



**FCC 47 CFR PART 15 SUBPART C**

**TEST REPORT**

**For**

**WIRELESS 11g ROUTER**

**Model: WR514A**

**Trade Name: PRO-NETS; Speed Com+; Jet Com**

*Issued to*

**PRO-NETS TECHNOLOGY CORPORATION  
7F, No. 95, Li-De St., Chung Ho City 235, Taipei, Taiwan 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.**

<http://www.ccsemc.com.tw>

[service@tw.ccsemc.com](mailto:service@tw.ccsemc.com)



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# TABLE OF CONTENTS

- 1. TEST RESULT CERTIFICATION.....3**
- 2. EUT DESCRIPTION .....4**
- 3. TEST METHODOLOGY .....5**
  - 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 .....7
- 4. INSTRUMENT CALIBRATION.....7**
- 5. FACILITIES AND ACCREDITATIONS .....8**
  - 5.1 FACILITIES .....8
  - 5.2 EQUIPMENT .....8
  - 5.3 LABORATORY ACCREDITATIONS AND LISTING.....8
  - 5.4 TABLE OF ACCREDITATIONS AND LISTINGS.....9
- 6. SETUP OF EQUIPMENT UNDER TEST .....10**
  - 6.1 SETUP CONFIGURATION OF EUT.....10
  - 6.2 SUPPORT EQUIPMENT .....10
- 7. FCC PART 15.247 REQUIREMENTS.....11**
  - 7.1 6DB BANDWIDTH .....11
  - 7.2 PEAK POWER.....16
  - 7.3 AVERAGE POWER .....21
  - 7.4 BAND EDGES MEASUREMENT.....25
  - 7.5 PEAK POWER SPECTRAL DENSITY .....35
  - 7.6 RADIO FREQUENCY EXPOSURE .....40
  - 7.7 SPURIOUS EMISSIONS .....42
  - 7.8 POWERLINE CONDUCTED EMISSIONS.....57
- APPENDIX 1 PHOTOGRAPHS OF TEST SETUP .....60**



# 1. TEST RESULT CERTIFICATION

**Applicant:** PRO-NETS TECHNOLOGY CORPORATION  
7F, No. 95, Li-De St., Chung Ho City 235, Taipei, Taiwan R.O.C.

**Equipment Under Test:** WIRELESS 11g ROUTER

**Trade Name:** PRO-NETS; Speed Com+; Jet Com

**Model:** WR514A

**Date of Test:** October 8 ~ 28, 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:*

*Reviewed by:*

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Robert Huang  
Section Manager  
Compliance Certification Services Inc.

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Julia Wei  
Senior Specialist  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	WIRELESS 11g ROUTER		
<b>Trade Name</b>	PRO-NETS; Speed Com+; Jet Com		
<b>Model Number</b>	WR514A		
<b>Model Discrepancy</b>	N/A		
<b>EUT Power Rating</b>	12VDC		
<b>Power Adapter</b>	Ktec	<b>Model</b>	KSLFC1200100W1US
	DVE	<b>Model</b>	DSA-12G-12FUS 120120
	OEM	<b>Model</b>	ADS10-W120100
<b>Power Adapter Power Rating</b>	<b>For KSLFC1200100W1US; DSA-12G-12FUS 120120</b> I/P: 100-240VAC, 50/60Hz, 0.3A O/P: 12VDC, 1.0A		
	<b>For ADS10-W120100</b> I/P: 100-240VAC, 50-60Hz, 0.5A O/P: 12VDC, 1.0A		
<b>Frequency Range</b>	2412 ~ 2462 MHz		
<b>Transmit Power</b>	IEEE 802.11b mode: 18.84 dBm IEEE 802.11g mode: 15.88 dBm		
<b>Modulation Technique</b>	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + 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>	Dipole Antenna / Gain: 2 dBi		

### Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **RXZ-WR514A** 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: WR514A) had been tested under operating condition.

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

The worst case data rate is determined as the data rate with highest output power.

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.

#### **IEEE 802.11b mode:**

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

#### **IEEE 802.11g mode:**

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

After verification, power line conduction emission tests were carried out with the worst case test modes, which worst case was used OEM / ADS10-W120100 in all test mode only.

## 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	CFR 47, FCC Part15/18, CISPR 22, EN 55022, ICES-003, AS/NZS CISPR 22, VCCI V-3, EN 55011, CISPR 11, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 61000-6-1/2/3/4, EN 55024, CISPR 24, AS/NZS CISPR 24, AS/NZS 61000.6.2, EN 55014-1/-2, ETSI EN 300 386 v1.3.2/v1.3.3, IEC/EN 61000-3-2, AS/NZS 61000.3.2, IEC/EN 61000-3-3, AS/NZS 61000.3.3	 ACCREDITED No. 0824-01
USA	FCC MRA	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 FC TW1026
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	<b>VCCI</b> R-2882/2541/2798/725/1868 C-402/747/912 T-321/325
Taiwan	TAF	EN 55014-1, CISPR 14, CNS 13781-1, EN 55013, CISPR 13, CNS 13439, EN 55011, CISPR 11, CNS 13803, PLMN09, IS2045-0, LP0002 FCC Part 27/90, Part 15B/C/D/E, RSS-192/193/210/310 ETSI EN 300 328/ 300 220-1/ 300 220-2/ 301 893/ 301 489-01/ 301 489-03/ 301 489-07 / 301 489-17/ 300 440-1/ 300 440-2 AS/NZS 4268, AS/NZS 4771 CISPR 22, EN 55022, CNS 13438, AS/NZS CISPR 22, VCCI, IEC/EN 61000-4-2/3/4/5/6/8/11, CNS 14676-2/3/4/5/6/8, CNS 14934-2/3, CNS 13783-1, CNS 13439, CNS 13803	 TAF 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	 Canada 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

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

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

**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

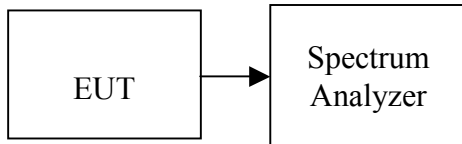
According to §15.247(a)(2), for the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2009

*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 = 300kHz, Span = 30MHz, 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 mode**

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Bandwidth (MHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
Low	2412	11.16	>500	PASS
Mid	2437	11.10		PASS
High	2462	12.06		PASS

### **Test mode: IEEE 802.11g mode**

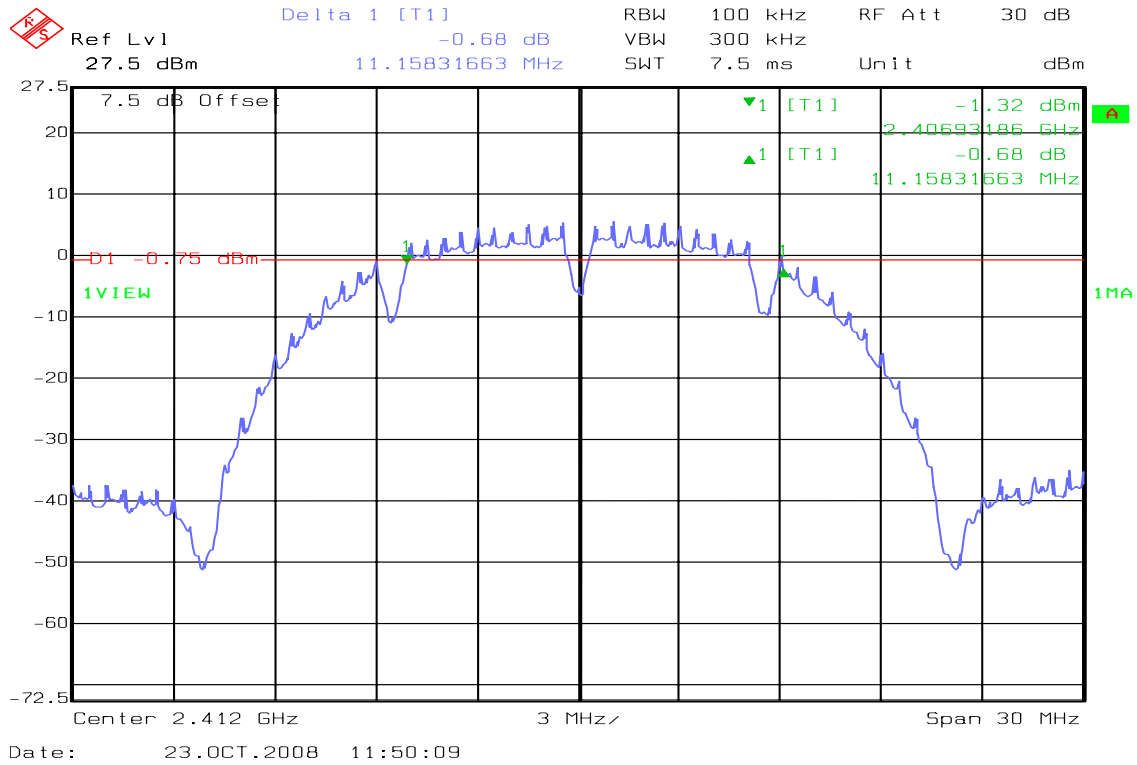
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Bandwidth (MHz)</b>	<b>Limit (kHz)</b>	<b>Result</b>
Low	2412	16.26	>500	PASS
Mid	2437	16.35		PASS
High	2462	16.32		PASS



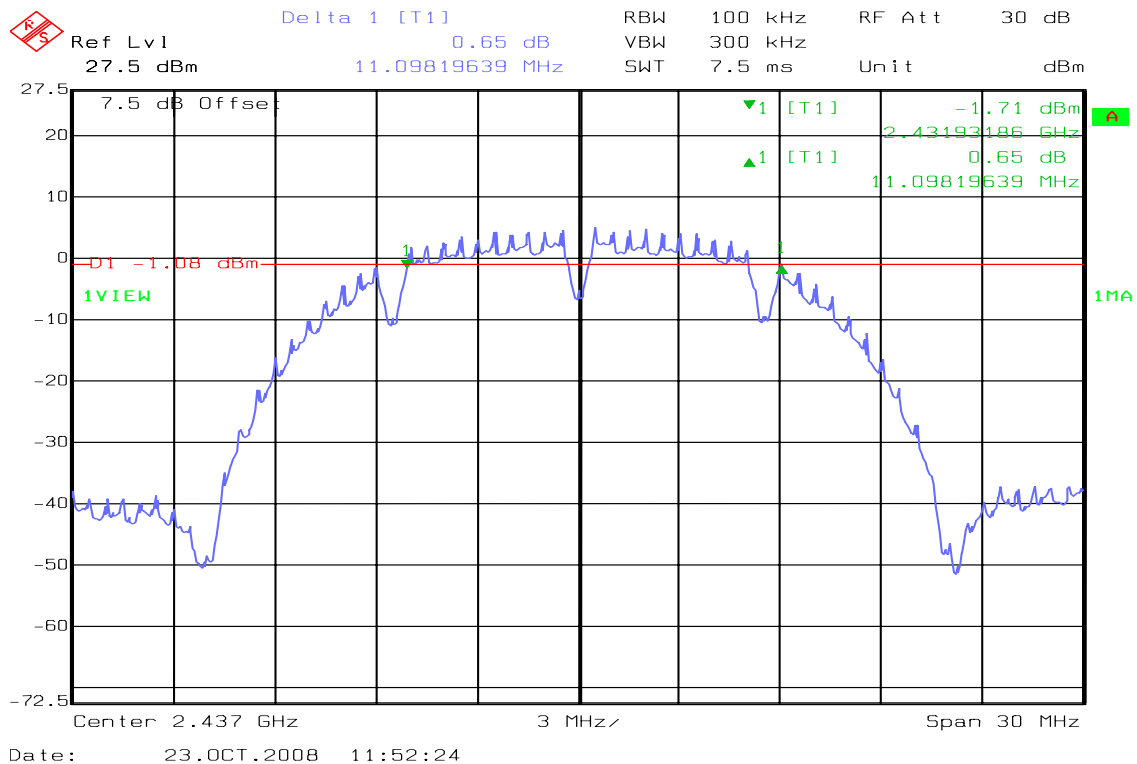
### Test Plot

### IEEE 802.11b mode

### 6dB Bandwidth (CH Low)

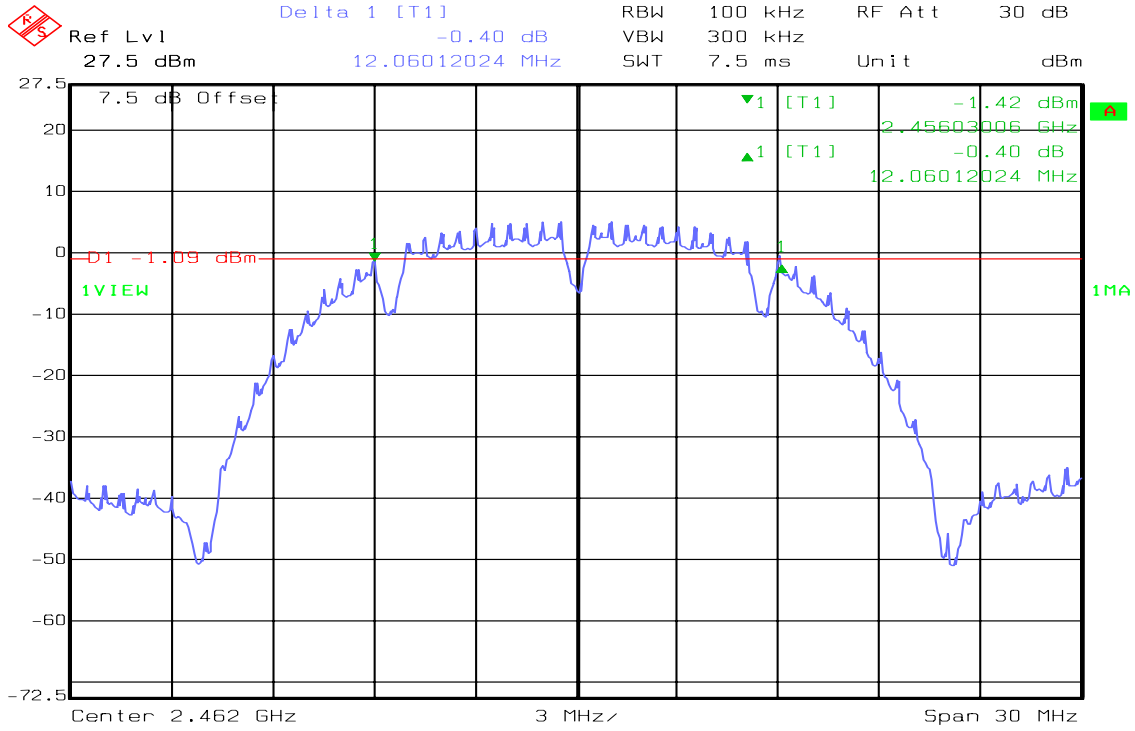


### 6dB Bandwidth (CH Mid)





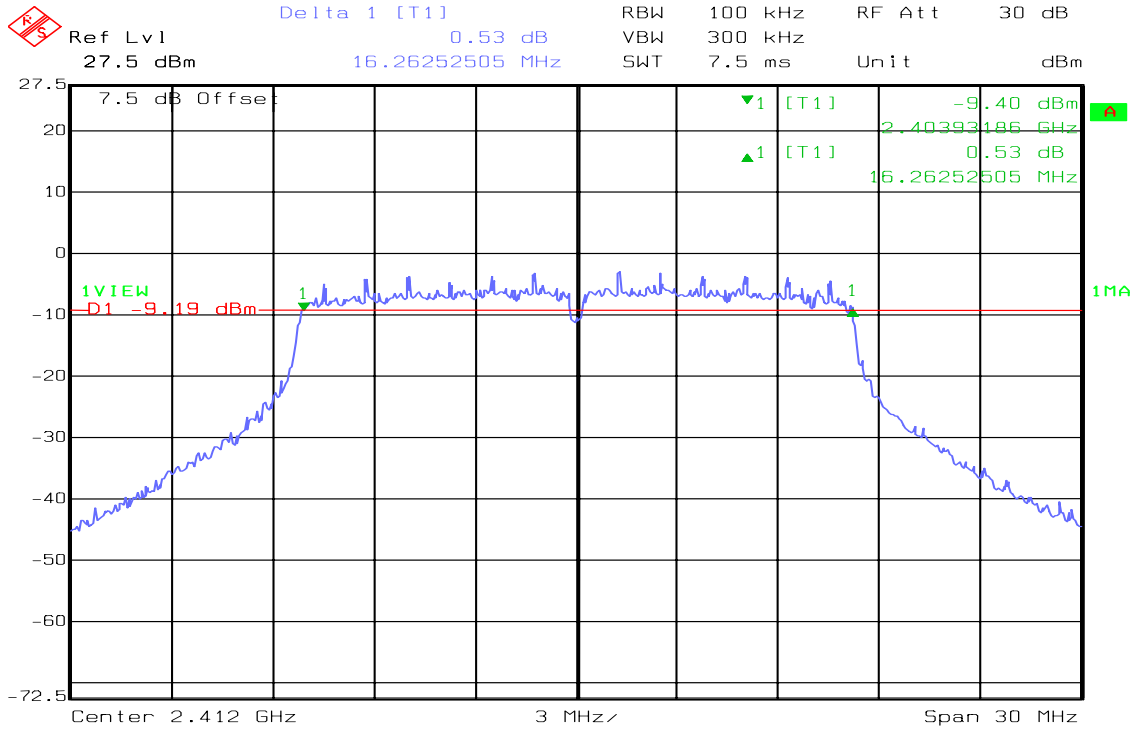
### 6dB Bandwidth (CH High)



Date: 23.OCT.2008 11:54:44

### IEEE 802.11g mode

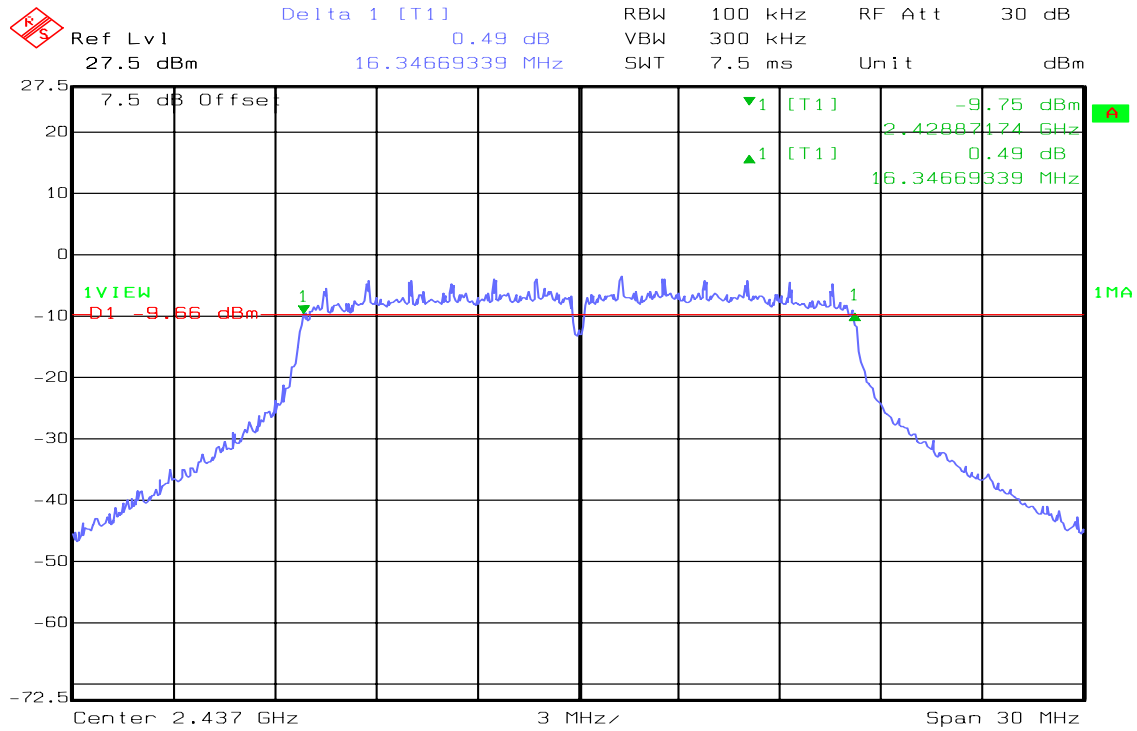
### 6dB Bandwidth (CH Low)



Date: 23.OCT.2008 11:33:02

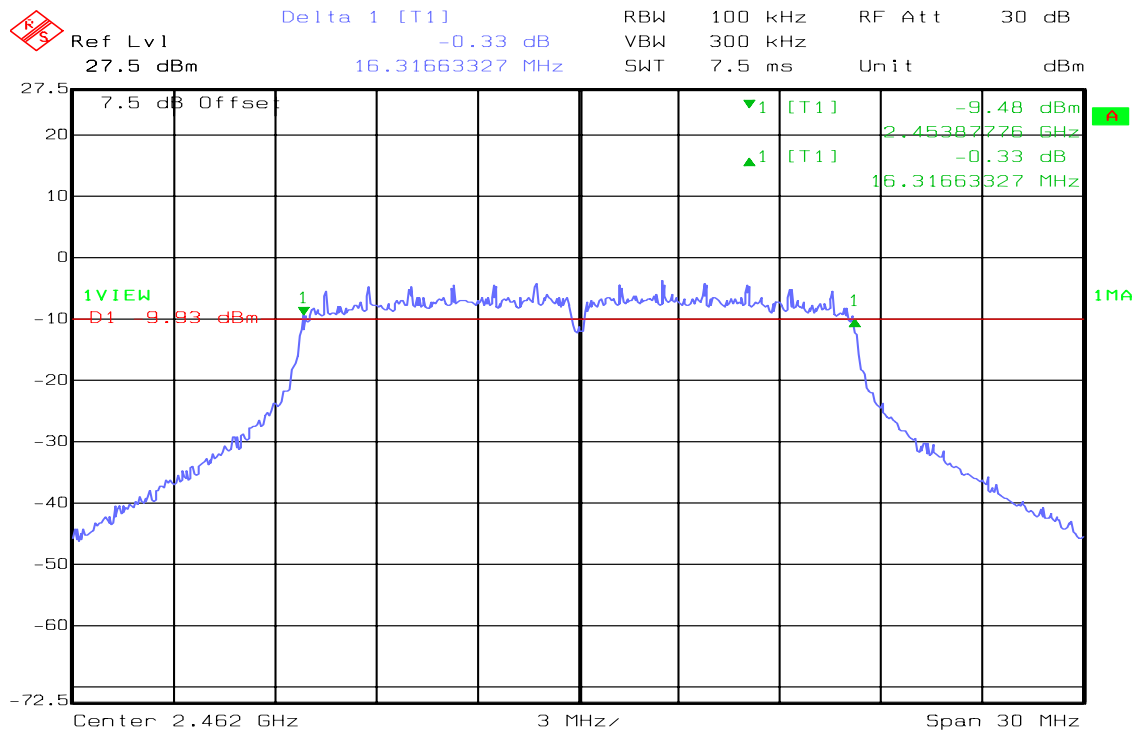


### 6dB Bandwidth (CH Mid)



Date: 23.OCT.2008 11:37:11

### 6dB Bandwidth (CH High)



Date: 23.OCT.2008 11:58:52



## 7.2 PEAK POWER

### LIMIT

According to §15.247(b)(3) & (4), the maximum peak output power of the intentional radiator shall not exceed the following:

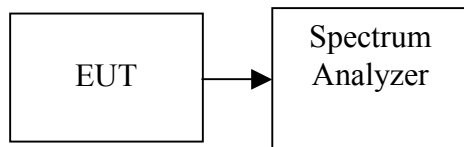
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph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

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2009

*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	18.81	0.07603	1	PASS
Mid	2437	18.44	0.06982		PASS
High	2462	18.84	0.07656		PASS

**IEEE 802.11g**

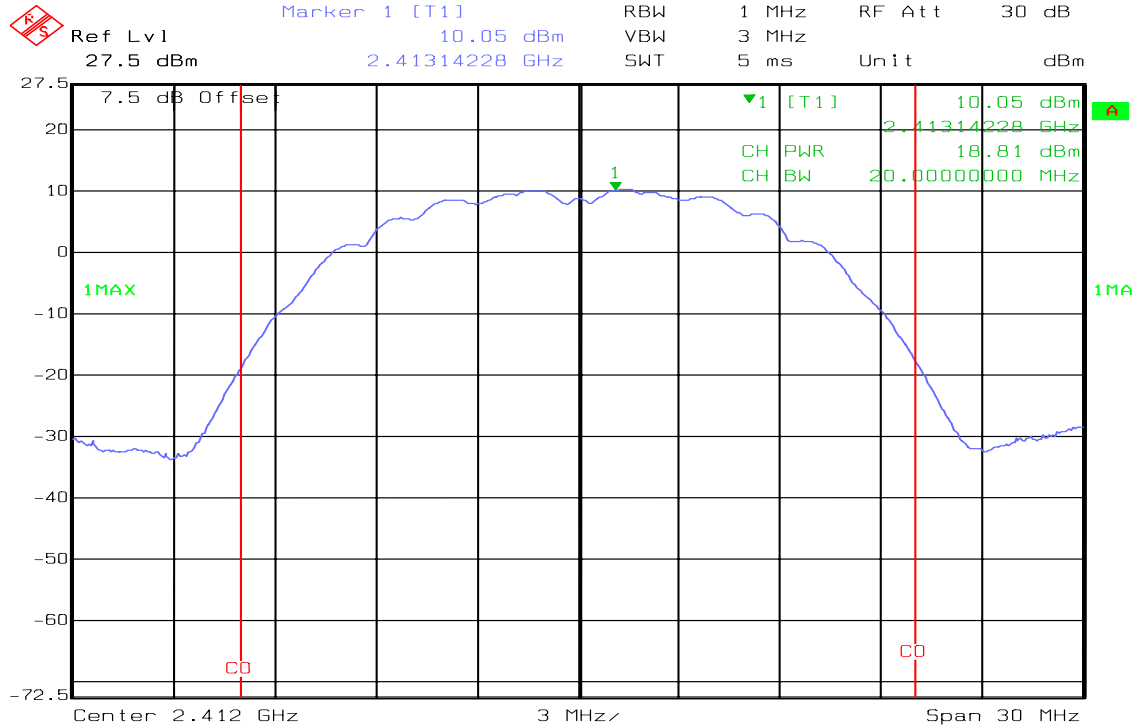
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	15.88	0.03873	1	PASS
Mid	2437	15.66	0.03681		PASS
High	2462	15.65	0.03673		PASS



**Test Plot**

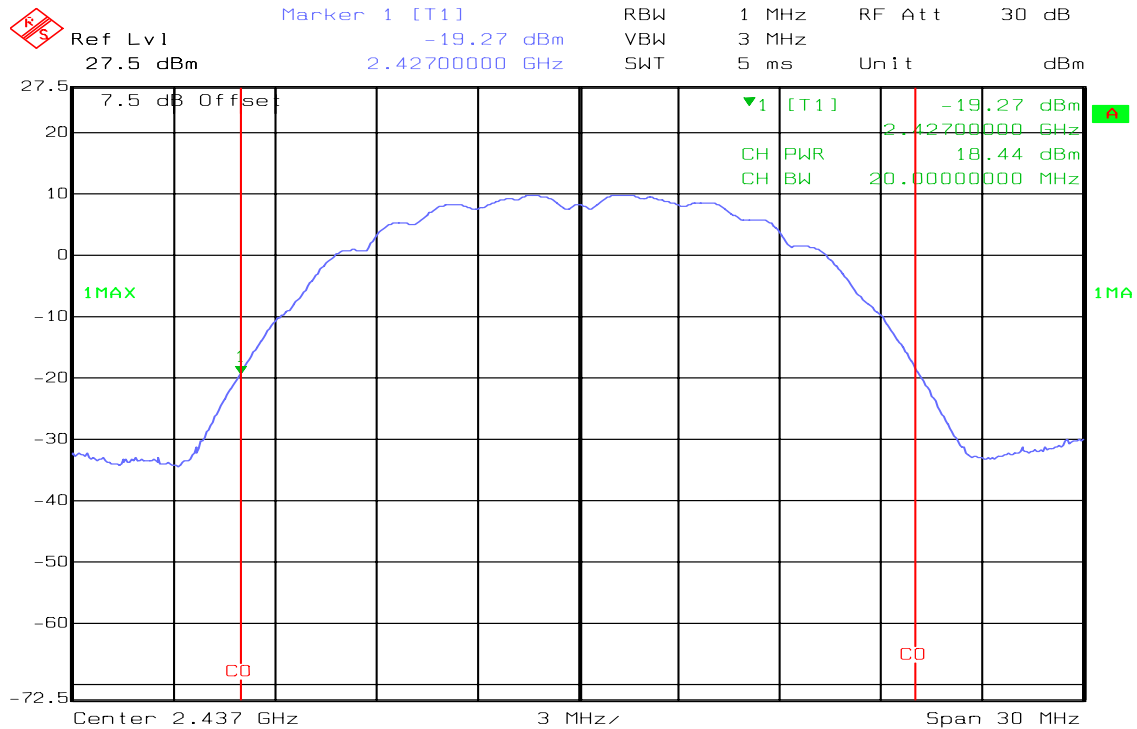
**IEEE 802.11b mode**

**Peak Power (CH Low)**



Date: 23.OCT.2008 11:00:23

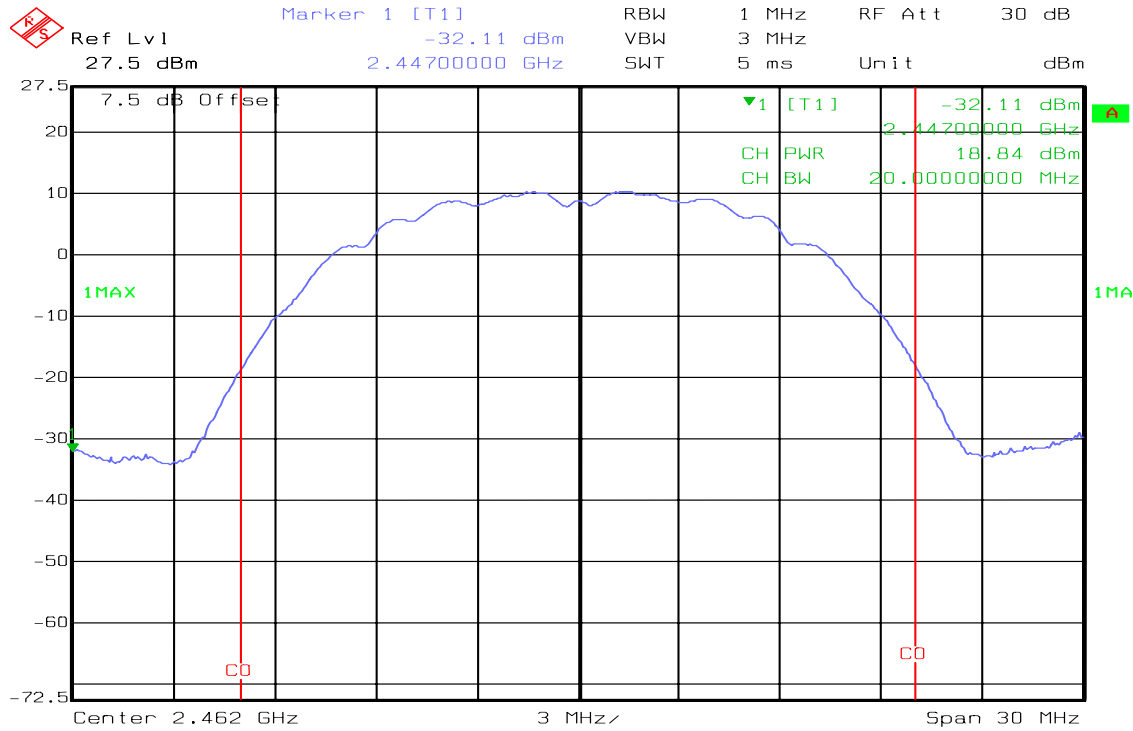
**Peak Power (CH Mid)**



Date: 23.OCT.2008 11:07:11



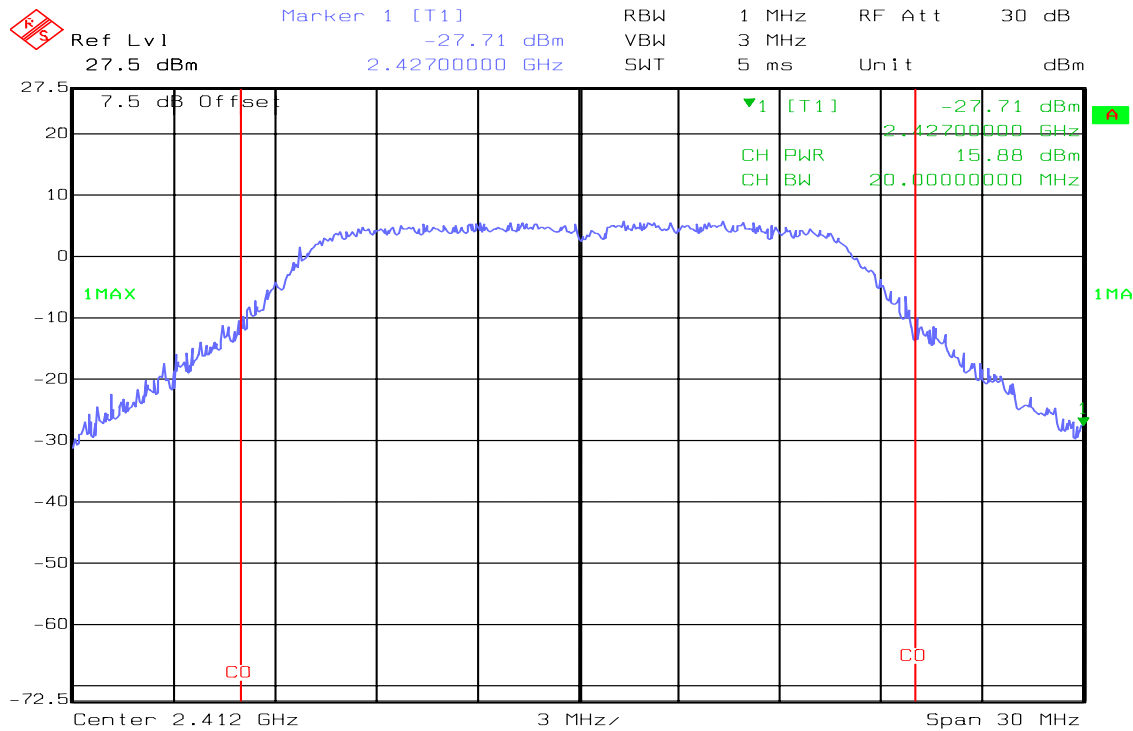
### Peak Power (CH High)



Date: 23.OCT.2008 11:08:53

### IEEE 802.11g mode

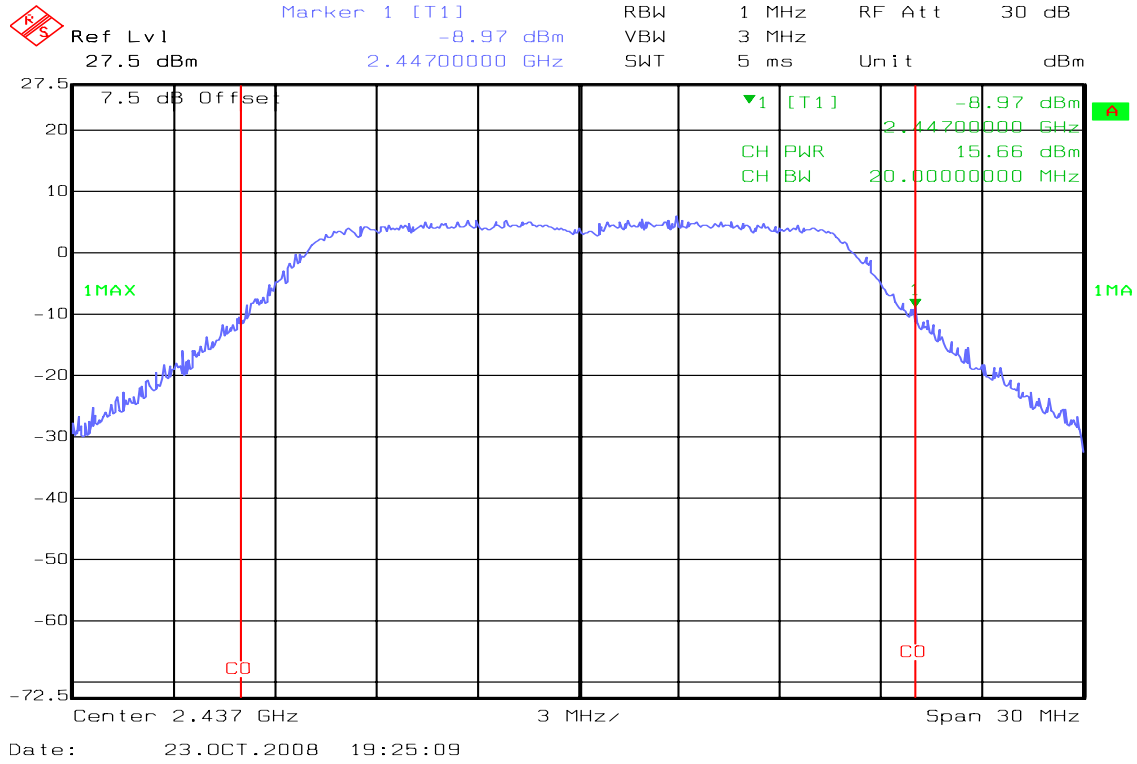
### Peak Power (CH Low)



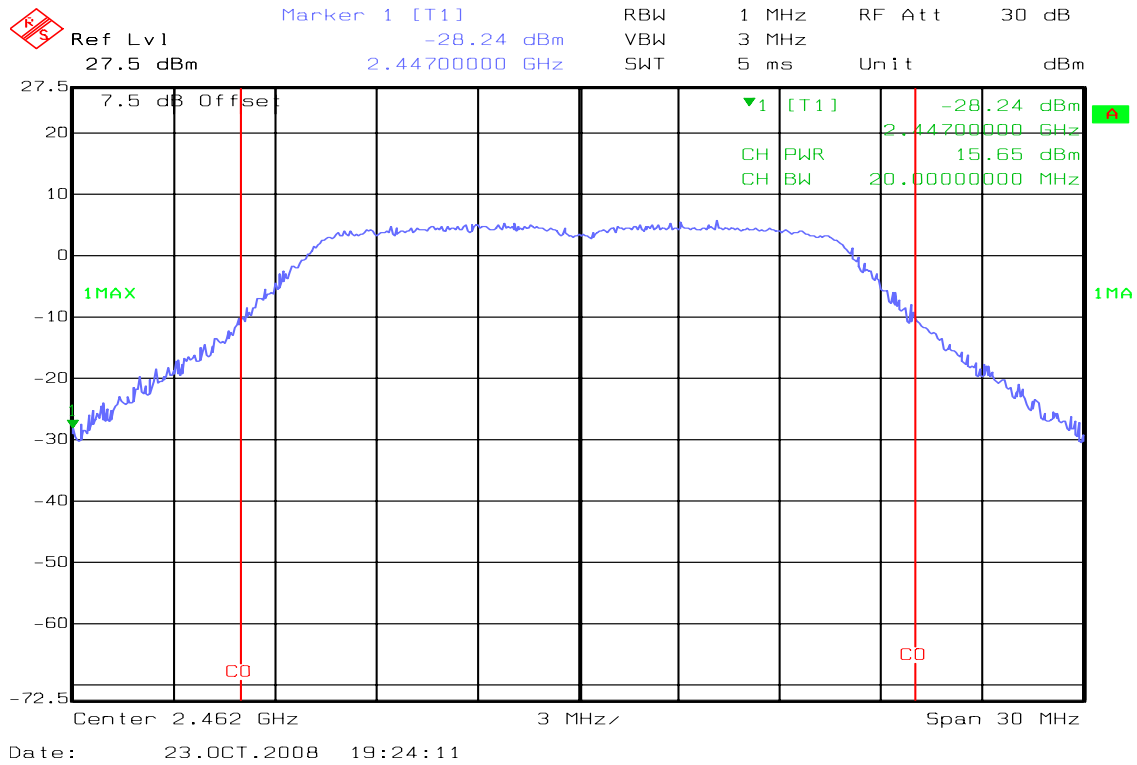
Date: 23.OCT.2008 11:18:14



### Peak Power (CH Mid)



### Peak Power (CH High)



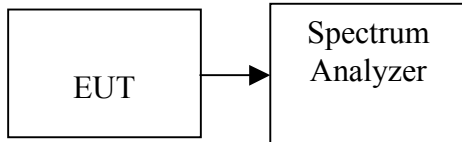


### 7.3 AVERAGE POWER

#### LIMIT

None; for reporting purposes only.

#### TEST CONFIGURATION



#### TEST PROCEDURE

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

#### TEST RESULTS

*No non-compliance noted*

#### TEST DATA

##### Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	18.41	0.01132
Mid	2437	17.99	0.01202
High	2462	18.54	0.01059

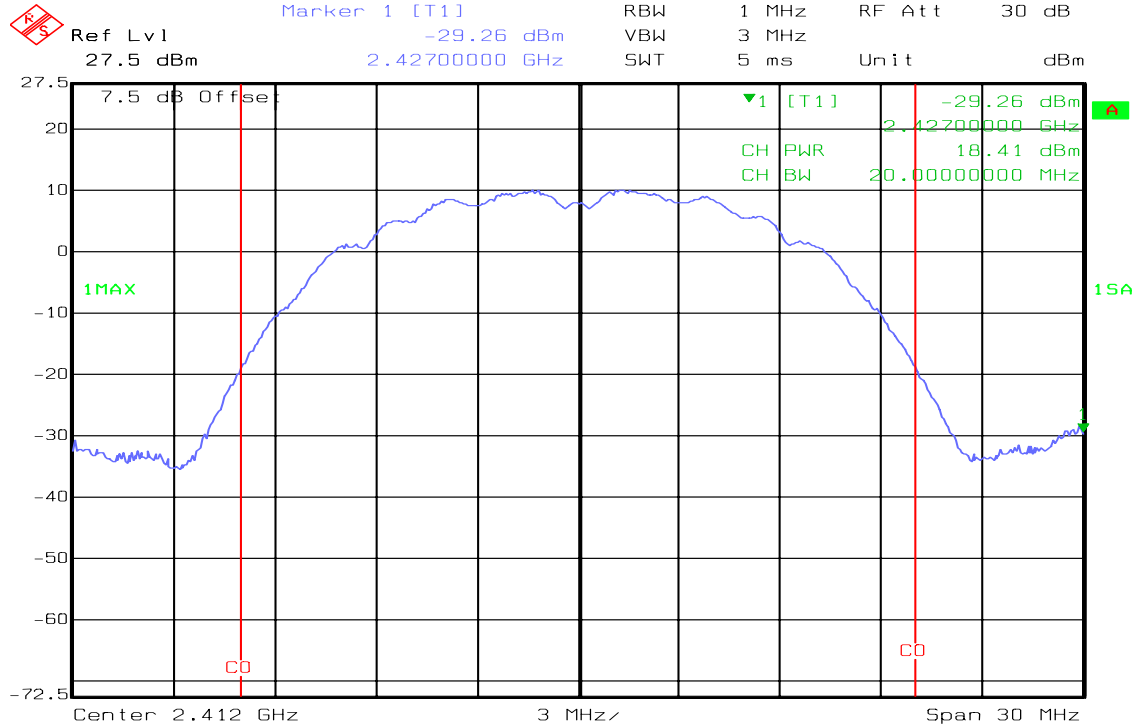
##### Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	14.39	0.00386
Mid	2437	13.58	0.00427
High	2462	13.35	0.00404



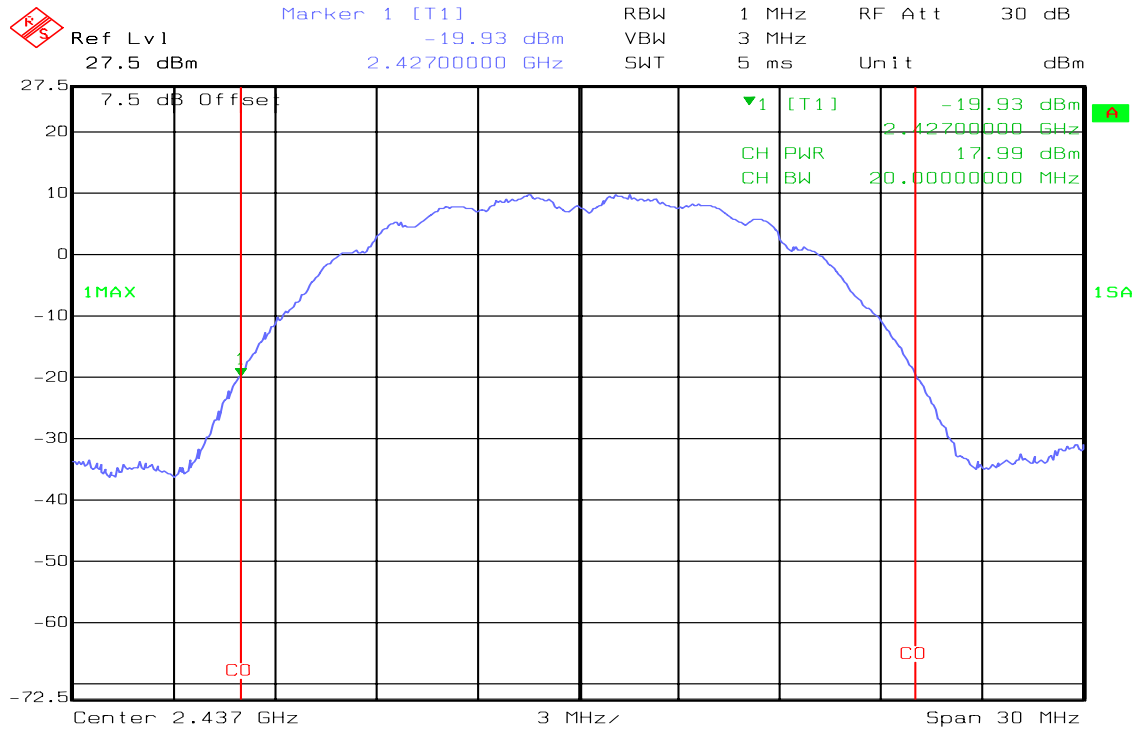
### TEST PLOT

#### Average power (IEEE 802.11b / CH Low)



Date: 23.OCT.2008 19:28:25

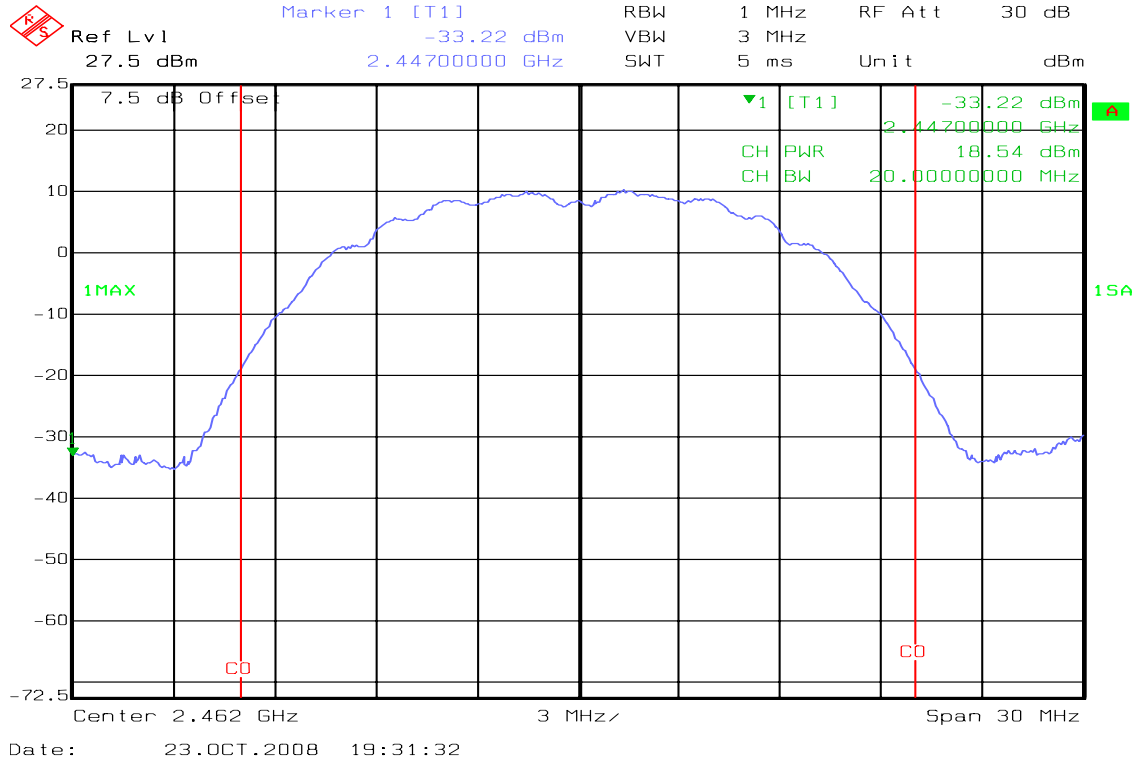
#### Average power (IEEE 802.11b / CH Mid)



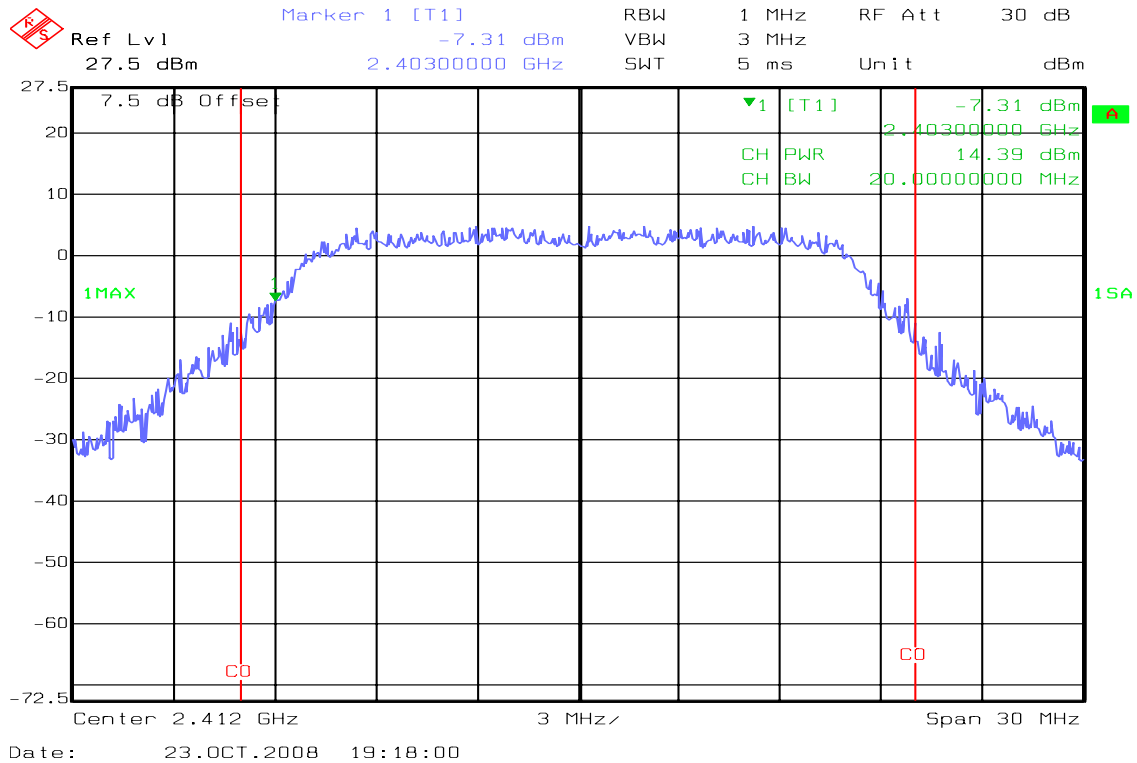
Date: 23.OCT.2008 19:30:12



### Average power (IEEE 802.11b / CH High)

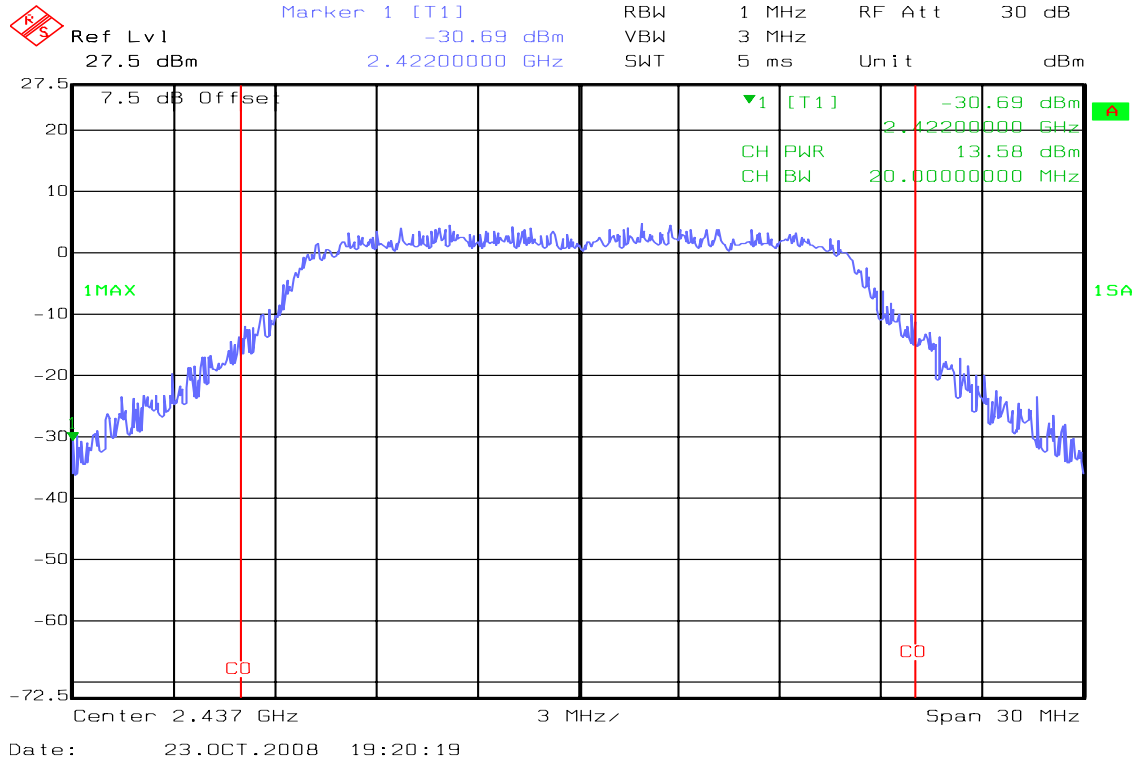


### Average power (IEEE 802.11g / CH Low)

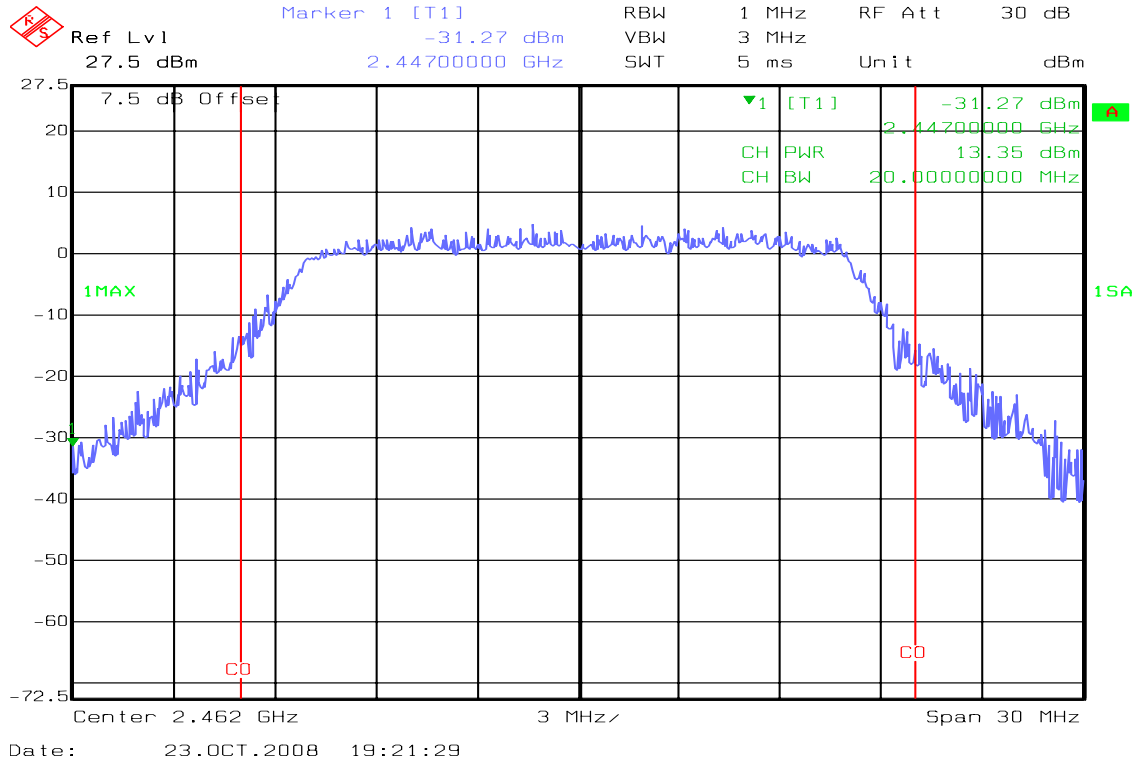




### Average power (IEEE 802.11g / CH Mid)



### Average power (IEEE 802.11g / CH High)





## 7.4 BAND EDGES MEASUREMENT

### LIMIT

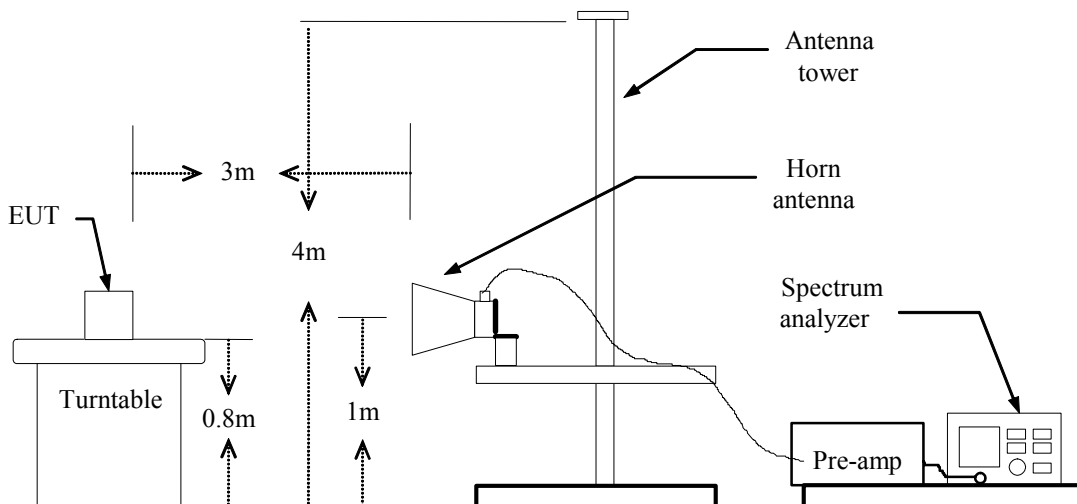
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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	10/14/2009
Horn Antenna	EMCO	3115	00022250	05/08/2009
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

*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**

*No non-compliance noted*

## **TEST DATA**

Refer to attach spectrum analyzer data chart.



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

Detector mode: Peak

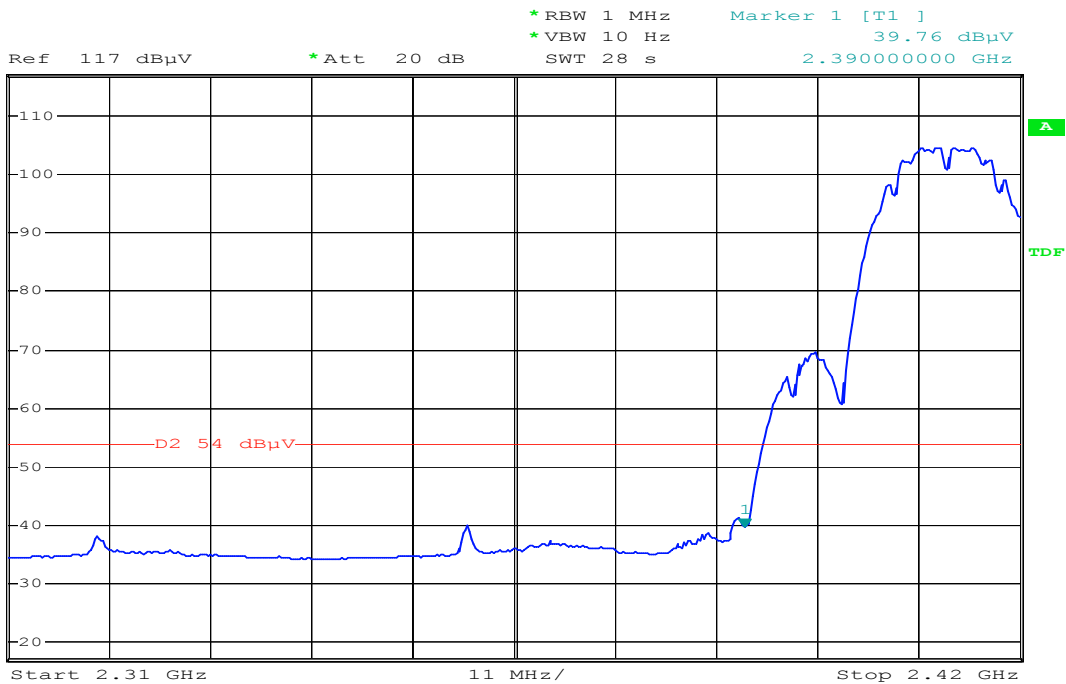
Polarity: Vertical



Date: 21.OCT.2008 19:08:50

Detector mode: Average

Polarity: Vertical

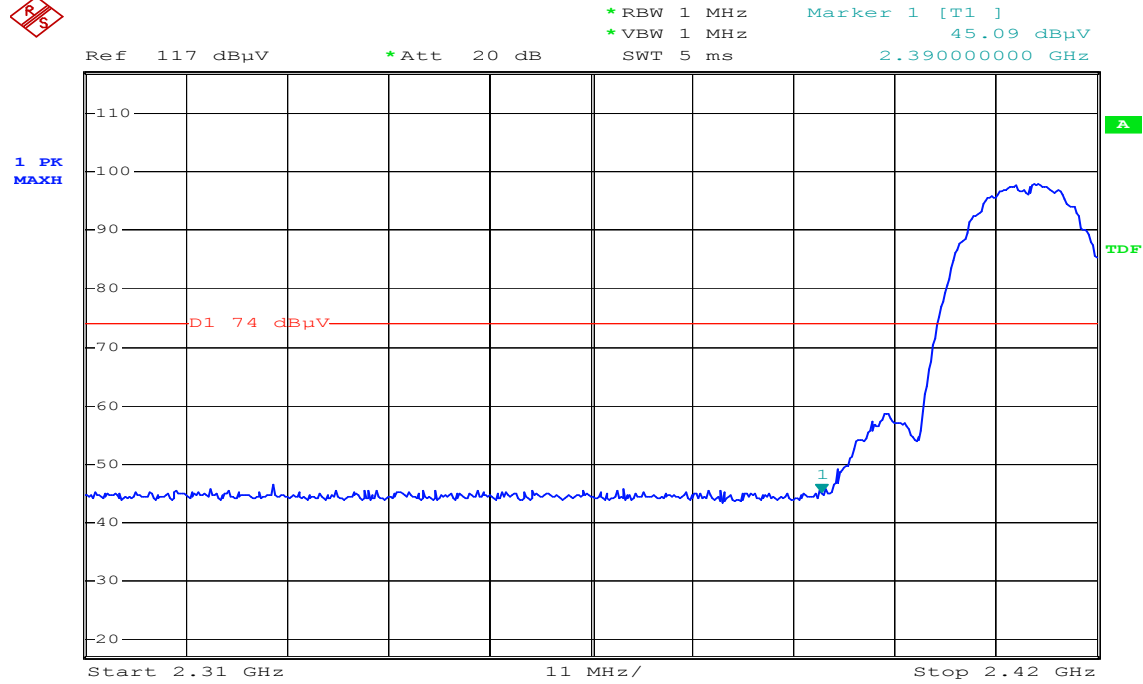


Date: 21.OCT.2008 19:09:58



Detector mode: Peak

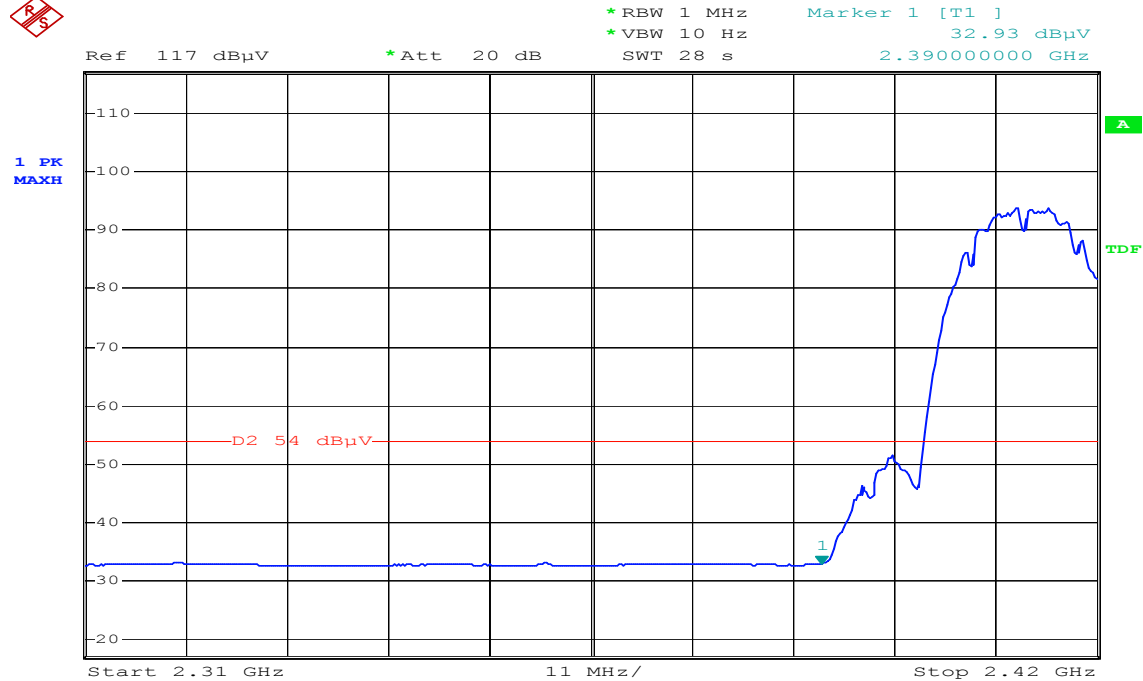
Polarity: Horizontal



Date: 21.OCT.2008 19:00:01

Detector mode: Average

Polarity: Horizontal



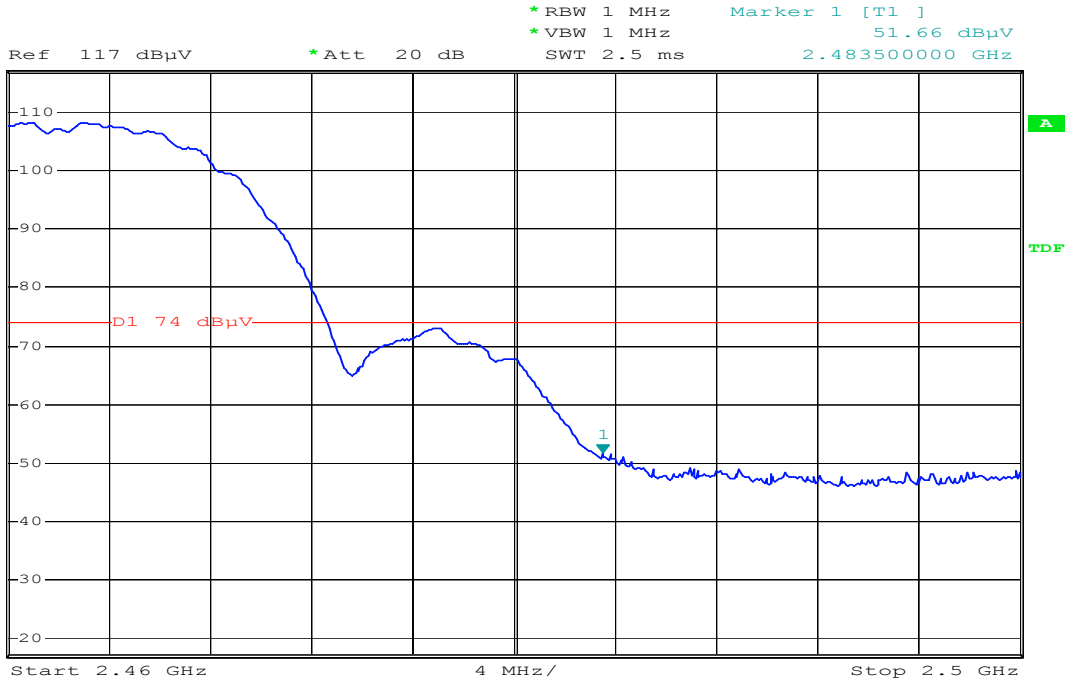
Date: 21.OCT.2008 19:01:34



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

Detector mode: Peak

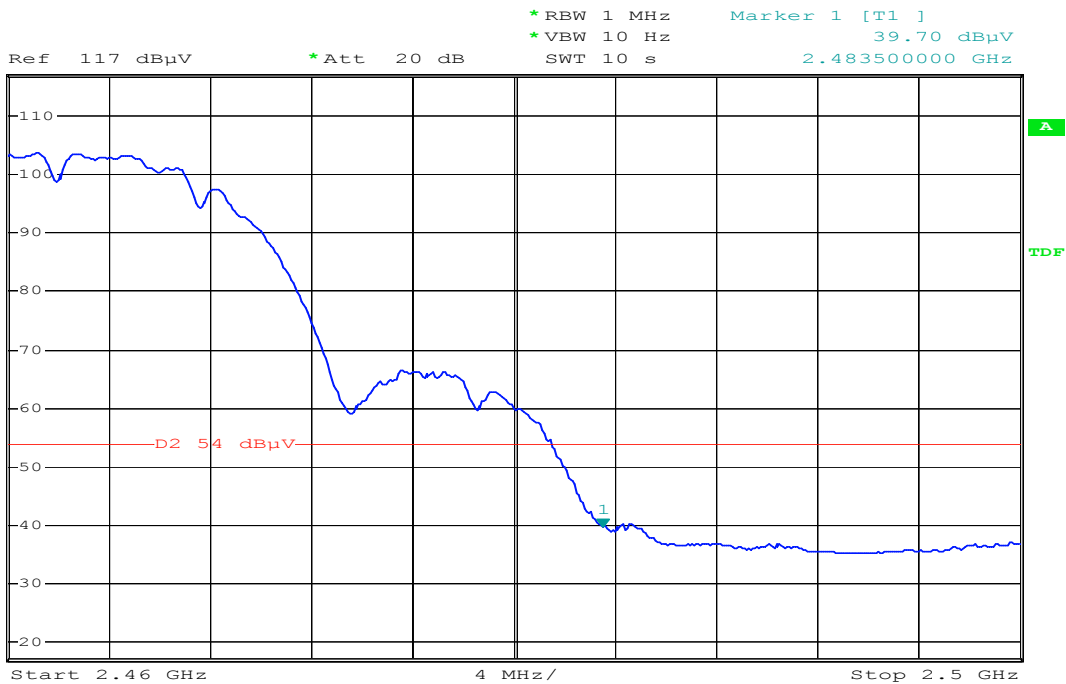
Polarity: Vertical



Date: 21.OCT.2008 19:12:39

Detector mode: Average

Polarity: Vertical

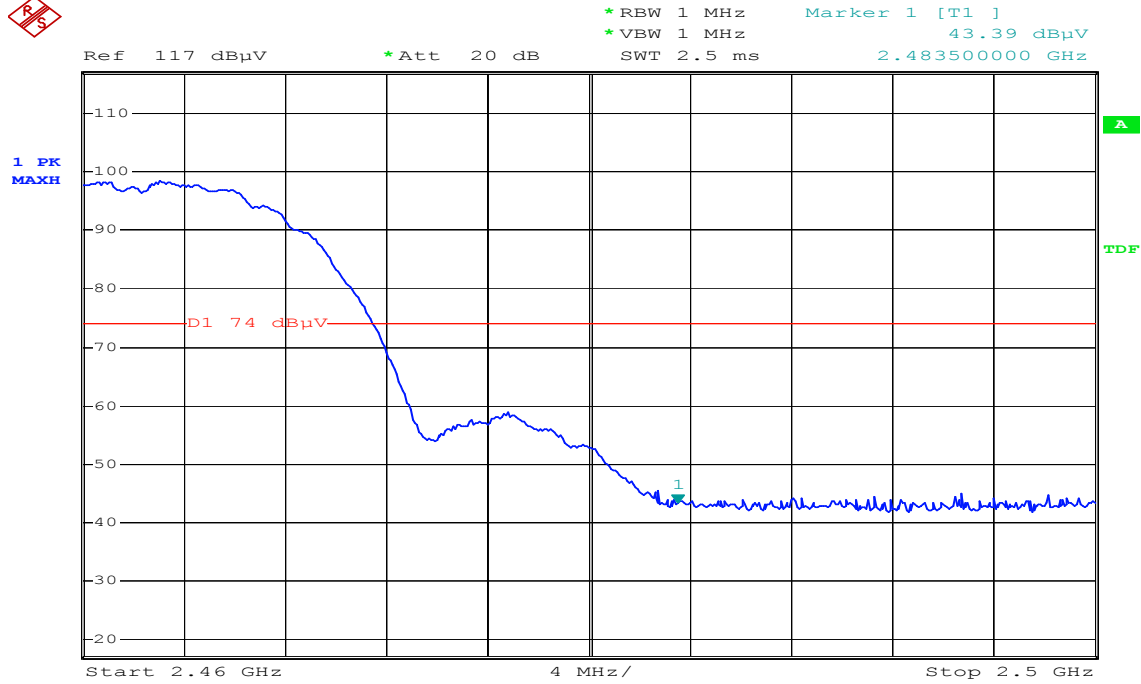


Date: 21.OCT.2008 19:13:11



Detector mode: Peak

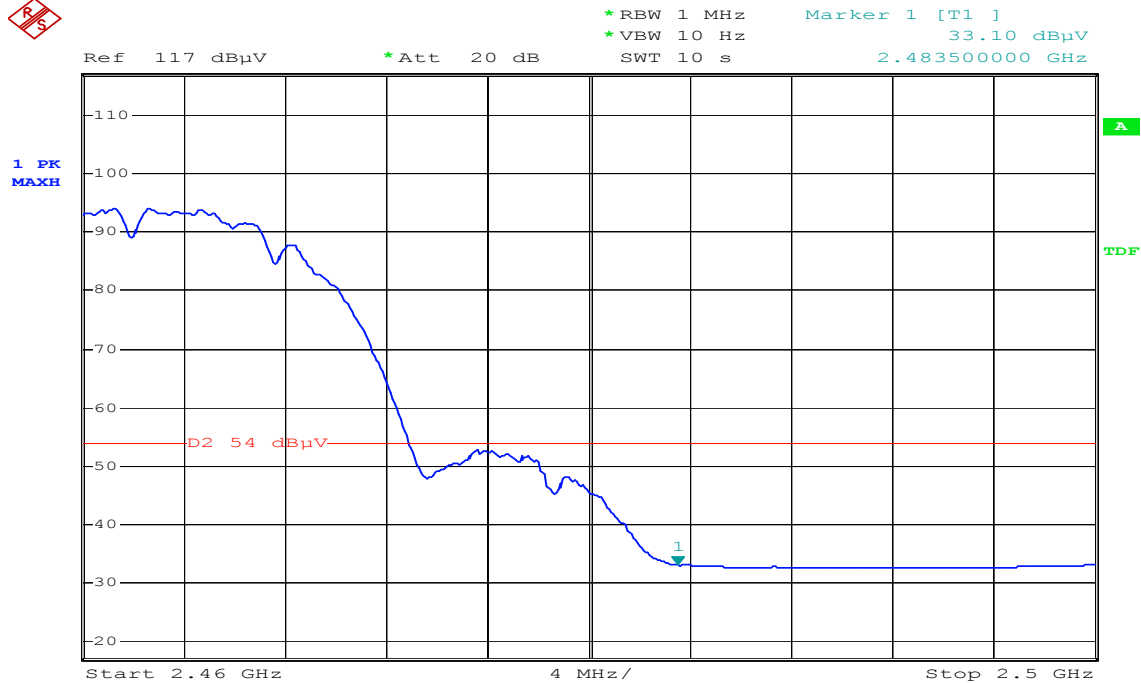
Polarity: Horizontal



Date: 21.OCT.2008 19:15:24

Detector mode: Average

Polarity: Horizontal



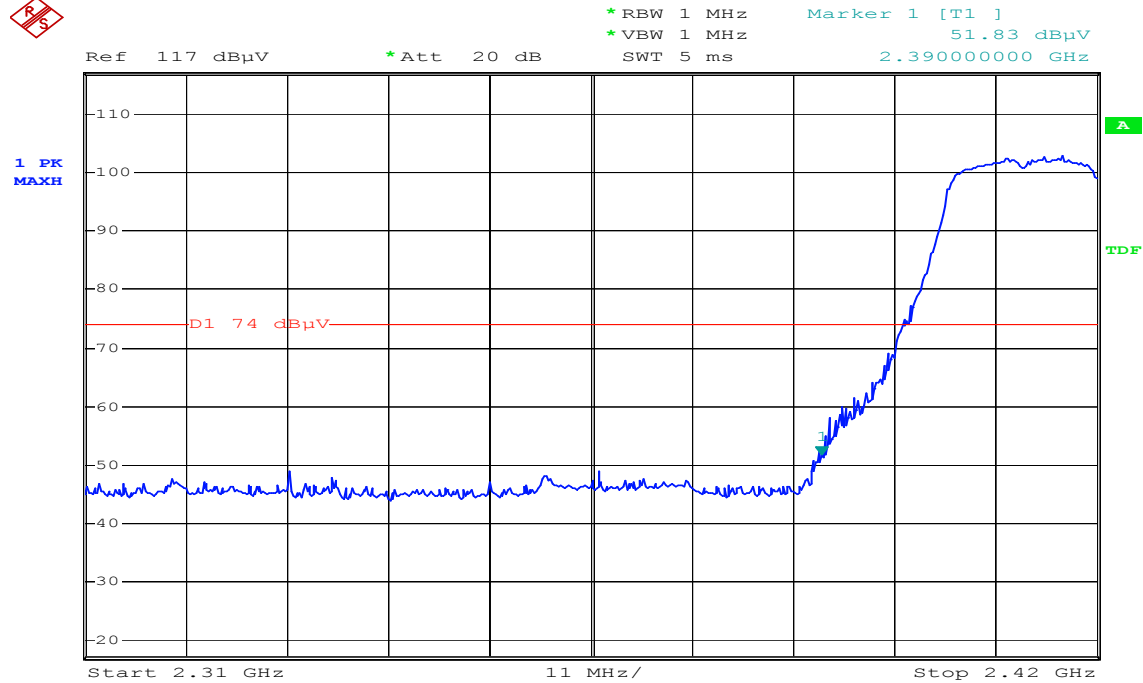
Date: 21.OCT.2008 19:15:52



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

Detector mode: Peak

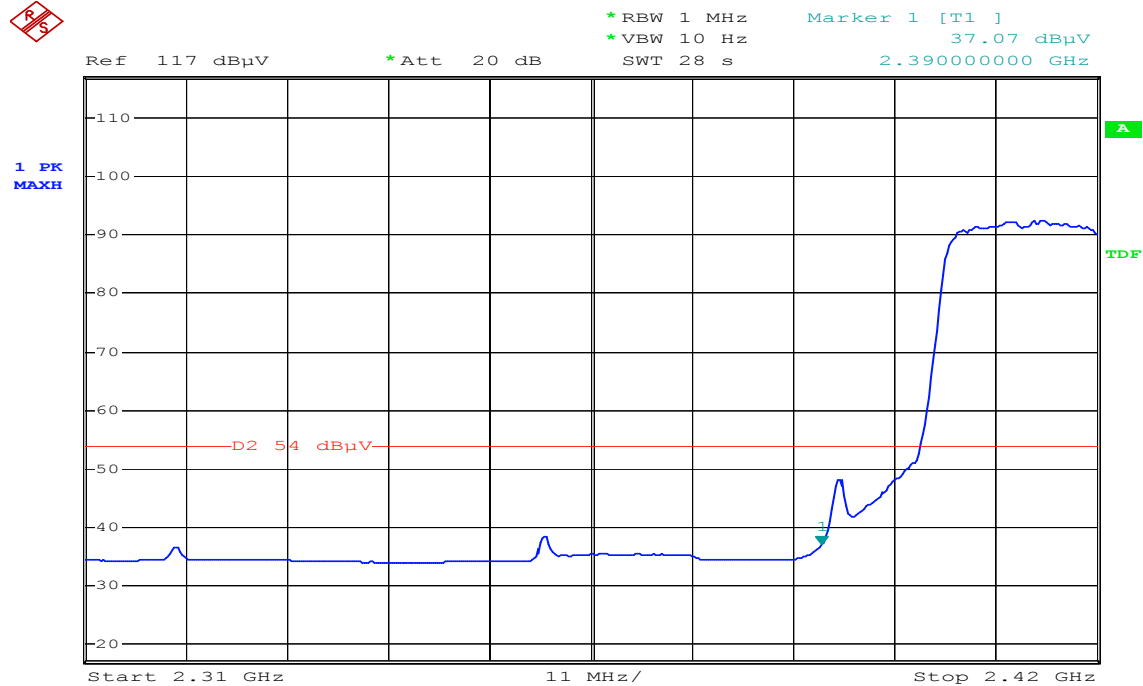
Polarity: Vertical



Date: 21.OCT.2008 18:47:36

Detector mode: Average

Polarity: Vertical

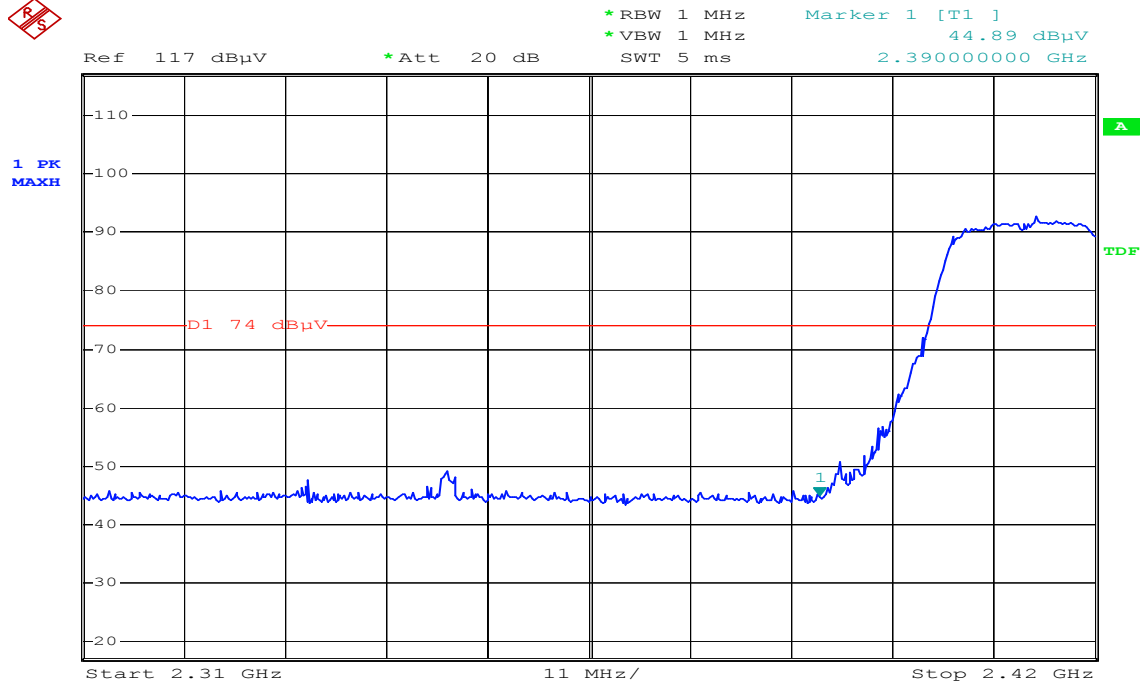


Date: 21.OCT.2008 18:48:28



Detector mode: Peak

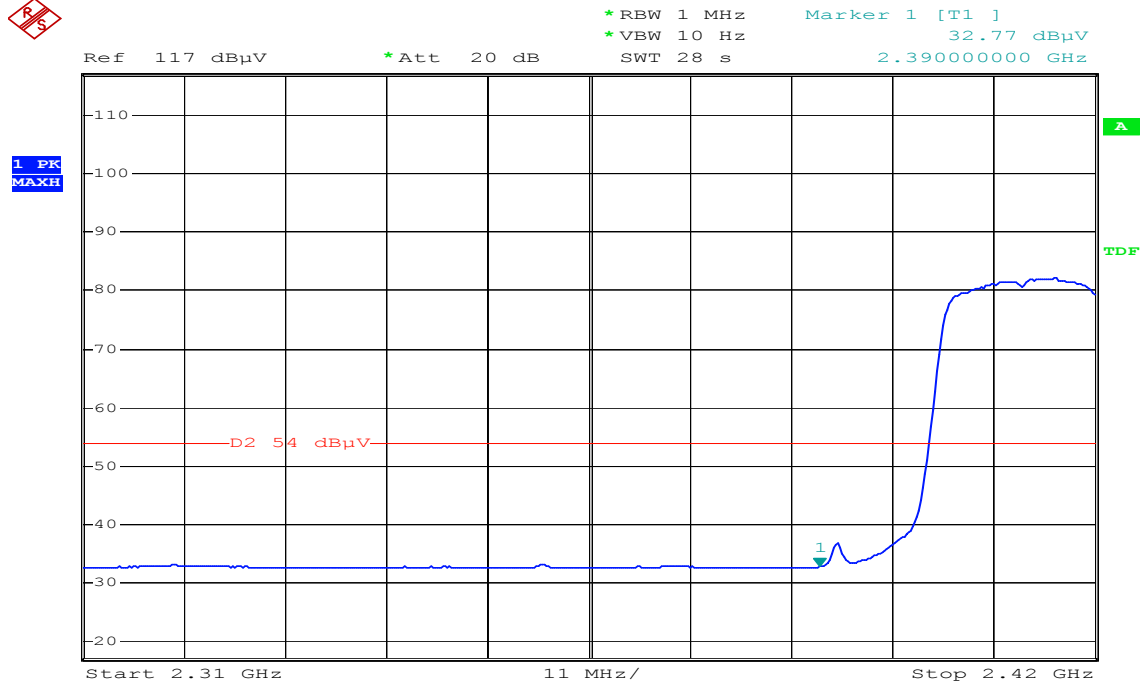
Polarity: Horizontal



Date: 21.OCT.2008 18:51:55

Detector mode: Average

Polarity: Horizontal



Date: 21.OCT.2008 19:04:55

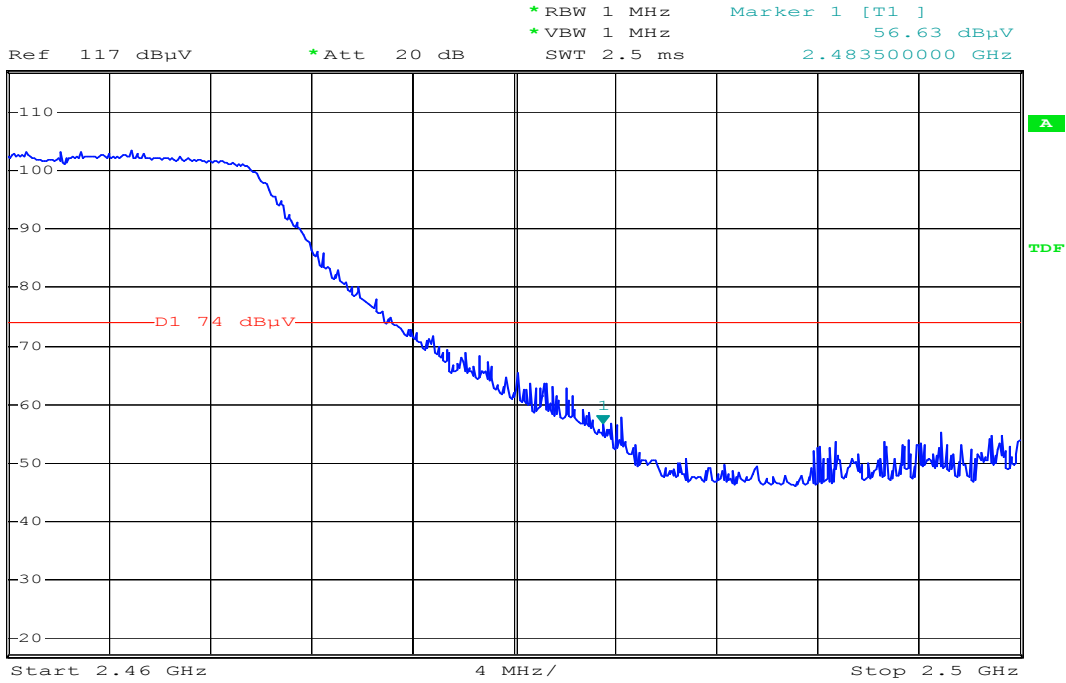




### Band Edges (IEEE 802.11g mode / CH High)

Detector mode: Peak

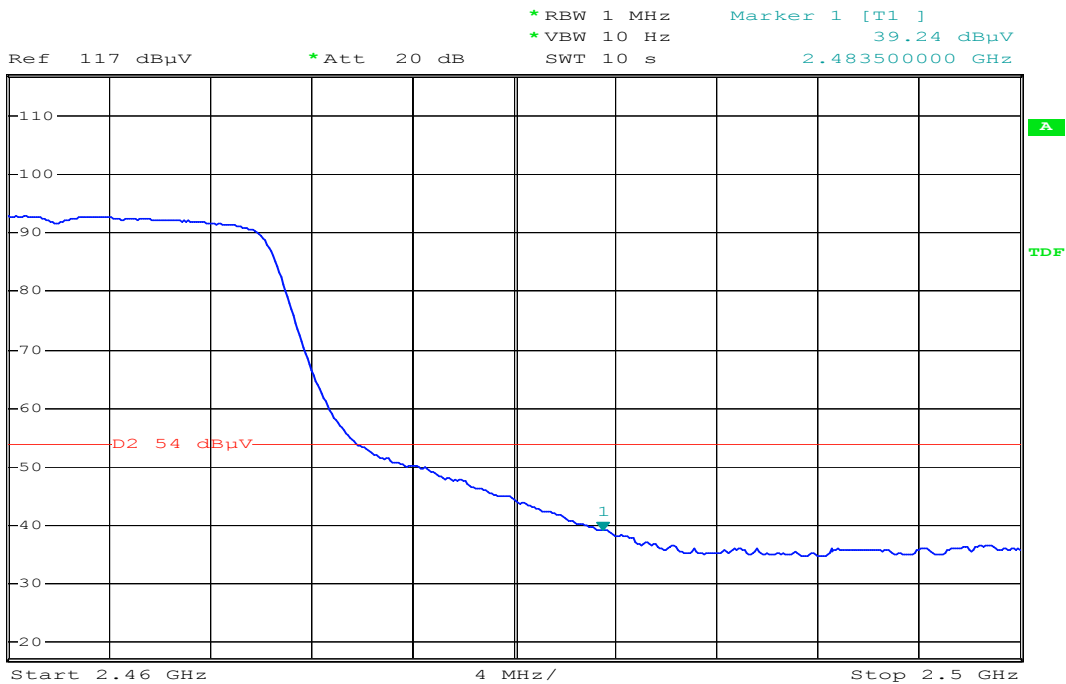
Polarity: Vertical



Date: 21.OCT.2008 19:19:33

Detector mode: Average

Polarity: Vertical

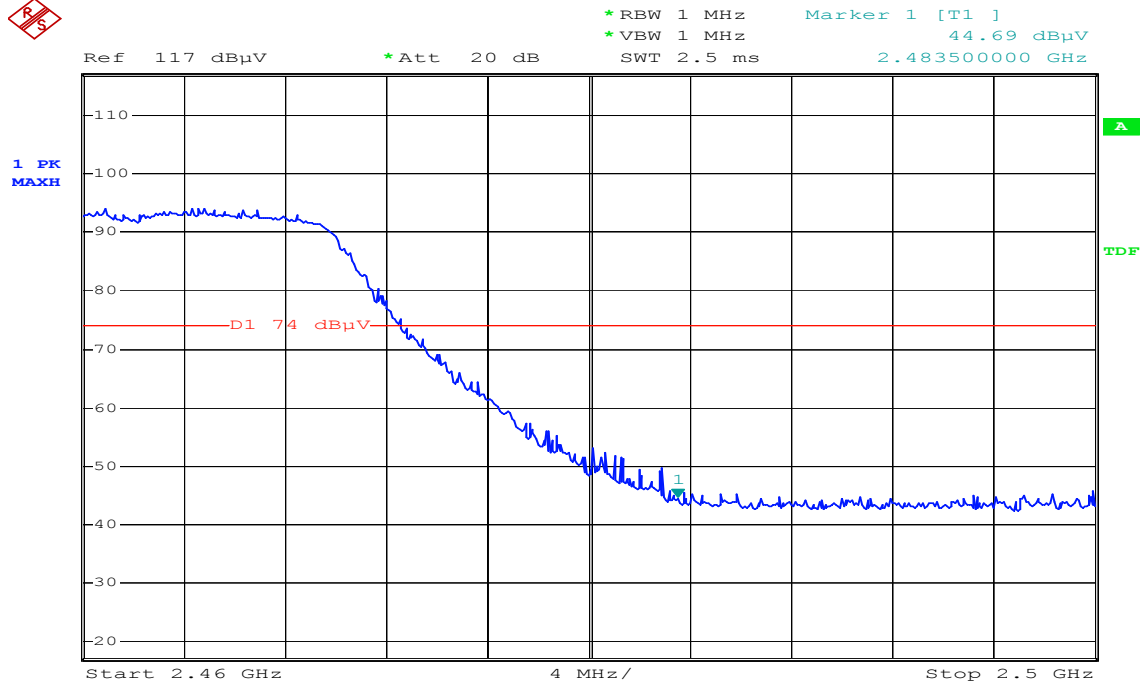


Date: 21.OCT.2008 19:20:02



Detector mode: Peak

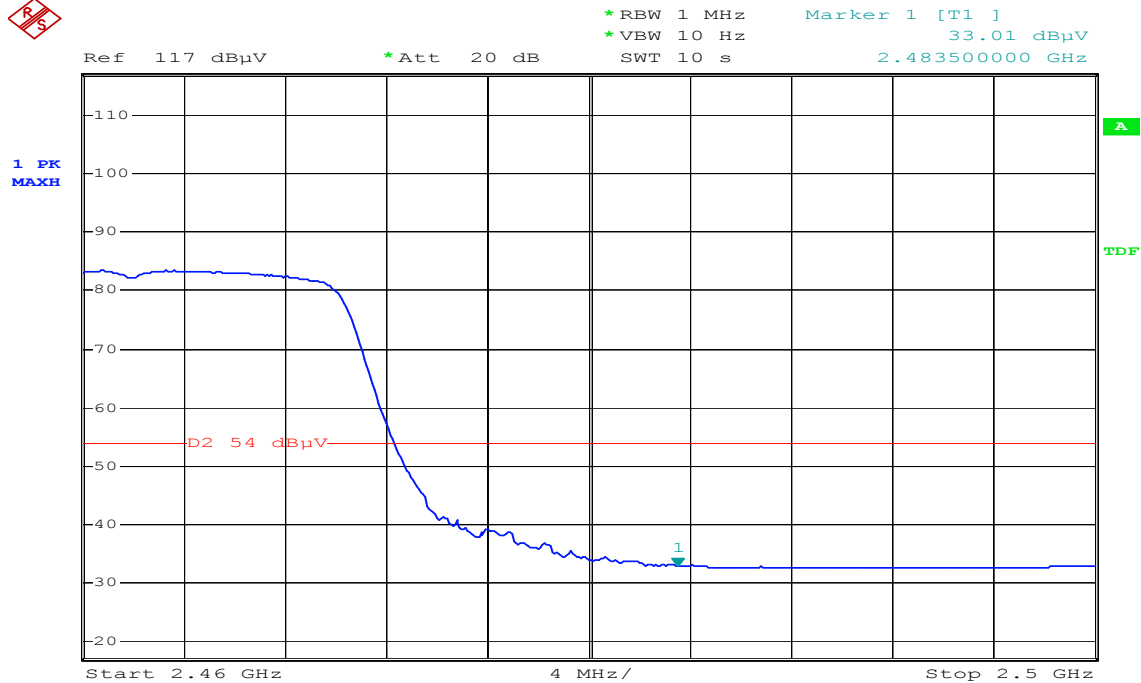
Polarity: Horizontal



Date: 21.OCT.2008 19:17:17

Detector mode: Average

Polarity: Horizontal



Date: 21.OCT.2008 19:17:58



## 7.5 PEAK POWER SPECTRAL DENSITY

### LIMIT

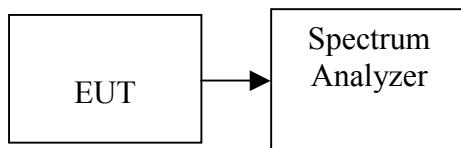
1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2009

*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=auto.
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	-9.18	8.00	PASS
Mid	2437	-8.96		PASS
High	2462	-8.32		PASS

**IEEE 802.11g**

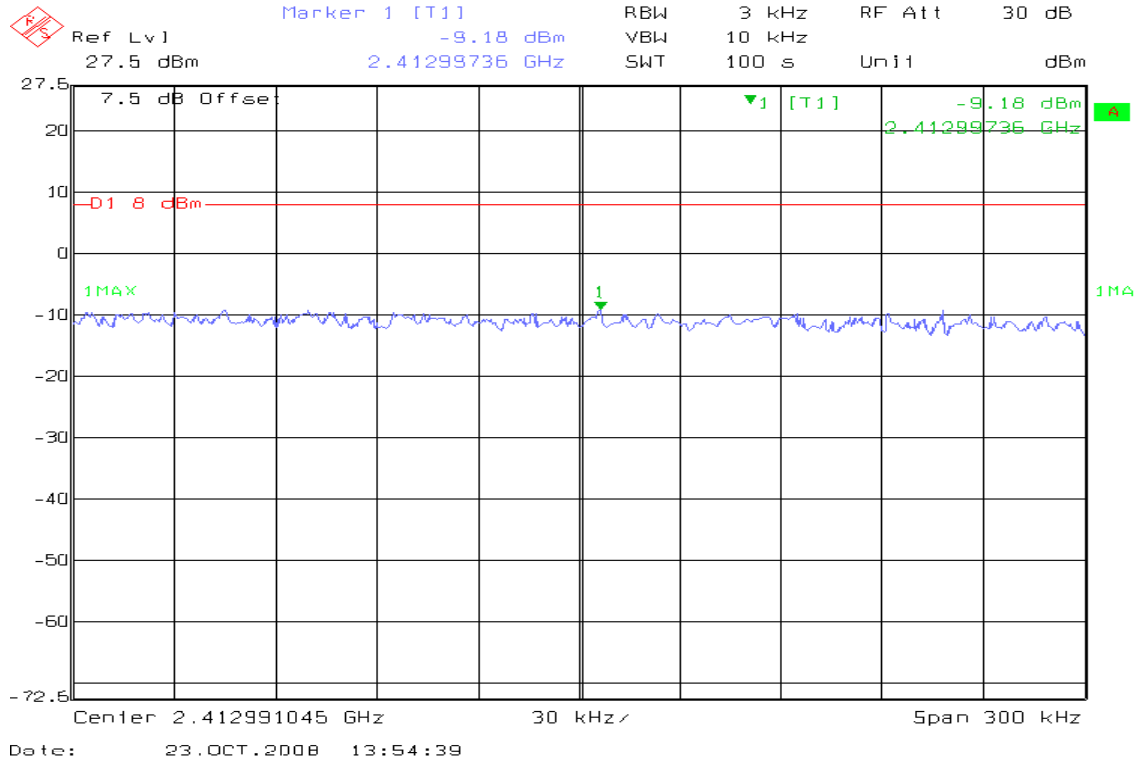
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-16.51	8.00	PASS
Mid	2437	-17.46		PASS
High	2462	-17.09		PASS



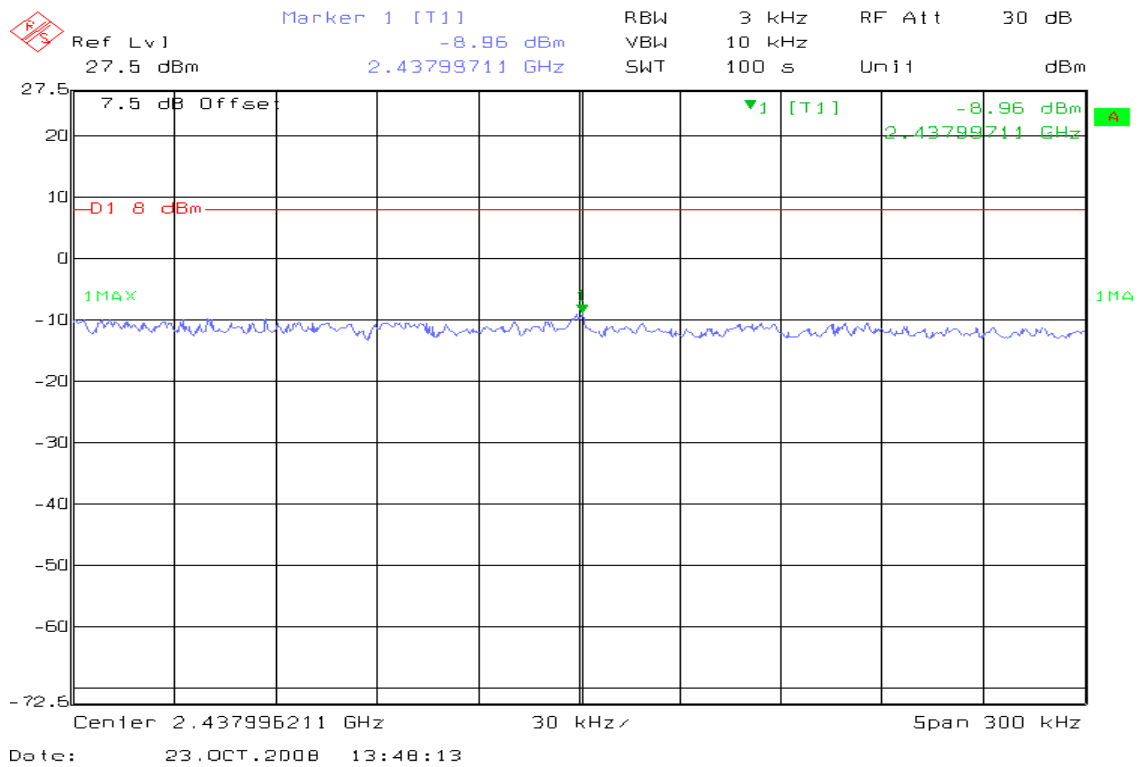
### Test Plot

### IEEE 802.11b mode

### PPSD (CH Low)

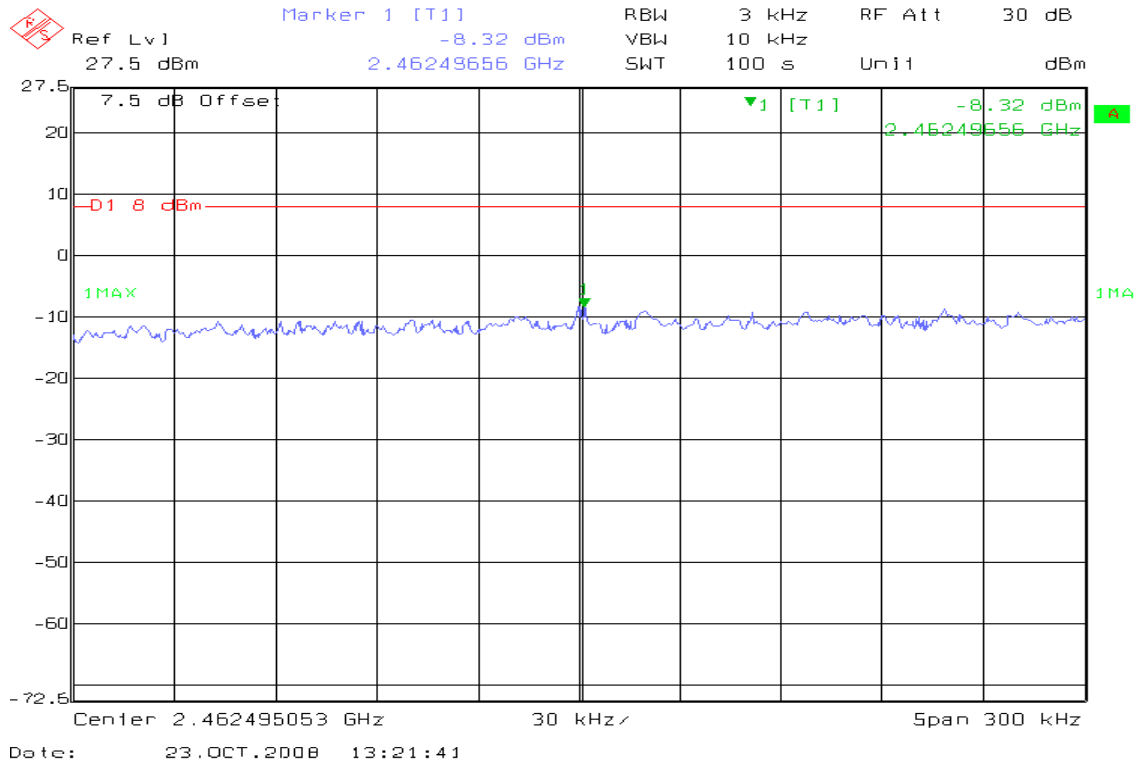


### PPSD (CH Mid)



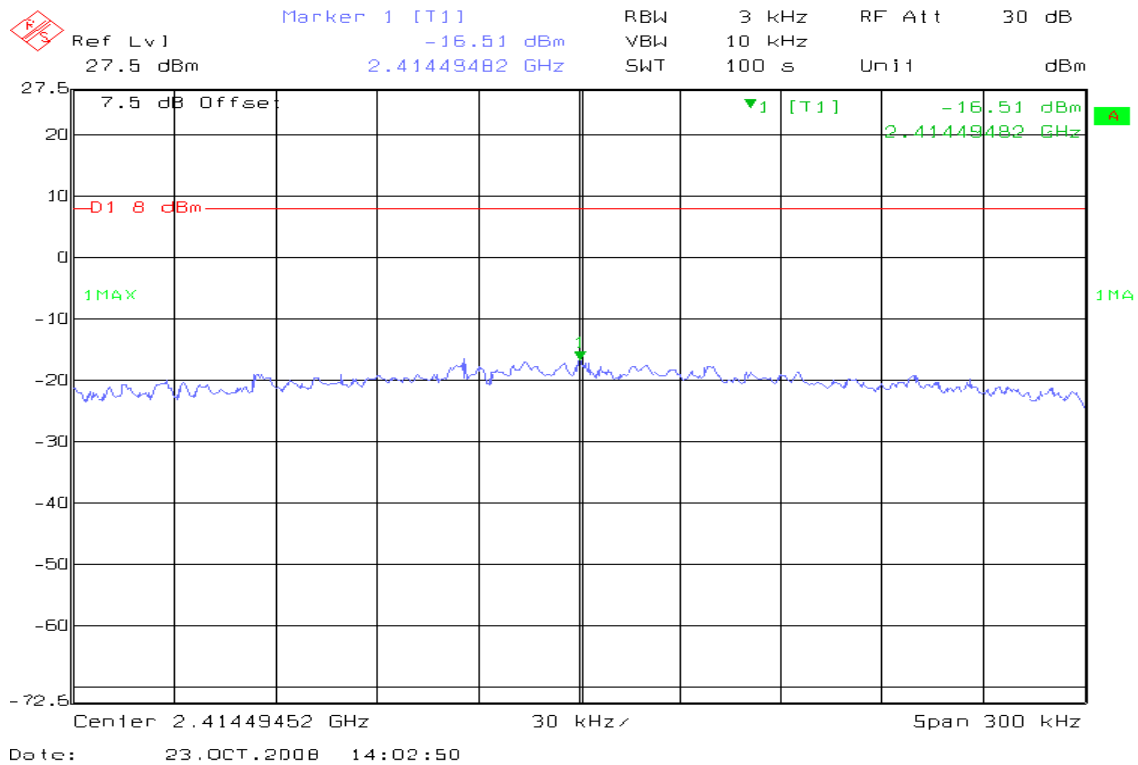


### PPSD (CH High)



### IEEE 802.11g mode

### PPSD (CH Low)







## 7.6 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>	WIRELESS 11g ROUTER
<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 type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	IEEE 802.11b mode: 18.84 dBm (76.56 mW) IEEE 802.11g mode: 15.88 dBm (38.73 mW)
<b>Antenna gain (Max)</b>	2 dBi (Numeric gain: 1.58)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

#### **Remark:**

- The maximum output power is 18.84dBm (76.56mW) at 2462MHz (with 1.58 numeric antenna gain.)*
- DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
- For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.*

### TEST RESULTS

*No non-compliance noted.*

### MPE EVALUATION

*No non-compliance noted.*





**Calculation**

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

Where  $E =$  Field strength in Volts / meter

$P =$  Power in Watts

$G =$  Numeric antenna gain

$d =$  Distance in meters

$S =$  Power density in milliwatts / square centimeter

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

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

Changing to units of mW and cm, using:

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

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

Yields

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

Where  $d =$  Distance in cm

$P =$  Power in mW

$G =$  Numeric antenna gain

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

**Maximum Permissible Exposure**

EUT output power = 76.56mW

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 / cm<sup>2</sup>

→ Power density = 0.024072 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.)



## 7.7 SPURIOUS EMISSIONS

### 7.7.1 Conducted Measurement

#### LIMIT

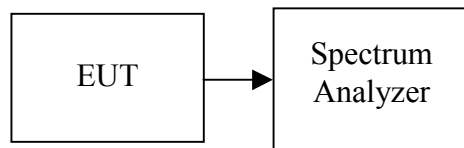
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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	10/14/2009

*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 26.5GHz range with the transmitter set to the lowest, middle, and highest channels.

#### TEST RESULTS

*No non-compliance noted*

#### TEST DATA

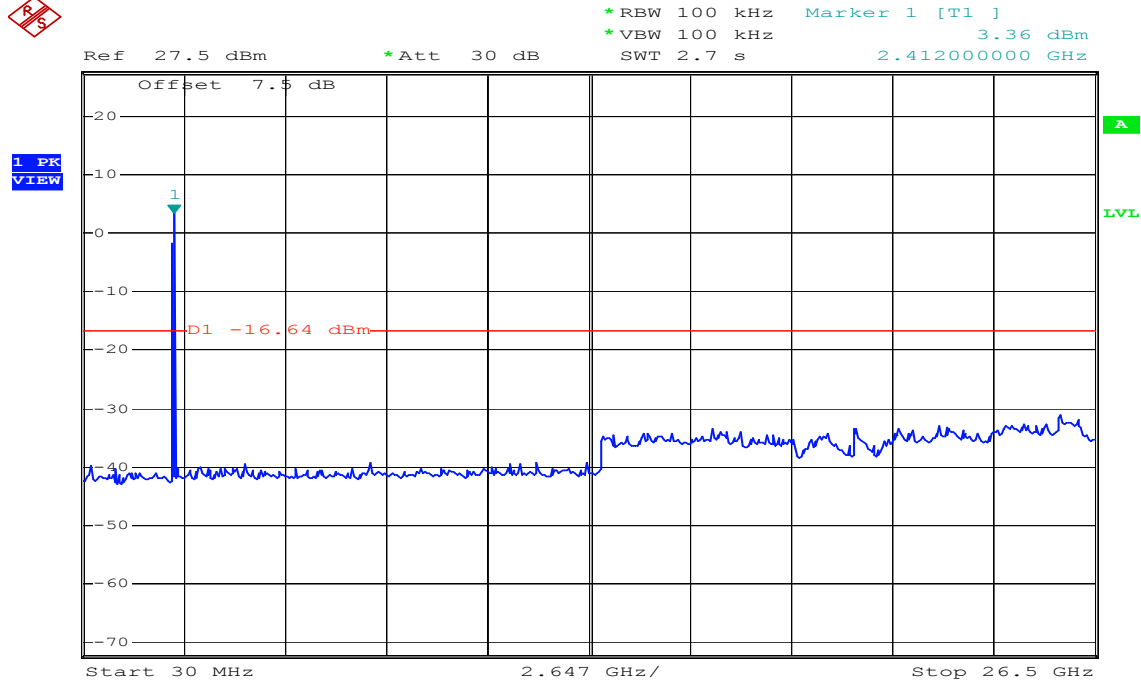
Refer to attach spectrum analyzer data chart.



**Test Plot**

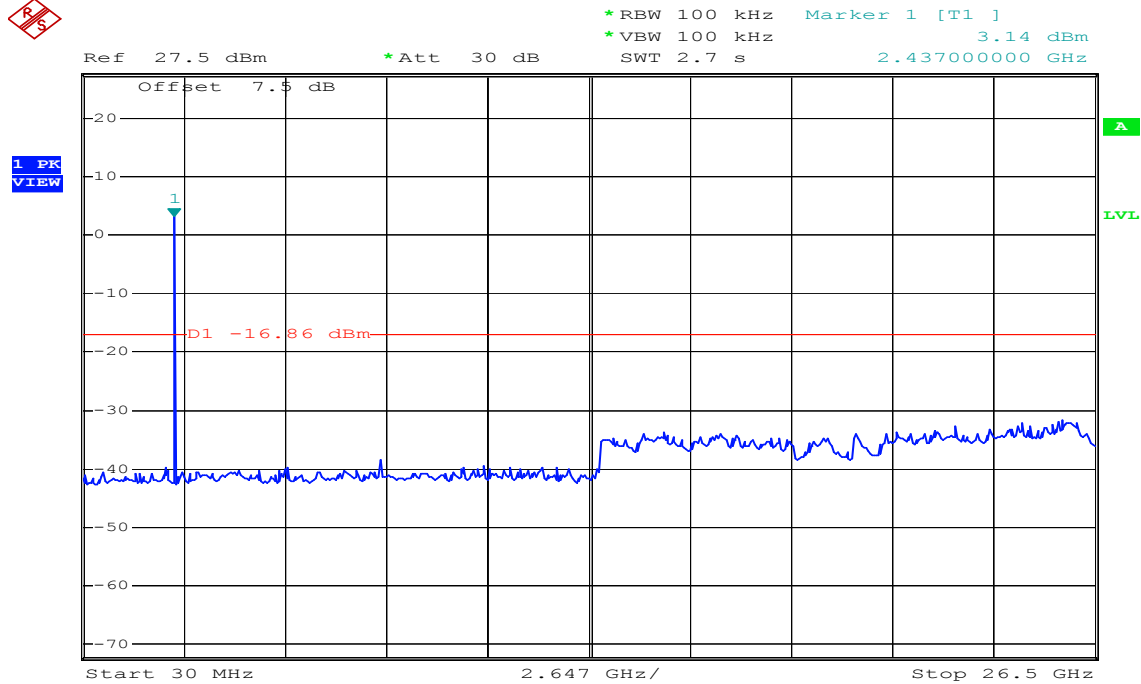
**IEEE 802.11b mode**

**CH Low**



Date: 28.OCT.2008 09:26:08

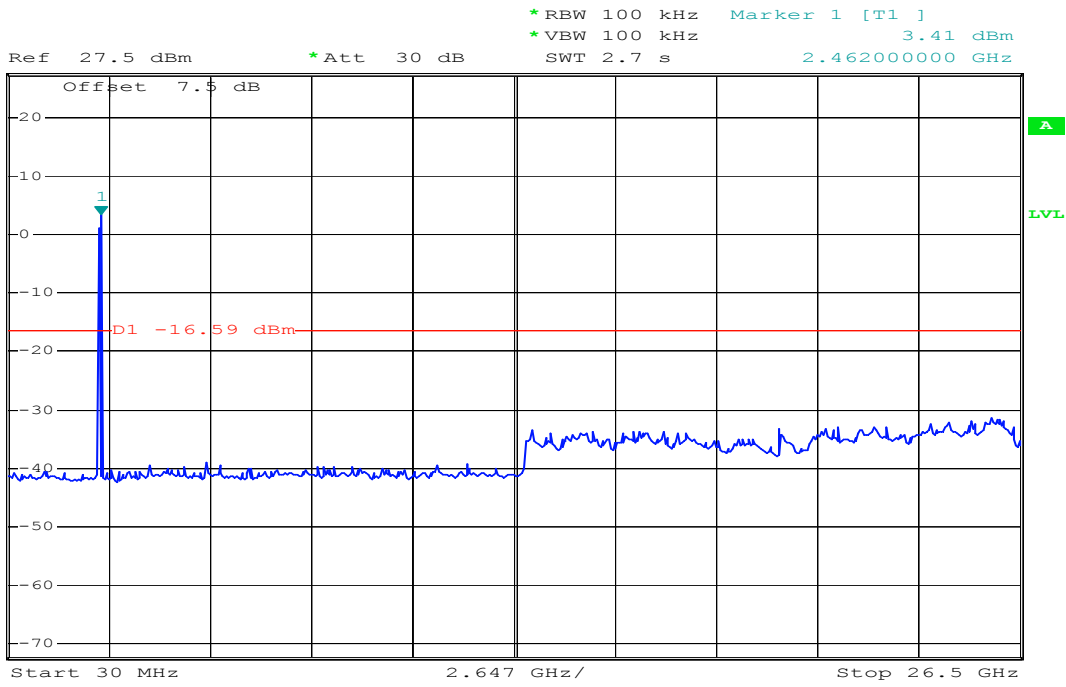
**CH Mid**



Date: 28.OCT.2008 09:28:05



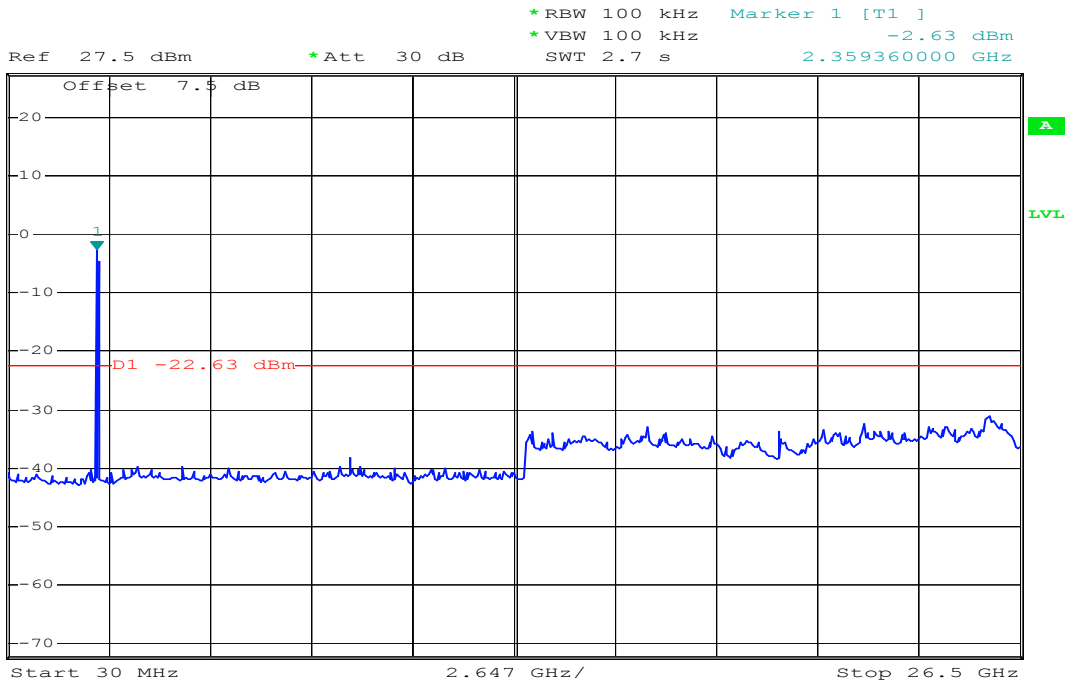
### CH High



Date: 28.OCT.2008 09:30:38

### IEEE 802.11g mode

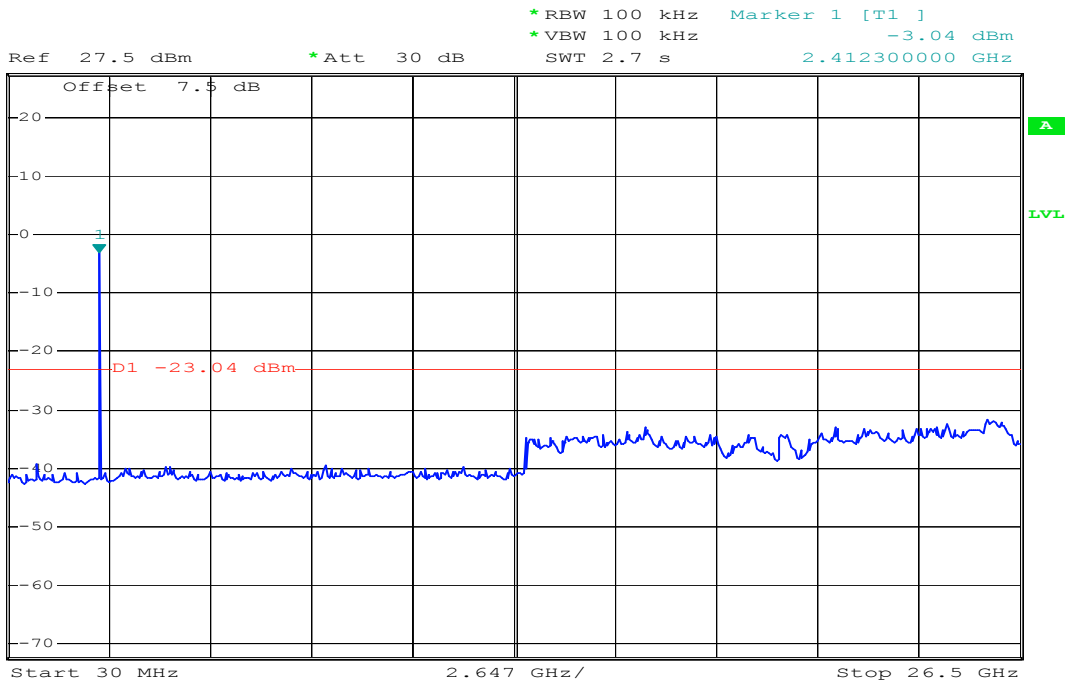
### CH Low



Date: 28.OCT.2008 09:39:10

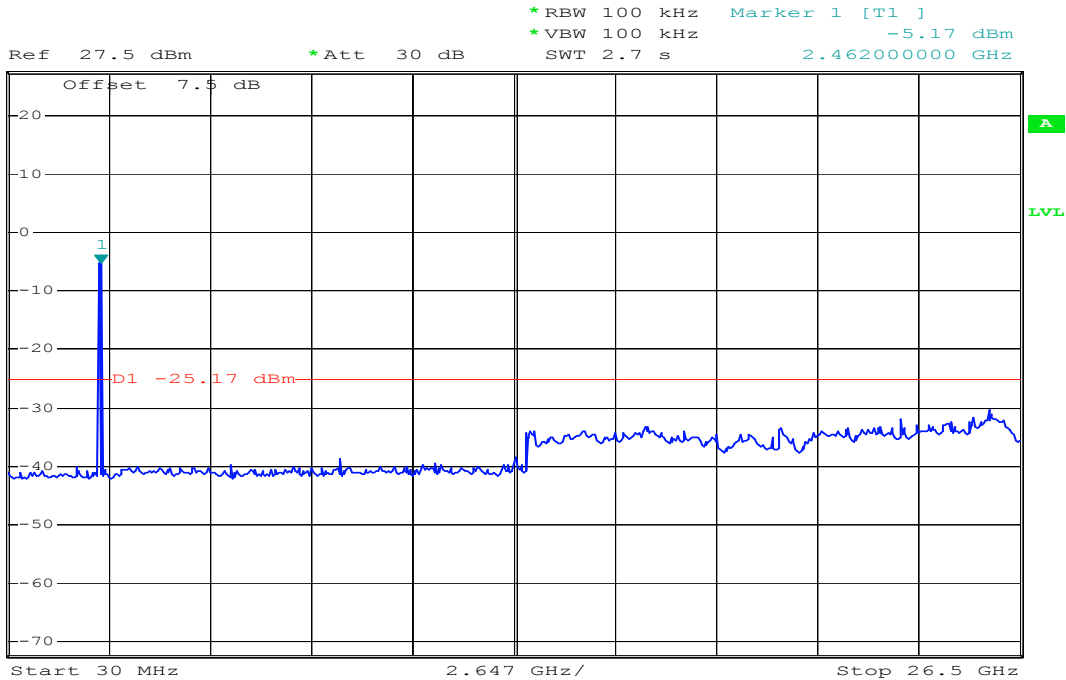


### CH Mid



Date: 28.OCT.2008 09:36:37

### CH High



Date: 28.OCT.2008 09:34:30



### 7.7.2 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 ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54



**MEASUREMENT EQUIPMENT USED**

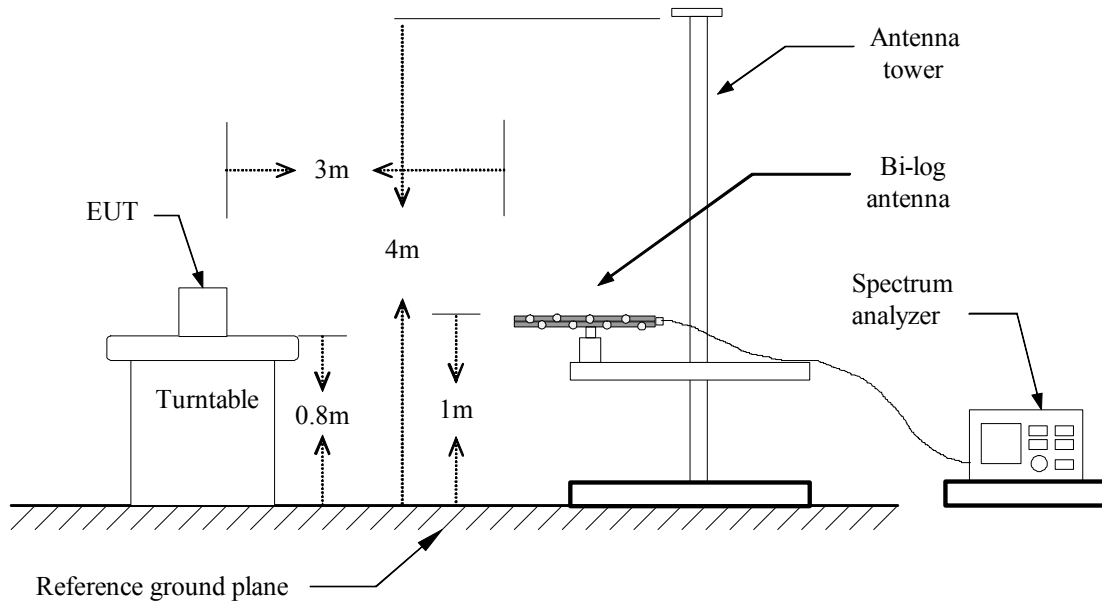
3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	ADVANTEST	R3271A	85060321	10/22/2009
Bilog Antenna	SCHWAZBECK	VULB9160	3084	N.C.R.
EMI Test Receiver	R&S	ESVS10	834468/006	04/17/2009
Pre-Amplifier	HP	8447D	2944A06530	12/09/2008
Antenna Tower	HD	MA240	240/443	N.C.R.
Controller	HD	HD100	100/529	N.C.R.
Turn Table	HD	HD320	N/A	N.C.R.
Site NSA	SIDT EUROPE	9x6x6	N/A	05/16/2009
Test S/W	CCS-3A1RE			

1166 Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/16/2009
Spectrum Analyzer	R&S	FSEB	825829/011	10/11/2009
Pre-Amplifier	Anritsu	MH648A	M89145	07/25/2009
Pre-Amplifier	Agilent	8449B	3008A01738	03/28/2009
Bilog Antenna	FRANKONIA	BTA-M	030003M	N.C.R.
Horn Antenna	EMCO	3115	00022257	12/16/2008
Antenna Tower	HD	AS620E	N/A	N.C.R.
Controller	HD	HD100	N/A	N.C.R.
Turn Table	HD	DT-K312	N/A	N.C.R.
Test S/W	LabVIEW 6.1 (Wugu Chamber EMI Teat V1_4.5.3)			

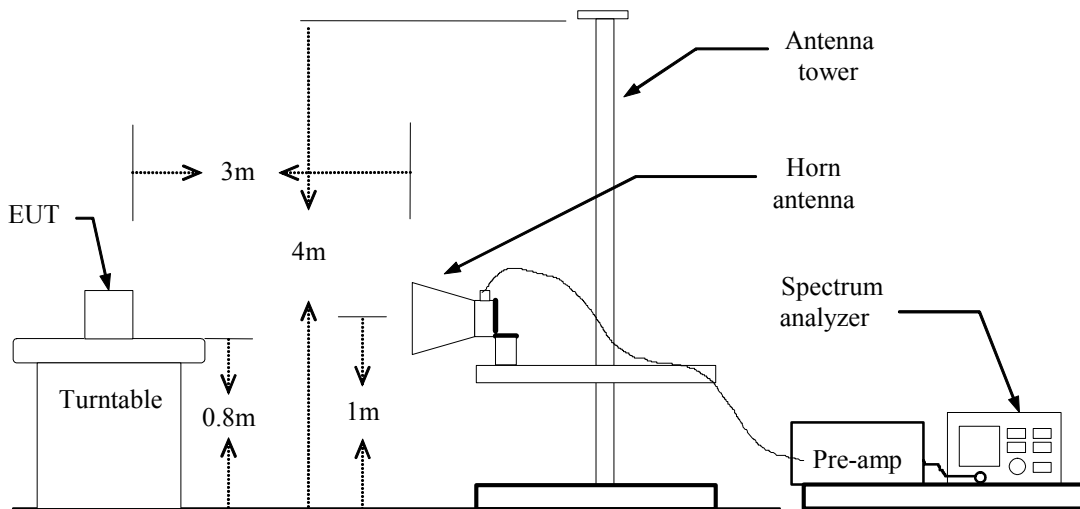
**Remark:** Each piece of equipment is scheduled for calibration once a year.

## 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**

*No non-compliance noted*

**TEST DATA**

**Below 1GHz**

**Operation Mode:** Normal Link

**Test Date:** October 18, 2008

**Temperature:** 26°C

**Tested by:** Stan Lin

**Humidity:** 60% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
34.1571	V	51.75	-15.27	36.48	40.00	-3.52	Peak
57.7143	V	47.25	-14.80	32.45	40.00	-7.55	Peak
92.3571	V	51.46	-17.43	34.03	43.50	-9.47	Peak
145.0143	V	52.72	-12.87	39.85	43.50	-3.65	Peak
183.8143	V	50.30	-14.17	36.13	43.50	-7.37	Peak
276.6571	V	45.97	-12.40	33.57	46.00	-12.43	Peak
416.6143	V	40.00	-9.36	30.64	46.00	-15.36	Peak
34.1571	H	44.00	-15.27	28.73	40.00	-11.27	Peak
92.3571	H	50.21	-17.43	32.78	43.50	-10.72	Peak
145.0143	H	53.72	-12.87	40.85	43.50	-2.65	Peak
183.8143	H	51.05	-14.17	36.88	43.50	-6.62	Peak
276.6571	H	54.72	-12.40	42.32	46.00	-3.68	Peak
416.6143	H	44.50	-9.36	35.14	46.00	-10.86	Peak

**Remark:**

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

**Above 1 GHz****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** October 25, 2008**Temperature:** 22°C**Tested by:** Alonso Lu**Humidity:** 51 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1732.00	V	49.47	---	-7.06	42.41	---	74.00	54.00	-11.59	Peak
2576.00	V	51.63	---	-4.05	47.58	---	74.00	54.00	-6.42	Peak
2764.00	V	49.64	---	-3.19	46.45	---	74.00	54.00	-7.55	Peak
4820.00	V	43.81	---	1.87	45.68	---	74.00	54.00	-8.32	Peak
6730.00	V	41.36	---	5.02	46.38	---	74.00	54.00	-7.62	Peak
7830.00	V	41.89	---	7.06	48.95	---	74.00	54.00	-5.05	Peak
1656.00	H	48.01	---	-7.50	40.51	---	74.00	54.00	-13.49	Peak
1964.00	H	47.87	---	-5.74	42.13	---	74.00	54.00	-11.87	Peak
2760.00	H	47.83	---	-3.20	44.63	---	74.00	54.00	-9.37	Peak
4820.00	H	44.24	---	1.87	46.11	---	74.00	54.00	-7.89	Peak
7310.00	H	42.24	---	6.62	48.86	---	74.00	54.00	-5.14	Peak
N/A										

**Remark:**

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



Operation Mode: TX / IEEE 802.11b / CH Mid

Test Date: October 25, 2008

Temperature: 25°C

Tested by: Alonso Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2396.00	V	55.18	---	-4.64	50.55	---	74.00	54.00	-3.45	Peak
2576.00	V	51.80	---	-4.05	47.75	---	74.00	54.00	-6.25	Peak
2644.00	V	51.88	---	-3.74	48.14	---	74.00	54.00	-5.86	Peak
2760.00	V	49.98	---	-3.20	46.78	---	74.00	54.00	-7.22	Peak
4870.00	V	44.08	---	2.02	46.10	---	74.00	54.00	-7.90	Peak
5580.00	V	42.50	---	3.51	46.01	---	74.00	54.00	-7.99	Peak
2764.00	H	47.98	---	-3.19	44.79	---	74.00	54.00	-9.21	Peak
4870.00	H	43.45	---	2.02	45.47	---	74.00	54.00	-8.53	Peak
5400.00	H	41.76	---	3.18	44.93	---	74.00	54.00	-9.07	Peak
7510.00	H	41.37	---	7.13	48.50	---	74.00	54.00	-5.50	Peak
N/A										

**Remark:**

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



Operation Mode: TX / IEEE 802.11b / CH High

Test Date: October 25, 2008

Temperature: 25°C

Tested by: Alonso Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2288.00	V	50.59	---	-4.88	45.72	---	74.00	54.00	-8.28	Peak
2396.00	V	52.29	---	-4.64	47.65	---	74.00	54.00	-6.35	Peak
4920.00	V	48.52	---	2.16	50.69	---	74.00	54.00	-3.31	Peak
N/A										
2660.00	H	48.18	---	-3.66	44.52	---	74.00	54.00	-9.48	Peak
2980.00	H	47.52	---	-2.19	45.33	---	74.00	54.00	-8.67	Peak
4730.00	H	42.05	---	1.61	43.66	---	74.00	54.00	-10.34	Peak
4920.00	H	45.49	---	2.16	47.65	---	74.00	54.00	-6.35	Peak
N/A										

**Remark:**

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



Operation Mode: TX / IEEE 802.11g / CH Low

Test Date: October 25, 2008

Temperature: 25°C

Tested by: Alonso Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1656.00	V	48.30	---	-7.50	40.81	---	74.00	54.00	-13.19	Peak
2524.00	V	53.78	---	-4.29	49.49	---	74.00	54.00	-4.51	Peak
2580.00	V	52.52	---	-4.03	48.49	---	74.00	54.00	-5.51	Peak
2760.00	V	50.98	---	-3.20	47.78	---	74.00	54.00	-6.22	Peak
3210.00	V	43.93	---	-1.48	42.45	---	74.00	54.00	-11.55	Peak
4780.00	V	42.24	---	1.75	44.00	---	74.00	54.00	-10.00	Peak
2724.00	H	48.49	---	-3.37	45.12	---	74.00	54.00	-8.88	Peak
3240.00	H	45.07	---	-1.39	43.68	---	74.00	54.00	-10.32	Peak
N/A										

**Remark:**

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



Operation Mode: TX / IEEE 802.11g / CH Mid

Test Date: October 25, 2008

Temperature: 25°C

Tested by: Alonso Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1732.00	V	48.15	---	-7.06	41.08	---	74.00	54.00	-12.92	Peak
2644.00	V	52.26	---	-3.74	48.52	---	74.00	54.00	-5.48	Peak
2764.00	V	50.30	---	-3.19	47.11	---	74.00	54.00	-6.89	Peak
3250.00	V	44.69	---	-1.37	43.32	---	74.00	54.00	-10.68	Peak
7210.00	V	41.10	---	6.35	47.45	---	74.00	54.00	-6.55	Peak
N/A										
2764.00	H	48.16	---	-3.19	44.97	---	74.00	54.00	-9.03	Peak
3310.00	H	42.76	---	-1.19	41.57	---	74.00	54.00	-12.43	Peak
3850.00	H	42.58	---	0.67	43.25	---	74.00	54.00	-10.75	Peak
N/A										

**Remark:**

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



Operation Mode: TX / IEEE 802.11g / CH High

Test Date: October 25, 2008

Temperature: 25°C

Tested by: Alonso Lu

Humidity: 50 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2288.00	V	50.71	---	-4.88	45.83	---	74.00	54.00	-8.17	Peak
2396.00	V	54.30	---	-4.64	49.66	---	74.00	54.00	-4.34	Peak
2576.00	V	52.18	---	-4.05	48.13	---	74.00	54.00	-5.87	Peak
2644.00	V	51.72	---	-3.74	47.99	---	74.00	54.00	-6.01	Peak
4880.00	V	42.22	---	2.05	44.27	---	74.00	54.00	-9.73	Peak
7110.00	V	40.81	---	6.08	46.90	---	74.00	54.00	-7.10	Peak
1576.00	H	48.14	---	-7.96	40.18	---	74.00	54.00	-13.82	Peak
4200.00	H	42.82	---	1.11	43.93	---	74.00	54.00	-10.07	Peak
11740.00	H	40.53	---	10.68	51.21	---	74.00	54.00	-2.79	Peak
N/A										

**Remark:**

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





## 7.8 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 (LINE and NEUTRAL) 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	04/08/2009
LISN	R&S	ENV216	100074	12/03/2008
LISN	FCC	FCC-LISN-50/250-16-2-07	06013	10/12/2009
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:** October 8, 2008  
**Temperature:** 25°C                                      **Tested by:** Alonso Lu  
**Humidity:** 57% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
20.5992	38.87	32.17	10.43	49.30	42.60	60.00	50.00	-10.70	-7.40	L1
21.7149	29.61	23.81	10.49	40.10	34.30	60.00	50.00	-19.90	-15.70	L1
0.1539	39.79	24.89	9.71	49.50	34.60	65.79	55.79	-16.29	-21.19	L1
0.2008	33.10	20.60	9.70	42.80	30.30	63.58	53.58	-20.78	-23.28	L1
0.2320	28.40	14.70	9.70	38.10	24.40	62.38	52.38	-24.28	-27.98	L1
23.1266	39.94	36.04	10.56	50.50	46.60	60.00	50.00	-9.50	-3.40	L1
7.4859	23.68	21.78	9.92	33.60	31.70	60.00	50.00	-26.40	-18.30	L1
21.1110	38.74	33.04	10.46	49.20	43.50	60.00	50.00	-10.80	-6.50	L2
23.1265	39.94	35.64	10.56	50.50	46.20	60.00	50.00	-9.50	-3.80	L2
7.4858	23.58	21.38	9.92	33.50	31.30	60.00	50.00	-26.50	-18.70	L2
0.1577	35.09	17.29	9.71	44.80	27.00	65.58	55.58	-20.78	-28.58	L2
0.1890	33.00	16.70	9.70	42.70	26.40	64.08	54.08	-21.38	-27.68	L2
0.2008	32.90	20.50	9.70	42.60	30.20	63.57	53.58	-20.97	-23.38	L2
0.2594	23.00	13.20	9.70	32.70	22.90	61.45	51.45	-28.75	-28.55	L2

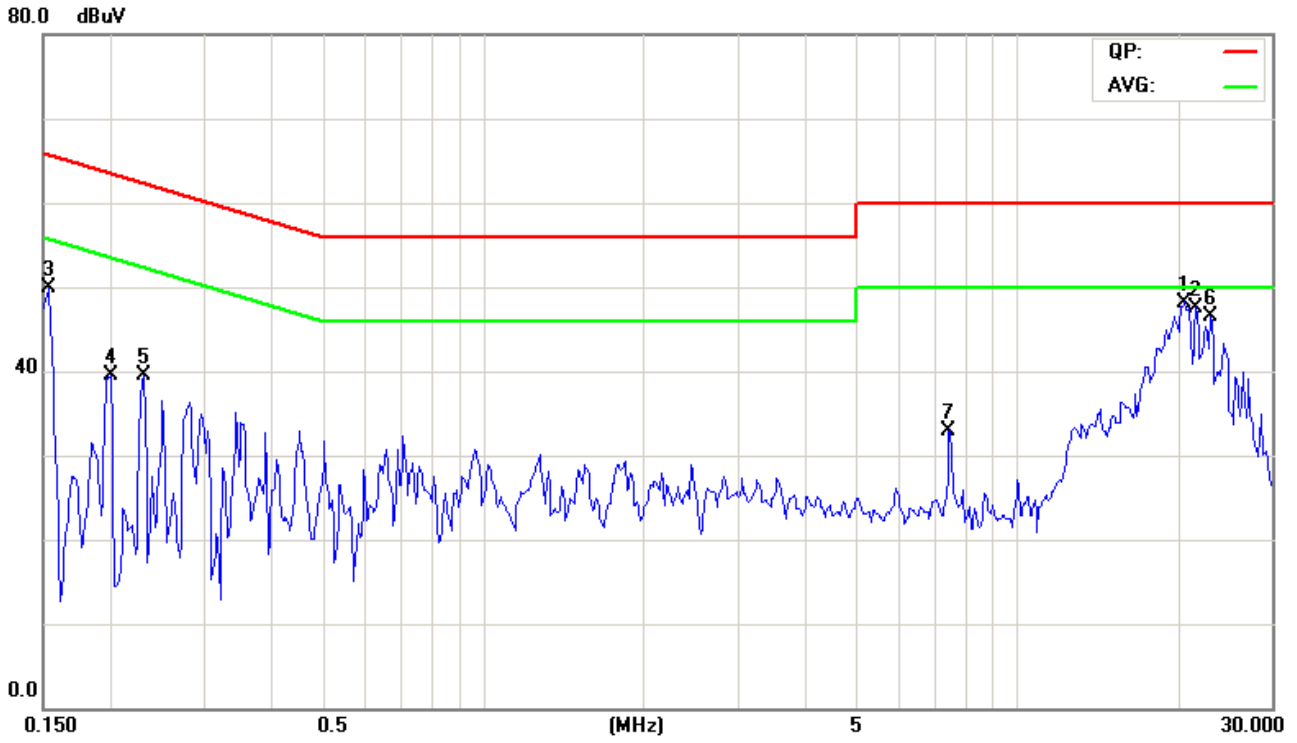
### **Remark:**

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)**

