



# TEST REPORT

No. I22N01939-BT

for

**FEITIAN Technologies Co., Ltd.**

**Android POS Terminal**

**Model Name: F310**

with

**Hardware Version: V1.01**

**Software Version: F310\_OS\_1.01.06.00**

**FCC ID: ZD3FTF310**

**Issued Date: 2022-11-10**

**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:**

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I22N01939-BT	Rev.0	1st edition	2022-11-10

Note: the latest revision of the test report supersedes all previous versions.

## 1. Summary of Test Report

### 1.1. Test Items

Description	Android POS Terminal
Model Name	F310
Code Name	F310
Applicant's name	FEITIAN Technologies Co., Ltd.
Manufacturer's Name	FEITIAN Technologies Co., Ltd.

### 1.2. Test Standards

FCC Part15-2021; 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 518000

### 1.5. Project data

Testing Start Date:	2022-10-18
Testing End Date:	2022-11-03

### 1.6. Signature



Ma Rui

(Prepared this test report)



An Ran

(Reviewed this test report)



Zhang Bojun

(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: FEITIAN Technologies Co., Ltd.  
Address: 17th Floor, Tower B, Huizhi Mansion, No.9 Xueqing Road, Haidian District, Beijing, China  
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### **2.2. Manufacturer Information**

Company Name: FEITIAN Technologies Co., Ltd.  
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Telephone: 13811812336  
FAX: +86 10 62304477



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

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

Description	Android POS Terminal
Model Name	F310
Frequency Band	2400MHz~2483.5MHz
Equipment type	Bluetooth® BR/EDR
Type of Modulation	GFSK/ $\pi$ /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	1.27 dBi
Power Supply	3.8V DC by Battery
FCC ID	ZD3FTF310
Condition of EUT as received	No abnormality in appearance

Note: Photographs of EUT are shown in ANNEX A of this test report. Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

#### **3.2. Internal Identification of EUT**

EUT ID*	IMEI	HW Version	SW Version	Date of Receipt
UT10aa	864255060100091	V1.01	F310_OS_1.01.06.00	2022-10-18
UT08aa	867400020316612	V1.01	F310_OS_1.01.06.00	2022-09-24

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

\*UT10aa is used for Conduction test; UT08aa is used for Radiation test and AC Power line Conducted Emission test.

#### **3.3. Internal Identification of AE**

AE ID*	Description	SN
AE1	Battery	/
AE2	Charger	
AE3	USB Cable	

##### AE1-1

Model	25001
Manufacturer	Dongguan HongDe Battery Co.,Ltd
Capacity	3000mAh
Nominal Voltage	3.8 V

##### AE1-2

Model	F310
Manufacturer	Shenzhen Aerospace Electronic Co.,Ltd.
Capacity	3000mAh



Nominal Voltage	3.8 V
AE2-1	
Model	TPA-46050200UU
Manufacturer	Shenzhen Tianyin Electronics Co.,Ltd
AE2-2	
Model	TPA-147C050100UU01
Manufacturer	Shenzhen Tianyin Electronics Co.,Ltd
AE3-1	
Model	USB A-C L=1000MM 1QA035_F310_RO
Manufacturer	SiChuan RTT Electronic Technology .,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 Android POS Terminal 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.

<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	2021
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	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)	/
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/manufacture 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.

Disclaimer:

A. After confirmation with the customer, the sample information provided by the customer may affect the validity of the measurement results in this report, and the impact and consequences arising therefrom shall be borne by the customer.

B. The samples in this report are provided by the customer, and the test results are only applicable to the samples received.

## 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	2022-12-29	1 year
2	Bluetooth Tester	CBT32	100584	Rohde & Schwarz	2022-12-29	1 year
3	Power Sensor	U2021XA	MY55430013	Keysight	2022-12-29	1 year
4	Data Acquisiton	U2531A	TW55443507	Keysight	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due Date	Calibration Period
1	Test Receiver	ESR7	101676	R&S	2022-11-24	1year
2	BiLog Antenna	3142E	0224831	ETS-lindgren	2024-05-27	3years
3	Horn Antenna	3117	00066577	ETS-lindgren	2025-04-17	1year
4	Anechoic Chamber	FACT3-2.0	1285	ETS-Lindgren	2023-05-29	2year
5	Spectrum Analyzer	FSV40	101192	R&S	2023-01-12	1year
6	Loop Antenna	HLA6120	35779	TESEQ	2025-05-10	3 years
7	Horn Antenna	QSH-SL-1 8-26-S-20	17013	Q-par	2023-01-06	3 years
8	Test Receiver	ESCI	100702	R&S	2023-01-12	1 year
9	LISN	ENV216	102067	R&S	2023-07-14	1 year

### Test software

No.	Equipment	Manufacturer	Version
1	TechMgr Software	CAICT	2.1.1
2	EMC32	Rohde & Schwarz	10.50.40

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

### 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
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

### Shielded room

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

## 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	4.56kHz	
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	$9\text{kHz} \leq f < 30\text{MHz}$	1.79dB
	$30\text{MHz} \leq f < 1\text{GHz}$	4.86dB
	$1\text{GHz} \leq f < 18\text{GHz}$	4.82dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	2.90dB
6. AC Power line Conducted Emission	$150\text{kHz} \leq f \leq 30\text{MHz}$	2.62dB



## **ANNEX A: Detailed Test Results**

### **A.0 Antenna requirement**

#### **Measurement Limit:**

<b>Standard</b>	<b>Requirement</b>
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 1.27 dBi. 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	5.90	6.10	6.66
$\pi/4$ DQPSK	7.35	7.11	7.76
8DPSK	7.67	7.39	7.92

### E.I.R.P

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	7.17	7.37	7.93
$\pi/4$ DQPSK	8.62	8.38	9.03
8DPSK	8.94	8.66	9.19

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

**Conclusion: Pass**



## A.2 Band Edges Compliance

Method of Measurement: See ANSI C63.10-clause 7.8.6.

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



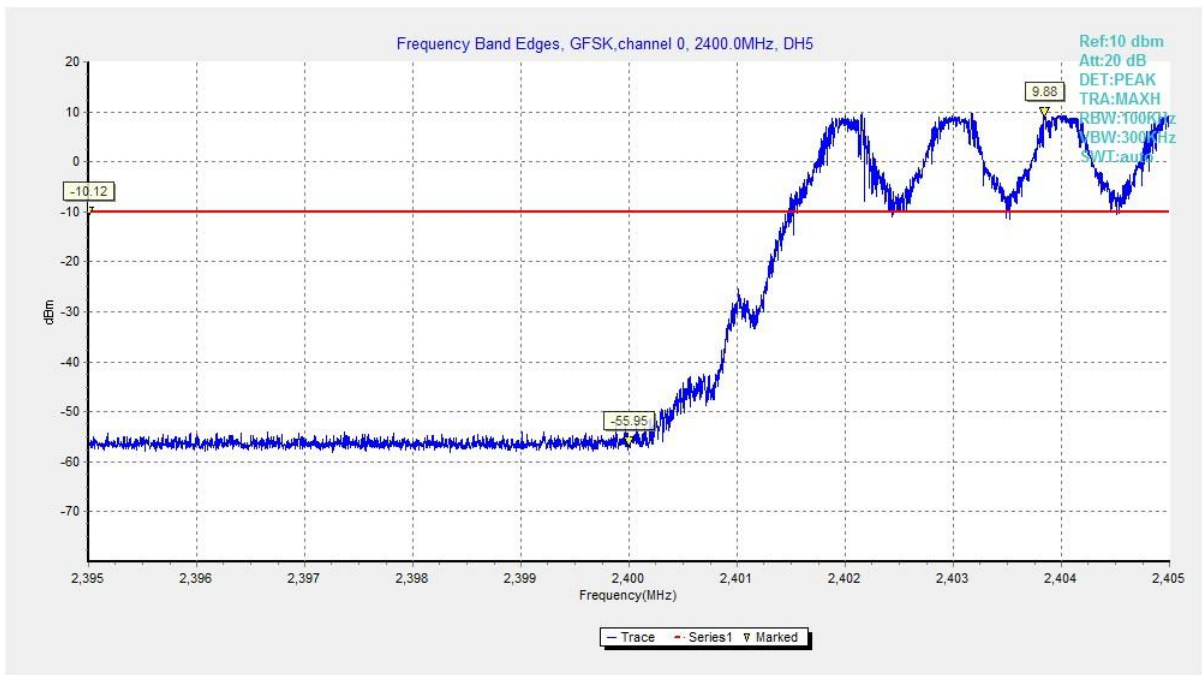


Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)

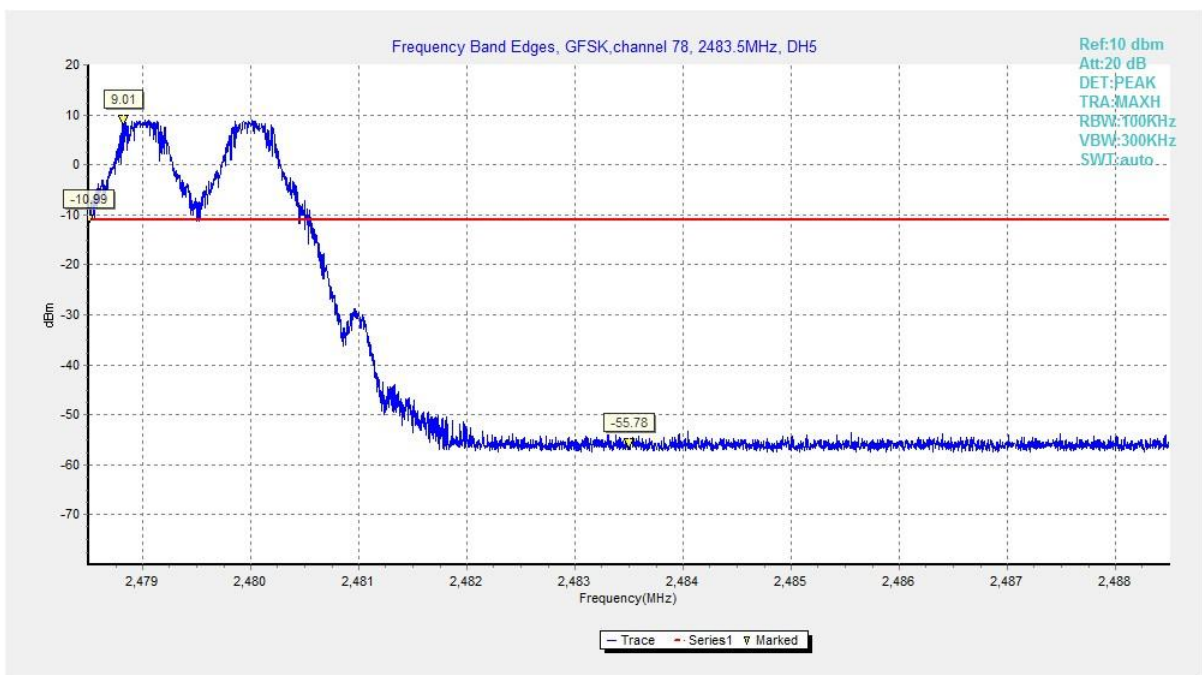


Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)

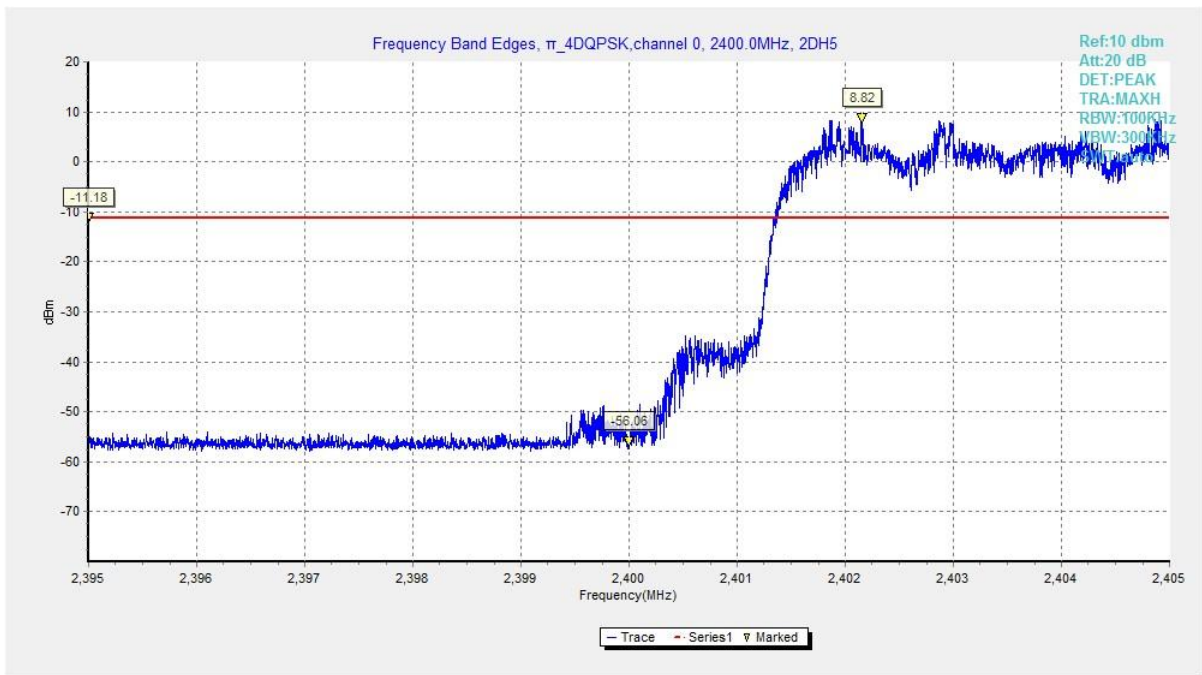


Fig. 3 Band Edges ( $\pi$ /4 DQPSK, Ch 0, Hopping ON)

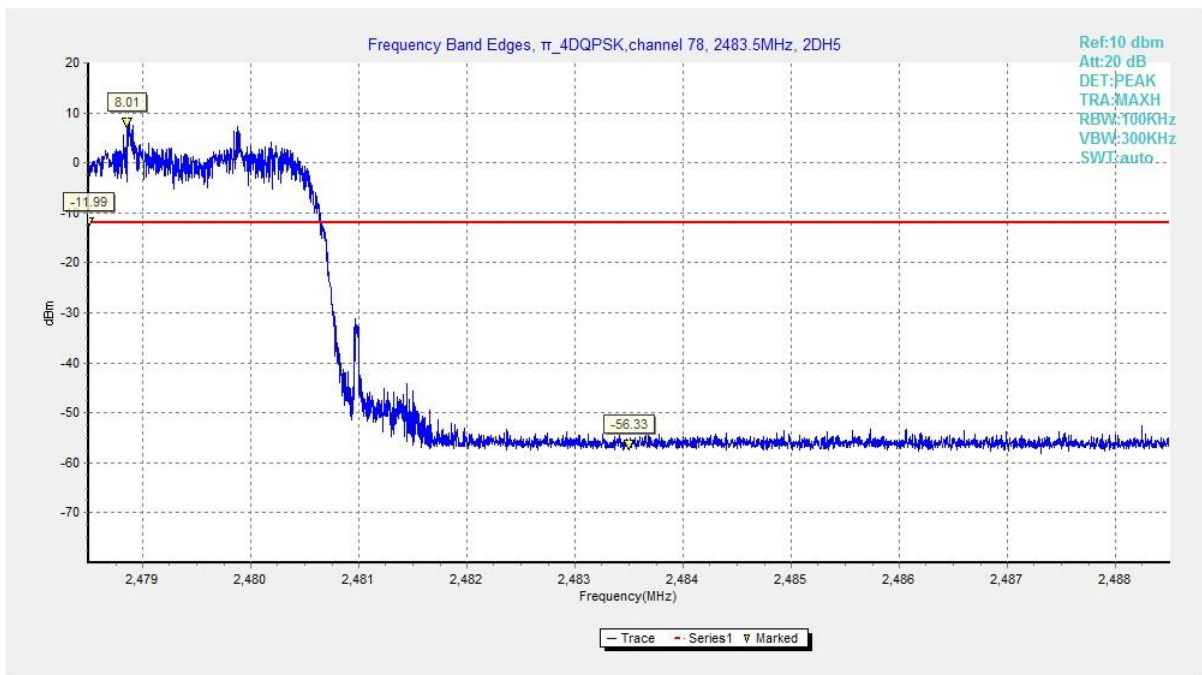


Fig. 4 Band Edges ( $\pi$ /4 DQPSK, Ch 78, Hopping ON)

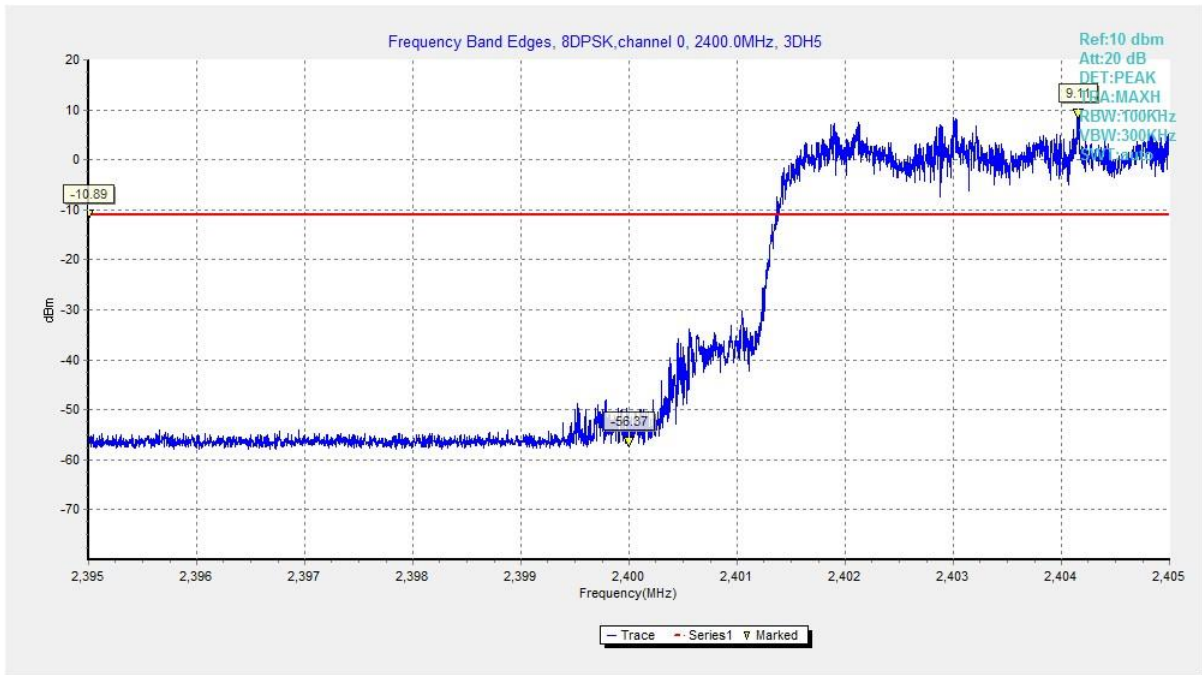


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

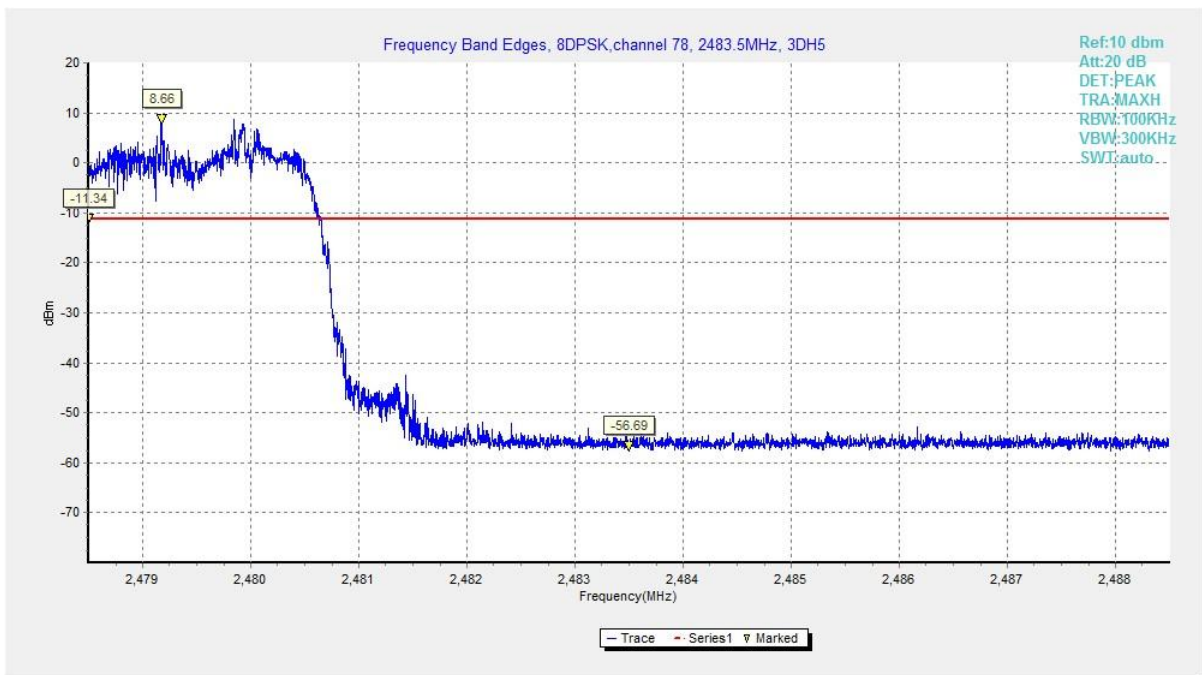


Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)

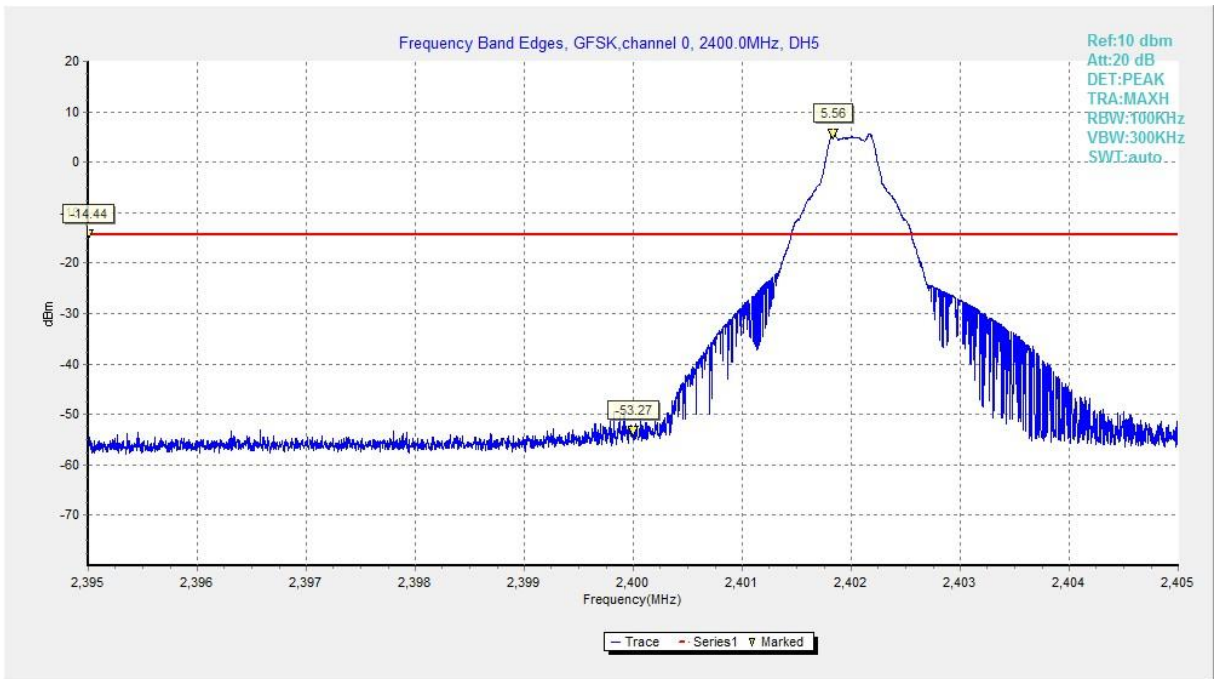


Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)

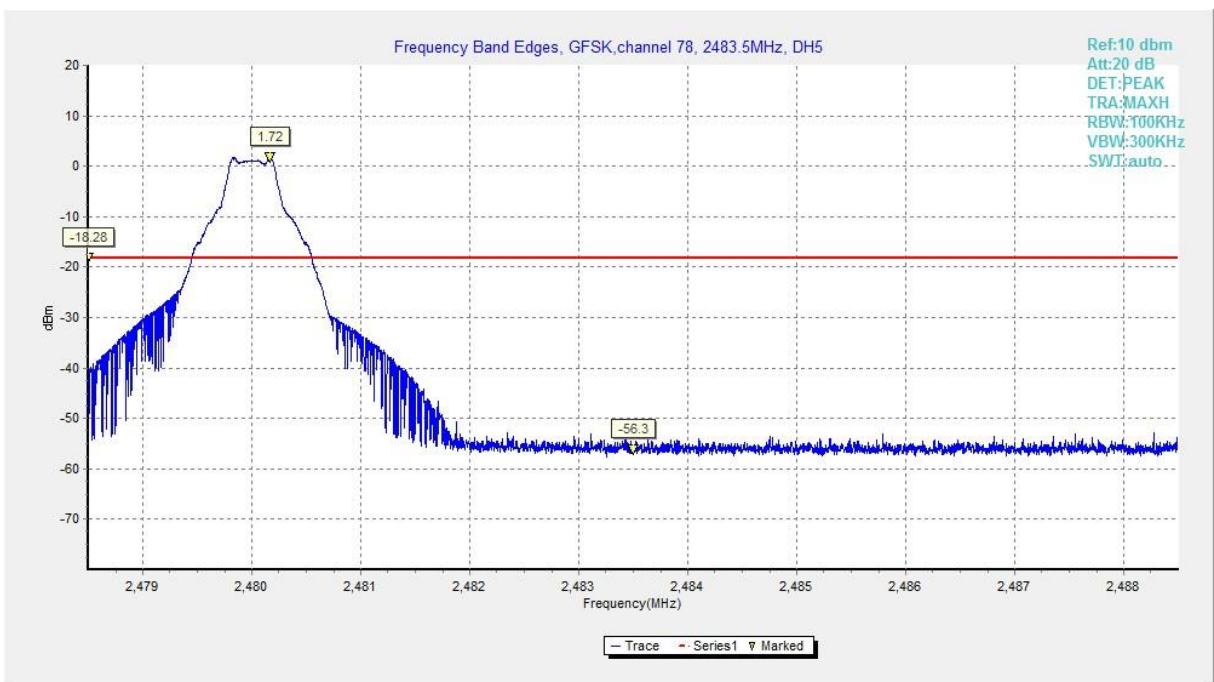


Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)

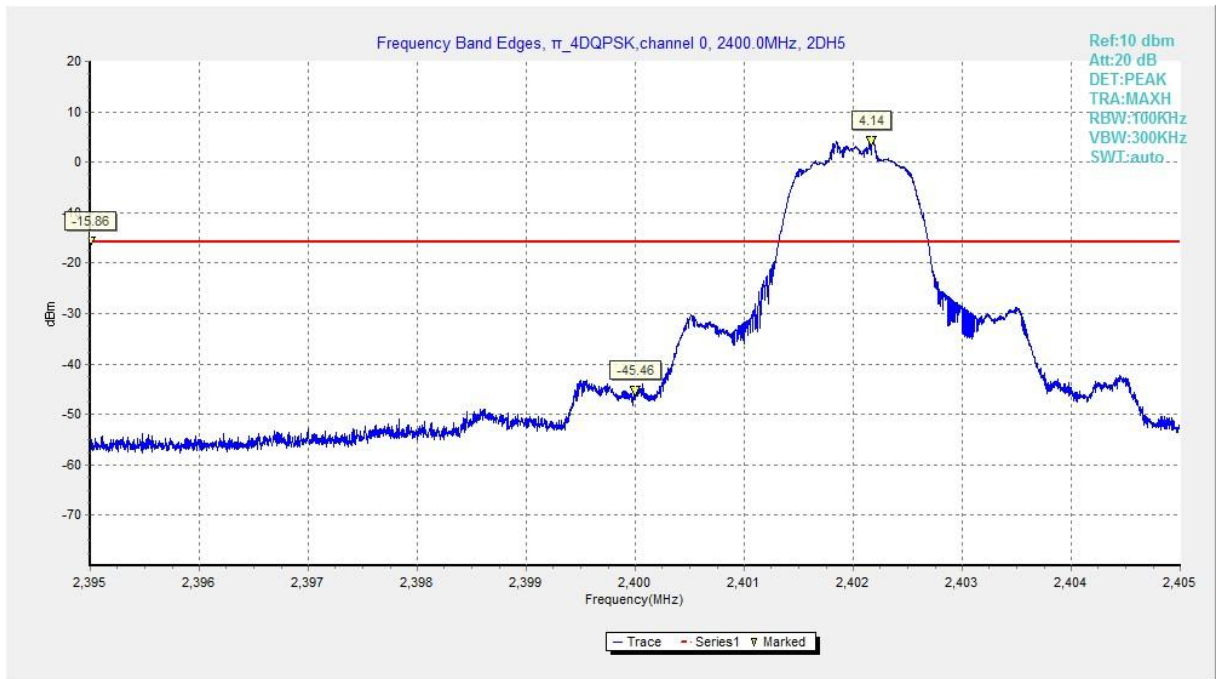


Fig. 9 Band Edges ( $\pi/4$  DQPSK, Ch 0, Hopping OFF)

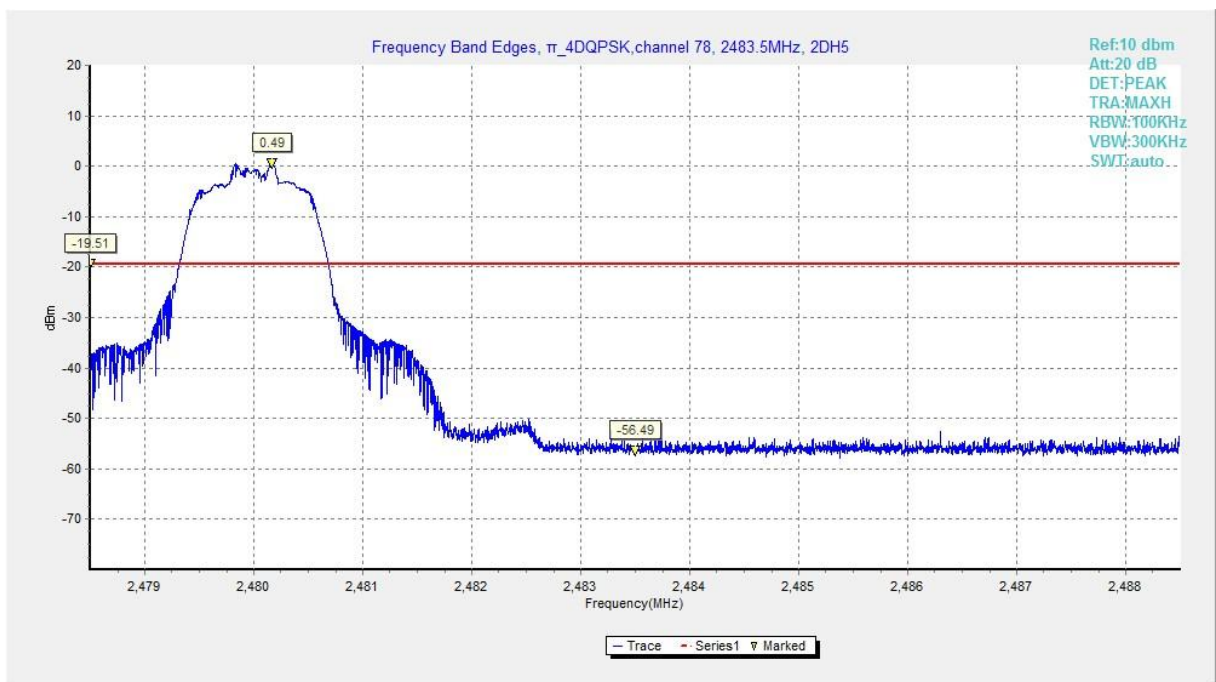


Fig. 10 Band Edges ( $\pi/4$  DQPSK, Ch 78, Hopping OFF)

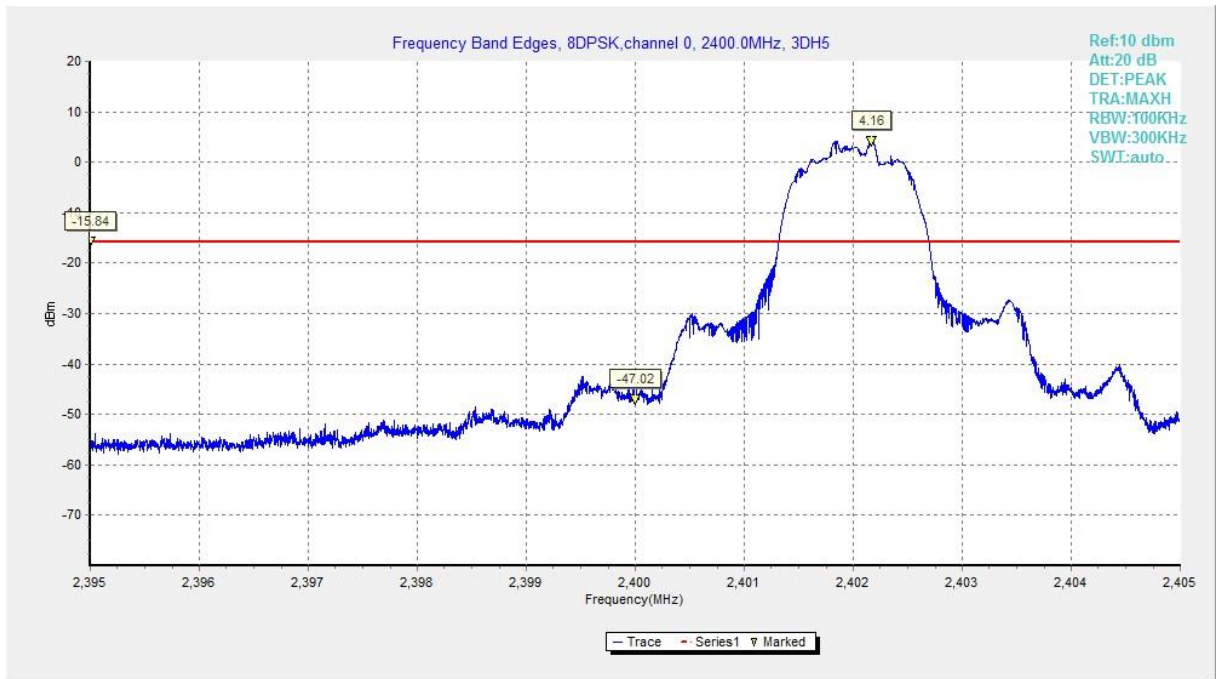


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

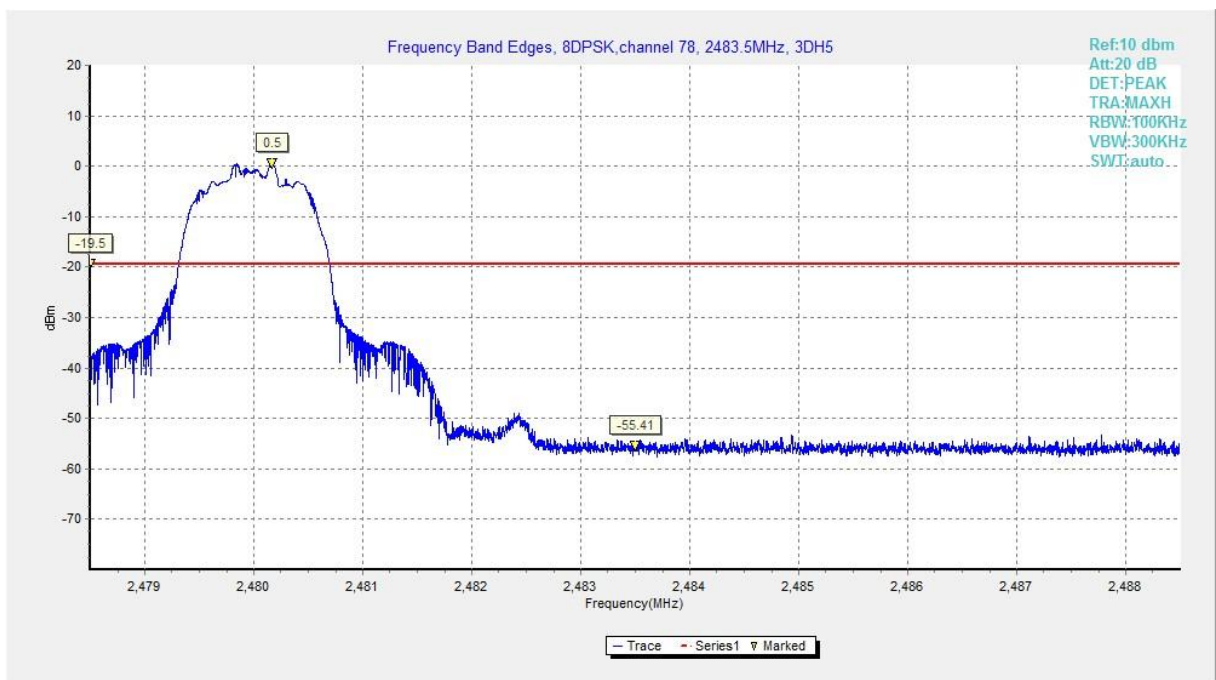


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)



**A.3 Conducted Emission**

**Method of Measurement: See ANSI C63.10-clause 7.8.8.**

**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	1GHz-3GHz	Fig.13	P
		3GHz-10GHz	Fig.14	P
	39	1GHz-3GHz	Fig.15	P
		3GHz-10GHz	Fig.16	P
	78	1GHz-3GHz	Fig.17	P
		3GHz-10GHz	Fig.18	P
$\pi/4$ DQPSK	0	1GHz-3GHz	Fig.19	P
		3GHz-10GHz	Fig.20	P
	39	1GHz-3GHz	Fig.21	P
		3GHz-10GHz	Fig.22	P
	78	1GHz-3GHz	Fig.23	P
		3GHz-10GHz	Fig.24	P
8DPSK	0	1GHz-3GHz	Fig.25	P
		3GHz-10GHz	Fig.26	P
	39	1GHz-3GHz	Fig.27	P
		3GHz-10GHz	Fig.28	P
	78	1GHz-3GHz	Fig.29	P
		3GHz-10GHz	Fig.30	P
/	All channels	30 MHz-1GHz	Fig.31	P
		10GHz-26GHz	Fig.32	P

See below for test graphs.

**Conclusion: Pass**

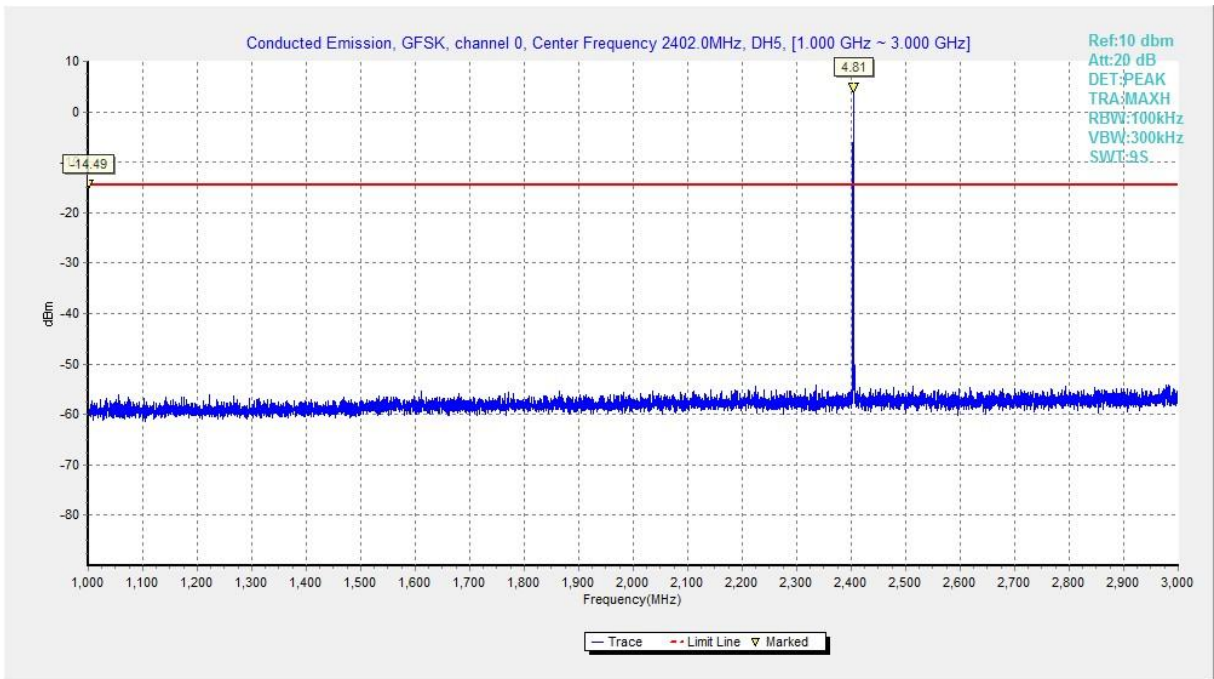


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 1GHz-3GHz)

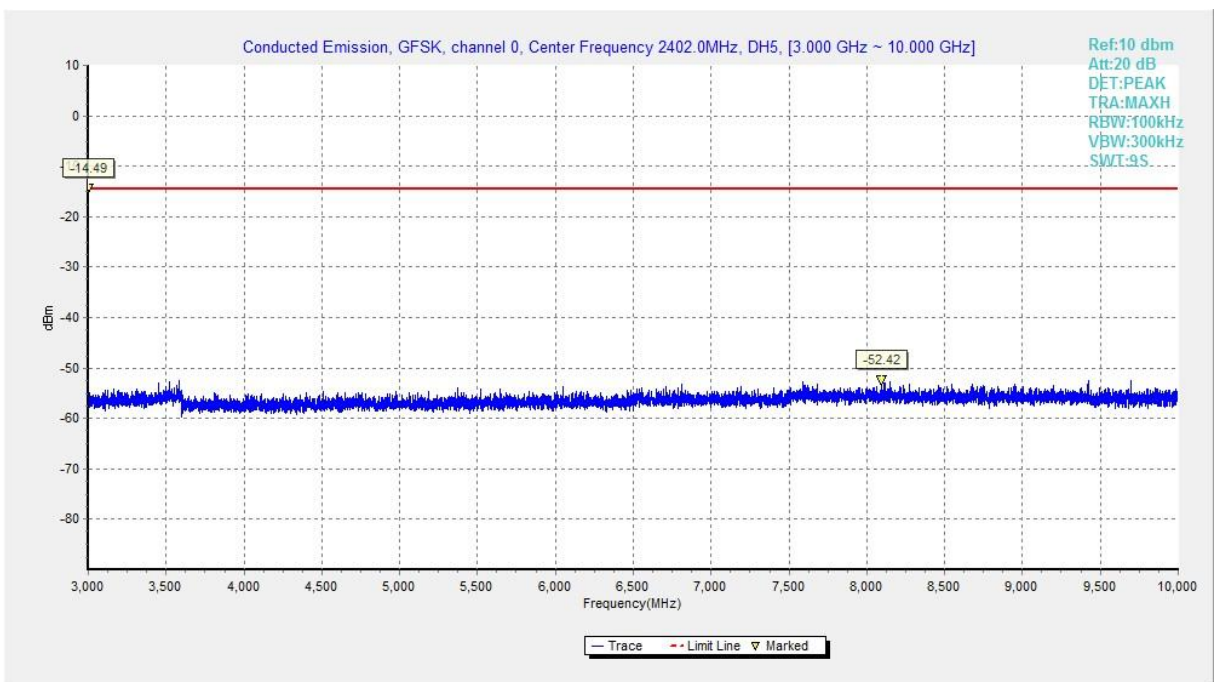


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10GHz)



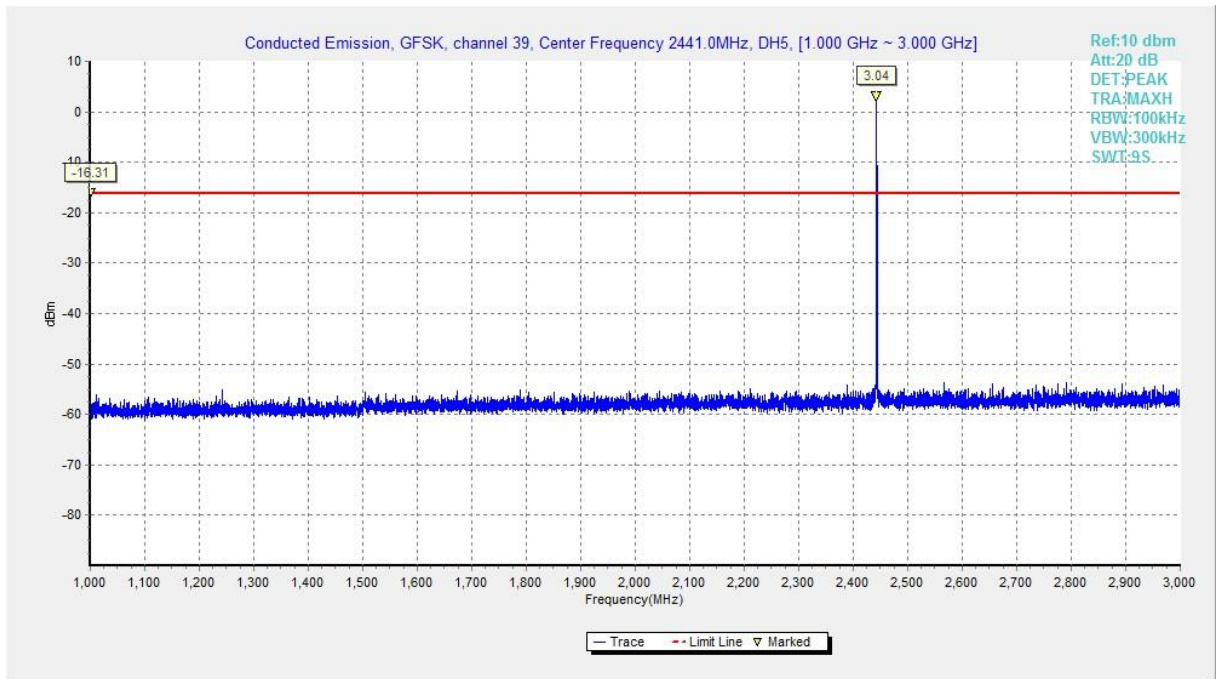


Fig. 15 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3GHz)

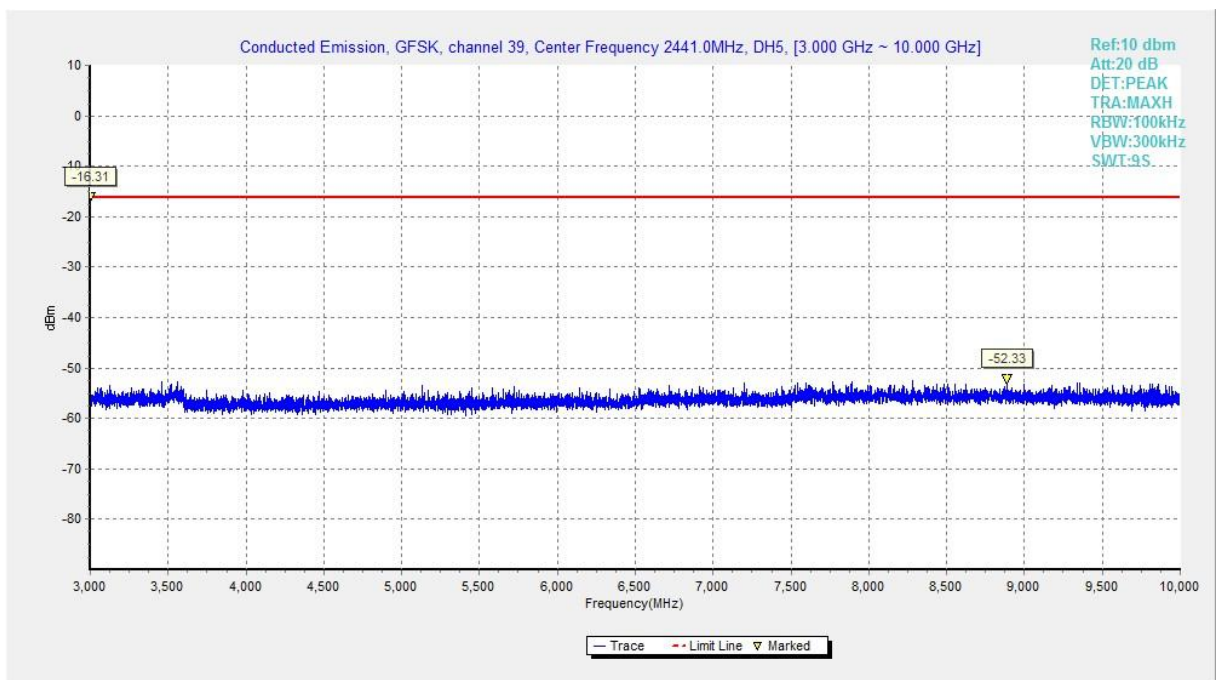


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10GHz)

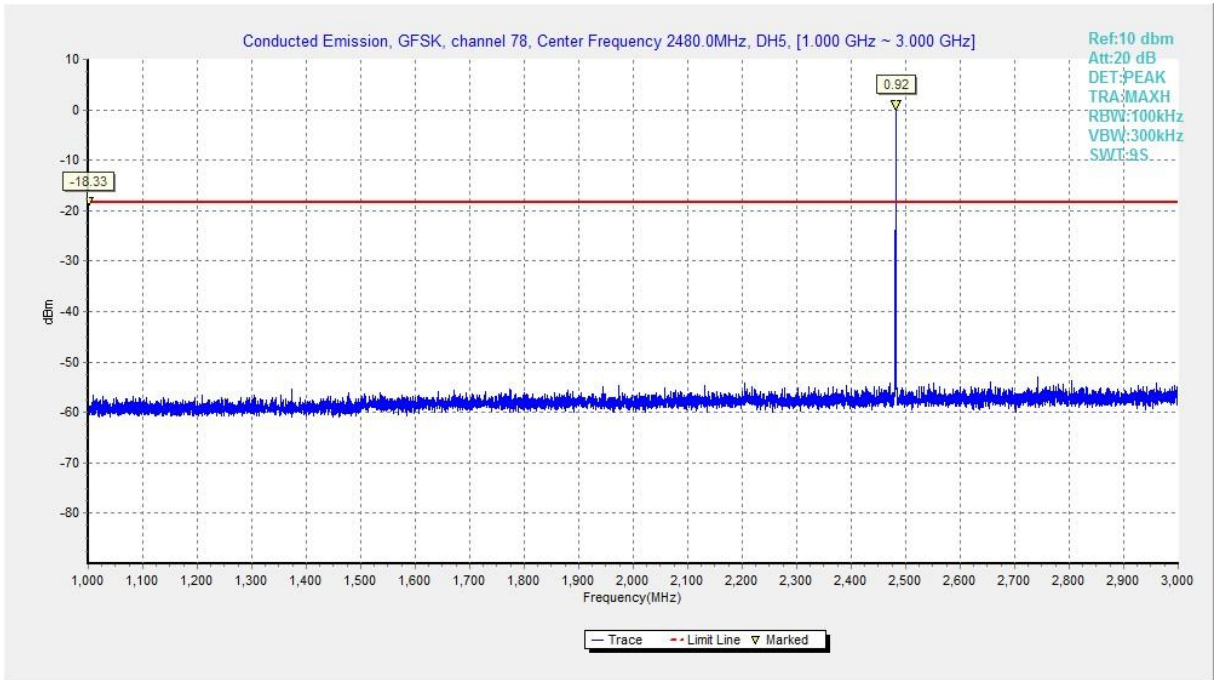


Fig. 17 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3GHz)

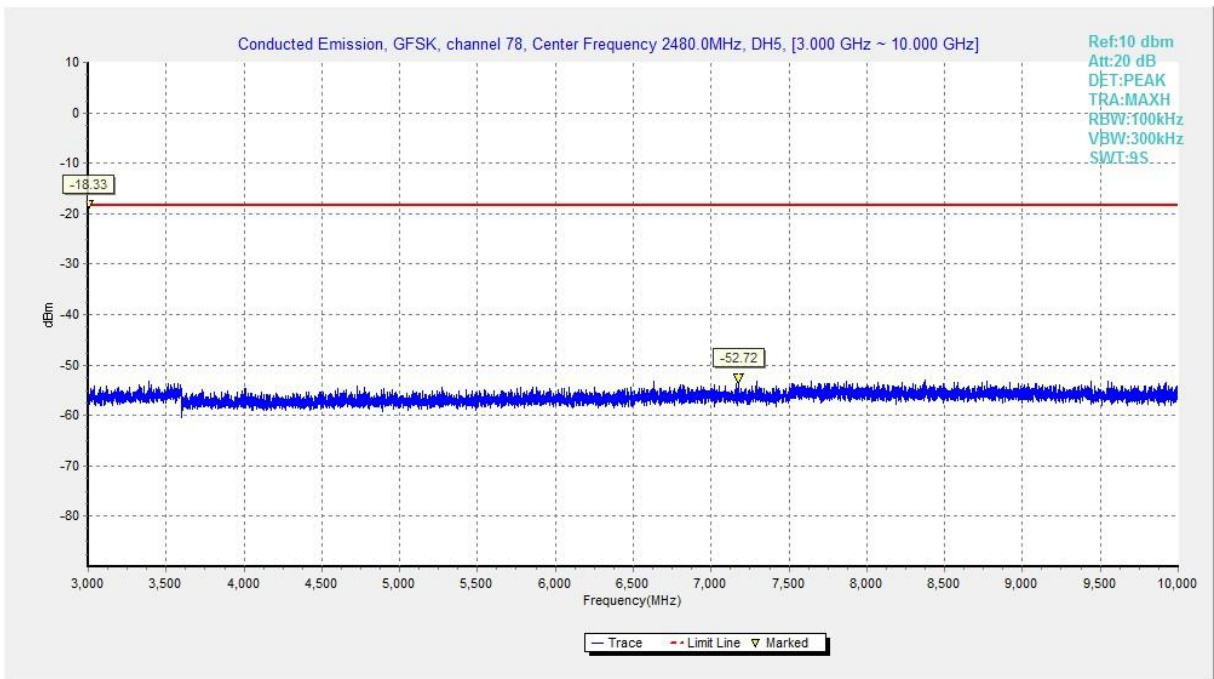
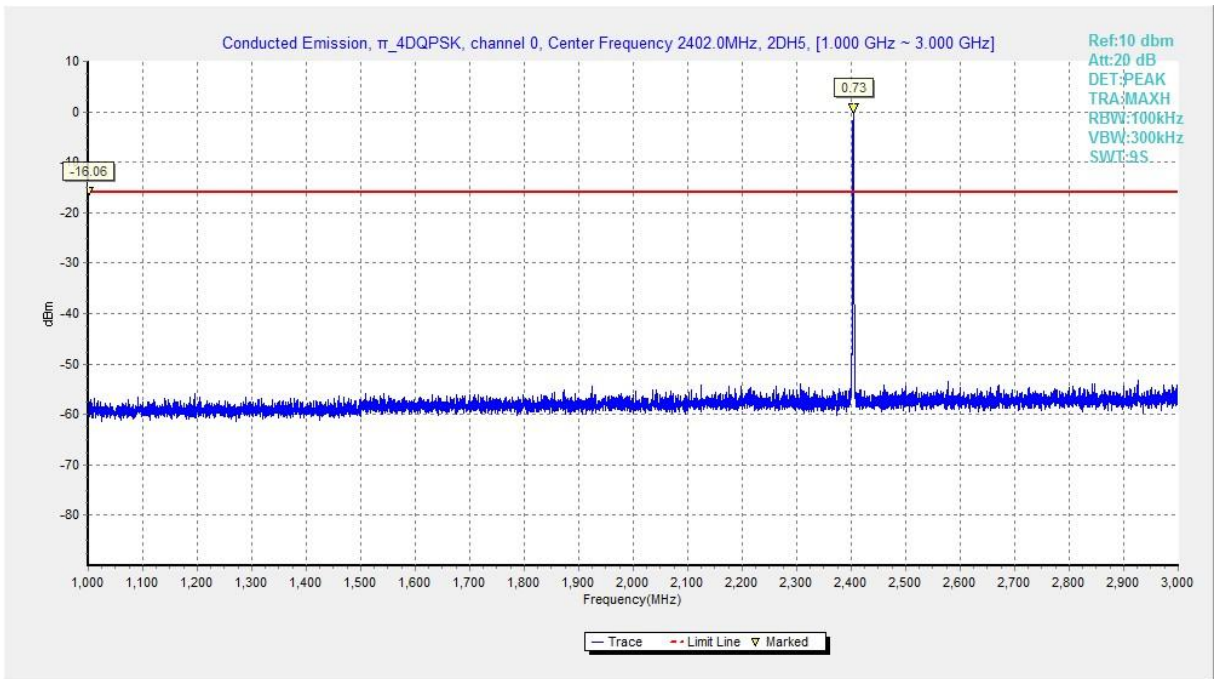
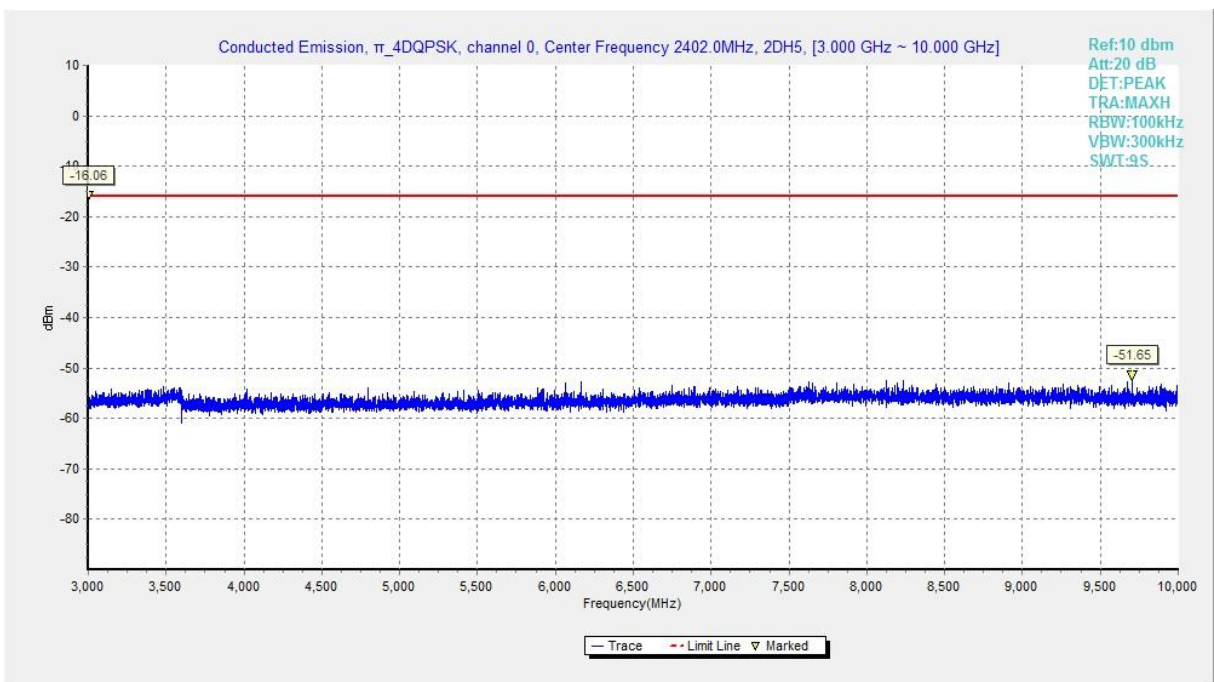


Fig. 18 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10GHz)



**Fig. 19 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch0, 1GHz-3GHz)**



**Fig. 20 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch0, 3GHz-10GHz)**

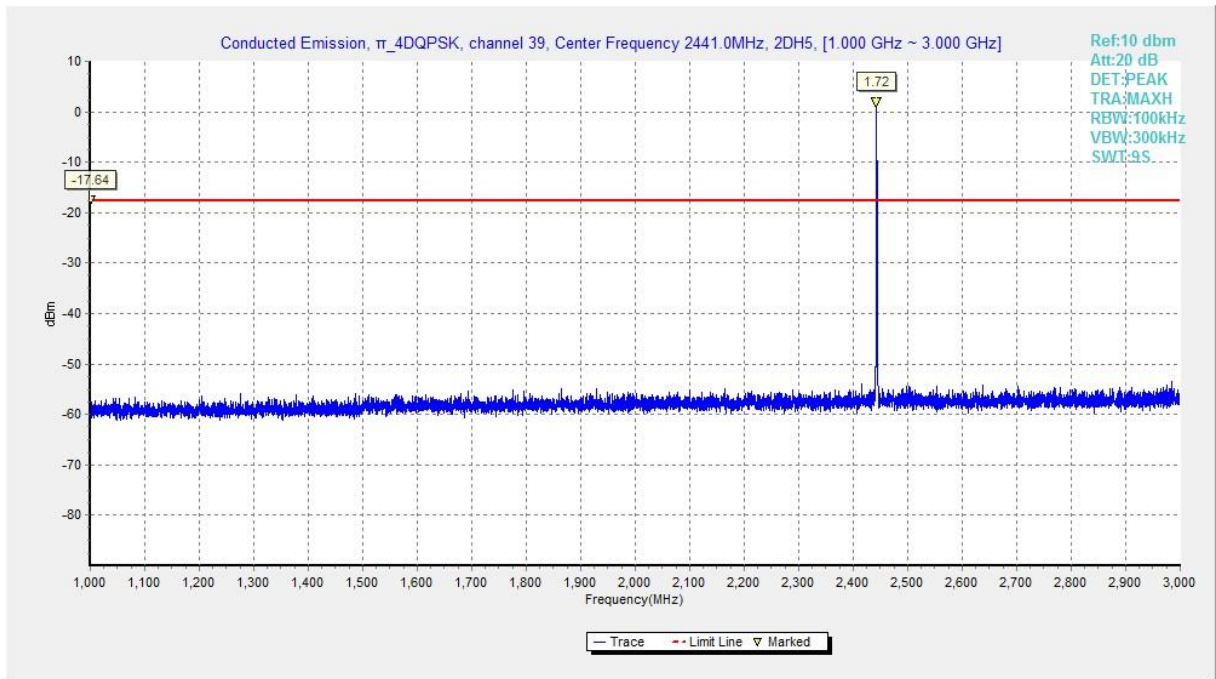


Fig. 21 Conducted Spurious Emission ( $\pi$ /4 DQPSK, Ch39, 1GHz-3GHz)

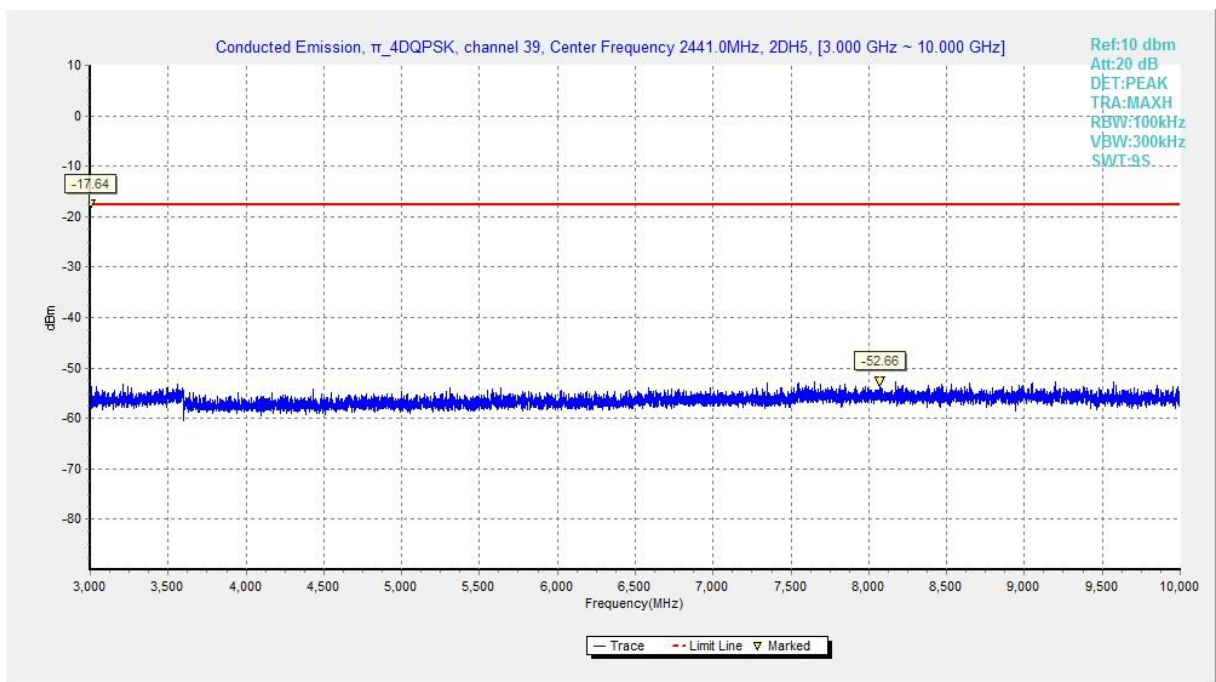


Fig. 22 Conducted Spurious Emission ( $\pi$ /4 DQPSK, Ch39, 3GHz-10GHz)

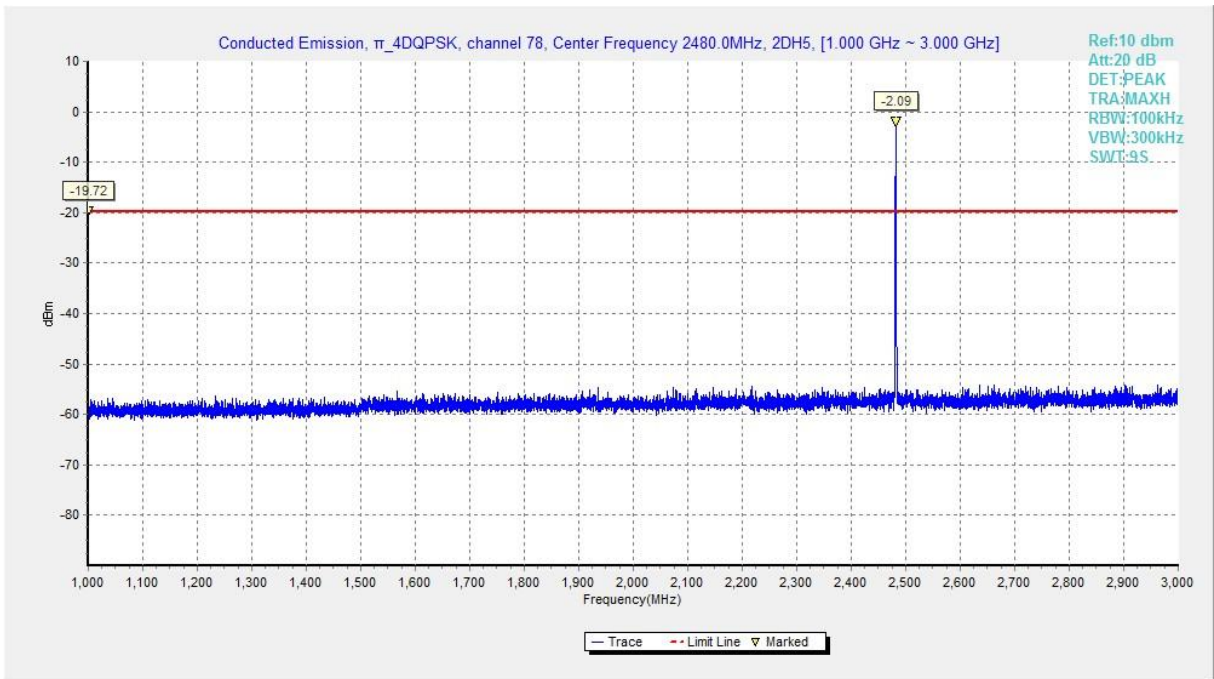


Fig. 23 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch78, 1GHz-3GHz)

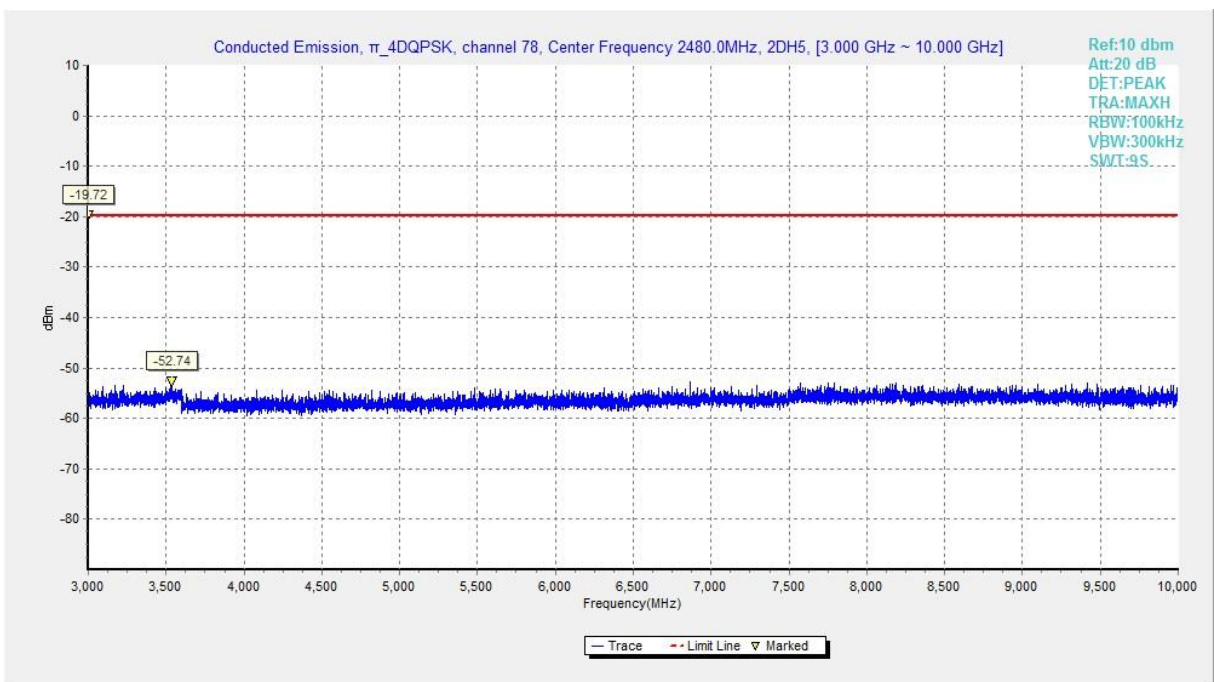


Fig. 24 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch78, 3GHz-10GHz)

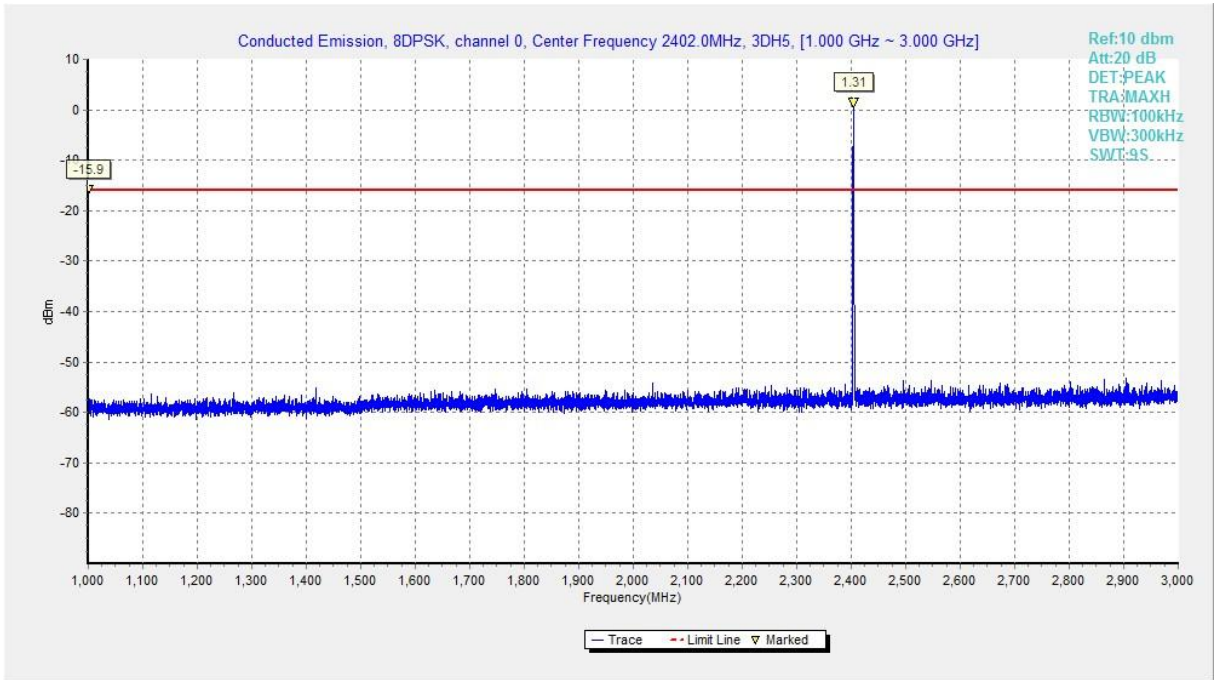


Fig. 25 Conducted Spurious Emission (8DPSK, Ch0, 1GHz-3GHz)

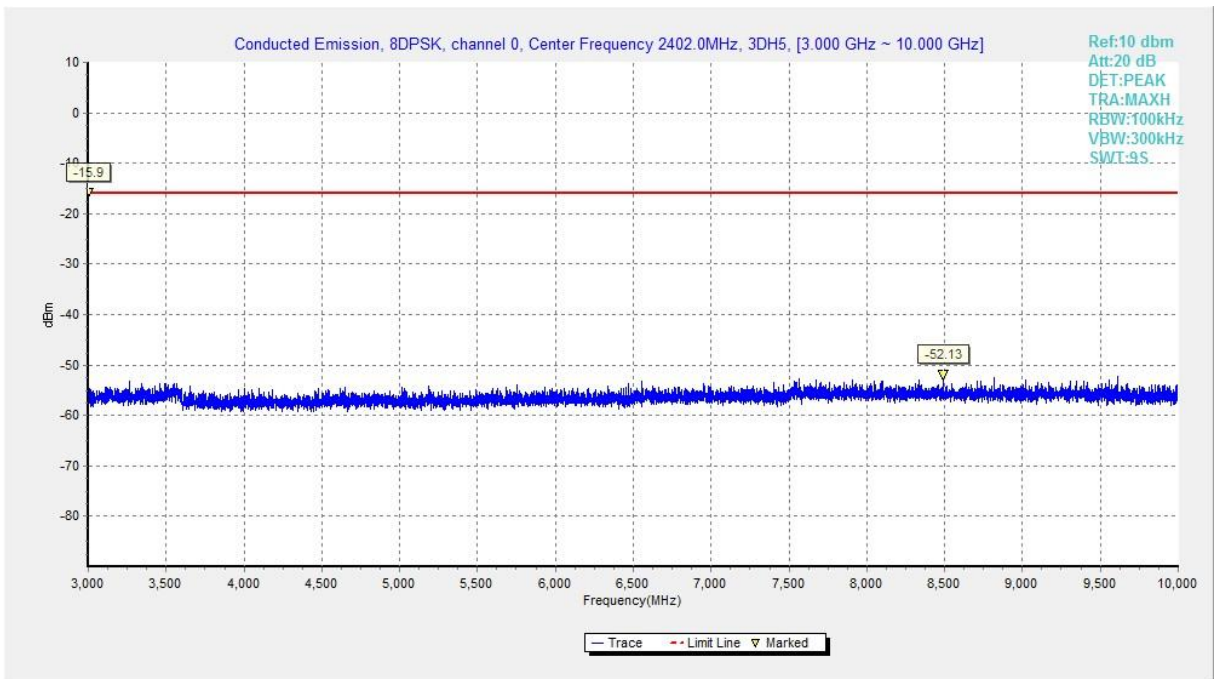


Fig. 26 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10GHz)

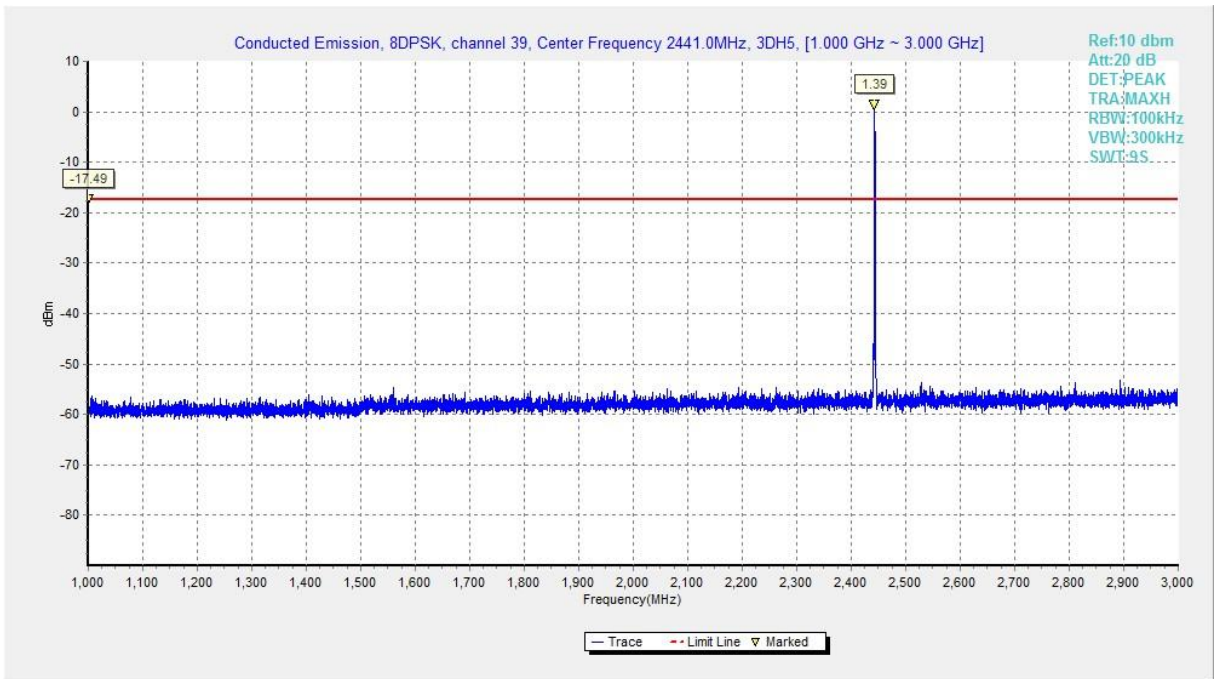


Fig. 27 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3GHz)

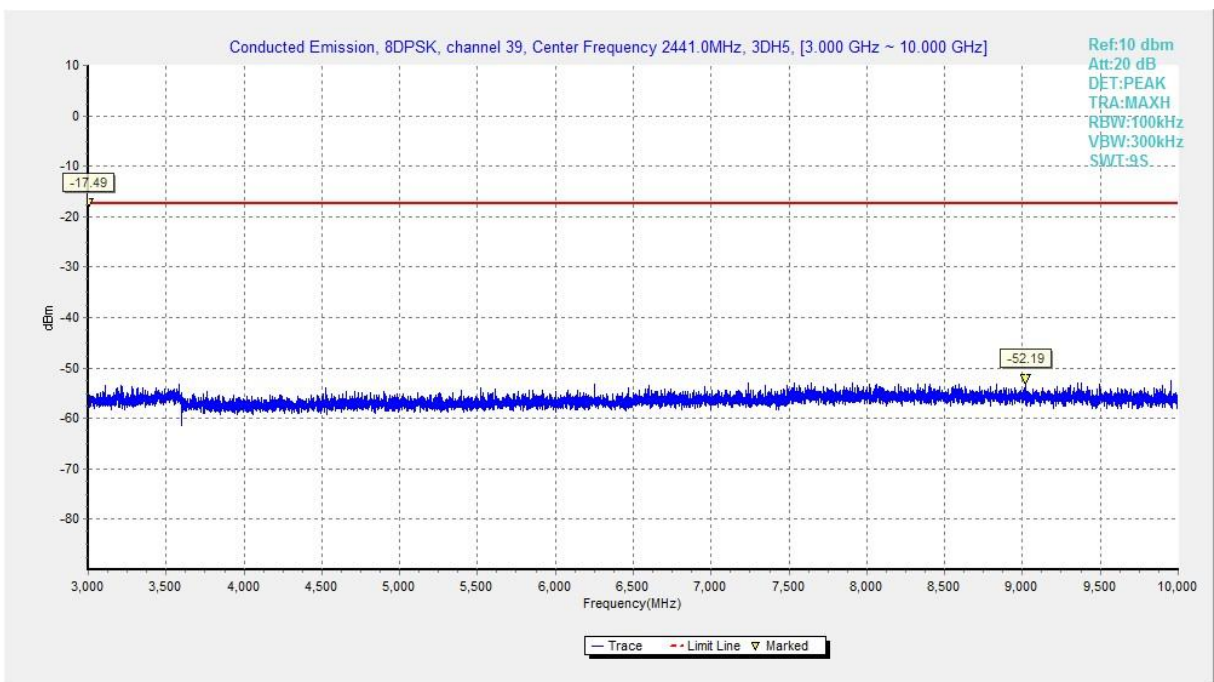
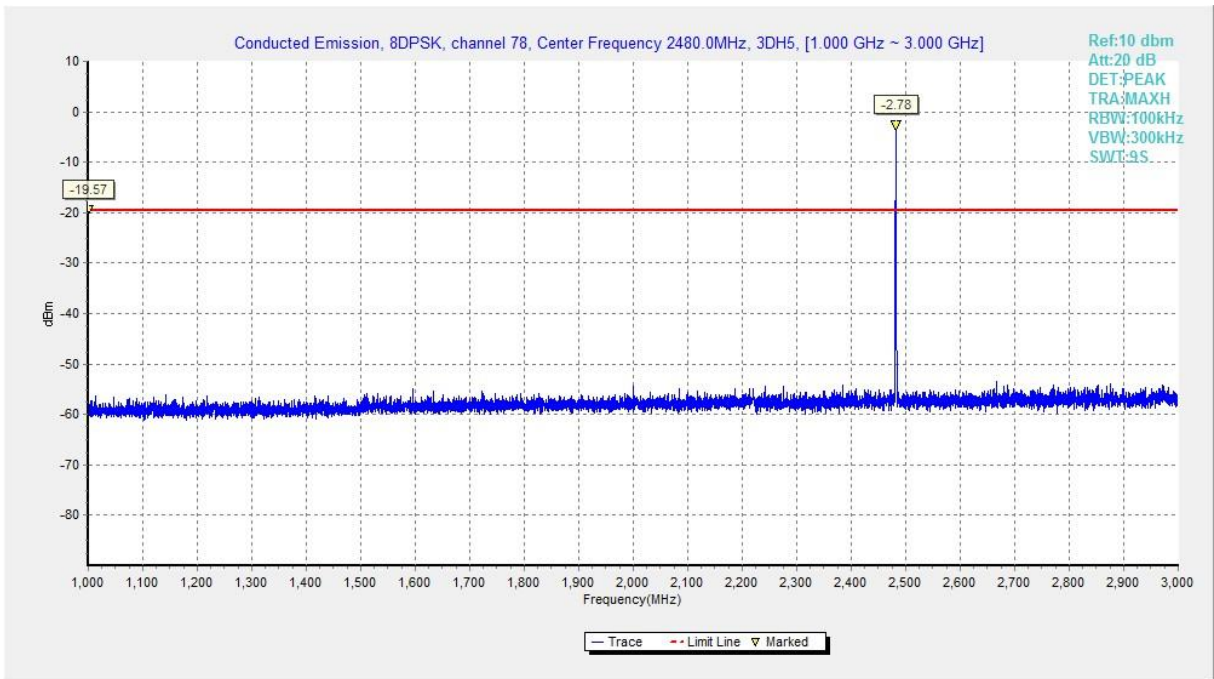
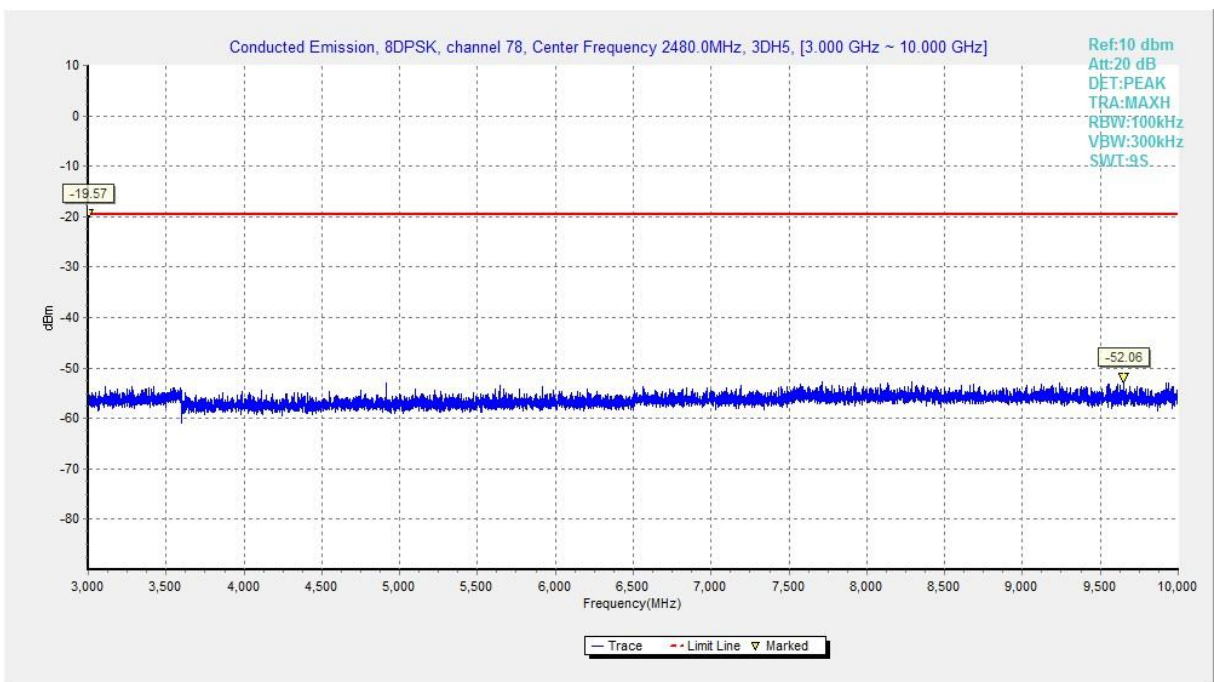


Fig. 28 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10GHz)



**Fig. 29 Conducted Spurious Emission (8DPSK, Ch78, 1GHz-3GHz)**



**Fig. 30 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10GHz)**



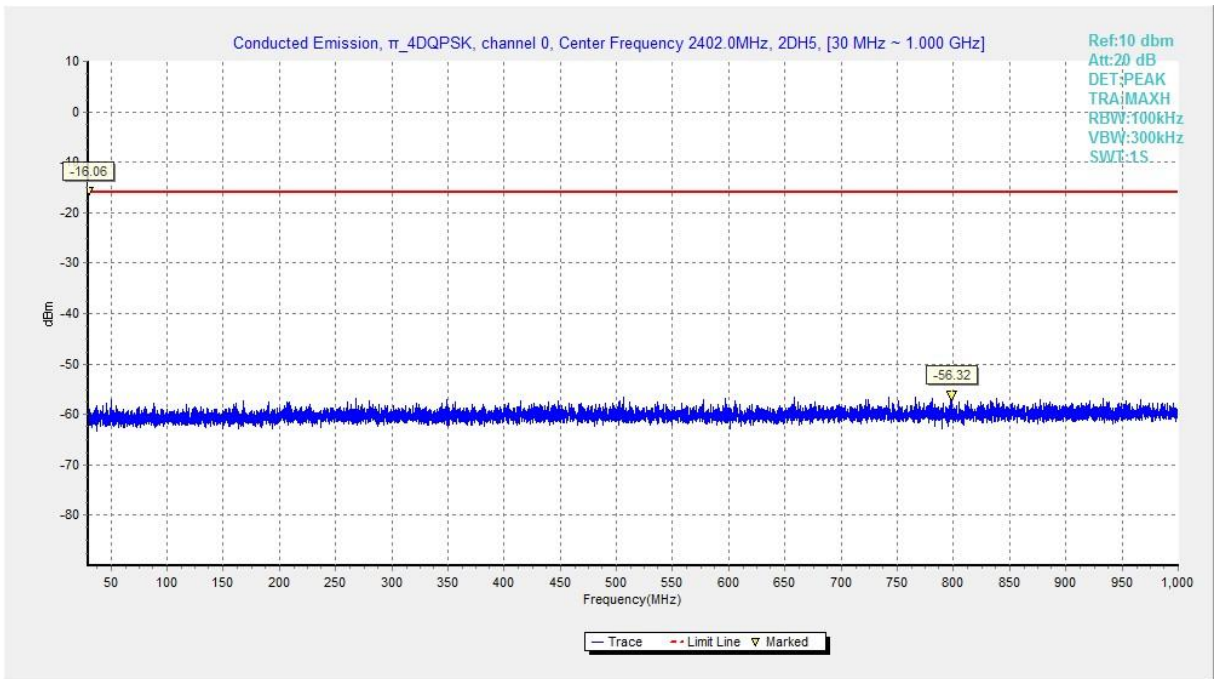


Fig. 31 Conducted Spurious Emission (All channel, 30MHz-1GHz)

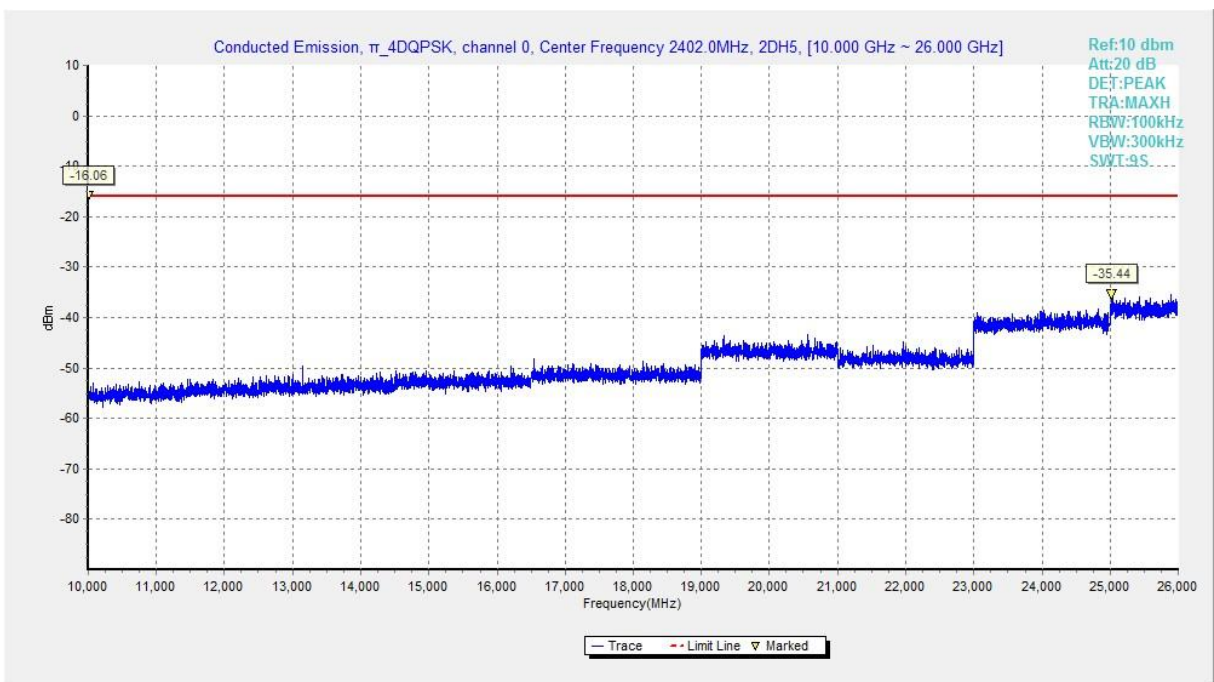


Fig. 32 Conducted Spurious Emission (All channel, 10GHz-26GHz)

#### A.4 Radiated Emission

**Method of Measurement: See ANSI C63.10-clause 6.3&6.4&6.5&6.6.**

**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 ( $\mu\text{V}/\text{m}$ )	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.33	<b>P</b>
	39	1 GHz ~ 18 GHz	Fig.34	<b>P</b>
	78	1 GHz ~ 18 GHz	Fig.35	<b>P</b>
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.36	<b>P</b>
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.37	<b>P</b>
$\pi/4$ DQPSK	0	1 GHz ~ 18 GHz	Fig.38	<b>P</b>
	39	1 GHz ~ 18 GHz	Fig.39	<b>P</b>
	78	1 GHz ~ 18 GHz	Fig.40	<b>P</b>
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.41	<b>P</b>
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.42	<b>P</b>
8DPSK	0	1 GHz ~ 18 GHz	Fig.43	<b>P</b>
	39	1 GHz ~ 18 GHz	Fig.44	<b>P</b>
	78	1 GHz ~ 18 GHz	Fig.45	<b>P</b>
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.46	<b>P</b>
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.47	<b>P</b>
/	All channels	9 kHz ~ 30 MHz	Fig.48	<b>P</b>
		30 MHz ~ 1 GHz	Fig.49	<b>P</b>
		18 GHz ~ 26.5 GHz	Fig.50	<b>P</b>

**Worst Case Result**  
**GFSK CH0 (1-18GHz)**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
4701.000000	47.06	74.00	26.94	V	4.4
5982.300000	47.97	74.00	26.03	H	4.9
10412.142857	47.26	74.00	26.74	V	9.1
12840.857143	48.47	74.00	25.53	V	11.1
16918.285714	54.44	74.00	18.56	V	18.1
17951.571429	54.76	74.00	19.24	H	19.0

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
4701.000000	35.52	54.00	19.48	V	4.4
5982.300000	36.82	54.00	18.18	H	4.9
10412.142857	36.01	54.00	18.99	V	9.1
12840.857143	37.05	54.00	17.95	V	11.1
16918.285714	43.19	54.00	11.81	V	18.1
17951.571429	43.49	54.00	11.51	H	19.0

 **$\pi/4$  DQPSK CH0 (1-18GHz)**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
9476.571429	44.24	74.00	29.76	V	7.0
10434.857143	47.23	74.00	26.77	H	9.0
12253.714286	47.33	74.00	26.67	V	10.9
13182.000000	46.45	74.00	27.55	H	10.9
14659.714286	48.66	74.00	25.34	H	12.2
16635.857143	53.31	74.00	20.69	V	17.1

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
9476.571429	36.20	54.00	17.80	V	7.0
10434.857143	38.12	54.00	15.88	H	9.0
12253.714286	38.90	54.00	15.10	V	10.9
13182.000000	38.10	54.00	15.90	H	10.9
14659.714286	37.44	54.00	16.56	H	12.2
16635.857143	44.31	54.00	9.69	V	17.1

**8DPSK CH0 (1-18GHz)**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
8857.285714	45.79	74.00	28.21	V	6.5
10908.857143	47.33	74.00	26.67	H	9.4
13337.571429	47.71	74.00	26.29	H	11.3
14787.000000	50.08	74.00	23.92	H	12.7
15676.714286	50.87	74.00	23.13	V	13.6
16873.714286	54.04	74.00	19.96	V	18.0

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
8857.285714	35.03	54.00	17.97	V	6.5
10908.857143	37.33	54.00	16.67	H	9.4
13337.571429	37.87	54.00	16.13	H	11.3
14787.000000	39.66	54.00	14.34	H	12.7
15676.714286	40.12	54.00	13.88	V	13.6
16873.714286	44.82	54.00	9.18	V	18.0

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:

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

**See below for test graphs.**

**Conclusion: Pass**

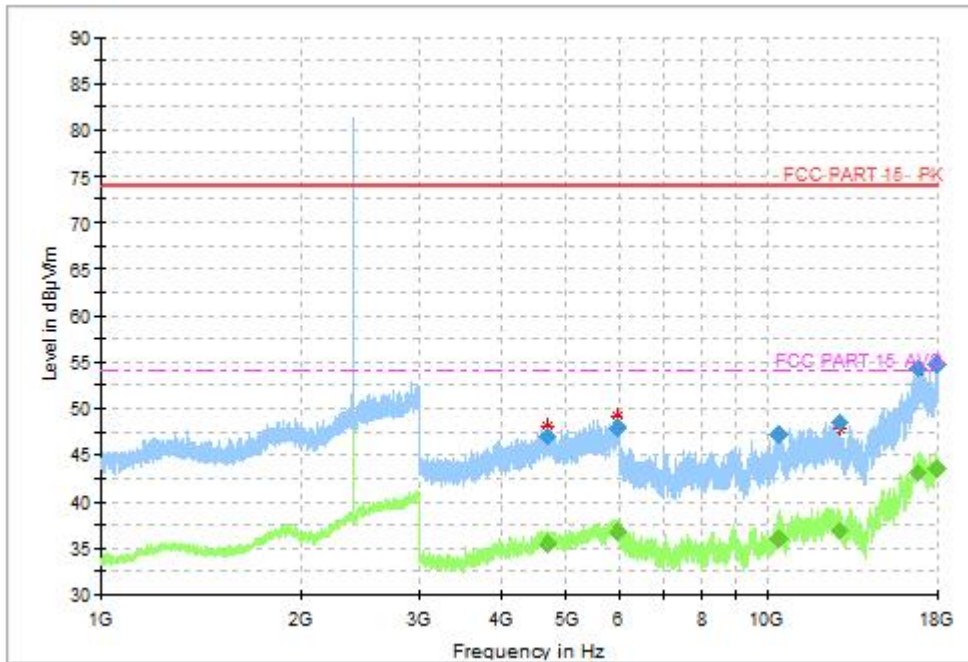


Fig. 33 Radiated Spurious Emission (GFSK, Ch0, 1GHz ~ 18GHz)

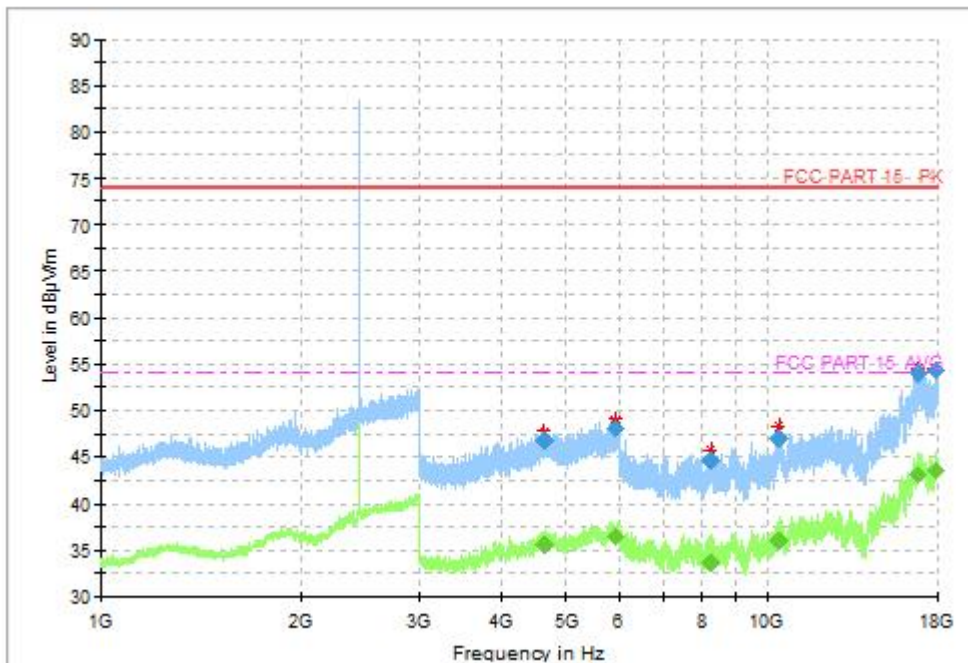


Fig. 34 Radiated Spurious Emission (GFSK, Ch39, 1GHz ~ 18GHz)

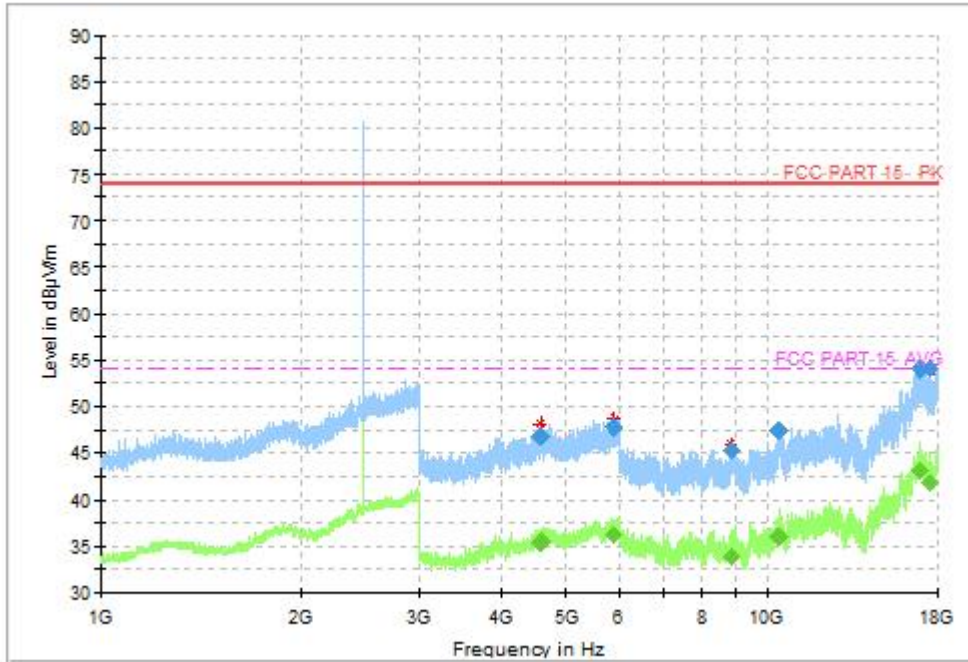


Fig. 35 Radiated Spurious Emission (GFSK, Ch78, 1GHz ~ 18GHz)

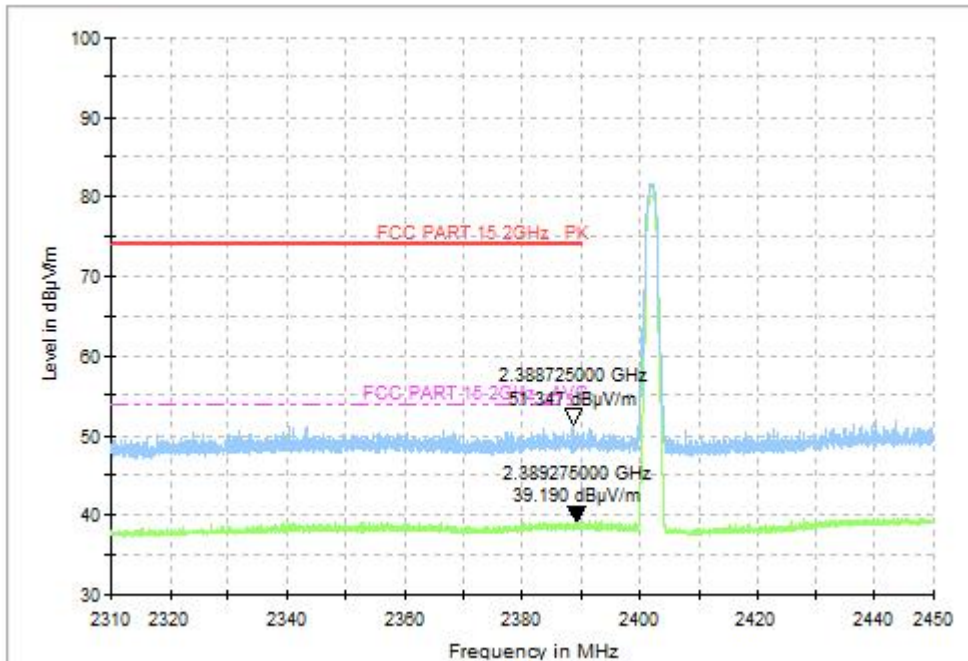


Fig. 36 Radiated Band Edges (GFSK, Ch0, 2380GHz ~ 2450GHz)

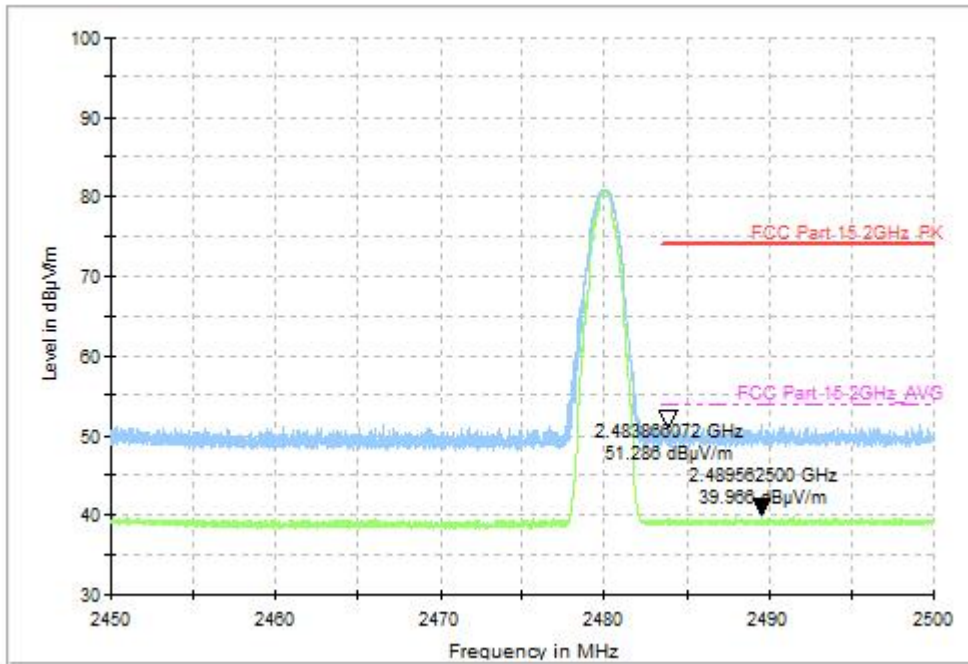


Fig. 37 Radiated Band Edges (GFSK, Ch78, 2450GHz ~ 2500GHz)

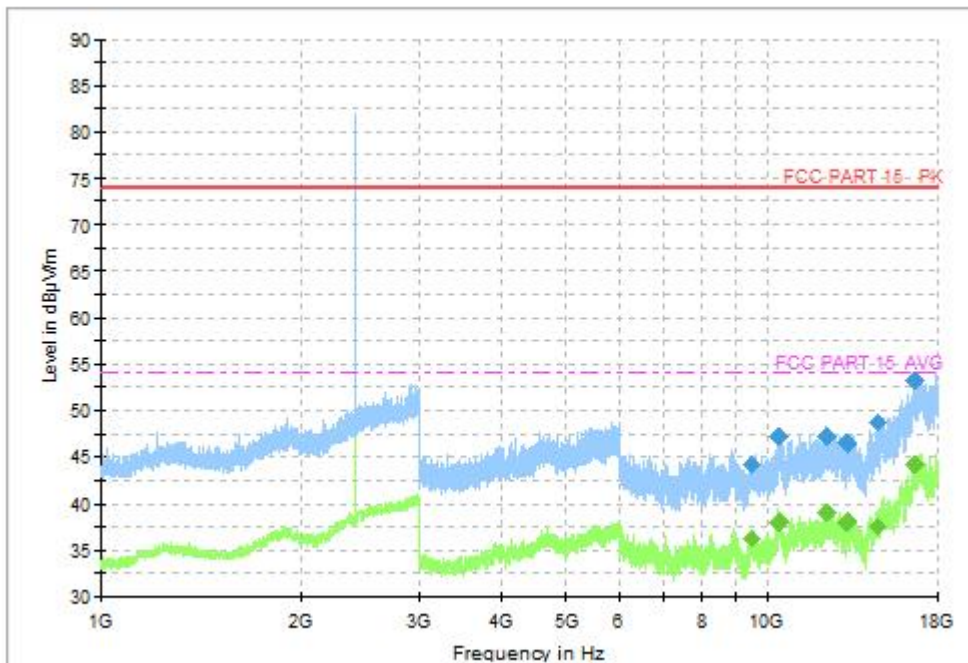


Fig. 38 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch0, 1GHz ~ 18GHz)



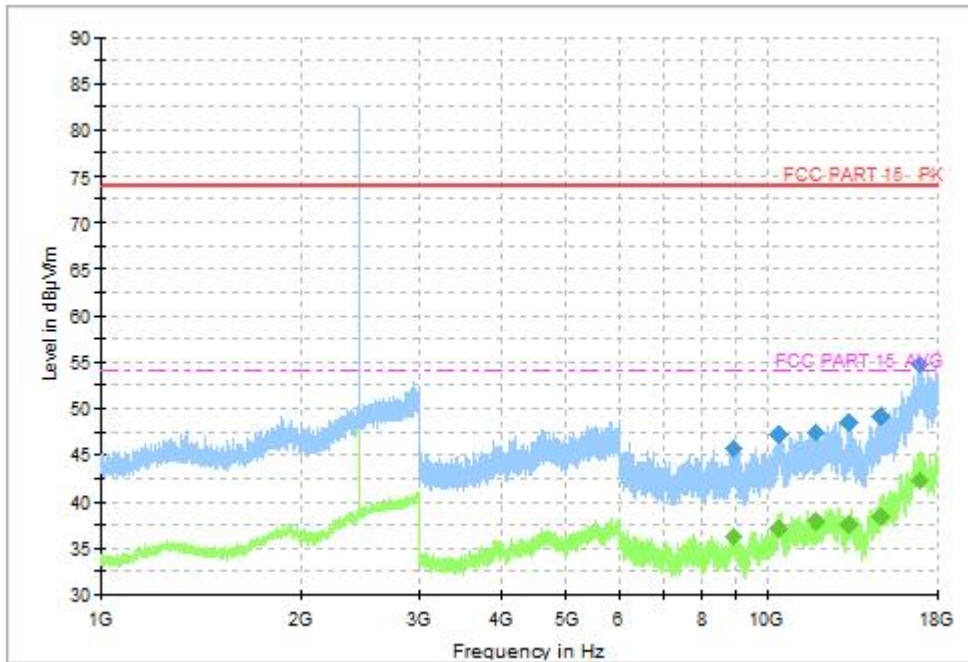


Fig. 39 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch39, 1GHz ~ 18GHz)

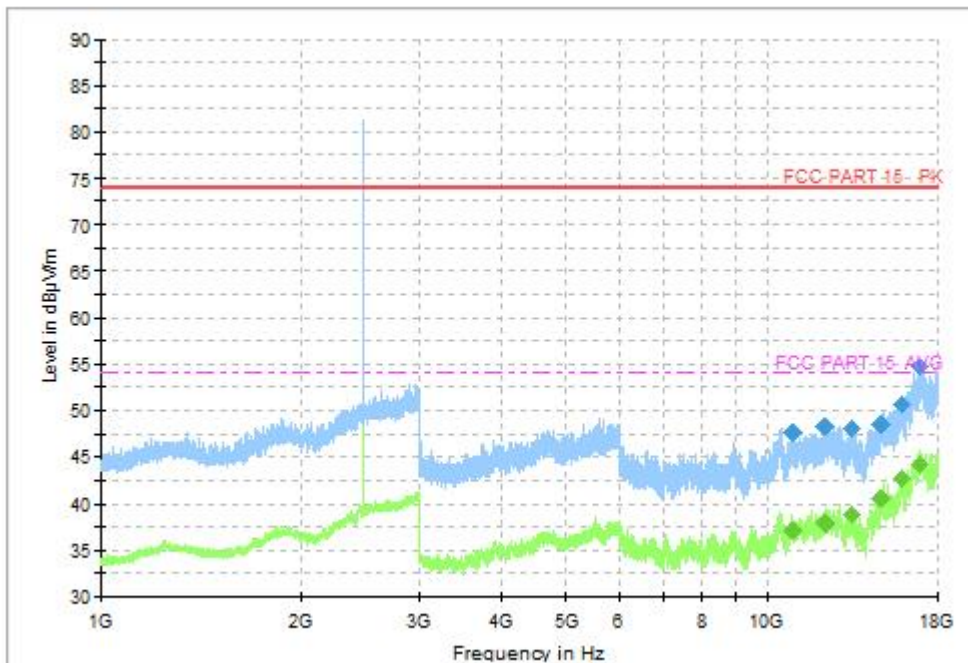


Fig. 40 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch78, 1GHz ~ 18GHz)

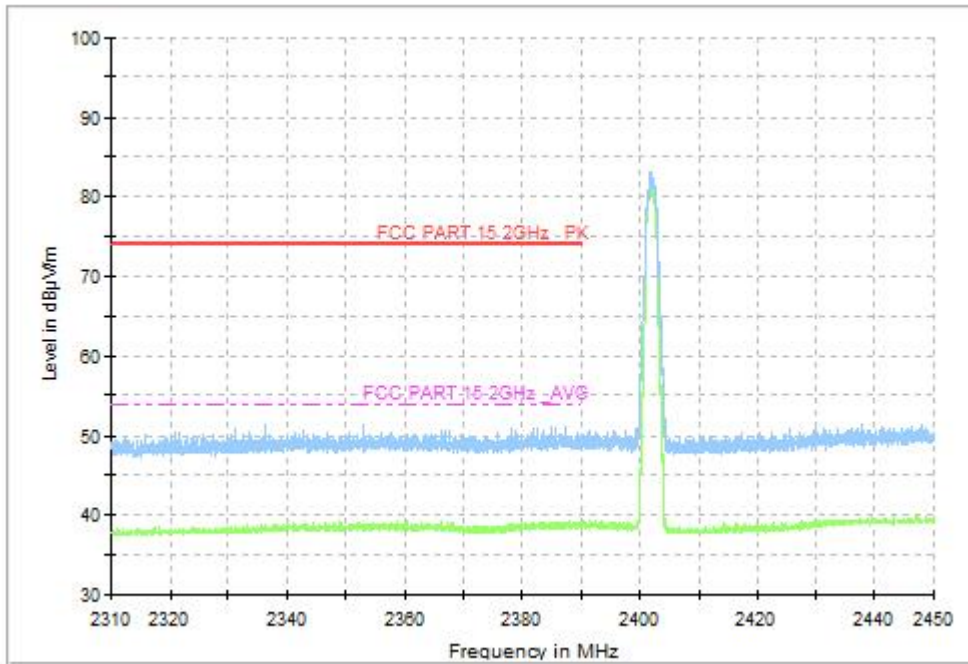


Fig. 41 Radiated Band Edges ( $\pi/4$  DQPSK, Ch0, 2380GHz ~ 2450GHz)

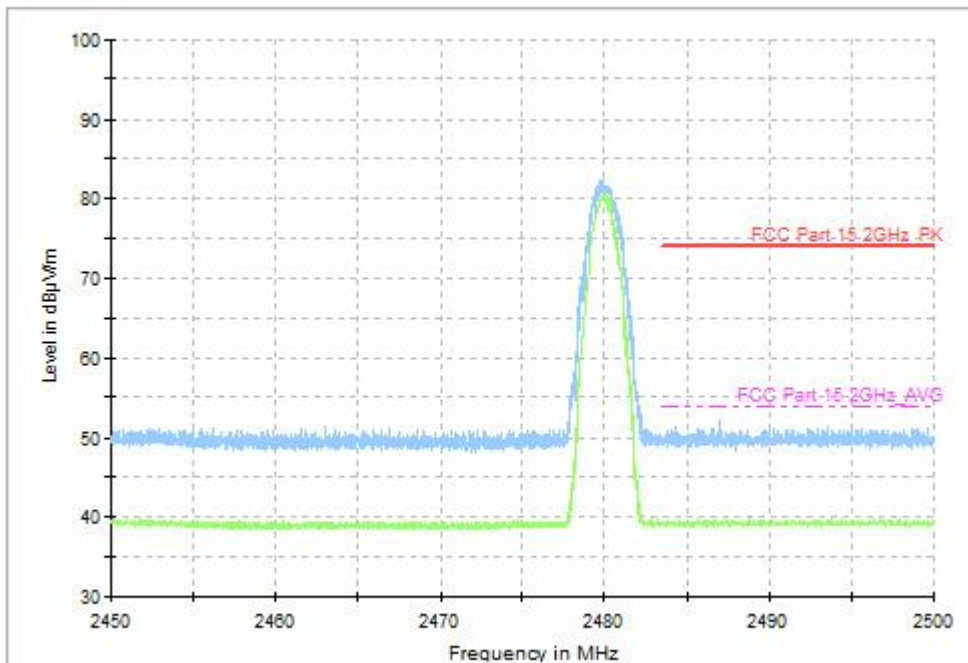


Fig. 42 Radiated Band Edges ( $\pi/4$  DQPSK, Ch78, 2450GHz ~ 2500GHz)

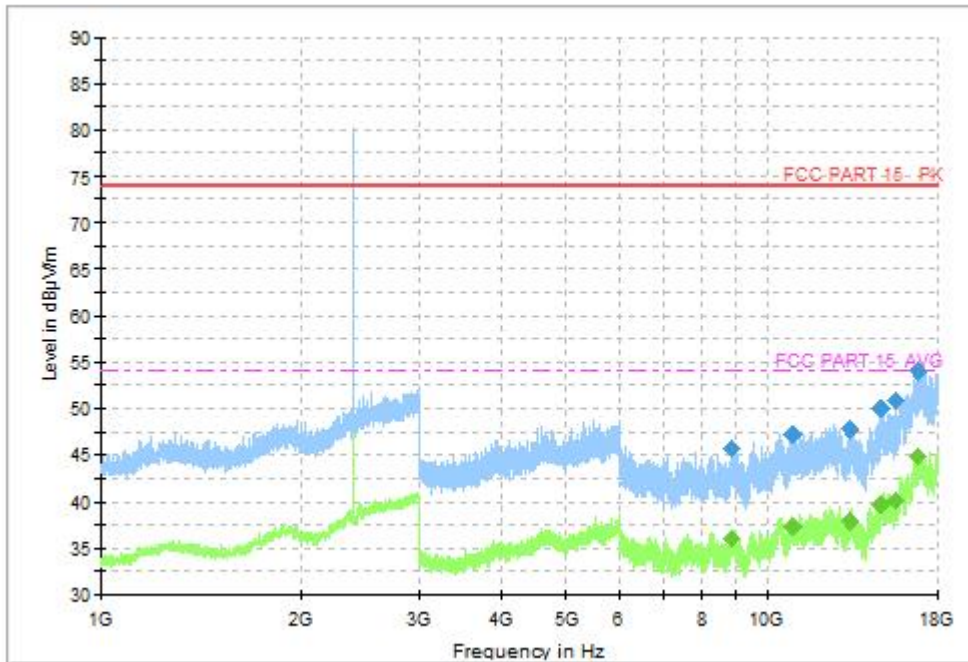


Fig. 43 Radiated Spurious Emission (8DPSK, Ch0, 1GHz ~ 18GHz)

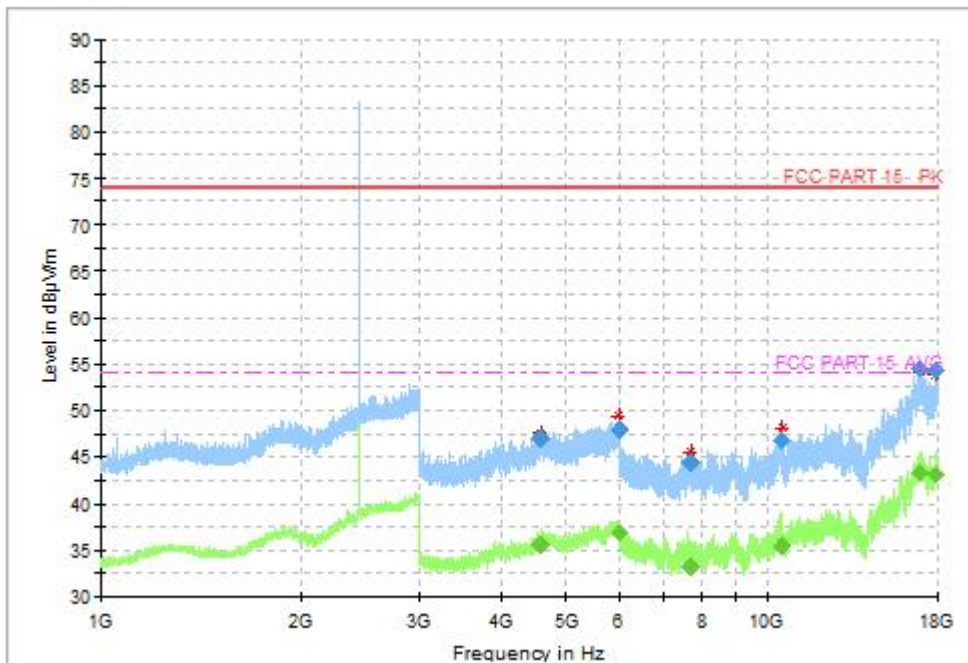


Fig. 44 Radiated Spurious Emission (8DPSK, Ch39, 1GHz ~ 18GHz)

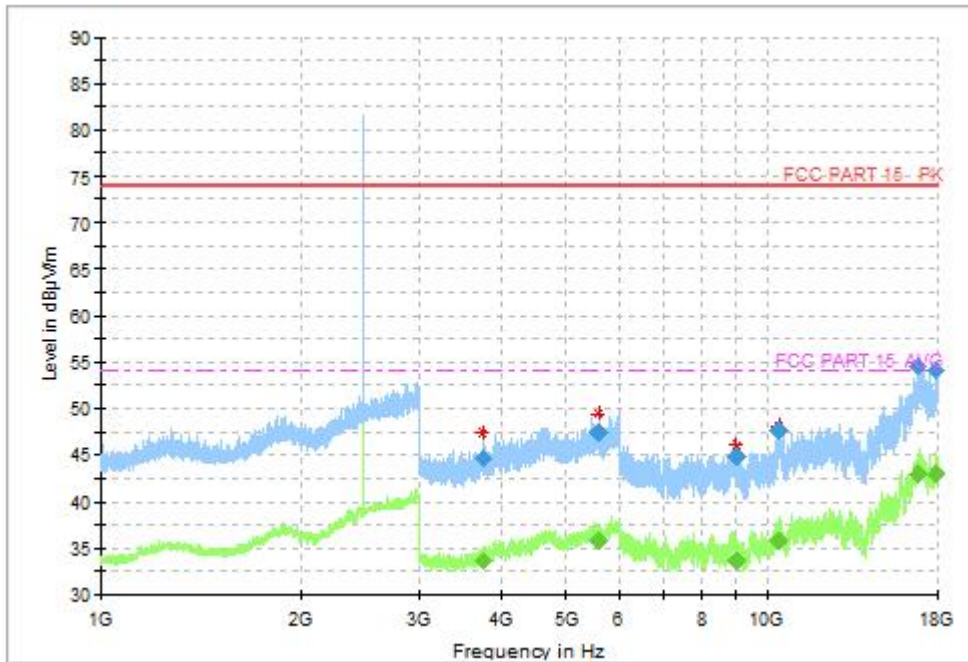


Fig. 45 Radiated Spurious Emission (8DPSK, Ch78, 1GHz ~ 18GHz)

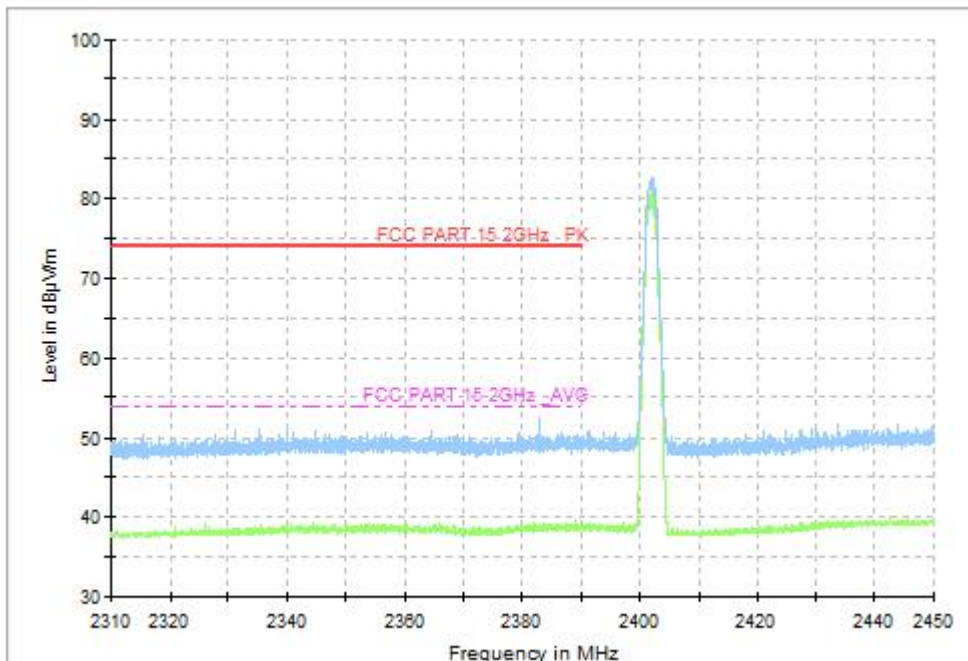


Fig. 46 Radiated Band Edges (8DPSK, Ch0, 2380GHz ~ 2450GHz)

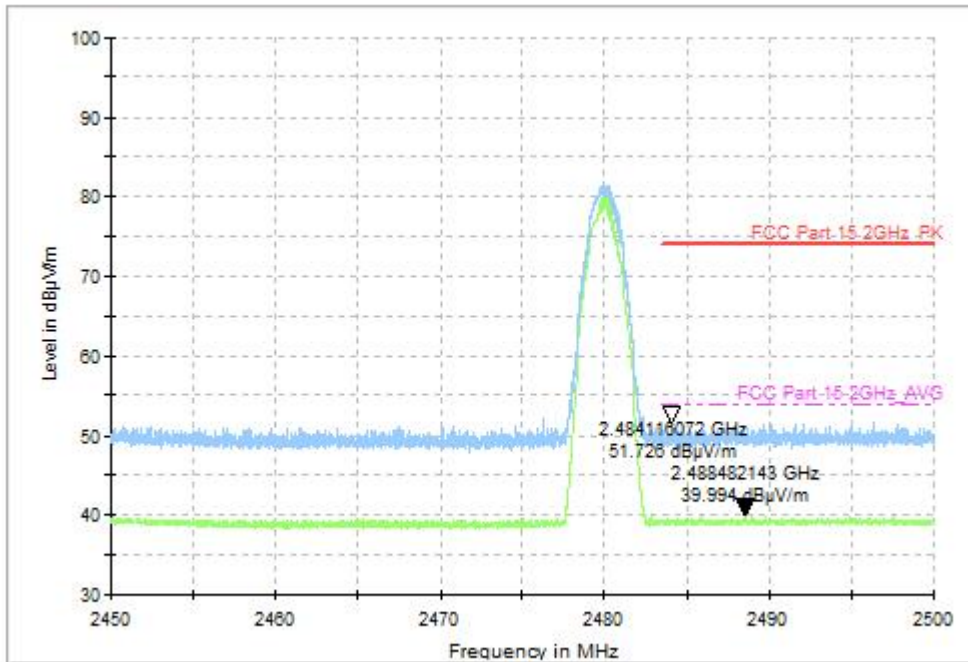


Fig. 47 Radiated Band Edges (8DPSK, Ch78, 2450GHz ~ 2500GHz)

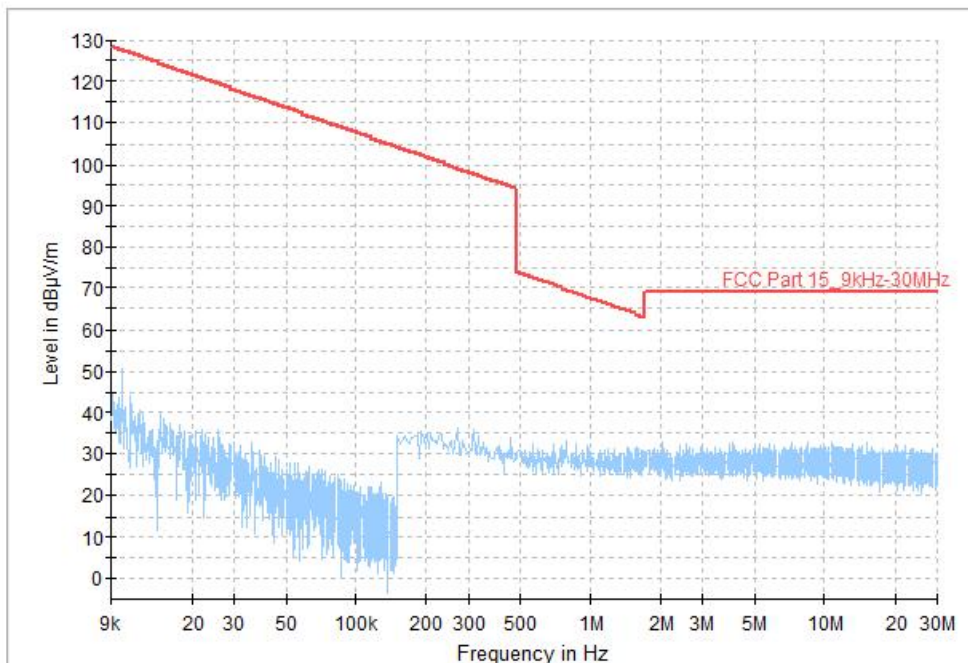
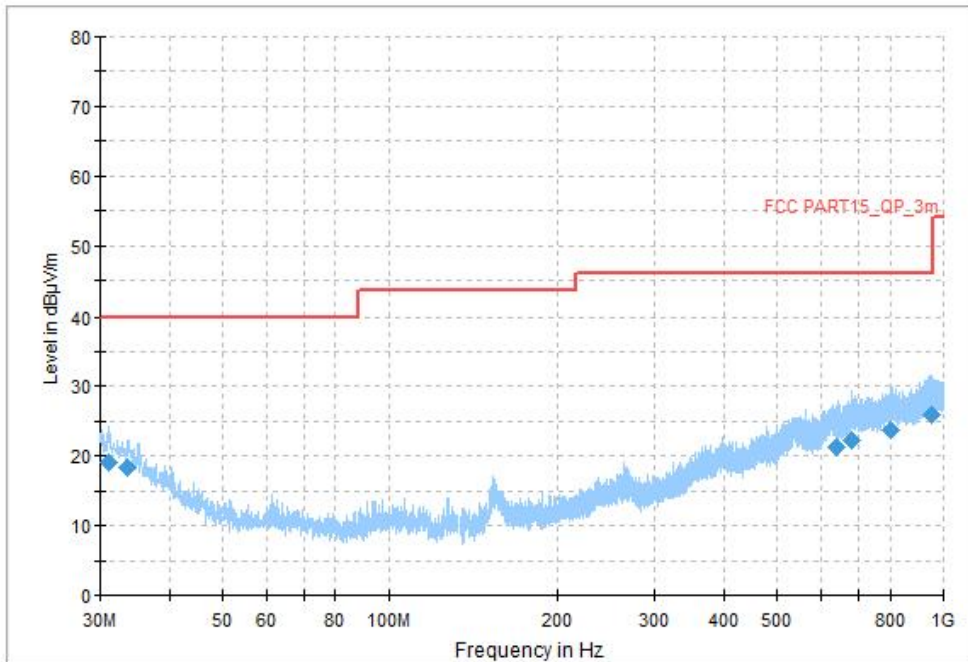
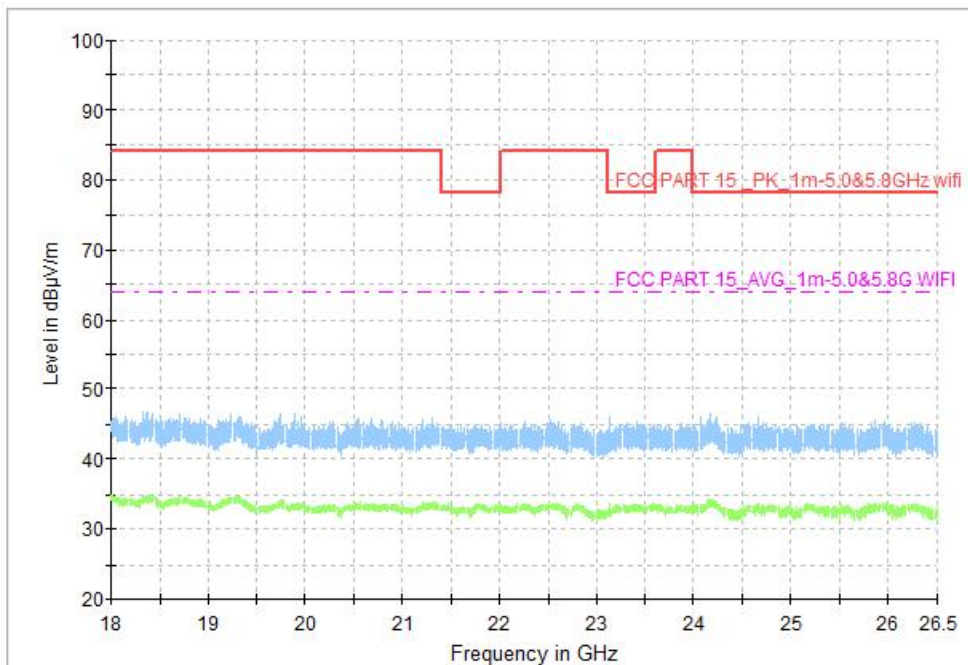


Fig. 48 Radiated Spurious Emission (All Channels, 9kHz ~ 30MHz)



**Fig. 49 Radiated Spurious Emission (All Channels, 30MHz ~ 1GHz)**



**Fig. 50 Radiated Spurious Emission (All Channels, 18GHz ~ 26.5GHz)**

### A.5 20dB Bandwidth

Method of Measurement: See ANSI C63.10-clause 7.8.7.

Measurement Limit:

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

Measurement Result:

Mode	Channel	20dB Bandwidth (kHz)		conclusion
GFSK	0	Fig.51	937.50	/
	39	Fig.52	937.50	
	78	Fig.53	936.00	
$\pi/4$ DQPSK	0	Fig.54	1286.25	/
	39	Fig.55	1283.25	
	78	Fig.56	1283.25	
8DPSK	0	Fig.57	1284.00	/
	39	Fig.58	1287.75	
	78	Fig.59	1281.00	

See below for test graphs.

Conclusion: PASS

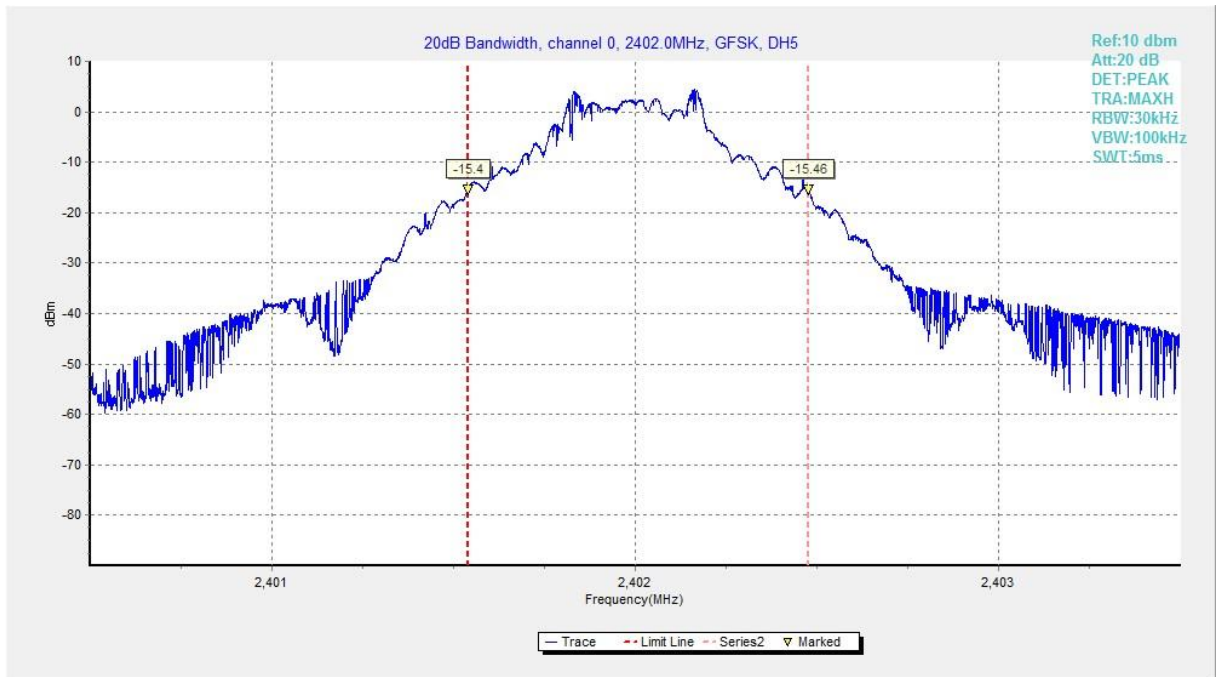


Fig. 51 20dB Bandwidth (GFSK, Ch 0)

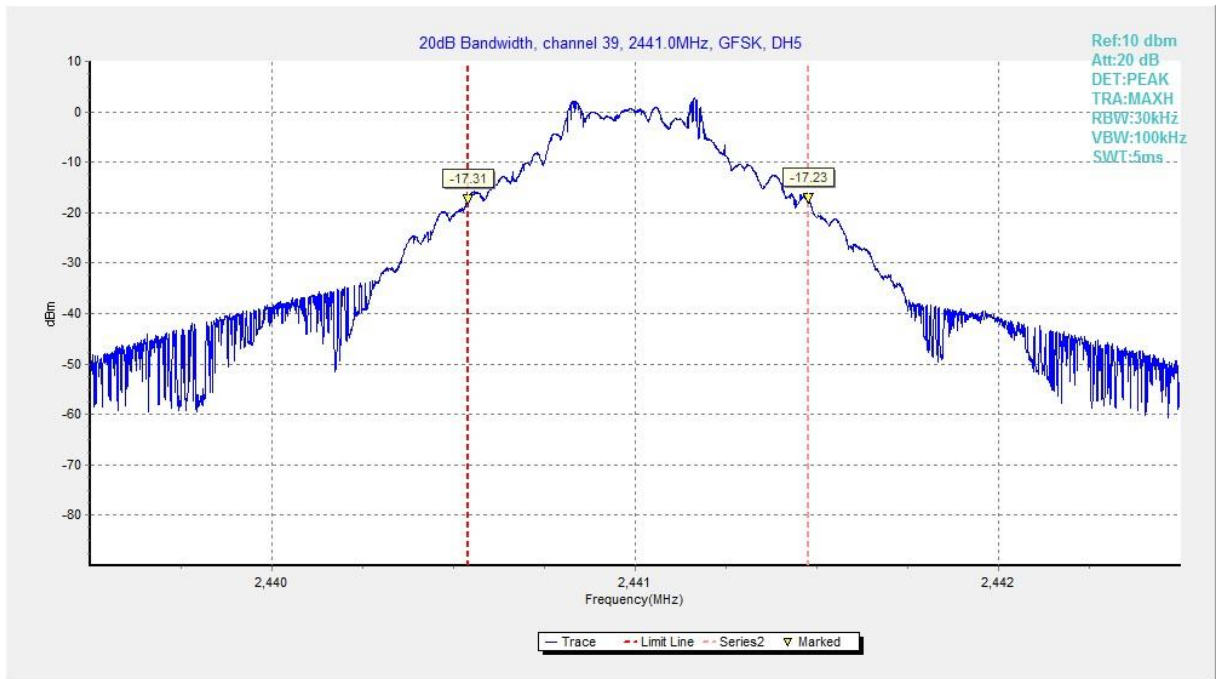


Fig. 52 20dB Bandwidth (GFSK, Ch 39)

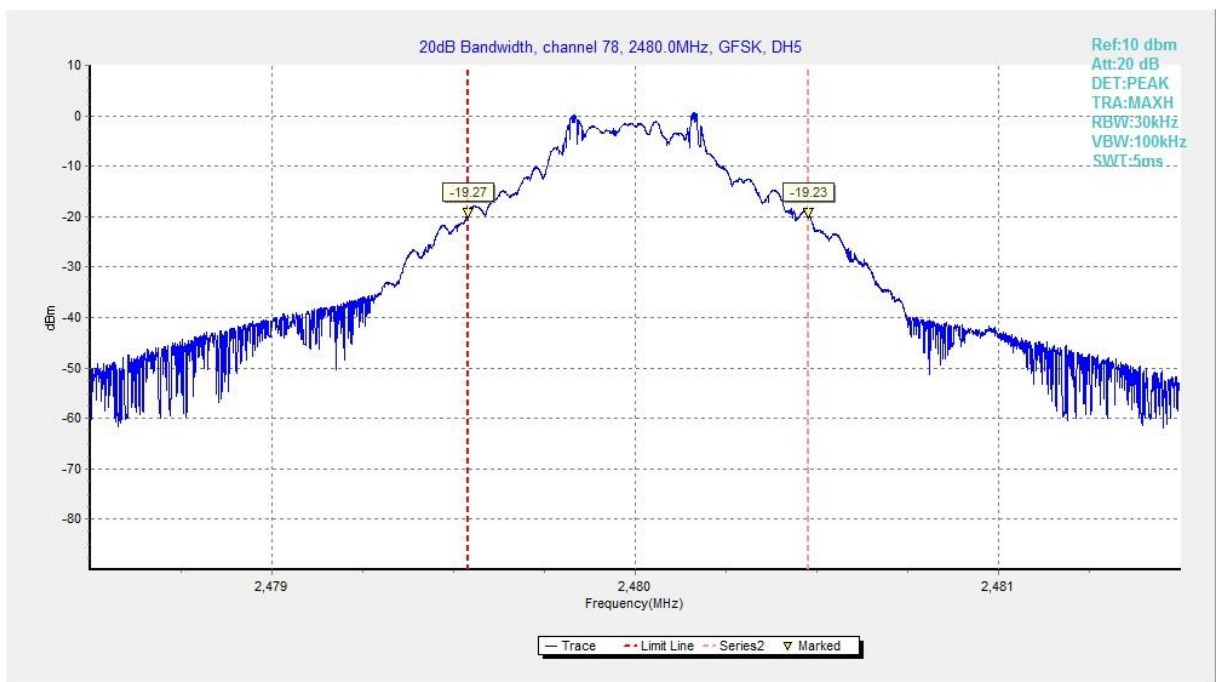


Fig. 53 20dB Bandwidth (GFSK, Ch 78)



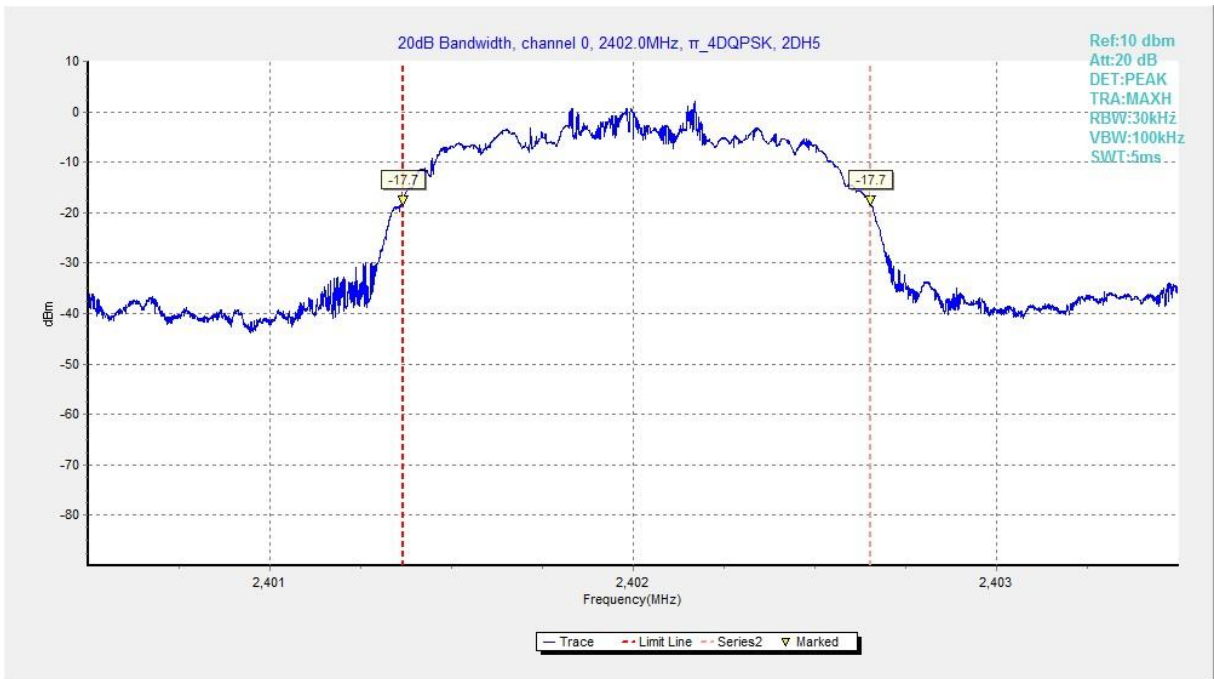


Fig. 54 20dB Bandwidth ( $\pi$ /4 DQPSK, Ch 0)

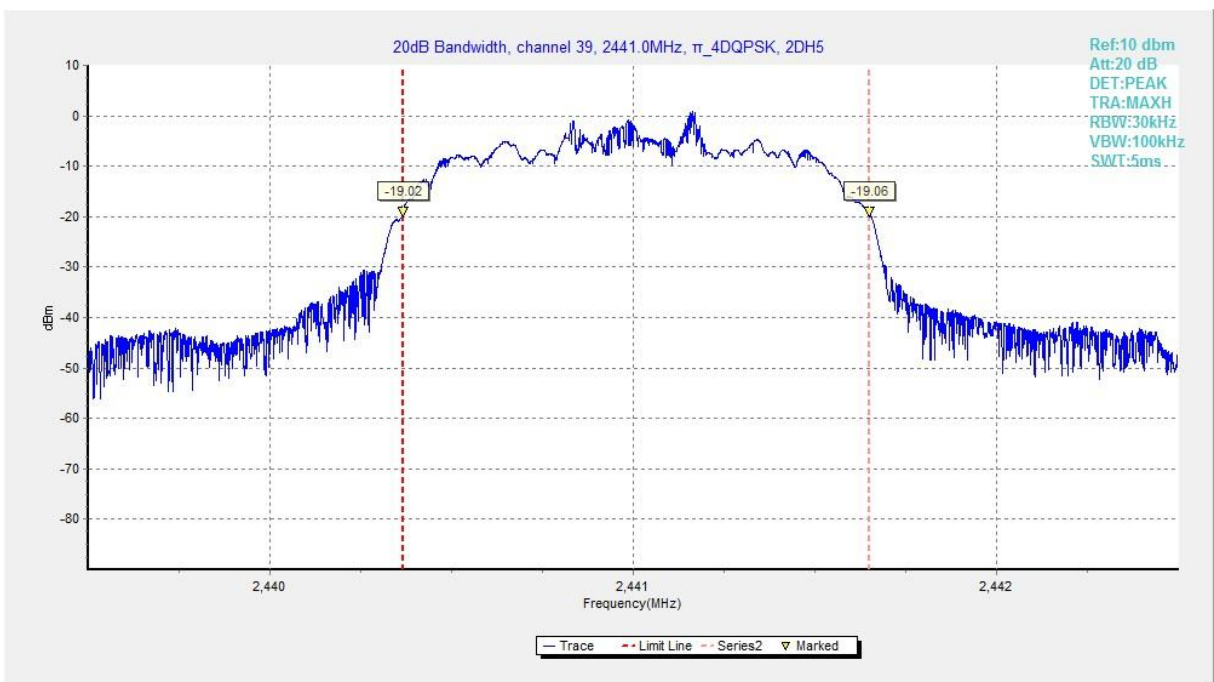


Fig. 55 20dB Bandwidth ( $\pi$ /4 DQPSK, Ch 39)

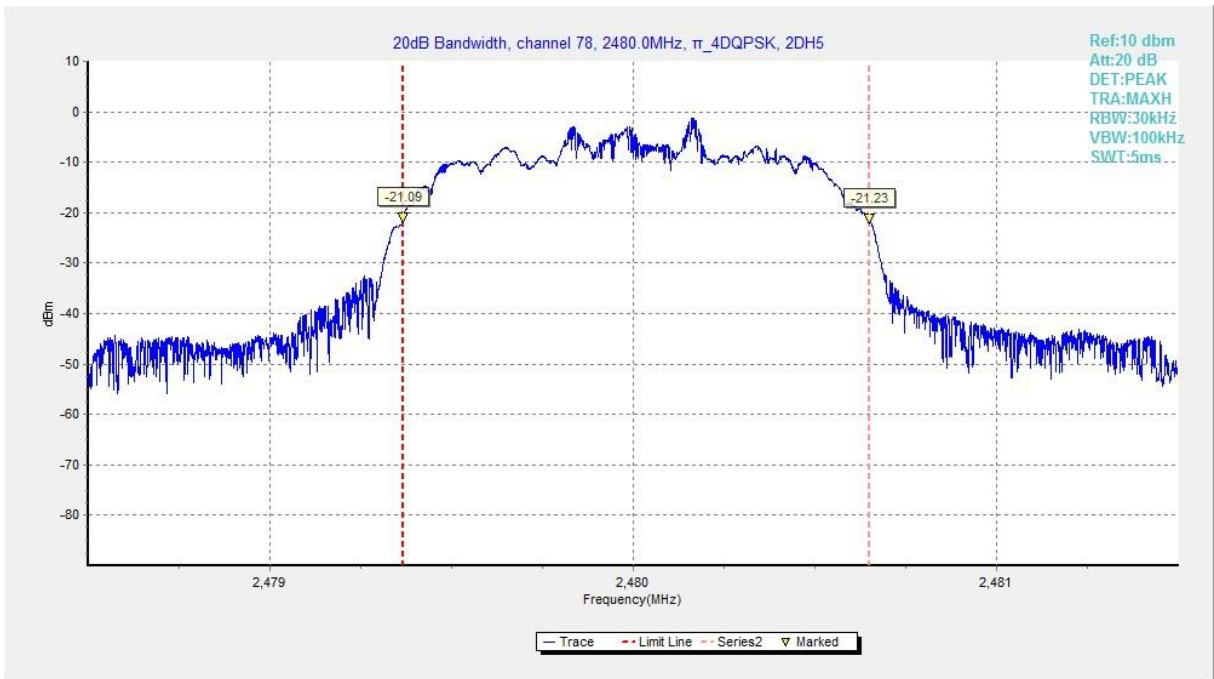


Fig. 56 20dB Bandwidth ( $\pi/4$  DQPSK, Ch 78)

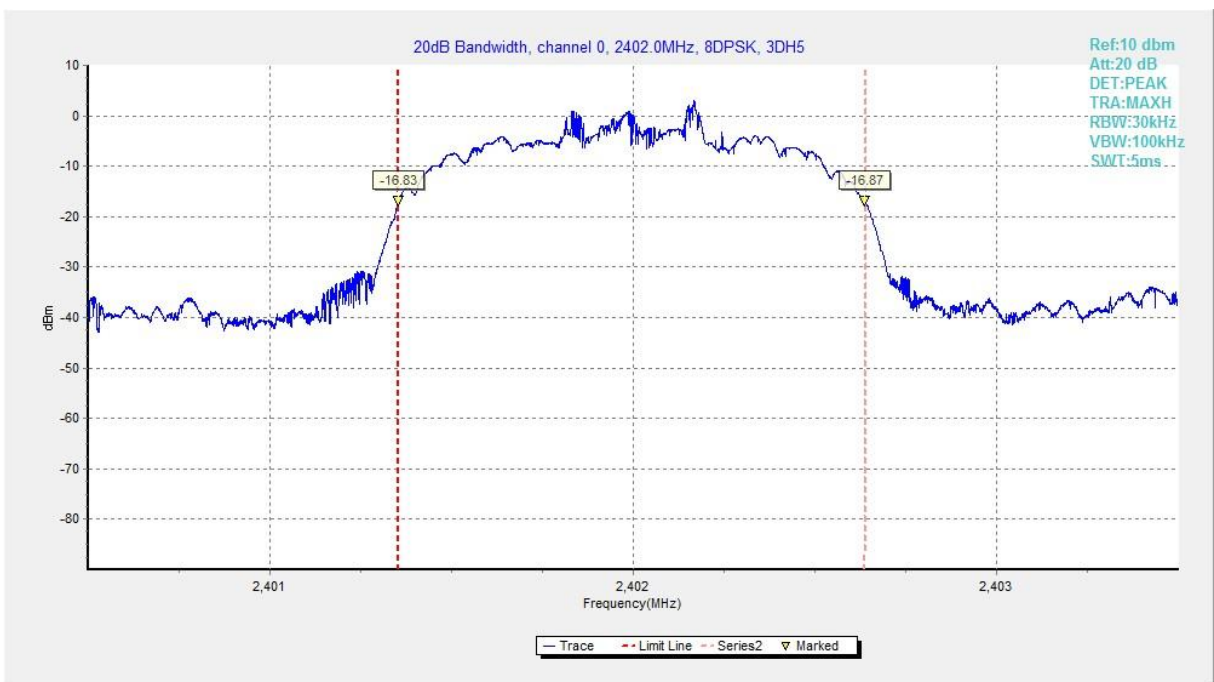


Fig. 57 20dB Bandwidth (8DPSK, Ch 0)

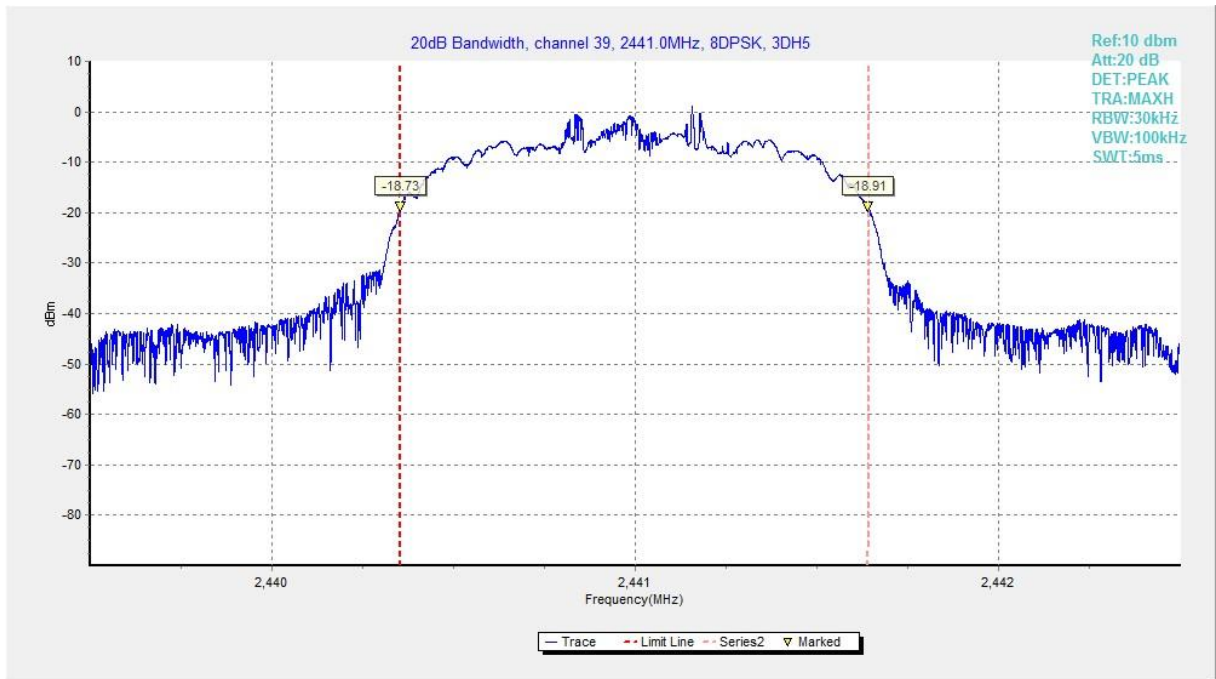


Fig. 58 20dB Bandwidth (8DPSK, Ch 39)

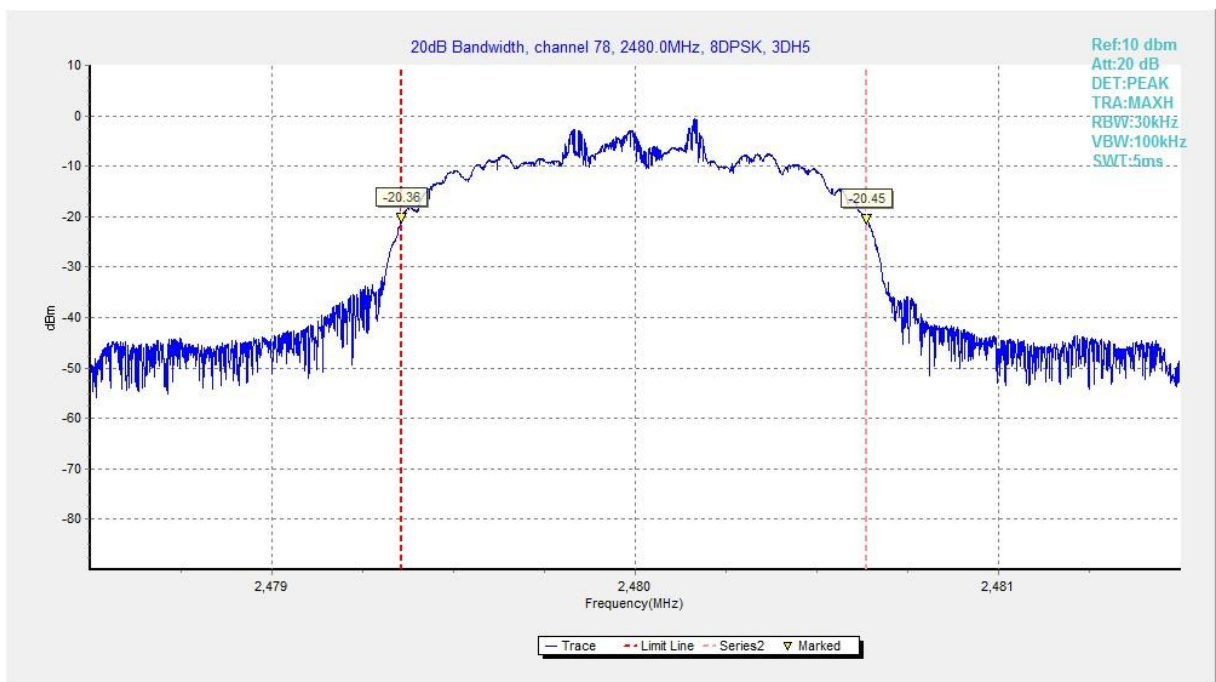


Fig. 59 20dB Bandwidth (8DPSK, Ch 78)



**A.6 Time of Occupancy (Dwell Time)**

**Method of Measurement: See ANSI C63.10-clause 7.8.4.**

**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.60	167.95	<b>P</b>
			Fig.61		
$\pi/4$ DQPSK	39	2-DH5	Fig.62	210.53	<b>P</b>
			Fig.63		
8DPSK	39	3-DH5	Fig.64	172.99	<b>P</b>
			Fig.65		

**See below for test graphs.**

**Conclusion: Pass**

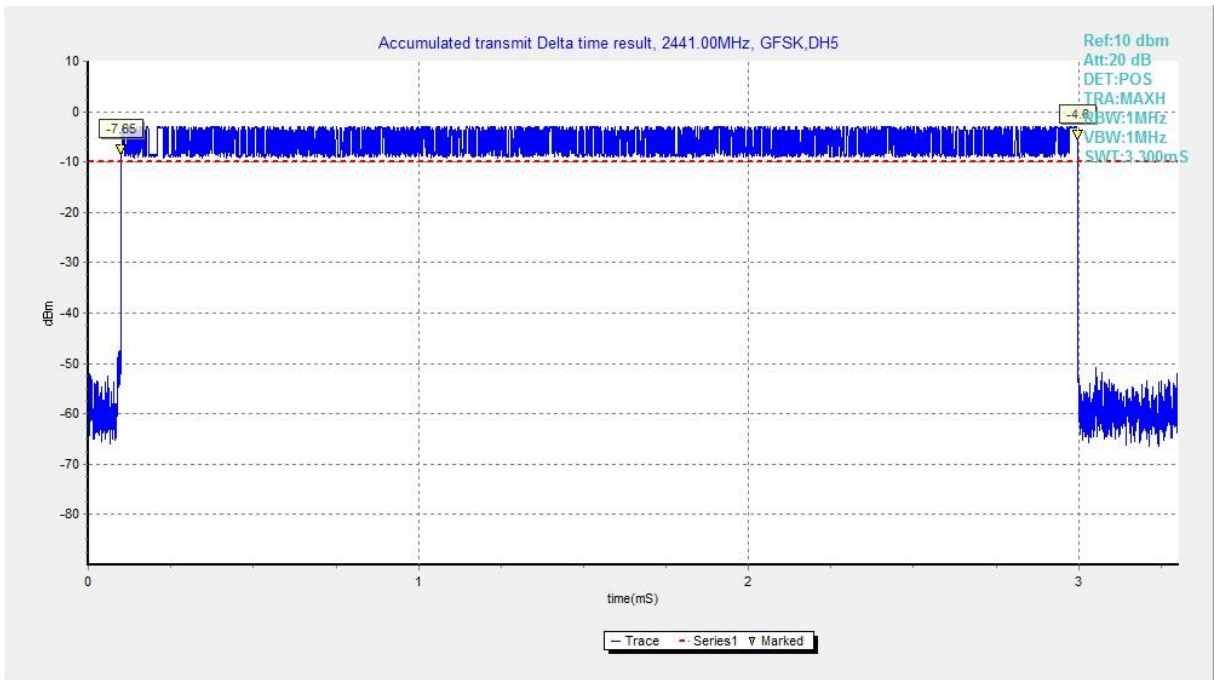


Fig. 60 Time of Occupancy (Dwell Time) (GFSK, Ch39)

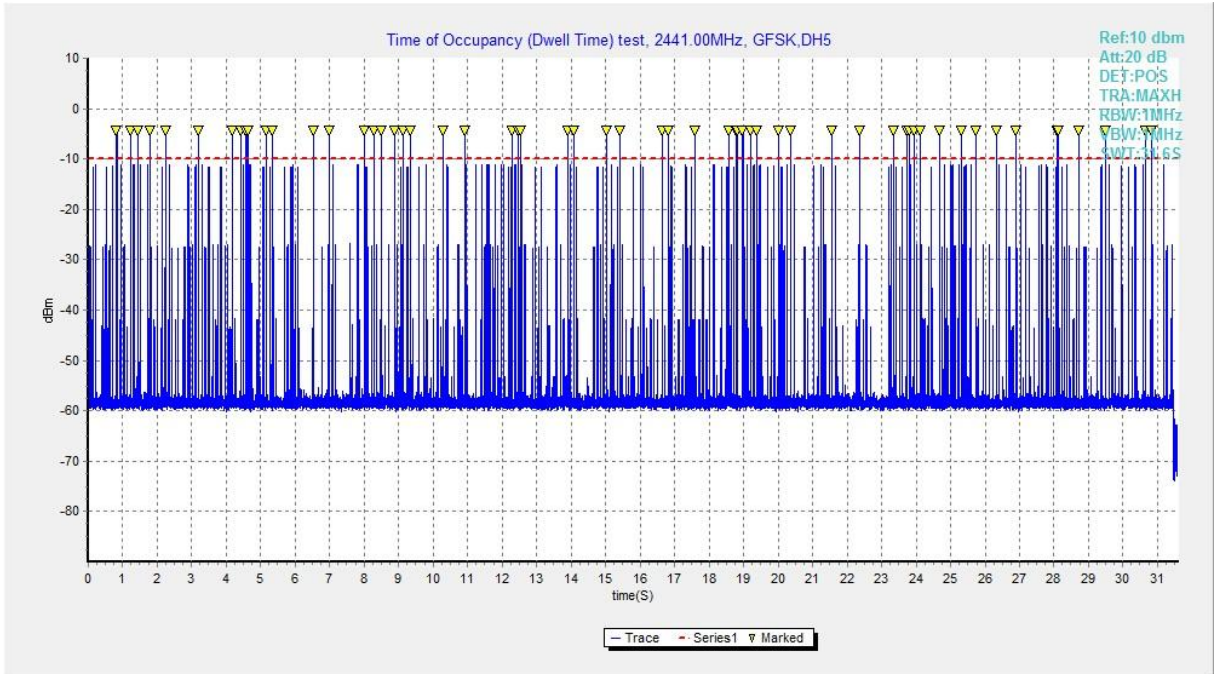


Fig. 61 Time of Occupancy (Dwell Time) (GFSK, Ch39)

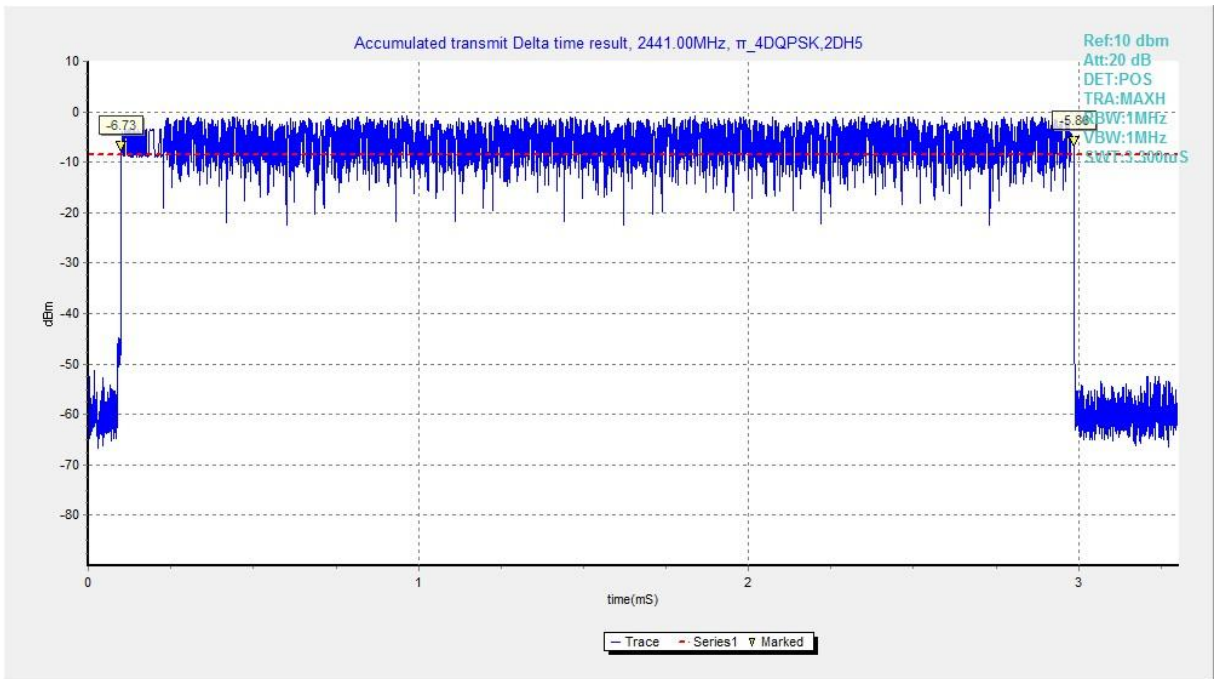


Fig. 62 Time of Occupancy (Dwell Time) ( $\pi/4$  DQPSK, Ch39)

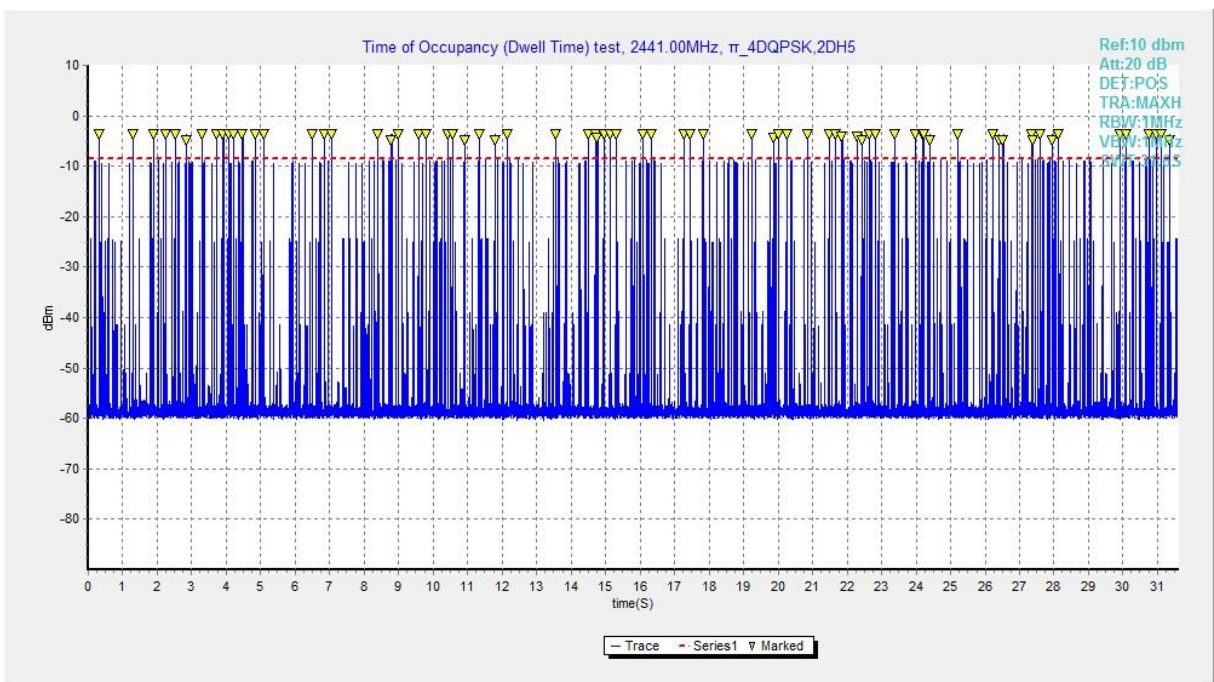


Fig. 63 Time of Occupancy (Dwell Time) ( $\pi/4$  DQPSK, Ch39)

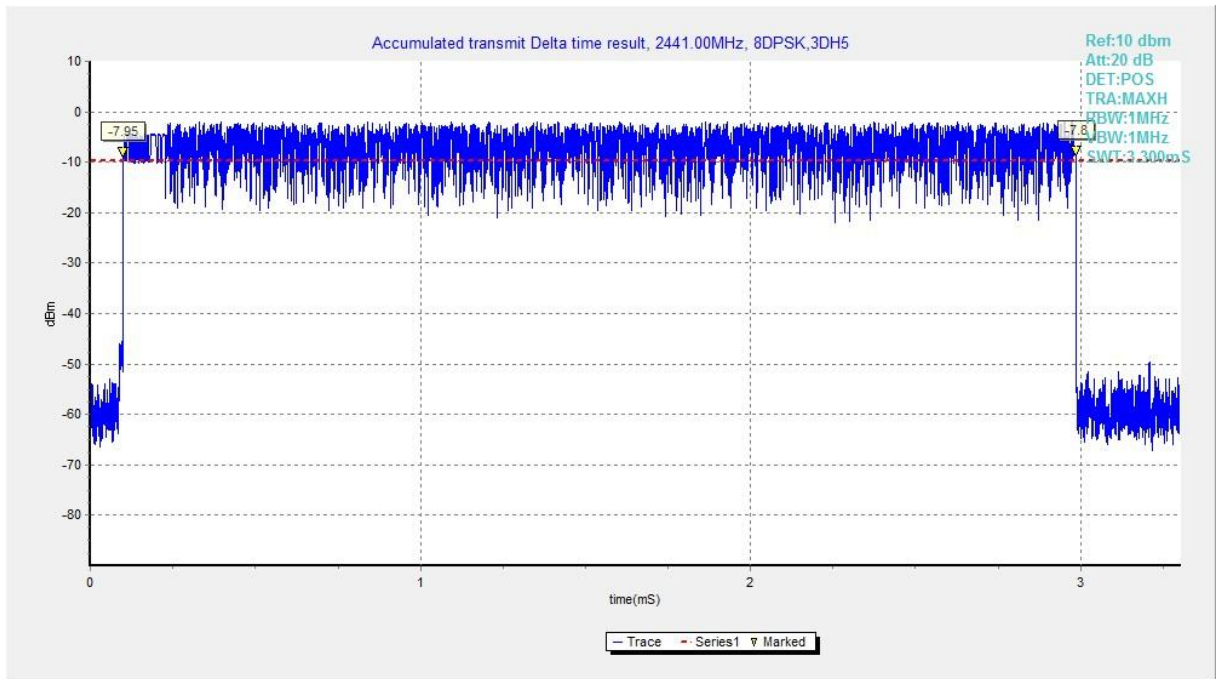


Fig. 64 Time of Occupancy (Dwell Time) (8DPSK, Ch39)

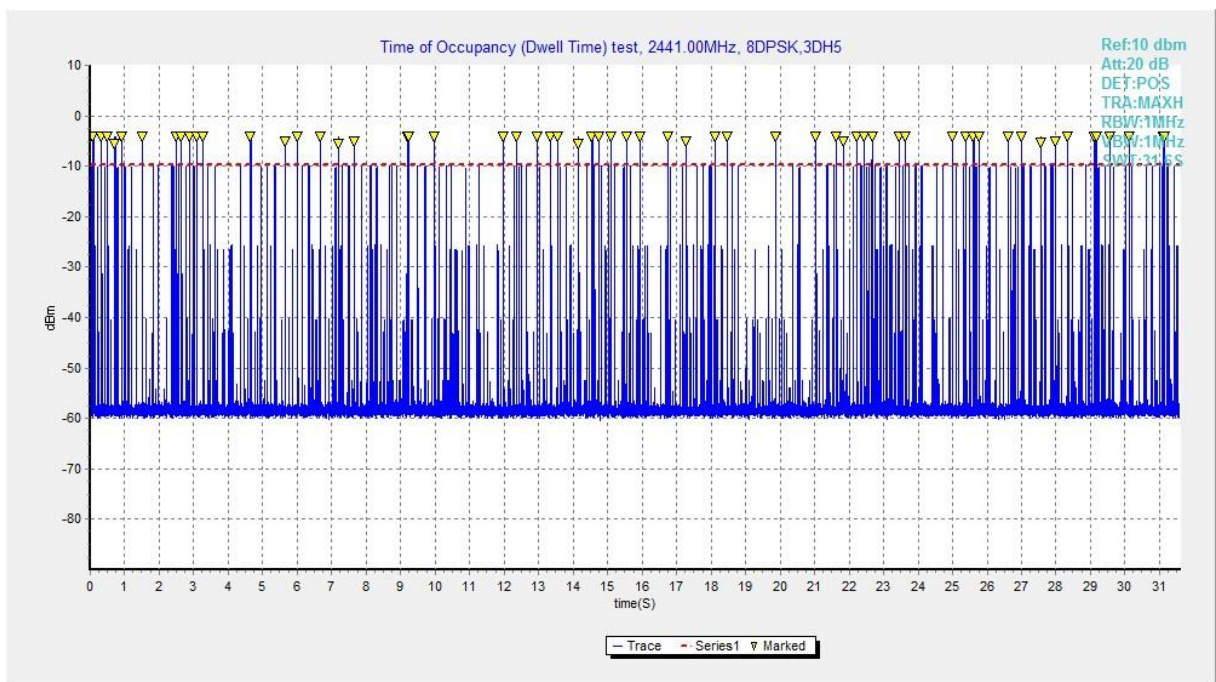


Fig. 65 Time of Occupancy (Dwell Time) (8DPSK, Ch39)



**A.7 Number of Hopping Channels**

**Method of Measurement: See ANSI C63.10-clause 7.8.3.**

**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.66	Fig.67	79	<b>P</b>
$\pi/4$ DQPSK	2-DH5	Fig.68	Fig.69	79	<b>P</b>
8DPSK	3-DH5	Fig.70	Fig.71	79	<b>P</b>

**See below for test graphs.**

**Conclusion: Pass**



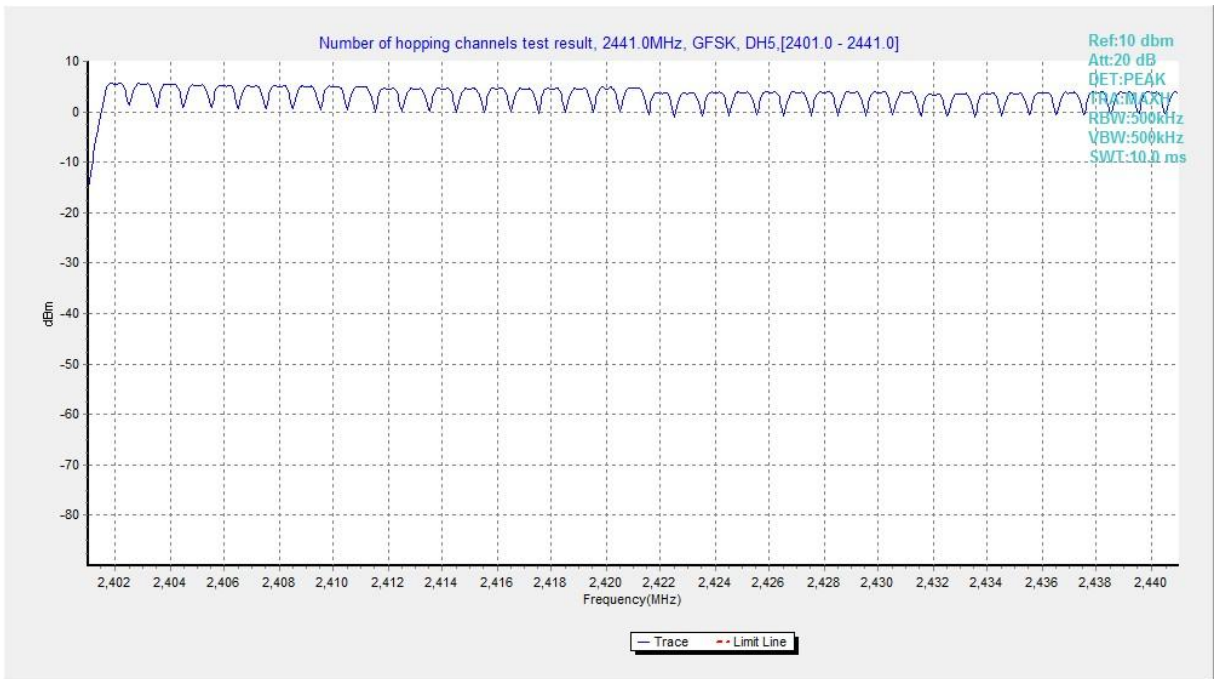


Fig. 66 Hopping channel ch0~39 (GFSK, Ch39)

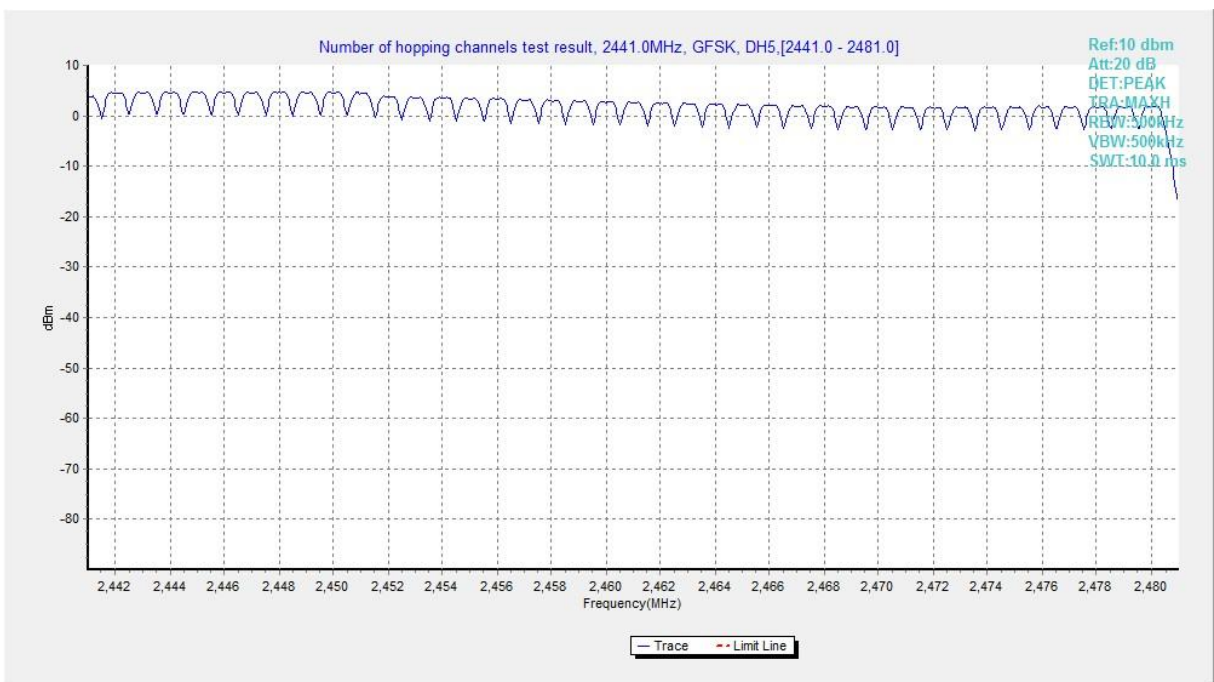


Fig. 67 Hopping channel ch40~78 (GFSK, Ch39)

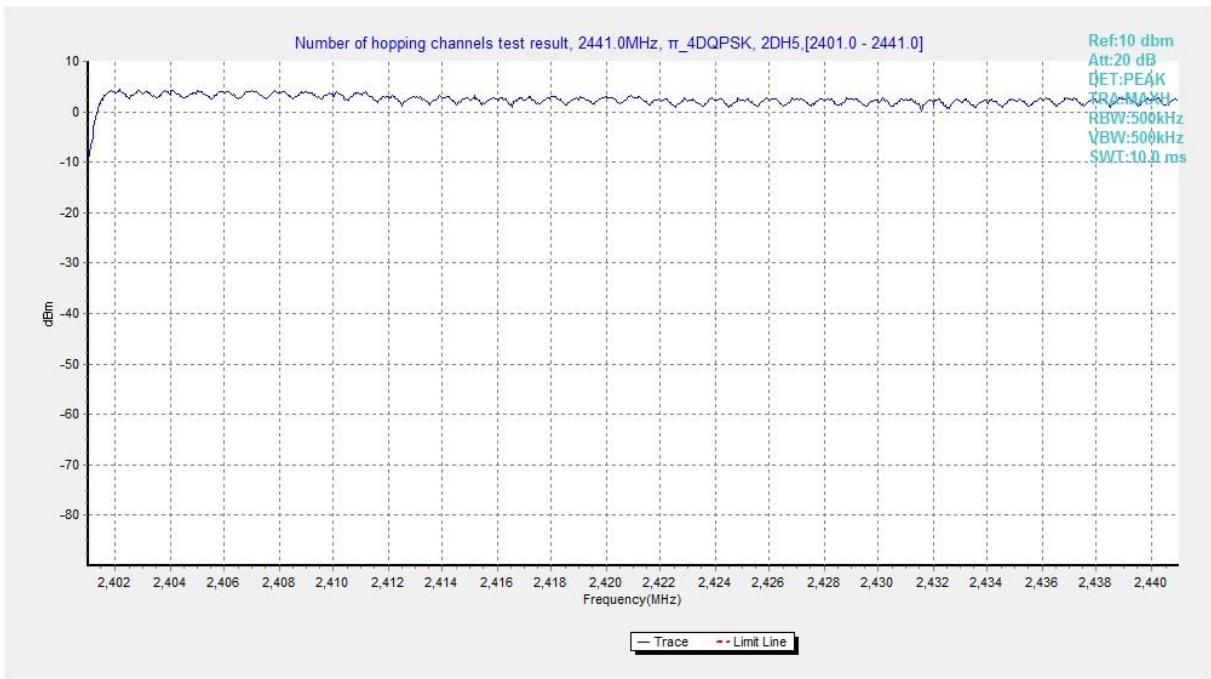


Fig. 68 Hopping channel ch0~39 ( $\pi$  /4 DQPSK, Ch39)

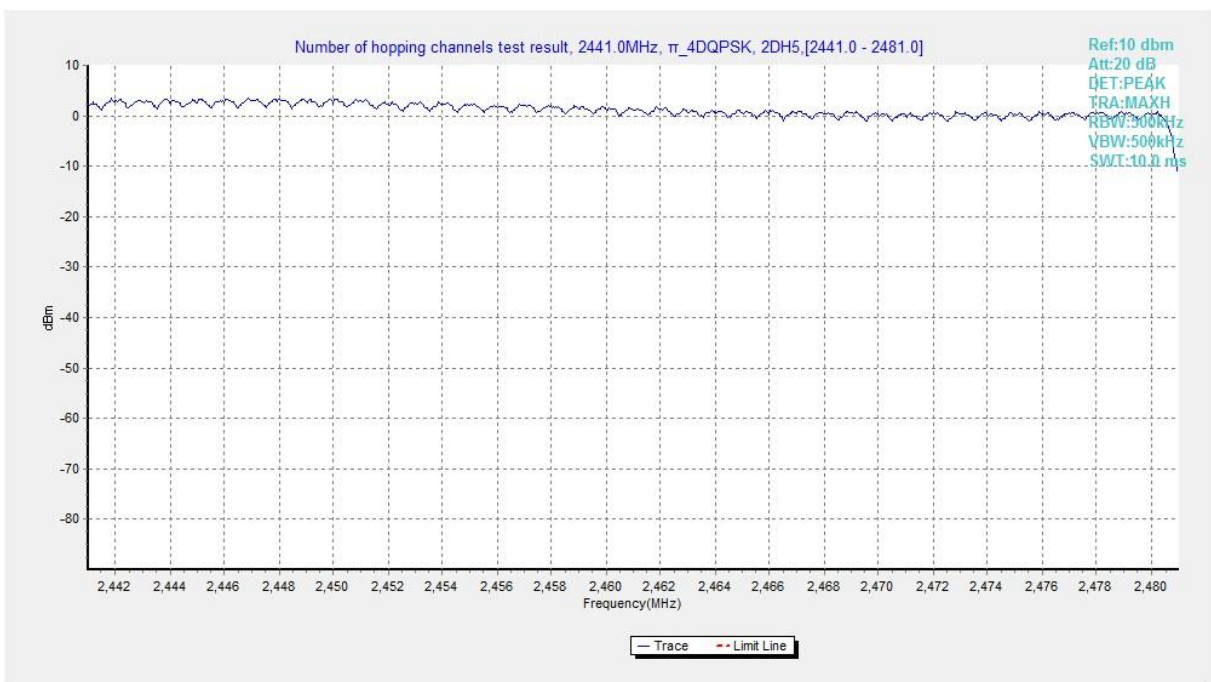


Fig. 69 Hopping channel ch40~78 ( $\pi$  /4 DQPSK, Ch39)

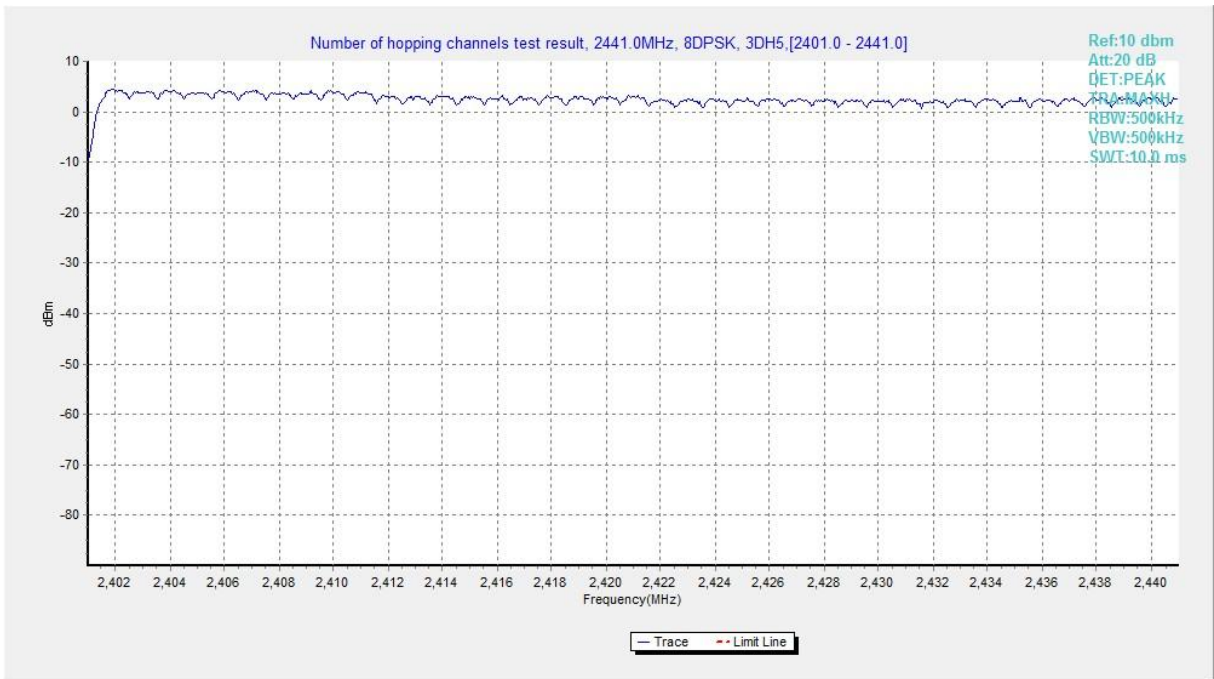


Fig. 70 Hopping channel ch0~39 (8DPSK, Ch39)

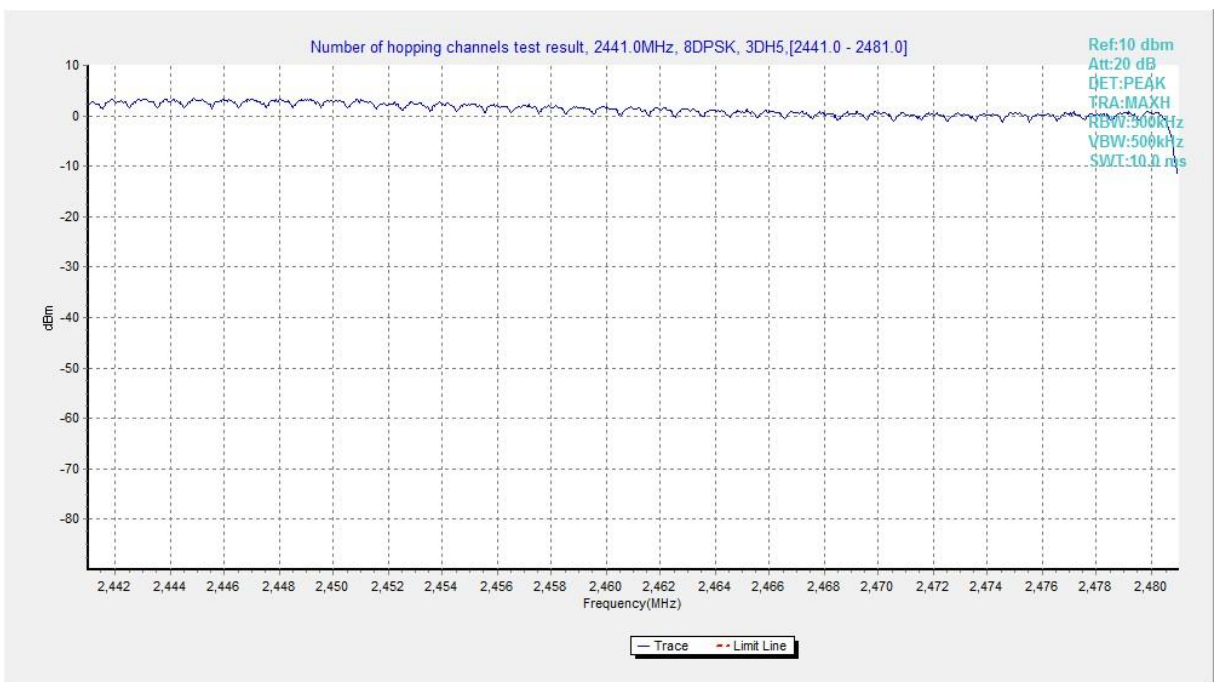


Fig. 71 Hopping channel ch40~78 (8DPSK, Ch39)

### A.8 Carrier Frequency Separation

**Method of Measurement:** See ANSI C63.10-clause 7.8.2.

**Measurement Limit:**

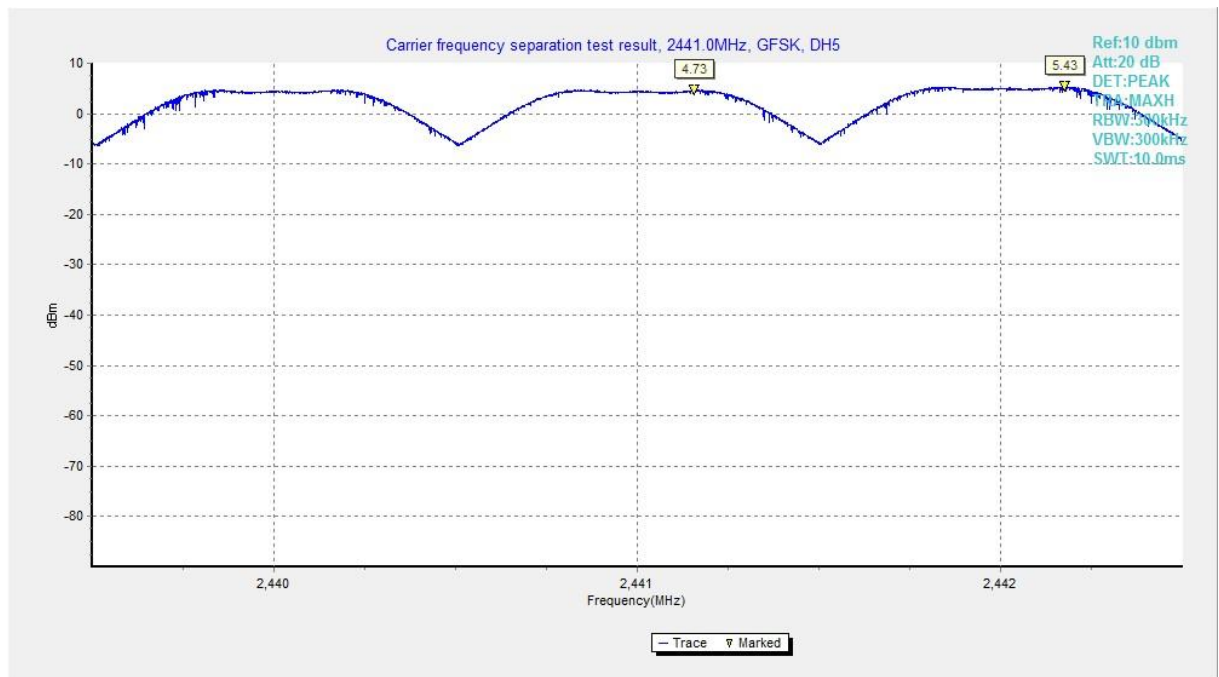
Standard	Limit
FCC 47 CFR Part 15.247(a)	By a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

**Measurement Results:**

Mode	Channel	Packet	Separation of hopping channels	Test result (MHz)	Conclusion
GFSK	39	DH5	Fig.72	1.00	<b>P</b>
$\pi/4$ DQPSK	39	2-DH5	Fig.73	1.00	<b>P</b>
8DPSK	39	3-DH5	Fig.74	1.00	<b>P</b>

See below for test graphs.

**Conclusion: Pass**



**Fig. 72 Carrier Frequency Separation (GFSK, Ch39)**

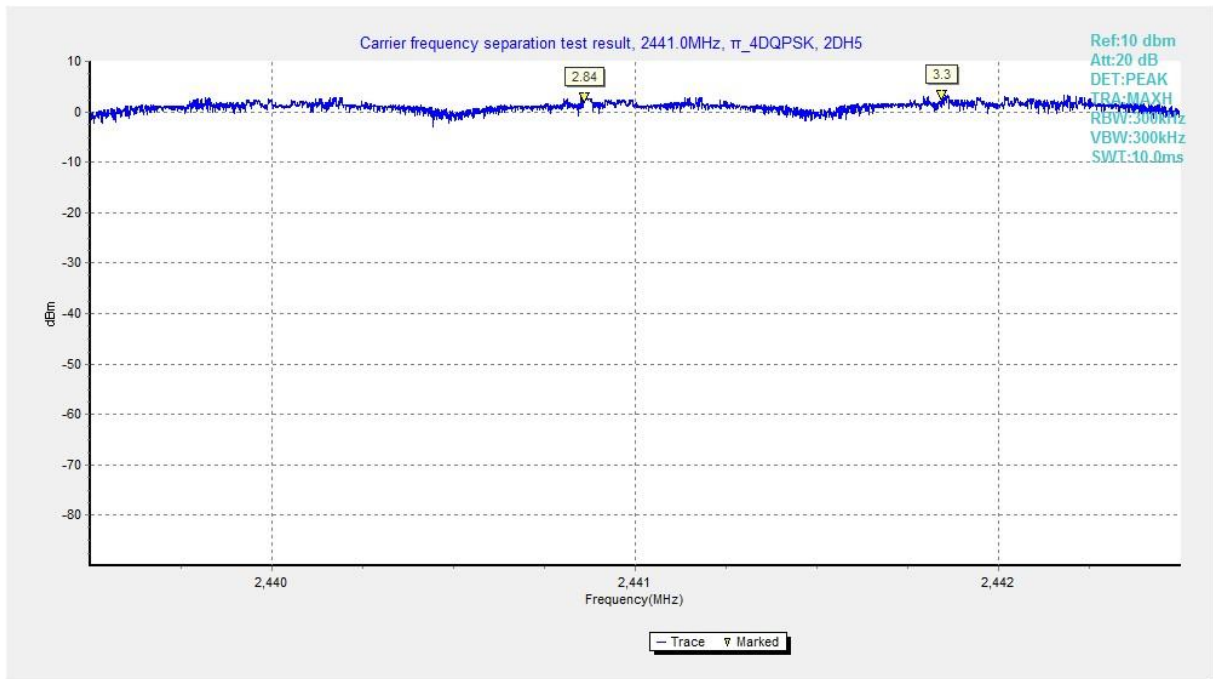


Fig. 73 Carrier Frequency Separation ( $\pi$  /4 DQPSK, Ch39)

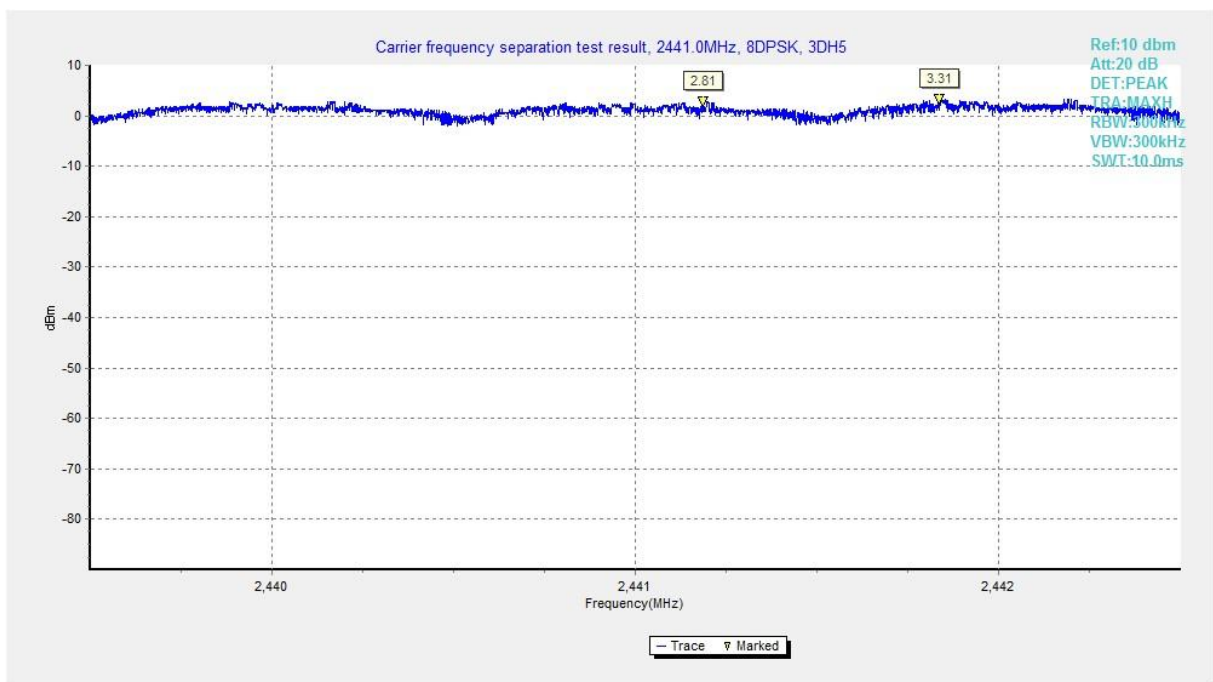


Fig. 74 Carrier Frequency Separation (8DPSK, Ch39)

**A.9 AC Power line Conducted Emission**

**Method of Measurement: See ANSI C63.10-clause 6.2.**

**Test Condition:**

Voltage (V)	Frequency (Hz)
120	60

**Measurement Result and limit:**

BT

Frequency range (MHz)	Quasi-peak Limit (dBµV)	Average-peak Limit (dBµV)	Result (dBµV)		Conclusion
			Traffic	Idle	
0.15 to 0.5	66 to 56	56 to 46	Fig.75	Fig.76	<b>P</b>
0.5 to 5	56	46			
5 to 30	60	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.

**See below for test graphs.**

**Conclusion: Pass**

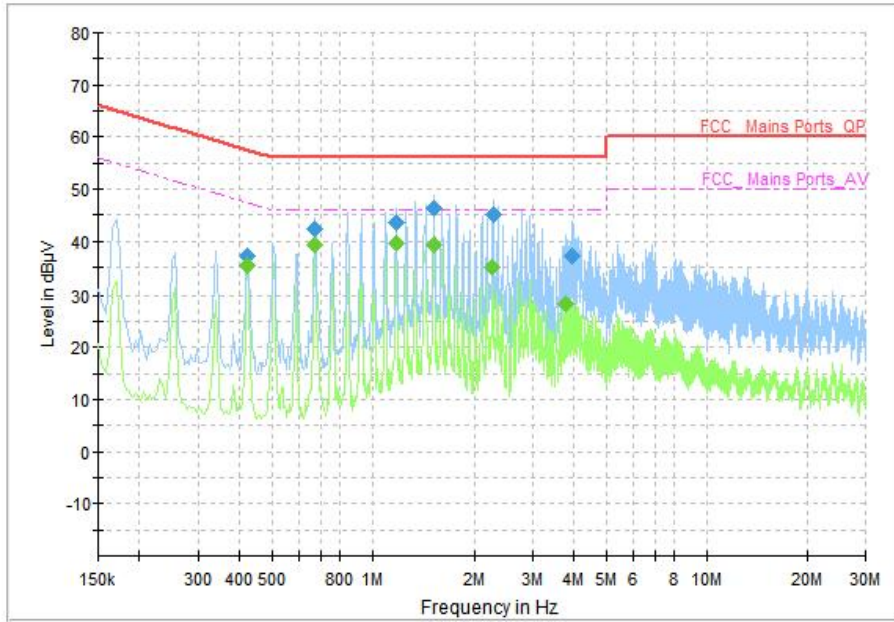


Fig. 75 AC Powerline Conducted Emission (Traffic, AE3, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.422000	37.33	57.41	20.08	N	ON	10
0.674000	42.28	56.00	13.72	L1	ON	10
1.182000	43.57	56.00	12.43	L1	ON	10
1.518000	46.48	56.00	9.52	L1	ON	10
2.278000	45.24	56.00	10.76	L1	ON	10
3.958000	37.21	56.00	18.79	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.422000	35.44	47.41	11.97	N	ON	10
0.674000	39.19	46.00	6.81	N	ON	10
1.178000	39.76	46.00	6.24	N	ON	10
1.514000	39.26	46.00	6.74	N	ON	10
2.274000	35.04	46.00	10.96	N	ON	10
3.782000	28.37	46.00	17.63	N	ON	10

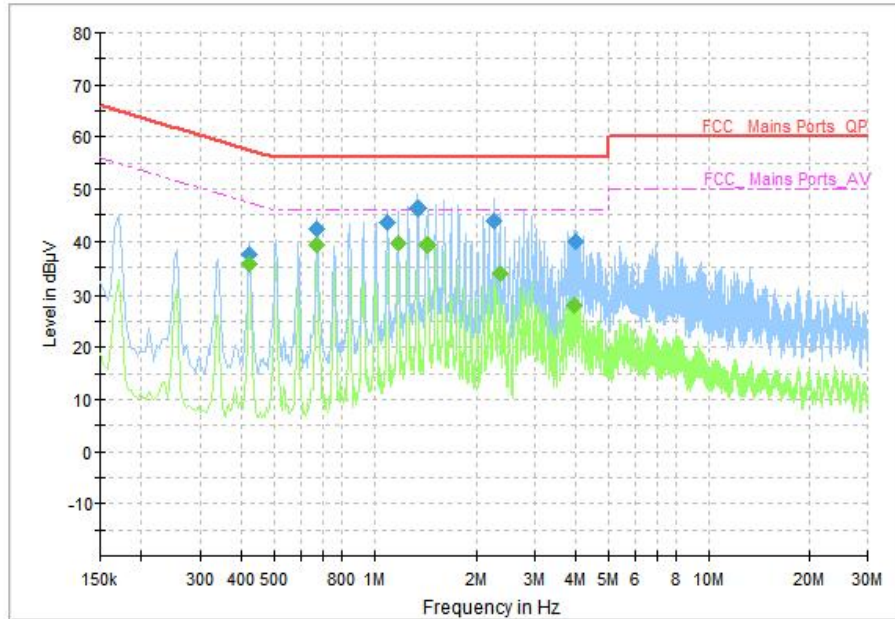


Fig. 76 AC Power line Conducted Emission (Idle, AE3, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.422000	37.37	57.41	20.04	L1	ON	10
0.674000	42.31	56.00	13.69	L1	ON	10
1.094000	43.55	56.00	12.45	L1	ON	10
1.350000	46.46	56.00	9.54	L1	ON	10
2.274000	43.96	56.00	12.04	L1	ON	10
3.962000	39.87	56.00	16.13	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.422000	35.58	47.41	11.83	N	ON	10
0.674000	39.32	46.00	6.68	N	ON	10
1.178000	39.54	46.00	6.46	N	ON	10
1.430000	39.21	46.00	6.79	N	ON	10
2.354000	33.80	46.00	12.20	N	ON	10
3.950000	28.16	46.00	17.84	N	ON	10

\*\*\*END OF REPORT\*\*\*