



# TEST REPORT

No. I21N00755-BT

**TCL Communication Ltd.**

**Tablet**

**Model Name: 9317X**

**with**

**Hardware Version: PIO**

**Software Version: EN1**

**FCC ID: 2ACCJB150**

**Issued Date: 2021-03-14**

**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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## 1. Summary of Test Report

### 1.1. Test Items

Description	Tablet
Model Name	9317X
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:	2021-01-29
Testing End Date:	2021-02-10

### 1.6. Signature

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Lin Kanfeng  
(Prepared this test report)

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Tang Weisheng  
(Reviewed this test report)

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Zhang Bojun  
(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd.  
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong  
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  
Contact Person: Gong Zhizhou  
E-Mail: zhizhou.gong@tcl.com  
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### **3. Equipment Under Test (EUT) and Ancillary Equipment (AE)**

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

Description	Tablet
Model Name	9317X
Frequency Band	2400MHz~2483.5MHz
Type of Modulation	GFSK/ $\pi$ /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	-0.8 dBi
Power Supply	3.8V DC by Battery
FCC ID	2ACCJB150
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>
UT06aa	DC9BD64608B5221	PIO	EN1	2021-01-29
UT01aa	DC9BD64608B5128	PIO	EN1	2021-01-29

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

\*UT06aa is used for Conduction test; UT01aa is used for Radiation test and AC Power line Conducted Emission test.

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

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>
AE1	Battery	CAC2580038C7
AE2	Battery	CAC2580046CA
AE3	Charger	CBA0058AGAC7
AE4	Charger	CBA0058AGAC5

AE1

Model	TLp025F7
Manufacturer	VEKEN
Capacity	2580mAh
Nominal Voltage	3.8v

AE2

Model	TLp025FA
Manufacturer	Tianmao
Capacity	2580mAh
Nominal Voltage	3.8v

AE3

Model	UC11US
Manufacturer	CHENYANG



AE4

Model UC11US

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 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.

9317X is a variant product of 9317G, test results were from the initial model, the initial model report number is I21N00294-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	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.

## 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	2022-01-14	1 year
2	Bluetooth Tester	CBT32	100584	Rohde & Schwarz	2021-12-31	1 year
3	Power Sensor	U2021XA	MY55430013	Agilent	2022-01-14	1 year
4	Data Acquisition	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 ( $k=2$ )	
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	$30\text{MHz} \leq f < 1\text{GHz}$	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 -0.8dBi. 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	6.37	6.15	6.00
$\pi$ /4 DQPSK	6.28	6.14	5.98
8DPSK	6.37	6.23	6.04

### E.I.R.P

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	5.57	5.35	5.20
$\pi$ /4 DQPSK	5.48	5.34	5.18
8DPSK	5.57	5.43	5.24

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**

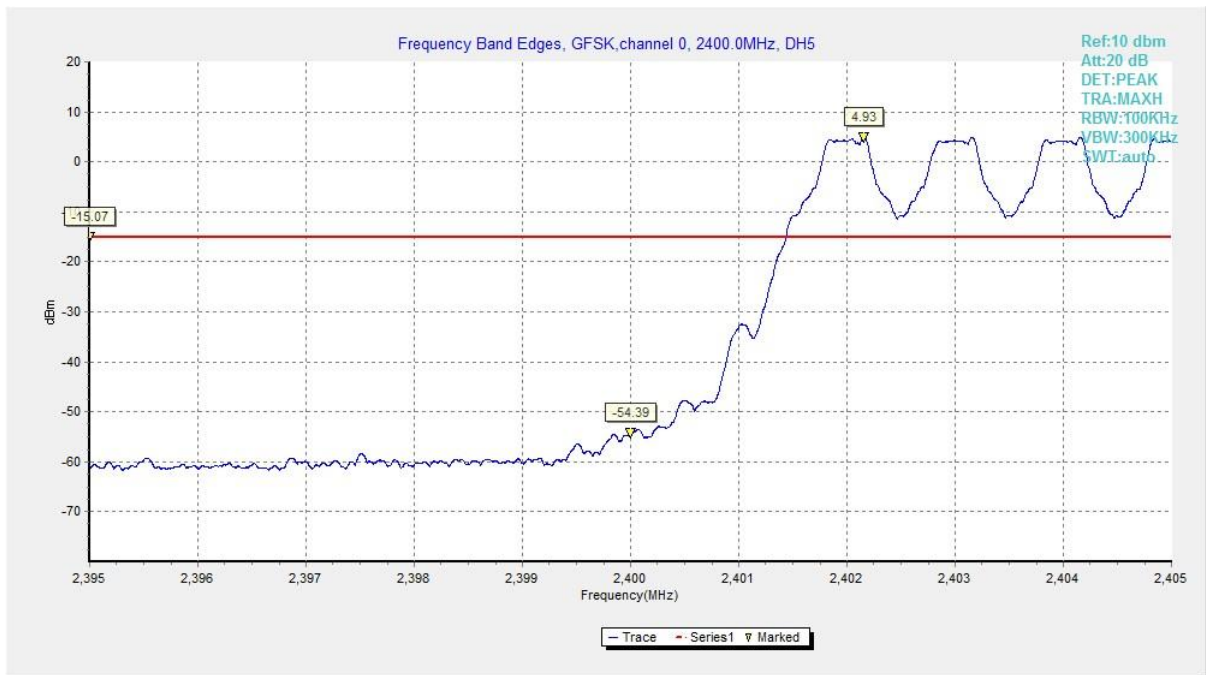


Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)

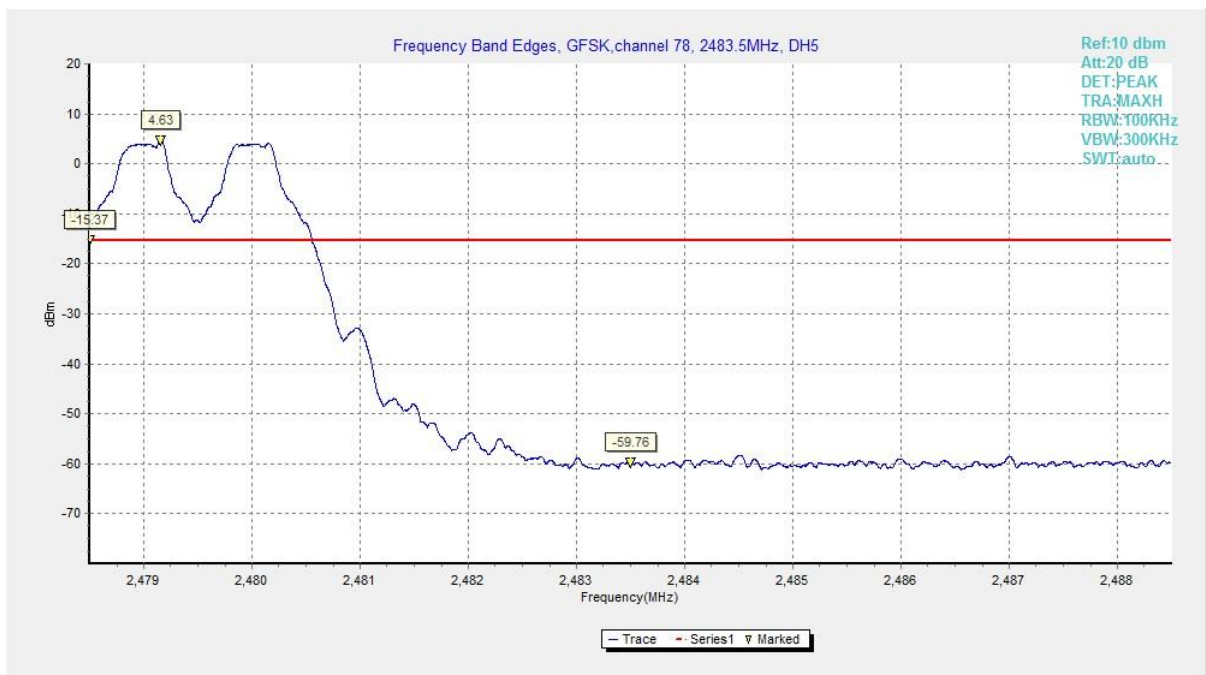


Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)



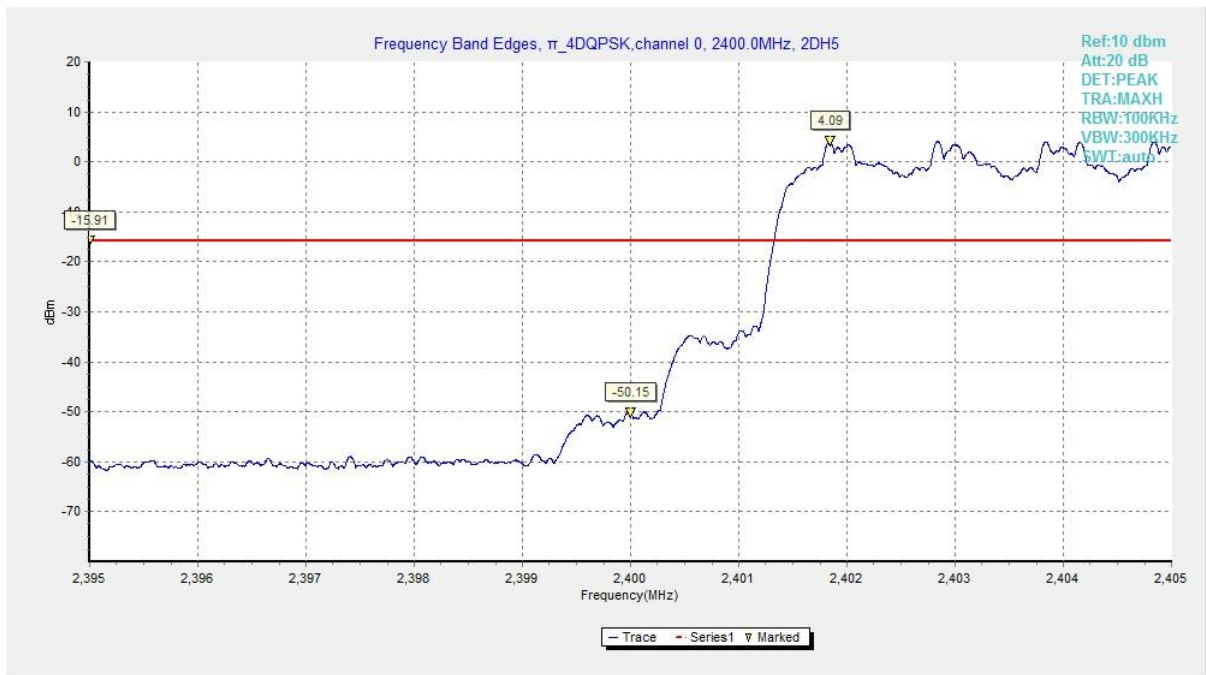


Fig. 3 Band Edges ( $\pi$ /4 DQPSK, Ch 0, Hopping ON)

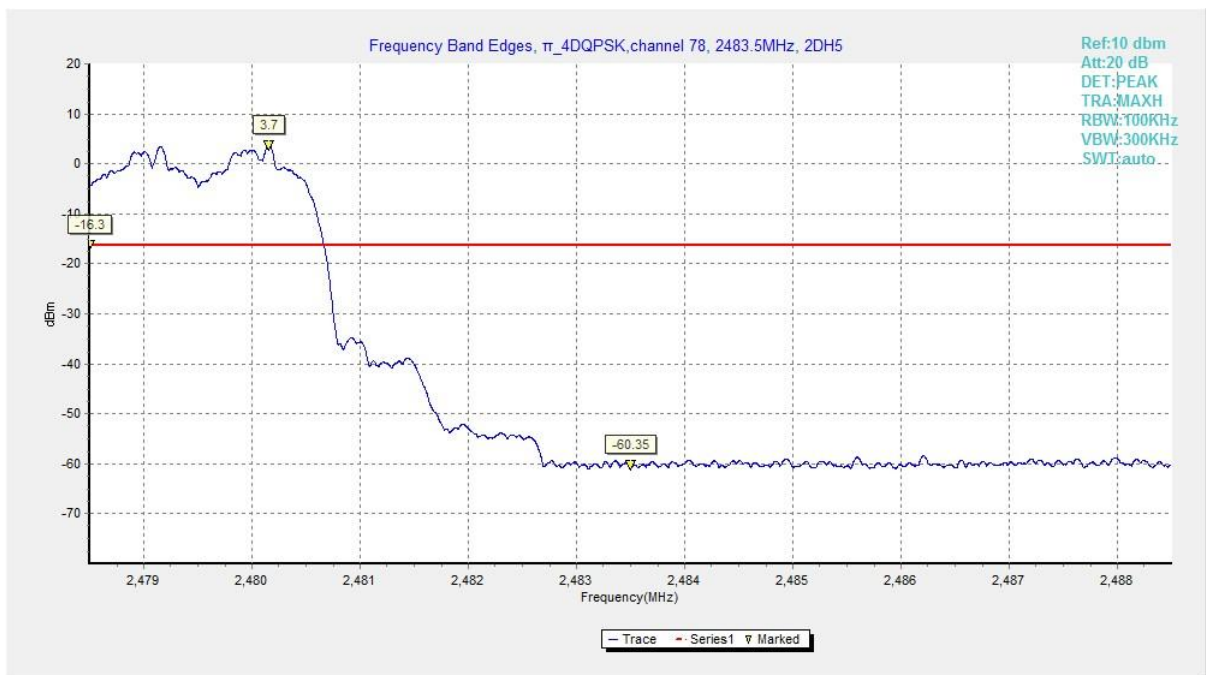


Fig. 4 Band Edges ( $\pi$ /4 DQPSK, Ch 78, Hopping ON)

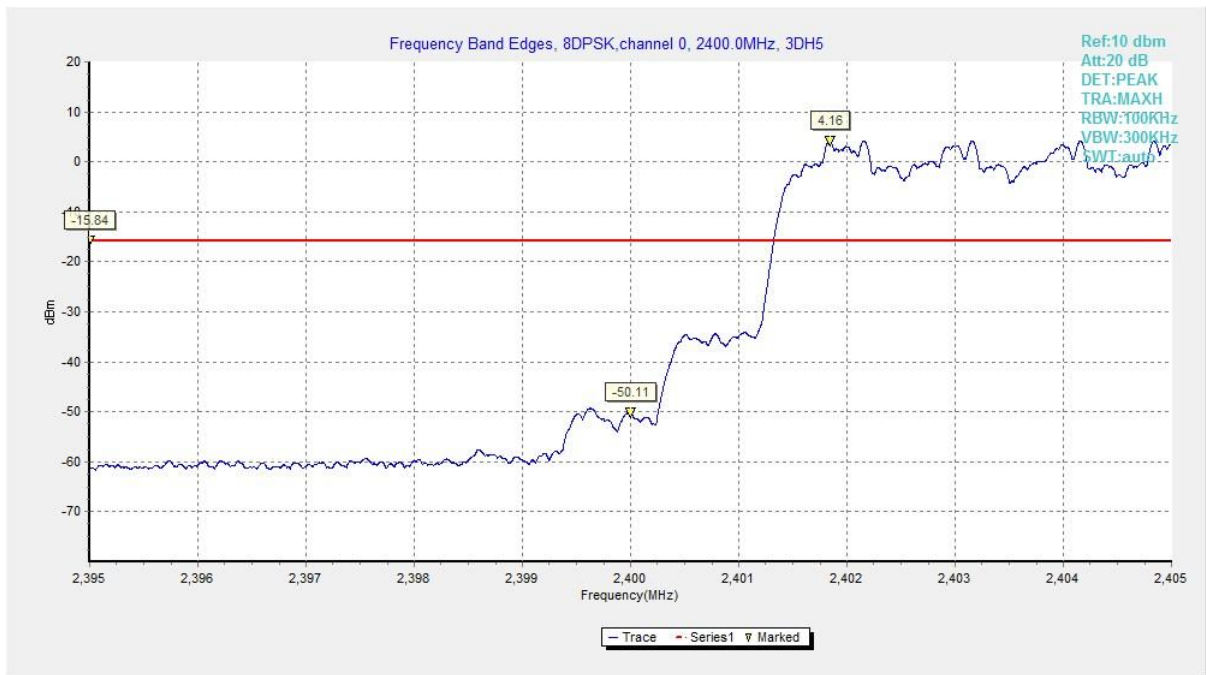


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

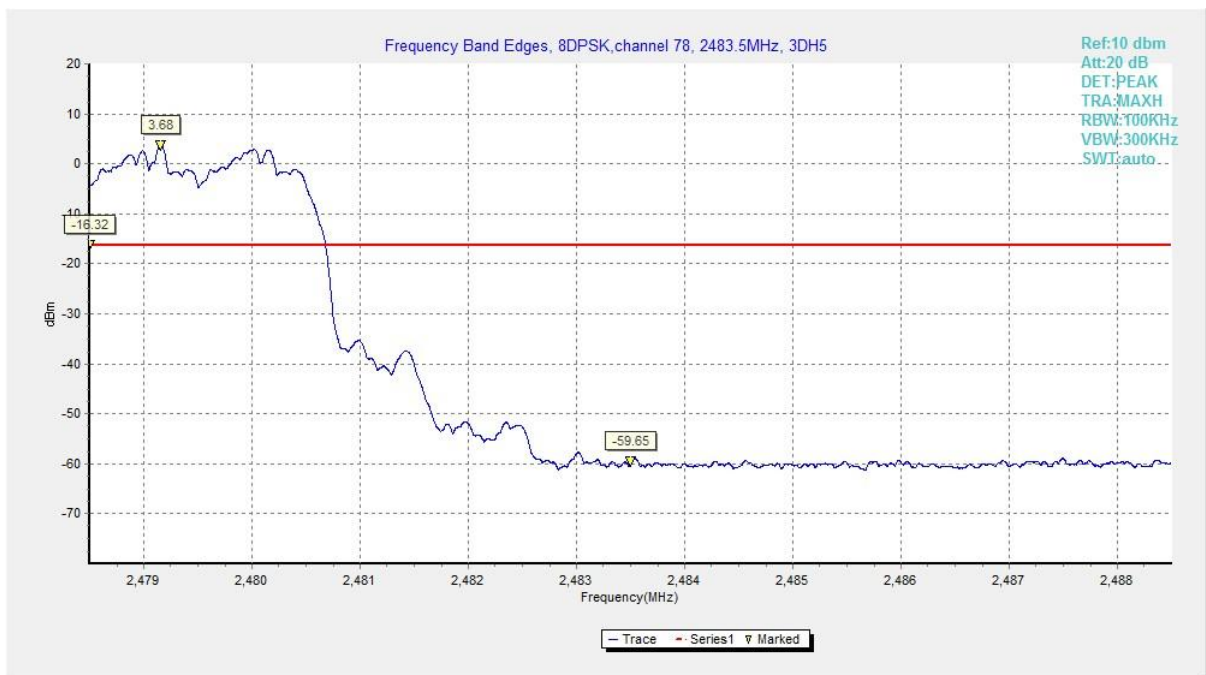


Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)

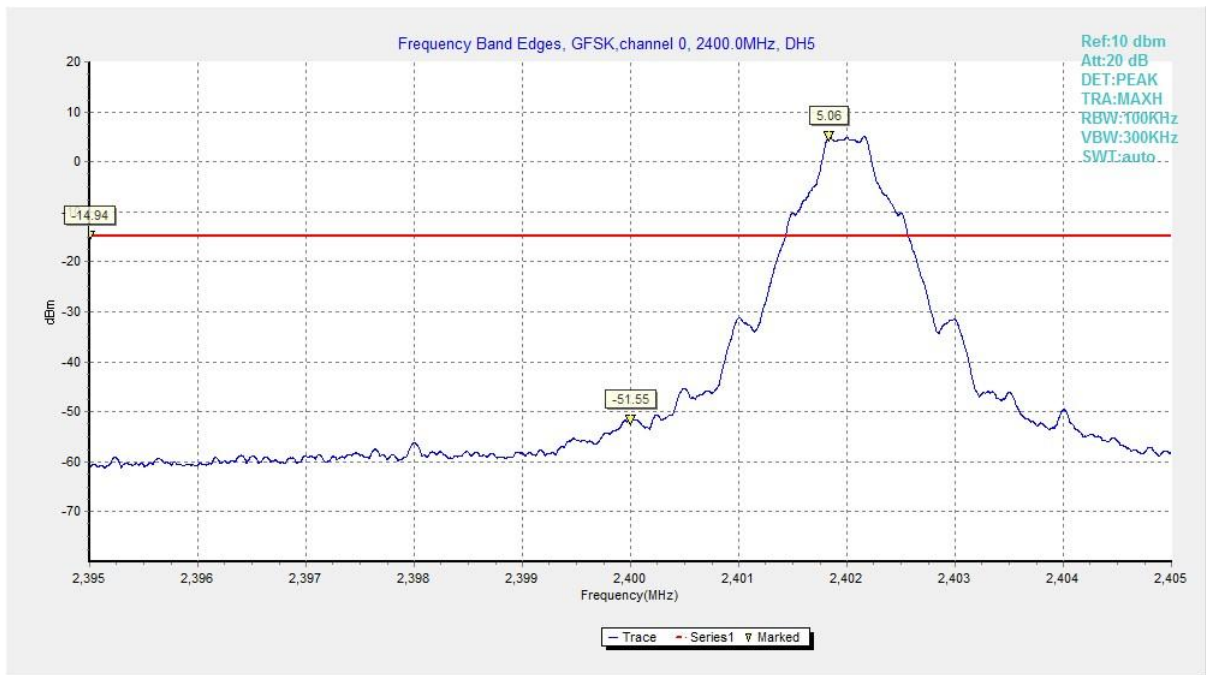


Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)

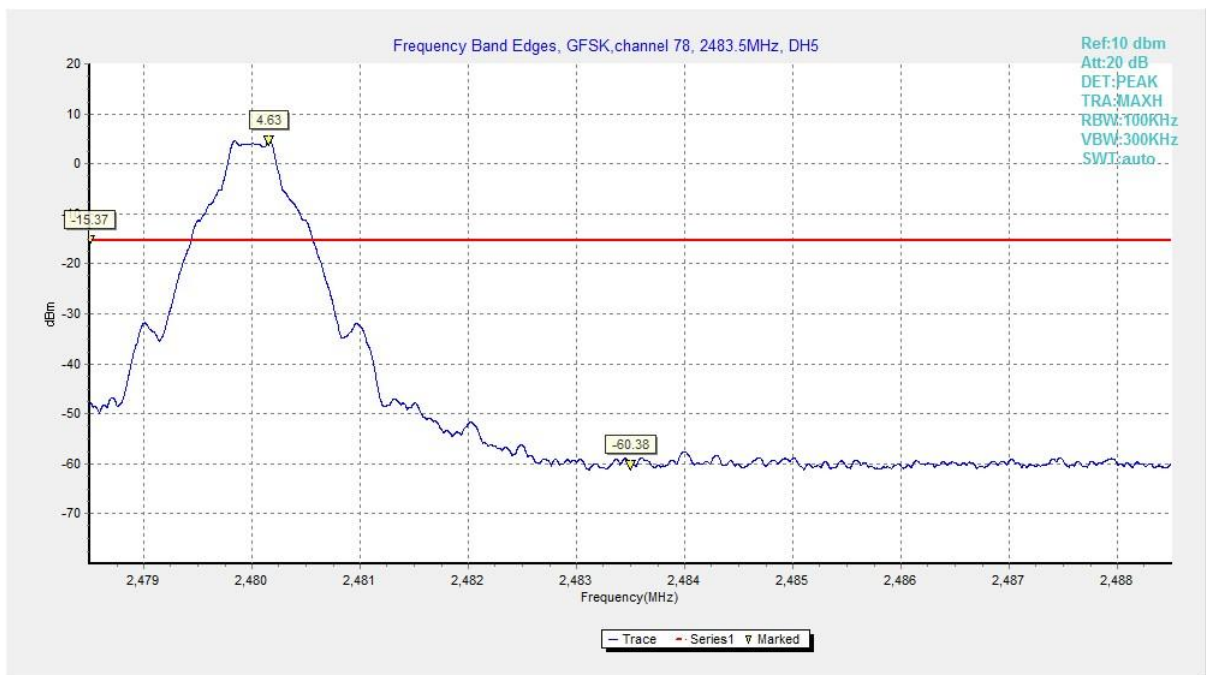


Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)

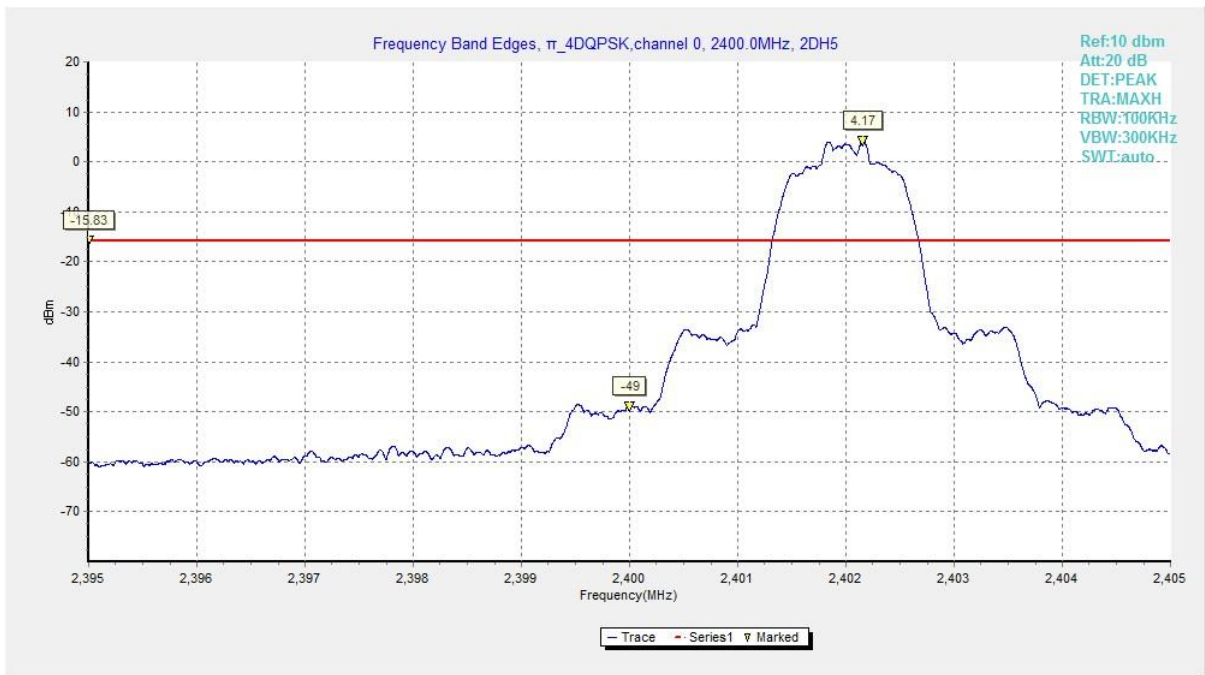


Fig. 9 Band Edges ( $\pi$ /4 DQPSK, Ch 0, Hopping OFF)

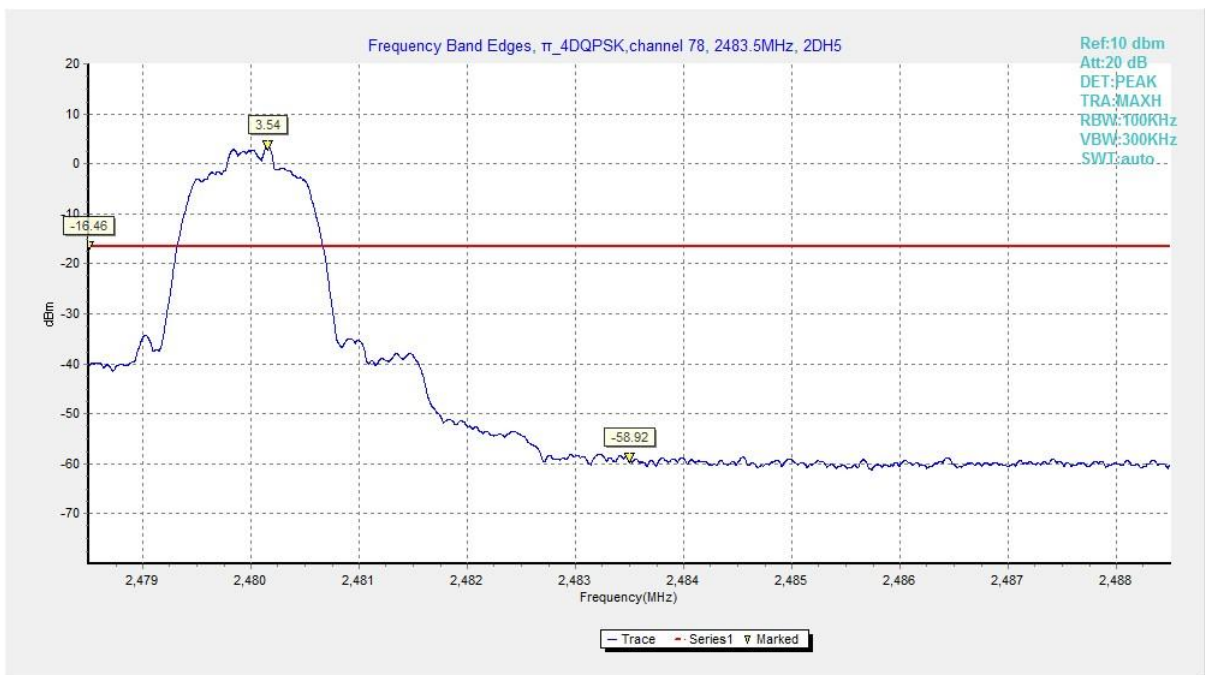


Fig. 10 Band Edges ( $\pi$ /4 DQPSK, Ch 78, Hopping OFF)

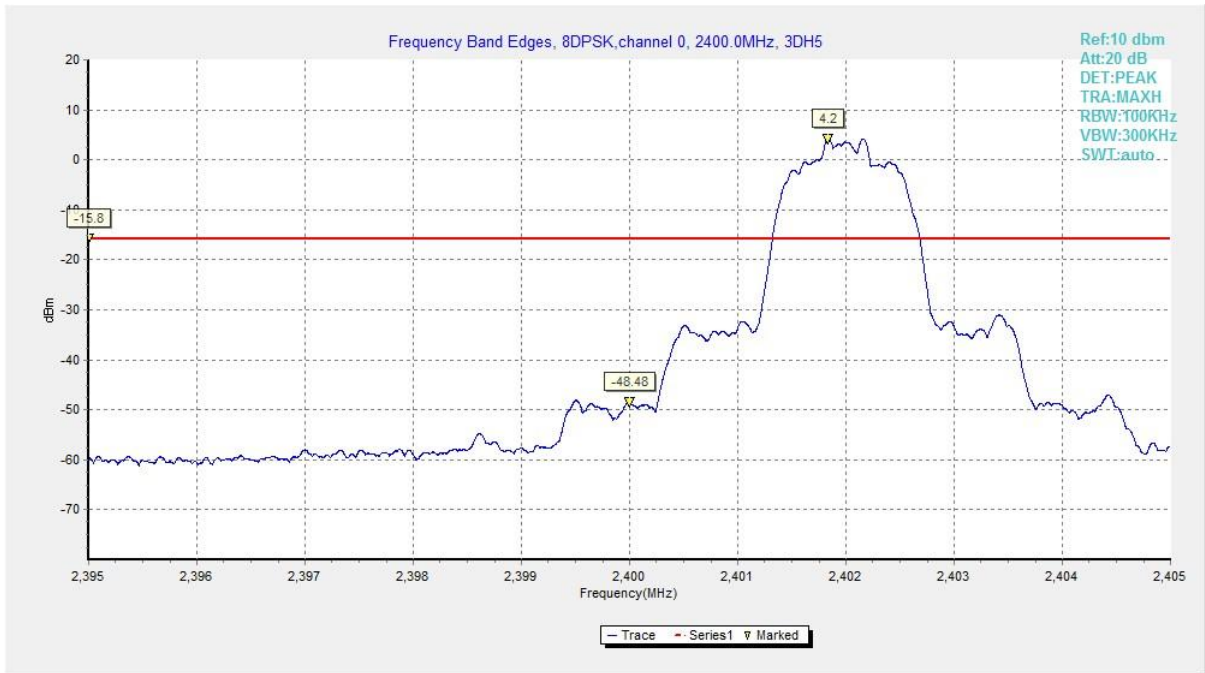


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

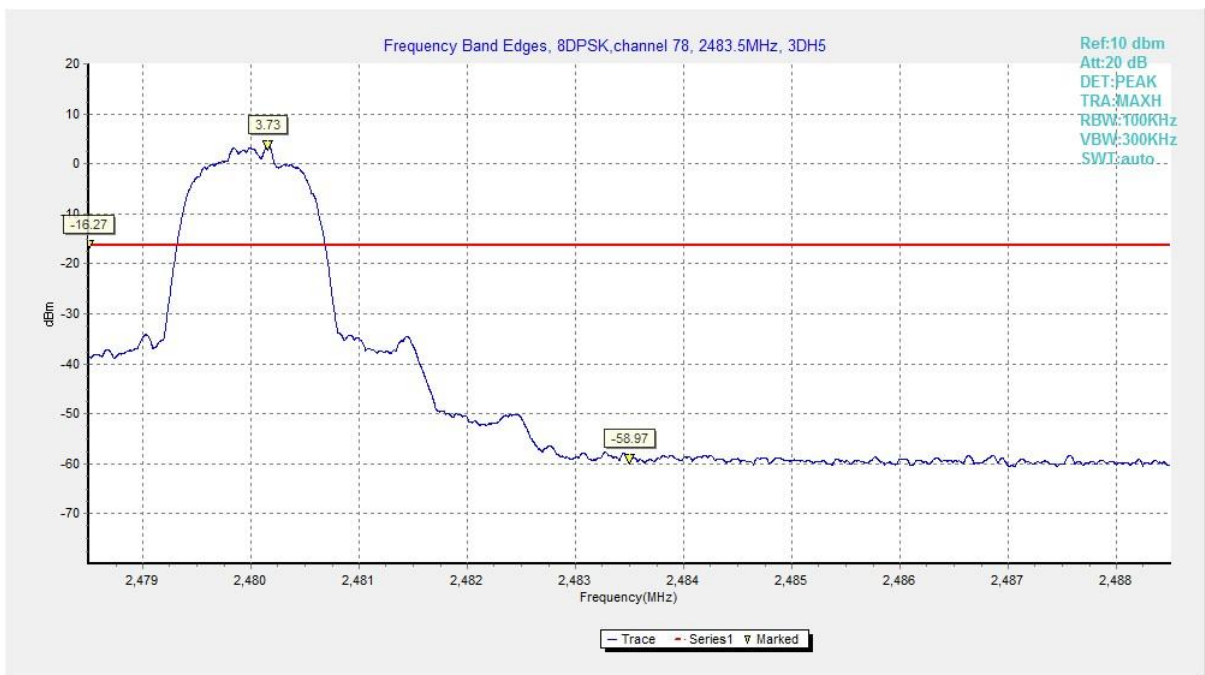


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)

### 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**

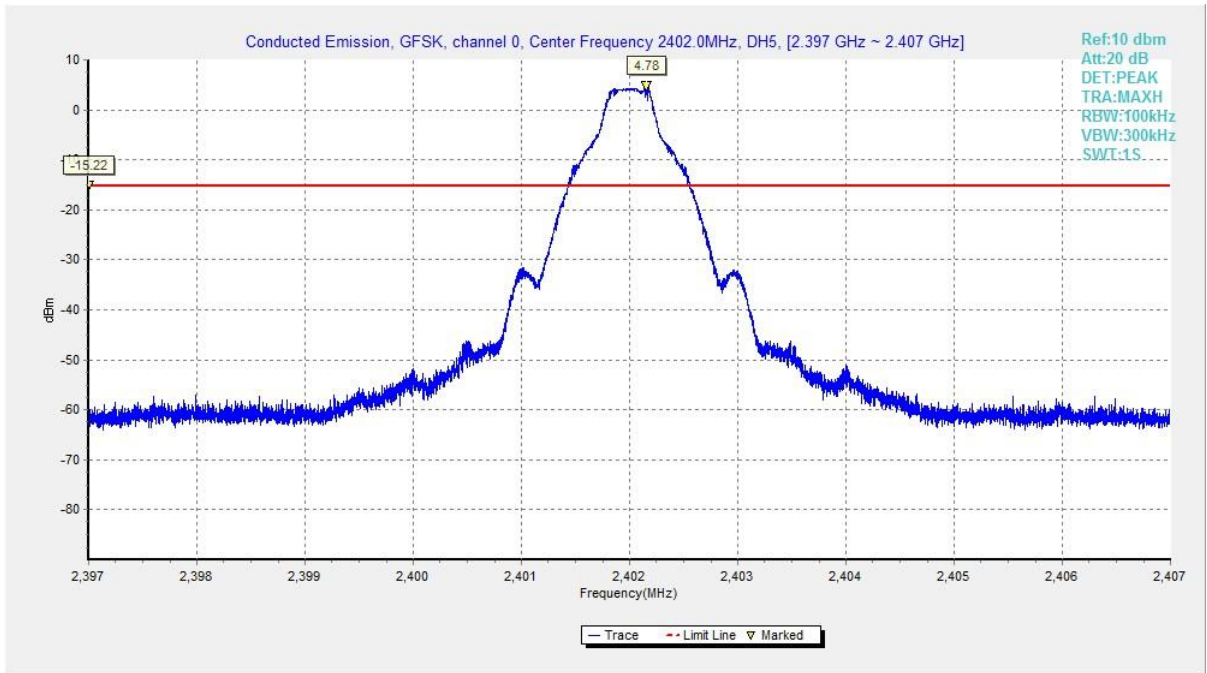


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

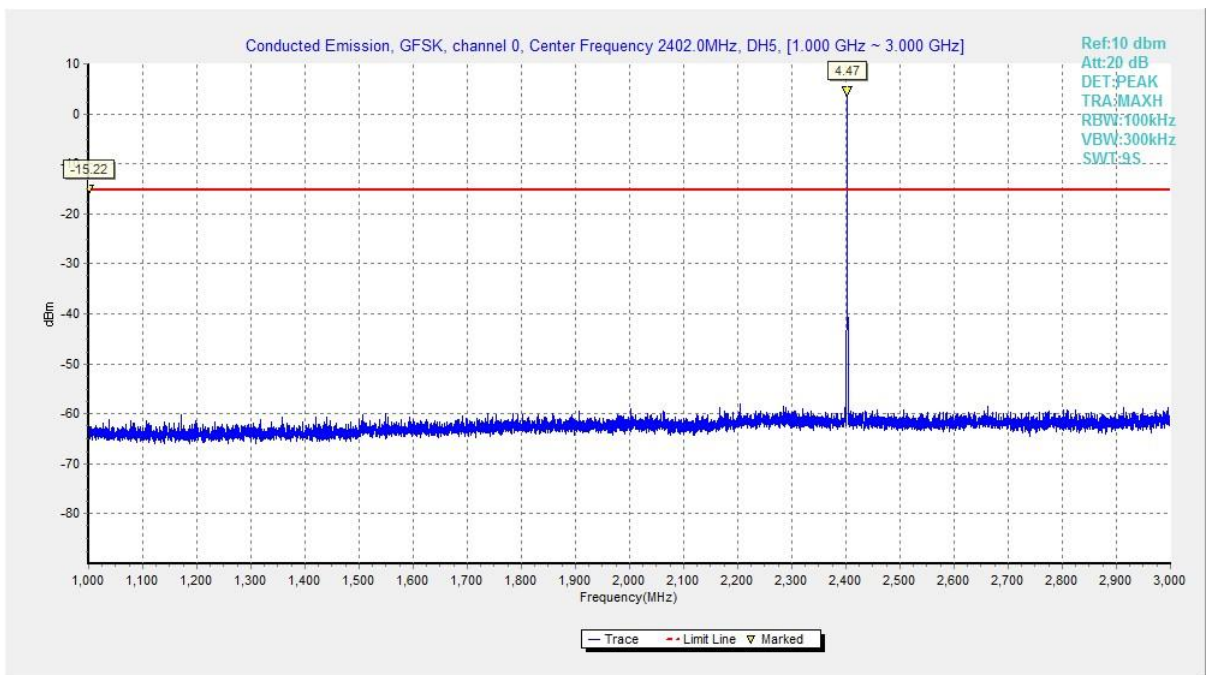


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 1 GHz-3 GHz)

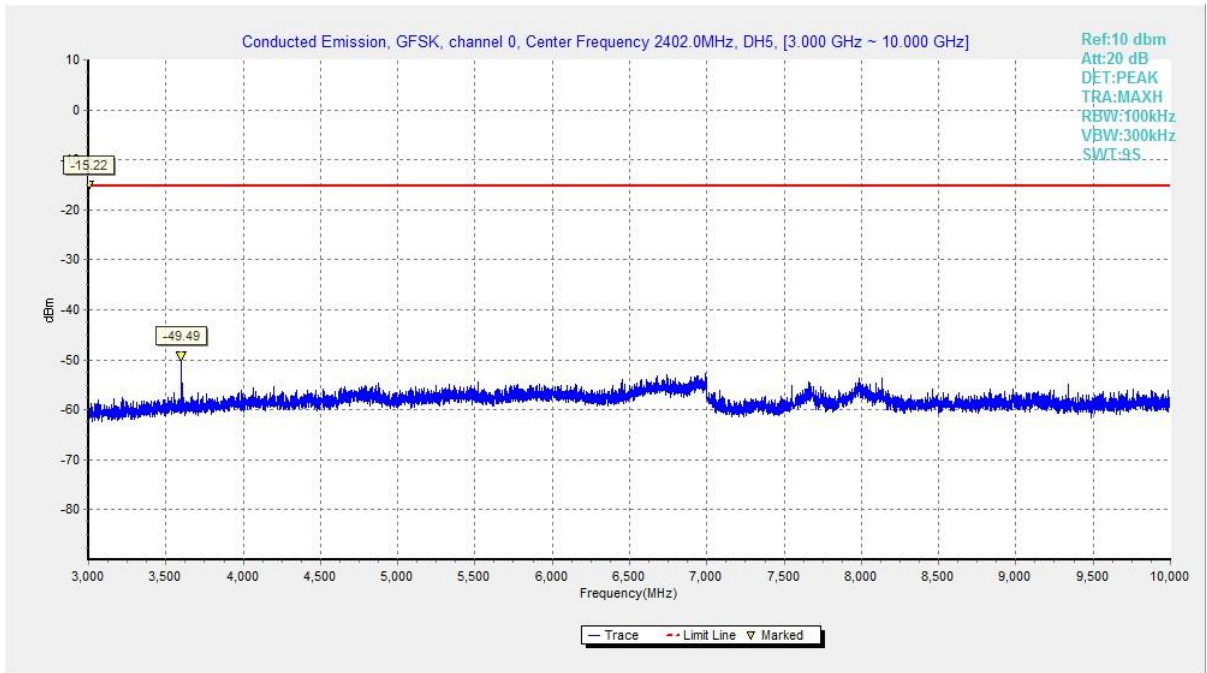


Fig. 15 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10 GHz)

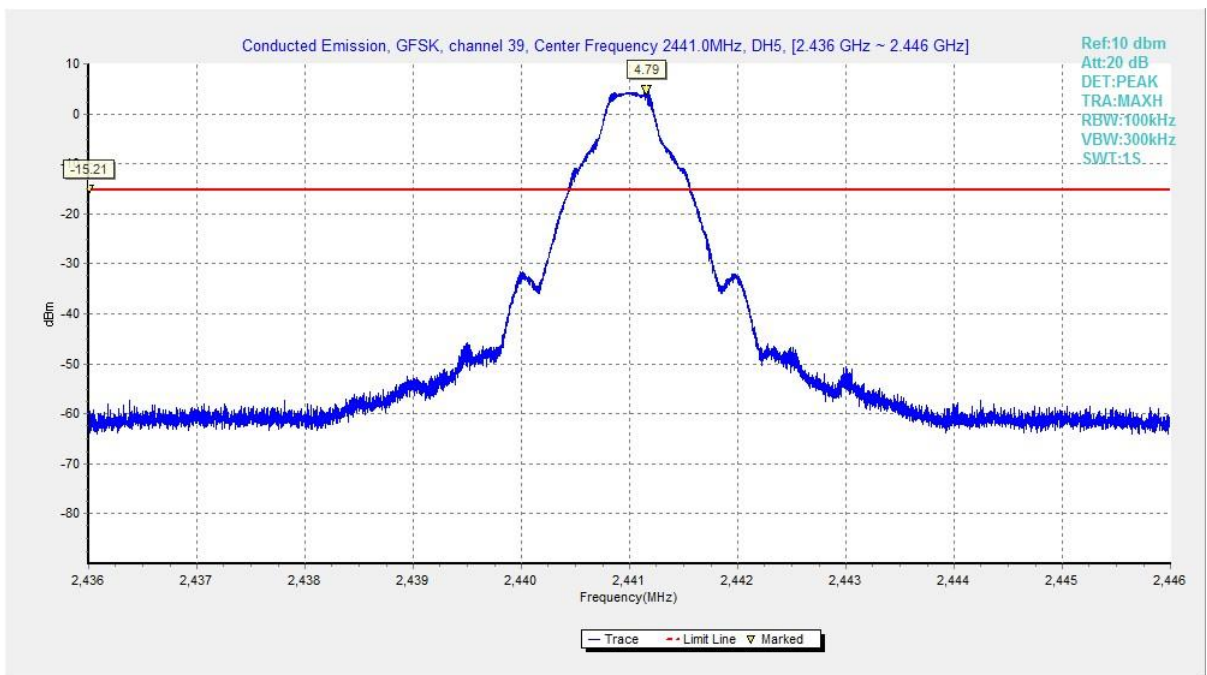


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)



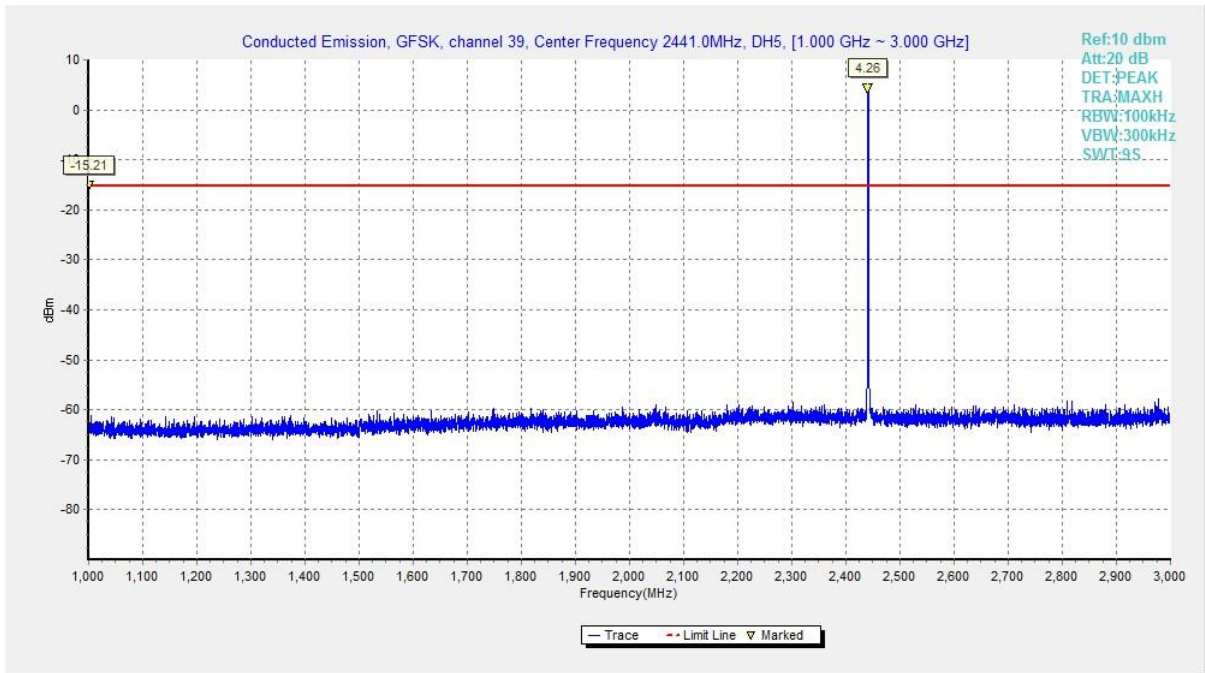


Fig. 17 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3 GHz)

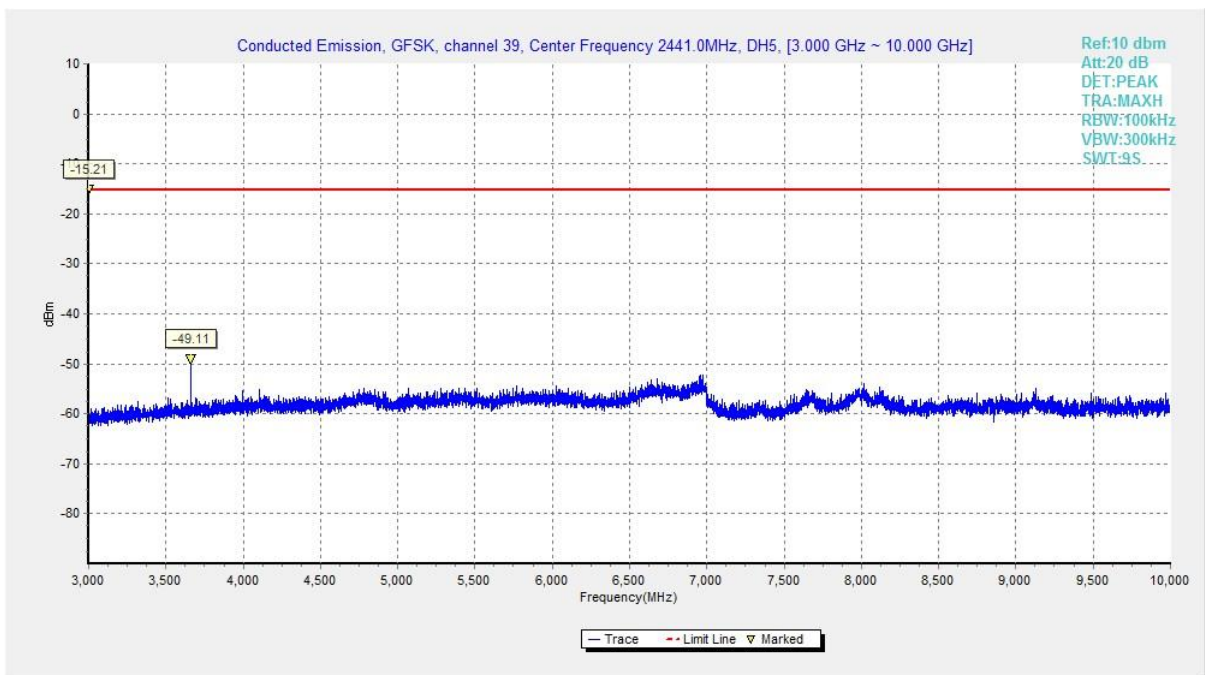


Fig. 18 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10 GHz)

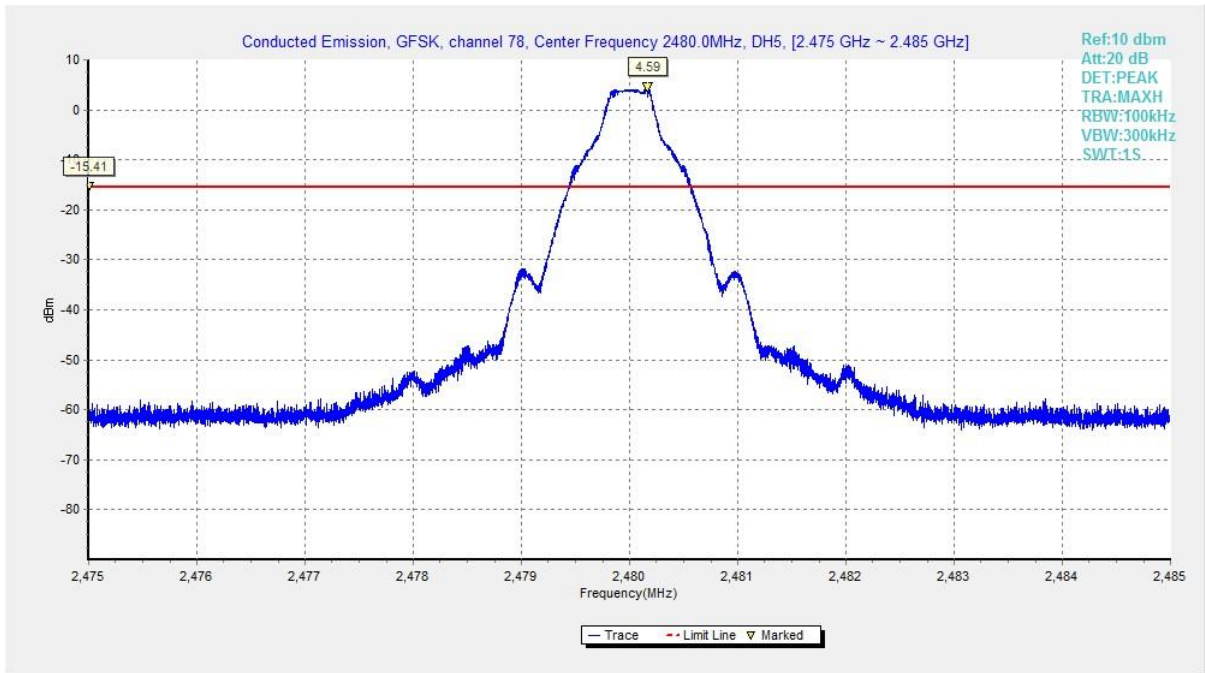


Fig. 19 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

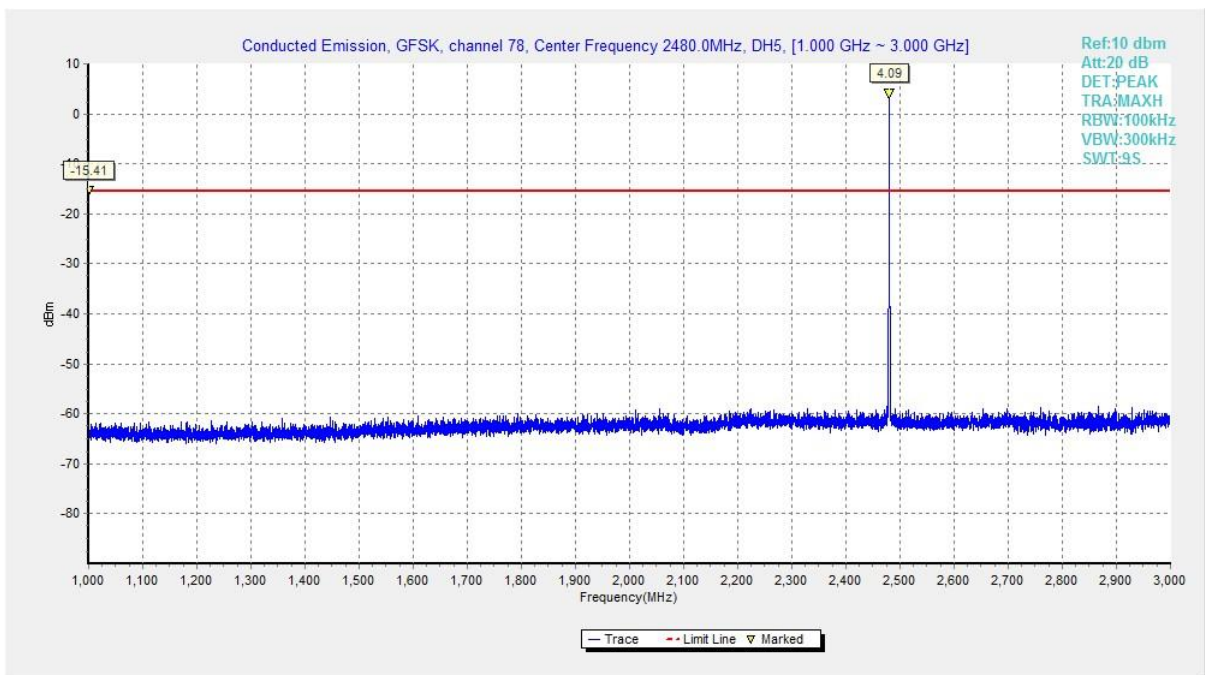


Fig. 20 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3 GHz)

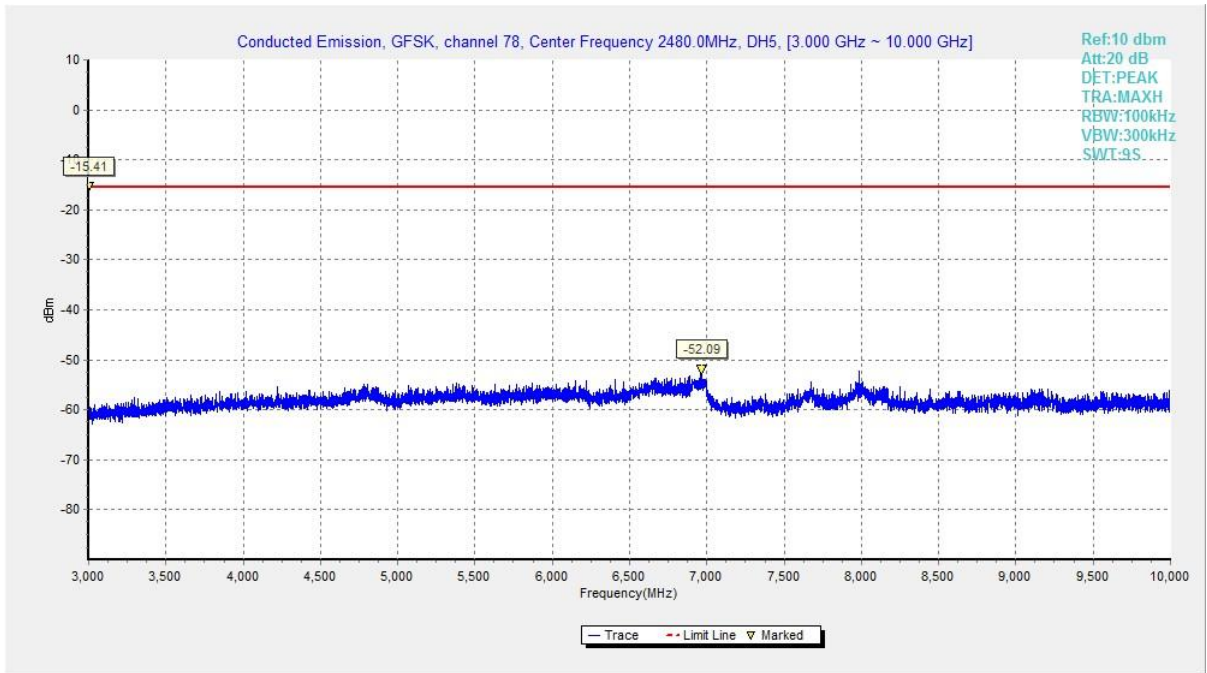


Fig. 21 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10 GHz)

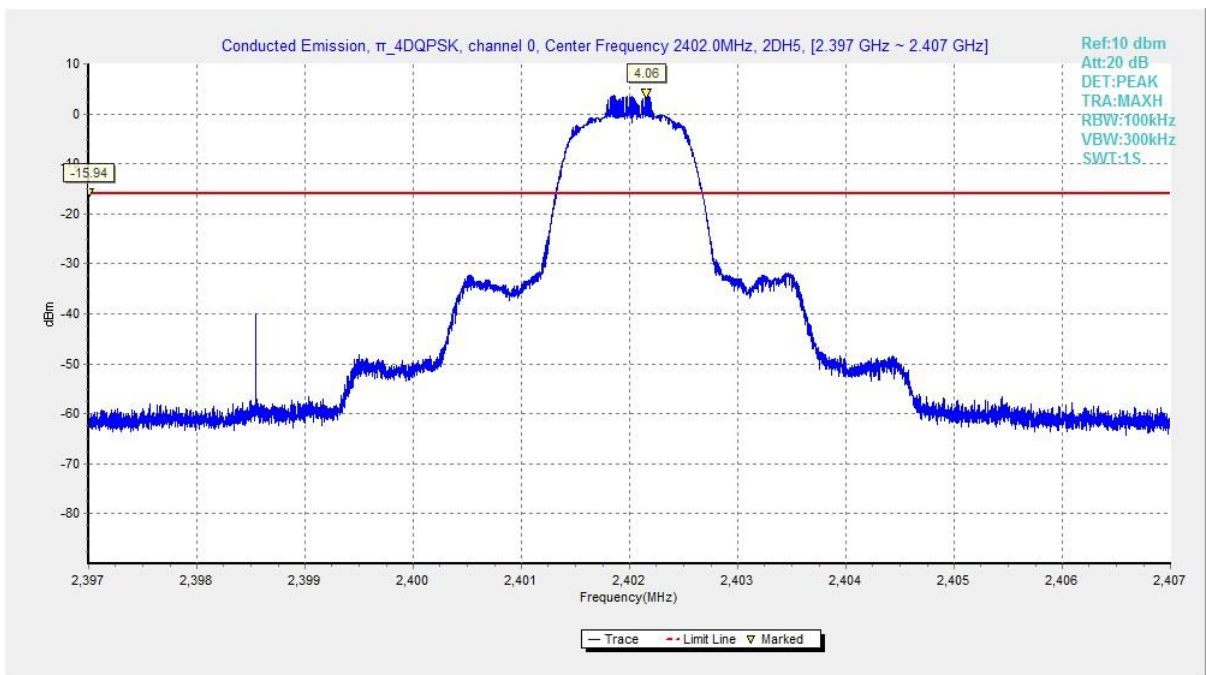


Fig. 22 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch0, 2.402GHz)

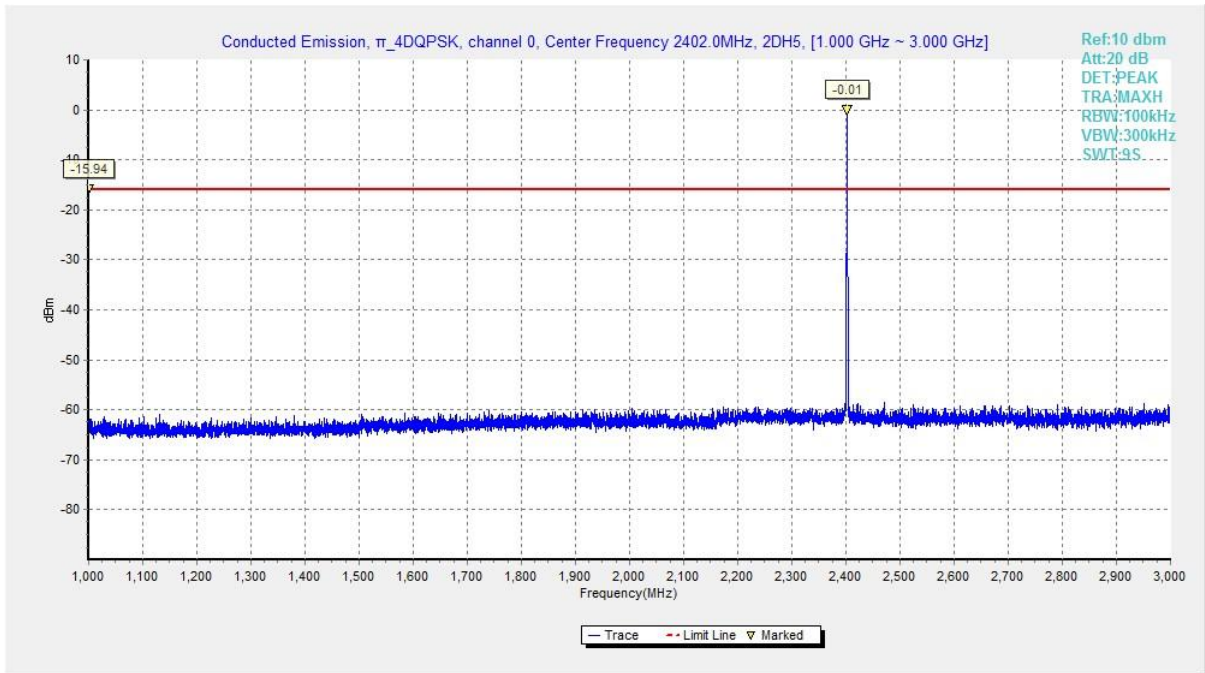


Fig. 23 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch0, 1GHz-3 GHz)

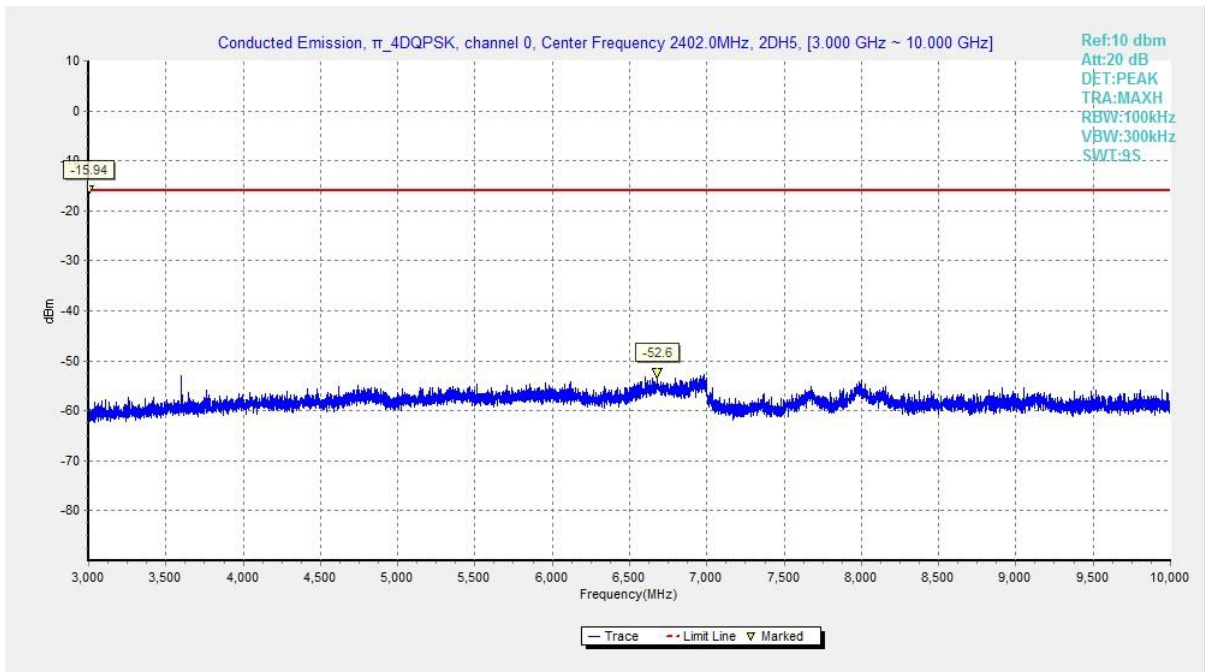


Fig. 24 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch0, 3GHz-10 GHz)

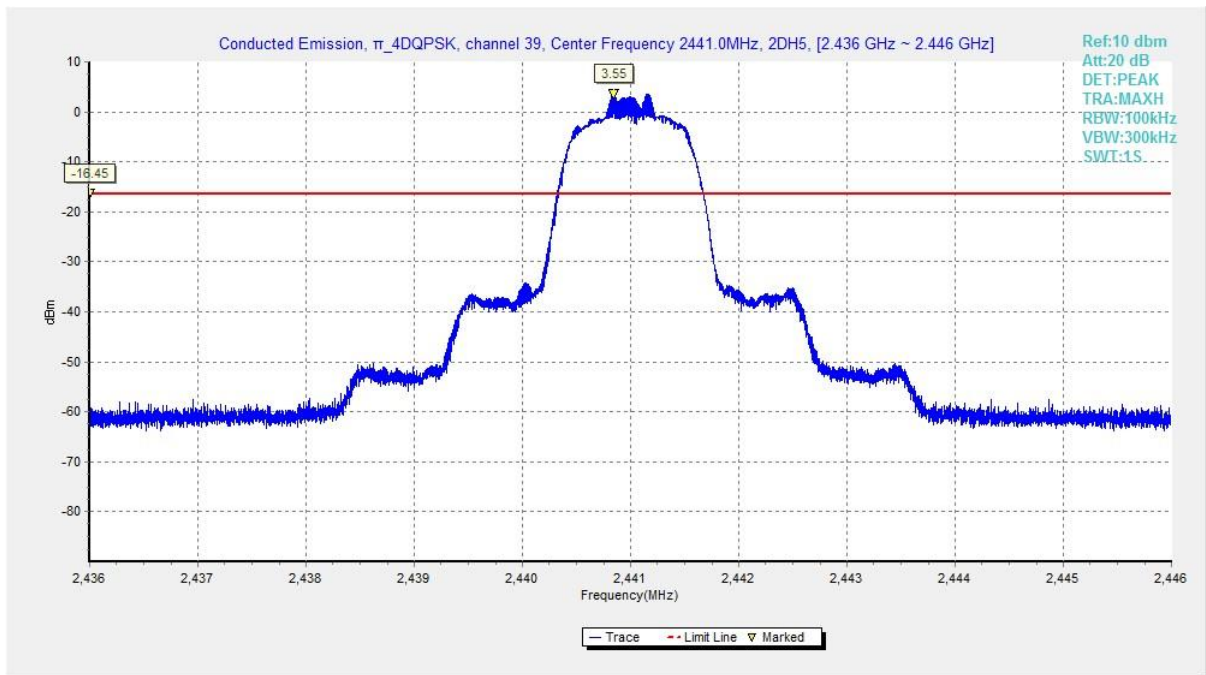


Fig. 25 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch39, 2.441GHz)

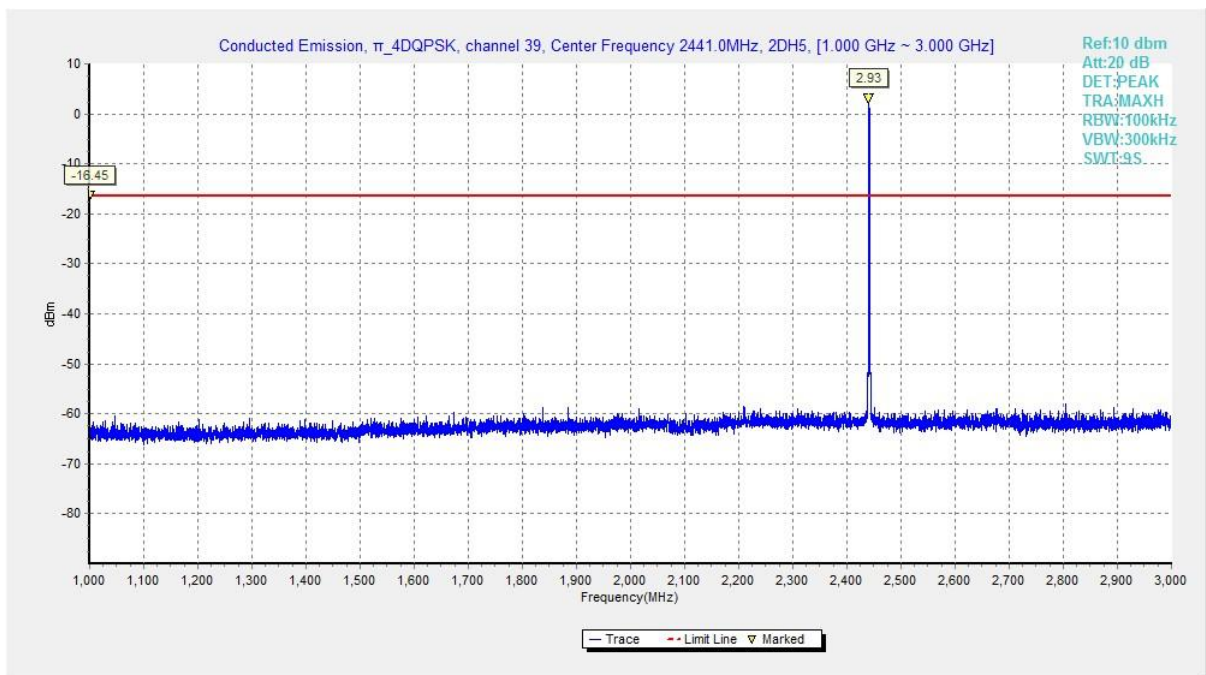


Fig. 26 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch39, 1GHz-3 GHz)

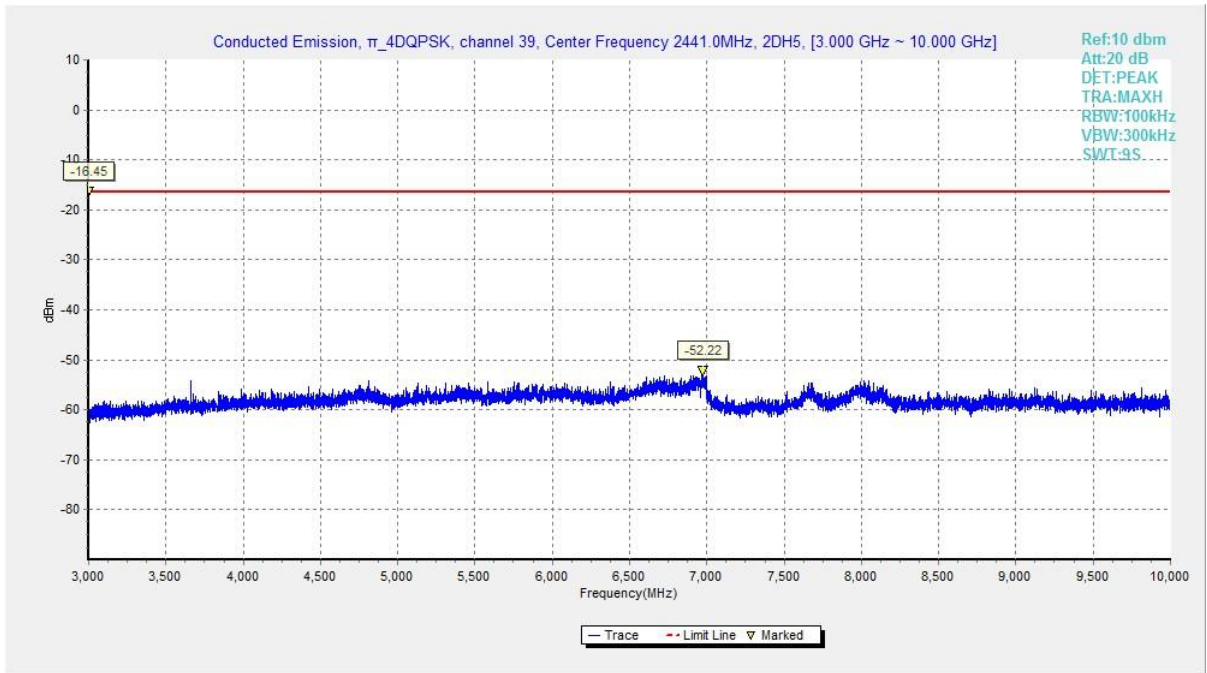


Fig. 27 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch39, 3GHz-10 GHz)

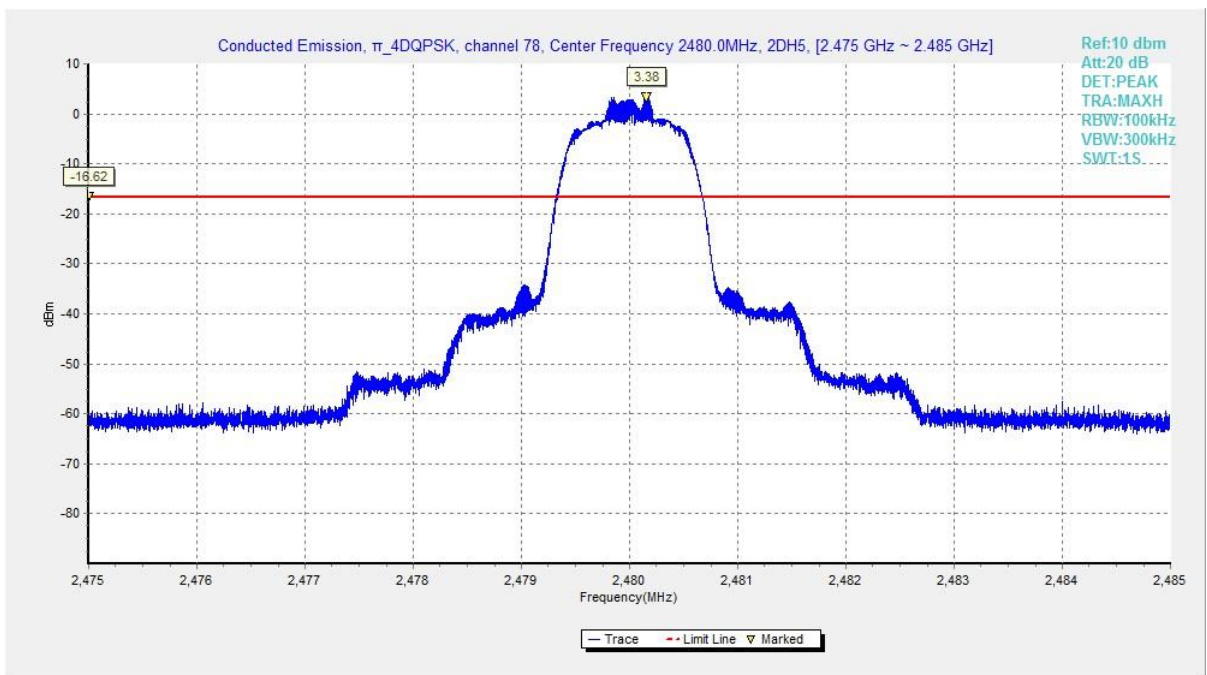


Fig. 28 Conducted Spurious Emission ( $\pi$  /4 DQPSK, Ch78, 2.480GHz)

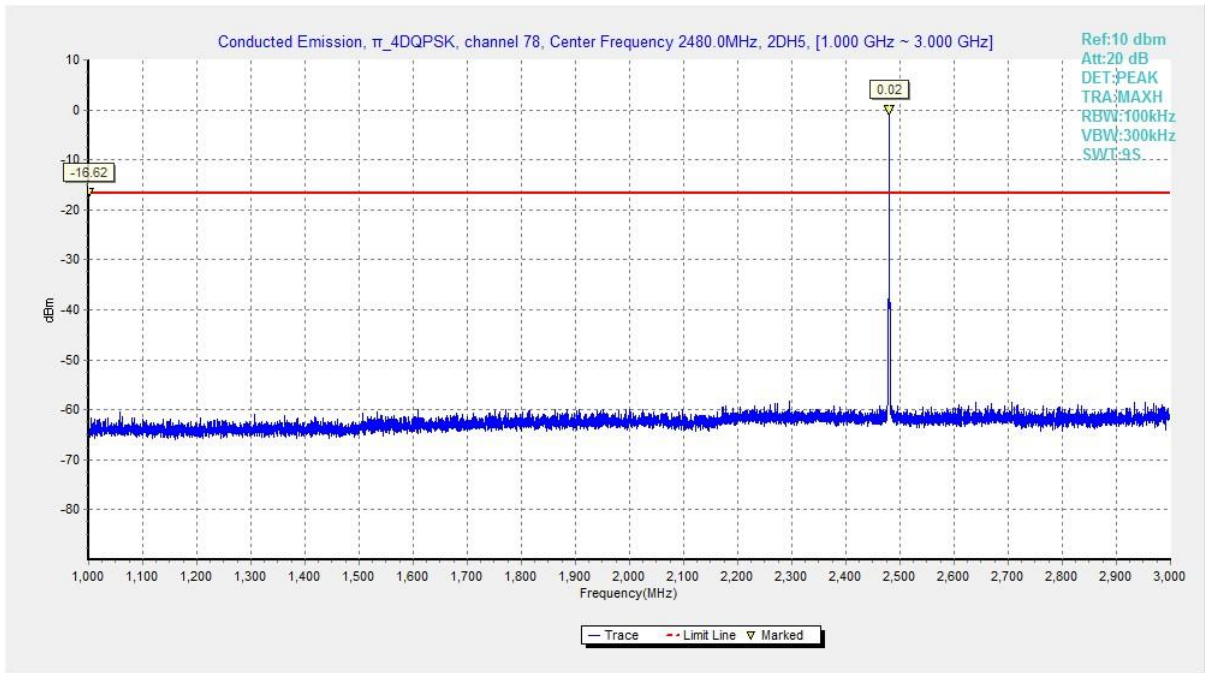


Fig. 29 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch78, 1GHz-3 GHz)

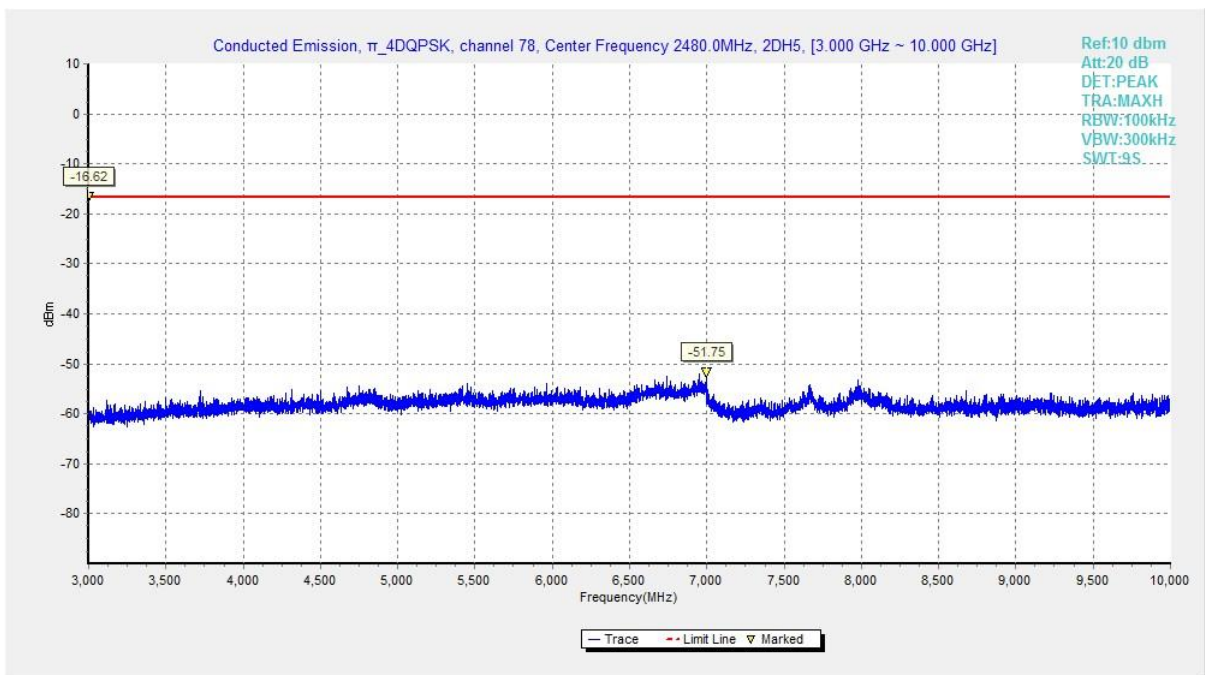


Fig. 30 Conducted Spurious Emission ( $\pi/4$  DQPSK, Ch78, 3GHz-10 GHz)

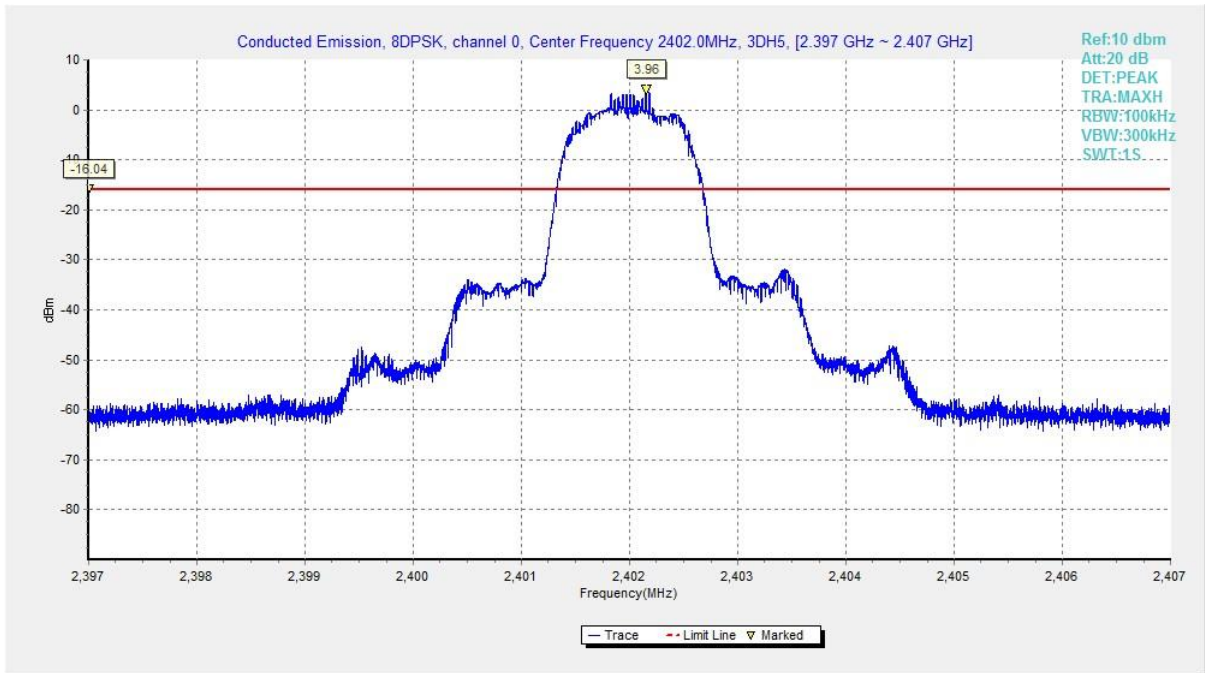


Fig. 31 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)

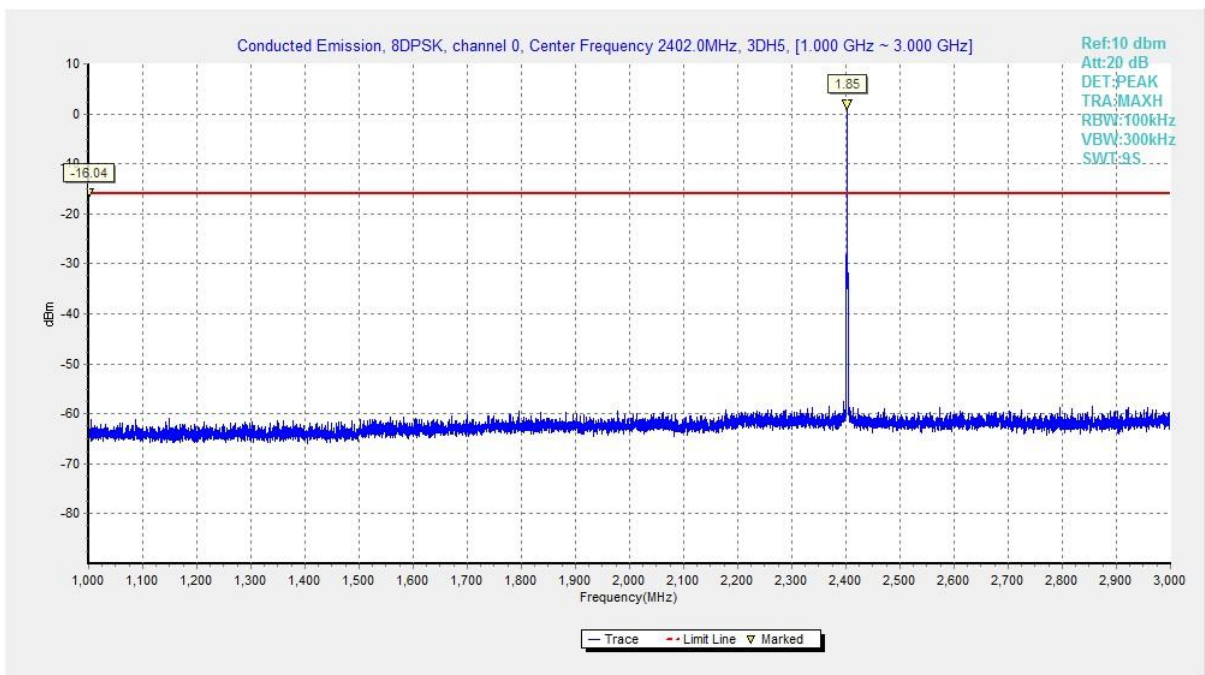


Fig. 32 Conducted Spurious Emission (8DPSK, Ch0, 1GHz-3 GHz)



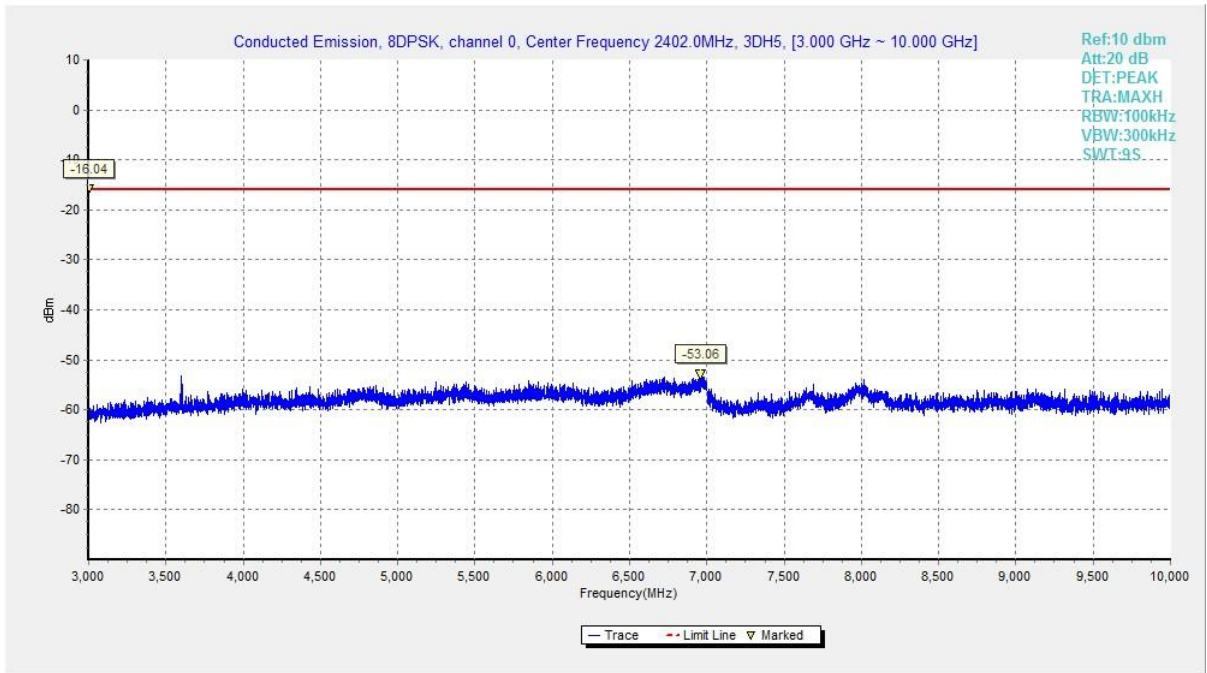


Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10 GHz)

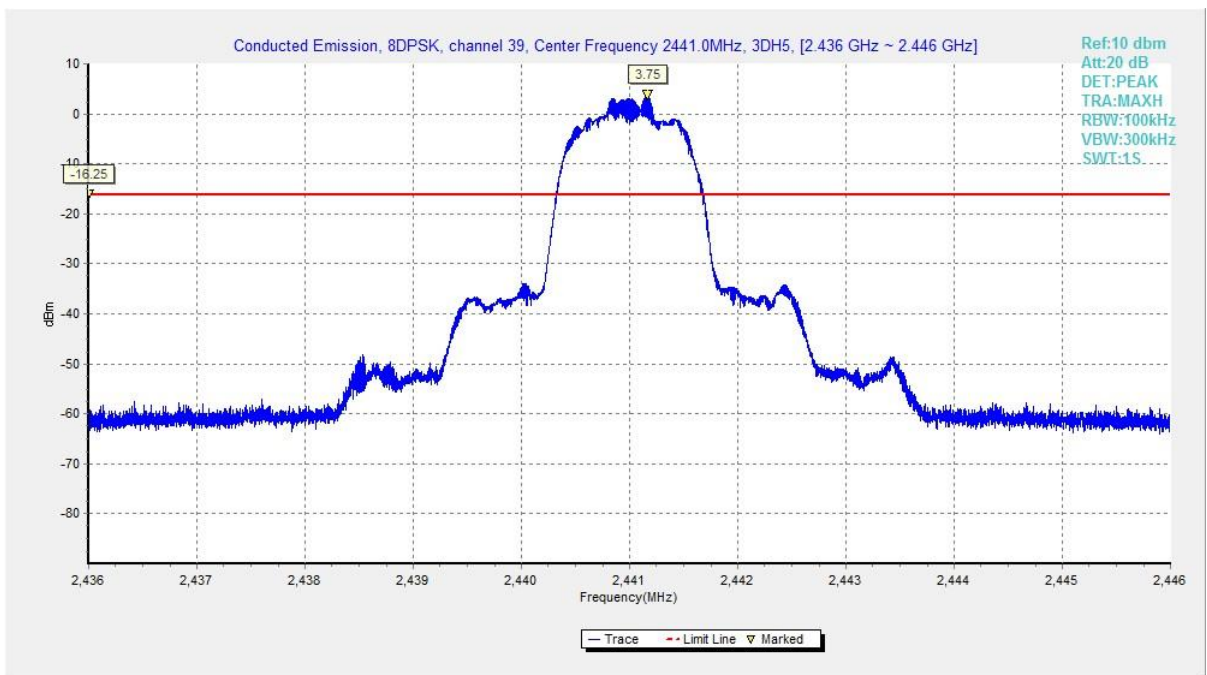
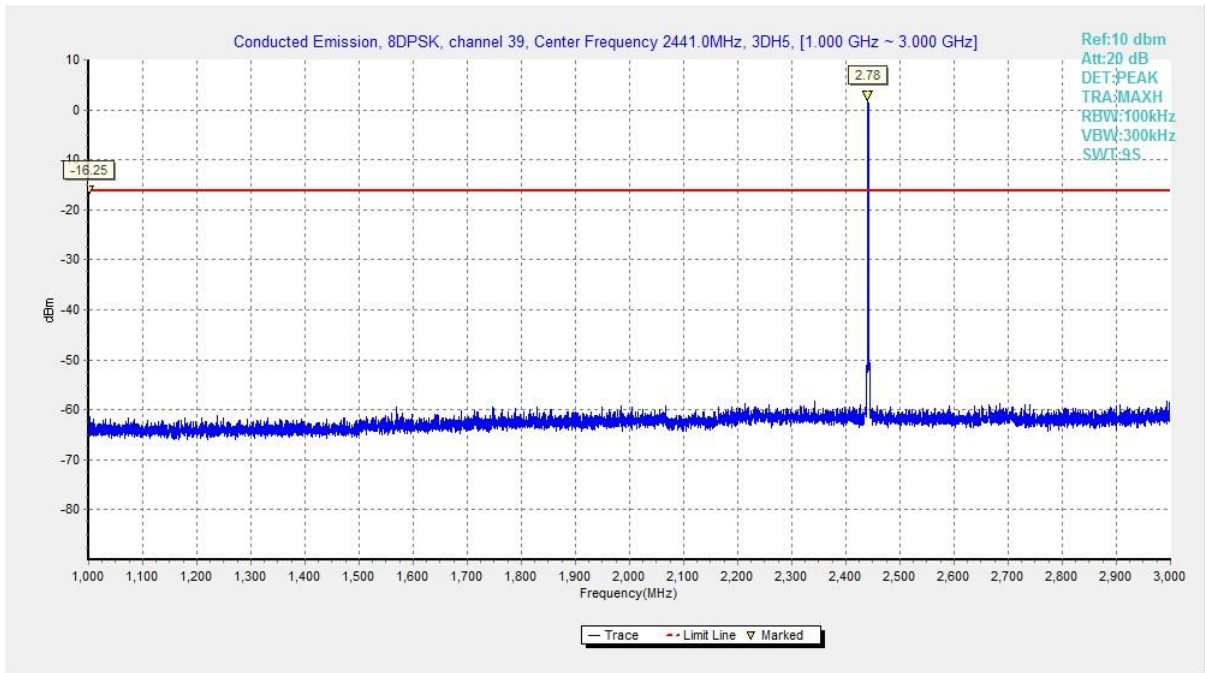
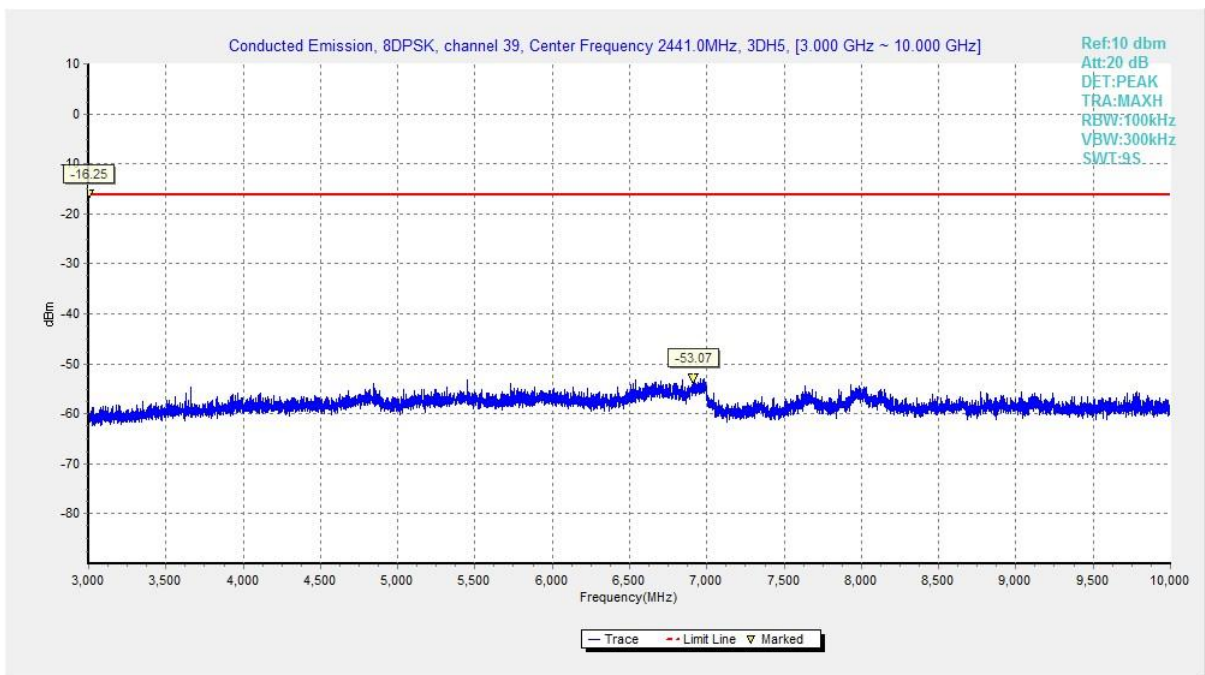


Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)



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



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

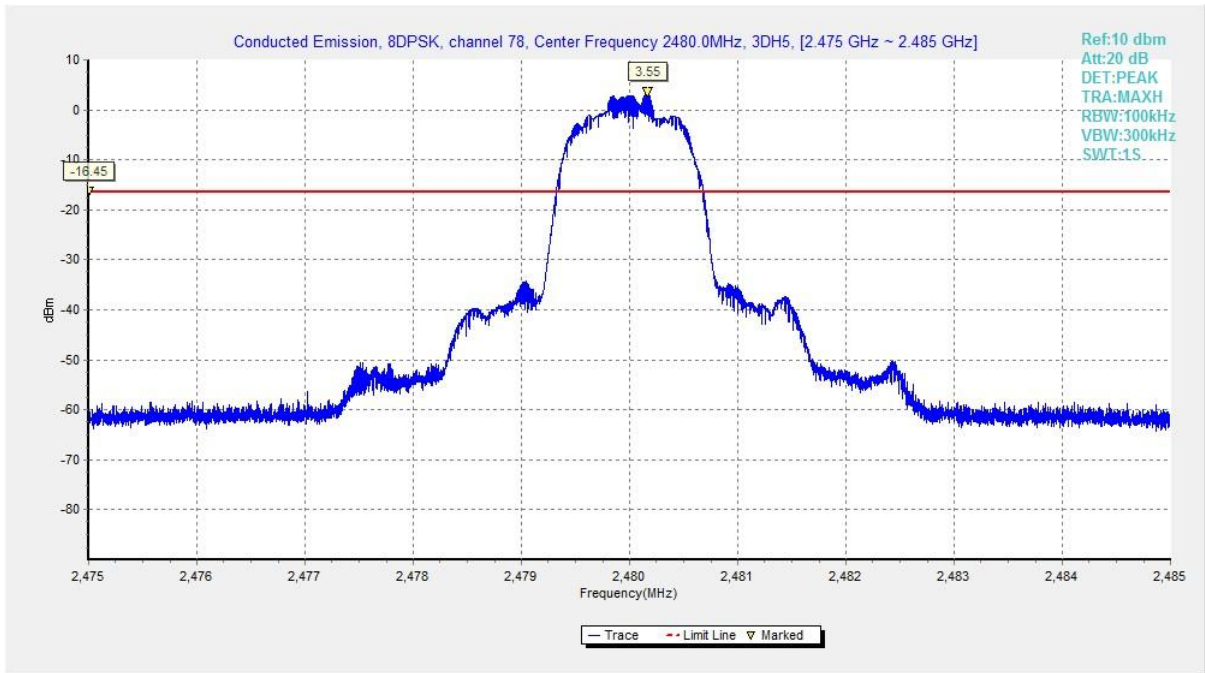


Fig. 37 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)

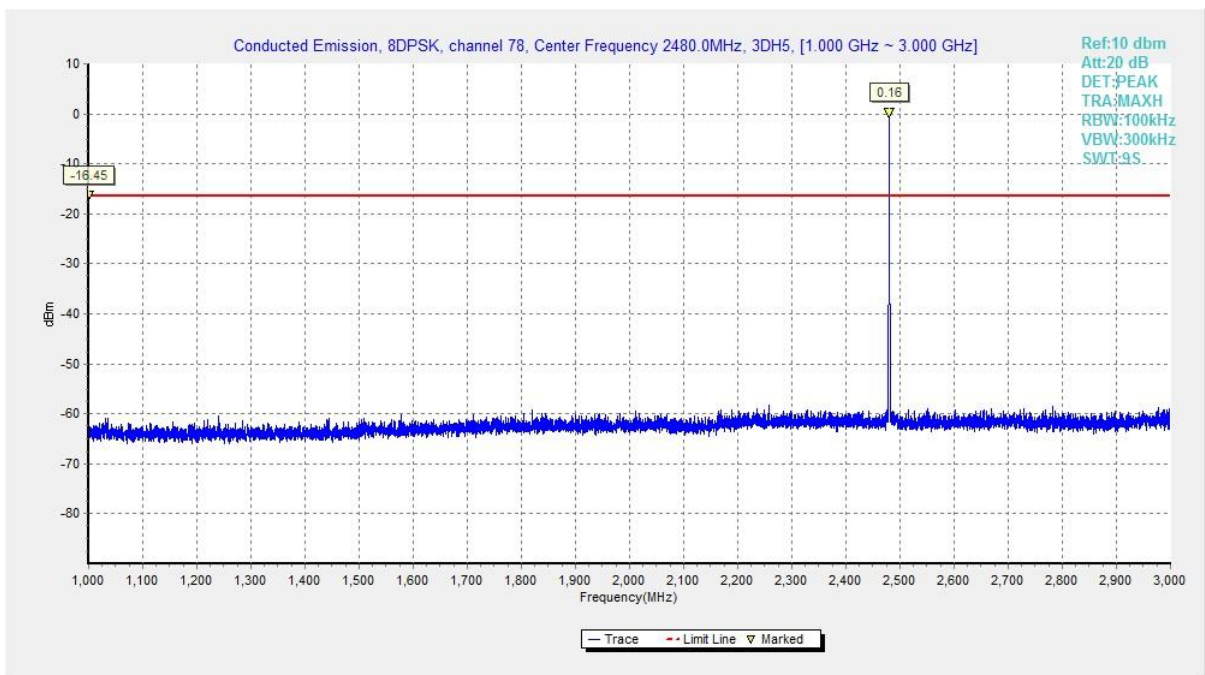


Fig. 38 Conducted Spurious Emission (8DPSK, Ch78, 1GHz-3 GHz)

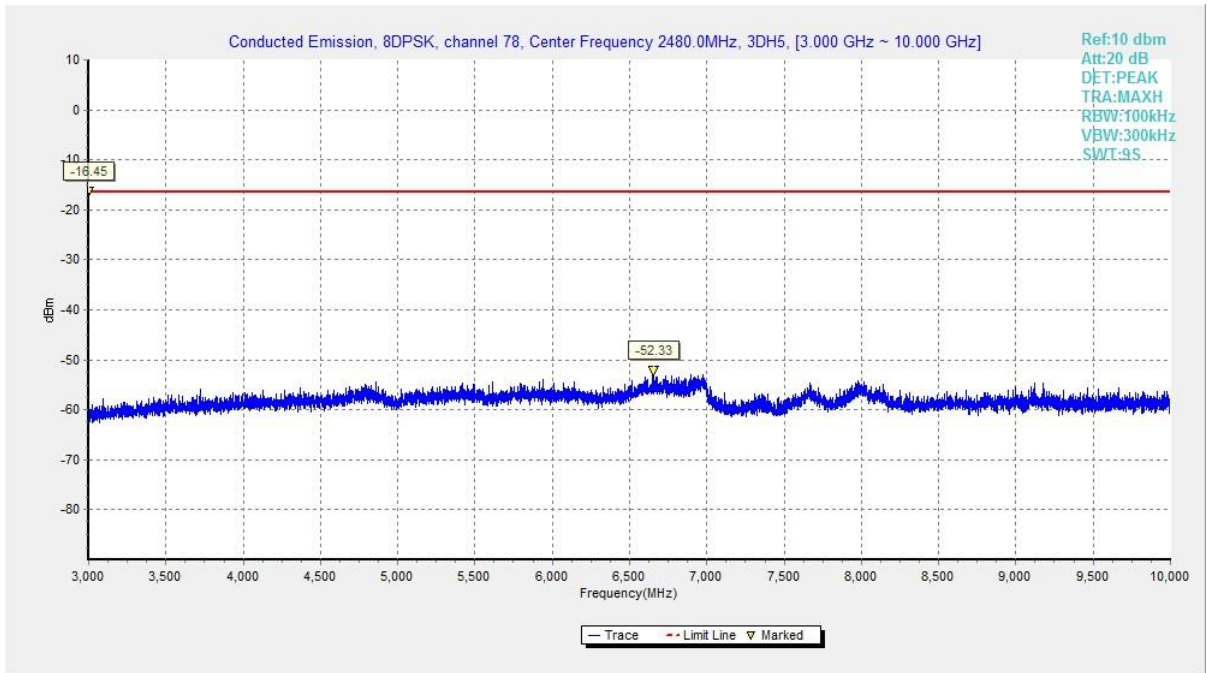


Fig. 39 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10 GHz)

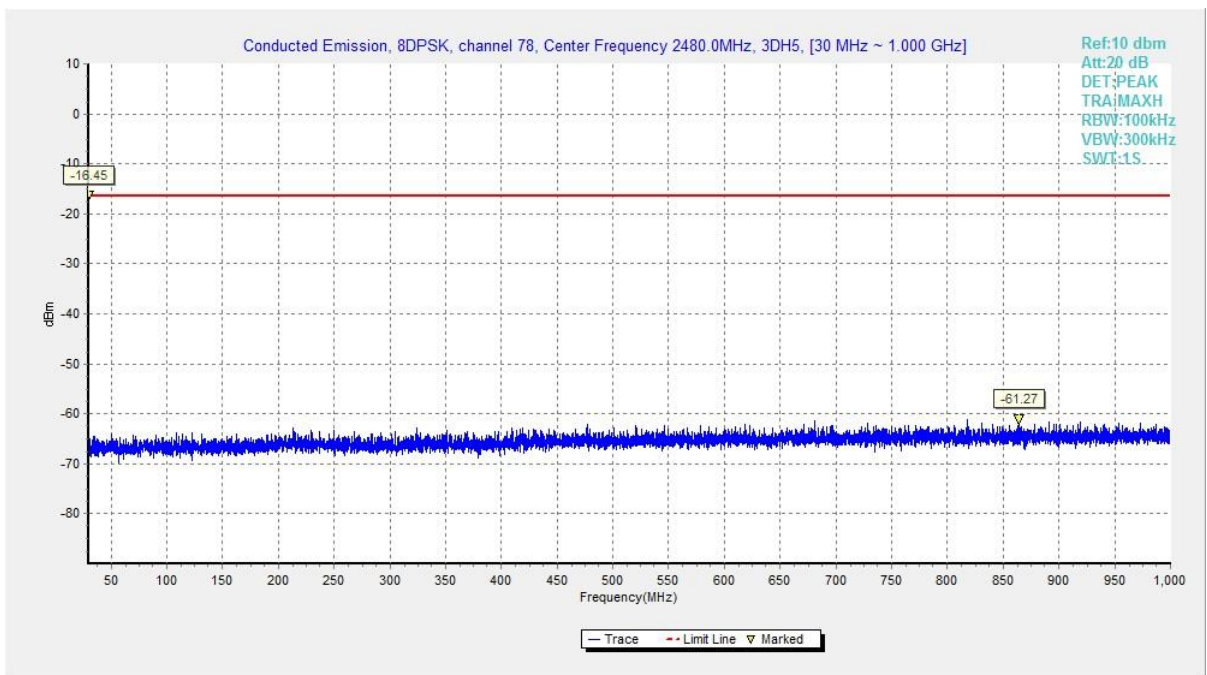


Fig. 40 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)

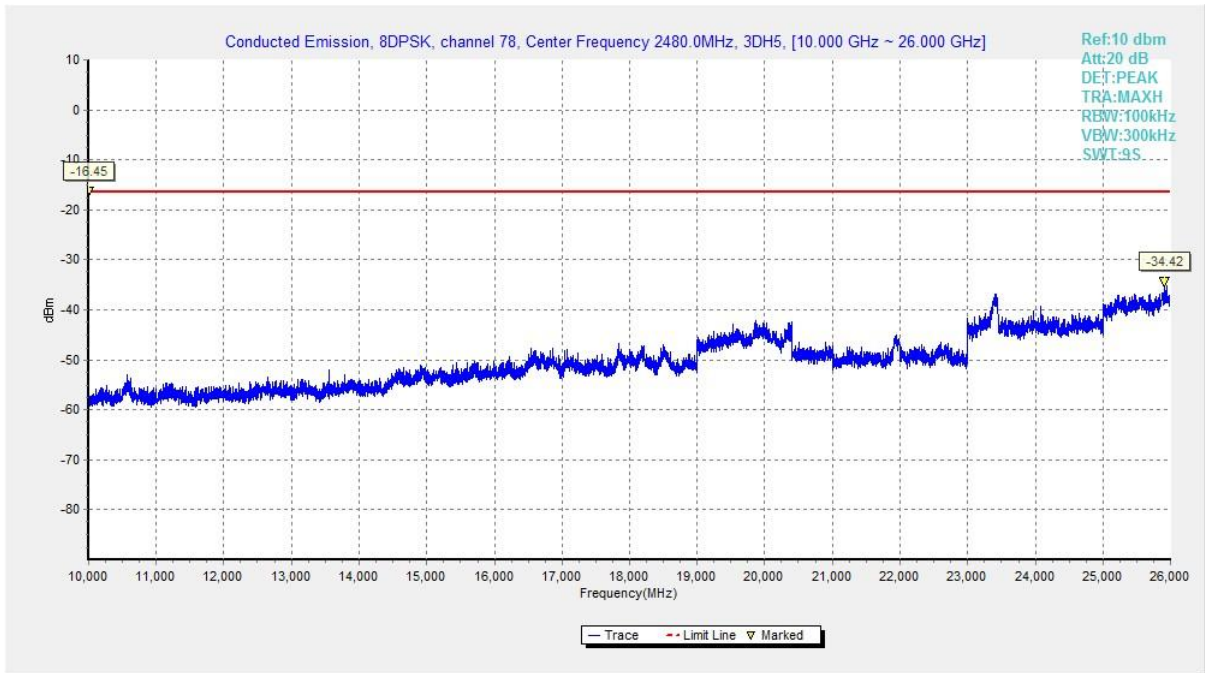


Fig. 41 Conducted Spurious Emission (All channel, 10GHz-26 GHz)

#### 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 (µV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**Test Condition:**

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.

**Measurement Results:**

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	1 GHz ~ 18 GHz	Fig.42	<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 CH0 (1-18GHz)**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
5358.000000	49.33	74.00	24.67	H	15.1
6142.000000	51.57	74.00	22.43	V	18.3
7292.225000	46.71	74.00	27.29	V	5.3
12002.875000	45.99	74.00	28.01	H	10.5
15450.687500	48.34	74.00	25.66	H	13.3
16985.437500	48.68	74.00	25.32	H	16.5

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
5304.000000	41.48	54.00	12.52	V	14.9
6191.000000	41.19	54.00	12.81	H	18.9
7292.762500	42.02	54.00	11.98	V	5.3
12122.737500	34.96	54.00	19.04	V	11.0
15718.875000	38.14	54.00	15.86	V	14.3
16948.250000	38.94	54.00	15.06	H	16.4

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

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
5101.000000	48.41	74.00	25.59	V	14.6
6198.000000	51.40	74.00	22.60	H	18.9
7292.762500	48.19	74.00	25.81	V	5.3
14371.375000	47.29	74.00	26.71	V	13.0
15786.687500	48.61	74.00	25.39	V	14.6
17182.312500	49.28	74.00	24.72	H	17.0

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
5096.000000	37.77	54.00	16.23	V	14.6
6189.000000	40.92	54.00	13.08	H	18.9
7292.762500	41.58	54.00	12.42	V	5.3
14388.875000	36.87	54.00	17.13	V	13.0
15805.062500	38.57	54.00	15.43	V	14.6
17202.875000	39.15	54.00	14.85	V	17.0



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

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
6162.500000	51.54	74.00	22.46	V	18.6
7293.300000	50.10	74.00	23.90	V	5.3
11083.212500	44.38	74.00	29.62	V	8.4
12512.962500	46.14	74.00	27.86	H	11.4
14343.375000	47.51	74.00	26.49	V	12.9
17128.500000	49.71	74.00	24.29	H	17.0

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
6199.000000	42.15	54.00	11.85	H	18.9
7292.762500	42.94	54.00	11.06	V	5.3
11114.387500	34.06	54.00	19.94	H	8.5
12485.012500	36.26	54.00	17.74	V	11.4
14526.250000	37.97	54.00	16.03	H	13.0
17140.750000	40.28	54.00	13.72	V	17.1

Note:

A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and Antenna Factor, the gain of the preamplifier, the cable loss.  $P_{Mea}$  is the field strength recorded from the instrument.

The measurement results are obtained as described below:

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

**See below for test graphs.**

**Conclusion: Pass**

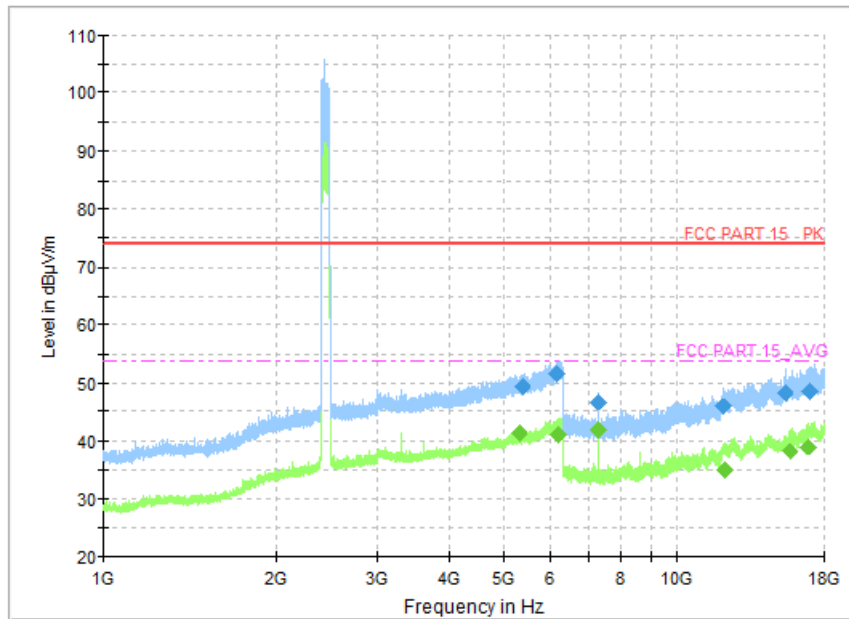


Fig. 42 Radiated Spurious Emission (GFSK, Ch0, 1GHz ~ 18GHz)

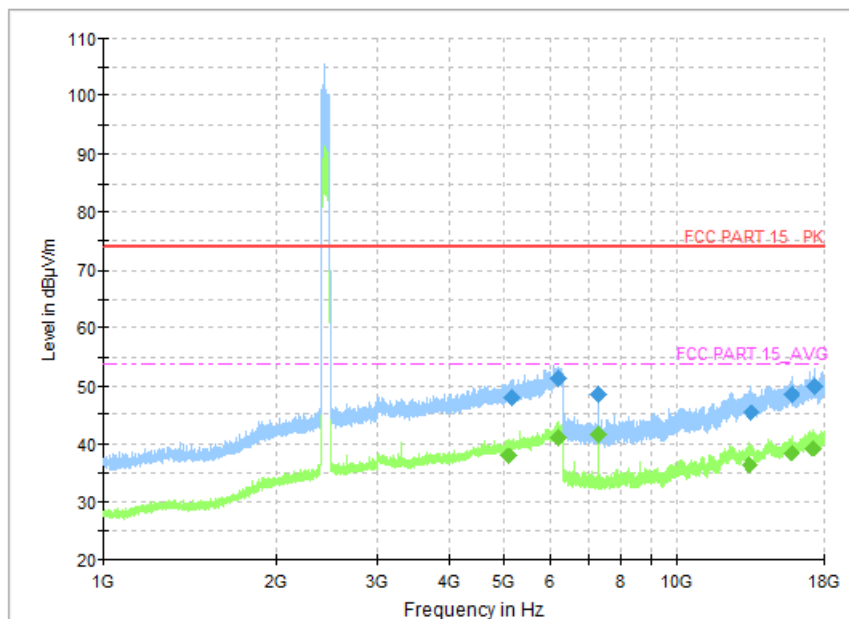


Fig. 43 Radiated Spurious Emission (GFSK, Ch39, 1GHz ~ 18GHz)

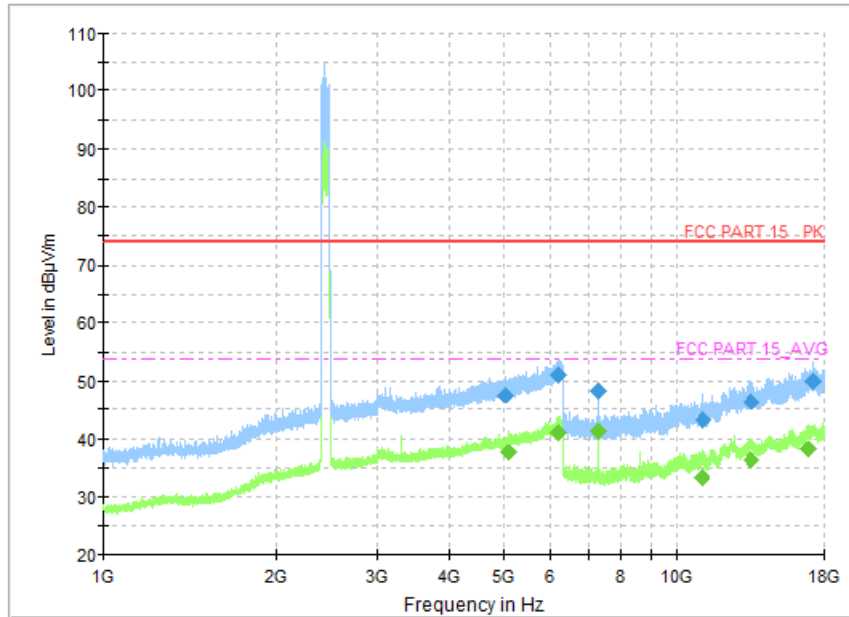


Fig. 44 Radiated Spurious Emission (GFSK, Ch78, 1GHz ~ 18GHz)

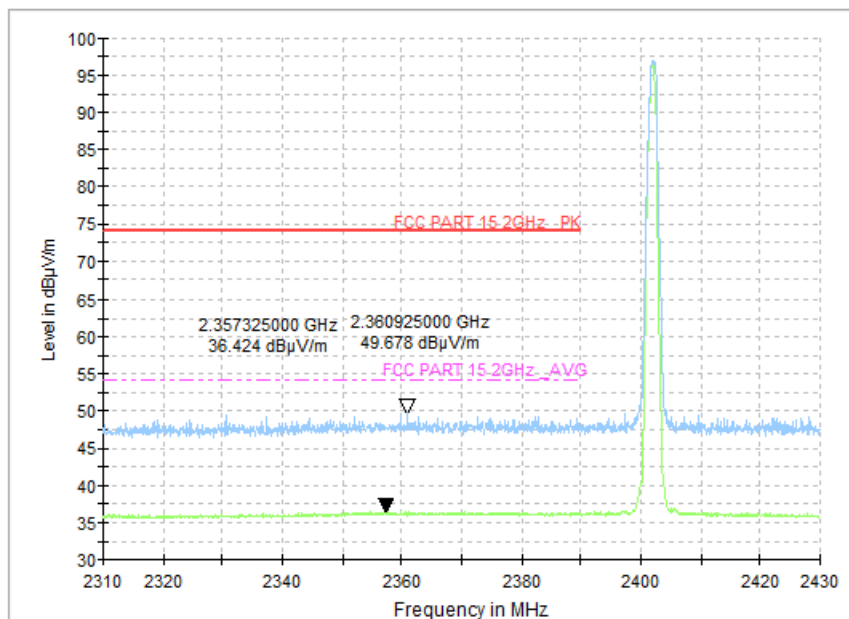


Fig. 45 Radiated Band Edges (GFSK, Ch0, 2380GHz ~ 2450GHz)

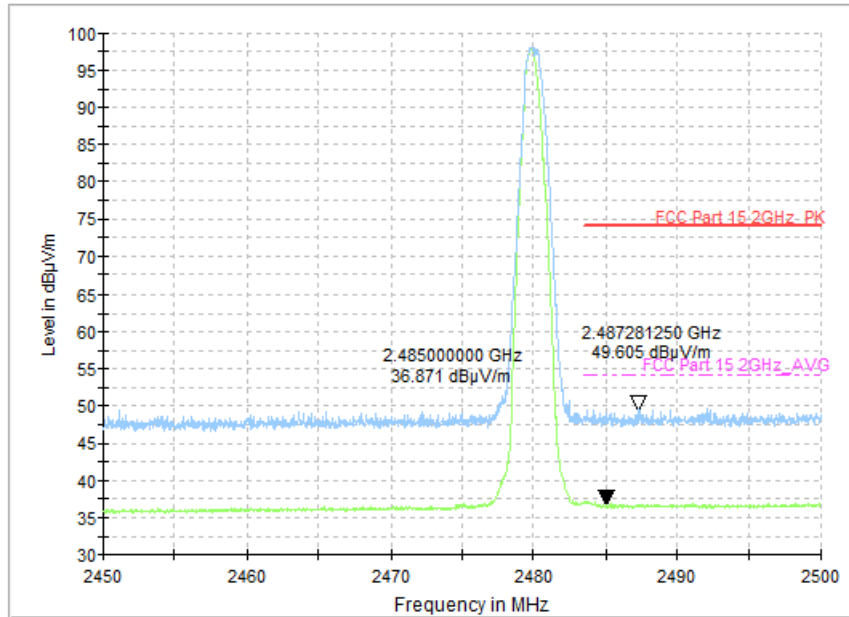


Fig. 46 Radiated Band Edges (GFSK, Ch78, 2450GHz ~ 2500GHz)

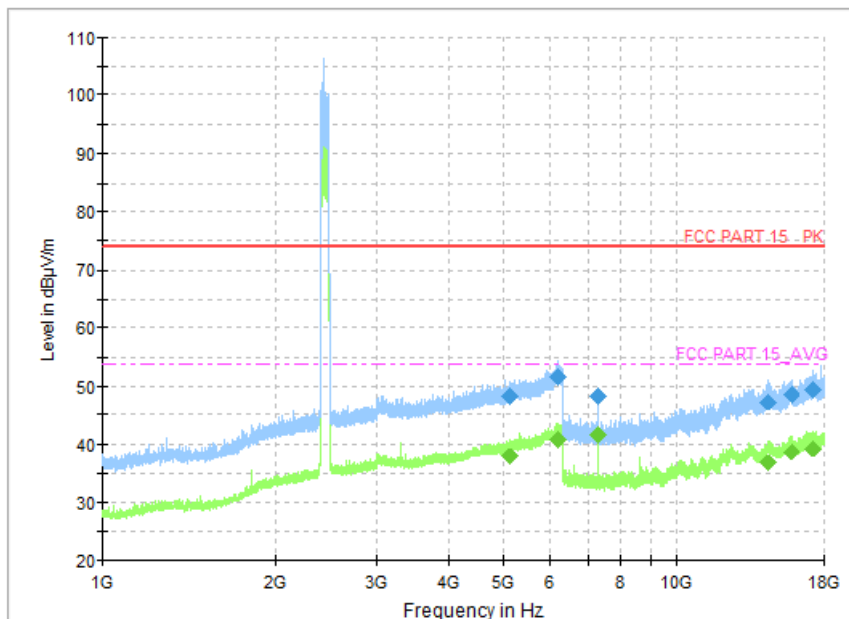


Fig. 47 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch0, 1GHz ~ 18GHz)

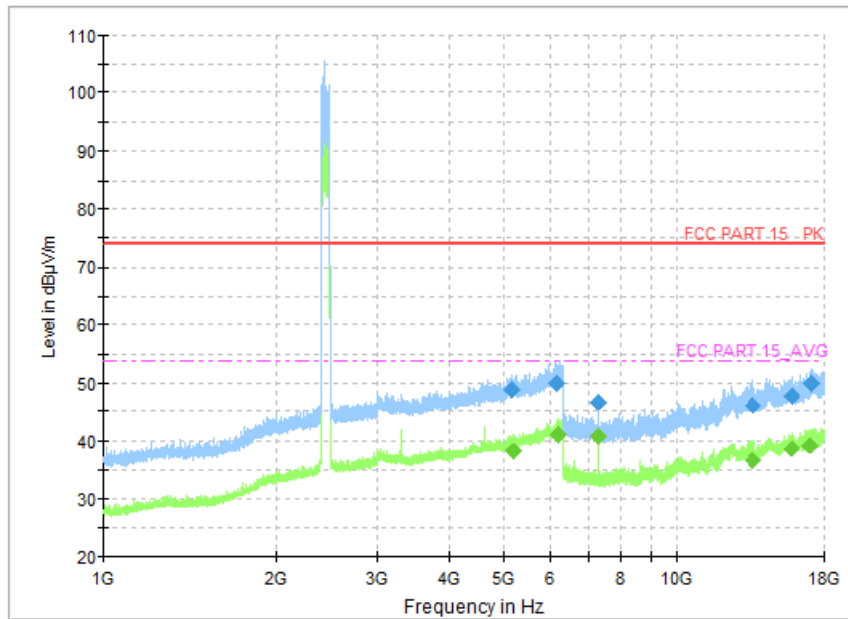


Fig. 48 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch39, 1GHz ~ 18GHz)

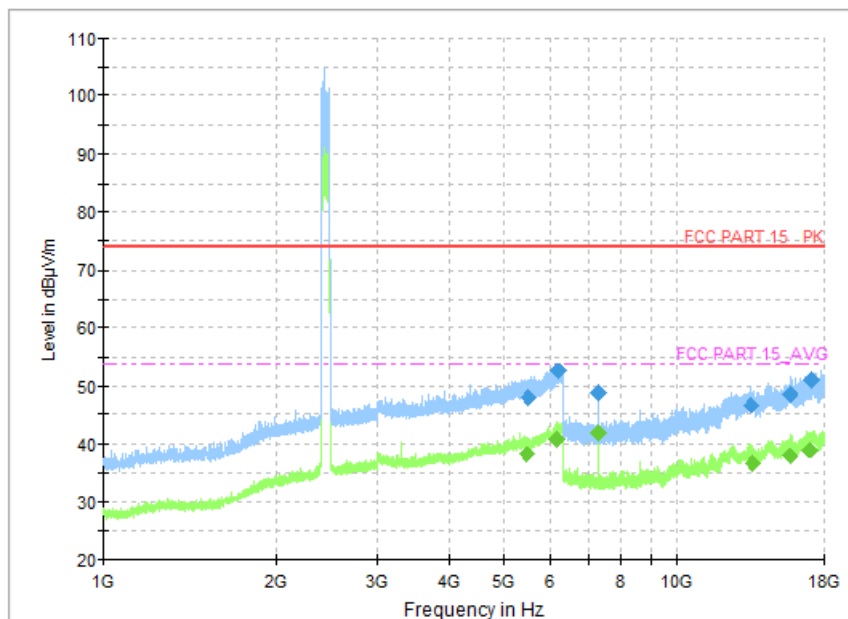


Fig. 49 Radiated Spurious Emission ( $\pi/4$  DQPSK, Ch78, 1GHz ~ 18GHz)

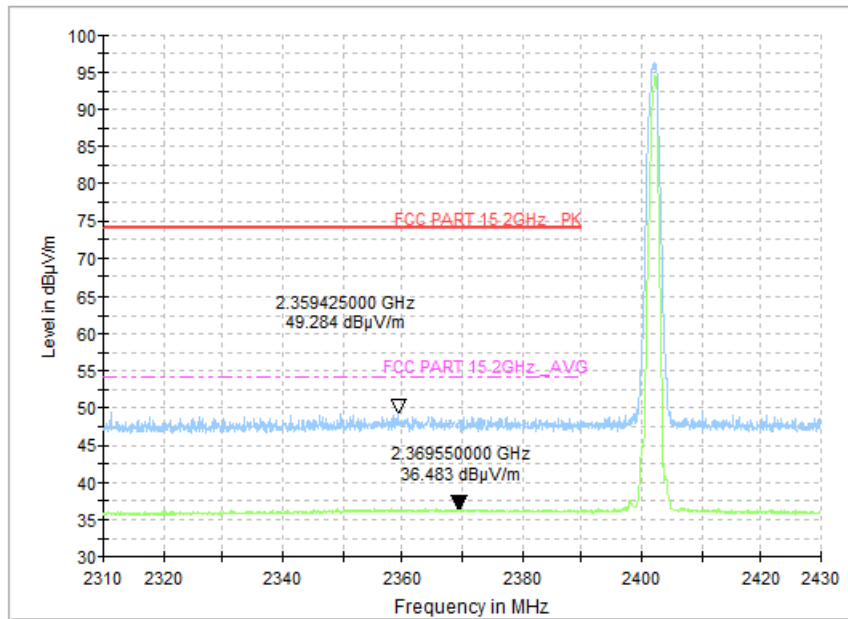


Fig. 50 Radiated Band Edges ( $\pi/4$  DQPSK, Ch0, 2380GHz ~ 2450GHz)

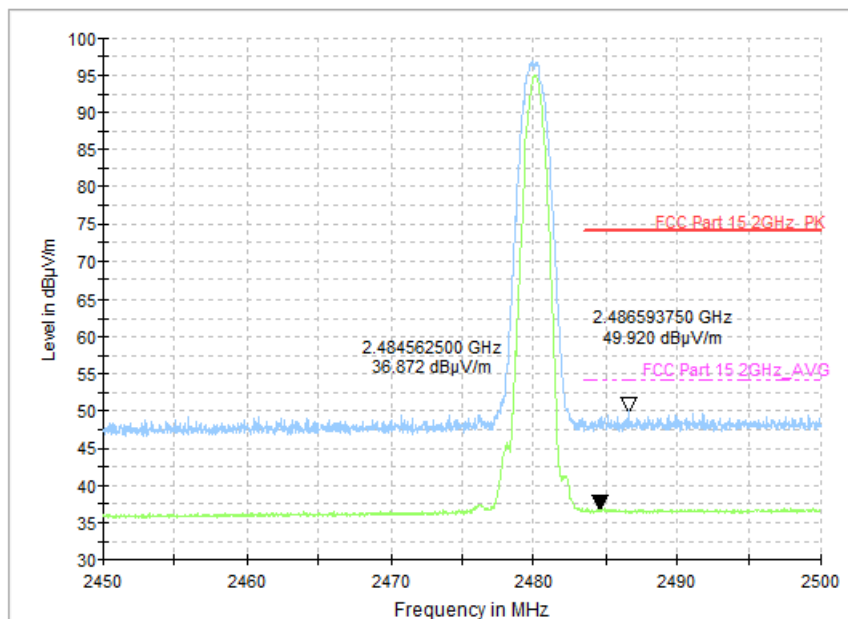


Fig. 51 Radiated Band Edges ( $\pi/4$  DQPSK, Ch78, 2450GHz ~ 2500GHz)

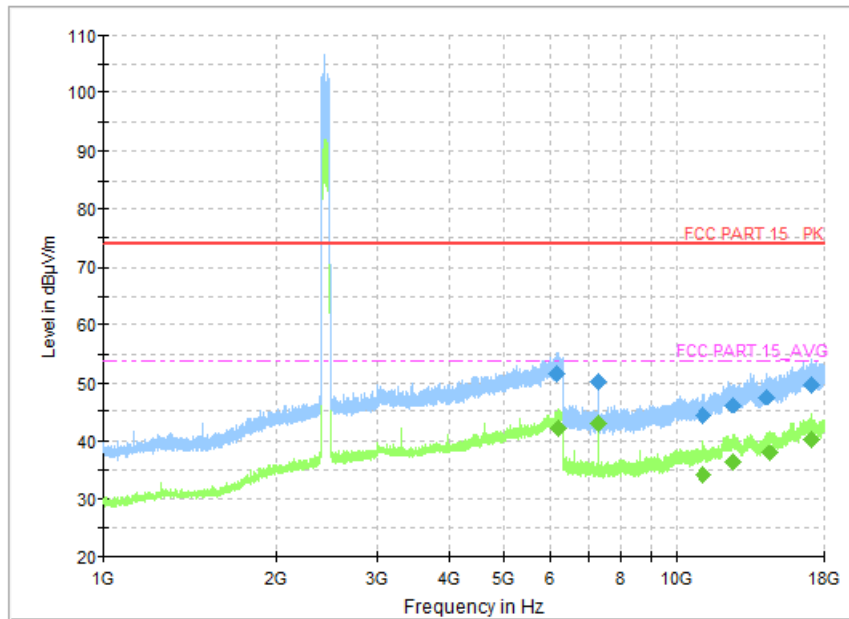


Fig. 52 Radiated Spurious Emission (8DPSK, Ch0, 1GHz ~ 18GHz)

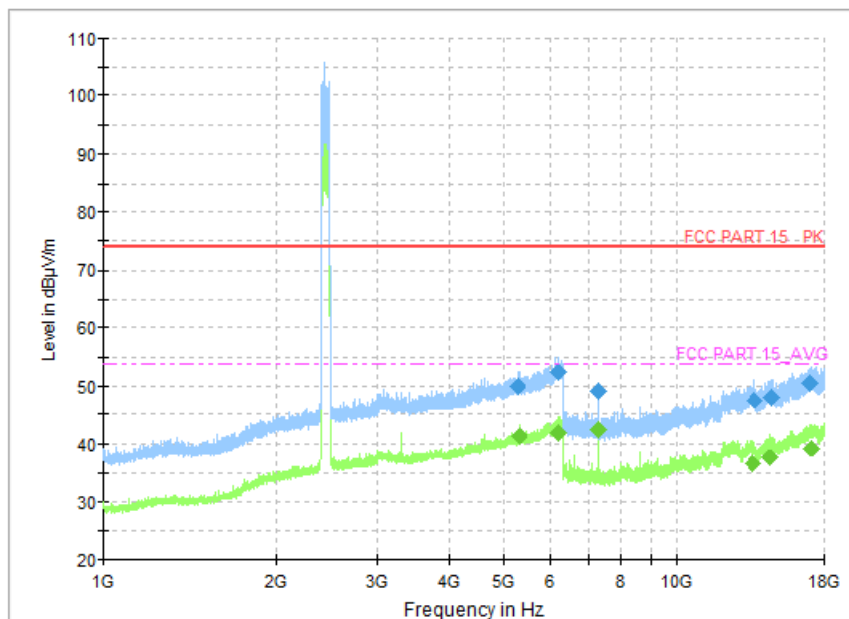


Fig. 53 Radiated Spurious Emission (8DPSK, Ch39, 1GHz ~ 18GHz)

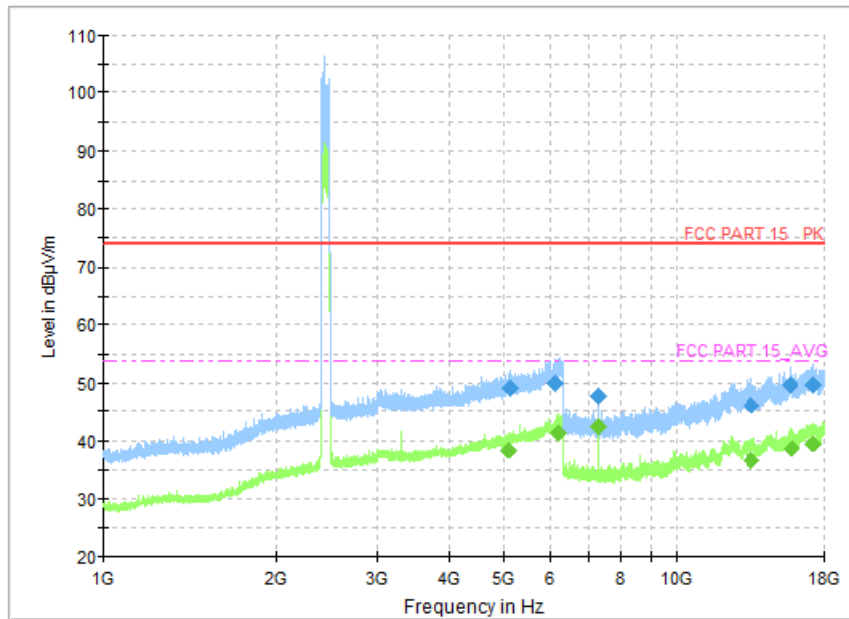


Fig. 54 Radiated Spurious Emission (8DPSK, Ch78, 1GHz ~ 18GHz)

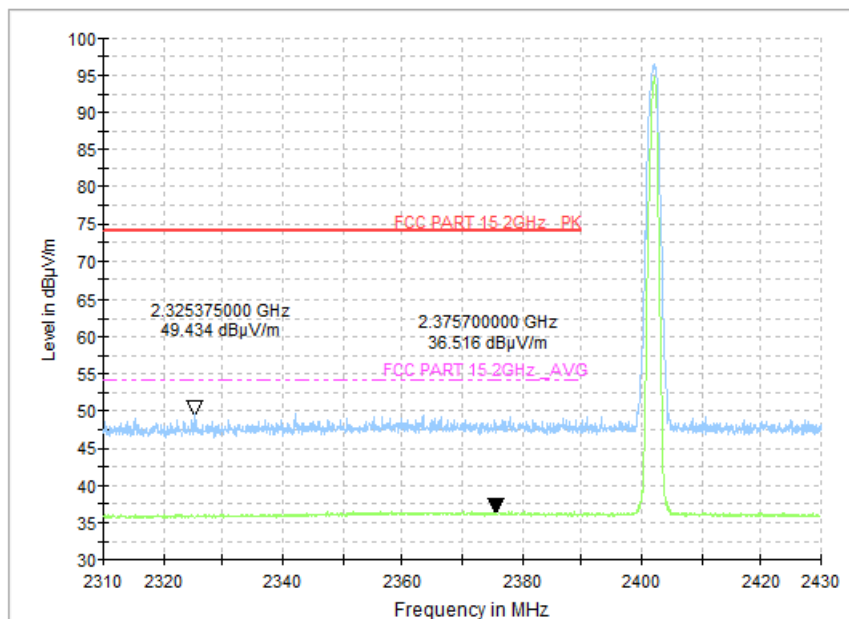


Fig. 55 Radiated Band Edges (8DPSK, Ch0, 2380GHz ~ 2450GHz)



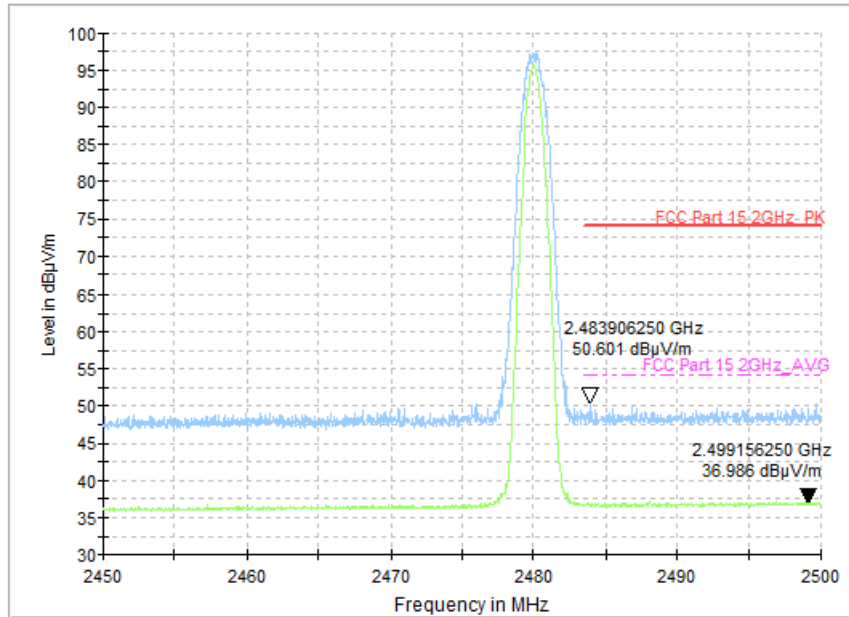


Fig. 56 Radiated Band Edges (8DPSK, Ch78, 2450GHz ~ 2500GHz)

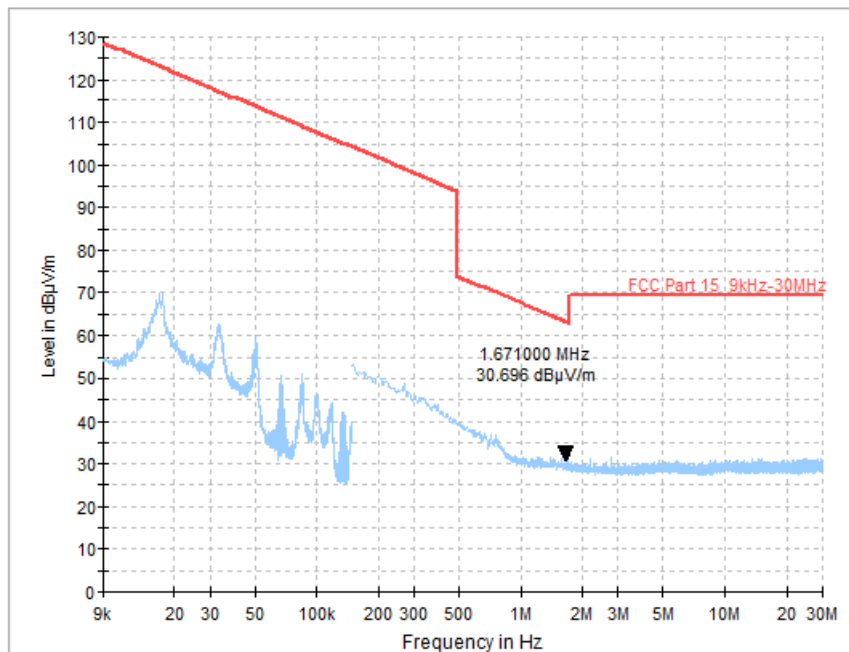


Fig. 57 Radiated Spurious Emission (All Channels, 9kHz ~ 30MHz)

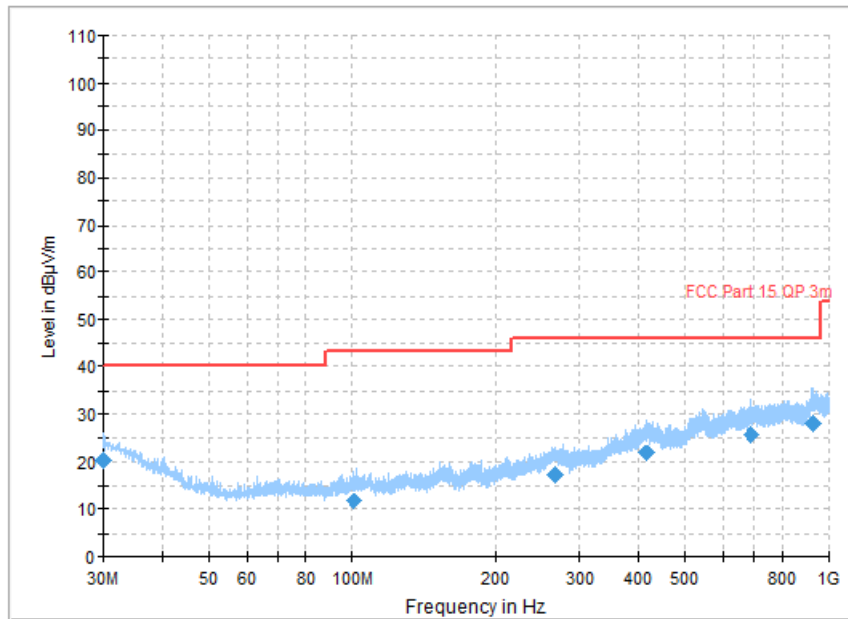


Fig. 58 Radiated Spurious Emission (All Channels, 30MHz ~ 1GHz)

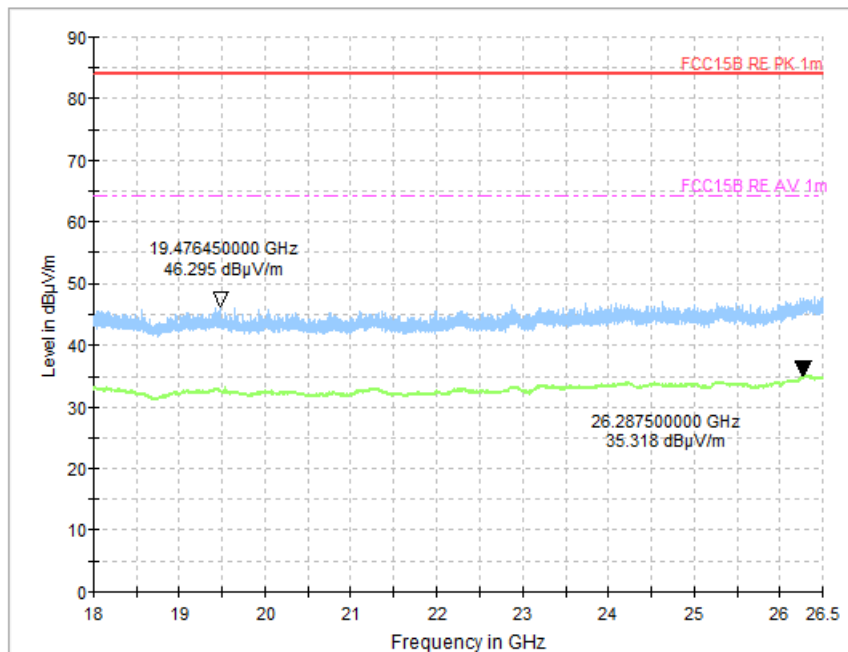


Fig. 59 Radiated Spurious Emission (All Channels, 18GHz ~ 26.5GHz)

### 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	963.00	/
	39	Fig.61	948.00	
	78	Fig.62	947.25	
$\pi/4$ DQPSK	0	Fig.63	1281.00	/
	39	Fig.64	1266.75	
	78	Fig.65	1265.25	
8DPSK	0	Fig.66	1280.25	/
	39	Fig.67	1257.00	
	78	Fig.68	1253.25	

See below for test graphs.

Conclusion: PASS

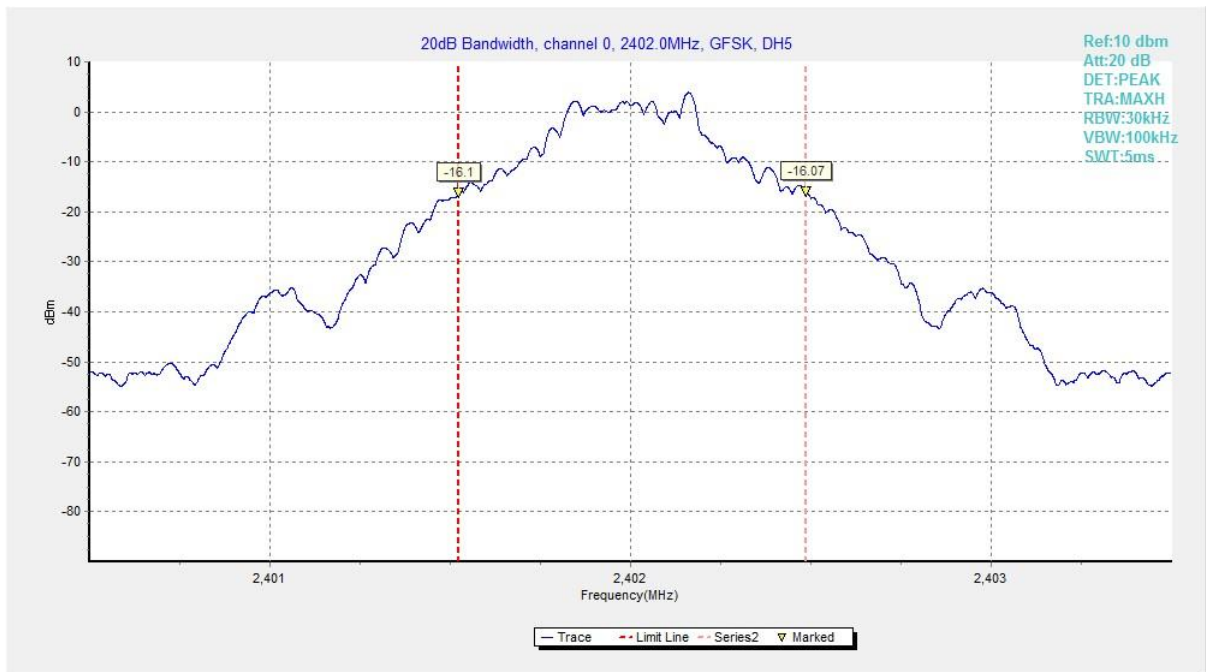


Fig. 60 20dB Bandwidth (GFSK, Ch 0)

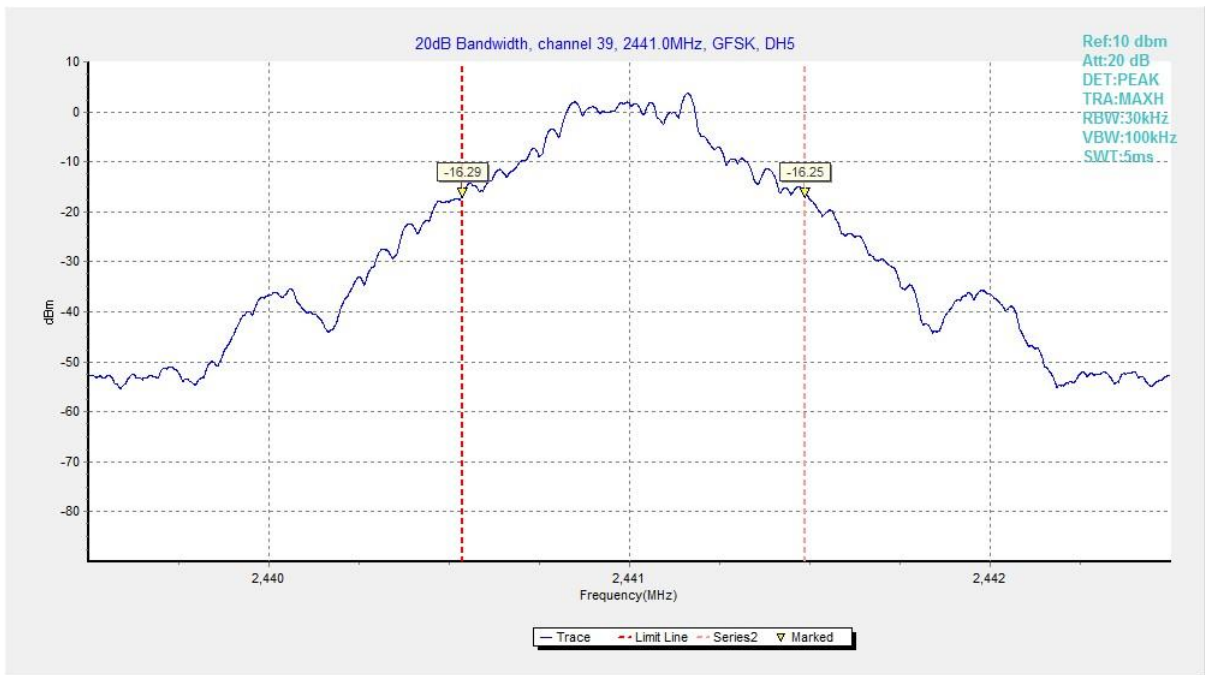


Fig. 61 20dB Bandwidth (GFSK, Ch 39)

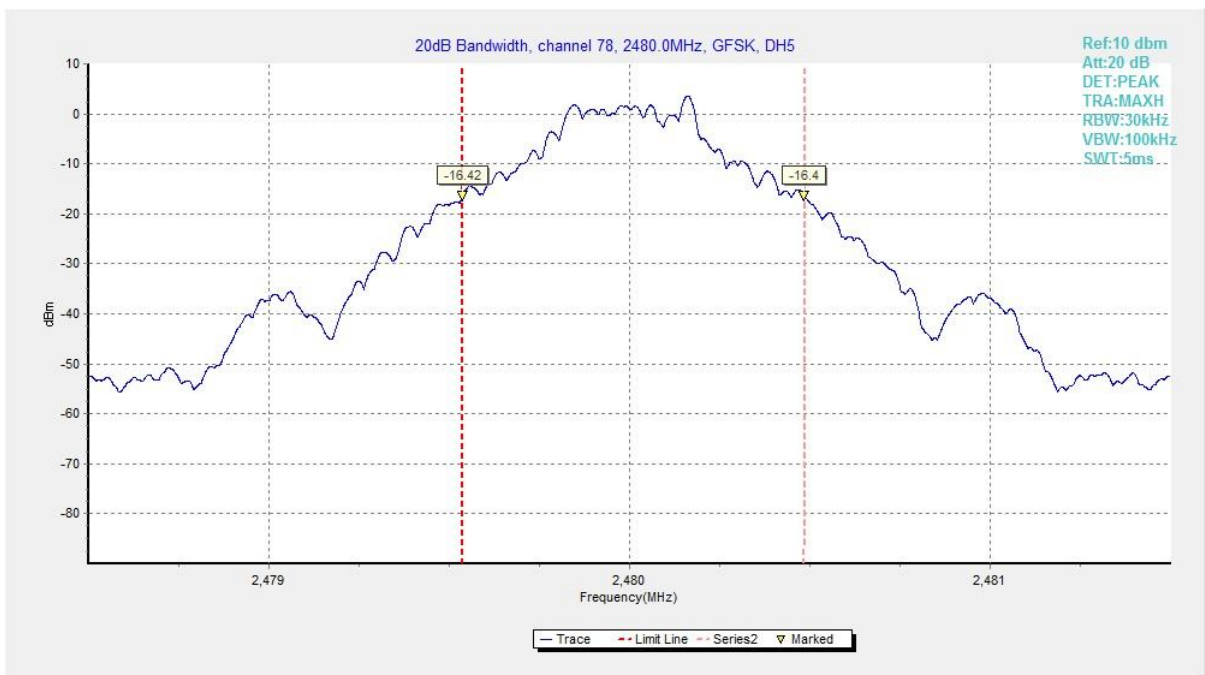


Fig. 62 20dB Bandwidth (GFSK, Ch 78)

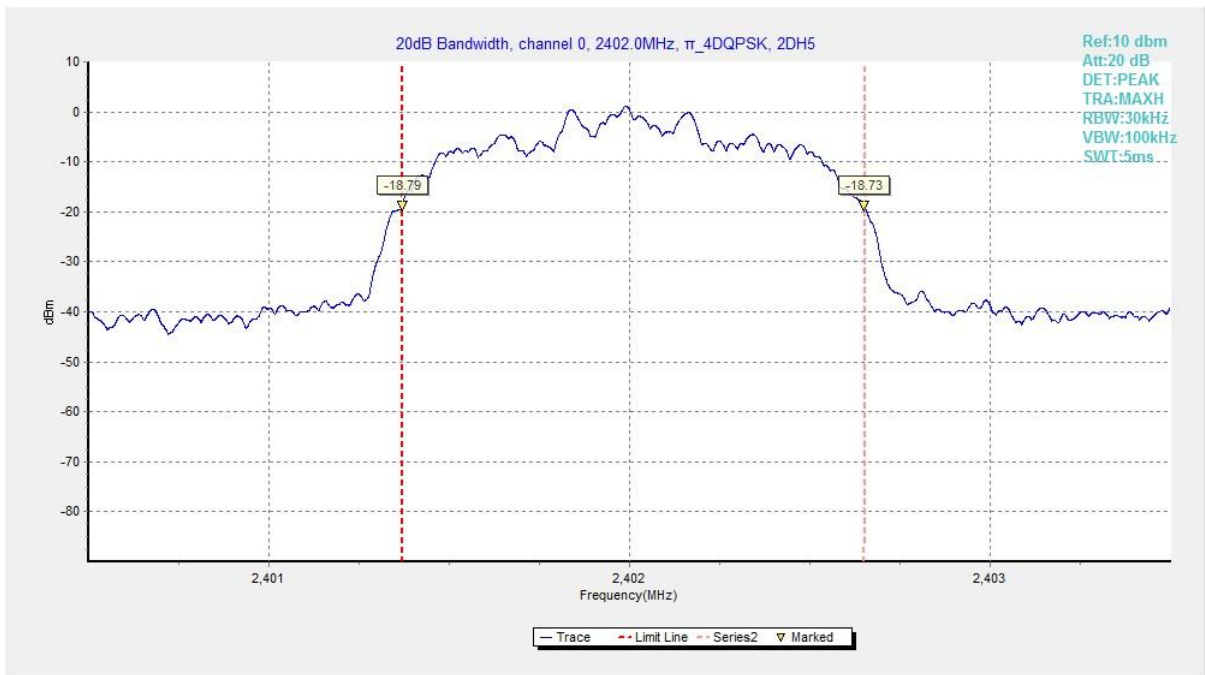


Fig. 63 20dB Bandwidth ( $\pi$  /4 DQPSK, Ch 0)

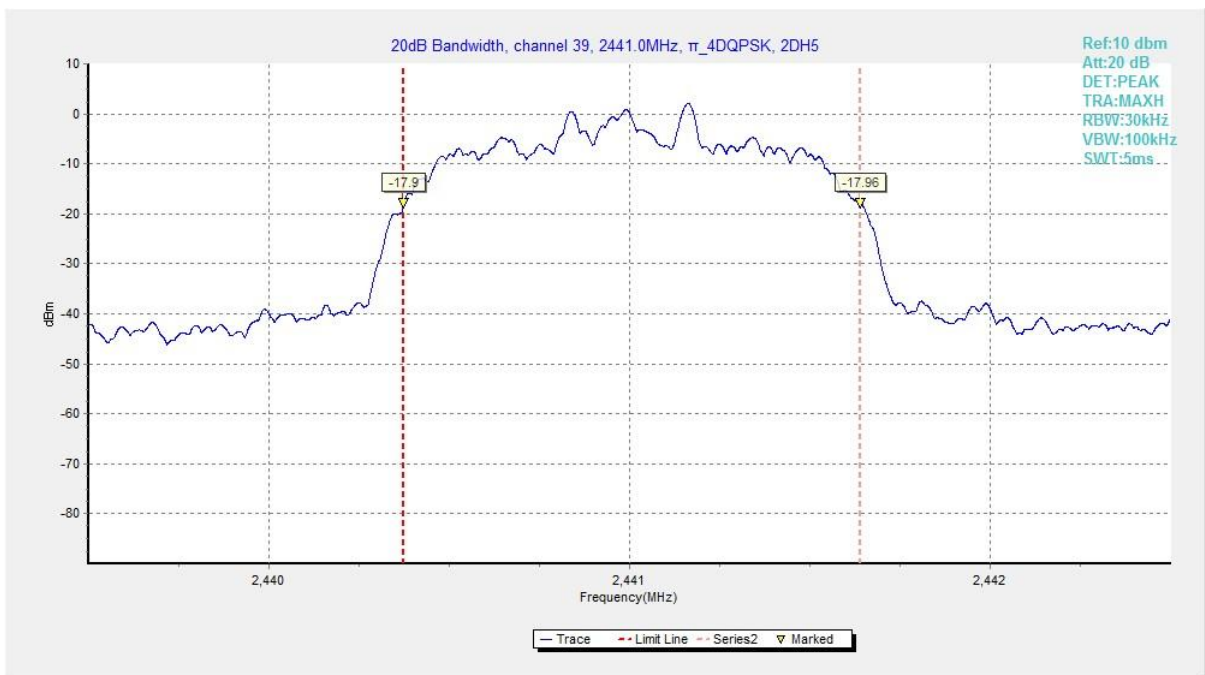


Fig. 64 20dB Bandwidth ( $\pi$  /4 DQPSK, Ch 39)

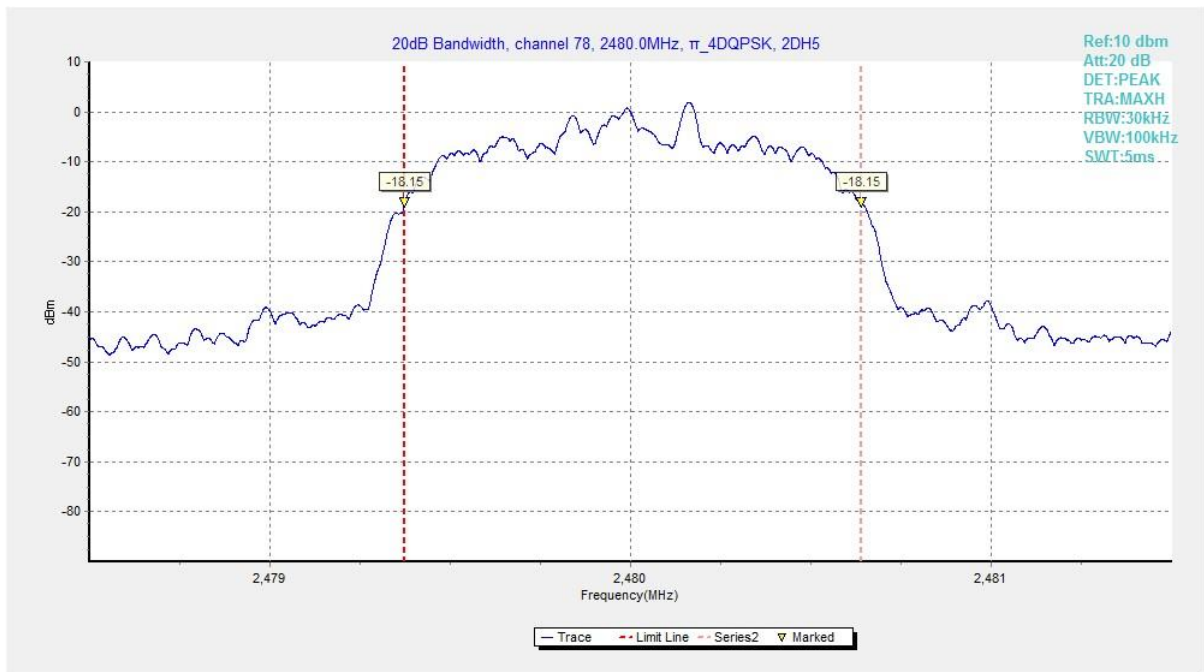


Fig. 65 20dB Bandwidth ( $\pi/4$  DQPSK, Ch 78)

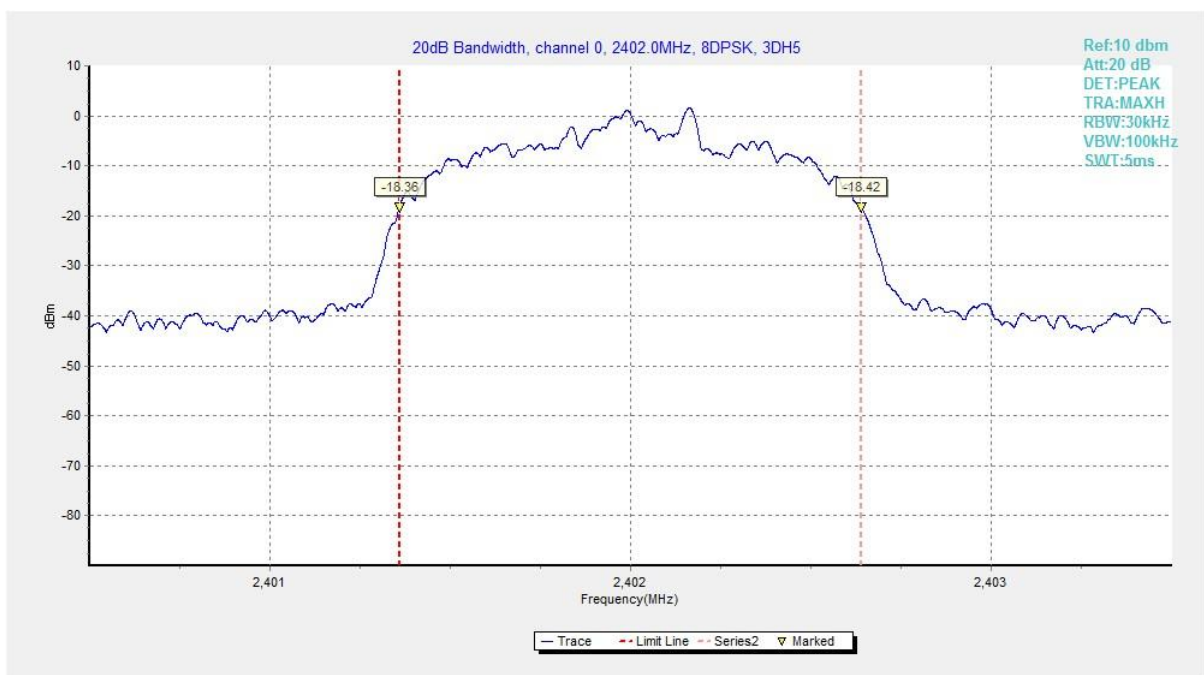


Fig. 66 20dB Bandwidth (8DPSK, Ch 0)

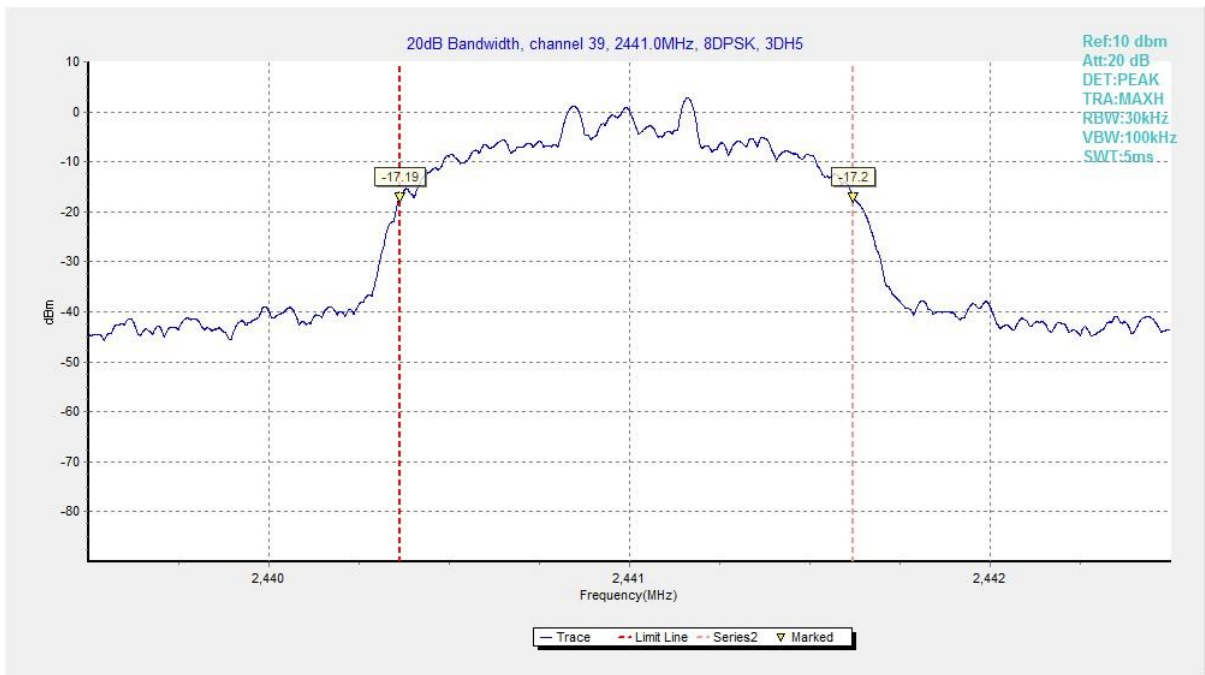


Fig. 67 20dB Bandwidth (8DPSK, Ch 39)

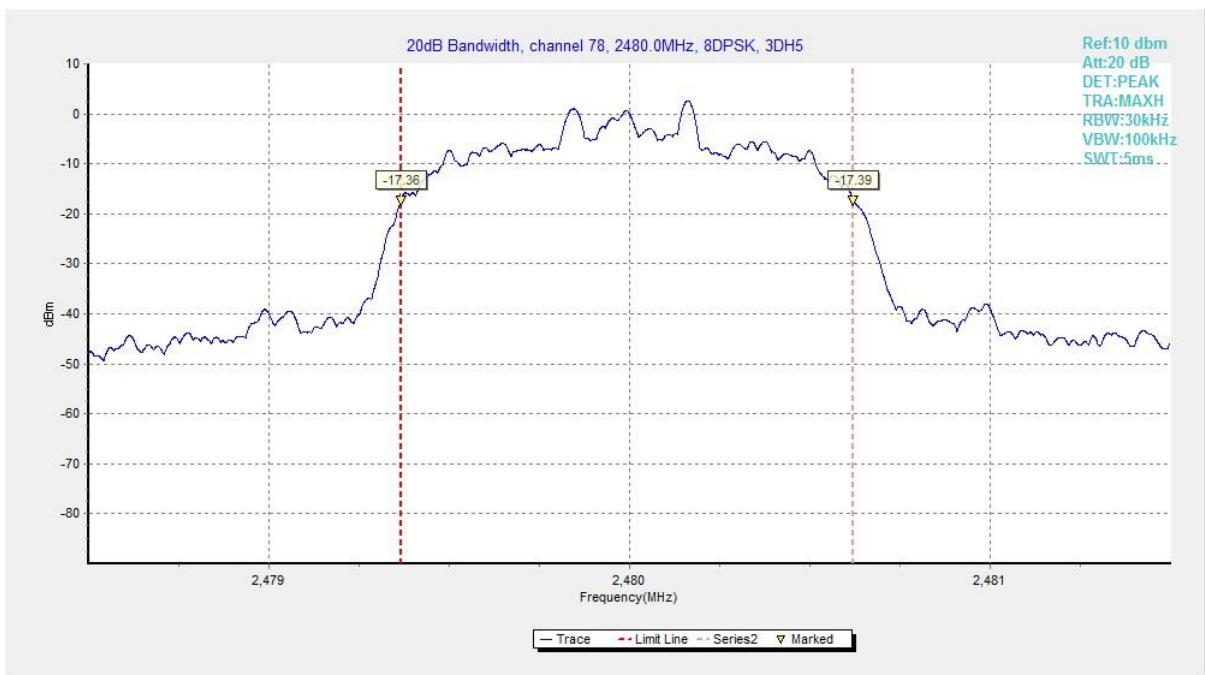


Fig. 68 20dB Bandwidth (8DPSK, Ch 78)

### 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	198.85	P
			Fig.70		
$\pi/4$ DQPSK	39	2-DH5	Fig.71	219.27	P
			Fig.72		
8DPSK	39	3-DH5	Fig.73	207.88	P
			Fig.74		

See below for test graphs.

Conclusion: Pass

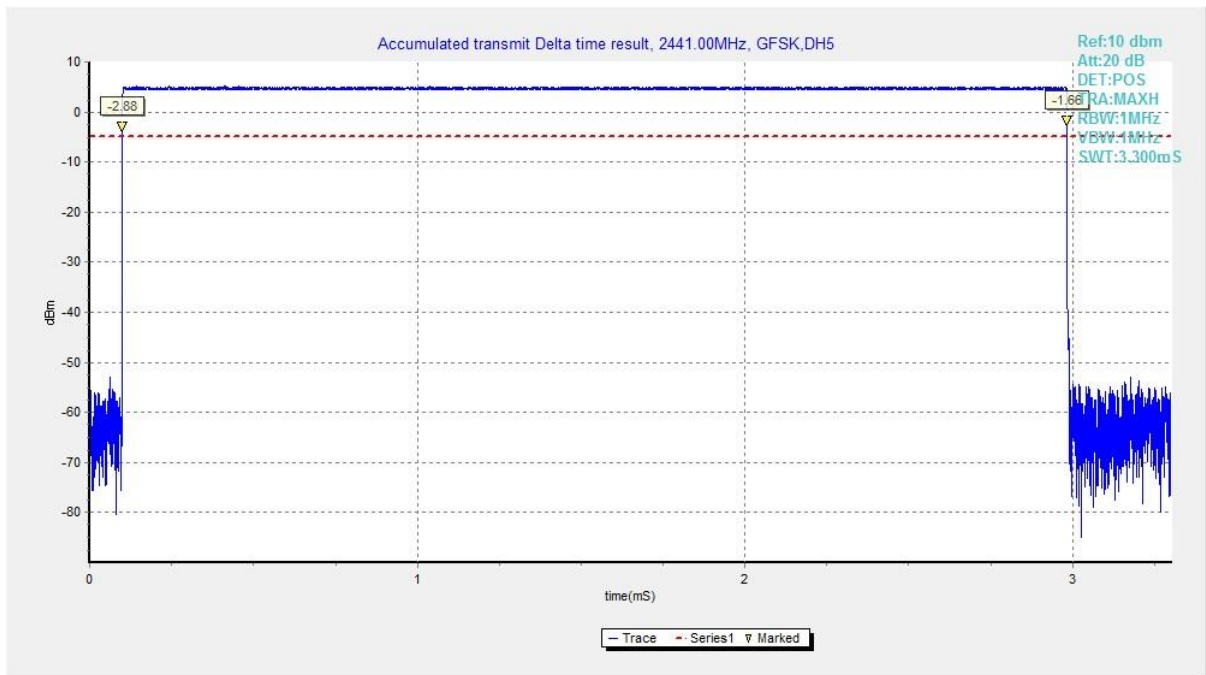


Fig. 69 Time of Occupancy(Dwell Time) (GFSK, Ch39)



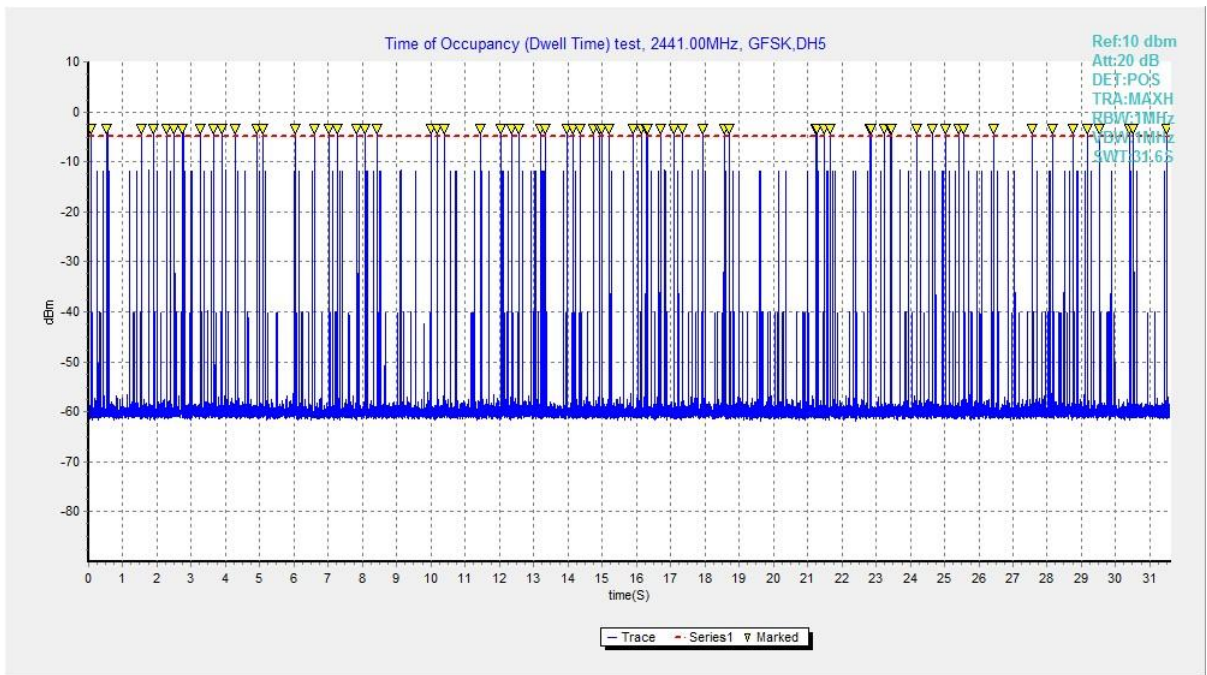


Fig. 70 Time of Occupancy(Dwell Time) (GFSK, Ch39)

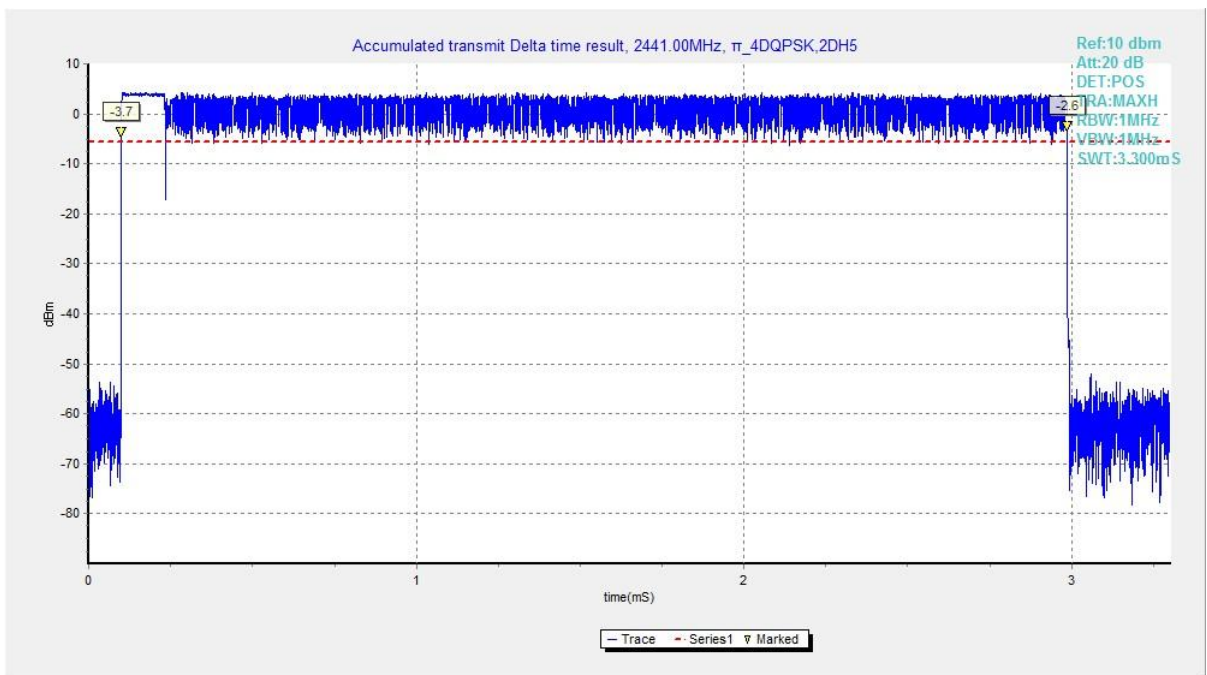


Fig. 71 Time of Occupancy(Dwell Time) ( $\pi/4$  DQPSK, Ch39)

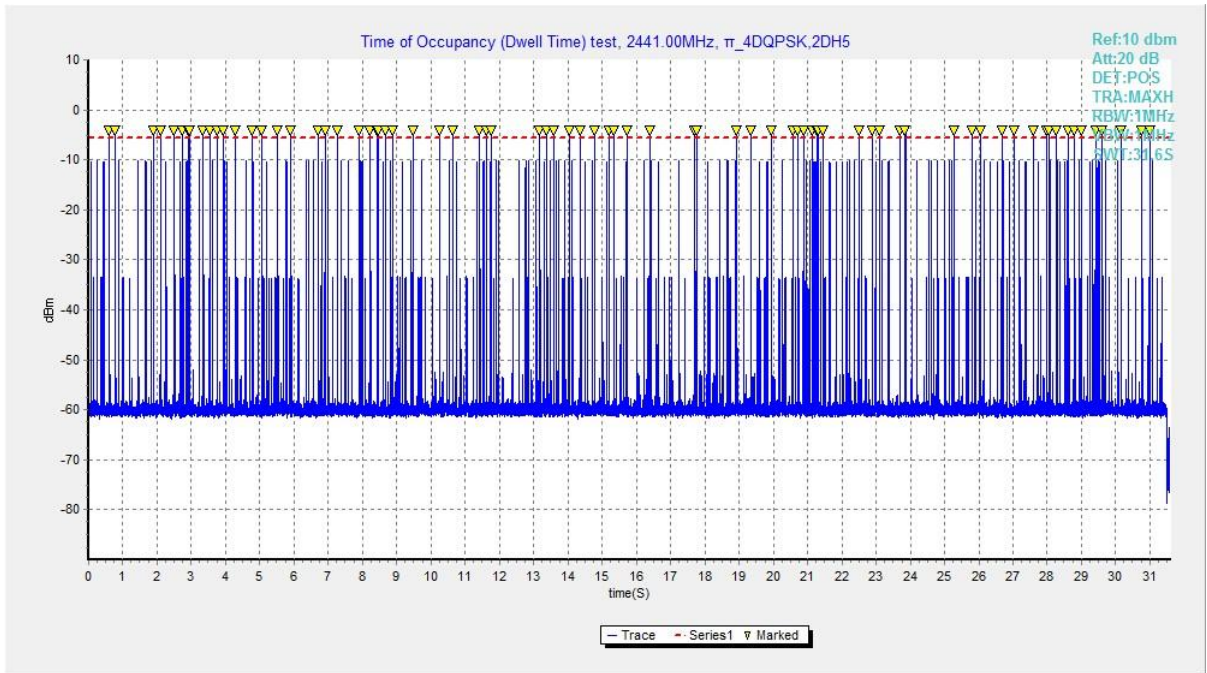


Fig. 72 Time of Occupancy(Dwell Time) ( $\pi$  /4 DQPSK, Ch39)

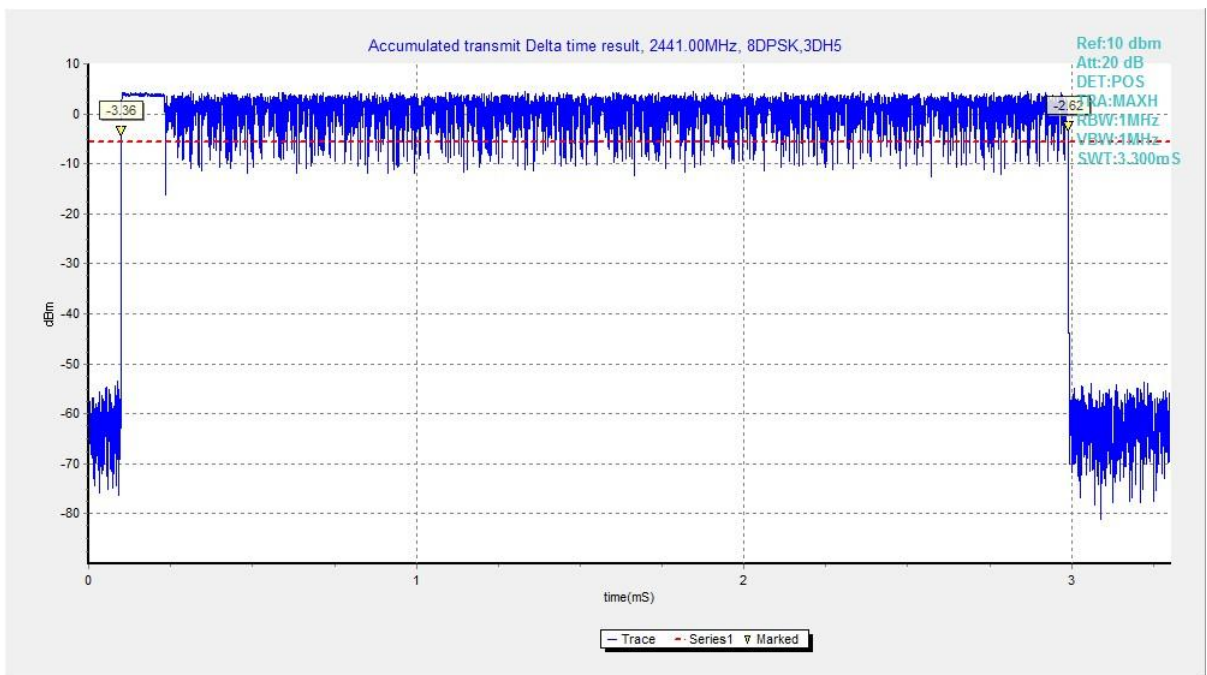


Fig. 73 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

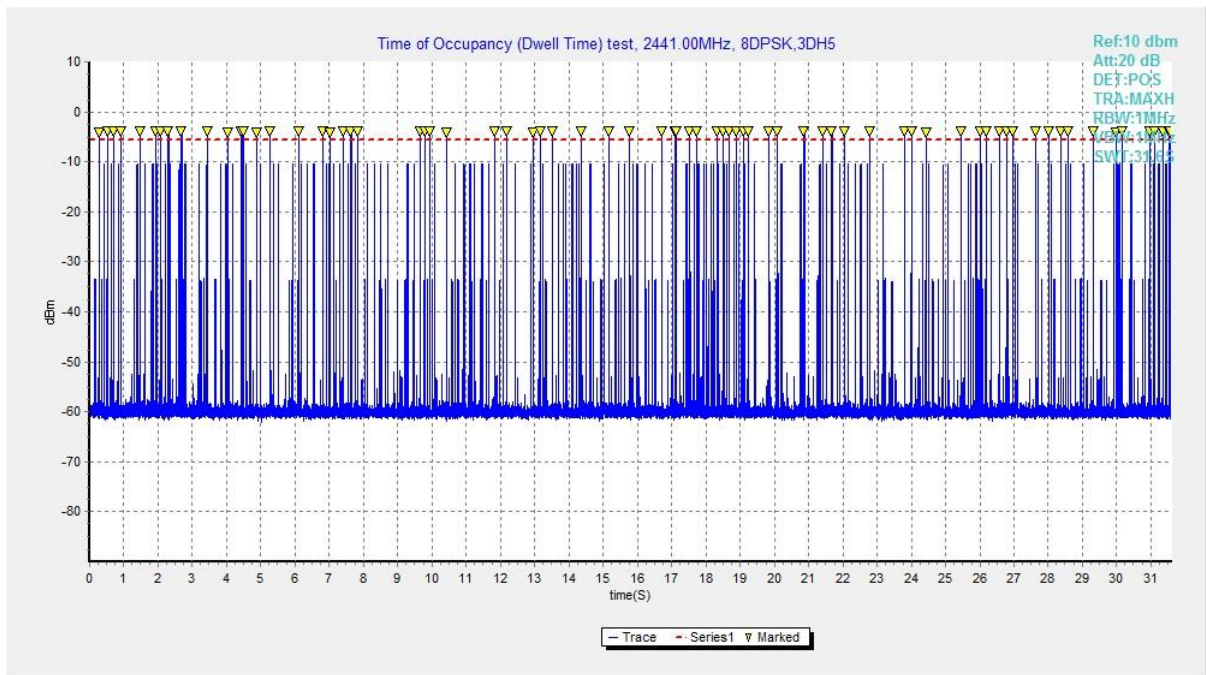


Fig. 74 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

### A.7 Number of Hopping Channels

**Measurement Limit:**

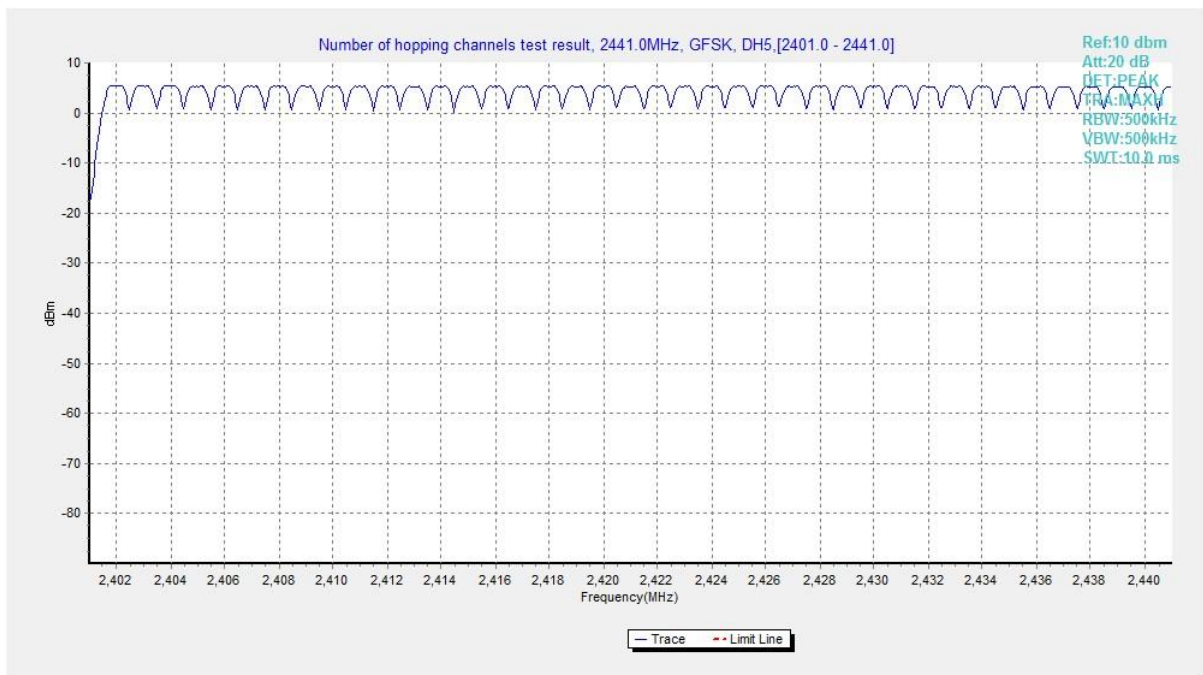
Standard	Limit
FCC 47 CFR Part 15.247(a)	At least 15 non-overlapping channels

**Measurement Results:**

Mode	Packet	Number of hopping channels		Test result	Conclusion
GFSK	DH5	Fig.75	Fig.76	79	<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



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

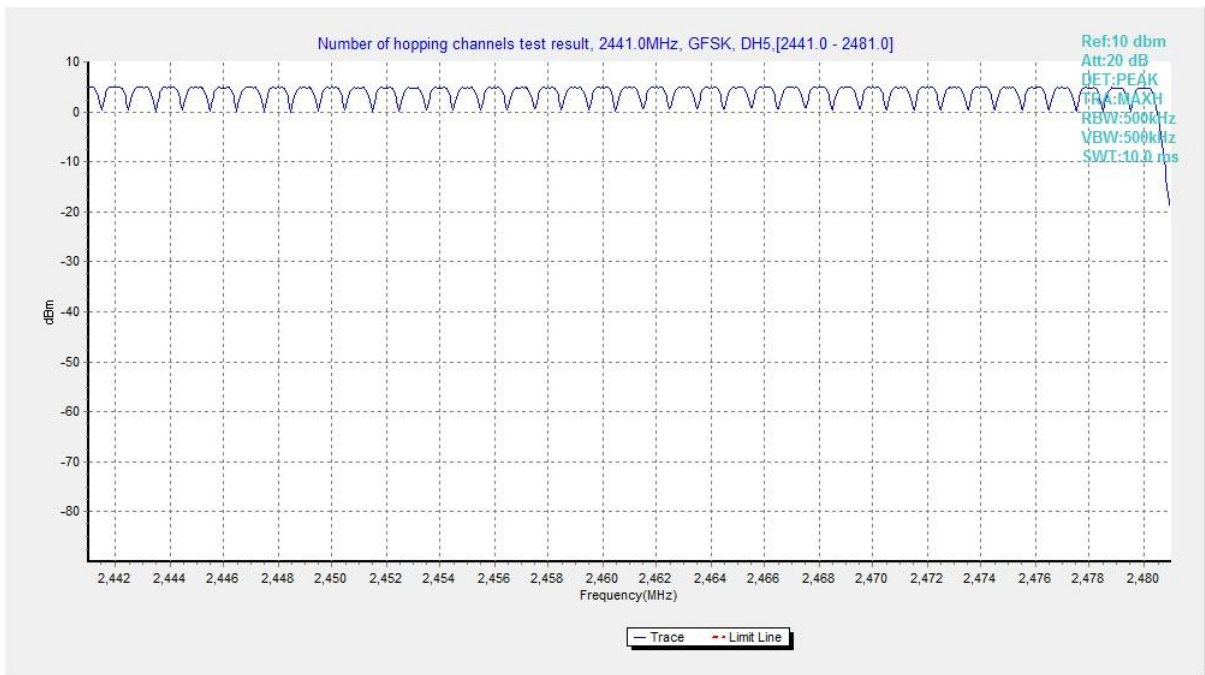


Fig. 76 Hopping channel ch40~78 (GFSK, Ch39)

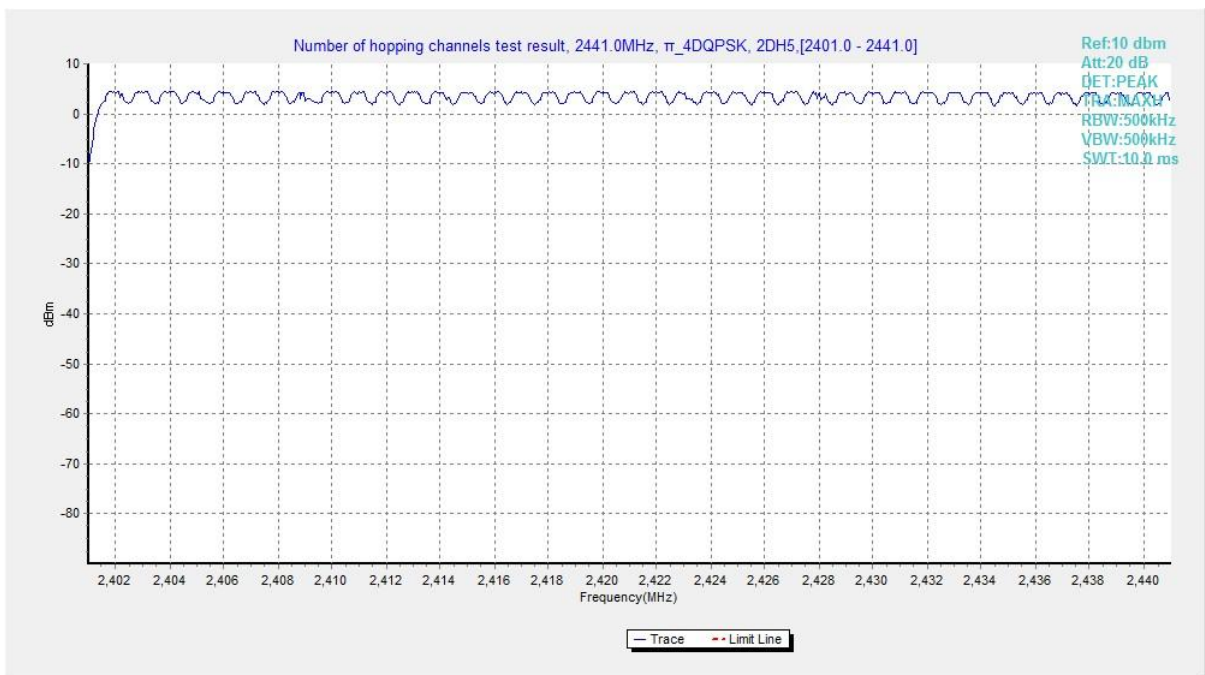


Fig. 77 Hopping channel ch0~39 ( $\pi/4$  DQPSK, Ch39)

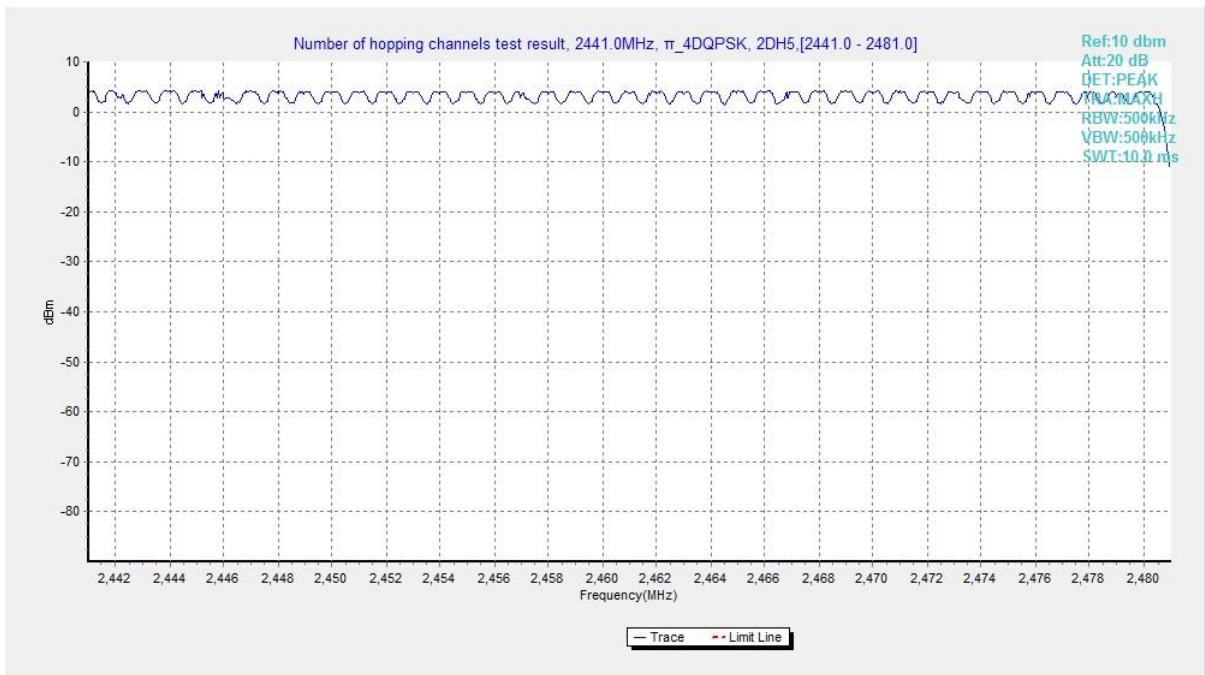


Fig. 78 Hopping channel ch40~78 ( $\pi$ /4 DQPSK, Ch39)

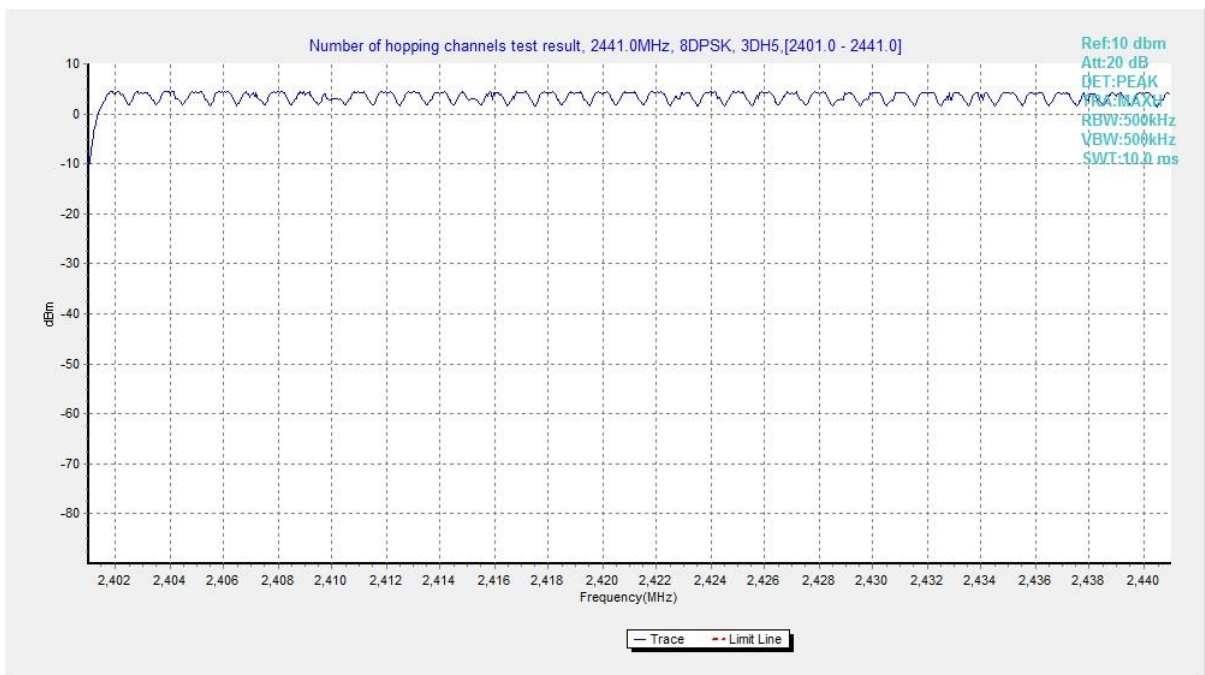


Fig. 79 Hopping channel ch0~39 (8DPSK, Ch39)

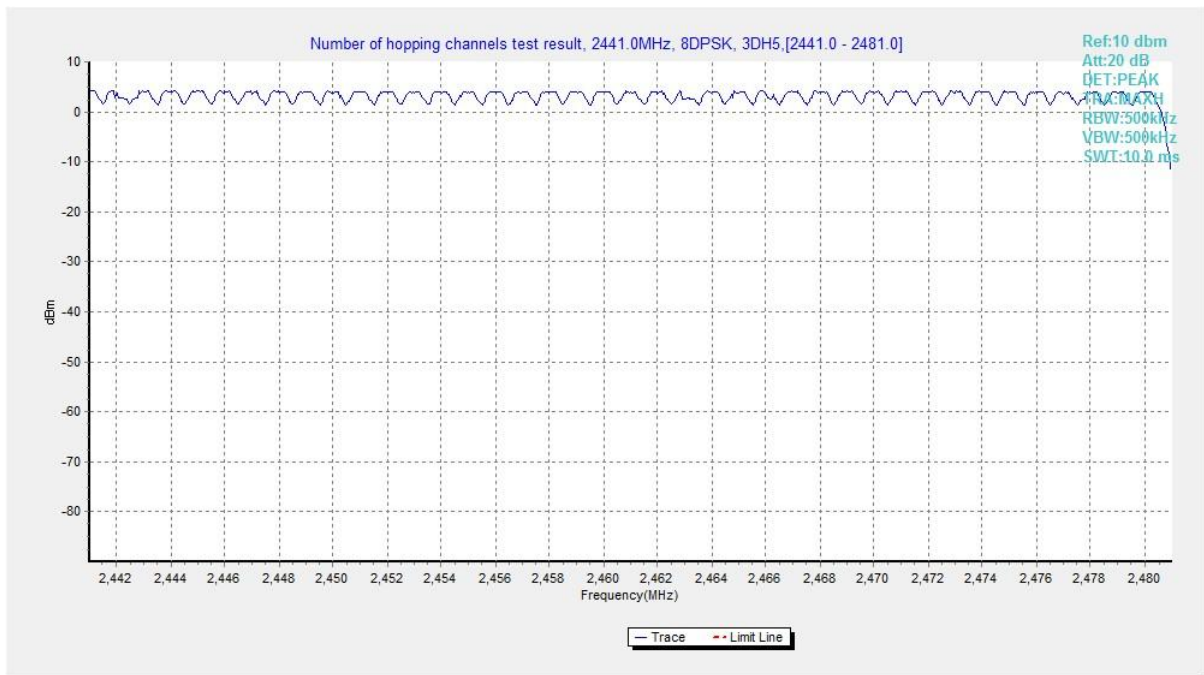


Fig. 80 Hopping channel ch40~78 (8DPSK, Ch39)

### 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	1.00	<b>P</b>
$\pi/4$ DQPSK	39	2-DH5	Fig.82	1.00	<b>P</b>
8DPSK	39	3-DH5	Fig.83	1.01	<b>P</b>

See below for test graphs.

Conclusion: Pass

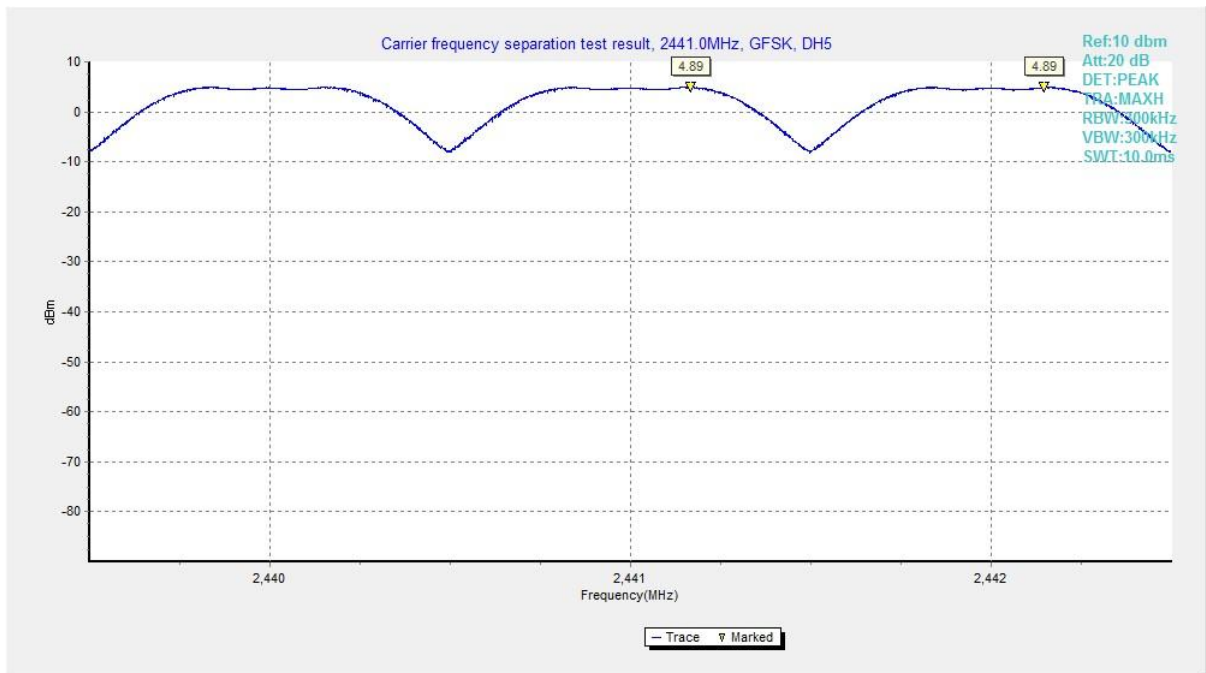


Fig. 81 Carrier Frequency Separation (GFSK, Ch39)



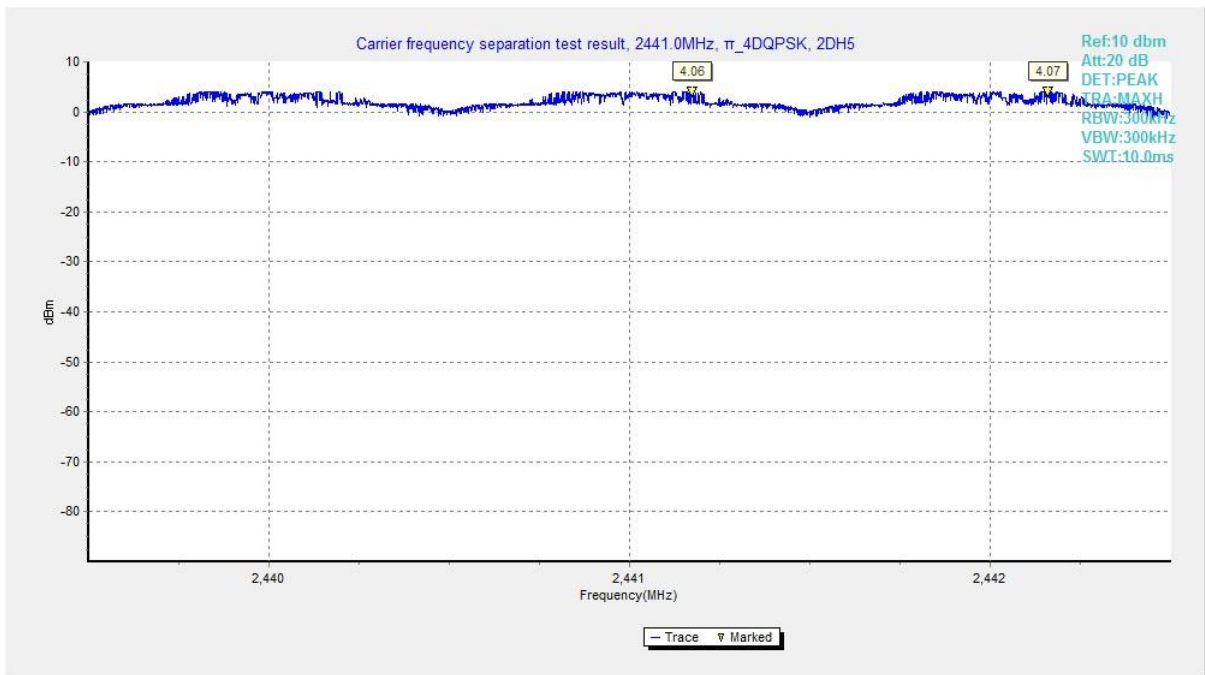


Fig. 82 Carrier Frequency Separation ( $\pi$  /4 DQPSK, Ch39)

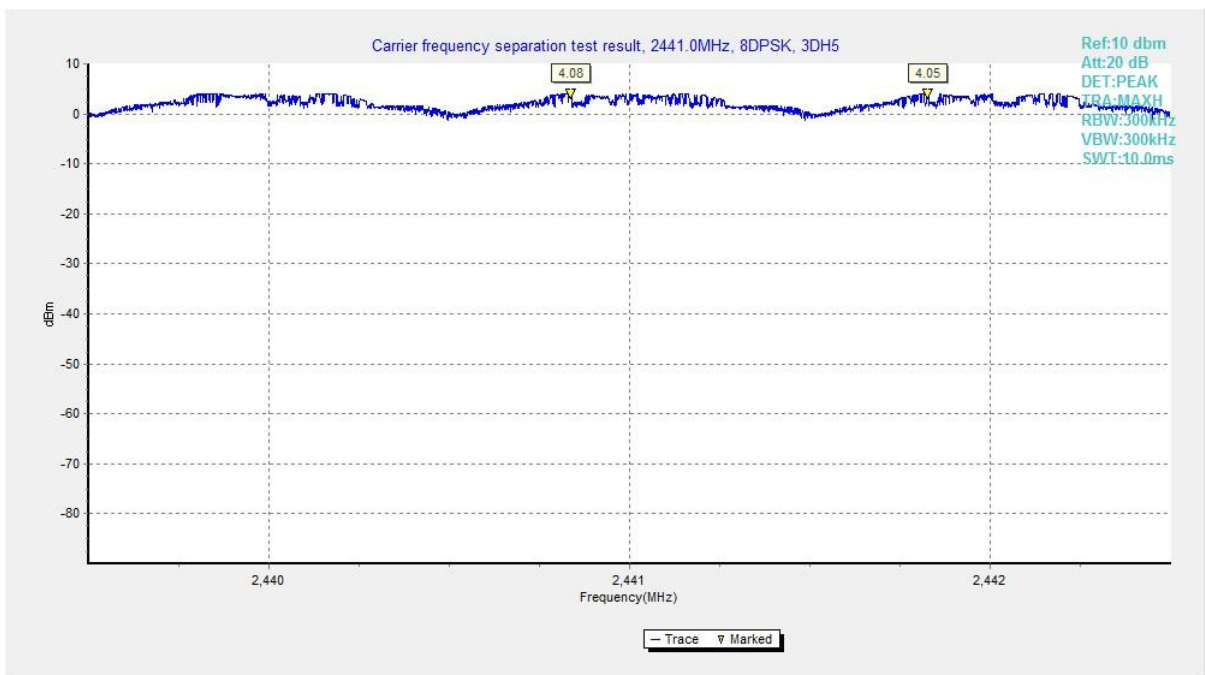


Fig. 83 Carrier Frequency Separation (8DPSK, Ch39)

### 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 $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.84	Fig.85	<b>P</b>
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 $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.84	Fig.85	<b>P</b>
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 $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.86	Fig.87	<b>P</b>
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 $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.86	Fig.87	<b>P</b>
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.



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

**See below for test graphs.**

**Conclusion: Pass**

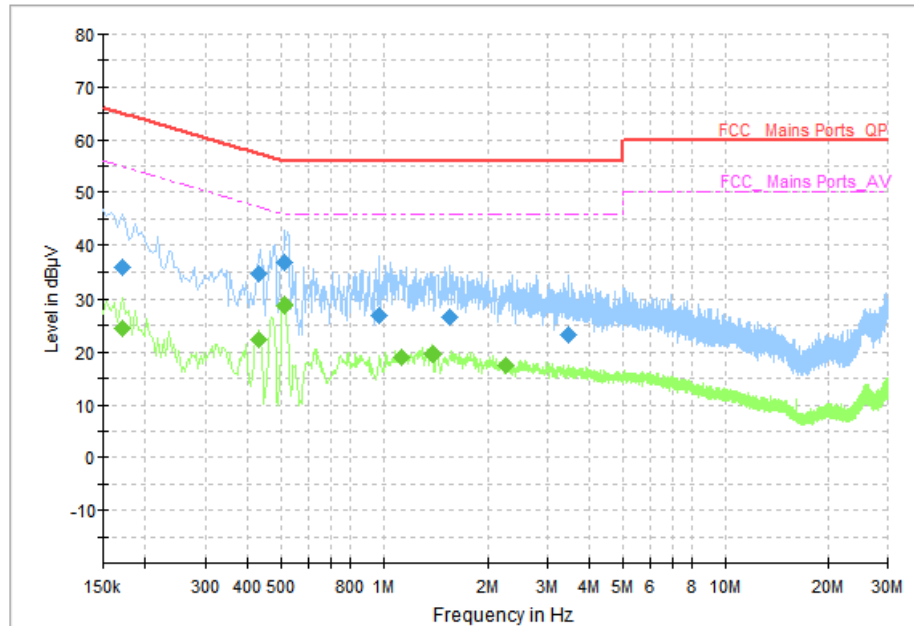


Fig. 84 AC Powerline Conducted Emission (Traffic, AE3, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170000	35.72	64.96	29.24	N	ON	10
0.430000	34.44	57.25	22.82	L1	ON	10
0.514000	36.59	56.00	19.41	L1	ON	10
0.966000	26.97	56.00	29.03	L1	ON	10
1.546000	26.66	56.00	29.34	L1	ON	10
3.454000	23.43	56.00	32.57	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170000	24.36	54.96	30.60	N	ON	10
0.430000	22.40	47.25	24.85	N	ON	10
0.510000	28.93	46.00	17.07	L1	ON	10
1.134000	19.02	46.00	26.98	L1	ON	10
1.386000	19.72	46.00	26.28	L1	ON	10
2.258000	17.39	46.00	28.61	L1	ON	10

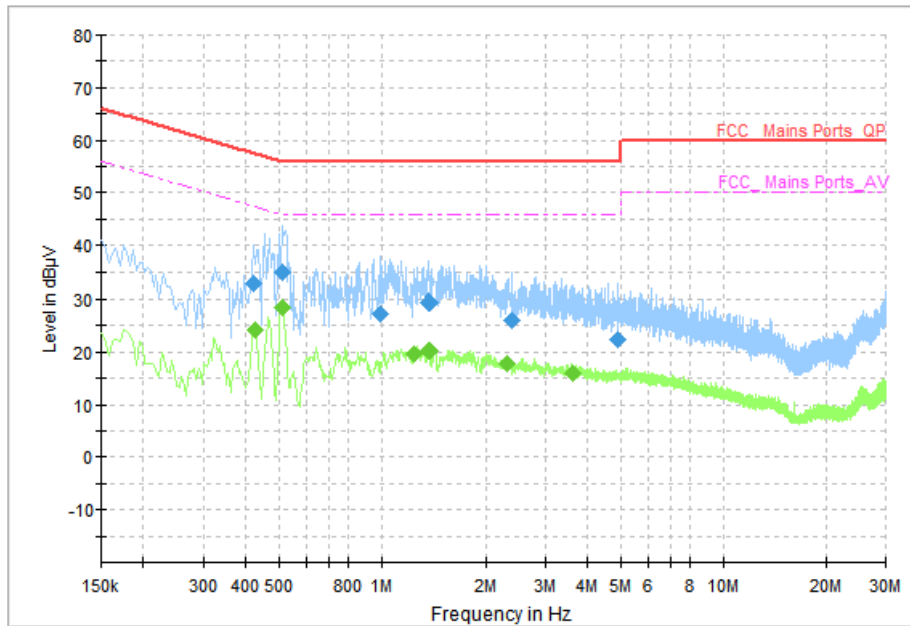


Fig. 85 AC Power line Conducted Emission (Idle, AE3, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.422000	32.79	57.41	24.62	L1	ON	10
0.510000	34.90	56.00	21.10	L1	ON	10
0.994000	27.18	56.00	28.82	L1	ON	10
1.370000	29.42	56.00	26.58	L1	ON	10
2.382000	26.12	56.00	29.88	L1	ON	10
4.890000	22.31	56.00	33.69	N	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.426000	24.14	47.33	23.19	L1	ON	10
0.510000	28.55	46.00	17.45	L1	ON	10
1.246000	19.57	46.00	26.43	N	ON	10
1.374000	20.26	46.00	25.74	N	ON	10
2.306000	17.69	46.00	28.31	L1	ON	10
3.630000	16.05	46.00	29.95	N	ON	10

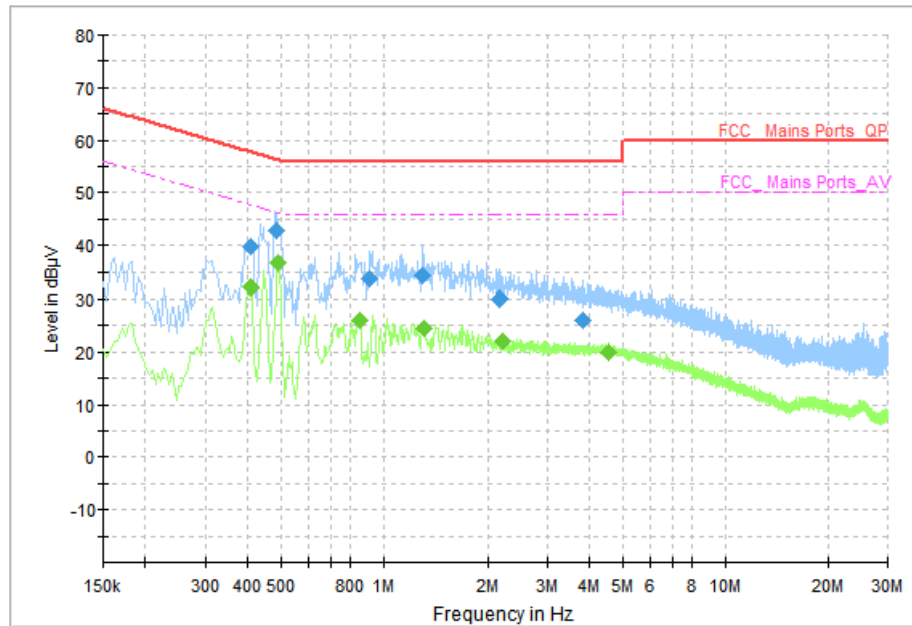


Fig. 86 AC Powerline Conducted Emission (Traffic, AE4, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.406000	39.63	57.73	18.10	L1	ON	10
0.486000	42.83	56.24	13.41	L1	ON	10
0.914000	33.79	56.00	22.21	N	ON	10
1.306000	34.13	56.00	21.87	L1	ON	10
2.158000	30.00	56.00	26.00	L1	ON	10
3.806000	25.91	56.00	30.09	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.406000	32.05	47.73	15.68	L1	ON	10
0.490000	36.64	46.17	9.53	L1	ON	10
0.850000	26.12	46.00	19.88	N	ON	10
1.310000	24.56	46.00	21.44	N	ON	10
2.206000	22.01	46.00	23.99	N	ON	10
4.538000	20.03	46.00	25.97	N	ON	10

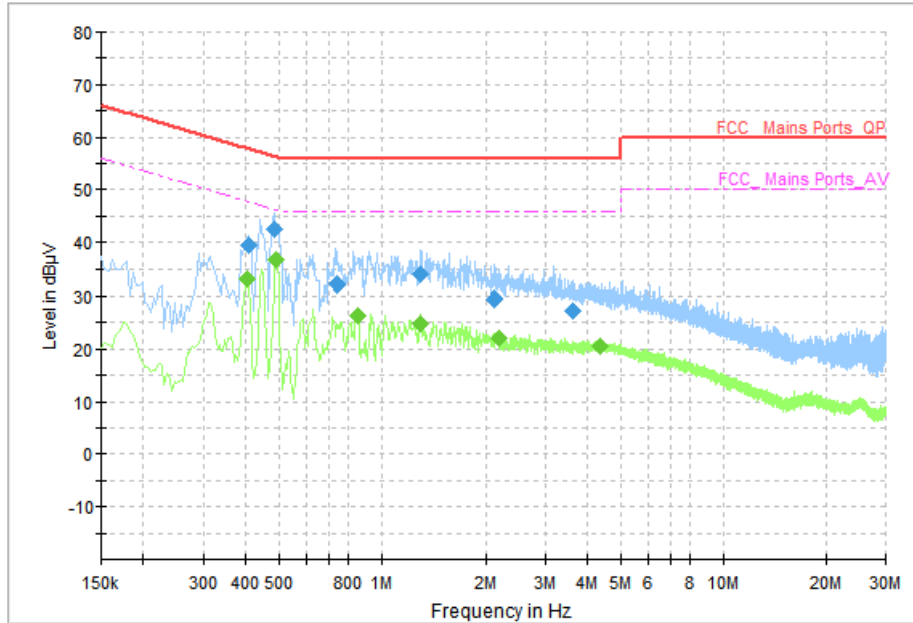


Fig. 87 AC Power line Conducted Emission (Idle, AE4, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.406000	39.51	57.73	18.22	N	ON	10
0.482000	42.57	56.31	13.73	L1	ON	10
0.738000	32.03	56.00	23.97	L1	ON	10
1.306000	34.05	56.00	21.95	N	ON	10
2.130000	29.36	56.00	26.64	L1	ON	10
3.622000	27.17	56.00	28.83	N	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.402000	33.08	47.81	14.73	N	ON	10
0.490000	36.60	46.17	9.57	L1	ON	10
0.850000	26.25	46.00	19.75	L1	ON	10
1.306000	24.73	46.00	21.27	N	ON	10
2.198000	22.07	46.00	23.93	L1	ON	10
4.330000	20.53	46.00	25.47	N	ON	10

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