**SGS-CSTC Standards Technical Services Ltd.**

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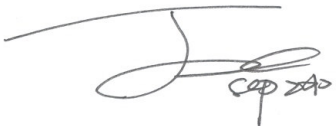
# FCC REPORT

| | |
|---|---|
| **Application No:** | SZEMO100804886RF |
| **Applicant:** | Nokia (China) Investment Co., Ltd. |
| **Product Name:** | Bluetooth headset |
| **Operation Frequency:** | 2402MHz to 2480MHz |
| **FCC ID:** | QTLBH-219 |
| **Standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2008 |
| **Date of Receipt:** | 2010-08-02 |
| **Date of Test:** | 2010-08-02 to 2010-09-02 |
| **Date of Issue:** | 2010-09-03 |
| **Test Result :** | **PASS *** |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang
Laboratory Manager

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. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
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.

# 2 Contents

# 3 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna Requirement | 15.203/15.247 (c) | Passed |
| AC Power Line Conducted Emission | 15.207/15.107 | Passed |
| Conducted Peak Output Power | 15.247 (b)(1) | Passed |
| 20dB Occupied Bandwidth | 15.247 (a)(1) | Passed |
| Carrier Frequencies Separation | 15.247 (a)(1) | Passed |
| Hopping Channel Number | 15.247 (b) | Passed |
| Dwell Time | 15.247 (a)(1) | Passed |
| Pseudorandom Frequency Hopping Sequence | 15.247(b)(4)&TCB Exclusion List (7 July 2002) | Passed |
| Radiated Emission | 15.205/15.209/15.109 | Passed |
| Band Edge | 15.247(d) | Passed |

*Remark: Passed: The EUT complies with the essential requirements in the standard.*
*Failed: The EUT does not comply with the essential requirements in the standard.*

# 4 General Information

## 4.1 Client Information

| | |
|---|---|
| Applicant: | Nokia (China) Investment Co., Ltd. |
| Address of Applicant: | Nokia China, Beijing, Kaifaqu-Donghuan Zhonglu Building: R&D Wing, 7th Floor, BDA Building 2-No.5, Donghuan Zhong Rd. |

## 4.2 General Description of E.U.T.

| | |
|---|---|
| Product Name: | Bluetooth headset |
| Trade Mark: | NOKIA |
| Item No.: | BH-219 |
| Bluetooth Version: | 2.1+EDR |
| HW: | V2.2 |
| SW: | V4.3 |
| MV: | V3.0 |
| Operation Frequency: | 2402MHz~2480MHz |
| Channel numbers: | 79 |
| Channel separation: | 1MHz |
| Modulation type: | GFSK, Pi/4QPSK, 8DPSK |
| Antenna Type: | Integral |
| Antenna gain: | 3.05 dBi (declared by manufacturer) |
| Power supply: | DC3.7V (Lithium Battery) |
| AC Adapter: | Type: AC-15U<br>Input: AC 100-240V/50-60Hz 150mA<br>Output: DC 5.0 V 800mA |
| Power Code | < 3m |
| DC Adapter: | Type: DC-4<br>Input: DC 12V/24V<br>Output: 5.7V/890mA |

| Operation Frequency each of channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2402MHz | 21 | 2422MHz | 41 | 2442MHz | 61 | 2462MHz |
| 2 | 2403MHz | 22 | 2423MHz | 42 | 2443MHz | 62 | 2463MHz |
| 3 | 2404MHz | 23 | 2424MHz | 43 | 2444MHz | 63 | 2464MHz |
| 4 | 2405MHz | 24 | 2425MHz | 44 | 2445MHz | 64 | 2465MHz |
| 5 | 2406MHz | 25 | 2426MHz | 45 | 2446MHz | 65 | 2466MHz |
| 6 | 2407MHz | 26 | 2427MHz | 46 | 2447MHz | 66 | 2467MHz |
| 7 | 2408MHz | 27 | 2428MHz | 47 | 2448MHz | 67 | 2468MHz |
| 8 | 2409MHz | 28 | 2429MHz | 48 | 2449MHz | 68 | 2469MHz |
| 9 | 2410MHz | 29 | 2430MHz | 49 | 2450MHz | 69 | 2470MHz |
| 10 | 2411MHz | 30 | 2431MHz | 50 | 2451MHz | 70 | 2471MHz |
| 11 | 2412MHz | 31 | 2432MHz | 51 | 2452MHz | 71 | 2472MHz |
| 12 | 2413MHz | 32 | 2433MHz | 52 | 2453MHz | 72 | 2473MHz |
| 13 | 2414MHz | 33 | 2434MHz | 53 | 2454MHz | 73 | 2474MHz |
| 14 | 2415MHz | 34 | 2435MHz | 54 | 2455MHz | 74 | 2475MHz |
| 15 | 2416MHz | 35 | 2436MHz | 55 | 2456MHz | 75 | 2476MHz |
| 16 | 2417MHz | 36 | 2437MHz | 56 | 2457MHz | 76 | 2477MHz |
| 17 | 2418MHz | 37 | 2438MHz | 57 | 2458MHz | 77 | 2478MHz |
| 18 | 2419MHz | 38 | 2439MHz | 58 | 2459MHz | 78 | 2479MHz |
| 19 | 2420MHz | 39 | 2440MHz | 59 | 2460MHz | 79 | 2480MHz |
| 20 | 2421MHz | 40 | 2441MHz | 60 | 2461MHz | | |

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel | Frequency |
|---|---|
| The lowest channel | 2402MHz |
| The middle channel | 2441MHz |
| The Highest channel | 2480MHz |

## 4.3 E.U.T Operation mode

| **Operating Environment:** | |
|---|---|
| Temperature: | 24.0 °C |
| Humidity: | 52 % RH |
| Atmospheric Pressure: | 1008 mbar |
| **Test mode:** | |
| AC charge+ Bluetooth mode | Keep the EUT communicate with other Bluetooth device, and AC adapter charge to EUT. |
| DC charge+ Bluetooth mode | Keep the EUT communicate with other Bluetooth device, and DC adapter charge to EUT. |
| Bluetooth mode | Keep the EUT communicate with other Bluetooth device. |
| AC charge mode | Keep the AC adapter charge to EUT. |
| DC charge mode | Keep the DC adapter charge to EUT. |
| Transmitting mode | Keep the EUT in transmitting mode with modulation. |

## 4.4 Test Facility

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

**CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab 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.

**VCCI**

The 3m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197 and C-2383 respectively.

Date of Registration: September 29, 2008. Valid until September 28, 2011.

**FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 556682, June 27, 2008.

**Industry Canada (IC)**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

## 4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

## 4.6 Other Information Requested by the Customer

None.

## 4.7 Test Instruments list

| RE in Chamber | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (yyyy-mm-dd)** | **Cal.Due date (yyyy-mm-dd)** |
| 1 | 3m Semi-Anechoic Chamber | ETS-LINDGREN | N/A | SEL0017 | 2010-06-17 | 2011-06-17 |
| 2 | EMI Test Receiver | Rohde & Schwarz | ESIB26 | SEL0023 | 2009-11-05 | 2010-11-05 |
| 3 | EMI Test software | AUDIX | E3 | SEL0050 | N/A | N/A |
| 4 | Coaxial cable | SGS | N/A | SEL0028 | 2008-06-18 | 2011-06-18 |
| 5 | BiConiLog Antenna (26-3000MHz) | ETS-LINDGREN | 3142C | SEL0015 | 2009-11-05 | 2010-11-05 |
| 6 | Double-ridged horn (1-18GHz) | ETS-LINDGREN | 3117 | SEL0006 | 2009-11-10 | 2010-11-10 |
| 7 | Horn Antenna (18-26GHz) | ETS-LINDGREN | 3160 | SEL0076 | 2009-11-10 | 2010-11-10 |
| 8 | Pre-amplifier (0.1-1300MHz) | Agilent Technologies | 8447D | SEL0053 | 2010-06-02 | 2011-06-02 |
| 9 | Pre-Amplifier (0.1-26.5GHz) | Compliance Directions Systems Inc. | PAP-0126 | SEL0168 | 2009-12-18 | 2010-12-18 |
| 10 | Pre-amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | SEL0080 | 2010-06-04 | 2011-06-04 |
| 11 | Band filter | Amindeon | 82346 | SEL0094 | 2010-06-02 | 2011-06-02 |

| Conducted Emission | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (yyyy-mm-dd)** | **Cal.Due date (yyyy-mm-dd)** |
| 1 | Shielding Room | ZhongYu Electron | GB-88 | SEL0042 | N/A | N/A |
| 2 | LISN | ETS-LINDGREN | 3816/2 | SEL0021 | 2010-06-02 | 2011-06-02 |
| 3 | Two-Line V-Network | Rohde & Schwarz | ENV216 | SEL0152 | 2009-10-22 | 2010-10-22 |
| 4 | EMI Test Receiver | Rohde & Schwarz | ESCI | SEL0022 | 2010-06-02 | 2011-06-02 |
| 5 | Coaxial Cable | SGS | N/A | SEL0024 | 2008-06-18 | 2011-06-18 |

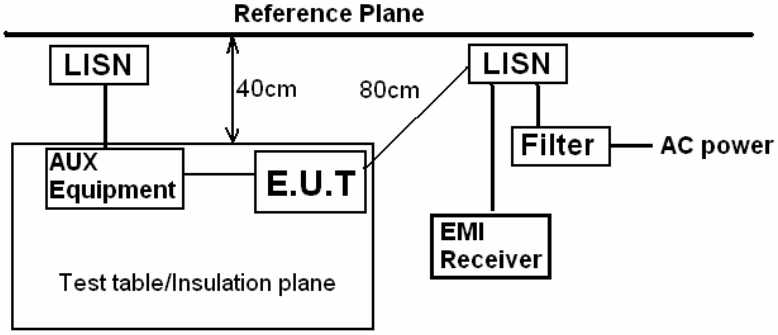
| RF conducted | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (yyyy-mm-dd)** | **Cal.Due date (yyyy-mm-dd)** |
| 1 | Spectrum Analyzer | Rohde & Schwarz | FSP 30 | SEL0154 | 2009-10-22 | 2010-10-22 |
| 2 | Coaxial cable | SGS | N/A | SEL0028 | 2008-06-18 | 2011-06-18 |

# 5 Test results and Measurement Data

## 5.1 Antenna requirement:

| | |
|---|---|
| **Standard requirement:** | FCC Part15 C Section 15.203 /247(c) |
| 15.203 requirement:<br>*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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.*<br>15.247(c) (1)(i) requirement:<br>*(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi 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 6dBi.* | |
| **E.U.T Antenna:** | |
| The antenna is integrated on the main PCB and no consideration of replacement, the configuration of the antenna attach to the internal photos. The best case gain of the antenna is 3.05dBi. | |

## 5.2 Conducted Emissions

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.207/15.107 |
| Test Method: | ANSI C63.4: 2003 |
| Test Frequency Range: | 150KHz to 30MHz |
| Class / Severity: | Class B |
| Limit: | Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average<br>0.15-0.5: 66 to 56* / 56 to 46*<br>0.5-5: 56 / 46<br>5-30: 60 / 50<br>* Decreases with the logarithm of the frequency. |
| Test procedure | The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement. |
| Test setup: |  <br>*Remark:*<br>*E.U.T: Equipment Under Test*<br>*LISN: Line Impedence Stabilization Network*<br>*Test table height=0.8m* |
| Test Instruments: | Refer to section 4.7 for details |
| Test mode: | AC charge+ Bluetooth mode, AC charge mode |
| Test results: | Passed |

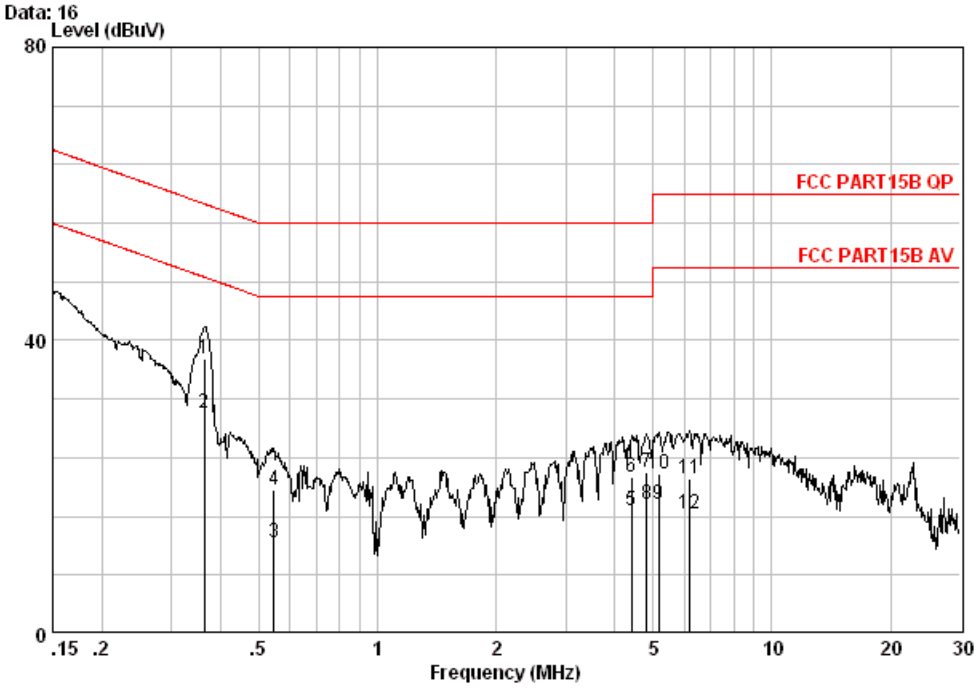
**Measurement Data**

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

## AC charge+ Bluetooth mode:

## Live line:




Site : Shielding Room
Condition : FCC PART15B QP CE LINE
EUT : BLUETOOTH HEADSET
JOB NO. : 4886RF
MODE : AC CHARGE+BLUETOOTH

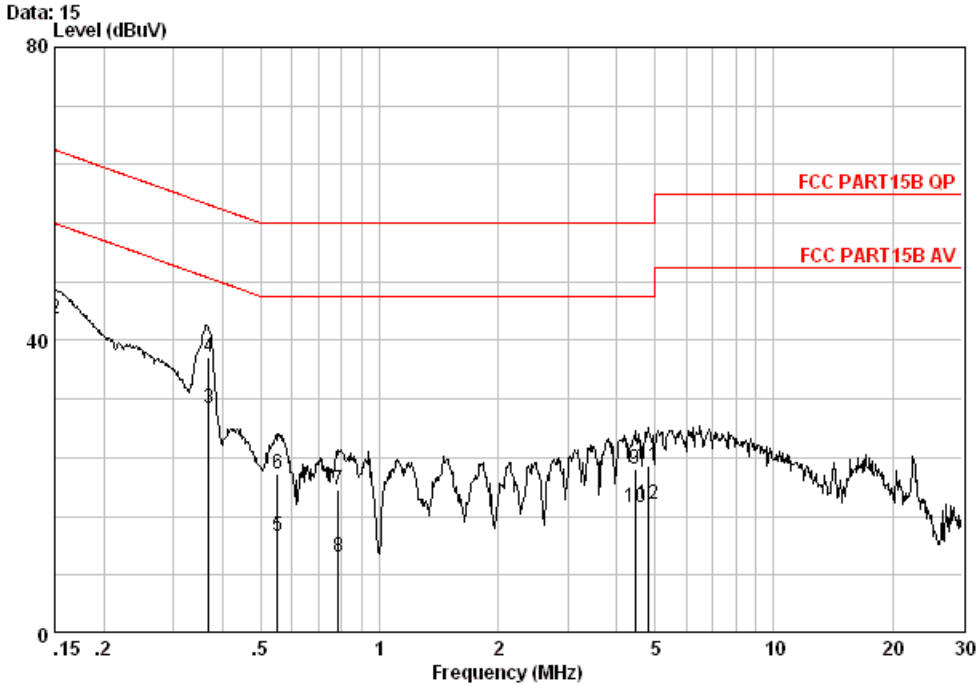
| | Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.36300 | 0.05 | -0.04 | 37.50 | 37.51 | 58.66 | -21.15 | QP |
| 2 @ | 0.36300 | 0.05 | -0.04 | 30.10 | 30.11 | 48.66 | -18.55 | Average |
| 3 | 0.54600 | 0.06 | -0.04 | 12.50 | 12.52 | 46.00 | -33.48 | Average |
| 4 | 0.54600 | 0.06 | -0.04 | 19.60 | 19.62 | 56.00 | -36.38 | QP |
| 5 | 4.400 | 0.16 | -0.10 | 16.70 | 16.76 | 46.00 | -29.24 | Average |
| 6 | 4.400 | 0.16 | -0.10 | 21.40 | 21.46 | 56.00 | -34.54 | QP |
| 7 | 4.820 | 0.17 | -0.11 | 21.90 | 21.96 | 56.00 | -34.04 | QP |
| 8 | 4.820 | 0.17 | -0.11 | 17.60 | 17.66 | 46.00 | -28.34 | Average |
| 9 | 5.160 | 0.17 | -0.11 | 17.50 | 17.56 | 50.00 | -32.44 | Average |
| 10 | 5.160 | 0.17 | -0.11 | 21.80 | 21.86 | 60.00 | -38.14 | QP |
| 11 | 6.180 | 0.19 | -0.13 | 21.20 | 21.25 | 60.00 | -38.75 | QP |
| 12 | 6.180 | 0.19 | -0.13 | 16.40 | 16.45 | 50.00 | -33.55 | Average |

*Notes:*

*1. The following Quasi-Peak and Average measurements were performed on the EUT:*

*2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.*

**Neutral line:**




Site : Shielding Room
Condition : FCC PART15B QP CE NEUTRAL
EUT : BLUETOOTH HEADSET
JOB NO. : 4886RF
MODE : AC CHARGE+BLUETOOTH

| | Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.15000 | 0.04 | -0.05 | 30.50 | 30.49 | 56.00 | -25.51 | Average |
| 2 | 0.15000 | 0.04 | -0.05 | 42.90 | 42.89 | 66.00 | -23.11 | QP |
| 3 @ | 0.36800 | 0.05 | -0.04 | 30.70 | 30.71 | 48.55 | -17.83 | Average |
| 4 | 0.36800 | 0.05 | -0.04 | 37.60 | 37.61 | 58.55 | -20.93 | QP |
| 5 | 0.55000 | 0.06 | -0.04 | 13.20 | 13.22 | 46.00 | -32.78 | Average |
| 6 | 0.55000 | 0.06 | -0.04 | 21.70 | 21.72 | 56.00 | -34.28 | QP |
| 7 | 0.78700 | 0.07 | -0.04 | 19.50 | 19.52 | 56.00 | -36.48 | QP |
| 8 | 0.78700 | 0.07 | -0.04 | 10.40 | 10.42 | 46.00 | -35.58 | Average |
| 9 | 4.450 | 0.16 | -0.11 | 22.40 | 22.46 | 56.00 | -33.54 | QP |
| 10 | 4.450 | 0.16 | -0.11 | 17.20 | 17.26 | 46.00 | -28.74 | Average |
| 11 | 4.790 | 0.17 | -0.11 | 22.80 | 22.85 | 56.00 | -33.15 | QP |
| 12 | 4.790 | 0.17 | -0.11 | 17.50 | 17.55 | 46.00 | -28.45 | Average |

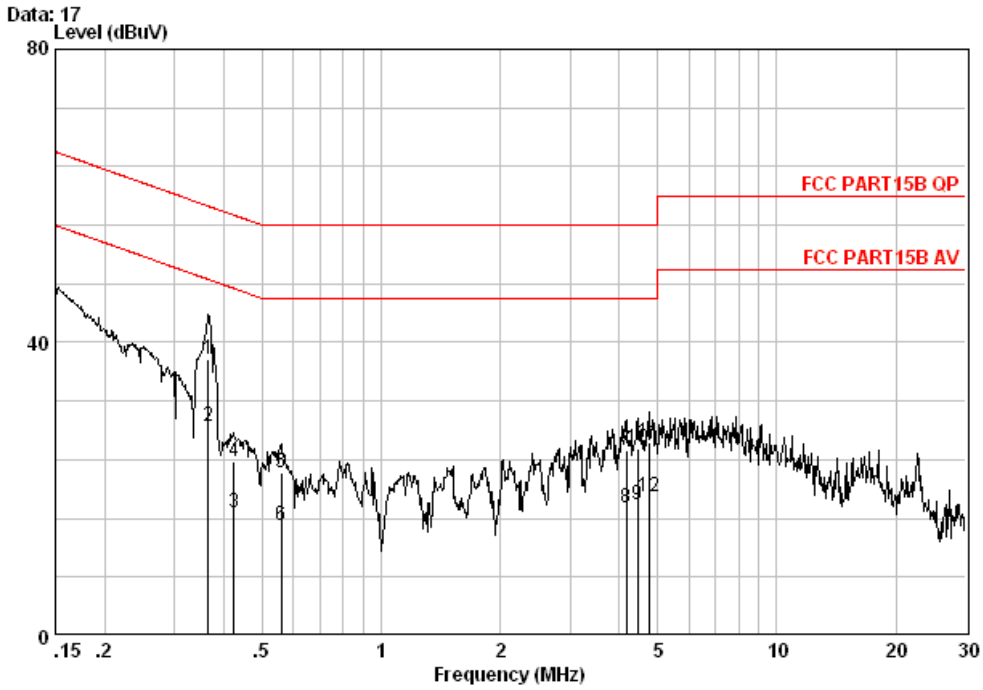
*Notes:*

*1. The following Quasi-Peak and Average measurements were performed on the EUT:*

*2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.*

## AC charge mode:

## Live line:




Site : Shielding Room
Condition : FCC PART15B QP CE LINE
EUT : BLUETOOTH HEADSET
JOB NO. : 4886RF
MODE : AC CHARGE

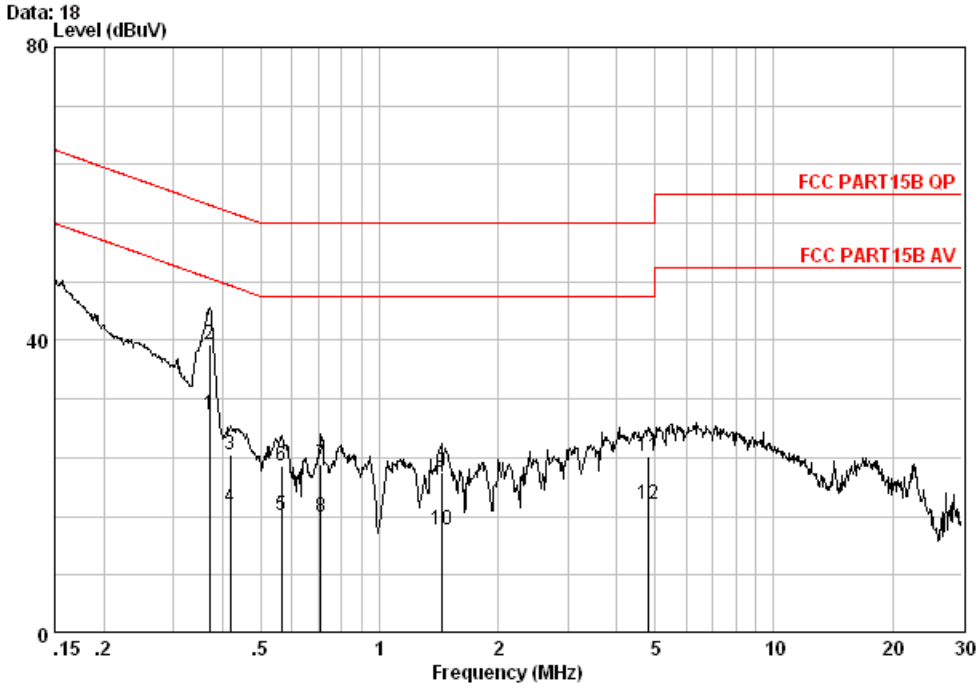
| | Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.36531 | 0.05 | -0.04 | 37.74 | 37.75 | 58.61 | -20.86 | QP |
| 2 | 0.36531 | 0.05 | -0.04 | 28.50 | 28.51 | 48.61 | -20.10 | Average |
| 3 | 0.42373 | 0.06 | -0.04 | 16.80 | 16.81 | 47.37 | -30.56 | Average |
| 4 | 0.42373 | 0.06 | -0.04 | 23.64 | 23.65 | 57.37 | -33.72 | QP |
| 5 | 0.55814 | 0.06 | -0.04 | 22.20 | 22.22 | 56.00 | -33.78 | QP |
| 6 | 0.55814 | 0.06 | -0.04 | 15.10 | 15.12 | 46.00 | -30.88 | Average |
| 7 | 4.158 | 0.16 | -0.09 | 25.30 | 25.37 | 56.00 | -30.63 | QP |
| 8 | 4.158 | 0.16 | -0.09 | 17.40 | 17.46 | 46.00 | -28.54 | Average |
| 9 | 4.454 | 0.16 | -0.10 | 17.80 | 17.86 | 46.00 | -28.14 | Average |
| 10 | 4.454 | 0.16 | -0.10 | 25.53 | 25.59 | 56.00 | -30.41 | QP |
| 11 | 4.746 | 0.17 | -0.11 | 26.37 | 26.43 | 56.00 | -29.57 | QP |
| 12 | 4.746 | 0.17 | -0.11 | 18.90 | 18.96 | 46.00 | -27.04 | Average |

*Notes:*

*1. The following Quasi-Peak and Average measurements were performed on the EUT:*

*2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.*

**Neutral line:**




Site : Shielding Room
Condition : FCC PART15B QP CE NEUTRAL
EUT : BLUETOOTH HEADSET
JOB NO. : 4886RF
MODE : AC CHARGE

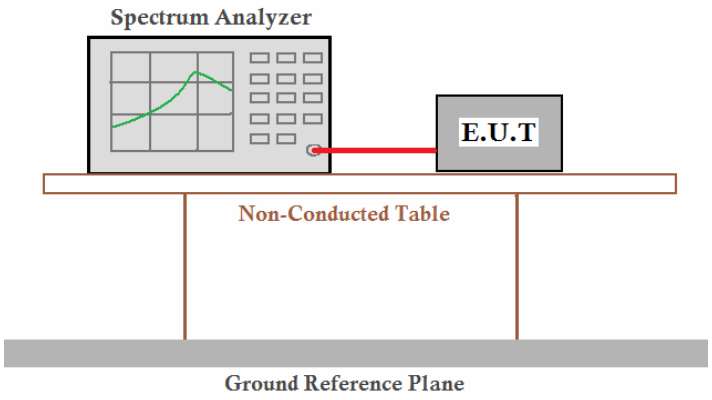
| | Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 1 @ | 0.37117 | 0.05 | -0.04 | 29.80 | 29.82 | 48.47 | -18.66 | Average |
| 2 | 0.37117 | 0.05 | -0.04 | 39.50 | 39.52 | 58.47 | -18.96 | QP |
| 3 | 0.41927 | 0.06 | -0.04 | 24.29 | 24.31 | 57.46 | -33.16 | QP |
| 4 | 0.41927 | 0.06 | -0.04 | 17.20 | 17.22 | 47.46 | -30.25 | Average |
| 5 | 0.56409 | 0.06 | -0.04 | 16.10 | 16.12 | 46.00 | -29.88 | Average |
| 6 | 0.56409 | 0.06 | -0.04 | 22.91 | 22.93 | 56.00 | -33.07 | QP |
| 7 | 0.70842 | 0.06 | -0.04 | 23.18 | 23.20 | 56.00 | -32.80 | QP |
| 8 | 0.70842 | 0.06 | -0.04 | 15.90 | 15.92 | 46.00 | -30.08 | Average |
| 9 | 1.433 | 0.10 | -0.05 | 21.97 | 22.02 | 56.00 | -33.98 | QP |
| 10 | 1.433 | 0.10 | -0.05 | 14.20 | 14.25 | 46.00 | -31.75 | Average |
| 11 | 4.822 | 0.17 | -0.12 | 24.06 | 24.11 | 56.00 | -31.89 | QP |
| 12 | 4.822 | 0.17 | -0.12 | 17.50 | 17.55 | 46.00 | -28.45 | Average |

*Notes:*

*1. The following Quasi-Peak and Average measurements were performed on the EUT:*

*2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.*

## 5.3 Conducted Peak Output Power

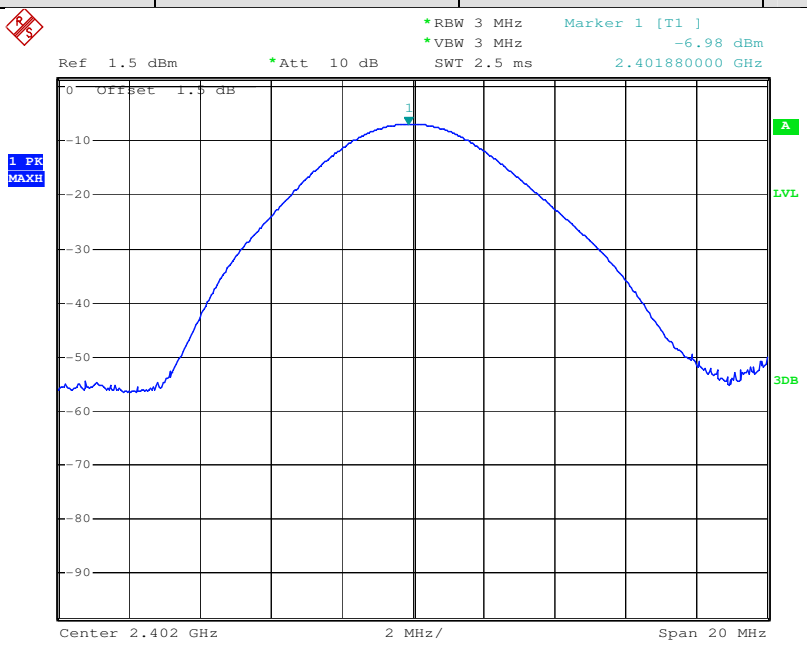
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (b)(1) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Limit: | 30dBm |
| Test setup: |  <br>*Remark:*<br>*Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.* |
| Test Instruments: | Refer to section 4.7 for details |
| Test state: | Non-hopping transmitting with all kinds of modulation. |
| Test results: | Passed |

**Measurement Data**

| GFSK mode | | | |
|---|---|---|---|
| Test channel | Peak Output Power (dBm) | Limit (dBm) | Result |
| Lowest | -6.98 | 30.00 | Pass |
| Middle | -6.31 | 30.00 | Pass |
| Highest | -6.78 | 30.00 | Pass |
| Pi/4QPSK mode | | | |
| Test channel | Peak Output Power (dBm) | Limit (dBm) | Result |
| Lowest | -3.20 | 30.00 | Pass |
| Middle | -3.79 | 30.00 | Pass |
| Highest | -4.03 | 30.00 | Pass |
| 8DPSK mode | | | |
| Test channel | Peak Output Power (dBm) | Limit (dBm) | Result |
| Lowest | -3.96 | 30.00 | Pass |
| Middle | -4.54 | 30.00 | Pass |
| Highest | -3.55 | 30.00 | Pass |

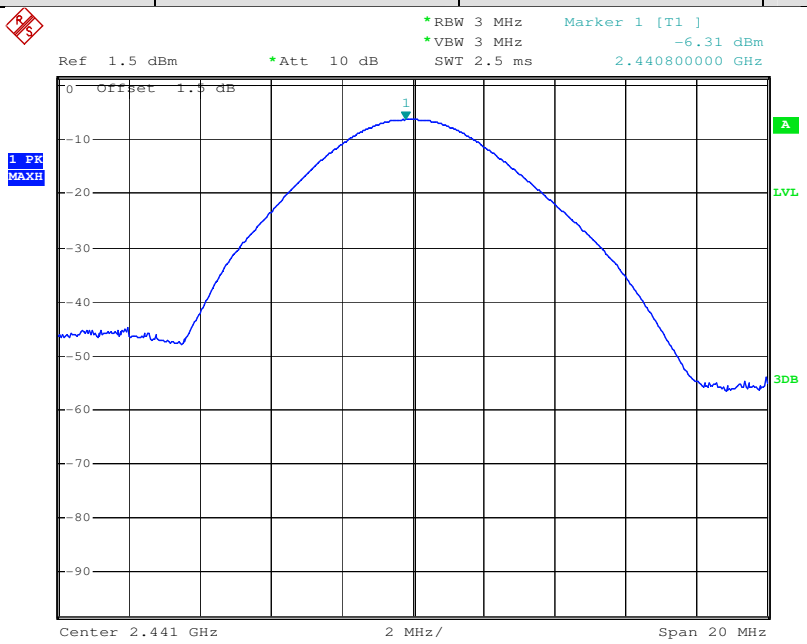
**Test plot as follows:**

| Test mode: | GFSK | Test channel: | Lowest |
|---|---|---|---|



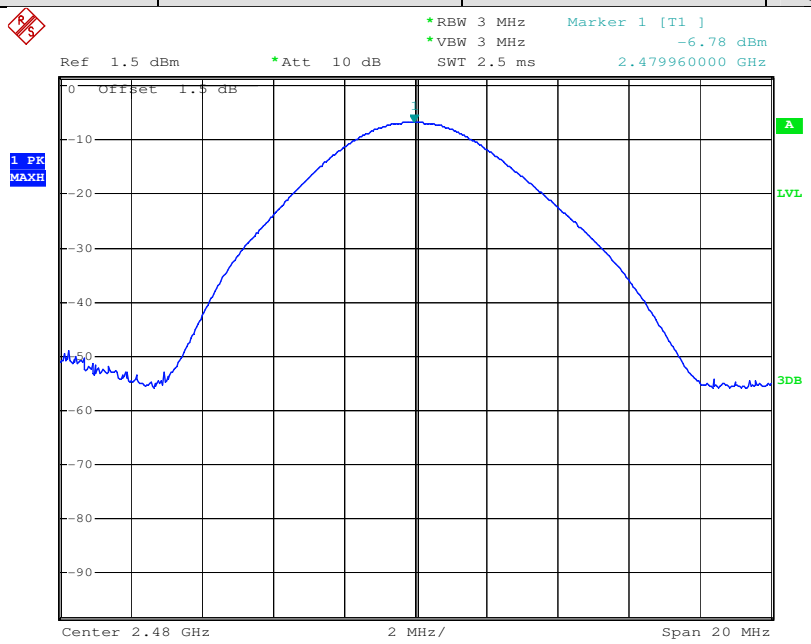

Date: 29.JUN.2010 12:50:31

| Test mode: | GFSK | Test channel: | Middle |
|---|---|---|---|



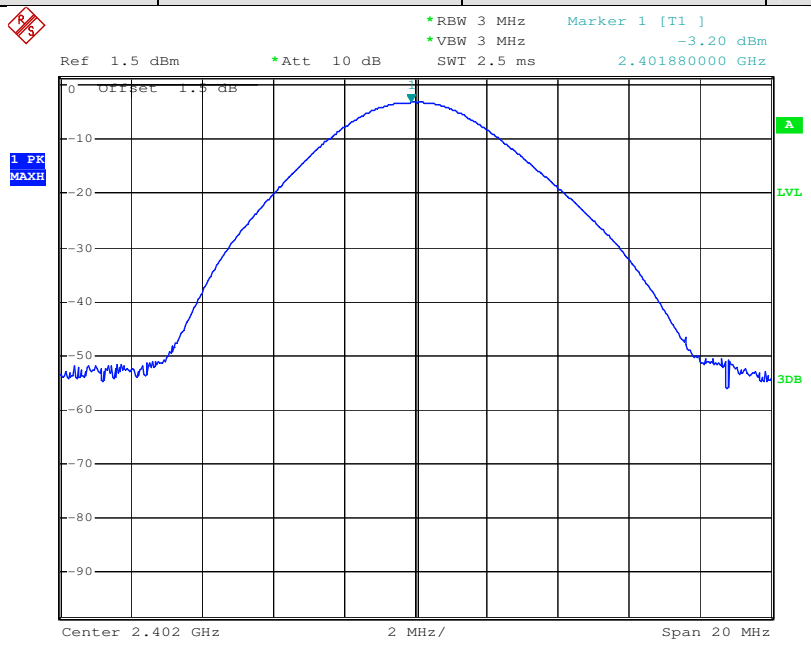

Date: 29.JUN.2010 12:51:19

| Test mode: | GFSK | Test channel: | Highest |
|---|---|---|---|



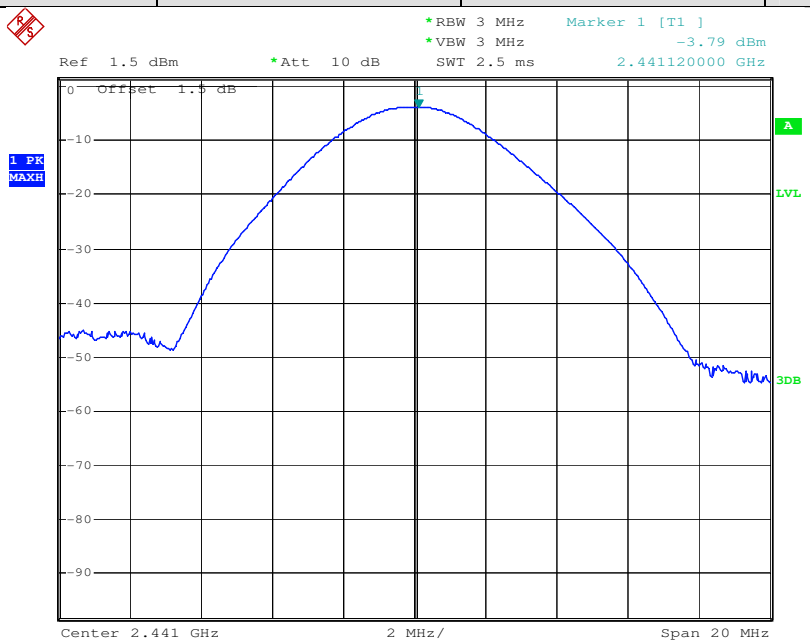

Date: 29.JUN.2010 13:11:53

| Test mode: | Pi/4QPSK | Test channel: | Lowest |
|---|---|---|---|



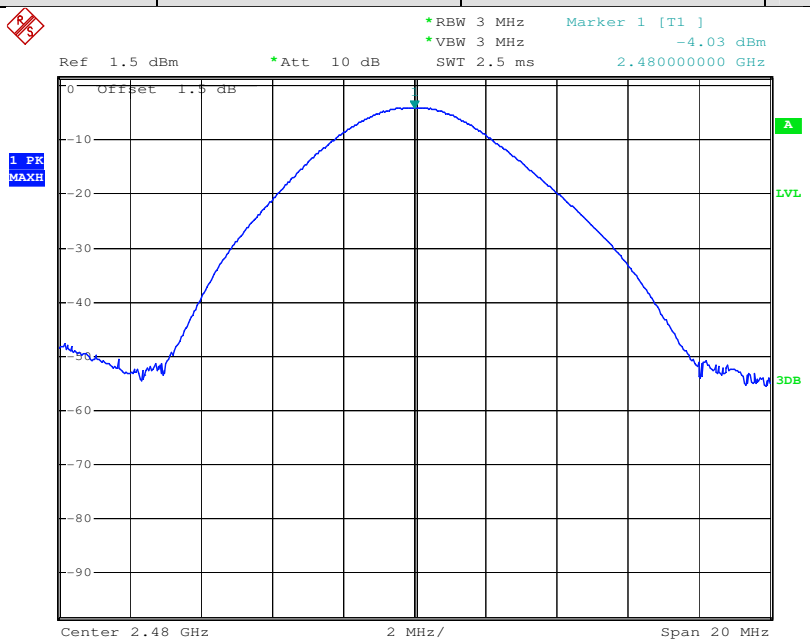

Date: 29.JUN.2010 13:31:47

| Test mode: | Pi/4QPSK | Test channel: | Middle |
|---|---|---|---|



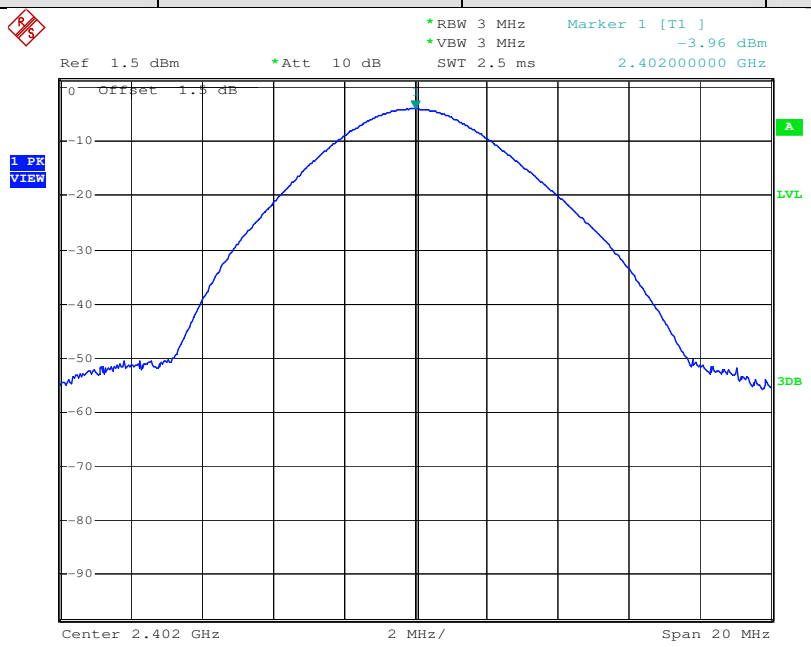

Date: 29.JUN.2010 14:13:33

| Test mode: | Pi/4QPSK | Test channel: | Highest |
|---|---|---|---|



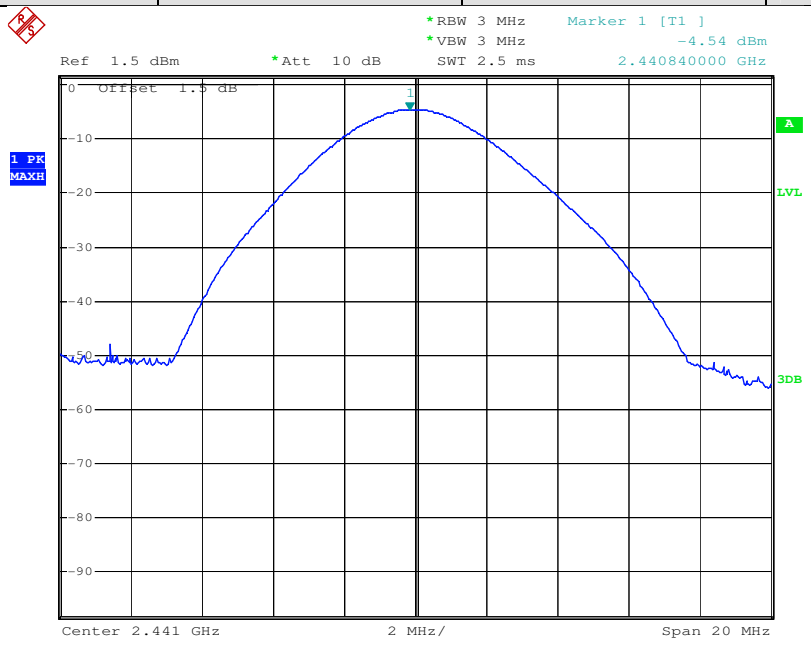

Date: 29.JUN.2010 14:30:56

| Test mode: | 8DPSK | Test channel: | Lowest |
|---|---|---|---|



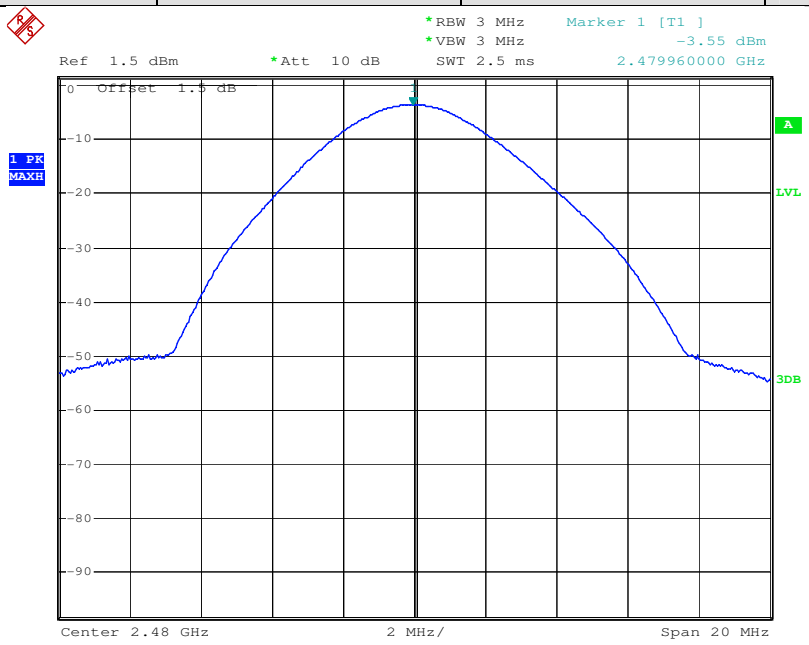

Date: 29.JUN.2010 14:41:46

| Test mode: | 8DPSK | Test channel: | Middle |
|---|---|---|---|



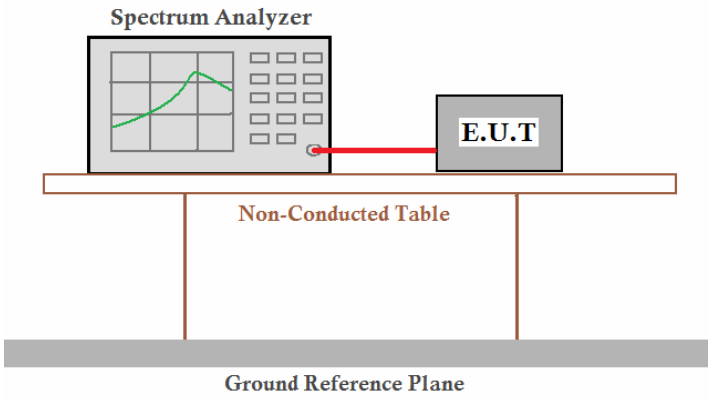

Date: 29.JUN.2010 14:50:10

| Test mode: | 8DPSK | Test channel: | Highest |
|---|---|---|---|




Date: 29.JUN.2010 15:07:50

## 5.4 20dB Occupy Bandwidth

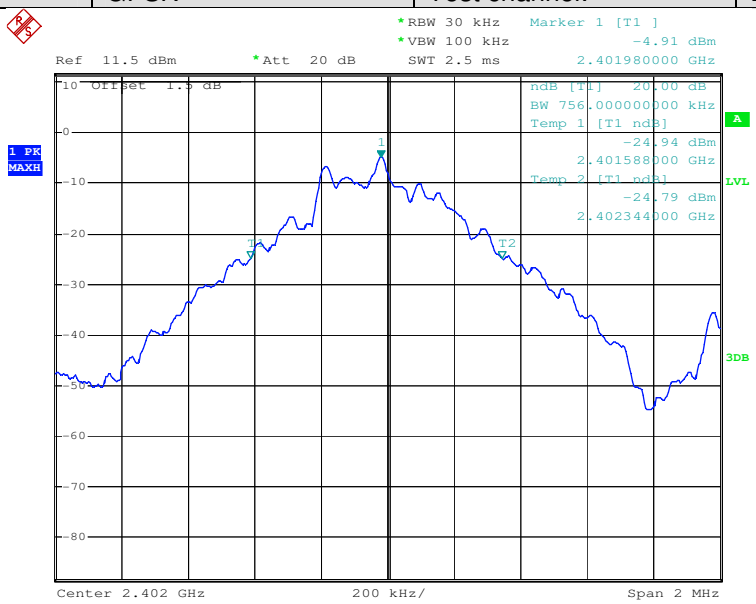
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Limit: | NA |
| Test setup: |  |
| Test Instruments: | Refer to section 4.7 for details |
| Test state: | Non-hopping transmitting with all kind of modulation. |
| Test results: | Passed |

**Measurement Data**

| Test channel | 20dB Occupy Bandwidth (KHz) | | |
|---|---|---|---|
| | GFSK | Pi/4QPSK | 8DPSK |
| Lowest | 756 | 1196 | 1200 |
| Middle | 752 | 1212 | 1204 |
| Highest | 764 | 1216 | 1208 |

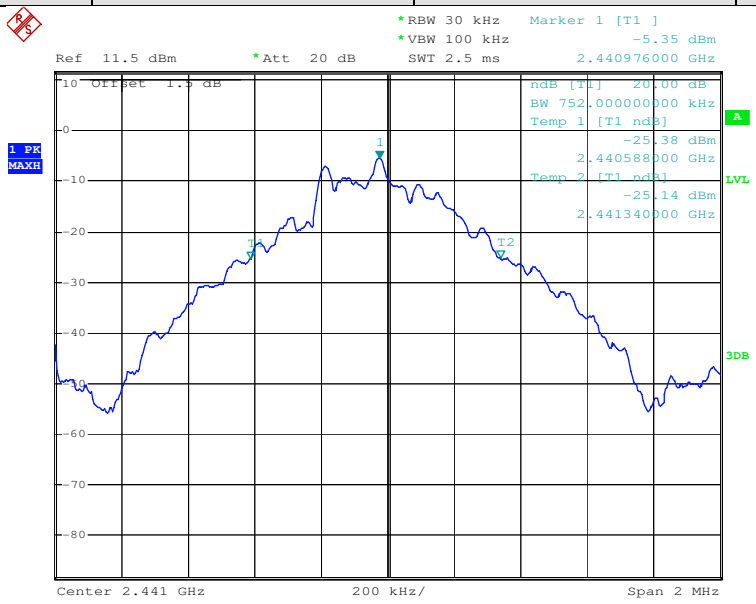
**Test plot as follows:**

| Test mode: | GFSK | Test channel: | Lowest |
|---|---|---|---|



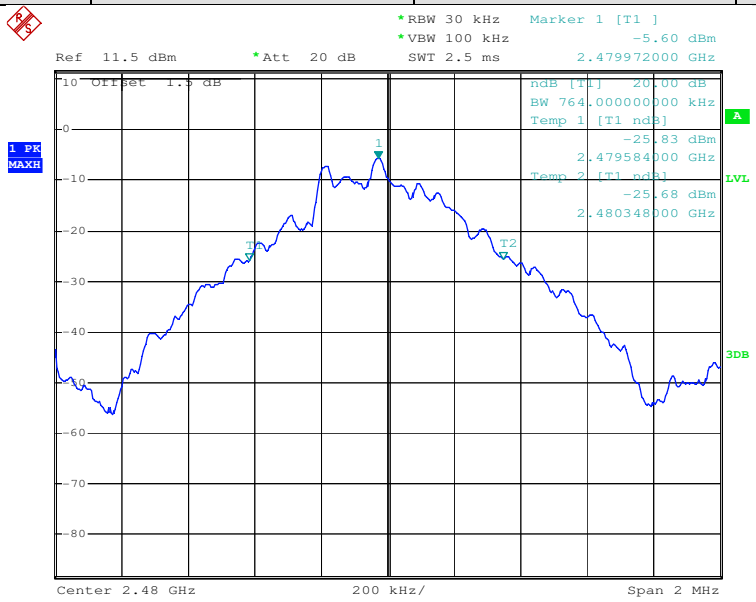

Date: 1.SEP.2010 17:32:11

| Test mode: | GFSK | Test channel: | Middle |
|---|---|---|---|



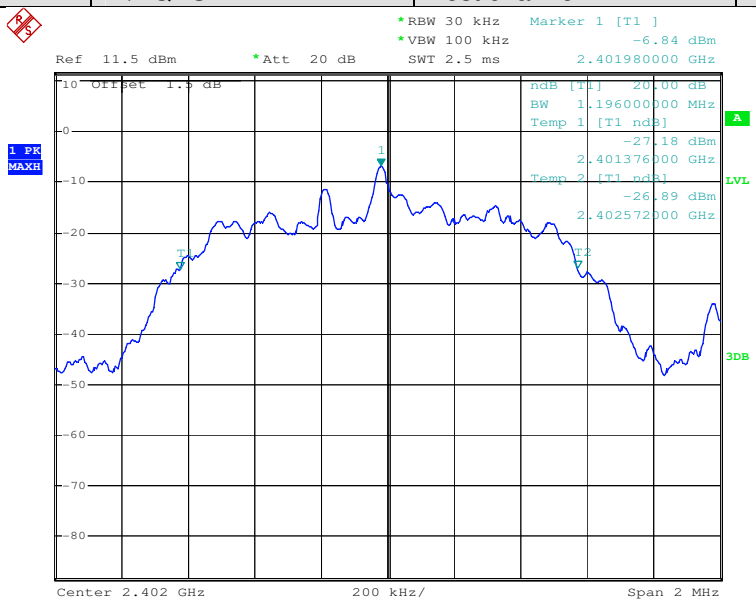

Date: 1.SEP.2010 17:32:37

| Test mode: | GFSK | Test channel: | Highest |
|---|---|---|---|



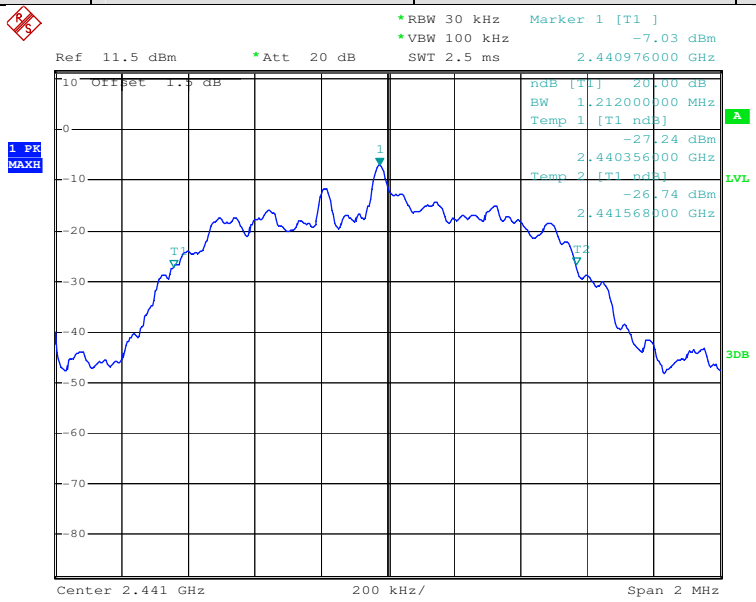

Date: 1.SEP.2010 17:33:11

| Test mode: | Pi/4QPSK | Test channel: | Lowest |
|---|---|---|---|



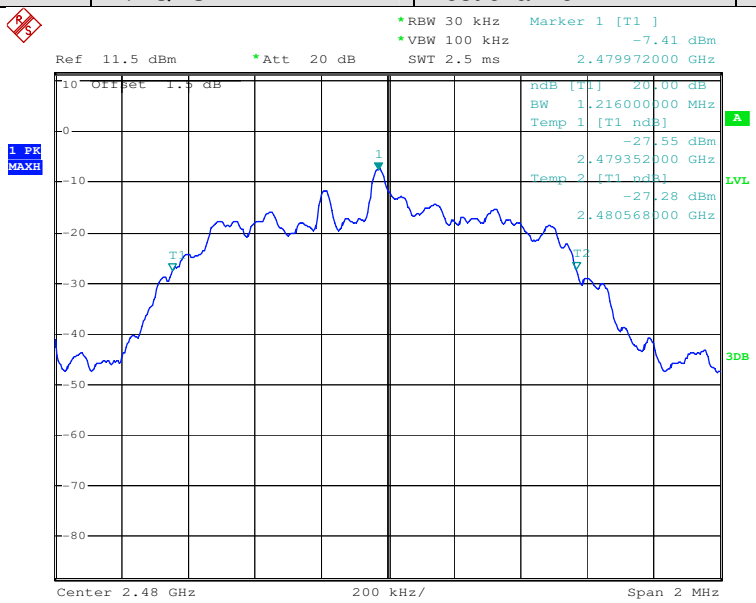

Date: 1.SEP.2010 17:35:29

| Test mode: | Pi/4QPSK | Test channel: | Middle |
|---|---|---|---|



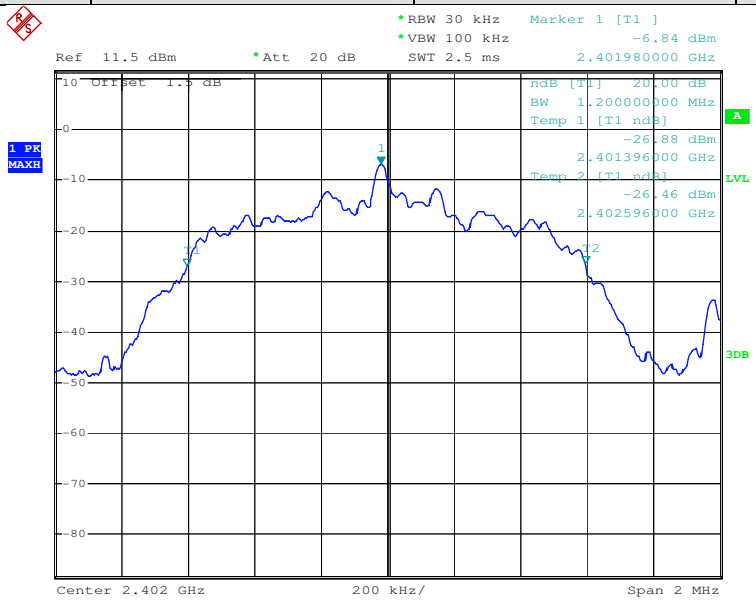

Date: 1.SEP.2010 17:34:42

| Test mode: | Pi/4QPSK | Test channel: | Highest |
|---|---|---|---|



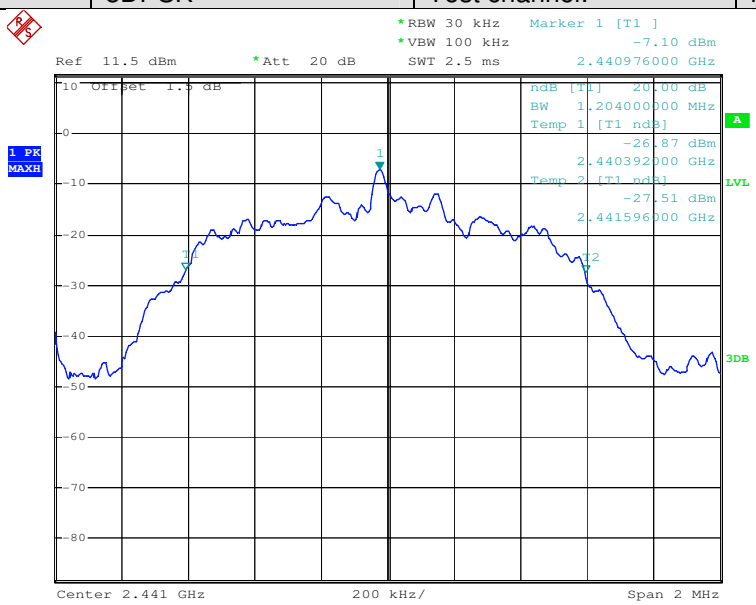

Date: 1.SEP.2010 17:34:09

| Test mode: | 8DPSK | Test channel: | Lowest |
|---|---|---|---|



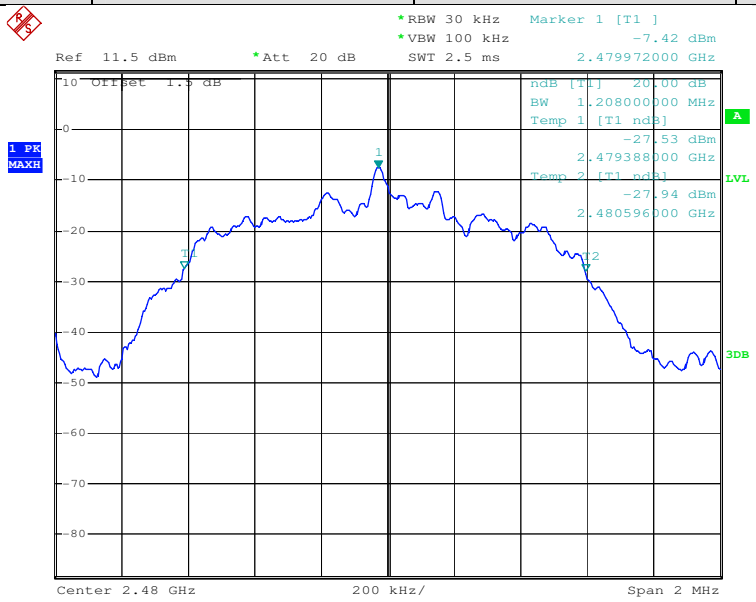

Date: 1.SEP.2010 17:36:18

| Test mode: | 8DPSK | Test channel: | Middle |
|---|---|---|---|



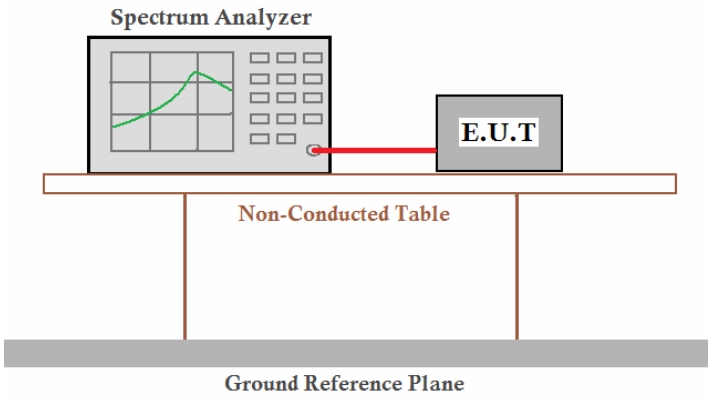

Date: 1.SEP.2010 17:36:47

| Test mode: | 8DPSK | Test channel: | Highest |
|---|---|---|---|




Date: 1.SEP.2010 17:37:18

## 5.5 Carrier Frequencies Separation

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Test state: | Hopping transmitting with all kind of modulation. |
| Test setup: |  |
| Test Instruments: | Refer to section 4.7 for details |
| Limit: | 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater) |
| Test results: | Passed |

**Measurement Data**

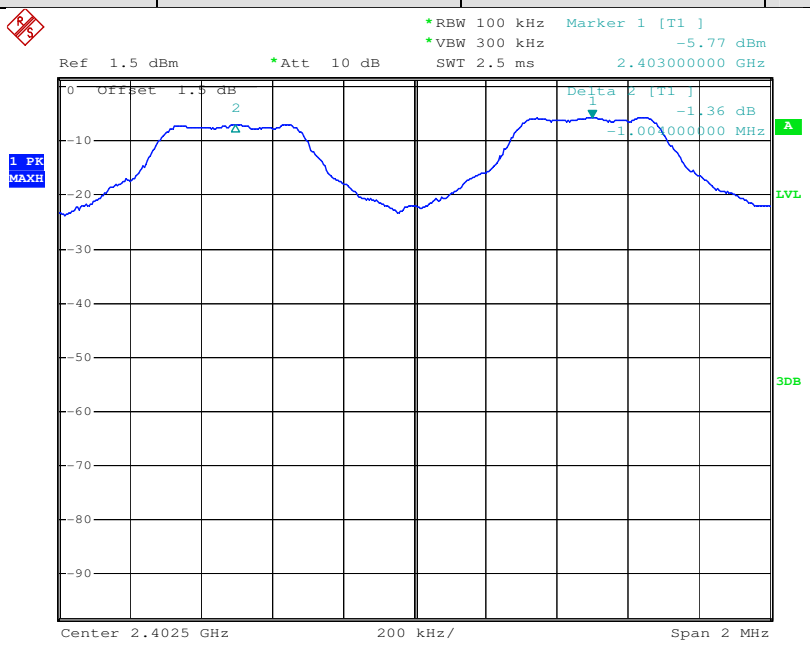
| GFSK mode | | | |
|---|---|---|---|
| Test channel | Carrier Frequencies Separation (KHz) | Limit (KHz) | Result |
| Lowest | 1004 | *810.7* | Pass |
| Middle | 1000 | *810.7* | Pass |
| Highest | 1000 | *810.7* | Pass |
| Pi/4QPSK mode | | | |
| Test channel | Carrier Frequencies Separation (KHz) | Limit (KHz) | Result |
| Lowest | 1004 | *810.7* | Pass |
| Middle | 1004 | *810.7* | Pass |
| Highest | 1000 | *810.7* | Pass |
| 8DPSK mode | | | |
| Test channel | Carrier Frequencies Separation (KHz) | Limit (KHz) | Result |
| Lowest | 1004 | *810.7* | Pass |
| Middle | 1000 | *810.7* | Pass |
| Highest | 1000 | *810.7* | Pass |

*Note: According to section 5.4,*

| *Mode* | *20dB bandwidth (KHz) (worse case)* | *Limit (KHz) (Carrier Frequencies Separation)* |
|---|---|---|
| *GFSK* | 764 | *509.3* |
| *PI/4QPSK* | 1216 | *810.7* |
| *8DPSK* | 1208 | *805.3* |

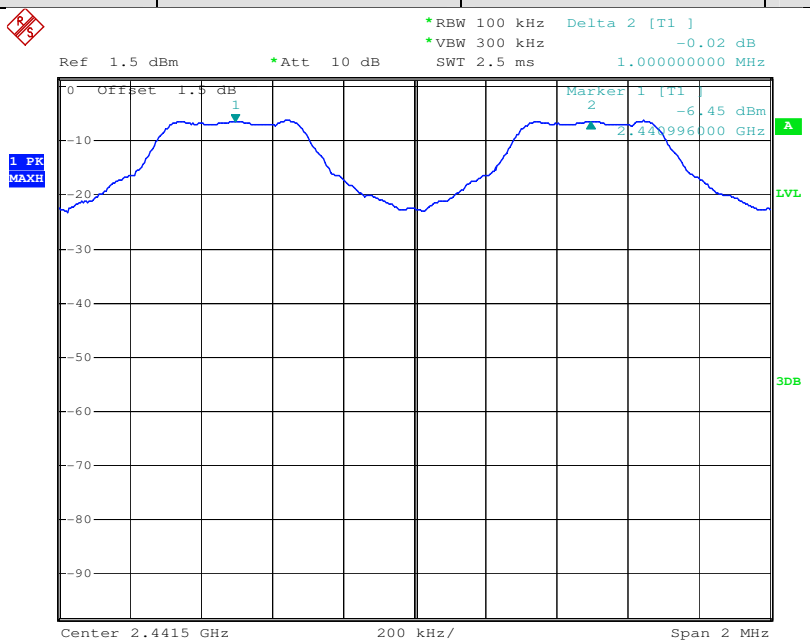
**Test plot as follows:**

| Test mode: | GFSK | Test channel: | Lowest |
|---|---|---|---|



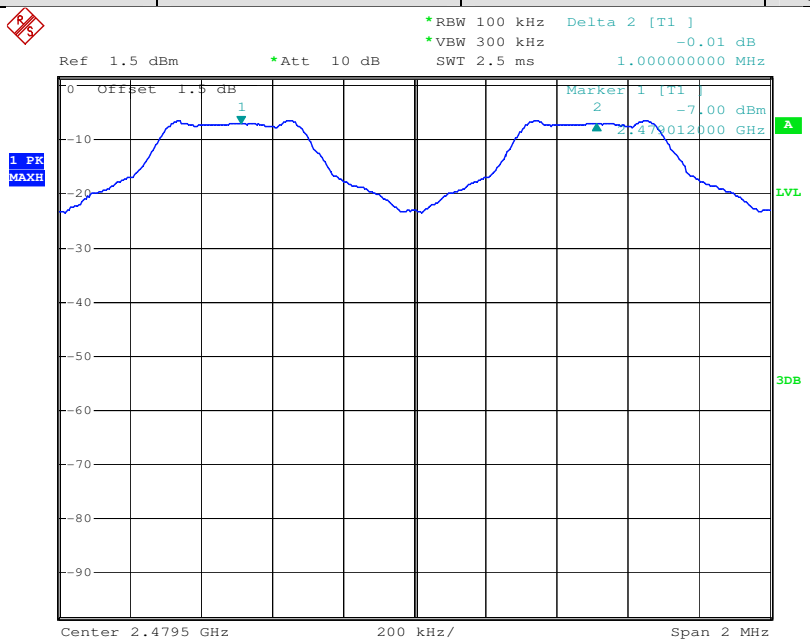

Date: 29.JUN.2010 12:46:55

| Test mode: | GFSK | Test channel: | Middle |
|---|---|---|---|



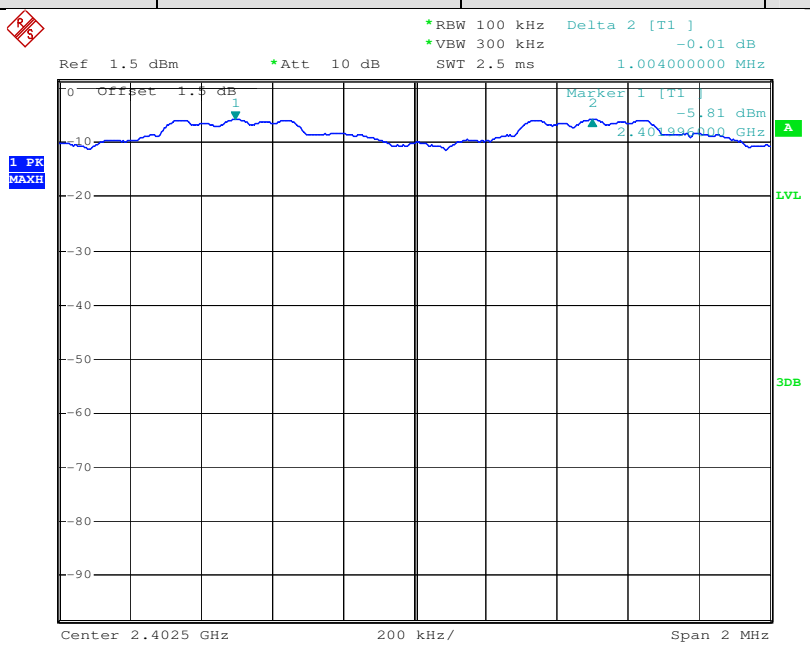

Date: 29.JUN.2010 13:01:34

| Test mode: | GFSK | Test channel: | Highest |
|---|---|---|---|



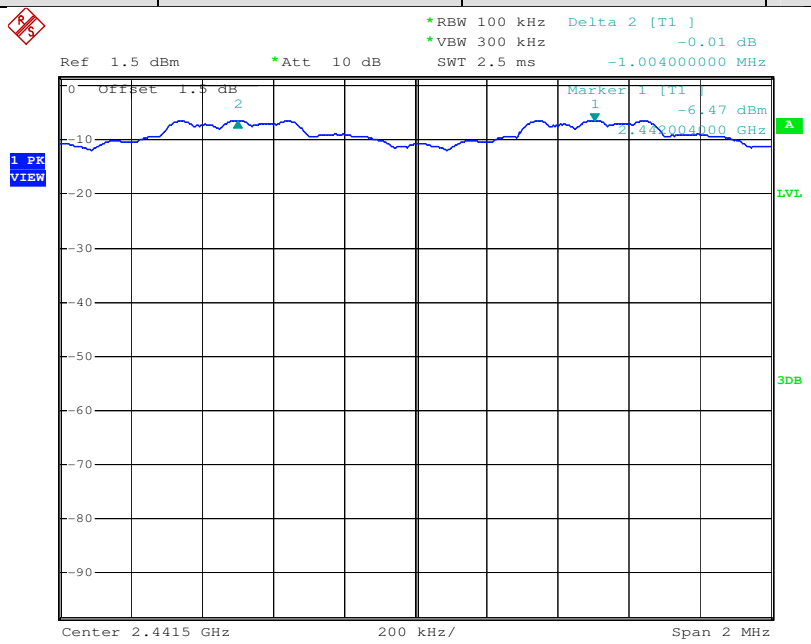

Date: 29.JUN.2010 13:22:56

| Test mode: | PI/4QPSK | Test channel: | Lowest |
|---|---|---|---|



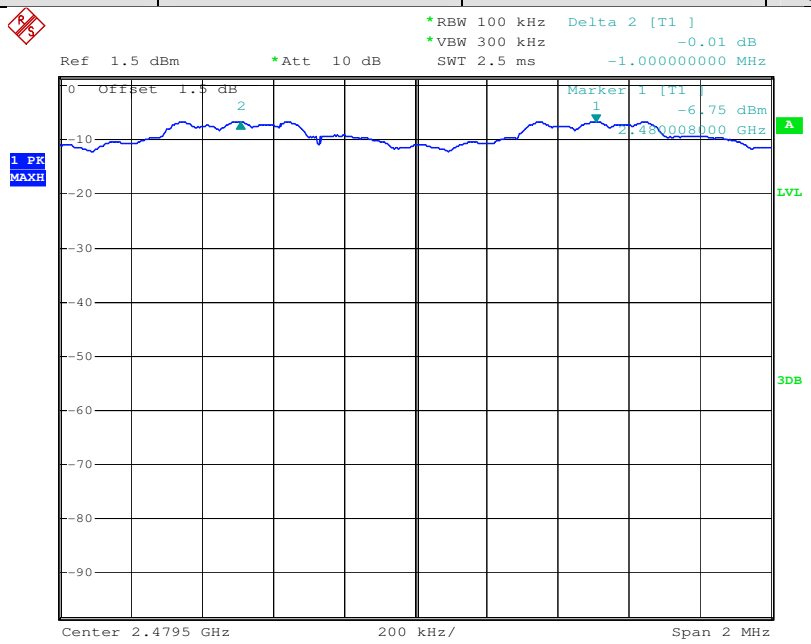

Date: 29.JUN.2010 13:38:36

| Test mode: | PI/4QPSK | Test channel: | Middle |
|---|---|---|---|



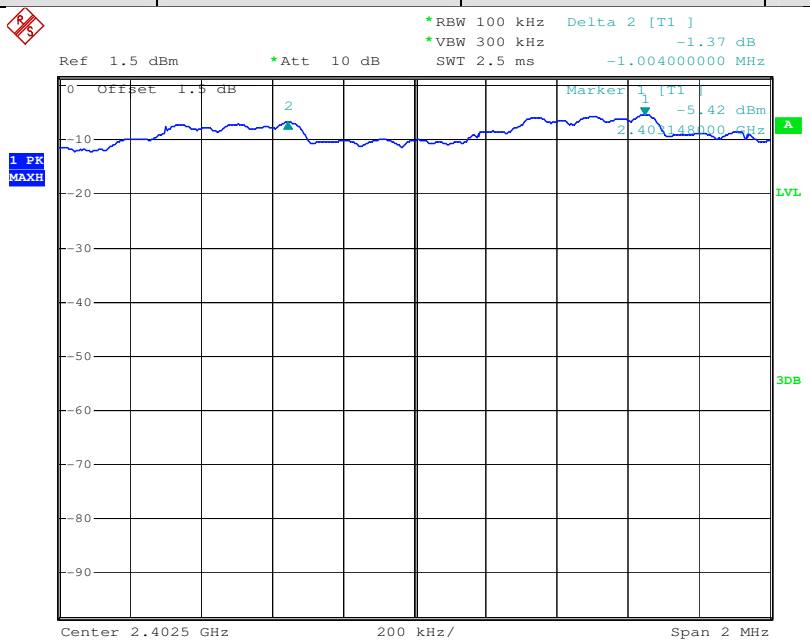

Date: 29.JUN.2010 14:27:34

| Test mode: | PI/4QPSK | Test channel: | Highest |
|---|---|---|---|



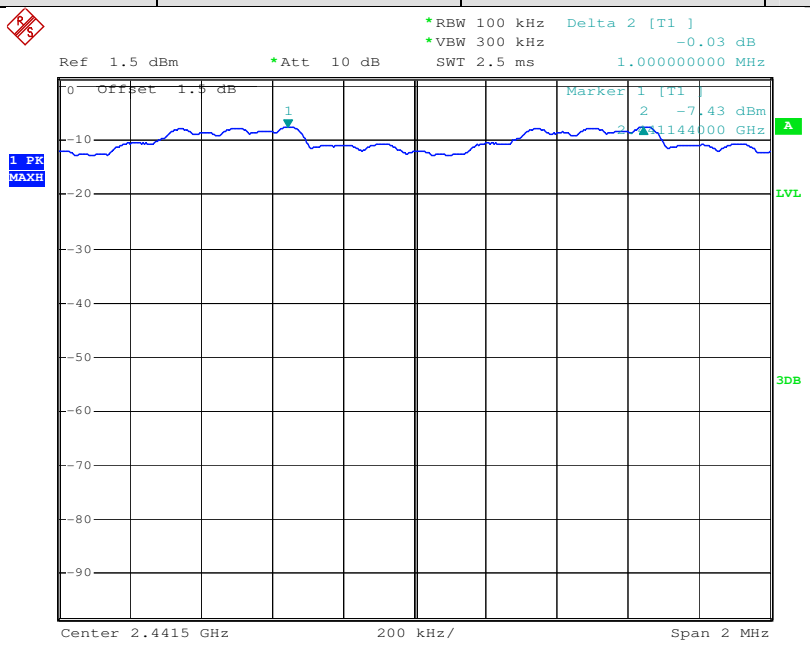

Date: 29.JUN.2010 14:35:41

| Test mode: | 8DPSK | Test channel: | Lowest |
|---|---|---|---|



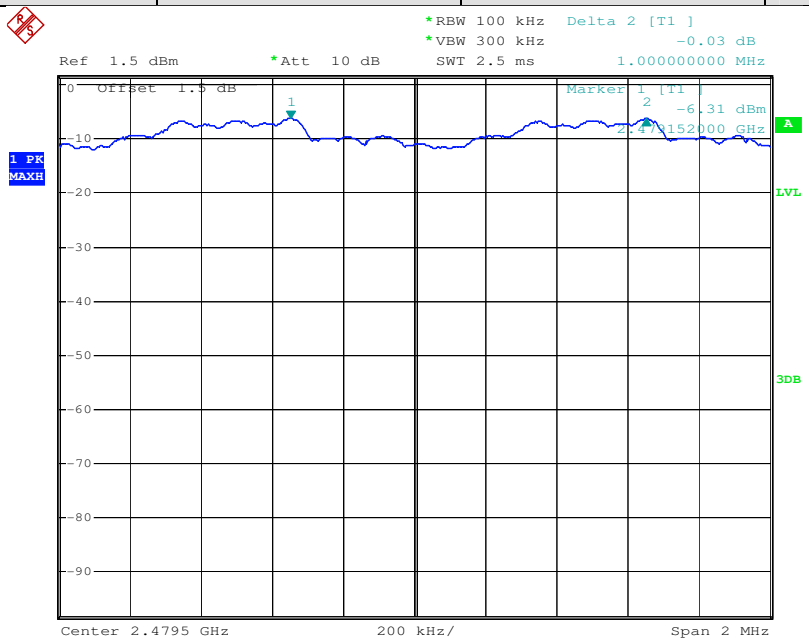

Date: 29.JUN.2010 14:44:53

| Test mode: | 8DPSK | Test channel: | Middle |
|---|---|---|---|



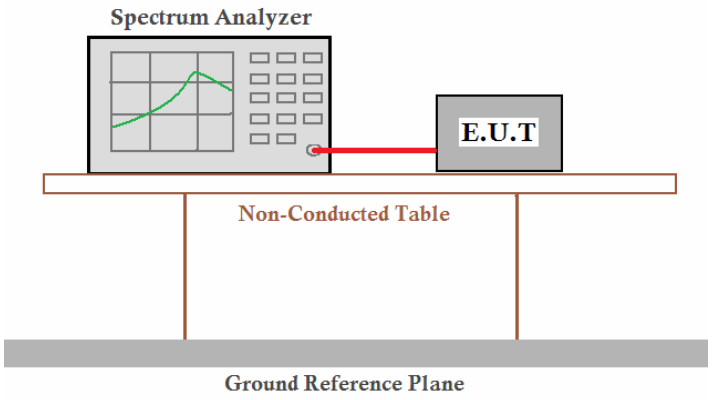

Date: 29.JUN.2010 14:52:43

| Test mode: | 8DPSK | Test channel: | Highest |
|---|---|---|---|




Date: 29.JUN.2010 15:16:48

## 5.6 Hopping Channel Number

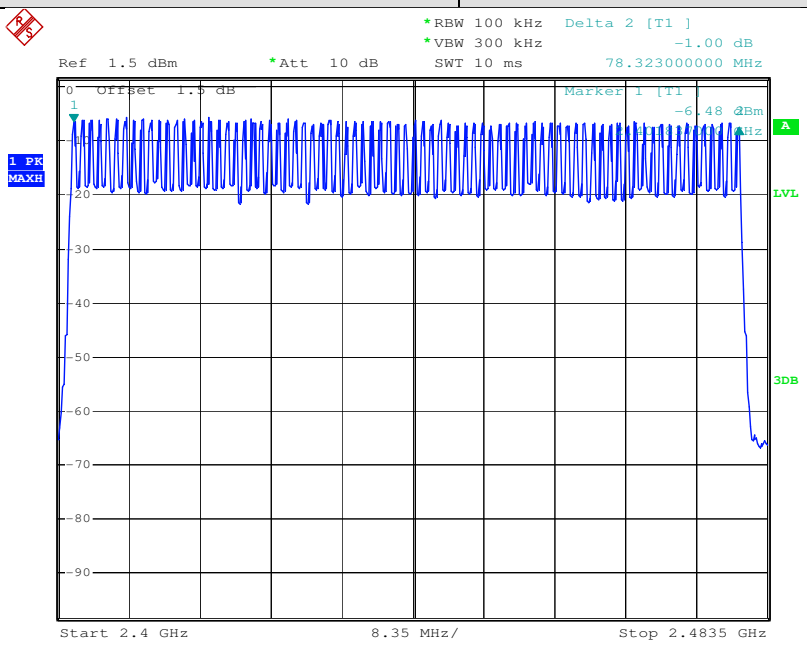
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (b) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Limit: | 75channels |
| Test setup: |  |
| Test Instruments: | Refer to section 4.7 for details |
| Test state: | Hopping transmitting with all kind of modulation. |
| Test results: | Passed |

**Measurement Data**

| Mode | Hopping channel numbers | Limit |
|---|---|---|
| GFSK | 79 | 75 |
| Pi/4QPSK | 79 | 75 |
| 8DPSK | 79 | 75 |

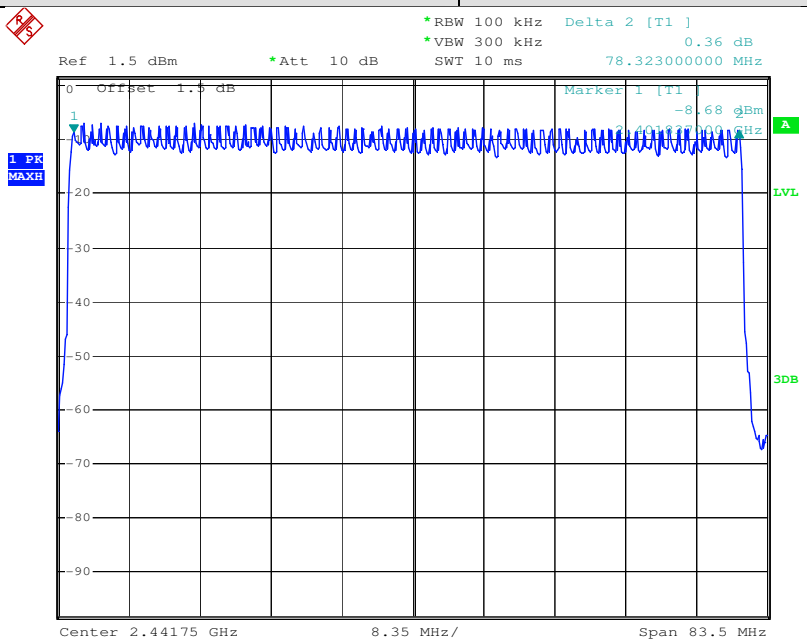
**Test plot as follows**

| Test mode: | GFSK |
|---|---|



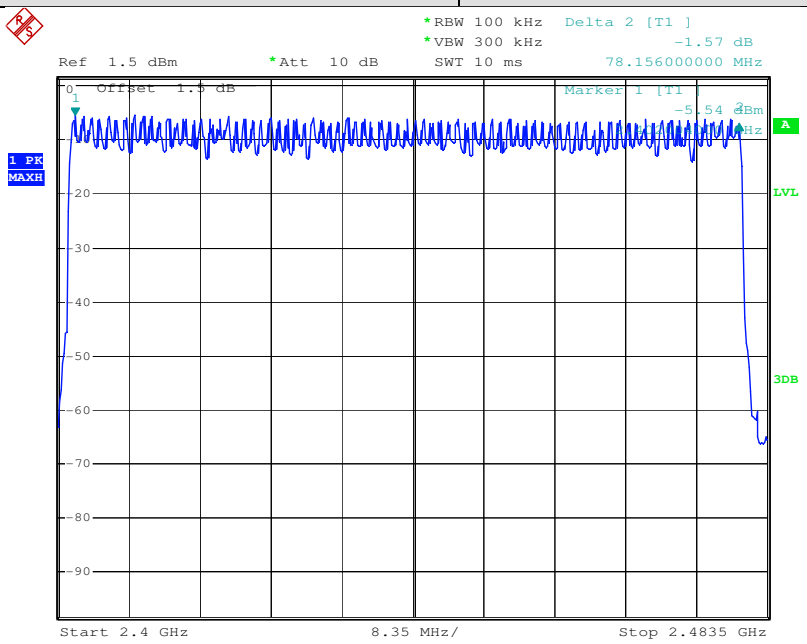

Date: 29.JUN.2010 13:26:17

| Test mode: | Pi/4QPSK |
|---|---|



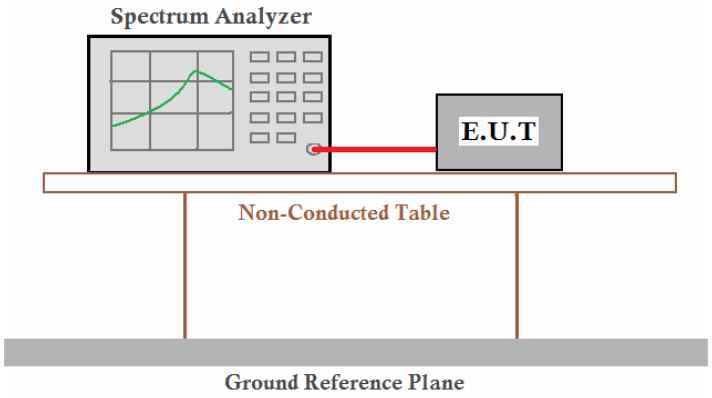

Date: 29.JUN.2010 13:30:34

| Test mode: | 8DPSK |
|---|---|




Date: 29.JUN.2010 15:19:24

## 5.7 Dwell Time

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (a)(1) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Limit: | 0.4 Second |
| Test setup: |  |
| Test Instruments: | Refer to section 4.7 for details |
| Test state: | Hopping transmitting with all kind of modulation. |
| Test results: | Passed |

**Measurement Data**

| Mode | Packet | Dwell time (second) | Limit (second) |
|---|---|---|---|
| GFSK | DH1 | 0.1344 | 0.4 |
| | DH3 | 0.2688 | 0.4 |
| | DH5 | 0.3155 | 0.4 |
| Pi/4QPSK | 2-DH1 | 0.1344 | 0.4 |
| | 2-DH3 | 0.2688 | 0.4 |
| | 2-DH5 | 0.3155 | 0.4 |
| 8DPSK | 3-DH1 | 0.1344 | 0.4 |
| | 3-DH3 | 0.2688 | 0.4 |
| | 3-DH5 | 0.3155 | 0.4 |

**Test Result:**

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 second

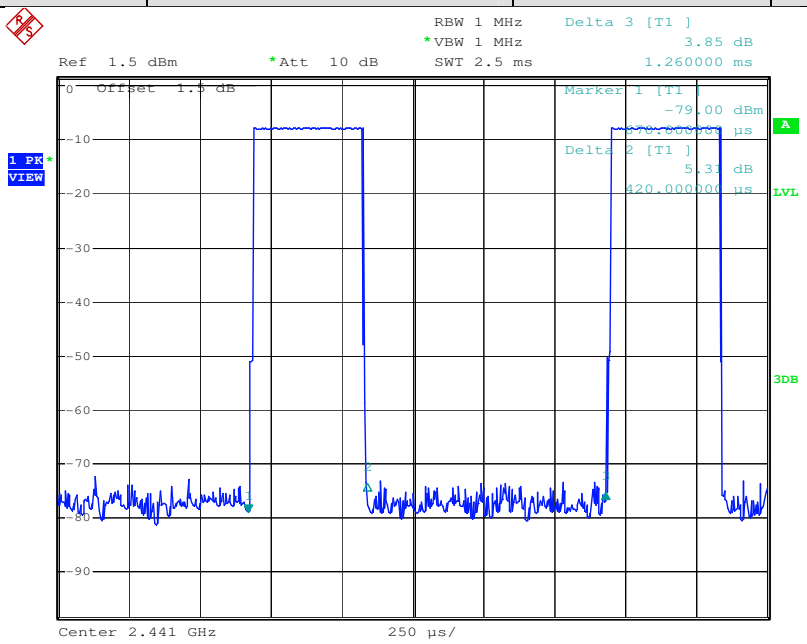
DH1 time slot=0.42(ms)*(1600/ (2*79))*31.6=134.4ms

DH3 time slot=1.680(ms)*(1600/ (4*79))*31.6=268.8ms

DH5 time slot=2.96(ms)*(1600/ (6*79))*31.6=315.5ms

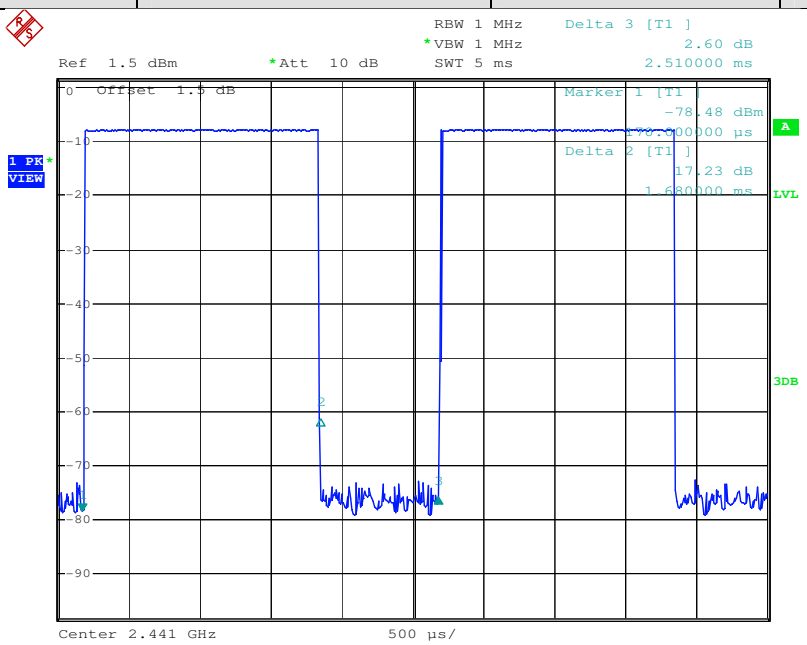
**Test plot as follows**

| Test mode: | GFSK | Test Packet: | DH1 |
|---|---|---|---|



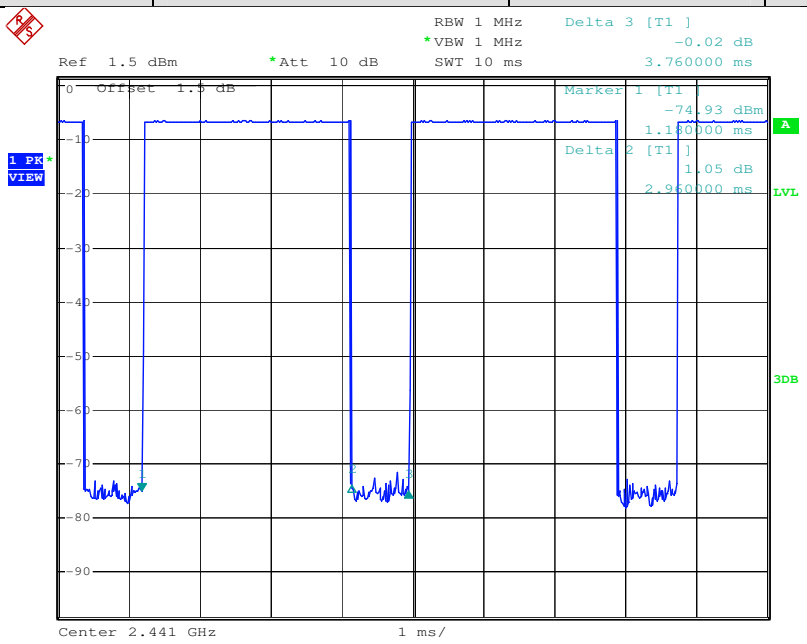

Date: 29.JUN.2010 13:06:38

| Test mode: | GFSK | Test Packet: | DH3 |
|---|---|---|---|



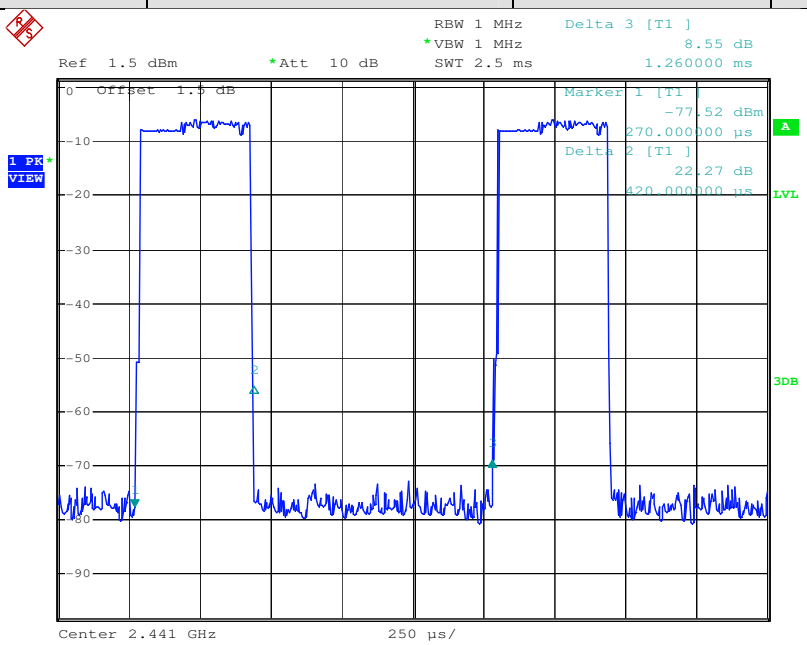

Date: 29.JUN.2010 13:07:59

| Test mode: | GFSK | Test Packet: | DH5 |
|---|---|---|---|



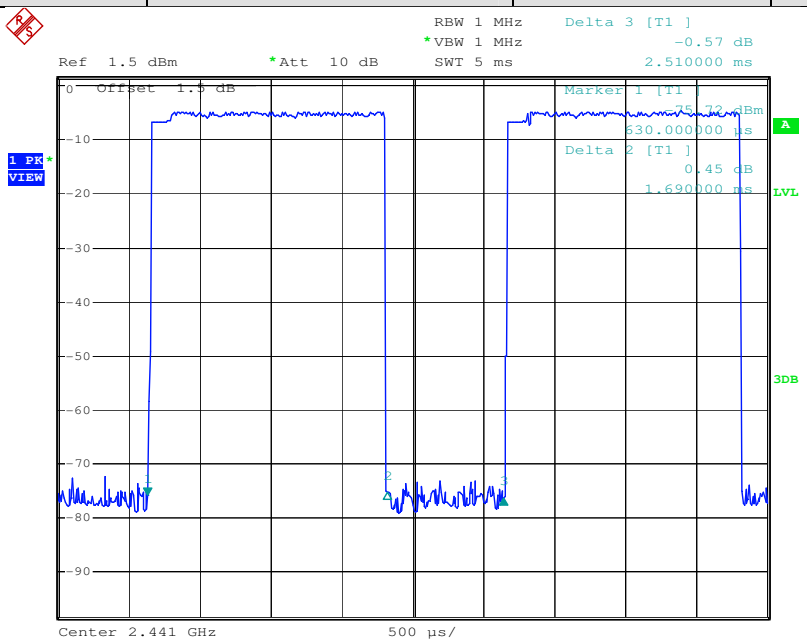

Date: 29.JUN.2010 13:08:45

| Test mode: | Pi/4QPSK | Test Packet: | 2-DH1 |
|---|---|---|---|



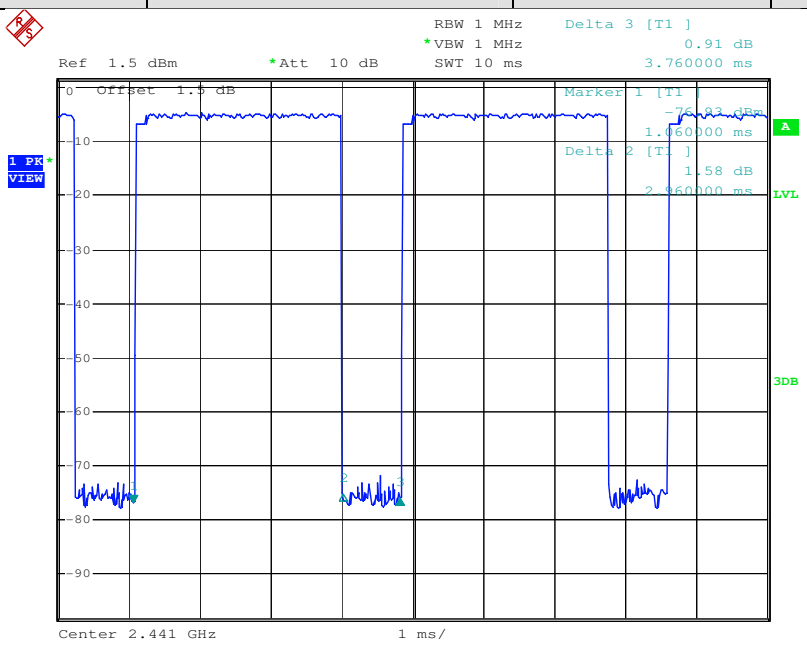

Date: 29.JUN.2010 14:28:17

| Test mode: | Pi/4QPSK | Test Packet: | 2-DH3 |
|---|---|---|---|



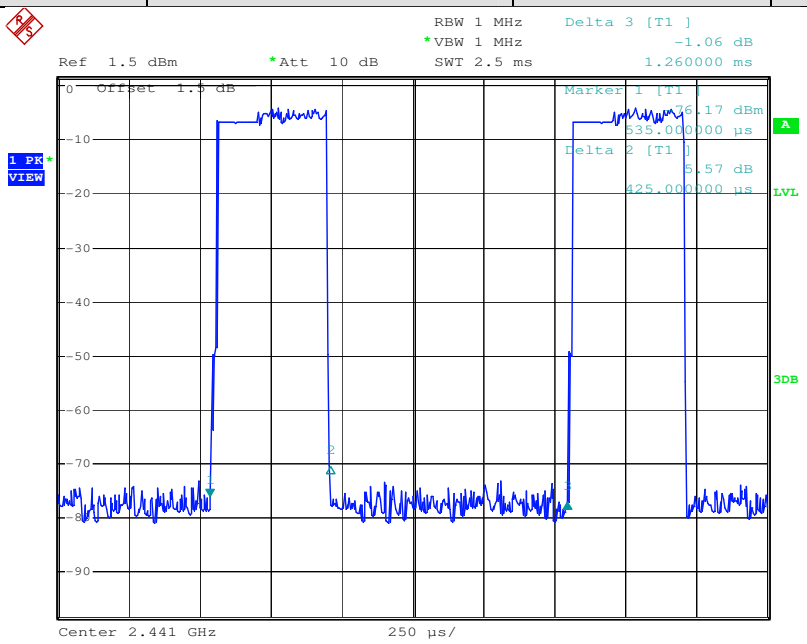

Date: 29.JUN.2010 14:29:07

| Test mode: | Pi/4QPSK | Test Packet: | 2-DH5 |
|---|---|---|---|



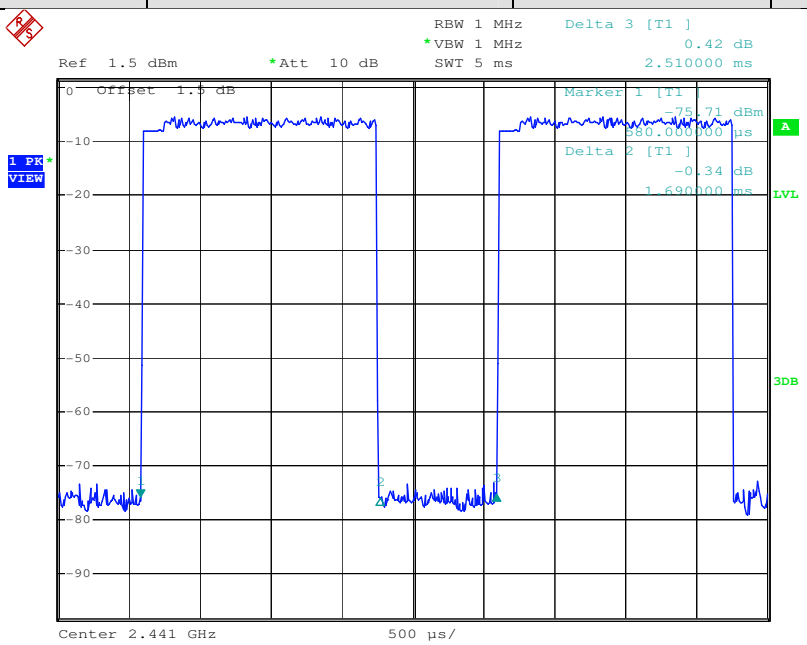

Date: 29.JUN.2010 14:29:49

| Test mode: | 8DPSK | Test Packet: | 3-DH1 |
|---|---|---|---|



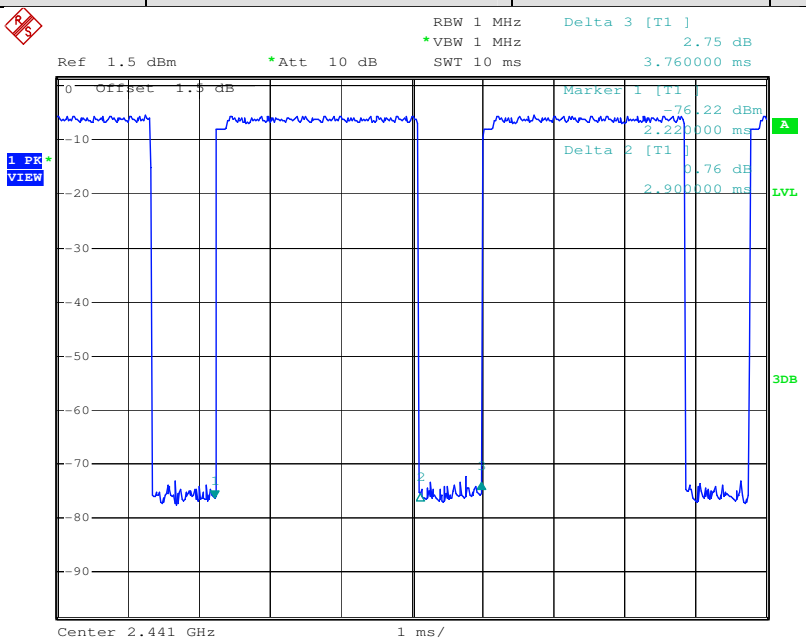

Date: 29.JUN.2010 15:00:14

| Test mode: | 8DPSK | Test Packet: | 3-DH3 |
|---|---|---|---|



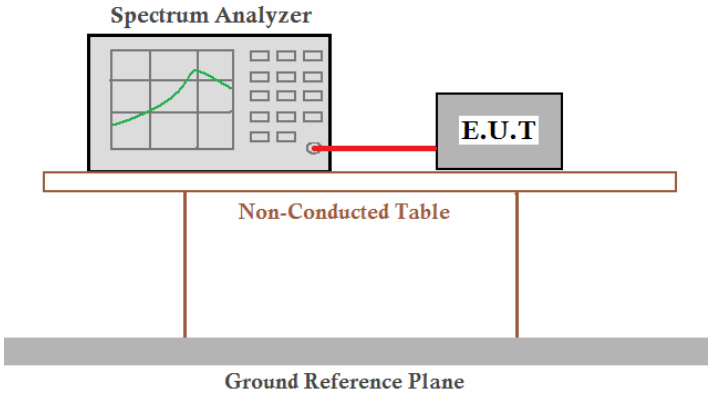

Date: 29.JUN.2010 15:00:58

| Test mode: | 8DPSK | Test Packet: | 3-DH5 |
|---|---|---|---|



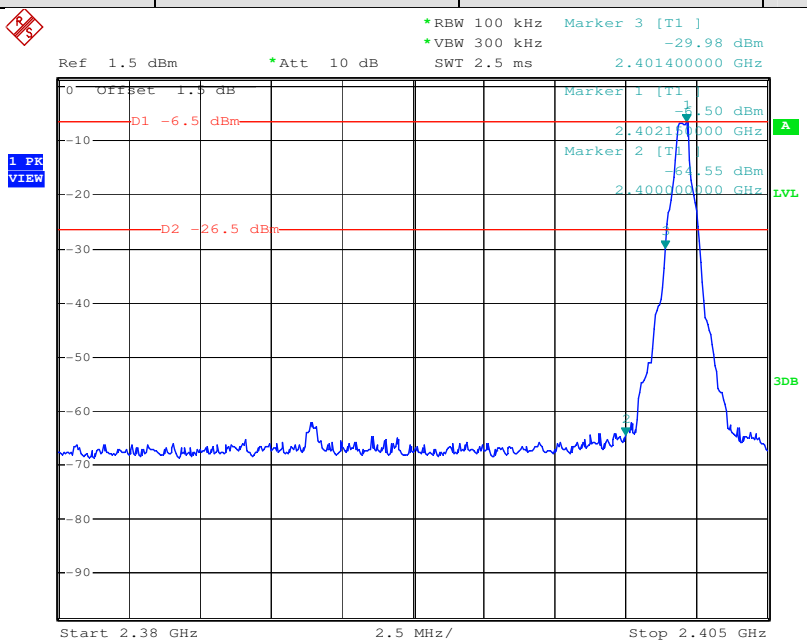

Date: 29.JUN.2010 15:01:37

## 5.8 Band Edge

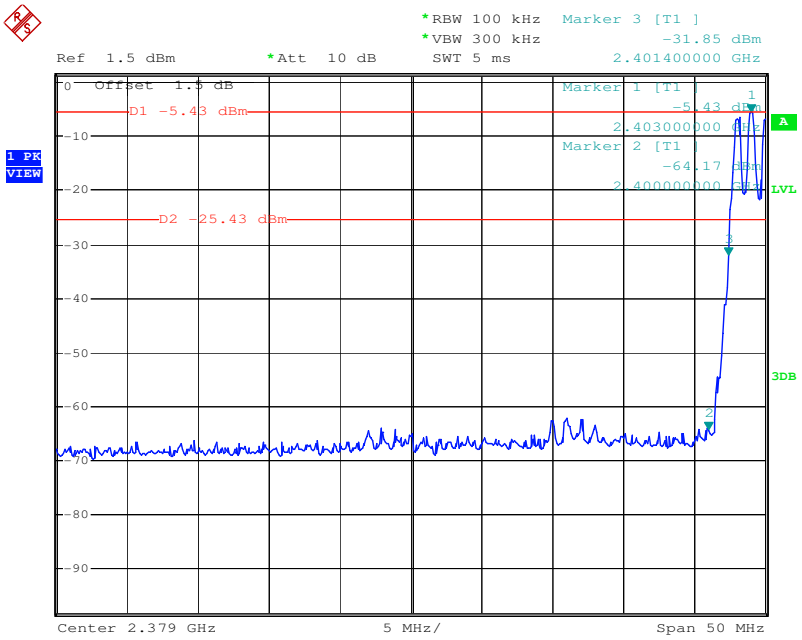
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (d) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the 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, based on either an RF conducted or a radiated measurement. |
| Test setup: |  <br>*Remark:*<br>*Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.* |
| Test Instruments: | Refer to section 4.7 for details |
| Test state: | Hopping transmitting with all kinds of modulation. |
| Test results: | Passed |

**Test plot as follows:**

| Test mode: | GFSK | Test channel: | Lowest |
|---|---|---|---|

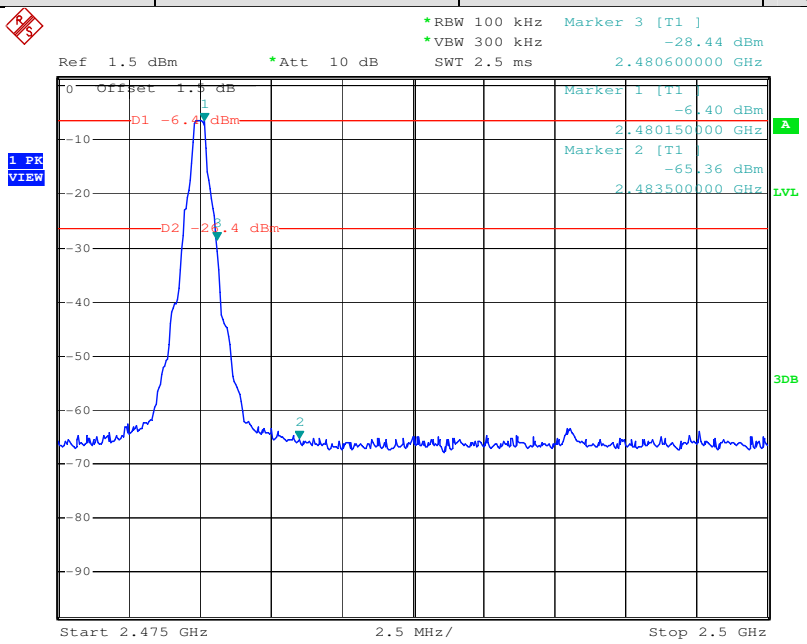



Date: 29.JUN.2010 12:44:15

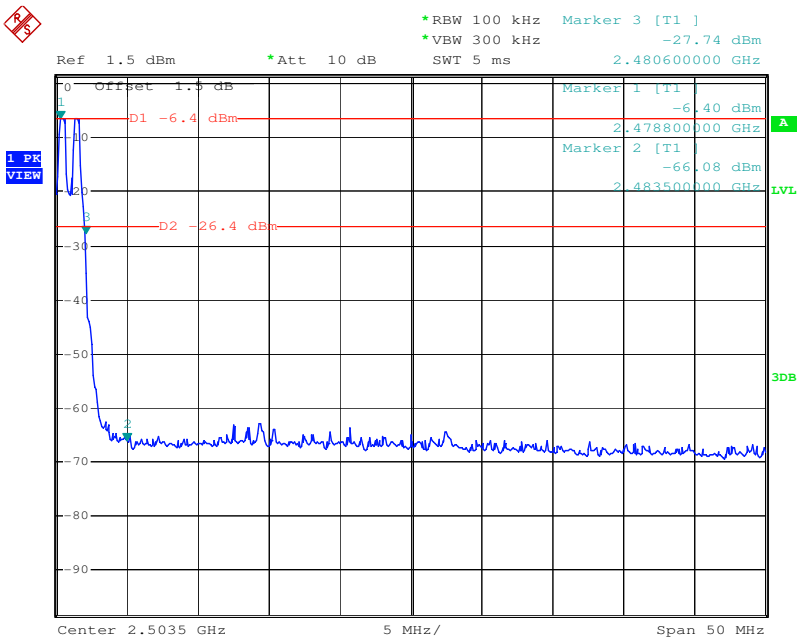



Date: 29.JUN.2010 12:48:46

| Test mode: | GFSK | Test channel: | Highest |
|---|---|---|---|

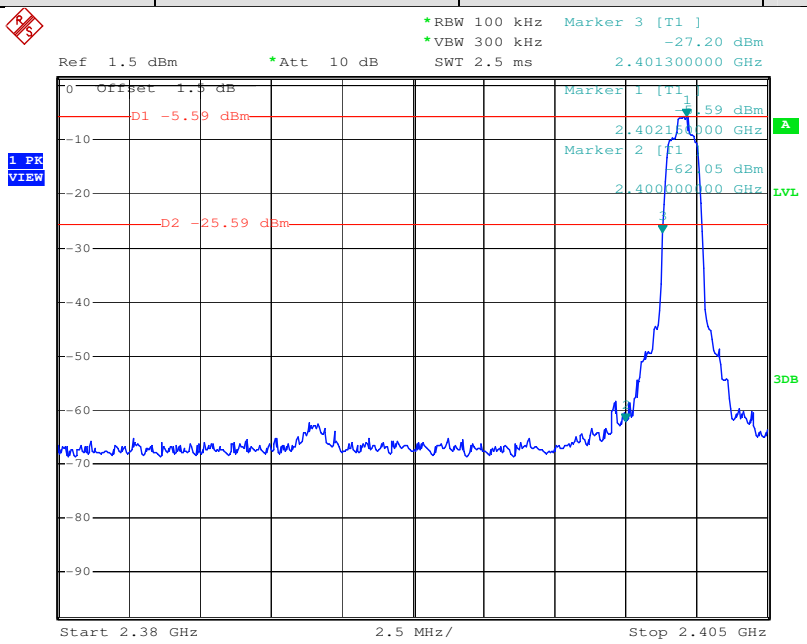



Date: 29.JUN.2010 13:16:26

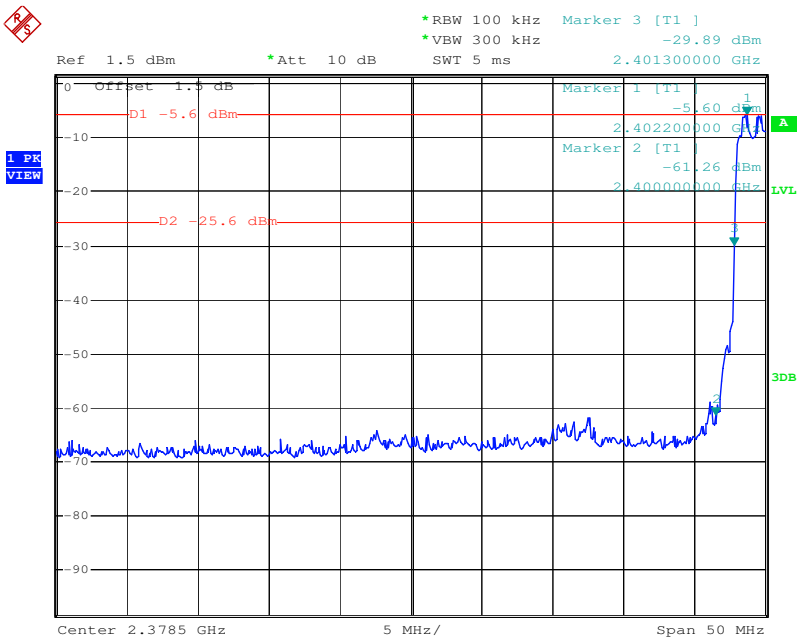



Date: 29.JUN.2010 13:24:26

| Test mode: | Pi/4QPSK | Test channel: | Lowest |
|---|---|---|---|

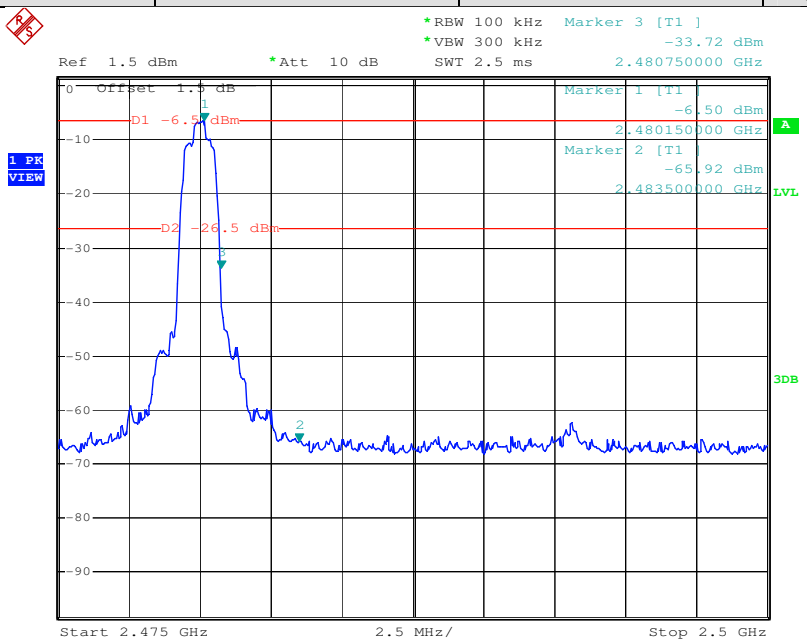



Date: 29.JUN.2010 13:36:08

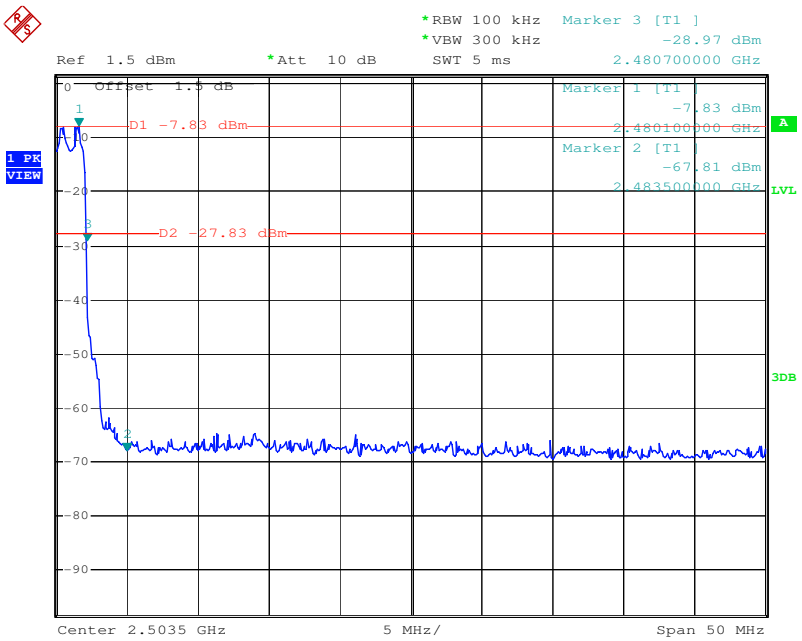



Date: 29.JUN.2010 13:40:36

| Test mode: | Pi/4QPSK | Test channel: | Highest |
|---|---|---|---|

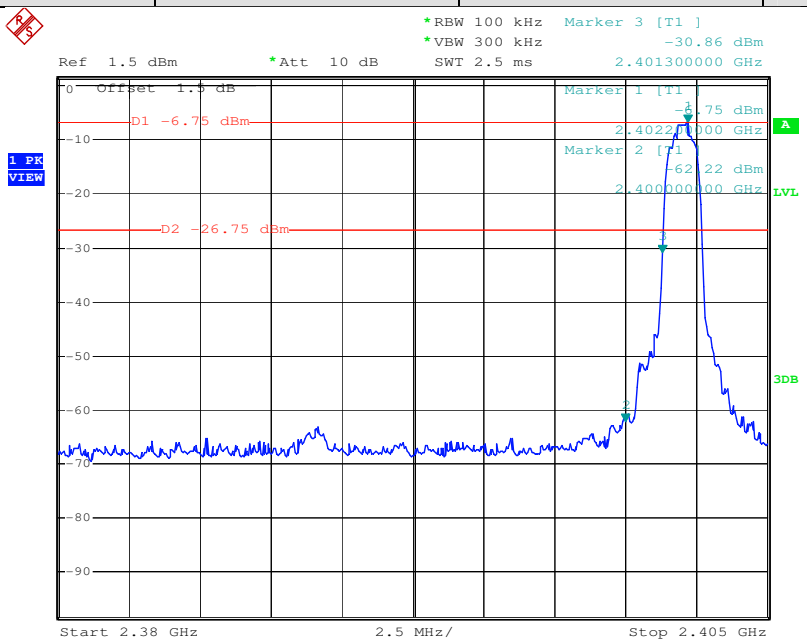



Date: 29.JUN.2010 14:33:59

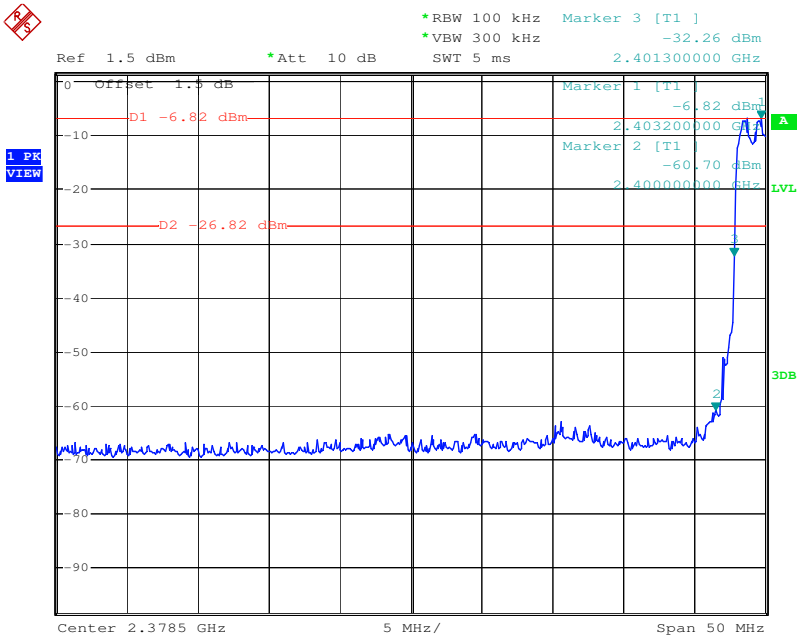



Date: 29.JUN.2010 14:37:36

| Test mode: | 8DPSK | Test channel: | Lowest |
|---|---|---|---|

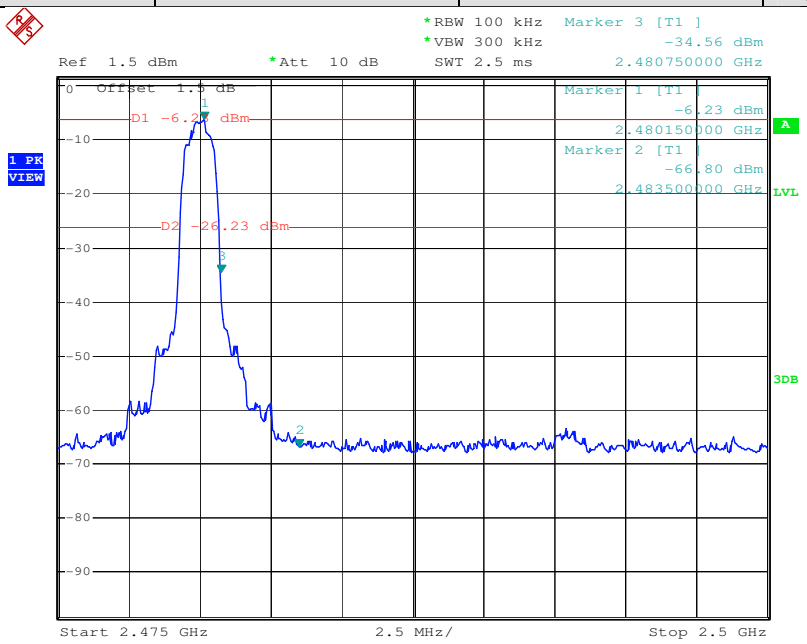



Date: 29.JUN.2010 14:48:45

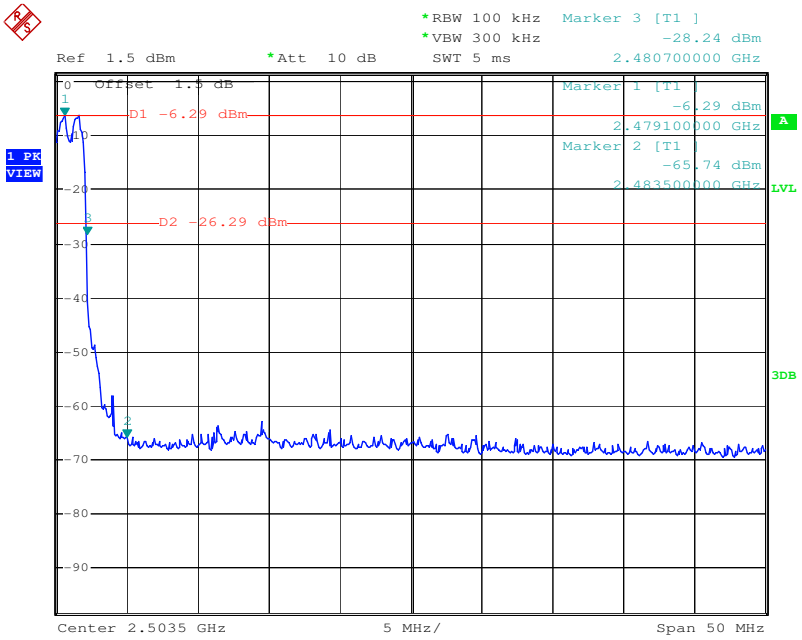



Date: 29.JUN.2010 14:46:21

| Test mode: | 8DPSK | Test channel: | Highest |
|---|---|---|---|

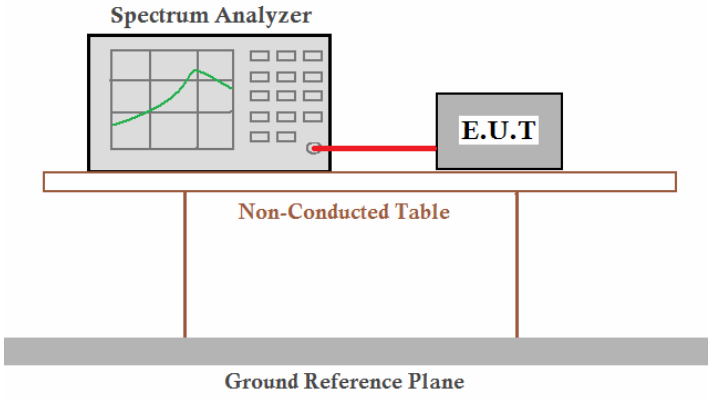



Date: 29.JUN.2010 15:12:15

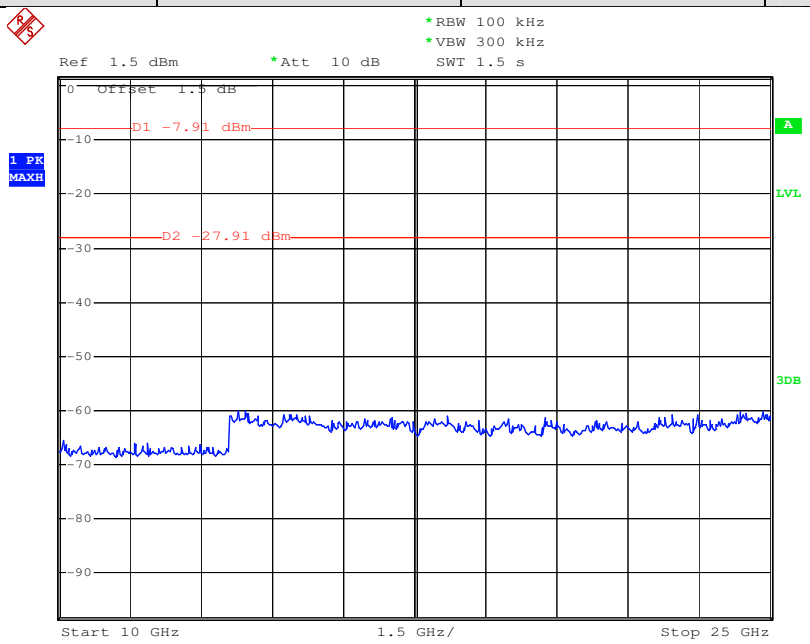



Date: 29.JUN.2010 15:14:17

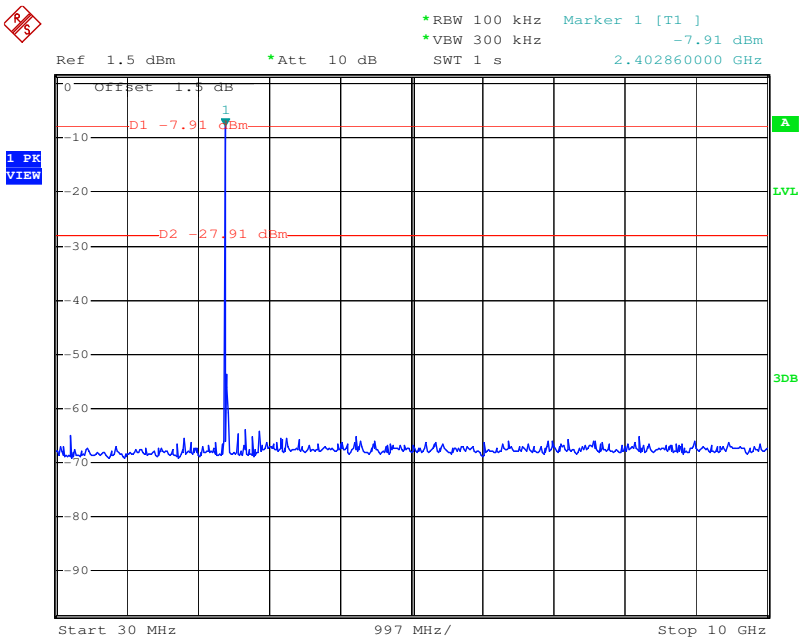
## 5.9 RF Antenna Conducted spurious emissions

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (d) |
| Test Method: | ANSI C63.4:2003 and KDB DA00-705 |
| Limit: | 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, based on either an RF conducted or a radiated measurement. |
| Test setup: |  <br>*Remark:*<br>*Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.* |
| Test Instruments: | Refer to section 4.7 for details |
| Test results: | Passed |

| Test mode: | GFSK | Test channel: | Lowest |
|---|---|---|---|

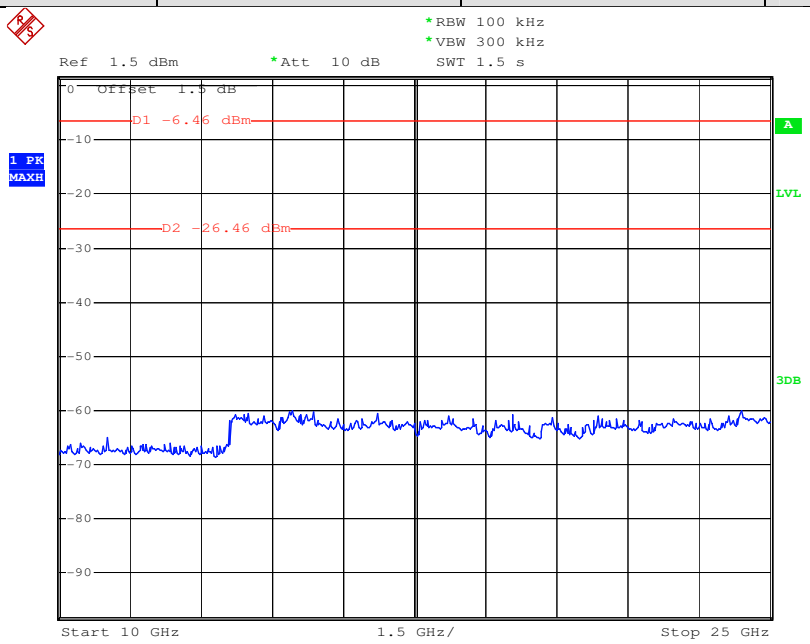



Date: 29.JUN.2010 12:45:40

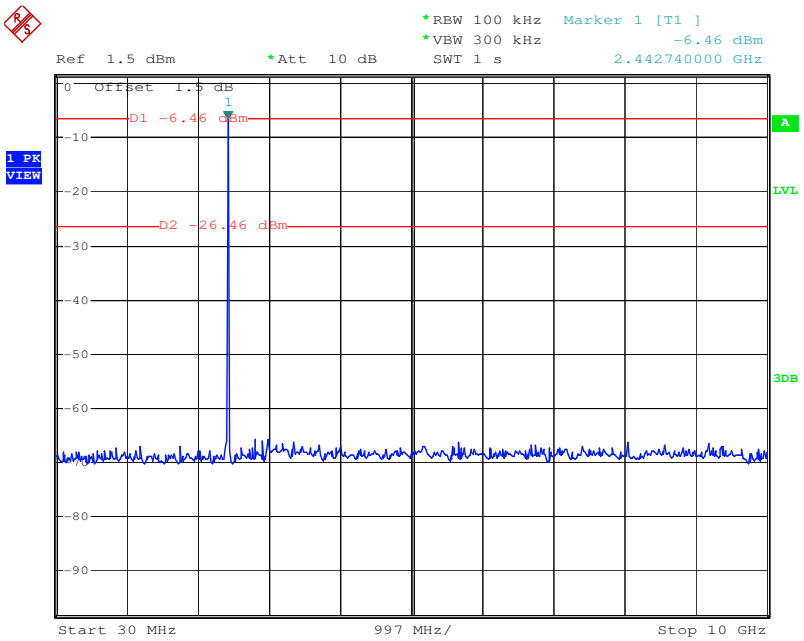



Date: 29.JUN.2010 12:45:20

| Test mode: | GFSK | Test channel: | Middle |
|---|---|---|---|

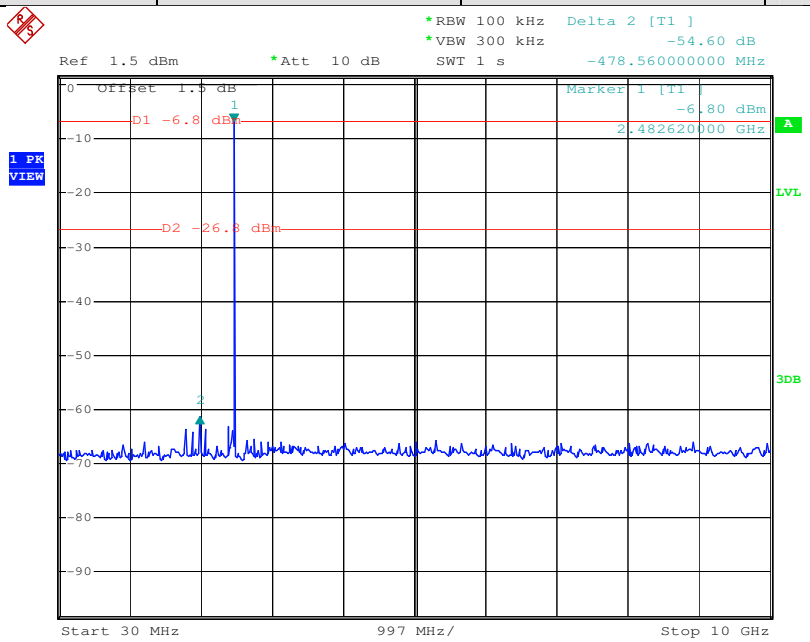



Date: 29.JUN.2010 13:00:12

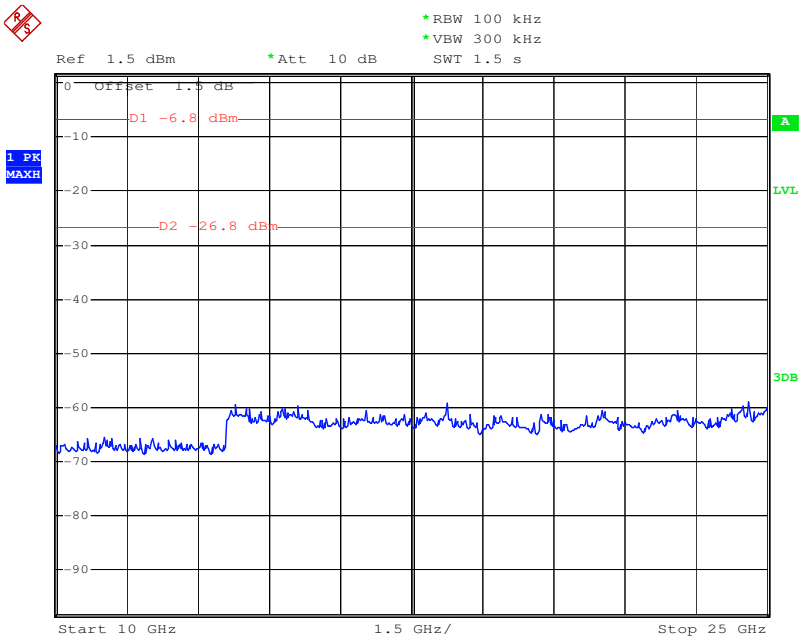



Date: 29.JUN.2010 12:59:50

| Test mode: | GFSK | Test channel: | Highest |
|---|---|---|---|

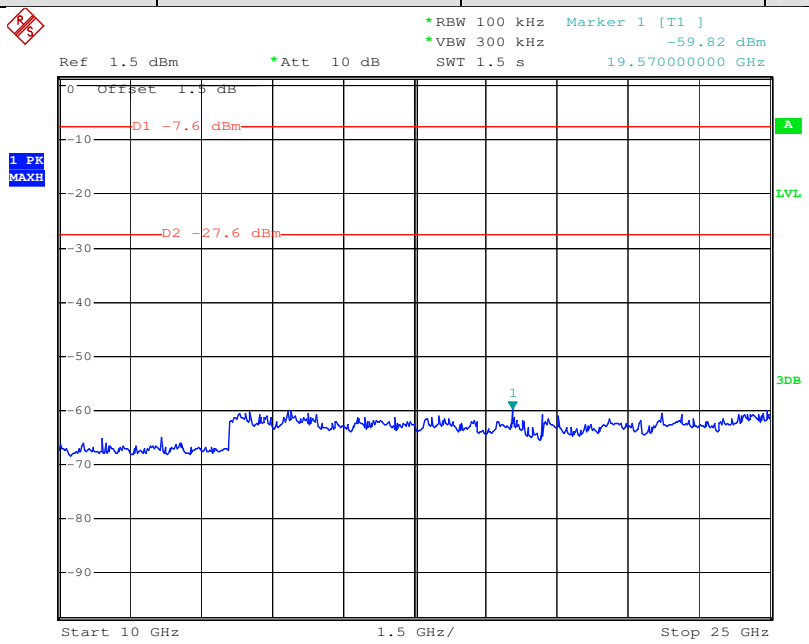



Date: 29.JUN.2010 13:19:07

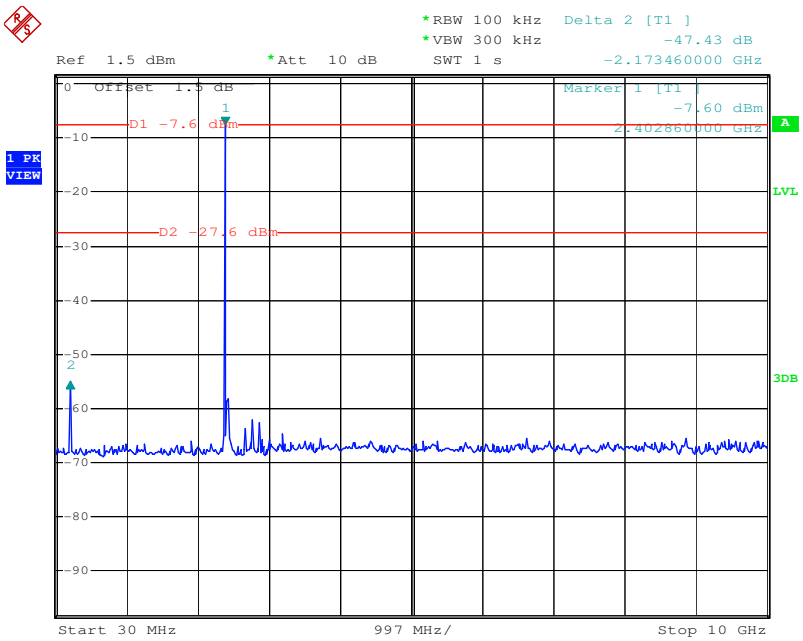



Date: 29.JUN.2010 13:19:34

| Test mode: | Pi/4QPSK | Test channel: | Lowest |
|---|---|---|---|

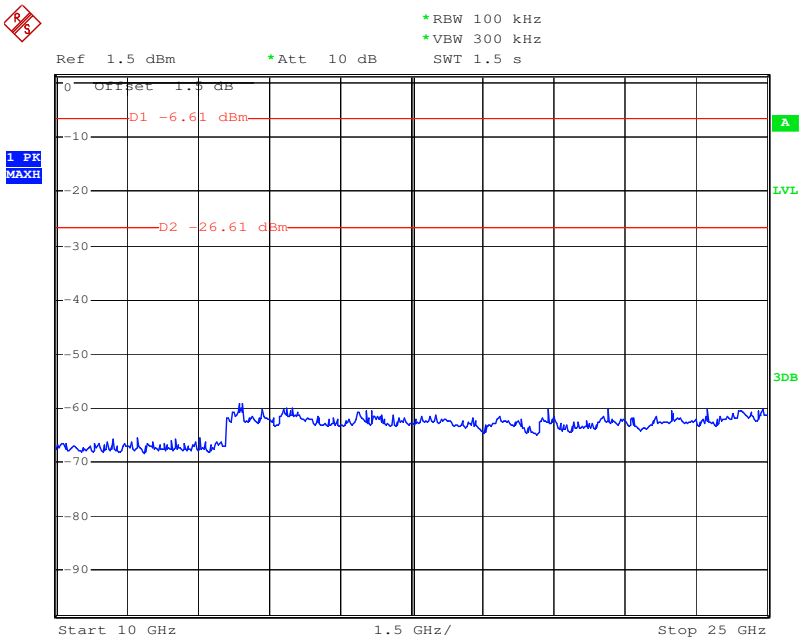



Date: 29.JUN.2010 14:12:37

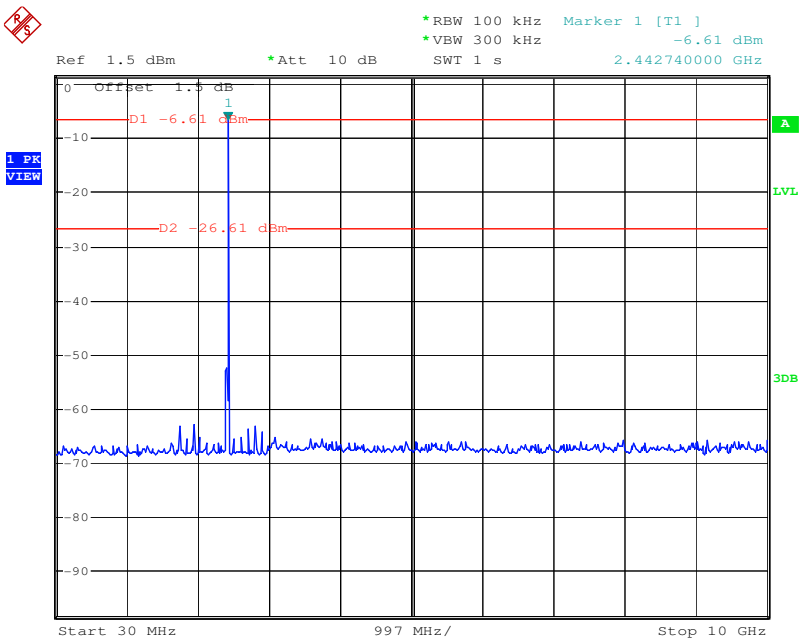



Date: 29.JUN.2010 14:12:13

| Test mode: | Pi/4QPSK | Test channel: | Middle |
|---|---|---|---|

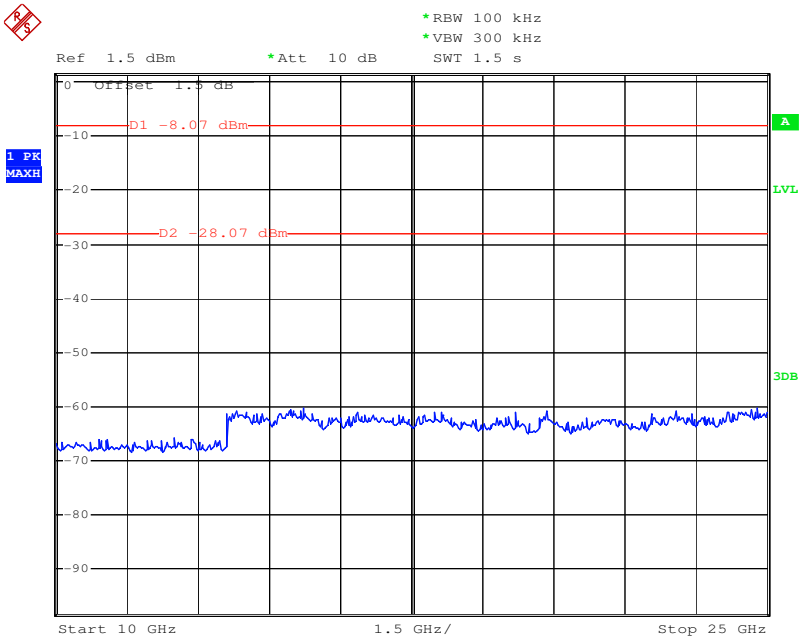



Date: 29.JUN.2010 14:25:25

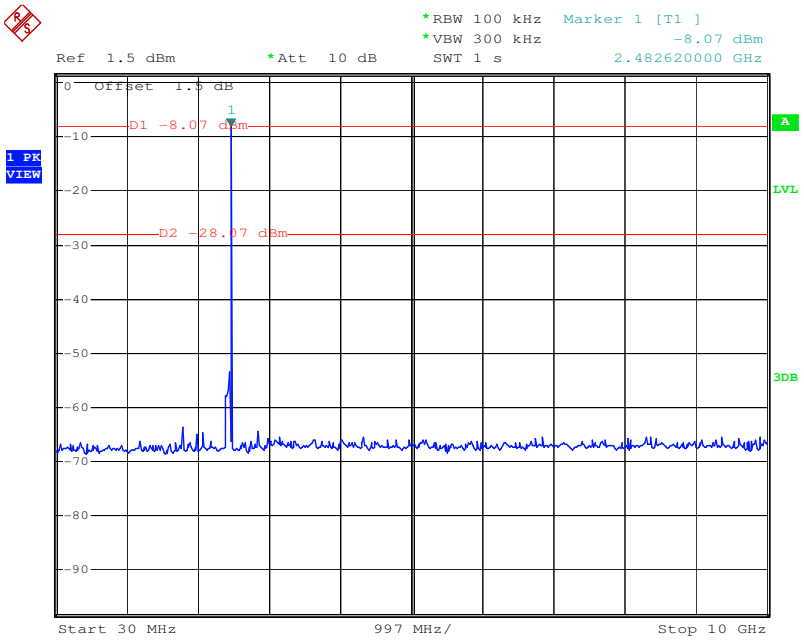



Date: 29.JUN.2010 14:24:58

| Test mode: | Pi/4QPSK | Test channel: | Highest |
|---|---|---|---|

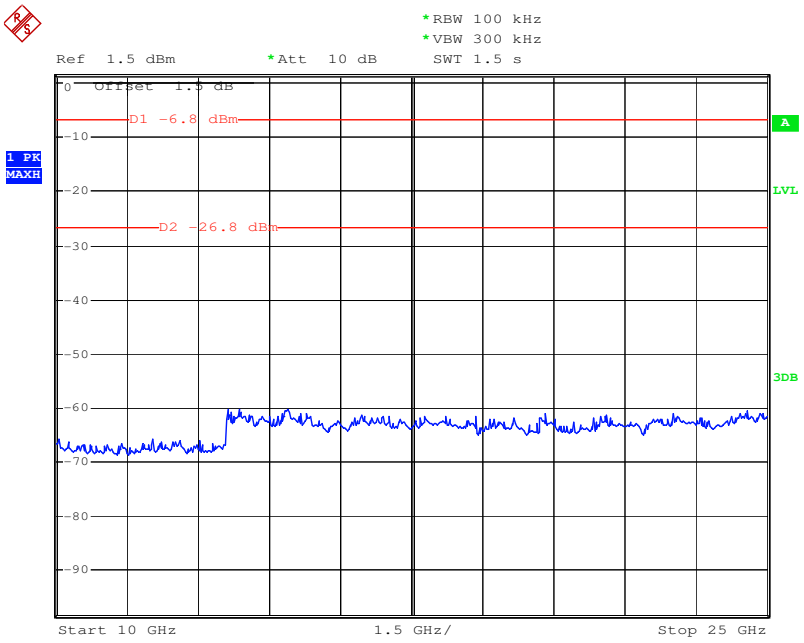



Date: 29.JUN.2010 14:39:54

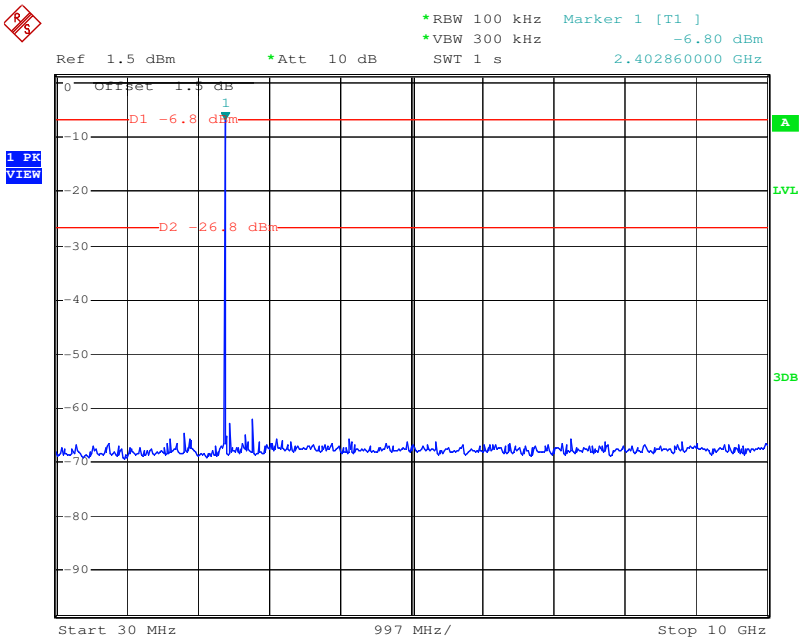



Date: 29.JUN.2010 14:39:33

| Test mode: | 8DPSK | Test channel: | Lowest |
|---|---|---|---|

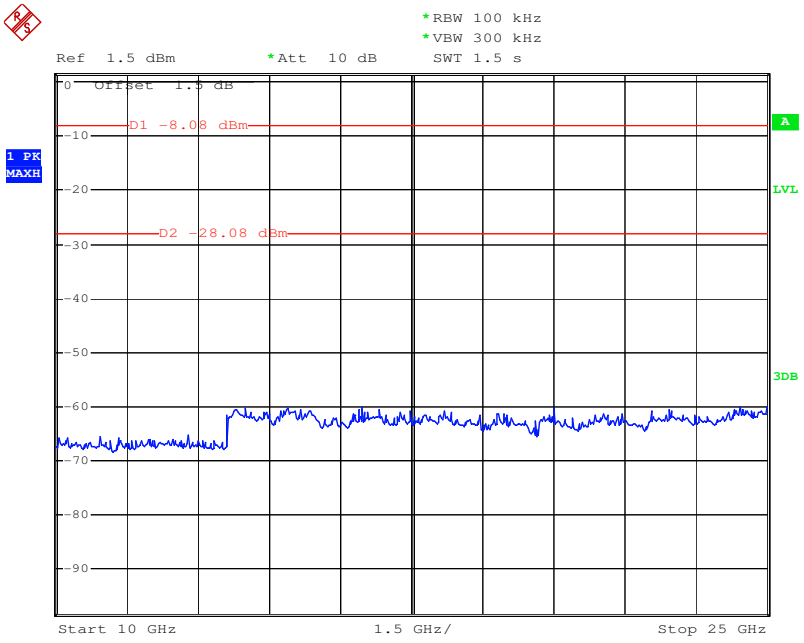



Date: 29.JUN.2010 14:47:36

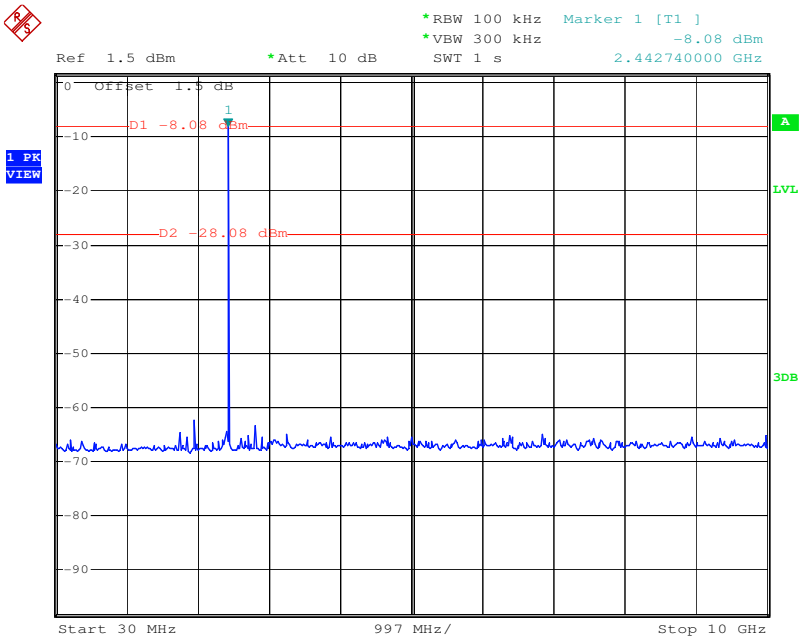



Date: 29.JUN.2010 14:47:16

| Test mode: | 8DPSK | Test channel: | Middle |
|---|---|---|---|

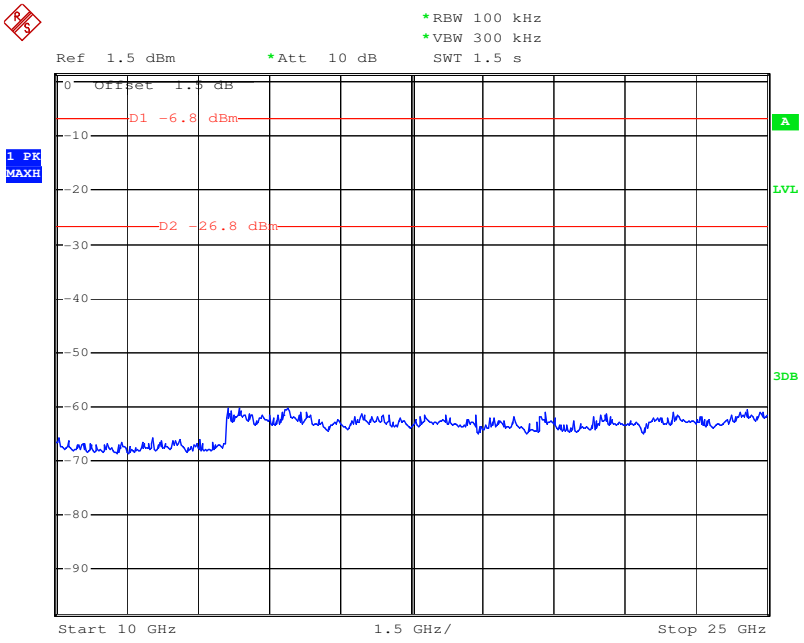



Date: 29.JUN.2010 14:57:11

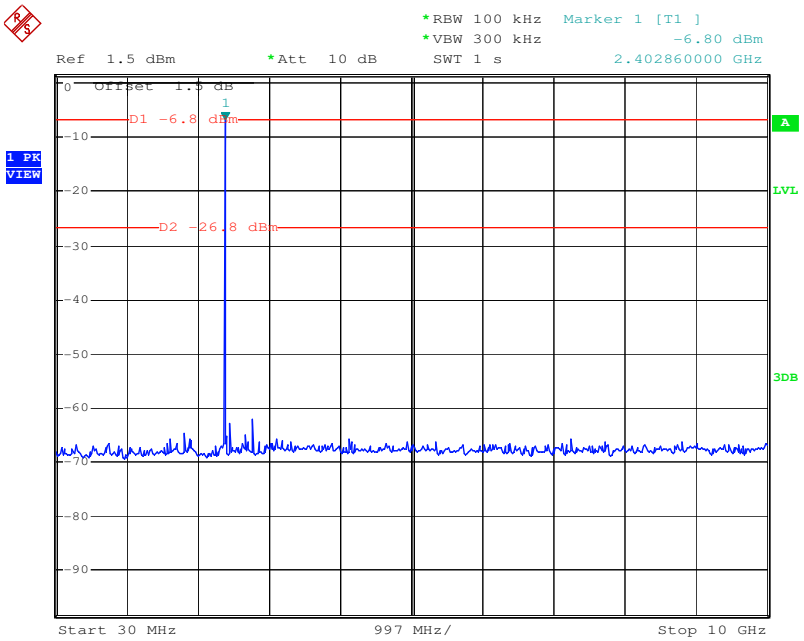



Date: 29.JUN.2010 14:56:32

| Test mode: | 8DPSK | Test channel: | Highest |
|---|---|---|---|




Date: 29.JUN.2010 14:47:36




Date: 29.JUN.2010 14:47:16

## 5.10 Pseudorandom Frequency Hopping Sequence

| Test Requirement: | FCC Part15 C Section 15.247 (a)(1) requirement: |
|---|---|

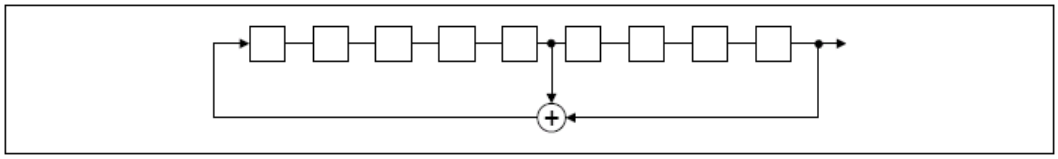
*Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.*

*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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.*

**EUT Pseudorandom Frequency Hopping Sequence**

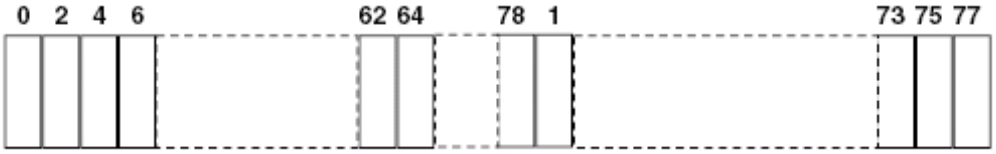
*The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.*

- *Number of shift register stages: 9*
- *Length of pseudo-random sequence: $2^9$ -1 = 511 bits*
- *Longest sequence of zeros: 8 (non-inverted signal)*



*Linear Feedback Shift Register for Generation of the PRBS sequence*

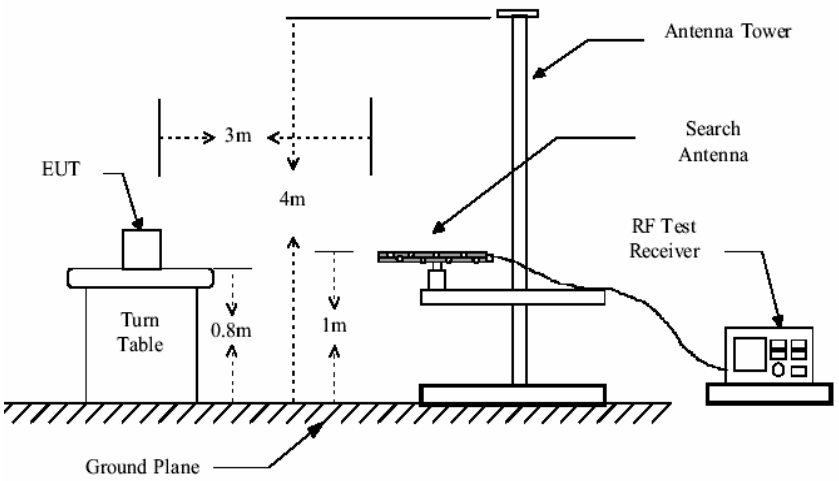
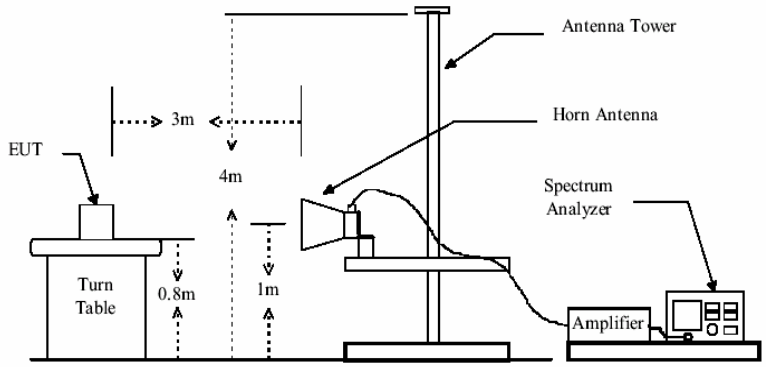
*An example of Pseudorandom Frequency Hopping Sequence as follow:*




*Each frequency used equally on the average by each transmitter.*
*The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.*

## 5.11 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205/15.107</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2003 and KDB DA00-705</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 4.7 for details</td></tr>
<tr><td>Test mode:</td><td>Non-hopping transmitting with modulation.<br>1. Pre-scan the EUT in GFSK, Pi/4QPSK and 8DPSK modes and find out the worst case is GFSK mode.<br>2. AC charge+ Bluetooth mode, DC charge+ Bluetooth mode, Bluetooth, AC charge mode, DC charge mode, Transmitting mode.<br>Pre-scan was performed on the EUT on above all modes, and then found the charge mode was the worse case.<br>Only the worst case mode and Bluetooth mode data was displayed.</td></tr>
<tr><td>Test results:</td><td>Passed</td></tr>
</table>

| Test setup: | Below 1GHz<br>  <br><br>Above 1GHz<br>  <br> |
|---|---|

*Note:*
*The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:*

*Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor*

## 5.11.1 Radiated emission below 1GHz

**Bluetooth mode**

| 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) | polarization |
|---|---|---|---|---|---|---|---|---|
| 33.880 | 0.60 | 13.51 | 28.15 | 29.90 | 15.86 | 40.00 | -24.14 | Vertical |
| 66.860 | 0.80 | 6.99 | 28.01 | 34.35 | 14.13 | 40.00 | -25.87 | Vertical |
| 113.420 | 1.24 | 8.36 | 27.74 | 31.50 | 13.36 | 43.50 | -30.14 | Vertical |
| 288.020 | 1.85 | 13.40 | 26.76 | 30.51 | 19.00 | 46.00 | -27.00 | Vertical |
| 685.720 | 2.87 | 21.50 | 27.32 | 31.91 | 28.96 | 46.00 | -17.04 | Vertical |
| 971.870 | 3.67 | 23.90 | 26.44 | 32.30 | 33.43 | 54.00 | -20.57 | Vertical |
| 33.880 | 0.60 | 13.47 | 28.15 | 29.50 | 15.42 | 40.00 | -24.58 | Horizontal |
| 101.780 | 1.21 | 9.00 | 27.86 | 31.00 | 13.35 | 43.50 | -30.15 | Horizontal |
| 250.190 | 1.68 | 12.30 | 26.91 | 30.02 | 17.09 | 46.00 | -28.91 | Horizontal |
| 401.510 | 2.21 | 16.31 | 27.42 | 31.32 | 22.42 | 46.00 | -23.58 | Horizontal |
| 673.110 | 2.85 | 21.40 | 27.37 | 31.95 | 28.83 | 46.00 | -17.17 | Horizontal |
| 974.780 | 3.68 | 24.00 | 26.44 | 32.35 | 33.59 | 54.00 | -20.41 | Horizontal |

**AC Charge mode**

| 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) | polarization |
|---|---|---|---|---|---|---|---|---|
| 31.940 | 0.60 | 14.43 | 28.17 | 34.00 | 20.86 | 40.00 | -19.14 | Vertical |
| 47.460 | 0.75 | 8.72 | 28.11 | 38.40 | 19.76 | 40.00 | -20.24 | Vertical |
| 82.380 | 1.10 | 7.95 | 27.99 | 32.90 | 13.96 | 40.00 | -26.04 | Vertical |
| 257.950 | 1.71 | 12.47 | 26.88 | 31.82 | 19.12 | 46.00 | -26.88 | Vertical |
| 533.430 | 2.64 | 18.65 | 27.68 | 31.41 | 25.02 | 46.00 | -20.98 | Vertical |
| 987.390 | 3.69 | 24.17 | 26.44 | 32.19 | 33.61 | 54.00 | -20.39 | Vertical |
| 31.940 | 0.60 | 14.31 | 28.17 | 29.65 | 16.39 | 40.00 | -23.61 | Horizontal |
| 87.230 | 1.10 | 8.45 | 27.96 | 31.38 | 12.97 | 40.00 | -27.03 | Horizontal |
| 163.860 | 1.34 | 9.56 | 27.36 | 31.26 | 14.80 | 43.50 | -28.70 | Horizontal |
| 393.750 | 2.18 | 16.22 | 27.37 | 32.01 | 23.04 | 46.00 | -22.96 | Horizontal |
| 773.020 | 3.13 | 21.97 | 27.03 | 32.38 | 30.45 | 46.00 | -15.55 | Horizontal |
| 928.220 | 3.63 | 23.30 | 26.43 | 32.72 | 33.22 | 46.00 | -12.78 | Horizontal |

Remark: the data above is tested with QP detector mode.

## 5.11.2 Transmitter emission above 1GHz

| Worst case mode: | GFSK | Test channel: | Lowest | Remark: | Peak |
|---|---|---|---|---|---|

| 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) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 5228 | 11.74 | 34.81 | 41.19 | 37.51 | 42.87 | 74.00 | -31.13 | Vertical |
| 7104 | 13.56 | 37.17 | 41.46 | 34.00 | 43.27 | 74.00 | -30.73 | Vertical |
| 8588 | 13.11 | 37.76 | 37.94 | 33.00 | 45.93 | 74.00 | -28.07 | Vertical |
| 9722 | 13.79 | 38.02 | 37.86 | 30.80 | 44.75 | 74.00 | -29.25 | Vertical |
| 11654 | 15.87 | 38.83 | 38.65 | 30.50 | 46.55 | 74.00 | -27.45 | Vertical |
| 13404 | 17.00 | 40.50 | 40.29 | 30.01 | 47.22 | 74.00 | -26.78 | Vertical |
| 5508 | 12.36 | 35.18 | 41.75 | 34.99 | 40.78 | 74.00 | -33.22 | Horizontal |
| 6306 | 14.44 | 36.22 | 41.59 | 36.00 | 45.07 | 74.00 | -28.93 | Horizontal |
| 8546 | 13.10 | 37.76 | 38.06 | 33.49 | 46.29 | 74.00 | -27.71 | Horizontal |
| 10660 | 14.90 | 38.23 | 36.74 | 31.81 | 48.20 | 74.00 | -25.80 | Horizontal |
| 12298 | 17.79 | 39.28 | 39.38 | 33.00 | 50.69 | 74.00 | -23.31 | Horizontal |
| 13446 | 17.09 | 40.58 | 40.43 | 30.00 | 47.24 | 74.00 | -26.76 | Horizontal |

| Worst case mode: | GFSK | Test channel: | Lowest | Remark: | Average |
|---|---|---|---|---|---|

| 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) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 5228 | 11.74 | 34.81 | 41.19 | 25.81 | 31.17 | 54.00 | -22.83 | Vertical |
| 7104 | 13.56 | 37.17 | 41.46 | 22.50 | 31.77 | 54.00 | -22.23 | Vertical |
| 8588 | 13.11 | 37.76 | 37.94 | 21.70 | 34.63 | 54.00 | -19.37 | Vertical |
| 9722 | 13.79 | 38.02 | 37.86 | 19.00 | 32.95 | 54.00 | -21.05 | Vertical |
| 11654 | 15.87 | 38.83 | 38.65 | 19.00 | 35.05 | 54.00 | -18.95 | Vertical |
| 13404 | 17.00 | 40.50 | 40.29 | 17.61 | 34.82 | 54.00 | -19.18 | Vertical |
| 5508 | 12.36 | 35.18 | 41.75 | 23.69 | 29.48 | 54.00 | -24.52 | Horizontal |
| 6306 | 14.44 | 36.22 | 41.59 | 24.50 | 33.57 | 54.00 | -20.43 | Horizontal |
| 8546 | 13.10 | 37.76 | 38.06 | 22.19 | 34.99 | 54.00 | -19.01 | Horizontal |
| 10660 | 14.90 | 38.23 | 36.74 | 20.01 | 36.40 | 54.00 | -17.60 | Horizontal |
| 12298 | 17.79 | 39.28 | 39.38 | 20.70 | 38.39 | 54.00 | -15.61 | Horizontal |
| 13446 | 17.09 | 40.58 | 40.43 | 18.60 | 35.84 | 54.00 | -18.16 | Horizontal |

| Worst case mode: | GFSK | Test channel: | Middle | Remark: | Peak |
|---|---|---|---|---|---|

| Frequency (MHz) | Cable loss (dB) | Antenna factors (dB/m) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Over limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 5676 | 12.82 | 35.41 | 42.01 | 37.00 | 43.22 | 74.00 | -30.78 | Vertical |
| 6740 | 13.38 | 36.78 | 40.42 | 37.01 | 46.75 | 74.00 | -27.25 | Vertical |
| 8658 | 13.10 | 37.77 | 37.78 | 33.90 | 46.99 | 74.00 | -27.01 | Vertical |
| 10492 | 14.48 | 38.20 | 36.39 | 31.79 | 48.08 | 74.00 | -25.92 | Vertical |
| 12340 | 17.71 | 39.30 | 39.41 | 33.00 | 50.60 | 74.00 | -23.40 | Vertical |
| 13628 | 17.41 | 40.94 | 40.81 | 31.00 | 48.54 | 74.00 | -25.46 | Vertical |
| 4304 | 8.76 | 33.55 | 39.68 | 34.50 | 37.13 | 74.00 | -36.87 | Horizontal |
| 5186 | 11.56 | 34.75 | 41.19 | 37.20 | 42.32 | 74.00 | -31.68 | Horizontal |
| 6362 | 14.42 | 36.29 | 41.52 | 37.00 | 46.19 | 74.00 | -27.81 | Horizontal |
| 7804 | 14.34 | 37.60 | 39.65 | 35.00 | 47.29 | 74.00 | -26.71 | Horizontal |
| 10548 | 14.69 | 38.21 | 36.40 | 30.00 | 46.50 | 74.00 | -27.50 | Horizontal |
| 12788 | 17.03 | 39.59 | 39.07 | 33.70 | 51.25 | 74.00 | -22.75 | Horizontal |

| Worst case mode: | GFSK | Test channel: | Middle | Remark: | Average |
|---|---|---|---|---|---|

| Frequency (MHz) | Cable loss (dB) | Antenna factors (dB/m) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Over limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 5676 | 12.82 | 35.41 | 42.01 | 25.50 | 31.72 | 54.00 | -22.28 | Vertical |
| 6740 | 13.38 | 36.78 | 40.42 | 24.51 | 34.25 | 54.00 | -19.75 | Vertical |
| 8658 | 13.10 | 37.77 | 37.78 | 22.00 | 35.09 | 54.00 | -18.91 | Vertical |
| 10492 | 14.48 | 38.20 | 36.39 | 22.99 | 39.28 | 54.00 | -14.72 | Vertical |
| 12340 | 17.71 | 39.30 | 39.41 | 20.30 | 37.90 | 54.00 | -16.10 | Vertical |
| 13628 | 17.41 | 40.94 | 40.81 | 20.00 | 37.54 | 54.00 | -16.46 | Vertical |
| 4304 | 8.76 | 33.55 | 39.68 | 23.00 | 25.63 | 54.00 | -28.37 | Horizontal |
| 5186 | 11.56 | 34.75 | 41.19 | 23.50 | 28.62 | 54.00 | -25.38 | Horizontal |
| 6362 | 14.42 | 36.29 | 41.52 | 25.00 | 34.19 | 54.00 | -19.81 | Horizontal |
| 7804 | 14.34 | 37.60 | 39.65 | 23.30 | 35.59 | 54.00 | -18.41 | Horizontal |
| 10548 | 14.69 | 38.21 | 36.40 | 20.00 | 36.50 | 54.00 | -17.50 | Horizontal |
| 12788 | 17.03 | 39.59 | 39.07 | 21.00 | 38.55 | 54.00 | -15.45 | Horizontal |

| Worst case mode: | GFSK | Test channel: | Highest | Remark: | Peak |
|---|---|---|---|---|---|

| Frequency (MHz) | Cable loss (dB) | Antenna factors (dB/m) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Over limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 4052 | 8.10 | 33.17 | 40.56 | 33.01 | 33.72 | 74.00 | -40.28 | Vertical |
| 4934 | 10.53 | 34.41 | 40.90 | 37.40 | 41.44 | 74.00 | -32.56 | Vertical |
| 6362 | 14.42 | 36.29 | 41.52 | 37.90 | 47.09 | 74.00 | -26.91 | Vertical |
| 7804 | 14.34 | 37.60 | 39.65 | 35.50 | 47.79 | 74.00 | -26.21 | Vertical |
| 10548 | 14.69 | 38.21 | 36.40 | 31.80 | 48.30 | 74.00 | -25.70 | Vertical |
| 13404 | 17.00 | 40.50 | 40.29 | 30.01 | 47.22 | 74.00 | -26.78 | Vertical |
| 6208 | 14.46 | 36.09 | 41.69 | 37.01 | 45.87 | 74.00 | -28.13 | Horizontal |
| 7734 | 13.85 | 37.56 | 39.52 | 34.00 | 45.89 | 74.00 | -28.11 | Horizontal |
| 8434 | 13.07 | 37.75 | 38.31 | 33.00 | 45.51 | 74.00 | -28.49 | Horizontal |
| 9694 | 13.69 | 38.01 | 37.79 | 31.00 | 44.91 | 74.00 | -29.09 | Horizontal |
| 11416 | 15.05 | 38.62 | 38.28 | 30.00 | 45.39 | 74.00 | -28.61 | Horizontal |
| 13726 | 17.28 | 41.09 | 40.93 | 31.50 | 48.94 | 74.00 | -25.06 | Horizontal |

| Worst case mode: | GFSK | Test channel: | Highest | Remark: | Average |
|---|---|---|---|---|---|

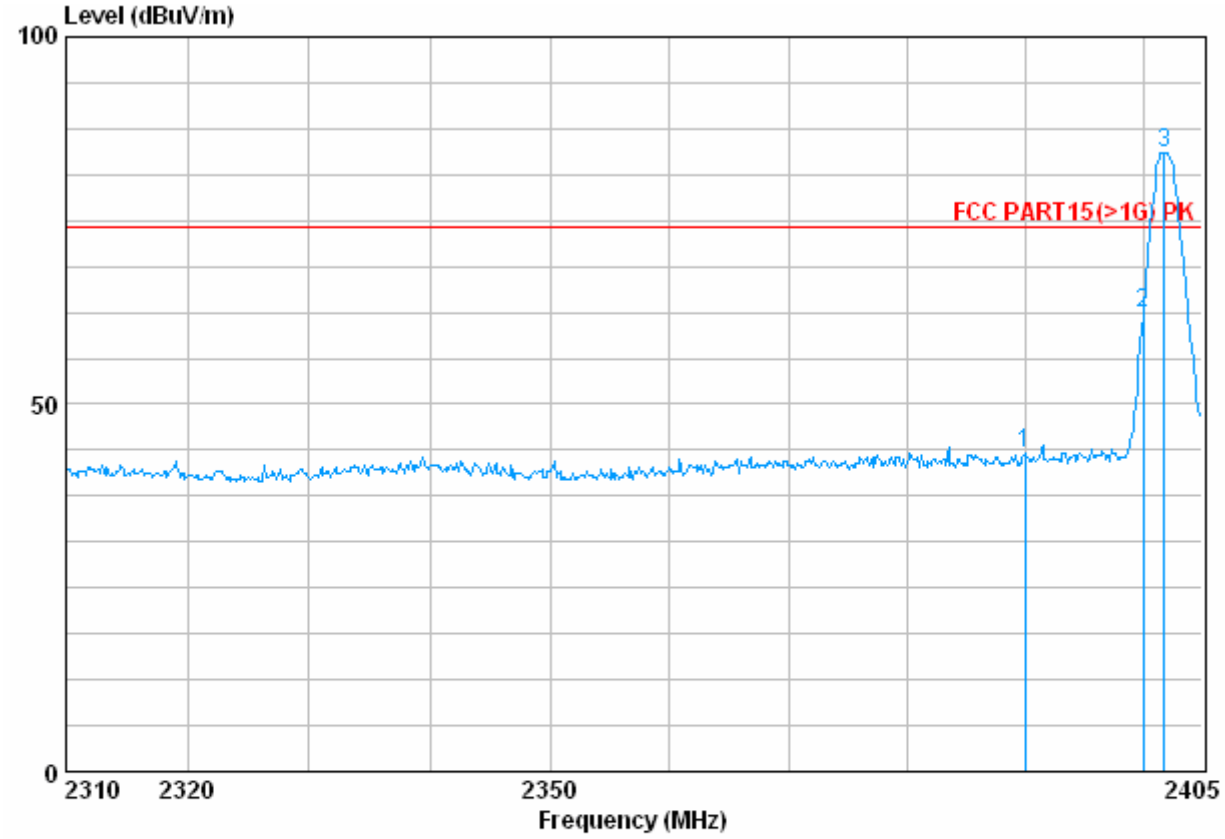
| Frequency (MHz) | Cable loss (dB) | Antenna factors (dB/m) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Over limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 4052 | 8.10 | 33.17 | 40.56 | 22.01 | 22.72 | 54.00 | -31.28 | Vertical |
| 4934 | 10.53 | 34.41 | 40.90 | 25.40 | 29.44 | 54.00 | -24.56 | Vertical |
| 6362 | 14.42 | 36.29 | 41.52 | 25.00 | 34.19 | 54.00 | -19.81 | Vertical |
| 7804 | 14.34 | 37.60 | 39.65 | 23.30 | 35.59 | 54.00 | -18.41 | Vertical |
| 10548 | 14.69 | 38.21 | 36.40 | 20.00 | 36.50 | 54.00 | -17.50 | Vertical |
| 13404 | 17.00 | 40.50 | 40.29 | 17.61 | 34.82 | 54.00 | -19.18 | Vertical |
| 6208 | 14.46 | 36.09 | 41.69 | 20.31 | 29.17 | 54.00 | -24.83 | Horizontal |
| 7734 | 13.85 | 37.56 | 39.52 | 18.00 | 29.89 | 54.00 | -24.11 | Horizontal |
| 8434 | 13.07 | 37.75 | 38.31 | 19.00 | 31.51 | 54.00 | -22.49 | Horizontal |
| 9694 | 13.69 | 38.01 | 37.79 | 21.00 | 34.91 | 54.00 | -19.09 | Horizontal |
| 11416 | 15.05 | 38.62 | 38.28 | 22.30 | 37.69 | 54.00 | -16.31 | Horizontal |
| 13726 | 17.28 | 41.09 | 40.93 | 25.00 | 42.44 | 54.00 | -11.56 | Horizontal |

Remark:1. The disturbance above 14GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

## 5.11.3 Band Edge and Restricted band (Radiated measurement)

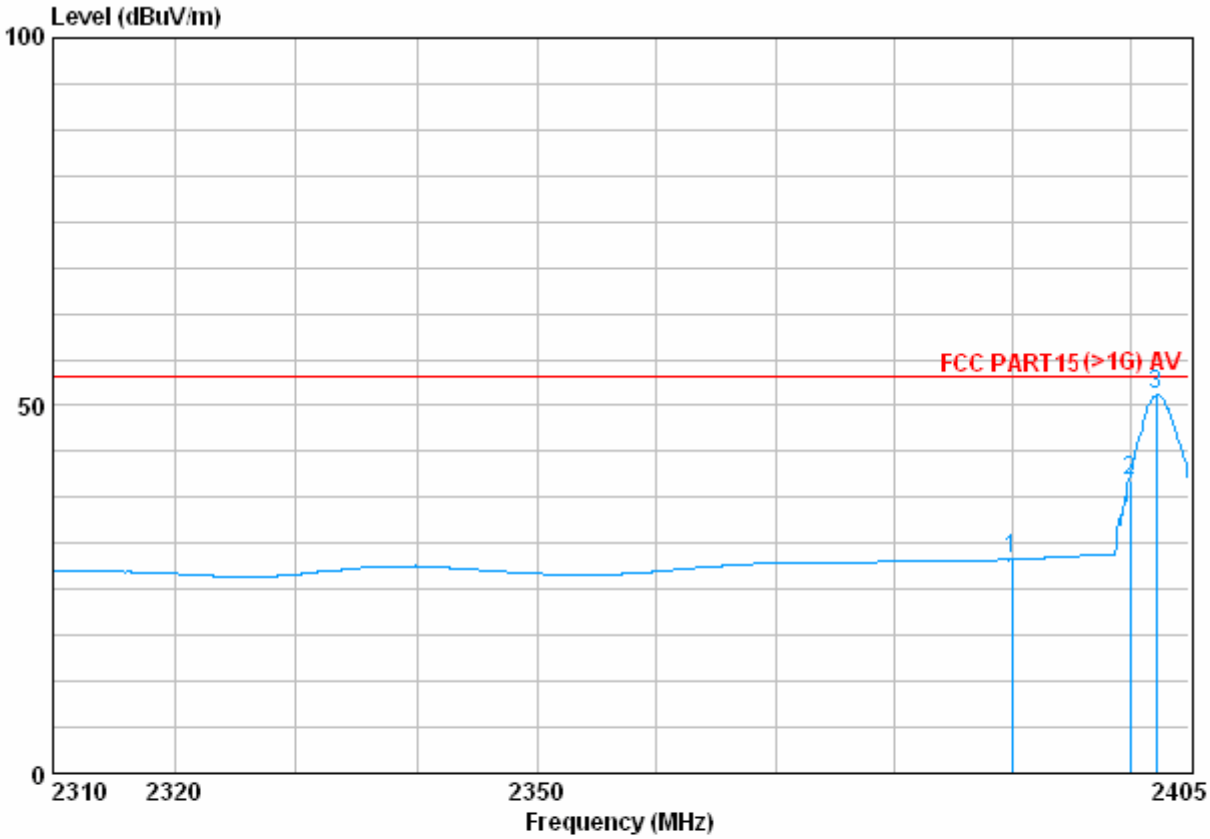
| Test mode: | GFSK | Test channel: | Lowest | Polarization: | Vertical |
|---|---|---|---|---|---|

Peak measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2390.000 | 6.28 | 29.98 | 39.03 | 45.97 | 43.20 | 74.00 | -30.80 |
| 2 | 2400.000 | 6.34 | 30.03 | 38.87 | 64.86 | 62.36 | 74.00 | -11.64 |
| 3 @ | 2401.770 | 6.34 | 30.03 | 38.87 | 86.70 | 84.20 | 74.00 | 10.20 |

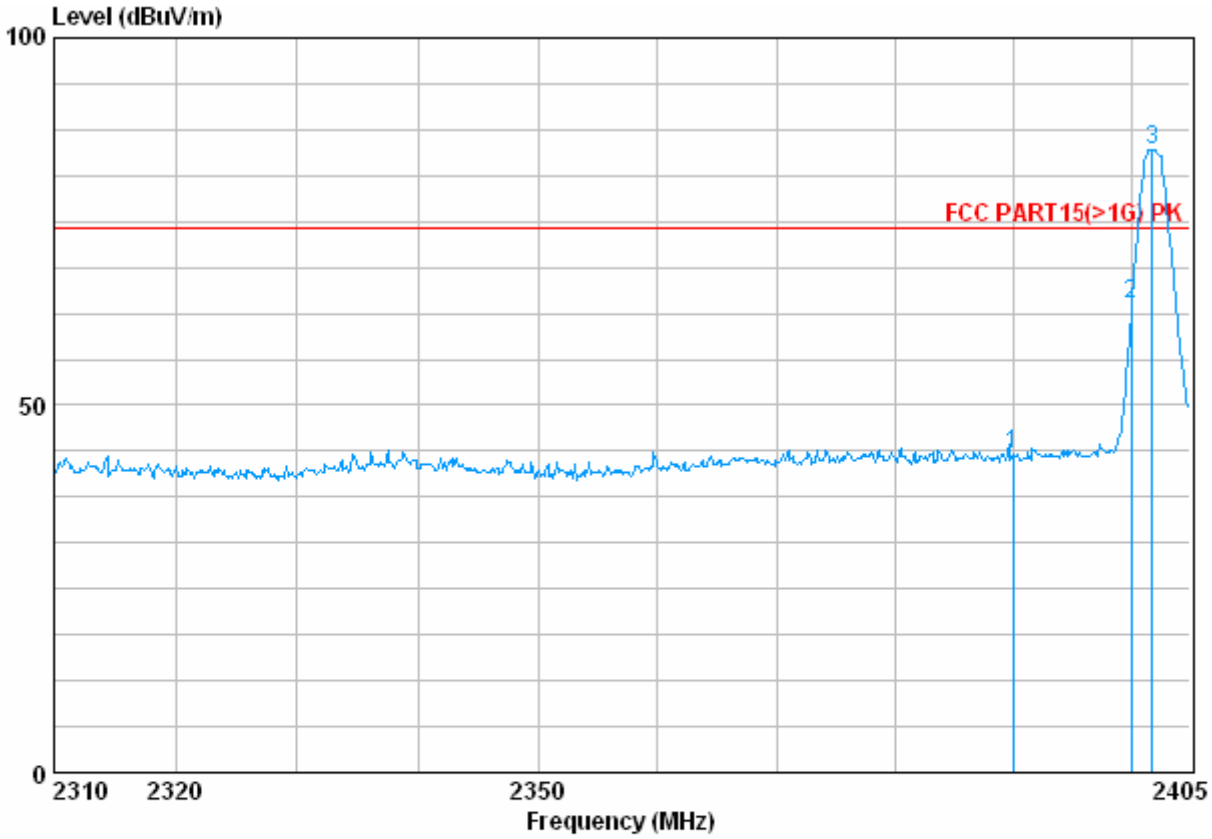
Average measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2390.000 | 6.28 | 29.98 | 39.03 | 31.80 | 29.04 | 54.00 | -24.96 |
| 2 | 2400.000 | 6.34 | 30.03 | 38.87 | 42.17 | 39.67 | 54.00 | -14.33 |
| 3 @ | 2402.245 | 6.34 | 30.03 | 38.87 | 53.91 | 51.41 | 54.00 | -2.59 |

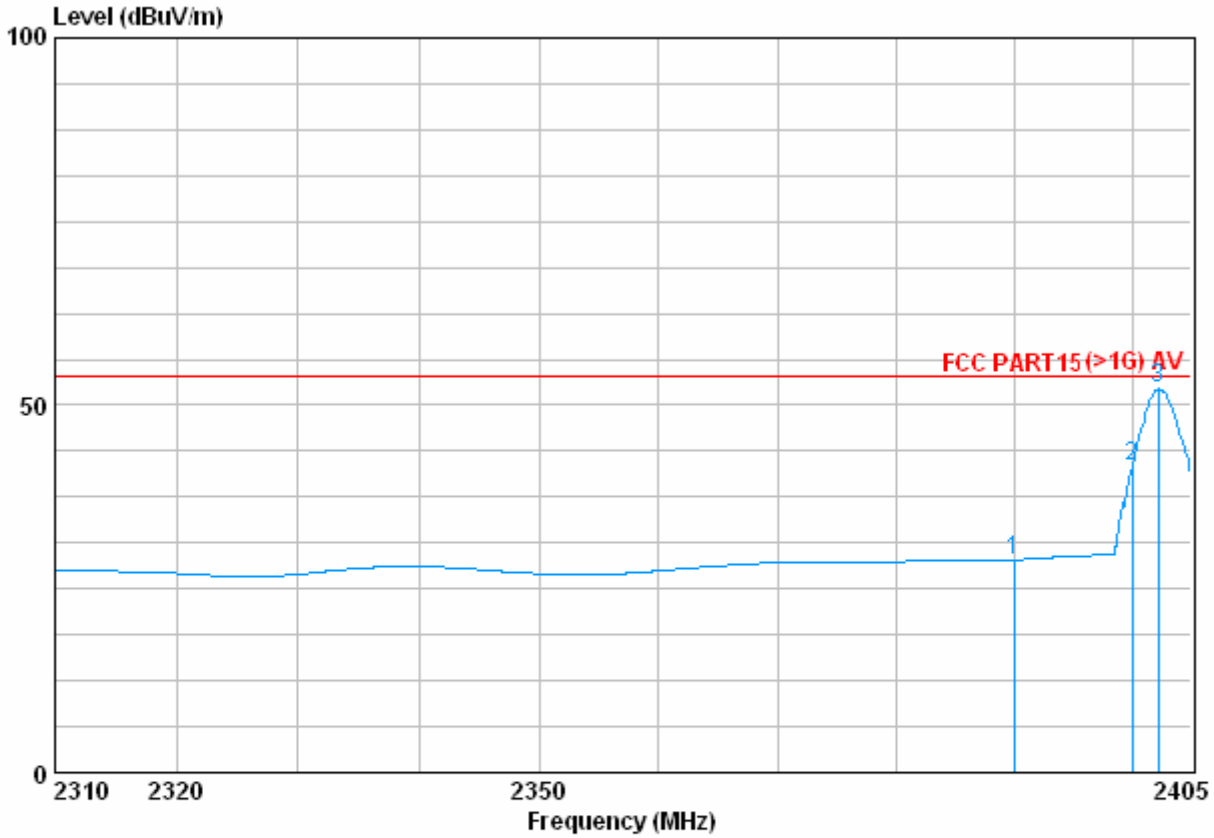
| Test mode: | GFSK | Test channel: | Lowest | Polarization: | Horizontal |
|---|---|---|---|---|---|

Peak measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2390.000 | 6.28 | 29.98 | 39.03 | 46.05 | 43.28 | 74.00 | -30.72 |
| 2 | 2400.000 | 6.34 | 30.03 | 38.87 | 66.30 | 63.80 | 74.00 | -10.20 |
| 3 @ | 2401.770 | 6.34 | 30.03 | 38.87 | 87.28 | 84.78 | 74.00 | 10.78 |

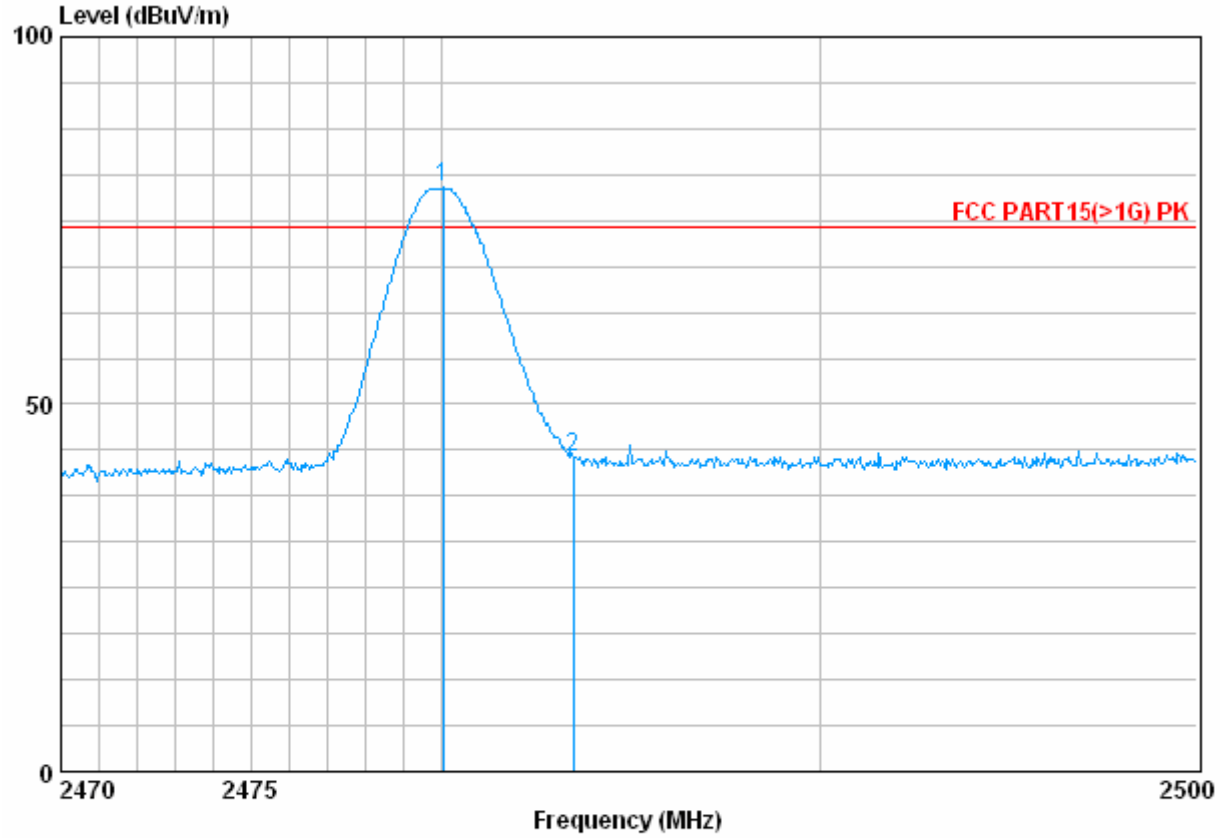
Average measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2390.000 | 6.28 | 29.98 | 39.03 | 31.72 | 28.95 | 54.00 | -25.05 |
| 2 | 2400.000 | 6.34 | 30.03 | 38.87 | 44.21 | 41.71 | 54.00 | -12.29 |
| 3 @ | 2402.245 | 6.34 | 30.03 | 38.87 | 54.69 | 52.19 | 54.00 | -1.81 |

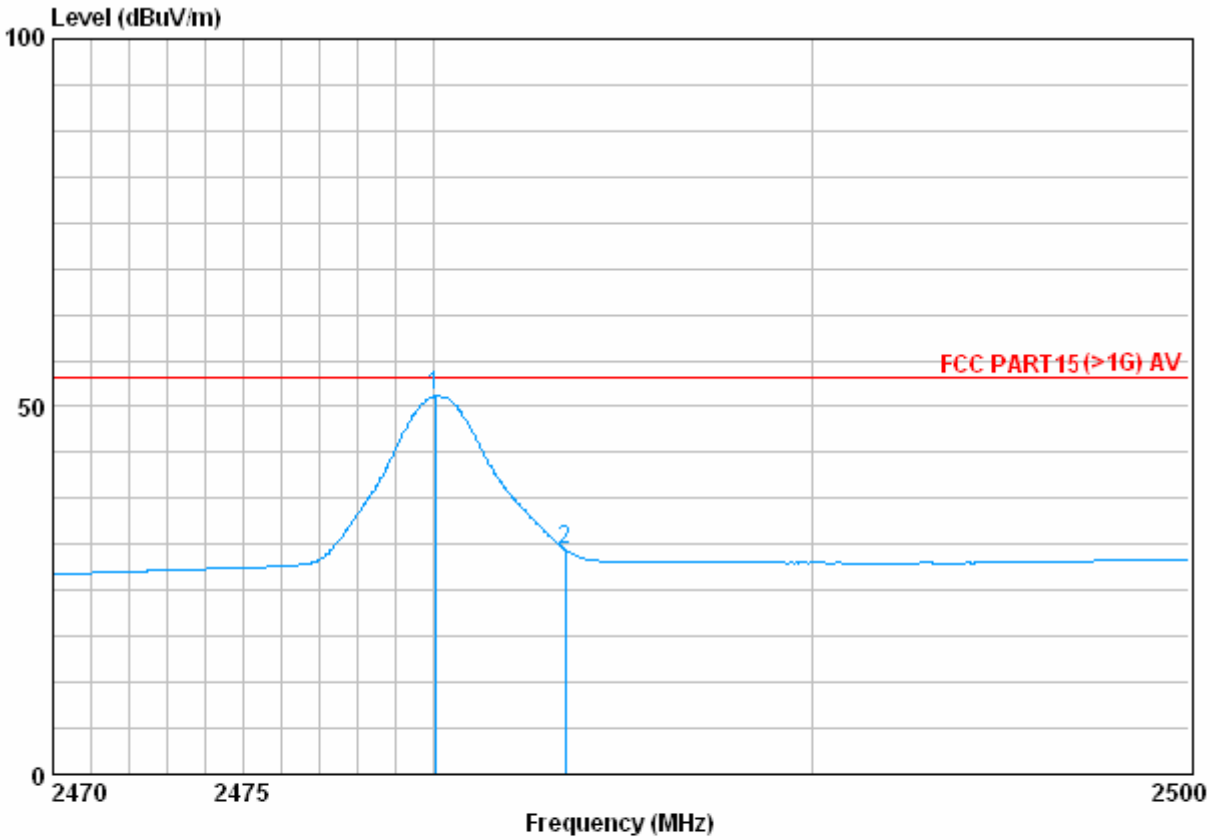
| Test mode: | GFSK | Test channel: | Highest | Polarization: | Vertical |
|---|---|---|---|---|---|

Peak measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 X | 2480.050 | 6.45 | 30.30 | 39.72 | 82.45 | 79.48 | 74.00 | 5.48 |
| 2 | 2483.500 | 6.22 | 30.32 | 39.53 | 45.82 | 42.83 | 74.00 | -31.17 |

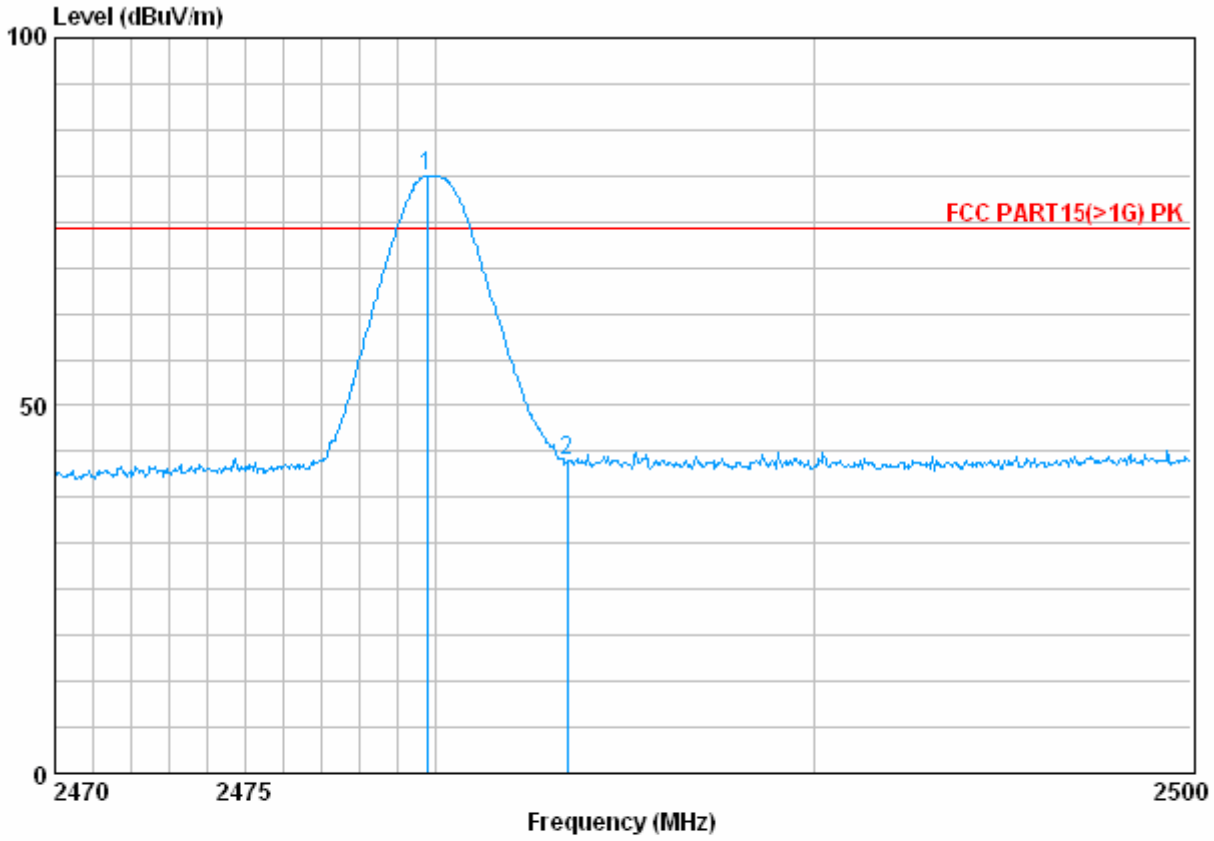
Average measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2480.050 | 6.45 | 30.30 | 39.72 | 54.38 | 51.41 | 54.00 | -2.59 |
| 2 | 2483.500 | 6.22 | 30.32 | 39.53 | 33.54 | 30.55 | 54.00 | -23.45 |

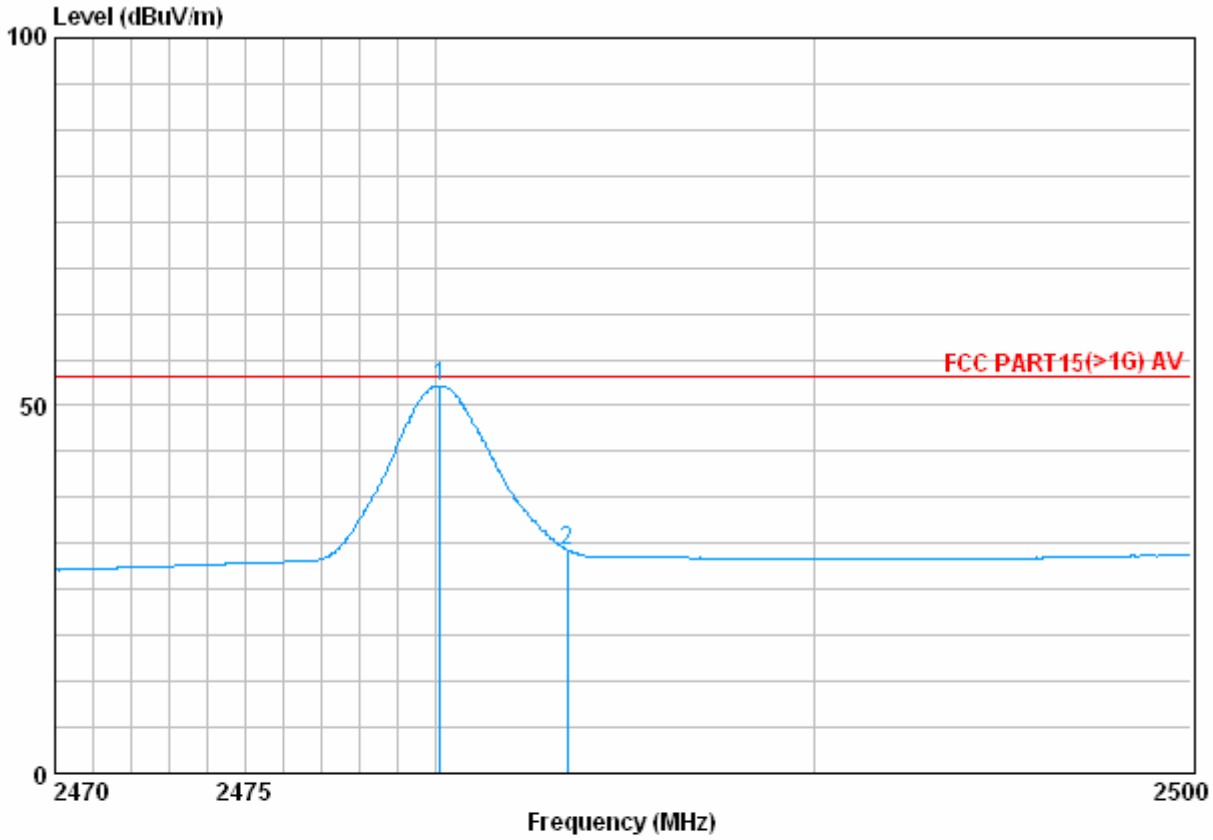
| Test mode: | GFSK | Test channel: | Highest | Polarization: | Horizontal |
|---|---|---|---|---|---|

Peak measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 @ | 2479.780 | 6.45 | 30.30 | 39.72 | 84.20 | 81.23 | 74.00 | 7.23 |
| 2 | 2483.500 | 6.22 | 30.32 | 39.53 | 45.52 | 42.54 | 74.00 | -31.46 |

Average measurement




| | Freq | Cable Loss | Antenna Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 2480.140 | 6.45 | 30.30 | 39.72 | 55.69 | 52.72 | 54.00 | -1.28 |
| 2 | 2483.500 | 6.22 | 30.32 | 39.53 | 33.36 | 30.37 | 54.00 | -23.63 |