



**SGS-CSTC Standards
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Report No.: SHEM121000145301
Page 1 of 74

TEST REPORT

Application No. : SHEM1210001453RF
Applicant: Linquet Technologies Inc
FCC ID: QY3-KEYCHAIN
IC ID: 10726A-KEYCHAIN
Equipment Under Test (EUT):
Product Name: Bluetooth Key Chain
Model: BT
Brand Name: Linquet
Standards: FCC PART 15 Subpart C: 2011
RSS-210 Issue 8 (December 2010)
RSS-Gen Issue 3 (December 2010)
Date of Receipt: Oct. 18, 2012
Date of Test: Oct. 23, 2012 to Nov. 04, 2012
Date of Issue: Nov. 06, 2012

| | |
|----------------------|---------------|
| Test Result : | PASS * |
|----------------------|---------------|

*In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Tony Wu

E&E Section Manager

SGS-CSTC (Shanghai) Co., Ltd.

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

| Revision Record | | | | |
|-----------------|---------|--------------|----------|----------|
| Version | Chapter | Date | Modifier | Remark |
| 00 | | Nov 06, 2012 | | Original |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|--------------------------|--|--------------|--|---------------------|
| Authorized for issue by: | | | | |
| Engineer | | Zenger Zhang | | <i>Zenger Zhang</i> |
| | | Print Name | | Date (Nov 03, 2012) |
| Clerk | | Zenger Zhang | | <i>Zenger Zhang</i> |
| | | Print Name | | Date(Nov 05, 2012) |
| Reviewer | | Jim Xu | | <i>Jim Xu</i> |
| | | Print Name | | Date(Nov 06, 2012) |



3 Test Summary

| Test items | FCC REFERENCE | IC REFERENCE | Result |
|---|-------------------------------|---------------------------------|--------|
| Antenna Requirement | Section 15.247 (c) | --- | PASS |
| 20dB Bandwidth | Section 15.247 (a)(1) | RSS-Gen Issue 3 Clause 4.6.1 | PASS |
| Carrier Frequencies Separated | Section 15.247(a)(1) | RSS-210 Issue 8 Annex 8.1(b) | PASS |
| Hopping Channel Number | Section 15.247(a)(1)(iii) | RSS-210 Issue 8 Annex 8.1(d) | PASS |
| Dwell Time | Section 15.247(a)(1)(iii) | RSS-210 Issue 8 Annex 8.1(d) | PASS |
| Maximum Peak Output Power | Section 15.247(b)(1) | RSS-210 Issue 8 Annex 8.4(2) | PASS |
| RF Exposure Compliance Requirement | 15.247(b)(4) | RSS-Gen Issue 3 Clause 5.6 | PASS |
| Conducted Spurious Emission (30MHz to 25GHz) | &15.247(d) | RSS-210 Issue 8 Annex 8.5 | PASS |
| Radiated Spurious Emission (30MHz to 25GHz) | Section 15.209 &15.247(d) | RSS-210 Issue 8 Annex 8.5 | PASS |
| Band Edges Measurement | Section 15.247 (d) &15.205 | RSS-Gen Issue 3 Clause 7.2.2 | PASS |
| Power line conducted emission | Section 15.207 | RSS-Gen Issue 8 Clause 7.2.4 | PASS |
| Occupied bandwidth | --- | RSS-Gen Issue 3 Clause 4.6.1 | Tested |



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5 General Information

5.1 Client Information

Applicant: Linquet Technologies Inc
Address of Applicant: 2604 - 950 Cambie St, Vancouver, BC, V6B 5X5 Canada
Manufacturer: Brio Technology Ltd.
Address of Manufacturer: 312-8988 Fraserton Court, Burnaby, BC V5J 5H8, Cannada

5.2 General Description of E.U.T.

Product Name Bluetooth Key Chain
Model No: BT
Brand Name: Linquet
Supported Frequency Bands: Bluetooth 2.402GHz to 2.480GHz
Test Frequency Bands: 2.402GHz to 2.480GHz

5.3 Details of E.U.T.

Bluetooth Version: V2.1 (EDR)
Modulation Type: GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna Type: Internal antenna
Antenna Gain: -0.5dBi
Battery: Fix Battery---DC 3.3V
Battery Charge: By Micro USB Cable

5.4 Standards Applicable for Testing

The standard used were FCC PART 15 Subpart C: 2011, ANSI C63.10: 2009. RSS-210 Issue 8, RSS-Gen Issue 3.

5.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
No.588 West Jindu Road, Songjiang District, Shanghai, China.201612.
Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2015-02-22.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively. Date of Registration: 2012-05-29. Date of Expiry: 2015-05-28.



6 Equipments Used during Test

| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due date |
|------|------------------------------|---------------------------------------|---------------------------------------|-----------------|------------|---------------|
| 1 | EMI test receiver | Rohde & Schwarz | ESU40 | 100109 | 2012-06-03 | 2013-06-01 |
| 2 | Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-679 | 2012-06-03 | 2013-06-01 |
| 3 | Horn Antenna | Rohde & Schwarz | HF906 | 100284 | 2012-06-03 | 2013-06-01 |
| 4 | ANTENNA | SCHWARZBECK | VULB9168 | 9168-313 | 2012-06-03 | 2013-06-01 |
| 5 | Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170 373 | 2012-03-15 | 2013-03-14 |
| 6 | Ultra broadband antenna | Rohde & Schwarz | HL562 | 100227 | 2012-10-09 | 2013-10-08 |
| 7 | Atmosphere pressure meter | Shanghai ZhongXuan Electronic Co.,Ltd | BY—2009P | -- | 2012-10-09 | 2013-10-08 |
| 8 | CLAMP METER | FLUKE | 316 | 86080010 | 2012-06-03 | 2013-06-01 |
| 9 | Thermo-Hygrometer | ZHICHEN | ZC1-2 | 01050033 | 2012-10-09 | 2013-10-08 |
| 11 | High-low temperature cabinet | Shanghai YuanZhen | GW2050 | -- | 2012-06-03 | 2013-06-01 |
| 12 | Tunable Notch Filter | Wainwright instruments GmbH | WRCT1800.0/ 2000.0-0.2/40- 5SSK | 11 | 2012-06-03 | 2013-06-01 |
| 13 | Tunable Notch Filter | Wainwright instruments GmbH | WRCT800.0/88 0.0-0.2/40- 5SSK | 9 | 2012-06-03 | 2013-06-01 |
| 14 | High pass Filter | FSCW | HP 12/2800- 5AA2 | 19A45-02 | 2012-06-03 | 2013-06-01 |



| | | | | | | |
|----|---|-----------------|----------|----------|------------|------------|
| 15 | Low noise amplifier | TESEQ | LNA6900 | 70133 | 2012-06-03 | 2013-06-01 |
| 16 | EMI test receiver | Rohde & Schwarz | ESCS30 | 100086 | 2012-06-03 | 2013-06-01 |
| 17 | Line impedance stabilization network | SCHWARZBECK | NSLK8127 | 8127-490 | 2012-06-03 | 2013-06-01 |

7 Test Results

7.1 E.U.T. test conditions

| | |
|------------------------|---|
| Power supply: | 3.7V DC 250mAh |
| Requirements: | 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery. |
| Type of antenna: | integral |
| Operating Environment: | |
| Temperature: | 20.0 -25.0 °C |
| Humidity: | 35-75 % RH |
| Atmospheric Pressure: | 992 -1020 mbar |
| Test frequencies: | According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table: |

| Frequency range over which device operates | Number of frequencies | Location in the range of operation |
|--|-----------------------|---|
| 1 MHz or less | 1 | Middle |
| 1 to 10 MHz | 2 | 1 near top and 1 near bottom |
| More than 10 MHz | 3 | 1 near top. 1 near middle and 1 near bottom |

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

Test frequency is the lowest channel: 0 channel (2402MHz), middle channel: 39 channel (2441MHz) and highest channel: 78 channel (2480MHz) with fixed at channel.

7.2 Antenna Requirement

7.2.1 Standard requirement

15.203 requirement:

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

7.2.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The gain of the antenna is less than -0.5 dBi.

Test result: The EUT does meet the FCC requirements.



7.3 20dB Bandwidth

Test Requirement: FCC Part 15 C Section 15.247 (a)(1)
RSS-Gen Issue 3 Clause 4.6.1

Test Method: ANSI C63.10:2009 Clause 6.9.1

Test Date: Oct. 29, 2011

Test Status: Test in fixing operating frequency at lowest, Middle, highest channel with charger or only battery.

Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on the hopping channel;
3. Set the spectrum analyzer: RBW \geq 1% of the 20dB bandwidth (set 100kHz). VBW \geq RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points.

Test result: Pass

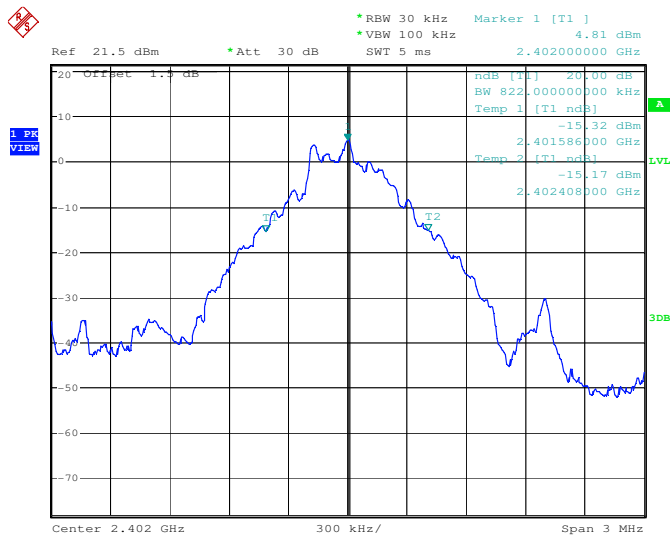
Test date

| Test Channel | Channel Frequency (MHz) | Modulation | Bandwidth(MHz) |
|--------------|-------------------------|---------------|----------------|
| Low | 2402 | GFSK | 0.822 |
| Middle | 2441 | GFSK | 0.870 |
| High | 2480 | GFSK | 0.870 |
| Low | 2402 | $\pi/4$ DQPSK | 1.230 |
| Middle | 2441 | $\pi/4$ DQPSK | 1.230 |
| High | 2480 | $\pi/4$ DQPSK | 1.236 |
| Low | 2402 | 8DPSK | 1.236 |
| Middle | 2441 | 8DPSK | 1.218 |
| High | 2480 | 8DPSK | 1.218 |



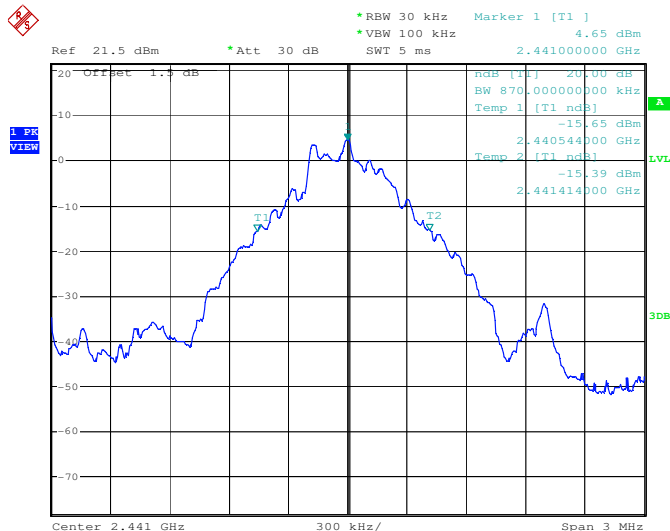
Result plot as follows:

Lowest Channel – GFSK:



Date: 29.OCT.2012 10:26:54

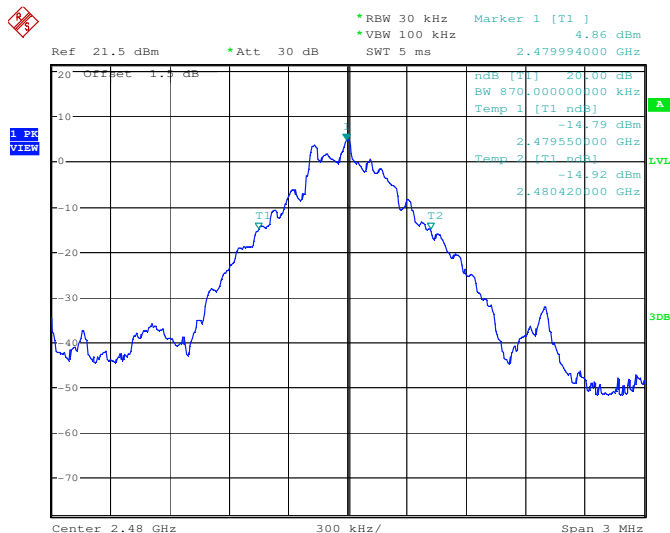
Middle Channel – GFSK:



Date: 29.OCT.2012 10:27:30

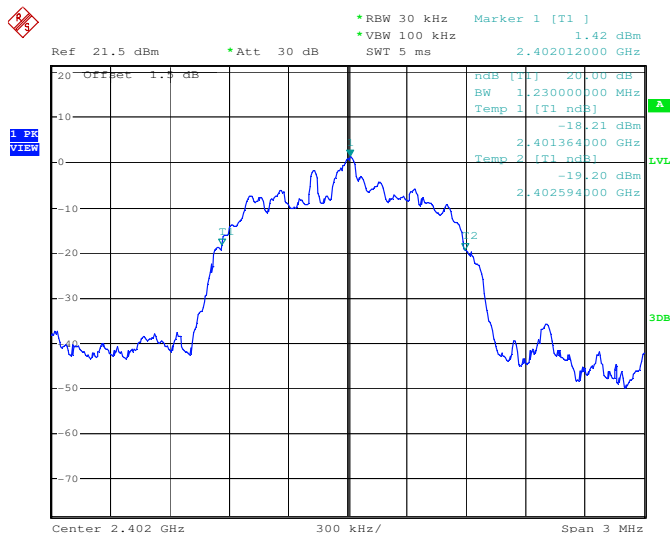


Highest Channel – GFSK:



Date: 29.OCT.2012 10:28:11

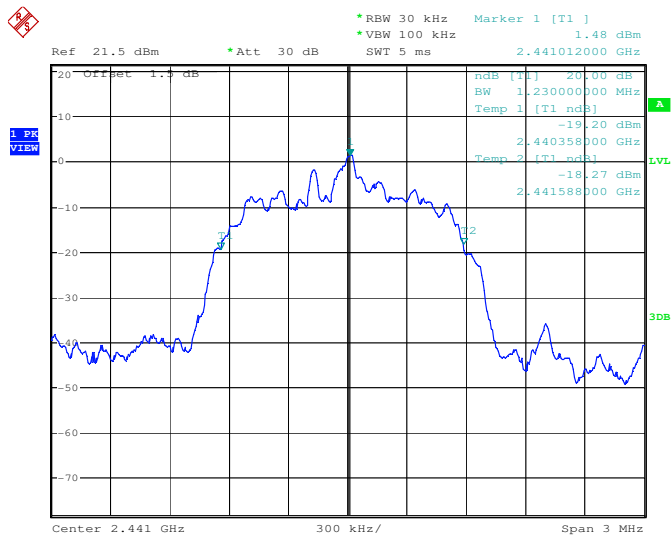
Lowest Channel – $\pi/4$ DQPSK:



Date: 29.OCT.2012 10:29:13

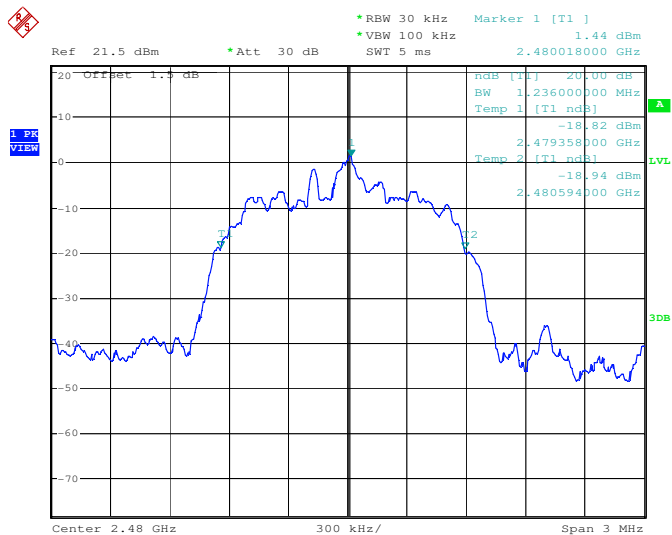


Middle Channel $-\pi/4$ DQPSK:



Date: 29.OCT.2012 10:29:55

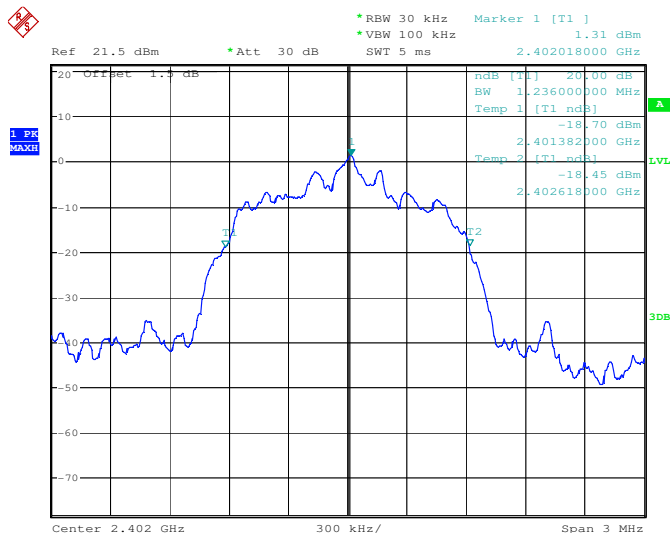
Highest Channel $-\pi/4$ DQPSK:



Date: 29.OCT.2012 10:30:39

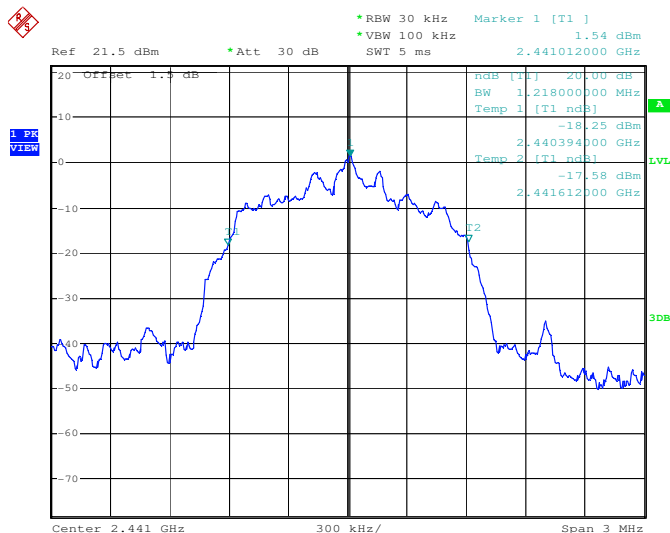


Lowest Channel –8DPSK:



Date: 29.OCT.2012 10:32:22

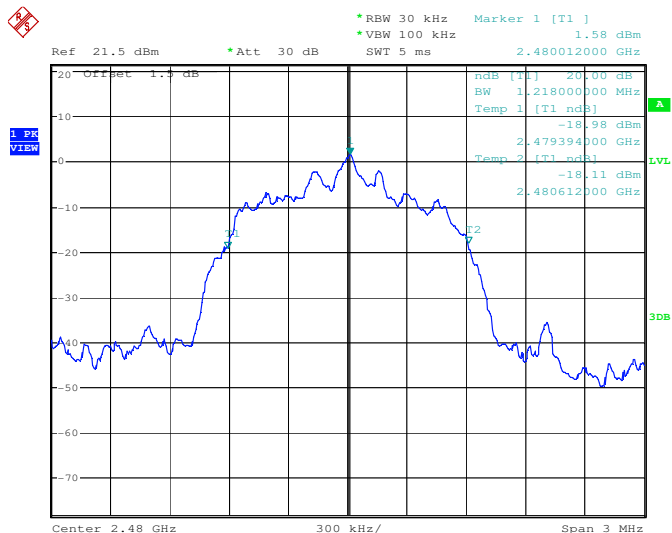
Middle Channel –8DPSK:



Date: 29.OCT.2012 10:33:06



Highest Channel –8DPSK:



Date: 29.OCT.2012 10:34:06



7.4 Carrier Frequencies Separated

Test Requirement: FCC Part 15 C Section 15.247 (a)(1)
RSS-Gen Issue 3 Clause 8.1(b)

Test Method: ANSI C63.10:2009 Clause 7.7.2

Test Date: Oct 29, 2012

Test requirements: Regulation 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Status: Test in hopping transmitting operating mode.

Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW \geq 1% of the span (set 100 kHz). VBW \geq RBW, Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max,hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

Test result: Pass

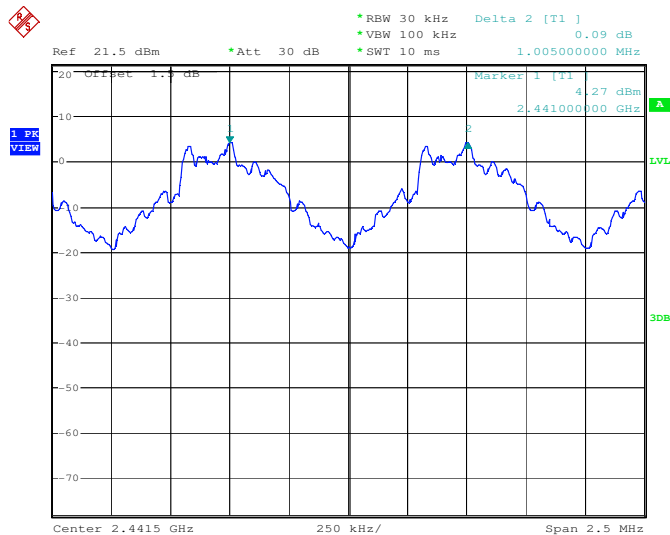
| Test Channel | Modulation | Carrier Frequencies Separated | Limit (25kHz or two- thirds of the 20 dB bandwidth) | PASS/FAIL |
|--|---------------|-------------------------------------|--|-----------|
| Middle Channels (channel 39 and channel 40) | GFSK | 1.005 | 25kHz/908kHz | PASS |
| Middle Channels (channel 39 and channel 40) | $\pi/4$ DQPSK | 1.005 | 25kHz/908kHz | PASS |
| Middle Channels (channel 39 and channel 40) | 8DPSK | 1.005 | 25kHz/908kHz | PASS |



Result plot as follows:

Middle Channels

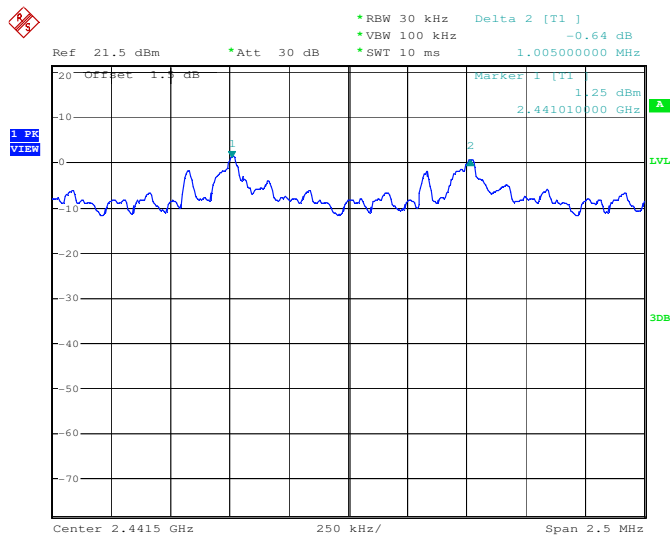
Modulation: GFSK



Date: 29.OCT.2012 11:17:10

Middle Channels

Modulation: $\pi/4$ DQPSK

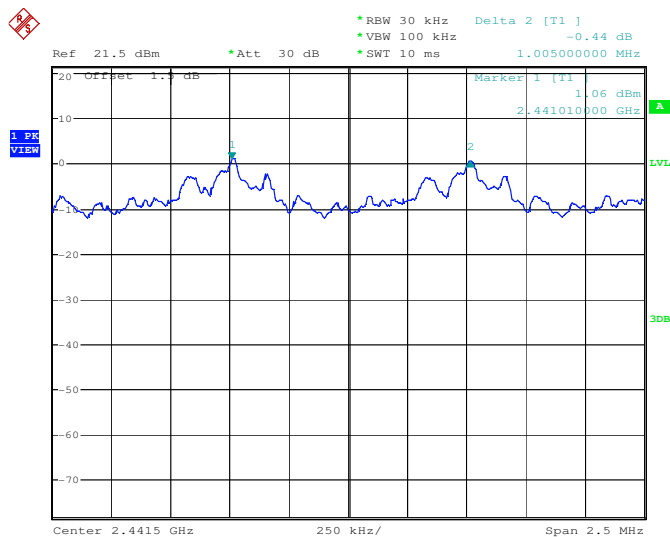


Date: 29.OCT.2012 11:20:52



Middle Channels

Modulation: 8DPSK



Date: 29.OCT.2012 11:25:41

Test result: The EUT does meet the FCC requirements.



7.5 Hopping Channel Number

Test Requirement: FCC Part15 C Section 15.247(a)(1)(iii)
RSS-210 Issue 8 Annex 8.1(d)

Test Method: ANSI C63.10:2009 Clause 7.7.3

Test Date: Oct. 29, 2012

Requirements: Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

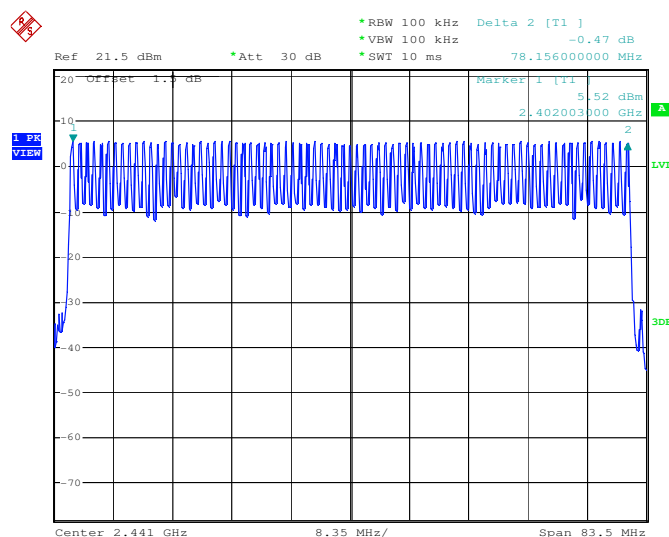
Test Status: Test in hopping transmitting operating mode.

Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 300 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

Test result: Total channels are 79 channels. The EUT does meet the FCC requirements.

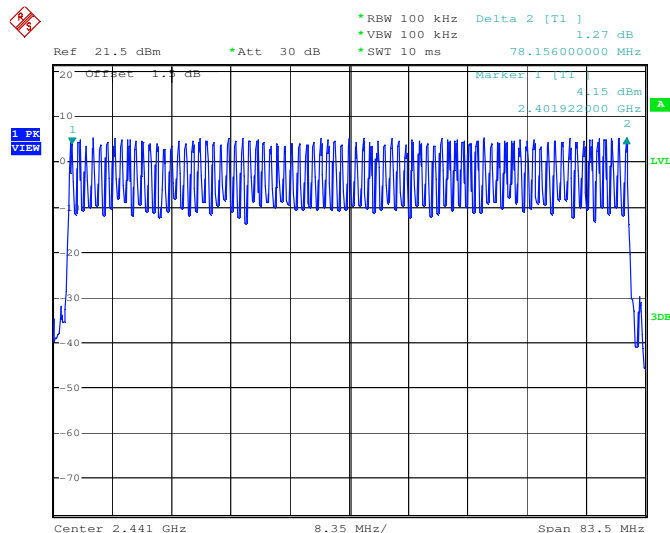
GFSK



Date: 29.OCT.2012 11:35:48

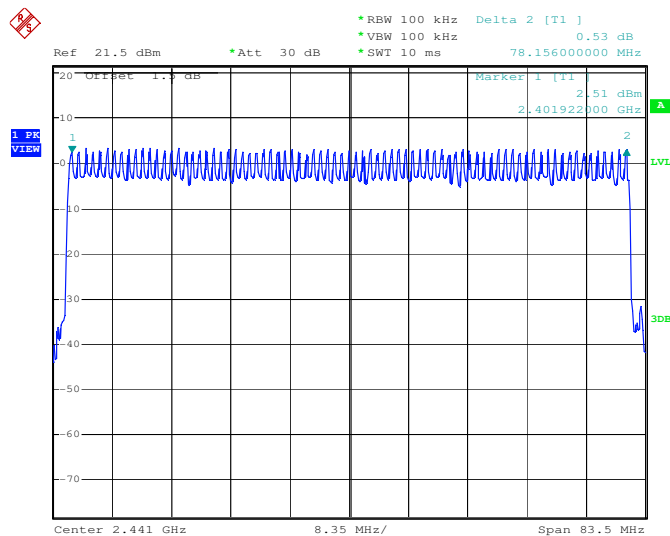


$\pi/4$ DQPSK



Date: 29.OCT.2012 11:39:26

8DPSK



Date: 29.OCT.2012 11:48:37



7.6 Dwell Time

Test Requirement:

FCC Part 15 C Section 15.247(a)(1)(iii)

RSS-210 Issue 8 Annex 8.1(d)

Test Method:

ANSI C63.10:2009 Clause 7.7.3

Test Date:

Oct 30, 2012

Test requirements:

Regulation 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Status:

Hopping transmitting with all kind of modulation.

Test Procedure:

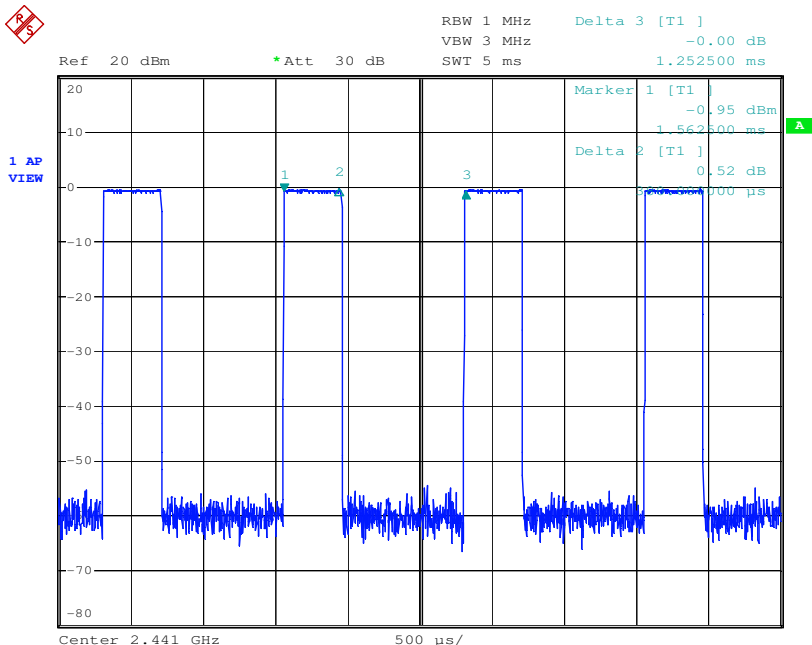
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. centered on a hopping channel;
3. Use Emission width / No. of Hopping Channels in 31.6s to determine the dwell time.

| Frequency (MHz) | Modulation | Packet | Emission Width (ms) | Number of Hopping Channel in 31.6s | Average Time of Occupancy(s) | Limit(s) | Result |
|-----------------|---------------|--------|---------------------|------------------------------------|------------------------------|----------|--------|
| 2441 | GFSK | DH1 | 0.38 | 201 | 0.076 | 0.4 | Pass |
| | | DH3 | 1.66 | 125 | 0.208 | 0.4 | Pass |
| | | DH5 | 2.92 | 90 | 0.263 | 0.4 | Pass |
| 2441 | $\pi/4$ DQPSK | 2DH1 | 0.40 | 211 | 0.084 | 0.4 | Pass |
| | | 2DH3 | 1.66 | 140 | 0.232 | 0.4 | Pass |
| | | 2DH5 | 2.92 | 88 | 0.257 | 0.4 | Pass |
| 2441 | 8DPSK | 3DH1 | 0.40 | 164 | 0.066 | 0.4 | Pass |
| | | 3DH3 | 1.64 | 123 | 0.202 | 0.4 | Pass |
| | | 3DH5 | 2.92 | 102 | 0.298 | 0.4 | Pass |

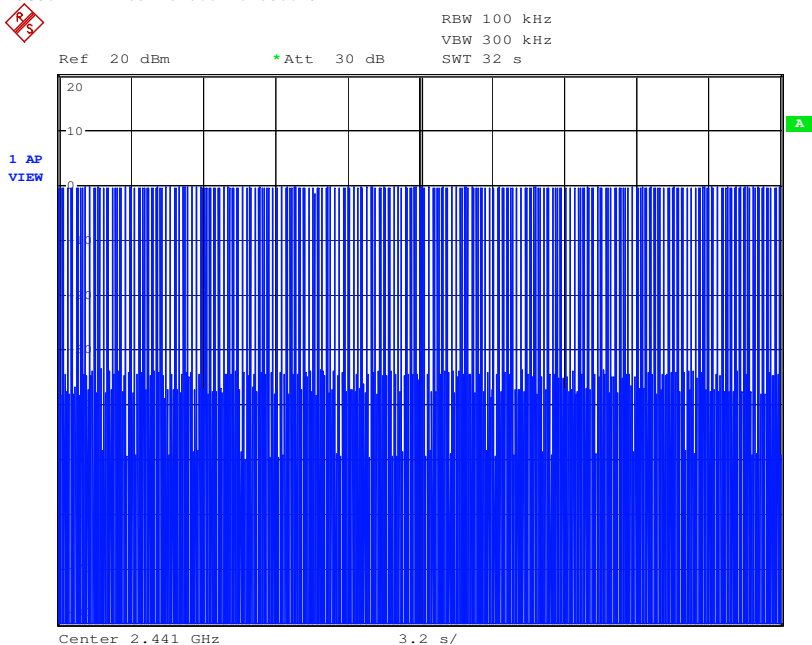
Refer testing graph as below:

Frequency 2441MHz:

Modulation: GFSK-DH1



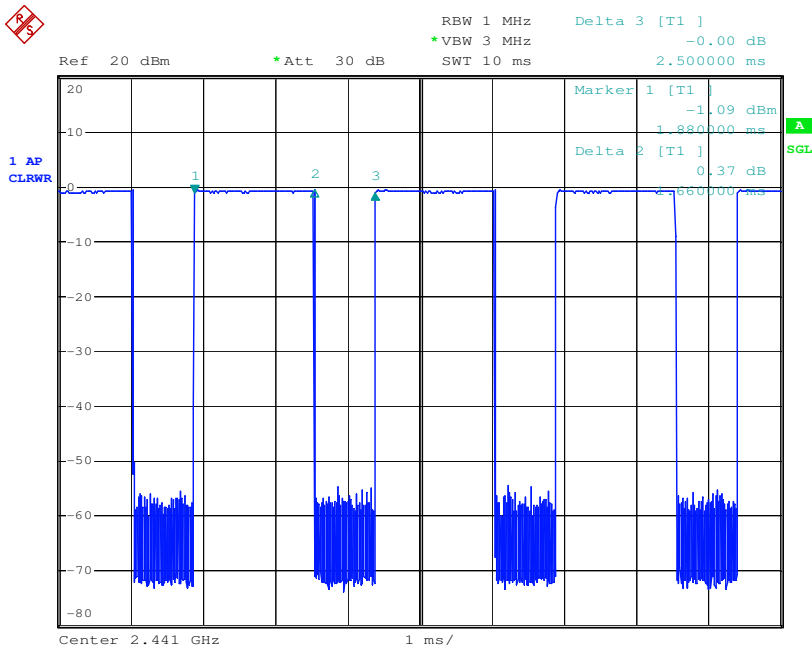
Date: 1.JAN.2000 02:36:49



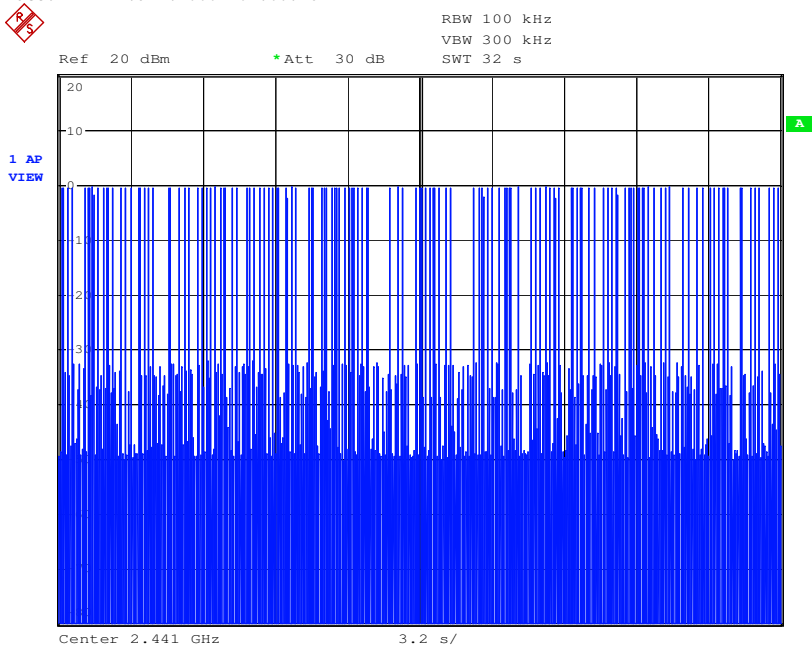
Date: 1.JAN.2000 04:28:57

Frequency 2441MHz:

Modulation: GFSK- DH3



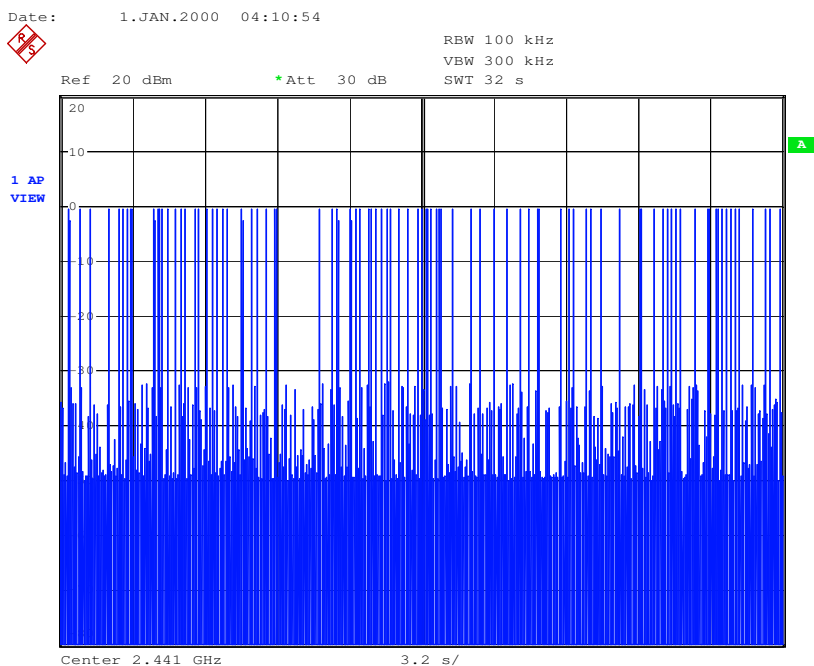
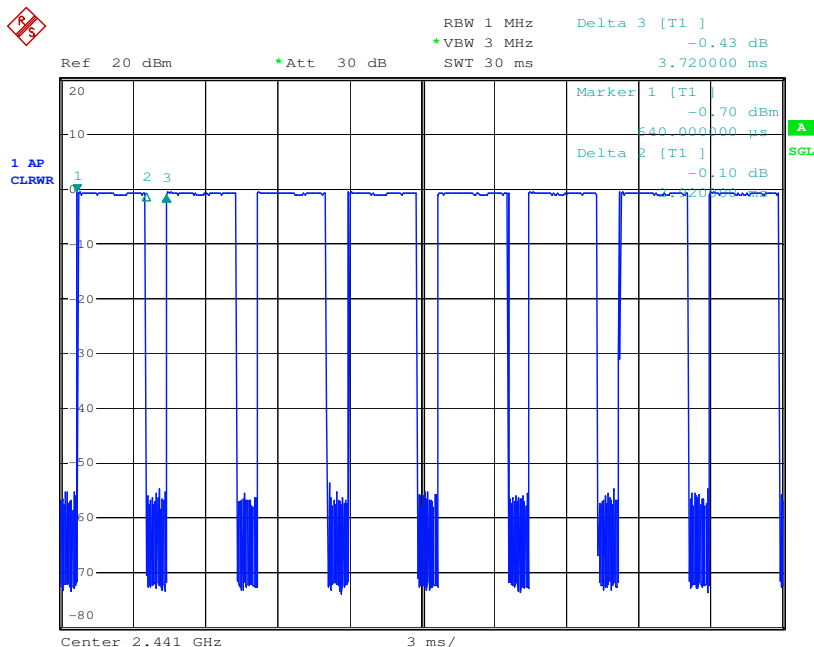
Date: 1.JAN.2000 04:06:28



Date: 1.JAN.2000 04:32:40

Frequency 2441MHz:

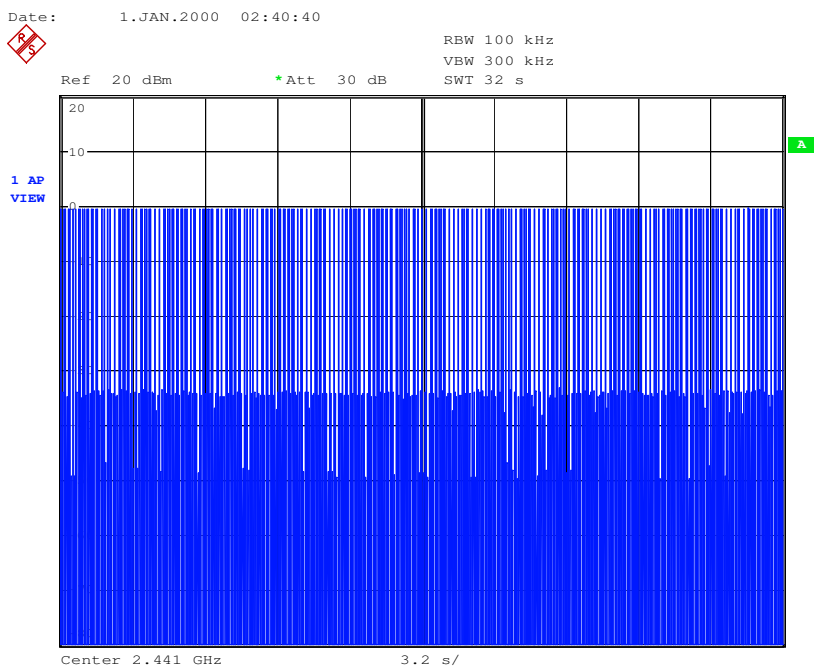
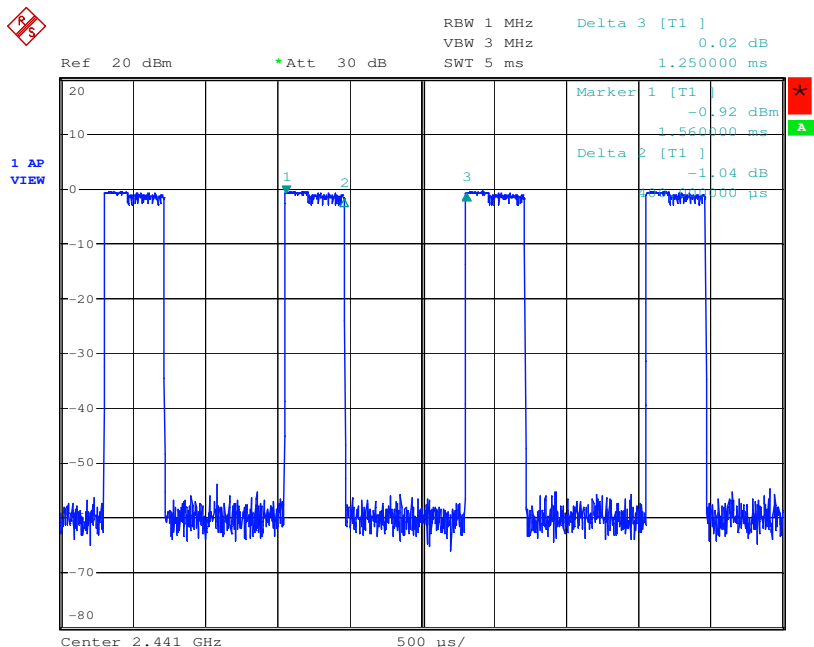
Modulation: GFSK- DH5



Date: 1.JAN.2000 04:36:48

Frequency 2441MHz:

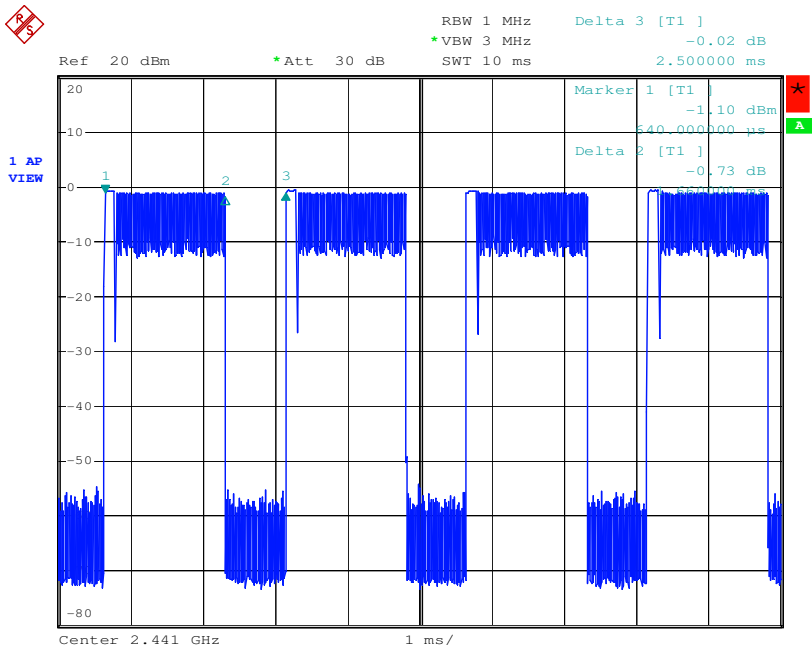
Modulation: $\pi/4$ DQPSK-2DH1



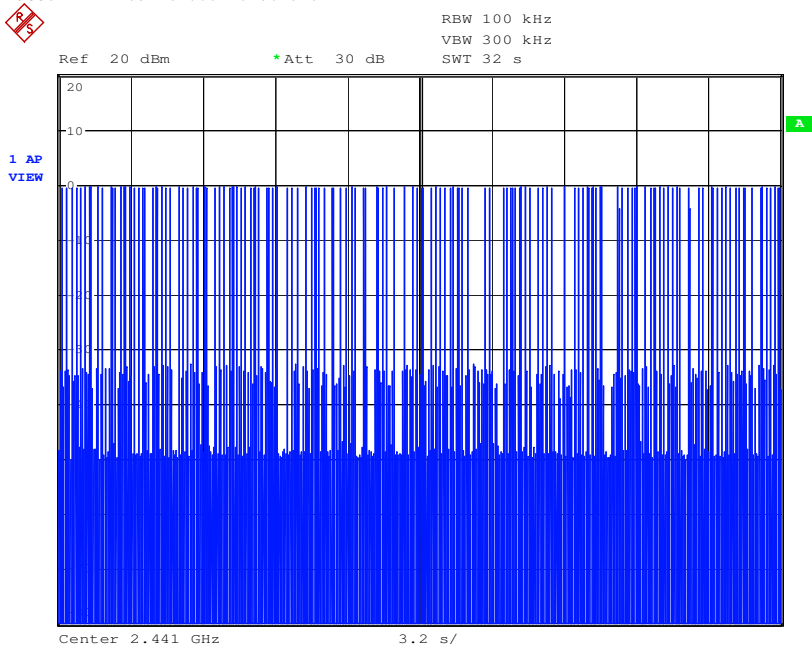
Date: 1.JAN.2000 04:42:31

Frequency 2441MHz:

Modulation: $\pi/4$ DQPSK-2DH3



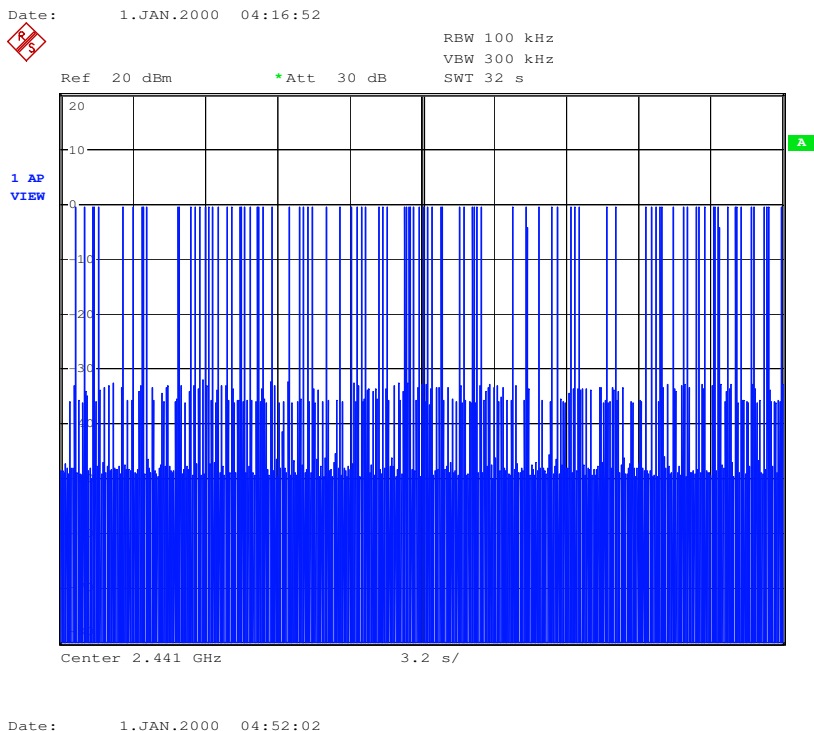
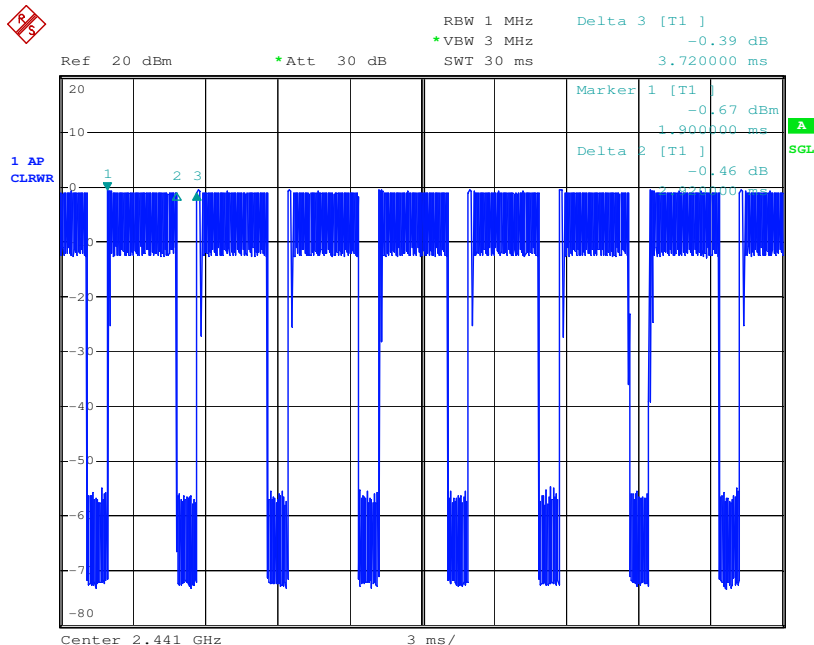
Date: 1.JAN.2000 04:01:46



Date: 1.JAN.2000 04:46:42

Frequency 2441MHz:

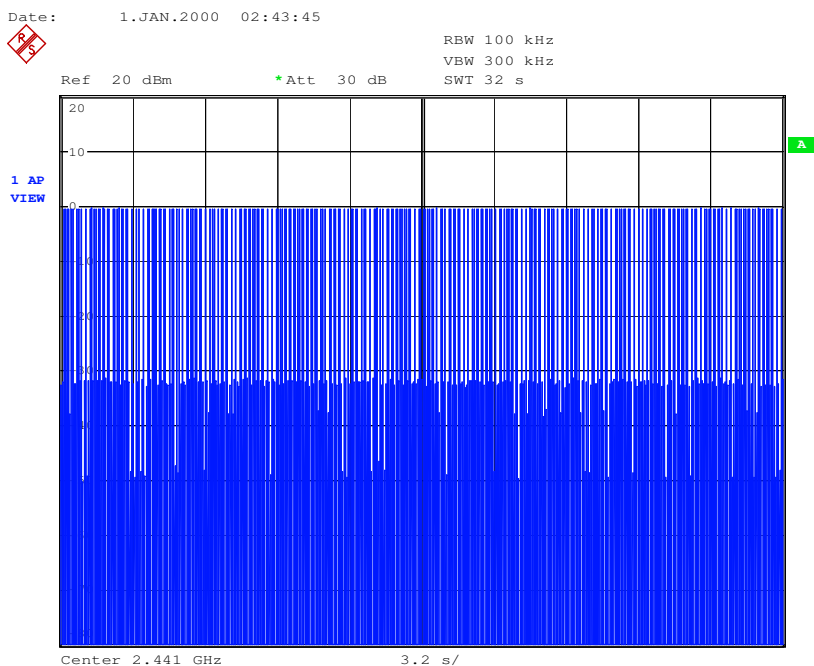
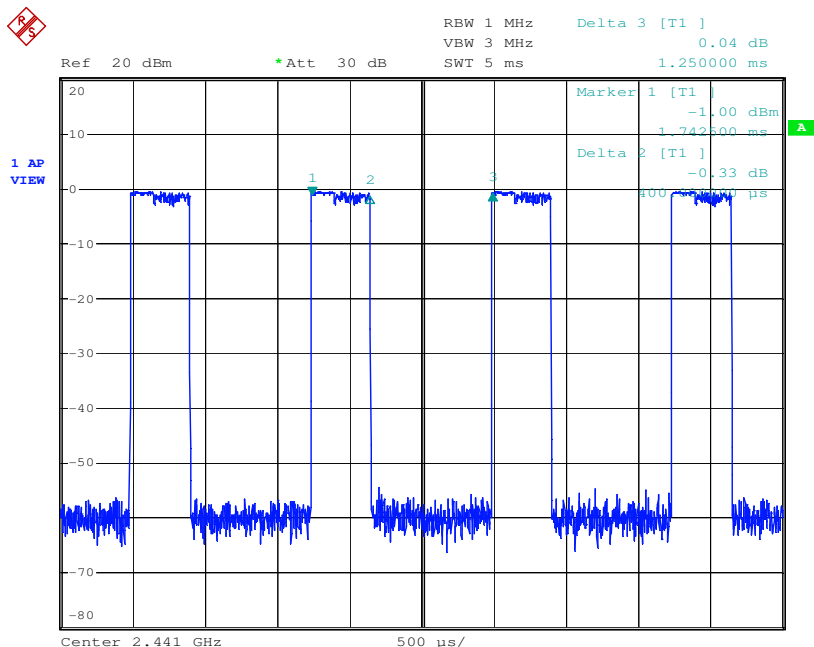
Modulation: $\pi/4$ DQPSK-2DH5



Date: 1.JAN.2000 04:52:02

Frequency 2441MHz:

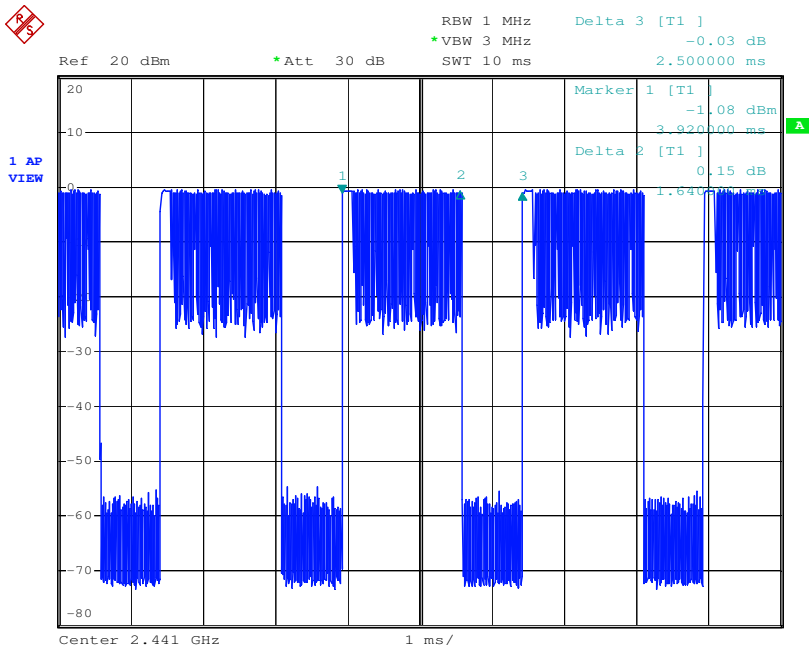
Modulation: 8DPSK-3DH1



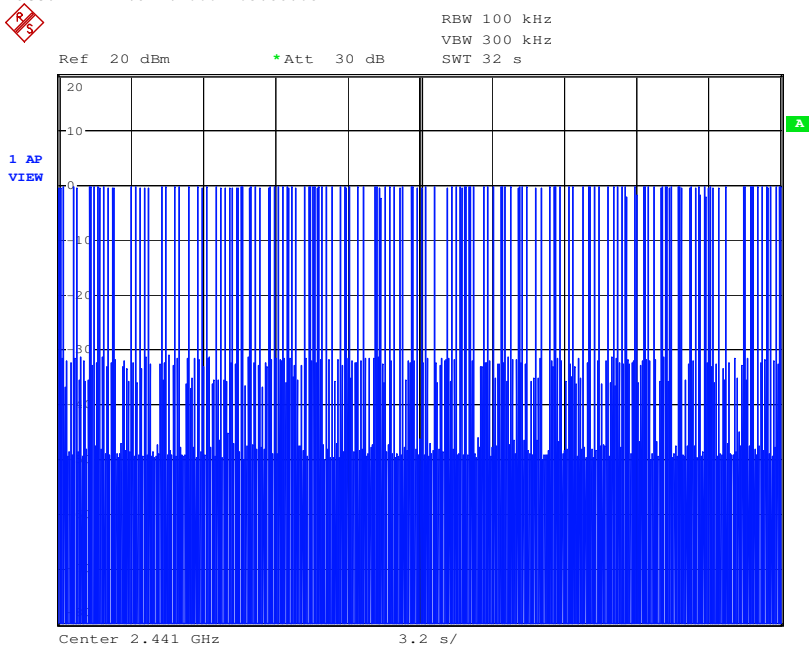
Date: 1.JAN.2000 05:33:30

Frequency 2441MHz:

Modulation: 8DPSK-3DH3



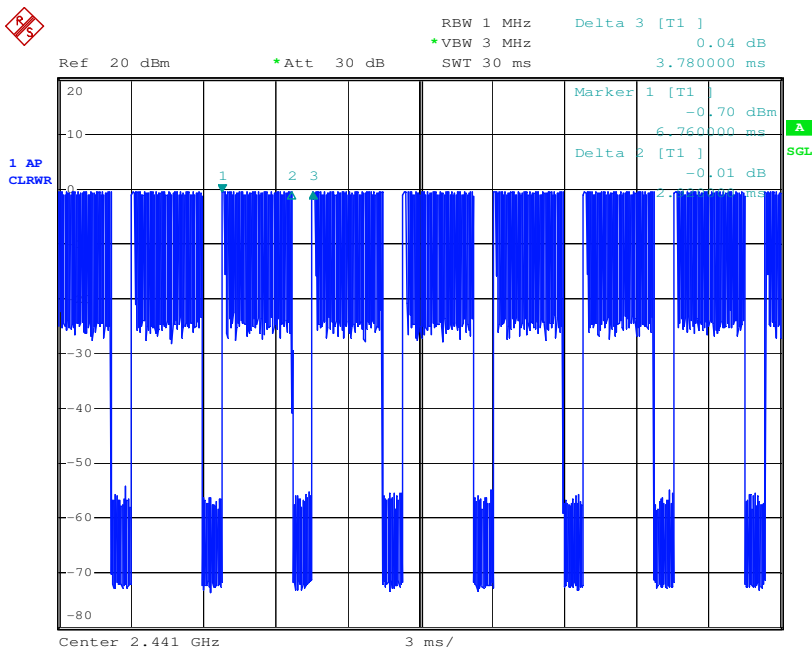
Date: 1.JAN.2000 03:58:05



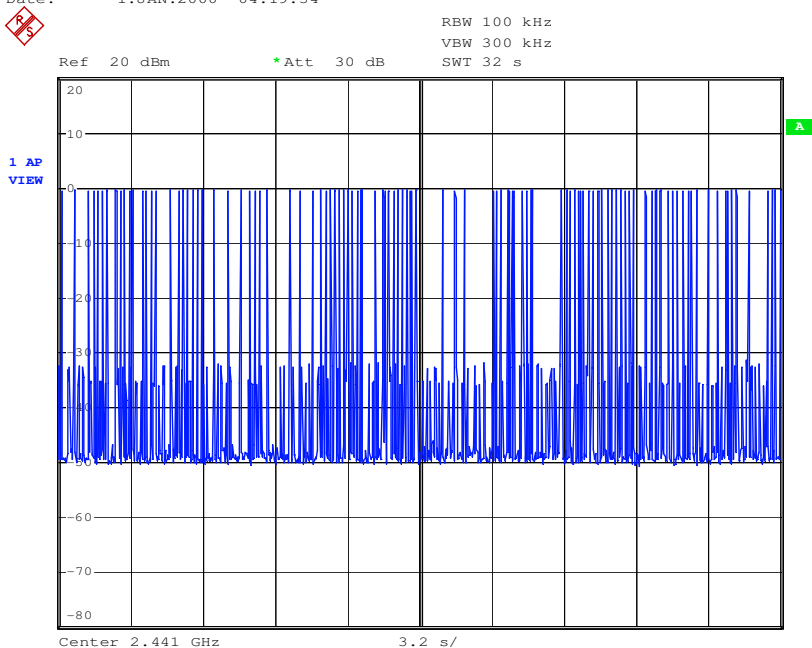
Date: 1.JAN.2000 05:37:01

Frequency 2441MHz:

Modulation: 8DPSK-3DH5



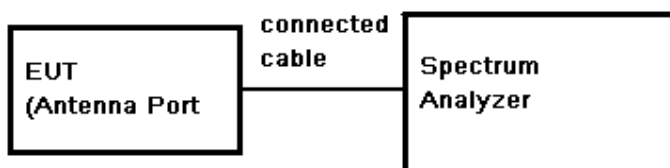
Date: 1.JAN.2000 04:19:54



Date: 1.JAN.2000 06:02:02

7.7 Maximum Peak Output Power

| | |
|----------------------------|---|
| Test Requirement: | FCC Part 15.247 Section 15.247(b)(1) RSS-210 Issue 8 Annex 8.4(2) |
| Test Method: | ANSI C64.10:2009 Clause 6.10.1 |
| Test Date: | Oct 30, 2012 |
| Test Limit: | Regulation 15.247 (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. Refer to the result "Hopping channel number" of this document. The 0.125 watt (20.0dBm) limit applies. |
| Test mode: | Test in fixing frequency transmitting mode. |
| Test Configuration: | |



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

Test Results record:

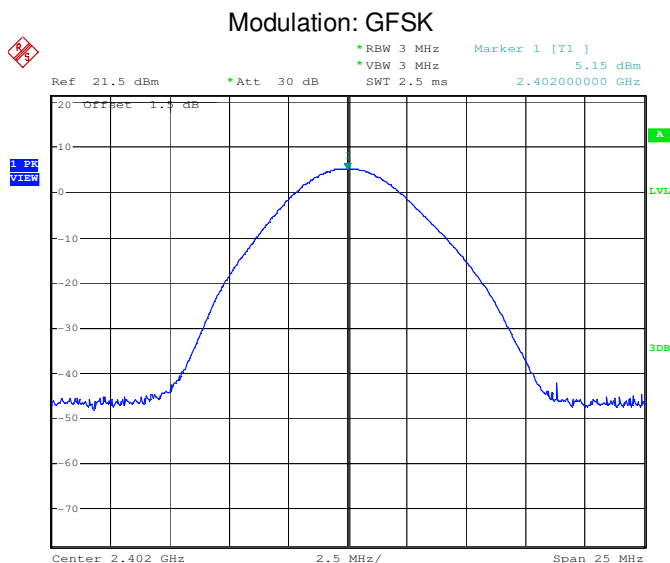
| Test Channel | Modulation | Fundamental Frequency (MHz) | Reading Power (dBm) | Cable Loss (dB) | Output Power | | Limit (dBm) | Margin (dB) |
|--------------|---------------|-----------------------------|---------------------|-----------------|--------------|-------|-------------|-------------|
| | | | | | (dBm) | (mW) | | |
| Lowest | GFSK | 2402 | 5.15 | 0.5 | 5.65 | 3.673 | 20 | 14.35 |
| Middle | GFSK | 2441 | 5.01 | 0.5 | 5.51 | 3.556 | 20 | 14.49 |
| Highest | GFSK | 2480 | 5.27 | 0.5 | 5.77 | 3.776 | 20 | 14.23 |
| Lowest | $\pi/4$ DQPSK | 2402 | 3.15 | 0.5 | 3.65 | 2.317 | 20 | 16.35 |
| Middle | $\pi/4$ DQPSK | 2441 | 2.86 | 0.5 | 3.36 | 2.168 | 20 | 16.64 |
| Highest | $\pi/4$ DQPSK | 2480 | 2.97 | 0.5 | 3.47 | 2.223 | 20 | 16.53 |



| | | | | | | | | |
|---------|-------|------|------|-----|------|-------|----|-------|
| Lowest | 8DPSK | 2402 | 3.42 | 0.5 | 3.92 | 2.466 | 20 | 16.08 |
| Middle | 8DPSK | 2441 | 3.15 | 0.5 | 3.65 | 2.317 | 20 | 16.35 |
| Highest | 8DPSK | 2480 | 3.31 | 0.5 | 3.81 | 2.404 | 20 | 16.19 |

Test result plot as follows:

Low Channel

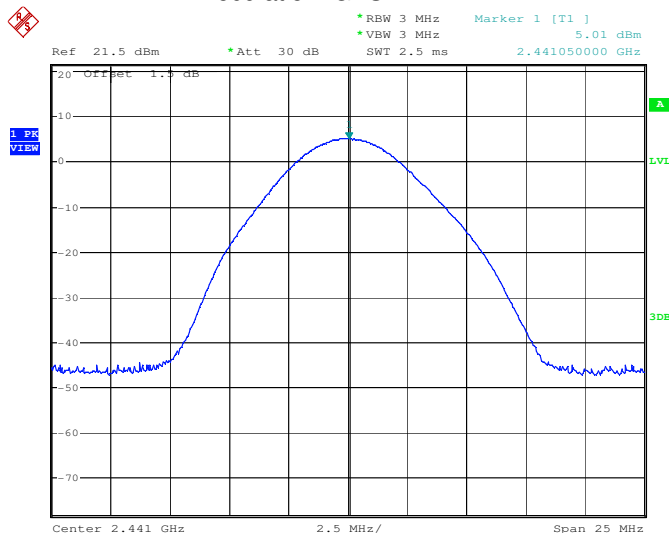


Date: 29.OCT.2012 10:17:14



Middle Channel

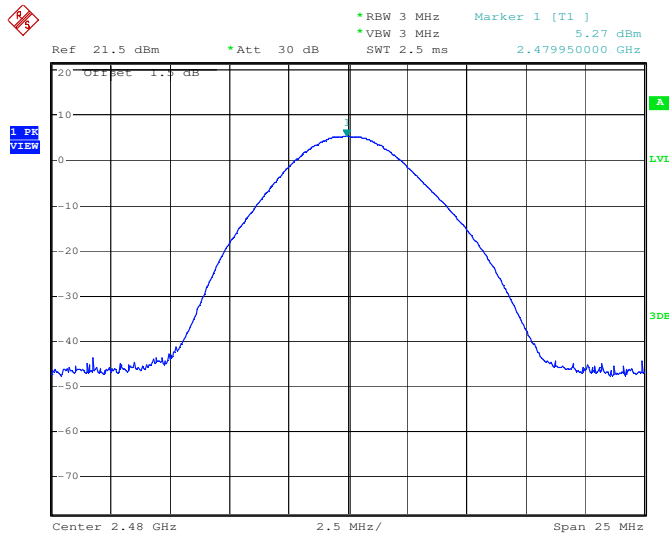
Modulation: GFSK



Date: 29.OCT.2012 10:17:44

High Channel

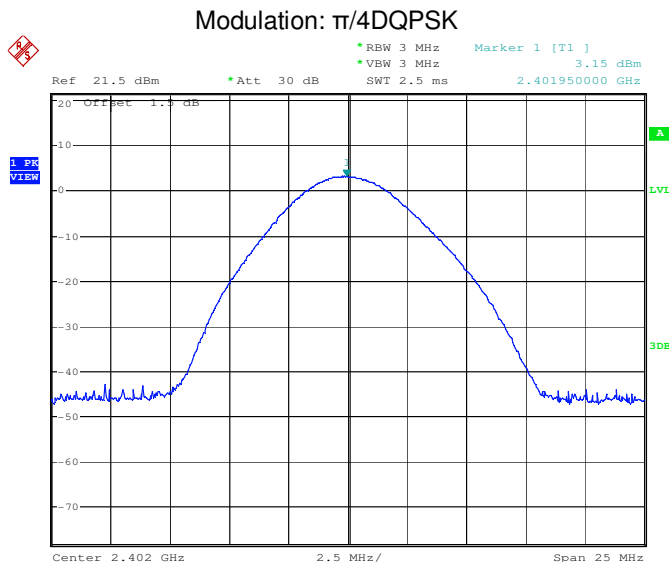
Modulation: GFSK



Date: 29.OCT.2012 10:18:11

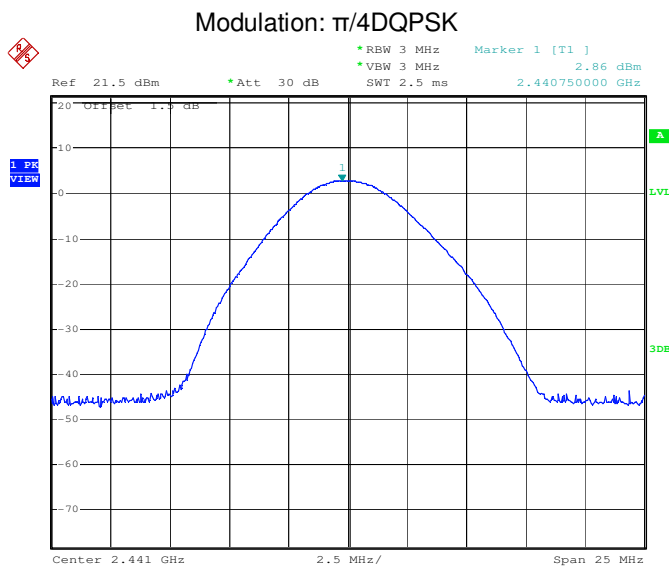


Low Channel



Date: 29.OCT.2012 10:19:11

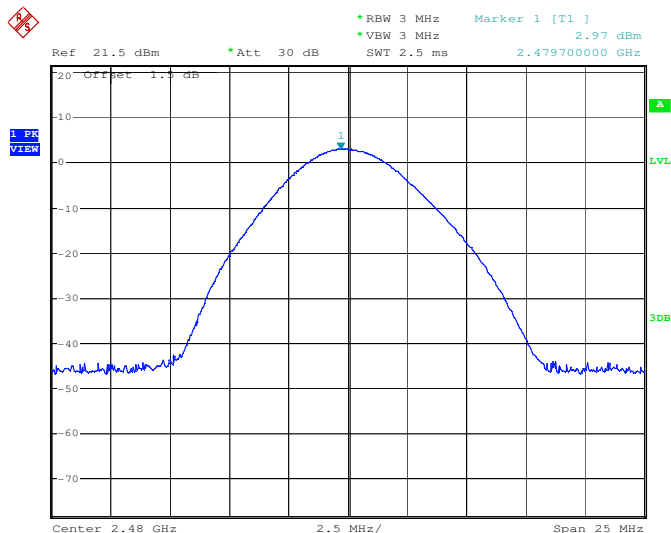
Middle Channel



Date: 29.OCT.2012 10:19:51

High Channel

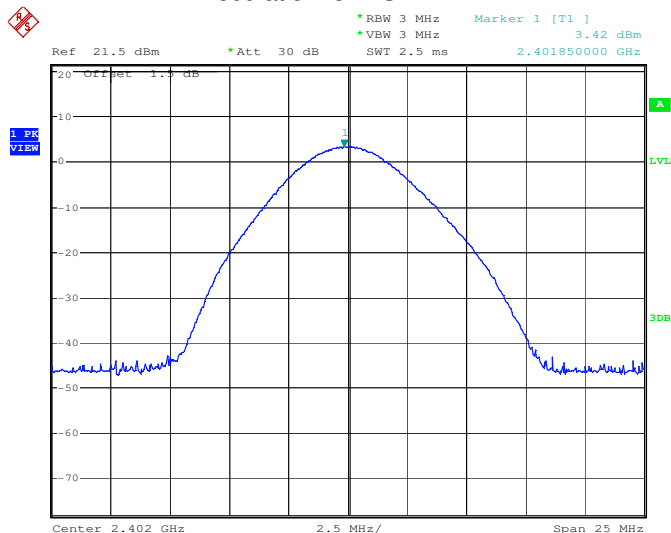
Modulation: $\pi/4$ DQPSK



Date: 29.OCT.2012 10:20:37

Low Channel

Modulation: 8DPSK

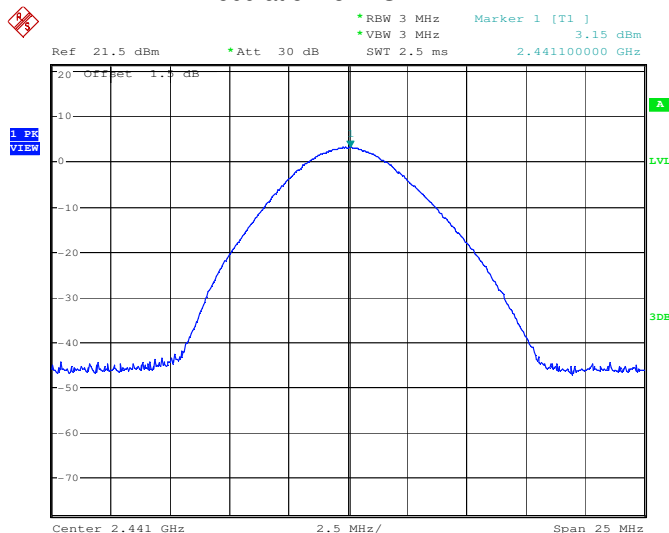


Date: 29.OCT.2012 10:21:33



Middle Channel

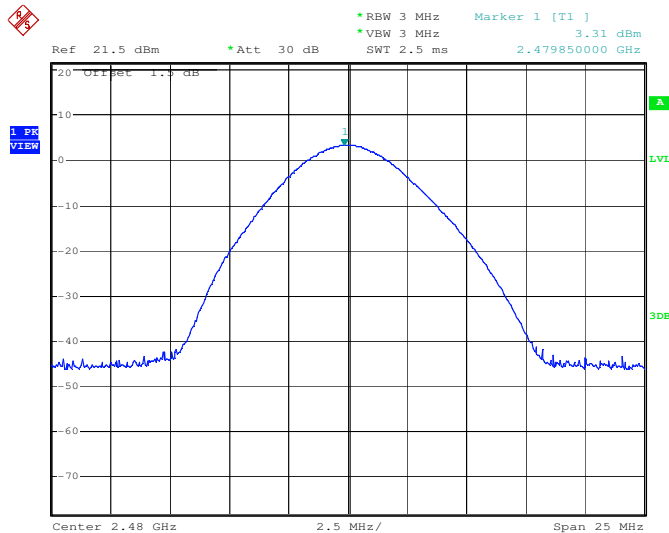
Modulation: 8DPSK



Date: 29.OCT.2012 10:22:08

High Channel

Modulation: 8DPSK



Date: 29.OCT.2012 10:22:55

7.8 RF Exposure Compliance Requirement

7.8.1 Standard requirement

15.247(b)(4) requirement:

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TCB Exclusion List (7 July 2002)

| Exposure category | low threshold | high threshold |
|--------------------|---|-----------------------------|
| General population | (60/fGHz) mW. $d < 2.5$ cm (120/fGHz) mW. $d \geq 2.5$ cm | (900/fGHz) mW. $d < 20$ cm |
| Occupational | (375/fGHz) mW. $d < 2.5$ cm (900/fGHz) mW. $d \geq 2.5$ cm | (2250/fGHz) mW. $d < 20$ cm |

7.8.2 Output power Results:

| Test Channel | Modulation | Fundamental Frequency (MHz) | Reading Power (dBm) | Cable Loss (dB) | Output Power | |
|--------------|---------------|-----------------------------|---------------------|-----------------|--------------|-------|
| | | | | | (dBm) | (mW) |
| Lowest | GFSK | 2402 | 5.15 | 0.5 | 5.65 | 3.673 |
| Middle | GFSK | 2441 | 5.01 | 0.5 | 5.51 | 3.556 |
| Highest | GFSK | 2480 | 5.27 | 0.5 | 5.77 | 3.776 |
| Lowest | $\pi/4$ DQPSK | 2402 | 3.15 | 0.5 | 3.65 | 2.317 |
| Middle | $\pi/4$ DQPSK | 2441 | 2.86 | 0.5 | 3.36 | 2.168 |
| Highest | $\pi/4$ DQPSK | 2480 | 2.97 | 0.5 | 3.47 | 2.223 |
| Lowest | 8DPSK | 2402 | 3.42 | 0.5 | 3.92 | 2.466 |
| Middle | 8DPSK | 2441 | 3.15 | 0.5 | 3.65 | 2.317 |
| Highest | 8DPSK | 2480 | 3.31 | 0.5 | 3.81 | 2.404 |

Mark: the RF output power is from section 7.7. So the test method please reference the report section 7.7.

7.8.3 EUT RF Exposure

The Max Conducted Peak Output Power is 5.77dBm(3.776mW) at 2480MHz.

And the antenna gain at 2402MHz is -0.5dBi PCB integrated in the actual use logarithmic terms convert to numeric result is nearly 0.891;

According to the formula, calculate the EIRP test result:

$$\text{EIRP} = P \times G = 3.776 \text{ mW} \times 0.891 = 3.364 \text{ mW} \text{ ①}$$

SAR requirement:

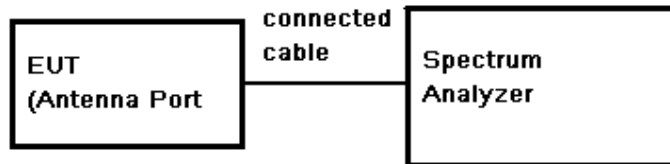
$$S = 60 / f(\text{GHz}) = 60 / 2.402 = 24.979 \text{ mW} \text{ ②};$$

$$\text{①} < \text{②}.$$

So the SAR test for Bluetooth is not required.

7.9 Conducted Spurious Emissions

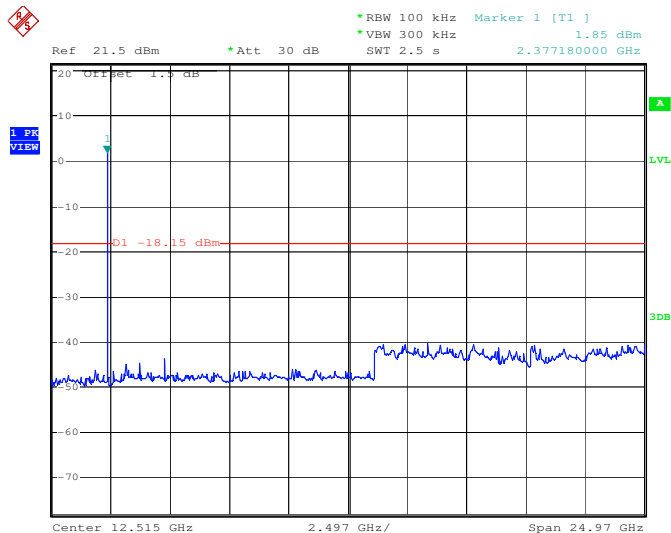
| | |
|----------------------------|---|
| Test Requirement: | FCC Part 15 Section 15.207 & 15.247(d) RSS-210 Issue 8 Annex 8.5 |
| Test Method: | ANSI C63.10:2009 Clause 7.7.10 |
| Test Date: | Nov 01, 2012 |
| Test requirements: | (d) In any 100 kHz bandwidth outside the frequency band in which the 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. |
| Test Status: | Test the lowest, Middle, highest channel. Remark: GFSK Modulation mode is the worst case (base on the 7.7 section Effective Isotropically Radiated Power test result in this report, GFSK modulation is the worst case). |
| Test Configuration: | |



| | |
|------------------------|--|
| Test Procedure: | 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum. 2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold). |
| Test result | The EUT does meet the FCC requirements. |

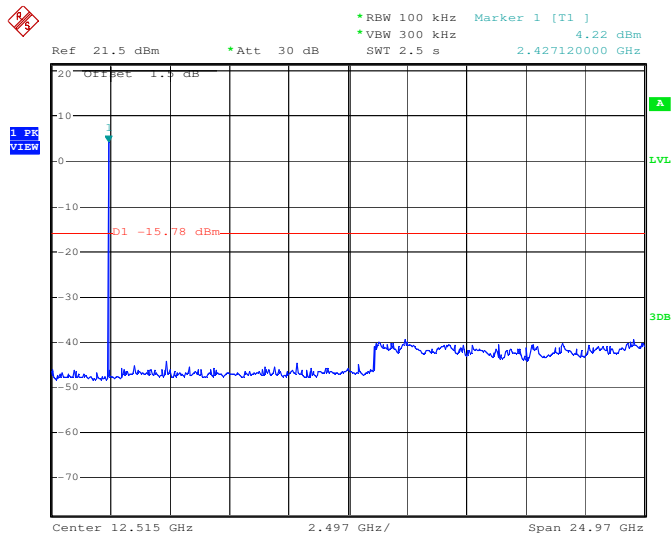


Low Channel:



Date: 1.NOV.2012 10:36:21

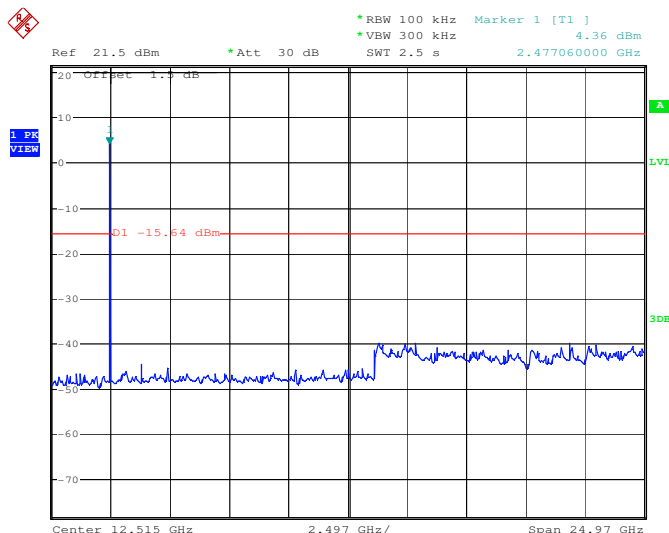
Middle Channel:



Date: 1.NOV.2012 10:38:41



High Channel:



Date: 1.NOV.2012 10:41:57



7.10 Radiated Spurious Emissions

| | |
|--------------------------|---|
| Test Requirement: | FCC Part 15 Section 15.209 & 15.247(d) RSS-210 Issue 8 Annex 8.5 |
| Test Method: | ANSI C63.10:2009 Clause 6.12 |
| Test Date: | Oct 23, 2012 |
| Test Status: | Test the lowest. Middle, highest channel with charger or only battery. Remark: GFSK Modulation mode is the worst case (base on the 7.7 section Effective Isotropically Radiated Power test result in this report, GFSK modulation is the worst case). |
| Test site/setup: | Measurement Distance: 3m (Semi-Anechoic Chamber) Test instrumentation resolution bandwidth 120 kHz and Quasi-Peak detector applies (30 MHz - 1000 MHz). For PK value: RBW = 1 MHz for $f \geq 1$ GHz VBW \geq RBW; Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz VBW = 10Hz; Sweep = auto Detector function = peak Trace = max hold Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal |
| 15.209 Limit: | 40.0 dB μ V/m between 30MHz & 88MHz 43.5 dB μ V/m between 88MHz & 216MHz 46.0 dB μ V/m between 216MHz & 960MHz 54.0 dB μ V/m above 960MHz |
| 15.247(d) limit: | (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. |

Test Configuration:

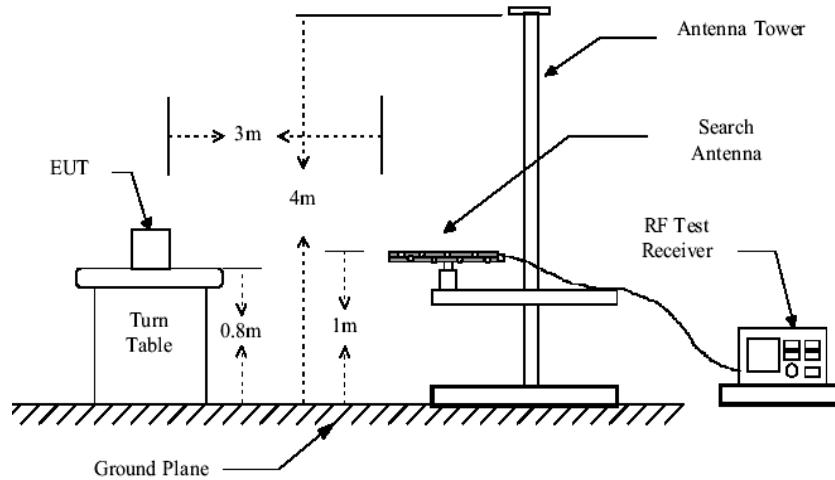


Figure 1. 30MHz to 1GHz radiated emissions test configuration

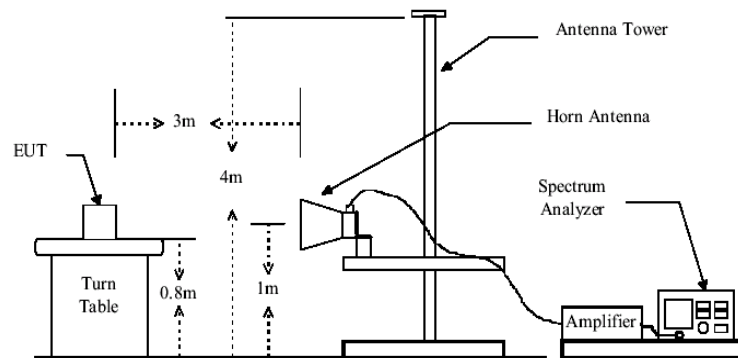


Figure 2. Above 1GHz radiated emissions test configuration

Test Procedure:

The procedure used was ANSI Standard C63.10:2009. The receiver was scanned from 30MHz to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

Low noise amplifier was used below 1GHz, High pass Filter was used above 3GHz.

Between 1G and 3GHz, we did not use any amplifier or filter.

Pre-test was performed on GFSK and EDR mode with charging mode and only battery power mode, Compliance test was performed on worse case (GFSK mode with charging).

Test were performed for three spatial orthogonal (X, Y, Z), the worst test data (X orthogonal) was submitted.

1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.

As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

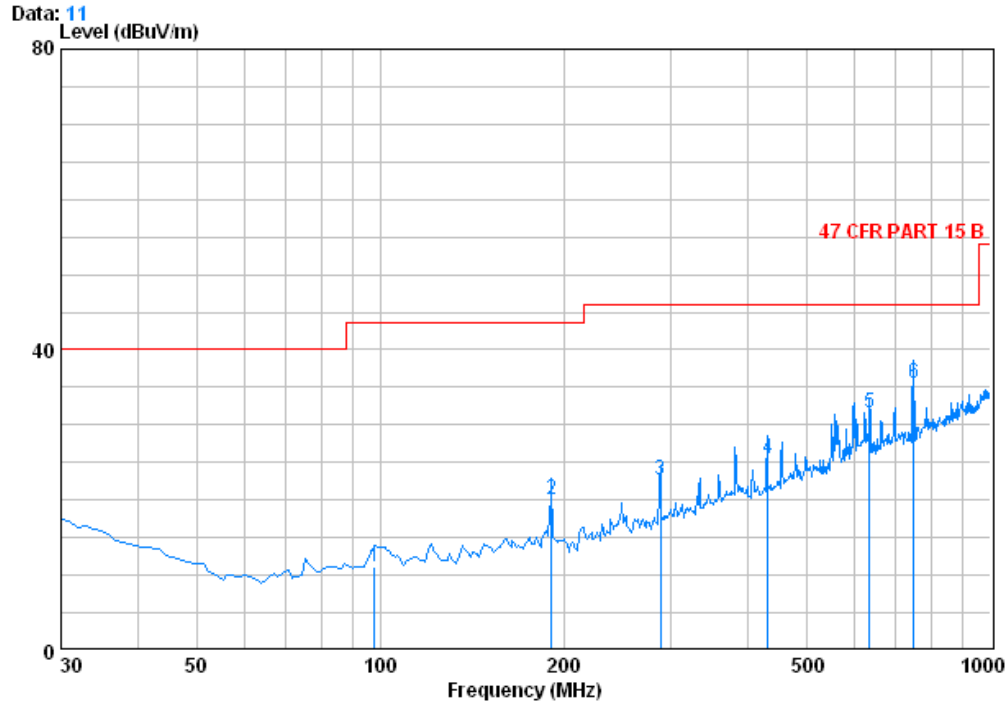
Test Results: The EUT does meet the FCC requirements.

GFSK with charging mode test data as follows:

Transmitter:

30MHz~1GHz Spurious Emission,Quasi-Peak Measurement

Horizontal



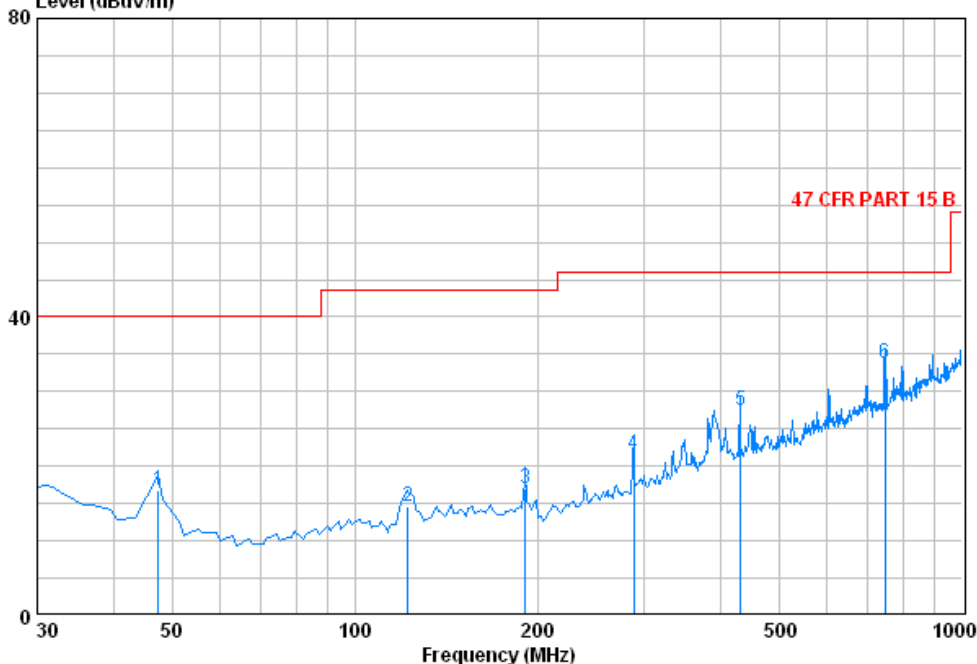
| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Limit Level | Limit Line | Over Limit |
|---|---------|---------------|-------------------|------------------|---------------|----------------|---------------|---------------|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 97.900 | 1.18 | 9.02 | 27.20 | 28.04 | 11.03 | 43.50 | -32.47 |
| 2 | 191.020 | 1.39 | 10.11 | 26.73 | 35.22 | 19.99 | 43.50 | -23.51 |
| 3 | 288.020 | 1.85 | 13.40 | 26.43 | 33.79 | 22.60 | 46.00 | -23.40 |
| 4 | 431.580 | 2.33 | 16.53 | 27.33 | 33.93 | 25.46 | 46.00 | -20.54 |
| 5 | 633.340 | 2.77 | 20.53 | 27.49 | 35.85 | 31.66 | 46.00 | -14.34 |
| 6 | 749.740 | 3.06 | 21.70 | 27.35 | 38.23 | 35.63 | 46.00 | -10.37 |



30MHz~1GHz Spurious Emission,Quasi-Peak Measurement

Vertical

Data: 12
Level (dBuV/m)



| | | CableAntenna Preamp | | | Read | | Limit | Over |
|---|---------|---------------------|--------|--------|-------|--------|--------|--------|
| | Freq | Loss | Factor | Factor | Level | Level | Line | Limit |
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 47.460 | 0.75 | 8.72 | 27.30 | 34.70 | 16.88 | 40.00 | -23.12 |
| 2 | 122.150 | 1.26 | 7.85 | 27.06 | 32.64 | 14.70 | 43.50 | -28.80 |
| 3 | 191.020 | 1.39 | 10.11 | 26.73 | 32.14 | 16.90 | 43.50 | -26.60 |
| 4 | 288.020 | 1.85 | 13.40 | 26.43 | 32.70 | 21.50 | 46.00 | -24.50 |
| 5 | 431.580 | 2.33 | 16.53 | 27.33 | 35.90 | 27.42 | 46.00 | -18.58 |
| 6 | 745.860 | 3.04 | 21.69 | 27.36 | 36.37 | 33.74 | 46.00 | -12.26 |



1~25 GHz Harmonics & Spurious Emissions, , Peak & Average Measurement

Test in **Channel Low** in transmitting status- **Horizontal** polarization

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Preamp Factor (dB) | Read Level (dBuV) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Remark |
|--------------------|-----------------------|-----------------------------|--------------------------|-------------------------|-------------------|---------------------------|-----------------------|---------|
| 3747.66 | 6.11 | 33.51 | 40.86 | 47.99 | 46.75 | 74 | -27.25 | Peak |
| 3747.66 | 6.11 | 33.51 | 40.86 | 28.00 | 26.76 | 54 | -27.24 | Average |
| 4785.08 | 4.68 | 34.73 | 41.61 | 67.66 | 65.46 | 74 | -8.54 | Peak |
| 4785.08 | 4.68 | 34.73 | 41.61 | 46.00 | 43.80 | 54 | -10.20 | Average |
| 6428.77 | 8.12 | 36.20 | 40.55 | 47.68 | 51.45 | 74 | -22.55 | Peak |
| 6428.77 | 8.12 | 36.20 | 40.55 | 28.01 | 31.78 | 54 | -22.22 | Average |
| 7470.56 | 9.05 | 35.99 | 39.64 | 47.73 | 53.13 | 74 | -20.87 | Peak |
| 7470.56 | 9.05 | 35.99 | 39.64 | 27.61 | 33.01 | 54 | -20.99 | Average |
| 8973.25 | 9.62 | 36.57 | 38.34 | 44.29 | 52.14 | 74 | -21.86 | Peak |
| 8973.25 | 9.62 | 36.57 | 38.34 | 25.01 | 32.86 | 54 | -21.14 | Average |
| 9441.91 | 9.66 | 37.14 | 37.94 | 43.73 | 52.59 | 74 | -21.41 | Peak |
| 9441.91 | 9.66 | 37.14 | 37.94 | 23.99 | 32.85 | 54 | -21.15 | Average |

Remark: No other radiation has been found.



Test in **Channel Low** in transmitting status- **Vertical** polarization

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Preamp Factor (dB) | Read Level (dBuV) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Remark |
|--------------------|-----------------------|-----------------------------|--------------------------|-------------------------|-------------------|---------------------------|-----------------------|---------|
| 3516.59 | 5.78 | 33.22 | 40.67 | 46.32 | 44.65 | 74 | -29.35 | Peak |
| 3516.59 | 5.78 | 33.22 | 40.67 | 25.99 | 24.32 | 54 | -29.68 | Average |
| 4785.08 | 4.68 | 34.73 | 41.61 | 65.53 | 63.33 | 74 | -10.67 | Peak |
| 4785.08 | 4.68 | 34.73 | 41.61 | 44.8 | 42.60 | 54 | -11.40 | Average |
| 6611.33 | 8.18 | 36.20 | 40.40 | 44.75 | 48.73 | 74 | -25.27 | Peak |
| 6611.33 | 8.18 | 36.20 | 40.40 | 25.00 | 28.98 | 54 | -25.02 | Average |
| 7566.24 | 9.17 | 36.00 | 39.56 | 45.42 | 51.03 | 74 | -22.97 | Peak |
| 7566.24 | 9.17 | 36.00 | 39.56 | 25.60 | 31.21 | 54 | -22.79 | Average |
| 8615.12 | 9.51 | 36.29 | 38.65 | 43.23 | 50.38 | 74 | -23.62 | Peak |
| 8615.12 | 9.51 | 36.29 | 38.65 | 23.01 | 30.16 | 54 | -23.84 | Average |
| 9393.96 | 9.66 | 37.08 | 37.98 | 42.67 | 51.43 | 74 | -22.57 | Peak |
| 9393.96 | 9.66 | 37.08 | 37.98 | 21.99 | 30.75 | 54 | -23.25 | Average |

Remark: No other radiation has been found.



Test in **Channel Middle** in transmitting status- **Horizontal** polarization

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Preamp Factor (dB) | Read Level (dBuV) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Remark |
|--------------------|-----------------------|-----------------------------|--------------------------|-------------------------|-------------------|---------------------------|-----------------------|---------|
| 3216.84 | 5.37 | 33.32 | 40.47 | 47.70 | 45.92 | 74 | -28.08 | Peak |
| 3216.84 | 5.37 | 33.32 | 40.47 | 27.00 | 25.22 | 54 | -28.78 | Average |
| 4883.52 | 7.48 | 34.59 | 41.68 | 61.52 | 61.91 | 74 | -12.09 | Peak |
| 4883.52 | 7.48 | 34.59 | 41.68 | 42.00 | 42.39 | 54 | -11.61 | Average |
| 5850.92 | 7.91 | 35.45 | 41.06 | 48.08 | 50.38 | 74 | -23.62 | Peak |
| 5850.92 | 7.91 | 35.45 | 41.06 | 29.01 | 31.31 | 54 | -22.69 | Average |
| 6478.05 | 8.14 | 36.26 | 40.51 | 48.25 | 52.14 | 74 | -21.86 | Peak |
| 6478.05 | 8.14 | 36.26 | 40.51 | 28.30 | 32.19 | 54 | -21.81 | Average |
| 7489.60 | 9.08 | 36.00 | 39.62 | 47.77 | 53.23 | 74 | -20.77 | Peak |
| 7489.60 | 9.08 | 36.00 | 39.62 | 27.89 | 33.35 | 54 | -20.65 | Average |
| 8703.29 | 9.54 | 36.36 | 38.59 | 46.80 | 54.11 | 74 | -19.89 | Peak |
| 8703.29 | 9.54 | 36.36 | 38.59 | 27.00 | 34.31 | 54 | -19.69 | Average |

Remark: No other radiation has been found.



Test in **Channel Middle** in transmitting status- **Vertical** polarization

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Preamplifier Factor (dB) | Read Level (dBuV) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Remark |
|--------------------|-----------------------|-----------------------------|--------------------------------|-------------------------|-------------------|---------------------------|-----------------------|---------|
| 3151.99 | 5.27 | 33.34 | 40.41 | 47.87 | 46.07 | 74 | -27.93 | Peak |
| 3151.99 | 5.27 | 33.34 | 40.41 | 30.00 | 28.20 | 54 | -25.80 | Average |
| 3747.66 | 6.11 | 33.51 | 40.86 | 48.46 | 47.22 | 74 | -26.78 | Peak |
| 3747.66 | 6.11 | 33.51 | 40.86 | 29.00 | 27.76 | 54 | -26.24 | Average |
| 4883.52 | 7.48 | 34.59 | 41.68 | 63.37 | 63.76 | 74 | -10.24 | Peak |
| 4883.52 | 7.48 | 34.59 | 41.68 | 45.00 | 45.39 | 54 | -8.61 | Average |
| 6299.18 | 8.08 | 36.06 | 40.66 | 48.84 | 52.32 | 74 | -21.68 | Peak |
| 6299.18 | 8.08 | 36.06 | 40.66 | 29.00 | 32.48 | 54 | -21.52 | Average |
| 8377.24 | 9.44 | 36.15 | 38.87 | 47.17 | 53.89 | 74 | -20.11 | Peak |
| 8377.24 | 9.44 | 36.15 | 38.87 | 28.20 | 34.92 | 54 | -19.08 | Average |
| 9346.26 | 9.65 | 37.01 | 38.03 | 46.50 | 55.13 | 74 | -18.87 | Peak |
| 9346.26 | 9.65 | 37.01 | 38.03 | 27.01 | 35.64 | 54 | -18.36 | Average |

Remark: No other radiation has been found.



Test in **Channel High** in transmitting status- **Vertical** polarization

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Preamp Factor (dB) | Read Level (dBuV) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Remark |
|--------------------|-----------------------|-----------------------------|--------------------------|-------------------------|-------------------|---------------------------|-----------------------|---------|
| 3588.94 | 5.88 | 33.30 | 40.73 | 48.41 | 46.86 | 74 | -27.14 | Peak |
| 3588.94 | 5.88 | 33.30 | 40.73 | 29.00 | 27.45 | 54 | -26.55 | Average |
| 4971.32 | 7.53 | 34.43 | 41.75 | 53.87 | 54.08 | 74 | -19.92 | Peak |
| 4971.32 | 7.53 | 34.43 | 41.75 | 33.99 | 34.20 | 54 | -19.80 | Average |
| 6544.35 | 8.16 | 36.27 | 40.45 | 48.73 | 52.71 | 74 | -21.29 | Peak |
| 6544.35 | 8.16 | 36.27 | 40.45 | 29.00 | 32.98 | 54 | -21.02 | Average |
| 7470.56 | 9.05 | 35.99 | 39.64 | 48.76 | 54.16 | 74 | -19.84 | Peak |
| 7470.56 | 9.05 | 35.99 | 39.64 | 28.91 | 34.31 | 54 | -19.69 | Average |
| 7941.19 | 9.31 | 36.00 | 39.24 | 47.63 | 53.70 | 74 | -20.30 | Peak |
| 7941.19 | 9.31 | 36.00 | 39.24 | 28.00 | 34.07 | 54 | -19.93 | Average |
| 10139.45 | 9.94 | 37.88 | 37.51 | 44.91 | 55.22 | 74 | -18.78 | Peak |
| 10139.45 | 9.94 | 37.88 | 37.51 | 25.01 | 35.32 | 54 | -18.68 | Average |

Remark: No other radiation has been found.



Test in **Channel High** in transmitting status- **Horizontal** polarization

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Preamp Factor (dB) | Read Level (dBuV) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Remark |
|--------------------|-----------------------|-----------------------------|--------------------------|-------------------------|-------------------|---------------------------|-----------------------|---------|
| 3625.67 | 5.93 | 33.34 | 40.76 | 48.03 | 46.54 | 74 | -27.46 | Peak |
| 3625.67 | 5.93 | 33.34 | 40.76 | 28.00 | 26.51 | 54 | -27.49 | Average |
| 4971.32 | 7.53 | 34.43 | 41.75 | 54.90 | 55.11 | 74 | -18.89 | Peak |
| 4971.32 | 7.53 | 34.43 | 41.75 | 34.99 | 35.20 | 54 | -18.80 | Average |
| 5776.92 | 7.88 | 35.34 | 41.12 | 47.80 | 49.90 | 74 | -24.10 | Peak |
| 5776.92 | 7.88 | 35.34 | 41.12 | 27.80 | 29.90 | 54 | -24.10 | Average |
| 7027.82 | 8.49 | 35.81 | 40.03 | 48.18 | 52.45 | 74 | -21.55 | Peak |
| 7027.82 | 8.49 | 35.81 | 40.03 | 28.30 | 32.57 | 54 | -21.43 | Average |
| 7489.60 | 9.08 | 36.00 | 39.62 | 48.17 | 53.63 | 74 | -20.37 | Peak |
| 7489.60 | 9.08 | 36.00 | 39.62 | 28.29 | 33.75 | 54 | -20.25 | Average |
| 8973.25 | 9.62 | 36.57 | 38.34 | 46.89 | 54.74 | 74 | -19.26 | Peak |
| 8973.25 | 9.62 | 36.57 | 38.34 | 27.01 | 34.86 | 54 | -19.14 | Average |

Remark: No other radiation has been found.

Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

Remark: No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.

7.10.1 Radiated Emissions which fall in the restricted bands

| | |
|------------------------------|--|
| Test Requirement: | Section 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)). |
| Test Method: | ANSI 63.10:2009 Clause 6.12 |
| Test Date: | Nov 01, 2012 |
| Measurement Distance: | 3m (Semi-Anechoic Chamber) |
| Limit: | 40.0 dB μ V/m between 30MHz & 88MHz; 43.5 dB μ V/m between 88MHz & 216MHz; 46.0 dB μ V/m between 216MHz & 960MHz; 54.0 dB μ V/m above 960MHz. |
| Detector: | For PK value: RBW = 1 MHz for $f \geq 1$ GHz VBW \geq RBW; Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz VBW = 10Hz; Sweep = auto Detector function = peak Trace = max hold |

According to section, 15.35(b) for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Pre-test were performed for there spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was submitted.

Test Result: The EUT does meet the FCC requirements.

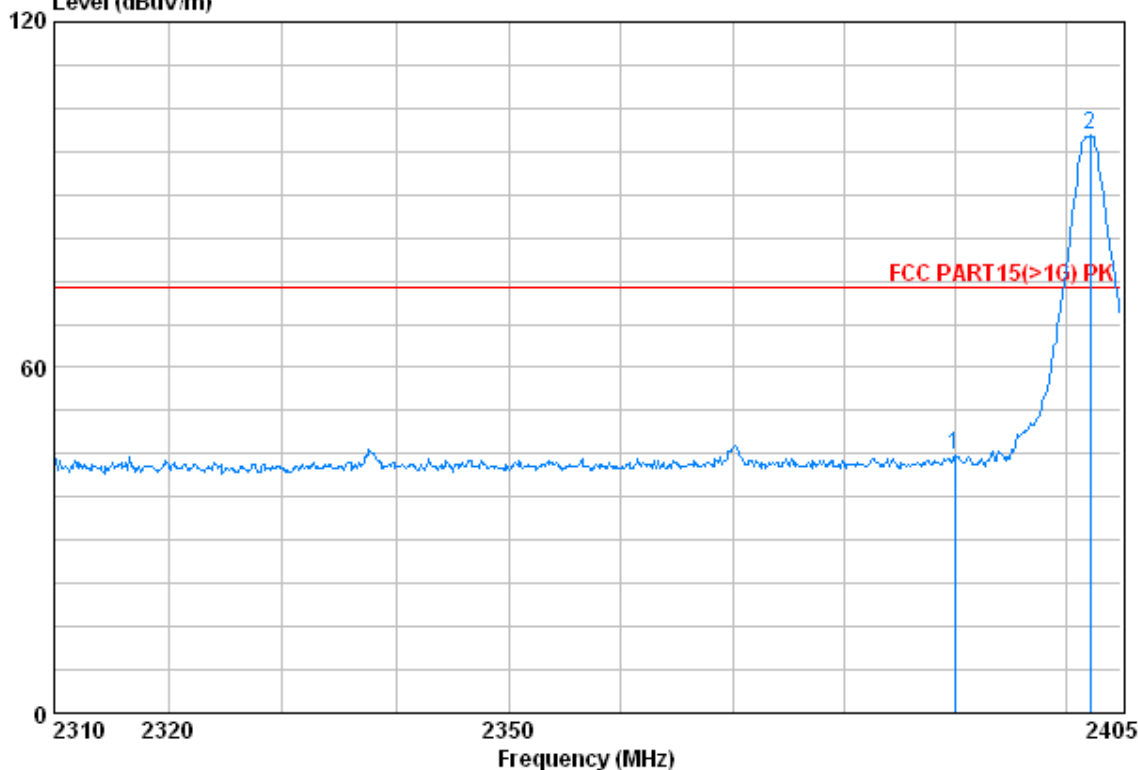
Measurement Result:

CH Low 2412MHz Radiated Bandedge

Modulation: GFSK

Horizontal, Peak Detector:

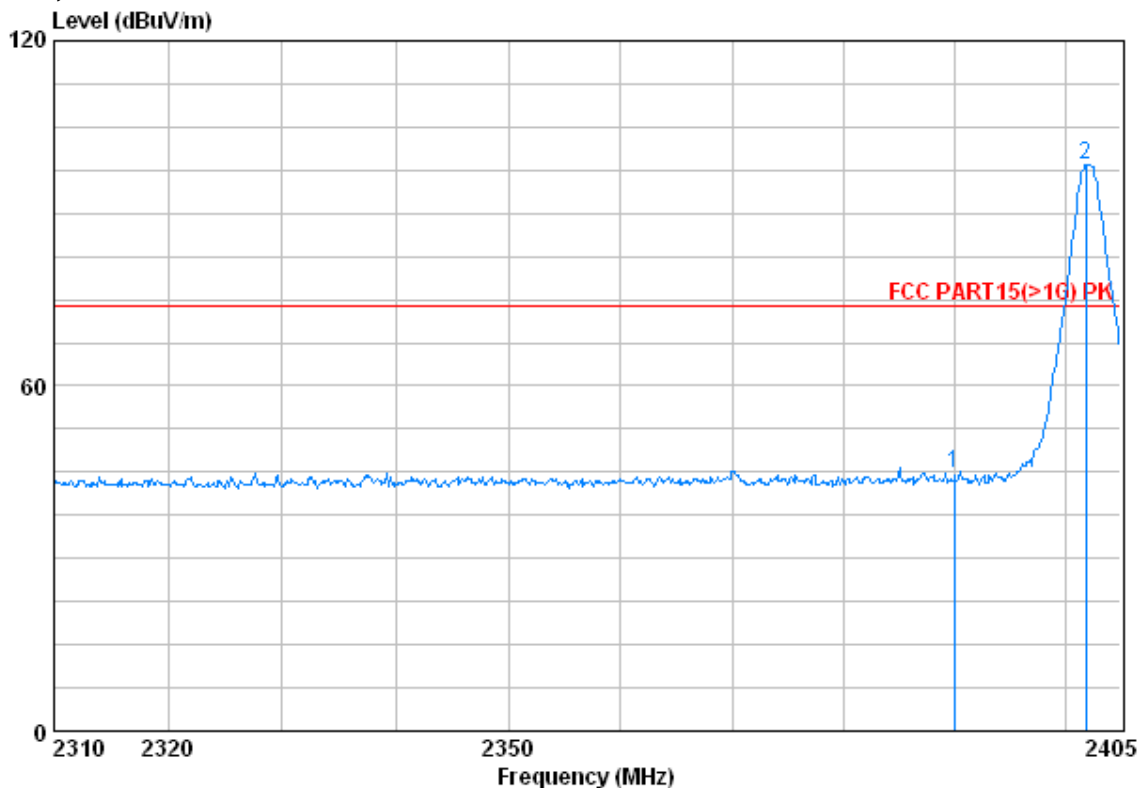
Level (dBuV/m)



| Freq | Cable | Antenna | Preamp | Read | Limit | Over | |
|----------|-------|---------|--------|-------|--------|--------|-------------|
| MHz | Loss | Factor | Factor | Level | Line | Limit | Remark |
| | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 2390.000 | 2.98 | 32.51 | 39.85 | 49.15 | 44.80 | 74.00 | -29.20 Peak |



Vertical, Peak Detector:



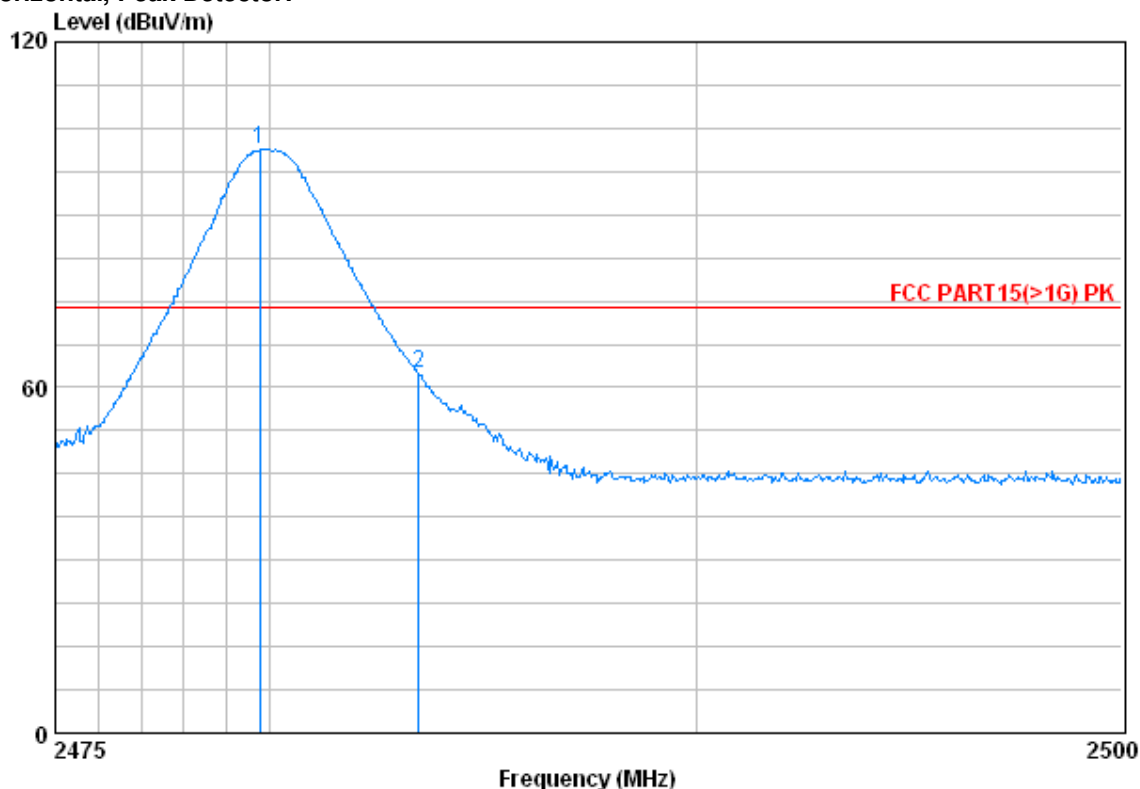
| Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Limit | Over Limit | Remark |
|----------|------------|----------------|---------------|------------|--------|------------|-------------|
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 2390.000 | 2.98 | 32.51 | 39.85 | 49.00 | 44.64 | 74.00 | -29.36 Peak |



CH Low 2480MHz Radiated Bandedge

Modulation: GFSK

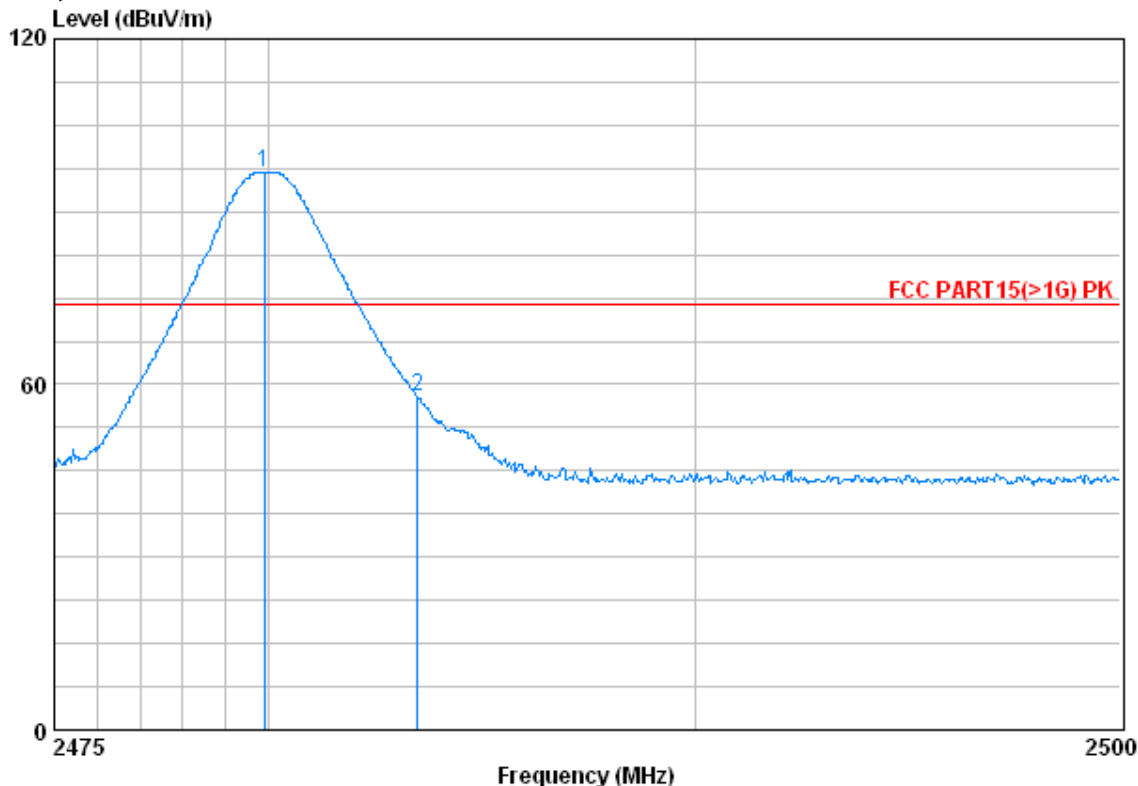
Horizontal, Peak Detector:



| Freq | Cable | Antenna | Preamp | Read | Limit | Over | |
|----------|--------|---------|--------|-------|--------|--------|-------------|
| Loss | Factor | Factor | Level | Level | Line | Limit | Remark |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 2483.500 | 3.03 | 32.67 | 39.92 | 66.65 | 62.43 | 74.00 | -11.57 Peak |



Vertical, Peak Detector:



| Freq | Cable | Antenna | Preamp | Read | Limit | Over | |
|----------|-------|---------|--------|-------|--------|--------|-------------|
| MHz | Loss | Factor | Factor | Level | Line | Limit | Remark |
| | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 2483.500 | 3.03 | 32.67 | 39.92 | 62.05 | 57.83 | 74.00 | -16.17 Peak |

Remark: No any other emission which fall in restricted bands can be detected and be reported.

Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor

All frequencies within the “Restricted bands” have been evaluated to compliance. Section 15.205 Restricted bands of operation.



Except as shown in paragraph of this section. only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|----------------------------|---------------------|-----------------|---------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| ¹ 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | |
| 13.36 - 13.41 | 322 - 335.4 | | |



7.11 Band Edges Requirement

Test Requirement: FCC Part 15 C Section 15.247 (d) & 15.205
RSS-Gen Issue 3 Clause 7.2.2

Test Method: Based on ANSI 63.10 Clause 6.9
Operation within the band 2400M – 2483.5 MHz

Test Date: Oct 30, 2012

Requirements: Section 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. 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)).

Method of Measurement: Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.

The band edges was measured and recorded Result:

The Lower Edges attenuated more than 20dB.

The Upper Edges attenuated more than 20dB.

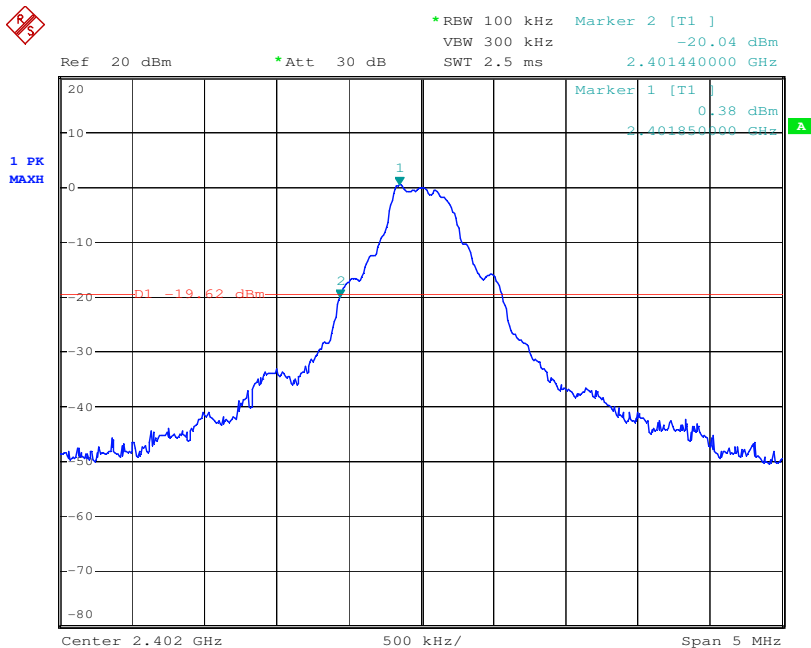
Test Result: The EUT does meet the FCC requirements.

The graph as below. represents the emissions take for this device.

Test results: The EUT does meet the FCC requirements.

Low Channel

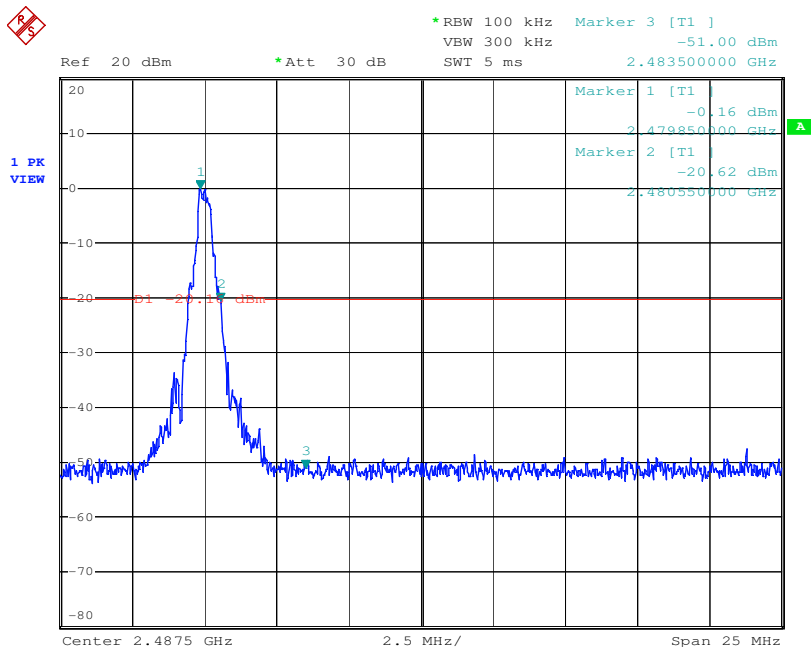
Test Status: GFSK- Static



Date: 1.JAN.2000 01:03:46

High Channel

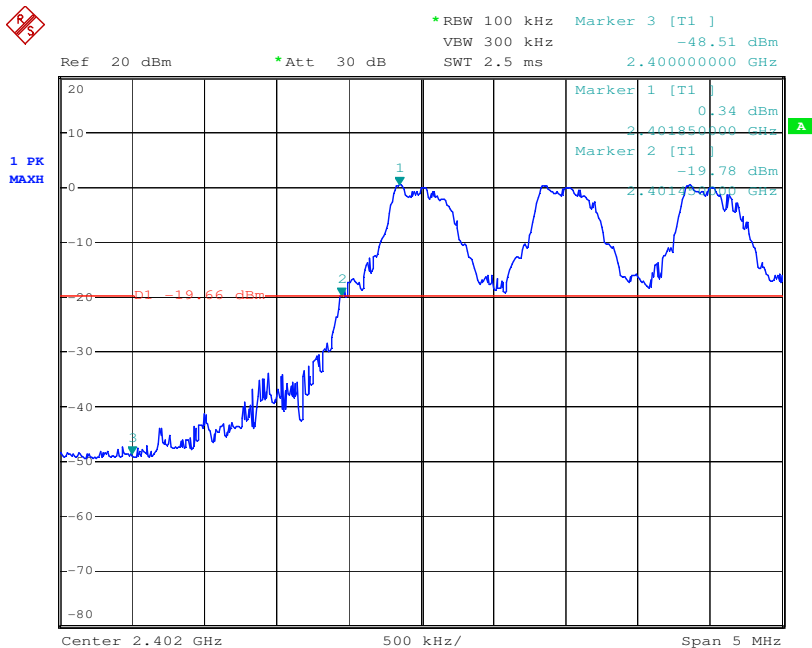
Test Status: GFSK- Static



Date: 1.JAN.2000 05:45:03

Low Channel

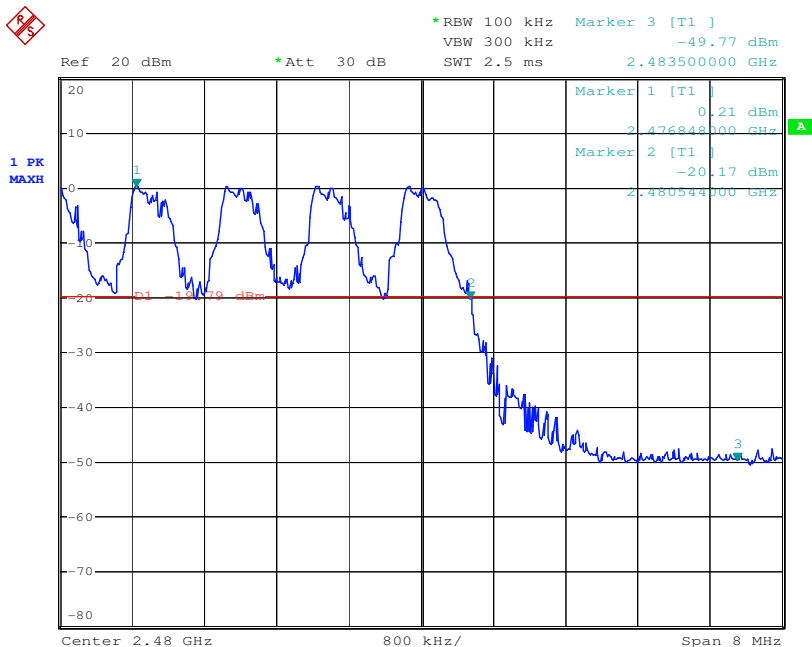
Test Status: GFSK- Hopping



Date: 1.JAN.2000 01:11:20

High Channel

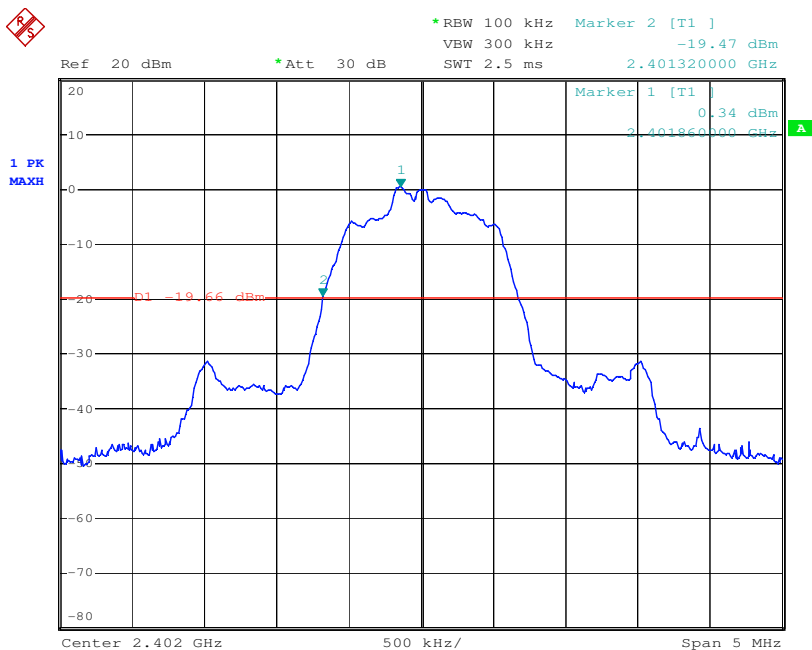
Test Status: GFSK- Hopping



Date: 1.JAN.2000 01:20:04

Low Channel

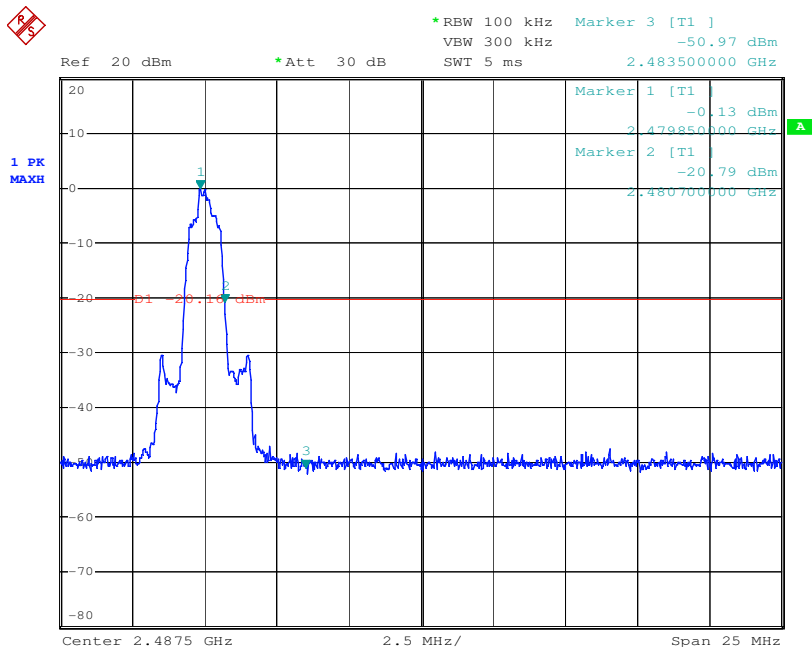
Test Status: $\pi/4$ DQPSK - Static



Date: 1.JAN.2000 01:00:33

High Channel

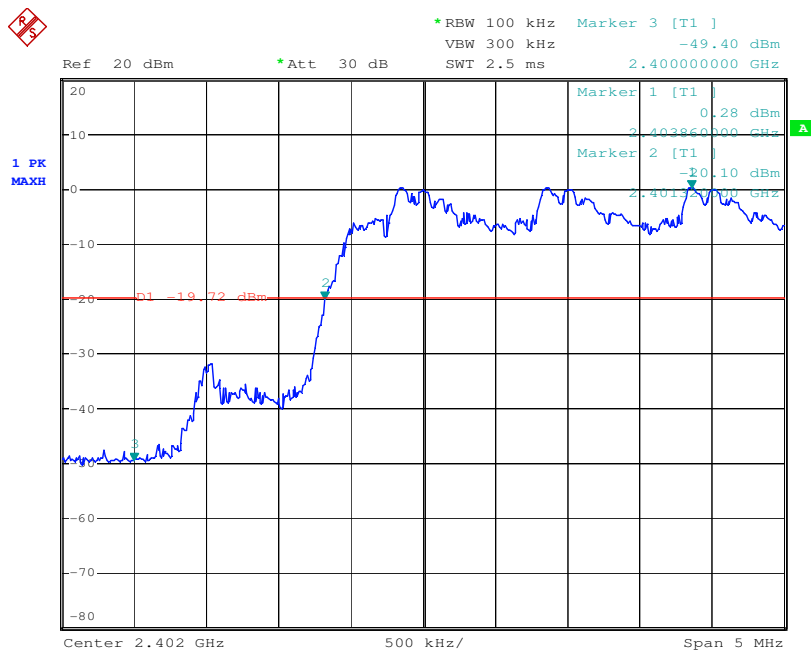
Test Status: $\pi/4$ DQPSK - Static



Date: 1.JAN.2000 05:44:10

Low Channel

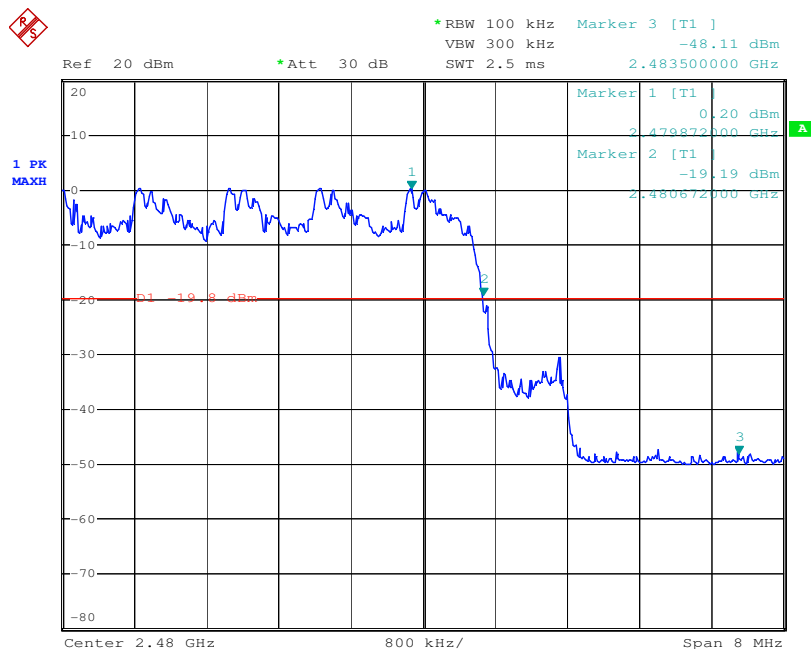
Test Status: $\pi/4$ DQPSK - Hopping



Date: 1.JAN.2000 00:59:13

High Channel

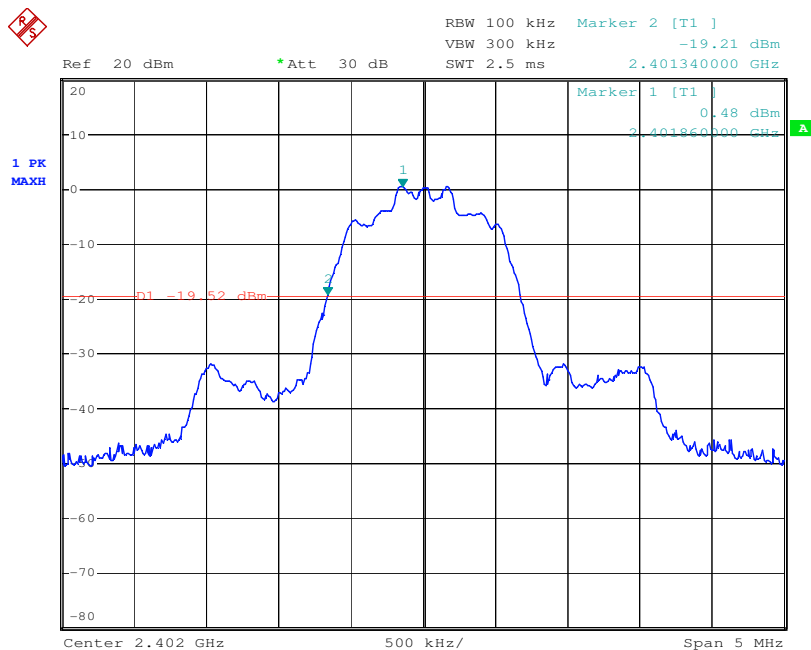
Test Status: $\pi/4$ DQPSK - Hopping



Date: 1.JAN.2000 00:54:48

Low Channel

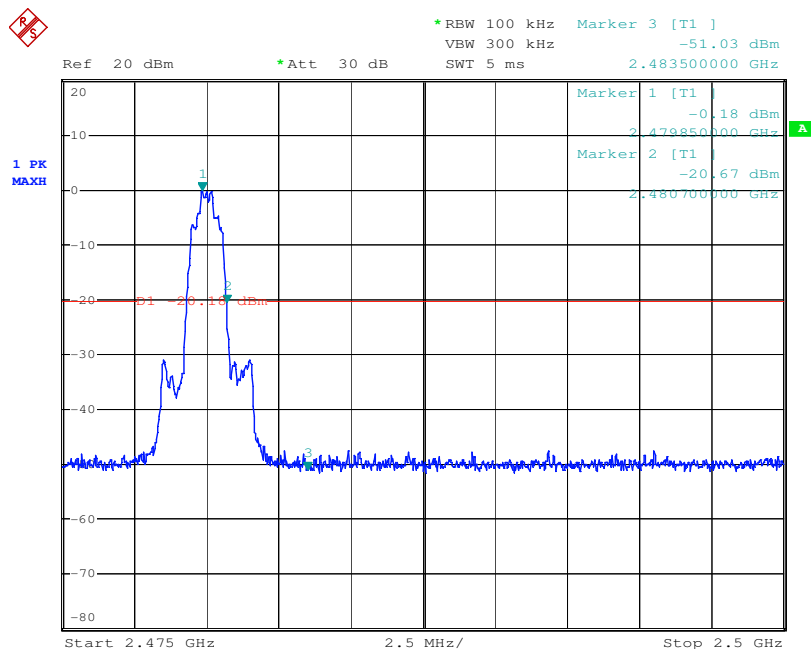
Test Status: 8DPSK - Static



Date: 1.JAN.2000 00:41:29

High Channel

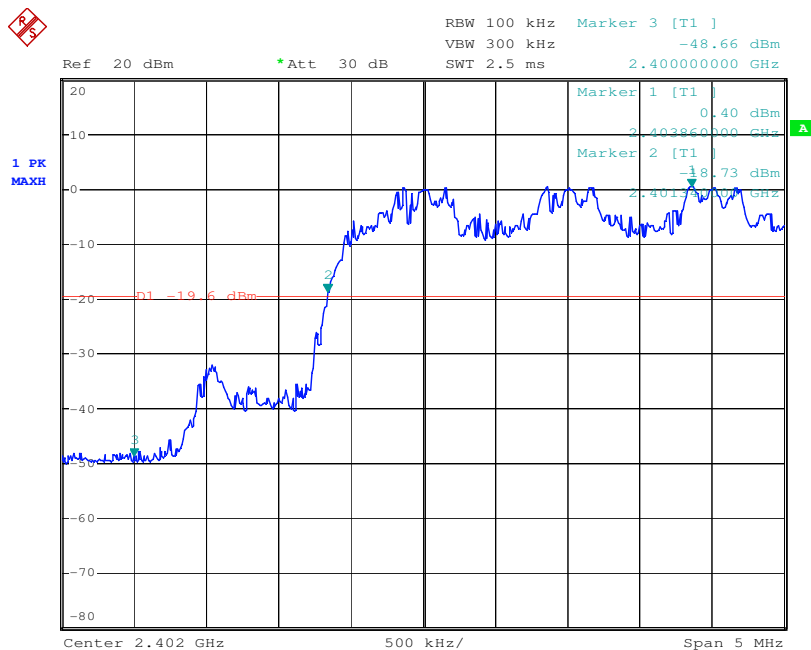
Test Status: 8DPSK - Static



Date: 1.JAN.2000 05:42:53

Low Channel

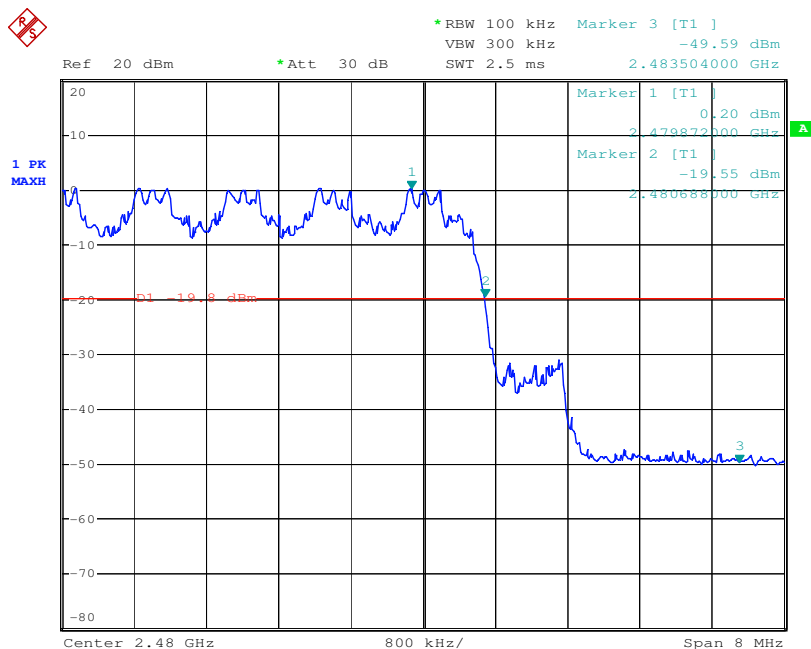
Test Status: 8DPSK - Hopping



Date: 1.JAN.2000 00:46:07

High Channel

Test Status: 8DPSK - Hopping



Date: 1.JAN.2000 00:50:59

7.12 Conducted Emission Test

Test Requirement: FCC Part15 15.207

Test date: Oct. 25, 2012

Standard Applicable According to section 15.207, frequency 150KHz to 30MHz shall not exceed the limit table as blew.

| 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 |

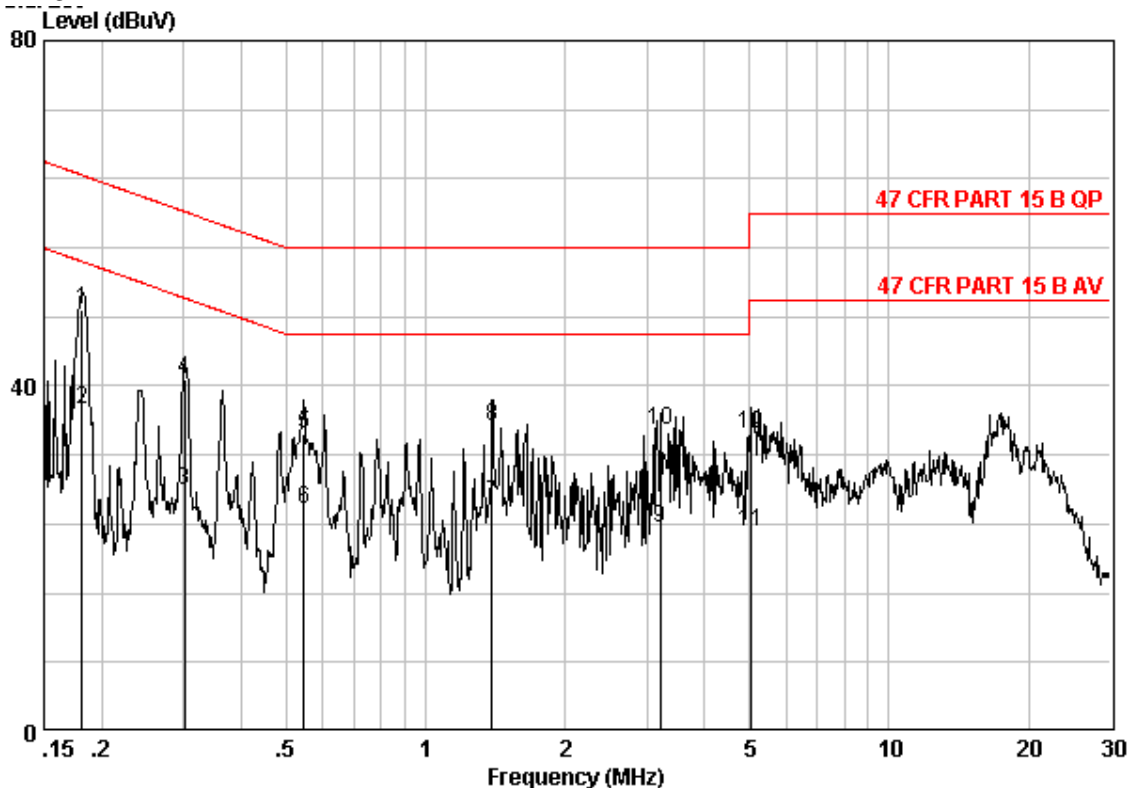
EUT Setup

- 1.The conducted emission tests were performed in the test site,using the setup in accordance with the ANSI C63.10-2009.
- 2.EUT is charged with PC.The AC Power adaptor of PC was plug-in LISN.The rear of the EUT and periphearals were placed flushed with the rear of the tabletop.
- 3.The LISN was connected with 120V AC/60Hz power source.

Measurement Result

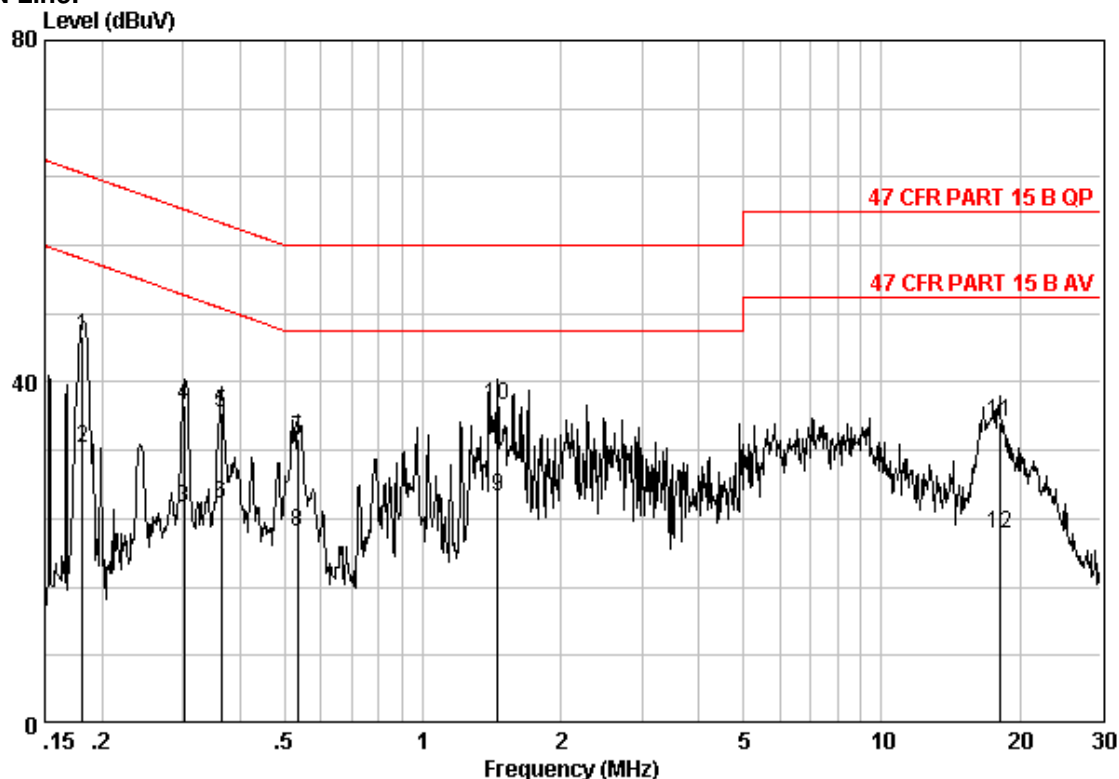
Operation mode: Transmitter conducted to Receiver by wireless.
Note:All test modes have been tested, below show the worst plots.

L line:



| Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---------|------------|-------------|------------|-------|------------|------------|---------|
| MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 0.18152 | 0.02 | 9.70 | 39.19 | 48.91 | 64.42 | -15.51 | QP |
| 0.18152 | 0.02 | 9.70 | 27.58 | 37.30 | 54.42 | -17.12 | Average |
| 0.30188 | 0.01 | 9.70 | 18.16 | 27.87 | 50.19 | -22.32 | Average |
| 0.30188 | 0.01 | 9.70 | 30.96 | 40.67 | 60.19 | -19.52 | QP |
| 0.54644 | 0.01 | 9.80 | 24.62 | 34.43 | 56.00 | -21.57 | QP |
| 0.54644 | 0.01 | 9.80 | 15.87 | 25.68 | 46.00 | -20.32 | Average |
| 1.388 | 0.02 | 9.80 | 16.51 | 26.33 | 46.00 | -19.67 | Average |
| 1.388 | 0.02 | 9.80 | 25.45 | 35.27 | 56.00 | -20.73 | QP |
| 3.207 | 0.02 | 9.85 | 13.66 | 23.53 | 46.00 | -22.47 | Average |
| 3.207 | 0.02 | 9.85 | 24.95 | 34.82 | 56.00 | -21.18 | QP |
| 5.058 | 0.01 | 9.90 | 13.17 | 23.08 | 50.00 | -26.92 | Average |
| 5.058 | 0.01 | 9.90 | 24.47 | 34.38 | 60.00 | -25.62 | QP |

N Line:



| Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---------|------------|-------------|------------|-------|------------|------------|---------|
| MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 0.18152 | 0.02 | 9.70 | 35.54 | 45.26 | 64.42 | -19.16 | QP |
| 0.18152 | 0.02 | 9.70 | 22.49 | 32.21 | 54.42 | -22.21 | Average |
| 0.30188 | 0.01 | 9.70 | 15.53 | 25.24 | 50.19 | -24.95 | Average |
| 0.30188 | 0.01 | 9.70 | 27.50 | 37.21 | 60.19 | -22.98 | QP |
| 0.36338 | 0.01 | 9.77 | 26.65 | 36.43 | 58.65 | -22.22 | QP |
| 0.36338 | 0.01 | 9.77 | 16.02 | 25.80 | 48.65 | -22.85 | Average |
| 0.53215 | 0.01 | 9.80 | 23.47 | 33.28 | 56.00 | -22.72 | QP |
| 0.53215 | 0.01 | 9.80 | 12.62 | 22.43 | 46.00 | -23.57 | Average |
| 1.456 | 0.02 | 9.80 | 16.85 | 26.67 | 46.00 | -19.33 | Average |
| 1.456 | 0.02 | 9.80 | 27.47 | 37.29 | 56.00 | -18.71 | QP |
| 18.039 | 0.02 | 10.06 | 25.19 | 35.27 | 60.00 | -24.73 | QP |
| 18.039 | 0.02 | 10.06 | 12.15 | 22.23 | 50.00 | -27.77 | Average |

7.13 Occupied Bandwidth Test

Test Requirement: RSS-Gen Issue 3 Clause 4.6.1

Test date: Nov 04, 2012

Standard Applicable According to the section RSS-Gen Issue 3 Clause 4.6.1

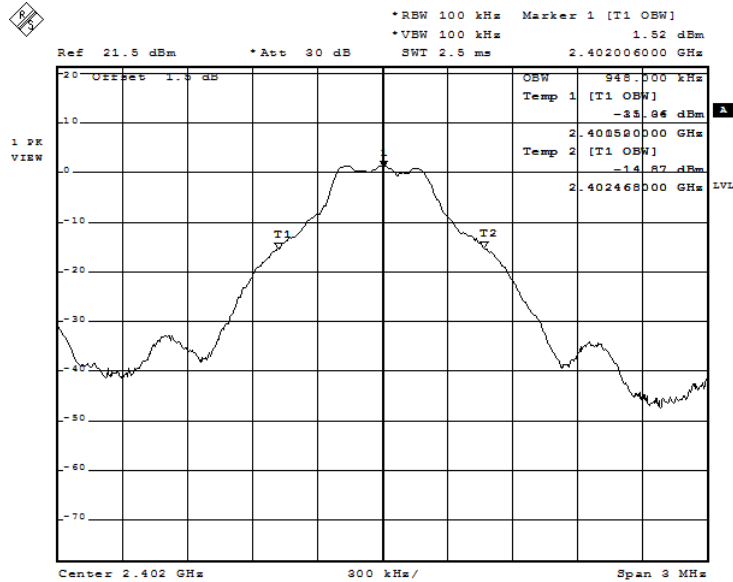
EUT Setup The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer with the resolutions set at 100kHz, the video bandwidth set at 300kHz.

Test date

| Test Channel | Channel Frequency (MHz) | Modulation | Occupied Bandwidth(MHz) |
|--------------|----------------------------|---------------|----------------------------|
| Low | 2402 | GFSK | 0.948 |
| Middle | 2441 | GFSK | 0.948 |
| High | 2480 | GFSK | 0.948 |
| Low | 2402 | $\pi/4$ DQPSK | 1.200 |
| Middle | 2441 | $\pi/4$ DQPSK | 1.200 |
| High | 2480 | $\pi/4$ DQPSK | 1.200 |
| Low | 2402 | 8DPSK | 1.188 |
| Middle | 2441 | 8DPSK | 1.188 |
| High | 2480 | 8DPSK | 1.188 |

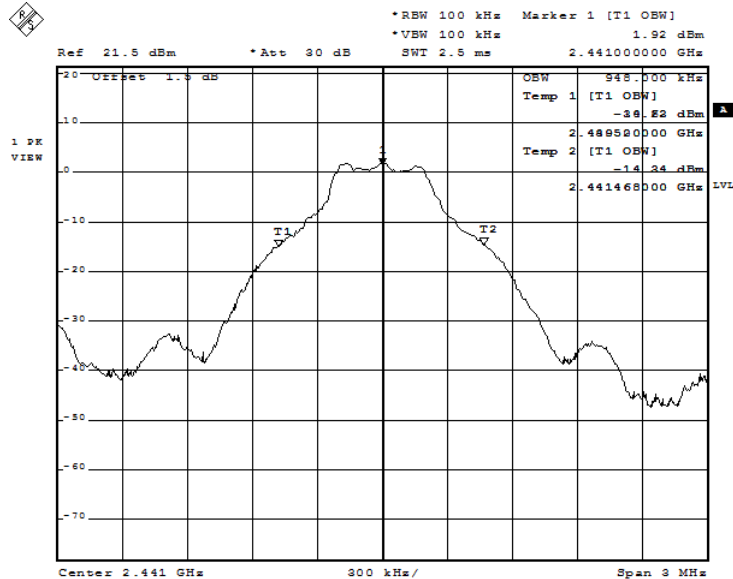
Result plot as follows:

Lowest Channel – GFSK:



Date: 1.NOV.2012 13:46:37

Middle Channel – GFSK:

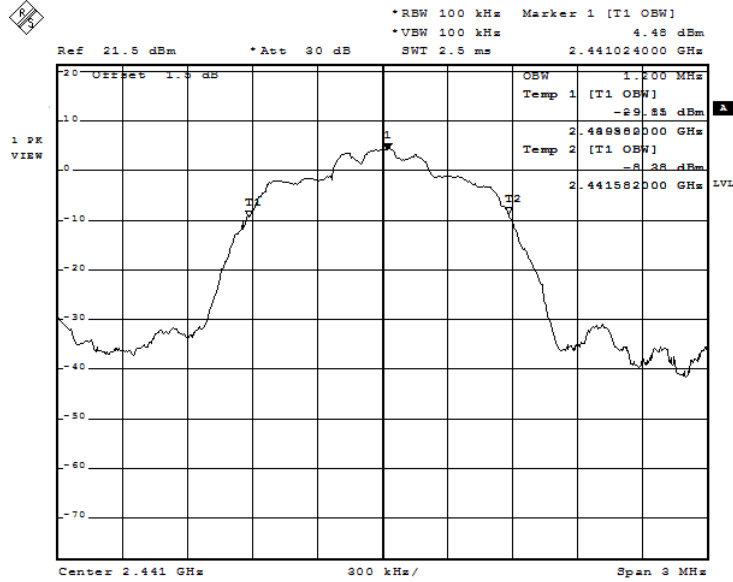


Date: 1.NOV.2012 13:48:15

Date: 1.NOV.2012 13:49:15

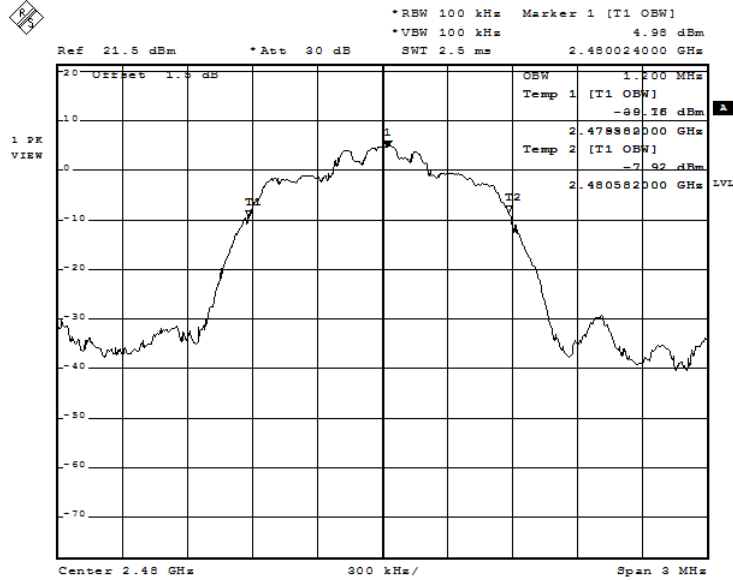
Date: 1.NOV.2012 16:16:41

Middle Channel $-\pi/4$ DQPSK:



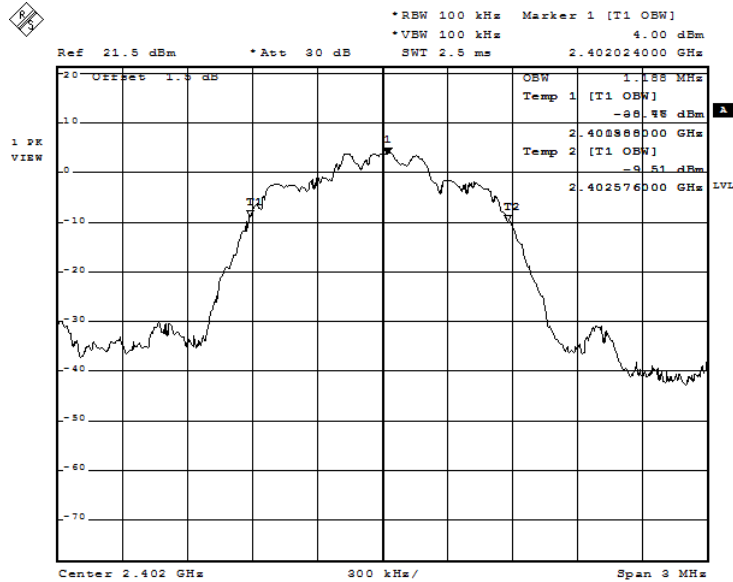
Date: 1.NOV.2012 16:17:54

Highest Channel $-\pi/4$ DQPSK:



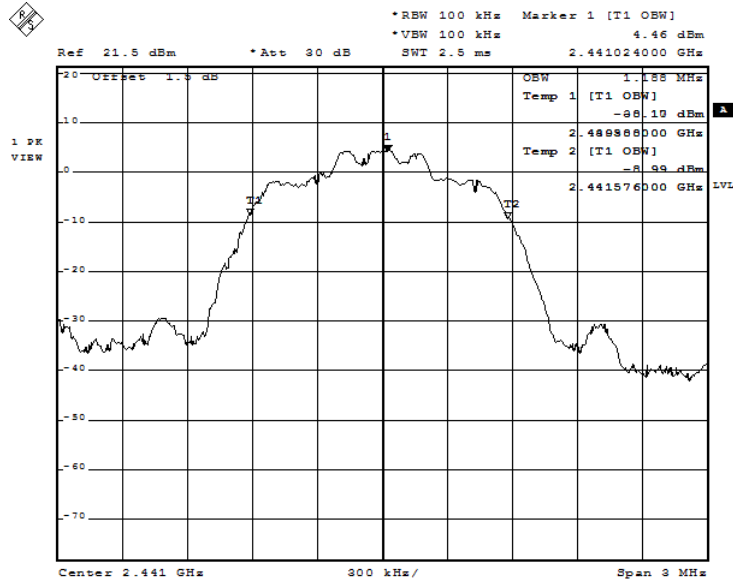
Date: 1.NOV.2012 16:18:43

Lowest Channel –8DPSK:



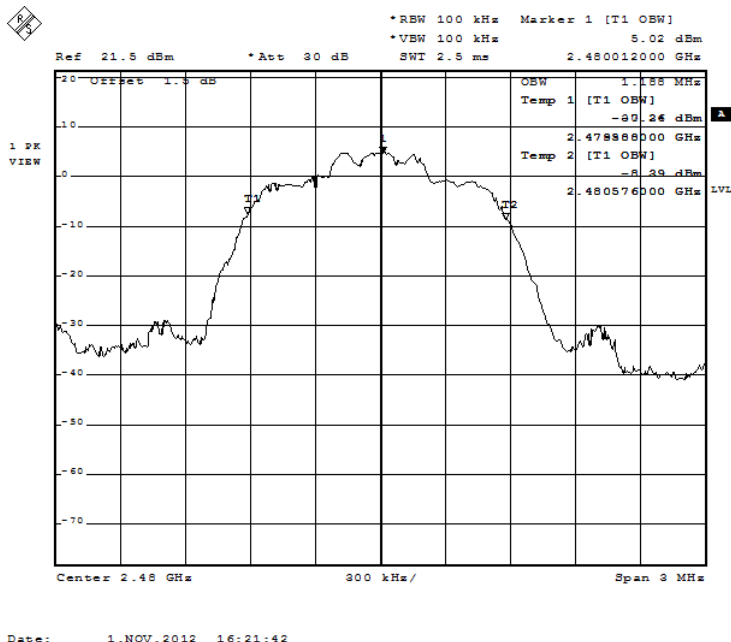
Date: 1.NOV.2012 16:20:03

Middle Channel –8DPSK:



Date: 1.NOV.2012 16:20:52

Highest Channel –8DPSK:



End of Report