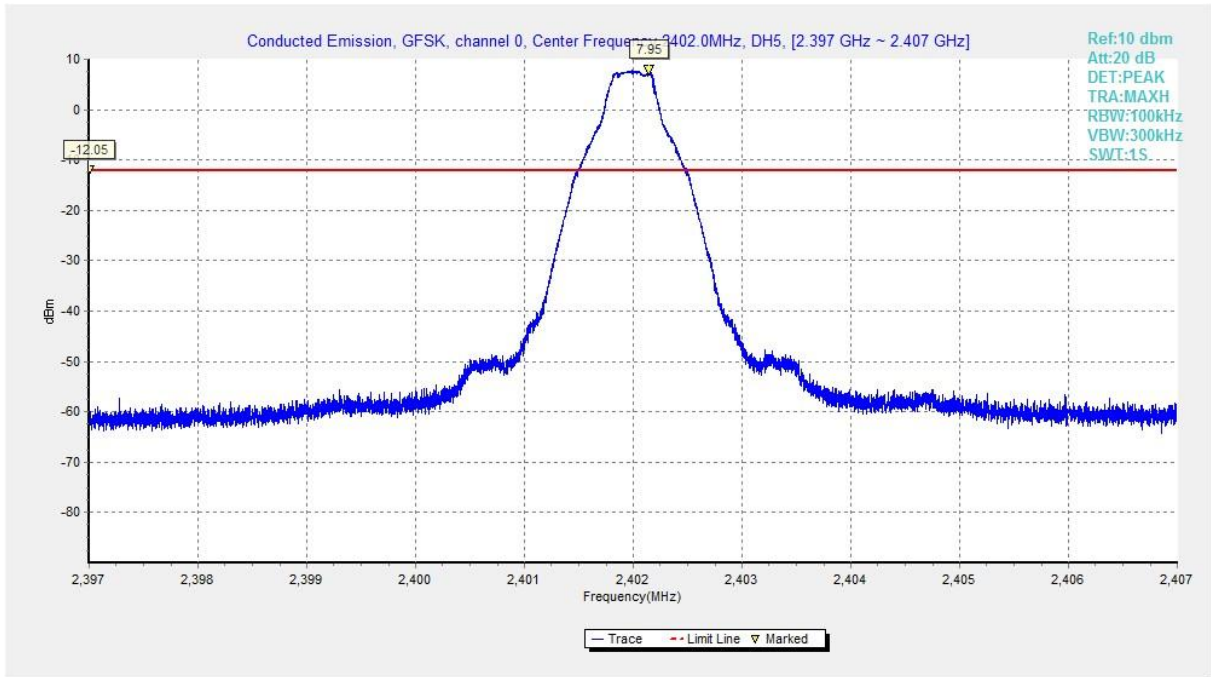


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

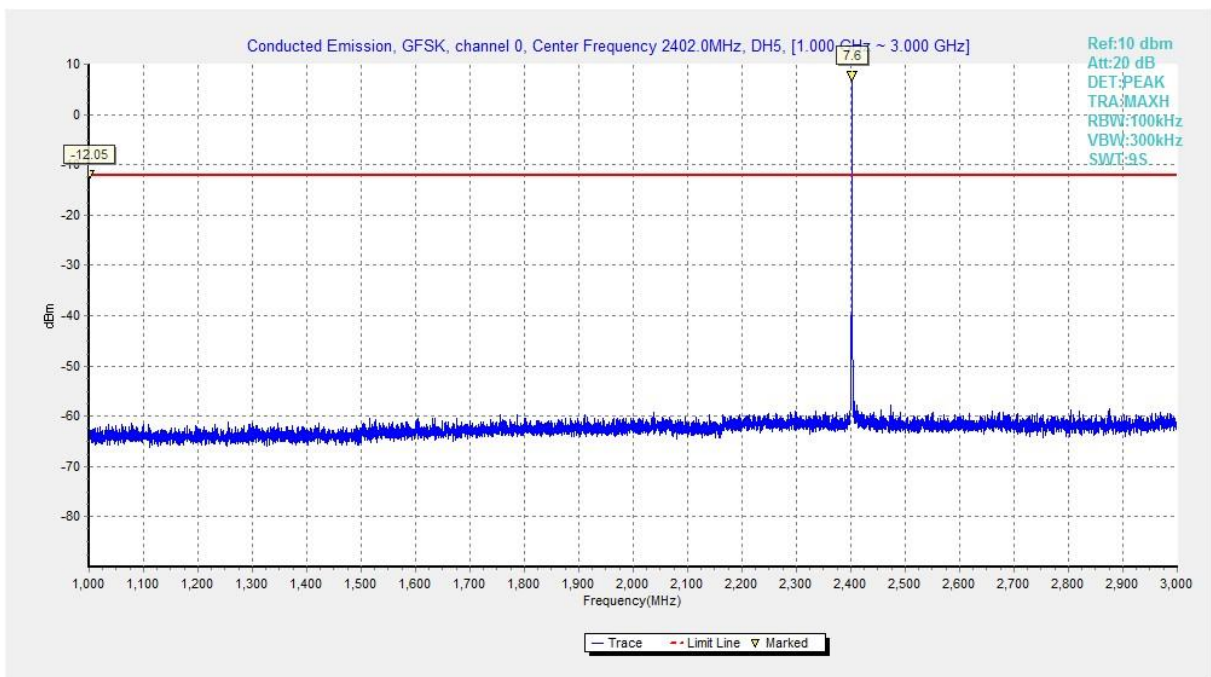


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)

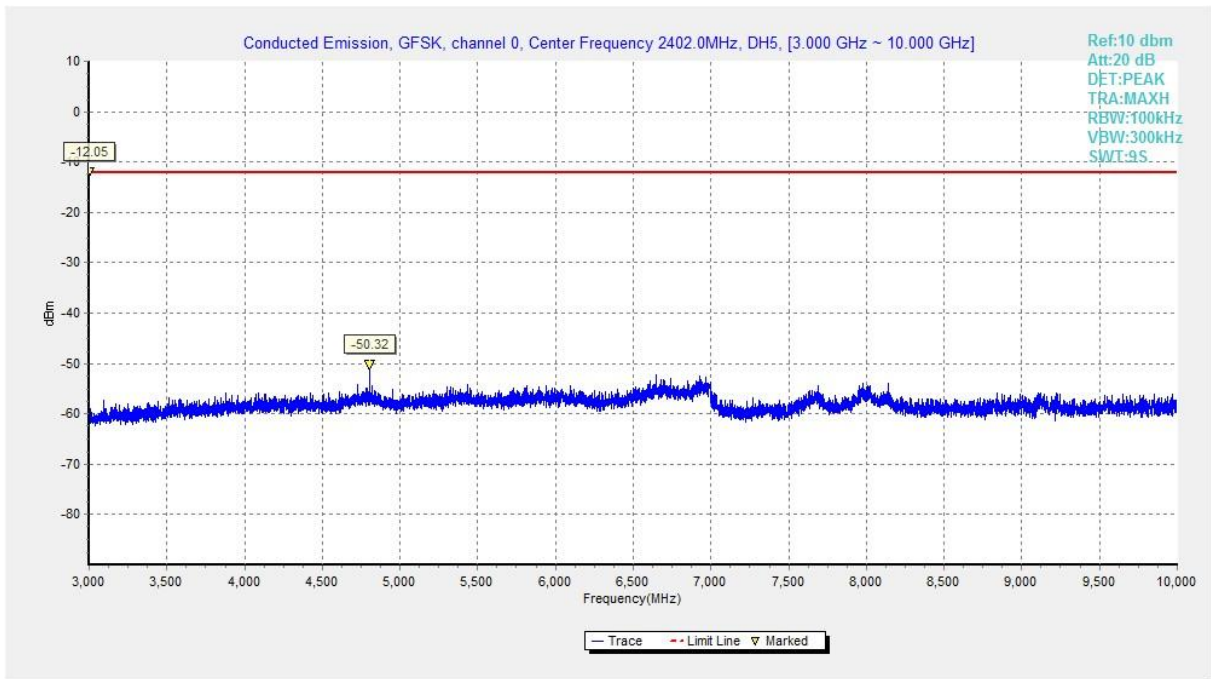


Fig. 15 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10 GHz)

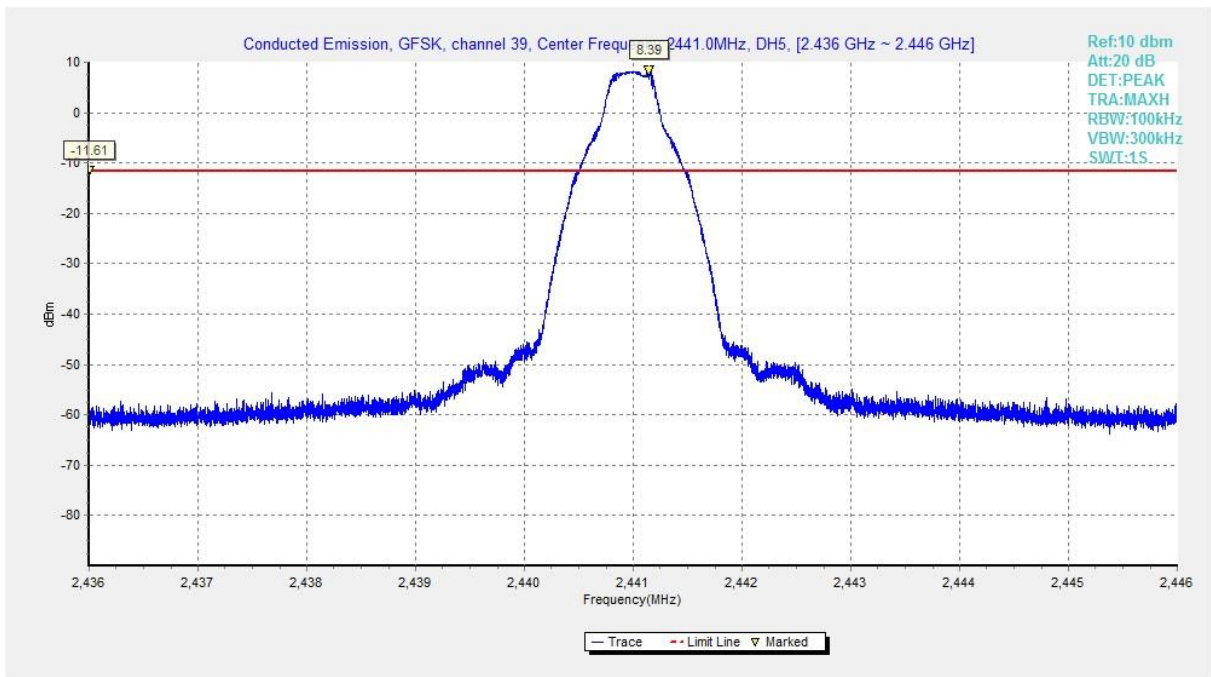


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)



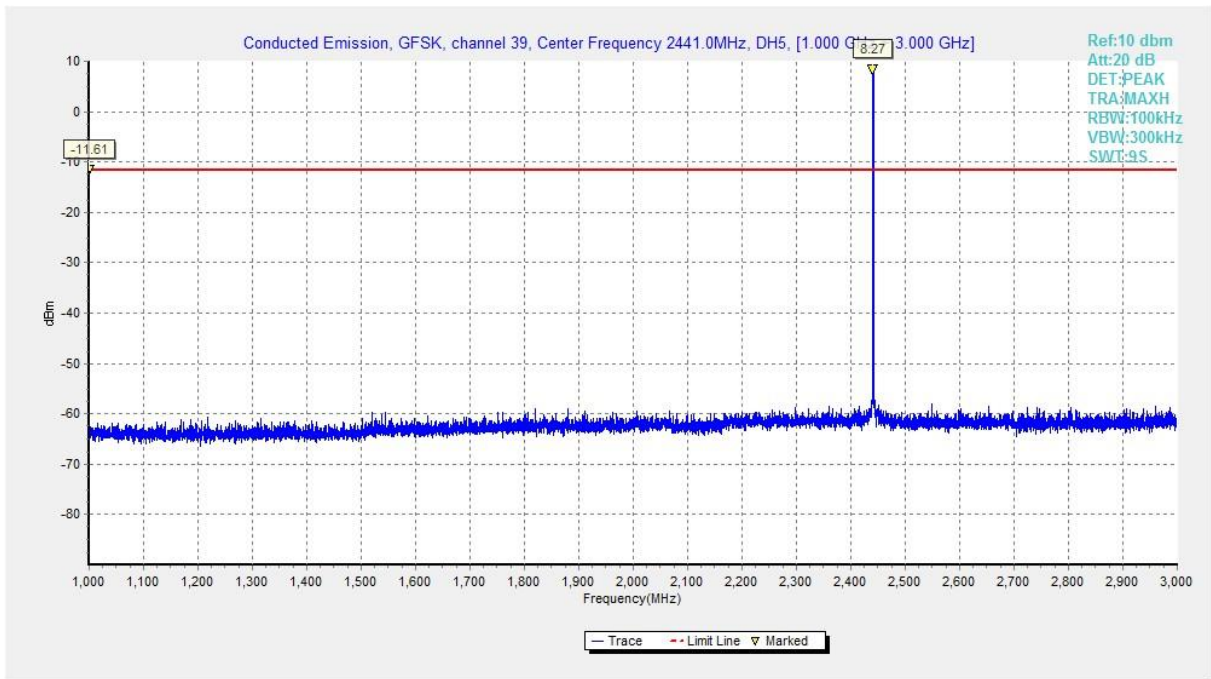


Fig. 17 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3 GHz)

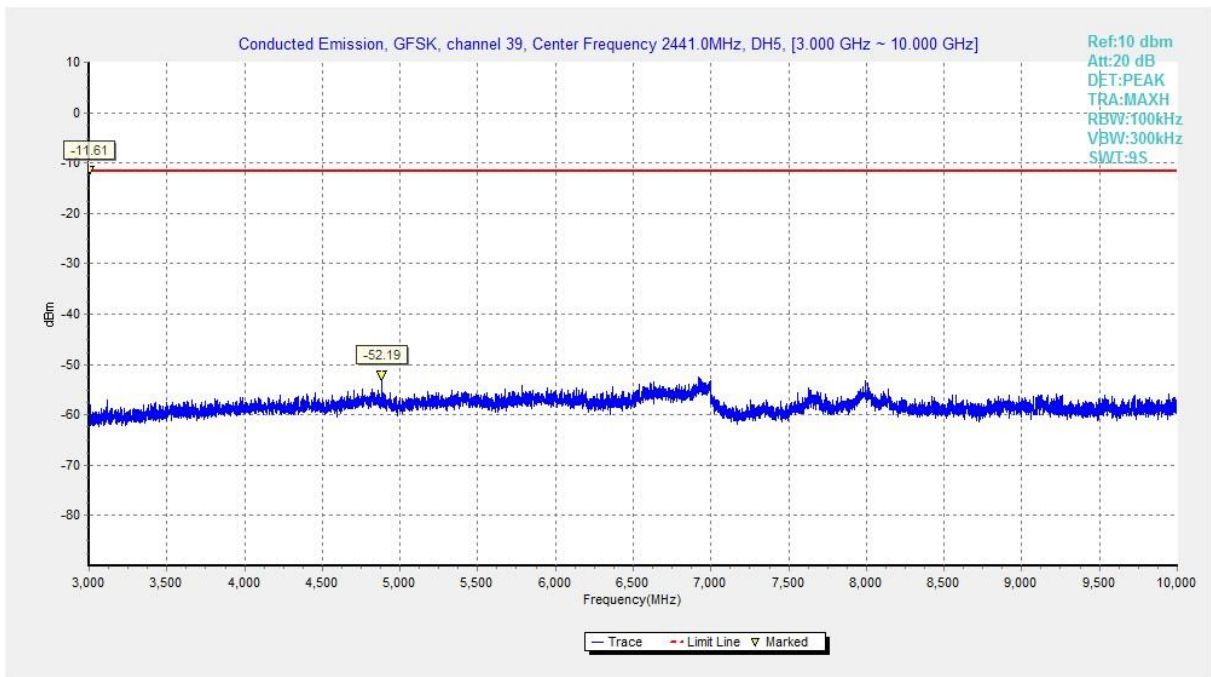


Fig. 18 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10 GHz)

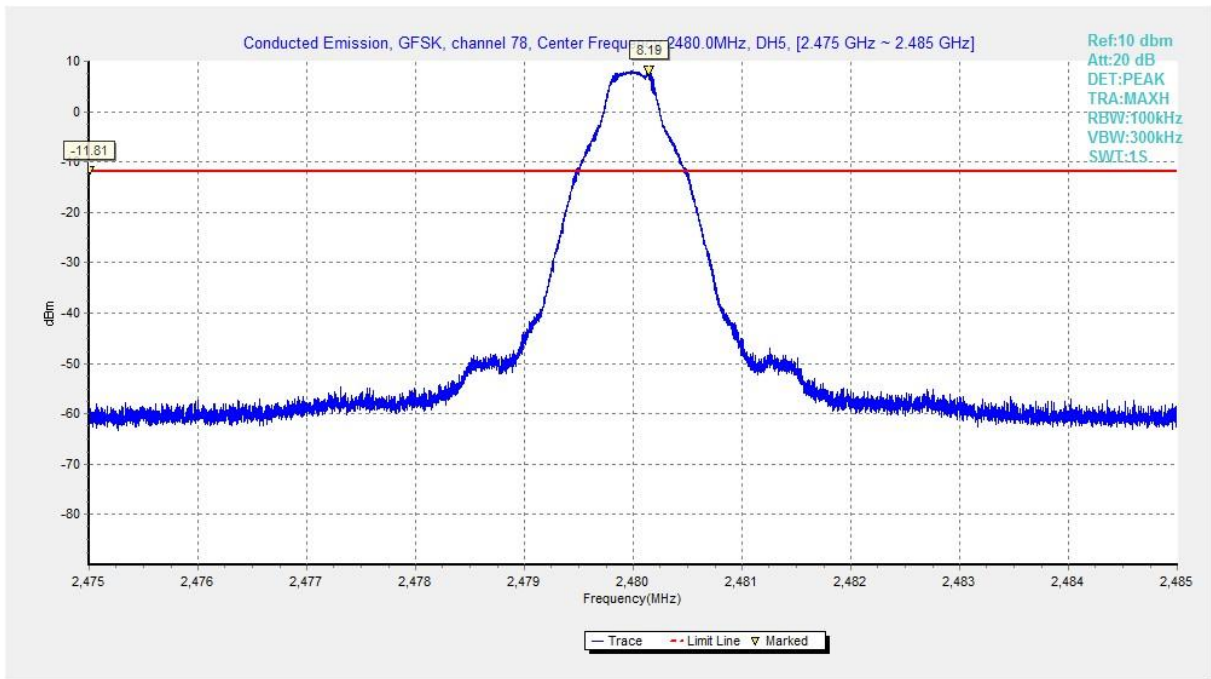


Fig. 19 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

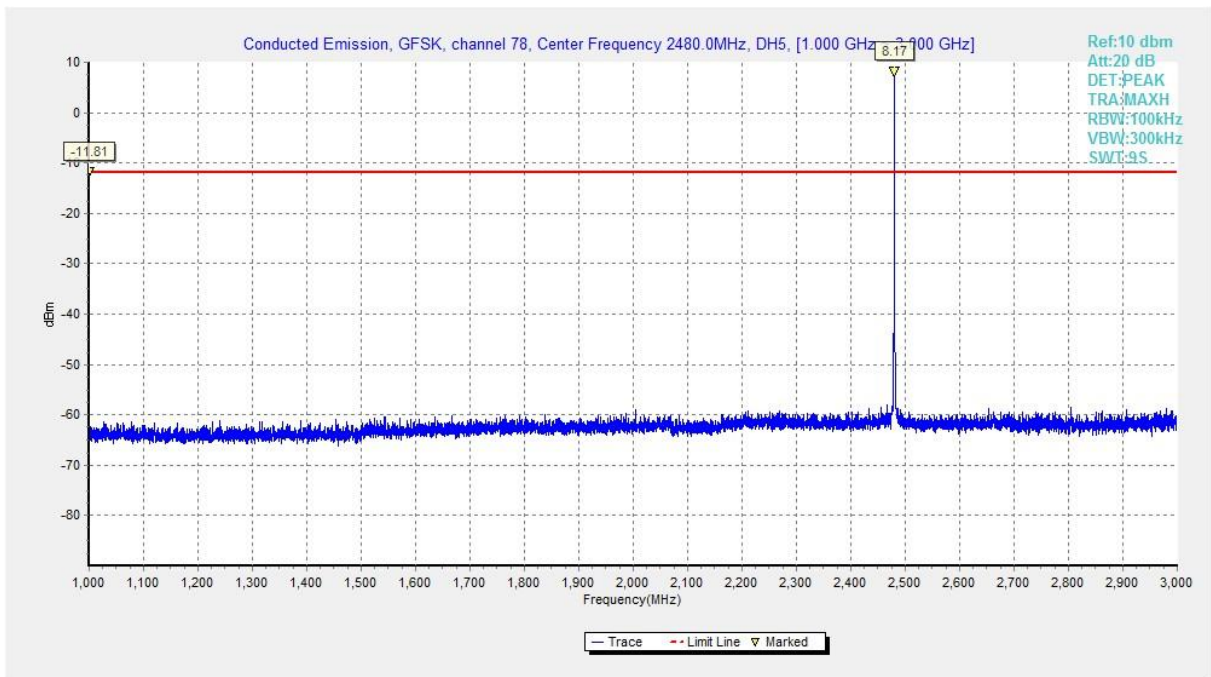


Fig. 20 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3 GHz)

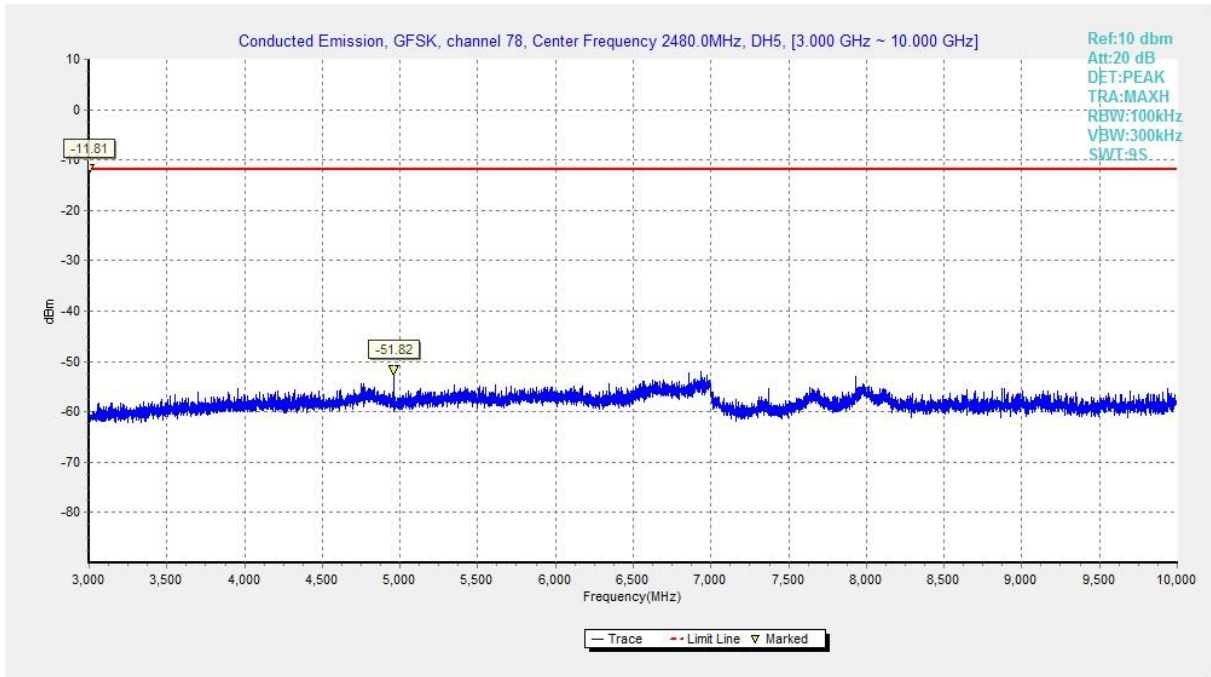


Fig. 21 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10 GHz)

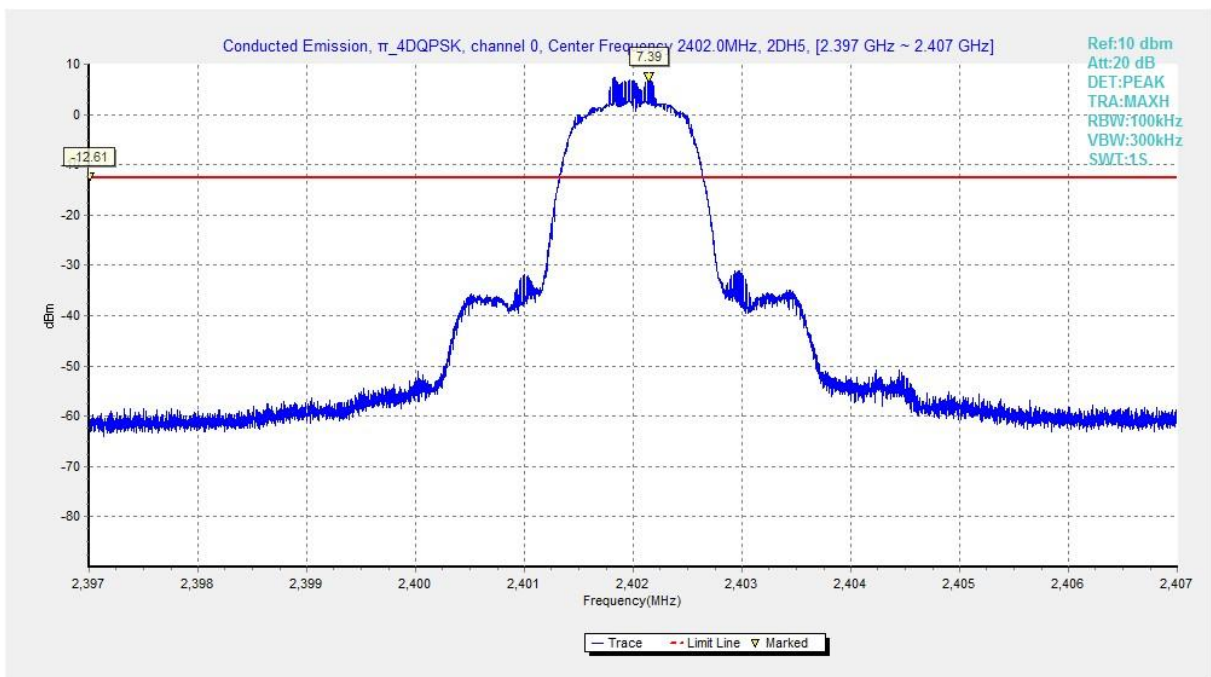


Fig. 22 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch0, 2.402GHz)

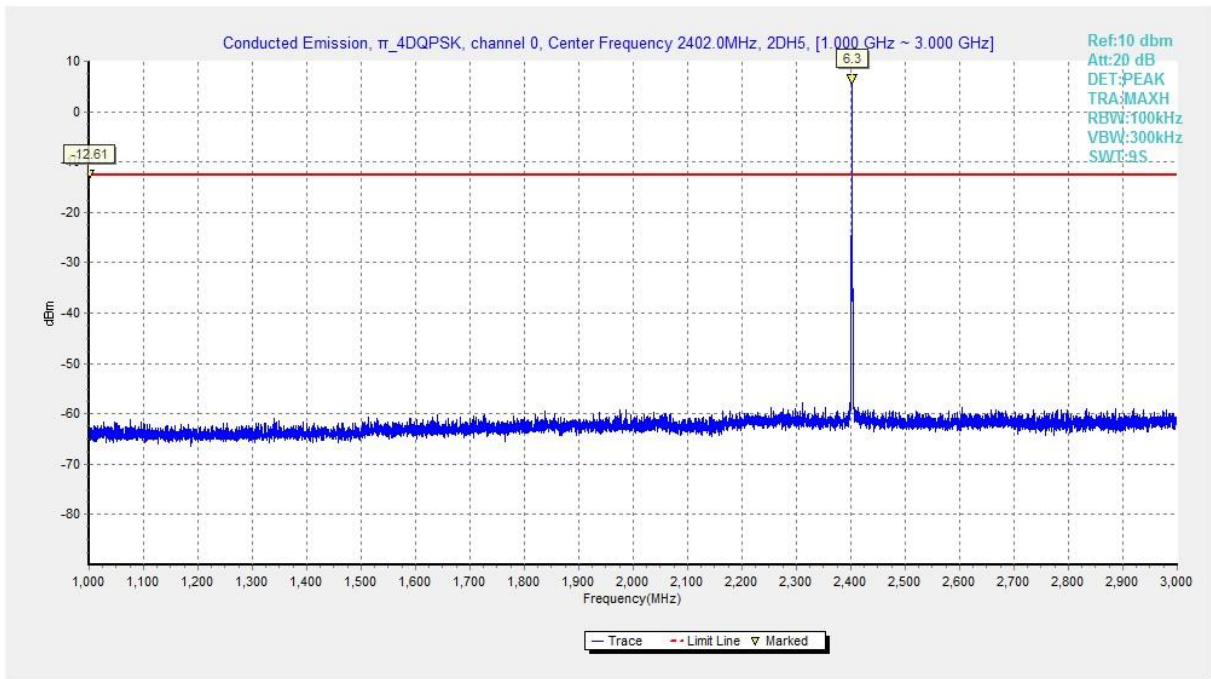


Fig. 23 Conducted Spurious Emission ( $\pi$ /4 DQPSK, Ch0, 1GHz-3 GHz)

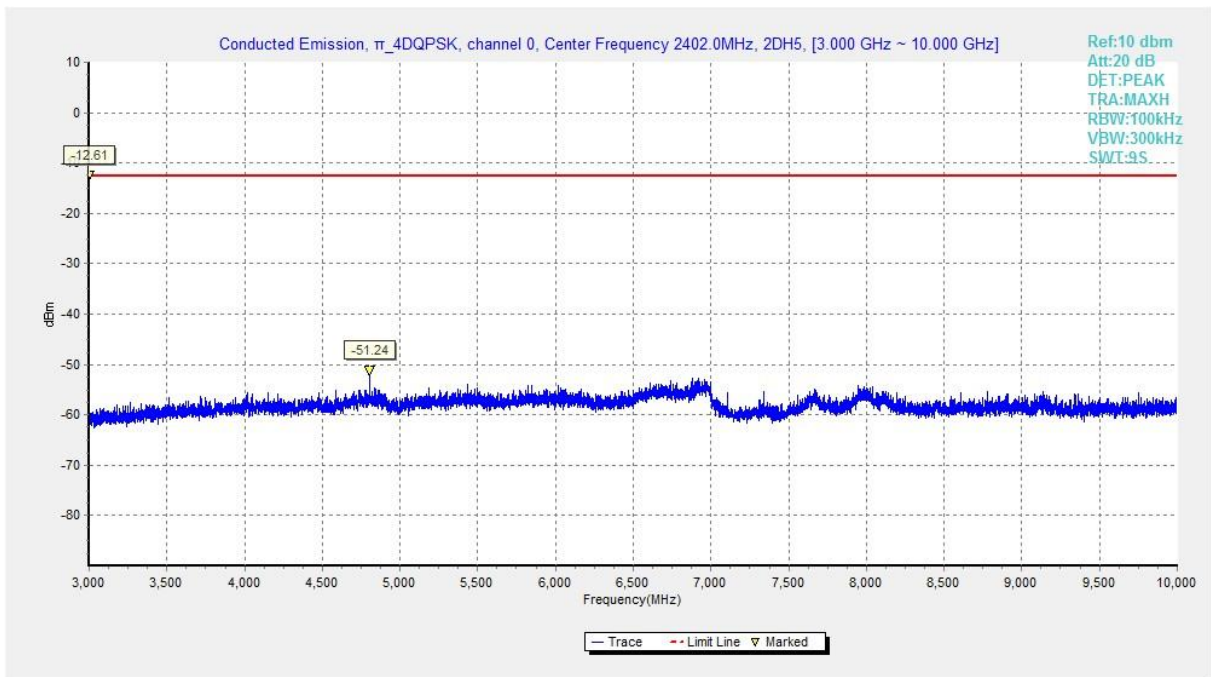


Fig. 24 Conducted Spurious Emission ( $\pi$ /4 DQPSK, Ch0, 3GHz-10 GHz)



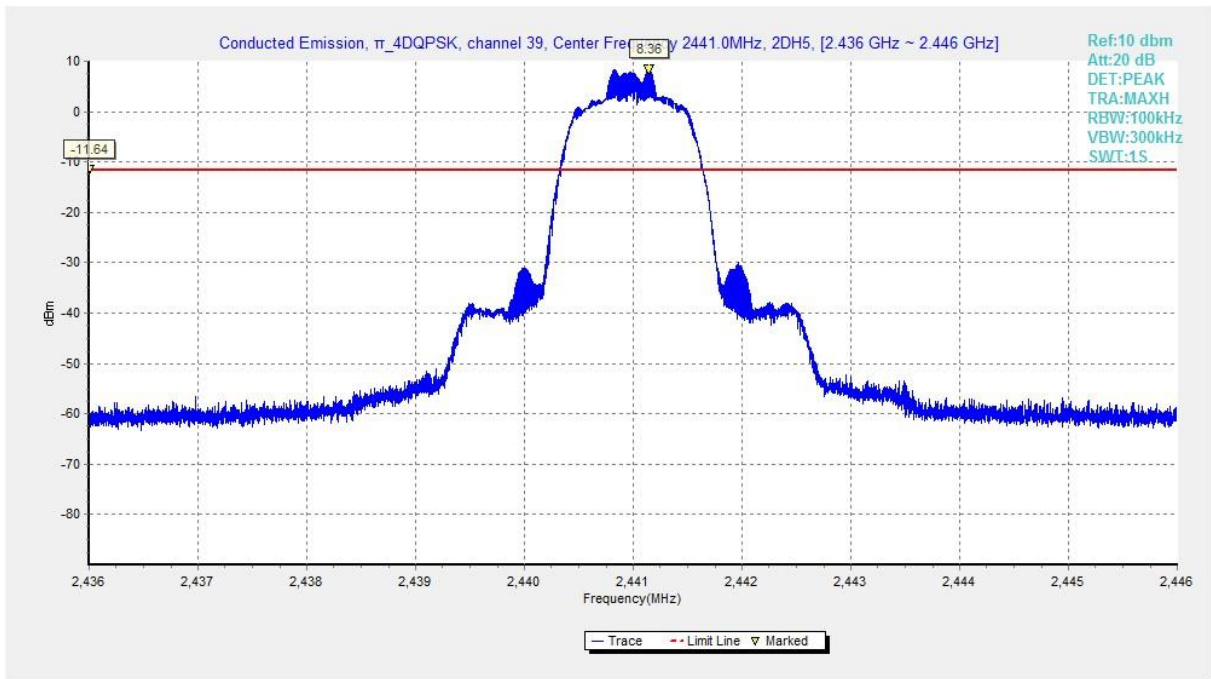


Fig. 25 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch39, 2.441GHz)

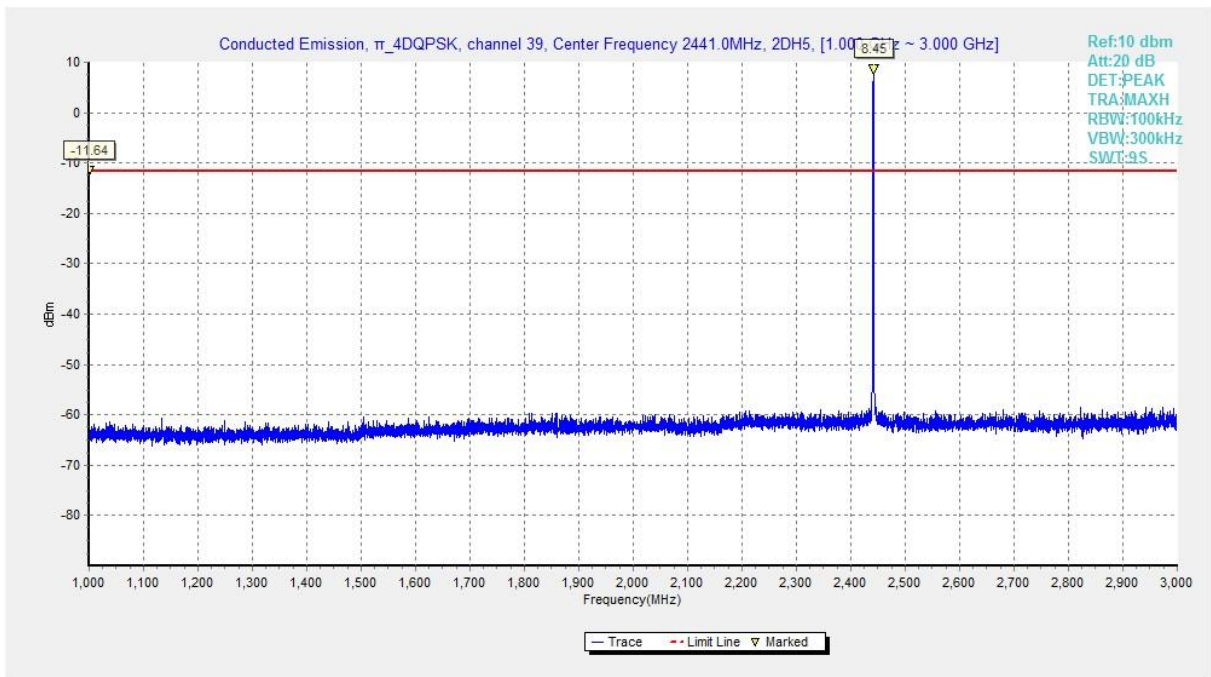


Fig. 26 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch39, 1GHz-3 GHz)

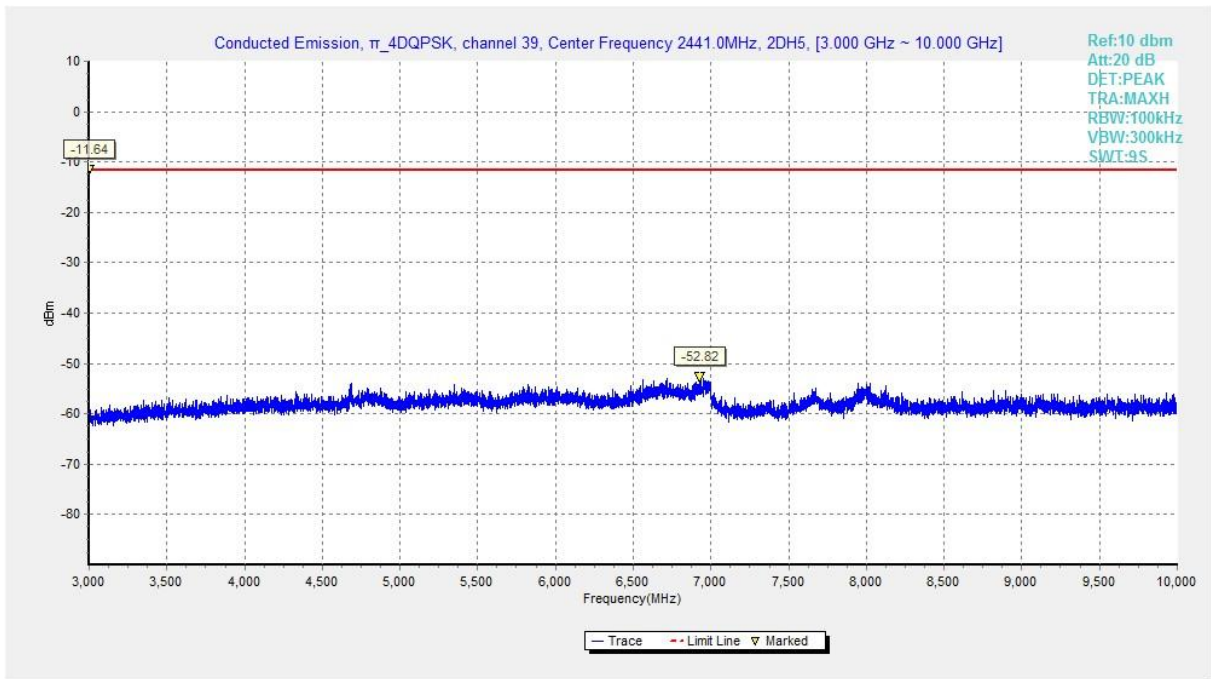


Fig. 27 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch39, 3GHz-10 GHz)

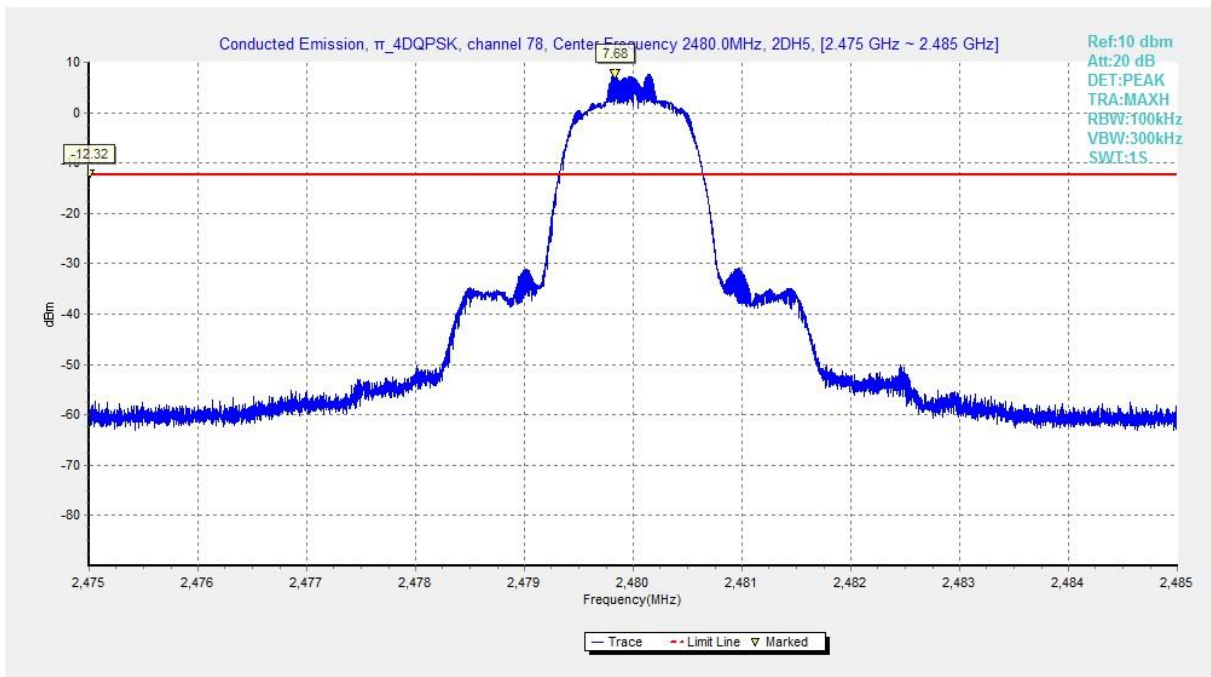


Fig. 28 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch78, 2.480GHz)

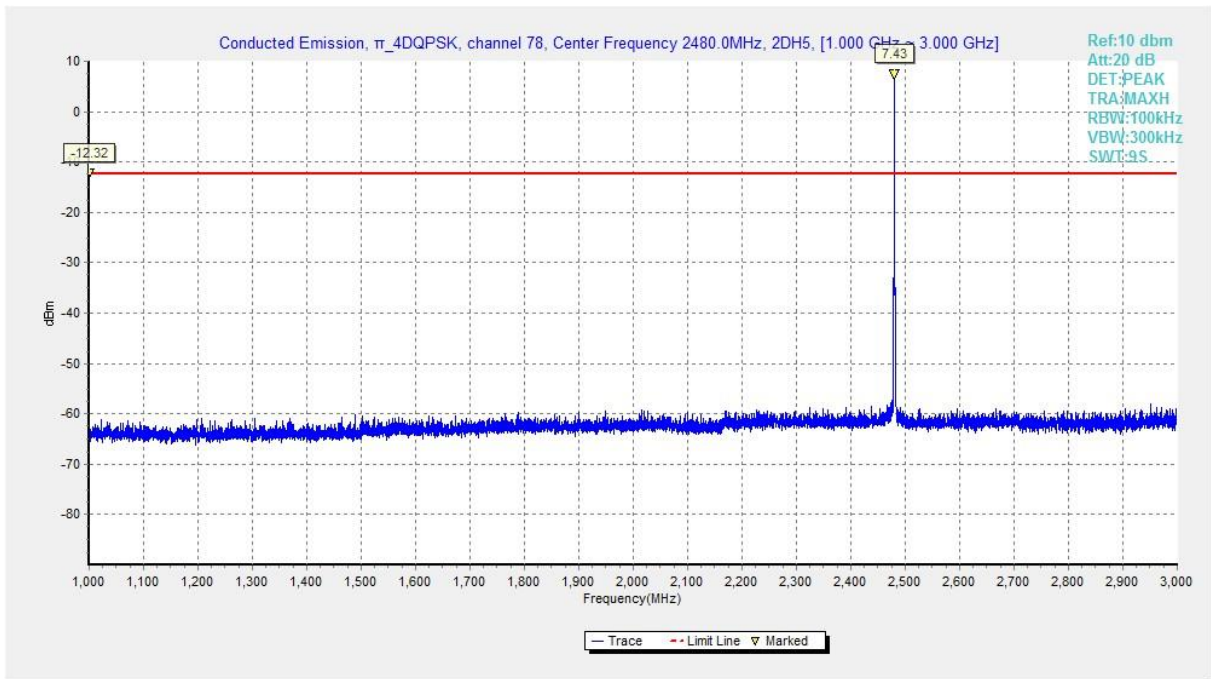


Fig. 29 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch78, 1GHz-3 GHz)

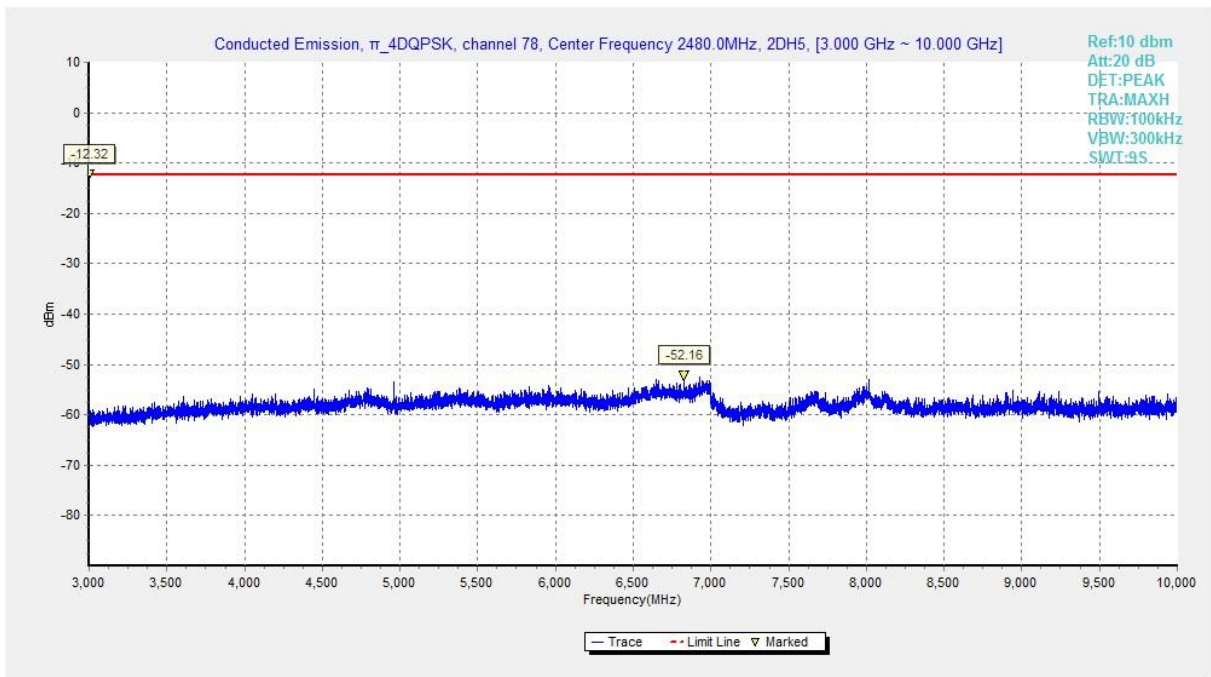
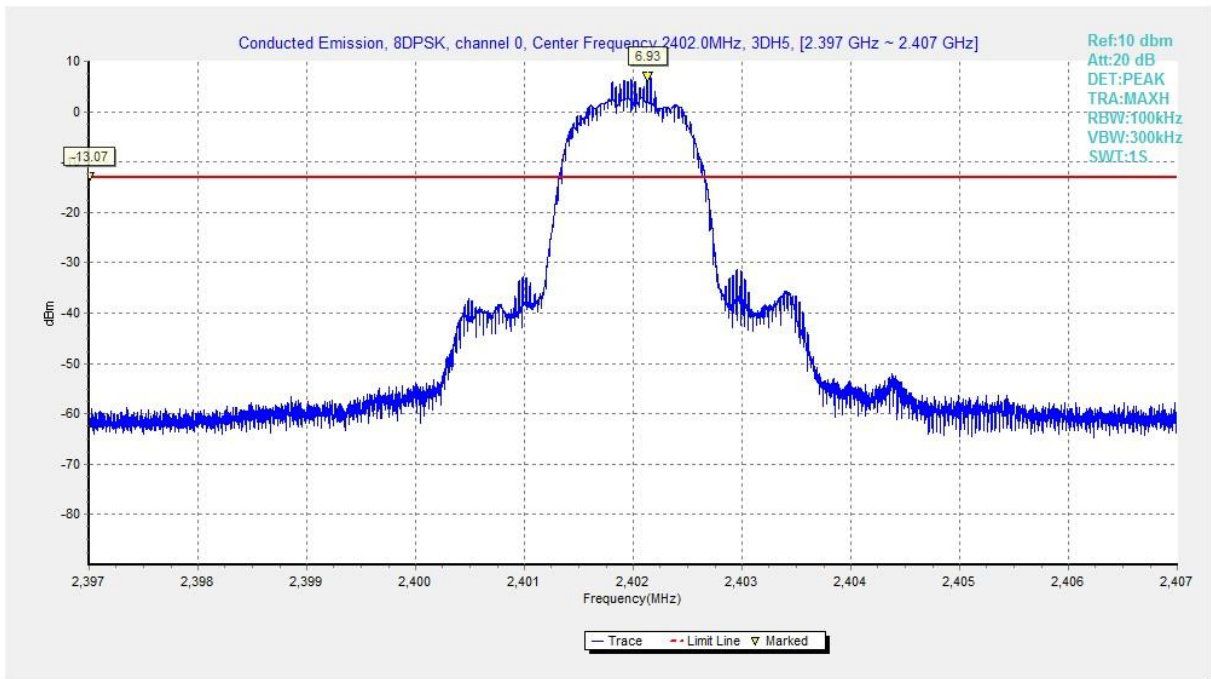
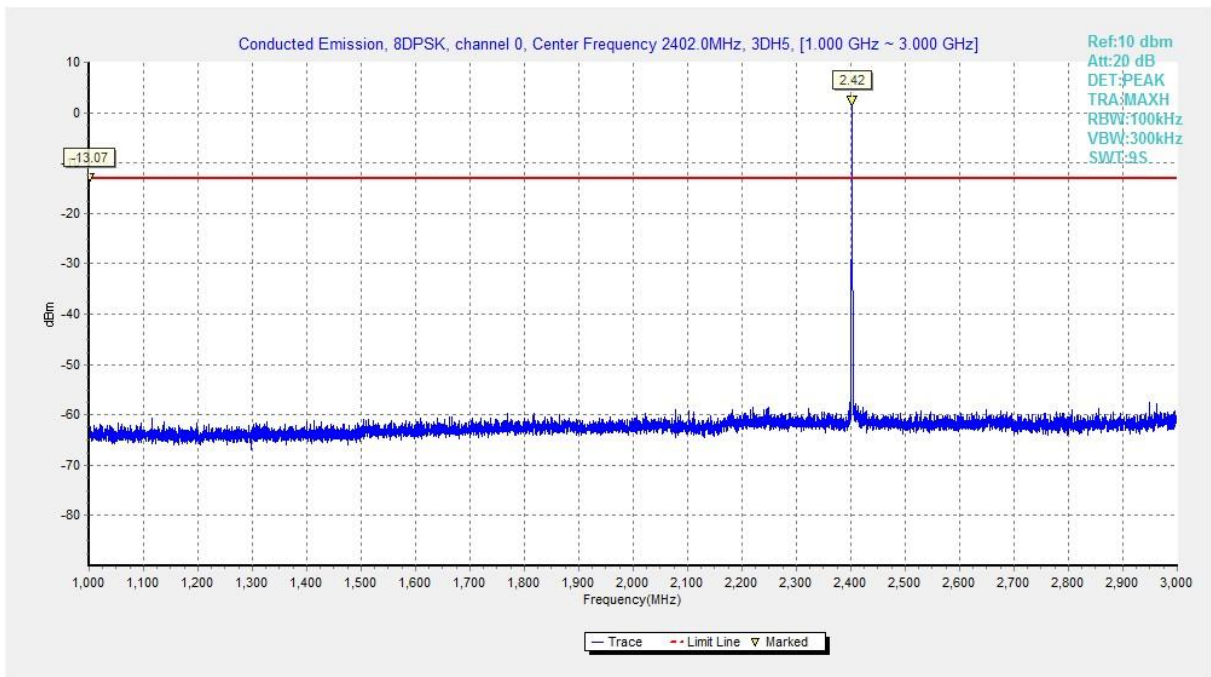


Fig. 30 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch78, 3GHz-10 GHz)



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



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



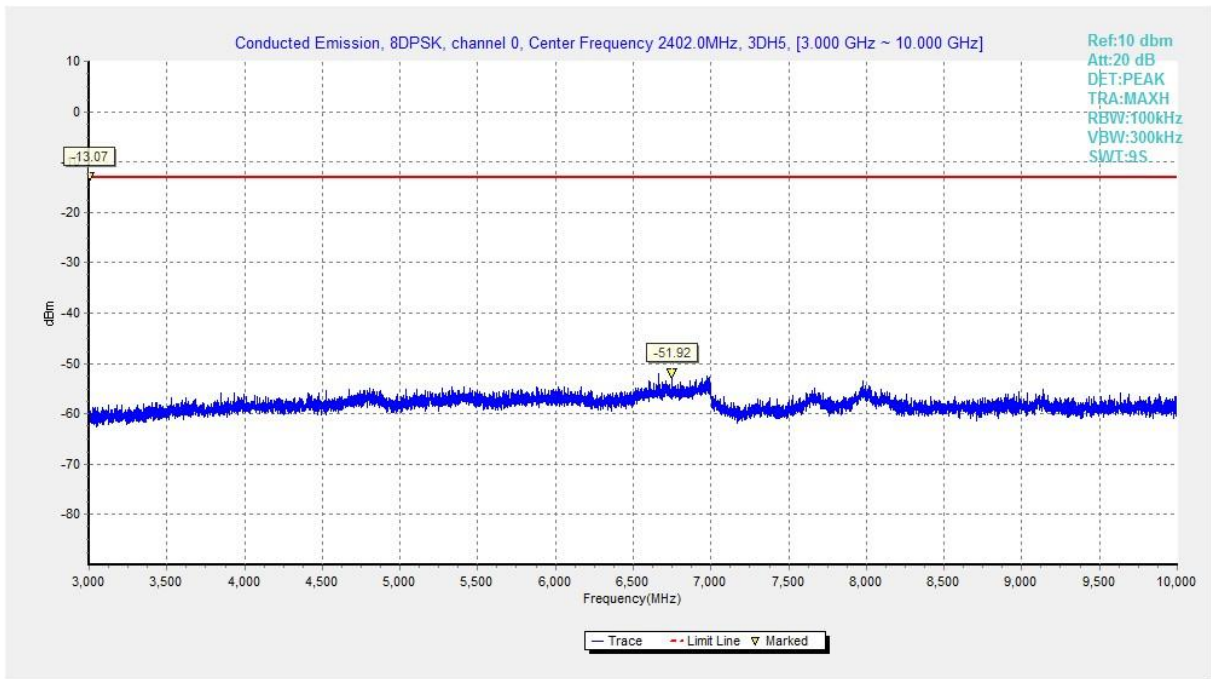


Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10 GHz)

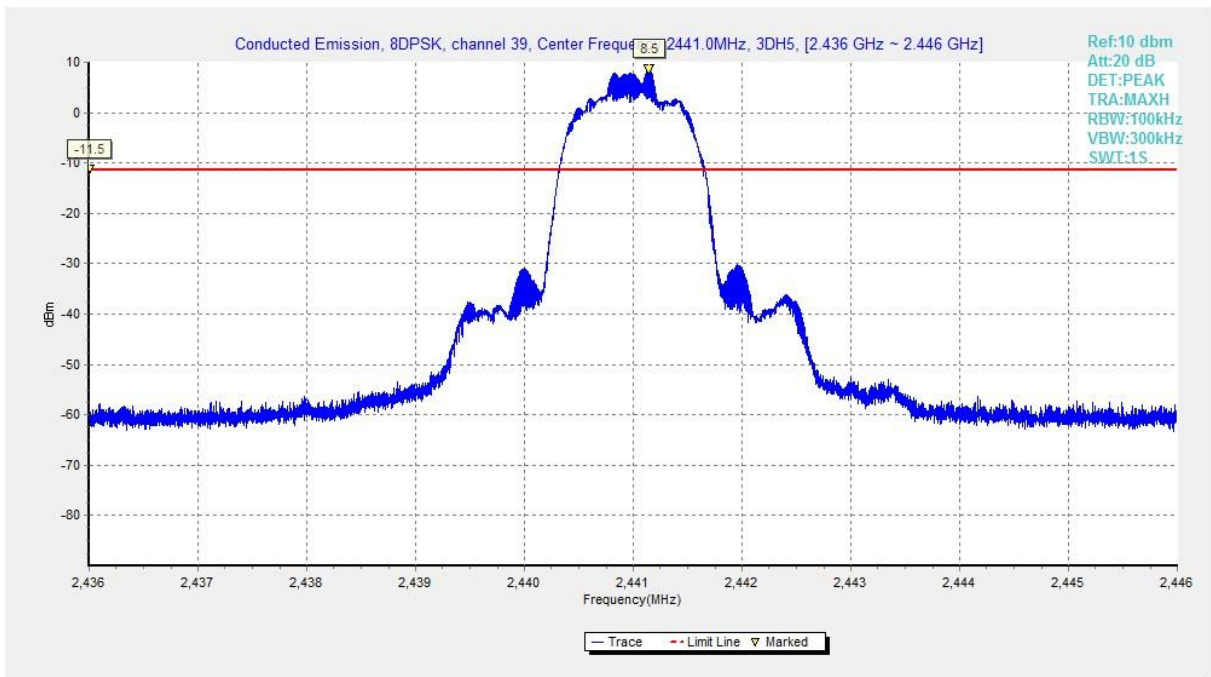


Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

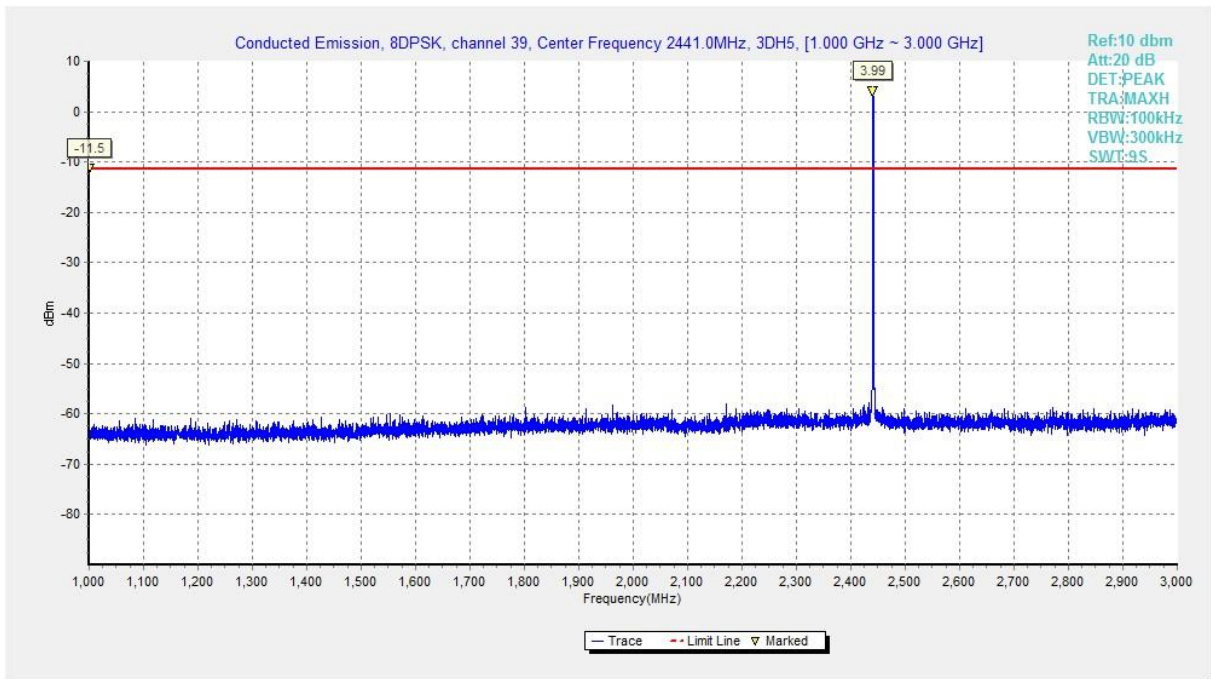


Fig. 35 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3 GHz)

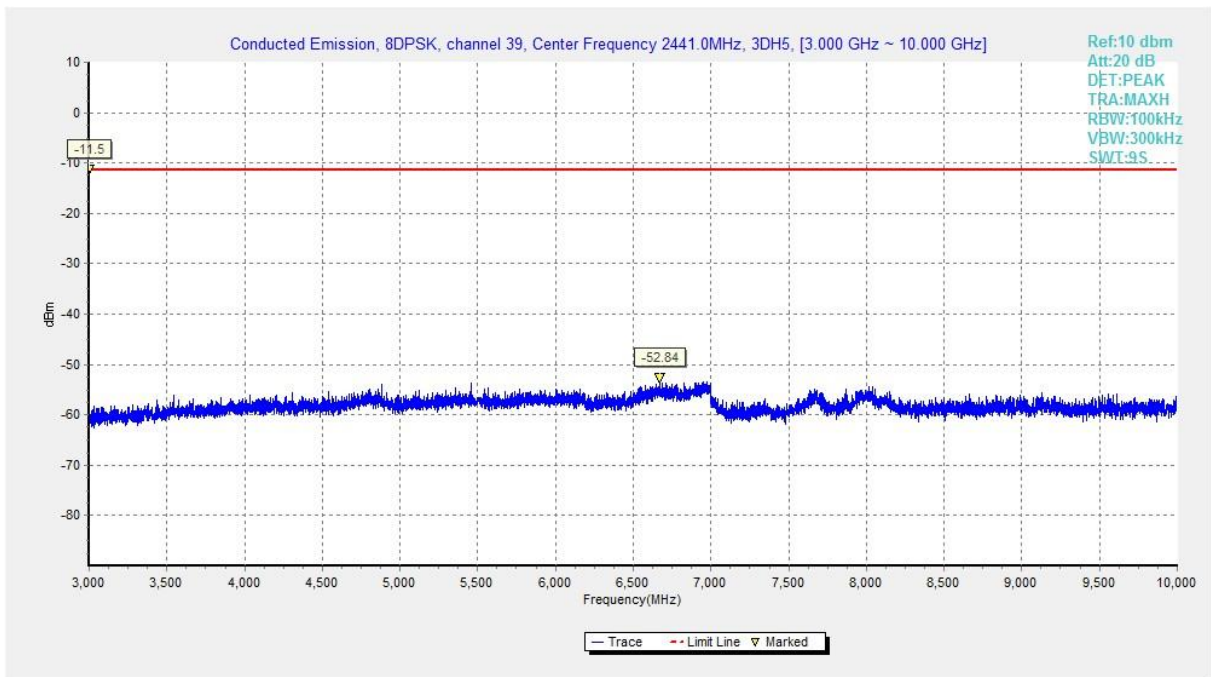
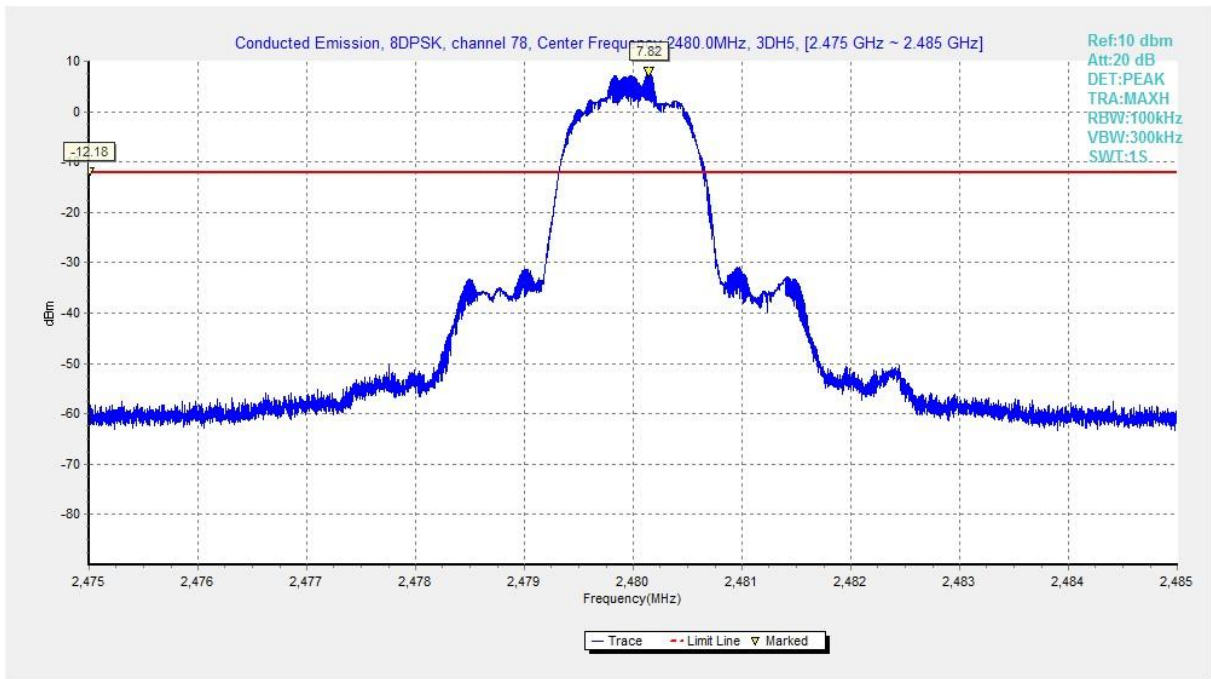
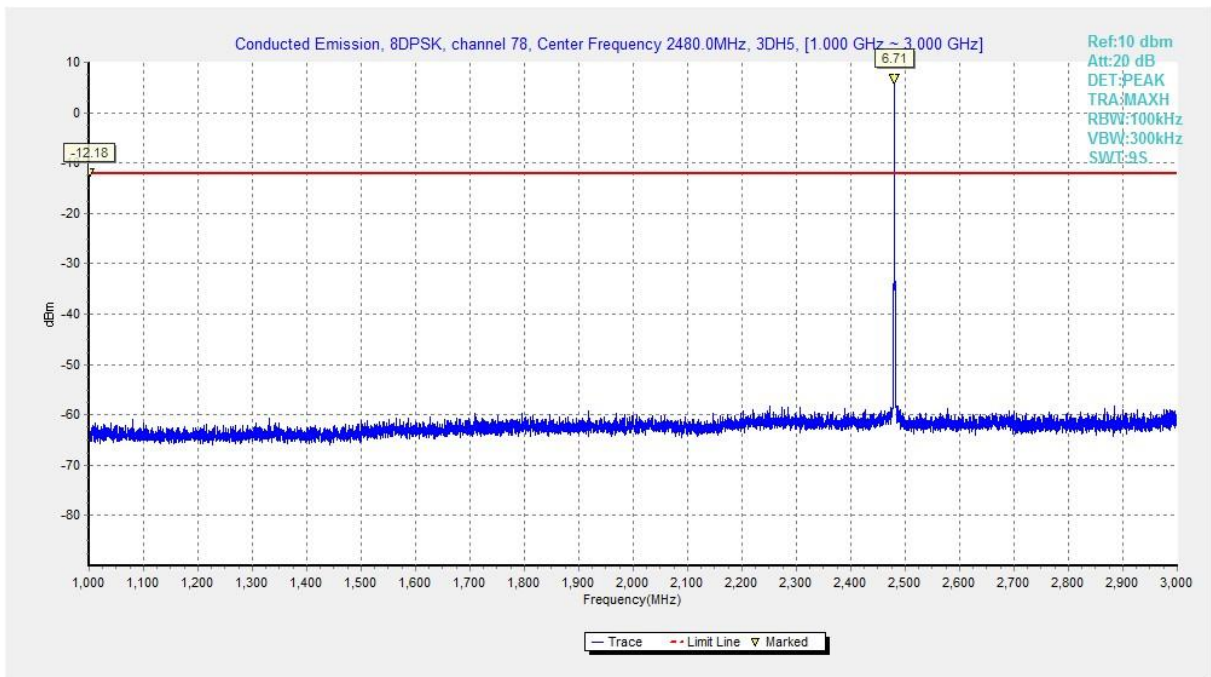


Fig. 36 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10 GHz)



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



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

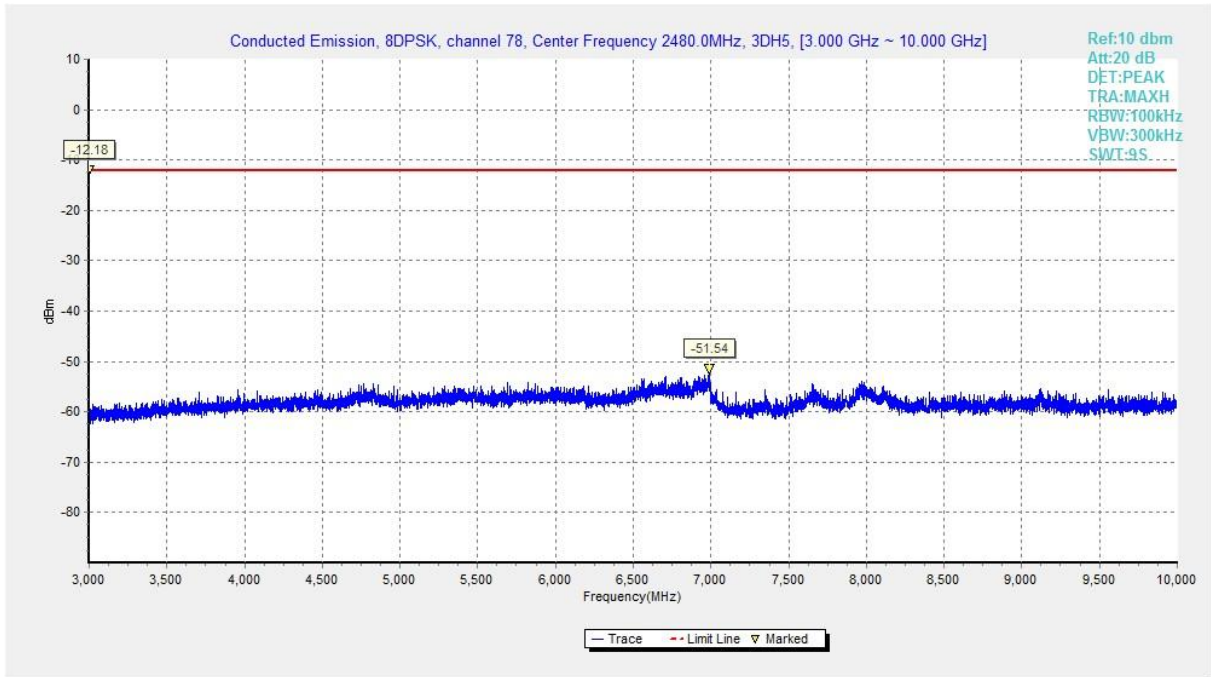


Fig. 39 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10 GHz)

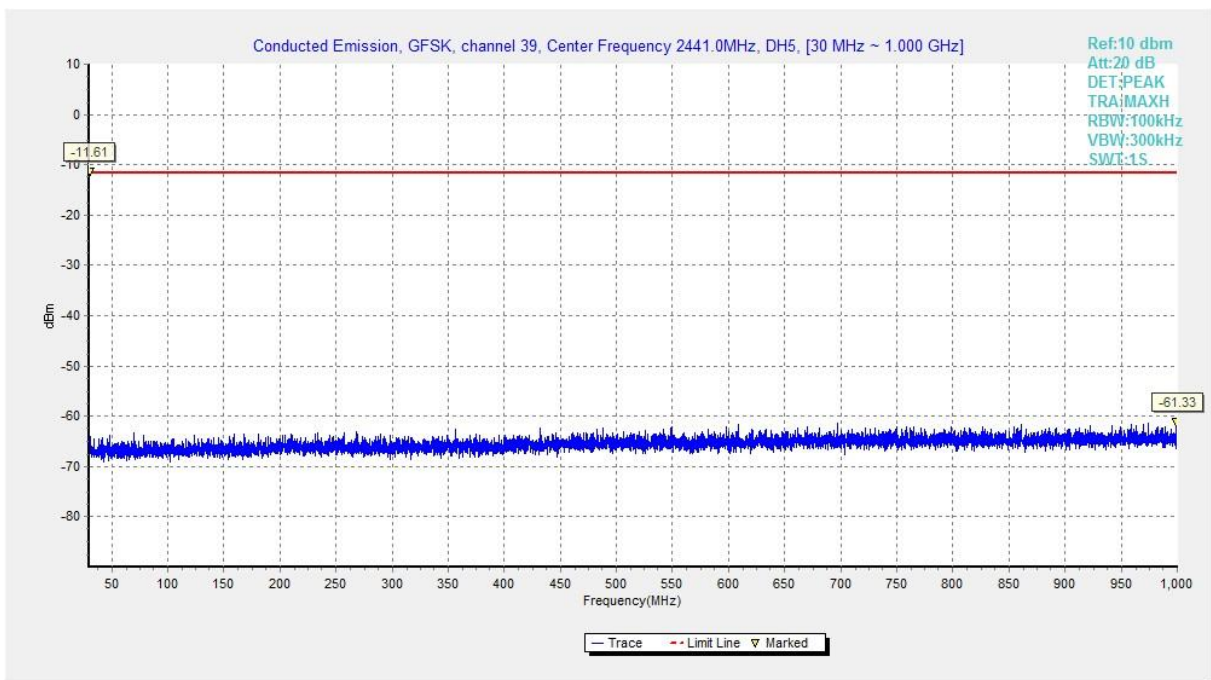


Fig. 40 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)



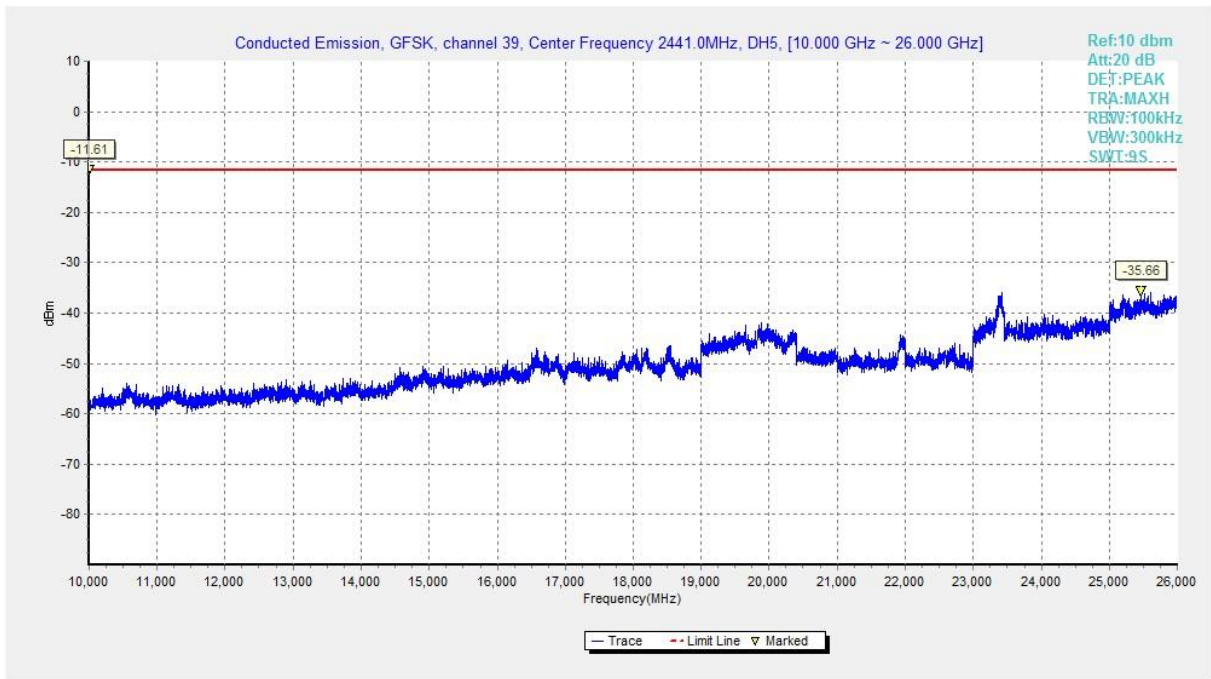


Fig. 41 Conducted Spurious Emission All channel, (10 GHz-26 GHz,)

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

**Worst Case Result**
**GFSK CH39 (1-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
2973.20000	49.7	---	74.00	24.3	H	11.0
4881.60000	41.9	---	74.00	32.1	H	-7.4
7723.20000	46.1	---	74.00	27.9	H	-0.6
11150.0000	49.2	---	74.00	24.8	H	3.0
14180.5000	51.1	---	74.00	22.9	V	7.1
17826.4000	56.9	---	74.00	17.1	H	13.6
2997.00000	---	37.5	54.00	16.5	V	11.0
4881.60000	---	35.3	54.00	18.7	H	-7.4
7327.20000	---	32.5	54.00	21.5	H	-0.6
9958.40000	---	36.5	54.00	17.5	H	2.3
14142.0000	---	39.2	54.00	14.8	H	7.0
17949.2000	---	45.5	54.00	8.5	H	14.9



**π /4 DQPSK CH39 (1-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
2907.20000	49.3	---	74.00	24.7	H	10.5
5024.00000	40.2	---	74.00	33.8	V	-7.2
7433.60000	44.5	---	74.00	29.5	H	-0.6
9952.00000	48.2	---	74.00	25.8	H	2.4
14109.0000	51.1	---	74.00	22.9	V	6.9
17790.0000	56.5	---	74.00	17.5	V	13.2
2967.00000	---	37.7	54.00	16.3	V	10.9
5011.20000	---	28.5	54.00	25.5	V	-7.1
7667.20000	---	33.4	54.00	20.6	H	-0.4
9958.40000	---	36.6	54.00	17.4	V	2.3
14188.5000	---	39.1	54.00	14.9	H	7.1
17949.2000	---	45.3	54.00	8.7	H	14.9

**8DPSK CH39 (1-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
2971.60000	49.1	---	74.00	24.9	H	11.0
4648.80000	41.1	---	74.00	32.9	V	-7.7
6996.80000	44.8	---	74.00	29.2	V	-2.0
9906.40000	48.1	---	74.00	25.9	V	2.0
14123.0000	51.2	---	74.00	22.8	V	6.9
17824.0000	56.4	---	74.00	17.6	V	13.5
2997.00000	---	37.5	54.00	16.5	V	11.0
4881.60000	---	31.2	54.00	22.8	H	-7.4
7731.20000	---	33.5	54.00	20.5	H	-0.6
9904.00000	---	36.3	54.00	17.7	V	1.9
14381.0000	---	39.1	54.00	14.9	V	7.1
17948.4000	---	45.4	54.00	8.6	H	14.9

**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**



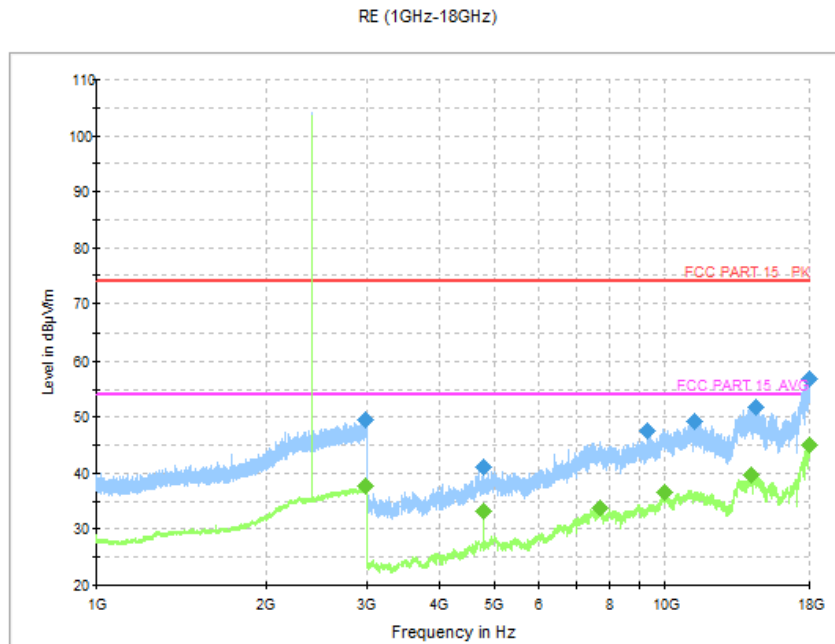


Fig. 42 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~18 GHz)

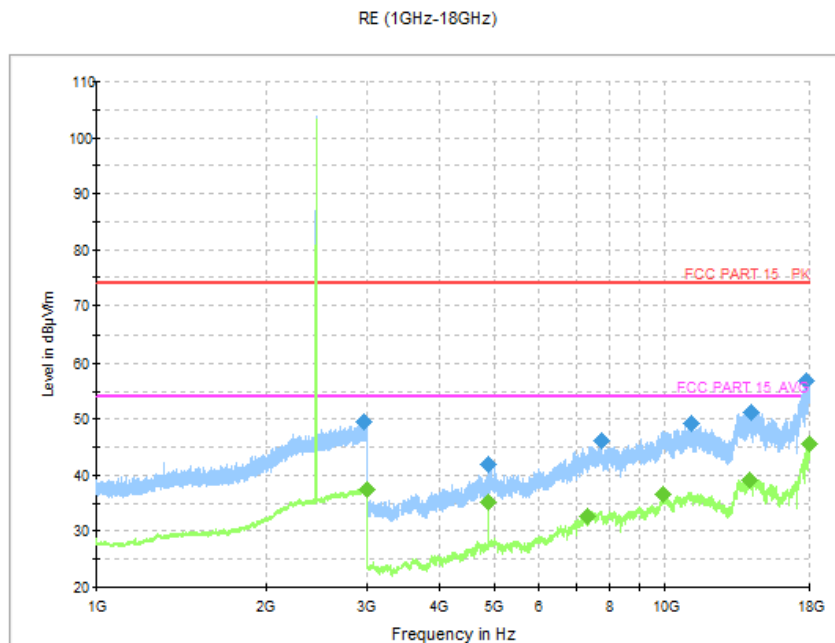
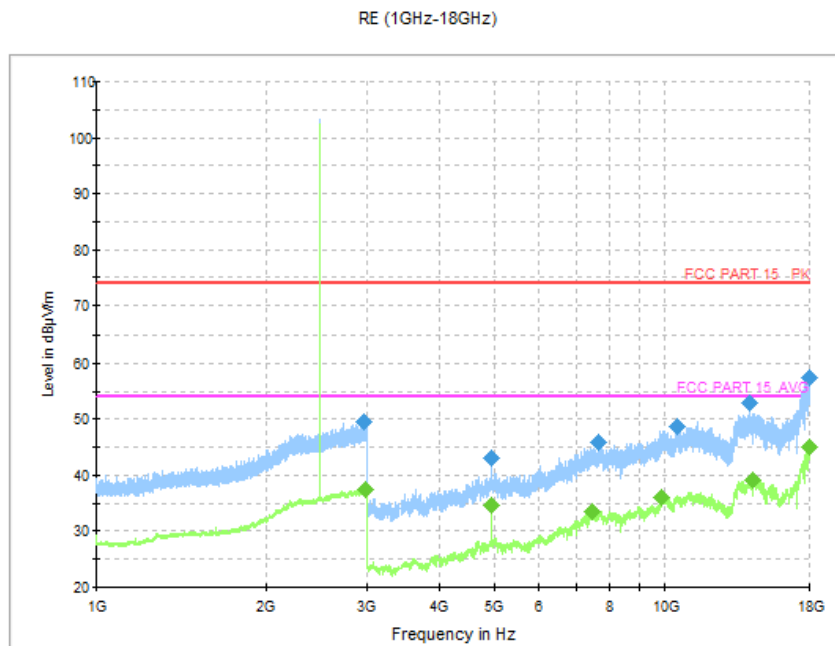
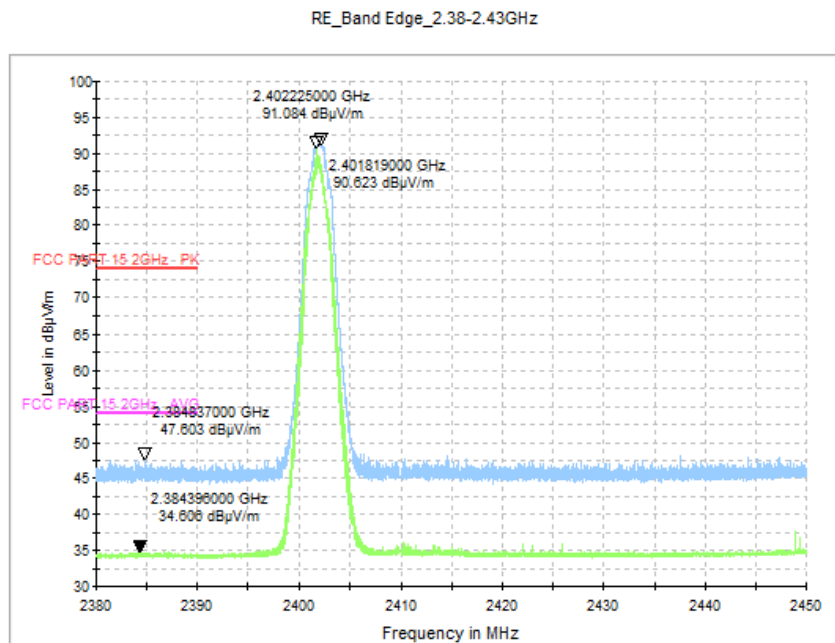


Fig. 43 Radiated Spurious Emission (GFSK, Ch39, 1 GHz ~18 GHz)



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



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

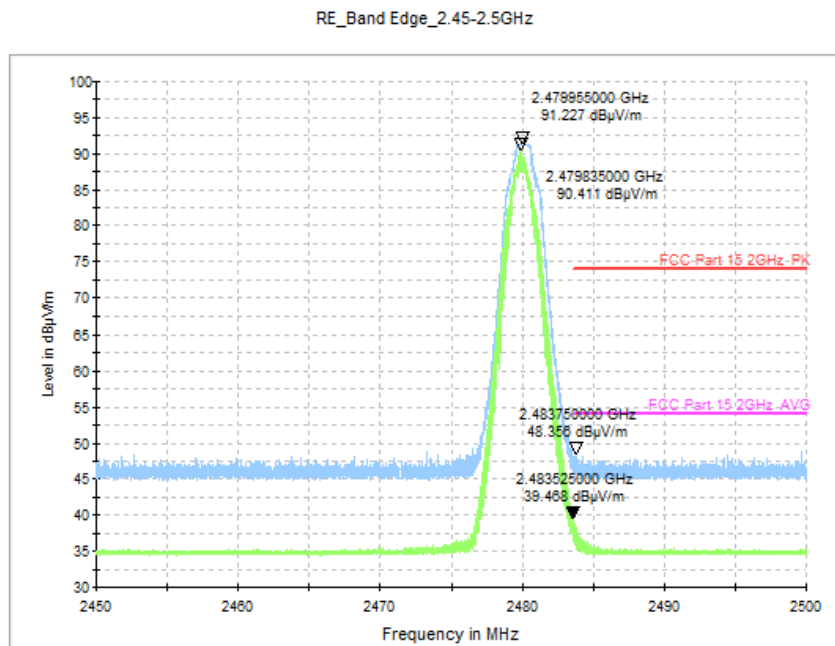


Fig. 46 Radiated Band Edges (GFSK, Ch78, 2450GHz~2500GHz)

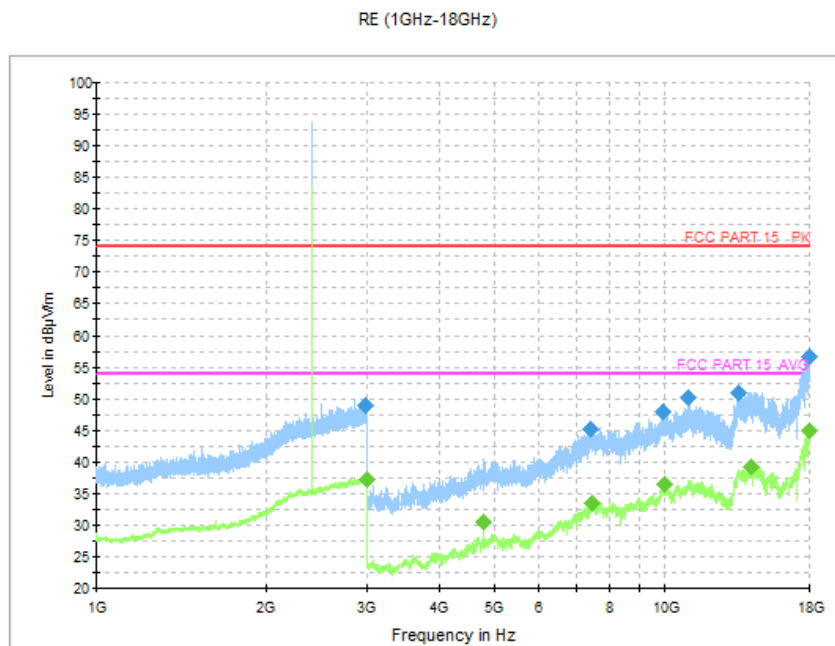


Fig. 47 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch0, 1 GHz ~18 GHz)

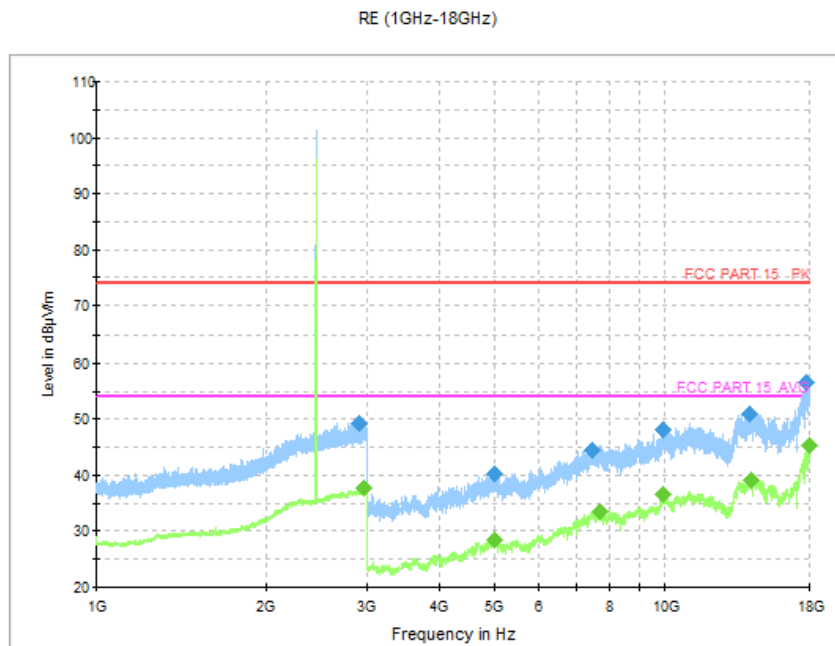


Fig. 48 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch39, 1 GHz ~18 GHz)

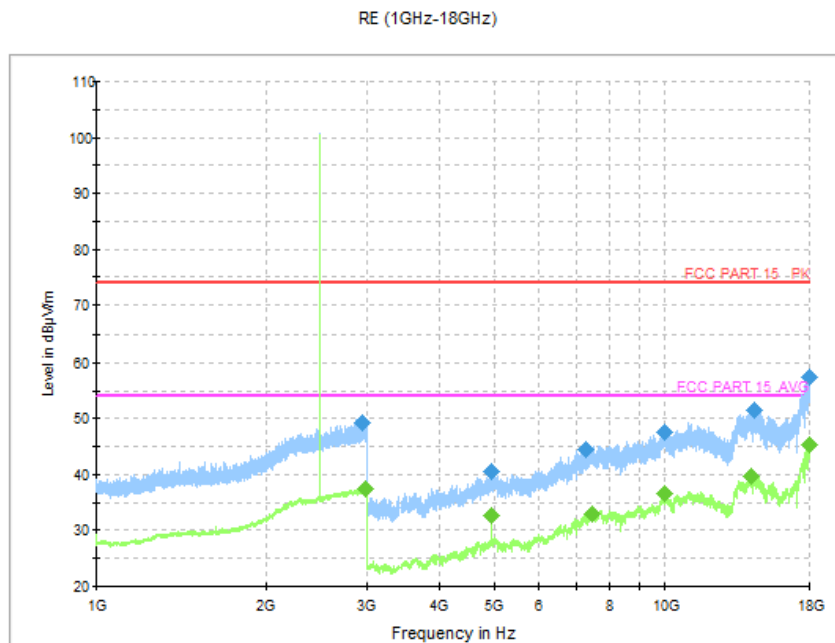


Fig. 49 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch78, 1 GHz ~18 GHz)

RE\_Band Edge\_2.38-2.43GHz

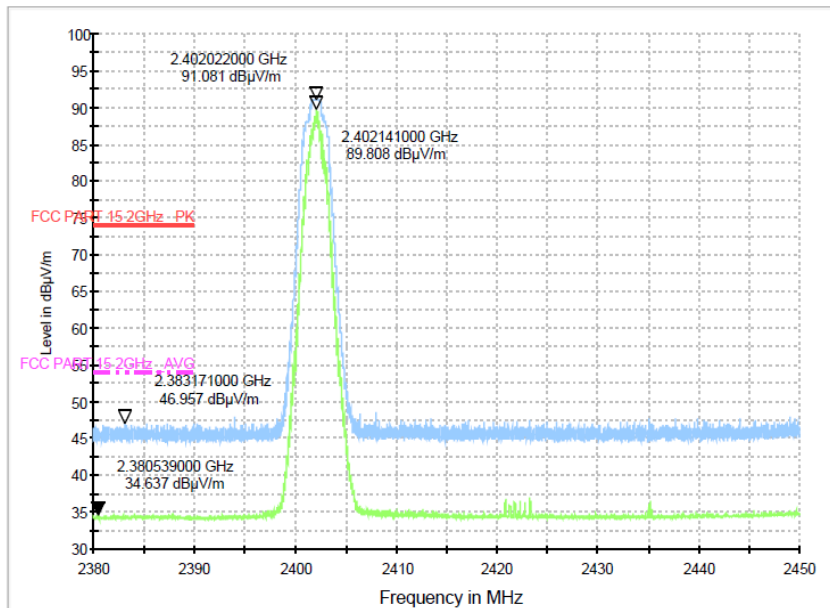


Fig. 50 Radiated Band Edges ( $\pi/4$  DQPSK, Ch0, 2380GHz~2450GHz)

RE\_Band Edge\_2.45-2.5GHz

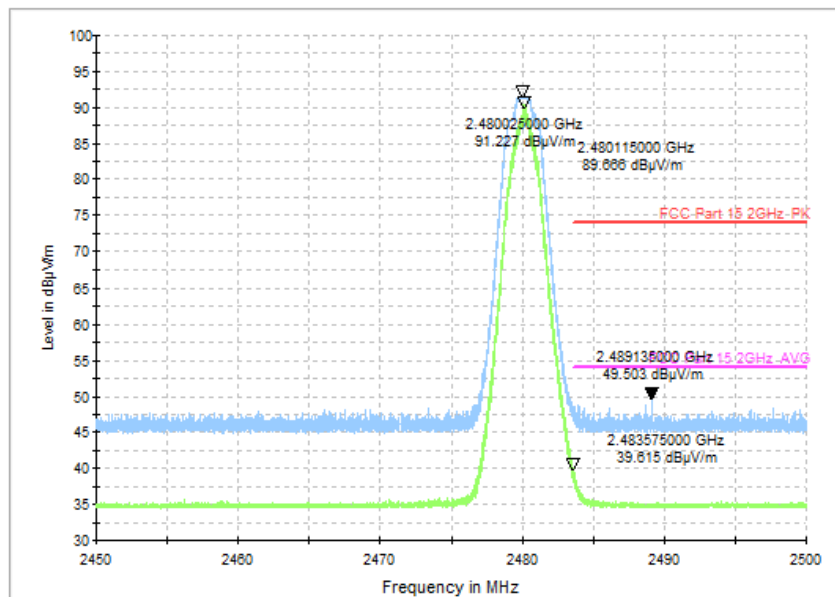
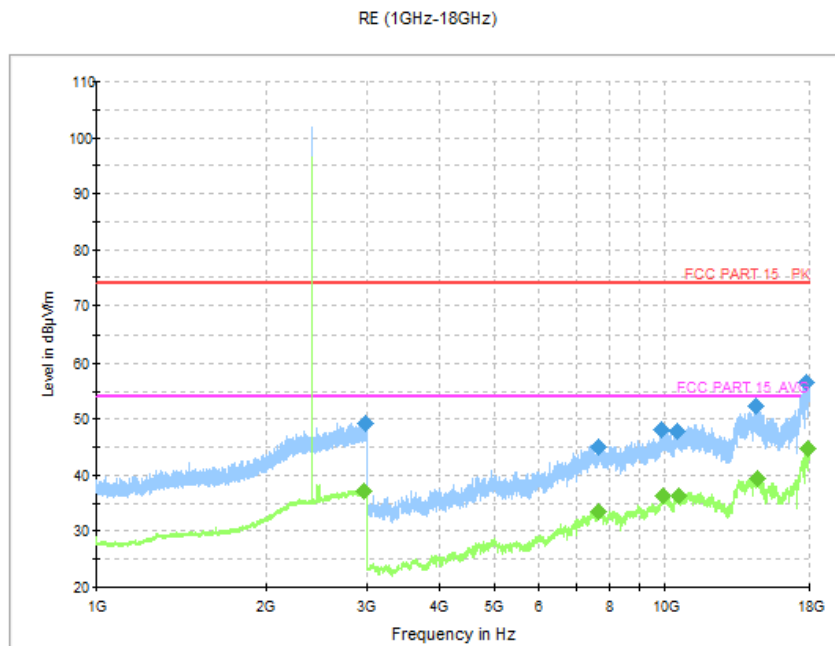
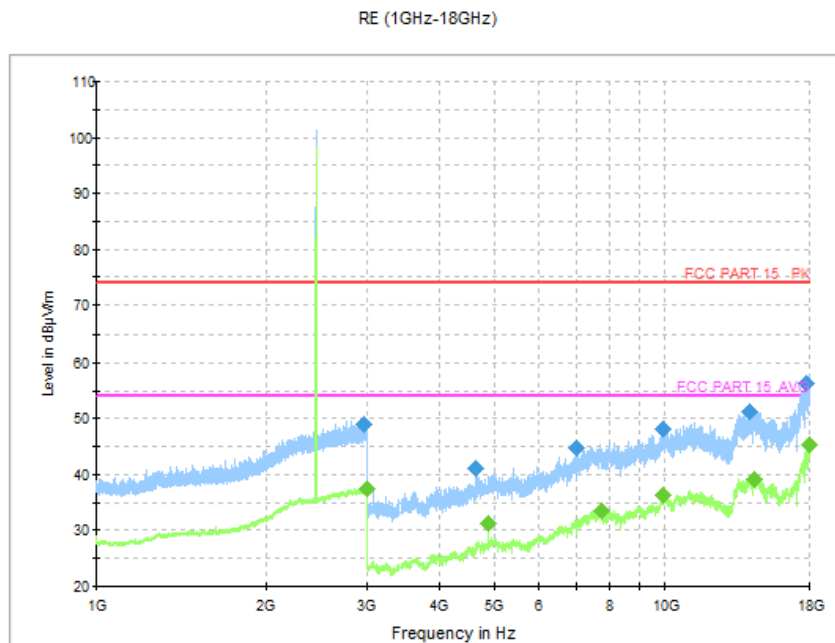


Fig. 51 Radiated Band Edges ( $\pi/4$  DQPSK, Ch78, 2450GHz~2500GHz)



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



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

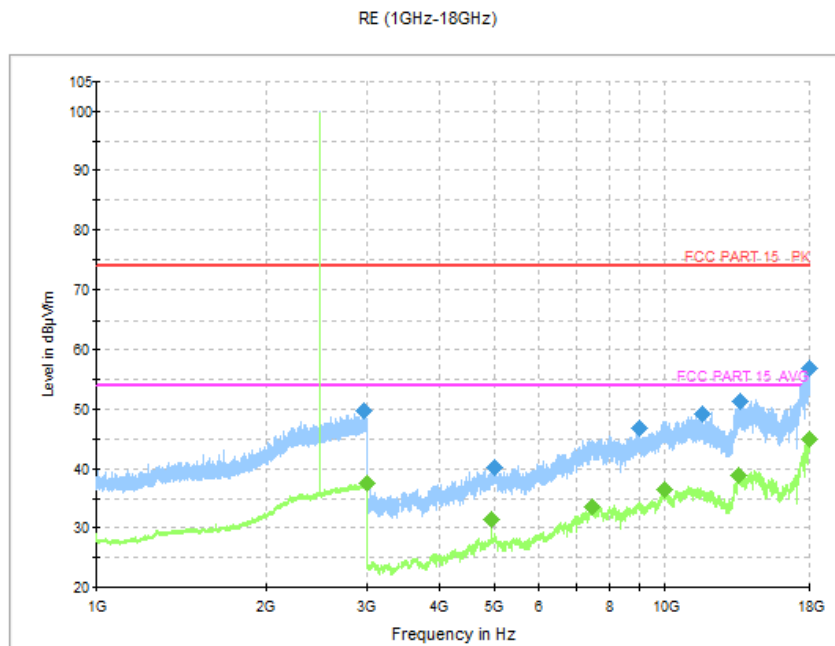


Fig. 54 Radiated Spurious Emission (8DPSK, Ch78, 1 GHz ~18 GHz)

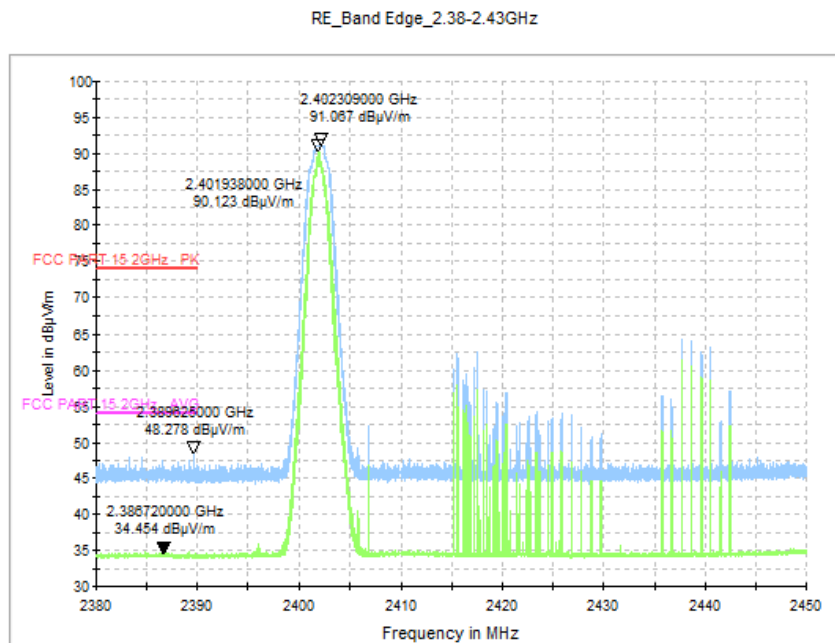


Fig. 55 Radiated Band Edges (8DPSK, Ch0, 2380GHz~2450GHz)

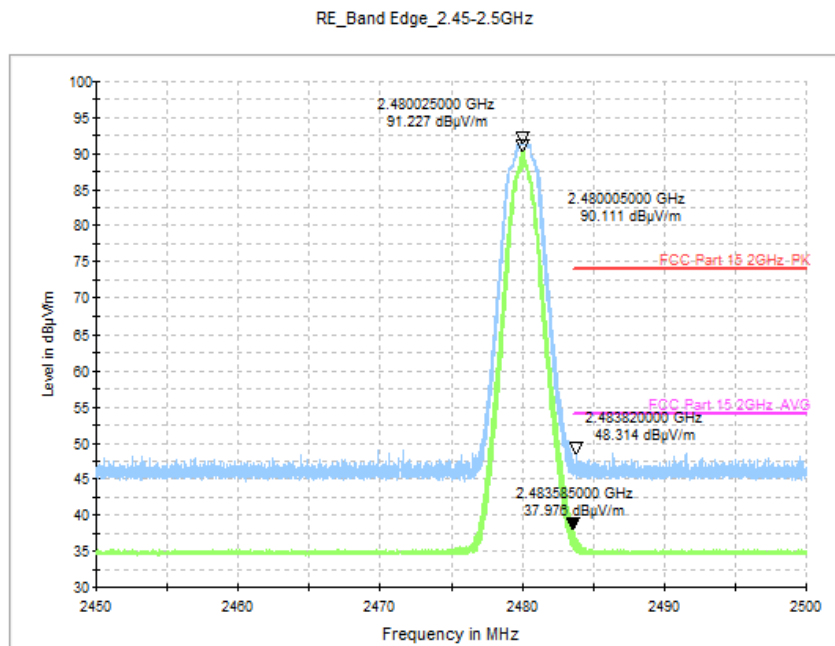


Fig. 56 Radiated Band Edges (8DPSK, Ch78, 2450GHz~2500GHz)

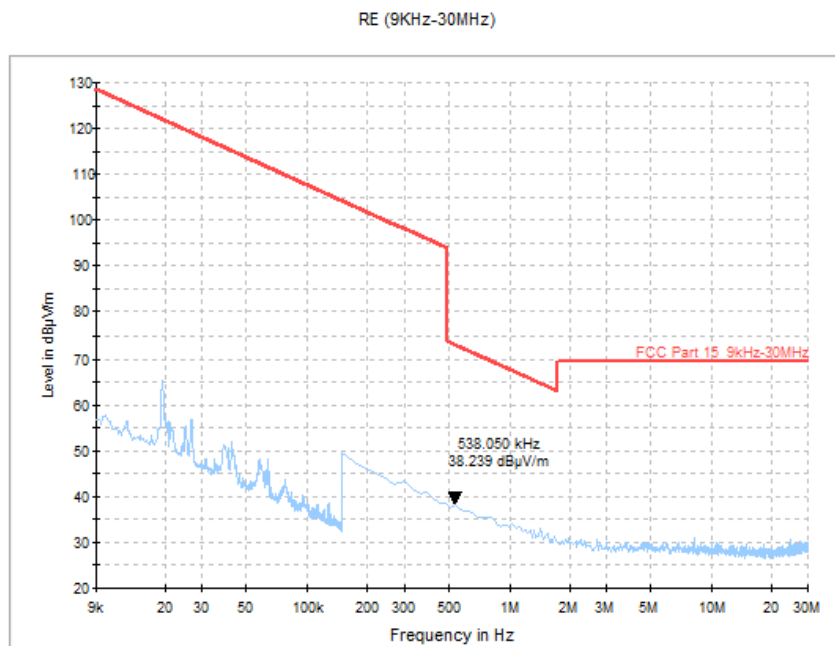


Fig. 57 Radiated Spurious Emission (All Channels, 9 kHz ~30 MHz)



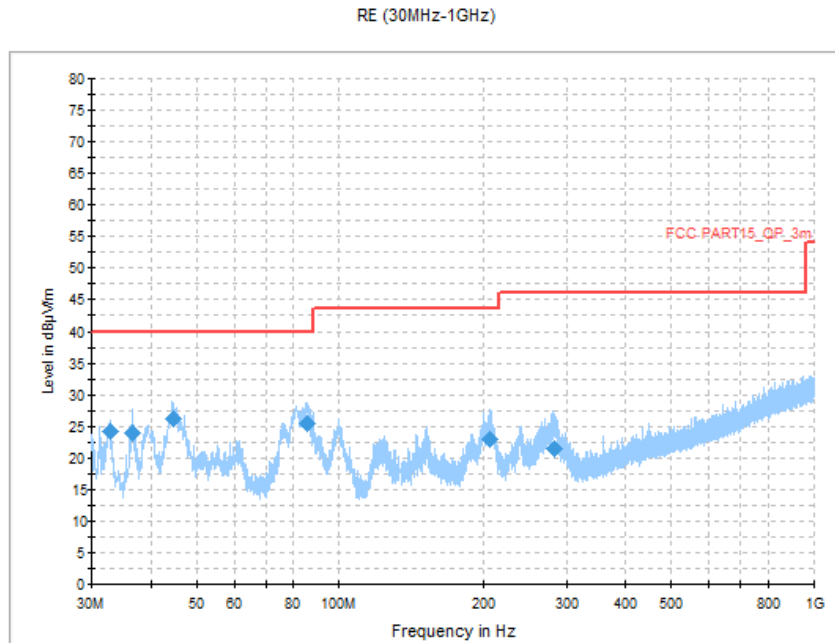


Fig. 58 Radiated Spurious Emission (All Channels, 30 MHz ~1 GHz)

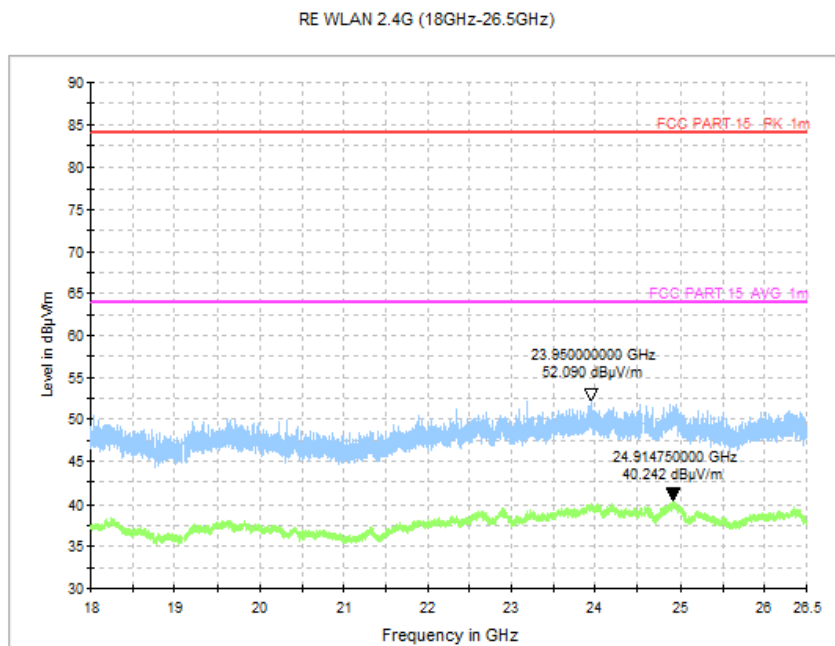


Fig. 59 Radiated Spurious Emission (All Channels, 18 GHz ~26.5 GHz)

### A.5 20dB Bandwidth

**Measurement Limit:**

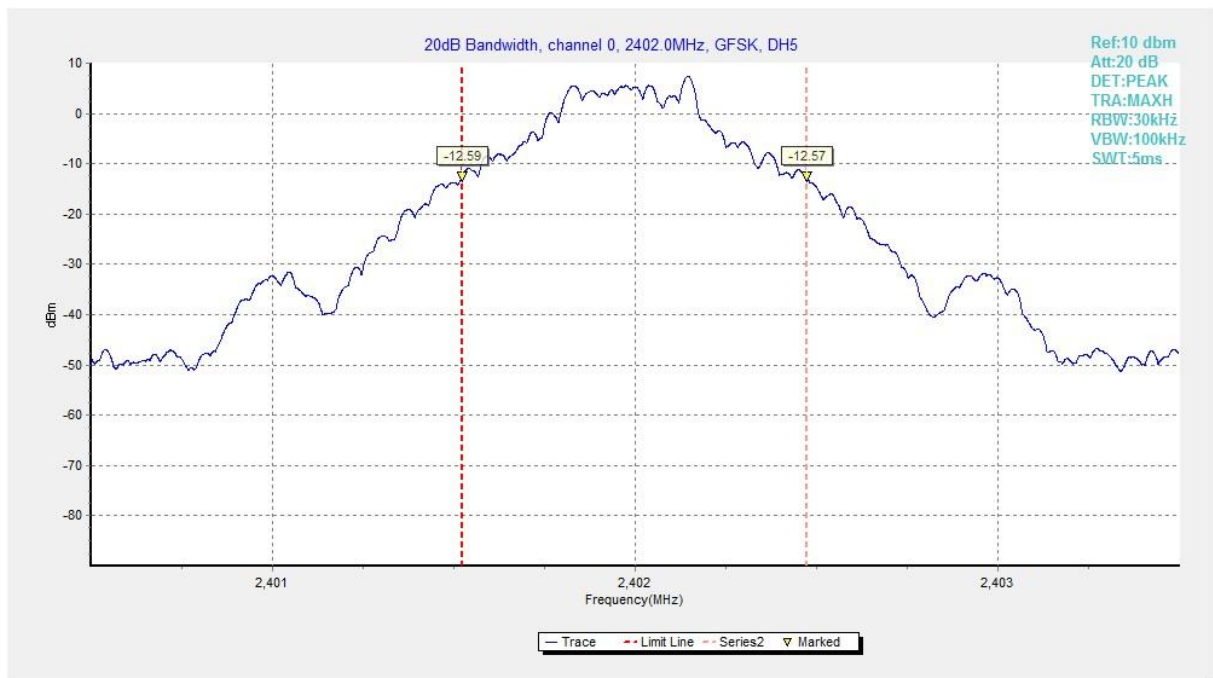
Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	/

**Measurement Result:**

Mode	Channel	20dB Bandwidth ( kHz)		conclusion
		Fig.	Value	
GFSK	0	Fig.60	951.75	/
	39	Fig.61	941.25	
	78	Fig.62	949.50	
$\pi$ /4 DQPSK	0	Fig.63	1257.00	/
	39	Fig.64	1229.25	
	78	Fig.65	1233.75	
8DPSK	0	Fig.66	1259.25	/
	39	Fig.67	1254.00	
	78	Fig.68	1286.25	

See below for test graphs.

**Conclusion: PASS**



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

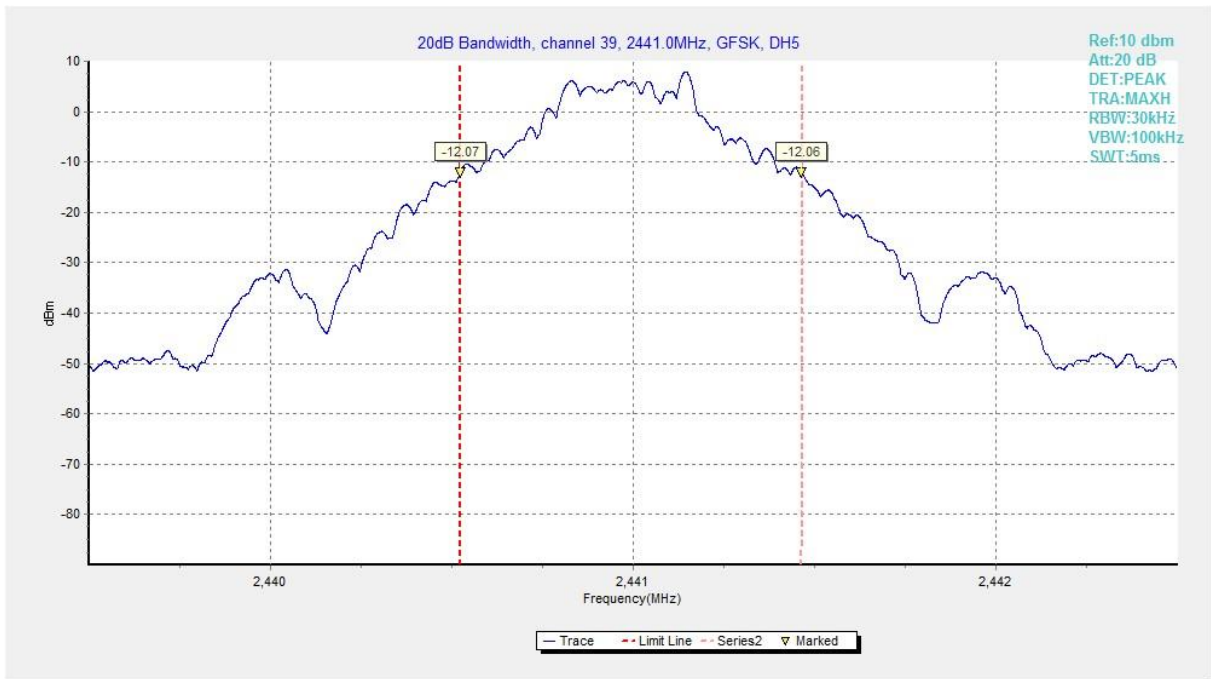


Fig. 61 20dB Bandwidth (GFSK, Ch 39)

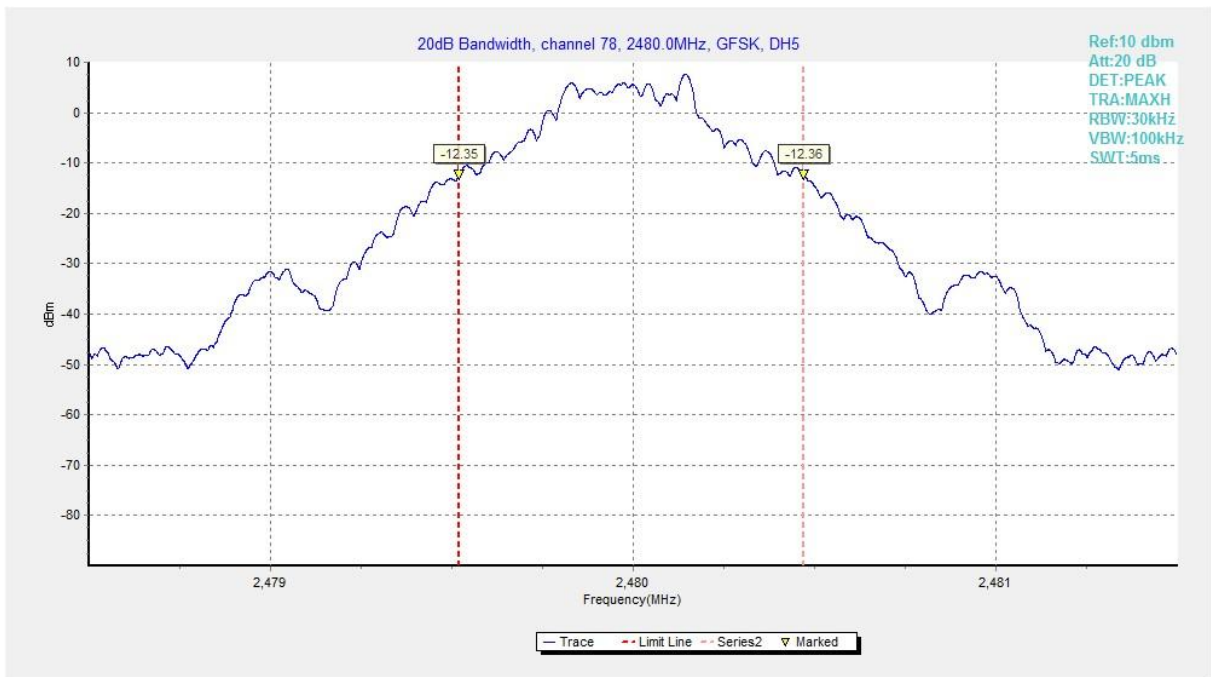


Fig. 62 20dB Bandwidth (GFSK, Ch 78)

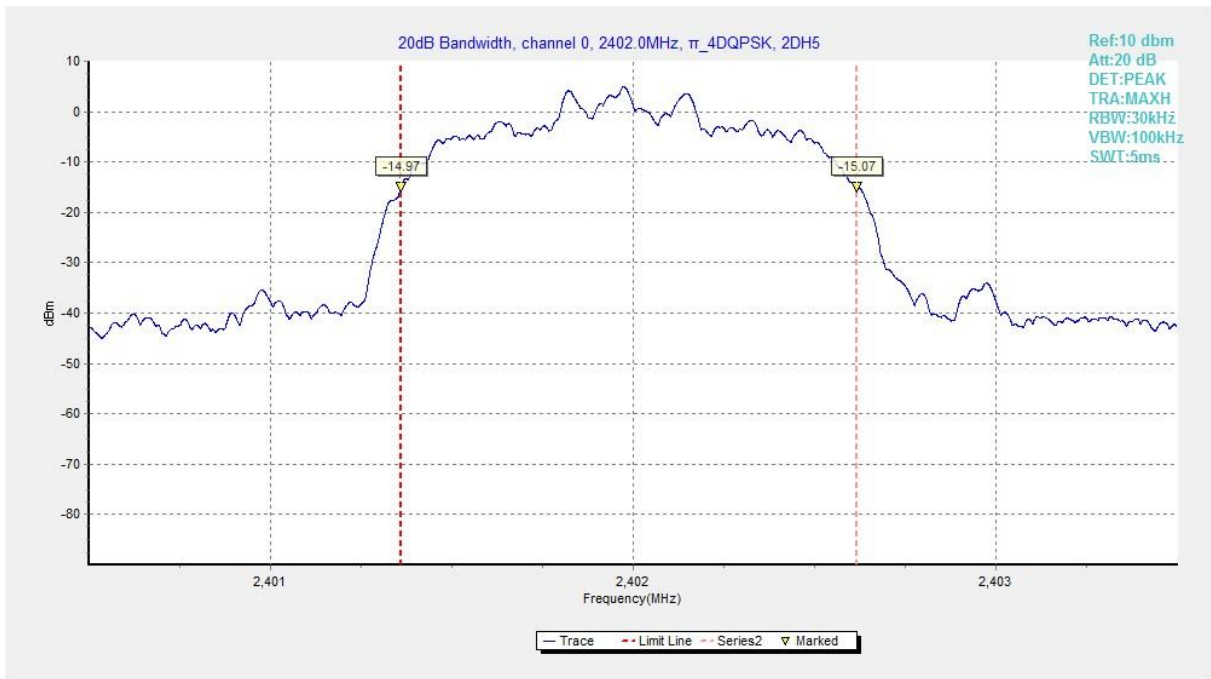


Fig. 63 20dB Bandwidth ( $\pi$  /4 DQPSK, Ch 0)

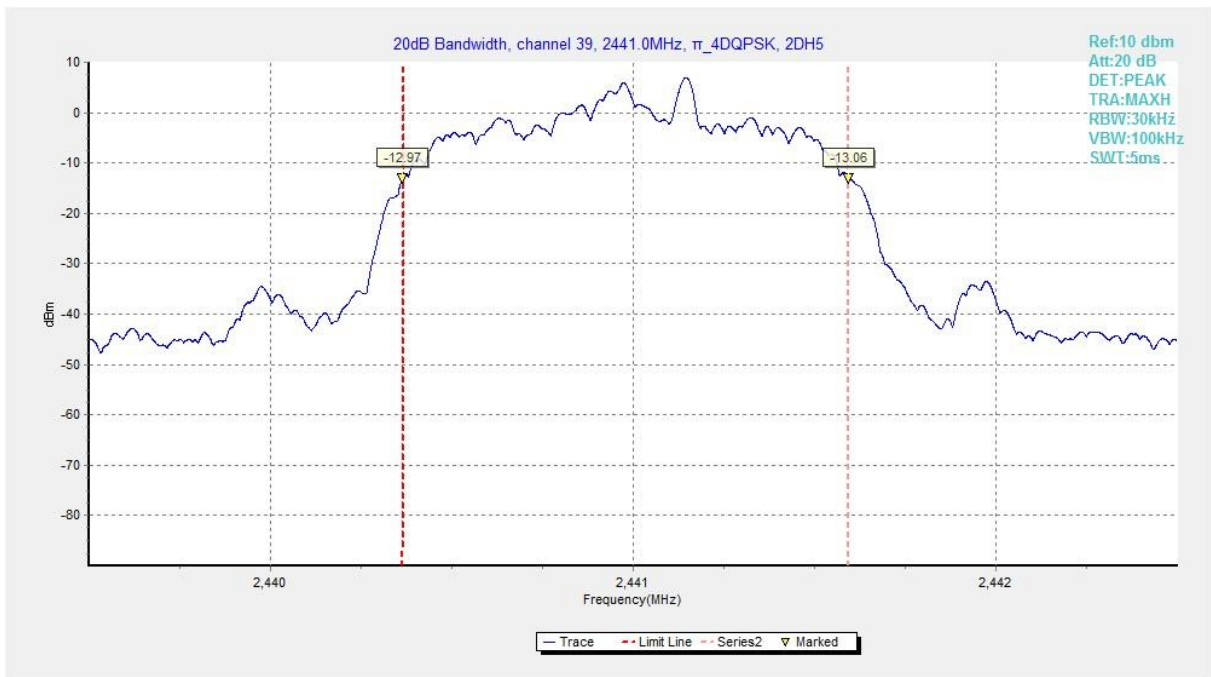


Fig. 64 20dB Bandwidth ( $\pi$  /4 DQPSK, Ch 39)

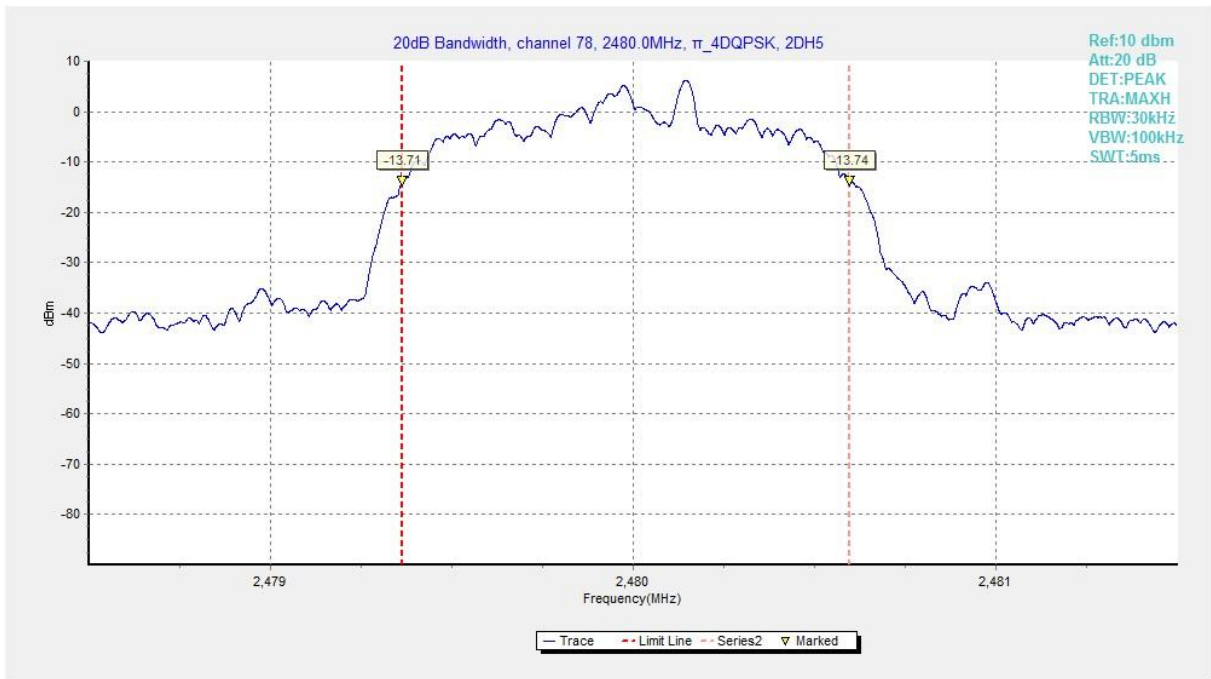


Fig. 65 20dB Bandwidth ( $\pi/4$  DQPSK, Ch 78)

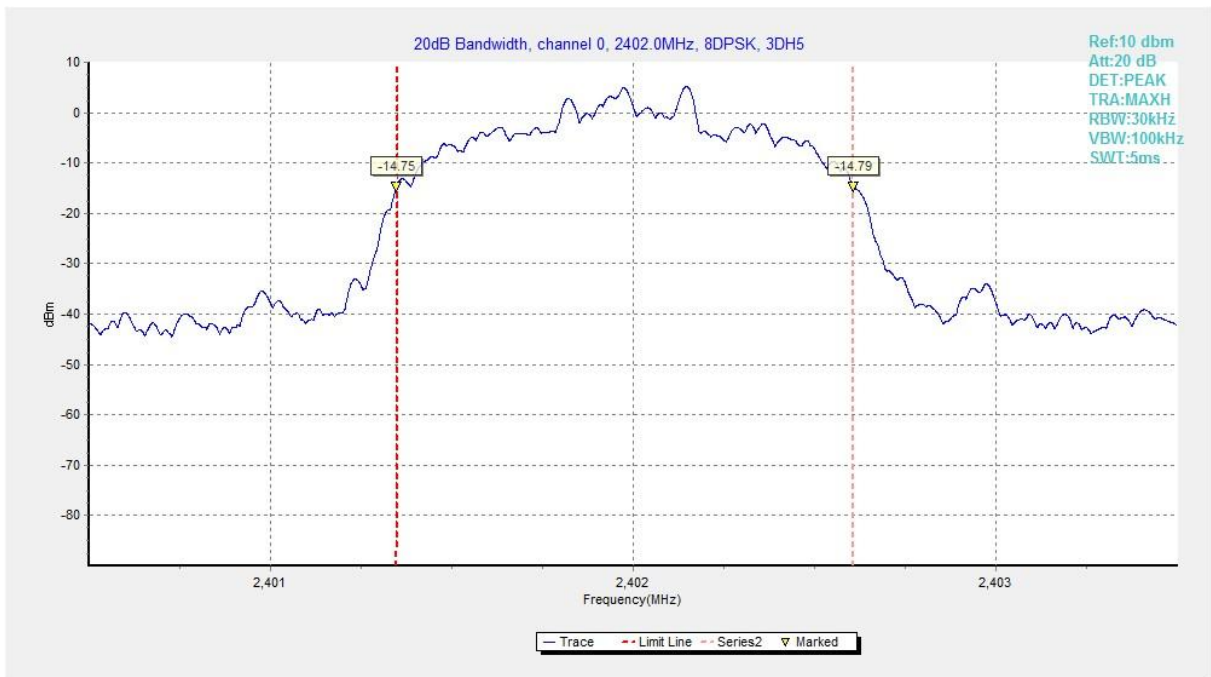


Fig. 66 20dB Bandwidth (8DPSK, Ch 0)

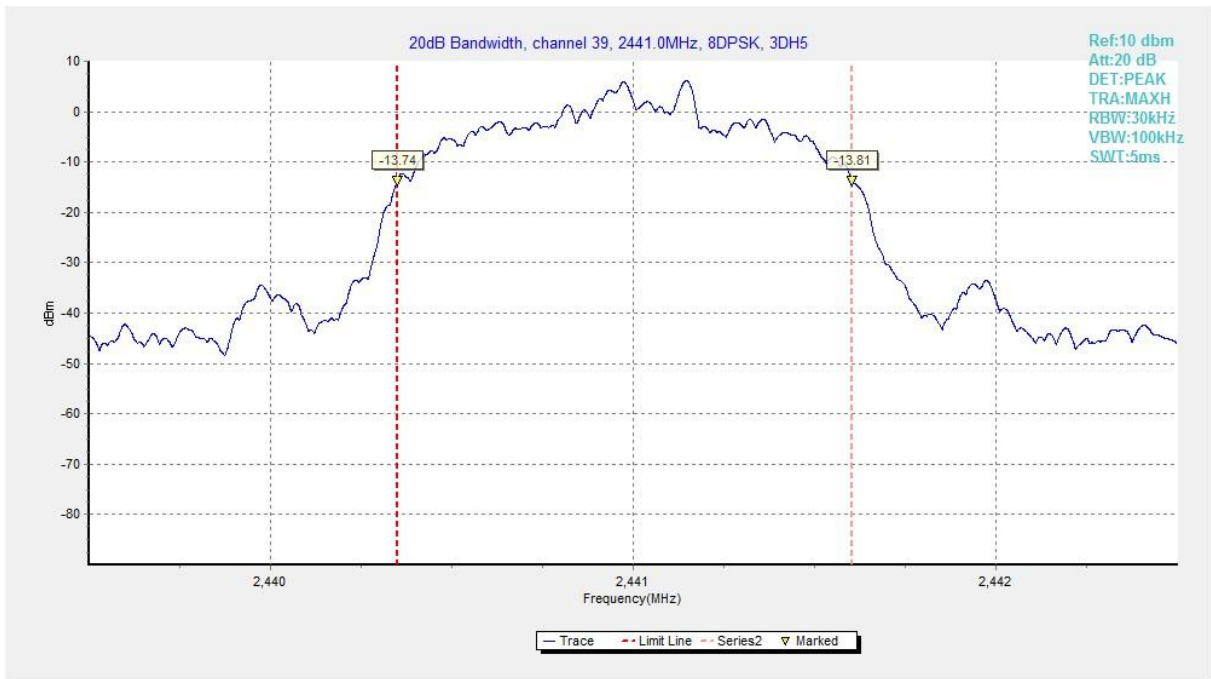


Fig. 67 20dB Bandwidth (8DPSK, Ch 39)

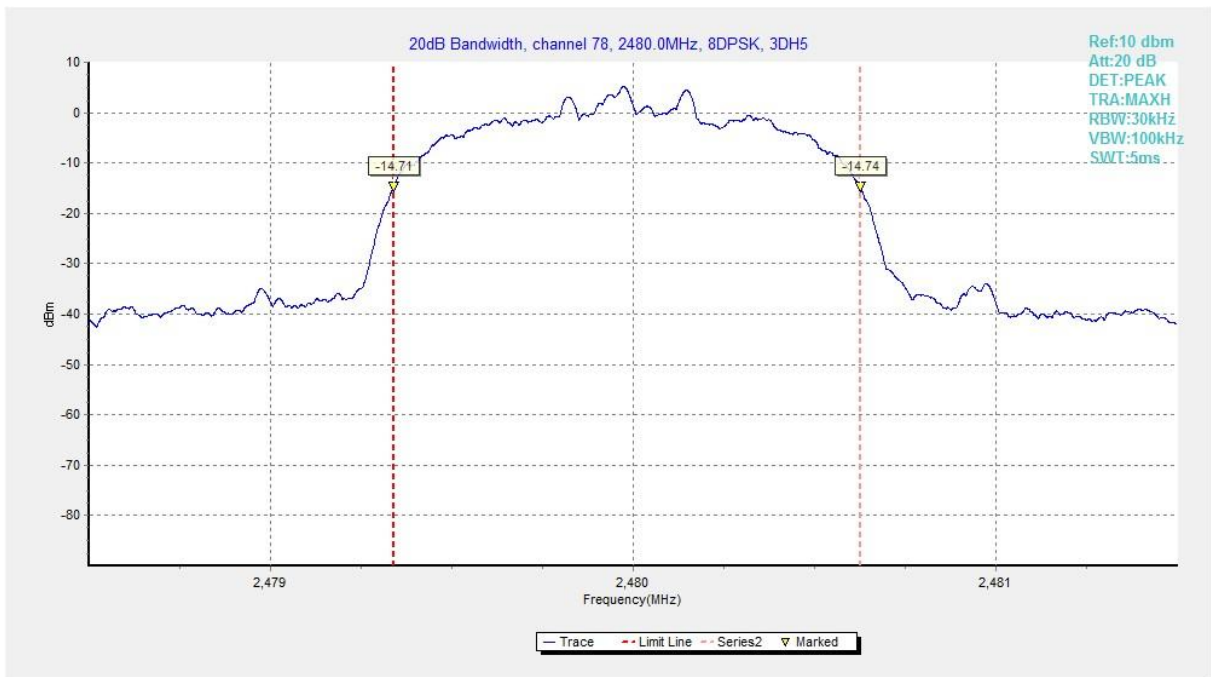


Fig. 68 20dB Bandwidth (8DPSK, Ch 78)



### 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	306.36	<b>P</b>
			Fig.70		
$\pi/4$ DQPSK	39	2-DH5	Fig.71	307.79	<b>P</b>
			Fig.72		
8DPSK	39	3-DH5	Fig.73	307.15	<b>P</b>
			Fig.74		

See below for test graphs.

**Conclusion: Pass**



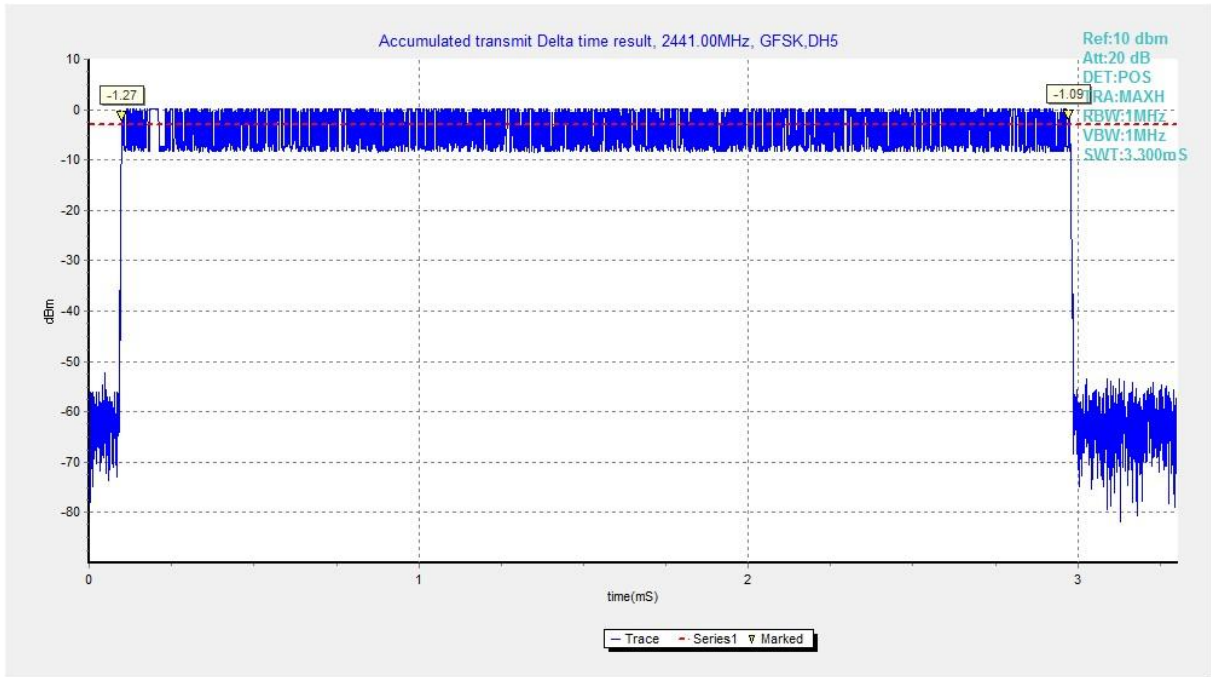


Fig. 69 Time of Occupancy(Dwell Time) (GFSK, Ch39)

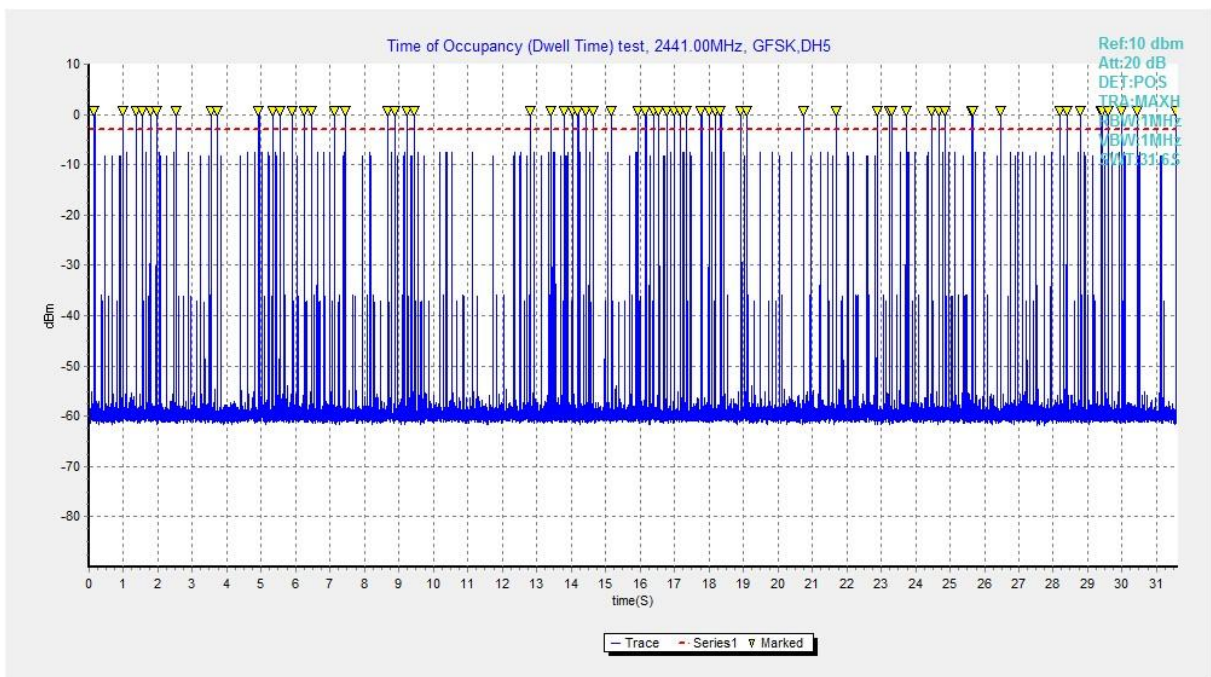


Fig. 70 Time of Occupancy(Dwell Time) (GFSK, Ch39)



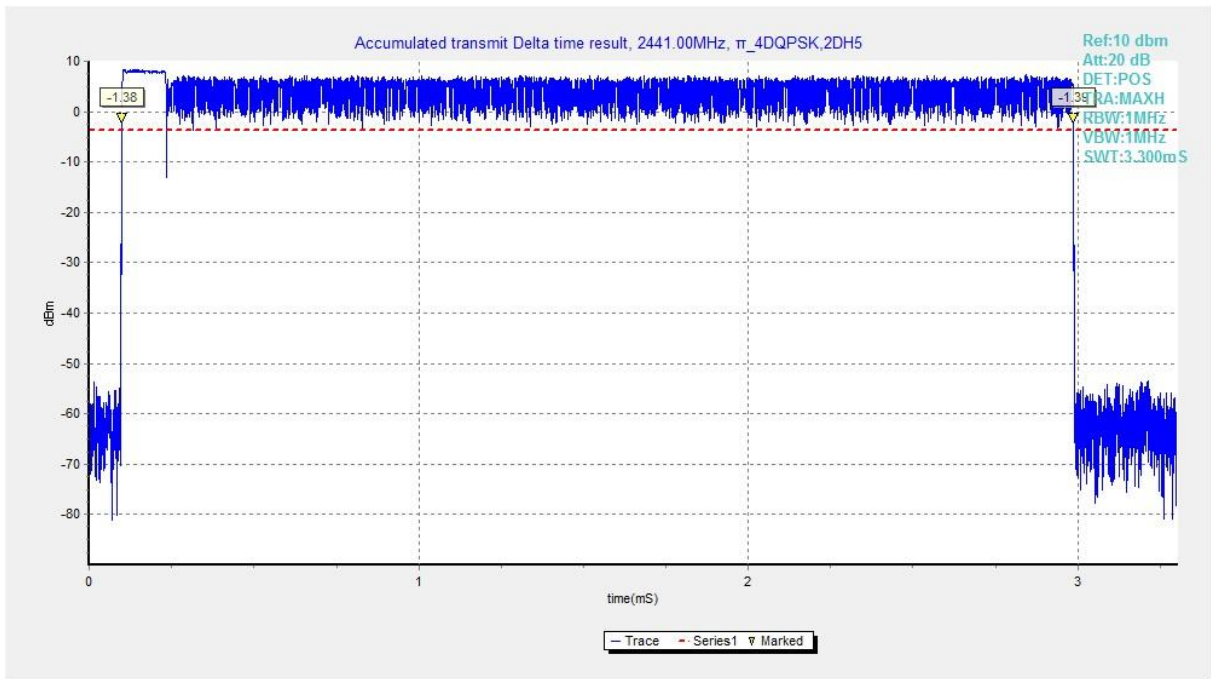


Fig. 71 Time of Occupancy(Dwell Time) ( $\pi$  /4 DQPSK, Ch39)

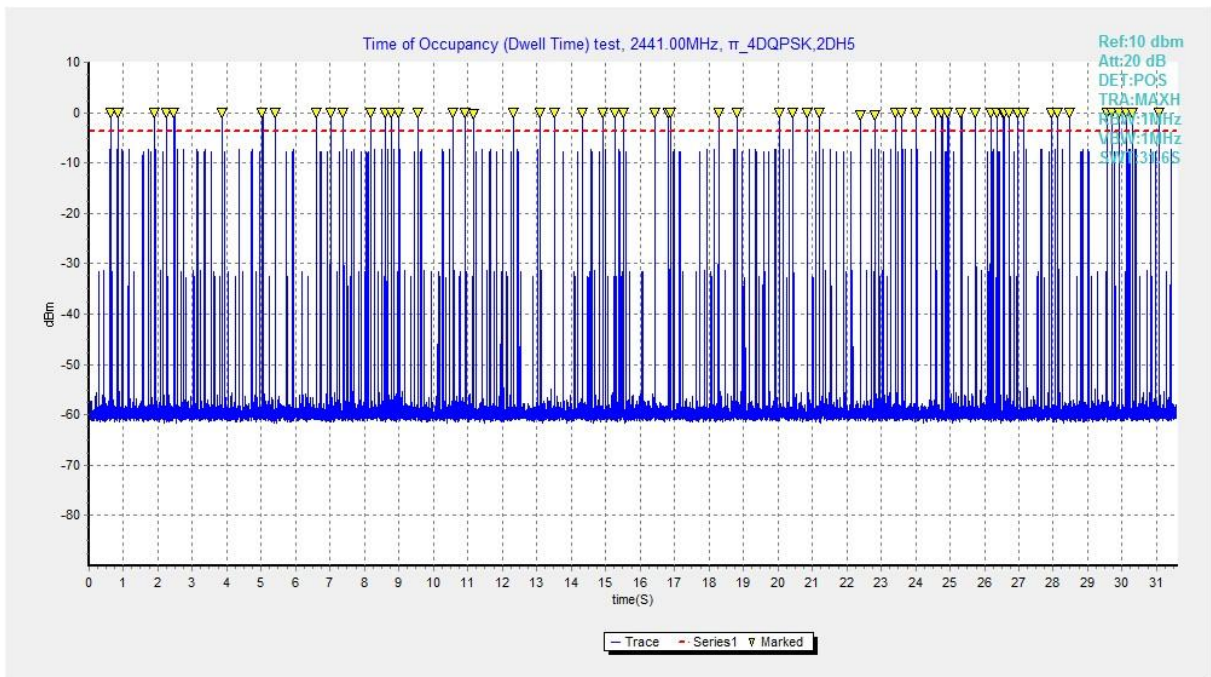


Fig. 72 Time of Occupancy(Dwell Time) ( $\pi$  /4 DQPSK, Ch39)

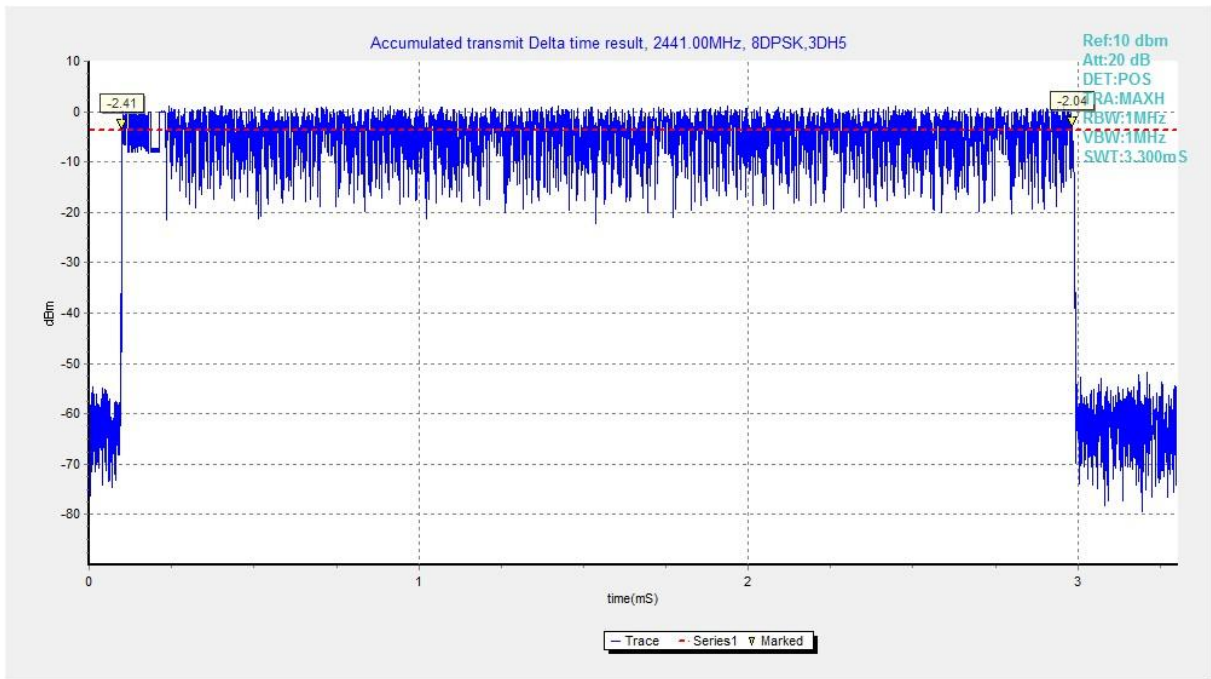


Fig. 73 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

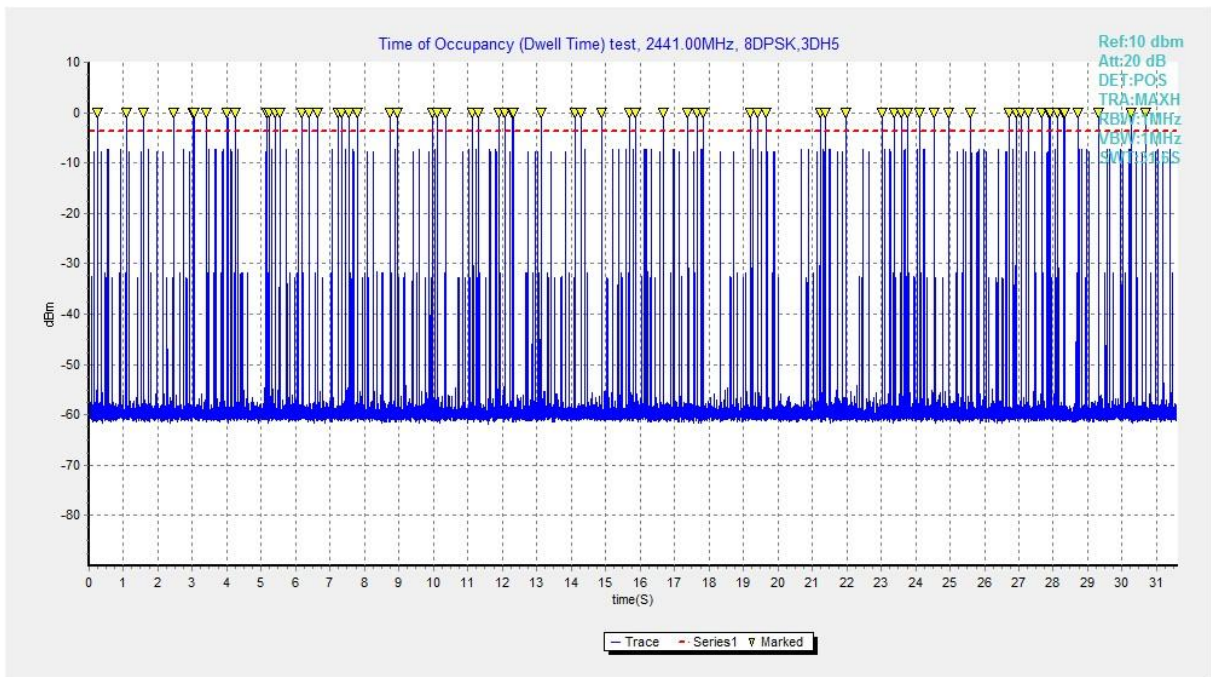


Fig. 74 Time of Occupancy(Dwell Time) (8DPSK, Ch39)



### 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		Test result	Conclusion
GFSK	DH5	Fig.75	Fig.76	79	<b>P</b>
$\pi/4$ DQPSK	2-DH5	Fig.77	Fig.78	79	<b>P</b>
8DPSK	3-DH5	Fig.79	Fig.80	79	<b>P</b>

See below for test graphs.

**Conclusion: Pass**