



# FCC PART 15C TEST REPORT

## No.I18Z62245-IOT02

for

**TCL Communication Ltd.**

**HSUPA/HSDPA/UMTS Tri Band/GSM Bi Band/LTE Quad Bands**

**mobile phone**

**Model Name: 4051S**

**FCC ID:2ACCJN030**

**with**

**Hardware Version:02**

**Software Version:XV21**

**Issued Date: 2019-02-26**



**Note:**

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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## REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z62245-IOT02	Rev.0	1st edition	2019-02-26

## **CONTENTS**

<b>1. TEST LABORATORY .....</b>	<b>5</b>
1.1. TESTING LOCATION .....	5
1.2. TESTING ENVIRONMENT .....	5
1.3. PROJECT DATA .....	5
1.4. SIGNATURE .....	5
<b>2. CLIENT INFORMATION.....</b>	<b>6</b>
2.1. APPLICANT INFORMATION .....	6
2.2. MANUFACTURER INFORMATION .....	6
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>7</b>
3.1. ABOUT EUT .....	7
3.2. INTERNAL IDENTIFICATION OF EUT .....	7
3.3. INTERNAL IDENTIFICATION OF AE .....	7
3.4. NORMAL ACCESSORY SETTING .....	8
3.5. GENERAL DESCRIPTION.....	8
<b>4. REFERENCE DOCUMENTS.....</b>	<b>9</b>
4.1. DOCUMENTS SUPPLIED BY APPLICANT .....	9
4.2. REFERENCE DOCUMENTS FOR TESTING.....	9
<b>5. TEST RESULTS .....</b>	<b>10</b>
5.1. SUMMARY OF TEST RESULTS .....	10
5.2. STATEMENTS .....	10
<b>6. TEST FACILITIES UTILIZED .....</b>	<b>11</b>
<b>7. MEASUREMENT UNCERTAINTY .....</b>	<b>12</b>
7.1. PEAK OUTPUT POWER - CONDUCTED .....	12
7.2. FREQUENCY BAND EDGES .....	12
7.3. TRANSMITTER SPURIOUS EMISSION - CONDUCTED .....	12
7.4. TRANSMITTER SPURIOUS EMISSION - RADIATED .....	12
7.5. TIME OF OCCUPANCY (DWELL TIME) .....	12
7.6. 20dB BANDWIDTH .....	12
7.7. CARRIER FREQUENCY SEPARATION .....	12
7.8. AC POWERLINE CONDUCTED EMISSION .....	13
<b>ANNEX A: DETAILED TEST RESULTS.....</b>	<b>14</b>
A.1. MEASUREMENT METHOD .....	14
A.2. PEAK OUTPUT POWER – CONDUCTED .....	15
A.3. FREQUENCY BAND EDGES – CONDUCTED .....	16
A.4. TRANSMITTER SPURIOUS EMISSION - CONDUCTED .....	23
A.5. TRANSMITTER SPURIOUS EMISSION - RADIATED .....	48
A.6. TIME OF OCCUPANCY (DWELL TIME) .....	58



A.7. 20DB BANDWIDTH.....	68
A.8. CARRIER FREQUENCY SEPARATION .....	74
A.9. NUMBER OF HOPPING CHANNELS.....	77
A.10. AC POWERLINE CONDUCTED EMISSION.....	81
<b>ANNEX E: ACCREDITATION CERTIFICATE .....</b>	<b>85</b>



## **1. Test Laboratory**

### **1.1. Testing Location**

Conducted testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,  
P. R. China100191

Radiated testing Location:CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,  
P. R. China100191

### **1.2. Testing Environment**

Normal Temperature: 15-35°C  
Relative Humidity: 20-75%

### **1.3. Project data**

Testing Start Date: 2019-01-02  
Testing End Date: 2019-02-14

### **1.4. Signature**

Wu Le

(Prepared this test report)

Sun Zhenyu

(Reviewed this test report)

Li Zhuofang

(Approved this test report)



## **2. ClientInformation**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd.  
7/F, Block F4, TCL Communication Technology Building, TCL  
Address/Post: International E City,Zhong Shan Yuan Road, Nanshan District,  
Shenzhen, Guangdong, P.R. China 518052  
City: Shenzhen  
Postal Code: 518052  
Country: China  
Telephone: 0086-755-36611722  
Fax: 0086-755-36612000-81722

### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd.  
7/F, Block F4, TCL Communication Technology Building, TCL  
Address/Post: International E City,Zhong Shan Yuan Road, Nanshan District,  
Shenzhen, Guangdong, P.R. China 518052  
City: Shenzhen  
Postal Code: 518052  
Country: China  
Telephone: 0086-755-36611722  
Fax: 0086-755-36612000-81722

### **3. Equipment UnderTest (EUT) and Ancillary Equipment (AE)**

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

Description	HSUPA/HSDPA/UMTS Tri Band/GSM Bi Band/LTE Quad Bands mobile phone
Model Name	4051S
FCC ID	2ACCJN030
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/ $\pi/4$ DQPSK/8DPSK
Number of Channels	79
Power Supply	3.7V DC by Battery

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

EUT ID*	SN or IMEI	HW Version	SW Version
EUT2	015355000003773	02	XV21
EUT3	015355000003377	02	XV21

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

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

AE ID*	Description	/	/
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB cable	/	/

##### **AE1**

Model	TLi013C1
Manufacturer	BYD
Capacitance	1350mAh
Nominal voltage	3.7V

##### **AE2**

Model	PA-5V550mA-005
Manufacturer	PUAN
Length of cable	/

##### **AE3**

Model	/
Manufacturer	/
Length of cable	/

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



### **3.4. Normal Accessory setting**

Fully charged battery should be used during the test.

### **3.5. General Description**

The Equipment Under Test (EUT) is a model of HSUPA/HSDPA/UMTS Tri Band/GSM Bi Band/LTE Quad Bands mobile phonewith integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfill 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 Part15	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.	2016
ANSI C63.10	American National Standard of Procedures for ComplianceTesting of Unlicensed Wireless Devices	June,2013

## 5. Test Results

### 5.1. Summary of Test Results

Abbreviations used in this clause:

- P** Pass, The EUT complies with the essential requirements in the standard.  
**F** Fail, The EUT does not comply with the essential requirements in the standard  
**NA** Not Applicable, The test was not applicable  
**NP** Not Performed, The test was not performed by CTTL

SUMMARY OF MEASUREMENT RESULTS	Sub-clause	Verdict
Peak Output Power - Conducted	15.247 (b)(1)	<b>P</b>
Frequency Band Edges	15.247 (d)	<b>P</b>
Transmitter Spurious Emission - Conducted	15.247 (d)	<b>P</b>
Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	<b>P</b>
Time of Occupancy (Dwell Time)	15.247 (a) (1)(iii)	<b>P</b>
20dB Bandwidth	15.247 (a)(1)	<b>NA</b>
Carrier Frequency Separation	15.247 (a)(1)	<b>P</b>
Number of hopping channels	15.247 (a)(b)(iii)	<b>P</b>
AC Powerline Conducted Emission	15.107, 15.207	<b>P</b>

Please refer to **ANNEX A** for detail.

The measurement is made according to ANSI C63.10.

### 5.2. Statements

CTTL has evaluated the test cases requested by the applicant /manufacturer as listed in section 5.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2

## **6. Test Facilities Utilized**

### **Conducted test system**

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ26	200136	Rohde & Schwarz	1 year	2019-11-21
2	Bluetooth Tester	CBT32	100649	Rohde & Schwarz	1 year	2019-10-28
3	LISN	ENV216	101200	Rohde & Schwarz	1 year	2019-04-15
4	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2019-02-28
5	Bluetooth Tester	CBT	101042	Rohde & Schwarz	1 year	2019-03-08
6	Shielding Room	S81	/	ETS-Lindgren	/	/

### **Radiated emission test system**

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	1 year	2019-03-31
2	BiLog Antenna	VULB9163	9163-483	Schwarzbeck	3 Years	2021-08-21
3	EMI Antenna	3115	00167250	ETS-Lindgren	3 Years	2020-05-21
4	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	3 years	2020-07-27
5	Bluetooth Tester	CBT	101042	Rohde & Schwarz	1 year	2019-03-08

## **7. Measurement Uncertainty**

### **7.1. Peak Output Power - Conducted**

**Measurement Uncertainty:**

Measurement Uncertainty(k=2)	0.66dB
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### **7.2. Frequency Band Edges**

**Measurement Uncertainty:**

Measurement Uncertainty(k=2)	0.66dB
------------------------------	--------

### **7.3. Transmitter Spurious Emission - Conducted**

**Measurement Uncertainty:**

FrequencyRange	Uncertainty(k=2)
30 MHz ~ 8 GHz	1.22dB
8 GHz ~ 12.75 GHz	1.51dB
12.7GHz ~ 26 GHz	1.51dB

### **7.4. Transmitter Spurious Emission - Radiated**

**Measurement Uncertainty:**

FrequencyRange	Uncertainty(k=2)
<1 GHz	5.66dB
> 1 GHz	5.44dB

### **7.5. Time of Occupancy (Dwell Time)**

**Measurement Uncertainty:**

Measurement Uncertainty(k=2)	0.88ms
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### **7.6. 20dB Bandwidth**

**Measurement Uncertainty:**

Measurement Uncertainty(k=2)	61.936Hz
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### **7.7. Carrier Frequency Separation**

**Measurement Uncertainty:**



Measurement Uncertainty(k=2)	61.936Hz
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## 7.8. AC Powerline Conducted Emission

### Measurement Uncertainty:

Measurement Uncertainty(k=2)	3.08dB
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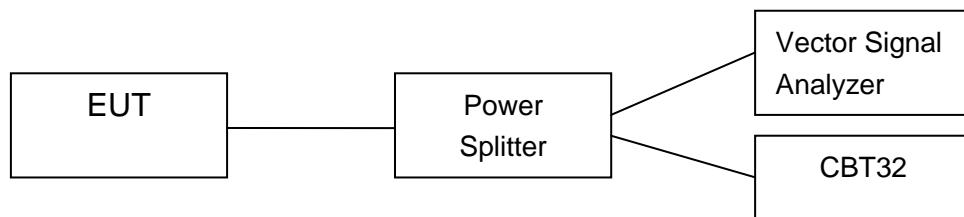
## **ANNEX A: Detailed Test Results**

### **A.1. Measurement Method**

#### **A.1.1. Conducted Measurements**

The measurement is made according to ANSI C63.10.

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode (Transmitter, receiver or transmitter & receiver).
- 3). Set the EUT to the required channel.
- 4). Set the EUT hopping mode (hopping or hopping off).
- 5). Set the spectrum analyzer to start measurement.
- 6). Record the values. Vector Signal Analyzer



#### **A.1.2. Radiated Emission Measurements**

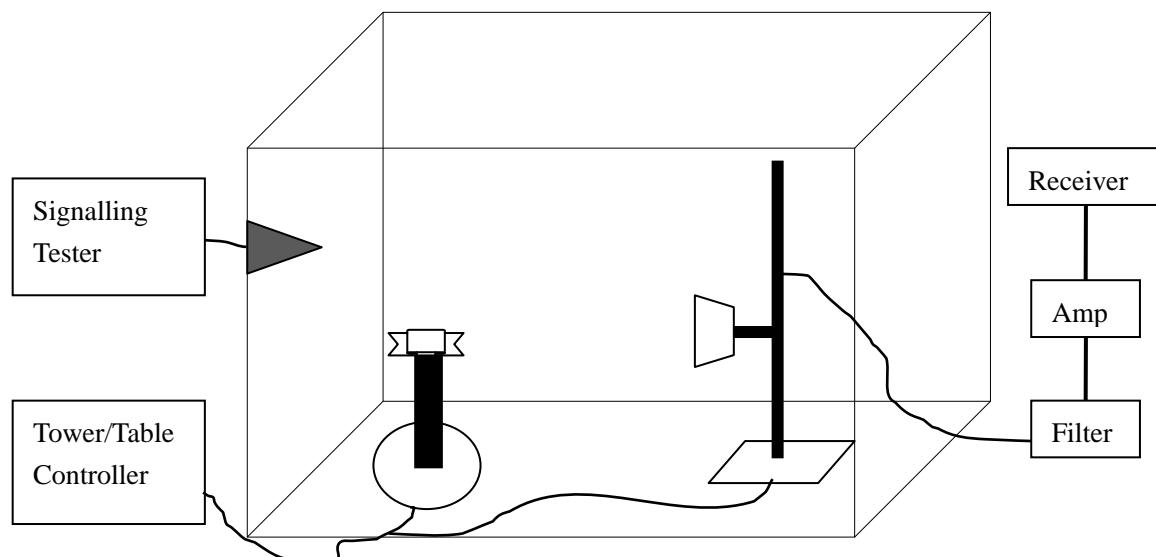
The measurement is made according to ANSI C63.10

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 1MHz;



## A.2. Peak Output Power – Conducted

**Method of Measurement: See ANSI C63.10-clause 7.8.5**

- a) Use the following spectrum analyzer settings:
  - Span: 6MHz
  - RBW: 3MHz
  - VBW: 3MHz
  - Sweep time: 2.5ms
  - Detector function: peak
  - Trace: max hold
- b) Allow trace to stabilize.
- c) Use the marker-to-peak function to set the marker to the peak of the emission.
- d) The indicated level is the peak output power.

**Measurement Limit:**

Standard	Limit (dBm)
FCC Part 15.247(b)(1)	< 30

**Measurement Results:**

**For GFSK**

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	8.16	9.15	7.95	P

**For π/4 DQPSK**

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.29	8.59	7.29	P

**For 8DPSK**

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.66	8.74	7.52	P

**Conclusion: PASS**

### A.3. Frequency Band Edges – Conducted

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

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

- Span: 10 MHz
- Resolution Bandwidth: 100 kHz
- Video Bandwidth: 300 kHz
- Sweep Time: Auto
- Detector: Peak
- Trace: max hold

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel.

Observe the stored trace and measure the amplitude difference between the peak of the fundamental and the peak of the band-edge emission. This is not an absolute field strength measurement; it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.

#### Measurement Limit:

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

#### Measurement Result:

##### For GFSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.1	-59.54	P
	Hopping ON	Fig.2	-61.68	P
78	Hopping OFF	Fig.3	-66.26	P
	Hopping ON	Fig.4	-68.83	P

##### For 4 DQPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.5	-56.10	P
	Hopping ON	Fig.6	-67.84	P
78	Hopping OFF	Fig.7	-64.21	P
	Hopping ON	Fig.8	-66.31	P

##### For 8DPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.9	-55.12	P
	Hopping ON	Fig.10	-64.10	P
78	Hopping OFF	Fig.11	-65.53	P

	Hopping ON	Fig.12	-66.19	P
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**Conclusion: PASS**

**Test graphs as below**

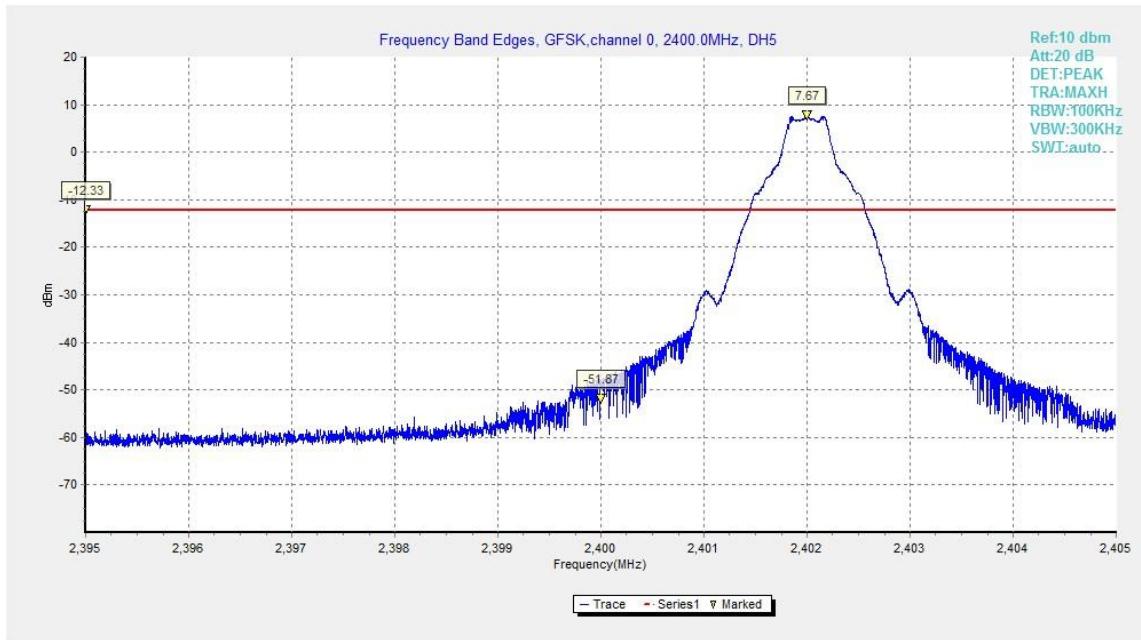


Fig.1. Frequency Band Edges: GFSK, Channel 0, Hopping Off

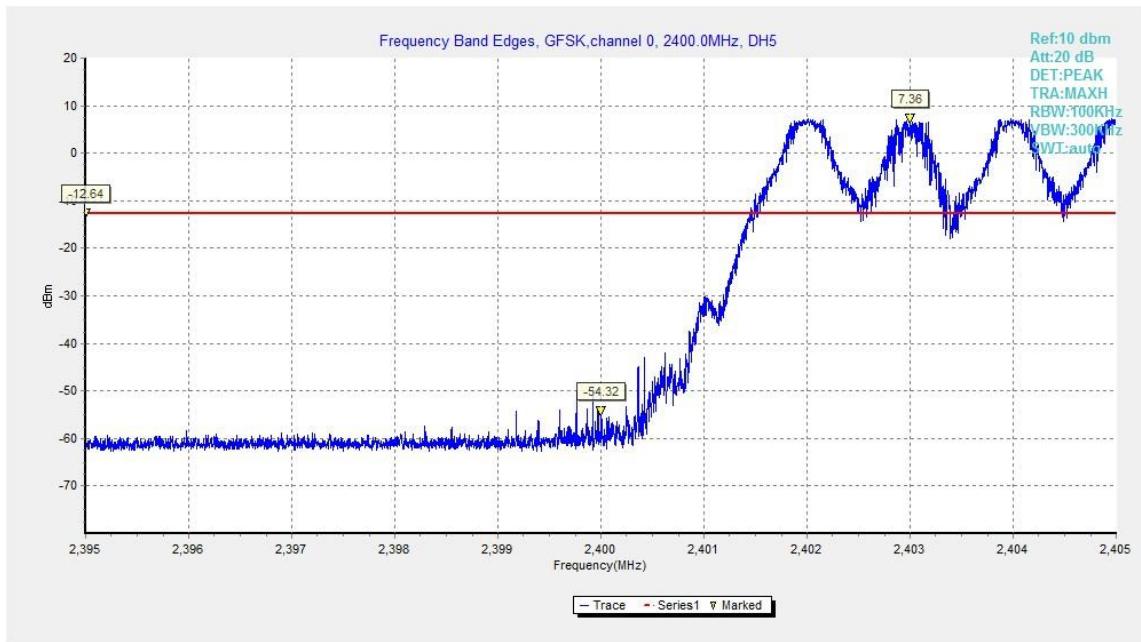


Fig.2. Frequency Band Edges: GFSK, Channel 0, Hopping On

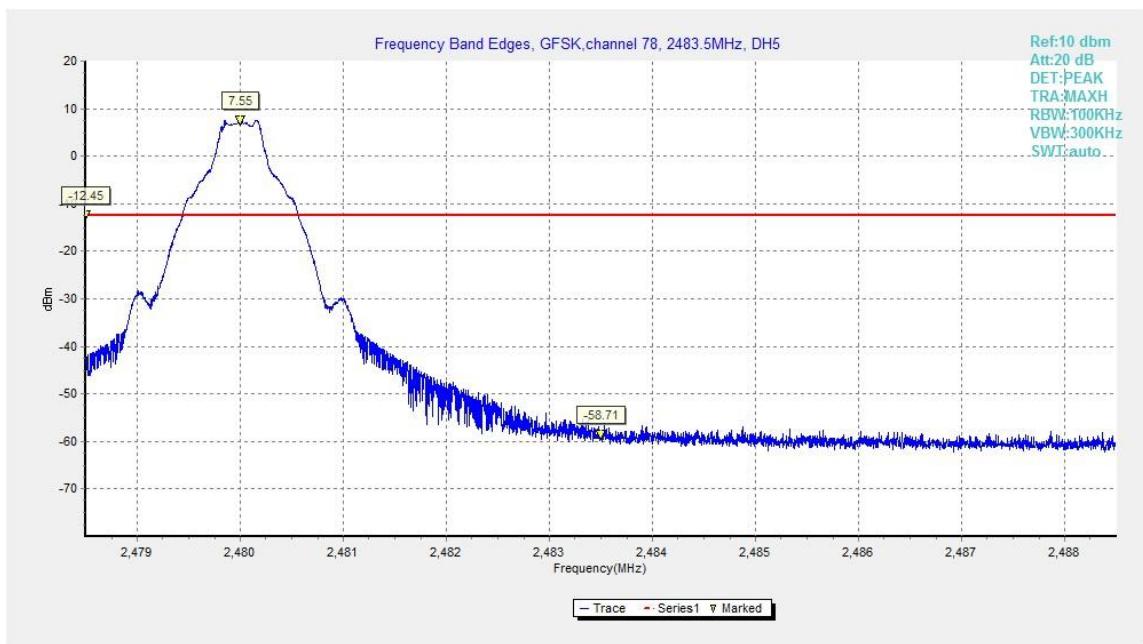


Fig.3. Frequency Band Edges: GFSK, Channel 78, Hopping Off

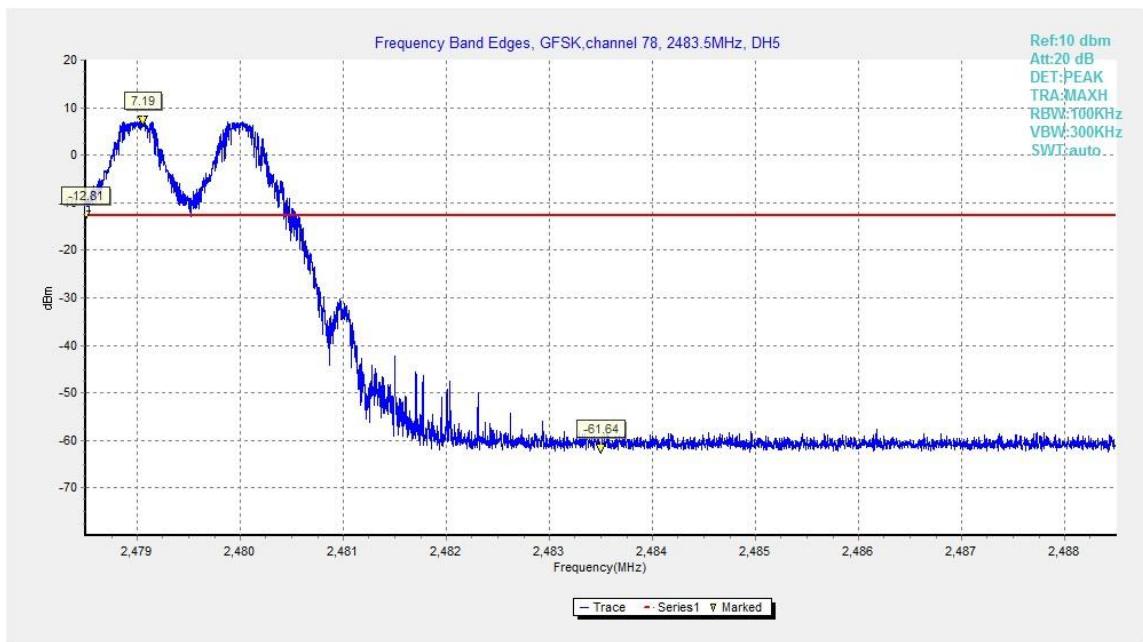


Fig.4. Frequency Band Edges: GFSK, Channel 78, Hopping On

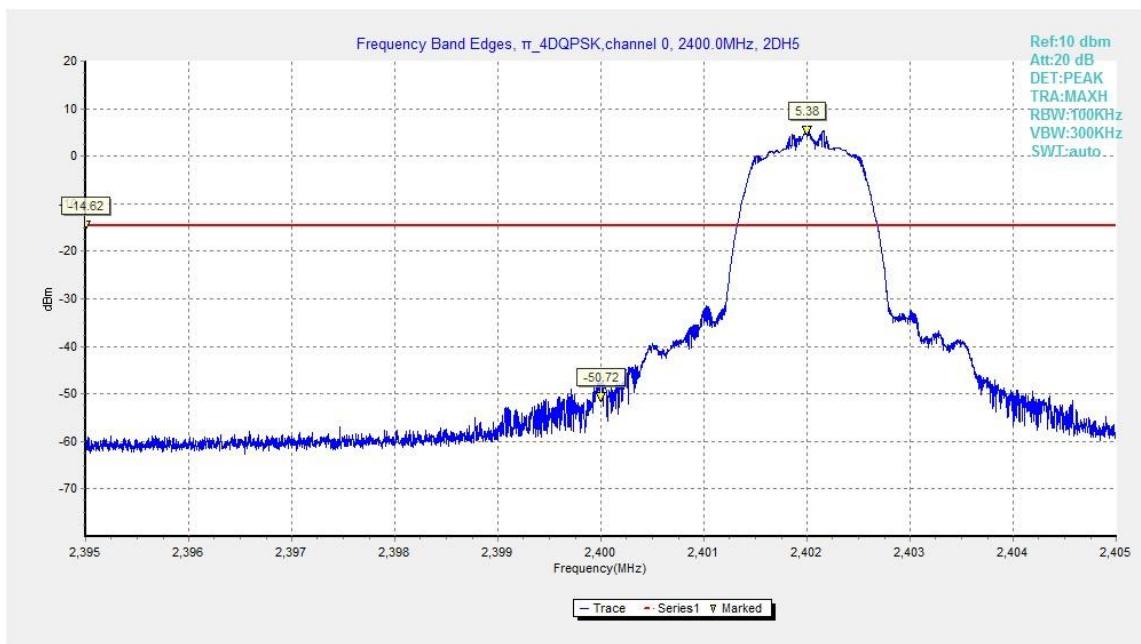


Fig.5. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping Off

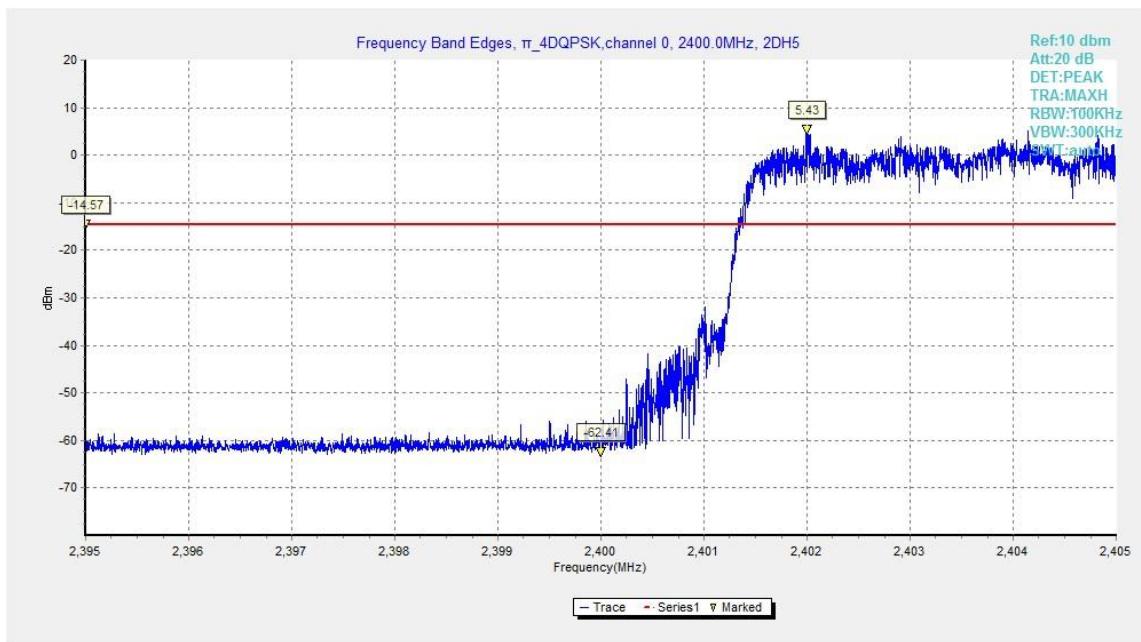


Fig.6. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping On

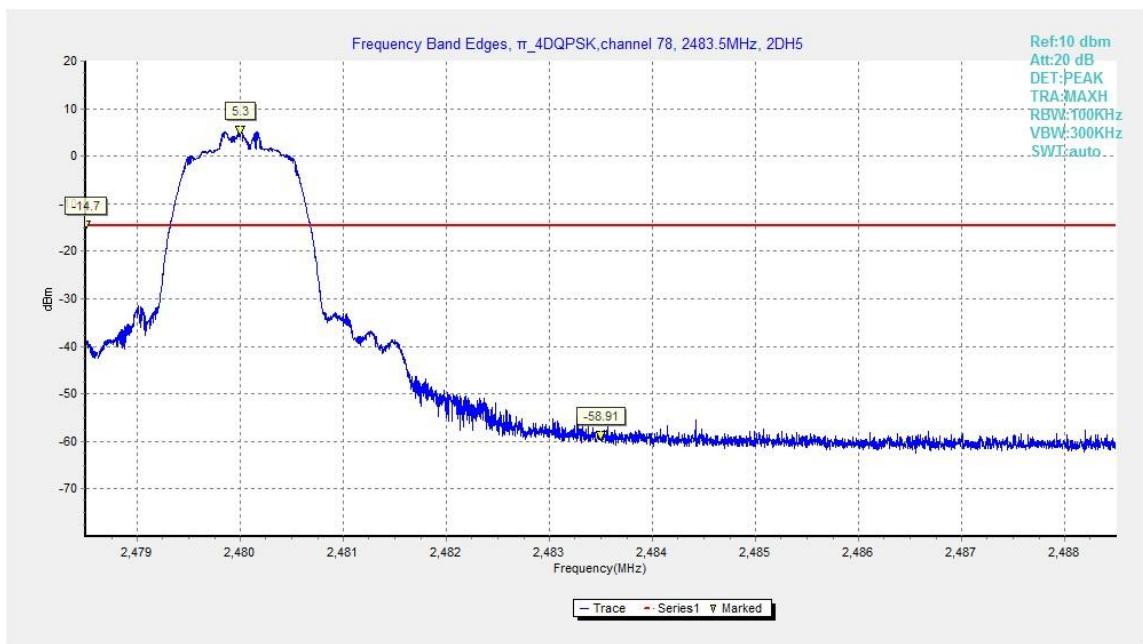


Fig.7. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping Off

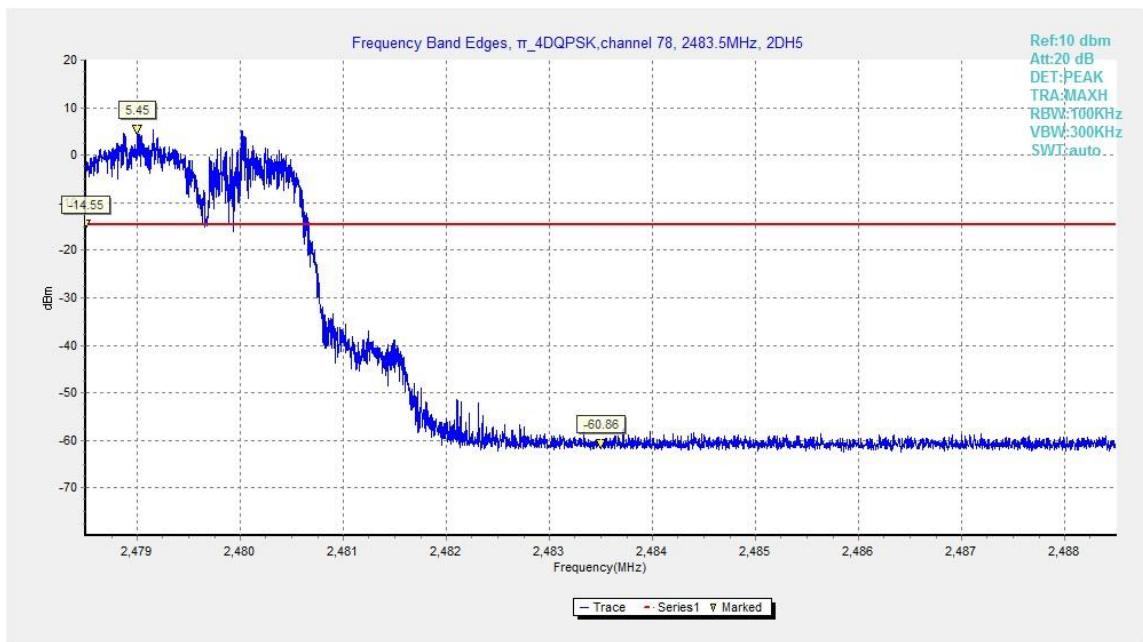


Fig.8. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping On

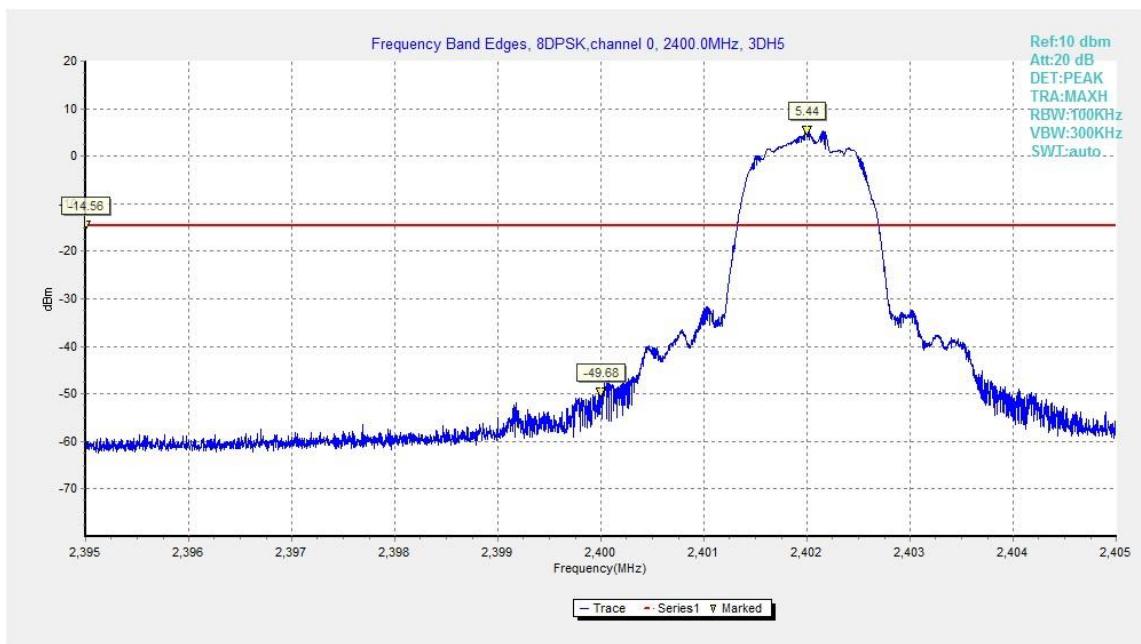


Fig.9. Frequency Band Edges: 8DPSK, Channel 0, Hopping Off

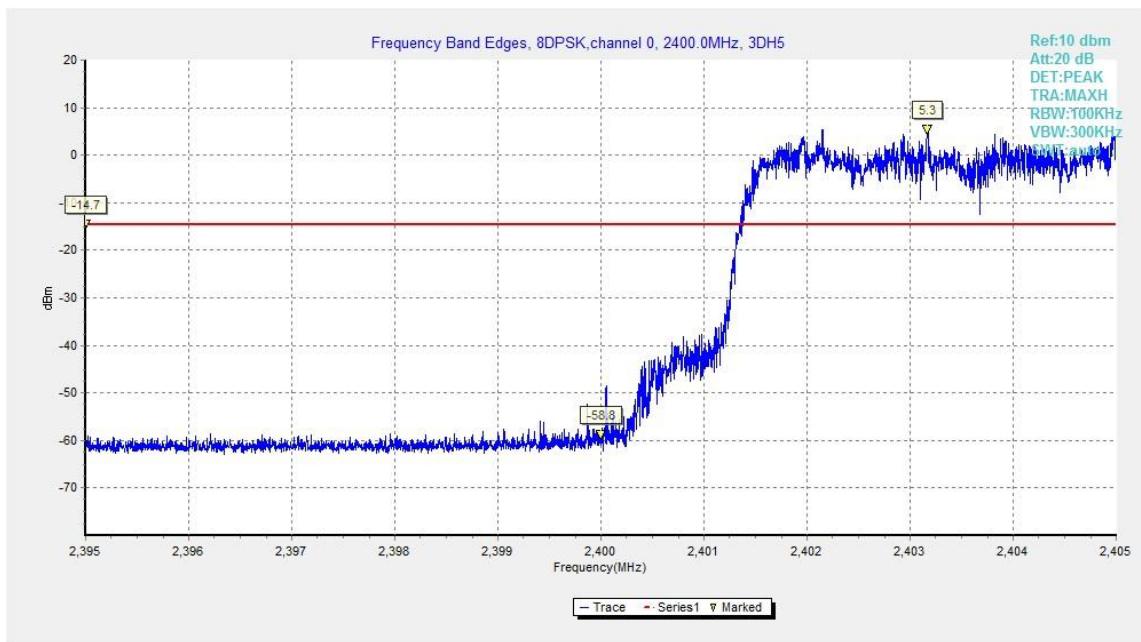


Fig.10. Frequency Band Edges: 8DPSK, Channel 0, Hopping On

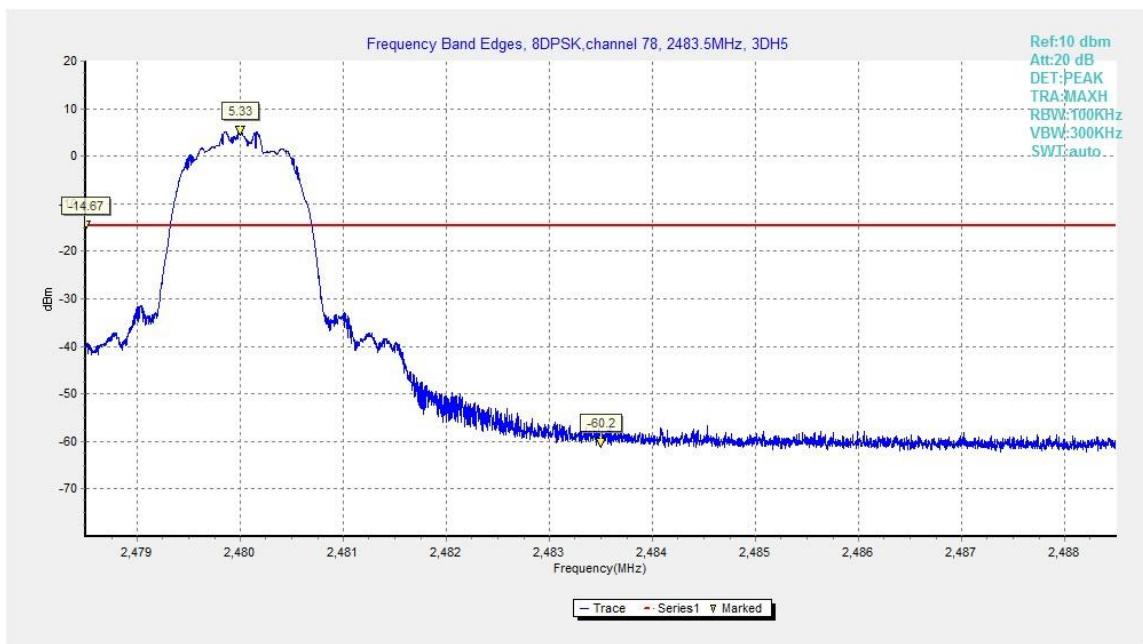


Fig.11. Frequency Band Edges: 8DPSK, Channel 78, Hopping Off

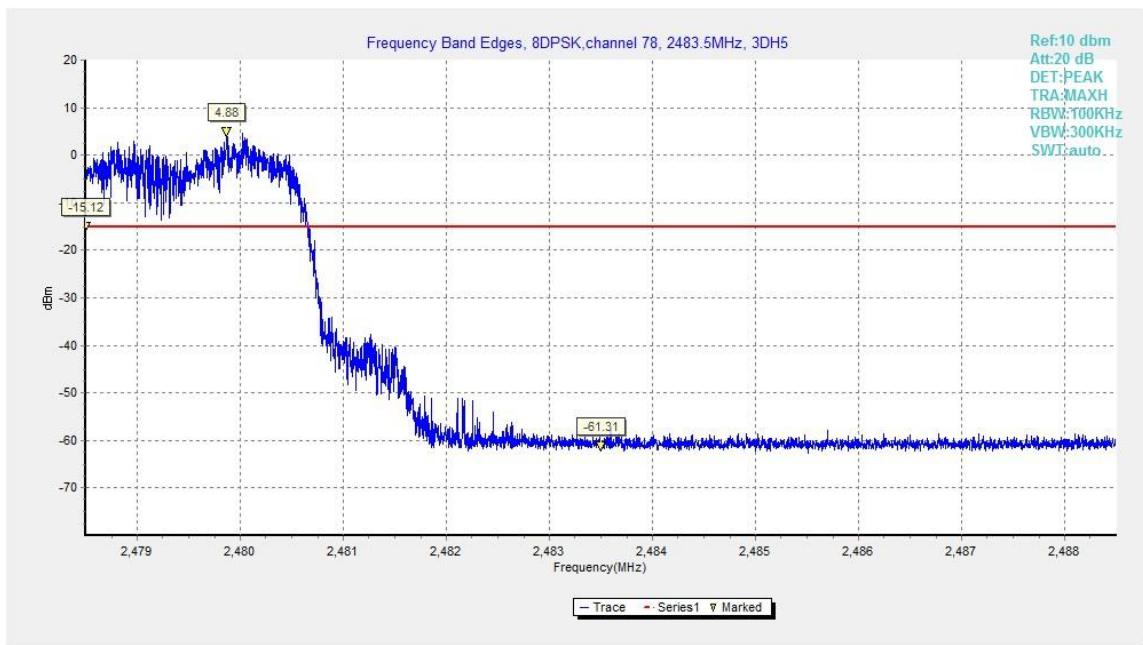


Fig.12. Frequency Band Edges: 8DPSK, Channel 78, Hopping On

#### A.4. Transmitter Spurious Emission - Conducted

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

Measurement Procedure – Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW = 300 kHz.
3. Set the span to 5-30 % greater than the EBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW. Next, determine the power in 100 kHz band segments outside of the authorized frequency band using the following measurement:

Measurement Procedure - Unwanted Emissions

1. Set RBW = 100 kHz.
2. Set VBW = 300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize (this may take some time, depending on the extent of the span).

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified above.

##### **Measurement Limit:**

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

##### **Measurement Results:**

###### **For GFSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0	Center Frequency	Fig.13	P
2402 MHz	30 MHz ~ 1 GHz	Fig.14	P

	1 GHz ~ 3 GHz	Fig.15	P
	3 GHz ~ 10 GHz	Fig.16	P
	10 GHz ~ 26 GHz	Fig.17	P
Ch 39 2441 MHz	Center Frequency	Fig.18	P
	30 MHz ~ 1 GHz	Fig.19	P
	1 GHz ~ 3 GHz	Fig.20	P
	3 GHz ~ 10 GHz	Fig.21	P
	10 GHz ~ 26 GHz	Fig.22	P
Ch 78 2480 MHz	Center Frequency	Fig.23	P
	30 MHz ~ 1 GHz	Fig.24	P
	1 GHz ~ 3 GHz	Fig.25	P
	3 GHz ~ 10 GHz	Fig.26	P
	10 GHz ~ 26 GHz	Fig.27	P

**For π/4 DQPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	Center Frequency	Fig.28	P
	30 MHz ~ 1 GHz	Fig.29	P
	1 GHz ~ 3 GHz	Fig.30	P
	3 GHz ~ 10 GHz	Fig.31	P
	10 GHz ~ 26 GHz	Fig.32	P
Ch 39 2441 MHz	Center Frequency	Fig.33	P
	30 MHz ~ 1 GHz	Fig.34	P
	1 GHz ~ 3 GHz	Fig.35	P
	3 GHz ~ 10 GHz	Fig.36	P
	10 GHz ~ 26 GHz	Fig.37	P
Ch 78 2480 MHz	Center Frequency	Fig.38	P
	30 MHz ~ 1 GHz	Fig.39	P
	1 GHz ~ 3 GHz	Fig.40	P
	3 GHz ~ 10 GHz	Fig.41	P
	10 GHz ~ 26 GHz	Fig.42	P

**For 8DPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	Center Frequency	Fig.43	P
	30 MHz ~ 1 GHz	Fig.44	P
	1 GHz ~ 3 GHz	Fig.45	P
	3 GHz ~ 10 GHz	Fig.46	P
	10 GHz ~ 26 GHz	Fig.47	P
Ch 39	Center Frequency	Fig.48	P

2441 MHz	30 MHz ~ 1 GHz	Fig.49	P
	1 GHz ~ 3 GHz	Fig.50	P
	3 GHz ~ 10 GHz	Fig.51	P
	10 GHz ~ 26 GHz	Fig.52	P
Ch 78 2480 MHz	Center Frequency	Fig.53	P
	30 MHz ~ 1 GHz	Fig.54	P
	1 GHz ~ 3 GHz	Fig.55	P
	3 GHz ~ 10 GHz	Fig.56	P
	10 GHz ~ 26 GHz	Fig.57	P

**Conclusion: PASS**

**Test graphs as below**

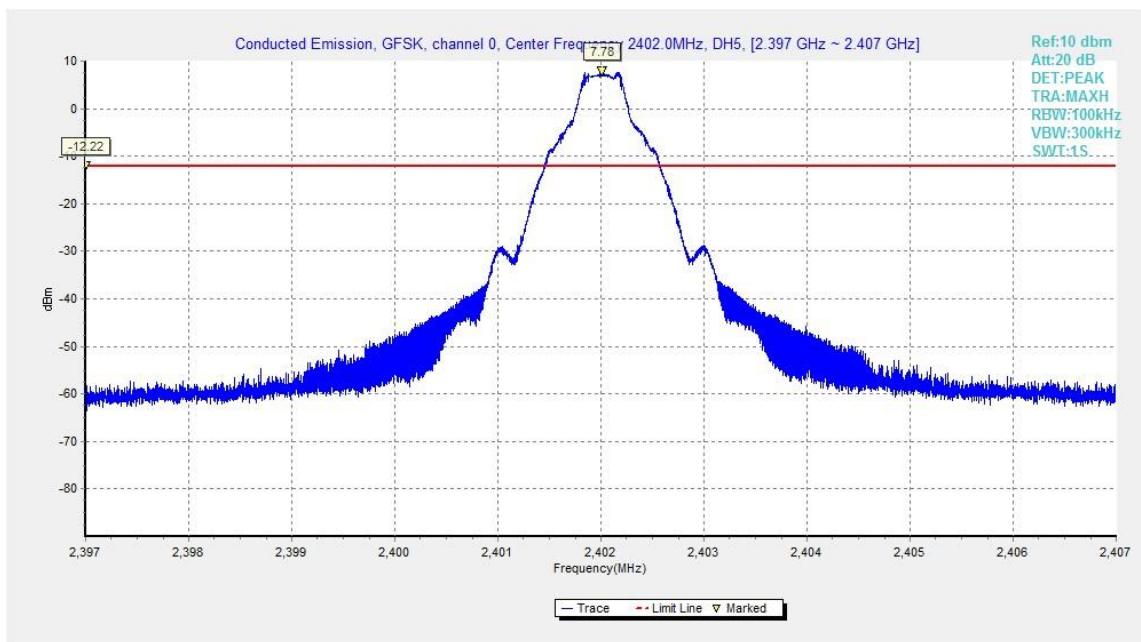


Fig.13. Conducted spurious emission: GFSK, Channel 0,2402MHz

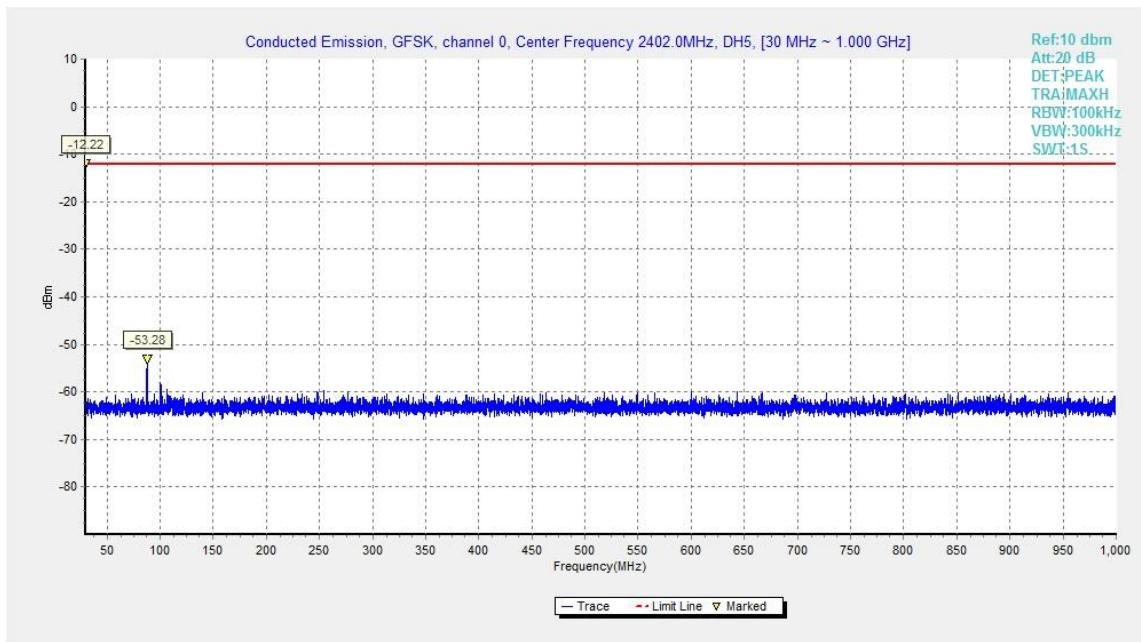


Fig.14. Conducted spurious emission: GFSK, Channel 0, 30MHz - 1GHz

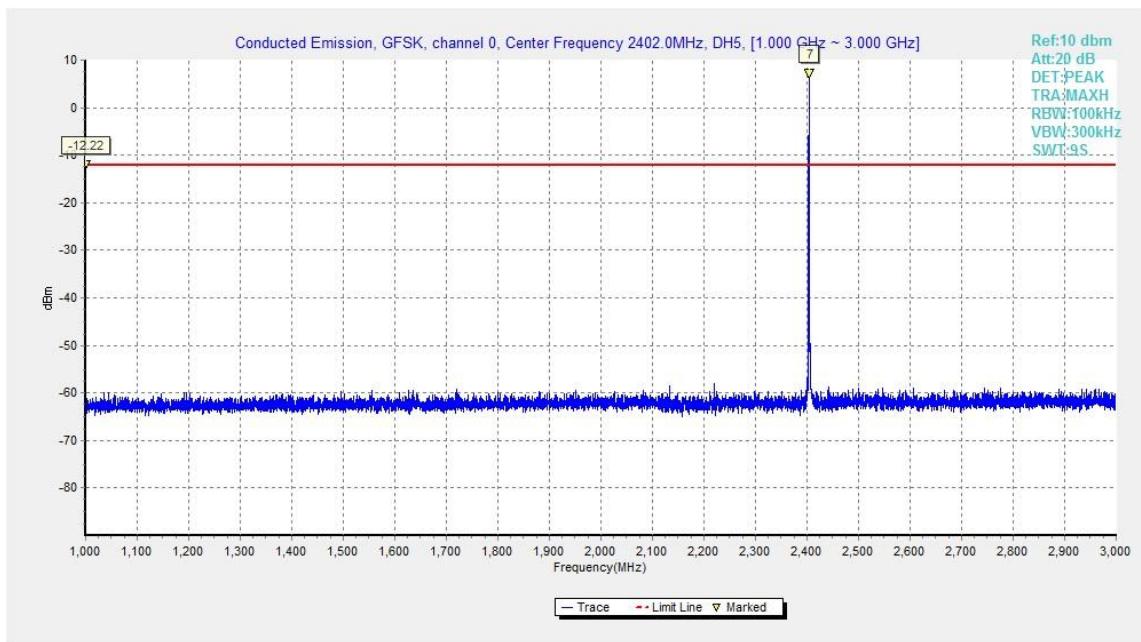


Fig.15. Conducted spurious emission: GFSK, Channel 0, 1GHz - 3GHz

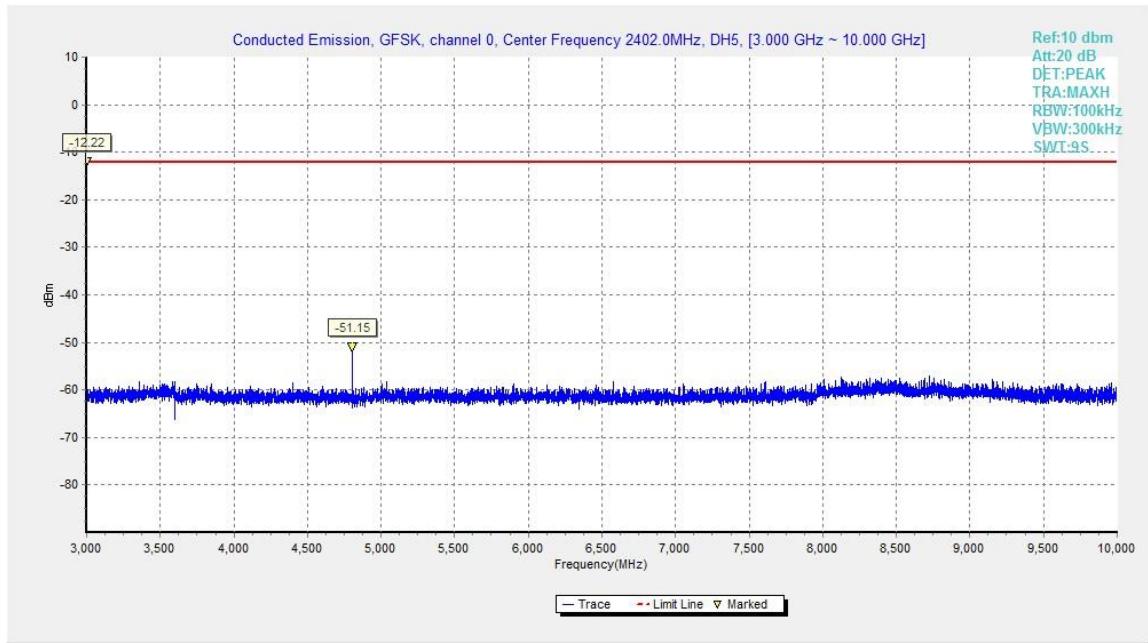


Fig.16. Conducted spurious emission: GFSK, Channel 0, 3GHz - 10GHz

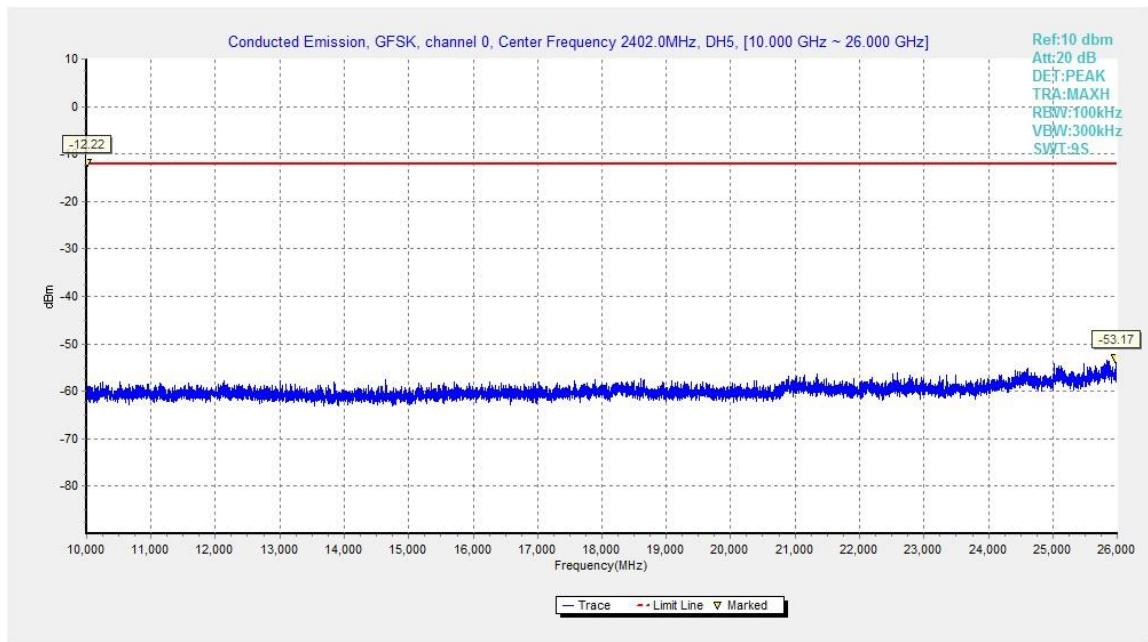


Fig.17. Conducted spurious emission: GFSK, Channel 0, 10GHz - 26GHz

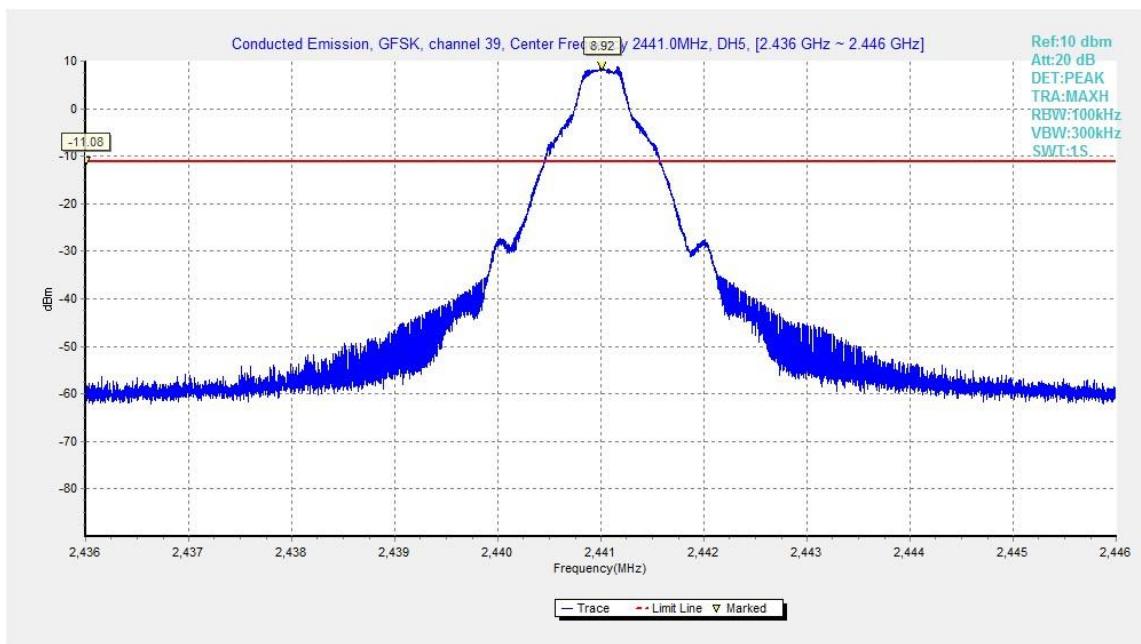


Fig.18. Conducted spurious emission: GFSK, Channel 39, 2441MHz

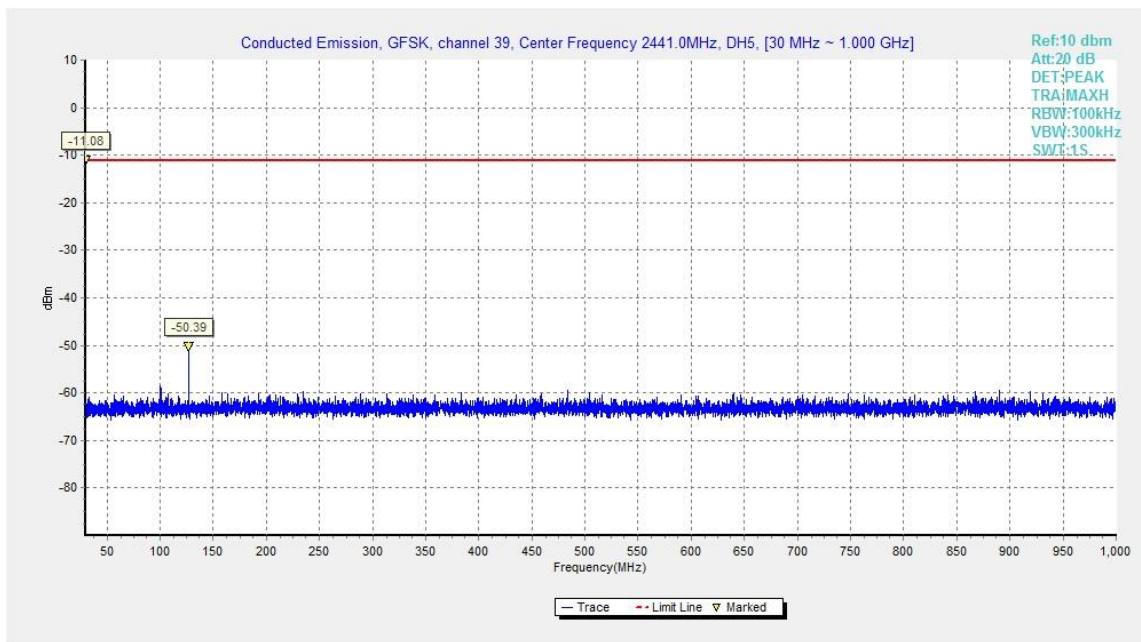


Fig.19. Conducted spurious emission: GFSK, Channel 39, 30MHz - 1GHz

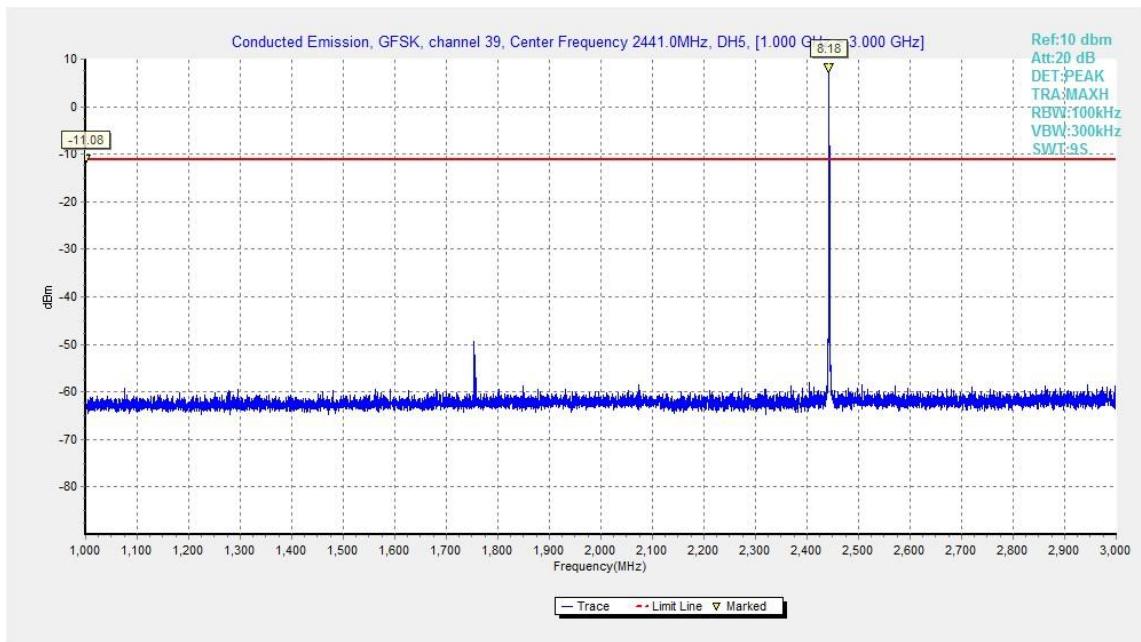


Fig.20. Conducted spurious emission: GFSK, Channel 39, 1GHz – 3GHz

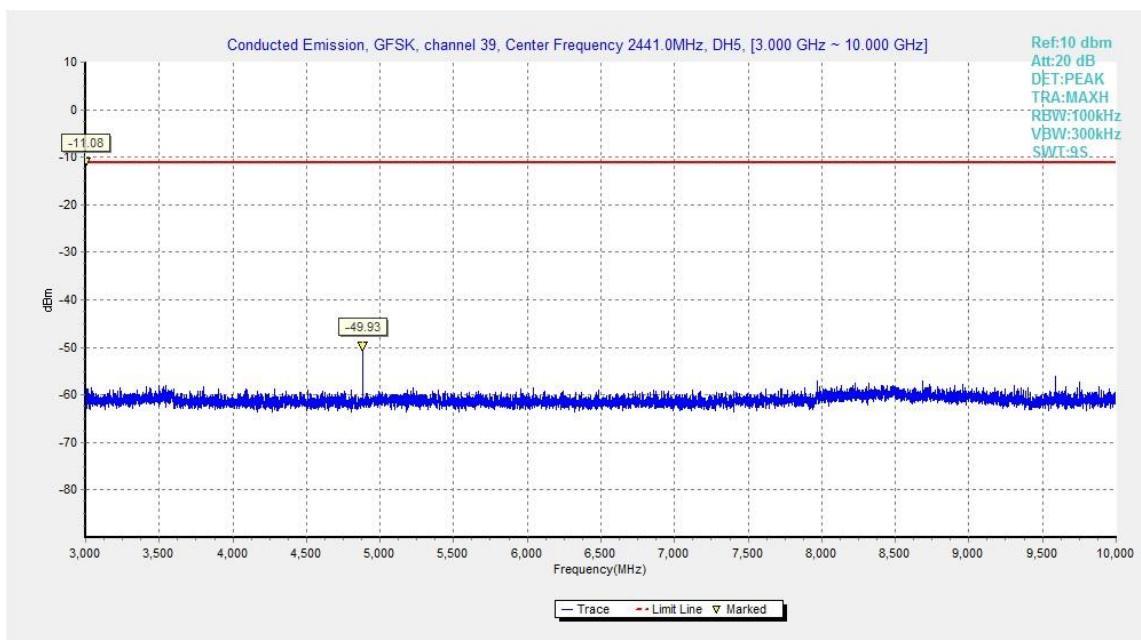


Fig.21. Conducted spurious emission: GFSK, Channel 39, 3GHz – 10GHz

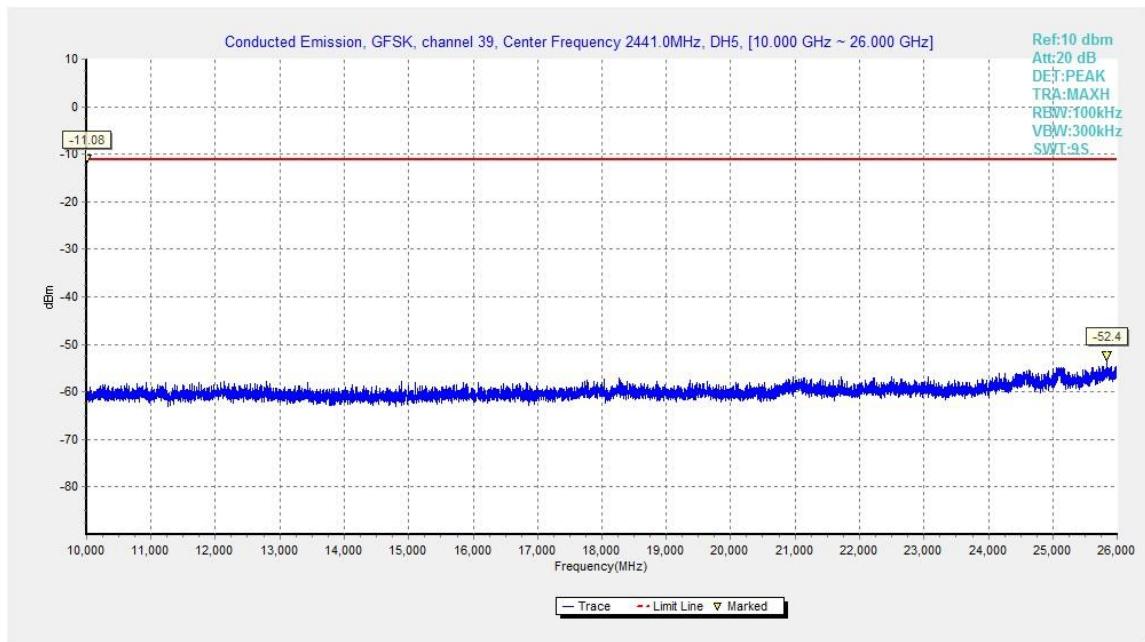


Fig.22. Conducted spurious emission: GFSK, Channel 39, 10GHz – 26GHz

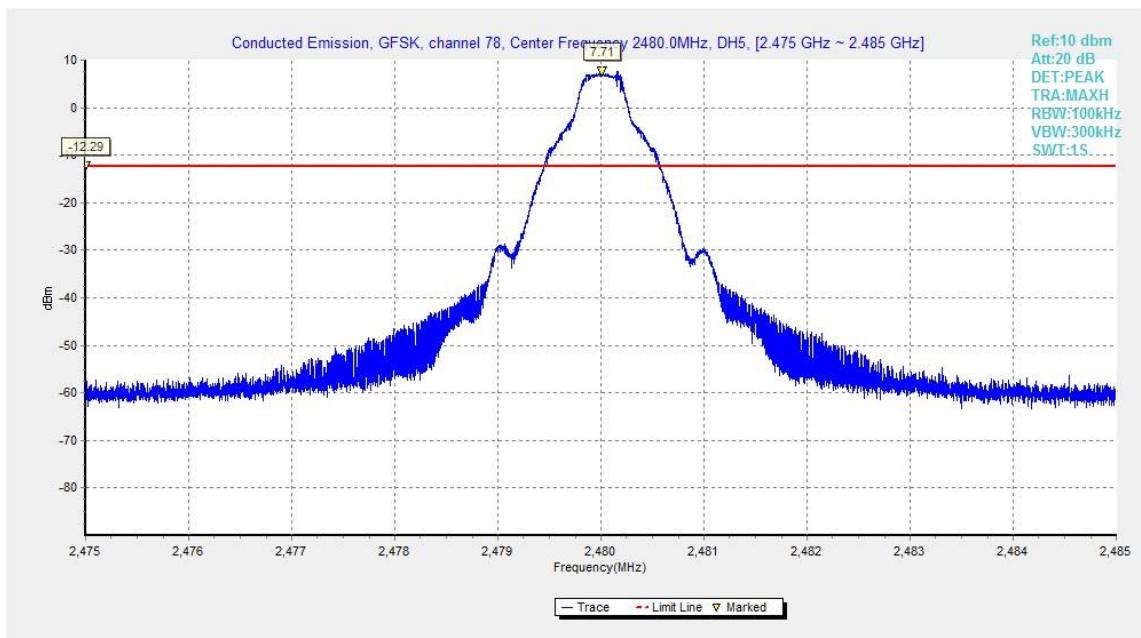


Fig.23. Conducted spurious emission: GFSK, Channel 78, 2480MHz

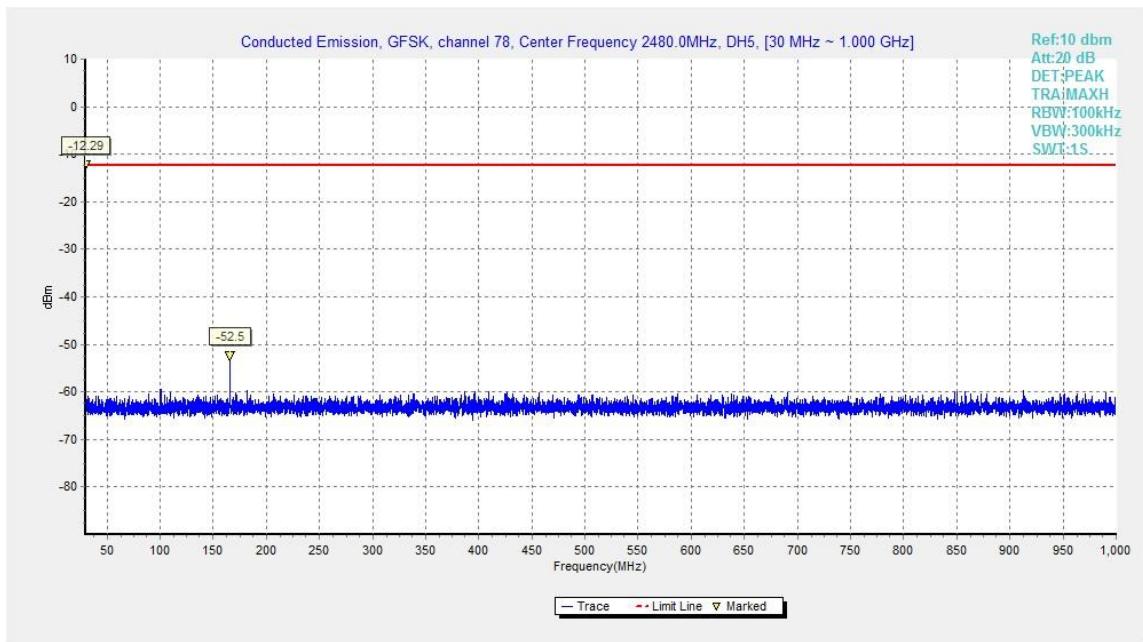


Fig.24. Conducted spurious emission: GFSK, Channel 78, 30MHz - 1GHz

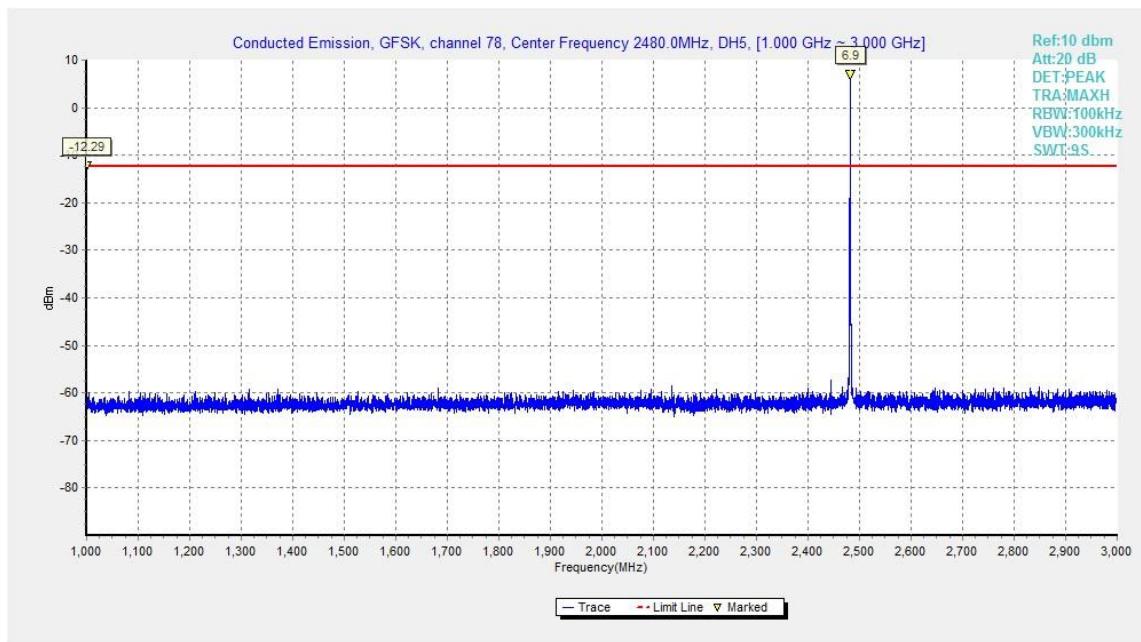


Fig.25. Conducted spurious emission: GFSK, Channel 78, 1GHz - 3GHz

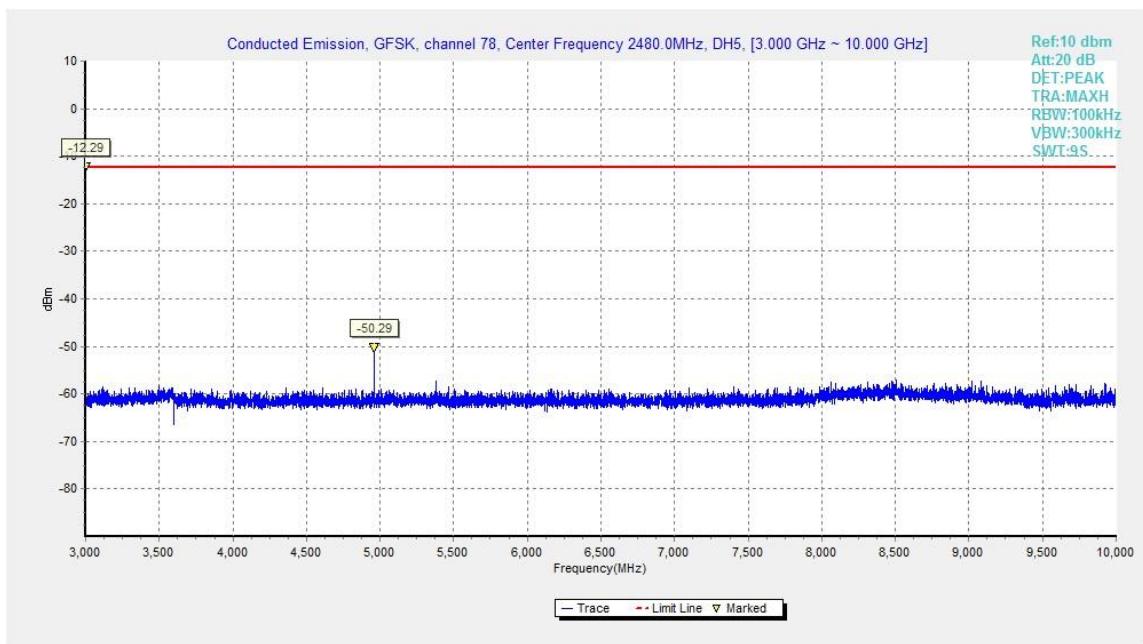


Fig.26. Conducted spurious emission: GFSK, Channel 78, 3GHz - 10GHz

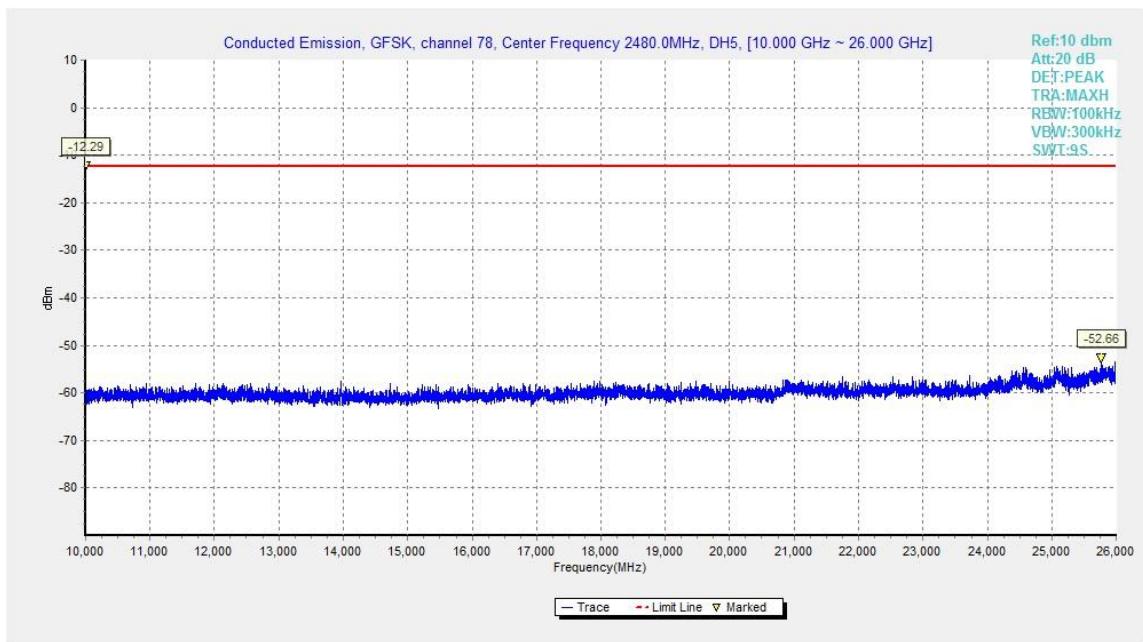


Fig.27. Conducted spurious emission: GFSK, Channel 78, 10GHz - 26GHz

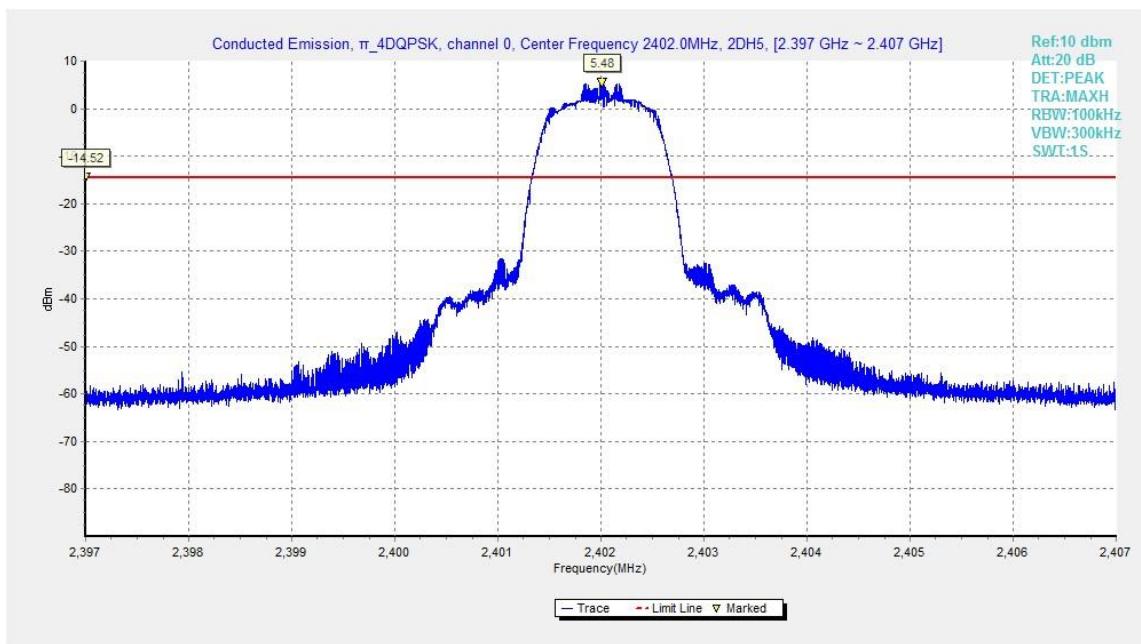


Fig.28. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 2402MHz

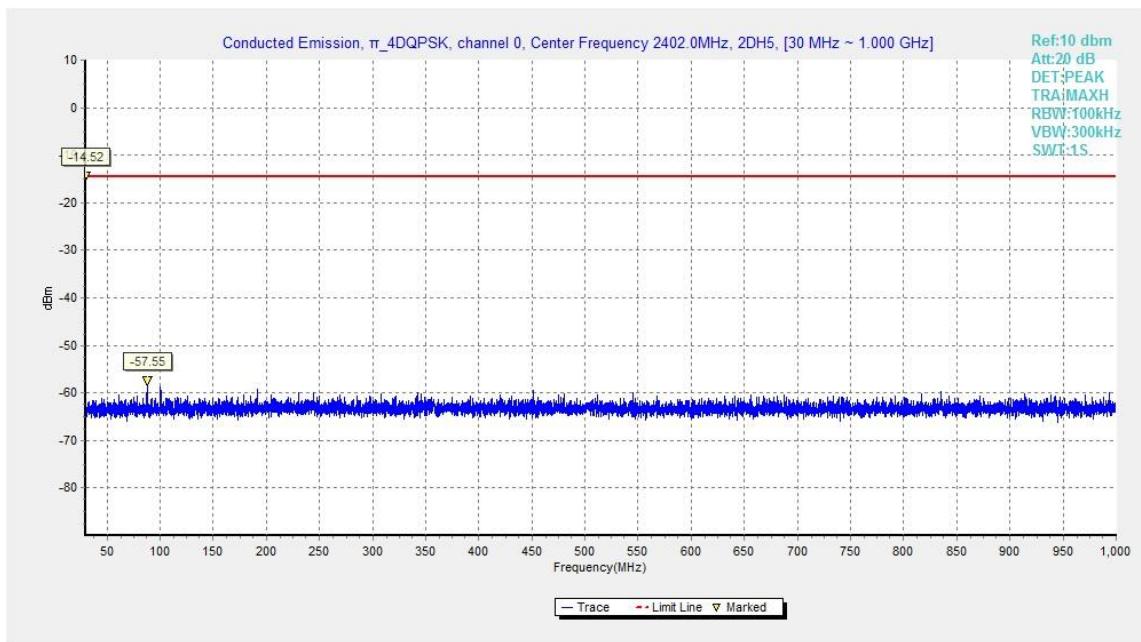


Fig.29. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 30MHz - 1GHz

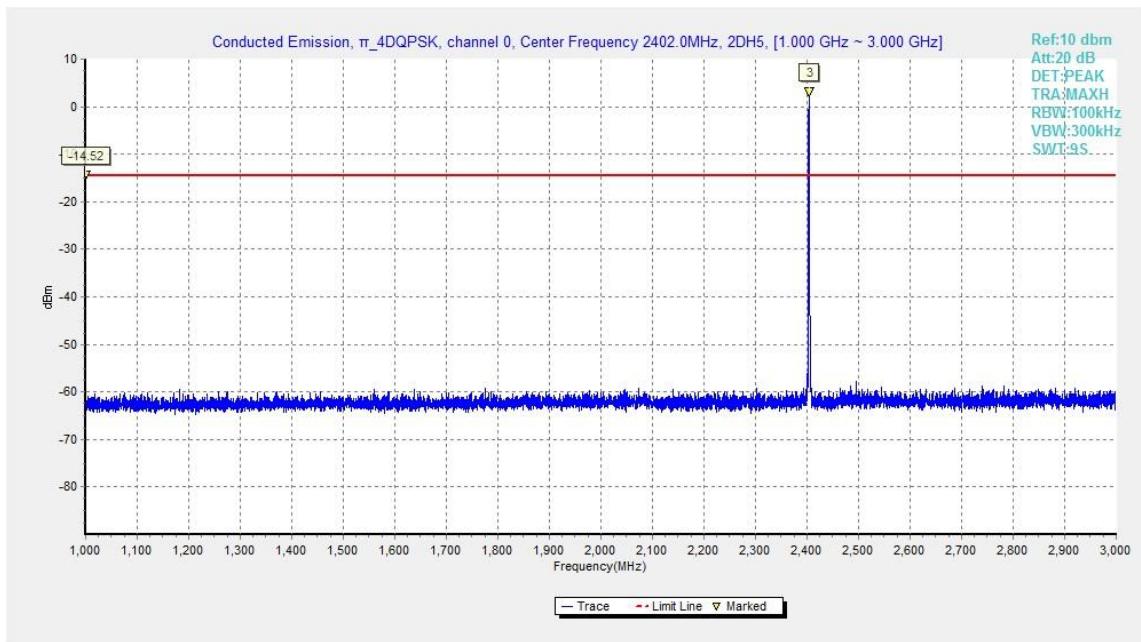


Fig.30. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 1GHz - 3GHz

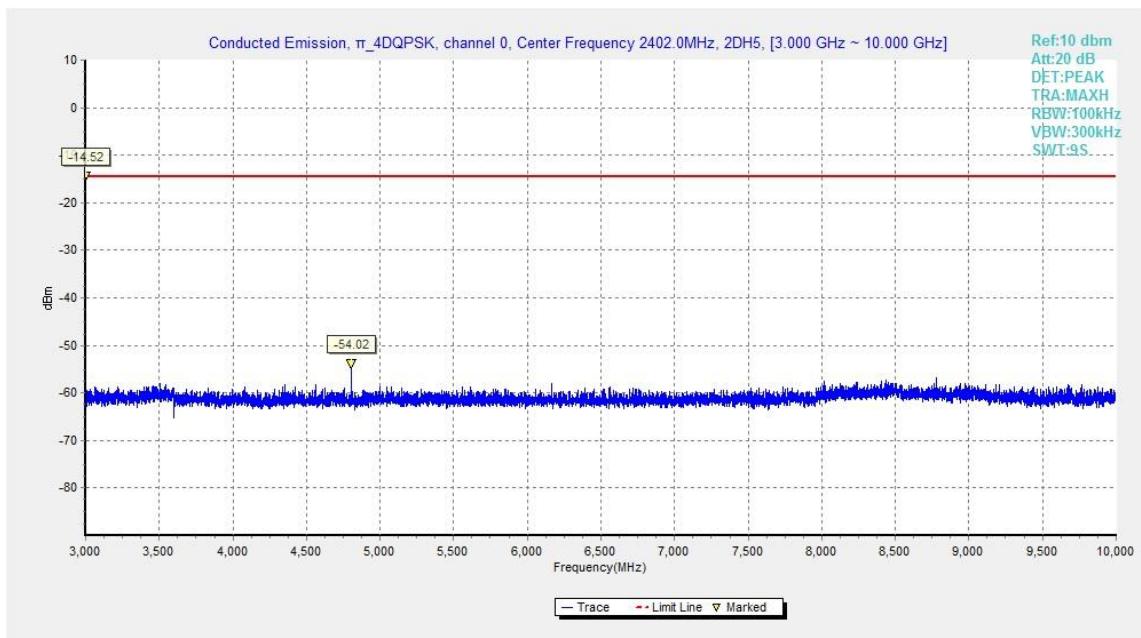


Fig.31. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 3GHz - 10GHz

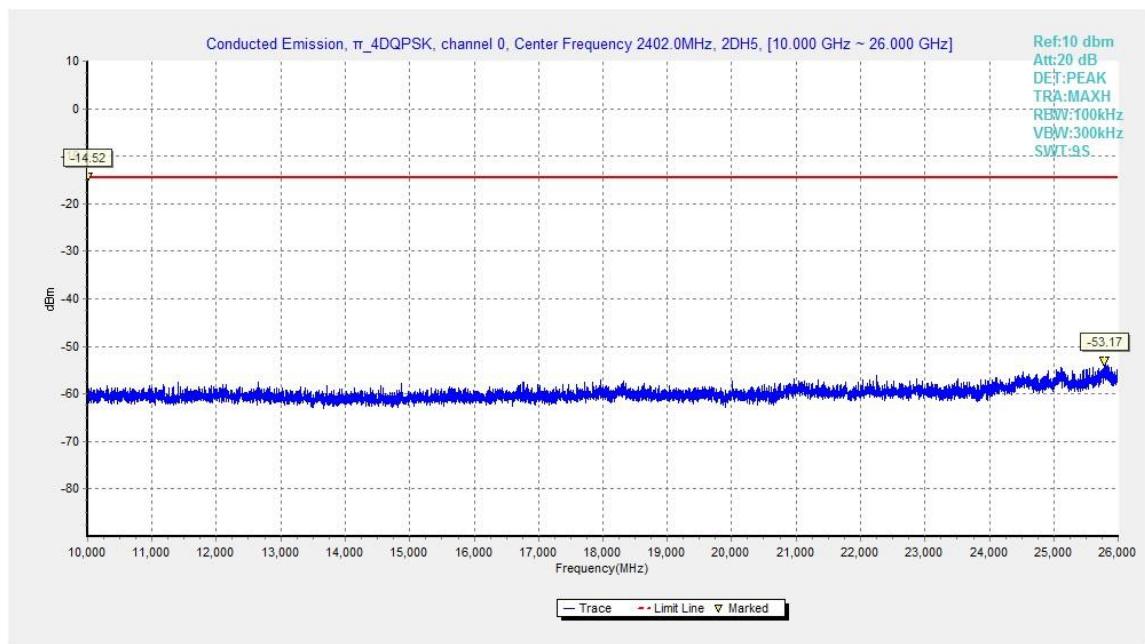


Fig.32. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 10GHz - 26GHz

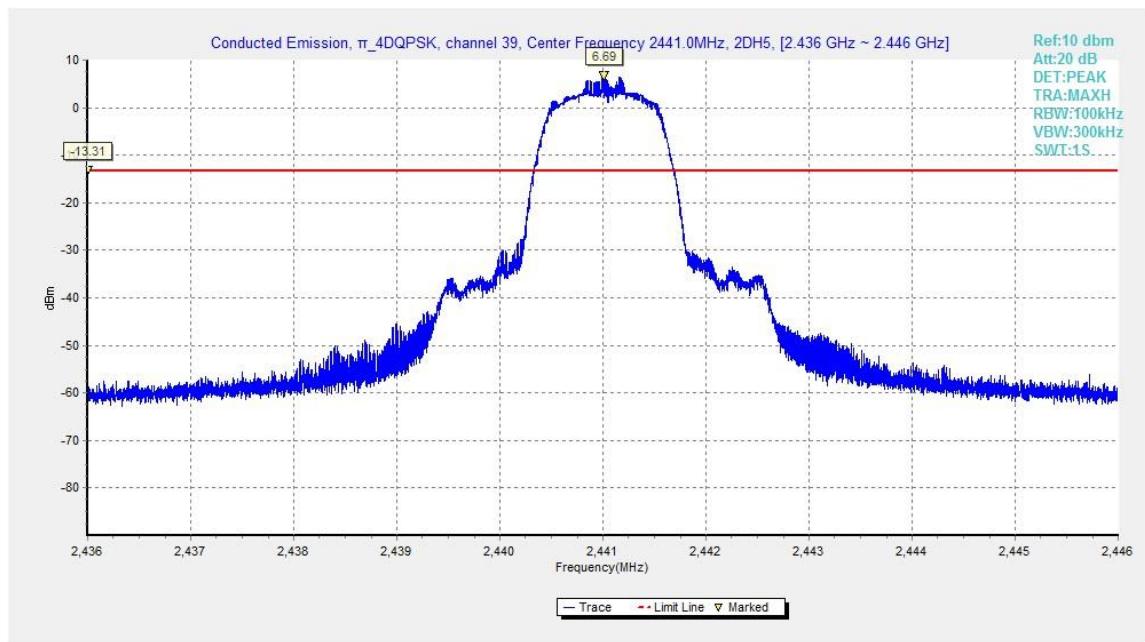


Fig.33. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 2441MHz

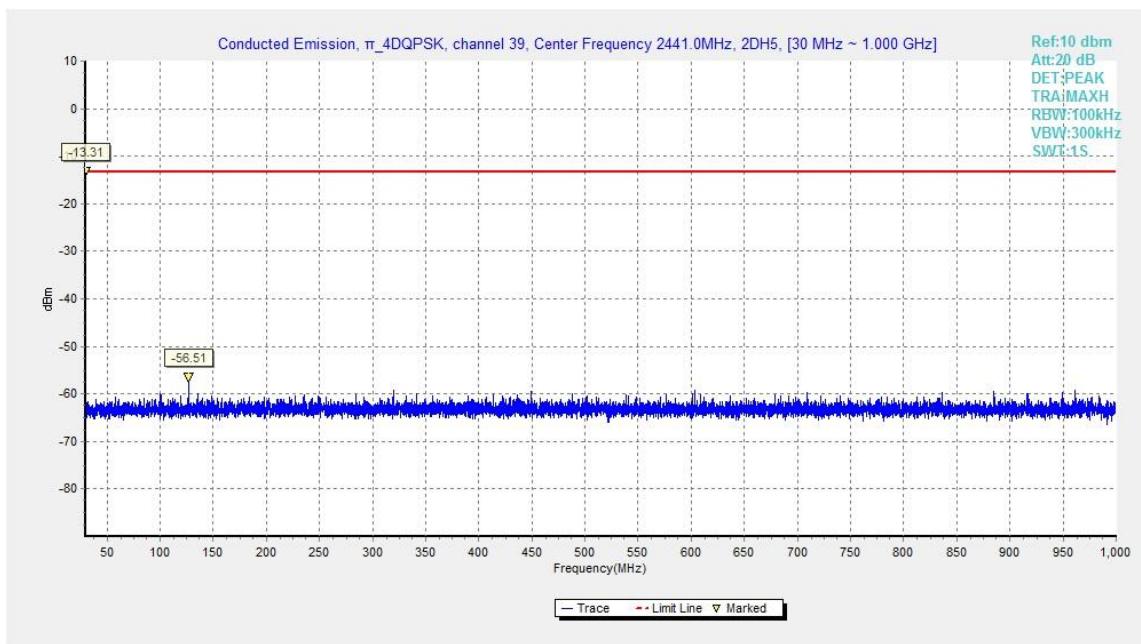


Fig.34. Conducted spurious emission: π/4 DQPSK, Channel 39, 30MHz - 1GHz

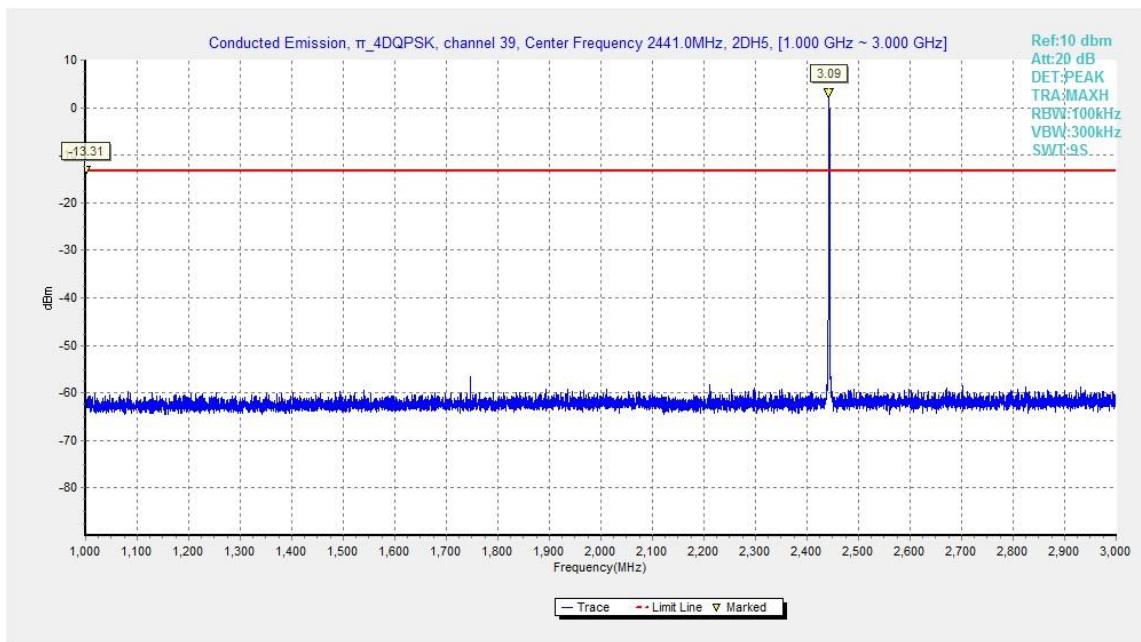


Fig.35. Conducted spurious emission: π/4 DQPSK, Channel 39, 1GHz - 3GHz

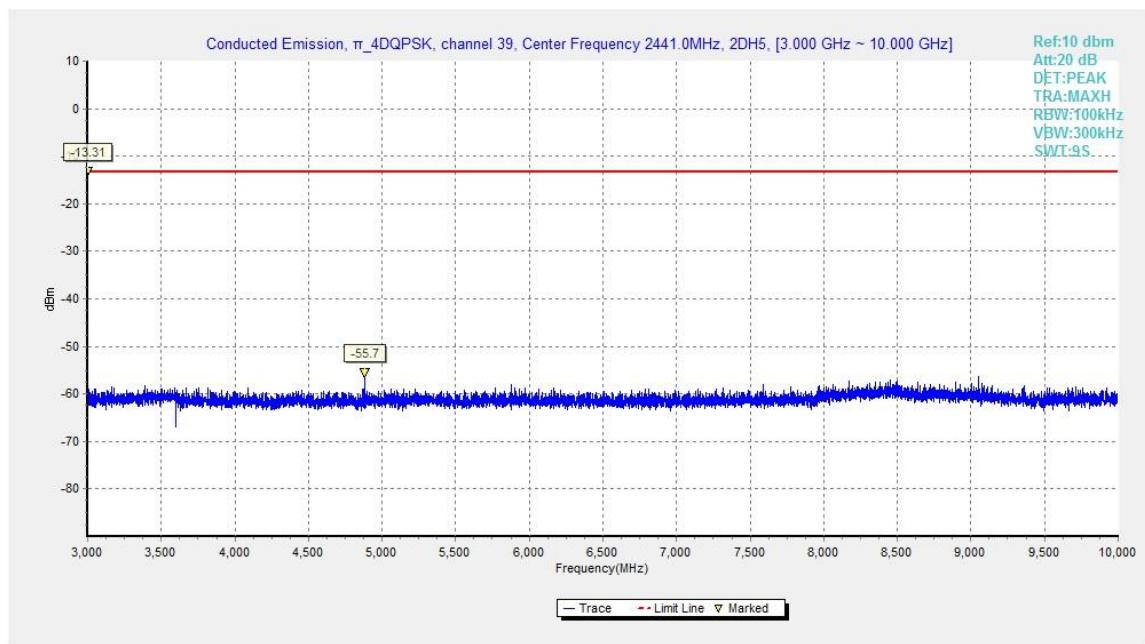


Fig.36. Conducted spurious emission: π/4 DQPSK, Channel 39, 3GHz - 10GHz

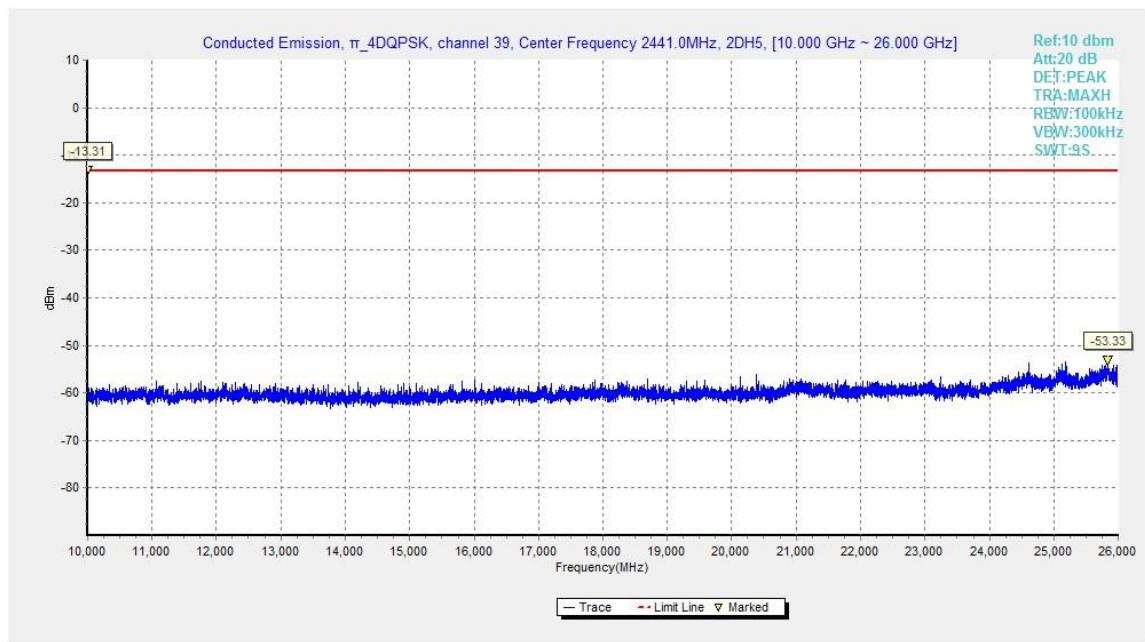


Fig.37. Conducted spurious emission: π/4 DQPSK, Channel 39, 10GHz – 26GHz

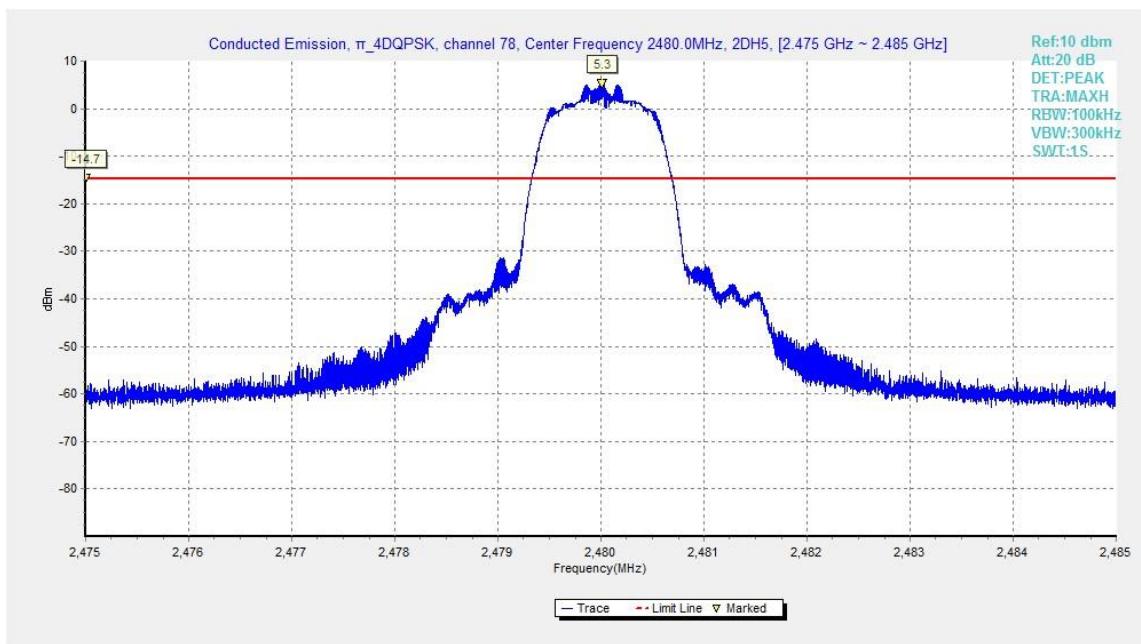


Fig.38. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 2480MHz

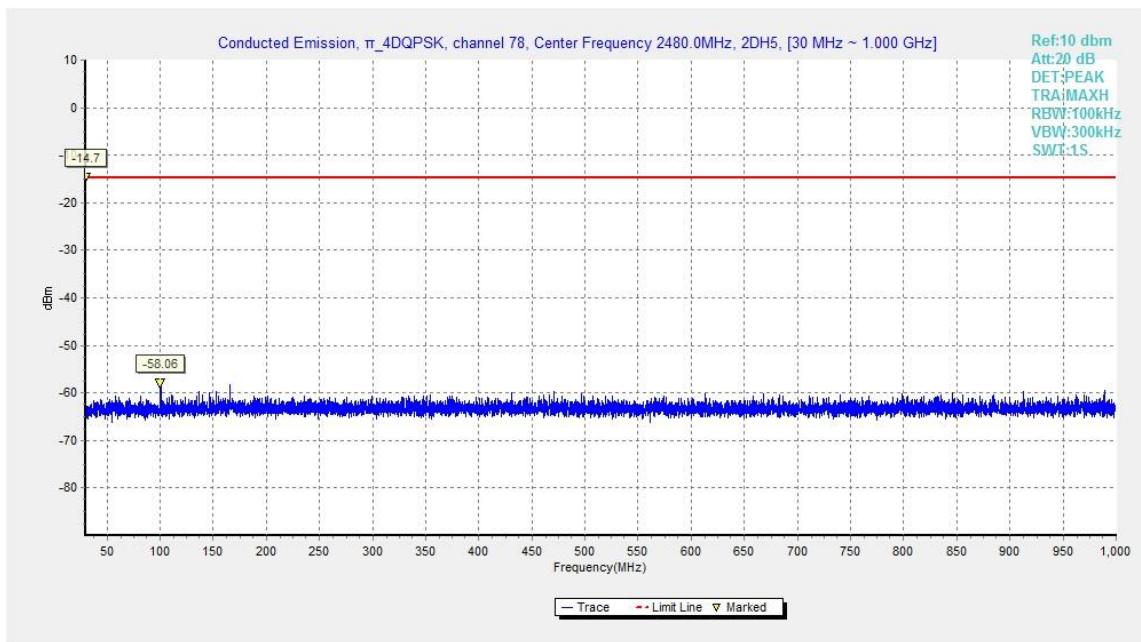


Fig.39. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 30MHz - 1GHz

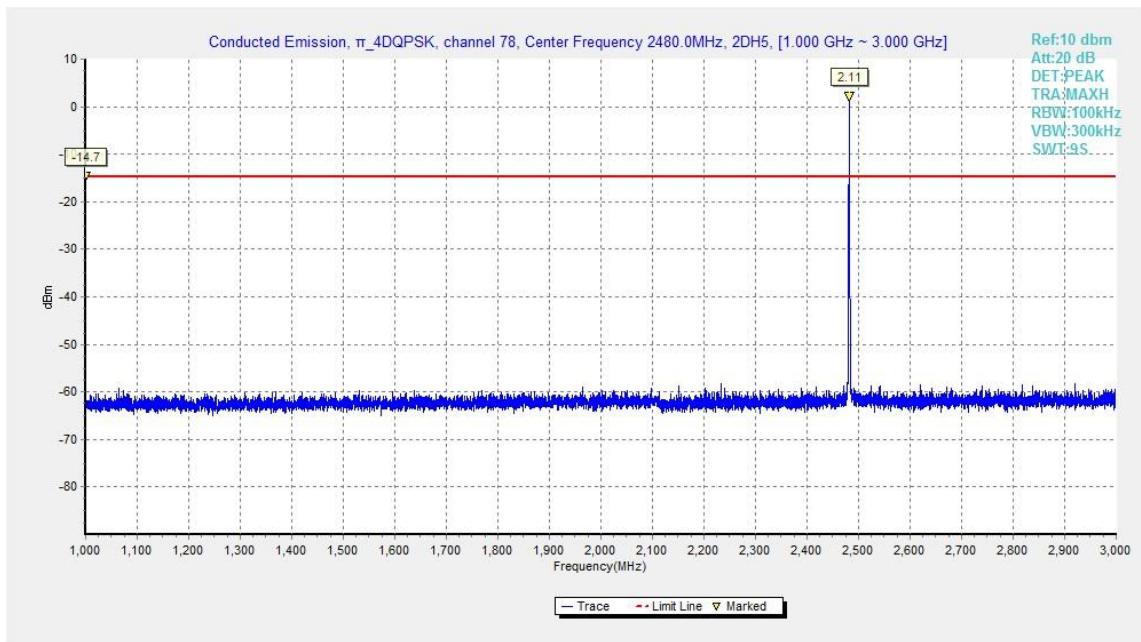


Fig.40. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 1GHz - 3GHz

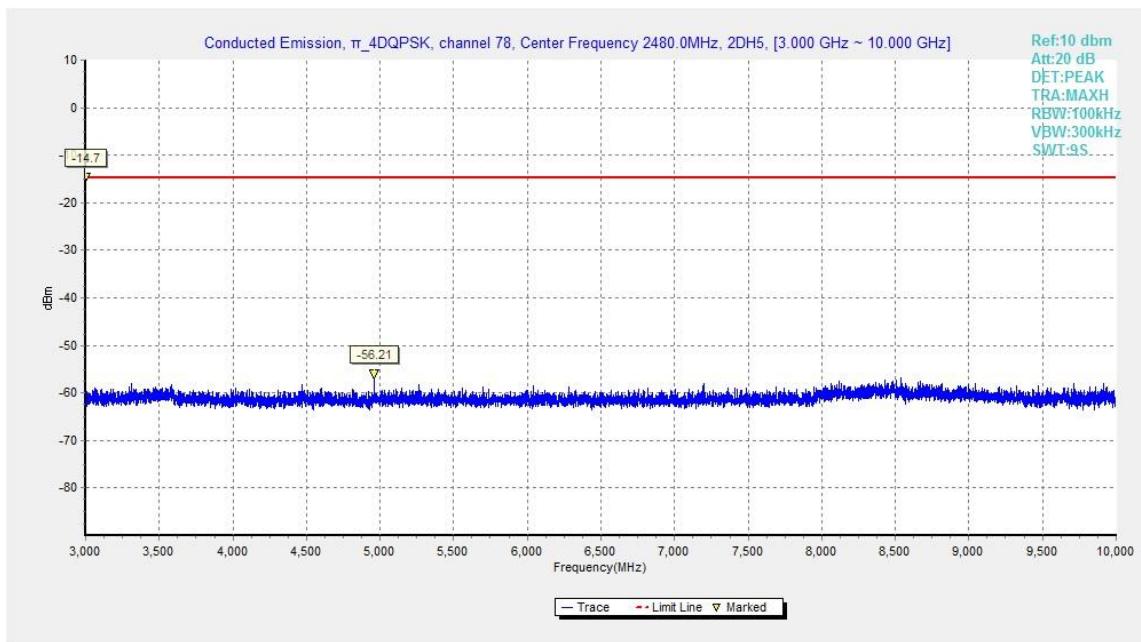


Fig.41. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 3GHz - 10GHz

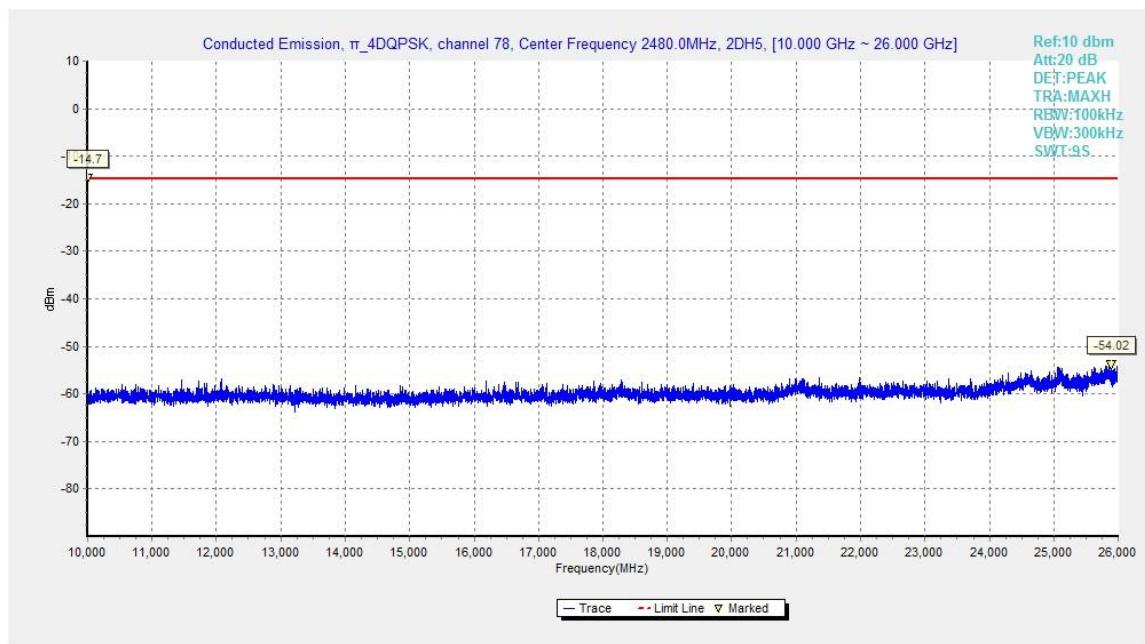


Fig.42. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 10GHz - 26GHz

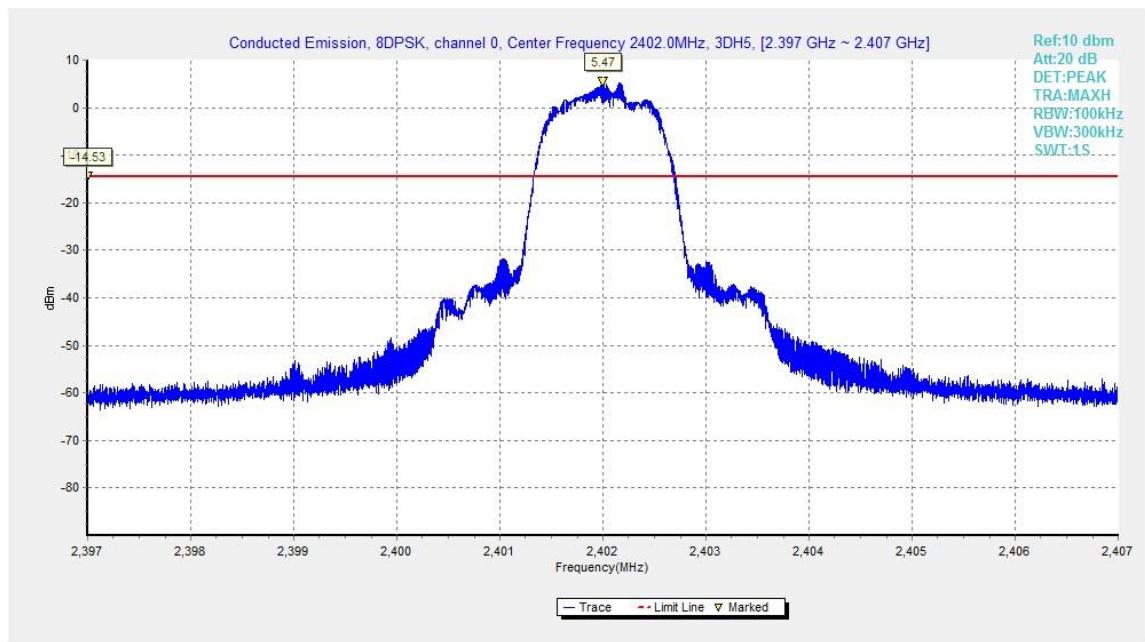


Fig.43. Conducted spurious emission: 8DPSK, Channel 0, 2402MHz

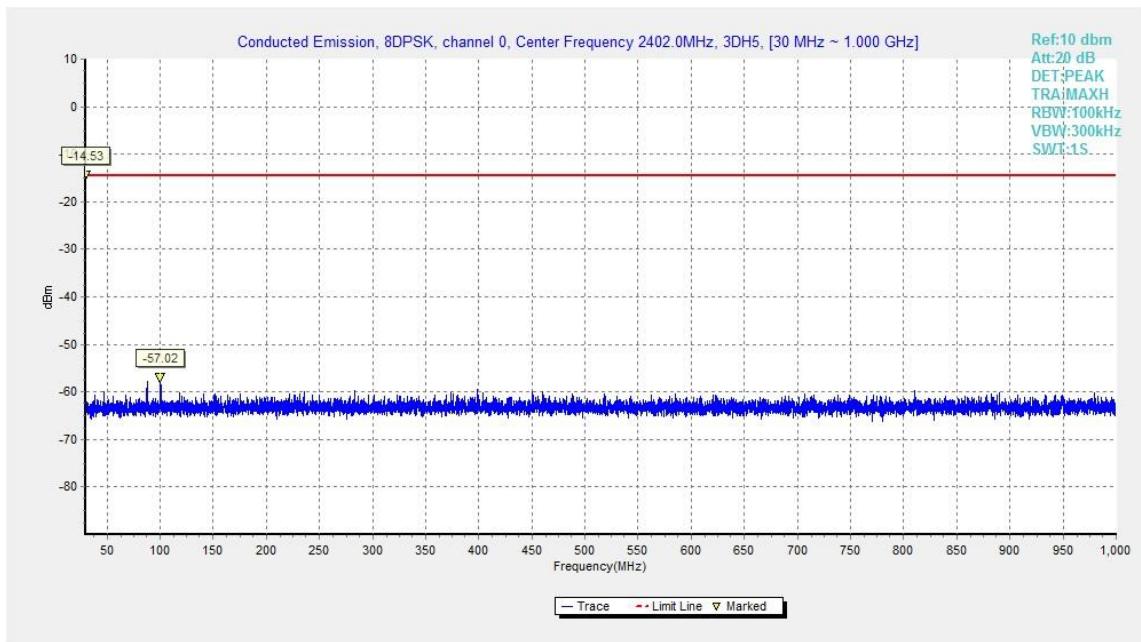


Fig.44. Conducted spurious emission: 8DPSK, Channel 0, 30MHz - 1GHz

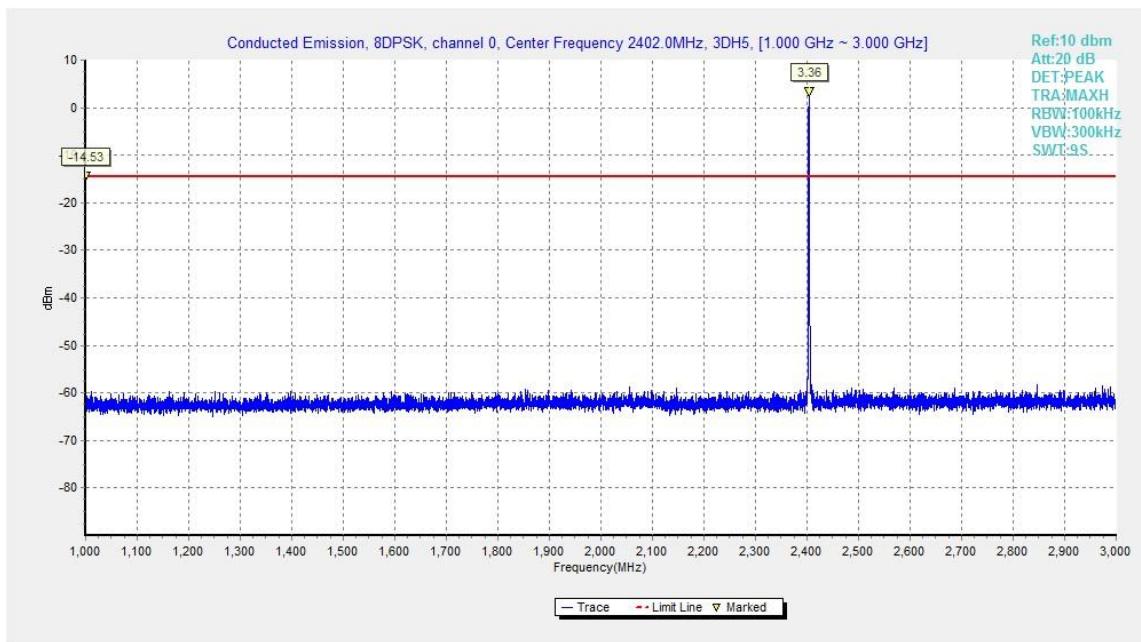


Fig.45. Conducted spurious emission: 8DPSK, Channel 0, 1GHz - 3GHz

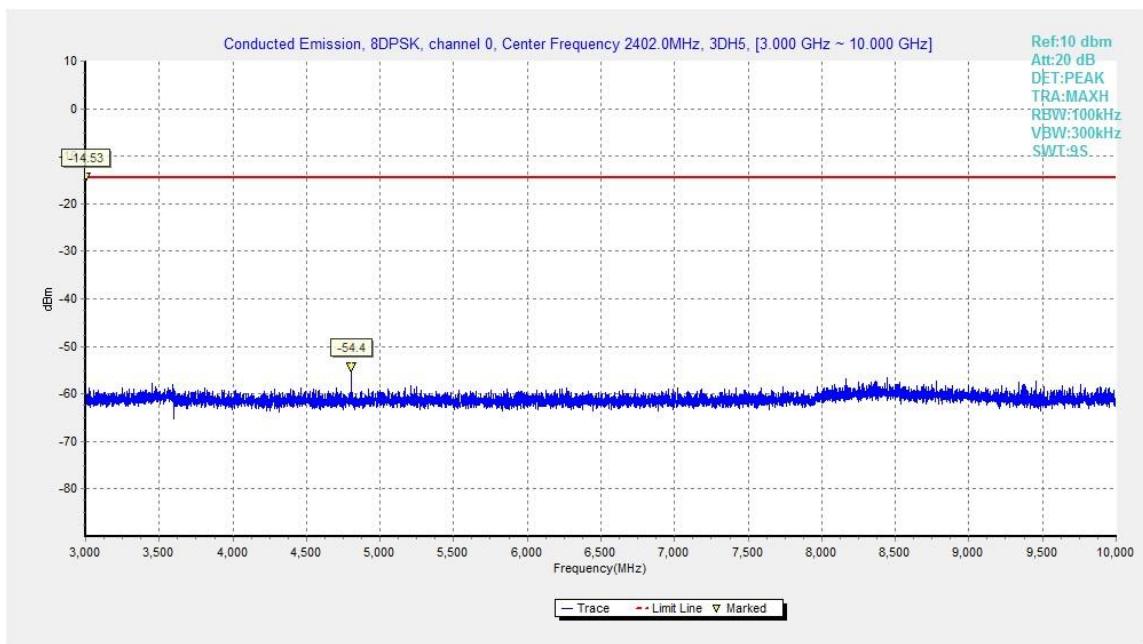


Fig.46. Conducted spurious emission: 8DPSK, Channel 0, 3GHz - 10GHz

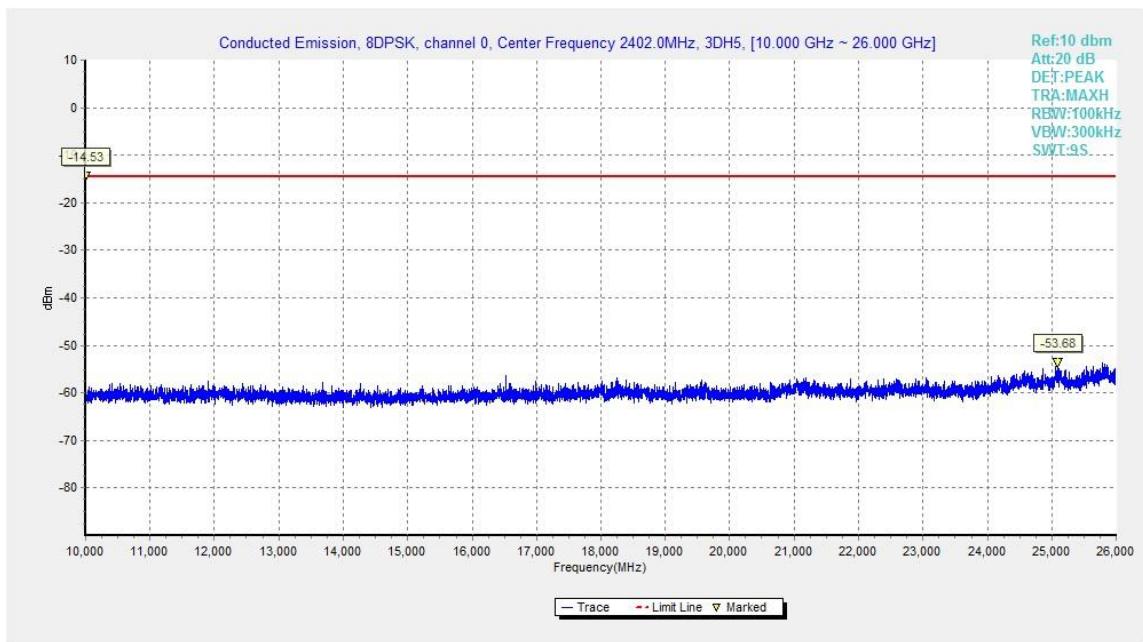


Fig.47. Conducted spurious emission: 8DPSK, Channel 0,10GHz - 26GHz

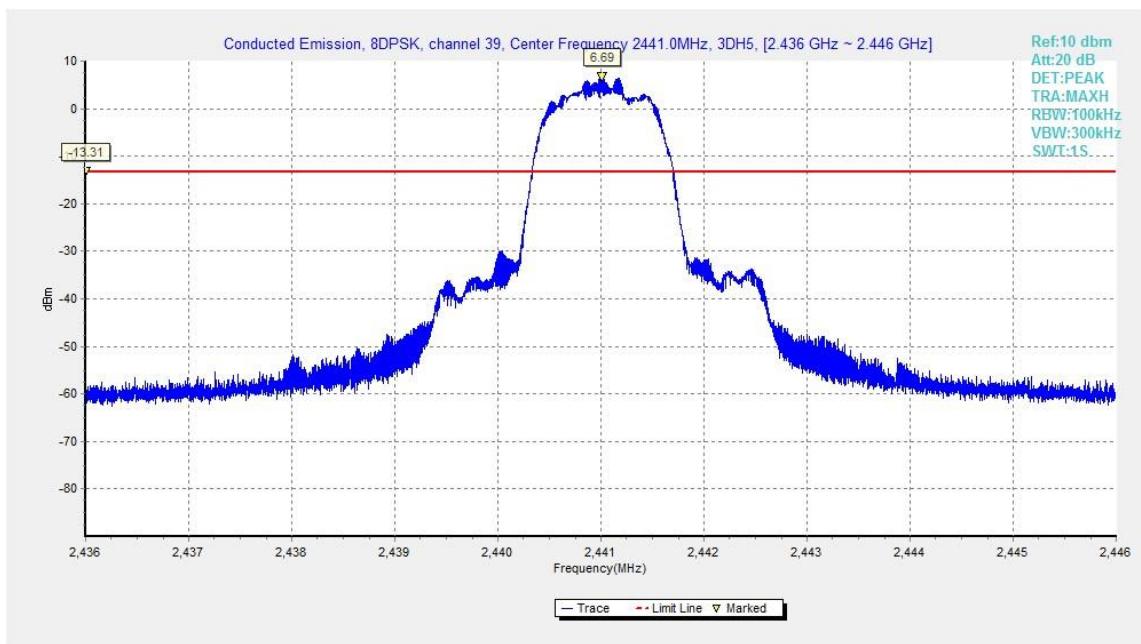


Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

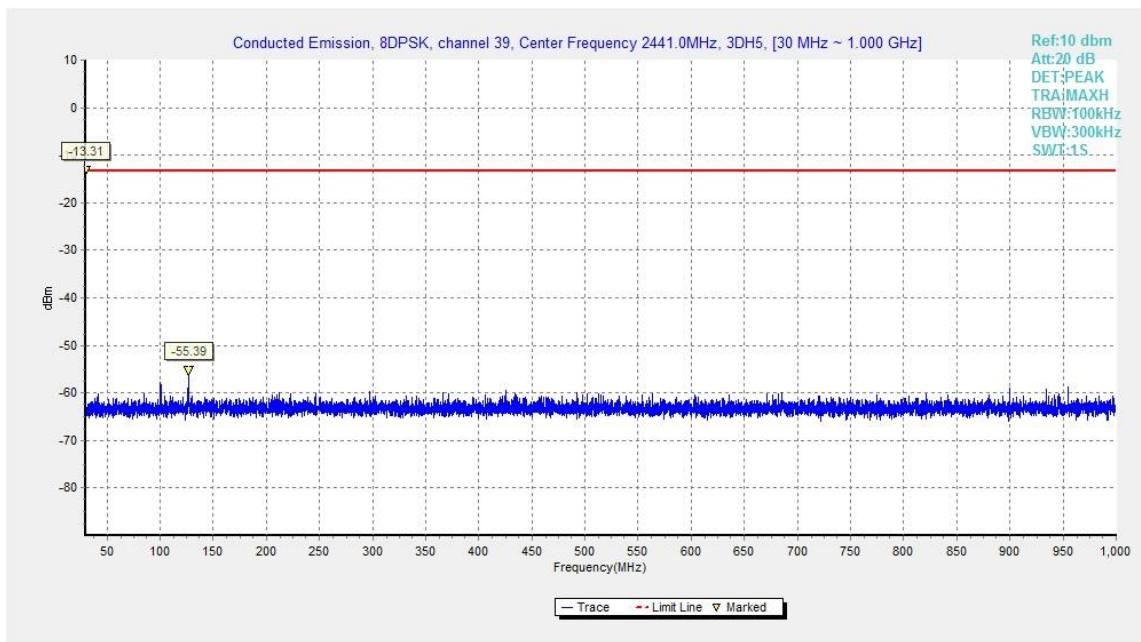


Fig.49. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz