

FCC PART 15C TEST REPORT No. **I17Z62134-IOT02**

for

TCL Communication Ltd.

HSUPA/HSDPA/UMTS Tri Band/GSM Quad Band/LTE 6 Bands mobile

phone

Model Name: A405DL

FCC ID: 2ACCJN023

with

Hardware Version: 01

Software Version: WU15

Issued Date: 2017-12-27



Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No.52, HuayuanNorth Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512,Fax:+86(0)10-62304633-2504

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z62134-IOT02	Rev.0	1st edition	2017-12-22
I17Z62134-IOT02	Rev.1	Update Equipment information in	2017-12-27
		chapter 6	



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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 ℃
Relative Humidity:	20-75%

1.3. Project data

Testing Start Date:	2017-12-5
Testing End Date:	2017-12-22

1.4. Signature

F

Wu Le (Prepared this test report)



Sun Zhenyu (Reviewed this test report)

Stratz

Lv Songdong (Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Address /Post.	Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	China
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Address / Post.	Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	China
Telephone:	0086-21-31363544
Fax:	0086-21-61460602



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

3.1. About EUT

Description	HSUPA/HSDPA/UMTS Tri Band/GSM Quad Band/LTE 6 Bands
	mobile phone
Model Name	A405DL
FCC ID	2ACCJN023
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/π/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
EUT1	015114000001653	01	WU15
EUT2	015114000000796	01	WU15

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

3.3. Internal Identification of AE

	AE ID* AE1	Description Battery	SN /	Remarks /
	AE2	Charger	1	1
	AE3	USB cable	1	1
Α	E1			
	Model		TLi013C1	
	Manufac	turer	BYD	
Capacitance		nce	1350 mAh	
Nominal voltage		voltage	3.7V	
Α	E2			
Model			CBA0066AGNC5	
Manufacturer		turer	PUAN	
Length of cable		f cable	116 cm	
А	E3			
	Model		/	
	Manufac	turer	/	
	Length o	f cable	/	
* ^ ⊏		d to identify the test	comple in the lab internally	

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

3.4. EUT set-ups

	-
Set.2	EUT1+AE1+AE2

Charger



3.5. Normal Accessory setting

Fully charged battery should be used during the test.

3.6. General Description

The Equipment Under Test (EUT) is a model of HSUPA/HSDPA/UMTS Tri Band/GSM Quad Band/LTE 6 Bands mobile phone with 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. <u>Reference Documents</u>

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.

5	5	
Reference	Title	Version
	FCC CFR 47, Part 15, Subpart C:	
	15.205 Restricted bands of operation;	
FCC Part15	15.209 Radiated emission limits, general requirements;	2016
	15.247 Operation within the bands 902–928MHz,	
	2400–2483.5 MHz, and 5725–5850 MHz.	
ANSI C63.10	American National Standard of Procedures for	luno 2012
ANSI 003.10	Compliance Testing 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)	Р
Frequency Band Edges	15.247 (d)	Р
Transmitter Spurious Emission - Conducted	15.247 (d)	Р
Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	Р
Time of Occupancy (Dwell Time)	15.247 (a) (1)(iii)	Р
20dB Bandwidth	15.247 (a)(1)	NA
Carrier Frequency Separation	15.247 (a)(1)	Р
Number of hopping channels	15.247 (a)(b)(iii)	Р
AC Powerline Conducted Emission	15.107, 15.207	Р

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.	Equipmont	Model	Serial Manufacturer	Calibration	Calibration	
NO.	Equipment	WOUEI	Number	Wanuacturer	date	Due date
1	Vector Signal	FSQ26	200136	Rohde &	1 year	2018-09-30
	Analyzer	F3Q20	200130	Schwarz	1 year	2018-09-30
2	2 Test Receiver ESCI	100344	Rohde &	1.voor	2018-03-15	
2		ESCI	ESCI 100344	Schwarz	1 year	2010-03-15
3	LISN	ENV216	101200	Rohde &	1.voor	2018-08-03
3	LISIN	EINV210 101200	101200	Schwarz	1 year	2010-00-03
4 Bluetooth Tes	Plustaath Taatar	luetooth Tester CBT 1	101042	Rohde &	1 year	2018-09-29
	Didelooth tester		101042	Schwarz		2010-09-29
5	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial	Manufacturer	Calibration	Calibration
			Number		Period	Due date
1	Test Receiver	ESU26	100235	Rohde &	1 year	2018-03-01
1	lest Necelvel	L3020	100233	Schwarz	ryear	2010-03-01
2	BiLog Antenna	VULB9163	9163-302	Schwarzbeck	3 years	2020-03-27
3	Bluetooth Tester	СВТ	101042	Rohde &	1.voor	2018-02-19
3	Didelooth tester	СЫ	101042	Schwarz	1 year	2010-02-19
4	EMI Antenna	3115	00167250	ETS-Lindgren	3 Years	2020-05-21
	Dual-Ridge					
5	Waveguide Horn	3116	2661	ETS-Lindgren	3 years	2020-07-27
	Antenna					



7. <u>Measurement Uncertainty</u>

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:

7.3. Transmitter Spurious Emission - Conducted

Measurement Uncertainty:

Frequency Range	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:

Frequency Range	Uncertainty (k=2)
< 1 GHz	4.86dB
> 1 GHz	5.26dB

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:



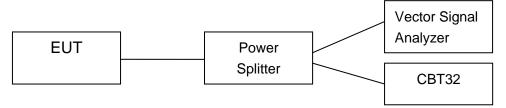
ANNEX A: Detailed Test Results

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



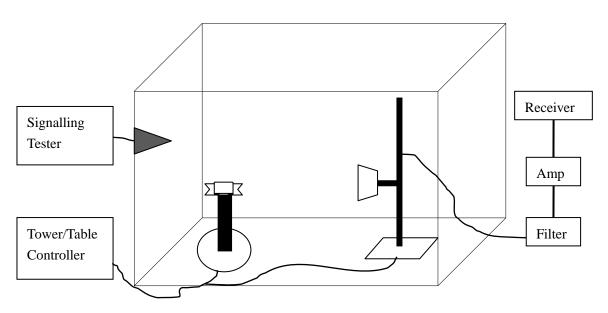
A.1.2. Radiated Emission Measurements

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)	7.79	8.61	7.48	Р

Form/4 DQPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	8.48	9.46	8.32	Р

For 8DPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	8.93	9.57	8.38	Р

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 delta 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	-56.92	Р
0	Hopping ON	Fig.2	-67.87	Р
70	Hopping OFF	Fig.3	-65.57	Р
78	Hopping ON	Fig.4	-69.22	Р

Forπ/4 DQPSK

Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.5	-57.30	Р
0	Hopping ON	Fig.6	-66.84	Р
78	Hopping OFF	Fig.7	-66.37	Р
10	Hopping ON	Fig.8	-67.41	Р

For 8DPSK

Channel	Hopping	Band Edge Power (dBc)		Conclusion
Hop	Hopping OFF	Fig.9	-57.17	Р
0	Hopping ON	Fig.10	-63.57	Р



78	Hopping OFF	Fig.11	-66.35	Р
70	Hopping ON	Fig.12	-66.65	Р

Conclusion: PASS

Test graphs as below

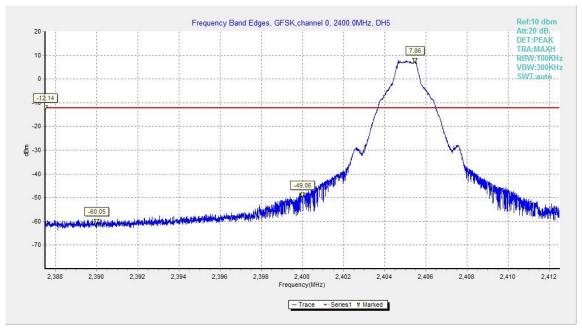


Fig.1. Frequency Band Edges: GFSK, Channel 0, Hopping Off

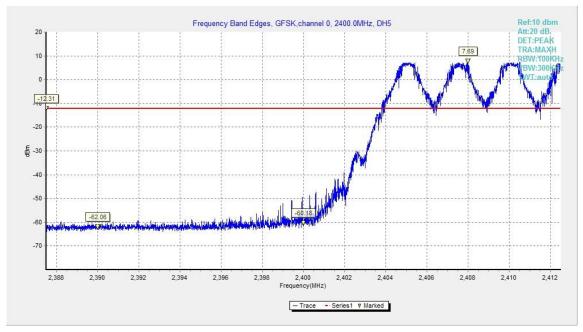


Fig.2. Frequency Band Edges: GFSK, Channel 0, Hopping On

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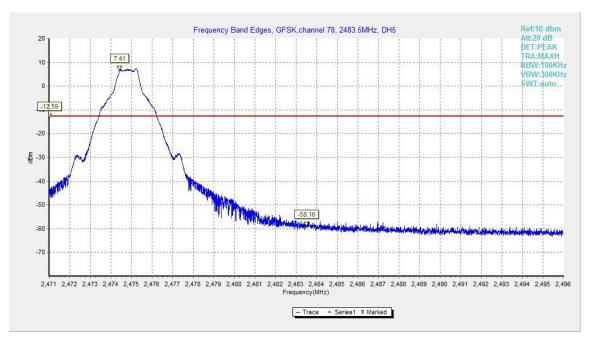


Fig.3. Frequency Band Edges: GFSK, Channel 78, Hopping Off

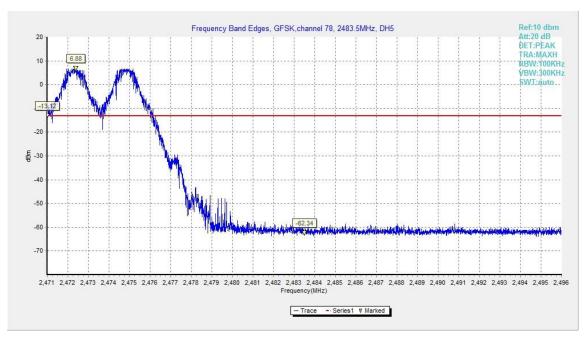


Fig.4. Frequency Band Edges: GFSK, Channel 78, Hopping On

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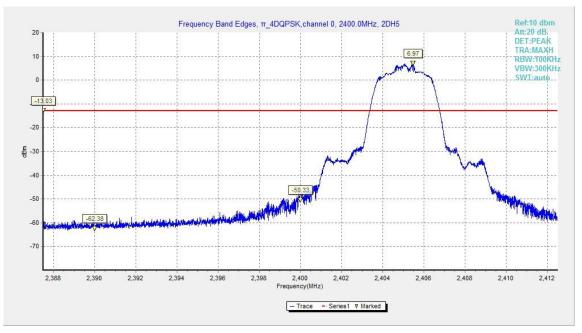


Fig.5. Frequency Band Edges: π/4 DQPSK, Channel 0, Hopping Off

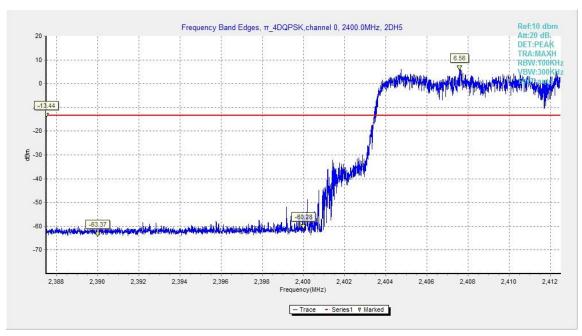


Fig.6. Frequency Band Edges: π/4 DQPSK, Channel 0, Hopping On

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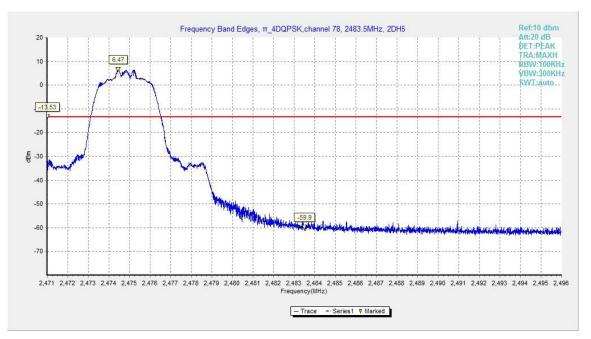


Fig.7. Frequency Band Edges: π/4 DQPSK, Channel 78, Hopping Off

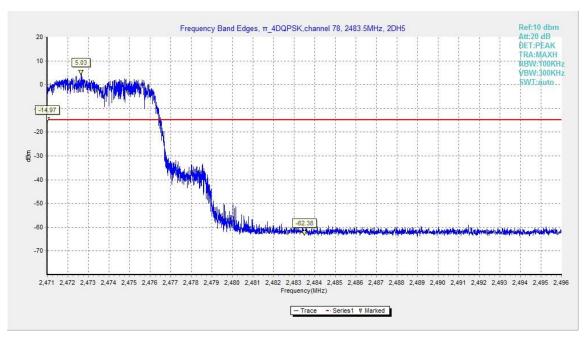
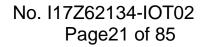


Fig.8. Frequency Band Edges: π/4 DQPSK, Channel 78, Hopping On





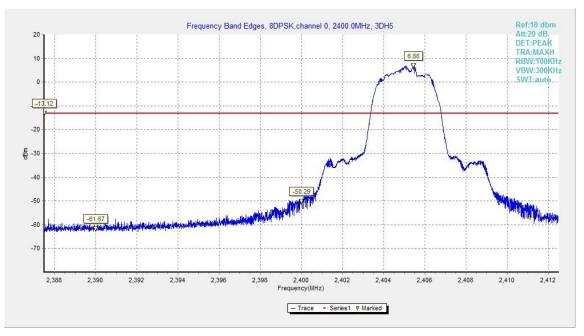


Fig.9. Frequency Band Edges: 8DPSK, Channel 0, Hopping Off

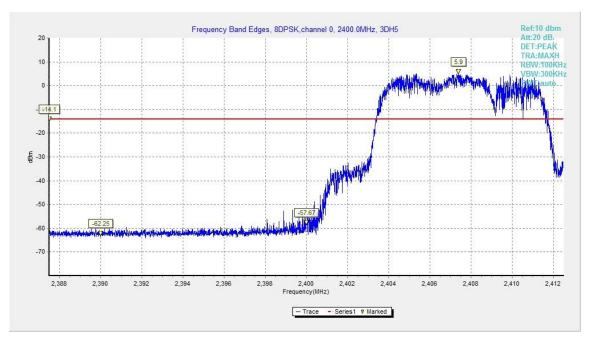


Fig.10. Frequency Band Edges: 8DPSK, Channel 0, Hopping On

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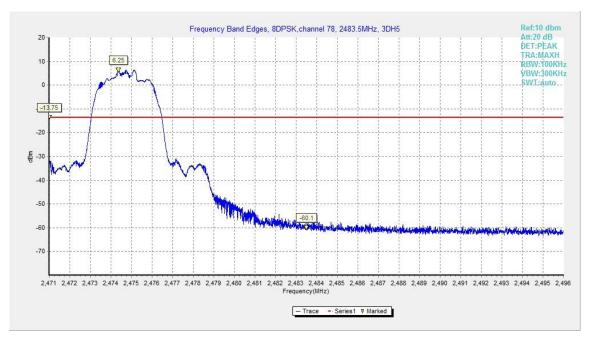


Fig.11. Frequency Band Edges: 8DPSK, Channel 78, Hopping Off

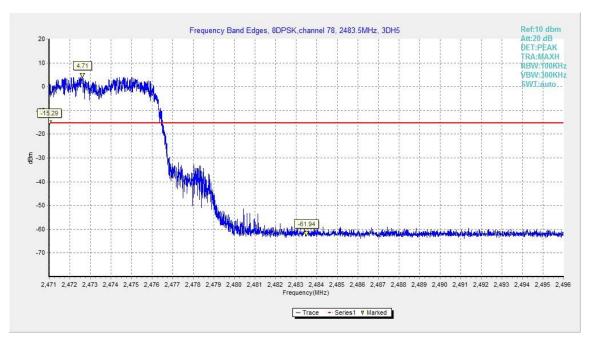


Fig.12. Frequency Band Edges: 8DPSK, Channel 78, Hopping On



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

Measurement Results:

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0	Center Frequency	Fig.13	Р



2402 MHz	30 MHz ~ 1 GHz	Fig.14	Р
	1 GHz ~ 3 GHz	Fig.15	Р
	3 GHz ~ 10 GHz	Fig.16	Р
	10 GHz ~ 26 GHz	Fig.17	Р
	Center Frequency	Fig.18	Р
	30 MHz ~ 1 GHz	Fig.19	Р
Ch 39 2441 MHz	1 GHz ~ 3 GHz	Fig.20	Р
	3 GHz ~ 10 GHz	Fig.21	Р
	10 GHz ~ 26 GHz	Fig.22	Р
	Center Frequency	Fig.23	Р
	30 MHz ~ 1 GHz	Fig.24	Р
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.25	Р
2400 10112	3 GHz ~ 10 GHz	Fig.26	Р
	10 GHz ~ 26 GHz	Fig.27	Р
or π/4 DQPSK			
Channel	Frequency Range	Test Results	Conclusion
	Center Frequency	Fig.28	Р
Ch 0	30 MHz ~ 1 GHz	Fig.29	Р
2402 MHz	1 GHz ~ 3 GHz	Fig.30	Р
	3 GHz ~ 10 GHz	Fig.31	Р
	10 GHz ~ 26 GHz	Fig.32	Р
	Center Frequency	Fig.33	Р
	30 MHz ~ 1 GHz	Fig.34	Р
Ch 39 2441 MHz	1 GHz ~ 3 GHz	Fig.35	Р
	3 GHz ~ 10 GHz	Fig.36	Р
	10 GHz ~ 26 GHz	Fig.37	Р
	Center Frequency	Fig.38	Р
	30 MHz ~ 1 GHz	Fig.39	Р
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.40	Р
	3 GHz ~ 10 GHz	Fig.41	Р
	10 GHz ~ 26 GHz	Fig.42	Р
For 8DPSK			
Channel	Frequency Range	Test Results	Conclusion

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

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Ch 39 2441 MHz	Center Frequency	Fig.48	Р
	30 MHz ~ 1 GHz	Fig.49	Р
	1 GHz ~ 3 GHz	Fig.50	Р
	3 GHz ~ 10 GHz	Fig.51	Р
	10 GHz ~ 26 GHz	Fig.52	Р
Ch 78 2480 MHz	Center Frequency	Fig.53	Р
	30 MHz ~ 1 GHz	Fig.54	Р
	1 GHz ~ 3 GHz	Fig.55	Р
	3 GHz ~ 10 GHz	Fig.56	Р
	10 GHz ~ 26 GHz	Fig.57	Р

Conclusion: PASS

Test graphs as below

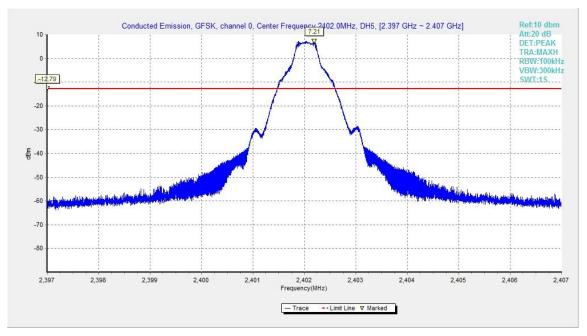


Fig.13. Conducted spurious emission: GFSK, Channel 0,2402MHz

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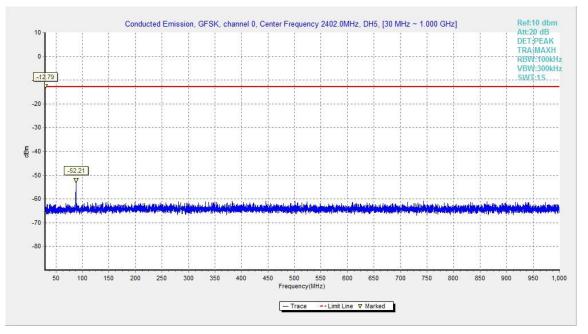


Fig.14. Conducted spurious emission: GFSK, Channel 0, 30MHz - 1GHz

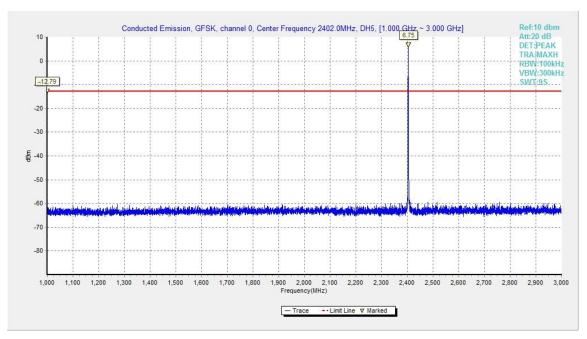
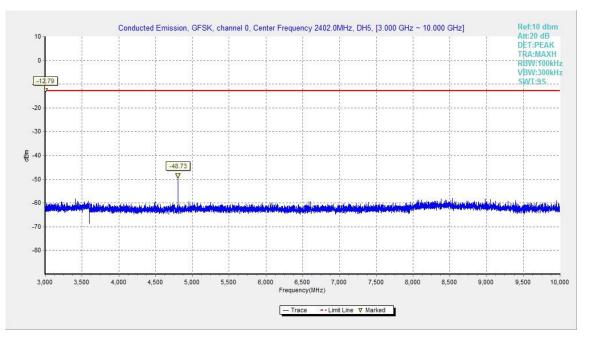


Fig.15. Conducted spurious emission: GFSK, Channel 0, 1GHz - 3GHz

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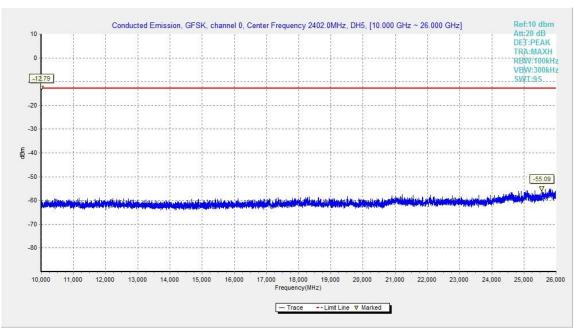


Fig.17. Conducted spurious emission: GFSK, Channel 0,10GHz - 26GHz

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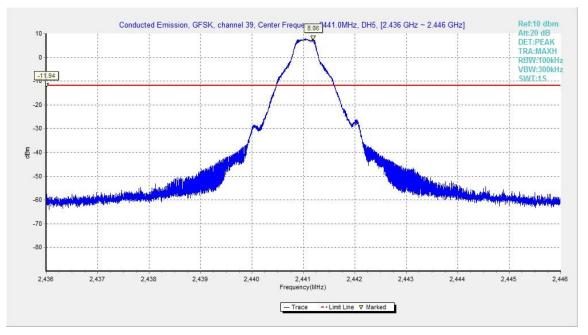


Fig.18. Conducted spurious emission: GFSK, Channel 39, 2441MHz

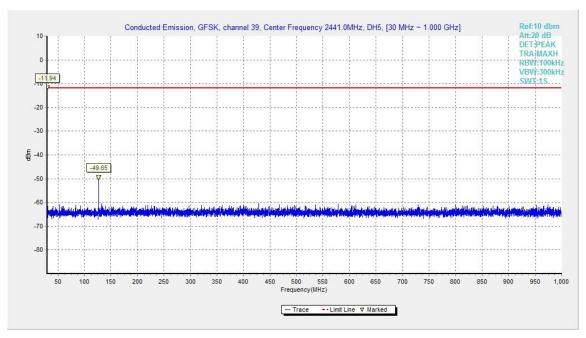


Fig.19. Conducted spurious emission: GFSK, Channel 39, 30MHz - 1GHz

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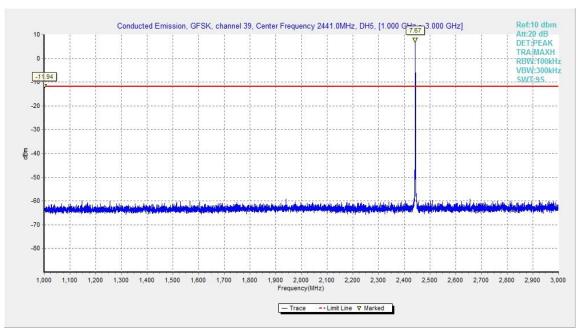


Fig.20. Conducted spurious emission: GFSK, Channel 39, 1GHz - 3GHz

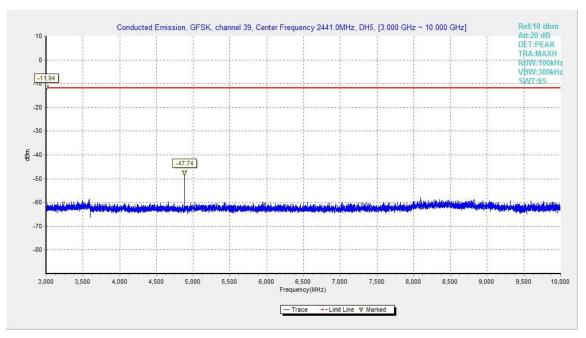


Fig.21. Conducted spurious emission: GFSK, Channel 39, 3GHz - 10GHz

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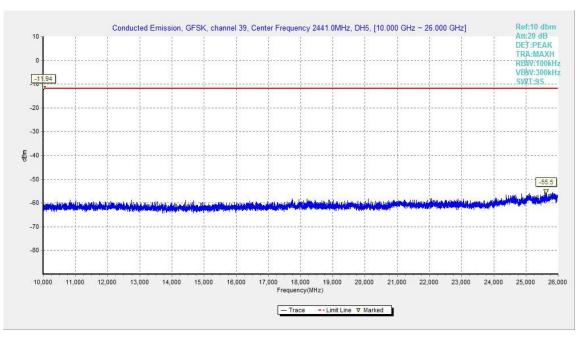


Fig.22. Conducted spurious emission: GFSK, Channel 39, 10GHz – 26GHz

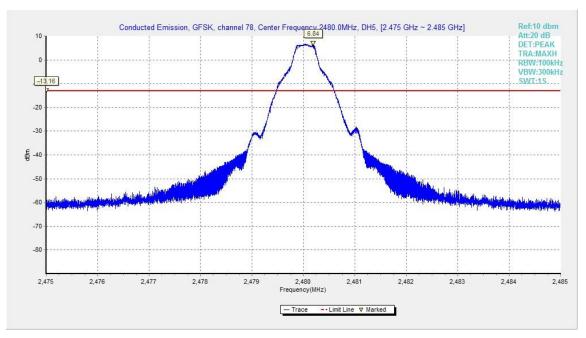


Fig.23. Conducted spurious emission: GFSK, Channel 78, 2480MHz

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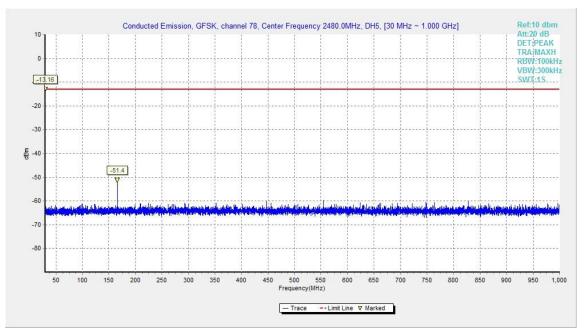


Fig.24. Conducted spurious emission: GFSK, Channel 78, 30MHz - 1GHz

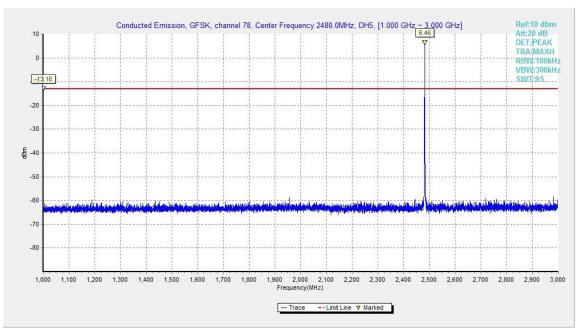


Fig.25. Conducted spurious emission: GFSK, Channel 78, 1GHz - 3GHz

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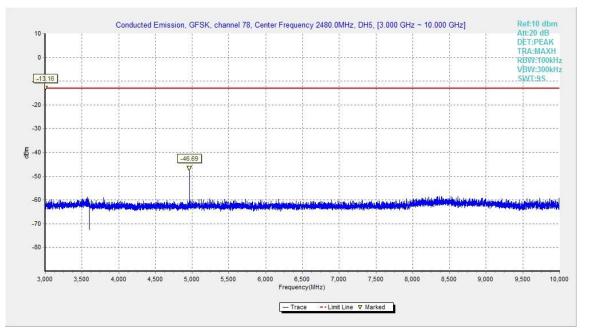


Fig.26. Conducted spurious emission: GFSK, Channel 78, 3GHz - 10GHz

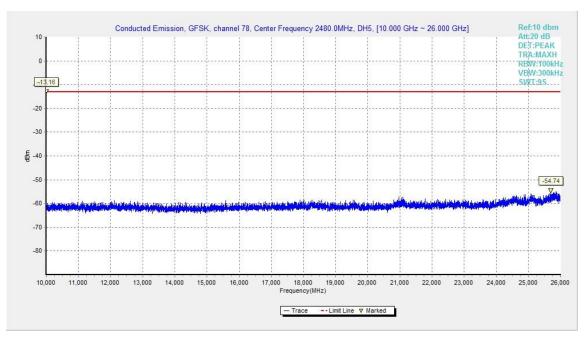


Fig.27. Conducted spurious emission: GFSK, Channel 78, 10GHz - 26GHz

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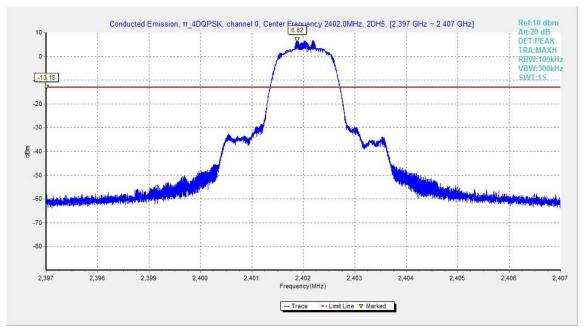


Fig.28. Conducted spurious emission: $\pi/4$ DQPSK, Channel 0,2402MHz

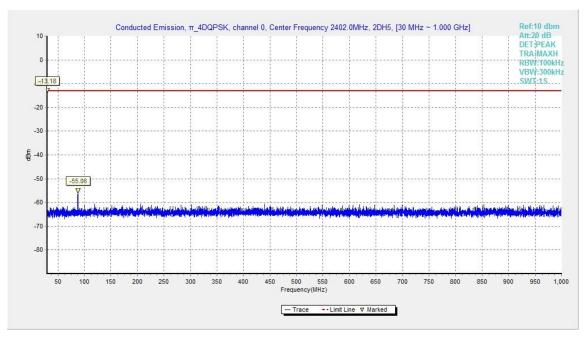


Fig.29. Conducted spurious emission: $\pi/4$ DQPSK, Channel 0, 30MHz - 1GHz

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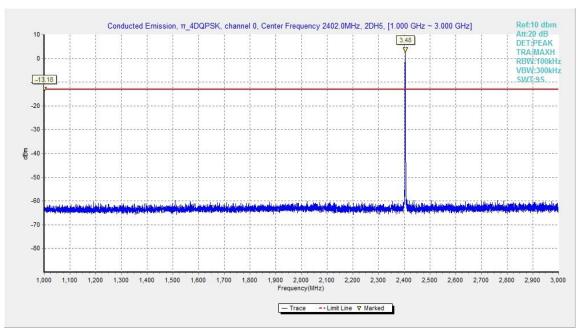


Fig.30. Conducted spurious emission: $\pi/4$ DQPSK, Channel 0, 1GHz - 3GHz

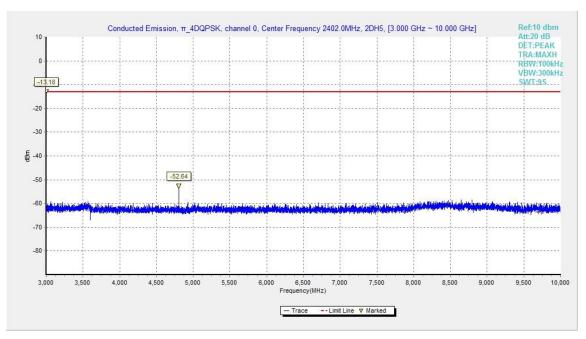


Fig.31. Conducted spurious emission: $\pi/4$ DQPSK, Channel 0, 3GHz - 10GHz

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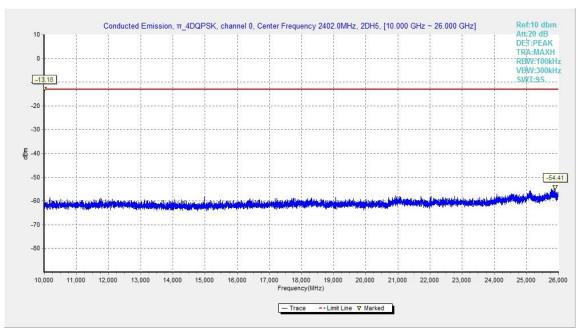


Fig.32. Conducted spurious emission: $\pi/4$ DQPSK, Channel 0,10GHz - 26GHz

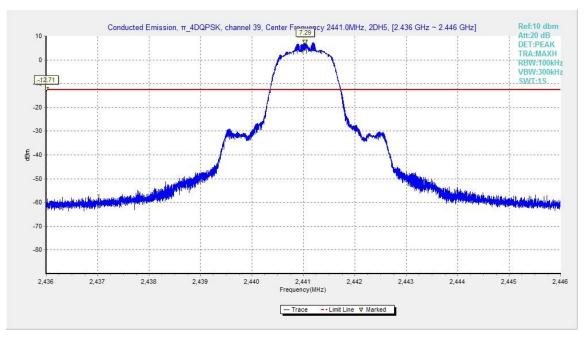


Fig.33. Conducted spurious emission: $\pi/4$ DQPSK, Channel 39, 2441MHz

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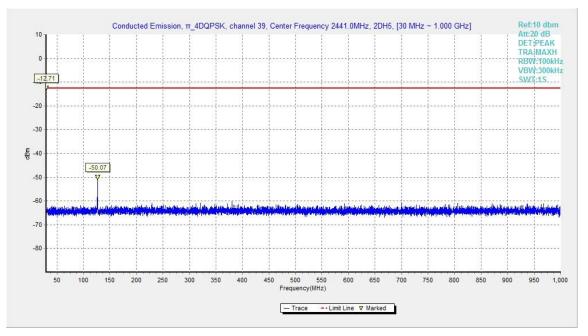


Fig.34. Conducted spurious emission: $\pi/4$ DQPSK, Channel 39, 30MHz - 1GHz

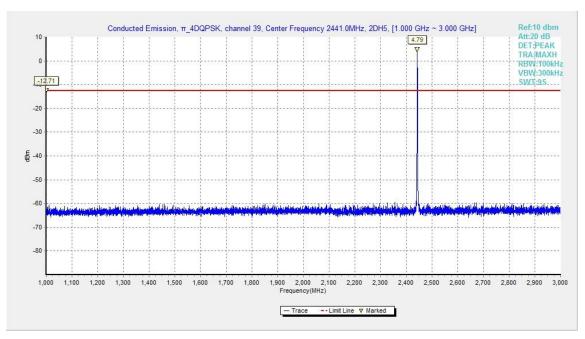


Fig.35. Conducted spurious emission: $\pi/4$ DQPSK, Channel 39, 1GHz - 3GHz

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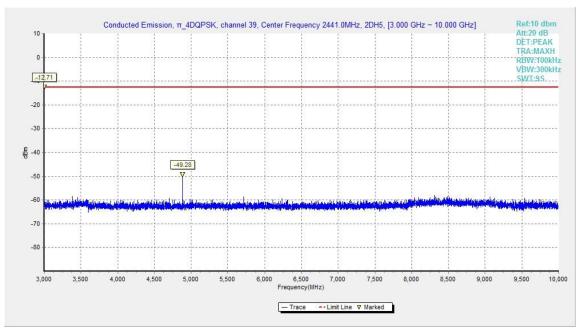


Fig.36. Conducted spurious emission: $\pi/4$ DQPSK, Channel 39, 3GHz - 10GHz

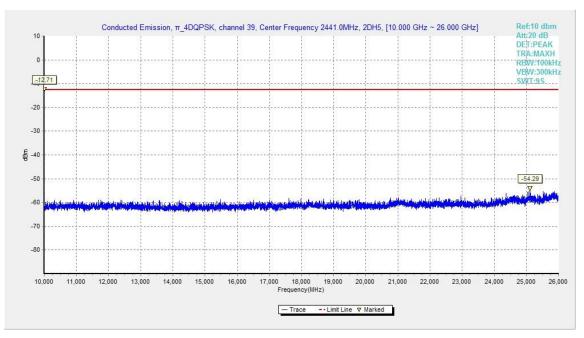


Fig.37. Conducted spurious emission: $\pi/4$ DQPSK, Channel 39, 10GHz – 26GHz

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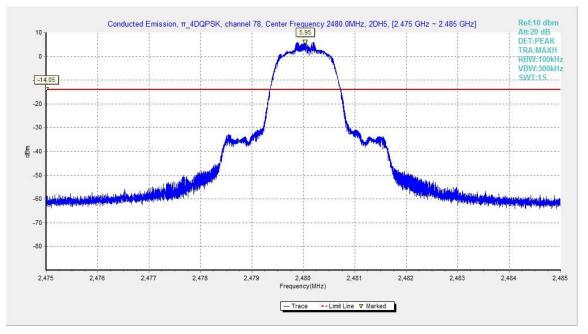


Fig.38. Conducted spurious emission: $\pi/4$ DQPSK, Channel 78, 2480MHz

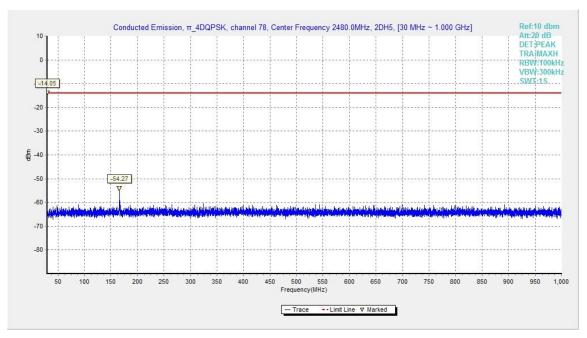


Fig.39. Conducted spurious emission: $\pi/4$ DQPSK, Channel 78, 30MHz - 1GHz

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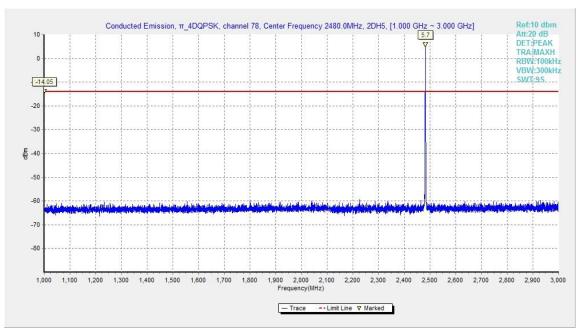


Fig.40. Conducted spurious emission: $\pi/4$ DQPSK, Channel 78, 1GHz - 3GHz

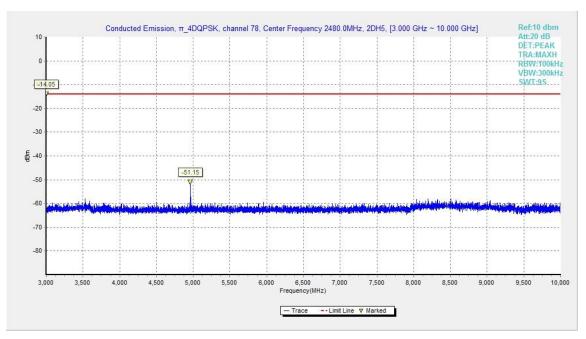


Fig.41. Conducted spurious emission: $\pi/4$ DQPSK, Channel 78, 3GHz - 10GHz

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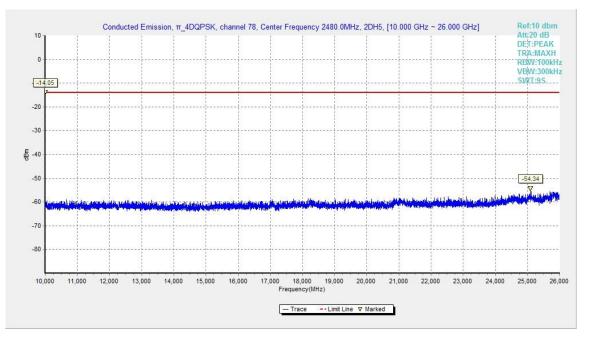


Fig.42. Conducted spurious emission: π/4 DQPSK, Channel 78, 10GHz - 26GHz

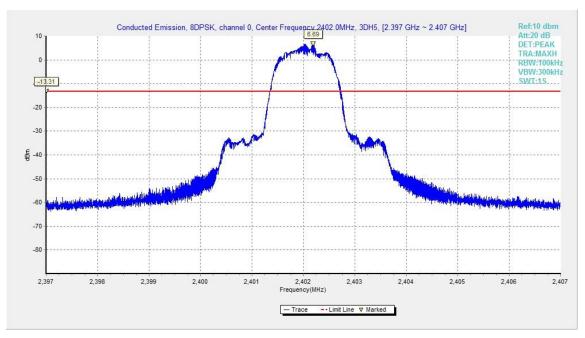


Fig.43. Conducted spurious emission: 8DPSK, Channel 0,2402MHz

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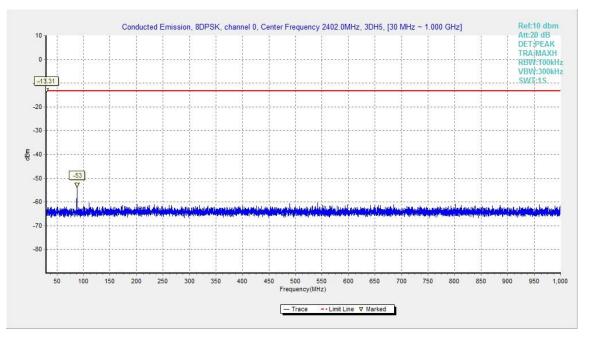


Fig.44. Conducted spurious emission: 8DPSK, Channel 0, 30MHz - 1GHz

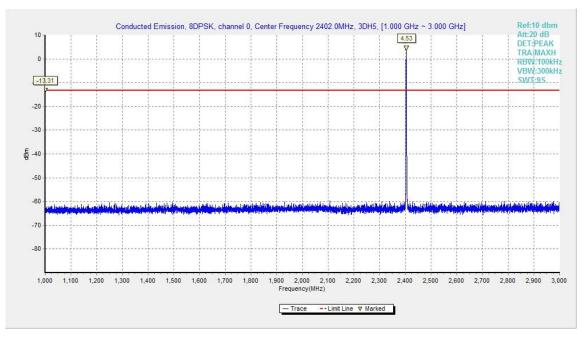


Fig.45. Conducted spurious emission: 8DPSK, Channel 0, 1GHz - 3GHz

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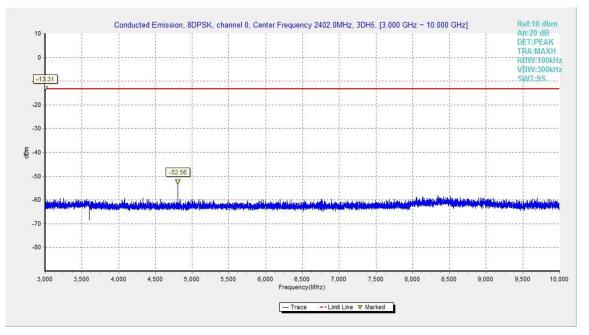


Fig.46. Conducted spurious emission: 8DPSK, Channel 0, 3GHz - 10GHz

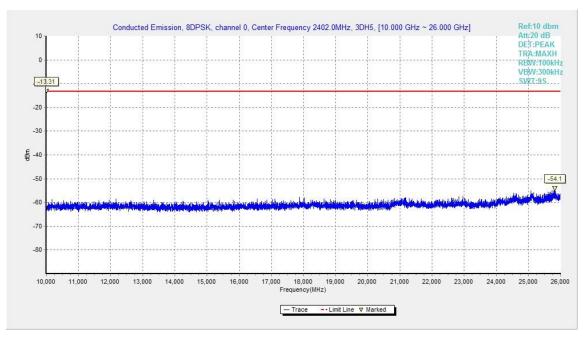


Fig.47. Conducted spurious emission: 8DPSK, Channel 0,10GHz - 26GHz

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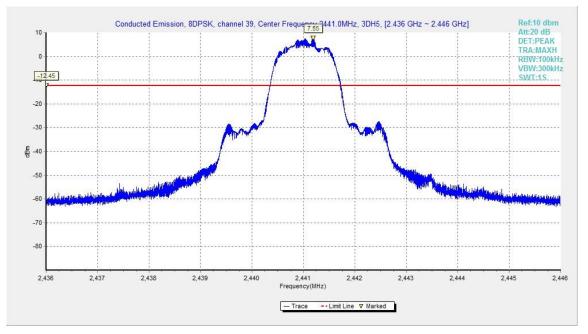


Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

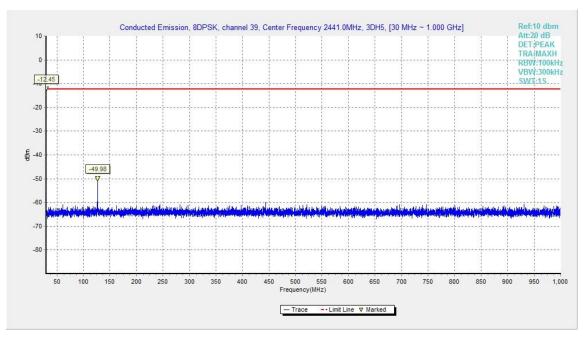


Fig.49. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz