D-PL-12111-01-01

CNAS L0447

Registration No.910917

TEST REPORT

Report No.: SRTC2014-H024-E0037

Product Name: GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi

Product Model: Philips I928

Applicant: Shenzhen Sang Fei Consumer Communications Co., Ltd.

Manufacturer: Shenzhen Sang Fei Consumer Communications Co., Ltd.

Specification: FCC Part 15, Subpart C (October 9, 2012 edition)

FCC ID: VQRCTI928

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

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
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:	Shenzhen Sang Fei Consumer Communications Co., Ltd.
Address:	11 Science & Technology Rd., Shenzhen Hi-tech Industrial Park, Nanshan District
City:	Shenzhen
Country or Region:	China
Grantee Code:	VQR
Contacted person:	Helen.Lin
Tel:	86-755-33308888
Fax:	86-755-26614979
Email:	Helen.Lin@sangfei.com

1.4 Manufacturer's details

Company:	Shenzhen Sang Fei Consumer Communications Co., Ltd.
Address:	11 Science & Technology Rd., Shenzhen Hi-tech Industrial Park, Nanshan District
City:	Shenzhen
Country or Region:	China
Contacted person:	Helen.Lin
Tel:	86-755-33308888
Fax:	86-755-26614979
Email:	Helen.Lin@sangfei.com

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1.5 Application details

Date of reception of test sample: 10th June 2014
Date of test: 16th June 2014 to 4th July 2014

1.6 Reference specification

FCC Part 15, Subpart C (October 9, 2012 edition)

1.7 Information of EUT

1.7.1 General information

Name of EUT	GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi
FCC ID	VQRCTI928
Frequency Range	2.4GHz~2.4835GHz
Number of Channel	79
Modulation Type	GFSK, π/4DQPSK, 8DPSK
Duplex Mode	TDD
Channel Spacing	1MHz
Data Rate	1Mbps, 2 Mbps, 3 Mbps
Antenna Type	Fixed Internal
Power Supply	Battery or Charger
Rated Power Supply Voltage	3.8V
HW Version	TMBHb
SW Version	I928_M6592_1418_00_V01A_T01_AG

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1.7.2 EUT details

Product Name	Product Model	IMEI
GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi	Philips I928	864359020039884

1.7.3 Auxiliary equipment details

Equipment	Charger
Manufacturer	Salcomp (Shenzhen) Co., Ltd
Model Number	S14B08
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Battery
Manufacturer	harbin coslight powerco.,ltd
Model Number	AB3000BWMC
Capacity	3000mAh
Rated Voltage	3.8V d.c.

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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(b)(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)(1)(iii)	Pass
9	AC Power line Conducted Emission	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. Zhang Wentao Test engineer	Issued date: **2014.07.11**

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2.2 Test result

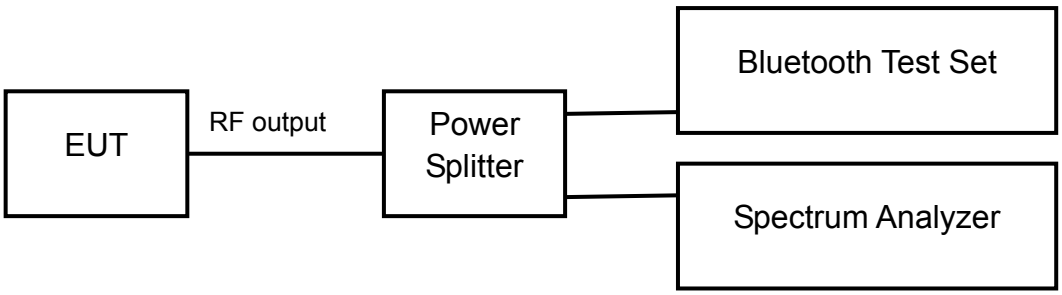
2.2.1 Occupied Bandwidth

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 ANSI C63.10-2009 Section 6.9.1.
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 Part15.247(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.

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2.2.1.4 Test result

Modulation type: GFSK

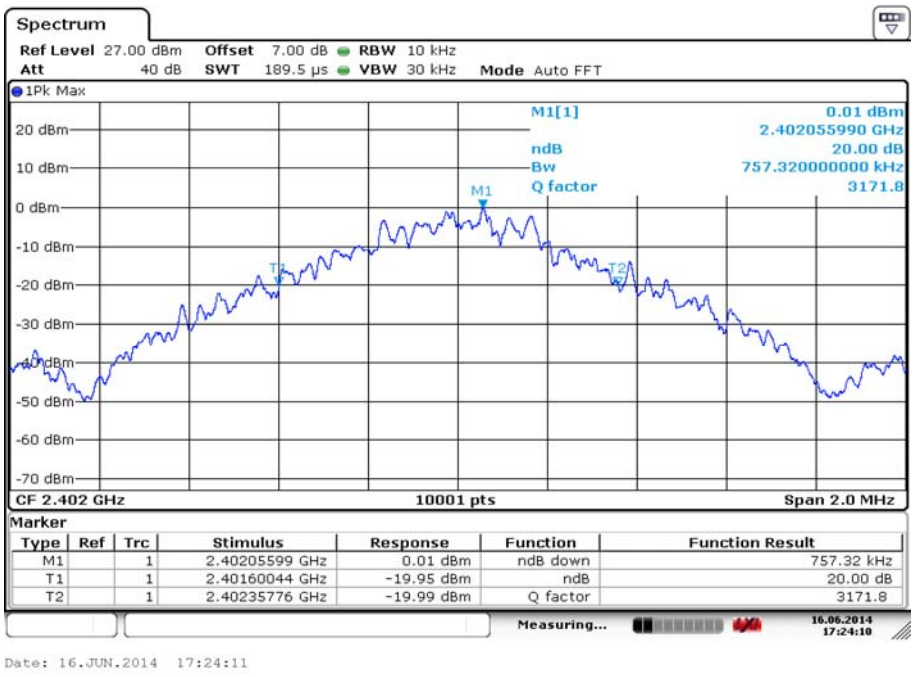
Carrier frequency (MHz)	Channel No.	20 dB bandwidth(kHz)
2402	0	757.32
2441	39	757.12
2480	78	757.52

Modulation type: π/4DQPSK

Carrier frequency (MHz)	Channel No.	20 dB bandwidth(kHz)
2402	0	1186.88
2441	39	1186.68
2480	78	1187.48

Modulation type: 8DPSK

Carrier frequency (MHz)	Channel No.	20 dB bandwidth(kHz)
2402	0	1215.88
2441	39	1263.47
2480	78	1216.08



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

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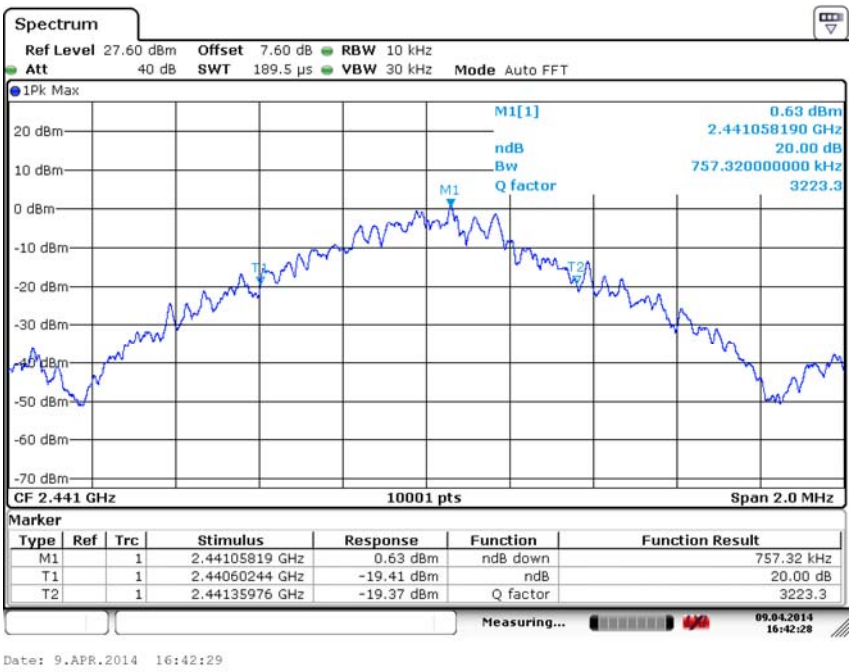
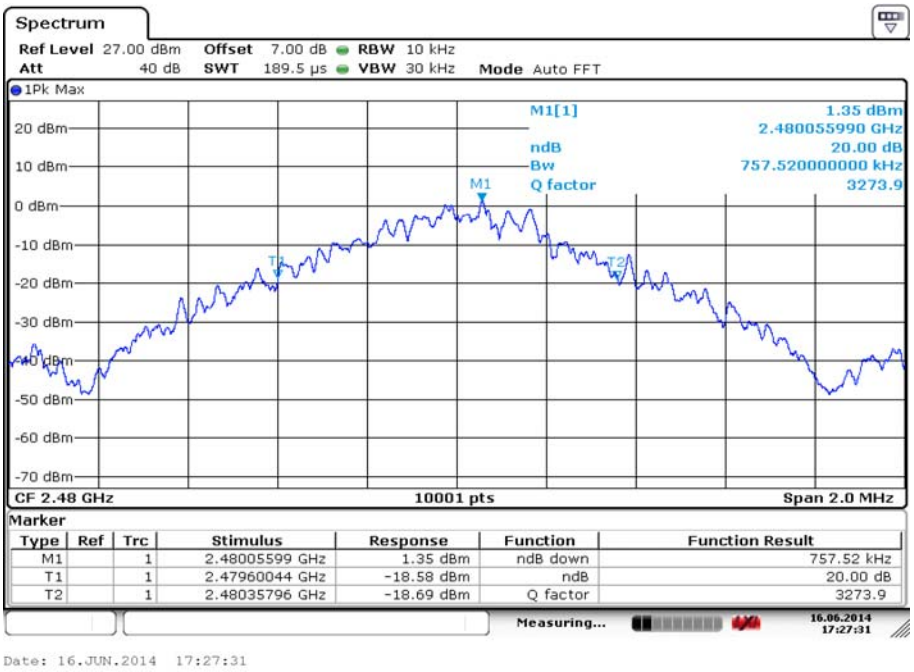


Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: GFSK



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

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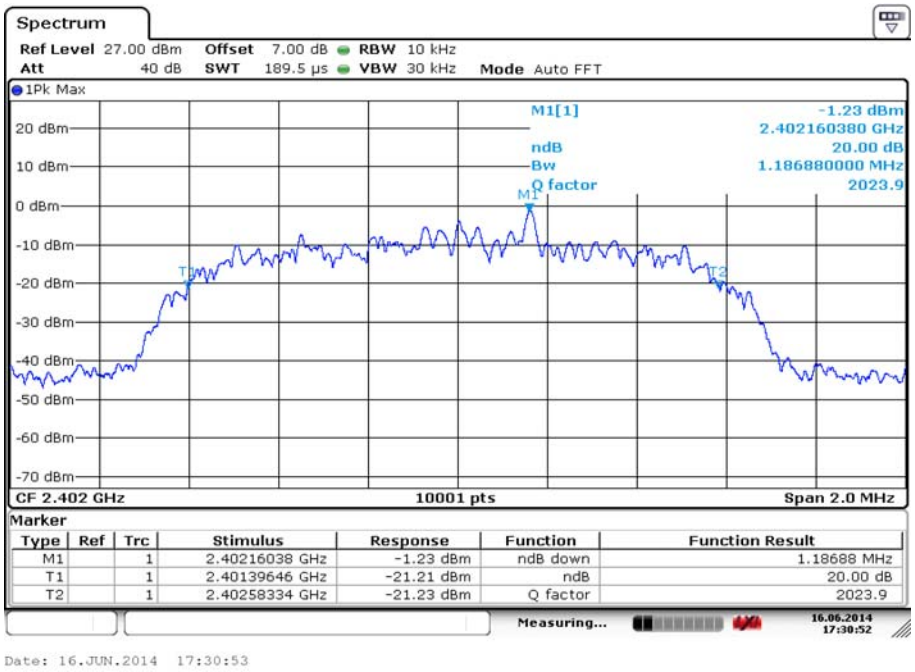
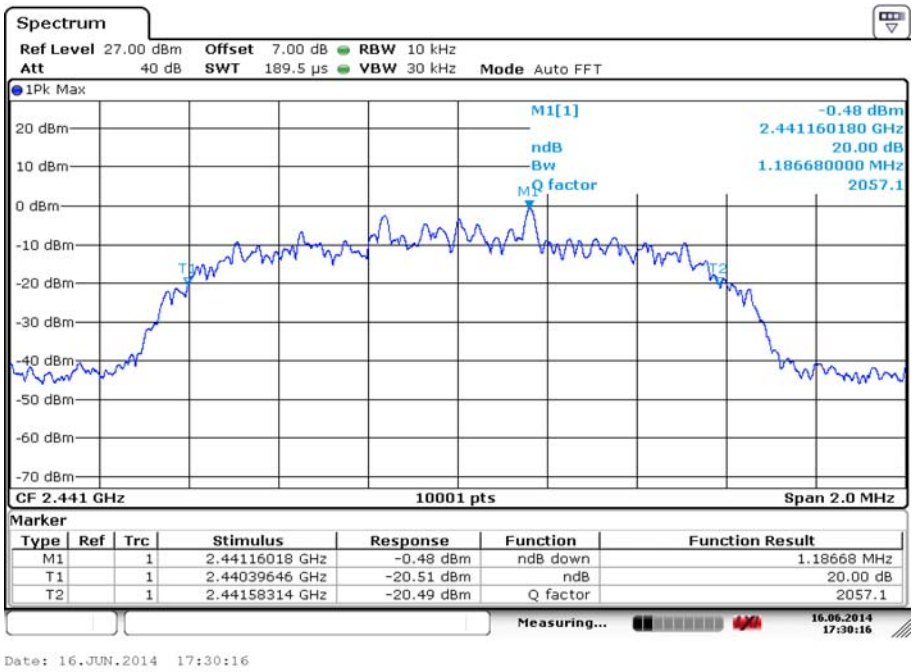


Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: π/4DQPSK



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

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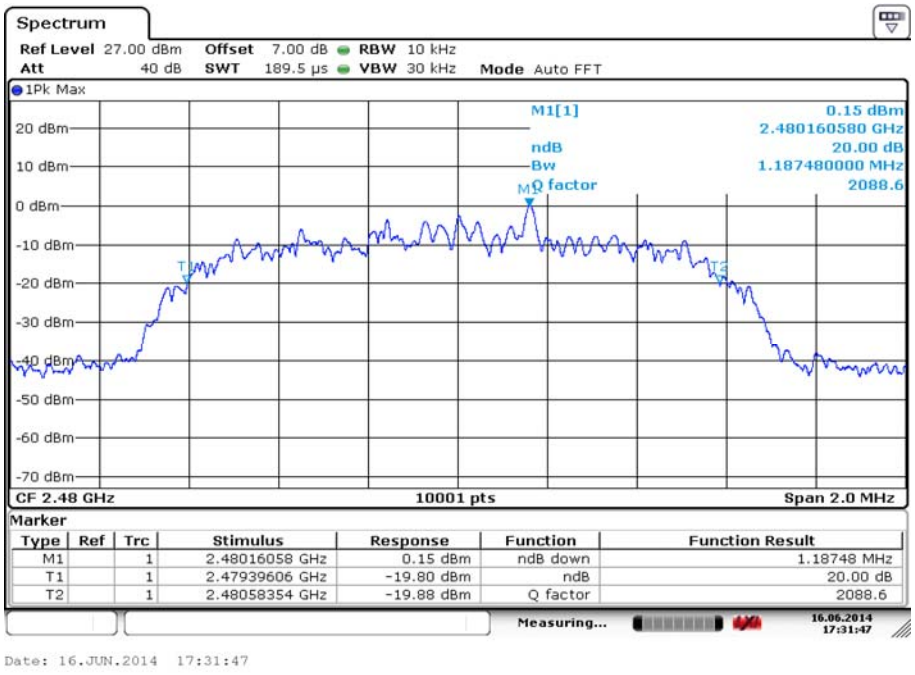

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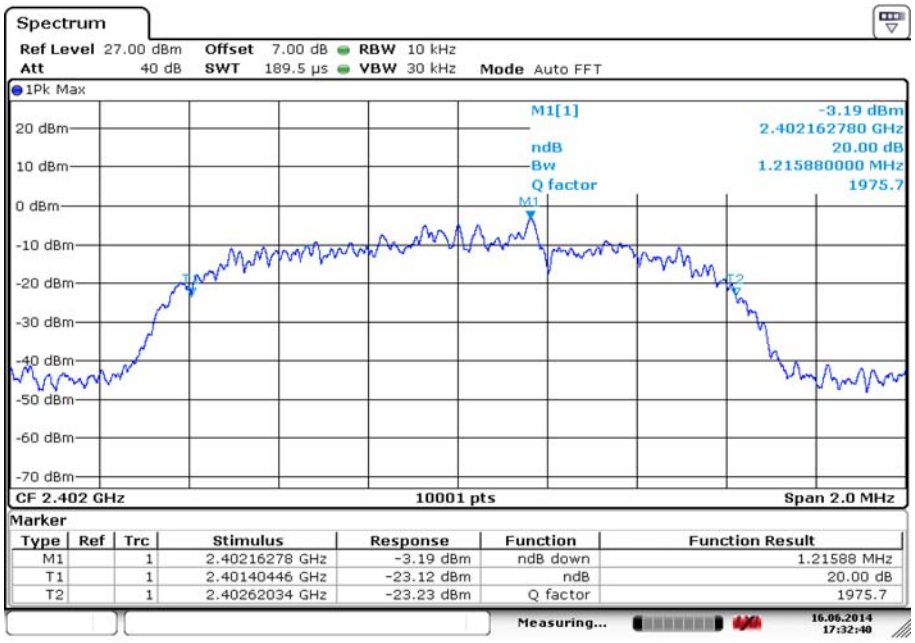
Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: π/4DQPSK



Date: 16.JUN.2014 17:32:39

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

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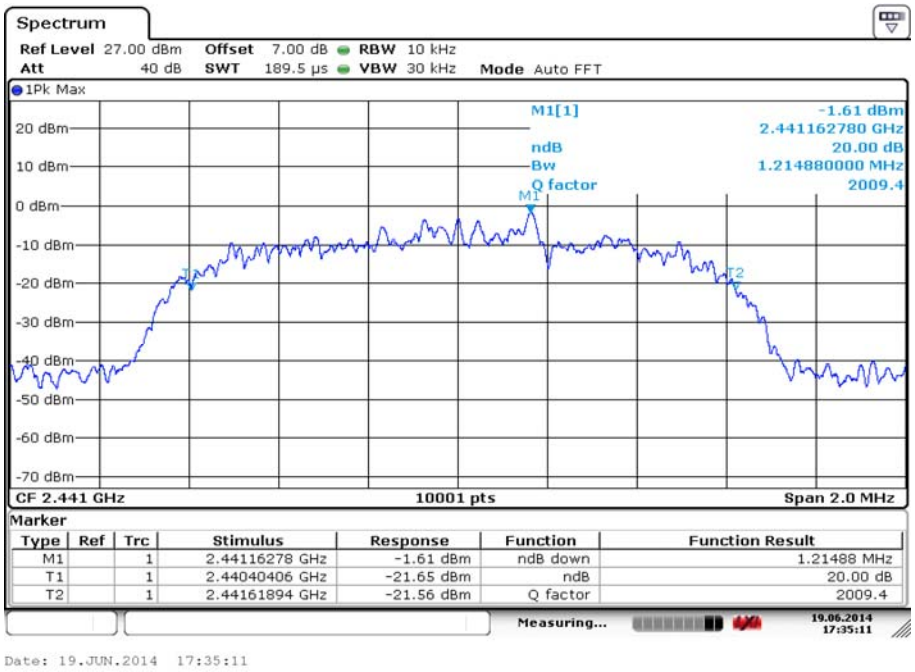
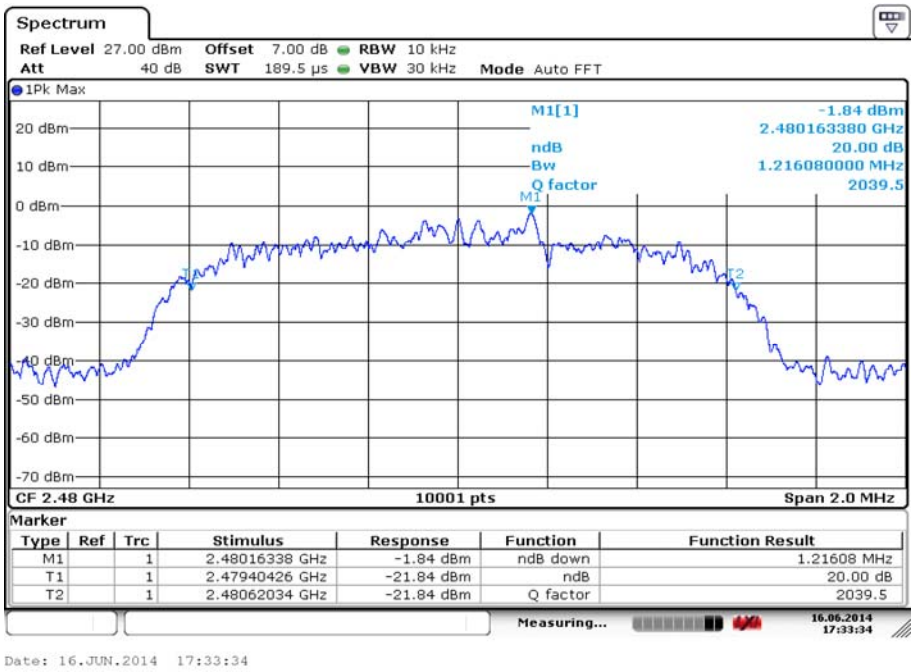


Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: 8DPSK



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

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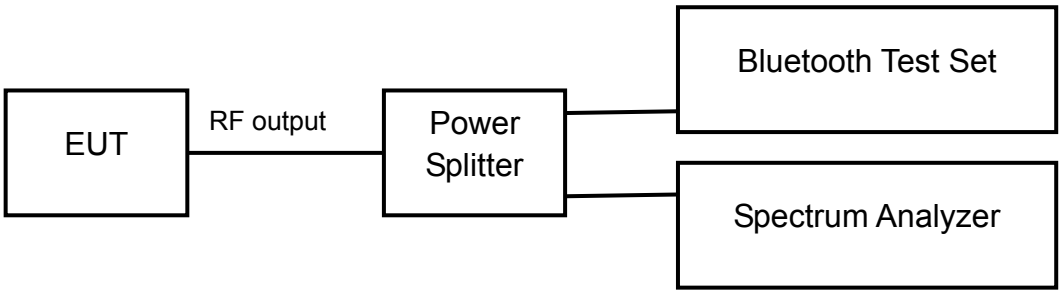
2.2.2 Peak Power Output

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 ANSI C63.10-2009 Section 6.10.1.
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 Part15.247(b)(1):
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

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

Modulation type	GFSK	π/4DQPSK	8DPSK
Maximum Output Power	30dBm	30dBm	30dBm

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2.2.2.4 Test Condition

Hopping Mode	Modulation type	RBW	VBW	Span	Sweep time
Hopping OFF	GFSK	2MHz	3MHz	8MHz	1ms
Hopping OFF	π/4DQPSK	2MHz	3MHz	8MHz	1ms
Hopping OFF	8DPSK	2MHz	3MHz	8MHz	1ms

2.2.2.5 Test result

Modulation type	Average Power Output (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	2.43	3.21	3.68
π/4DQPSK	0.19	0.96	1.36
8DPSK	0.08	1.11	1.35

Modulation type	Peak Power Output (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	6.41	7.10	7.67
π/4DQPSK	5.66	6.46	7.23
8DPSK	5.86	6.68	7.21

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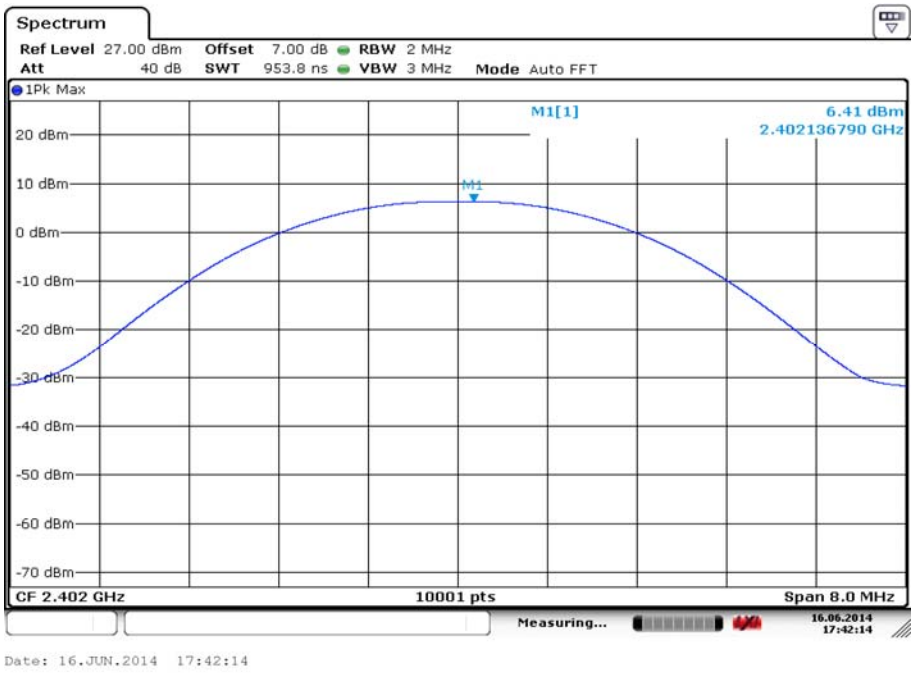

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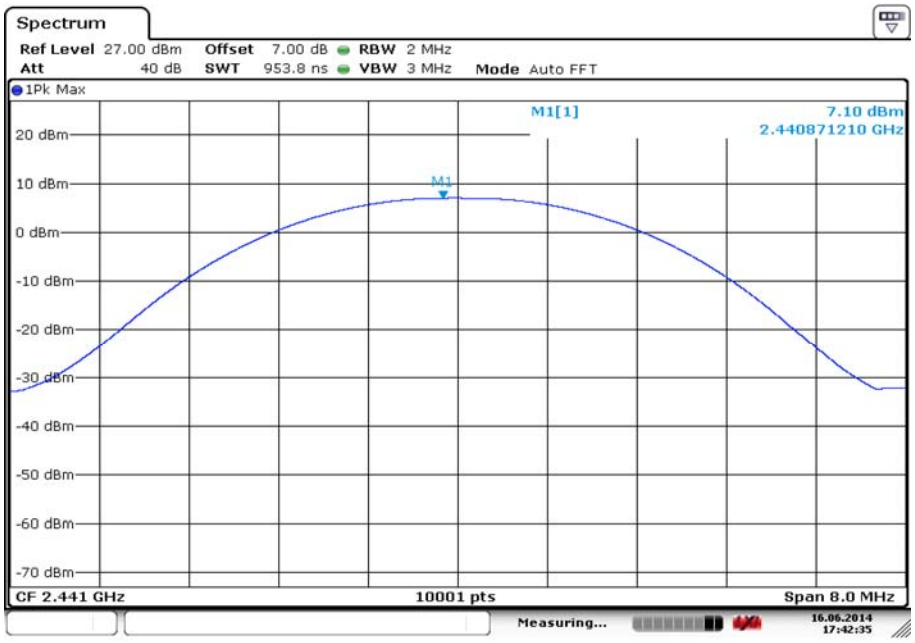
Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: GFSK



Date: 16.JUN.2014 17:42:36

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

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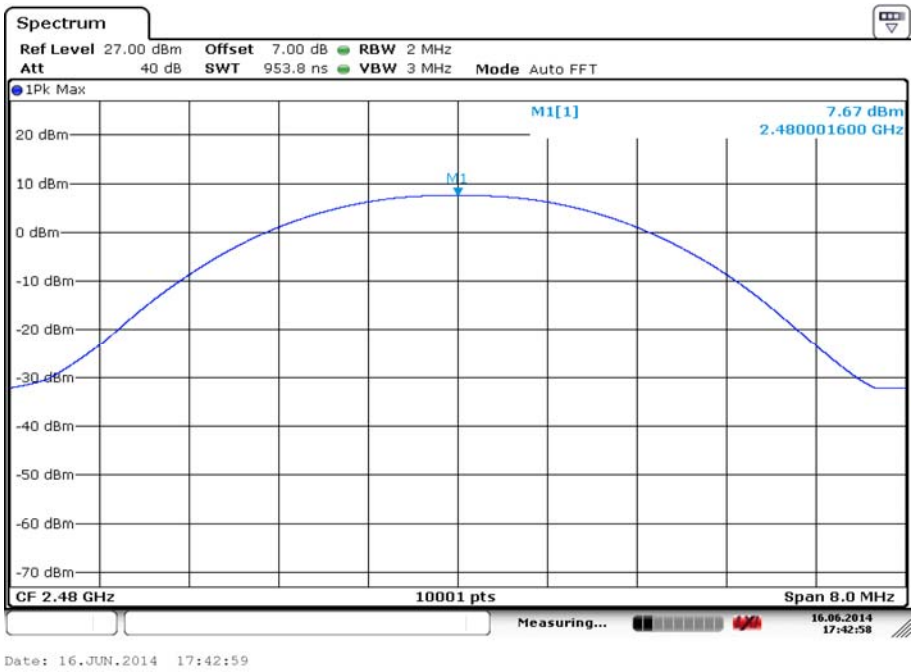
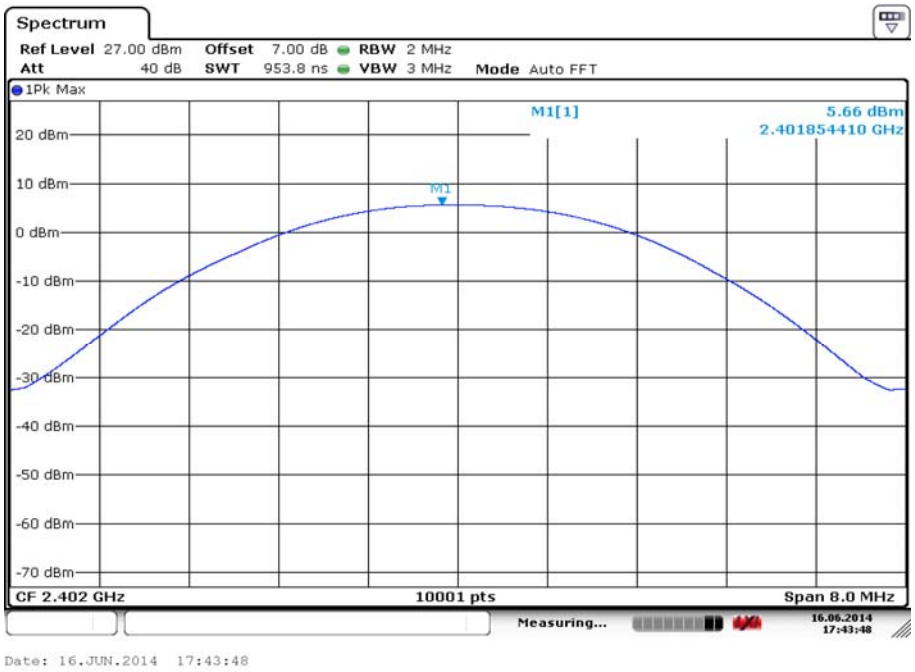


Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: GFSK



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

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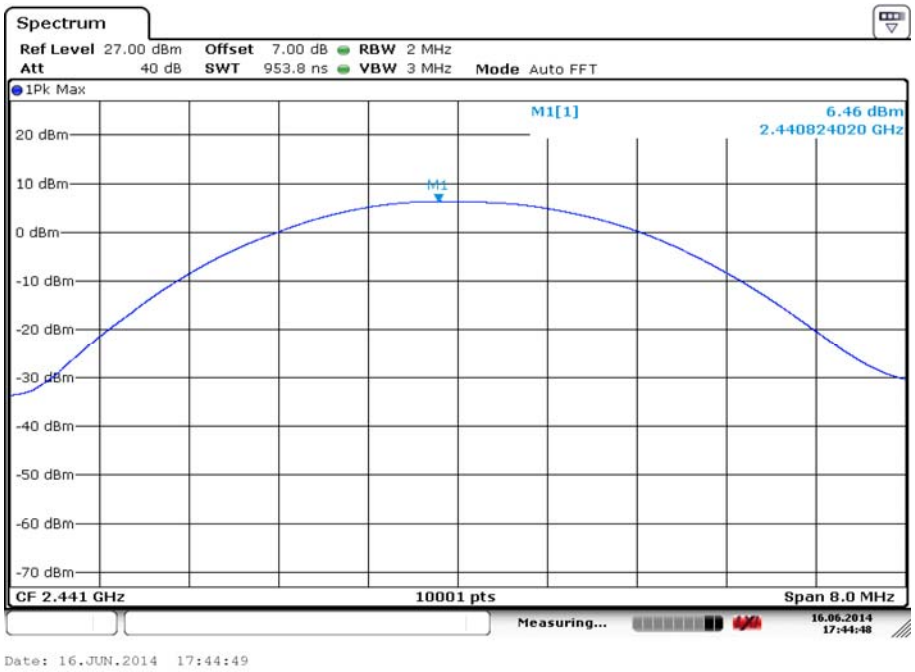
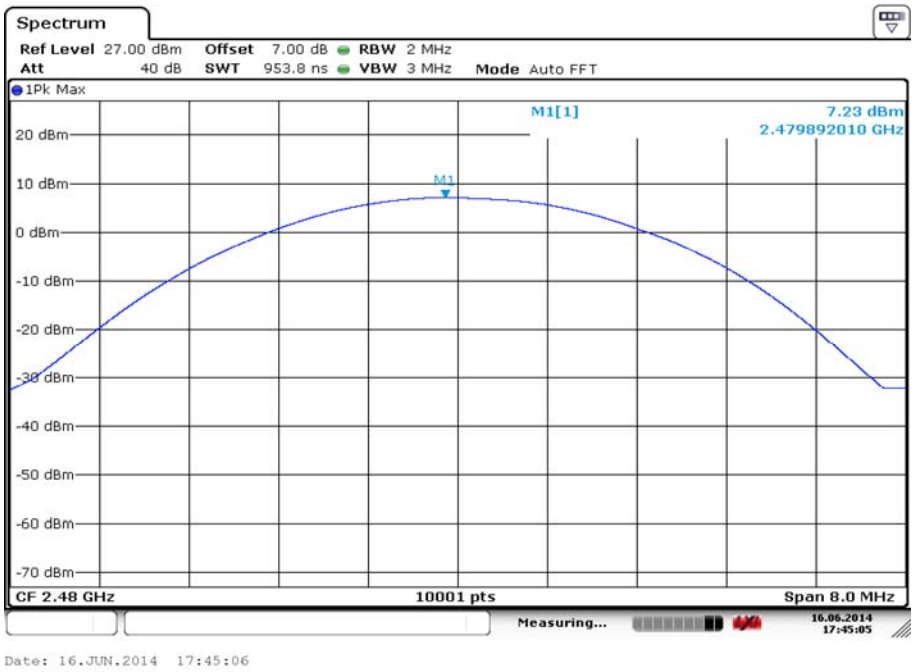


Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: π/4DQPSK



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

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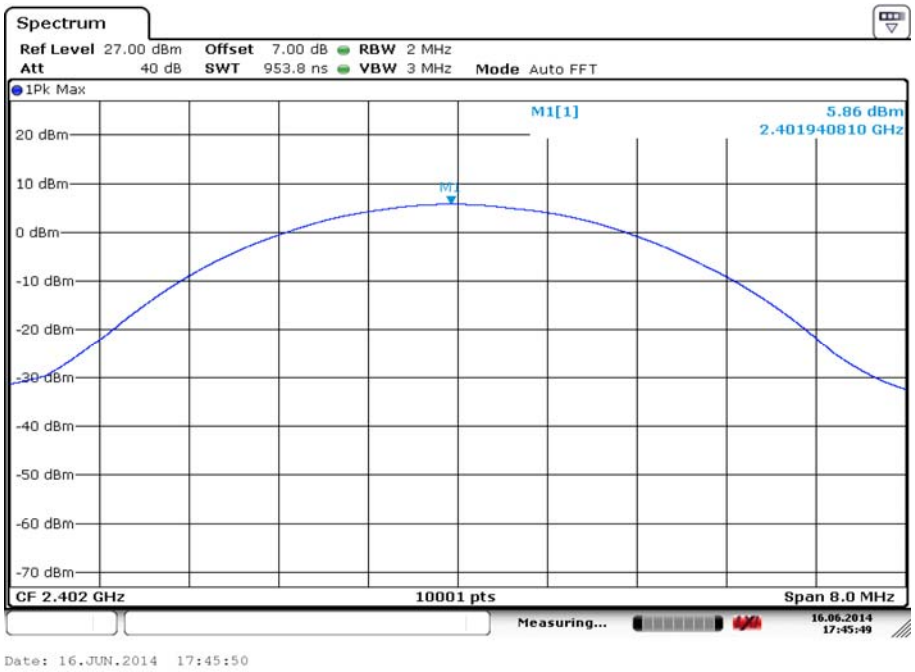
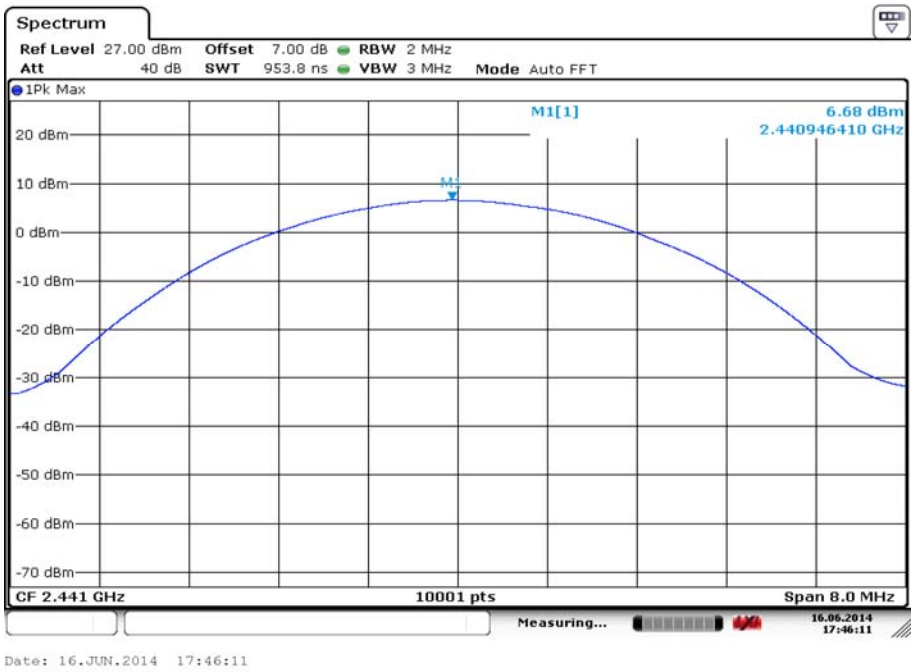


Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: 8DPSK



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

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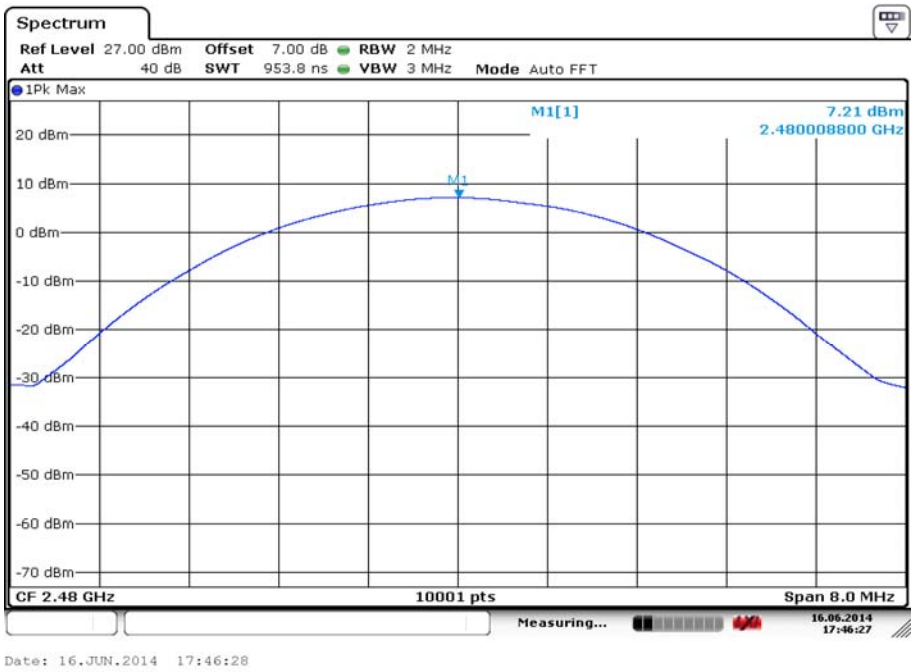

Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: 8DPSK

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2.2.3 Spurious RF Conducted Emissions

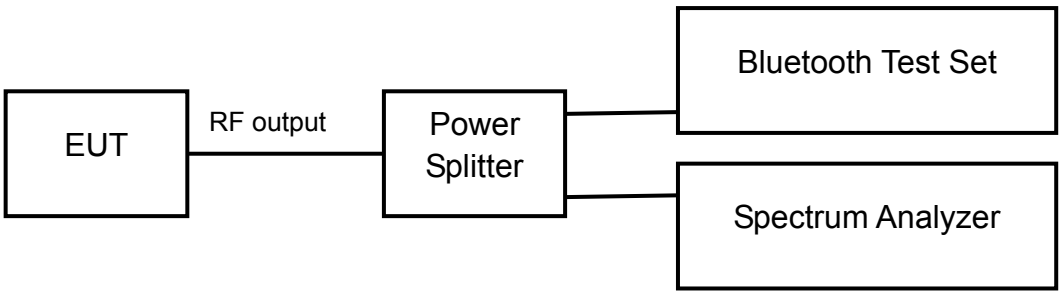
2.2.3.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

2.2.3.2 Test Description

The measurement is made according to ANSI C63.10-2009 Section 6.7.
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 Part15.247(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.

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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 dB
---	---	---	---	---
---	---	---	---	---

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

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

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

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

Note: The Reference value see 2.2.5 Band Edge Compliance

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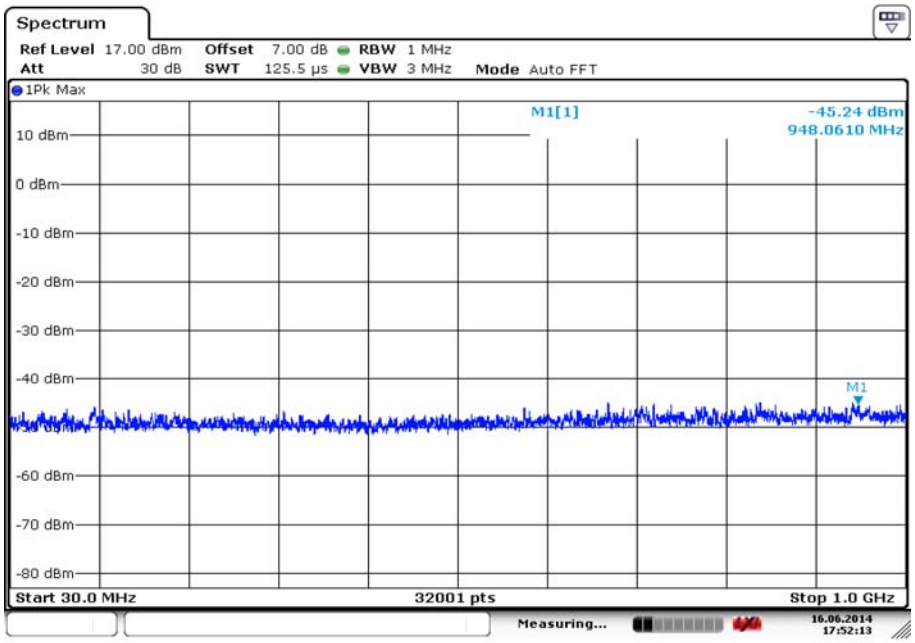

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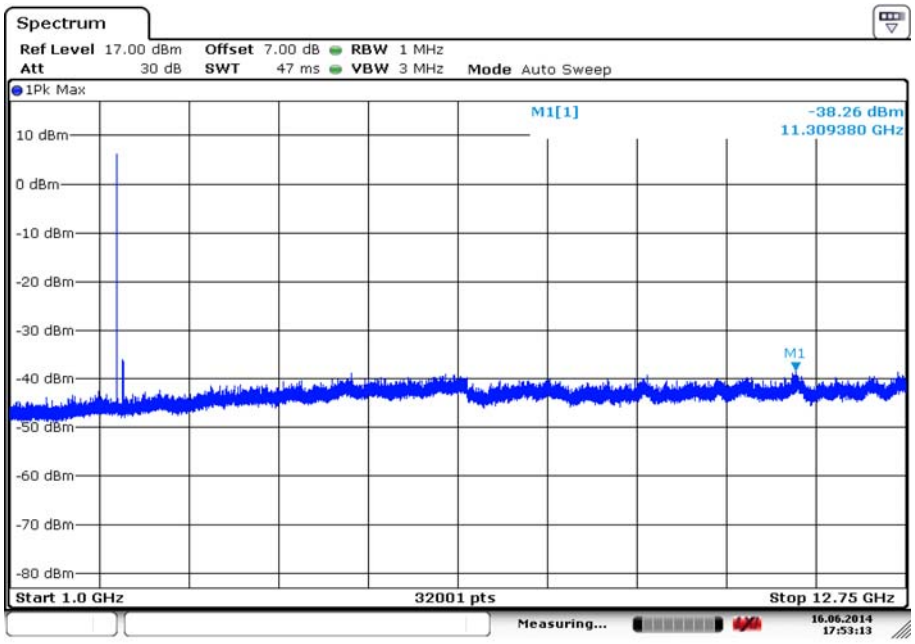

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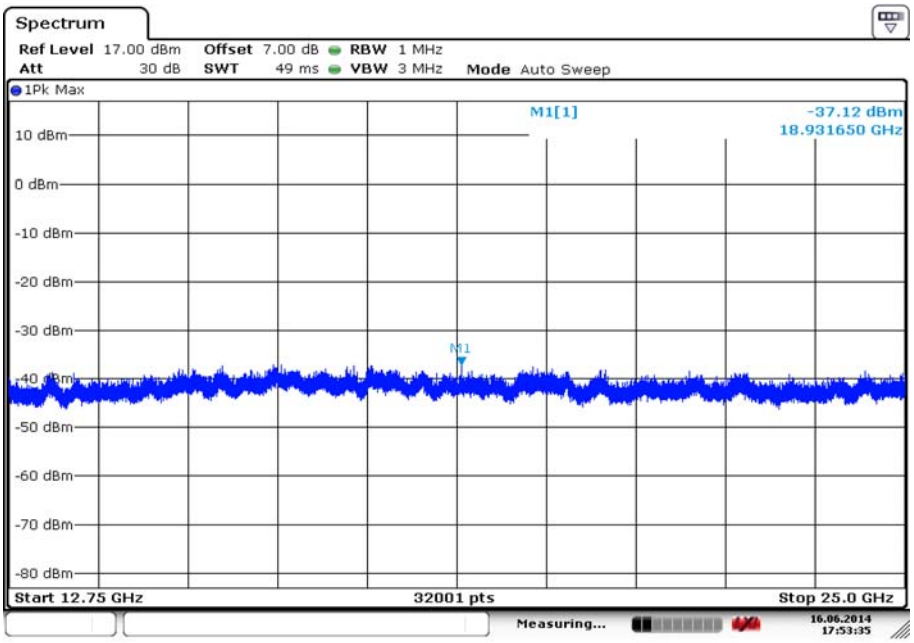

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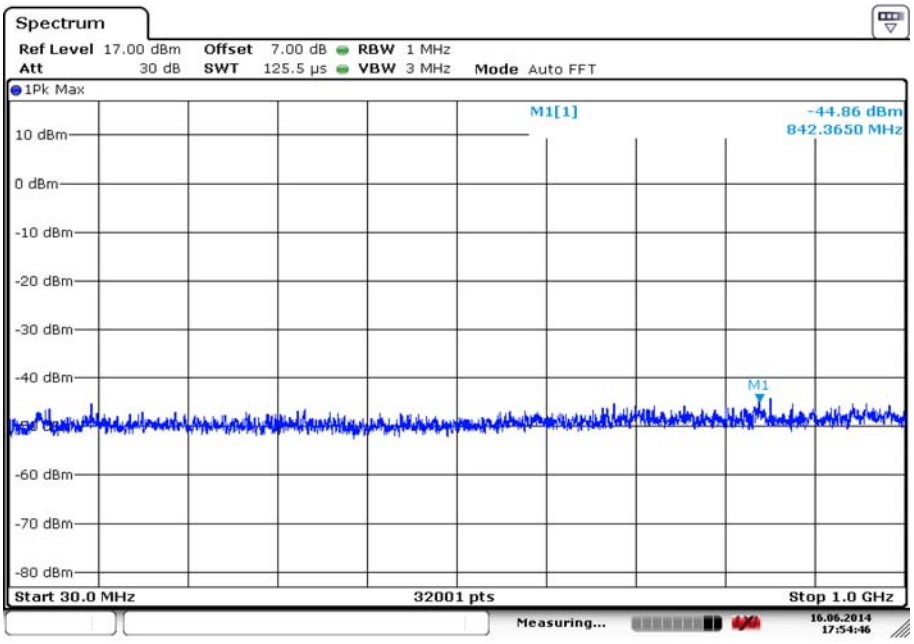
Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: GFSK



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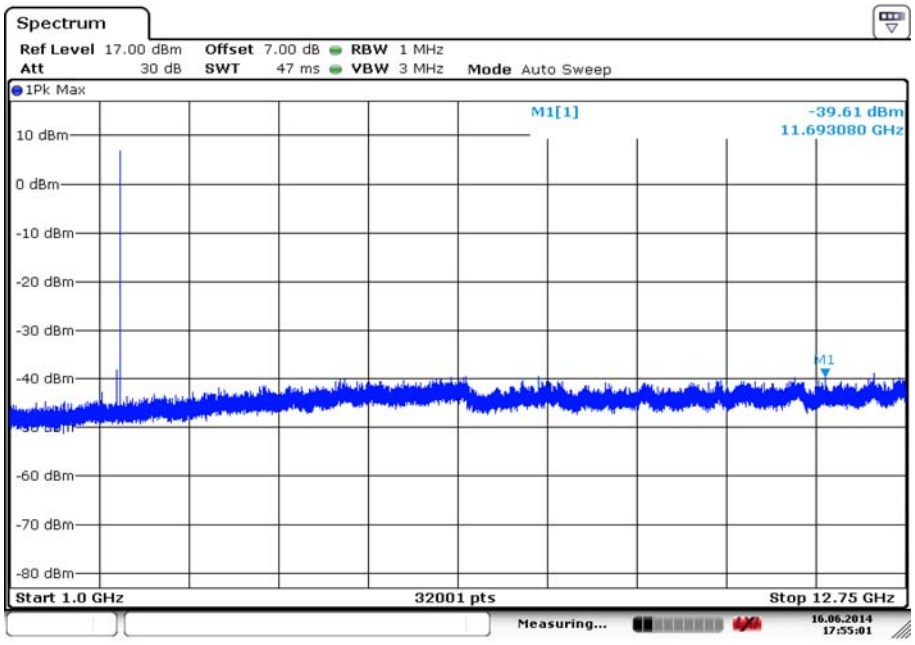

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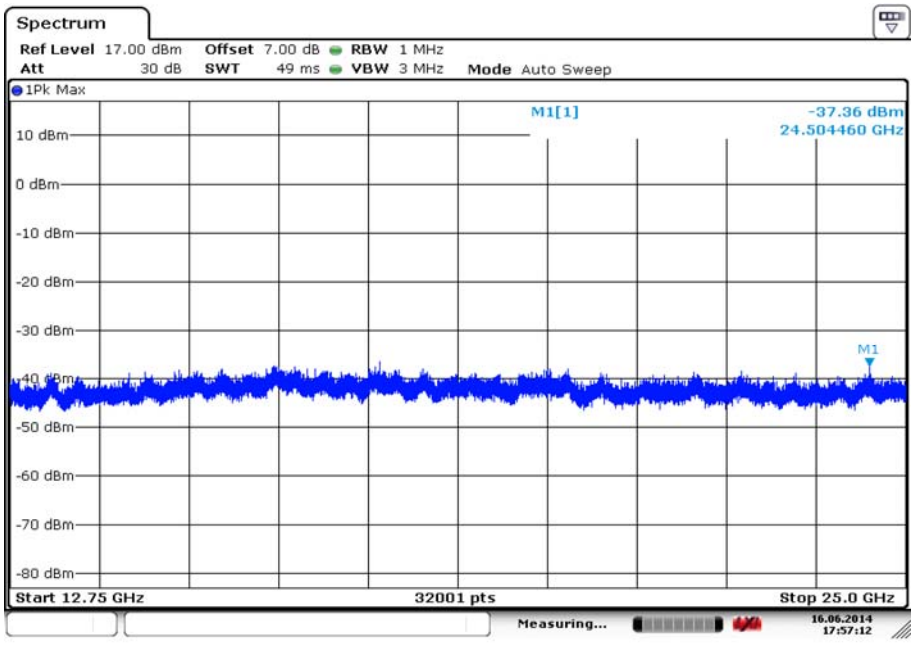

Date: 16.JUN.2014 17:57:11

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

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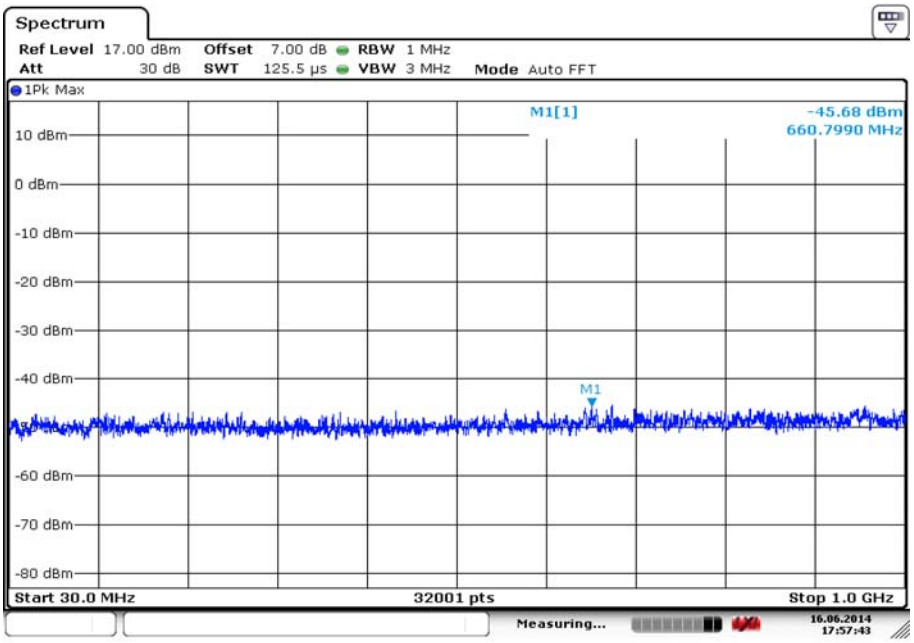

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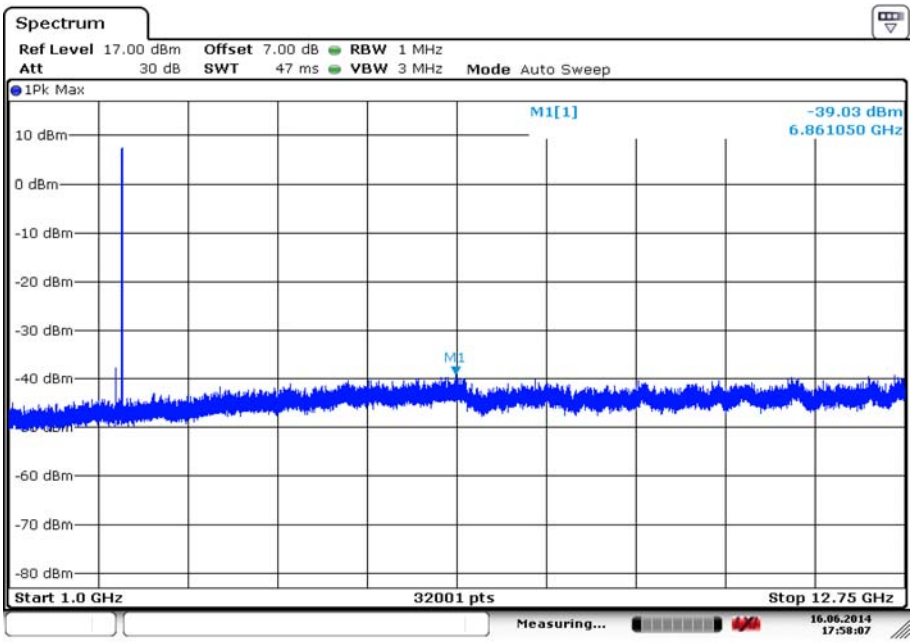

Date: 16.JUN.2014 17:58:06

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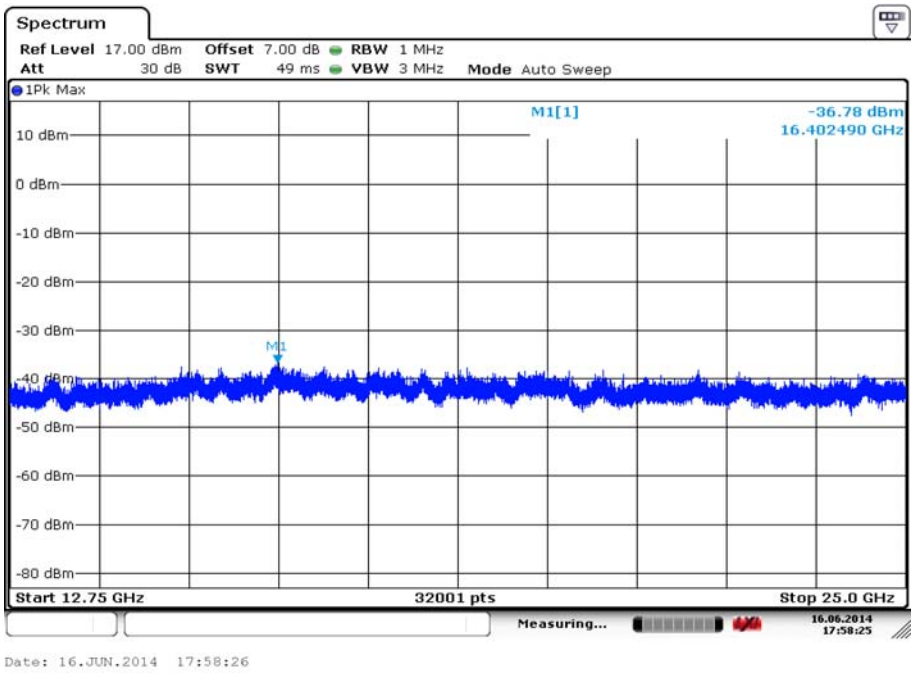

Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: GFSK

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

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

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

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

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

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

Note: The Reference value see 2.2.5 Band edge compliance

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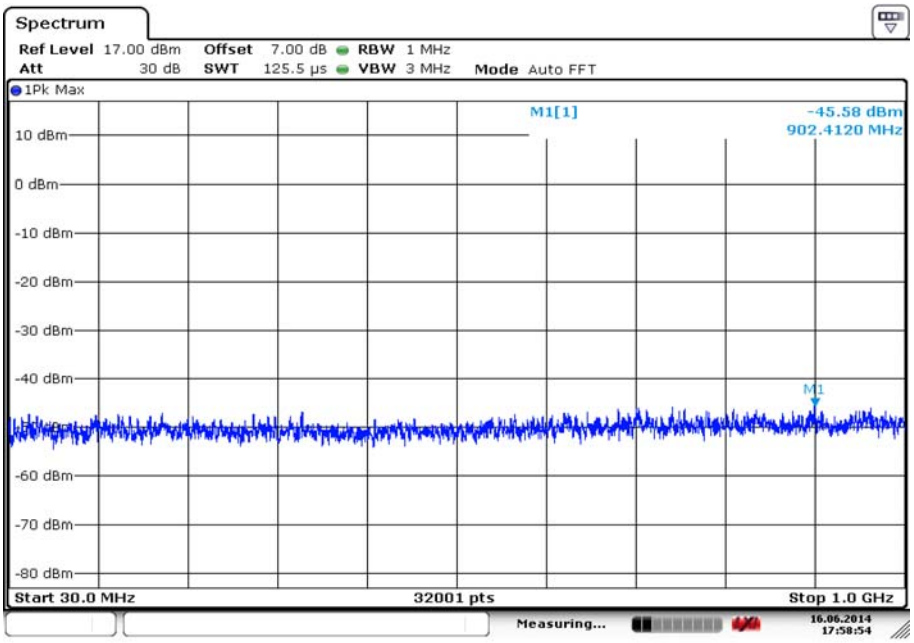

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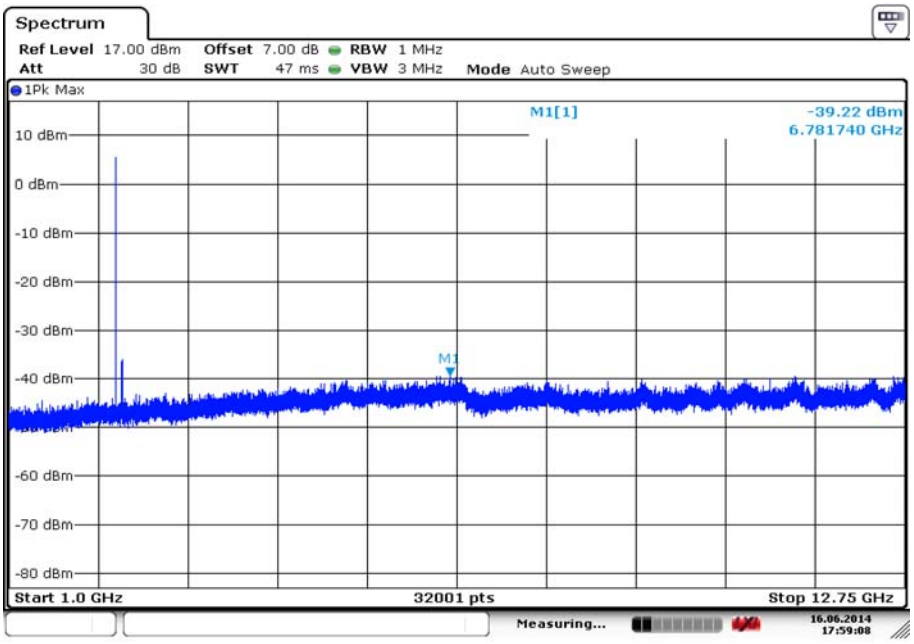

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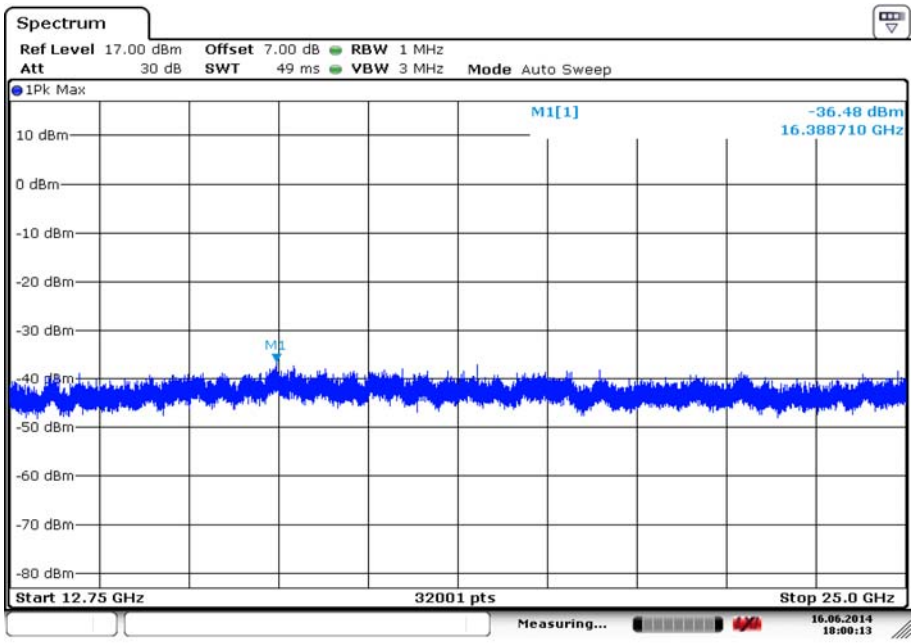
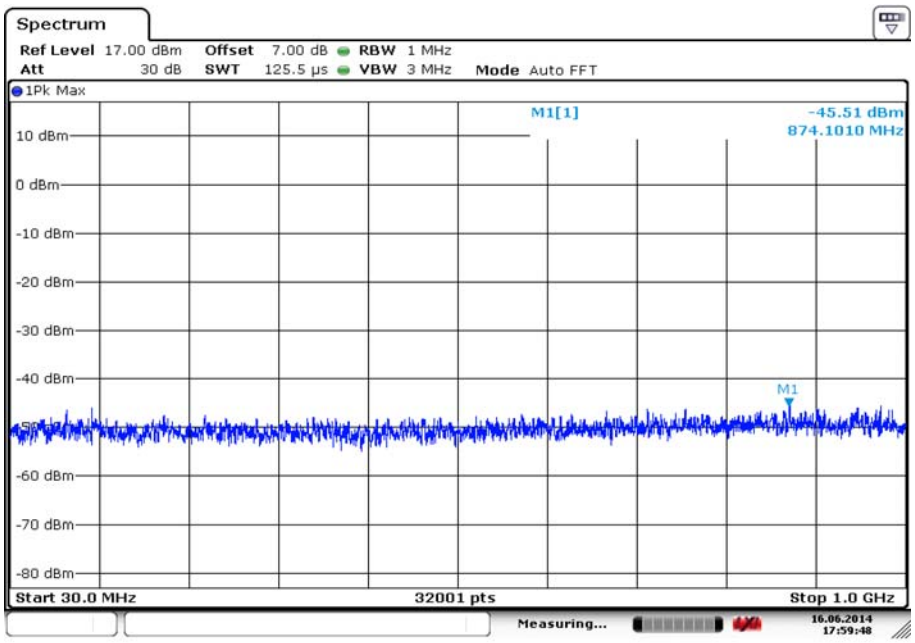


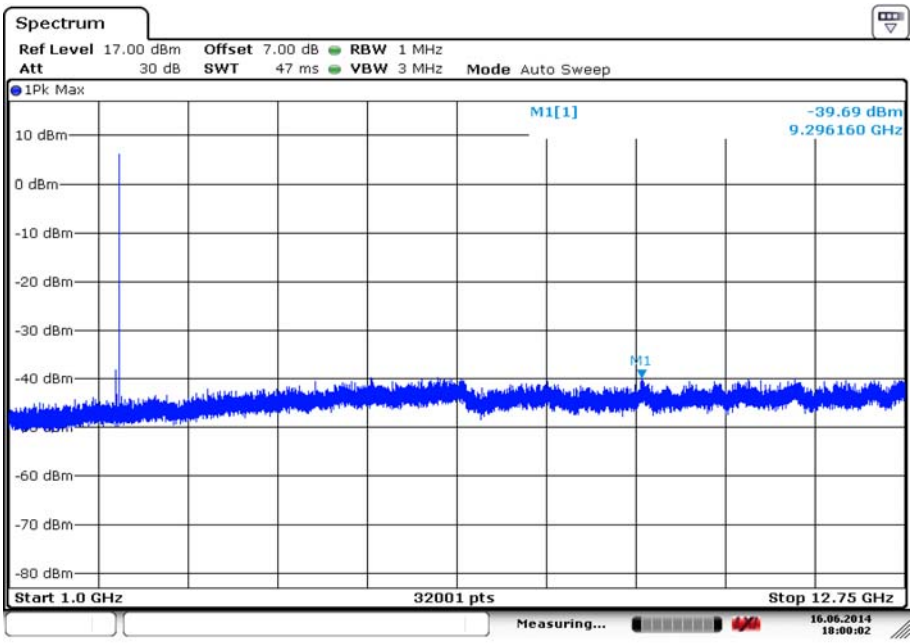
Date: 16.JUN.2014 18:00:14

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



Date: 16.JUN.2014 17:59:49

Copyright © SRTC



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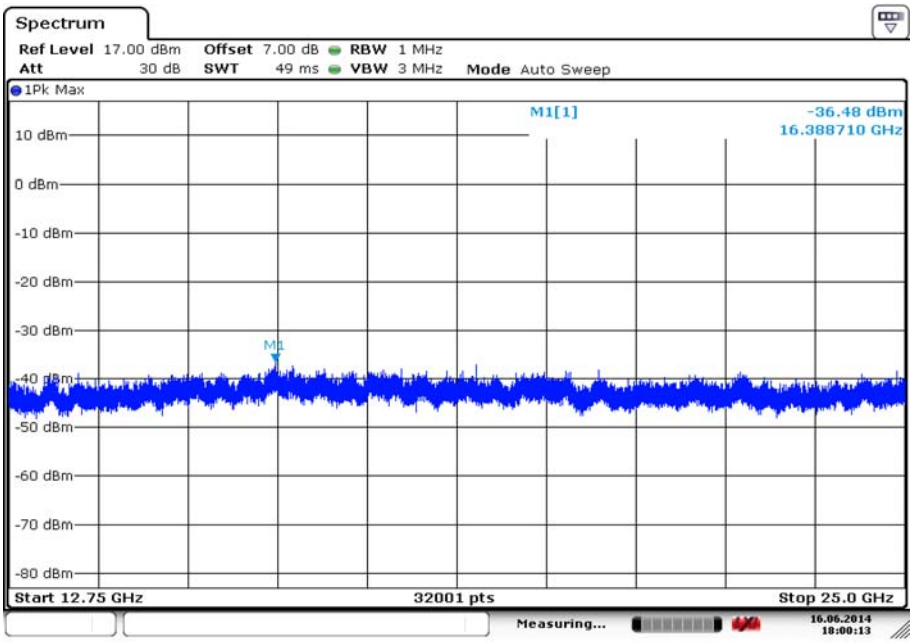

Date: 16.JUN.2014 18:00:14

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

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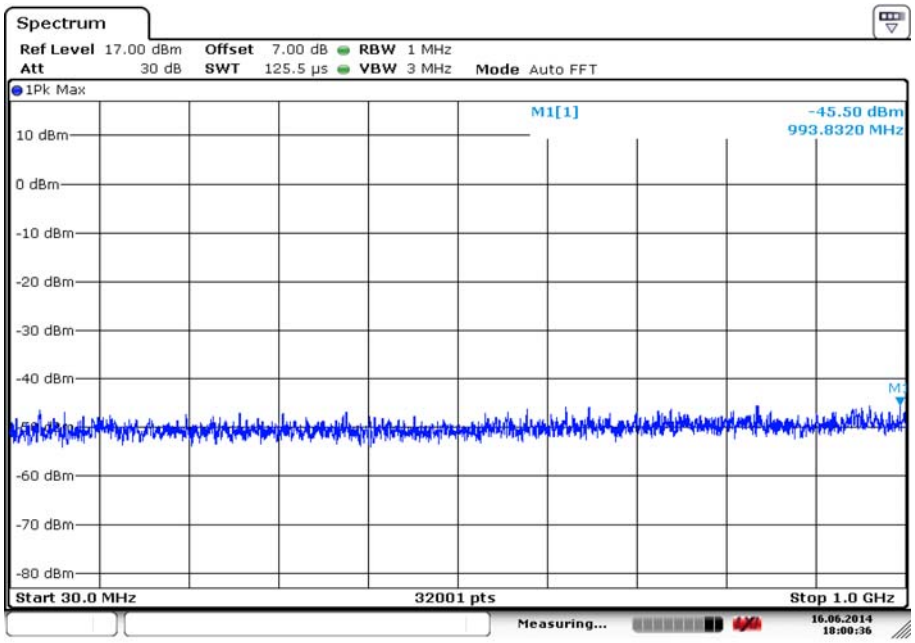

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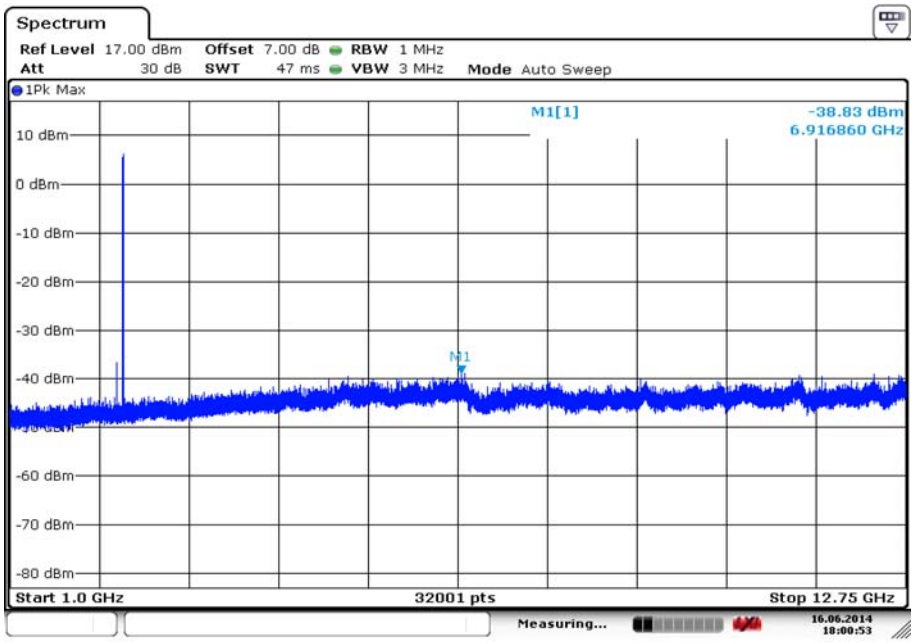

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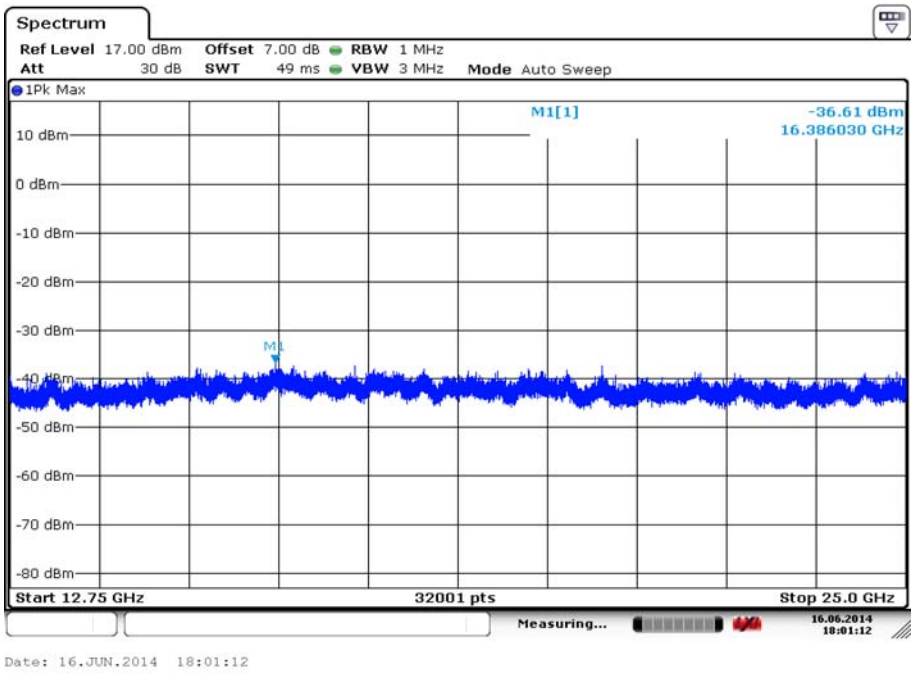

Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: π/4DQPSK

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

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

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

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

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

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

Note: The Reference value see 2.2.5 Band edge compliance

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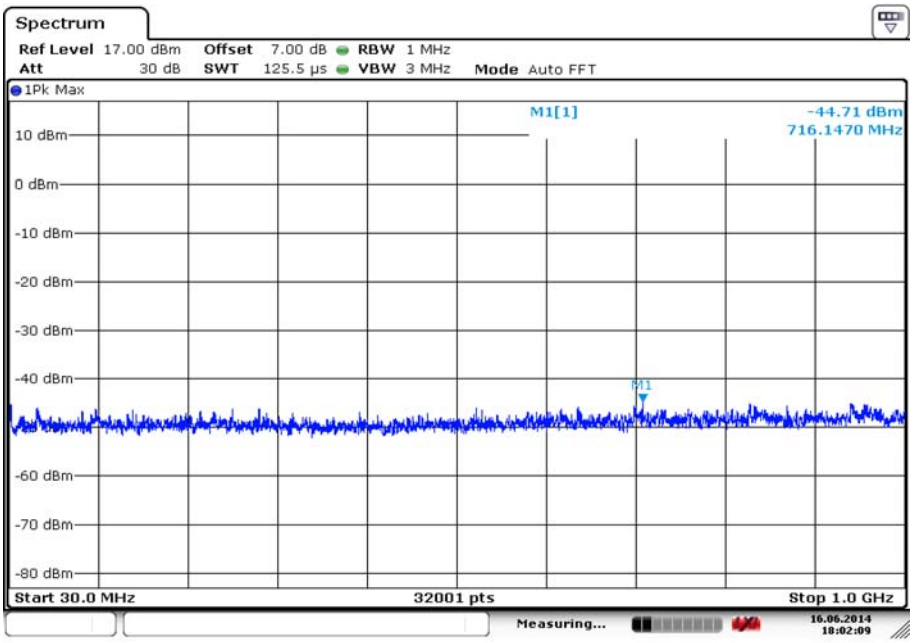

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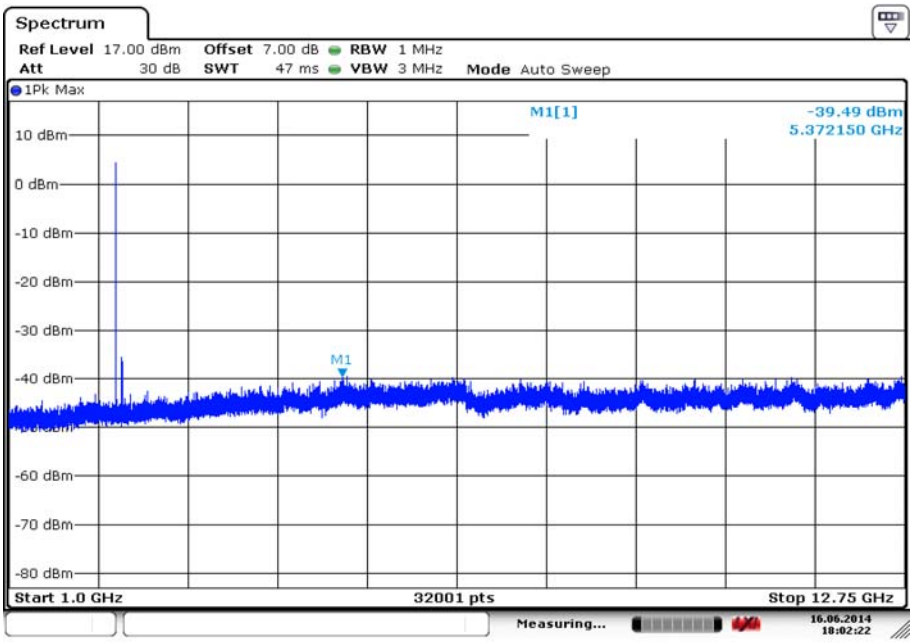

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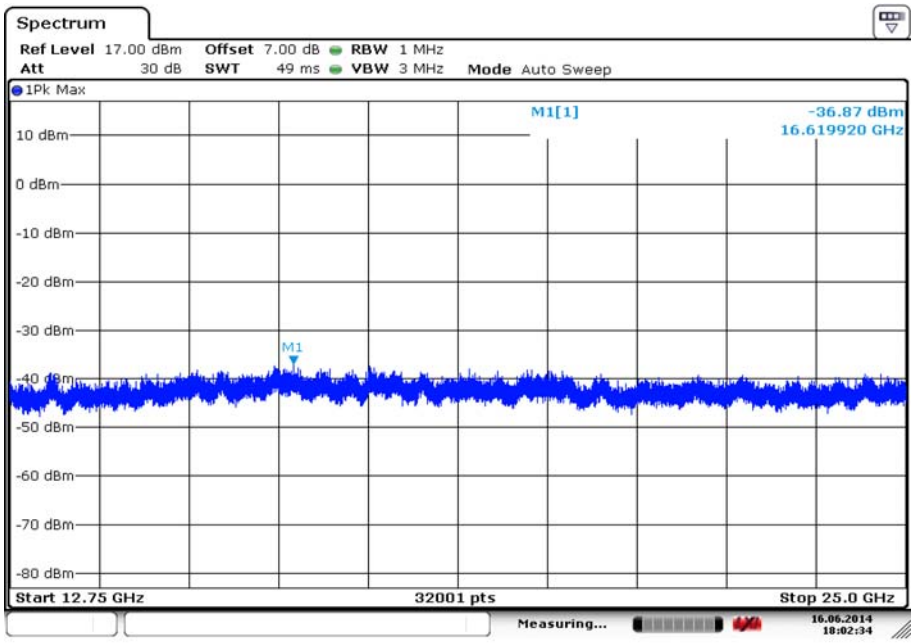
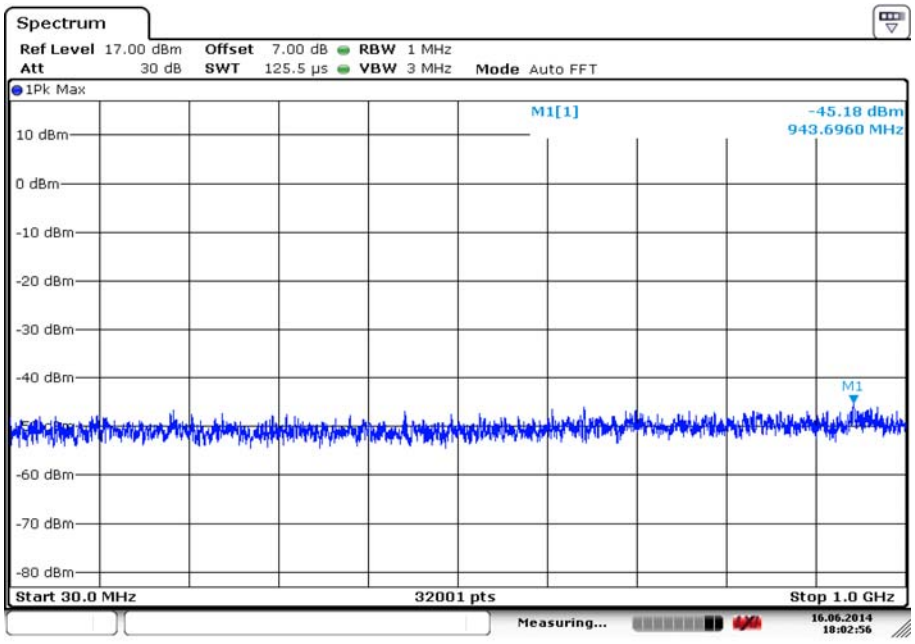


Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: 8DPSK



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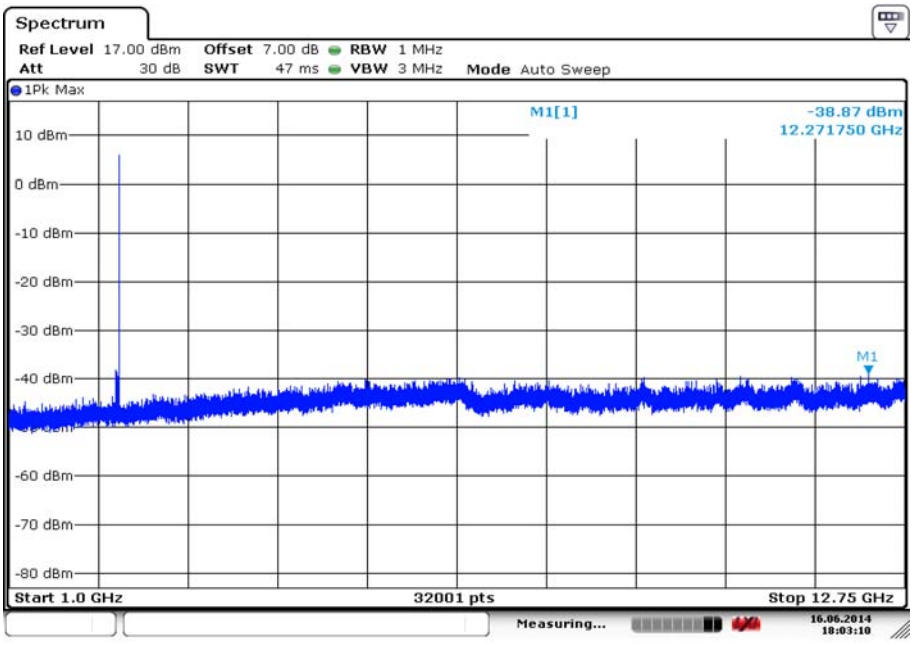

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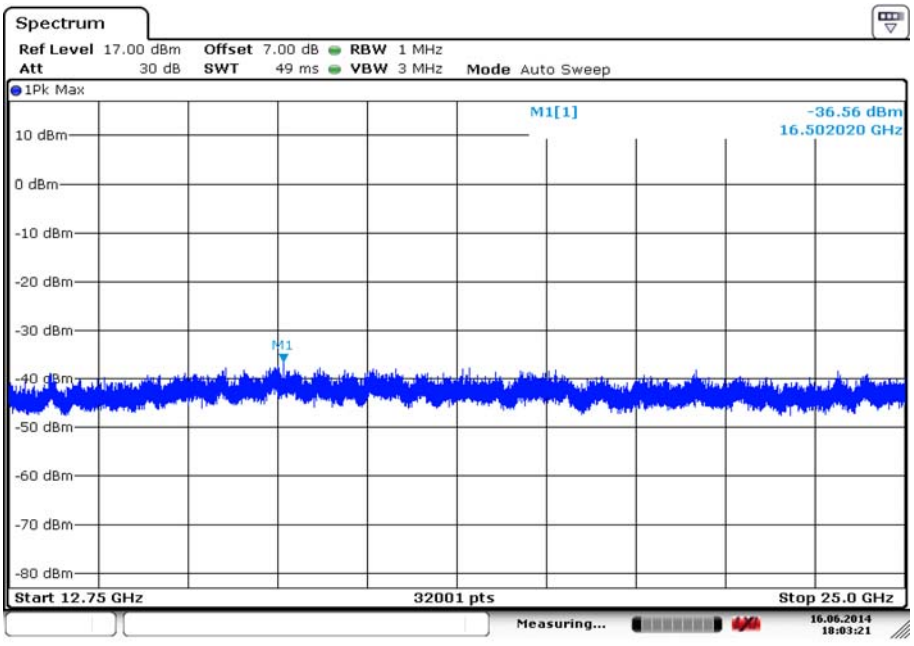

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Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: 8DPSK

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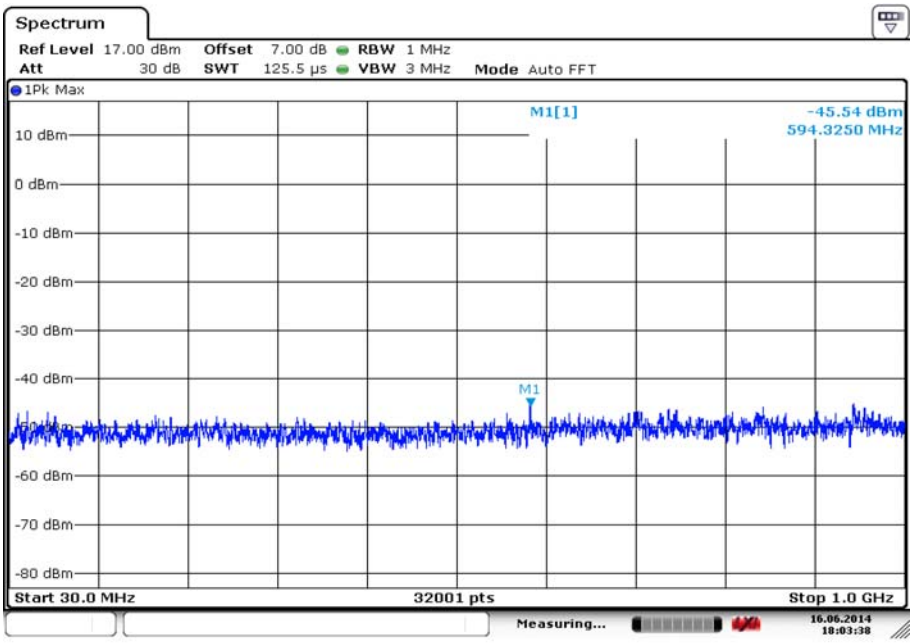

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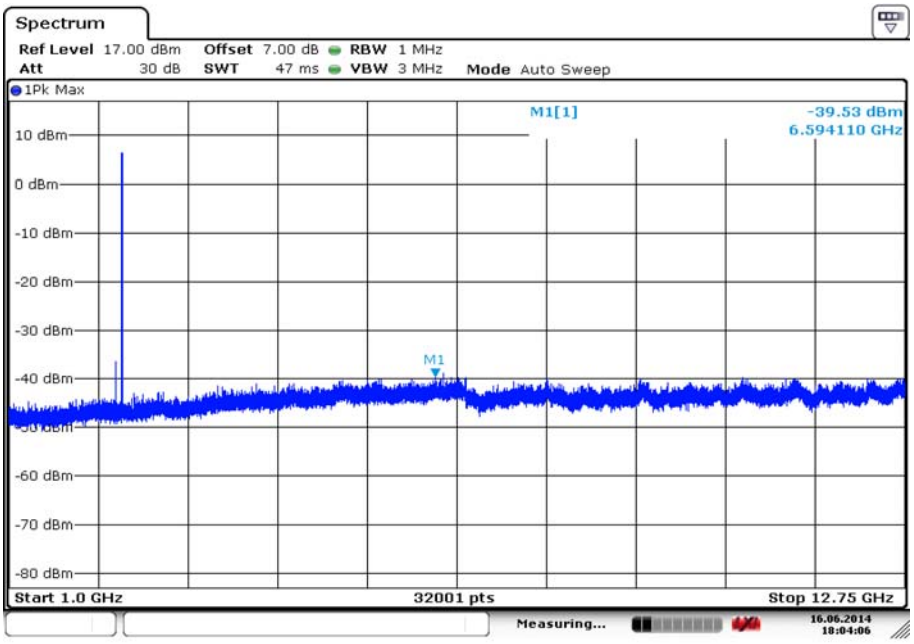

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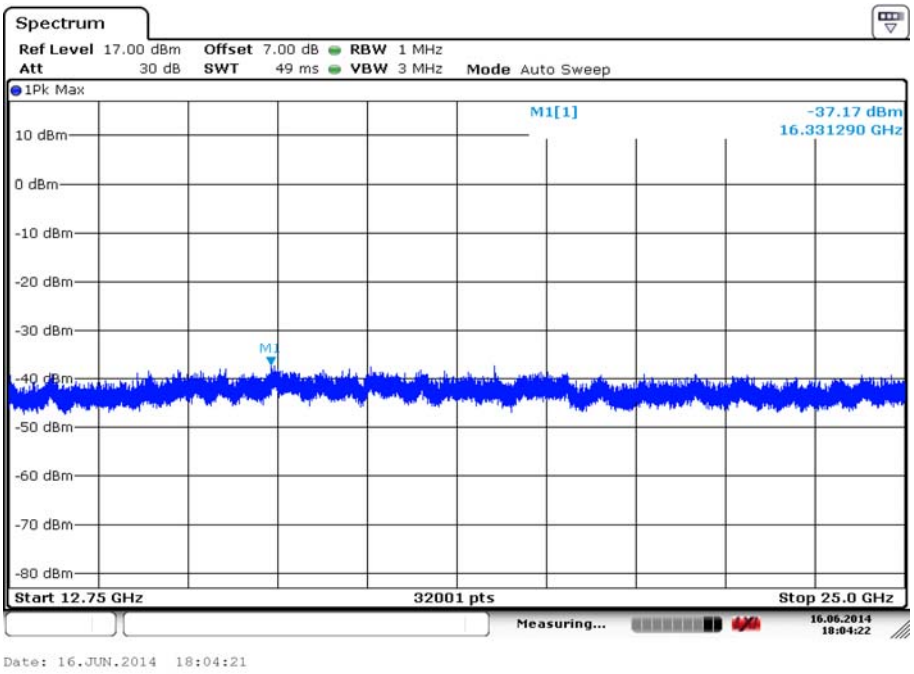

Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: 8DPSK

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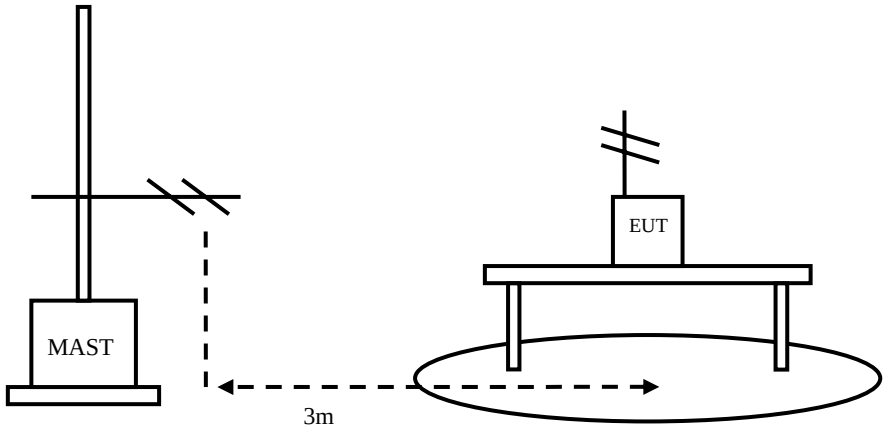
2.2.4 Spurious Radiated Emissions

2.2.4.1 Ambient condition

Temperature	Relative humidity	Pressure
24.3°C	36.2%	100.2kPa

2.2.4.2 Test Description

The measurement is made according to ANSI C63.10-2009 Section 6.3 - 6.6.
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.



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2.2.4.3 Test limit

FCC Part15.247(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 Part15.209:
Radiated Emission Limits

Frequency of Emission(MHz)	Limits	
	Detector	Unit (dBμV/m)
30～88	Quasi-peak	40.0
88～216	Quasi-peak	43.5
216～960	Quasi-peak	46.0
960～1000	Quasi-peak	54.0
1000～5th harmonic of the highest frequency or 40GHz, whichever is lower	Average	54.0
	Peak	74.0

FCC Part15.35(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 (dBμV/m) = 20 log (Limit (μV/m)/1μV/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.

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For GFSK
Channel No.:39

Frequency(MHz)	Result(dBuV/m)	A_{Rpl} (dB)	P_{mea} (dBuV/m)	Polarity
270.74	30.30	10.90	19.40	Vertical
273.15	26.00	10.90	15.10	Vertical
276.35	30.70	10.90	19.80	Horizontal
279.56	25.20	11.00	14.20	Vertical
281.96	32.50	11.10	21.40	Vertical
284.37	28.70	11.30	17.40	Vertical

For π/4DQPSK
Channel No.:39

Frequency(MHz)	Result(dBuV/m)	A_{Rpl} (dB)	P_{mea} (dBuV/m)	Polarity
44.87	19.40	12.30	7.10	Vertical
270.74	30.10	10.90	19.20	Horizontal
273.95	29.40	10.90	18.50	Vertical
276.35	29.20	10.90	18.30	Horizontal
279.56	27.00	11.00	16.00	Vertical
281.96	30.50	11.10	19.40	Vertical

For 8DPSK
Channel No.:39

Frequency(MHz)	Result(dBuV/m)	A_{Rpl} (dB)	P_{mea} (dBuV/m)	Polarity
264.33	28.10	10.70	17.40	Vertical
268.34	29.70	10.90	18.80	Vertical
270.74	26.30	10.90	15.40	Vertical
273.95	28.40	10.90	17.50	Vertical
276.35	27.00	10.90	16.10	Horizontal
280.36	20.30	11.10	9.20	Vertical

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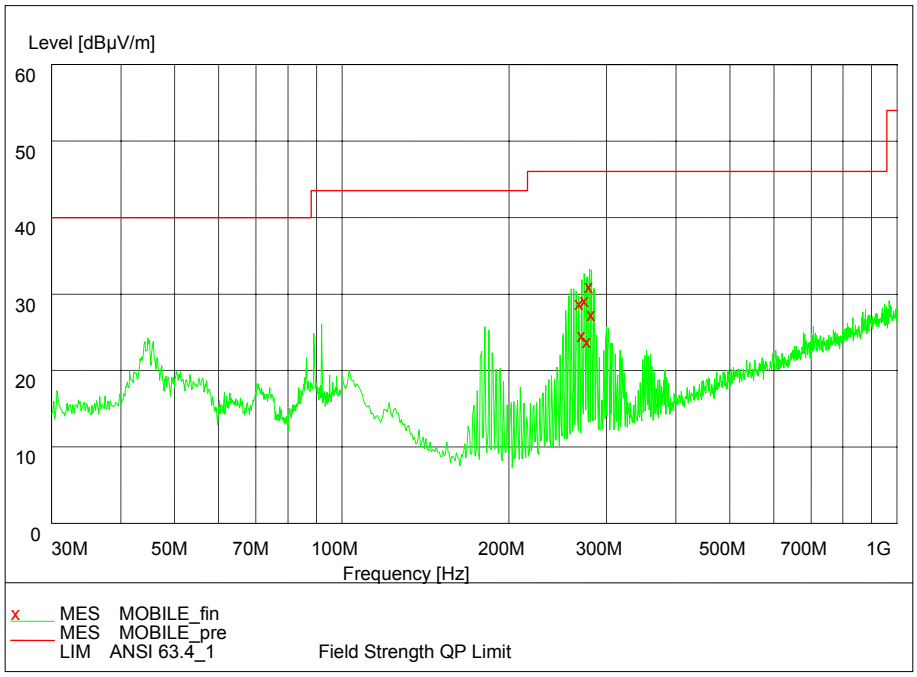
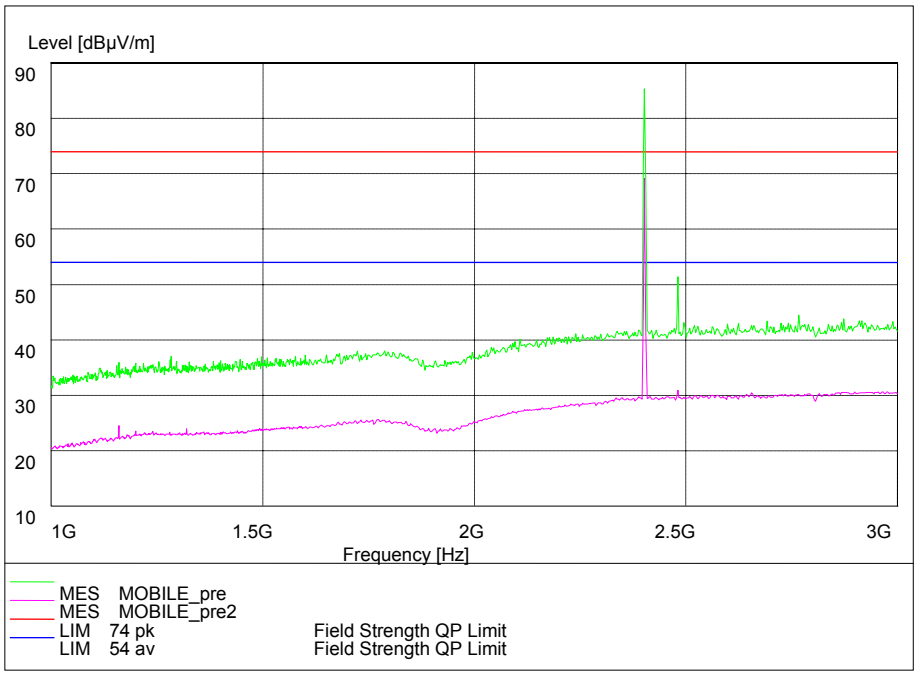
Carrier frequency (MHz): 2441
Channel No.:39



Frequency Range: 30MHz-1000MHz
Detector: QP mode
Modulation type: GFSK



Frequency Range: 1GHz-3GHz
Detector: Av mode and PK mode
Modulation type: GFSK

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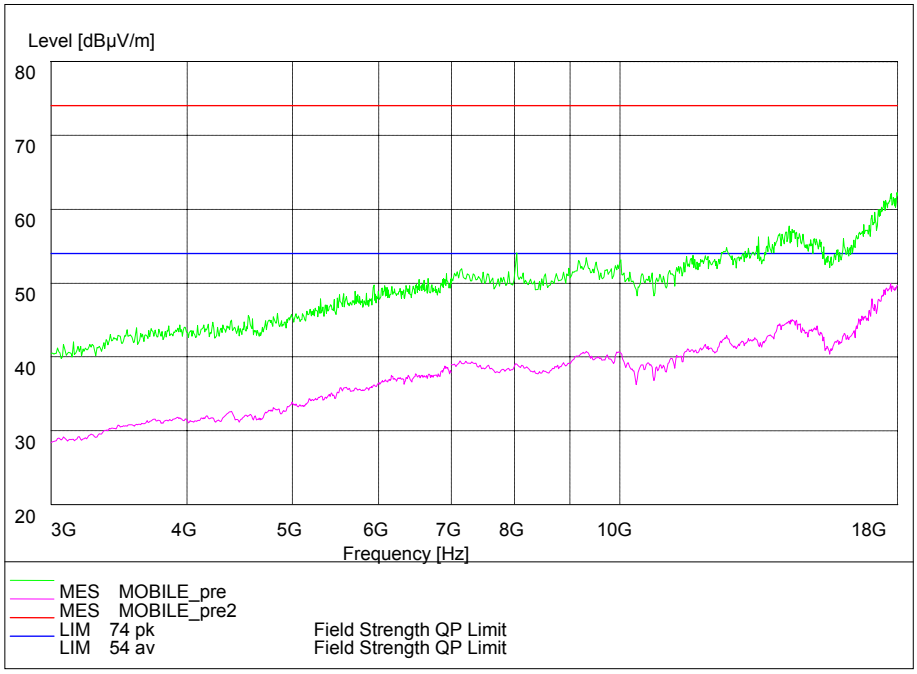
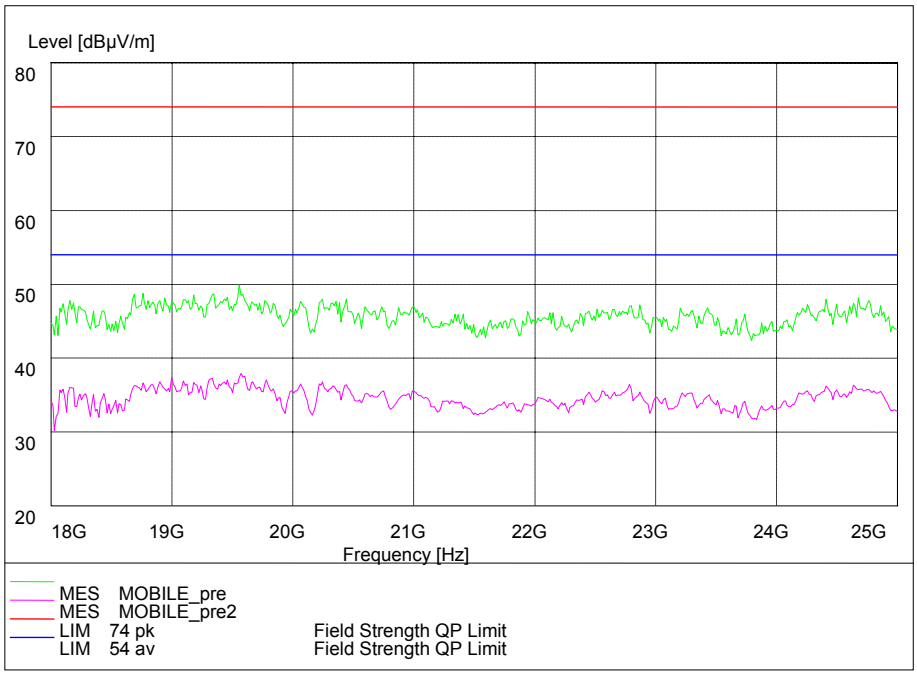


Frequency Range: 3GHz-18GHz
Detector: Av mode and PK mode
Modulation type: GFSK



Frequency Range: 18GHz-25GHz
Detector: Av mode and PK mode
Modulation type: GFSK

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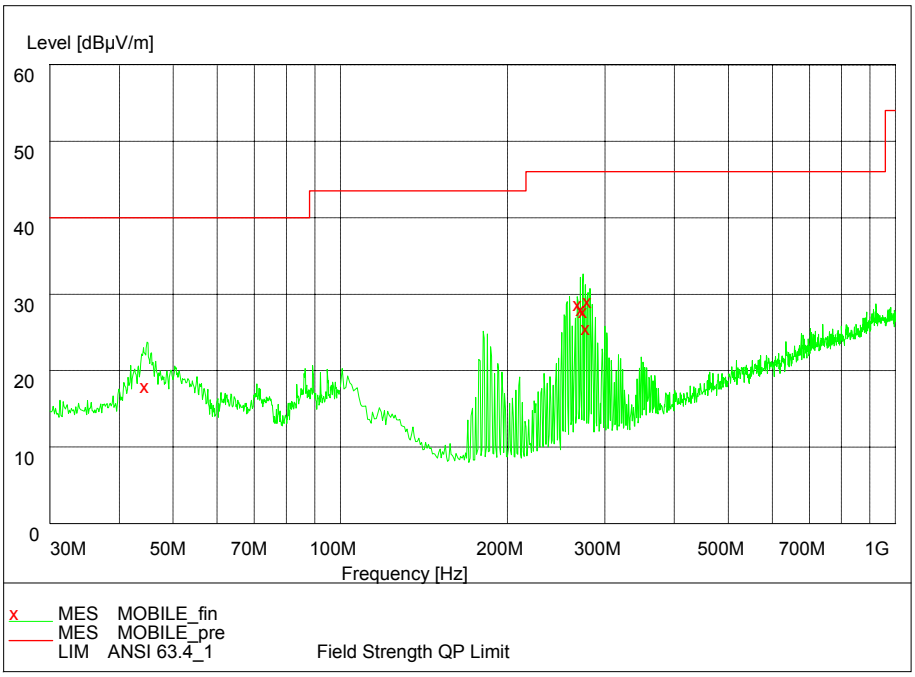
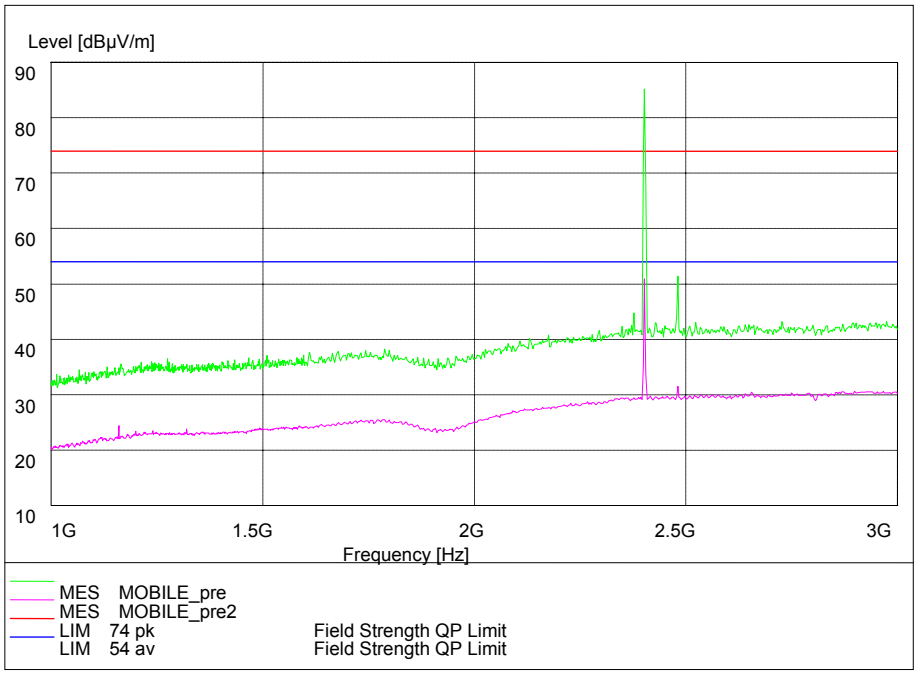


Frequency Range: 30MHz-1000 MHz
Detector: QP mode
Modulation type: π/4DQPSK



Frequency Range: 1GHz-3GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK

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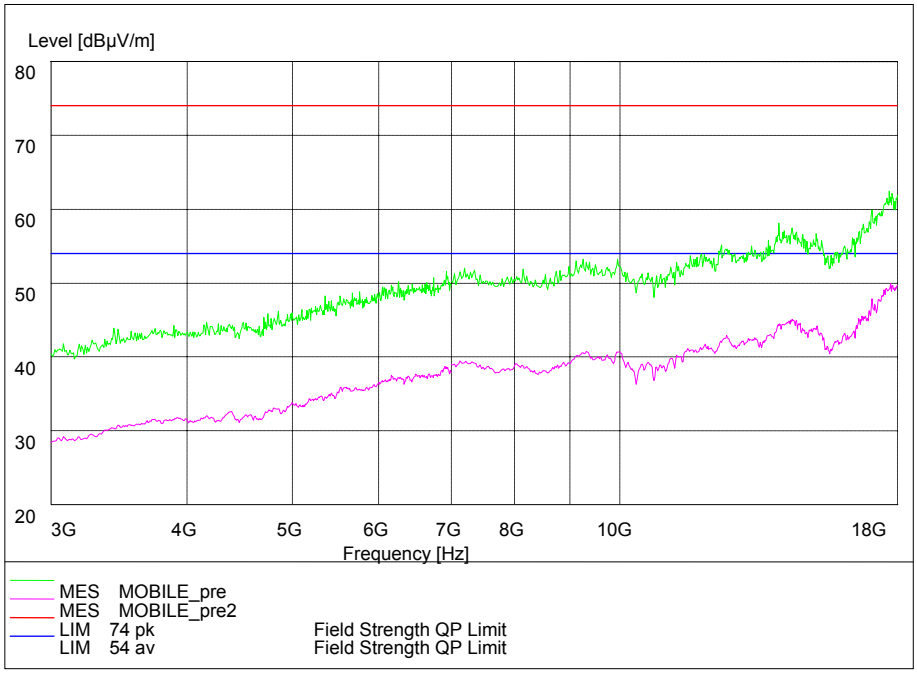
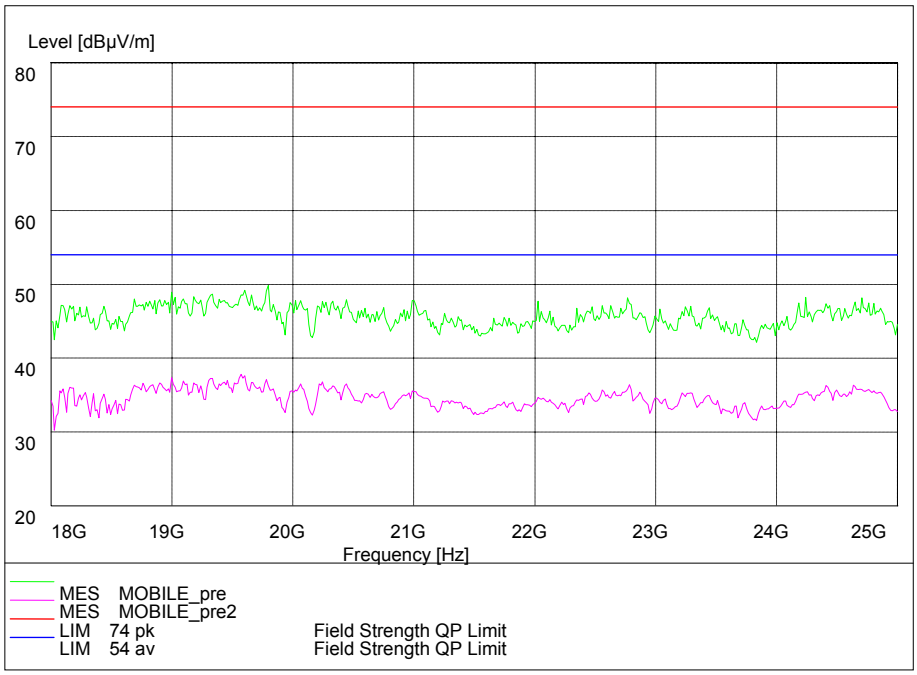


Frequency Range: 3GHz-18GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK



Frequency Range: 18GHz-25GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK

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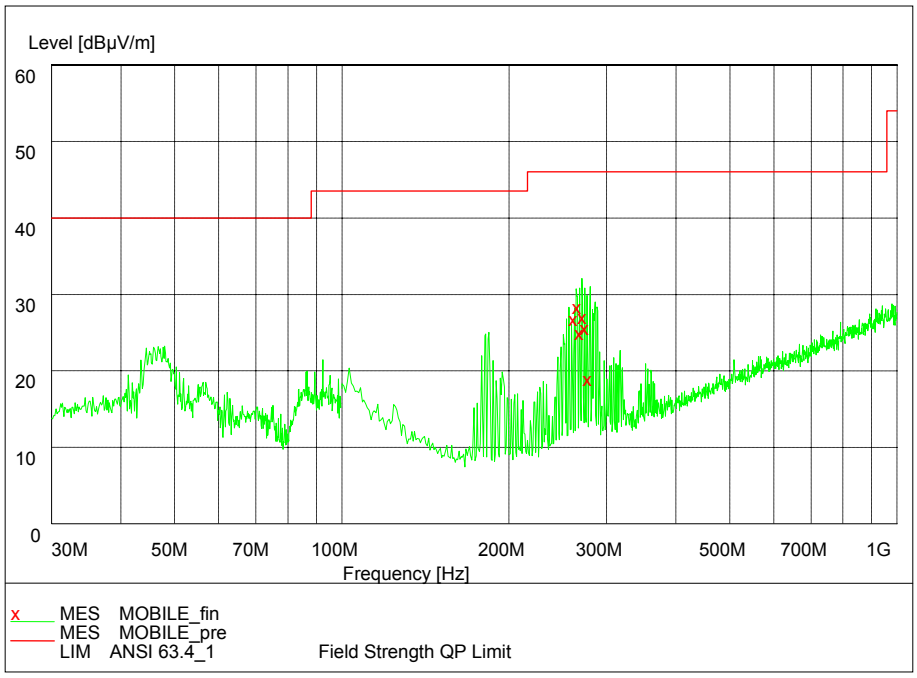
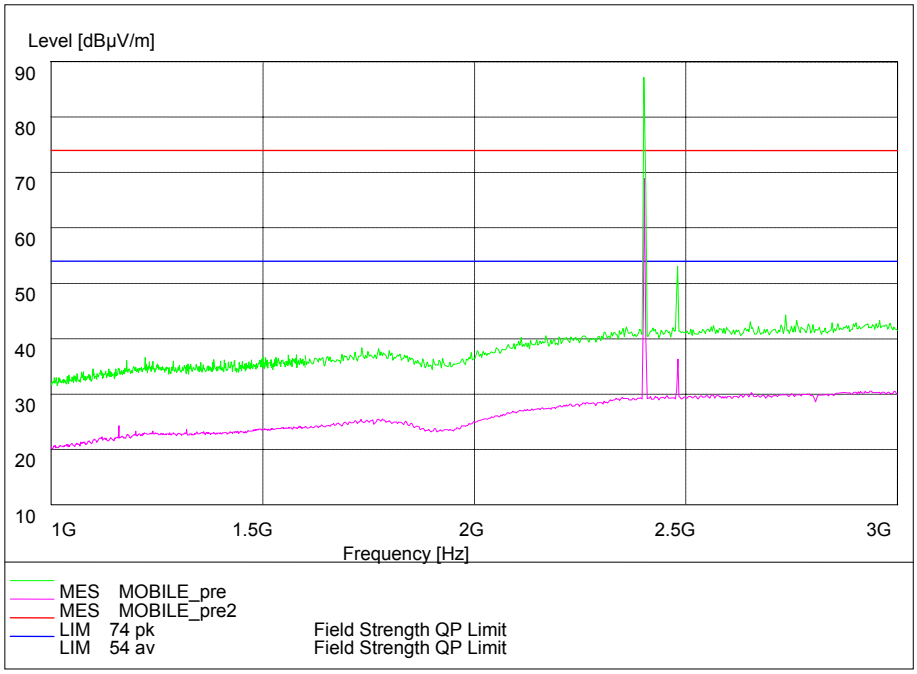


Frequency Range: 30MHz-1000 MHz
Detector: QP mode
Modulation type: 8DPSK



Frequency Range: 1GHz-3GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK

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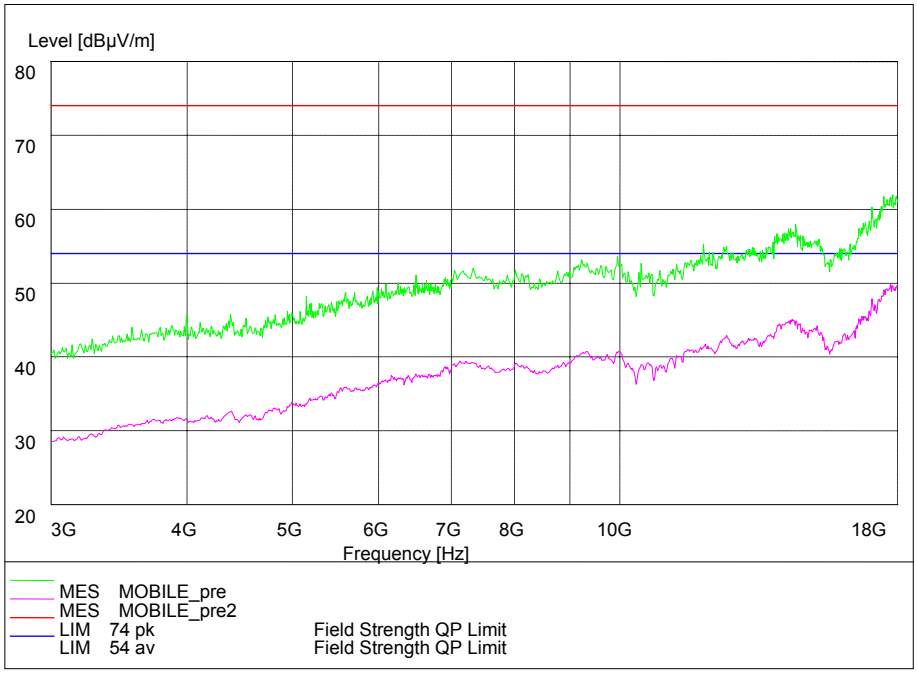
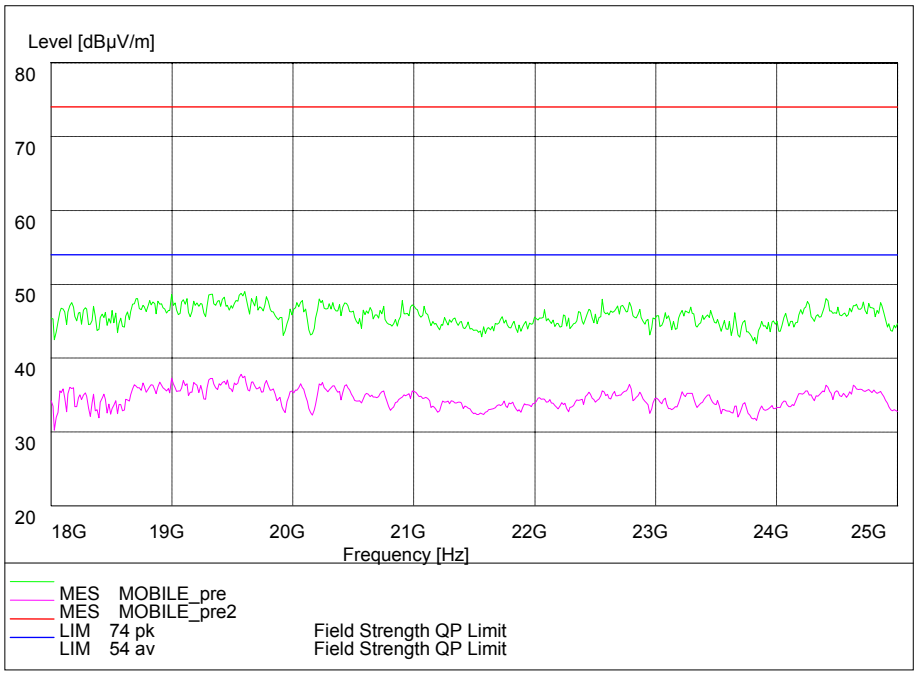


Frequency Range: 3GHz-18GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK



Frequency Range: 18GHz-25GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK

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2.2.5 Band Edge Compliance

2.2.5.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

2.2.5.2 Test Description

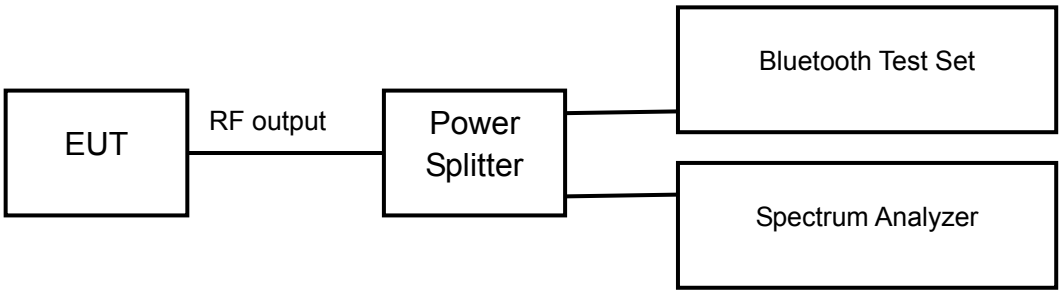
The measurement is made according to ANSI C63.10-2009 Section 6.9.2.

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 2390 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



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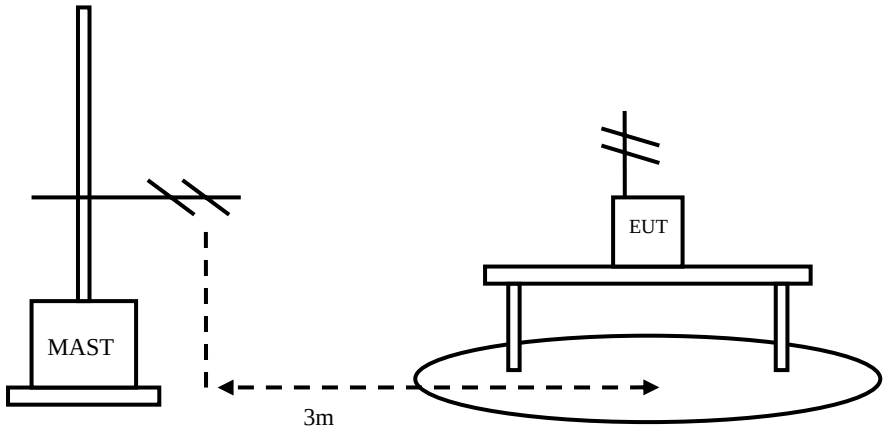
2.2.5.2.2 RF Radiated Measurement

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 Part15.247(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.

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2.2.5.4 Test result

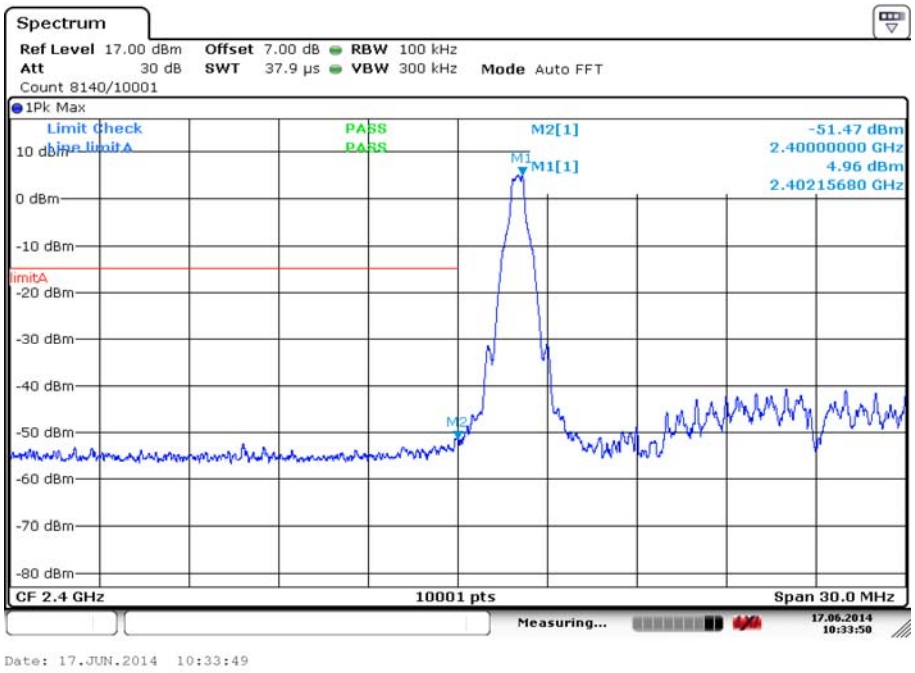
2.2.5.4.1 RF Conducted Measurement

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

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm
2400	Hopping OFF	-51.47	4.96	-15.04
2400	Hopping ON	-53.91	5.65	-14.35

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

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm
2483.5	Hopping OFF	-54.17	6.62	-13.38
2483.5	Hopping ON	-55.92	6.64	-13.36



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

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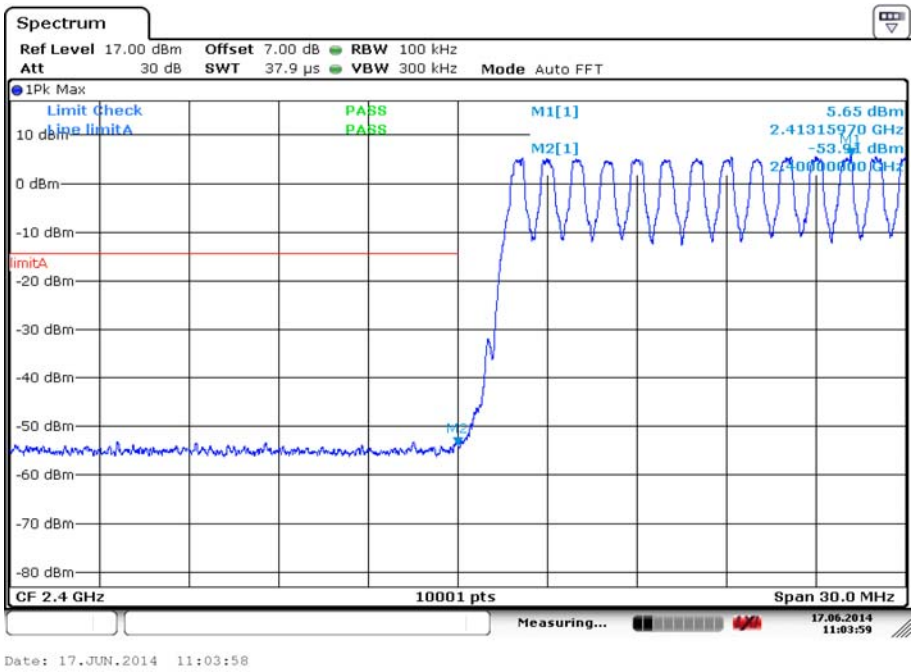
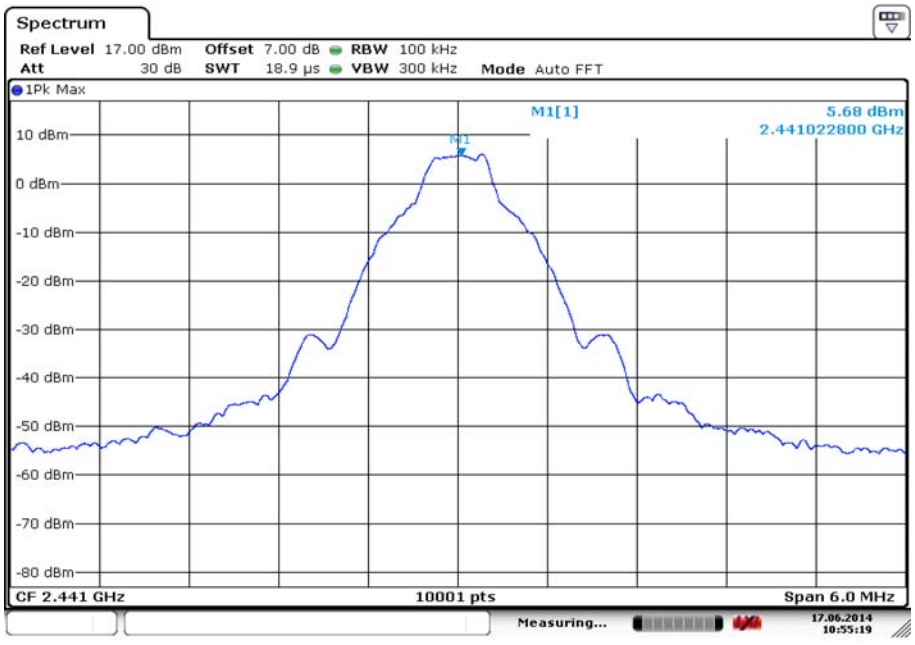


Date: 17.JUN.2014 11:03:58

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



Date: 17.JUN.2014 10:55:18

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

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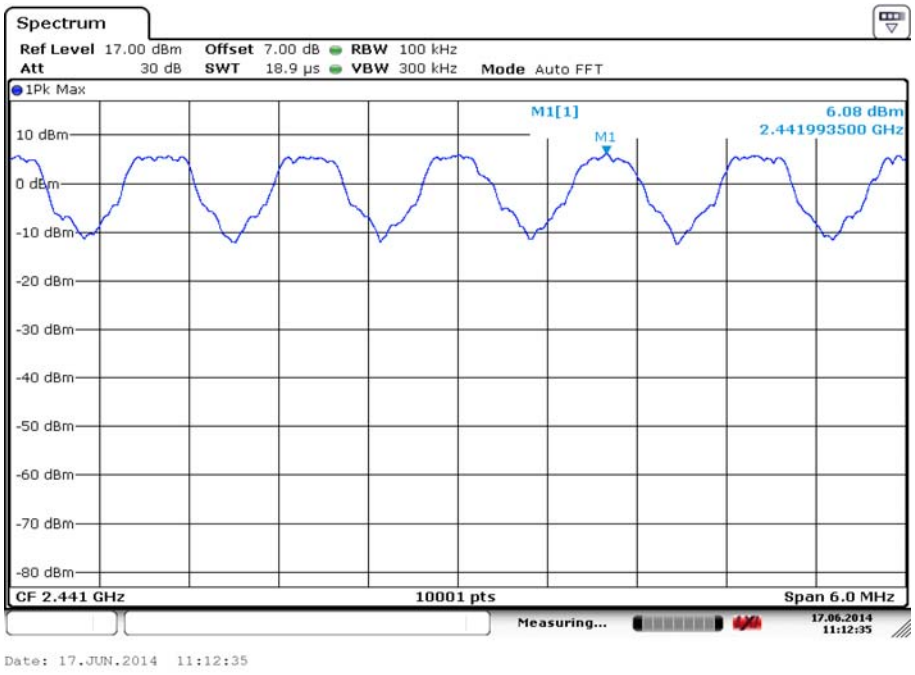
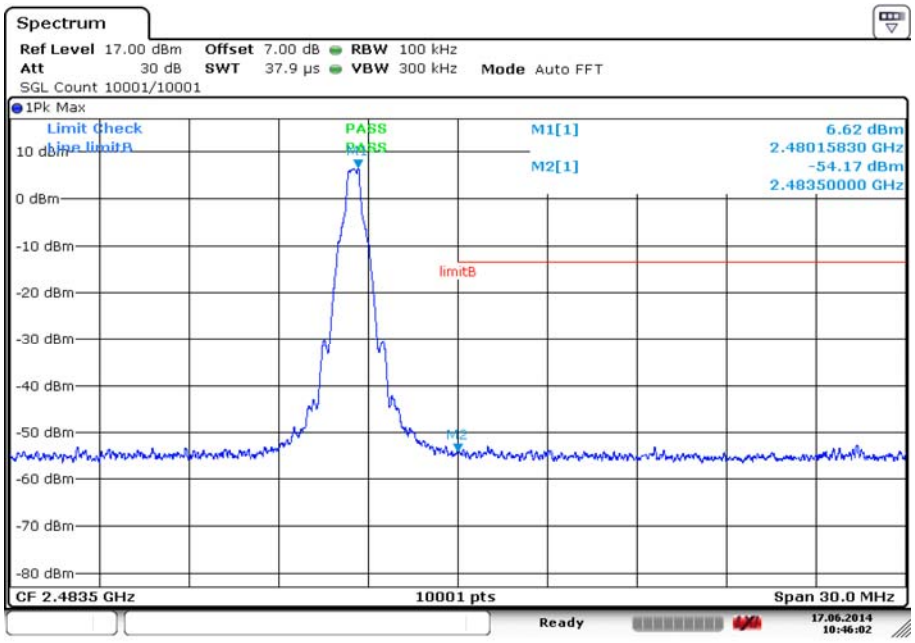


Date: 17.JUN.2014 11:12:35

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



Date: 17.JUN.2014 10:46:02

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

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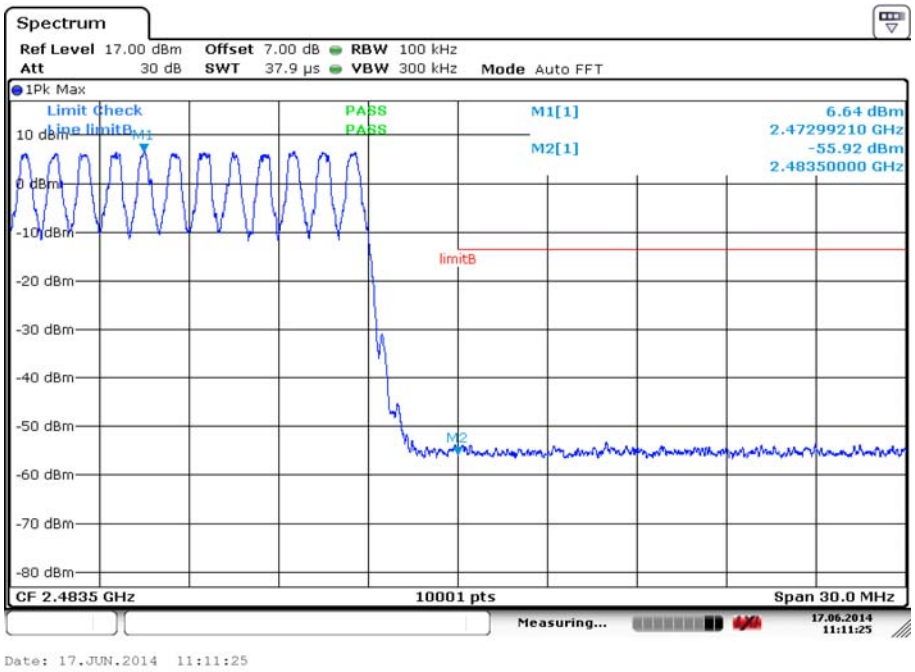

Carrier frequency (MHz): 2480
Channel No.:78, Hopping ON
Modulation type: GFSK

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

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit DBm
2400	Hopping OFF	-51.22	4.13	-15.87
2400	Hopping ON	-52.73	4.70	-15.30

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

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm
2483.5	Hopping OFF	-55.32	5.83	-14.17
2483.5	Hopping ON	-54.30	5.92	-14.08

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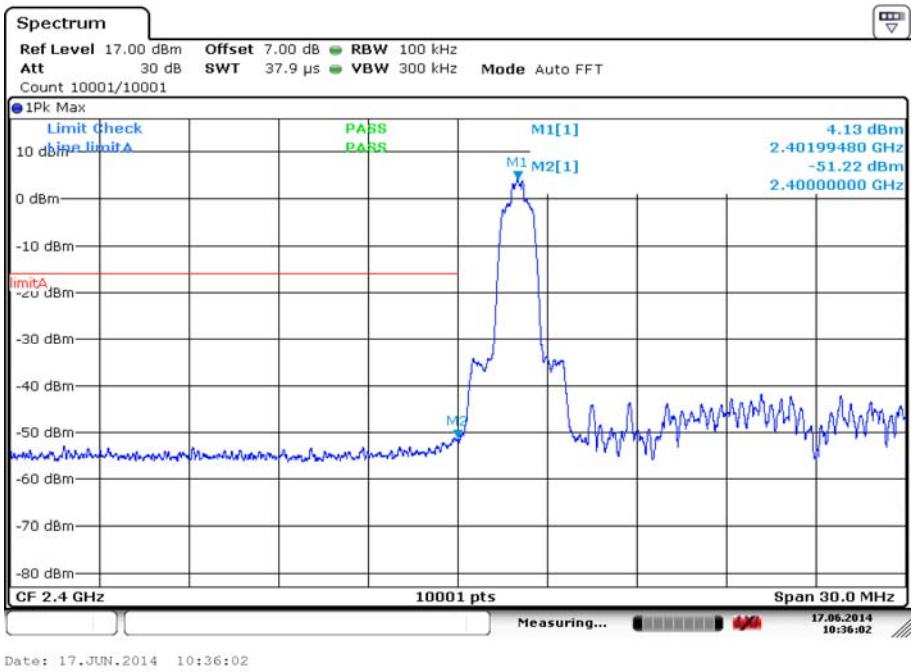
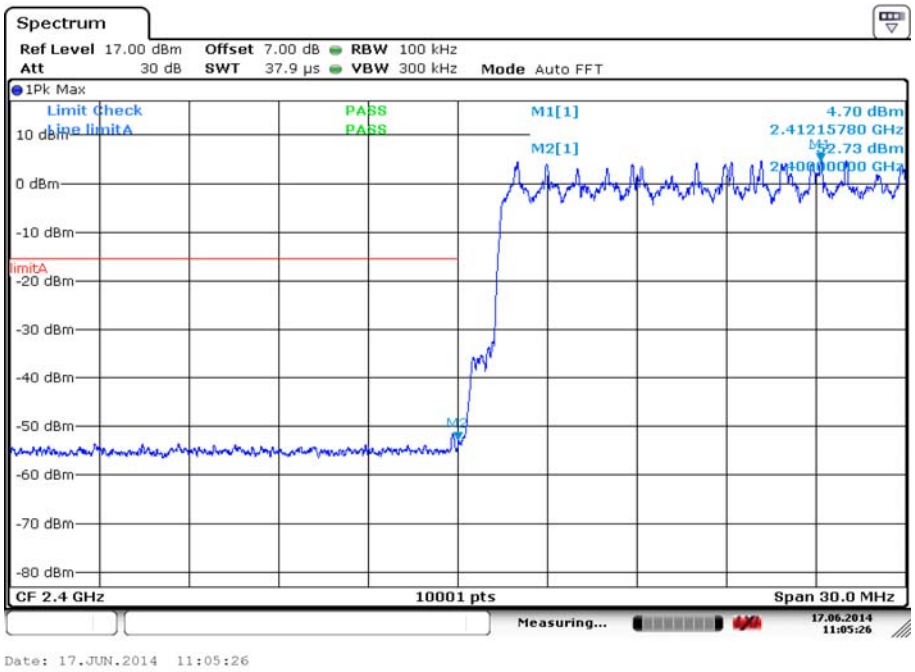


Carrier frequency (MHz): 2402
Channel No.:0, Hopping OFF
Modulation type: π/4DQPSK



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

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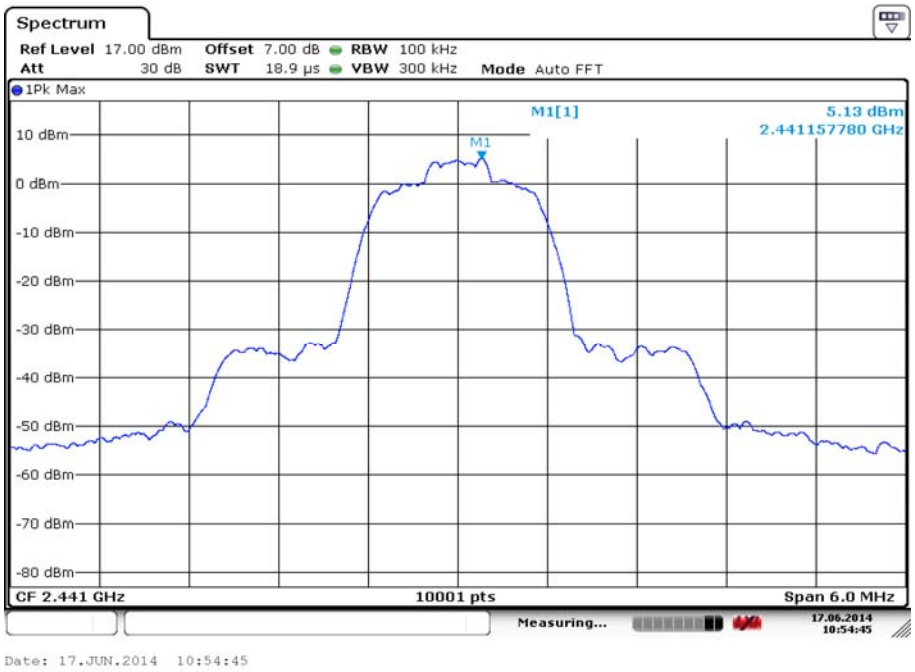
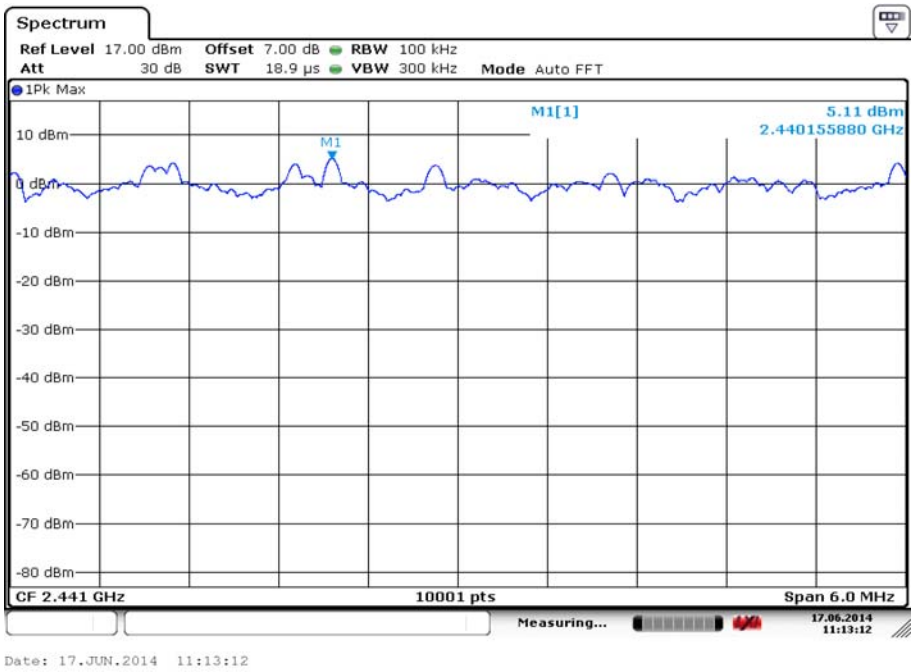


Carrier frequency (MHz): 2441
Channel No.:39, Hopping OFF
Modulation type: π/4DQPSK



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

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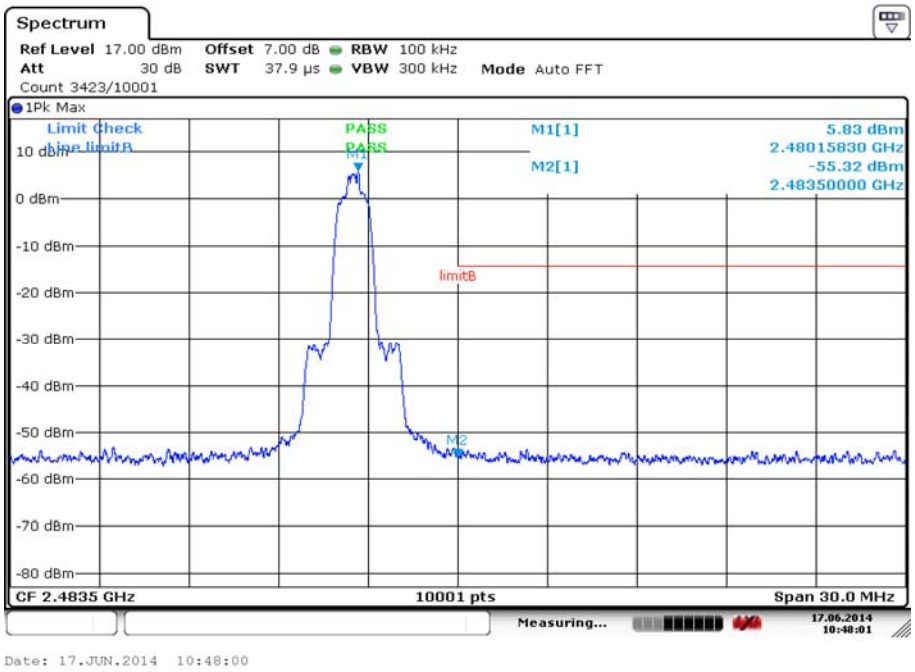
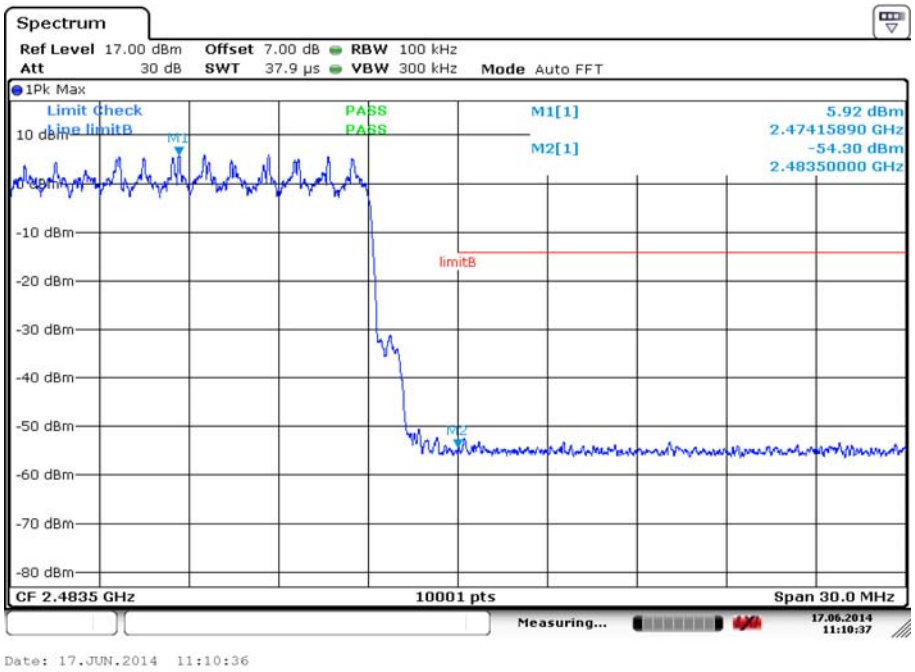


Carrier frequency (MHz): 2480
Channel No.:78, Hopping OFF
Modulation type: π/4DQPSK



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

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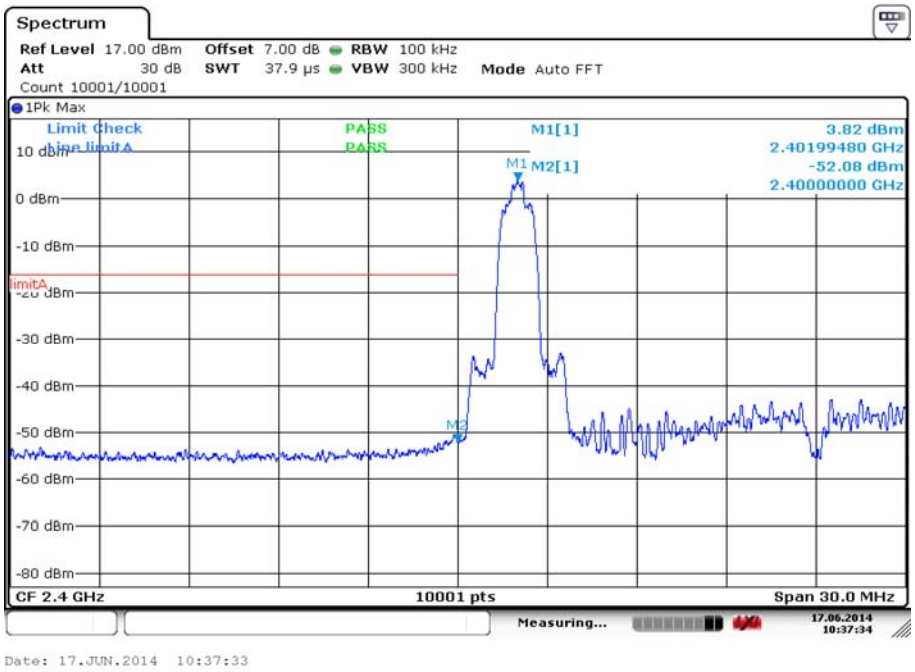
Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: 8DPSK

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm
2400	Hopping OFF	-52.08	3.82	-16.18
2400	Hopping ON	-52.33	4.39	-15.61

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

Frequency MHz	Hopping Mode	Measured value dBm	Reference value dBm	Limit dBm
2483.5	Hopping OFF	-53.01	5.31	-14.69
2483.5	Hopping ON	-55.20	5.84	-14.16



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

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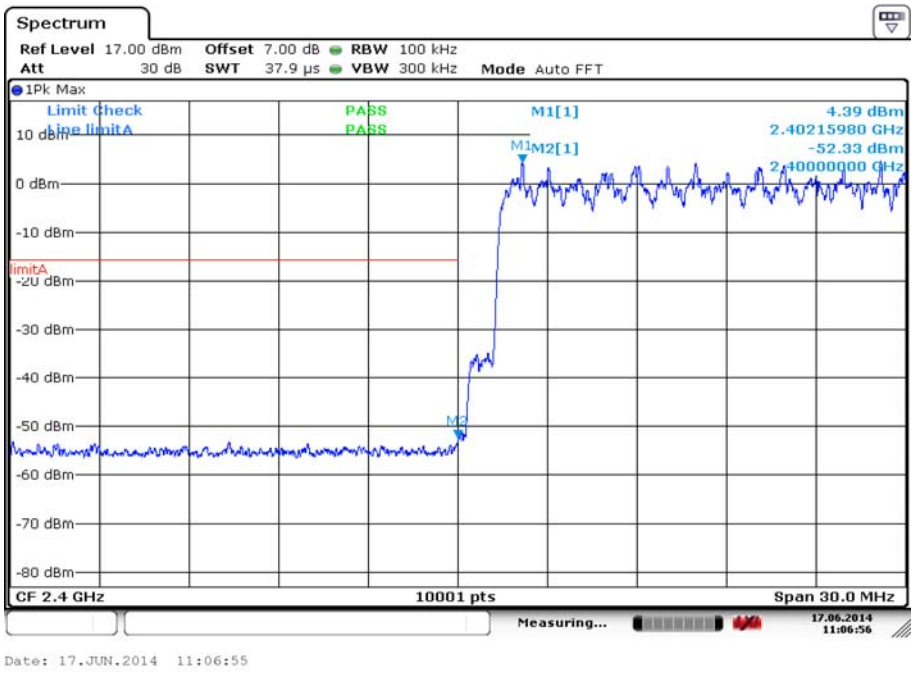
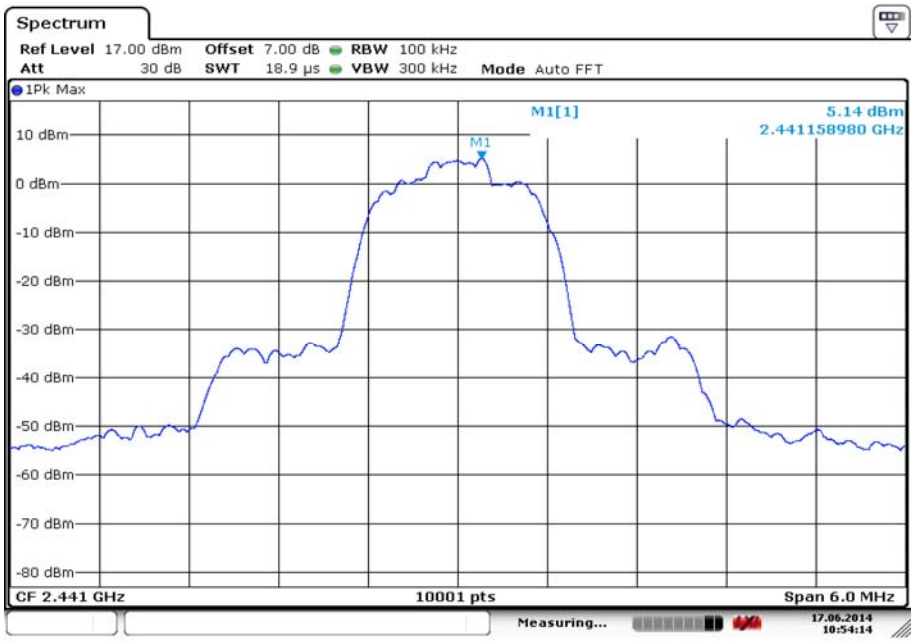


Date: 17.JUN.2014 11:06:55

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



Date: 17.JUN.2014 10:54:14

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

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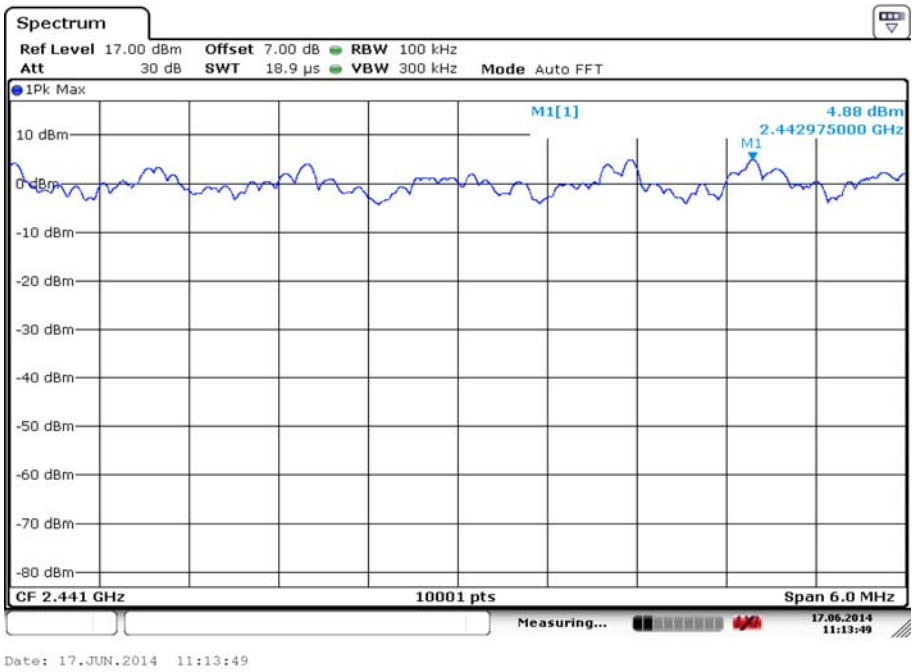
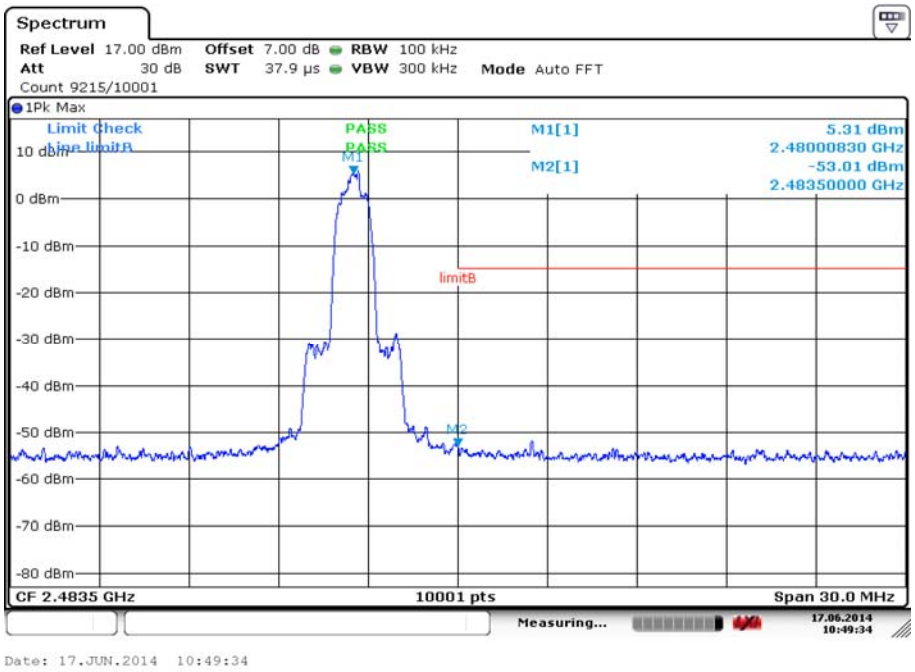


Carrier frequency (MHz): 2441
Channel No.:39, Hopping ON
Modulation type: 8DPSK



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

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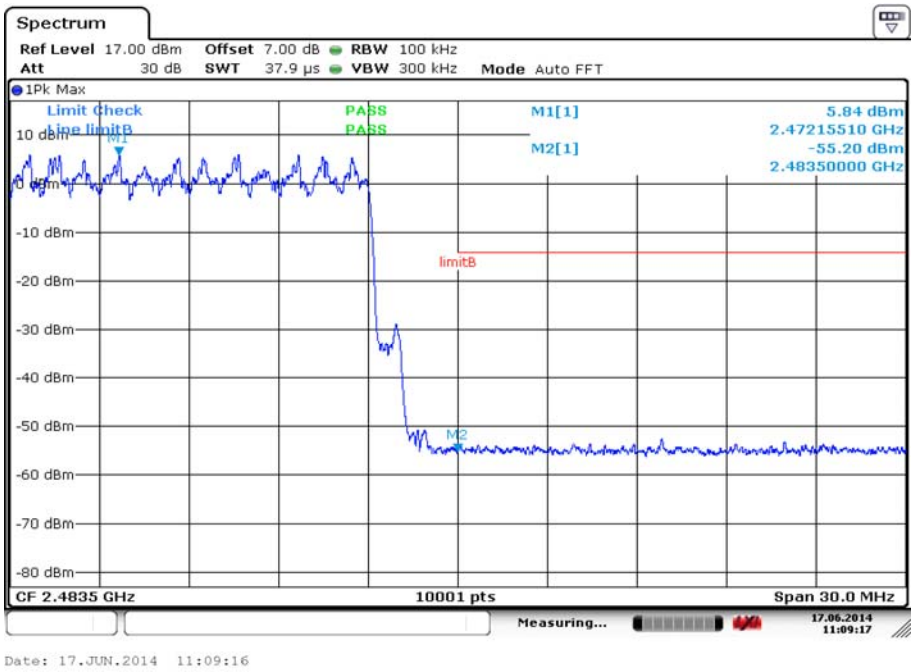

Carrier frequency (MHz): 2480
Channel No.:78, Hopping ON
Modulation type: 8DPSK

2.2.5.4.2 Radiated Measurement

The worst case attitude: The mobile lay down.

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	98.85	64.85	N/A	N/A	8.9	25.10
2	2390	54.67	20.67	-19.33	74	8.9	25.10

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Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	98.16	64.16	N/A	N/A	8.9	25.10
2	2390	56.29	22.29	-17.71	74	8.9	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	91.43	57.43	N/A	N/A	8.9	25.10
2	2390	42.73	8.73	-11.27	54	8.9	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	91.50	57.50	N/A	N/A	8.9	25.10
2	2390	42.70	8.70	-11.30	54	8.9	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	94.99	60.99	N/A	94.99	8.9	25.10
2	2483.5	55.42	21.42	-18.58	55.42	8.9	25.10

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Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	94.20	60.20	N/A	N/A	8.9	25.10
2	2483.5	57.04	23.04	-16.96	74	8.9	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	92.63	58.63	N/A	N/A	8.90	25.10
2	2483.5	41.85	7.85	-12.15	54.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	92.87	58.87	N/A	N/A	8.90	25.10
2	2483.5	42.63	8.63	-11.37	54.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	99.18	65.18	N/A	N/A	8.90	25.10
2	2390	54.90	20.90	-19.10	74.00	8.90	25.10

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Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	95.87	61.87	N/A	N/A	8.90	25.10
2	2390	56.76	22.76	-17.24	74.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	92.77	58.77	N/A	N/A	8.90	25.10
2	2390	41.45	7.45	-12.55	54.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	92.45	58.45	N/A	N/A	8.90	25.10
2	2390	41.09	7.09	-12.91	54.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	96.98	62.98	N/A	N/A	8.90	25.10
2	2483.5	57.27	23.27	-16.73	74.00	8.90	25.10

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Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	95.57	61.57	N/A	N/A	8.90	25.10
2	2483.5	54.75	20.75	-19.25	74.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	93.75	59.75	N/A	N/A	8.90	25.10
2	2483.5	42.36	8.36	-11.64	54.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	94.24	60.24	N/A	N/A	8.90	25.10
2	2483.5	41.67	7.67	-12.33	54.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	97.67	63.67	N/A	N/A	8.90	25.10
2	2390	57.16	23.16	-16.84	74.00	8.90	25.10

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Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	98.41	64.41	N/A	N/A	8.90	25.10
2	2390	57.45	23.45	-20.35	74.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	91.81	57.81	N/A	N/A	8.90	25.10
2	2390	41.85	7.85	-12.15	54.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	91.15	57.15	N/A	N/A	8.90	25.10
2	2390	42.42	8.42	-11.58	54.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	97.45	63.45	N/A	N/A	8.90	25.10
2	2483.5	56.05	22.05	-17.95	74.00	8.90	25.10

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Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	97.36	63.36	N/A	N/A	8.90	25.10
2	2483.5	57.25	23.25	-16.75	74.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	94.33	60.33	N/A	N/A	8.90	25.10
2	2483.5	42.41	8.41	-11.59	54.00	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	93.12	59.12	N/A	N/A	8.90	25.10
2	2483.5	42.39	8.39	-11.61	54.00	8.90	25.10

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2.2.6 Dwell Time

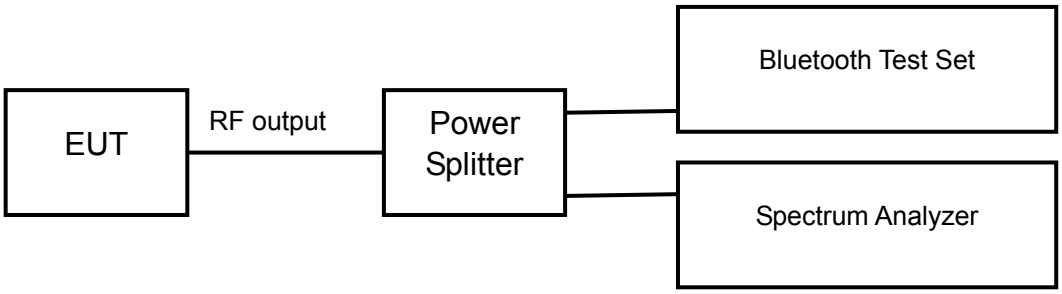
2.2.6.1 Ambient condition

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=1600/2 * 1/s for DH1 packets =800
- hop rate=1600/4 * 1/s for DH3 packets =400
- hop rate=1600/6 * 1/s for DH5 packets =266.67
- 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 Part15.247(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.

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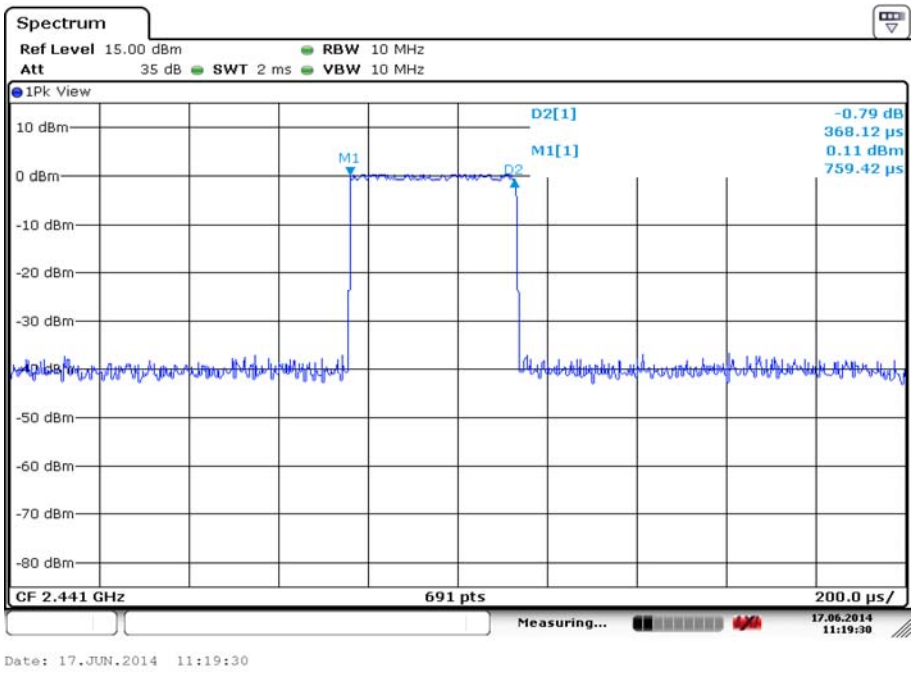
2.2.6.4 Test result

Modulation type: GFSK

Packet type	Time slot length ms	Dwell time	Dwell time ms
DH1	0.3681	time slot length *31.6 *1600/2 /79	117.79
DH3	1.6290	time slot length * 31.6 *1600/4 /79	260.64
DH5	2.8754	time slot length * 31.6 *1600/6 /79	306.71



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

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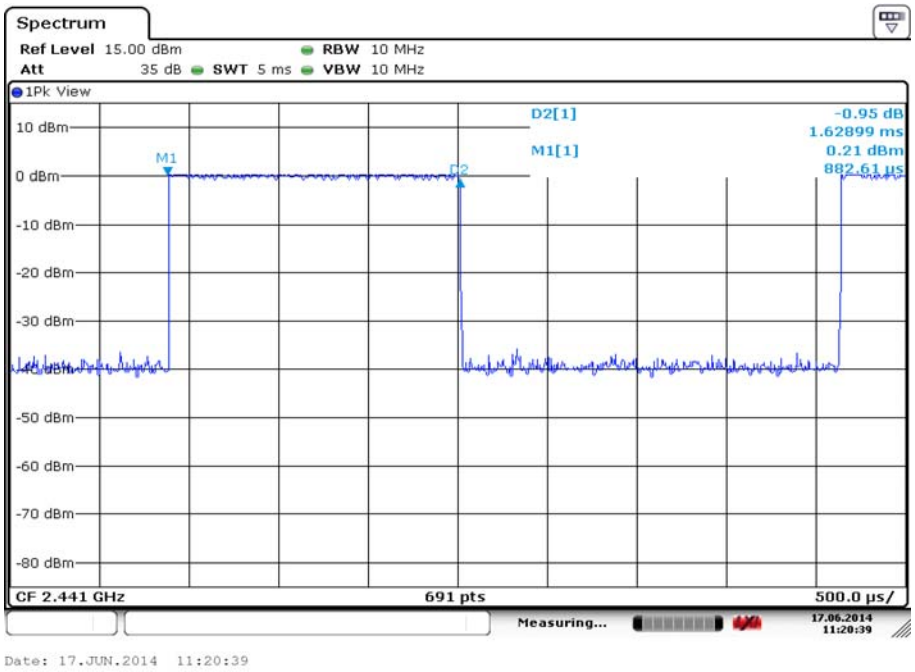
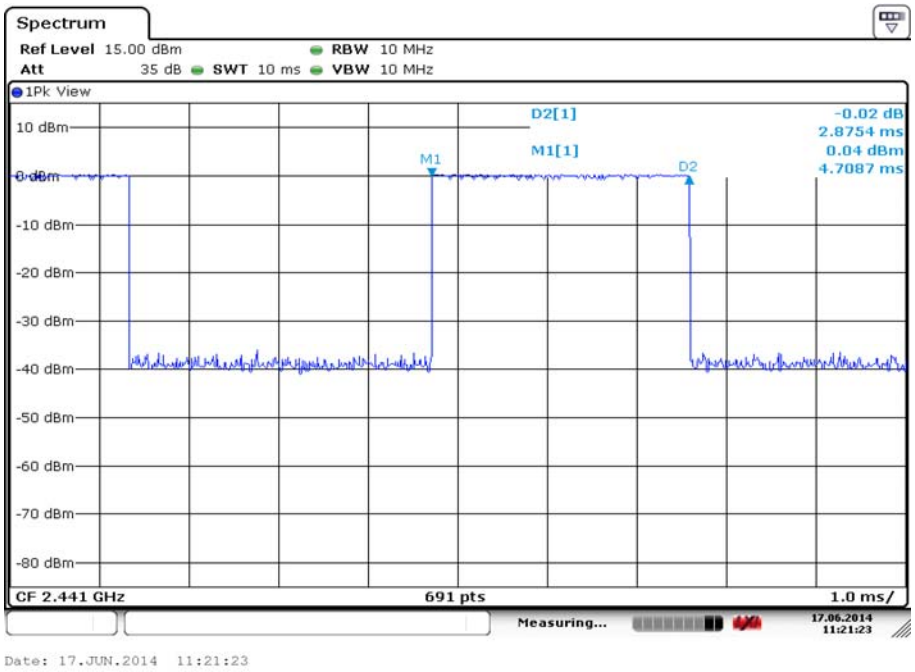


Carrier frequency (MHz): 2441
Packet type: DH3
Modulation type: GFSK



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

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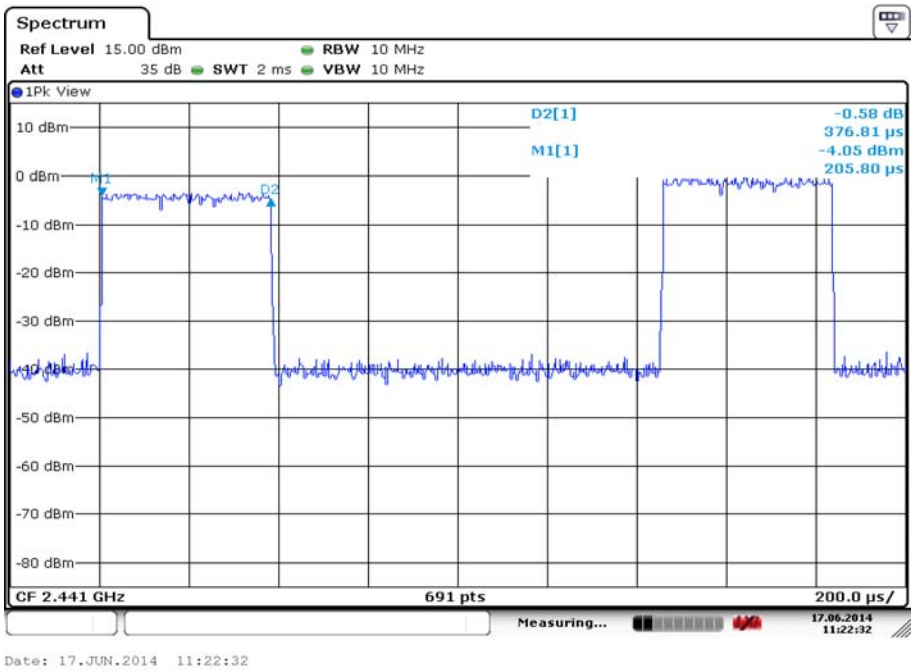
Modulation type: π/4DQPSK

Packet type	Time slot length ms	Dwell time	Dwell time ms
DH1	0.3768	time slot length *31.6 *1600/2 /79	120.58
DH3	1.6333	time slot length * 31.6 *1600/4 /79	261.33
DH5	2.8725	time slot length * 31.6 *1600/6 /79	306.40



Carrier frequency (MHz): 2441
Packet type: DH1
Modulation type: π/4DQPSK

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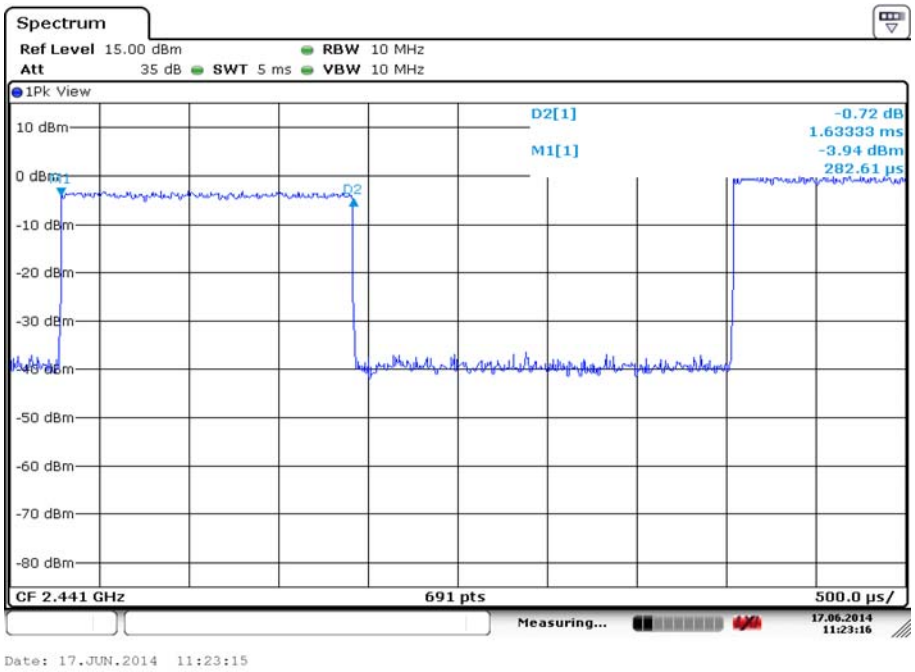
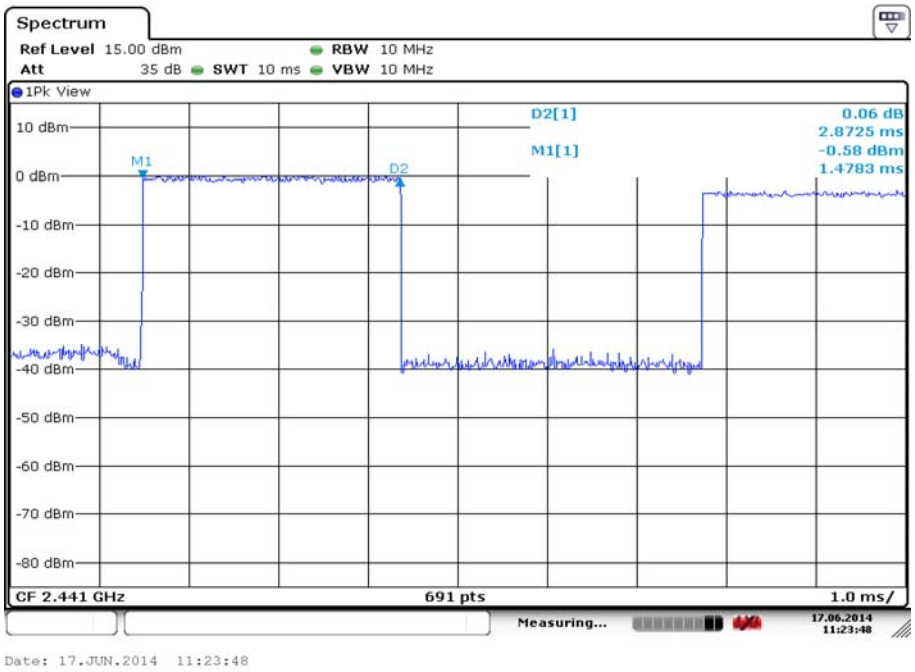


Carrier frequency (MHz): 2441
Packet type: DH3
Modulation type: π/4DQPSK



Carrier frequency (MHz): 2441
Packet type: DH5
Modulation type: π/4DQPSK

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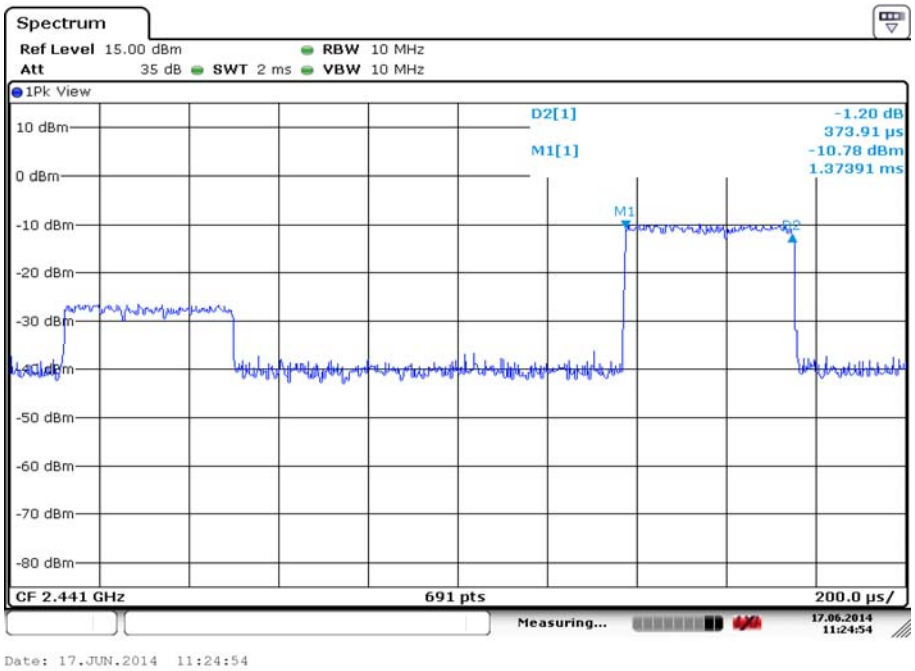
Modulation type: 8DPSK

Packet type	Time slot length ms	Dwell time	Dwell time ms
DH1	0.3739	time slot length *31.6 *1600/2 /79	119.65
DH3	0.7652	time slot length * 31.6 *1600/4 /79	122.43
DH5	2.8855	time slot length * 31.6 *1600/6 /79	307.79



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

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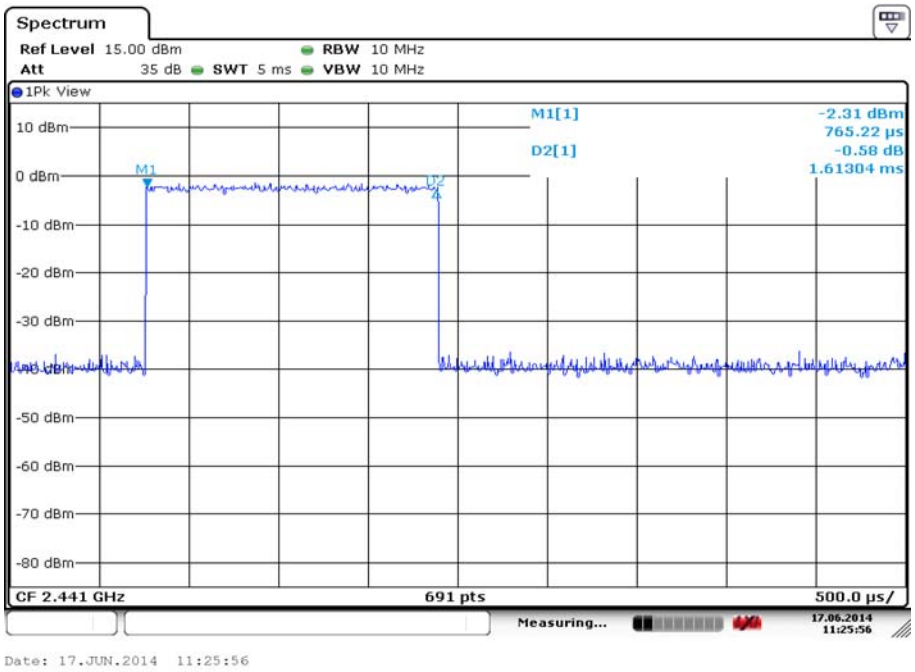
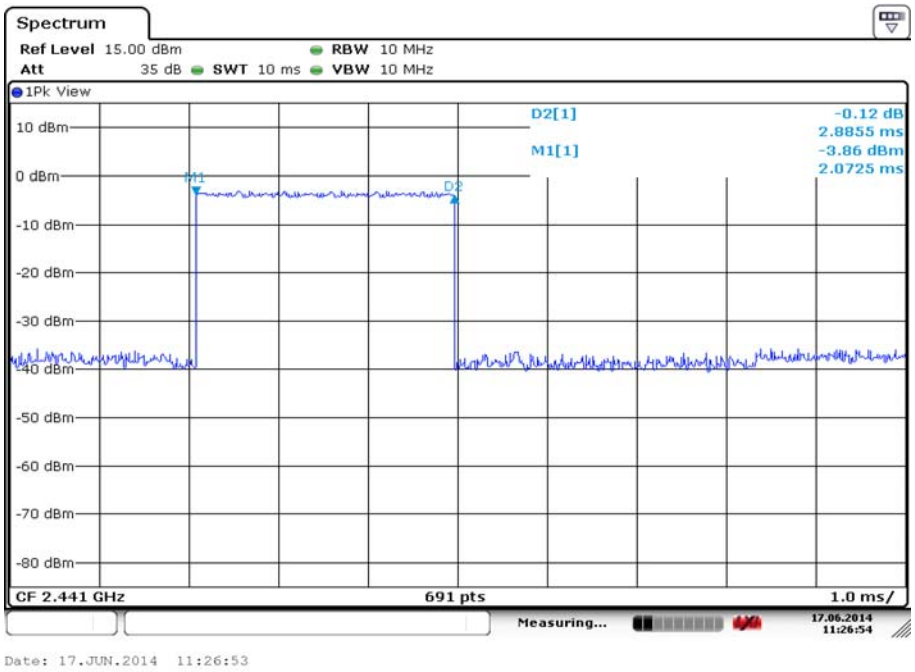


Carrier frequency (MHz): 2441
Packet type:DH3
Modulation type: 8DPSK



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

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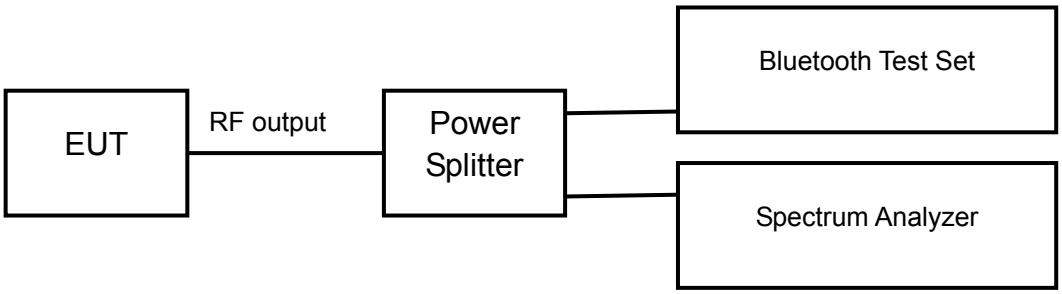
2.2.7 Channel Separation

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-Max hold
- Span: 3 MHz
- Centre Frequency: 2441 MHz
- Resolution Bandwidth (RBW): 30 kHz
- Video Bandwidth (VBW): 1 MHz
- Sweep Time: Coupled



2.2.7.3 Test limit

FCC Part15.247(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.

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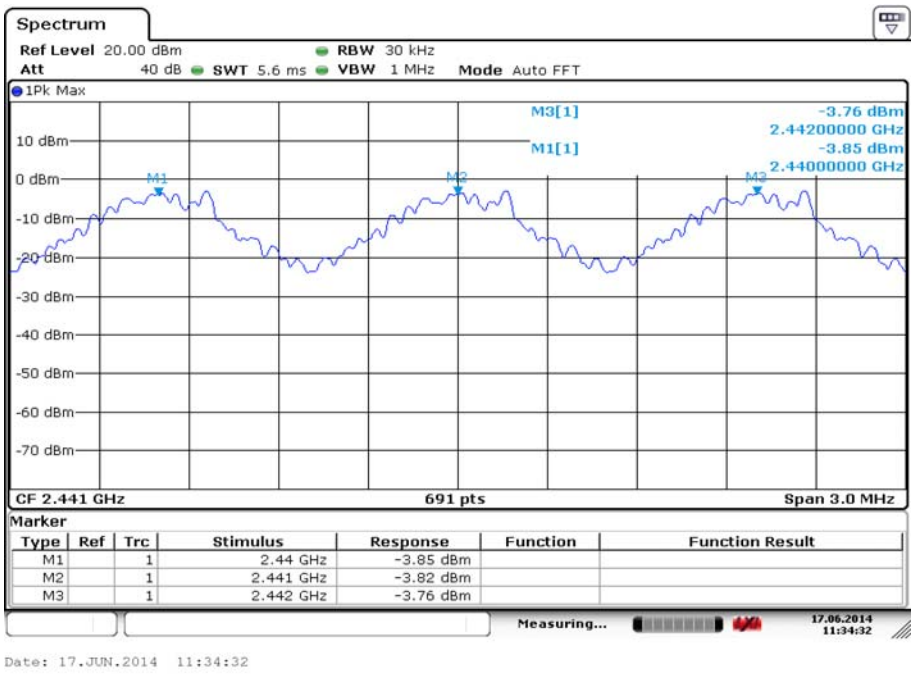
2.2.7.4 Test result

Op-mode	Channel separation MHz
Hopping mode	1



Op-mode: Hopping mode

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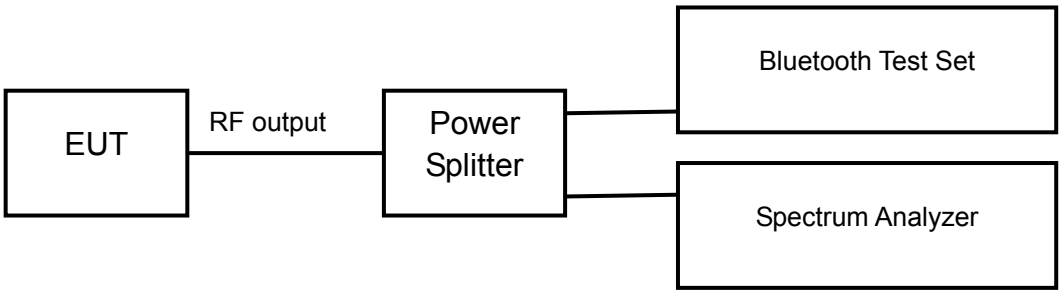
2.2.8 Number of Hopping Frequencies

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): 30 kHz
- Video Bandwidth (VBW): 1 MHz
- Sweep Time: Coupled



2.2.8.3 Test limit

FCC Part15.247(a)(1)(iii)
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

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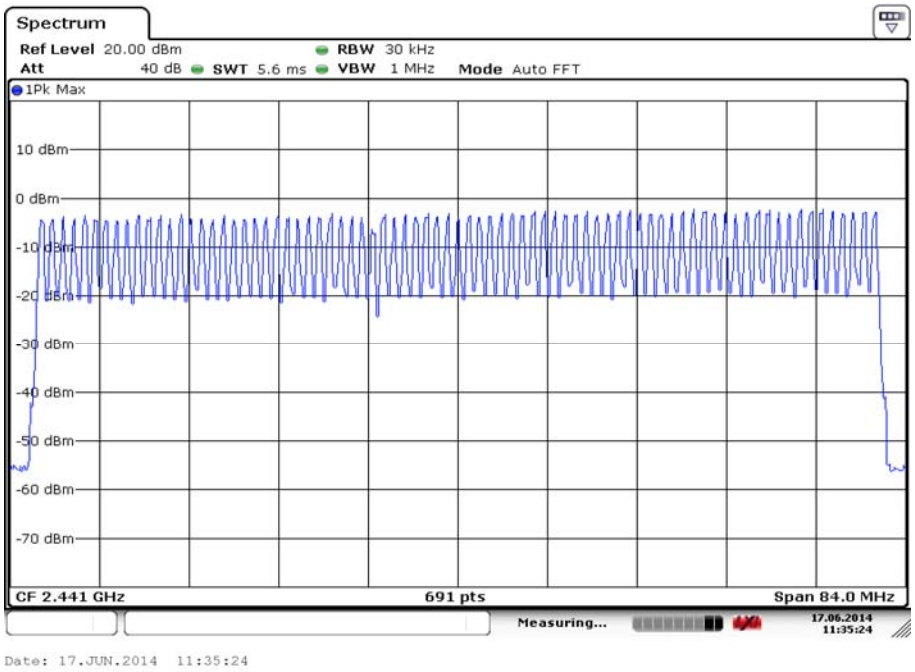
2.2.8.4 Test result

Op-mode	Result
Hopping mode	79



Op-mode: Hopping mode

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2.2.9 AC Power line Conducted Emission

2.2.9.1 Ambient condition

Temperature	Relative humidity	Pressure
20°C	35%	101.4kPa

2.2.9.2 Test limit

FCC Part15.207

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 ANSI C63.4-2009

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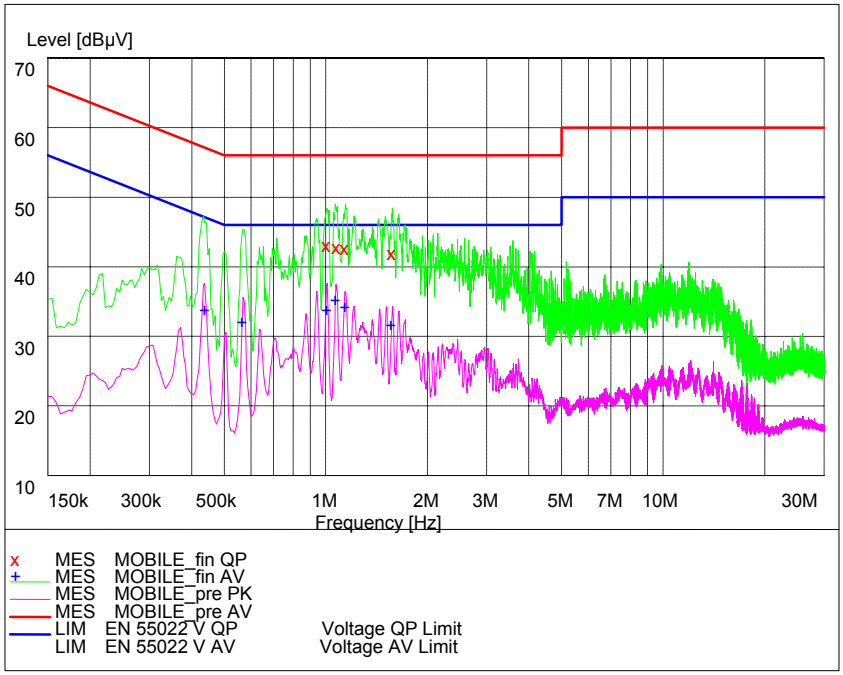
2.2.9.3 Test result

Noise Level of the Measuring Instrument



L+N Line

MEASUREMENT RESULT: "MOBILE_fin AV"

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.438000	35.40	20.3	47	11.7	---	---
0.564000	33.80	20.3	46	12.2	---	---
1.005000	35.40	20.2	46	10.6	---	---
1.068000	36.90	20.2	46	9.1	---	---
1.140000	35.80	20.2	46	10.2	---	---
1.563000	33.30	20.2	46	12.7	---	---

MEASUREMENT RESULT: "MOBILE_fin QP"

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
1.005000	44.80	20.2	56	11.2	---	---
1.077000	44.50	20.2	56	11.5	---	---
1.140000	44.40	20.2	56	11.6	---	---
1.572000	43.70	20.2	56	12.3	---	---

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2.3. Measurement Uncertainty

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Spurious emissions	30MHz～1GHz	2.83dB
	1GHz～12.75GHz	2.50dB
	12.75GHz～25GHz	2.75dB

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2.4. List of test equipment

No.	Name/Model	Manufacturer	S/N	Cal Due date
1.	Spectrum Analyzer FSV	ROHDE&SCHWARZ	101065	2014.8
2.	Signal Generator MG3700A	Anritsu	6200677084	2014.8
3.	Bluetooth Test Set MT8852B	Anritsu	1142010	2015.2
4.	Cable 104EA	SUCOFLEX	9272/4EA	2014.8
5.	Cable 104EA	SUCOFLEX	9266/4EA	2014.8
6.	Power Splitter 11850C	Agilent	026057	2014.8
7.	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----
8.	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	-----
9.	Turn table Diameter:1m	HD	-----	-----
10.	Turn table Diameter:5m	HD	-----	-----
11.	Antenna master FAC(MA4.0)	MATURO	-----	-----
12.	Antenna master SAC(MA4.0)	MATURO	-----	-----
13.	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	-----
14.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2014.8
15.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	2014.8
16.	HL562 Ultra log antenna	R&S	100016	2014.8
17.	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2014.8
18.	ESI 40 EMI test receiver	R&S	100015	2014.8
19.	Radio tester	CMU 200	114667	2014.8
20.	ESCS30 EMI test receiver	R&S	100029	2014.8
21.	HL562 Receive antenna	R&S	100167	2014.8
22.	ESH3-Z5 LISN	R&S	100020	2014.8

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Appendix

Appendix1 Test Setup

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