# FCC 47 CFR PART 15 SUBPART C

# TEST REPORT

## For

## Wireless Audio AP

## Trade Name: AzureWave

## Model Number: AW-GA200; AW-GA201

*Issued to*

**AzureWave Technologies, Inc.**
**8F, No.94, Baozhong Rd., Xindian,**
**Taipei , Taiwan 231, R.O.C.**

*Issued by*

**Compliance Certification Services Inc.**
**No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,**
**Taoyuan Hsien, (338) Taiwan, R.O.C.**
**TEL: 886-3-324-0332**
**FAX: 886-3-324-5235**

ACCREDITED
No. 0824-01

Testing Laboratory
0363

# TABLE OF CONTENTS

# 1. TEST RESULT CERTIFICATION

**Applicant:** AzureWave Technologies, Inc.
8F, No.94, Baozhong Rd., Xindian,
Taipei , Taiwan 231, R.O.C.

**Equipment Under Test:** Wireless Audio AP

**Trade Name:** AzureWave

**Model Number:** AW-GA200; AW-GA201

**Date of Test:** Aug. 19 ~ 21, 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:***

Miller Lee
Deputy Manager of Linkou Laboratory
Compliance Certification Services Inc.

***Reviewed by:***

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

# 2. EUT DESCRIPTION

| | | | |
|---|---|---|---|
| **Product** | Wireless Audio AP | | |
| **Trade Name** | AzureWave | | |
| **Model Number** | AW-GA200; AW-GA201 | | |
| **Model Discrepancy** | All the above models are identical except the flash memory capacity. | | |
| **Power Adapter Manufacturer** | ENERTRONIX | **Model** | EXA0601UA |
| | SPEC LIN | **Model** | SP05001000-U |
| **Power Adapter Power Rating** | **For EXA0601UA**<br>I/P: 100-240VAC, 50-60Hz, 0.5A<br>O/P: DC 5V, 1A<br>**For SP05001000-U**<br>I/P: 100-240VAC, 50-60Hz, 0.3A<br>O/P: DC 5V, 1A | | |
| **Frequency Range** | 2412 ~ 2462 MHz | | |
| **Transmit Power** | IEEE802.11b mode: 18.08 dBm<br>IEEE802.11g mode: 19.42 dBm | | |
| **Modulation Technique** | IEEE802.11b: DSSS<br>IEEE802.11g: OFDM | | |
| **Transmit Data Rate** | IEEE802.11b: 11Mbps(CCK) with fall back rates of 5.5, 2, and 1Mbps<br>IEEE802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9/6 Mbps (OFDM) | | |
| **Number of Channels** | 11 Channels | | |
| **Antenna Specification** | Dipole antenna<br>Gain: 1.8dBi | | |

***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: TLZ-GA200 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 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | 322 - 335.4 | | |

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] 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: AW-GA200; AW-GA201) had been tested under operating condition.

After verification, the worst-case test model was the AW-GA201.

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

There were two sources of power adapters: ENERTRONIX / EXA0601UA and SPEC LIN / 050010000-U. After verified, the worst data of radiated spurious emission recorded in the test report was Delta / ADP-10SB.

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

IEEE802.11b: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 11Mbps data rate were chosen for full testing.

IEEE802.11g:

Base mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

# 4. 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.

# 5. FACILITIES AND ACCREDITATIONS

## 5.1 FACILITIES

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

☒ No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.

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

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 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200600-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (Registration no: 93105 and 90471).

## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

| 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, EIC/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 | ACCREDITED No. 0824-01 |
| USA | FCC | 3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements | 93105, 90471 |
| Japan | VCCI | 3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements | 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 | 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 | Testing Laboratory 0363 |
| Taiwan | BSMI | CNS 13438, CNS 13783-1, CNS 13439, CNS 14115 | SL2-IS-E-0014 / IN-E-0014 /A1-E-0014 /R1-E-0014 /R2-E-0014 /L1-E-0014 |
| Canada | Industry Canada | RSS212, Issue 1 | IC 3991-3<br>IC 3991-4 |

** No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.*

# 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. | Equipment | Model No. | Serial No. | FCC ID | Trade Name | Data Cable | Power Cord |
|---|---|---|---|---|---|---|---|
| 1 | DVD | DVP-NS975V | 2030939 | FCC DoC | SONY | AV Terminal Cable: Unshielded, 1.8m | Unshielded, 1.8m |
| 2 | 5.1 DIGITAL | J9918 | 00-J-870010-C | FCC DoC | JS | Fiber Cable: Unshielded, 1.8m | Unshielded, 1.8m |
| 3 | Multimedia Headset | Axis-301 | N/A | FCC DoC | Labtec | Unshielded, 1.8m | N/A |
| 4 | Notebook PC | PDG-6GFP | J000YXJM | FCC DOC | SONY | LAN Cable: Unshielded, 10m | AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with two cores |

***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

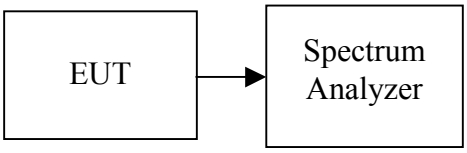
For the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

### MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 100112 | 09/12/2006 |

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

**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 = 100kHz, VBW = RBW, Span = auto, 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) | Margin (kHz) |
|---|---|---|---|---|
| Low | 2412 | 9900 | >500 | PASS |
| Mid | 2437 | 9500 | | PASS |
| High | 2462 | 9500 | | PASS |

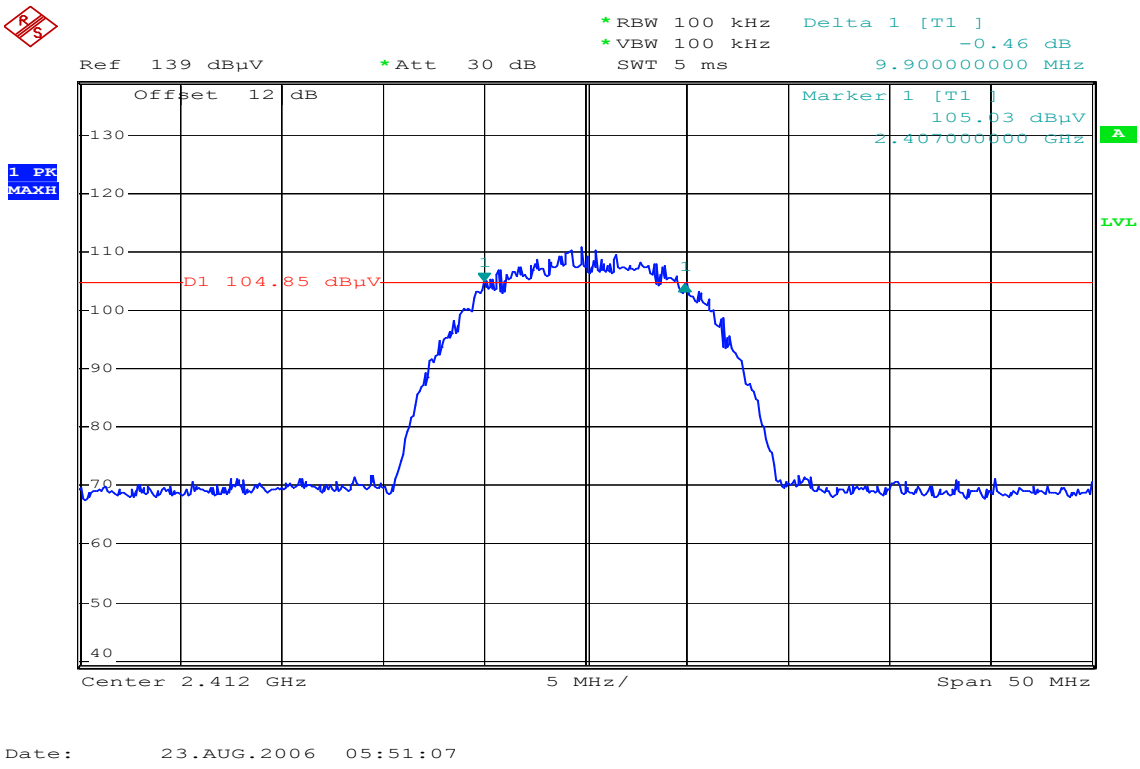
**Test mode: IEEE 802.11g**

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

## Test Plot

## IEEE 802.11b mode

**6dB Bandwidth (CH Low)**

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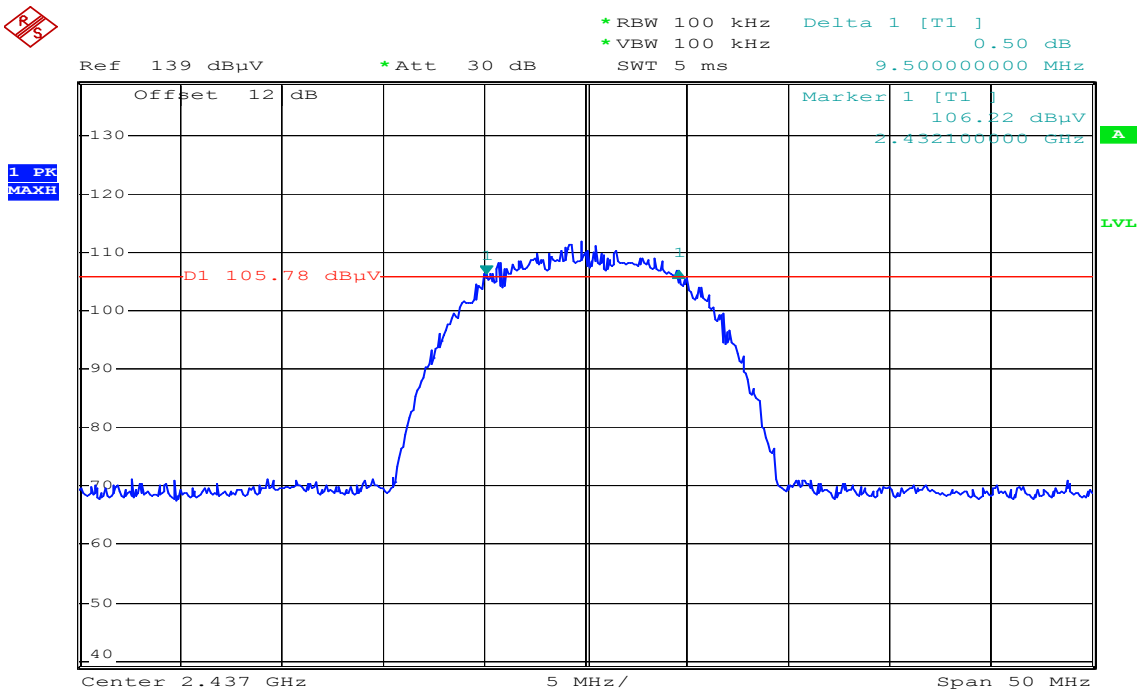
## 6dB Bandwidth (CH Mid)

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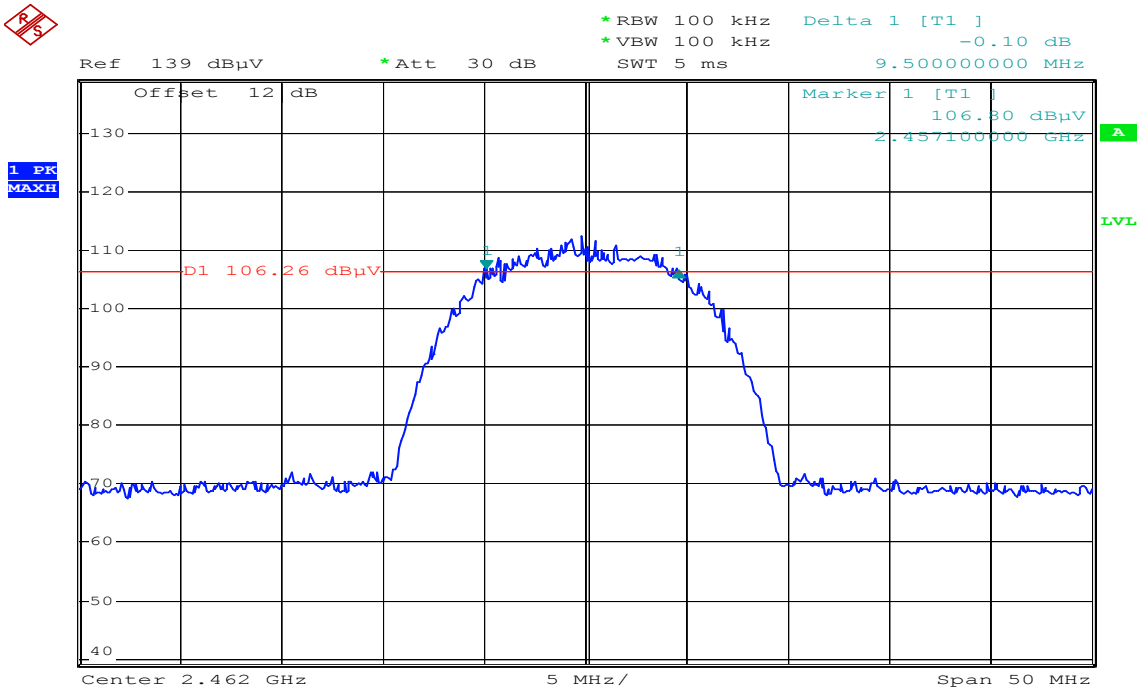
## 6dB Bandwidth (CH High)

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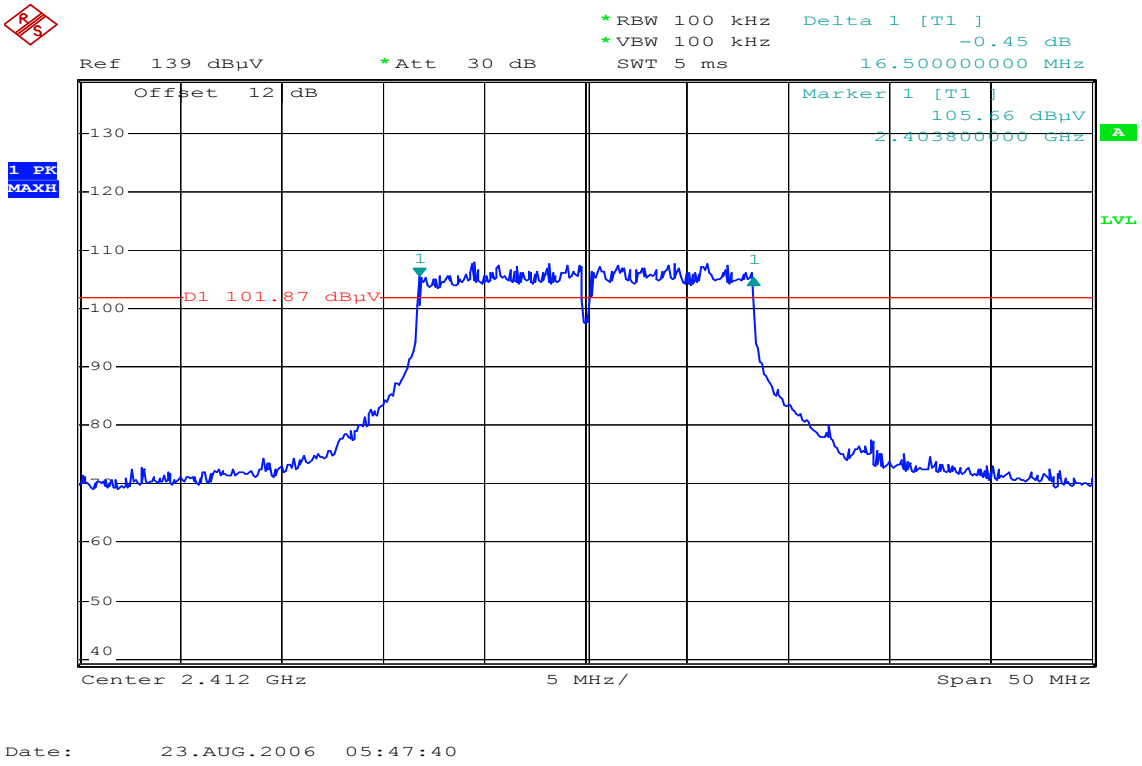
## IEEE 802.11g mode

### 6dB Bandwidth (CH Low)

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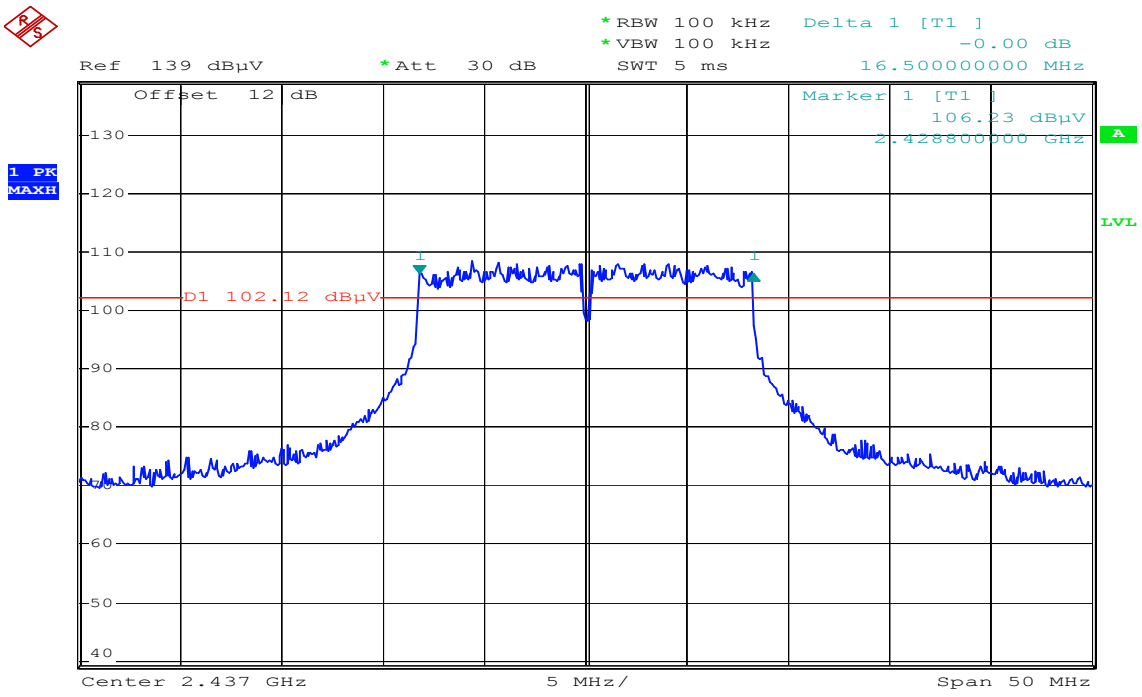
### 6dB Bandwidth (CH Mid)

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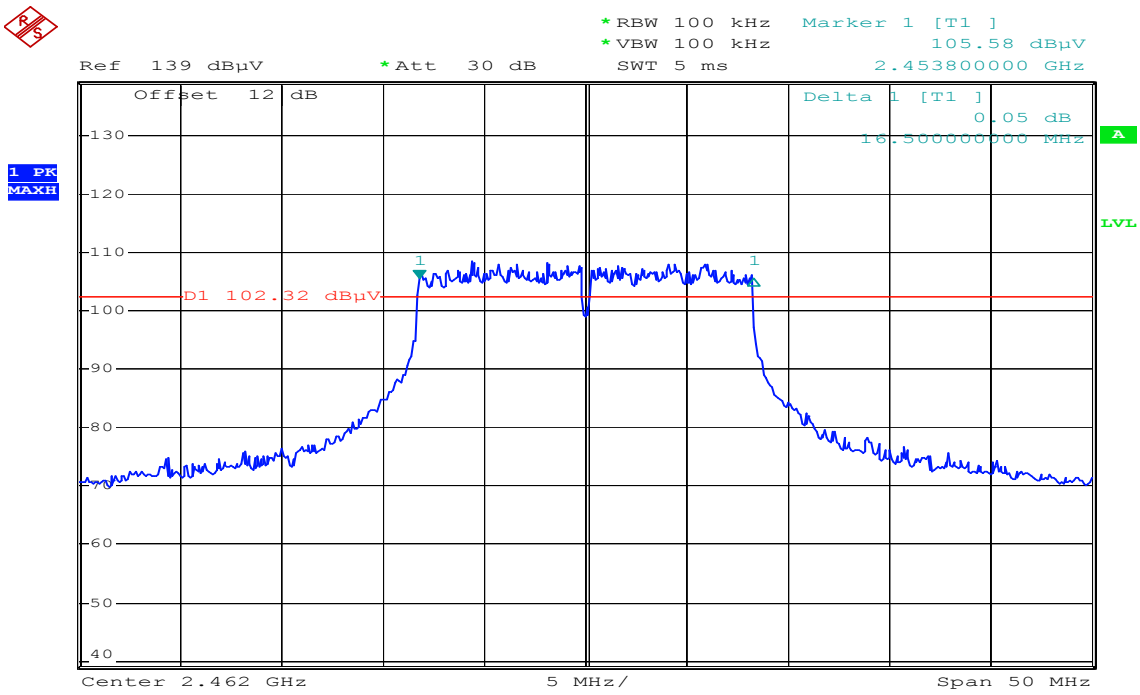
## 6dB Bandwidth (CH High)

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## 7.2 PEAK POWER

### LIMIT

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

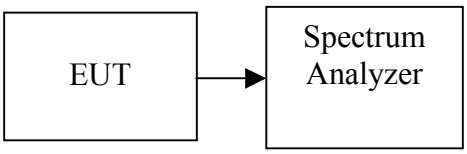
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 100112 | 09/12/2006 |

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

**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) | Reading Power (dBm) | Factor (dB) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---|---|---|---|---|---|---|---|
| Low | 2412 | 5.22 | 12.00 | 17.22 | 0.05272 | 1 | PASS |
| Mid | 2437 | 6.08 | 12.00 | 18.08 | 0.06427 | | PASS |
| High | 2462 | 5.87 | 12.00 | 17.87 | 0.06124 | | PASS |

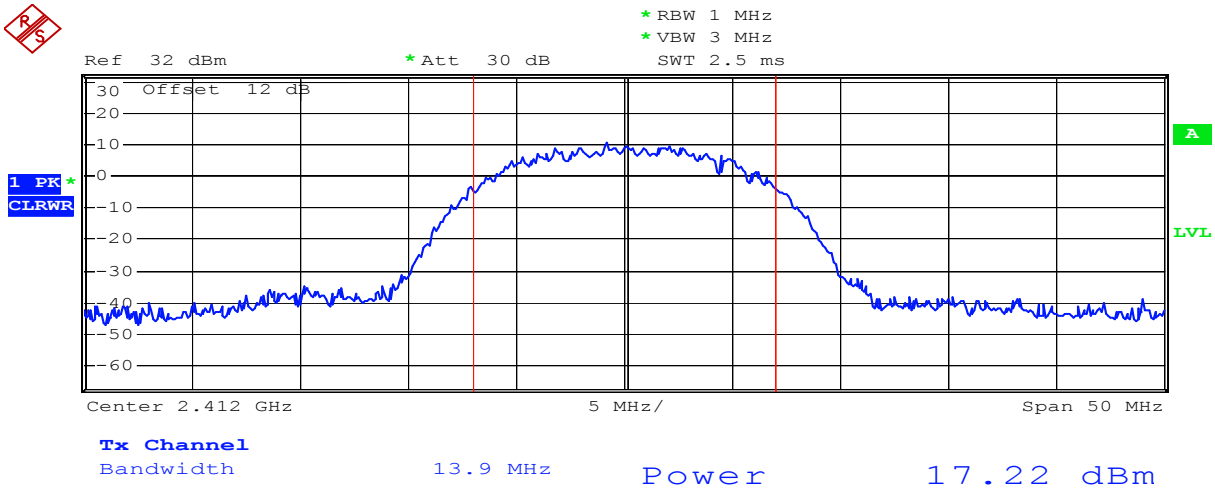
### Test mode: IEEE 802.11g

| Channel | Frequency (MHz) | Reading Power (dBm) | Factor (dB) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---|---|---|---|---|---|---|---|
| Low | 2412 | 6.39 | 12.00 | 18.39 | 0.06902 | 1 | PASS |
| Mid | 2437 | 7.07 | 12.00 | 19.07 | 0.08072 | | PASS |
| High | 2462 | 7.42 | 12.00 | 19.42 | 0.08750 | | PASS |

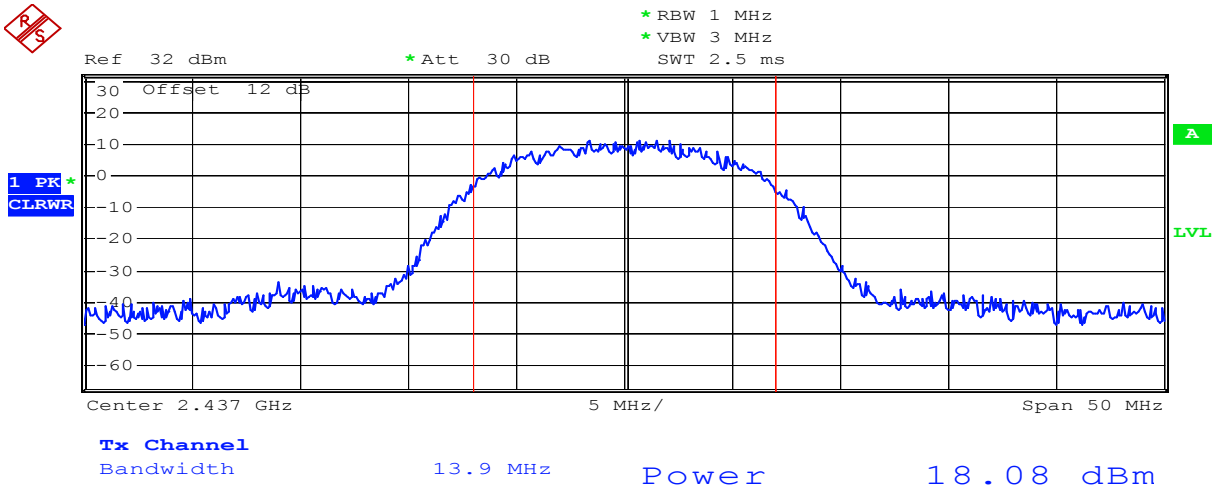
## Test Plot

## IEEE 802.11b mode

### Peak power (CH Low)



## Peak power (CH Mid)

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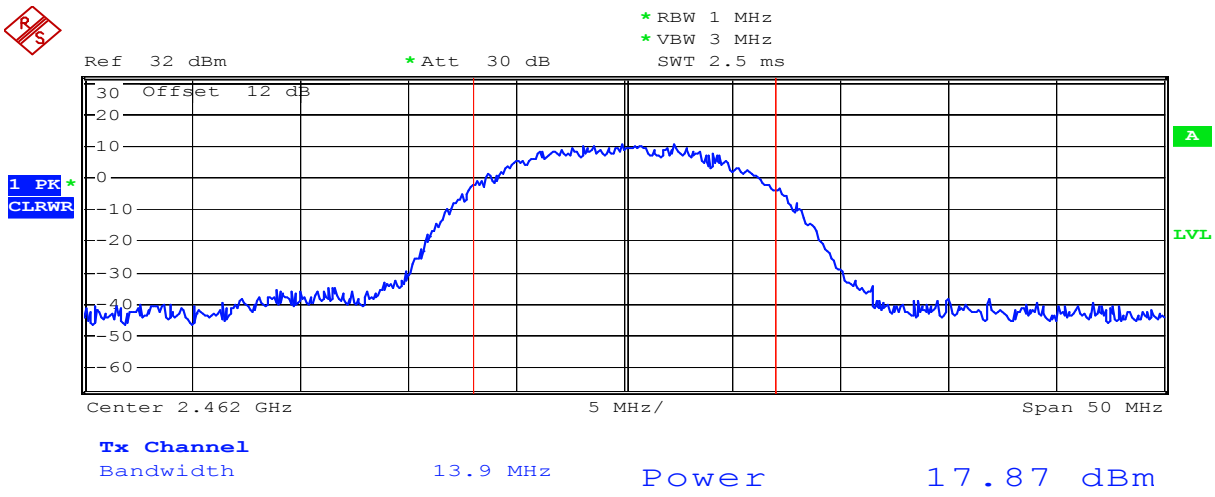
## Peak power (CH High)

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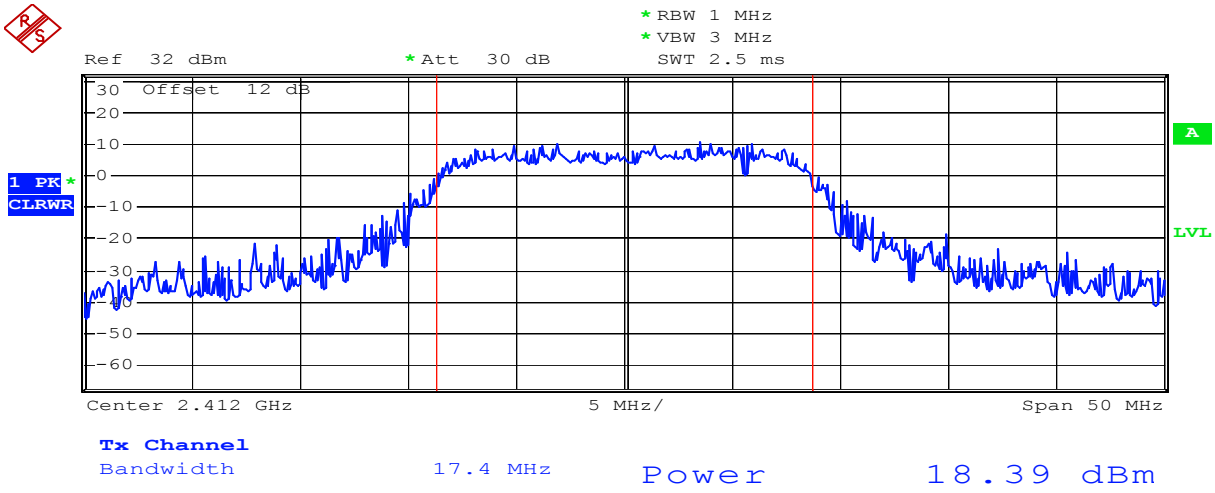
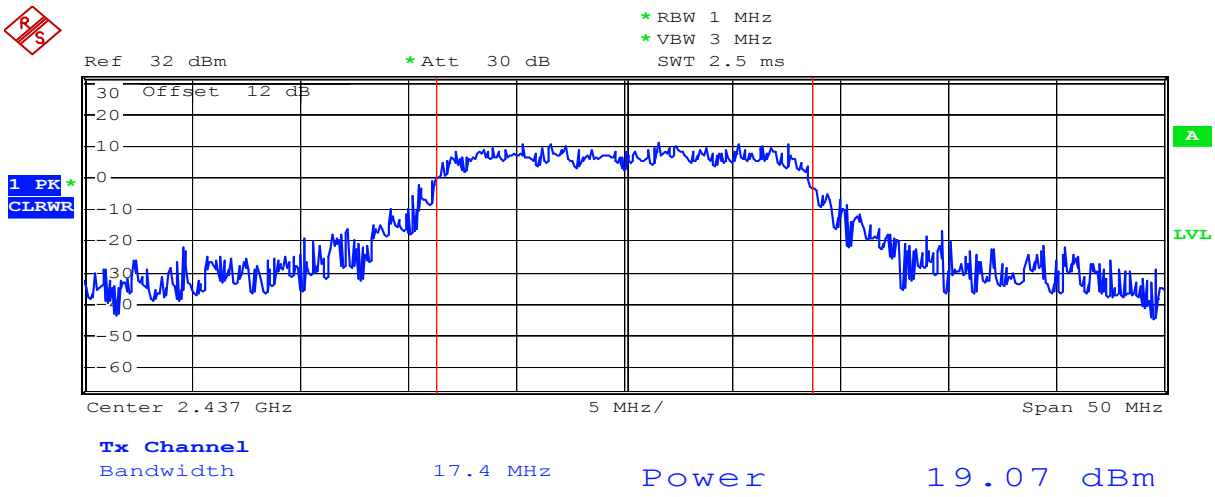
## IEEE 802.11g mode

### Peak power (CH Low)



## Peak power (CH Mid)

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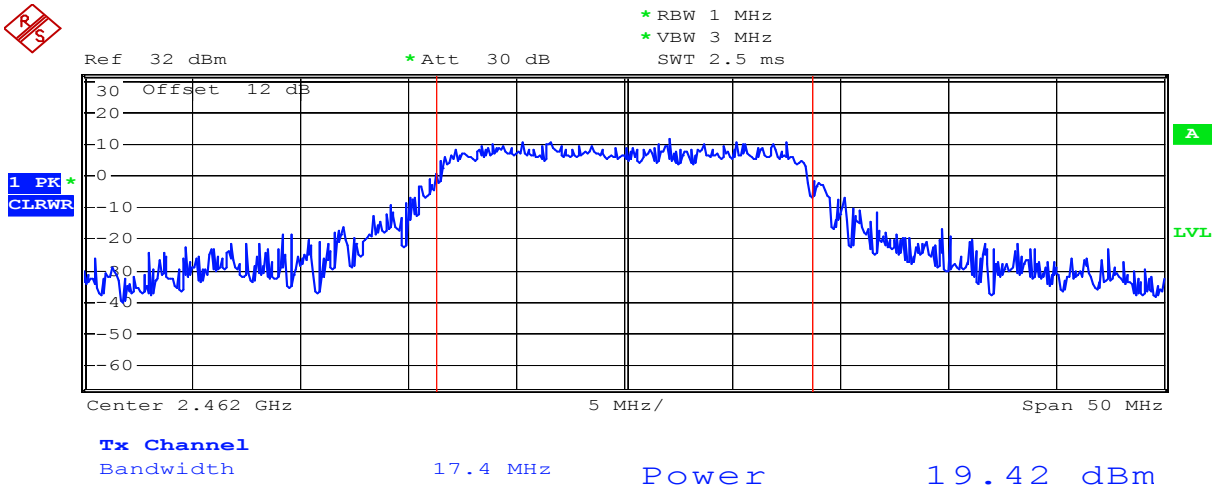
## Peak power (CH High)

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## 7.3 BAND EDGES MEASUREMENT

## LIMIT

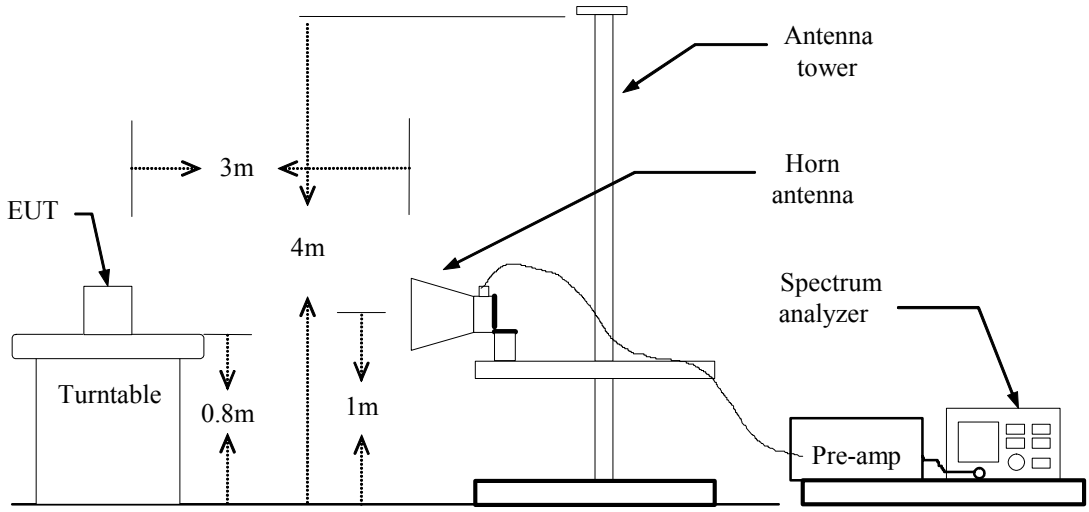
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

## MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 100112 | 09/12/2006 |

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

### Test Configuration




## TEST PROCEDURE

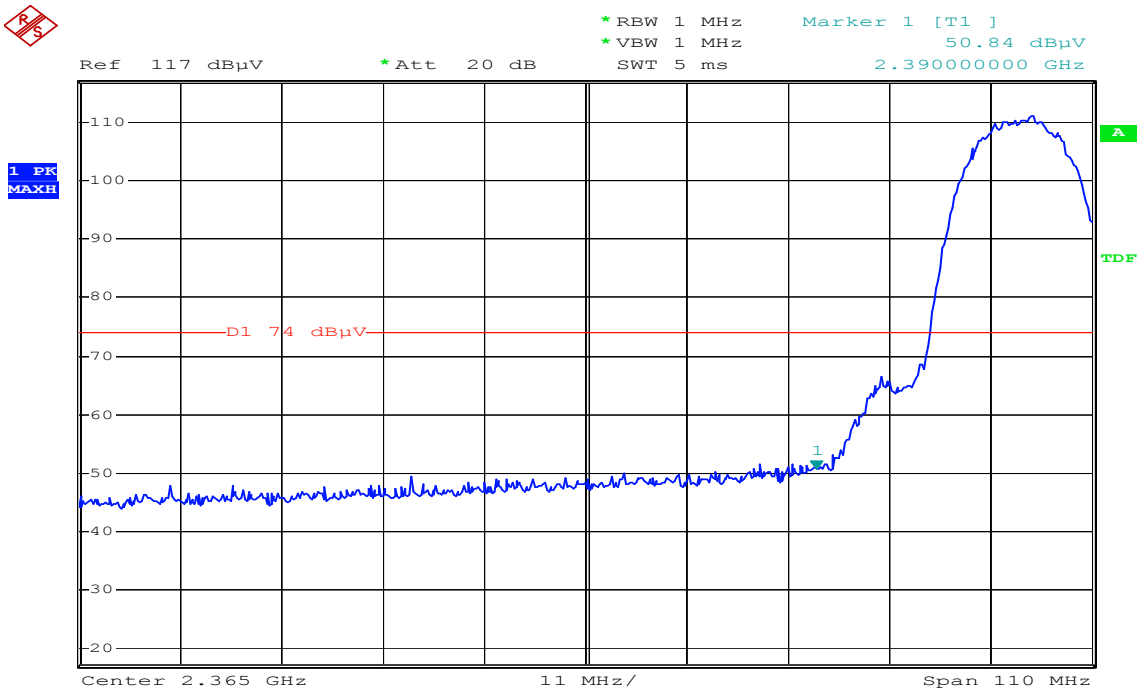
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the 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.

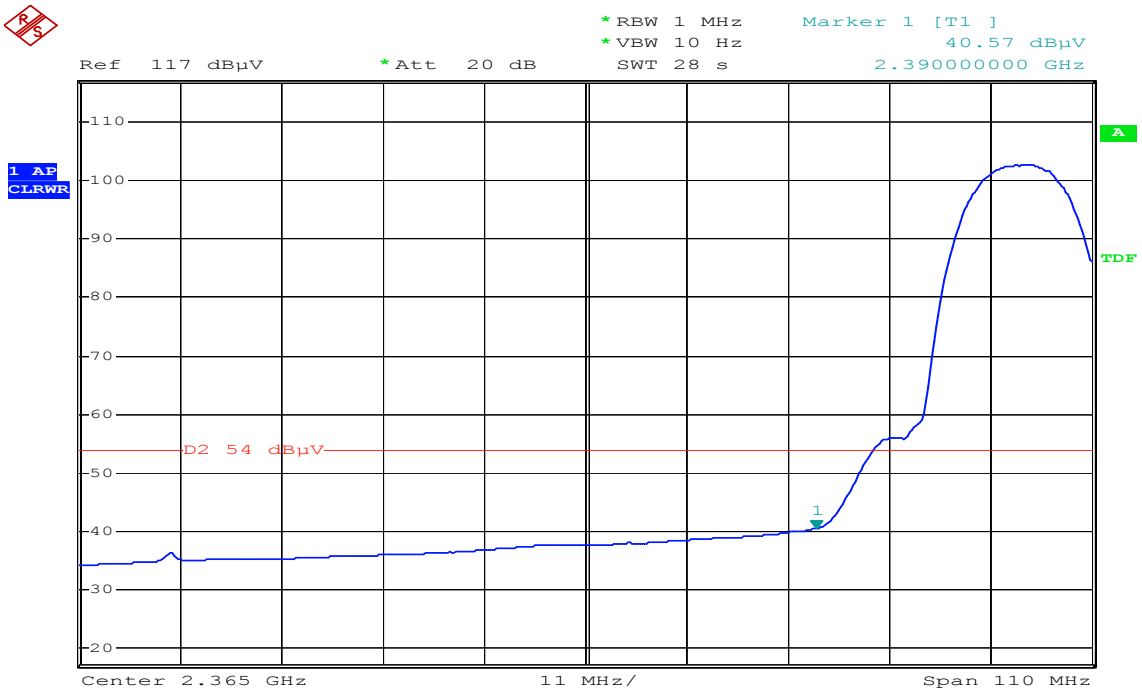
## Band Edges (IEEE 802.11b mode / CH Low)

## Detector mode: Peak Polarity: Vertical



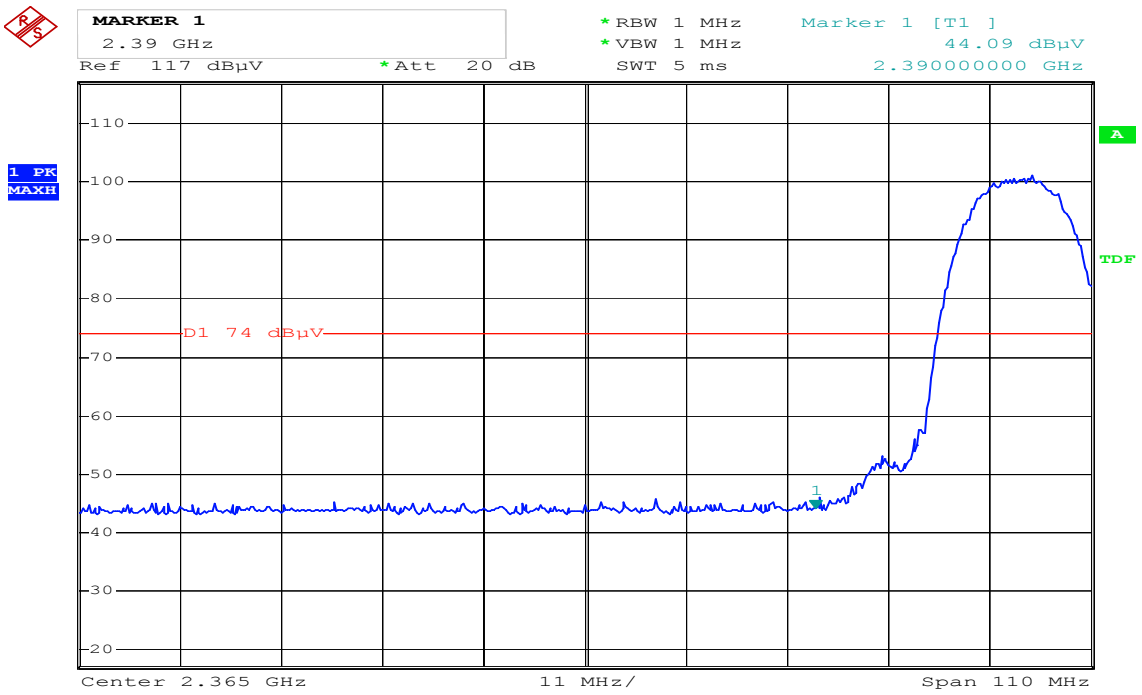

Date: 20.AUG.2006 04:10:33

## Detector mode: Average Polarity: Vertical



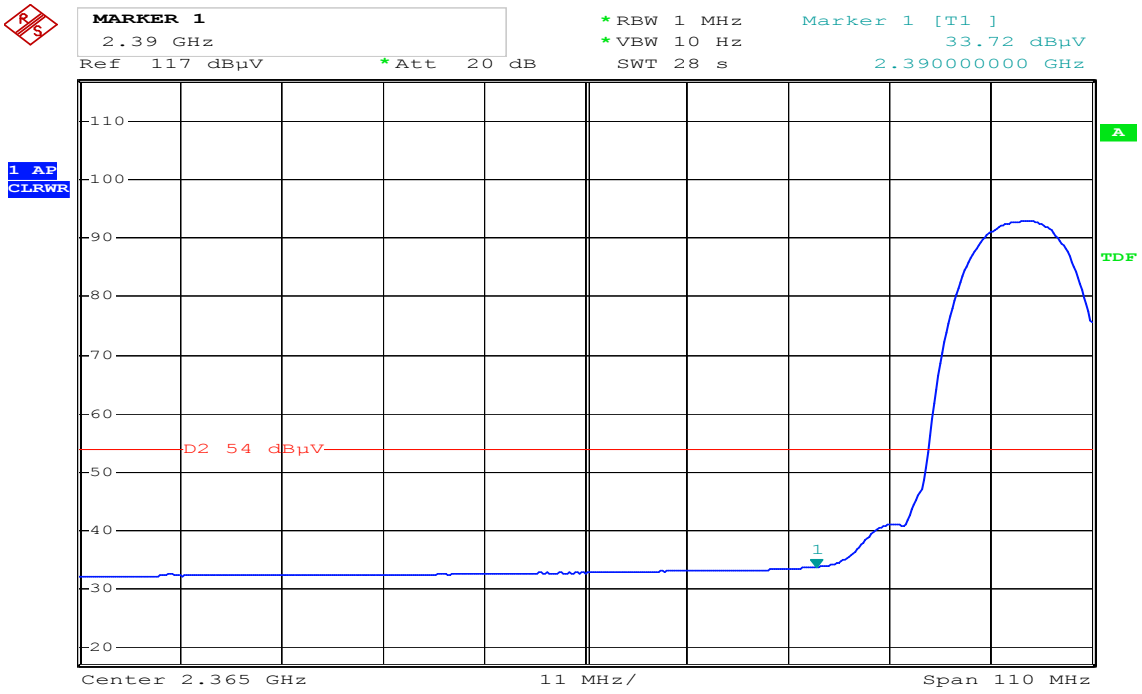

Date: 20.AUG.2006 04:12:22

## Detector mode: Peak Polarity: Horizontal




Date: 20.AUG.2006 04:06:51

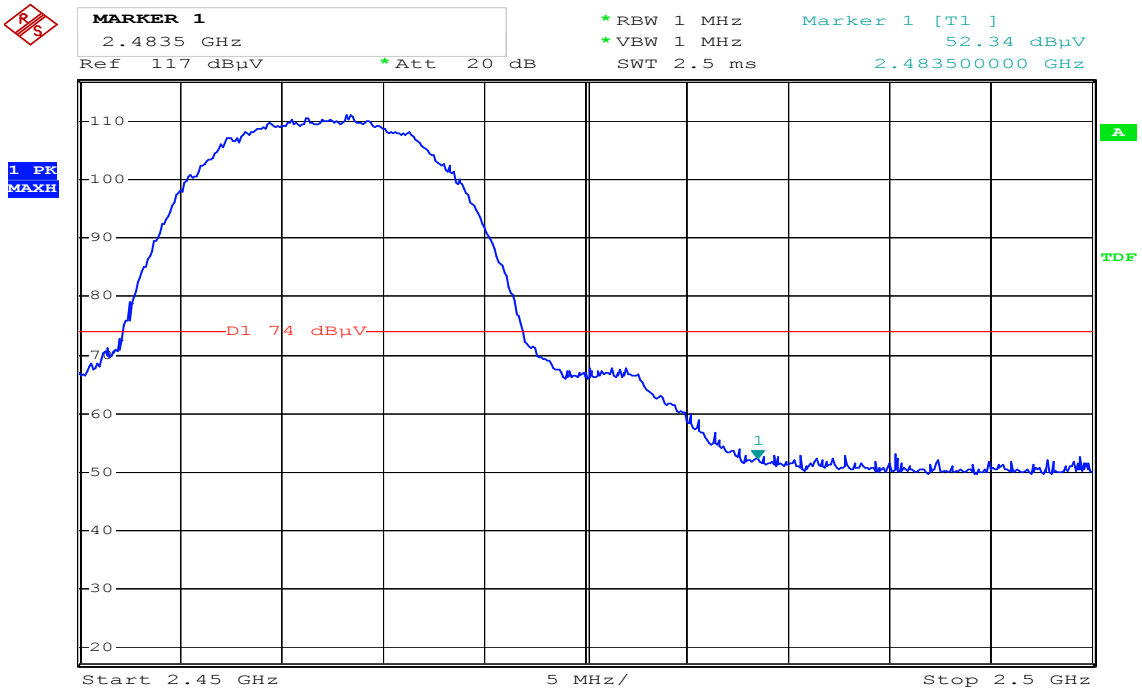
## Detector mode: Average Polarity: Horizontal




Date: 20.AUG.2006 04:08:27

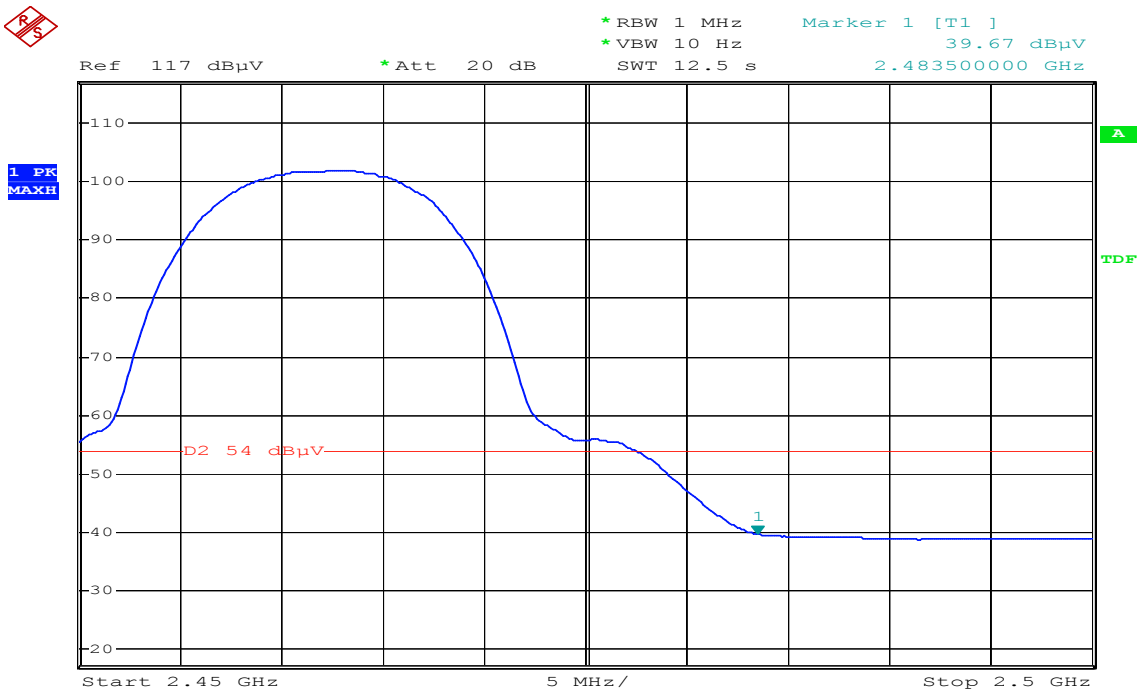
## Band Edges (IEEE 802.11b mode / CH High)

### Detector mode: Peak Polarity: Vertical



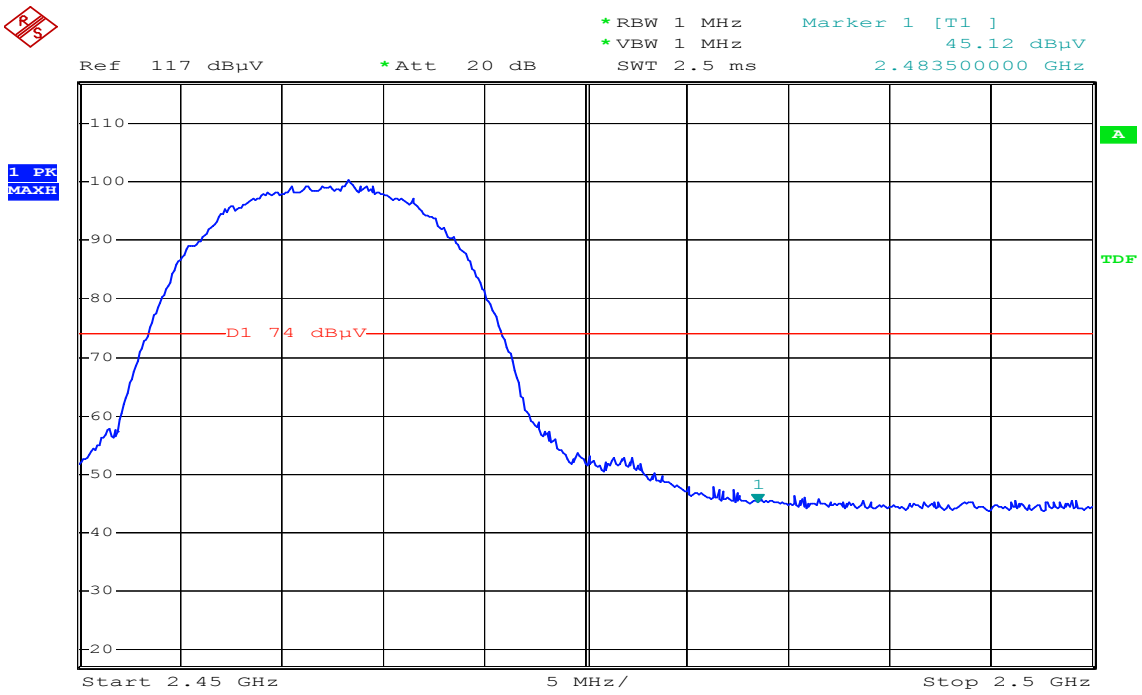

Date: 20.AUG.2006 04:24:59

### Detector mode: Average Polarity: Vertical



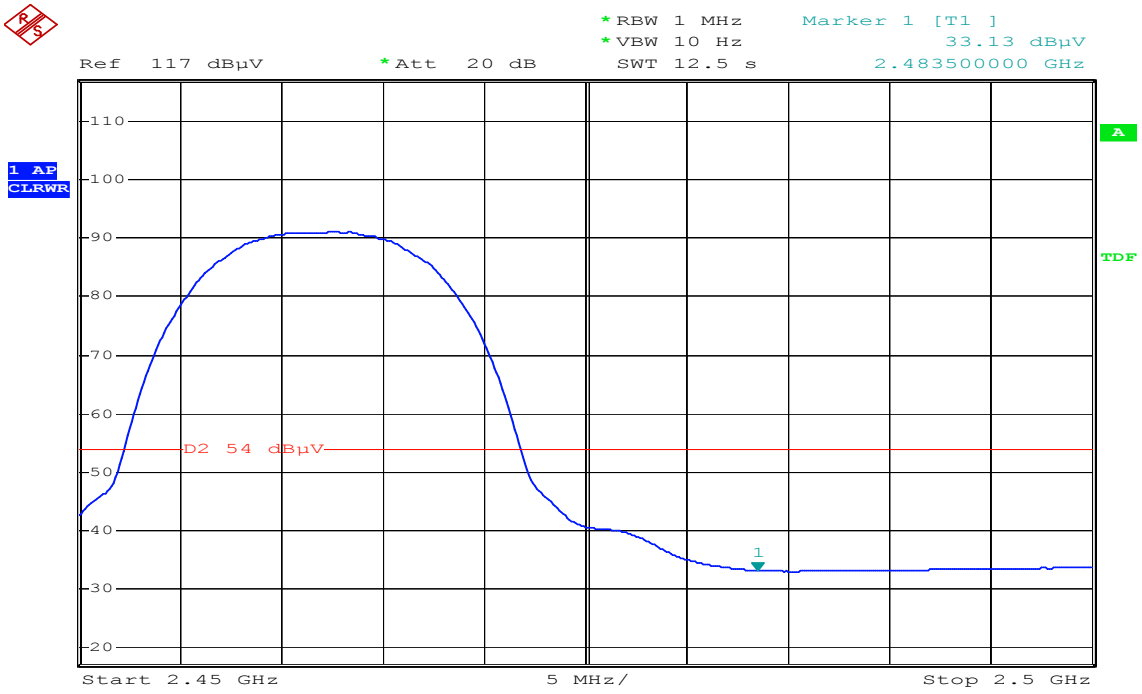

Date: 20.AUG.2006 04:26:25

## Detector mode: Peak Polarity: Horizontal




Date: 20.AUG.2006 04:32:30

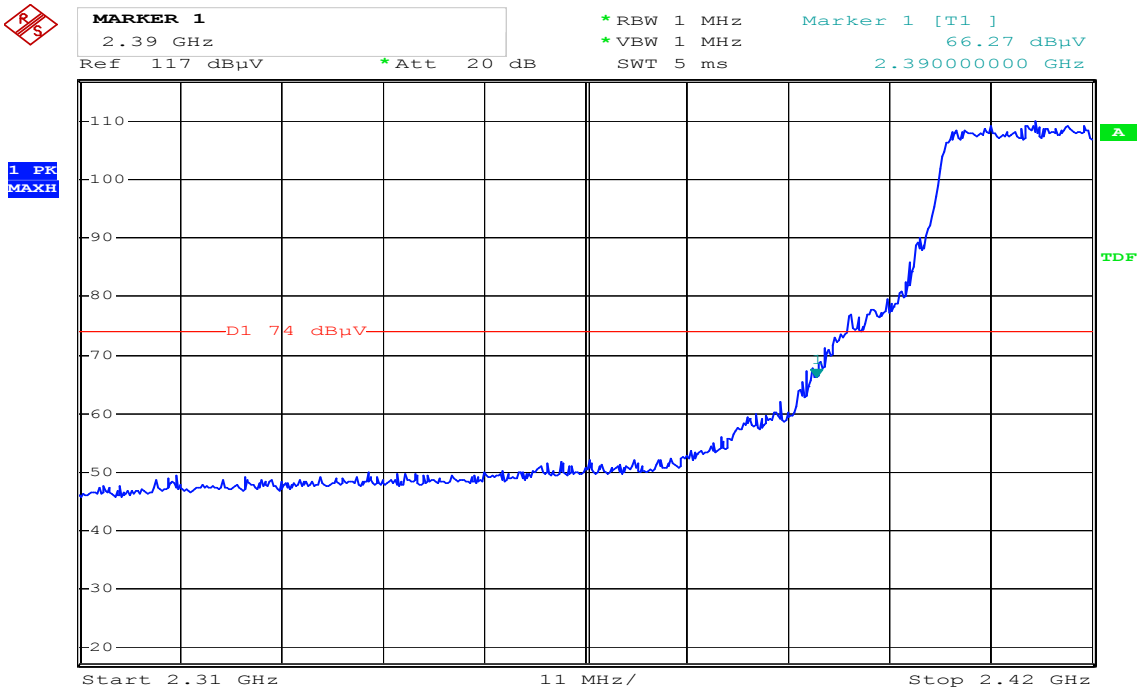
## Detector mode: Average Polarity: Horizontal




Date: 20.AUG.2006 04:34:19

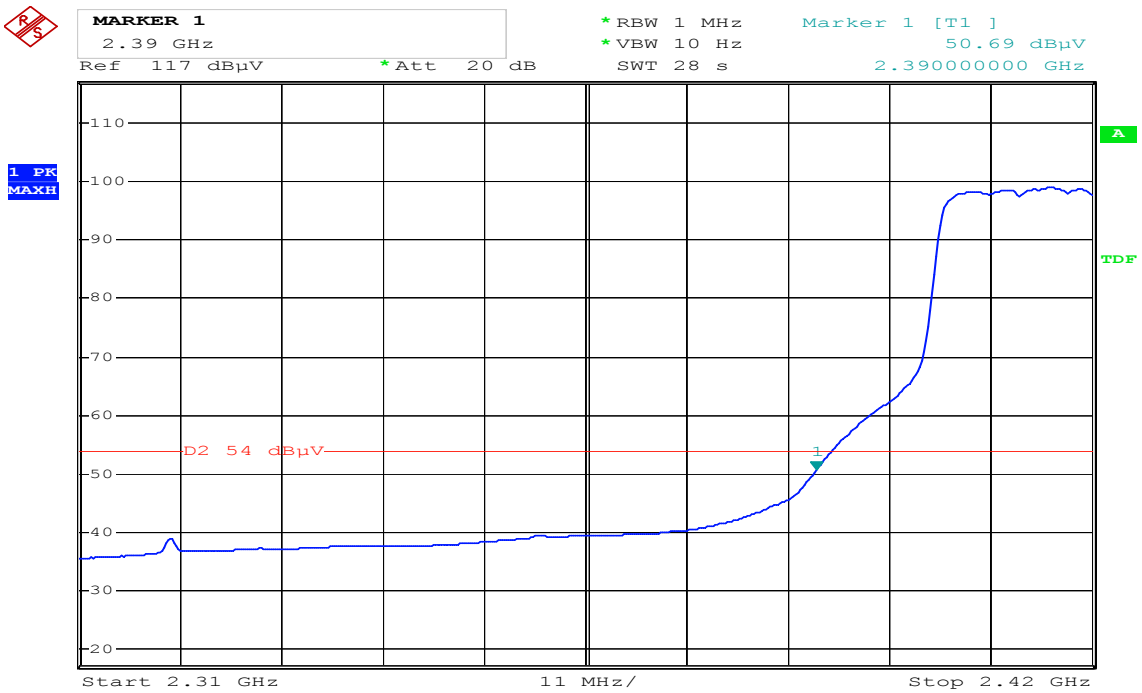
## Band Edges (IEEE 802.11g mode / CH Low)

### Detector mode: Peak Polarity: Vertical



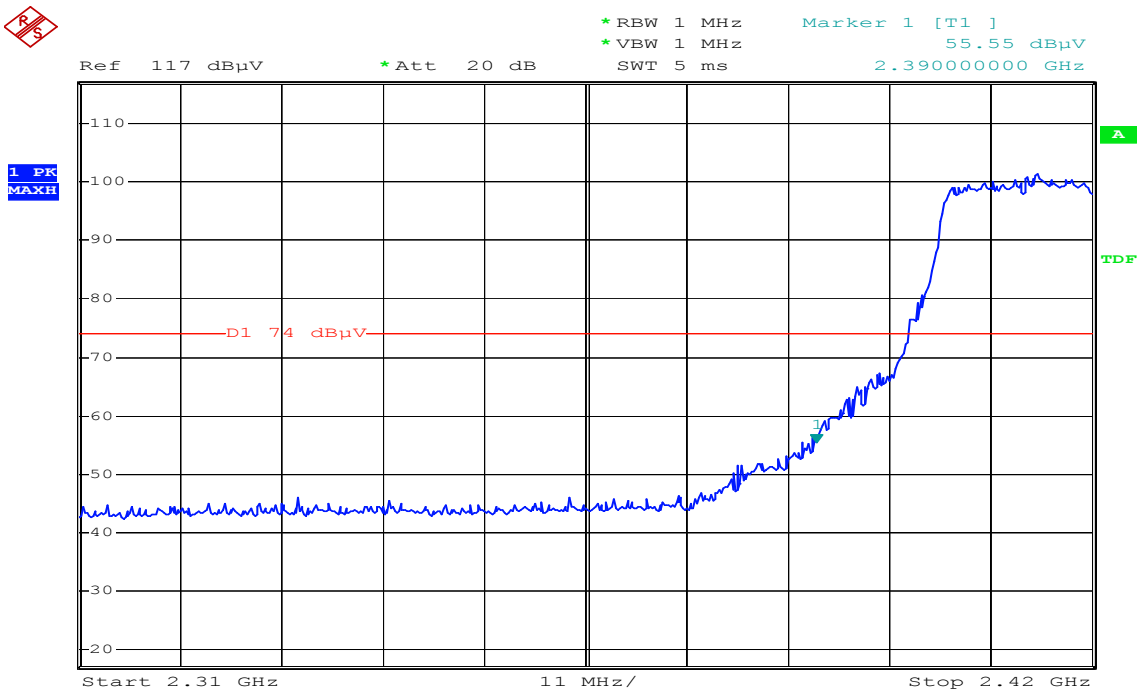

Date: 20.AUG.2006 04:56:26

### Detector mode: Average Polarity: Vertical



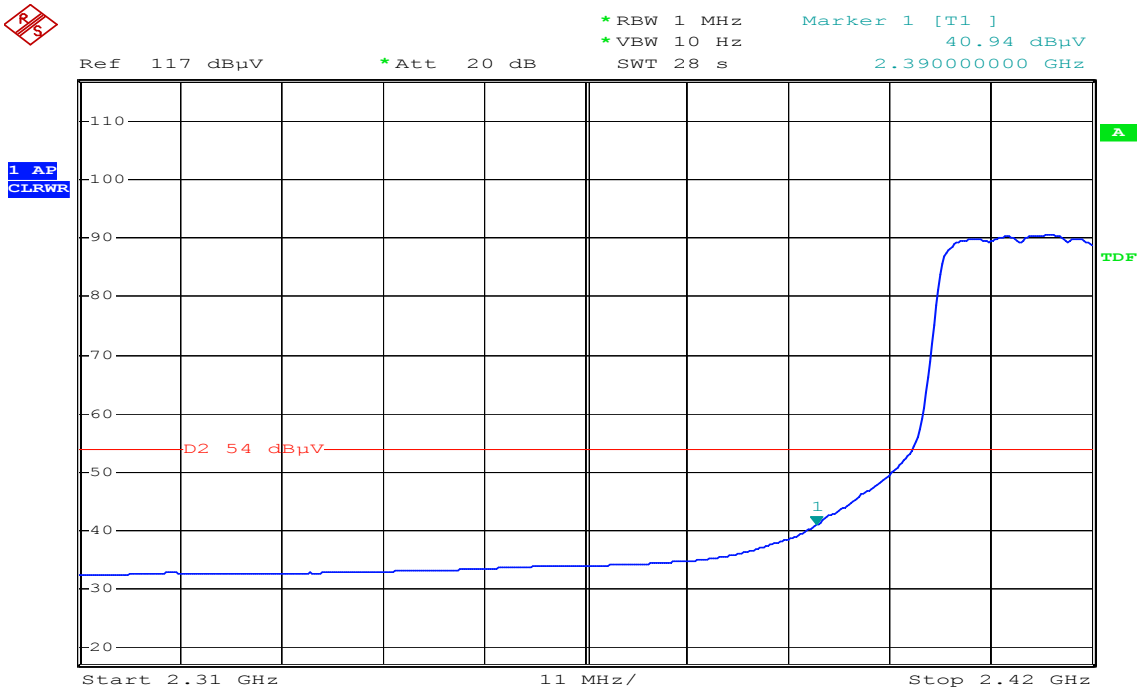

Date: 20.AUG.2006 04:58:17

## Detector mode: Peak Polarity: Horizontal




Date: 20.AUG.2006 05:01:31

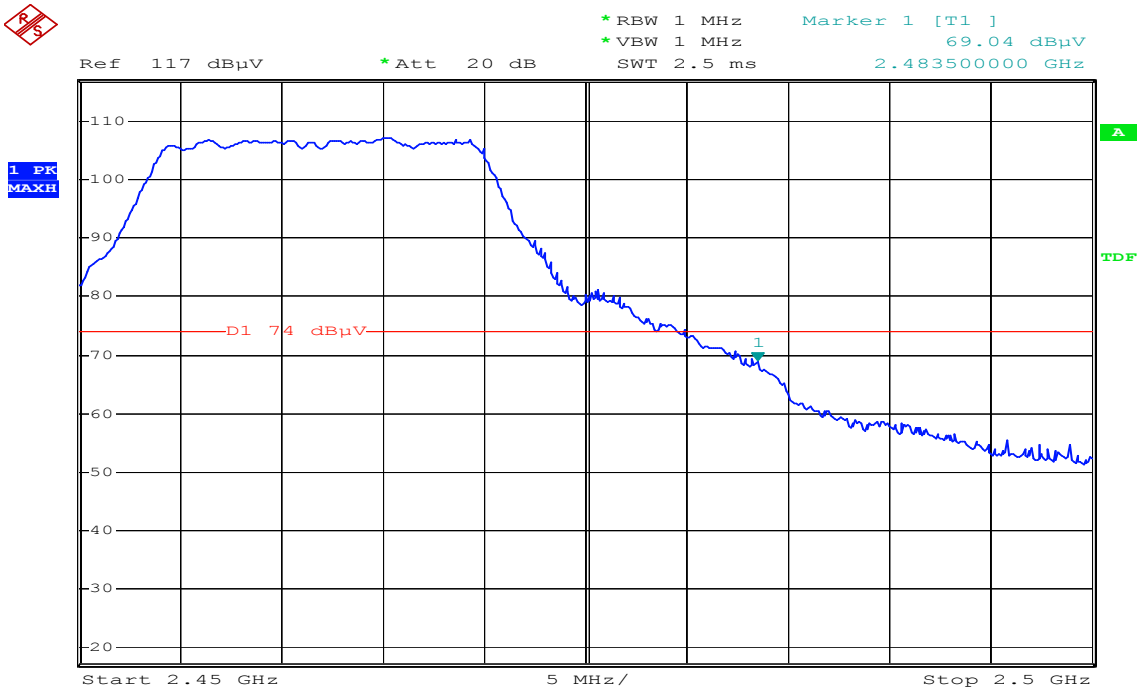
## Detector mode: Average Polarity: Horizontal



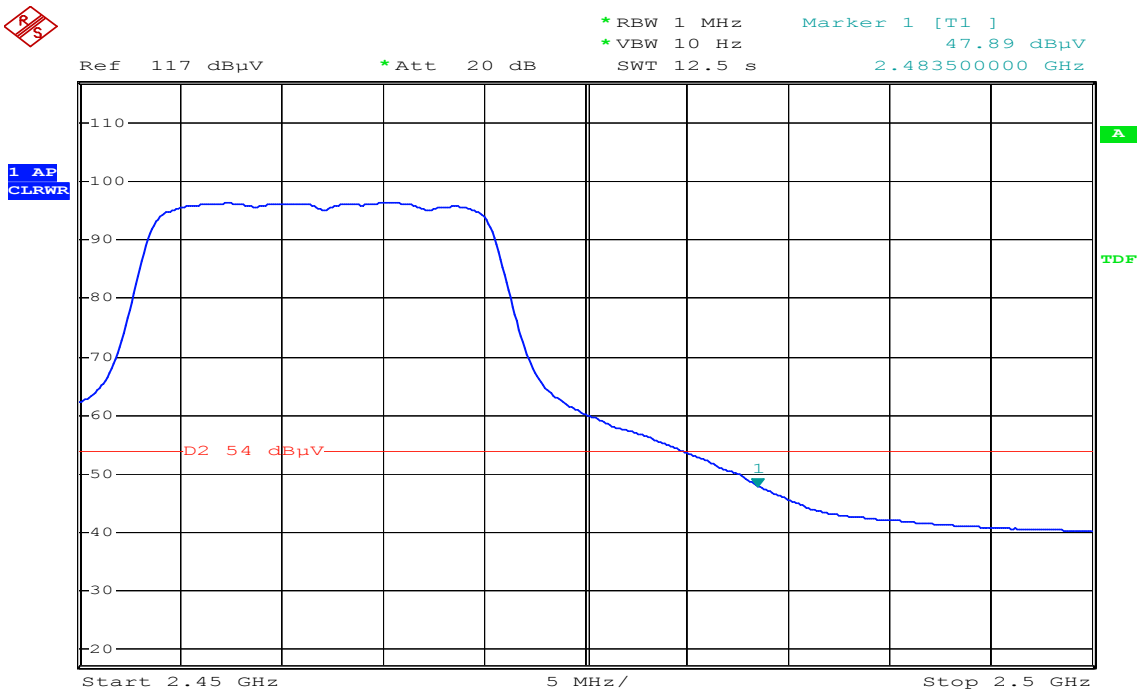

Date: 20.AUG.2006 05:02:58

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

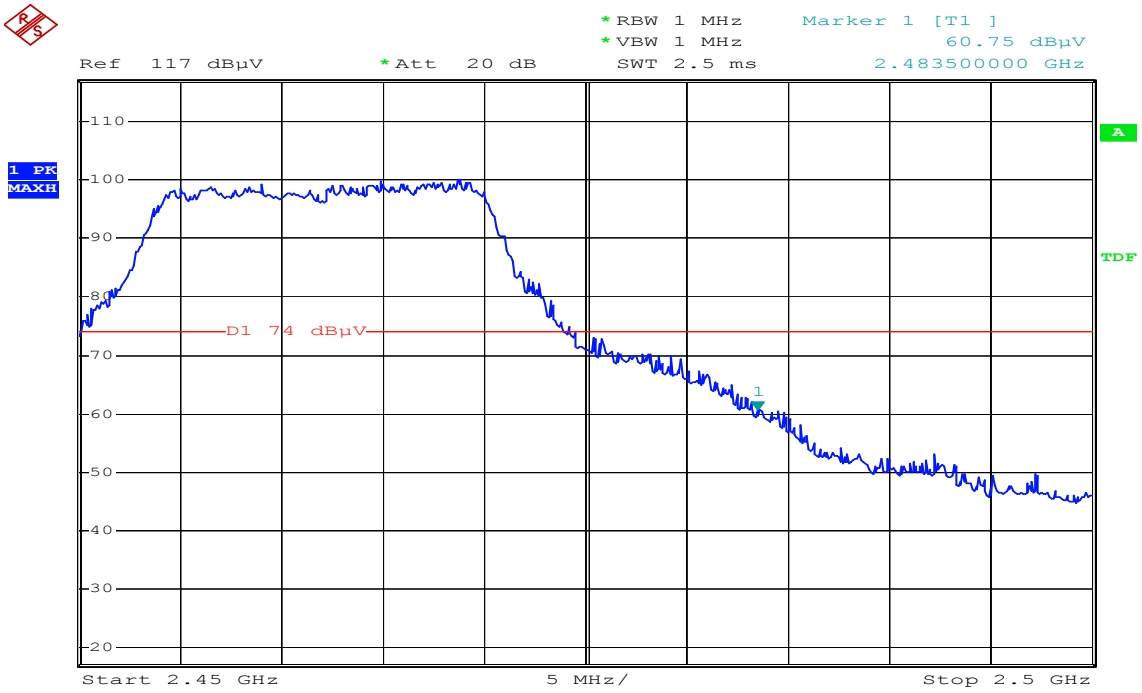
### Detector mode: Peak Polarity: Vertical



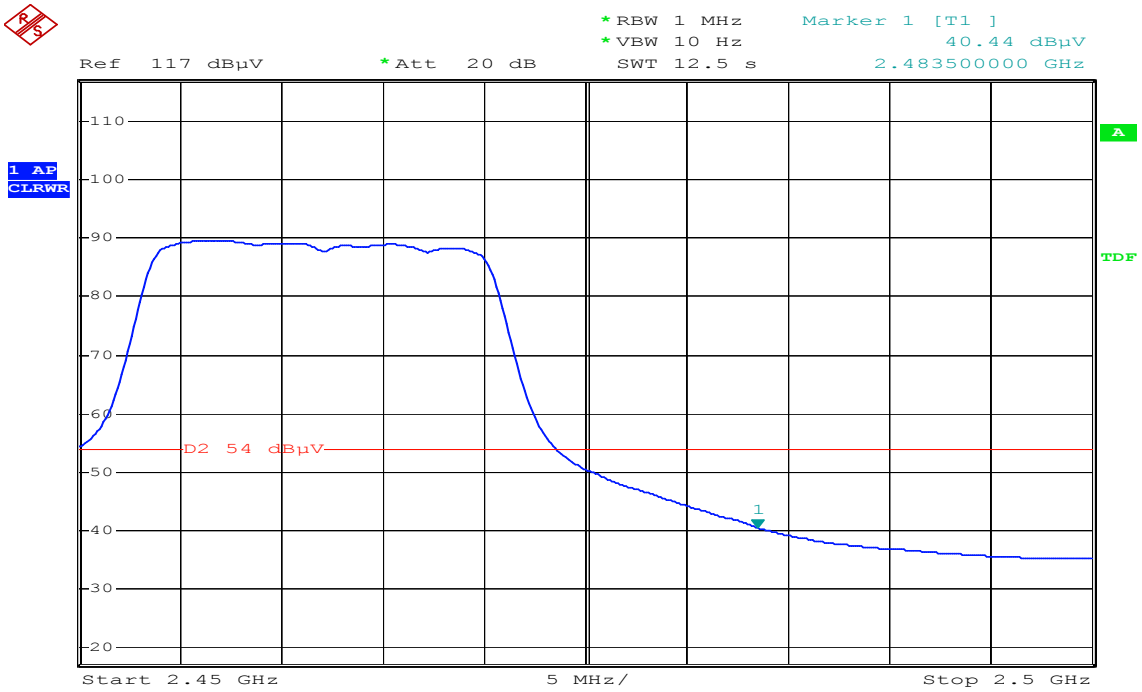

### Detector mode: Average Polarity: Vertical



## Detector mode: Peak Polarity: Horizontal




## Detector mode: Average Polarity: Horizontal



## 7.4 PEAK POWER SPECTRAL DENSITY

## LIMIT

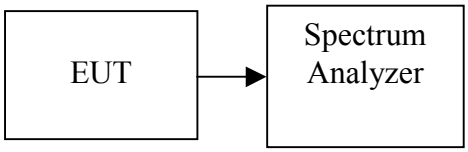
1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

## MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 100112 | 09/12/2006 |

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

**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 = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
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 | Reading (dBm) | Factor (dB) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| Low | 2412 | -22.57 | 12.00 | -10.57 | 8.00 | PASS |
| Mid | 2437 | -22.16 | 12.00 | -10.16 | | PASS |
| High | 2462 | -21.74 | 12.00 | -9.74 | | PASS |

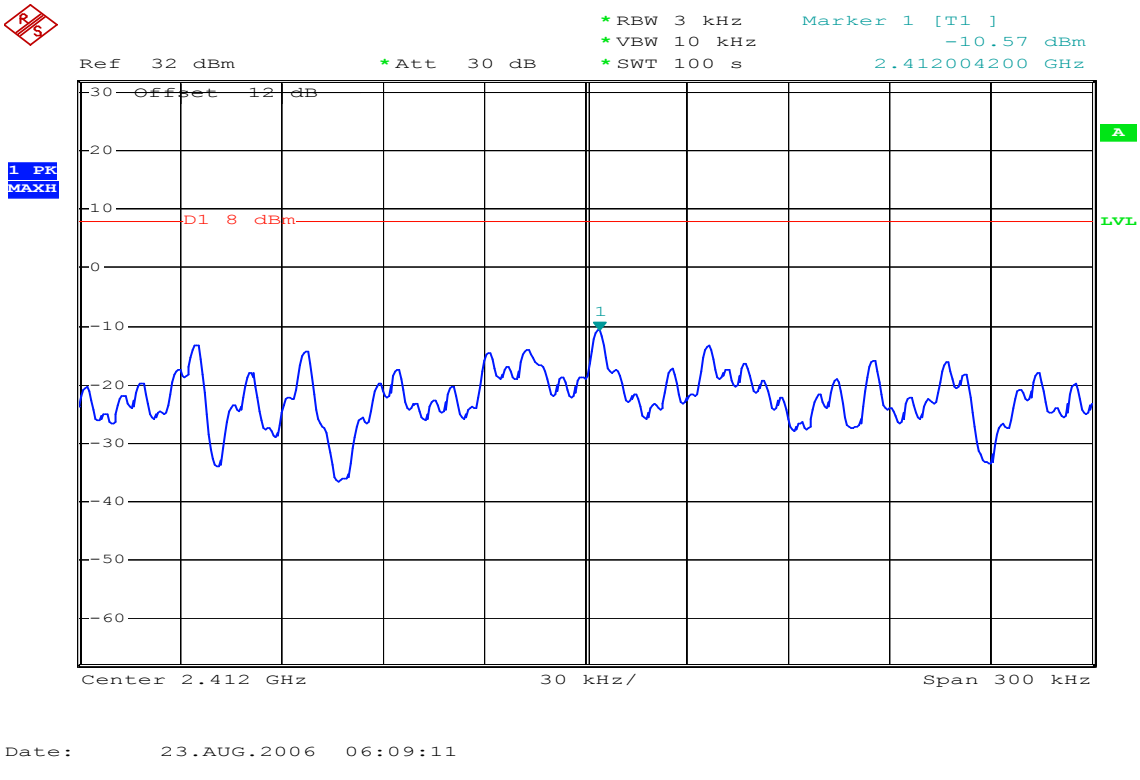
**Test mode: IEEE 802.11g**

| Channel | Frequency | Reading (dBm) | Factor (dB) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| Low | 2412 | -33.53 | 12.00 | -21.53 | 8.00 | PASS |
| Mid | 2437 | -32.90 | 12.00 | -20.90 | | PASS |
| High | 2462 | -32.65 | 12.00 | -20.65 | | PASS |

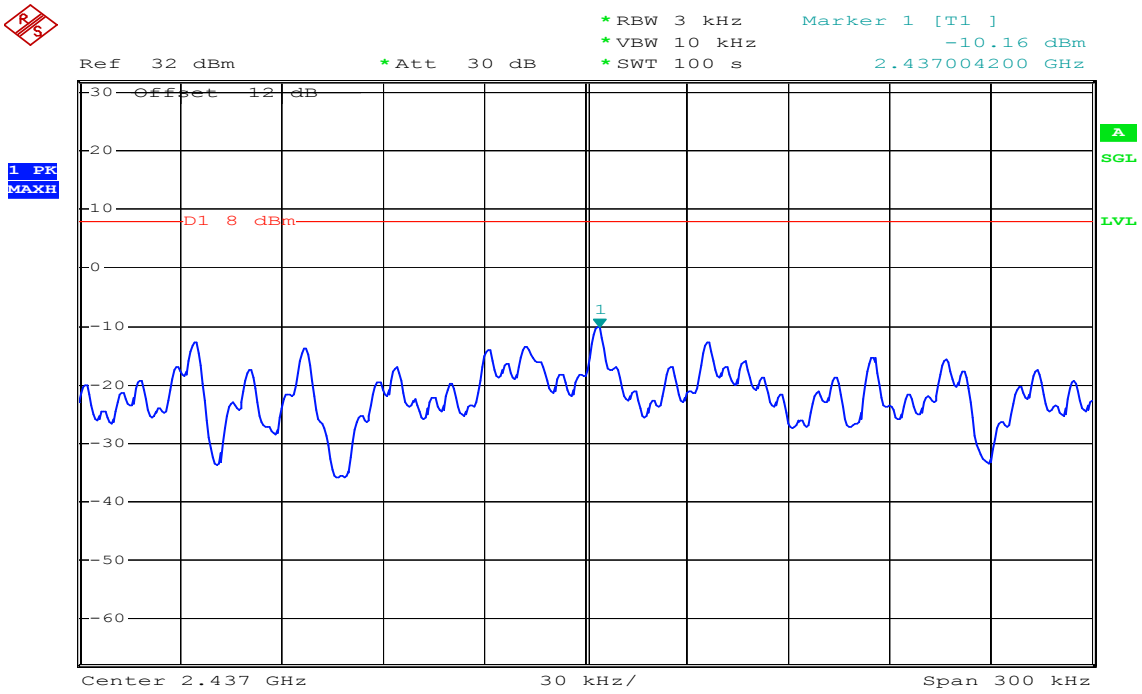
## Test Plot

## IEEE 802.11b mode

**PPSD (CH Low)**

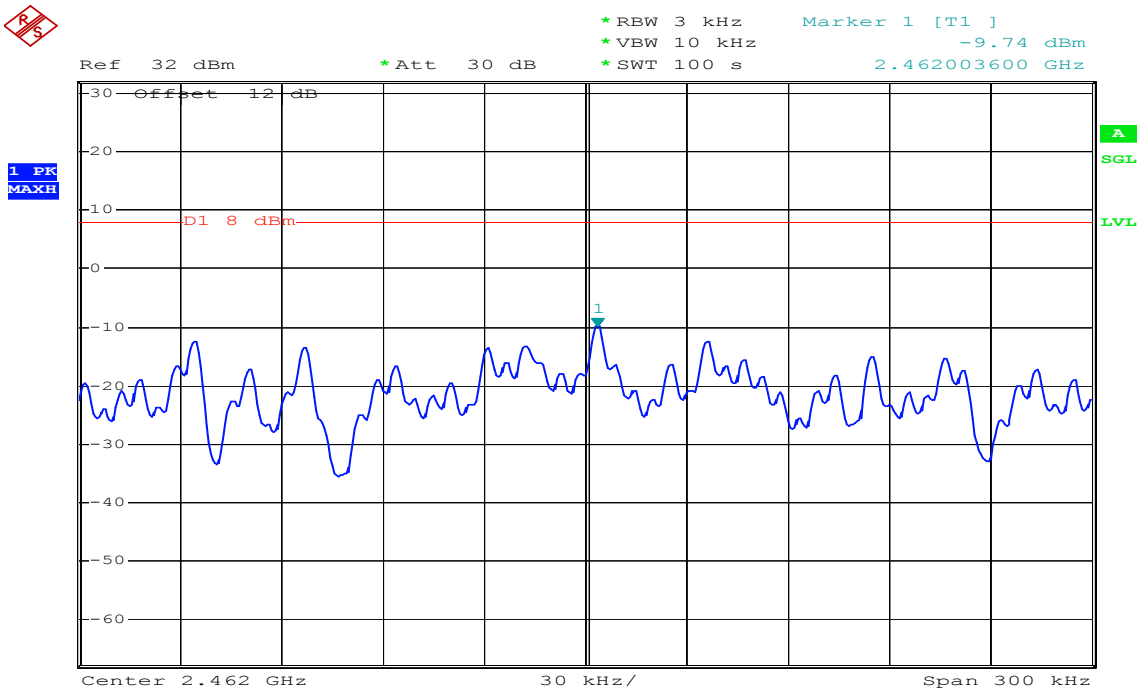



**PPSD (CH Mid)**




Date: 23.AUG.2006 06:02:51

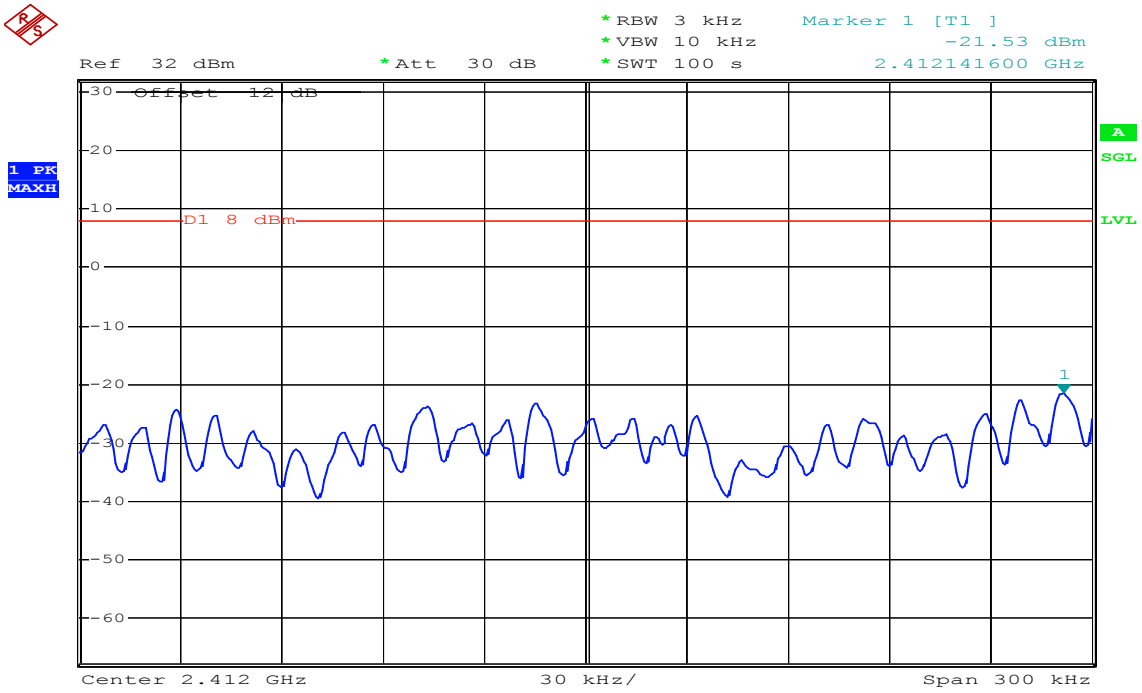
## PPSD (CH High)




Date: 23.AUG.2006 06:12:32

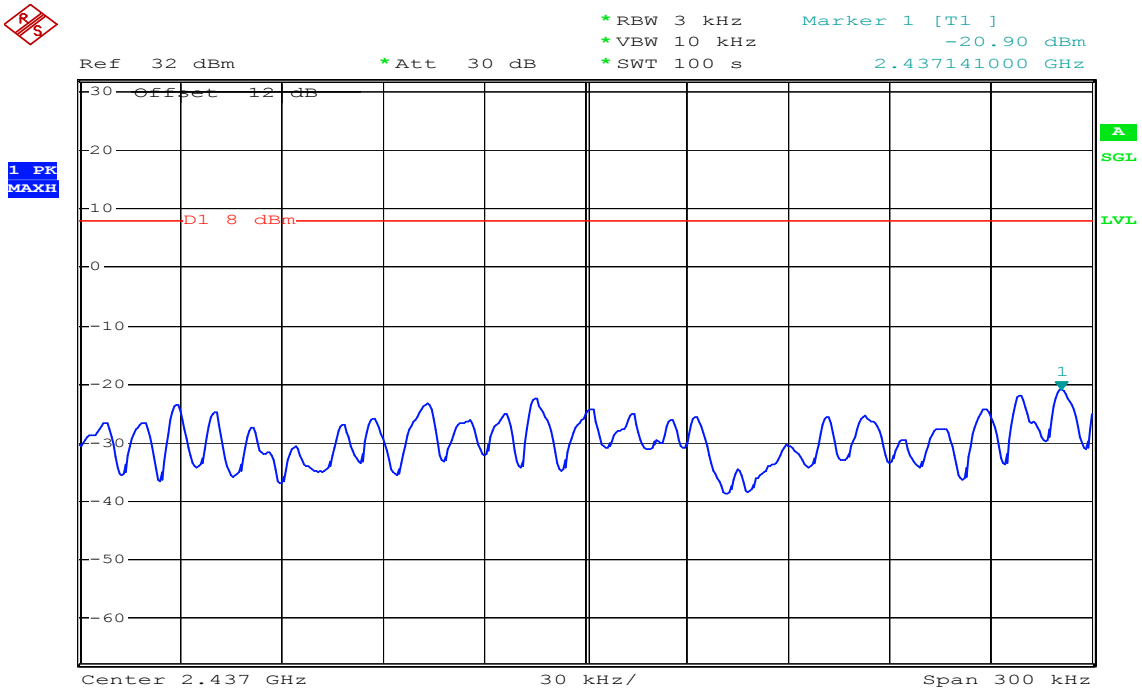
## IEEE 802.11g mode

### PPSD (CH Low)



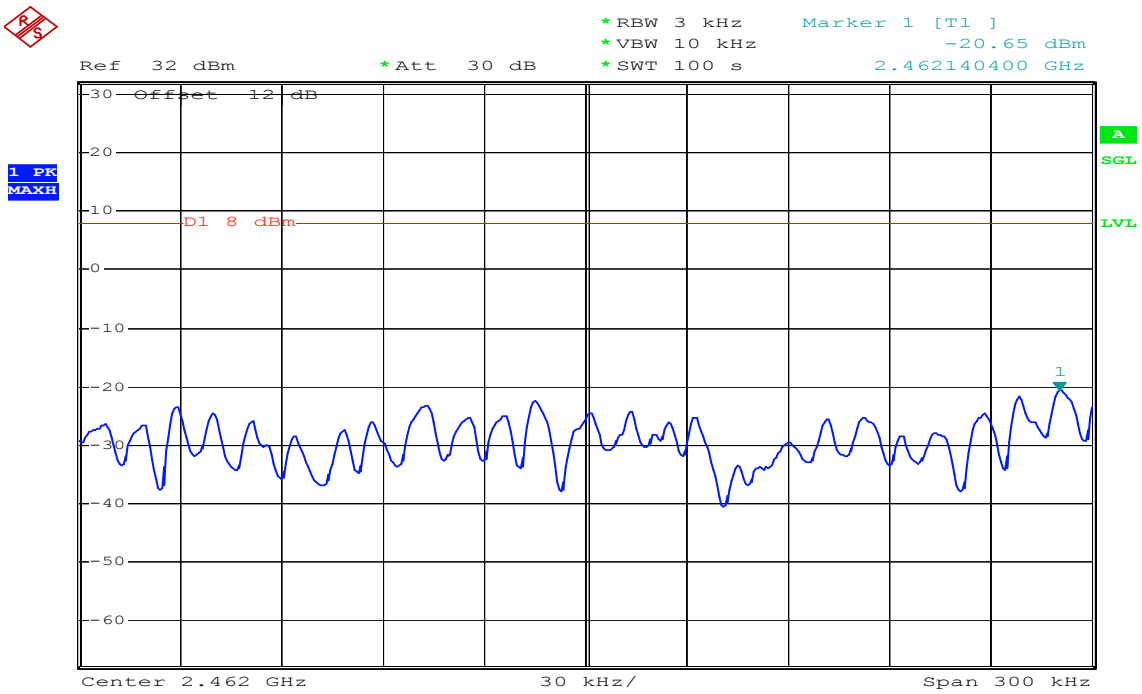

Date: 23.AUG.2006 06:16:32

### PPSD (CH Mid)




Date: 23.AUG.2006 06:19:24

## PPSD (CH High)




Date: 23.AUG.2006 06:22:17

## 7.5 RADIO FREQUENCY EXPOSURE

## LIMIT

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 §15.247(i) and §1.1307(b)(1) of this chapter.

**EUT Specification**

| | |
|---|---|
| **EUT** | Wireless Audio AP |
| **Frequency band (Operating)** | ☒ WLAN: 2.412GHz ~ 2.462GHz<br>☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br>☐ WLAN: 5.745GHz ~ 5.825GHz<br>☐ Others |
| **Device category** | ☐ Portable (<20cm separation)<br>☒ Mobile (>20cm separation)<br>☐ Others |
| **Exposure classification** | ☐ Occupational/Controlled exposure (S = 5mW/cm2)<br>☒ General Population/Uncontrolled exposure (S=1mW/cm2) |
| **Antenna diversity** | ☐ Single antenna<br>☒ Multiple antennas<br>☐ Tx diversity<br>☐ Rx diversity<br>☒ Tx/Rx diversity |
| **Max. output power** | IEEE 802.11b mode: 18.08 dBm (64.27mW)<br>IEEE 802.11g mode: 19.42 dBm (87.49mW) |
| **Antenna gain (Max)** | 1.8 dBi (Numeric gain: 1.58) |
| **Evaluation applied** | ☒ MPE Evaluation<br>☐ SAR Evaluation*<br>☐ N/A |

***Remark:***

1. *The maximum output power is 19.42dBm (87.49mW) at 2412MHz (with 1.58 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.*

## TEST RESULTS

*No non-compliance noted.*

## MPE EVALUATION

*Not applicable.*

**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:

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

Changing to units of mW and cm, using:

*P (mW) = P (W) / 1000 and*

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

Yields

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

*Where* $d$ = *Distance in cm*

$P$ = *Power in mW*

$G$ = *Numeric antenna gain*

$S$ = *Power density in mW / cm²*

**Maximum Permissible Exposure**

EUT output power = 87.49mW

Numeric antenna gain = 1.58

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 / cm²*

***→ Power density = 0.02750 mW / cm²***

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)

# 7.6 SPURIOUS EMISSIONS

## 7.6.1 CONDUCTED MEASUREMENT

## LIMIT

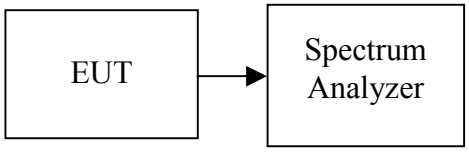
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 100112 | 09/12/2006 |

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

**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 26GHz range with the transmitter set to the lowest, middle, and highest channels.

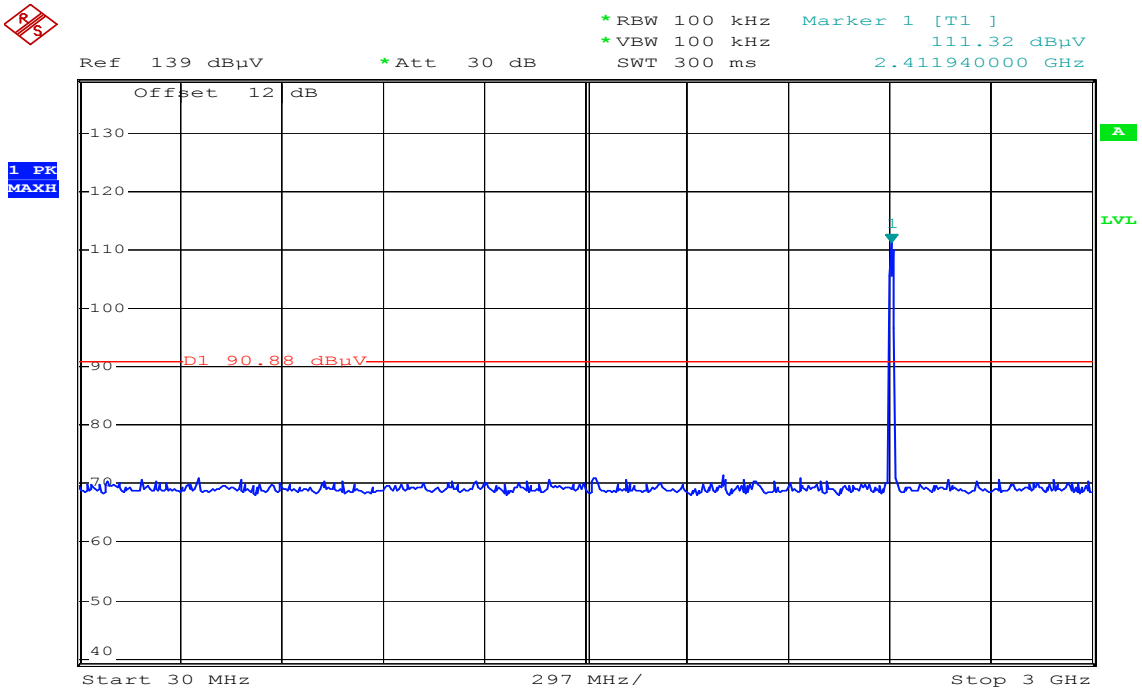
## TEST RESULTS

*No non-compliance noted*

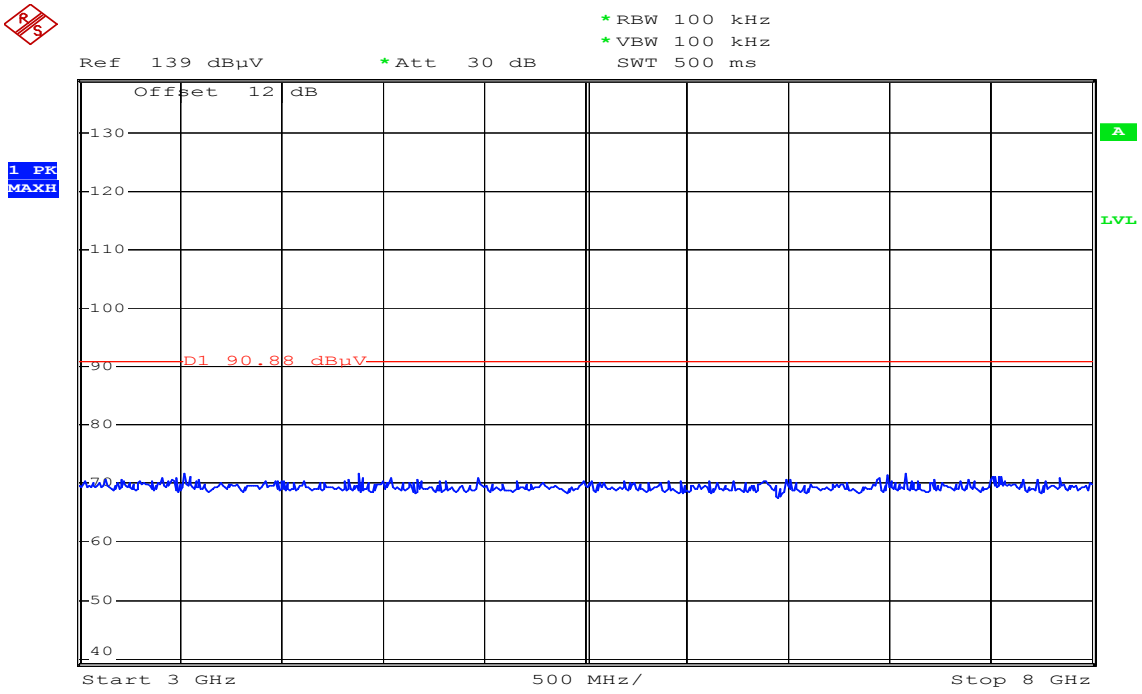
## Test Plot

## IEEE 802.11b mode

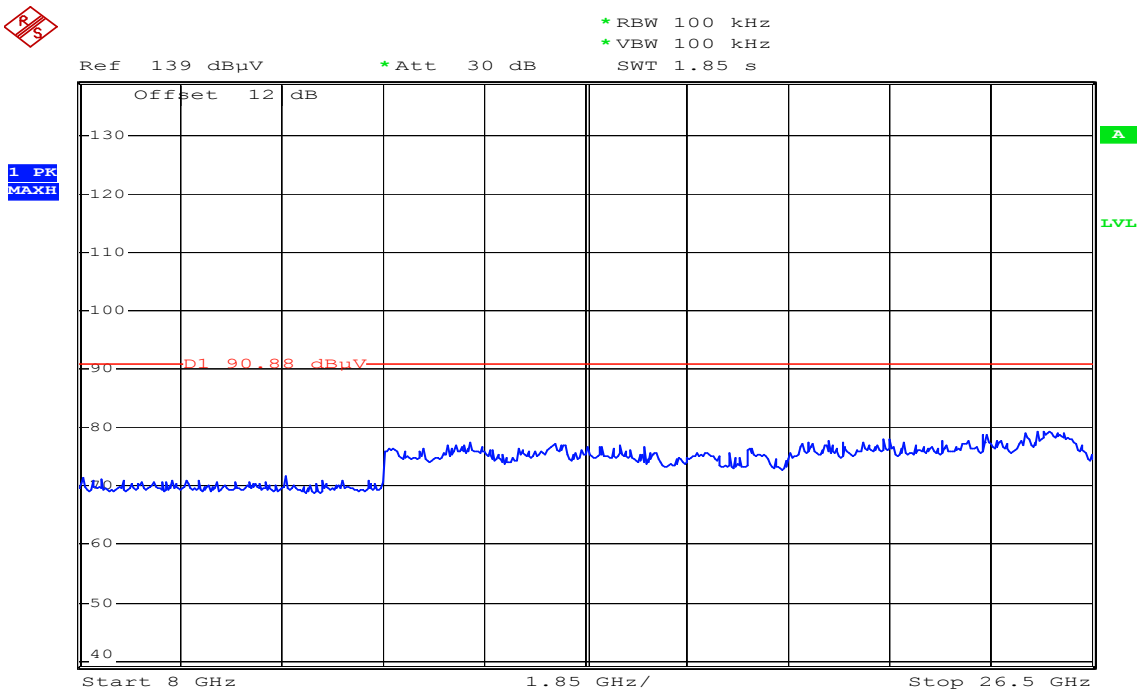
### CH Low




Date: 23.AUG.2006 07:47:11

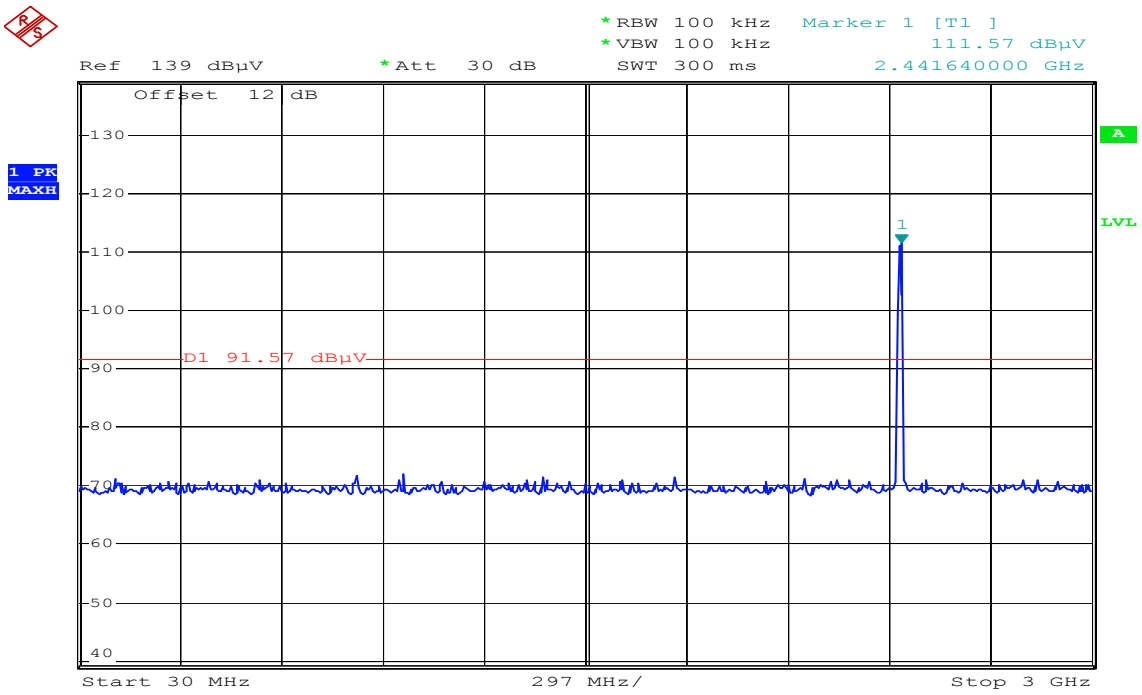



Date: 23.AUG.2006 07:47:47

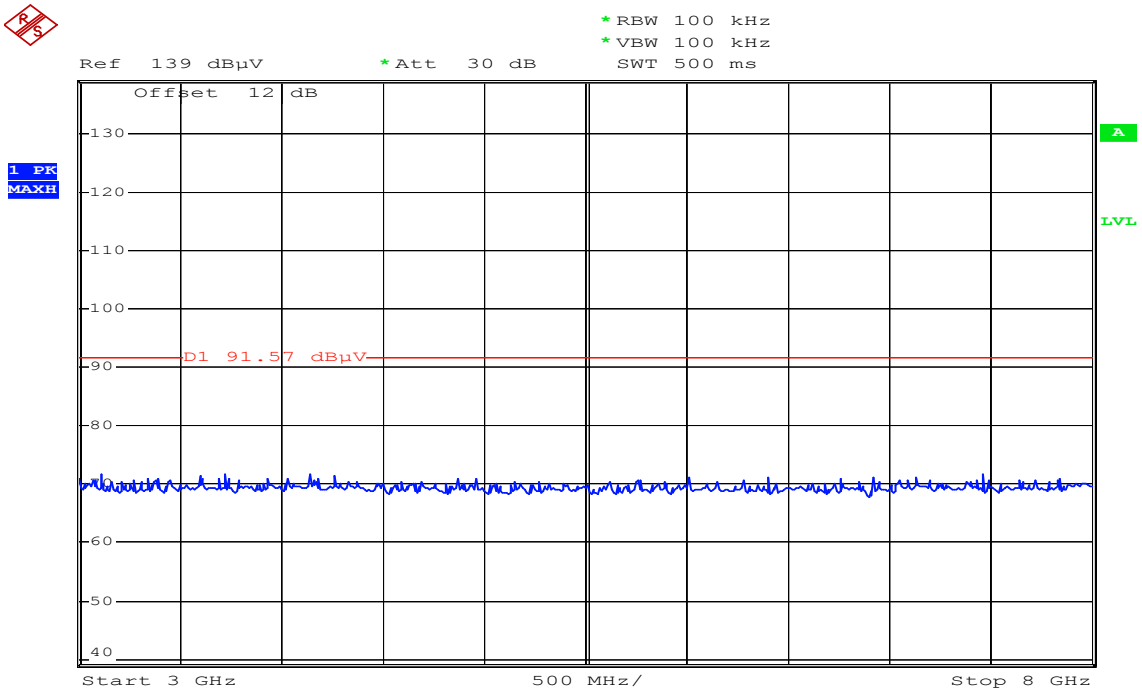



Date: 23.AUG.2006 07:48:15

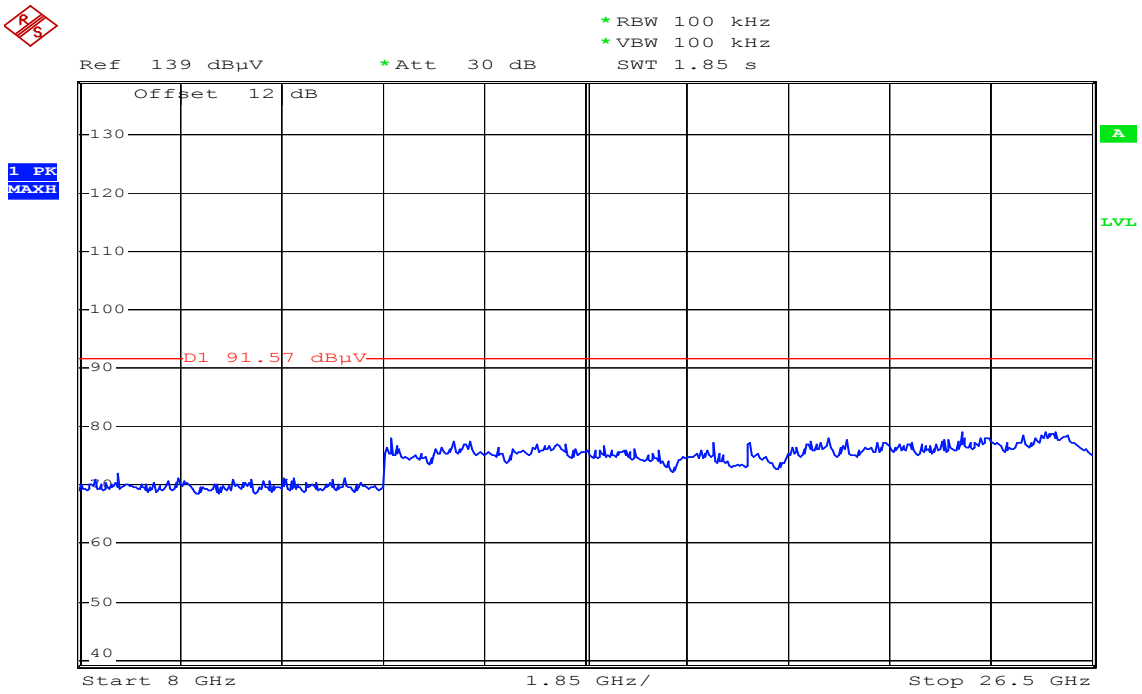
## CH Mid




Date: 23.AUG.2006 07:49:49

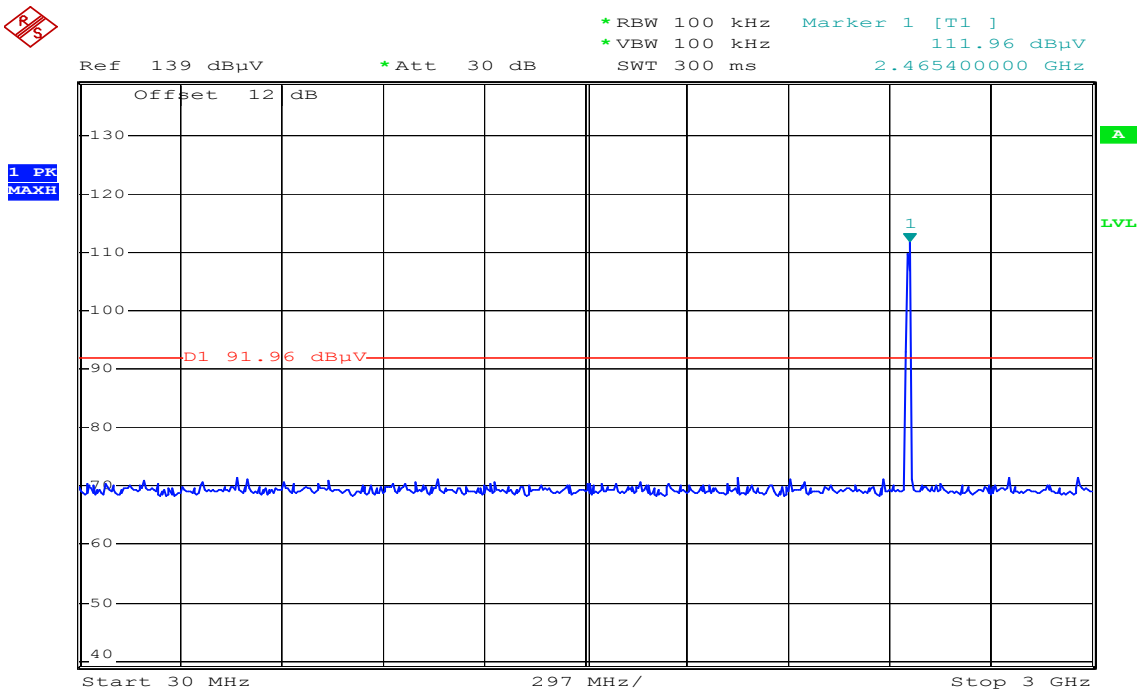



Date: 23.AUG.2006 07:50:20

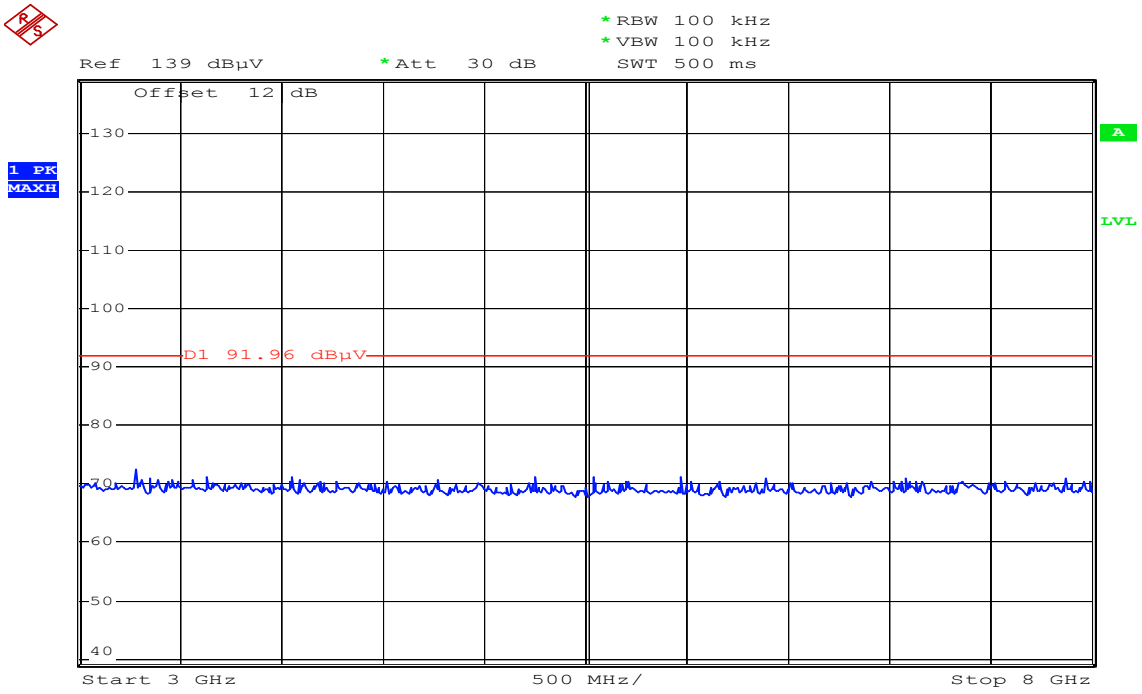



Date: 23.AUG.2006 07:50:46

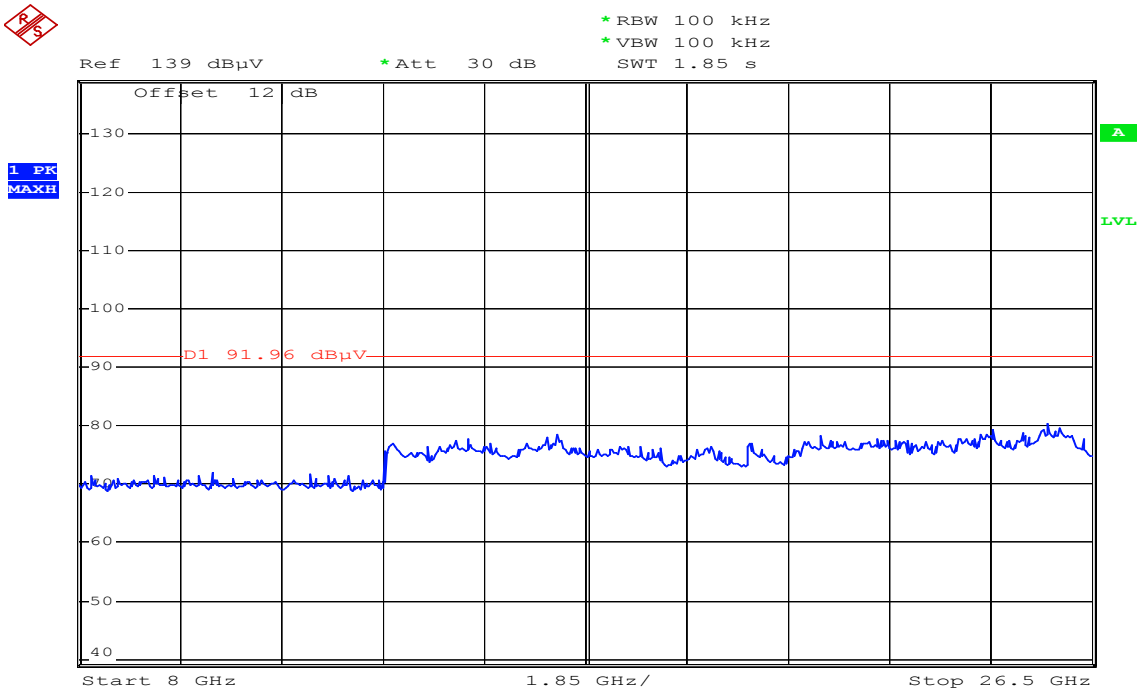
## CH High




Date: 23.AUG.2006 07:52:11



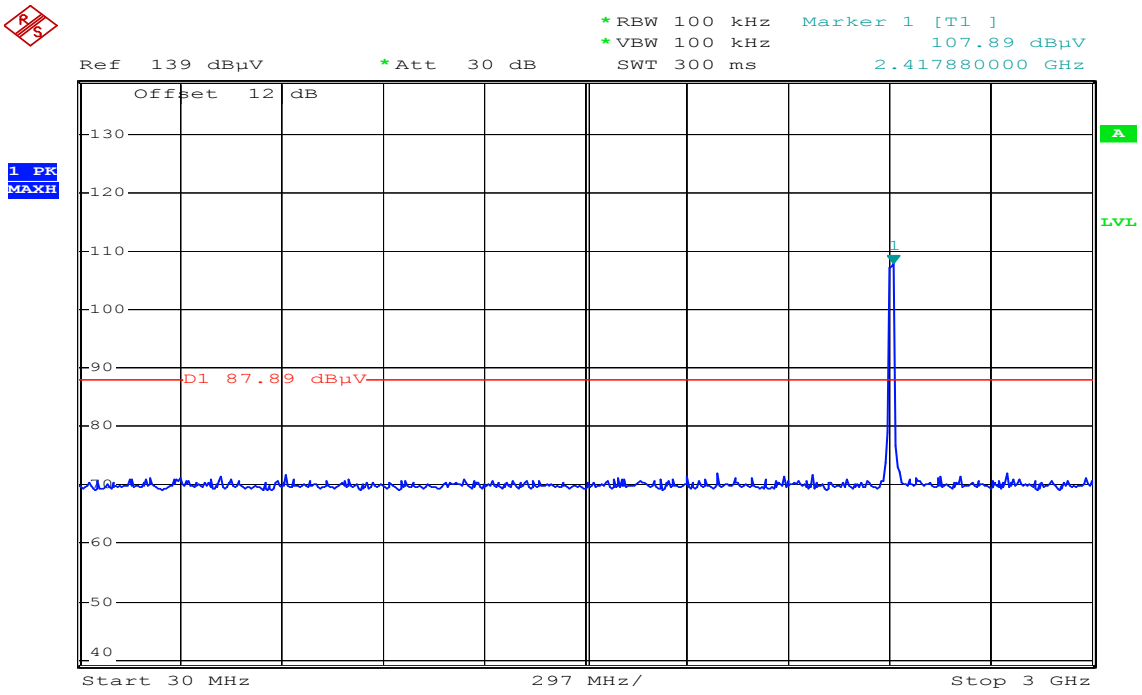

Date: 23.AUG.2006 07:52:38



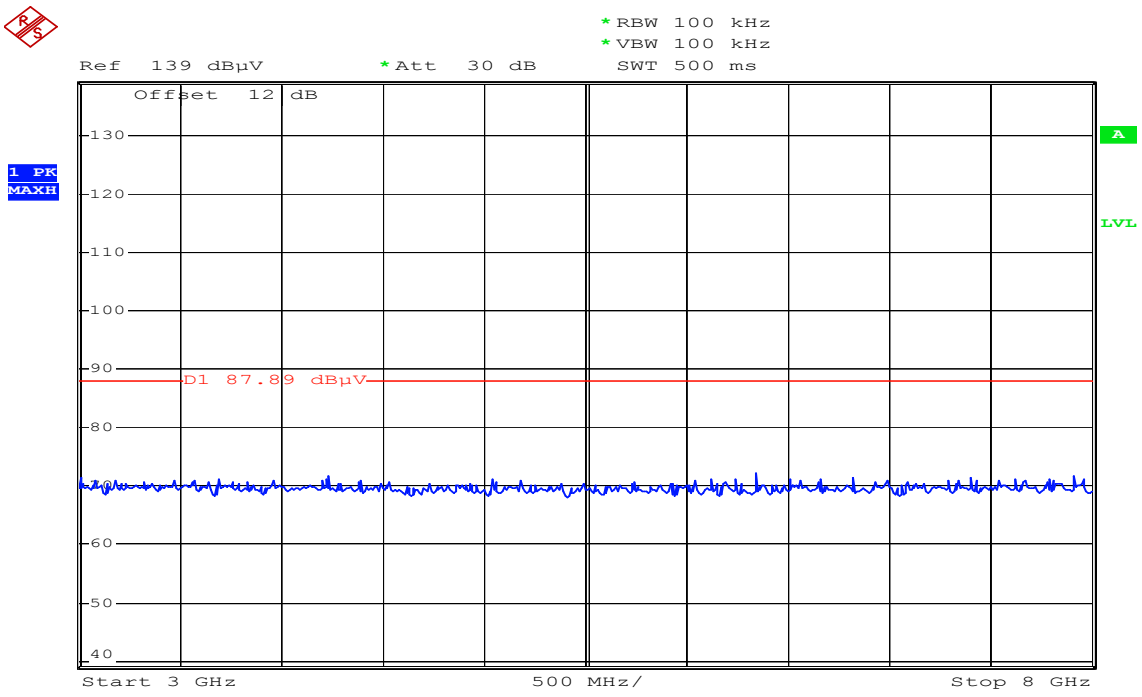

Date: 23.AUG.2006 07:53:14

## IEEE 802.11g mode

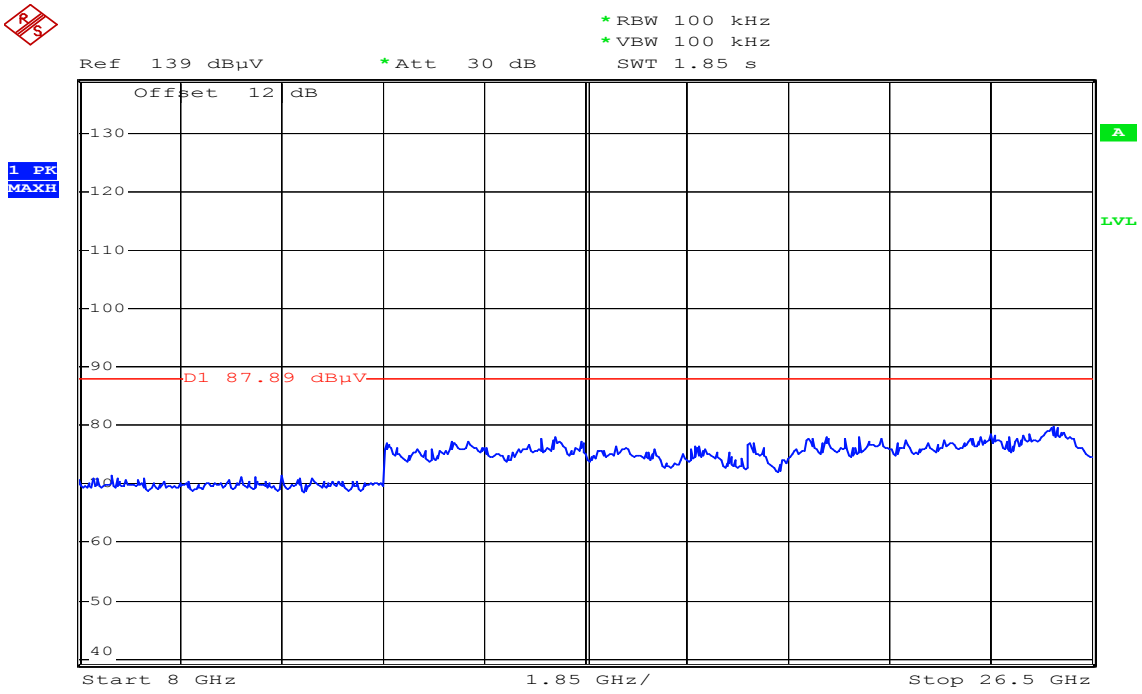
### CH Low




Date: 23.AUG.2006 07:37:18

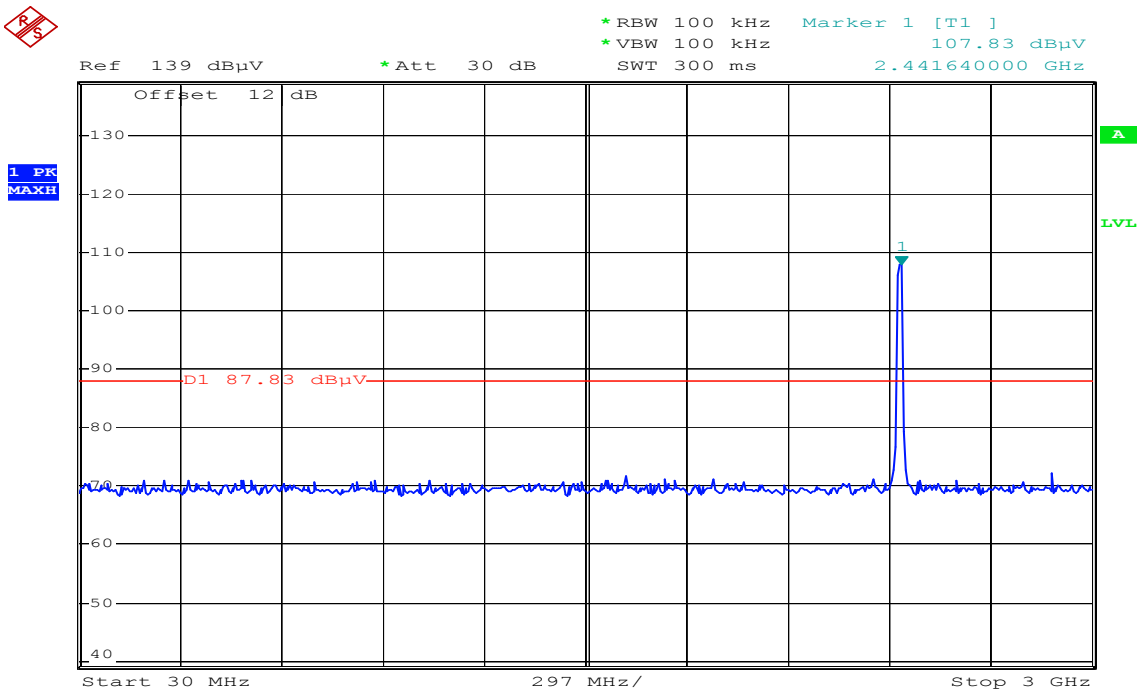



Date: 23.AUG.2006 07:38:25

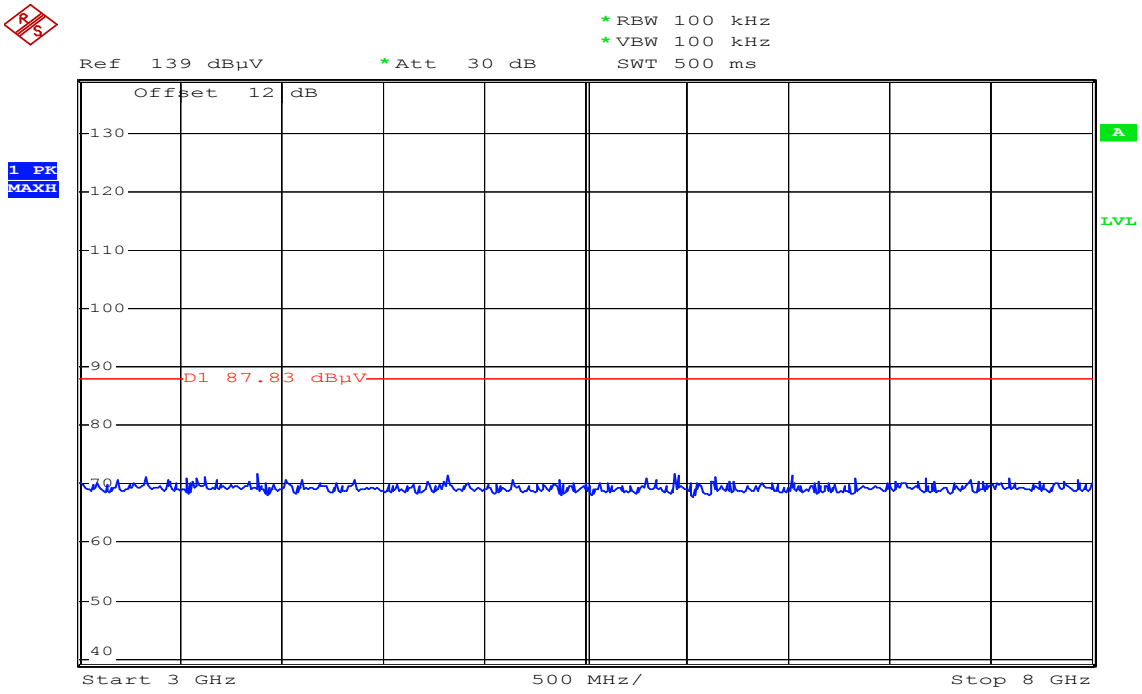



Date: 23.AUG.2006 07:39:04

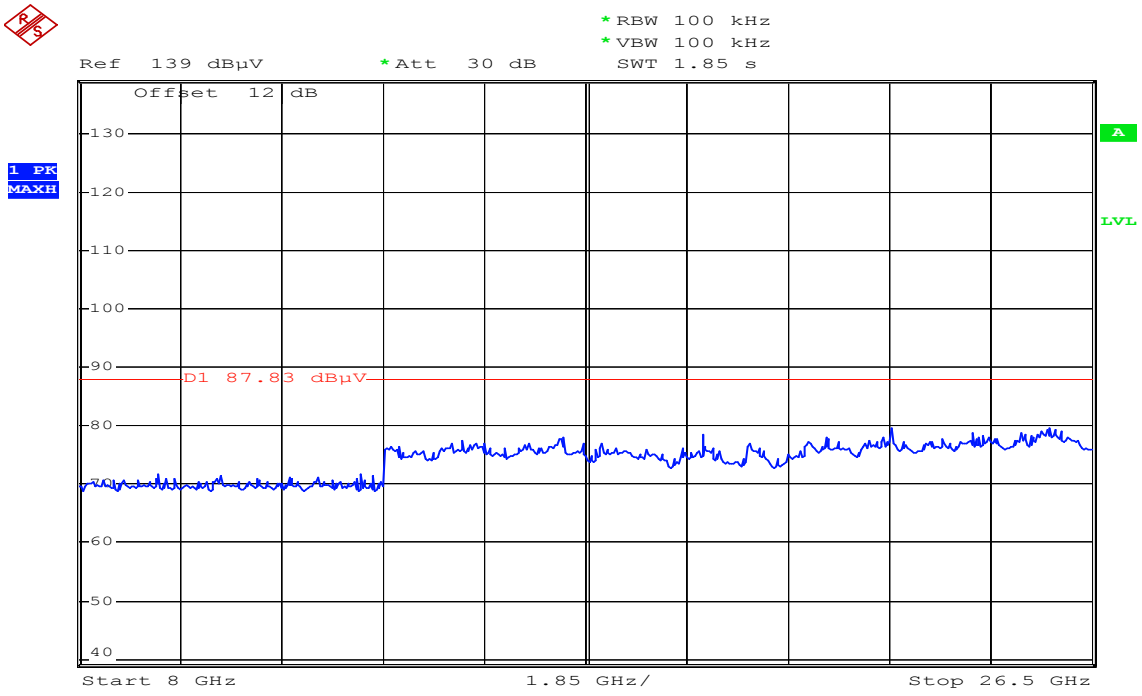
## CH Mid




Date: 23.AUG.2006 07:41:23

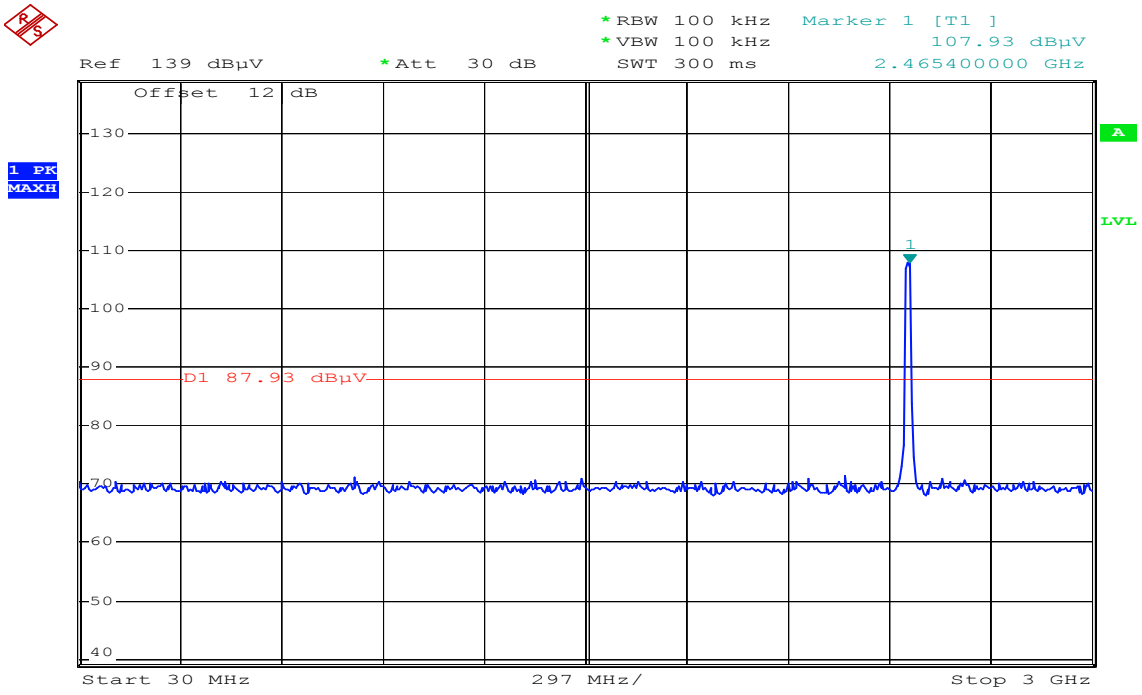



Date: 23.AUG.2006 07:41:57

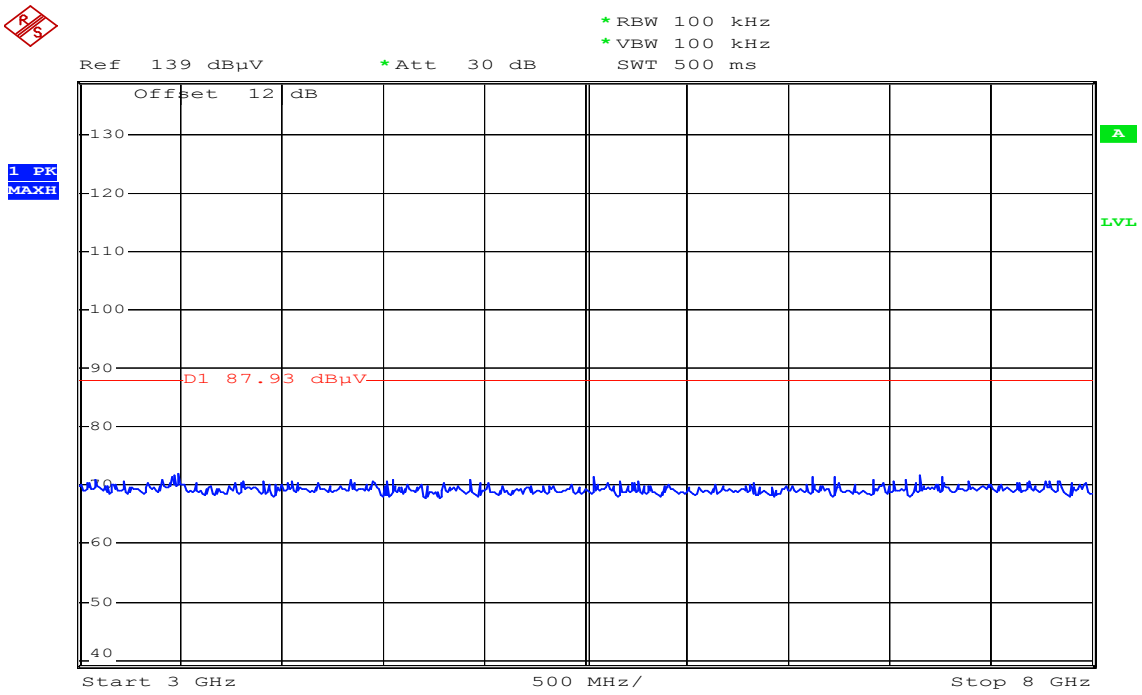



Date: 23.AUG.2006 07:42:31

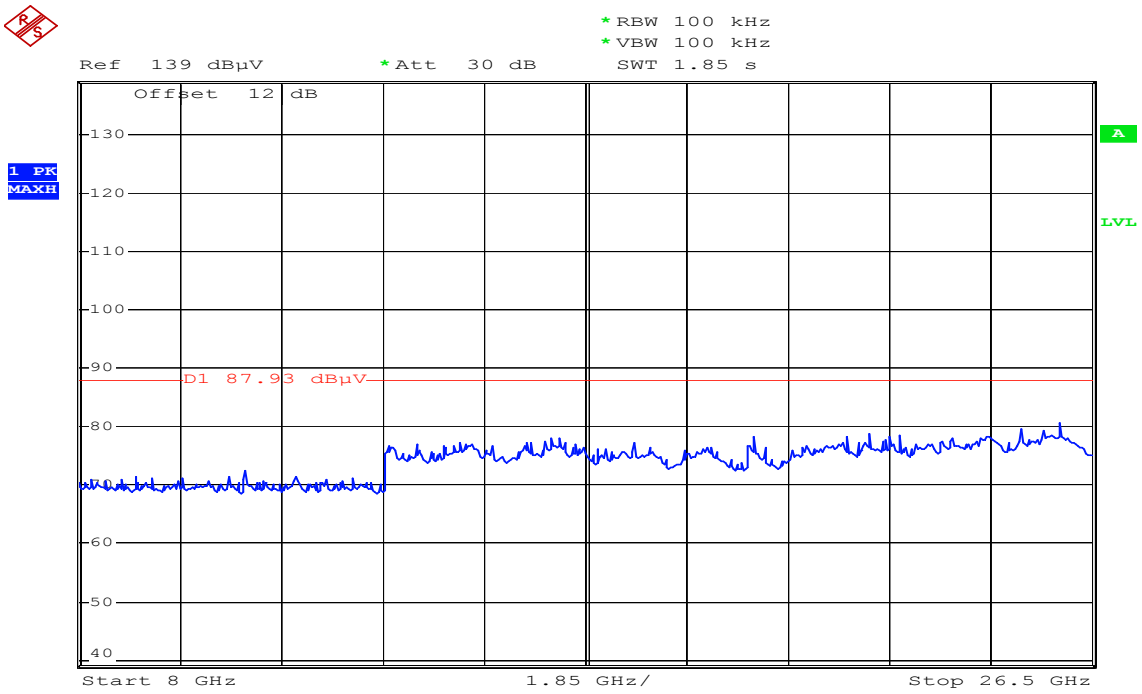
## CH High




Date: 23.AUG.2006 07:44:09




Date: 23.AUG.2006 07:44:36




Date: 23.AUG.2006 07:45:23

## 7.6.2 RADIATED EMISSIONS

## LIMIT

1. 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 (mV/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 above emission table, the tighter limit applies at the band edges.

| Frequency (Hz) | 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 |

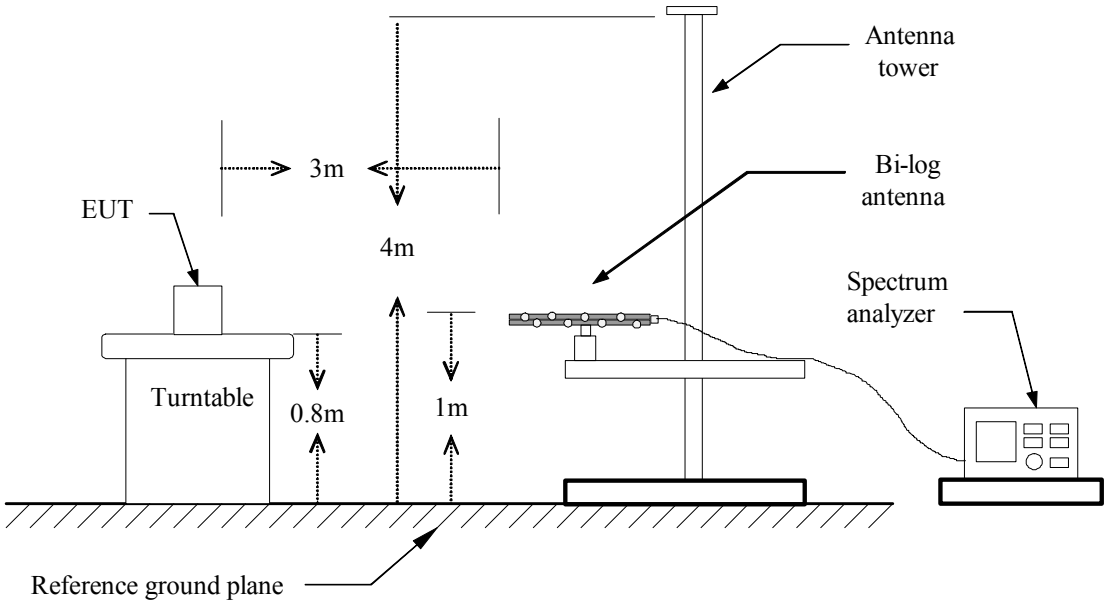
# MEASUREMENT EQUIPMENT USED

| Open Area Test Site # 3 | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| Spectrum Analyzer | Agilnet | E4411B | MY41440314 | N.C.R |
| Spectrum Analyzer | R&S | FSP30 | 100112 | 09/12/2006 |
| EMI Test Receiver | SCHAFFNER | SCR 3501 | 436 | 11/24/2006 |
| Pre-Amplifier | Anritsu | MH648A | M18767 | 08/31/2006 |
| Pre-Amplifier | MITEQ | AFS42-00102650-42-10P-42 | 924206 | 04/27/2007 |
| Bilog Antenna | SCHWAZBECK | VULB9163 | 144 | 03/31/2007 |
| Horn Antenna | EMCO | 3115 | 00022250 | 04/16/2007 |
| 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 | 05/05/2007 |

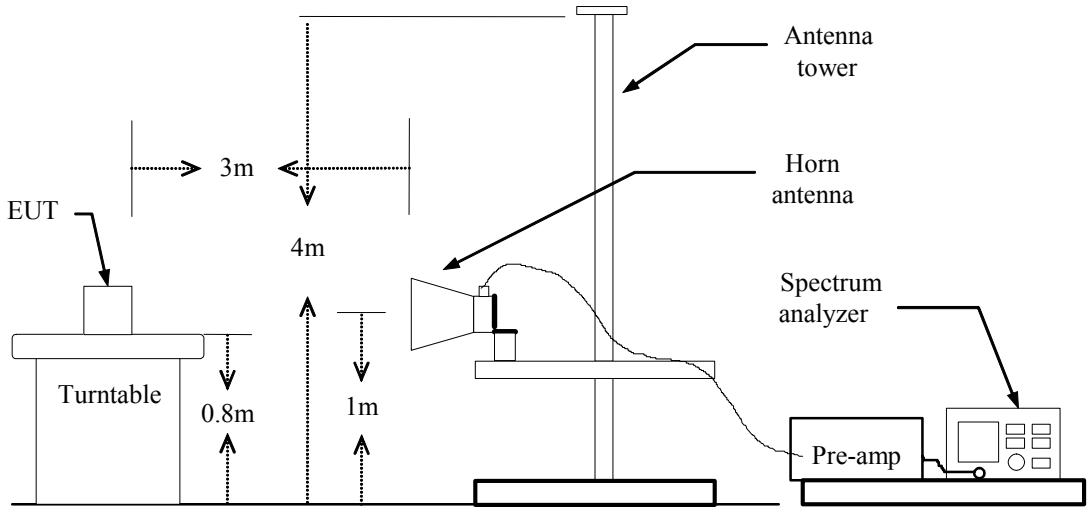
***Remark:*** *Each piece of equipment is scheduled for calibration once a year.*

## 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 1 GHz

**Operation Mode:** Normal Link **Test Date:** 2006/8/21

**Temperature:** 30°C **Tested by:** ARNO HSIEH

**Humidity:** 55 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/QP) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 52.00 | V | QP | 19.00 | 14.24 | 33.24 | 40.00 | -6.76 |
| 168.00 | V | Peak | 22.25 | 10.87 | 33.13 | 43.50 | -10.37 |
| 360.00 | V | Peak | 14.69 | 16.98 | 31.66 | 46.00 | -14.34 |
| 375.03 | V | Peak | 14.46 | 17.27 | 31.73 | 46.00 | -14.27 |
| 583.98 | V | Peak | 16.48 | 21.32 | 37.80 | 46.00 | -8.20 |
| 800.01 | V | Peak | 9.83 | 23.76 | 33.59 | 46.00 | -12.41 |
| | | | | | | | |
| 149.50 | H | Peak | 26.71 | 10.17 | 36.88 | 43.50 | -6.62 |
| 168.03 | H | Peak | 28.88 | 10.88 | 39.75 | 43.50 | -3.75 |
| 175.00 | H | QP | 29.50 | 11.23 | 40.73 | 43.50 | -2.77 |
| 250.00 | H | QP | 23.60 | 14.27 | 37.87 | 46.00 | -8.13 |
| 279.55 | H | Peak | 22.81 | 14.84 | 37.64 | 46.00 | -8.36 |
| 480.00 | H | Peak | 20.62 | 19.10 | 39.72 | 46.00 | -6.28 |

***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 detector mode.*
3. *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.*
4. *The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.*

**Above 1 GHz**

**Operation Mode:** TX / IEEE 802.11b mode / CH Low **Test Date:** 2006/8/19

**Temperature:** 28°C **Tested by:** ARNO HSIEH

**Humidity:** 56 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 1488.00 | V | 49.74 | --- | -8.45 | 41.29 | --- | 74.00 | 54.00 | -12.71 | Peak |
| 1600.00 | V | 49.59 | --- | -7.82 | 41.77 | --- | 74.00 | 54.00 | -12.23 | Peak |
| 2484.00 | V | 54.87 | --- | -4.44 | 50.44 | --- | 74.00 | 54.00 | -3.56 | Peak |
| 2756.00 | V | 48.09 | --- | -3.22 | 44.87 | --- | 74.00 | 54.00 | -9.13 | Peak |
| 2896.00 | V | 48.61 | --- | -2.58 | 46.03 | --- | 74.00 | 54.00 | -7.97 | Peak |
| 4820.00 | V | 54.41 | 43.14 | 1.87 | 56.28 | 45.01 | 74.00 | 54.00 | -8.99 | AV |
| | | | | | | | | | | |
| 1440.00 | H | 48.90 | --- | -8.67 | 40.24 | --- | 74.00 | 54.00 | -13.76 | Peak |
| 2344.00 | H | 48.13 | --- | -4.75 | 43.38 | --- | 74.00 | 54.00 | -10.62 | Peak |
| 2648.00 | H | 47.39 | --- | -3.72 | 43.67 | --- | 74.00 | 54.00 | -10.33 | Peak |
| 2976.00 | H | 47.18 | --- | -2.21 | 44.97 | --- | 74.00 | 54.00 | -9.03 | Peak |
| 4820.00 | H | 51.96 | 40.22 | 1.87 | 53.83 | 42.09 | 74.00 | 54.00 | -11.91 | AV |
| N/A | | | | | | | | | | |

***Remark:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
   b. *AV Setting 1GH z to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*

**Operation Mode:** TX / IEEE 802.11b mode / CH Mid **Test Date:** 2006/8/19

**Temperature:** 28°C **Tested by:** ARNO HSIEH

**Humidity:** 56 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 1492.00 | V | 48.05 | --- | -8.43 | 39.62 | --- | 74.00 | 54.00 | -14.38 | Peak |
| 1792.00 | V | 48.44 | --- | -6.72 | 41.72 | --- | 74.00 | 54.00 | -12.28 | Peak |
| 1920.00 | V | 48.24 | --- | -5.99 | 42.25 | --- | 74.00 | 54.00 | -11.75 | Peak |
| 2528.00 | V | 53.77 | --- | -4.27 | 49.50 | --- | 74.00 | 54.00 | -4.50 | Peak |
| 2928.00 | V | 47.82 | --- | -2.43 | 45.39 | --- | 74.00 | 54.00 | -8.61 | Peak |
| 4870.00 | V | 57.14 | 45.54 | 2.02 | 59.16 | 47.56 | 74.00 | 54.00 | -6.44 | AV |
| | | | | | | | | | | |
| 1084.00 | H | 48.04 | --- | -10.31 | 37.73 | --- | 74.00 | 54.00 | -16.27 | Peak |
| 1628.00 | H | 47.88 | --- | -7.66 | 40.22 | --- | 74.00 | 54.00 | -13.78 | Peak |
| 2612.00 | H | 47.75 | --- | -3.88 | 43.86 | --- | 74.00 | 54.00 | -10.14 | Peak |
| 2744.00 | H | 46.97 | --- | -3.28 | 43.69 | --- | 74.00 | 54.00 | -10.31 | Peak |
| 4870.00 | H | 54.40 | 41.57 | 2.02 | 56.42 | 43.59 | 74.00 | 54.00 | -10.41 | AV |
| N/A | | | | | | | | | | |

***Remark:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
   b. *AV Setting 1GH z to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*

**Operation Mode:** TX / IEEE 802.11b mode / CH High **Test Date:** 2006/8/19

**Temperature:** 28°C **Tested by:** ARNO HSIEH

**Humidity:** 56 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 1064.00 | V | 49.29 | --- | -10.40 | 38.88 | --- | 74.00 | 54.00 | -15.12 | Peak |
| 1416.00 | V | 47.92 | --- | -8.78 | 39.14 | --- | 74.00 | 54.00 | -14.86 | Peak |
| 1600.00 | V | 48.43 | --- | -7.82 | 40.61 | --- | 74.00 | 54.00 | -13.39 | Peak |
| 2376.00 | V | 52.12 | --- | -4.68 | 47.44 | --- | 74.00 | 54.00 | -6.56 | Peak |
| 2532.00 | V | 54.39 | --- | -4.25 | 50.13 | --- | 74.00 | 54.00 | -3.87 | Peak |
| 4920.00 | V | 58.94 | 48.55 | 2.16 | 61.11 | 50.71 | 74.00 | 54.00 | -3.29 | AV |
| | | | | | | | | | | |
| 1080.00 | H | 49.51 | --- | -10.33 | 39.18 | --- | 74.00 | 54.00 | -14.82 | Peak |
| 1600.00 | H | 48.84 | --- | -7.82 | 41.02 | --- | 74.00 | 54.00 | -12.98 | Peak |
| 1792.00 | H | 48.23 | --- | -6.72 | 41.51 | --- | 74.00 | 54.00 | -12.49 | Peak |
| 2352.00 | H | 47.98 | --- | -4.73 | 43.25 | --- | 74.00 | 54.00 | -10.75 | Peak |
| 2652.00 | H | 47.45 | --- | -3.70 | 43.75 | --- | 74.00 | 54.00 | -10.25 | Peak |
| 4920.00 | H | 55.20 | 43.15 | 2.16 | 57.36 | 45.31 | 74.00 | 54.00 | -8.69 | AV |

***Remark:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
   b. *AV Setting 1GH z to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*

**Operation Mode:** TX / IEEE 802.11g mode / CH Low **Test Date:** 2006/8/19

**Temperature:** 28°C **Tested by:** ARNO HSIEH

**Humidity:** 56 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 1412.00 | V | 48.23 | --- | -8.80 | 39.43 | --- | 74.00 | 54.00 | -14.57 | Peak |
| 1788.00 | V | 48.64 | --- | -6.74 | 41.90 | --- | 74.00 | 54.00 | -12.10 | Peak |
| 1920.00 | V | 48.29 | --- | -5.99 | 42.30 | --- | 74.00 | 54.00 | -11.70 | Peak |
| 2524.00 | V | 55.62 | --- | -4.29 | 51.33 | --- | 74.00 | 54.00 | -2.67 | Peak |
| 2896.00 | V | 52.67 | --- | -2.58 | 50.09 | --- | 74.00 | 54.00 | -3.91 | Peak |
| 4820.00 | V | 52.40 | 41.24 | 1.87 | 54.27 | 43.11 | 74.00 | 54.00 | -10.89 | AV |
| | | | | | | | | | | |
| 1800.00 | H | 47.69 | --- | -6.67 | 41.01 | --- | 74.00 | 54.00 | -12.99 | Peak |
| 2036.00 | H | 47.71 | --- | -5.45 | 42.27 | --- | 74.00 | 54.00 | -11.73 | Peak |
| 2520.00 | H | 50.15 | --- | -4.31 | 45.85 | --- | 74.00 | 54.00 | -8.15 | Peak |
| 2888.00 | H | 47.79 | --- | -2.62 | 45.17 | --- | 74.00 | 54.00 | -8.83 | Peak |
| 4820.00 | H | 51.90 | 41.29 | 1.87 | 53.77 | 43.16 | 74.00 | 54.00 | -10.84 | AV |
| | | | | | | | | | | |

***Remark:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
   b. *AV Setting 1GH z to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*

**Operation Mode:** TX / IEEE 802.11g mode / CH Mid **Test Date:** 2006/8/19

**Temperature:** 28°C **Tested by:** ARNO HSIEH

**Humidity:** 56 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 2524.00 | V | 56.08 | --- | -4.29 | 51.79 | --- | 74.00 | 54.00 | -2.21 | Peak |
| 2920.00 | V | 50.48 | --- | -2.47 | 48.01 | --- | 74.00 | 54.00 | -5.99 | Peak |
| 4880.00 | V | 53.69 | 43.67 | 2.05 | 55.74 | 45.72 | 74.00 | 54.00 | -8.28 | AV |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 2524.00 | H | 49.66 | --- | -4.29 | 45.38 | --- | 74.00 | 54.00 | -8.62 | Peak |
| 2924.00 | H | 47.42 | --- | -2.45 | 44.97 | --- | 74.00 | 54.00 | -9.03 | Peak |
| 4880.00 | H | 53.69 | 42.47 | 2.05 | 55.74 | 44.52 | 74.00 | 54.00 | -9.48 | AV |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

***Remark:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
   b. *AV Setting 1GH z to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*

**Operation Mode:** TX / IEEE 802.11g mode / CH High **Test Date:** 2006/8/19

**Temperature:** 28°C **Tested by:** ARNO HSIEH

**Humidity:** 56 % RH **Polarity:** Ver. / Hor.

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 2552.00 | V | 55.01 | --- | -4.16 | 50.85 | --- | 74.00 | 54.00 | -3.15 | Peak |
| 2952.00 | V | 48.13 | --- | -2.32 | 45.81 | --- | 74.00 | 54.00 | -8.19 | Peak |
| 4920.00 | V | 58.91 | 46.65 | 2.16 | 61.07 | 48.81 | 74.00 | 54.00 | -5.19 | AV |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 4920.00 | H | 54.42 | 42.71 | 2.16 | 56.59 | 44.87 | 74.00 | 54.00 | -9.13 | AV |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

***Remark:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
   b. *AV Setting 1GH z to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto*

## 7.7 POWERLINE CONDUCTED EMISSIONS

## LIMIT

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dBµV) | |
|---|---|---|
| | 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 |

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (*Live Line* and *Neutral Line*) and ground at the power terminals.

## MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCS30 | 845552/030 | 03/21/2007 |
| LISN | R&S | ESH2-Z5 | 843285/010 | 01/04/2007 |
| LISN | R&S | ESH3-Z5 | 848773/014 | 10/24/2006 |

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

### 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:** | 2006/8/21 |
| **Temperature:** | 26°C | **Humidity:** | 53% RH |
| **Tested by:** | ARNO HSIEH | | |

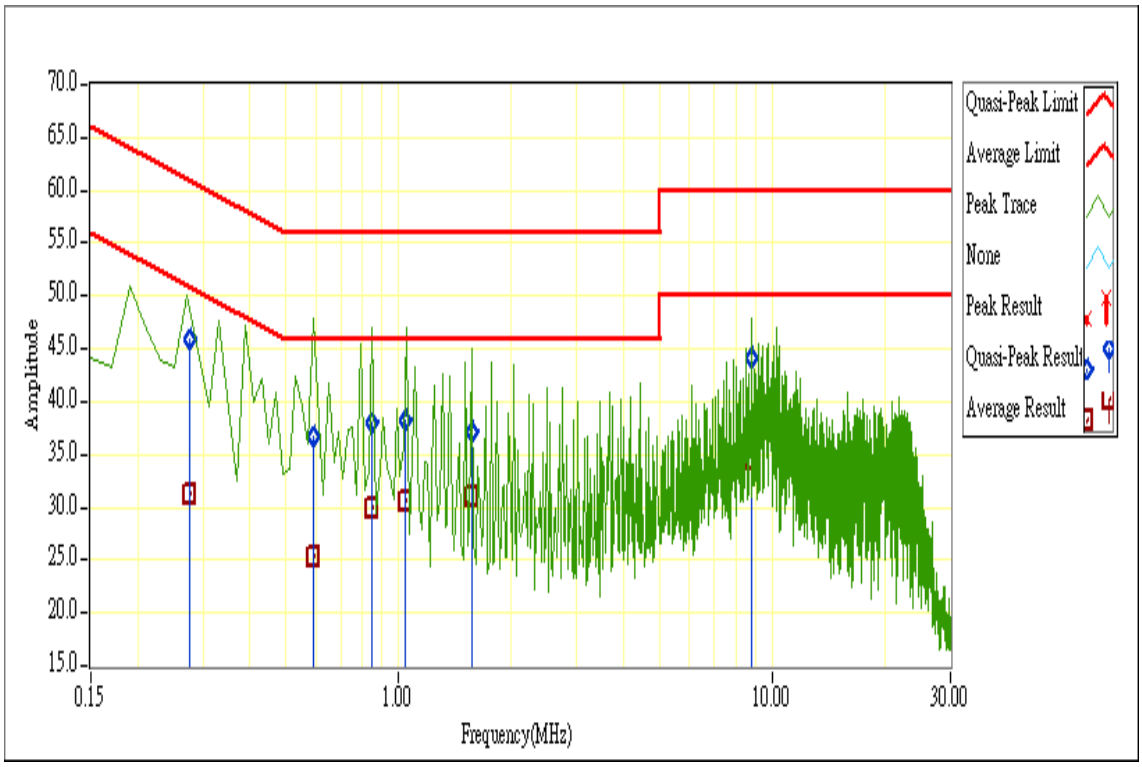
| Freq. (MHz) | QP Reading | AV Reading | Corr. factor | QP Result | AV Result | QP Limit | AV Limit | QP Margin | AV Margin | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.27 | 35.81 | 21.22 | 10.10 | 45.91 | 31.32 | 60.97 | 50.97 | -15.06 | -19.65 | L1 |
| 0.59 | 26.47 | 15.26 | 10.12 | 36.59 | 25.38 | 56.00 | 46.00 | -19.41 | -20.62 | L1 |
| 0.85 | 27.84 | 19.84 | 10.17 | 38.01 | 30.01 | 56.00 | 46.00 | -17.99 | -15.99 | L1 |
| 1.04 | 27.99 | 20.46 | 10.20 | 38.19 | 30.66 | 56.00 | 46.00 | -17.81 | -15.34 | L1 |
| 1.57 | 27.02 | 20.83 | 10.20 | 37.22 | 31.03 | 56.00 | 46.00 | -18.78 | -14.97 | L1 |
| 8.83 | 33.69 | 23.98 | 10.42 | 44.11 | 34.40 | 60.00 | 50.00 | -15.89 | -15.60 | L1 |
| | | | | | | | | | | |
| 0.21 | 34.88 | 24.59 | 10.90 | 45.78 | 35.49 | 63.21 | 53.21 | -17.43 | -17.72 | L2 |
| 0.85 | 27.70 | 19.02 | 10.90 | 38.60 | 29.92 | 56.00 | 46.00 | -17.40 | -16.08 | L2 |
| 1.37 | 30.03 | 20.71 | 10.90 | 40.93 | 31.61 | 56.00 | 46.00 | -15.07 | -14.39 | L2 |
| 5.41 | 32.01 | 21.83 | 11.10 | 43.11 | 32.93 | 60.00 | 50.00 | -16.89 | -17.07 | L2 |
| 8.15 | 32.17 | 22.92 | 11.18 | 43.35 | 34.10 | 60.00 | 50.00 | -16.65 | -15.90 | L2 |
| 9.45 | 36.15 | 25.10 | 11.19 | 47.34 | 36.29 | 60.00 | 50.00 | -12.66 | -13.71 | 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. *"---" denotes the emission level was or more than 2dB below the Average limit*
4. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
5. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

## Test Plots

### *Conducted emissions (Line 1)*




### *Conducted emissions (Line 2)*