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**FEDERAL COMMUNICATIONS COMMISSION**  
Registration number: 282399

Report No.: GLEMR060500091AVF

Page: 1 of 36  
FCC ID: RLQBH-5300

# TEST REPORT

**Application No. :** GLEMR060500091AV  
**Applicant:** Zhongshan K-mate Electronics Co. Ltd.  
**FCC ID:** RLQBH-5300  
**Fundamental Carrier**  
**Frequency :** 2.402GHz to 2.480GHz  
**Equipment Under Test (EUT):**  
    Name: Bluetooth Car Kit & Headset  
    Model: BH-5300  
**Standards:** FCC PART 15, SUBPART C : 2006 ( Section 15.247)  
**Date of Receipt:** 18 May 2006  
**Date of Test:** 20 May to 14 June 2006  
**Date of Issue:** 16 June 2006

|                      |               |
|----------------------|---------------|
| <b>Test Result :</b> | <b>PASS *</b> |
|----------------------|---------------|

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

Authorized Signature:

Jerry Chen  
Manager

This report refers to the General Conditions for Inspection and Testing Services, printed overleaf  
This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.  
This report may only be reproduced and distributed in full. 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.



## 2 Test Summary

| Test                                               | Test Requirement  | Standard Paragraph               | Result |
|----------------------------------------------------|-------------------|----------------------------------|--------|
| Conducted Emission<br>(150KHz to 30MHz)            | FCC PART 15 :2006 | Section 15.107                   | PASS   |
| Maximum Peak<br>Output Power                       | FCC PART 15 :2006 | Section 15.247 (b1)              | PASS   |
| Conducted Spurious<br>Emission<br>(30MHz to 25GHz) | FCC PART 15 :2006 | Section 15.247 (d)               | PASS   |
| Radiated Spurious<br>Emission<br>(30MHz to 25GHz)  | FCC PART 15 :2006 | Section 15.109<br>Section 15.209 | PASS   |
| Band Edges<br>Measurement                          | FCC PART 15 :2006 | Section 15.247 (c)               | PASS   |
| Hopping Channel<br>Number                          | FCC PART 15 :2006 | Section 15.247 (b1)              | PASS   |
| Occupied Bandwidth                                 | FCC PART 15 :2006 | Section 15.247 (a1)              | PASS   |
| Carrier Frequencies<br>Separated                   | FCC PART 15 :2006 | Section 15.247 (a1,iii)          | PASS   |
| Dell Time                                          | FCC PART 15 :2006 | Section 15.247 (a1)              | PASS   |



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## **4 General Information**

### **4.1 Client Information**

Applicant Name: Zhongshan K-mate Electronics Co. Ltd.  
Applicant Address: 3/F B1 Building Fuwan Industrial Zone Sunwen East Road,  
Zhongshan, China.

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

Product Name: Bluetooth Car Kit & Headset  
Model: BH-5300  
Bluetooth Specification: Bluetooth V1.1  
Power Supply: Inside Rechargeable Battery  
Charging Method: Supplied by USB line connected with PC or  
Supplied by Car-kit.  
USB Line: 1.0 Cable provided by applicant  
Car-kit: Charging function and Hands-free function since there is speaker inside.

### **4.3 Description of Support Units**

The EUT has been tested as an independent unit except the test in Charging mode connected PC by USB line or connected a car kit.

### **4.4 Standards Applicable for Testing**

The customer requested FCC tests for a Bluetooth earphone.  
The standard used was FCC PART 15, SUBPART C (2006) section 15.247.

### **4.5 Test Location**

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory, No.198 Kezhu Road, Science Town Economic& Technology Development District Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

### **4.6 Other Information Requested by the Customer**

None.

#### 4.7 Test Facility

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

- **NVLAP – Lab Code: 200611-0**  
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0. Effective through December 31, 2006.
- **ACA**  
SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.
- **VCCI**  
The 3m Semi-anechoic chamber and Shielded Room (11.5m x 4m x 4m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-1599 and C-1706 respectively.  
Date of Registration: June 01, 2005. Valid until February 22, 2008
- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FINKO**  
Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.
- **CNAL – LAB Code: L0141**  
SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of Testing Laboratories.
- **FCC – Registration No.: 282399**  
SGS-CSTC Standards Technical Services Co., Ltd., 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 282399, May 31, 2002. With the above and NVLAP, SGS-CSTC is an authorized test laboratory for the DoC process.
- **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.: 5169.

## 5 Equipments Used during Test

| Conducted Emission |                   |                 |                            |            |                      |                         |
|--------------------|-------------------|-----------------|----------------------------|------------|----------------------|-------------------------|
| No:                | Test Equipment    | Manufacturer    | Model No.                  | Serial No. | Cal. Date (dd-mm-yy) | Cal.Due date (dd-mm-yy) |
| EMC0306            | Shielding Room    | Zhong Yu        | 8 x 3 x 3.8 m <sup>3</sup> | N/A        | N/A                  | N/A                     |
| EMC0102            | LISN              | Schaffner Chase | MNZ050D/1                  | 1421       | 05-12-2005           | 05-12-2006              |
| EMC0506            | EMI Test Receiver | Rohde & Schwarz | ESCS30                     | 100085     | 05-12-2005           | 05-12-2006              |
| EMC0107            | Coaxial Cable     | SGS             | 2m                         | N/A        | 25-11-2005           | 25-11-2006              |

| RE in Chamber/OATS |                              |                   |               |            |                      |                         |
|--------------------|------------------------------|-------------------|---------------|------------|----------------------|-------------------------|
| No:                | Test Equipment               | Manufacturer      | Model No.     | Serial No. | Cal. Date (dd-mm-yy) | Cal.Due date (dd-mm-yy) |
| EMC0525            | Impact Semi-Anechoic Chamber | ChangZhou ZhongYu | N/A           | N/A        | 06-03-2006           | 06-03-2007              |
| EMC0522            | EMI Test Receiver            | Rohde & Schwarz   | ESIB26        | 100249     | 05-12-2005           | 05-12-2006              |
| N/A                | EMI Test Software            | Audix             | E3            | N/A        | N/A                  | N/A                     |
| EMC0514            | Coaxial cable                | SGS               | N/A           | N/A        | 04-12-2005           | 04-12-2006              |
| EMC0524            | Bi-log Type Antenna          | Schaffner -Chase  | CBL6112B      | 2966       | 31-10-2005           | 31-10-2006              |
| EMC0519            | Bilog Type Antenna           | Schaffner -Chase  | CBL6143       | 5070       | 16-01-2006           | 16-01-2007              |
| EMC0518            | Horn Antenna                 | Rohde & Schwarz   | HF906         | 100096     | 10-05-2005           | 09-05-2006              |
| EMC0040            | Spectrum Analyzer            | Rohde & Schwarz   | FSP30         | 100324     | 05-12-2005           | 05-12-2006              |
| EMC0520            | 0.1-1300 MHz Pre-Amplifier   | HP                | 8447D OPT 010 | 2944A06252 | 06-03-2006           | 06-03-2007              |
| EMC0521            | 1-26.5 GHz Pre-Amplifier     | Agilent           | 8449B         | 3008A01649 | 06-03-2006           | 06-03-2007              |
| EMC0523            | Active Loop Antenna          | EMCO              | 6502          | 00042963   | 14-01-2006           | 14-01-2007              |
| EMC0529            | 10m Open Site                | ZhongYu           | N/A           | N/A        | 26-12-2005           | 26-12-2006              |

| General used equipment |                         |                   |           |            |                      |                         |
|------------------------|-------------------------|-------------------|-----------|------------|----------------------|-------------------------|
| No:                    | Test Equipment          | Manufacturer      | Model No. | Serial No. | Cal. Date (dd-mm-yy) | Cal.Due date (dd-mm-yy) |
| EMC0050 to EMC0053     | Temperature, & Humidity | ZHENGZHOU BO YANG | WSB       | N/A        | 05-12-2005           | 05-12-2006              |
| EMC0054                | Temperature, & Humidity | Shenzhen Tai Kong | THG-1     | N/A        | 04-01-2006           | 04-01-2007              |
| EMC0006                | DMM                     | Fluke             | 73        | 70681569   | 28-09-2005           | 28-09-2006              |
| EMC0007                | DMM                     | Fluke             | 73        | 70671122   | 12-09-2005           | 12-09-2006              |

## 6 Test Results

### 6.1 E.U.T. Operation

Input voltage: Inside Rechargeable Battery

Operating Environment:

Temperature: 24.0 -25.0 °C

Humidity: 50-56 % RH

Atmospheric Pressure: 1008 -1012 mbar

EUT Operation: Test the EUT as a product which has frequency hopping system. The total hopping channels are 79 channels (0 to 78 channel), the fundamental frequencies are from 2.402GHz to 2.480GHz.

The test procedure provided by applicant enabled the EUT to transmit and receive data at lowest (**Channel 0: 2.402GHz**), medium (**Channel 39: 2.402GHz**), and highest channel (**Channel 78: 2.480GHz**), frequencies individually.

Pre-test all the frequencies mode and their power status, compliance test in the worse case: Channel 78, Channel 39, Channel 0.

## **6.2 Conducted Emissions Mains Terminals, 150kHz to 30MHz**

Test Requirement: FCC Part15 B  
Test Method: ANSI C63.4  
Test Date: 15 June 2006  
Frequency Range: 150KHz to 30MHz  
Class / Severity: Class B  
Detector: Peak for pre-scan (9kHz Resolution Bandwidth)  
Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit  
EUT Operation: Test in charging mode connected with PC by USB line.  
Test result:

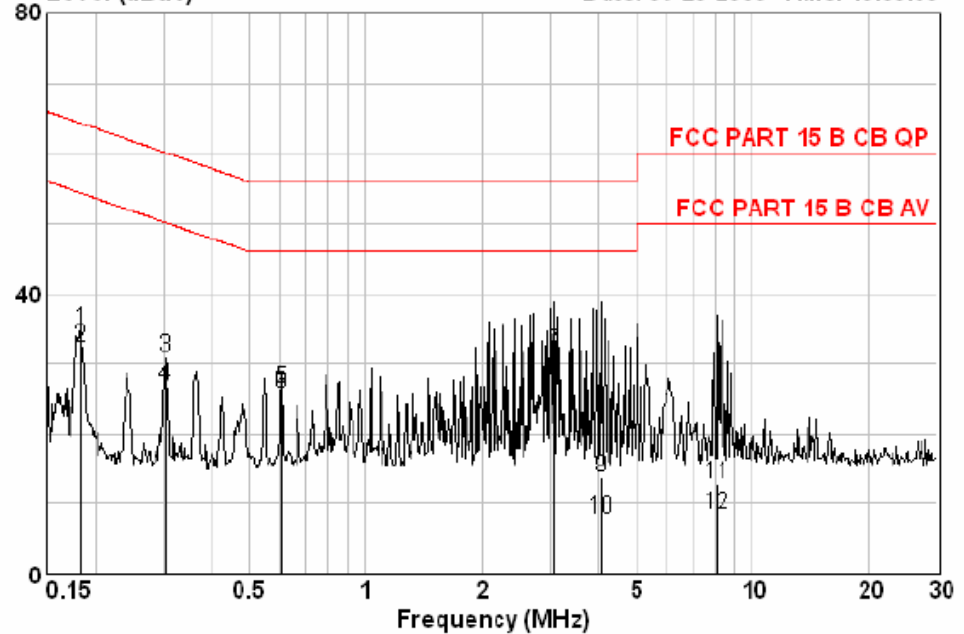
An initial pre-scan was performed on the live and neutral lines with peak detector.

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

The following Quasi-Peak and Average measurements were performed on the EUT on 15 June 2006:

Live Line:

Data: 3 File: F:\e3CE\Applc\ant\0091AV (CE) Zhongshan K-mate General Electri Date: 06-23-2006 Time: 10:33:33

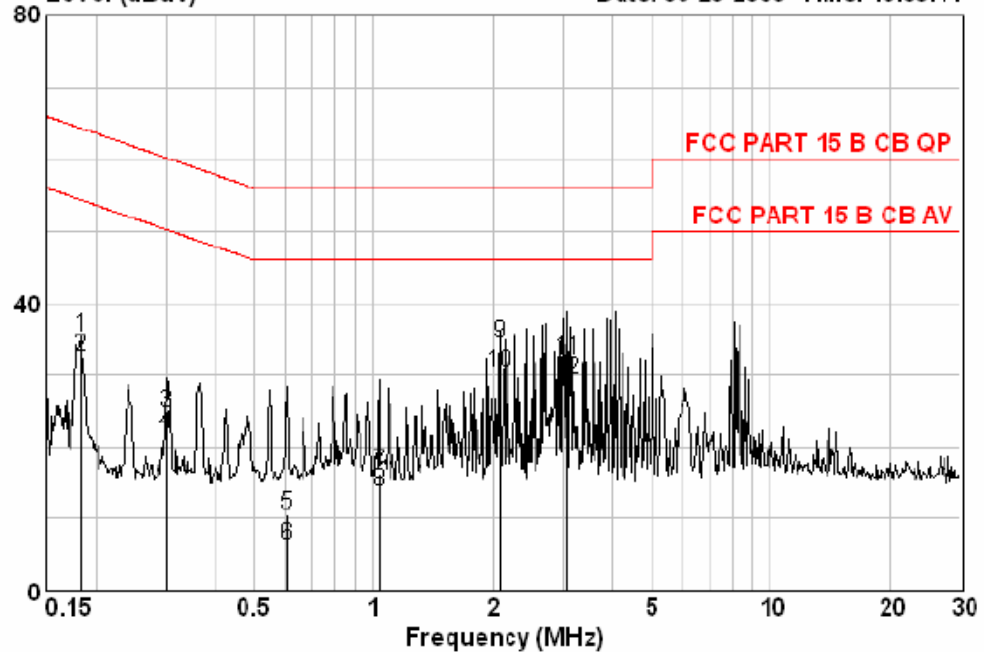


Site : sgs  
Condition : FCC PART 15 B CB QP LISN LINE LINE  
Job No.: : 0091AV  
Applicant: : Zhongshan K-mate General Electronic Co.,  
EUT: : Bluetooth Car Kit & Headset  
Model: : EH-5300  
Test mode: : Test in PC connection mode  
Remark: :

|     | Freq  | Read Level | Cable Loss | LISN Factor | Level | Limit Line | Over Limit | Remark  |
|-----|-------|------------|------------|-------------|-------|------------|------------|---------|
|     | MHz   | dBuV       | dB         | dB          | dBuV  | dBuV       | dB         |         |
| 1   | 0.182 | 34.82      | -0.09      | 0.07        | 34.80 | 64.37      | -29.57     | QP      |
| 2   | 0.182 | 32.39      | -0.09      | 0.07        | 32.37 | 54.37      | -22.00     | AVERAGE |
| 3   | 0.303 | 30.98      | -0.06      | 0.10        | 31.02 | 60.15      | -29.13     | QP      |
| 4   | 0.303 | 26.84      | -0.06      | 0.10        | 26.88 | 50.15      | -23.27     | AVERAGE |
| 5   | 0.604 | 26.34      | -0.03      | 0.04        | 26.36 | 56.00      | -29.64     | QP      |
| 6   | 0.604 | 25.62      | -0.03      | 0.04        | 25.64 | 46.00      | -20.36     | AVERAGE |
| 7   | 3.090 | 31.62      | 0.05       | 0.05        | 31.72 | 56.00      | -24.28     | QP      |
| 8 ! | 3.090 | 29.52      | 0.05       | 0.05        | 29.62 | 46.00      | -16.38     | AVERAGE |
| 9   | 4.049 | 13.66      | 0.06       | 0.08        | 13.80 | 56.00      | -42.20     | QP      |
| 10  | 4.049 | 7.67       | 0.06       | 0.08        | 7.81  | 46.00      | -38.19     | AVERAGE |
| 11  | 8.105 | 12.66      | 0.09       | 0.17        | 12.92 | 60.00      | -47.08     | QP      |
| 12  | 8.105 | 8.12       | 0.09       | 0.17        | 8.38  | 50.00      | -41.62     | AVERAGE |

Neutral Line

Data: 4 File: File3CE\Applcant\0091AV (CE) Zhongshan K-mate General Electri  
Level (dBuV) Date: 06-23-2006 Time: 10:38:11



Site : sgs  
Condition : FCC PART 15 B CB QP LISN NEUTRAL NEUTRAL  
Job No.: : 0091AV  
Applicant: : Zhongshan K-mate General Electronic Co.,  
EUT: : Bluetooth Car Kit & Headset  
Model: : EH-5300  
Test mode: : Test in PC connection mode  
Remark: :

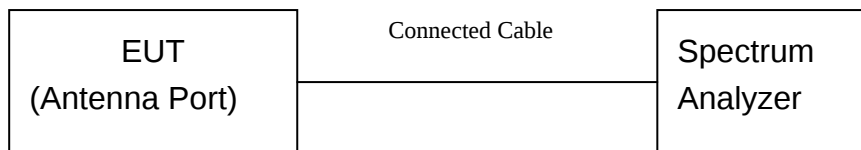
|      | Freq  | Read Level | Cable Loss | LISN Factor | Level | Limit Line | Over Limit | Remark  |
|------|-------|------------|------------|-------------|-------|------------|------------|---------|
|      | MHz   | dBuV       | dB         | dB          | dBuV  | dBuV       | dB         |         |
| 1    | 0.182 | 35.26      | -0.09      | 0.10        | 35.27 | 64.37      | -29.10     | QP      |
| 2    | 0.182 | 32.58      | -0.09      | 0.10        | 32.59 | 54.37      | -21.78     | AVERAGE |
| 3    | 0.302 | 24.84      | -0.06      | 0.10        | 24.88 | 60.19      | -35.31     | QP      |
| 4    | 0.302 | 21.73      | -0.06      | 0.10        | 21.77 | 50.19      | -28.42     | AVERAGE |
| 5    | 0.604 | 10.62      | -0.03      | 0.04        | 10.64 | 56.00      | -45.36     | QP      |
| 6    | 0.604 | 6.08       | -0.03      | 0.04        | 6.10  | 46.00      | -39.90     | AVERAGE |
| 7    | 1.032 | 16.18      | 0.00       | 0.10        | 16.28 | 56.00      | -39.72     | QP      |
| 8    | 1.032 | 13.63      | 0.00       | 0.10        | 13.73 | 46.00      | -32.27     | AVERAGE |
| 9    | 2.077 | 34.32      | 0.03       | 0.00        | 34.35 | 56.00      | -21.65     | QP      |
| 10 ! | 2.077 | 30.22      | 0.03       | 0.00        | 30.25 | 46.00      | -15.75     | AVERAGE |
| 11   | 3.090 | 32.16      | 0.05       | 0.00        | 32.21 | 56.00      | -23.79     | QP      |
| 12   | 3.090 | 29.25      | 0.05       | 0.00        | 29.30 | 46.00      | -16.70     | AVERAGE |

### 6.3 Maximum Peak Output Power

Test Requirement: FCC Part15 C  
 Test Method: Base on ANSI 63.4.  
 Test Date: 14 June 2006  
 Test Limit: Regulation 15.247 (b) The Limit of Maximum Peak Output Power 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.

Test mode: Test in transmitting mode: Channel 0, Channel 39, Channel 78.

#### 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 = 1 MHz, VBW = 1 MHz, Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max. reading.

#### Test Result:

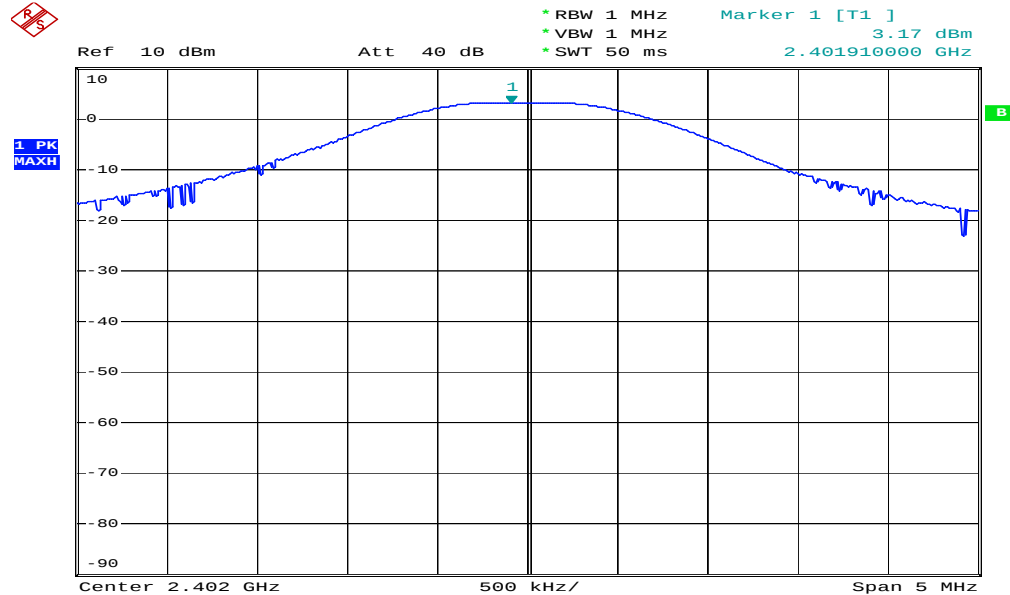
| Test Channel | Fundamental Frequency (GHz) | Reading Power (dBm) | Cable Loss (dB) | Output Power (dBm) | Limit (dBm) | PASS/FAIL |
|--------------|-----------------------------|---------------------|-----------------|--------------------|-------------|-----------|
| 0            | 2.402                       | 3.17                | 0.30            | 3.47               | 30.0        | Pass      |
| 39           | 2.441                       | 2.65                | 0.30            | 2.95               | 30.0        | Pass      |
| 78           | 2.480                       | 2.50                | 0.30            | 2.80               | 30.0        | Pass      |

**TEST RESULTS:** The unit does meet the FCC requirements.



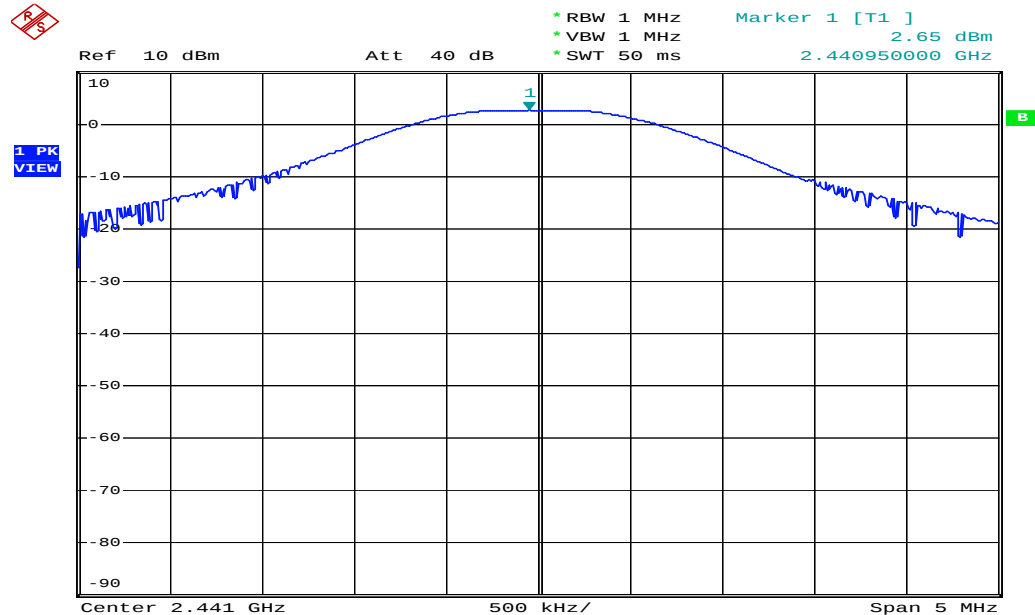
Max. Power Output Data Plot:

1. Lowest Channel:



Date: 14.JUN.2006 19:04:37

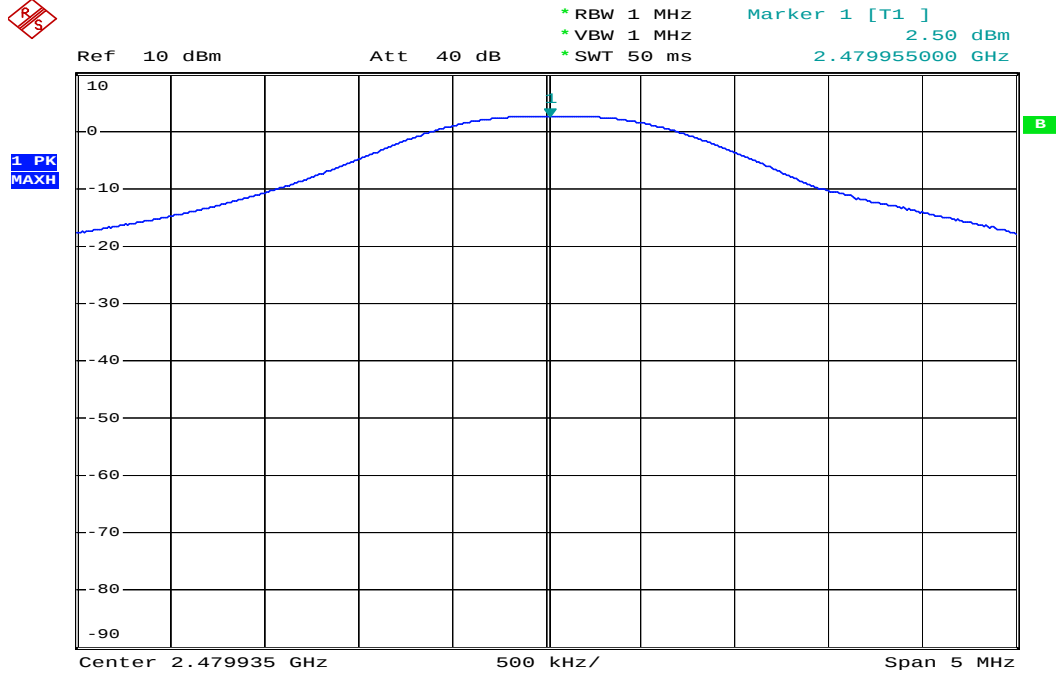
2. Medium Channel:



Date: 14.JUN.2006 19:03:26



### 3. Highest Channel:



Date: 14.JUN.2006 18:57:29



#### **6.4 Conducted Spurious Emissions**

Test Requirement: FCC Part 15 C

Test Method: Based on FCC Part15 C Section 15.247:

Test Date: 14 June 2006

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.

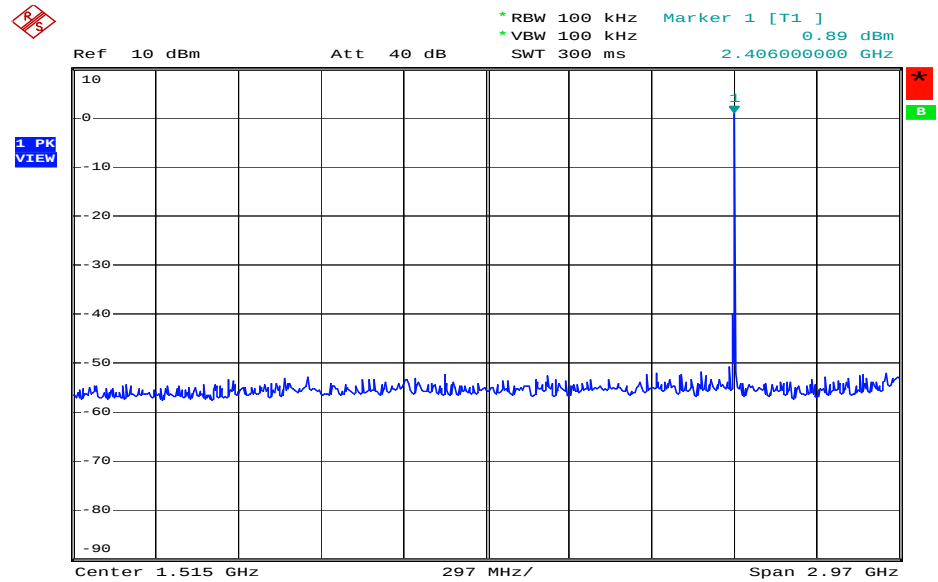
Test Procedure:

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  $\geq$  RBW (set 100KHz), Sweep = auto; Detector Function = Peak (Max. hold).

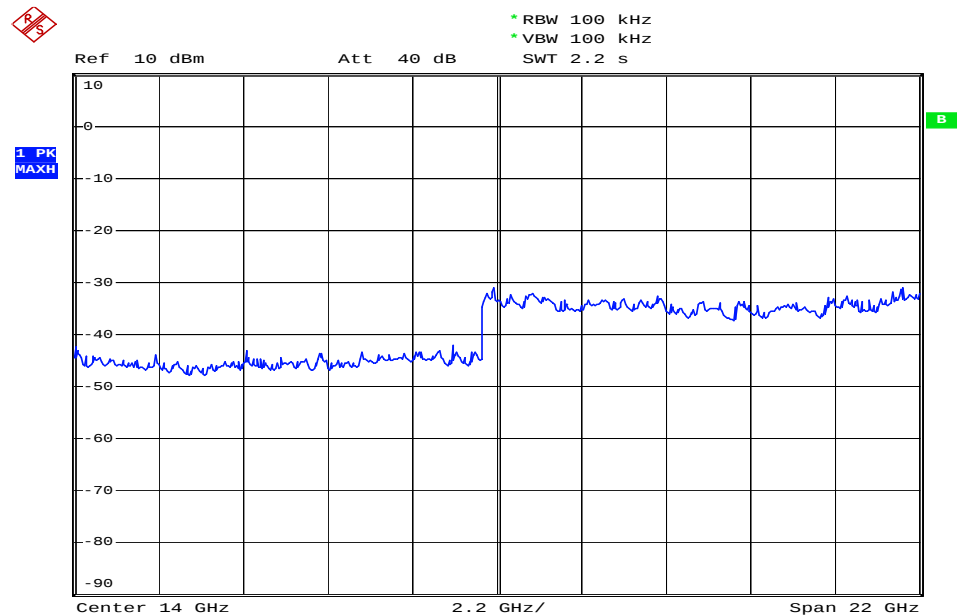
**Test result:**



Lowest Channel (channel 0)



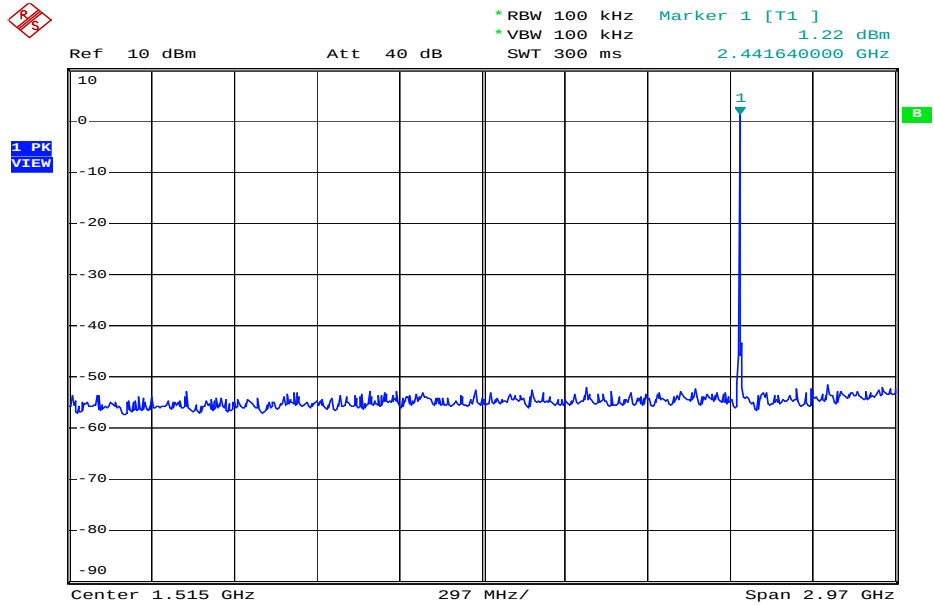
Date: 14.JUN.2006 19:24:53



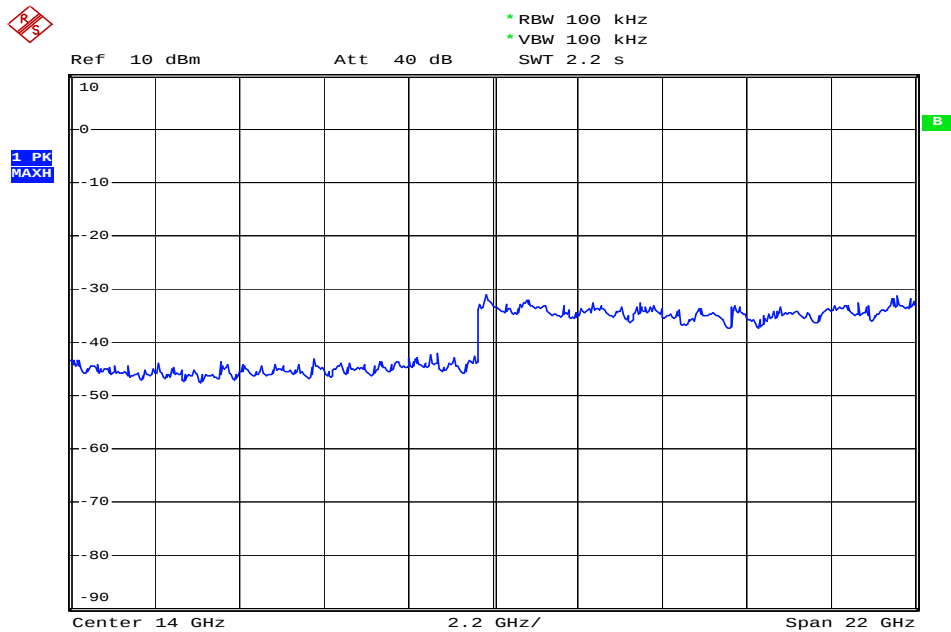
Date: 14.JUN.2006 19:17:55



Medium Channel (channel 39)



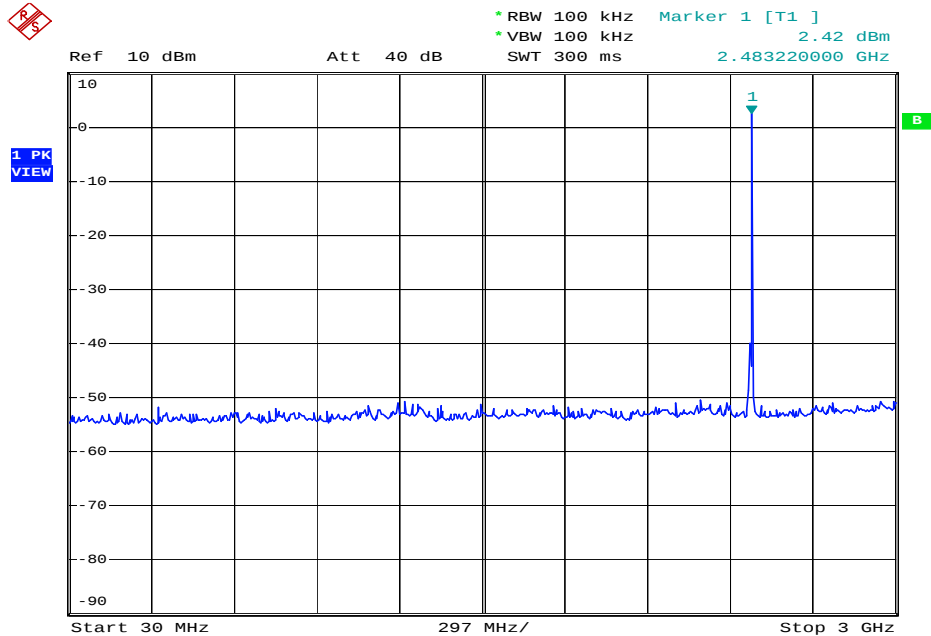
Date: 14.JUN.2006 19:21:18



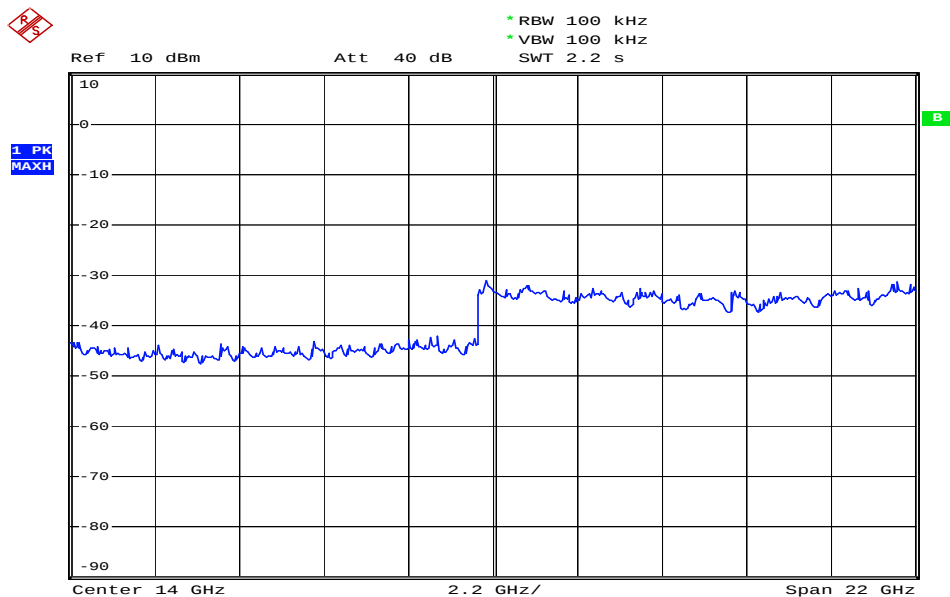
Date: 14.JUN.2006 19:17:29



Highest Channel (channel 78)



Date: 14.JUN.2006 19:15:04



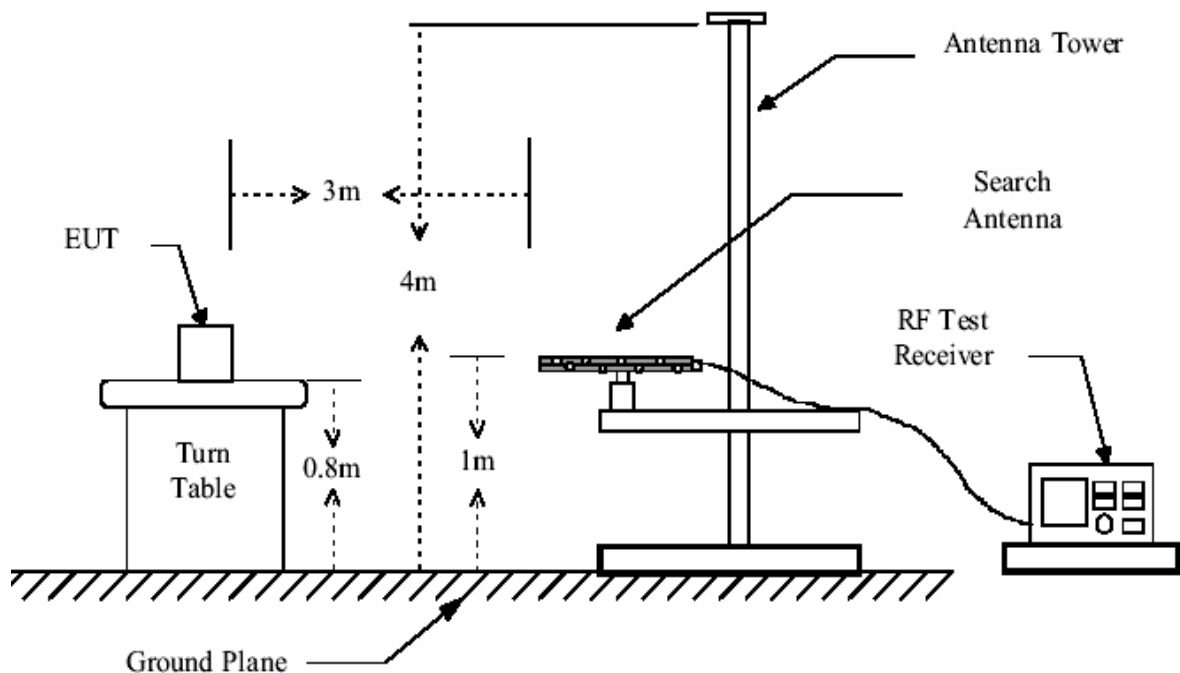
Date: 14.JUN.2006 19:17:29

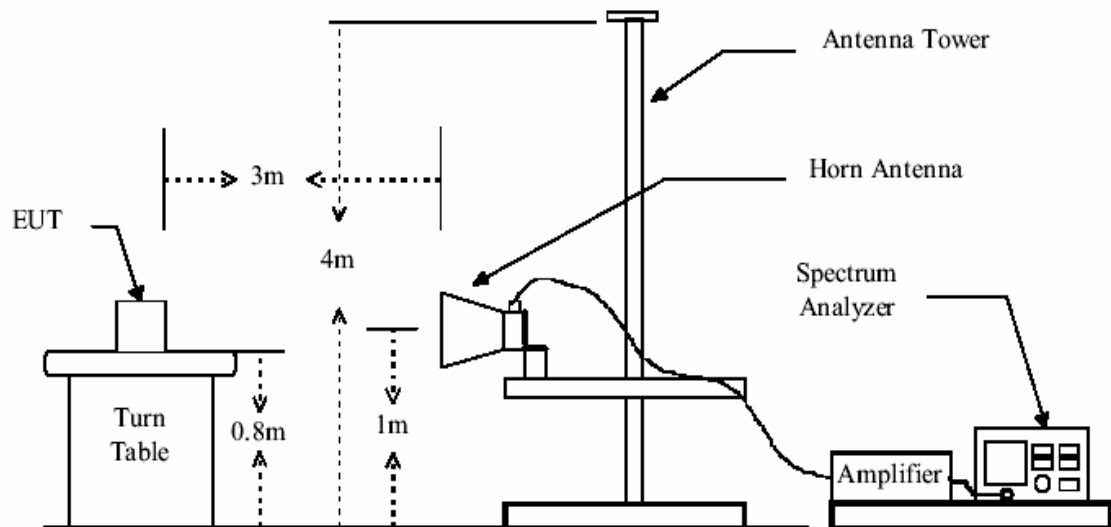
## 6.5 Radiated Spurious Emissions

Test Requirement: FCC 15.209 & FCC 15.109  
Test Method: ANSI C63.4 section 8 & 13  
Test Date: 15 June 2006  
Measurement Distance: 3m (Semi-Anechoic Chamber and OATS)  
Frequency range 30 MHz – 25GHz for transmitting mode.  
Test instrumentation resolution bandwidth 120 kHz (30 MHz - 1000 MHz)  
1 MHz (1000 MHz – 25GHz)  
Receive antenna scan height 1 m - 4 m, polarization Vertical / Horizontal

Limit:  
40.0 dB $\mu$ V/m between 30MHz & 88MHz  
43.5 dB $\mu$ V/m between 88MHz & 216MHz  
46.0 dB $\mu$ V/m between 216MHz & 960MHz  
54.0 dB $\mu$ V/m zbove 960MHz

### Test Configuration:





**Test Procedure:** The procedure used was ANSI Standard C63.4-2001. 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.

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

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Peramlifer Factor

The following test results were performed on the EUT

### 6.5.1 Harmonics Emissions

Test in Channel 0 in transmitting status:

Harmonics & Spurious Emissions

| Peak Measurement           |                          |            |                    |             |            |  |
|----------------------------|--------------------------|------------|--------------------|-------------|------------|--|
| Test<br>Frequency<br>(GHz) | Measuring Level (dBuV/m) |            | Limits<br>(dBuV/m) | Margin (dB) |            |  |
|                            | Vertical                 | Horizontal |                    | Vertical    | Horizontal |  |
| 2) 4.804                   | 40.8                     | 41.2       | 74.0               | 33.2        | 32.8       |  |
| 3) 7.206                   | 42.6                     | 40.7       | 74.0               | 31.4        | 33.3       |  |
| 4) 9.608                   | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 5) 12.010                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 6) 14.412                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 7) 16.814                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 8) 19.216                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 9) 21.618                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 10) 24.020                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| Average Measurement        |                          |            |                    |             |            |  |
| 2) 4.804                   | 31.0                     | 32.2       | 54.0               | 23.0        | 21.8       |  |
| 3) 7.206                   | 30.2                     | 33.7       | 54.0               | 23.8        | 20.3       |  |
| 4) 9.608                   | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 5) 12.010                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 6) 14.412                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 7) 16.814                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 8) 19.216                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 9) 21.618                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 10) 24.020                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |

N/A: refer to remark 1).

**Test in Channel 39 in transmitting status:**

Harmonics & Spurious Emissions:

| Peak Measurement           |                          |            |                    |             |            |  |
|----------------------------|--------------------------|------------|--------------------|-------------|------------|--|
| Test<br>Frequency<br>(GHz) | Measuring Level (dBuV/m) |            | Limits<br>(dBuV/m) | Margin (dB) |            |  |
|                            | Vertical                 | Horizontal |                    | Vertical    | Horizontal |  |
| 11) 4.882                  | 40.8                     | 41.2       | 74.0               | 33.2        | 32.8       |  |
| 12) 7.323                  | 42.6                     | 40.7       | 74.0               | 31.4        | 33.3       |  |
| 13) 9.764                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 14) 12.205                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 15) 14.646                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 16) 17.087                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 17) 19.528                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 18) 21.969                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 19) 24.410                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| Average Measurement        |                          |            |                    |             |            |  |
| 11) 4.882                  | 31.5                     | 32.5       | 54.0               | 22.5        | 21.5       |  |
| 12) 7.323                  | 30.3                     | 33.2       | 54.0               | 23.7        | 20.8       |  |
| 13) 9.764                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 14) 12.205                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 15) 14.646                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 16) 17.087                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 17) 19.528                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 18) 21.969                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 19) 24.410                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |

N/A: refer to remark 1).

**Test in Channel 78 in transmitting status:**

Harmonics & Spurious Emissions:

| Peak Measurement           |                          |            |                    |             |            |  |
|----------------------------|--------------------------|------------|--------------------|-------------|------------|--|
| Test<br>Frequency<br>(GHz) | Measuring Level (dBuV/m) |            | Limits<br>(dBuV/m) | Margin (dB) |            |  |
|                            | Vertical                 | Horizontal |                    | Vertical    | Horizontal |  |
| 20) 4.960                  | 39.2                     | 41.5       | 74.0               | 34.8        | 32.3       |  |
| 21) 7.440                  | 42.0                     | 40.2       | 74.0               | 32.0        | 33.8       |  |
| 22) 9.920                  | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 23) 12.400                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 24) 14.880                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 25) 17.360                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 26) 19.840                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 27) 22.320                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| 28) 24.800                 | N/A                      | N/A        | 74.0               | N/A         | N/A        |  |
| Average Measurement        |                          |            |                    |             |            |  |
| 20) 4.960                  | 31.0                     | 32.2       | 54.0               | 23.0        | 21.8       |  |
| 21) 7.440                  | 30.2                     | 33.7       | 54.0               | 23.8        | 20.3       |  |
| 22) 9.920                  | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 23) 12.400                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 24) 14.880                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 25) 17.360                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 26) 19.840                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 27) 22.320                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |
| 28) 24.800                 | N/A                      | N/A        | 54.0               | N/A         | N/A        |  |

N/A: refer to remark 1).



**Remark:**

- 1). N/A: 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 3rd harmonic.
- 2). According to 15.249 (d) As shown in 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.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

**TEST RESULTS:** The unit does meet the FCC requirements.

### 6.5.2 Other Radiated Spurious Emissions.

Test Requirement: FCC Part15 Section 15.109  
 Test Method: Based on FCC Part15 B  
 Measurement Distance: 3m  
 Limit:  
     40.0 dB $\mu$ V/m between 30MHz & 88MHz  
     43.5 dB $\mu$ V/m between 88MHz & 216MHz  
     46.0 dB $\mu$ V/m between 216MHz & 960MHz  
     54.0 dB $\mu$ V/m above 960MHz  
 Detector: Peak for pre-scan, 120kHz resolution bandwidth within 1GHz,  
                     1MHz resolution bandwidth above 1GHz  
                     Quasi-Peak if maximised peak within 6dB of limit

Pre-test in (1).Charging mode including with USB line charging and (2)Car kit Charging and hand free mode.  
 Completely test in the worse case: Charging by PC USB port.  
 The following measurement result were performed on the EUT:

| Frequency (Hz) | Antenna Polarization | Emission Level (dB $\mu$ V/m) | Limit dB $\mu$ V/m) | Margin (dB) |
|----------------|----------------------|-------------------------------|---------------------|-------------|
| 141.550        | Vertical             | 27.7                          | 43.5                | 15.8        |
| 448.070        | Vertical             | 35.0                          | 46.0                | 11.0        |
| 564.470        | Vertical             | 34.0                          | 46.0                | 12.0        |
| 644.010        | Vertical             | 34.8                          | 46.0                | 11.2        |
| 731.112        | Vertical             | 31.9                          | 46.0                | 14.1        |
| 797.685        | Vertical             | 30.2                          | 46.0                | 15.8        |
| 44.550         | Horizontal           | 24.8                          | 40.0                | 15.2        |
| 141.550        | Horizontal           | 23.0                          | 43.5                | 20.5        |
| 330.700        | Horizontal           | 24.9                          | 46.0                | 21.1        |
| 622.670        | Horizontal           | 33.8                          | 46.0                | 12.2        |
| 730.340        | Horizontal           | 31.5                          | 46.0                | 14.5        |
| 815.700        | Horizontal           | 33.2                          | 46.0                | 12.8        |

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

**TEST RESULTS: The unit does meet the FCC requirements**



## **6.6 Band Edges Requirement**

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Test Method:      | Based on FCC Part15 C Section 15.247:<br>Operation within the band 2400 – 2483.5 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test Date:        | 14 June 2006                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Requirements:     | Section 15.247 (c) 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. 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)). |

### **6.6.1 100 kHz Bandwidth Outside the Frequency Band**

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

#### **Test Result:**

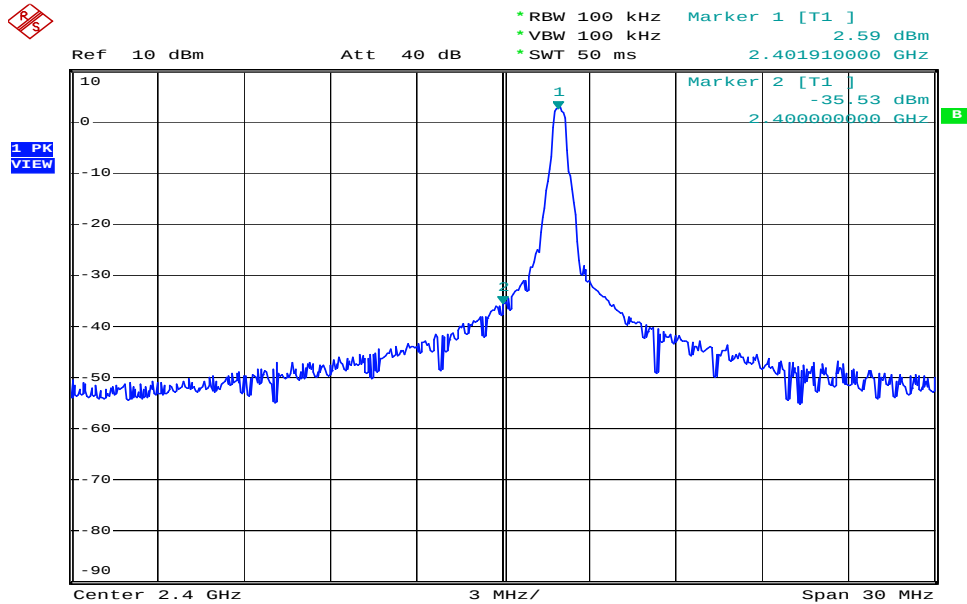
The Lower Edges: the value is -35.53dBm that is attenuated more than 20dB.

The Upper Edges: the value is -41.73dBm that is attenuated more than 20dB.

#### **The unit does meet the FCC requirements**

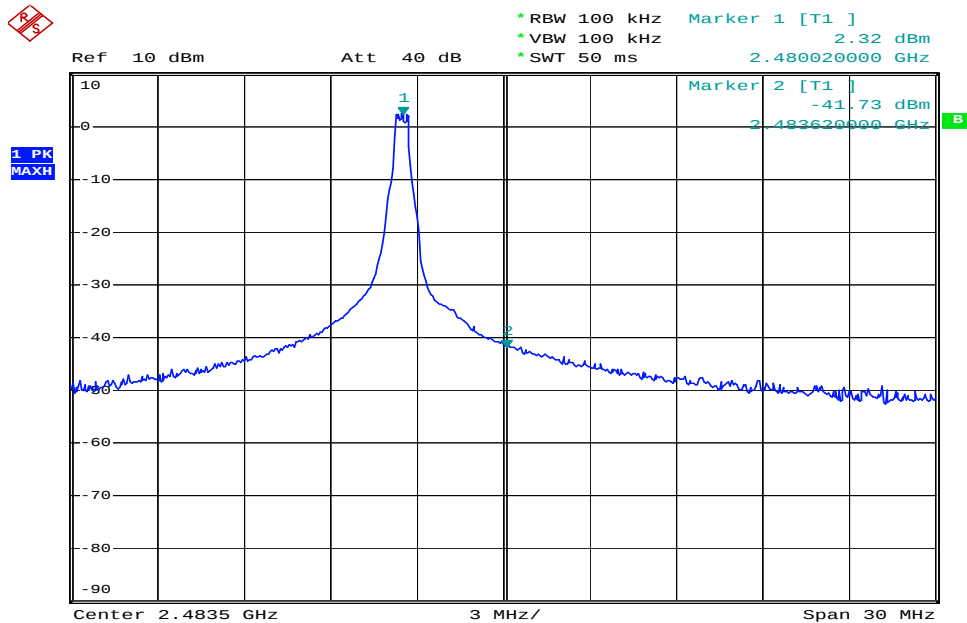
The graph as below, represents the emissions take for this device.

1. For Lower Channel: the fundamental frequency is **2.402G Hz.**



Date: 14.JUN.2006 19:08:40

2. For Upper Channel: the fundamental frequency is **2.481GHz.**



Date: 14.JUN.2006 19:10:01

## 6.6.2 Radiated Emissions which fall in the restricted bands

**Test Requirement:** Section 15.247 (c) 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:** Base on ANSI 63.4.

**Test Date:** 15 June 2006

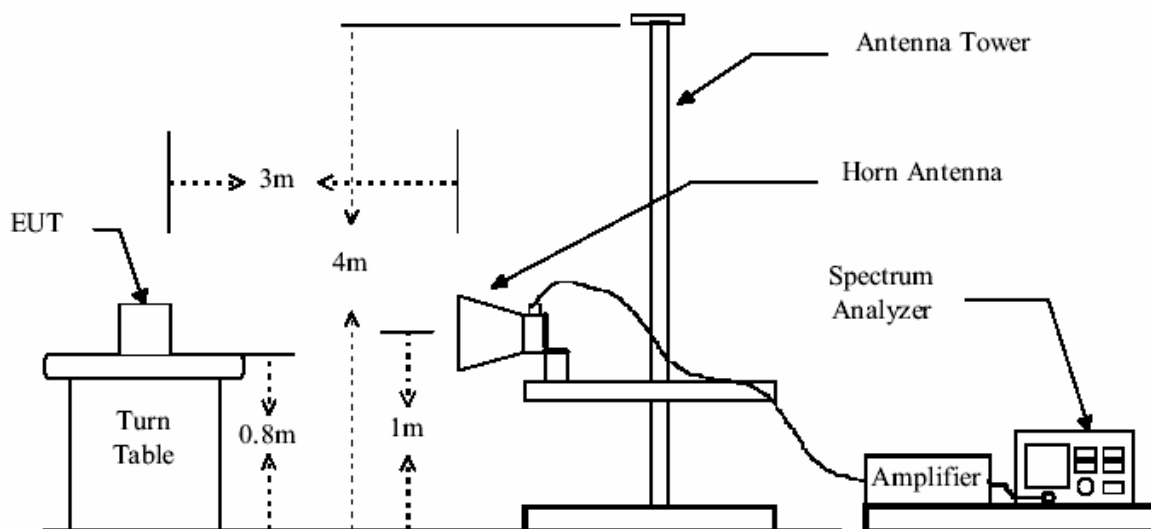
**Measurement Distance:** 3m (Semi-Anechoic Chamber)

**Limit:**

- 40.0 dB $\mu$ V/m between 30MHz & 88MHz
- 43.5 dB $\mu$ V/m between 88MHz & 216MHz
- 46.0 dB $\mu$ V/m between 216MHz & 960MHz
- 54.0 dB $\mu$ V/m above 960MHz

**Detector:** Peak for pre-scan , 120kHz resolution bandwidth within 1GHz,  
1MHz resolution bandwidth above 1GHz

### Test Configuration:



**Test Procedure:** The procedure used was ANSI Standard C63.4-2003. 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.

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

**Test Result:**

**1. Channel 0 ( 2.402GHz)**

| Test Frequency (MHz) | Peak Level (dBuV/m) | Average Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) |      |
|----------------------|---------------------|------------------------|---------------------|------------------------|-------------|------|
|                      |                     |                        |                     |                        | Peak        | AV   |
| 2390.000             | 45.4                | 36.0                   | 74.0                | 54.0                   | 28.6        | 18.0 |
| 2483.500             | 46.2                | 38.0                   | 74.0                | 54.0                   | 27.8        | 16.0 |

**2. Channel 39 ( 2.441GHz)**

| Test Frequency (MHz) | Peak Level (dBuV/m) | Average Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) |      |
|----------------------|---------------------|------------------------|---------------------|------------------------|-------------|------|
|                      |                     |                        |                     |                        | Peak        | AV   |
| 2390.000             | 44.8                | 36.0                   | 74.0                | 54.0                   | 29.2        | 18.0 |
| 2483.500             | 47.2                | 38.2                   | 74.0                | 54.0                   | 26.8        | 15.8 |

**3. Channel 79 ( 2.480GHz)**

| Test Frequency (MHz) | Peak Level (dBuV/m) | Average Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) |      |
|----------------------|---------------------|------------------------|---------------------|------------------------|-------------|------|
|                      |                     |                        |                     |                        | Peak        | AV   |
| 2390.000             | 45.0                | 35.9                   | 74.0                | 54.0                   | 29.0        | 18.1 |
| 2483.500             | 46.8                | 38.5                   | 74.0                | 54.0                   | 27.2        | 15.5 |

The unit does meet the FCC requirements.



Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) 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       |
| <sup>1</sup> 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 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2655 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |
| 13.36 - 13.41              |                       |                 |                  |

## 6.7 Hopping Channel Number

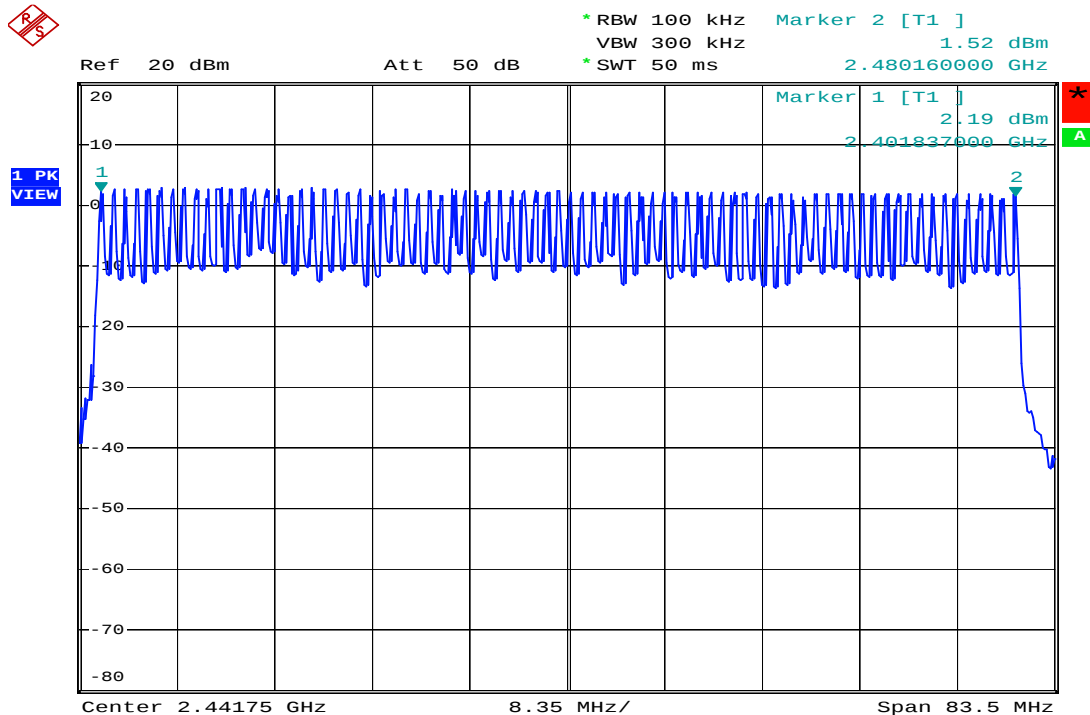
|                   |                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part15 C                                                                                                                          |
| Test Method:      | Based on FCC Part15 C Section 15.247                                                                                                  |
| Test Date:        | 23 May 2006                                                                                                                           |
| Requirements:     | Regulation 15.247 (b) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels. |

### 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 = 100KHz, Sweep = auto; Detector Function = Peak.
3. Set the spectrum analyzer: start frequency = 2400MHz, stop frequency = 2483.5MHz. Record the max. hold reading graph.

### Test result:

Total channels are 79 channels, channel 0 to channel 78.



Date: 23.MAY.2006 17:56:55

## 6.8 Occupied Bandwidth

Test Requirement: FCC Part 15 C  
 Test Method: Based on FCC Part15 C Section 15.247:  
 Test Date: 14 June 2006  
 Test requirements: (a) Operation under the provisions of this Section is limited to frequency hopping and direct sequence spread spectrum intentional radiators that comply with the following provisions: (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.

### Test Procedure:

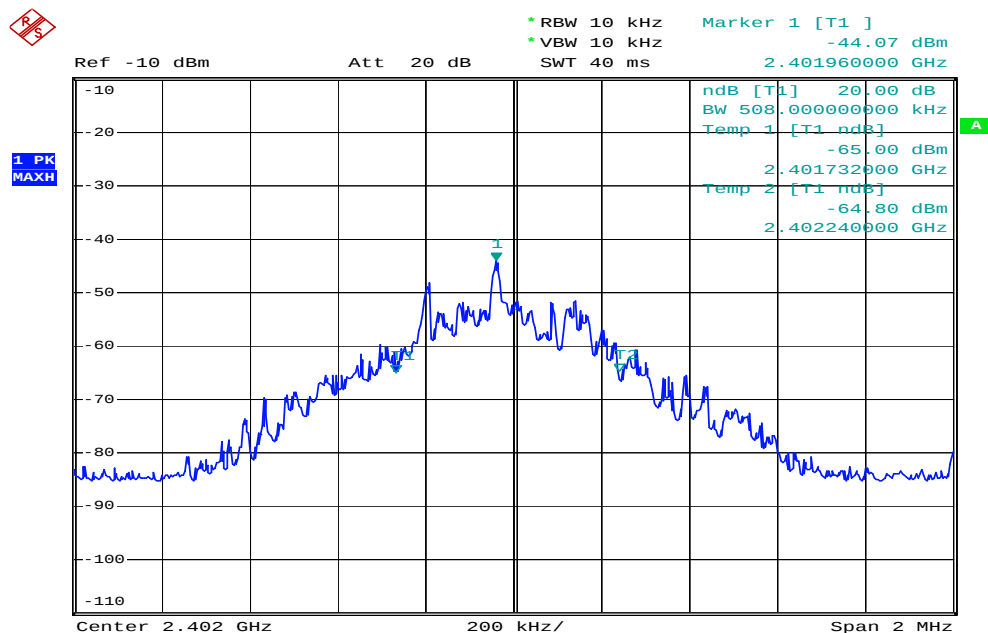
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW  $\geq$  1% of the 20dB bandwidth (set 10KHz), VBW  $\geq$  RBW (set 10KHz), Span = 3MHz, Sweep = auto; Detector Function = Peak (Max. hold).
3. Mark the peak frequency and -20dBm.

### Test result:

| Test Channel | 20 dB bandwidth | PASS/FAIL |
|--------------|-----------------|-----------|
| 0            | 508KHz          | Pass      |
| 39           | 516KHz          | Pass      |
| 78           | 474KHz          | Pass      |

The unit does meet the FCC requirements.

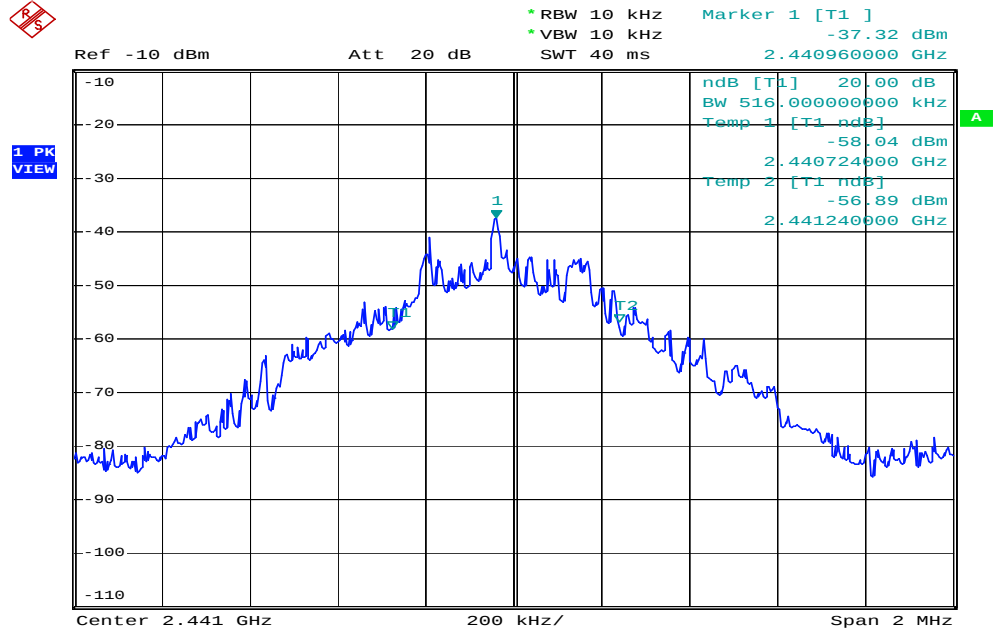
Please refer the graph as below: Lowest Channel ( 20 dB Bandwidth)



Date: 14.JUN.2006 18:02:09

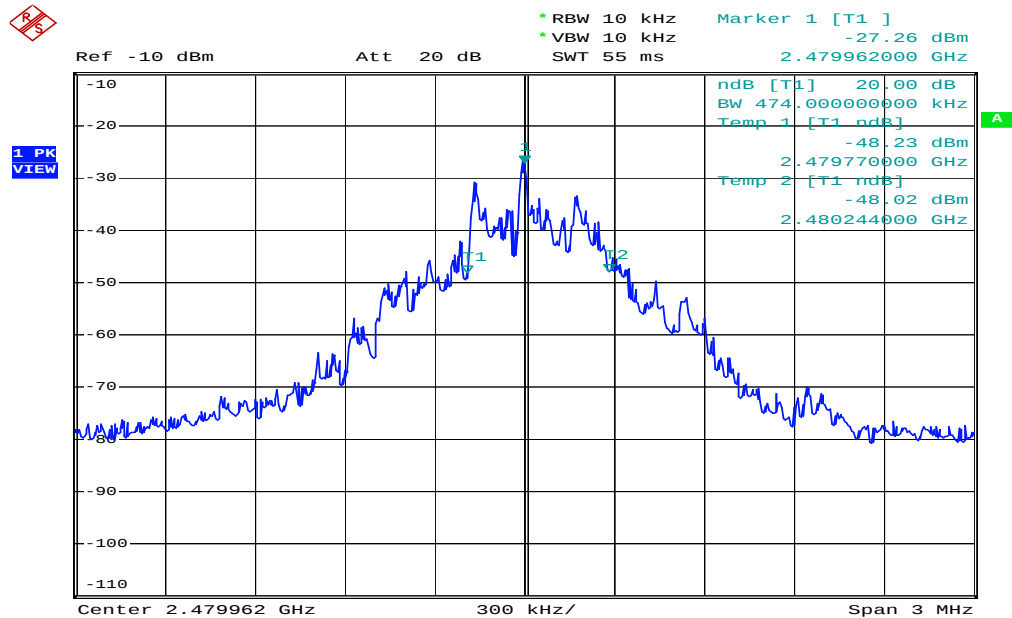


Medium Channel (20 dB Bandwidth)



Date: 14.JUN.2006 17:59:41

Highest Channel (20 dB Bandwidth)



Date: 14.JUN.2006 17:38:51

## 6.9 Carrier Frequencies Separated

Test Requirement: FCC Part 15 C  
 Test Method: Based on FCC Part15 C Section 15.247:  
 Test Date: 23 and 29 May 2006  
 Test requirements: (a) 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.

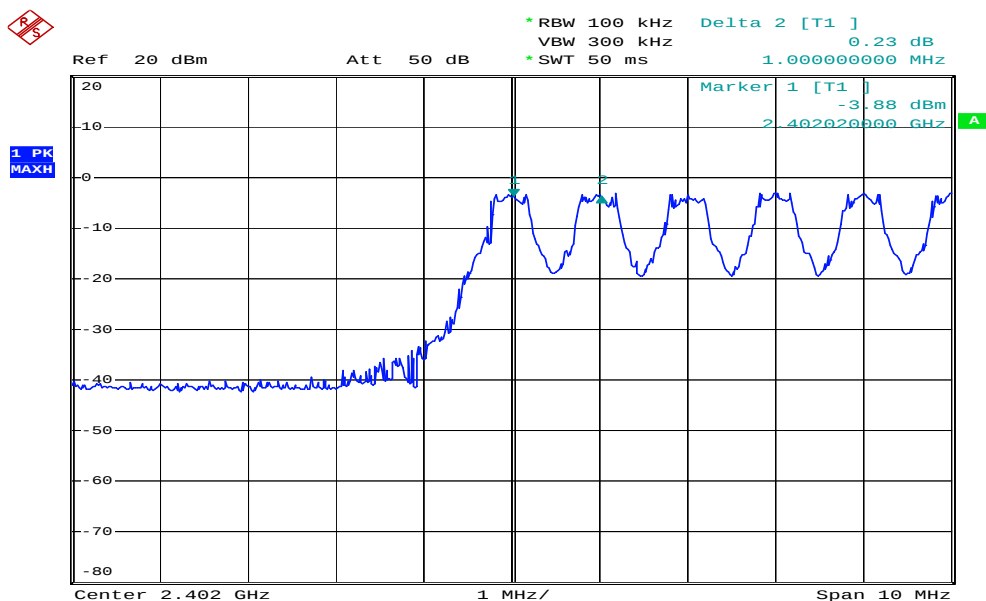
Test Procedure:

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 100KHz), VBW  $\geq$  RBW (set 300KHz), Span = 10MHz, Sweep = auto; Detector Function = Peak (Max. hold).
3. Mark the peak frequency and -20dBm.

Test result:

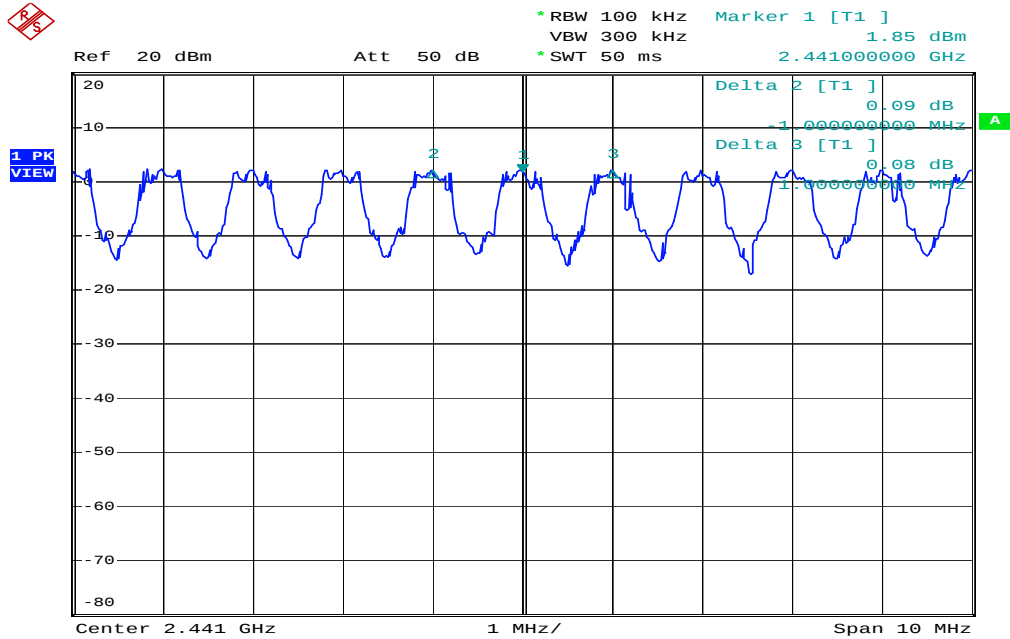
| Test Channel                                   | Carrier Frequencies Separated | PASS/FAIL |
|------------------------------------------------|-------------------------------|-----------|
| Lower Channels<br>(channel 0 and channel 1)    | 1.0MHz                        | Pass      |
| Middle Channels<br>(channel 39 and channel 40) | 1.0MHz                        | Pass      |
| Upper Channels<br>(channel 77 and channel 78)  | 1.0MHz                        | Pass      |

### 1. Lower Channels: Carrier Frequencies Separated



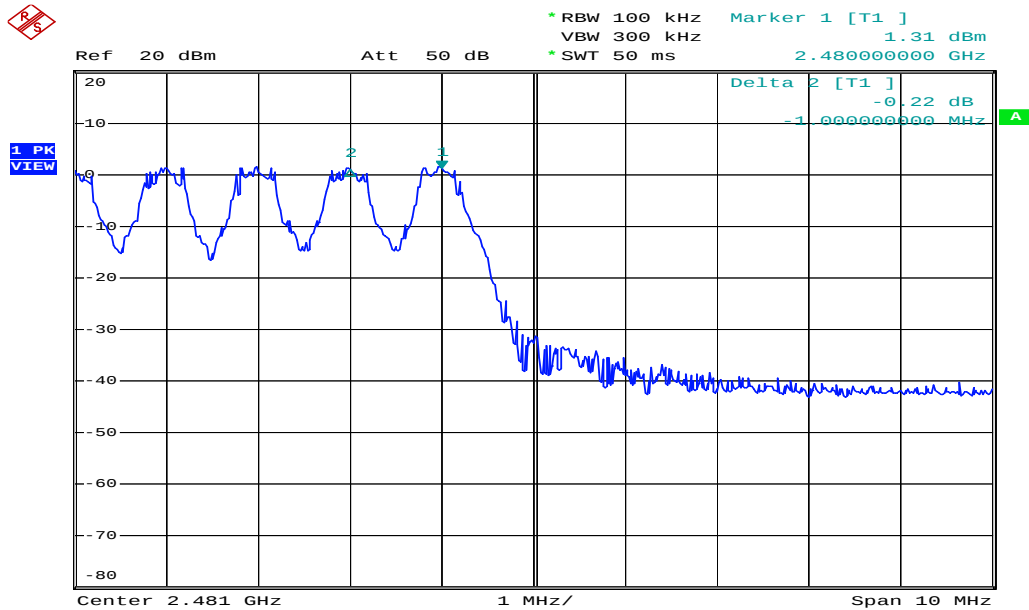
Date: 23.MAY.2006 18:09:12

## 2. Middle Channels: Carrier Frequencies Separated



Date: 29.MAY.2006 11:19:19

## 3. Upper Channels: Carrier Frequencies Separated



Date: 29.MAY.2006 11:24:38

## 6.10 Dwell Time

Test Requirement: FCC Part 15 C  
Test Method: Based on FCC Part 15 C Section 15.247:  
Test Date: 14 June 2006

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

### 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 RBW of spectrum analyzer to 1MHz and VBW of spectrum analyzer to 1MHz , Set the test channel frequency span to 0.

### Test Result:

The test period:  $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

#### 1. Channel 0: 2.402GHz

DH1 time slot =  $0.440 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 140.800 \text{ ms}$

DH3 time slot =  $1.690 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 270.400 \text{ ms}$

DH5 time slot =  $2.950 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 314.667 \text{ ms}$

#### 2. Channel 39: 2.441GHz

DH1 time slot =  $0.440 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 140.800 \text{ ms}$

DH3 time slot =  $1.690 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 270.400 \text{ ms}$

DH5 time slot =  $2.930 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 312.533 \text{ ms}$

#### 3. Channel 78: 2.4835GHz

DH1 time slot =  $0.448 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 143.360 \text{ ms}$

DH3 time slot =  $1.690 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 270.400 \text{ ms}$

DH5 time slot =  $2.938 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 313.387 \text{ ms}$

The results are not be greater than 0.4 seconds.

**The unit does meet the FCC requirements.**



## **6.11 Antenna Requirement**

### **6.11.1 Standard Applicable**

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.

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 3dB that the directional gain of the antenna exceeds 6 dBi.

### **6.11.2 Antenna Construction**

The antenna is integrated on the main PCB and no consideration of replacement.