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# TEST REPORT

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Report No.: SRTC2011-H024-E0041

Product Name: GSM/GPRS/EDGE/WCDMA

Digital Mobile Phone with Bluetooth

Marketing Name: one touch 900A

Product Model: yippee 3G\_A2

Applicant: TCT Mobile Limited

Manufacture: TCT Mobile Limited

Specification: 47CFR Part 15 July 10, 2008, Subpart C

FCC ID: RAD197

The State Radio\_monitoring\_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-68009202 Fax: 86-10-68009205

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## 1. General information

### 1.1 Notes of the test report

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The test results relate only to individual items of the samples which have been tested.

### 1.2 Information about the testing laboratory

Company: The State Radio\_monitoring\_center Testing Center (SRTC)  
Address: No.80 Beilishi Road, Xicheng District, Beijing China  
City: Beijing  
Country or Region: China  
Contacted person: Wang Junfeng  
Tel: +86 10 68009181 +86 10 68009202  
Fax: +86 10 68009195 +86 10 68009205  
Email: wangjf@srrc.org.cn / wangjunfeng@srtc.org.cn

### 1.3 Applicant's details

Company: TCT Mobile Limited  
Address: 5F, E building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area  
City: Shanghai  
Country or Region: P.R.China  
Grantee Code: RAD  
Contacted Person: Gong Zhizhou  
Tel: +86-21-61460890  
Fax: +86-21-61460602  
Email: zhizhou.gong@jrdcom.com

### 1.4 Manufacturer's details

Company: TCT Mobile Limited  
Address: 5F, E building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area  
City: Shanghai  
Country or Region: P.R.China  
Contacted Person: Gong Zhizhou  
Tel: +86-21-61460890  
Fax: +86-21-61460602  
Email: zhizhou.gong@jrdcom.com

## 1.5 Application details

Date of reception of test sample: 9<sup>th</sup> March 2011

Date of test: 20<sup>th</sup> April 2011 to 24<sup>th</sup> April 2011

## 1.6 Reference specification

47CFR Part 15, July 10, 2008, Subpart C

## 1.7 Information of EUT

### 1.7.1 General information

Name of EUT	GSM/GPRS/EDGE/WCDMA Digital Mobile Phone with Bluetooth
FCC ID	RAD197
Frequency range	2.4000~2.4835GHz
Number of channel	79
Modulation type	GFSK, $\pi/4$ DQPSK,8DPSK
Duplex mode	TDD
Channel spacing	1MHz
Data rate	1Mbps,2 Mbps,3 Mbps
Antenna type	Integral
Power Supply	Battery or charger
Rated Power Supply Voltage	3.8V
HW Version	LOT1
SW Version	sw53K

### 1.7.2 EUT details

Product Name	Marketing Name	Product Model	IMEI
GSM/GPRS/EDGE/WCDMA Digital Mobile Phone with Bluetooth	one touch 900A	yippee 3G_A2	EUT 1: 012787000001069 EUT 2: 012787000001077

### 1.7.3 Auxiliary equipment details

Equipment	Charger
Manufacturer	Ten Pao International Ltd.
Model Number	CBA3120AG0C2
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Charger
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Model Number	CBA3001AG0C1
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Battery
Manufacturer	BYD LITHIUM BATTERY CO., LTD
Model Number	CAB31L0000C1
Capacity	1000mAh
Rated Voltage	3.7V d.c.

Equipment	Battery
Manufacturer	SHENZHEN BAK BATTERY CO., LTD
Model Number	CAB31L0000C2
Capacity	1000mAh
Rated Voltage	3.7V d.c.

Equipment	Data Cable
Manufacturer	Shen Zhen Ju Wei Electronic Co.,LTD
Model Number	CDA3122001C1

Equipment	Data Cable
Manufacturer	Huizhou Shenghua Industry Co.,Ltd
Model Number	CDA3122001C2


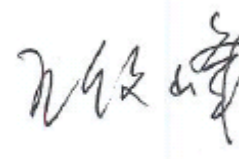

Note: As the information described above, there are two different models of charger manufactured by two different companies, and two different models of battery manufactured by two different companies.

The relevant tests have been performed in order to verify in which combination case (EUT exercised by only one model of battery and one model of charger) the EUT would have the worst features. So all the tests shown in this test report are performed when the EUT exercised by the charger CBA3120AG0C2 and the battery CAB31L0000C1.

## 2. Test information

### 2.1 Summary of the test results

No.	Test case	FCC reference	Verdict
1	Occupied Bandwidth	15.247(a) (1)	Pass
2	Peak Power Output	15.247(a) (1)	Pass
3	Spurious RF Conducted Emissions	15.247(d)	Pass
4	Spurious Radiated Emissions	15.247(d), 15.35(b), 15.209	Pass
5	Band Edge Compliance	15.247(d)	Pass
6	Dwell time	15.247(a) (1)(iii)	Pass
7	Channel separation	15.247(a) (1)	Pass
8	Number of Hopping frequencies	15.247(a) (iii)	Pass
9	AC Powerline Conducted Emission	15.107, 15.207	Pass

This Test Report Is Issued by: Mr. Song Qizhu Director of the test lab 	Checked by: Mr. Wang Junfeng Deputy director of the test lab 
Tested by: Mr. Li Bin Test engineer 	Issued date:  <b>2011.06.08</b>

## 2.2 Test result

### 2.2.1 Occupied Bandwidth-§15.247(a) (1)

#### 2.2.1.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

#### 2.2.1.2 Test Description

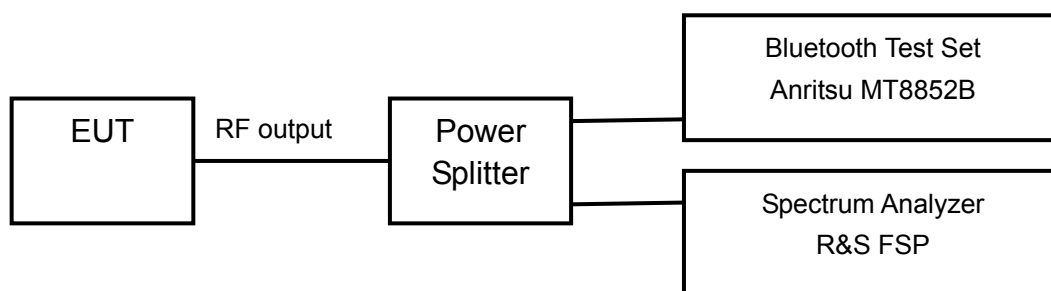
The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produces the worst-case (widest) occupied bandwidth. The resolution bandwidth for measuring the reference level and the occupied bandwidth was 10 kHz.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.



#### 2.2.1.3 Test limit

FCC Part 15, Subpart C, §15.247 (a) (1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### 2.2.1.4 Test result

Modulation type: GFSK

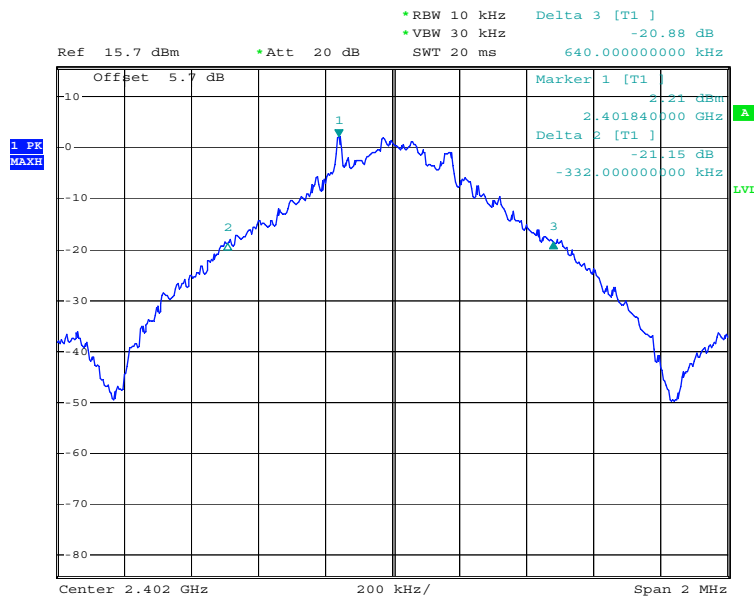
Carrier frequency (MHz)	Channel No.	20 dB bandwidth(KHz)
2402	0	972.00
2441	39	944.00
2480	79	988.00

Modulation type:  $\pi/4$ DQPSK

Carrier frequency (MHz)	Channel No.	20 dB bandwidth(KHz)
2402	0	1296.00
2441	39	1296.00
2480	79	1292.00

Modulation type: 8DPSK

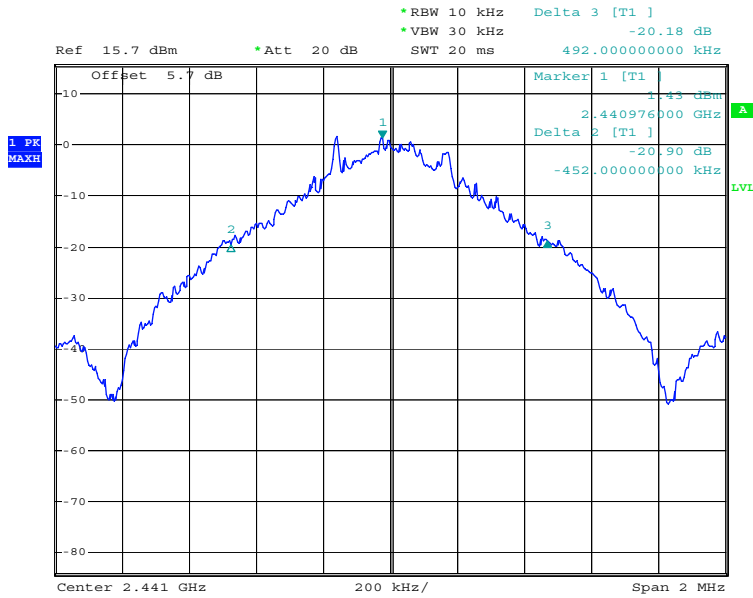
Carrier frequency (MHz)	Channel No.	20 dB bandwidth(KHz)
2402	0	1308.00
2441	39	1304.00
2480	79	1292.00



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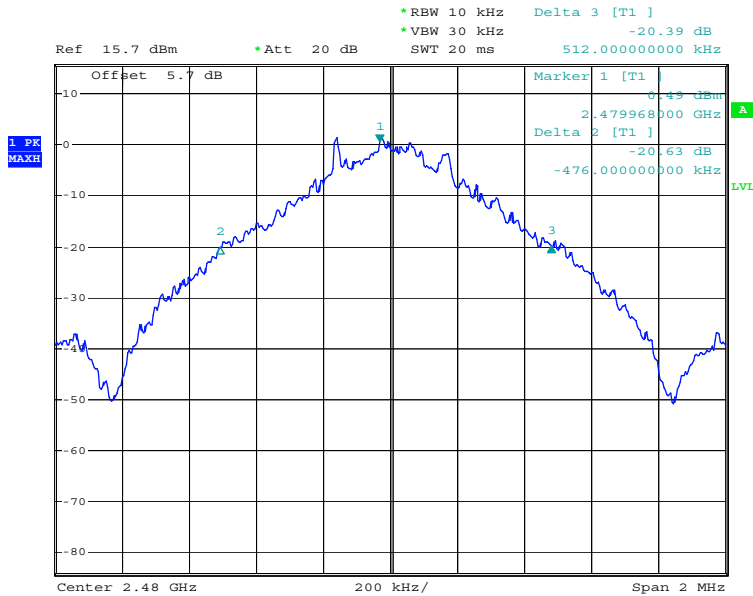
Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type: GFSK





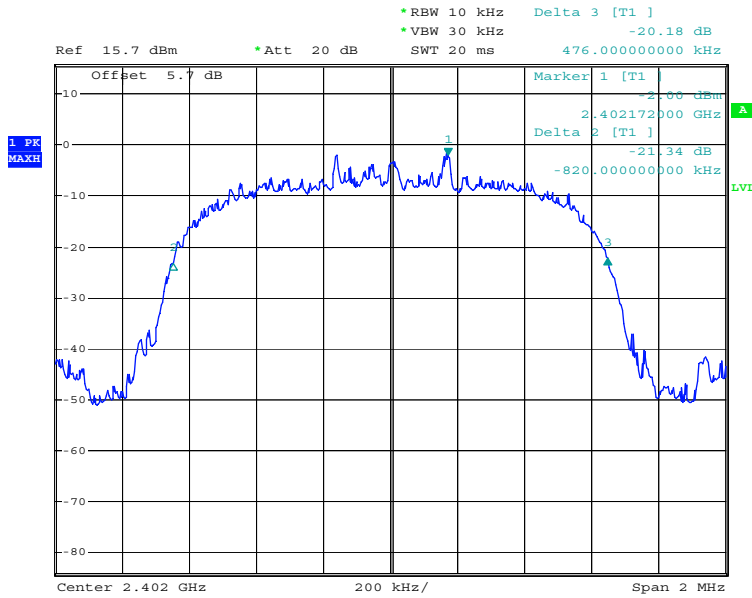
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Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type: GFSK



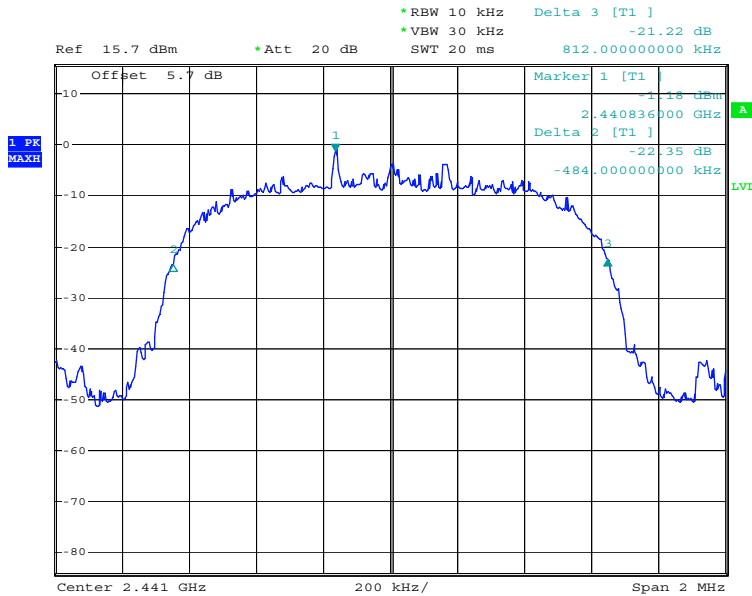
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Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type:GFSK



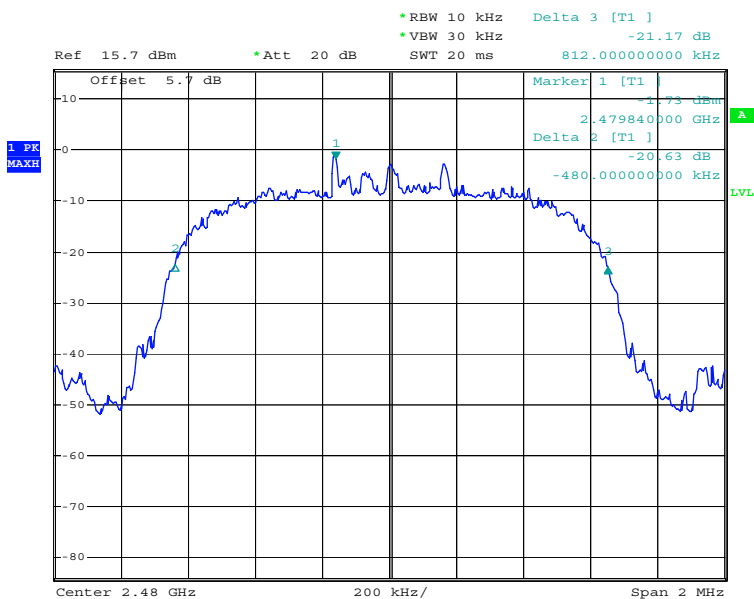
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Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type:  $\pi/4$ DQPSK



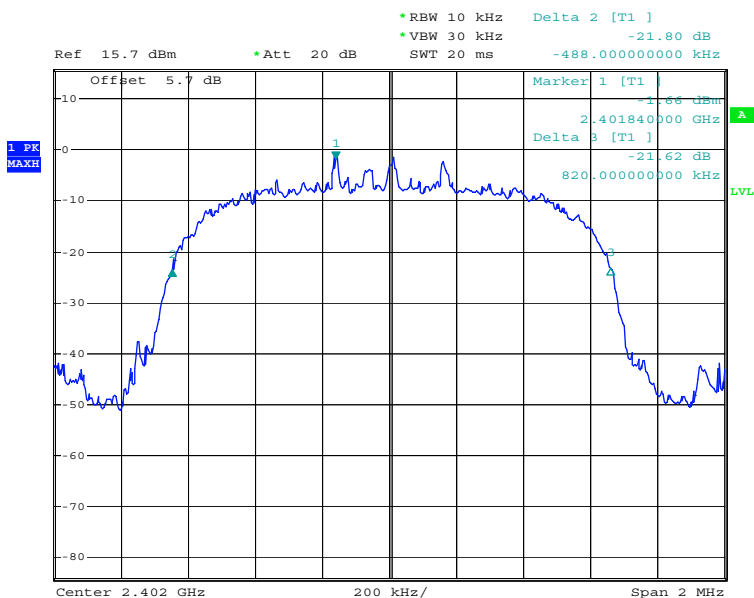
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Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type:  $\pi/4$ DQPSK



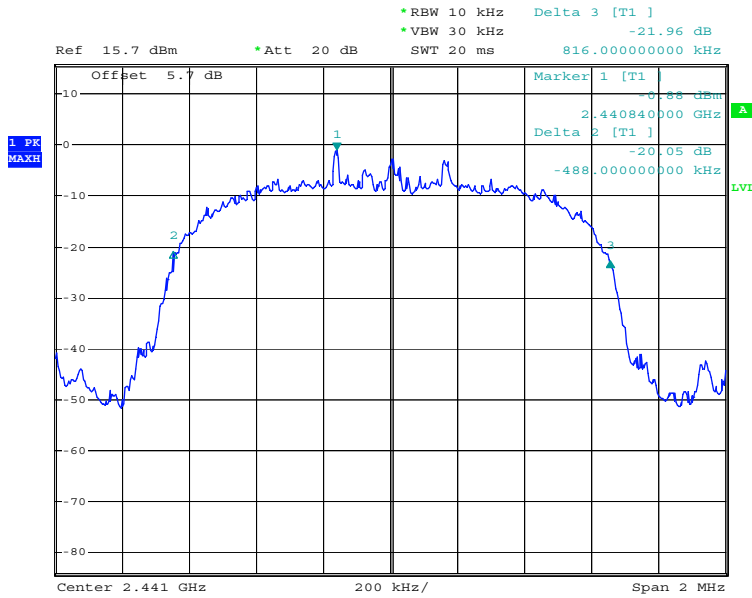
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Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type:  $\pi/4$ DQPSK



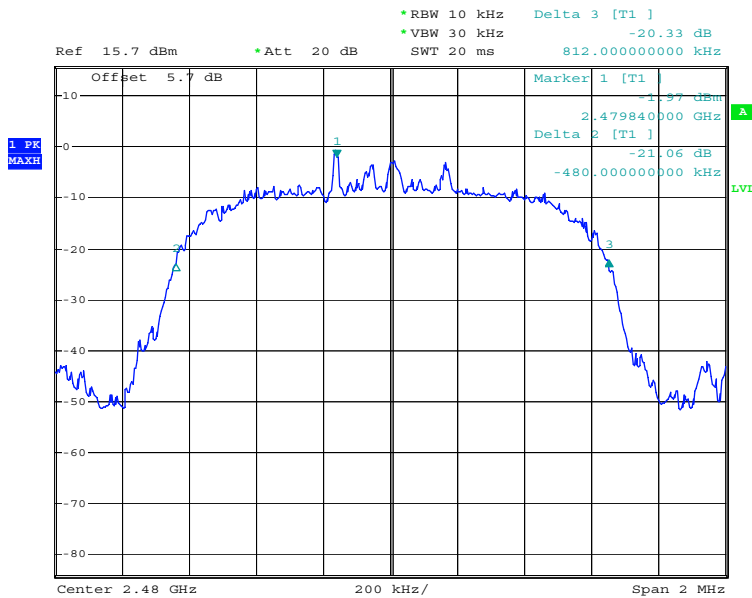
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Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type: 8DPSK



Date: 21.APR.2011 16:16:23

Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type: 8DPSK



Date: 21.APR.2011 16:15:10

Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type: 8DPSK

## 2.2.2 Peak power output-§15.247(a) (1)

### 2.2.2.1 Ambient condition:

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

### 2.2.2.2 Test Description

The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009

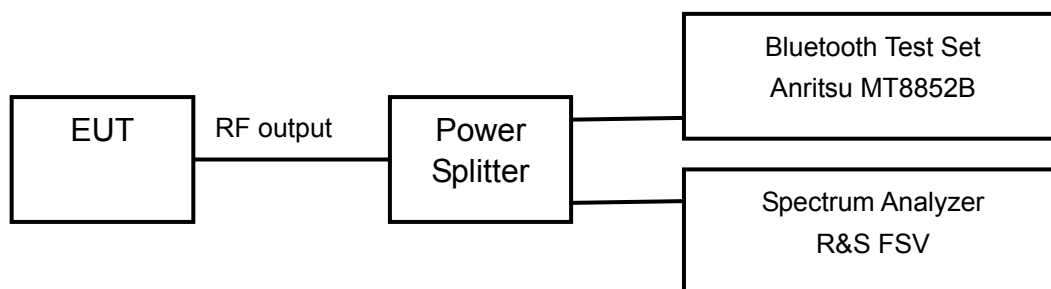
The Equipment Under Test (EUT) was set up in a shielded room to perform the output power measurements.

The results recorded were measured with the modulation which produces the worst-case (highest) output power.

The resolution bandwidth for measuring the output power was 2 MHz.

The reference level of the spectrum analyzer was set higher than the output power of the EUT.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.



### 2.2.2.3 Test limit

FCC Part 15, Subpart C, §15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW)

==> Maximum Output Power: 30 dBm

### 2.2.2.4 Test Condition

Hopping Mode	Modulation type	RBW	VBW	Span	Sweeptime
Hopping OFF	GFSK	2MHz	3MHz	8MHz	1ms
Hopping OFF	$\pi/4$ DQPSK	2MHz	3MHz	8MHz	1ms
Hopping OFF	8DPSK	2MHz	3MHz	8MHz	1ms

### 2.2.2.4 Test result:

Offset= the insertion loss of the power splitter+ cable loss  
=6.30+0.50=6.80dB

Modulation type: GFSK

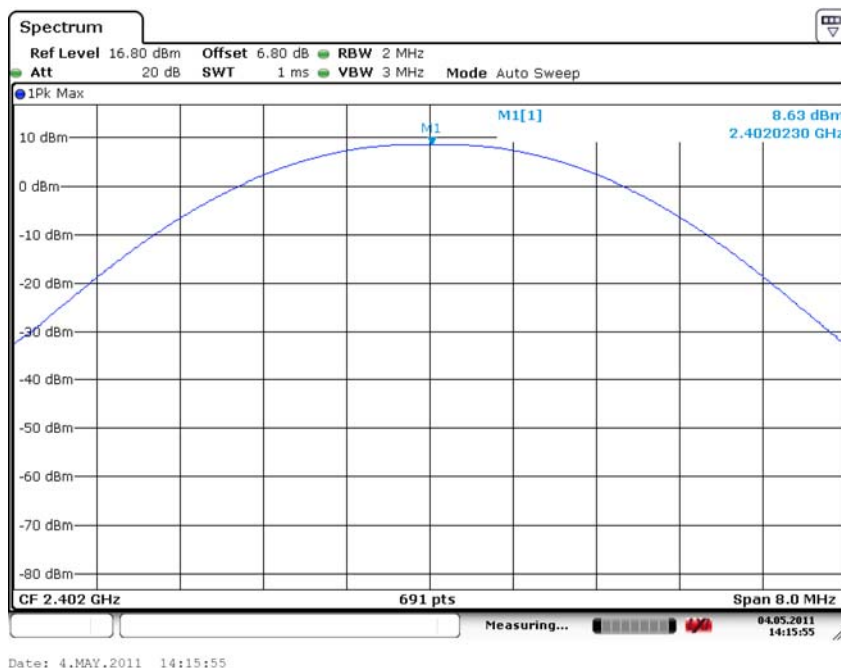
Carrier frequency (MHz)	Channel No.	Peak Conducted Output Power (dBm)
2402	0	8.63
2441	39	8.10
2480	78	7.89

Modulation type:  $\pi/4$ DQPSK

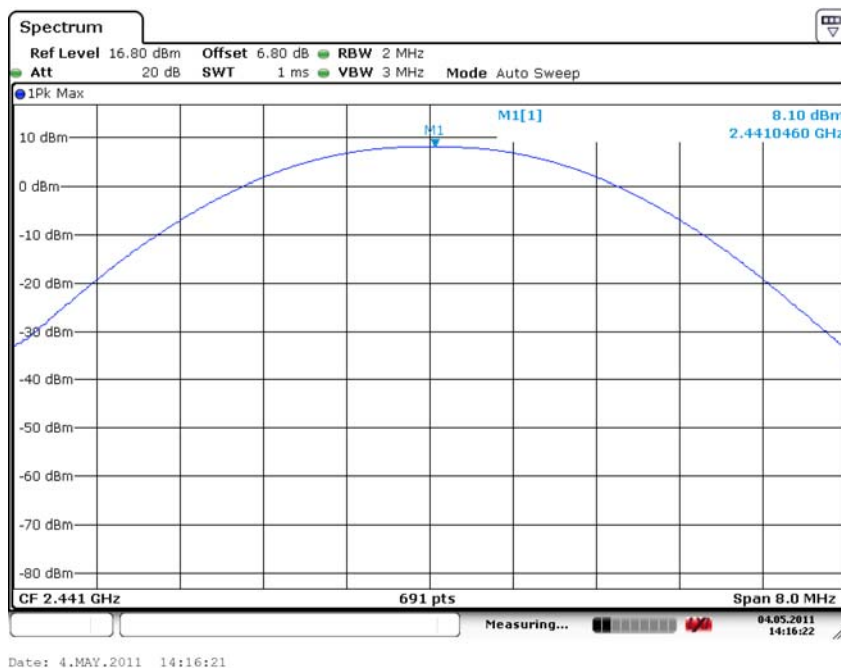
Carrier frequency (MHz)	Channel No.	Peak Conducted Output Power (dBm)
2402	0	8.57
2441	39	8.05
2480	78	7.84

Modulation type: 8DPSK

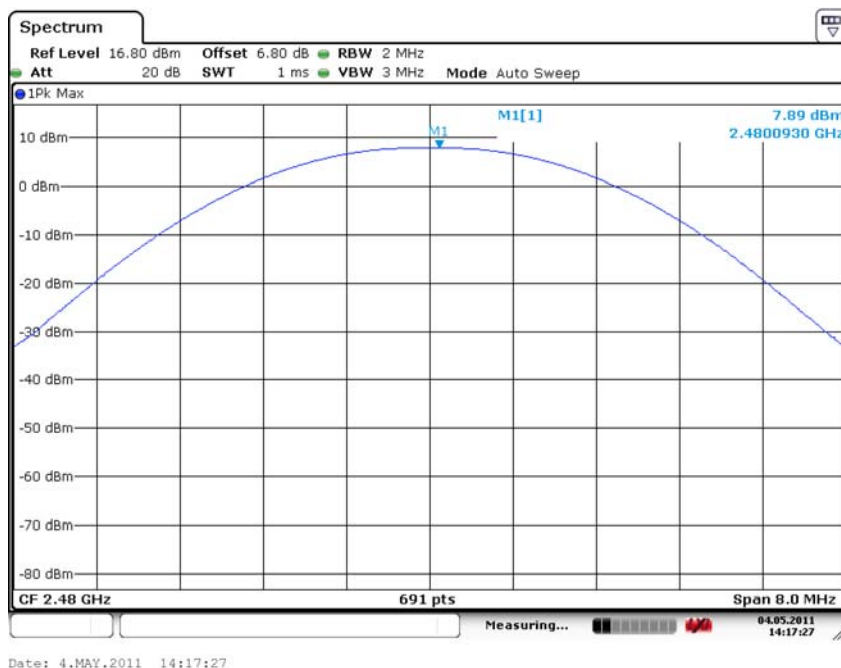
Carrier frequency (MHz)	Channel No.	Peak Conducted Output Power (dBm)
2402	0	8.53
2441	39	7.99
2480	78	7.80



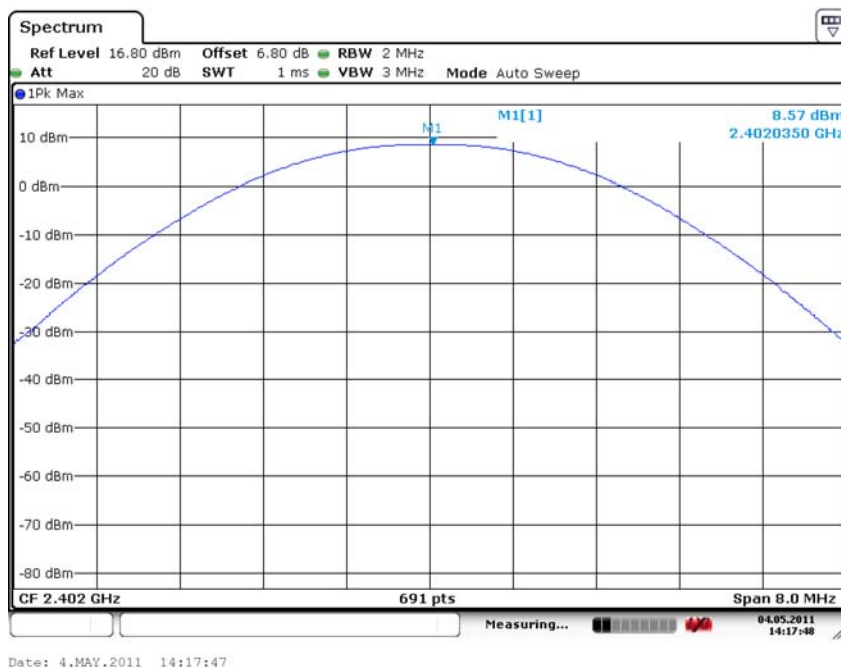
Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type: GFSK



Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type: GFSK

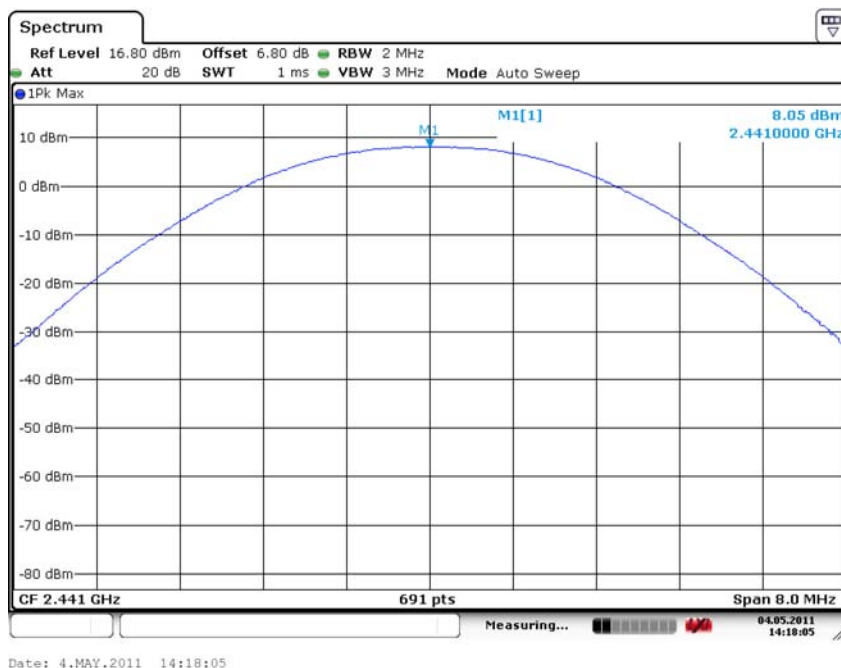


Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type: GFSK

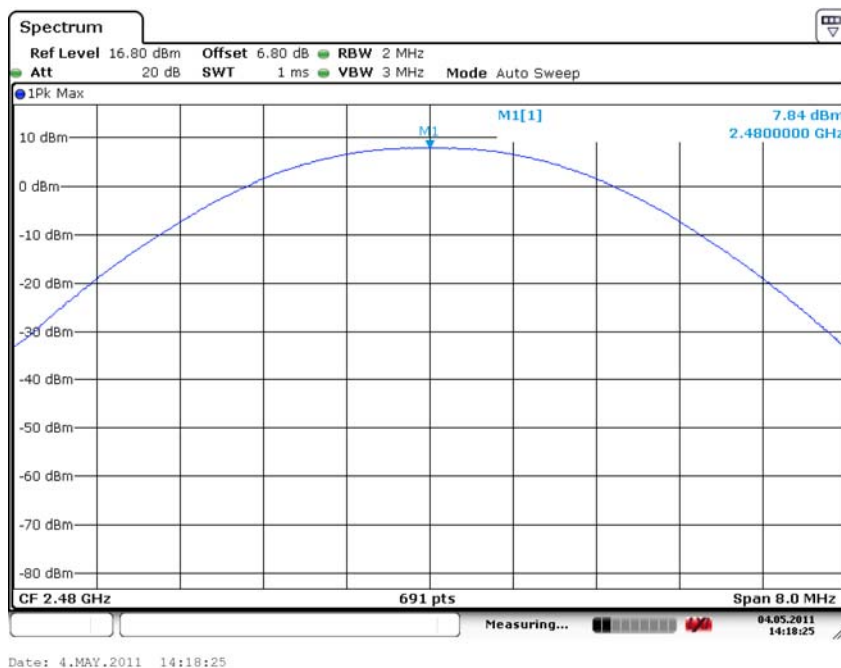


Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type:  $\pi/4$ DQPSK

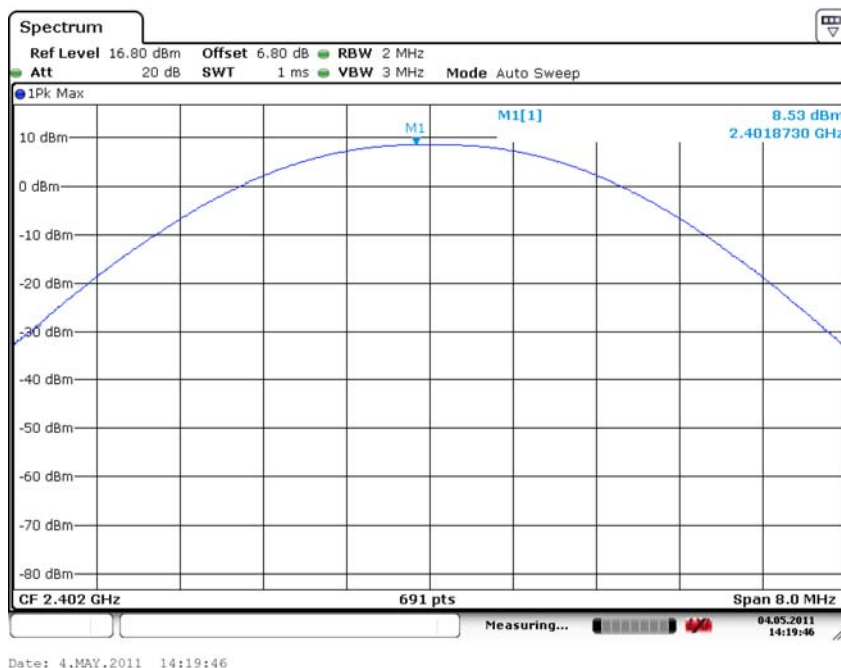




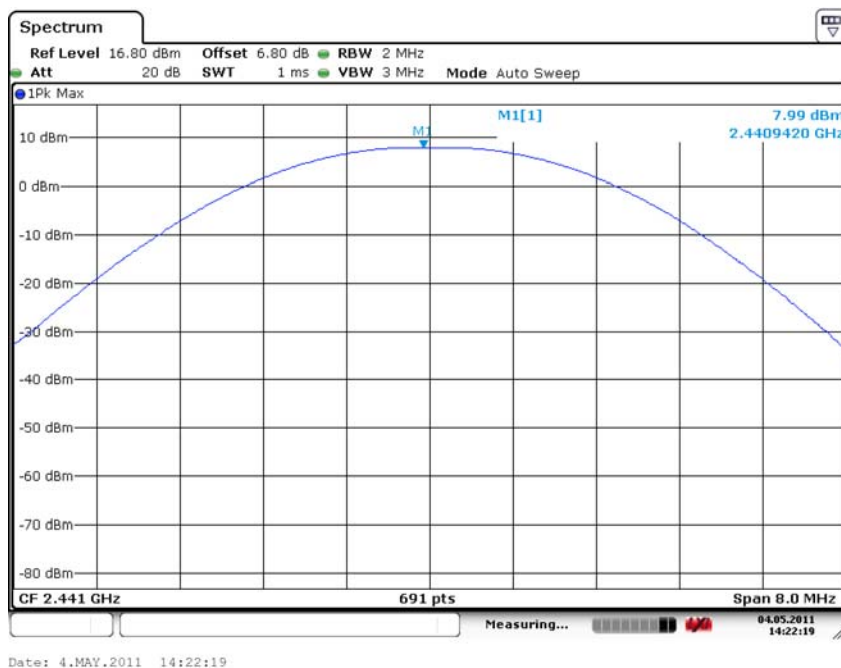
Carrier frequency (MHz): 2441  
 Channel No.:39  
 Modulation type:  $\pi/4$ DQPSK



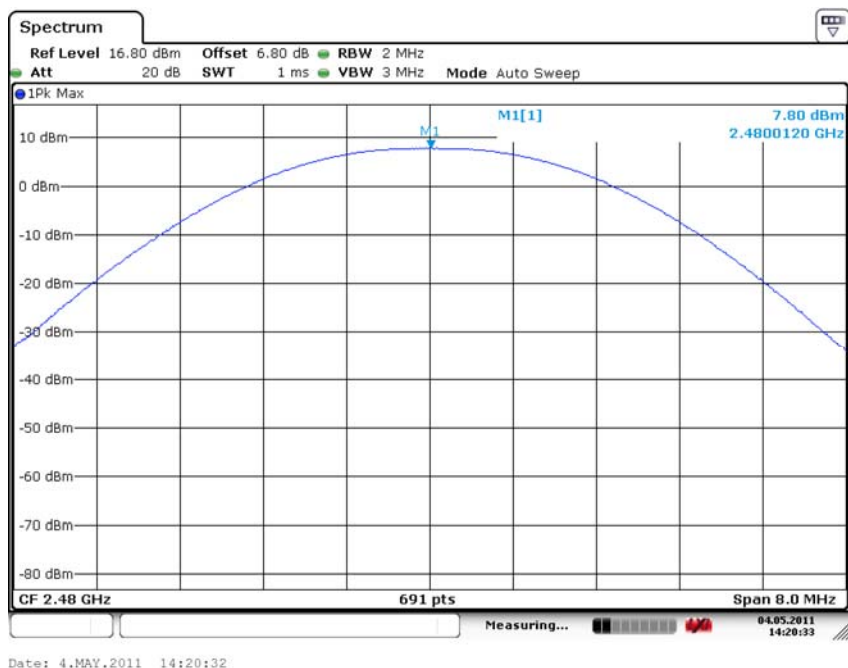
Carrier frequency (MHz): 2480  
 Channel No.:78  
 Modulation type:  $\pi/4$ DQPSK



Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type: 8DPSK



Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type: 8DPSK



Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type: 8DPSK

## 2.2.3 Spurious RF conducted emissions-§15.247(d)

### 2.2.3.1 Ambient condition:

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

### 2.2.3.2 Test Description

The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

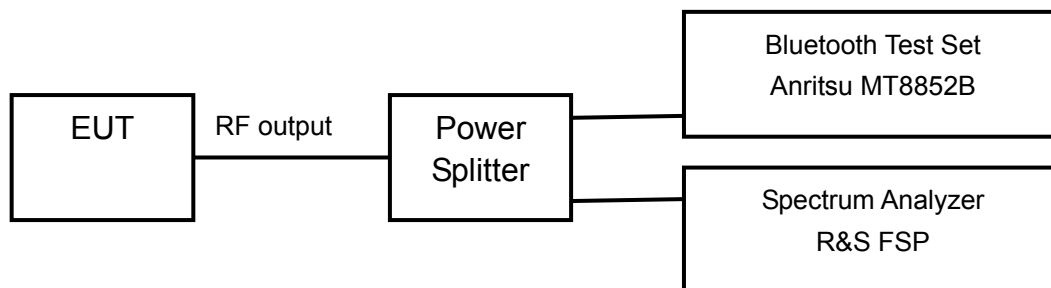
The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

Analyzer settings:

- Detector: Peak-Maxhold
- Frequency range: 30 ~25000 MHz
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz

The reference value for the measurement of the spurious RF conducted emissions is determined during the test “band edge compliance” (cf. chapter 4.5). This value is used to calculate the 20 dBc limit.



### 2.2.3.3 Test limit

FCC Part 15, Subpart C, §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

### 2.2.3.4 Test result

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: GFSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2441

Channel No.:39

Modulation type: GFSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

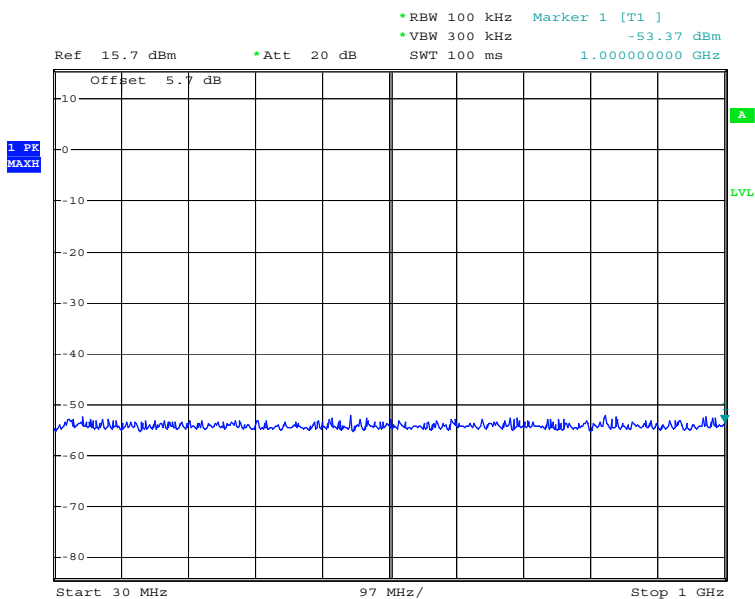
Carrier frequency (MHz): 2480

Channel No.:78

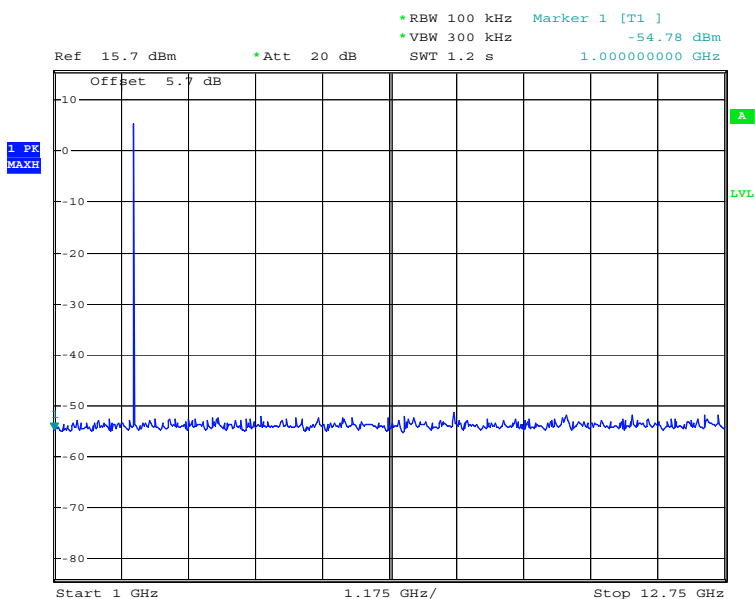
Modulation type: GFSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

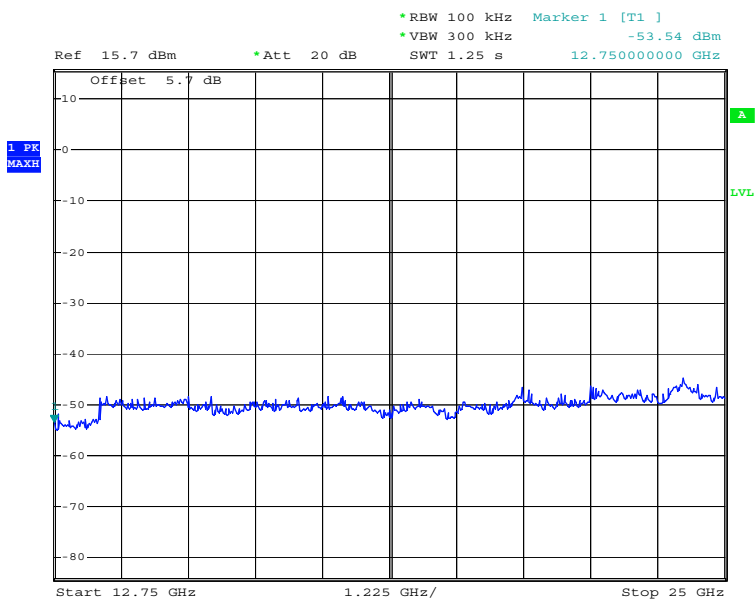
Note: The Reference value see 2.2.5 Band edge compliance



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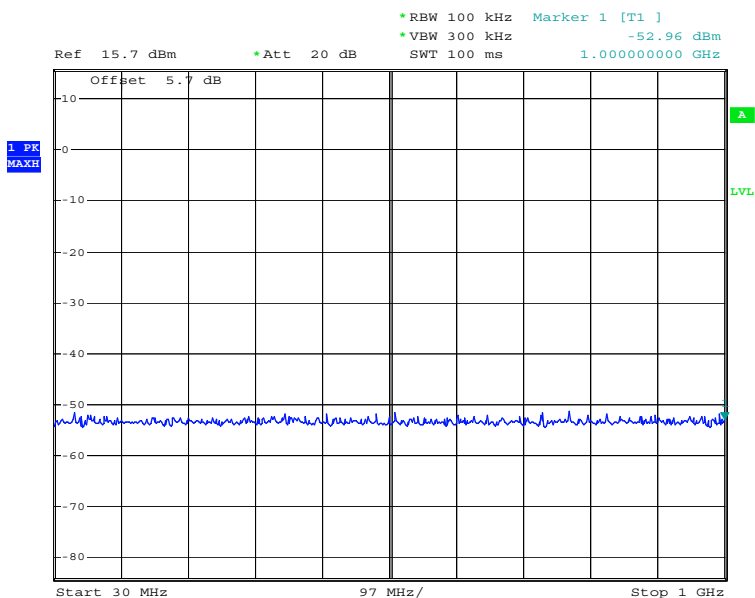


Date: 21.APR.2011 16:44:41

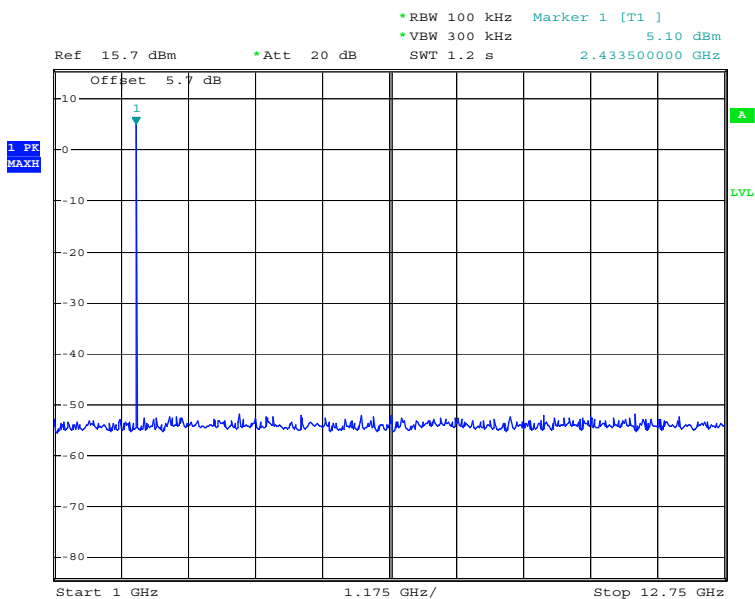


Date: 21.APR.2011 16:44:56

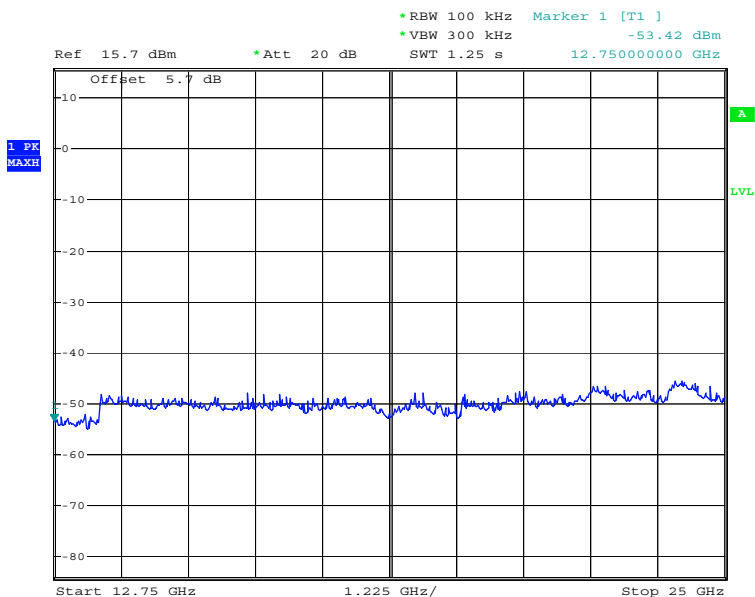
Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type: GFSK



Date: 21.APR.2011 16:46:56



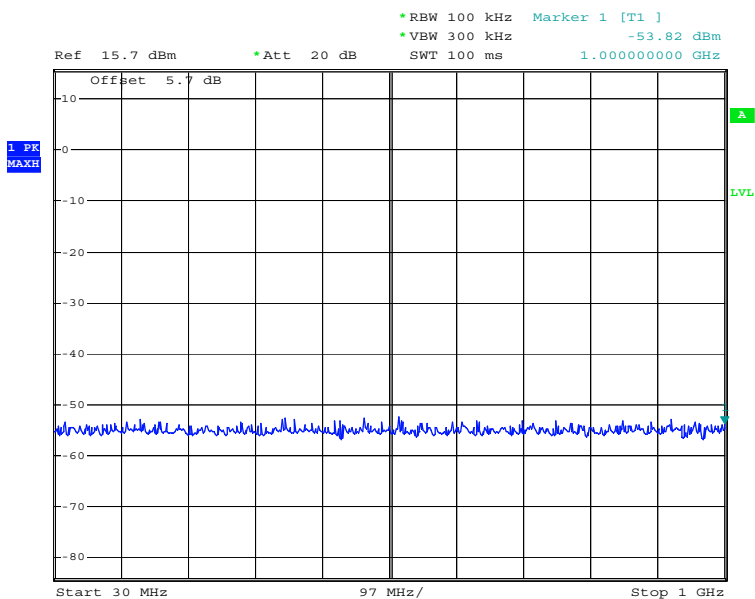
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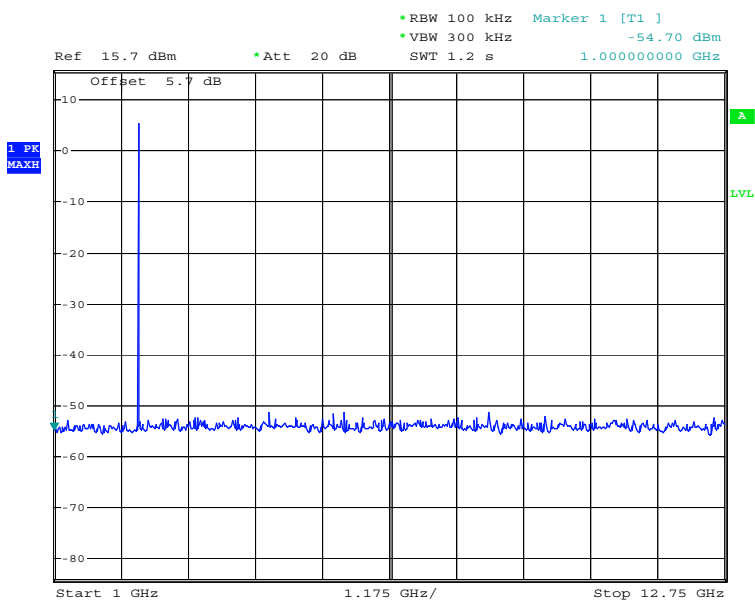
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Carrier frequency (MHz): 2441  
 Channel No.:39  
 Modulation type: GFSK

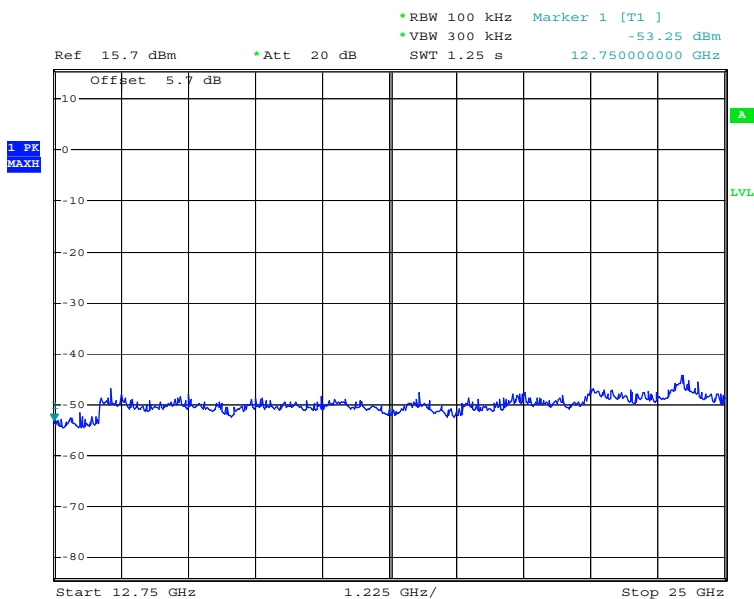




Date: 21.APR.2011 16:48:05



Date: 21.APR.2011 16:48:17



Date: 21.APR.2011 16:48:30

Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type: GFSK

Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

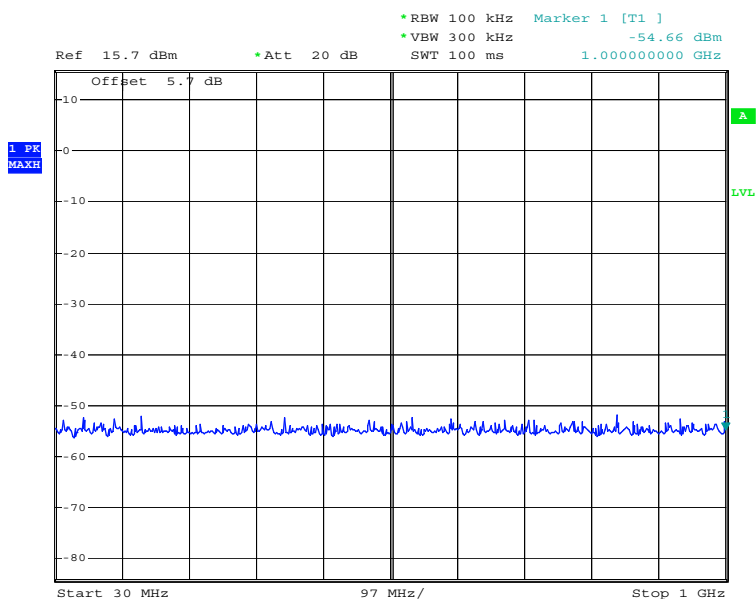
Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

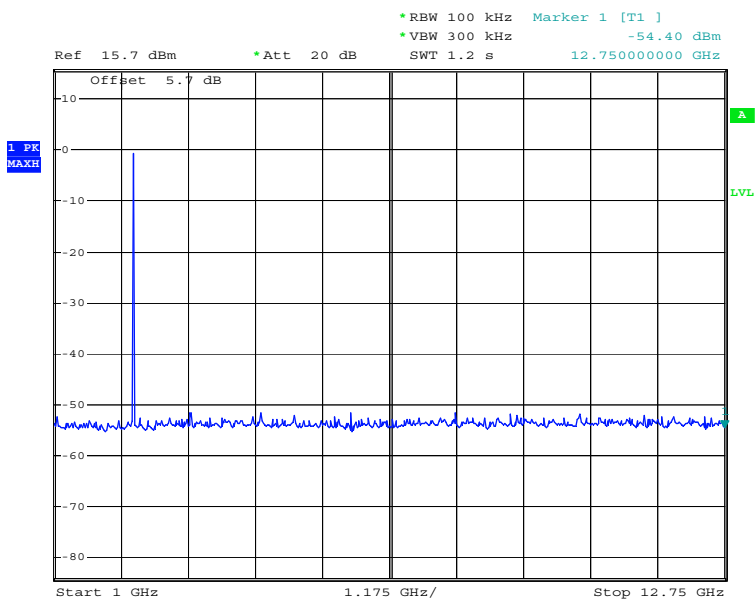
Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

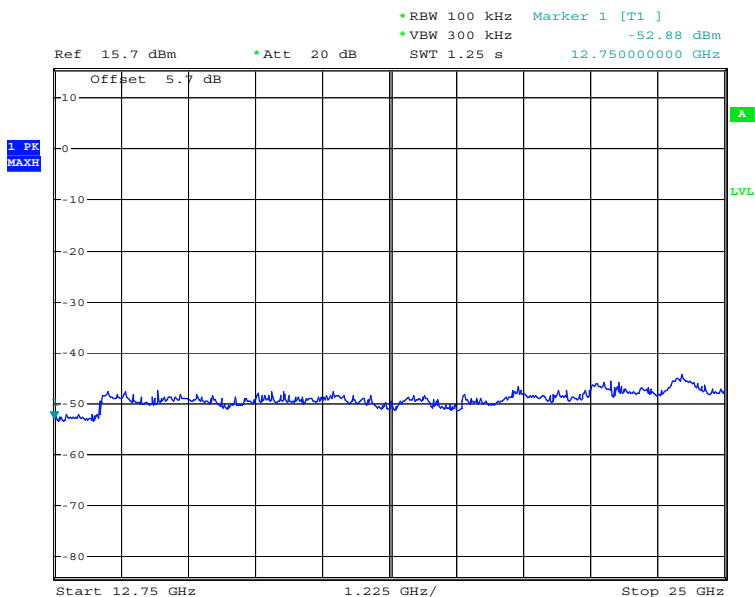
Note: The Reference value see 2.2.5 Band edge compliance



Date: 21.APR.2011 16:48:52

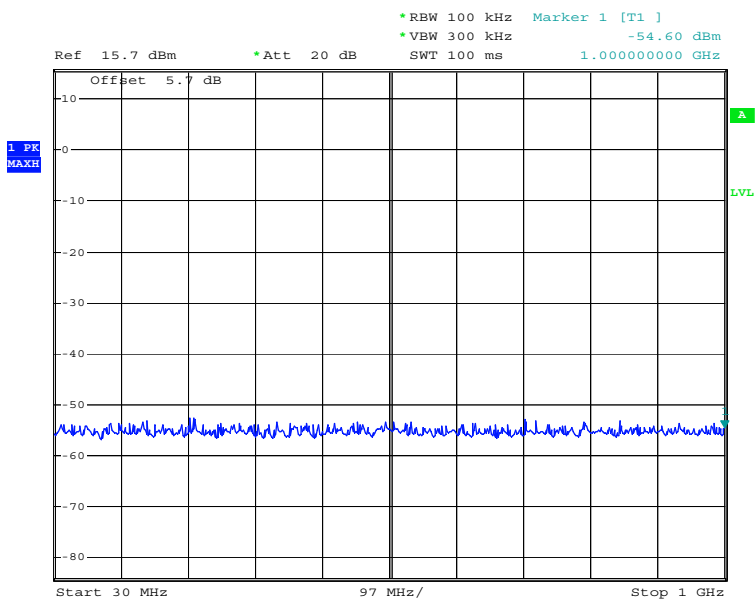


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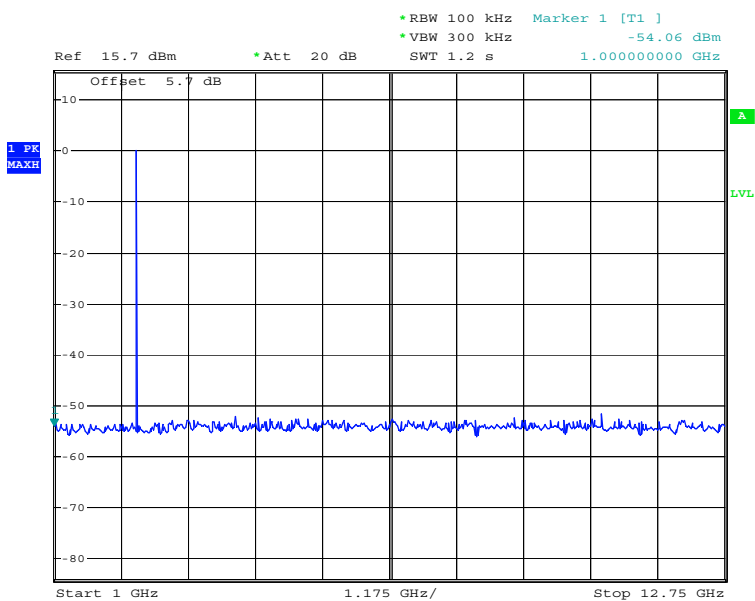


Date: 21.APR.2011 16:50:16

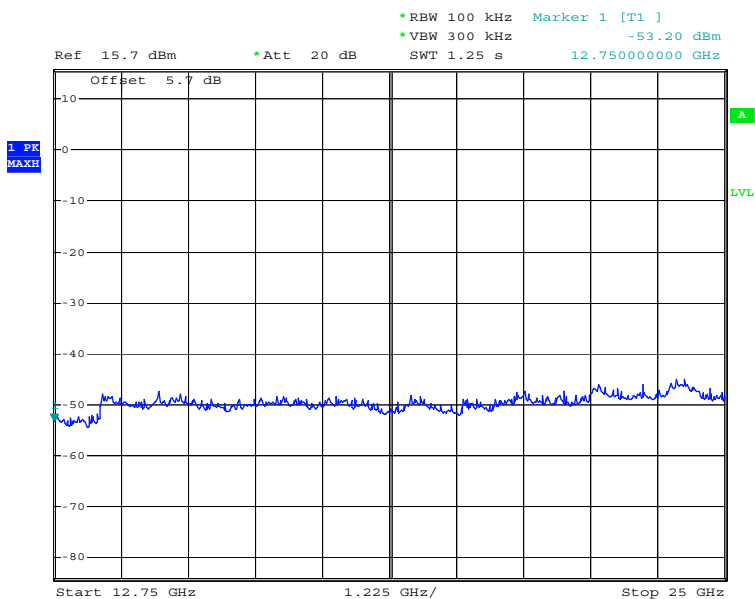
Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type:  $\pi/4$ DQPSK



Date: 21.APR.2011 16:50:29

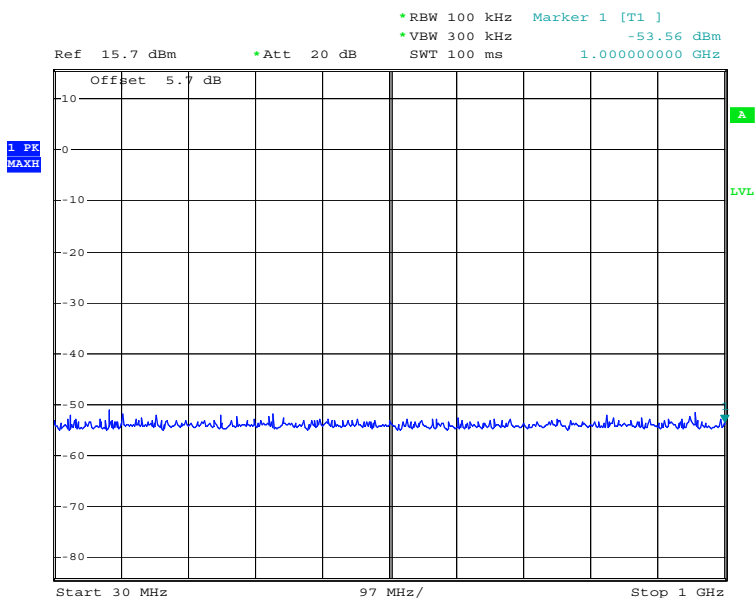


Date: 21.APR.2011 16:50:43

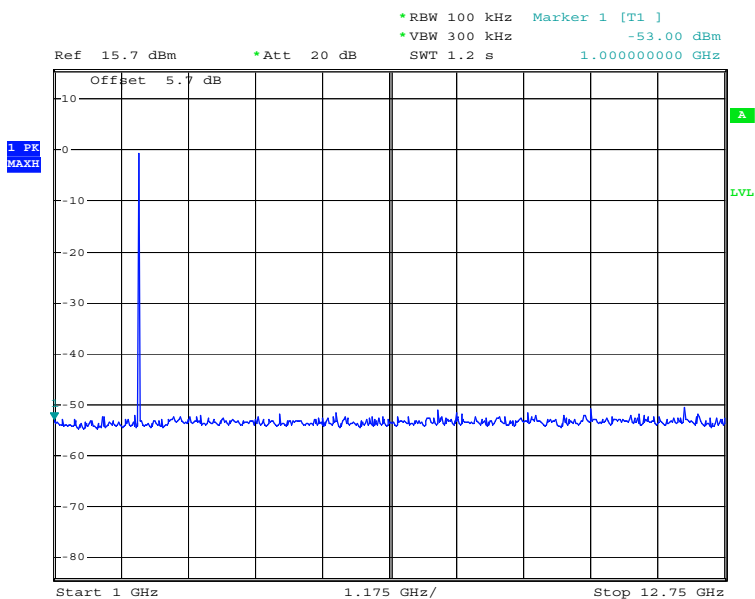


Date: 21.APR.2011 16:51:03

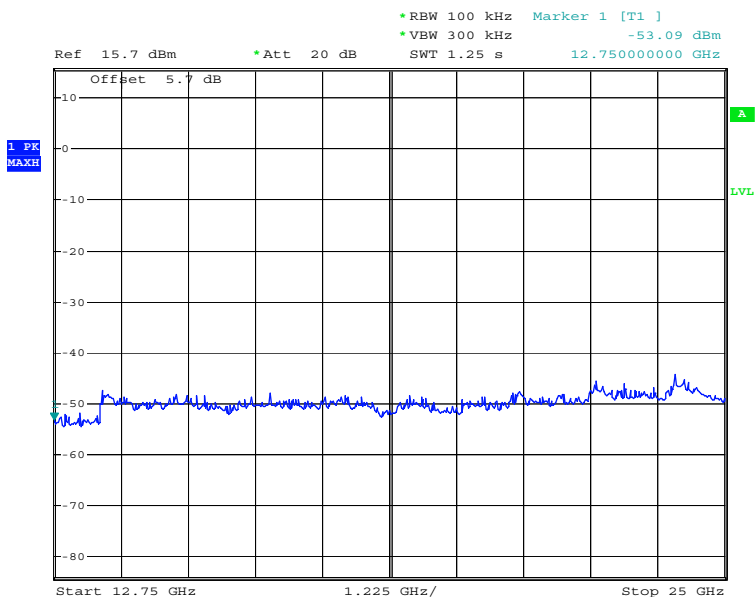
Carrier frequency (MHz): 2441  
 Channel No.:39  
 Modulation type:  $\pi/4$ DQPSK



Date: 21.APR.2011 16:51:38



Date: 21.APR.2011 16:52:12



Date: 21.APR.2011 16:52:26

Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type:  $\pi/4$ DQPSK

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: 8DPSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2441

Channel No.:39

Modulation type: 8DPSK

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2480

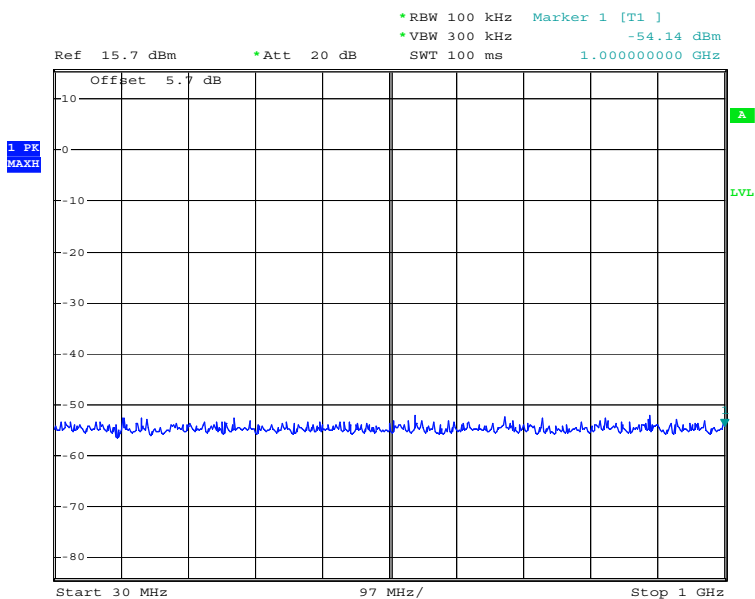
Channel No.:78

Modulation type: 8DPSK

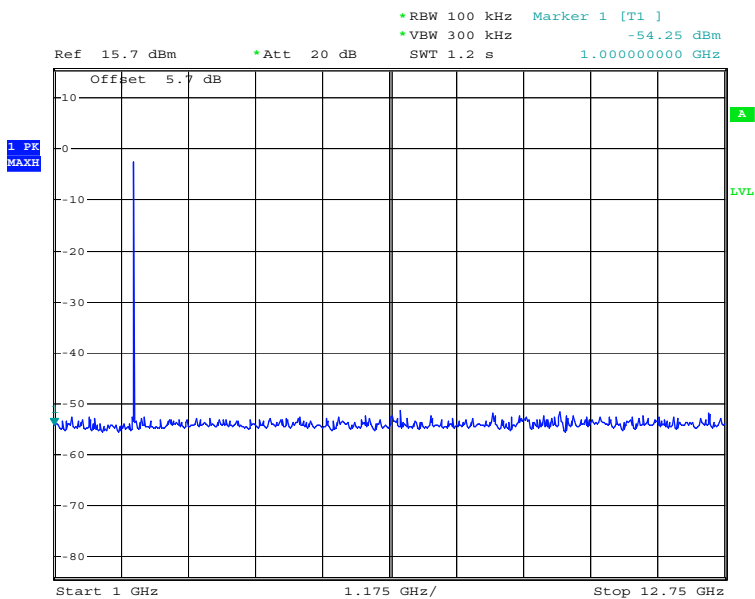
Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Note: The Reference value see 2.2.5 Band edge compliance

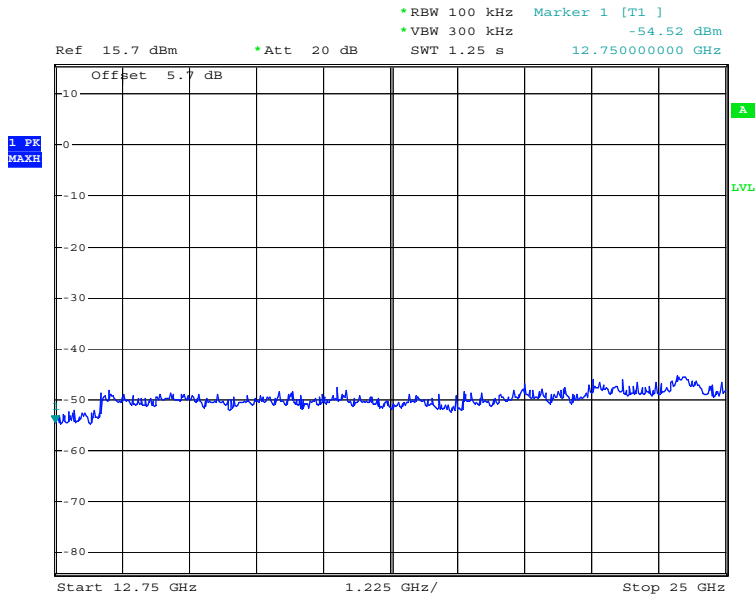




Date: 21.APR.2011 16:52:47

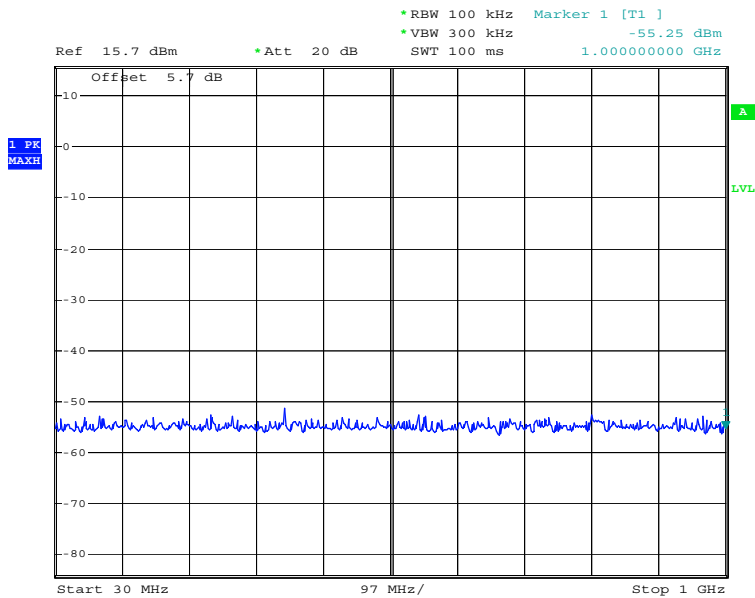


Date: 21.APR.2011 16:52:59

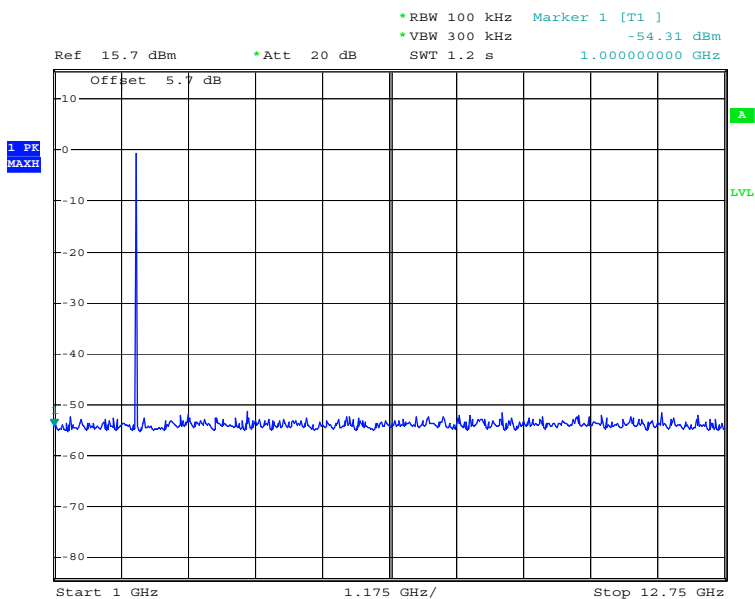


Date: 21.APR.2011 19:53:59

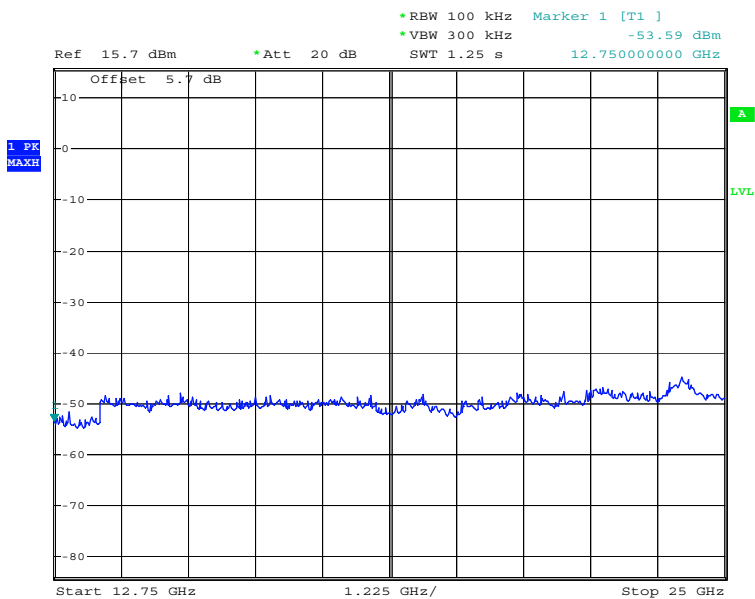
Carrier frequency (MHz): 2402  
Channel No.:0  
Modulation type: 8DPSK



Date: 21.APR.2011 16:53:29

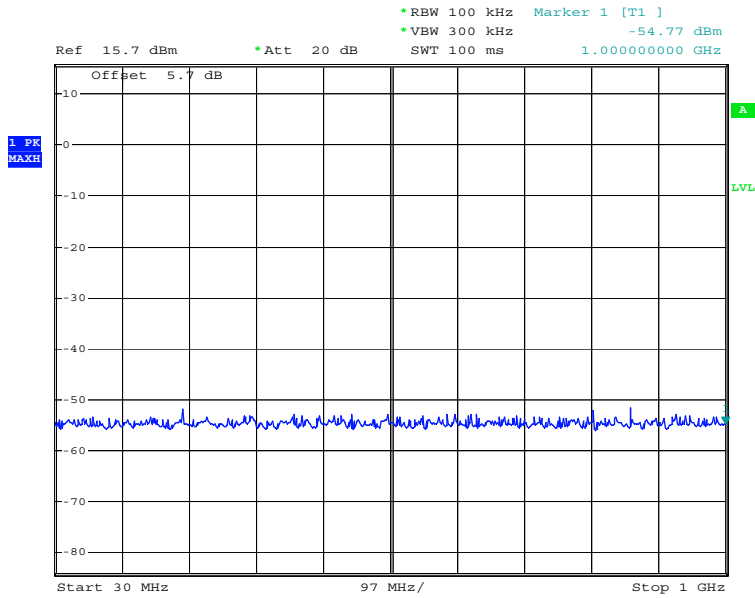


Date: 21.APR.2011 16:53:44

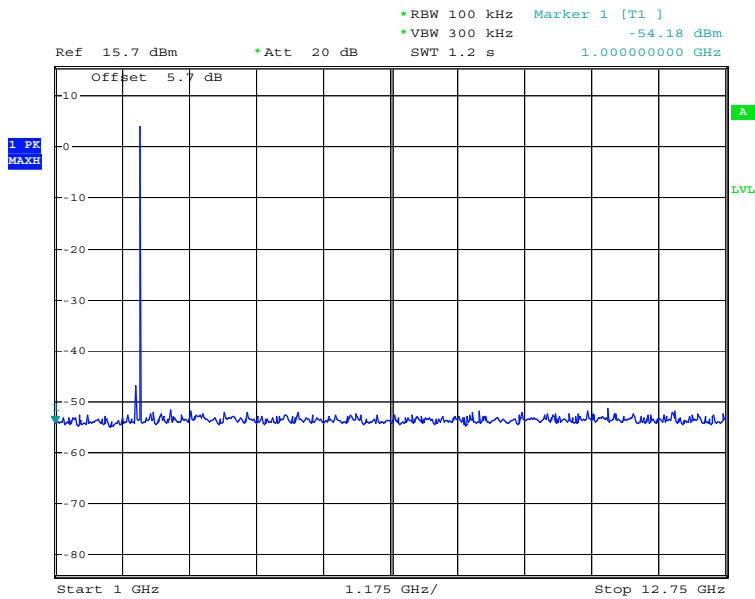


Date: 21.APR.2011 16:53:57

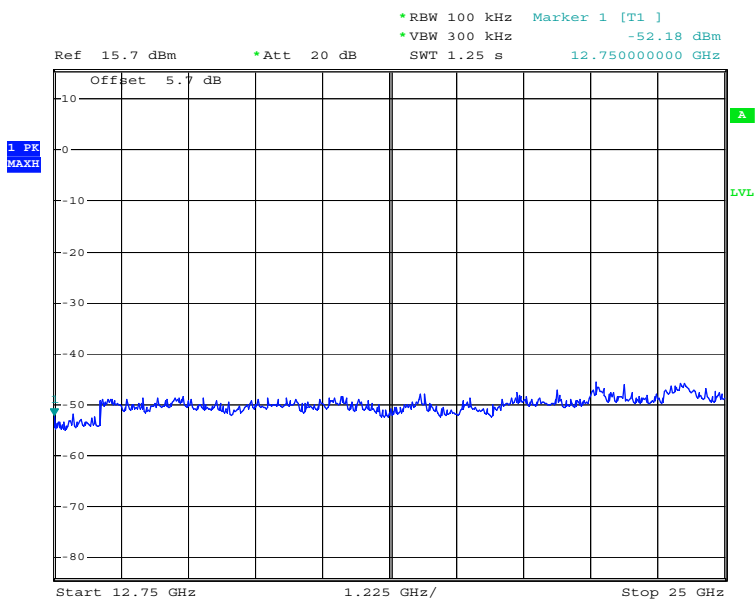
Carrier frequency (MHz): 2441  
Channel No.:39  
Modulation type: 8DPSK



Date: 21.APR.2011 16:54:23



Date: 21.APR.2011 16:54:51



Date: 21.APR.2011 16:55:09

Carrier frequency (MHz): 2480  
Channel No.:78  
Modulation type: 8DPSK

## 2.2.4 Spurious radiated emissions-§15.247(d),§15.35(b),§15.209

### 2.2.4.1 Ambient condition

Temperature	Relative humidity	Pressure
20°C	35%	101.4kPa

### 2.2.4.2 Test Description

The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

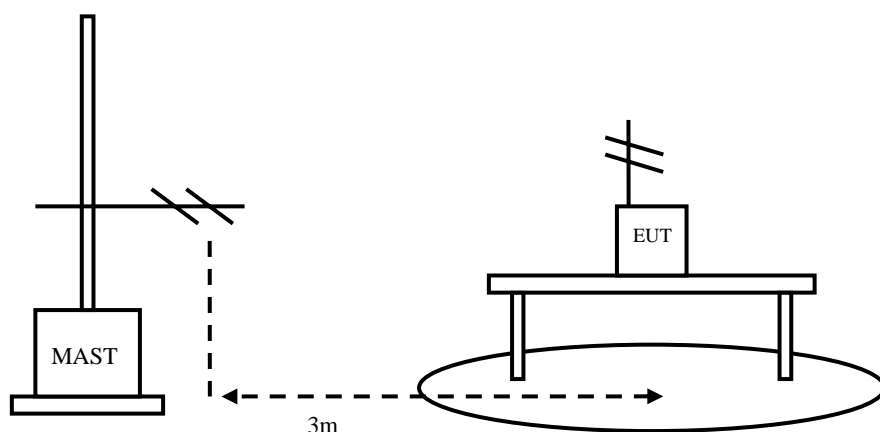
The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The radiated emissions measurements were made in a typical installation configuration.

Then start the test software ES-K1. Sweep the whole frequency band through the range from 30MHz to 1GHz or above, using receive log period antenna HL562 or Ridge horn antenna HF906.

During the test, the antenna height and EUT azimuth were varied in order to identify the maximum level of emission from the EUT. The height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees. The measurements shall be repeated with orthogonal polarization of the test antenna. The results (reference to 2.2.4.4) shall be showed the worst case of the three orthogonal axes.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.



### 2.2.4.3 Test limit

FCC Part 15, Subpart C, §15.247 (d)

... In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency Range (MHz)	Class B Limit (dB $\mu$ V/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

§15.35(b)

..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dB $\mu$ V/m) = 20 log (Limit ( $\mu$ V/m)/1 $\mu$ V/m)

### 2.2.4.4 Test result

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

The measurement results are obtained as described below:

Result=  $P_{mea} + A_{Rpl}$

The worst case attitude: The mobile lay down.

For GFSK

Channel No.:39

Frequency(MHz)	Result(dBuV/m)	$A_{Rpl}$ (dB)	$P_{mea}$ (dBuV/m)	Polarity
10022.04409	24.24	-5.2	29.44	Vertical
14254.50902	27.71	1.0	26.71	Horizontal
17464.92986	33.06	7.4	25.66	Vertical
17987.97595	35.90	10.6	25.30	Vertical
20044.08818	46.46	19.9	26.56	Vertical
22432.86573	50.30	21.8	28.50	Vertical

For  $\pi/4$ DQPSK  
Channel No.:39

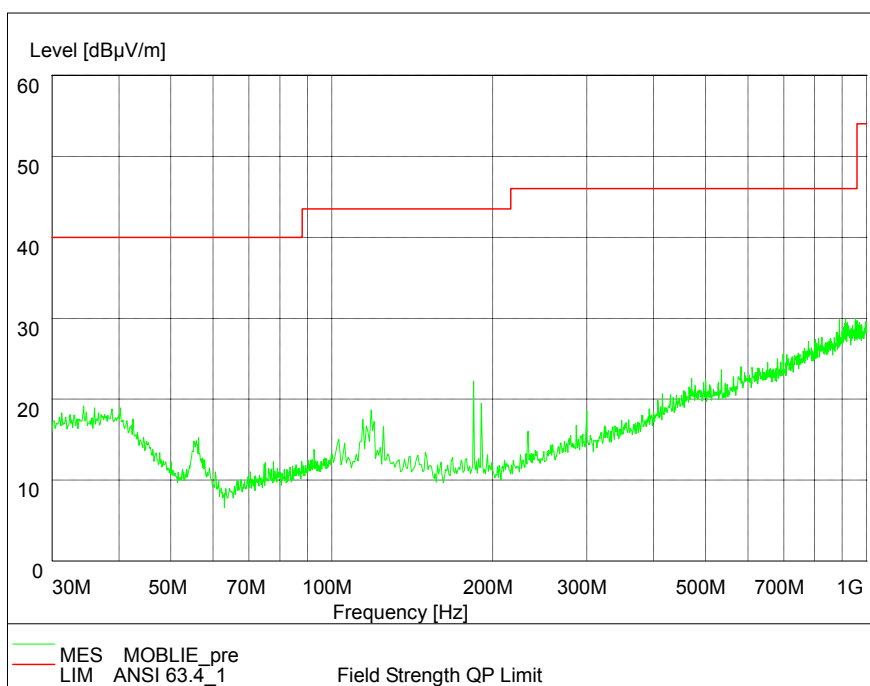
Frequency(MHz)	Result(dBuV/m)	A <sub>Rpl</sub> (dB)	P <sub>mea</sub> (dBuV/m)	Polarity
10022.04409	24.26	-5.2	29.46	Vertical
14254.50902	27.87	1.0	26.87	Vertical
17464.92986	33.01	7.4	25.61	Vertical
17921.84369	35.82	10.5	25.32	Vertical
20709.41884	46.31	21.2	25.11	Horizontal
22432.86573	50.07	21.8	28.27	Vertical

For 8DPSK  
Channel No.:39

Frequency(MHz)	Result(dBuV/m)	A <sub>Rpl</sub> (dB)	P <sub>mea</sub> (dBuV/m)	Polarity
10022.04409	24.15	-5.2	29.35	Vertical
14254.50902	27.74	1.0	26.74	Vertical
17452.90581	33.11	7.4	25.71	Horizontal
17987.97595	35.89	10.6	25.29	Vertical
20709.41884	46.44	21.2	25.24	Vertical
22432.86573	50.19	21.8	28.39	Vertical

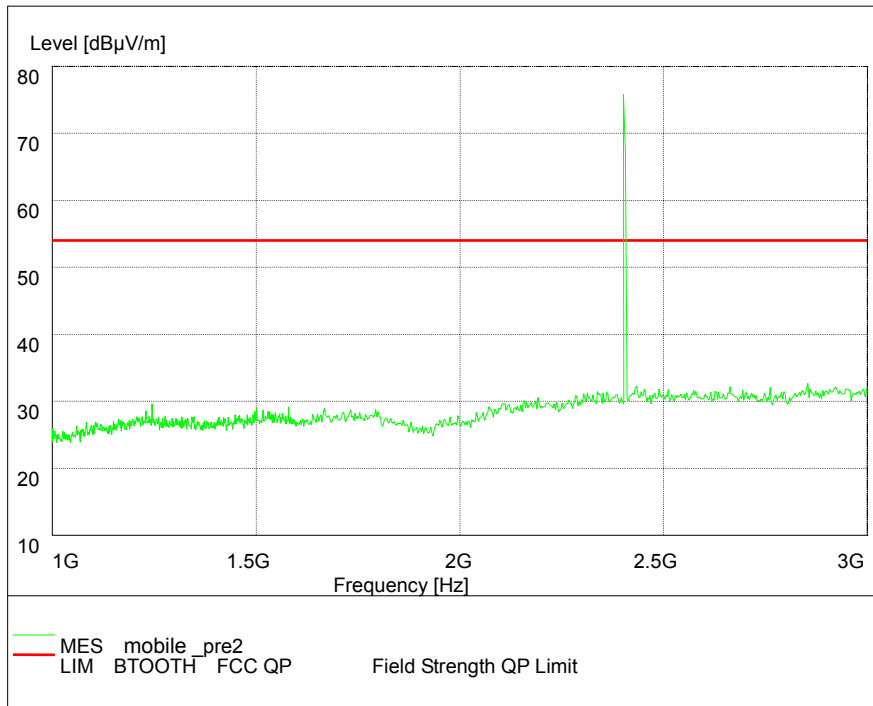
Refer to figures

Carrier frequency (MHz): 2441  
Channel No.:39



Frequency Range :30MHz -1000 MHz  
Modulation type: GFSK

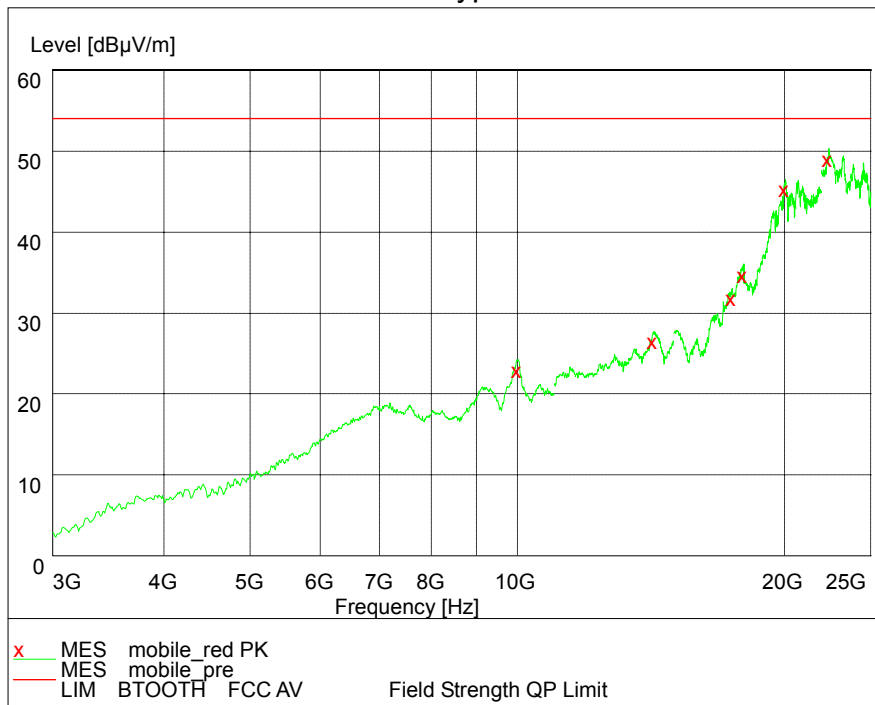




Frequency Range : 1GHz -3GHz

Detector: PK mode

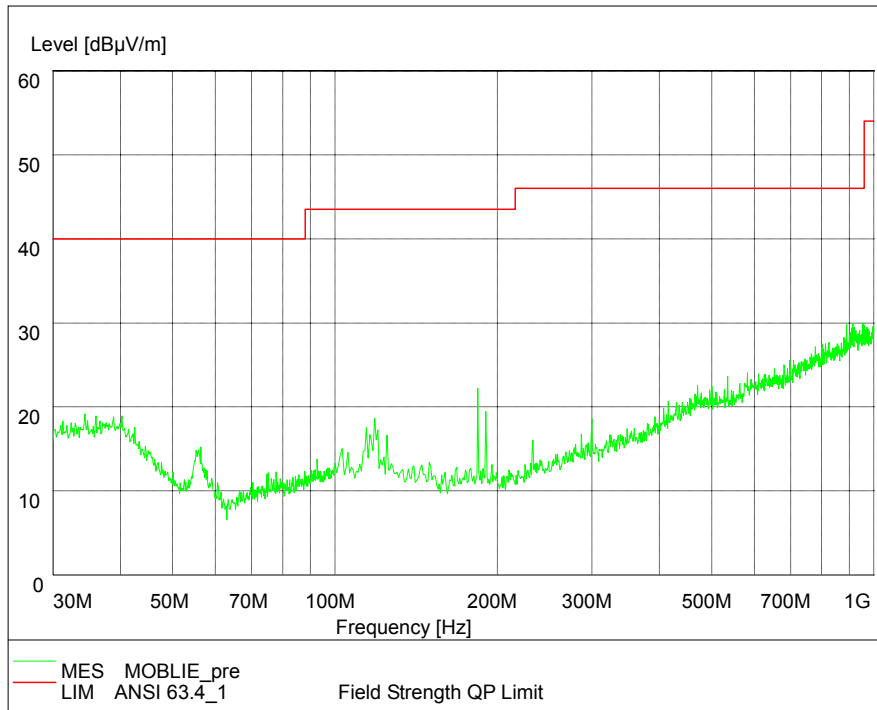
Modulation type: GFSK



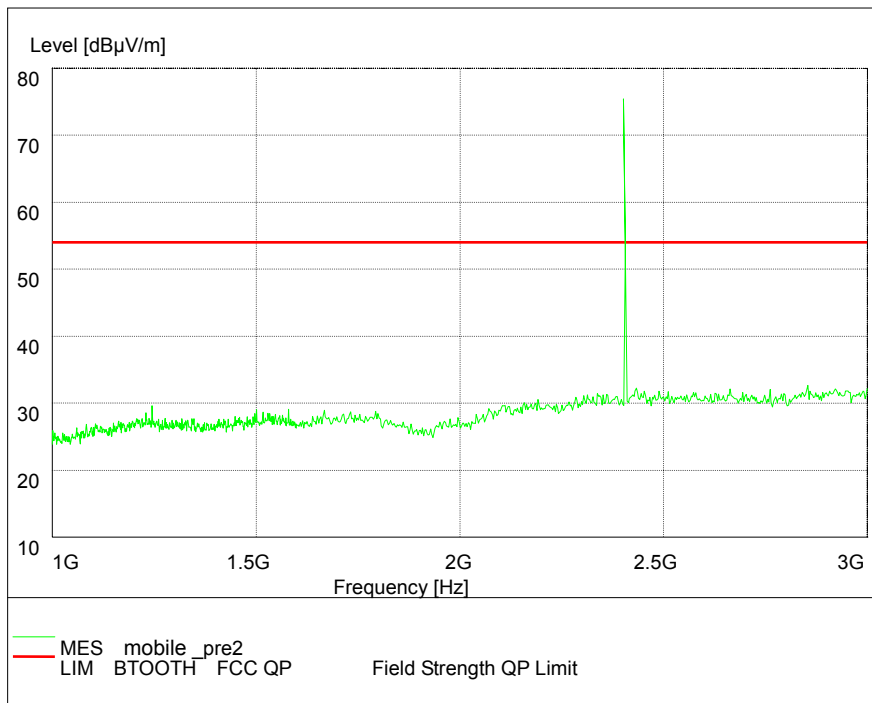
Frequency Range :3GHz-25GHz

Detector: PK mode

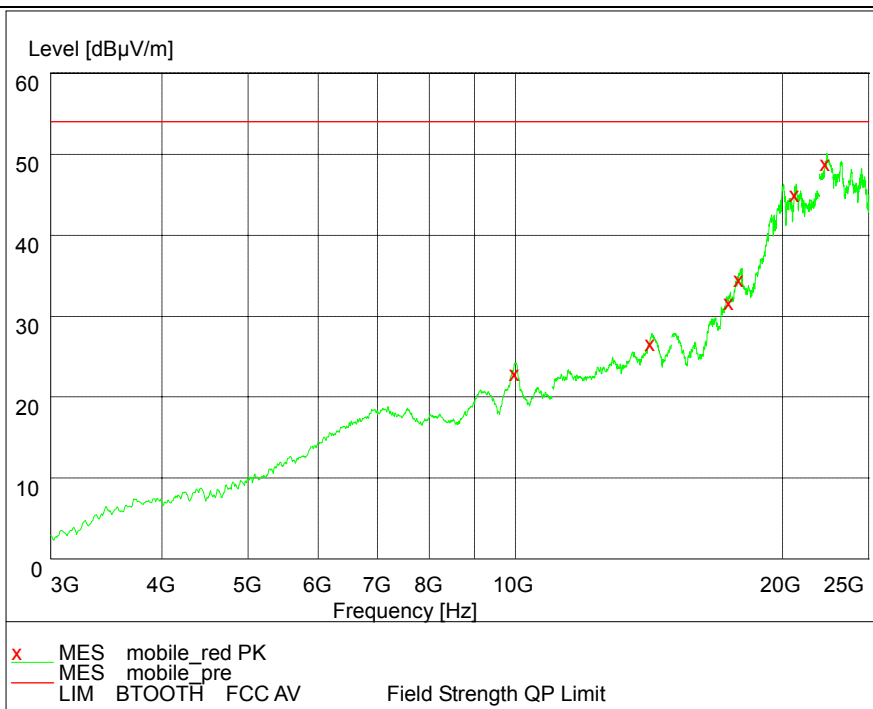
Modulation type: GFSK



Frequency Range :30MHz -1000 MHz  
Modulation type:  $\pi/4$ DQPSK



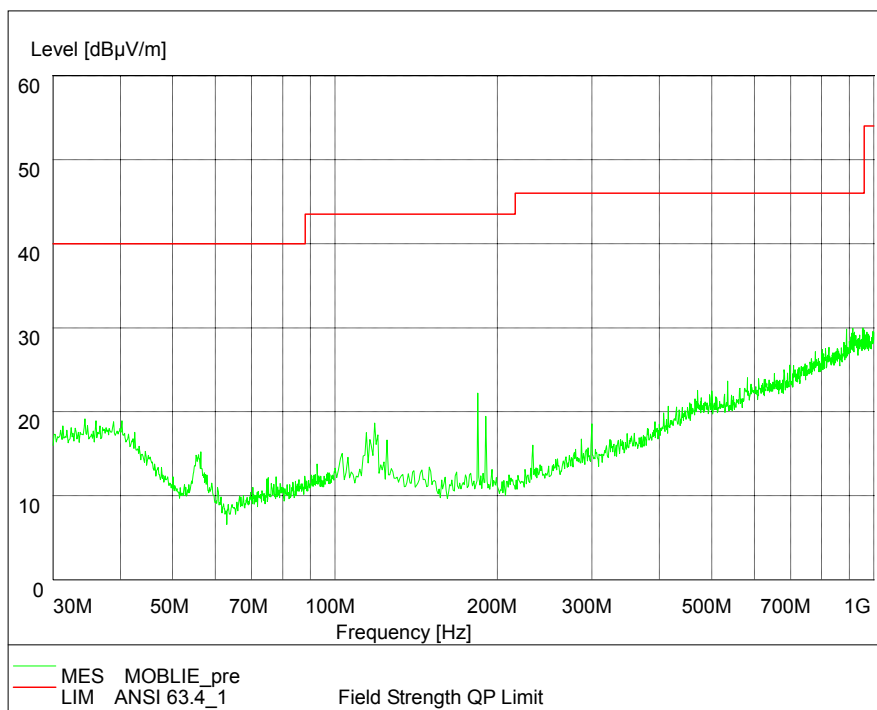
Frequency Range : 1GHz -3GHz  
Detector: PK mode  
Modulation type:  $\pi/4$ DQPSK



Frequency Range : 3GHz - 25GHz

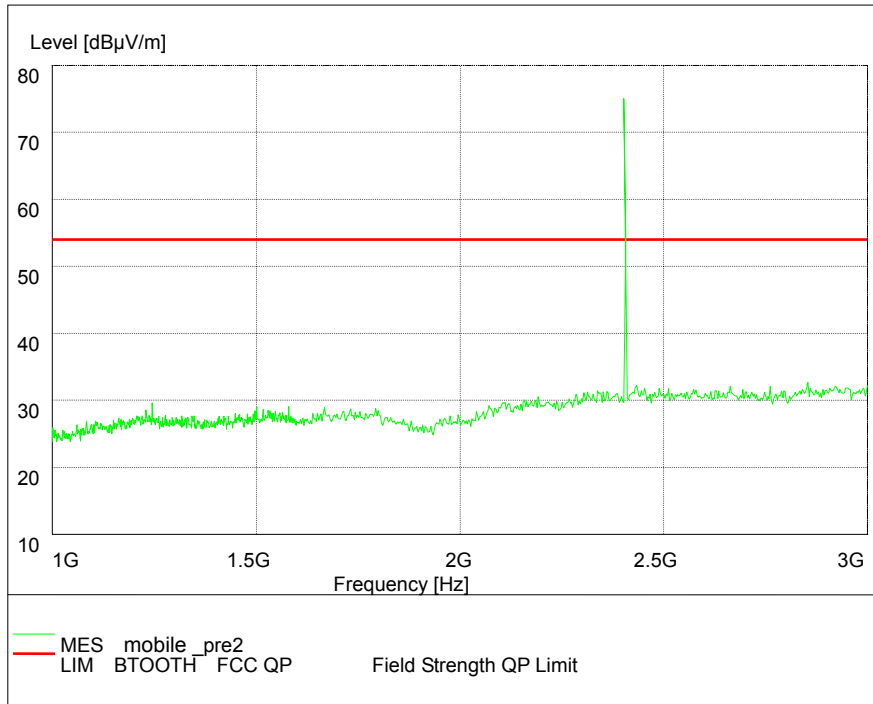
Detector: PK mode

Modulation type:  $\pi/4$ DQPSK



Frequency Range :30MHz -1000 MHz

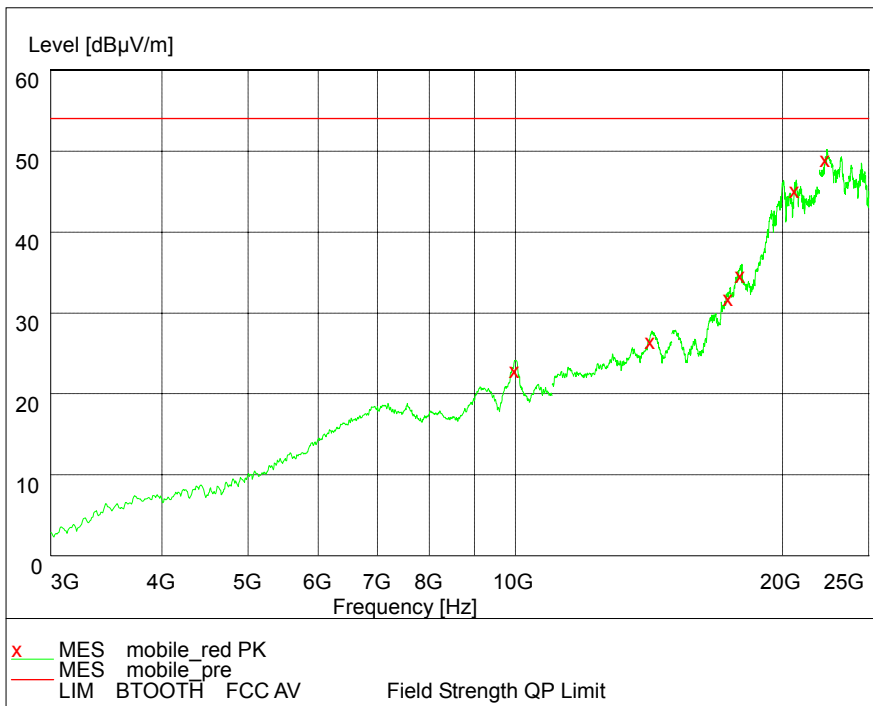
Modulation type: 8DPSK



Frequency Range : 1GHz -3GHz

Detector: PK mode

Modulation type: 8DPSK



Frequency Range : 3GHz -25GHz

Detector: PK mode

Modulation type: 8DPSK

## 2.2.5 Band edge compliance-§15.247(d)

### 2.2.5.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

### 2.2.5.2 Test Description

The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

#### 2.2.5.2.1 RF Conducted Measurement:

The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

For the first measurement the EUT is set to transmit on the lowest channel (2402 MHz). The lower band edge is 2400 MHz.

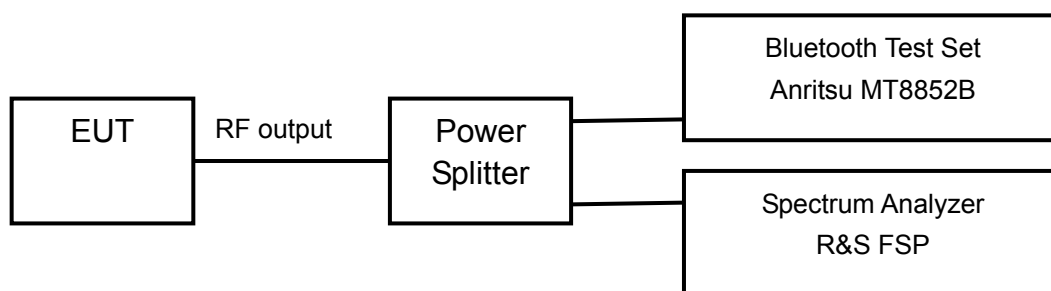
Analyzer settings:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz

For the second measurement the EUT is set to transmit on the highest channel (2480MHz). The higher band edge is 2483.5 MHz.

Analyzer settings:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz



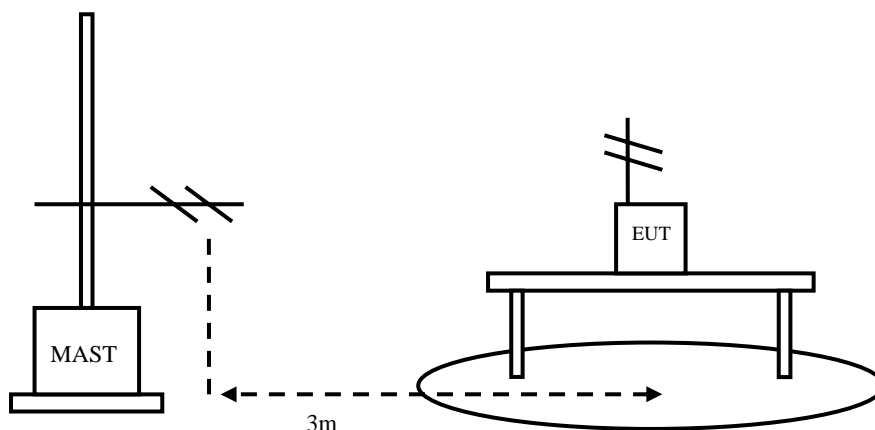
### 2.2.5.2.2 RF Radiated Measurement

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The radiated emissions measurements were made in a typical installation configuration.

During the test, the antenna height and EUT azimuth were varied in order to identify the maximum level of emission from the EUT. The height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.



### 2.2.5.3 Test limit

FCC Part 15.247 (d)

“In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

## 2.2.5.4 Test result

### RF Conducted Measurement

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: GFSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2400	Hopping OFF	-45.41	6.68	-13.32	32.09
2400	Hopping ON	-53.10	6.43	-13.57	39.53

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type: GFSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2483.5	Hopping OFF	-48.27	6.02	-13.98	34.29
2483.5	Hopping ON	-55.58	6.18	-13.82	41.76

### RF Radiated Measurement

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: GFSK

Frequency MHz	Hopping Mode	Correction Factor dB/m	Reading Level dBuV	Emission Level dBuV/m	Detector
2402	Hopping OFF	2.7	73.67	76.37	Peak
2402	Hopping ON	2.7	73.04	75.74	Peak

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type: GFSK

Frequency MHz	Hopping Mode	Correction Factor dB/m	Reading Level dBuV	Emission Level dBuV/m	Detector
2480	Hopping OFF	2.5	74.06	76.56	Peak
2480	Hopping ON	2.5	73.39	75.89	Peak

### Band Edge Test Data

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: GFSK

Frequency MHz	Hopping Mode	Fundamental (dBuV/m)	Delta dB	Band Edge Field Strength (dBuV/m)	Detector
2400	Hopping OFF	76.37	32.09	44.28	Peak
2400	Hopping ON	75.74	39.53	36.21	Peak

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type: GFSK

Frequency MHz	Hopping Mode	Fundamental (dBuV/m)	Delta dB	Band Edge Field Strength (dBuV/m)	Detector
2483.5	Hopping OFF	76.56	34.29	44.67	Peak
2483.5	Hopping ON	75.89	41.76	31.87	Peak

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge

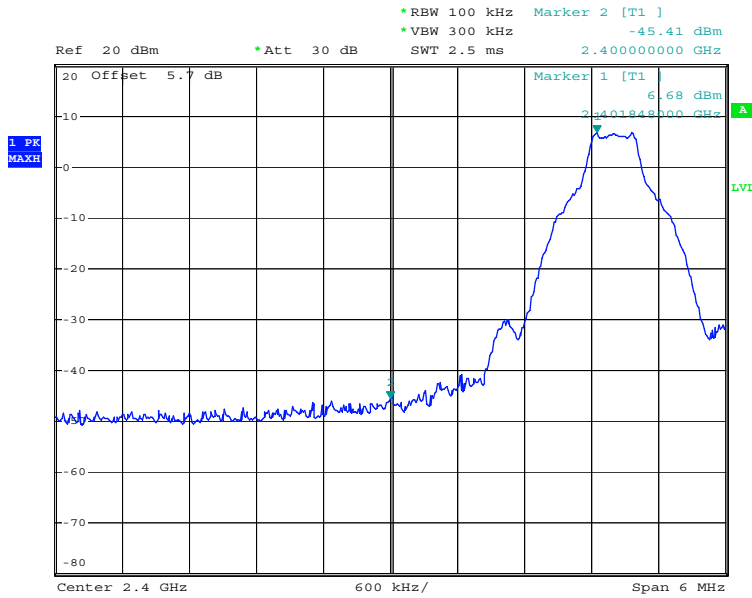
measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Delta

F = Fundamental field Strength (Peak or Average)

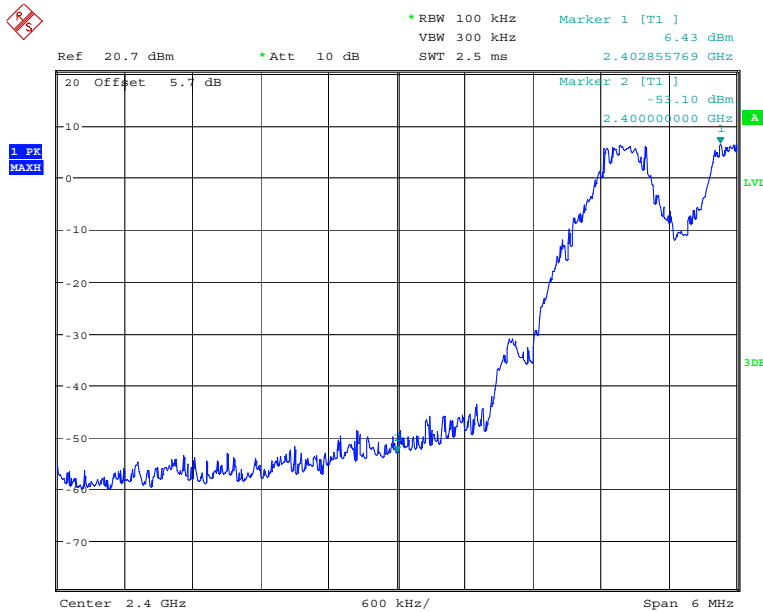
Delta= Conducted Band Edge Delta (Peak or Average)





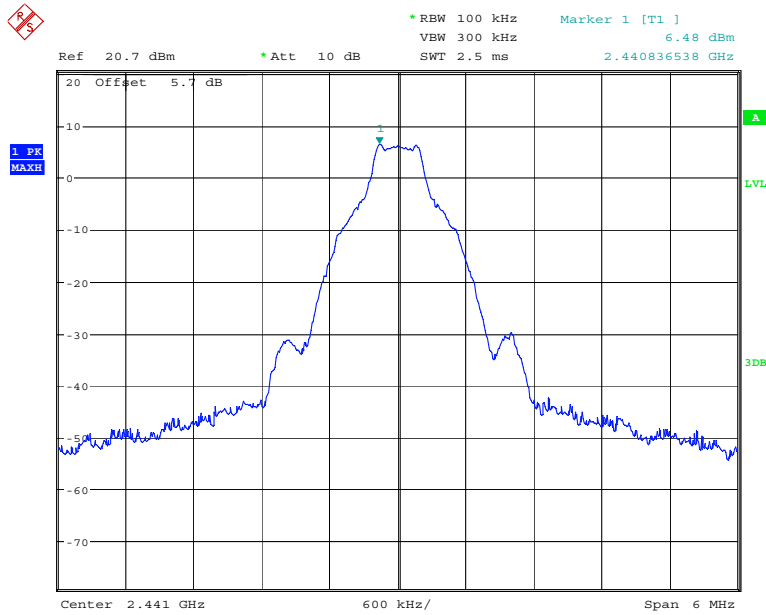
Date: 21.APR.2011 17:00:46

Carrier frequency (MHz): 2402  
Channel No.:0, Hopping OFF  
Modulation type: GFSK



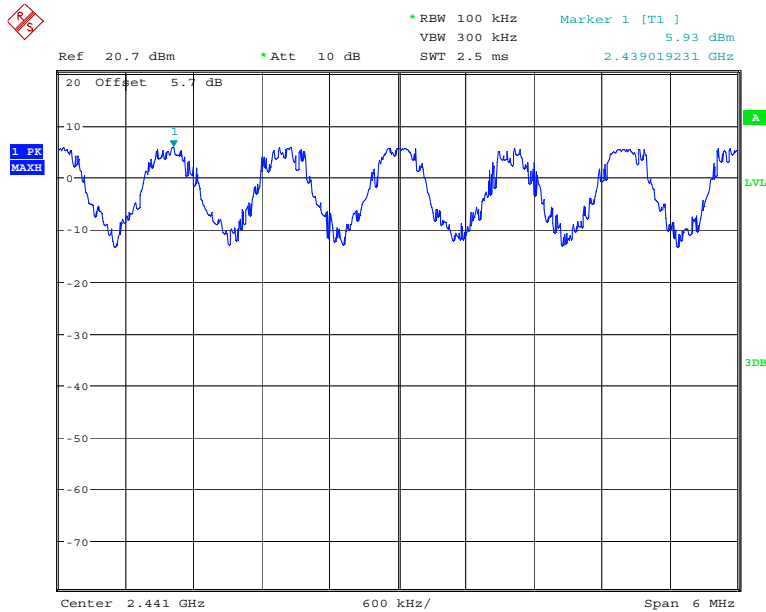
Date: 23.APR.2011 12:48:21

Carrier frequency (MHz): 2402  
Channel No.:0, Hopping ON  
Modulation type: GFSK



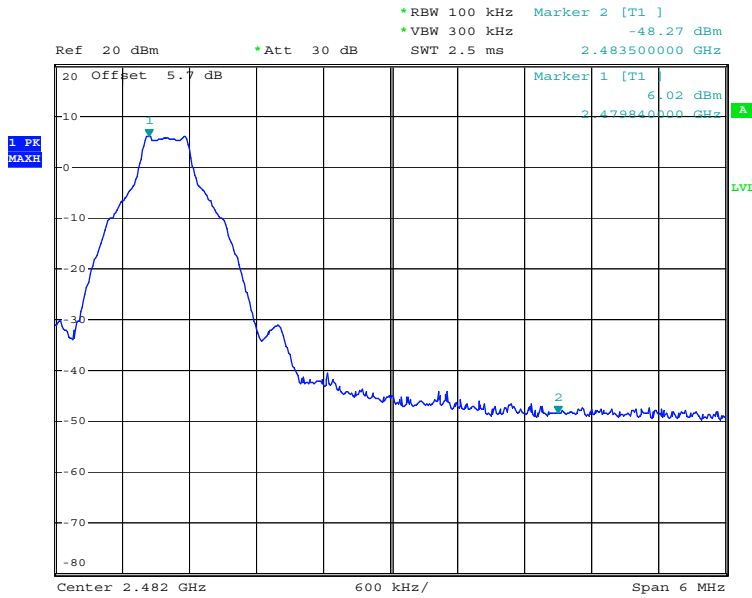
Date: 23.APR.2011 12:45:44

Carrier frequency (MHz): 2441  
Channel No.:39, Hopping OFF  
Modulation type: GFSK



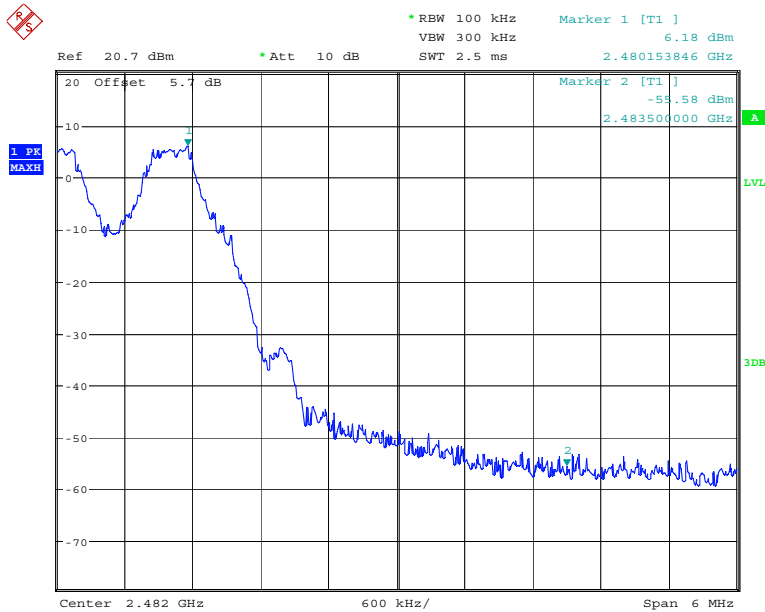
Date: 23.APR.2011 12:48:58

Carrier frequency (MHz): 2441  
Channel No.:39, Hopping ON  
Modulation type: GFSK



Date: 21.APR.2011 17:04:25

Carrier frequency (MHz): 2480  
Channel No.:78, Hopping OFF  
Modulation type: GFSK



Date: 23.APR.2011 12:50:11

Carrier frequency (MHz): 2480  
Channel No.:78, Hopping ON  
Modulation type: GFSK

### RF Conducted Measurement

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2400	Hopping OFF	-48.83	5.23	-14.77	34.06
2400	Hopping ON	-49.41	4.36	-15.64	33.77

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2483.5	Hopping OFF	-50.18	3.93	-16.07	34.11
2483.5	Hopping ON	-56.22	4.92	-15.08	41.14

### RF Radiated Measurement

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Hopping Mode	Correction Factor dB/m	Reading Level dBuV	Emission Level dBuV/m	Detector
2402	Hopping OFF	2.7	73.53	76.23	Peak
2402	Hopping ON	2.7	72.64	75.34	Peak

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Hopping Mode	Correction Factor dB/m	Reading Level dBuV	Emission Level dBuV/m	Detector
2480	Hopping OFF	2.5	73.63	76.13	Peak
2480	Hopping ON	2.5	72.92	75.42	Peak

## Band Edge Test Data

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Hopping Mode	Fundamental (dBuV/m)	Delta dB	Band Edge Field Strength (dBuV/m)	Detector
2400	Hopping OFF	76.23	34.06	42.17	Peak
2400	Hopping ON	75.34	33.77	41.57	Peak

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type:  $\pi/4$ DQPSK

Frequency MHz	Hopping Mode	Fundamental (dBuV/m)	Delta dB	Band Edge Field Strength (dBuV/m)	Detector
2483.5	Hopping OFF	76.13	34.11	42.02	Peak
2483.5	Hopping ON	75.42	41.14	34.28	Peak

**Note:**

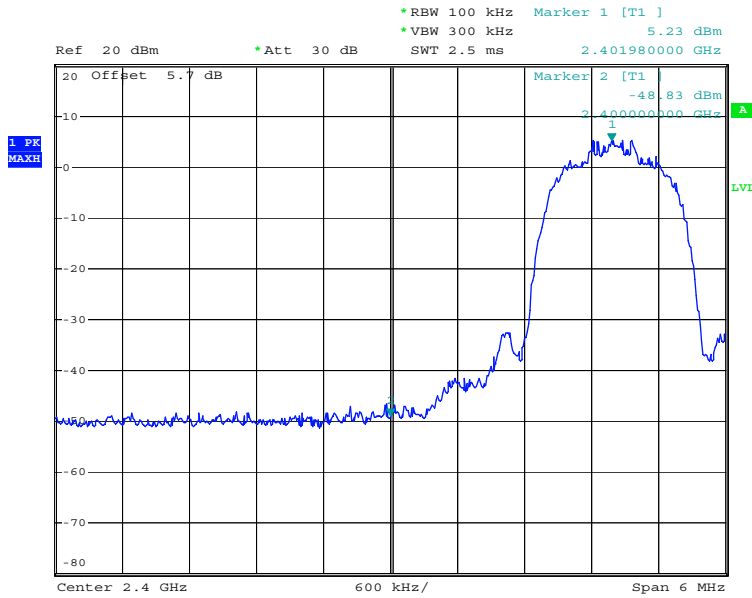
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge

measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Delta

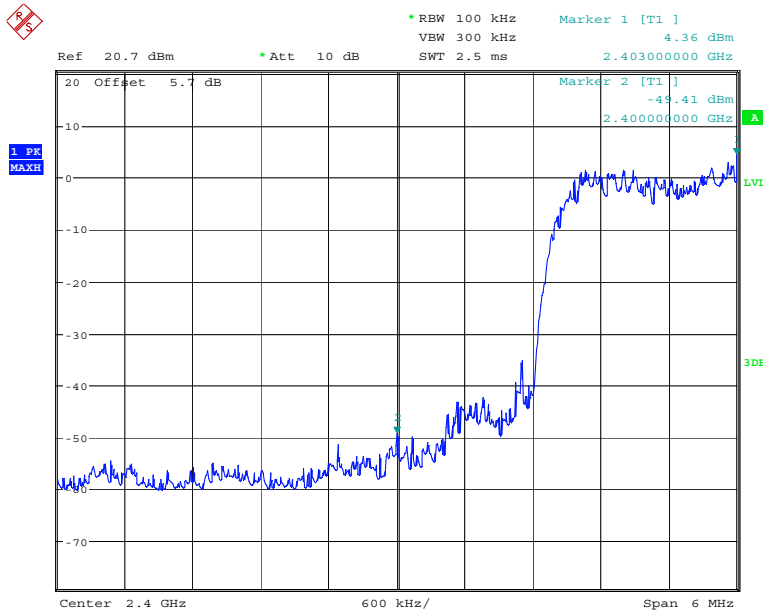
F = Fundamental field Strength (Peak or Average)

Delta= Conducted Band Edge Delta (Peak or Average)



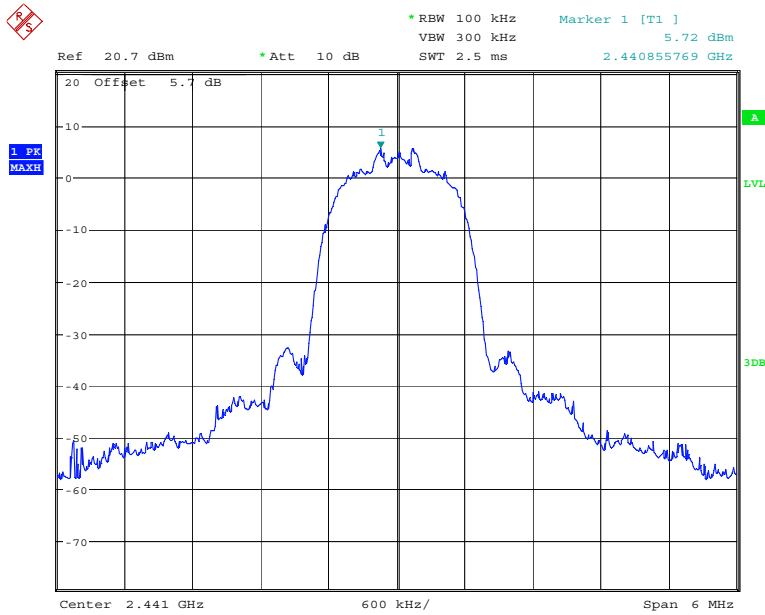
Date: 21.APR.2011 17:05:37

Carrier frequency (MHz): 2402  
Channel No.:0, Hopping OFF  
Modulation type:  $\pi/4$ DQPSK



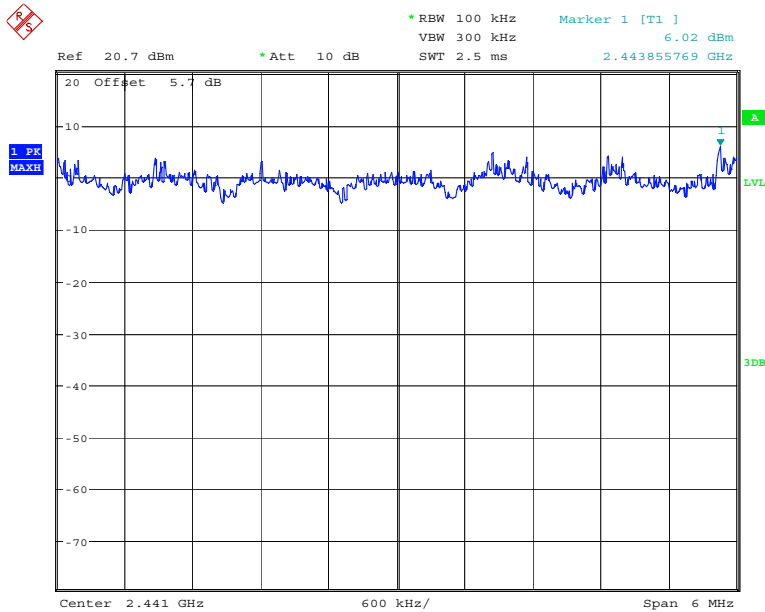
Date: 23.APR.2011 12:51:35

Carrier frequency (MHz): 2402  
Channel No.:0, Hopping ON  
Modulation type:  $\pi/4$ DQPSK



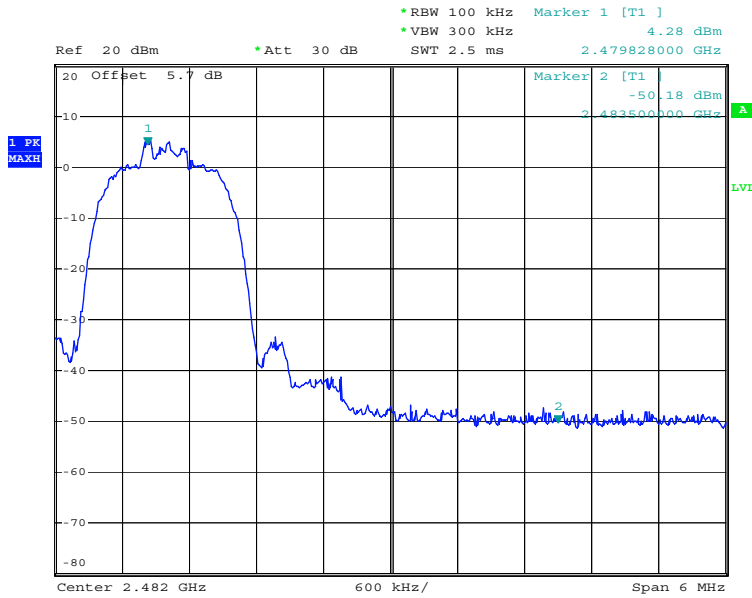
Date: 23.APR.2011 12:46:53

Carrier frequency (MHz): 2441  
Channel No.:39, Hopping OFF  
Modulation type:  $\pi/4$ DQPSK



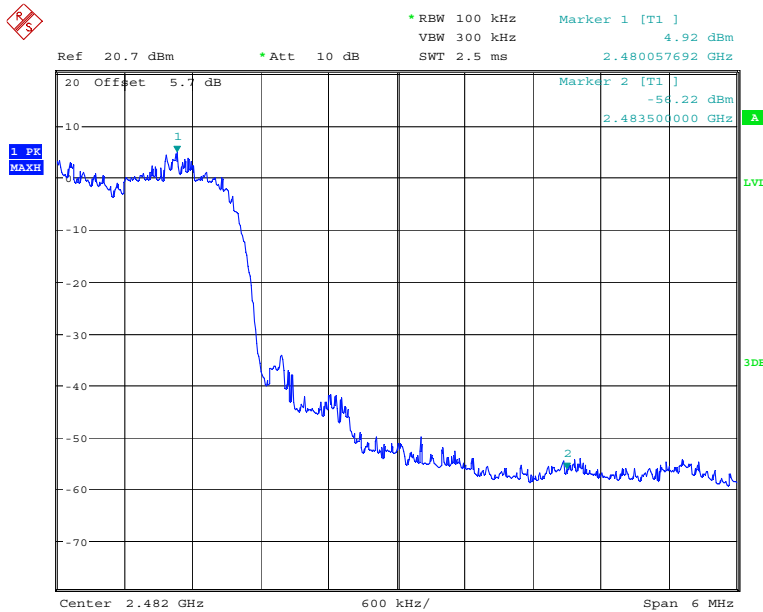
Date: 23.APR.2011 12:53:39

Carrier frequency (MHz): 2441  
Channel No.:39, Hopping ON  
Modulation type:  $\pi/4$ DQPSK



Date: 21.APR.2011 17:05:04

Carrier frequency (MHz): 2480  
Channel No.:78, Hopping OFF  
Modulation type:  $\pi/4$ DQPSK



Date: 23.APR.2011 12:59:41

Carrier frequency (MHz): 2480  
Channel No.:78, Hopping ON  
Modulation type:  $\pi/4$ DQPSK



### RF Conducted Measurement

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2400	Hopping OFF	-48.08	4.80	-15.20	32.88
2400	Hopping ON	-53.27	4.67	-15.33	37.94

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2483.5	Hopping OFF	-49.05	4.99	-15.01	34.04
2483.5	Hopping ON	-56.06	5.26	-14.74	41.32

### RF Radiated Measurement

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Correction Factor dB/m	Reading Level dBuV	Emission Level dBuV/m	Detector
2402	Hopping OFF	2.7	73.67	76.37	Peak
2402	Hopping ON	2.7	73.17	75.87	Peak

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Correction Factor dB/m	Reading Level dBuV	Emission Level dBuV/m	Detector
2480	Hopping OFF	2.5	74.02	76.52	Peak
2480	Hopping ON	2.5	73.24	75.74	Peak

### Band Edge Test Data

Carrier frequency (MHz): 2402

Channel No.:0

Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Fundamental (dBuV/m)	Delta dB	Band Edge Field Strength (dBuV/m)	Detector
2400	Hopping OFF	76.37	32.88	43.49	Peak
2400	Hopping ON	75.87	37.94	37.93	Peak

Carrier frequency (MHz): 2480

Channel No.:78

Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Fundamental (dBuV/m)	Delta dB	Band Edge Field Strength (dBuV/m)	Detector
2483.5	Hopping OFF	76.52	34.04	42.48	Peak
2483.5	Hopping ON	75.74	41.32	34.42	Peak

Note:

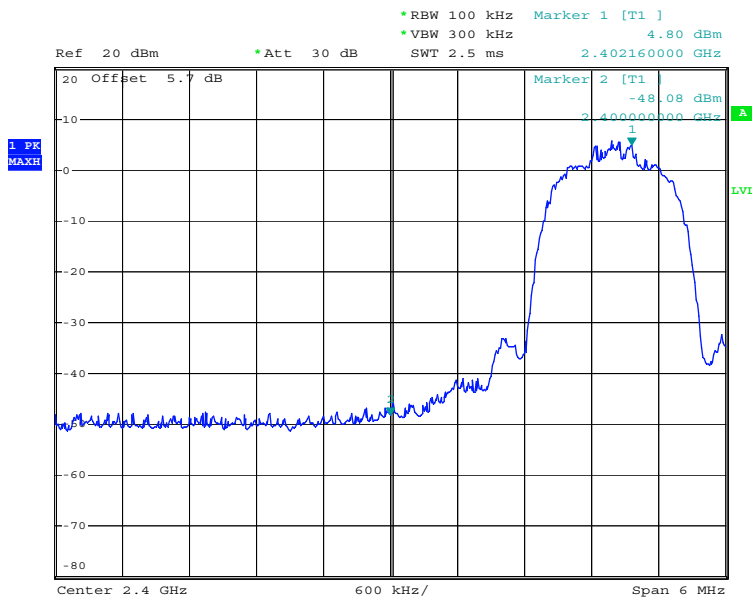
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge

measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Delta

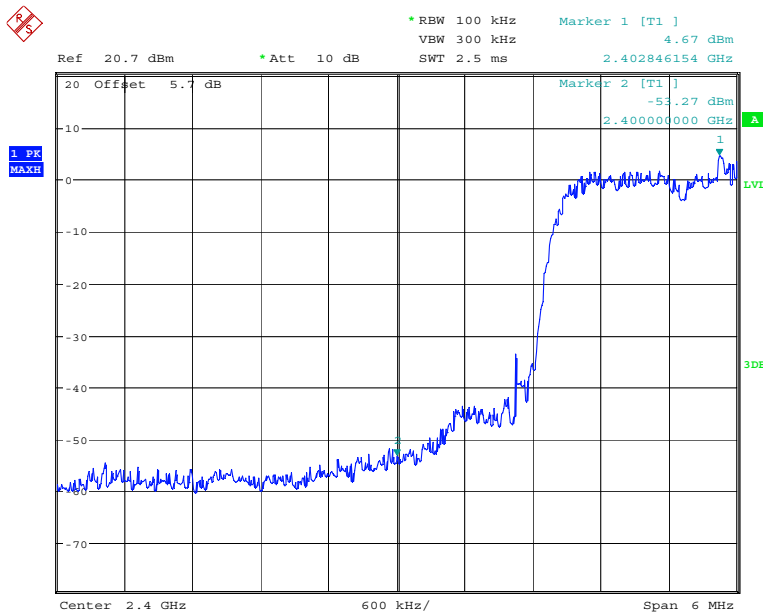
F = Fundamental field Strength (Peak or Average)

Delta= Conducted Band Edge Delta (Peak or Average)



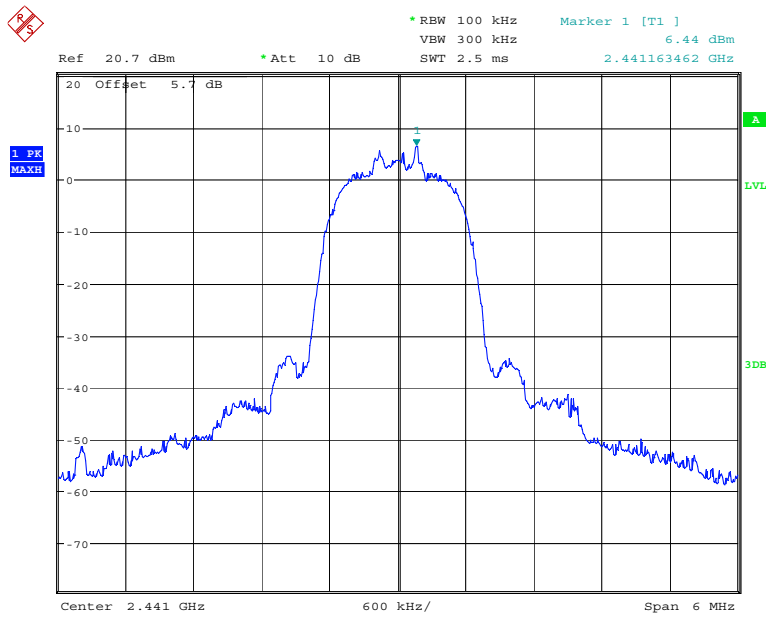
Date: 21.APR.2011 17:08:44

Carrier frequency (MHz): 2402  
Channel No.:0, Hopping OFF  
Modulation type: 8DPSK



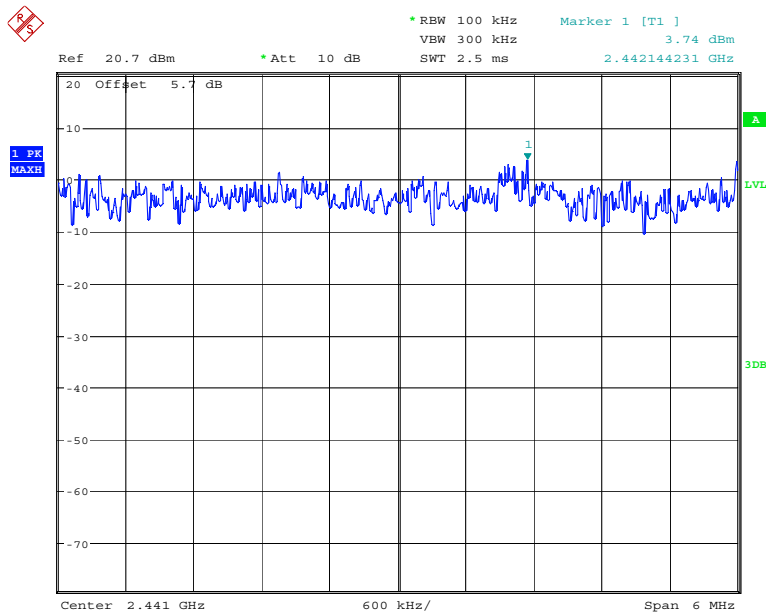
Date: 23.APR.2011 13:01:28

Carrier frequency (MHz): 2402  
Channel No.:0, Hopping ON  
Modulation type: 8DPSK



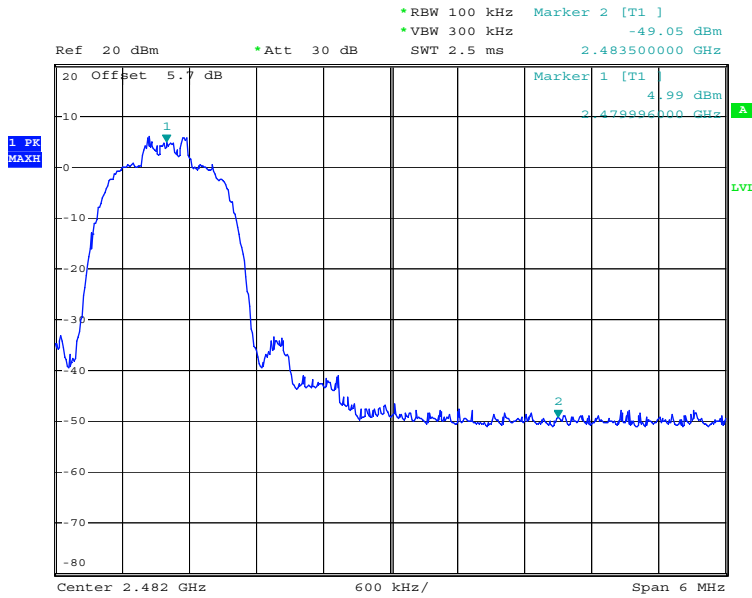
Date: 23.APR.2011 12:47:22

Carrier frequency (MHz): 2441  
Channel No.:39, Hopping OFF  
Modulation type: 8DPSK



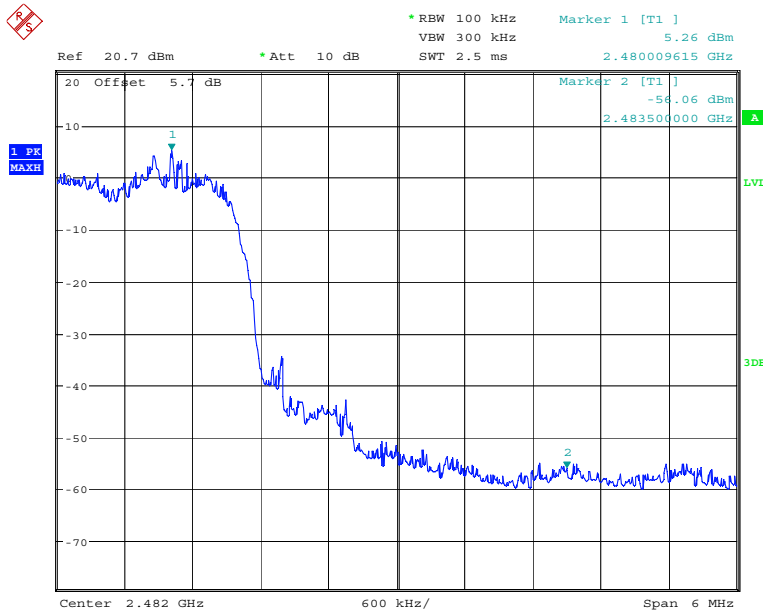
Date: 23.APR.2011 13:01:49

Carrier frequency (MHz): 2441  
Channel No.:39, Hopping ON  
Modulation type: 8DPSK



Date: 21.APR.2011 17:09:20

Carrier frequency (MHz): 2480  
Channel No.:78, Hopping OFF  
Modulation type: 8DPSK



Date: 23.APR.2011 13:03:53

Carrier frequency (MHz): 2480  
Channel No.:78, Hopping ON  
Modulation type: 8DPSK

## 2.2.6 Dwell time-§15.247(a) (1)(iii)

### 2.2.6.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

### 2.2.6.2 Test Description

The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

The Equipment Under Test (EUT) was set up in a shielded room to perform the dwell time measurements.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

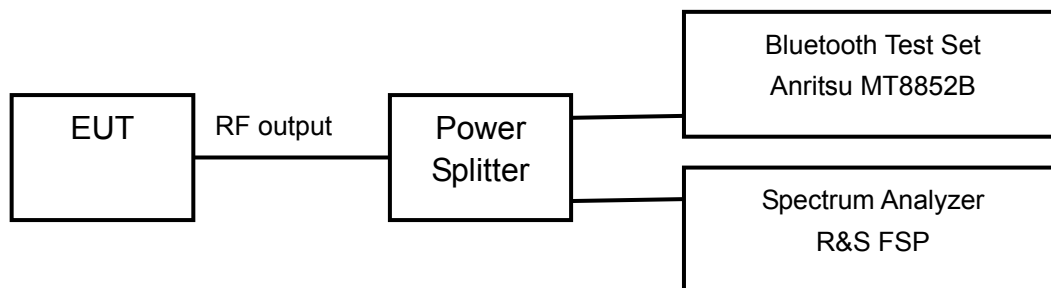
The time slot length is measured of three different packet types which are available in the Bluetooth technology. Those are DH1, DH3 and DH5 packets.

The dwell time is calculated by:

Dwell time = time slot length \* hop rate \* 31.6/ number of hopping channels

with:

- hop rate=1600 \* 1/s for DH1 packets =1600
- hop rate=1600/3 \* 1/s for DH3 packets =533.33
- hop rate=1600/5 \* 1/s for DH5 packets =320
- number of hopping channels=79
- 31.6 s=0.4 seconds multiplied by the number of hopping channels=0.4s \* 79



### 2.2.6.3 Test limit

FCC Part 15, Subpart C, §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

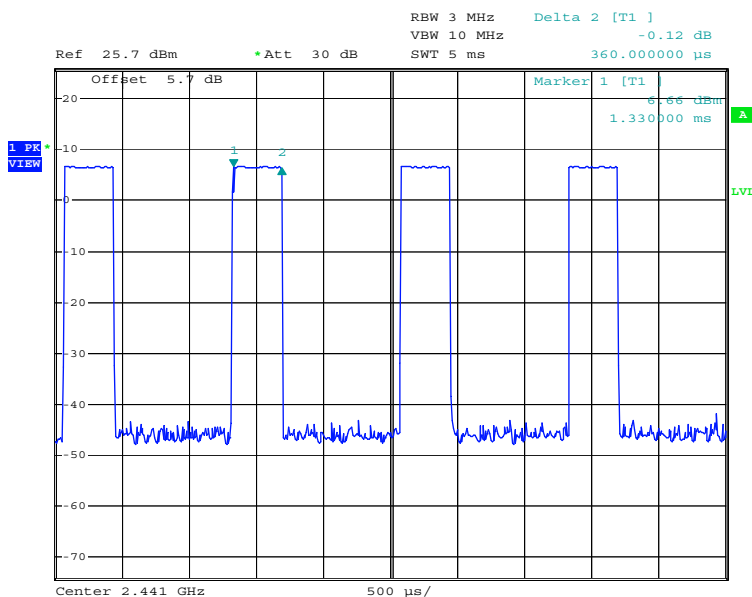
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Since the Bluetooth technology uses 79 channels this period is calculated to be 31.6 seconds.

### 2.2.6.4 Test result

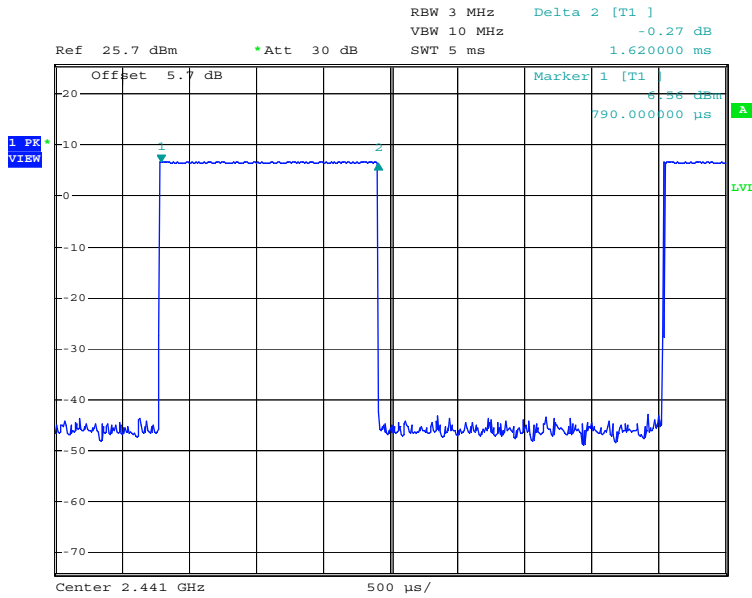
Modulation type: GFSK

Packet type	Time slot length ms	Dwell time	Dwell time ms
DH1	0.3600	time slot length * 1600* 31.6 /79	230.40
DH3	1.6200	time slot length * 31.6 *1600/3 /79	345.60
DH5	2.8800	time slot length * 31.6 *1600/5 /79	368.64



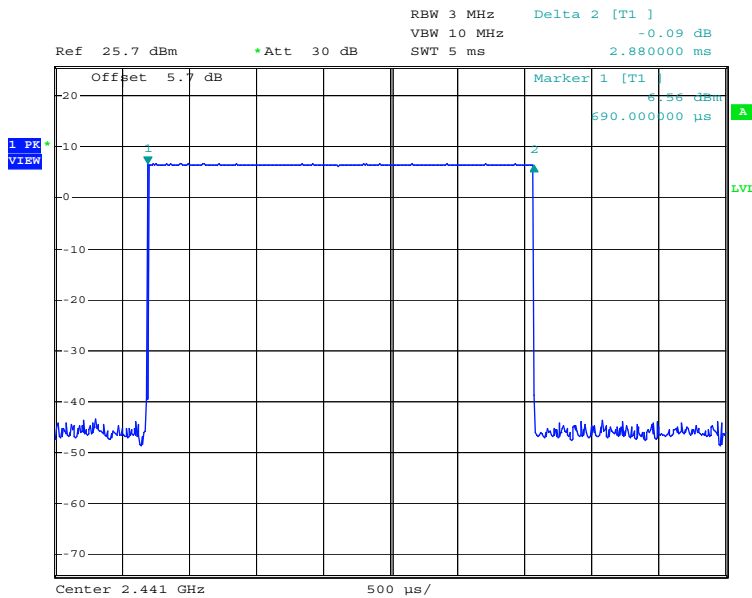
Date: 21.APR.2011 17:15:22

Carrier frequency (MHz): 2441  
Packet type: DH1  
Modulation type: GFSK



Date: 21.APR.2011 17:16:04

Carrier frequency (MHz): 2441  
Packet type: DH3  
Modulation type: GFSK



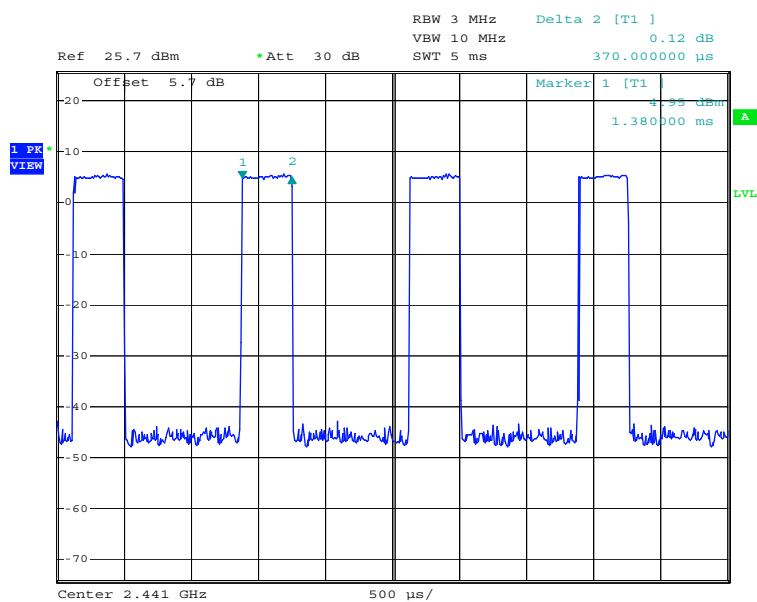
Date: 21.APR.2011 17:16:35

Carrier frequency (MHz): 2441  
Packet type: DH5  
Modulation type: GFSK



Modulation type:  $\pi/4$ DQPSK

Packet type	Time slot length ms	Dwell time	Dwell time ms
DH1	0.3700	time slot length * 1600* 31.6 /79	236.80
DH3	1.6200	time slot length * 31.6 *1600/3 /79	345.60
DH5	2.8700	time slot length * 31.6 *1600/5 /79	367.36

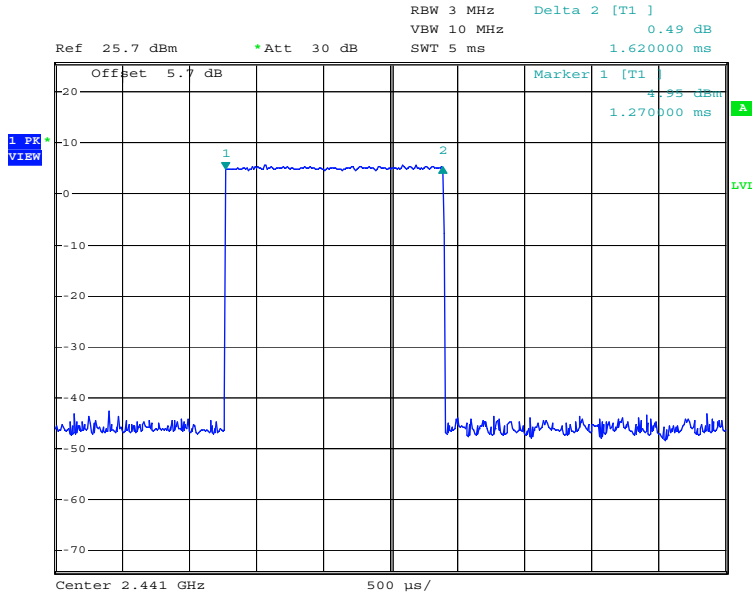


Date: 21.APR.2011 17:17:28

Carrier frequency (MHz): 2441

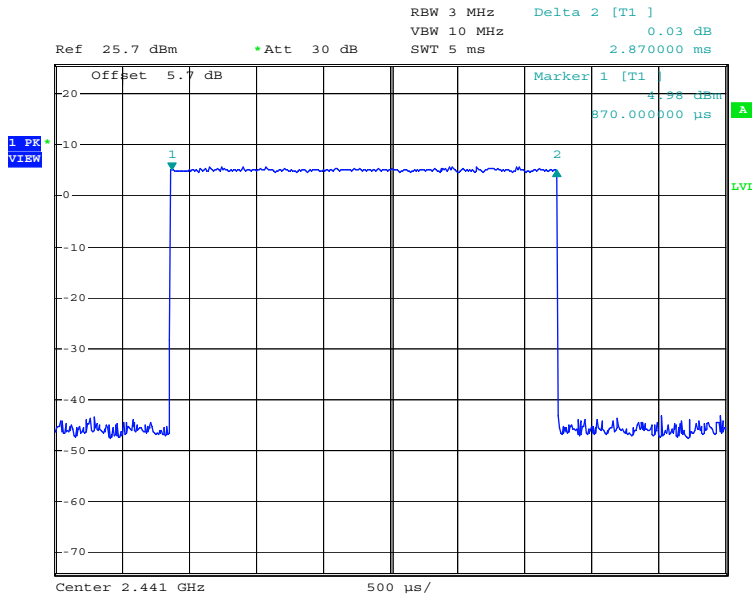
Packet type: DH1

Modulation type:  $\pi/4$ DQPSK



Date: 21.APR.2011 17:18:06

Carrier frequency (MHz): 2441  
Packet type: DH3  
Modulation type:  $\pi/4$ DQPSK

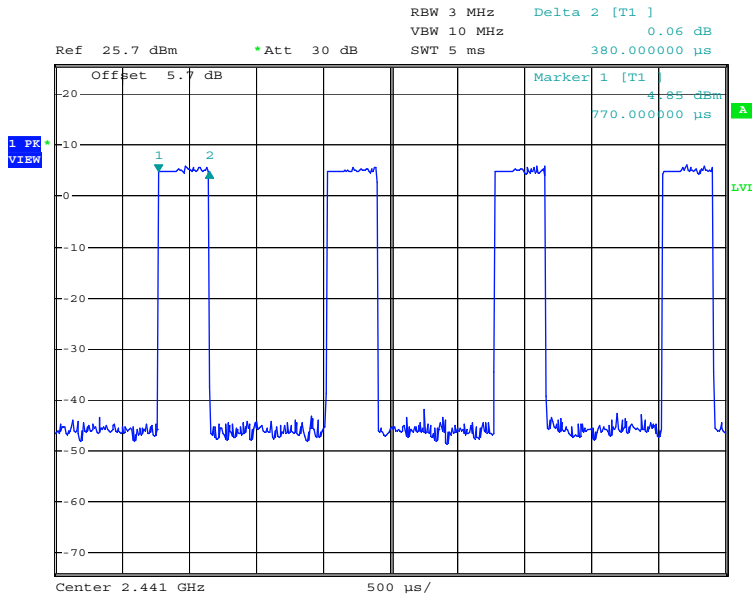


Date: 21.APR.2011 17:18:56

Carrier frequency (MHz): 2441  
Packet type: DH5  
Modulation type:  $\pi/4$ DQPSK

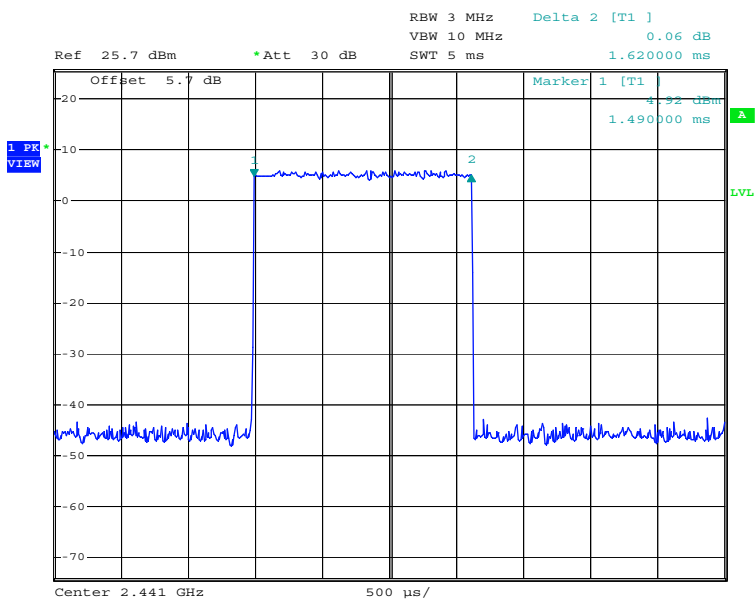
Modulation type: 8DPSK

Packet type	Time slot length ms	Dwell time	Dwell time ms
DH1	0.3800	time slot length * 1600* 31.6 /79	243.20
DH3	1.6200	time slot length * 31.6 *1600/3 /79	345.60
DH5	2.8800	time slot length * 31.6 *1600/5 /79	368.64



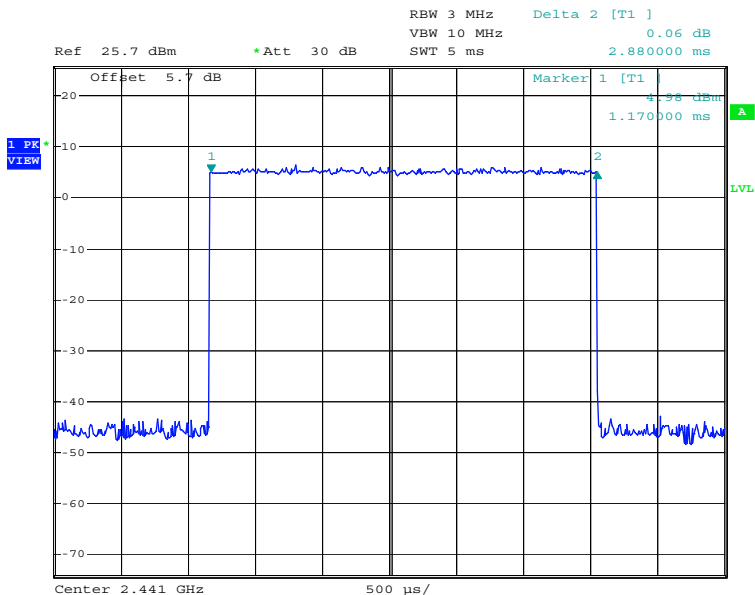
Date: 21.APR.2011 17:19:33

Carrier frequency (MHz): 2441  
Packet type:DH1  
Modulation type: 8DPSK



Date: 21.APR.2011 17:19:58

Carrier frequency (MHz): 2441  
Packet type:DH3  
Modulation type: 8DPSK



Date: 21.APR.2011 17:20:25

Carrier frequency (MHz): 2441  
Packet type:DH5  
Modulation type: 8DPSK

## 2.2.7 Channel separation-§15.247(a) (1)

### 2.2.7.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

### 2.2.7.2 Test Description

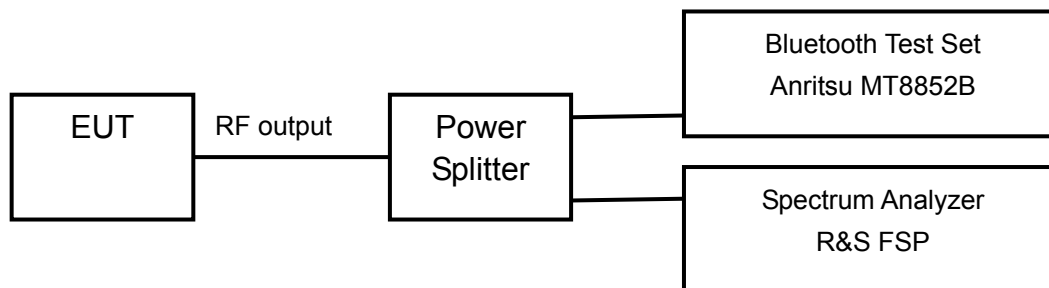
The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

The Equipment Under Test (EUT) was set up in a shielded room to perform the channel separation measurements.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

Analyzer settings:

- Detector: Peak-Maxhold
- Span: 3 MHz
- Centre Frequency: 2441 MHz
- Resolution Bandwidth (RBW): 30 kHz
- Video Bandwidth (VBW): 100 kHz
- Sweep Time: Coupled



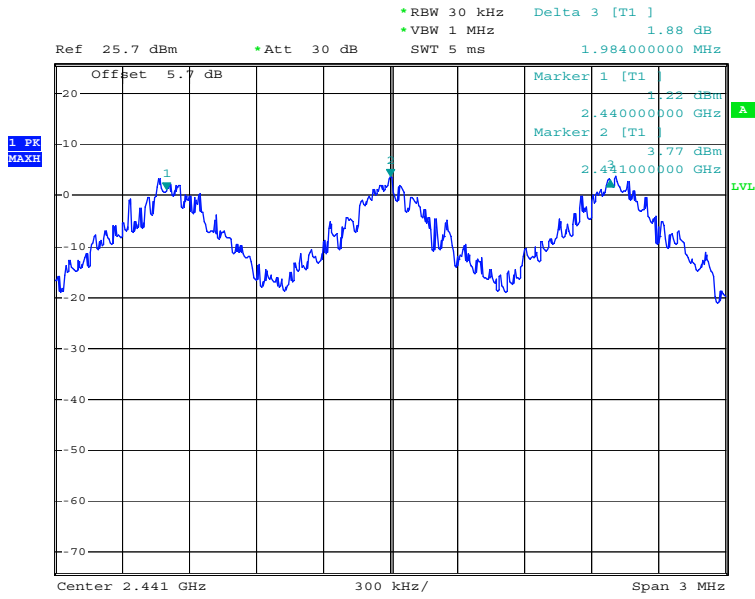
### 2.2.7.3 Test limit

FCC Part 15, Subpart C, §15.247 (a) (1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### 2.2.7.4 Test result

Carrier frequency MHz	Channel No.	Op-mode	Channel separation MHz
2441	39	Hopping mode	1



Date: 21.APR.2011 17:22:26

Carrier frequency (MHz): 2441  
 Op-mode: Hopping mode

## 2.2.8 Number of hopping frequencies-§15.247(a) (iii)

### 2.2.8.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

### 2.2.8.2 Test Description

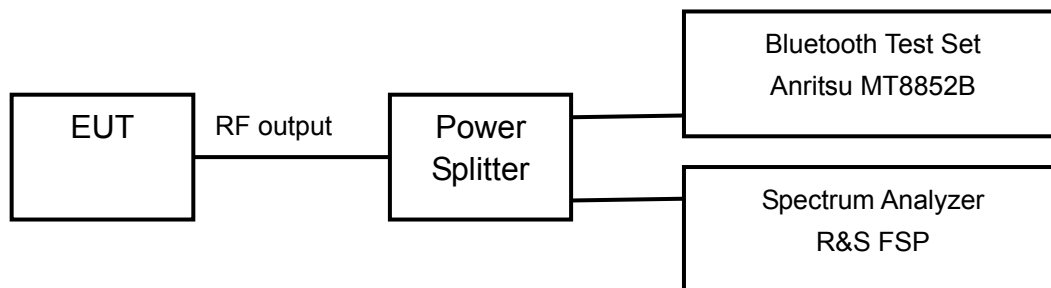
The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009.

The Equipment Under Test (EUT) was set up in a shielded room to perform the number of hopping frequencies measurement.

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

Analyzer settings:

- Detector: Peak-Maxhold
- Start frequency: 2400 MHz
- Stop frequency: 2483.5 MHz
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Sweep Time: Coupled



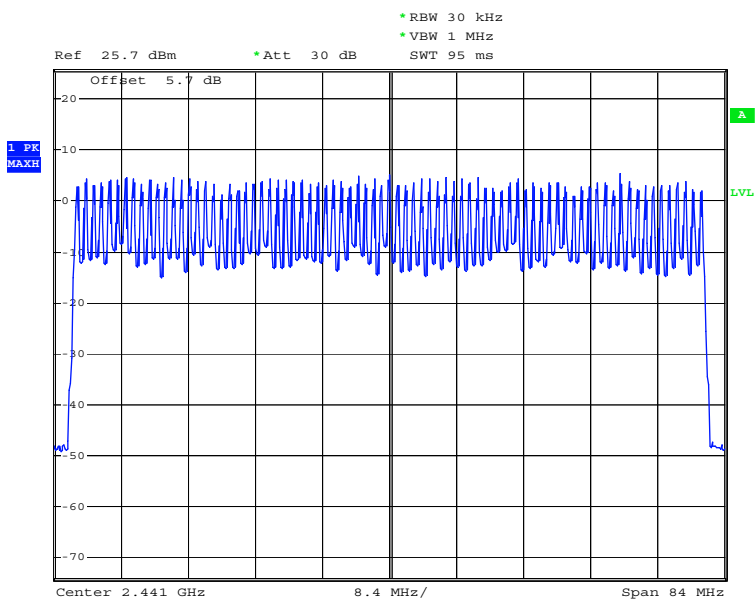
### 2.2.8.3 Test limit

FCC Part 15, Subpart C, §15.247 (a) (iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 2.2.8.4 Test result

Carrier frequency MHz	Channel No.	Op-mode	Result
2441	39	Hopping mode	Pass



Date: 21.APR.2011 17:26:45

Carrier frequency (MHz): 2441  
Op-mode: Hopping mode



## 2.2.9 AC Powerline Conducted Emission-§15.107, §15.207

### 2.2.9.1 Ambient condition

Temperature	Relative humidity	Pressure
20°C	35%	101.4kPa

### 2.2.9.2 Test limit

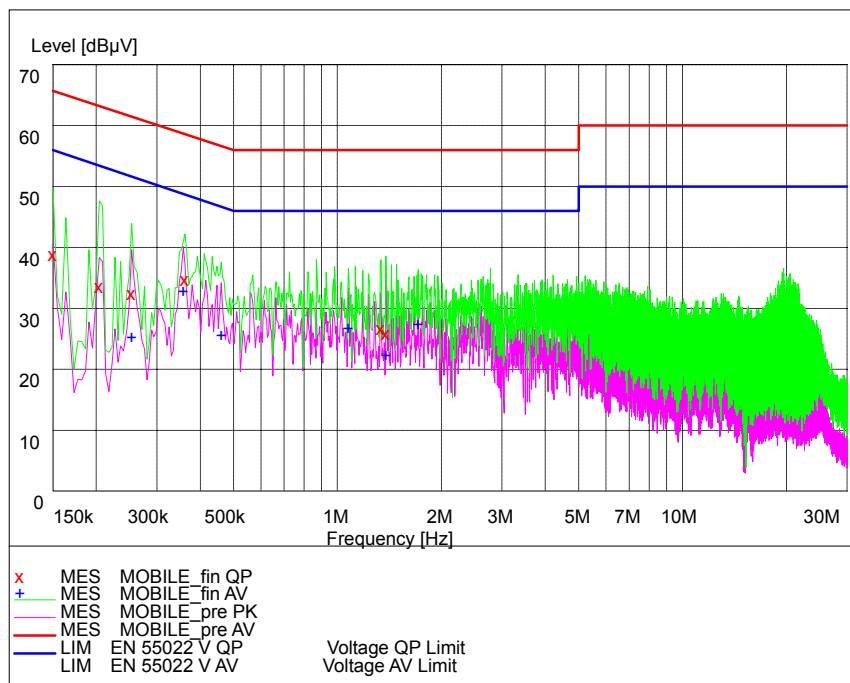
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

The measurement is made according to Public notice DA 00-705 and ANSI C63.4-2009

### 2.2.9.3 Test result

Noise Level of the Measuring Instrument



L and N Line

**MEASUREMENT RESULT: "MOBILE\_fin QP"**

Frequency MHz	Level dBμV	Transd	Limit dB	Margin dBμV	Line dB	PE
0.150000	40.80	20.1	66	25.0	L1	GND
0.204000	35.50	20.2	63	27.7	L1	GND
0.253500	34.30	20.2	62	27.2	L1	GND
0.361500	36.70	20.2	59	21.9	L1	GND
1.338000	28.70	20.2	56	27.3	L1	GND
1.383000	27.90	20.2	56	28.1	L1	GND

**MEASUREMENT RESULT: "MOBILE\_fin AV"**

Frequency MHz	Level dBμV	Transd	Limit dB	Margin dBμV	Line dB	PE
0.253500	27.10	20.2	52	24.5	L1	GND
0.357000	34.60	20.2	49	14.2	L1	GND
0.460500	27.40	20.3	47	19.3	N	GND
1.077000	28.60	20.2	46	17.4	L1	GND
1.383000	24.10	20.2	46	21.9	L1	GND
1.711500	29.20	20.2	46	16.8	L1	GND

## 2.3. List of test equipment

No.	Name/Model	Manufacturer	S/N	Calibration Date
1	Bluetooth Test Set Anritsu MT8852B	Anritsu	6K 00005827	Aug. 2010
2	R&S FSQ Spectrum Analyzer	R&S	200065	Mar. 2011
3	R&S FSP Spectrum Analyzer	R&S	100118	Aug. 2010
4	R&S FSV Spectrum Analyzer	R&S	100930	Mar. 2011
5	1506A Power Splitter	Weinschel	MN154	Aug. 2010
6	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	Aug. 2010
7	ESI 40 EMI test receiver	R&S	100015	Aug. 2010
8	SMR 20 Signal generator	R&S	100086	Aug. 2010
9	CMU 200 Radio tester	R&S	100313	Aug. 2010
10	12.65m*8.03m*7.50m Fully-Anechoic Chamber	FRANKONIA	-----	Aug. 2010
11	HL562 Ultra log test antenna	R&S	100016	Aug. 2010
12	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	Aug. 2010
13	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	Aug. 2010
14	PS2000 Turn Table	FRANKONIA	-----	Aug. 2010
15	MA260 Antenna Master	FRANKONIA	-----	Aug. 2010
16	ES-K1EMI test software	R&S	-----	-----
17	HL562 Receive antenna	R&S	100167	Aug. 2010