



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

**Wireless LAN USB Dongle**

**Model: AWUG2407**

**Trade Name: AsiaRF**

*Issued to*

**AsiaRF Ltd.**

**4F., No. 2, Lane 560, Zhongzheng Rd.,  
Xindian City, Taipei County 231, Taiwan**

*Issued by*



**Compliance Certification Services Inc.**  
No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,  
Taoyuan Hsien, (338) Taiwan, R.O.C.  
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[service@tw.ccsemc.com](mailto:service@tw.ccsemc.com)



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# 1. TEST RESULT CERTIFICATION

**Applicant:** AsiaRF Ltd.  
 4F., No. 2, Lane 560, Zhongzheng Rd.,  
 Xindian City, Taipei County 231, Taiwan

**Equipment Under Test:** Wireless LAN USB Dongle

**Trade Name:** AsiaRF

**Model:** AWUG2407

**Date of Test:** July 31 ~ August 1, 2006

| APPLICABLE STANDARDS         |                         |
|------------------------------|-------------------------|
| STANDARD                     | TEST RESULT             |
| FCC 47 CFR Part 15 Subpart C | No non-compliance noted |

### We hereby certify that:


The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

**Approved by:**

**Reviewed by:**

  
 \_\_\_\_\_  
 Jim Chang  
 Deputy Manager of Linkou Laboratory  
 Compliance Certification Services Inc.

  
 \_\_\_\_\_  
 Susan Su  
 Section Manager of Linkou Laboratory  
 Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

|                              |   |
|------------------------------|---|
| <b>Product</b>               | Wireless LAN USB Dongle   |
| <b>Trade Name</b>            | AsiaRF  |
| <b>Model Number</b>          | AWUG2407  |
| <b>Model Discrepancy</b>     | N/A   |
| <b>Power Supply</b>          | Powered from host device.   |
| <b>Frequency Range</b>       | 2412 ~ 2462 MHz   |
| <b>Transmit Power</b>        | IEEE 802.11b: 16.54 dBm<br>IEEE 802.11g: 13.67 dBm  |
| <b>Modulation Technique</b>  | IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) +<br>OFDM (QPSK, BPSK, 16-QAM, 64-QAM) |
| <b>Transmit Data Rate</b>    | IEEE 802.11b: 11, 5.5, 2, 1 Mbps<br>IEEE 802.11g: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps                      |
| <b>Number of Channels</b>    | 11 Channels   |
| <b>Antenna Specification</b> | HIGH GAIN OMNI ANTENNA INDOOR EXTENDING /<br>Gain: 5.0 dBi  |

**Remark:**

- 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
- 2. This submittal(s) (test report) is intended for FCC ID: TKZAWUG2407 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



### **3.5 DESCRIPTION OF TEST MODES**

The EUT (model: AWUG2407) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE802.11b mode:

Channel Low, Channel Mid and Channel High with 1Mbps data rate were chosen for full testing.

IEEE802.11g mode:

Channel Low, Channel Mid and Channel High with 6Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year.*

| Conducted Emissions Test Site |              |       |               |                 |
|-------------------------------|--------------|-------|---------------|-----------------|
| Name of Equipment             | Manufacturer | Model | Serial Number | Calibration Due |
| Spectrum Analyzer             | R&S          | FSP30 | 100112        | 09/12/2007      |

| Open Area Test Site # 3 |                                    |           |               |                 |
|-------------------------|------------------------------------|-----------|---------------|-----------------|
| Name of Equipment       | Manufacturer                       | Model     | Serial Number | Calibration Due |
| Spectrum Analyzer       | Agilent                            | E4411B    | MY41440314    | N.C.R           |
| Spectrum Analyzer       | R&S                                | FSP30     | 100112        | 09/12/2007      |
| EMI Test Receiver       | R&S                                | ESVS20    | 838804/004    | 01/18/2008      |
| Pre-Amplifier           | Anritsu                            | MH648A    | M18767        | 08/31/2007      |
| Pre-Amplifier           | Agilent                            | 8449B     | 3008A01738    | 03/30/2007      |
| Bilog Antenna           | SCHWAZBECK                         | VULB9163  | 144           | 03/31/2007      |
| Horn Antenna            | EMCO                               | 3115      | 00022250      | 04/24/2007      |
| Loop Antenna            | EMCO                               | 6502      | 2356          | N.C.R           |
| Turn Table              | Chance Most                        | CM-T003-1 | T807-6        | N.C.R           |
| Antenna Tower           | Chance Most                        | CM-A003-1 | A807-6        | N.C.R           |
| Controller              | CCS                                | CC-C-1F   | N/A           | N.C.R           |
| RF Switch               | ANRITSU                            | MP59B     | M53867        | N.C.R           |
| Site NSA                | CCS                                | N/A       | N/A           | 05/13/2007      |
| Test S/W                | LabVIEW 6.1 (CCS OATS EMI SW V2.4) |           |               |                 |

*Remark: The measurement uncertainty is less than +/- 4.5248dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

| Powerline Conducted Emissions Test Site |                                  |                 |               |                 |
|---|----------------------------------|-----------------|---------------|-----------------|
| Name of Equipment                       | Manufacturer                     | Model           | Serial Number | Calibration Due |
| EMI Test Receiver                       | R&S                              | ESCS30          | 847793/012    | 02/12/2007      |
| LISN                                    | EMCO                             | 3825/2          | 9003-1628     | 07/28/2007      |
| LISN                                    | R&S                              | ENV 4200        | 830326/016    | 03/28/2007      |
| Spectrum Analyzer                       | ADVANTEST                        | R3261AN         | 31720234      | N.C.R           |
| ISN                                     | FCC                              | FCC-TLISN-T4    | 20065         | 05/17/2007      |
| ISN                                     | FCC                              | FCC-TLISN-T8-02 | 20148         | 11/09/2007      |
| Test S/W                                | LabVIEW CCS conduction CON4 V1.0 |                 |               |                 |

*Remark: The measurement uncertainty is less than +/- 3.4508dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*





## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.







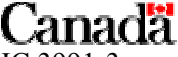
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

The test facilities used to perform Electromagnetic compatibility tests are registered or accredited by the organizations listed in the following table which includes the recognized scope specifically. This accredited organization maintains A2LA accreditation to ISO/IEC 17025 for the specific test listed in A2LA Certificate # 0824-01.

| Country | Agency          | Scope of Accreditation  | Logo   |
|---------|-----------------|---|--|
| USA     | A2LA            | EN 55011, EN 55014-1/2, CISPR 11, CISPR 14-1/2, EN 55022, EN 55015, CISPR 22, CISPR 15, AS/NZS 3548, VCCI V3 (2001), CFR 47, FCC Part 15/18, CNS 13783-1, CNS 13439, CNS 13438, CNS 13803, CNS 14115, EN 55024, IEC 801-2, IEC 801-3, IEC 801-4, IEC/EN 61000-3-2, IEC/EN 61000-3-3, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 50081-1/EN 61000-6-3, EN 50081-2/EN 61000-6-4, EN 50081-2/EN 61000-6-1: 2001 | <br>ACCREDITED<br>No. 0824-01   |
| USA     | FCC             | 3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements  | <br>93105, 90471  |
| Japan   | VCCI            | 3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements   | <br>R-393/2316/725/1868<br>C-402/747/912   |
| Norway  | NEMKO           | EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328-2, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2   | <br>ELA 124a<br>ELA 124b<br>ELA 124c  |
| Taiwan  | TAF             | EN 300 328-1, EN 300 328-2, EN 300 220-1, EN 300 220-2, EN 300 220-3, 47 CFR FCC Part 15 Subpart C, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 14115, CNS 13438, AS/NZS CISPR 22, CNS 13022-1, IEC 61000-4-2/3/4/5/6/8/11, CNS 13022-2/3   | <br>Testing Laboratory<br>0363  |
| Taiwan  | BSMI            | CNS 13438, CNS 13783-1, CNS 13439, CNS 14115  | <br>SL2-IS-E-0014 / IN-E-0014<br>/A1-E-0014 /R1-E-0014<br>/R2-E-0014 /L1-E-0014 |
| Canada  | Industry Canada | RSS212, Issue 1   | <br>IC 3991-3<br>IC 3991-4  |

**Note:** No part of this report may be used to claim or imply product endorsement by A2LA, TAF or other government agency.



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

| No. | Device Type    | Brand | Model     | Series No.  | FCC ID     | Data Cable | Power Cord   |
|-----|----------------|-------|-----------|-------------|------------|------------|--|
| 1.  | Notebook PC    | SONY  | PDG-6GFP  | J000YXJM    | FCC DOC    | N/A        | I/P:<br>Unshielded, 1.8m<br>O/P:<br>Unshielded, 1.8m |
| 2.  | AP<br>(Remote) | LEMEL | LM-RT210W | 12442028770 | H8N-RT210W | N/A        | Unshielded, 1.5m                                     |

**Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



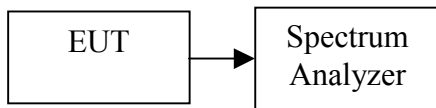
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6DB BANDWIDTH

#### LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

#### Test Configuration



#### TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = RBW, Span = 20 MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

##### Test mode: IEEE 802.11b

| Channel | Frequency (MHz) | Bandwidth (kHz) | Limit (kHz) | Result |
|---------|-----------------|-----------------|-------------|--------|
| Low     | 2412            | 8600            | >500        | PASS   |
| Mid     | 2437            | 9200            |             | PASS   |
| High    | 2462            | 9100            |             | PASS   |

##### Test mode: IEEE 802.11g

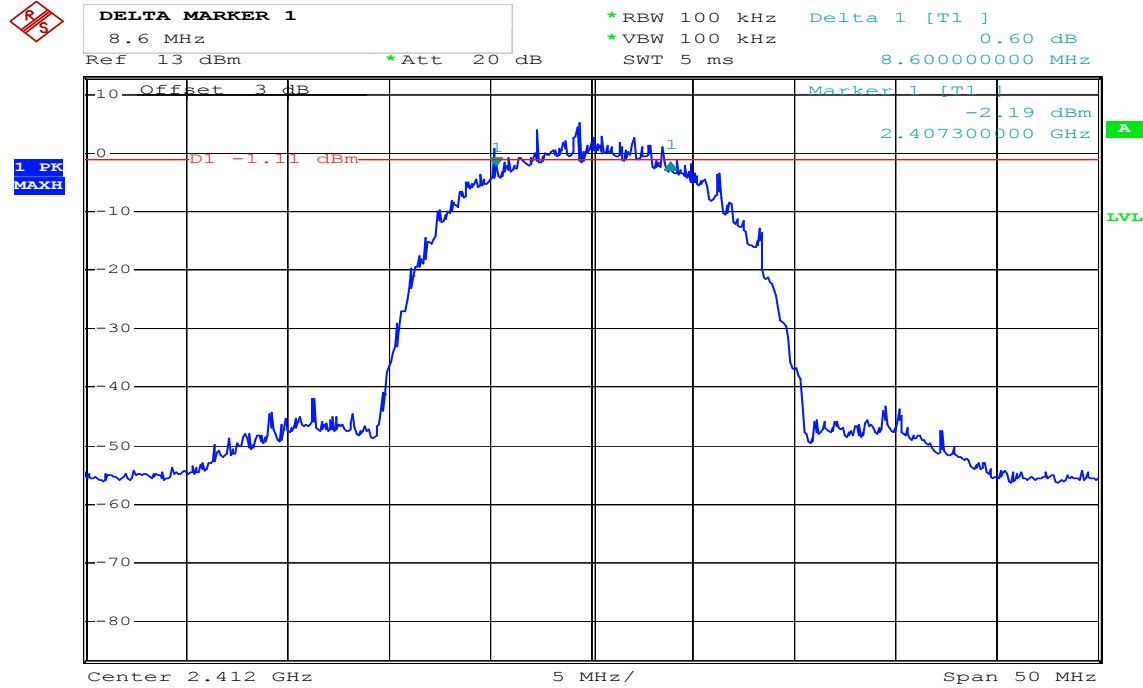
| Channel | Frequency (MHz) | Bandwidth (kHz) | Limit (kHz) | Result |
|---------|-----------------|-----------------|-------------|--------|
| Low     | 2412            | 16500           | >500        | PASS   |
| Mid     | 2437            | 16500           |             | PASS   |
| High    | 2462            | 16500           |             | PASS   |



### Test Plot

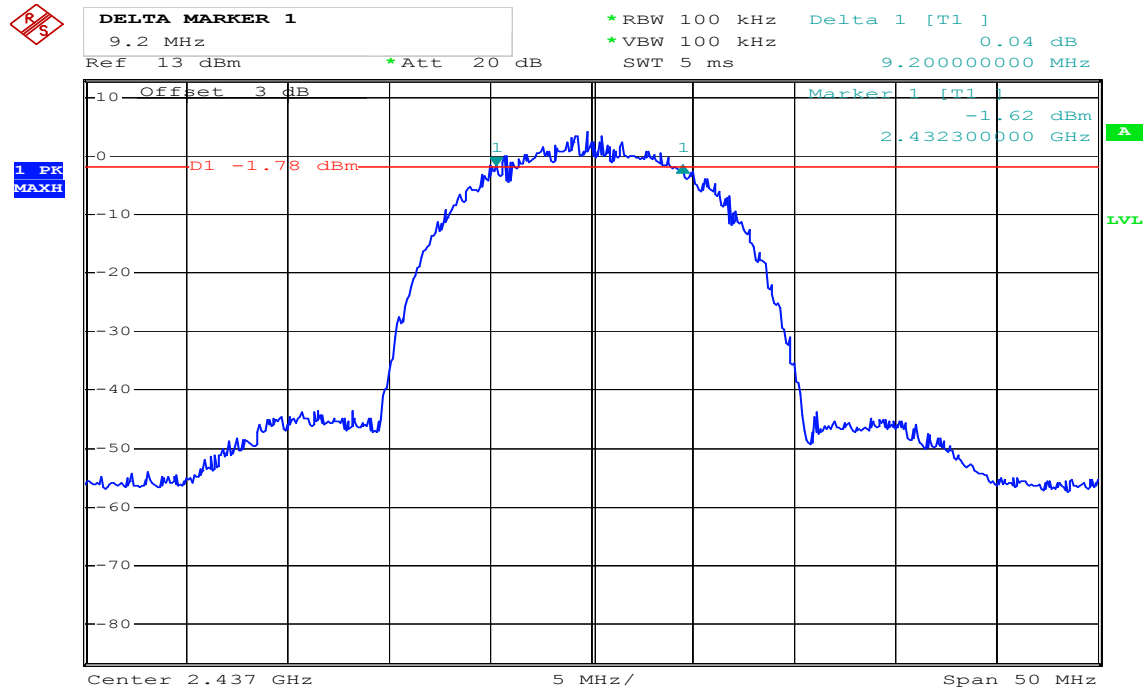
### IEEE 802.11b

### 6dB Bandwidth (CH Low)



Date: 1.AUG.2006 14:24:30

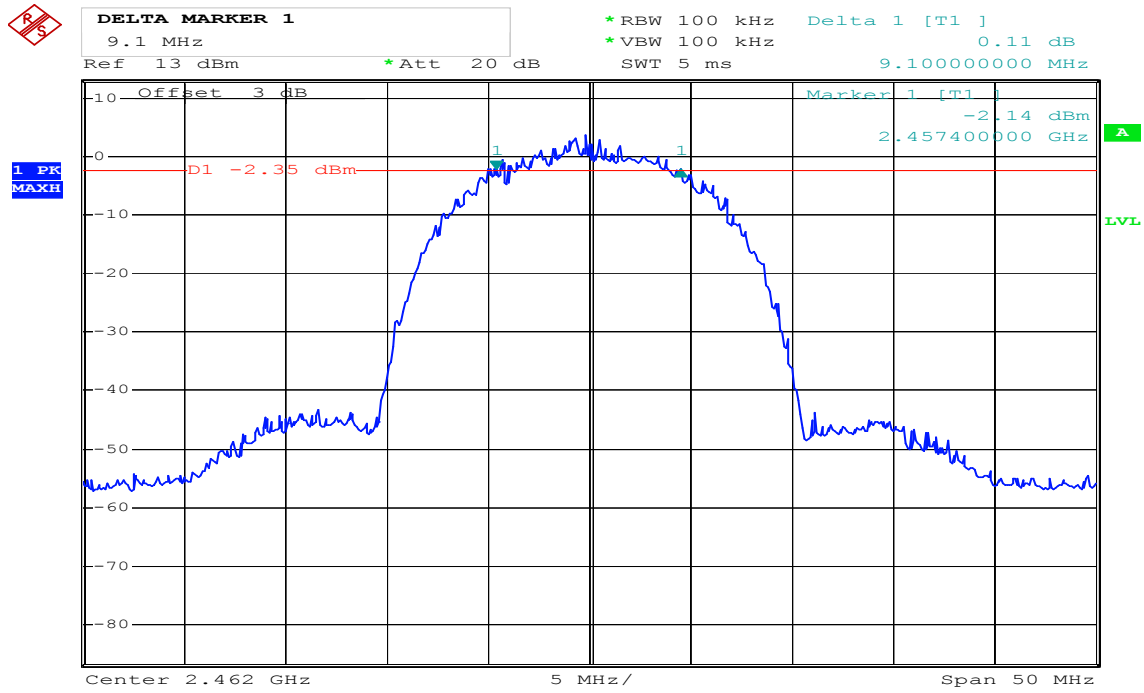
### 6dB Bandwidth (CH Mid)



Date: 1.AUG.2006 14:26:24



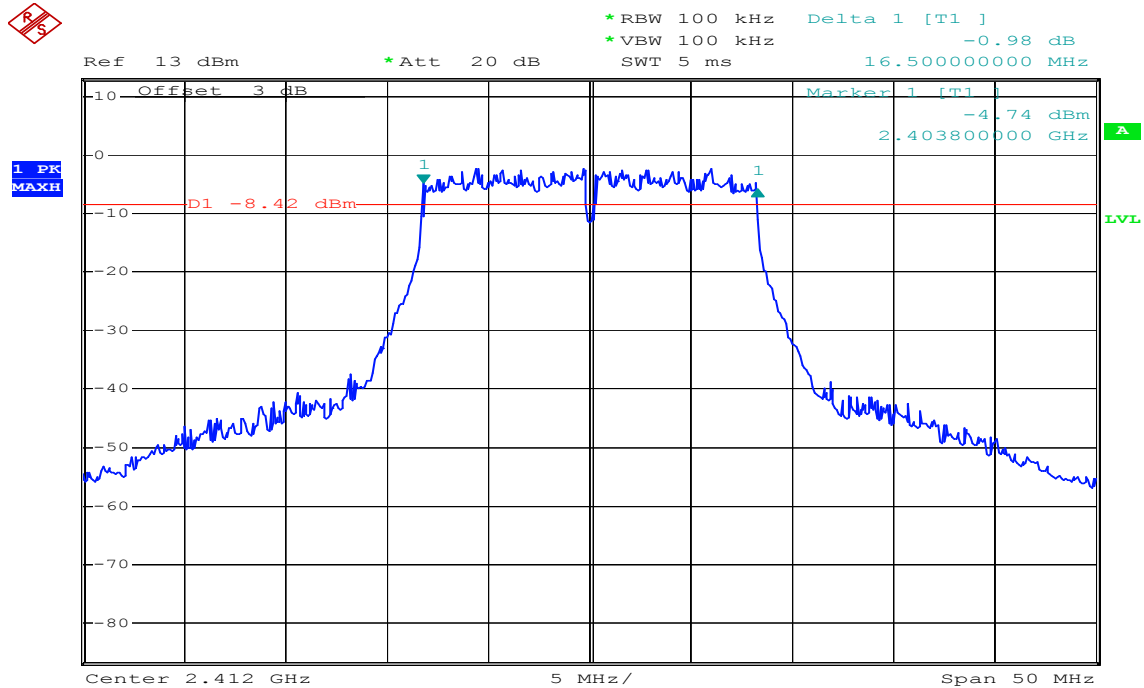
### 6dB Bandwidth (CH High)



Date: 1.AUG.2006 14:28:16

### IEEE 802.11g

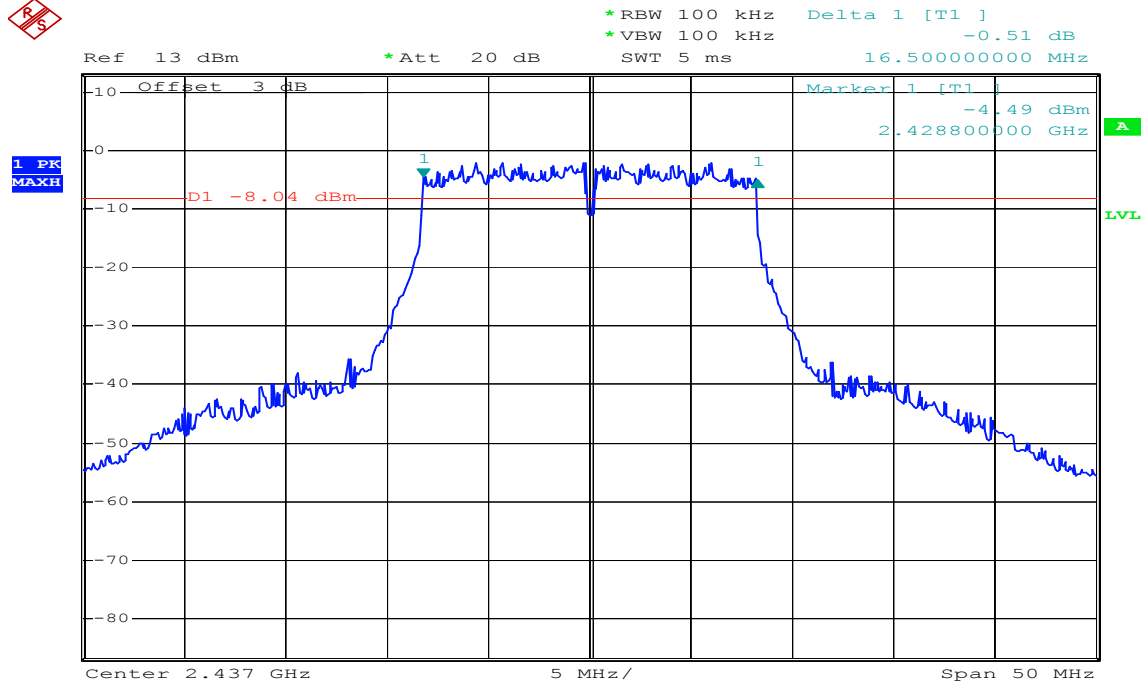
### 6dB Bandwidth (CH Low)



Date: 2.AUG.2006 04:11:53

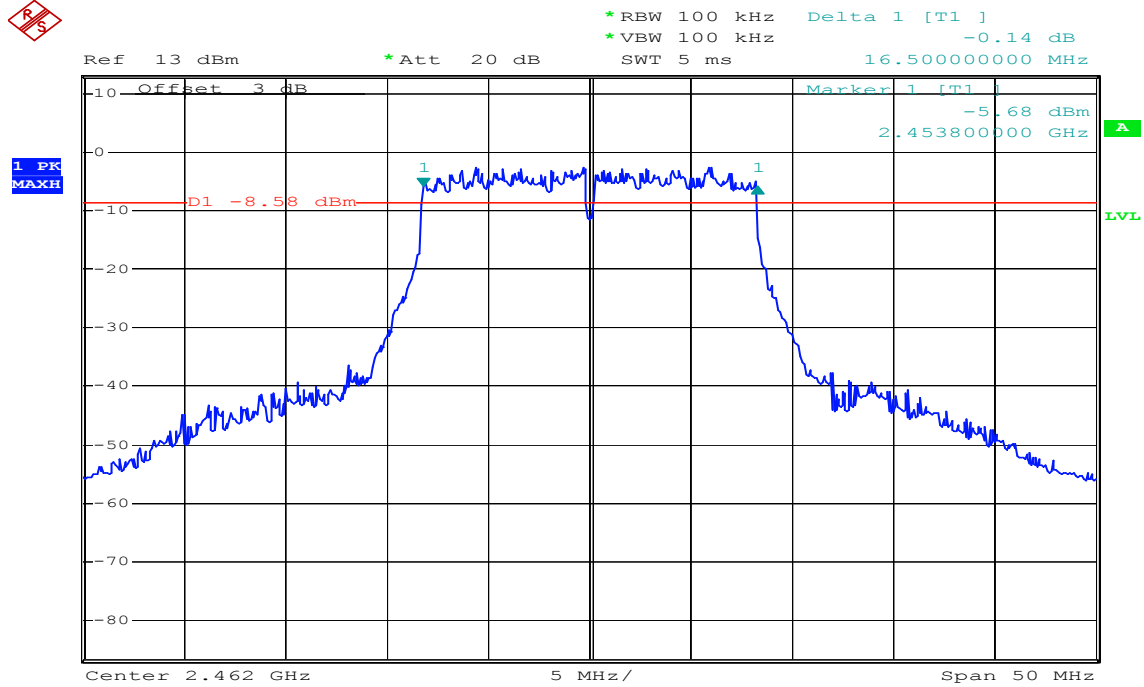


### 6dB Bandwidth (CH Mid)



Date: 2.AUG.2006 04:14:34

### 6dB Bandwidth (CH High)



Date: 2.AUG.2006 04:15:49



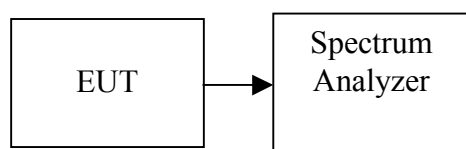
## 7.2 PEAK POWER

### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*

#### Test Data

**Test mode: IEEE 802.11b**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---------|-----------------|--------------------|------------------|-----------|--------|
| Low     | 2412            | 16.54              | 0.04508          | 1.00      | PASS   |
| Mid     | 2437            | 15.82              | 0.03819          |           | PASS   |
| High    | 2462            | 15.02              | 0.03177          |           | PASS   |

**Test mode: IEEE 802.11g**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---------|-----------------|--------------------|------------------|-----------|--------|
| Low     | 2412            | 13.67              | 0.02328          | 1.00      | PASS   |
| Mid     | 2437            | 13.24              | 0.02109          |           | PASS   |
| High    | 2462            | 12.96              | 0.01977          |           | PASS   |

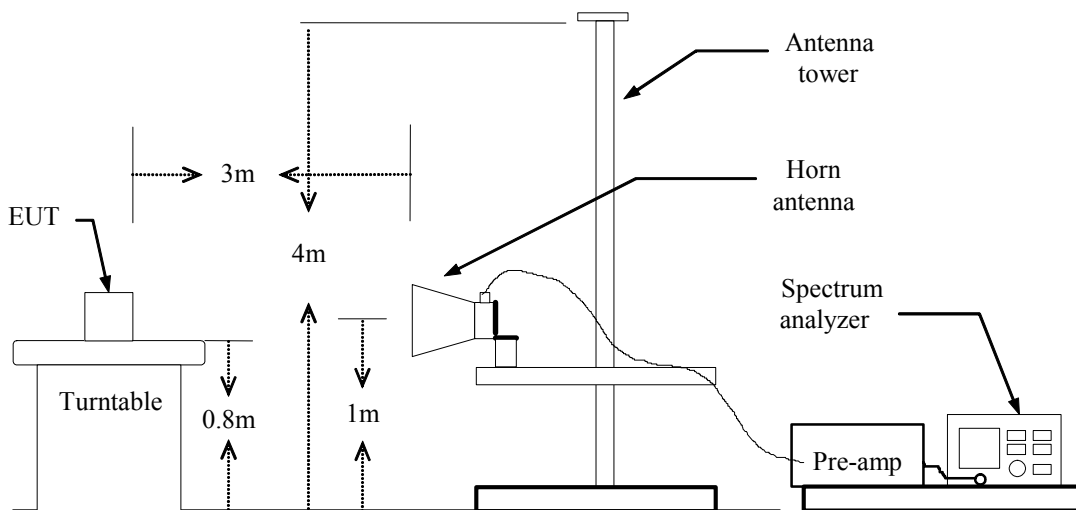


## 7.3 BAND EDGES MEASUREMENT

### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### Test Configuration



### TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### TEST RESULTS

Refer to attach spectrum analyzer data chart.



### Band Edges (IEEE 802.11b / CH Low)

ADD ANT

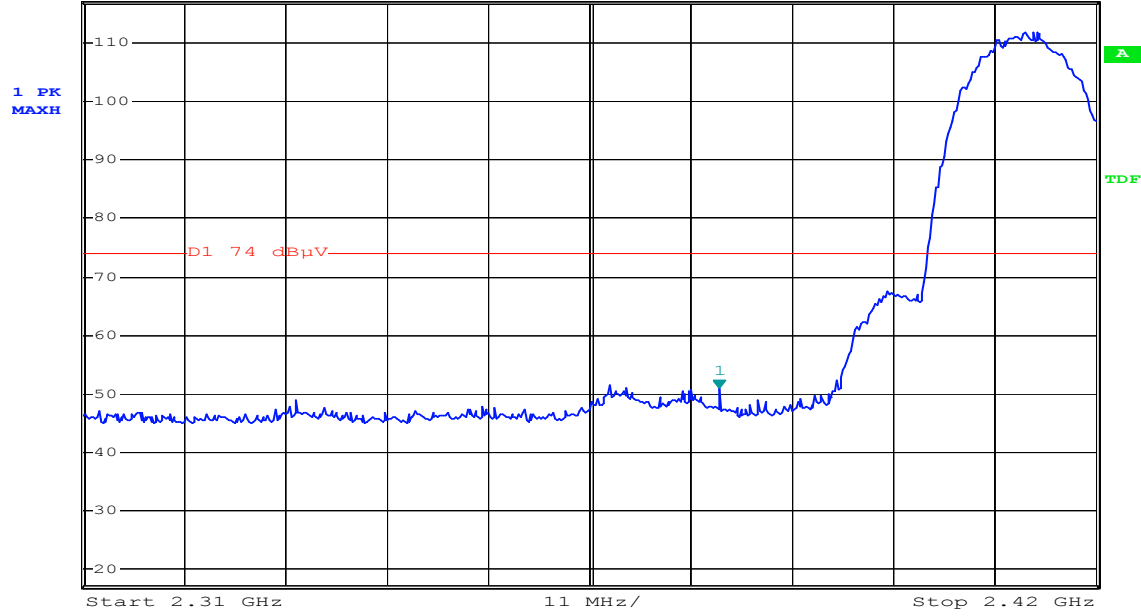
Detector mode: Peak

Polarity: Vertical



**MARKER 1**  
2.379 GHz  
Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1] 51.05 dBµV  
\*VBW 1 MHz 2.379000000 GHz  
SWT 5 ms



Date: 1.AUG.2006 13:14:01

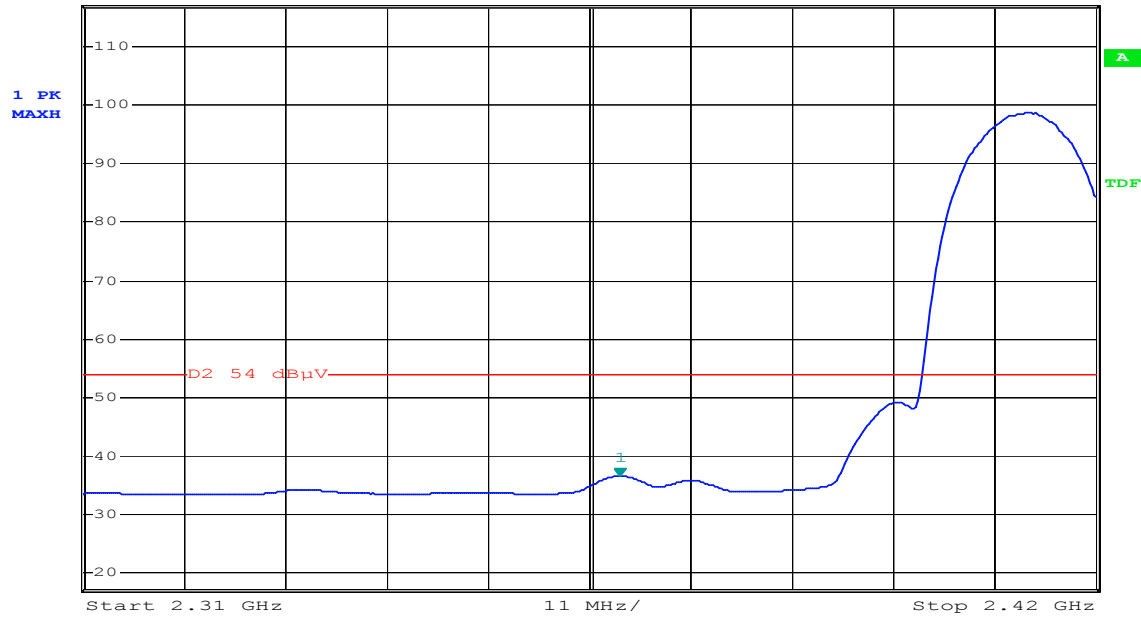
Detector mode: Average

Polarity: Vertical



**MARKER 1**  
2.36822 GHz  
Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1] 36.55 dBµV  
\*VBW 10 Hz 2.368220000 GHz  
SWT 28 s



Date: 1.AUG.2006 13:15:18



Detector mode: Peak

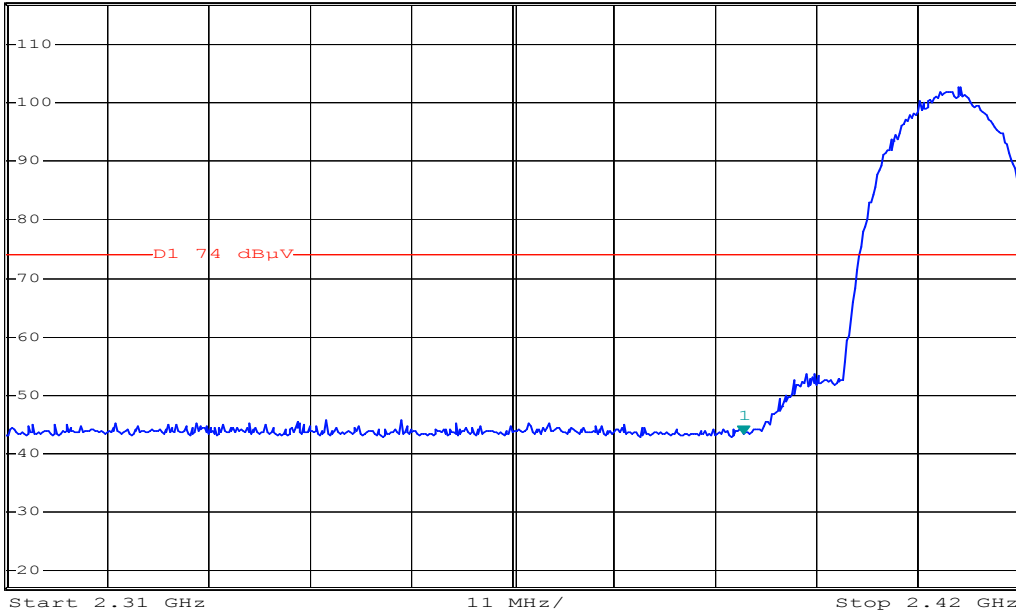
Polarity: Horizontal



**MARKER 1**  
 2.39 GHz  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 43.35 dBµV  
 SWT 5 ms 2.390000000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:17:12

Detector mode: Average

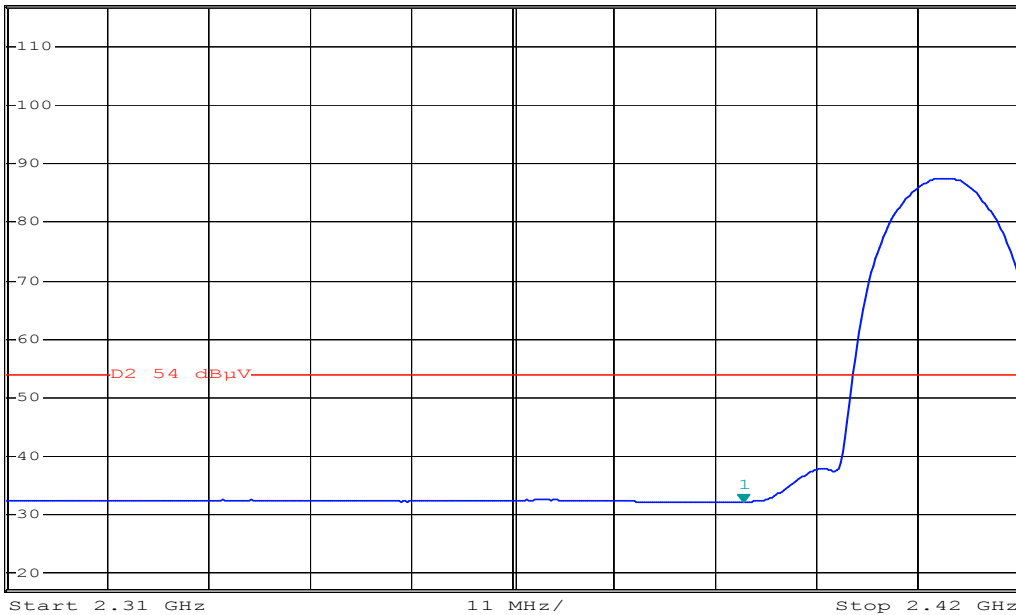
Polarity: Horizontal



Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 32.18 dBµV  
 SWT 28 s 2.390000000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:18:05



### Band Edges (IEEE 802.11b / CH High)

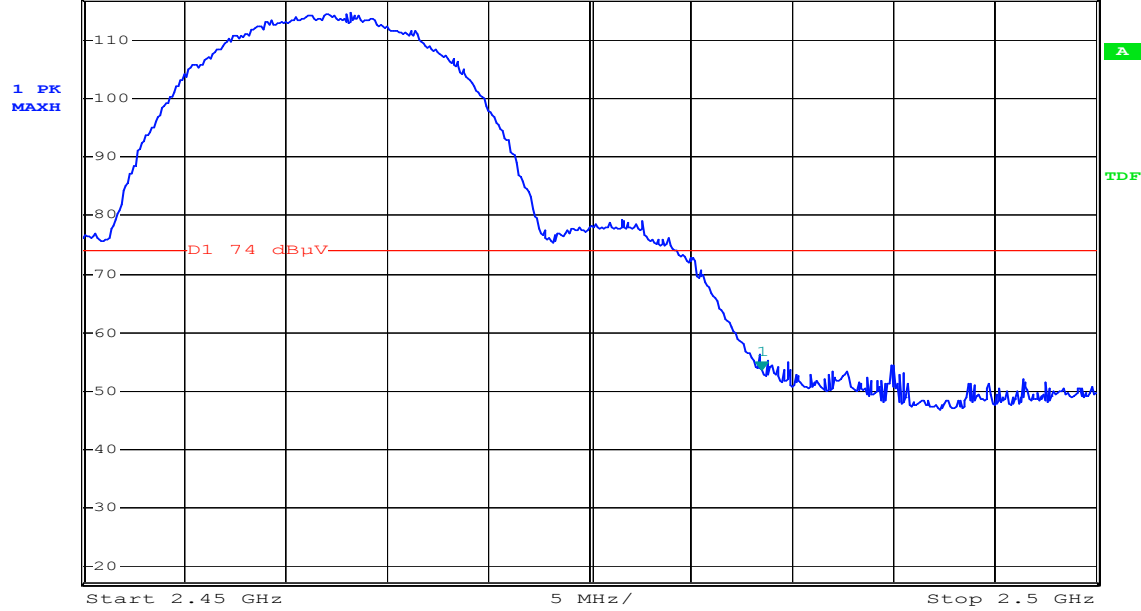
Detector mode: Peak

Polarity: Vertical



DISPLAY LINE 1  
 74 dBµV  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 53.61 dBµV  
 SWT 2.5 ms 2.483500000 GHz



Date: 1.AUG.2006 13:22:22

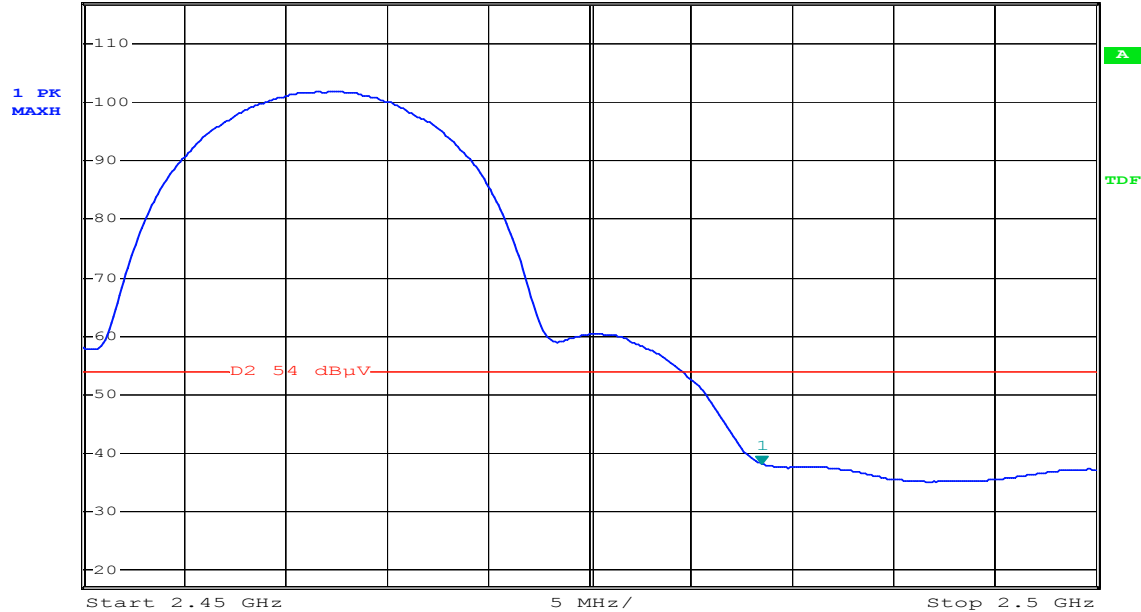
Detector mode: Average

Polarity: Vertical



Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 38.21 dBµV  
 SWT 12.5 s 2.483500000 GHz



Date: 1.AUG.2006 13:23:12



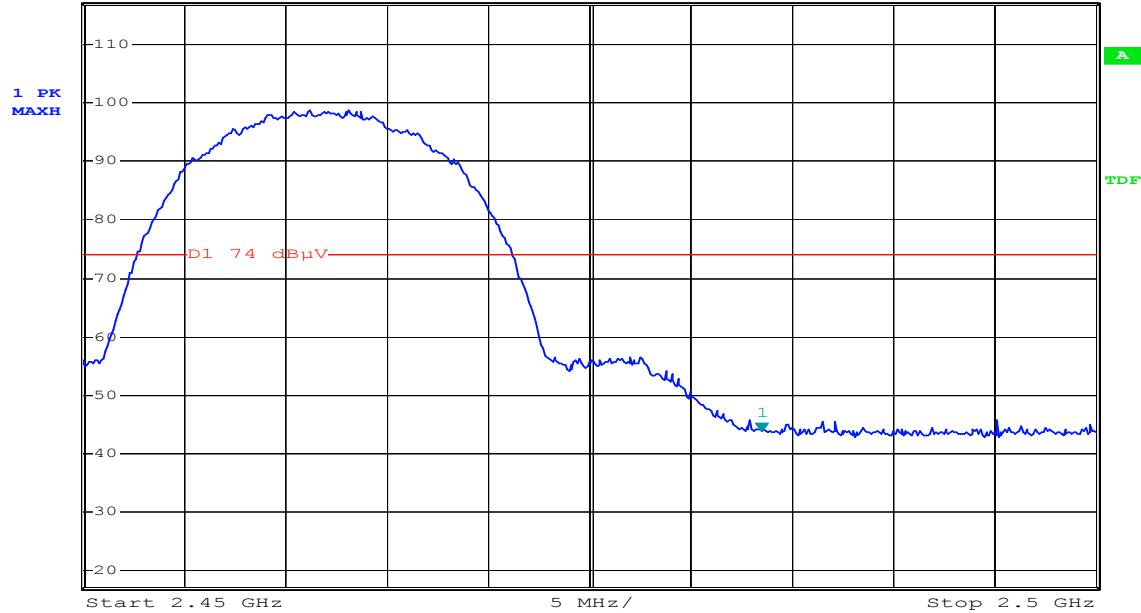
Detector mode: Peak

Polarity: Horizontal



**MARKER 1**  
 2.4835 GHz  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 43.96 dBµV  
 SWT 2.5 ms 2.483500000 GHz



Date: 1.AUG.2006 13:20:19

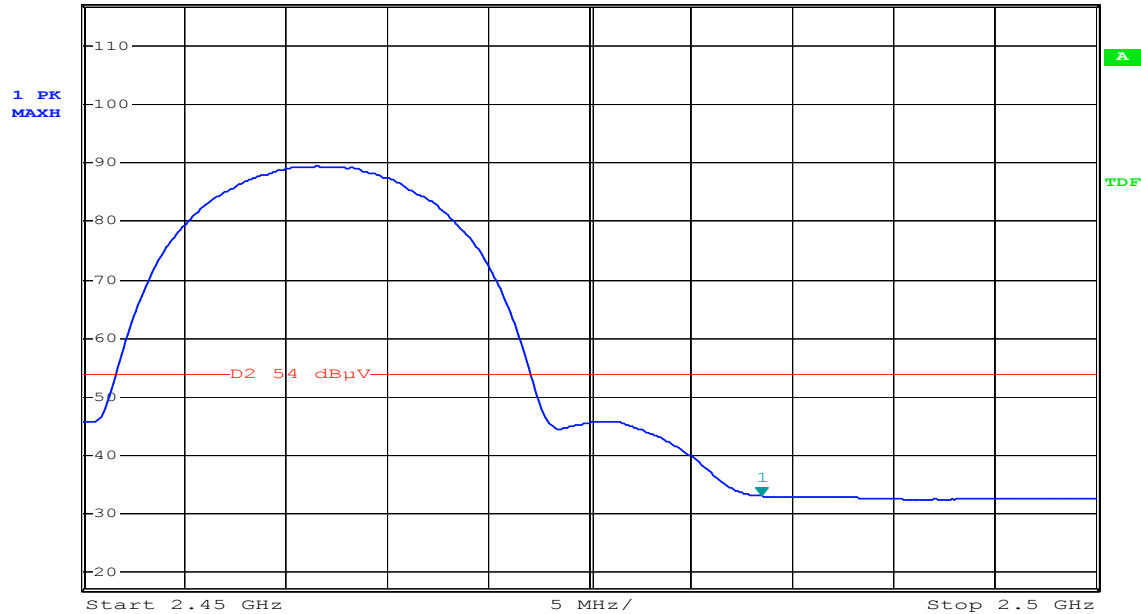
Detector mode: Average

Polarity: Horizontal



Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 33.01 dBµV  
 SWT 12.5 s 2.483500000 GHz



Date: 1.AUG.2006 13:21:01



### Band Edges (IEEE 802.11b / CH Low)

WITHOUT ANT

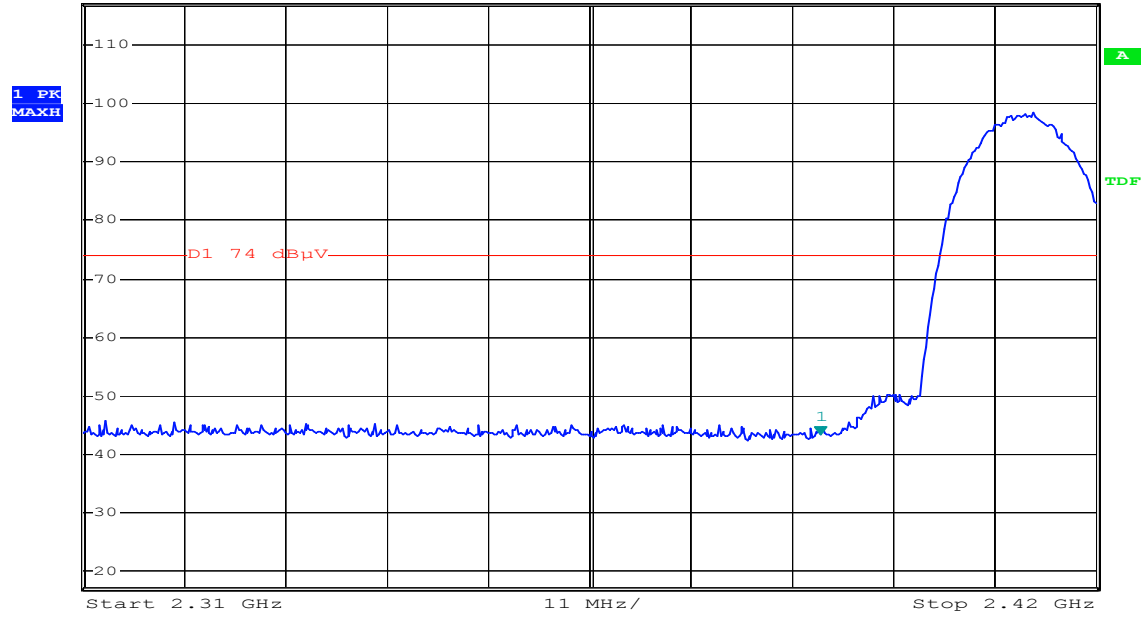
Detector mode: Peak

Polarity: Vertical



DISPLAY LINE 1  
74 dBµV  
Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
\*VBW 1 MHz 43.36 dBµV  
SWT 5 ms 2.390000000 GHz



Date: 1.AUG.2006 13:49:40

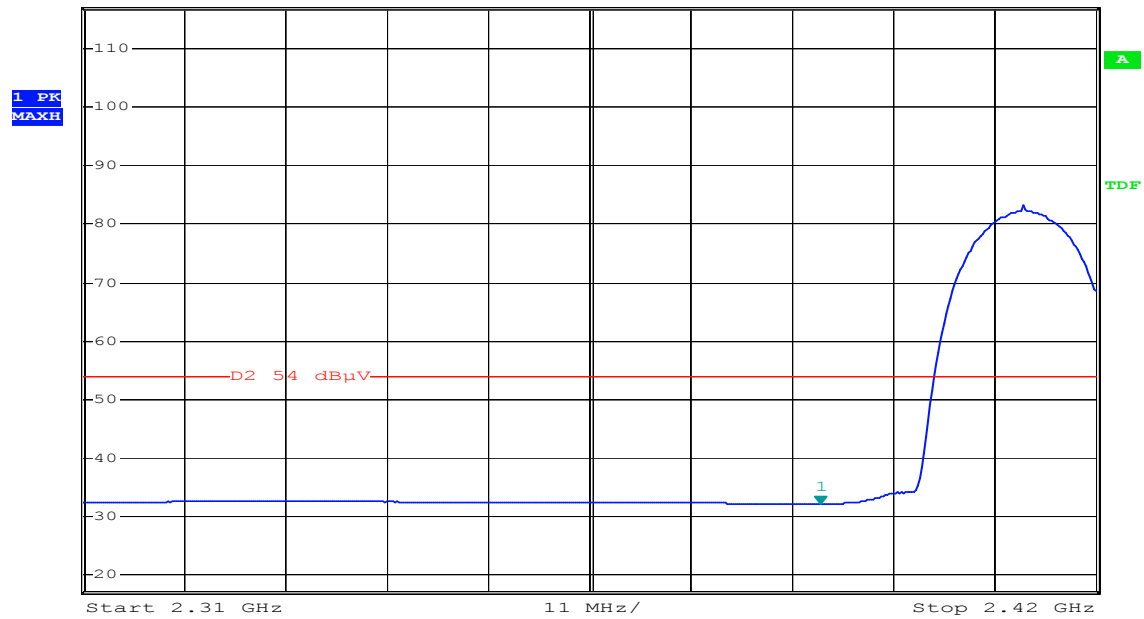
Detector mode: Average

Polarity: Vertical



Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
\*VBW 10 Hz 32.15 dBµV  
SWT 28 s 2.390000000 GHz



Date: 1.AUG.2006 13:50:34



Detector mode: Peak

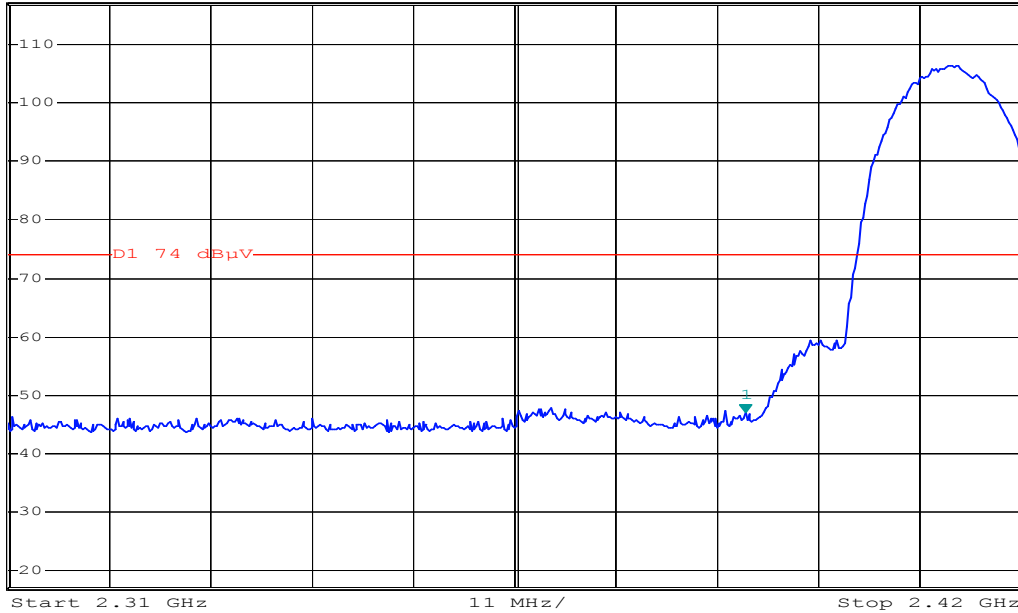
Polarity: Horizontal



DISPLAY LINE 1  
 74 dBµV  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 47.02 dBµV  
 SWT 5 ms 2.390000000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:51:49

Detector mode: Average

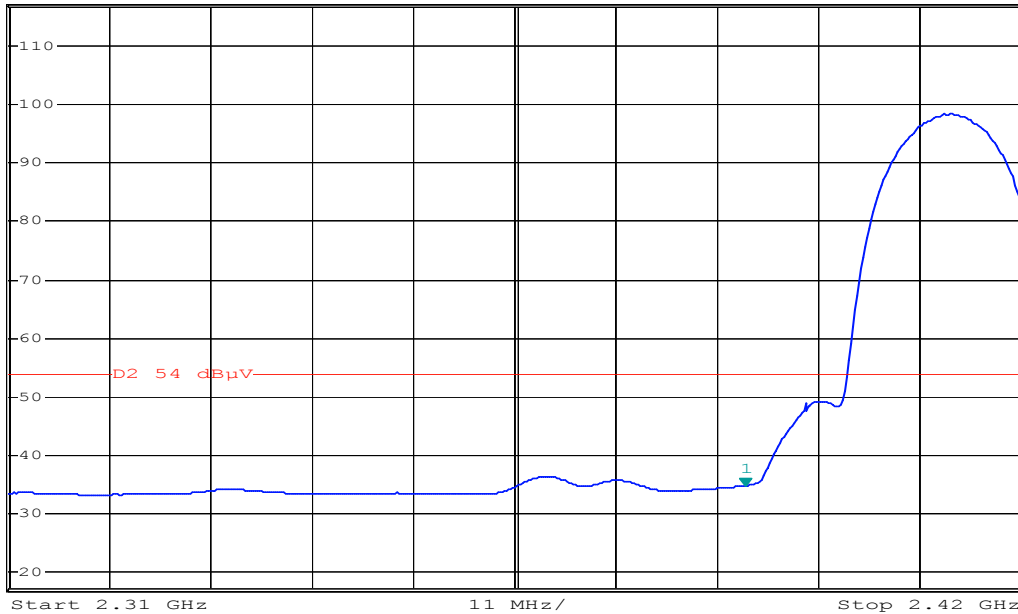
Polarity: Horizontal



DISPLAY LINE 2  
 54 dBµV  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 34.83 dBµV  
 SWT 28 s 2.390000000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:52:38



### Band Edges (IEEE 802.11b / CH High)

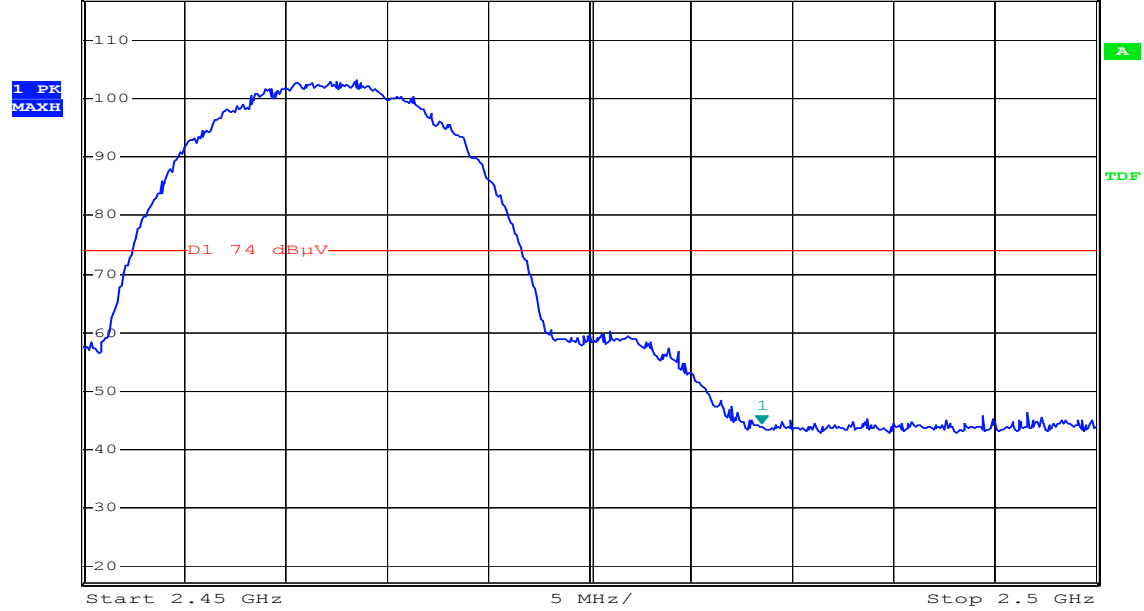
Detector mode: Peak

Polarity: Vertical



DISPLAY LINE 1  
 74 dBµV  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 44.50 dBµV  
 SWT 2.5 ms 2.483500000 GHz



Date: 1.AUG.2006 13:56:47

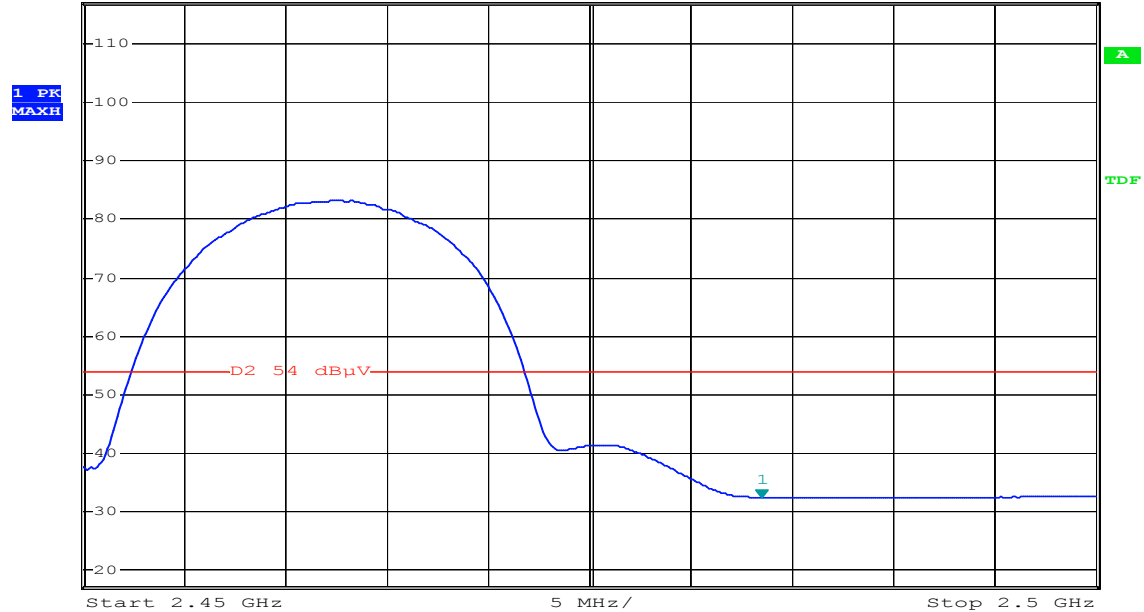
Detector mode: Average

Polarity: Vertical



Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 32.39 dBµV  
 SWT 12.5 s 2.483500000 GHz



Date: 1.AUG.2006 13:57:18





Detector mode: Peak

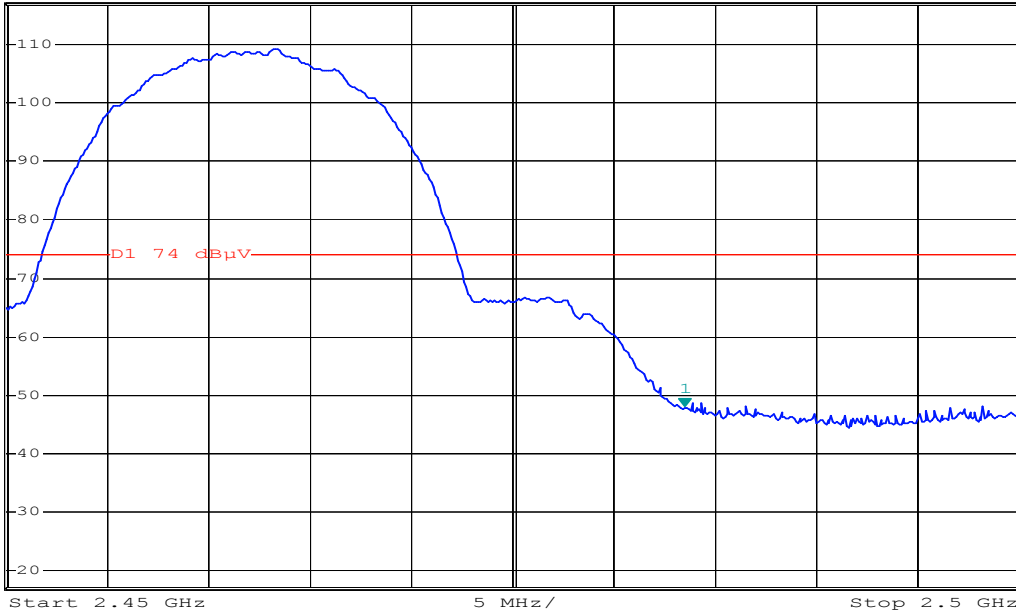
Polarity: Horizontal



MARKER 1  
2.4835 GHz  
Ref 117 dBμV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
\*VBW 1 MHz 48.10 dBμV  
SWT 2.5 ms 2.483500000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:54:48

Detector mode: Average

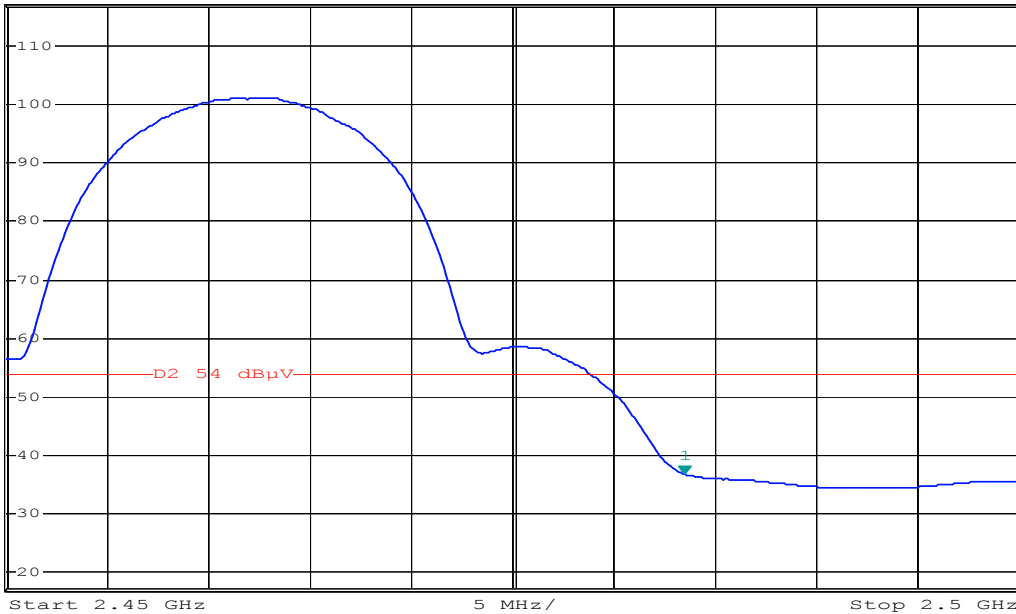
Polarity: Horizontal



Ref 117 dBμV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
\*VBW 10 Hz 36.76 dBμV  
SWT 12.5 s 2.483500000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:55:25



### Band Edges (IEEE 802.11g / CH Low)

ADD ANT

Detector mode: Peak

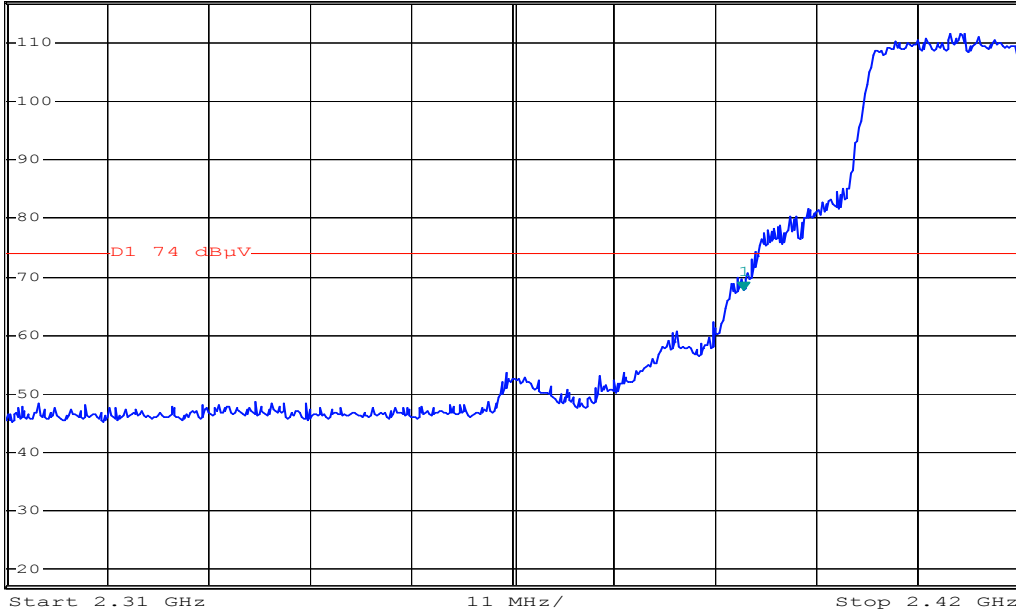
Polarity: Vertical



**MARKER 1**  
 2.39 GHz  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 67.77 dBµV  
 SWT 5 ms 2.390000000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:26:42

Detector mode: Average

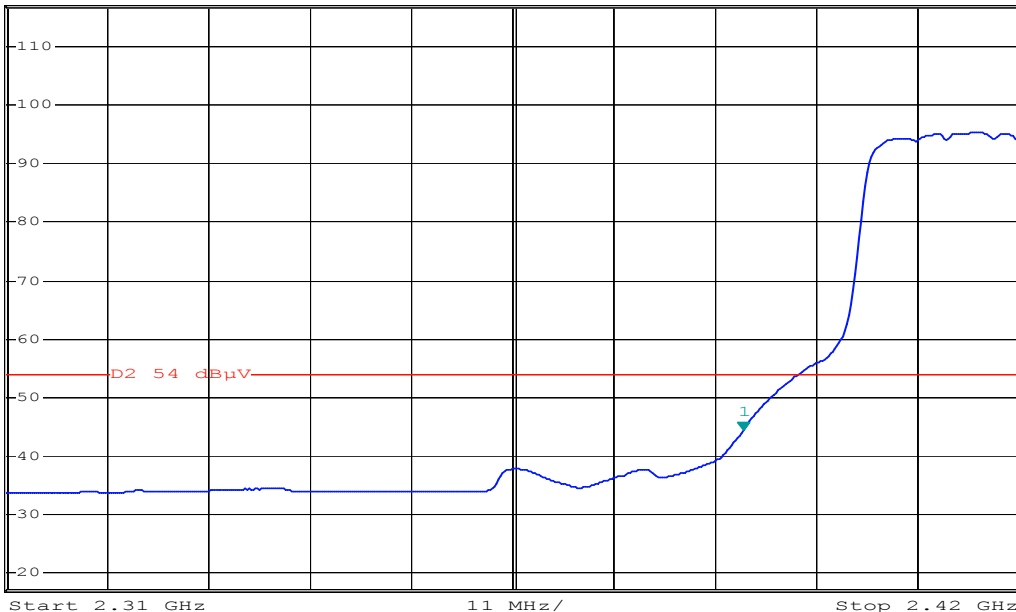
Polarity: Vertical



**DISPLAY LINE 2**  
 54 dBµV  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 44.44 dBµV  
 SWT 28 s 2.390000000 GHz

1 PK  
MAXH

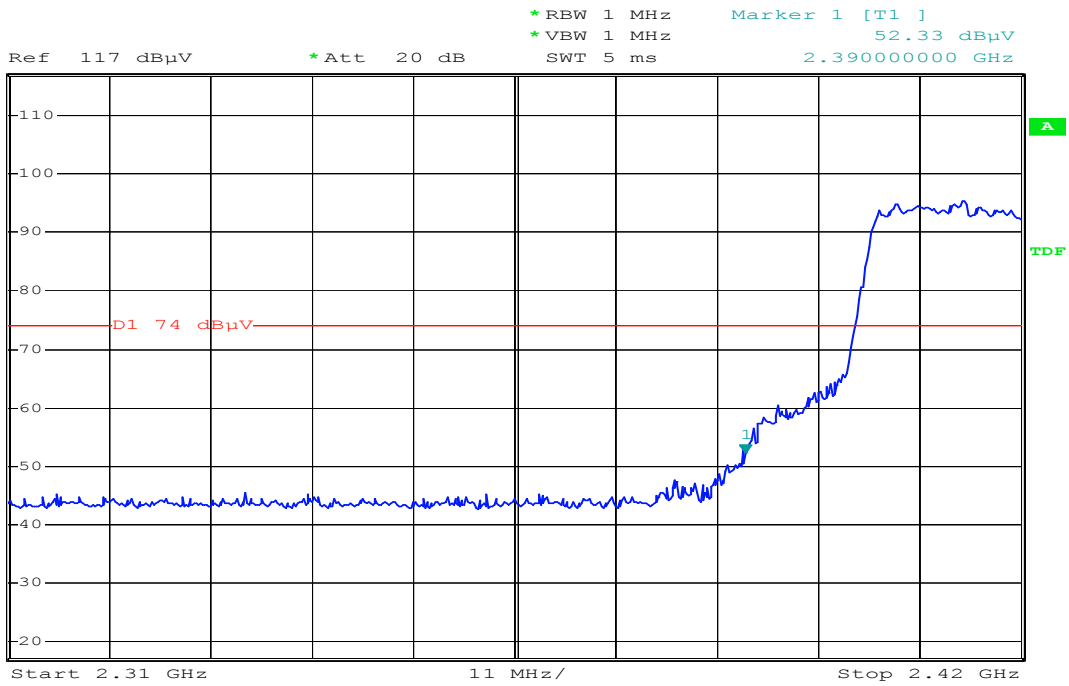


Date: 1.AUG.2006 13:27:52



Detector mode: Peak

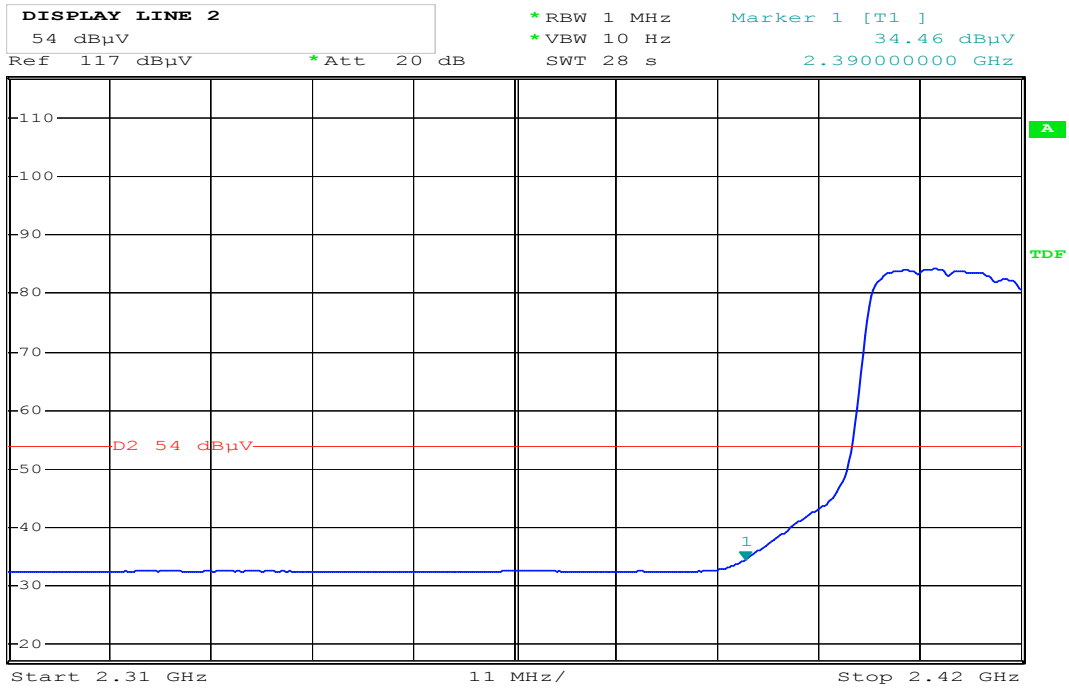
Polarity: Horizontal



Date: 1.AUG.2006 13:29:12

Detector mode: Average

Polarity: Horizontal



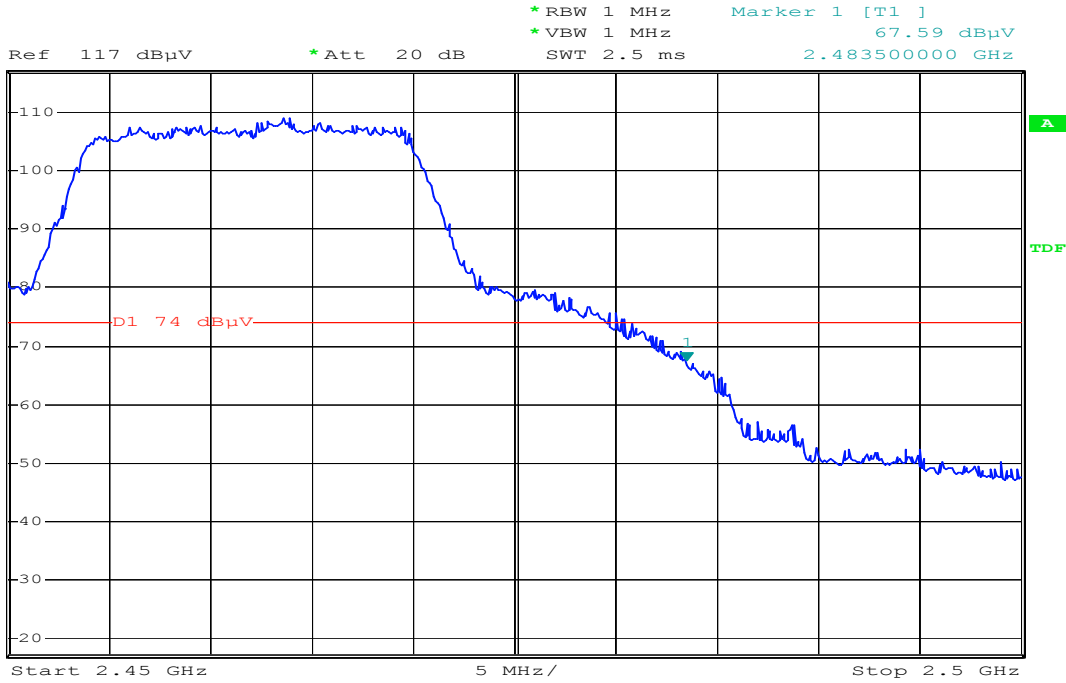
Date: 1.AUG.2006 13:29:58



### Band Edges (IEEE 802.11g / CH High)

Detector mode: Peak

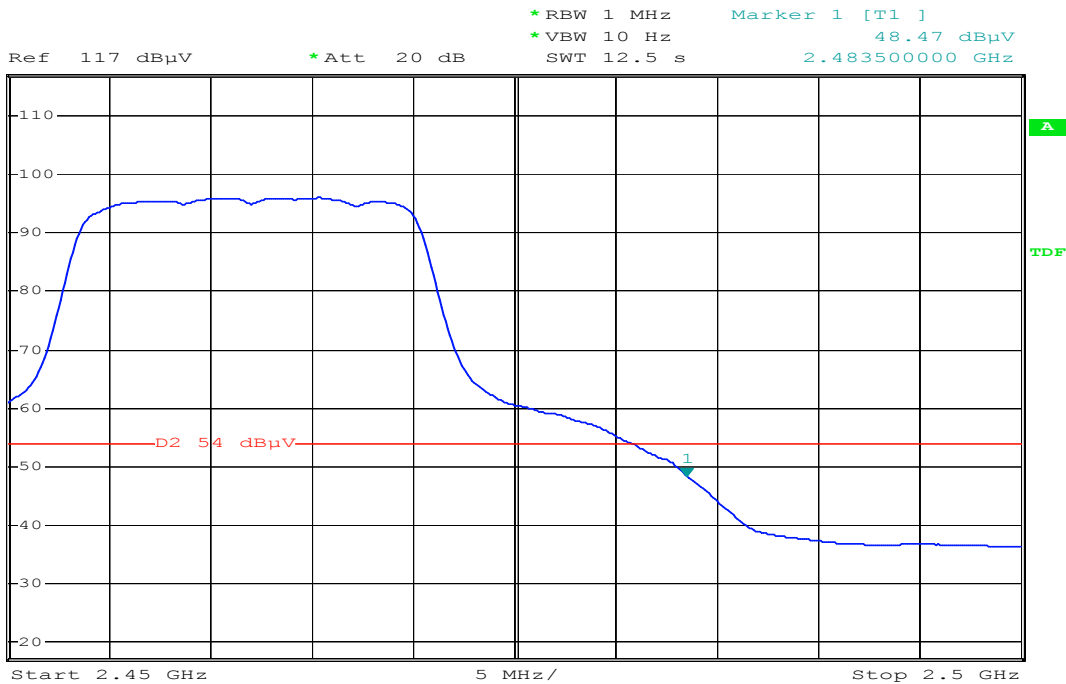
Polarity: Vertical



Date: 1.AUG.2006 13:34:19

Detector mode: Average

Polarity: Vertical



Date: 1.AUG.2006 13:35:10



Detector mode: Peak

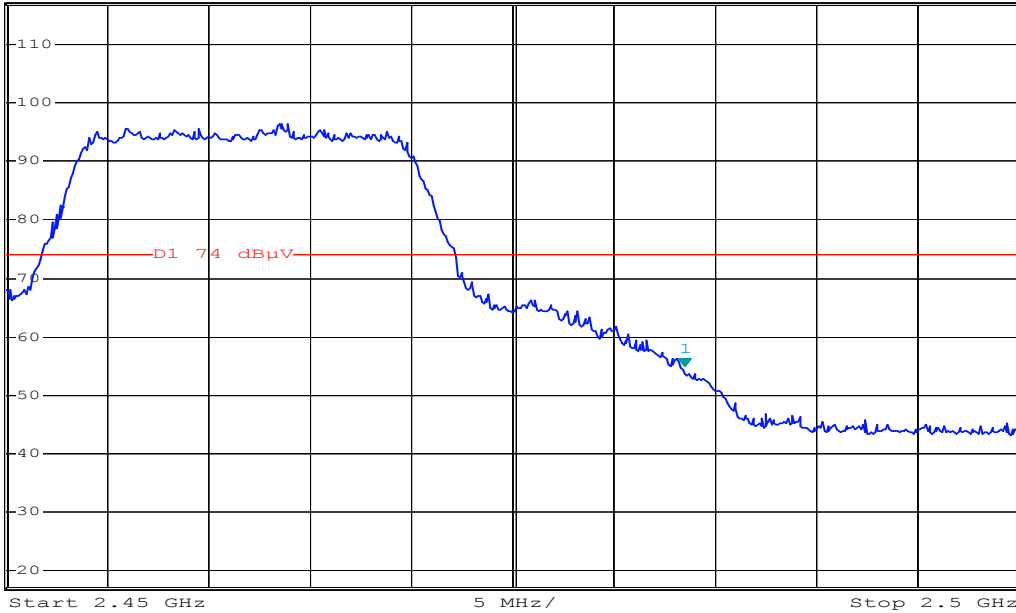
Polarity: Horizontal



**MARKER 1**  
 2.4835 GHz  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 54.95 dBµV  
 SWT 2.5 ms 2.483500000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:32:08

Detector mode: Average

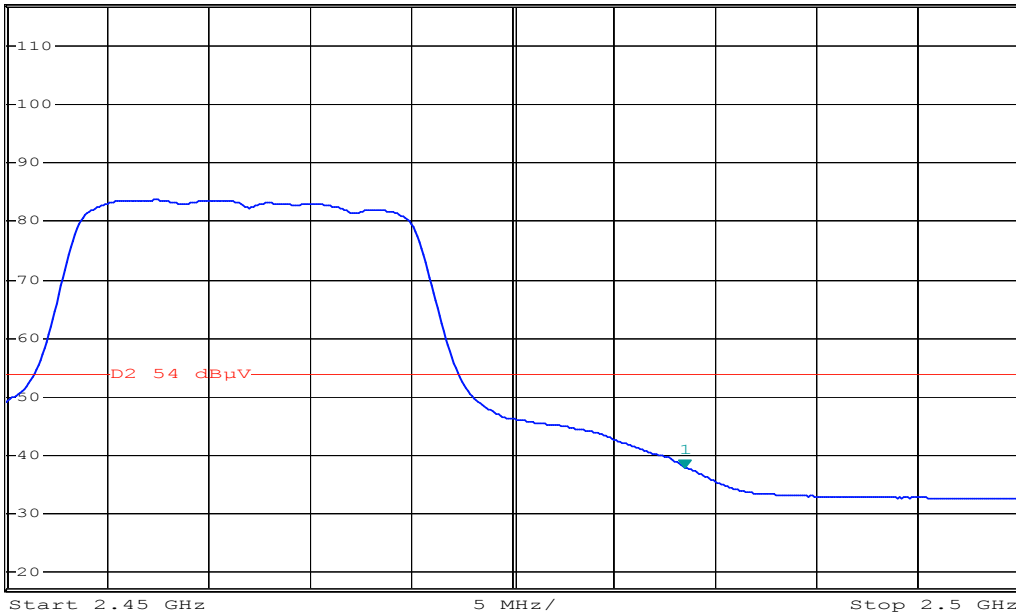
Polarity: Horizontal



**DISPLAY LINE 2**  
 54 dBµV  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 38.00 dBµV  
 SWT 12.5 s 2.483500000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:32:50

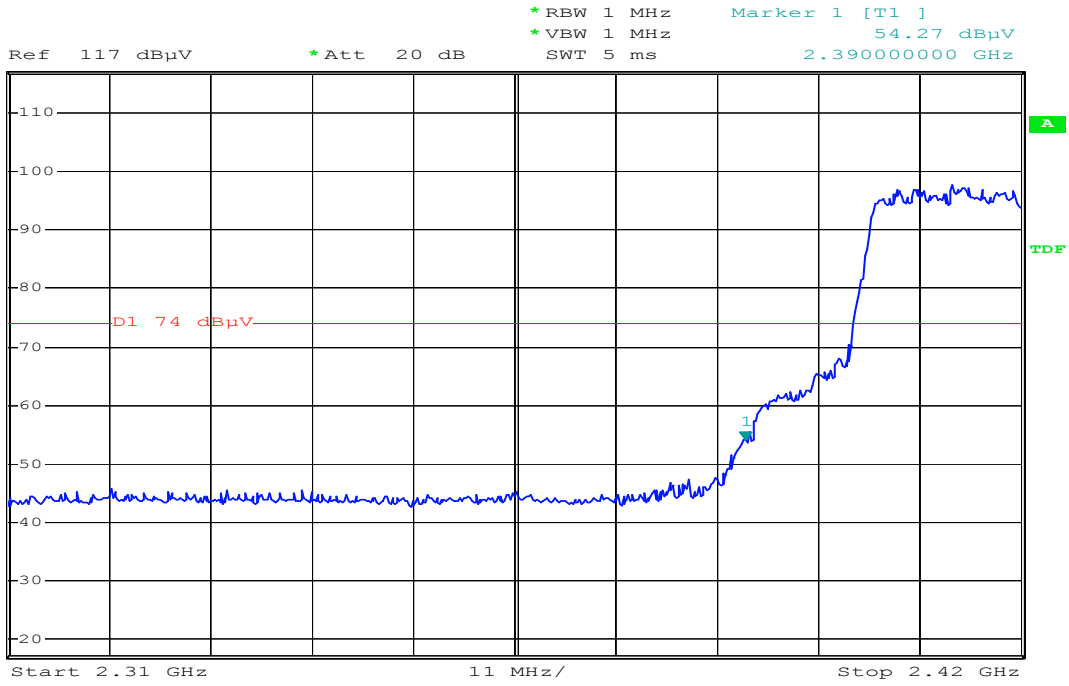


### Band Edges (IEEE 802.11g / CH Low)

WITHOUT ANT

Detector mode: Peak

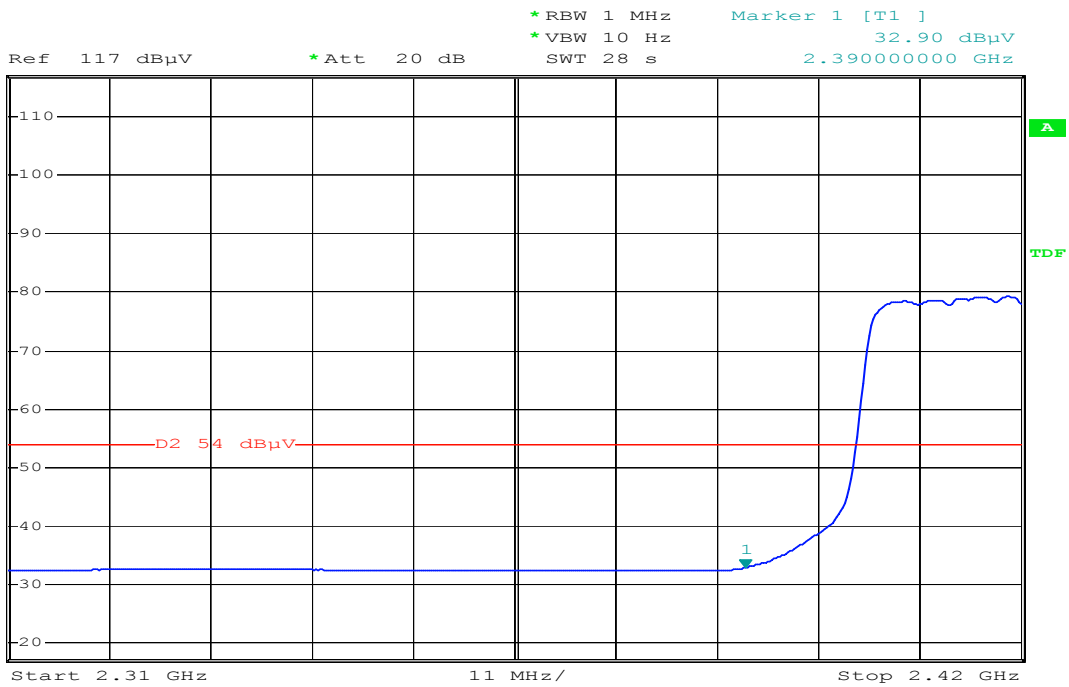
Polarity: Vertical



Date: 1.AUG.2006 13:46:20

Detector mode: Average

Polarity: Vertical



Date: 1.AUG.2006 13:47:11



Detector mode: Peak

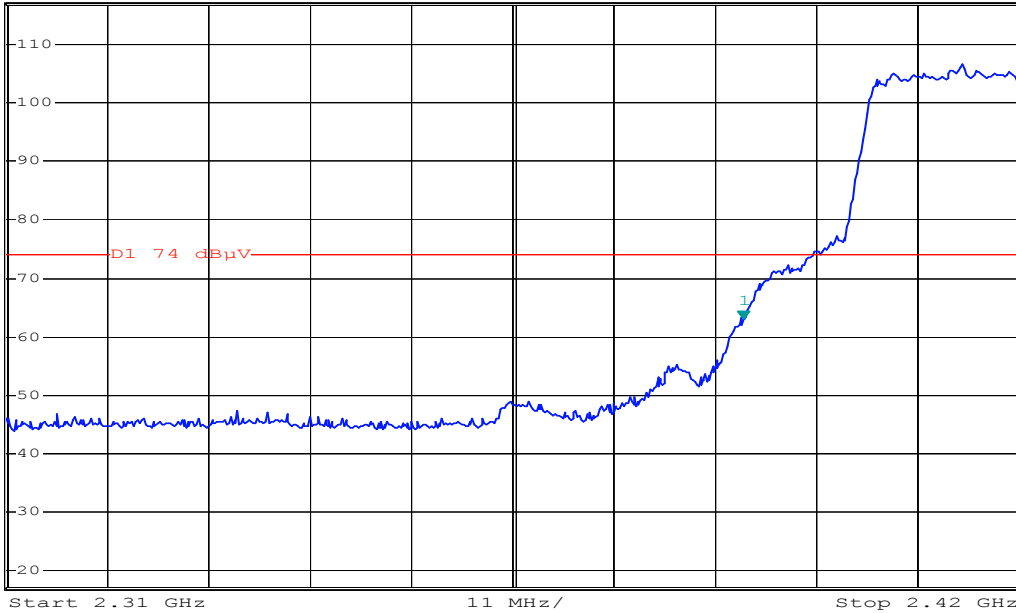
Polarity: Horizontal



**MARKER 1**  
 2.39 GHz  
 Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 1 MHz 63.14 dBµV  
 SWT 5 ms 2.39000000 GHz

1 PK  
MAXH



Date: 1.AUG.2006 13:44:09

Detector mode: Average

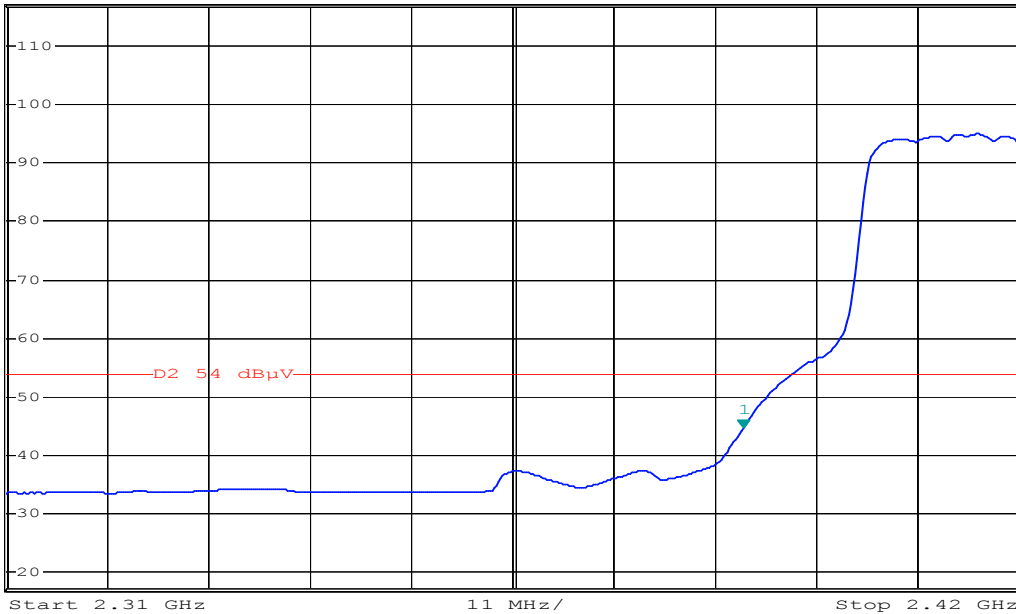
Polarity: Horizontal



Ref 117 dBµV \*Att 20 dB

\*RBW 1 MHz Marker 1 [T1 ]  
 \*VBW 10 Hz 44.69 dBµV  
 SWT 28 s 2.39000000 GHz

1 PK  
MAXH



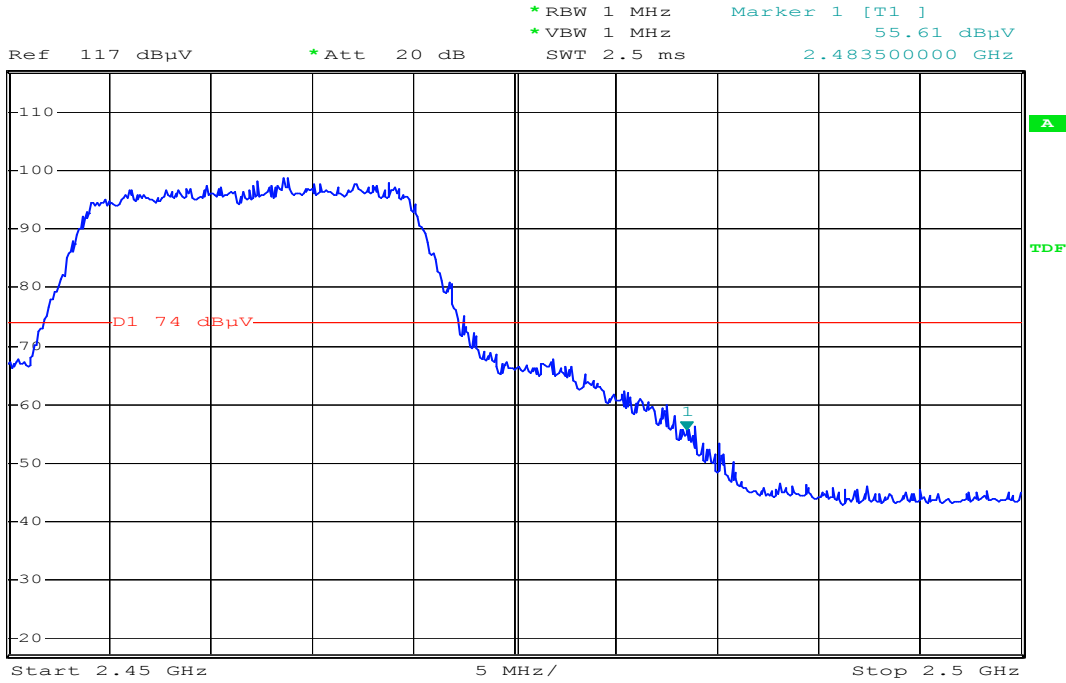
Date: 1.AUG.2006 13:45:01



### Band Edges (IEEE 802.11g / CH High)

Detector mode: Peak

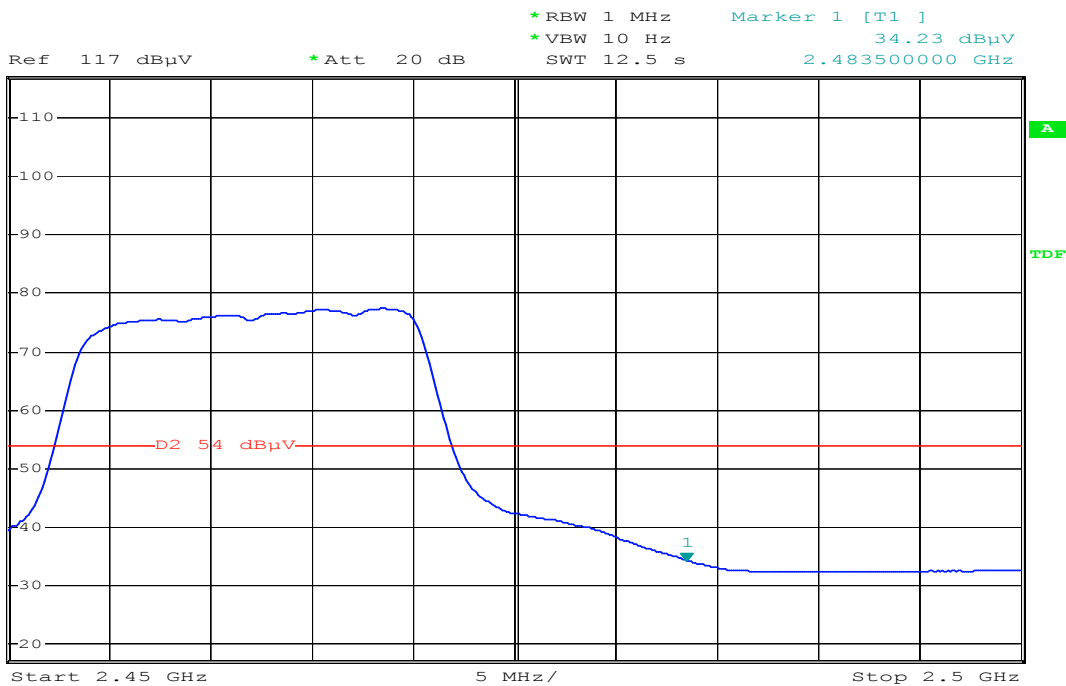
Polarity: Vertical



Date: 1.AUG.2006 13:39:06

Detector mode: Average

Polarity: Vertical



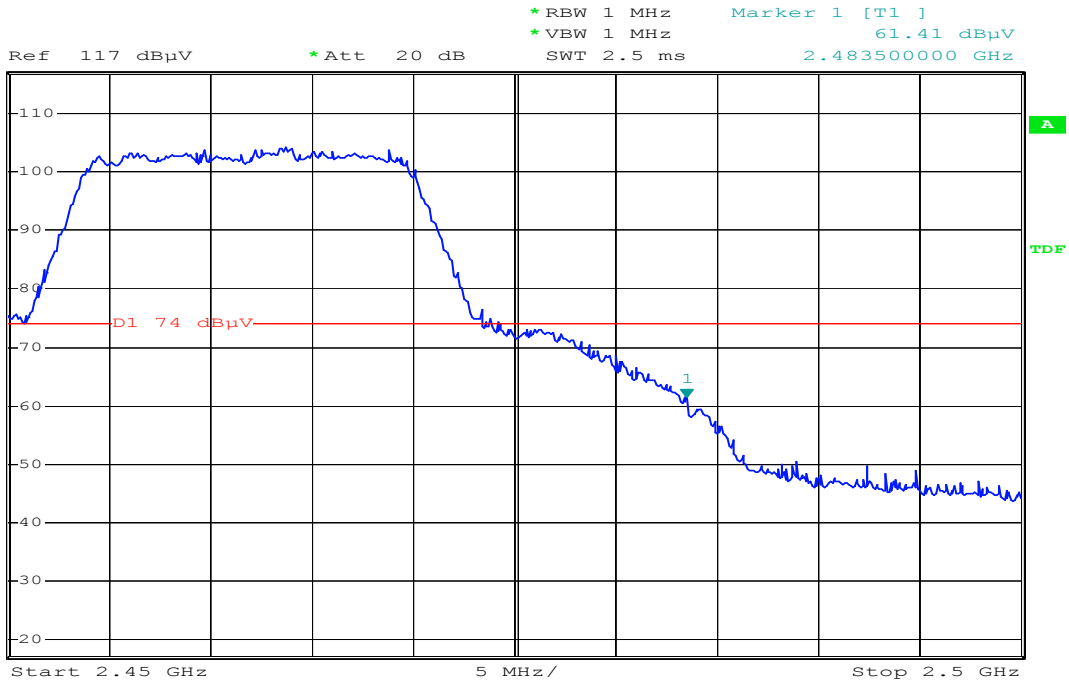
Date: 1.AUG.2006 13:39:54





**Detector mode: Peak**

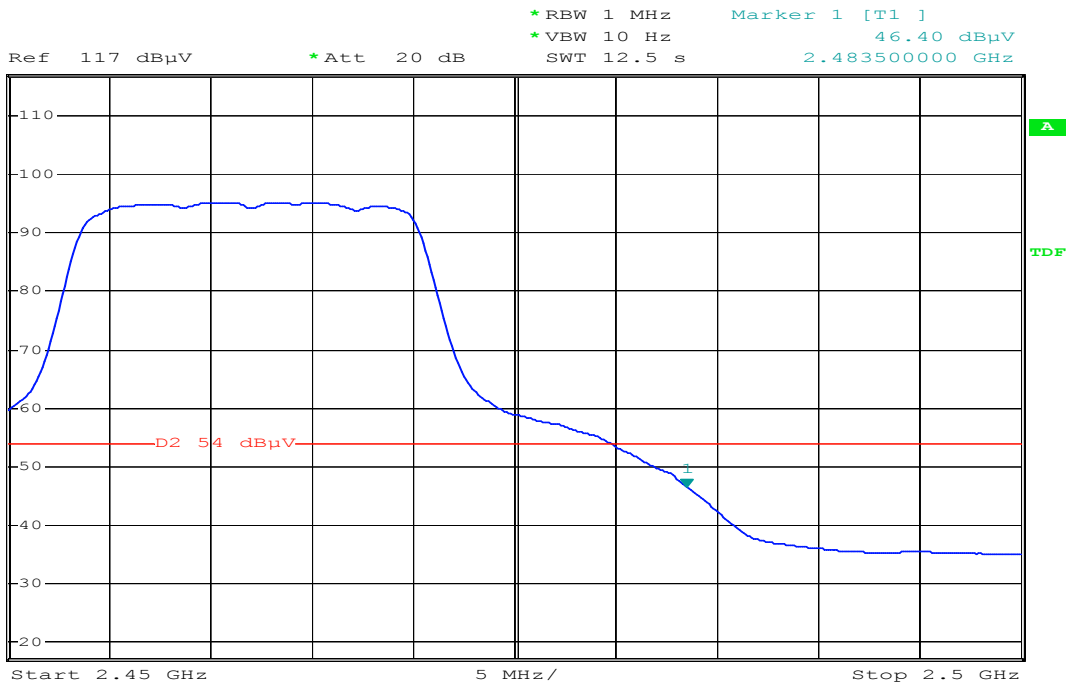
**Polarity: Horizontal**



Date: 1.AUG.2006 13:41:27

**Detector mode: Average**

**Polarity: Horizontal**



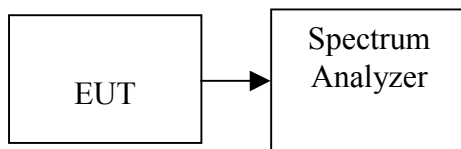
Date: 1.AUG.2006 13:42:01

## 7.4 PEAK POWER SPECTRAL DENSITY

### LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep = 100 s
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.



## TEST RESULTS

*No non-compliance noted*

### Test Data

**Test mode: IEEE 802.11b**

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Result |
|---------|-----------------|------------|-------------|--------|
| Low     | 2412            | -12.61     | 8.00        | PASS   |
| Mid     | 2437            | -8.20      |             | PASS   |
| High    | 2462            | -8.57      |             | PASS   |

**Test mode: IEEE 802.11g**

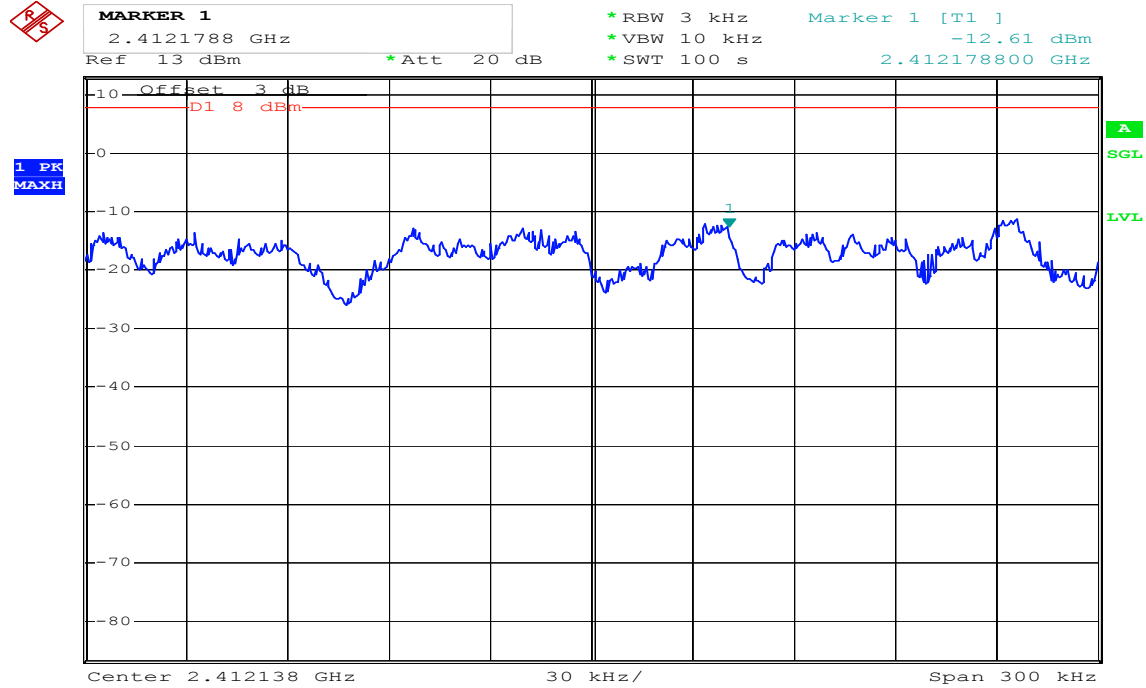
| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Result |
|---------|-----------------|------------|-------------|--------|
| Low     | 2412            | -20.11     | 8.00        | PASS   |
| Mid     | 2437            | -19.62     |             | PASS   |
| High    | 2462            | -19.85     |             | PASS   |



Test Plot

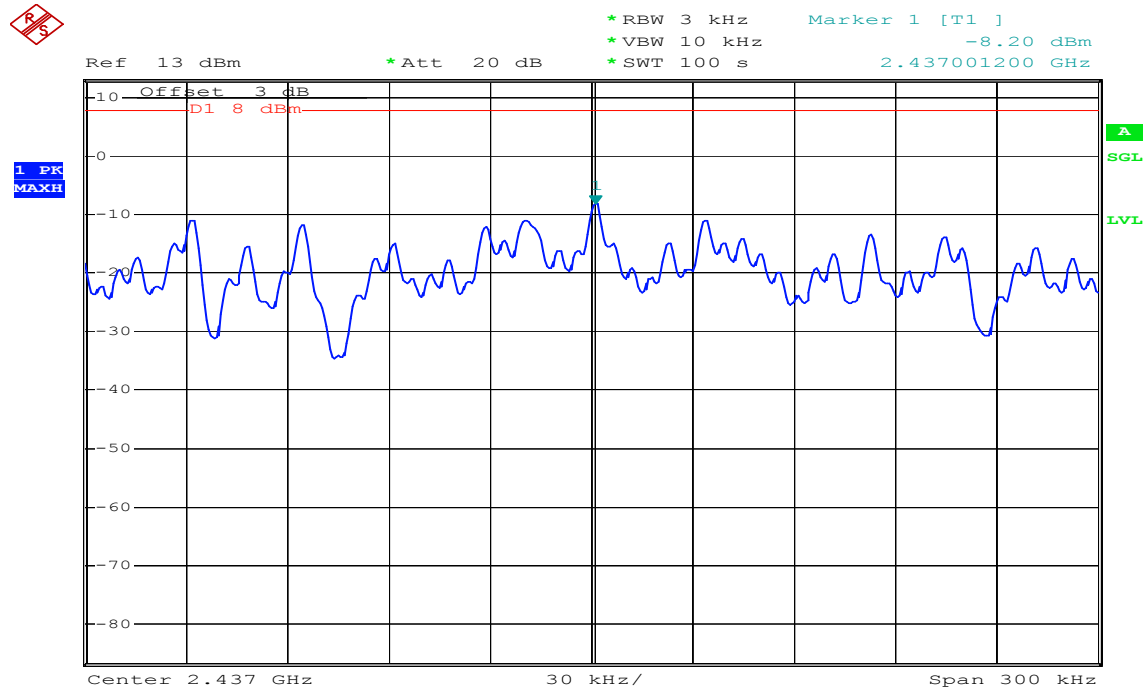
IEEE 802.11b

PPSD (CH Low)



Date: 2.AUG.2006 05:00:15

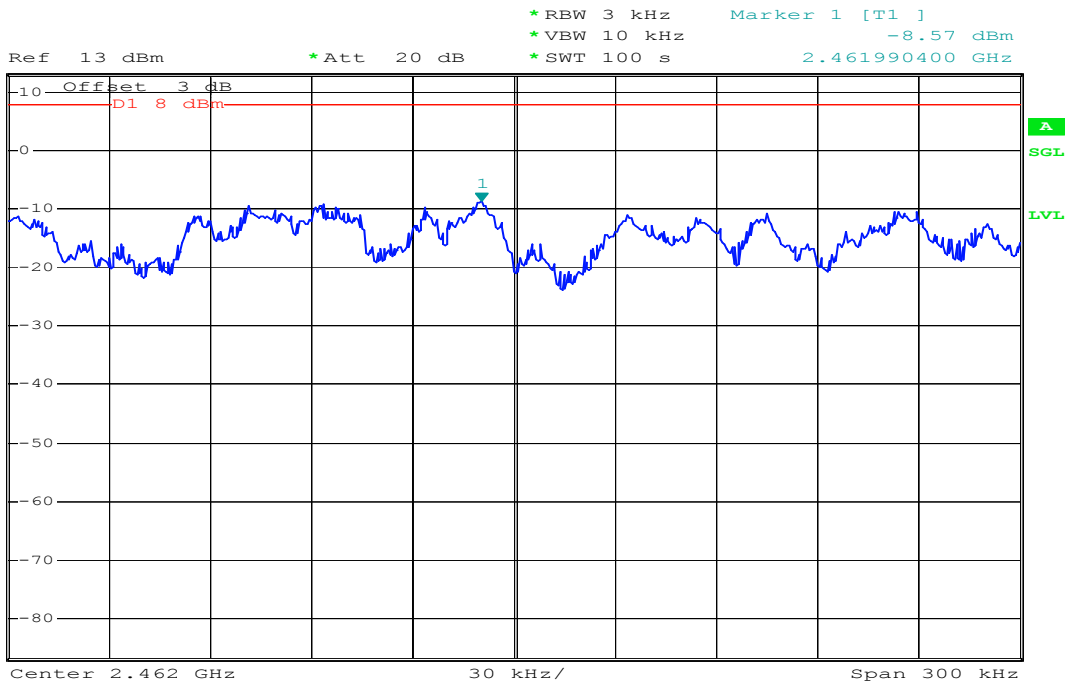
PPSD (CH Mid)



Date: 2.AUG.2006 04:56:52



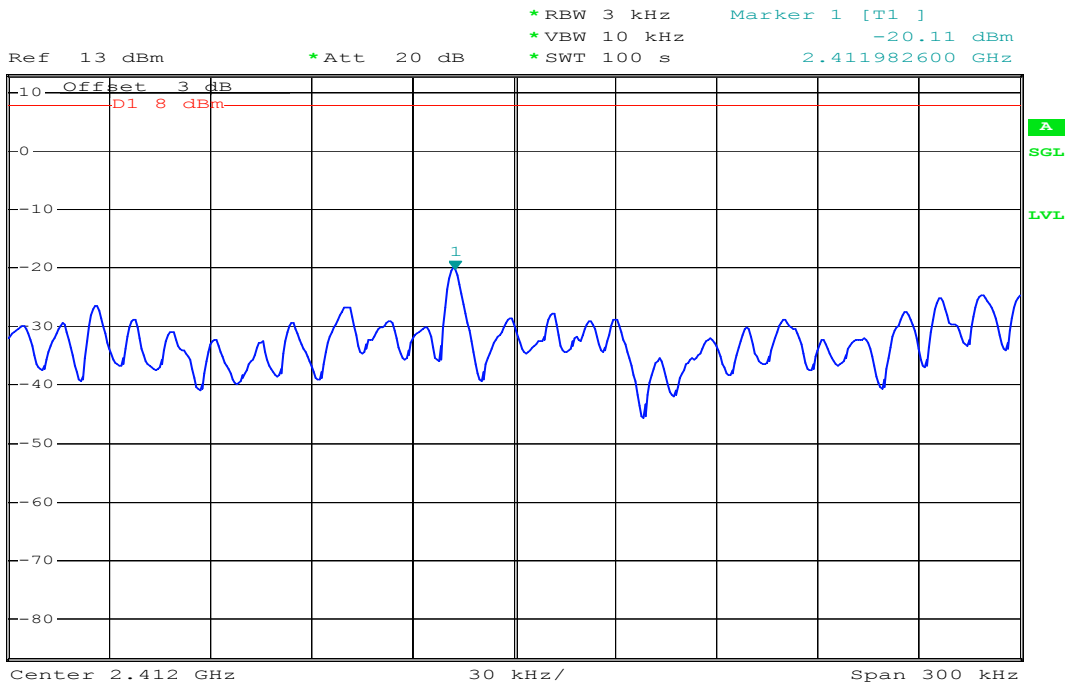
### PPSD (CH High)



Date: 2.AUG.2006 04:41:28

### IEEE 802.11g

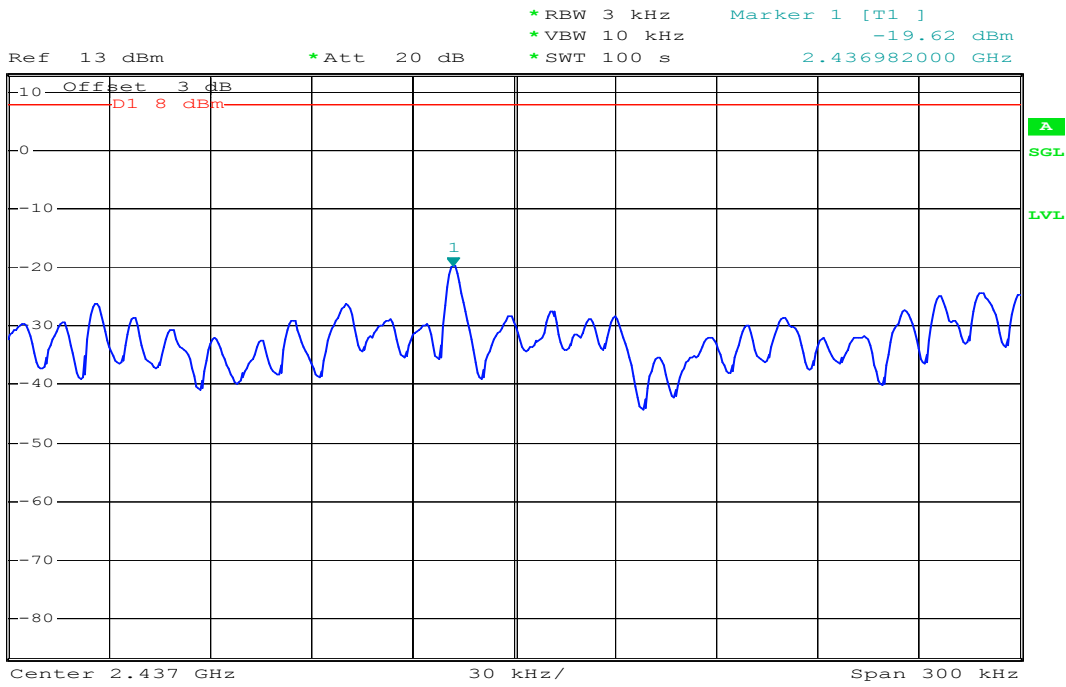
### PPSD (CH Low)



Date: 2.AUG.2006 05:03:38

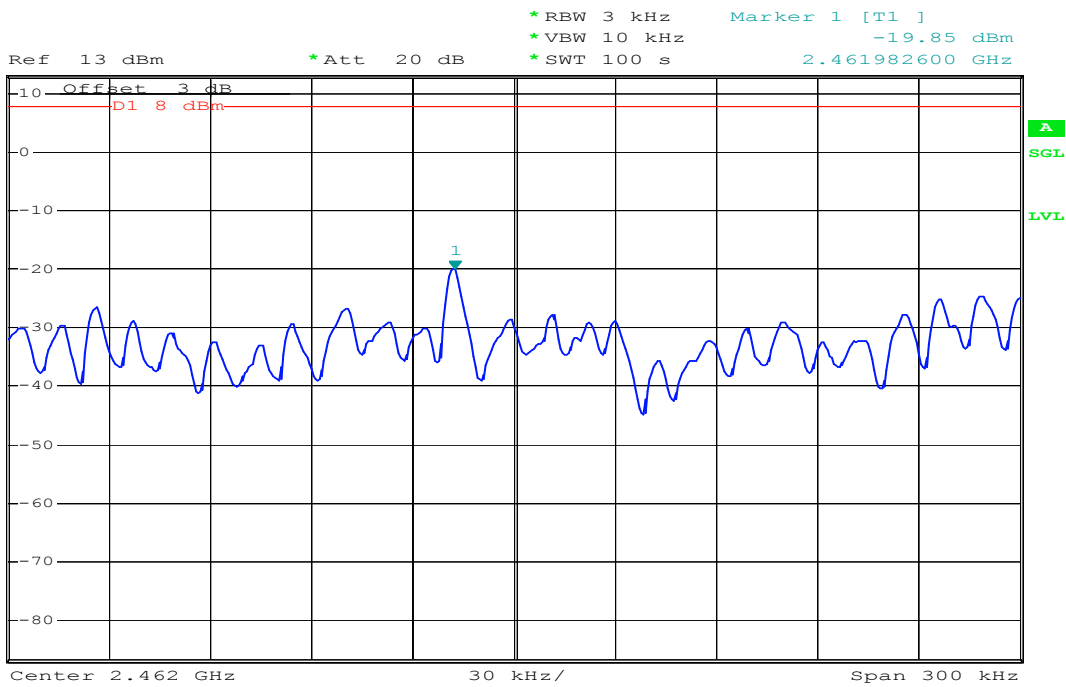


### PPSD (CH Mid)



Date: 2.AUG.2006 05:06:52

### PPSD (CH High)



Date: 2.AUG.2006 05:09:46



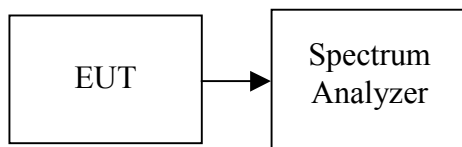
## 7.5 SPURIOUS EMISSIONS

### 7.5.1 Conducted Measurement

#### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

#### Test Configuration



#### TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 25GHz range with the transmitter set to the lowest, middle, and highest channels.

#### TEST RESULTS

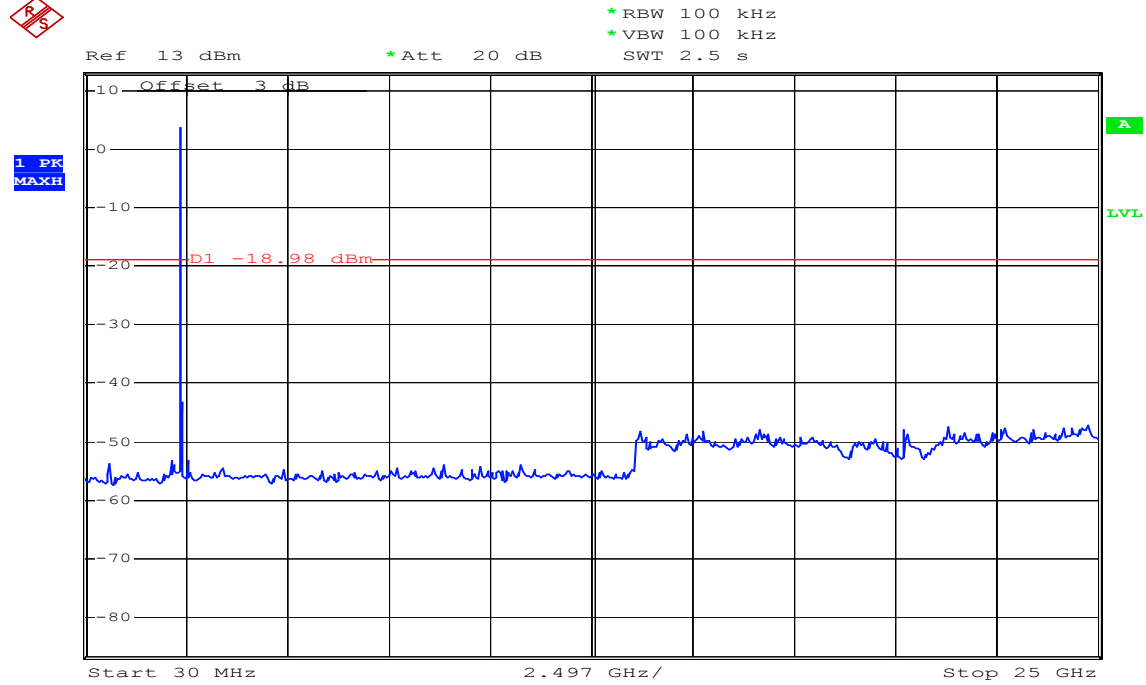
*No non-compliance noted*



**Test Plot**

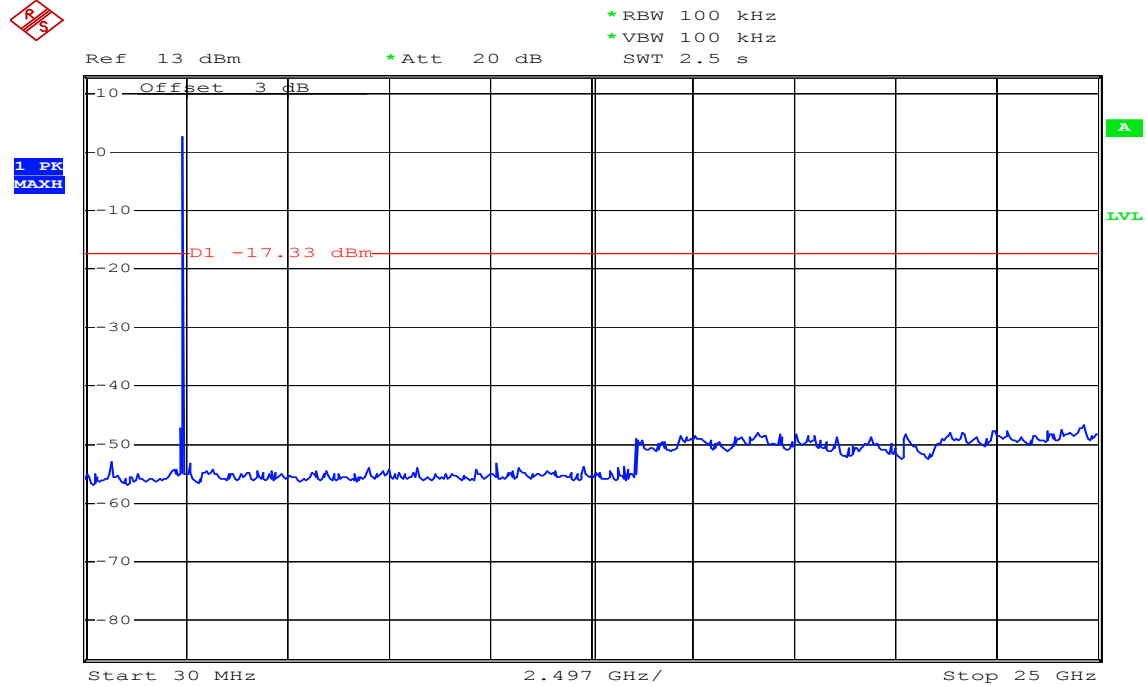
**IEEE 802.11b**

**CH Low**



Date: 2.AUG.2006 05:23:28

**CH Mid**

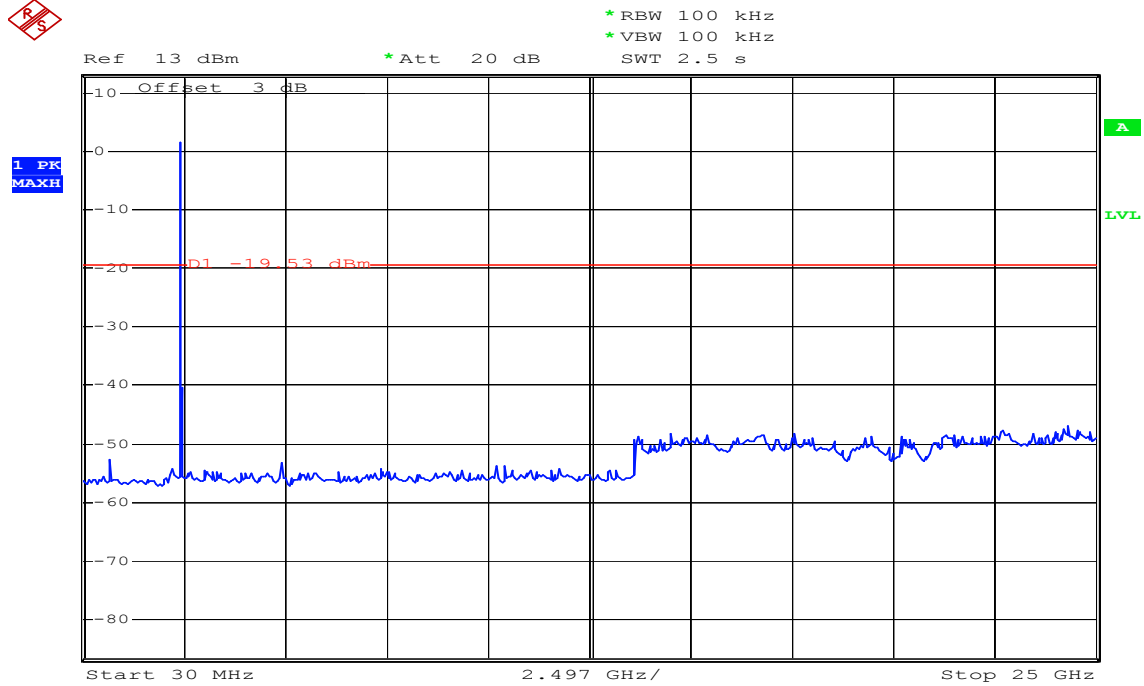


Date: 2.AUG.2006 05:22:28





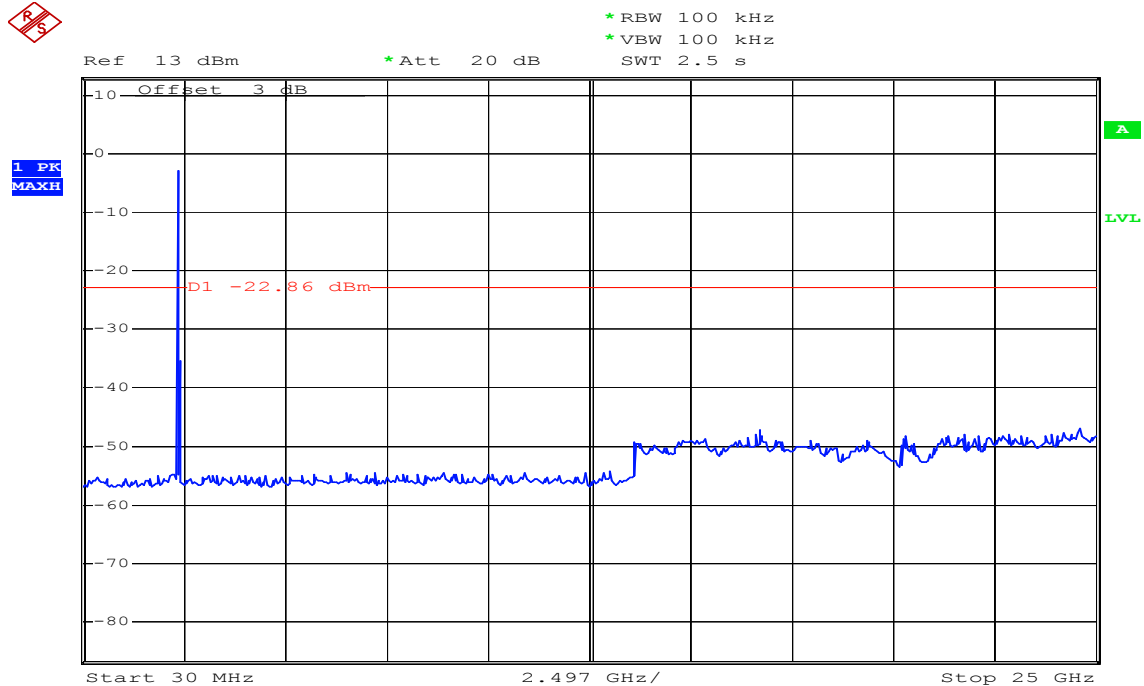
### CH High



Date: 2.AUG.2006 05:24:31

### IEEE 802.11g

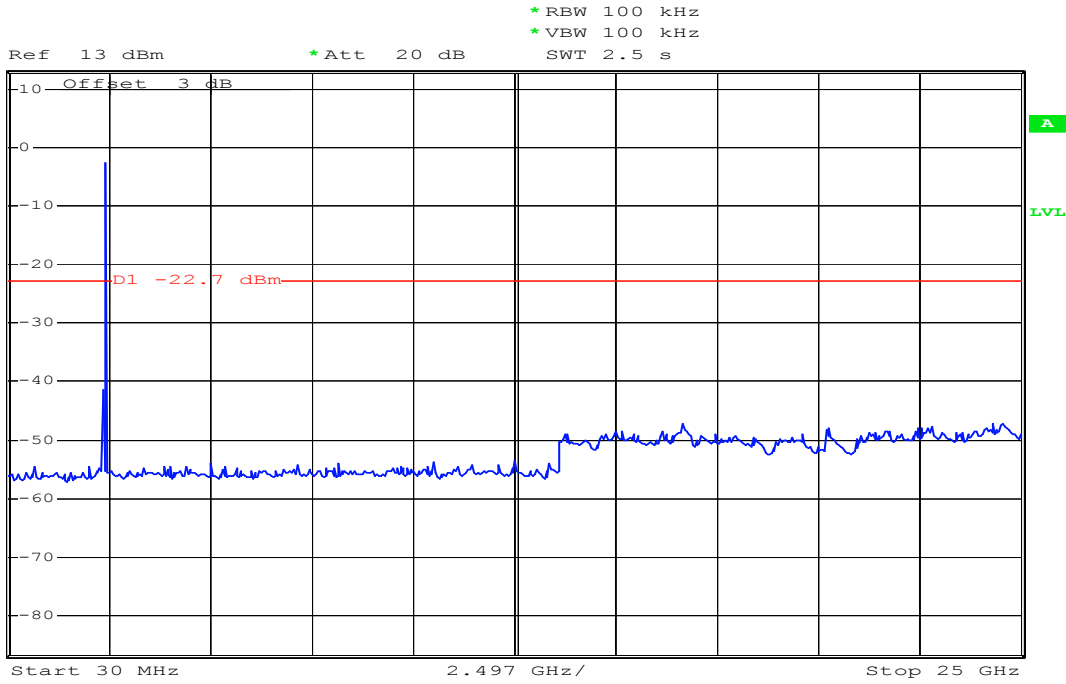
#### CH Low



Date: 2.AUG.2006 05:18:43

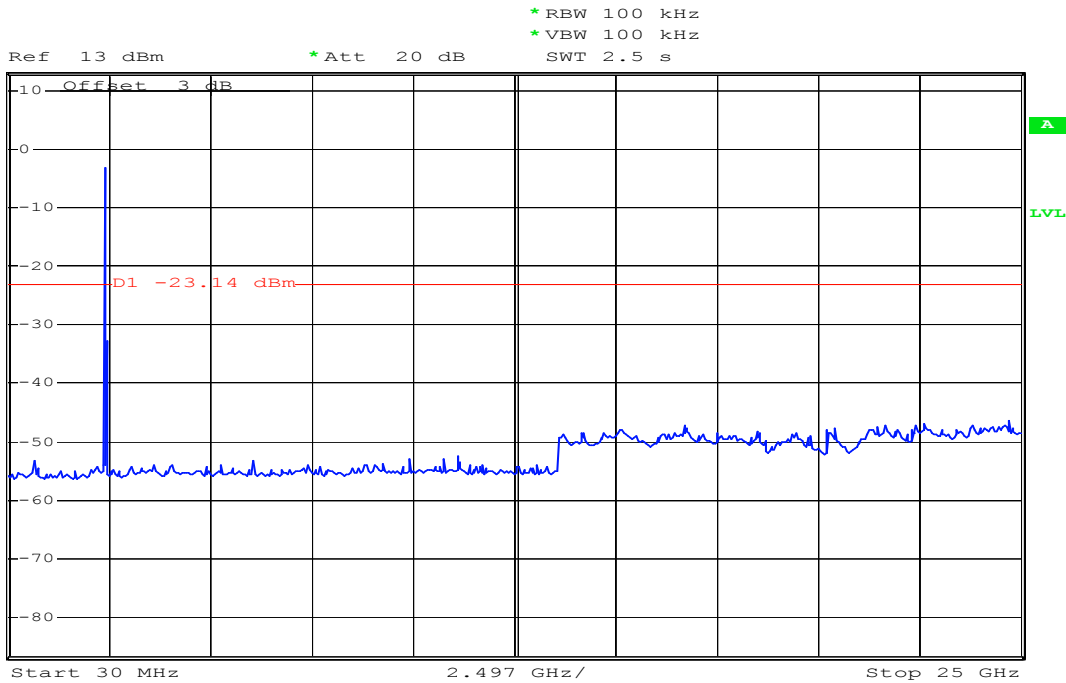


### CH Mid



Date: 2.AUG.2006 05:17:25

### CH High



Date: 2.AUG.2006 05:15:58



### 7.5.2 RADIATED EMISSIONS

#### LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (µV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 30-88           | 100*                  | 3                        |
| 88-216          | 150*                  | 3                        |
| 216-960         | 200*                  | 3                        |
| Above 960       | 500                   | 3                        |

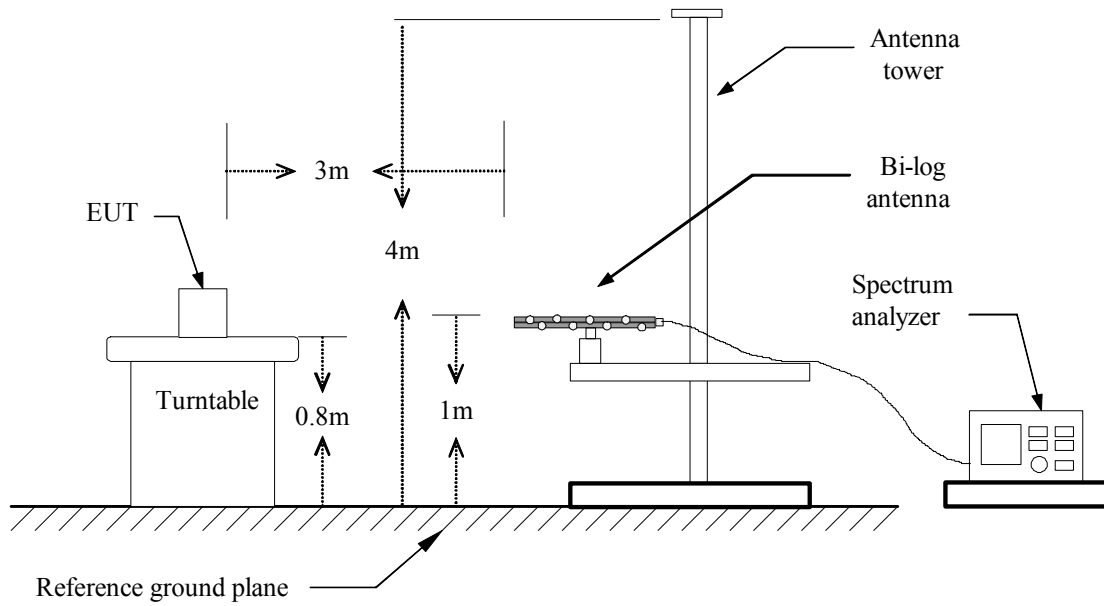
*Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2. In the emission table above, the tighter limit applies at the band edges.

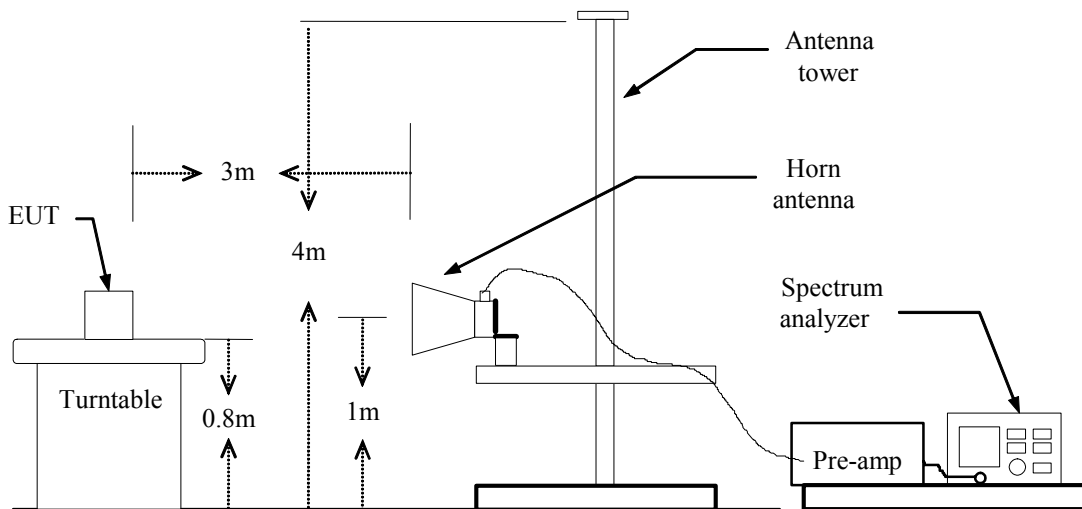
| Frequency (MHz) | Field Strength (µV/m at 3-meter) | Field Strength (dBµV/m at 3-meter) |
|-----------------|----------------------------------|------------------------------------|
| 30-88           | 100                              | 40                                 |
| 88-216          | 150                              | 43.5                               |
| 216-960         | 200                              | 46                                 |
| Above 960       | 500                              | 54                                 |

### Test Configuration

#### Below 1 GHz



#### Above 1 GHz





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
Below 1GHz:  
RBW=100kHz / VBW=300kHz / Sweep=AUTO  
Above 1GHz:  
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO  
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**TEST RESULTS****Below 1GHz****ADD ANT****Operation Mode:** Normal Link**Test Date:** August 1, 2006**Temperature:** 26°C**Tested by:** Arno Hsieh**Humidity:** 55% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant.Pol. (H/V) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|
| 86.00           | V              | 15.07          | 11.86                    | 26.93           | 40.00          | -13.07      | Peak   |
| 136.00          | V              | 18.20          | 10.31                    | 28.51           | 43.50          | -14.99      | Peak   |
| 280.00          | V              | 16.09          | 14.85                    | 30.93           | 46.00          | -15.07      | Peak   |
| 334.00          | V              | 15.71          | 16.33                    | 32.04           | 46.00          | -13.96      | Peak   |
| 577.00          | V              | 16.28          | 21.18                    | 37.45           | 46.00          | -8.55       | Peak   |
| 720.00          | V              | 17.71          | 22.46                    | 40.17           | 46.00          | -5.83       | Peak   |
| 136.00          | H              | 17.21          | 10.31                    | 27.52           | 43.50          | -15.98      | Peak   |
| 216.00          | H              | 16.66          | 13.01                    | 29.68           | 46.00          | -16.32      | Peak   |
| 280.00          | H              | 16.04          | 14.85                    | 30.89           | 46.00          | -15.11      | Peak   |
| 333.00          | H              | 17.53          | 16.30                    | 33.82           | 46.00          | -12.18      | Peak   |
| 577.00          | H              | 16.47          | 21.18                    | 37.64           | 46.00          | -8.36       | Peak   |
| 621.00          | H              | 16.96          | 21.85                    | 38.82           | 46.00          | -7.18       | Peak   |

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5.  $Margin (dB) = Remark\ result (dBuV/m) - Quasi-peak\ limit (dBuV/m)$ .

**Below 1GHz****Without ANT****Operation Mode:** Normal Link**Test Date:** August 1, 2006**Temperature:** 26°C**Tested by:** Arno Hsieh**Humidity:** 55% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant.Pol. (H/V) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|
| 82.00           | V              | 12.23          | 10.51                    | 22.74           | 40.00          | -17.26      | Peak   |
| 158.00          | V              | 4.98           | 10.41                    | 15.39           | 43.50          | -28.11      | Peak   |
| 282.00          | V              | 9.63           | 14.90                    | 24.53           | 46.00          | -21.47      | Peak   |
| 334.00          | V              | 9.74           | 16.33                    | 26.06           | 46.00          | -19.94      | Peak   |
| 579.00          | V              | 10.88          | 21.22                    | 32.09           | 46.00          | -13.91      | Peak   |
| 749.00          | V              | 12.48          | 22.83                    | 35.31           | 46.00          | -10.69      | Peak   |
| 49.00           | H              | 9.77           | 14.41                    | 24.18           | 40.00          | -15.82      | Peak   |
| 86.00           | H              | 11.68          | 11.86                    | 23.54           | 40.00          | -16.46      | Peak   |
| 198.00          | H              | 10.78          | 12.37                    | 23.15           | 43.50          | -20.35      | Peak   |
| 284.00          | H              | 11.44          | 14.95                    | 26.39           | 46.00          | -19.61      | Peak   |
| 334.00          | H              | 10.72          | 16.33                    | 27.04           | 46.00          | -18.96      | Peak   |
| 625.00          | H              | 11.44          | 21.89                    | 33.33           | 46.00          | -12.67      | Peak   |

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz****ADD ANT****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** July 31, 2006**Temperature:** 27°C**Tested by:** Arno Hsieh**Humidity:** 54% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1160.00         | V               | 51.36                 | ---                      | -9.96                    | 41.39                  | ---                       | 74.00                 | 54.00                    | -12.61      | Peak   |
| 1440.00         | V               | 49.16                 | ---                      | -8.67                    | 40.49                  | ---                       | 74.00                 | 54.00                    | -13.51      | Peak   |
| 1788.00         | V               | 49.40                 | ---                      | -6.74                    | 42.66                  | ---                       | 74.00                 | 54.00                    | -11.34      | Peak   |
| 2212.00         | V               | 52.61                 | ---                      | -5.05                    | 47.56                  | ---                       | 74.00                 | 54.00                    | -6.44       | Peak   |
| 2256.00         | V               | 52.97                 | ---                      | -4.95                    | 48.02                  | ---                       | 74.00                 | 54.00                    | -5.98       | Peak   |
| 2612.00         | V               | 53.63                 | ---                      | -3.88                    | 49.74                  | ---                       | 74.00                 | 54.00                    | -4.26       | Peak   |
| 4820.00         | V               | 49.64                 | ---                      | 1.87                     | 51.51                  | ---                       | 74.00                 | 54.00                    | -2.49       | Peak   |
| 1080.00         | H               | 49.94                 | ---                      | -10.33                   | 39.61                  | ---                       | 74.00                 | 54.00                    | -14.39      | Peak   |
| 1160.00         | H               | 51.48                 | ---                      | -9.96                    | 41.52                  | ---                       | 74.00                 | 54.00                    | -12.48      | Peak   |
| 1188.00         | H               | 51.33                 | ---                      | -9.83                    | 41.50                  | ---                       | 74.00                 | 54.00                    | -12.50      | Peak   |
| 4820.00         | H               | 49.94                 | ---                      | 1.87                     | 51.81                  | ---                       | 74.00                 | 54.00                    | -2.19       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** July 31, 2006**Temperature:** 27°C**Tested by:** Arno Hsieh**Humidity:** 54% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1168.00         | V               | 51.78                 | ---                      | -9.92                    | 41.85                  | ---                       | 74.00                 | 54.00                    | -12.15      | Peak   |
| 1584.00         | V               | 49.81                 | ---                      | -7.91                    | 41.90                  | ---                       | 74.00                 | 54.00                    | -12.10      | Peak   |
| 2240.00         | V               | 53.48                 | ---                      | -4.99                    | 48.49                  | ---                       | 74.00                 | 54.00                    | -5.51       | Peak   |
| 2636.00         | V               | 52.82                 | ---                      | -3.77                    | 49.04                  | ---                       | 74.00                 | 54.00                    | -4.96       | Peak   |
| 4870.00         | V               | 47.82                 | ---                      | 2.02                     | 49.84                  | ---                       | 74.00                 | 54.00                    | -4.16       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             | Peak   |
| 1080.00         | H               | 50.15                 | ---                      | -10.33                   | 39.82                  | ---                       | 74.00                 | 54.00                    | -14.18      | Peak   |
| 1168.00         | H               | 52.09                 | ---                      | -9.92                    | 42.16                  | ---                       | 74.00                 | 54.00                    | -11.84      | Peak   |
| 1440.00         | H               | 48.79                 | ---                      | -8.67                    | 40.12                  | ---                       | 74.00                 | 54.00                    | -13.88      | Peak   |
| 4870.00         | H               | 51.69                 | 42.49                    | 2.02                     | 53.71                  | 44.51                     | 74.00                 | 54.00                    | -9.49       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11b / CH High

Test Date: July 31, 2006

Temperature: 27°C

Tested by: Arno Hsieh

Humidity: 54% RH

Polarity: Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1956.00         | V               | 51.69                 | ---                      | -5.78                    | 45.91                  | ---                       | 74.00                 | 54.00                    | -8.09       | Peak   |
| 2268.00         | V               | 54.87                 | ---                      | -4.92                    | 49.95                  | ---                       | 74.00                 | 54.00                    | -4.05       | Peak   |
| 2684.00         | V               | 53.73                 | ---                      | -3.55                    | 50.17                  | ---                       | 74.00                 | 54.00                    | -3.83       | Peak   |
| 4920.00         | V               | 53.66                 | 46.24                    | 2.16                     | 55.83                  | 48.40                     | 74.00                 | 54.00                    | -5.60       | AVG    |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1164.00         | H               | 51.52                 | ---                      | -9.94                    | 41.58                  | ---                       | 74.00                 | 54.00                    | -12.42      | Peak   |
| 1440.00         | H               | 50.94                 | ---                      | -8.67                    | 42.27                  | ---                       | 74.00                 | 54.00                    | -11.73      | AVG    |
| 4920.00         | H               | 52.88                 | 45.49                    | 2.16                     | 55.04                  | 47.65                     | 74.00                 | 54.00                    | -6.35       | AVG    |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Above 1 GHz****WITHOUT ANT****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1080.00         | V               | 50.70                 | ---                      | -10.33                   | 40.37                  | ---                       | 74.00                 | 54.00                    | -13.63      | Peak   |
| 1168.00         | V               | 52.01                 | ---                      | -9.92                    | 42.09                  | ---                       | 74.00                 | 54.00                    | -11.91      | Peak   |
| 2252.00         | V               | 50.83                 | ---                      | -4.96                    | 45.87                  | ---                       | 74.00                 | 54.00                    | -8.13       | Peak   |
| 2616.00         | V               | 52.44                 | ---                      | -3.87                    | 48.57                  | ---                       | 74.00                 | 54.00                    | -5.43       | Peak   |
| 4820.00         | V               | 45.57                 | ---                      | 1.87                     | 47.45                  | ---                       | 74.00                 | 54.00                    | -6.55       | Peak   |
| 7570.00         | V               | 42.67                 | ---                      | 7.12                     | 49.79                  | ---                       | 74.00                 | 54.00                    | -4.21       | Peak   |
| 1076.00         | H               | 50.47                 | ---                      | -10.35                   | 40.12                  | ---                       | 74.00                 | 54.00                    | -13.88      | Peak   |
| 1160.00         | H               | 52.81                 | ---                      | -9.96                    | 42.85                  | ---                       | 74.00                 | 54.00                    | -11.15      | Peak   |
| 2216.00         | H               | 49.79                 | ---                      | -5.04                    | 44.75                  | ---                       | 74.00                 | 54.00                    | -9.25       | Peak   |
| 2252.00         | H               | 50.83                 | ---                      | -4.96                    | 45.87                  | ---                       | 74.00                 | 54.00                    | -8.13       | Peak   |
| 2616.00         | H               | 51.32                 | ---                      | -3.87                    | 47.45                  | ---                       | 74.00                 | 54.00                    | -6.55       | Peak   |
| 4820.00         | H               | 45.96                 | ---                      | 1.87                     | 47.83                  | ---                       | 74.00                 | 54.00                    | -6.17       | Peak   |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1076.00         | V               | 48.17                 | ---                      | -10.35                   | 37.82                  | ---                       | 74.00                 | 54.00                    | -16.18      | Peak   |
| 1164.00         | V               | 50.13                 | ---                      | -9.94                    | 40.19                  | ---                       | 74.00                 | 54.00                    | -13.81      | Peak   |
| 1500.00         | V               | 48.83                 | ---                      | -8.39                    | 40.44                  | ---                       | 74.00                 | 54.00                    | -13.56      | Peak   |
| 1792.00         | V               | 49.19                 | ---                      | -6.72                    | 42.47                  | ---                       | 74.00                 | 54.00                    | -11.53      | Peak   |
| 4870.00         | V               | 49.19                 | ---                      | 2.02                     | 51.21                  | ---                       | 74.00                 | 54.00                    | -2.79       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1108.00         | H               | 51.75                 | ---                      | -10.20                   | 41.55                  | ---                       | 74.00                 | 54.00                    | -12.45      | Peak   |
| 1164.00         | H               | 51.76                 | ---                      | -9.94                    | 41.82                  | ---                       | 74.00                 | 54.00                    | -12.18      | Peak   |
| 2280.00         | H               | 50.17                 | ---                      | -4.90                    | 45.27                  | ---                       | 74.00                 | 54.00                    | -8.73       | Peak   |
| 2564.00         | H               | 50.02                 | ---                      | -4.11                    | 45.92                  | ---                       | 74.00                 | 54.00                    | -8.08       | Peak   |
| 2636.00         | H               | 50.74                 | ---                      | -3.77                    | 46.97                  | ---                       | 74.00                 | 54.00                    | -7.03       | Peak   |
| 4870.00         | H               | 48.34                 | ---                      | 2.02                     | 50.36                  | ---                       | 74.00                 | 54.00                    | -3.64       | Peak   |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11b / CH High

Test Date: July 31, 2006

Temperature: 26, 27°C

Tested by: Arno Hsieh

Humidity: 54% RH

Polarity: Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1168.00         | V               | 50.57                 | ---                      | -9.92                    | 40.65                  | ---                       | 74.00                 | 54.00                    | -13.35      | Peak   |
| 1796.00         | V               | 48.78                 | ---                      | -6.70                    | 42.09                  | ---                       | 74.00                 | 54.00                    | -11.91      | Peak   |
| 4930.00         | V               | 49.63                 | ---                      | 2.19                     | 51.83                  | ---                       | 74.00                 | 54.00                    | -2.17       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1164.00         | H               | 51.63                 | ---                      | -9.94                    | 41.69                  | ---                       | 74.00                 | 54.00                    | -12.31      | Peak   |
| 2304.00         | H               | 51.63                 | ---                      | -4.84                    | 46.78                  | ---                       | 74.00                 | 54.00                    | -7.22       | Peak   |
| 2604.00         | H               | 49.80                 | ---                      | -3.92                    | 45.87                  | ---                       | 74.00                 | 54.00                    | -8.13       | Peak   |
| 2660.00         | H               | 50.94                 | ---                      | -3.66                    | 47.27                  | ---                       | 74.00                 | 54.00                    | -6.73       | Peak   |
| 4920.00         | H               | 51.36                 | 40.49                    | 2.16                     | 53.52                  | 42.65                     | 74.00                 | 54.00                    | -11.35      | AVG    |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Above 1 GHz****ADD ANT****Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 2236.00         | V               | 52.48                 | ---                      | -5.00                    | 47.48                  | ---                       | 74.00                 | 54.00                    | -6.52       | Peak   |
| 2364.00         | V               | 54.29                 | ---                      | -4.71                    | 49.58                  | ---                       | 74.00                 | 54.00                    | -4.42       | Peak   |
| 2508.00         | V               | 51.27                 | ---                      | -4.36                    | 46.91                  | ---                       | 74.00                 | 54.00                    | -7.09       | Peak   |
| 2612.00         | V               | 51.63                 | ---                      | -3.88                    | 47.75                  | ---                       | 74.00                 | 54.00                    | -6.25       | Peak   |
| 4820.00         | V               | 48.30                 | ---                      | 1.87                     | 50.17                  | ---                       | 74.00                 | 54.00                    | -3.83       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1108.00         | H               | 50.15                 | ---                      | -10.20                   | 39.95                  | ---                       | 74.00                 | 54.00                    | -14.05      | Peak   |
| 1156.00         | H               | 53.24                 | ---                      | -9.98                    | 43.26                  | ---                       | 74.00                 | 54.00                    | -10.74      | Peak   |
| 1192.00         | H               | 52.32                 | ---                      | -9.81                    | 42.50                  | ---                       | 74.00                 | 54.00                    | -11.50      | Peak   |
| 4820.00         | H               | 49.48                 | ---                      | 1.87                     | 51.35                  | ---                       | 74.00                 | 54.00                    | -2.65       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1172.00         | V               | 51.69                 | ---                      | -9.91                    | 41.78                  | ---                       | 74.00                 | 54.00                    | -12.22      | Peak   |
| 2288.00         | V               | 53.19                 | ---                      | -4.88                    | 48.31                  | ---                       | 74.00                 | 54.00                    | -5.69       | Peak   |
| 2576.00         | V               | 51.53                 | ---                      | -4.05                    | 47.48                  | ---                       | 74.00                 | 54.00                    | -6.52       | Peak   |
| 4870.00         | V               | 46.07                 | ---                      | 2.02                     | 48.09                  | ---                       | 74.00                 | 54.00                    | -5.91       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1104.00         | H               | 49.30                 | ---                      | -10.22                   | 39.09                  | ---                       | 74.00                 | 54.00                    | -14.91      | Peak   |
| 1164.00         | H               | 50.86                 | ---                      | -9.94                    | 40.92                  | ---                       | 74.00                 | 54.00                    | -13.08      | Peak   |
| 1440.00         | H               | 48.67                 | ---                      | -8.67                    | 40.00                  | ---                       | 74.00                 | 54.00                    | -14.00      | Peak   |
| 4870.00         | H               | 45.87                 | ---                      | 2.02                     | 47.88                  | ---                       | 74.00                 | 54.00                    | -6.12       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11g / CH High

Test Date: July 31, 2006

Temperature: 26, 27°C

Tested by: Arno Hsieh

Humidity: 54 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1160.00         | V               | 51.11                 | ---                      | -9.96                    | 41.15                  | ---                       | 74.00                 | 54.00                    | -12.85      | Peak   |
| 1788.00         | V               | 48.82                 | ---                      | -6.74                    | 42.08                  | ---                       | 74.00                 | 54.00                    | -11.92      | Peak   |
| 2304.00         | V               | 54.88                 | ---                      | -4.84                    | 50.04                  | ---                       | 74.00                 | 54.00                    | -3.96       | Peak   |
| 2664.00         | V               | 53.10                 | ---                      | -3.65                    | 49.46                  | ---                       | 74.00                 | 54.00                    | -4.54       | Peak   |
| 4930.00         | V               | 47.71                 | ---                      | 2.19                     | 49.90                  | ---                       | 74.00                 | 54.00                    | -4.10       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1104.00         | H               | 52.43                 | ---                      | -10.22                   | 42.21                  | ---                       | 74.00                 | 54.00                    | -11.79      | Peak   |
| 1164.00         | H               | 52.03                 | ---                      | -9.94                    | 42.09                  | ---                       | 74.00                 | 54.00                    | -11.91      | Peak   |
| 1440.00         | H               | 49.22                 | ---                      | -8.67                    | 40.55                  | ---                       | 74.00                 | 54.00                    | -13.45      | Peak   |
| 4920.00         | H               | 47.55                 | ---                      | 2.16                     | 49.72                  | ---                       | 74.00                 | 54.00                    | -4.28       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
|                 |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Above 1 GHz****WITHOUT ANT****Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1160.00         | V               | 51.95                 | ---                      | -9.96                    | 41.99                  | ---                       | 74.00                 | 54.00                    | -12.01      | Peak   |
| 1332.00         | V               | 50.33                 | ---                      | -9.17                    | 41.17                  | ---                       | 74.00                 | 54.00                    | -12.83      | Peak   |
| 1496.00         | V               | 50.30                 | ---                      | -8.41                    | 41.89                  | ---                       | 74.00                 | 54.00                    | -12.11      | Peak   |
| 4820.00         | V               | 43.77                 | ---                      | 1.87                     | 45.64                  | ---                       | 74.00                 | 54.00                    | -8.36       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1160.00         | H               | 51.95                 | ---                      | -9.96                    | 41.99                  | ---                       | 74.00                 | 54.00                    | -12.01      | Peak   |
| 1332.00         | H               | 50.33                 | ---                      | -9.17                    | 41.17                  | ---                       | 74.00                 | 54.00                    | -12.83      | Peak   |
| 1496.00         | H               | 50.30                 | ---                      | -8.41                    | 41.89                  | ---                       | 74.00                 | 54.00                    | -12.11      | Peak   |
| 2076.00         | H               | 50.20                 | ---                      | -5.36                    | 44.84                  | ---                       | 74.00                 | 54.00                    | -9.16       | Peak   |
| 4820.00         | H               | 43.71                 | ---                      | 1.87                     | 45.58                  | ---                       | 74.00                 | 54.00                    | -8.42       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1076.00         | V               | 49.89                 | ---                      | -10.35                   | 39.54                  | ---                       | 74.00                 | 54.00                    | -14.46      | Peak   |
| 1156.00         | V               | 50.68                 | ---                      | -9.98                    | 40.70                  | ---                       | 74.00                 | 54.00                    | -13.30      | Peak   |
| 1248.00         | V               | 48.99                 | ---                      | -9.55                    | 39.43                  | ---                       | 74.00                 | 54.00                    | -14.57      | Peak   |
| 1420.00         | V               | 48.67                 | ---                      | -8.76                    | 39.91                  | ---                       | 74.00                 | 54.00                    | -14.09      | Peak   |
| 1776.00         | V               | 48.91                 | ---                      | -6.81                    | 42.10                  | ---                       | 74.00                 | 54.00                    | -11.90      | Peak   |
| 4870.00         | V               | 43.99                 | ---                      | 2.02                     | 46.01                  | ---                       | 74.00                 | 54.00                    | -7.99       | Peak   |
| 1164.00         | H               | 52.90                 | ---                      | -9.94                    | 42.96                  | ---                       | 74.00                 | 54.00                    | -11.04      | Peak   |
| 1440.00         | H               | 50.01                 | ---                      | -8.67                    | 41.34                  | ---                       | 74.00                 | 54.00                    | -12.66      | Peak   |
| 2244.00         | H               | 49.33                 | ---                      | -4.98                    | 44.35                  | ---                       | 74.00                 | 54.00                    | -9.65       | Peak   |
| 2640.00         | H               | 51.10                 | ---                      | -3.76                    | 47.34                  | ---                       | 74.00                 | 54.00                    | -6.66       | Peak   |
| 4870.00         | H               | 44.27                 | ---                      | 2.02                     | 46.29                  | ---                       | 74.00                 | 54.00                    | -7.71       | Peak   |
| 7330.00         | H               | 43.17                 | ---                      | 6.67                     | 49.85                  | ---                       | 74.00                 | 54.00                    | -4.15       | Peak   |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH High**Test Date:** July 31, 2006**Temperature:** 26, 27°C**Tested by:** Arno Hsieh**Humidity:** 54 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Ant. Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|-----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| 1064.00         | V               | 50.90                 | ---                      | -10.40                   | 40.50                  | ---                       | 74.00                 | 54.00                    | -13.50      | Peak   |
| 1156.00         | V               | 51.90                 | ---                      | -9.98                    | 41.92                  | ---                       | 74.00                 | 54.00                    | -12.08      | Peak   |
| 1504.00         | V               | 50.35                 | ---                      | -8.37                    | 41.98                  | ---                       | 74.00                 | 54.00                    | -12.02      | Peak   |
| 4930.00         | V               | 45.83                 | ---                      | 2.19                     | 48.03                  | ---                       | 74.00                 | 54.00                    | -5.97       | Peak   |
| N/A             |                 |                       |                          |                          |                        |                           |                       |                          |             |        |
| 1164.00         | H               | 51.35                 | ---                      | -9.94                    | 41.41                  | ---                       | 74.00                 | 54.00                    | -12.59      | Peak   |
| 1440.00         | H               | 49.26                 | ---                      | -8.67                    | 40.59                  | ---                       | 74.00                 | 54.00                    | -13.41      | Peak   |
| 2304.00         | H               | 50.74                 | ---                      | -4.84                    | 45.90                  | ---                       | 74.00                 | 54.00                    | -8.10       | Peak   |
| 2660.00         | H               | 48.95                 | ---                      | -3.66                    | 45.29                  | ---                       | 74.00                 | 54.00                    | -8.71       | Peak   |
| 4930.00         | H               | 45.03                 | ---                      | 2.19                     | 47.23                  | ---                       | 74.00                 | 54.00                    | -6.77       | Peak   |
| 7390.00         | H               | 42.99                 | ---                      | 6.84                     | 49.82                  | ---                       | 74.00                 | 54.00                    | -4.18       | Peak   |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



## 7.6 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency Range (MHz) | Limits (dB $\mu$ V) |           |
|-----------------------|---------------------|-----------|
|                       | Quasi-peak          | Average   |
| 0.15 to 0.50          | 66 to 56*           | 56 to 46* |
| 0.50 to 5             | 56                  | 46        |
| 5 to 30               | 60                  | 50        |

\* Decreases with the logarithm of the frequency.

### Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

**TEST RESULTS**

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

**Test Data**

**Operation Mode:** Normal Link                      **Test Date:** August 1, 2006  
**Temperature:** 25°C                                      **Tested by:** Arno Hsieh  
**Humidity:** 44% RH

| Freq. (MHz) | QP Reading (dBuV) | AV Reading (dBuV) | Corr. factor (dB) | QP Result (dBuV) | AV Result (dBuV) | QP Limit (dBuV) | AV Limit (dBuV) | QP Margin (dB) | AV Margin (dB) | Note |
|-------------|-------------------|-------------------|-------------------|------------------|------------------|-----------------|-----------------|----------------|----------------|------|
| 0.15        | 29.38             | 20.00             | 10.10             | 39.48            | 30.10            | 66.00           | 56.00           | -26.52         | -25.90         | L1   |
| 0.61        | 25.09             | 21.77             | 10.12             | 35.21            | 31.89            | 56.00           | 46.00           | -20.79         | -14.11         | L1   |
| 1.29        | 21.49             | 18.08             | 10.20             | 31.69            | 28.28            | 56.00           | 46.00           | -24.31         | -17.72         | L1   |
| 5.57        | 16.54             | 7.87              | 10.40             | 26.94            | 18.27            | 60.00           | 50.00           | -33.06         | -31.73         | L1   |
| 6.79        | 16.88             | 11.02             | 10.48             | 27.36            | 21.50            | 60.00           | 50.00           | -32.64         | -28.50         | L1   |
| 28.17       | 16.50             | 10.20             | 11.56             | 28.06            | 21.76            | 60.00           | 50.00           | -31.94         | -28.24         | L1   |
| 0.21        | 23.40             | 15.69             | 10.90             | 34.30            | 26.59            | 63.21           | 53.21           | -28.91         | -26.62         | L2   |
| 0.27        | 28.03             | 24.57             | 10.90             | 38.93            | 35.47            | 61.12           | 51.12           | -22.19         | -15.65         | L2   |
| 0.37        | 24.16             | 6.11              | 10.97             | 35.13            | 17.08            | 58.50           | 48.50           | -23.37         | -31.42         | L2   |
| 0.95        | 23.74             | 20.38             | 10.90             | 34.64            | 31.28            | 56.00           | 46.00           | -21.36         | -14.72         | L2   |
| 2.51        | 18.28             | 14.94             | 10.95             | 29.23            | 25.89            | 56.00           | 46.00           | -26.77         | -20.11         | L2   |
| 6.31        | 21.90             | 18.33             | 11.10             | 33.00            | 29.43            | 60.00           | 50.00           | -27.00         | -20.57         | L2   |

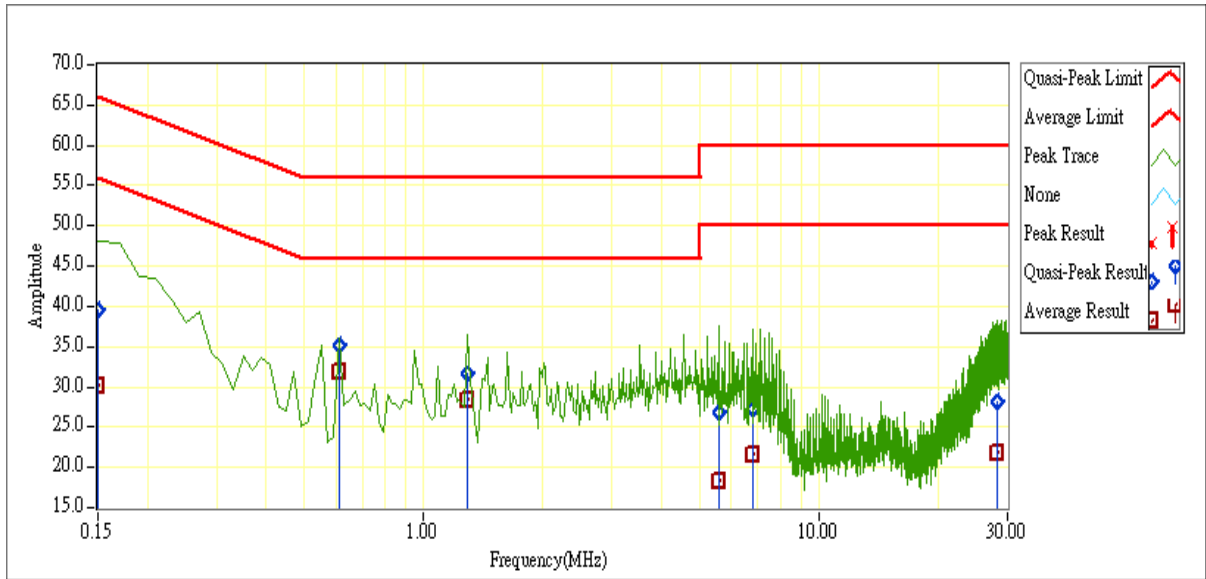
***Remark:***

- 1. Measuring frequencies from 0.15 MHz to 30MHz.*
- 2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
- 3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9 kHz;*
- 4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

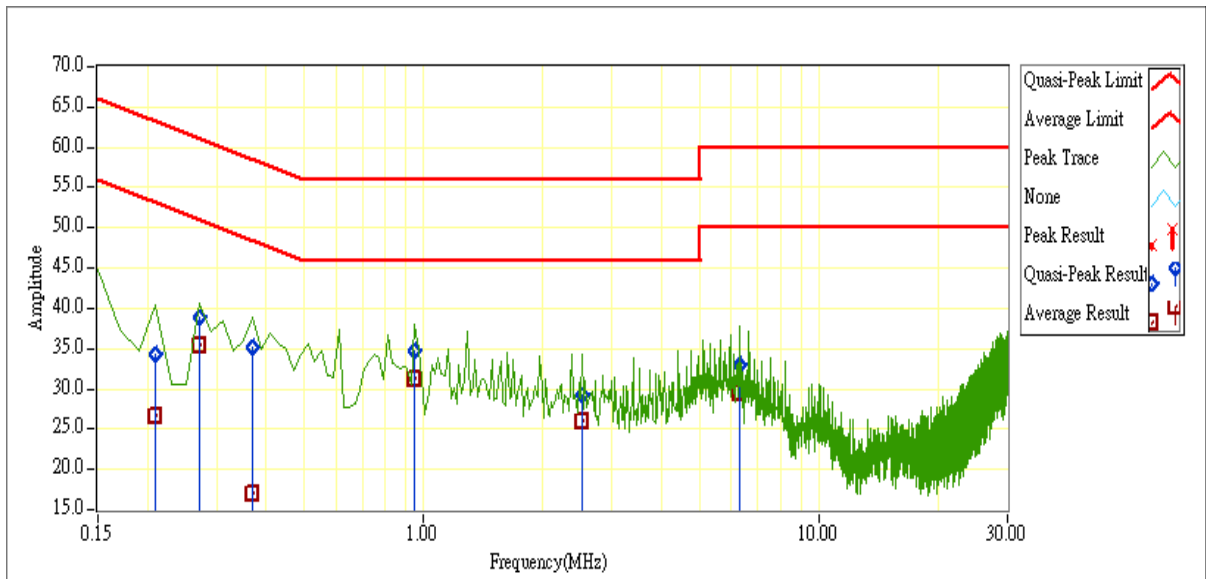


**Test Plots**

**Conducted emissions (Line 1)**



**Conducted emissions (Line 2)**





# APPENDIX I RADIO FREQUENCY EXPOSURE

## LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

## EUT Specification

|                                   |  |
|-----------------------------------|--|
| <b>EUT</b>                        | Wireless LAN USB Dongle  |
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br><input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz<br><input type="checkbox"/> Others |
| <b>Device category</b>            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)<br><input type="checkbox"/> Others   |
| <b>Exposure classification</b>    | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )                                  |
| <b>Antenna diversity</b>          | <input checked="" type="checkbox"/> Single antenna<br><input type="checkbox"/> Multiple antennas<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input type="checkbox"/> Tx/Rx diversity |
| <b>Max. output power</b>          | IEEE 802.11b: 16.54 dBm (45.08mW)<br>IEEE 802.11g: 13.67 dBm (23.28mW)   |
| <b>Antenna gain (Max)</b>         | 5.0 dBi (Numeric gain: 3.16)   |
| <b>Evaluation applied</b>         | <input checked="" type="checkbox"/> MPE Evaluation<br><input type="checkbox"/> SAR Evaluation  |

### Remark:

- The maximum output power is 16.54dBm (45.08mW) at 2412MHz (with 3.16 numeric antenna gain.)
- DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
- For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.

## TEST RESULTS

No non-compliance noted.



**Calculation**

Given  $E = \frac{\sqrt{30 \times P \times G}}{d}$  &  $S = \frac{E^2}{3770}$

Where  $E =$  Field strength in Volts / meter

$P =$  Power in Watts

$G =$  Numeric antenna gain

$d =$  Distance in meters

$S =$  Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where  $d =$  Distance in cm

$P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>

**Maximum Permissible Exposure**

EUT output power = 45.08mW

Numeric Antenna gain = 3.16

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where  $P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>

→ Power density = 0.0283 mW / cm<sup>2</sup>

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.)