



# FCC PART 15C TEST REPORT

**No. 2013TAR628**

for

**TCT Mobile Limited**

**GSM/EGPRS quadband mobile phone**

**Model Name: Tigris Plus 2SIM**

**Marketing Name: ALCATEL 3020D**

**FCC ID : RAD415**

with

**Hardware Version: Proto**

**Software Version: VF15**

**Issued Date: 2013-09-27**



*DAR accreditation (DIN EN ISO/IEC 17025): No. D-PL-12123-01-01*

*FCC 2.948 Listed: No.733176*

*IC O.A.T.S listed: No.6629B*

**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 TMC Beijing.

**Test Laboratory:**

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## **CONTENTS**

<b>1. TEST LABORATORY .....</b>	<b>3</b>
1.1. TESTING LOCATION .....	3
1.2. TESTING ENVIRONMENT.....	3
1.3. PROJECT DATA .....	3
1.4. SIGNATURE.....	3
<b>2. CLIENT INFORMATION.....</b>	<b>4</b>
2.1. APPLICANT INFORMATION.....	4
<b>2.2. MANUFACTURER INFORMATION.....</b>	<b>4</b>
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>5</b>
3.1. ABOUT EUT .....	5
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....	5
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST.....	5
3.4. NORMAL ACCESSORY SETTING.....	6
3.5. GENERAL DESCRIPTION.....	6
<b>4. REFERENCE DOCUMENTS.....</b>	<b>7</b>
4.1. DOCUMENTS SUPPLIED BY APPLICANT .....	7
4.2. REFERENCE DOCUMENTS FOR TESTING.....	7
<b>5. LABORATORY ENVIRONMENT.....</b>	<b>8</b>
<b>6. SUMMARY OF TEST RESULTS .....</b>	<b>9</b>
6.1. SUMMARY OF TEST RESULTS.....	9
6.2. STATEMENTS.....	9
<b>7. TEST EQUIPMENTS UTILIZED.....</b>	<b>10</b>
<b>ANNEX A: MEASUREMENT RESULTS.....</b>	<b>11</b>
A.1. MEASUREMENT METHOD .....	11
A.2. PEAK OUTPUT POWER - CONDUCTED .....	13
A.3. FREQUENCY BAND EDGES - CONDUCTED.....	14
A.4. CONDUCTED EMISSION.....	21
A.5. RADIATED EMISSION.....	45
A.6. TIME OF OCCUPANCY (DWELL TIME) .....	72
A.7. 20dB BANDWIDTH.....	82
A.8. CARRIER FREQUENCY SEPARATION .....	87
A.9. NUMBER OF HOPPING CHANNELS.....	89
A.10. AC POWERLINE CONDUCTED EMISSION .....	93

## 1. Test Laboratory

### 1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT  
Address: Shouxiang Science Building, No 51, Xueyuan Road, Haidian District,  
Beijing, P.R.China  
Postal Code: 100191  
Telephone: 00861062304633  
Fax: 00861062304633

### 1.2. Testing Environment

Normal Temperature: 15-35°C  
Extreme Temperature: -20/+55°C  
Relative Humidity: 20-75%

### 1.3. Project data

Project Leader: Zi Xiaogang  
Testing Start Date: 2013-08-20  
Testing End Date: 2013-09-27

### 1.4. Signature



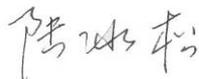
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**Zi Xiaogang**  
**(Prepared this test report)**



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**Sun Xiangqian**  
**(Reviewed this test report)**



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**Lu Bingsong**  
**Deputy Director of the laboratory**  
**(Approved this test report)**

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCT Mobile Limited  
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  
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Telephone: 0086-21-61460890  
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### **2.2. Manufacturer Information**

Company Name: TCT Mobile Limited  
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: 0086-21-61460890  
Fax: 0086-21-61460602

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

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

Description	GSM/EGPRS quadband mobile phone
Model Name	Tigris Plus 2SIM
Marketing Name	ALCATEL 3020D
FCC ID	RAD415
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

Note: The EUT is a variant model of ALCATEL 3020G. All the other result is coming from ALCATEL 3020G.

#### **3.2. Internal Identification of EUT used during the test**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
N01	013816000000830	proto	VF15
N02	013816000000095	proto	VF15

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

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

<b>AE ID*</b>	<b>Description</b>	
AE1	Battery	/
AE2	Travel charger	/
AE3	Travel charger	/

##### AE1

Model	CAB3120000C1
Manufacturer	BYD
Capacitance	850 mAh
Nominal voltage	3.8V

##### AE2

Model	CBA3002AG0C1
Manufacturer	BYD
Length of cable	/

##### AE3

Model	CBA3002AG0C2
Manufacturer	Tenpao
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 GSM/EGPRS quadband 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. Samples undergoing test were selected by the Client.

## 4. Reference Documents

### 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

	FCC CFR 47, Part 15, Subpart C:	
	15.205 Restricted bands of operation;	10-1-12
FCC Part15	15.209 Radiated emission limits, general requirements;	
	15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz.	
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2009
FCC Public Notice DA 00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems	March 2000
KDB412172 D01	Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System	2011

## 5. LABORATORY ENVIRONMENT

**Control room / conducted chamber** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω

**Fully-anechoic chamber 2** (8.6 meters X 6.1 meters X 3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω
Site voltage standing-wave ratio ( $S_{VSWR}$ )	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

**Semi-anechoic chamber 2 / Fully-anechoic chamber 3** (10 meters X 6.7 meters X 6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance
Site voltage standing-wave ratio ( $S_{VSWR}$ )	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

## 6. SUMMARY OF TEST RESULTS

### 6.1. 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 TMC

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 Public notice DA 00-705 and ANSI C63.4.

### 6.2. Statements

TMC has evaluated the test cases requested by the applicant /manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2

## 7. Test Equipments Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Vector Signal Analyzer	FSU26	200030	Rohde & Schwarz	2014-06-12
2	Bluetooth Tester	CBT32	100649	Rohde & Schwarz	2014-02-03

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Test Receiver	ESU26	100376	Rohde & Schwarz	2013-11-07
2	EMI Antenna	VULB 9163	9163482	Schwarzbeck	2014-02-17
3	EMI Antenna	3117	00119024	EMCO	2014-02-03
4	Dual-Ridge Waveguide Horn Antenna	3116	2663	ETS-Lindgren	2014-06-30
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	2014-06-30
6	Bluetooth Tester	CBT	100153	Rohde & Schwarz	2014-09-15
7	LISN	ESH2-Z5	829991/012	Rohde & Schwarz	2014-03-17
8	Pre-amplifier(18GHz)	SCU18	1005277	Rohde & Schwarz	/
9	Pre-amplifier(26.5GHz)	SCU26	1006788	Rohde & Schwarz	/

### Anechoic chamber

Fully anechoic chamber by Frankonia German.

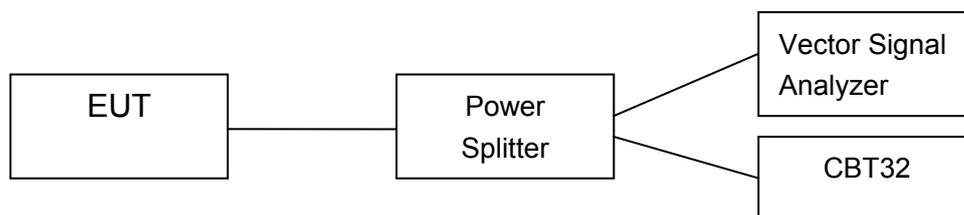
## ANNEX A: MEASUREMENT RESULTS

### A.1. Measurement Method

#### A.1.1. Conducted Measurements

The measurement is made according to Public notice DA 00-705 and ANSI C63.4.

- 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

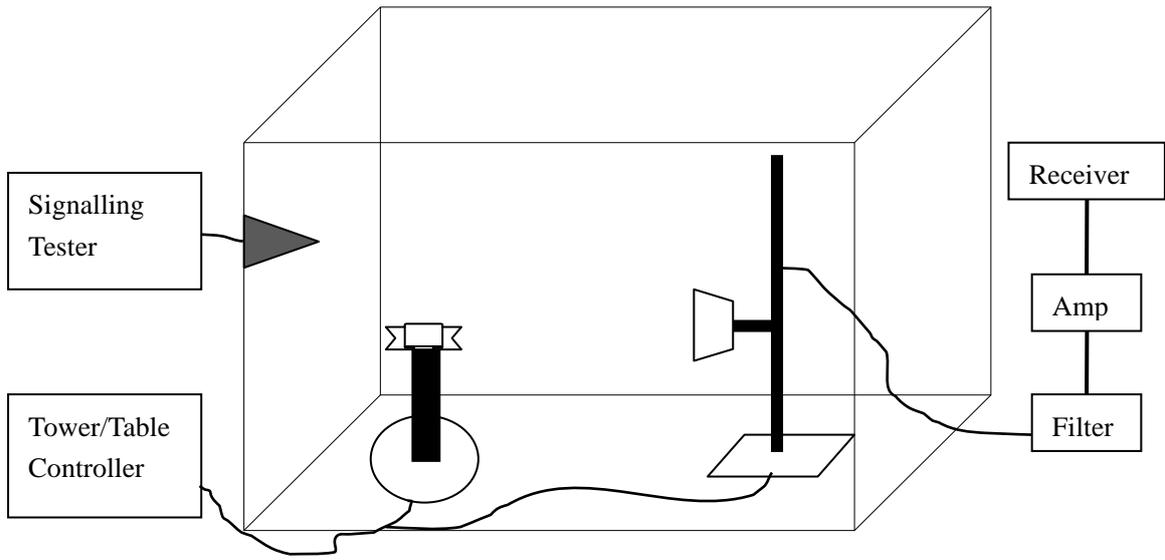
The measurement is made according to Public notice DA 00-705 and ANSI C63.4

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

### Measurement Limit:

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4.

### Test Condition

Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	3MHz	3MHz	5MHz	2.5ms

### Measurement Results:

#### For GFSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	9.05	9.32	9.66	P

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

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	8.80	9.08	9.37	P

#### For 8DPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	9.07	9.36	9.70	P

**Conclusion: PASS**

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

#### Measurement Limit:

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4.

#### Measurement Result:

##### For GFSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.1	-57.89	P
	Hopping ON	Fig.2	-57.43	P
78	Hopping OFF	Fig.3	-59.35	P
	Hopping ON	Fig.4	-49.07	P

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

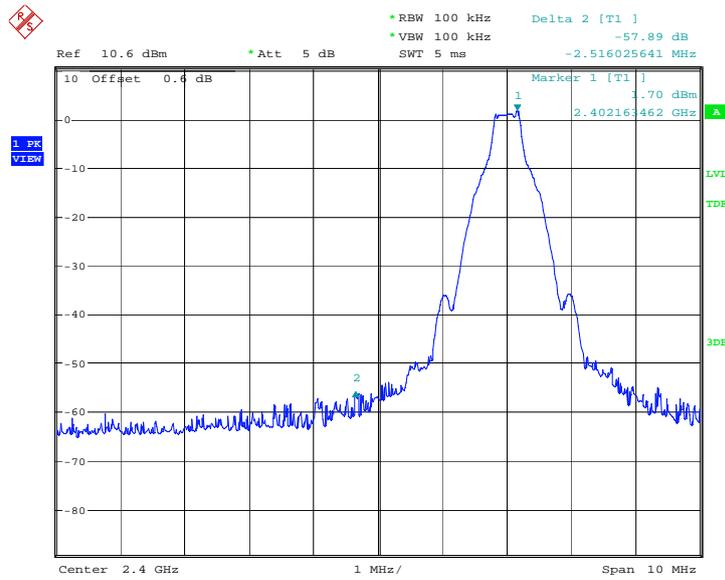
Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.5	-57.61	P
	Hopping ON	Fig.6	-57.78	P
78	Hopping OFF	Fig.7	-61.91	P
	Hopping ON	Fig.8	-62.04	P

##### For 8DPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.9	-57.92	P
	Hopping ON	Fig.10	-55.46	P
78	Hopping OFF	Fig.11	-61.21	P
	Hopping ON	Fig.12	-58.94	P

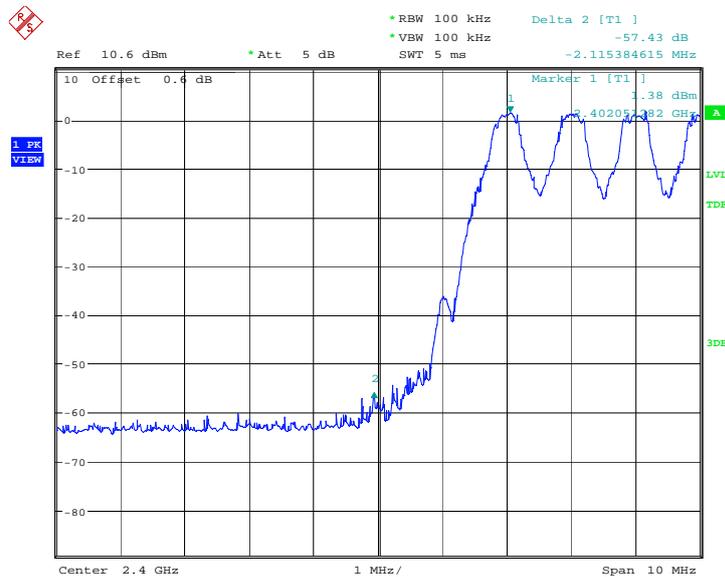
**Conclusion: PASS**

Test graphs as below



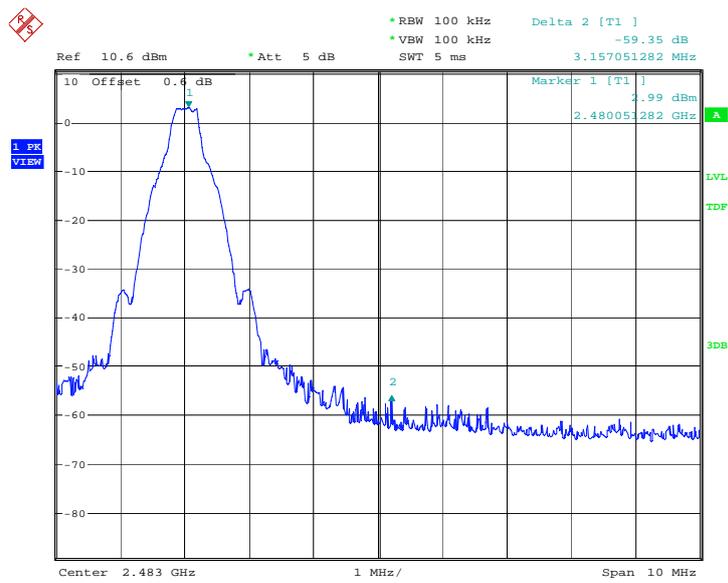
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Fig.1. Frequency Band Edges: GFSK, Channel 0, Hopping Off



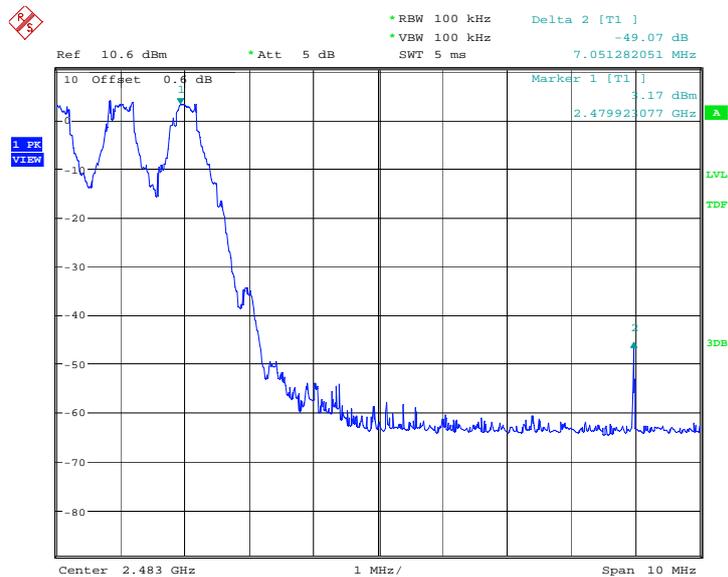
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Fig.2. Frequency Band Edges: GFSK, Channel 0, Hopping On



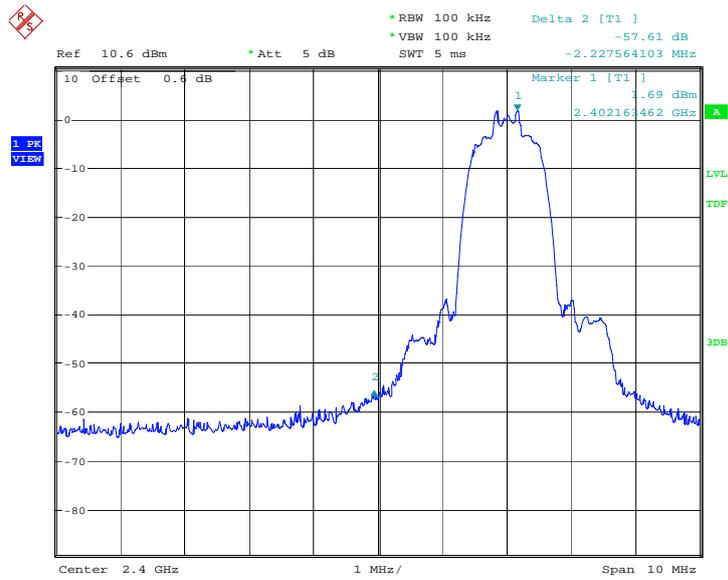
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Fig.3. Frequency Band Edges: GFSK, Channel 78, Hopping Off



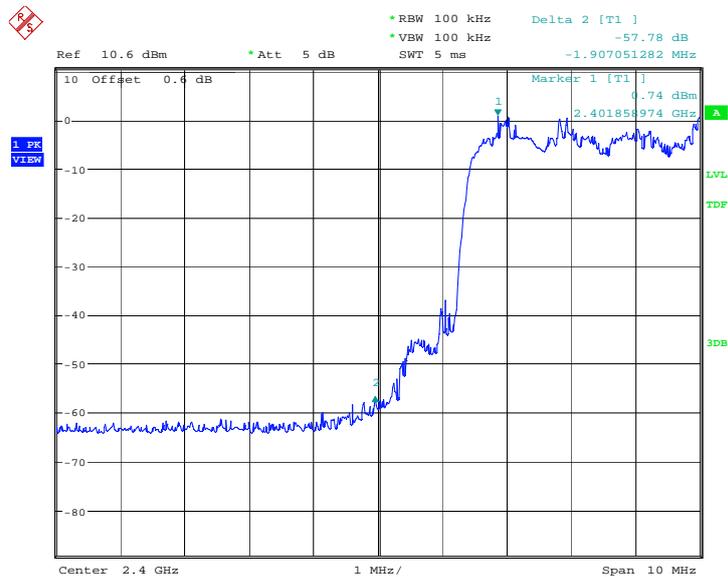
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Fig.4. Frequency Band Edges: GFSK, Channel 78, Hopping On



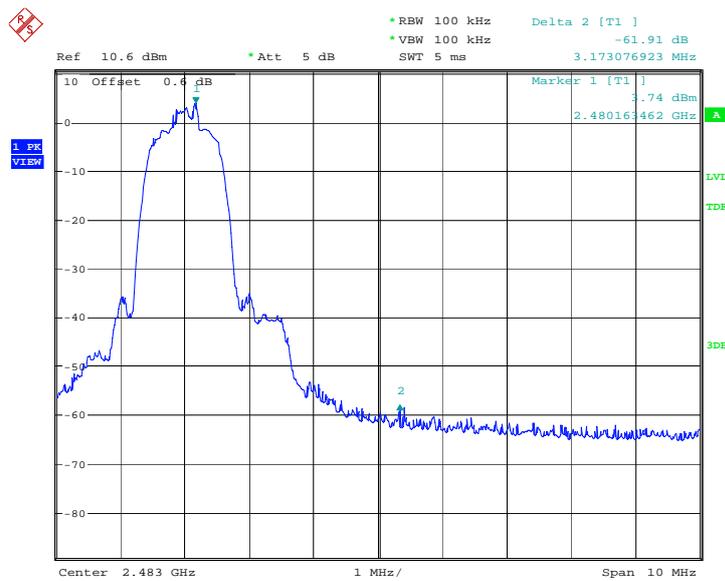
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Fig.5. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping Off



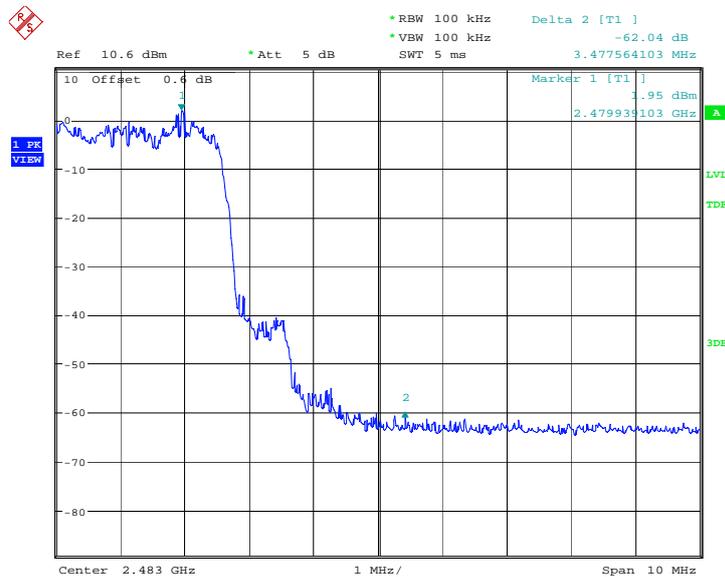
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Fig.6. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping On



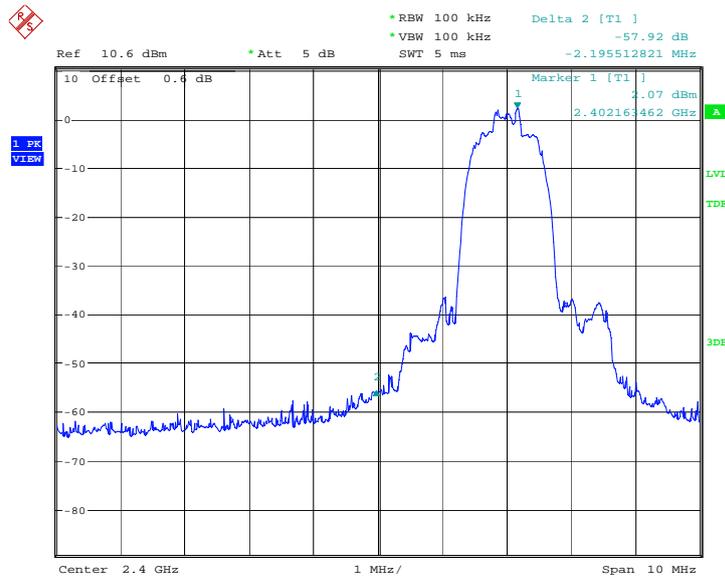
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Fig.7. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping Off



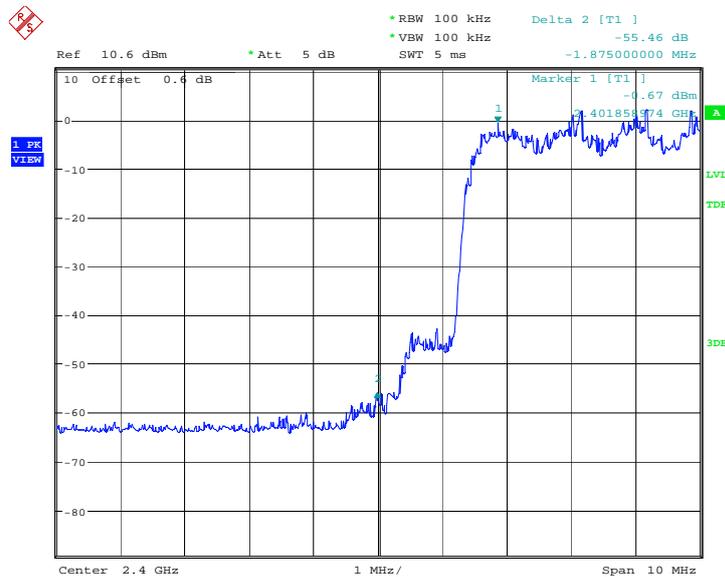
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Fig.8. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping On



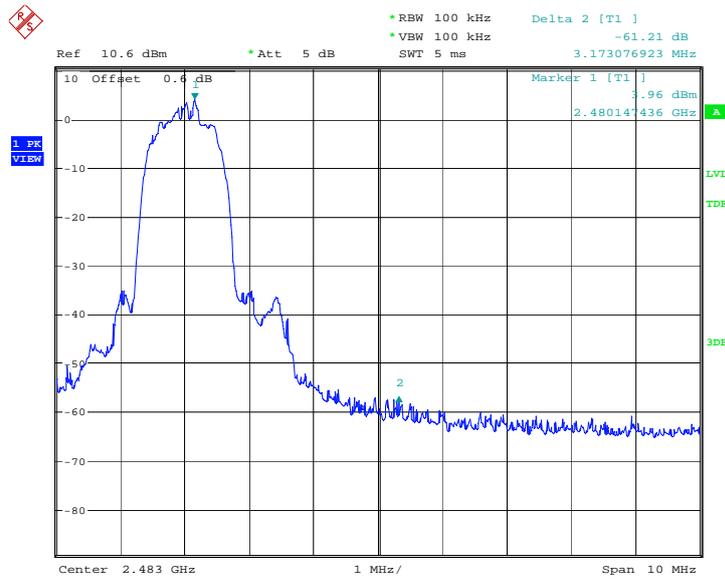
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Fig.9. Frequency Band Edges: 8DPSK, Channel 0, Hopping Off



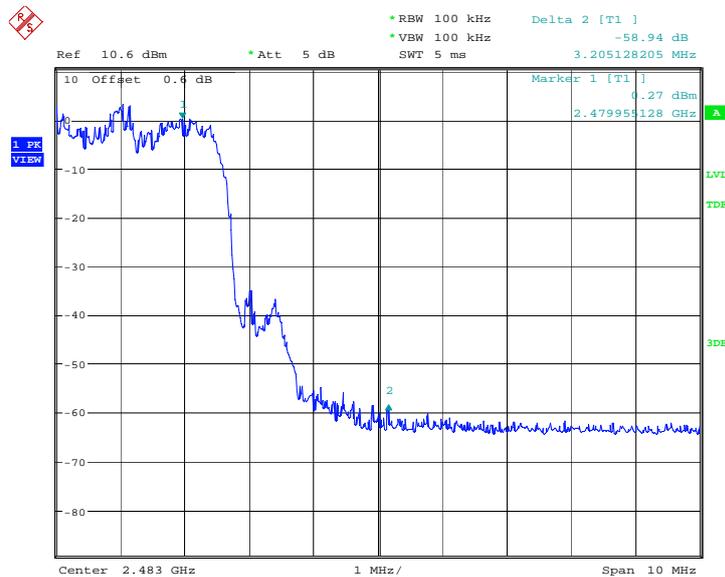
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Fig.10. Frequency Band Edges: 8DPSK, Channel 0, Hopping On



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



Date: 20.AUG.2013 11:57:53

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

#### A.4. Conducted Emission

##### Measurement Limit:

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4

##### Measurement Results:

###### For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	Center Frequency	Fig.13	P
	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

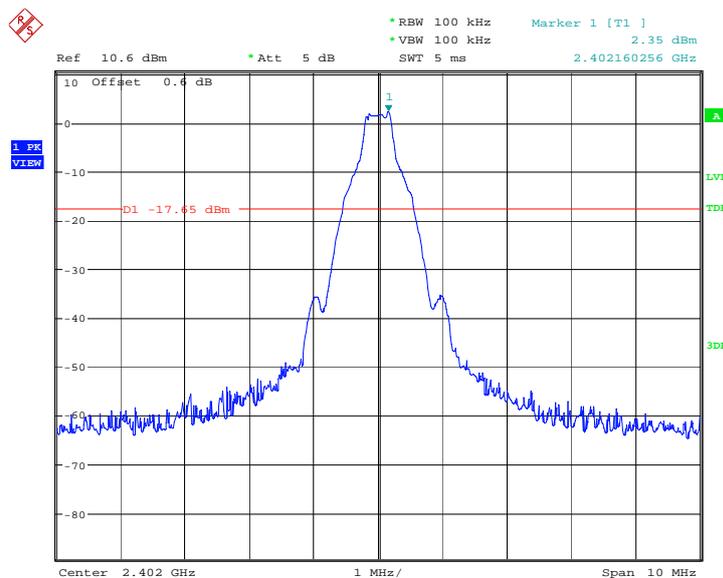
	1 GHz ~ 3 GHz	Fig.40	P
	3 GHz ~ 10 GHz	Fig.41	P
	10 GHz ~ 26 GHz	Fig.42	P

**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

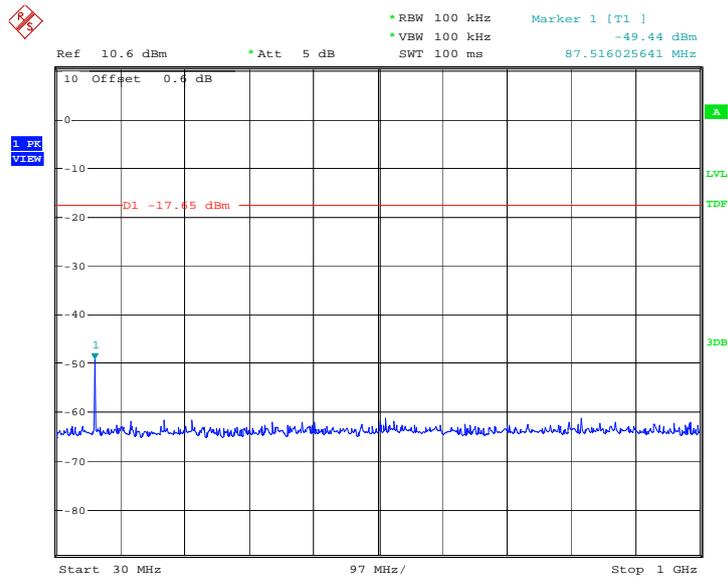
**Conclusion: PASS**

**Test graphs as below**



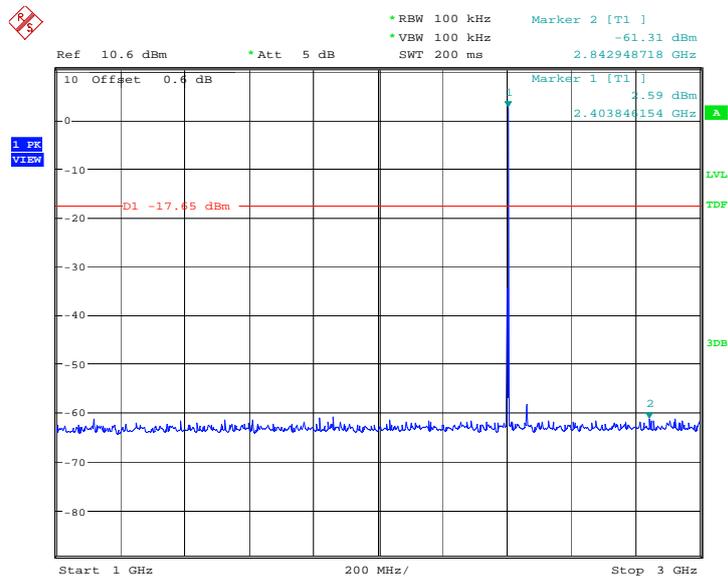
Date: 20.AUG.2013 11:15:16

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



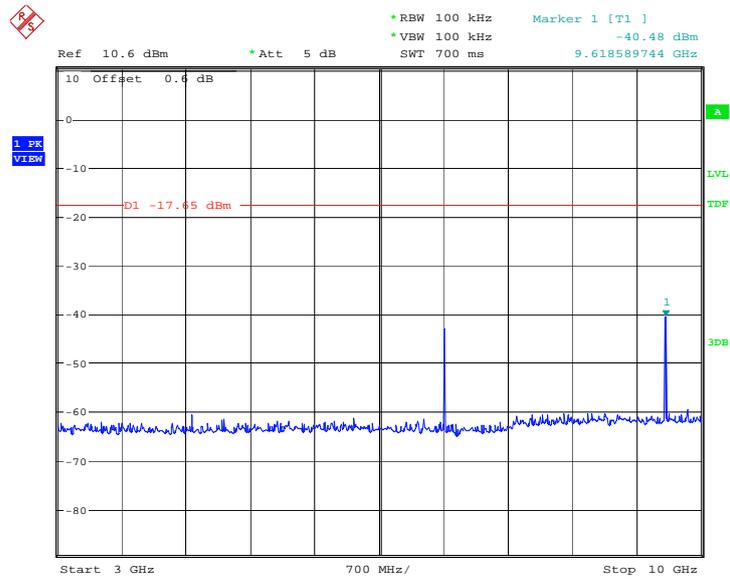
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Fig.14. Conducted spurious emission: GFSK, Channel 0, 30MHz - 1GHz



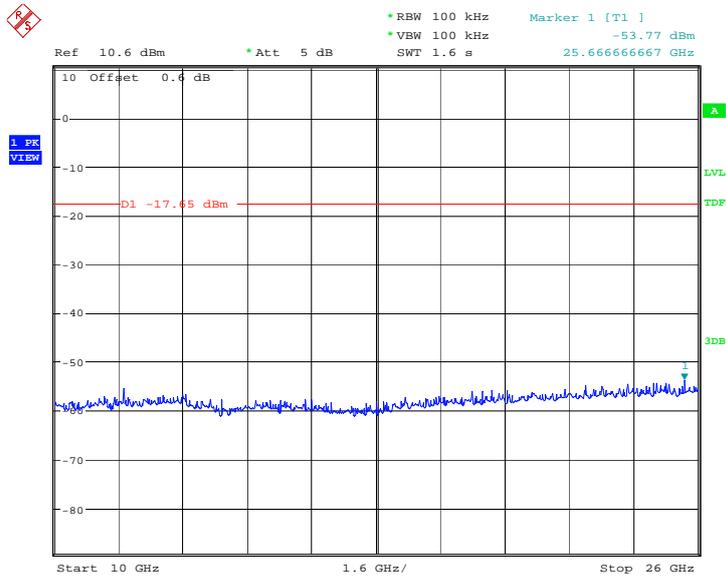
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Fig.15. Conducted spurious emission: GFSK, Channel 0, 1GHz - 3GHz



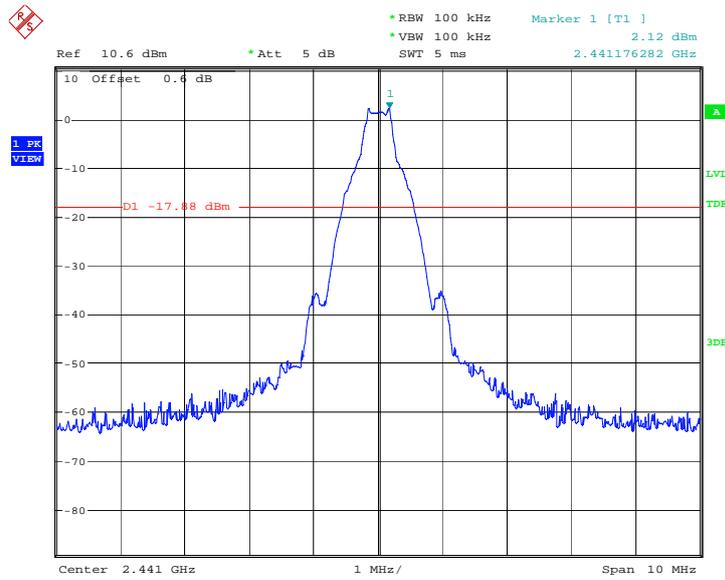
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Fig.16. Conducted spurious emission: GFSK, Channel 0, 3GHz - 10GHz



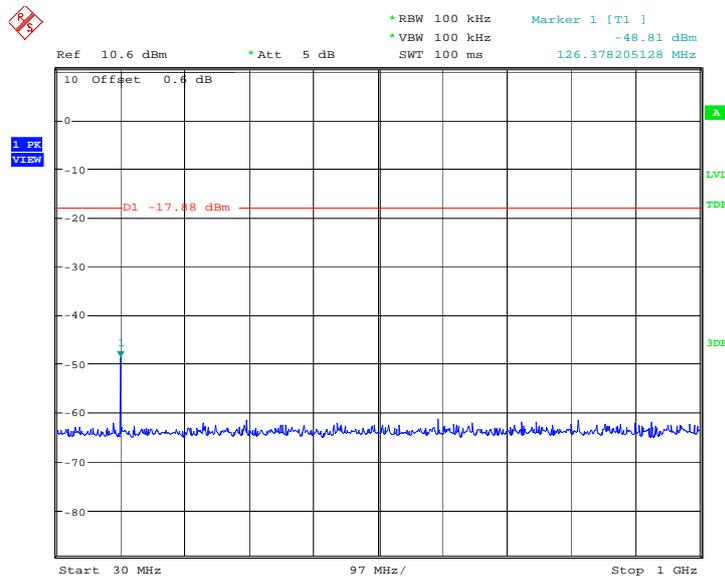
Date: 20.AUG.2013 11:16:37

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



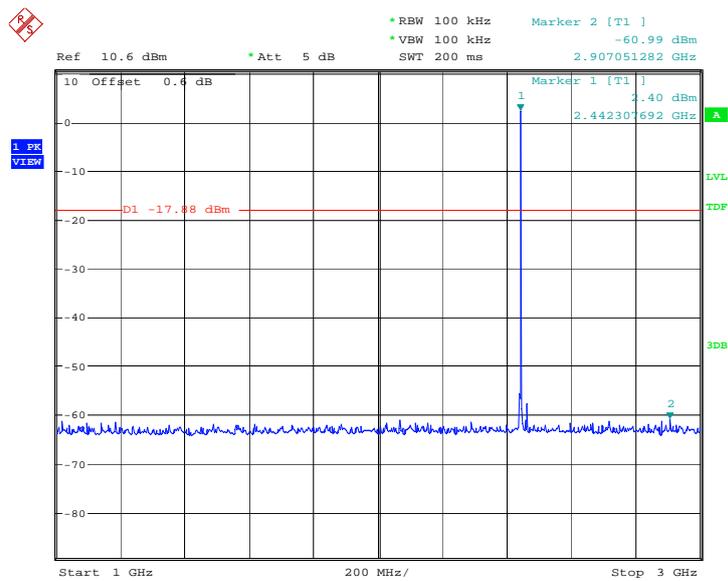
Date: 20.AUG.2013 11:16:54

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



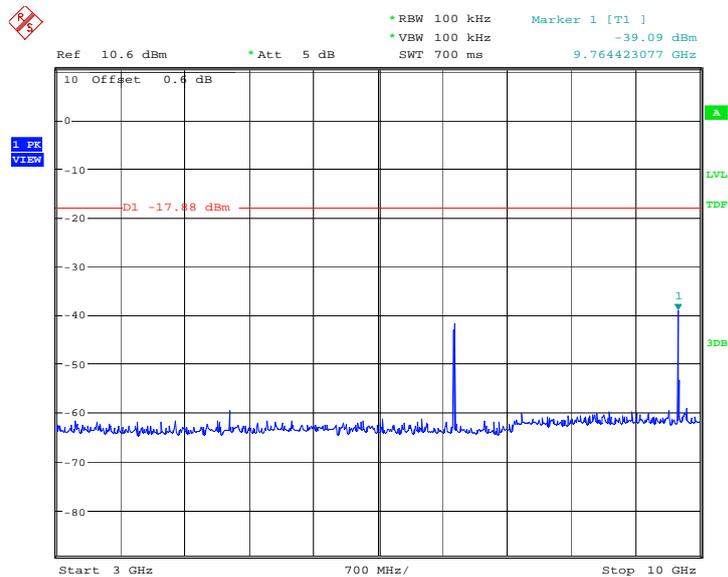
Date: 20.AUG.2013 11:17:10

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



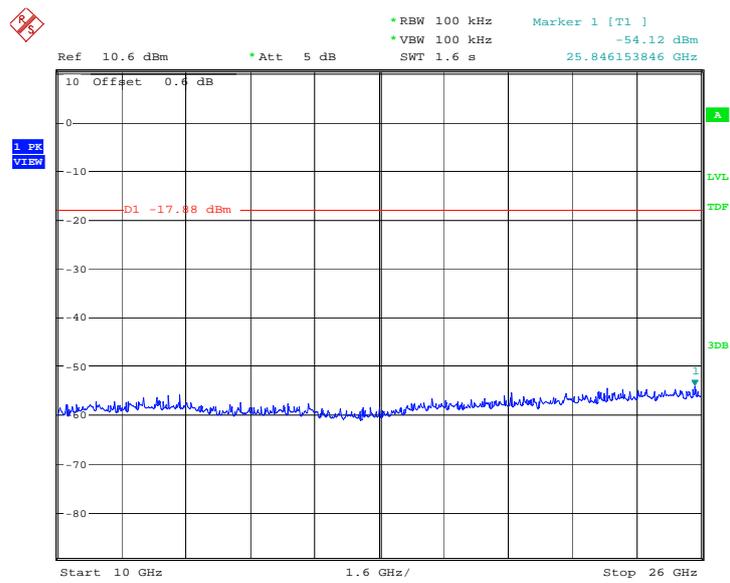
Date: 20.AUG.2013 11:17:42

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



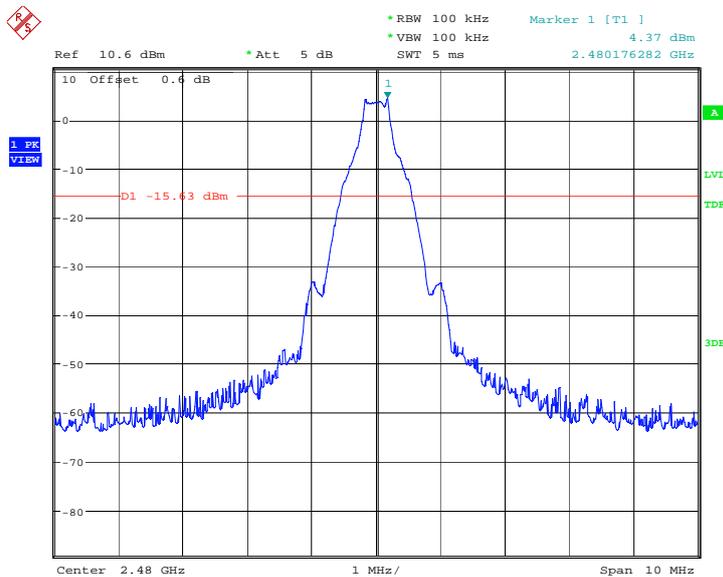
Date: 20.AUG.2013 11:17:59

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



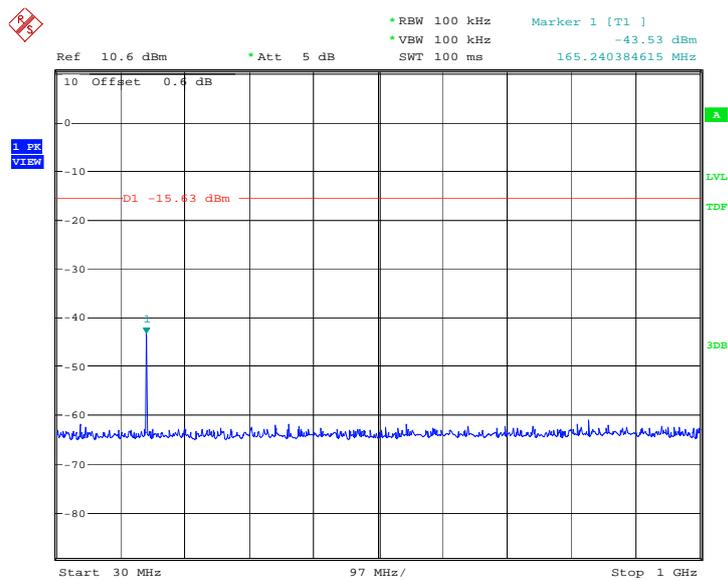
Date: 20.AUG.2013 11:18:15

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



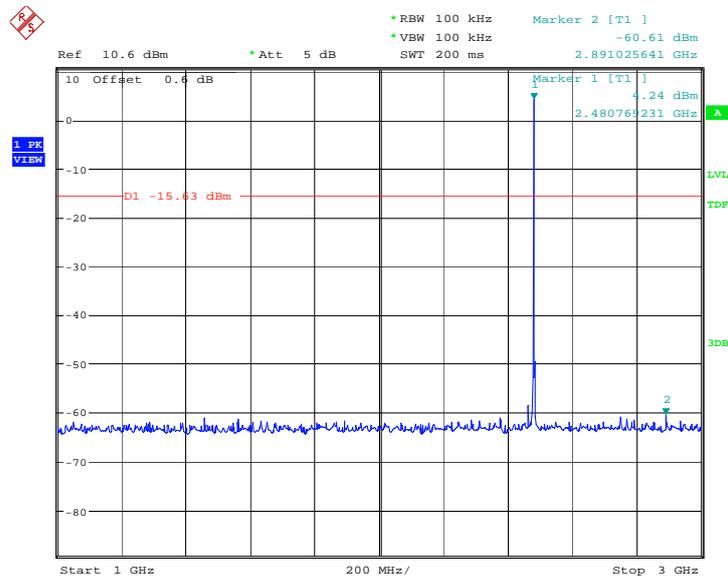
Date: 20.AUG.2013 11:18:32

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



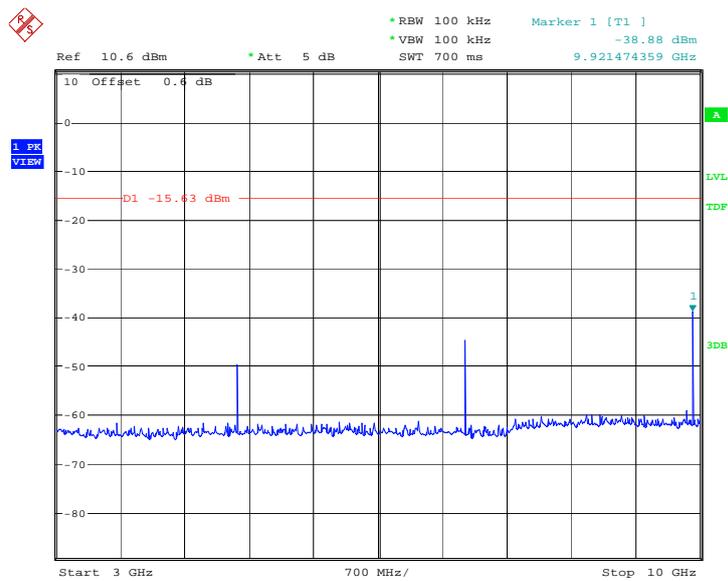
Date: 20.AUG.2013 11:18:49

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



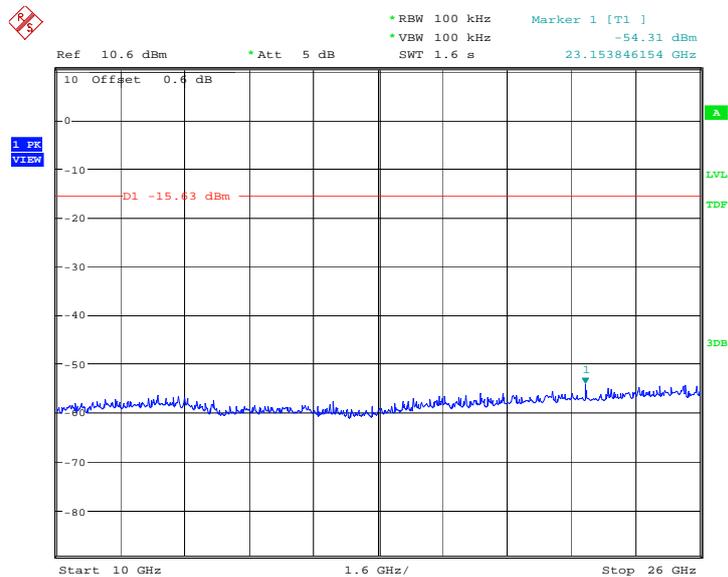
Date: 20.AUG.2013 11:19:20

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



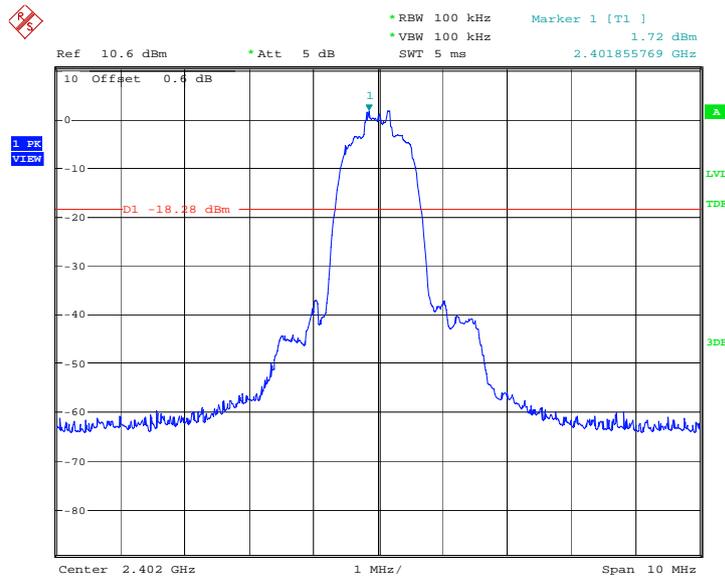
Date: 20.AUG.2013 11:19:37

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



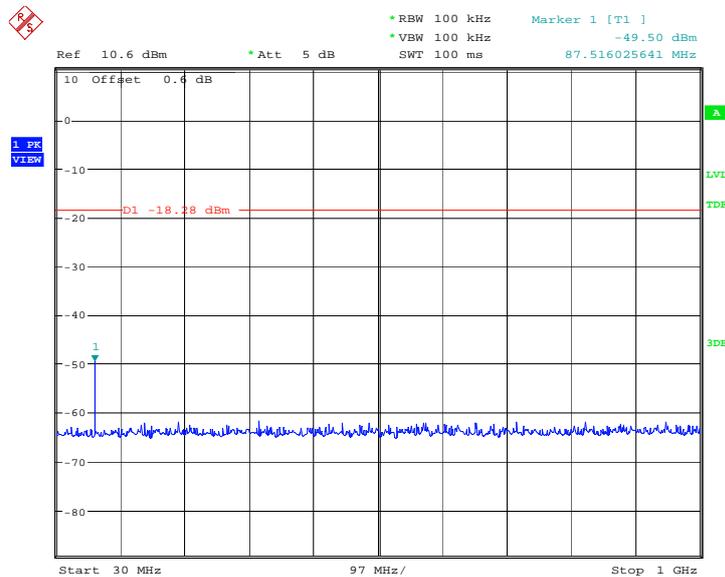
Date: 20.AUG.2013 11:19:53

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



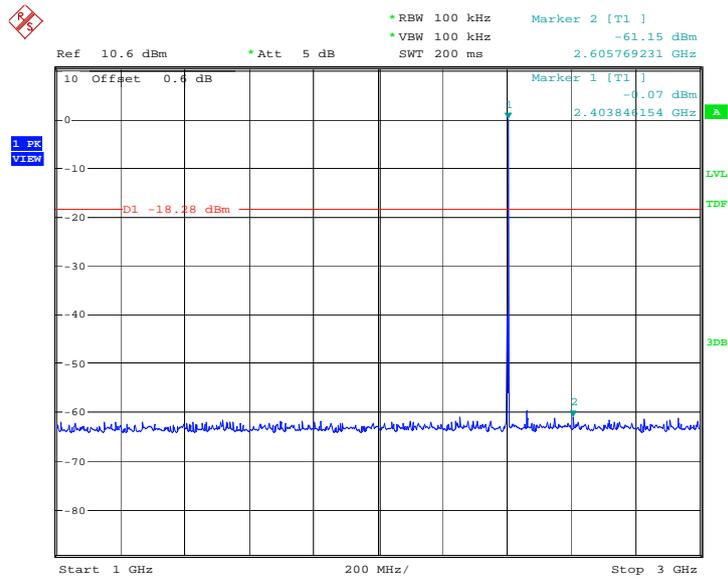
Date: 20.AUG.2013 11:36:45

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



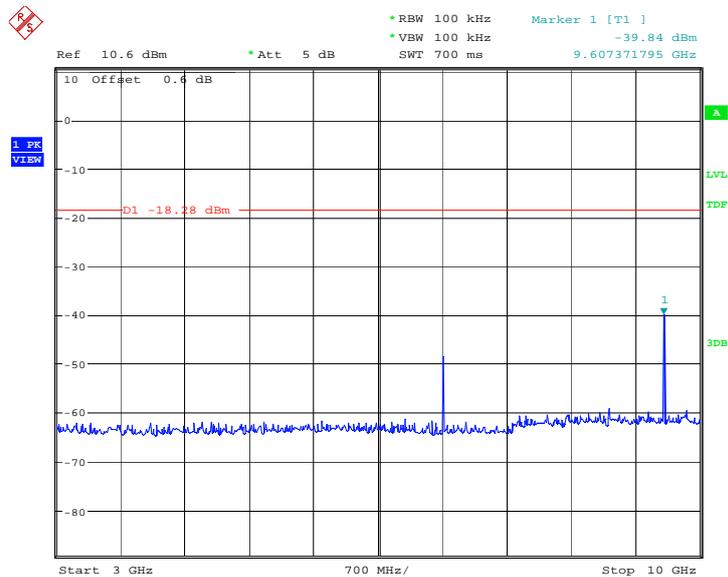
Date: 20.AUG.2013 11:37:01

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



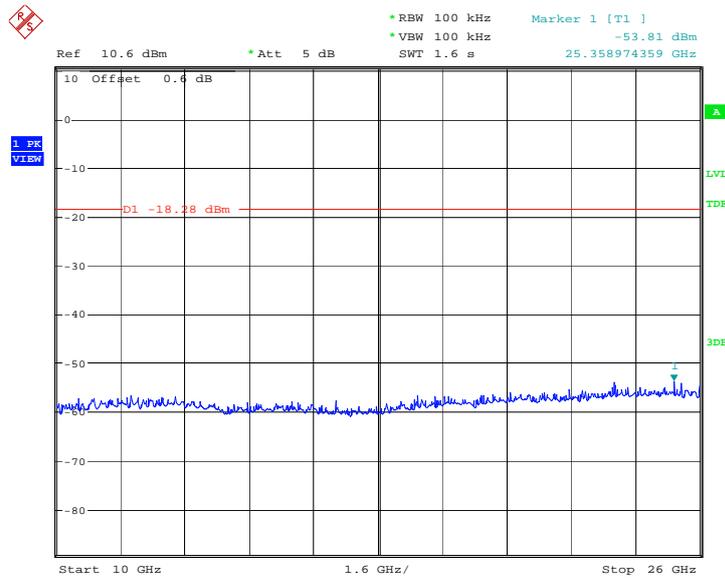
Date: 20.AUG.2013 11:37:33

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



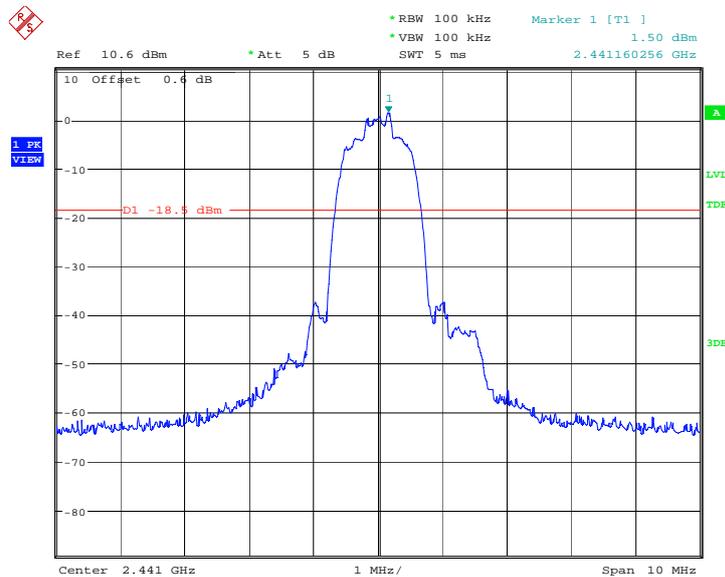
Date: 20.AUG.2013 11:37:49

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



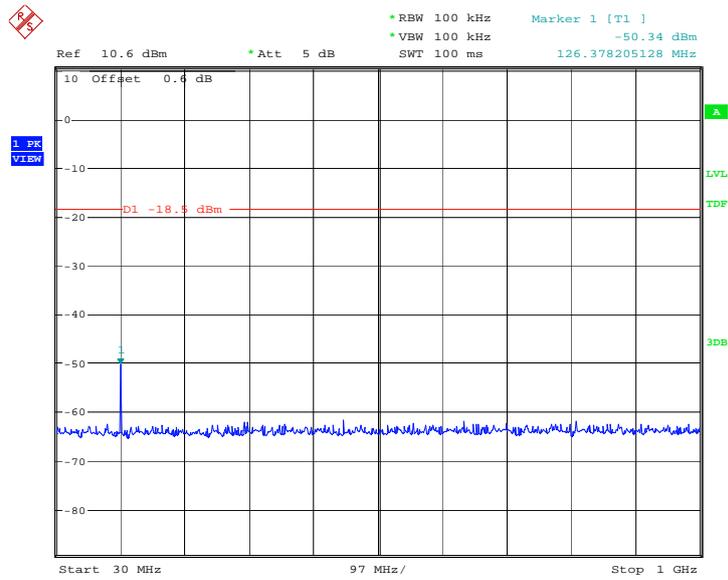
Date: 20.AUG.2013 11:38:06

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



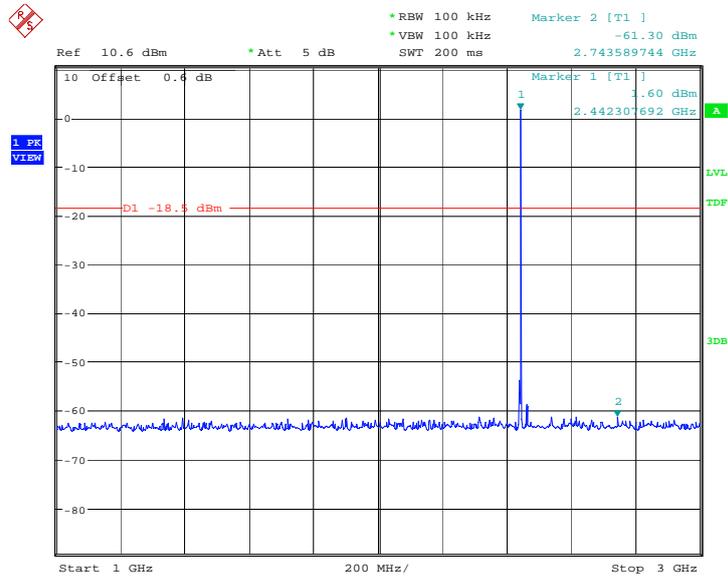
Date: 20.AUG.2013 11:38:23

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



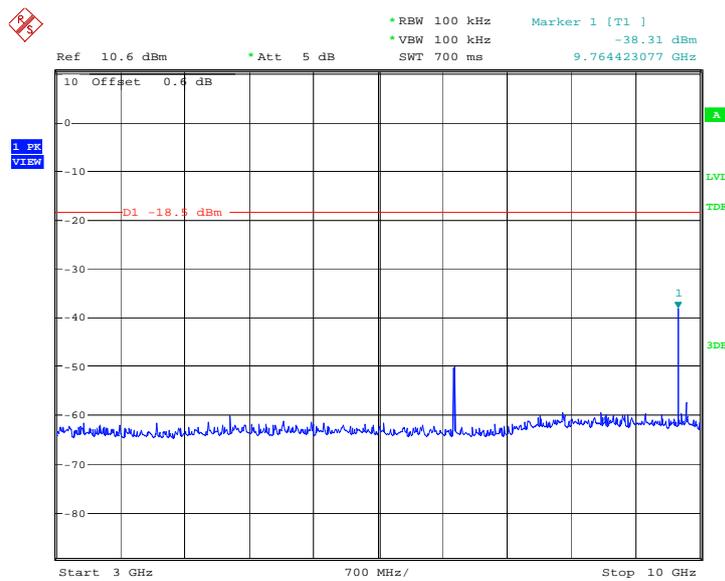
Date: 20.AUG.2013 11:38:39

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



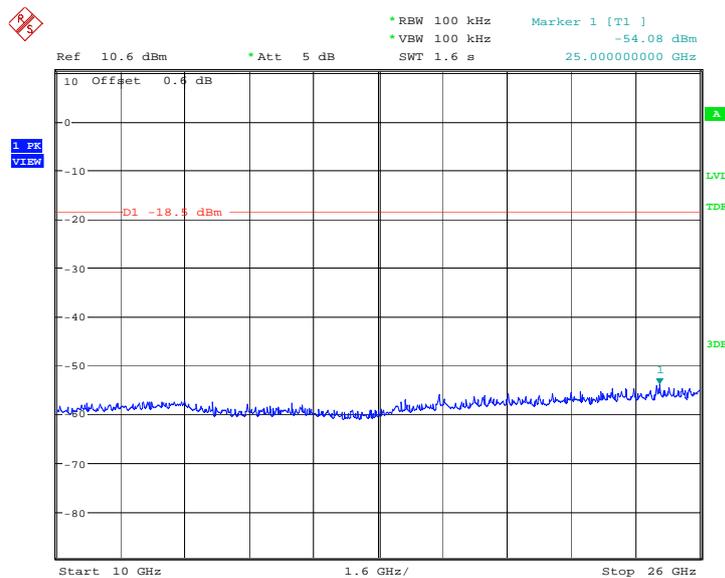
Date: 20.AUG.2013 11:39:11

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



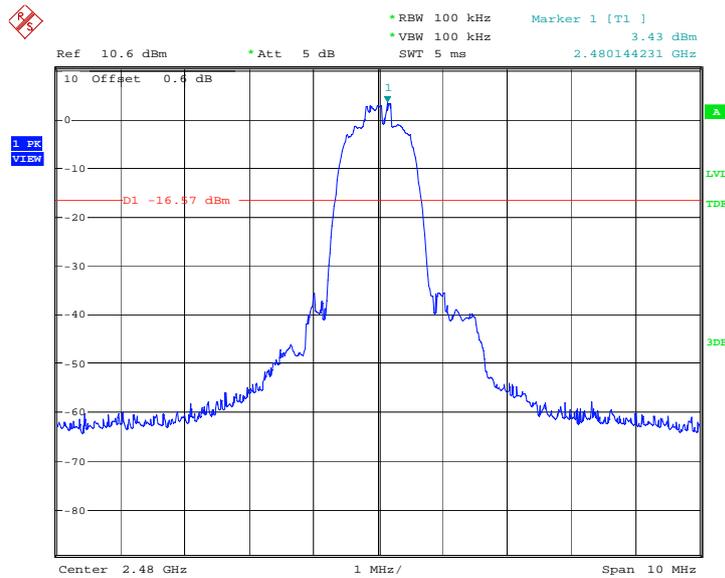
Date: 20.AUG.2013 11:39:27

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



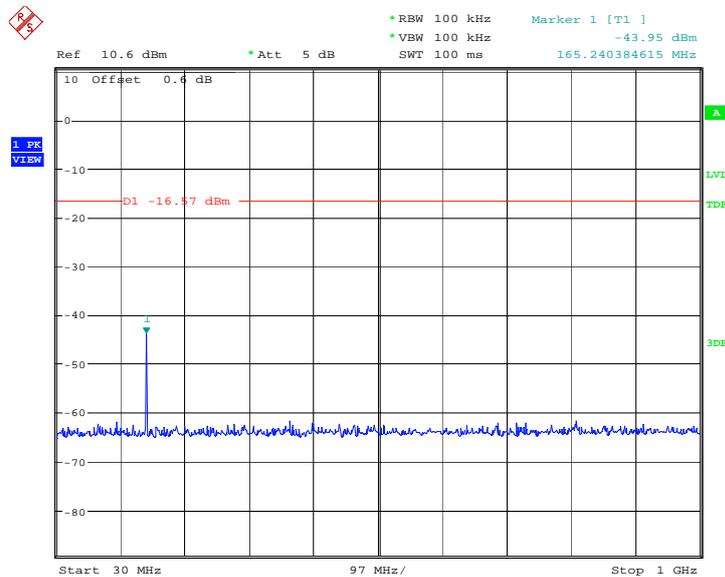
Date: 20.AUG.2013 11:39:44

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



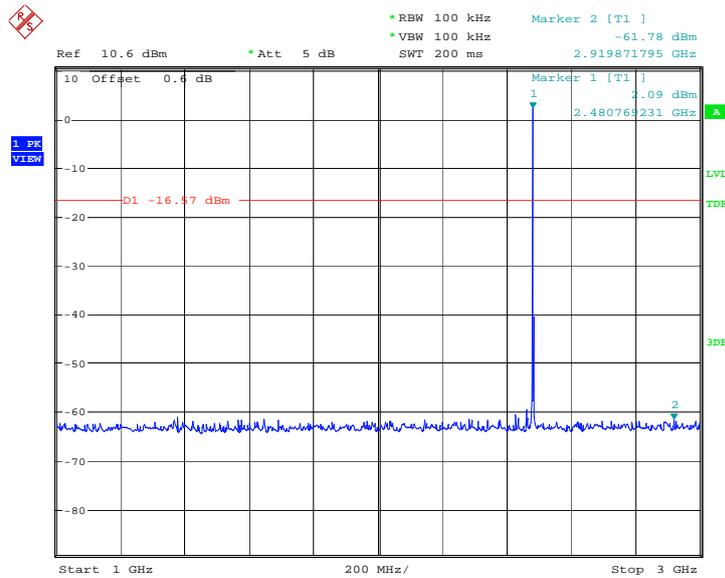
Date: 20.AUG.2013 11:40:01

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



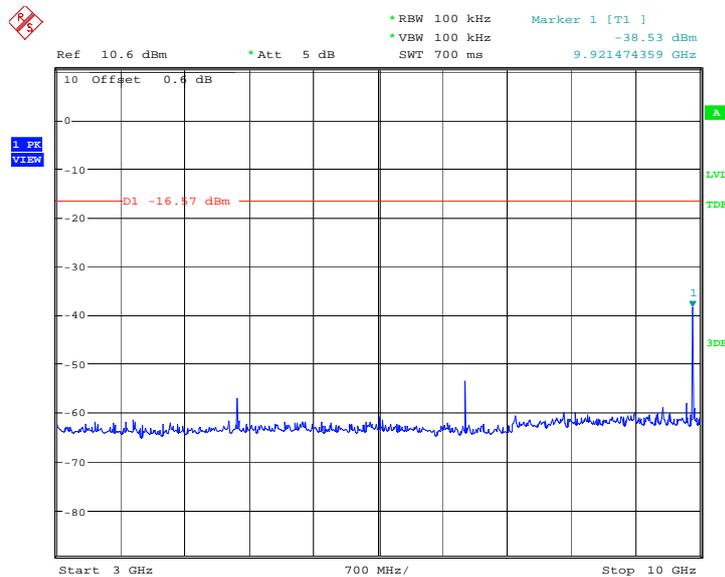
Date: 20.AUG.2013 11:40:17

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



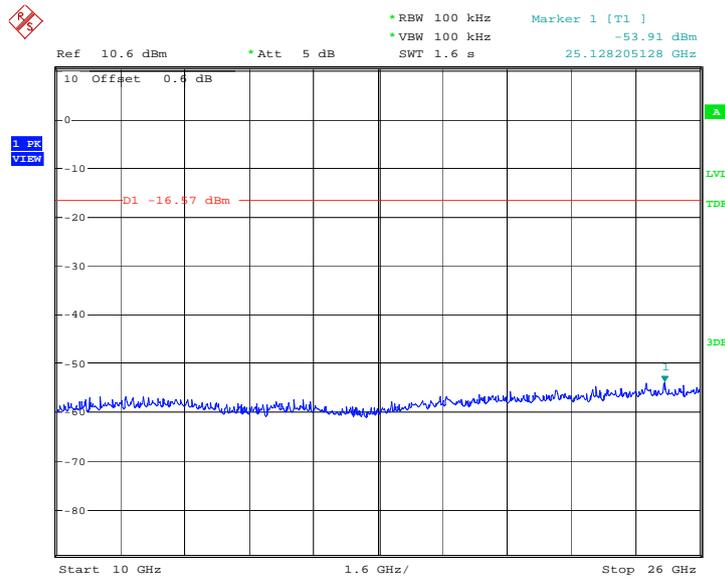
Date: 20.AUG.2013 11:40:49

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



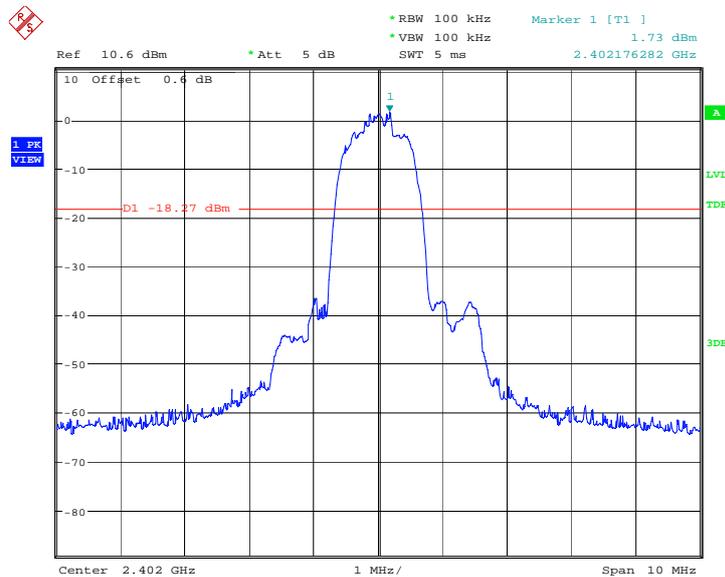
Date: 20.AUG.2013 11:41:05

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



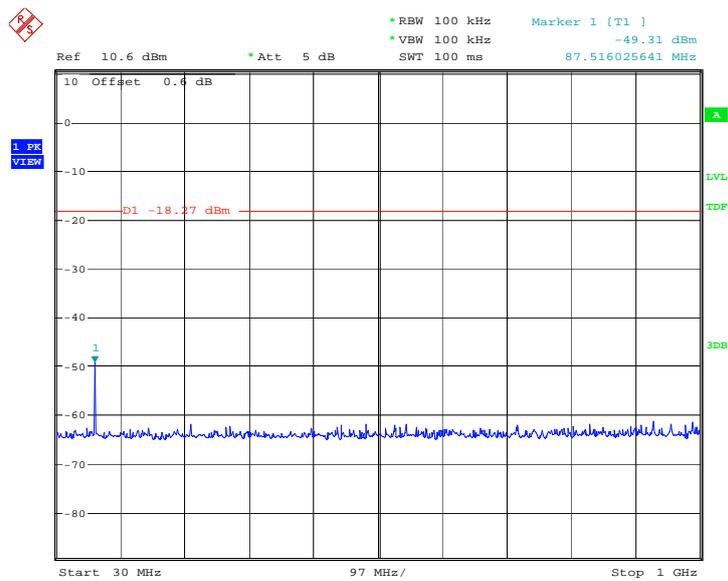
Date: 20.AUG.2013 11:41:22

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



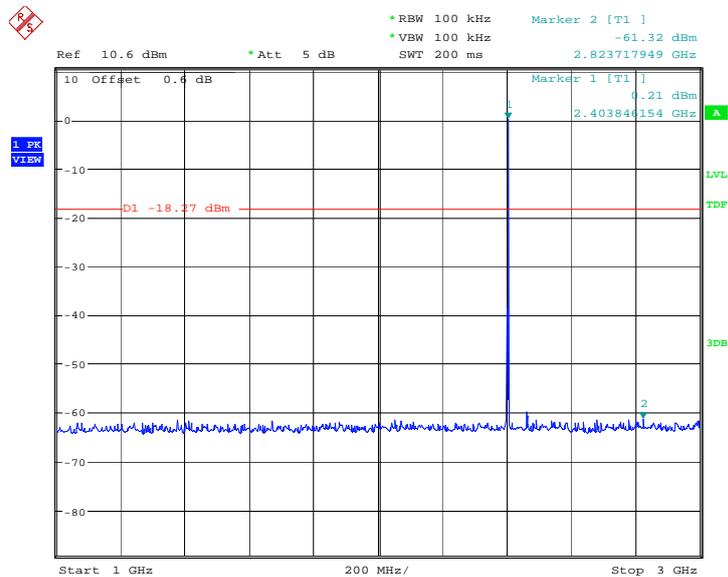
Date: 20.AUG.2013 11:58:11

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



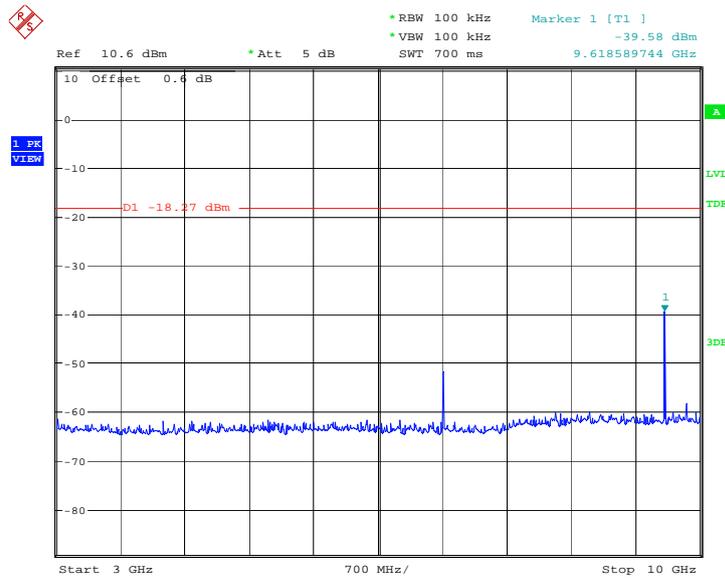
Date: 20.AUG.2013 11:58:28

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



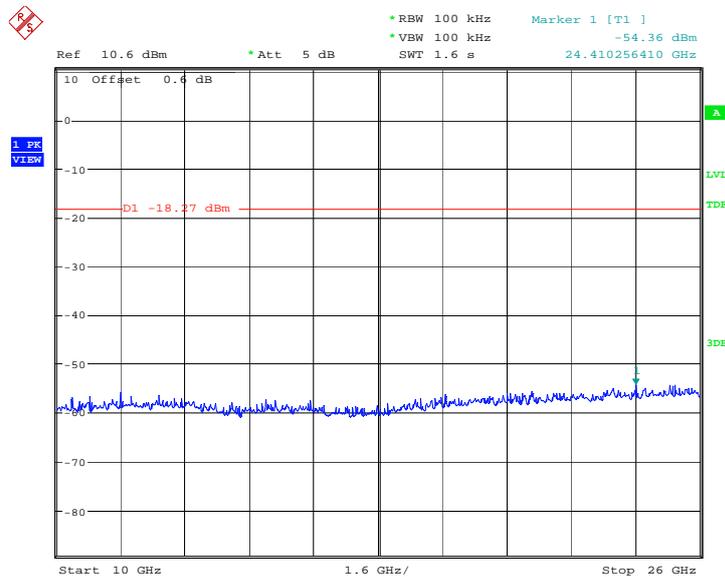
Date: 20.AUG.2013 11:59:00

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



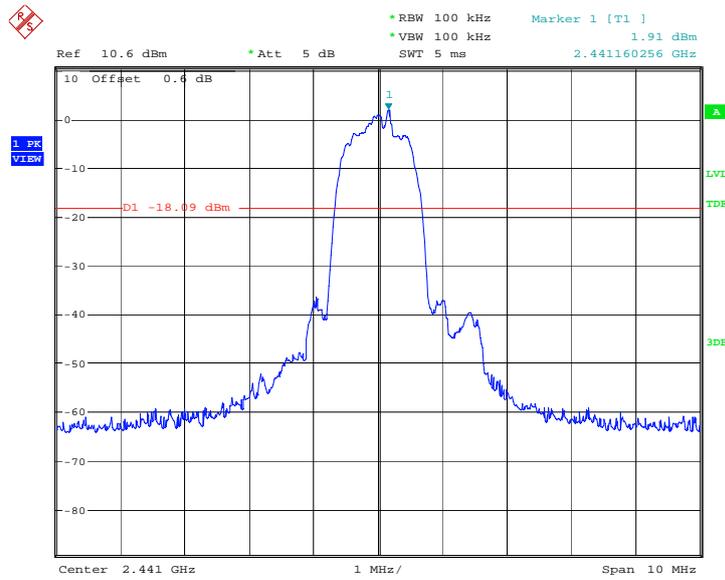
Date: 20.AUG.2013 11:59:16

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



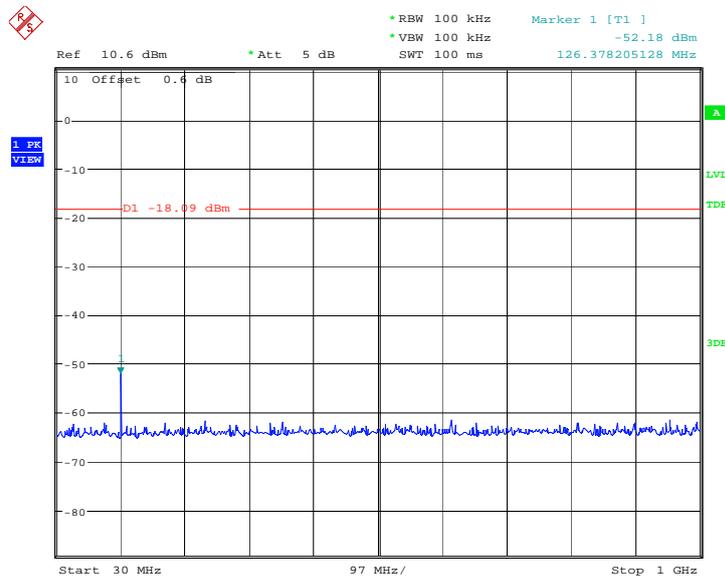
Date: 20.AUG.2013 11:59:33

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



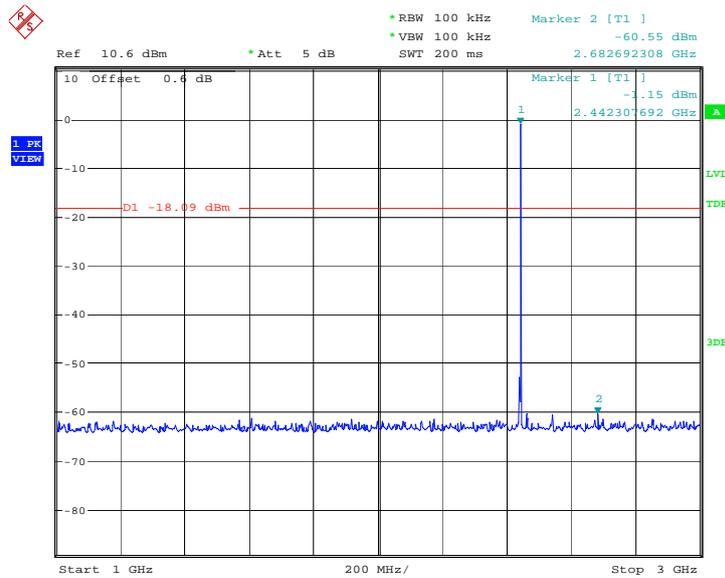
Date: 20.AUG.2013 11:59:49

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



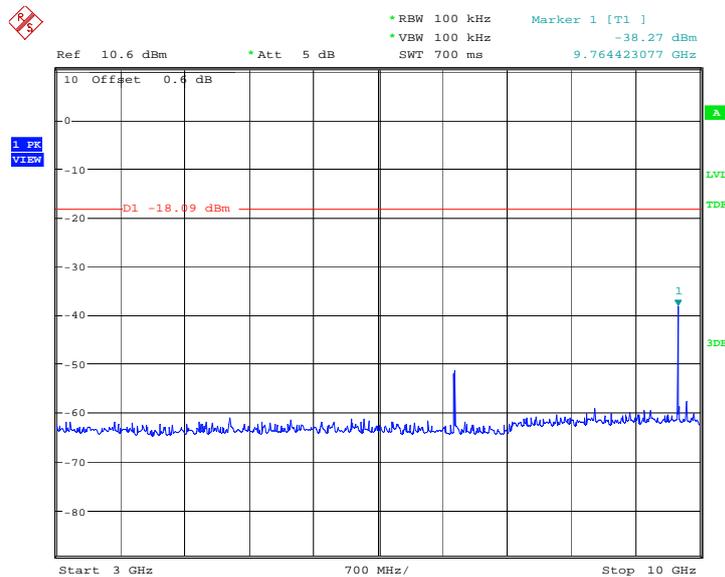
Date: 20.AUG.2013 12:00:06

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



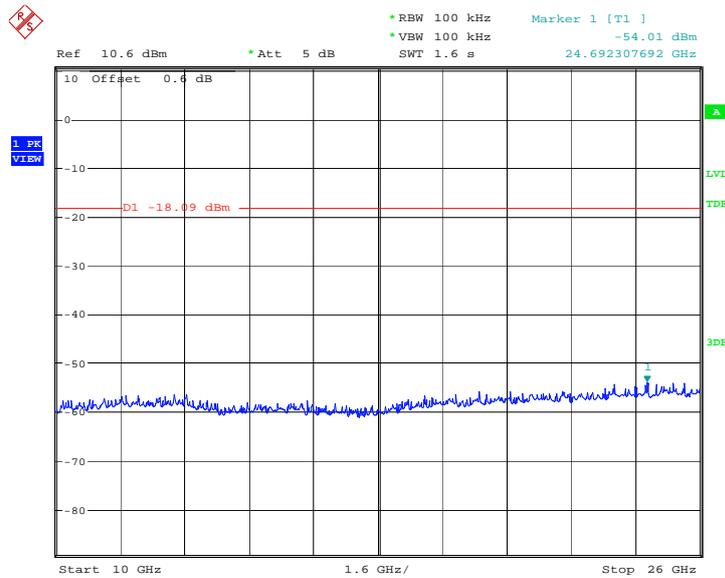
Date: 20.AUG.2013 12:00:38

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



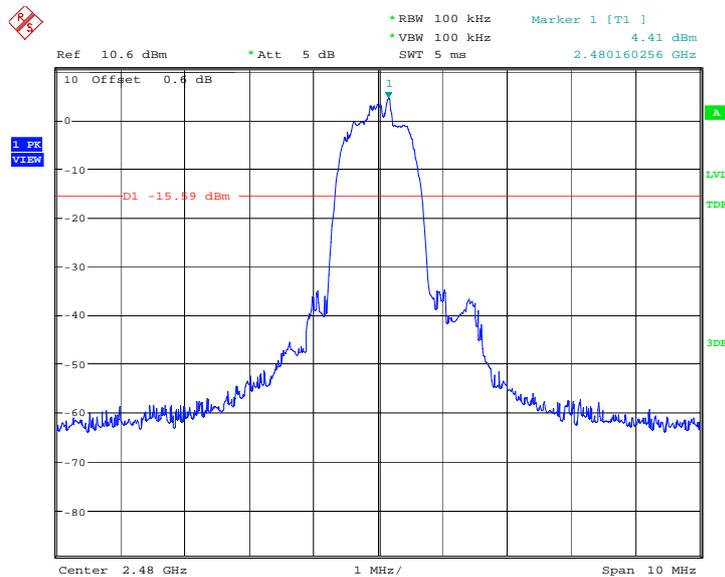
Date: 20.AUG.2013 12:00:54

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



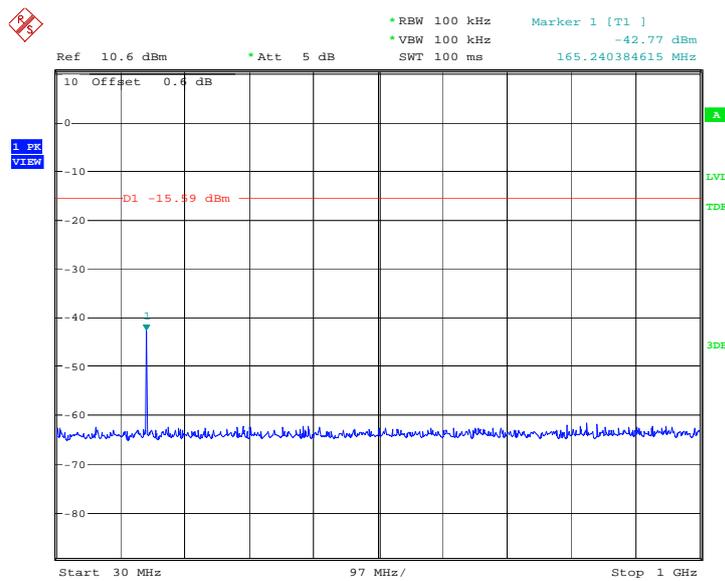
Date: 20.AUG.2013 12:01:11

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



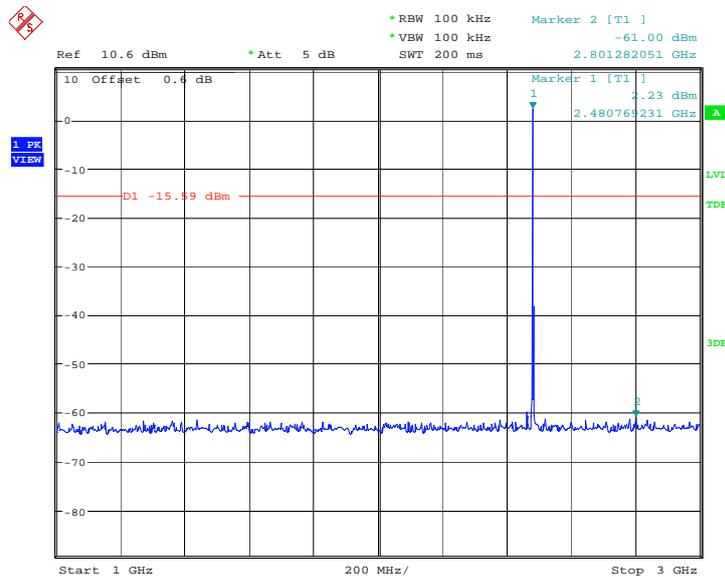
Date: 20.AUG.2013 12:01:28

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



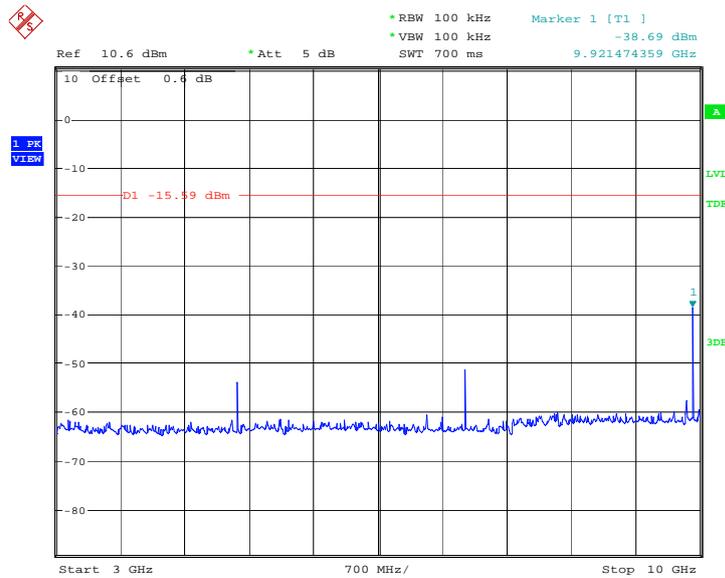
Date: 20.AUG.2013 12:01:44

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



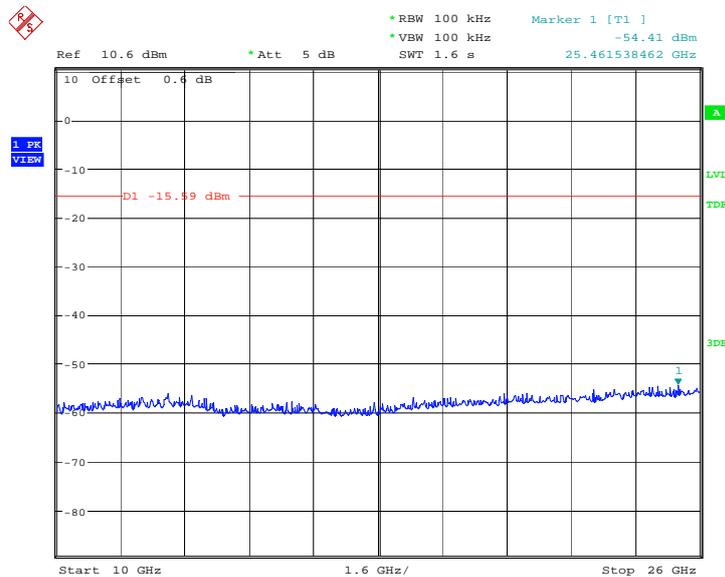
Date: 20.AUG.2013 12:02:16

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



Date: 20.AUG.2013 12:02:32

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



Date: 20.AUG.2013 12:02:49

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 Public notice DA 00-705

#### 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:

A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable los.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}}$$

#### For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	30 MHz ~ 1 GHz	Fig.58	P
	1 GHz ~ 3 GHz	Fig.59	P
	3 GHz ~ 18 GHz	Fig.60	P
Ch 39 2441 MHz	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	30 MHz ~ 1 GHz	Fig.64	P
	1 GHz ~ 3 GHz	Fig.65	P
	3 GHz ~ 18 GHz	Fig.66	P
Power	2.38GHz~2.4GHz---L (VBW=10Hz)	Fig.67	P
Power	2.38GHz~2.4GHz---L (VBW=1MHz)	Fig.68	P
Power	2.45GHz~2.5GHz---H (VBW=10Hz)	Fig.69	P
Power	2.45GHz~2.5GHz---H (VBW=1MHz)	Fig.70	P
For all channels	18 GHz ~ 26 GHz	Fig.71	P

**For  $\pi/4$  DQPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	30 MHz ~ 1 GHz	Fig.72	P
	1 GHz ~ 3 GHz	Fig.73	P
	3 GHz ~ 18 GHz	Fig.74	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.75	P
	1 GHz ~ 3 GHz	Fig.76	P
	3 GHz ~ 18 GHz	Fig.77	P
Ch 78 2480 MHz	30 MHz ~ 1 GHz	Fig.78	P
	1 GHz ~ 3 GHz	Fig.79	P
	3 GHz ~ 18 GHz	Fig.80	P
Power	2.38GHz~2.4GHz---L (VBW=10Hz)	Fig.81	P
Power	2.38GHz~2.4GHz---L (VBW=1MHz)	Fig.82	P
Power	2.45GHz~2.5GHz---H (VBW=10Hz)	Fig.83	P
Power	2.45GHz~2.5GHz---H (VBW=1MHz)	Fig.84	P
For all channels	18 GHz ~ 26 GHz	Fig.85	P

**For 8DPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	30 MHz ~ 1 GHz	Fig.86	P
	1 GHz ~ 3 GHz	Fig.87	P
	3 GHz ~ 18 GHz	Fig.88	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.89	P
	1 GHz ~ 3 GHz	Fig.90	P
	3 GHz ~ 18 GHz	Fig.91	P
Ch 78	30 MHz ~ 1 GHz	Fig.92	P

2480 MHz	1 GHz ~ 3 GHz	Fig.93	P
	3 GHz ~ 18 GHz	Fig.94	P
Power	2.38GHz~2.4GHz---L (VBW=10Hz)	Fig.95	P
Power	2.38GHz~2.4GHz---L (VBW=1MHz)	Fig.96	P
Power	2.45GHz~2.5GHz---H (VBW=10Hz)	Fig.97	P
Power	2.45GHz~2.5GHz---H (VBW=1MHz)	Fig.98	P
For all channels	18 GHz ~ 26 GHz	Fig.99	P

**GFSK Ch 0 (10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17500.10	44.60	20.02	24.61	H
17500.00	44.60	20.02	24.61	H
17500.70	44.60	20.02	24.61	H
17500.80	44.60	20.02	24.61	H
17500.60	44.60	20.02	24.61	H
17500.20	44.60	20.02	24.61	H

**GFSK Ch 0(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17590.70	56.40	19.92	36.47	H
17934.20	55.50	19.52	35.99	H
17514.70	55.50	20.02	35.51	H
17900.70	55.50	19.82	35.73	H
17972.20	55.40	19.82	35.58	V
17545.90	55.40	20.12	35.25	H

**GFSK Ch 39(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17501.10	44.60	20.02	24.61	H
17500.70	44.60	20.02	24.61	H
17500.60	44.60	20.02	24.61	H
17500.80	44.60	20.02	24.61	H
17501.20	44.60	20.02	24.61	H
17501.00	44.60	20.02	24.61	H

**GFSK Ch 39(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17993.50	56.80	19.77	37.07	H
17575.00	56.30	19.92	36.37	V
17863.40	56.30	19.82	36.45	V
17535.30	56.20	20.12	36.05	V
17671.40	56.00	19.86	36.17	V

17625.90	55.90	19.92	36.01	V
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**GFSK Ch 78(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17500.00	44.60	20.02	24.61	V
17501.10	44.60	20.02	24.61	H
17500.40	44.60	20.02	24.61	H
17500.70	44.60	20.02	24.61	H
17501.50	44.60	20.02	24.61	V
17500.50	44.60	20.02	24.61	V

**GFSK Ch 78(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17988.30	55.80	19.77	36.07	V
17953.20	55.80	19.82	35.98	H
17988.40	55.70	19.77	35.97	V
17524.40	55.70	20.02	35.71	H
17531.00	55.60	20.12	35.45	H
17533.50	55.50	20.12	35.35	V

**$\pi/4$  DQPSK Ch 0(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17500.50	44.60	20.02	24.61	V
17501.50	44.60	20.02	24.61	H
17500.00	44.60	20.02	24.61	H
17501.60	44.60	20.02	24.61	H
17500.10	44.60	20.02	24.61	V
17500.40	44.60	20.02	24.61	V

**$\pi/4$  DQPSK Ch 0(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17692.10	56.00	19.46	36.50	V
17925.20	55.80	19.52	36.29	V
17893.30	55.80	19.62	36.19	V
17522.60	55.50	20.02	35.51	H
17621.20	55.50	20.02	35.52	H
17698.80	55.40	19.46	35.90	H

**$\pi/4$  DQPSK Ch 39(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17500.60	44.60	20.02	24.61	H
17500.70	44.60	20.02	24.61	H
17501.10	44.60	20.02	24.61	H
17500.10	44.60	20.02	24.61	H
17500.30	44.60	20.02	24.61	H
17500.20	44.60	20.02	24.61	H

**$\pi/4$  DQPSK Ch 39(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17844.50	56.90	19.42	37.47	H
17566.70	55.90	19.52	36.42	V
17663.80	55.70	19.86	35.87	V
17994.50	55.70	19.77	35.97	V
17614.70	55.60	20.02	35.62	V
17896.40	55.60	19.62	35.99	V

**$\pi/4$  DQPSK Ch 78(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17500.00	44.60	20.02	24.61	H
17500.20	44.60	20.02	24.61	V
17500.50	44.60	20.02	24.61	H
17500.60	44.60	20.02	24.61	H
17501.10	44.60	20.02	24.61	H
17500.40	44.60	20.02	24.61	V

**$\pi/4$  DQPSK Ch 78(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17739.50	56.40	19.26	37.16	V
17715.90	56.30	19.96	36.31	H
17999.80	55.80	19.77	36.07	H
17978.50	55.70	19.42	36.32	H
17500.00	55.60	20.02	35.61	H
17997.90	55.50	19.77	35.77	V

**8DPSK Ch 0(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17501.10	44.60	20.02	24.61	H
17500.00	44.60	20.02	24.61	H
17501.20	44.60	20.02	24.61	H
17501.70	44.60	20.02	24.61	H
17501.00	44.60	20.02	24.61	H
17504.40	44.60	20.02	24.61	H

**8DPSK Ch 0(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17618.90	56.80	20.02	36.82	V
17826.00	56.10	19.42	36.67	V
17643.00	55.90	19.86	36.07	H
17693.30	55.80	19.46	36.30	H
17556.40	55.70	19.52	36.22	V
17740.70	55.70	19.26	36.46	V

**8DPSK Ch 39(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17501.60	44.60	20.02	24.61	H

17500.40	44.60	20.02	24.61	H
17500.50	44.60	20.02	24.61	H
17501.50	44.60	20.02	24.61	H
17500.10	44.60	20.02	24.61	V
17501.20	44.60	20.02	24.61	H

**8DPSK Ch 39(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17744.90	57.00	19.26	37.76	V
17602.60	56.40	20.02	36.42	V
17950.10	56.30	19.82	36.48	V
17612.60	56.30	20.02	36.32	H
17647.10	55.80	19.86	35.97	H
17748.00	55.80	19.26	36.56	V

**8DPSK Ch 78(10Hz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17500.40	44.60	20.02	24.61	H
17500.20	44.60	20.02	24.61	H
17500.10	44.60	20.02	24.61	H
17500.00	44.60	20.02	24.61	H
17500.30	44.60	20.02	24.61	H
17504.20	44.60	20.02	24.61	H

**8DPSK Ch 78(1MHz)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
17971.70	58.40	19.82	38.58	V
17531.70	56.40	20.12	36.25	H
17927.00	56.20	19.52	36.69	V
17526.40	55.90	20.12	35.75	V
17594.40	55.60	19.92	35.67	V
17751.30	55.60	19.36	36.27	H

**Conclusion: PASS**

**Test graphs as below:**

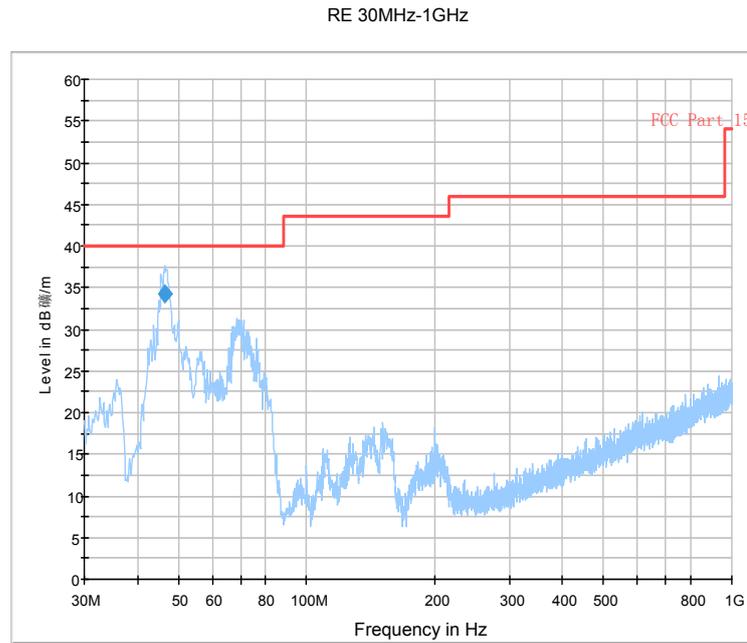


Fig.58. Radiated emission: GFSK, Channel 0, 30 MHz - 1 GHz

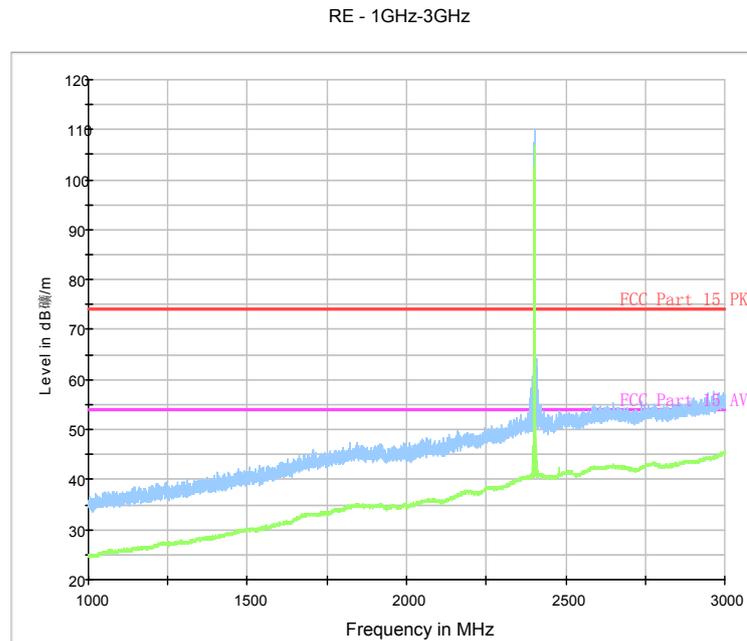


Fig.59. Radiated emission: GFSK, Channel 0, 1 GHz - 3 GHz

RE - 3GHz-18GHz

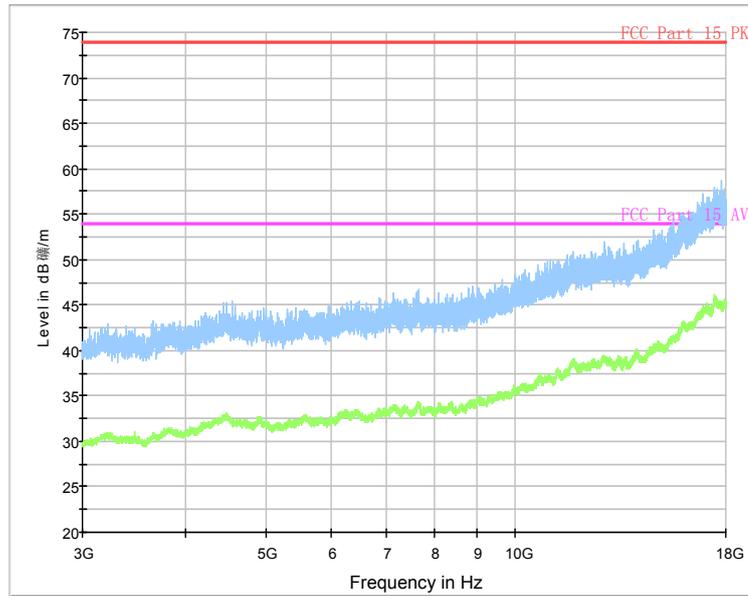


Fig.60. Radiated emission: GFSK, Channel 0, 3 GHz - 18 GHz

RE 30MHz-1GHz

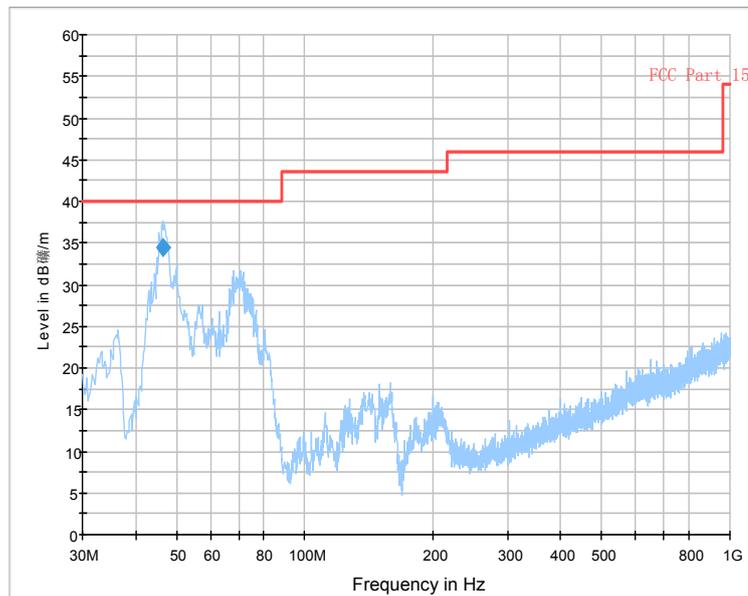


Fig.61. Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz

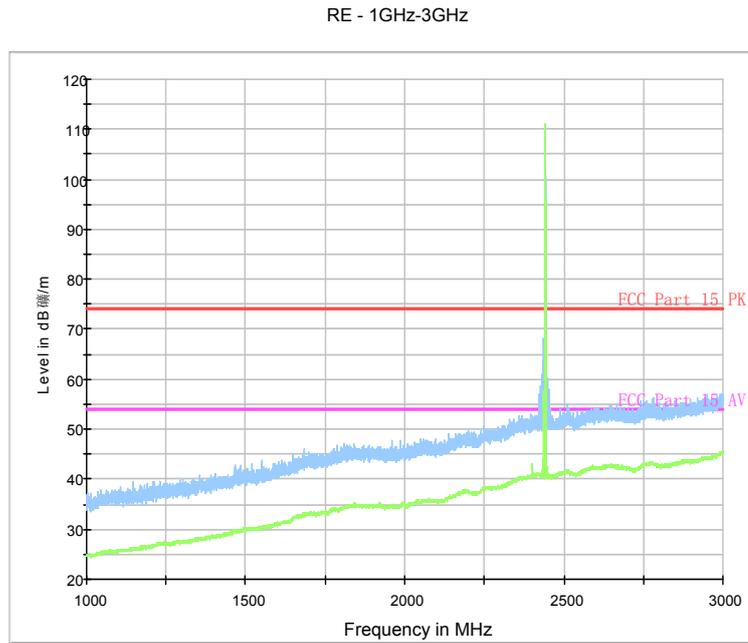


Fig.62. Radiated emission: GFSK, Channel 39, 1 GHz - 3 GHz

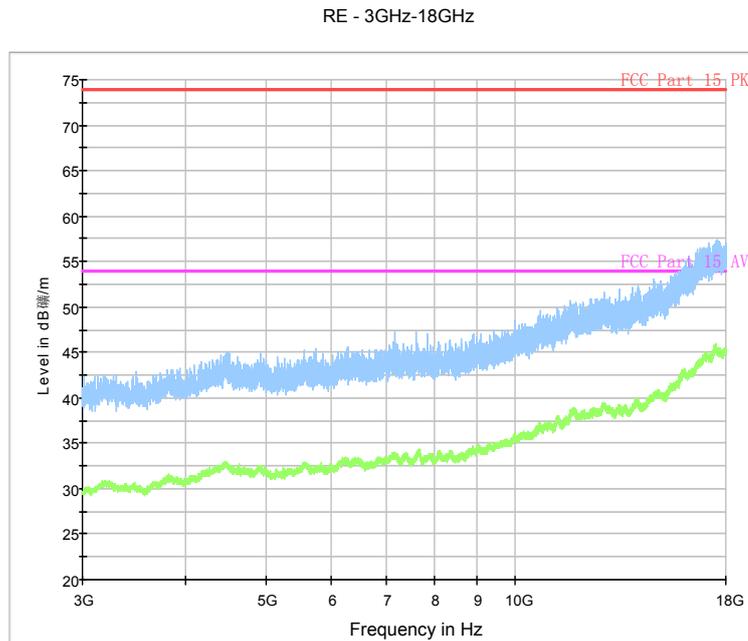


Fig.63. Radiated emission: GFSK, Channel 39, 3 GHz - 18 GHz

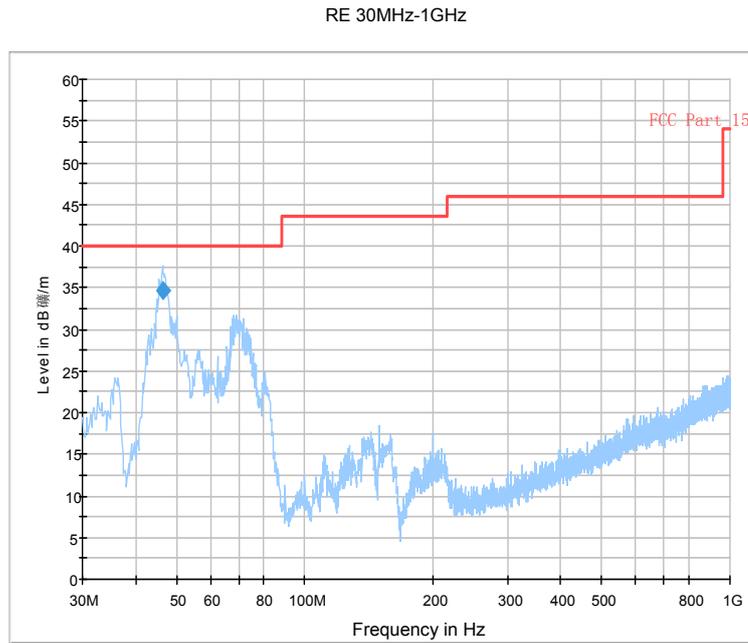


Fig.64. Radiated emission: GFSK, Channel 78, 30 MHz - 1 GHz

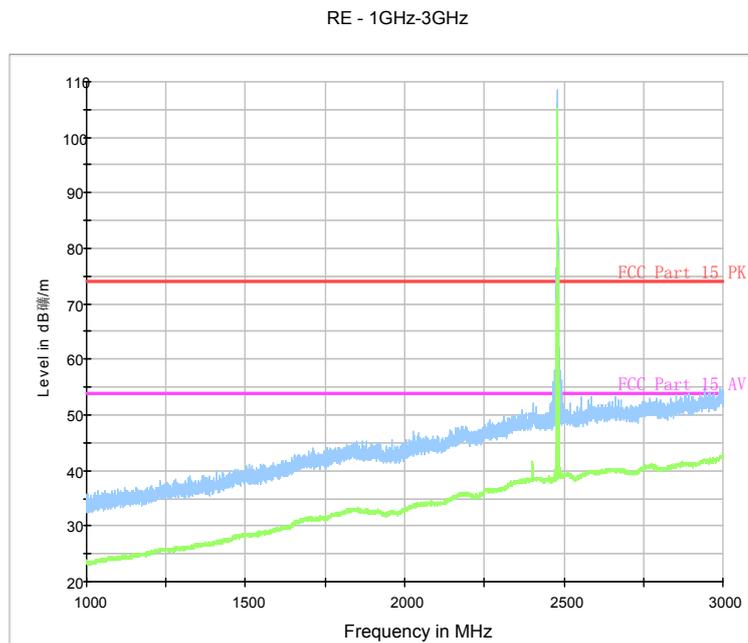


Fig.65. Fig.47 Radiated emission: GFSK, Channel 78, 1 GHz - 3 GHz

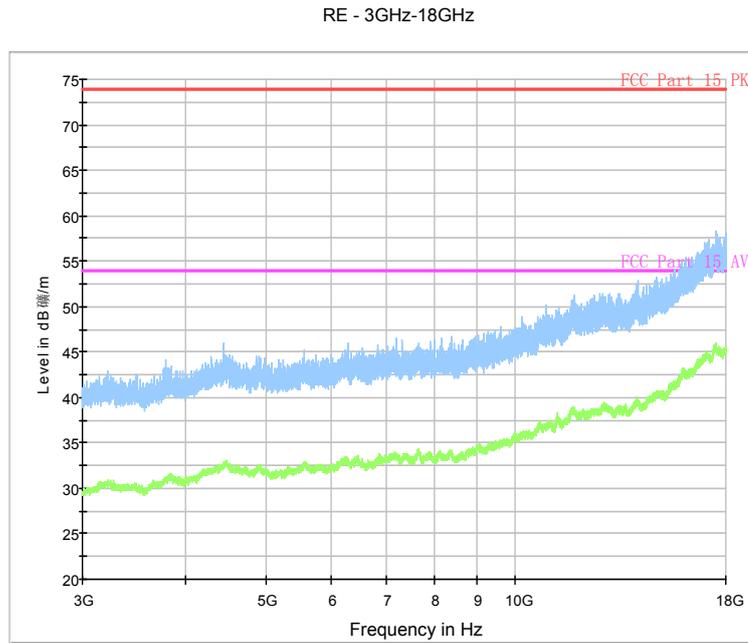


Fig.66. Radiated emission: GFSK, Channel 78, 3 GHz - 18 GHz

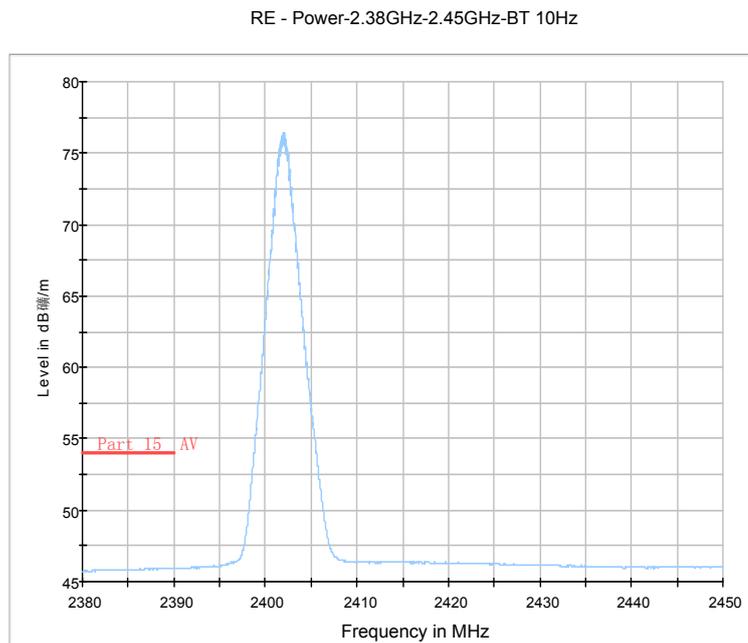


Fig.67. Radiated emission (Power): GFSK, low channel(VBW=10Hz)

RE - Power-2.38GHz-2.45GHz-BT 1M

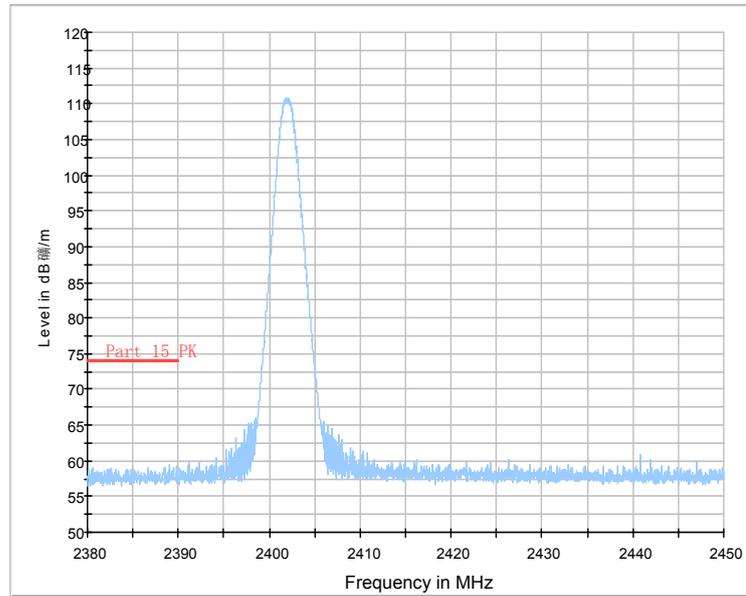


Fig.68. Radiated emission (Power): GFSK, low channel(VBW=1MHz)

RE - Power-2.45GHz-2.5GHz

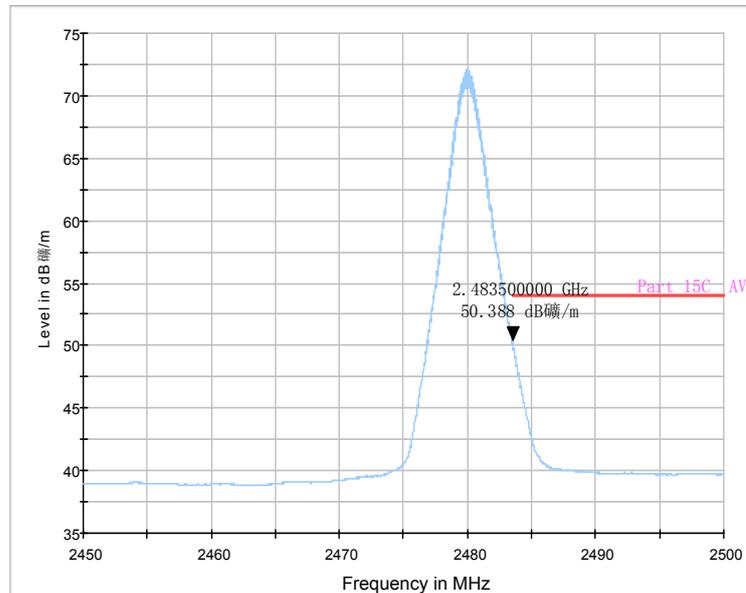


Fig.69. Radiated emission (Power) GFSK, high channel(VBW=10Hz)

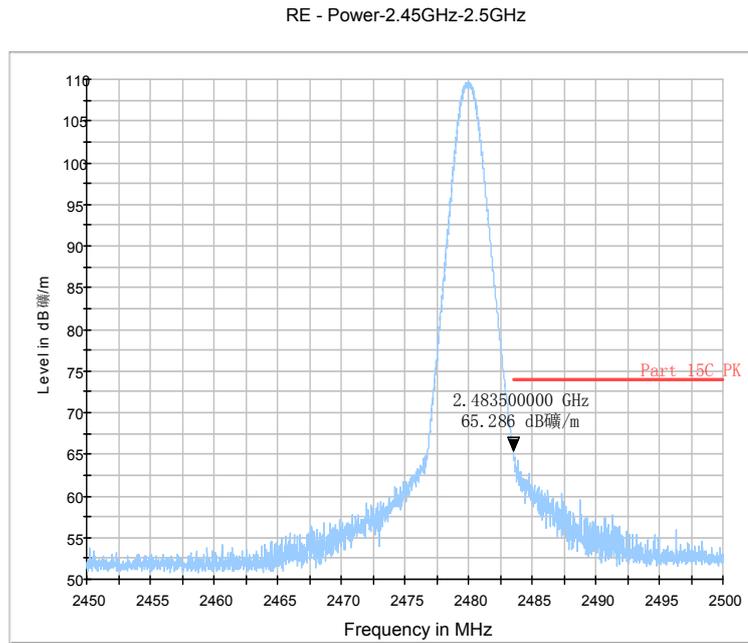


Fig.70. Radiated emission (Power) GFSK, high channel(VBW=1MHz)

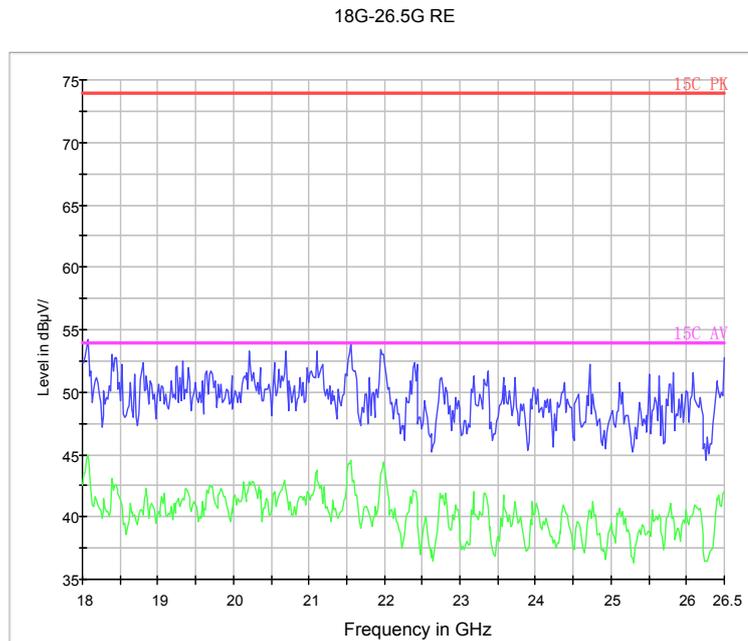


Fig.71. Radiated emission: GFSK, 18 GHz - 26 GHz

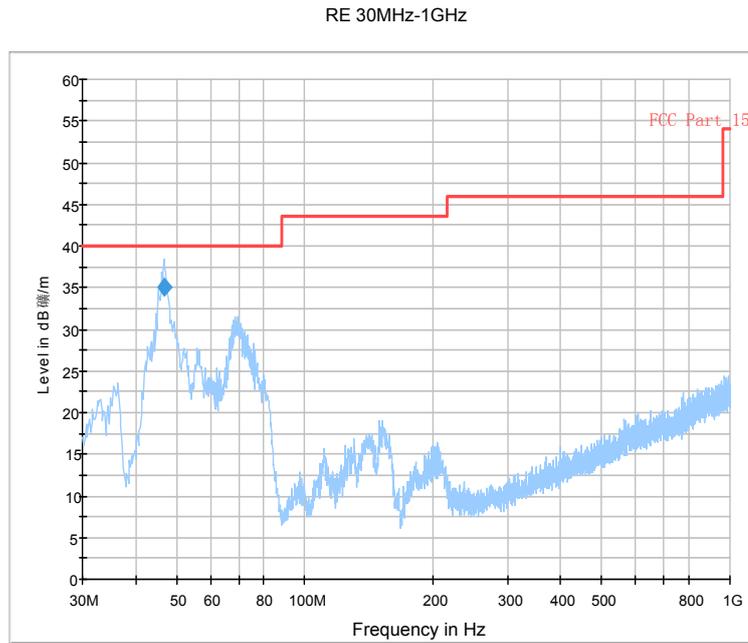


Fig.72. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 30 MHz - 1 GHz

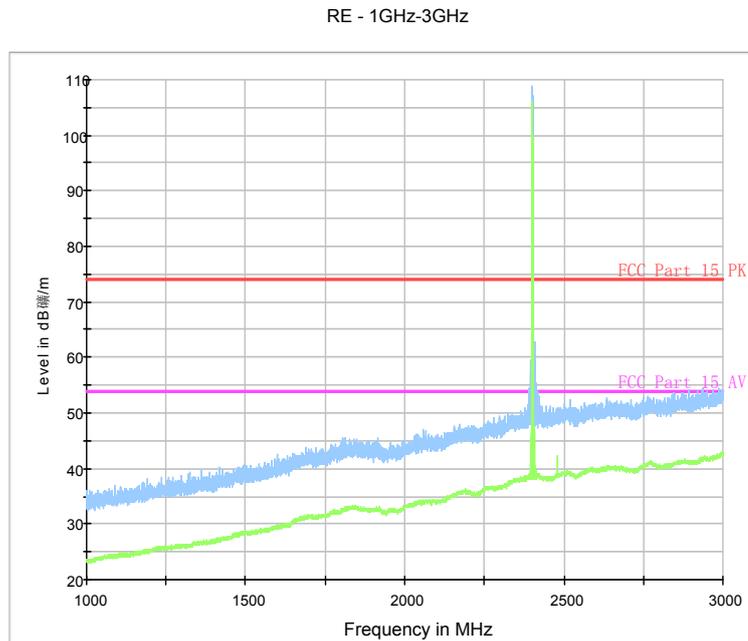


Fig.73. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 1 GHz - 3 GHz

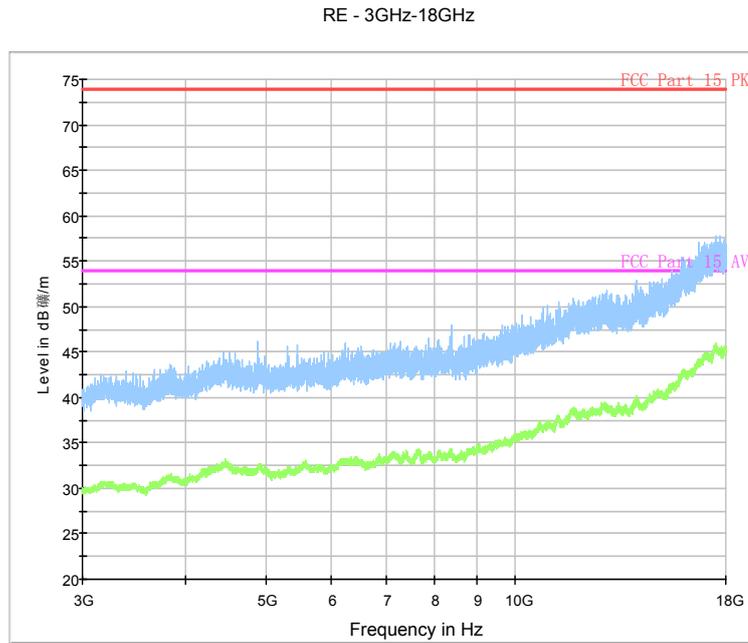


Fig.74. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 3 GHz - 18 GHz

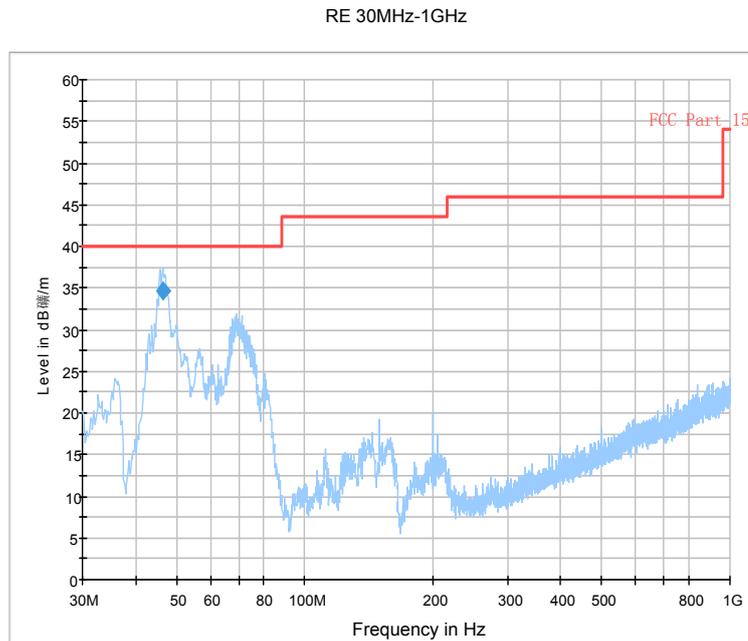


Fig.75. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 30 MHz - 1 GHz

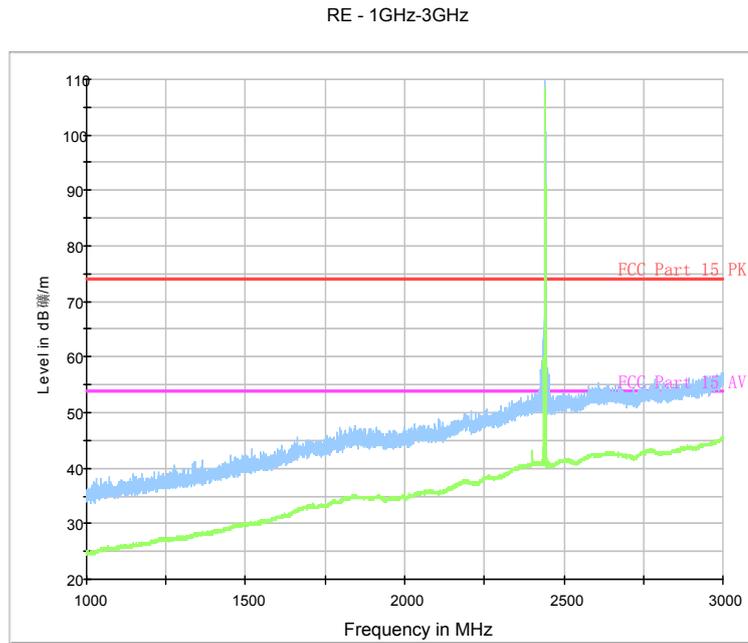


Fig.76. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 1 GHz - 3 GHz

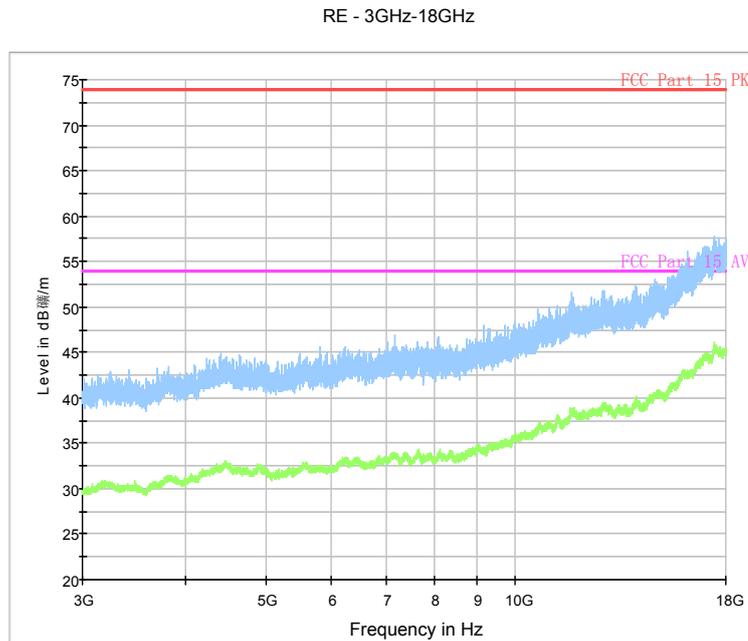


Fig.77. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 3 GHz - 18 GHz

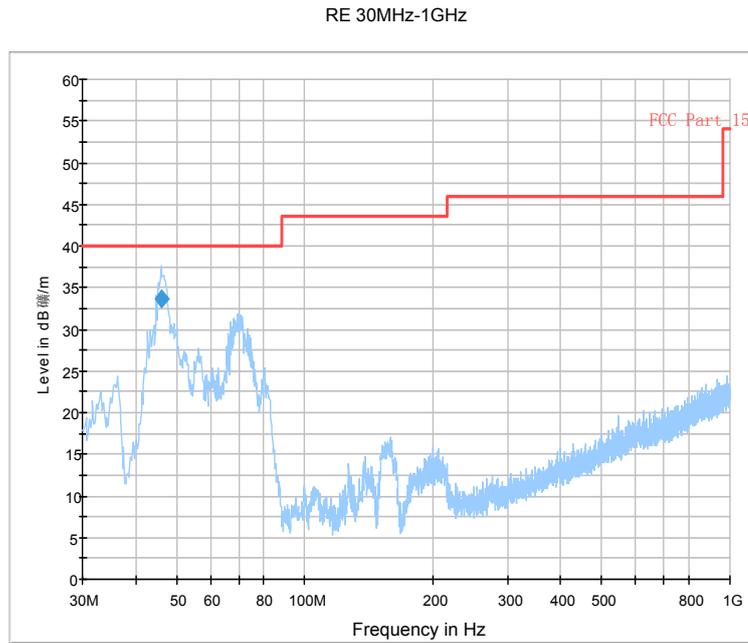


Fig.78. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 30 MHz - 1 GHz

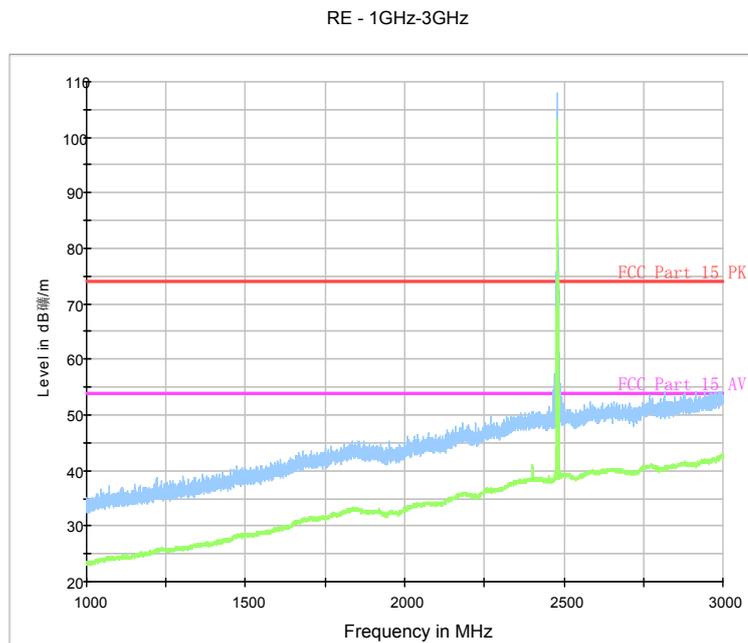


Fig.79. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 1 GHz - 3 GHz

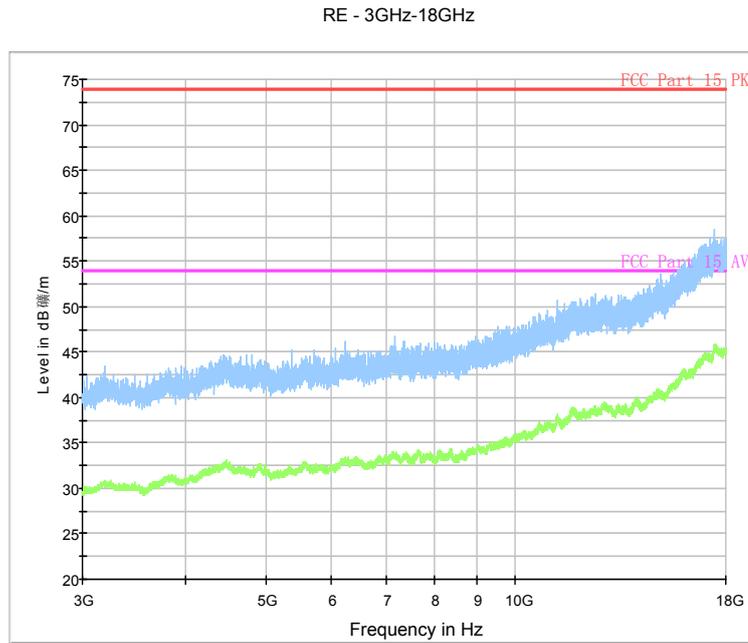


Fig.80. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 3 GHz - 18 GHz

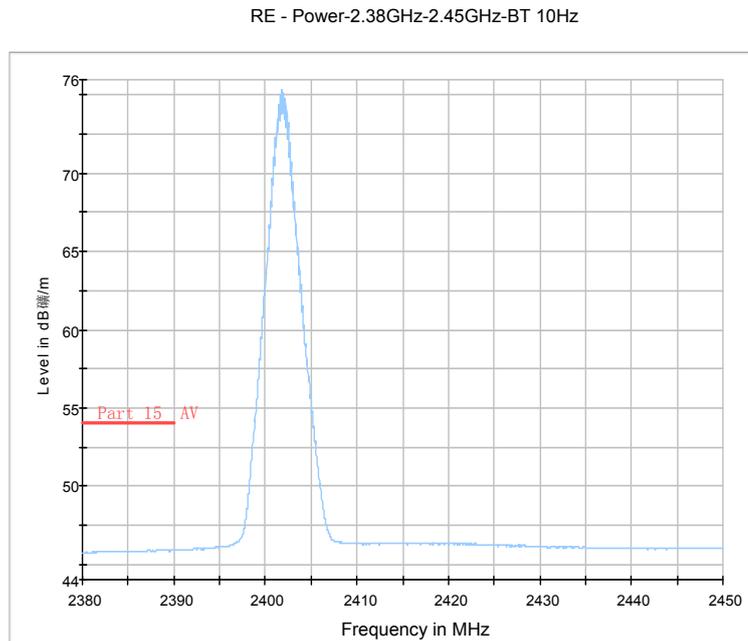


Fig.81. Radiated emission (Power):  $\pi/4$  DQPSK, low channel(VBW=10Hz)

RE - Power-2.38GHz-2.45GHz-BT 1M

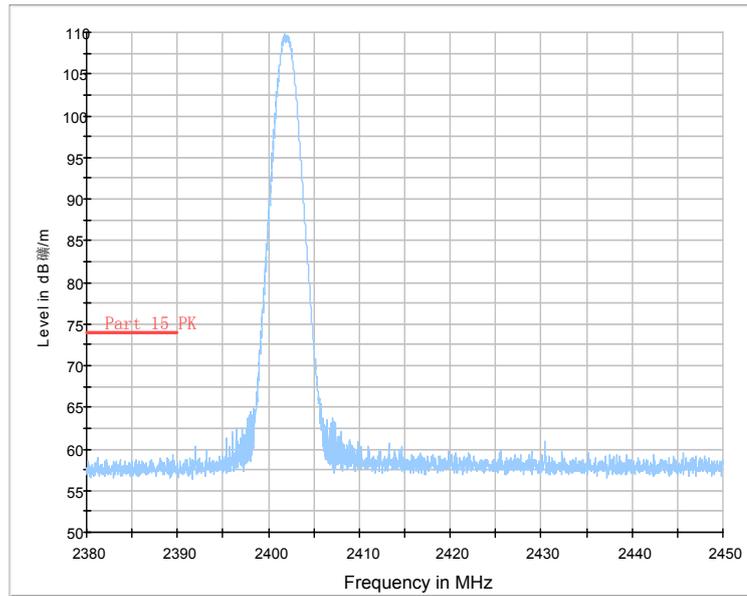


Fig.82. Radiated emission (Power):  $\pi/4$  DQPSK, low channel(VBW=1MHz)

RE - Power-2.45GHz-2.5GHz-BT 10Hz

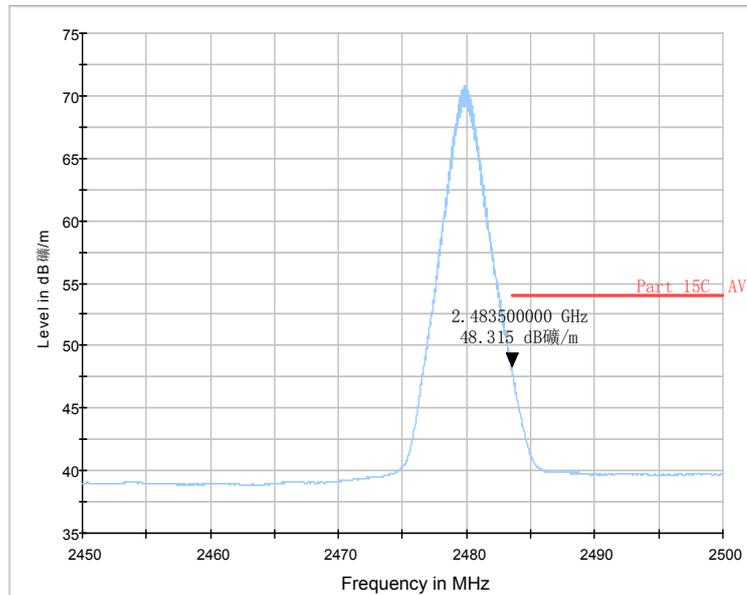


Fig.83. Radiated emission (Power):  $\pi/4$  DQPSK, high channel(VBW=10Hz)

RE - Power-2.45GHz-2.5GHz- BT 1M

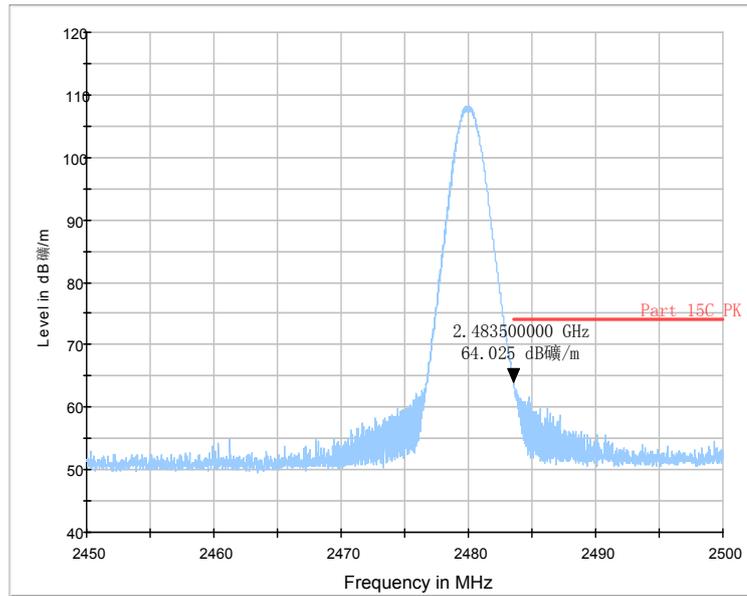


Fig.84. Radiated emission (Power):  $\pi/4$  DQPSK, high channel(VBW=1MHz)

18G-26.5G RE

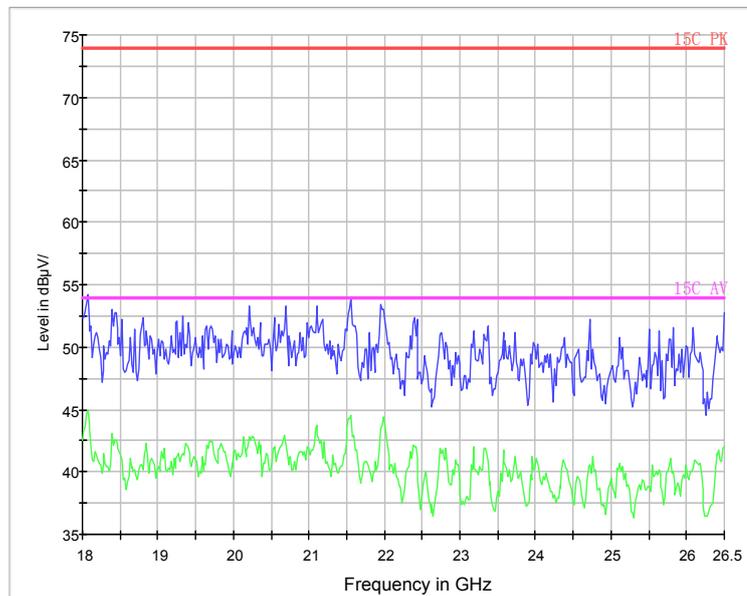


Fig.85. Radiated emission:  $\pi/4$  DQPSK, 18 GHz - 26 GHz

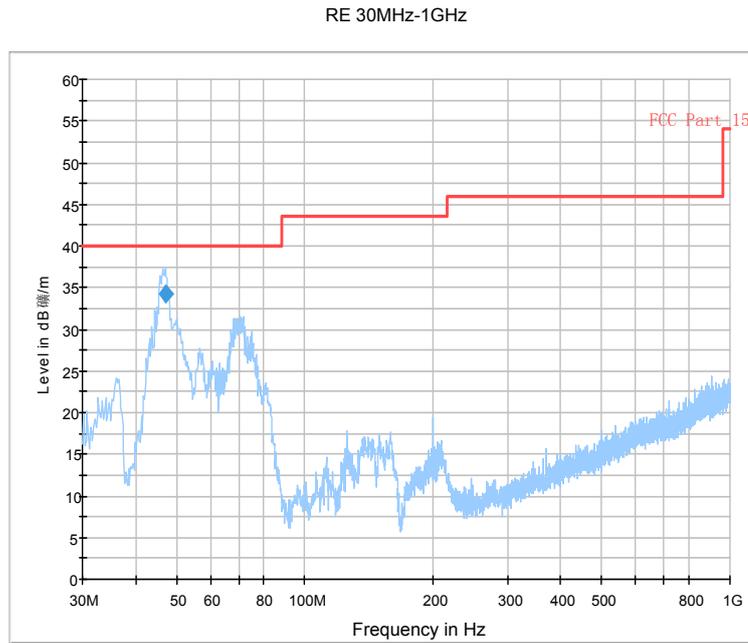


Fig.86. Radiated emission: 8DPSK, Channel 0, 30 MHz - 1 GHz

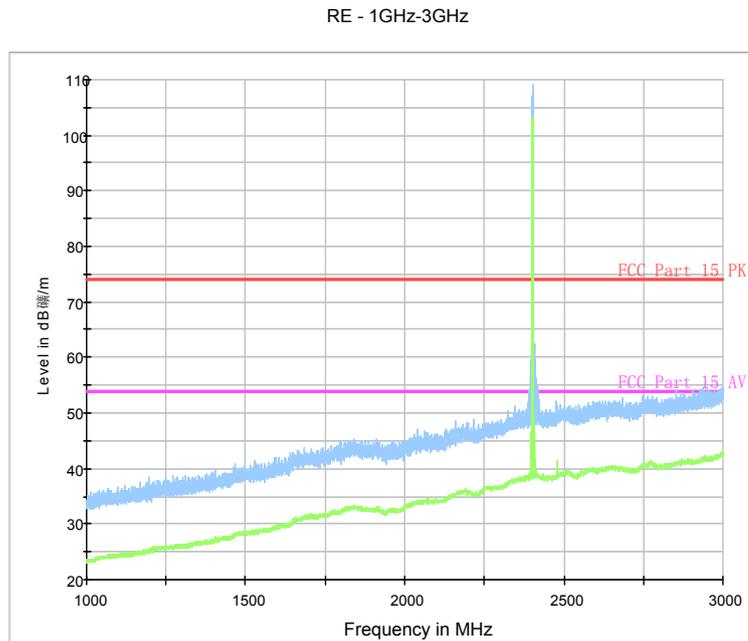


Fig.87. Radiated emission: 8DPSK, Channel 0, 1 GHz - 3 GHz

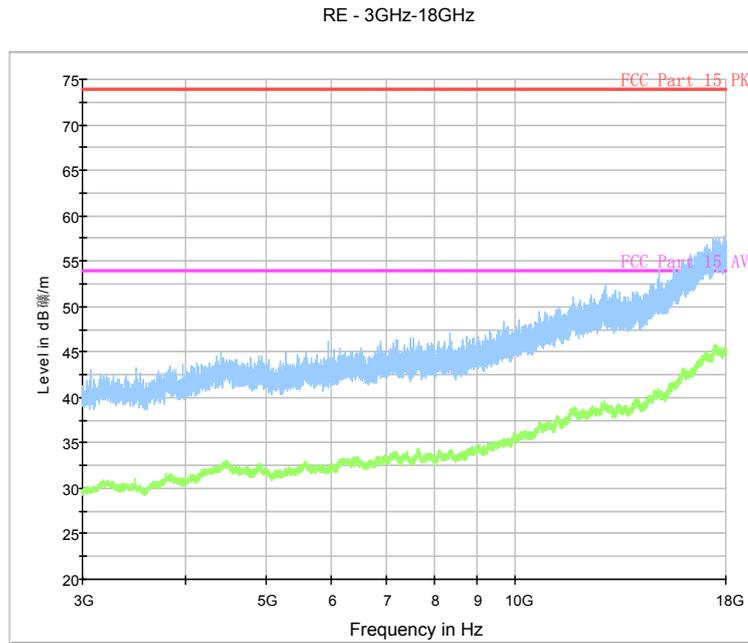


Fig.88. Radiated emission: 8DPSK, Channel 0, 3 GHz - 18 GHz

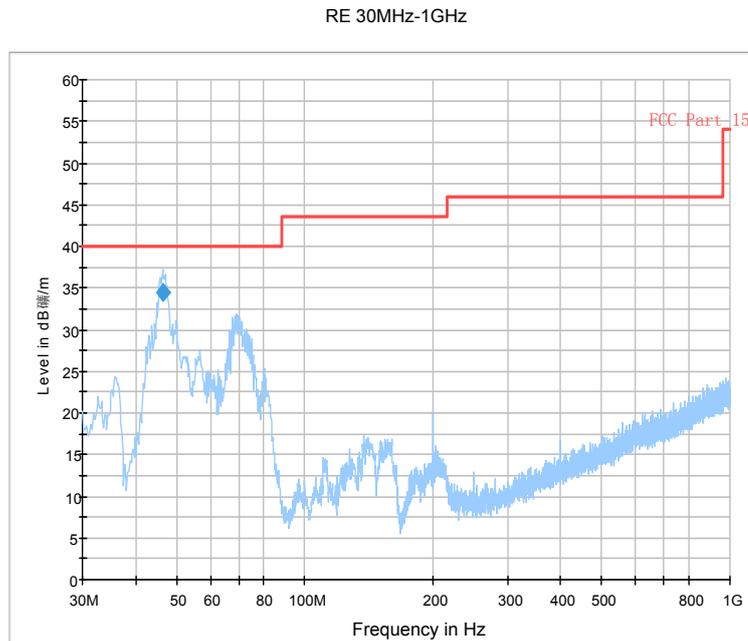


Fig.89. Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

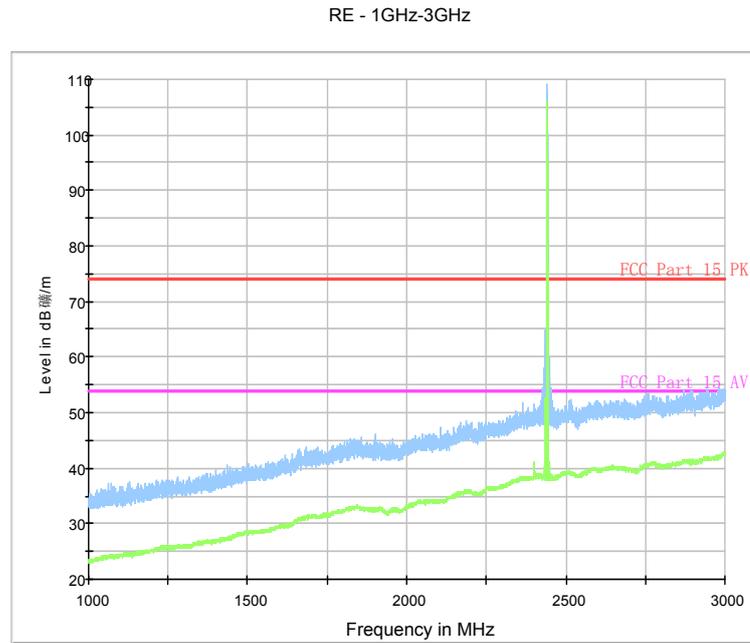


Fig.90. Radiated emission: 8DPSK, Channel 39, 1 GHz - 3 GHz

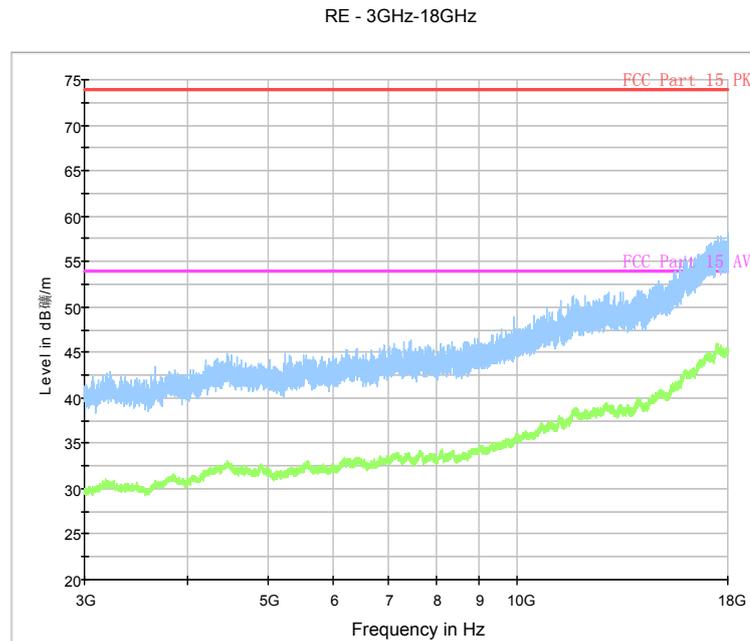


Fig.91. Radiated emission: 8DPSK, Channel 39, 3 GHz - 18 GHz

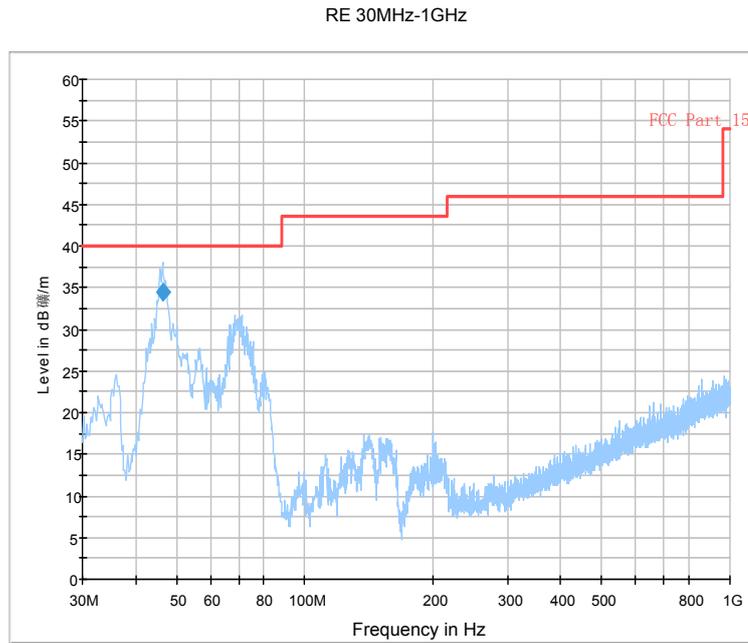


Fig.92. Radiated emission: 8DPSK, Channel 78, 30 MHz - 1 GHz

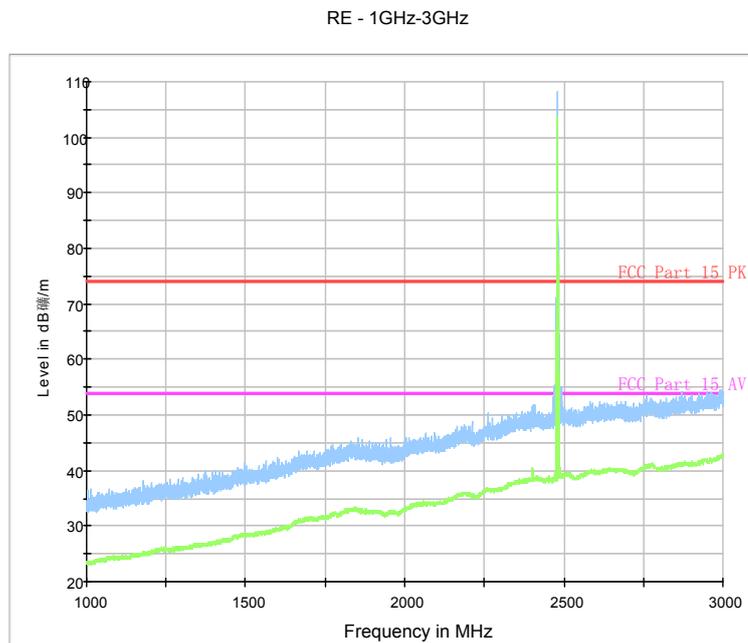


Fig.93. Radiated emission: 8DPSK, Channel 78, 1 GHz - 3 GHz

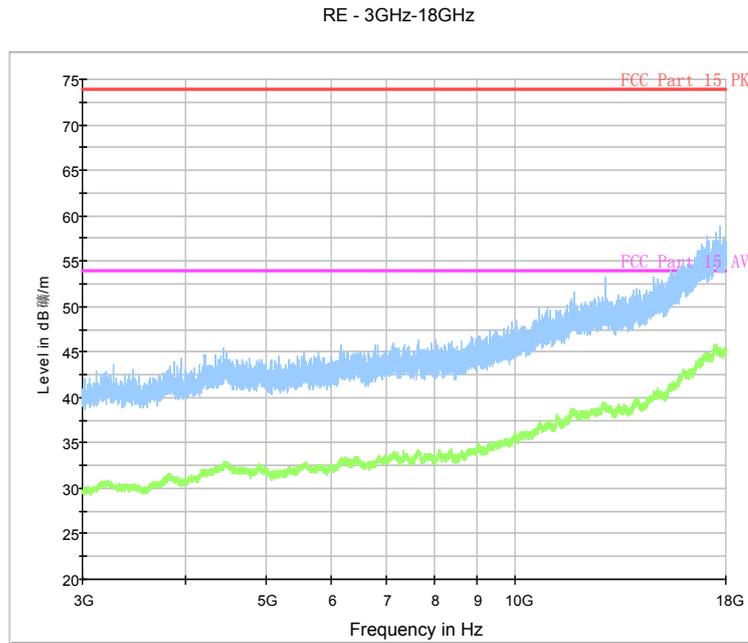


Fig.94. Radiated emission: 8DPSK, Channel 78, 3 GHz - 18 GHz

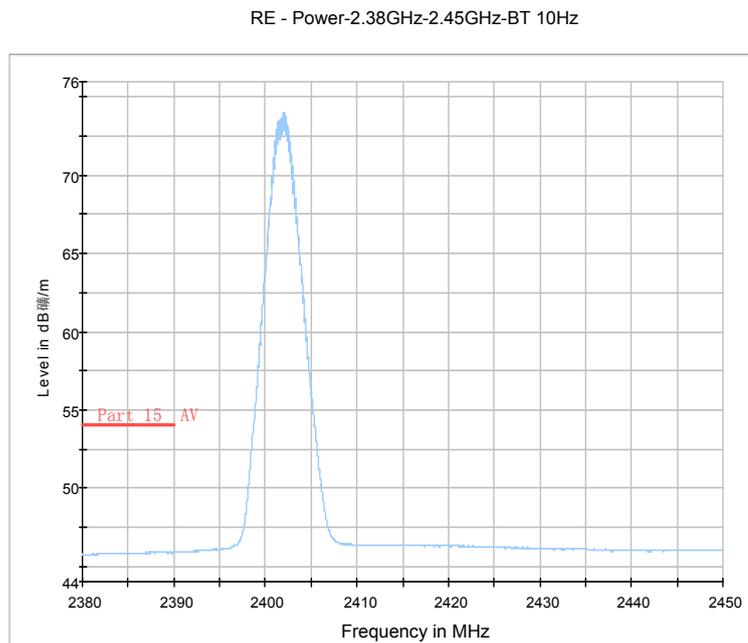


Fig.95. Radiated emission (Power): 8DPSK, low channel(VBW=10Hz)

RE - Power-2.38GHz-2.45GHz-BT 1M

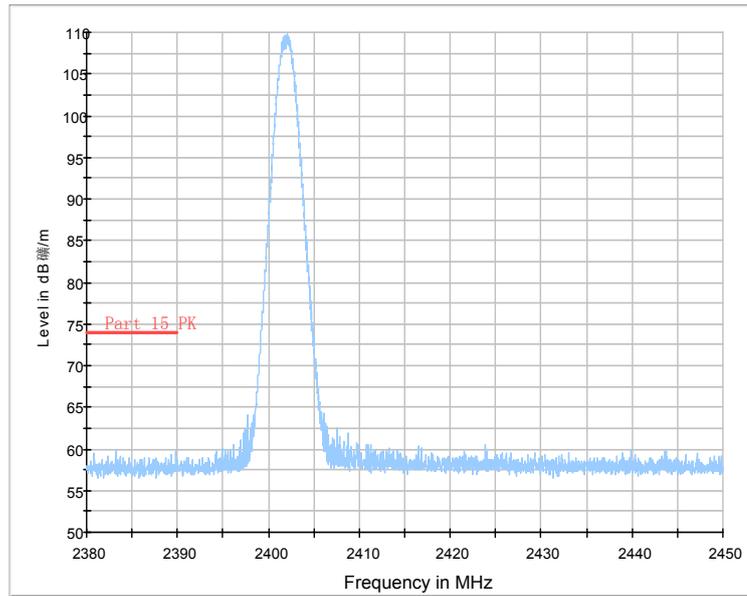


Fig.96. Radiated emission (Power): 8DPSK, low channel(VBW=1MHz)

RE - Power-2.45GHz-2.5GHz-BT 10Hz

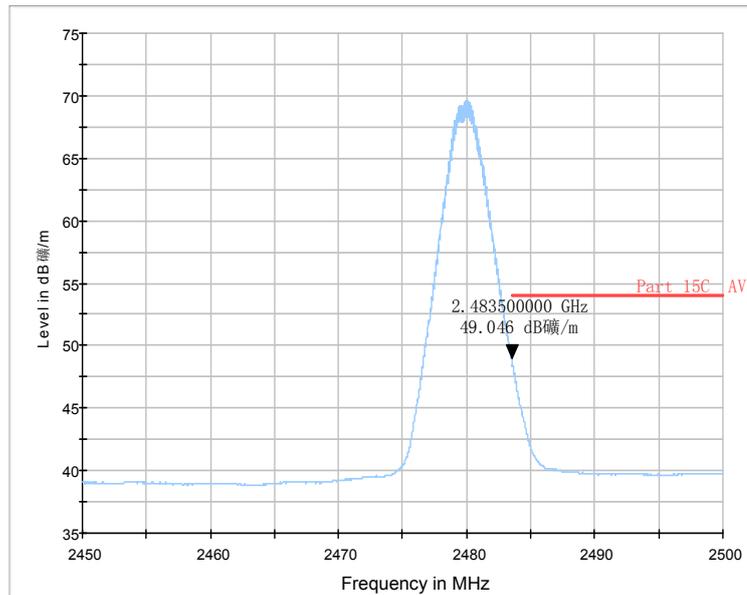


Fig.97. Radiated emission (Power): 8DPSK, high channel(VBW=10Hz)

RE - Power-2.45GHz-2.5GHz- BT 1M

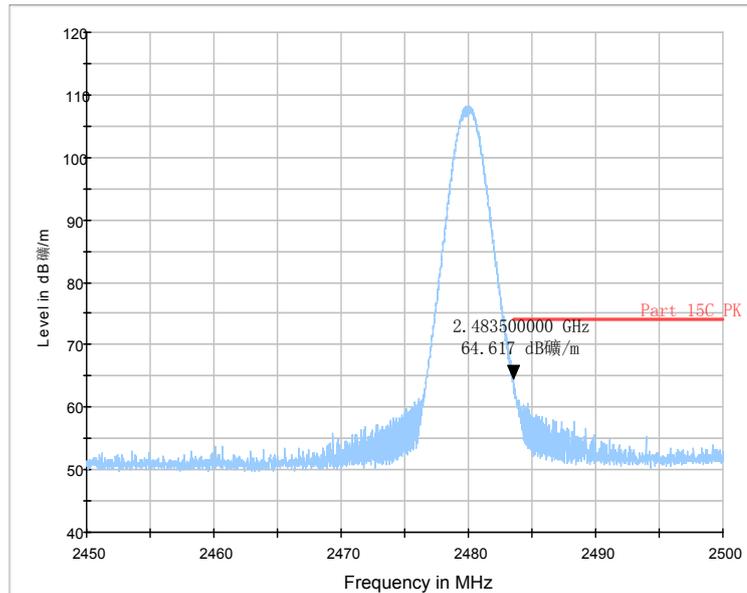


Fig.98. Radiated emission (Power): 8DPSK, high channel(VBW=1MHz)

18G-26.5G RE

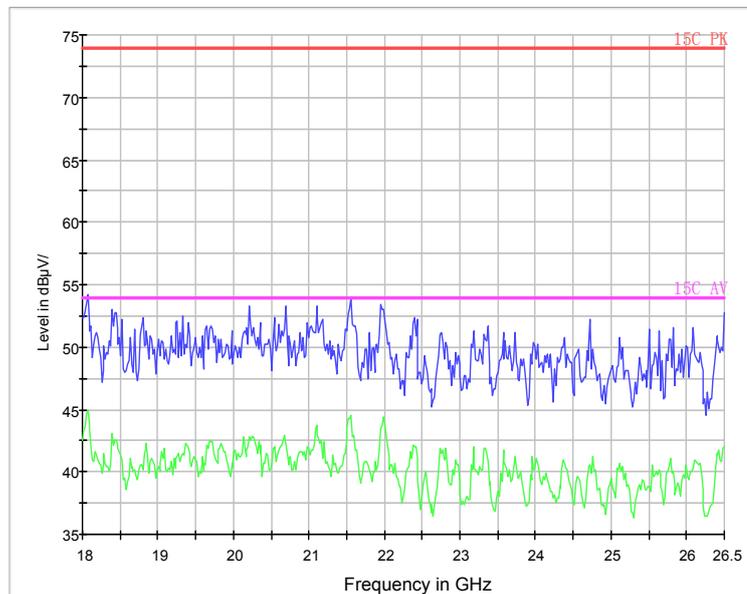


Fig.99. Radiated emission: 8DPSK, 18 GHz - 26 GHz

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

**Measurement Limit:**

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4

**Measurement Result:**

**For GFSK**

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.100	106.99	P
		Fig.101		
	DH3	Fig.102	188.53	P
		Fig.103		
	DH5	Fig.104	185.14	P
		Fig.105		

**For  $\pi/4$  DQPSK**

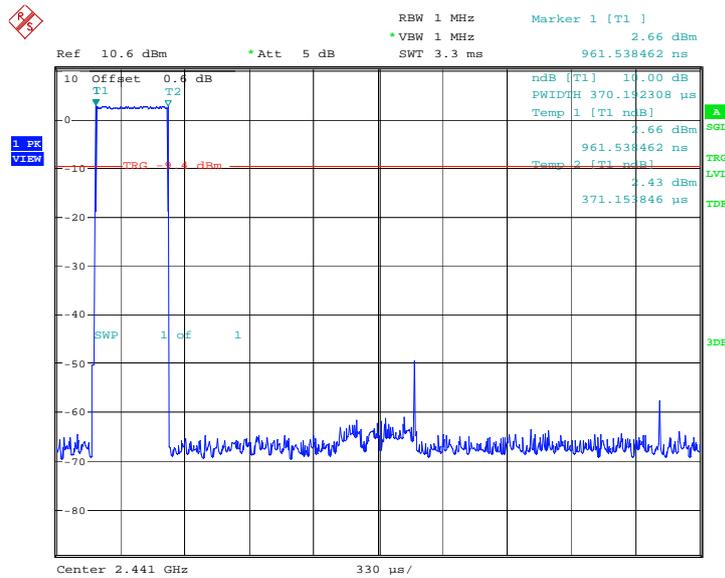
Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.106	108.52	P
		Fig.107		
	DH3	Fig.108	187.50	P
		Fig.109		
	DH5	Fig.110	211.95	P
		Fig.111		

**For 8DPSK**

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.112	110.03	P
		Fig.113		
	DH3	Fig.114	167.22	P
		Fig.115		
	DH5	Fig.116	246.79	P
		Fig.117		

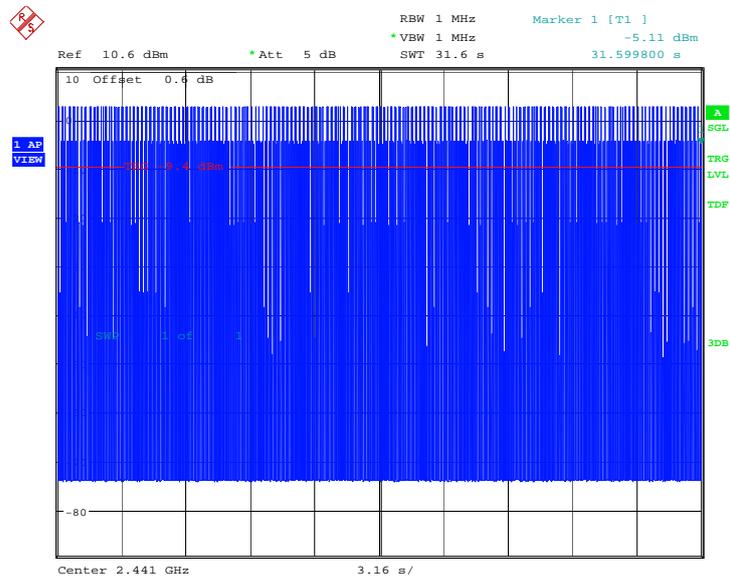
**Conclusion: PASS**

**Test graphs as below:**



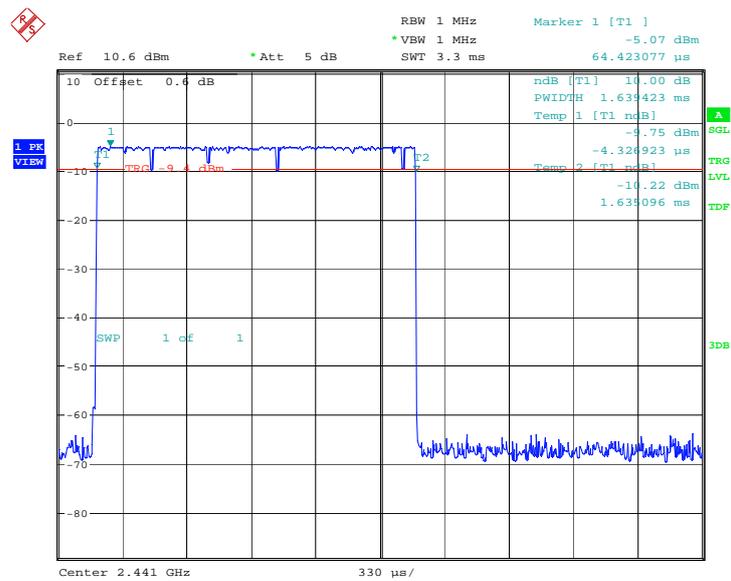
Date: 20.AUG.2013 11:21:19

Fig.100. Time of occupancy (Dwell Time): Channel 39, Packet DH1



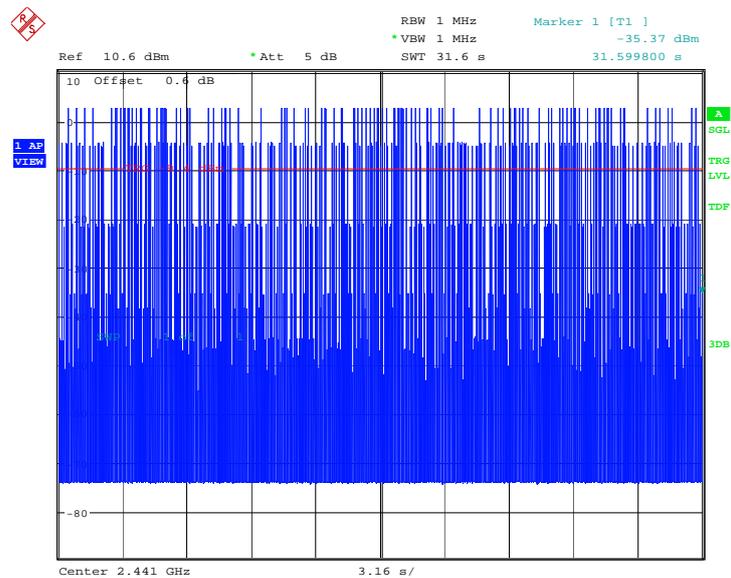
Date: 20.AUG.2013 11:21:07

Fig.101. Number of Transmissions Measurement: Channel 39, Packet DH1



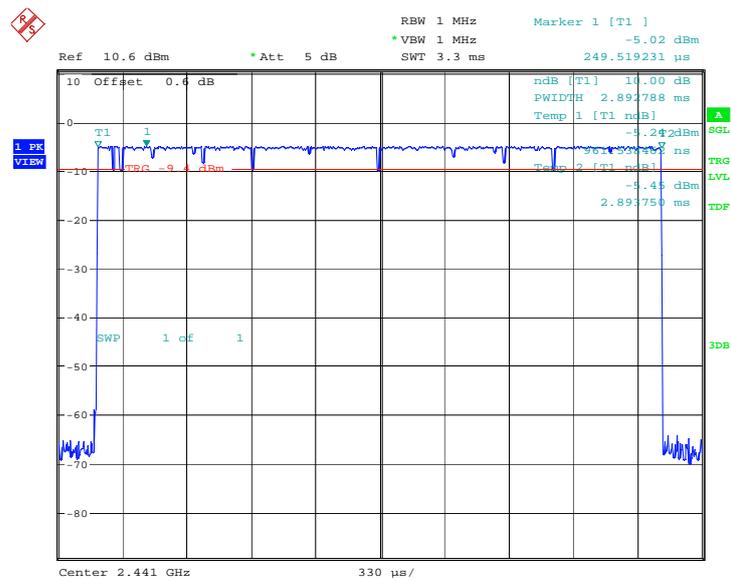
Date: 20.AUG.2013 11:22:39

Fig.102. Time of occupancy (Dwell Time): Channel 39, Packet DH3



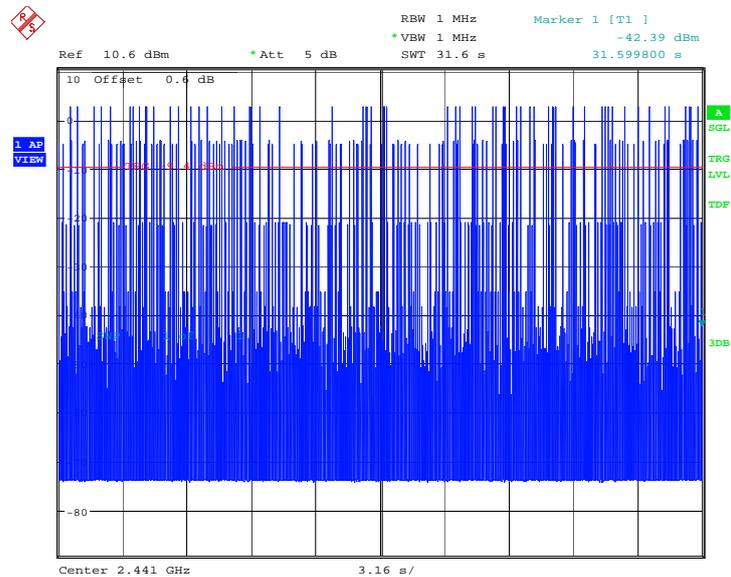
Date: 20.AUG.2013 11:22:27

Fig.103. Number of Transmissions Measurement:Channel 39,Packet DH3



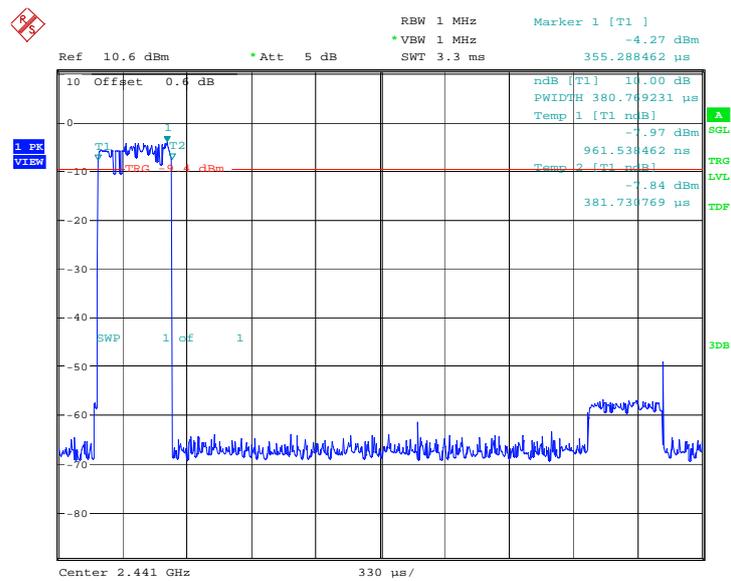
Date: 20.AUG.2013 11:23:57

Fig.104. Time of occupancy (Dwell Time): Channel 39, Packet DH5



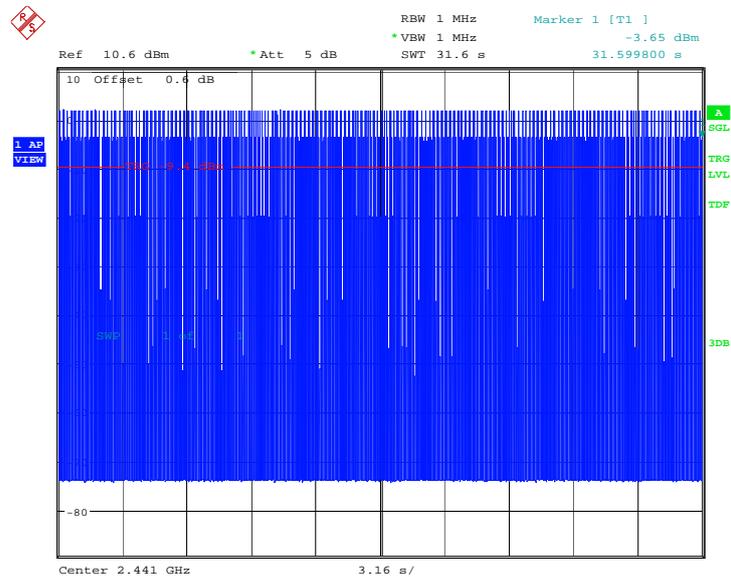
Date: 20.AUG.2013 11:23:46

Fig.105. Number of Transmissions Measurement:Channel 39,Packet DH5



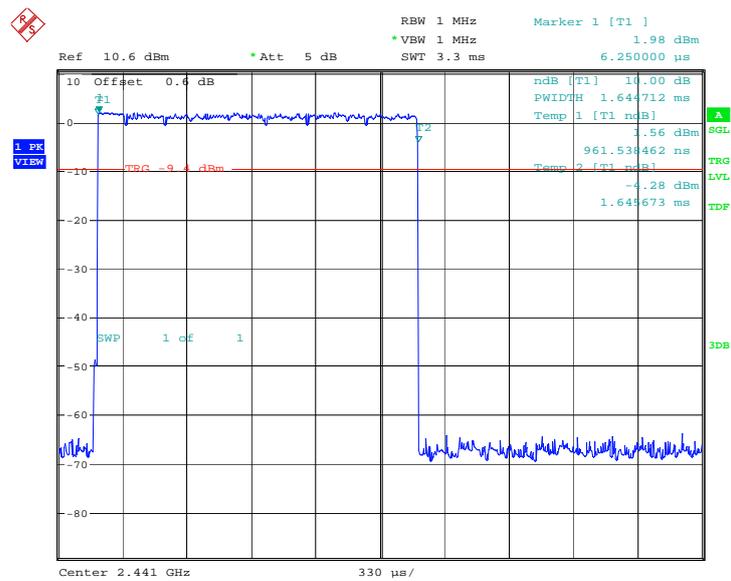
Date: 20.AUG.2013 11:42:45

Fig.106. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1



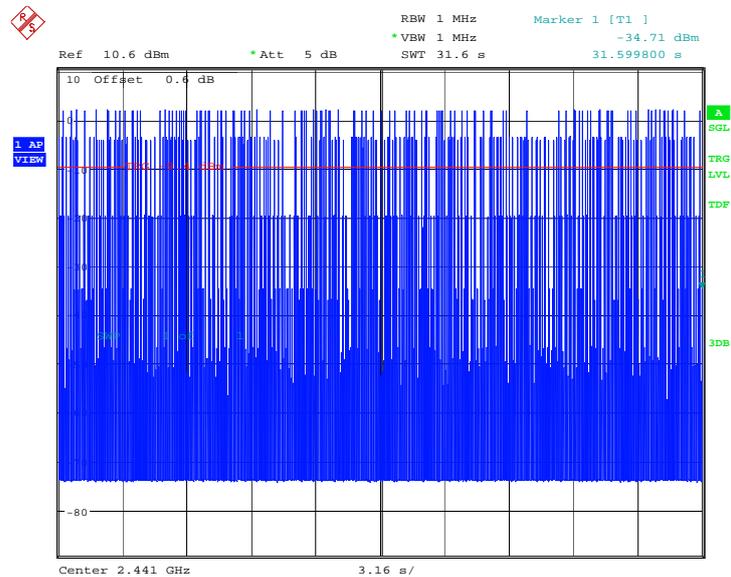
Date: 20.AUG.2013 11:42:34

Fig.107. Number of Transmissions Measurement:Channel 39,Packet 2-DH1



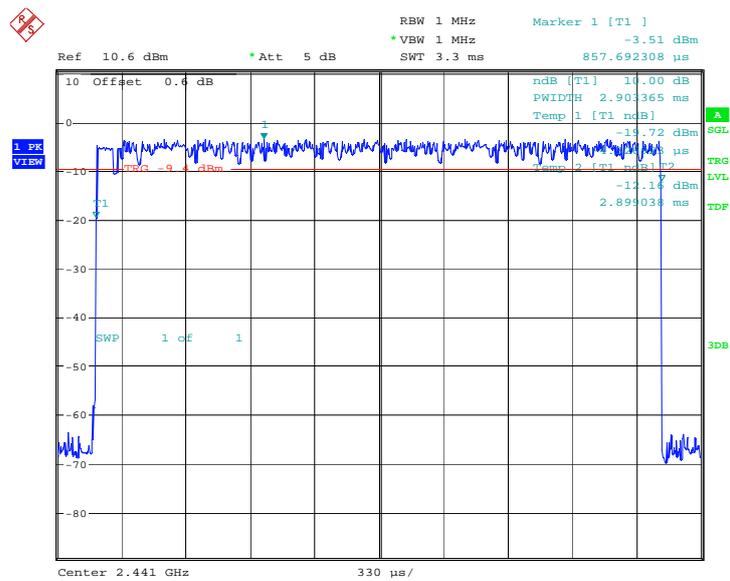
Date: 20.AUG.2013 11:44:05

Fig.108. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3



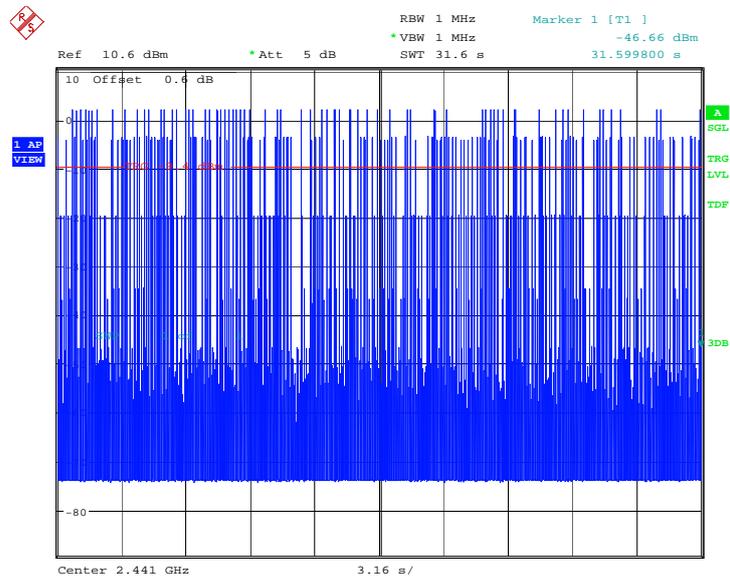
Date: 20.AUG.2013 11:43:53

Fig.109. Number of Transmissions Measurement:Channel 39,Packet 2-DH3



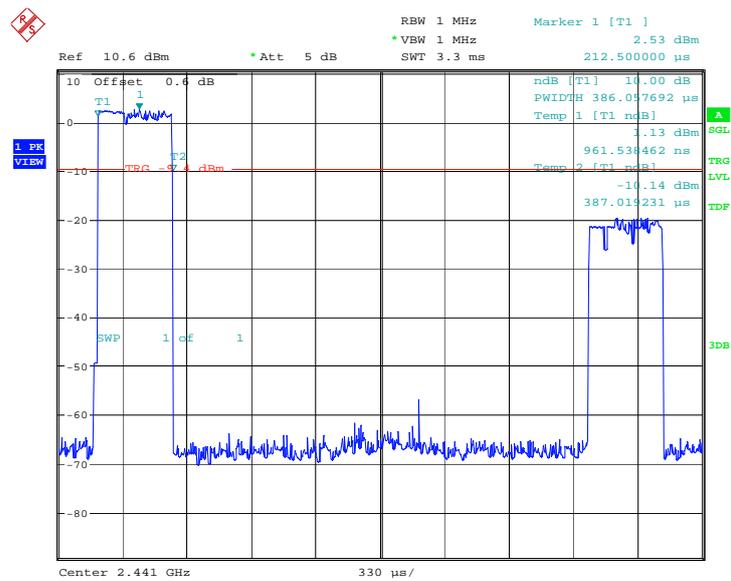
Date: 20.AUG.2013 11:45:23

Fig.110. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5



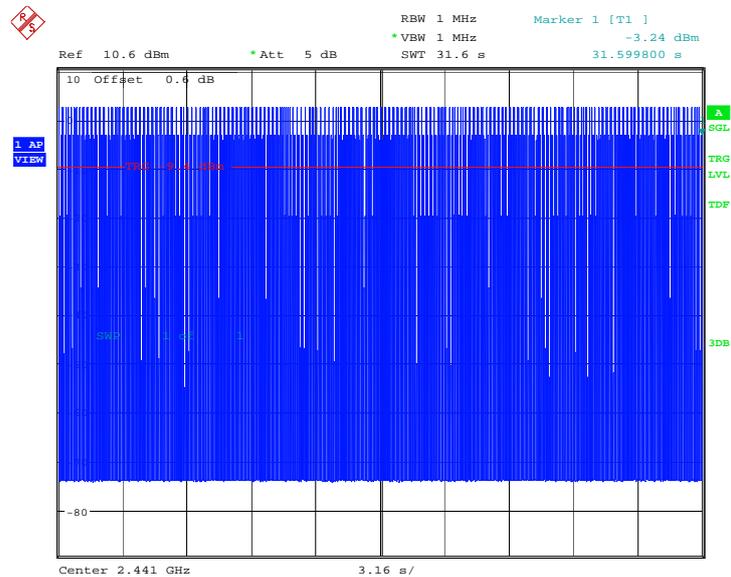
Date: 20.AUG.2013 11:45:11

Fig.111. Number of Transmissions Measurement:Channel 39,Packet 2-DH5



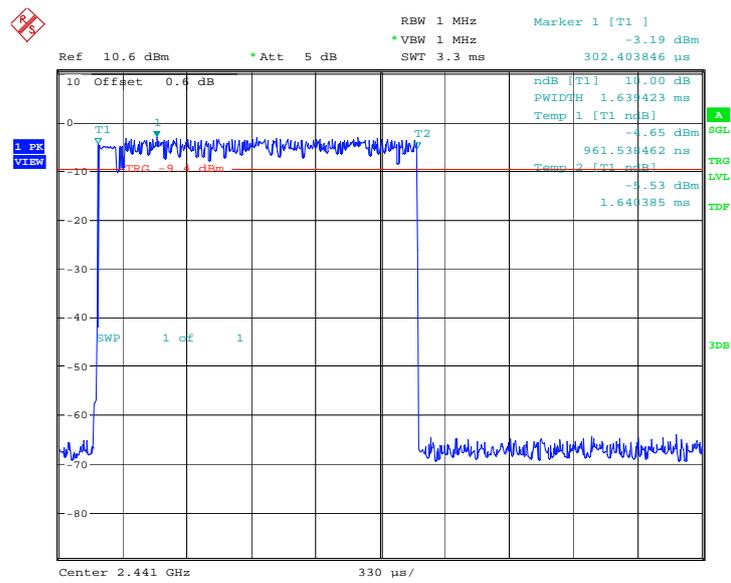
Date: 20.AUG.2013 12:04:15

Fig.112. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1



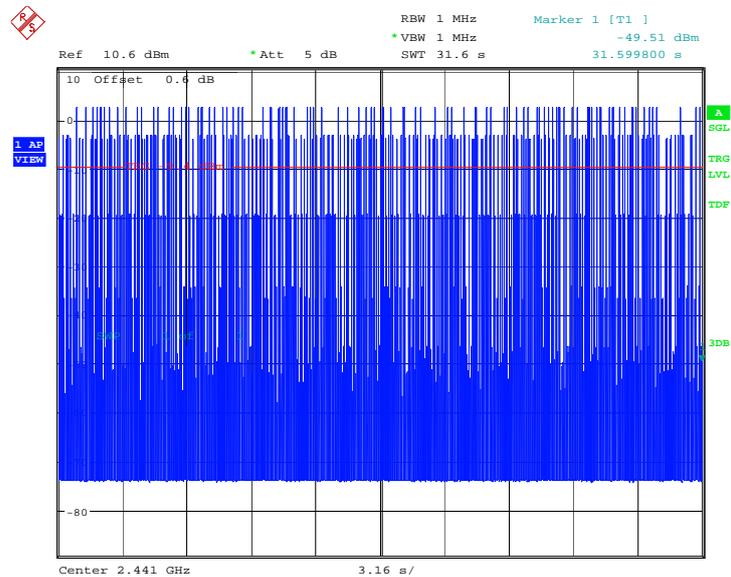
Date: 20.AUG.2013 12:04:03

Fig.113. Number of Transmissions Measurement:Channel 39,Packet 3-DH1



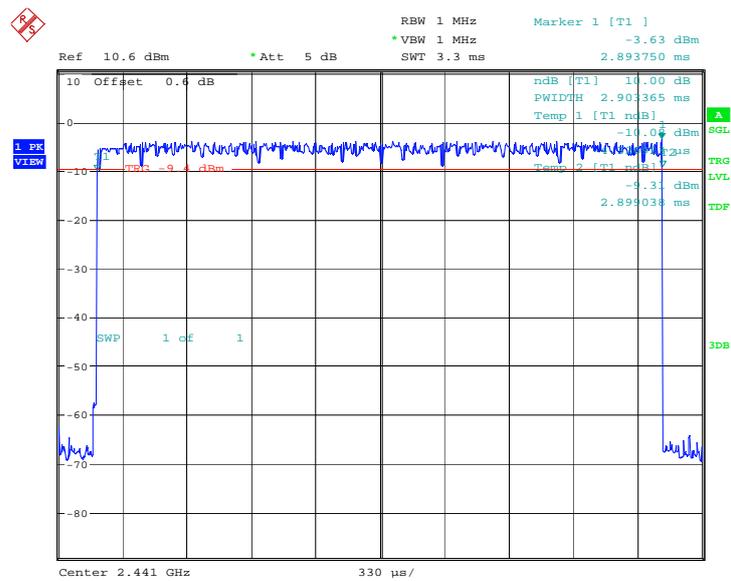
Date: 20.AUG.2013 12:05:32

Fig.114. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3



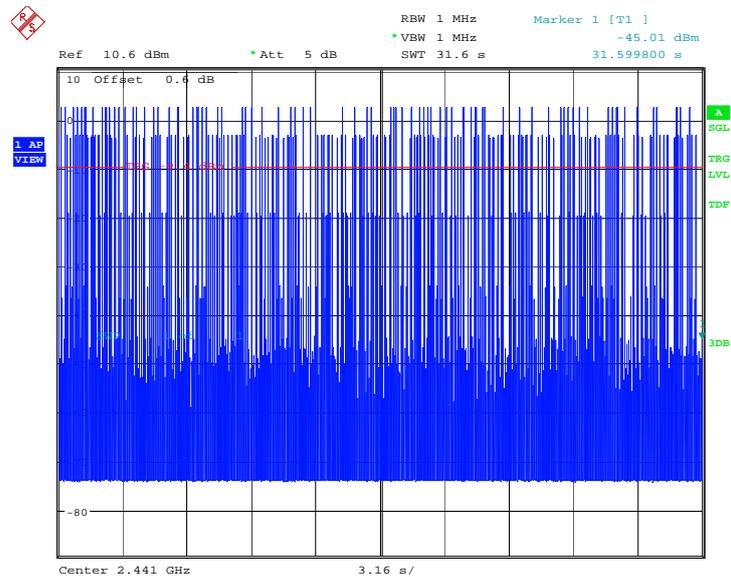
Date: 20.AUG.2013 12:05:21

Fig.115. Number of Transmissions Measurement:Channel 39,Packet 3-DH3



Date: 20.AUG.2013 12:06:48

Fig.116. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5



Date: 20.AUG.2013 12:06:36

Fig.117. Number of Transmissions Measurement:Channel 39,Packet 3-DH5

### A.7. 20dB Bandwidth

#### Measurement Limit:

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4

\* 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.118	870.19	NA
39	Fig.119	870.19	NA
78	Fig.120	870.19	NA

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

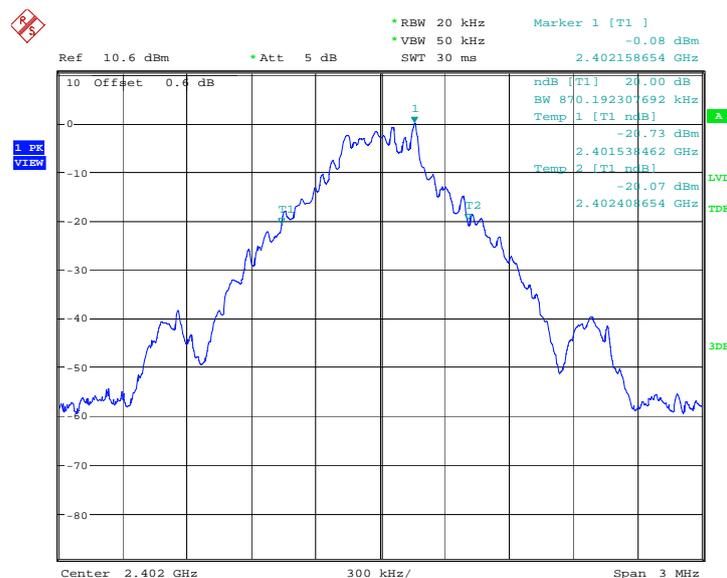
Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.121	1269.23	NA
39	Fig.122	1254.81	NA
78	Fig.123	1254.81	NA

##### For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.124	1254.81	NA
39	Fig.125	1264.42	NA
78	Fig.126	1250.00	NA

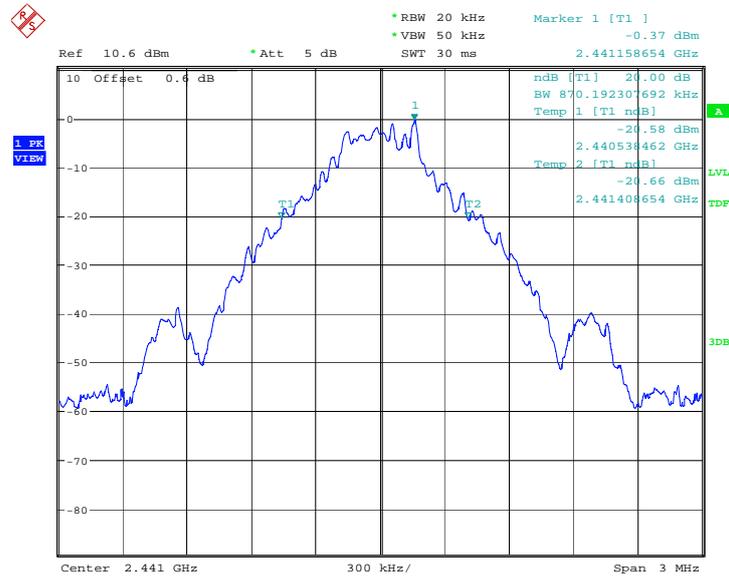
**Conclusion: NA**

Test graphs as below:



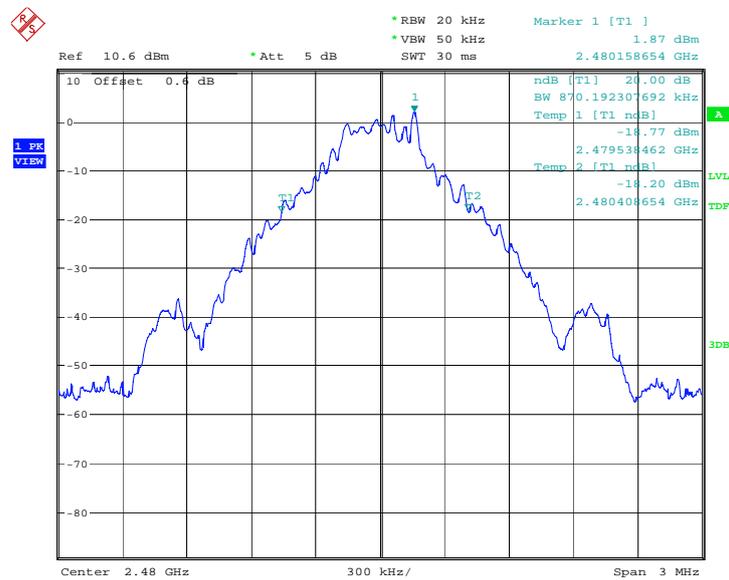
Date: 20.AUG.2013 11:24:31

Fig.118. 20dB Bandwidth: GFSK, Channel 0



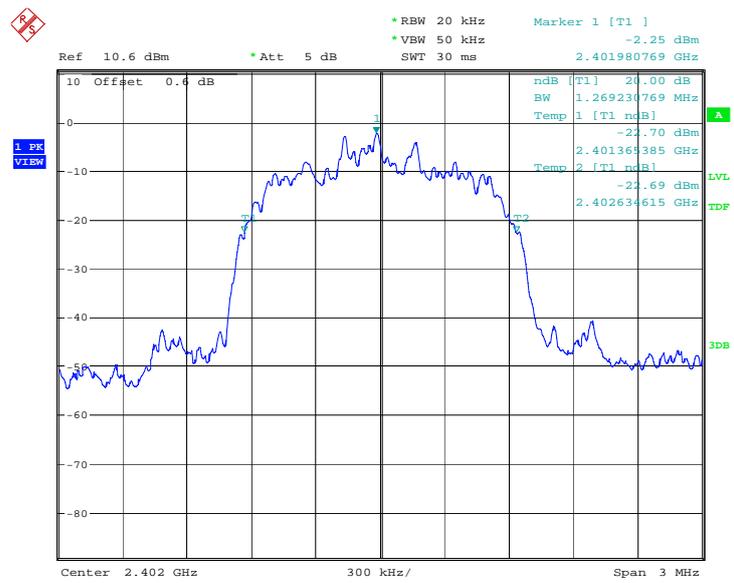
Date: 20.AUG.2013 11:25:03

Fig.119. 20dB Bandwidth: GFSK, Channel 39



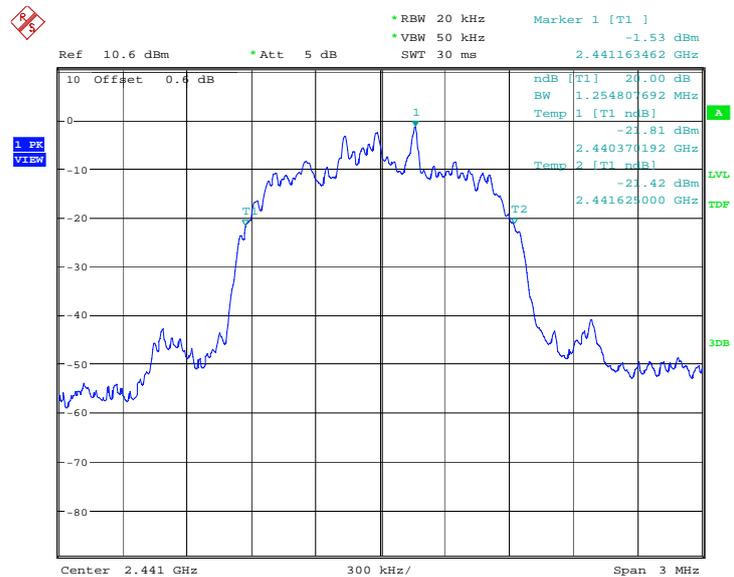
Date: 20.AUG.2013 11:25:34

Fig.120. 20dB Bandwidth: GFSK, Channel 78



Date: 20.AUG.2013 11:45:57

Fig.121. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 0



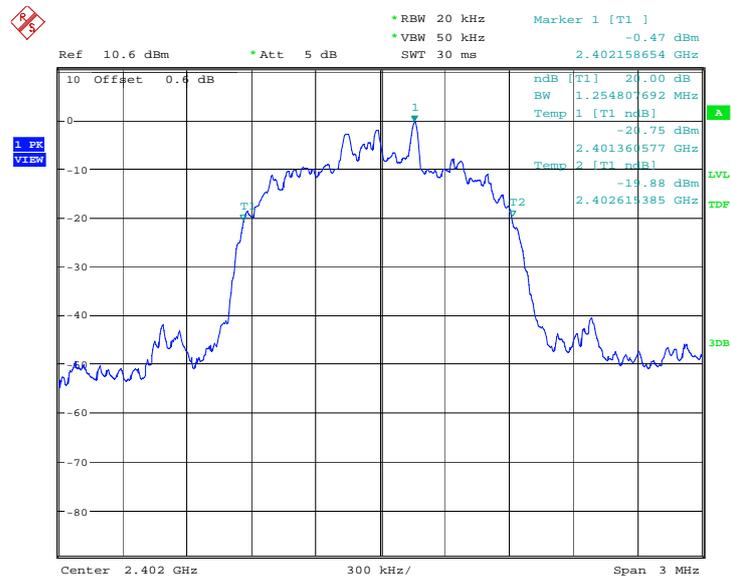
Date: 20.AUG.2013 11:46:29

Fig.122. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39



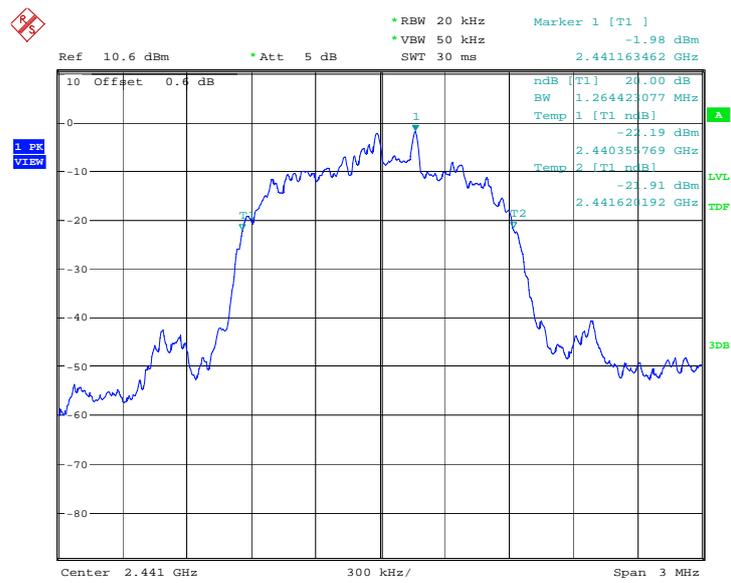
Date: 20.AUG.2013 11:47:01

Fig.123. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78



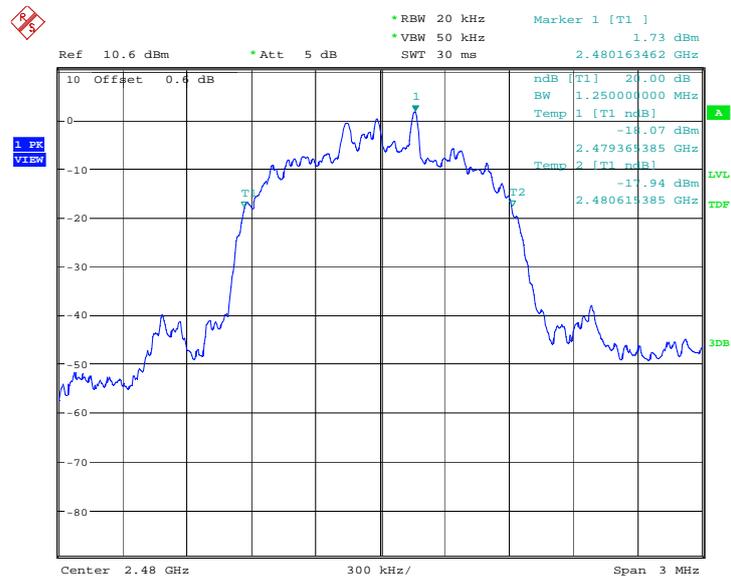
Date: 20.AUG.2013 12:07:22

Fig.124. 20dB Bandwidth: 8DPSK, Channel 0



Date: 20.AUG.2013 12:07:54

Fig.125. 20dB Bandwidth: 8DPSK, Channel 39



Date: 20.AUG.2013 12:08:26

Fig.126. 20dB Bandwidth: 8DPSK, Channel 78

### A.8. Carrier Frequency Separation

#### Measurement Limit:

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4

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

#### Measurement Result:

##### For GFSK

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.127	P

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

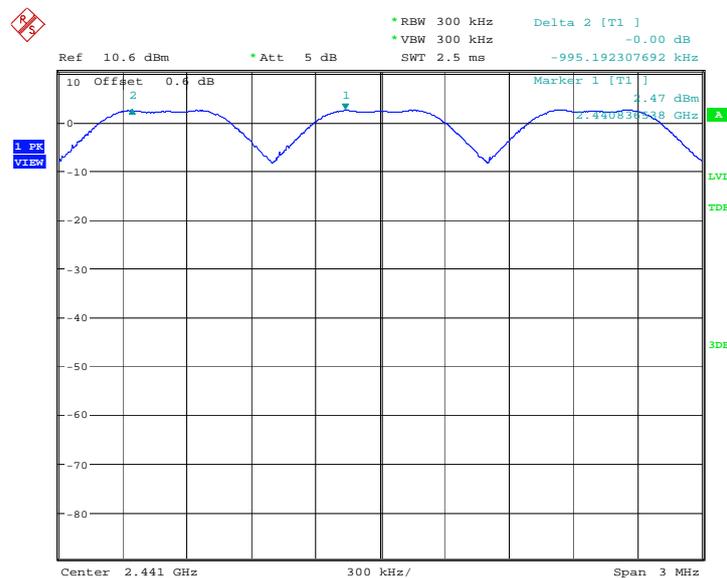
Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.128	P

##### For 8DPSK

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.129	P

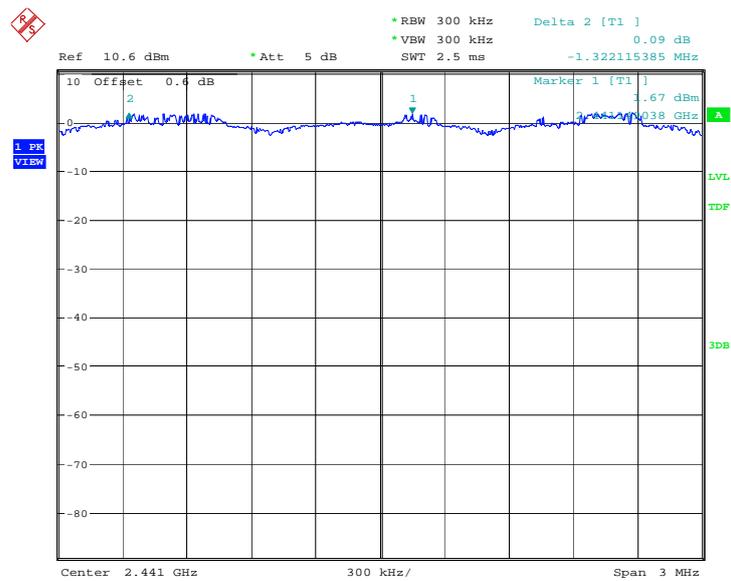
**Conclusion: PASS**

Test graphs as below:



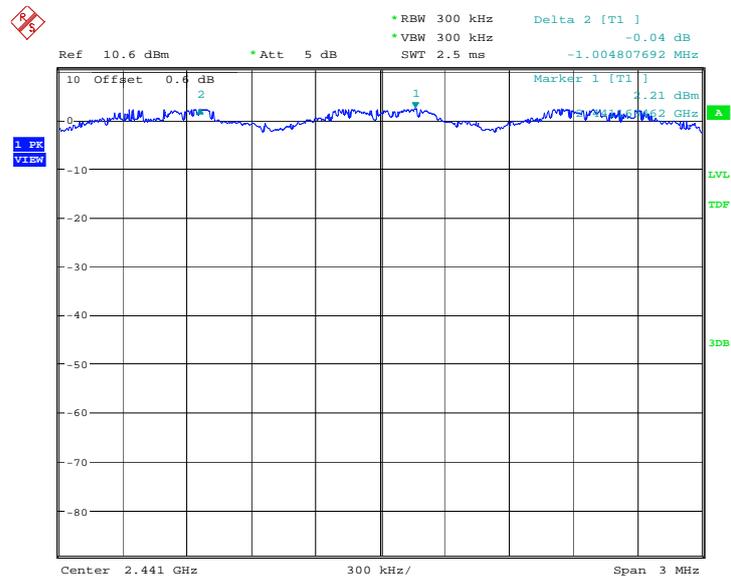
Date: 20.AUG.2013 11:27:38

Fig.127. Carrier frequency separation measurement: GFSK, Channel 39



Date: 20.AUG.2013 11:49:05

Fig.128. Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39



Date: 20.AUG.2013 12:17:56

Fig.129. Carrier frequency separation measurement: 8DPSK, Channel 39

### A.9. Number of Hopping Channels

#### Measurement Limit:

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

The measurement is made according to Public notice DA 00-705 and ANSI C63.4

#### Measurement Result:

##### For GFSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.130	P
40~78	Fig.131	

##### Forπ/4 DQPSK

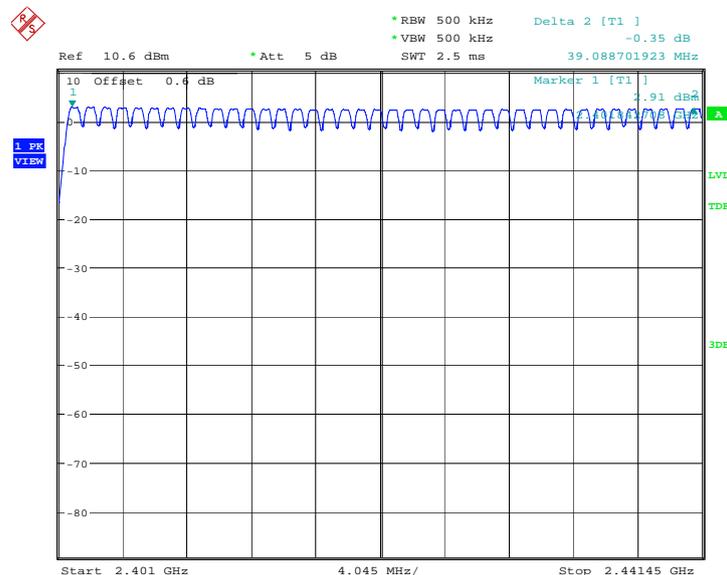
Channel	Number of hopping channels	Conclusion
0~39	Fig.132	P
40~78	Fig.133	

##### For 8DPSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.134	P
40~78	Fig.135	

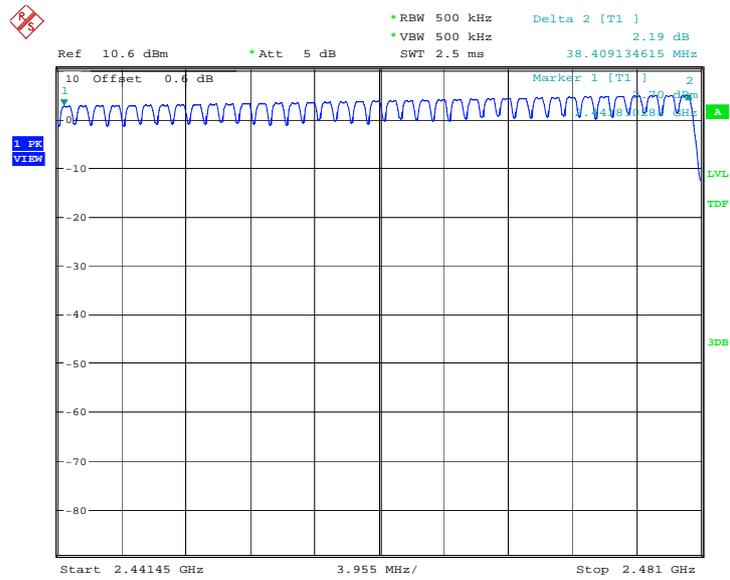
**Conclusion: PASS**

Test graphs as below:



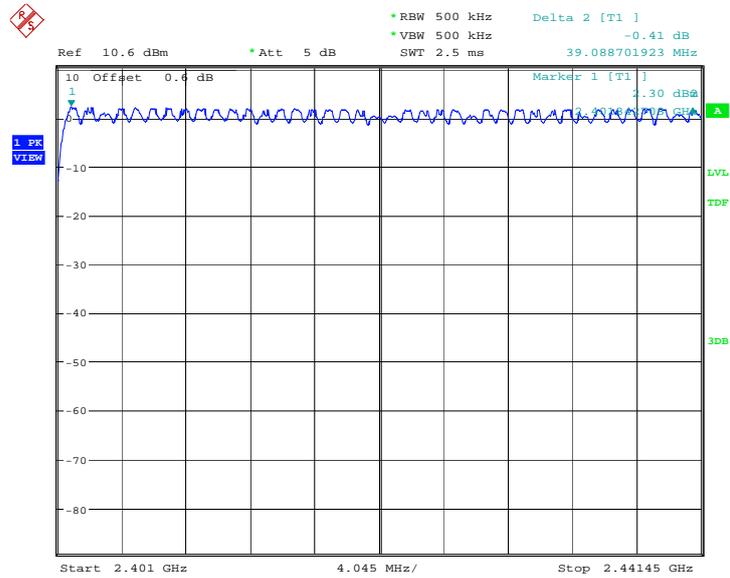
Date: 20.AUG.2013 11:29:42

Fig.130. Number of hopping frequencies: GFSK, Channel 0 - 39



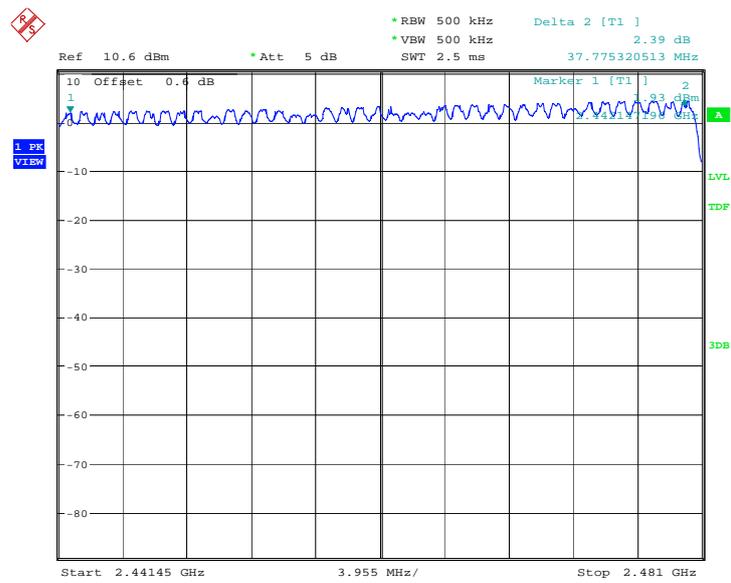
Date: 20.AUG.2013 11:31:44

Fig.131. Number of hopping frequencies: GFSK, Channel 40 - 78



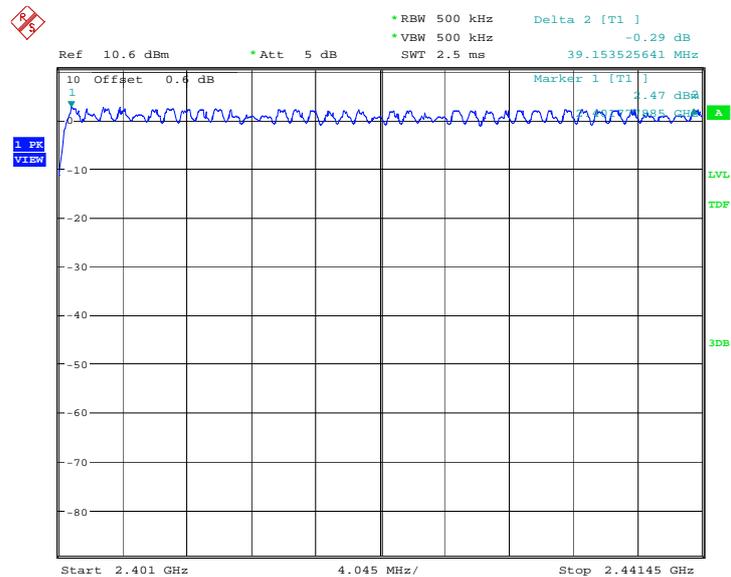
Date: 20.AUG.2013 11:51:09

Fig.132. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39



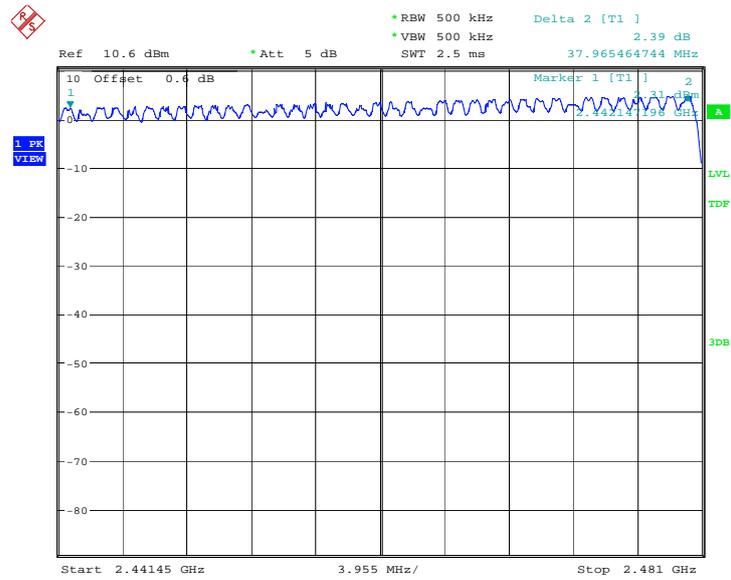
Date: 20.AUG.2013 11:53:11

Fig.133. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78



Date: 20.AUG.2013 12:12:34

Fig.134. Number of hopping frequencies: 8DPSK, Channel 0 - 39



Date: 20.AUG.2013 12:14:36

Fig.135. 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	

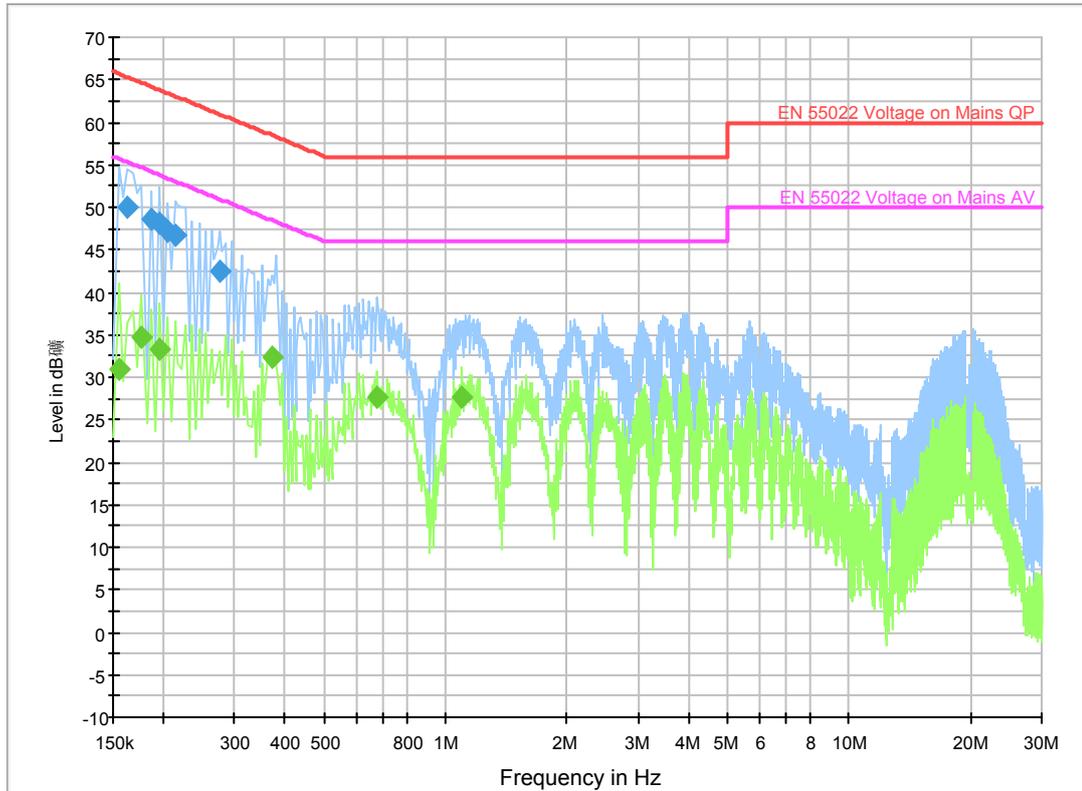
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to Public notice DA 00-705 and ANSI C63.4

**Conclusion: PASS**

**Test graphs as below:**

**Traffic:**



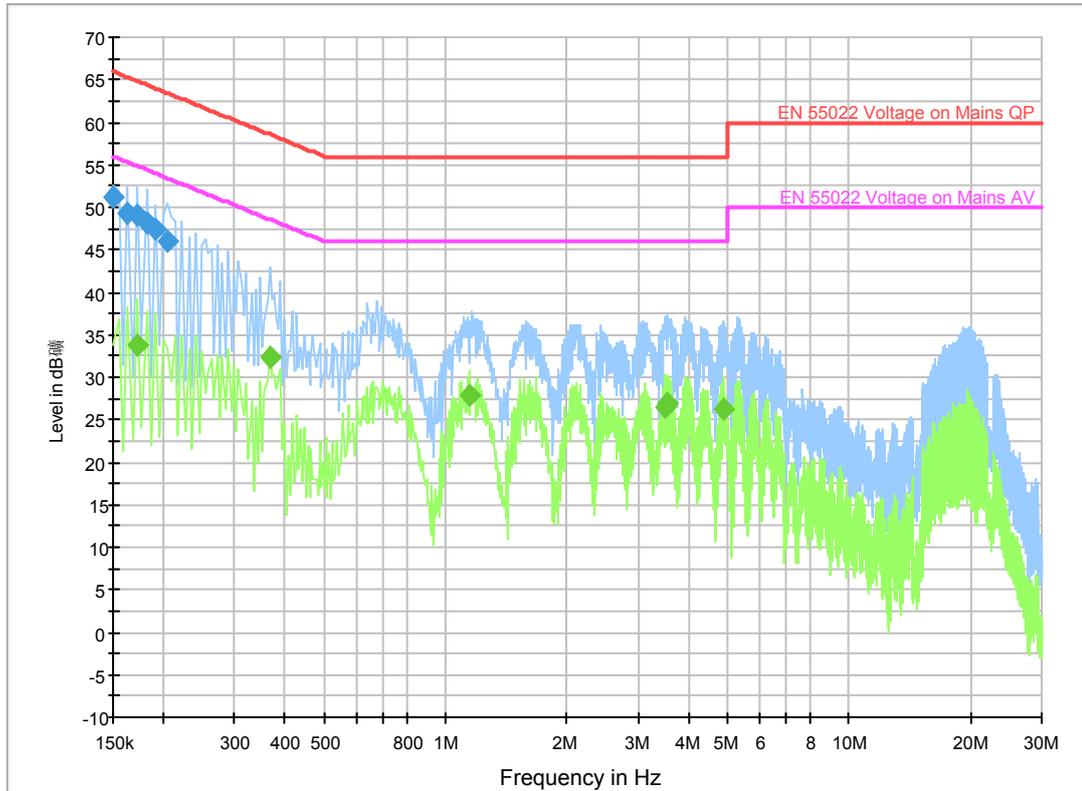
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.163501	50.1	GND	L1	9.9	15.2	65.3
0.186001	48.6	GND	L1	9.9	15.6	64.2
0.195001	48.0	GND	N	9.9	15.8	63.8
0.204001	47.2	GND	L1	9.9	16.3	63.4
0.213001	46.7	GND	N	9.9	16.4	63.1
0.276001	42.4	GND	N	9.9	18.5	60.9

**Final Result 2**

Frequency (MHz)	CAverage (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154501	30.9	GND	L1	9.9	24.9	55.8
0.177001	34.7	GND	N	9.9	20.0	54.6
0.195001	33.4	GND	N	9.9	20.5	53.8
0.370501	32.3	GND	L1	9.9	16.2	48.5
0.676501	27.8	GND	N	9.9	18.2	46.0
1.099501	27.7	GND	N	9.9	18.3	46.0

Idle:



### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150001	51.1	GND	L1	9.9	14.9	66.0
0.163501	49.3	GND	L1	9.9	15.9	65.3
0.172501	49.2	GND	L1	9.9	15.7	64.8
0.181501	48.1	GND	L1	9.9	16.3	64.4
0.190501	47.3	GND	L1	9.9	16.7	64.0
0.204001	46.0	GND	L1	9.9	17.4	63.4

### Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172501	33.7	GND	L1	9.9	21.1	54.8
0.366001	32.3	GND	L1	9.9	16.3	48.6
1.149001	28.0	GND	N	9.9	18.0	46.0
3.489001	26.5	GND	N	9.9	19.5	46.0
3.520501	26.9	GND	N	9.9	19.1	46.0
4.870501	26.3	GND	N	9.9	19.7	46.0

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