



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

**Network Player**

**Model: NP2900/\*\* (\*= 0 ~ 9, a~z, A ~ Z or blank)**

**Trade Name: Philips**

*Issued to*

**Philips Consumer Lifestyle  
3029 E. Governor John Sevier Hwy.,  
Knoxville, Tennessee 37914, USA**

*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**



---

**Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.



## TABLE OF CONTENTS

<b>1. TEST RESULT CERTIFICATION .....</b>	<b>3</b>
<b>2. EUT DESCRIPTION.....</b>	<b>4</b>
<b>3. TEST METHODOLOGY.....</b>	<b>5</b>
3.1 EUT CONFIGURATION .....	5
3.2 EUT EXERCISE .....	5
3.3 GENERAL TEST PROCEDURES .....	5
3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS .....	6
3.5 DESCRIPTION OF TEST MODES .....	6
<b>4. INSTRUMENT CALIBRATION .....</b>	<b>7</b>
<b>5. FACILITIES AND ACCREDITATIONS .....</b>	<b>7</b>
5.1 FACILITIES.....	7
5.2 EQUIPMENT .....	7
5.3 LABORATORY ACCREDITATIONS AND LISTING .....	7
5.4 TABLE OF ACCREDITATIONS AND LISTINGS.....	8
<b>6. SETUP OF EQUIPMENT UNDER TEST .....</b>	<b>9</b>
6.1 SETUP CONFIGURATION OF EUT .....	9
6.2 SUPPORT EQUIPMENT.....	9
<b>7. FCC PART 15.247 REQUIREMENTS.....</b>	<b>10</b>
7.1 6DB BANDWIDTH.....	10
7.2 PEAK POWER .....	15
7.3 BAND EDGES MEASUREMENT .....	20
7.4 PEAK POWER SPECTRAL DENSITY .....	30
7.5 RADIO FREQUENCY EXPOSURE .....	35
7.6 SPURIOUS EMISSIONS.....	37
7.7 POWERLINE CONDUCTED EMISSIONS .....	59
<b>APPENDIX 1 PHOTOGRAPHS OF TEST SETUP.....</b>	<b>62</b>



## 1. TEST RESULT CERTIFICATION

**Applicant:** Philips Consumer Lifestyle  
3029 E. Governor John Sevier Hwy.,  
Knoxville, Tennessee 37914, USA

**Equipment Under Test:** Network Player

**Trade Name:** Philips

**Model:** NP2900/\*\* (\*= 0 ~ 9, A ~ Z or blank)

**Date of Test:** September 22 ~ October 4, 2008

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:*

Robert Huang  
Section Manager  
Compliance Certification Services Inc.

*Reviewed by:*

Julia Wei  
Senior Specialist  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	Network Player		
<b>Trade Name</b>	Philips		
<b>Model Number</b>	NP2900/** (*= 0 ~ 9, A ~ Z or blank)		
<b>Model Discrepancy</b>	All the model numbers are identical just for marketing purpose only.		
<b>EUT Power Rating</b>	12VDC, 3.5A		
<b>Power Adapter Manufacturer</b>	Philips	<b>Model</b>	DA-42I12
<b>Power Adapter Power Rating</b>	I/P: 100-240VAC, 50-60Hz, 1.1A O/P: 12VDC, 3.5A		
<b>Frequency Range</b>	2412 ~ 2462 MHz		
<b>Transmit Power</b>	IEEE 802.11b: 19.31 dBm (85.31mW) IEEE 802.11g: 20.28 dBm (106.66mW)		
<b>Modulation Technique</b>	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (QPSK, BPSK, 16-QAM, 64-QAM)		
<b>Transmit Data Rate</b>	IEEE 802.11b: 11, 5.5, 2, 1 Mbps 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>	1. PIFA Antenna / Gain: 2.15dBi 2. Dipole Antenna / Gain: 1.97dBi		

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **BOU-NP2900** 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: NP2900/17) had been tested under operating condition.

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

Use main (dipole) and aux (PIFA) antenna were verified and main (dipole) antenna was reported as worst case during conducted tests. As for radiated emission, dipole and PIFA antennas have been selected for final test.

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: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE802.11g:

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.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, Pa-De 2nd Rd., Luchu Hsiang, Taoyuan Shien, (338) Taiwan, R.O.C.  
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 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, 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	 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-2541/2798/725/1868 C-402/747/912
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 2324C-3 IC 2324C-5

**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

#### For Conducted and Radiated Measurement

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

**\*\*No any support equipment during the test.**

#### For Powerline Measurement

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	DVD	SONY	DVP-NS975V	2030939	FCC DoC	Unshielded, 1.5m x 2	Unshielded, 1.8m
2.	5.1 Digital	Logitech	Z-5400	S-0180B	FCC DoC	Unshielded, 1.5m	Unshielded, 1.8m
3.	Multimedia Headset	CJC	CJC-5258MV	0507106372	FCC DoC	Unshielded, 1.8m	N/A
4.	Notebook PC (Remote)	HP	COMPAQ NC 4010	CNU441F8LV	FCC DOC	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m

**Remark:** 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

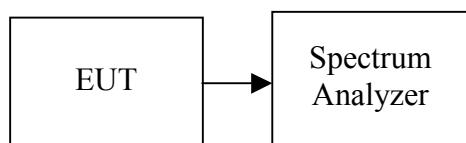
For the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2008

*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 = 1MHz, VBW = 3MHz, Span = 20MHz, 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	10180.4	>500	PASS
Mid	2437	10180.4		PASS
High	2462	10180.4		PASS

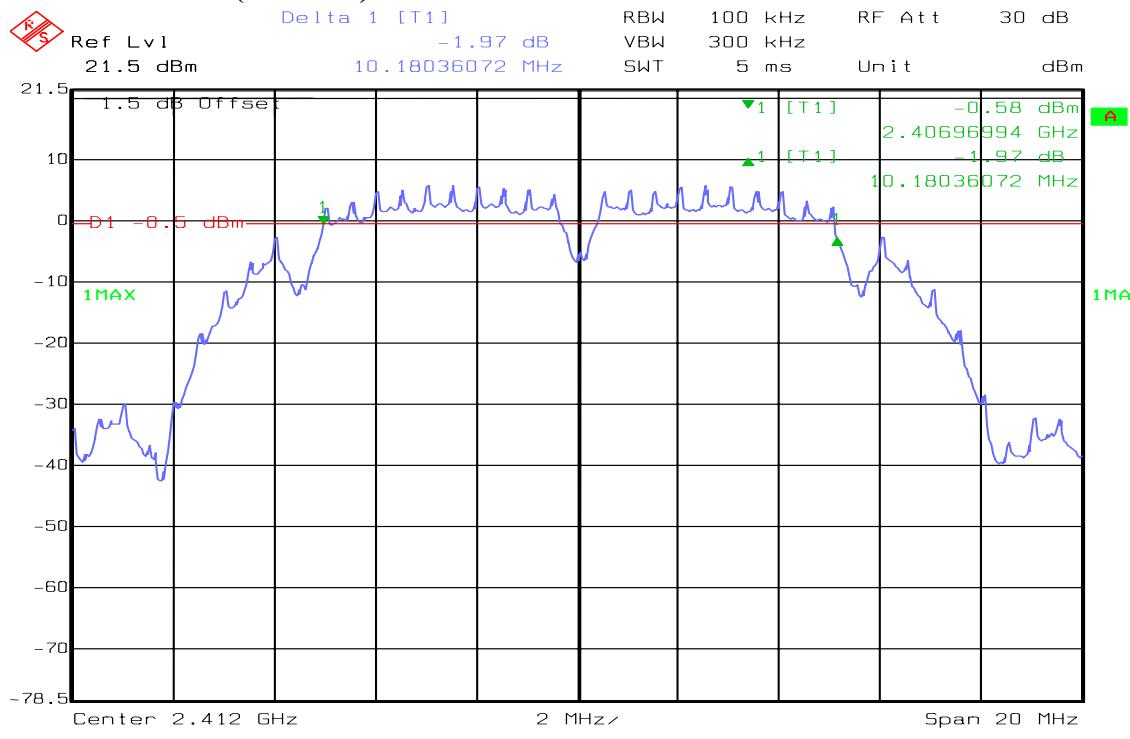
#### Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	16432.9	>500	PASS
Mid	2437	16392.8		PASS
High	2462	16392.8		PASS

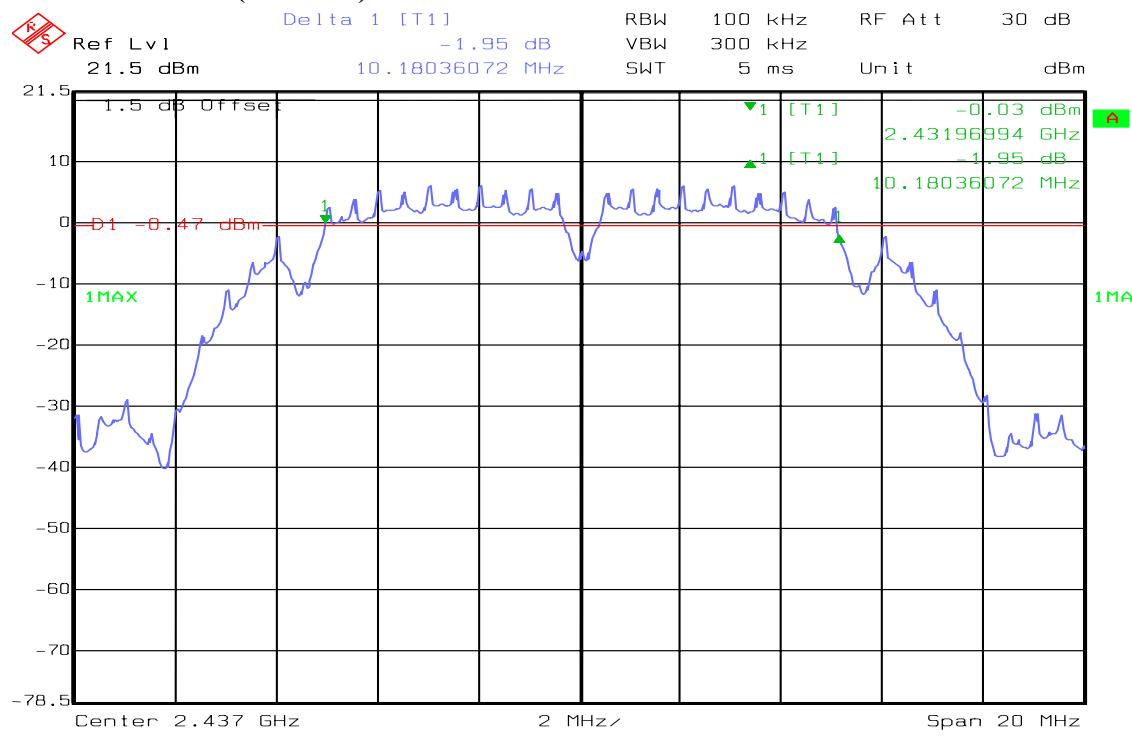
### Test Plot

#### IEEE 802.11b

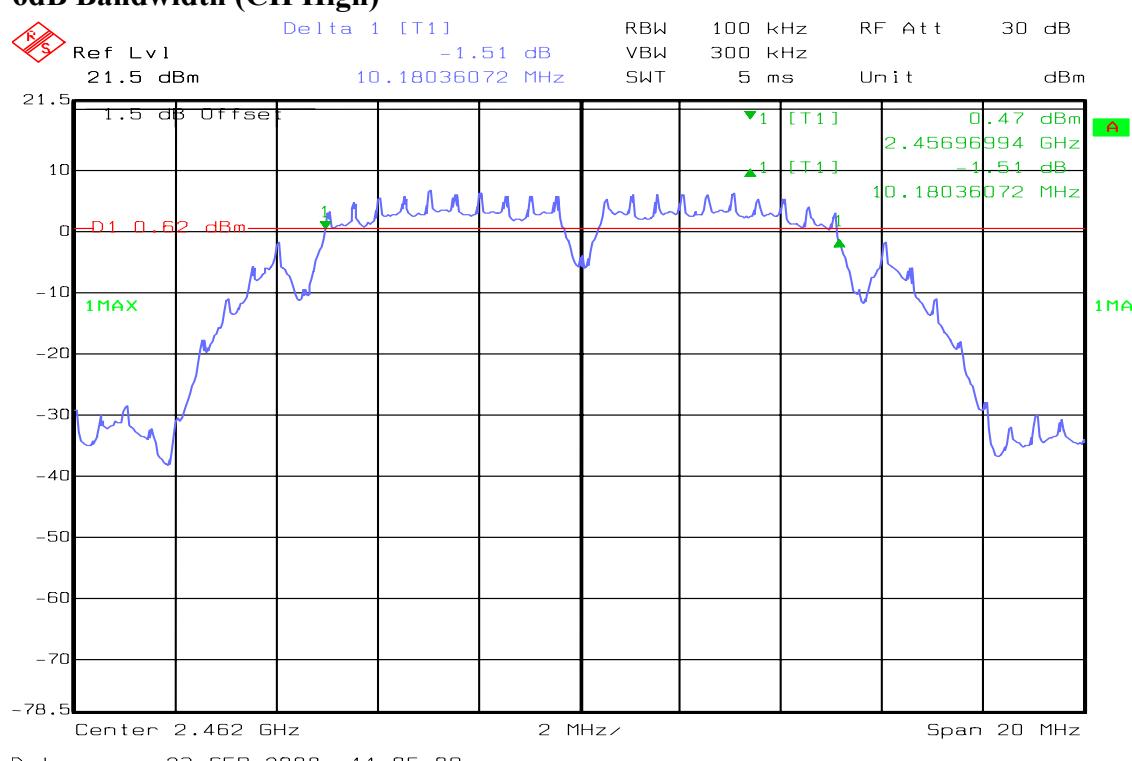
#### 6dB Bandwidth (CH Low)



### 6dB Bandwidth (CH Mid)

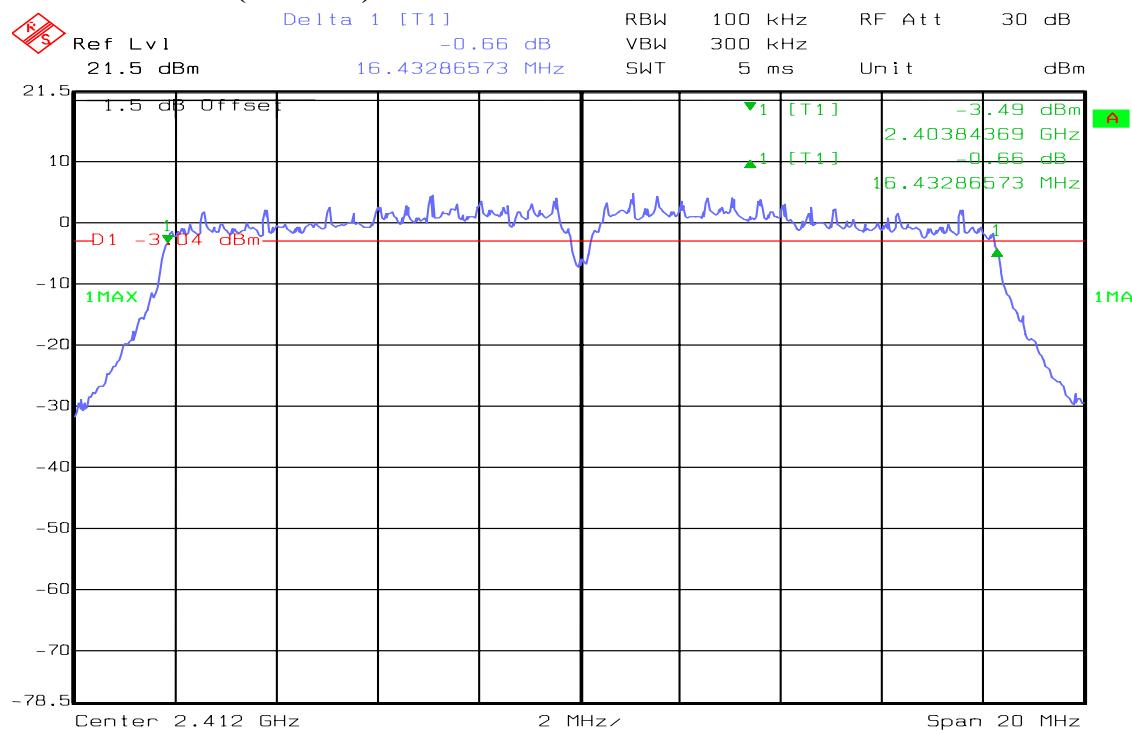


### 6dB Bandwidth (CH High)



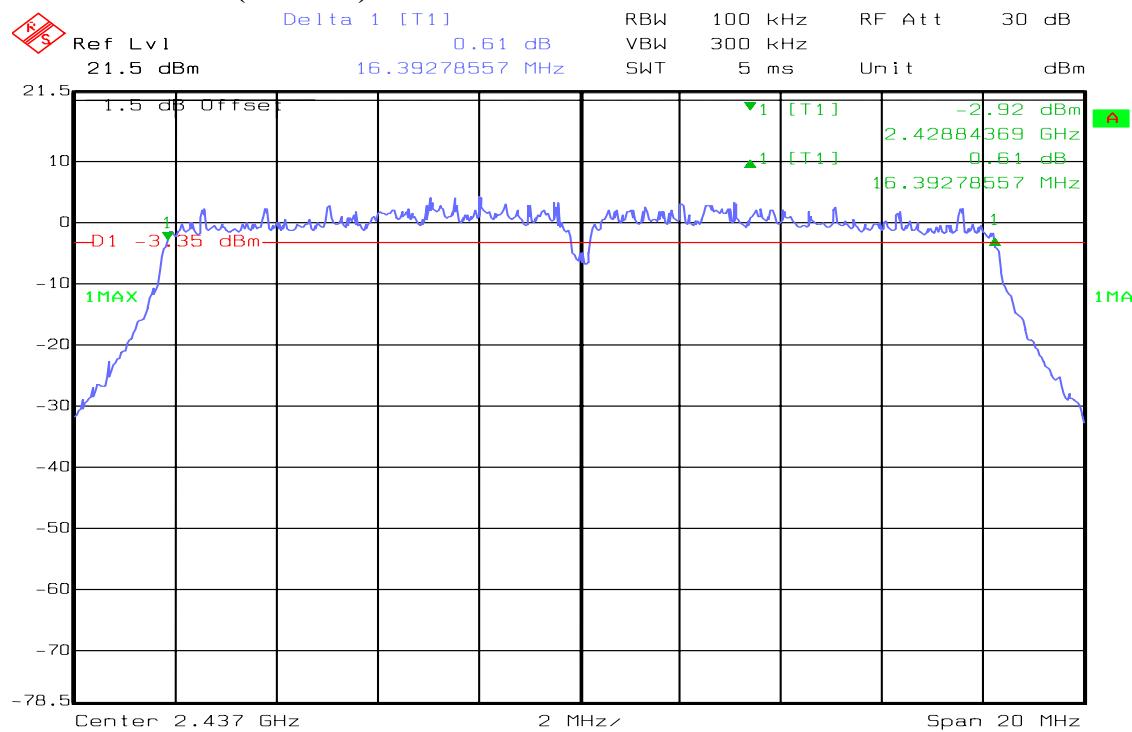
## IEEE 802.11g

### 6dB Bandwidth (CH Low)

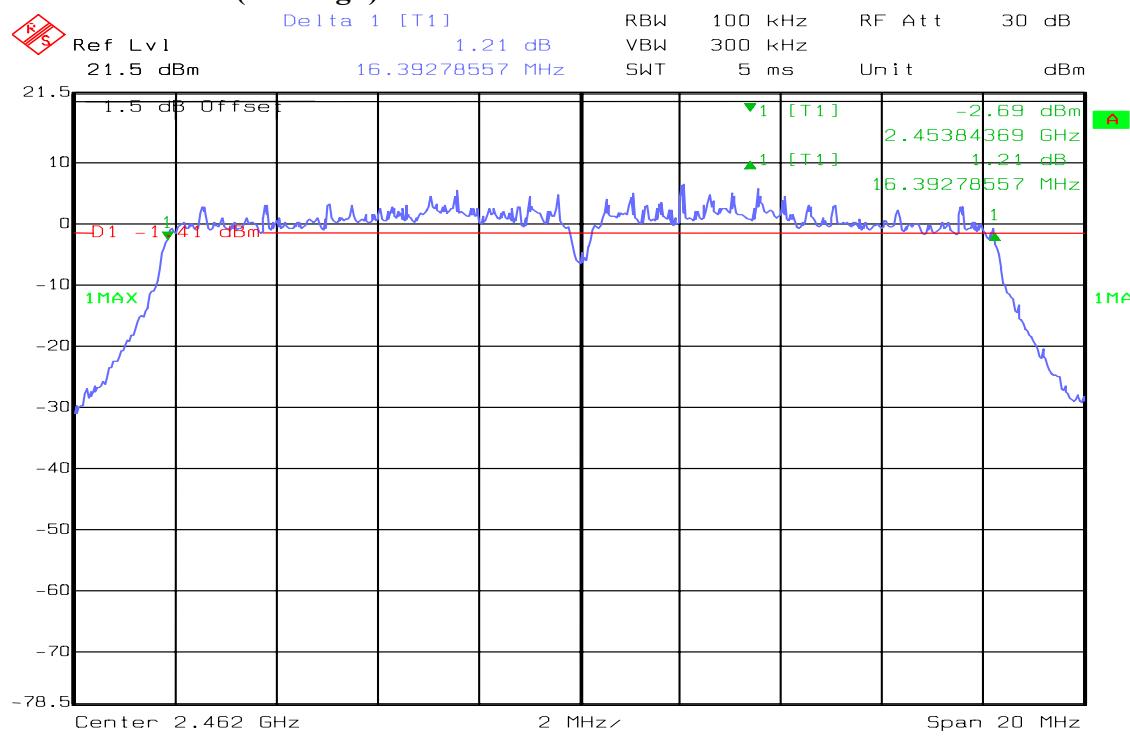


Date: 23.SEP.2008 11:00:16

### 6dB Bandwidth (CH Mid)



Date: 23.SEP.2008 11:02:34

**6dB Bandwidth (CH High)**



## 7.2 PEAK POWER

### LIMIT

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

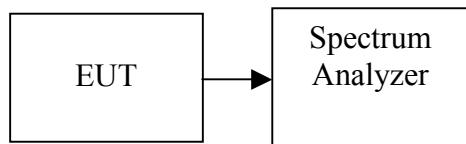
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional 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	10/14/2008

*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

#### **IEEE 802.11b**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	18.39	0.06902	1	PASS
Mid	2437	18.71	0.07430		PASS
High	2462	19.31	0.08531		PASS

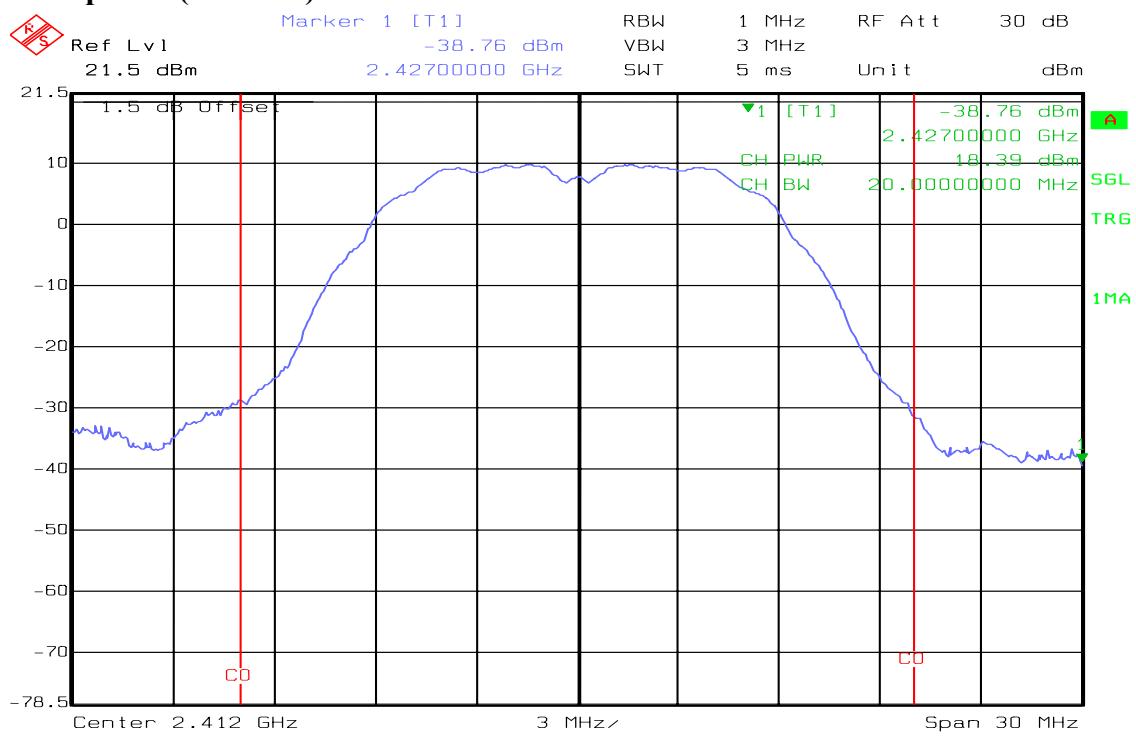
#### **IEEE 802.11g**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	19.21	0.08337	1	PASS
Mid	2437	19.83	0.09616		PASS
High	2462	20.28	0.10666		PASS

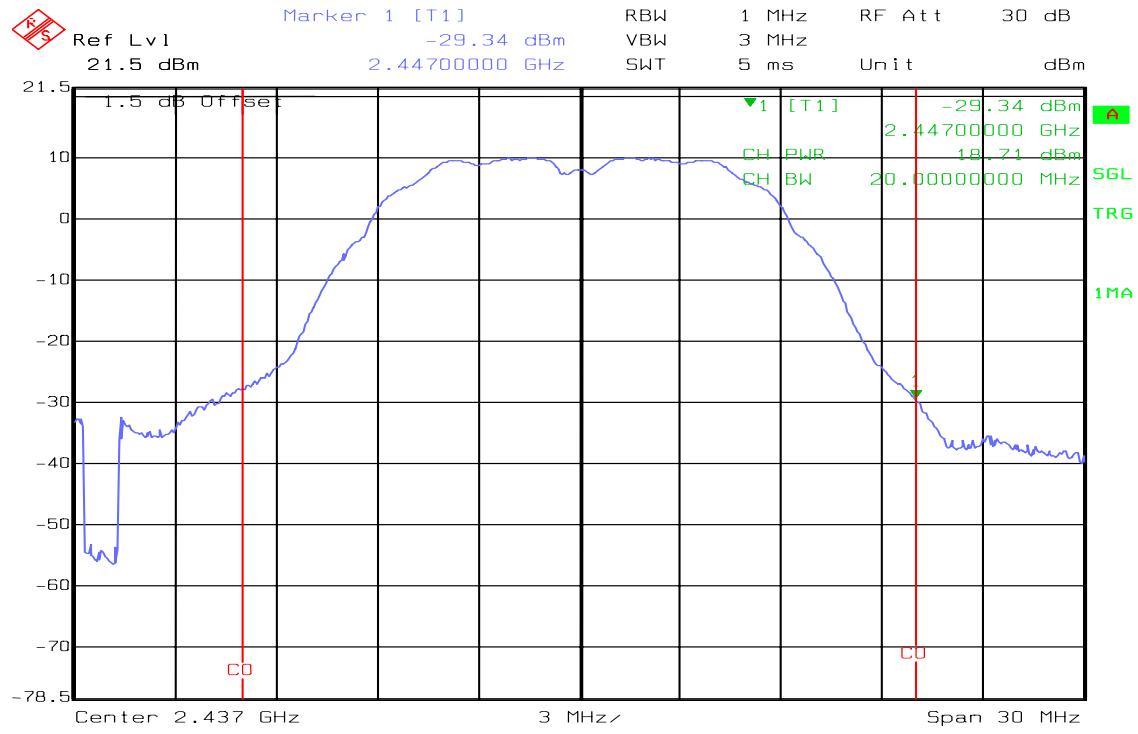
### Test Plot

#### IEEE 802.11b

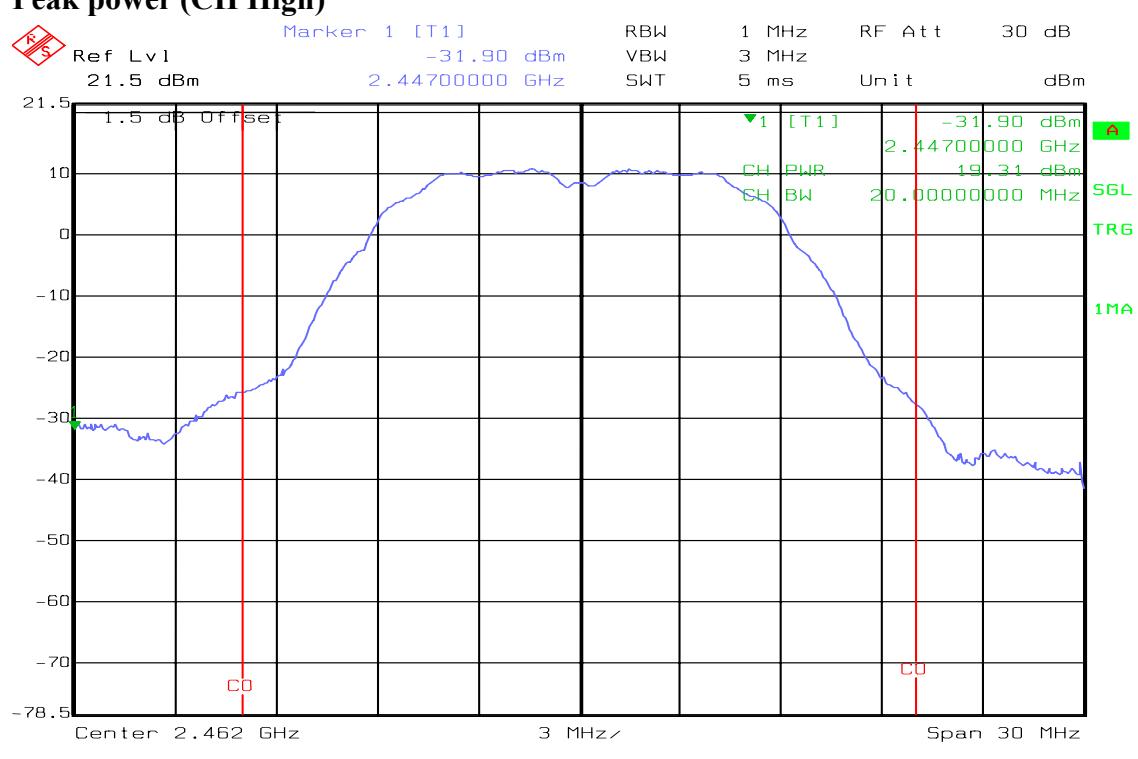
##### **Peak power (CH Low)**



### Peak power (CH Mid)

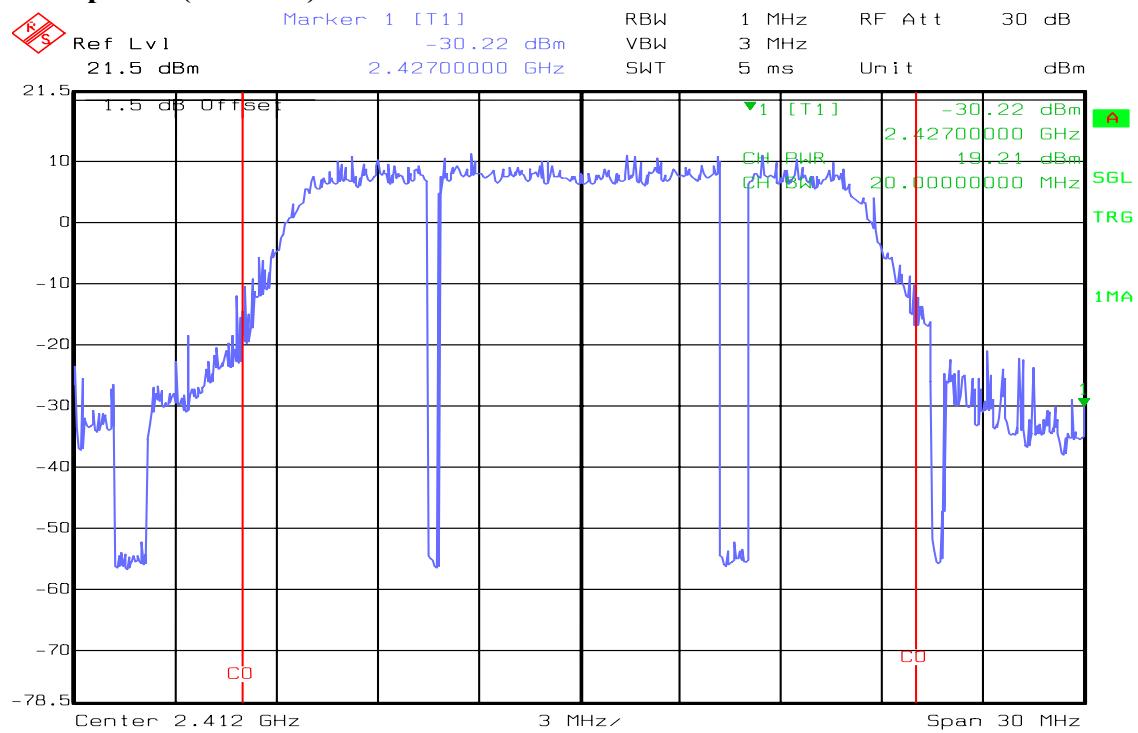


### Peak power (CH High)



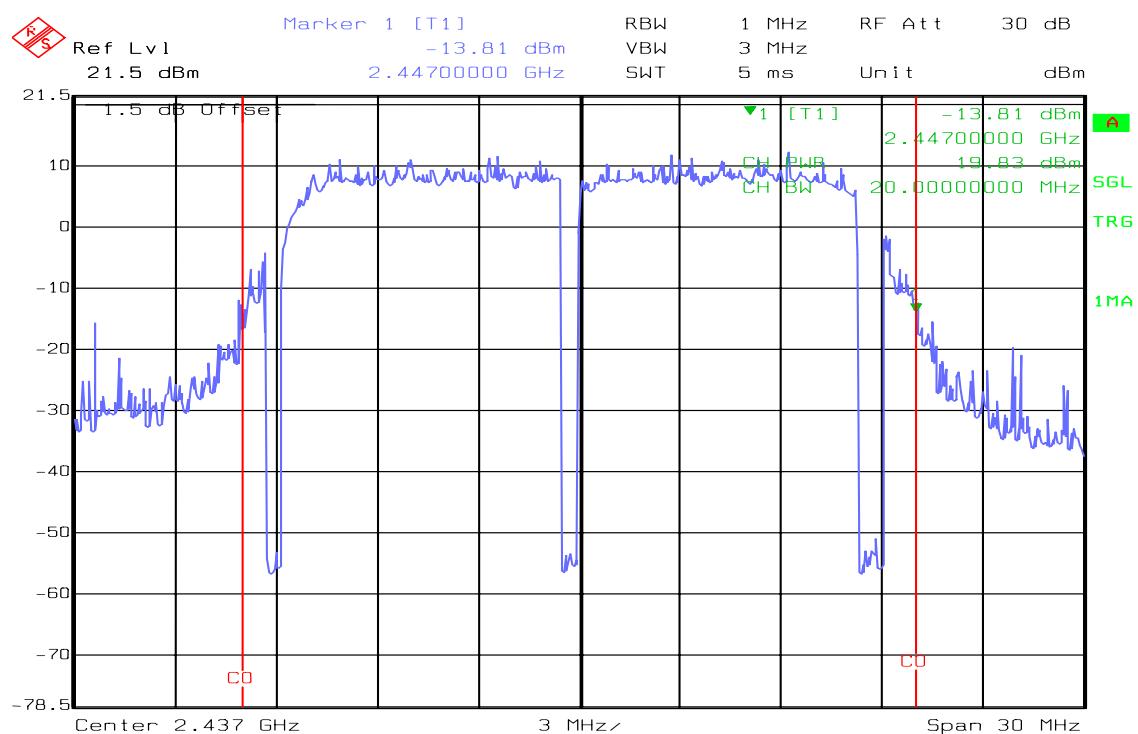
## IEEE 802.11g

### Peak power (CH Low)

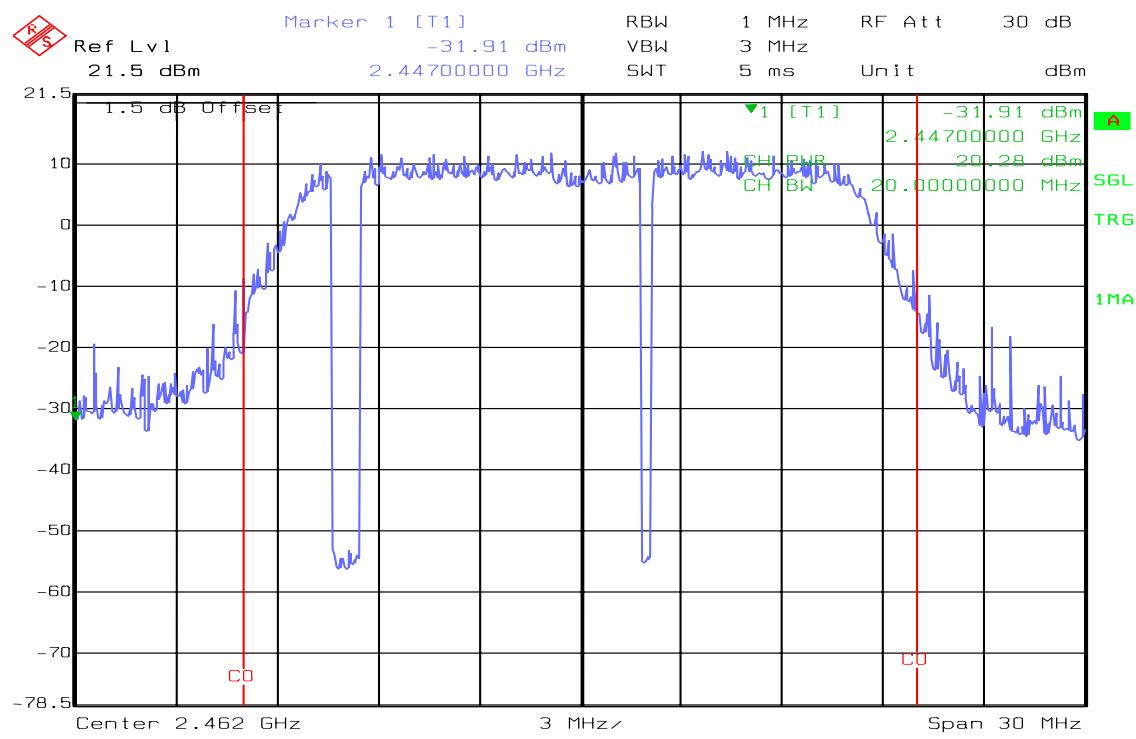


Date: 23.SEP.2008 10:21:51

### Peak power (CH Mid)



Date: 23.SEP.2008 10:29:54

**Peak power (CH High)**

Date: 23.SEP.2008 10:43:24

## 7.3 BAND EDGES MEASUREMENT

### LIMIT

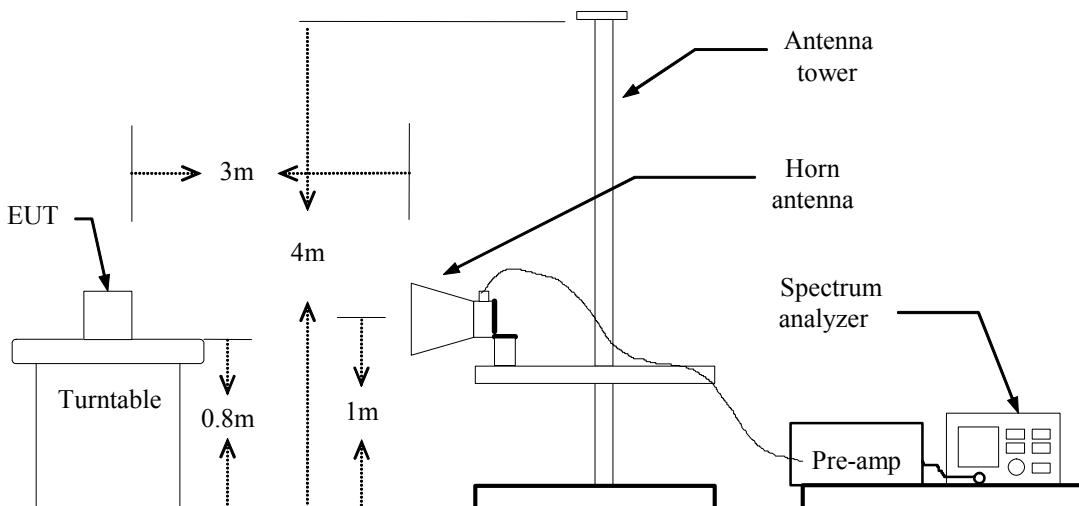
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains 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 in 15.209(a).

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2008
EMI Test Receiver	R&S	ESVS30	828488/004	03/20/2009
Horn Antenna	EMCO	3115	00022250	05/08/2009
Turn Table	Chance Most	CM-T003-1	T807-6	N.C.R

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

### TEST CONFIGURATION



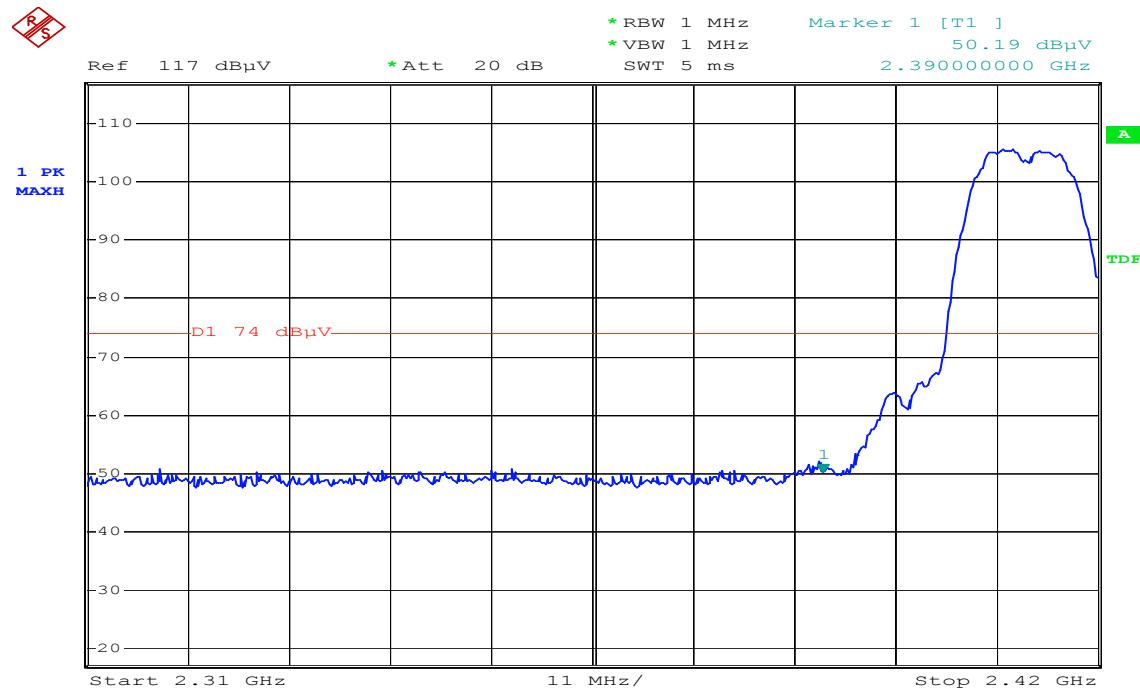


## **TEST PROCEDURE**

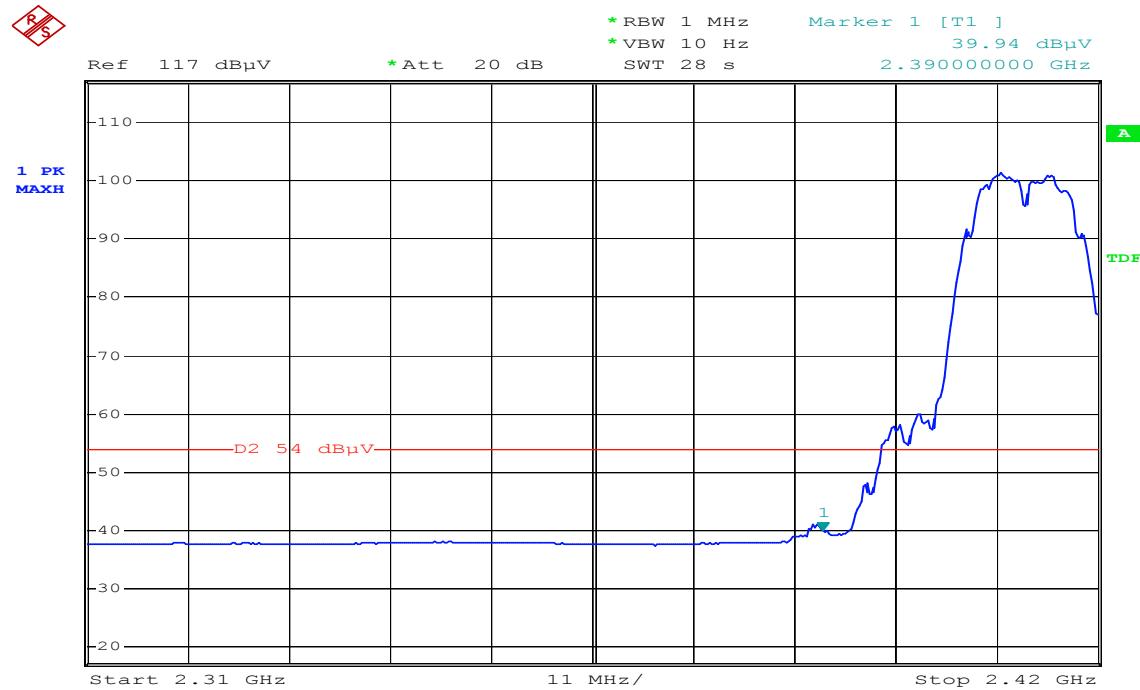
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=1MHz / 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**

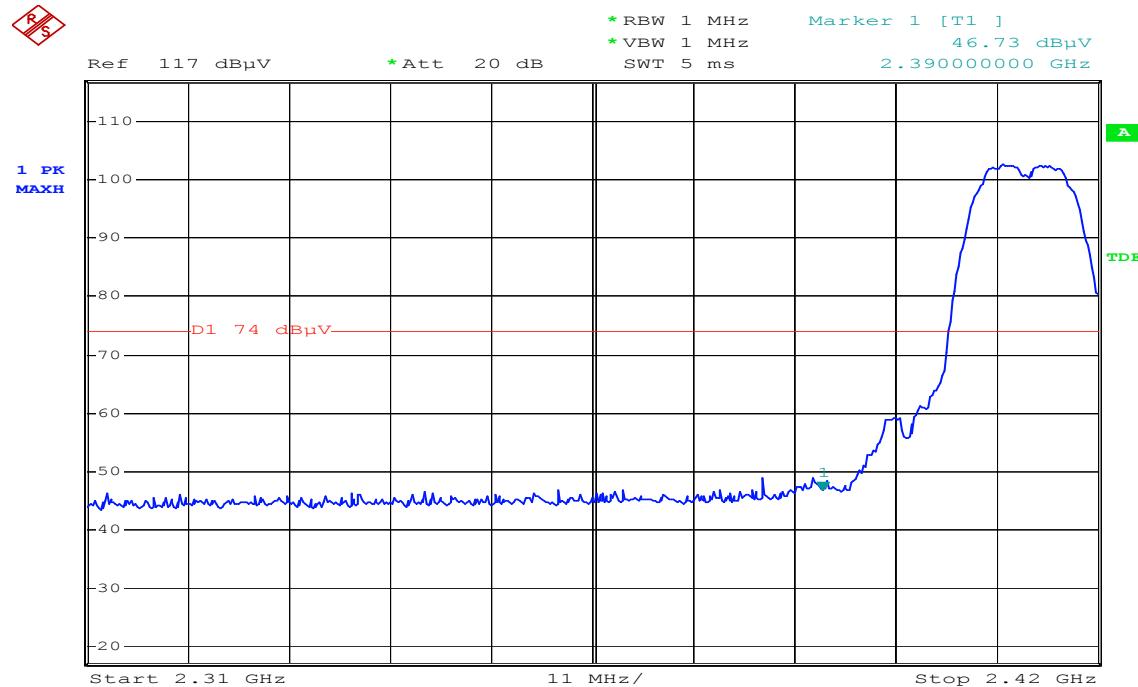
Refer to attach spectrum analyzer data chart.

**Band Edges (IEEE 802.11b / CH Low)**
**Detector mode: Peak**
**Polarity: Vertical**


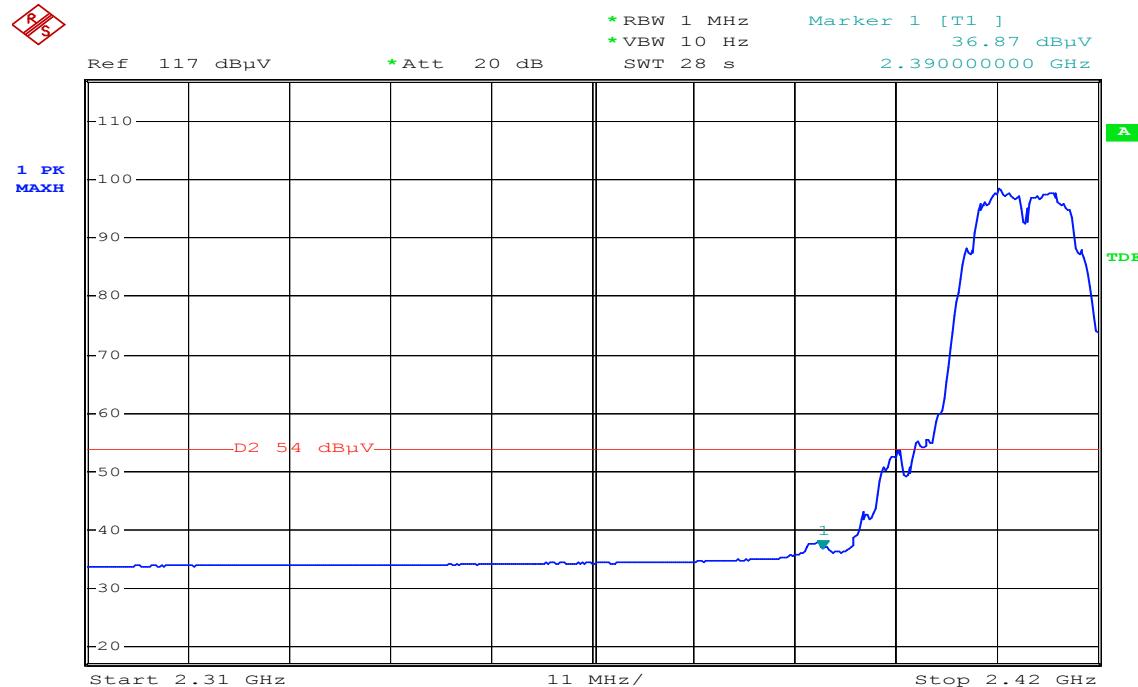
Date: 23.SEP.2008 16:27:19

**Detector mode: Average**
**Polarity: Vertical**


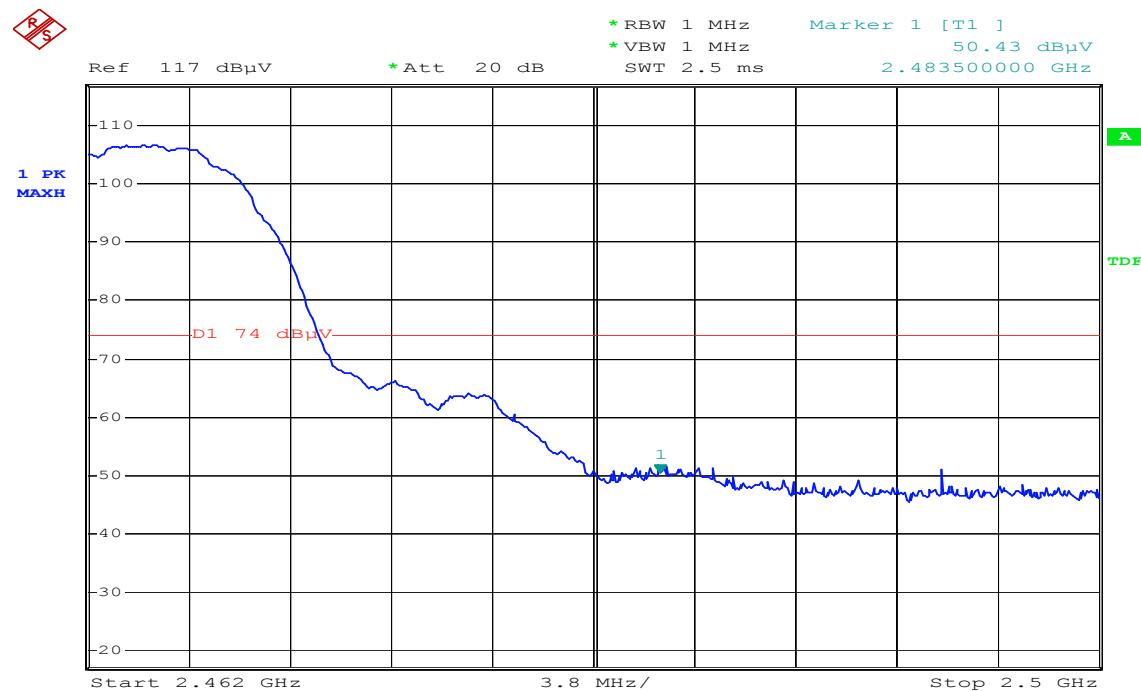
Date: 23.SEP.2008 16:30:26

**Detector mode: Peak****Polarity: Horizontal**

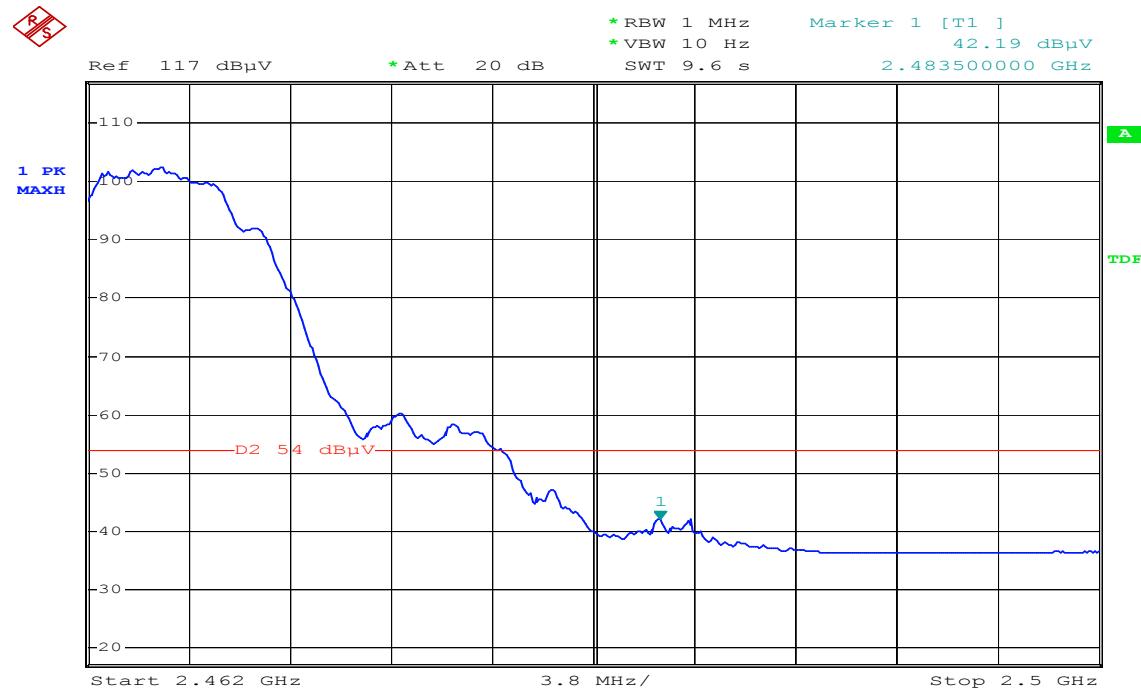
Date: 23.SEP.2008 16:20:45

**Detector mode: Average****Polarity: Horizontal**

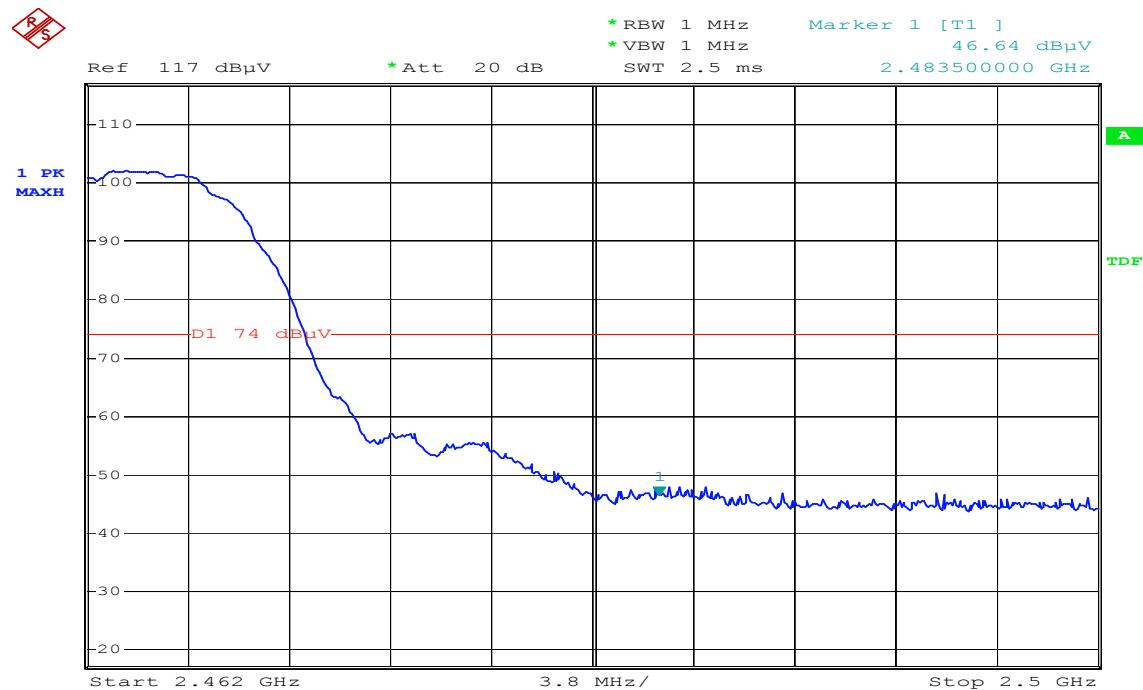
Date: 23.SEP.2008 16:22:12

**Band Edges (IEEE 802.11b / CH High)****Detector mode: Peak****Polarity: Vertical**

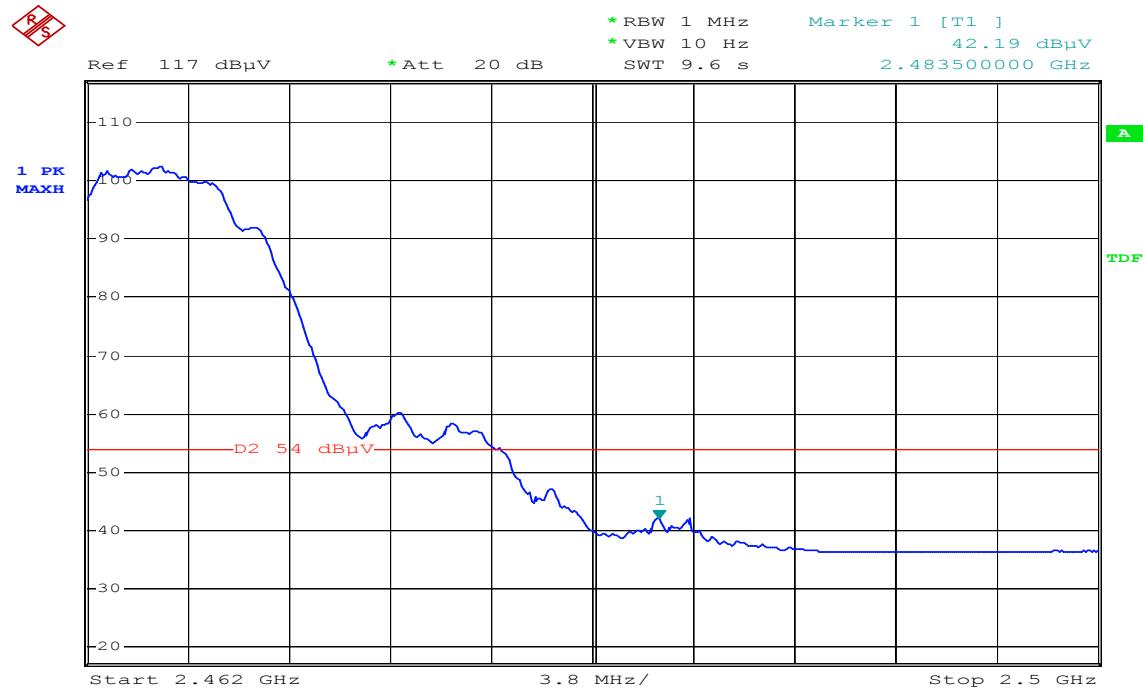
Date: 23.SEP.2008 17:03:55

**Detector mode: Average****Polarity: Vertical**

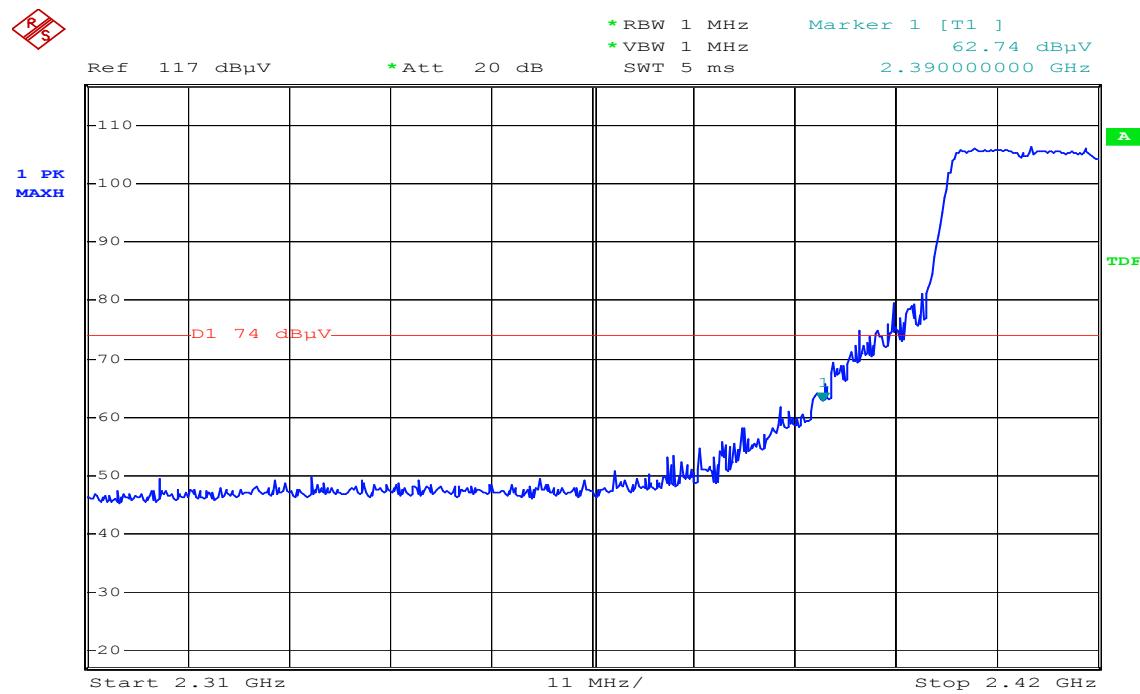
Date: 23.SEP.2008 17:04:28

**Detector mode: Peak****Polarity: Horizontal**

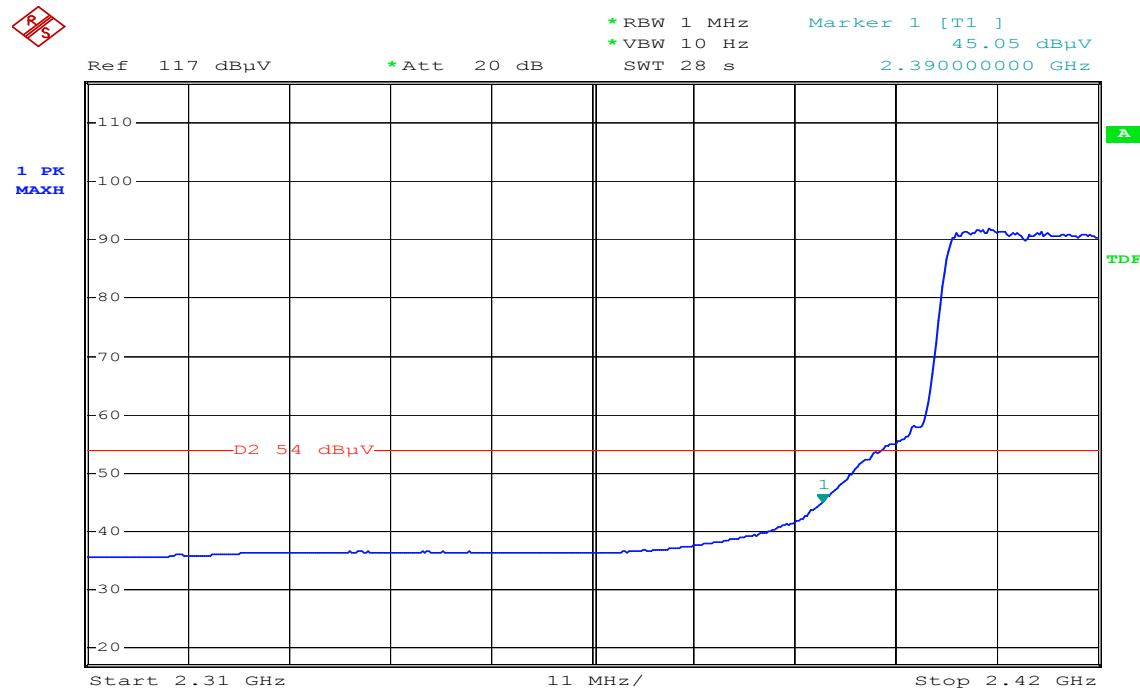
Date: 23.SEP.2008 17:07:00

**Detector mode: Average****Polarity: Horizontal**

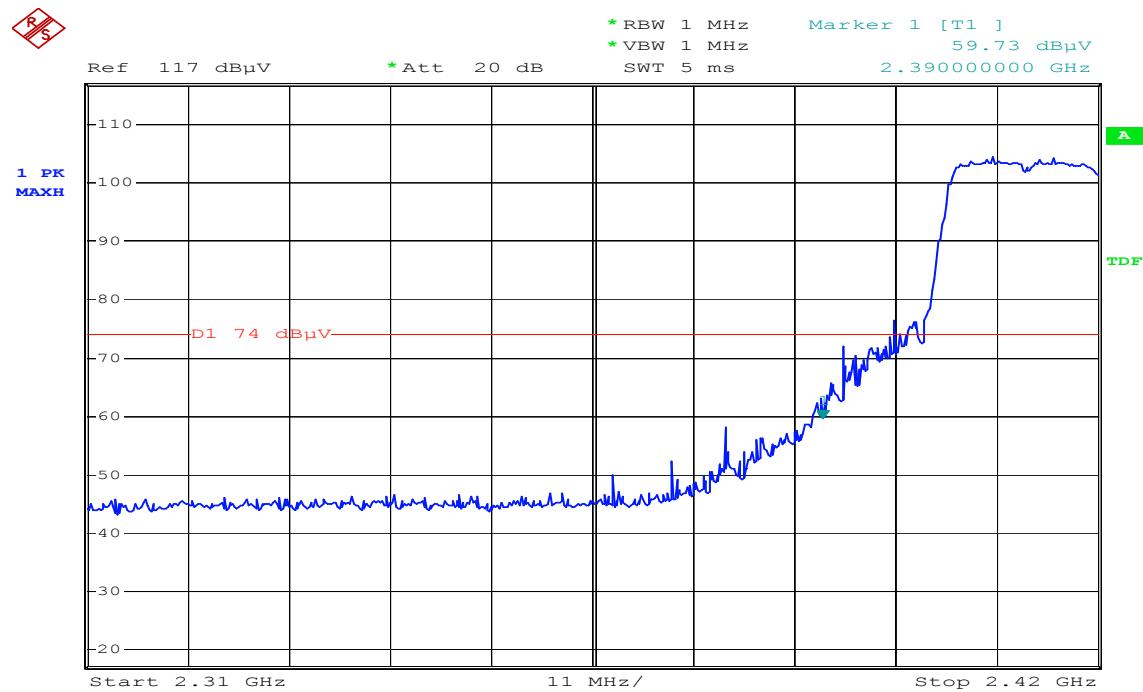
Date: 23.SEP.2008 17:04:28

**Band Edges (IEEE 802.11g / CH Low)****Detector mode: Peak****Polarity: Vertical**

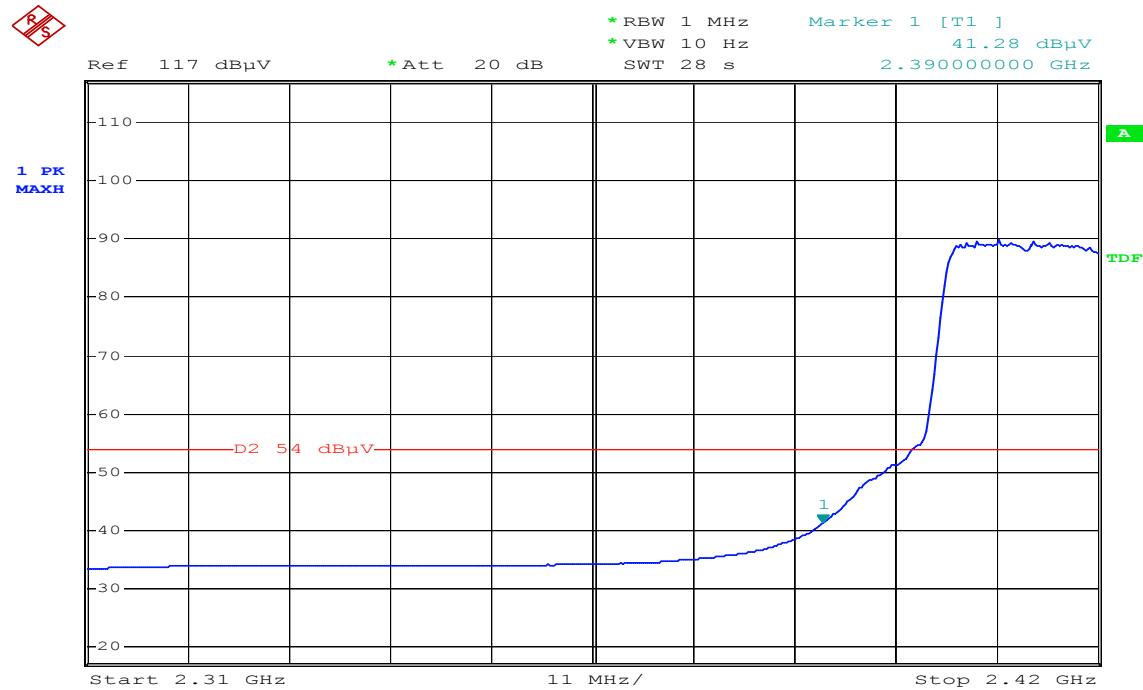
Date: 23.SEP.2008 16:39:45

**Detector mode: Average****Polarity: Vertical**

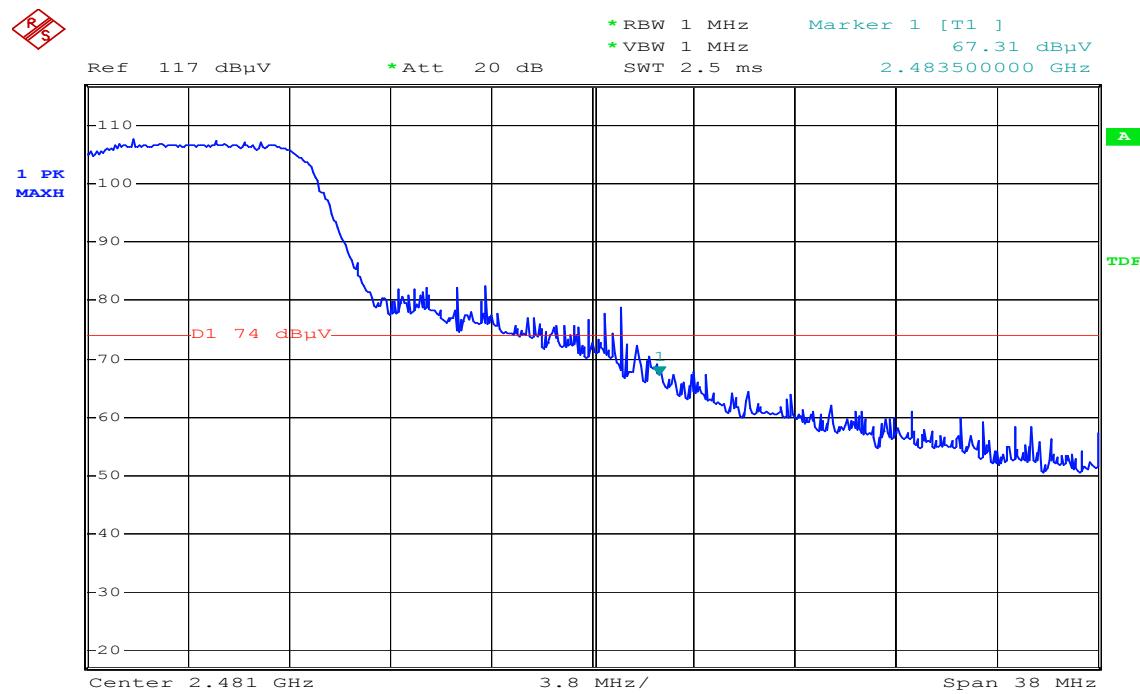
Date: 23.SEP.2008 16:41:44

**Detector mode: Peak****Polarity: Horizontal**

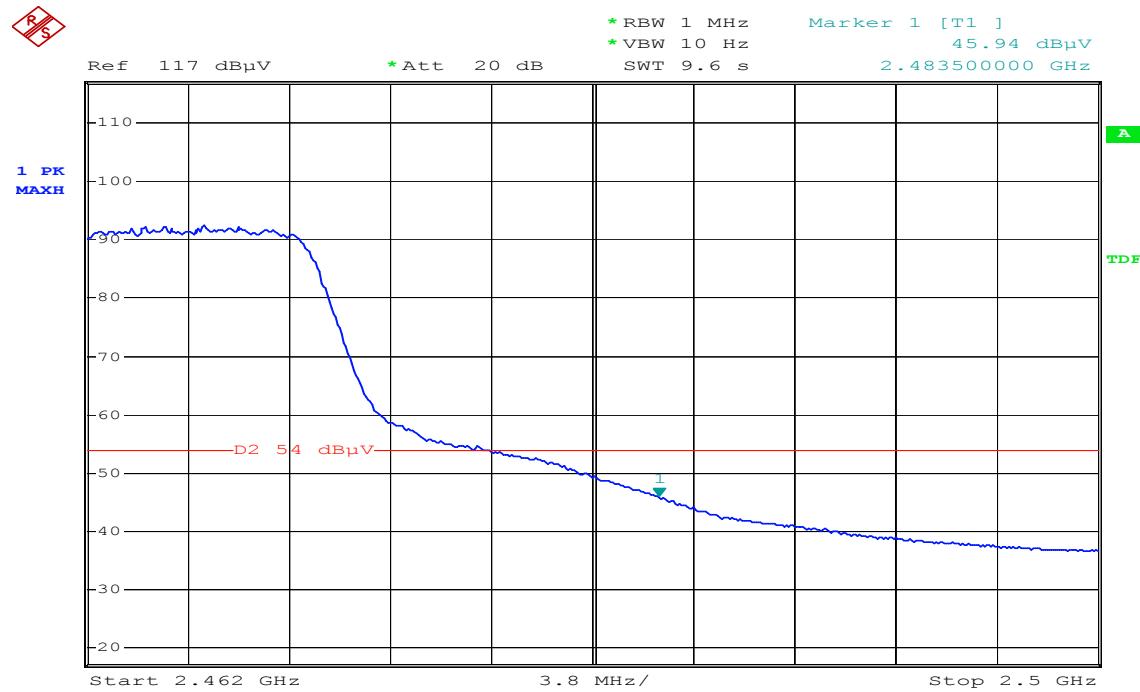
Date: 23.SEP.2008 16:48:54

**Detector mode: Average****Polarity: Horizontal**

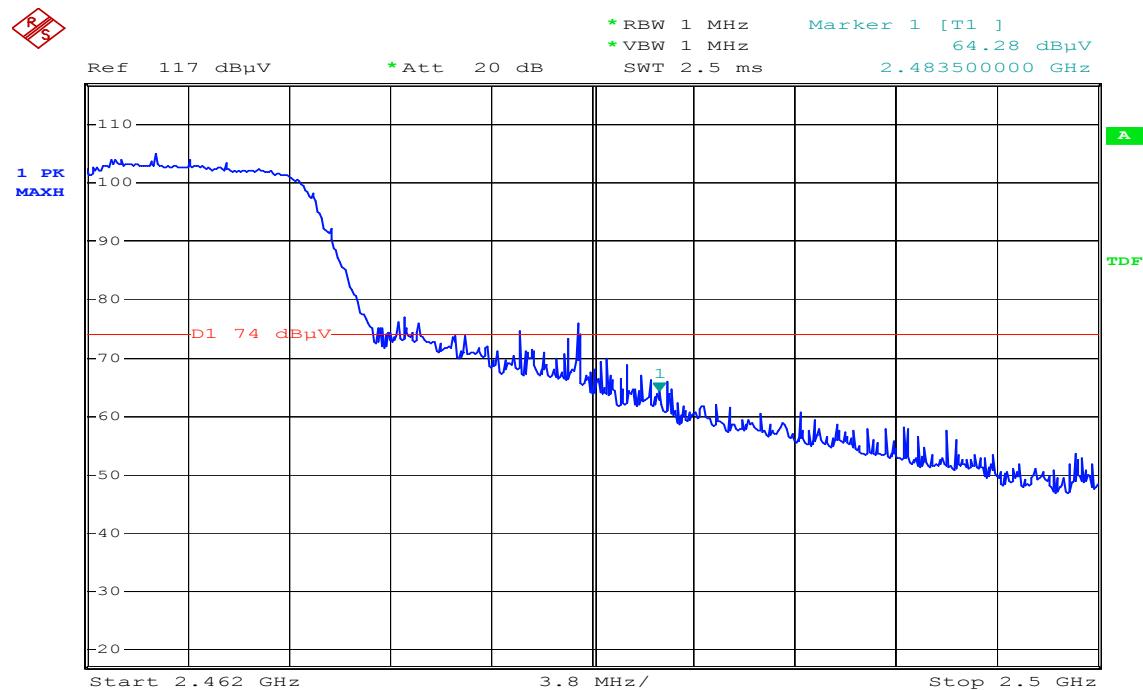
Date: 23.SEP.2008 16:51:10

**Band Edges (IEEE 802.11g / CH High)**
**Detector mode: Peak**
**Polarity: Vertical**


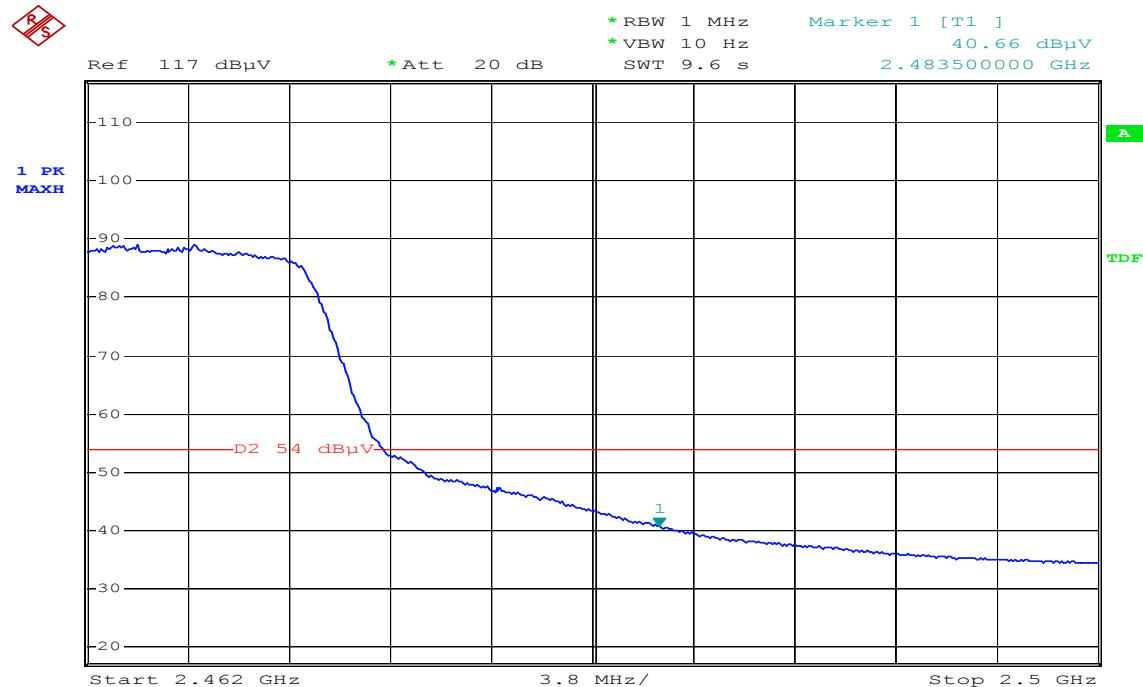
Date: 23.SEP.2008 16:59:44

**Detector mode: Average**
**Polarity: Vertical**


Date: 23.SEP.2008 17:00:17

**Detector mode: Peak**
**Polarity: Horizontal**


Date: 23.SEP.2008 16:56:05

**Detector mode: Average**
**Polarity: Horizontal**


Date: 23.SEP.2008 16:56:54

## 7.4 PEAK POWER SPECTRAL DENSITY

### LIMIT

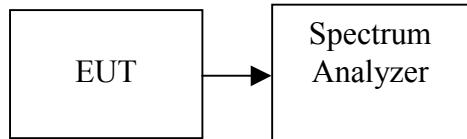
1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping 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	10/14/2008

*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

### **IEEE 802.11b**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	4.71	8.00	PASS
Mid	2437	4.89		PASS
High	2462	4.50		PASS

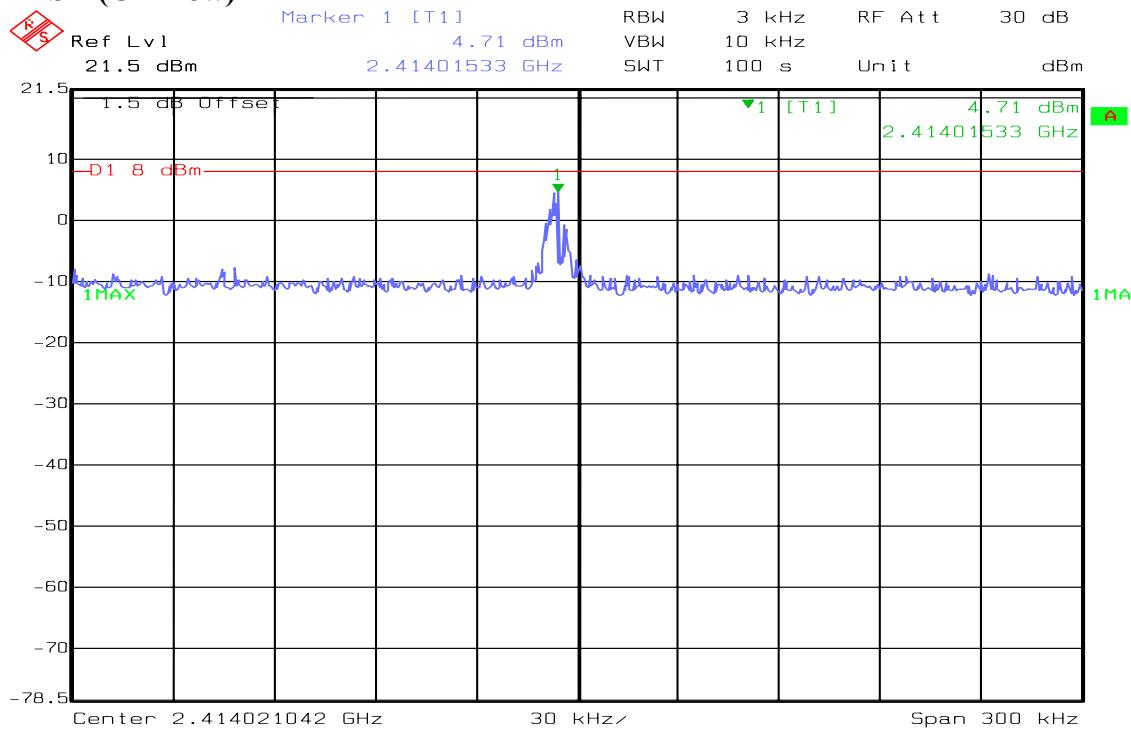
### **IEEE 802.11g**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-11.47	8.00	PASS
Mid	2437	-8.94		PASS
High	2462	-9.11		PASS

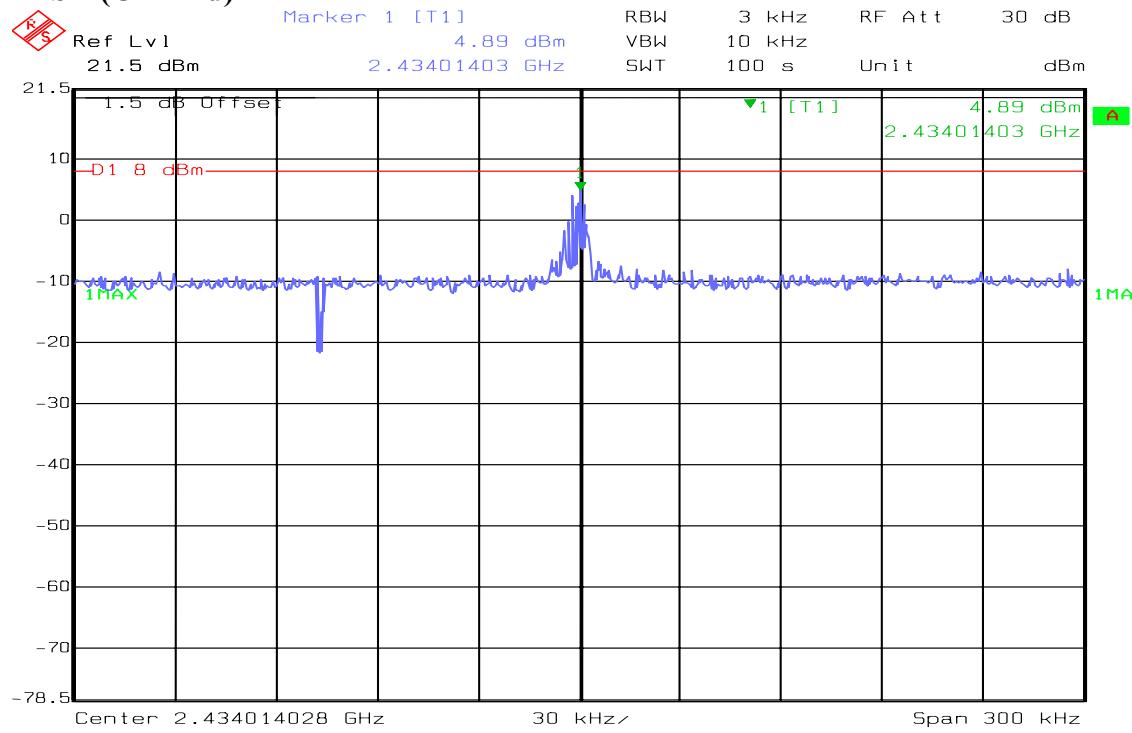
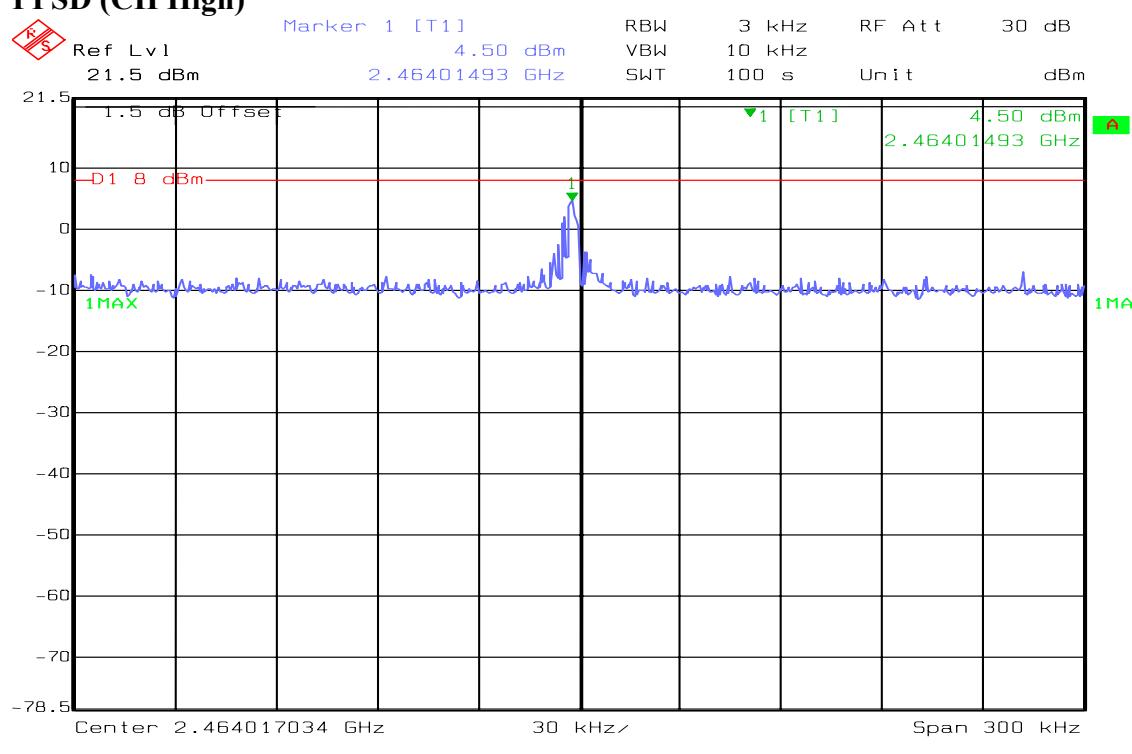
## Test Plot

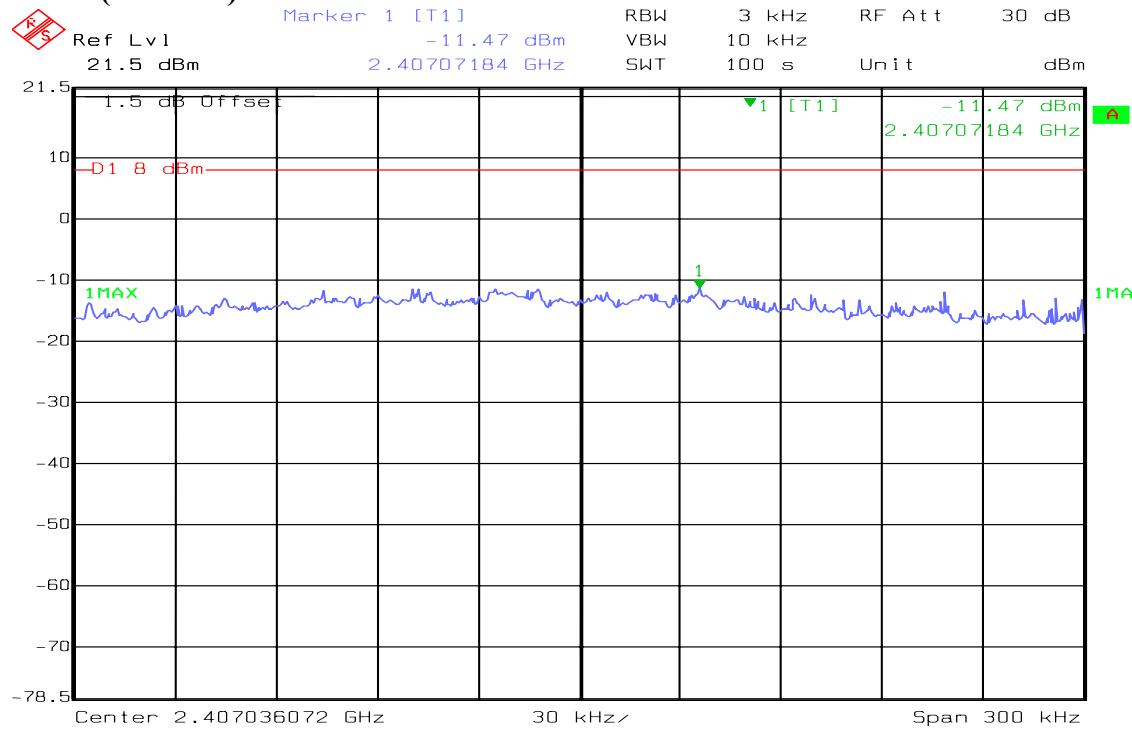
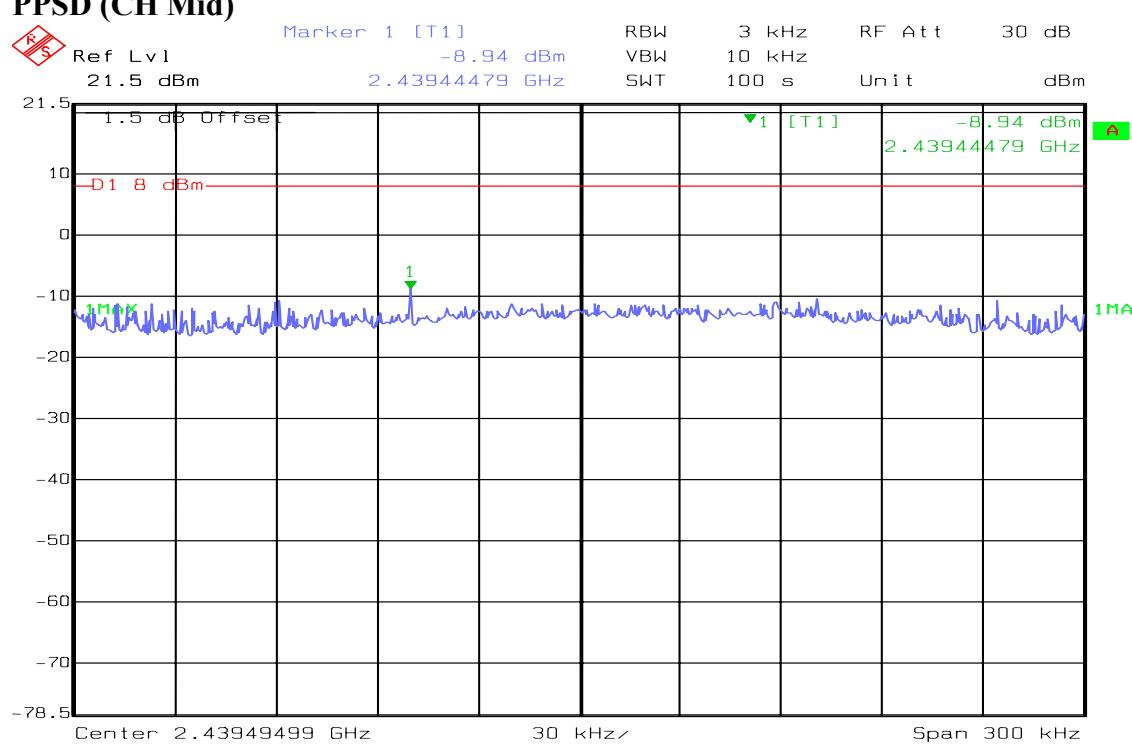
### IEEE 802.11b

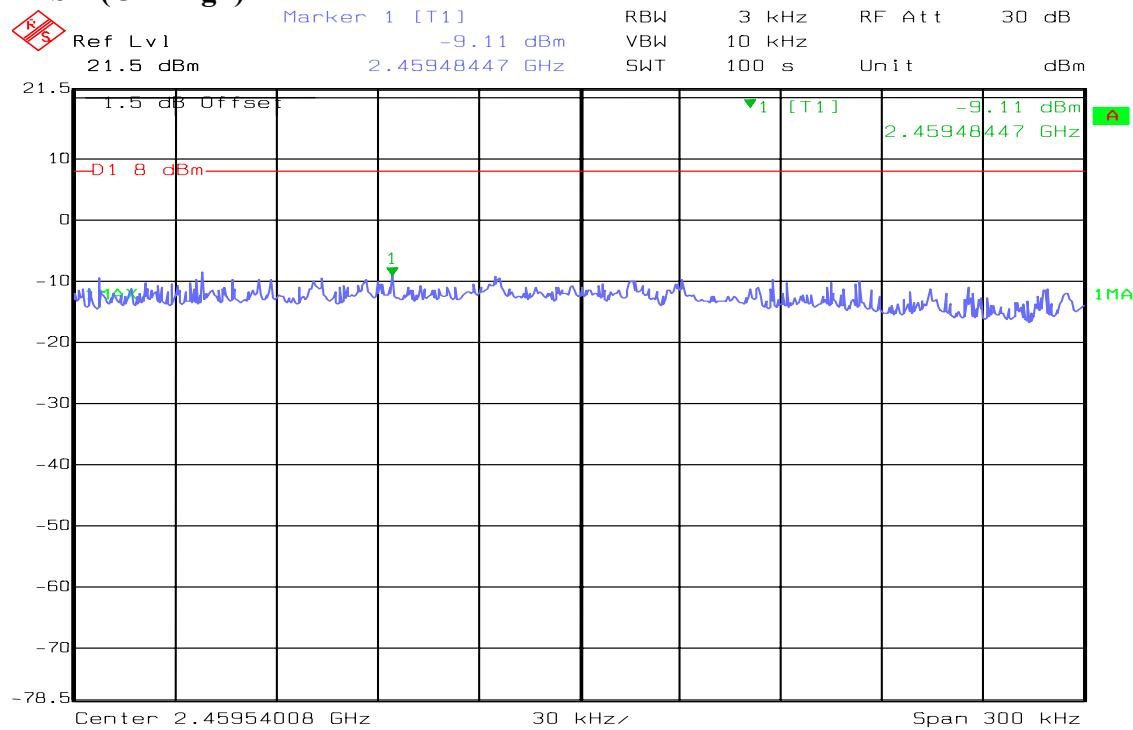
#### **PPSD (CH Low)**



Date: 23.SEP.2008 11:36:33

**PPSD (CH Mid)****PPSD (CH High)**

**IEEE 802.11g****PPSD (CH Low)****PPSD (CH Mid)**

**PPSD (CH High)**



## 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

<b>EUT</b>	Network Player
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	IEEE 802.11b: 19.31 dBm (85.31mW) IEEE 802.11g: 20.28 dBm (106.66mW)
<b>Antenna gain (Max)</b>	1. 2.15dBi (Numeric gain: 1.64) 2. 1.97dBi (Numeric gain: 1.57)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

#### **Remark:**

1. The maximum output power is 20.28dBm (106.66mW) at 2462MHz (with 1.64numeric 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

### 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:

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

$$d \text{ (cm)} = d \text{ (m)} / 100$$

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 = 106.66mW

Numeric Antenna gain = 1.64dBi

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>

$\Rightarrow$  Power density = 0.0456 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.)

## 7.6 SPURIOUS EMISSIONS

### 7.6.1 Conducted Measurement

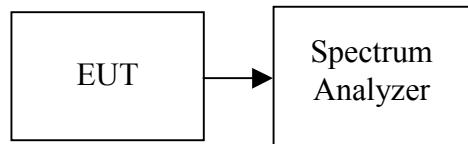
#### LIMIT

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	10/14/2008

*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 300 kHz.

Measurements are made over the 30MHz to 26.5GHz range with the transmitter set to the lowest, middle, and highest channels.

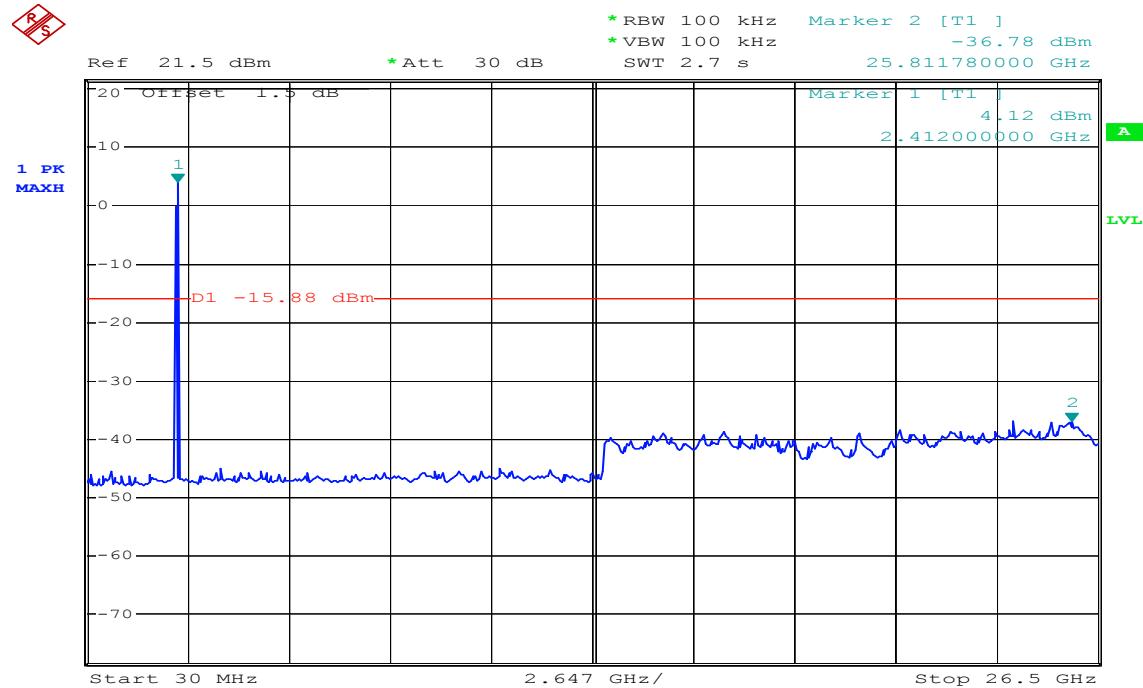
#### TEST RESULTS

*No non-compliance noted*

## Test Plot

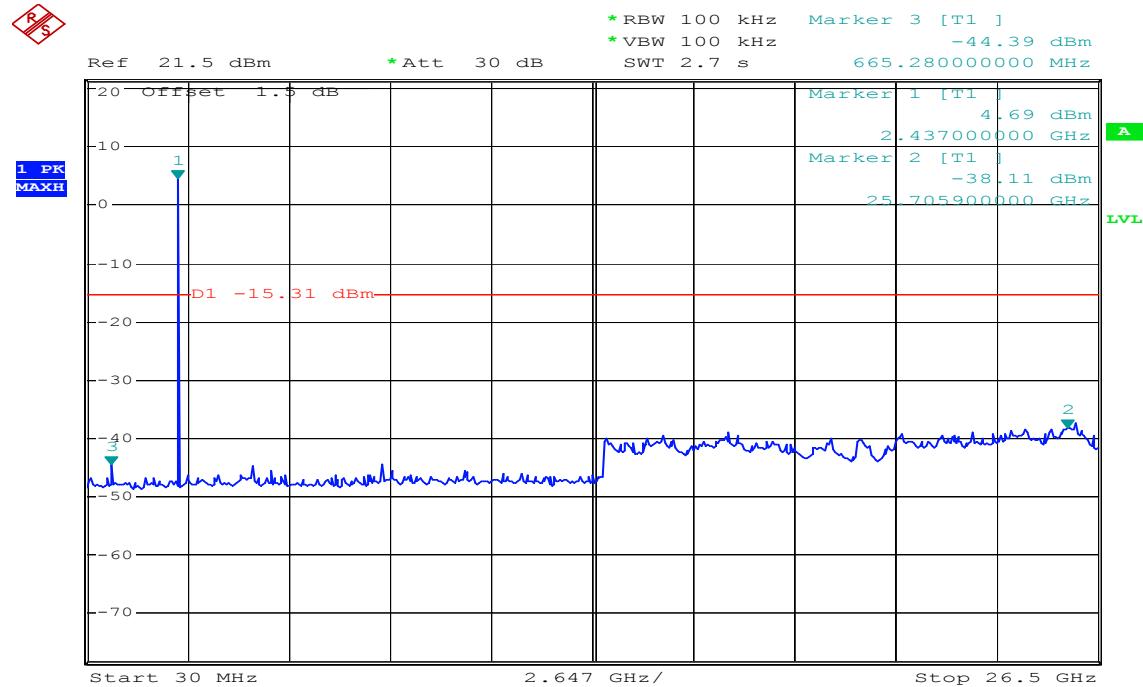
### IEEE 802.11b

#### CH Low



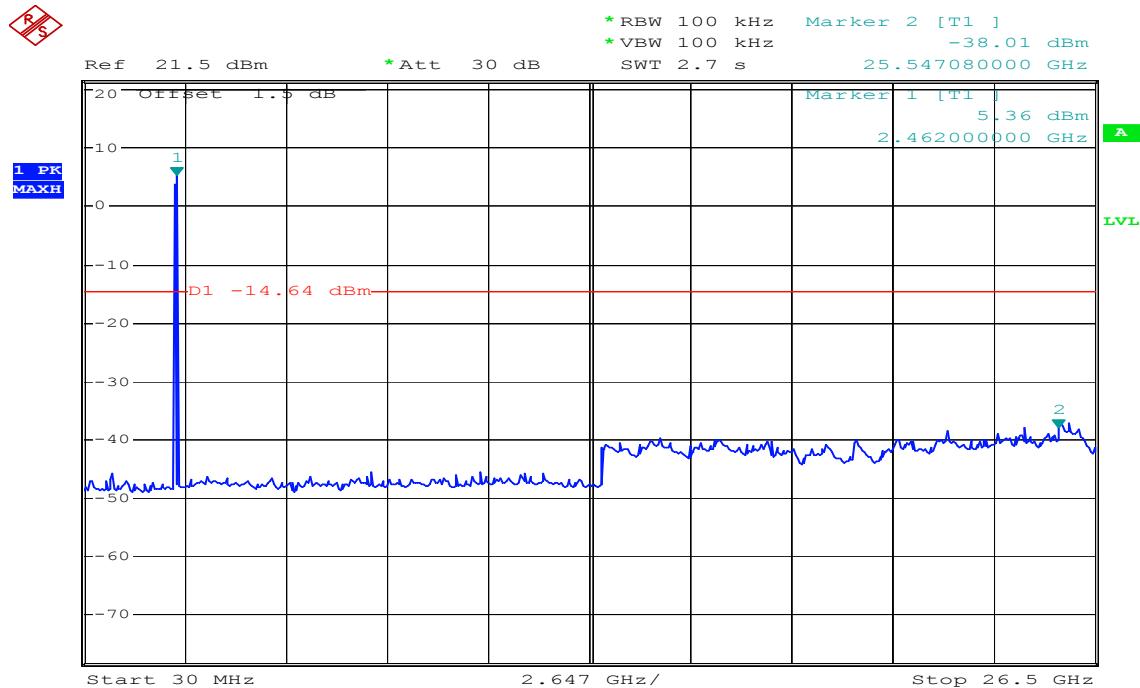
Date: 25.SEP.2008 10:38:01

#### CH Mid



Date: 25.SEP.2008 10:42:32

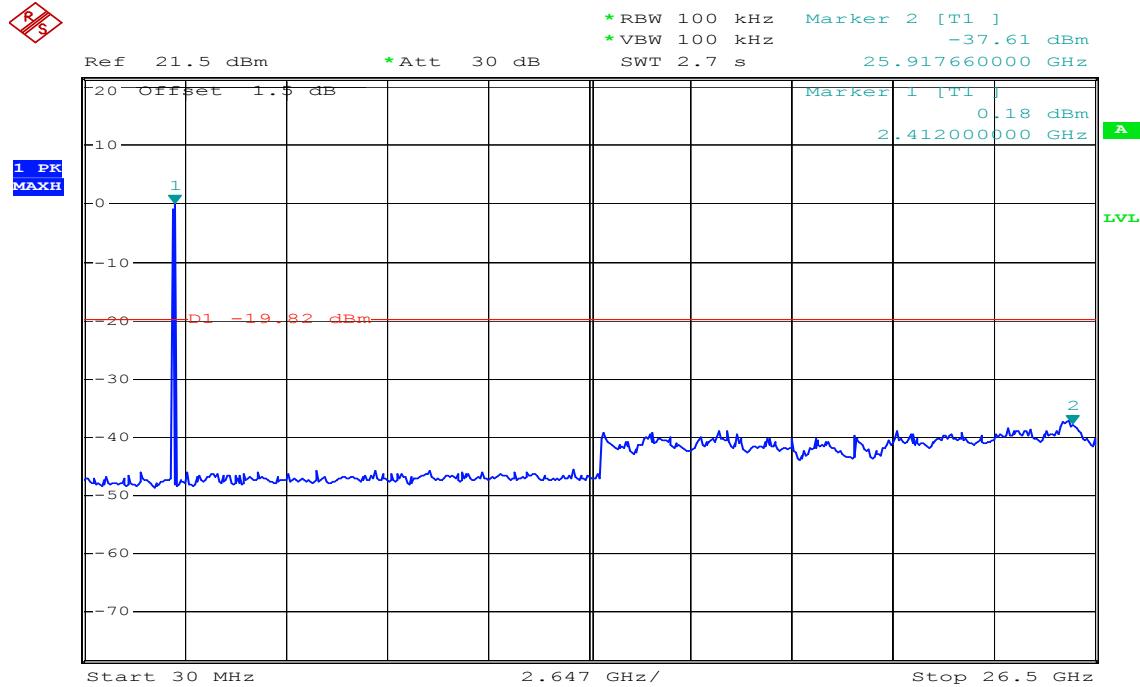
## CH High



Date: 25.SEP.2008 10:43:53

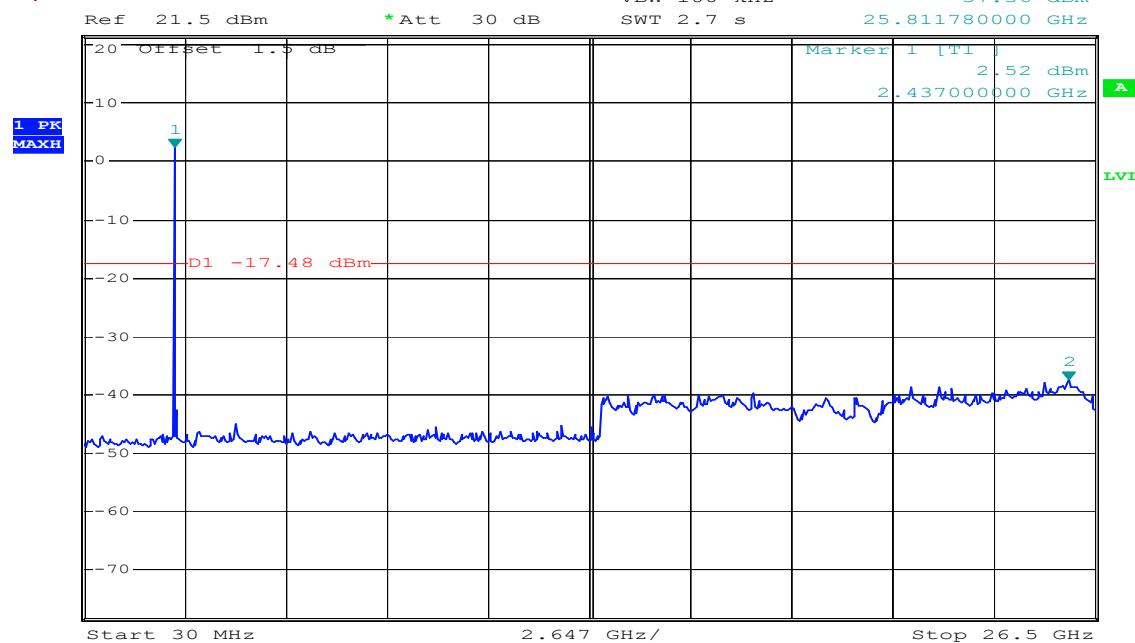
## IEEE 802.11g

### CH Low

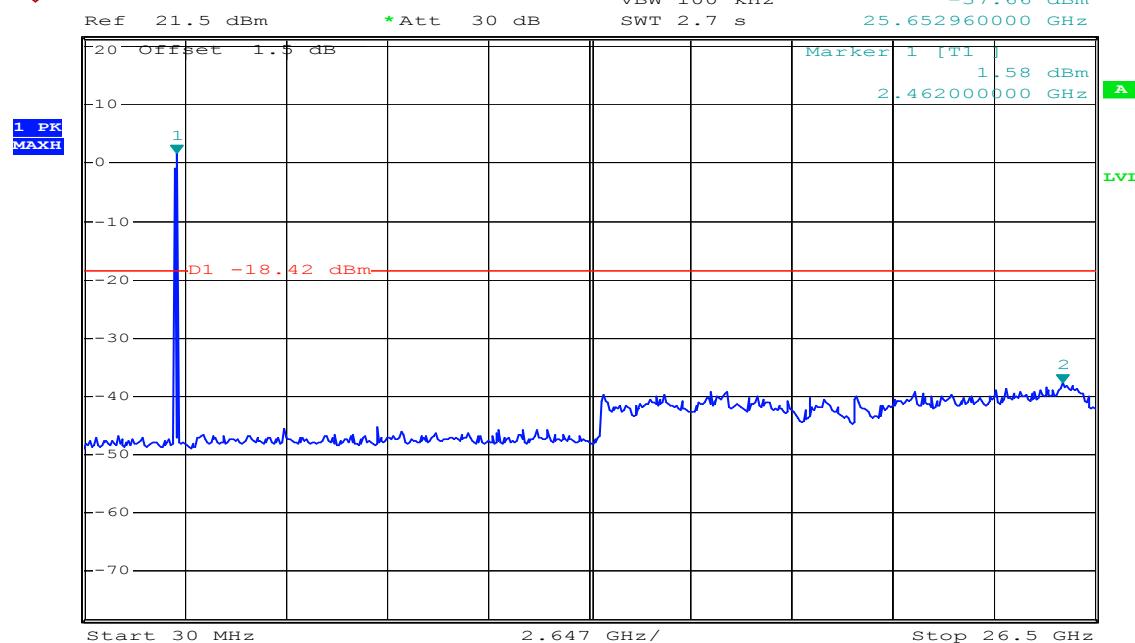


Date: 25.SEP.2008 10:39:38

## CH Mid


**A**
**LVL**

## CH High


**A**
**LVL**

Date: 25.SEP.2008 10:41:18

Date: 25.SEP.2008 10:44:42



## 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

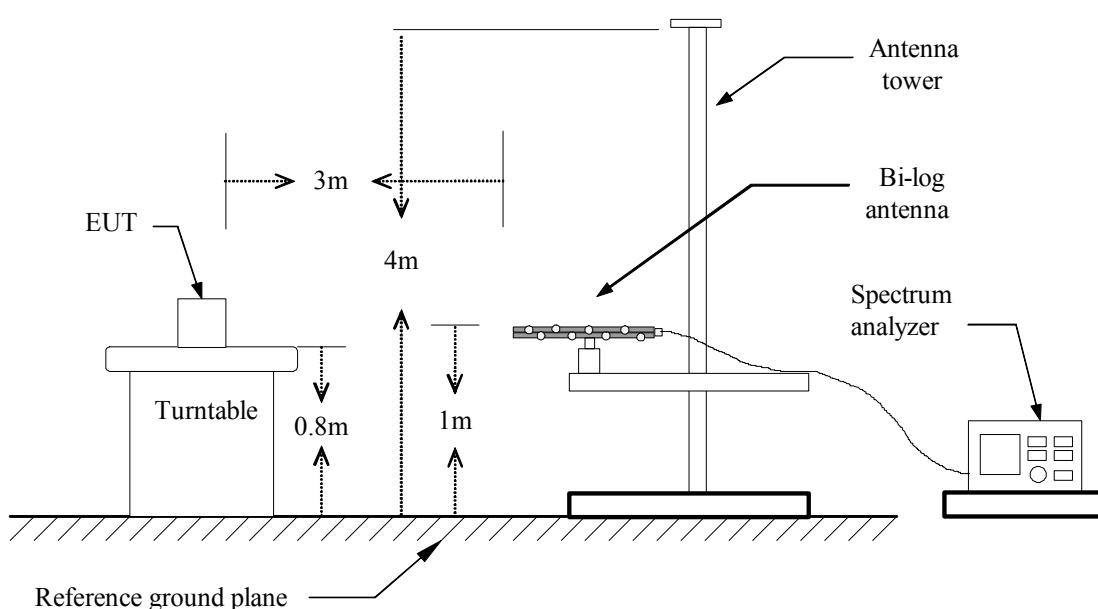
## MEASUREMENT EQUIPMENT USED

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	10/14/2008
EMI Test Receiver	R&S	ESVS30	828488/004	03/20/2009
Pre-Amplifier	Mini-Circuits	ZKL-2R5	83153007374	04/02/2009
Pre-Amplifier	Agilent	8449B	3008A01738	03/28/2009
Bilog Antenna	Sunol Sciences	JB1	A031605	04/03/2009
Horn Antenna	EMCO	3115	00022250	05/08/2009
Loop Antenna	EMCO	6502	2356	05/28/2010
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	05/09/2009
Test S/W	LabVIEW 6.1 (CCS OATS EMI SW V2.6)			

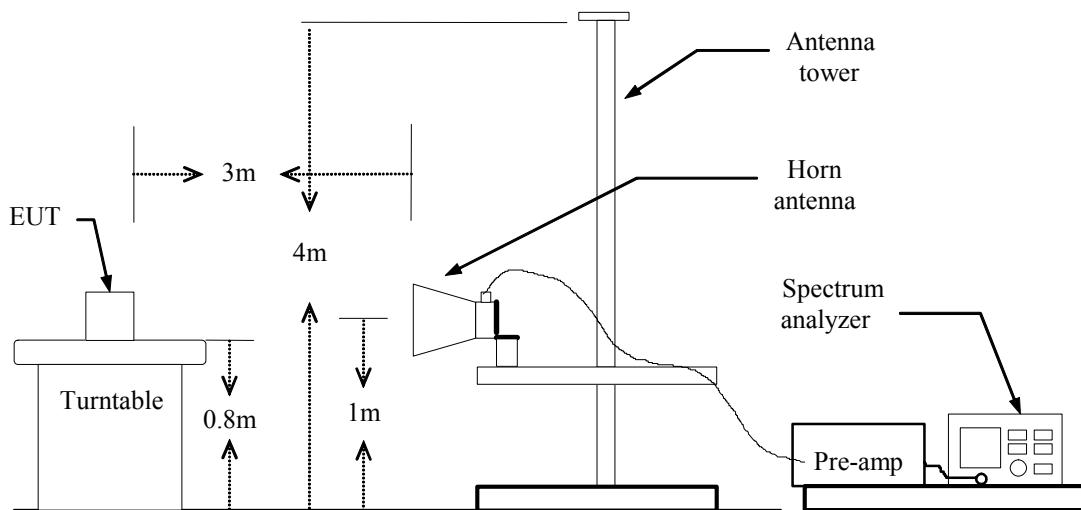
*Remark: Each piece of equipment is scheduled for calibration once a year.*

## 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: September 23, 2008

Temperature: 25oC

Tested by: Eason Chen

Humidity: 56 % 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)
54.17	V	QP	28.52	8.68	37.20	40.00	-2.80
57.42	V	QP	24.51	8.09	32.60	40.00	-7.40
108.62	V	QP	20.65	13.95	34.60	43.50	-8.90
131.09	V	QP	20.38	14.42	34.80	43.50	-8.70
191.11	V	QP	25.38	12.42	37.80	43.50	-5.70
208.41	V	QP	19.88	12.92	32.80	43.50	-10.70
221.21	V	QP	21.65	12.95	34.60	46.00	-11.40
230.81	V	QP	25.08	13.72	38.80	46.00	-7.20
238.43	V	QP	23.28	14.72	38.00	46.00	-8.00
248.93	V	QP	24.70	16.10	40.80	46.00	-5.20
473.60	V	QP	12.26	23.14	35.40	46.00	-10.60
596.70	V	QP	13.61	26.19	39.80	46.00	-6.20
812.34	V	QP	9.35	29.45	38.80	46.00	-7.20
936.43	V	QP	4.11	30.69	34.80	46.00	-11.20
983.14	V	QP	2.38	31.82	34.20	53.90	-19.70
<hr/>							
56.60	H	QP	18.56	8.24	26.80	40.00	-13.20
109.20	H	QP	11.41	13.99	25.40	43.50	-18.10
118.80	H	QP	11.54	14.66	26.20	43.50	-17.30
129.97	H	QP	17.75	14.45	32.20	43.50	-11.30
133.97	H	QP	14.47	14.33	28.80	43.50	-14.70
169.91	H	QP	21.26	12.54	33.80	43.50	-9.70
193.91	H	QP	23.83	12.57	36.40	43.50	-7.10
238.84	H	QP	29.20	14.78	43.98	46.00	-2.02
250.00	H	QP	25.60	16.24	41.84	46.00	-4.16
280.30	H	QP	17.47	17.33	34.80	46.00	-11.20
315.10	H	QP	14.07	18.33	32.40	46.00	-13.60
476.50	H	QP	8.19	23.21	31.40	46.00	-14.60
744.00	H	QP	7.94	28.26	36.20	46.00	-9.80
814.20	H	QP	9.14	29.46	38.60	46.00	-7.40

**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 GHzDipole Antenna**Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1012.00	V	53.10	---	-10.64	42.45	---	74.00	54.00	-11.55	Peak
1184.00	V	51.46	---	-9.85	41.61	---	74.00	54.00	-12.39	Peak
1608.00	V	52.18	---	-7.77	44.41	---	74.00	54.00	-9.59	Peak
4820.00	V	46.67	---	1.87	48.54	---	74.00	54.00	-5.46	Peak
6600.00	V	42.36	---	4.65	47.01	---	74.00	54.00	-6.99	Peak
N/A										
1656.00	H	48.31	---	-7.50	40.81	---	74.00	54.00	-13.19	Peak
1896.00	H	48.19	---	-6.12	42.06	---	74.00	54.00	-11.94	Peak
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 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1192.00	V	51.78	---	-9.81	41.96	---	74.00	54.00	-12.04	Peak
1624.00	V	52.63	---	-7.68	44.95	---	74.00	54.00	-9.05	Peak
N/A										
1008.00	H	52.27	---	-10.66	41.60	---	74.00	54.00	-12.40	Peak
1192.00	H	49.40	---	-9.81	39.59	---	74.00	54.00	-14.41	Peak
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 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11b / CH High**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1644.00	V	53.43	---	-7.57	45.86	---	74.00	54.00	-8.14	Peak
4920.00	V	42.79	---	2.16	44.96	---	74.00	54.00	-9.04	Peak
N/A										
1016.00	H	51.55	---	-10.63	40.92	---	74.00	54.00	-13.08	Peak
1072.00	H	52.16	---	-10.37	41.79	---	74.00	54.00	-12.21	Peak
8730.00	H	42.19	---	8.14	50.33	---	74.00	54.00	-3.67	Peak
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 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1180.00	V	52.59	---	-9.87	42.73	---	74.00	54.00	-11.27	Peak
1608.00	V	52.98	---	-7.77	45.21	---	74.00	54.00	-8.79	Peak
N/A										
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 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1192.00	V	51.16	---	-9.81	41.35	---	74.00	54.00	-12.65	Peak
1624.00	V	52.77	---	-7.68	45.08	---	74.00	54.00	-8.92	Peak
N/A										
1192.00	H	50.87	---	-9.81	41.06	---	74.00	54.00	-12.94	Peak
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 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11g / CH High**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1180.00	V	53.68	---	-9.87	43.81	---	74.00	54.00	-10.19	Peak
1644.00	V	52.58	---	-7.57	45.02	---	74.00	54.00	-8.98	Peak
N/A										
1192.00	H	49.21	---	-9.81	39.39	---	74.00	54.00	-14.61	Peak
1552.00	H	48.58	---	-8.09	40.49	---	74.00	54.00	-13.51	Peak
7050.00	H	42.26	---	5.92	48.19	---	74.00	54.00	-5.81	Peak
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 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto

**Operation Mode:** RX / IEEE 802.11g / CH Mid**Test Date:** September 22, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 53 % 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)				
1036.00	V	51.68	---	-10.53	41.14	---	74.00	54.00	-12.86	Peak
1504.00	V	46.28	---	-8.37	37.92	---	74.00	54.00	-16.08	Peak
1624.00	V	49.25	---	-7.68	41.56	---	74.00	54.00	-12.44	Peak
8370.00	V	42.77	---	7.67	50.44	---	74.00	54.00	-3.56	Peak
11830.00	V	41.14	---	10.71	51.85	---	74.00	54.00	-2.15	Peak
N/A										
1552.00	H	47.93	---	-8.09	39.83	---	74.00	54.00	-14.17	Peak
3630.00	H	44.08	---	-0.15	43.94	---	74.00	54.00	-10.06	Peak
4970.00	H	43.50	---	2.31	45.81	---	74.00	54.00	-8.19	Peak
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:
  - c. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - d. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto

**PIFA Antenna****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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)				
1432.00	V	49.31	---	-8.70	40.61	---	74.00	54.00	-13.39	Peak
1608.00	V	50.55	---	-7.77	42.78	---	74.00	54.00	-11.22	Peak
2468.00	V	52.25	---	-4.47	47.77	---	74.00	54.00	-6.23	Peak
N/A										
1064.00	H	51.93	---	-10.40	41.53	---	74.00	54.00	-12.47	Peak
2340.00	H	50.89	---	-4.76	46.13	---	74.00	54.00	-7.87	Peak
4820.00	H	44.80	---	1.87	46.67	---	74.00	54.00	-7.33	Peak
7060.00	H	42.69	---	5.95	48.64	---	74.00	54.00	-5.36	Peak
N/A										

**Remark:**

5. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
6. 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.
7. 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.
8. Spectrum setting:
  - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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)				
1624.00	V	50.16	---	-7.68	42.48	---	74.00	54.00	-11.52	Peak
2268.00	V	51.93	---	-4.92	47.00	---	74.00	54.00	-7.00	Peak
2468.00	V	52.46	---	-4.47	47.99	---	74.00	54.00	-6.01	Peak
N/A										
1624.00	H	49.90	---	-7.68	42.22	---	74.00	54.00	-11.78	Peak
2296.00	H	50.19	---	-4.86	45.33	---	74.00	54.00	-8.67	Peak
N/A										

**Remark:**

5. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
6. 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.
7. 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.
8. Spectrum setting:
  - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11b / CH High**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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)				
1644.00	V	49.94	---	-7.57	42.37	---	74.00	54.00	-11.63	Peak
2276.00	V	52.06	---	-4.91	47.15	---	74.00	54.00	-6.85	Peak
2896.00	V	49.00	---	-2.58	46.43	---	74.00	54.00	-7.57	Peak
5710.00	V	42.09	---	3.74	45.83	---	74.00	54.00	-8.17	Peak
6630.00	V	41.97	---	4.73	46.70	---	74.00	54.00	-7.30	Peak
N/A										
1300.00	H	50.05	---	-9.31	40.73	---	74.00	54.00	-13.27	Peak
2380.00	H	51.03	---	-4.67	46.35	---	74.00	54.00	-7.65	Peak
5730.00	H	42.21	---	3.77	45.98	---	74.00	54.00	-8.02	Peak
N/A										

**Remark:**

5. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
6. 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.
7. 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.
8. Spectrum setting:
  - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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	52.67	---	-10.40	42.26	---	74.00	54.00	-11.74	Peak
1300.00	V	51.50	---	-9.31	42.19	---	74.00	54.00	-11.81	Peak
2276.00	V	51.26	---	-4.91	46.36	---	74.00	54.00	-7.64	Peak
7580.00	V	42.99	---	7.11	50.10	---	74.00	54.00	-3.90	Peak
N/A										
1072.00	H	52.05	---	-10.37	41.69	---	74.00	54.00	-12.31	Peak
1608.00	H	51.34	---	-7.77	43.56	---	74.00	54.00	-10.44	Peak
2268.00	H	50.36	---	-4.92	45.43	---	74.00	54.00	-8.57	Peak
4820.00	H	43.51	---	1.87	45.38	---	74.00	54.00	-8.62	Peak
N/A										

**Remark:**

5. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
6. 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.
7. 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.
8. Spectrum setting:
  - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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)				
1124.00	V	50.99	---	-10.13	40.86	---	74.00	54.00	-13.14	Peak
1624.00	V	49.95	---	-7.68	42.27	---	74.00	54.00	-11.73	Peak
2288.00	V	50.58	---	-4.88	45.70	---	74.00	54.00	-8.30	Peak
6220.00	V	42.20	---	4.29	46.49	---	74.00	54.00	-7.51	Peak
N/A										
1064.00	H	53.46	---	-10.40	43.05	---	74.00	54.00	-10.95	Peak
1180.00	H	50.57	---	-9.87	40.71	---	74.00	54.00	-13.29	Peak
1432.00	H	50.02	---	-8.70	41.32	---	74.00	54.00	-12.68	Peak
N/A										

**Remark:**

5. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
6. 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.
7. 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.
8. Spectrum setting:
  - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX / IEEE 802.11g / CH High**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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)				
1432.00	V	50.34	---	-8.70	41.64	---	74.00	54.00	-12.36	Peak
2284.00	V	50.99	---	-4.89	46.10	---	74.00	54.00	-7.90	Peak
7480.00	V	42.14	---	7.08	49.22	---	74.00	54.00	-4.78	Peak
N/A										
1020.00	H	52.43	---	-10.61	41.82	---	74.00	54.00	-12.18	Peak
1072.00	H	52.76	---	-10.37	42.40	---	74.00	54.00	-11.60	Peak
1536.00	H	48.66	---	-8.18	40.48	---	74.00	54.00	-13.52	Peak
2388.00	H	51.66	---	-4.65	47.01	---	74.00	54.00	-6.99	Peak
4920.00	H	43.20	---	2.16	45.37	---	74.00	54.00	-8.63	Peak
7450.00	H	42.22	---	7.00	49.21	---	74.00	54.00	-4.79	Peak

**Remark:**

5. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
6. 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.
7. 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.
8. Spectrum setting:
  - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto

**Operation Mode:** RX / IEEE 802.11g / CH Mid**Test Date:** October 4, 2008**Temperature:** 24°C**Tested by:** Alonso Lu**Humidity:** 58 % 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)				
1312.00	V	47.58	---	-9.26	38.32	---	74.00	54.00	-15.68	Peak
1624.00	V	49.24	---	-7.68	41.56	---	74.00	54.00	-12.44	Peak
1672.00	V	47.58	---	-7.41	40.17	---	74.00	54.00	-13.83	Peak
1720.00	V	46.14	---	-7.13	39.01	---	74.00	54.00	-14.99	Peak
N/A										
1552.00	H	46.77	---	-8.09	38.67	---	74.00	54.00	-15.33	Peak
1656.00	H	46.07	---	-7.50	38.58	---	74.00	54.00	-15.42	Peak
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:
  - c. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - d. AV Setting 1GHz 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 (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

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

### MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site # 3				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	845552/030	04/08/2009
LISN	R&S	ENV216	100074	12/03/2008
LISN	FCC	FCC-LISN-50/ 250-16-2-07	06013	10/16/2008
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

*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:** September 24, 2008  
**Temperature:** 25°C      **Tested by:** Alonso Lu  
**Humidity:** 57% RH

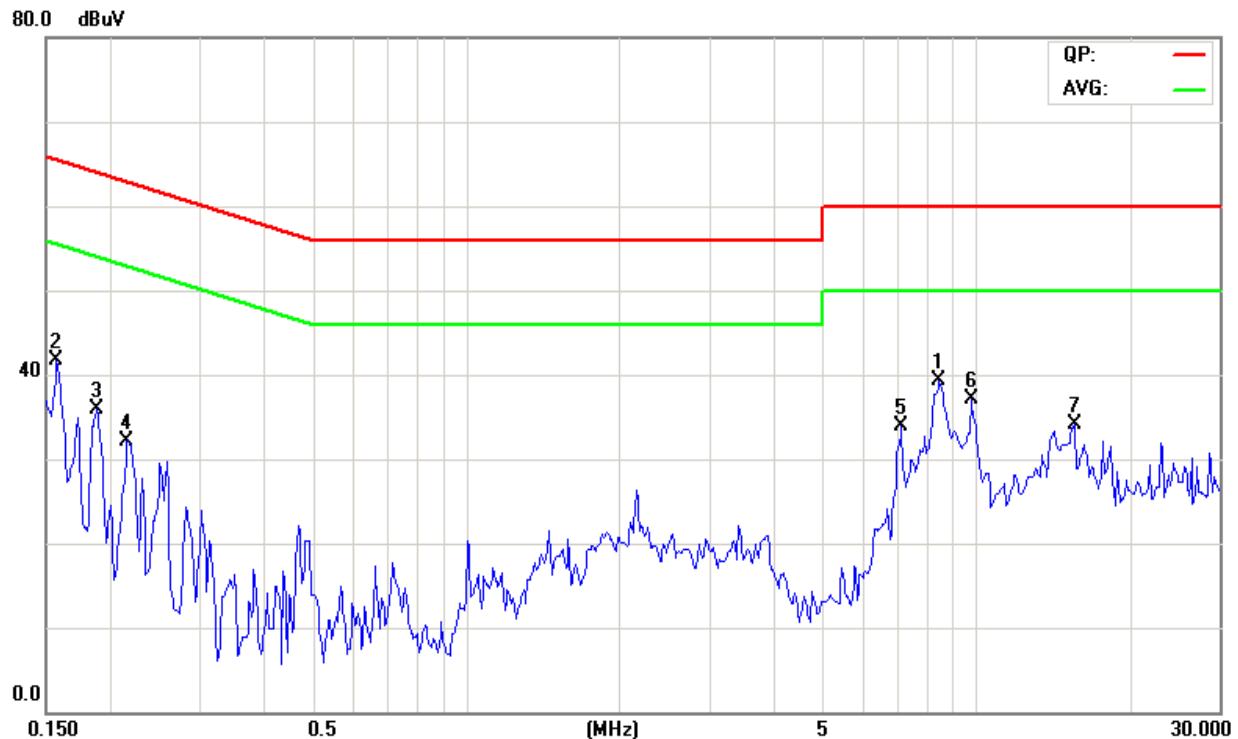
Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
8.4664	31.26	24.76	10.04	41.30	34.80	60.00	50.00	-18.70	-15.20	L1
0.1578	31.34	28.04	9.36	40.70	37.40	65.58	55.58	-24.88	-18.18	L1
0.1891	28.23	25.63	9.17	37.40	34.80	64.08	54.08	-26.68	-19.28	L1
0.2164	24.15	17.35	9.15	33.30	26.50	62.96	52.96	-29.66	-26.46	L1
7.1422	22.12	17.82	9.88	32.00	27.70	60.00	50.00	-28.00	-22.30	L1
9.7906	28.31	23.11	10.19	38.50	33.30	60.00	50.00	-21.50	-16.70	L1
15.6109	22.80	18.40	10.40	33.20	28.80	60.00	50.00	-26.80	-21.20	L1
8.3766	30.27	25.67	10.03	40.30	35.70	60.00	50.00	-19.70	-14.30	L2
9.8453	25.31	19.71	10.19	35.50	29.90	60.00	50.00	-24.50	-20.10	L2
7.0602	23.92	18.72	9.88	33.80	28.60	60.00	50.00	-26.20	-21.40	L2
7.9820	24.92	20.12	9.98	34.90	30.10	60.00	50.00	-25.10	-19.90	L2
9.2594	25.57	21.47	10.13	35.70	31.60	60.00	50.00	-24.30	-18.40	L2
0.4742	21.58	13.38	9.62	31.20	23.00	56.44	46.44	-25.24	-23.44	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)*

