



# FCC PART 15C TEST REPORT No. I14Z47312-SRD01

for

**TCT Mobile Limited**

**HSUPA/HSDPA/UMTS triband/GSM quadband mobile phone**

**Model Name: 4037A**

**FCC ID: RAD510**

with

**Hardware Version: PIO**

**Software Version: v9H2N**

**Issued Date: 2014-07-18**



***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-1***

**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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## 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: 00861062304633-2504

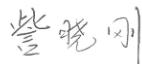
### 1.2. Testing Environment

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

### 1.3. Project data

Project Leader: Zi Xiaogang  
Testing Start Date: 2014-05-14  
Testing End Date: 2014-05-22

### 1.4. Signature



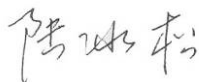
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**Zi Xiaogang**  
**(Prepared this test report)**



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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,  
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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  
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Fax: 0086-21-61460602

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

#### 3.1. About EUT

|                    |                                                    |
|--------------------|----------------------------------------------------|
| Description        | HSUPA/HSDPA/UMTS triband/GSM quadband mobile phone |
| Model Name         | 4037A                                              |
| FCC ID             | RAD510                                             |
| Frequency Band     | ISM 2400MHz~2483.5MHz                              |
| Type of Modulation | GFSK/ $\pi/4$ DQPSK/8DPSK                          |
| Number of Channels | 79                                                 |
| Power Supply       | 3.9V DC by Battery                                 |

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

| EUT ID* | SN or IMEI | HW Version | SW Version |
|---------|------------|------------|------------|
| UT13a   | /          | PIO        | v9H2N      |
| UT40a   | /          | PIO        | v9H2N      |

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

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

| AE ID*       | Description |              |         |
|--------------|-------------|--------------|---------|
| AE1          | Battery     | /            | Inbuilt |
| AE2          | Charger     | /            |         |
| AE1          |             |              |         |
| Model        |             | CAB60B0004C1 |         |
| Manufacturer |             | BYD          |         |
| Capacitance  |             | 1400 mAh     |         |
| AE2          |             |              |         |
| Model        |             | CBA3007AG3C1 |         |
| Manufacturer |             | BYD          |         |

\*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 triband/GSM 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.

## 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;                                            | 10-1-13 |
| 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 C63.10 | American National Standard for Testing Unlicensed<br>Wireless Devices            | 2009    |
| FCC Part 2  | Frequency Allocations and Radio Treaty Matters;<br>General Rules and Regulations | 10–1–13 |

## 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×6.1 meters×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×6.7 meters×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 ANSI C63.10.

### 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

This model is a variant product which market name is 4035A; all the test result has been derived from test report of 4035A.



## 7. Test Equipments Utilized

### Conducted test system

| No. | Equipment              | Model | Serial Number | Manufacturer    | Calibration Due date |
|-----|------------------------|-------|---------------|-----------------|----------------------|
| 1   | Vector Signal Analyzer | FSQ26 | 200136        | Rohde & Schwarz | 2015-01-06           |
| 2   | Bluetooth Tester       | CBT32 | 100649        | Rohde & Schwarz | 2015-02-09           |

### Radiated emission test system

| No. | Equipment                         | Model     | Serial Number | Manufacturer    | Calibration Due date |
|-----|-----------------------------------|-----------|---------------|-----------------|----------------------|
| 1   | Test Receiver                     | ESU26     | 100376        | Rohde & Schwarz | 2014-11-05           |
| 2   | EMI Antenna                       | VULB 9163 | 9163 175      | Schwarzbeck     | 2014-07-13           |
| 3   | EMI Antenna                       | 3117      | 00119021      | ETS-Lindgren    | 2015-04-19           |
| 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 | 2015-04-14           |
| 8   | Loop Antenna                      | HFH2-Z2   | 829324/007    | Rohde & Schwarz | 2014-12-12           |
| 9   | Pre-amplifier(18GHz)              | SCU18     | 1005277       | Rohde & Schwarz | /                    |
| 10  | Pre-amplifier(26.5GHz)            | SCU26     | 1006788       | Rohde & Schwarz | /                    |

### Anechoic chamber

Fully anechoic chamber by Frankonia German.

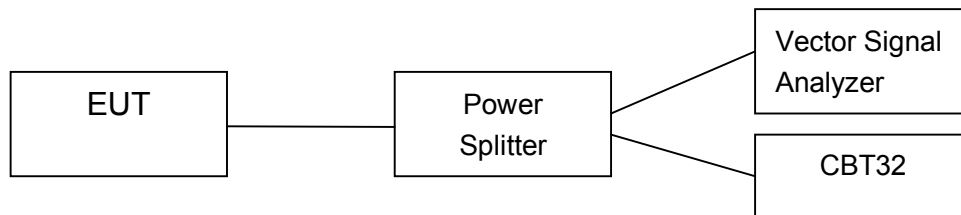
## ANNEX A: MEASUREMENT RESULTS

### 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

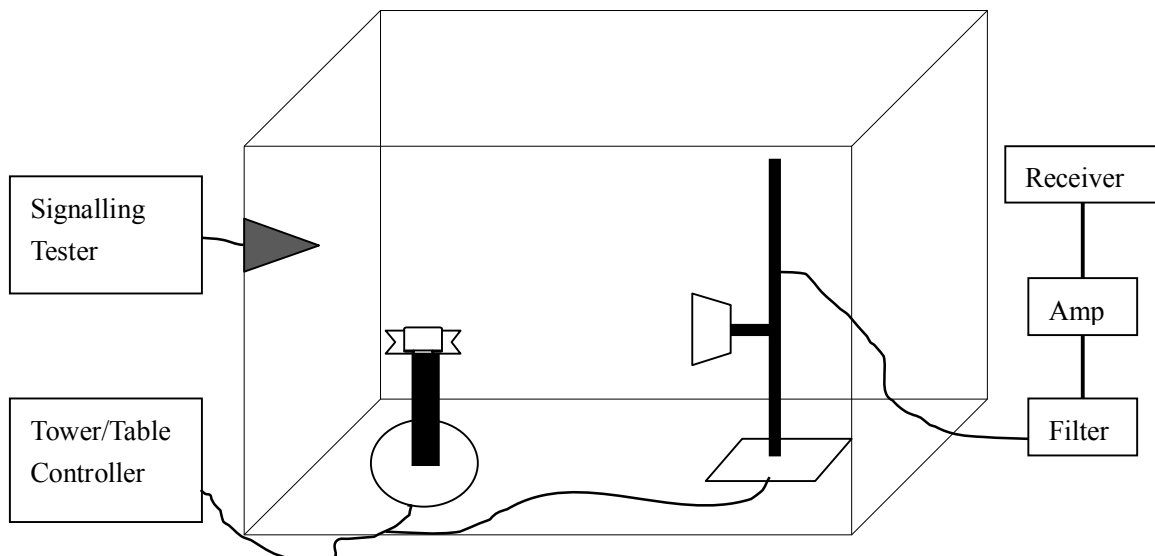
The measurement is made according to ANSI C63.10

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

### Measurement Limit:

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

The measurement is made according to ANSI C63.10.

### Test Condition

| Hopping Mode | RBW  | VBW  | Span | Sweep time | Detector | Trace Mode |
|--------------|------|------|------|------------|----------|------------|
| Hopping OFF  | 3MHz | 3MHz | 5MHz | 2.5ms      | Peak     | Max Hold   |

### Measurement Results:

#### For GFSK

| Channel                                 | Ch 0<br>2402 MHz | Ch 39<br>2441 MHz | Ch 78<br>2480 MHz | Conclusion |
|-----------------------------------------|------------------|-------------------|-------------------|------------|
| Peak Conducted<br>Output Power<br>(dBm) | 6.48             | 7.09              | 7.10              | P          |

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

| Channel                                 | Ch 0<br>2402 MHz | Ch 39<br>2441 MHz | Ch 78<br>2480 MHz | Conclusion |
|-----------------------------------------|------------------|-------------------|-------------------|------------|
| Peak Conducted<br>Output Power<br>(dBm) | 6.31             | 6.95              | 6.94              | P          |

#### For 8DPSK

| Channel                                 | Ch 0<br>2402 MHz | Ch 39<br>2441 MHz | Ch 78<br>2480 MHz | Conclusion |
|-----------------------------------------|------------------|-------------------|-------------------|------------|
| Peak Conducted<br>Output Power<br>(dBm) | 6.53             | 7.15              | 7.18              | 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 ANSI C63.10.

#### Test Condition

| Hopping Mode   | RBW    | VBW    | Span  | SweepTime | Detector | Trace Mode |
|----------------|--------|--------|-------|-----------|----------|------------|
| Hopping OFF/ON | 100KHz | 300KHz | 10MHz | 5ms       | Peak     | Max Hold   |

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 Result:

##### For GFSK

| Channel | Hopping     | Band Edge Power ( dBc) |        | Conclusion |
|---------|-------------|------------------------|--------|------------|
| 0       | Hopping OFF | Fig.1                  | -58.81 | P          |
|         | Hopping ON  | Fig.2                  | -57.82 | P          |
| 78      | Hopping OFF | Fig.3                  | -62.52 | P          |
|         | Hopping ON  | Fig.4                  | -62.44 | P          |

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

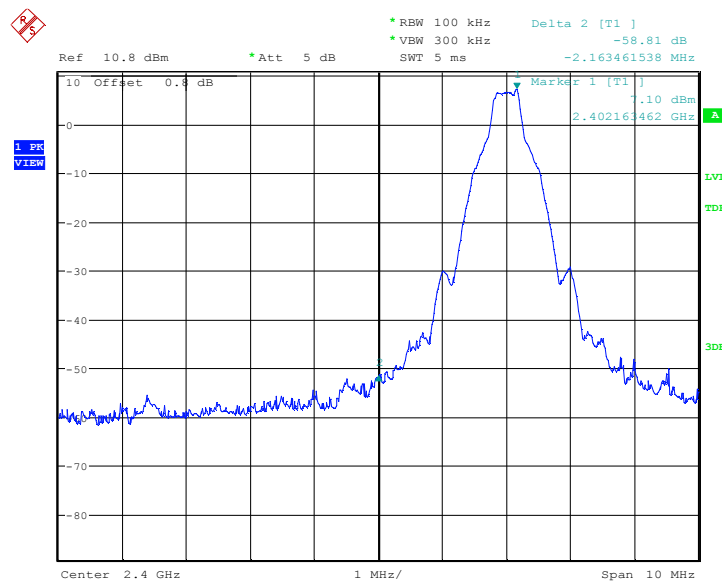
| Channel | Hopping     | Band Edge Power ( dBc) |        | Conclusion |
|---------|-------------|------------------------|--------|------------|
| 0       | Hopping OFF | Fig.5                  | -56.08 | P          |
|         | Hopping ON  | Fig.6                  | -56.14 | P          |
| 78      | Hopping OFF | Fig.7                  | -60.06 | P          |
|         | Hopping ON  | Fig.8                  | -60.18 | P          |

##### For 8DPSK

| Channel | Hopping     | Band Edge Power ( dBc) |        | Conclusion |
|---------|-------------|------------------------|--------|------------|
| 0       | Hopping OFF | Fig.9                  | -55.18 | P          |
|         | Hopping ON  | Fig.10                 | -54.34 | P          |
| 78      | Hopping OFF | Fig.11                 | -59.57 | P          |
|         | Hopping ON  | Fig.12                 | -56.57 | P          |

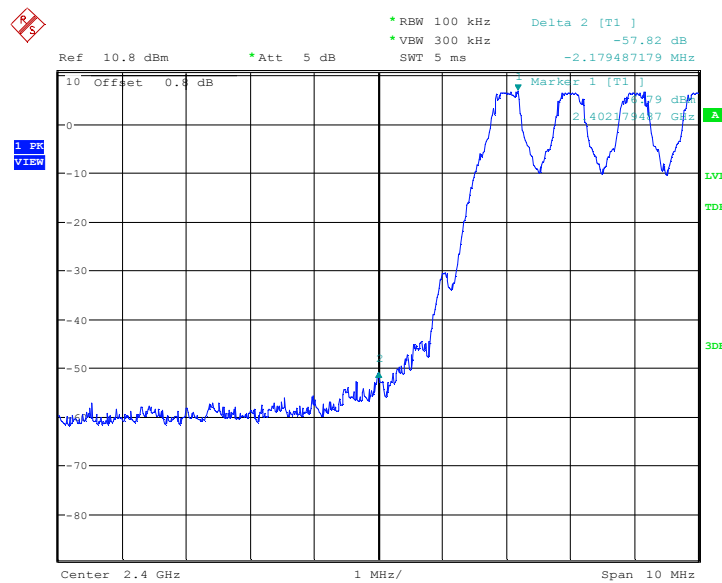
**Conclusion: PASS**

**Test graphs as below**



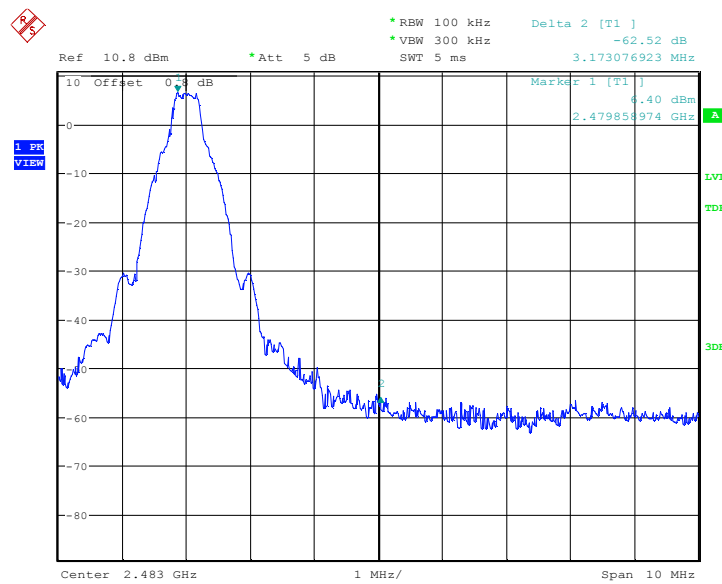
Date: 7.MAY.2014 19:18:35

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



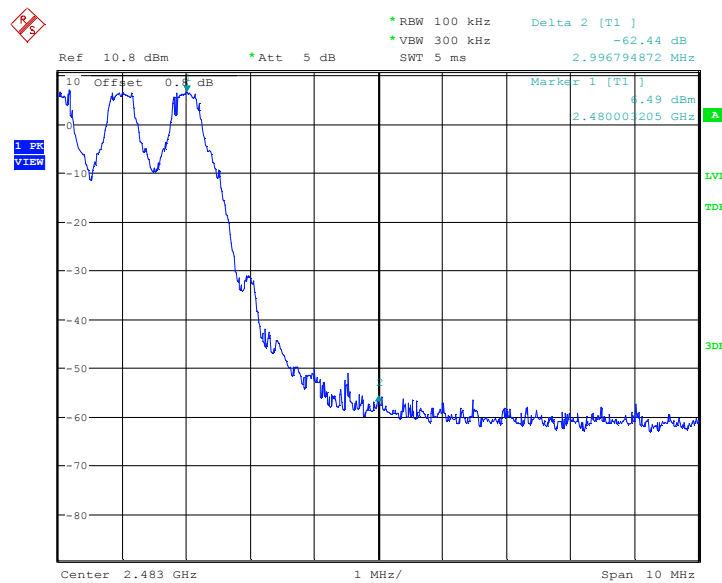
Date: 7.MAY.2014 19:20:54

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



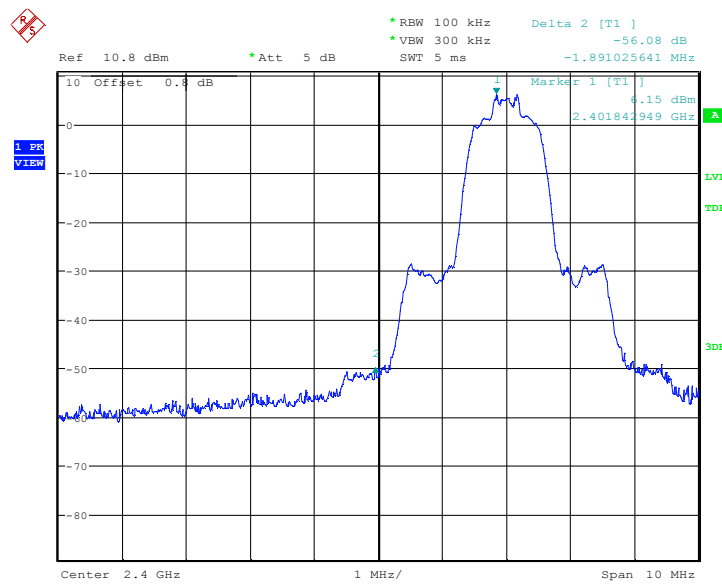
Date: 7.MAY.2014 19:18:52

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



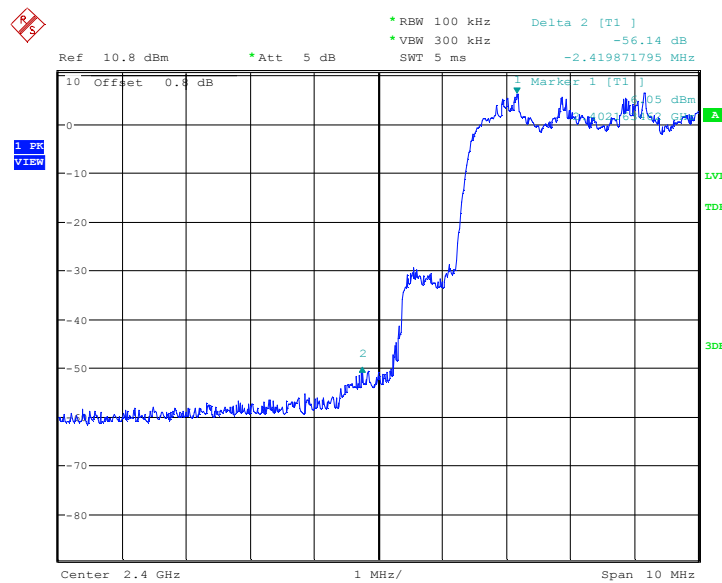
Date: 7.MAY.2014 19:22:56

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



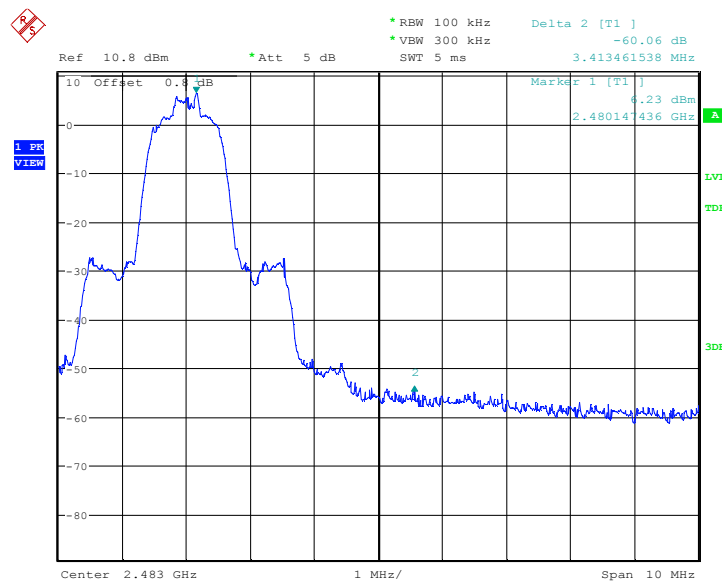
Date: 7.MAY.2014 19:39:35

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



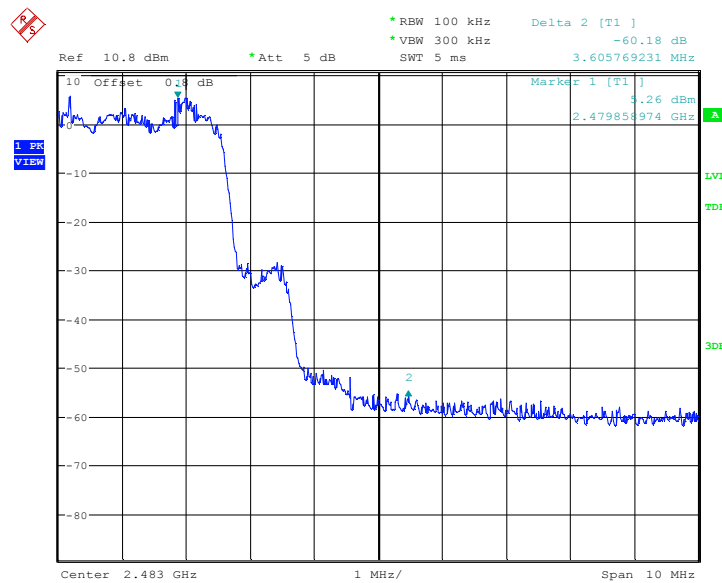
Date: 7.MAY.2014 19:41:54

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



Date: 7.MAY.2014 19:39:52

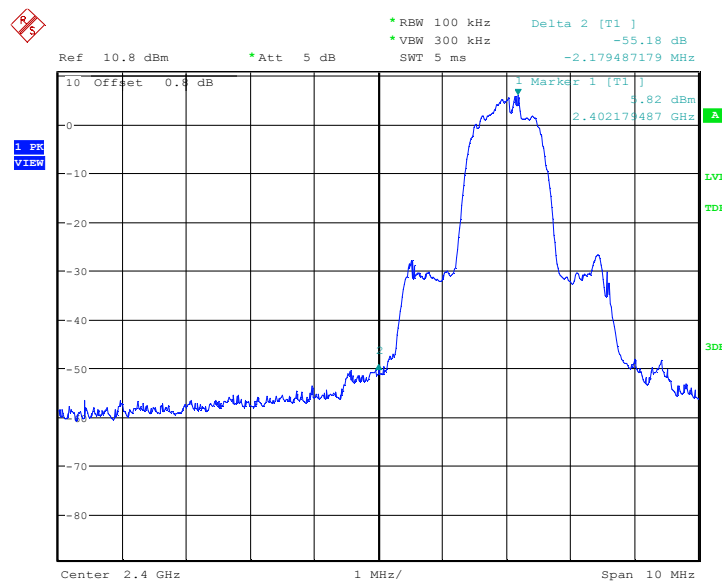
Fig.7. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping Off



Date: 7.MAY.2014 19:43:56

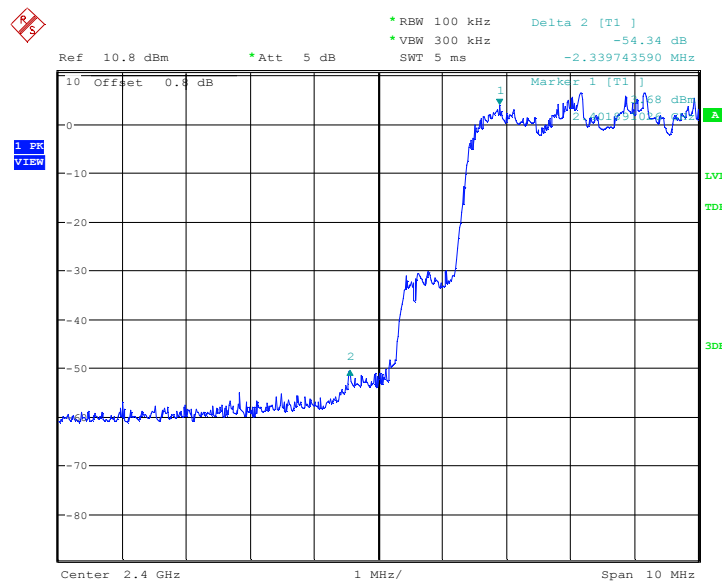
Fig.8. Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping On





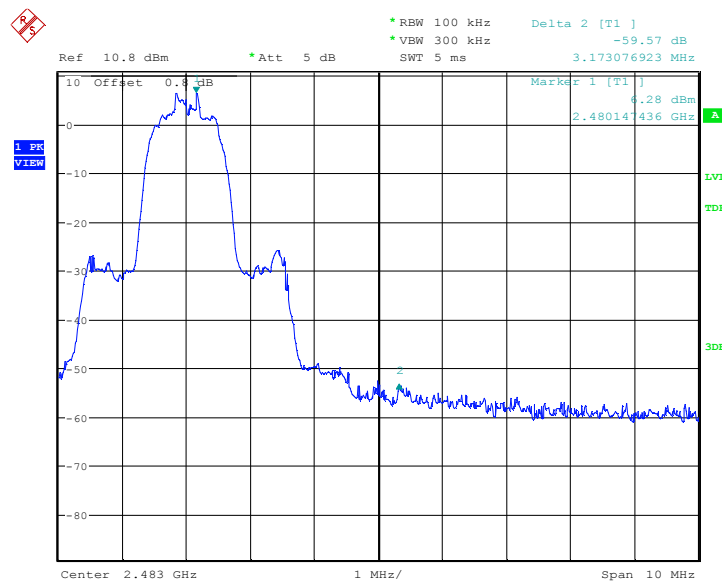
Date: 7.MAY.2014 20:00:35

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



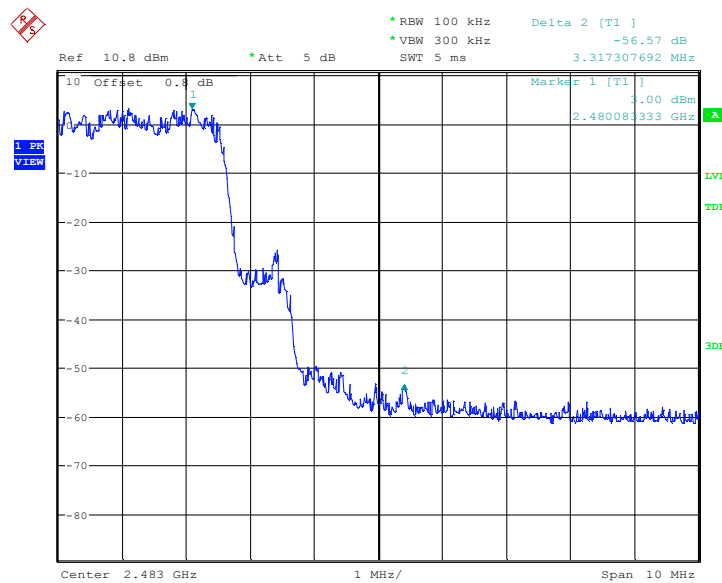
Date: 7.MAY.2014 20:02:54

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



Date: 7.MAY.2014 20:00:52

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



Date: 7.MAY.2014 20:04:56

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 ANSI C63.10

##### Test Condition

|              |        |        |           |          |            |
|--------------|--------|--------|-----------|----------|------------|
| Hopping Mode | RBW    | VBW    | Sweeptime | Detector | Trace Mode |
| Hopping OFF  | 100KHz | 300KHz | Auto      | Peak     | Max Hold   |

##### Measurement Procedure – Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  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  $\geq$  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 Results:**
**For GFSK**

| Channel           | Frequency Range  | Test Results | Conclusion |
|-------------------|------------------|--------------|------------|
| Ch 0<br>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<br>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<br>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<br>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<br>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<br>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          |

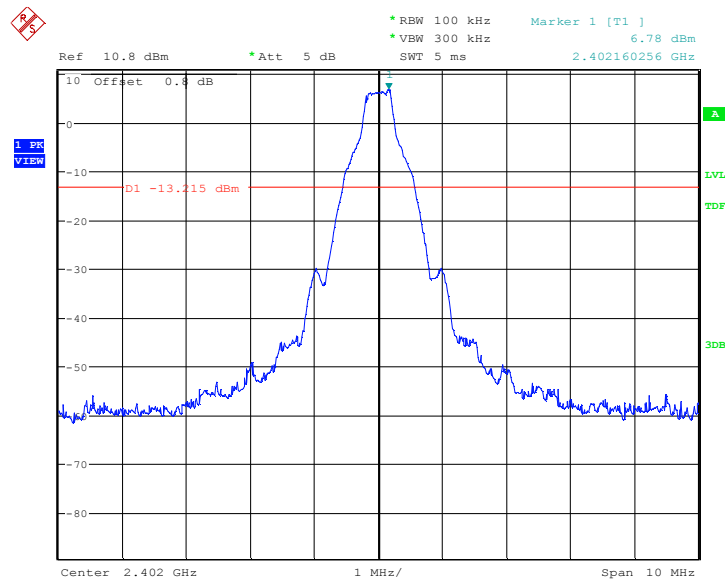
**For 8DPSK**

| Channel          | Frequency Range  | Test Results | Conclusion |
|------------------|------------------|--------------|------------|
| Ch 0<br>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<br>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<br>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 |

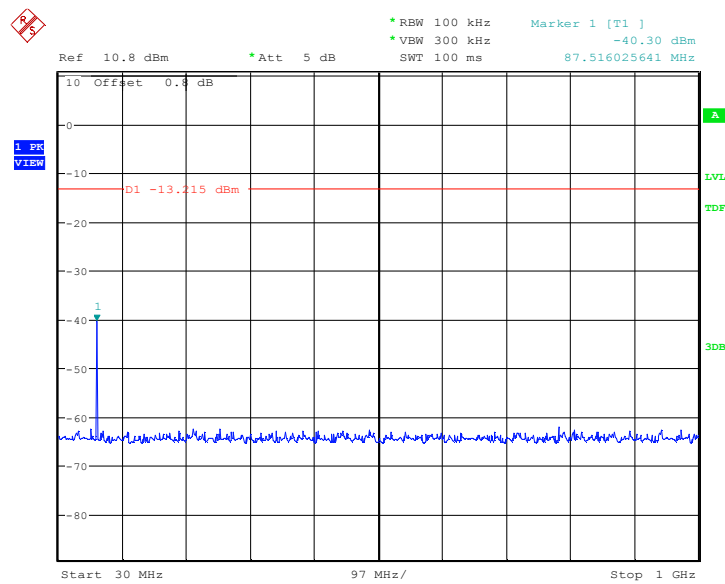
**Conclusion: PASS**

**Test graphs as below**



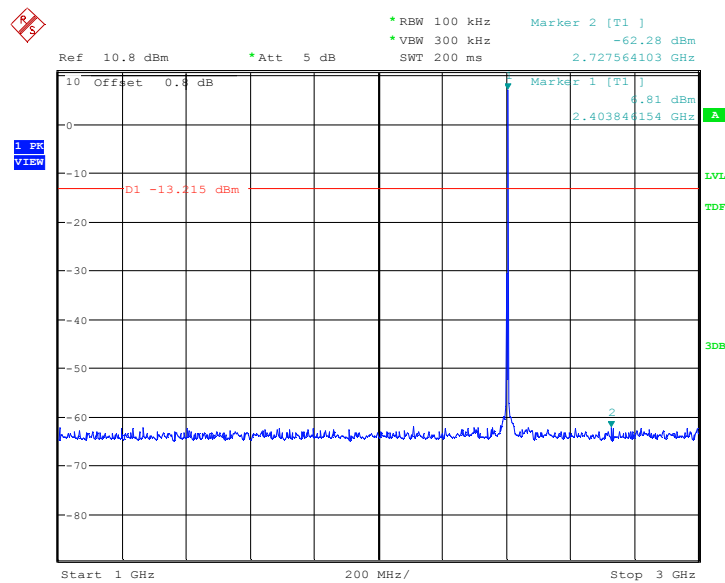
Date: 22.MAY.2014 17:17:14

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



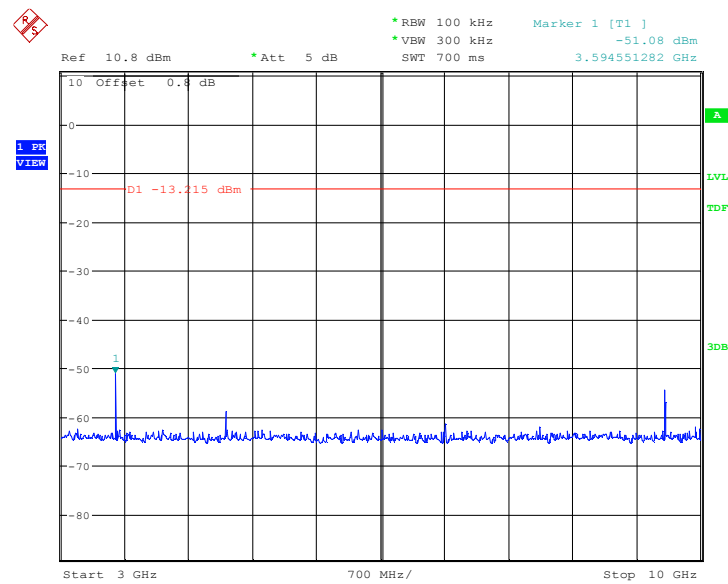
Date: 22.MAY.2014 17:17:31

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



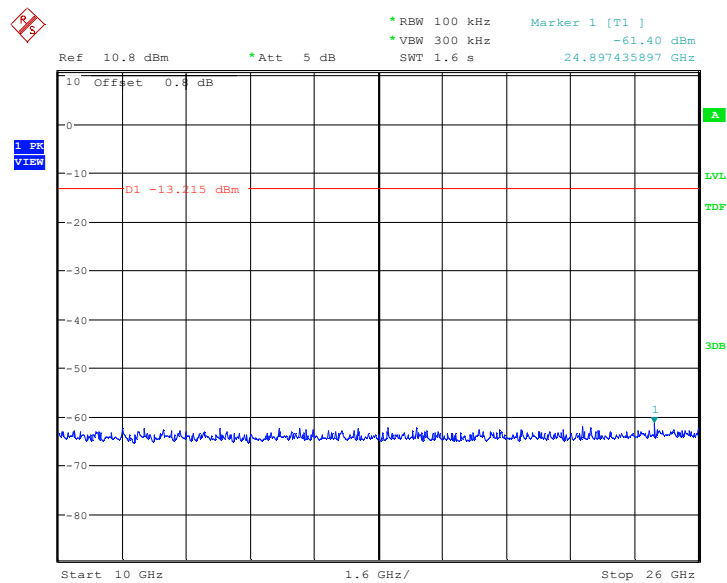
Date: 22.MAY.2014 17:18:02

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



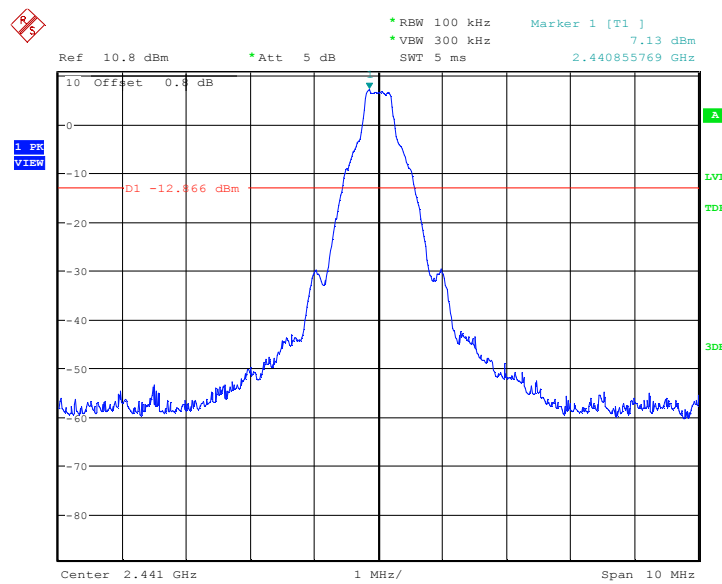
Date: 22.MAY.2014 17:18:19

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



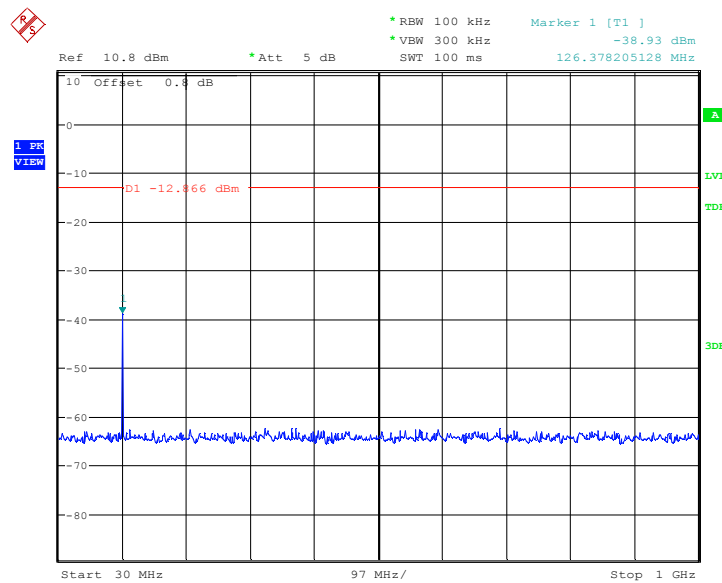
Date: 22.MAY.2014 17:18:35

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



Date: 22.MAY.2014 17:18:52

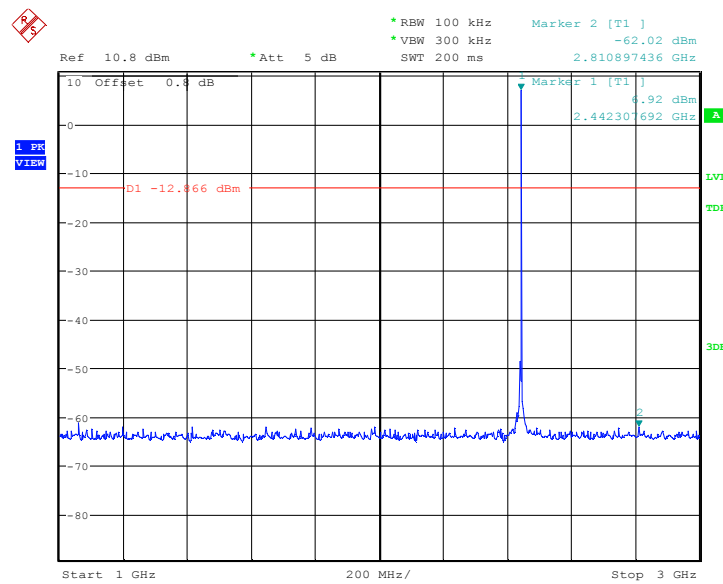
Fig.18. Conducted spurious emission: GFSK, Channel 39, 2441MHz



Date: 22.MAY.2014 17:19:09

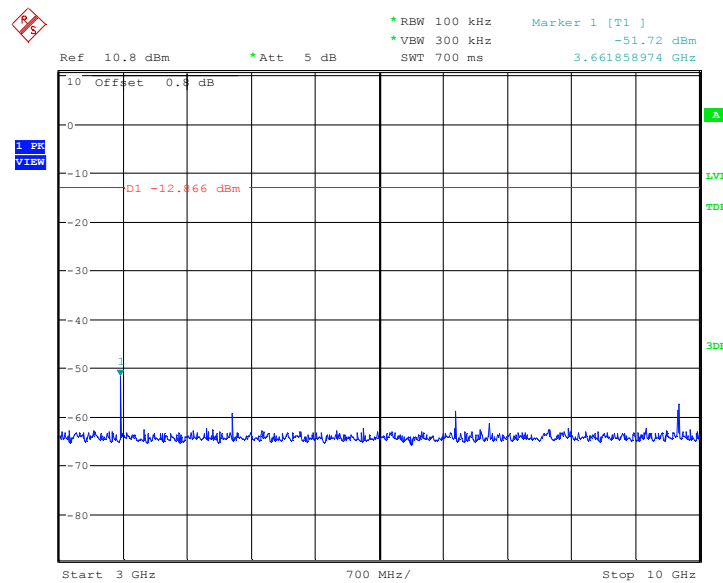
Fig.19. Conducted spurious emission: GFSK, Channel 39, 30MHz - 1GHz





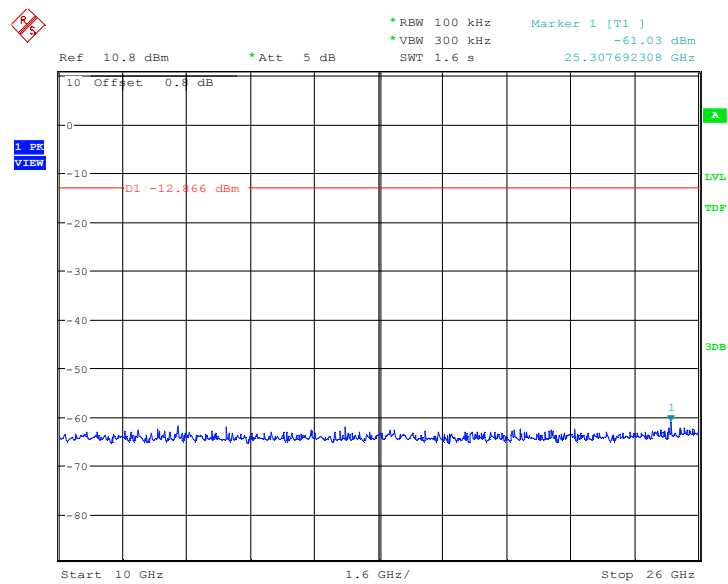
Date: 22.MAY.2014 17:19:40

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



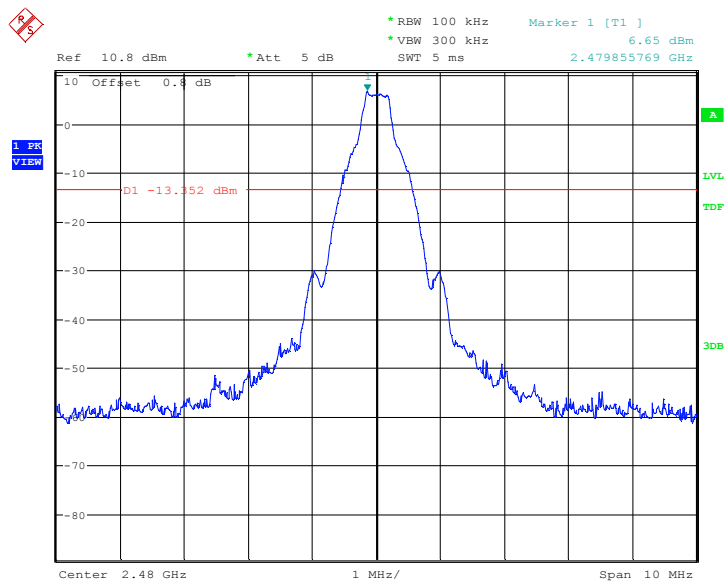
Date: 22.MAY.2014 17:19:57

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



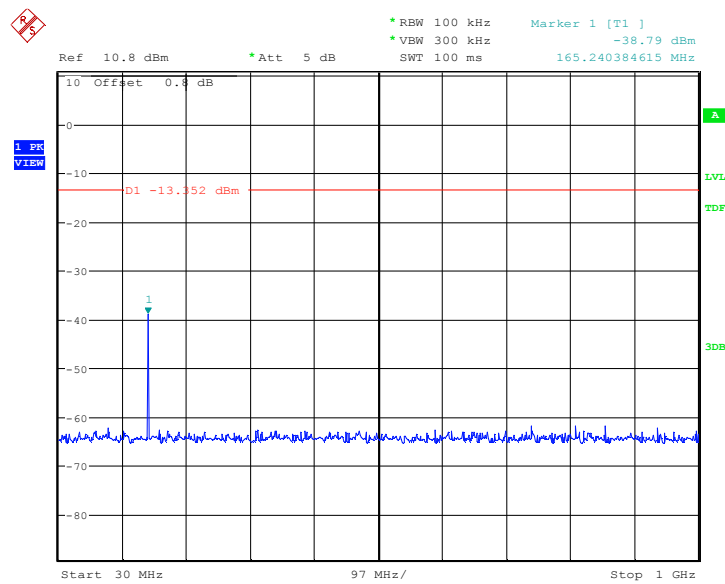
Date: 22.MAY.2014 17:20:13

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



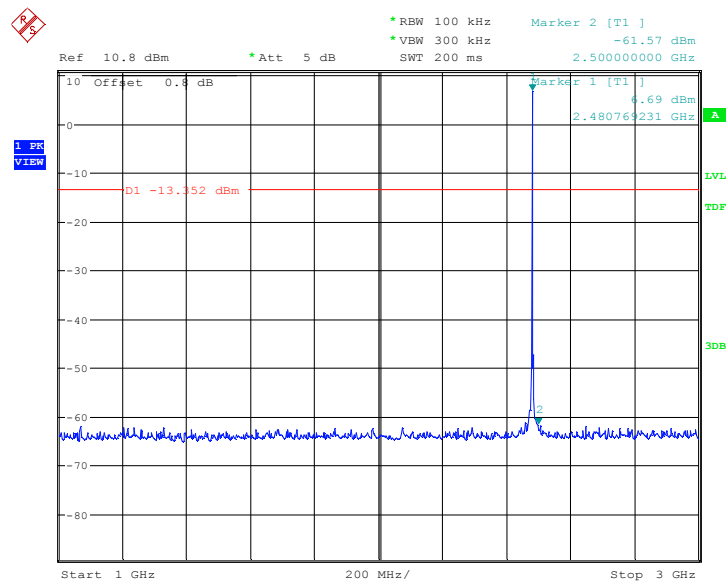
Date: 22.MAY.2014 17:20:30

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



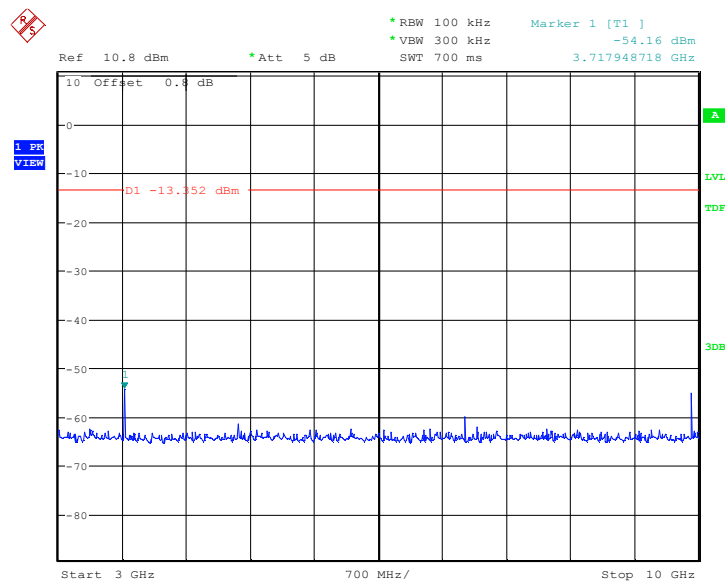
Date: 22.MAY.2014 17:20:46

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



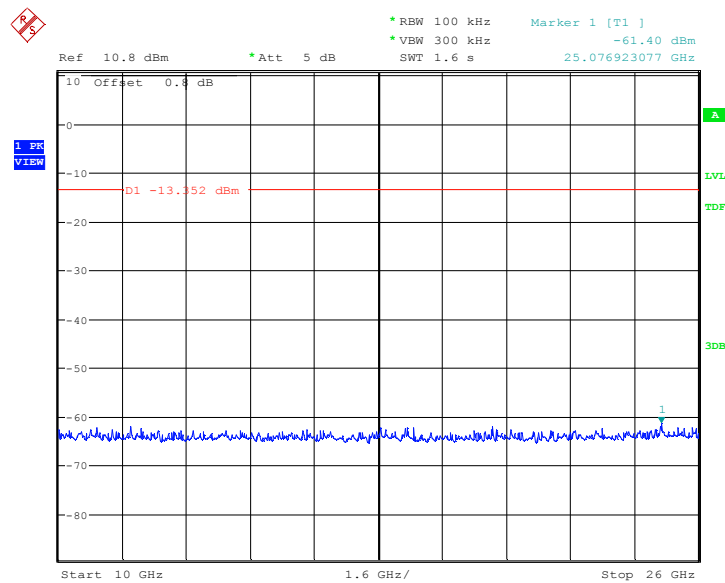
Date: 22.MAY.2014 17:21:18

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



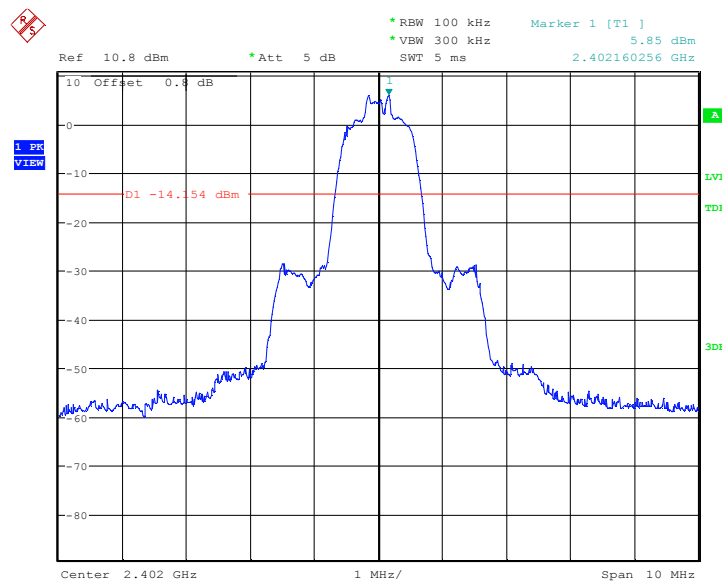
Date: 22.MAY.2014 17:21:35

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



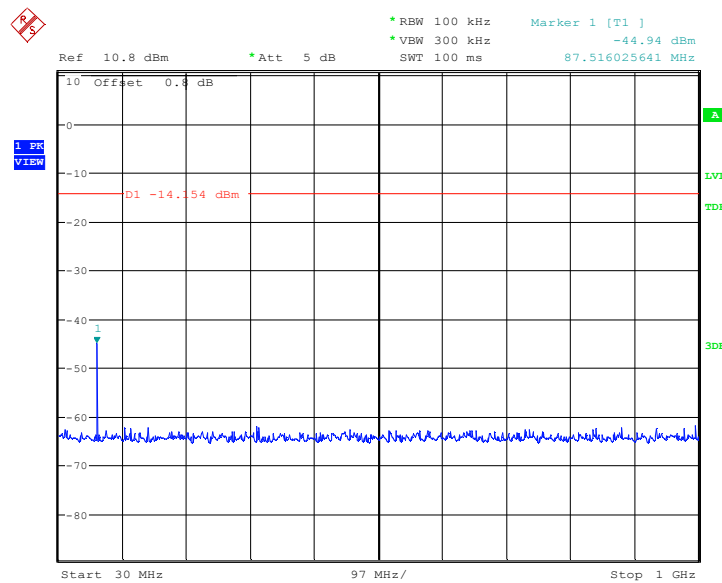
Date: 22.MAY.2014 17:21:51

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



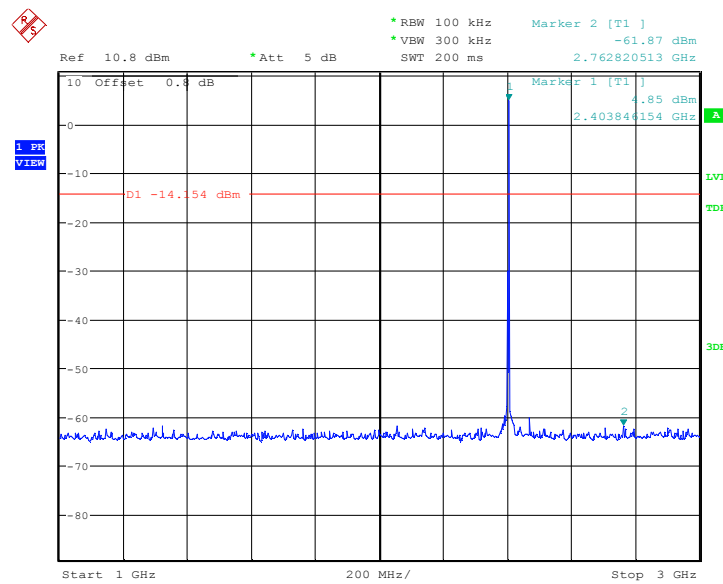
Date: 22.MAY.2014 17:38:37

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



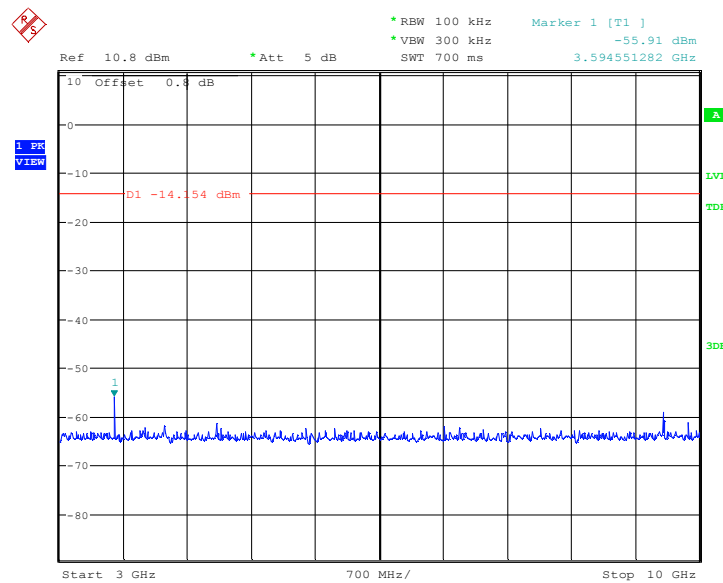
Date: 22.MAY.2014 17:38:54

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



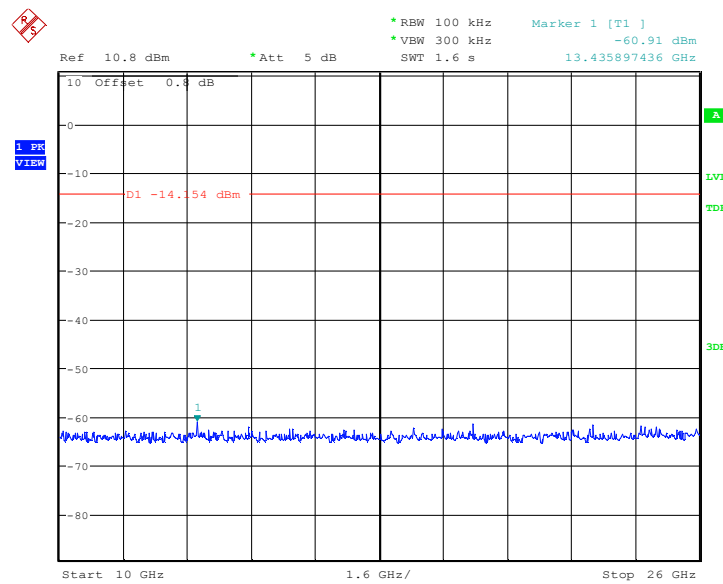
Date: 22.MAY.2014 17:39:25

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



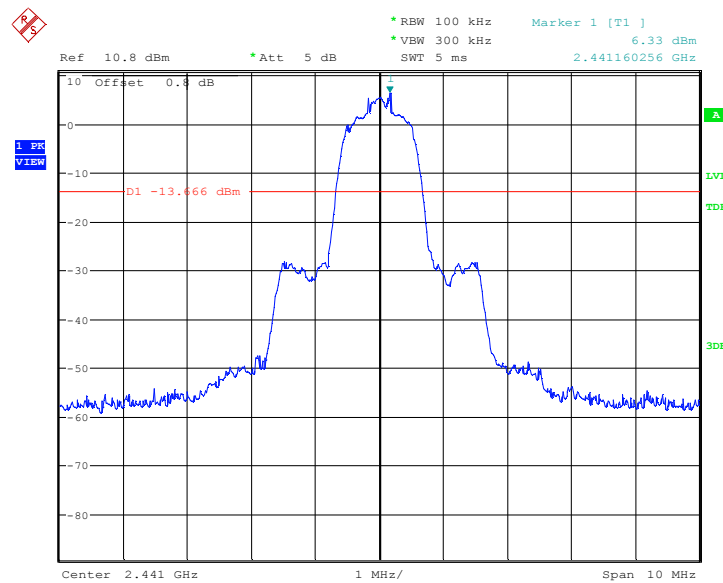
Date: 22.MAY.2014 17:39:42

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



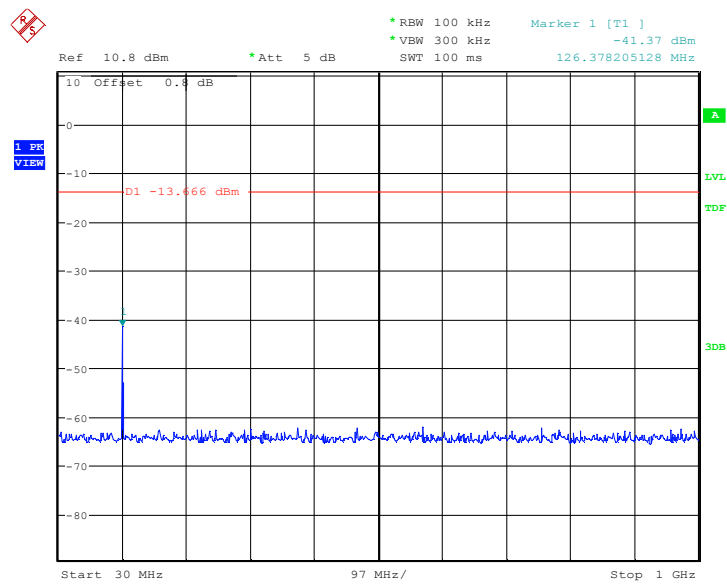
Date: 22.MAY.2014 17:39:58

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



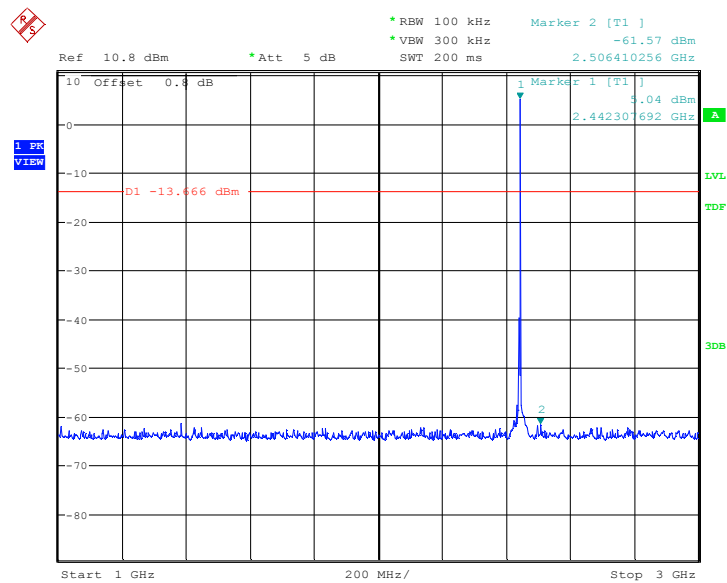
Date: 22.MAY.2014 17:40:15

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



Date: 22.MAY.2014 17:40:32

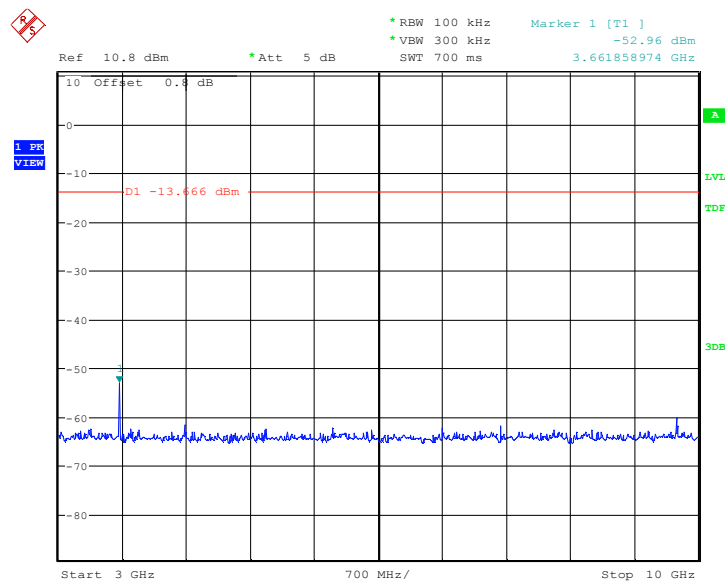
Fig.34. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 30MHz - 1GHz



Date: 22.MAY.2014 17:41:03

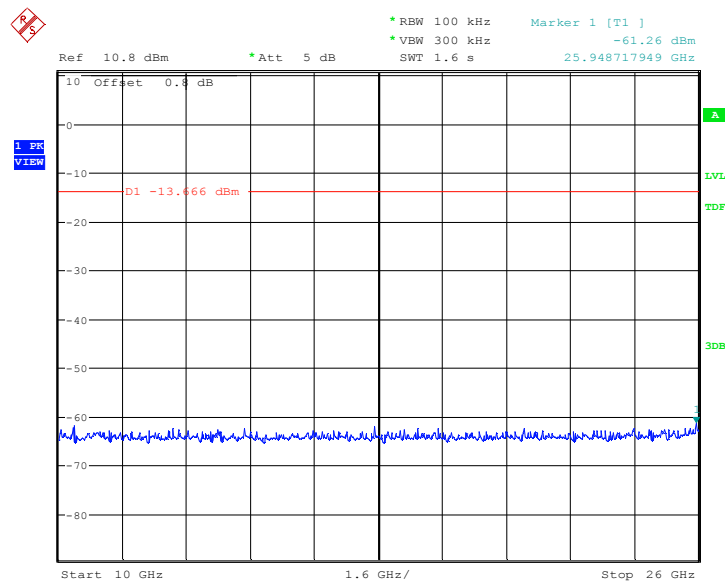
Fig.35. Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 1GHz - 3GHz





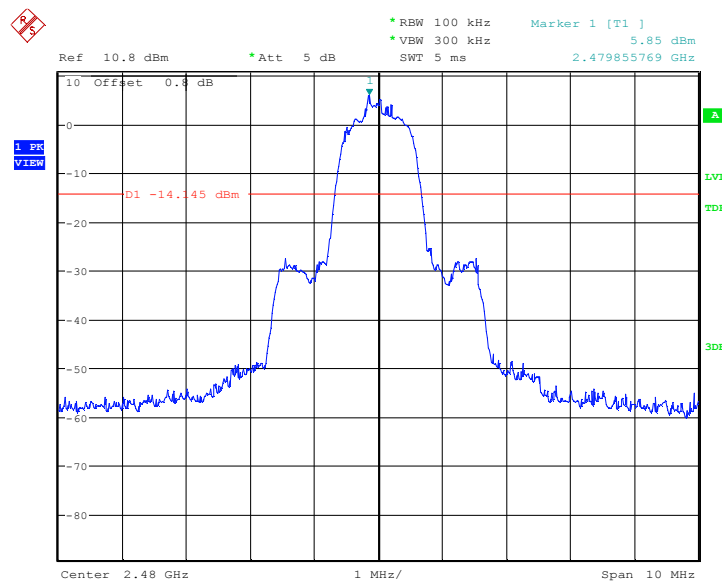
Date: 22.MAY.2014 17:41:20

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



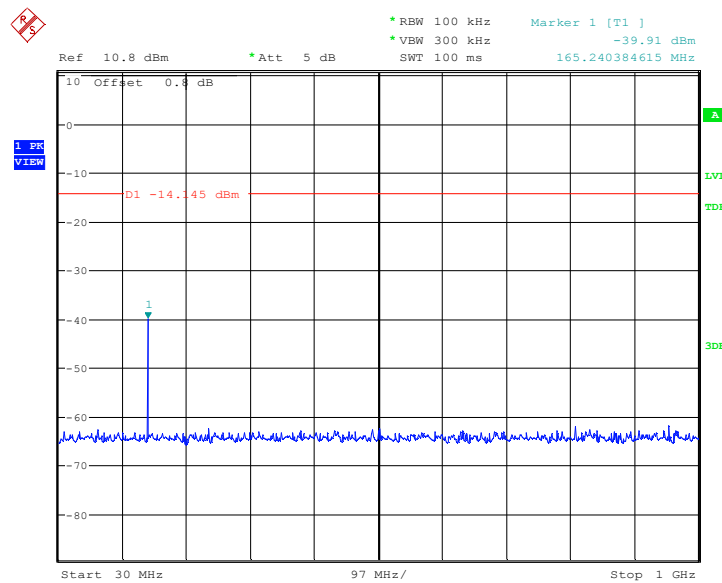
Date: 22.MAY.2014 17:41:36

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



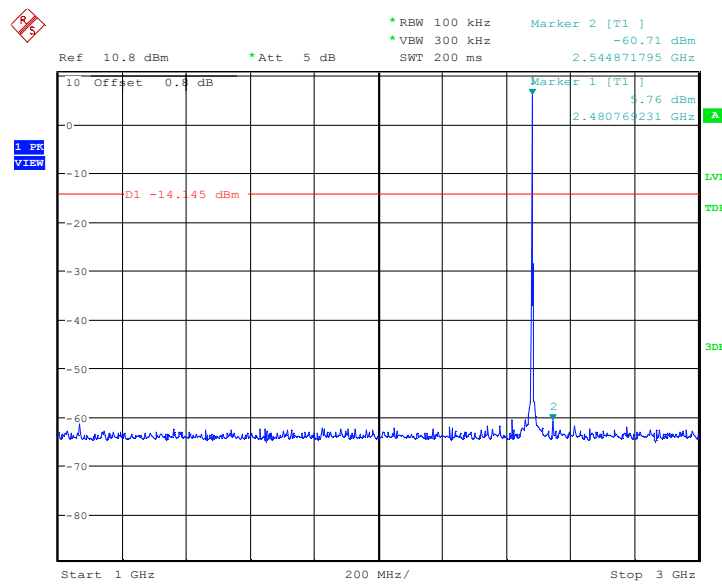
Date: 22.MAY.2014 17:41:53

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



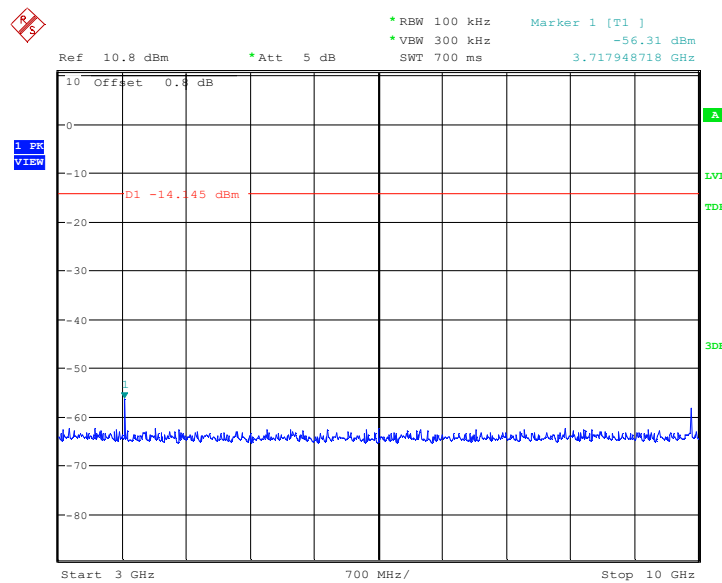
Date: 22.MAY.2014 17:42:10

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



Date: 22.MAY.2014 17:42:41

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



Date: 22.MAY.2014 17:42:58

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



Ref 10.8 dBm \* Att 5 dB \* RBW 100 kHz Marker 1 [T1] 5.89 dBm  
 \* VBW 300 kHz SWT 5 ms 2.402160256 GHz

10 Offset 0.0 dB

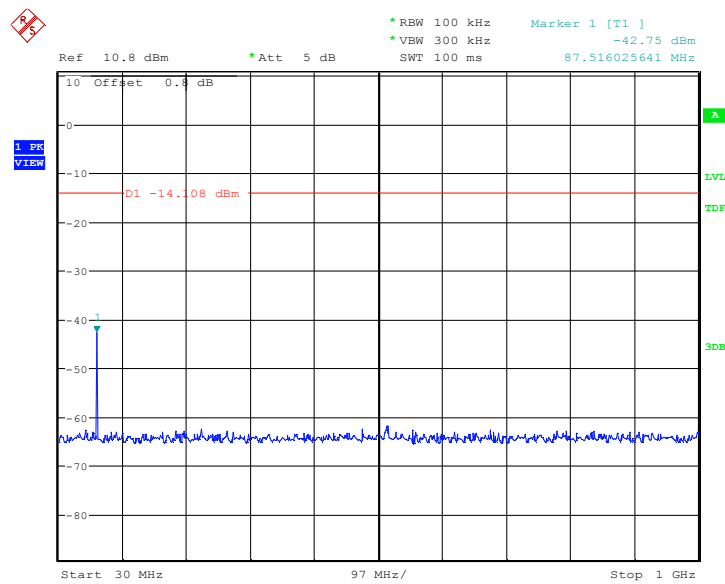
1 SP VIEW

D1 -14.108 dBm

Center 2.402 GHz 1 MHz/ Span 10 MHz

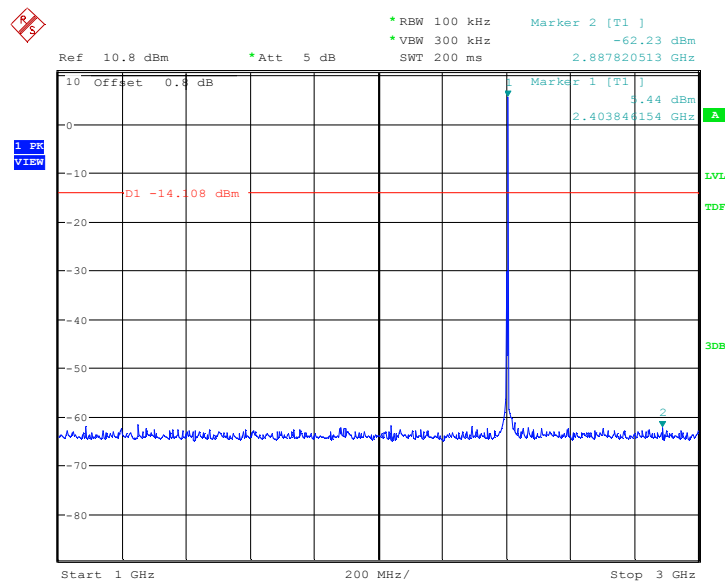
Date: 22.MAY.2014 17:59:58

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



Date: 22.MAY.2014 18:00:15

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



Date: 22.MAY.2014 18:00:46

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



\* RBW 100 kHz  
 \* VBW 300 kHz  
 SWT 1.6 s

Marker 1 [T1]  
 -61.44 dBm  
 24.512820513 GHz

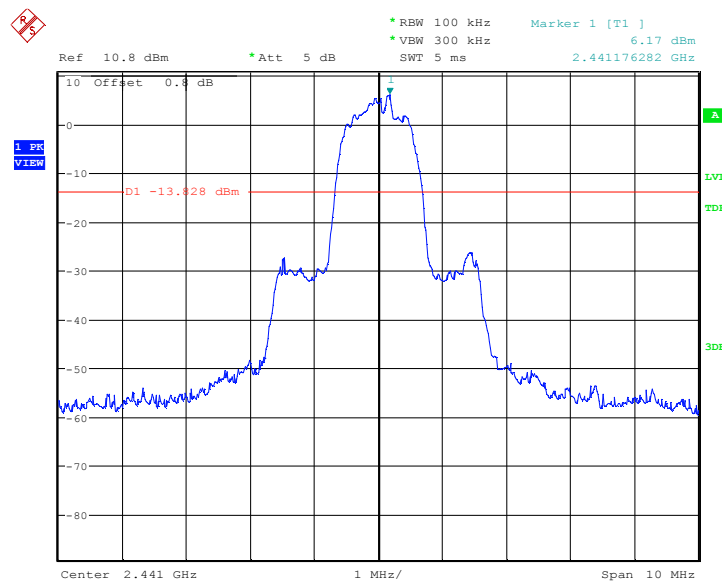
Ref 10.8 dBm  
 \* Att 5 dB

Offset 0.0 dB

D1 -14.108 dBm

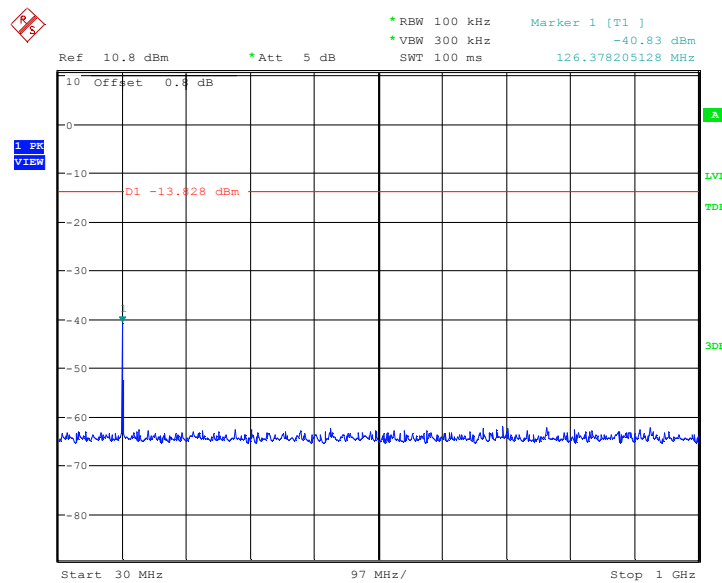
Start 10 GHz  
 1.6 GHz/  
 Stop 26 GHz

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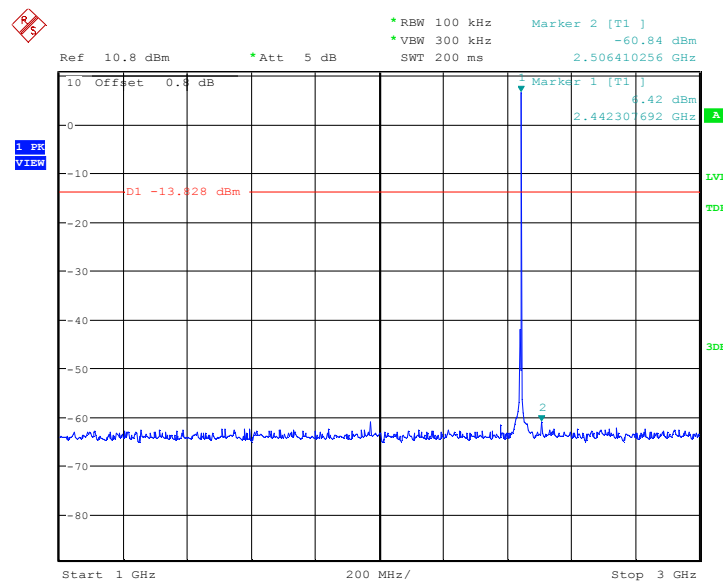
Date: 22.MAY.2014 18:01:36

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



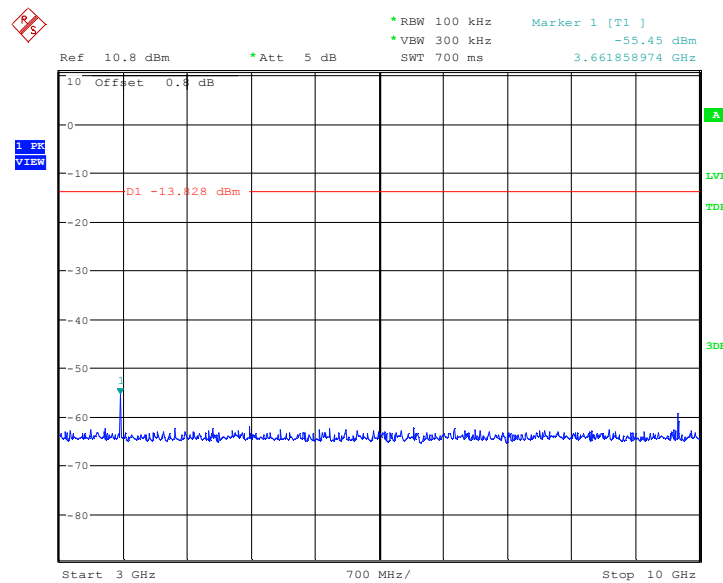
Date: 22.MAY.2014 18:01:52

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



Date: 22.MAY.2014 18:02:24

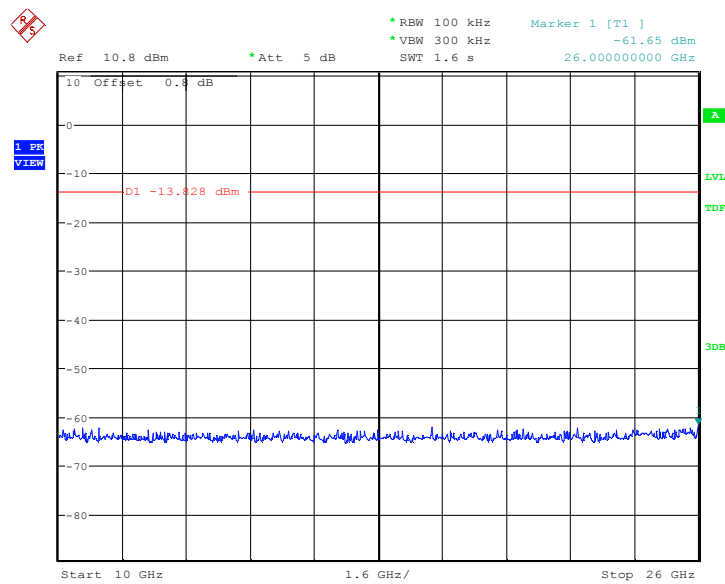
Fig.50. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz



Date: 22.MAY.2014 18:02:41

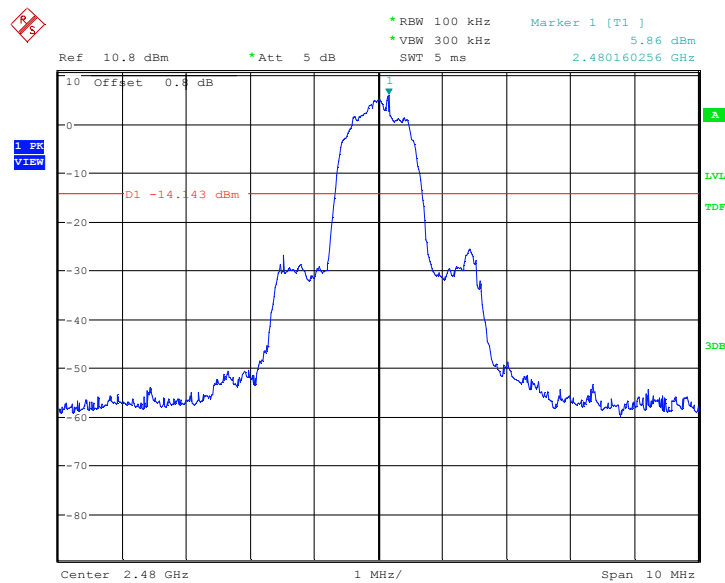
Fig.51. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz





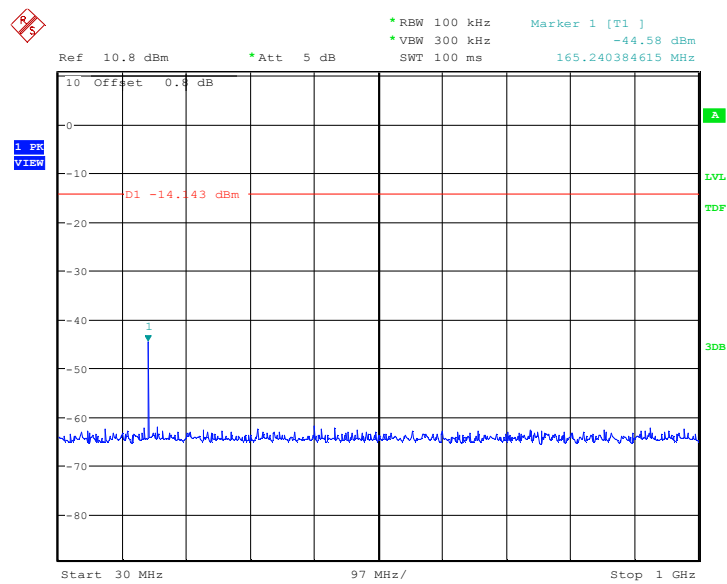
Date: 22.MAY.2014 18:02:57

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



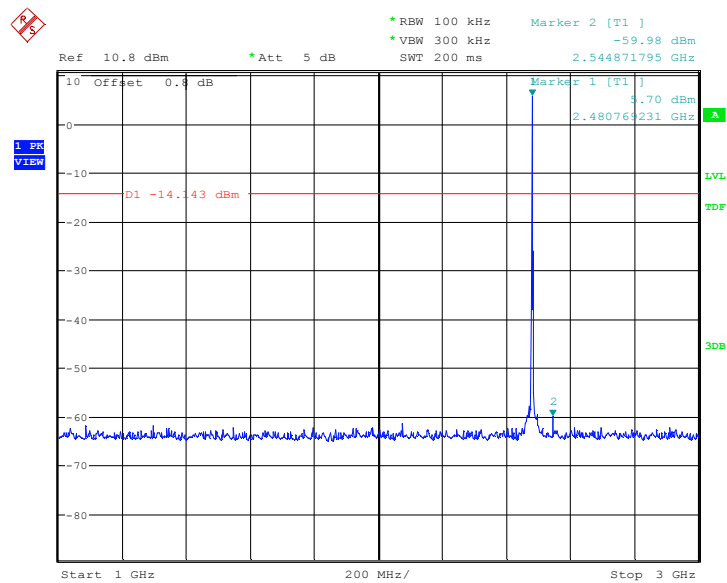
Date: 22.MAY.2014 18:03:14

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



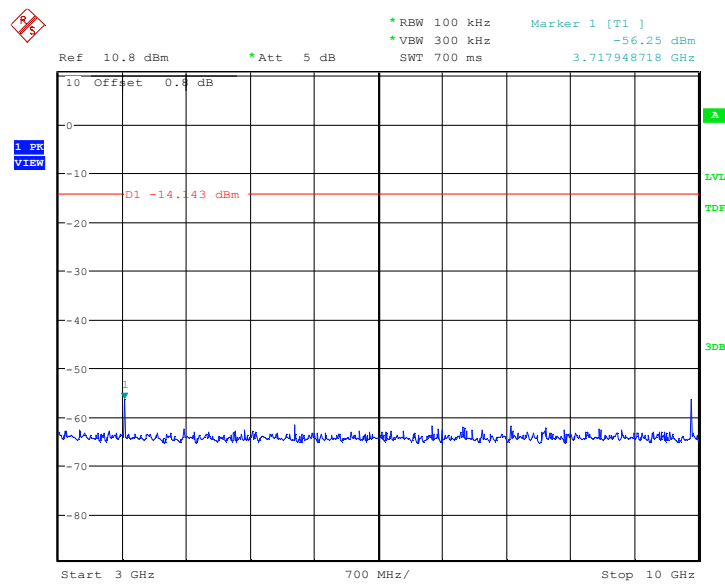
Date: 22.MAY.2014 18:03:30

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



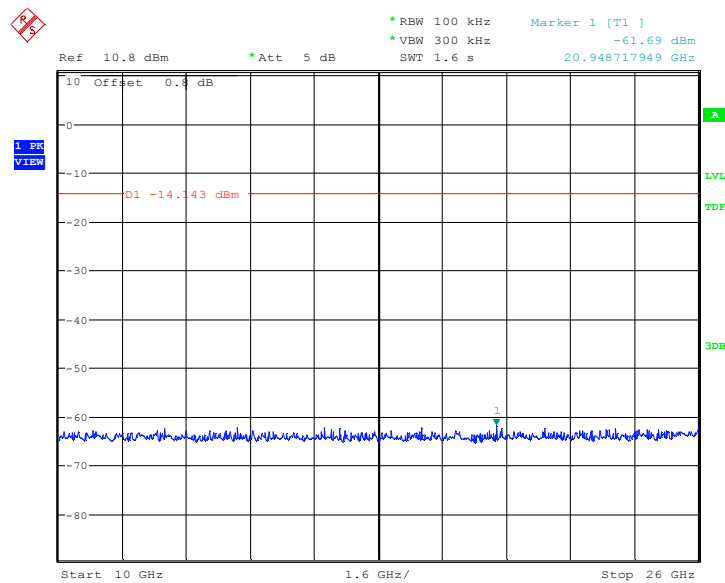
Date: 22.MAY.2014 18:04:02

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



Date: 22.MAY.2014 18:04:18

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



Date: 22.MAY.2014 18:04:35

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<br>2402 MHz  | 1 GHz ~ 3 GHz      | Fig.58       | P          |
|                   | 3 GHz ~ 18 GHz     | Fig.59       | P          |
| Ch 39<br>2441 MHz | 30 MHz ~ 1 GHz     | Fig.60       | P          |
|                   | 1 GHz ~ 3 GHz      | Fig.61       | P          |
|                   | 3 GHz ~ 18 GHz     | Fig.62       | P          |
| Ch 78<br>2480 MHz | 1 GHz ~ 3 GHz      | Fig.63       | P          |
|                   | 3 GHz ~ 18 GHz     | Fig.64       | P          |
| Power             | 2.38GHz~2.4GHz---L | Fig.65       | P          |
| Power             | 2.45GHz~2.5GHz---H | Fig.66       | P          |

|                  |                 |        |   |
|------------------|-----------------|--------|---|
| For all channels | 18 GHz ~ 26 GHz | Fig.67 | P |
|------------------|-----------------|--------|---|

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

| Channel           | Frequency Range    | Test Results | Conclusion |
|-------------------|--------------------|--------------|------------|
| Ch 0<br>2402 MHz  | 1 GHz ~ 3 GHz      | Fig.68       | P          |
|                   | 3 GHz ~ 18 GHz     | Fig.69       | P          |
| Ch 39<br>2441 MHz | 30 MHz ~ 1 GHz     | Fig.70       | P          |
|                   | 1 GHz ~ 3 GHz      | Fig.71       | P          |
|                   | 3 GHz ~ 18 GHz     | Fig.72       | P          |
| Ch 78<br>2480 MHz | 1 GHz ~ 3 GHz      | Fig.73       | P          |
|                   | 3 GHz ~ 18 GHz     | Fig.74       | P          |
| Power             | 2.38GHz~2.4GHz---L | Fig.75       | P          |
| Power             | 2.45GHz~2.5GHz---H | Fig.76       | P          |
| For all channels  | 18 GHz ~ 26 GHz    | Fig.77       | P          |

#### For 8DPSK

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

#### GFSK Ch 0 - Average

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | PMea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 2390.000       | 33.7           | -11.10    | 44.8         | H            |
| 17982.000      | 42.6           | 27.90     | 14.7         | V            |
| 17989.500      | 42.4           | 27.90     | 14.5         | V            |
| 17995.500      | 42.2           | 27.90     | 14.3         | V            |
| 17973.000      | 42.1           | 27.90     | 14.2         | H            |
| 17976.000      | 42.1           | 27.90     | 14.2         | V            |

#### GFSK Ch 39 - Average

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 17989.500      | 42.5           | 27.90     | 14.6         | V            |
| 17998.500      | 42.2           | 27.90     | 14.3         | V            |
| 17982.000      | 42.1           | 27.90     | 14.2         | V            |
| 17995.500      | 42.1           | 27.90     | 14.2         | V            |
| 17986.500      | 42.1           | 27.90     | 14.2         | V            |
| 17979.000      | 42.0           | 27.90     | 14.1         | H            |

**GFSK Ch 78 - Average**

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 2483.500       | 34.5           | -11.20    | 45.700       | H            |
| 17976.000      | 42.4           | 27.90     | 14.500       | V            |
| 17982.000      | 42.3           | 27.90     | 14.400       | H            |
| 17949.000      | 42.2           | 27.90     | 14.300       | H            |
| 17989.500      | 42.2           | 27.90     | 14.300       | V            |
| 17965.500      | 42.2           | 27.90     | 14.300       | H            |

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

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 2390.000       | 33.6           | -11.10    | 44.7         | V            |
| 17982.000      | 42.5           | 27.90     | 14.6         | V            |
| 17992.500      | 42.5           | 27.90     | 14.6         | H            |
| 17989.500      | 42.2           | 27.90     | 14.3         | H            |
| 17998.500      | 42.1           | 27.90     | 14.2         | V            |
| 17979.000      | 42.1           | 27.90     | 14.2         | H            |

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

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 17982.000      | 42.3           | 27.90     | 14.4         | V            |
| 17992.500      | 42.2           | 27.90     | 14.3         | V            |
| 17989.500      | 42.1           | 27.90     | 14.2         | H            |
| 17979.000      | 42.1           | 27.90     | 14.2         | V            |
| 17976.000      | 42.0           | 27.90     | 14.1         | V            |
| 17983.500      | 41.9           | 27.90     | 14.0         | V            |

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

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 2484.300       | 35.2           | -11.20    | 46.4         | H            |
| 17979.000      | 42.2           | 27.90     | 14.3         | V            |
| 17992.500      | 42.2           | 27.90     | 14.3         | V            |
| 17989.500      | 42.2           | 27.90     | 14.3         | V            |
| 17995.500      | 42.2           | 27.90     | 14.3         | V            |
| 17986.500      | 42.2           | 27.90     | 14.3         | V            |

**8DPSK Ch 0 - Average**

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 2390.000       | 33.6           | -11.10    | 44.7         | V            |
| 17976.000      | 42.5           | 27.90     | 14.6         | H            |
| 17982.000      | 42.3           | 27.90     | 14.4         | V            |
| 17992.500      | 42.2           | 27.90     | 14.3         | V            |
| 17979.000      | 42.2           | 27.90     | 14.3         | V            |
| 17995.500      | 41.9           | 27.90     | 14.0         | H            |

### 8DPSK Ch 39 - Average

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 17989.500      | 42.1           | 27.90     | 14.2         | V            |
| 17982.000      | 42.1           | 27.90     | 14.2         | V            |
| 17965.500      | 42.0           | 27.90     | 14.1         | V            |
| 17976.000      | 42.0           | 27.90     | 14.1         | H            |
| 17979.000      | 42.0           | 27.90     | 14.1         | V            |
| 17955.000      | 41.9           | 27.90     | 14.0         | V            |

### 8DPSK Ch 78 - Average

| Frequency(MHz) | Result(dBuv/m) | ARPL (dB) | Pmea(dBuv/m) | Polarization |
|----------------|----------------|-----------|--------------|--------------|
| 2483.500       | 34.5           | -11.20    | 45.7         | H            |
| 17982.000      | 42.4           | 27.90     | 14.5         | V            |
| 17965.500      | 42.2           | 27.90     | 14.3         | V            |
| 17989.500      | 42.1           | 27.90     | 14.2         | V            |
| 17995.500      | 42.1           | 27.90     | 14.2         | V            |
| 17979.000      | 42.0           | 27.90     | 14.1         | V            |

**Conclusion: PASS**

**Test graphs as below:**

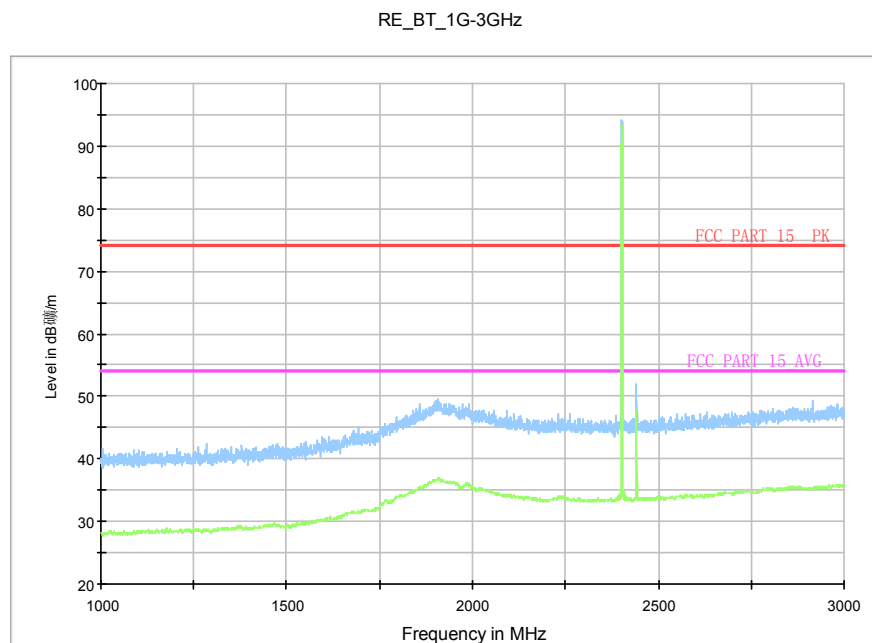


Fig.58. Radiated emission: GFSK, Channel 0, 1 GHz - 3 GHz

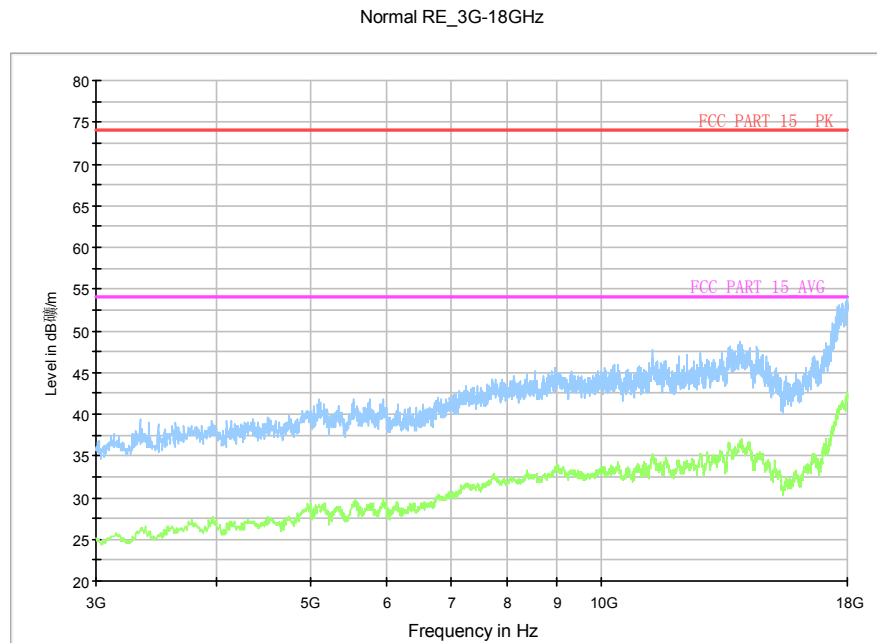


Fig.59. Radiated emission: GFSK, Channel 0, 3 GHz - 18 GHz

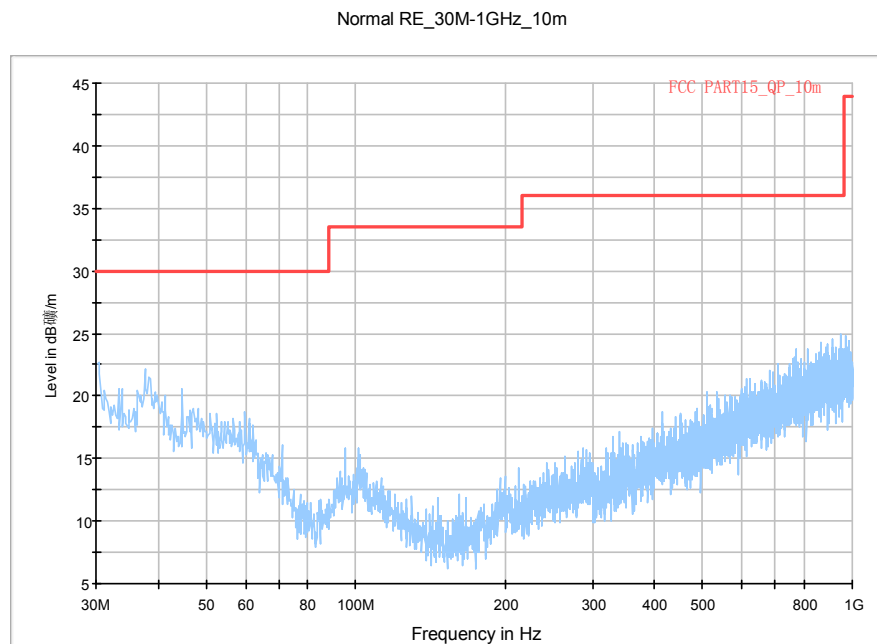


Fig.60. Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz



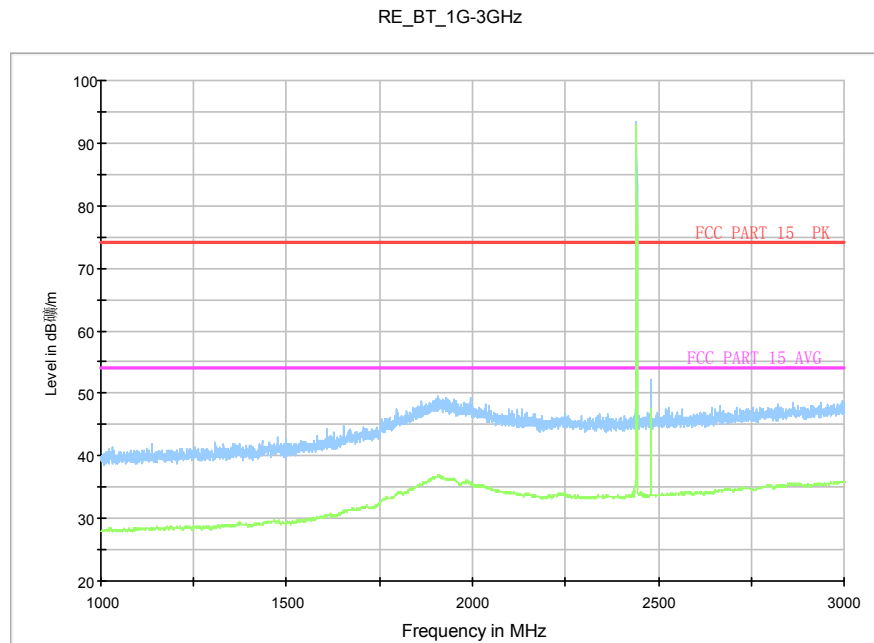


Fig.61. Radiated emission: GFSK, Channel 39, 1 GHz - 3 GHz

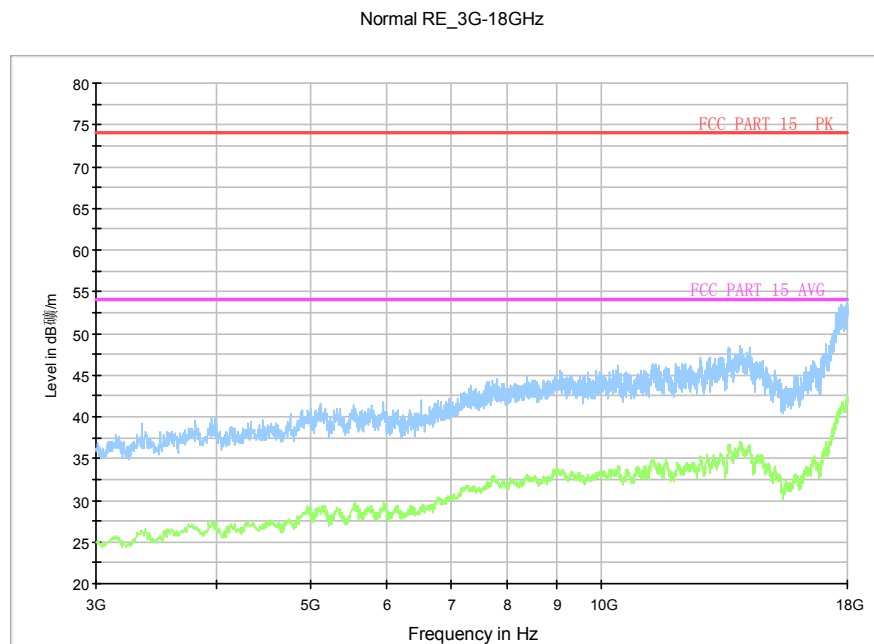


Fig.62. Radiated emission: GFSK, Channel 39, 3 GHz - 18 GHz

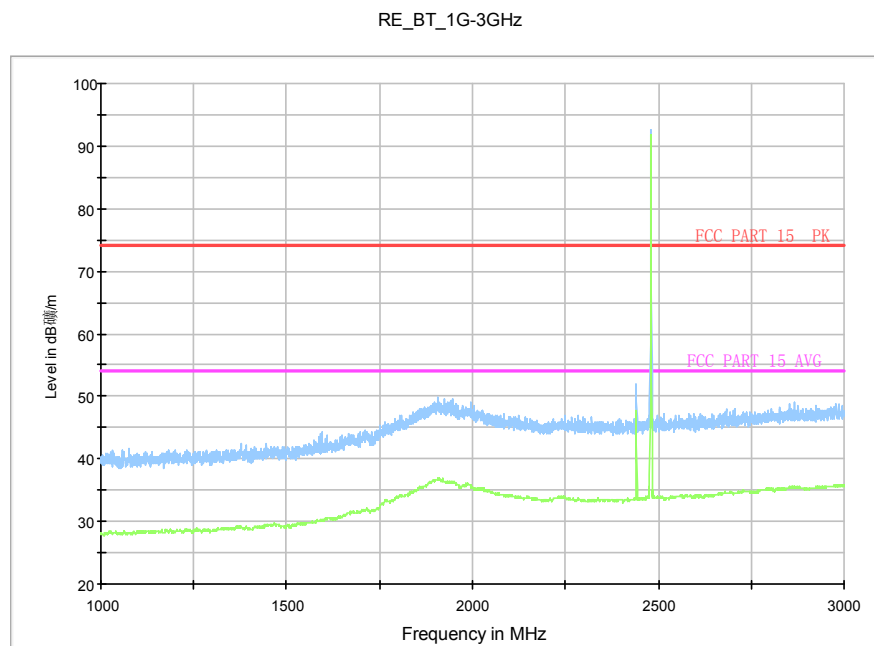


Fig.63. Radiated emission: GFSK, Channel 78, 1 GHz - 3 GHz

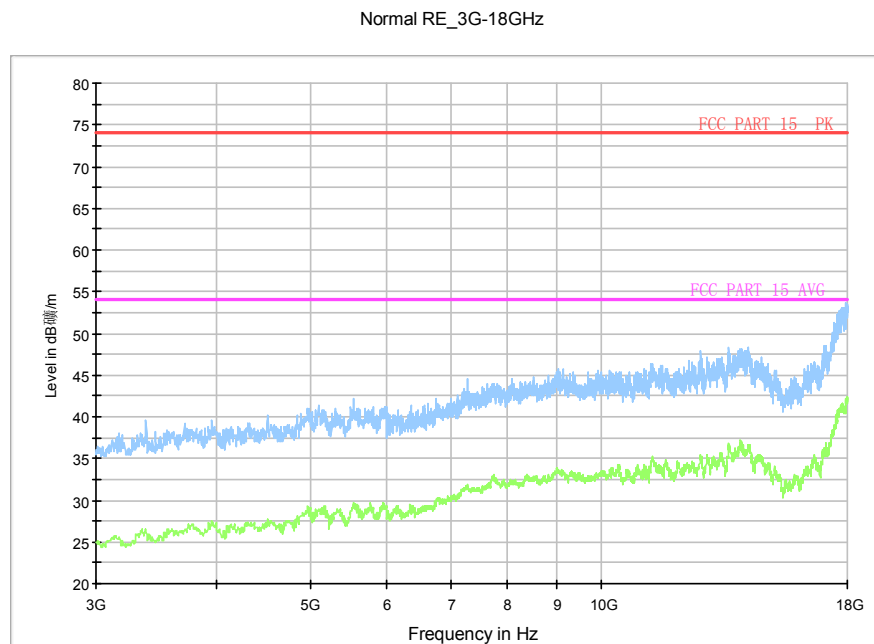


Fig.64. Radiated emission: GFSK, Channel 78, 3 GHz - 18 GHz

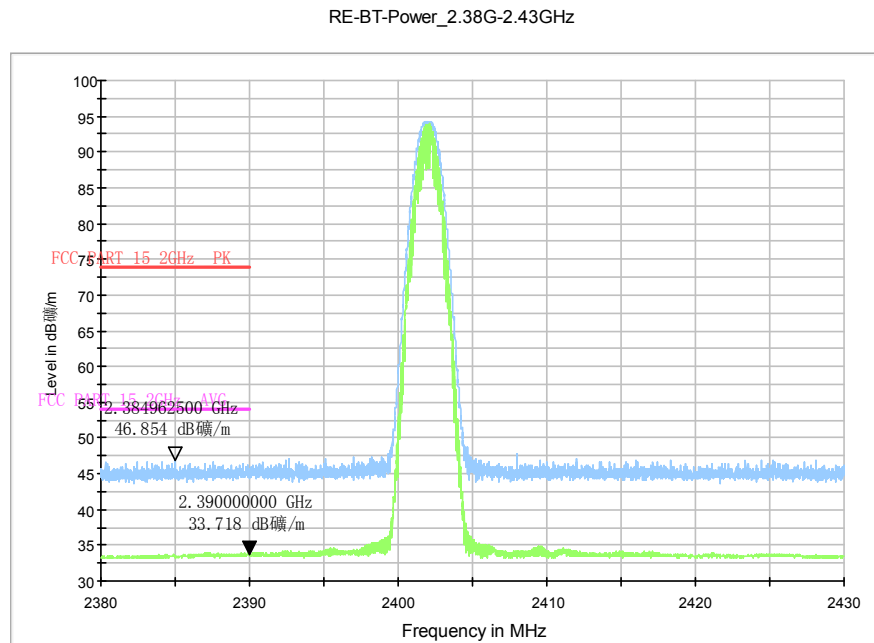


Fig.65. Radiated emission (Power): GFSK, low channel

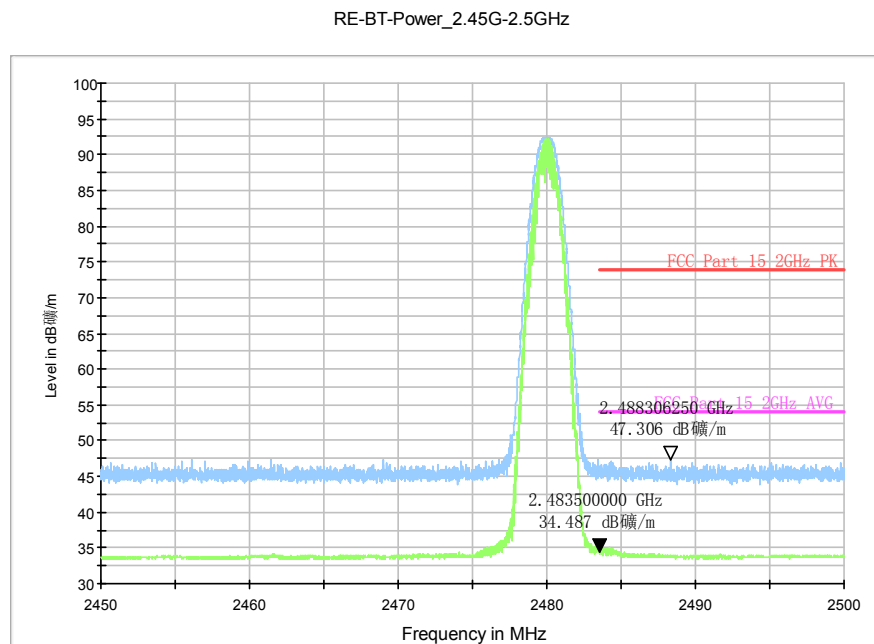


Fig.66. Radiated emission (Power) GFSK, high channel

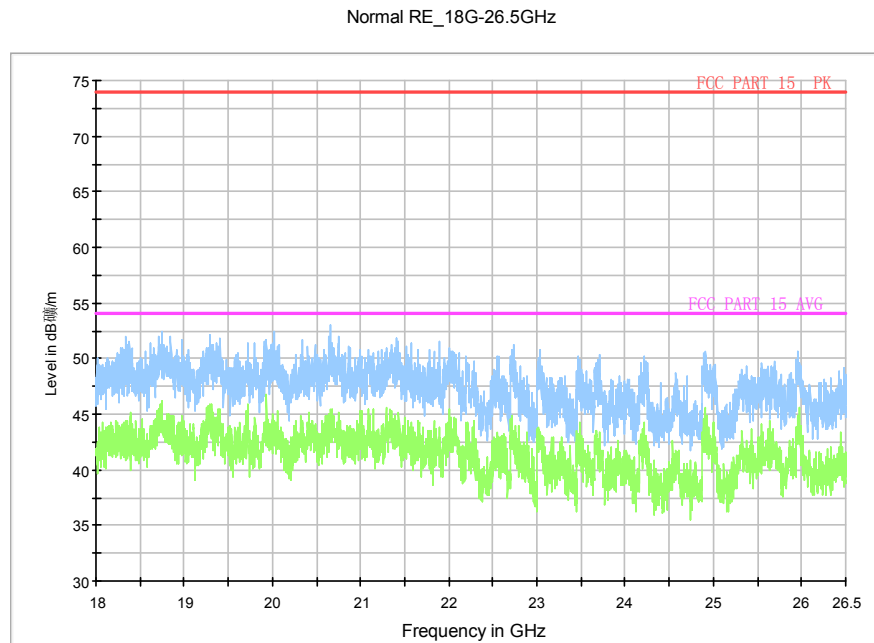


Fig.67. Radiated emission: GFSK, 18 GHz - 26 GHz

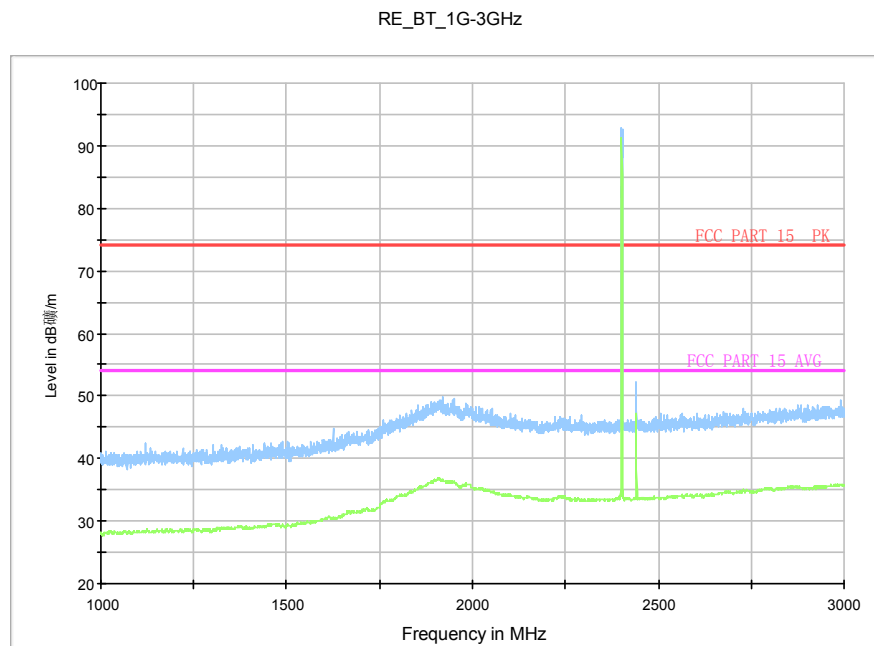


Fig.68. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 1 GHz - 3 GHz

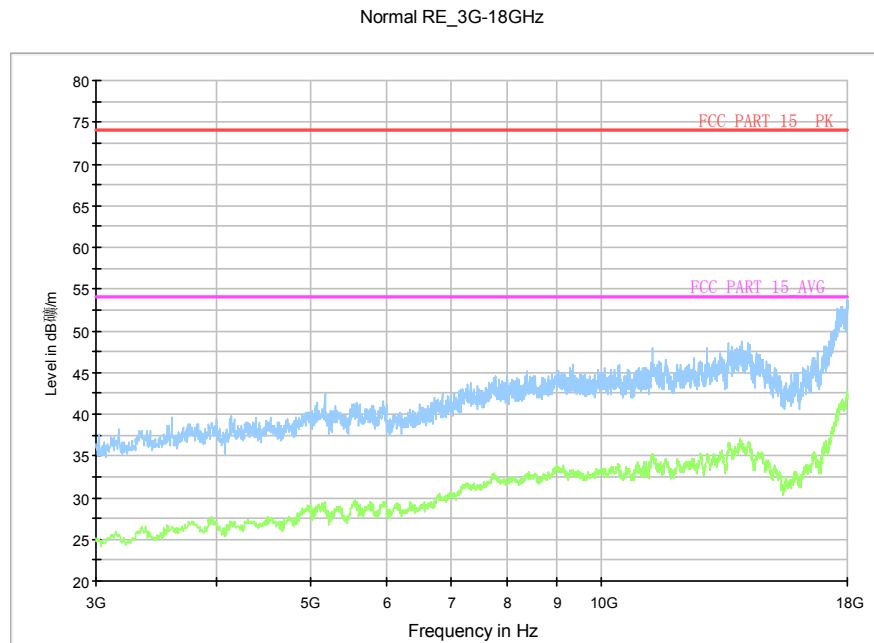


Fig.69. Radiated emission:  $\pi/4$  DQPSK, Channel 0, 3 GHz - 18 GHz

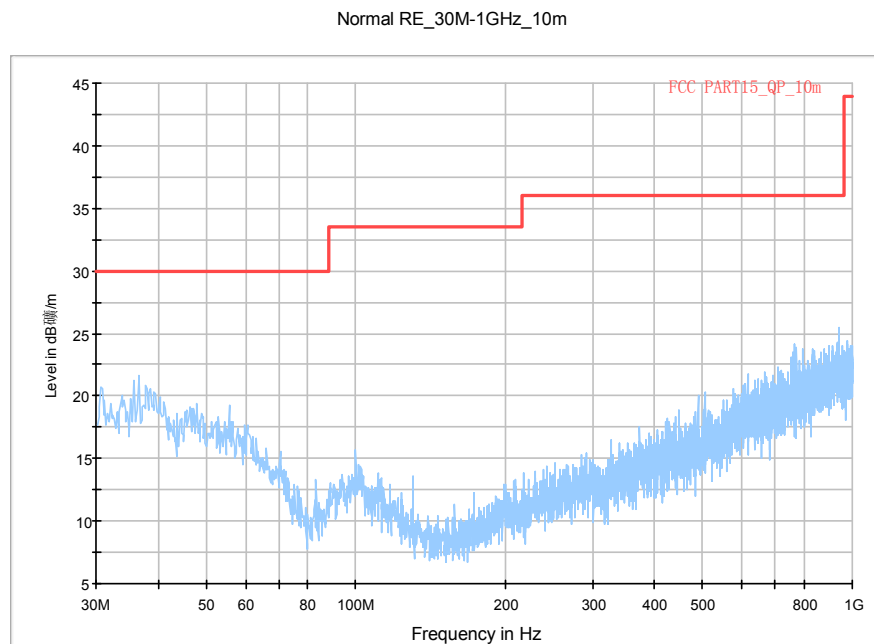


Fig.70. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 30 MHz - 1 GHz

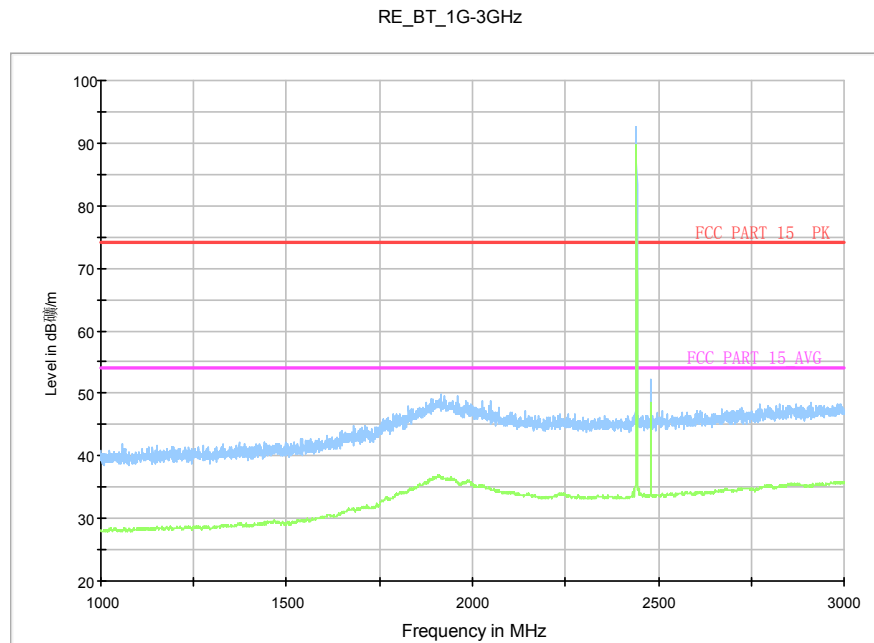


Fig.71. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 1 GHz - 3 GHz

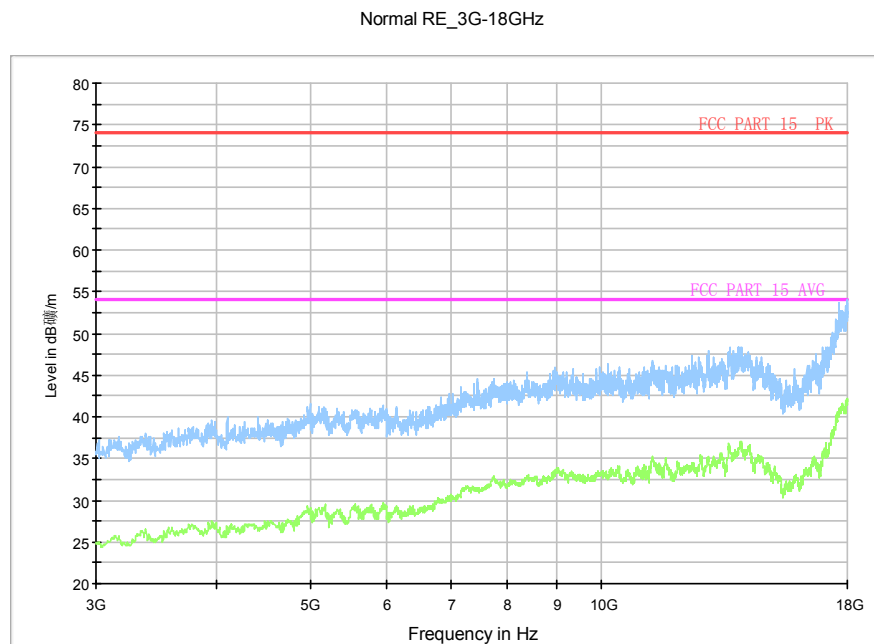


Fig.72. Radiated emission:  $\pi/4$  DQPSK, Channel 39, 3 GHz - 18 GHz

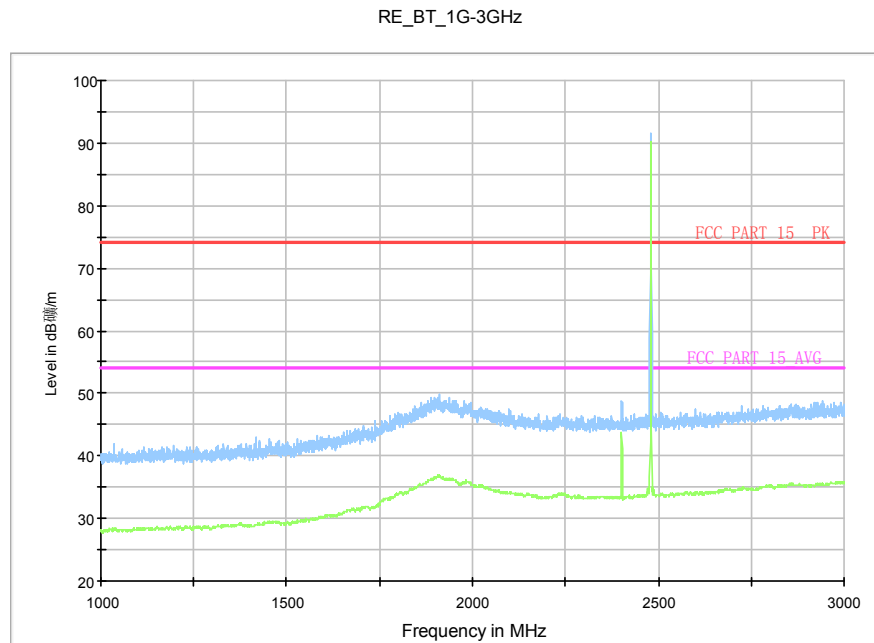


Fig.73. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 1 GHz - 3 GHz

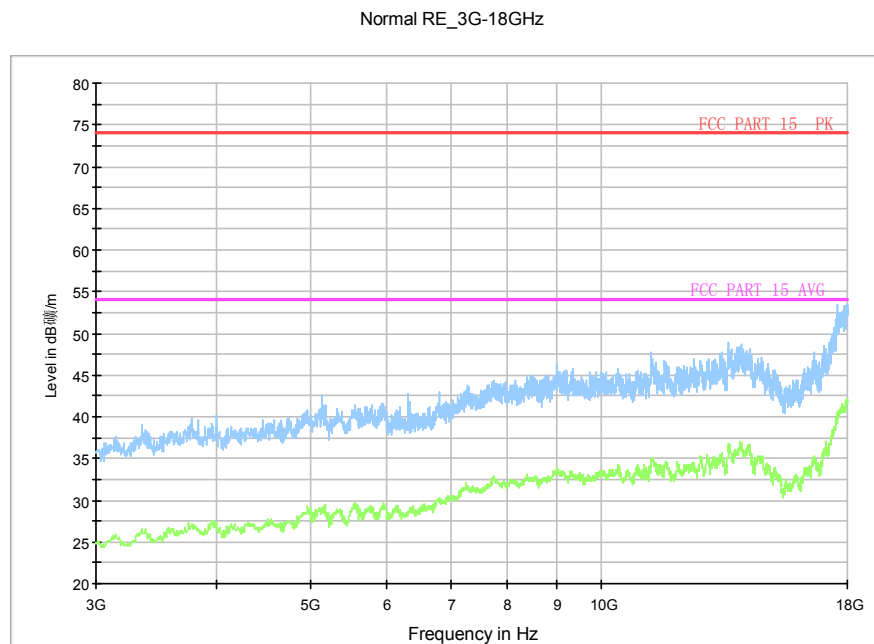


Fig.74. Radiated emission:  $\pi/4$  DQPSK, Channel 78, 3 GHz - 18 GHz

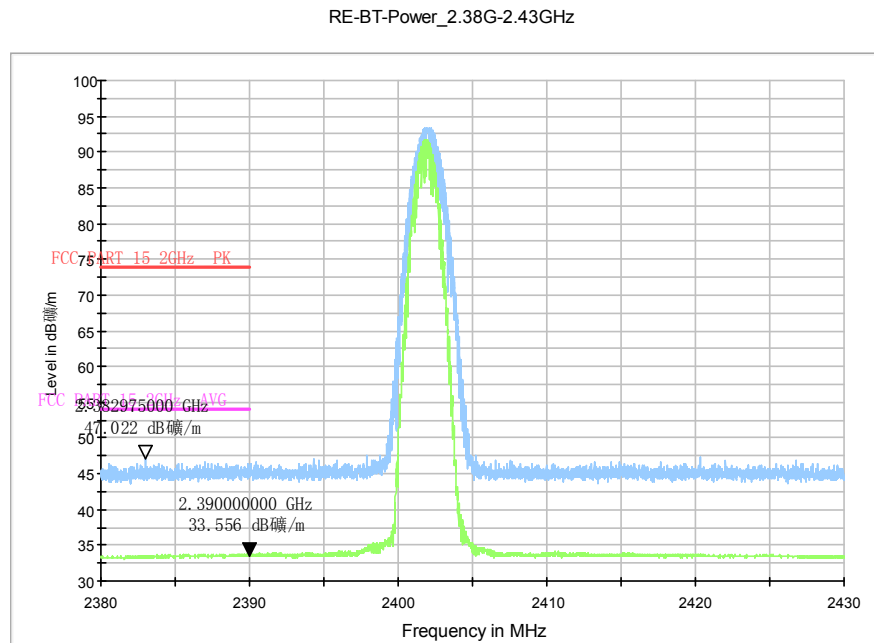


Fig.75. Radiated emission (Power):  $\pi/4$  DQPSK, low channel

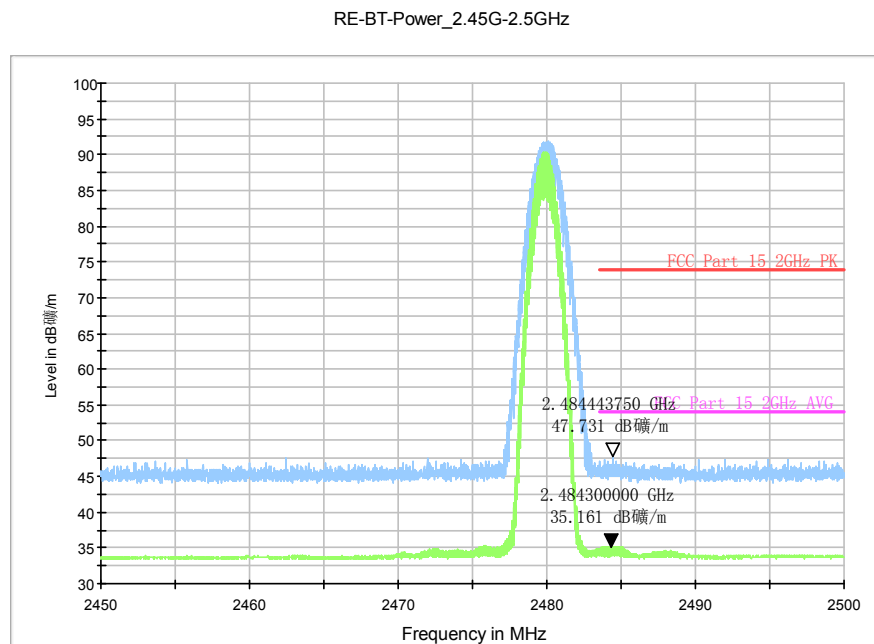


Fig.76. Radiated emission (Power):  $\pi/4$  DQPSK, high channel



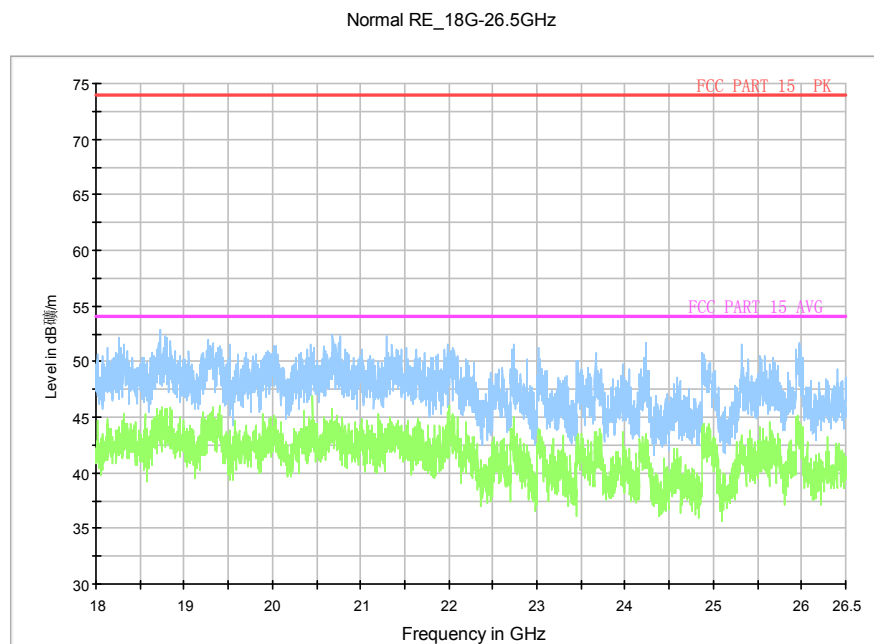


Fig.77. Radiated emission:  $\pi/4$  DQPSK, 18 GHz - 26 GHz

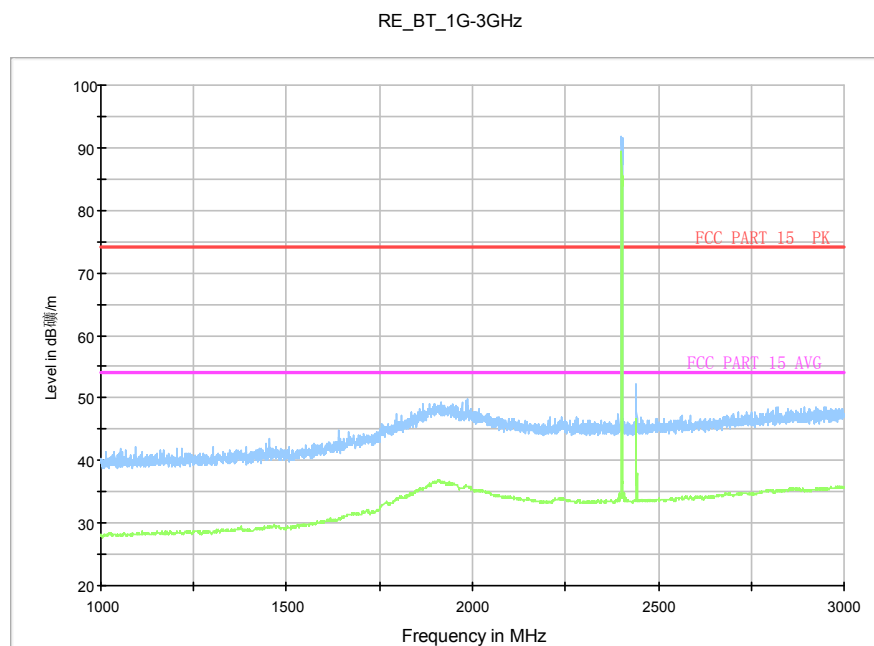


Fig.78. Radiated emission: 8DPSK, Channel 0, 1 GHz - 3 GHz

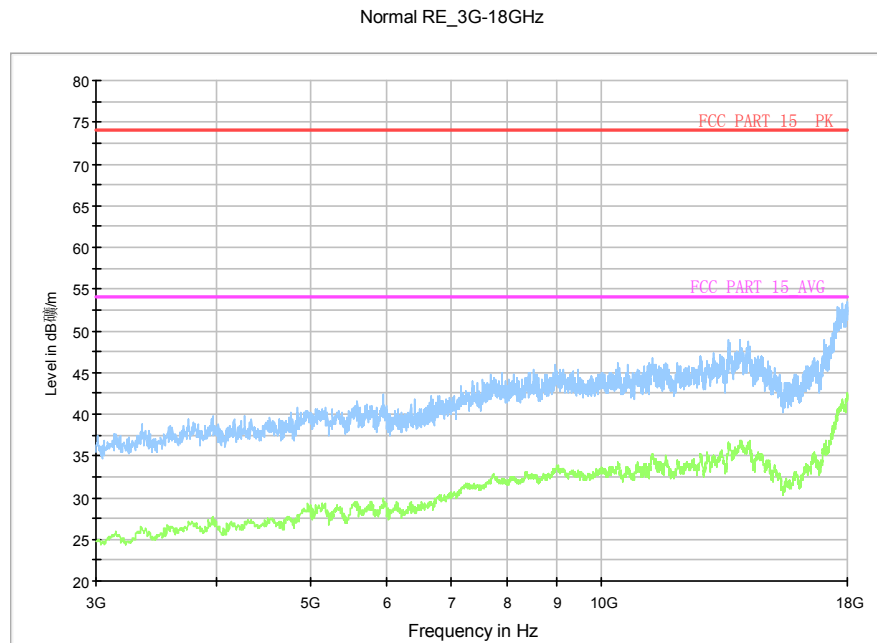


Fig.79. Radiated emission: 8DPSK, Channel 0, 3 GHz - 18 GHz

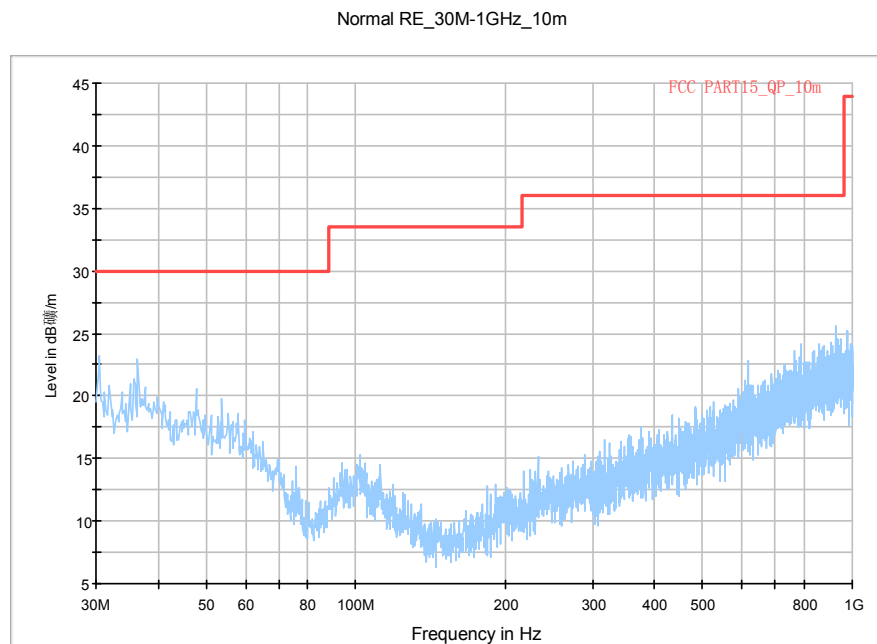


Fig.80. Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

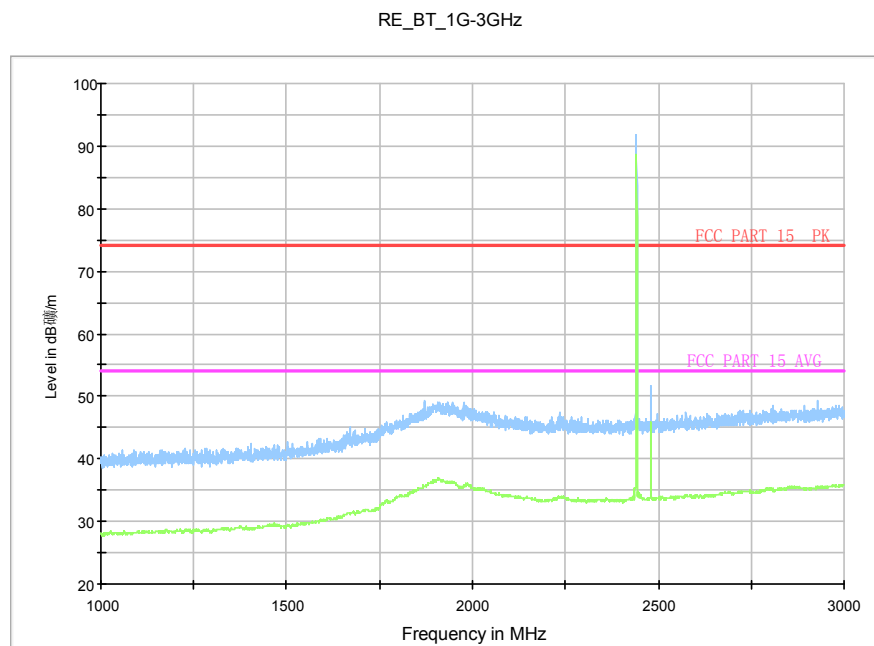


Fig.81. Radiated emission: 8DPSK, Channel 39, 1 GHz - 3 GHz

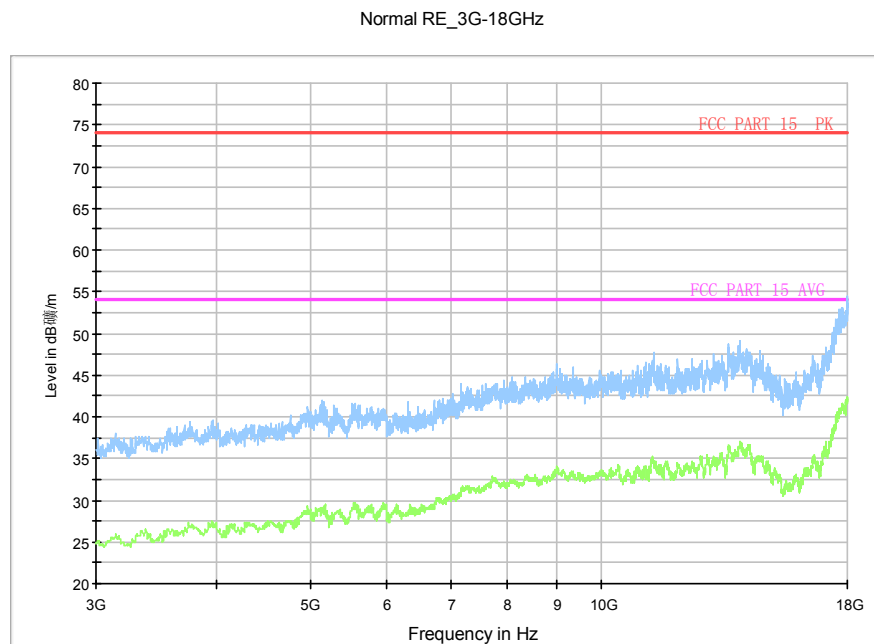


Fig.82. Radiated emission: 8DPSK, Channel 39, 3 GHz - 18 GHz

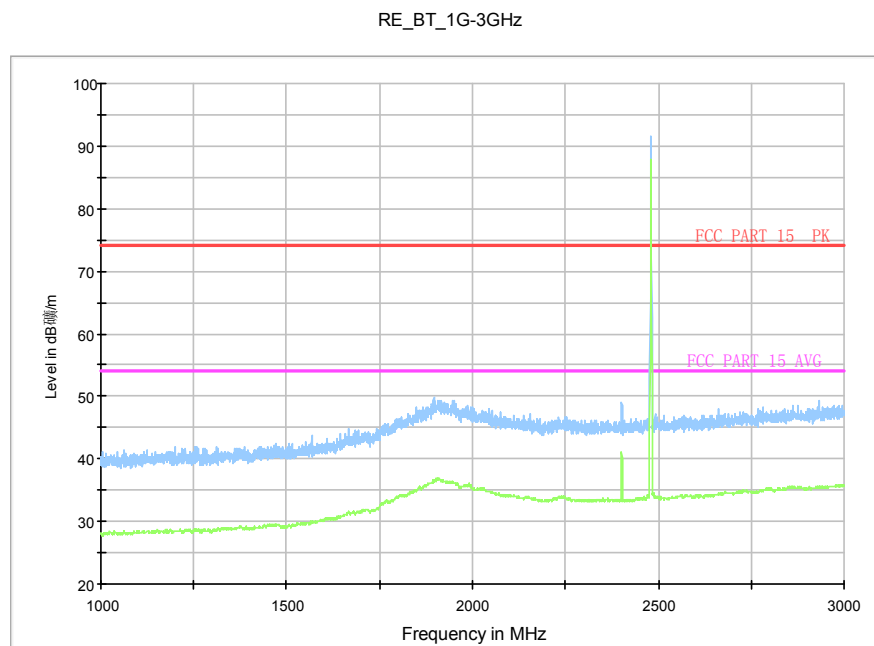


Fig.83. Radiated emission: 8DPSK, Channel 78, 1 GHz - 3 GHz

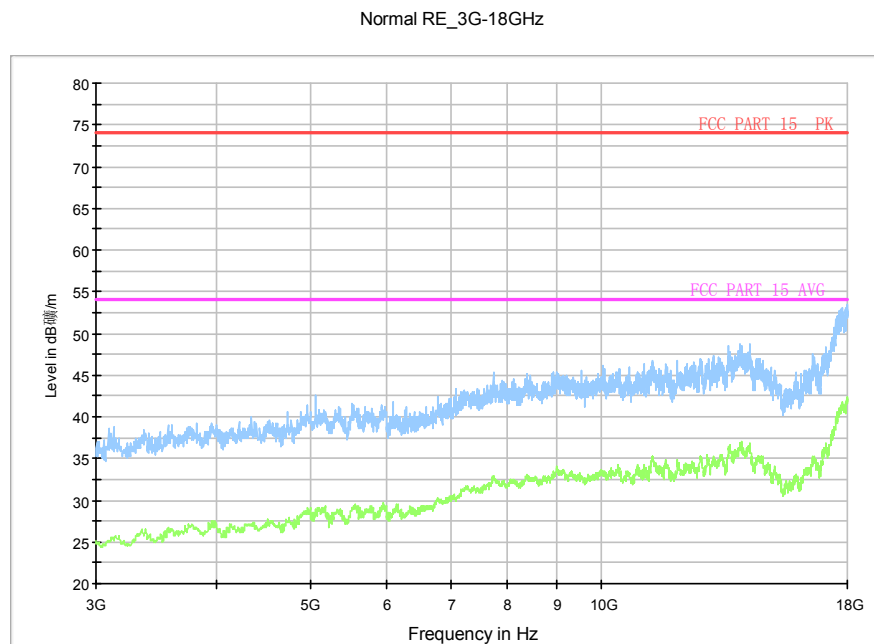


Fig.84. Radiated emission: 8DPSK, Channel 78, 3 GHz - 18 GHz

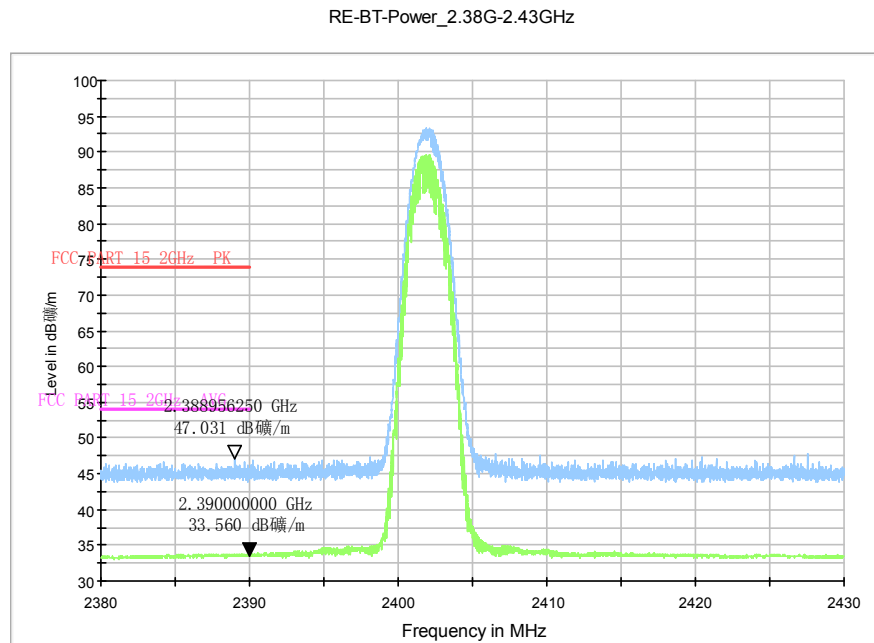


Fig.85. Radiated emission (Power): 8DPSK, low channel

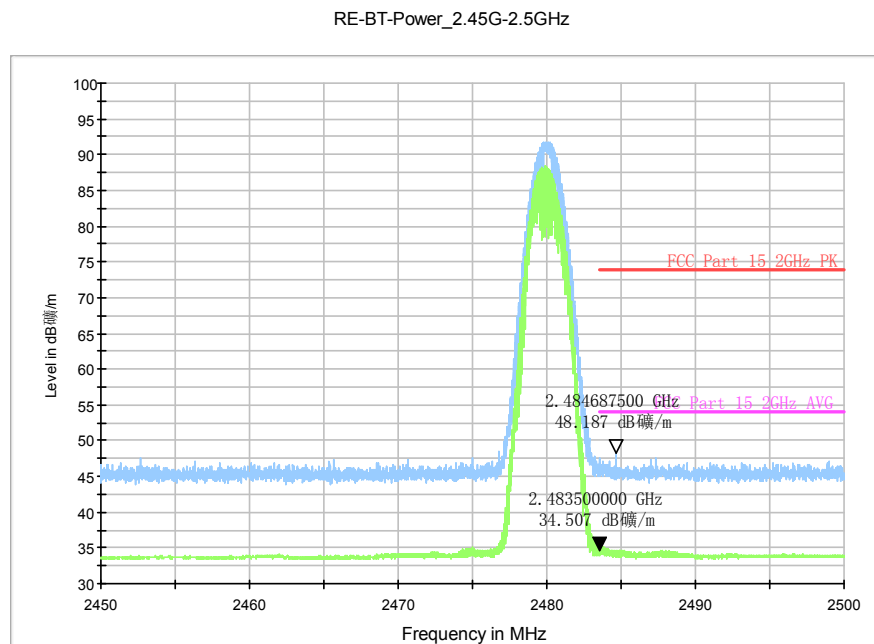


Fig.86. Radiated emission (Power): 8DPSK, high channel

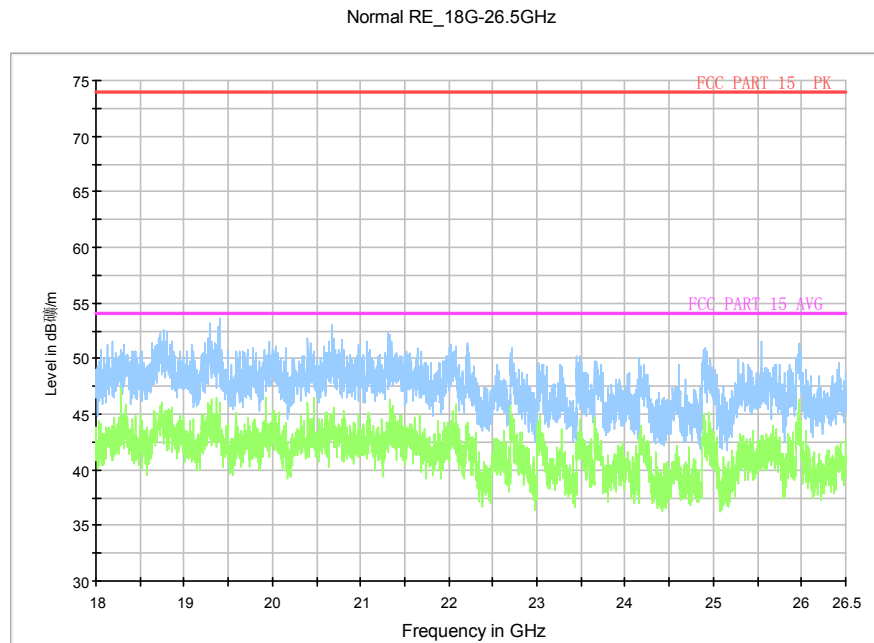


Fig.87. Radiated emission: 8DPSK, 18 GHz - 26 GHz

## 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 ANSI C63.10

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 Result:

#### For GFSK

| Channel | Packet | Dwell Time (ms) |        | Conclusion |
|---------|--------|-----------------|--------|------------|
| 39      | DH1    | Fig.88          | 105.51 | P          |
|         |        | Fig.89          |        |            |
|         | DH3    | Fig.90          | 172.14 | P          |
|         |        | Fig.91          |        |            |
|         | DH5    | Fig.92          | 162.00 | P          |
|         |        | Fig.93          |        |            |

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

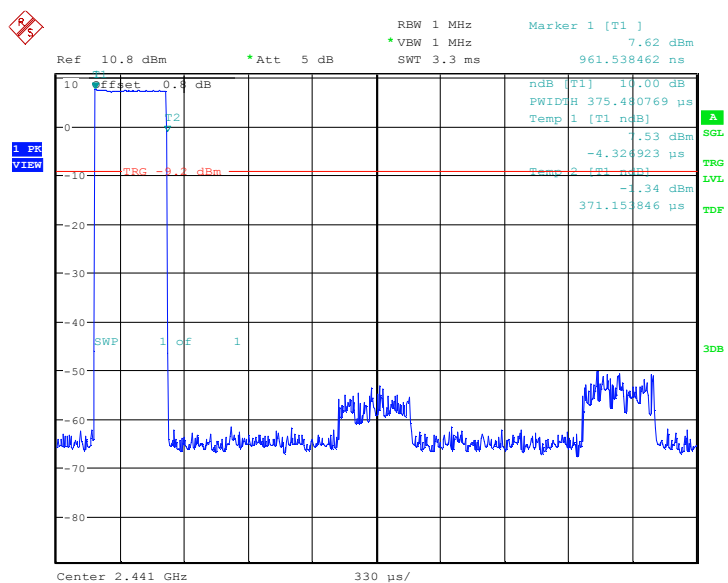
| Channel | Packet | Dwell Time (ms) |        | Conclusion |
|---------|--------|-----------------|--------|------------|
| 39      | DH1    | Fig.94          | 105.85 | P          |
|         |        | Fig.95          |        |            |
|         | DH3    | Fig.96          | 169.54 | P          |
|         |        | Fig.97          |        |            |
|         | DH5    | Fig.98          | 206.76 | P          |
|         |        | Fig.99          |        |            |

#### For 8DPSK

| Channel | Packet | Dwell Time (ms) |        | Conclusion |
|---------|--------|-----------------|--------|------------|
| 39      | DH1    | Fig.100         | 108.10 | P          |
|         |        | Fig.101         |        |            |
|         | DH3    | Fig.102         | 162.60 | P          |
|         |        | Fig.103         |        |            |
|         | DH5    | Fig.104         | 185.82 | P          |
|         |        | Fig.105         |        |            |

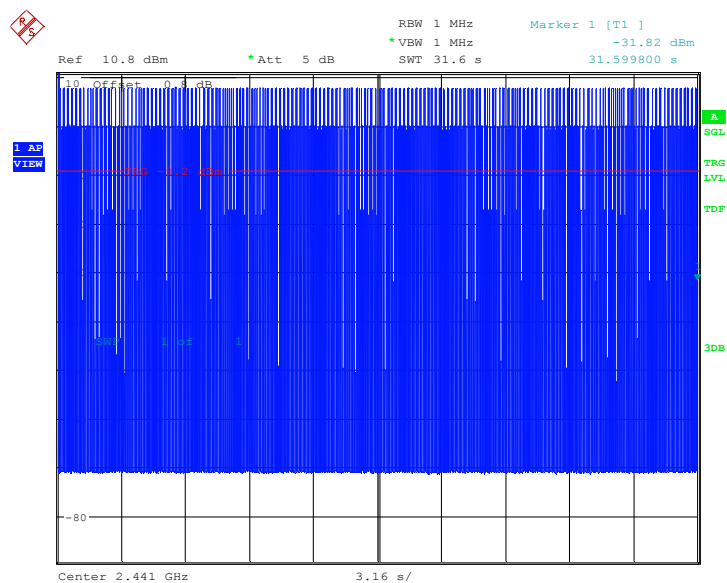
**Conclusion: PASS**

**Test graphs as below:**



Date: 22.MAY.2014 18:25:22

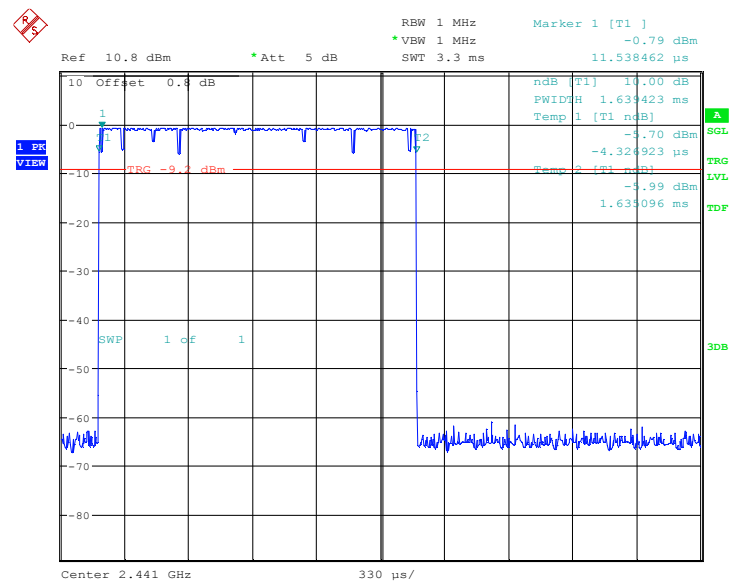
Fig.88. Time of occupancy (Dwell Time): Channel 39, Packet DH1



Date: 22.MAY.2014 18:25:10

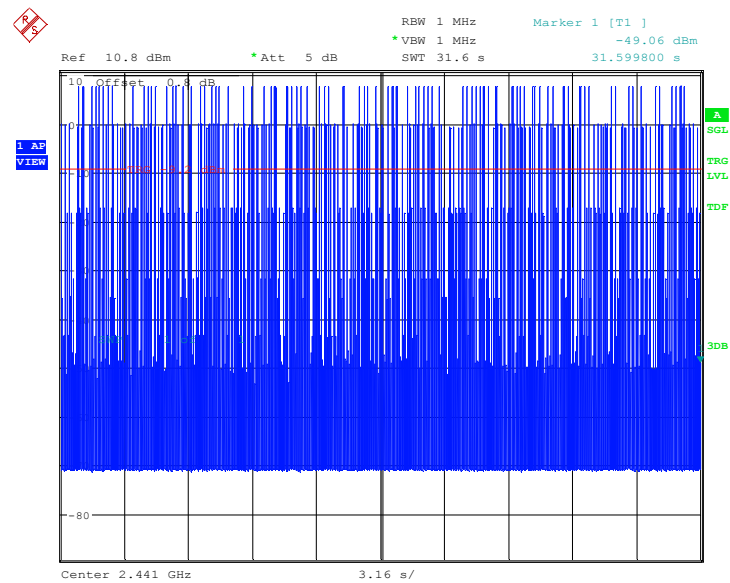
Fig.89. Number of Transmissions Measurement:Channel 39,Packet DH1





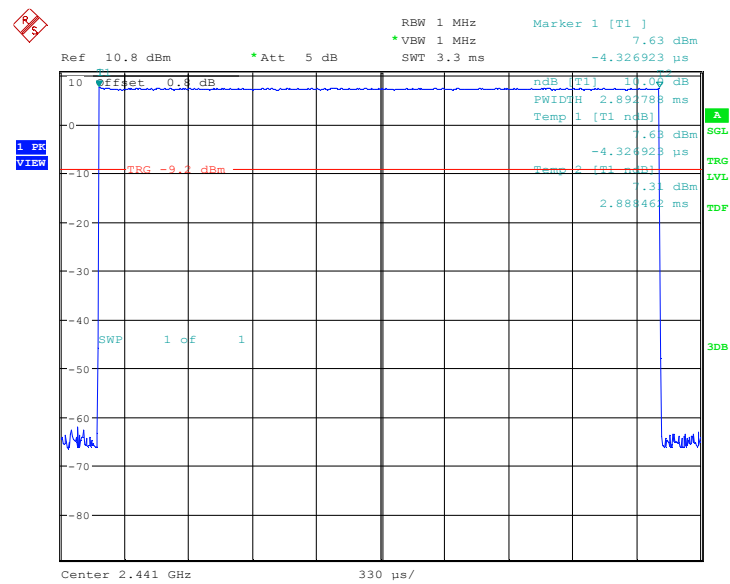
Date: 22.MAY.2014 18:26:39

Fig.90. Time of occupancy (Dwell Time): Channel 39, Packet DH3



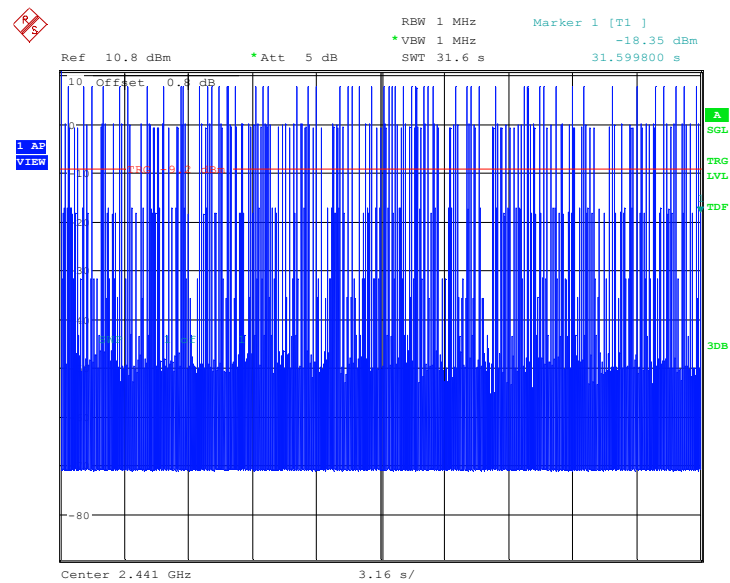
Date: 22.MAY.2014 18:26:27

Fig.91. Number of Transmissions Measurement: Channel 39, Packet DH3



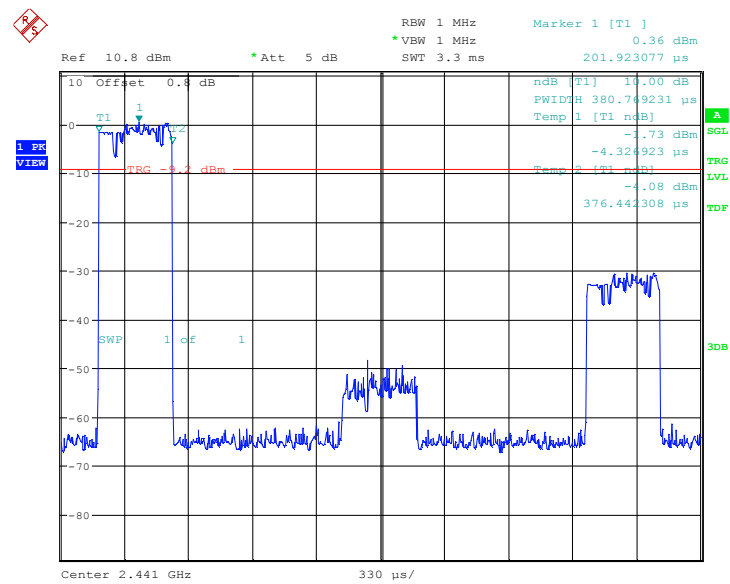
Date: 22.MAY.2014 18:27:56

Fig.92. Time of occupancy (Dwell Time): Channel 39, Packet DH5



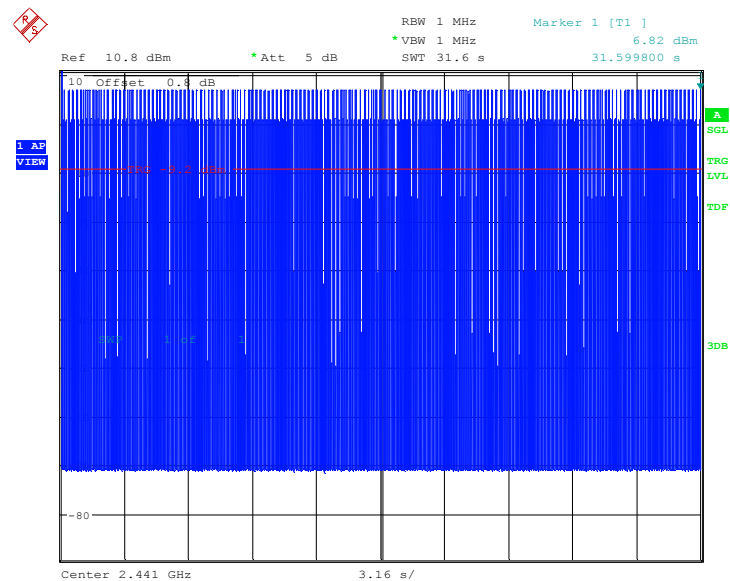
Date: 22.MAY.2014 18:27:44

Fig.93. Number of Transmissions Measurement:Channel 39,Packet DH5



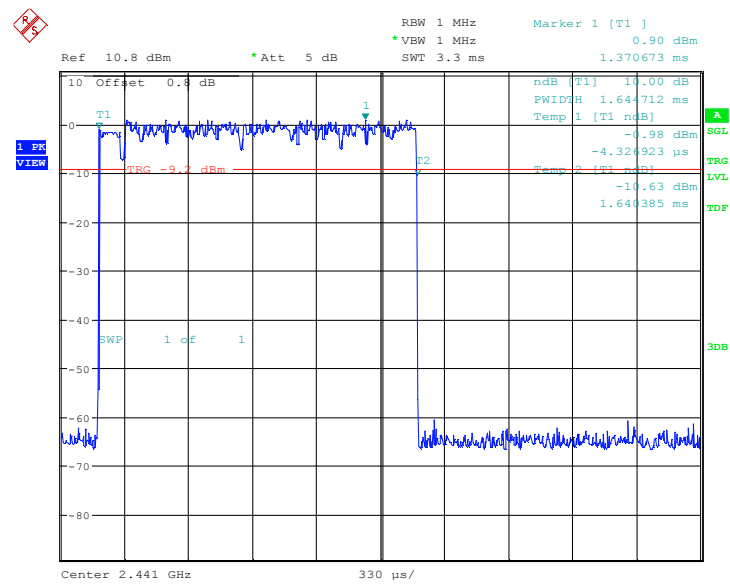
Date: 22.MAY.2014 18:34:01

Fig.94. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1



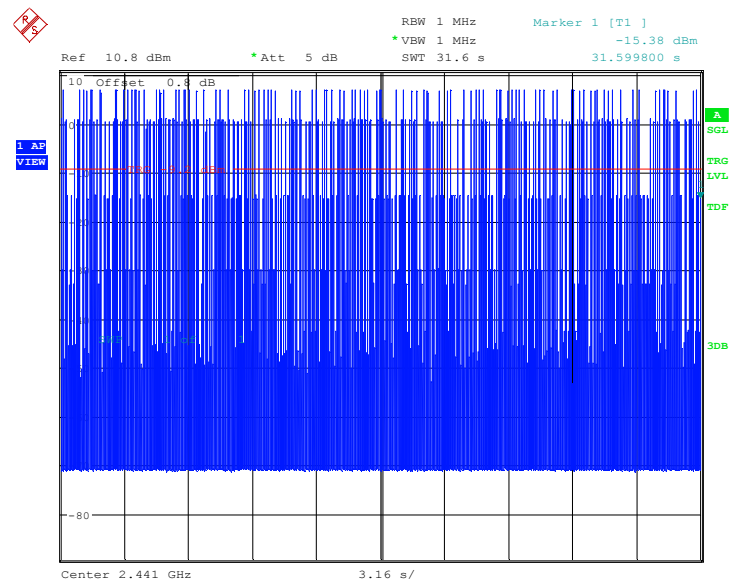
Date: 22.MAY.2014 18:33:50

Fig.95. Number of Transmissions Measurement:Channel 39,Packet 2-DH1



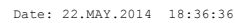
Date: 22.MAY.2014 18:35:20

Fig.96. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3



Date: 22.MAY.2014 18:35:09

Fig.97. Number of Transmissions Measurement:Channel 39,Packet 2-DH3



Ref 10.8 dBm      \*Att 5 dB      RBW 1 MHz      VBW 1 MHz      Marker 1 [T1]      -14.77 dBm  
 SWT 31.6 s      31.599800 s

10 Offset 0.8 dB  
 0  
 -80

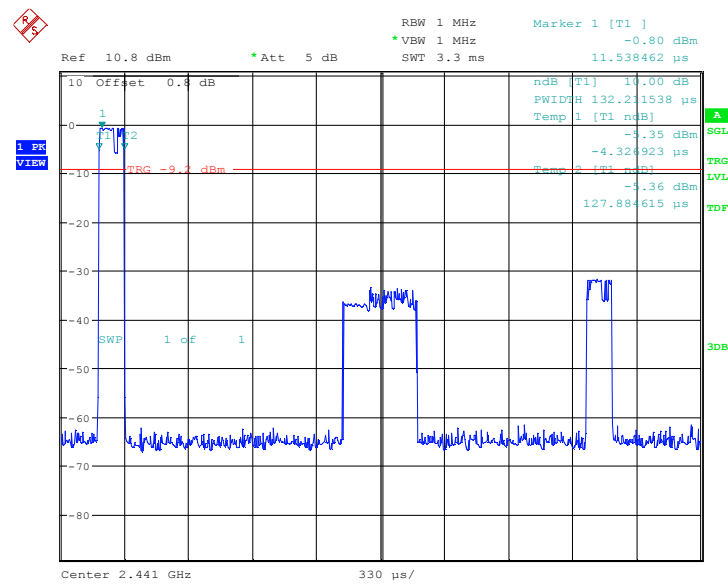
1 A  
 View

A  
 SGL  
 TRG  
 LVL  
 TDF  
 3DB

Center 2.441 GHz      3.16 s/

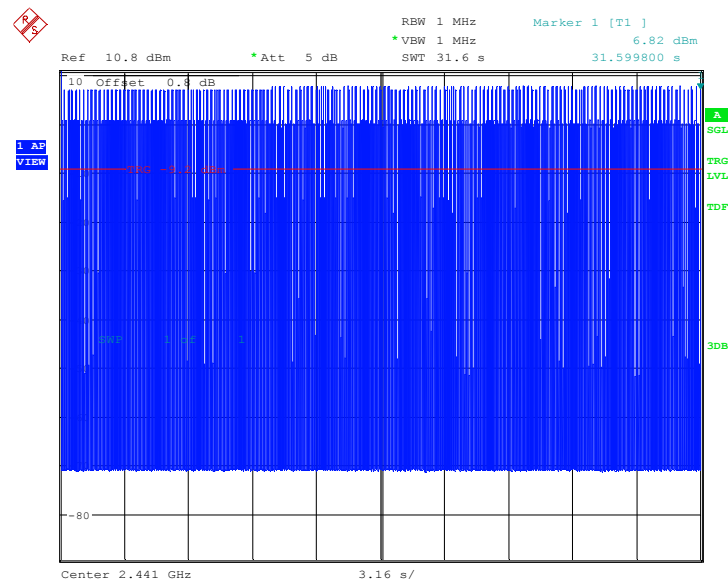
Date: 22.MAY.2014 18:36:24

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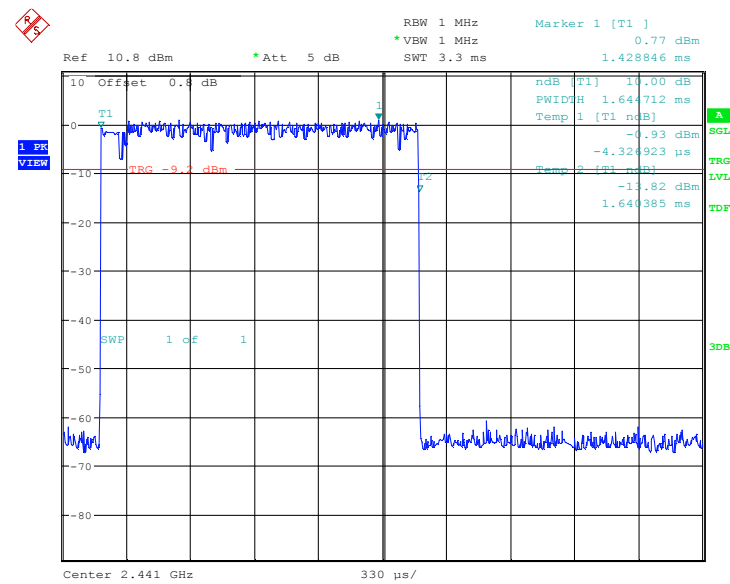
Date: 22.MAY.2014 18:42:43

Fig.100. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1



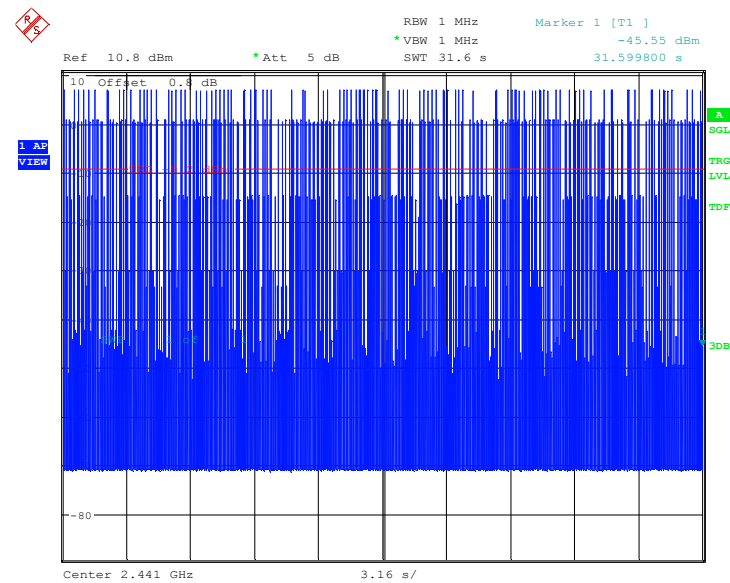
Date: 22.MAY.2014 18:42:31

Fig.101. Number of Transmissions Measurement:Channel 39,Packet 3-DH1



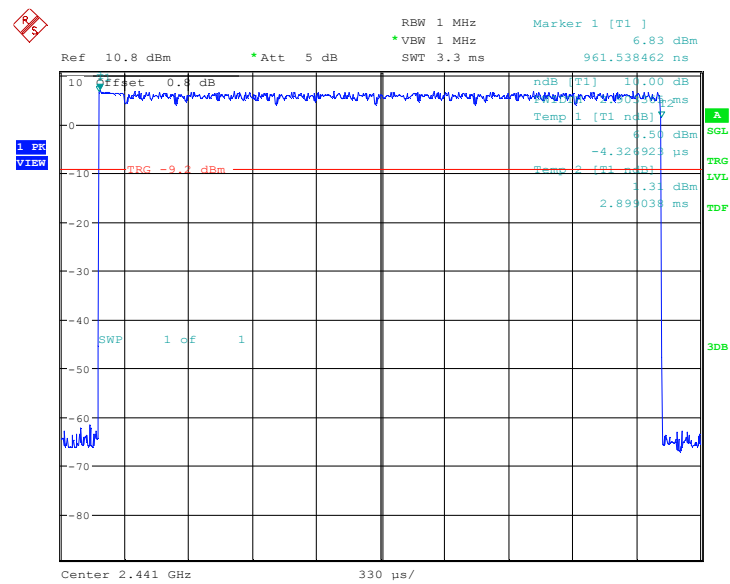
Date: 22.MAY.2014 18:44:02

Fig.102. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3



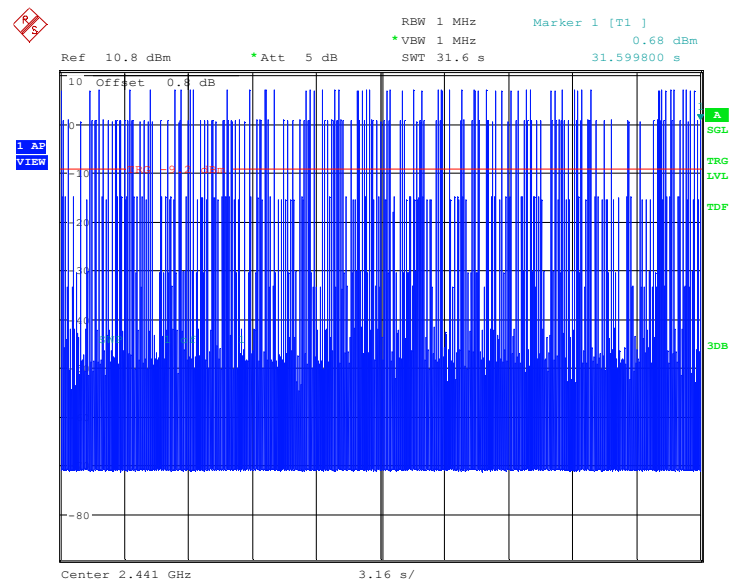
Date: 22.MAY.2014 18:43:51

Fig.103. Number of Transmissions Measurement:Channel 39,Packet 3-DH3



Date: 22.MAY.2014 18:45:17

Fig.104. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5



Date: 22.MAY.2014 18:45:05

Fig.105. 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 ANSI C63.10

### Test Condition

| Hopping Mode | RBW   | VBW    | SPAN | SweepTime | Detector | Trace Mode |
|--------------|-------|--------|------|-----------|----------|------------|
| Hopping OFF  | 20KHz | 100KHz | 3MHz | Auto      | Peak     | Max Hold   |

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.106              | 826.92 | NA         |
| 39      | Fig.107              | 870.19 | NA         |
| 78      | Fig.108              | 870.19 | NA         |

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

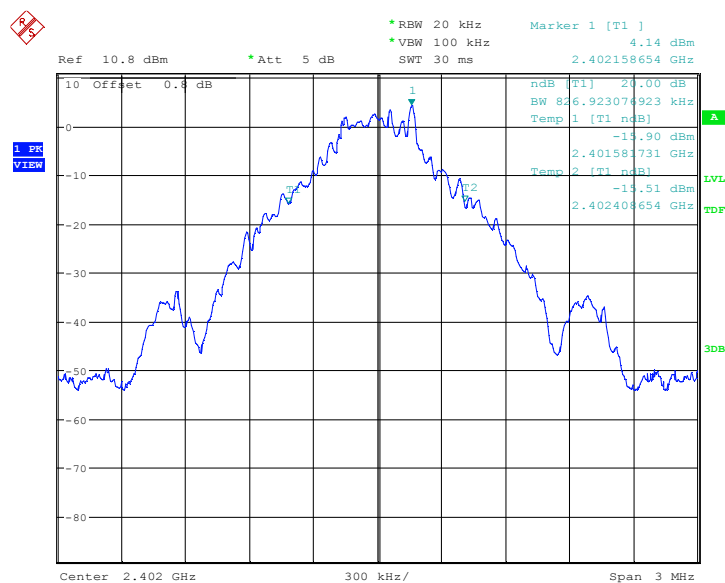
| Channel | 20dB Bandwidth (kHz) |         | Conclusion |
|---------|----------------------|---------|------------|
| 0       | Fig.109              | 1269.23 | NA         |
| 39      | Fig.110              | 1259.62 | NA         |
| 78      | Fig.111              | 1274.04 | NA         |

#### For 8DPSK

| Channel | 20dB Bandwidth (kHz) |         | Conclusion |
|---------|----------------------|---------|------------|
| 0       | Fig.112              | 1259.62 | NA         |
| 39      | Fig.113              | 1274.04 | NA         |
| 78      | Fig.114              | 1264.42 | NA         |

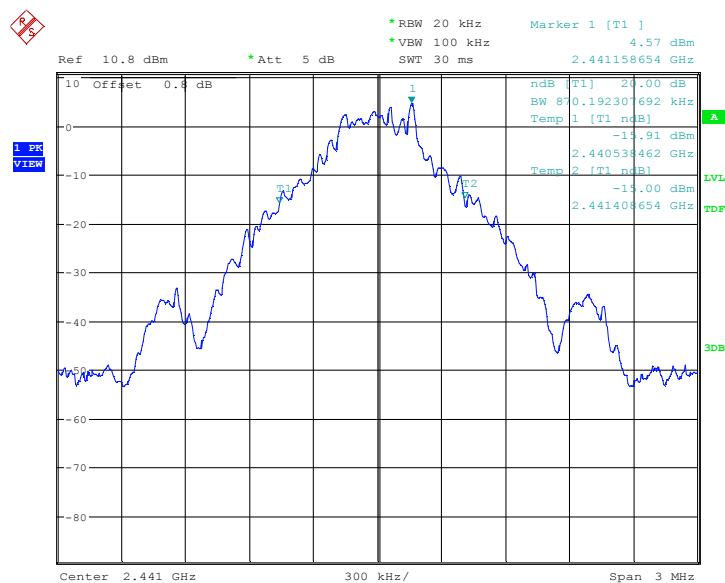
**Conclusion: NA**

**Test graphs as below:**



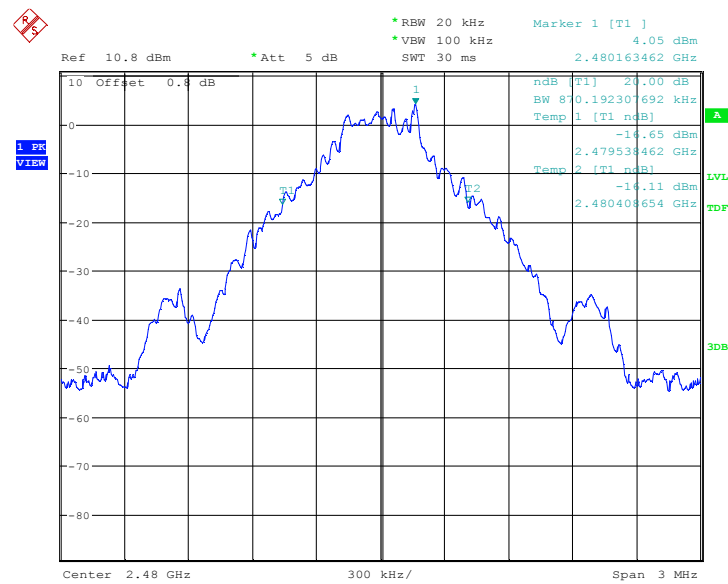
Date: 22.MAY.2014 17:26:22

Fig.106. 20dB Bandwidth: GFSK, Channel 0



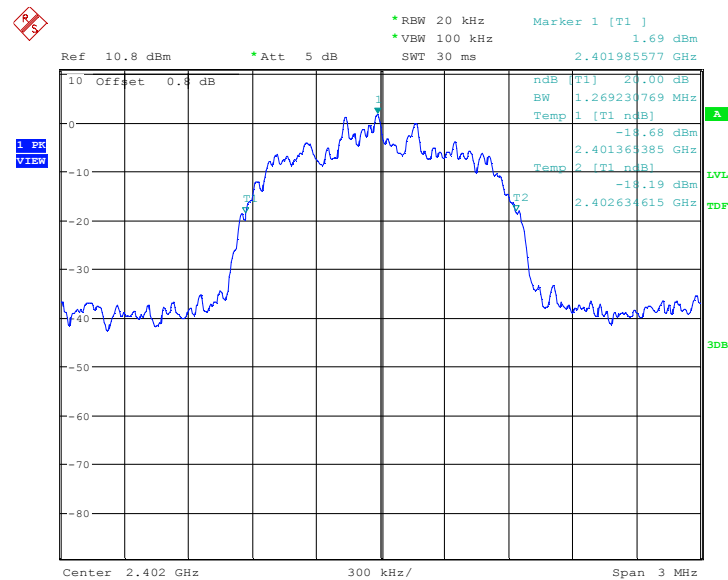
Date: 22.MAY.2014 17:26:54

Fig.107. 20dB Bandwidth: GFSK, Channel 39



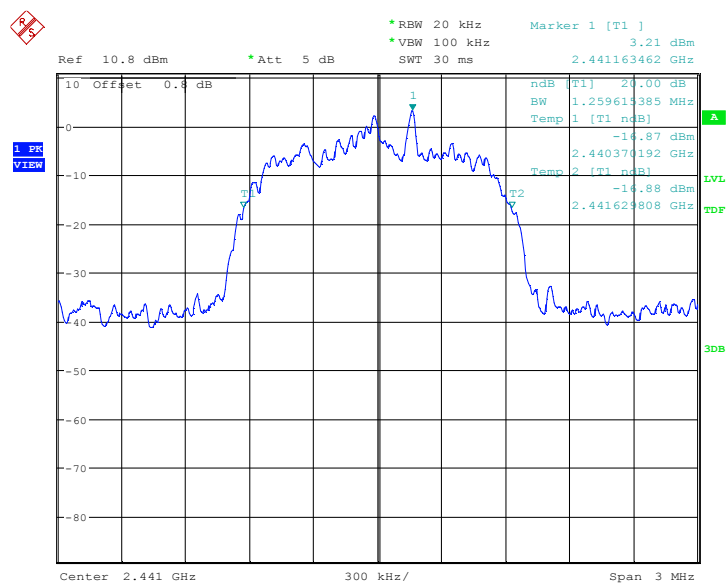
Date: 22.MAY.2014 17:27:25

Fig.108. 20dB Bandwidth: GFSK, Channel 78



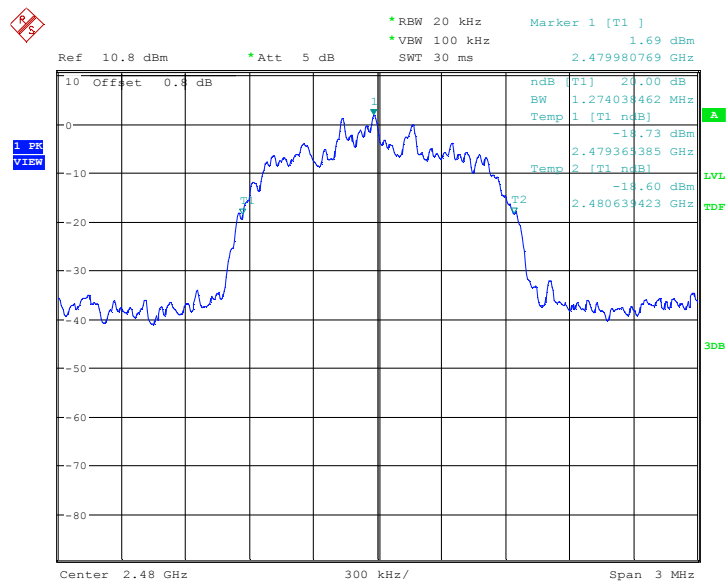
Date: 22.MAY.2014 17:47:43

Fig.109. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 0



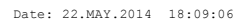
Date: 22.MAY.2014 17:48:14

Fig.110. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39



Date: 22.MAY.2014 17:48:46

Fig.111. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78



Ref 10.8 dBm \*Att 5 dB \*RBW 20 kHz \*VBW 100 kHz SWI 30 ms Marker 1 [T1] 2.45 dBm 2.441163462 GHz

10 Offset 0.6 dB

1 F F View

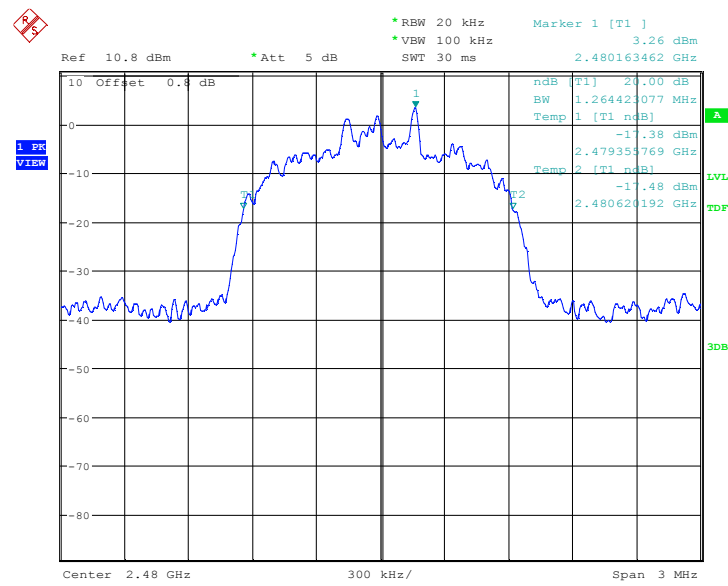
1 0 -10 -20 -30 -40 -50 -60 -70 -80

dB [T1] -20.00 dB BW 1.274039462 MHz Temp 1 [T1 dB] -17.98 dBm 2.440350962 GHz Temp 2 [T1 dB] -17.60 dBm 2.441623000 GHz

Center 2.441 GHz 300 kHz/ Span 3 MHz

Date: 22.MAY.2014 18:09:38

Fig.113. 20dB Bandwidth: 8DPSK, Channel 39



Date: 22.MAY.2014 18:10:10

Fig.114. 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 ANSI C63.10

### Test Condition

| Hopping Mode | RBW    | VBW  | SPAN | SweepTime | Detector | Trace Mode |
|--------------|--------|------|------|-----------|----------|------------|
| Hopping ON   | 300KHz | 1MHz | 3MHz | Auto      | Peak     | Max Hold   |

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

\* 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.115                            | P          |

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

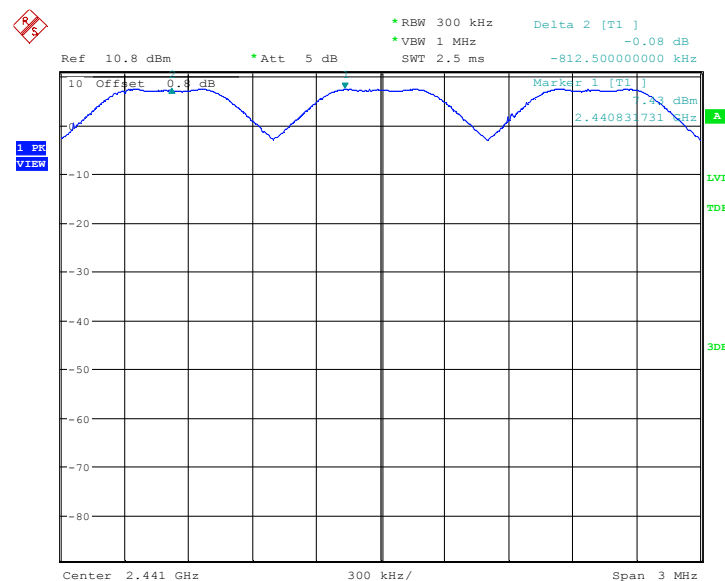
| Channel | Carrier frequency separation (kHz) | Conclusion |
|---------|------------------------------------|------------|
| 39      | Fig.116                            | P          |

#### For 8DPSK

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

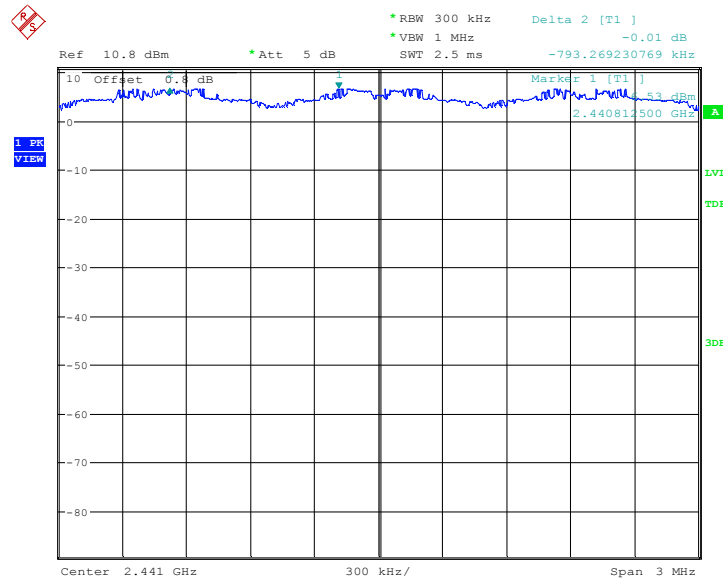
### Conclusion: PASS

### Test graphs as below:



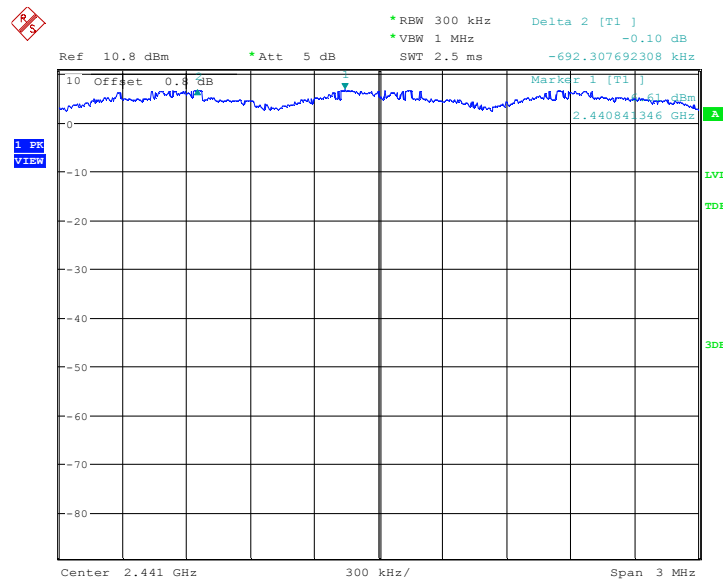
Date: 22.MAY.2014 17:29:30

Fig.115. Carrier frequency separation measurement: GFSK, Channel 39



Date: 22.MAY.2014 17:50:51

Fig.116. Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39



Date: 22.MAY.2014 18:12:15

Fig.117. 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 ANSI C63.10

### Test Condition

| Hopping Mode | RBW    | VBW    | Sweptime | Detector | Trace Mode |
|--------------|--------|--------|----------|----------|------------|
| Hopping ON   | 500KHz | 500KHz | Auto     | Peak     | Max Hold   |

### Measurement Result:

#### For GFSK

| Channel | Number of hopping channels | Conclusion |
|---------|----------------------------|------------|
| 0~39    | Fig.118                    | P          |
| 40~78   | Fig.119                    |            |

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

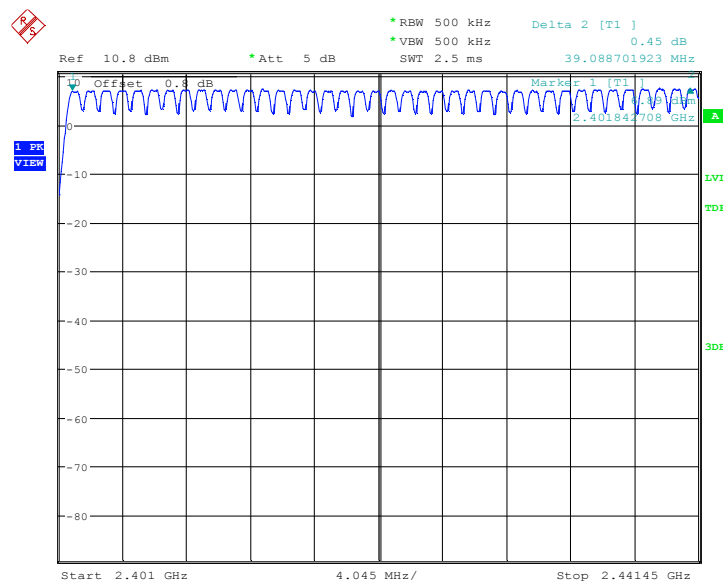
| Channel | Number of hopping channels | Conclusion |
|---------|----------------------------|------------|
| 0~39    | Fig.120                    | P          |
| 40~78   | Fig.121                    |            |

#### For 8DPSK

| Channel | Number of hopping channels | Conclusion |
|---------|----------------------------|------------|
| 0~39    | Fig.122                    | P          |
| 40~78   | Fig.123                    |            |

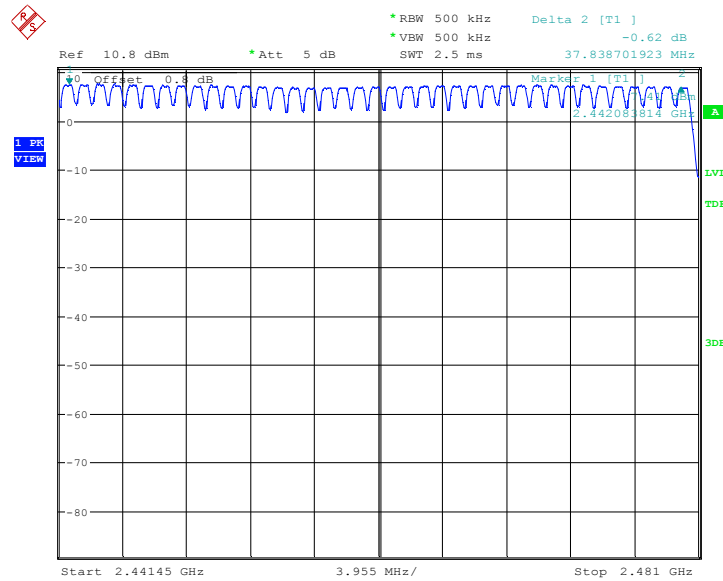
**Conclusion: PASS**

Test graphs as below:



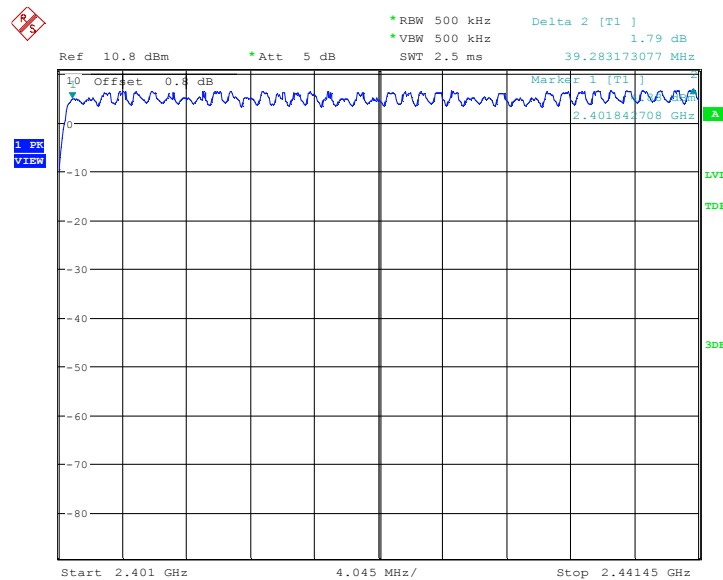
Date: 22.MAY.2014 17:31:35

Fig.118. Number of hopping frequencies: GFSK, Channel 0 - 39



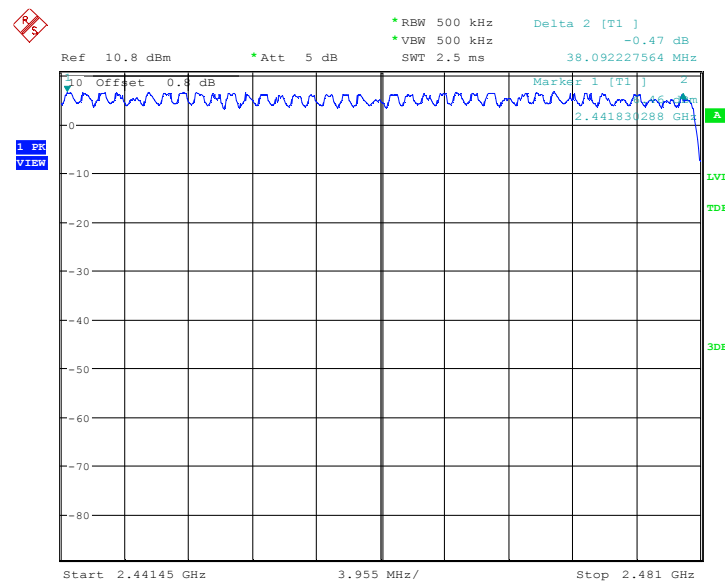
Date: 22.MAY.2014 17:33:37

Fig.119. Number of hopping frequencies: GFSK, Channel 40 - 78



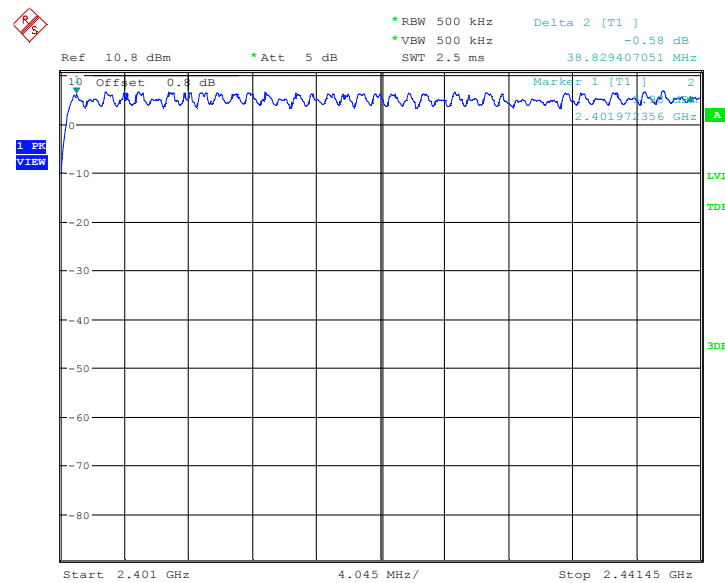
Date: 22.MAY.2014 17:52:55

Fig.120. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39



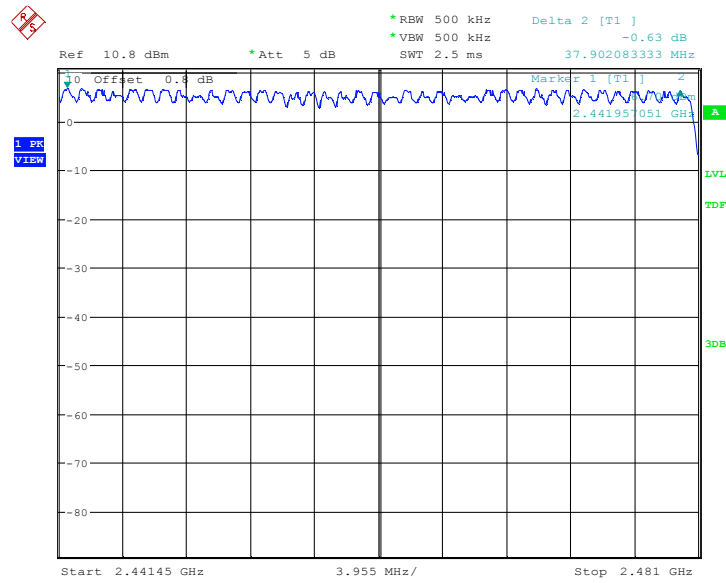
Date: 22.MAY.2014 17:54:58

Fig.121. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78



Date: 22.MAY.2014 18:14:19

Fig.122. Number of hopping frequencies: 8DPSK, Channel 0 - 39



Date: 22.MAY.2014 18:16:22

Fig.123. 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                         |            |

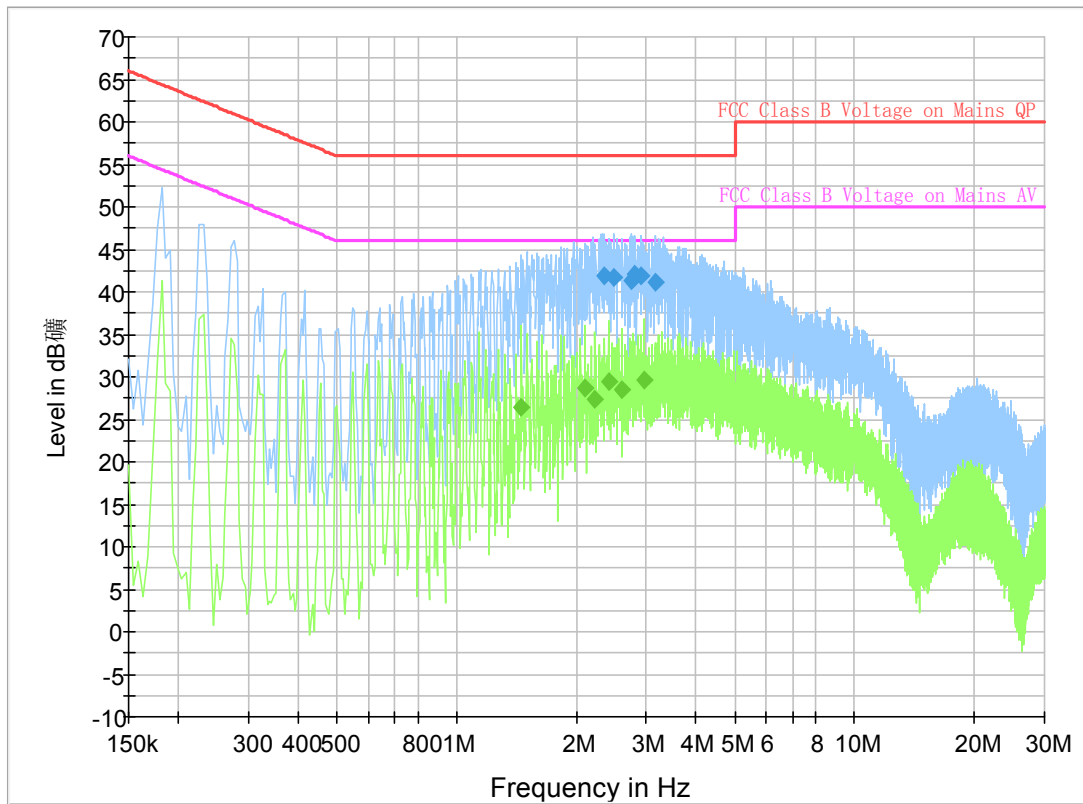
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10

**Conclusion: PASS**

**Test graphs as below:**

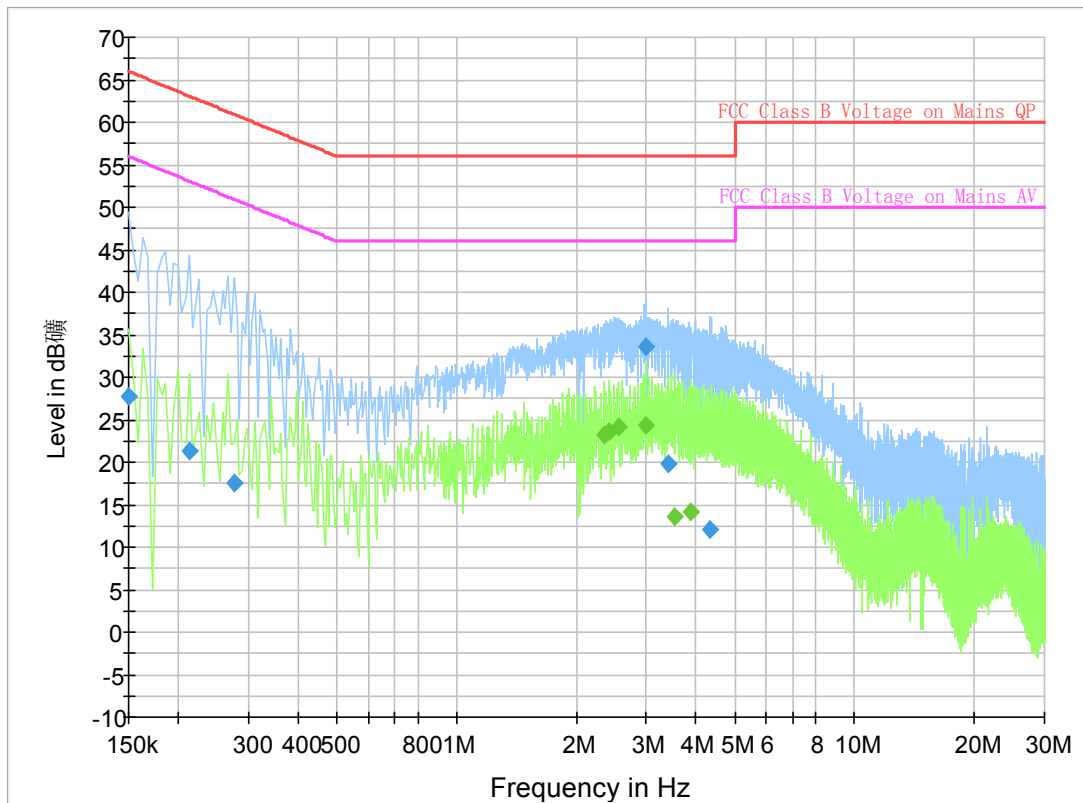
Traffic:

**Final Result 1**

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 2.359500        | 41.9             | GND | L1   | 9.7        | 14.1        | 56.0         |
| 2.476500        | 41.8             | GND | L1   | 9.7        | 14.2        | 56.0         |
| 2.751000        | 41.4             | GND | L1   | 9.7        | 14.6        | 56.0         |
| 2.809500        | 42.1             | GND | L1   | 9.7        | 13.9        | 56.0         |
| 2.899500        | 41.9             | GND | L1   | 9.7        | 14.1        | 56.0         |
| 3.160500        | 41.1             | GND | L1   | 9.7        | 14.9        | 56.0         |

**Final Result 2**

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 1.455000        | 26.3           | GND | L1   | 9.7        | 19.7        | 46.0         |
| 2.098500        | 28.7           | GND | L1   | 9.7        | 17.3        | 46.0         |
| 2.229000        | 27.3           | GND | L1   | 9.7        | 18.7        | 46.0         |
| 2.404500        | 29.4           | GND | L1   | 9.7        | 16.6        | 46.0         |
| 2.593500        | 28.4           | GND | L1   | 9.7        | 17.6        | 46.0         |
| 2.958000        | 29.5           | GND | L1   | 9.7        | 16.5        | 46.0         |



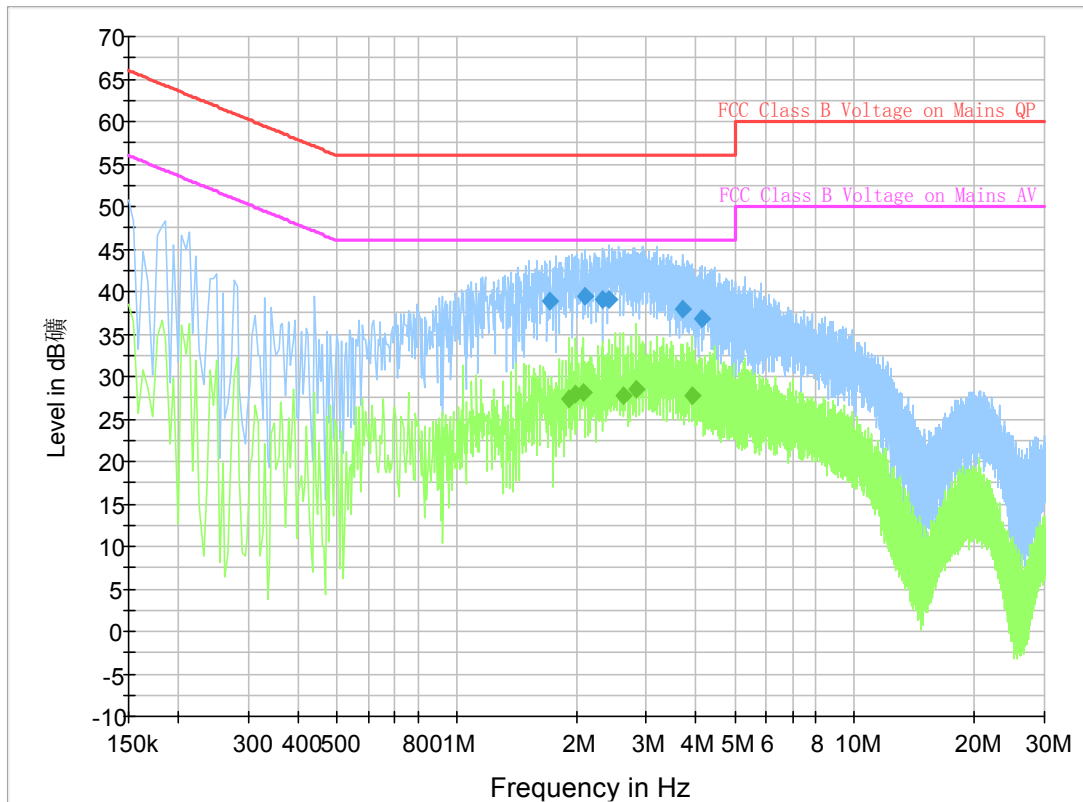
### Final Result 1

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.150000        | 27.8             | GND | N    | 9.8        | 38.2        | 66.0         |
| 0.213000        | 21.4             | GND | N    | 9.8        | 41.7        | 63.1         |
| 0.276000        | 17.6             | GND | N    | 9.8        | 43.4        | 60.9         |
| 2.980500        | 33.5             | GND | L1   | 9.7        | 22.5        | 56.0         |
| 3.403500        | 19.7             | GND | L1   | 9.7        | 36.3        | 56.0         |
| 4.348500        | 12.1             | GND | N    | 9.7        | 43.9        | 56.0         |

### Final Result 2

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 2.355000        | 23.2           | GND | L1   | 9.7        | 22.8        | 46.0         |
| 2.413500        | 23.7           | GND | L1   | 9.7        | 22.4        | 46.0         |
| 2.544000        | 24.2           | GND | L1   | 9.7        | 21.8        | 46.0         |
| 2.980500        | 24.3           | GND | L1   | 9.7        | 21.7        | 46.0         |
| 3.534000        | 13.6           | GND | L1   | 9.7        | 32.4        | 46.0         |
| 3.880500        | 14.1           | GND | L1   | 9.7        | 31.9        | 46.0         |

Idle:

**Final Result 1**

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 1.716000        | 38.8             | GND | L1   | 9.7        | 17.2        | 56.0         |
| 2.098500        | 39.4             | GND | L1   | 9.7        | 16.6        | 56.0         |
| 2.319000        | 39.1             | GND | L1   | 9.7        | 16.9        | 56.0         |
| 2.404500        | 39.1             | GND | L1   | 9.7        | 16.9        | 56.0         |
| 3.714000        | 37.9             | GND | L1   | 9.7        | 18.1        | 56.0         |
| 4.119000        | 36.7             | GND | L1   | 9.7        | 19.3        | 56.0         |

**Final Result 2**

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 1.918500        | 27.3           | GND | L1   | 9.7        | 18.7        | 46.0         |
| 1.995000        | 28.0           | GND | L1   | 9.7        | 18.0        | 46.0         |
| 2.085000        | 28.0           | GND | L1   | 9.7        | 18.0        | 46.0         |
| 2.625000        | 27.7           | GND | L1   | 9.7        | 18.3        | 46.0         |
| 2.814000        | 28.6           | GND | L1   | 9.7        | 17.4        | 46.0         |
| 3.903000        | 27.7           | GND | L1   | 9.7        | 18.3        | 46.0         |

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