



# FCC PART 15C TEST REPORT No. I15Z41312-SRD05

for

**TCL Communication Ltd.**

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

**Model Name: 5015E**

**FCC ID: 2ACCJH024**

with

**Hardware Version: P10**

**Software Version: v1A1D**

**Issued Date: 2015-07-03**



**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:**

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

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@catr.cn](mailto:cttl_terminals@catr.cn), website:[www.chinattl.com](http://www.chinattl.com)



## **REPORT HISTORY**

Report Number	Revision	Description	Issue Date
I15Z41312-SRD05	Rev.0	1st edition	2015-07-03

## **CONTENTS**

<b>1. TEST LABORATORY .....</b>	<b>4</b>
1.1. TESTING LOCATION .....	4
1.1. TESTING ENVIRONMENT .....	4
1.2. PROJECT DATA.....	4
1.3. SIGNATURE .....	4
<b>2. CLIENT INFORMATION.....</b>	<b>5</b>
2.1. APPLICANT INFORMATION .....	5
2.2. MANUFACTURER INFORMATION.....	5
<b>3. EQUIPMENT UNDERTEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>6</b>
3.1. ABOUT EUT .....	6
3.2. INTERNAL IDENTIFICATION OF EUT .....	6
3.3. INTERNAL IDENTIFICATION OF AE.....	6
3.4. NORMAL ACCESSORY SETTING .....	7
3.5. GENERAL DESCRIPTION .....	7
<b>4. REFERENCE DOCUMENTS .....</b>	<b>7</b>
4.1. DOCUMENTS SUPPLIED BY APPLICANT.....	7
4.2. REFERENCE DOCUMENTS FOR TESTING.....	7
<b>5. TEST RESULTS.....</b>	<b>8</b>
5.1. SUMMARY OF TEST RESULTS .....	8
5.2. STATEMENTS.....	8
<b>6. TEST FACILITIES UTILIZED.....</b>	<b>9</b>
<b>ANNEX A: DETAILED TEST RESULTS .....</b>	<b>10</b>
A.1. MEASUREMENT METHOD .....	10
A.2. PEAK OUTPUT POWER – CONDUCTED.....	12
A.3. FREQUENCY BAND EDGES – CONDUCTED .....	13
A.4. CONDUCTED EMISSION.....	20
A.5. RADIATED EMISSION.....	45
A.6. TIME OF OCCUPANCY (DWELL TIME).....	64
A.7. 20dB BANDWIDTH.....	74
A.8. CARRIER FREQUENCY SEPARATION.....	80
A.9. NUMBER OF HOPPING CHANNELS .....	83
A.10. AC POWERLINE CONDUCTED EMISSION .....	87
<b>ANNEX B: ACCREDITATION CERTIFICATE .....</b>	<b>90</b>

## **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**

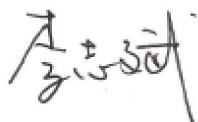
Testing Start Date: 2015-06-11  
Testing End Date: 2015-06-30

### **1.4. Signature**



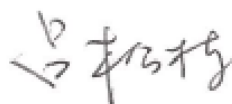
---

**Xu Zhongfei**  
**(Prepared this test report)**



---

**Li Zhibin**  
**(Reviewed this test report)**



---

**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,  
Pudong Area Shanghai, P.R. China.  
City: Shanghai  
Postal Code: 201203  
Country: China  
Contact Person: Gong Zhizhou  
Contact Email: zhizhou.gong@tcl.com  
Telephone: 0086-21-51798260  
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,  
Pudong Area Shanghai, P.R. China.  
City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: 0086-21-51798260  
Fax: 0086-21-61460602

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

#### 3.1. About EUT

Description	HSUPA/HSDPA/UMTS Quad-band/GSM Quad-band mobile phone
Model Name	5015E
FCC ID	2ACCJH024
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/π/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	v1A1D
EUT2	/	PIO	v1A1D

\*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
AE2	Battery	/	Inbuilt
AE1			
	Commercial name	Battery	
	Type	CAB1800011C1	
	Manufacturer	BYD	
	Length of cable	/	
AE2			
	Commercial name	Battery	
	Type	CAB1800011C2	
	Manufacturer	SCUD	
	Length of cable	/	

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

### 3.4. Normal Accessory setting

Fully charged battery should be used during the test.

### 3.5. General Description

The Equipment Under Test (EUT) is a model of HSUPA/HSDPA/UMTS Quad-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:	
	15.205 Restricted bands of operation;	October,
	15.209 Radiated emission limits, general requirements;	2014
ANSI C63.10	15.247 Operation within the bands 902–928MHz,	
	2400–2483.5 MHz, and 5725–5850 MHz.	
	American National Standard for Testing Unlicensed Wireless Devices	Sep,2009

## 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 5015A; all the test results have been derived from test report of 5015A.



## 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	2016-02-09
3	Shielding Room	S81	/	ETS-Lindgren	/	/
4	LISN	ENV216	101200	Rohde & Schwarz	1 year	2015-07-07
5	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2016-03-03

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESCI 7	100948	Rohde & Schwarz	1 year	2015-07-16
2	Loop antenna	HFH2-Z2	829324/00 7	Rohde & Schwarz	3 year	2017-12-16
3	BiLog Antenna	VULB9163	234	Schwarzbeck	3 year	2016-09-15
4	Dual-Ridge Waveguide Horn Antenna	3115	6914	EMCO	3 year	2017-12-15
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	3 year	2017-06-30
6	Vector Signal Analyzer	FSV	101047	Rohde & Schwarz	1 year	2015-07-03
7	Semi-anechoic chamber	/	CT000332 -1074	Frankonia German	/	/
8	Bluetooth Tester	CBT	100153	Rohde & Schwarz	1 year	2015-09-18

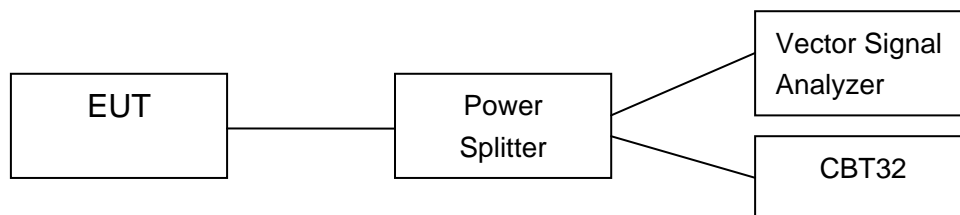
## **ANNEX A: Detailed Test Results**

### **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**

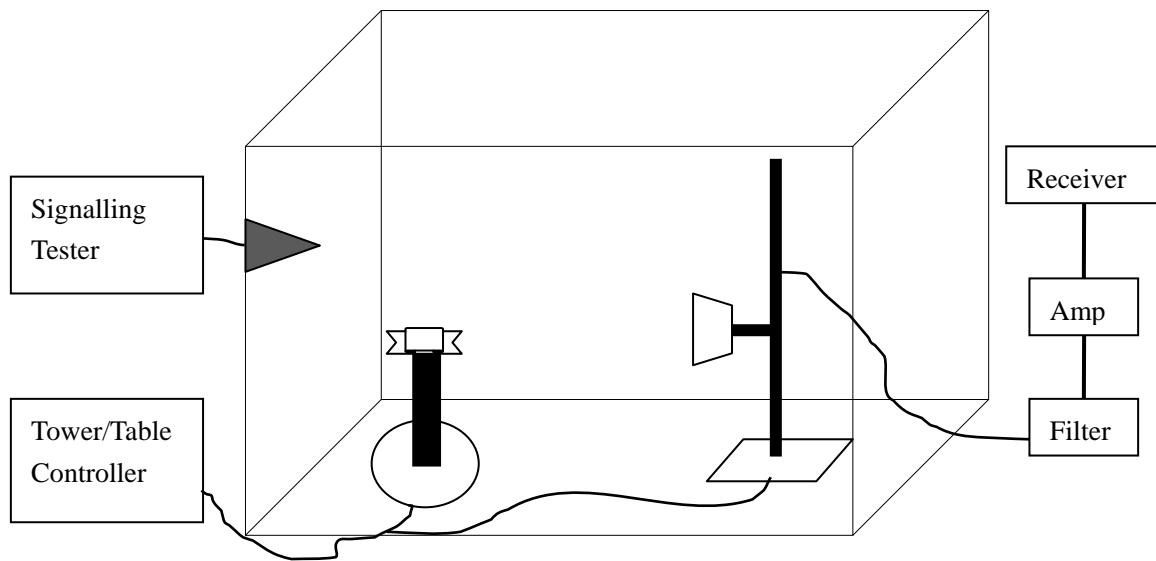
The measurement is made according to ANSI C63.10

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 6.10

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)	5.98	6.86	7.71	P

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

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	5.43	6.32	7.15	P

#### For 8DPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	5.71	6.63	7.47	P

**Conclusion: PASS**

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

#### Method of Measurement: See ANSI C63.10- clause 6.9

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	-54.94	P
	Hopping ON	Fig.2	-58.56	P
78	Hopping OFF	Fig.3	-62.04	P
	Hopping ON	Fig.4	-63.57	P

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

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.5	-56.64	P
	Hopping ON	Fig.6	-56.93	P
78	Hopping OFF	Fig.7	-61.59	P
	Hopping ON	Fig.8	-60.73	P

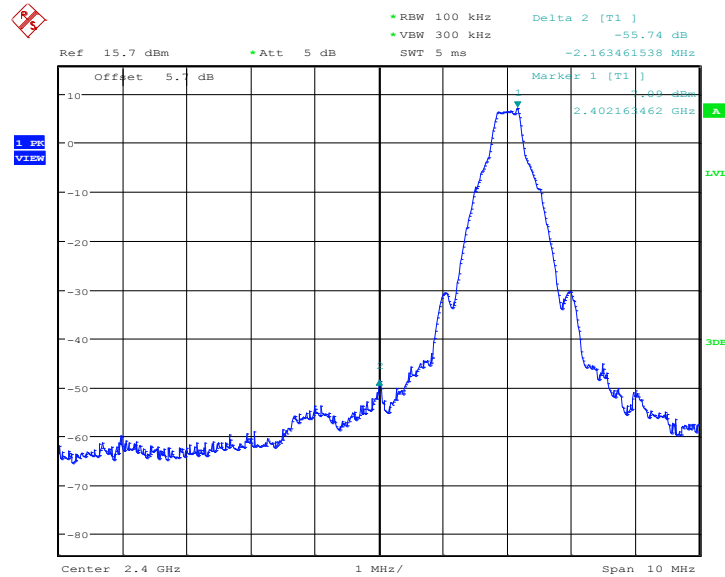
##### For 8DPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.9	-56.56	P
	Hopping ON	Fig.10	-54.28	P

78	Hopping OFF	Fig.11	-61.50	P
	Hopping ON	Fig.12	-62.34	P

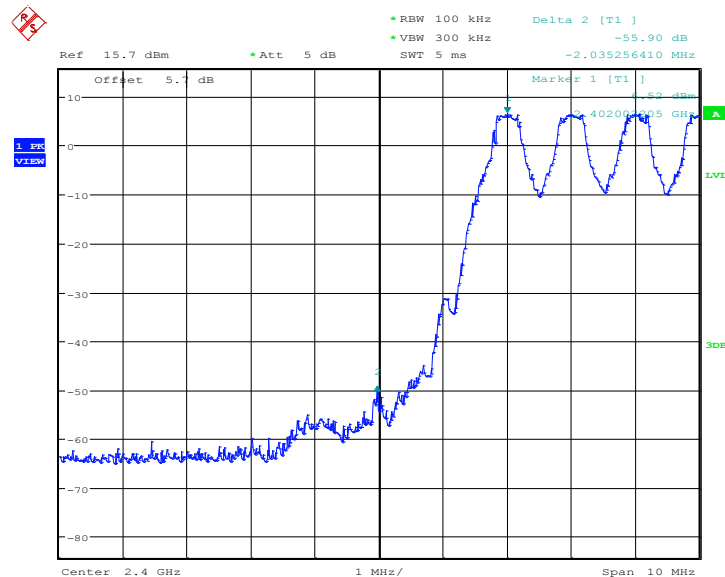
**Conclusion: PASS**

**Test graphs as below**



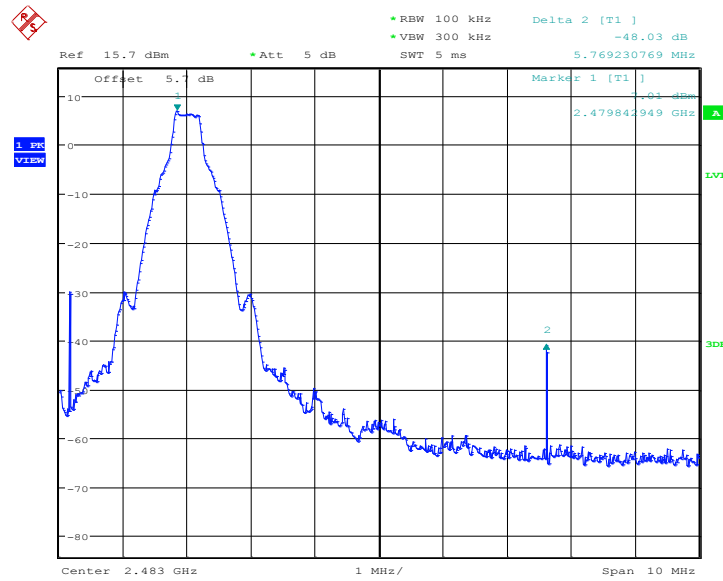
Date: 26.JUN.2015 11:48:40

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



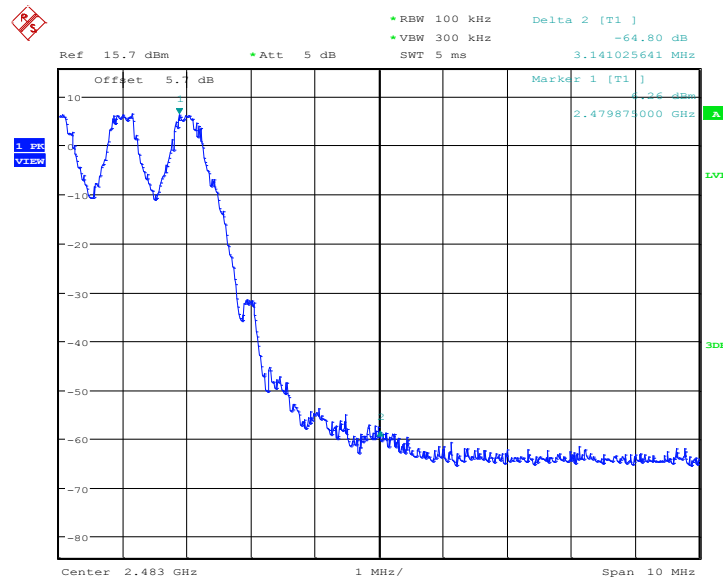
Date: 26.JUN.2015 11:50:59

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



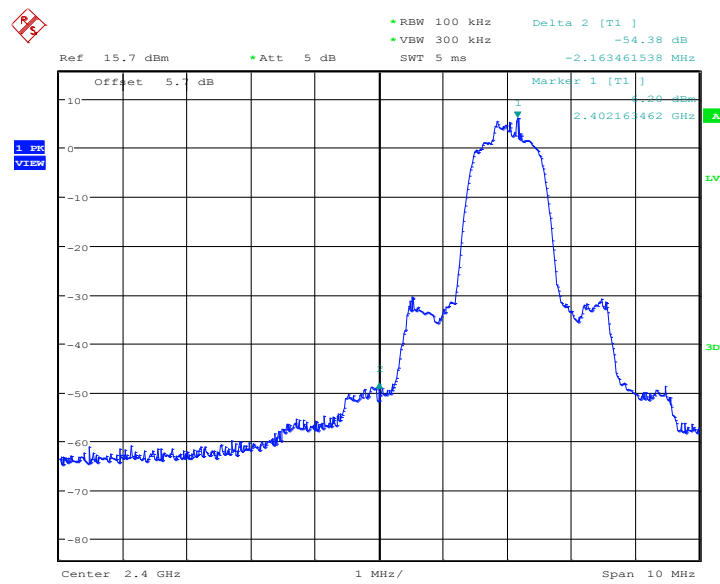
Date: 26.JUN.2015 11:48:57

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



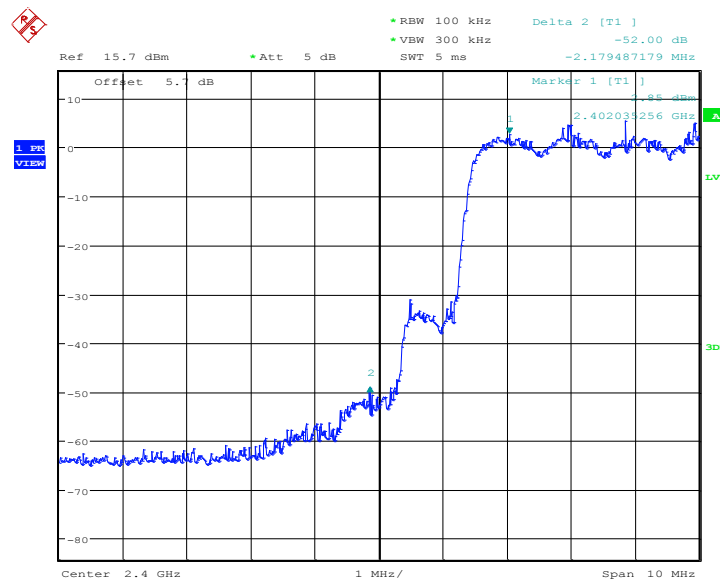
Date: 26.JUN.2015 11:53:02

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



Date: 26.JUN.2015 12:10:39

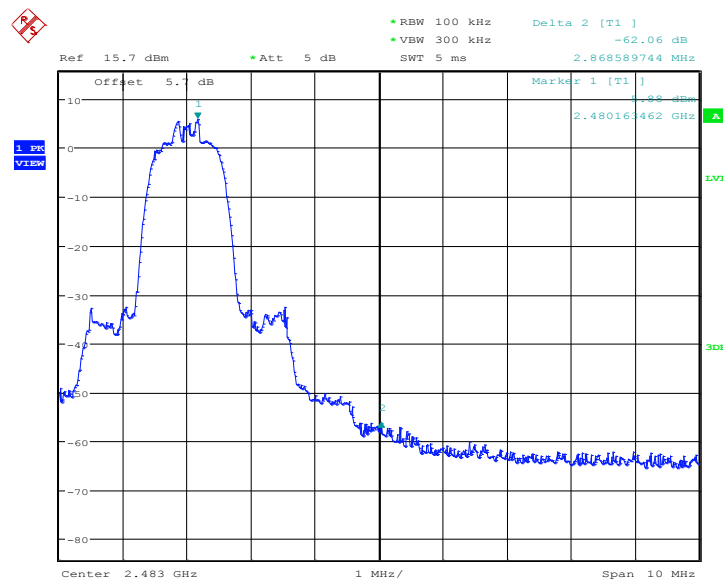
Fig.5. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping Off



Date: 26.JUN.2015 12:12:59

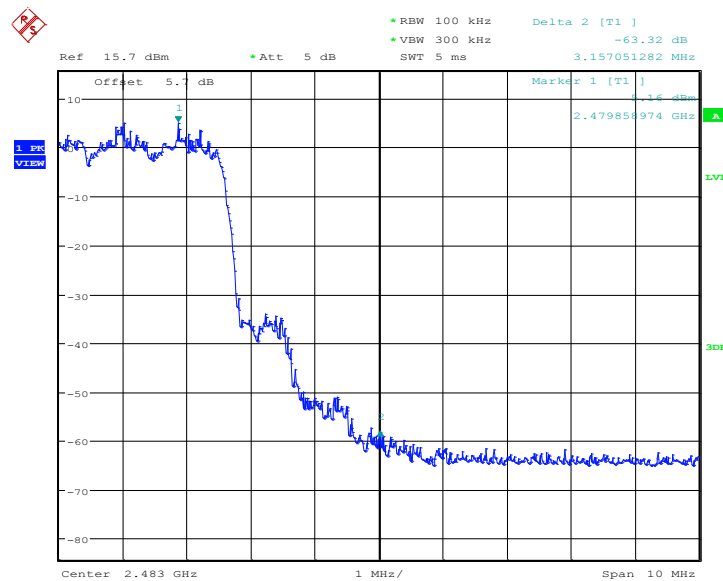
Fig.6. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping On





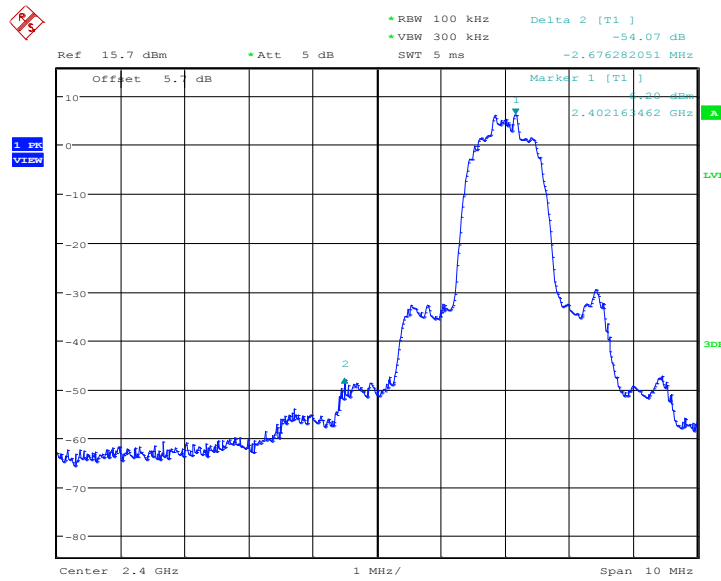
Date: 26.JUN.2015 12:10:56

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



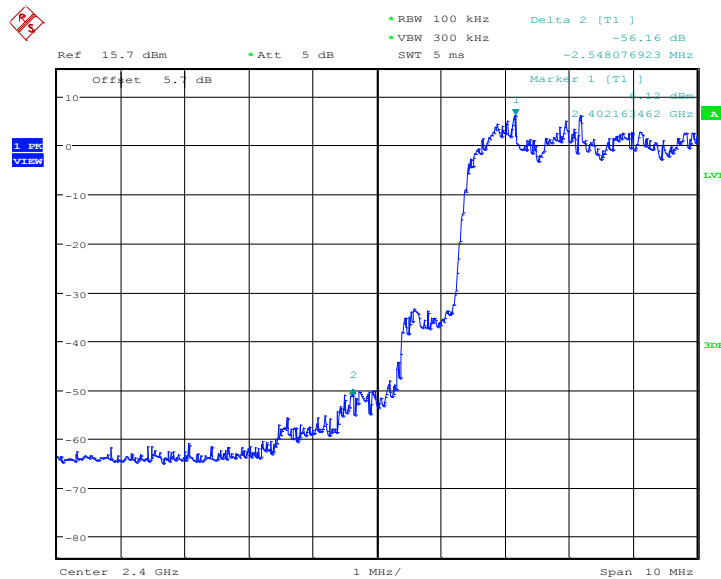
Date: 26.JUN.2015 12:15:01

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



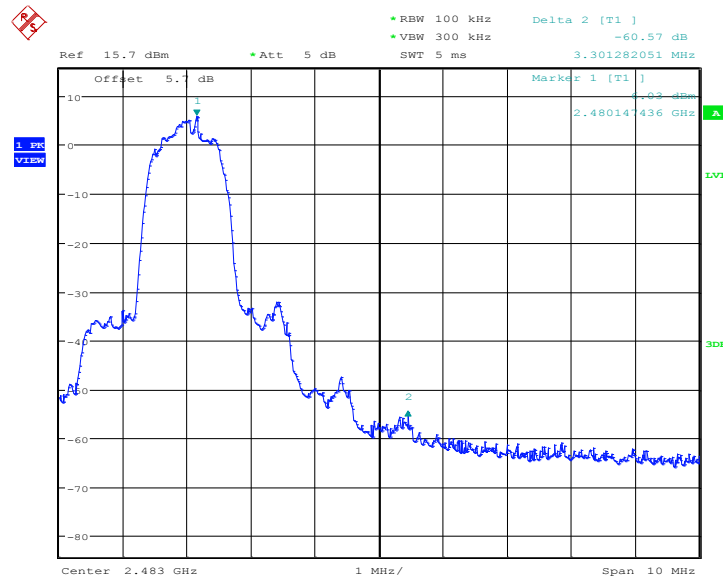
Date: 26.JUN.2015 12:32:42

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



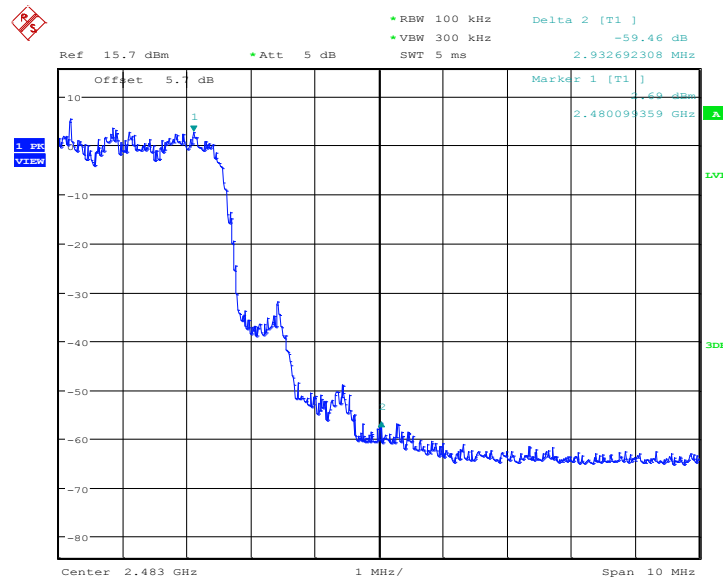
Date: 26.JUN.2015 12:35:02

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



Date: 26.JUN.2015 12:32:59

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



Date: 26.JUN.2015 12:37:04

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

#### A.4. Conducted Emission

**Method of Measurement: See ANSI C63.10- clause 6.7**

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

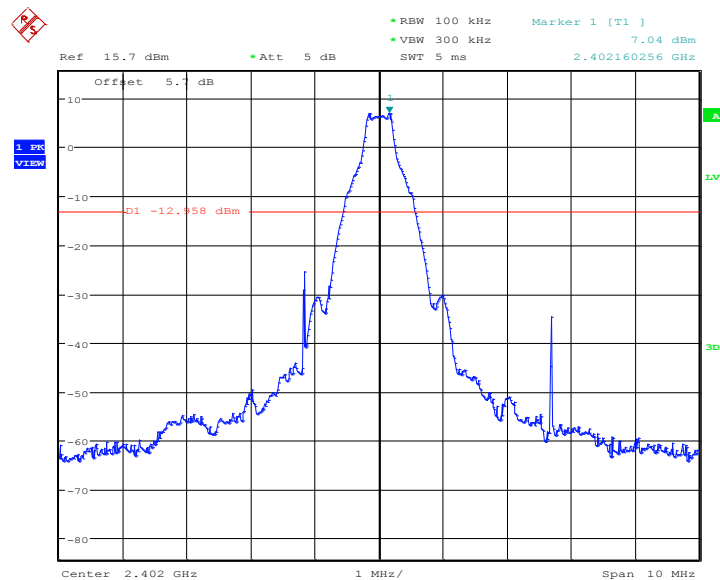
**For 8DPSK**

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

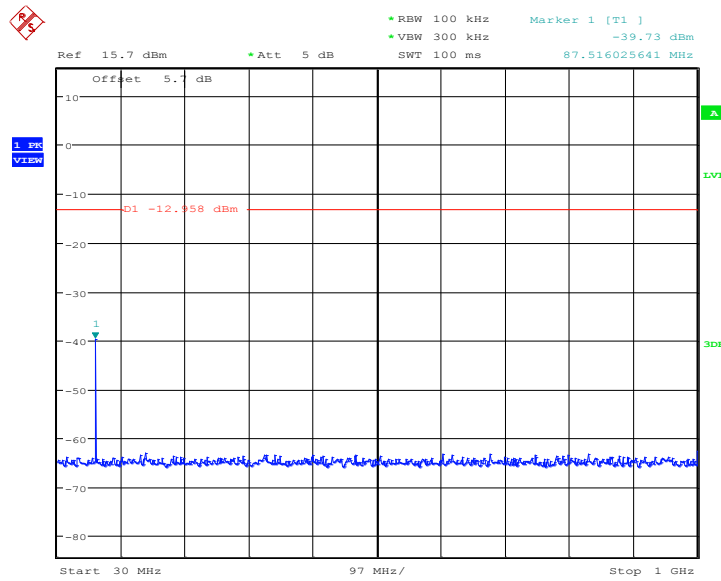
**Conclusion: PASS**

**Test graphs as below**



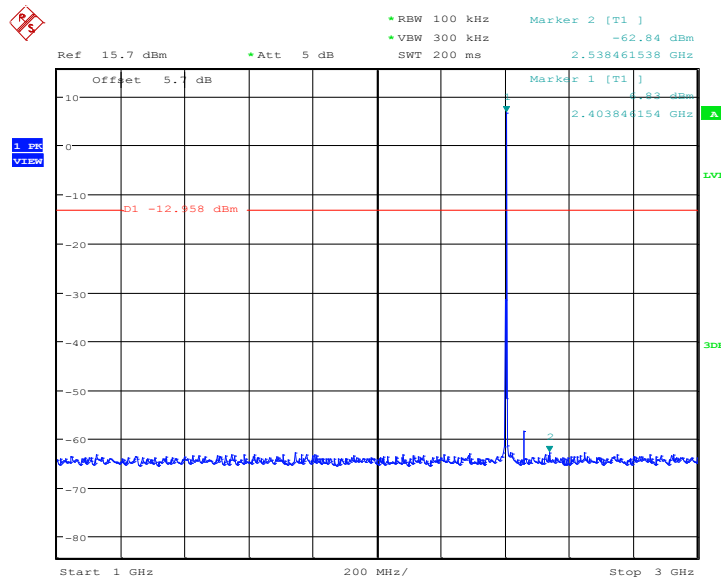
Date: 26.JUN.2015 11:53:21

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



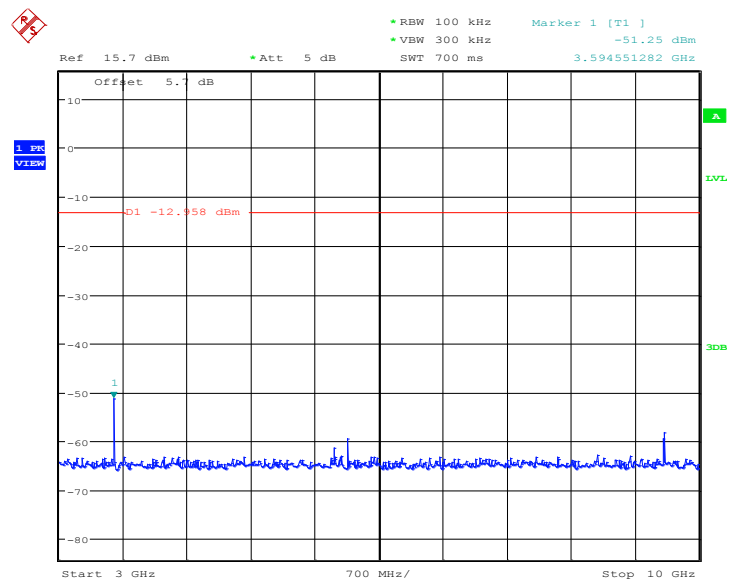
Date: 26.JUN.2015 11:53:37

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



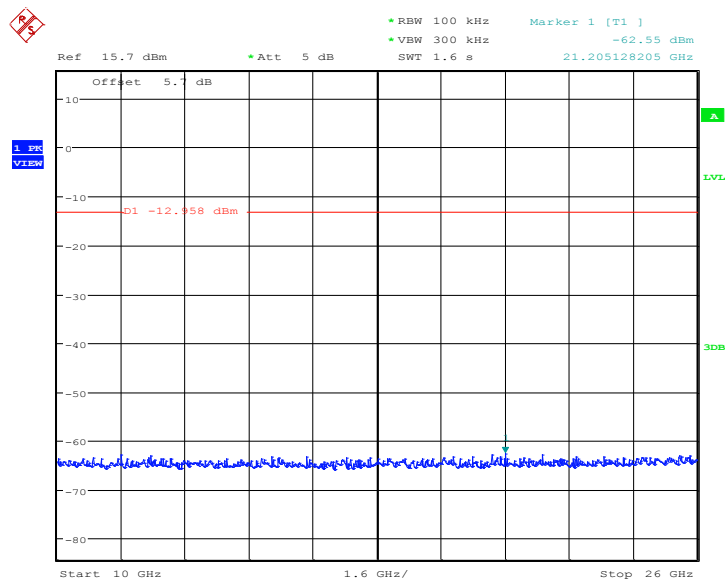
Date: 26.JUN.2015 11:54:09

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



Date: 26.JUN.2015 11:54:26

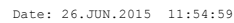
Fig.16. Conducted spurious emission: GFSK, Channel 0, 3GHz - 10GHz



Date: 26.JUN.2015 11:54:42

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





RBW 100 kHz VBW 300 kHz Marker 1 [T1] -38.48 dBm  
Att 5 dB SWT 100 ms 126.378205128 MHz

Offset 5.7 dB

D1 -12.47 dBm

Start 30 MHz 97 MHz/ Stop 1 GHz

©Copyright. All rights reserved by CTTL.



Ref 15.7 dBm      • Att 5 dB      • RBW 100 kHz      Marker 1 [T1]      -52.37 dBm  
 • VBW 300 kHz      SWT 700 ms      3.661858974 GHz

Offset 5.7 dB

D1 -12.47 dBm

1.96 V/div

Start 3 GHz      700 MHz/      Stop 10 GHz



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



Ref 15.7 dBm Att 5 dB RBW 100 kHz VBW 300 kHz SWT 5 ms Marker 1 [T1] 6.96 dBm 2.479839744 GHz

Offset 5.1 dB

1.50 V/div

D1 -13.94 dBm

Center 2.48 GHz 1 MHz/ Span 10 MHz



©Copyright. All rights reserved by CTTL.



Ref 15.7 dBm      \* Att 5 dB      \* RBW 100 kHz      \* VBW 300 kHz      Marker 2 [T1]      -62.40 dBm

SWT 200 ms      2.509615385 GHz

Offset 5.7 dB

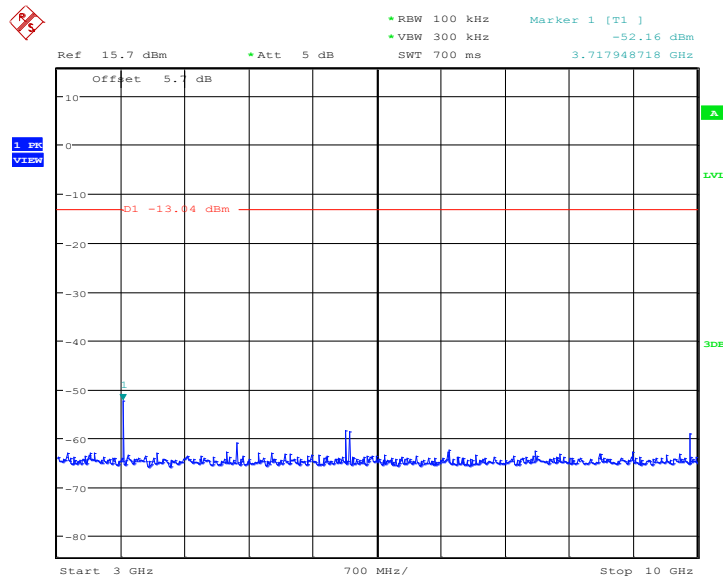
Marker 1 [T1]      -62.40 dBm      2.48076231 GHz

D1 -13.04 dBm

1.96 V=10V

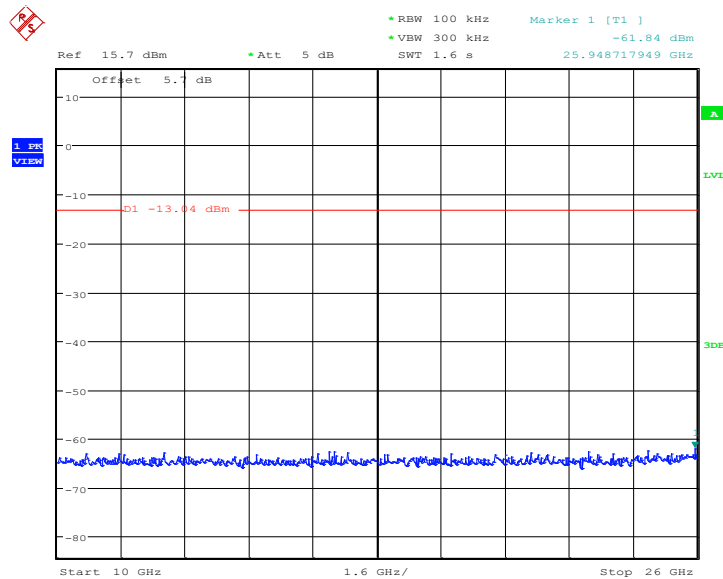
Start 1 GHz      200 MHz/      Stop 3 GHz

Date: 26.JUN.2015 11:57:25



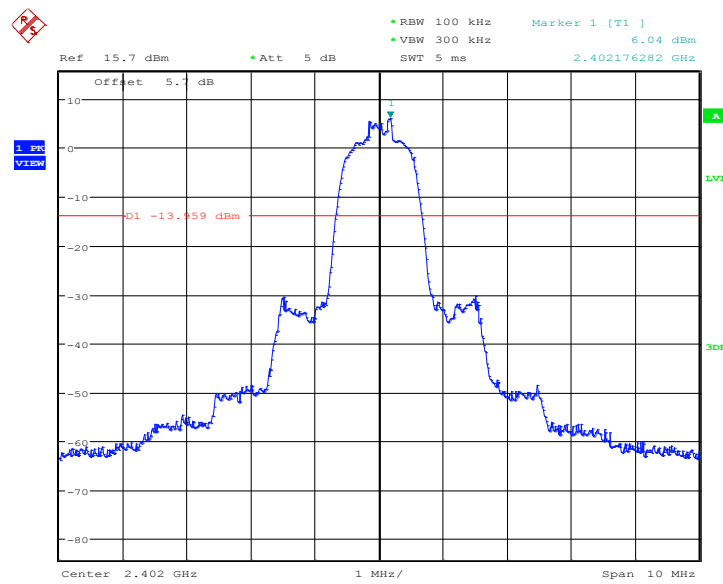
Date: 26.JUN.2015 11:57:41

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



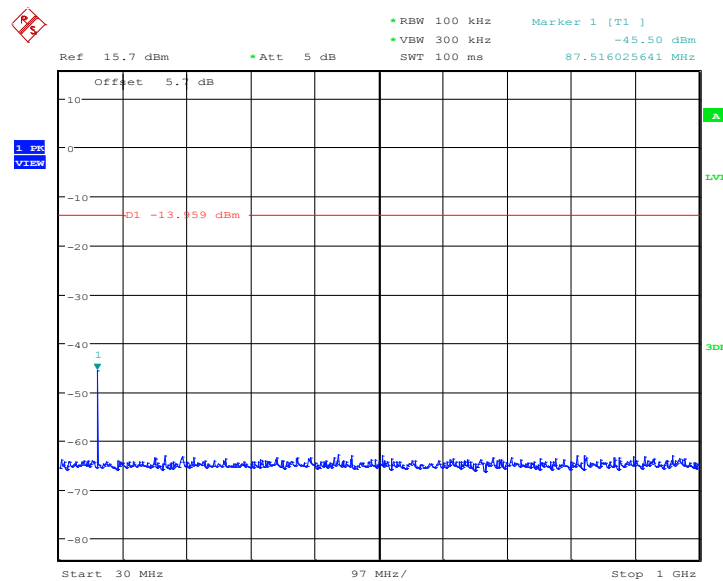
Date: 26.JUN.2015 11:57:58

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



Date: 26.JUN.2015 12:15:20

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



Date: 26.JUN.2015 12:15:36

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



RBW 100 kHz  
 VBW 300 kHz  
 SWT 700 ms

Marker 1 [T1]  
 -56.60 dBm  
 3.594551282 GHz

Ref 15.7 dBm  
 Att 5 dB

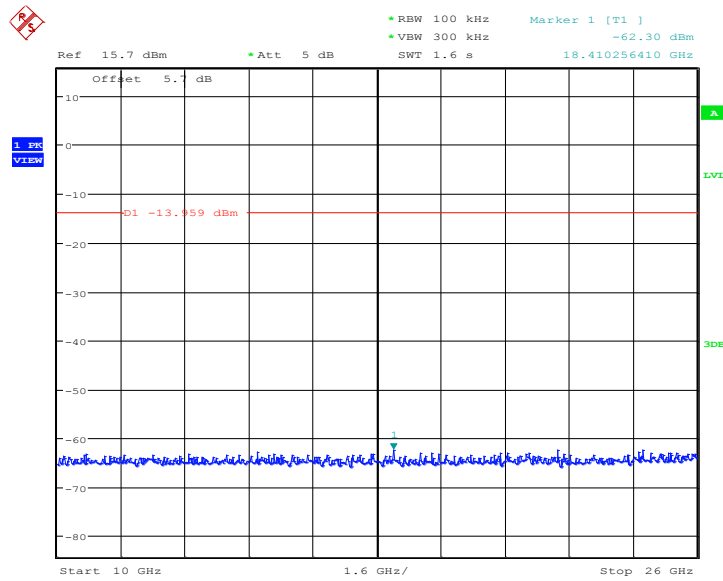
Offset 5.7 dB

D1 -13.459 dBm

1

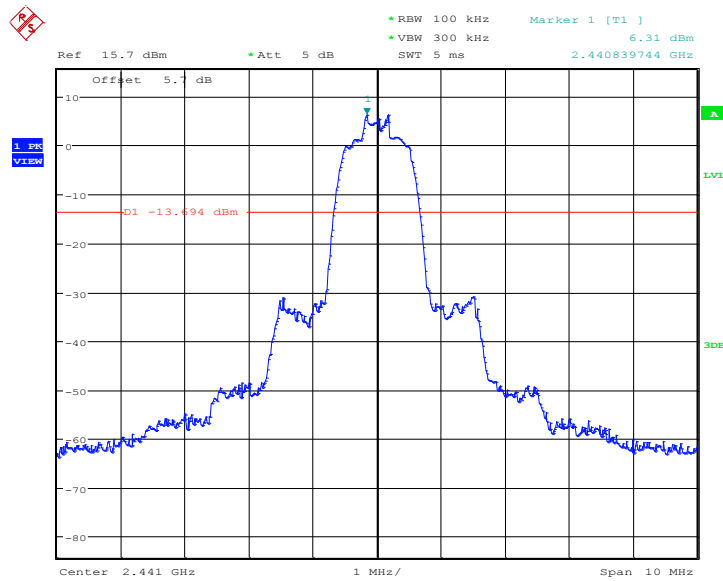
Start 3 GHz  
 700 MHz/  
 Stop 10 GHz

Date: 26.JUN.2015 12:16:24



Date: 26.JUN.2015 12:16:41

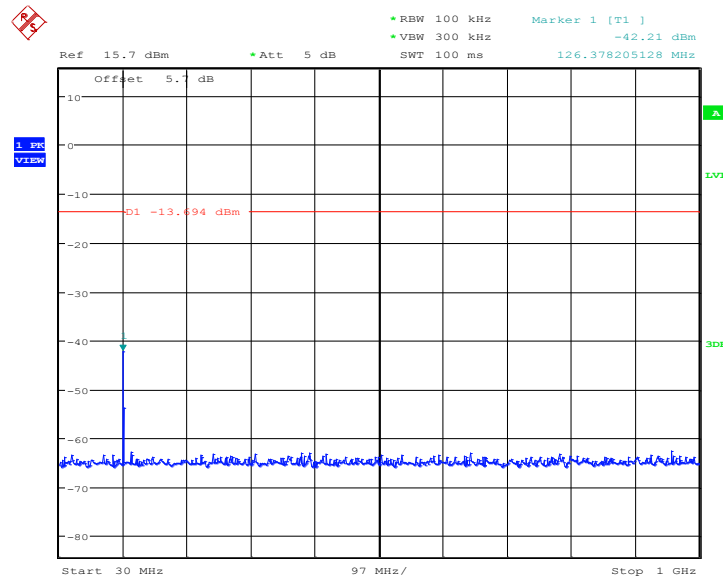
Fig.32. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 10GHz - 26GHz



Date: 26.JUN.2015 12:16:58

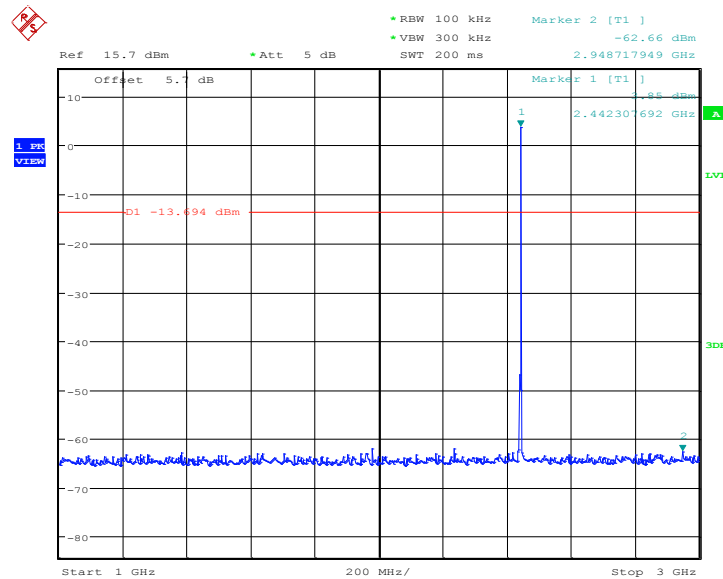
Fig.33. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 2441MHz





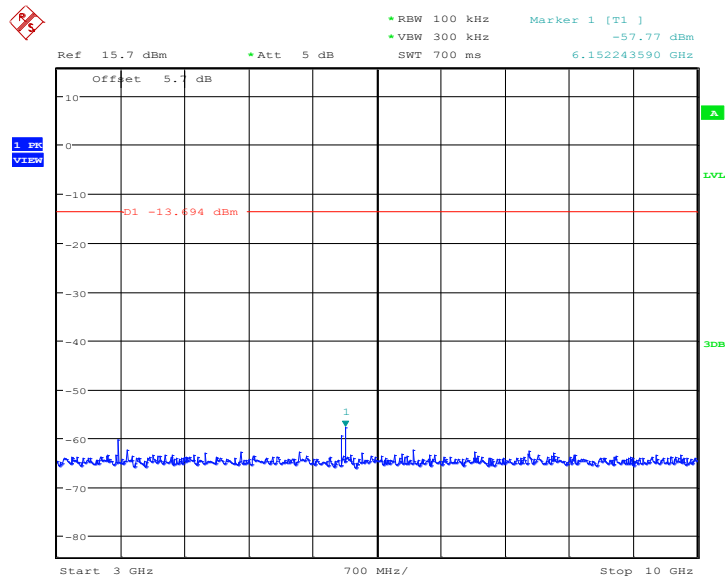
Date: 26.JUN.2015 12:17:14

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



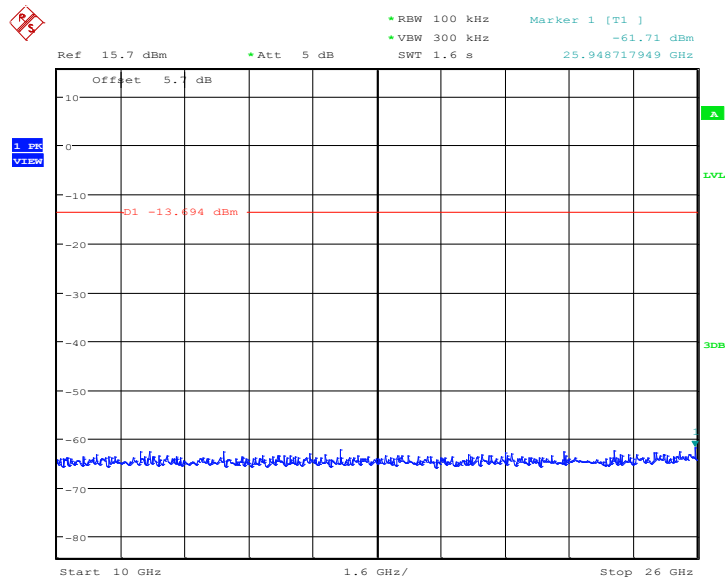
Date: 26.JUN.2015 12:17:46

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



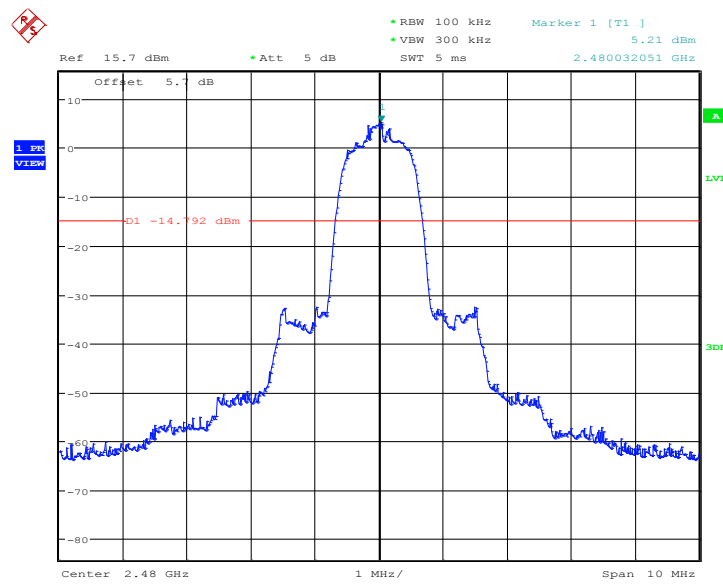
Date: 26.JUN.2015 12:18:02

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



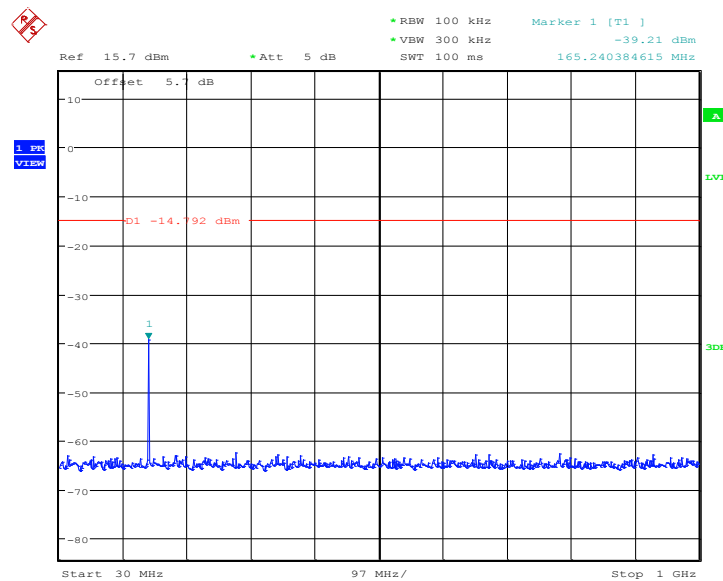
Date: 26.JUN.2015 12:18:19

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



Date: 26.JUN.2015 12:18:35

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



Date: 26.JUN.2015 12:18:52

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



• RBW 100 kHz  
 • VBW 300 kHz  
 • SWT 700 ms

Marker 1 [T1]  
 -57.39 dBm  
 3.717948718 GHz

Ref 15.7 dBm  
 Att 5 dB

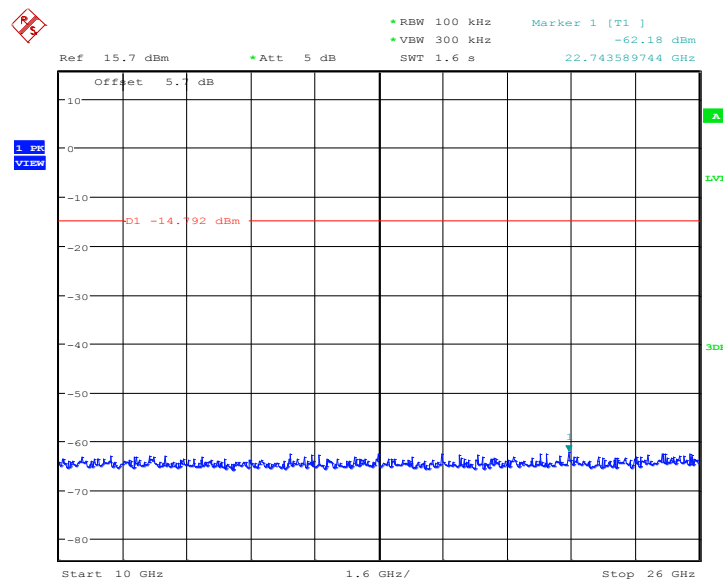
Offset 5.7 dB

1.00  
 V/div

D1 -14.792 dBm

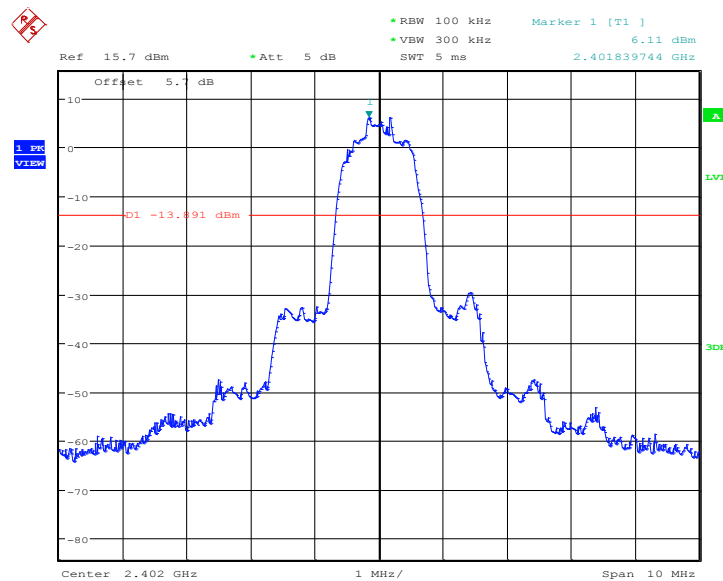
Start 3 GHz  
 700 MHz/  
 Stop 10 GHz

Date: 26.JUN.2015 12:19:40



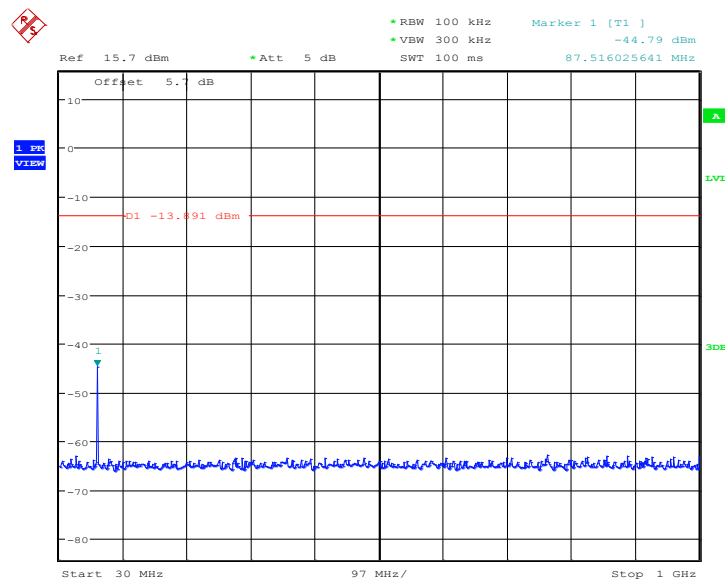
Date: 26.JUN.2015 12:19:57

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



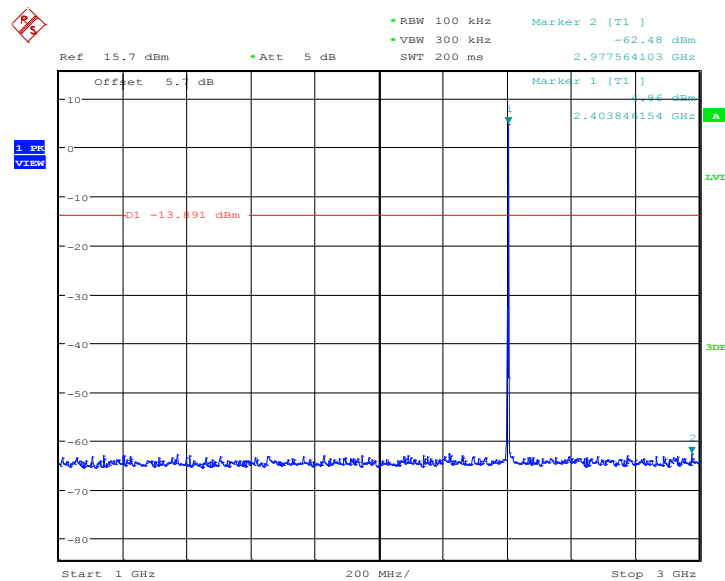
Date: 26.JUN.2015 12:37:24

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



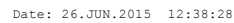
Date: 26.JUN.2015 12:37:40

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



Date: 26.JUN.2015 12:38:12

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



\* RBW 100 kHz  
 \* VBW 300 kHz  
 Marker 1 [ T1 ]  
 -62.30 dBm  
 25.538461538 GHz

Ref 15.7 dBm  
 \* Att 5 dB  
 SWT 1.6 s

Offset 5.7 dB

1.5%  
 V=10V

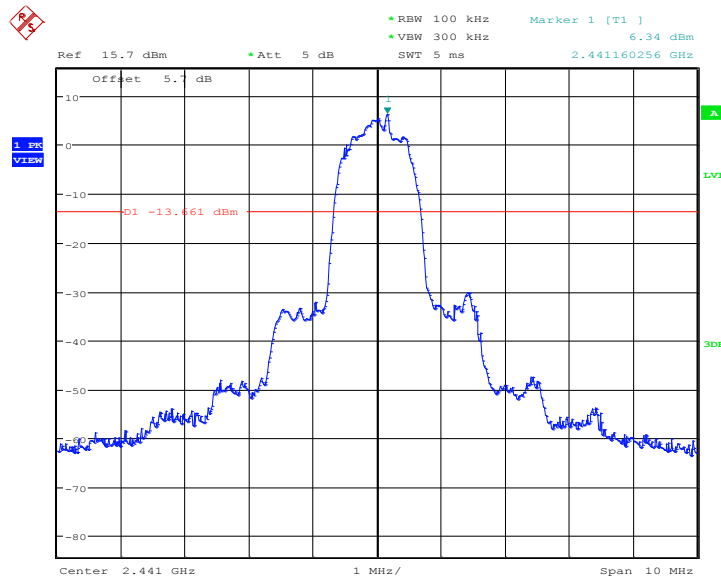
D1 -13.491 dBm

1

Start 10 GHz  
 1.6 GHz/  
 Stop 26 GHz

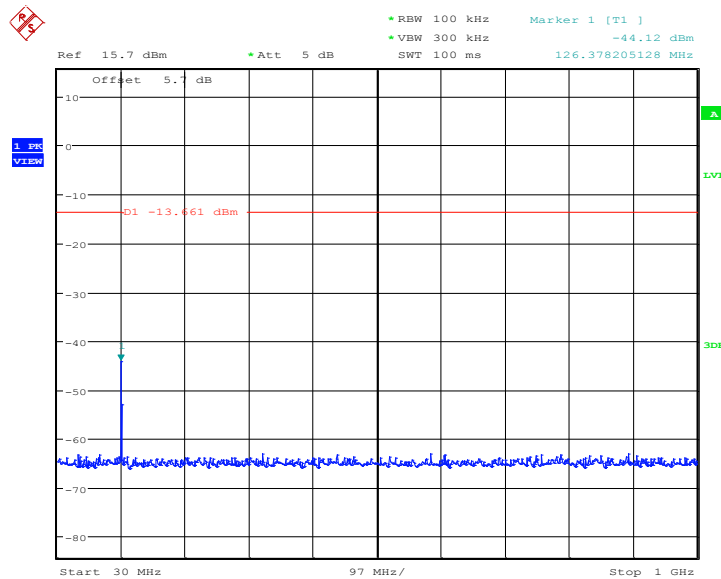
Date: 26.JUN.2015 12:38:45

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



Date: 26.JUN.2015 12:39:01

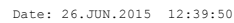
Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz



Date: 26.JUN.2015 12:39:18

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





• RBW 100 kHz  
 • VBW 300 kHz  
 SWT 700 ms

Marker 1 [T1]  
 -56.73 dBm  
 3.661858974 GHz

Ref 15.7 dBm  
 • Att 5 dB

Offset 5.7 dB

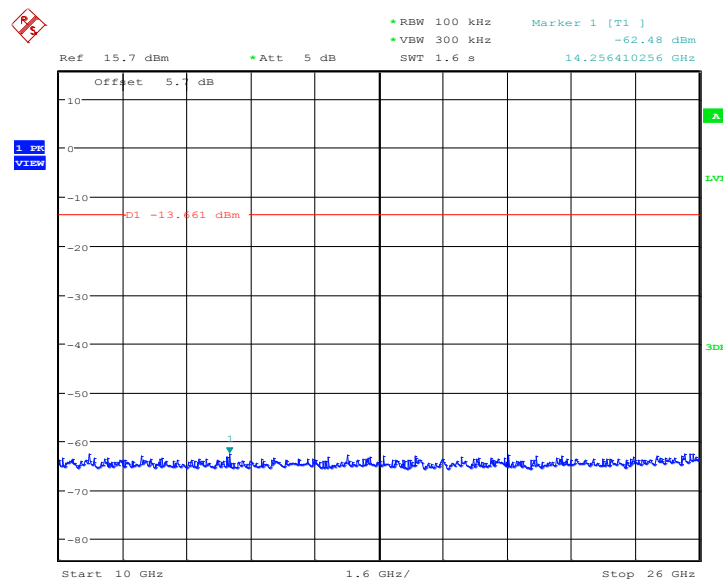
1 500  
 V=100V

D1 -13.461 dBm

T1 -56.73 dBm

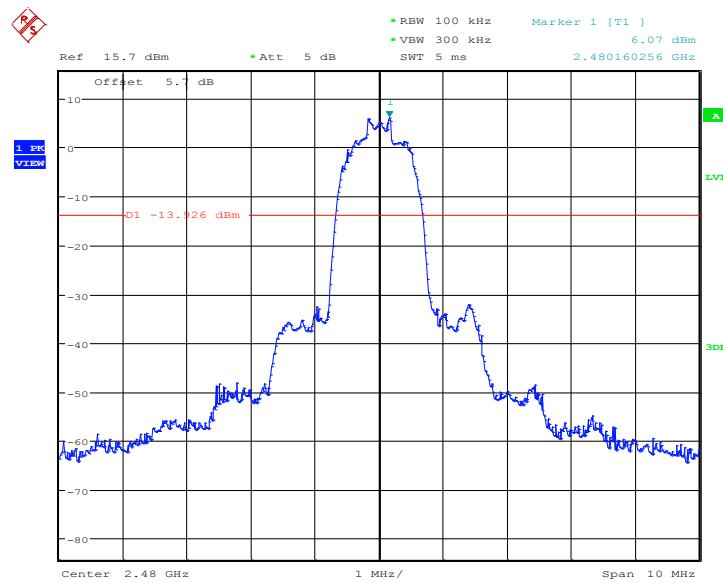
Start 3 GHz  
 700 MHz/  
 Stop 10 GHz

©Copyright. All rights reserved by CTTL.



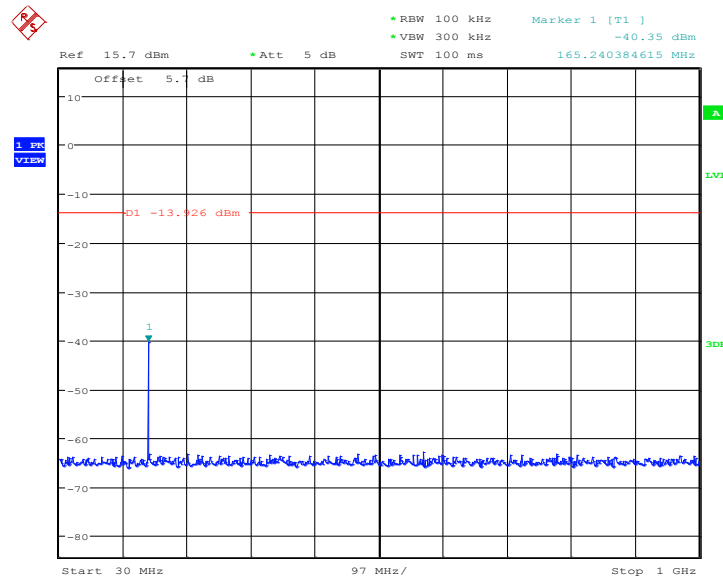
Date: 26.JUN.2015 12:40:23

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



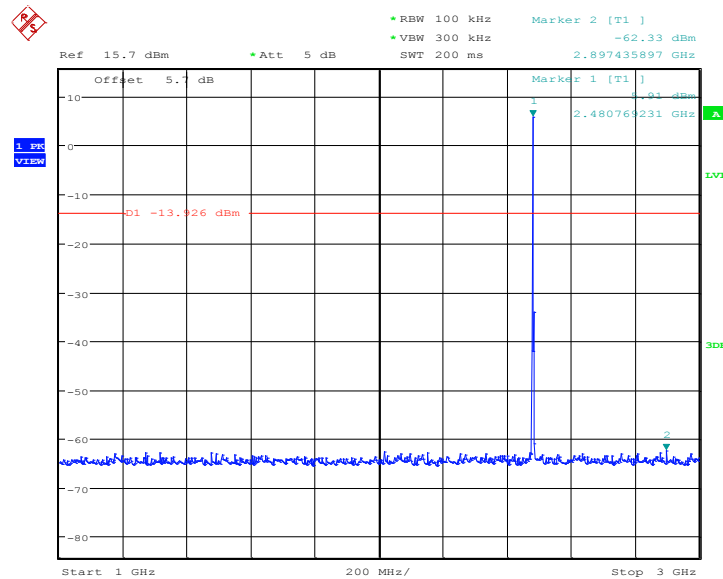
Date: 26.JUN.2015 12:40:39

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



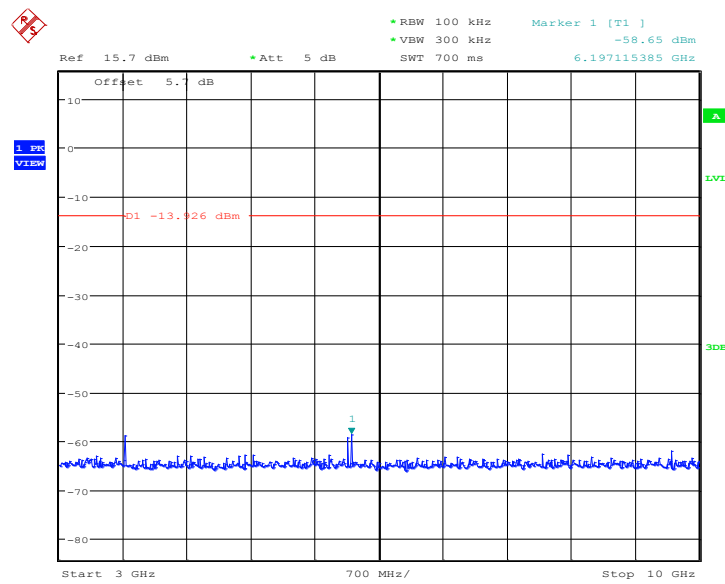
Date: 26.JUN.2015 12:40:56

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



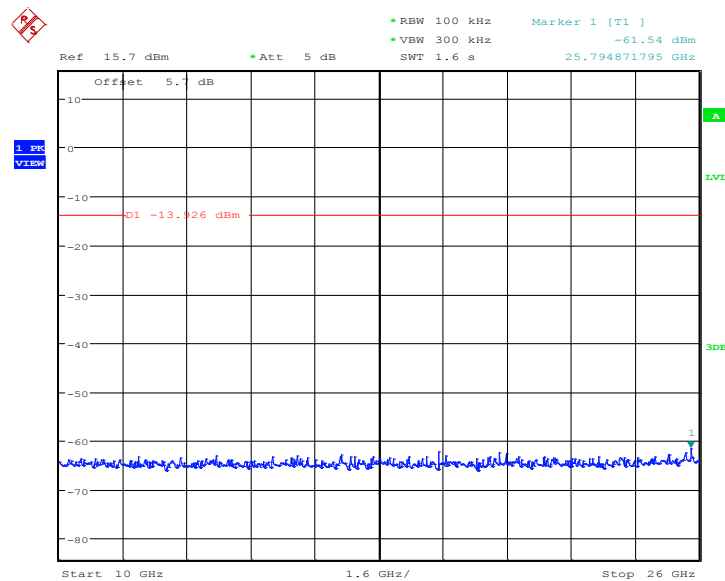
Date: 26.JUN.2015 12:41:27

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



Date: 26.JUN.2015 12:41:44

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



Date: 26.JUN.2015 12:42:01

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
2389.425	55.6	-11.1	66.7	H
17972.250	58.1	27.9	30.2	H
17943.750	58.0	27.9	30.1	V
17966.250	58.0	27.9	30.1	H
17994.750	57.2	27.9	29.3	H
17894.250	57.1	27.1	30.0	H

#### GFSK Ch 39 - Average

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
17981.250	58.0	27.9	30.1	H
17974.500	57.3	27.9	29.4	H
17969.250	57.3	27.9	29.4	V
17979.750	57.2	27.9	29.3	H
17954.250	57.1	27.9	29.2	H

17937.000	57.0	27.9	29.1	H
-----------	------	------	------	---

**GFSK Ch 78 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2493.970	56.8	-11.2	68.0	H
17999.250	57.6	27.9	29.7	H
17990.250	57.5	27.9	29.6	V
17910.750	57.4	27.1	30.3	H
17778.750	57.2	27.1	30.1	H
17973.000	57.2	27.9	29.3	H

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

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2389.720	56.6	-11.1	67.7	H
17933.250	57.7	27.9	29.8	H
17892.000	57.7	27.1	30.6	V
17900.250	57.6	27.1	30.5	H
17995.500	57.5	27.9	29.6	H
17979.000	57.3	27.9	29.4	H

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

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
17985.000	57.5	27.9	29.6	H
17967.750	57.3	27.9	29.4	H
17901.000	57.2	27.1	30.1	V
17833.500	57.2	27.1	30.1	H
17868.750	57.1	27.1	30.0	H
17949.000	57.1	27.9	29.2	H

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

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2493.765	56.7	-11.2	67.9	H
17961.750	57.6	27.9	29.7	H
17942.250	57.1	27.9	29.2	V
17972.250	57.1	27.9	29.2	H
17991.750	57.1	27.9	29.2	H
17916.000	56.9	27.9	29.0	H

**8DPSK Ch 0 - Average**

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2384.530	56.6	-11.1	67.7	H
17991.750	58.5	27.9	30.6	H
17974.500	58.4	27.9	30.5	V
17968.500	58.1	27.9	30.2	H
17903.250	57.7	27.1	30.6	H

17872.500	57.4	27.1	30.3	H
-----------	------	------	------	---

#### 8DPSK Ch 39 - Average

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
17936.250	57.9	27.9	30.0	H
17937.750	57.5	27.9	29.6	H
17948.250	57.4	27.9	29.5	V
17853.000	57.4	27.1	30.3	H
17968.500	57.2	27.9	29.3	H
17883.750	57.2	27.1	30.1	H

#### 8DPSK Ch 78 - Average

Frequency(MHz)	Result(dBuv/m)	ARPL (dB)	Pmea(dBuv/m)	Polarization
2495.300	56.4	-11.2	67.6	H
17964.750	58.1	27.9	30.2	H
17971.500	58.1	27.9	30.2	V
17903.250	57.9	27.1	30.8	H
17958.000	57.6	27.9	29.7	H
17960.250	57.4	27.9	29.5	H

**Conclusion: PASS**

**Test graphs as below:**

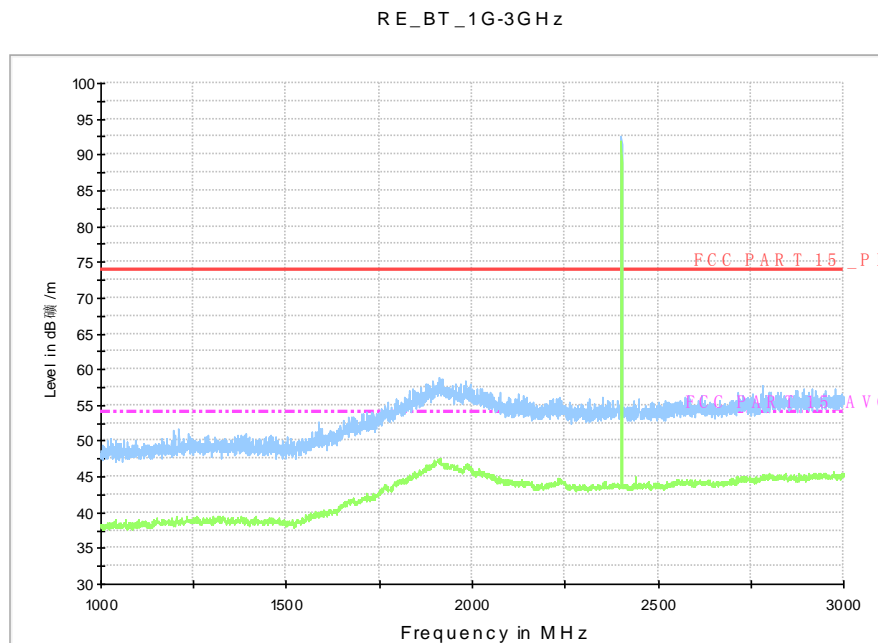


Fig.58. Radiated emission: GFSK, Channel 0, 1 GHz - 3 GHz



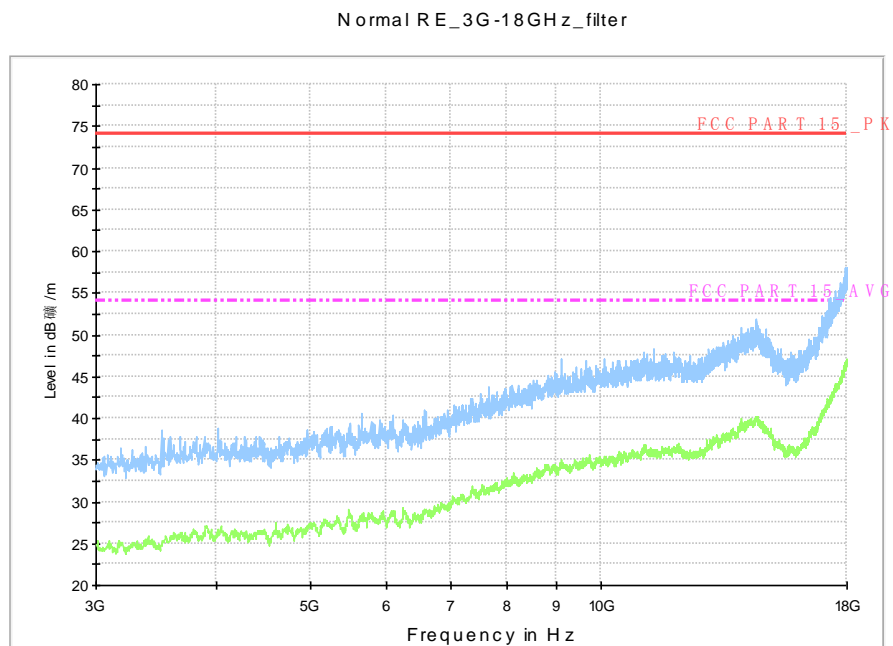


Fig.59. Radiated emission: GFSK, Channel 0, 3 GHz - 18 GHz

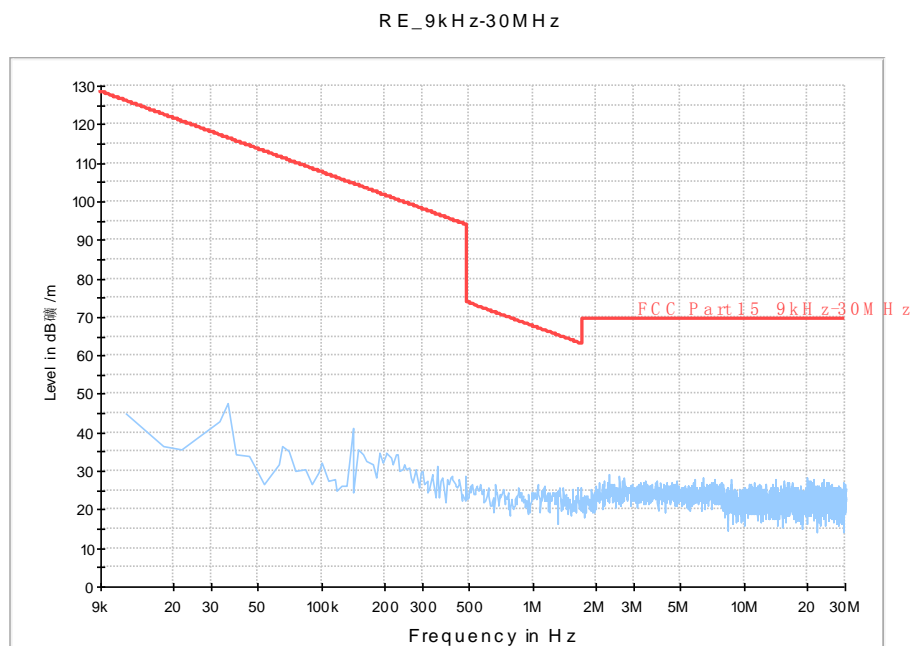


Fig.60. Radiated emission: GFSK, Channel 39, 9 kHz - 30 MHz

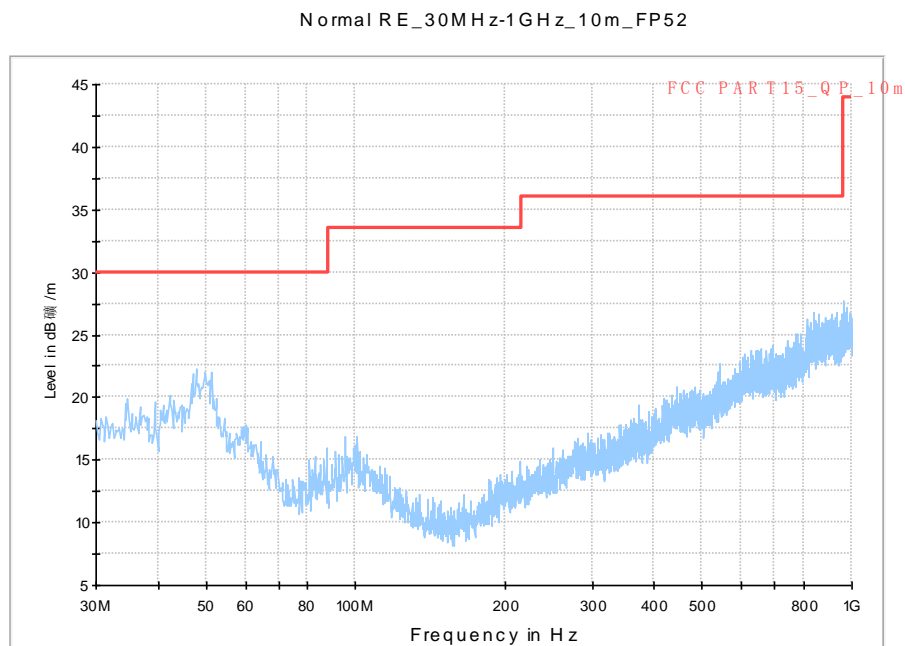


Fig.61. Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz

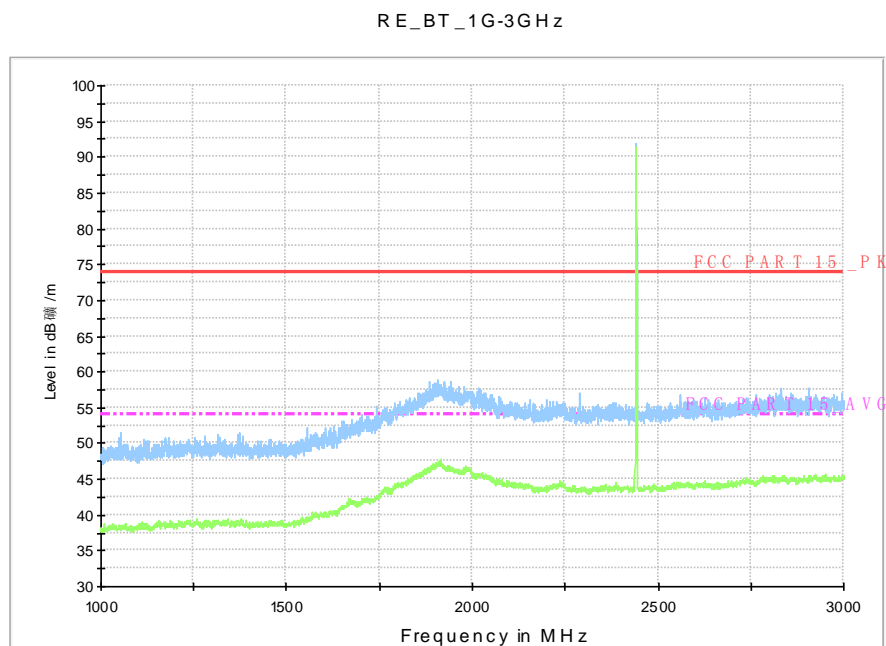


Fig.62. Radiated emission: GFSK, Channel 39, 1 GHz - 3 GHz

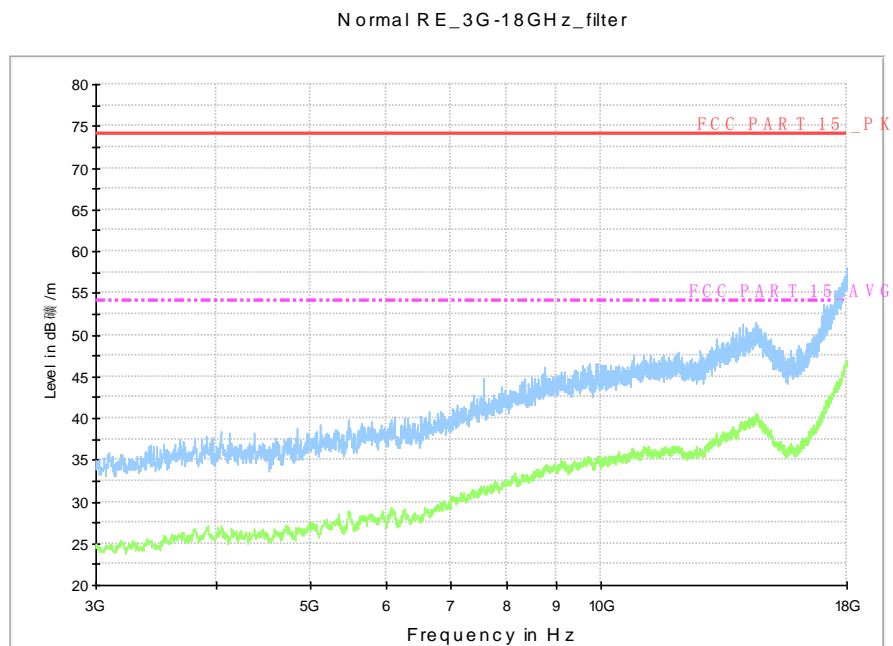


Fig.63. Radiated emission: GFSK, Channel 39, 3 GHz - 18 GHz

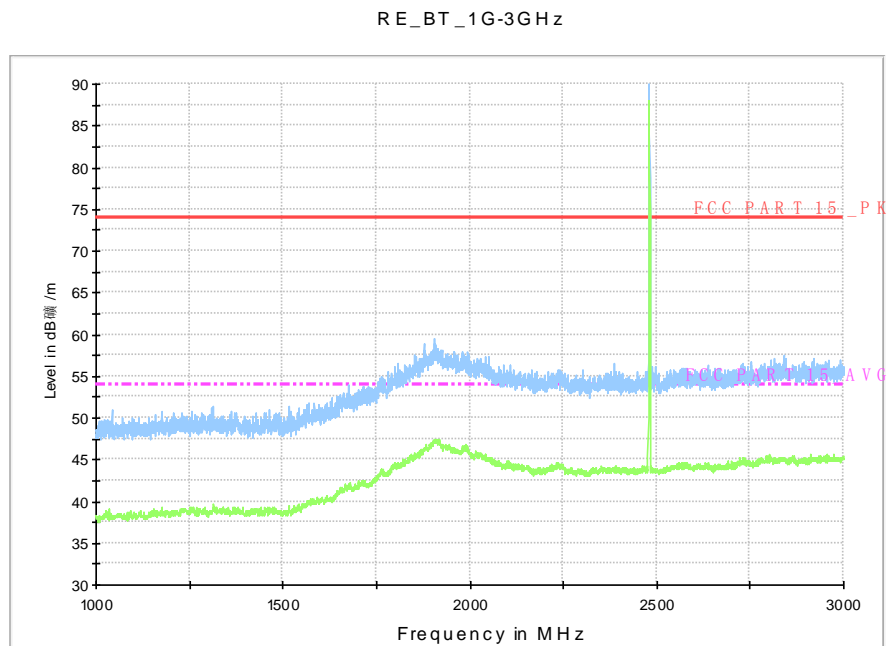


Fig.64. Radiated emission: GFSK, Channel 78, 1 GHz - 3 GHz

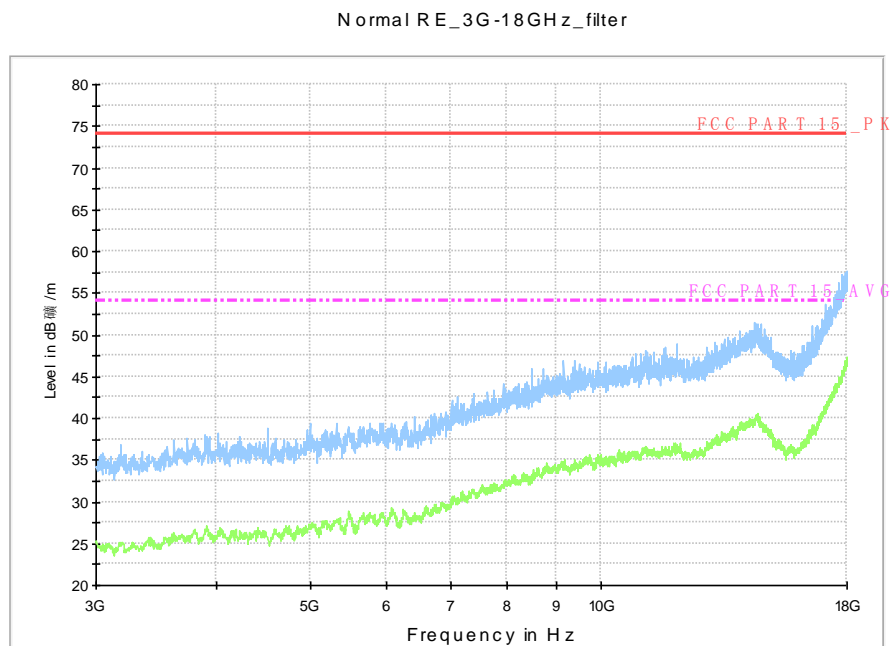


Fig.65. Radiated emission: GFSK, Channel 78, 3 GHz - 18 GHz

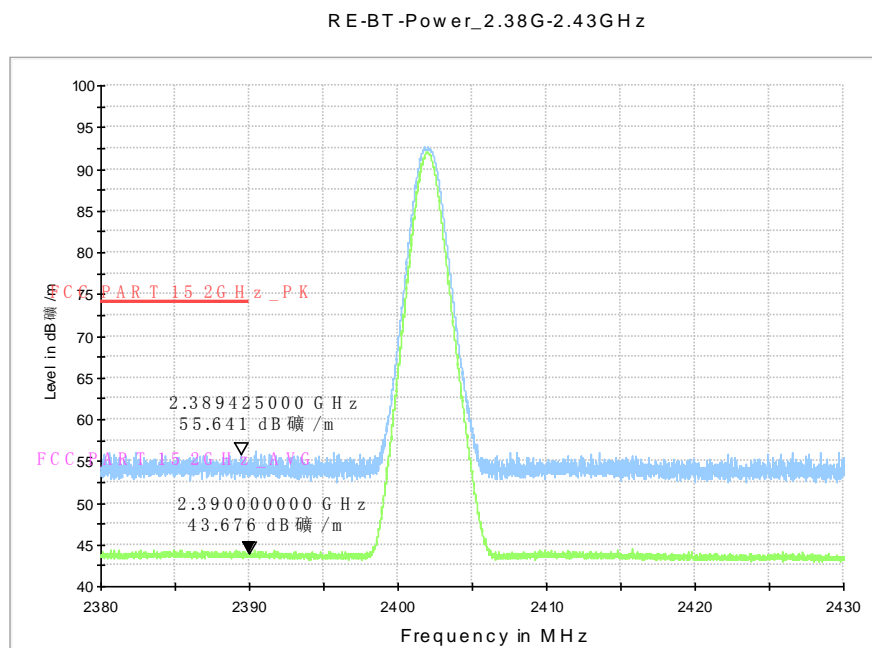


Fig.66. Radiated emission (Power): GFSK, low channel

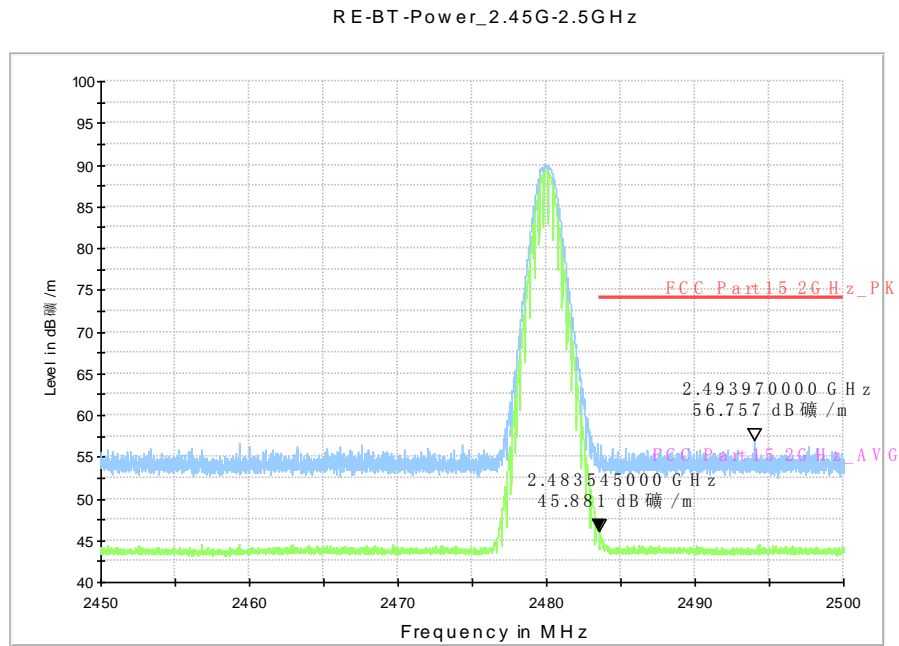


Fig.67. Radiated emission (Power) GFSK, high channel

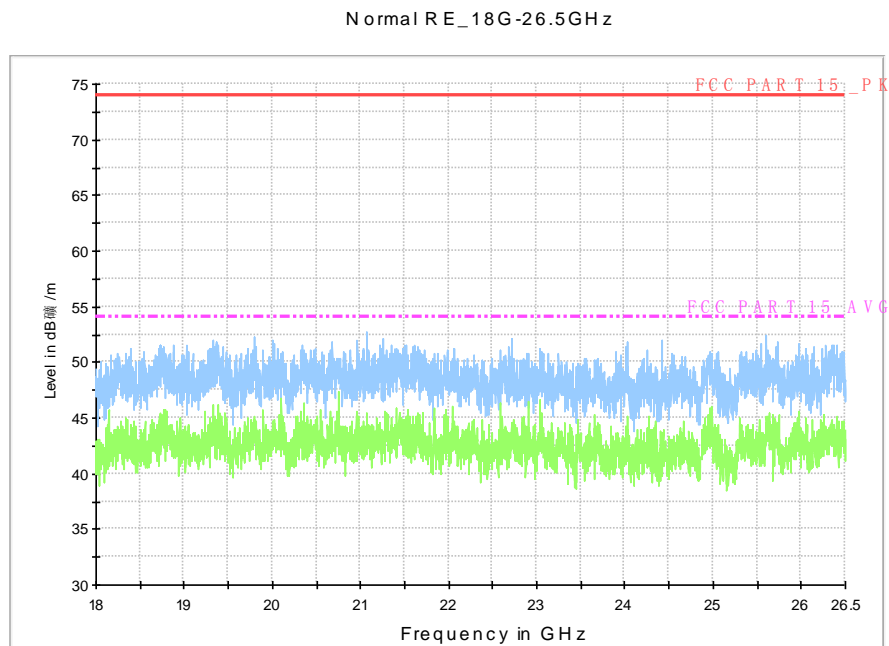


Fig.68. Radiated emission: GFSK, 18 GHz - 26 GHz

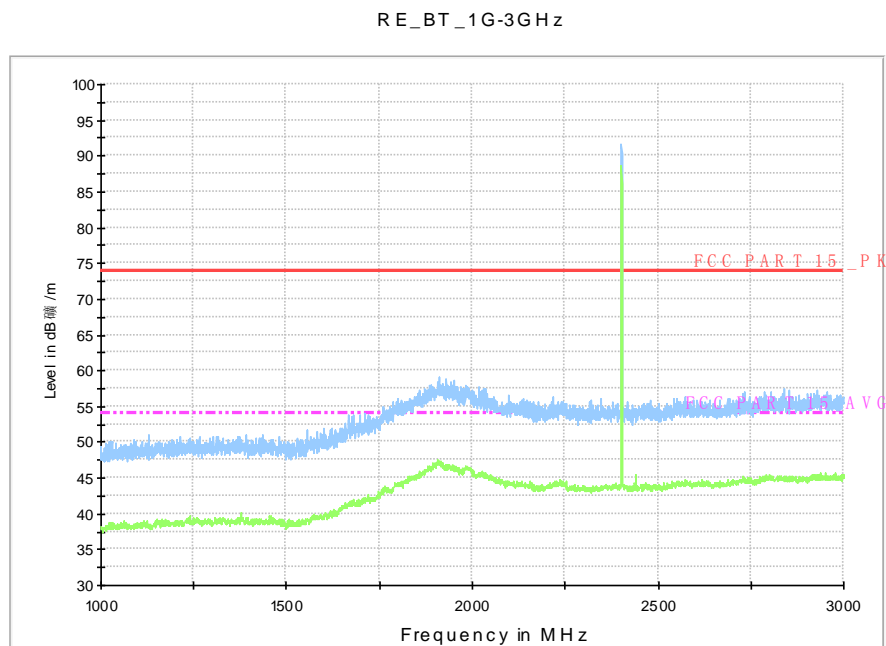


Fig.69. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 1 GHz - 3 GHz

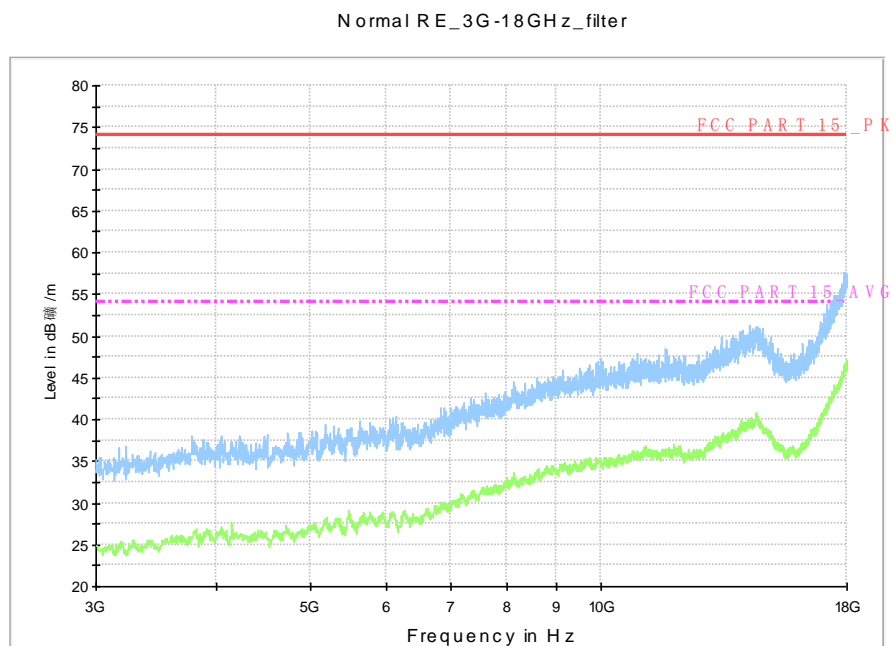


Fig.70. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 3 GHz - 18 GHz

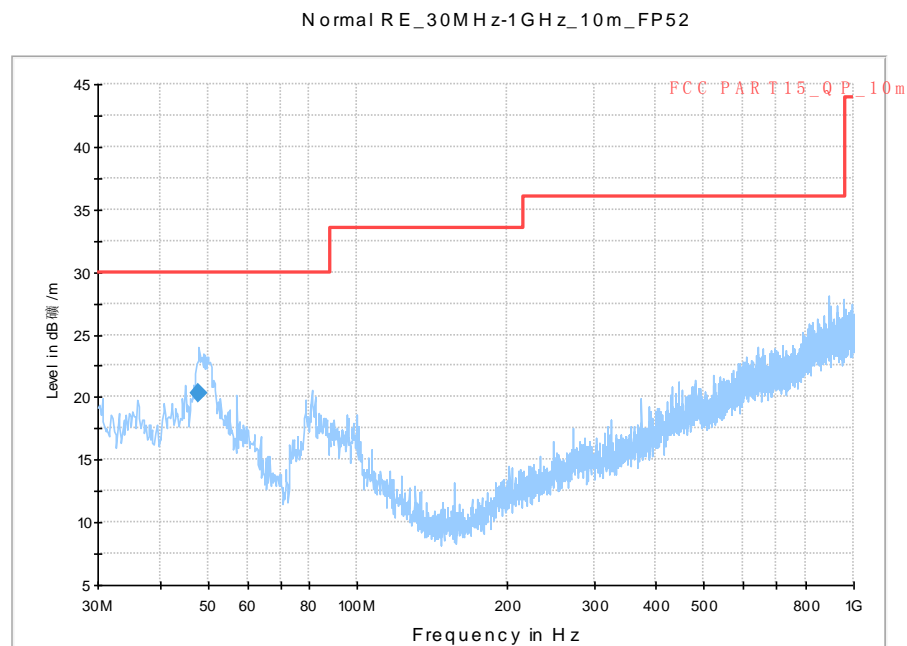


Fig.71. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 30 MHz - 1 GHz

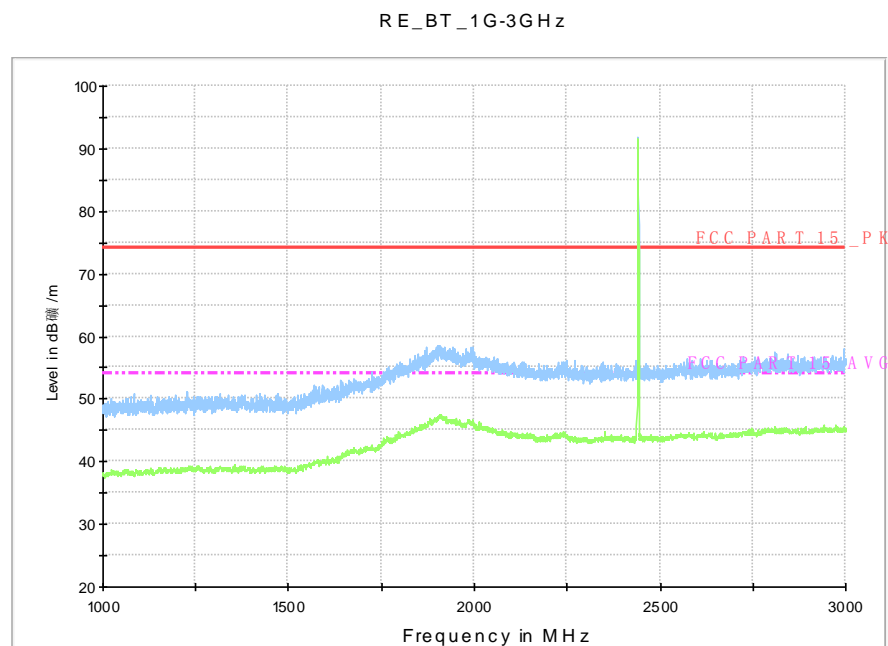


Fig.72. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 1 GHz - 3 GHz

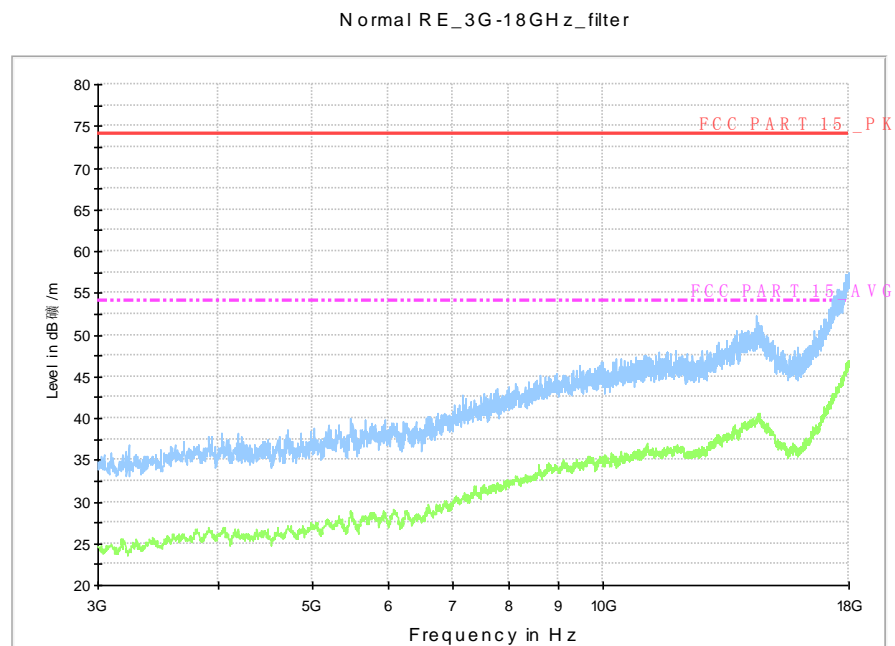


Fig.73. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 3 GHz - 18 GHz

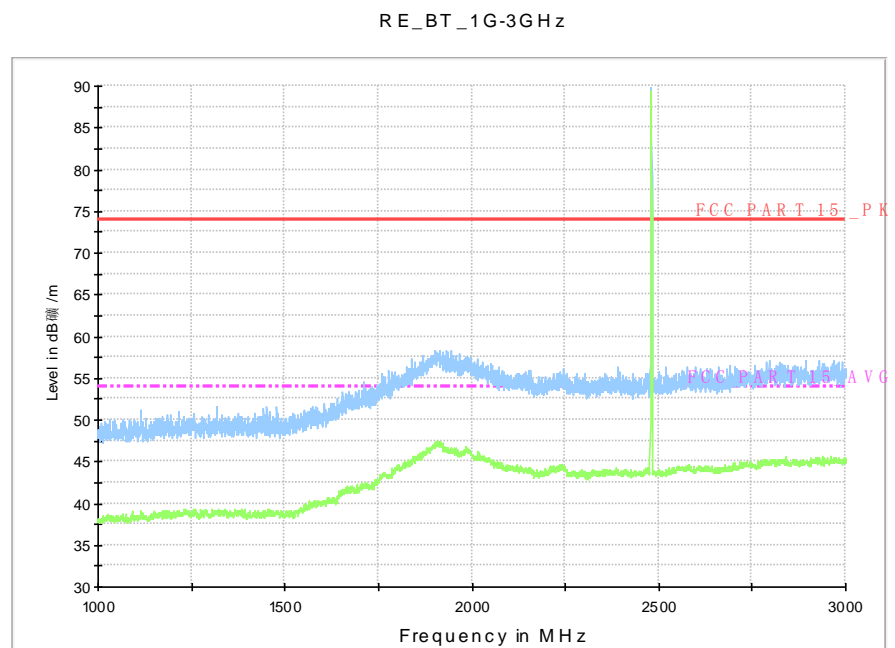


Fig.74. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 1 GHz - 3 GHz



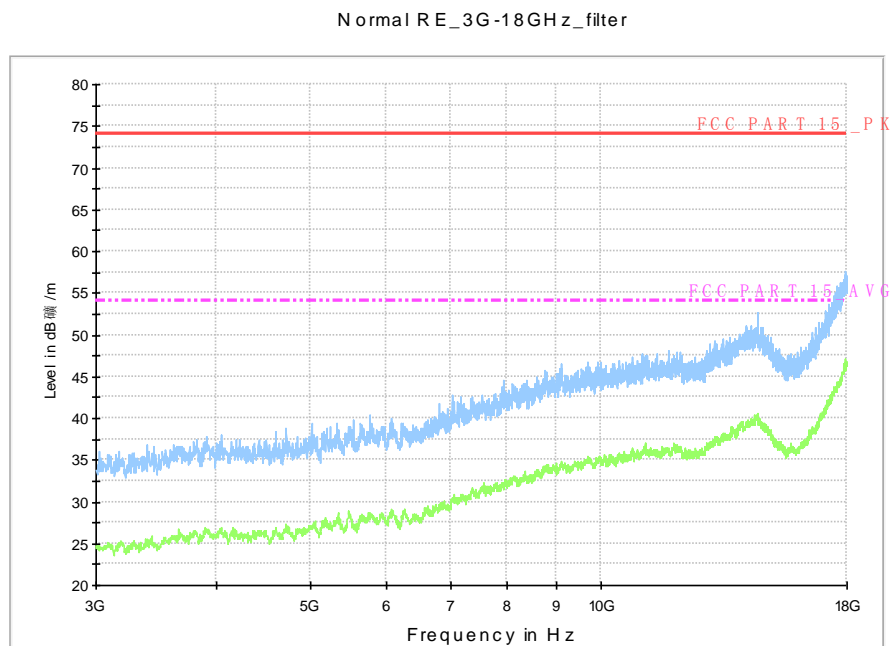


Fig.75. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 3 GHz - 18 GHz

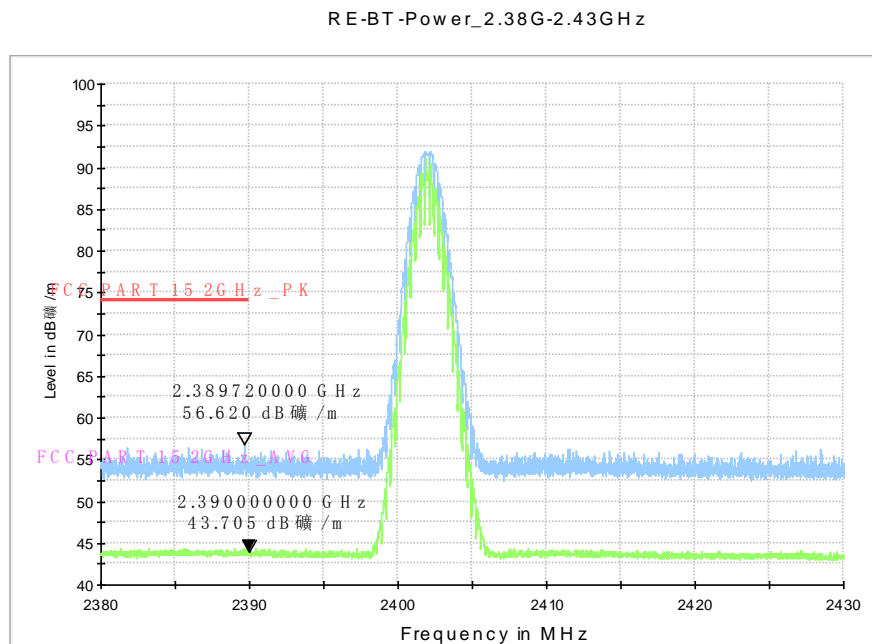


Fig.76. Radiated emission (Power):  $\pi/4$  DQPSK, low channel

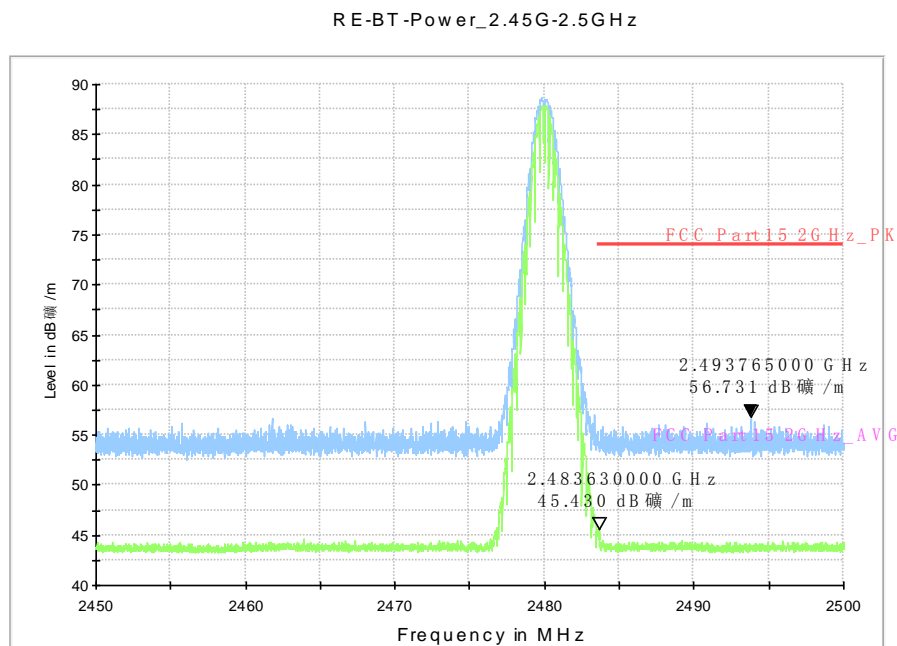


Fig.77. Radiated emission (Power):  $\pi/4$  DQPSK, high channel

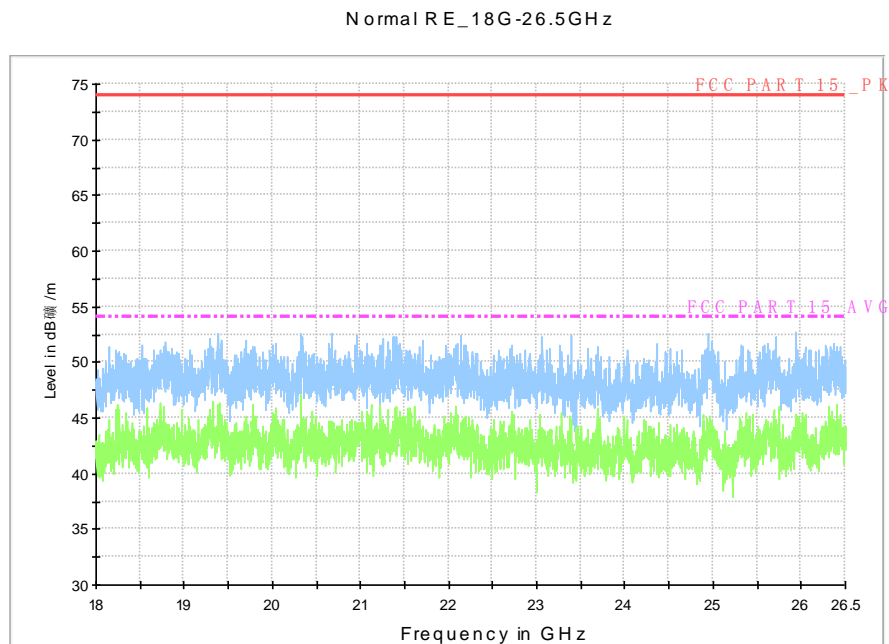


Fig.78. Radiated emission:  $\pi/4$  DQPSK, 18 GHz - 26 GHz

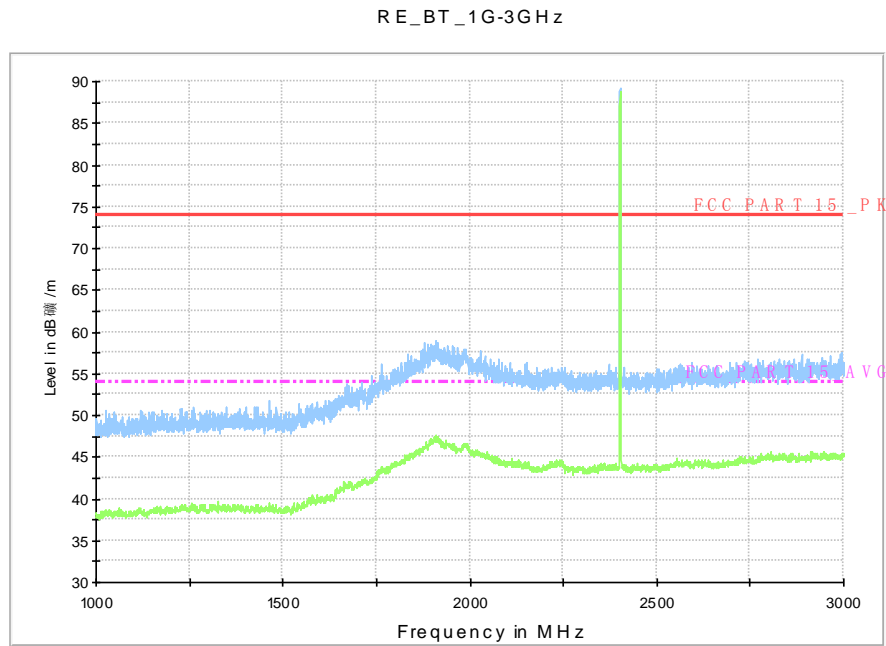


Fig.79. Radiated emission: 8DPSK, Channel 0, 1 GHz - 3 GHz

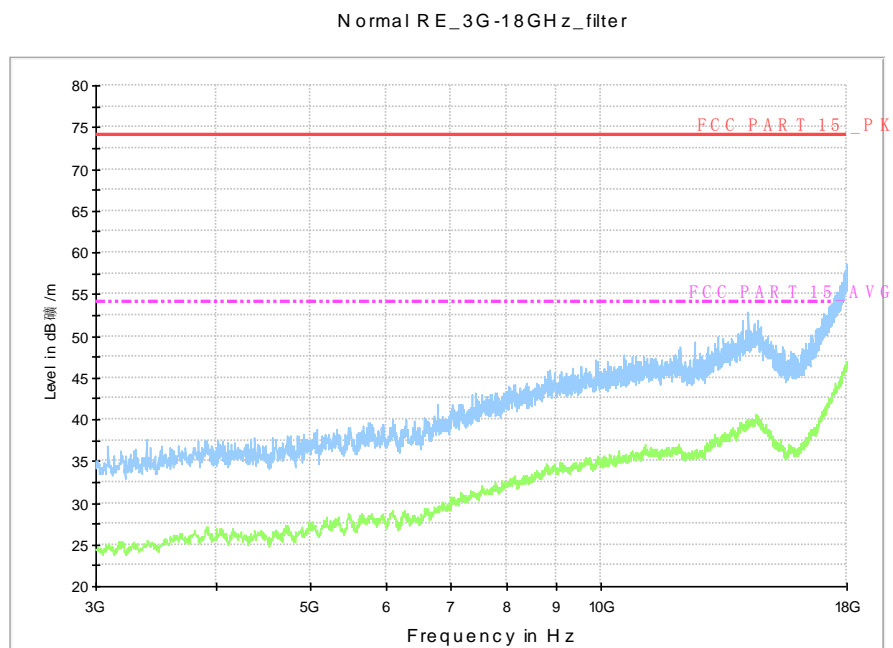


Fig.80. Radiated emission: 8DPSK, Channel 0, 3 GHz - 18 GHz

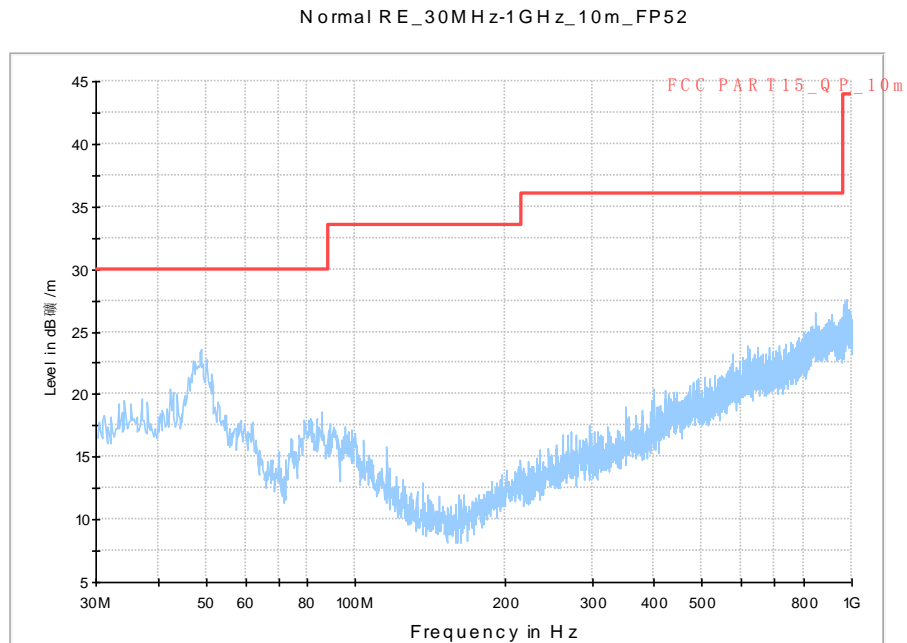


Fig.81. Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

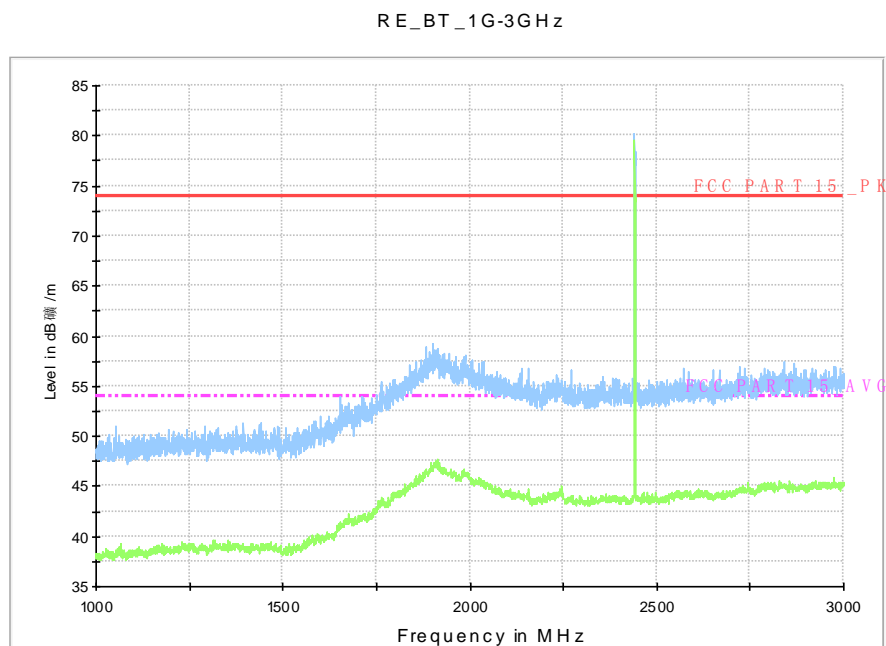


Fig.82. Radiated emission: 8DPSK, Channel 39, 1 GHz - 3 GHz

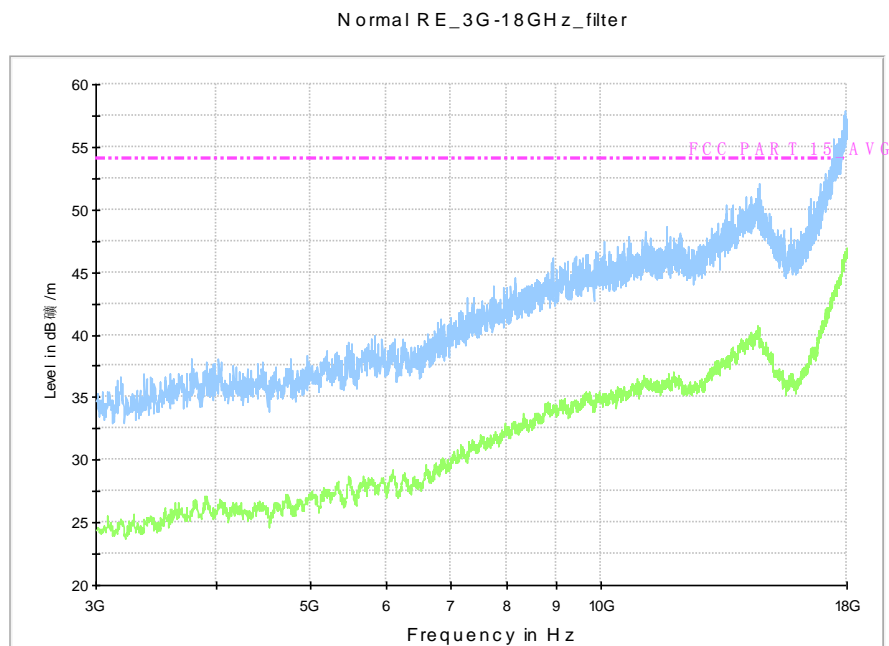


Fig.83. Radiated emission: 8DPSK, Channel 39, 3 GHz - 18 GHz

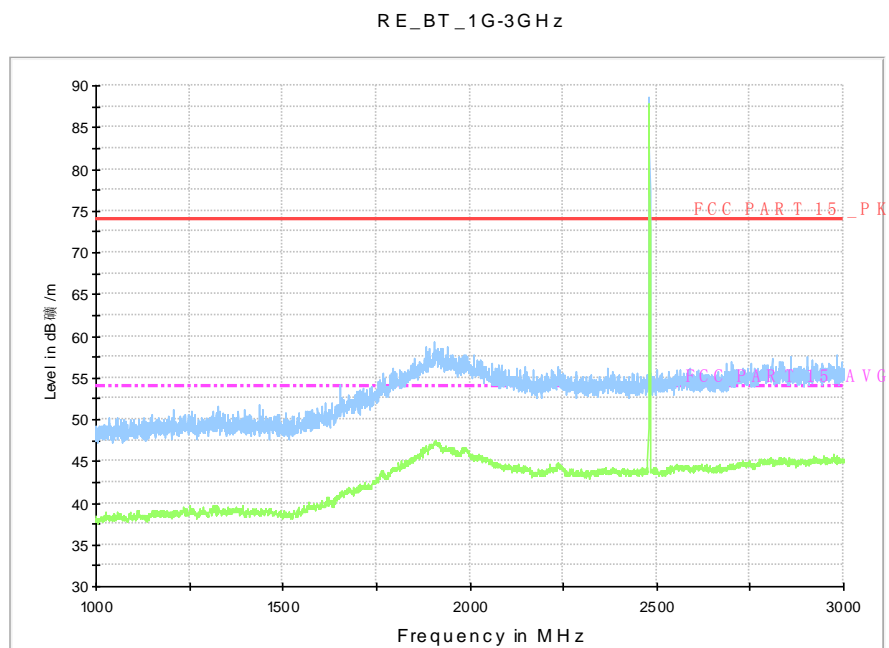


Fig.84. Radiated emission: 8DPSK, Channel 78, 1 GHz - 3 GHz

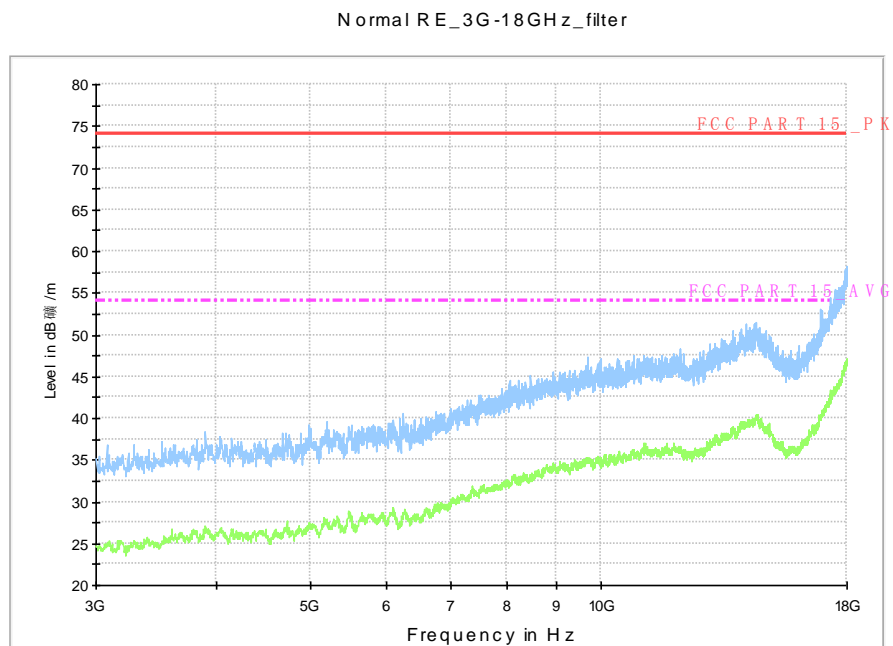


Fig.85. Radiated emission: 8DPSK, Channel 78, 3 GHz - 18 GHz

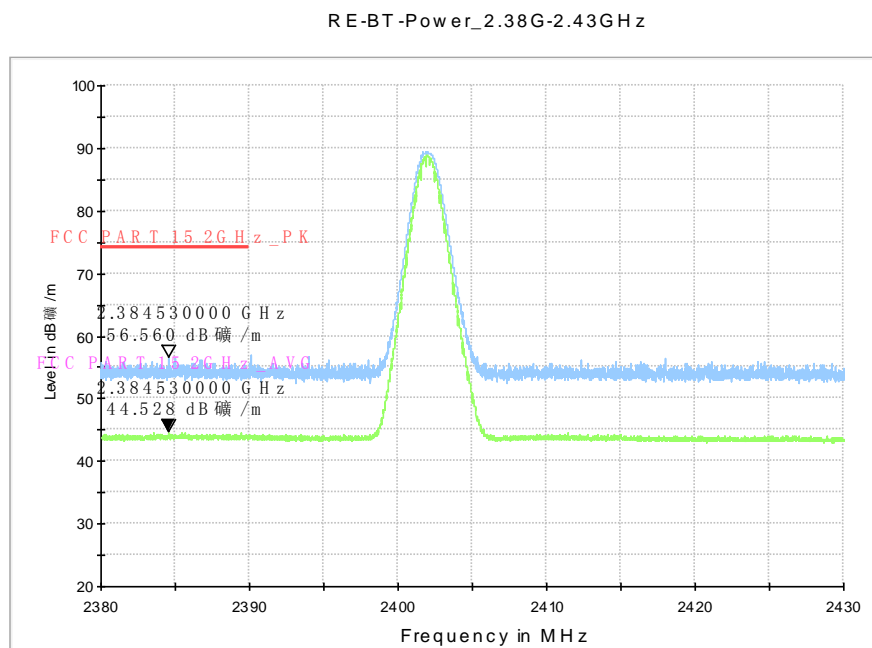


Fig.86. Radiated emission (Power): 8DPSK, low channel

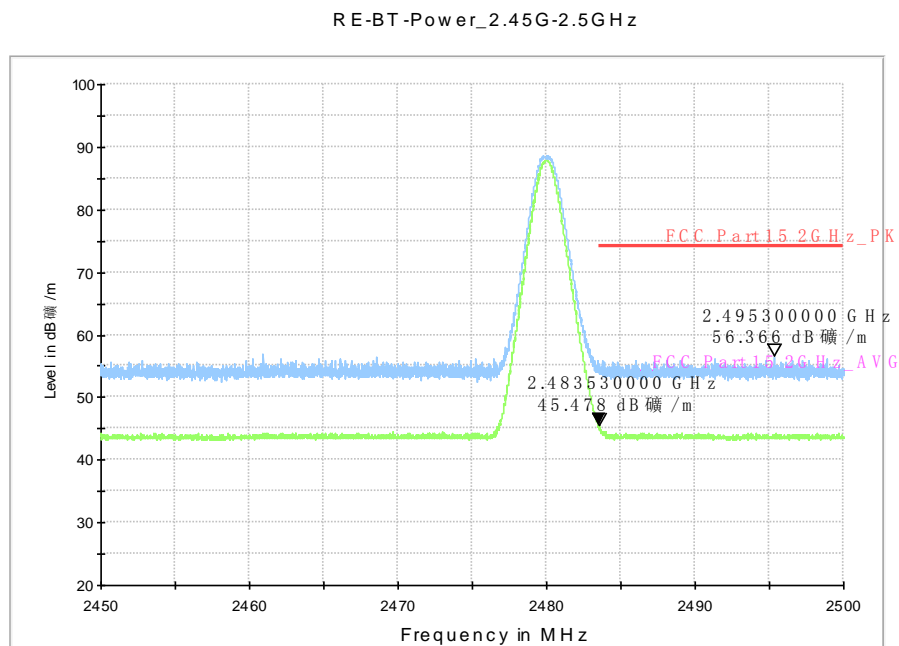


Fig.87. Radiated emission (Power): 8DPSK, high channel

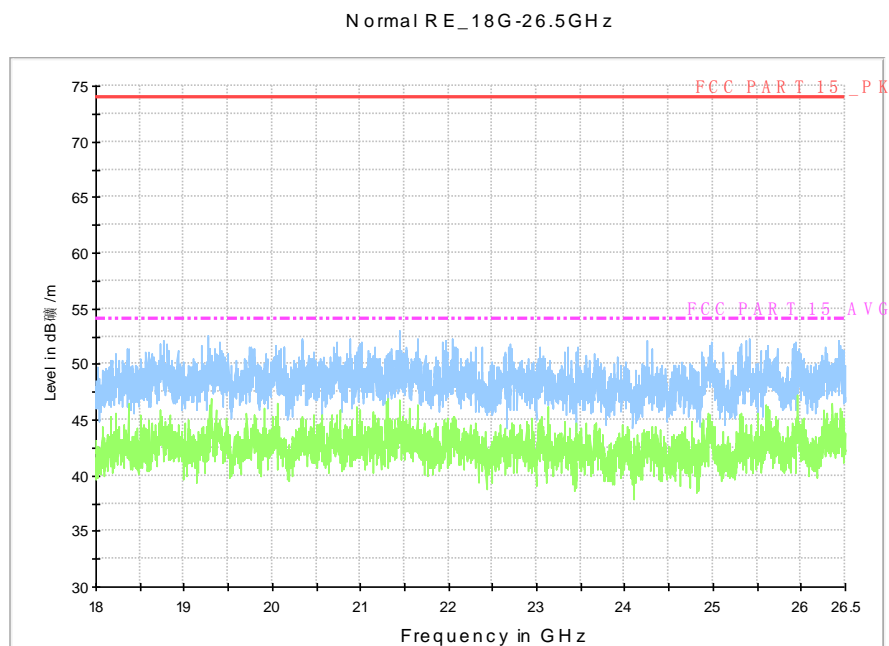


Fig.88. Radiated emission: 8DPSK, 18 GHz - 26 GHz

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

**Method of Measurement: See ANSI C63.10- clause 7.7.4**

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	105.13	P
		Fig.90		
	DH3	Fig.91	181.98	P
		Fig.92		
	DH5	Fig.93	196.71	P
		Fig.94		

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

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.95	110.03	P
		Fig.96		
	DH3	Fig.97	183.62	P
		Fig.98		
	DH5	Fig.99	179.68	P
		Fig.100		

#### For 8DPSK

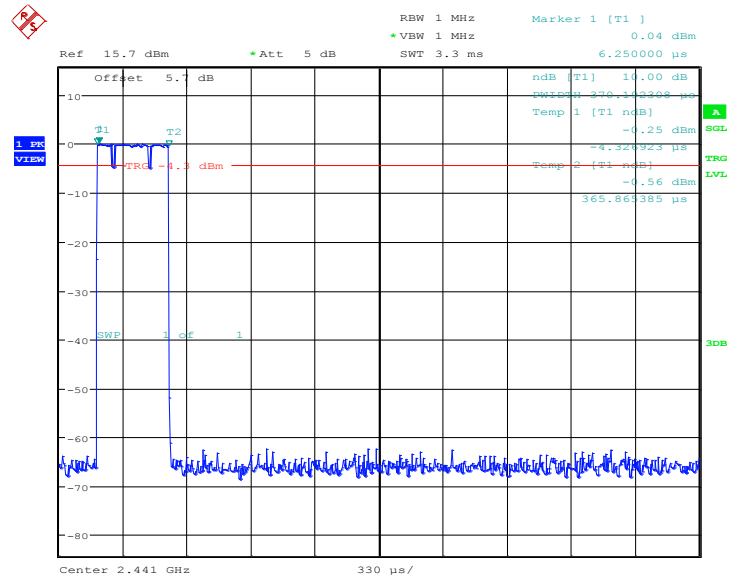
Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.101	110.80	P
		Fig.102		
	DH3	Fig.103	184.21	P



	DH5	Fig.104	200.33	P
		Fig.105		
		Fig.106		

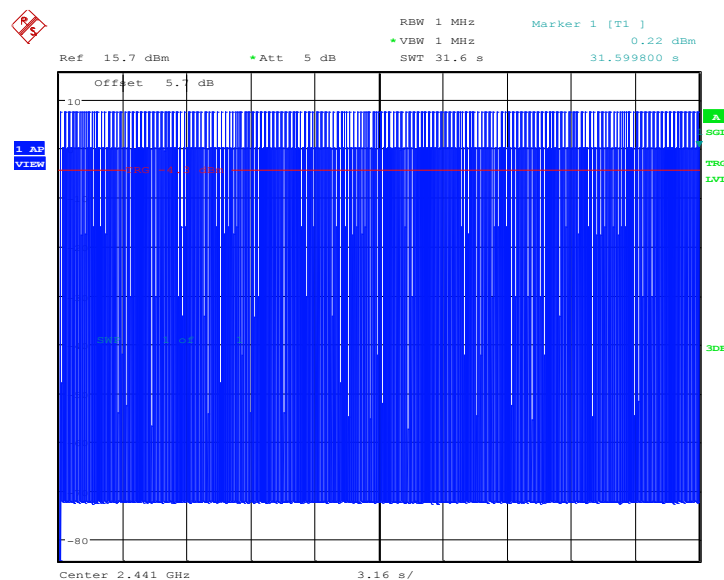
**Conclusion: PASS**

**Test graphs as below:**



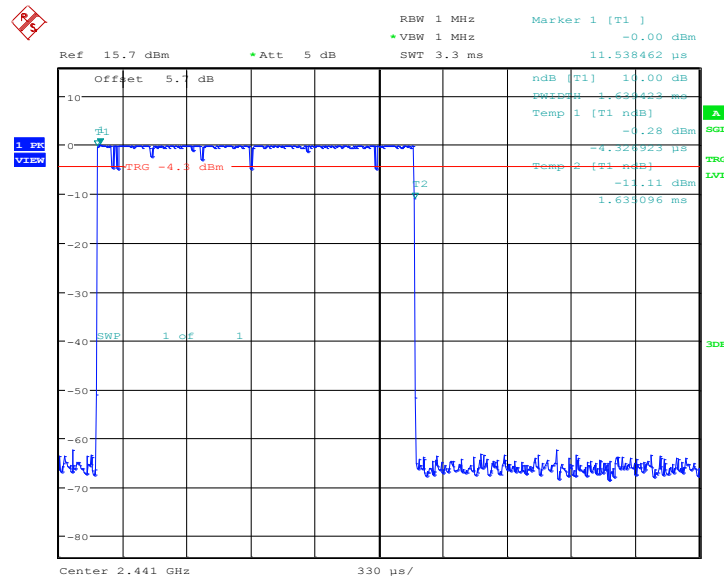
Date: 26.JUN.2015 11:59:21

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



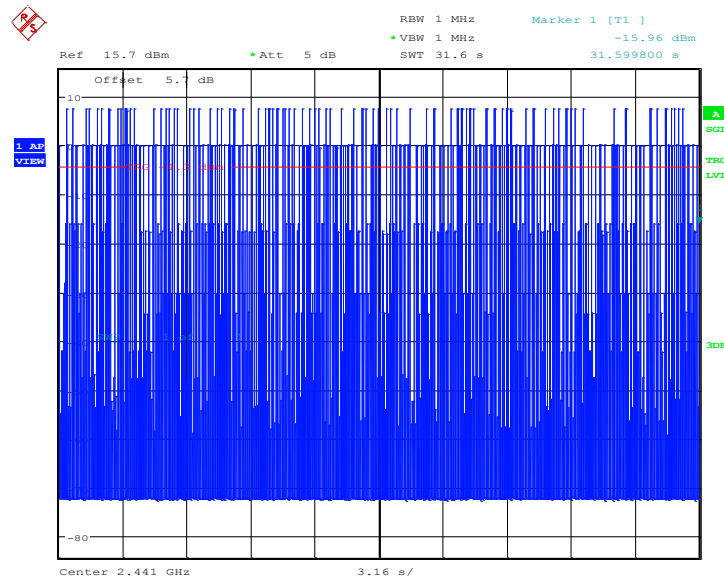
Date: 26.JUN.2015 11:59:10

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



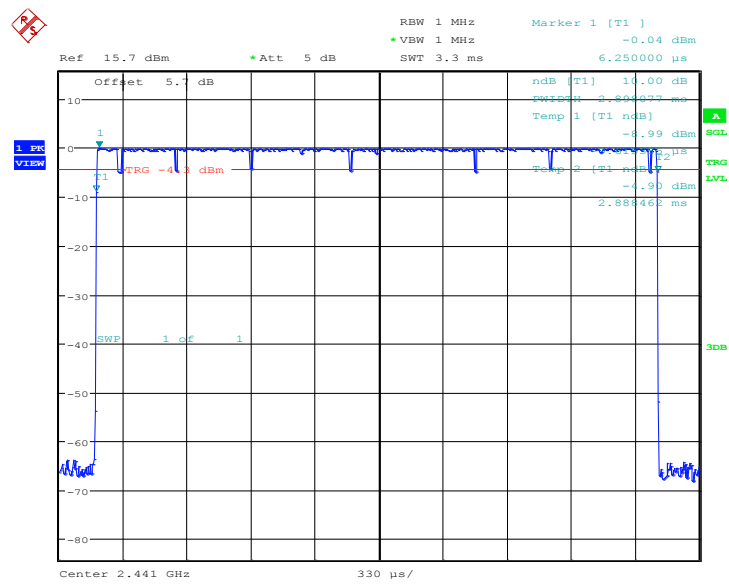
Date: 26.JUN.2015 12:00:40

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



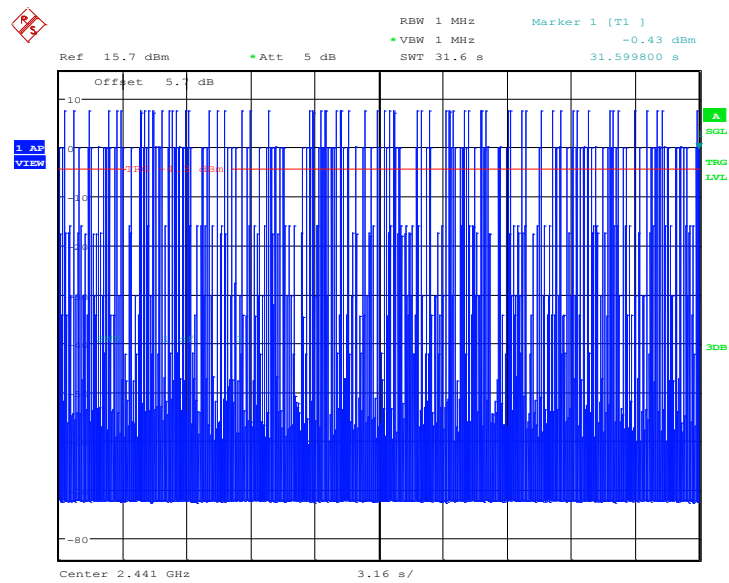
Date: 26.JUN.2015 12:00:29

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



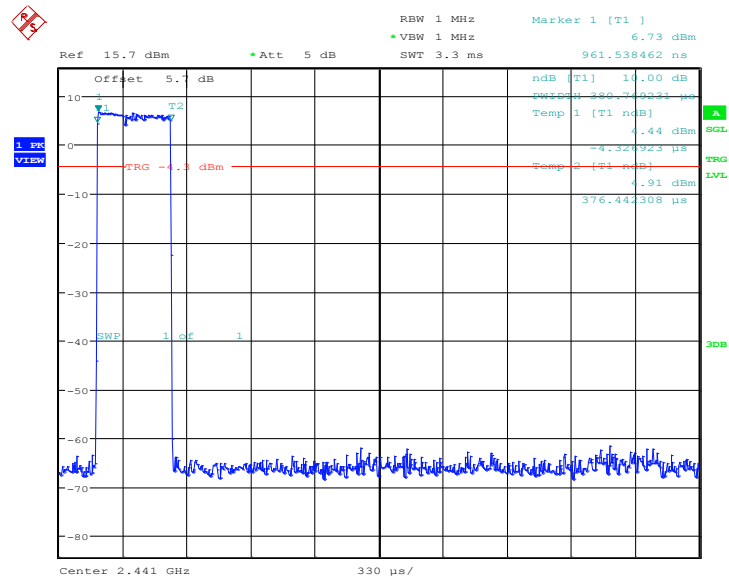
Date: 26.JUN.2015 12:01:54

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



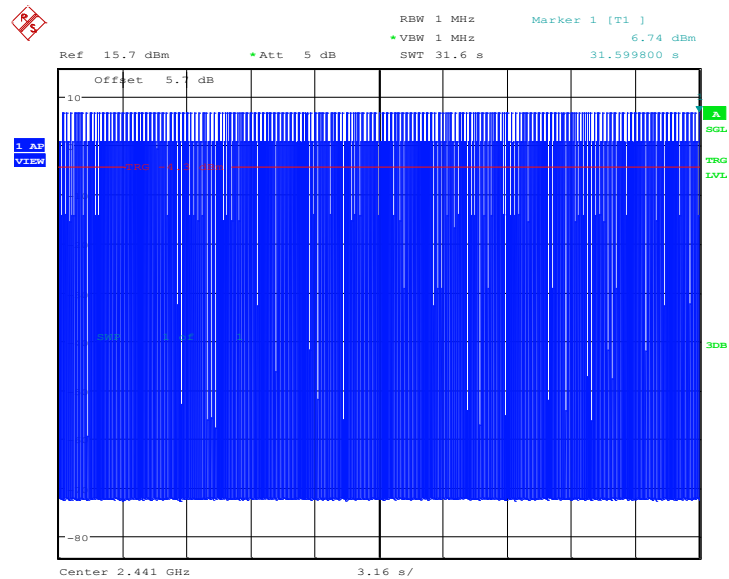
Date: 26.JUN.2015 12:01:43

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



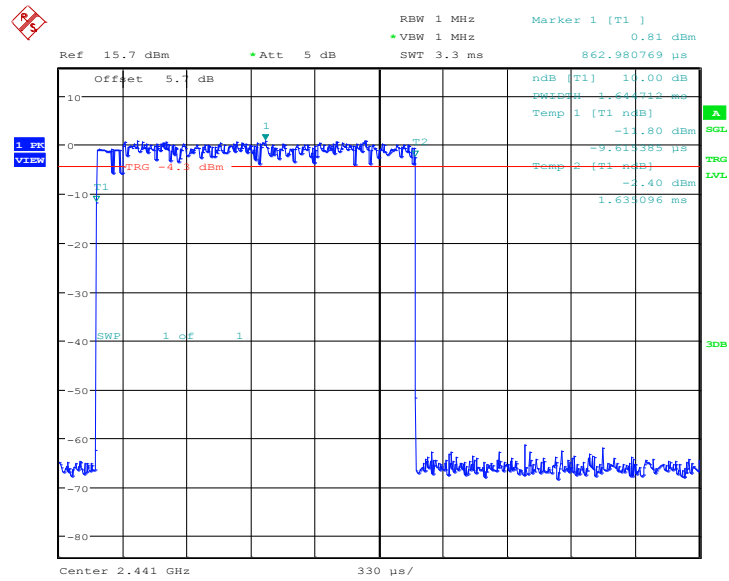
Date: 26.JUN.2015 12:21:21

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



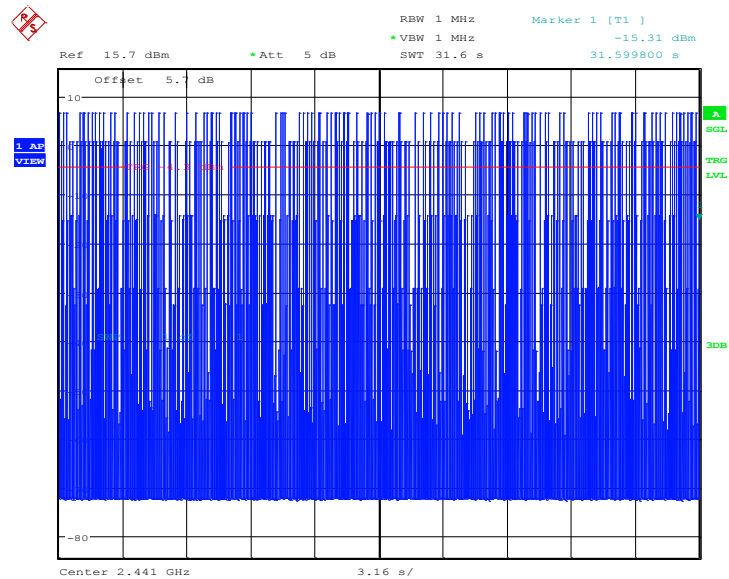
Date: 26.JUN.2015 12:21:09

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



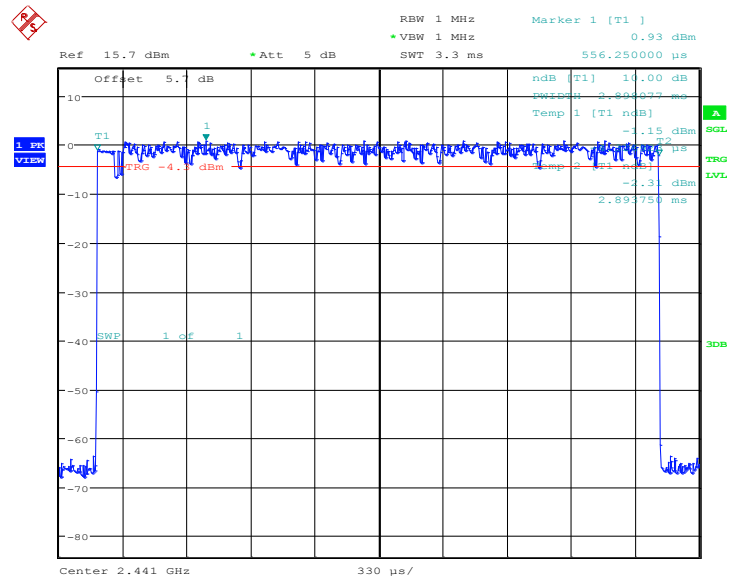
Date: 26.JUN.2015 12:22:40

Fig.97. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3



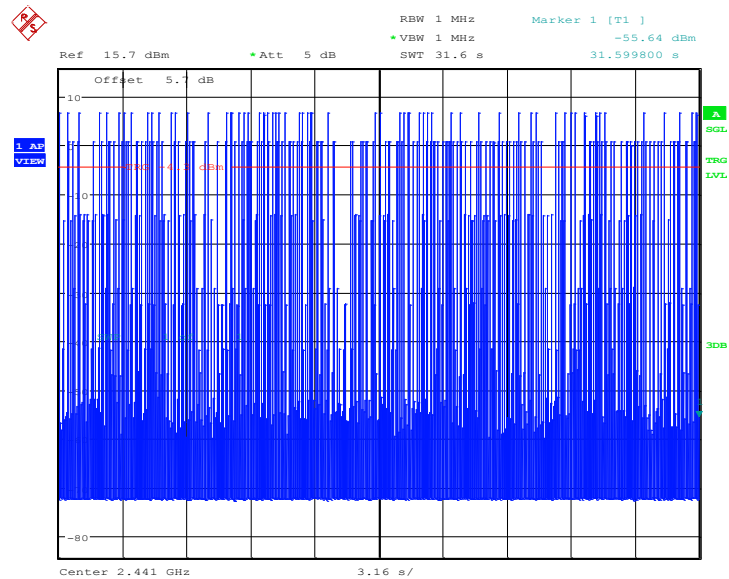
Date: 26.JUN.2015 12:22:28

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



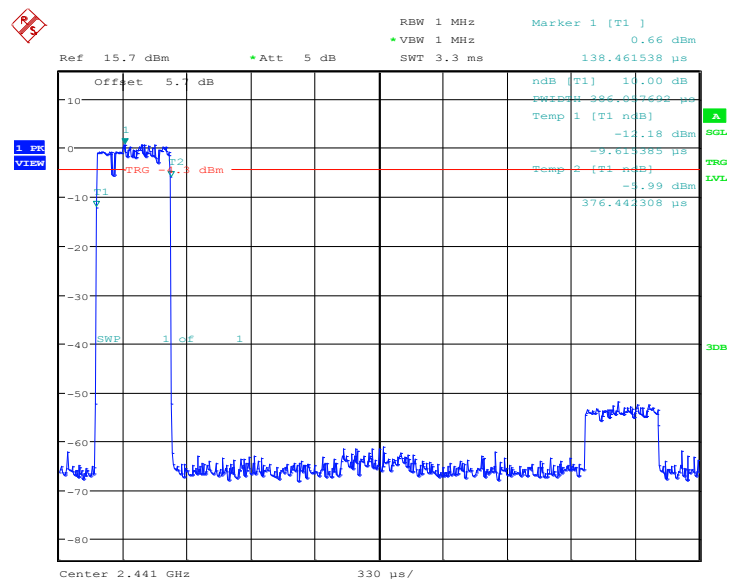
Date: 26.JUN.2015 12:23:57

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



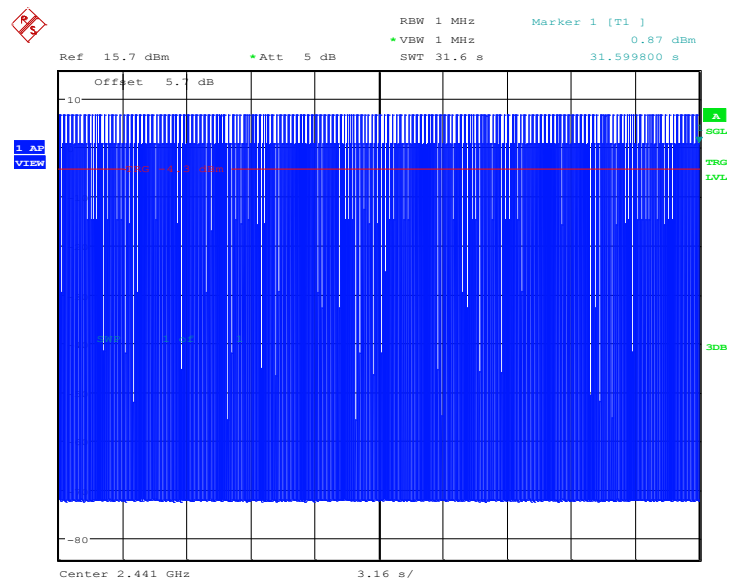
Date: 26.JUN.2015 12:23:45

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



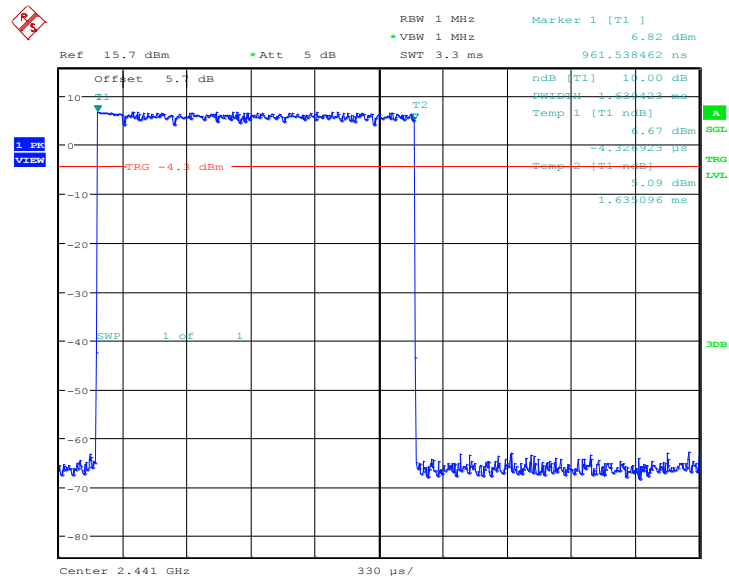
Date: 26.JUN.2015 16:12:33

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



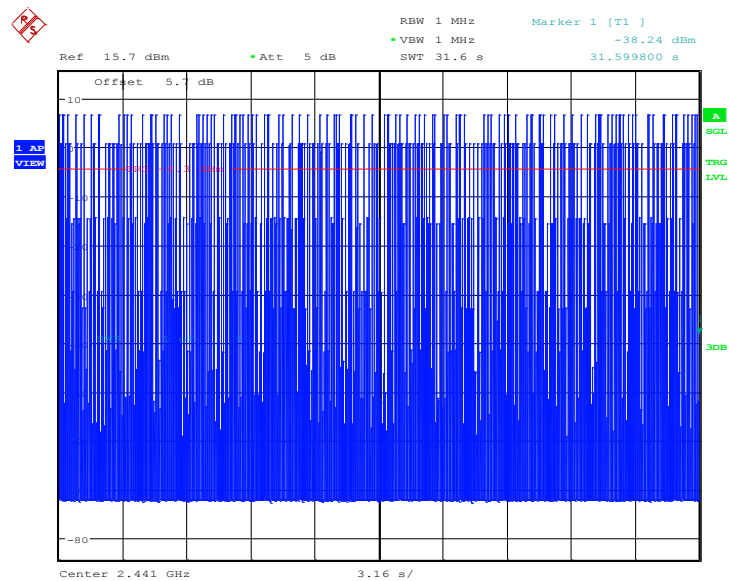
Date: 26.JUN.2015 16:12:21

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



Date: 26.JUN.2015 16:13:52

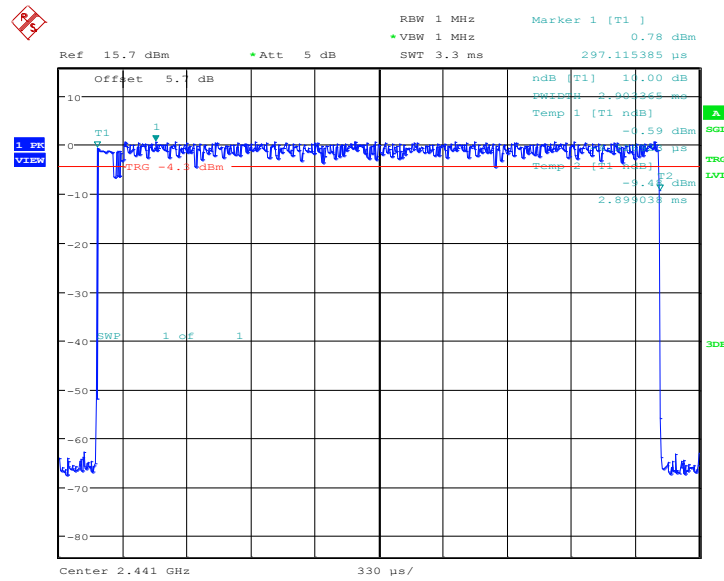
Fig.103. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3



Date: 26.JUN.2015 16:13:40

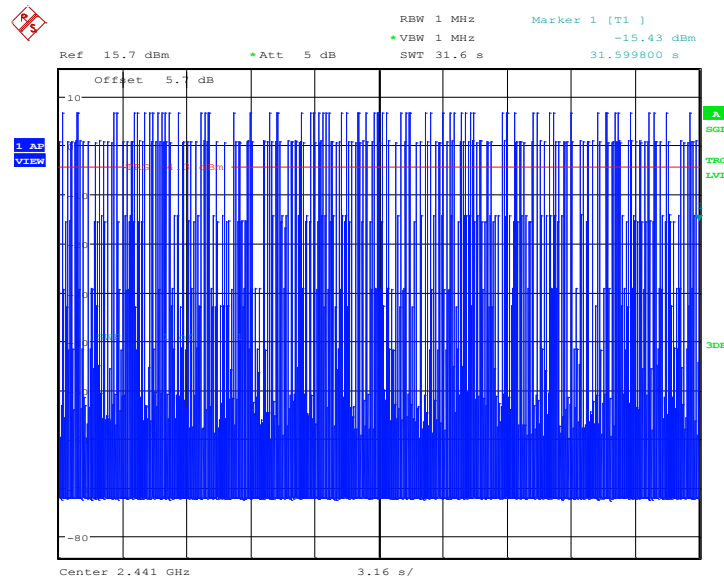
Fig.104. Number of Transmissions Measurement:Channel 39,Packet 3-DH3





Date: 26.JUN.2015 16:15:10

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



Date: 26.JUN.2015 16:14:58

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

## A.7. 20dB Bandwidth

**Method of Measurement: See ANSI C63.10- clause 6.9.1**

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	826.92	NA
39	Fig.108	826.92	NA
78	Fig.109	865.38	NA

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

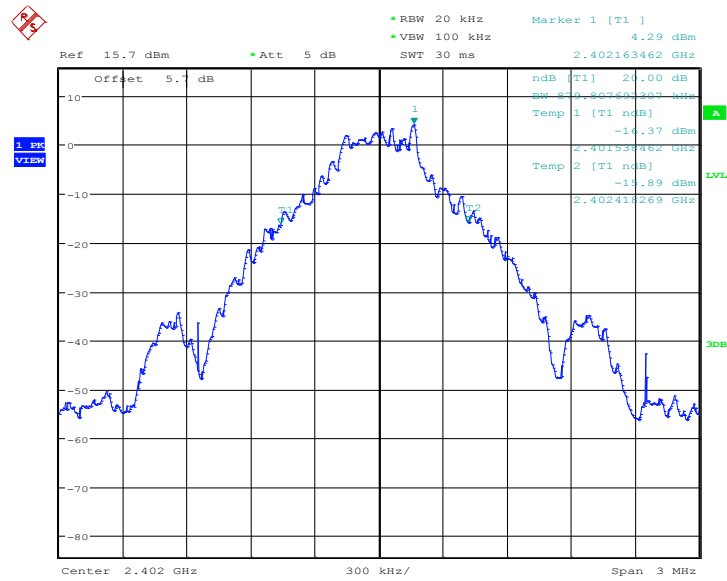
Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.110	1264.42	NA
39	Fig.111	1259.62	NA
78	Fig.112	1264.42	NA

#### For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.113	1211.54	NA
39	Fig.114	1264.42	NA
78	Fig.115	1211.54	NA

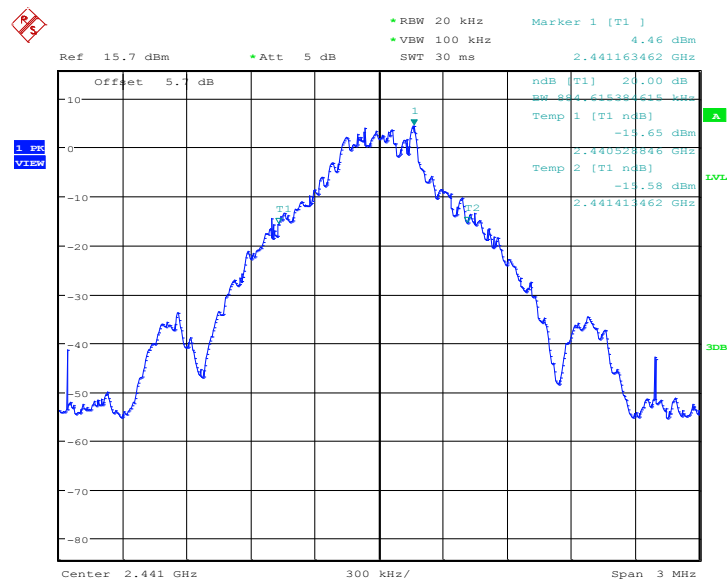
**Conclusion: NA**

**Test graphs as below:**



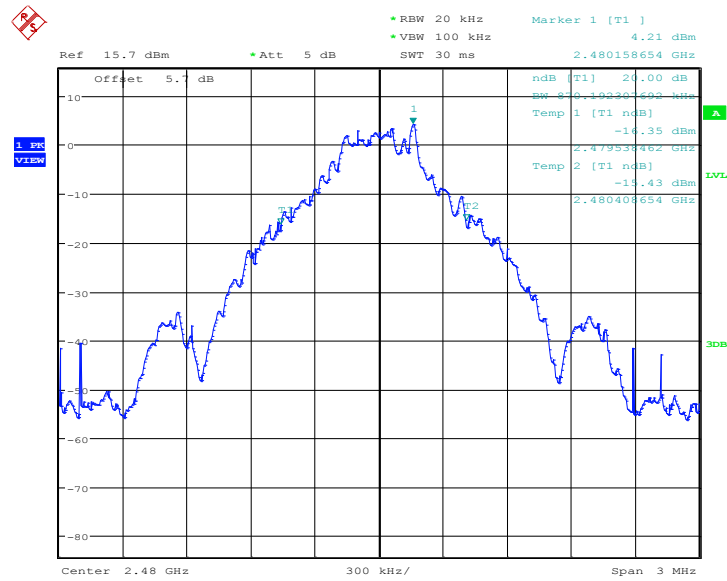
Date: 26.JUN.2015 12:02:28

Fig.107. 20dB Bandwidth: GFSK, Channel 0



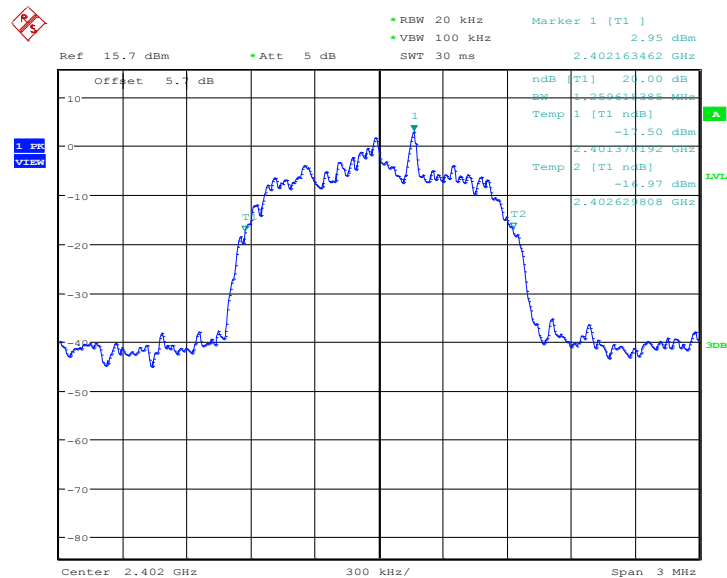
Date: 26.JUN.2015 12:03:00

Fig.108. 20dB Bandwidth: GFSK, Channel 39



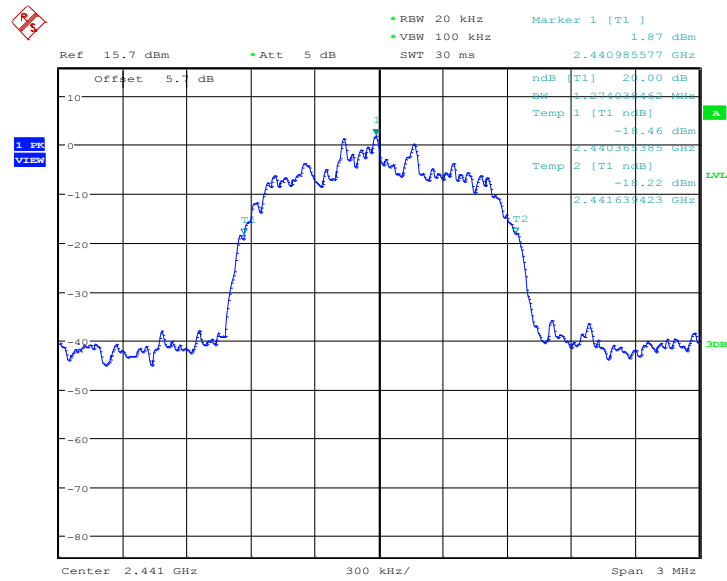
Date: 26.JUN.2015 12:03:32

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



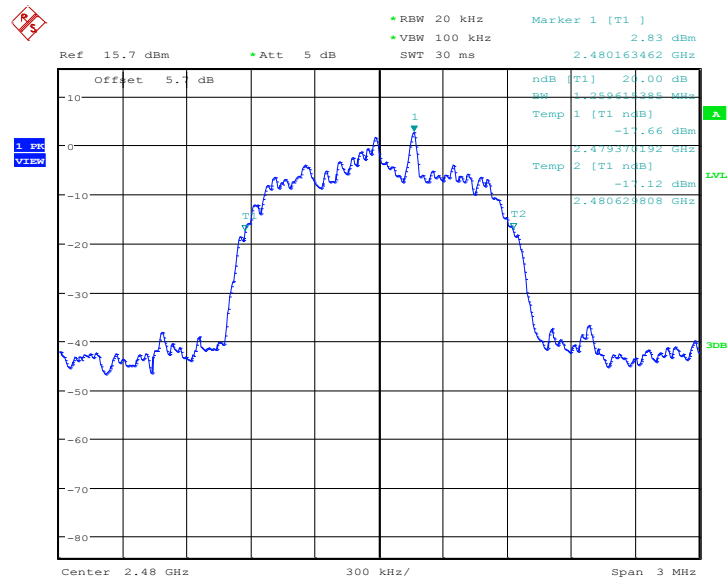
Date: 26.JUN.2015 12:24:31

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



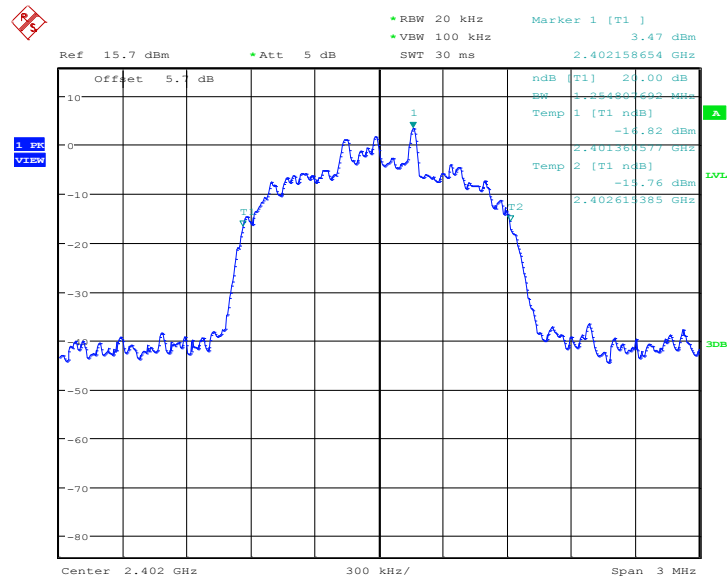
Date: 26.JUN.2015 12:25:03

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



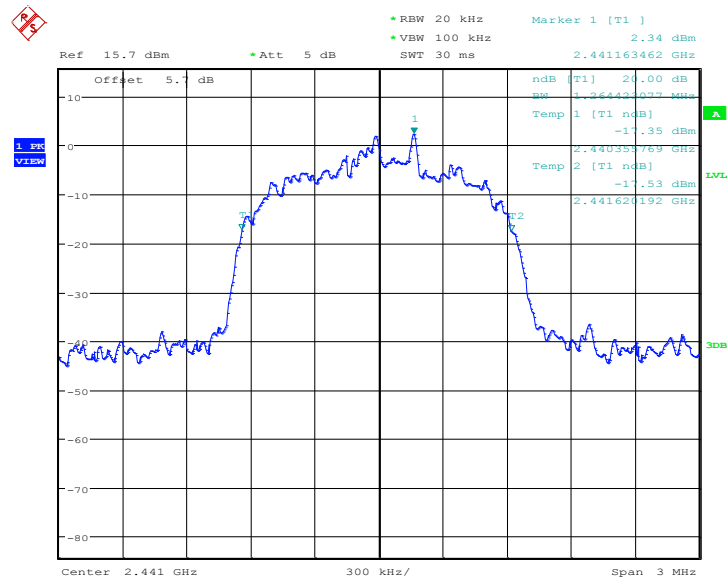
Date: 26.JUN.2015 12:25:35

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



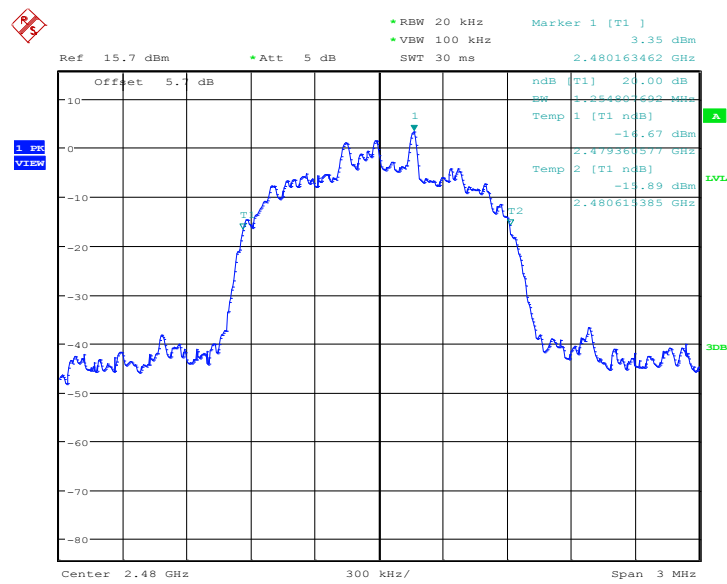
Date: 26.JUN.2015 12:46:30

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



Date: 26.JUN.2015 12:47:02

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



Date: 26.JUN.2015 12:47:34

Fig.115. 20dB Bandwidth: 8DPSK, Channel 78

## A.8. Carrier Frequency Separation

**Method of Measurement:** See ANSI C63.10-clause 7.7.2

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	1326.92	P

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

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.117	1014.42	P

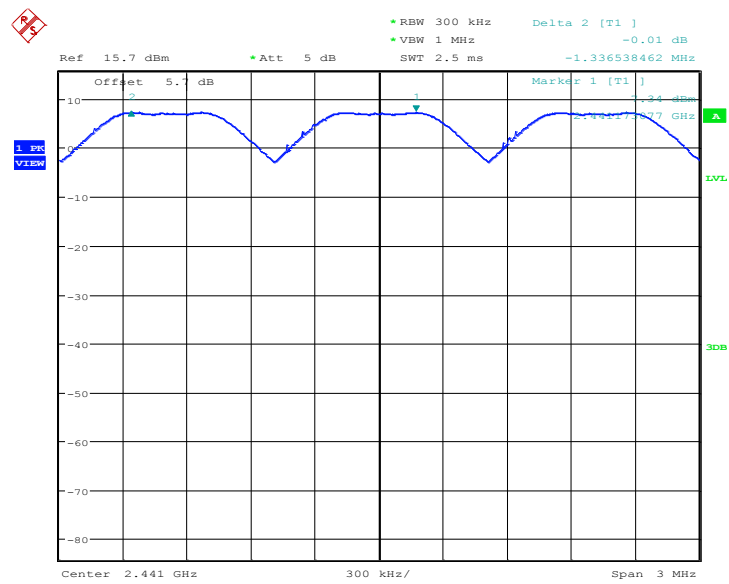
#### For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.118	1317.31	P

**Conclusion: PASS**

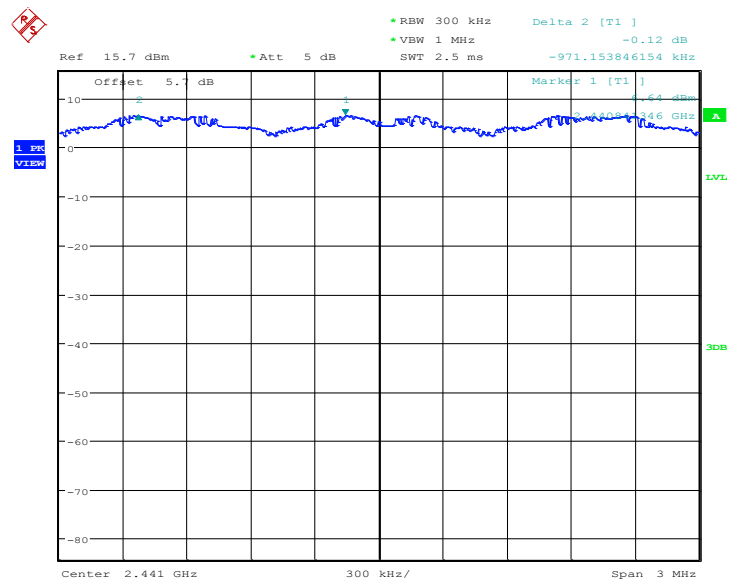
**Test graphs as below:**





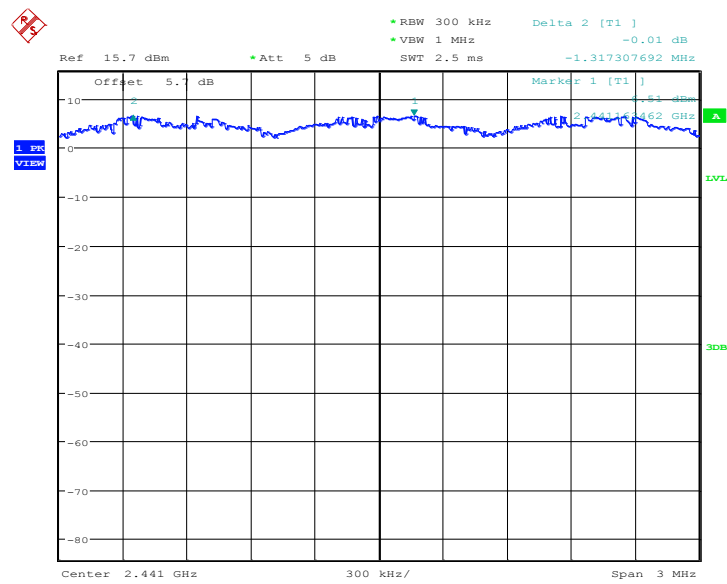
Date: 26.JUN.2015 12:05:36

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



Date: 26.JUN.2015 12:27:39

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



Date: 26.JUN.2015 12:49:38

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

## A.9. Number of Hopping Channels

**Method of Measurement:** See ANSI C63.10-clause 7.7.3

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

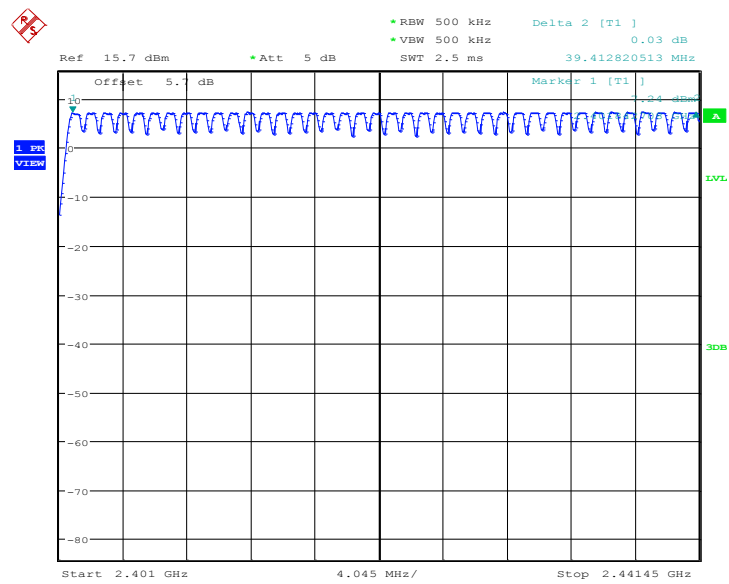
Channel	Number of hopping channels		Conclusion
0~39	Fig.121	79	P
40~78	Fig.122		

#### For 8DPSK

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

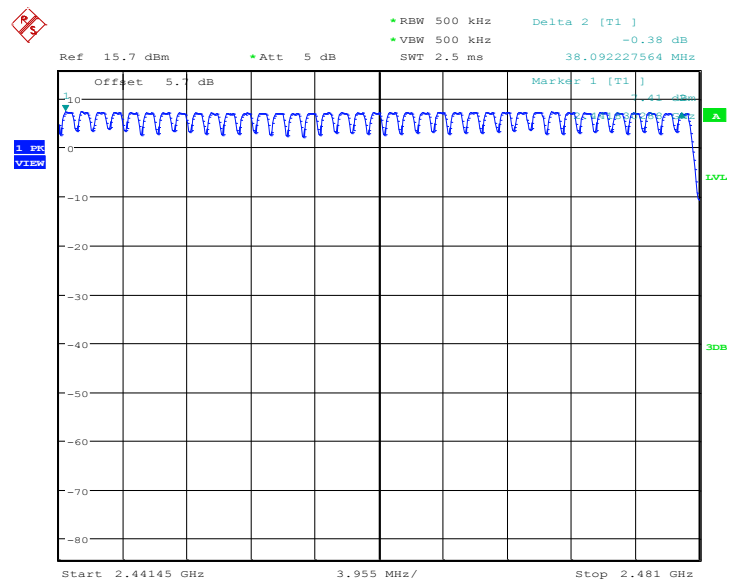
**Conclusion: PASS**

**Test graphs as below:**



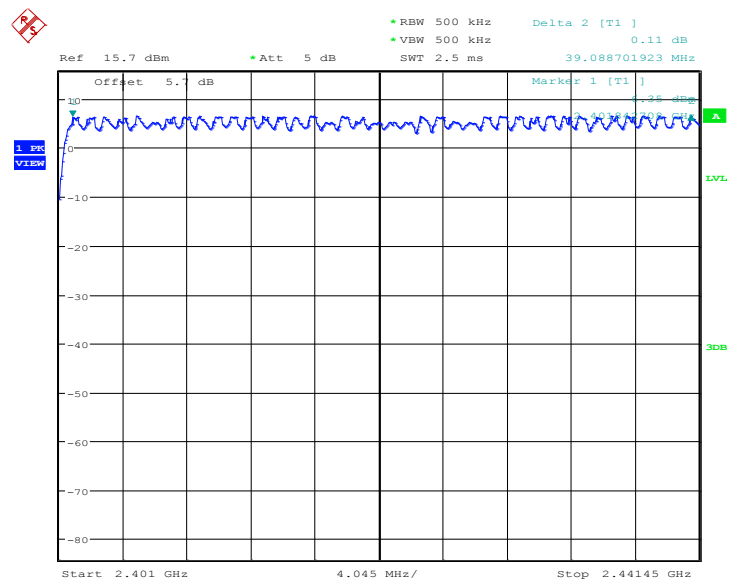
Date: 26.JUN.2015 12:07:40

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



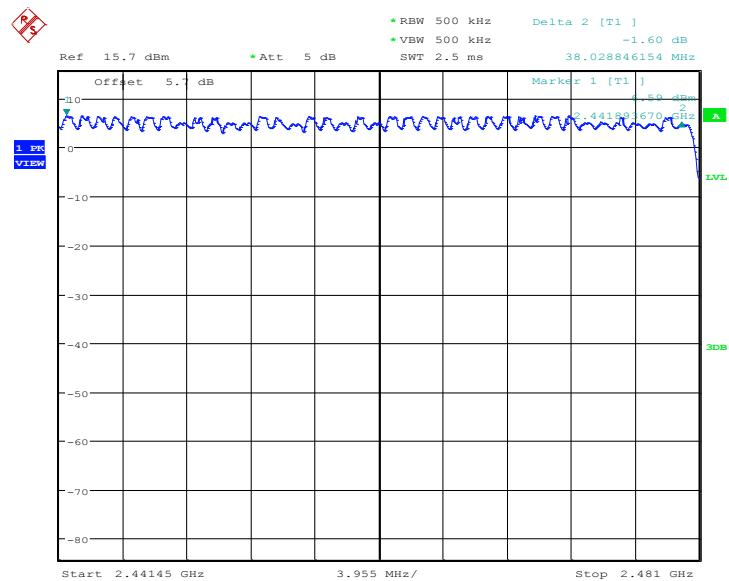
Date: 26.JUN.2015 12:09:42

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



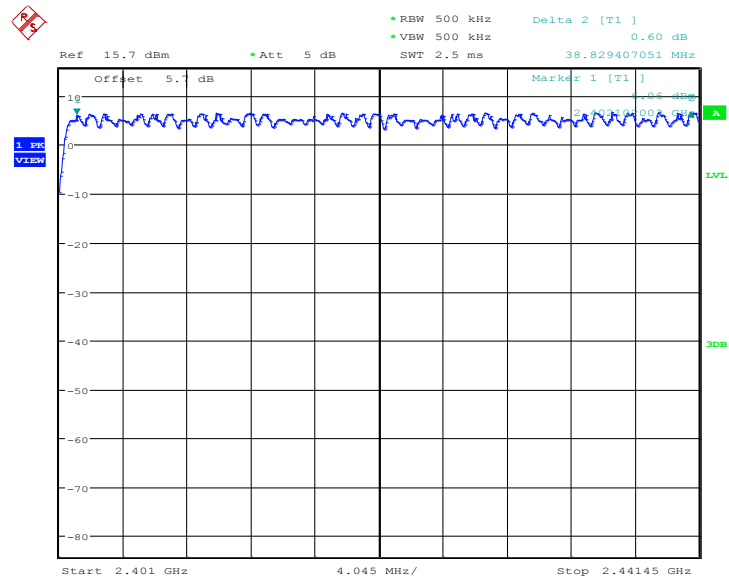
Date: 26.JUN.2015 12:29:43

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



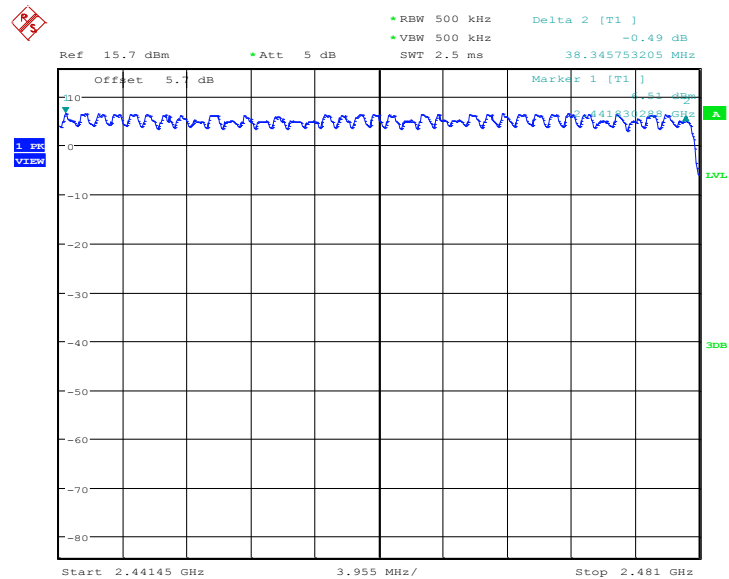
Date: 26.JUN.2015 12:31:45

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



Date: 26.JUN.2015 12:51:43

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



Date: 26.JUN.2015 12:53:45

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	

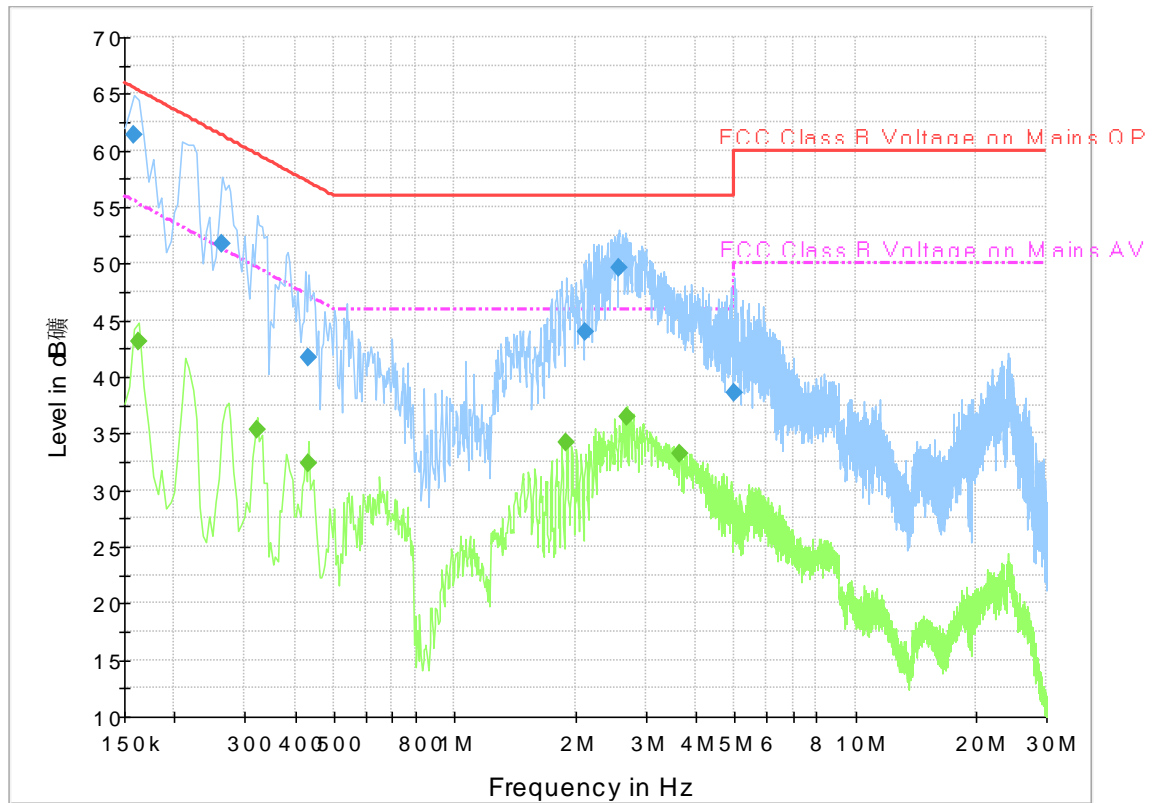
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10

**Conclusion: PASS**

**Test graphs as below:**

### Traffic:



### Final Result 1

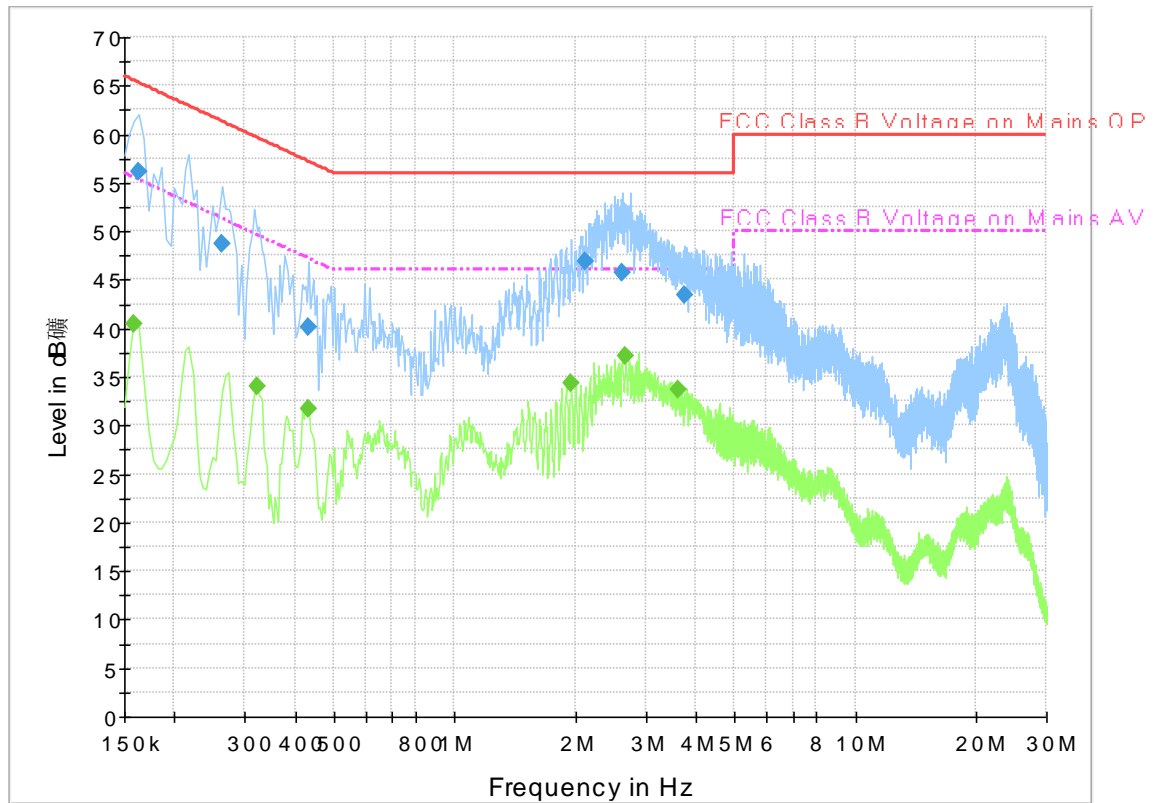
Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.159000	61.3	2000.0	9.000	On	L1	19.7	4.2	65.5	
0.262500	51.7	2000.0	9.000	On	N	19.7	9.7	61.4	
0.433500	41.7	2000.0	9.000	On	L1	19.8	15.5	57.2	
2.116500	44.0	2000.0	9.000	On	N	19.6	12.0	56.0	
2.562000	49.6	2000.0	9.000	On	L1	19.7	6.4	56.0	
4.996500	38.7	2000.0	9.000	On	N	19.6	17.3	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	43.1	2000.0	9.000	On	L1	19.7	12.1	55.3	
0.321000	35.3	2000.0	9.000	On	L1	19.8	14.4	49.7	
0.433500	32.4	2000.0	9.000	On	L1	19.8	14.8	47.2	
1.900500	34.2	2000.0	9.000	On	L1	19.6	11.8	46.0	
2.683500	36.5	2000.0	9.000	On	L1	19.7	9.5	46.0	
3.646500	33.2	2000.0	9.000	On	L1	19.7	12.8	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	56.2	2000.0	9.000	On	N	19.7	9.1	65.3	
0.262500	48.8	2000.0	9.000	On	N	19.7	12.6	61.4	
0.433500	40.1	2000.0	9.000	On	L1	19.8	17.1	57.2	
2.116500	46.8	2000.0	9.000	On	L1	19.6	9.2	56.0	
2.625000	45.8	2000.0	9.000	On	N	19.7	10.2	56.0	
3.736500	43.4	2000.0	9.000	On	L1	19.7	12.6	56.0	

## Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.159000	40.5	2000.0	9.000	On	L1	19.7	15.0	55.5	
0.321000	34.0	2000.0	9.000	On	L1	19.8	15.6	49.7	
0.433500	31.7	2000.0	9.000	On	L1	19.8	15.5	47.2	
1.950000	34.3	2000.0	9.000	On	L1	19.6	11.7	46.0	
2.670000	37.2	2000.0	9.000	On	L1	19.7	8.8	46.0	
3.633000	33.7	2000.0	9.000	On	L1	19.7	12.3	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>(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> <u>No.51, Xueyuan Road, Haidian District, Beijing, China</u></div> <div><i>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 in the field of testing and calibration.</i> <i>The scope of accreditation is detailed in the attached schedule bearing the same accreditation number as above. The schedule forms an integral part of this certificate.</i></div> <div><div>Date of Issue: 2014-10-29 Date of Expiry: 2017-06-19 Date of Initial Accreditation: 1998-07-03</div><div></div><div>Signed on behalf of China National Accreditation Service for Conformity Assessment</div><div><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></div></div>
<div>No.CNAS AL 2</div> <div>0011149</div>

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