

## **Radio test report**

### **20072023301**

based on:

- 47 CFR Part 15C, section 15.247 (01-OCT-06 Edition);
- 47 CFR Part 15C, section 15.205 (01-OCT-06 Edition);
- 47 CFR Part 15C, section 15.209 (01-OCT-06 Edition);
- RSS-210, Issue 7 (June 2007 edition);
- RSS-Gen, Issue 2 (June 2007 edition).

Complete Class 2 Bluetooth Module  
Taiyo Yuden  
EYSMJCS

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This report comprises of five modules. The total number of pages is: 101

## Main module

### 1 Introduction

This report contains the result of tests performed by:

Telefication B.V.  
Edisonstraat 12a  
6902 PK Zevenaar  
The Netherlands

*Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie). The contents of this test report, if reproduced, shall be copied in full, unless special consent in writing for reproduction in part is granted by Telefication. Copyright of this test report is reserved to Telefication.*

Ordering party:

Company name : Taiyo Yuden Co., Ltd., EMC Center  
Address : 5607-2 Nakamuroda-machi  
Zipcode : 370-3347  
City/town : Takasaki-shi Gunma  
Country : Japan  
Date of order : 22 August 2007

## 2 Product

A sample of the following product was submitted for testing:

|                     |                                     |
|---------------------|-------------------------------------|
| Product description | : Complete Class 2 Bluetooth Module |
| Manufacturer        | : Taiyo Yuden Co., Ltd.             |
| Trade mark          | : Taiyo Yuden Co., Ltd.             |
| Type designation    | : EYSMJCS                           |
| FCC ID              | : RYYEYSMJCS                        |
| IC ID               | : 4389B-EYSMJCS                     |
| Hardware version    | : --                                |
| Serial number       | : --                                |
| Software release    | : --                                |

## 3 Test schedule

Tests are carried out in accordance with the specification detailed in chapter 7 “Summary” of this report.

Tests are carried out at the following location:

- Telefication, Zevenaar and TNO EPS B.V., Niekkerk

The samples of the product were received on:

- 22 August 2007

Tests are carried out from:

- 3 September 2007 to 11 October 2007

## 4 Product documentation

For production of this report the following product documentation has been used:

| <b>Description:</b>          | <b>Date:</b> | <b>Identification:</b> |
|------------------------------|--------------|------------------------|
| Operating manual for testing | --           | Taiyo Yuden Co., Ltd.  |

The above-mentioned documentation will be filed at Telefication for a period of 10 years following the issue of this test report.

## 5 Observations and comments

For the purpose of testing a software test tool named BlueSuite™ V1.21 for CSR's BlueCore™ Bluetooth® wireless technology chips has been used.

For all transmitter tests the RF power settings ("Power Int.") in the software test tool were set according to the following table:

| GFSK | $\pi/4$ -DQPSK | 8DPSK |
|------|----------------|-------|
| 54   | 93             | 93    |

All tests are performed with the packet configuration according to the following table:

|     | GFSK        |             | $\pi/4$ -DQPSK |             | 8DPSK       |             |
|-----|-------------|-------------|----------------|-------------|-------------|-------------|
|     | Packet type | Packet size | Packet type    | Packet size | Packet type | Packet size |
| DH5 | 15          | 339         | 30             | 679         | 31          | 1021        |

The test sample used for the transmitter tests was provided with a temporary SMA antenna connector. The test sample used for the receiver tests was provided with the (original) integral antenna.

The test samples were tested while connected to a test-jig which enabled operation of the test samples as a stand-alone module.

Final measurements of unwanted emissions between 1 - 26 GHz were carried out at TNO EPS B.V. at the location in Niekerk, The Netherlands.

Final measurements of unwanted emissions between 30 - 1000 MHz are carried out on the open area test site of TNO EPS B.V., The Netherlands, at the following location:

TNO Electronic Products & Services (EPS) B.V  
Smidshornerweg 18  
9822 TL Niekerk  
The Netherlands

FCC listed : 90828  
Industry Canada : IC3501A-1

## 6 Modifications to the sample

No modifications were made to the sample(s).

## 7 Summary

The product is intended for use in the following application area(s):

INTENTIONAL RADIATOR OPERATING IN THE FREQUENCY BAND 2400 - 2483.5 MHz

The sample is tested according to the following specification(s):

47 CFR Part 15C, section 15.247 (01-OCT-06 Edition);  
47 CFR Part 15C, section 15.205 (01-OCT-06 Edition);  
47 CFR Part 15C, section 15.209 (01-OCT-06 Edition);  
RSS-210, Issue 7 (June 2007 edition);  
RSS-Gen, Issue 2 (June 2007 edition).

## 8 Conclusions

The samples of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report.

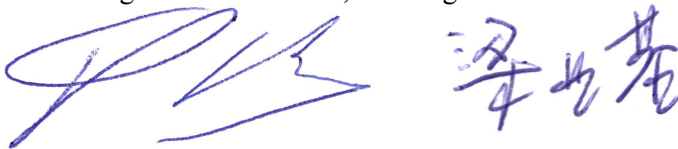
The results of the tests as stated in this report, are exclusively applicable to the product items as identified in this test report. Telefication does not accept any responsibility for the results stated in this test report, with respect to the properties of product items not involved in these tests.

All tests are performed by:

name : ing. P.A.J.M. Robben and R. Liang

function : Senior Engineer Radio/EMC, Test engineer

signature :



Review of test report by:

name : ing. S.J. van Spijker

function : Test Engineer

signature :



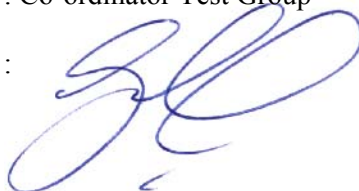
The above conclusions have been verified by the following signatory:

Date : 12 October 2007

name : J.P. van de Poll

function : Co-ordinator Test Group

signature :





## Test results module

### 1 General information

#### 1.1 Equipment information

|                           |                             |
|---------------------------|-----------------------------|
| Type of equipment         | Class 2 Bluetooth module    |
| Bluetooth specification   | V2.0 + EDR                  |
| Rated conducted RF power  | 1.0 dBm                     |
| Operating frequency range | 2402 - 2480 MHz             |
| Modulation types          | GFSK, $\pi/4$ -DQPSK, 8DPSK |
| ITU designation           | 943K0F1D, 1M26G1D, 1M27G1D  |
| Antenna type              | Integral                    |
| Antenna gain              | 2 dBi (peak)                |

#### 1.2 Tested channels

|                 | Test channel 1 | Test channel 2 | Test channel 3 |
|-----------------|----------------|----------------|----------------|
| Frequency (MHz) | 2402           | 2441           | 2480           |

## 2 Summary of test data

| Description                                                                                      | Clause                             | Limit                                        | Test result            | Pass/Fail |
|--------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------|------------------------|-----------|
| 20 dB bandwidth                                                                                  | 15.247 (a)(1)                      | --                                           | 1267 kHz               | Pass      |
| Channel separation                                                                               | 15.247 (a)(1)                      | $\geq 2/3 \times 20$ dB BW                   | 1007 kHz               | Pass      |
| Number of channels                                                                               | 15.247 (a)(1)(iii)                 | $\geq 15$                                    | 79                     | Pass      |
| Average time of occupancy                                                                        | 15.247 (a)(1)(iii)                 | 0.400 sec.                                   | 0.314 sec.             | Pass      |
| Maximum peak power output                                                                        | 15.247 (b)(1)<br>15.247 (b)(4)     | 30 dBm                                       | 1.0 dBm                | Pass      |
| Spurious emissions Tx (conducted)                                                                | 15.247 (d)                         | $< -20$ dBc                                  | $\leq -44.6$ dBc       | Pass      |
| Field strength of spurious emissions (radiated, receive mode)                                    | 15.109                             | 54 dB $\mu$ V/m (av)                         | 44.3 dB $\mu$ V/m (pk) | Pass      |
| Field strength of emissions outside of the frequency band of operation (radiated, transmit mode) | 15.247 (d)<br>15.205 (a)<br>15.209 | 54 dB $\mu$ V/m (av)<br>74 dB $\mu$ V/m (pk) | 44.0 dB $\mu$ V/m (pk) | Pass      |

### 3 Emission tests

#### 3.1 Carrier frequency separation

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)  
Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C  
Relative humidity : 50 %

##### 3.1.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the carrier frequency separation:

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

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span

Video (or Average) Bandwidth (VBW)  $\geq$  RBW

Sweep = auto

Detector function = peak

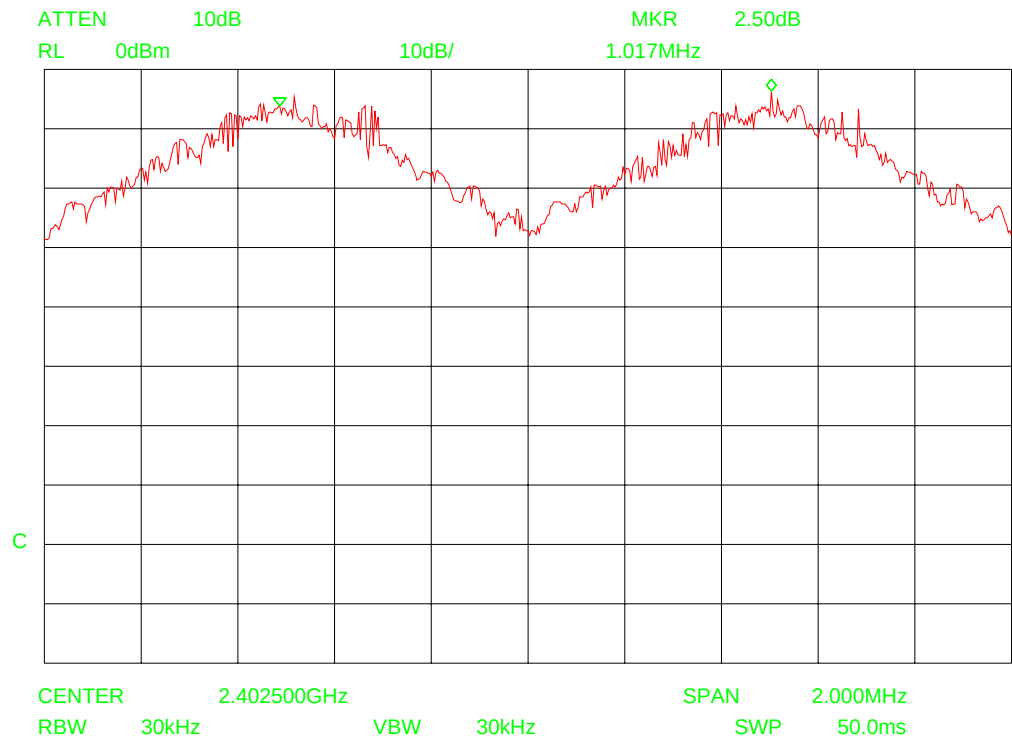
Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

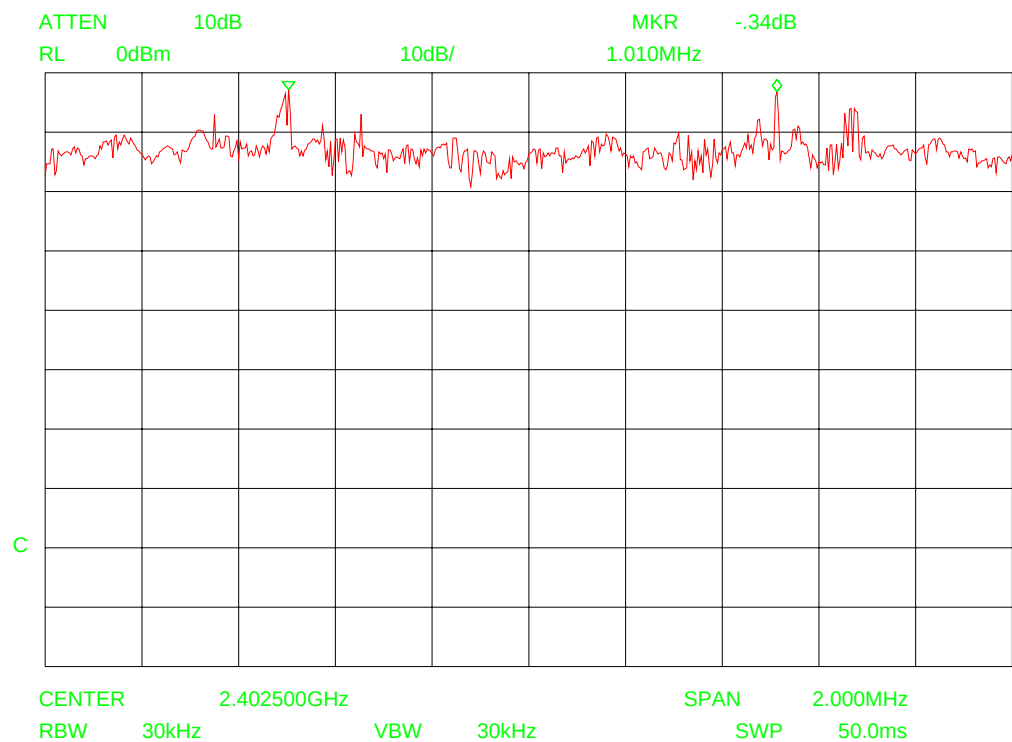
##### 3.1.2 Test results

| Modulation     | Carrier frequency separation | Plot numbers (on next pages) |
|----------------|------------------------------|------------------------------|
| GFSK           | 1017 kHz                     | 1                            |
| $\pi/4$ -DQPSK | 1010 kHz                     | 2                            |
| 8DPSK          | 1007 kHz                     | 3                            |

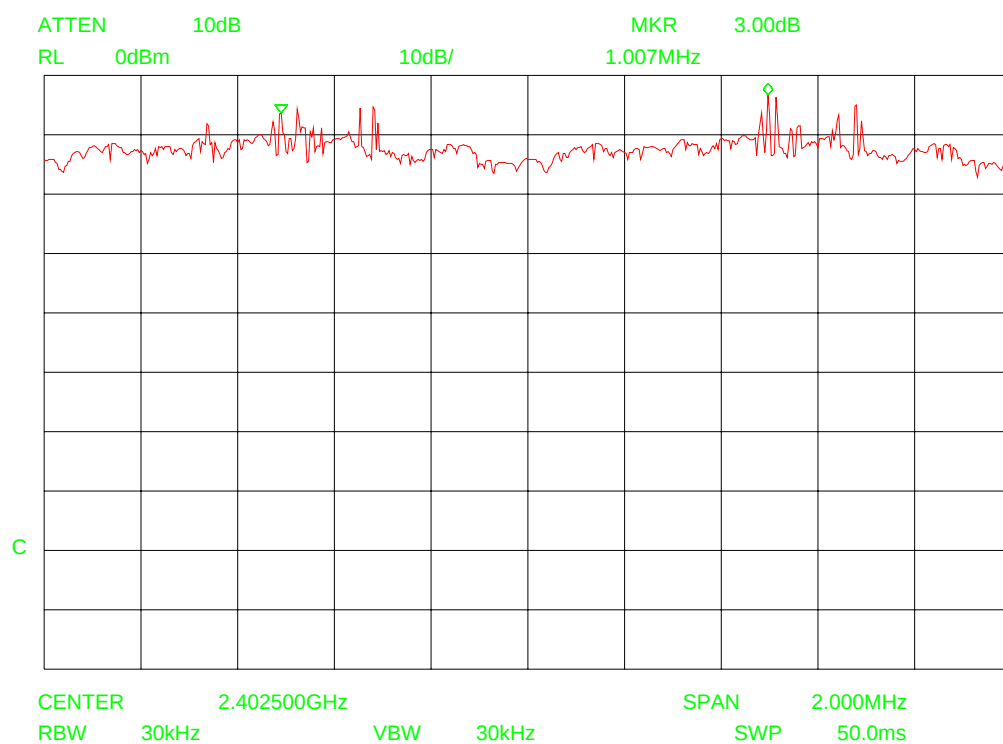
Measurement uncertainty: + 46/- 46 kHz



Plot 1 – Channel separation (GFSK mode)



Plot 2 – Channel separation ( $\pi/4$ -DQPSK mode)



Plot 3 – Channel separation (8DPSK mode)

## 3.2 Number of hopping frequencies

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)(iii)  
Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C  
Relative humidity : 50 %

### 3.2.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the number of hopping frequencies:

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

Span = the frequency band of operation

RBW  $\geq$  1% of the span

VBW  $\geq$  RBW

Sweep = auto

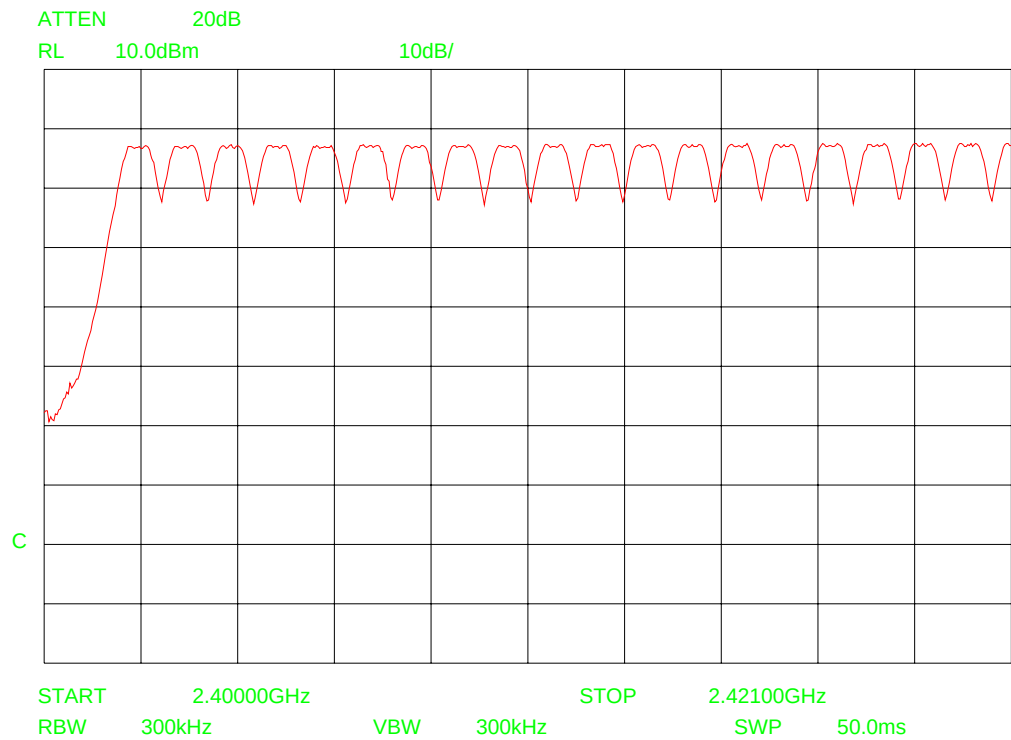
Detector function = peak

Trace = max hold

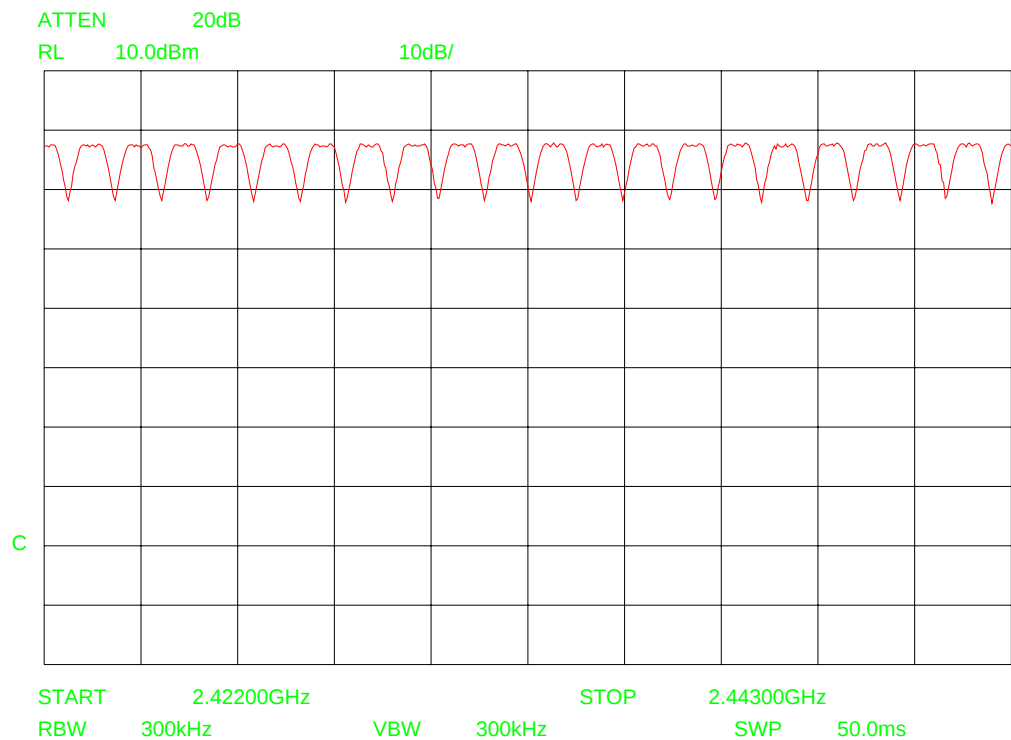
Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

### 3.2.2 Test results

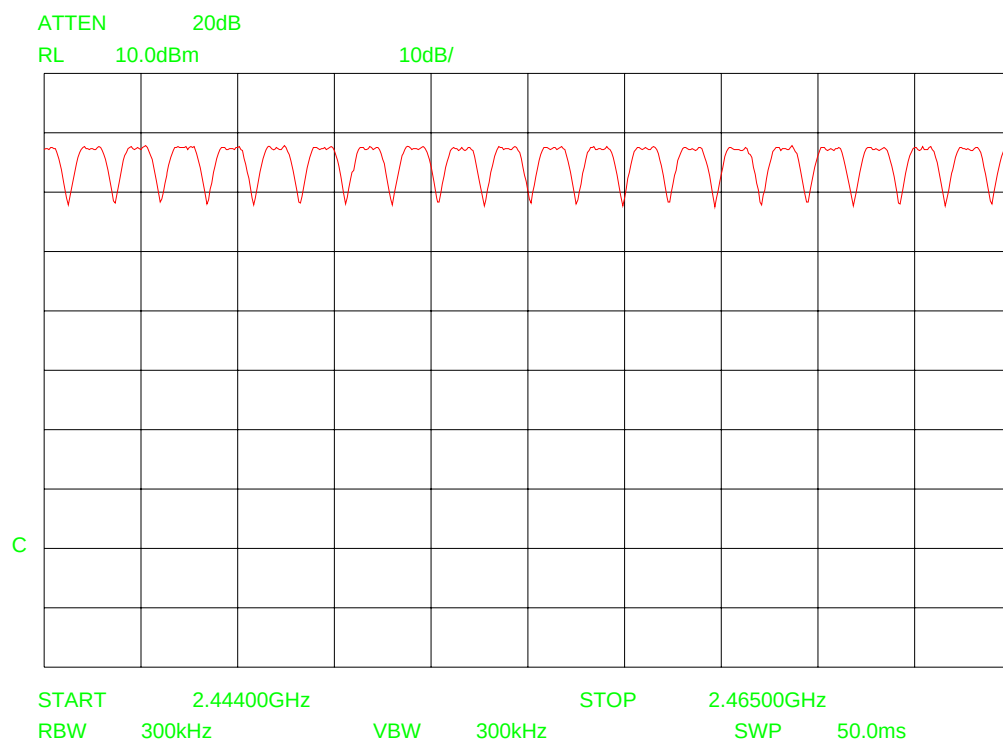
| Modulation     | Number of hopping frequencies | Plot numbers (on next pages) |
|----------------|-------------------------------|------------------------------|
| GFSK           | 79                            | 4 – 7                        |
| $\pi/4$ -DQPSK | 79                            | 8 – 11                       |
| 8DPSK          | 79                            | 12 – 15                      |



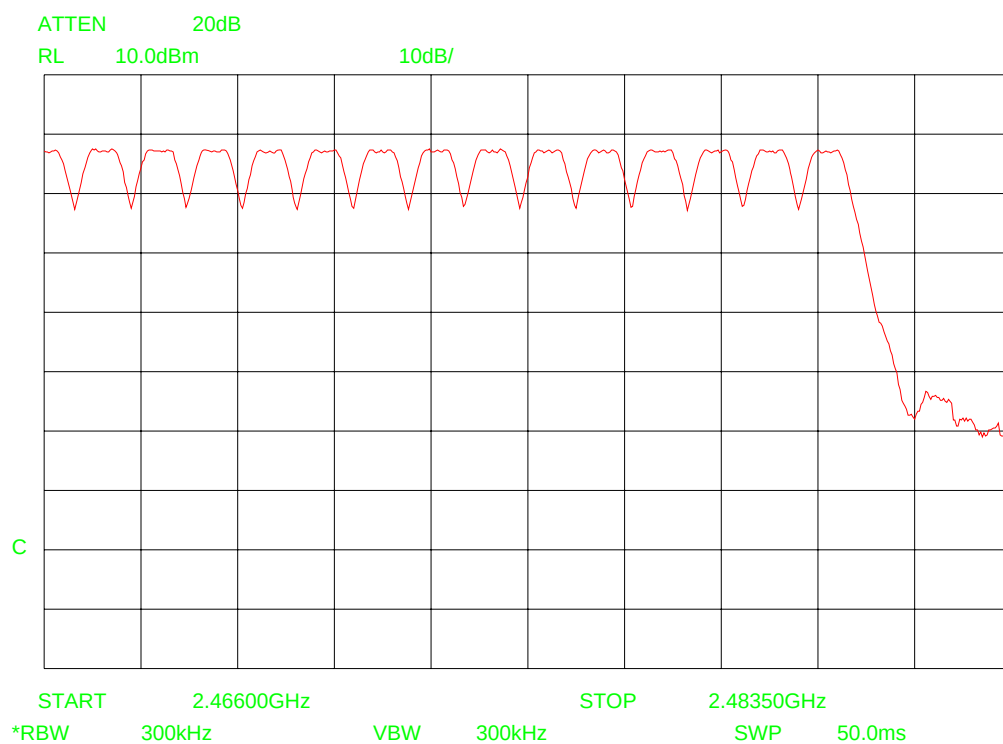
Plot 4 – Number of channels (channels 1-20, GFSK mode)



Plot 5 – Number of channels (channels 21-42, GFSK mode)

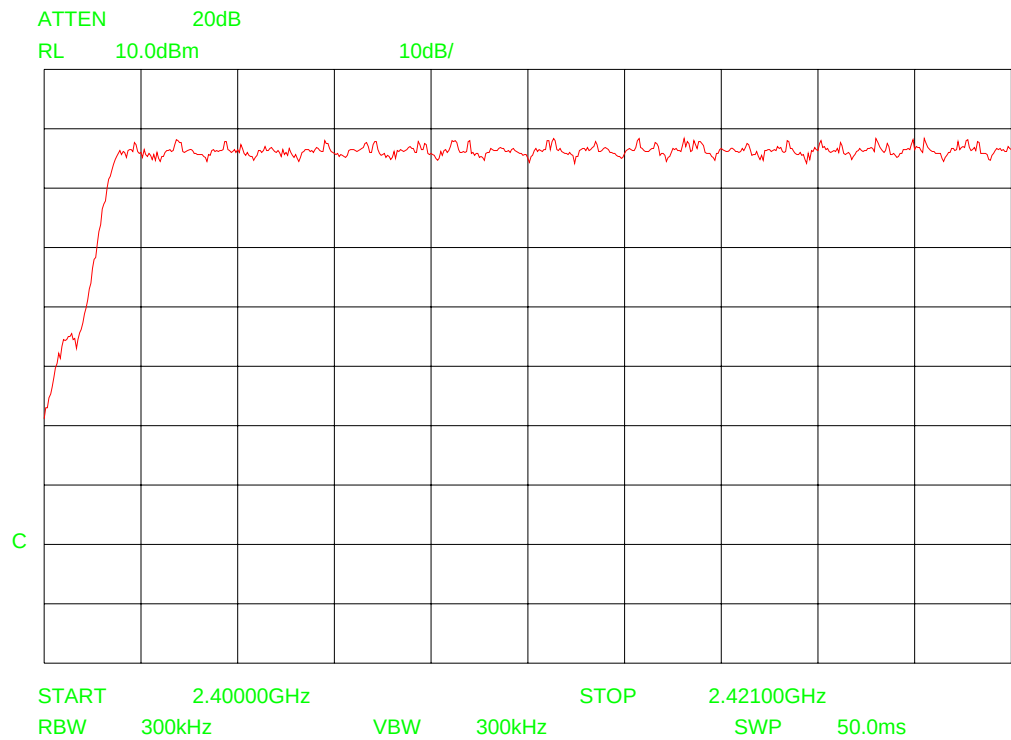


Plot 6 – Number of channels (channels 43-64, GFSK mode)

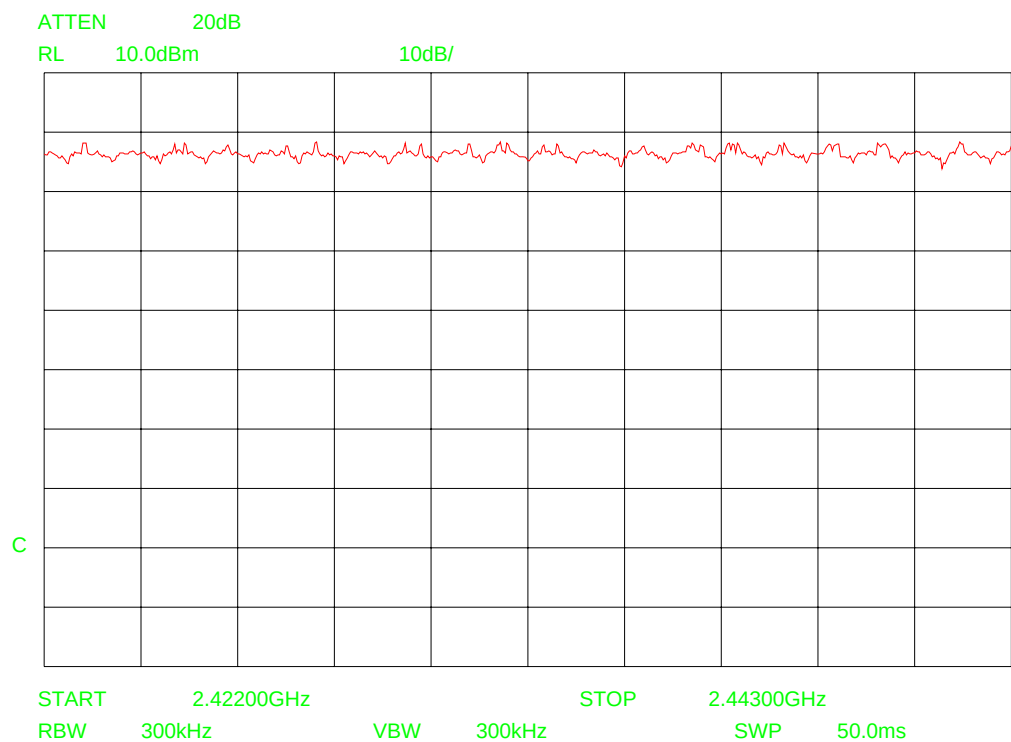


Plot 7 – Number of channels (channels 65-79, GFSK mode)

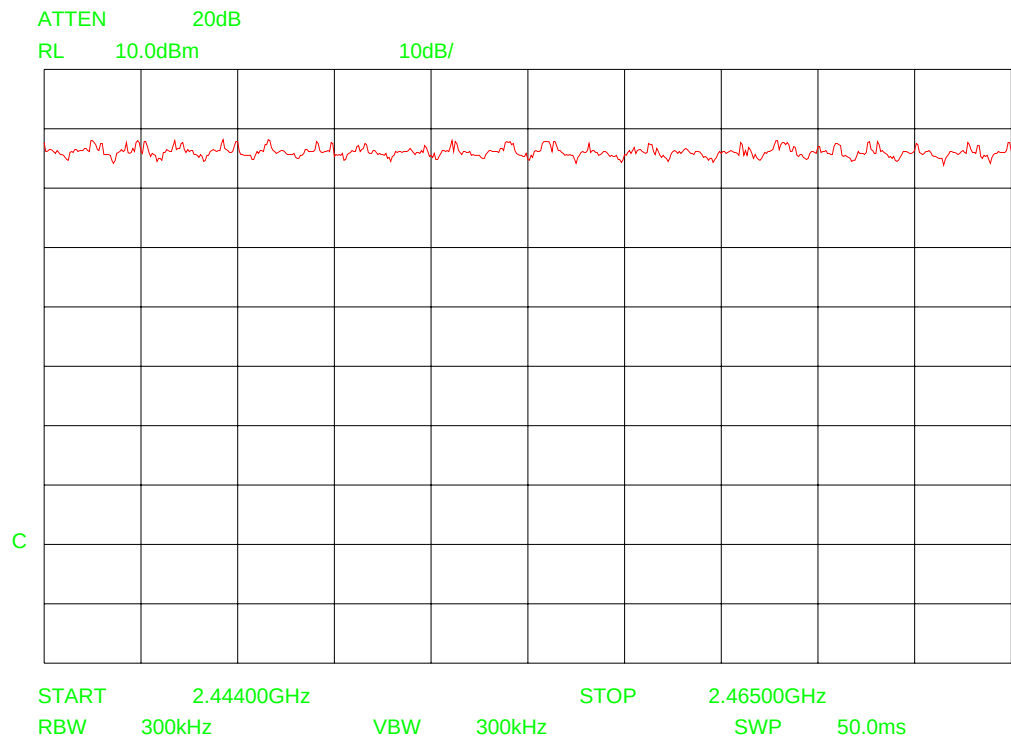




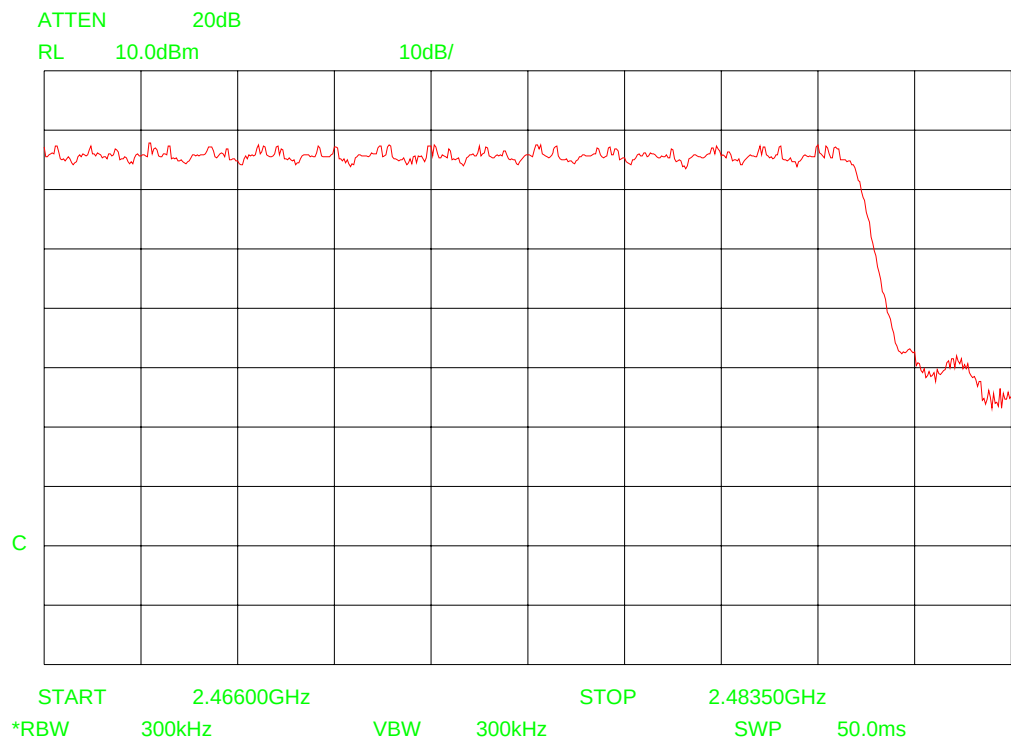
Plot 8 – Number of channels (channels 1-20,  $\pi/4$ -DQPSK mode)



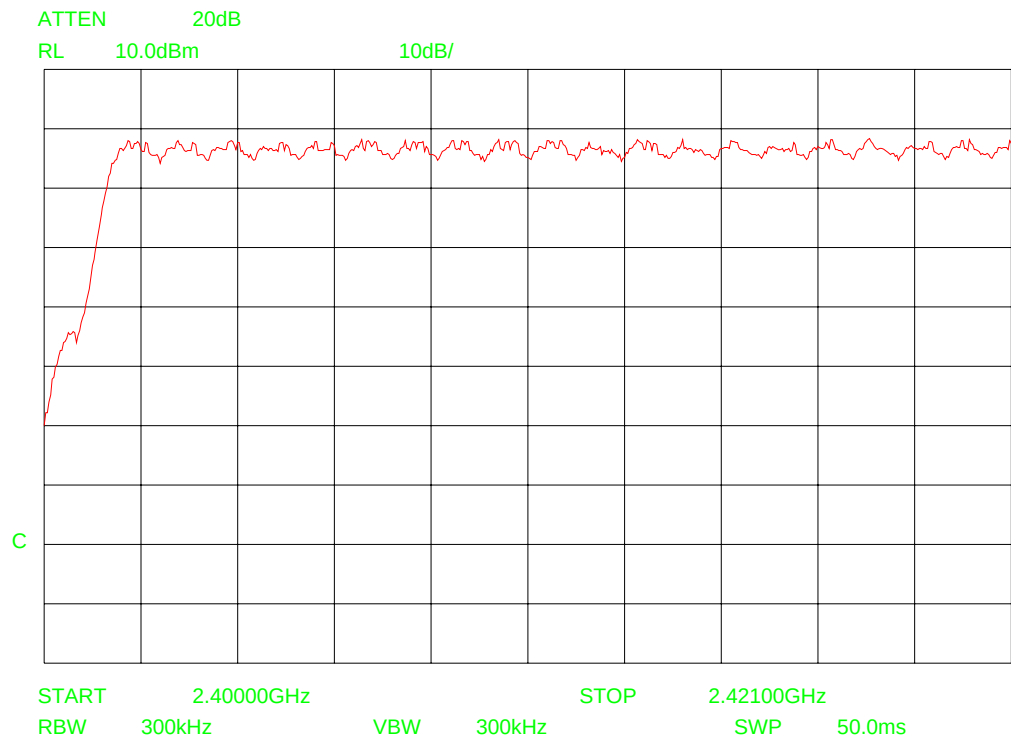
Plot 9 – Number of channels (channels 21-42,  $\pi/4$ -DQPSK mode)



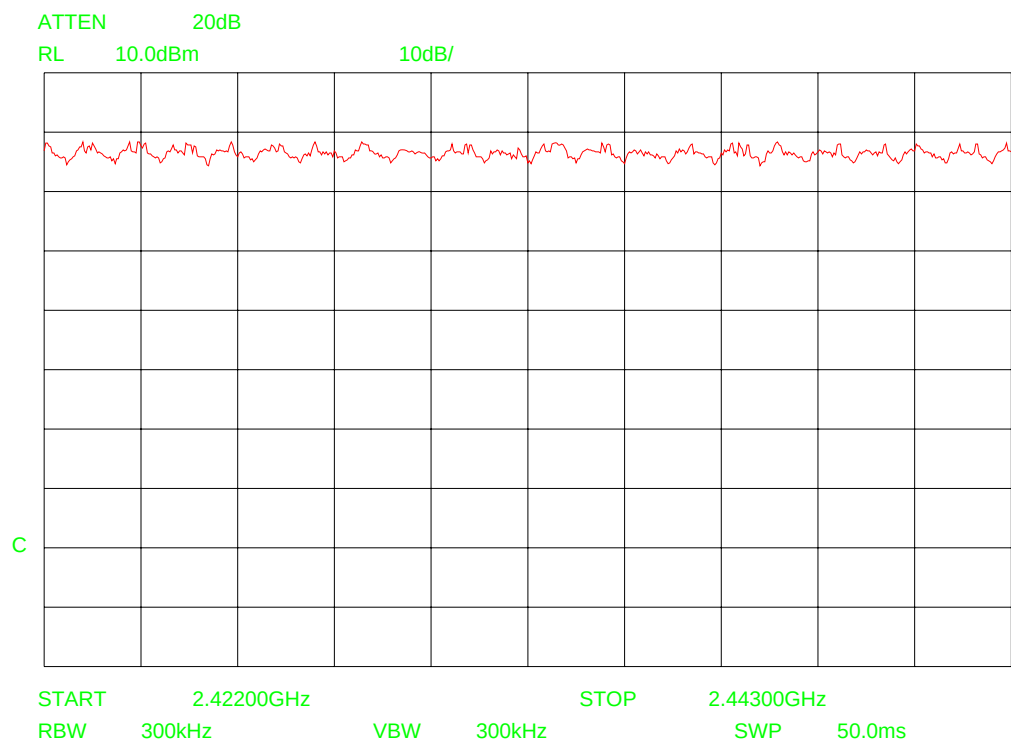
Plot 10 – Number of channels (channels 43-64,  $\pi/4$ -DQPSK mode)



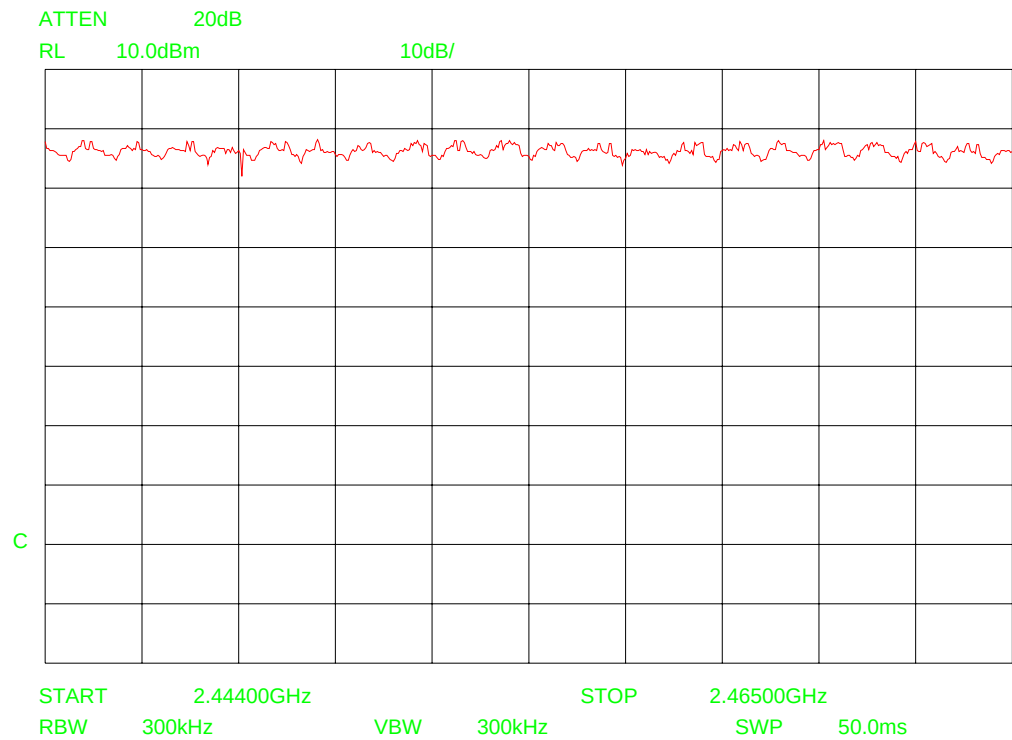
Plot 11 – Number of channels (channels 65-79,  $\pi/4$ -DQPSK mode)



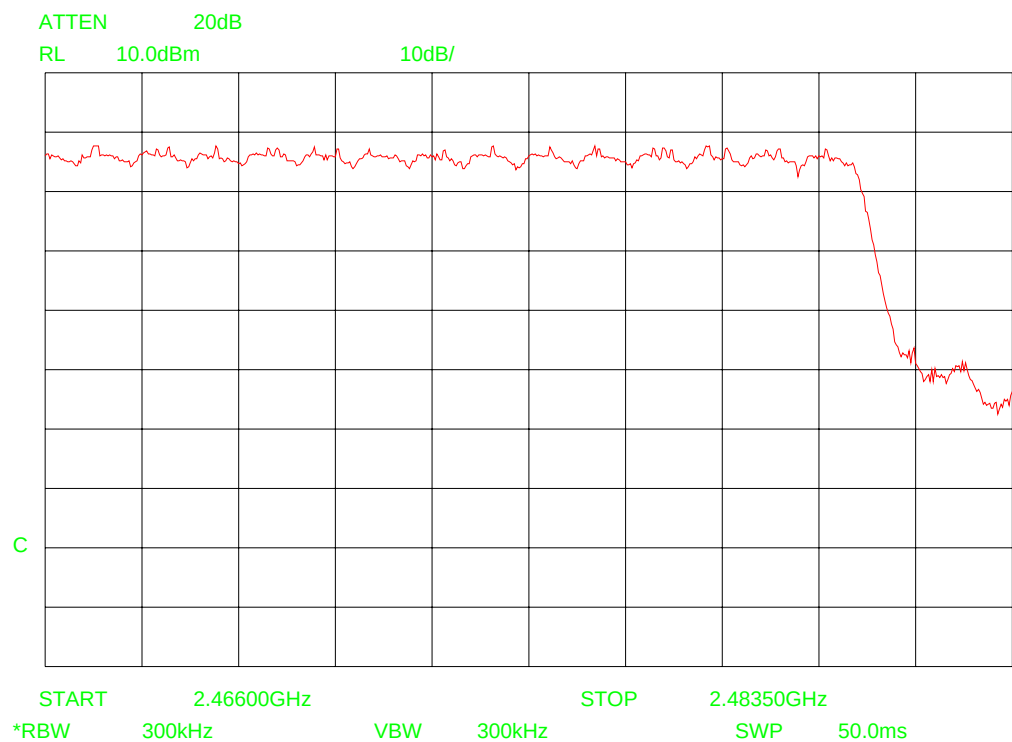
Plot 12 – Number of channels (channels 1-20, 8DPSK mode)



Plot 13 – Number of channels (channels 21-42, 8DPSK mode)



Plot 14 – Number of channels (channels 43-64, 8DPSK mode)



Plot 15 – Number of channels (channels 65-79, 8DPSK mode)

### 3.3 Average time of occupancy

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)(iii)  
Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C  
Relative humidity : 50 %

#### 3.3.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the time of occupancy:

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

Span = zero span, centered on a hopping channel

RBW = 1 MHz

VBW  $\geq$  RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

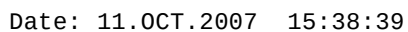
The EUT utilizes 75 hopping channels. Therefore the minimum sweep time for determining the number of hops is 75 x 0.4 seconds = 31.6 seconds. A sweep time of 32 seconds was chosen for the measurement of the number of hops.

#### 3.3.2 Test results

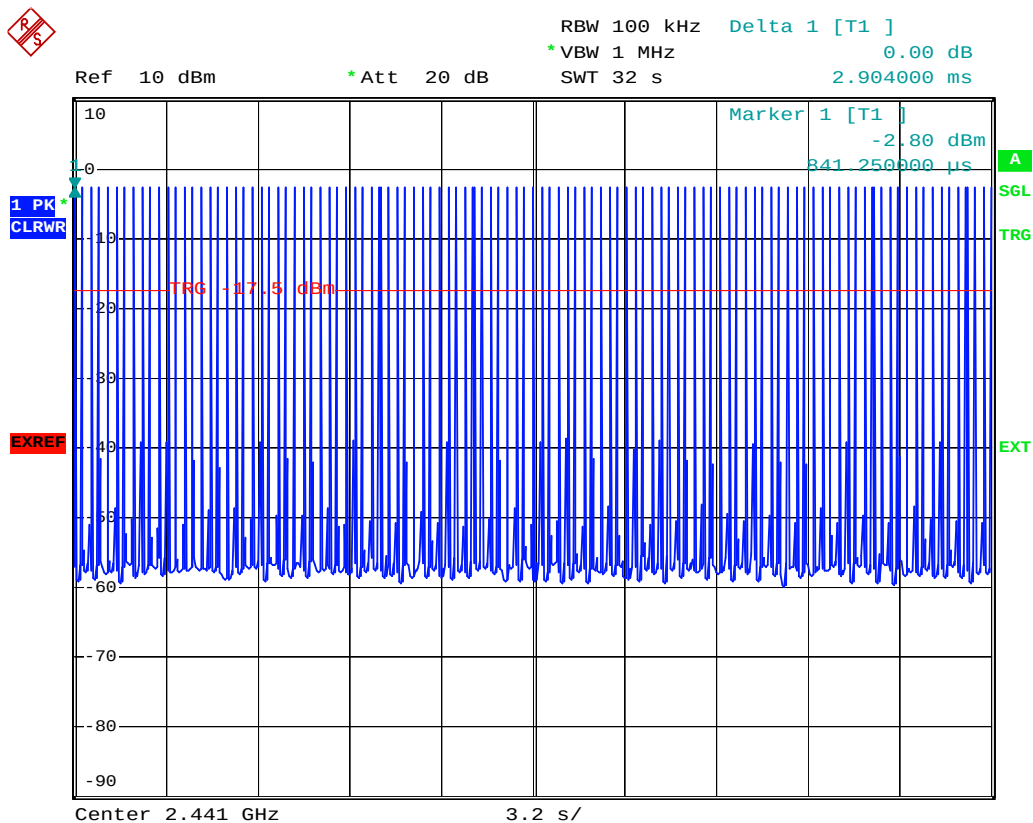
| Modulation     | Pulse time (ms) | Plot numbers (on next pages) |
|----------------|-----------------|------------------------------|
| GFSK           | 2.912           | 16a                          |
| $\pi/4$ -DQPSK | 2.904           | 17a                          |
| 8DPSK          | 2.904           | 18a                          |

| Modulation     | Number of hops | Plot numbers (on next pages) |
|----------------|----------------|------------------------------|
| GFSK           | 108            | 16b                          |
| $\pi/4$ -DQPSK | 108            | 17b                          |
| 8DPSK          | 108            | 18b                          |

| Modulation     | Average time of occupancy (s)<br>(pulse time x number of hops) | Plot numbers (on next pages) |
|----------------|----------------------------------------------------------------|------------------------------|
| GFSK           | 0.314                                                          | --                           |
| $\pi/4$ -DQPSK | 0.314                                                          | --                           |
| 8DPSK          | 0.314                                                          | --                           |



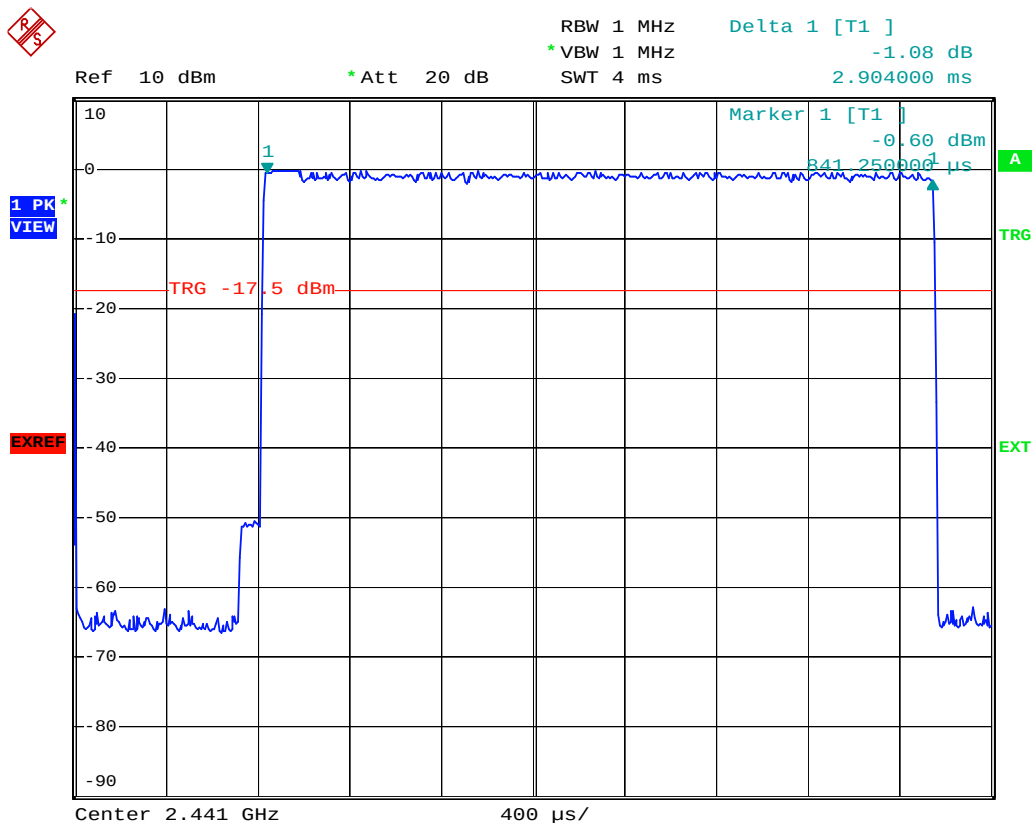
### Plot 16a – Pulse time (hopping transmit mode, GFSK mode)



Date: 11.OCT.2007 15:49:34

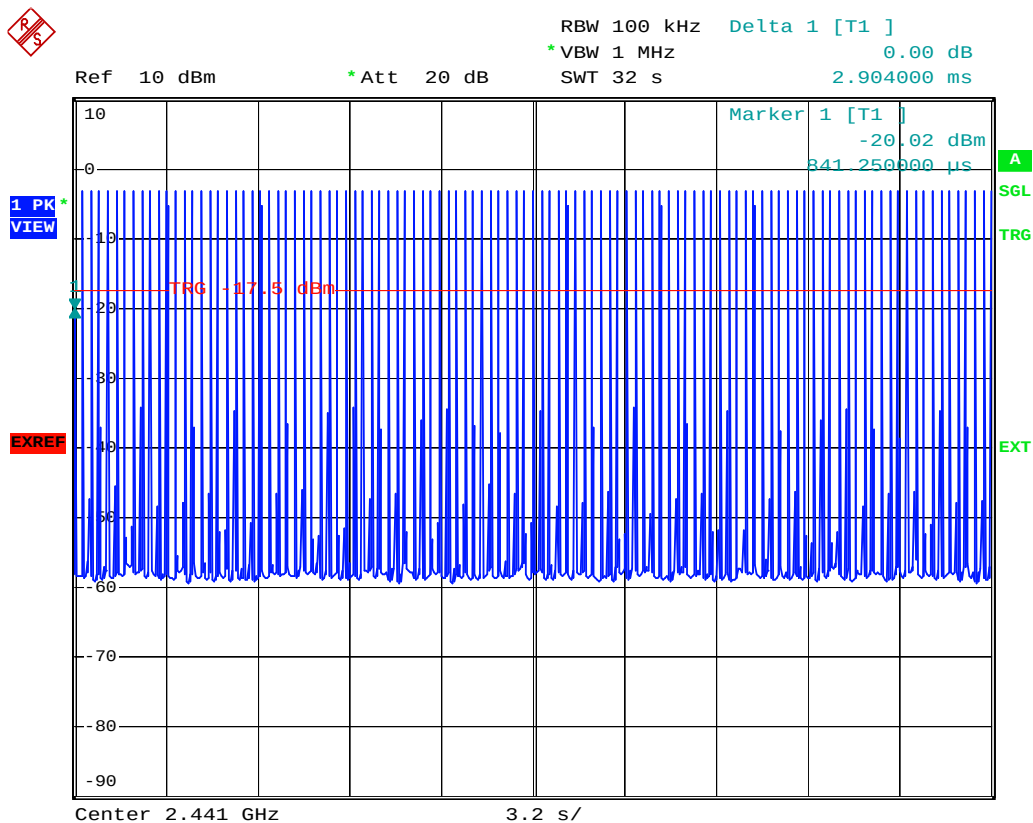
Plot 16b – Number of hops (hopping transmit mode, GFSK mode)





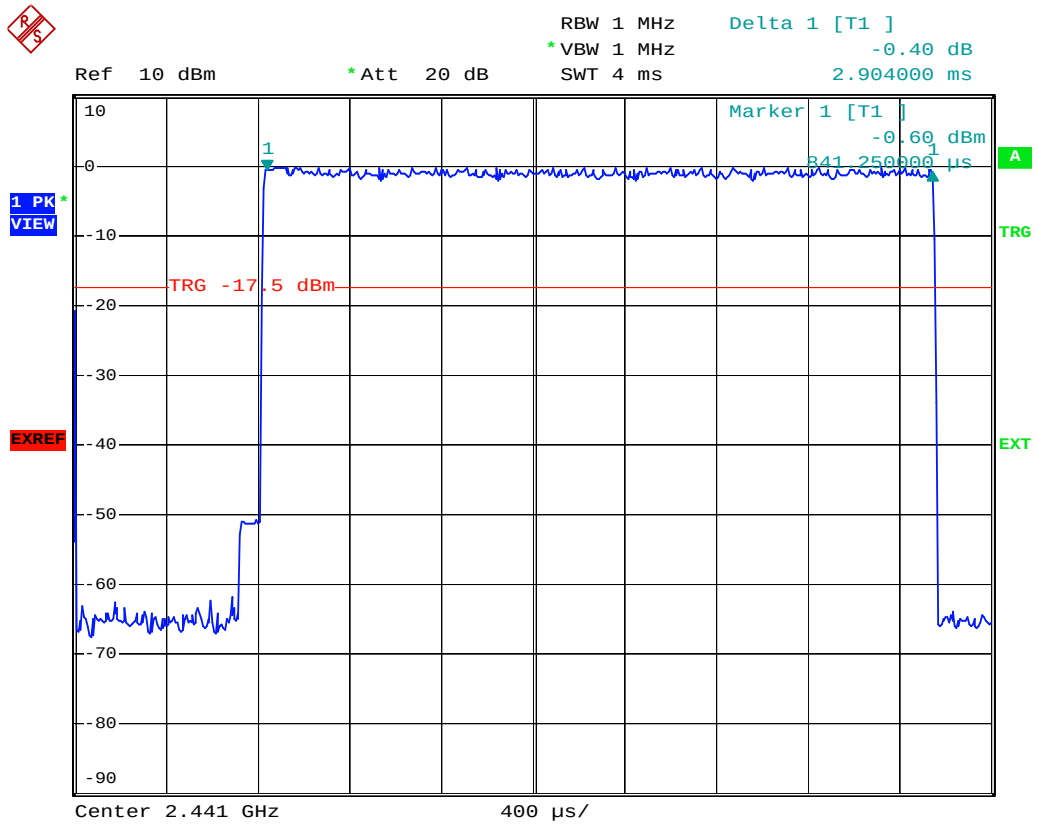
Date: 11.OCT.2007 15:42:21

Plot 17a – Pulse time (hopping transmit mode,  $\pi/4$ -DQPSK mode)



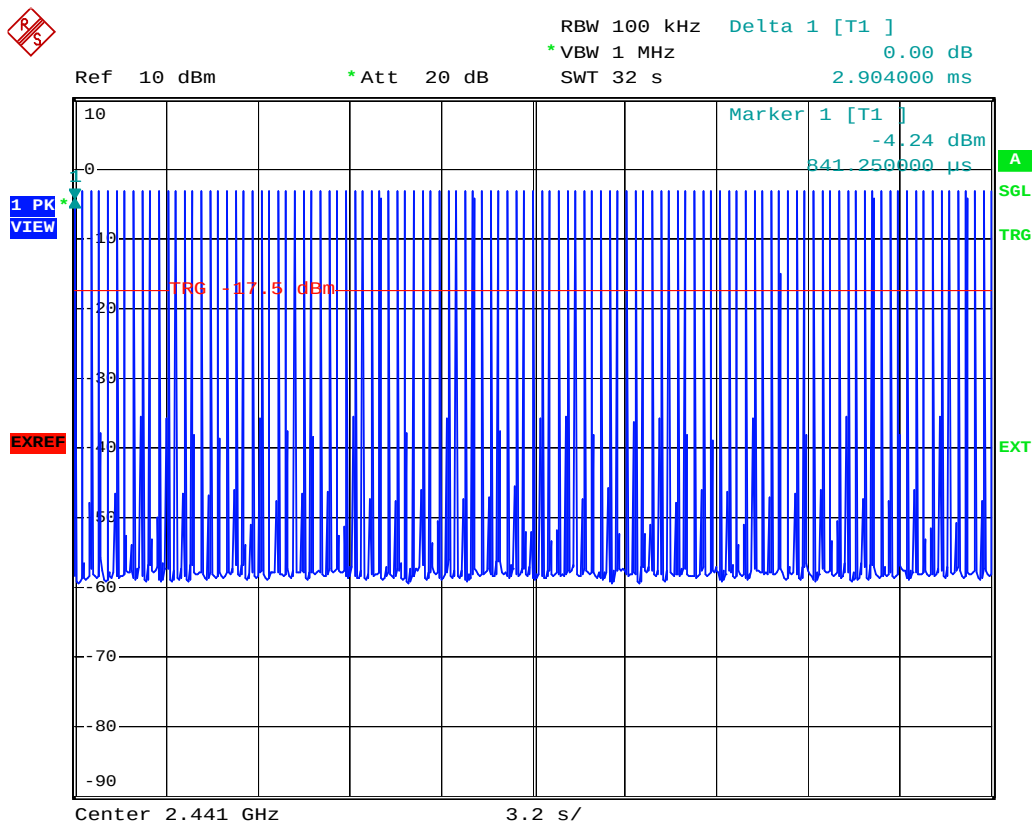
Date: 11.OCT.2007 15:48:13

Plot 17b – Pulse time (hopping transmit mode,  $\pi/4$ -DQPSK mode)



Date: 11.OCT.2007 15:43:07

Plot 18a – Pulse time (hopping transmit mode, 8DPSK mode)



Date: 11.OCT.2007 15:46:42

Plot 18b – Pulse time (hopping transmit mode, 8DPSK mode)

### 3.4 20 dB bandwidth

Compliance standard : 47 CFR Part 15, Subpart C, section 15.247 (a)(1)  
Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C  
Relative humidity : 50 %

#### 3.4.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the 20 dB bandwidth:

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW  $\geq$  1% of the 20 dB bandwidth

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

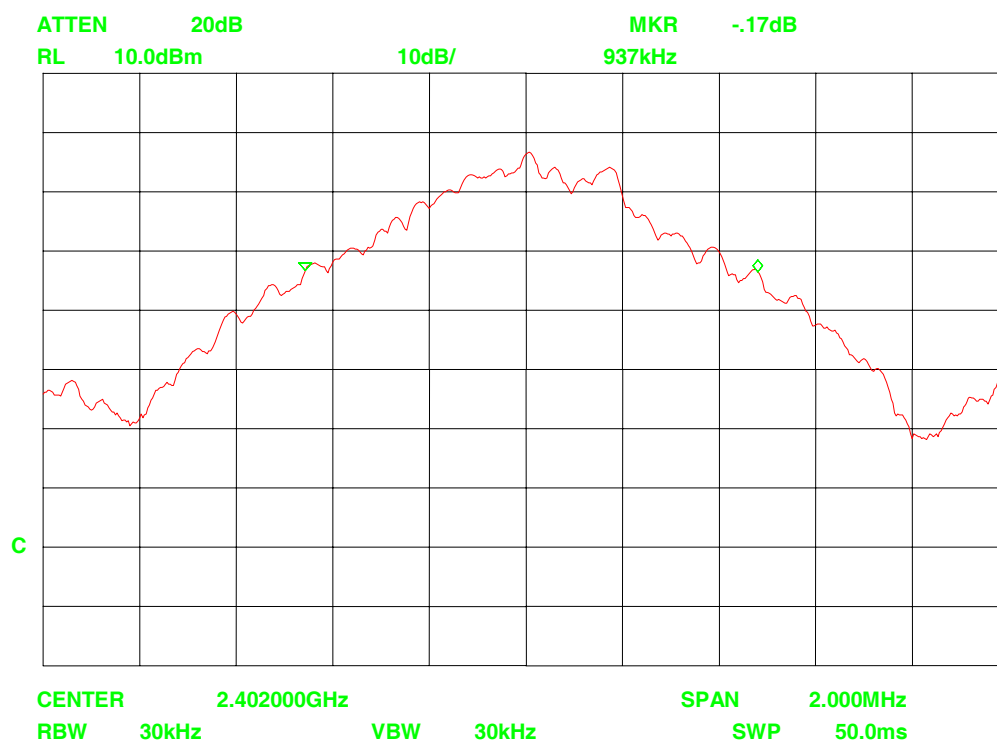
Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

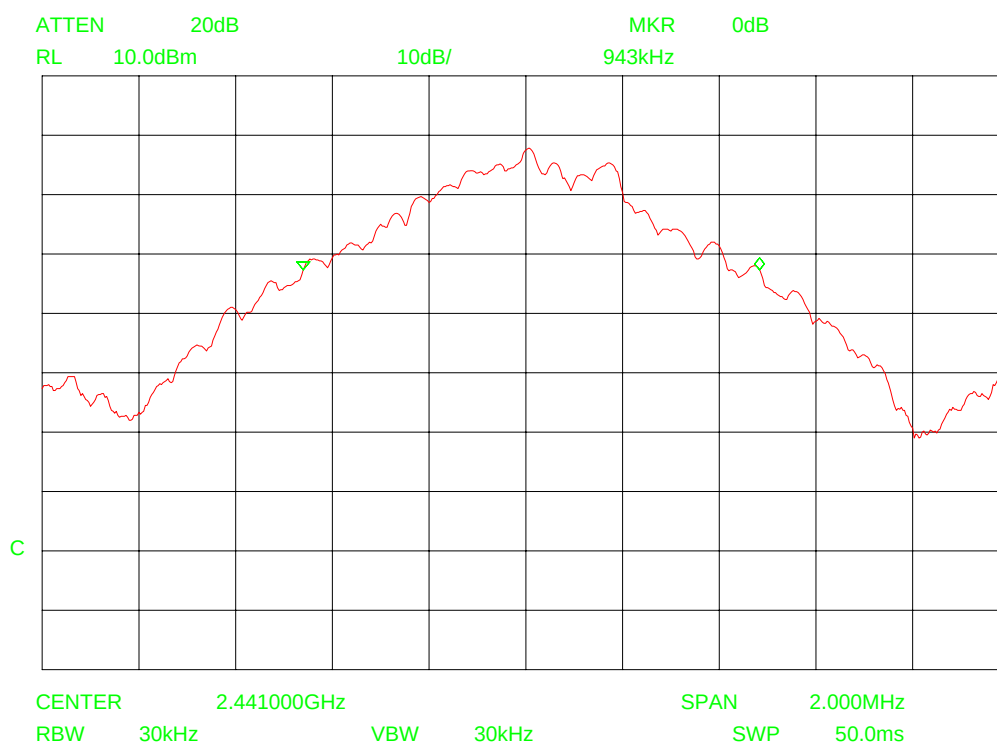
#### 3.4.2 Test results

| Modulation     | Test channel 1 | Test channel 2 | Test channel 3 | Plot numbers (on next pages) |
|----------------|----------------|----------------|----------------|------------------------------|
| GFSK           | 937 kHz        | 943 kHz        | 943 kHz        | 19 – 21                      |
| $\pi/4$ -DQPSK | 1250 kHz       | 1253 kHz       | 1257 kHz       | 22 – 24                      |
| 8DPSK          | 1267 kHz       | 1267 kHz       | 1267 kHz       | 25 – 27                      |

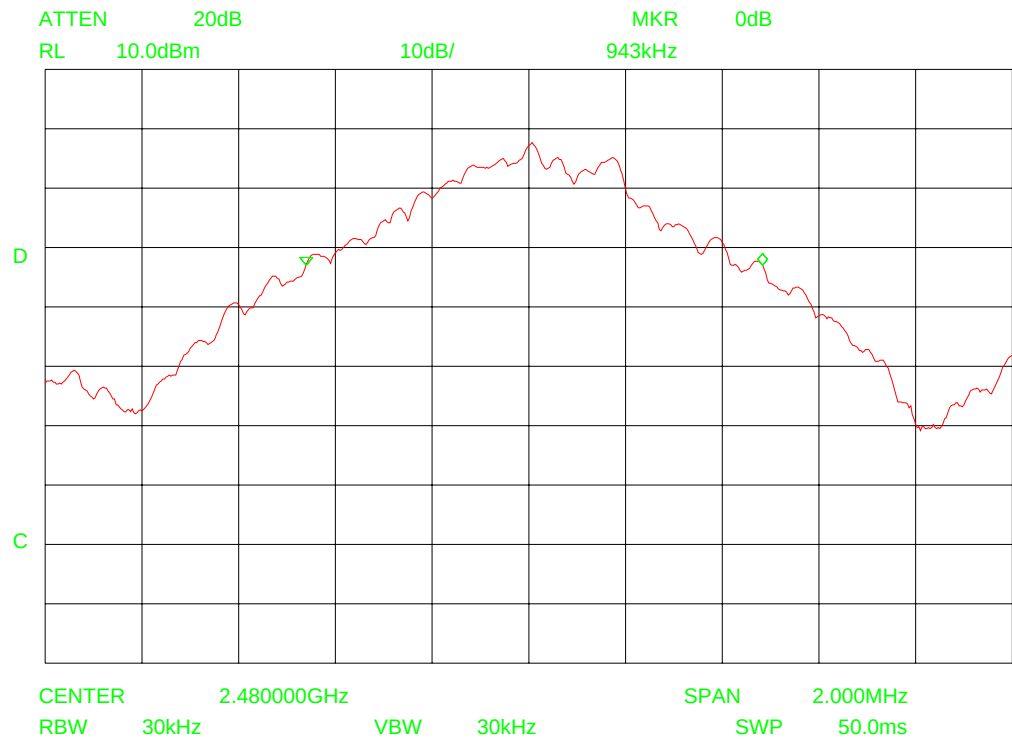
Measurement uncertainty: + 23/- 23 kHz



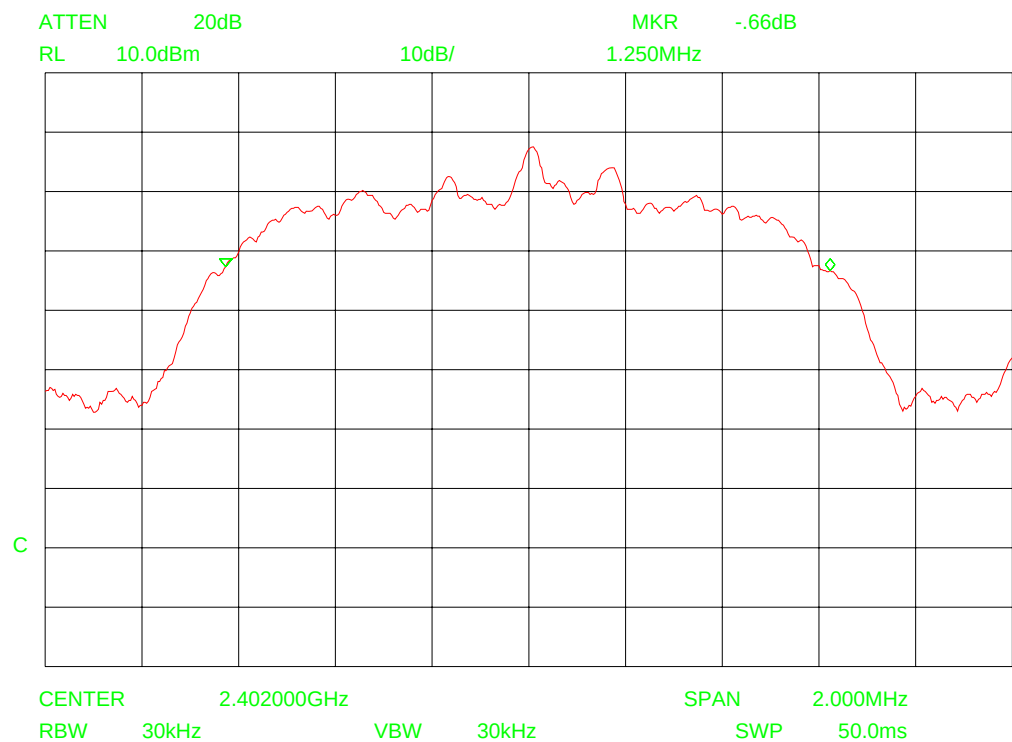
Plot 19 – 20 dB bandwidth on test channel 1 (2402 MHz, GFSK mode)



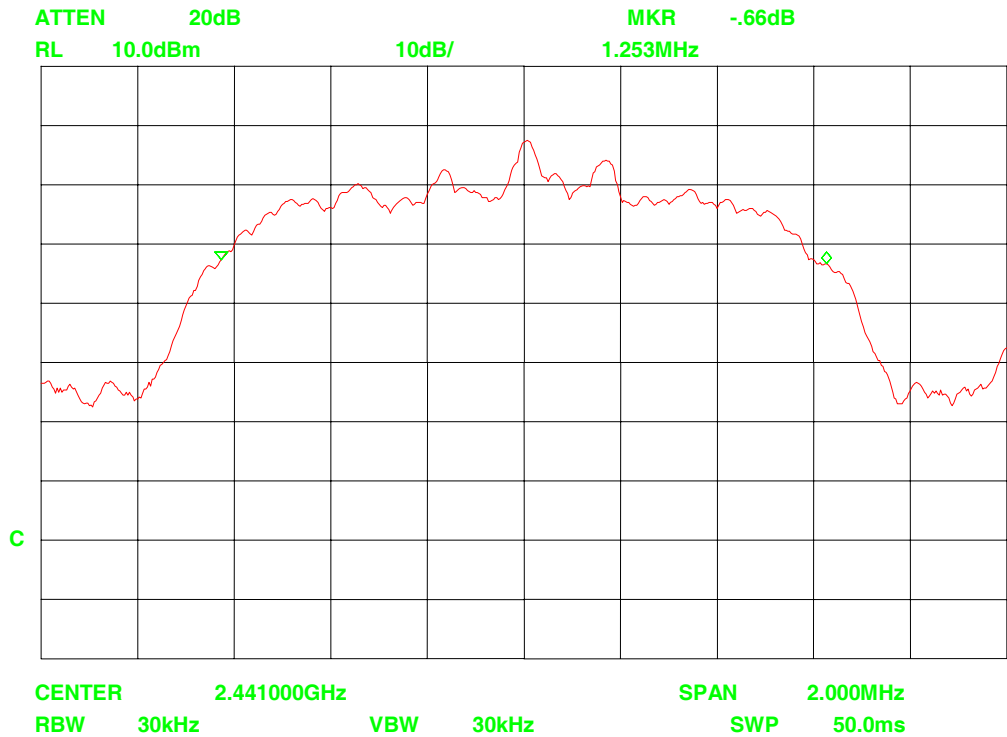
Plot 20 – 20 dB bandwidth on test channel 2 (2441 MHz, GFSK mode)



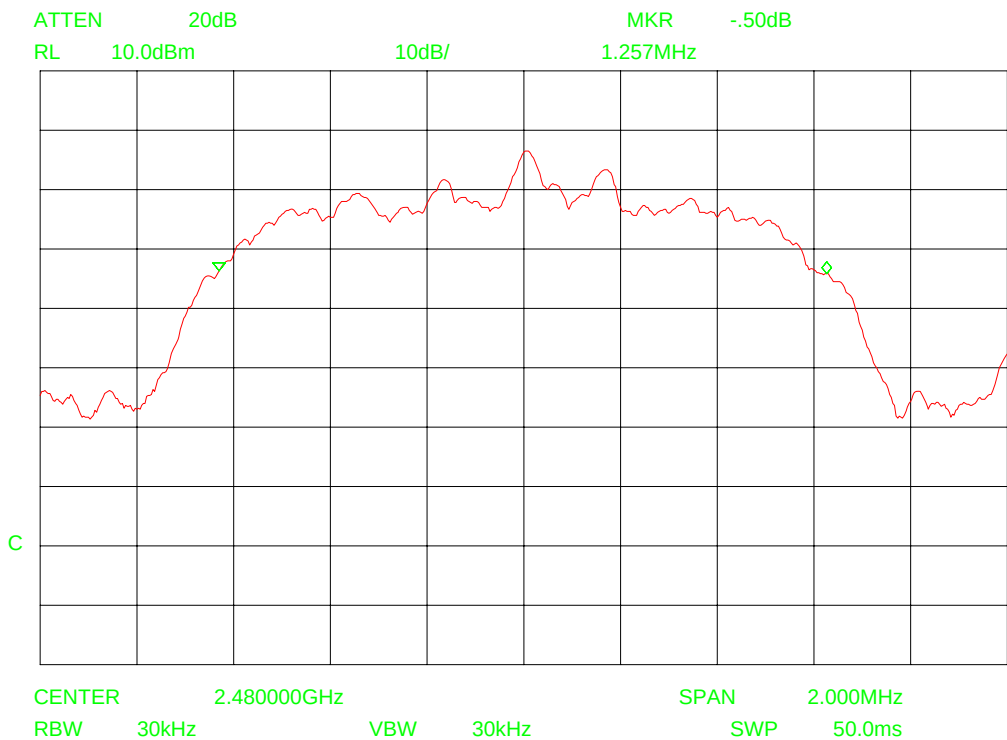
Plot 21 – 20 dB bandwidth on test channel 3 (2480 MHz, GFSK mode)



Plot 22 – 20 dB bandwidth on test channel 1 (2402 MHz,  $\pi/4$ -DQPSK mode)

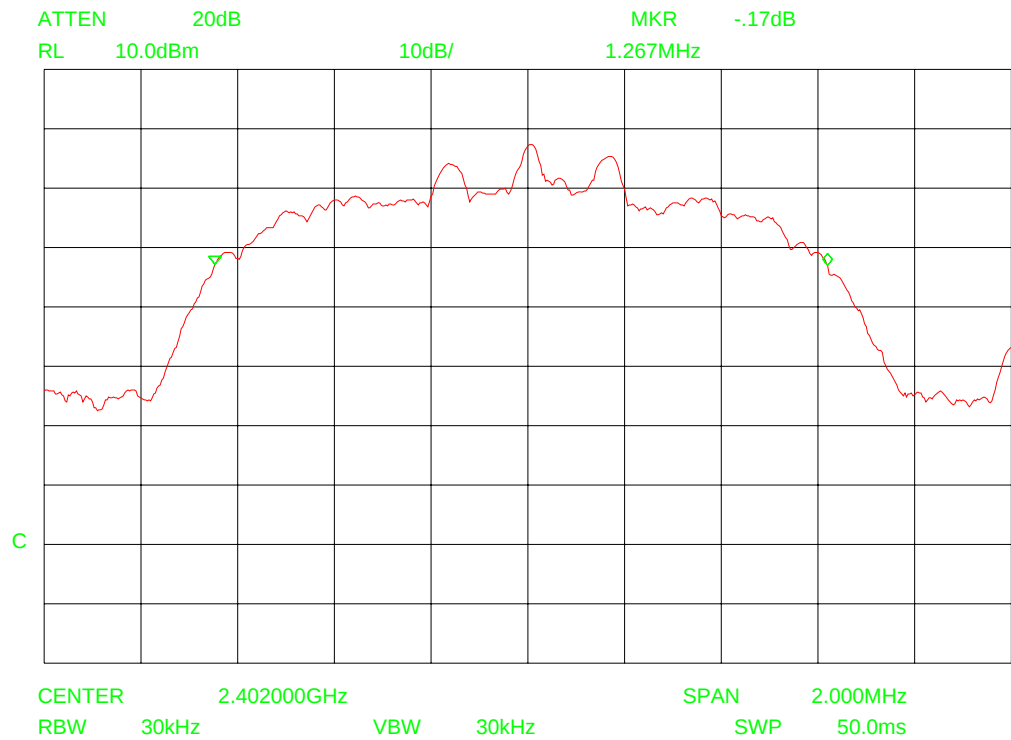


Plot 23 – 20 dB bandwidth on test channel 2 (2441 MHz,  $\pi/4$ -DQPSK mode)

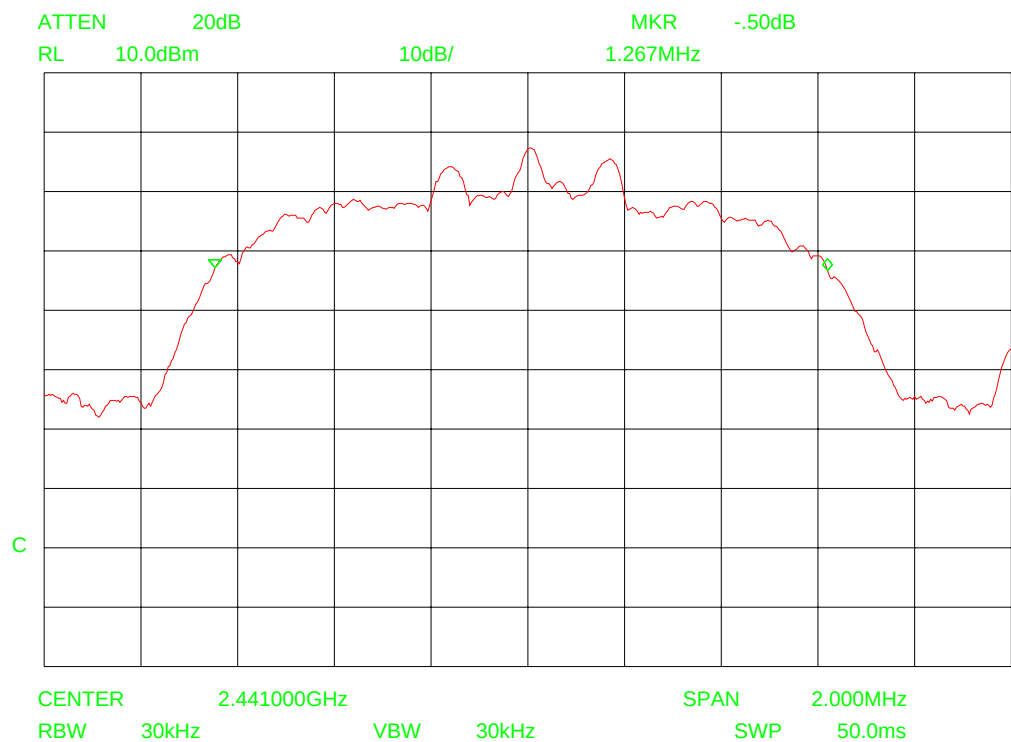


Plot 24 – 20 dB bandwidth on test channel 3 (2480 MHz,  $\pi/4$ -DQPSK mode)

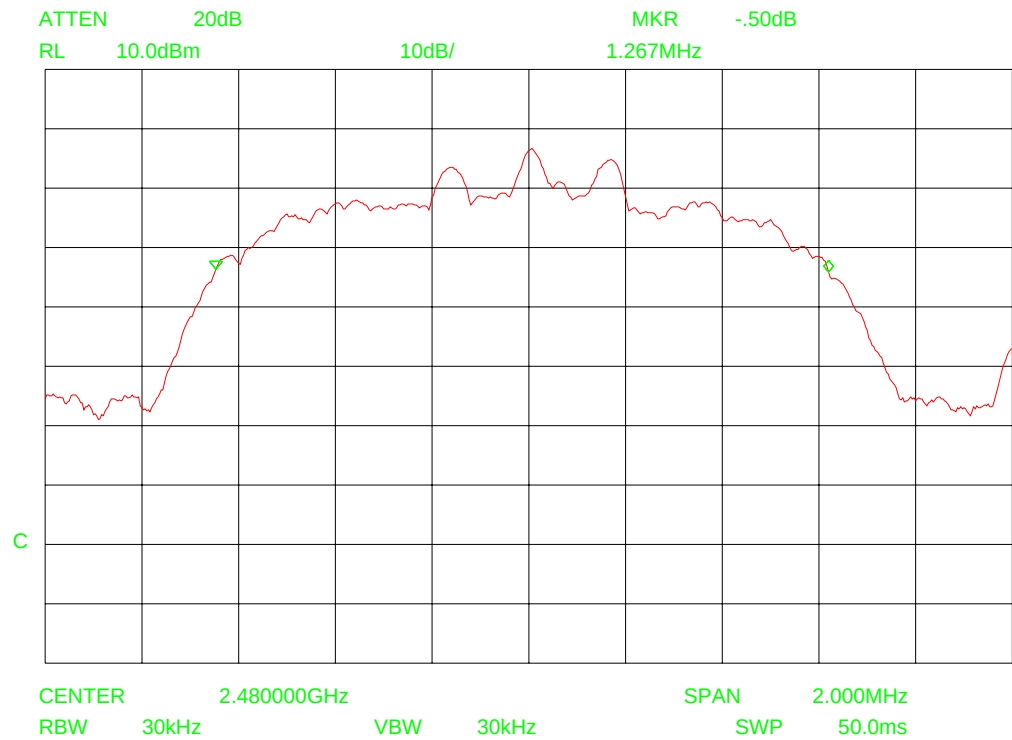




Plot 25 – 20 dB bandwidth on test channel 1 (2402 MHz, 8DPSK mode)



Plot 26 – 20 dB bandwidth on test channel 2 (2441 MHz, 8DPSK mode)



Plot 27 – 20 dB bandwidth on test channel 3 (2480 MHz, 8DPSK mode)

### 3.5 Peak output power

Compliance standard : FCC part 15, subpart C, sections 15.247 (b)(1) and 15.247 (b)(4)  
Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C  
Relative humidity : 50 %

#### 3.5.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the peak output power:

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the NOTE above regarding external attenuation and cable loss).

#### 3.5.2 Test results

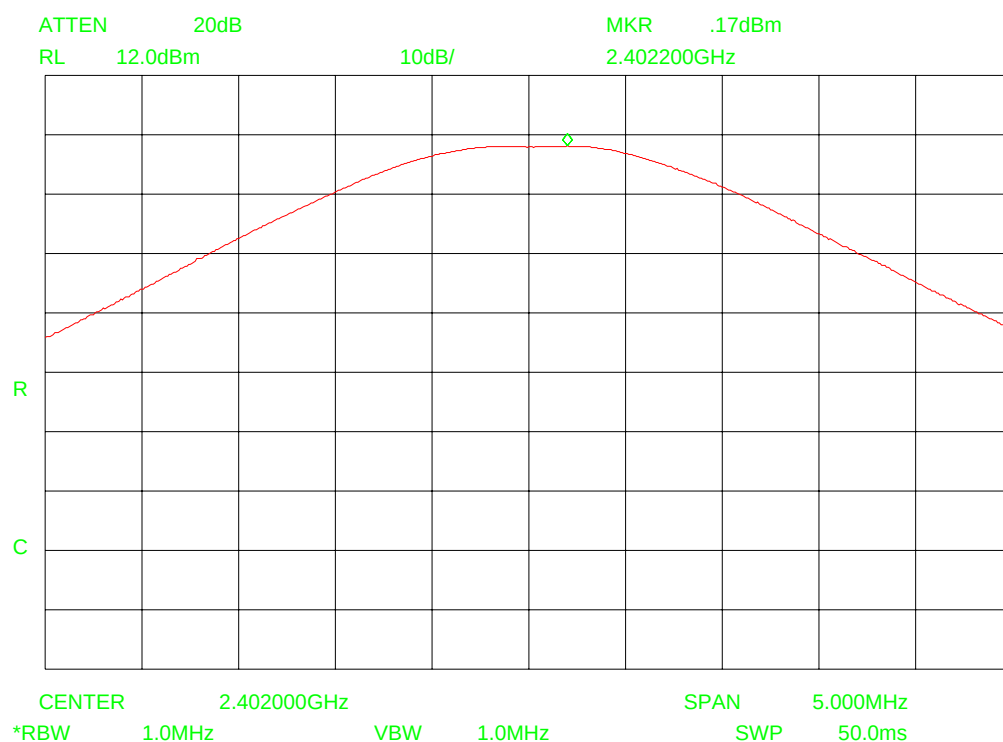
Conducted peak output power

| Modulation     | Test channel 1 | Test channel 2 | Test channel 3 | Plot numbers (on next pages) |
|----------------|----------------|----------------|----------------|------------------------------|
| GFSK           | 0.17 dBm       | 0.20 dBm       | 0.33 dBm       | 28 – 30                      |
| $\pi/4$ -DQPSK | 1.00 dBm       | 0.53 dBm       | 0.17 dBm       | 31 – 33                      |
| 8DPSK          | 1.00 dBm       | 0.70 dBm       | 0.33 dBm       | 34 – 36                      |

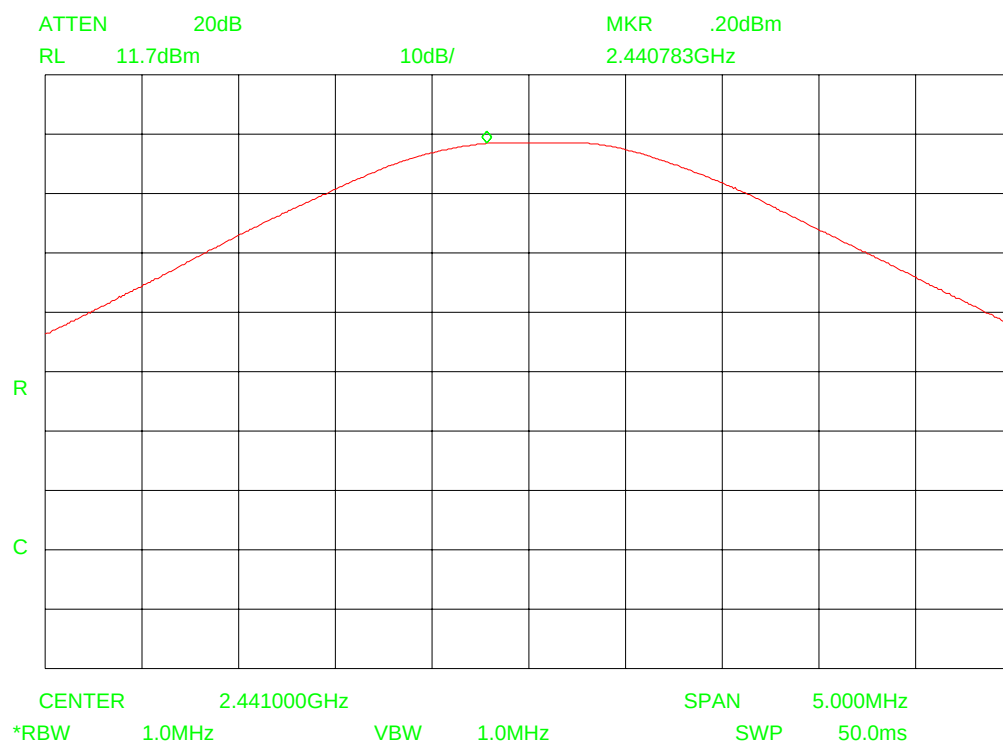
Radiated peak output power (EIRP, calculated, peak antenna gain of 2.0 dBi)

| Modulation     | Test channel 1 | Test channel 2 | Test channel 3 |
|----------------|----------------|----------------|----------------|
| GFSK           | 2.17 dBm       | 2.20 dBm       | 2.33 dBm       |
| $\pi/4$ -DQPSK | 3.00 dBm       | 2.53 dBm       | 2.17 dBm       |
| 8DPSK          | 3.00 dBm       | 2.70 dBm       | 2.33 dBm       |

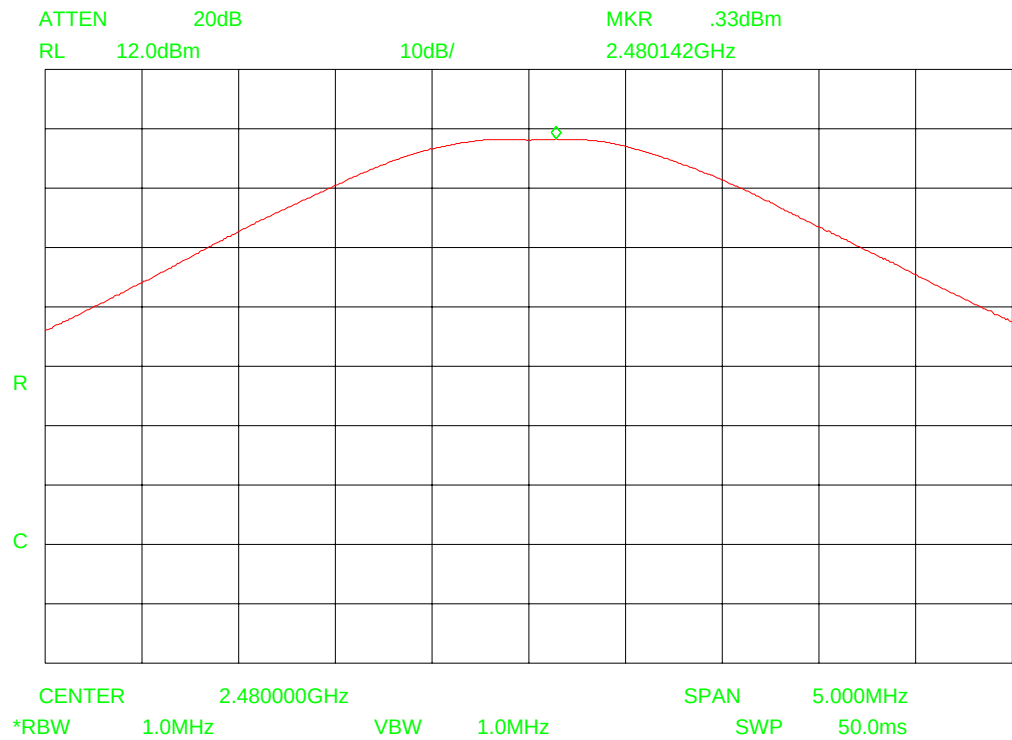
Measurement uncertainty: + 1.6/ -1.9 dB



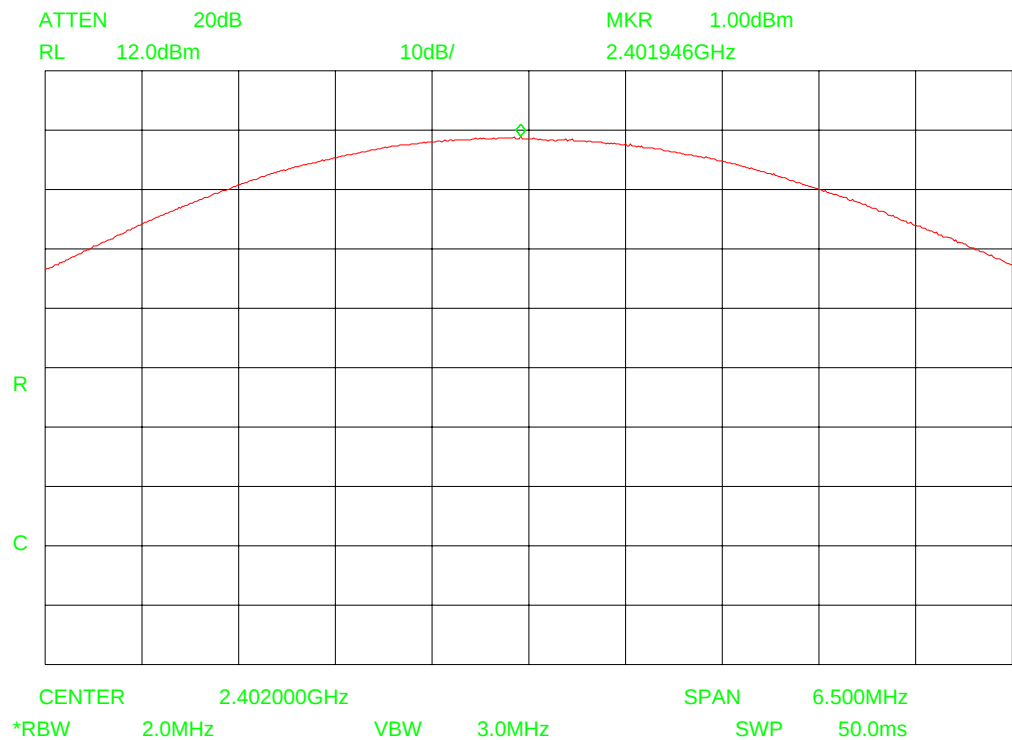
Plot 28 – Peak power output on 2402 MHz (GFSK mode, offset of 2 dB for cable losses)



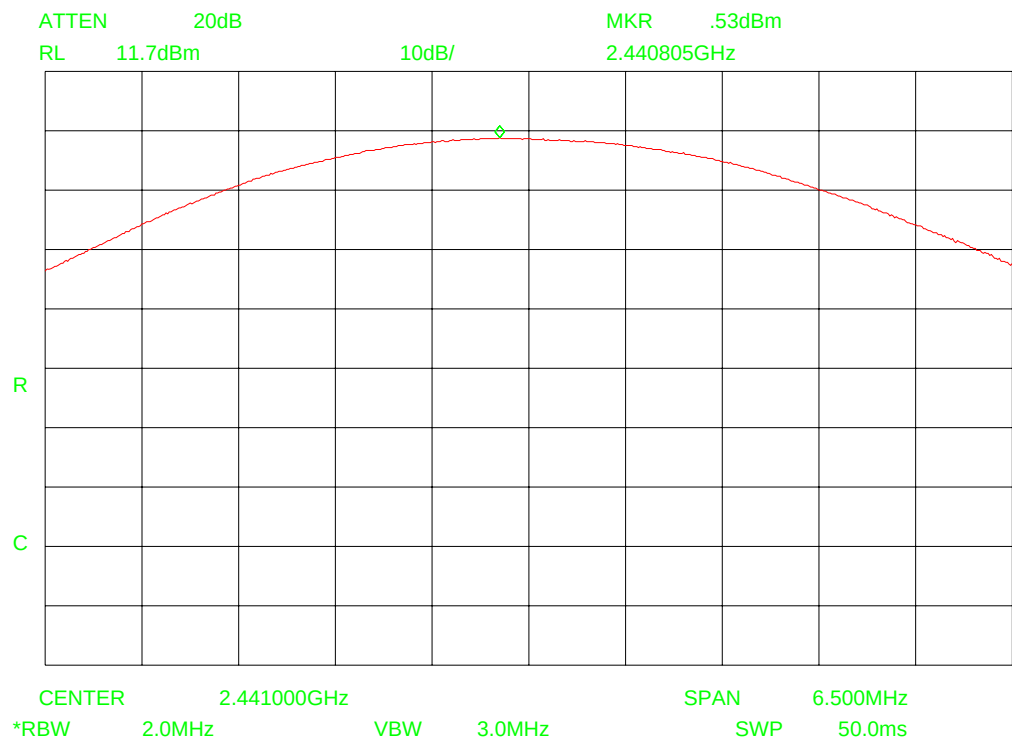
Plot 29 – Peak power output on 2441 MHz (GFSK mode, offset of 1.7 dB for cable losses)



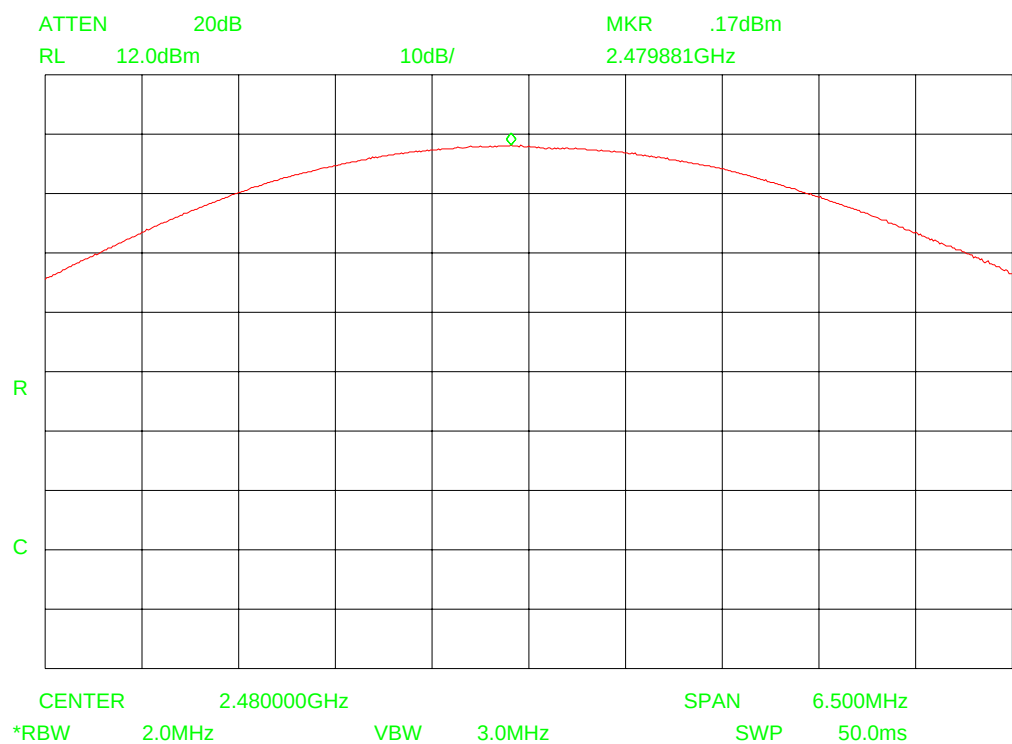
Plot 30 – Peak power output on 2480 MHz (GFSK mode, offset of 2 dB for cable losses)



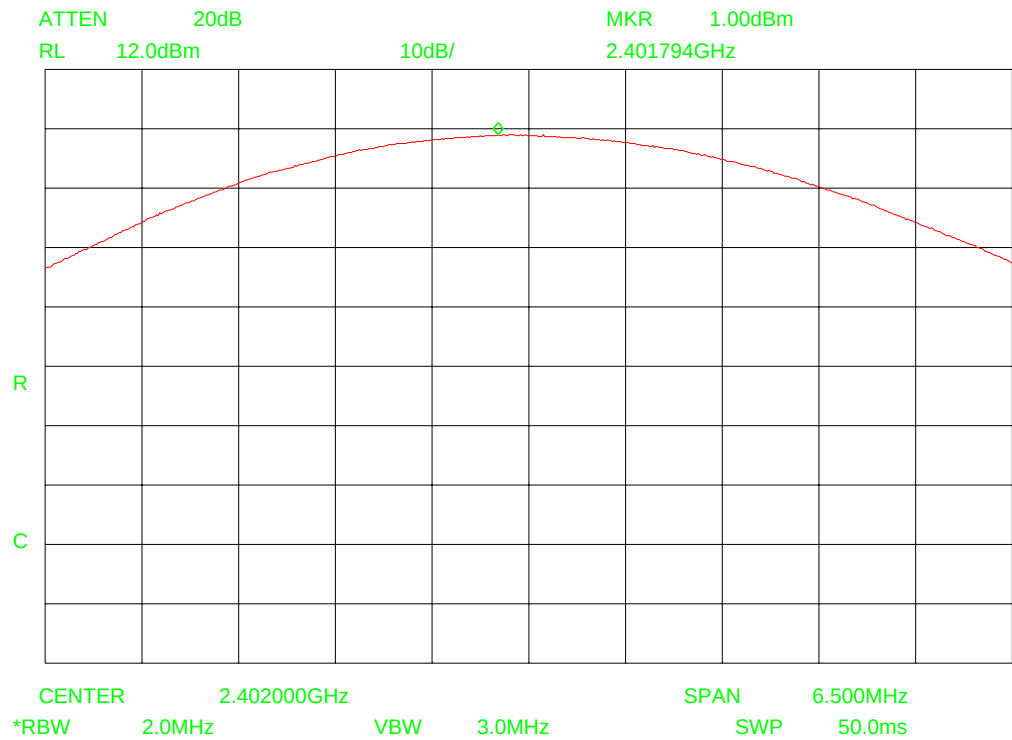
Plot 31 – Peak power output on 2402 MHz ( $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses)



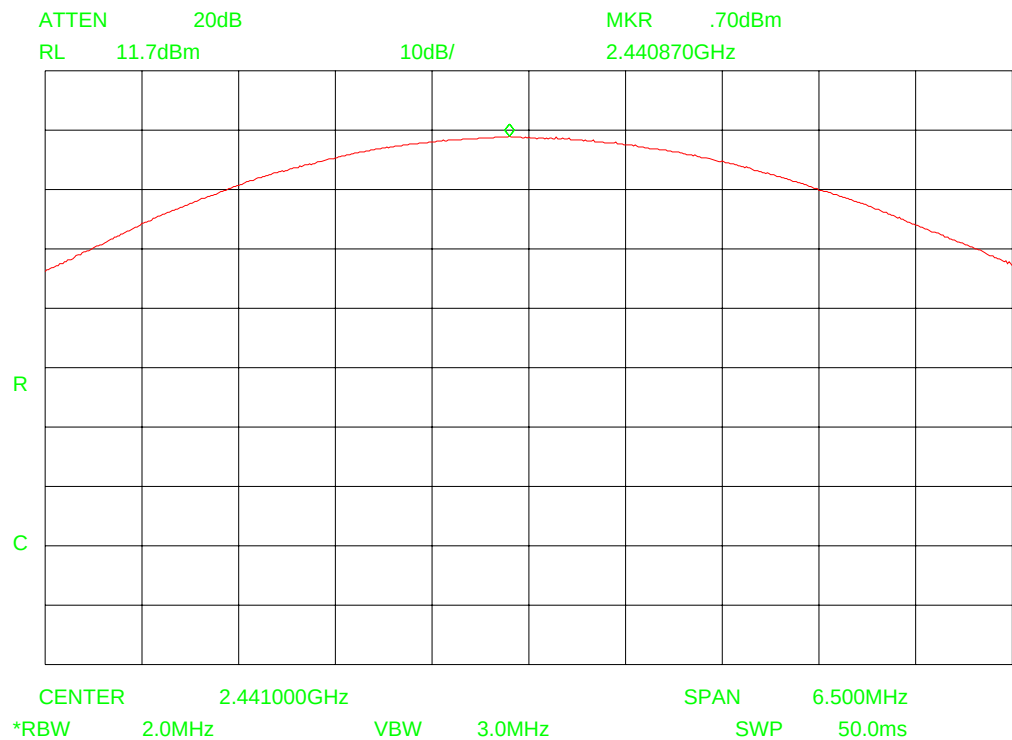
Plot 32 – Peak power output on 2441 MHz ( $\pi/4$ -DQPSK mode, offset of 1.7 dB for cable losses)



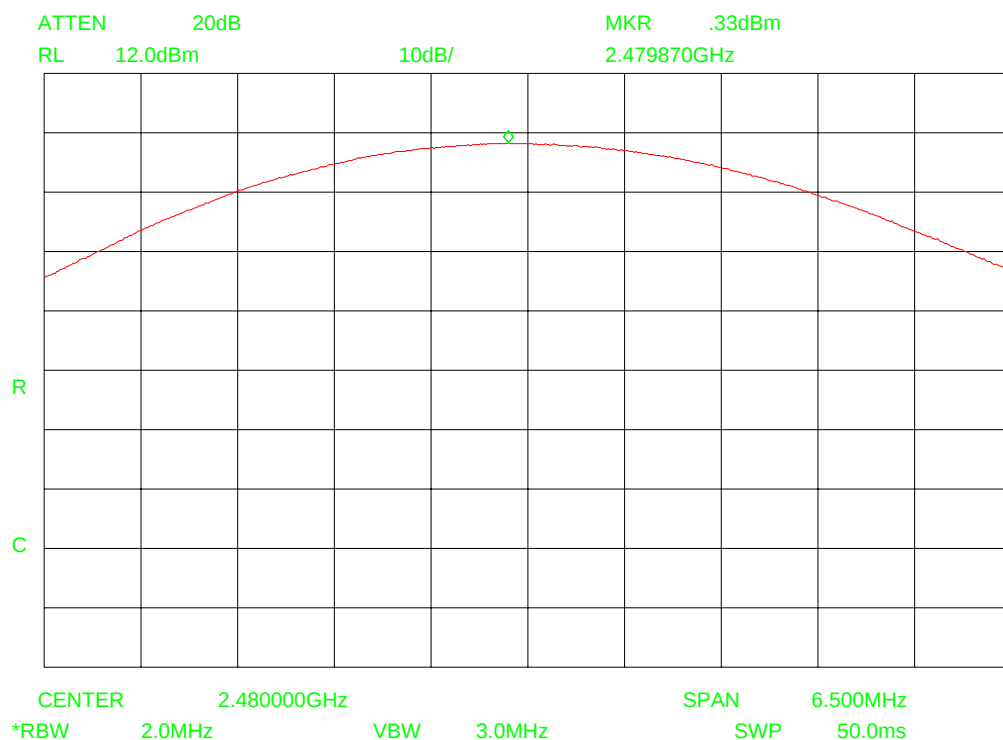
Plot 33 – Peak power output on 2480 MHz ( $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses)



Plot 34 – Peak power output on 2402 MHz (8DPSK mode, offset of 2 dB for cable losses)



Plot 35 – Peak power output on 2441 MHz (8DPSK mode, offset of 1.7 dB for cable losses)



Plot 36 – Peak power output on 2480 MHz (8DPSK mode, offset of 2 dB for cable losses)



### 3.6 Band-edge compliance of RF conducted emissions

Compliance standard : FCC part 15, subpart C, section 15.247 (d)

Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C

Relative humidity : 50 %

#### 3.6.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the band-edge compliance of RF conducted emissions:

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

RBW  $\geq$  1% of the span

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

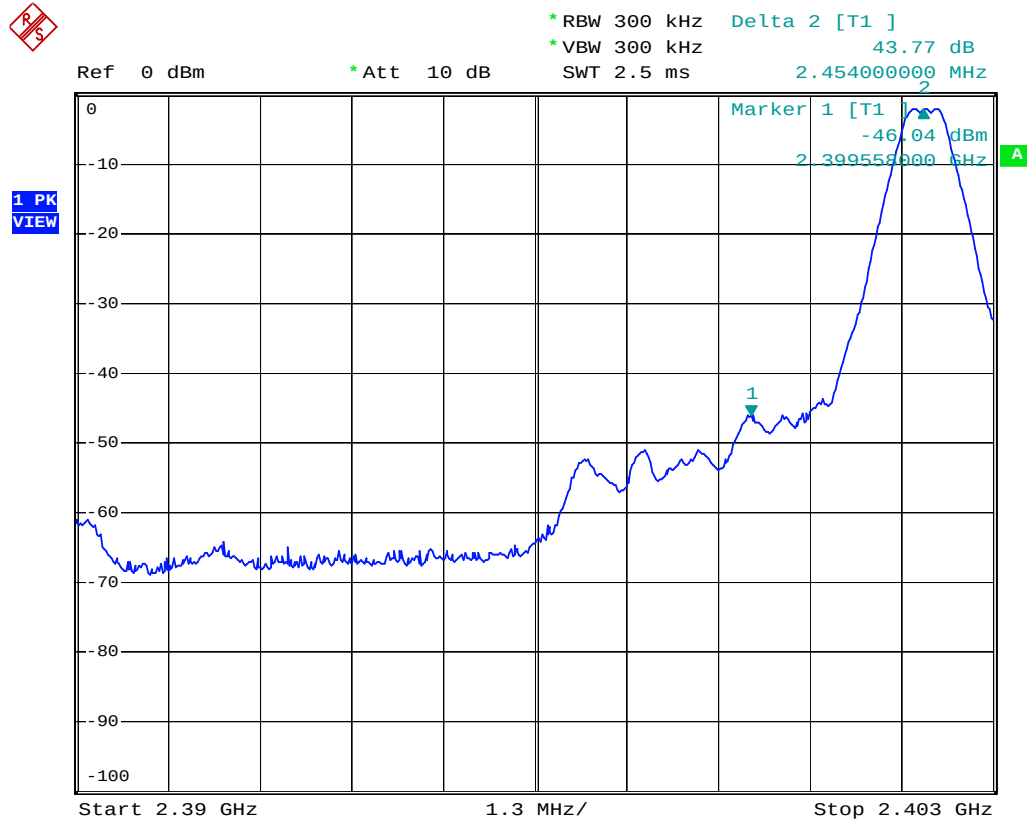
#### 3.6.2 Test results

Continuous transmit mode

| Modulation    | Lower bandedge | Plot numbers (on next pages) |
|---------------|----------------|------------------------------|
| GFSK          | -43.8 dBc      | 37                           |
| $\pi/4$ -DPSK | -45.7 dBc      | 38                           |
| 8DPSK         | -45.9 dBc      | 39                           |

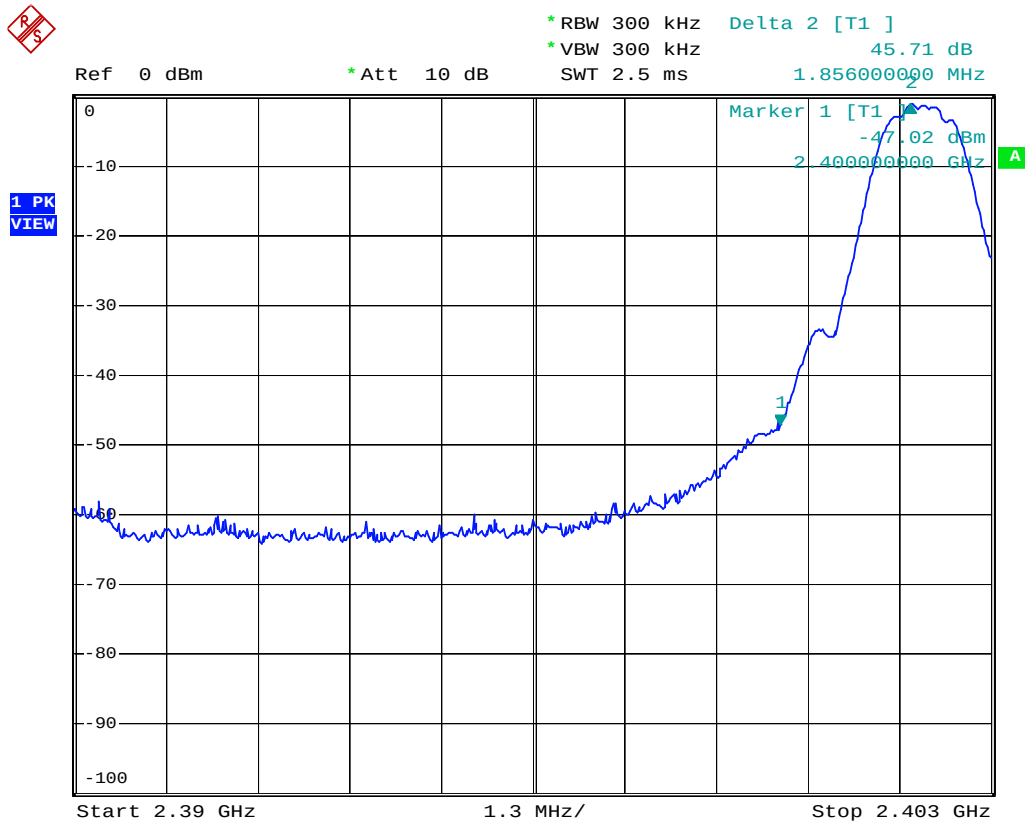
## Hopping transmit mode

| Modulation     | Lower bandedge | Plot numbers (on next pages) |
|----------------|----------------|------------------------------|
| GFSK           | -44.6 dBc      | 40                           |
| $\pi/4$ -DQPSK | -45.9 dBc      | 41                           |
| 8DPSK          | -48.1 dBc      | 42                           |



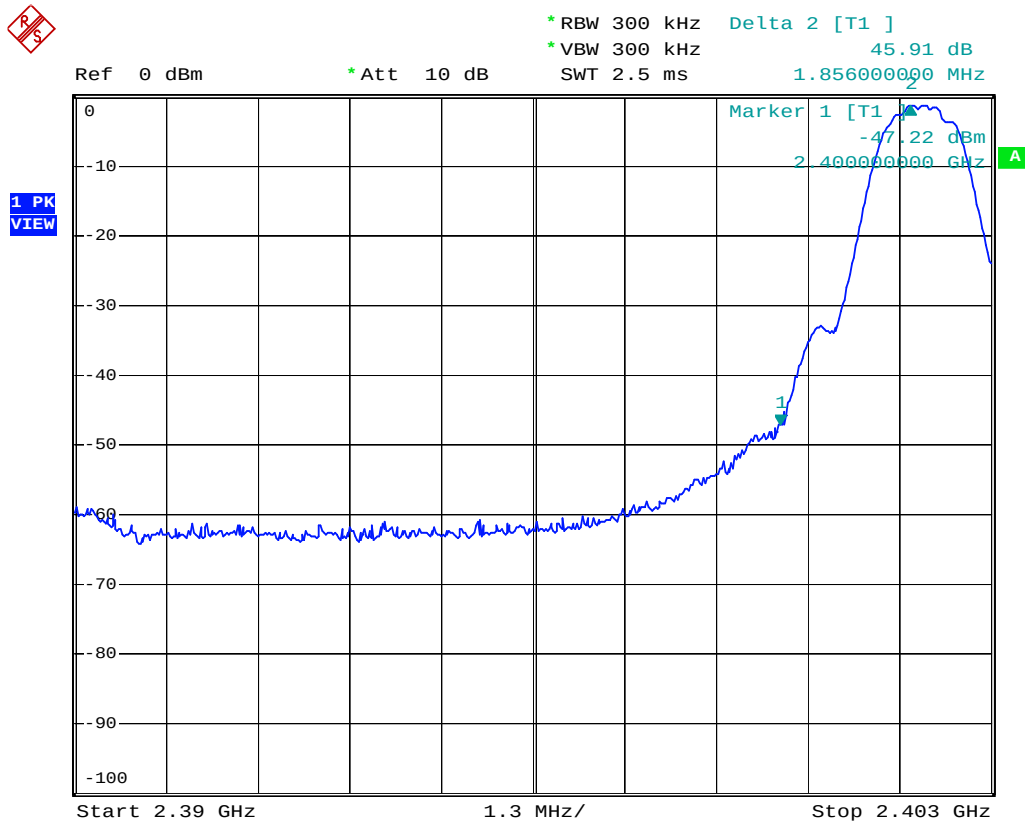
Date: 12.SEP.2007 17:01:25

Plot 37 – Emission at the lower bandedge of the frequency band 2.4 – 2.4835 MHz  
 (continuous transmit mode, GFSK mode, measurement results in peak mode)



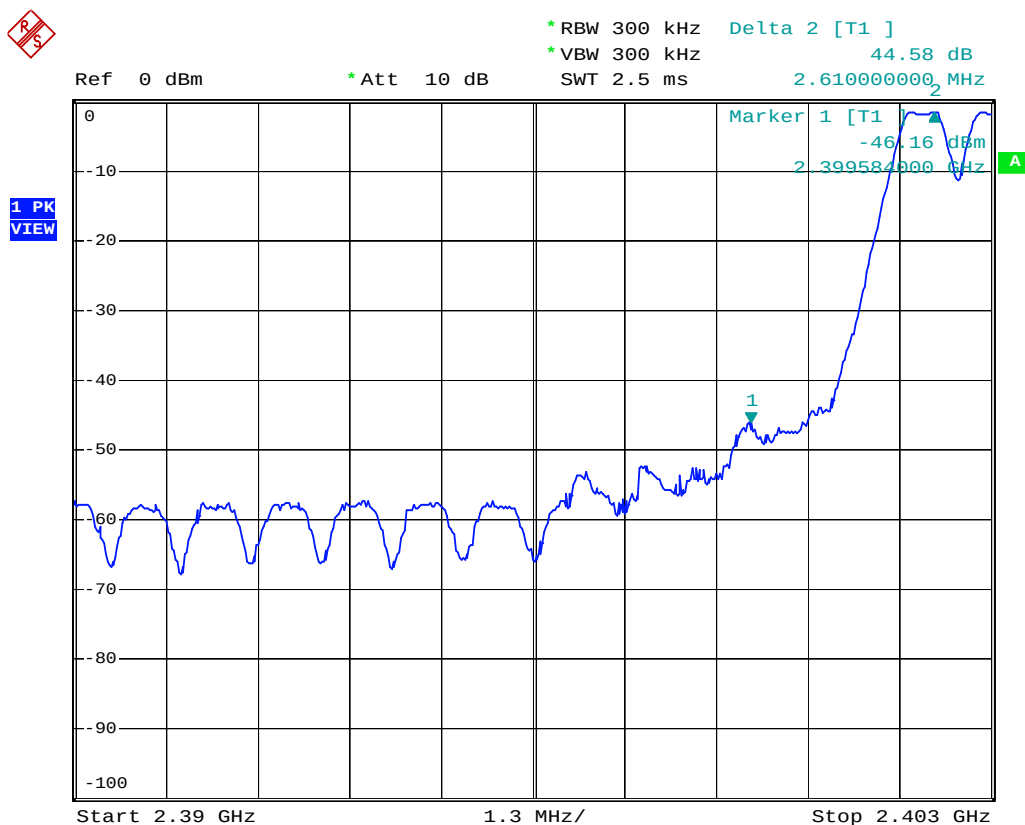
Date: 12.SEP.2007 16:56:49

Plot 38 – Emission at the lower bandedge of the frequency band 2.4 – 2.4835 MHz (continuous transmit mode,  $\pi/4$ -DQPSK mode, measurement results in peak mode)



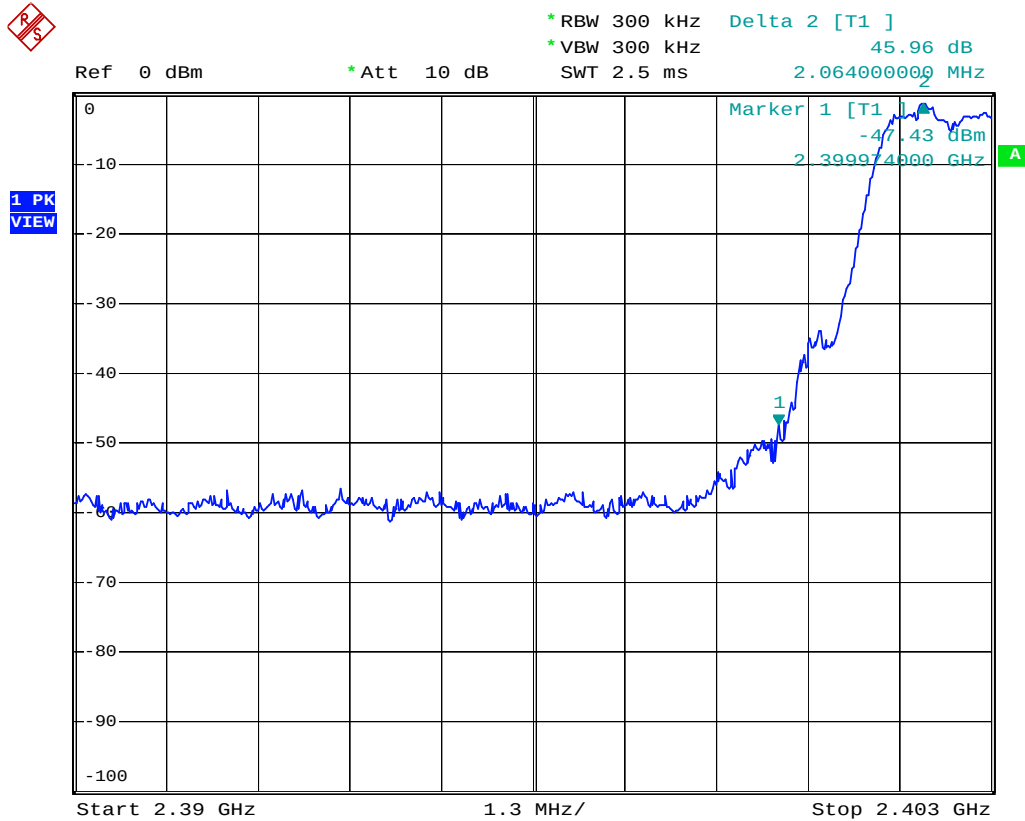
Date: 12.SEP.2007 16:54:50

Plot 39 – Emission at the lower bandedge of the frequency band 2.4 – 2.4835 MHz  
 (continuous transmit mode, 8DPSK mode, measurement results in peak mode)



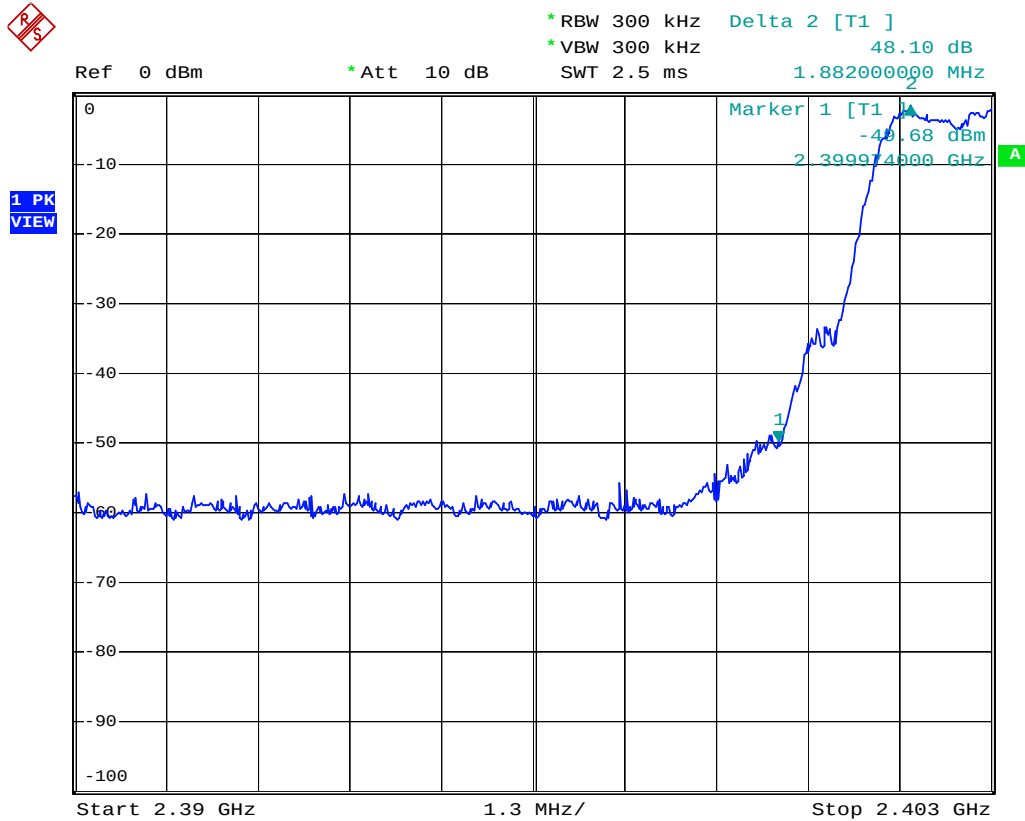
Date: 12.SEP.2007 17:04:47

Plot 40 – Emission at the lower bandedge of the frequency band 2.4 – 2.4835 MHz  
(hopping transmit mode, GFSK mode, measurement results in peak mode)



Date: 12.SEP.2007 17:07:37

Plot 41 – Emission at the lower bandedge of the frequency band 2.4 – 2.4835 MHz (hopping transmit mode,  $\pi/4$ -DQPSK mode, measurement results in peak mode)



Date: 12.SEP.2007 17:09:28

Plot 42 – Emission at the lower bandedge of the frequency band 2.4 – 2.4835 MHz  
(hopping transmit mode, 8DPSK mode, measurement results in peak mode)



### 3.7 Spurious RF conducted emissions

Compliance standard : FCC part 15, subpart C, section 15.247 (d)

Method of test : Public Notice DA 00-705

Ambient temperature : 21 °C

Relative humidity : 50 %

#### 3.7.1 Test method

The following is an excerpt from Public Notice DA 00-705 and describes the method for measuring the spurious RF conducted emissions:

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10<sup>th</sup> harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.

#### 3.7.2 Test results

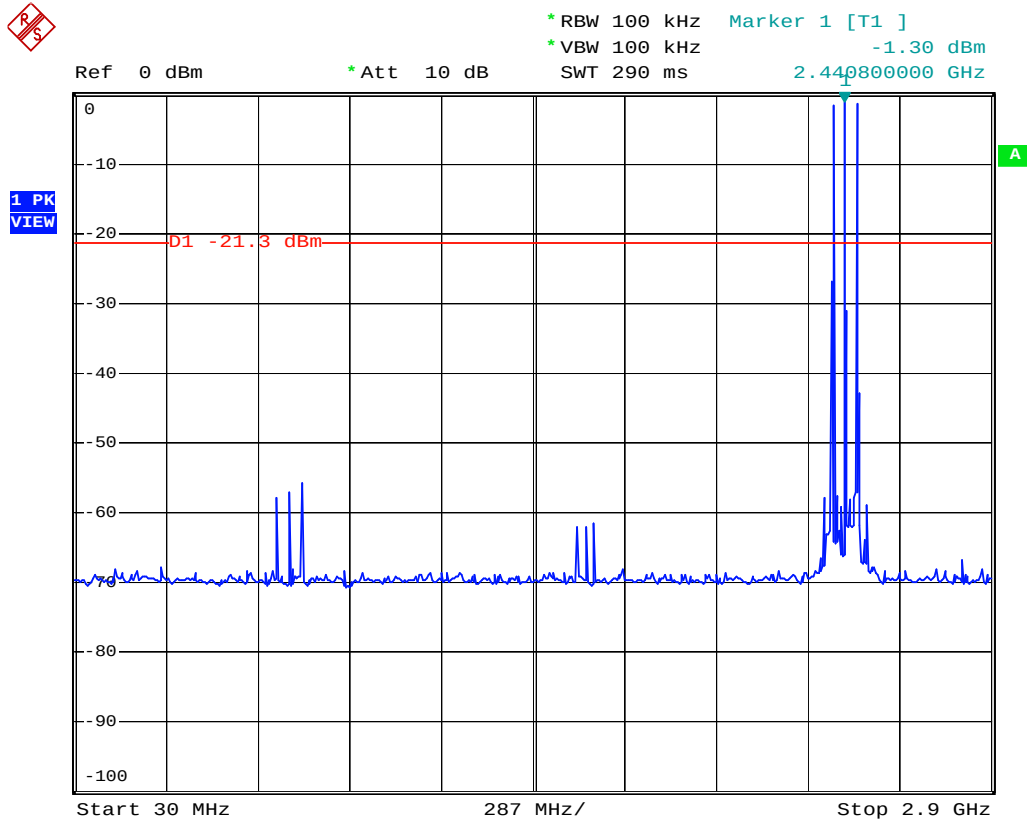
##### Continuous transmit mode

| Modulation     | Plot numbers (on next pages) |
|----------------|------------------------------|
| GFSK           | 43 – 45                      |
| $\pi/4$ -DQPSK | 46 – 48                      |
| 8DPSK          | 49 – 51                      |

##### Hopping transmit mode

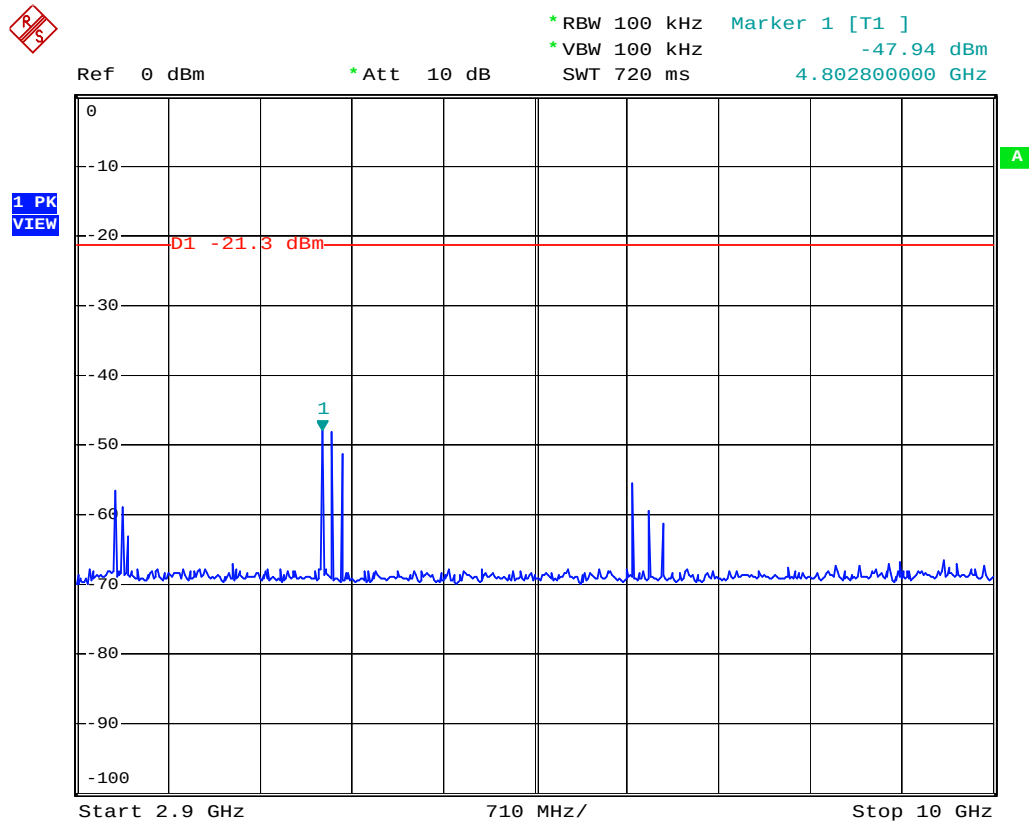
| Modulation     | Plot numbers (on next pages) |
|----------------|------------------------------|
| GFSK           | 52 – 54                      |
| $\pi/4$ -DQPSK | 55 – 57                      |
| 8DPSK          | 58 – 60                      |

Measurement uncertainty: 0.03 – 2 GHz: +1.7 / -1.9 dB, > 2 GHz: +2.4 / -2.7 dB



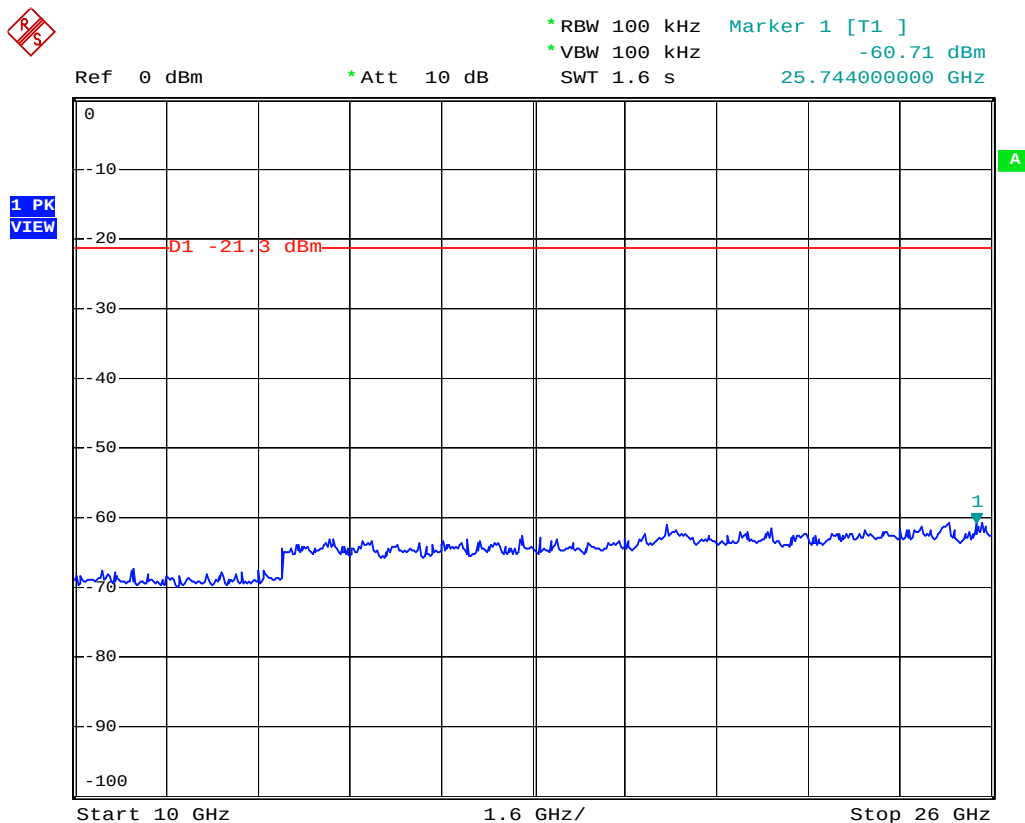
Date: 12.SEP.2007 14:47:41

Plot 43 – Spurious RF conducted emissions in the frequency range of 30 MHz – 2.9 GHz  
 (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz, GFSK mode)



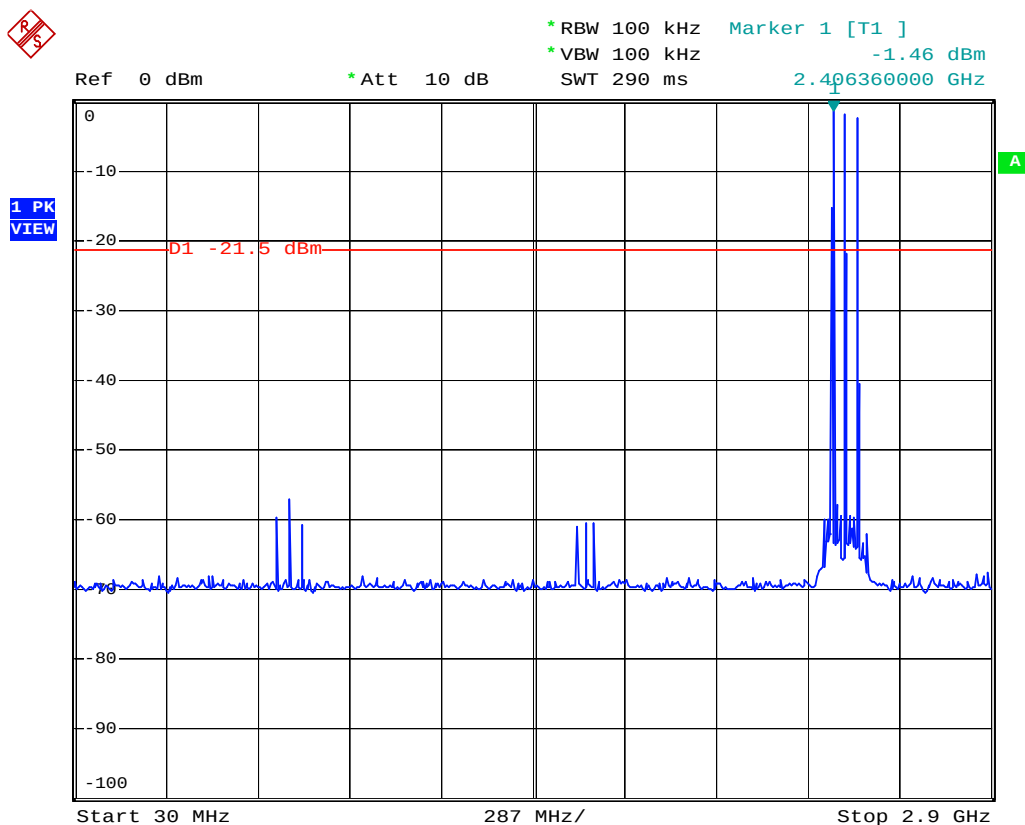
Date: 12.SEP.2007 14:51:13

Plot 44 – Spurious RF conducted emissions in the frequency range of 2.9 GHz – 10 GHz  
 (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz, GFSK mode)



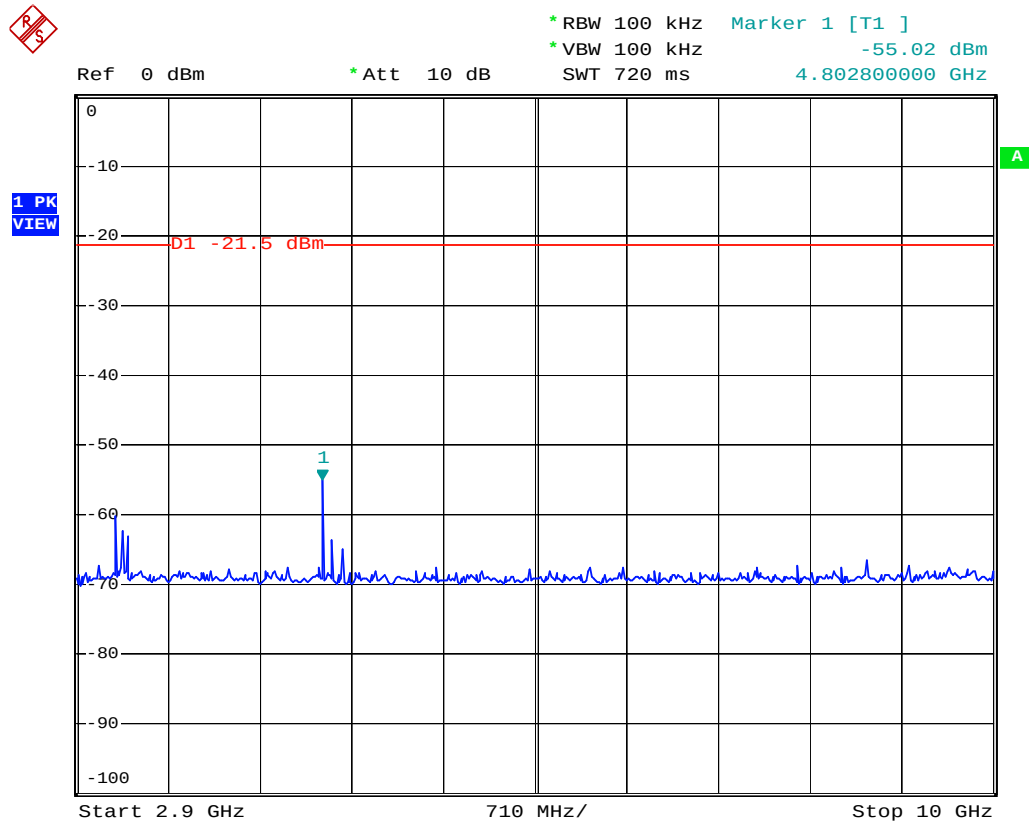
Date: 12.SEP.2007 14:53:43

Plot 45 – Spurious RF conducted emissions in the frequency range of 10 GHz – 26 GHz  
(continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz, GFSK mode)



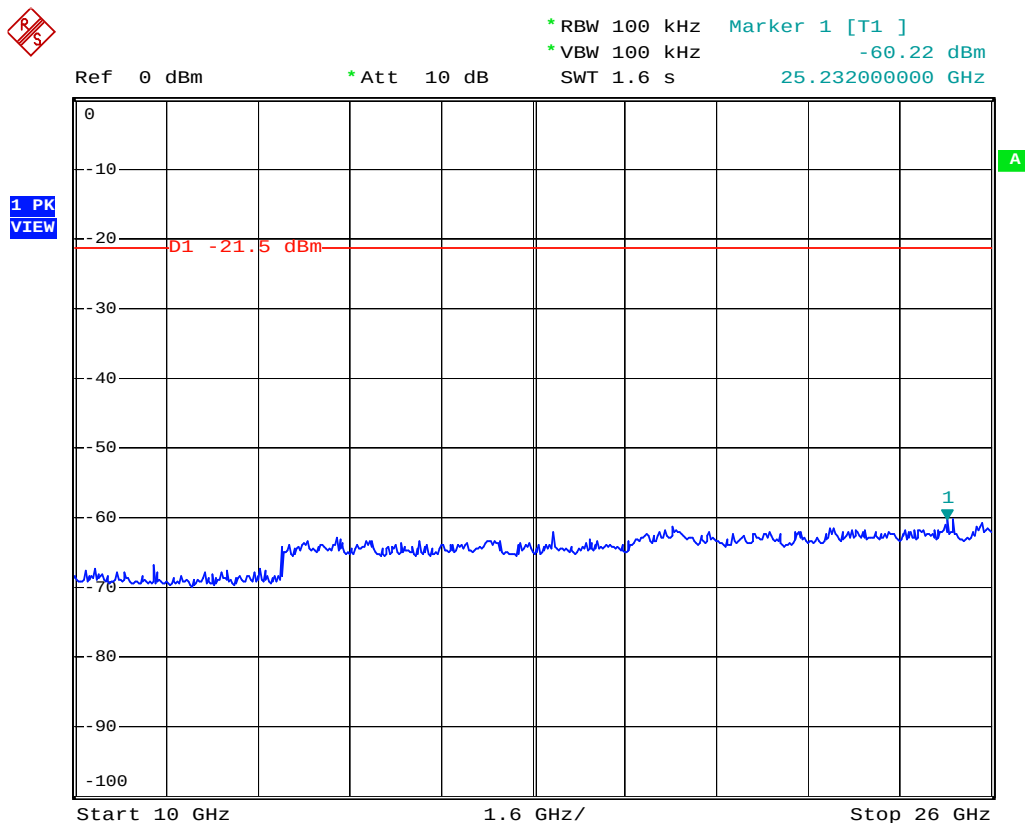
Date: 12.SEP.2007 14:59:53

Plot 46 – Spurious RF conducted emissions in the frequency range of 30 MHz – 2.9 GHz (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz,  $\pi/4$ -DQPSK mode)



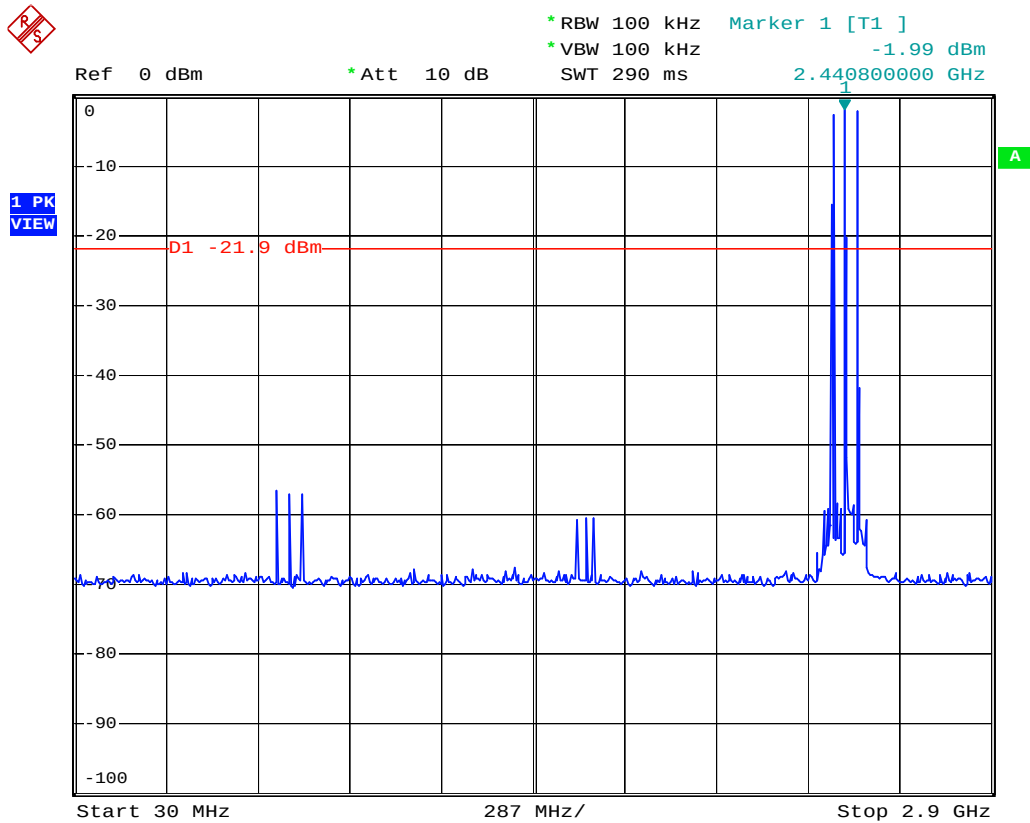
Date: 12.SEP.2007 15:02:10

Plot 47 – Spurious RF conducted emissions in the frequency range of 2.9 GHz – 10 GHz  
 (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz,  $\pi/4$ -DQPSK mode)



Date: 12.SEP.2007 15:04:29

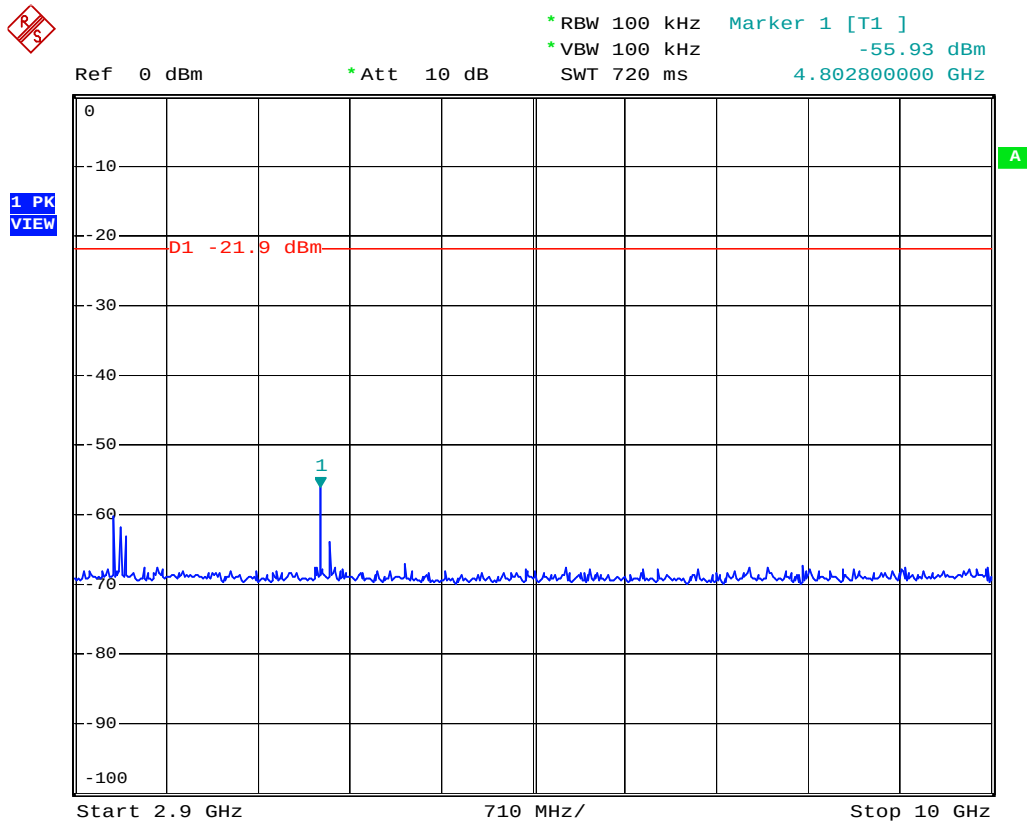
Plot 48 – Spurious RF conducted emissions in the frequency range of 10 GHz – 26 GHz  
 (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz,  $\pi/4$ -DQPSK mode)



Date: 12.SEP.2007 15:08:11

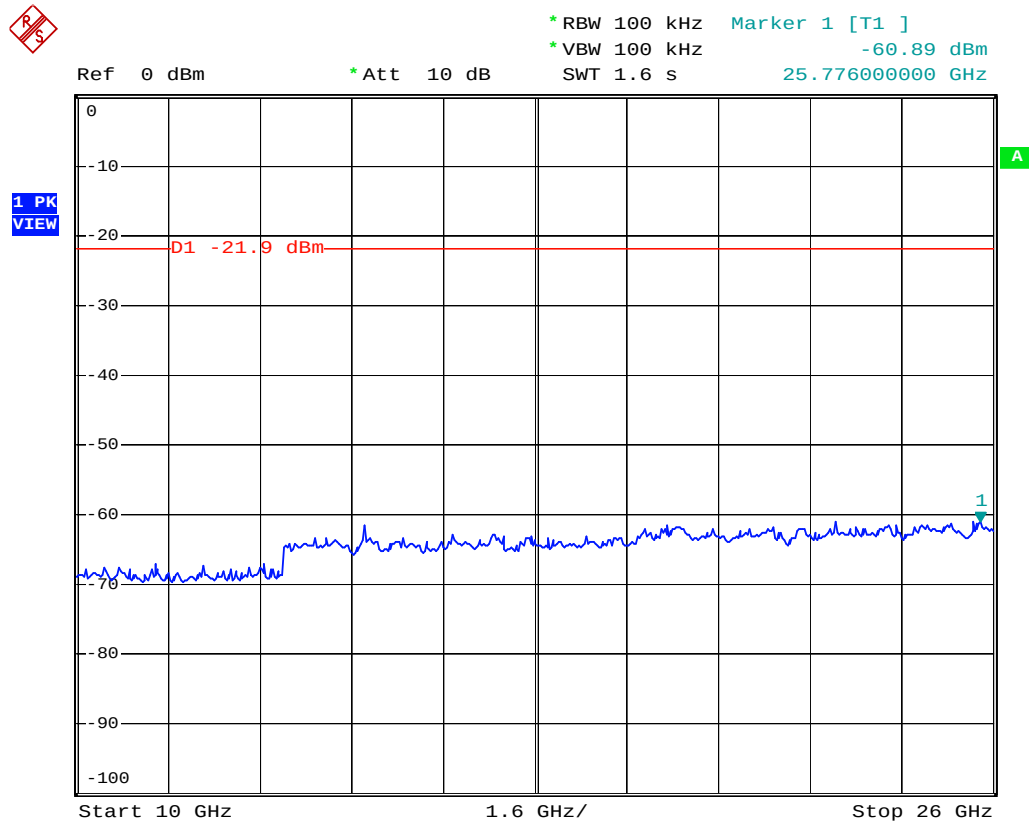
Plot 49 – Spurious RF conducted emissions in the frequency range of 30 MHz – 2.9 GHz (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz, 8DPSK mode)





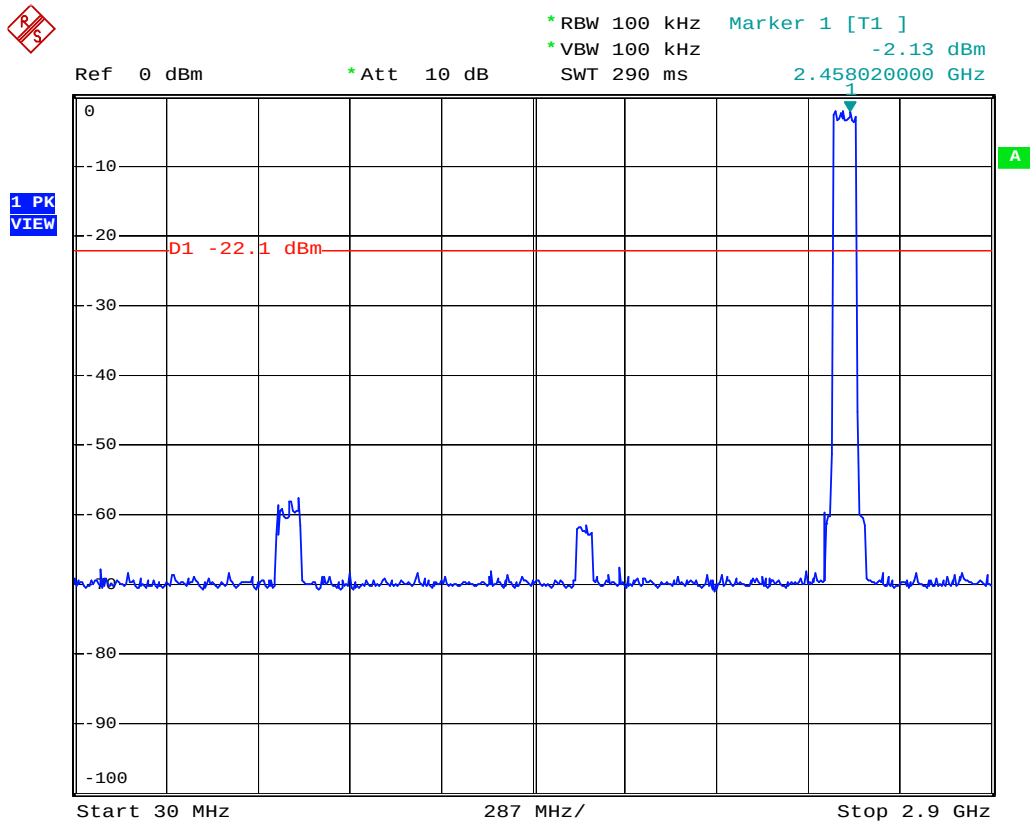
Date: 12.SEP.2007 15:10:55

Plot 50 – Spurious RF conducted emissions in the frequency range of 2.9 GHz – 10 GHz (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz, 8DPSK mode)



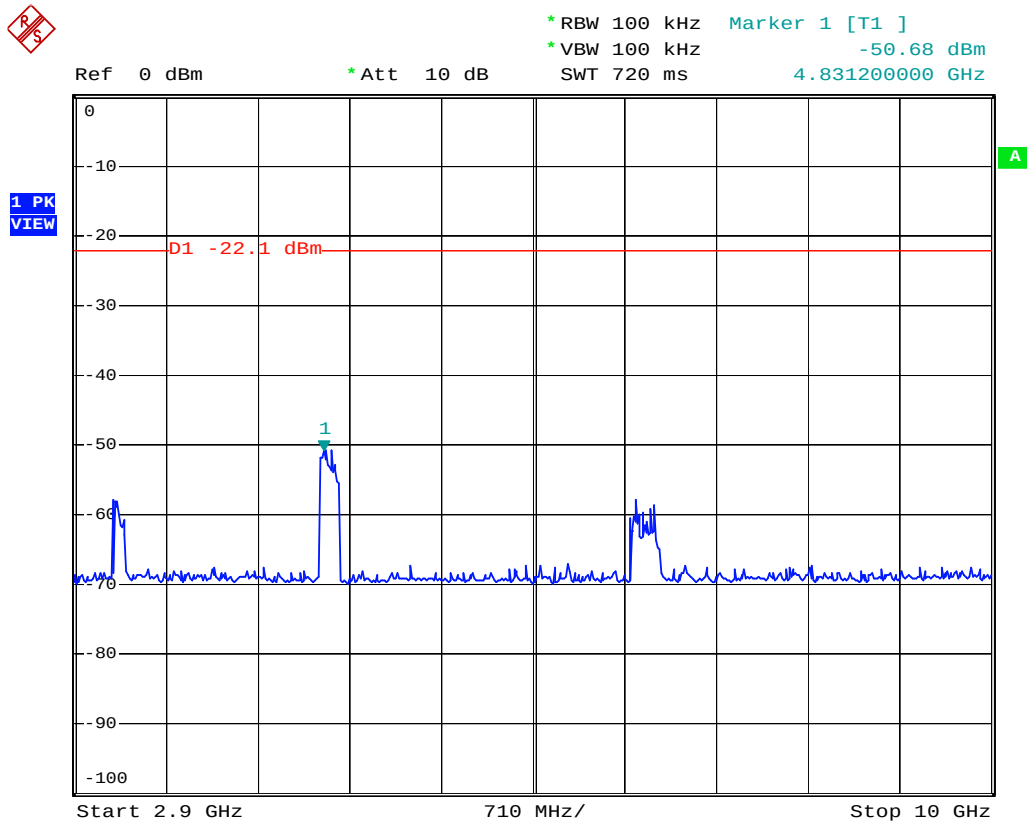
Date: 12.SEP.2007 15:13:39

Plot 51 – Spurious RF conducted emissions in the frequency range of 10 GHz – 26 GHz (continuous transmit mode on 2402 MHz, 2441 MHz and 2480 MHz, 8DPSK mode)



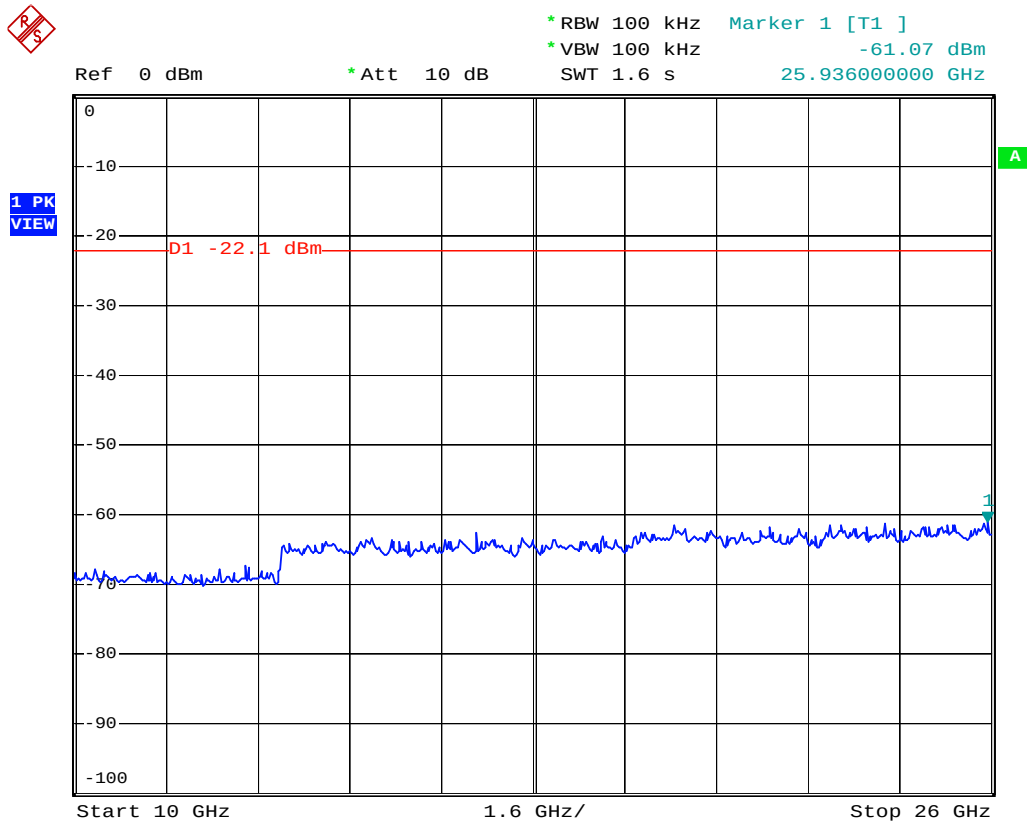
Date: 12.SEP.2007 15:31:24

Plot 52 – Spurious RF conducted emissions in the frequency range of 30 MHz – 2.9 GHz (hopping transmit mode, GFSK mode)



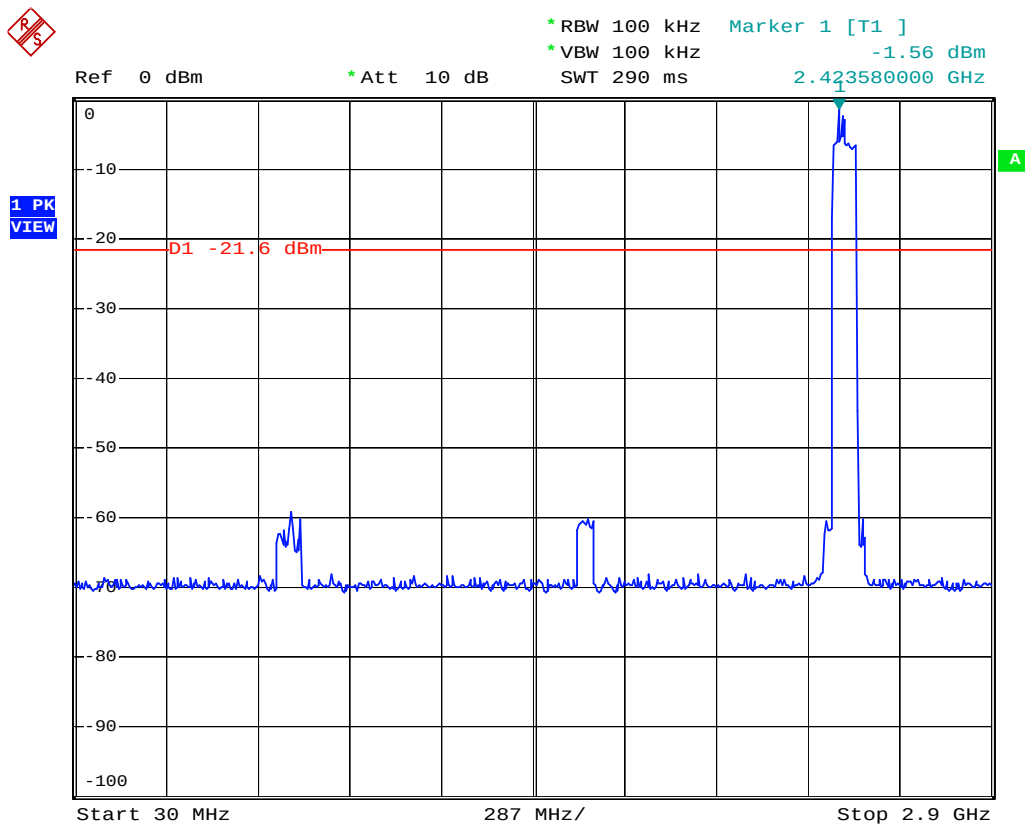
Date: 12.SEP.2007 15:33:45

Plot 53 – Spurious RF conducted emissions in the frequency range of 2.9 GHz – 10 GHz  
(hopping transmit mode, GFSK mode)



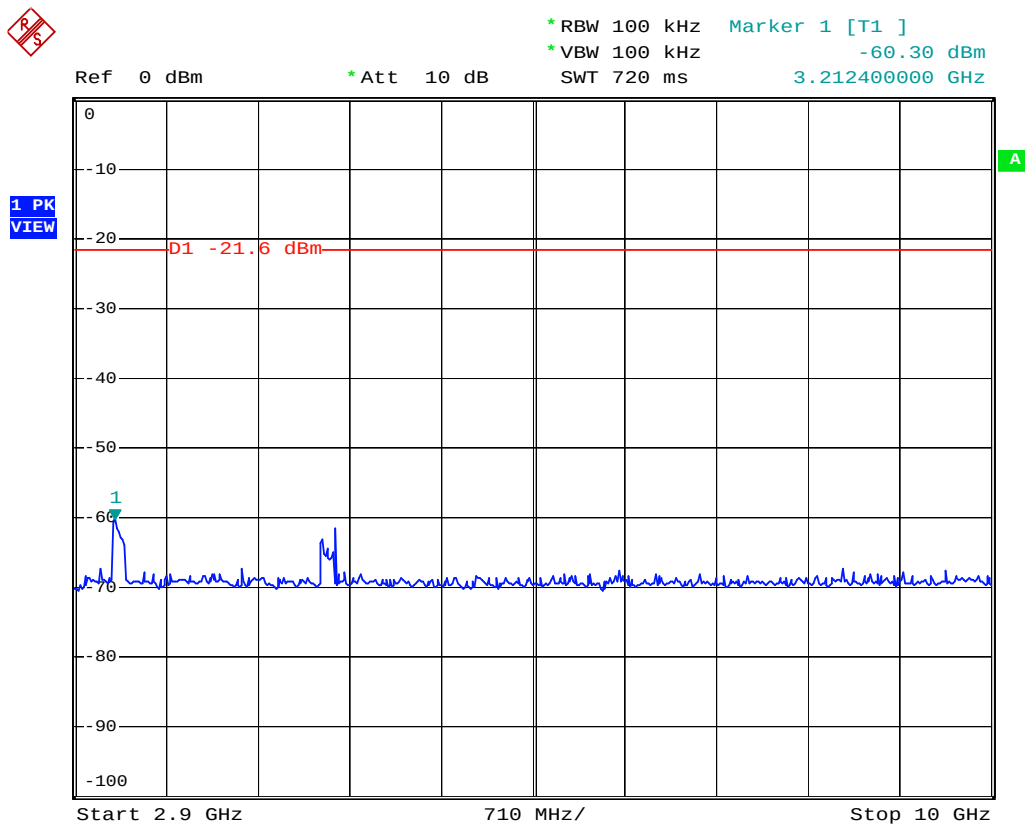
Date: 12.SEP.2007 15:35:05

Plot 54 – Spurious RF conducted emissions in the frequency range of 10 GHz – 26 GHz  
(hopping transmit mode, GFSK mode)



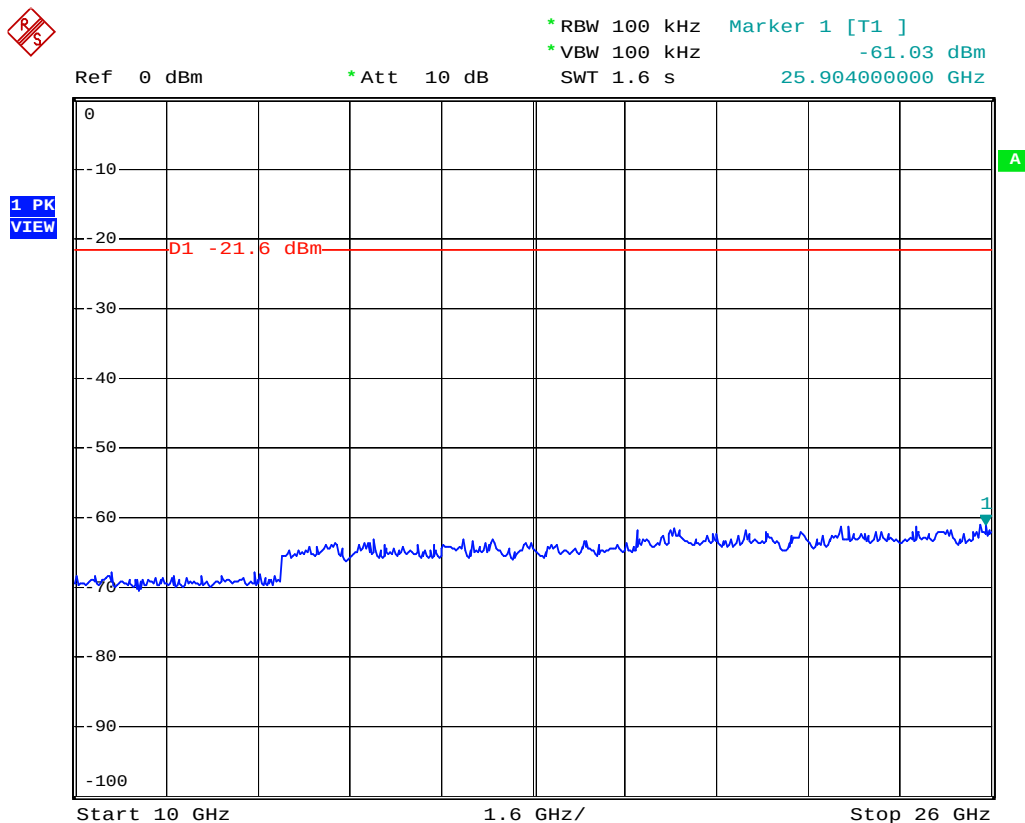
Date: 12.SEP.2007 15:25:27

Plot 55 – Spurious RF conducted emissions in the frequency range of 30 MHz – 2.9 GHz (hopping transmit mode,  $\pi/4$ -DQPSK mode)



Date: 12.SEP.2007 15:27:12

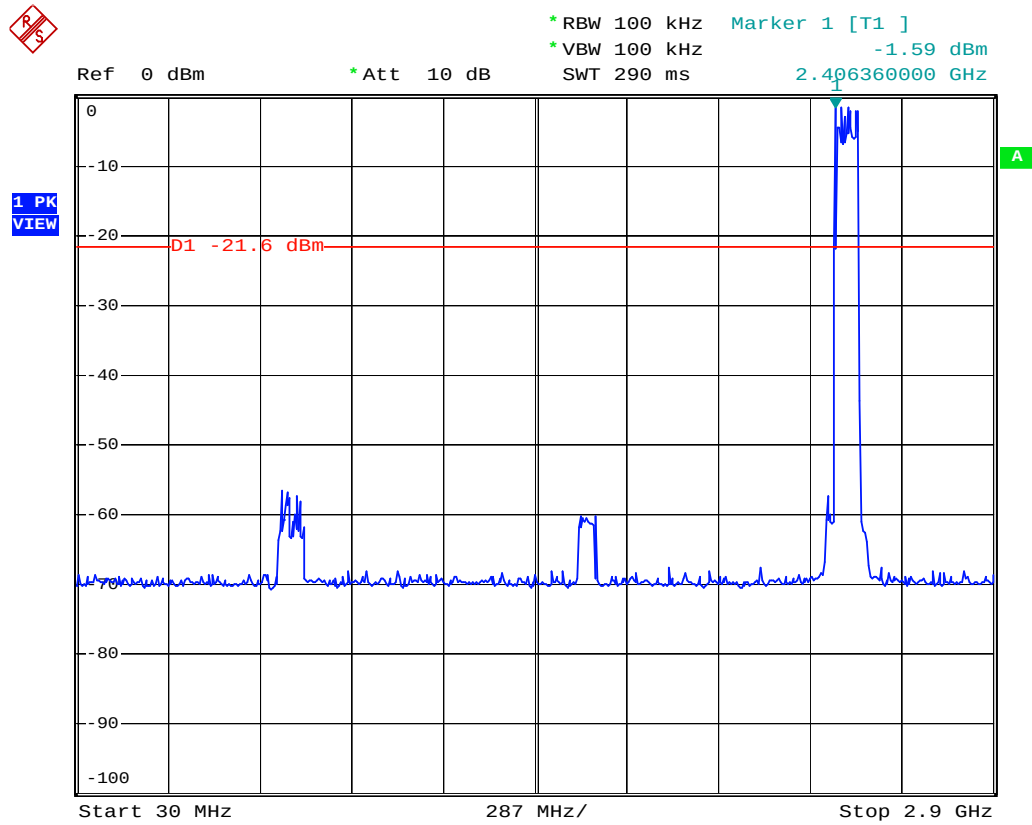
Plot 56 – Spurious RF conducted emissions in the frequency range of 2.9 GHz – 10 GHz (hopping transmit mode,  $\pi/4$ -DQPSK mode)



Date: 12.SEP.2007 15:28:32

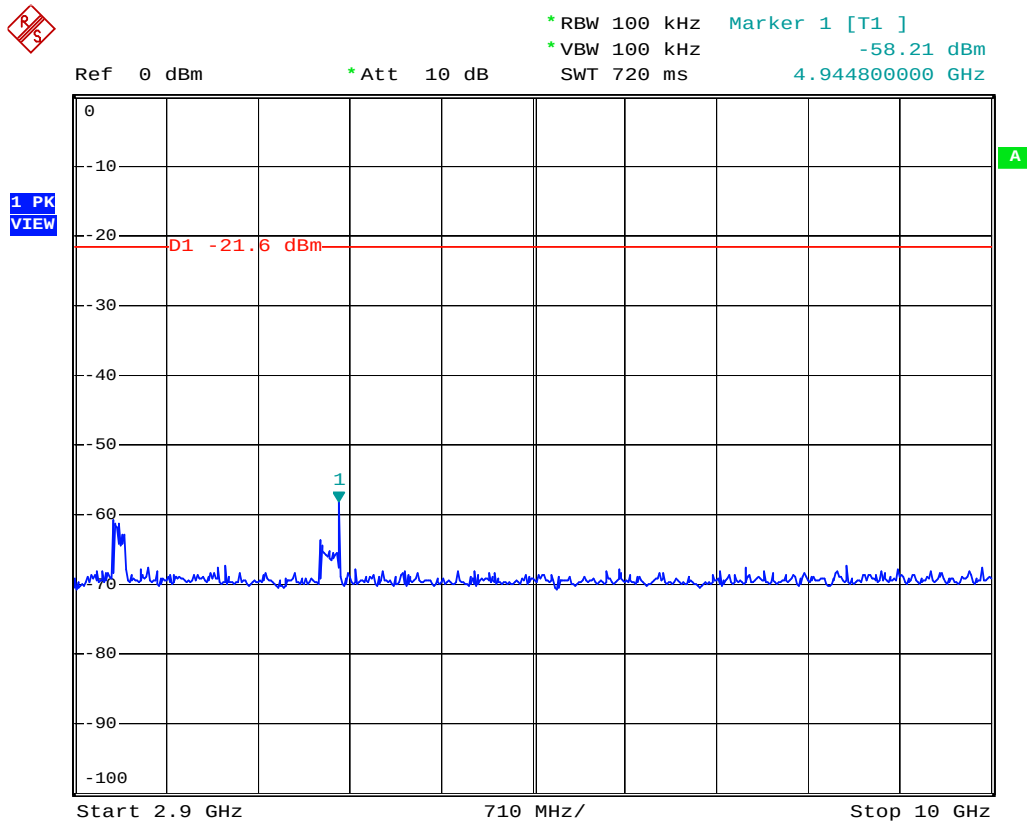
Plot 57 – Spurious RF conducted emissions in the frequency range of 10 GHz – 26 GHz  
 (hopping transmit mode,  $\pi/4$ -DQPSK mode)





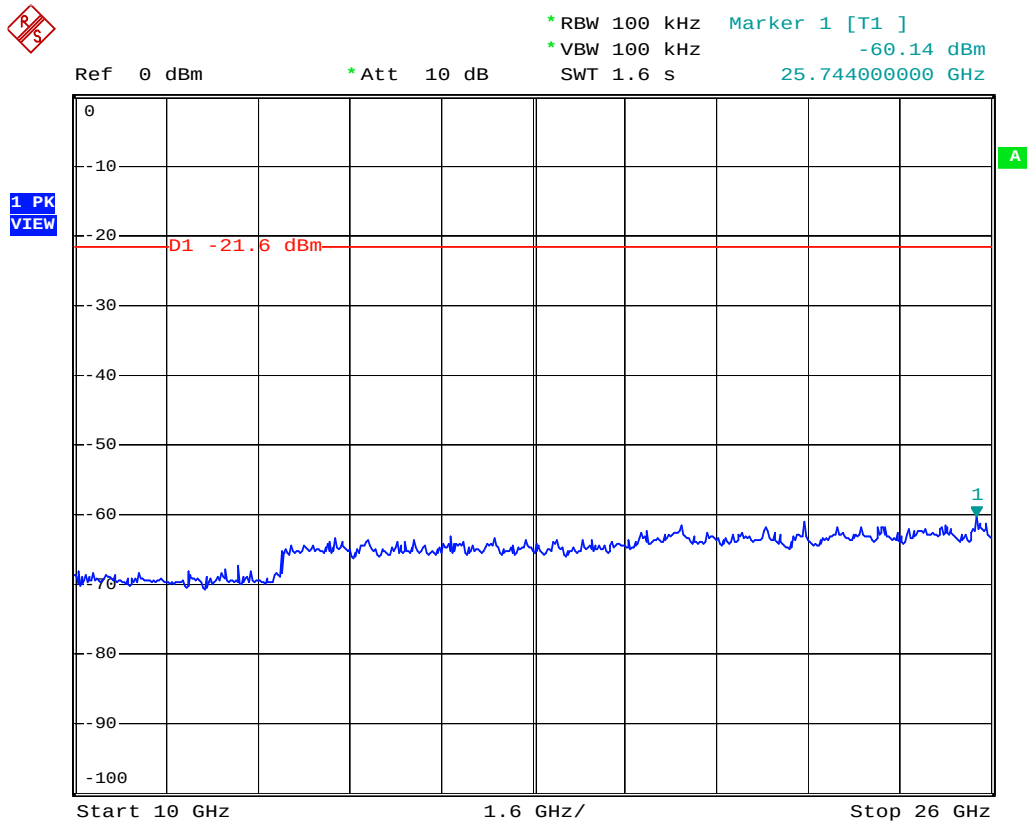
Date: 12.SEP.2007 15:16:09

Plot 58 – Spurious RF conducted emissions in the frequency range of 30 MHz – 2.9 GHz (hopping transmit mode, 8DPSK mode)



Date: 12.SEP.2007 15:17:45

Plot 59 – Spurious RF conducted emissions in the frequency range of 2.9 GHz – 10 GHz (hopping transmit mode, 8DPSK mode)



Date: 12.SEP.2007 15:18:56

Plot 60 – Spurious RF conducted emissions in the frequency range of 10 GHz – 26 GHz (hopping transmit mode, 8DPSK mode)

### 3.8 Emission in the restricted bands nearest to the frequency band 2400 – 2483.5 MHz

Compliance standard : FCC part 15, subpart C, section 15.247 (d)  
Method of test : Public Notice DA 00-705 (modified)

Ambient temperature : 21 °C  
Relative humidity : 50 %

#### 3.8.1 Test method

Public Notice DA 00-705 prescribes a radiated emissions test method for measuring emissions in the restricted bands nearest to the frequency band 2400 – 2483.5 MHz. Performing reliable measurements close to the operating frequency does not yield reliable test results due to overloading of the preamplifier within the test setup.

The application of a 2.4 GHz bandpass filter may solve the overloading of the preamplifier but at the same time it will introduce substantial and not reproduceable errors in measurement values.

Therefore this measurement was carried out conducted, with an offset for cable loss and maximum peak antenna gain in order to enable a correlation of the conducted measurement values with field strength values.

During the measurements for measuring the emission levels in average mode, a (worst-case) factor of  $10\log(2.9\text{ms}/100\text{ms})$  for peak/average ratio correction was included in the measurement results as an offset (where 2.9 ms is the dwell time per channel).

#### 3.8.2 Test results

##### Continuous transmit mode

| Modulation     | Restricted band (GHz) | Peak / average | Plot numbers (on next pages) |
|----------------|-----------------------|----------------|------------------------------|
| GFSK           | 2.31 – 2.39           | Peak           | 61                           |
|                | 2.31 – 2.39           | Average        | 62                           |
| $\pi/4$ -DQPSK | 2.31 – 2.39           | Peak           | 63                           |
|                | 2.31 – 2.39           | Average        | 64                           |
| 8DPSK          | 2.31 – 2.39           | Peak           | 65                           |
|                | 2.31 – 2.39           | Average        | 66                           |

##### Continuous transmit mode

| Modulation     | Restricted band (GHz) | Peak / average | Plot numbers (on next pages) |
|----------------|-----------------------|----------------|------------------------------|
| GFSK           | 2.4835 – 2.50         | Peak           | 67                           |
|                | 2.4835 – 2.50         | Average        | 68                           |
| $\pi/4$ -DQPSK | 2.4835 – 2.50         | Peak           | 69                           |
|                | 2.4835 – 2.50         | Average        | 70                           |
| 8DPSK          | 2.4835 – 2.50         | Peak           | 71                           |
|                | 2.4835 – 2.50         | Average        | 72                           |

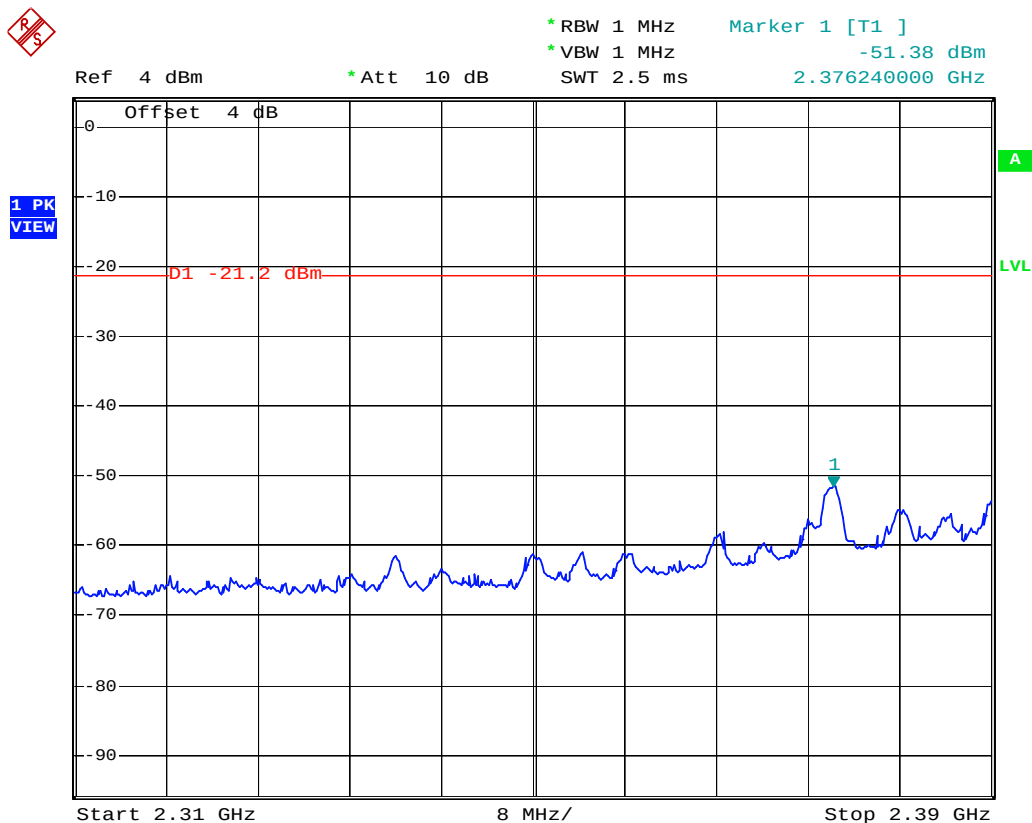
## Hopping transmit mode

| Modulation     | Restricted band (GHz) | Peak / average | Plot numbers (on next pages) |
|----------------|-----------------------|----------------|------------------------------|
| GFSK           | 2.31 – 2.39           | Peak           | 73                           |
|                | 2.31 – 2.39           | Average        | 74                           |
| $\pi/4$ -DQPSK | 2.31 – 2.39           | Peak           | 75                           |
|                | 2.31 – 2.39           | Average        | 76                           |
| 8DPSK          | 2.31 – 2.39           | Peak           | 77                           |
|                | 2.31 – 2.39           | Average        | 78                           |

## Hopping transmit mode

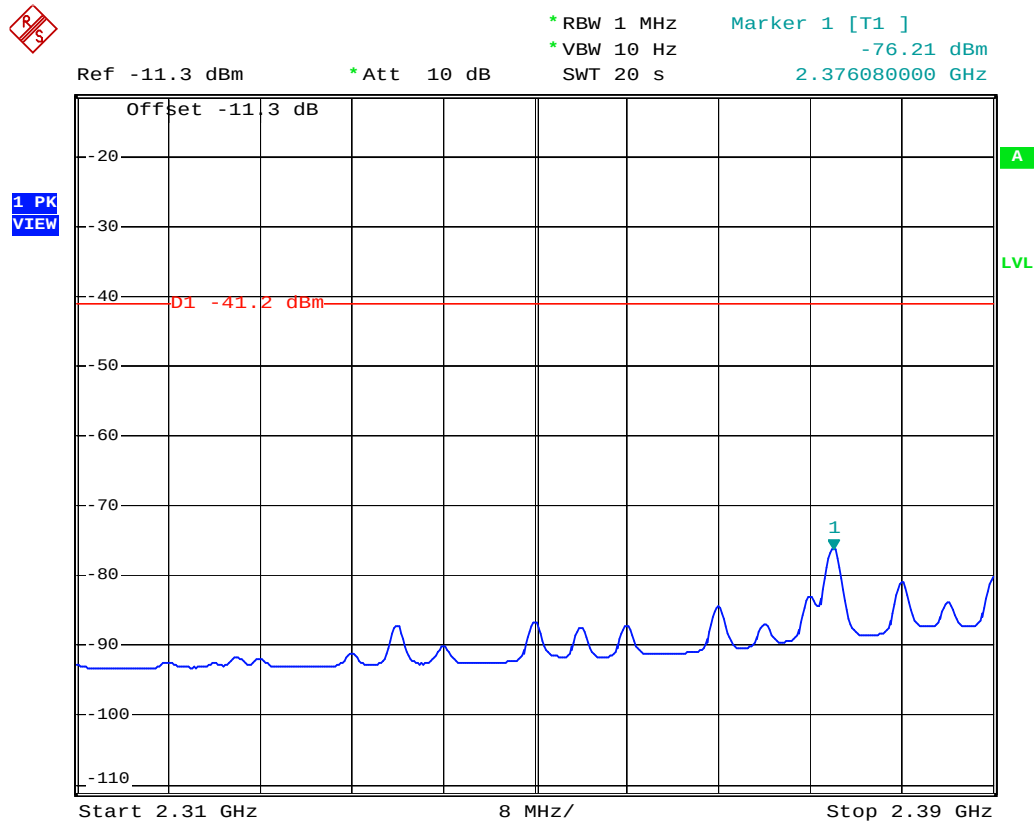
| Modulation     | Restricted band (GHz) | Peak / average | Plot numbers (on next pages) |
|----------------|-----------------------|----------------|------------------------------|
| GFSK           | 2.4835 – 2.50         | Peak           | 79                           |
|                | 2.4835 – 2.50         | Average        | 80                           |
| $\pi/4$ -DQPSK | 2.4835 – 2.50         | Peak           | 81                           |
|                | 2.4835 – 2.50         | Average        | 82                           |
| 8DPSK          | 2.4835 – 2.50         | Peak           | 83                           |
|                | 2.4835 – 2.50         | Average        | 84                           |

Measurement uncertainty: 0.03 – 2 GHz: +1.7 / -1.9 dB, &gt; 2 GHz: +2.4 / -2.7 dB



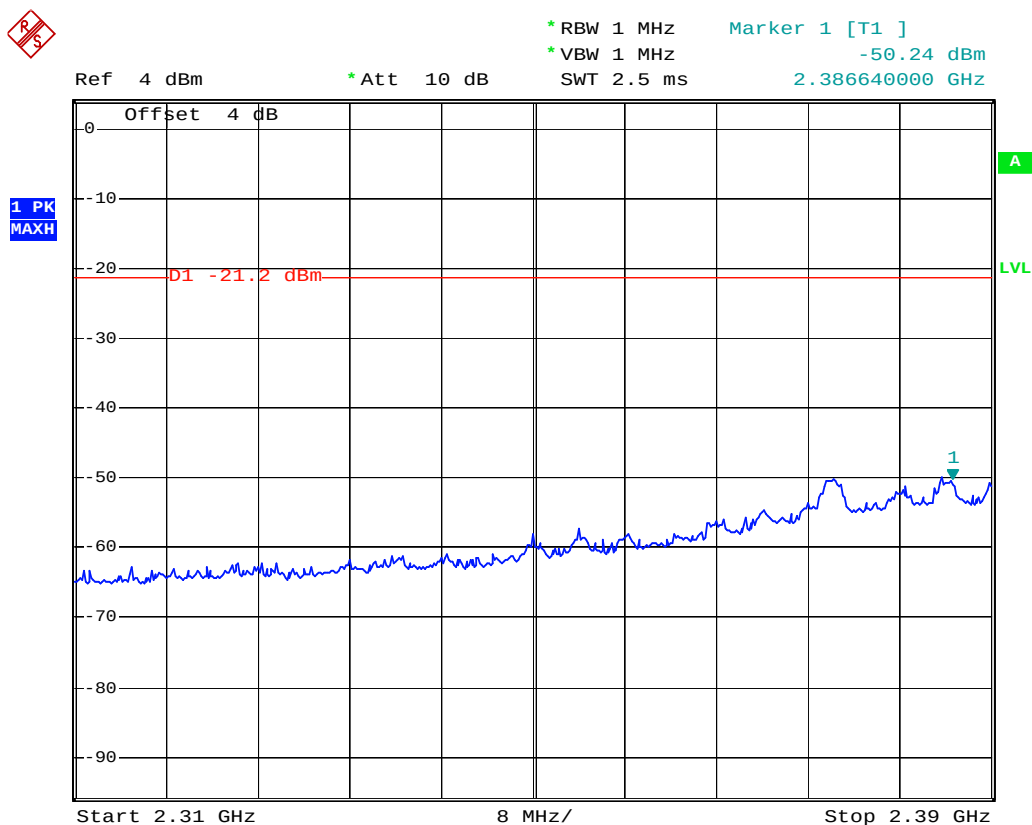
Date: 14.SEP.2007 16:27:14

Plot 61 – Emission in the restricted band 2.31 – 2.39 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (continuous transmit mode on 2402 MHz, GFSK mode, offset of 2 dB for cable losses and 2 dB for peak antenna gain, measurement results in peak mode)



Date: 14.SEP.2007 16:52:30

Plot 62 – Emission in the restricted band 2.31 – 2.39 GHz, -41.2 dBm corresponds to 54 dBμV/m (continuous transmit mode on 2402 MHz, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



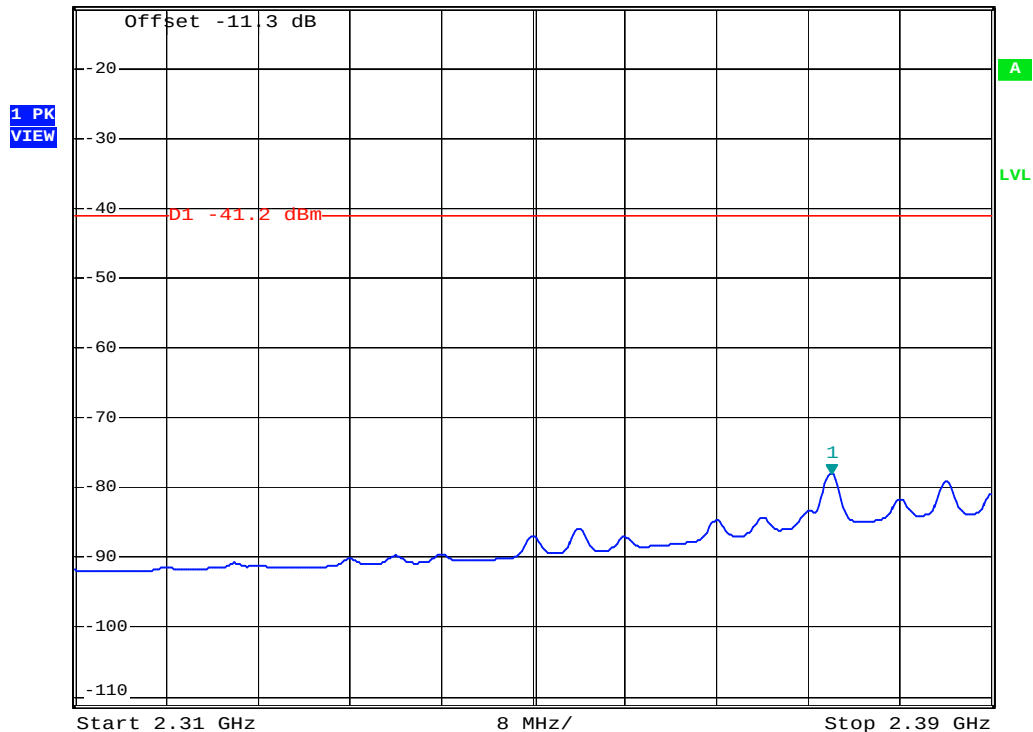
Date: 14.SEP.2007 16:29:47

Plot 63 – Emission in the restricted band 2.31 – 2.39 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (continuous transmit mode on 2402 MHz,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



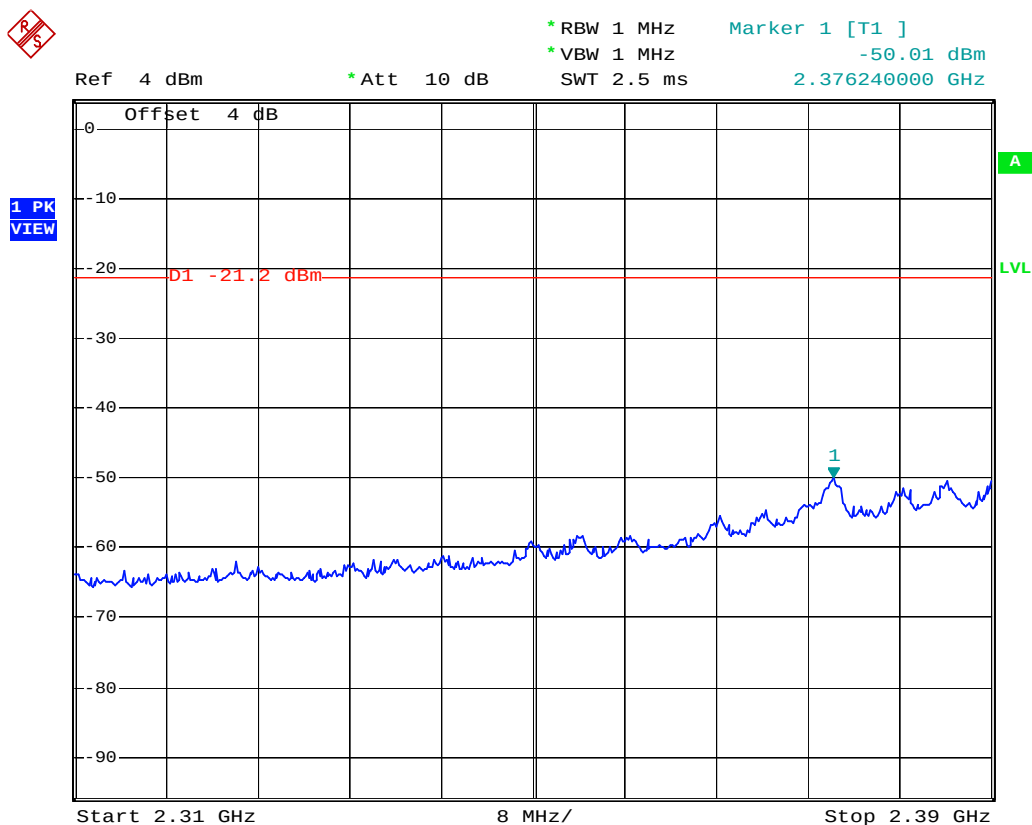


Ref -11.3 dBm      \* Att 10 dB      \* RBW 1 MHz      Marker 1 [T1 ]  
\* VBW 10 Hz      -78.00 dBm  
SWT 20 s      2.376080000 GHz



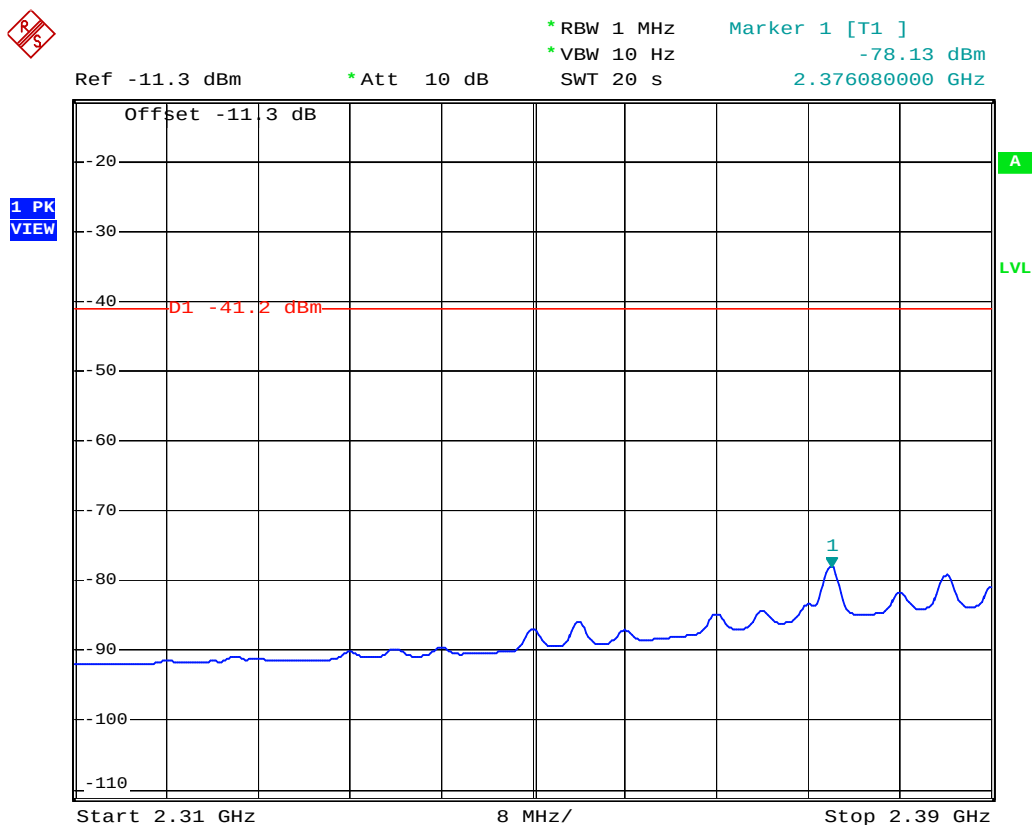
Date: 14.SEP.2007 16:55:00

Plot 64 – Emission in the restricted band 2.31 – 2.39 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (continuous transmit mode on 2402 MHz,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of  $10\log(2.9\text{ms}/100\text{ms})$  for peak/average ratio, measurement results in average mode)



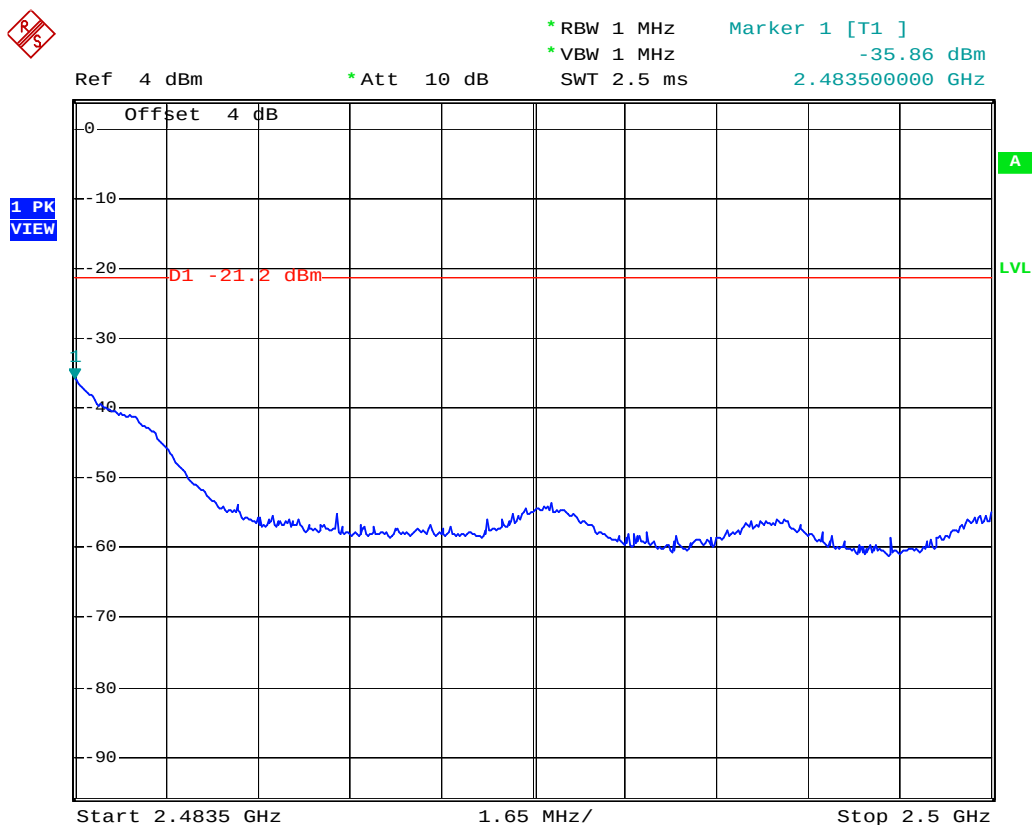
Date: 14.SEP.2007 16:31:32

Plot 65 – Emission in the restricted band 2.31 – 2.39 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (continuous transmit mode on 2402 MHz, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



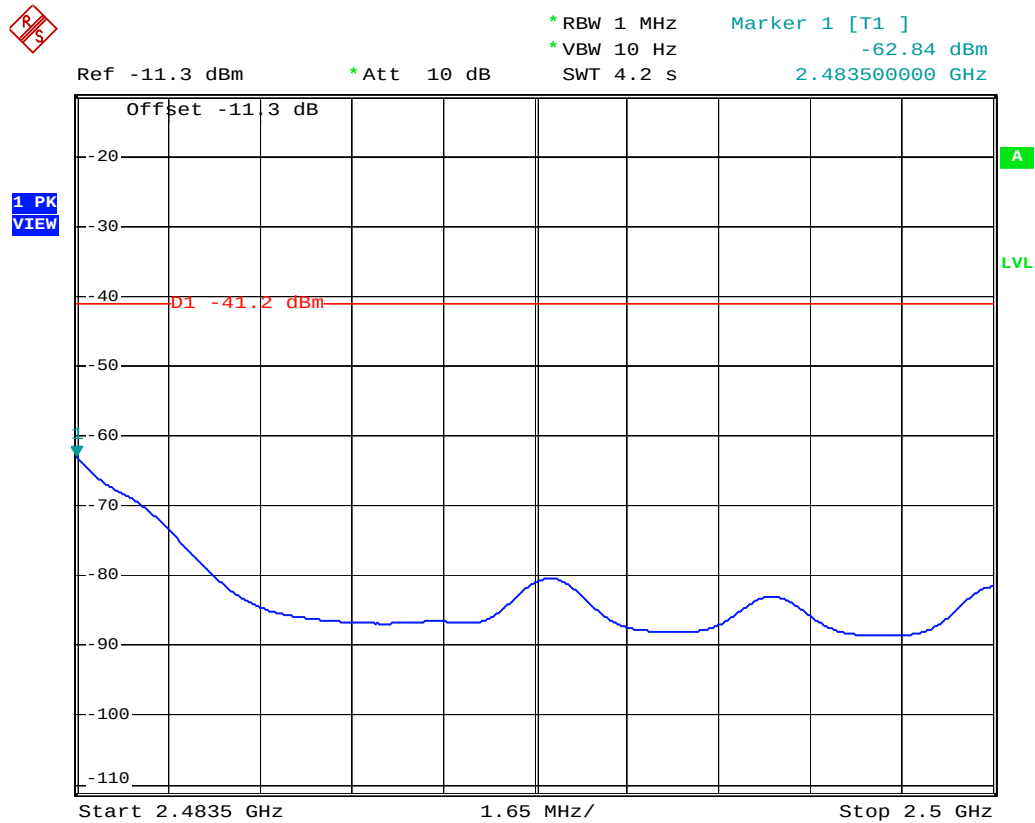
Date: 14.SEP.2007 16:56:46

Plot 66 – Emission in the restricted band 2.31 – 2.39 GHz, -41.2 dBm corresponds to 54 dBμV/m (continuous transmit mode on 2402 MHz, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



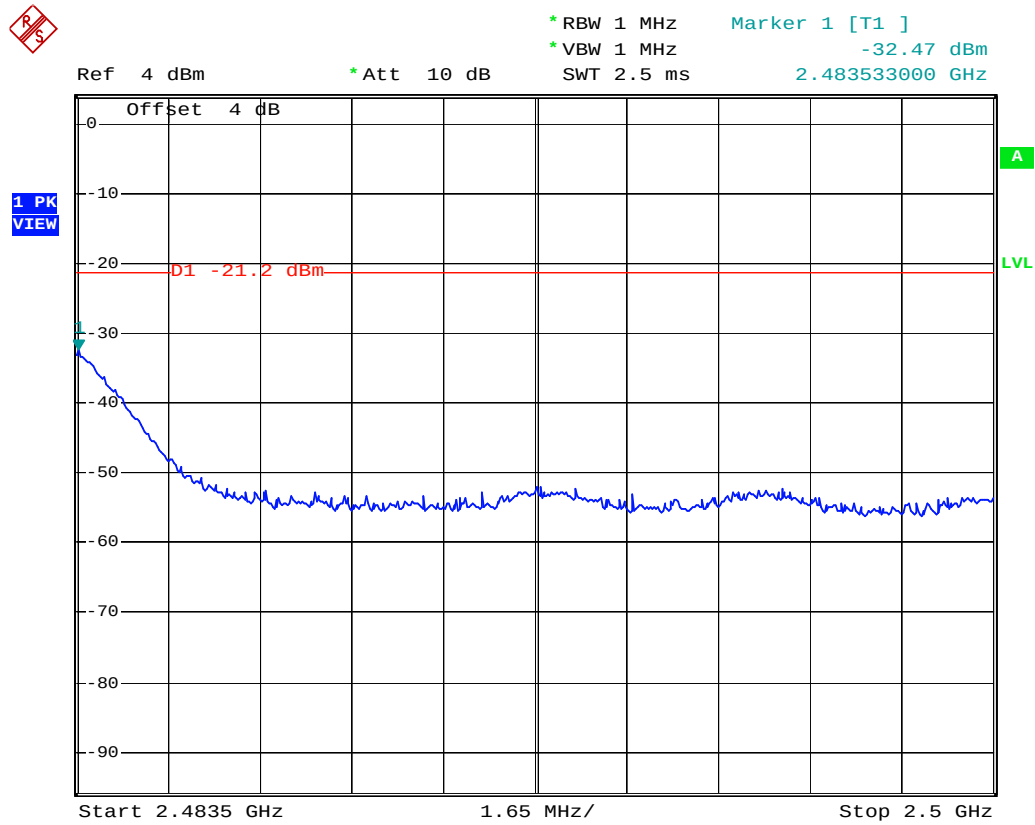
Date: 14.SEP.2007 17:11:55

Plot 67 – Emission in the restricted band 2.4835 – 2.5 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (continuous transmit mode on 2480 MHz, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



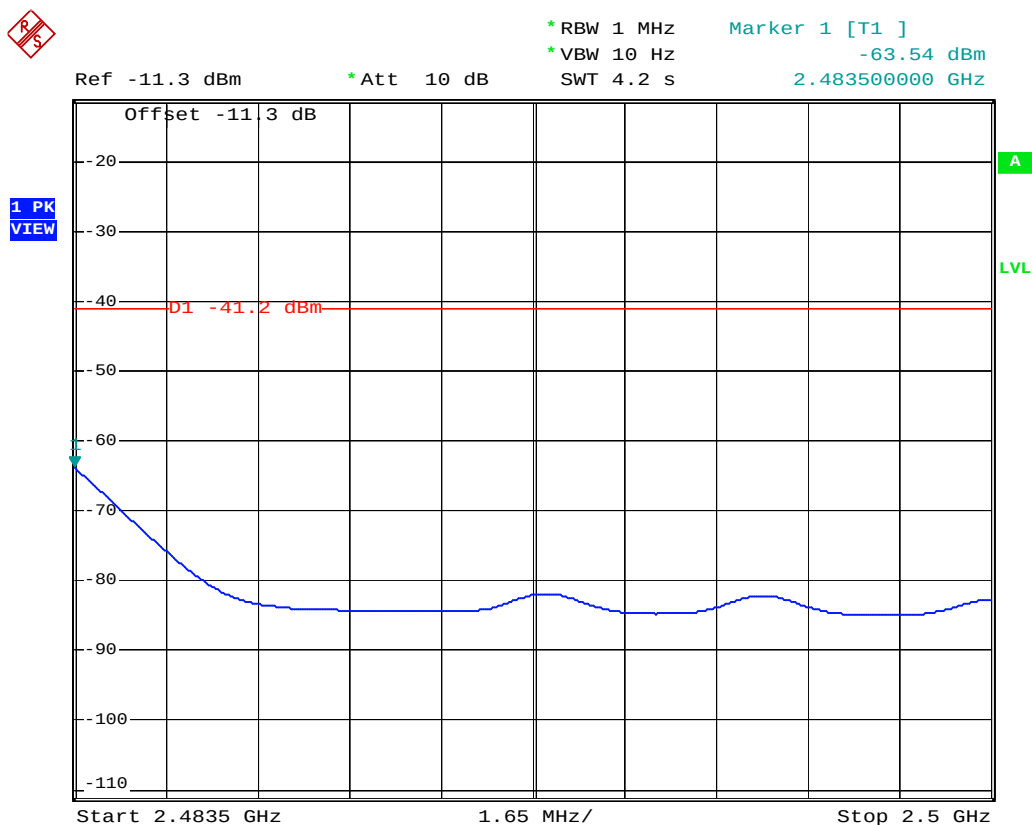
Date: 14.SEP.2007 17:10:14

Plot 68 – Emission in the restricted band 2.4835 – 2.5 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (continuous transmit mode on 2480 MHz, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



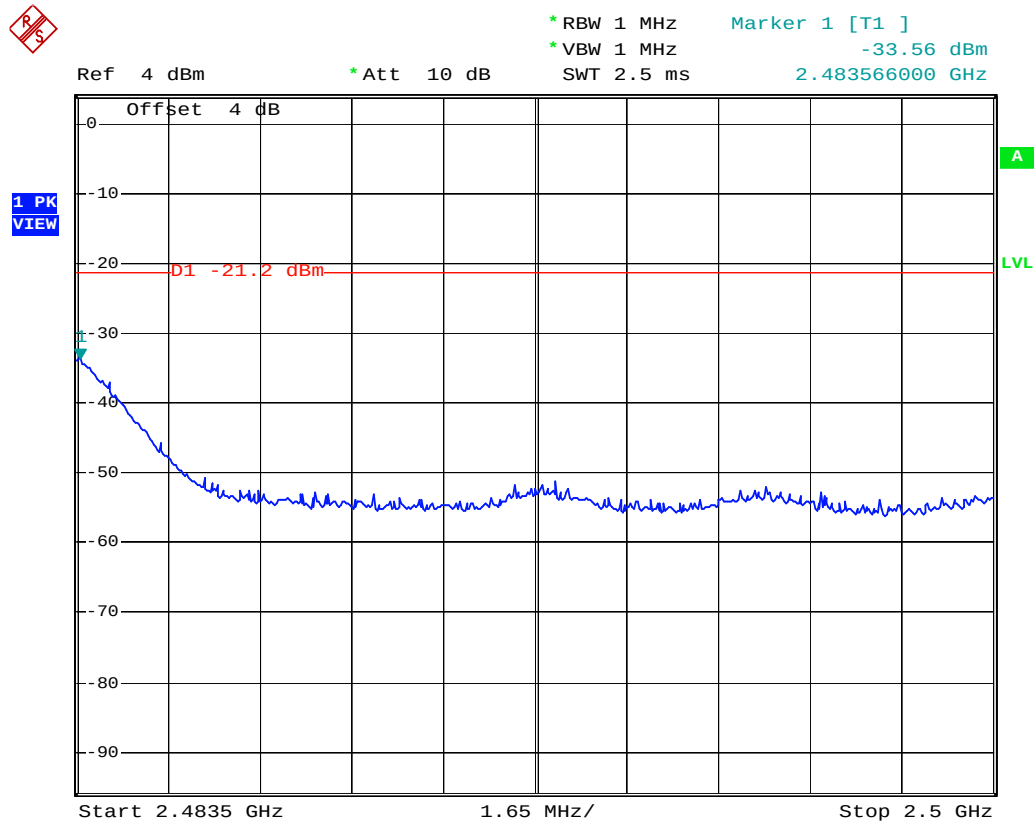
Date: 14.SEP.2007 17:14:05

Plot 69 – Emission in the restricted band 2.4835 – 2.5 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (continuous transmit mode on 2480 MHz,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



Date: 14.SEP.2007 17:05:03

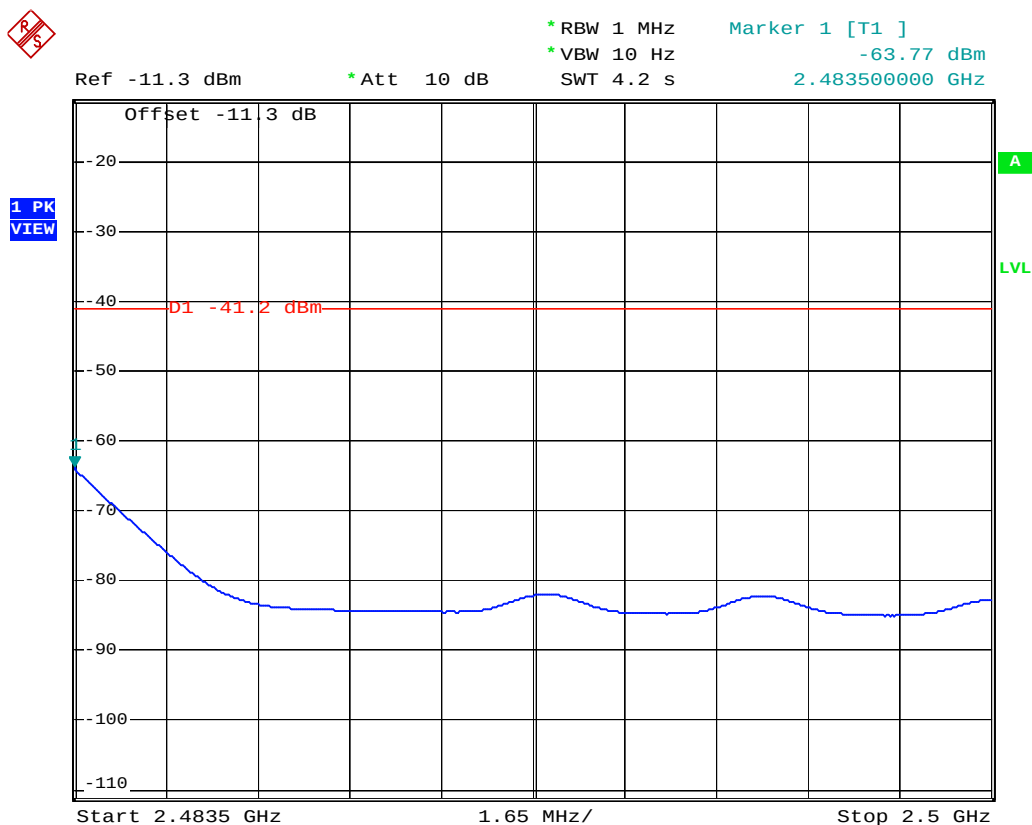
Plot 70 – Emission in the restricted band 2.4835 – 2.5 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (continuous transmit mode on 2480 MHz,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of  $10\log(2.9\text{ms}/100\text{ms})$  for peak/average ratio, measurement results in average mode)



Date: 14.SEP.2007 17:15:10

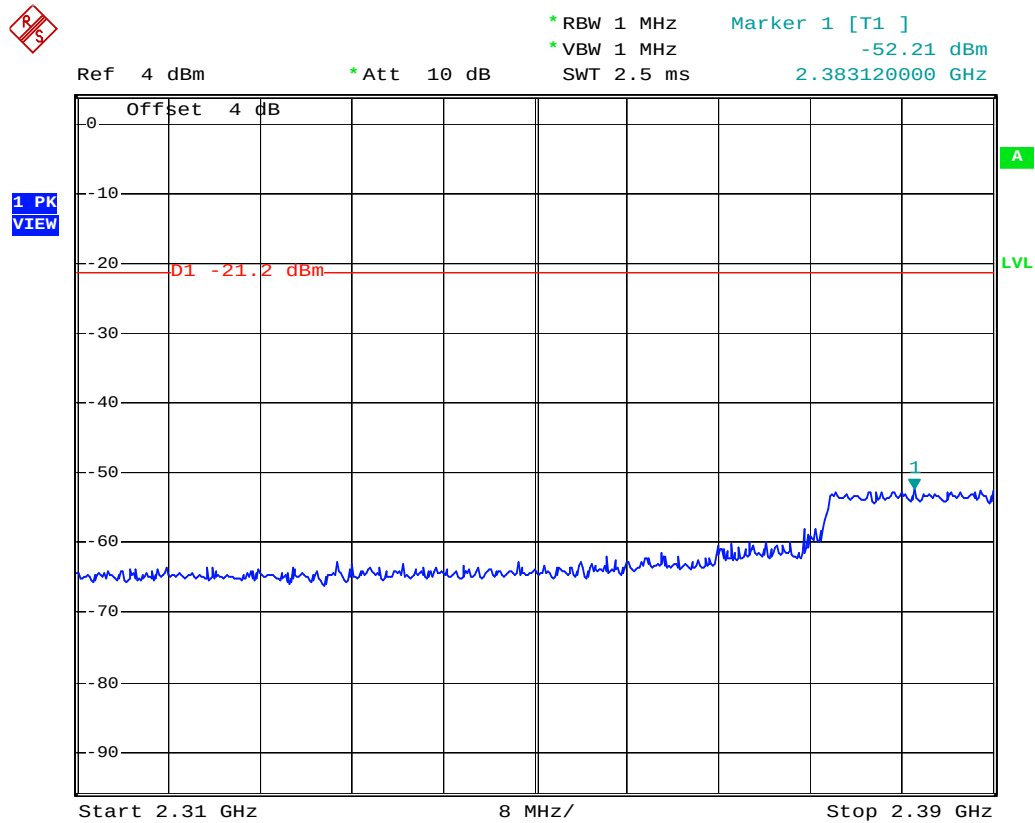
Plot 71 – Emission in the restricted band 2.4835 – 2.5 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (continuous transmit mode on 2480 MHz, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)





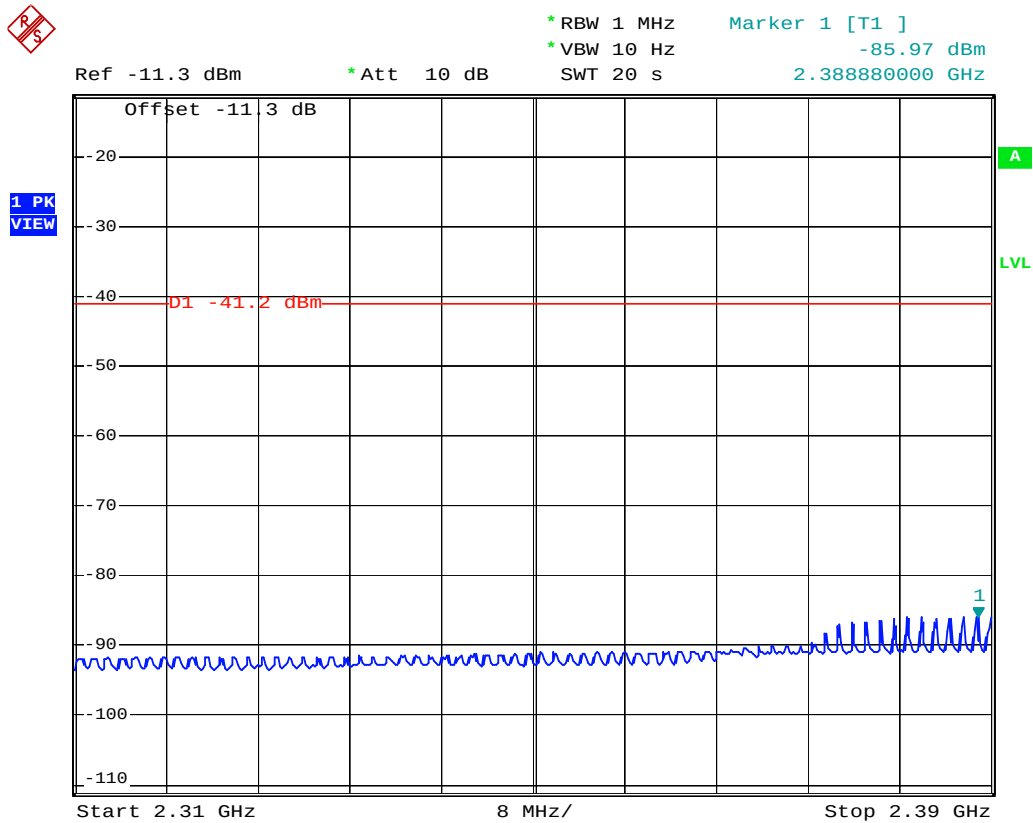
Date: 14.SEP.2007 17:02:46

Plot 72 – Emission in the restricted band 2.4835 – 2.5 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (continuous transmit mode on 2480 MHz, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



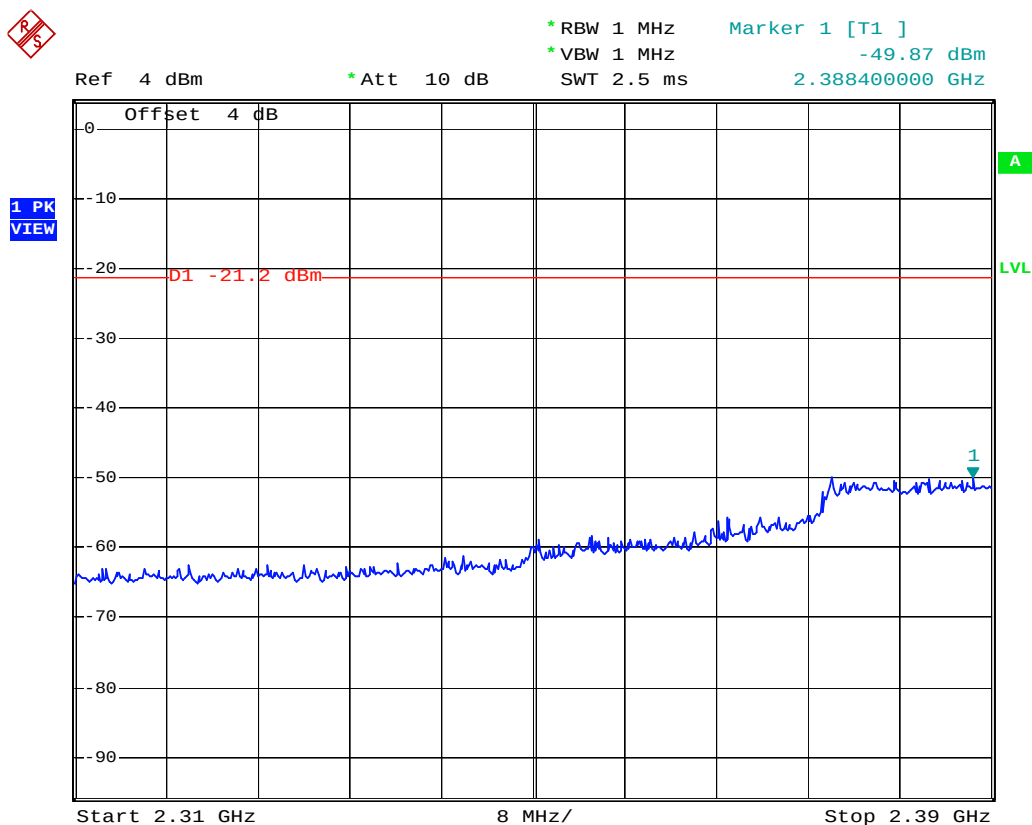
Date: 12.SEP.2007 14:34:30

Plot 73 – Emission in the restricted band 2.31 – 2.39 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (hopping transmit mode, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



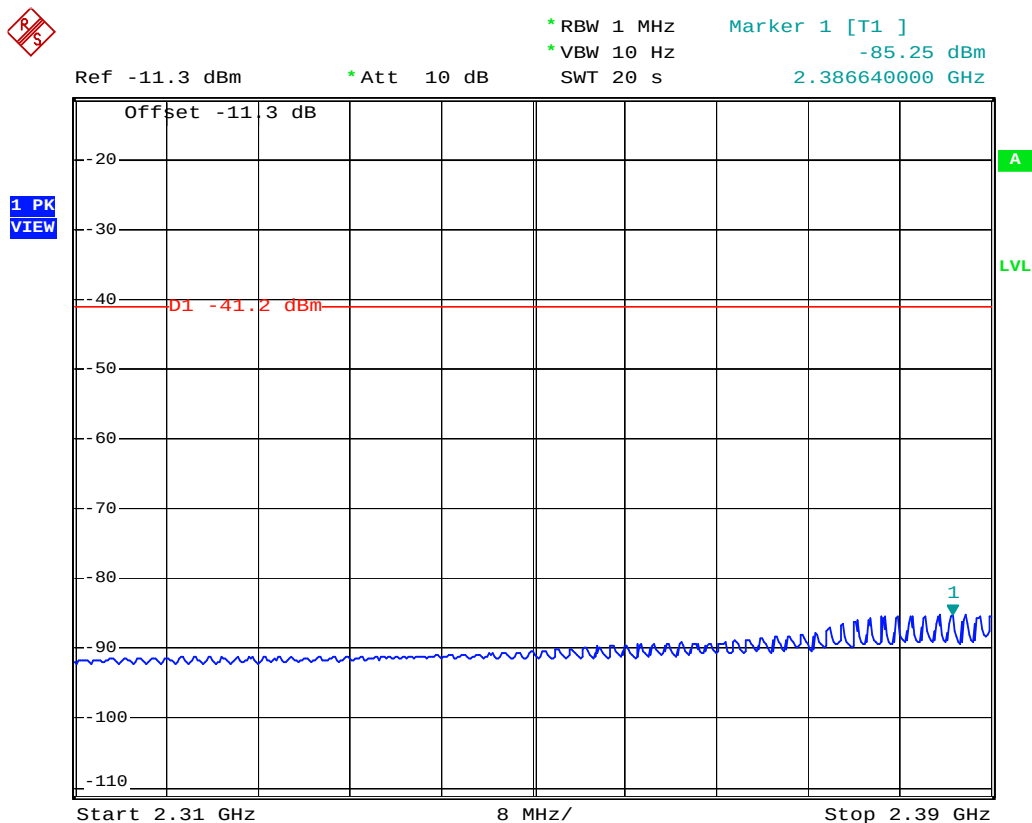
Date: 12.SEP.2007 14:12:37

Plot 74 – Emission in the restricted band 2.31 – 2.39 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (hopping transmit mode, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



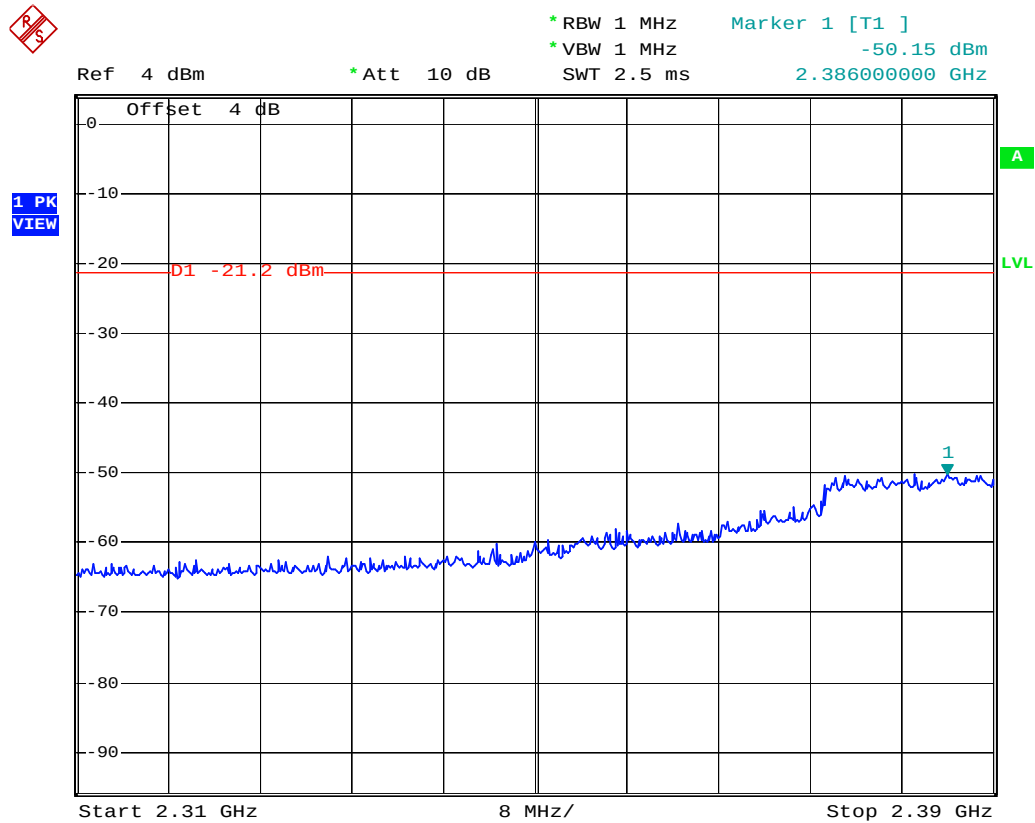
Date: 12.SEP.2007 14:31:58

Plot 75 – Emission in the restricted band 2.31 – 2.39 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (hopping transmit mode,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



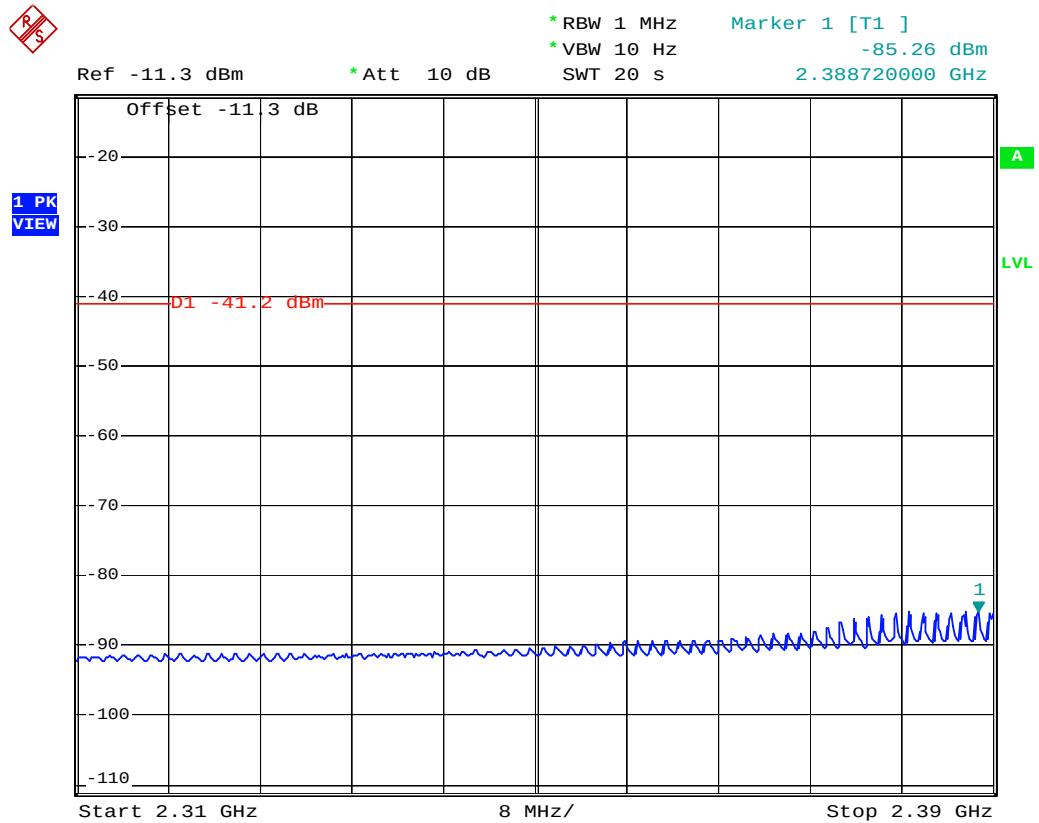
Date: 12.SEP.2007 14:09:03

Plot 76 – Emission in the restricted band 2.31 – 2.39 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (hopping transmit mode,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



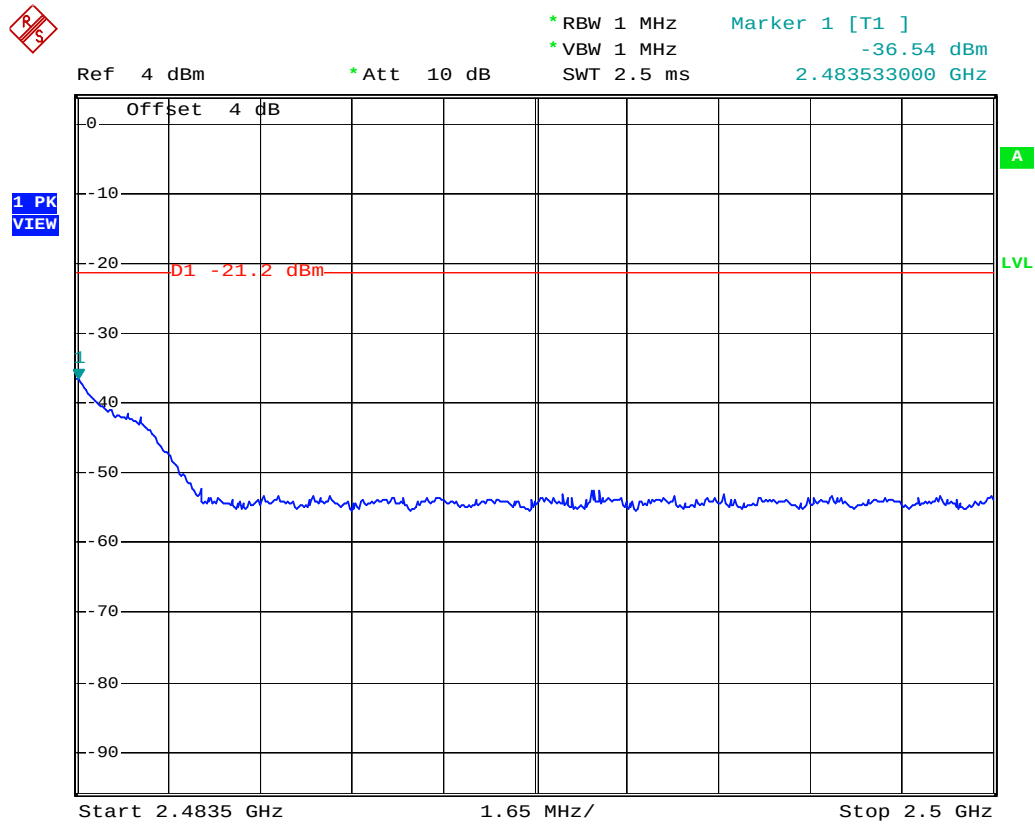
Date: 12.SEP.2007 14:29:46

Plot 77 – Emission in the restricted band 2.31 – 2.39 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (hopping transmit mode, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



Date: 12.SEP.2007 14:10:47

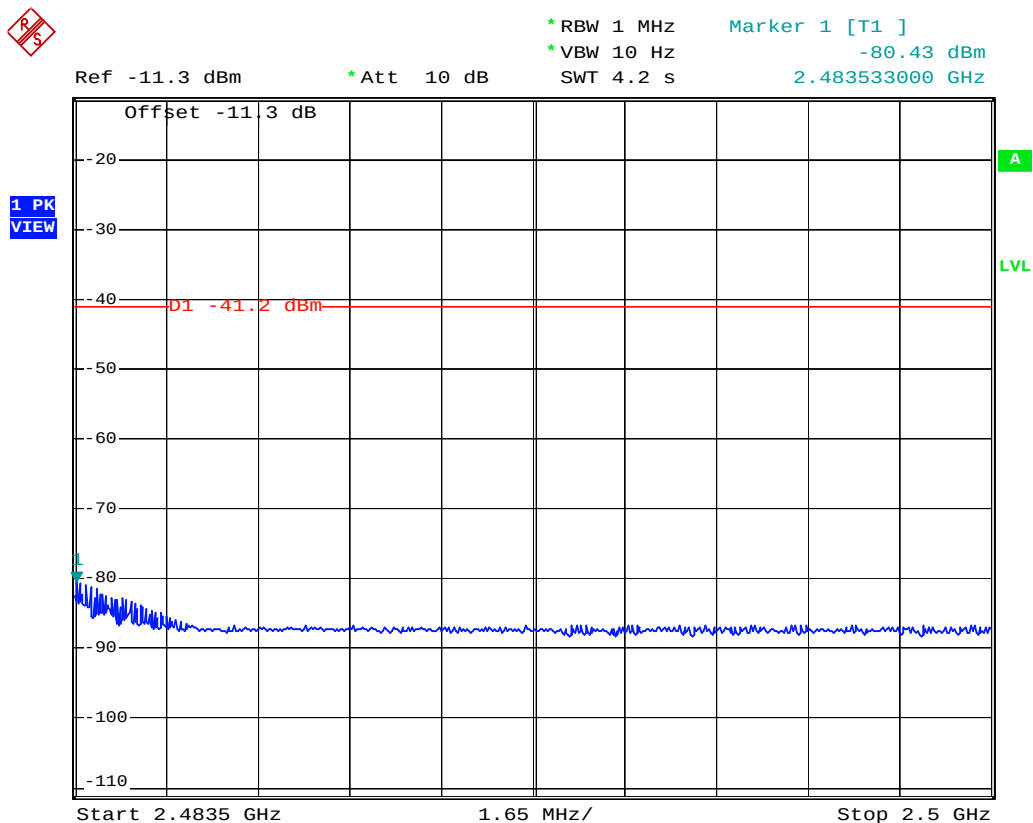
Plot 78 – Emission in the restricted band 2.31 – 2.39 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (hopping transmit mode, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



Date: 12.SEP.2007 14:23:52

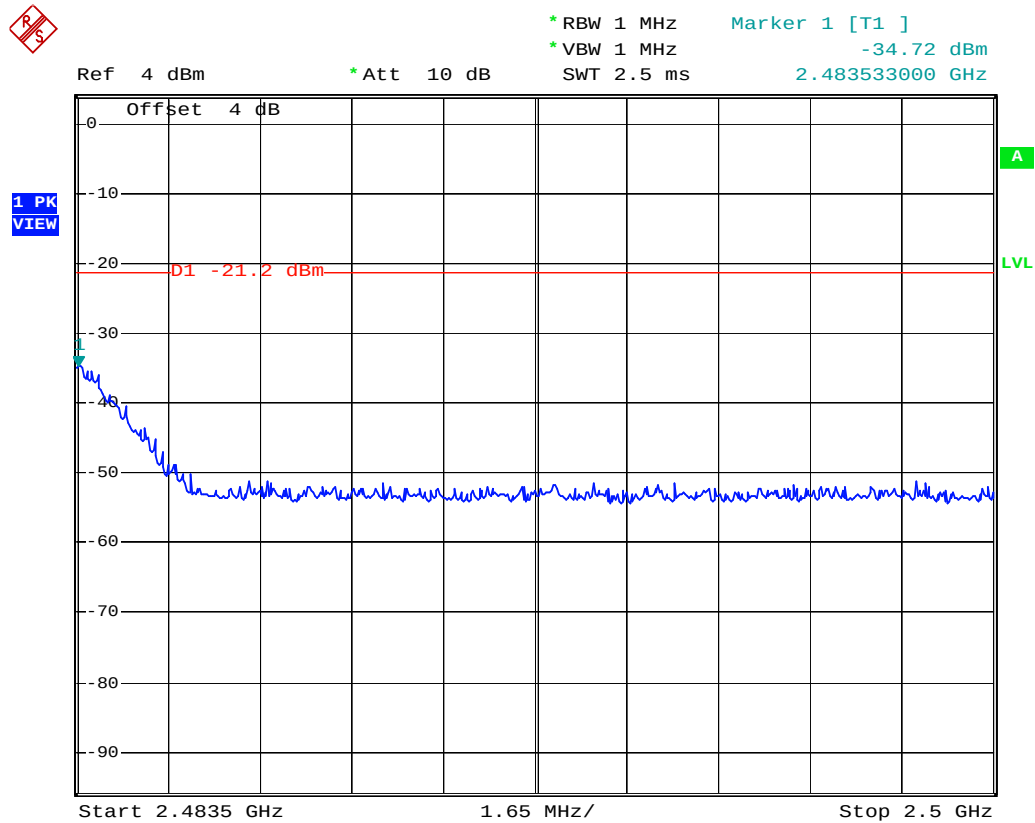
Plot 79 – Emission in the restricted band 2.4835 – 2.5 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (hopping transmit mode, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)





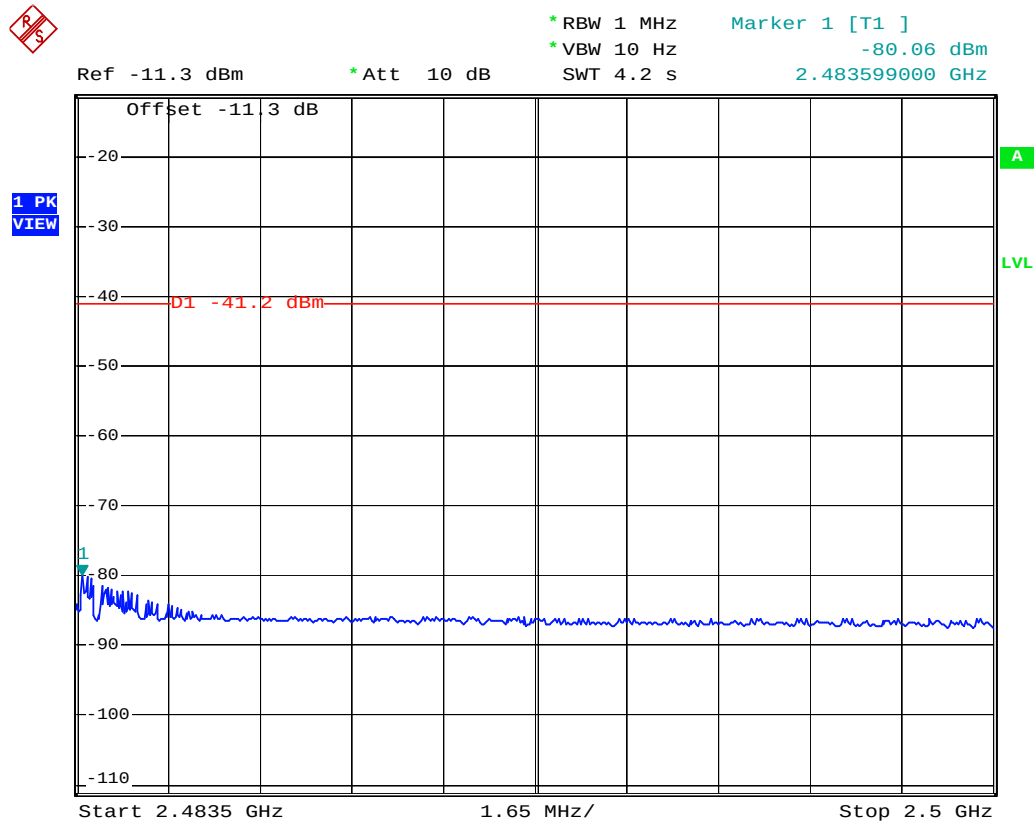
Date: 12.SEP.2007 14:21:29

Plot 80 – Emission in the restricted band 2.4835 – 2.5 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (hopping transmit mode, GFSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



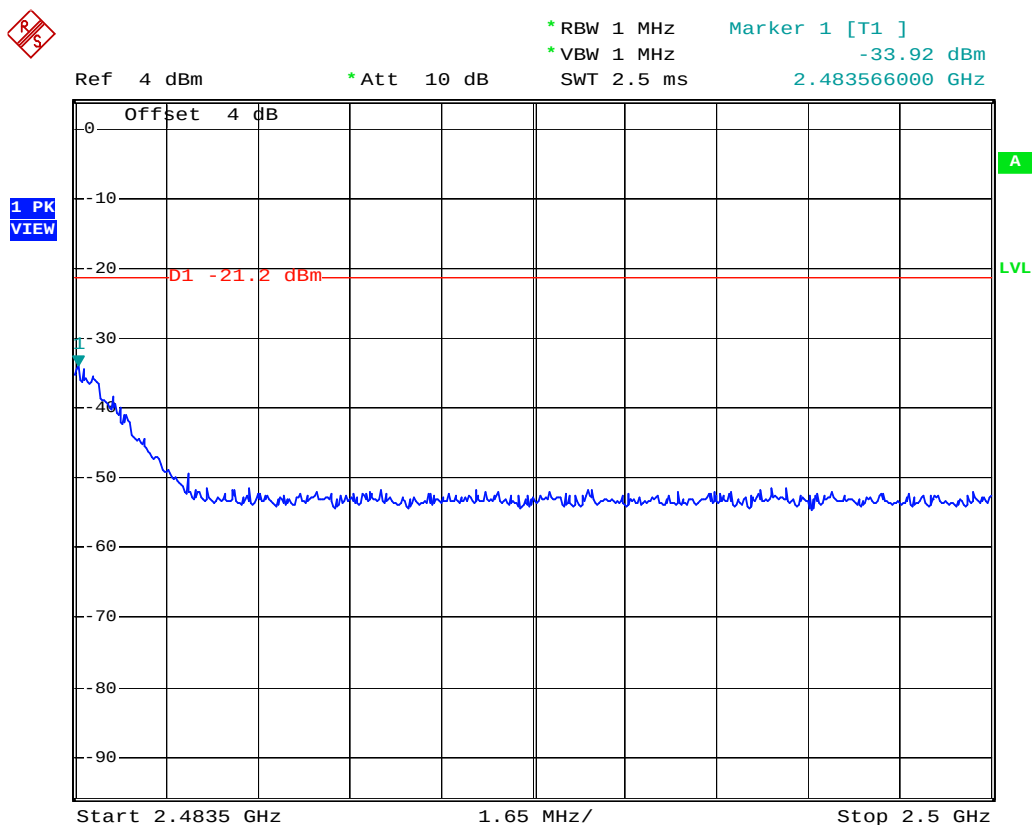
Date: 12.SEP.2007 14:25:35

Plot 81 – Emission in the restricted band 2.4835 – 2.5 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (hopping transmit mode,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



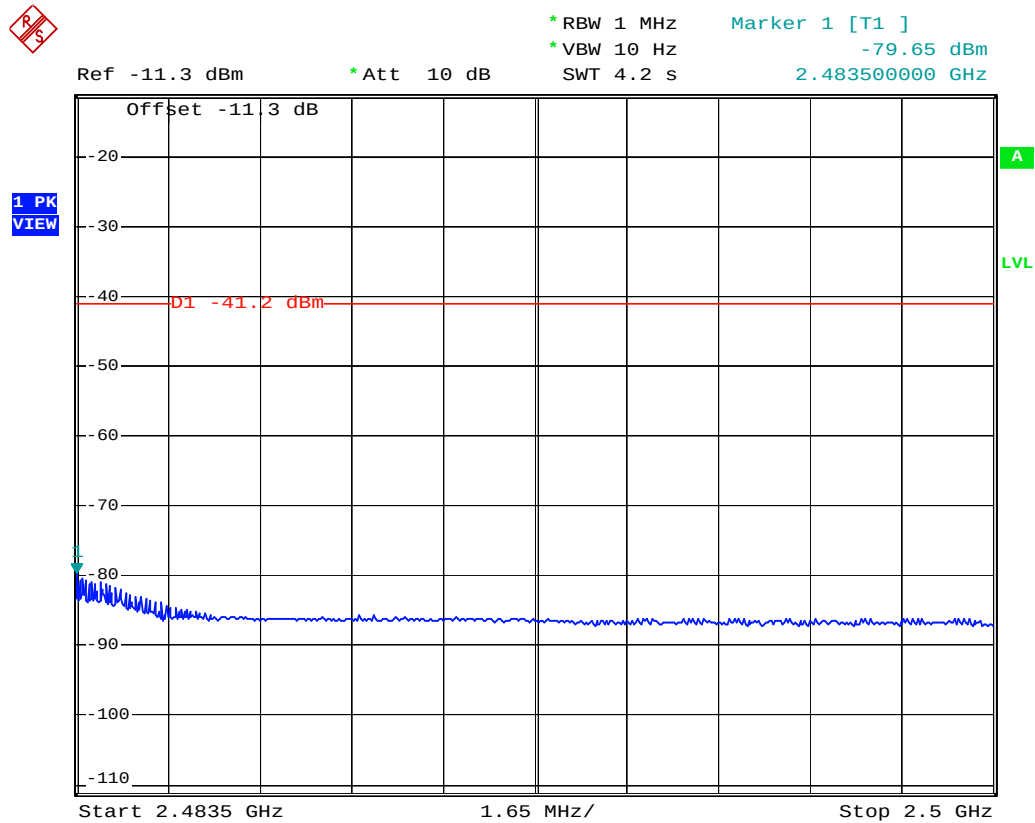
Date: 12.SEP.2007 14:16:03

Plot 82 – Emission in the restricted band 2.4835 – 2.5 GHz, -41.2 dBm corresponds to 54 dB $\mu$ V/m (hopping transmit mode,  $\pi/4$ -DQPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)



Date: 12.SEP.2007 14:27:09

Plot 83 – Emission in the restricted band 2.4835 – 2.5 GHz, -21.2 dBm corresponds to 74 dB $\mu$ V/m (hopping transmit mode, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, measurement results in peak mode)



Date: 12.SEP.2007 14:18:11

Plot 84 – Emission in the restricted band 2.4835 – 2.5 GHz, -41.2 dBm corresponds to 54 dBμV/m (hopping transmit mode, 8DPSK mode, offset of 2 dB for cable losses and 2 dB for antenna gain, offset of 10log(2.9ms/100ms) for peak/average ratio, measurement results in average mode)

### 3.9 Field strength of spurious emissions outside of the frequency band of operation (transmit mode)

Compliance standard : FCC part 15, subpart C, sections 15.247 (d), 15.205 (a), 15.209  
Method of test : FCC Public Notice DA 00-705

Ambient temperature : 21 °C  
Relative humidity : 50 %

#### 3.9.1 Test method

This test is required for any spurious emission or modulation product that falls in a restricted band, as defined in section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc.

A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35 (b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Note: dwell time per channel is 2.9 ms.

### 3.9.2 Test results (test channel 1)

| Frequency<br>(MHz) | Test results<br>quasi peak<br>(dB $\mu$ V/m) |        | Test results<br>average<br>(dB $\mu$ V/m) |      | Test results<br>peak<br>(dB $\mu$ V/m) |      | Resolution<br>bandwidth<br>(kHz) | Quasi<br>peak<br>limits<br>(dB $\mu$ V/m) | Average<br>limits<br>(dB $\mu$ V/m) | Peak<br>limits<br>(dB $\mu$ V/m) |
|--------------------|----------------------------------------------|--------|-------------------------------------------|------|----------------------------------------|------|----------------------------------|-------------------------------------------|-------------------------------------|----------------------------------|
|                    | V                                            | H      | V                                         | H    | V                                      | H    |                                  |                                           |                                     |                                  |
| 30.0 - 88.0        | < 20.0                                       | < 20.0 | -                                         | -    | -                                      | -    | 100                              | 40.0                                      | -                                   | -                                |
| 88.0 - 216.0       | < 23.5                                       | < 23.5 | -                                         | -    | -                                      | -    | 100                              | 43.5                                      | -                                   | -                                |
| 216.0 - 960.0      | < 26.0                                       | < 26.0 | -                                         | -    | -                                      | -    | 100                              | 46.0                                      | -                                   | -                                |
| 4804.00            | -                                            | -      | n.t.                                      | n.t. | 42.1                                   | 44.0 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 7206.00            | -                                            | -      | n.t.                                      | n.t. | 39.4                                   | 40.9 | 1000                             | -                                         | 54.0                                | 74.0                             |

Note 1: values stated in the table above are worst case for all three types of modulation.

Note 2: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note 3: Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Measurement uncertainty:  $\leq 1$  GHz: +2.6/-3.3 dB,  $> 1$  GHz: +4.5/-6.1 dB

### 3.9.3 Test results (test channel 2)

| Frequency<br>(MHz) | Test results<br>quasi peak<br>(dB $\mu$ V/m) |        | Test results<br>average<br>(dB $\mu$ V/m) |      | Test results<br>peak<br>(dB $\mu$ V/m) |      | Resolution<br>bandwidth<br>(kHz) | Quasi<br>peak<br>limits<br>(dB $\mu$ V/m) | Average<br>limits<br>(dB $\mu$ V/m) | Peak<br>limits<br>(dB $\mu$ V/m) |
|--------------------|----------------------------------------------|--------|-------------------------------------------|------|----------------------------------------|------|----------------------------------|-------------------------------------------|-------------------------------------|----------------------------------|
|                    | V                                            | H      | V                                         | H    | V                                      | H    |                                  |                                           |                                     |                                  |
| 30.0 - 88.0        | < 20.0                                       | < 20.0 | -                                         | -    | -                                      | -    | 100                              | 40.0                                      | -                                   | -                                |
| 88.0 - 216.0       | < 23.5                                       | < 23.5 | -                                         | -    | -                                      | -    | 100                              | 43.5                                      | -                                   | -                                |
| 216.0 - 960.0      | < 26.0                                       | < 26.0 | -                                         | -    | -                                      | -    | 100                              | 46.0                                      | -                                   | -                                |
| 4882.00            | -                                            | -      | n.t.                                      | n.t. | 39.8                                   | 41.8 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 7323.00            | -                                            | -      | n.t.                                      | n.t. | 42.4                                   | 40.7 | 1000                             | -                                         | 54.0                                | 74.0                             |

Note 1: values stated in the table above are worst case for all three types of modulation.

Note 2: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note 3: Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Measurement uncertainty:  $\leq 1$  GHz: +2.6/-3.3 dB,  $> 1$  GHz: +4.5/-6.1 dB

### 3.9.4 Test results (test channel 3)

| Frequency<br>(MHz) | Test results<br>quasi peak<br>(dB $\mu$ V/m) |        | Test results<br>average<br>(dB $\mu$ V/m) |      | Test results<br>peak<br>(dB $\mu$ V/m) |      | Resolution<br>bandwidth<br>(kHz) | Quasi<br>peak<br>limits<br>(dB $\mu$ V/m) | Average<br>limits<br>(dB $\mu$ V/m) | Peak<br>limits<br>(dB $\mu$ V/m) |
|--------------------|----------------------------------------------|--------|-------------------------------------------|------|----------------------------------------|------|----------------------------------|-------------------------------------------|-------------------------------------|----------------------------------|
|                    | V                                            | H      | V                                         | H    | V                                      | H    |                                  |                                           |                                     |                                  |
| 30.0 - 88.0        | < 20.0                                       | < 20.0 | -                                         | -    | -                                      | -    | 100                              | 40.0                                      | -                                   | -                                |
| 88.0 - 216.0       | < 23.5                                       | < 23.5 |                                           |      |                                        |      | 100                              | 43.5                                      |                                     |                                  |
| 216.0 - 960.0      | < 26.0                                       | < 26.0 | -                                         | -    | -                                      | -    | 100                              | 46.0                                      | -                                   | -                                |
| 4960.00            | -                                            | -      | n.t.                                      | n.t. | 39.9                                   | 41.0 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 7440.00            | -                                            | -      | n.t.                                      | n.t. | 43.0                                   | 42.1 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 12400.00           | -                                            | -      | n.t.                                      | n.t. | 36.7                                   | 36.2 | 1000                             | -                                         | 54.0                                | 74.0                             |

*Note 1: values stated in the table above are worst case for all three types of modulation.*

*Note 2: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.*

*Note 3: Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.*

Measurement uncertainty:  $\leq 1$  GHz: +2.6/-3.3 dB,  $> 1$  GHz: +4.5/-6.1 dB



### 3.10 Field strength of spurious emissions (receive mode)

Compliance standard : FCC part 15, subpart B, section 15.109  
Method of test : FCC part 15, subpart A, sections 15.31(f)(1), 15.31(m), 15.33, 15.35.  
Ambient temperature : 21 °C  
Relative humidity : 50 %

#### 3.10.1 Test method

FCC part 15, subpart A, sections 15.31(f)(1), 15.31(m), 15.33, 15.35.

#### 3.10.2 Test results (test channel 1)

| Frequency<br>(MHz) | Test results<br>quasi peak<br>(dB $\mu$ V/m) |        | Test results<br>average<br>(dB $\mu$ V/m) |      | Test results<br>peak<br>(dB $\mu$ V/m) |      | Resolution<br>bandwidth<br>(kHz) | Quasi<br>peak<br>limits<br>(dB $\mu$ V/m) | Average<br>limits<br>(dB $\mu$ V/m) | Peak<br>limits<br>(dB $\mu$ V/m) |
|--------------------|----------------------------------------------|--------|-------------------------------------------|------|----------------------------------------|------|----------------------------------|-------------------------------------------|-------------------------------------|----------------------------------|
|                    | V                                            | H      | V                                         | H    | V                                      | H    |                                  |                                           |                                     |                                  |
| 30.0 - 88.0        | < 20.0                                       | < 20.0 | -                                         | -    | -                                      | -    | 120                              | 40.0                                      | -                                   | -                                |
| 88.0 - 216.0       | < 23.5                                       | < 23.5 | -                                         | -    | -                                      | -    | 120                              | 43.5                                      | -                                   | -                                |
| 216.0 - 960.0      | < 26.0                                       | < 26.0 | -                                         | -    | -                                      | -    | 120                              | 46.0                                      | -                                   | -                                |
| 1600.35            | -                                            | -      | n.t.                                      | n.t. | 37.7                                   | 40.1 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 2400.50            | -                                            | -      | n.t.                                      | n.t. | 42.5                                   | 43.0 | 1000                             | -                                         | 54.0                                | 74.0                             |

Note 1: values stated in the table above are worst case.

Note 2: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note 3: Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Measurement uncertainty:  $\leq 1$  GHz: +2.6/-3.3 dB,  $> 1$  GHz: +4.5/-6.1 dB

### 3.10.3 Test results (test channel 2)

| Frequency<br>(MHz) | Test results<br>quasi peak<br>(dB $\mu$ V/m) |        | Test results<br>average<br>(dB $\mu$ V/m) |      | Test results<br>peak<br>(dB $\mu$ V/m) |      | Resolution<br>bandwidth<br>(kHz) | Quasi<br>peak<br>limits<br>(dB $\mu$ V/m) | Average<br>limits<br>(dB $\mu$ V/m) | Peak<br>limits<br>(dB $\mu$ V/m) |
|--------------------|----------------------------------------------|--------|-------------------------------------------|------|----------------------------------------|------|----------------------------------|-------------------------------------------|-------------------------------------|----------------------------------|
|                    | V                                            | H      | V                                         | H    | V                                      | H    |                                  |                                           |                                     |                                  |
| 30.0 - 88.0        | < 20.0                                       | < 20.0 | -                                         | -    | -                                      | -    | 120                              | 40.0                                      | -                                   | -                                |
| 88.0 - 216.0       | < 23.5                                       | < 23.5 | -                                         | -    | -                                      | -    | 120                              | 43.5                                      | -                                   | -                                |
| 216.0 - 960.0      | < 26.0                                       | < 26.0 | -                                         | -    | -                                      | -    | 120                              | 46.0                                      | -                                   | -                                |
| 1626.35            | -                                            | -      | n.t.                                      | n.t. | 38.1                                   | 41.4 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 2439.50            | -                                            | -      | n.t.                                      | n.t. | 44.0                                   | 42.5 | 1000                             | -                                         | 54.0                                | 74.0                             |

Note 1: values stated in the table above are worst case.

Note 2: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note 3: Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Measurement uncertainty:  $\leq 1$  GHz: +2.6/-3.3 dB,  $> 1$  GHz: +4.5/-6.1 dB

### 3.10.4 Test results (test channel 3)

| Frequency<br>(MHz) | Test results<br>quasi peak<br>(dB $\mu$ V/m) |        | Test results<br>average<br>(dB $\mu$ V/m) |      | Test results<br>peak<br>(dB $\mu$ V/m) |      | Resolution<br>bandwidth<br>(kHz) | Quasi<br>peak<br>limits<br>(dB $\mu$ V/m) | Average<br>limits<br>(dB $\mu$ V/m) | Peak<br>limits<br>(dB $\mu$ V/m) |
|--------------------|----------------------------------------------|--------|-------------------------------------------|------|----------------------------------------|------|----------------------------------|-------------------------------------------|-------------------------------------|----------------------------------|
|                    | V                                            | H      | V                                         | H    | V                                      | H    |                                  |                                           |                                     |                                  |
| 30.0 - 88.0        | < 20.0                                       | < 20.0 | -                                         | -    | -                                      | -    | 120                              | 40.0                                      | -                                   | -                                |
| 88.0 - 216.0       | < 23.5                                       | < 23.5 | -                                         | -    | -                                      | -    | 120                              | 43.5                                      | -                                   | -                                |
| 216.0 - 960.0      | < 26.0                                       | < 26.0 | -                                         | -    | -                                      | -    | 120                              | 46.0                                      | -                                   | -                                |
| 1652.40            | -                                            | -      | n.t.                                      | n.t. | 38.2                                   | 41.3 | 1000                             | -                                         | 54.0                                | 74.0                             |
| 2478.50            | -                                            | -      | n.t.                                      | n.t. | 43.4                                   | 44.3 | 1000                             | -                                         | 54.0                                | 74.0                             |

Note 1: values stated in the table above are worst case.

Note 2: Above 1 GHz, all measured values of the spurious emissions with the detector in peak mode, are below the applicable limits, which are valid when using an average detector. Therefore, all spurious emissions above 1 GHz have been measured with the peak detector only (n.t. = not tested), unless otherwise noted.

Note 3: Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Measurement uncertainty:  $\leq 1$  GHz: +2.6/-3.3 dB,  $> 1$  GHz: +4.5/-6.1 dB

## Used test equipment module

| Description         | Telef. ID | Manufacturer      | Model        | Used at par.                           |
|---------------------|-----------|-------------------|--------------|----------------------------------------|
| Spectrum analyzer   | TE 00099  | Hewlett Packard   | HP8562E      | 3.1, 3.2, 3.4, 3.5                     |
| Spectrum analyzer   | TE 11125  | Rohde & Schwarz   | FSP40        | 3.3, 3.6, 3.7, 3.8                     |
| Multimeter          | TE 00143  | Hewlett Packard   | HP34401A     | 3.1, 3.2, 3.4, 3.5, 3.3, 3.6, 3.7, 3.8 |
| Power supply        | TE 00616  | Delta Elektronika | E0303        | 3.1, 3.2, 3.4, 3.5, 3.3, 3.6, 3.7, 3.8 |
| Temperature chamber | TE 00741  | CTS               | C-40/350     | 3.1, 3.2, 3.4, 3.5, 3.3, 3.6, 3.7, 3.8 |
| Coaxial cable       | TE 01089  | Huber + Suhner    | Sucoflex 104 | 3.1, 3.2, 3.4, 3.5, 3.3, 3.6, 3.7, 3.8 |

The following measurement equipment is used at TNO Electronic Products & Services (EPS) B.V. and used at paragraphs 3.9 and 3.10:

| Inventory number | Description                   | Brand             | Model                |
|------------------|-------------------------------|-------------------|----------------------|
| 12476            | Antenna mast                  | EMCO              | TR3                  |
| 12477            | Antenna mast 1-4 mtr          | Poelstra          | --                   |
| 12482            | Loop antenna                  | EMCO              | 6507                 |
| 12483            | Guidehorn                     | EMCO              | 3115                 |
| 12484            | Guidehorn                     | EMCO              | 3115                 |
| 12488            | Guidehorn 18 - 26.5 GHz       | EMCO              | RA42-K-F-4B-C        |
| 12533            | Signalgenerator               | MARCONI           | 2032                 |
| 12561            | DC Power Supply 20A/70V       | DELTA             | SM7020D              |
| 12605            | calibrated dipole 28MHz-1GHz  | Emco              | 3121c                |
| 12636            | Polyester chamber             | Polyforce         | --                   |
| 12640            | Temperature chamber           | Heraeus           | VEM03/500            |
| 13664            | Spectrum analyzer             | HP                | HP8593E              |
| 13078            | Preamplifier 0.1 GHz - 12 GHz | Miteq             | AMF-3D-001120-35-14p |
| 13452            | Digital multi meter           | HP                | 34401A               |
| 13526            | Signalgenerator 20 GHz        | Hewlett & Packard | 83620A               |
| 13594            | Preamplifier 10 GHz - 25 GHz  | Miteq             | AMF-6D-100250-10p    |
| 13886            | Open Area testsite            | Comtest           | --                   |
| 14051            | Anechoic room                 | Comtest           | --                   |
| 14450            | 2.4 GHz bandrejectfilter      | BSC               | XN-1783              |
| 15633            | Biconilog Testantenna         | Chase             | CBL 6111B            |
| 15667            | Measuring receiver            | R&S               | ESCS 30              |
| 99045            | DC Power Supply 3A/30V        | DELTA             | E030/3               |
| 99055            | Non-conducting support        | NMi               | --                   |
| 99061            | Non-conducting support 150cm  | NMi               | --                   |
| 99068            | Detector N-F/BNC-F            | Radiall           | R451576000           |
| 99069            | Cable 5m RG214                | NMi               | --                   |
| 99071            | Cable 10m RG214               | NMi               | --                   |
| 99076            | Bandpassfilter 4 - 10 GHz     | Reactel           | 7AS-7G-6G-511        |
| 99077            | Regulating trafo              | RFT               | LTS006               |
| 99112            | Tripod                        | Chase             | --                   |
| 99136            | Bandpassfilter 10 - 26.5 GHz  | Reactel           | 9HS-10G/26.5G-S11    |

## Cross reference table

| <b>Transmitter</b>                 |                                                                |
|------------------------------------|----------------------------------------------------------------|
| <b>IC RSS-210 Issue 7, Annex 8</b> | <b>FCC 47 CFR Ch. 1 part 15, subpart C (01-OCT-06 Edition)</b> |
| A8.1 (a)                           | section 15.247 (a)(1)                                          |
| A8.1 (b)                           | section 15.247 (a)(1)                                          |
| A8.1 (d)                           | section 15.247 (a)(1) (iii)                                    |
| A8.4 (2)                           | section 15.247 (b)(1)                                          |
| A8.5                               | section 15.247 (d)                                             |
| 2.2                                | section 15.205                                                 |
| 2.6                                | section 15.209                                                 |
| <b>Receiver</b>                    |                                                                |
| <b>IC RSS-Gen Issue 2</b>          | <b>FCC 47 CFR Ch. 1 part 15, subpart B (01-OCT-06 Edition)</b> |
| Section 6, table 1                 | section 15.109                                                 |
| 2.2                                | section 15.205 (see part 15, subpart C)                        |

## Revision history

| REVISION | DATE | REMARKS |
|----------|------|---------|
| --       | --   | --      |