



# FCC PART 15C TEST REPORT No. I15Z40216-SRD01

for

**TCL Communication Ltd.**

**HSUPA/HSDPA/UMTS Triple band/GSM Quad band mobile phone**

**Model Name: 4009A**

**FCC ID: 2ACCJH017**

with

**Hardware Version: PIO**

**Software Version: v4B2A**

**Issued Date: 2015-02-09**



**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 CTTL.

**Test Laboratory:**

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## **REPORT HISTORY**

Report Number	Revision	Description	Issue Date
I15Z40216-SRD01	Rev.0	1st edition	2015-02-09

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## **1. Test Laboratory**

### **1.1. Testing Location**

Location 1:CTTL(huayuan North Road)

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

Location 2:CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road,  
Haidian District, Beijing, P. R. China100191

## 1.2. Testing Environment

Normal Temperature: 15-35℃  
Extreme Temperature: -10/+55℃  
Relative Humidity: 20-75%

## 1.3. Project data

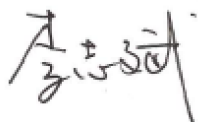
Testing Start Date: 2014-12-21  
Testing End Date: 2014-12-18

## 1.4. Signature



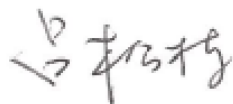
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Xu Zhongfei  
(Prepared this test report)



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Li Zhibin  
(Reviewed this test report)



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(Approved this test report)

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd.  
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Pudong Area Shanghai, P.R. China. 201203  
City: Shanghai  
Postal Code: 201203  
Country: China  
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### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd.  
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area Shanghai, P.R. China. 201203  
City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: 0086-21-61460890  
Fax: 0086-21-61460602

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

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

Description	HSUPA/HSDPA/UMTS Triple band/GSM Quad band mobile phone
Model Name	4009A
FCC ID	2ACCJH017
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/ $\pi/4$ DQPSK/8DPSK
Number of Channels	79
Power Supply	3.8v DC by Battery

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

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	/	PIO	v4B2A
EUT2	/	PIO	v4B2A

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

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

AE ID*	Description	
AE1	Battery	/ Inbuilt
AE1		
Model	CAB31P0000CB	
Manufacturer	OCEANSUN	
Capacitance	1300mAh	
Nominal voltage	3.8v	

\*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 Triple band/GSM Quad band mobile phone with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test.

## **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.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C:	June,2014
	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.	
ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	June,2013
FCC Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations	June,2014



## 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>
Conducted Emission	15.247 (d)	<b>P</b>
Radiated Emission	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

This model is a variant product which market name is 4009F; all the test result has been derived from test report of 4009F.

## 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	2016-01-06
2	Bluetooth Tester	CBT32	100649	Rohde & Schwarz	1 year	2015-02-09

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100376	Rohde & Schwarz	1 year	2015-11-05
2	EMI Antenna	VULB 9163	9163 175	Schwarzbeck	3 years	2015-07-13
3	EMI Antenna	3117	00119021	ETS-Lindgren	3 years	2015-04-19
4	Dual-Ridge Waveguide Horn Antenna	3116	2663	ETS-Lindgren	3 years	2015-06-30
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	3 years	2015-06-30
6	Bluetooth Tester	CBT	100153	Rohde & Schwarz	1 year	2015-09-15
7	LISN	ESH2-Z5	829991/01 2	Rohde & Schwarz	1 year	2015-04-14
8	Loop Antenna	HFH2-Z2	829324/00 7	Rohde & Schwarz	3 years	2015-12-12
9	Pre-amplifier(18GHz)	SCU18	1005277	Rohde & Schwarz	/	/
10	Pre-amplifier(26.5GHz)	SCU26	1006788	Rohde & Schwarz	/	/

### Anechoic chamber

Fully anechoic chamber by Frankonia German.

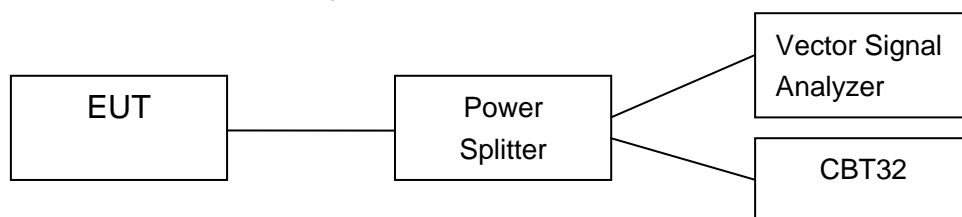
## **ANNEX A: Detailed Test Results**

### **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**

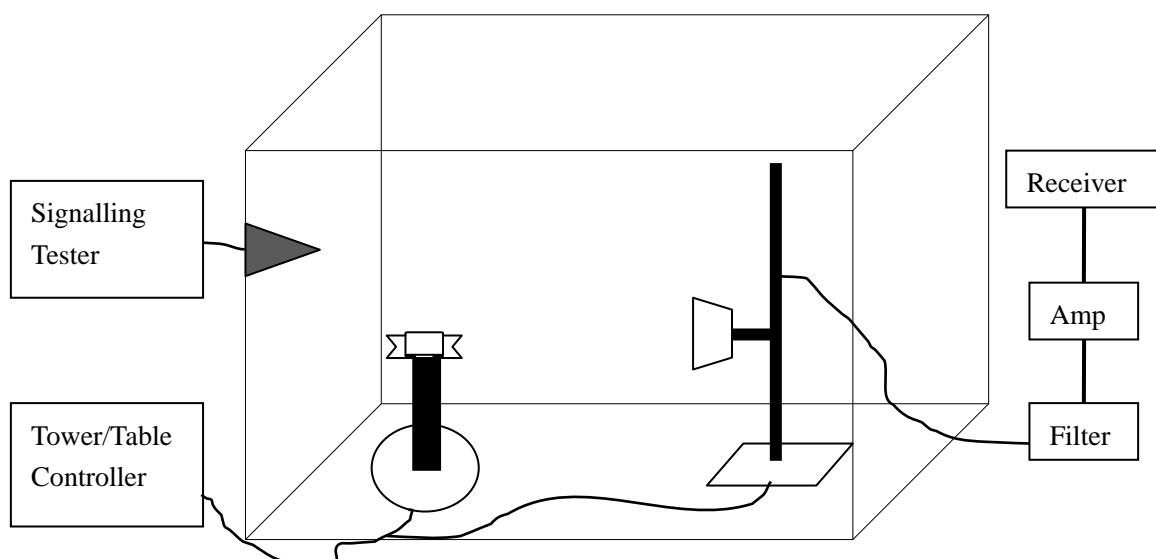
The measurement is made according to ANSI C63.10

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.

e) A plot of the test results and setup description shall be included in the test report.

### 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)	8.23	8.75	8.74	P

#### For $\pi/4$ DQPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.68	8.18	8.14	P

#### For 8DPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.79	8.30	8.29	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: 5ms
- 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	-56.17	P
	Hopping ON	Fig.2	-59.43	P
78	Hopping OFF	Fig.3	-61.42	P
	Hopping ON	Fig.4	-62.32	P

##### For $\pi/4$ DQPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.5	-56.21	P
	Hopping ON	Fig.6	-55.72	P
78	Hopping OFF	Fig.7	-60.19	P
	Hopping ON	Fig.8	-59.76	P

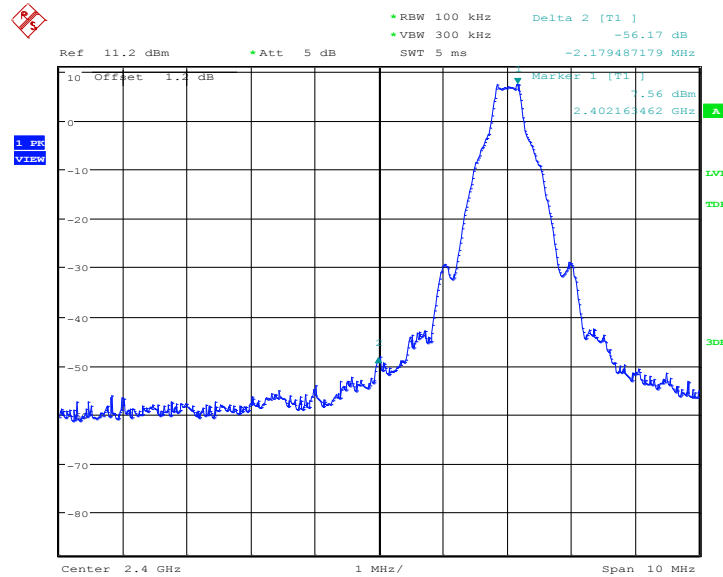
##### For 8DPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.9	-54.90	P
	Hopping ON	Fig.10	-56.45	P

78	Hopping OFF	Fig.11	-59.50	P
	Hopping ON	Fig.12	-56.79	P

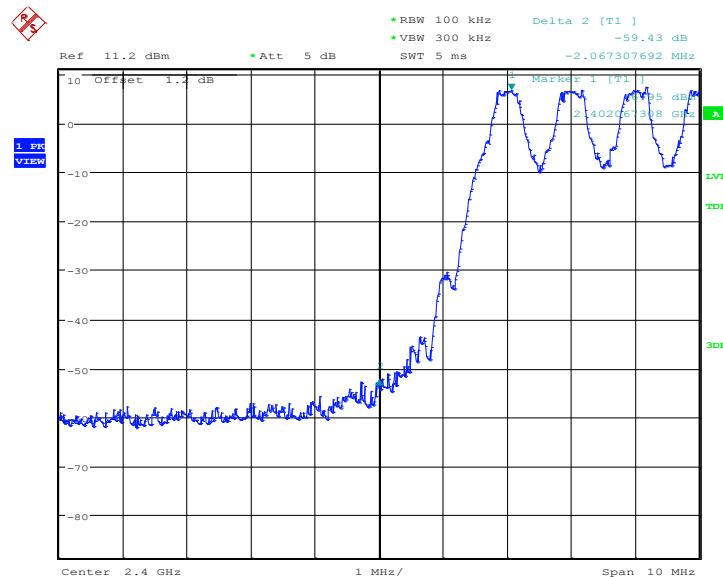
**Conclusion: PASS**

**Test graphs as below**



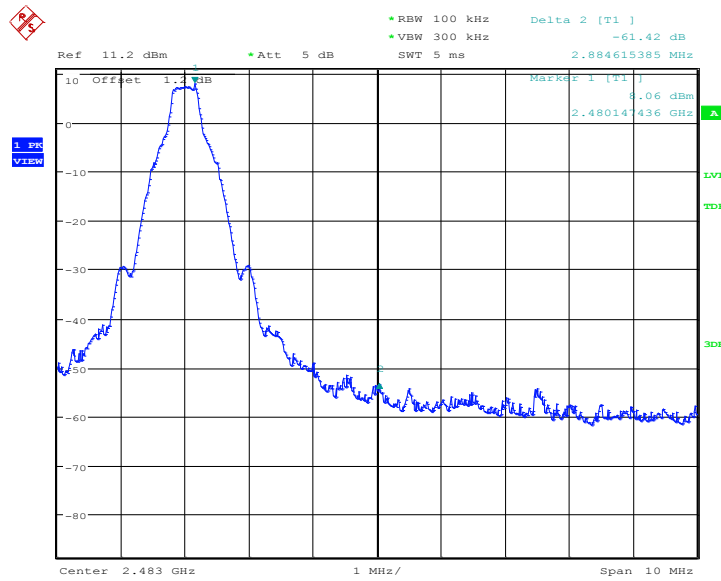
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Fig.1. Frequency Band Edges: GFSK, Channel 0, Hopping Off



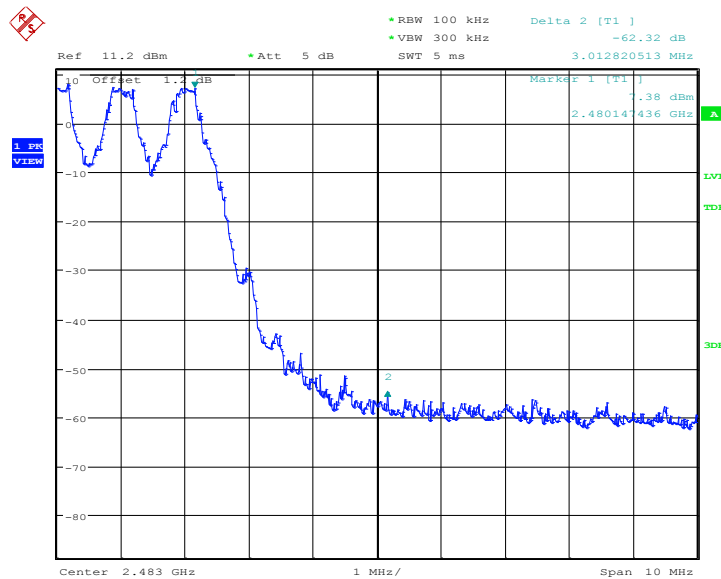
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Fig.2. Frequency Band Edges: GFSK, Channel 0, Hopping On



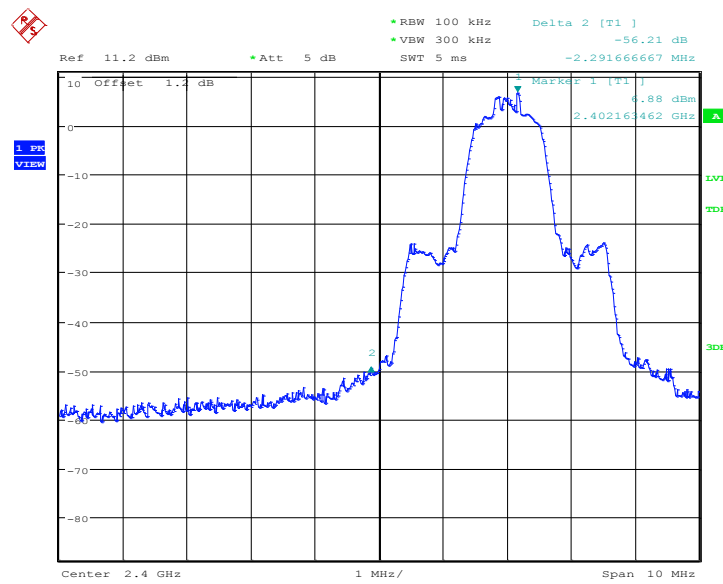
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Fig.3. Frequency Band Edges: GFSK, Channel 78, Hopping Off



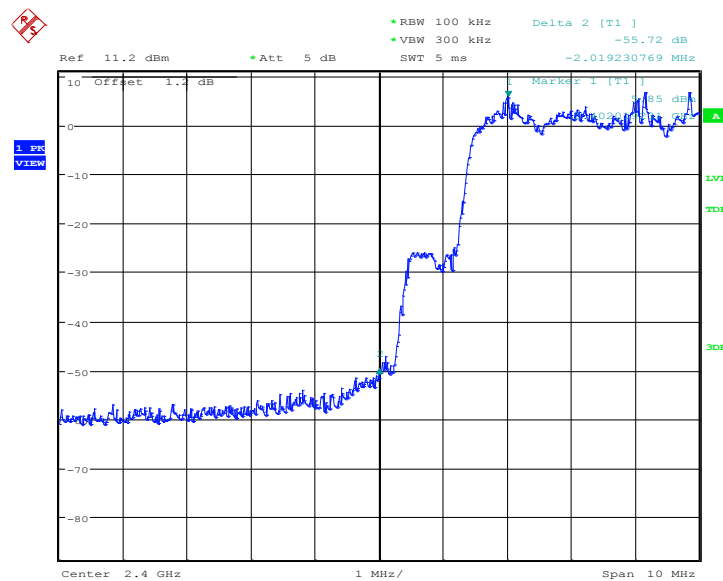
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Fig.4. Frequency Band Edges: GFSK, Channel 78, Hopping On



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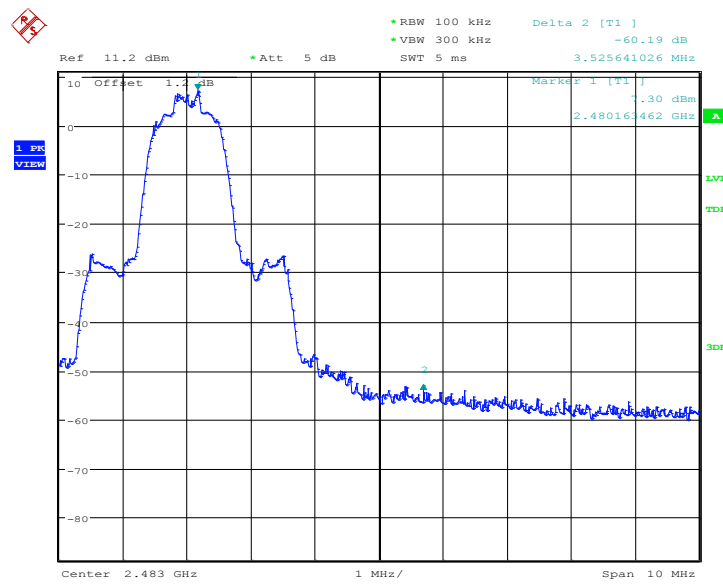
Fig.5. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping Off



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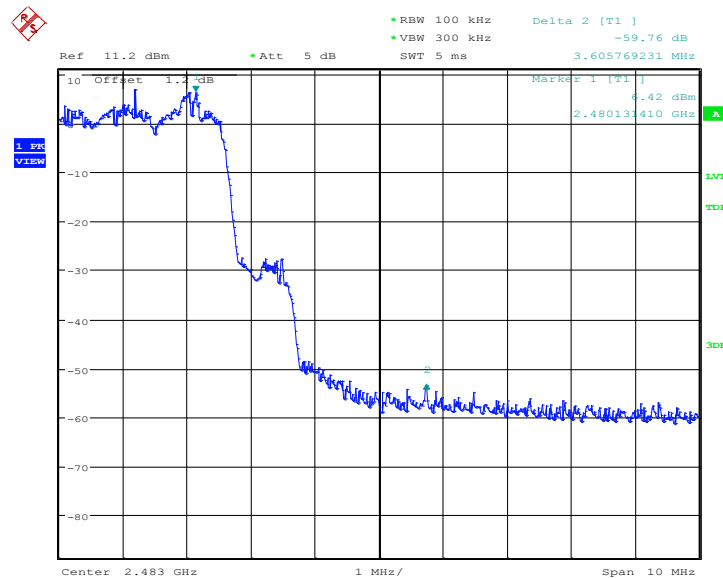
Fig.6. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping On





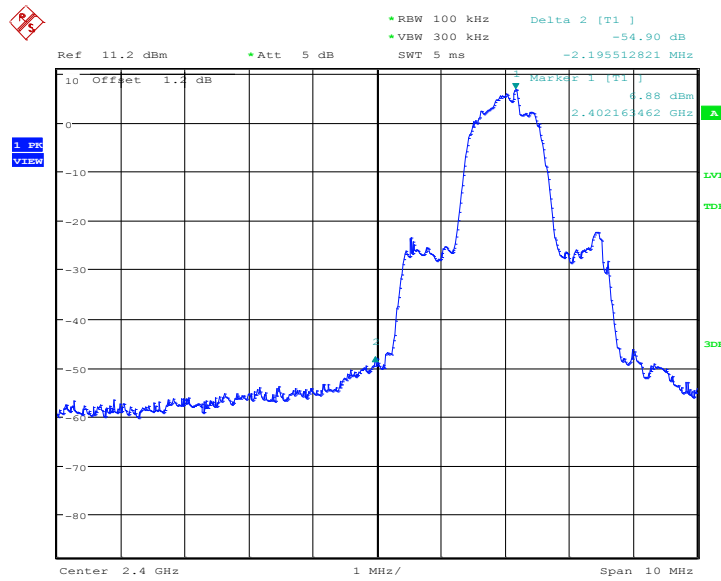
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Fig.7. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping Off



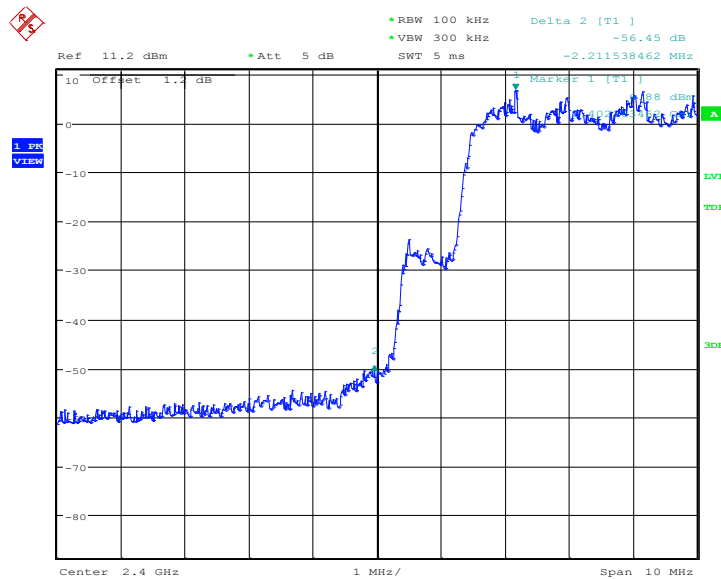
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Fig.8. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping On



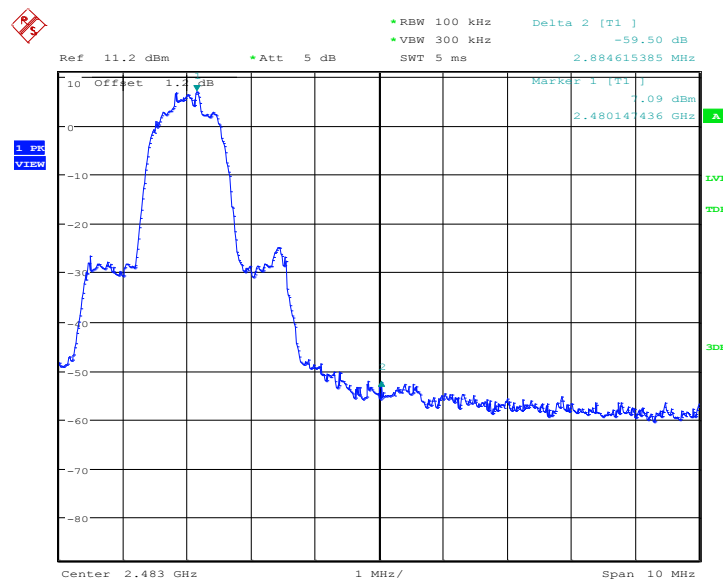
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Fig.9. Frequency Band Edges: 8DPSK, Channel 0, Hopping Off



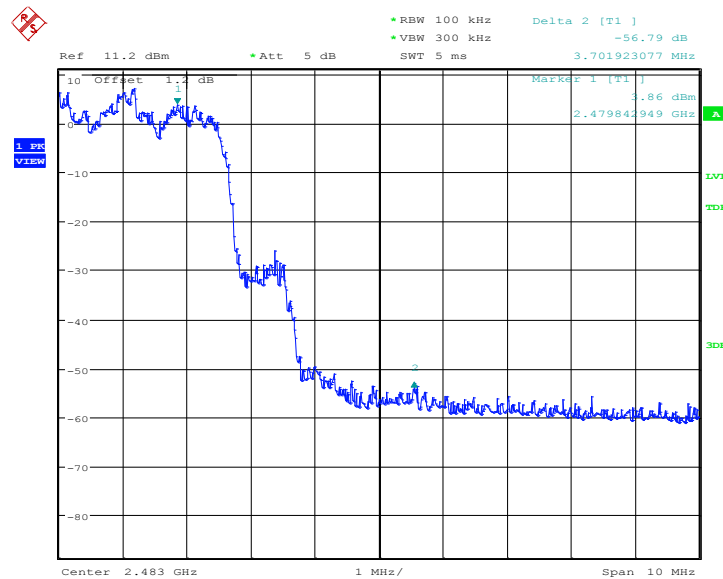
Date: 3.DEC.2014 18:27:22

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



Date: 3.DEC.2014 18:25:20

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



Date: 3.DEC.2014 18:29:26

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

#### A.4. Conducted Emission

##### 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  $\pi/4$  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

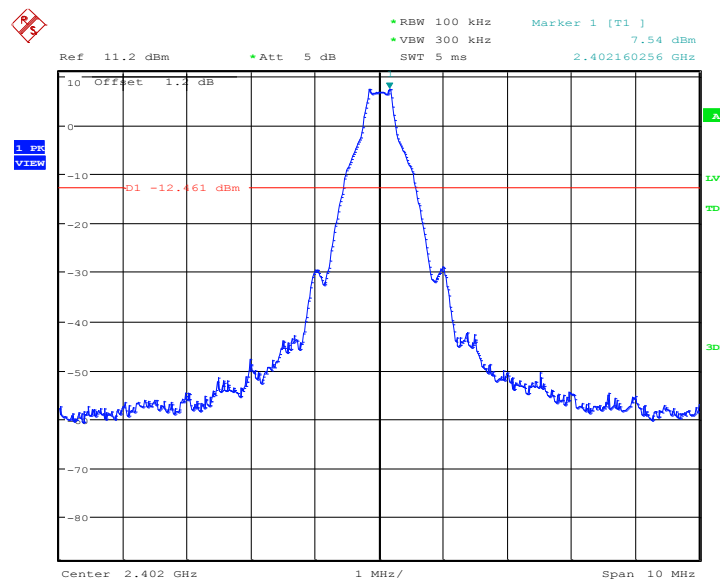
**For 8DPSK**

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 2441 MHz	Center Frequency	Fig.48	P
	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

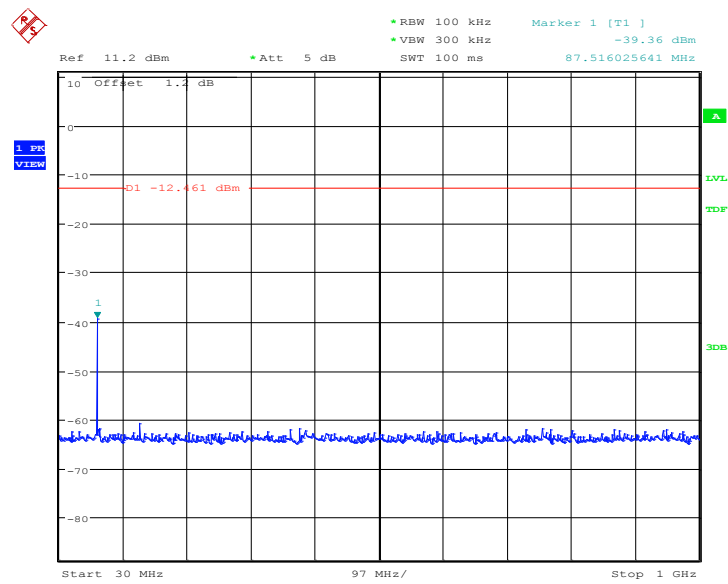
**Conclusion: PASS**

**Test graphs as below**



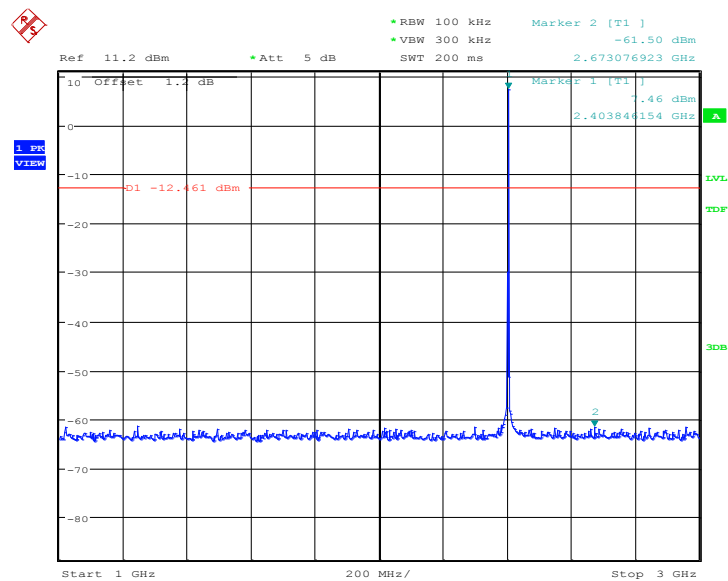
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Fig.13. Conducted spurious emission: GFSK, Channel 0,2402MHz



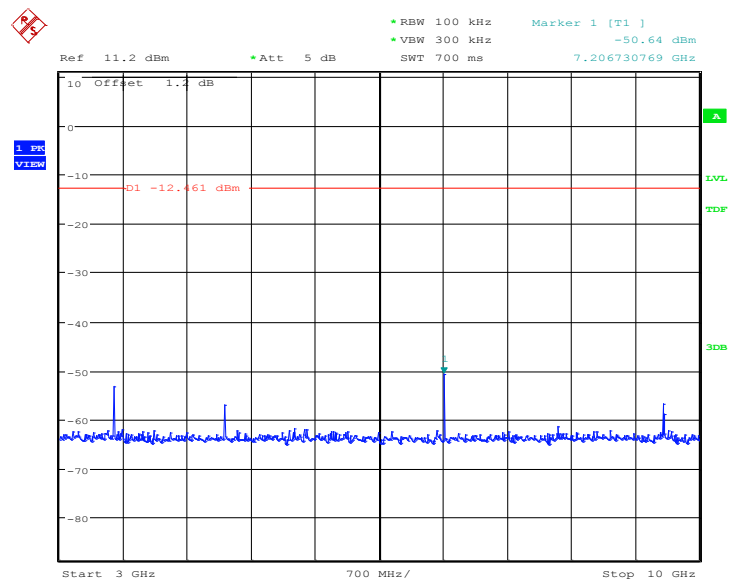
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Fig.14. Conducted spurious emission: GFSK, Channel 0, 30MHz - 1GHz



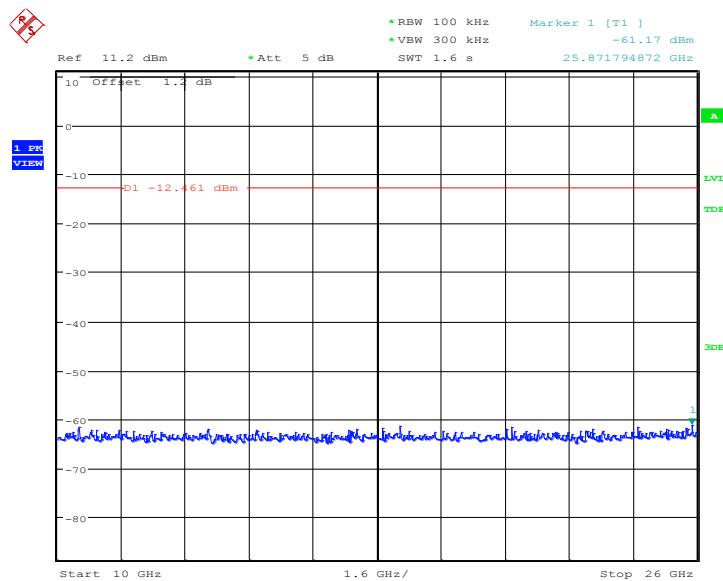
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Fig.15. Conducted spurious emission: GFSK, Channel 0, 1GHz - 3GHz



Date: 3.DEC.2014 17:46:51

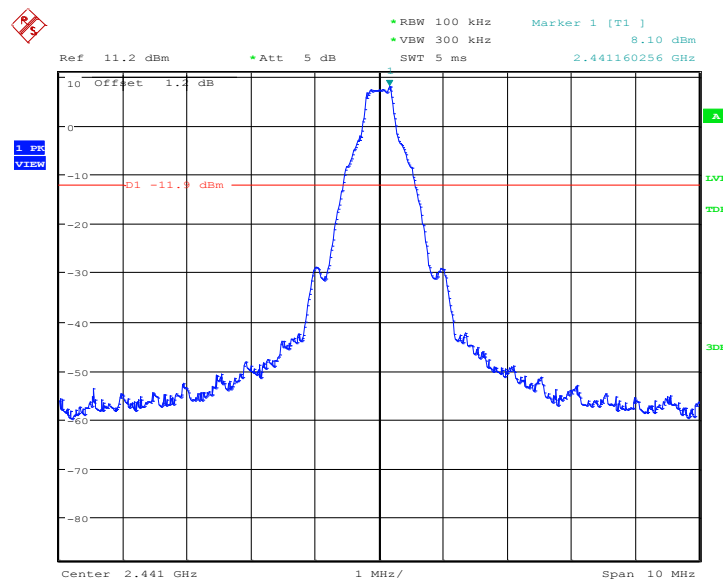
Fig.16. Conducted spurious emission: GFSK, Channel 0, 3GHz - 10GHz



Date: 3.DEC.2014 17:47:08

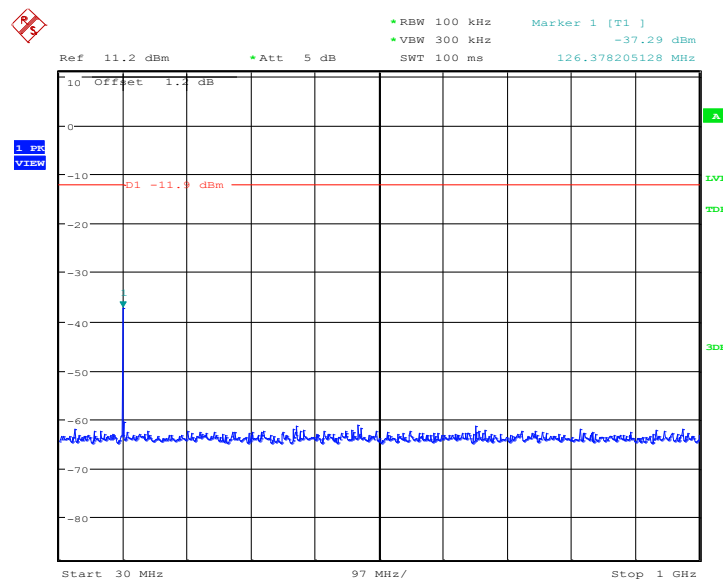
Fig.17. Conducted spurious emission: GFSK, Channel 0, 10GHz - 26GHz





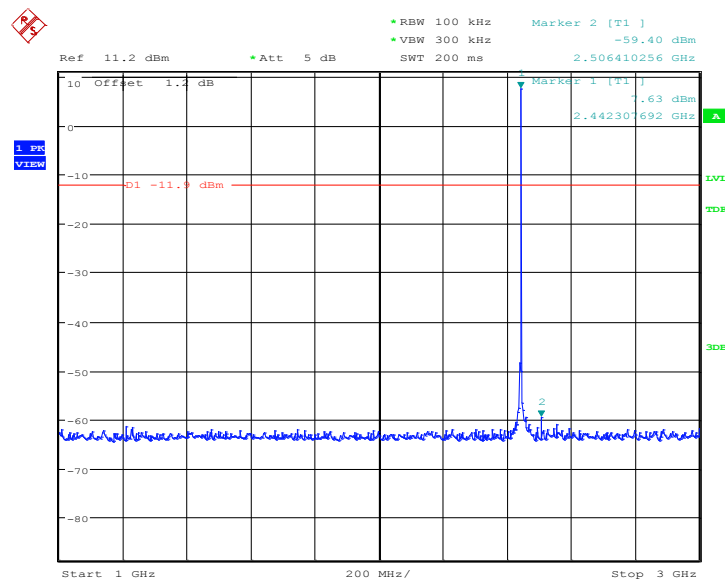
Date: 3.DEC.2014 17:47:24

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



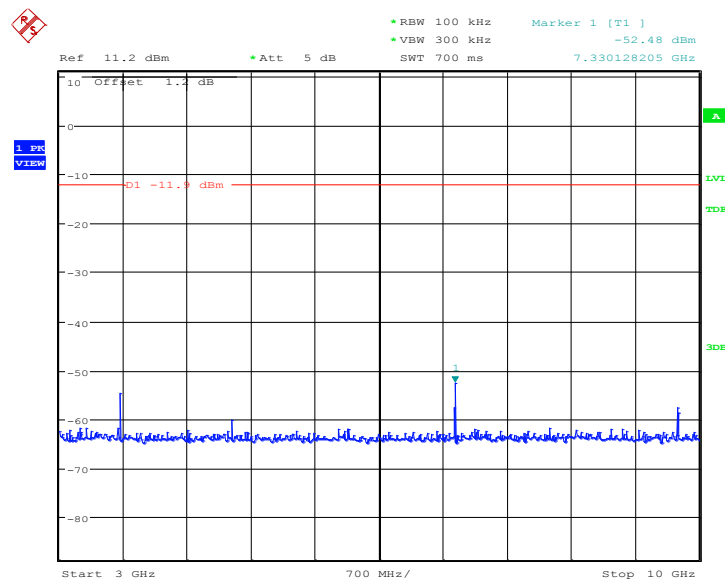
Date: 3.DEC.2014 17:47:41

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



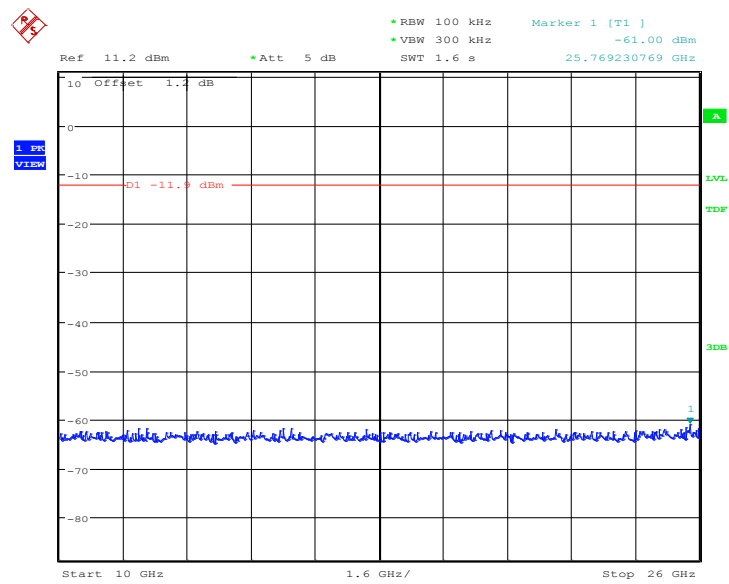
Date: 3.DEC.2014 17:48:12

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



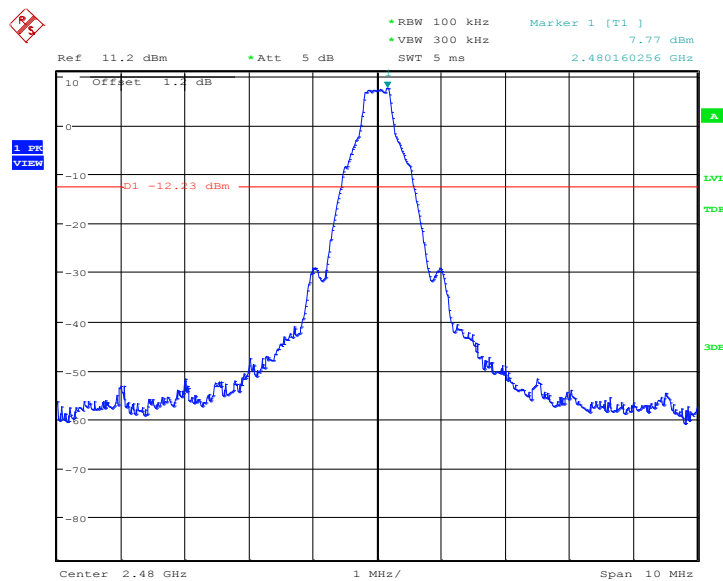
Date: 3.DEC.2014 17:48:29

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



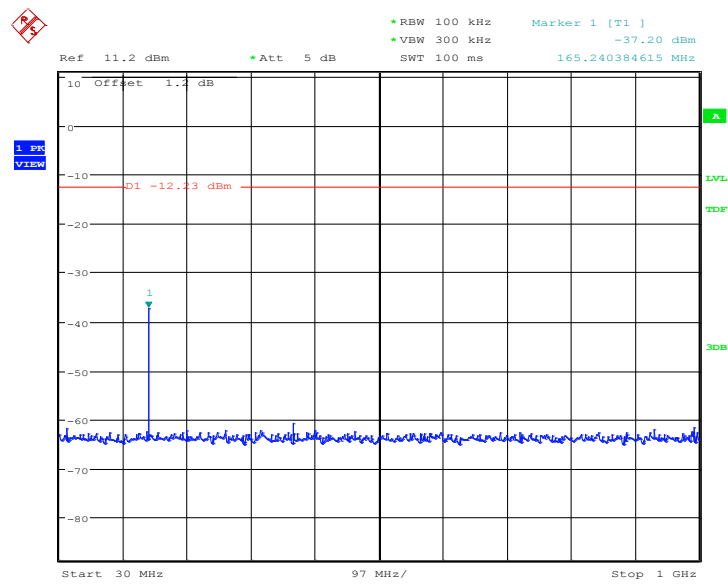
Date: 3.DEC.2014 17:48:45

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



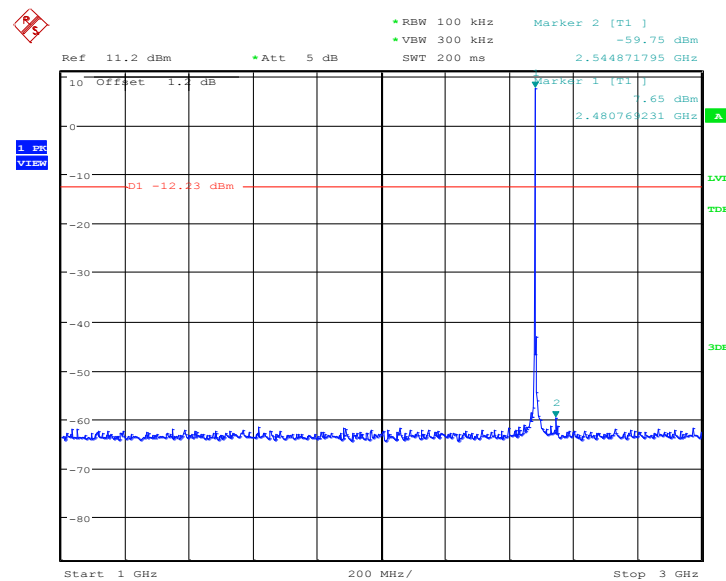
Date: 3.DEC.2014 17:49:02

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



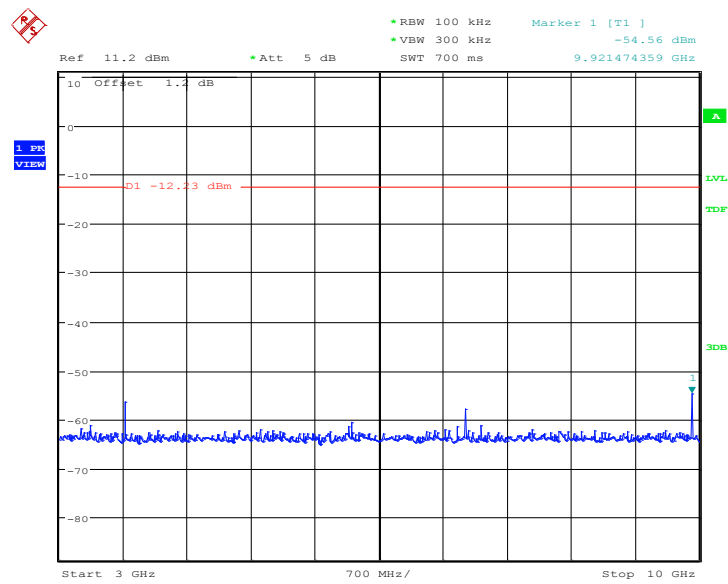
Date: 3.DEC.2014 17:49:19

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



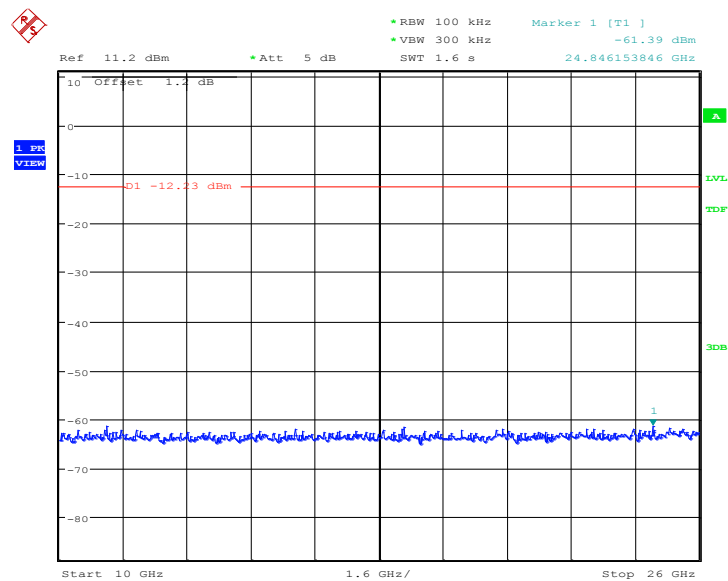
Date: 3.DEC.2014 17:49:50

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



Date: 3.DEC.2014 17:50:07

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



Date: 3.DEC.2014 17:50:23

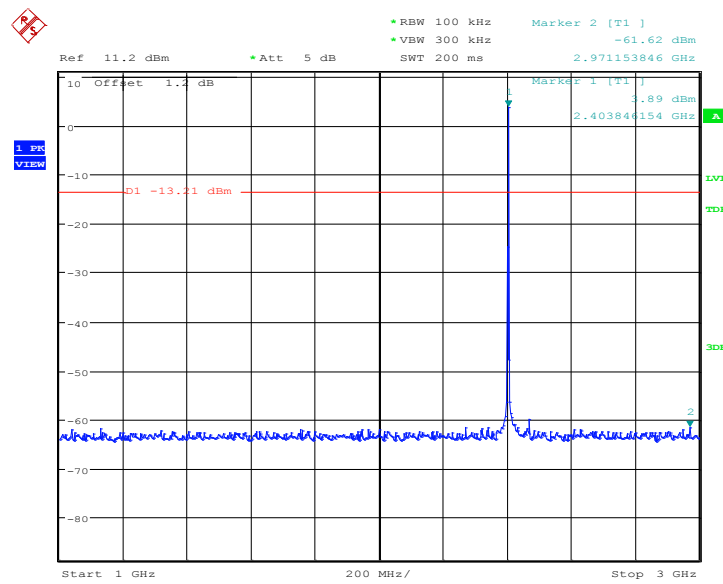
Fig.27. Conducted spurious emission: GFSK, Channel 78, 10GHz - 26GHz



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

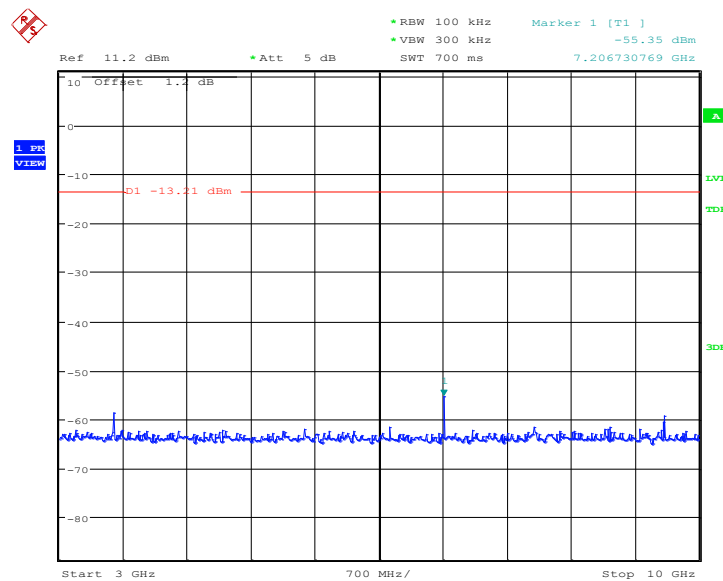


Fig.29. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 30MHz - 1GHz



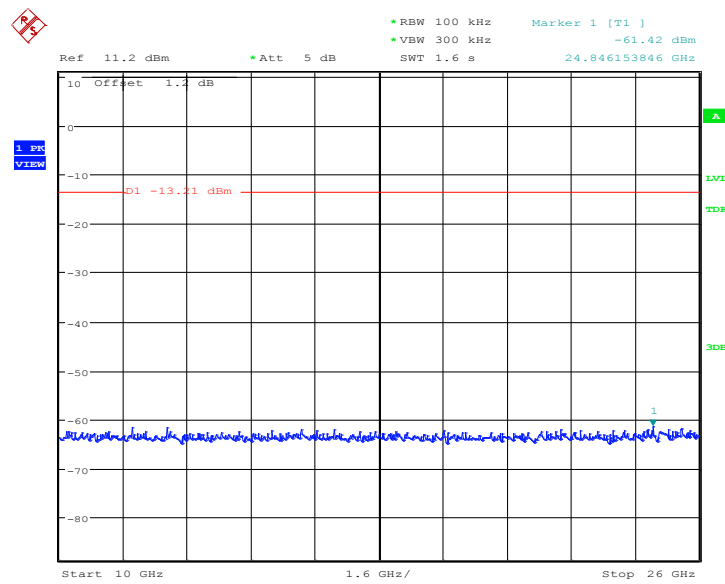
Date: 3.DEC.2014 18:08:34

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



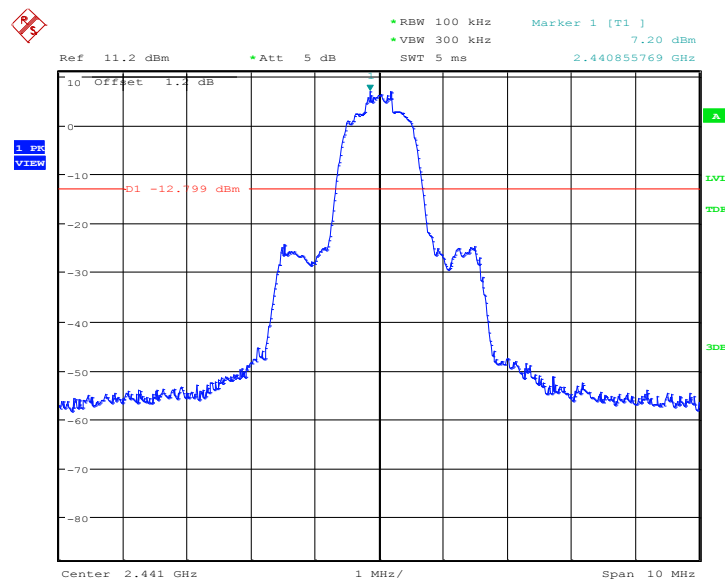
Date: 3.DEC.2014 18:08:50

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



Date: 3.DEC.2014 18:09:07

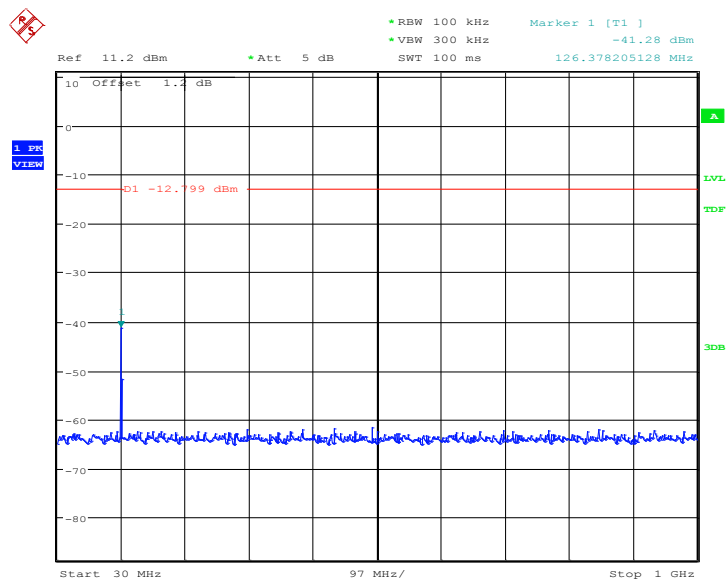
Fig.32. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 10GHz - 26GHz



Date: 3.DEC.2014 18:09:23

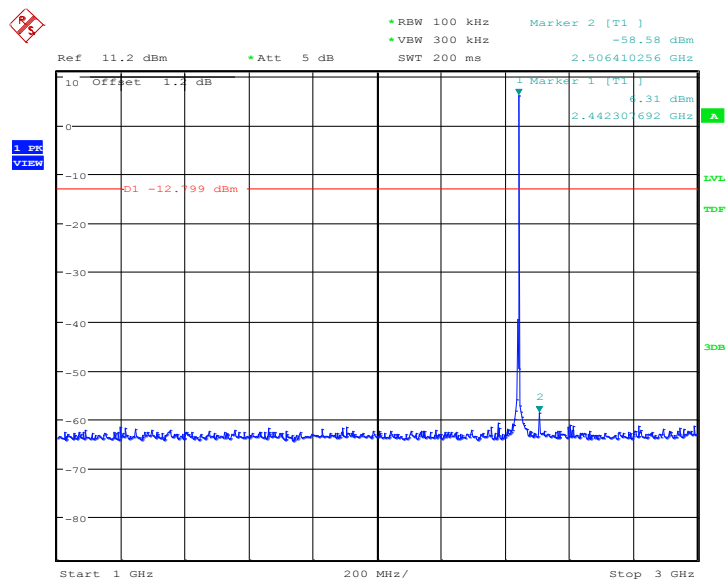
Fig.33. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 2441MHz





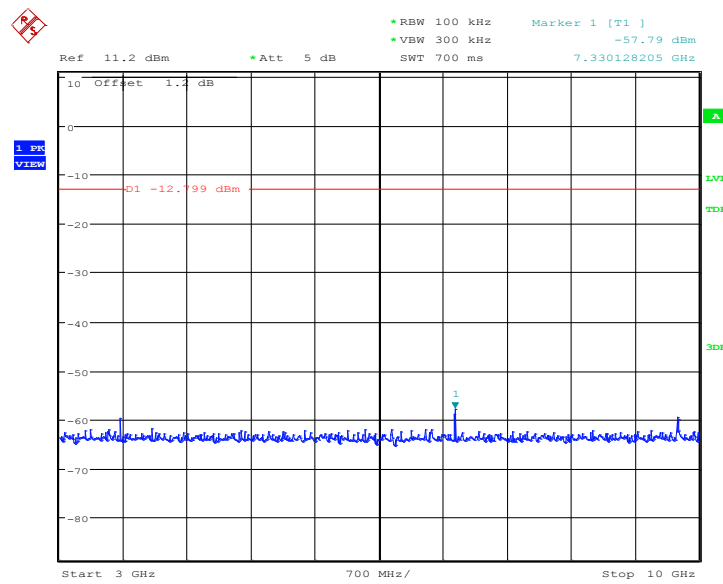
Date: 3.DEC.2014 18:09:40

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



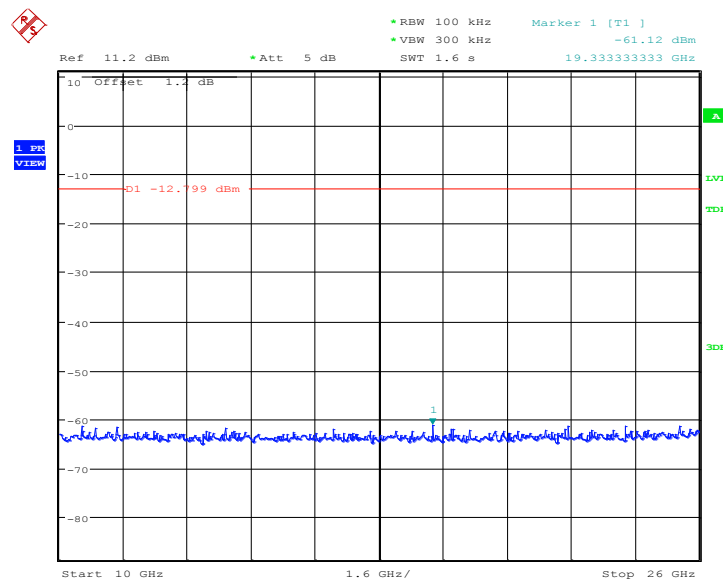
Date: 3.DEC.2014 18:10:11

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



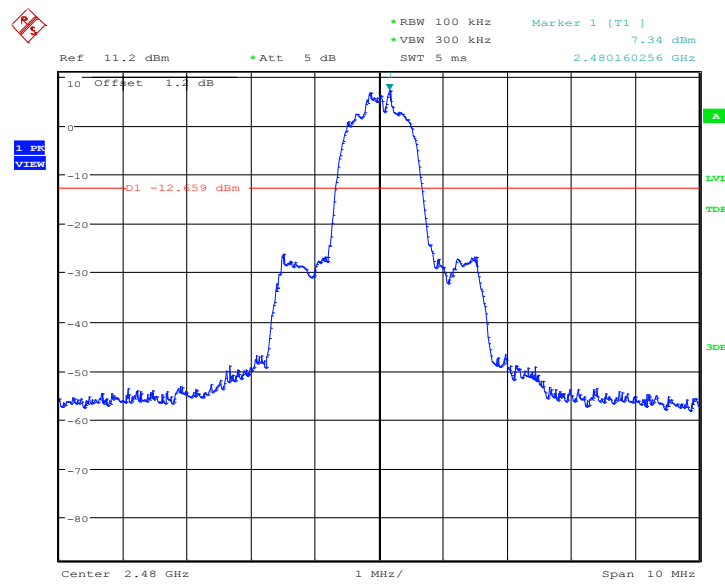
Date: 3.DEC.2014 18:10:28

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



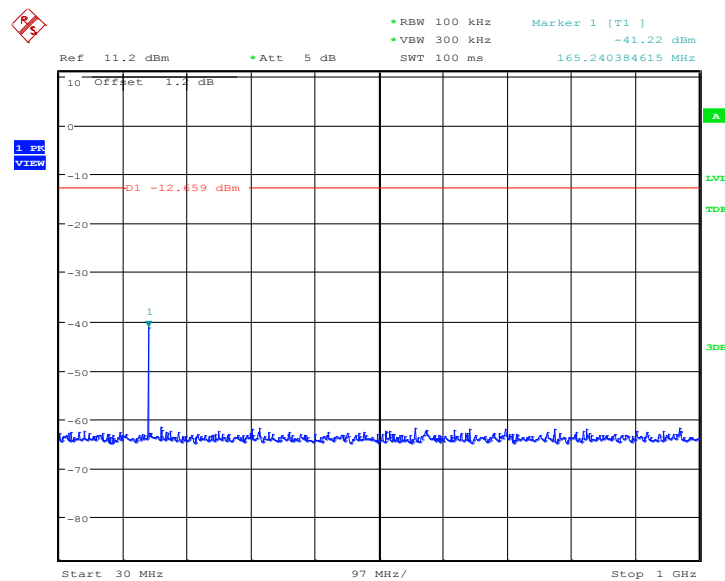
Date: 3.DEC.2014 18:10:44

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



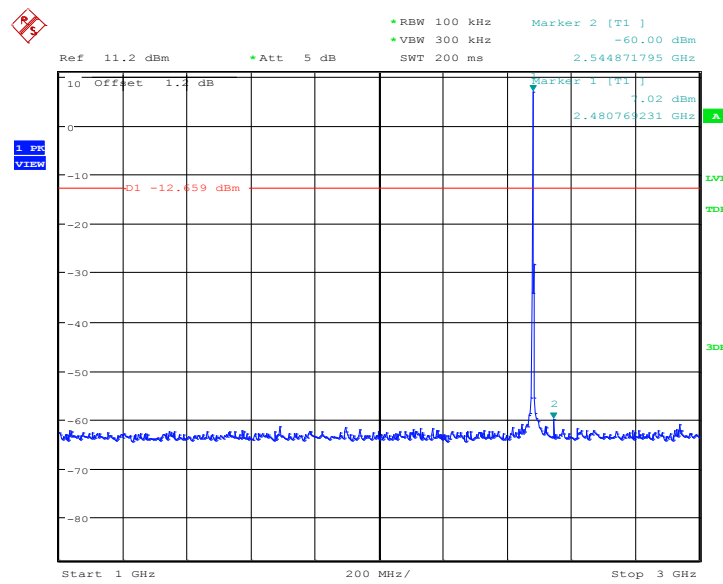
Date: 3.DEC.2014 18:11:01

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



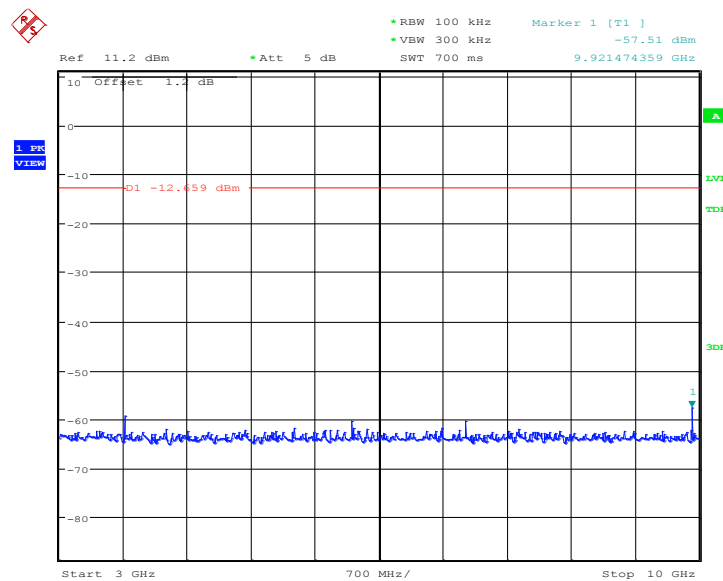
Date: 3.DEC.2014 18:11:18

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



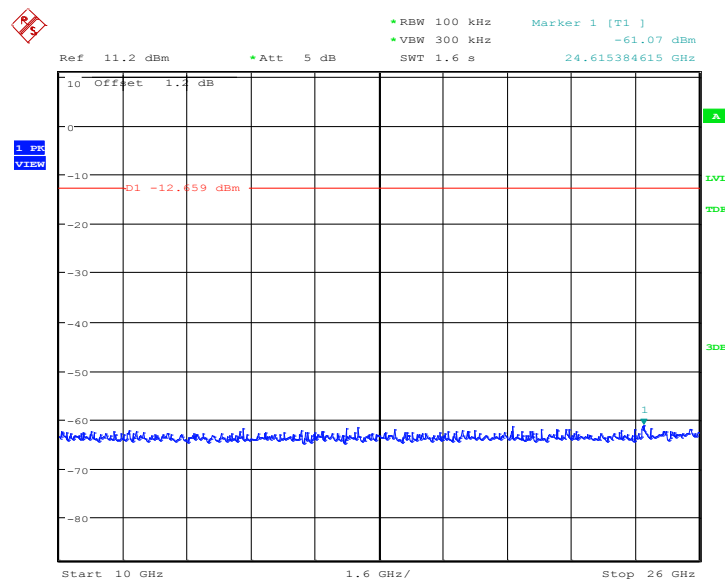
Date: 3.DEC.2014 18:11:49

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



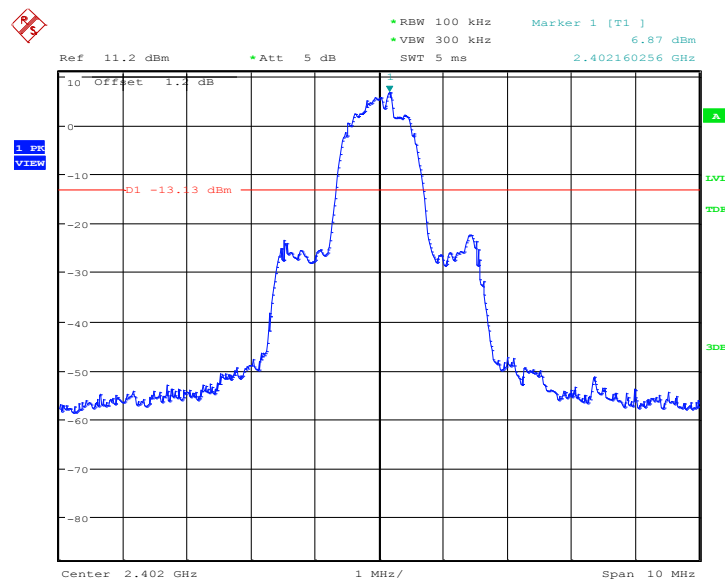
Date: 3.DEC.2014 18:12:06

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



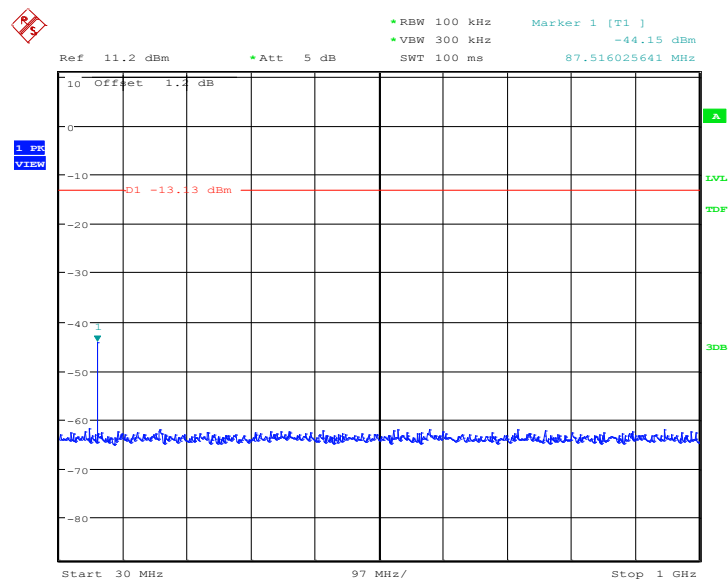
Date: 3.DEC.2014 18:12:22

Fig.42. Fig.30 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 10GHz - 26GHz



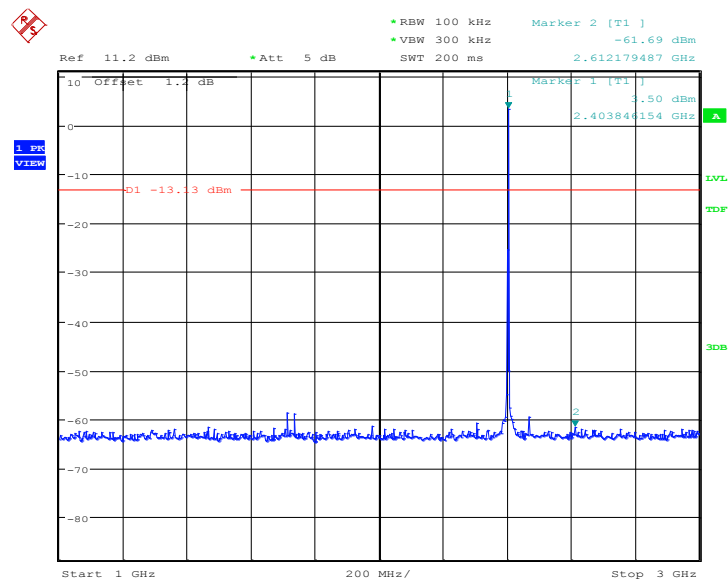
Date: 3.DEC.2014 18:29:45

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



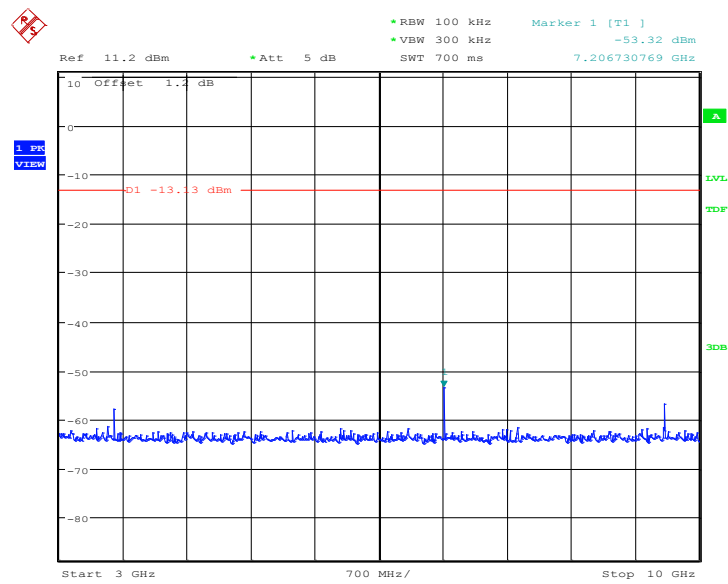
Date: 3.DEC.2014 18:30:01

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



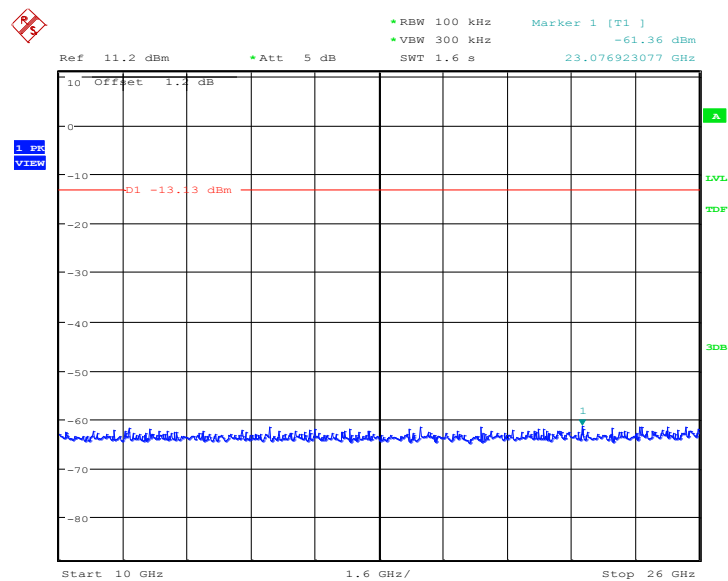
Date: 3.DEC.2014 18:30:33

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



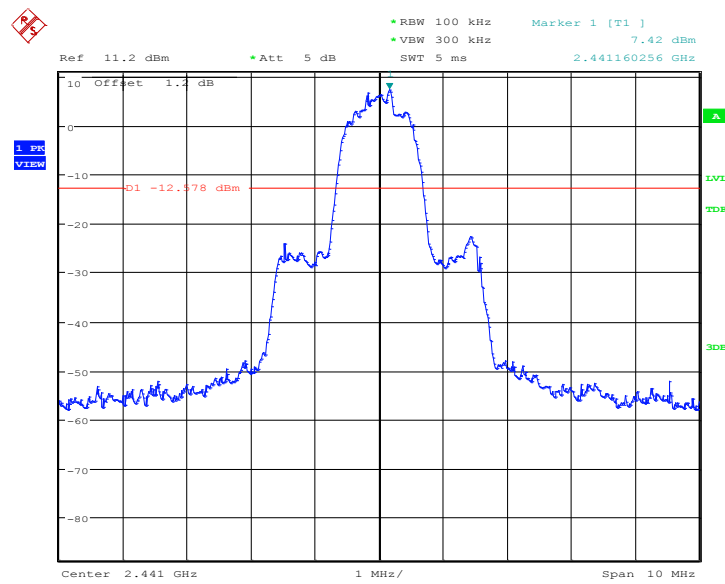
Date: 3.DEC.2014 18:30:49

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



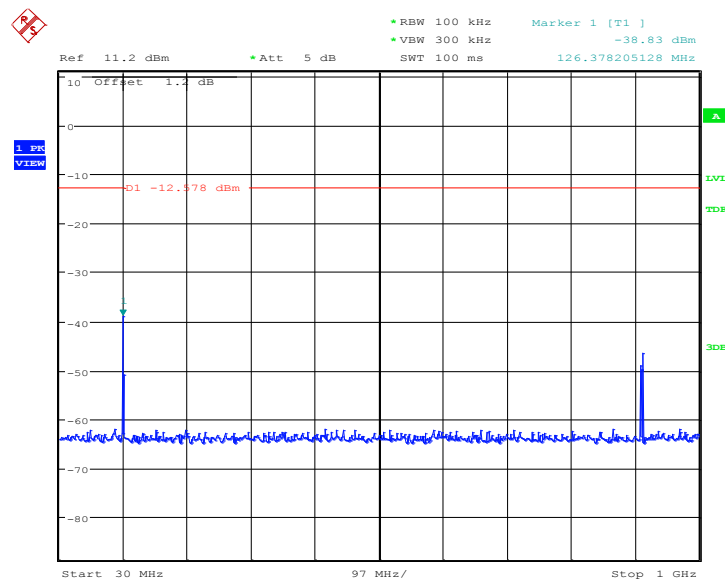
Date: 3.DEC.2014 18:31:06

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



Date: 3.DEC.2014 18:31:22

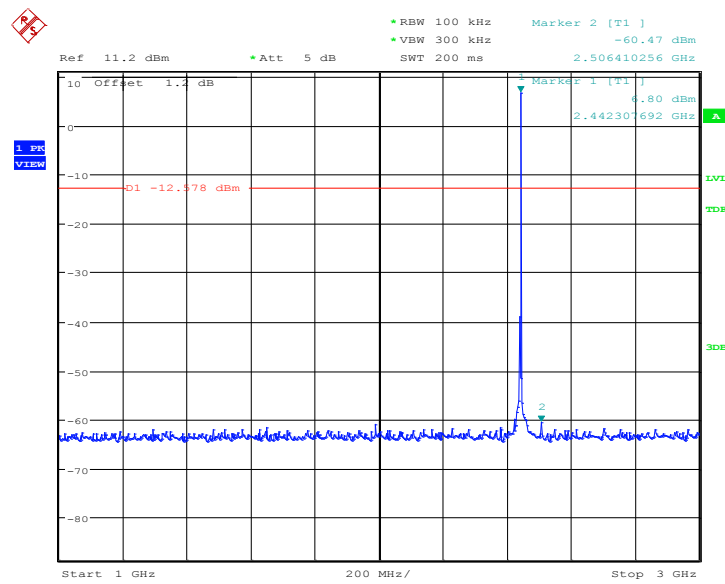
Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz



Date: 3.DEC.2014 18:31:39

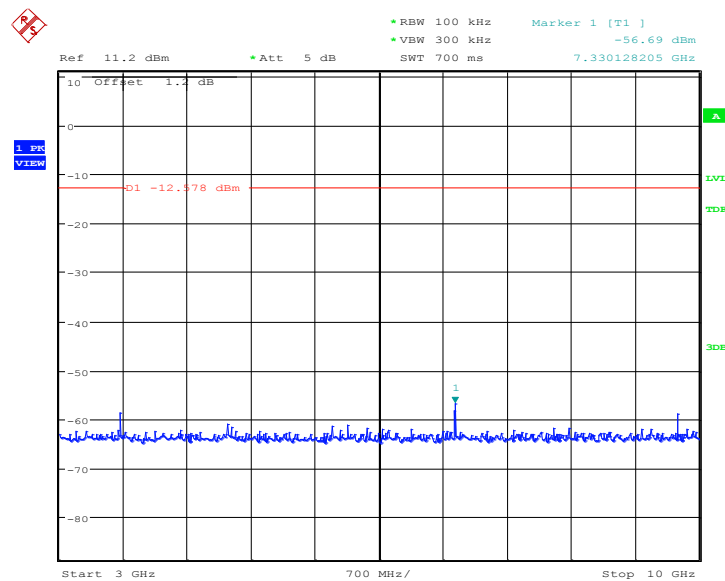
Fig.49. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz





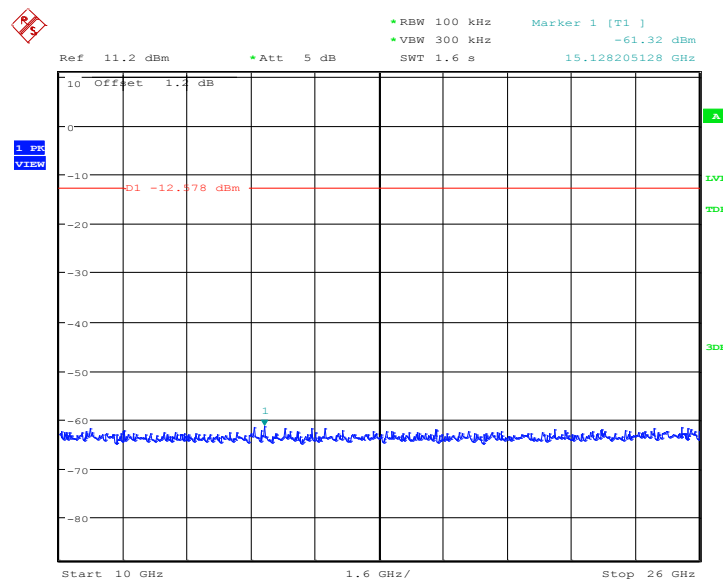
Date: 3.DEC.2014 18:32:11

Fig.50. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz



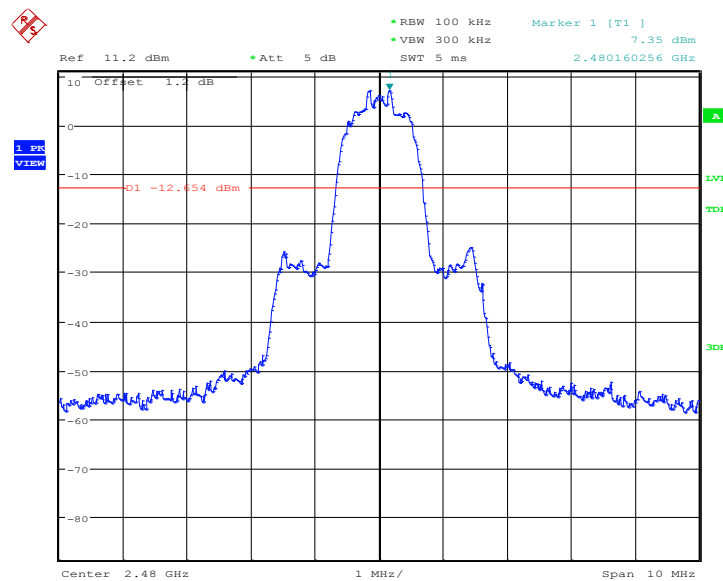
Date: 3.DEC.2014 18:32:27

Fig.51. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz



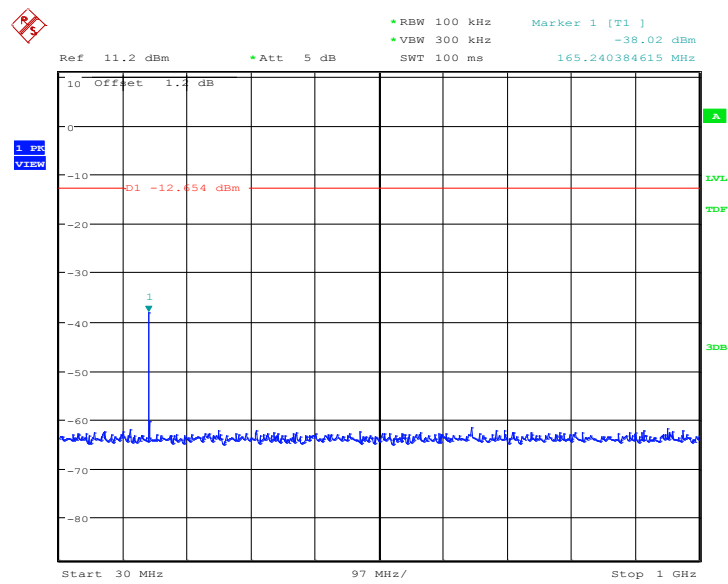
Date: 3.DEC.2014 18:32:44

Fig.52. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz



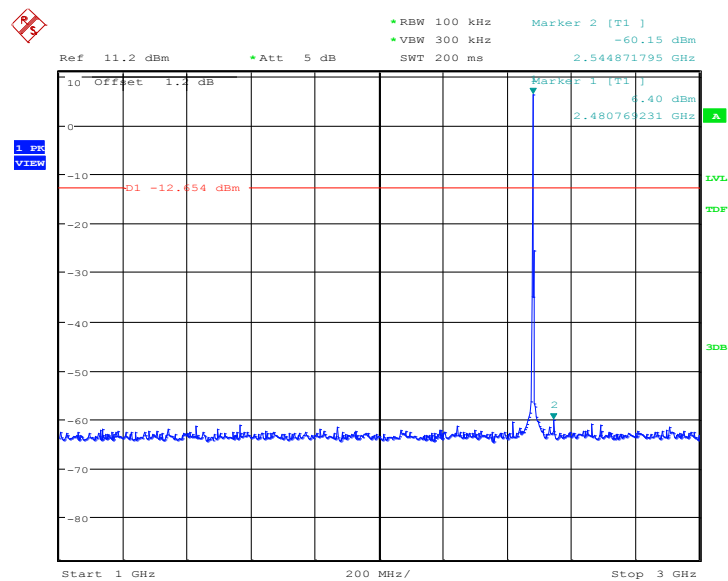
Date: 3.DEC.2014 18:33:00

Fig.53. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz



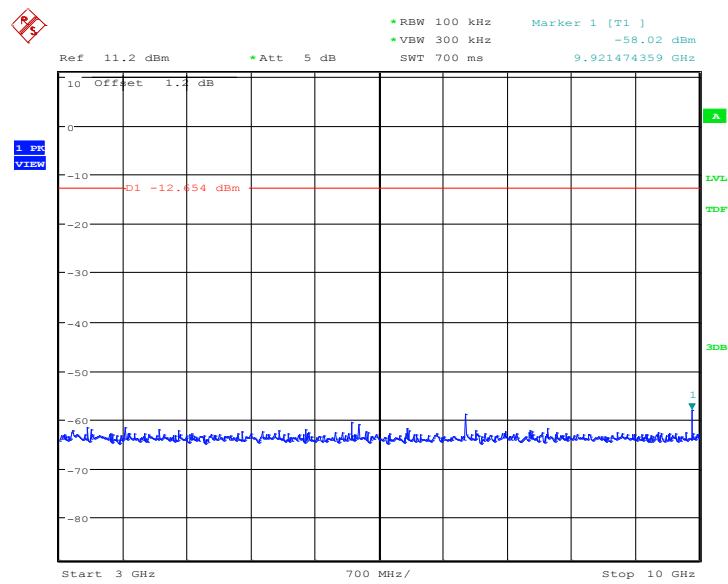
Date: 3.DEC.2014 18:33:17

Fig.54. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz



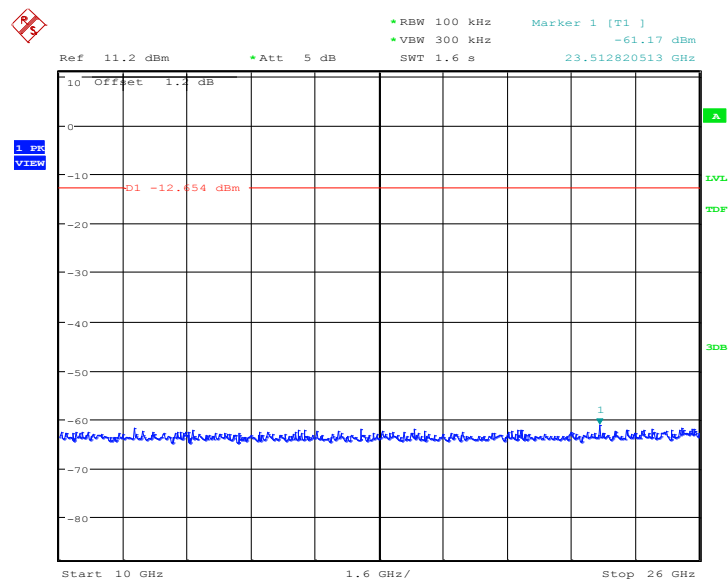
Date: 3.DEC.2014 18:33:48

Fig.55. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz



Date: 3.DEC.2014 18:34:05

Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz



Date: 3.DEC.2014 18:34:21

Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

## A.5. 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)).

The measurement is made according to ANSI C63.10

### Limit in restricted band:

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

### 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	100KHz/300KHz	5
1000-4000	1MHz/1MHz	15
4000-18000	1MHz/1MHz	40
18000-26500	1MHz/1MHz	20

### Measurement Results:

Result= $P_{Mea}$ +ARPL

### For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	Fig.58	P
	3 GHz ~ 18 GHz	Fig.59	P
Ch 39 2441 MHz	9 kHz ~ 30 MHz	Fig.60	P
	30 MHz ~ 1 GHz	Fig.61	P
	1 GHz ~ 3 GHz	Fig.62	P
	3 GHz ~ 18 GHz	Fig.63	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.64	P
	3 GHz ~ 18 GHz	Fig.65	P
Power	2.38GHz~2.4GHz---L	Fig.66	P

Power	2.45GHz~2.5GHz---H	Fig.67	P
For all channels	18 GHz ~ 26 GHz	Fig.68	P

#### For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	Fig.69	P
	3 GHz ~ 18 GHz	Fig.70	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.71	P
	1 GHz ~ 3 GHz	Fig.72	P
	3 GHz ~ 18 GHz	Fig.73	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.74	P
	3 GHz ~ 18 GHz	Fig.75	P
Power	2.38GHz~2.4GHz---L	Fig.76	P
Power	2.45GHz~2.5GHz---H	Fig.77	P
For all channels	18 GHz ~ 26 GHz	Fig.78	P

#### For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	Fig.79	P
	3 GHz ~ 18 GHz	Fig.80	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.81	P
	1 GHz ~ 3 GHz	Fig.82	P
	3 GHz ~ 18 GHz	Fig.83	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.84	P
	3 GHz ~ 18 GHz	Fig.85	P
Power	2.38GHz~2.4GHz---L	Fig.86	P
Power	2.45GHz~2.5GHz---H	Fig.87	P
For all channels	18 GHz ~ 26 GHz	Fig.88	P

#### GFSK Ch 0 - Average

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	PMea(dBuv/m)	Polarization
2390.000	35.1	-11.1	46.200	H
17998.500	42.2	27.9	14.300	H
17995.500	42.1	27.9	14.200	V
17977.500	42.0	27.9	14.100	V
17980.500	42.0	27.9	14.100	V
17964.000	41.9	27.9	14.000	V

**GFSK Ch 39 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
17997.000	42.5	27.9	14.600	H
17985.000	42.2	27.9	14.300	V
17979.000	42.2	27.9	14.300	V
17974.500	42.2	27.9	14.300	V
17995.500	42.1	27.9	14.200	H
17971.500	42.1	27.9	14.200	H

**GFSK Ch 78 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2483.519	41.7	-11.2	52.300	H
17971.500	42.1	27.9	15.100	V
17985.000	42.0	27.9	14.900	V
17979.000	42.0	-1.1	43.666	H
17994.000	42.0	27.9	14.700	H
17974.500	42.0	27.9	14.700	V

 **$\pi/4$  DQPSK Ch 0 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2389.825	35.1	-11.1	46.200	H
17955.000	41.9	27.9	14.000	V
17973.000	41.9	27.9	14.000	H
17995.500	41.7	27.9	13.800	V
17998.500	41.6	27.9	13.700	H
17956.500	41.6	27.9	13.700	V

 **$\pi/4$  DQPSK Ch 39 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
17997.000	42.0	27.9	14.100	V
17977.500	41.9	27.9	14.000	V
17971.500	41.7	27.9	13.800	V
17967.000	41.7	27.9	13.800	H
17974.500	41.7	27.9	13.800	V
17985.000	41.7	27.9	13.800	V

 **$\pi/4$  DQPSK Ch 78 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2483.513	40.6	-11.2	53.800	V
17998.500	42.4	27.9	15.900	H
17977.500	42.2	27.9	15.700	V
17995.500	41.9	-1.1	44.566	V
17991.000	41.9	27.9	15.600	V
17967.000	41.8	27.9	15.500	H

**8DPSK Ch 0 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2389.569	35.2	-11.1	46.300	V
17998.500	42.0	27.9	14.100	H
17977.500	41.9	27.9	14.000	V
17980.500	41.8	27.9	13.900	V
17991.000	41.7	27.9	13.800	H
17971.500	41.7	27.9	13.800	V

**8DPSK Ch 39 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
17994.000	42.0	27.9	14.100	H
17977.500	41.8	27.9	13.900	H
17997.000	41.8	27.9	13.900	V
17985.000	41.8	27.9	13.900	V
17967.000	41.7	27.9	13.800	H
17991.000	41.7	27.9	13.800	V

**8DPSK Ch 78 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2483.550	40.3	-11.2	51.500	H
18000.000	41.9	-1.1	42.966	V
17994.000	41.8	27.9	13.900	V
17970.000	41.7	27.9	13.800	V
17973.000	41.7	27.9	13.800	V
17988.000	41.6	27.9	13.700	H

**Conclusion: PASS**

**Test graphs as below:**



RE\_BT\_1G-3GHz

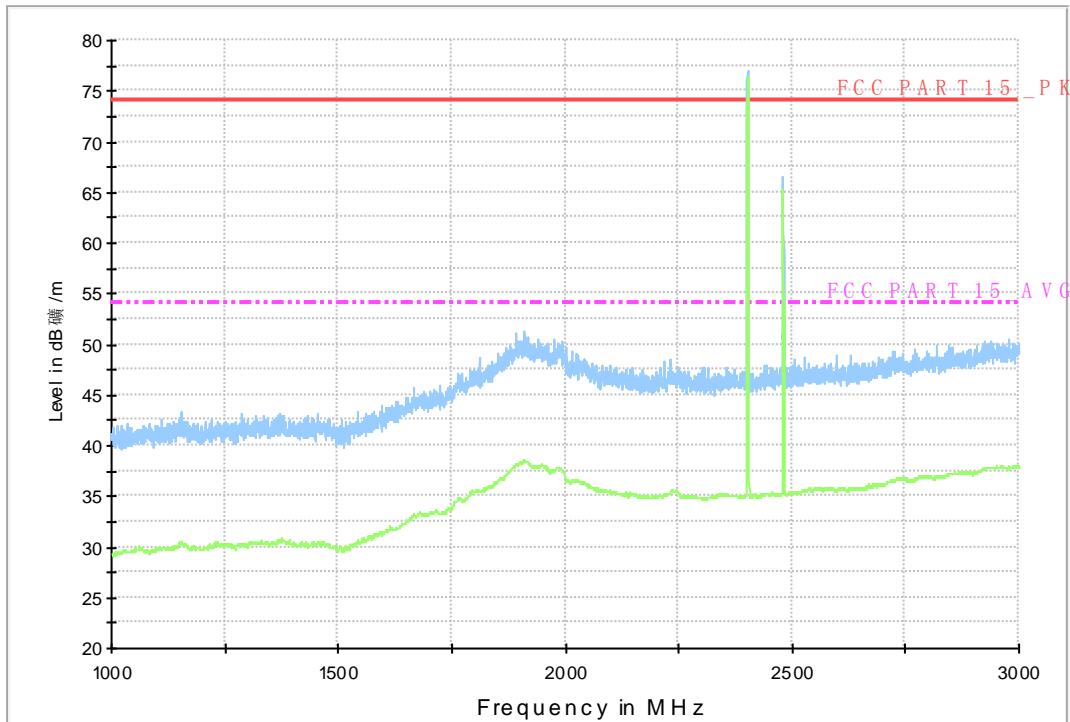


Fig.58. Radiated emission: GFSK, Channel 0, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

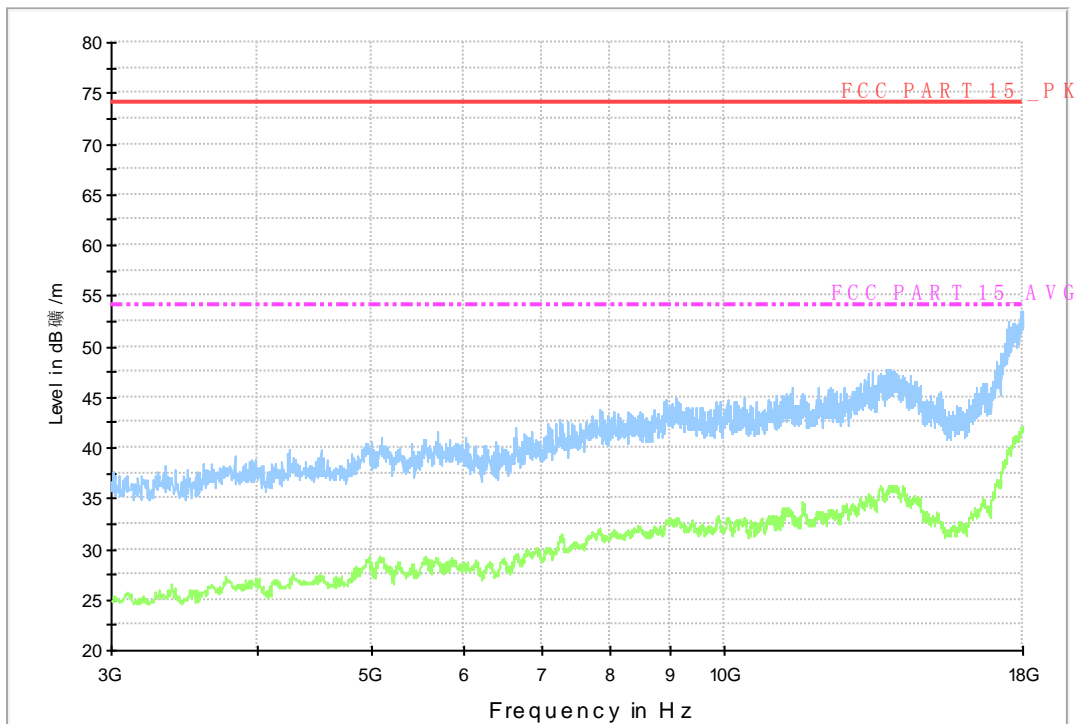


Fig.59. Radiated emission: GFSK, Channel 0, 3 GHz - 18 GHz

RE\_9kHz-30MHz

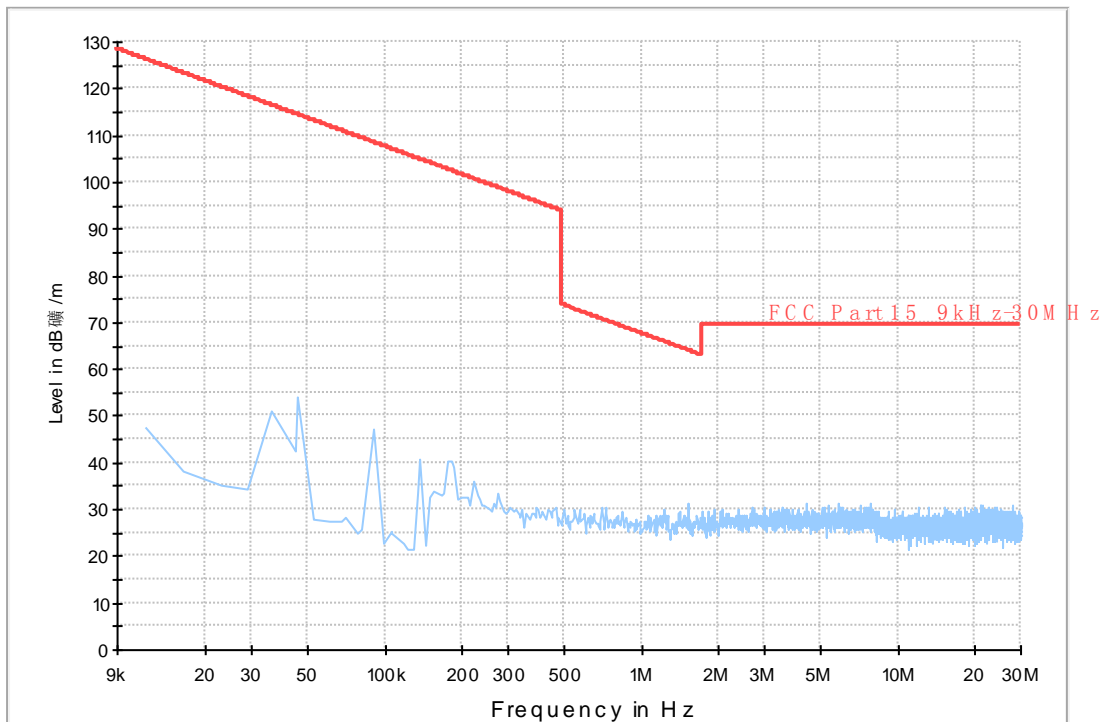


Fig.60. Radiated emission: GFSK, Channel 39, 9 kHz - 30 MHz

Normal RE\_30M-1GHz\_10m

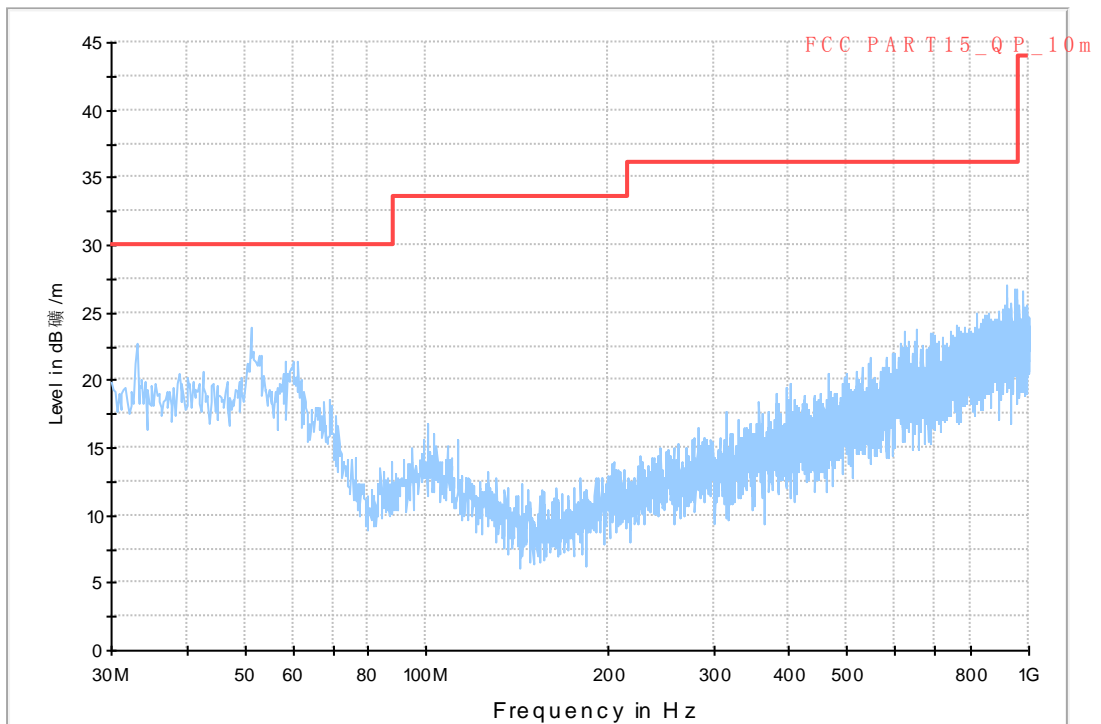


Fig.61. Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz

RE\_BT\_1G-3GHz

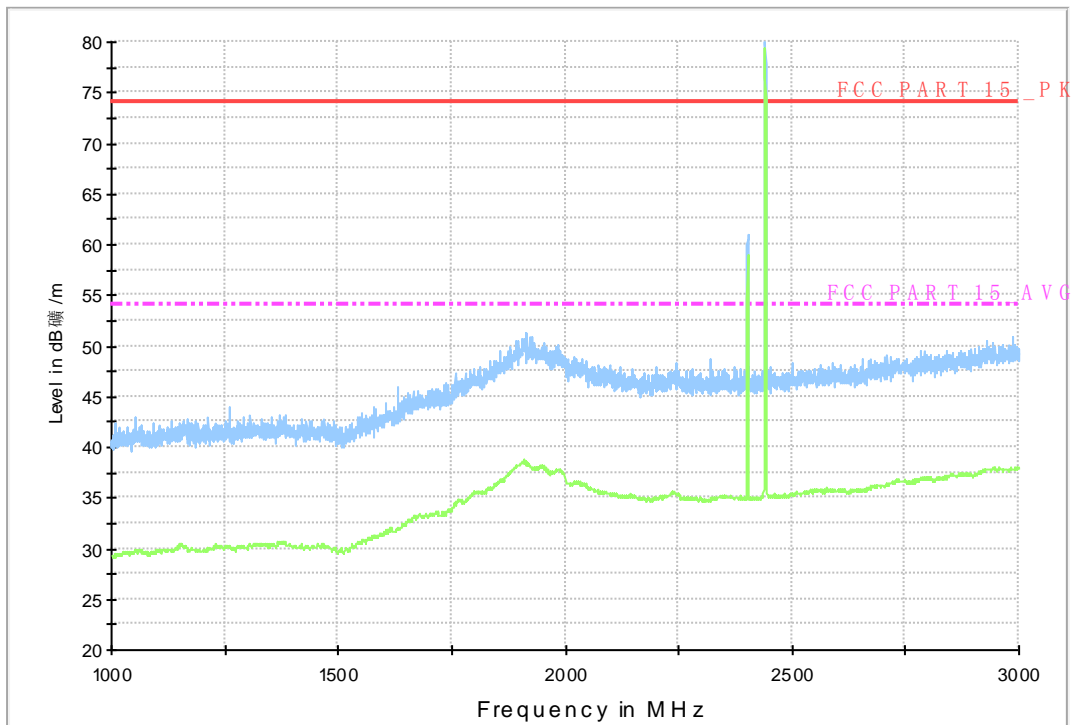


Fig.62. Radiated emission: GFSK, Channel 39, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

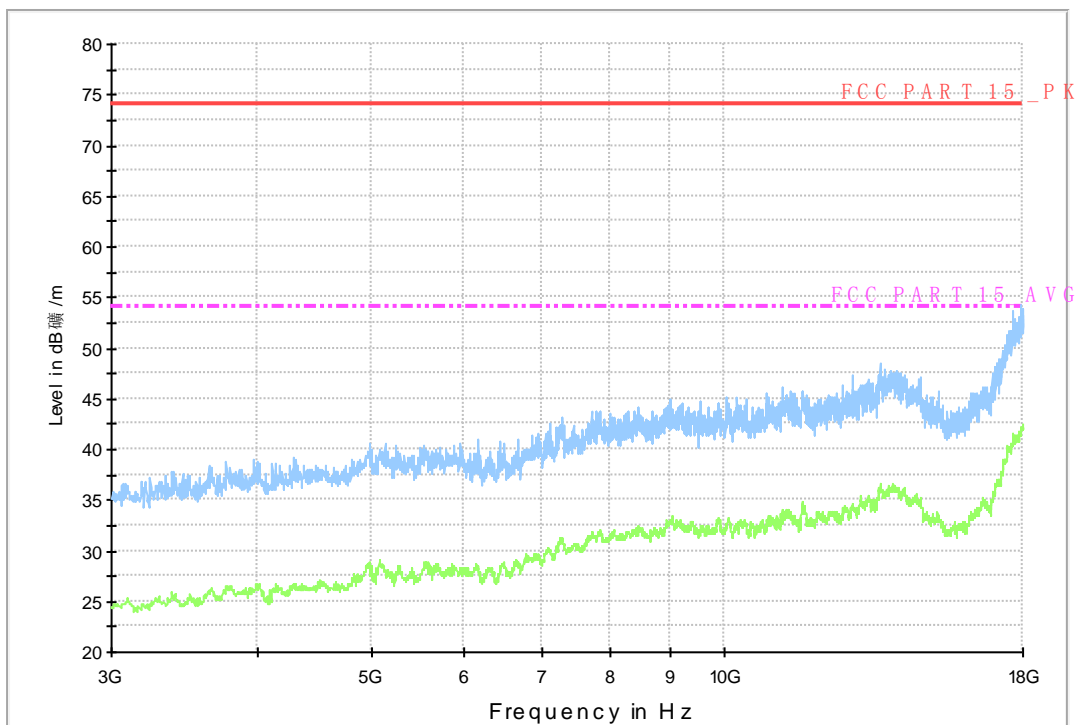


Fig.63. Radiated emission: GFSK, Channel 39, 3 GHz - 18 GHz

RE\_BT\_1G-3GHz

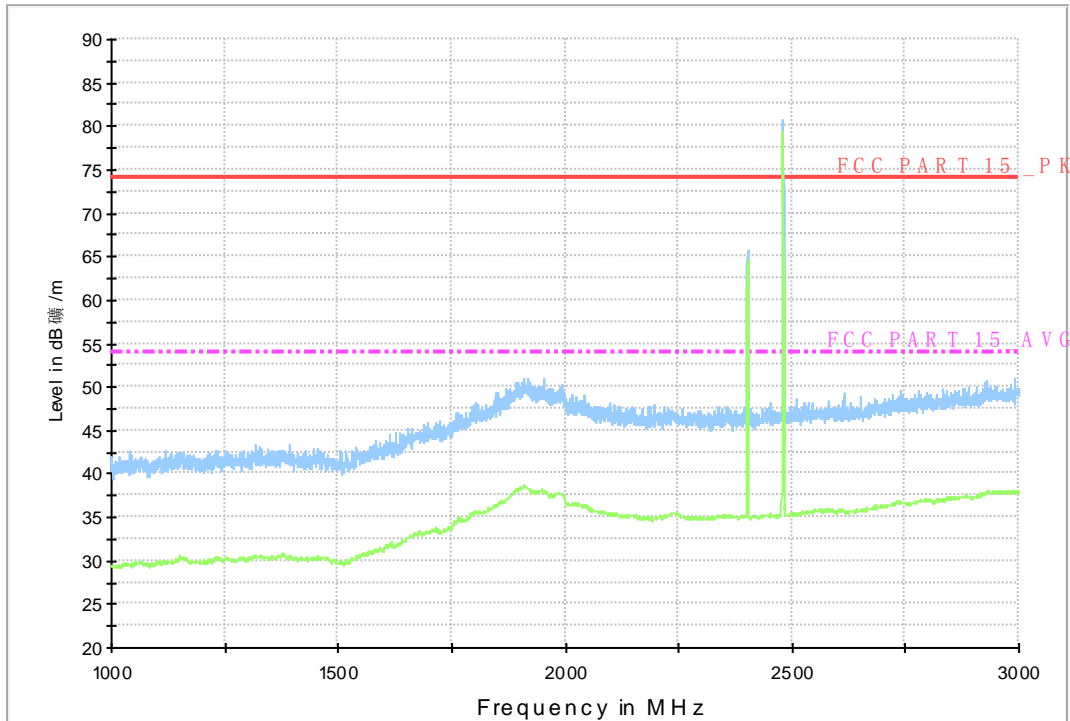


Fig.64. Radiated emission: GFSK, Channel 78, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

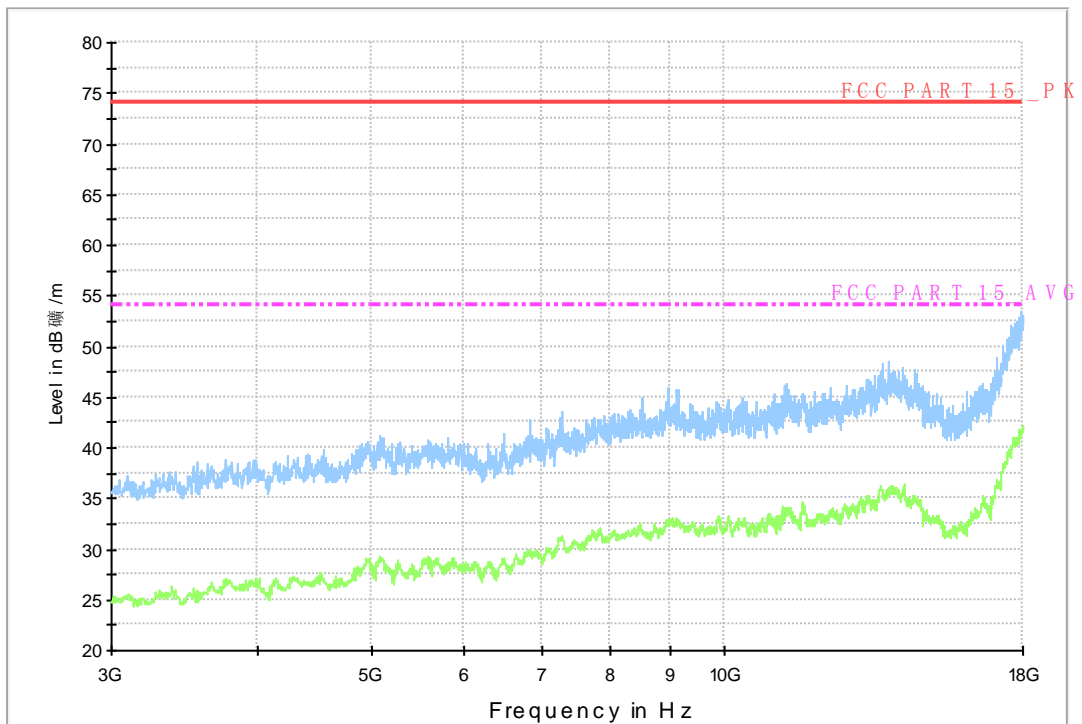


Fig.65. Radiated emission: GFSK, Channel 78, 3 GHz - 18 GHz

RE-BT-Power\_2.38G-2.43GHz

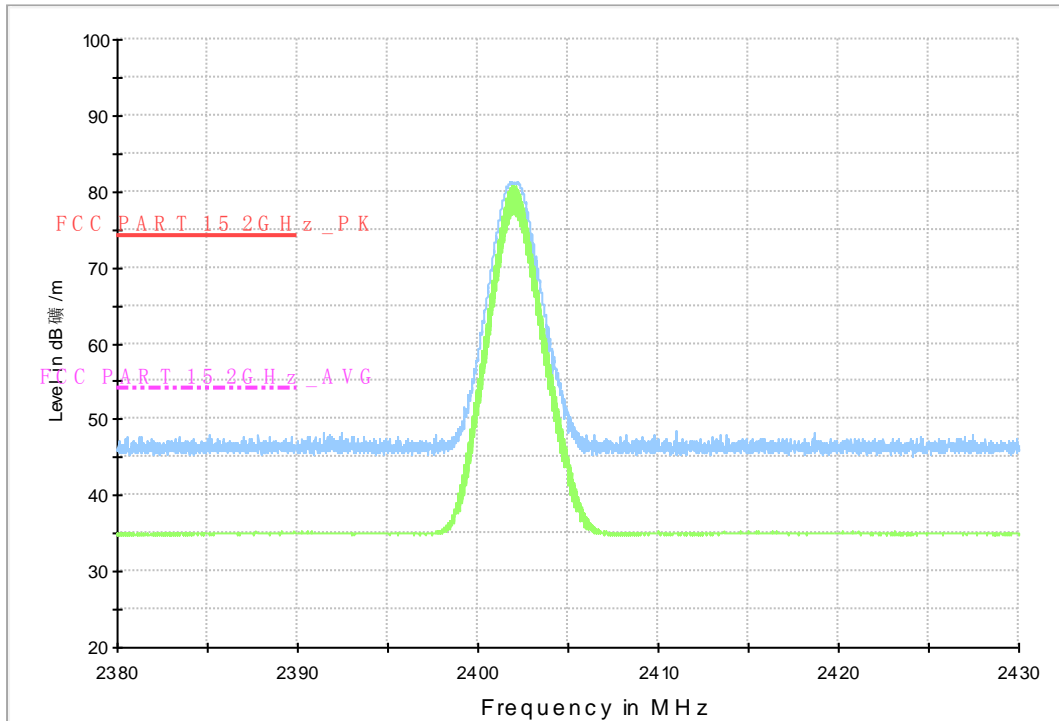


Fig.66. Radiated emission (Power): GFSK, low channel

RE-BT-Power\_2.45G-2.5GHz

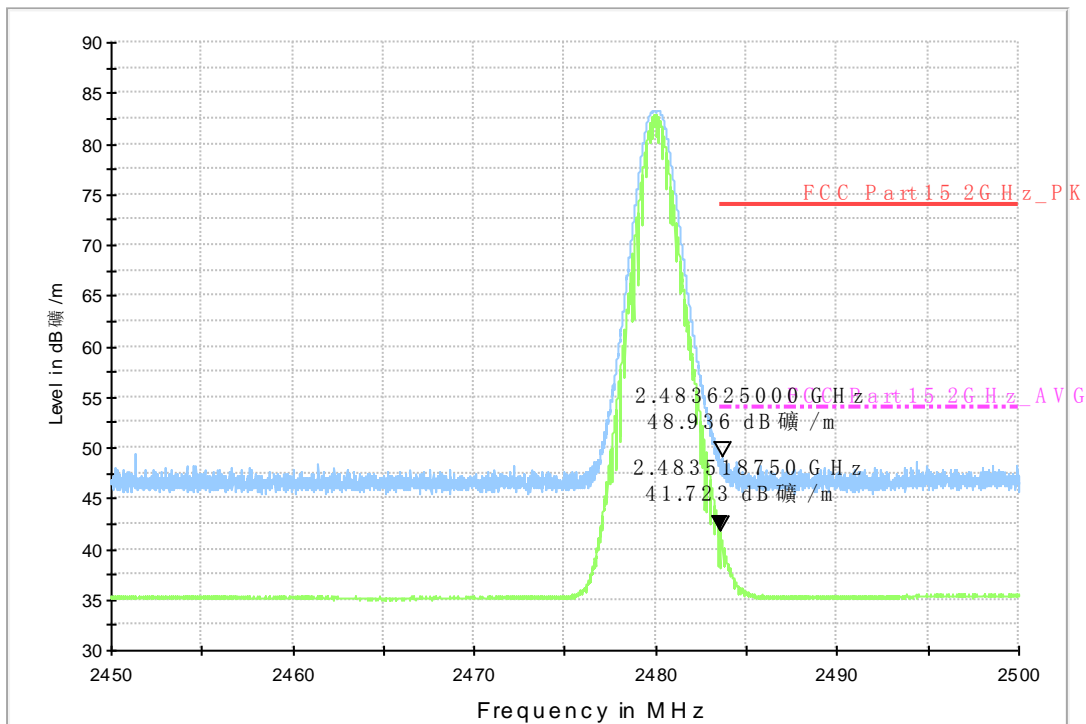


Fig.67. Radiated emission (Power) GFSK, high channel

Normal RE\_18G-26.5GHz

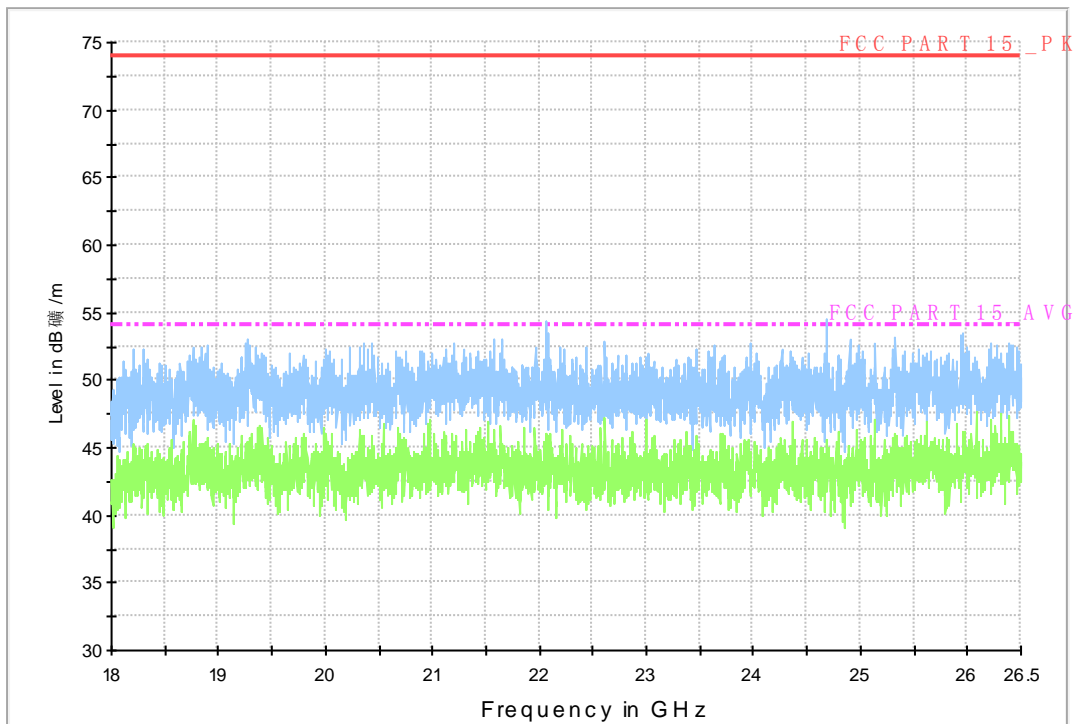


Fig.68. Radiated emission: GFSK, 18 GHz - 26 GHz

RE\_BT\_1G-3GHz

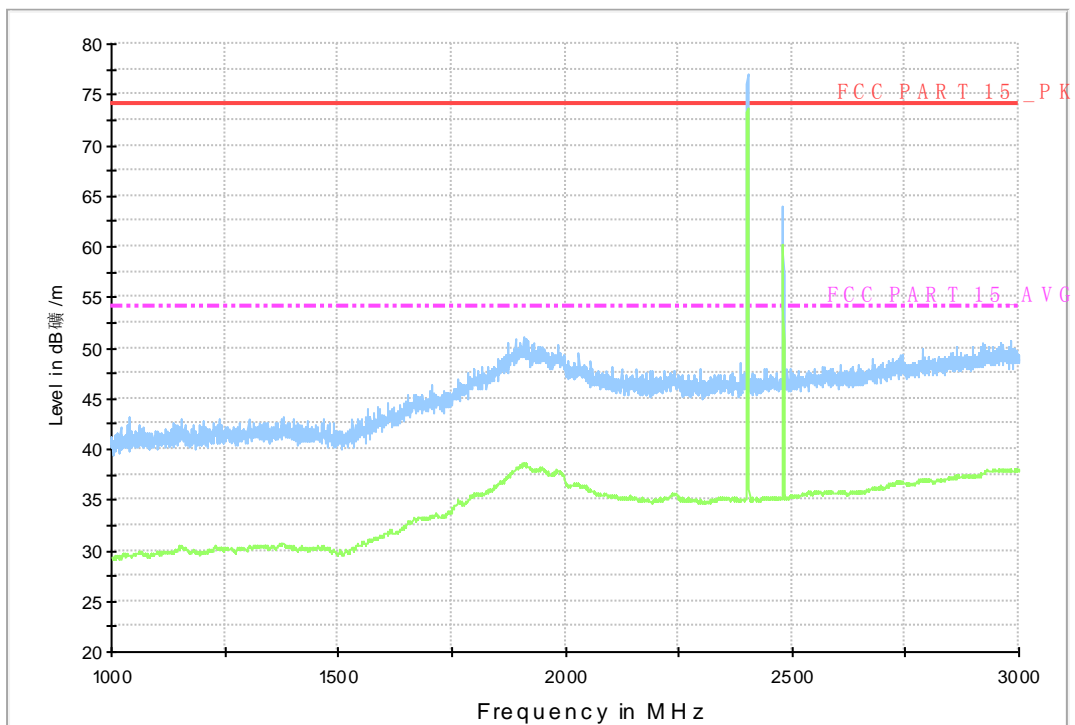


Fig.69. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 1 GHz - 3 GHz

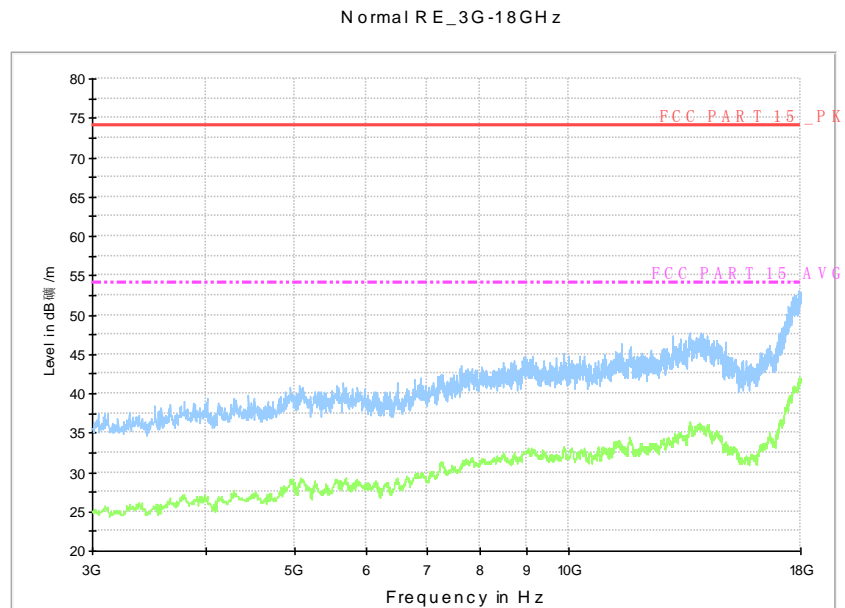


Fig.70. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 3 GHz - 18 GHz

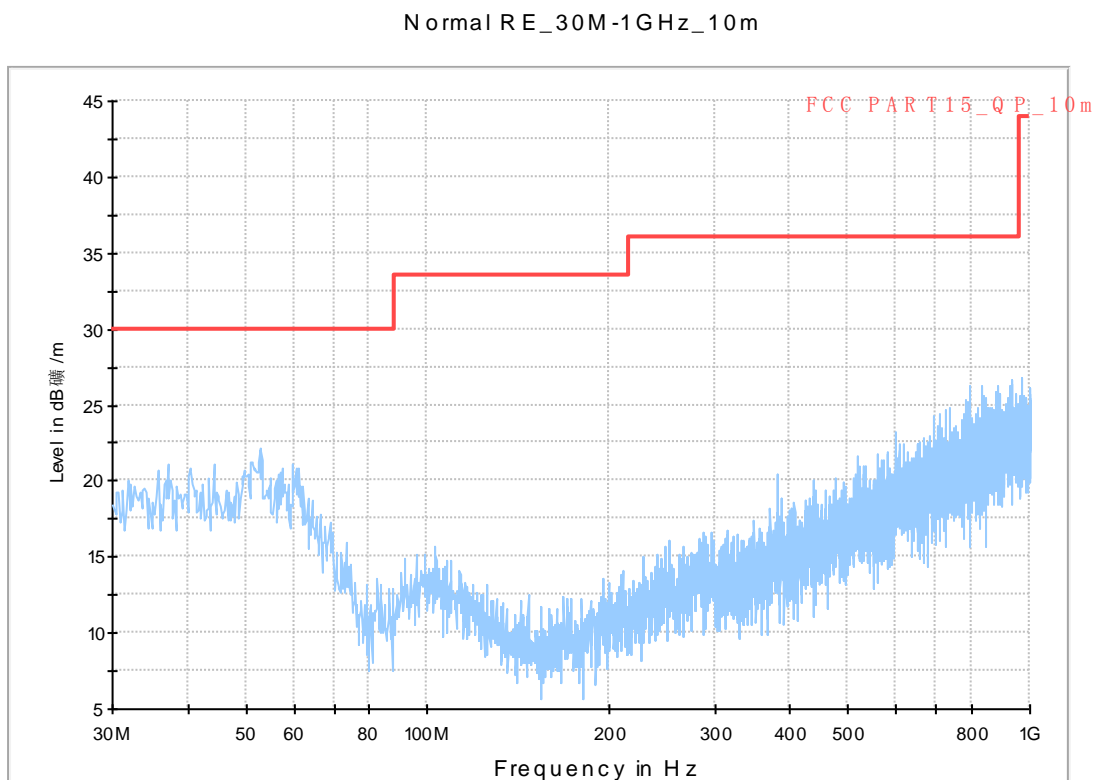


Fig.71. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 30 MHz - 1 GHz

RE\_BT\_1G-3GHz

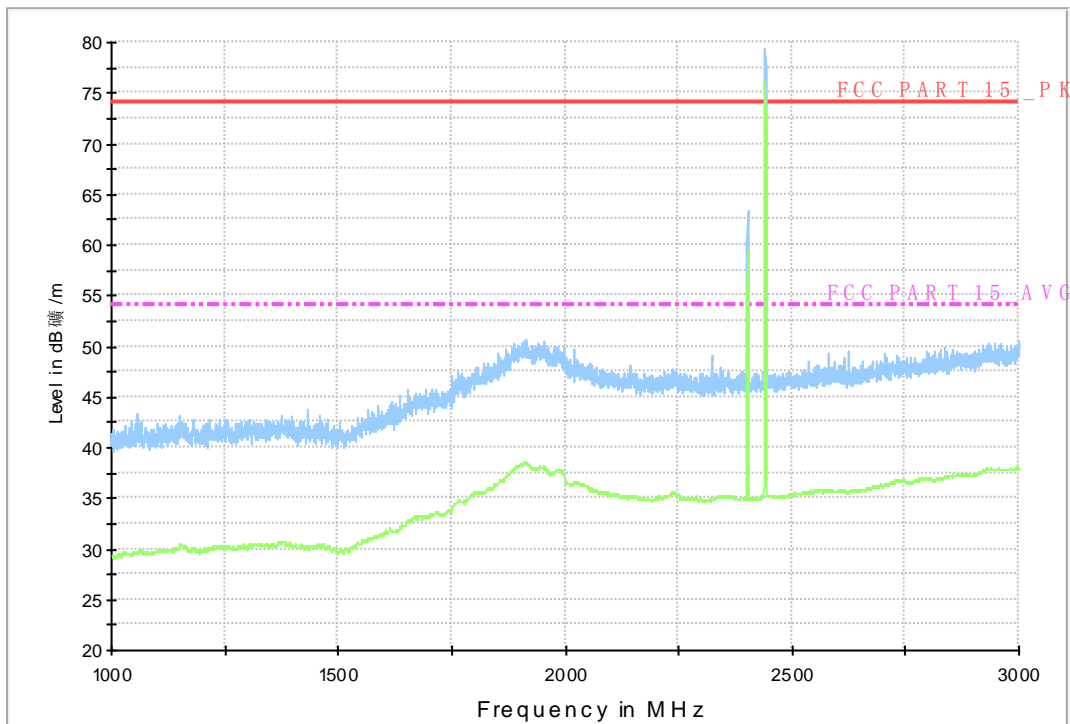


Fig.72. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

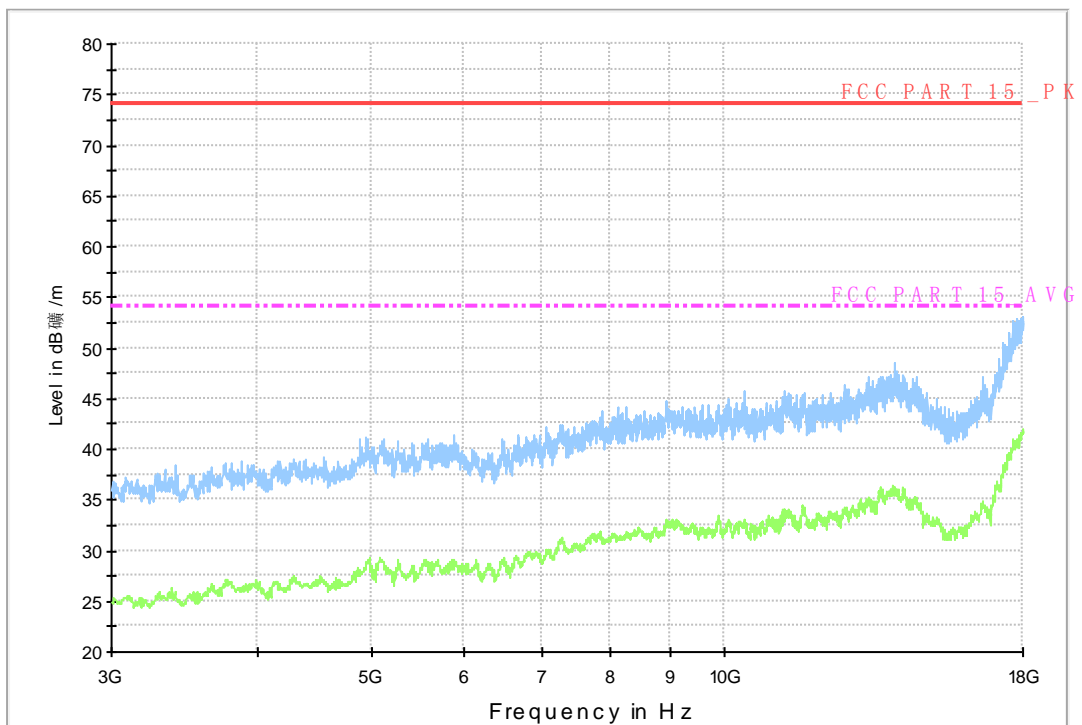


Fig.73. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 3 GHz - 18 GHz



RE\_BT\_1G-3GHz

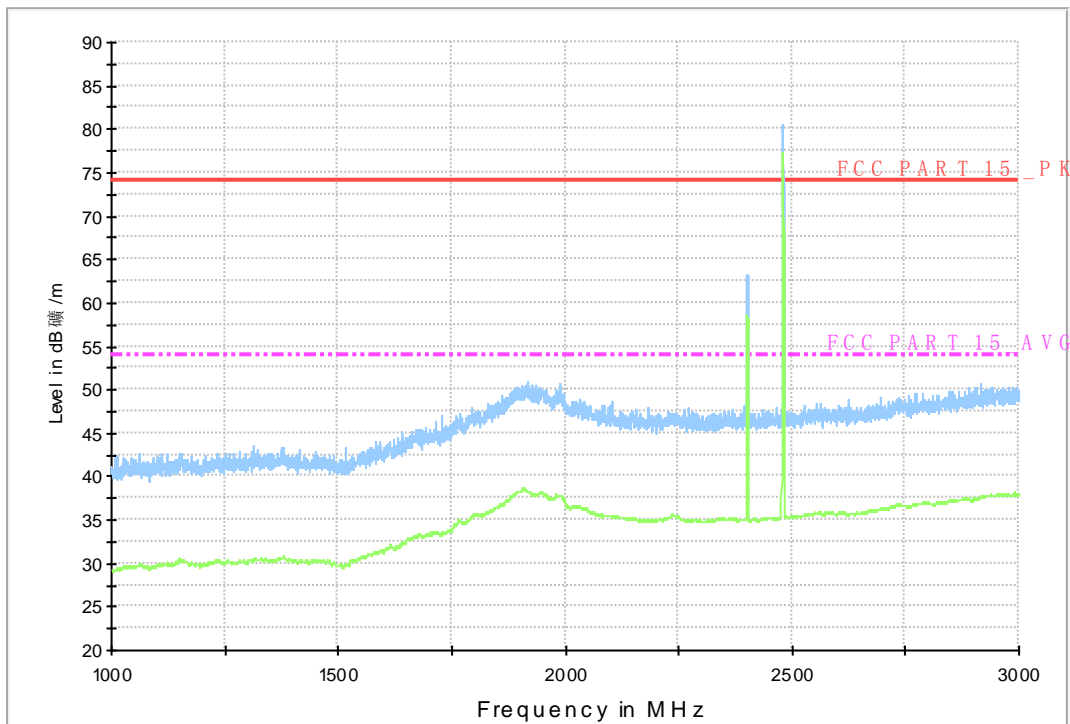


Fig.74. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

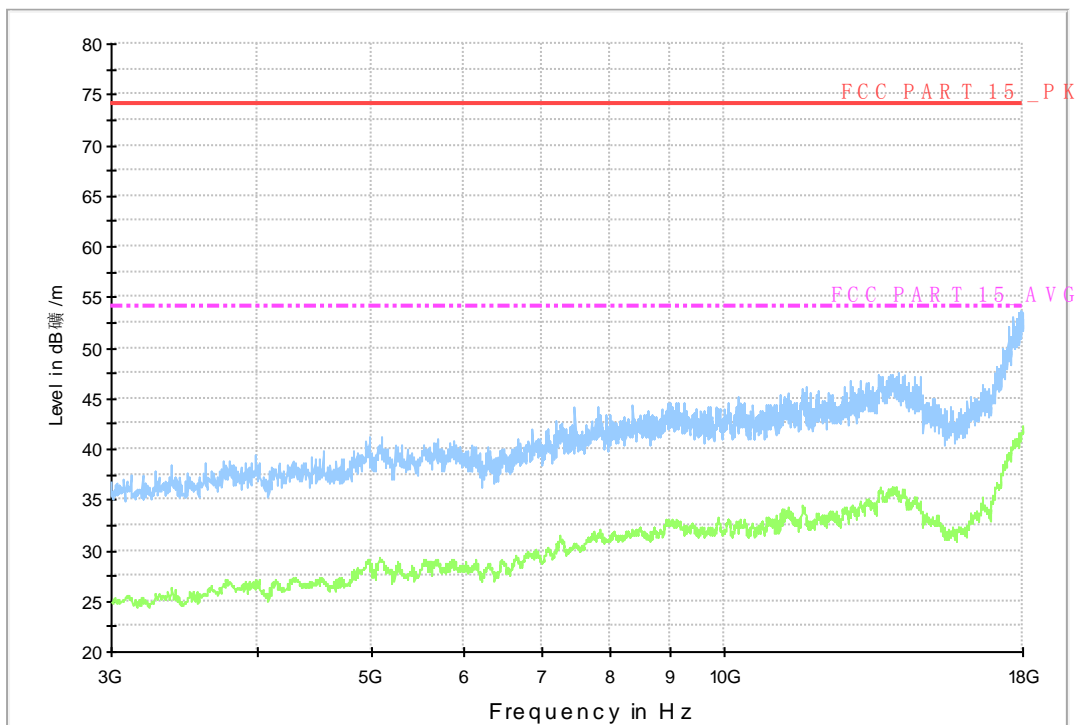


Fig.75. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 3 GHz - 18 GHz

RE-BT-Power\_2.38G-2.43GHz

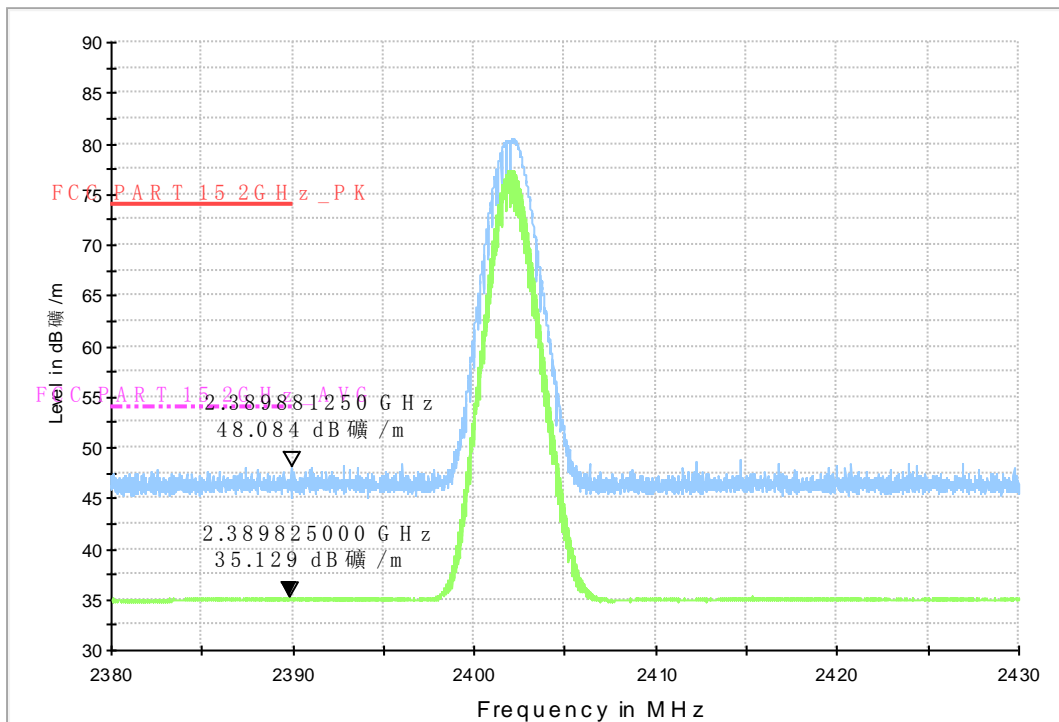


Fig.76. Radiated emission (Power):  $\pi/4$  DQPSK, low channel

RE-BT-Power\_2.45G-2.5GHz

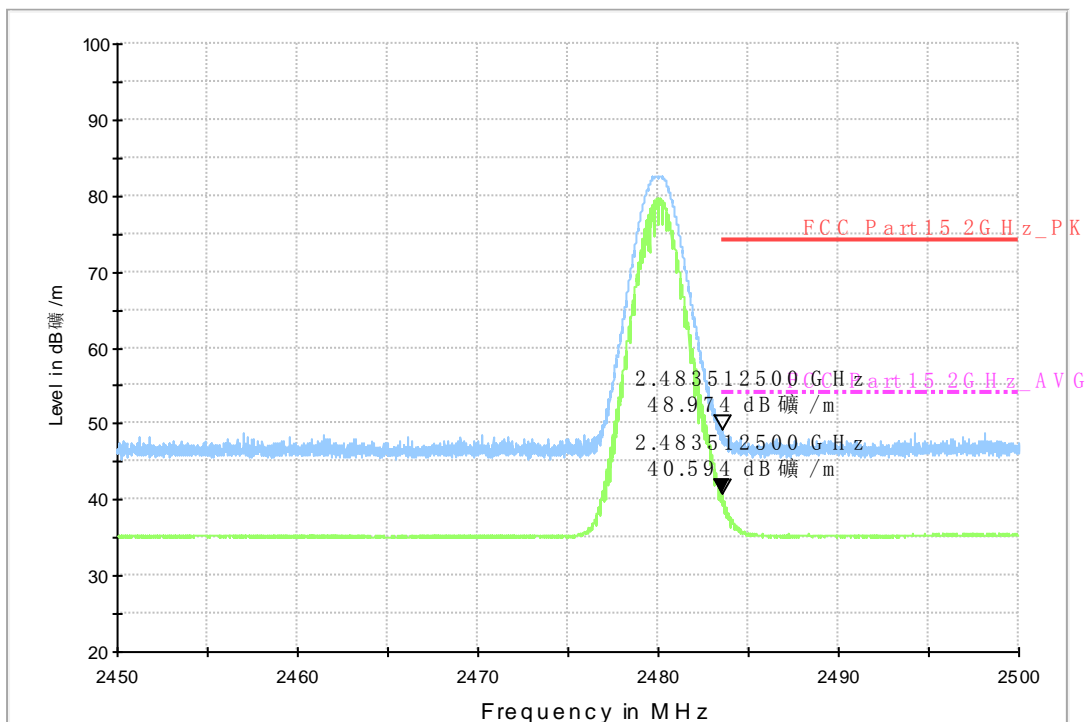


Fig.77. Radiated emission (Power):  $\pi/4$  DQPSK, high channel

Normal RE\_18G-26.5GHz

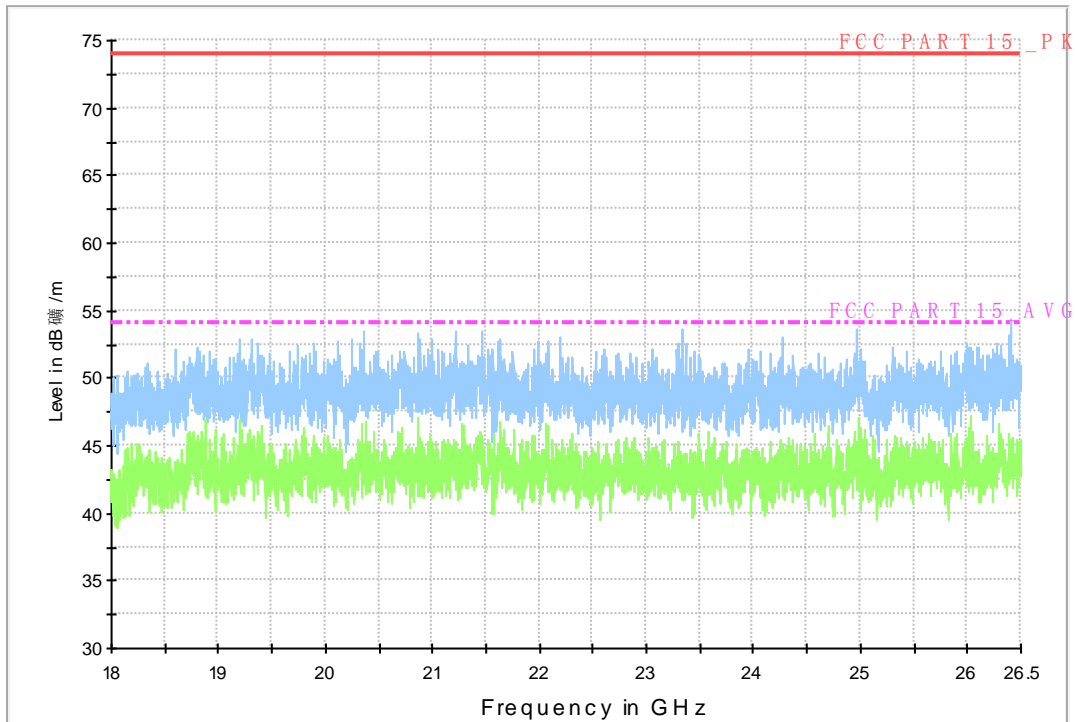


Fig.78. Radiated emission:  $\pi/4$  DQPSK, 18 GHz - 26 GHz

RE\_BT\_1G-3GHz

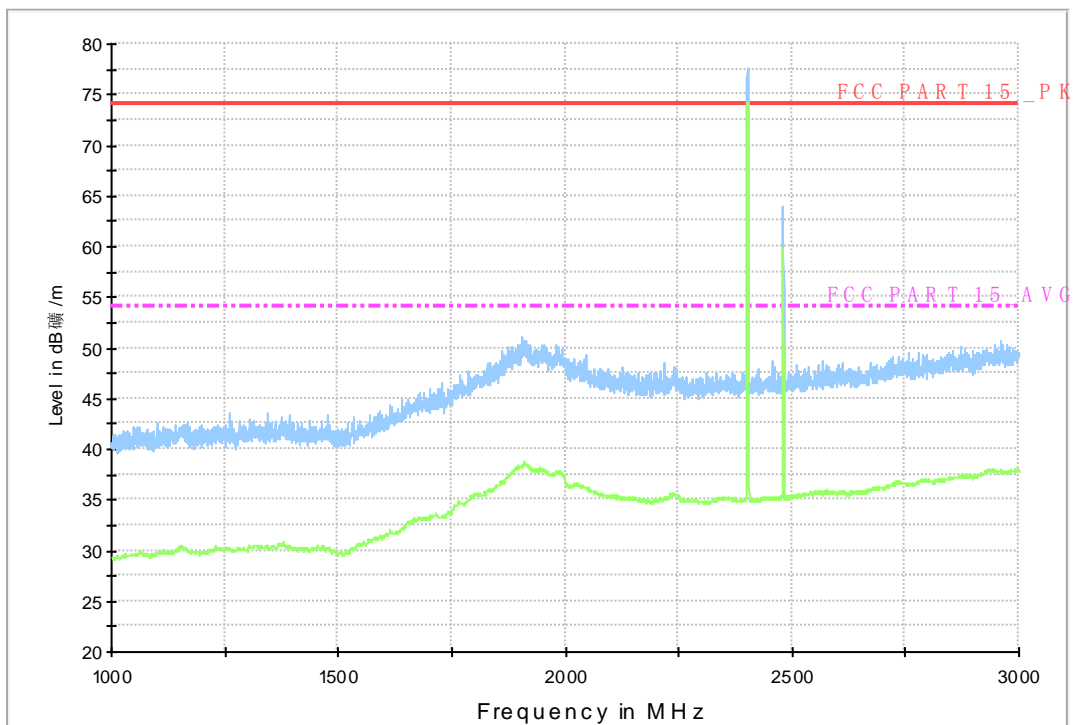


Fig.79. Radiated emission: 8DPSK, Channel 0, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

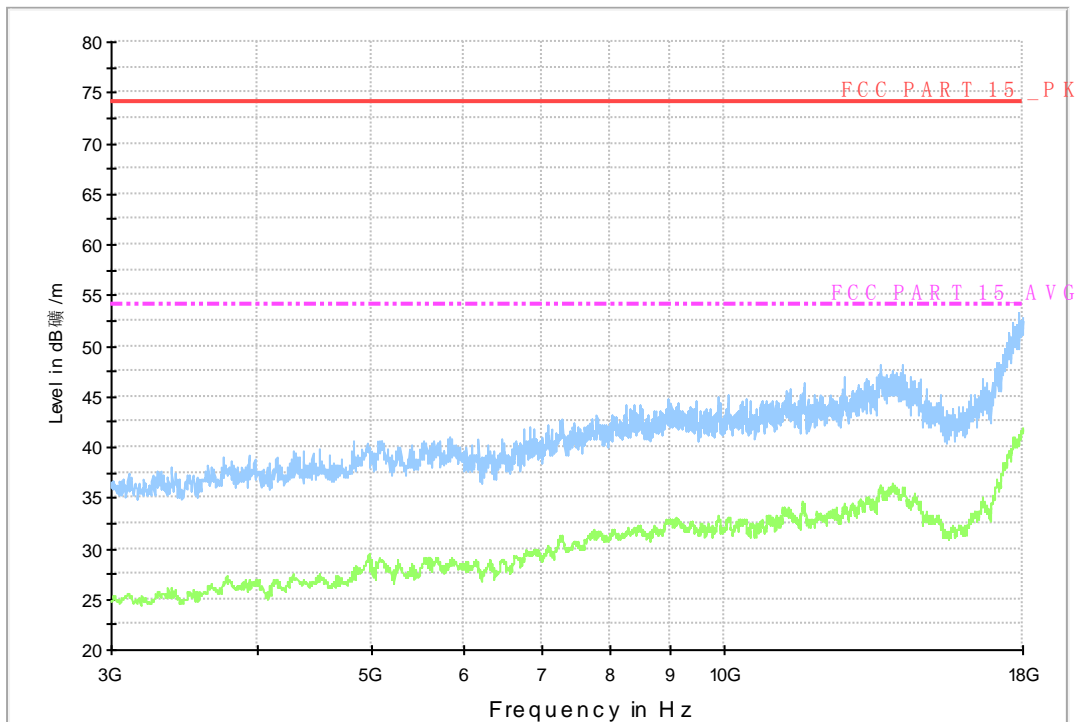


Fig.80. Radiated emission: 8DPSK, Channel 0, 3 GHz - 18 GHz

Normal RE\_30M-1GHz\_10m

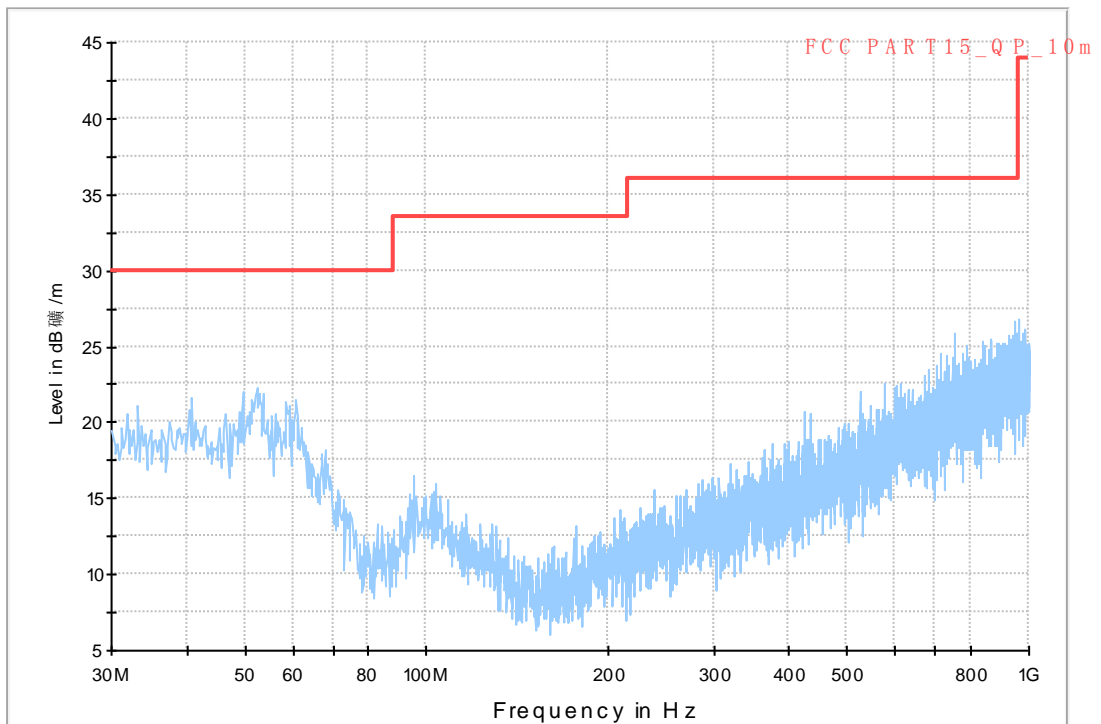


Fig.81. Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

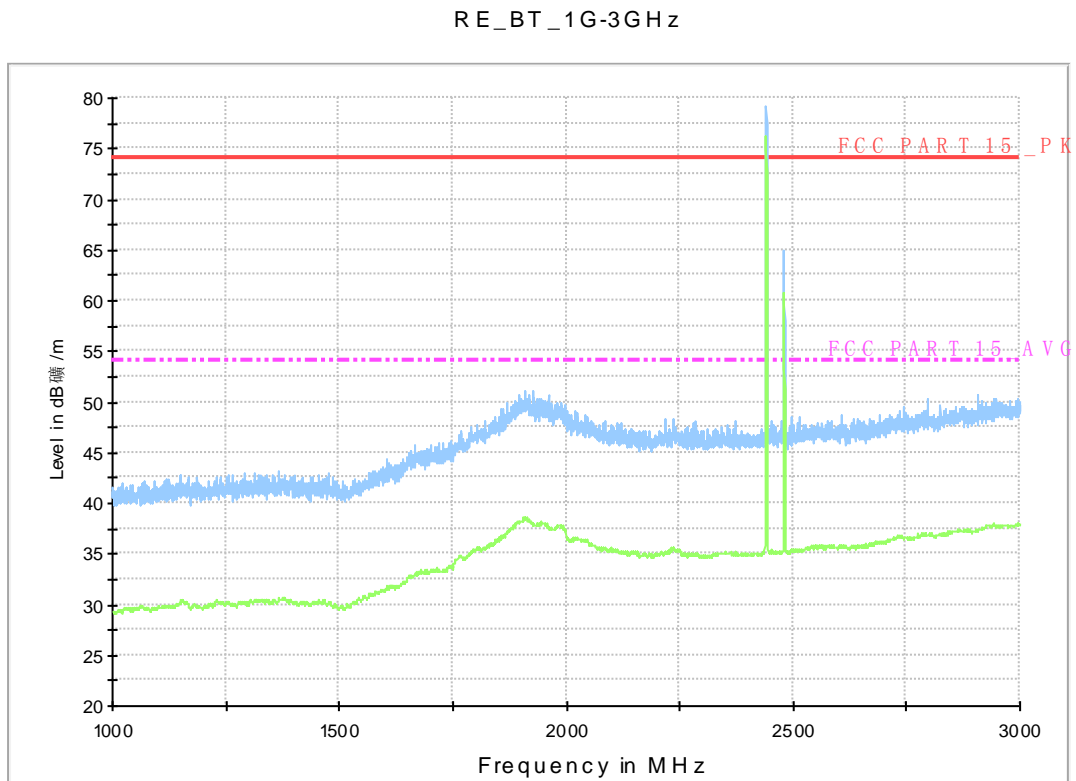


Fig.82. Radiated emission: 8DPSK, Channel 39, 1 GHz - 3 GHz

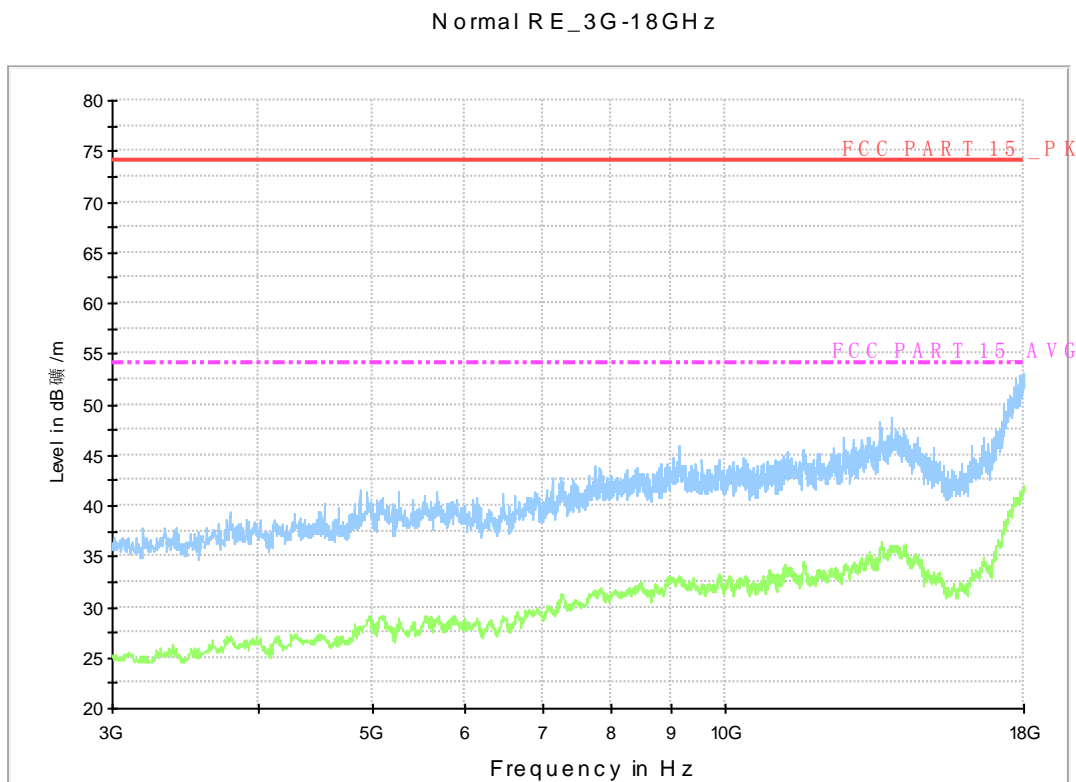


Fig.83. Radiated emission: 8DPSK, Channel 39, 3 GHz - 18 GHz

RE\_BT\_1G-3GHz

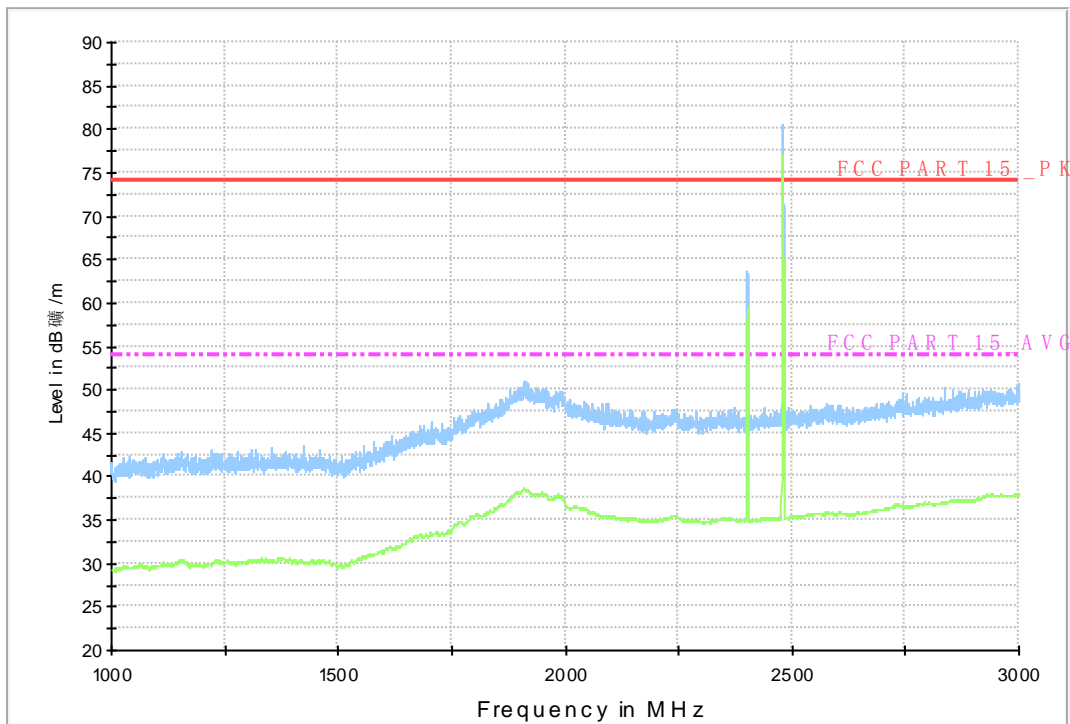


Fig.84. Radiated emission: 8DPSK, Channel 78, 1 GHz - 3 GHz

Normal RE\_3G-18GHz

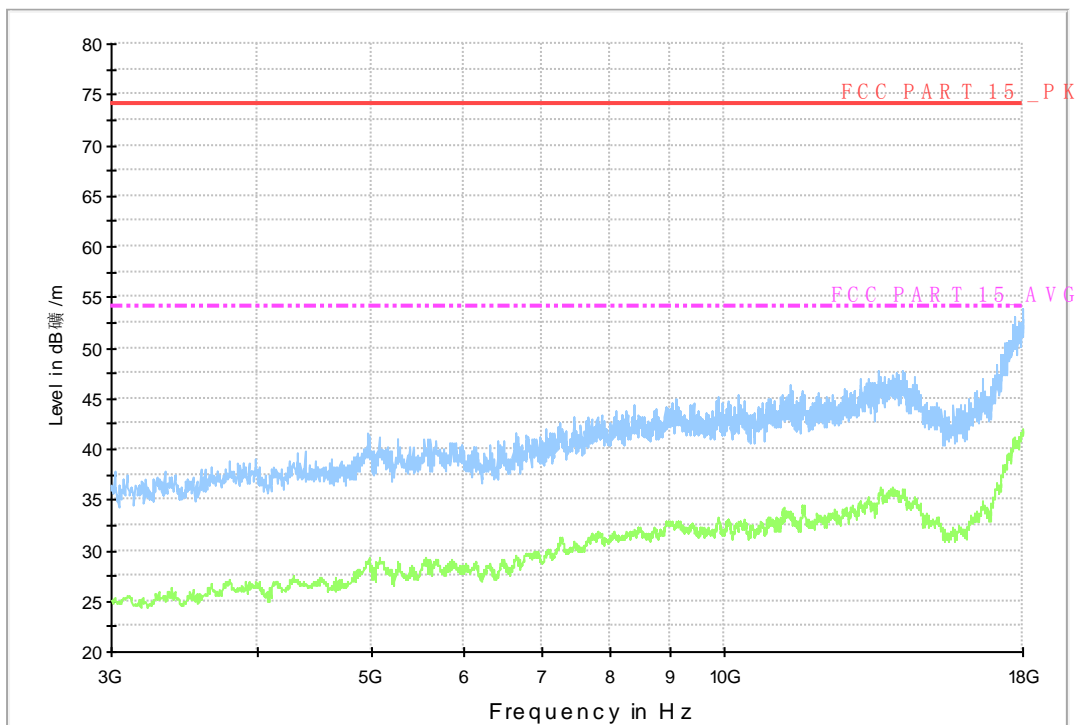


Fig.85. Radiated emission: 8DPSK, Channel 78, 3 GHz - 18 GHz

RE-BT-Power\_2.38G-2.43GHz

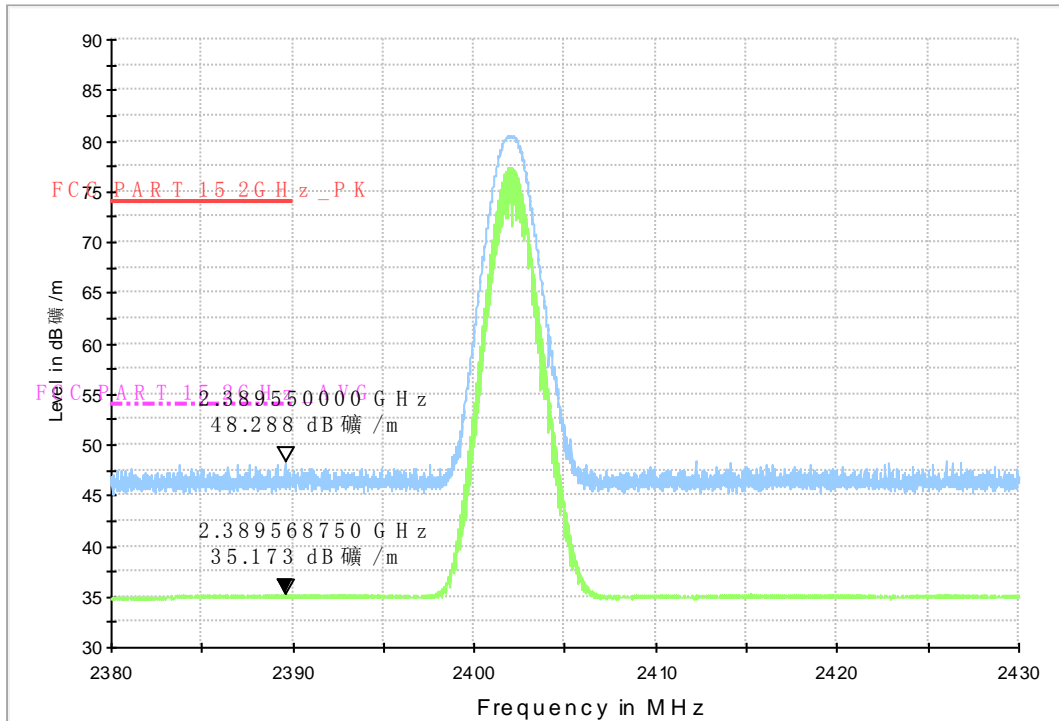


Fig.86. Radiated emission (Power): 8DPSK, low channel

RE-BT-Power\_2.45G-2.5GHz

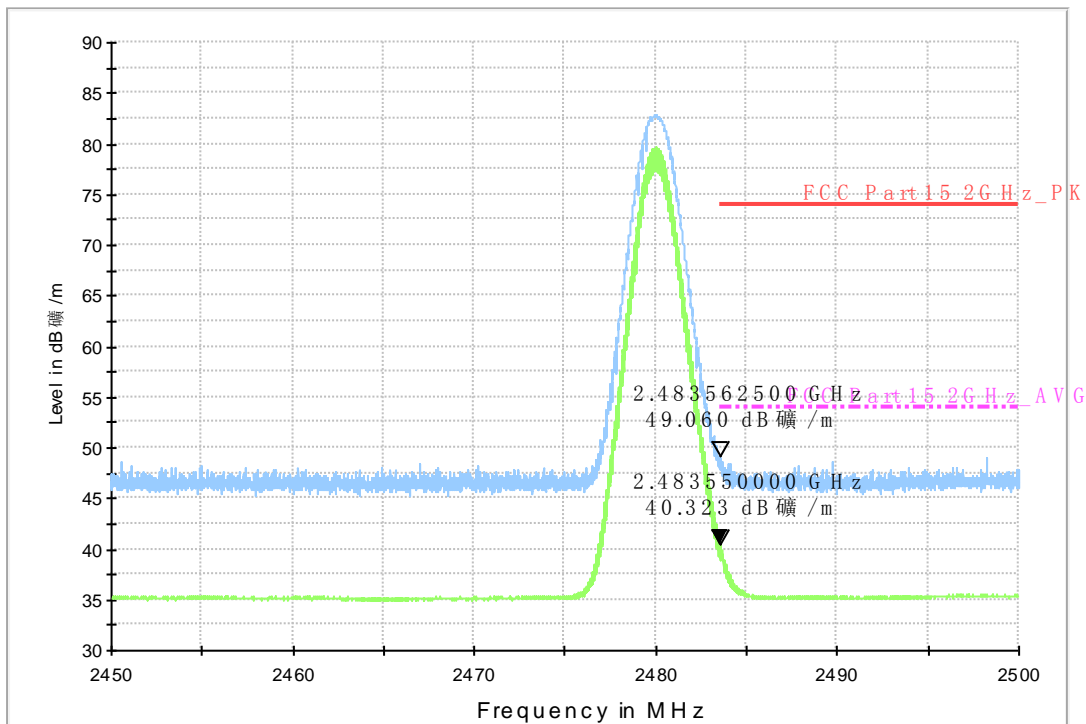


Fig.87. Radiated emission (Power): 8DPSK, high channel

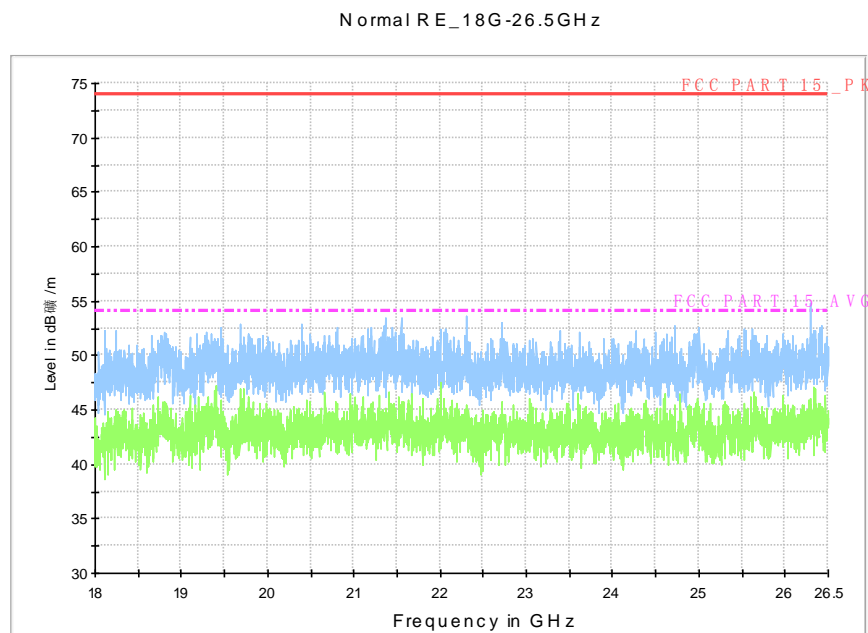


Fig.88. Radiated emission: 8DPSK, 18 GHz - 26 GHz



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

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

- Span = zero span, centered on a hopping channel
- RBW = 1 MHz
- VBW  $\geq$  RBW
- Sweep = as necessary to capture the entire dwell time per hopping channel
- Detector function = peak
- Trace = max hold

Measure a pulse time in time domain at middle frequency and then count the hopping number in 31.6s(which equals with 0.4 multiply 79) of middle frequency ,then multiply the pulse time and hopping number and record them.

### Measurement Limit:

Standard	Limit (ms)
FCC 47 CFR Part 15.247(a) (1)(iii)	< 400

### Measurement Result:

#### For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.89	97.36	P
		Fig.90		
	DH3	Fig.91	167.22	P
		Fig.92		
	DH5	Fig.93	208.66	P
		Fig.94		

#### For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.95	107.38	P
		Fig.96		
	DH3	Fig.97	149.19	P
		Fig.98		
	DH5	Fig.99	174.20	P
		Fig.100		

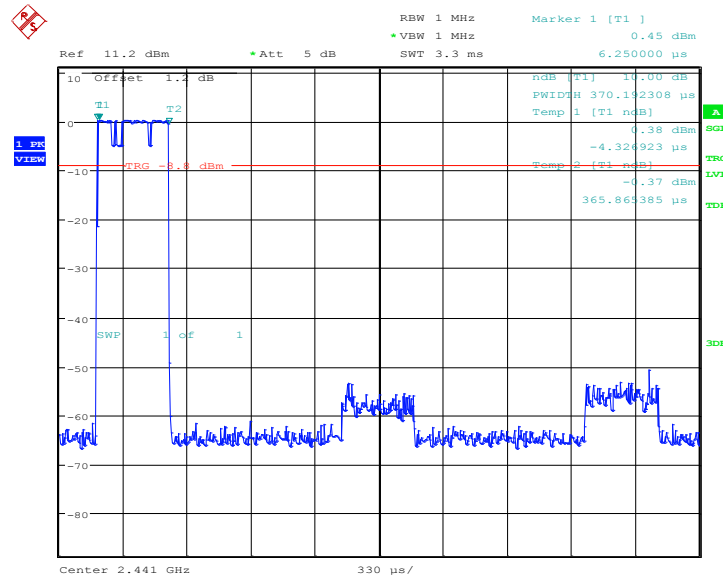
#### For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.101	101.28	P
		Fig.102		
	DH3	Fig.103	152.96	P

	DH5	Fig.104	220.25	P
		Fig.105		
		Fig.106		

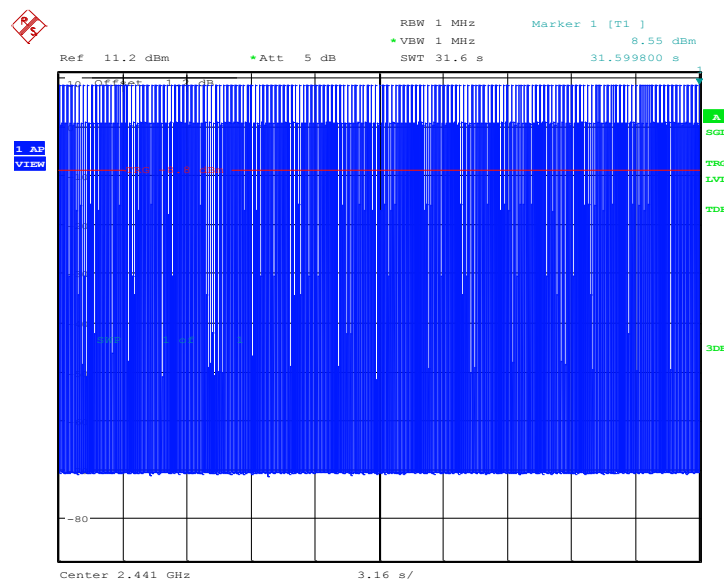
**Conclusion: PASS**

**Test graphs as below:**



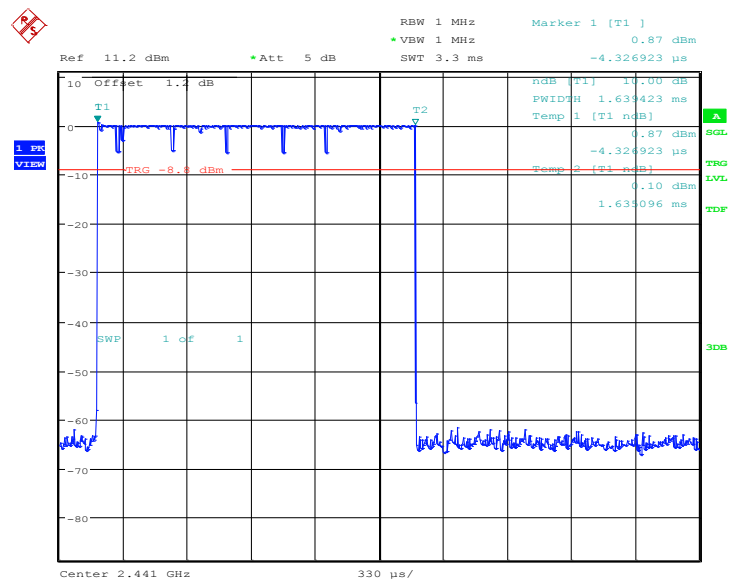
Date: 3.DEC.2014 17:51:47

Fig.89. Time of occupancy (Dwell Time): Channel 39, Packet DH1



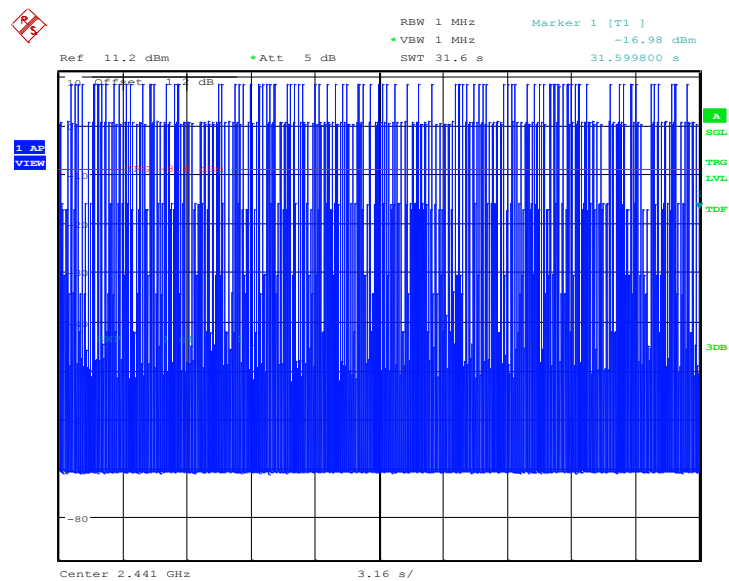
Date: 3.DEC.2014 17:51:35

Fig.90. Number of Transmissions Measurement:Channel 39,Packet DH1



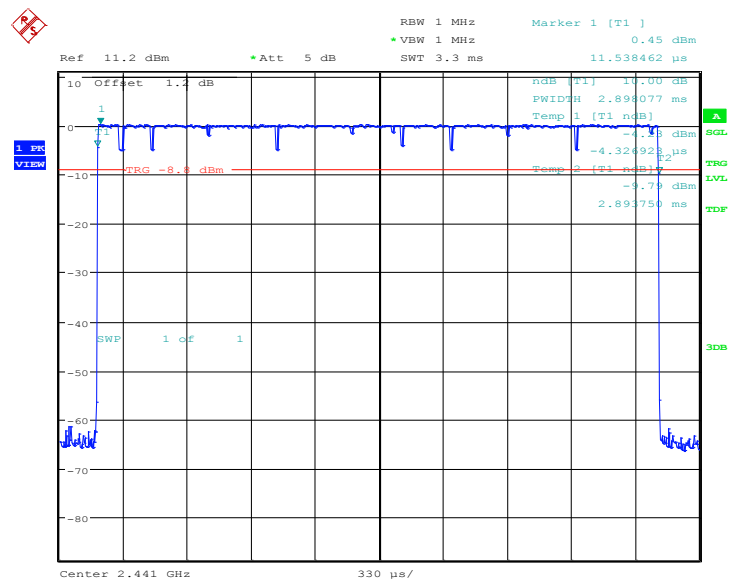
Date: 3.DEC.2014 17:53:04

Fig.91. Time of occupancy (Dwell Time): Channel 39, Packet DH3



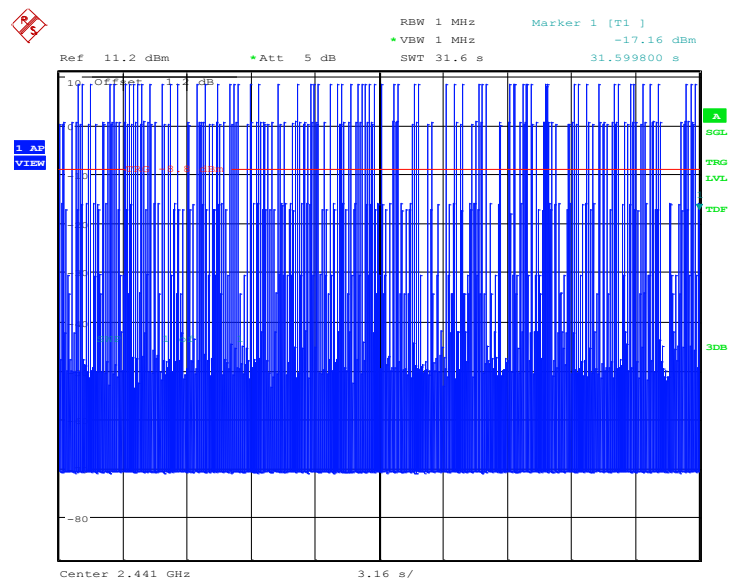
Date: 3.DEC.2014 17:52:52

Fig.92. Number of Transmissions Measurement:Channel 39,Packet DH3



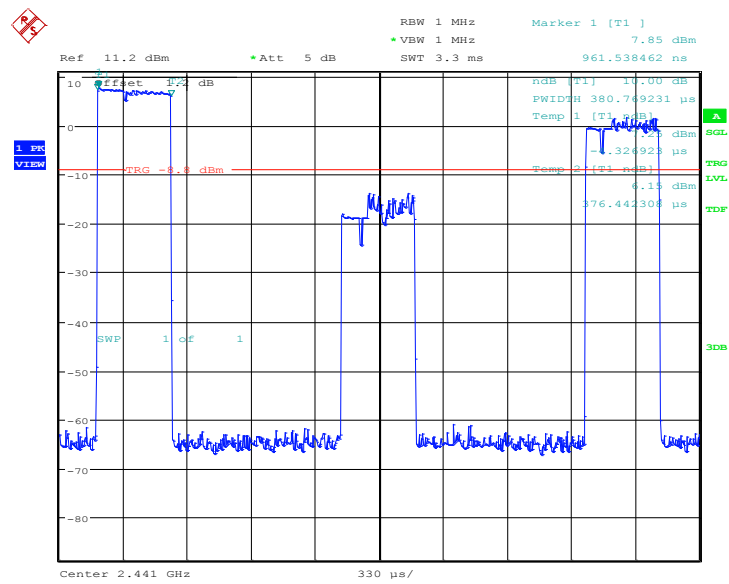
Date: 3.DEC.2014 17:54:19

Fig.93. Time of occupancy (Dwell Time): Channel 39, Packet DH5



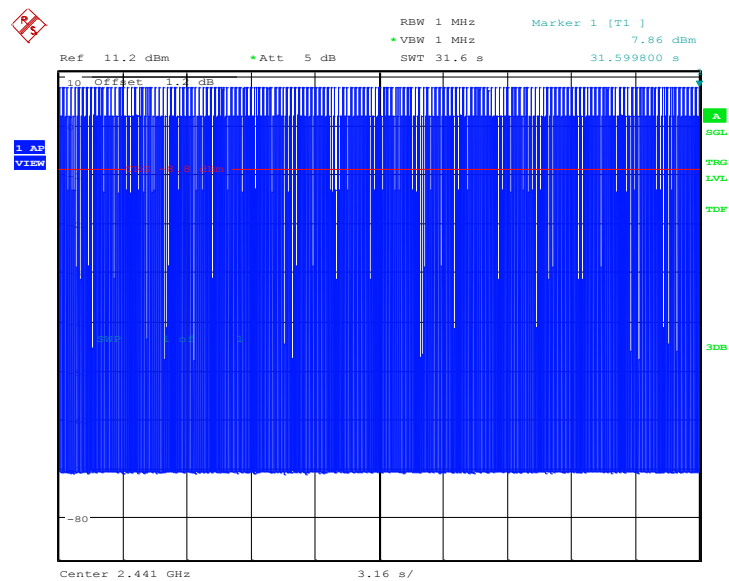
Date: 3.DEC.2014 17:54:07

Fig.94. Number of Transmissions Measurement:Channel 39,Packet DH5



Date: 3.DEC.2014 18:13:46

Fig.95. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1



Date: 3.DEC.2014 18:13:34

Fig.96. Number of Transmissions Measurement:Channel 39,Packet 2-DH1



RBW 1 MHz Marker 1 [T1 ]  
 VBW 1 MHz -45.34 dBm  
 Ref 11.2 dBm \* Att 5 dB  
 SWT 31.6 s 31.599800 s

10 Offset 1.0 dB

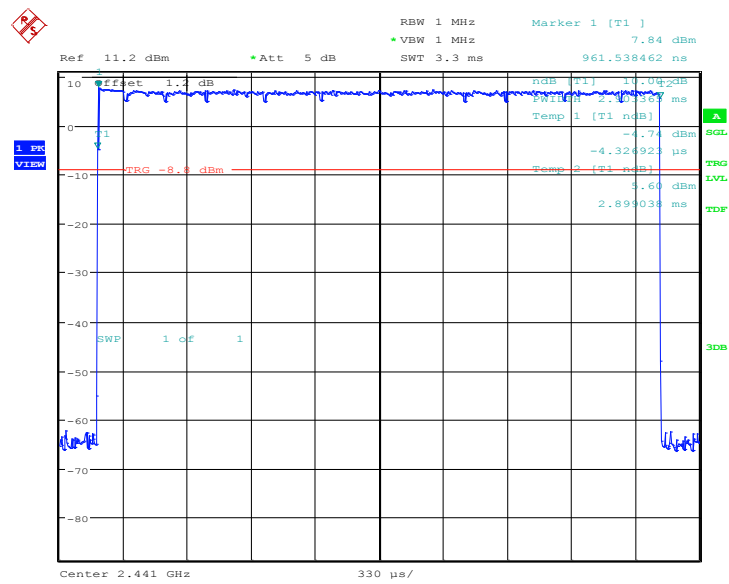
1 A  
 1 Att  
 1 V1.0dB

SGDR  
 TRG  
 LAV1  
 TDF  
 3DB

Center 2.441 GHz 3.16 s/

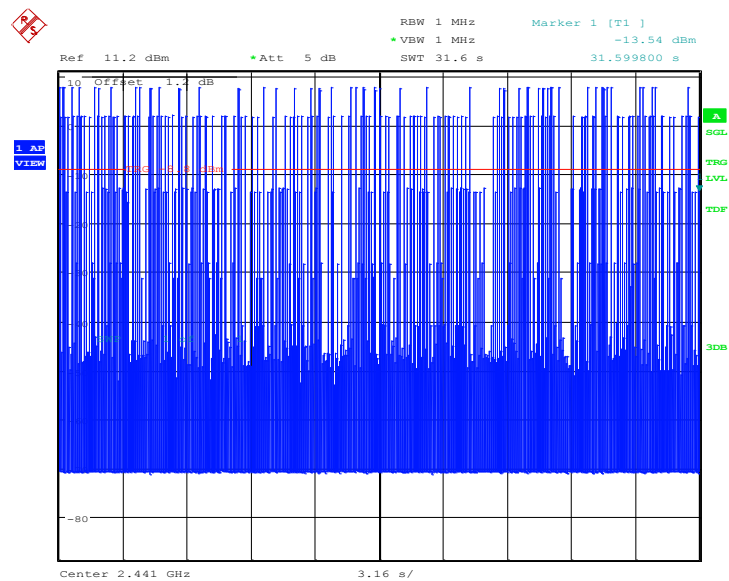
Date: 3.DEC.2014 18:14:51

Fig.98. Number of Transmissions Measurement:Channel 39,Packet 2-DH3



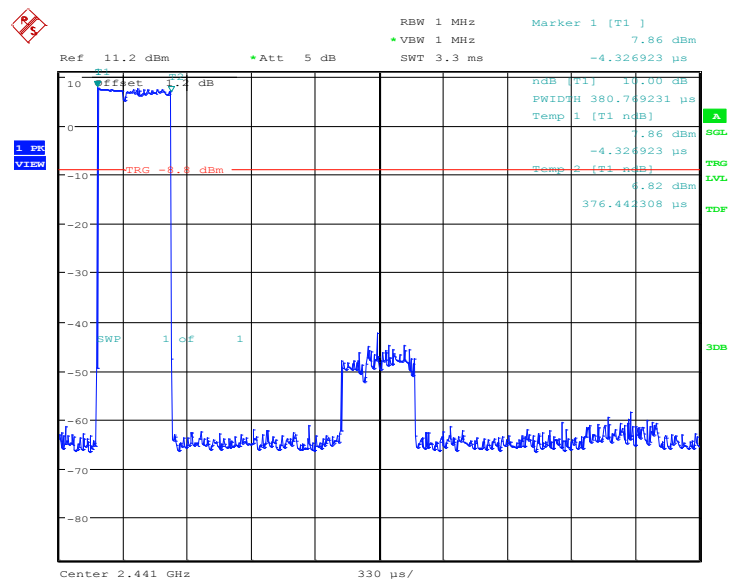
Date: 3.DEC.2014 18:16:18

Fig.99. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5



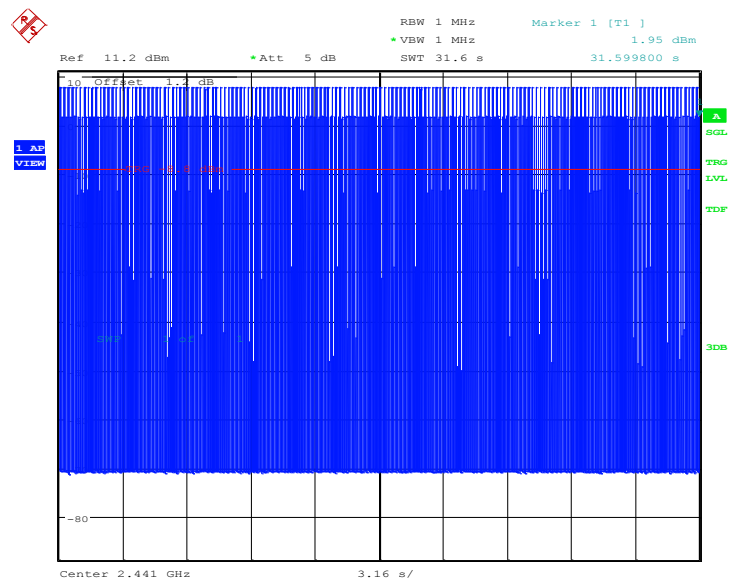
Date: 3.DEC.2014 18:16:06

Fig.100. Number of Transmissions Measurement: Channel 39, Packet 2-DH5



Date: 3.DEC.2014 18:35:47

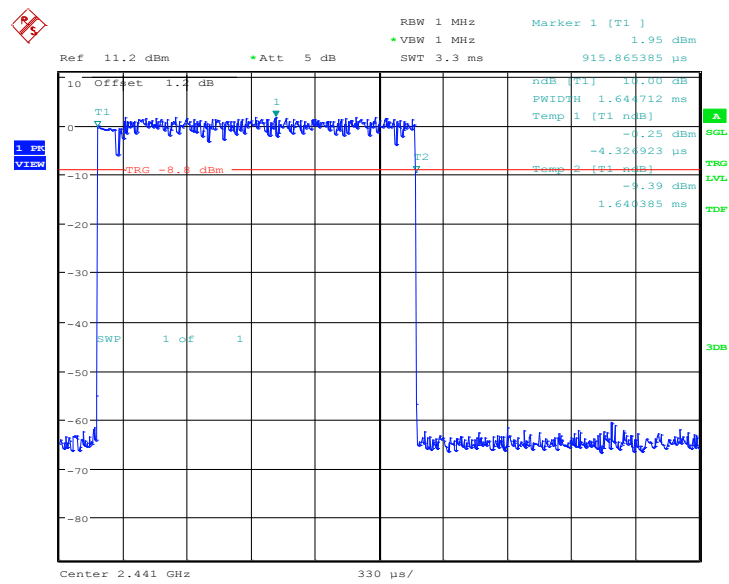
Fig.101. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1



Date: 3.DEC.2014 18:35:35

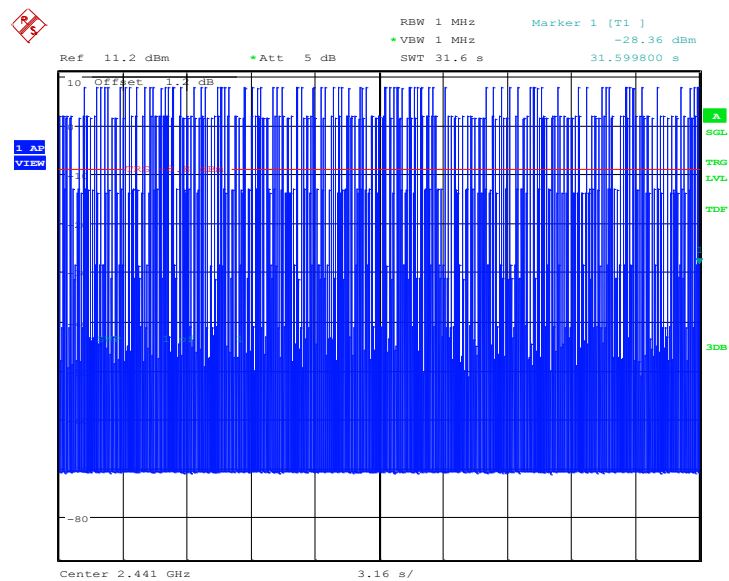
Fig.102. Number of Transmissions Measurement:Channel 39,Packet 3-DH1





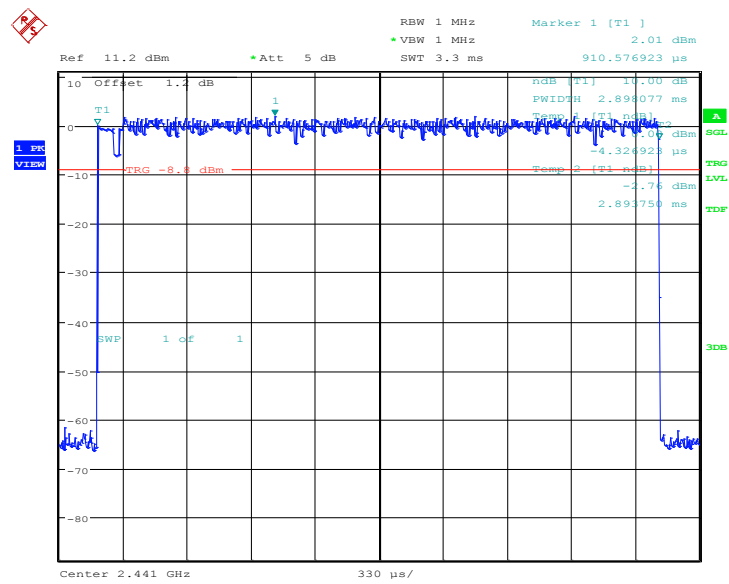
Date: 3.DEC.2014 18:37:07

Fig.103. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3



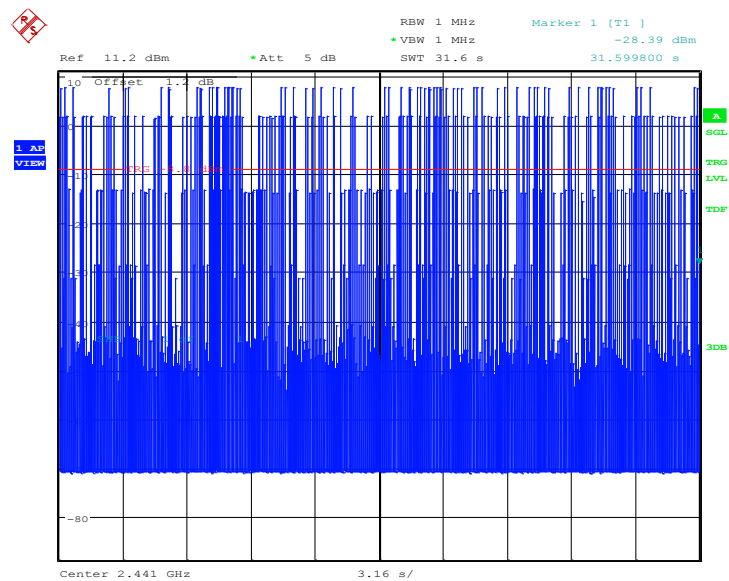
Date: 3.DEC.2014 18:36:55

Fig.104. Number of Transmissions Measurement:Channel 39,Packet 3-DH3



Date: 3.DEC.2014 18:38:24

Fig.105. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5



Date: 3.DEC.2014 18:38:12

Fig.106. Number of Transmissions Measurement:Channel 39,Packet 3-DH5

## A.7. 20dB Bandwidth

**Method of Measurement:** See ANSI C63.10-clause 6.9.2

Measurement Procedure - Unwanted Emissions

1. Set RBW = 20kHz.
2. Set VBW = 100 kHz.
3. Set span to 3MHz
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).

### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)(1)	NA *

Use NdB Down function of the SA to measure the 20dB Bandwidth

\* Comment: This test case is not required according to the latest FCC 47 CFR Part 15.247. But the test results are necessary for “carrier frequency separation” test case, in Annex A.8.

### Measurement Results:

#### For GFSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.107	875.00	NA
39	Fig.108	875.00	NA
78	Fig.109	870.19	NA

#### For $\pi/4$ DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.110	1259.62	NA
39	Fig.111	1259.62	NA
78	Fig.112	1254.81	NA

#### For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.113	1259.62	NA
39	Fig.114	1269.23	NA
78	Fig.115	1259.62	NA

**Conclusion: NA**

**Test graphs as below:**



• RBW 20 kHz  
 • VBW 100 kHz  
 • Att 5 dB  
 • SWT 30 ms

Marker 1 [T1]  
 5.46 dBm  
 2.441158654 GHz

Ref 11.2 dBm  
 Offset 1.1 dB

1.00 V/div

10 dB  
 0 dB  
 -10 dB  
 -20 dB  
 -30 dB  
 -40 dB  
 -50 dB  
 -60 dB  
 -70 dB  
 -80 dB

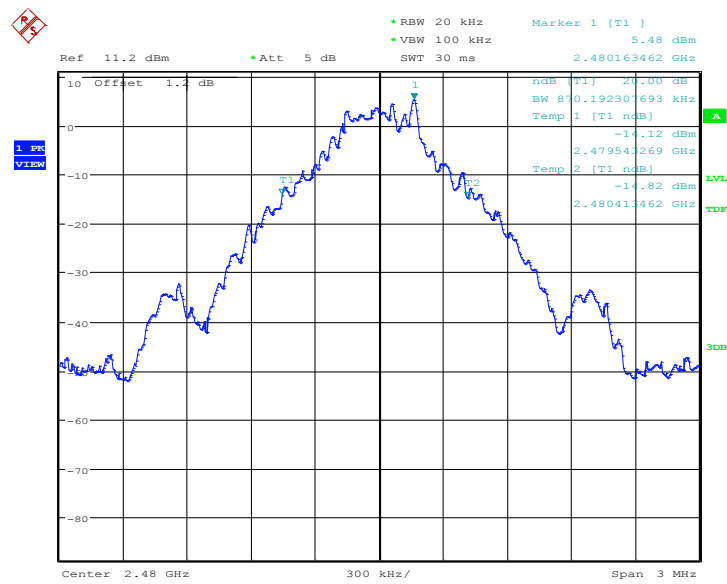
10 kHz  
 20 kHz  
 30 kHz  
 40 kHz  
 50 kHz  
 60 kHz  
 70 kHz  
 80 kHz  
 90 kHz  
 100 kHz  
 110 kHz  
 120 kHz  
 130 kHz  
 140 kHz  
 150 kHz  
 160 kHz  
 170 kHz  
 180 kHz  
 190 kHz  
 200 kHz  
 210 kHz  
 220 kHz  
 230 kHz  
 240 kHz  
 250 kHz  
 260 kHz  
 270 kHz  
 280 kHz  
 290 kHz  
 300 kHz  
 310 kHz  
 320 kHz  
 330 kHz  
 340 kHz  
 350 kHz  
 360 kHz  
 370 kHz  
 380 kHz  
 390 kHz  
 400 kHz  
 410 kHz  
 420 kHz  
 430 kHz  
 440 kHz  
 450 kHz  
 460 kHz  
 470 kHz  
 480 kHz  
 490 kHz  
 500 kHz  
 510 kHz  
 520 kHz  
 530 kHz  
 540 kHz  
 550 kHz  
 560 kHz  
 570 kHz  
 580 kHz  
 590 kHz  
 600 kHz  
 610 kHz  
 620 kHz  
 630 kHz  
 640 kHz  
 650 kHz  
 660 kHz  
 670 kHz  
 680 kHz  
 690 kHz  
 700 kHz  
 710 kHz  
 720 kHz  
 730 kHz  
 740 kHz  
 750 kHz  
 760 kHz  
 770 kHz  
 780 kHz  
 790 kHz  
 800 kHz  
 810 kHz  
 820 kHz  
 830 kHz  
 840 kHz  
 850 kHz  
 860 kHz  
 870 kHz  
 880 kHz  
 890 kHz  
 900 kHz  
 910 kHz  
 920 kHz  
 930 kHz  
 940 kHz  
 950 kHz  
 960 kHz  
 970 kHz  
 980 kHz  
 990 kHz  
 1000 kHz

Center 2.441 GHz  
 Span 3 MHz

1.72 dBm  
 2.440538462 GHz  
 2.441413462 GHz

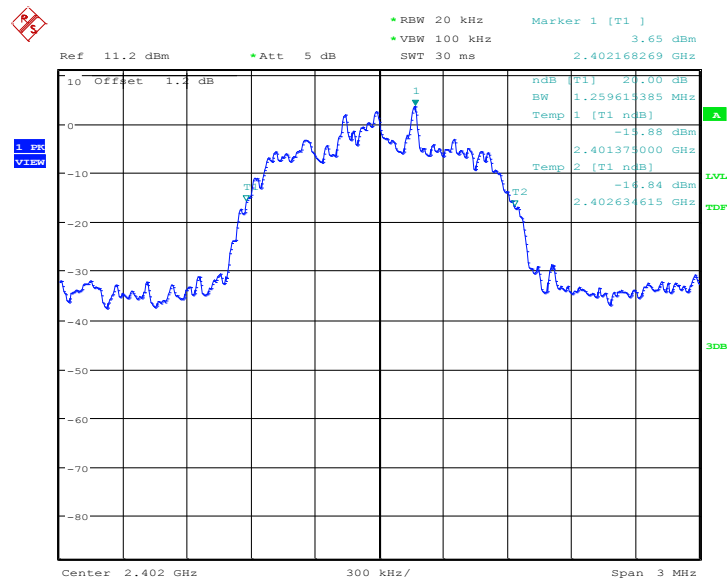
Temp 1 [T1 n dB]  
 Temp 2 [T1 n dB]

Date: 3.DEC.2014 17:55:24



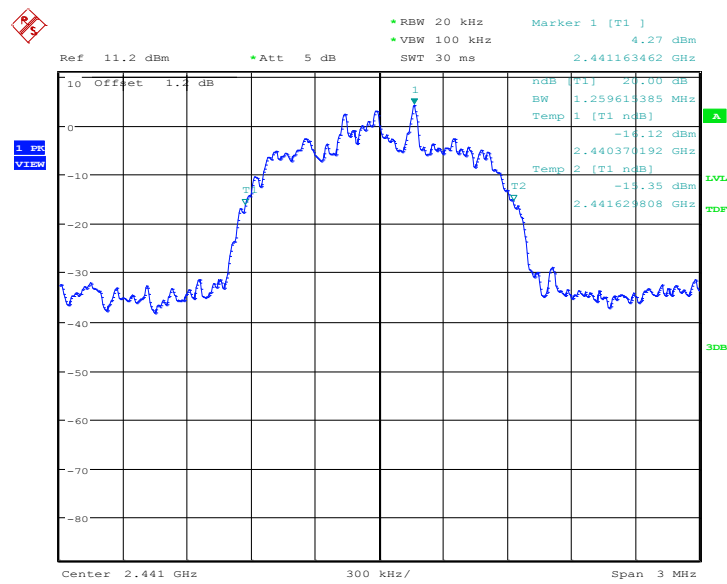
Date: 3.DEC.2014 17:55:56

Fig.109. 20dB Bandwidth: GFSK, Channel 78



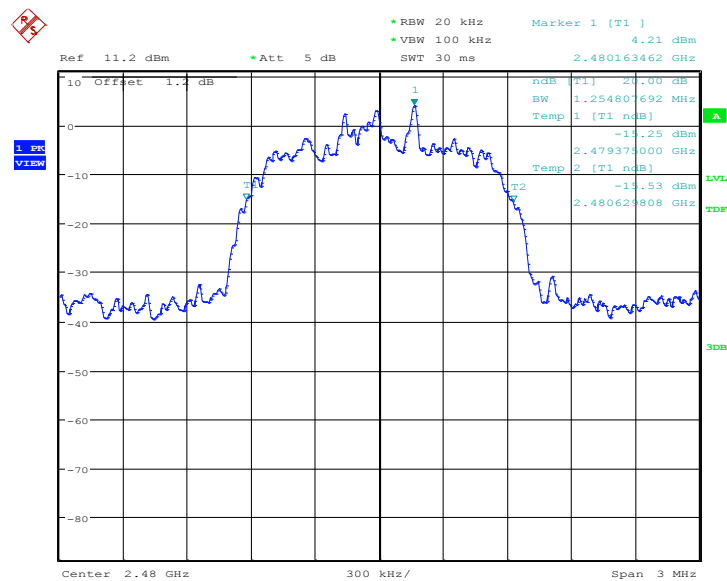
Date: 3.DEC.2014 18:16:52

Fig.110. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 0



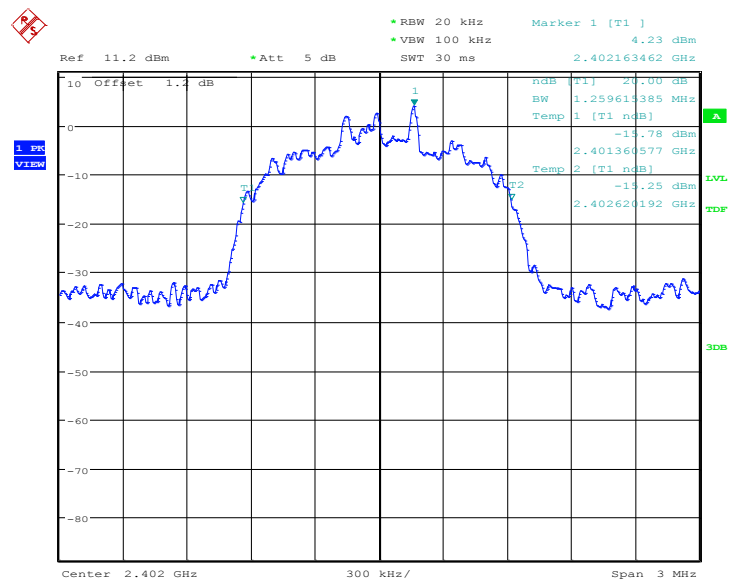
Date: 3.DEC.2014 18:17:23

Fig.111. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39



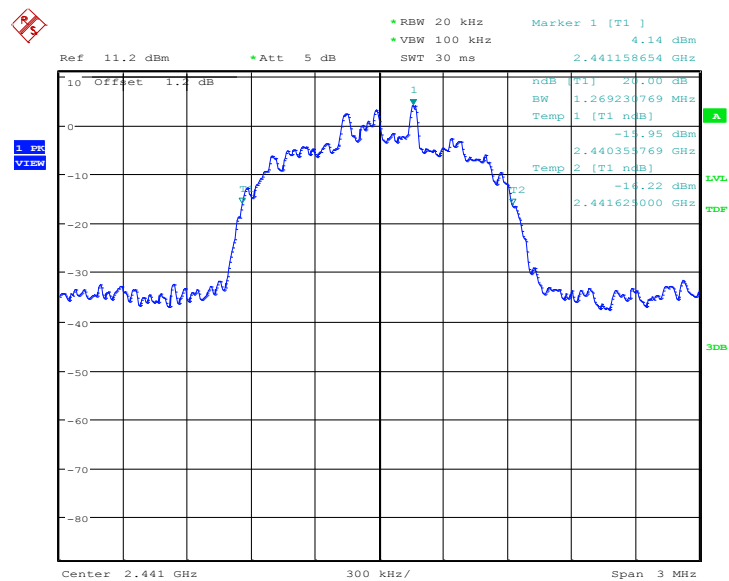
Date: 3.DEC.2014 18:17:55

Fig.112. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78



Date: 3.DEC.2014 18:38:58

Fig.113. 20dB Bandwidth: 8DPSK, Channel 0



Date: 3.DEC.2014 18:39:30

Fig.114. 20dB Bandwidth: 8DPSK, Channel 39



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## A.8. Carrier Frequency Separation

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

- Span = 3MHz
- RBW=300kHz
- VBW=1MHz
- Sweep = auto
- Detector function = peak
- Trace = max hold
- Allow the trace to stabilize

Search the peak marks of the middle frequency and adjacent channel, then record the separation between them.

\* Comment: This limit should be over 25 kHz or  $(2/3) * 20\text{dB}$  bandwidth, whichever is greater.

### Measurement Limit:

Standard	Limit(kHz)
FCC 47 CFR Part 15.247(a)(1)	over 25 kHz or $(2/3) * 20\text{dB}$ bandwidth

### Measurement Result:

#### For GFSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.116	1168.27	P

#### For $\pi/4$ DQPSK

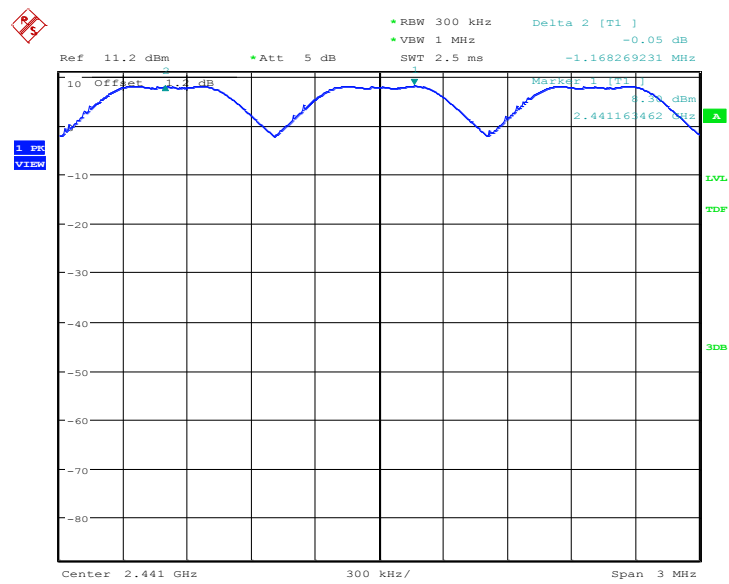
Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.117	1019.23	P

#### For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.118	1307.69	P

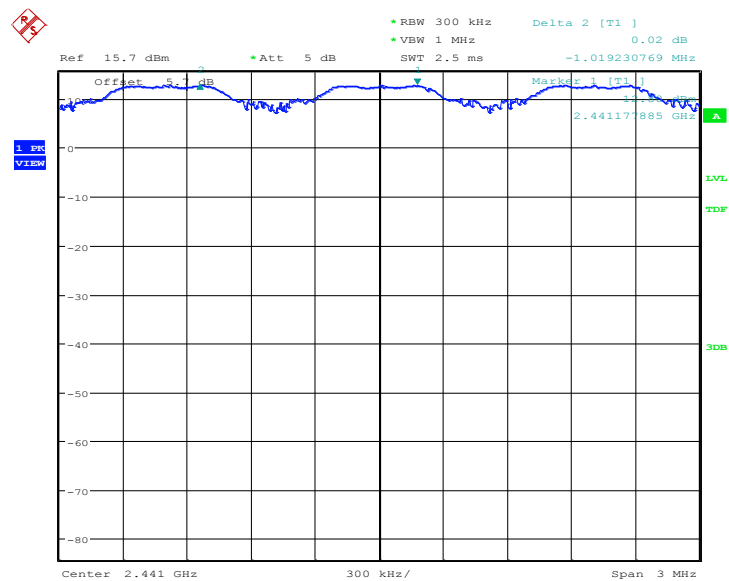
**Conclusion: PASS**

**Test graphs as below:**



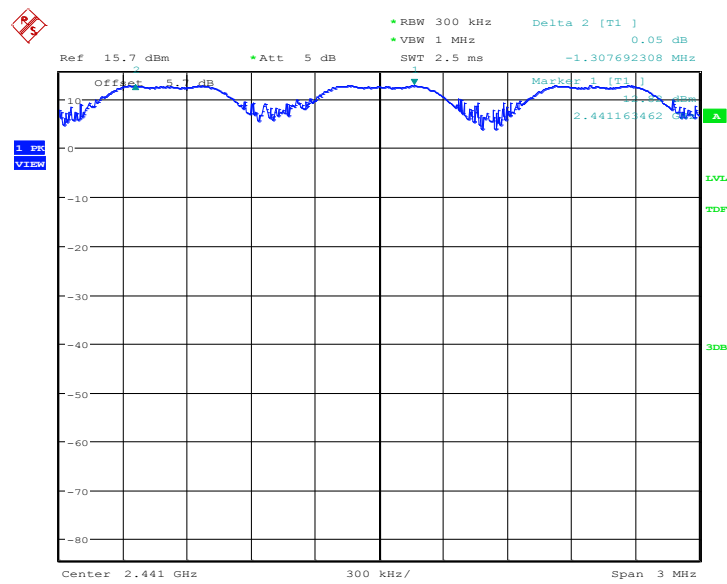
Date: 3.DEC.2014 17:58:00

Fig.116. Carrier frequency separation measurement: GFSK, Channel 39



Date: 3.DEC.2014 19:08:04

Fig.117. Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39



Date: 3.DEC.2014 19:13:17

Fig.118. Carrier frequency separation measurement: 8DPSK, Channel 39

## A.9. Number of Hopping Channels

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

- Span = the frequency band of operation
- RBW = 500kHz
- VBW = 500kHz
- Sweep = auto
- Detector function = peak
- Trace = max hold
- Allow the trace to stabilize

It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a) (1)(iii)	At least 15 non-overlapping channels

### Measurement Result:

#### For GFSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.119	79	P
40~78	Fig.120		

#### For $\pi/4$ DQPSK

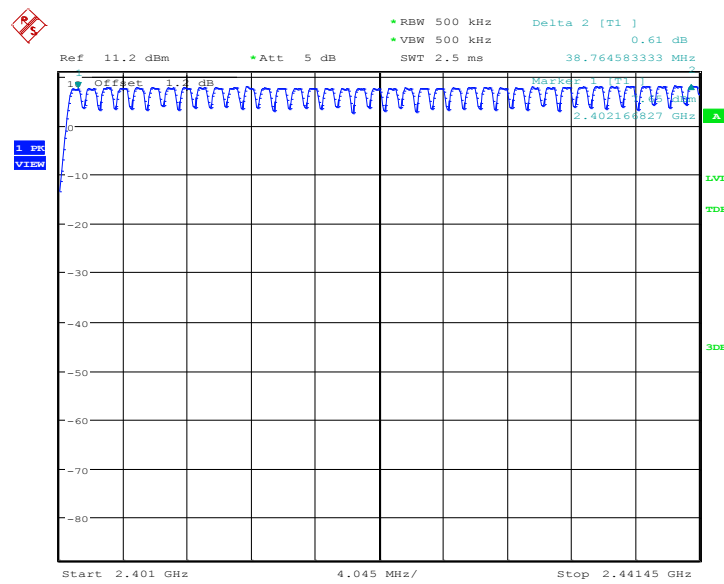
Channel	Number of hopping channels		Conclusion
0~39	Fig.121	79	P
40~78	Fig.122		

#### For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.123	79	P
40~78	Fig.124		

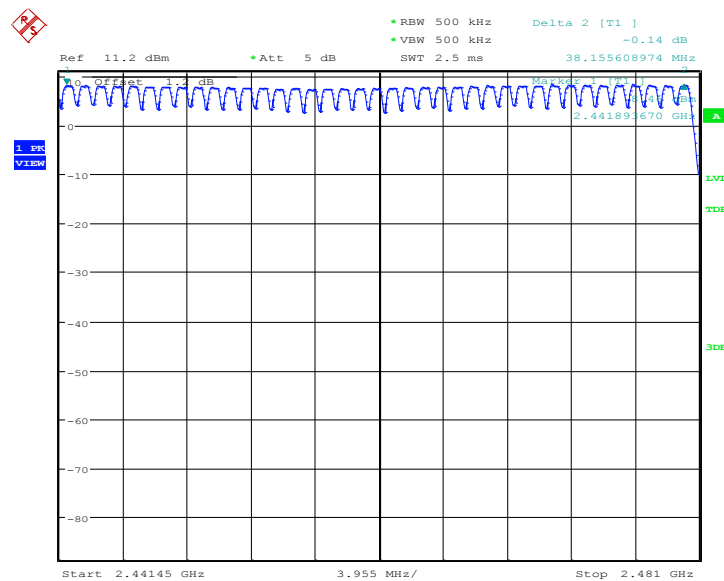
**Conclusion: PASS**

**Test graphs as below:**



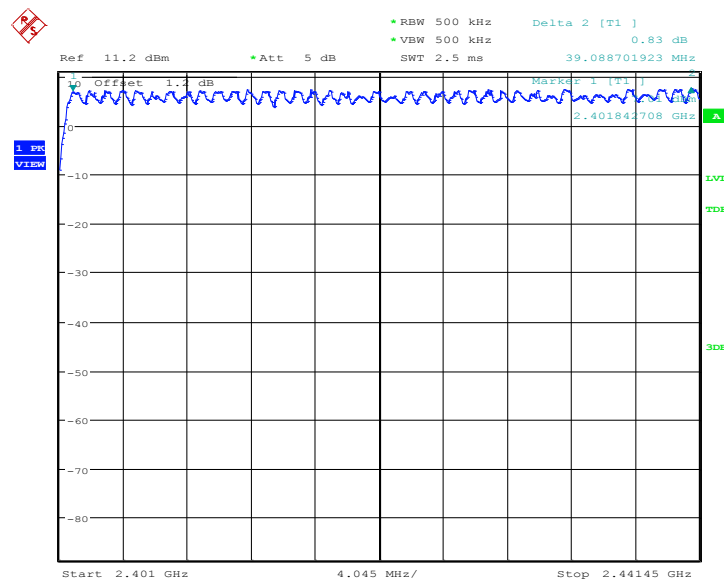
Date: 3.DEC.2014 18:00:05

Fig.119. Number of hopping frequencies: GFSK, Channel 0 - 39



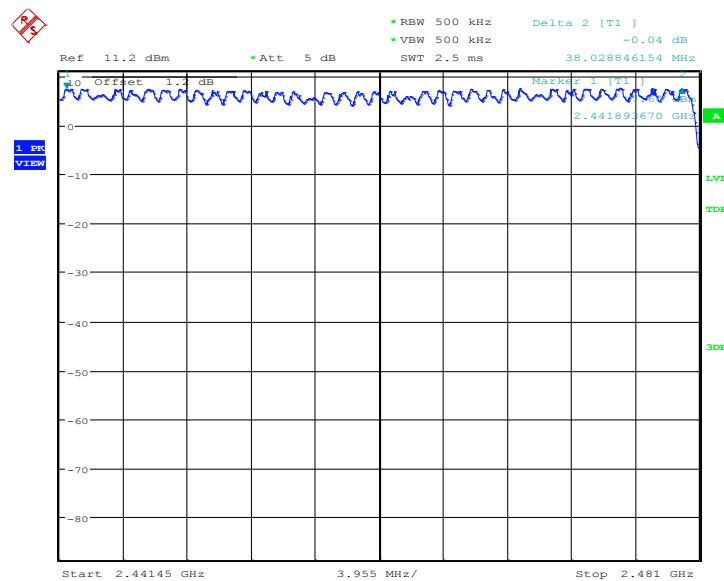
Date: 3.DEC.2014 18:02:07

Fig.120. Number of hopping frequencies: GFSK, Channel 40 - 78



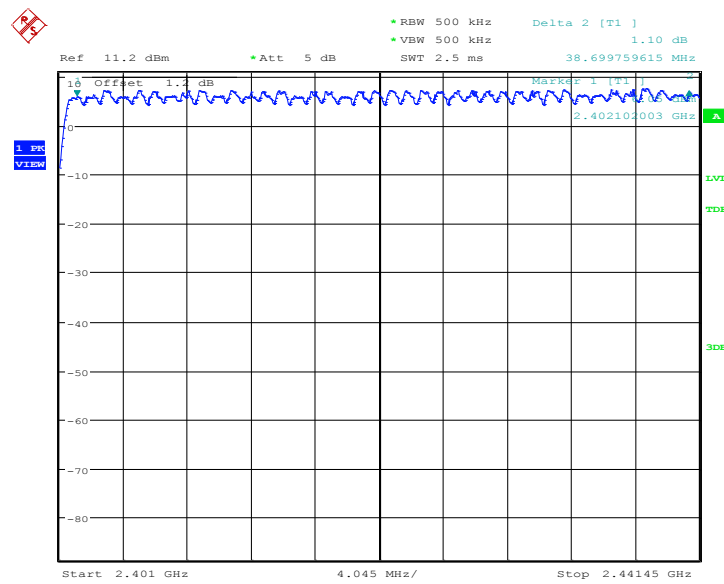
Date: 3.DEC.2014 18:22:04

Fig.121. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39



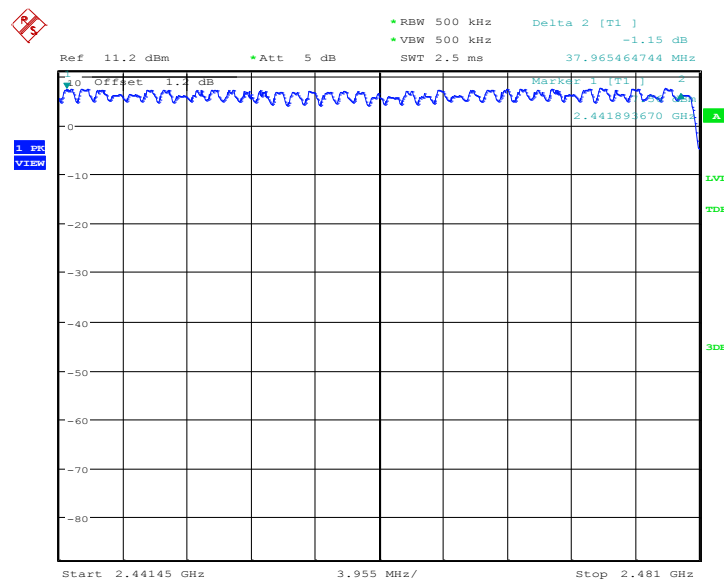
Date: 3.DEC.2014 18:24:06

Fig.122. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78



Date: 3.DEC.2014 18:44:11

Fig.123. Number of hopping frequencies: 8DPSK, Channel 0 - 39



Date: 3.DEC.2014 18:46:13

Fig.124. Number of hopping frequencies: 8DPSK, Channel 40 - 78

**A.10. AC Powerline Conducted Emission****Test Condition**

Voltage (V)	Frequency (Hz)
120	60

**Measurement Result and limit:****Bluetooth (Quasi-peak Limit)**

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Conclusion
0.15 to 0.5	66 to 56	P
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.

**Bluetooth (Average Limit)**

Frequency range (MHz)	Average Limit (dB $\mu$ V)	Conclusion
0.15 to 0.5	56 to 46	P
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.

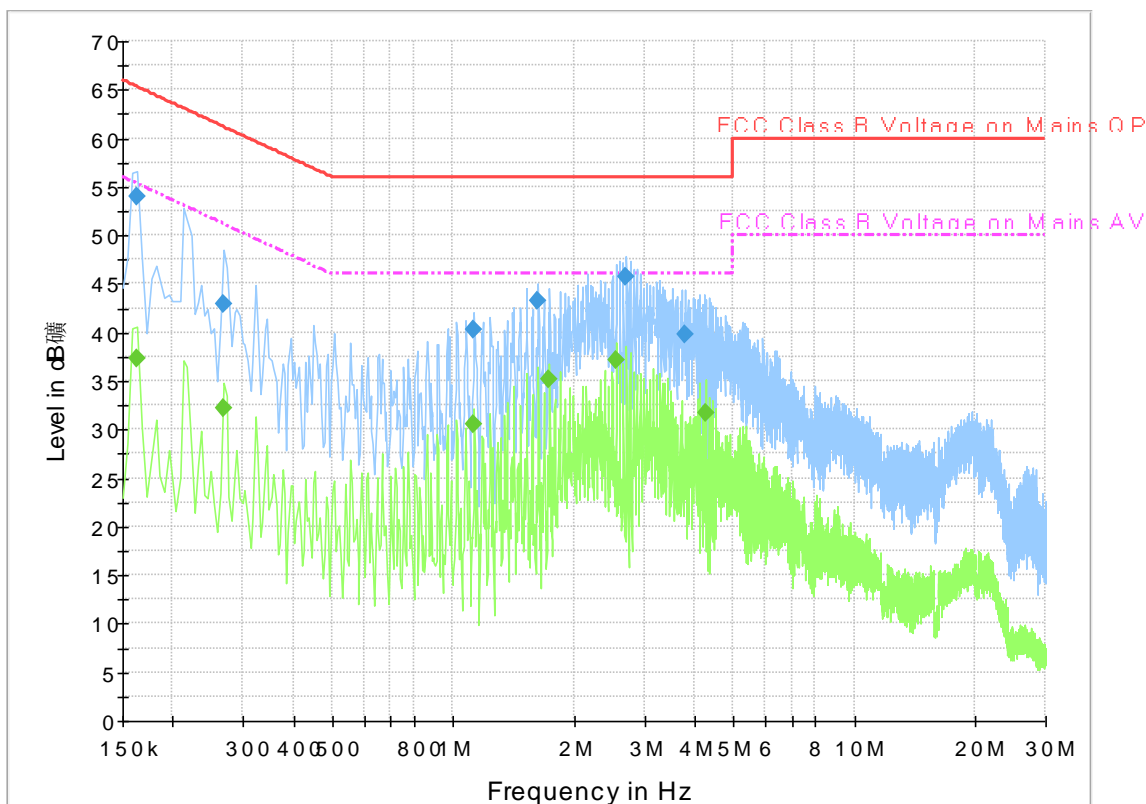
The measurement is made according to ANSI C63.10

**Conclusion: PASS**

**Test graphs as below:**



Traffic:



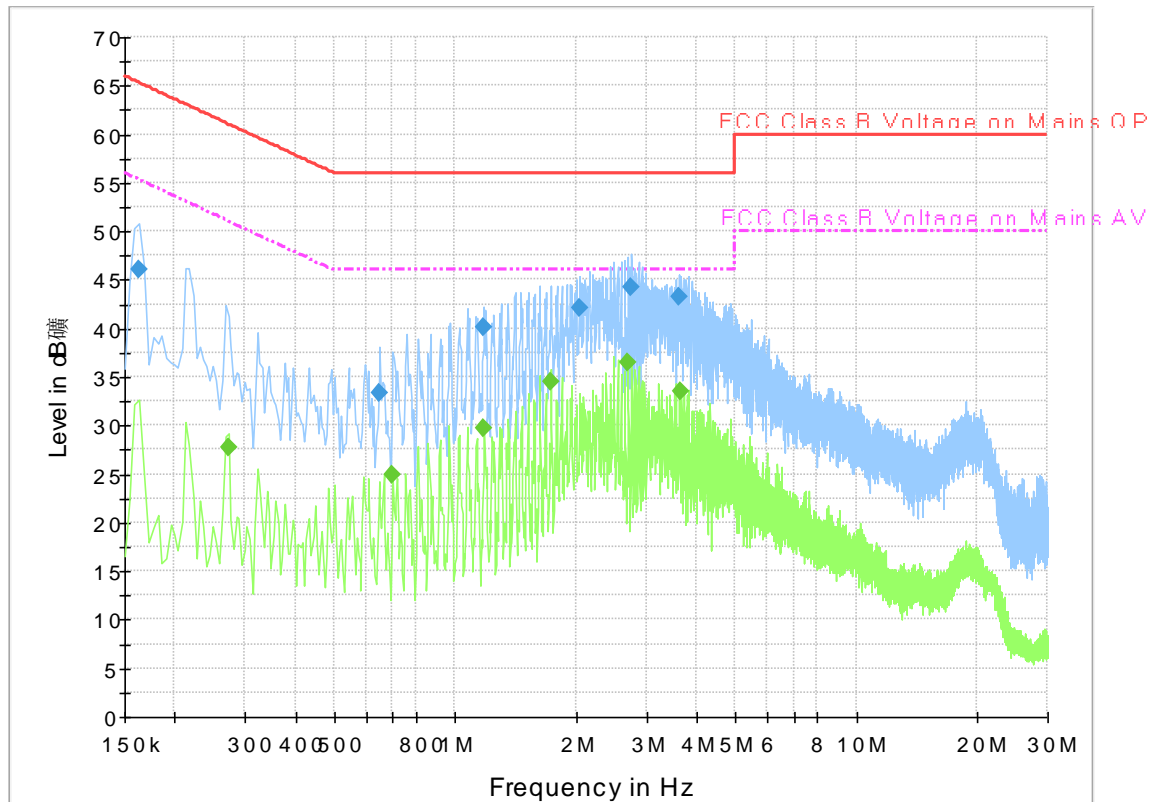
### Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.163500	54.0	2000.0	9.000	On	L1	19.9	11.3	65.3	
0.267000	43.0	2000.0	9.000	On	L1	19.8	18.2	61.2	
1.126500	40.3	2000.0	9.000	On	L1	19.7	15.7	56.0	
1.630500	43.2	2000.0	9.000	On	L1	19.7	12.8	56.0	
2.706000	45.7	2000.0	9.000	On	L1	19.7	10.3	56.0	
3.786000	39.8	2000.0	9.000	On	N	19.7	16.2	56.0	

### Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.163500	37.3	2000.0	9.000	On	L1	19.9	18.0	55.3	
0.267000	32.3	2000.0	9.000	On	L1	19.8	18.9	51.2	
1.126500	30.5	2000.0	9.000	On	L1	19.7	15.5	46.0	
1.738500	35.2	2000.0	9.000	On	L1	19.7	10.8	46.0	
2.544000	37.1	2000.0	9.000	On	L1	19.7	8.9	46.0	
4.281000	31.7	2000.0	9.000	On	L1	19.6	14.3	46.0	

Idle:



## Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.163500	46.0	2000.0	9.000	On	L1	19.9	19.3	65.3	
0.649500	33.4	2000.0	9.000	On	N	19.9	22.6	56.0	
1.180500	40.1	2000.0	9.000	On	L1	19.7	15.9	56.0	
2.040000	42.1	2000.0	9.000	On	L1	19.7	13.9	56.0	
2.755500	44.2	2000.0	9.000	On	L1	19.7	11.8	56.0	
3.610500	43.2	2000.0	9.000	On	L1	19.7	12.8	56.0	

## Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.271500	27.8	2000.0	9.000	On	L1	19.9	23.3	51.1	
0.699000	25.0	2000.0	9.000	On	L1	19.9	21.0	46.0	
1.180500	29.7	2000.0	9.000	On	L1	19.7	16.3	46.0	
1.734000	34.5	2000.0	9.000	On	L1	19.7	11.5	46.0	
2.701500	36.5	2000.0	9.000	On	L1	19.7	9.5	46.0	
3.664500	33.5	2000.0	9.000	On	L1	19.7	12.5	46.0	

## **ANNEX B: Accreditation Certificate**

<div></div> <div><b>China National Accreditation Service for Conformity Assessment</b></div> <div><b>LABORATORY ACCREDITATION CERTIFICATE</b></div> <div><b>(Registration No. CNAS L0570 )</b></div> <div><b>Telecommunication Technology Labs,</b> <b>Academy of Telecommunication Research, MIIT</b> <u>No.52, Huayuan North Road, Haidian District, Beijing, China</u></div> <div><p><i>is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence of testing and calibration.</i></p><p><i>The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.</i></p><div><div><p>Date of Issue: 2014-06-20</p><p>Date of Expiry: 2017-06-19</p><p>Date of Initial Accreditation: 1998-07-03</p><p>Date of Update: 2014-06-20</p></div><div></div><div><p>Signed on behalf of China National Accreditation Service for Conformity Assessment</p></div><div><p><small>China National Accreditation Service for Conformity Assessment (CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is the signatory to International Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (ILAC MRA) and Asia Pacific Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (APLAC MRA).</small></p></div></div><div><div>No.CNAS AL 2</div><div>0010044</div></div></div>
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